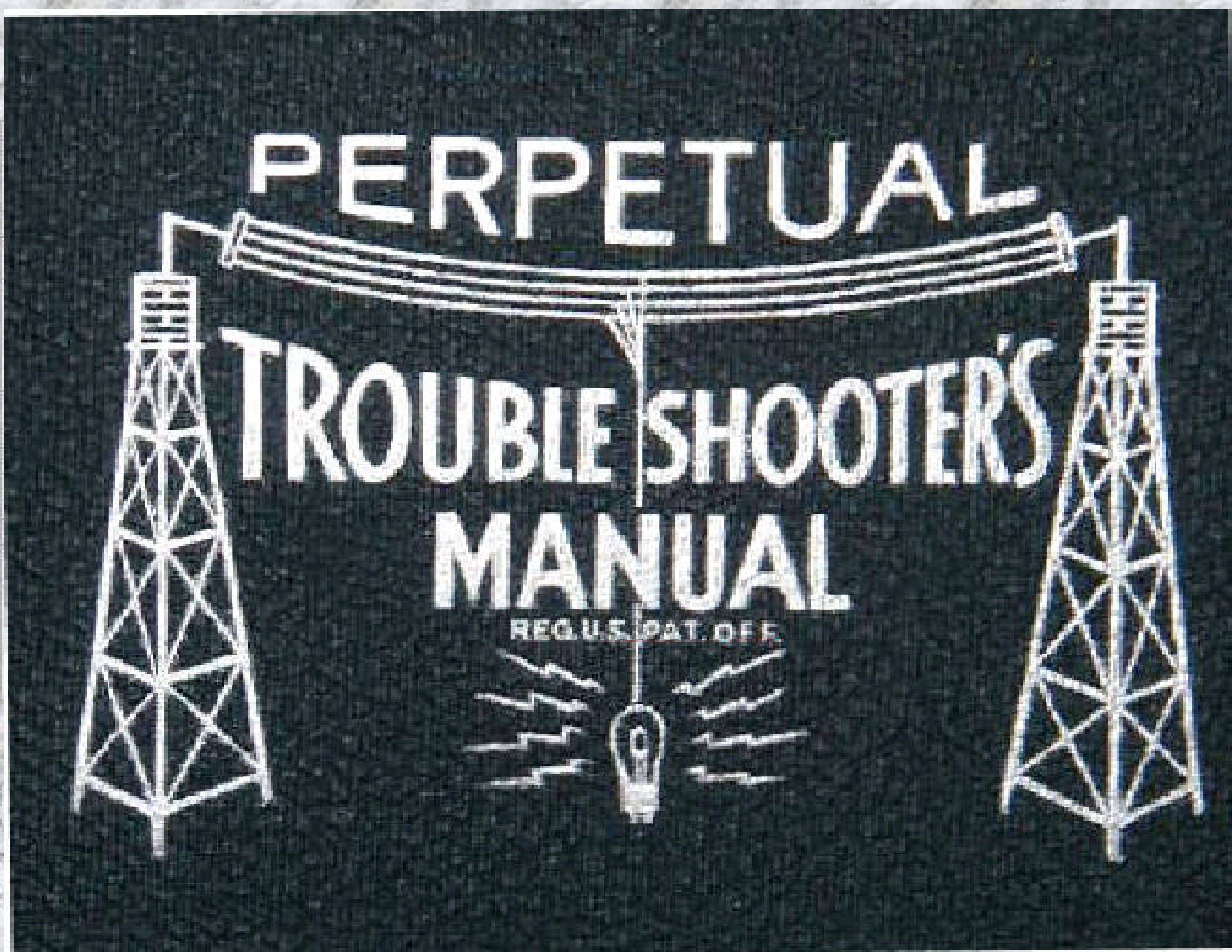
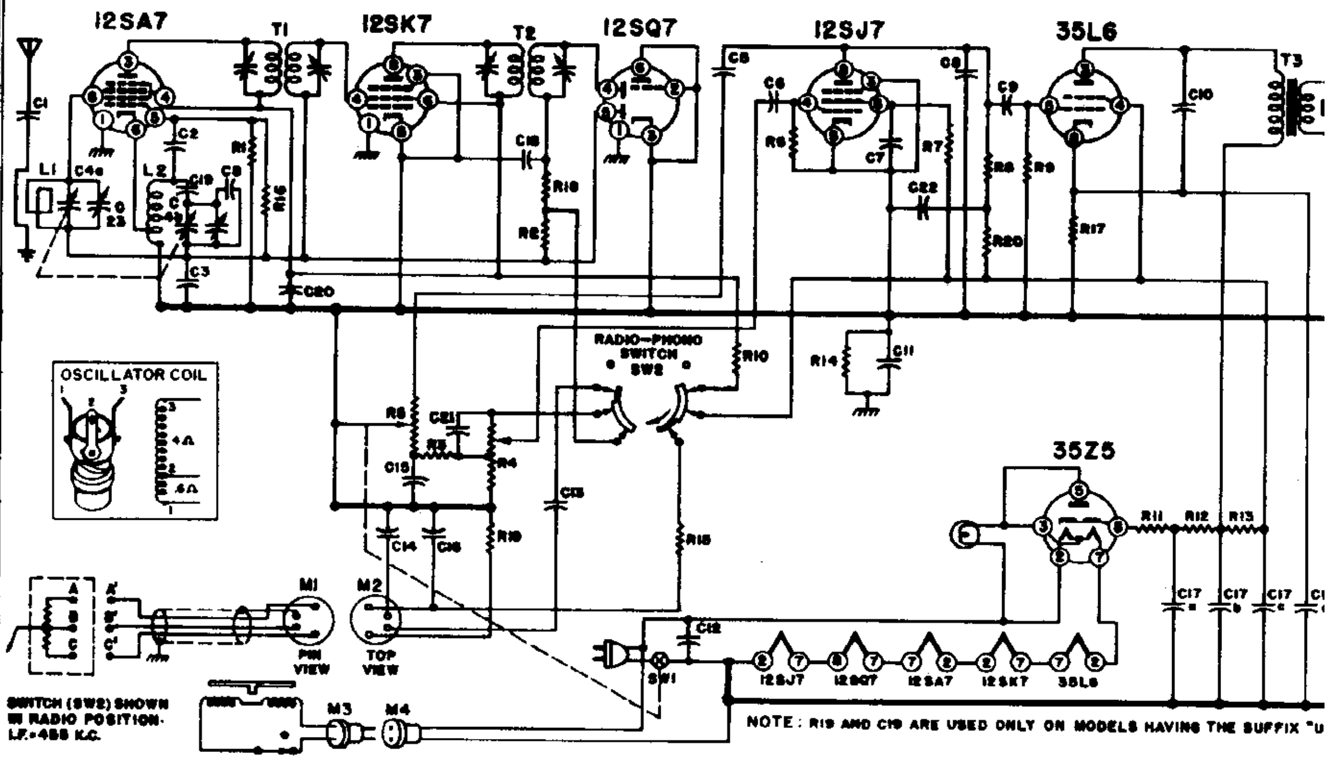
RIDER'S
VOLUME - XVII



COVERING 1947

ADMIRAL CORPORATION

MODELS 7C60,7C60[illegible]
Chassis 6B1,Earl[illegible]
Late



REPLACEMENT PARTS

RESISTORS

Symbol	RESISTORS	Part No.
R1	22,000 Ohms, ½ Watt	60B 8-223
R2	1 Megohm, ½ Watt	60B 8-105
R3	27,000 Ohms, ½ Watt	60B 8-273
R4	1 Megohm Volume Control (Tapped at 500,000 ohms)	75B 2-6
R5	2 Megohm Tone Control and Switch SW1	75B 1-12
R6	4.7 Megohms, ½ Watt	60B 8-475
R7	1.8 Megohms, ½ Watt	60B 8-185
R8	100,000 Ohms, ½ Watt	60B 8-104
R9	470,000 Ohms, ½ Watt	60B 8-474
R10	100 Ohms, ½ Watt	60B 8-101
R11	33 Ohms, 1 Watt	60B 28-3
R12	220 Ohms, 1 Watt	60B 28-7
R13	1,000 Ohms, 1 Watt	60B 28-2
R14	150,000 Ohms, ½ Watt	60B 8-154
R15	22,000 Ohms, ½ Watt	60B 8-223
R16	10 Megohms, ½ Watt	60B 8-106
R17	150 Ohms, 1 Watt	60B 14-151
R18	100,000 Ohms, ½ Watt	60B 8-104
R19	33,000 Ohms, ½ Watt (Used only on "UL" models)	60B 8-333
R20	47,000 Ohms, ½ Watt	60B 8-473

CONDENSERS

Symbol	CONDENSERS	Part No.
C1	.005 mfd., 600 Volts, Paper (Used only in early production)	64B 1-12
C2	50 mmfd. ±20%, Ceramic	65B 6-4
C3	.1 mfd., 200 Volts, Paper	64B 1-30
C4a	Gang, 0 to 420 mmfd.	A1341
C4b	Gang, 0 to 162 mmfd.	A1341
	(Spotwelded to drum)	
C5	.002 mfd., 600 Volts, Paper	64B 1-14
C6	.01 mfd., 400 Volts, Paper	64B 1-25
C7	.05 mfd., 400 Volts, Paper	64B 1-22
C8	15 mmfd. ±20%, Ceramic	65B 6-18
C9	.01 mfd., 400 Volts, Paper	64B 1-25
C10	.03 mfd., 400 Volts, Paper	64B 1-23
C11	.18 mfd., 200 Volts, Paper	64A 2-2
C12	.05 mfd., 400 Volts, Paper	64B 1-22
C13	.001 mfd., 600 Volts, Paper	64B 1-15
C14	.05 mfd., 400 Volts, Paper	64B 1-22
C15	.01 mfd., 400 Volts, Paper	64B 1-25
C16	.1 mfd., 200 Volts, Paper	64B 1-30
C17a	30 mfd., 150 Volts, Elect.	67A 14-1
C17b	30 mfd., 150 Volts, Elect.	67A 14-1
C17c	20 mfd., 150 Volts, Elect.	67A 14-1
C17d	20 mfd., 25 Volts, Elect.	67A 14-1
C18	250 mmfd. ±20%, Ceramic	65B 6-5
C19	.02 mfd., 400 Volts, Paper (Used only on "UL" models)	64B 1-24
C20	.05 mfd., 400 Volts, Paper	64B 1-22
C21	500 mmfd. ±20%, Ceramic	65B 6-6
C22	.1 mfd., 200 Volts, Paper	64B 1-30
C23	3-30 mmfd., Trimmer (Used only in later production)	Part of L1

COILS, TRANSFORMERS, Etc.

Symbol	Description	Part No.
L1	Antenna, Loop	69B 13
L2	Coil, Oscillator	69A 14
T1	Transformer, 1st I.F.	72B 3
T2	Transformer, 2nd I.F.	72B 4
T3	Transformer, Output	98A 33-10
	Speaker (6") & Output Transformer	78B 31-2
SW1	Switch, On-Off	Part of R5
SW2	Switch, Radio-Phono	77A 16-1

CABINET PARTS

Description	Part No.
Arm, Cabinet Lid Stay	
for 7C60W, 7C60M	98A 33-6
for 7C60B	98A 33-8
*Cabinet	
Walnut (7C60W)	35E 69-1
Mahogany (7C60M)	35E 69-2
Blond (7C60B)	35E 69-3
Dial Escutcheon, Plastic	23A 9-2
Dial Scale, Glass	21B 48-1
Grille Cloth	
for 7C60W	98A 33[illegible]
for 7C60M	98A 33[illegible]
for 7C60B	98A 33[illegible]
Grille, Metal (for 7C60M, 7C60B)	98A 33[illegible]
Hinge, Cabinet Lid	
for 7C60W, 7C60M	98A 33[illegible]
for 7C60B	98A 33[illegible]
Knob	33A 19[illegible]
Lid, Cabinet	
for 7C60W	98A 33[illegible]
for 7C60M	98A 33[illegible]
for 7C60B	98A 33[illegible]
Washer, Felt (under knobs)	5A 4-4[illegible]

PHONOGRAPH PARTS

Note: See record changer manual for compl[illegible] parts list.

Symbol / Description	Part No.
M1 Plug, Pickup	88A 8-[illegible]
M2 Socket, Phono	88A 8-[illegible]
M3 Plug, Motor	88A 8-[illegible]
M4 Phono-Motor Socket & Leads (Female connector)	89A 6-[illegible]
Cartridge and Needle, Pickup	A 1372
Centerpost	G400B13[illegible]
Drive Disc Assembly	G 400A [illegible]
Idler Wheel (407B3 Motor)	G 400A [illegible]
Idler Wheel (407B1 Motor)	G 400A [illegible]
Motor, 60 Cycle 115 Volt A.C.	407B 3-2[illegible]
Pickup Cable and Plug	A 1322

MISCELLANEOUS

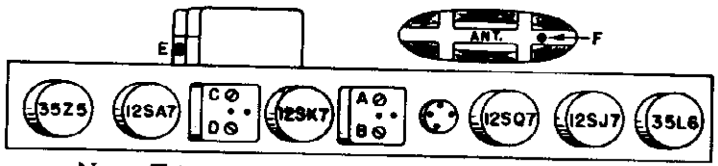
Description	Part No.
Background, Dial	22B 16[illegible]
Cord, Dial (44")	50A 1-[illegible]
Grommet, Rubber	12A 1-[illegible]
Pilot Light Socket and Leads	82A 2-[illegible]
Pointer	25A 27[illegible]
Pulley (Fibre) and Bracket Assembly	A 1014[illegible]
Shaft, Tuning	28A 11[illegible]
Spring, Dial Drum Cord Tension	19B 1-[illegible]

* Supplied only if old cabinet cannot be repair[illegible] When ordering, describe condition of old cabi[illegible] in detail.

MODELS 7C60,7C60UL

ADMIRAL CORPORATION

TUBE and TRIMMER LOCATION



Note: Trimmer "F" not used in early production.

TOP VIEW

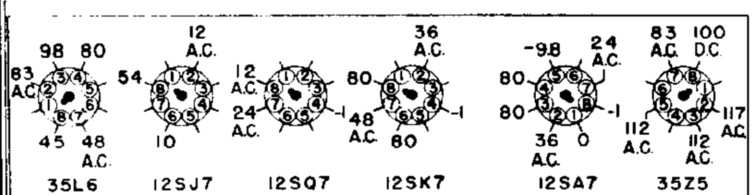
ALIGNMENT PROCEDURE

- Check pointer position. With tuning gang closed, the left edge of the pointer clip should be over the $\frac{1}{16}$" hole at the extreme left end of the dial background (see stringing diagram).
- Connect Output Meter across Voice Coil.
- Turn Receiver Volume Control—full on.
- Use lowest Output setting of Signal Generator capable of producing adequate Output Meter indication and then proceed in the following sequence.
- Repeat adjustments to insure good results.

Connect Signal Generator to—	Dummy Antenna Between Radio and Generator	Set Generator Frequency to—	Set Receiver Dial Frequency to—	Adjust Following Trimmers	Type of Adjustment
Tuning Condenser Antenna Stator	250 mmfd. Condenser	455 K.C.	High frequency end of Dial	A-B—2nd I. F. C-D—1st I. F.	Adjust to maximum Output
Tuning Condenser Antenna Stator	250 mmfd. Condenser	1630 K.C.	High frequency end of Dial	E—Osc.	Adjust to maximum Output
Loop radiator (or place lead from generator close to loop of set to obtain adequate signal)	No actual connection between set and generator.	1400 K.C.	Tune in generator signal	F—Ant. (See Note)	Adjust to maximum Output

Note: Antenna Trimmer "F" must be aligned after chassis and loop are mounted in cabinet. Trimmer "F" was not used in early production.

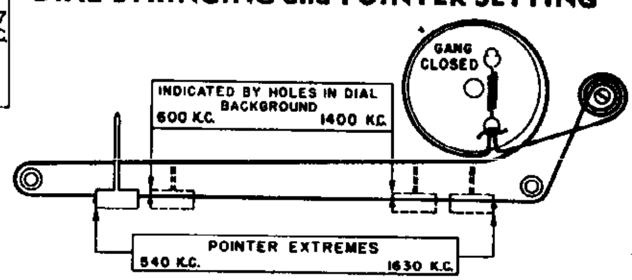
VOLTAGE DATA



REAR OF CHASSIS

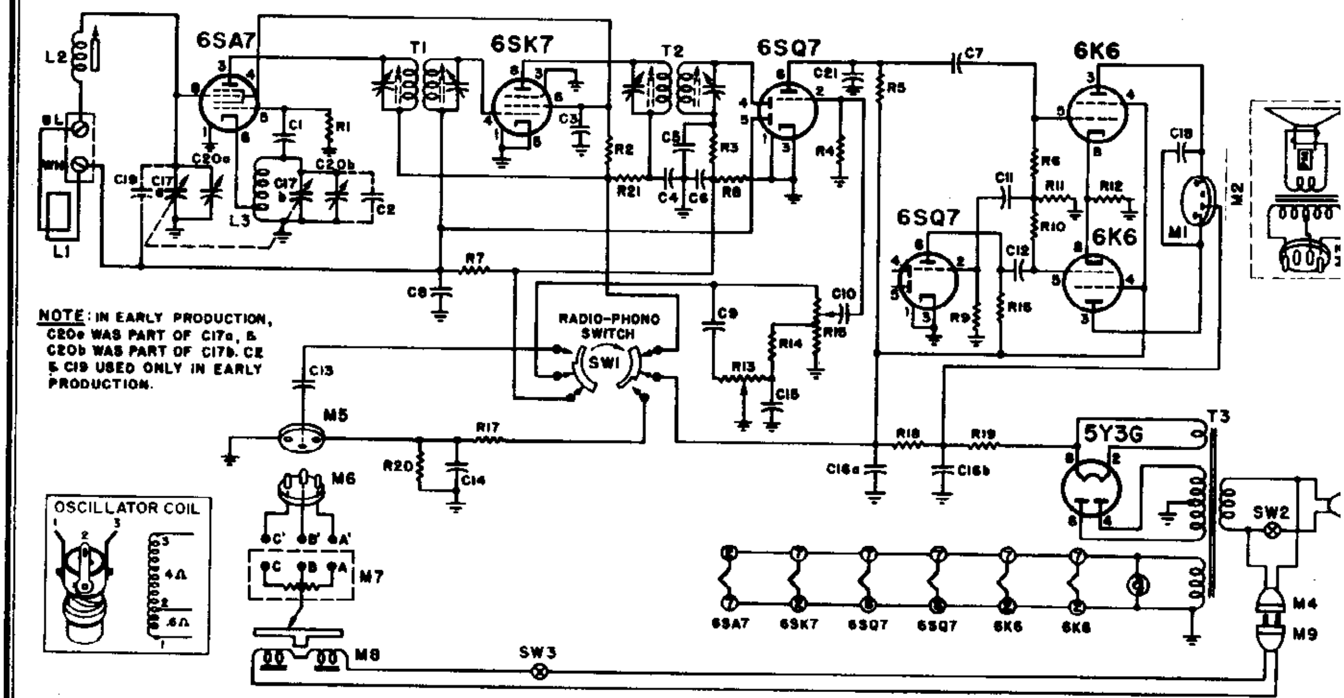
- All readings made between Tube Terminals and B minus (lug on SW1).
- Measured on 117 Volt A.C. line.
- Dial turned to low frequency end, no signal.
- Voltage obtained on Vacuum Tube Voltmeter.
- Switch SW2 in "Radio" position.

DIAL STRINGING and POINTER SETTING

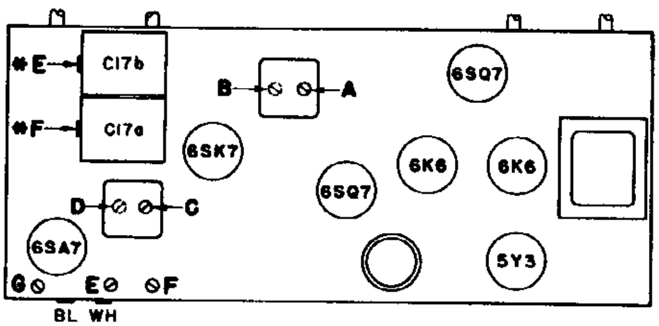


ADMIRAL CORPORATION

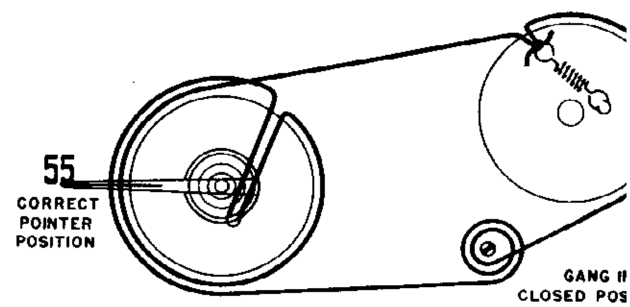
MODEL 7C65, Chass[is]
7E1



TOP VIEW — TUBE and TRIMMER LOCATION



DIAL CORD STRINGING and POINTER SETTI[NG]



ALIGNMENT PROCEDURE

- Check pointer position. The center line on the pointer should be at the bottom edge of "55" on the dial with the tuning gang closed (see stringing diagram). If incorrect, move to correct position by hand while holding the gang closed.
- Check set screws on dial drum and spotweld on tuning gang drum to eliminate possibility of backlash. Correct drum positions can be seen in the stringing diagram.
- Loop antenna must be connected to receiver during steps 3, 4 and 5. If disconnected during steps 1 and 2, conne[ct] jumper across loop terminals on chassis.
- Connect output meter across voice coil.
- Be sure both the set and the signal generator are thorough[ly] warmed up before starting alignment.
- Turn receiver volume control full on.
- Set "Radio-Phono" switch to "Radio" position.
- Use lowest output setting of signal generator that gives satisfactory reading on meter.

Step	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Trimmer and Type of Adjustme[nt]
1	Thru .1 mfd. to stator of rear section of gang condenser.	455 KC	Gang wide open	A, B, C, D to maximum output. Repea[t]
2	Thru 10 mmfd. to Black loop lead. (If 10 mmfd. is not available, wrap several turns of generator lead around black loop lead.)	1630 KC	Gang wide open	E to maximum output.
3		1400 KC	Tune in signal	F to maximum output.
4		600 KC	Tune in signal	G to maximum output.
5		1400 KC	Tune in signal	F to maximum output.

ADMIRAL 9A1 RECEIVER CIRCUIT

Due to the unusual nature of some portions of the circuit, and the fact that their function may not be too apparent, examination of the circuit prior to servicing will simplify the task of locating trouble. This is the purpose of the following information on the function of various portions of the circuit.

Grounded-Grid R.F. Amplifier

The input signal is introduced between grid and cathode in any amplifier circuit. It is conventional to apply the signal between grid and ground. The cathode is then grounded at signal frequencies. If the grid is grounded, the signal can just as well be applied between cathode and ground. This is the circuit arrangement of a grounded-grid RF amplifier.

Since the cathode circuit of a vacuum tube has a low characteristic impedance, the grounded-grid amplifier has a low input impedance and provides a satisfactory match for a folded dipole antenna. This eliminates complicated antenna coupling devices.

Due to the low impedance and inverted nature of the input circuit of the grounded-grid amplifier, feedback which might result in oscillation, is unlikely. This permits the use of a triode tube. The use of a triode tube greatly reduces circuit noise in comparison to that present in a pentode amplifier stage. A triode RF amplifier circuit provides excellent circuit stability without the use of tricky circuits or adjustments.

Band-Switching

There is little that is unusual about the operation of the band switch in the FM position. Due to the fact that some of the FM components are not removed from the circuit in the AM setting of the switch, it is rather difficult to trace the operation of the circuit. For AM operation, C7 is still in the circuit. Due to a relatively low capacity, it does not bypass the signal around the RF amplifier grid (but acts as a small portion of the tuned circuit capacity). L4 is also left in the circuit and is in series with the feed to the RF grid. It, like C7, has no appreciable effect due to its low electrical value. A shunt feed system is used on the RF amplifier grid, R3 being the grid return resistor.

C13 and L5 remain in series across the signal grid of the converter stage for AM operation. They have no appreciable effect on the circuit since C13 has a very low capacity. C14 is also across this grid circuit but it is also a very small capacity. The effect of these circuit components is merely that of added capacity.

The band switch shorts the primary of the first IF transformer that is not in use (the FM first IF transformer primary is shorted out for AM operation). This prevents the production of undesired frequencies in the plate circuit of the converter. The unused IF transformer windings which remain in the circuit have a very low impedance at the operating frequency since this frequency is far removed from the resonant frequency of the unused windings. Therefore, they have little effect on the operation of the circuit.

Although it does not cause difficulty in tracing the operation of the circuit, it is important to note that CH4 and C10 form a series resonant circuit at 10.7 Mc. Since this series resonant circuit is effectively connected from plate to ground on the RF amplifier, it acts as an IF wave trap for FM operation. This provides excellent rejection of any strong 10.7 Mc. signals which might be present in the input circuit of the receiver. (It is desirable to detune this trap for FM-IF alignment.)

FM Second IF Amplifier, AM Second Detector

A 6BA6 tube is used as a second IF amplifier for FM operation. Self-bias is developed in the grid resistor (R15 and R16 in series) of this stage. Since this DC bias voltage is dependent on signal strength, it is used for AVC purposes.

In the AM setting of the band switch, plate and screen voltages are removed from this tube. The grid and cathode of this tube then function as an AM second detector (diode) and AVC tube in a conventional manner.

Ratio Detector

In AM reception, the transmitter signal varies in amplitude in accordance with the sound being transmitted. The second detector of the receiver converts these amplitude variations into an audio signal that is a duplicate of that used to modulate the transmitter. In the case of FM, the transmitter frequency is made to vary in accordance with the sound to be transmitted. These frequency variations are again converted into an audio signal by the discriminator or ratio detector in an FM receiver.

The conventional discriminator has the disadvantage of being sensitive to amplitude variations as well as to variations in frequency. Amplitude variations, such as might be introduced by noise signals, can be removed by the use of a limiter circuit ahead of the discriminator. However, the input signal to the limiter must exceed a certain minimum amplitude before limiter action takes place. Therefore, the limiter-discriminator type circuit does not provide noise rejection on weak signals.

Since the ratio detector is relatively insensitive to amplitude variations, it can be used without a limiter stage. It provides noise rejection on weak as well as strong signals. This is the reason for the use of the ratio detector in preference to the limiter-discriminator type circuit.

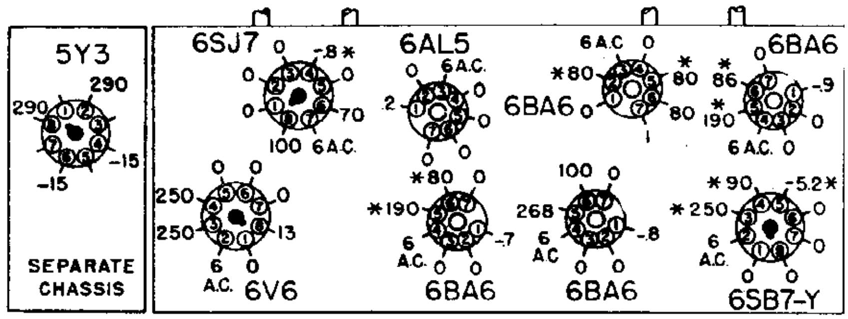
F.M. SERVICE

Much of F.M. service is similar to the usual service necessary for A.M. receivers such as voltage analysis, parts replacement, etc. The chief differences arise because of the considerably higher frequencies used in F.M. operation, and because of the different type of second detector needed in F.M.

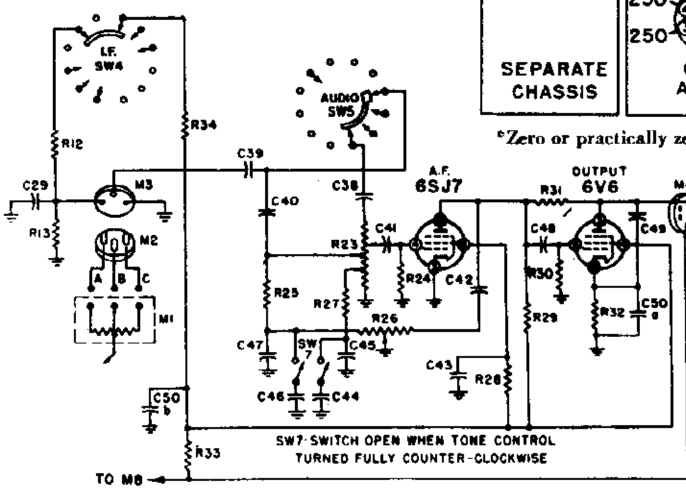
The higher frequencies involved means that more care must be exercised in location and length of leads. Leads tend to act as small inductances or capacities at high frequency and hence may appreciably alter the electrical characteristics of a circuit. For this reason, ground connections should always be maintained as originally made in the set. Also note that in certain circuits, the type by-pass condenser used is critical at the high F.M. frequencies. When replacing condensers it is important that they be replaced with condensers of identical capacity values, tolerances, temperature coefficients and construction. For example: C10 is a 40 MMFD $\pm$ 2%, zero temperature coefficient, ceramic capacitor. If defective it should be replaced with a 40 MMFD $\pm$ 2%, zero temperature coefficient, ceramic capacitor.

Fig. 8. VOLTAGE DATA

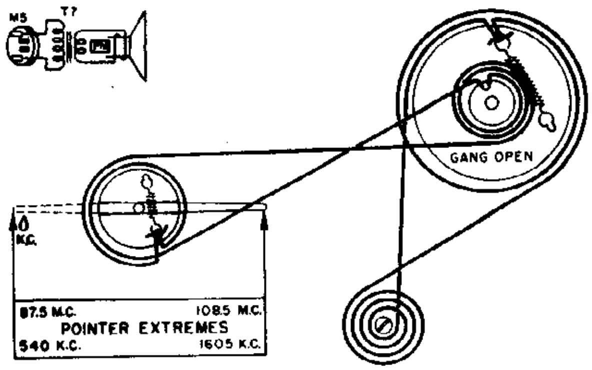
- Measured on 117 Volt A.C. line.
- No station tuned in. Dial turned to high frequency end.
- Voltages measured with a vacuum-tube voltmeter.
- Voltages measured between point indicated and chassis.
- Readings with bandswitch in F.M. position.



*Zero or practically zero if measured with band switch in phono position.



Simplified Schematic, Phono only



POINTER SETTING

With the gang closed, the lower edge of the pointer should be set at the upper tip of the pear-shaped opening (in the dial scale) on the A.M. range

FM ALIGNMENT

The model 9A1 chassis should be aligned only with an AM signal generator and a vacuum tube voltmeter. Any standard brand vacuum tube voltmeter with a DC scale of not over 5 volts is suitable. A 3-volt zero center scale is desirable. A signal generator with a frequency range up to 110 MC. is desirable. It is possible however, to align the receiver with a signal generator going to 20 or 30 megacycles, by using the harmonics of these lower frequencies. To do this merely set the signal generator dial as follows and align exactly as explained in the alignment instructions.

Where alignment chart specifies 108.5 *MC.*, set signal generator to highest available frequency of the following:

108.5 MC	27.13 MC
54.25 MC	21.7 MC
36.17 MC	18.08 MC

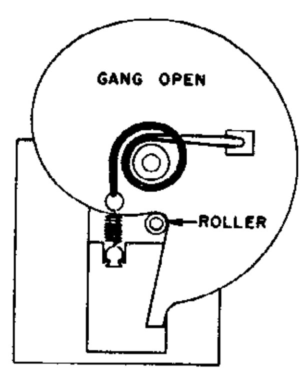
Where alignment chart specifies 102 *MC.*, set signal generator to highest available frequency of the following:

102. MC	25.5 MC
51.0 MC	20.4 MC
34.0 MC	17.0 MC

Signal generators which do not tune to 110 MC or whose harmonics are not strong enough, cannot be used for FM alignment.

In FM alignment, it is essential that every step be followed. Especially important is picking the center of the I.F. curve (step 4 in the FM-IF alignment instructions). During this portion of the alignment it is necessary to tune the signal generator very carefully; it may necessitate having to estimate the dial readings to a tenth of a division.

Alignment of the FM-RF section will require re-alignment of the AM-RF section due to common trimmer capacities during AM operation.



REPLACING TUNING SLUG

If it becomes necessary to change a tuning slug proceed i the following manner: Set the gang to its wide open position, u solder and remove the old slug. Set the slug adjusting screw abo half way down. Place the new slug in such a position that 1 inches of its length is above the coil form (or 1" above t chassis top). Solder it in this position making sure that it do not slip during the operation and that the slug wire is straigh

IMPORTANT PRELIMINARY ALIGNMENT STEPS

- With the gang closed, the lower edge of the pointer should be at the dotted position shown in Fig. 1. That is, the lower edge of the pointer should be at the upper tip of the AM pear-shaped opening in the dial scale. If the pointer is in different position, move it by hand while keeping the gang closed.
- Check the set screws that hold the tuning drum to the shaft to see that they are tight and that the drum has not slipped on the shaft. See Fig. 1 for correct drum position.
- In the wide open position, the roller on the slug tuning platform must be as shown in dial stringing diagram, Fig. 2.
- With the gang wide open, all slugs should be 1¼ inches out of their coil forms. If there is any serious deviation or if there has been any tampering, turn the adjusting screws until this distance is corrected. (See "Replacing Tuning Slug" on p. 1.)

FM IF AND RATIO DETECTOR ALIGNMENT

- Solder output indicator leads in place and keep them well separated from signal generator leads and chassis wiring.
- While peaking IF's, keep reducing signal generator output so VTVM reading is approximately +1.5 volts DC with exception of Step #5
- FM antenna disconnected during alignment
- Band switch in FM position (red signal at MC on dial)
- Speaker must be connected during alignment

I.F. SLUG INFORMATION

To avoid splitting the slotted head of the powdered iron core tuning slug in the I.F. transformers, use a screw-driver with a blade ⅛" wide for I.F. alignment.

Under normal operating conditions, mis-alignment of slug-tuned circuits with age is slight. Therefore, re-alignment of the I.F. transformers should be accomplished by only a slight adjustment of the slugs. Do not turn a slug in an extreme amount or it will fall into the center of the coil form. Always try to adjust by first turning slug out. Should an I.F. tuning slug be turned in too far and fall into the center of the coil form, it will be necessary to remove the other tuning slug on the opposite side of the I.F. can. Then, using a thin rod and screw-driver, "jockey" the dislocated slug until it re-engages the threads in the coil form. Since this is a difficult operation, care should be exercised as outlined above in paragraph and this difficulty will be avoided.

If the iron core slug should become stripped or if the slotted head should become rounded or cracked, it may be removed by removing the opposite slug and forcing the defective slug out with a thin screw-driver.

Steps 1 and 2 may be omitted if set is not badly out of alignment so signal comes through in Step 3
Before proceeding, be sure to follow all steps listed above, under "Important Preliminary Alignment Steps."

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Special Connections	Adjust as Follows (very carefully)
1	Thru .01 cond. to 2nd IF grid (Pin #1 of 6BA6 2nd I.F.).	10.7 MC unmodulated.	Tuning gang wide open	Connect 3300 ohm carbon resistor across secondaries of both FM-IF transformers. Connect VTVM (DC probe) from point "W" to ground. (See Figure 19.)	"A" (ratio detector primary) for maximum reading on VTVM.
2	Thru .01 cond. to 1st IF grid (Pin #1 of 6BA6 1st I.F.).	"	"	Same as above.	Iron cores "B" and "C" (2nd IF trans.) for maximum reading on VTVM.
3	To FM antenna terminals. (Do not feed signal into converter grid.)	"	"	Same as above. In addition, connect a 50 mmfd. condenser in parallel with C10 to detune the IF rejection trap consisting of CH4 and C10. (See note at bottom of page.) This condenser MUST be removed after step 5.	Iron cores D and E for maximum on VTVM. Re-adjust A, B, C, D, E for maximum. (Keep reducing generator output to keep VTVM at 1.5 volts.)
4	"	a. Remove 3300 ohm resistors from IF transformers. b. Reduce output of signal generator until VTVM reads exactly +1.5 volts DC. c. Tune generator frequency above 10.7 MC until VTVM reads exactly +1.0 volt. Note exact generator frequency. Extreme care in reading this is essential. d. Tune generator frequency below 10.7 MC until VTVM reads exactly +1.0 volt. Note exact generator frequency. Extreme care in reading this is essential. e. Add generator frequency in step c to generator frequency in step d and divide by 2. The result is the center frequency of the IF curve to be used in step 5. See example on page 10. f. Tune generator frequency above and below 10.7 MC and note voltage reading on VTVM at different frequency points until you have a good impression of the shape of the selectivity curve. If you have two peaks as in Figures 17 or 18, note readings (voltage) of both peaks. A selectivity curve that would require realignment is illustrated by Figure 18.			
5	"	Center of IF selectivity curve per step 4e above. See "EXAMPLE" on p. 10	Set pointer to upper limit on dial.	Connect VTVM (DC probe) from point "X" to ground. (See Figure 19.)	Iron core "F" (detector secondary) for zero voltage reading on VTVM. (The correct zero point is located between a positive and a negative maximum.)

If any adjustments were very far off, it is desirable to repeat steps 3, 4 and 5.

Note: Condenser C10 is mounted parallel to the chassis on the bakelite terminal board. Connect added 50 mmfd. condenser between the terminal board lug (junction of CH4 and R5) and pin #1 of the 6BA6 (GG RF stage). With the chassis in the position shown in figure 19, the correct terminal board lug is located on the corner nearest trimmer "C", and on the left side of the terminal board.

ADMIRAL CORPORATION

SETTING SIGNAL GENERATOR TO CENTER OF IF SELECTIVITY CURVE

CAUTION: Due to the difficulty of setting a signal generator to the accuracy required by this operation, extreme care must be exercised in making each setting. Otherwise improper alignment of the radio detector and consequent audio distortion will result.

EXAMPLE: (See Figs. 13 and 14)

Voltage reading in Step 4b is + 1.5 volts.

Generator frequency on low side of 10.7 MC for a reading of +1 volt DC = 10.640 MC.

Generator frequency on high side of 10.7 MC for a reading of +1 volt DC = 10.800 MC.

Center frequency is obtained by adding 10.640 and 10.800, then dividing by 2. For these readings it will be 10.72 MC.

Set generator frequency to 10.72 MC as this is center of selectivity curve as shown in Figure 14.

Note: Numerical vernier dial readings may be used instead of MC.

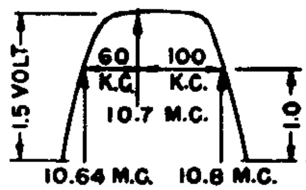


FIGURE 13.

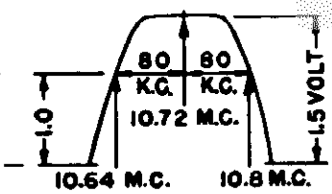


FIGURE 14.

TYPICAL SELECTIVITY CURVES

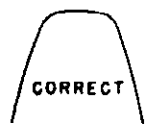


FIGURE 15.

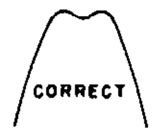


FIGURE 16.

FIGURE 17.

FIGURE 18.

TRIMMER LOCATION

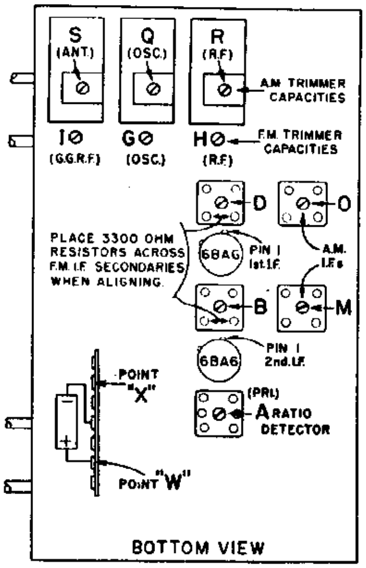
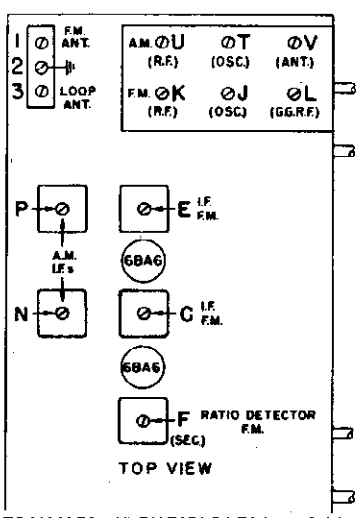


FIGURE 19.



FM RF ALIGNMENT PROCEDURE

Alignment of FM RF section will require re-alignment of AM RF section due to common trimmer capacities during AM operation. AM RF section can be aligned, however, without affecting FM alignment.

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Connections	Adjust as follows
6	Thru 270 ohms to FM ant. terminal.	108.5 MC† (unmodulated).	Tuning gang wide open	Connect VTVM (DC probe) from point "W" to ground.	*Capacity trimmers "G", "H" and "I" for maximum reading on VTVM.
7	"	102 MC† (unmodulated).	102 MC	"	*Iron slugs "J", "K" and "L" for maximum reading on VTVM.
8	"	108.5 MC† (unmodulated).	Tuning gang wide open	"	*Repeat Step #6.
9	Alignment of the FM RF section will affect the AM band also so the AM RF section must be realigned after the FM RF alignment.				

* It is advisable that generator output be adjusted so that VTVM readings do not exceed approximately +1.5 volts DC after peaking.

† If your signal generator does not reach this frequency, use harmonics as described in paragraph on "FM Alignment" on front page.

AM ALIGNMENT PROCEDURE

- Use regular output meter connected across speaker voice coil.
- Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.
- Turn receiver Volume Control full on.
- Use lowest output setting of signal generator that gives a satisfactory reading on meter.
- Proceed in sequence as outlined below.

	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
	Set Band Switch to Broadcast position (center) and be sure to follow instructions under heading "Important Preliminary Alignment Steps." (See page 9). Loop antenna can be disconnected from chassis in Steps 1, 2 and 3.				
1	6SB7-Y (Pin #8)	.1 MFD	455 KC	Tuning gang wide open	M, N, O, P
2	To loop ant. terminal #3	Direct connection	1605 KC	Tuning gang wide open	Q, R
3	To loop ant. terminal #3	Direct connection	1300 KC	1300 KC	T, U
	Set Receiver Chassis on table next to back of cabinet. Connect Loop Antenna to Receiver.				
4	To loop ant. terminal #3	10 MMFD (Or wrap several turns of generator lead around white loop lead.)	1605 KC	Tune in signal	S
5	To loop ant. terminal #3		1300 KC	Tune in signal	V

TRIMMER IDENTIFICATION CHART

TRIMMER	SYMBOL	FUNCTION
A,F	T3	Ratio Detector
B,C	T2	2nd I.F. Transformer (FM)
D,E	T1	1st I.F. Transformer (FM)
G	C16	FM Oscillator Trimmer
H	C14	FM Converter Trimmer (RF)
I	C7	FM-RF Trimmer
J	L7	FM Oscillator Coil
K	L5	FM Converter Coil (RF)
L	L4	FM-RF Coil
M,N	T5	2nd I.F. Transformer (AM)
O,P	T4	1st I.F. Transformer (AM)
Q	C21	AM Oscillator Trimmer
R	C11	AM Converter Trimmer (RF)
S	C6	AM Antenna Trimmer
T	L8	AM Oscillator Coil
U	L6	AM Converter Coil (RF)
V	L3	AM Antenna Coil

CHASSIS REMOVAL (For Servicing)

Due to the type of chassis mounting used, removal of the entire tilt-out door assembly (with receiver chassis attached) simplifies removal of the receiver chassis. The receiver chassis can then be easily removed from its shock mountings. Removal is a little "tricky" but can be done most readily as described below:

Disconnect all cabinet wiring and cables from the chassis. Difficulty may be experienced in removing the phono pickup plug due to the tight fit in the socket shield. This plug can best be removed with long-nose pliers.

Remove the screw and washer (#1 in figure 5) from both tilt-out spring studs (2), one on each side of the tilt-out assembly. Slip the tilt-out springs (3) off their respective studs. Unscrew the ends of the tie-bar (4). The tie-bar then hangs free on the copper braid used to bond it to the chassis.

Stand at the end of the cabinet (next to the radio compartment) and hold the tilt-out door open slightly with the left hand. Use a screwdriver to pry both tilt-out arms (#5 in figure 6) off their studs (#6). **Then push the tilt-out arms toward the front of the cabinet (against bracket #7).** The tilt-out assembly can now be removed from the front of the cabinet by tipping it forward and then pulling it straight out. CAUTION: In models having record storage compartments below the receiver, the record storage compartment door MUST be closed during the actual process of removing the radio tilt-out door assembly.

CHASSIS REPLACEMENT

Install chassis on the tilt-out assembly, making sure the chassis shock mounting is assembled exactly as shown in Fig. 7. The chassis bracket must not touch the tilt-out arm.

Make sure the rubber bumpers (#9, Fig. 5) and rubber strips (#8) are in place.

To replace the radio tilt-out door assembly in the cabinet, set the assembly in so that the tilt-out arms (#5) are in back of the studs (#6) they normally hinge on. Use your left hand to hold the assembly in the proper position in the same manner as was done in removing the tilt-out assembly. Use a screwdriver (in your right hand) to spring the tilt-out arm clear of its stud (#6). **Push it forward as far as possible (as shown in figure 6).** When both tilt-out arms are in this position, the assembly can be lifted up and the tilt-out arms slipped into place on their respective studs. The tilt-out assembly will now support itself (in the open position).

Replace the tie-bar (#4). Replace the tilt-out springs (#3. See figure 5). Reconnect the cabinet wiring and cables to the receiver chassis. Check to see that the rubber bumper (#9) and rubber strips (#8) are in place. The assembly should now appear as shown in figure 5.

CABINET DOOR ADJUSTMENT

If the door on the radio tilt-out assembly is shifted to one side, readjustment of the tilt-out arm will correct the difficulty. If the tilt-out door is too far to the right, the right-hand tilt-out arm can be sprung. If the door is too far to the left, the left-hand arm can be sprung. The tilt-out arms are sprung by holding the lower end of the arm against its bracket and prying the arm toward the chassis with a screwdriver. The screwdriver is used as a lever between the tilt-out arm and the side of the radio compartment.

In the event that the bottom edge of the radio tilt-out door rubs, it can be planed off slightly. Care must be exercised in doing this in order that the door is not marred. Hold the plane flat against the beveled bottom edge of the door while planing off a small amount.

If the door on the record tilt-out assembly is shifted to one side, open the tilt-out door and spring the door arms in the opposite direction. This can be done by exerting pressure against the side of the door.

RECORD CHANGER REMOVAL (For Servicing)

Removal of the record changer unit can be accomplished as follows: Disconnect the inter-connecting cables from the changer unit. Unscrew the tie-bar and tie rod on underside of changer unit. Hold the changer unit with one hand and spring each of the four tilt-out hinge arms away from the sides of the changer unit. As this is done, the four pivot studs will come out of their sockets and free the changer unit for removal from the cabinet.

To replace the changer unit, place it back in the cabinet. Spring the tilt-out arms out so that the changer will drop down between them. Guide the studs back into their sockets. Replace the tie-bar, tie rod, and interconnecting cables.

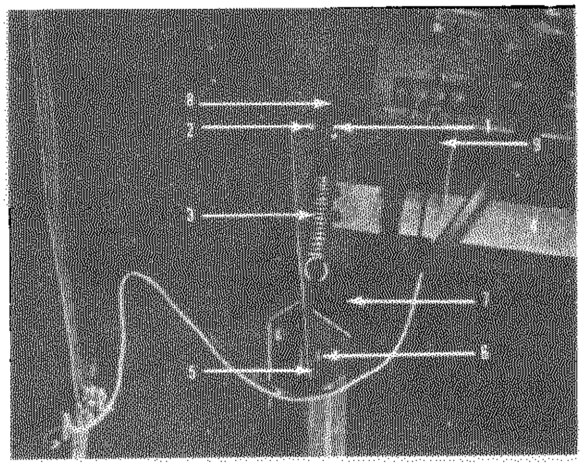


Fig. 5. Receiver Tilt-Out Mounting

Ref. No.	Description	Part. No.
1	#6—32 x ¼" Screw	
2	Stud	Part of #5
3	Spring, Adjusting (for chassis mtg.)	19A 15-2
4	Tie Bar (for receiver chassis mtg.)	15B 160
5	Door Arm, left (near center of cab.)	A1440
	Door Arm, right (nearest side of cab.)	A1441
6	Stud	Part of #7
7	Door Bracket, left (near center of cab.)	A1438
	Door Bracket, right (nearest side of cab)	A1439
8	Rubber Channel (⅝ x ⁱ⁄₁₆ x 2⅝" over-all)	12A 9-1
9	Bumper, Rubber (For radio chassis)	12A 3-6

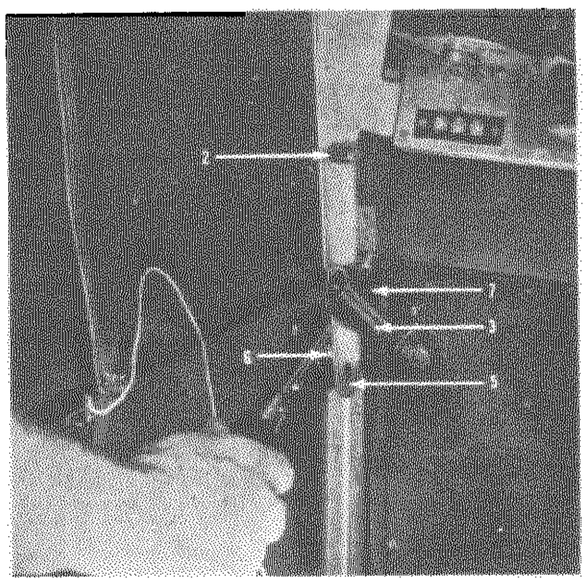


Fig 6. Receiver Tilt-Out Mounting

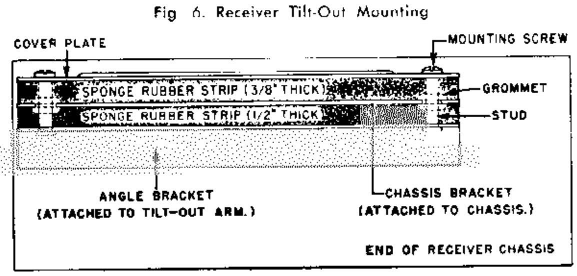
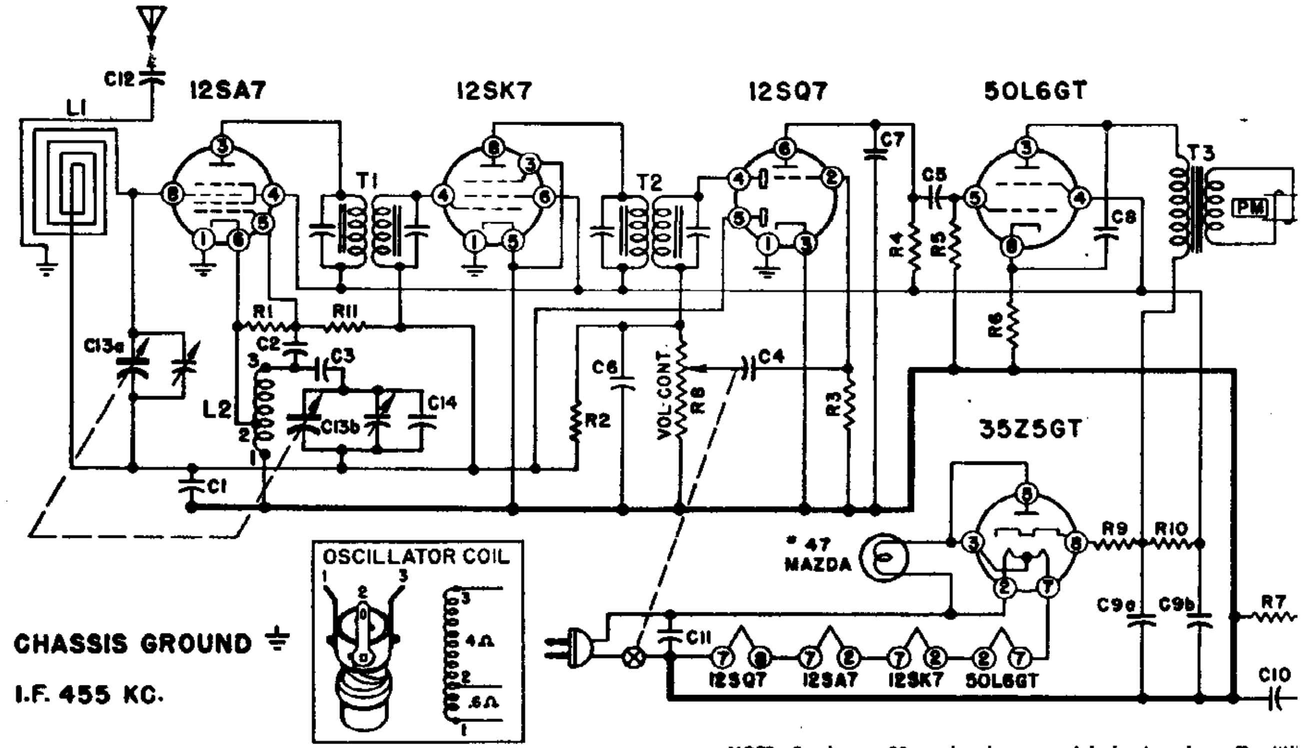


Fig. 7. Chassis Shock-Mounting

ADMIRAL CORPORATION

MODELS 7T01,7T
7T01UL,7T04UL,
Chassis 5N1



NOTE: Condenser C3 used only on models having the suffix "UL"

R E P L A C E M E N T   P A R T S

RESISTORS

Symbol	Description	Part No.
R1	22,000 Ohms, ½ Watt	60B 8-223
R2	1 Megohm, ½ Watt	60B 8-105
R3	4.7 Megohms, ½ Watt	60B 8-475
R4	470,000 Ohms, ½ Watt	60B 8-474
R5	470,000 Ohms, ½ Watt	60B 8-474
R6	150 Ohms, ½ Watt	60B 8-151
R7	150,000 Ohms, ½ Watt	60B 8-154
R8	1 Megohm Volume Control & Switch	75B 1-6
R9	33 Ohms, 1 Watt	60B 28-3
R10	1,000 Ohms, 1 Watt	60B 28-2
R11	10 Megohms, ¼ Watt	60B 2-106

CONDENSERS

Symbol	Description	Part No.
C1	.1 mfd., 200 Volts, Paper	64B 1-30
C2	50 mmfd., Ceramic	65B 6-4
C3	.02 mfd., 400 Volts, Paper	64B 1-24
C4	.01 mfd., 400 Volts, Paper	64B 1-25
C5	.01 mfd., 400 Volts, Paper	64B 1-25
C6	250 mmfd., Ceramic	65B 6-5
C7	500 mmfd., Ceramic	65B 6-6
C8	.02 mfd., 400 Volts, Paper	64B 1-24
C9a	50 mmfd., 150 Volts } Elec	67A 3
C9b	30 mmfd., 150 Volts } Elec	67A 3

CONDENSERS

Symbol	Description	Part No.
C10	.1 mfd., 400 Volts, Paper	64B 1-20
C11	.05 mfd., 400 Volts, Paper	64B 1-22
C12	.005 mfd., 600 Volts, Paper	64B 1-12
C13a	Gang, 0 to 420 mmfd. }	A1364
C13b	Gang, 0 to 162 mmfd. } (Spot welded to drum)	A1364
C14	15 mmfd., Ceramic	65B 6-18

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna, Loop (Includes C12)	69B 4
L2	Coil, Oscillator	67A 14
T1	Transformer, 1st I.F.	72B 31
T2	Transformer, 2nd I.F.	72B 32
T3	Transformer, Output	98A 4
	Speaker (5" PM) and Output Transformer (Can also use 78B 18-1)	78B 18-2

MISCELLANEOUS

Description	Part No.
Button, Snap (for Dial Background)	13A 1-3-47
Cabinet, Black Plastic (7T01E)	34D 1-3 N
Cabinet, Ivory Plastic (7T01C)	34D 1-1 N
Cabinet, Mahogany Plastic (7T01M)	34D 1-2 N

MISCELLANEOUS

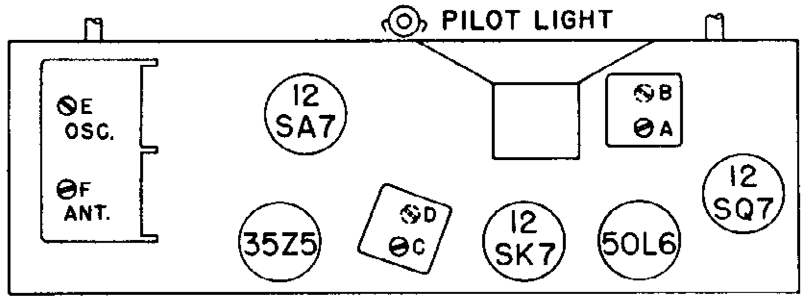
Description	Part N
*Cabinet, Wood	35D 59-1 [redacted]
Dial Background	22B 13
Dial Bulb (#47 Mazda)	81A 1-
Dial Cord	50A 1
Dial Glass Clip (7T01)	18A 2
Dial Glass Clip (7T04)	18A 12
Dial Scale, Glass (7T01)	21B 36
Dial Scale, Glass (7T04)	21B 43
Knob, Black Plastic (7T01E)	33A 18
Knob, Ivory Plastic (7T01C)	33A 18
Knob, Mahogany Plastic (7T01M)	33A 18
Knob, Wood	33A 19
Pointer, Dial	25A 25
Pulley, Dial (Double)	17A 5-
Pulley, Dial (Single)	17A 1-
Shaft, Tuning	28A 11
Socket, Tube	87A 5-
Socket and Leads (for Dial Bulb)	82A 2-
Spring, Tension (Dial Cord)	19B 1-
Washer, "C" (for Tuning Shaft)	4A 4-1
Washer, Felt (for Knobs)	5A 4-3
Washer, Fibre (for Mounting Oscillator Coil)	5A 1-5
Washer, Spring (for Tuning Shaft)	4A 6-3

*Supplied only if old cabinet cannot be repc
When ordering, describe condition of old ca
in detail.

MODELS 7T01,7T04,
7T01UL,7T04UL

ADMIRAL CORPORATION

TUBE AND TRIMMER LOCATION



REAR OF CHASSIS

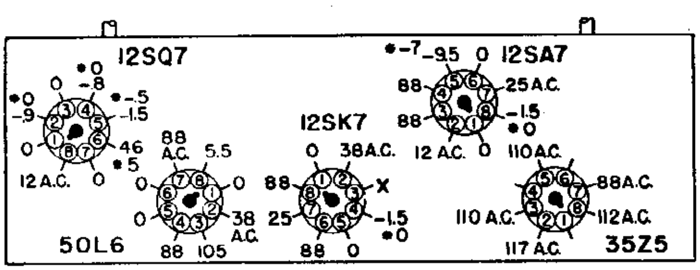
ALIGNMENT PROCEDURE

1. Check pointer setting: With gang open, the pointer should be at 1630 K.C.
2. Connect Output Meter across Voice Coil.
3. Turn Receiver Volume Control full on.
4. Use lowest Output setting of Signal Generator capable of producing adequate Output Meter indication and then proceed as outlined in chart below.
5. Repeat adjustments to insure good results.

Connect Signal Generator to—	Dummy Antenna Between Radio and Generator	Set Generator Frequency to—	Set Receiver Dial Frequency to—	Adjust Following Trimmers	Type of Adjustment
Tuning Condenser Antenna Stator	250 mmfd. Condenser	455 K.C.	High frequency end of Dial	A-B—2nd I. F. C-D—1st I. F. (See note below)	Adjust to maximum Output
Tuning Condenser Antenna Stator	250 mmfd. Condenser	1630 K.C.	High frequency end of Dial	E—Osc.	Adjust to maximum Output
Loop radiator (or place lead from generator close to loop of set to obtain adequate signal).	No actual connection between set and generator.	1400 K.C.	Tune in generator signal	F—Ant.	Adjust to maximum Output

Note: The B and D adjustments must be made from the underside of the chassis.

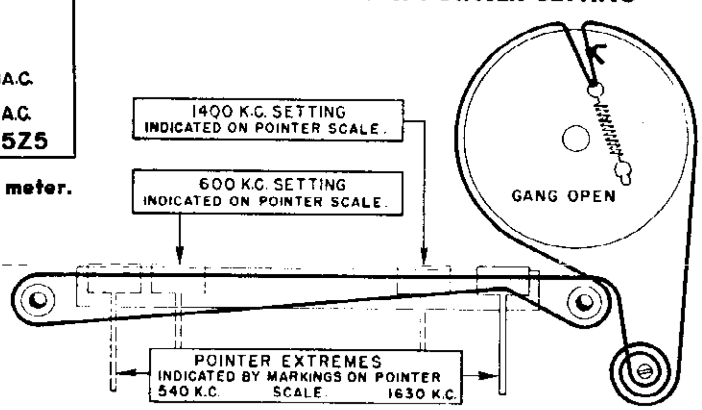
VOLTAGE CHART



*Indicates second reading taken with 1000 ohm-per-volt meter.

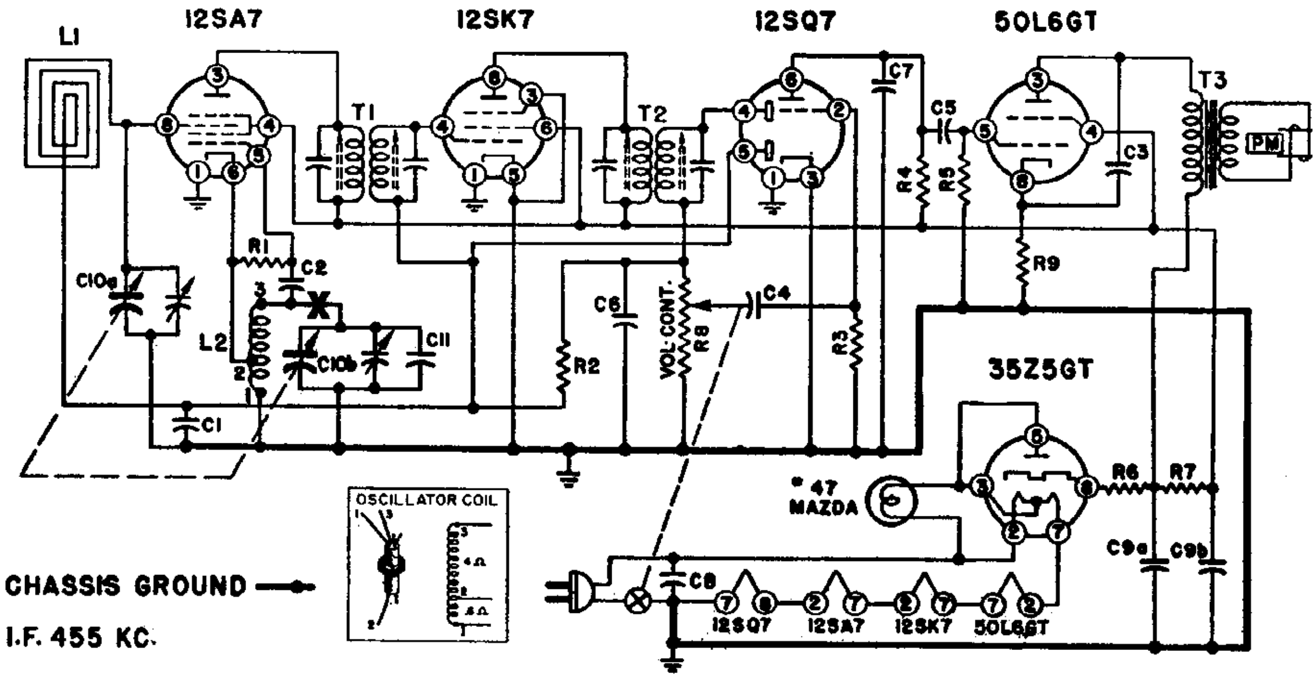
- All readings made between tube socket terminals and pin 3 of 12SK7 (marked "X" on Voltage Chart.
- Voltages measured on a 117 Volt A.C. line.
- Dial turned to low frequency end, no signal.
- Voltages measured with a vacuum-tube voltmeter. A second voltage reading (marked with an asterisk *) indicates readings made with a 1000 ohm-per-volt meter when use of this instrument would result in appreciably lower readings.

DIAL CORD STRINGING & POINTER SETTING



ADMIRAL CORPORATION

MODELS 7T10,7T1
7T15,Chassis 5K
UL5K1



CHASSIS GROUND

I.F. 455 KC.

UL5K1 Chassis has circuit changes as described It uses Speaker 78B 26-2.

1. .05 mfd. condenser added at point "X" in oscillator circuit.
2. B minus is isolated from chassis by 150,000 ohm resistor and .18 mfd. condenser in parallel.
3. Gang condenser grounded to chassis and not connected to B minus as in above circuit.

REPLACEMENT PARTS

RESISTORS

Symbol	Description	Part No.
R1	22,000 Ohms, ½ Watt	60B 8-223
R2	1 Megohm, ½ Watt	60B 8-105
R3	4.7 Megohms, ½ Watt	60B 8-475
R4	470,000 Ohms, ½ Watt	60B 8-474
R5	470,000 Ohms, ½ Watt	60B 8-474
R6	33 Ohms, 1 Watt	60B 28-3
R7	1000 Ohms, 1 Watt	60B 28-2
R8	1 Megohm Volume Control and Switch	75B 1-16
R9	150 Ohms, ½ Watt	60B 8-151

CONDENSERS

C1	.1 mfd., 200 Volts, Paper	64B 1-30
C2	50 mmfd., ±20%, Ceramic	65B 6-4
C3	.02 mfd., 400 Volts, Paper	64B 1-24
C4	.01 mfd., 400 Volts, Paper	64B 1-25
C5	.01 mfd., 400 Volts, Paper	64B 1-25
C6	250 mmfd., ±20%, Ceramic	65B 6-5
C7	500 mmfd., ±20%, Ceramic	65B 6-6
C8	.05 mfd., 400 Volts, Paper	64B 1-22
C9a	50 mmfd., 150 Volts } Elec.	67A 10
C9b	30 mmfd., 150 Volts }	
C10a	Gang, 0 to 420 mmfd. }	A1460
C10b	Gang, 0 to 162 mmfd. } (Spot welded to drum)	
C11	20 mmfd., ±20%, Ceramic	65B 6-26

COILS, TRANFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna, Loop	69C 19
L2	Coil, Oscillator	69A 20
T1	Transformer, 1st I.F. Above I.F. transformer is slug-tuned. Trimmer-tuned I.F. transformer, part number 72B33, also used and is interchangeable with 72B31.	72B 31
T2	Transformer, 2nd I.F. Above I. F. transformer is slug-tuned. Trimmer-tuned I.F. transformer, part number 72B34, also used and is interchangeable with 72B32.	72B 32
T3	Transformer, Output	98A 4
—	Speaker (5" PM) and Output ~~Transformer~~	78B 26-1

MISCELLANEOUS

Description	Part No.
Cabinet, Plastic (Black)	34D 14-1
Cabinet, Plastic (Black with Ivory Louvre)	34D 14-4 [redacted]
Cabinet, Plastic (Ivory)	34D 14-3

MISCELLANEOUS

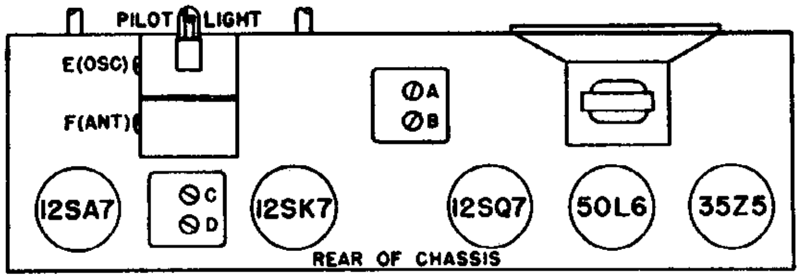
Description	Part No.
Cabinet, Plastic (Ivory with Black Louvre)	34D 14-
Cabinet, Plastic (Mahogany)	34D 14-
*Cabinet, Wood (7T14)	35D 61 [redacted]
*Cabinet, Wood (7T15)	35D 60
Dial Background	15B 180
Dial Cord	50A 1-3
Dial Crystal	24A 4
Dial Drum	See C10
Dial Light (#47 Mazda)	81A 1-8
Dial Light Socket and Leads	82A 3-2
Dial Scale	21B 39
Knob, Plastic (Black)	33A 18-
Knob, Plastic (Ivory)	33A 18-
Knob, Wood (Walnut)	33A 18-
Pointer	25A 26
Shaft, Tuning	28A 11-
Snap, Buttons (For dial scale)	13A 1-3
Snap Ring (For pointer)	18A 5-3
Socket, Tube	87A 10-
Spring, Tension	19B 1-2
Washer, 'C' (for tuning shaft)	4A 4-1
Washer, Felt (for knobs)	5A 4-3
Washer, Fibre	5A 2-1
Washer, Spring (for tuning shaft)	4A 6-3-

*Supplied only if old cabinet cannot be repai
When ordering, describe condition of old cab
in detail.

MODELS 7T10, 7T14, 7T15

ADMIRAL CORPORATION

TUBE AND TRIMMER LOCATION



TOP VIEW

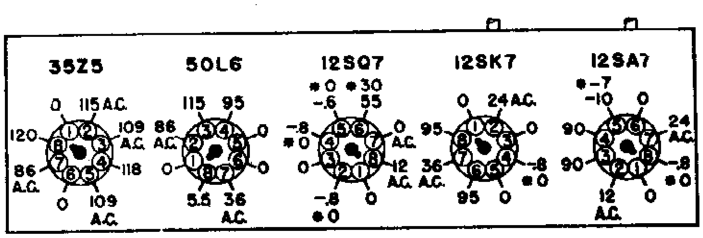
ALIGNMENT PROCEDURE

1. Check pointer setting: With gang closed, the pointer should be horizontal.
2. Connect Output Meter across Voice Coil.
3. Turn Receiver Volume Control full on.
4. Use lowest Output setting of Signal Generator capable of producing adequate Output Meter indication and then proceed as outlined in chart below.
5. Repeat adjustments to insure good results.

Connect Signal Generator to—	Dummy Antenna Between Radio and Generator	Set Generator Frequency to—	Set Receiver Dial Frequency to—	Adjust Following Trimmers	Type of Adjustment
Tuning Condenser Antenna Stator	250 mmfd. Condenser	455 K.C.	High frequency end of Dial	A-B—2nd I. F. C-D—1st. I. F. (See note below)	Adjust to maximum Output
Tuning Condenser Antenna Stator	250 mmfd. Condenser	1630 K.C.	High frequency end of Dial	E—Osc.	Adjust to maximum Output
Loop radiator (or place lead from generator close to loop of set to obtain adequate signal).	No actual connection between set and generator.	1400 K.C.	Tune in generator signal	F—Ant.	Adjust to maximum Output

Note: In some sets, the B and D adjustments must be made from the underside of the chassis.

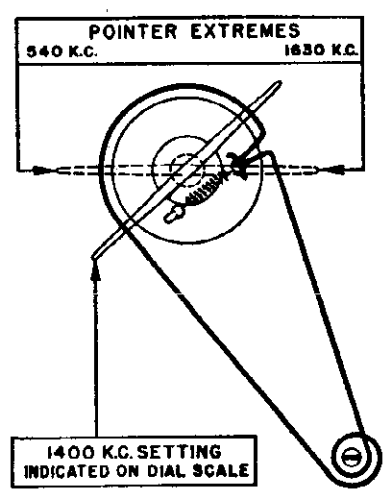
VOLTAGE CHART



*Indicates second reading taken with 1000 ohm-per-volt meter.

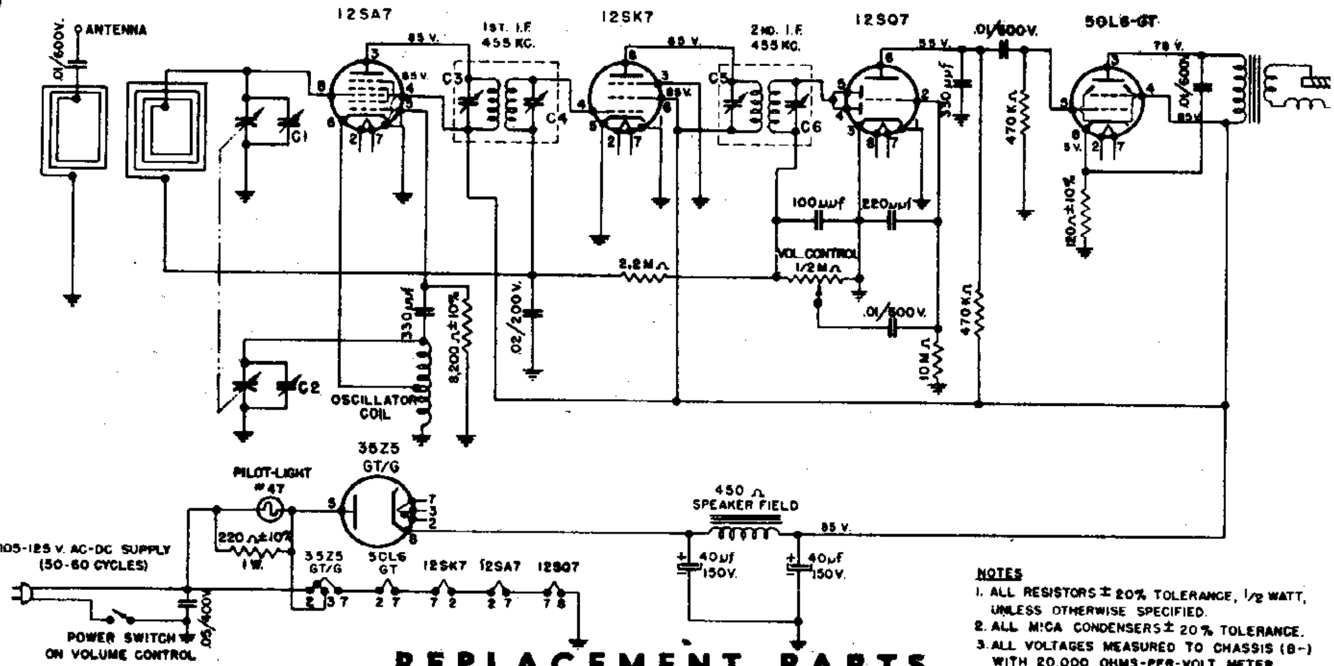
- All readings made between tube socket terminals and chassis.
- Voltages measured on a 117 Volt A.C. line.
- Dial turned to low frequency end, no signal.
- Voltages measured with a vacuum-tube voltmeter. A second voltage reading (marked with an asterisk *) indicates readings made with a 1000 ohm-per-volt meter when use of this instrument would result in appreciably lower readings.

DIAL CORD STRINGING



AFFILIATED RETAILERS, INC.

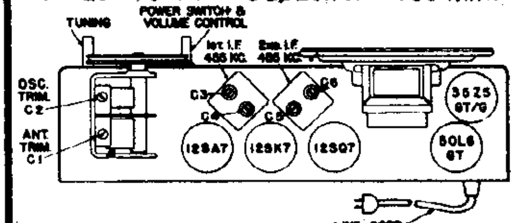
MODELS R-046, R-1046, R-1046M



NOTES
1. ALL RESISTORS ± 20% TOLERANCE, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ± 20% TOLERANCE.
3. ALL VOLTAGES MEASURED TO CHASSIS (B-) WITH 20,000 OHMS-PER-VOLT METER, WITH VOLUME CONTROL FULL ON.

REPLACEMENT PARTS

Part No.	Description
BU-187	Pilot light bulb 6.3V (#47 Mazda)
CA-350W	Cabinet—Walnut bakelite cabinet
CA-350V	Cabinet—Ivory bakelite cabinet
CL-159	Coil—oscillator coil
CO-107	Capacitor—Electrolytic 40+40/150WV
CR-169	Crystal—dial crystal
CV-501	Condenser—2 gang variable tuning condenser
KN-470	Knob—Walnut knob
KN-471	Knob—Ivory knob
KN-622	Knob—Walnut knob for model R-1046M only
LP-163	Loop
PO-259	Pointer—moulded pointer
PT-102	Volume control and power switch
RCM20A101M	Capacitor—100 mmf 20% mica
RCM20A221M	Capacitor—220 mmf ± 20% mica
RCM20A331M	Capacitor—330 mmf ± 20% mica
RCP10W2203A	Capacitor—.02 mfd., 200 volts tub
RCP10W4503A	Capacitor—.05 mfd., 400 volts tub
RCP10W6103A	Capacitor—.01 mfd., 600 volts tub
REB106M	Resistor— 10 meg., ± 20% 1/2 watt
REB121K	Resistor—120 ohms ± 10% 1/2 watt
REB225M	Resistor—2.2 meg., ± 20% 1/2 watt
REB474M	Resistor—470,000 ohms ± 20% 1/2 watt
REB822K	Resistor—8200 ohms ± 10% 1/2 watt
REC221K	Resistor—220 ohms ± 10% 1 watt
SK-110	Speaker—5" Dynamic with output transformer
SO-190	Socket—Dial light socket assembly
SP-191	Spring—Tuning drive lock spring
TR-186	Transformer—1st or 2nd I.F. transformer



ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN RECEIVER DIAL TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUT (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	ANTENNA SECTION TUNING CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	FULL CLOCKWISE POSITION. (CONDENSER PLATES FULLY OPEN.)	C6, C5, C4, C3 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS.)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1700 KC.	1700 KC. (170 ON DIAL)	C2 (OSCILLATOR)
3		1400 KC.	MAXIMUM SIGNAL (APPROX. 140 ON DIAL)	C1 (ANTENNA)
4		REPEAT STEPS 2 AND 3		

ALIGNMENT INSTRUCTIONS

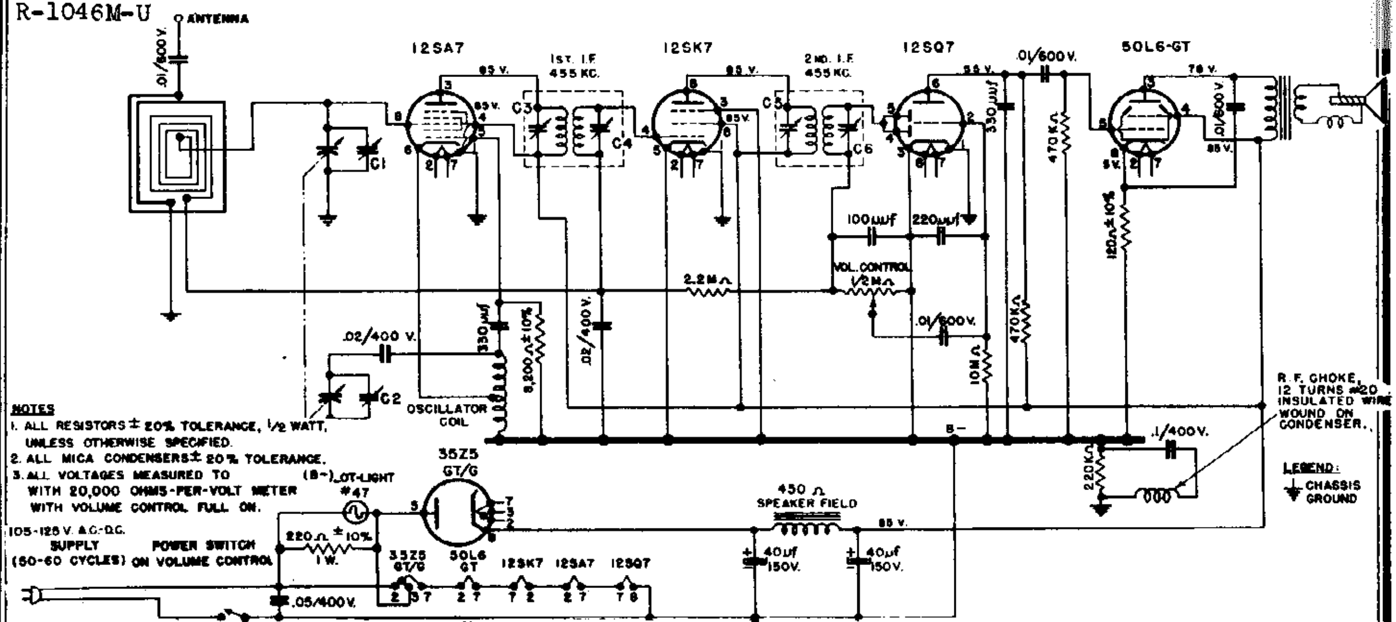
Modulated R.F. signal generator; output meter; insulated screw-driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

To align the receiver it is necessary to remove the chassis from the cabinet, check that the pointer is horizontal and coincides with the two horizontal reference lines on the dial. In this position the condenser should be completely closed. Connect the output meter and signal generator as follows:

Output meter — Connect across voice coil and turn volume control to maximum.

Signal generator — Connect the low side of the signal generator to the receiver chassis thru a .1 mfd condenser and keep the output as low as possible, then proceed in the sequence shown on the alignment chart.

MODELS R-1046-U, R-1046-U **AFFILIATED RETAILERS, INC.**
R-1046M-U

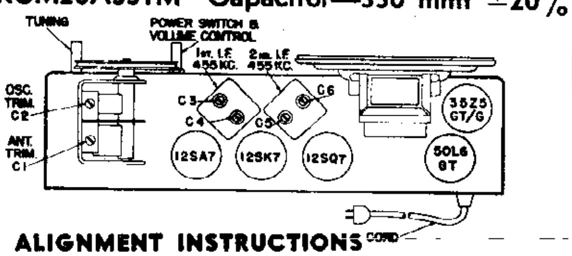


REPLACEMENT PARTS

* When ordering specify "with r-f choke"

Part No.	Description
BU-187	Pilot light bulb 6.3v (#47 Mazda)
CA-350W	Cabinet—Walnut bakelite cabinet
CA-350V	Cabinet—Ivory bakelite cabinet
CL-569	Coil—oscillator coil
CO-107	Capacitor—Electrolytic 40/40/150WV
CR-169	Crystal—dial crystal
CV-501	Condenser—2 gang variable tuning condenser
DL-457-2	Dial—moulded, lucite dial
KN-470	Knob—Walnut (for R-046-U only)
KN-471	Knob—Ivory knob (for R-1046-U only)
KN-622	Knob—Walnut knob (for R-1046M-U only)
LP-163	Loop—Antenna
PO-259W	Pointer—moulded walnut pointer
PO-259V	Pointer—moulded ivory pointer
PT-102	Volume control and power switch
RCM20A101M	Capacitor—100 mmf ±20% mica
RCM20A221M	Capacitor—220 mmf ±20% mica
RCM20A331M	Capacitor—330 mmf ±20% mica

Part No.	Description
*RCP10W4104L	.1/400WV tubular paper condenser
RCP10W4203A	.02/400WV tubular paper condenser
RCP10W4503A	.05/400WV tubular paper condenser
RCP10W6103A	.01/600WV tubular paper condenser
REB106M	Resistor—10 meg., ±20% 1/2 watt
REB121K	Resistor—120 ohms ±10% 1/2 watt
REB224M	Resistor—220,000 ohms ±20% 1/2 watt
REB225M	Resistor—2.2 meg., ±20% 1/2 watt
REB474M	Resistor—470,000 ohms ±20% 1/2 watt
REB822K	Resistor—8200 ohms ±10% 1/2 watt
REC221K	Resistor—220 ohms ±10% 1 watt
SK-110	Speaker—5" Dynamic with output transformer
SO-190	Socket—Dial light socket assembly
SP-191	Spring—Tuning drive lock spring
ST-293-2	Back—printed cardboard back (for R-1046M-U)
ST-516	Back—printed cardboard back (for Models R-046-U and R-1046-U)
TR-186	Transformer—1st or 2nd I.F.



ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN RECEIVER DIAL TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	ANTENNA SECTION TUNING CONDENSER IN SERIES WITH .1 MFD COND.	455 KC.	FULL CLOCKWISE POSITION. (CONDENSER PLATES FULLY OPEN)	C6, C5, C4, C3 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL	1700 KC	1700 KC. (170 ON DIAL)	C 2 (OSCILLATOR)
3	OF ANTENNA LOOP IN SERIES WITH	1400 KC	MAXIMUM SIGNAL (APPROX. 140 ON DIAL)	C1 (ANTENNA)
4	50 MMFD. COND.	REPEAT STEPS 2 AND 3		

ALIGNMENT INSTRUCTIONS

Modulated R.F. signal generator; output meter; insulated screw-driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

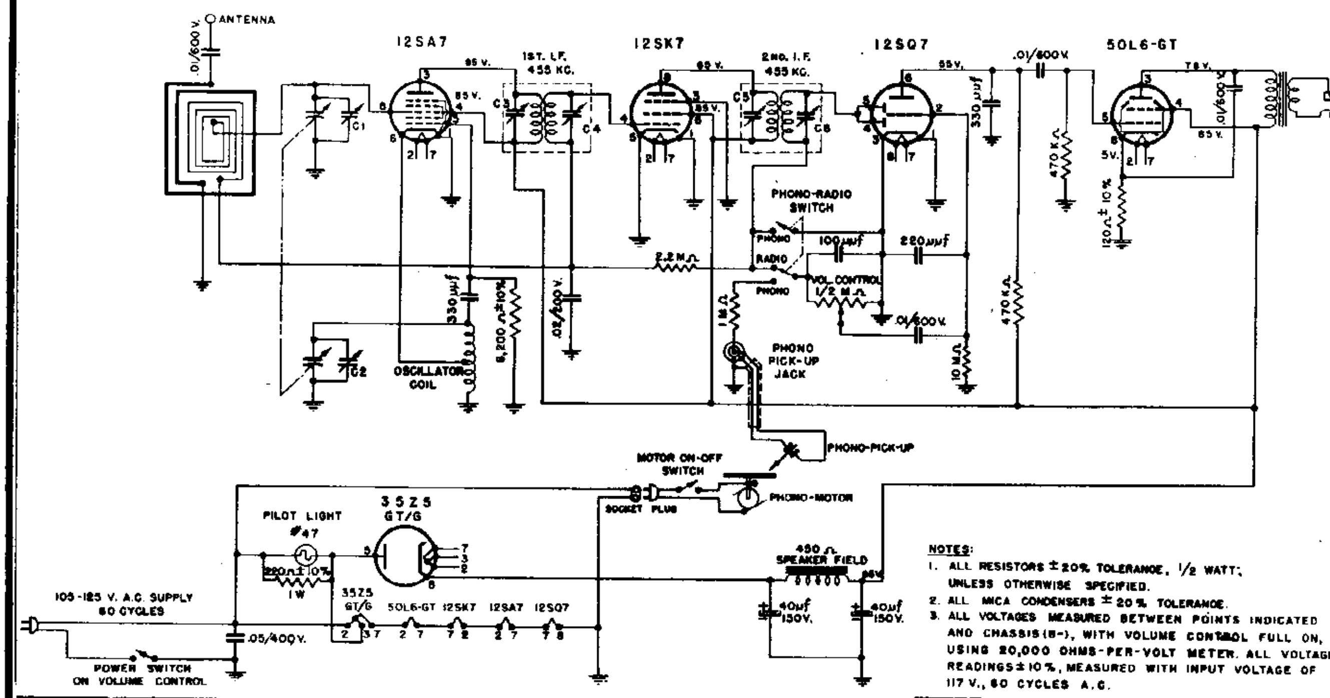
To align the receiver it is necessary to remove the chassis from the cabinet, check that the pointer is horizontal and coincides with the two horizontal reference lines on the dial. In this position the condenser should be completely closed. Connect the output meter and signal generator as follows:

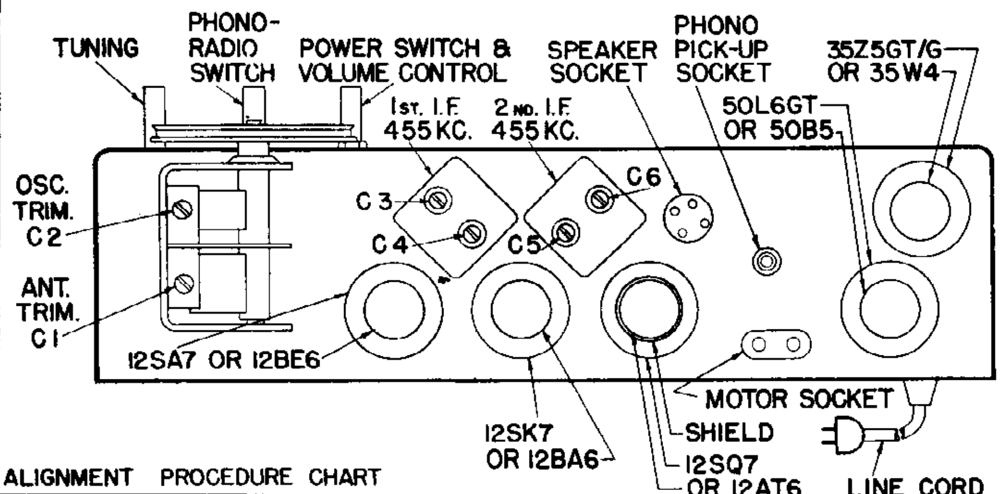
Output meter — Connect across voice coil and turn volume control to maximum.

Signal generator — Connect the low side of the signal generator to the common B—bus thru a .1 mfd condenser and keep the output as low as possible, then proceed in the sequence shown on the alignment chart.

AFFILIATED RETAILERS, INC.

MODEL R-14





CAUTION: A GROUN CONNECTION IS NO REQUIRED AND MUS NOT BE USED.

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN RECEIVER DIAL TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUT (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	ANTENNA SECTION TUNING CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	FULL CLOCKWISE POSITION. (CONDENSER PLATES FULLY OPEN.)	C6, C5, C4, C3 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS.)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1700 KC.	1700 KC. (170 ON DIAL)	C2 (OSCILLATOR)
3		1400 KC.	MAXIMUM SIGNAL (APPROX. 140 ON DIAL)	C1 (ANTENNA)
4		REPEAT STEPS 2 AND 3		

Frequency Range of Receiver 535 - 1700 kc.

Power Requirement 105 - 125 volts 60 cycles Alternating Current (a-c) only

Power Consumption: Receiver 30 watts — Record Player 35 watts

ALIGNMENT INSTRUCTIONS

WHEN SERVICING THIS RECEIVER DO NOT PLACE CHASSIS ON A GROUNDED METALLIC BENCH.

Equipment Required:

Modulated r-f signal generator; output meter; insulated screw driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

The receiver should be aligned with chassis and loop mounted in the cabinet. With the condenser completely closed the pointer should be checked so that it coincides with the two horizontal reference lines on the dial. Connect the output meter and signal generator as follows:

Output meter — Connect across voice coil and turn volume control to maximum.

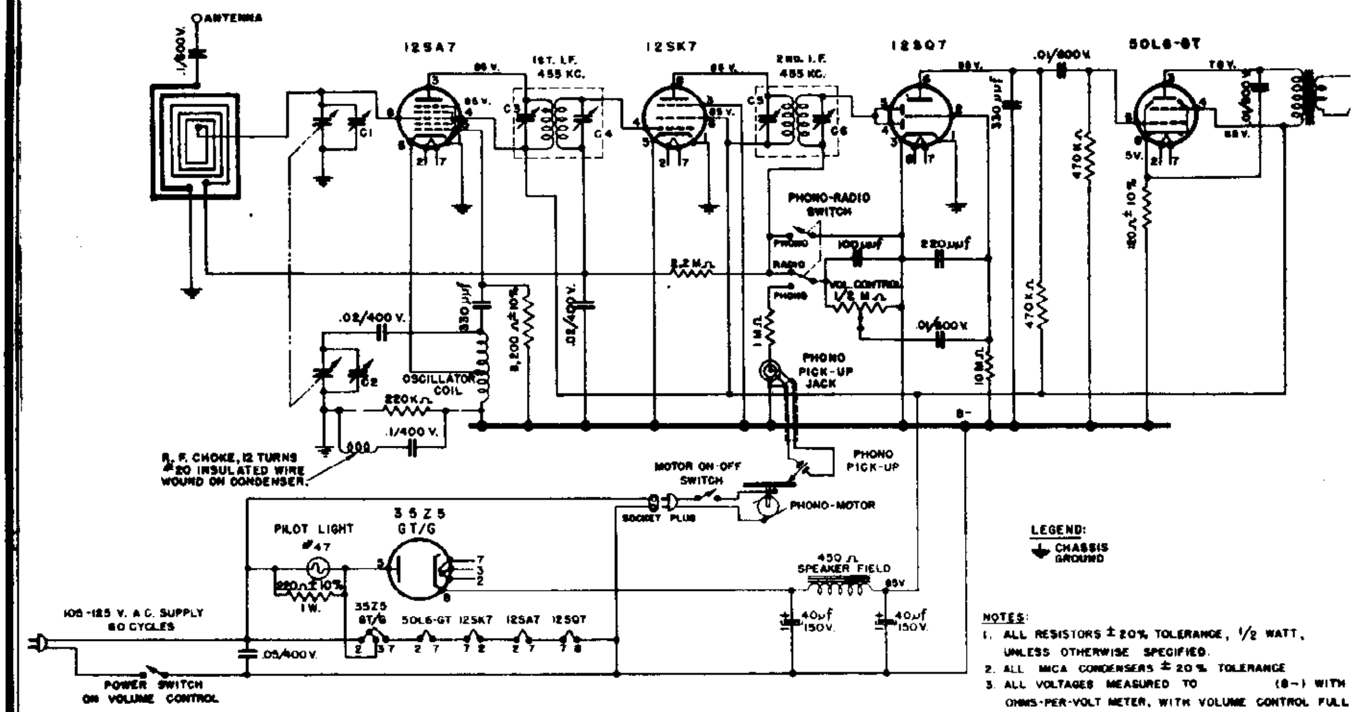
Signal generator — Connect the low side of the signal generator to the receiver chassis thru a .1 mfd condenser and keep the output as low as possible, then proceed in the sequence shown on the alignment chart.

Note: In case of dial light failure, replace the lamp (Mazda #47) as soon as possible to prevent damage to the 35Z5 tube.

REPLACEMENT PARTS

Part No.	Description
BU-187	Pilot light bulb 6.3v (#47 Mazda)
CL-159	Coil-oscillator coil
CO-107	Capacitor-Electrolytic 40-40/150WV
CR-170	Crystal-dial crystal
CV-501	Condenser-2 gang variable tuning condenser
DL-457-2	Dial-moulded lucite dial
KN-625	Knob-Walnut knob marked MOTOR OFF-ON
KN-626	Knob-Walnut knob marked TUNING
KN-627	Knob-Walnut knob marked OFF-ON-VOLUME
KN-628	Knob-Walnut knob marked RADIO-PHONO
LP-355	Loop-Antenna
PO-259W	Pointer-moulded walnut pointer
PT-102	Volume control and power switch
RCM20A101M	Capacitor-100 mmf ± 20% mica
RCM20A221M	Capacitor-220 mmf ±20% mica
RCM20A331M	Capacitor-330 mmf ±20% mica
RCP10W2203A	Capacitor-.02 mfd., 200 volts tubular
RCP10W4503A	Capacitor-.05 mfd., 400 volts tubular
RCP10W6103A	Capacitor-.01 mfd., 600 volts tubular
RE105M	Resistor-1 meg., ±20% 1/2 watt resistor
REB106M	Resistor - 10 meg., ±20% 1/2 watt
REB121K	Resistor - 120 ohms ±10% 1/2 watt
REB225M	Resistor - 2.2 meg., ±20% 1/2 watt
REB474M	Resistor - 470,000 ohms ±20% 1/2 watt
REB822K	Resistor - 8200 ohms ±10% 1/2 watt
REC221K	Resistor - 220 ohms ±10% 1 watt
SK-310	Speaker-5" Dynamic speaker with output transformer
SO-190	Socket - Dial light socket assembly
SP-191	Spring - Tuning drive lock spring
ST-482	Back-Masonite back
SW-243	Switch - Phono-Radio Switch
SW-330	Switch-spst Rotary Switch
TR-186	Transformer - 1st or 2nd I.F. transformer

AFFILIATED RETAILERS, INC. MODEL R-146-



REPLACEMENT PARTS

Part No.	Description
BU-187	Pilot light bulb 6.3v (#47 Mazda)
CL-569	Coil-oscillator coil
CO-107	Condenser-40/40/150WV electrolytic condenser
CR-170	Crystal-dial crystal
CV-501	Condenser-2 gang variable tuning condenser
DL-457-1	Dial-molded lucite dial
KN-625	Knob-Walnut knob marked MOTOR OFF-ON
KN-626	Knob-Walnut knob marked TUNING
KN-627	Knob-Walnut knob marked OFF-ON-VOLUME
KN-628	Knob-Walnut knob marked RADIO-PHONO
LP-355	Loop-Antenna
PO-259W	Pointer-moulded pointer, walnut
PT-102	Volume control and power switch
RCM20A101M	Condenser-100 mmf ±20% mica condenser
RCM20A221M	Condenser-220 mmf ±20% mica condenser
RCM20A331M	Condenser-330 mmf ±20% mica condenser
*RCP10W4104L	Condenser-.1/400W.V. tubular paper condenser
RCP10W4203A	Condenser-.02/400W.V. tubular paper condenser
RCP10W4503A	Condenser-.05/400W.V. tubular paper condenser
RCP10W6103A	Condenser-.01/600W.V. tubular paper condenser
REB105M	Resistor-1 megohm ±20% 1/2 Wa Resistor
REB106M	Resistor-10 meg., ±20% 1/2 Wat Resistor
REB121K	Resistor-120 ohms ±10% 1/2 Wat Resistor
REB224M	Resistor-220,000 ohms ±20% 1/2 Watt Resistor
REB225M	Resistor-2.2 meg., ±20% 1/2 Wat Resistor
REB474M	Resistor-470,000 ohms ±20% 1/2 Watt Resistor
REB822K	Resistor-8200 ohms ±10% 1/2 Wa Resistor
REC221K	Resistor-220 ohms ±10% 1 Watt Resistor
SK-310	Speaker-5" Dynamic with output transformer
SO-190	Socket-Dial light socket assembly
SP-191	Spring-Tuning drive lock spring
ST-482	Back-Masonite Back
SW-243	Switch-Phono-Radio Switch
SW-330	Switch-s.p.s.t. Rotary Switch
TR-186	Transformer-1st or 2nd I.F. Transformer

* When ordering specify "with r-f choke"

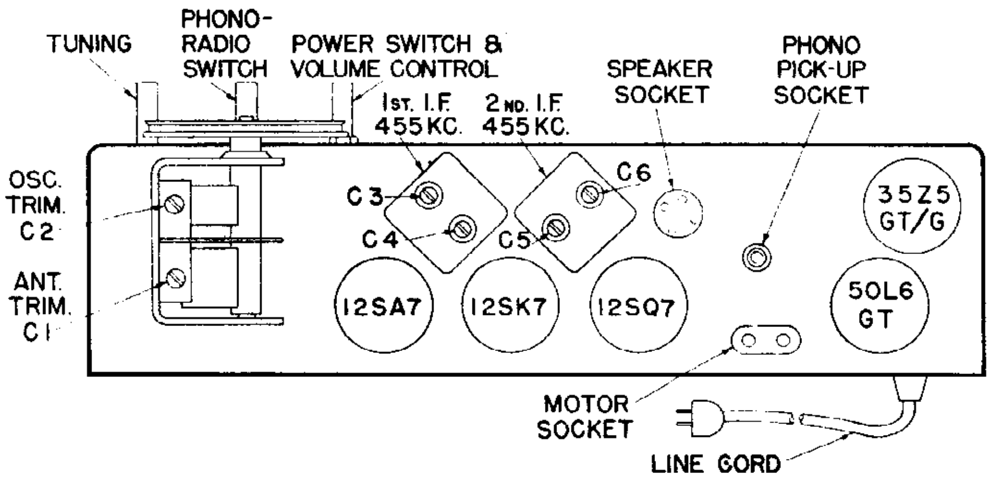
MODEL R-146-U AFFILIATED RETAILERS, INC.

Frequency Range of Receiver 535 - 1700 kc.

Power Requirement 105 - 125 volts 60 cycles Alternating Current (a-c) only

Power Consumption: Receiver 30 watts — Record Player 35 watts

Note: In case of dial light failure, replace the lamp (Mazda #47) as soon as possible to prevent damage to the 35Z5 tube.



ALIGNMENT INSTRUCTIONS

Equipment Required:

Modulated r-f signal generator; output meter; insulated screw driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

The receiver should be aligned with chassis and loop mounted in the cabinet. With the condenser completely closed the pointer should be checked so that it coincides with the two horizontal reference lines on the dial. Connect the output meter and signal generator as follows:

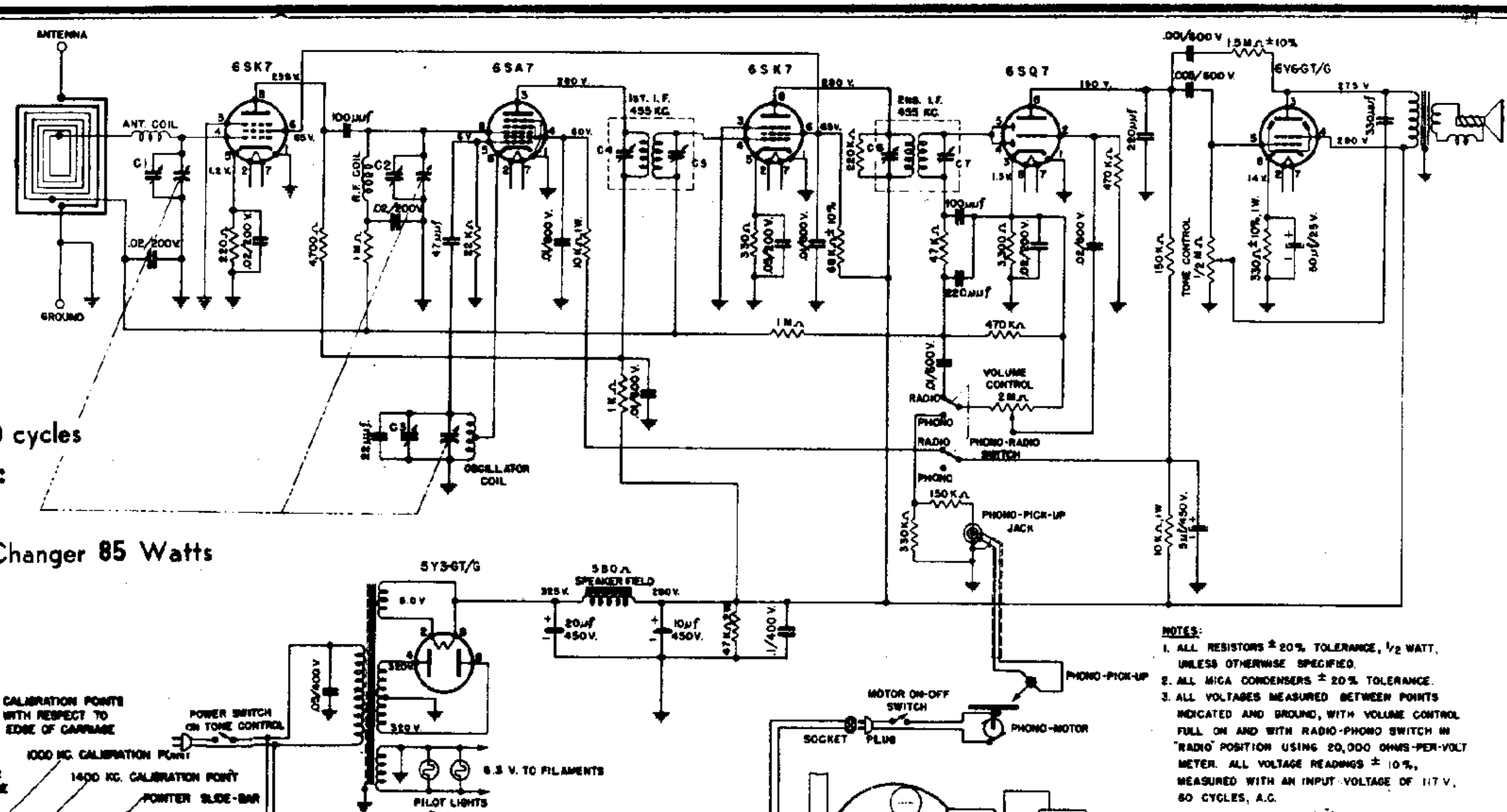
Output meter — Connect across voice coil and turn volume control to maximum.

Signal generator — Connect the low side of the signal generator to the common B—bus thru a .1 n denser and keep the output as low as possible, then proceed in the sequence shown on the alignmer

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN RECEIVER DIAL TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	ANTENNA SECTION TUNING CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	FULL CLOCKWISE POSITION. (CONDENSER PLATES FULLY OPEN)	C6, C5, C4, C3 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1700 KC.	1700 KC. (170 ON DIAL)	C 2 (OSCILLATOR)
3		1400 KC.	MAXIMUM SIGNAL (APPROX. 140 ON DIAL)	C1 (ANTENNA)
4		REPEAT STEPS 2 AND 3		

AFFILIATED RETAILERS, INC.



Frequency Range:

530 — 1700 K.C.

Power Requirement:

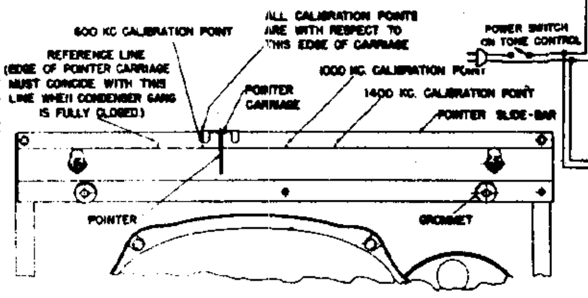
105 — 125 volts a-c 60 cycles

Power Consumption:

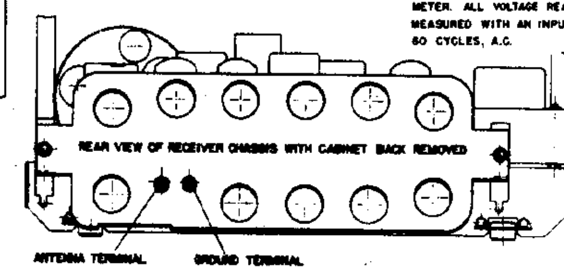
Receiver 70 Watts

Receiver with Record-Changer **85** Watts

NOTES:
1. ALL RESISTORS ± 20% TOLERANCE, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ± 20% TOLERANCE.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON AND WITH RADIO-PHONO SWITCH IN "RADIO" POSITION USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ± 10%, MEASURED WITH AN INPUT VOLTAGE OF 117 V. 60 CYCLES, A.C.

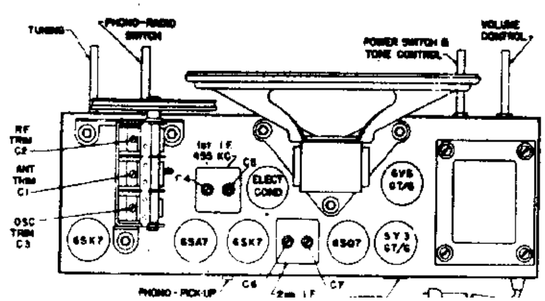


FRONT VIEW OF DIAL BACK-PLATE SHOWING CALIBRATION POINTS



ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE)
1	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH A .1 MFD, 400 VOLT CONDENSER.	455 KC.	EXTREME RIGHTHAND POSITION. (CONDENSER PLATES FULLY OPEN)	C7, C6, C5, C4 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1400 KC.	1400 KC. CALIBRATION POINT.	C3, C2, C1.
3		600 KC.	RESONANCE	CHECK THAT POINTER EDGE (AT RESONANCE) COINCIDES WITH 600 KC. CALIBRATION POINT IF DEVIATION IS TOO LARGE REPEAT STEP 2



MODEL R-246
MODEL R-546

AFFILIATED RETAILERS, INC.

SERVICE AND ALIGNMENT INSTRUCTIONS

To service this receiver it is first necessary to remove the motorboard with the record changer and then remove the chassis through the top opening of the cabinet. To lift the entire motorboard with the changer, unfasten the six screws holding the motorboard in place, disconnect motor and pick-up plugs from chassis, and lift up. It is unnecessary to remove the screws holding the metal-shield in front. CAUTION: WHEN REMOVING THE CHANGER BE SURE TO PLACE IT IN A POSITION WHEREBY THE CHANGER MECHANISM WILL NOT BE DAMAGED.

ALIGNMENT

Equipment Required: Modulated r-f signal generator; output meter; insulated screw driver; one .1 mfd 400 volts and one 50 mmfd 400 volts condenser.

With the receiver removed from the cabinet, connect output meter across voice coil. Connect ground side of the signal generator to chassis; turn volume control fully on, and keeping the output of the signal generator as low as possible, proceed in the sequence as shown on the alignment chart.

To facilitate alignment of the receiver when removed from cabinet, calibration points are provided on the pointer slide bar (see drawing).

Before aligning, close the variable condenser fully counterclockwise (plates fully closed) and check that pointer carriage coincides with the "reference line" on the pointer slide bar.

REPLACEMENT PARTS

Part No.	Description	Part No.	Description
BU-187	Pilot light bulb 6.3v (#47 Mazda)	RCP10W6502A	Condenser—.005/600WV tubular paper condenser
CL-210	Coil—oscillator coil	REB102M	Resistor—1000 ohms ±20% 1/2 watt resistor
CL-608	Coil—r-f coil	REB105M	Resistor—1 megohm ±20% 1/2 watt resistor
CL-609	Coil—antenna loading coil	REB154M	Resistor—150,000 ohms ±20% 1/2 watt resistor
CO-158	Condenser—20/10/5/450 WV & 50/25WV electrolytic condenser	REB155K	Resistor—1.5 megohm ±10% 1/2 watt resistor
CV-145	Condenser—3-gang variable condenser	REB221K	Resistor—220 ohms ±10% 1/2 watt resistor
DL-583	Dial—glass dial scale	REB223M	Resistor—22,000 ohms ±20% 1/2 watt resistor
KN-418	Knob—Walnut knob marked "VOLUME"	REB224M	Resistor—220,000 ohms ±20% 1/2 watt resistor
KN-419	Knob—Walnut knob marked "OFF-ON-TONE"	REB331M	Resistor—330 ohms ±20% 1/2 watt resistor
KN-420	Knob—Walnut knob marked "PHONO-RADIO"	REB332M	Resistor—3300 ohms ±20% 1/2 watt resistor
KN-421	Knob—Walnut knob marked "TUNING"	REB334M	Resistor—330,000 ohms ±20% 1/2 watt resistor
LP-179	Loop—antenna	REB472M	Resistor—4700 ohms ±20% 1/2 watt resistor
PO-181	Pointer	REB473M	Resistor—47,000 ohms ±20% 1/2 watt resistor
PT-105	Control—2 megohms volume control	REB474M	Resistor—470,000 ohms ±20% 1/2 watt resistor
PT-106	Control—1/2 megohm tone control with power switch S.P.S.T.	REB683K	Resistor—68,000 ohms ±10% 1/2 watt resistor
RCM20A101M	Condenser—100 mmfd ±20% mica condenser	REC103M	Resistor—10,000 ohms ±20% 1 watt resistor
RCM20A220M	Condenser—22 mmfd ±20% mica condenser	REC331K	Resistor—330 ohms ±10% 1 watt resistor
RCM20A221M	Condenser—220 mmfd ±20% mica condenser	RED473M	Resistor—47,000 ohms ±20% 2 watt resistor
RCM20A470M	Condenser—47 mmfd ±20% mica condenser	SK-325	Speaker—6" x 9" oval dynamic speaker 580 ohms field coil with output transformer
RCM40A331M	Condenser—330 mmfd ±20% mica condenser (1000 W.V.)	SP-191	Spring—drive shaft retaining spring
RCP10W2203A	Condenser—.02/200WV tubular paper condenser	SP-218	Spring—1/8" lg. pointer drive spring
RCP10W2503A	Condenser—.05/200WV tubular paper condenser	ST-369	Back—Masonite back
RCP10W4104L	Condenser—.1/400WV tubular paper condenser	SW-141	Switch—phono-radio switch D.P.D.T.
RCP10W4503A	Condenser—.05/400WV tubular paper condenser	TR-112	Transformer—power transformer
RCP10W6102A	Condenser—.001/600WV tubular paper condenser	TR-118	Transformer—I.F. transformer, 1st & 2nd
RCP10W6103A	Condenser—.01/600WV tubular paper condenser		

REPLACEMENT PARTS

Part No.	Description	Part No.	Description
BK-405	Bracket-Resistor mounting bracket	RCP10W6202M	Condenser-.002/600WV paper tubular condenser
BT-232	Battery-4½ volt battery (A)	RCP10W6502A	Condenser-.005/600WV paper tubular condenser
BT-233	Battery-45 volt battery (B)	RE-407	Resistor-2600 ohms ±5% 10 watt resistor
BU-187	Bulb-pilot light bulb 6.3v (#47 Mazda)	REB105M	Resistor-1 megohm ±20% ½ watt resistor
CA-475	Cabinet-portable cabinet	REB152M	Resistor-1500 ohms ±20% ½ watt resistor
CB-335	Cable-battery cable	REB224M	Resistor-220,000 ohms ±20% ½ watt resistor
CL-176	Coil-R.F. coil, shielded	REB225M	Resistor-2.2 megohms ±20% ½ watt resistor
CL-177	Coil-oscillator coil	REB270K	Resistor-27 ohms ±10% ½ watt resistor
CO-182	Condenser-80/20/150WV & 100/15WV electrolytic condenser	REB335M	Resistor-3.3 megohms ±20% ½ watt resistor
CR-299	Crystal-dial crystal	REB471M	Resistor-470 ohms ±20% ½ watt resistor
CT-388	Condenser-220-680 mmfd padder condenser	REB474M	Resistor-470,000 ohms ±20% ½ watt resistor
CV-146	Condenser-3 gang variable condenser (with pulley)	REB683K	Resistor-68,000 ohms ±10% ½ watt resistor
DL-391	Dial-metal dial scale	REB685M	Resistor-6.8 megohms ±20% ½ watt resistor
ES-274-2	Escutcheon-moulded escutcheon	REC332K	Resistor-3300 ohms ±10% 1 watt resistor
KN-260	Knob-walnut knob	RED101M	Resistor-100 ohms ±20% 2 watt resistor
KN-261	Knob-walnut knob with dot	SD-607	Shield-Tube Shield
LC-315	Line Cord-540 ohms resistance line cord	SK-156	Speaker-5" P.M. Speaker with output transformer
LP-178	Loop-Antenna	SO-572	Socket-pilot light socket assembly
PO-395	Pointer-dial pointer	SP-191	Spring-Drive shaft retaining spring
PT-383	Control-volume control 2 megohms with D.P.S.T. switch	SW-185	Switch-battery/electric D.P.D.T. slide switch
RCM20A100M	Condenser-10 mmfd ±20% mica condenser	TR-186	Transformer-I.F. 455 K.C. Transformer
RCM20A470M	Condenser-47 mmfd ±20% mica condenser		
RCP10W2104A	Condenser-.1/200WV paper tubular condenser		
RCP10W2203A	Condenser-.02/200WV paper tubular condenser		
RCP10W4503A	Condenser-.05/400WV paper tubular condenser		
RCP10W6103A	Condenser-.01/600WV paper tubular condenser		

SERVICE AND ALIGNMENT INSTRUCTIONS

WHEN SERVICING THIS RECEIVER DO NOT PLACE CHASSIS ON A GROUNDED METALLIC BENCH.

For tube replacement it is not necessary to remove the chassis from the cabinet. Access to the tubes may be made by removing the center screw on the loop holding same to the bracket, and then lifting loop carefully off the bracket so as to avoid breaking of wires connecting same.

For ALIGNMENT the chassis must be removed from case. Remove first batteries and then the three screws holding chassis to the bottom of the shelf.

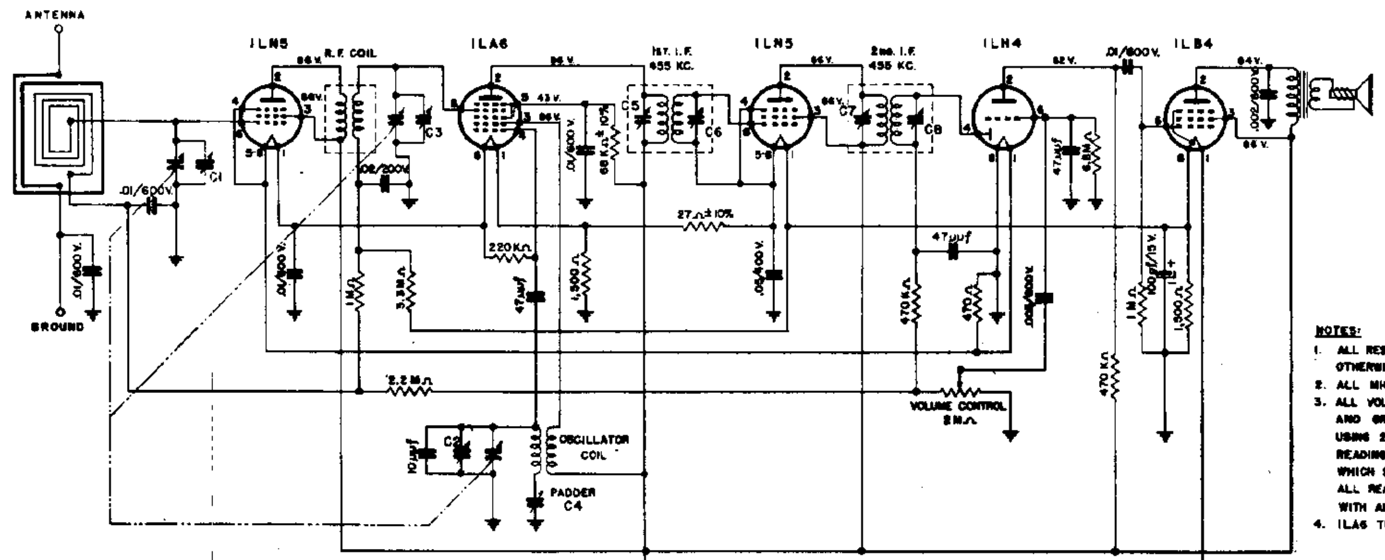
ALIGNMENT

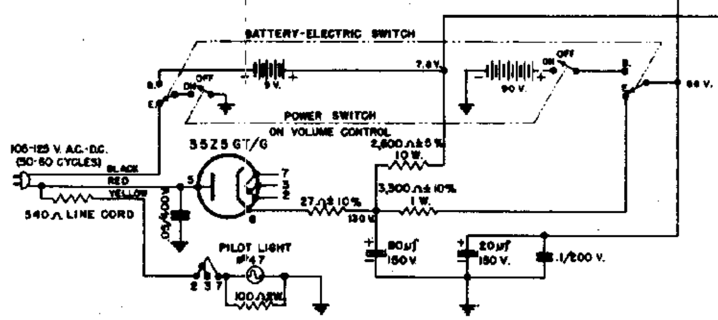
Equipment Required: Modulated r-f signal generator; output meter; insulated screw driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

Turn variable condenser fully counterclockwise (plates fully closed) and check that pointer coincides with the first thin calibration mark on the dial. Connect the output meter and signal generator as follows:

Output meter: Connect across voice coil and turn volume control to maximum.

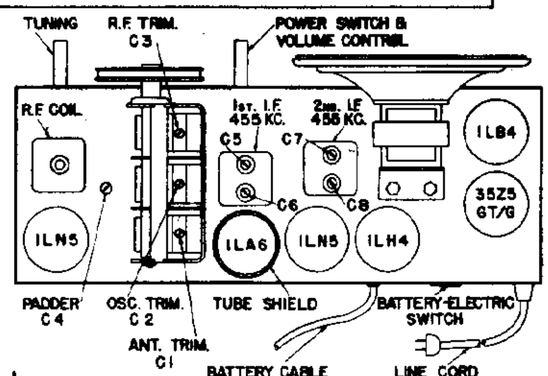
Signal generator: Connect the low side of the signal generator to the receiver chassis thru a .1 mfd condenser and keep output as low as possible, then proceed in the sequence shown on the alignment chart.



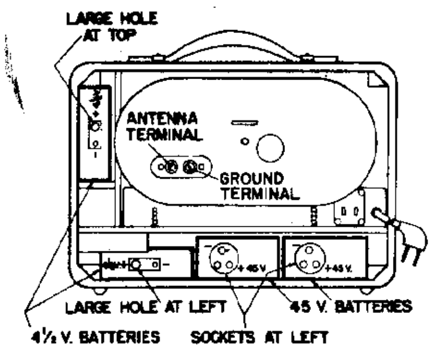


NOTES:

1. ALL RESISTORS ± 20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ± 20% TOLERANCE.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ± 10%, EXCEPT FILAMENT VOLTAGE WHICH SHOULD BE KEPT WITHIN ± 5%. ALL READINGS MEASURED ON ELECTRIC POWER OPERATION WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.
4. 1LA6 TUBE IS ENCLOSED IN METAL SHIELD.



TOP VIEW OF CHASSIS



REAR VIEW OF CABINET
SHOWING PLACEMENT OF BATTERIES

Frequency Range 530 - 1700 kc.

Power Requirement 105 - 125 volts a-c 50 to 60 cycles,
or 105 - 125 volts d-c,
or 9 volts "A" and 90 volts "B" battery supply.

Power Consumption on electric operation — 20 watts

NOTE: 1LA6 TUBE IS ENCLOSED IN METAL SHIELD.

ALIGNMENT PROCEDURE CHART

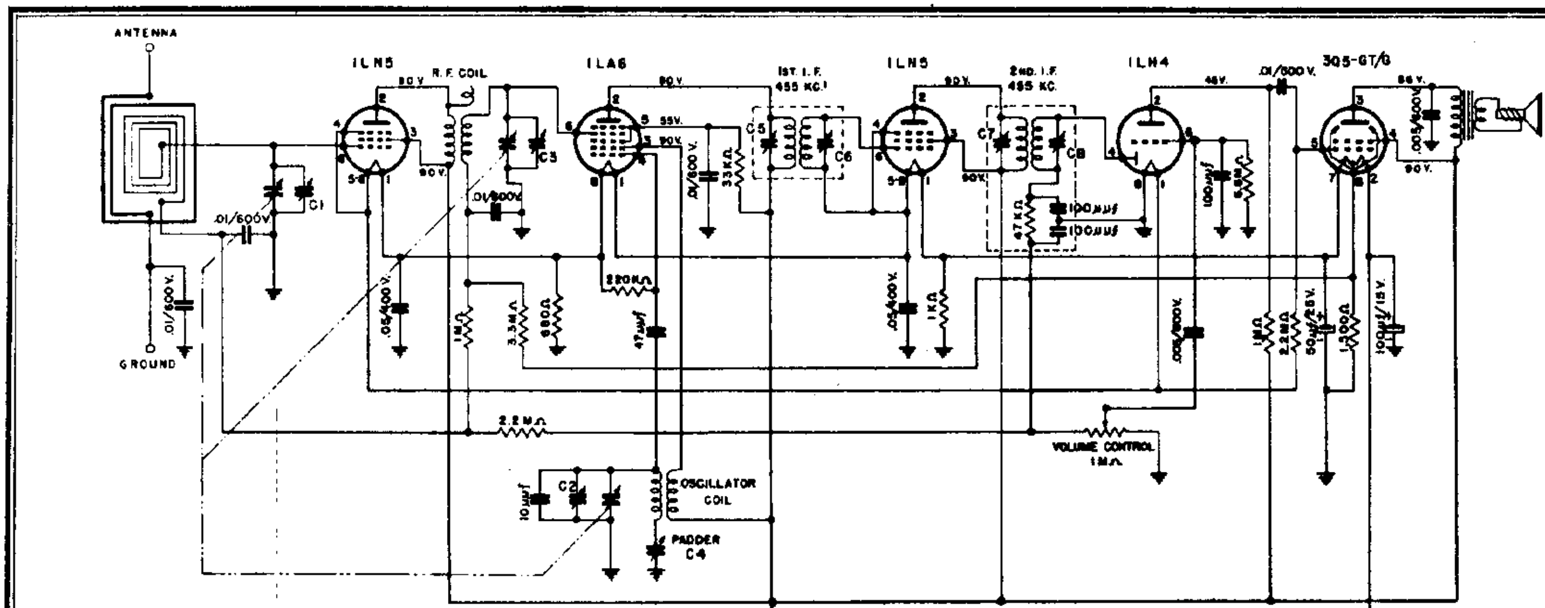
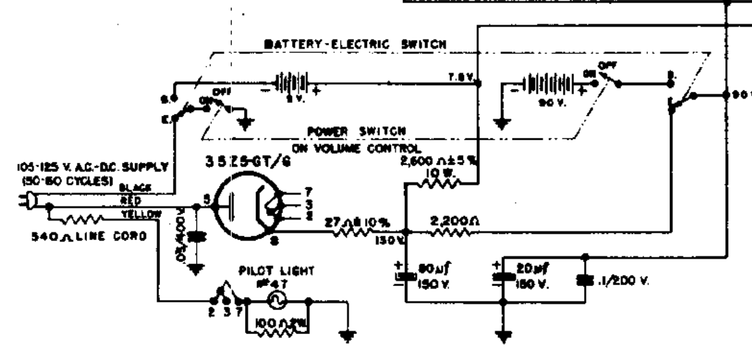
STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO -	SET SIGNAL GENERATOR TO -	SET POINTER TO -	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN.)	C8, C7, C6, C5 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS.)
2	ANTENNA TERMINAL	1500 KC.	1500 KC. (150 ON DIAL)	C2, C3, C1 OSCILLATOR, R.F. AND ANTENNA TRIMMERS
3	OF ANTENNA LOOP IN SERIES WITH	600 KC.	600 KC. (APPROX. 60 ON DIAL)	C4 PADDER ROCK DIAL FOR MAXIMUM SIGNAL

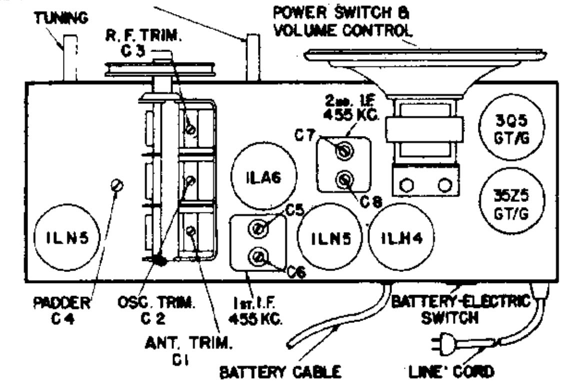
For Parts list, see P.1'

MODEL R-546-A

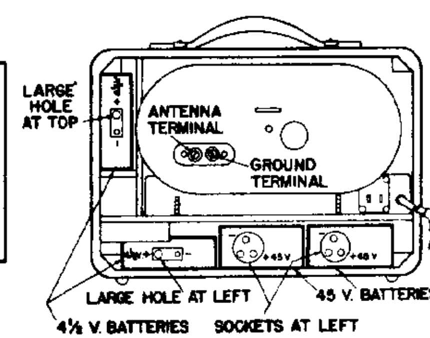
AFFILIATED RETAILERS, INC.

NOTES:
1. ALL RESISTORS ± 20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ± 20% TOLERANCE.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ± 10%, EXCEPT FILAMENT VOLTAGE WHICH SHOULD BE KEPT WITHIN ± 5%.
ALL READINGS MEASURED ON ELECTRIC POWER OPERATION WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.



TOP VIEW OF CHASSIS



REAR VIEW OF CABINET
SHOWING PLACEMENT OF BATTERIES

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	SET POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH .1 MFD COND.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN)	C8, C7, C6, C5 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1500 KC.	1500 KC. (150 ON DIAL)	C2, C3, C1 (OSCILLATOR, R.F. AND ANTENNA TRIMMERS)
3		600 KC.	600 KC. (APPROX. 60 ON DIAL)	C4 (PADDER) ROCK DIAL FOR MAXIMUM SIGNAL
4		REPEAT STEPS 2 AND 3		

Frequency Range 530 - 1700 kc.

Power Requirement 105 - 125 volts a-c, 50 to 60 cycles, or 105 - 125 volts d-c, or 9 volts "A" and 90 volts "B" battery supply.

Power Consumption on electric operation — 20 watts

MODEL R-546-

AFFILIATED RETAILERS, INC.

REPLACEMENT PARTS

Part No.	Description
BK-405	Bracket-Resistor mounting bracket
BU-187	Bulb-pilot light bulb 6.3v (#47 Mazda)
CA-475	Cabinet-portable cabinet
CB-335	Cable-battery cable
CL-177	Coil-oscillator coil
CL-630	Coil-R.F. coil
CO-182	Condenser-80/20/150WV & 100/15WV electrolytic condenser
CO 808	Condenser-50 mfd /25 W.V. electrolytic condenser
CR-299	Crystal-dial crystal
CT-388	Condenser-220-680 mmfd padder condenser
CV-146	Condenser-3 gang variable condenser (with pulley)
DL-391	Dial-metal dial scale
ES-274-2	Escutcheon-moulded escutcheon
KN-260	Knob-walnut knob
KN-261	Knob-walnut knob with dot
LC-315	Line Cord-540 ohms resistance line cord
LP-178	Loop-Antenna
PO-395	Pointer-dial pointer
PT-576	Control-volume control 1 megohm with D.P.S.T. switch
RCM20A100M	Condenser-10 mmfd 20% mica condenser
RCM20A101M	Condenser-100 mmf 20% mica condenser
RCM20A470M	Condenser-47 mmfd 20% mica condenser
RCP10W2104A	Condenser-.1/200WV paper tubular condenser
RCP10W4503A	Condenser-.05/400WV paper tubular condenser
RCP10W6103A	Condenser-.01/600WV paper tubular condenser
RCP10W6502A	Condenser-.005/600WV paper tubular condenser
RE 407	Resistor-2600 ohms 5% 10 watt resistor
REB102M	Resistor-1000 ohms 20% 1/2 watt resistor
REB105M	Resistor-1 megohm 20% 1/2 watt resistor
REB152M	Resistor-1500 ohms 20% 1/2 watt resistor
REB222M	Resistor-2200 ohms 20% 1/2 watt resistor
REB224M	Resistor-220,000 ohms 20% 1/2 watt resistor
REB225M	Resistor-2.2 megohms 20% 1/2 watt resistor
REB270K	Resistor-27 ohms 10% 1/2 watt resistor
REB333M	Resistor-33,000 ohms 20% 1/2 watt resistor
REB335M	Resistor-3.3 megohms 20% 1/2 watt resistor
REB681M	Resistor-680 Ohms 20% 1/2 watt resistor
REB685M	Resistor-6.8 megohms 20% 1/2 watt resistor
RED101M	Resistor-100 ohms 20% 2 watt resistor
SK-475	Speaker-5" P.M. Speaker with output transformer
SO-572	Socket-pilot light socket assembly
SP-191	Spring-Drive shaft retaining spring
SW-185	Switch-battery-electric D.P.D.T. slide switch
TR-707	Transformer-I.F. 455 K.C. input-Transformer
TR-708	Transformer-Output I.F. 455 K.C. Transformer with built-in I.F. filter

SERVICE AND ALIGNMENT INSTRUCTIONS

WHEN SERVICING THIS RECEIVER DO NOT PLACE CHASSIS ON A GROUNDED METALLIC BENCH.

For ALIGNMENT the chassis must be removed from case. Remove first batteries and then the three screws holding chassis to the bottom of the shelf.

ALIGNMENT

Equipment Required: Modulated r-f signal generator; output meter; insulated screw driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

Turn variable condenser fully counterclockwise (plates fully closed) and check that pointer coincides with the first thin calibration mark on the dial. Connect the output meter and signal generator as follows:

Output meter: Connect across voice coil and turn volume control to maximum.

Signal generator: Connect the low side of the signal generator to the receiver chassis thru a .1 mfd condenser and keep output as low as possible, then proceed in the sequence shown on the alignment chart.

REPLACEMENT PARTS

Part No.	Description
BK-405	Bracket-Resistor mounting bracket
CA-475	Cabinet-portable cabinet
CB-335	Cable-battery cable
CL-176	Coil-R.F. coil, shielded
CL-177	Coil-oscillator coil
CO-182	Condenser-80/20/150WV & 100/15WV electrolytic condenser
CR-299	Crystal-dial crystal
CT-388	Condenser-220-680 mmfd padder condenser
CV-146	Condenser-3 gang variable condenser (with pulley)
DL-391	Dial-metal dial scale
ES-274-2	Escutcheon-moulded escutcheon
KN-260	Knob-walnut knob
KN-261	Knob-walnut knob with dot
LC-223	Line Cord
LP-178	Loop-Antenna
PO-395	Pointer-dial pointer
PT-383	Control-volume control 2 megohms with D.P.S.T. switch
RCM20A100M	Condenser-10 mmfd ±20% mica condenser
RCM20A470M	Condenser-47 mmfd ±20% mica condenser
RCP10W2104A	Condenser-.1/200W.V. paper tubular condenser
RCP10W2203A	Condenser-.02/200W.V. paper tubular condenser
RCP10W2254A	Condenser-.25/200W.V. paper tubular condenser
RCP10W4104L	Condenser-.1/400W.V. paper tubular condenser
RCP10W4503A	Condenser-.05/400W.V. paper tubular condenser
RCP10W6103A	Condenser-.01/600WV paper tubular condenser
RCP10W6202M	Condenser-.002/600WV paper tubular condenser
RCP10W6502A	Condenser-.005/600WV paper tubular condenser
RE-407	Resistor-2600 ohms ±5% 10 watt resistor
REB105M	Resistor-1 megohm ±20% 1/2 watt resistor
REB152M	Resistor-1500 ohms ±20% 1/2 watt resistor
REB224M	Resistor-220,000 ohms ±20% 1/2 watt resistor
REB225M	Resistor-2.2 megohms ±20% 1/2 watt resistor
REB270K	Resistor-27 ohms ±10% 1/2 watt resistor
REB335M	Resistor-3.3 megohms ±20% 1/2 watt resistor
REB471M	Resistor-470 ohms ±20% 1/2 watt resistor
REB474M	Resistor-470,000 ohms ±20% 1/2 watt resistor
REB683K	Resistor-68,000 ohms ±10% 1/2 watt resistor
REB685M	Resistor-6.8 megohms ±20% 1/2 watt resistor
REC332K	Resistor-3300 ohms ±10% 1 watt resistor
SD-607	Shield-Tube Shield
SK-156	Speaker-5" P.M. Speaker with output transformer
SP-191	Spring-Drive shaft retaining spring
SW-193	Switch-battery-electric T.P.D.T. slide switch
TR-186	Transformer-I.F. 455 K.C. Transformer

SERVICE AND ALIGNMENT INSTRUCTIONS

For tube replacement it is not necessary to remove the chassis from the cabinet. Access to the tubes may be made by removing the center screw on the loop holding same to the bracket, and then lifting loop carefully off the bracket so as to avoid breaking of wires connecting same.

For ALIGNMENT the chassis must be removed from case. Remove first batteries and then the three screws holding chassis to the bottom of the shelf.

ALIGNMENT

Equipment Required: Modulated r-f signal generator; output meter; insulated screw driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

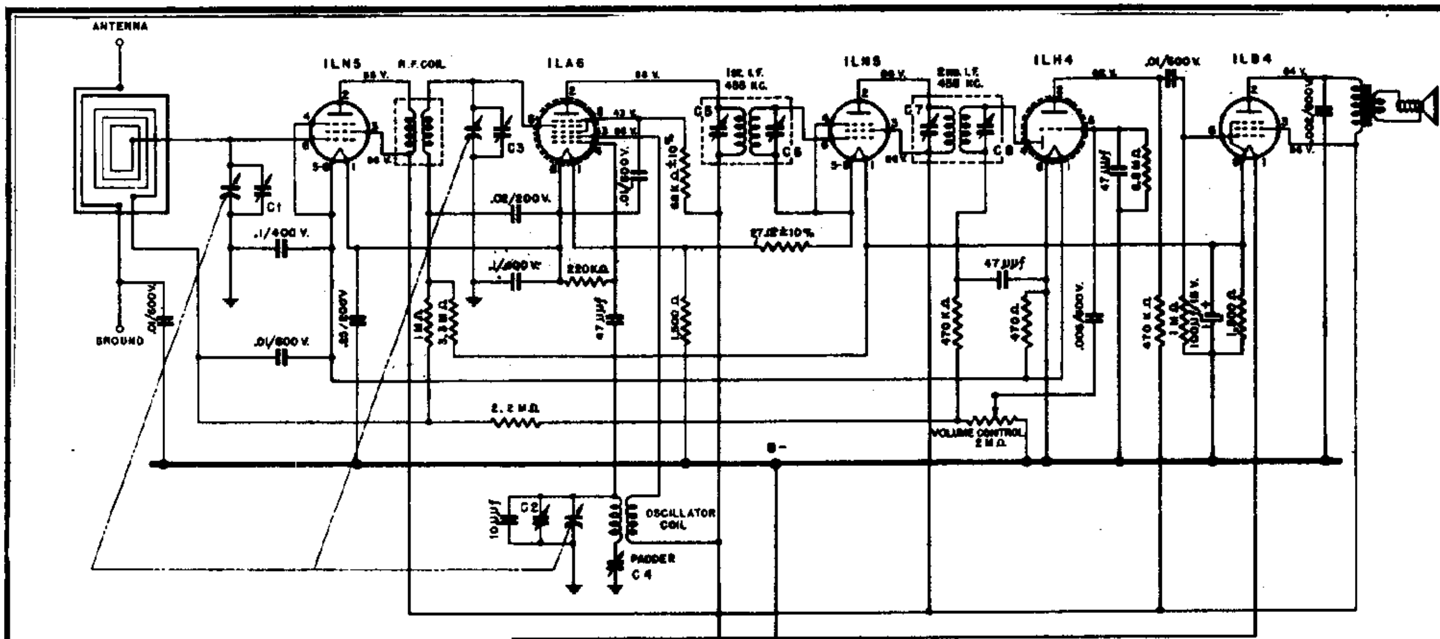
Turn variable condenser fully counterclockwise (plates fully closed) and check that pointer coincides with the first thin calibration mark on the dial. Connect the output meter and signal generator as follows:

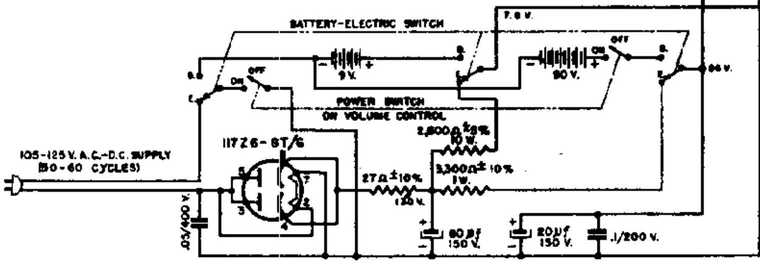
Output meter: Connect across voice coil and turn volume control to maximum.

Signal generator: Connect the low side of the signal generator to the receiver chassis thru a .1 mfd condenser and keep output as low as possible, then proceed in the sequence shown on the alignment chart.

MODEL R-546-U

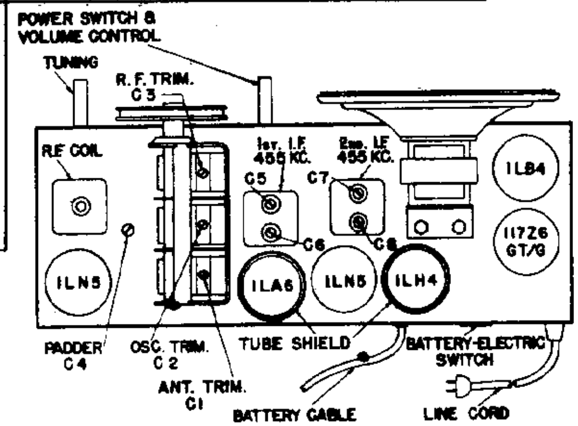
AFFILIATED RETAILERS, INC.





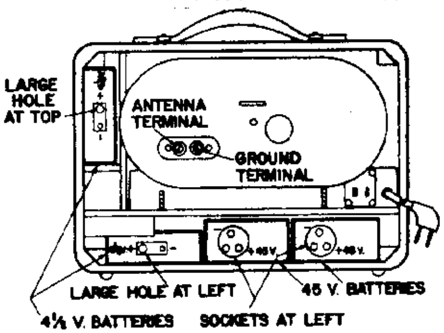
LEGEND: CHASSIS GROUND

NOTES:
1. ALL RESISTORS ±20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ±20% TOLERANCE.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND B- WITH VOLUME CONTROL FULL ON, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ±10%, EXCEPT FILAMENT VOLTAGE WHICH SHOULD BE KEPT WITHIN ±5%.
ALL READINGS MEASURED ON ELECTRIC POWER OPERATION WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.
4. ILA6 AND ILN4 TUBES ARE ENCLOSED IN METAL SHIELDS.



TOP VIEW OF CHASSIS

NOTE: ILA6 AND ILH4 TUBES ARE ENCLOSED IN METAL SHIELDS.



REAR VIEW OF CABINET
SHOWING PLACEMENT OF BATTERIES

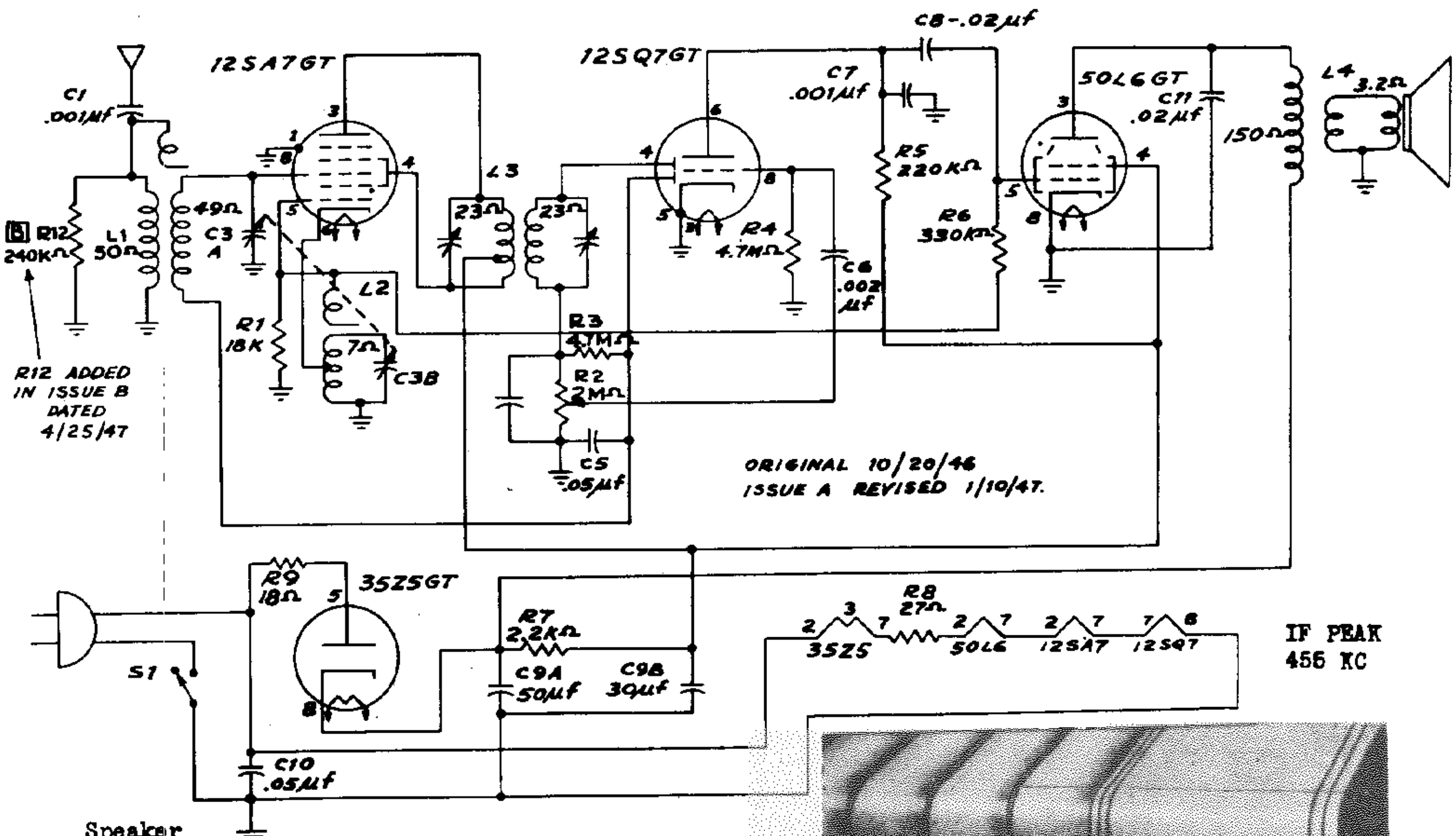
STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	SET POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN)	C8, C7, C6, C5 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1500 KC.	1500 KC. (150 ON DIAL)	C2, C3, C1 (OSCILLATOR, R.F. AND ANTENNA TRIMMERS)
3		600 KC.	600 KC. (APPROX. 60 ON DIAL)	C4 (PADDER) ROCK DIAL FOR MAXIMUM SIGNAL
4		REPEAT STEPS 2 AND 3		

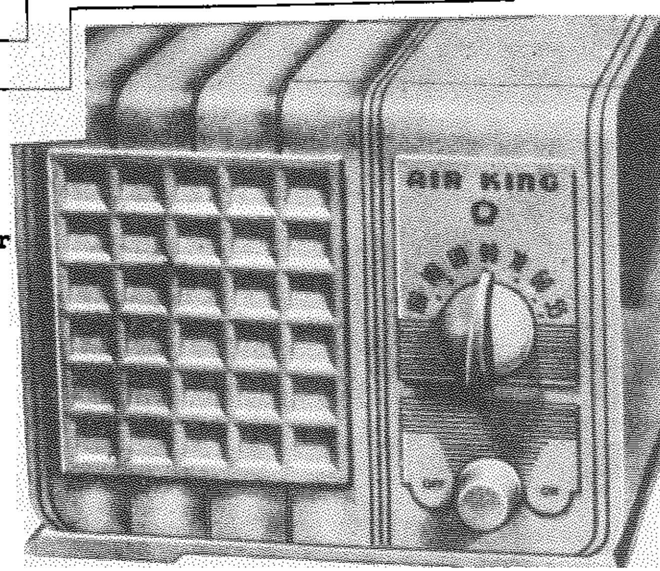
Frequency Range 530 - 1700 kc.

Power Requirement 105 - 125 volts a-c 50 to 60 cycles, or 105 - 125 volts d-c, or 9 volts "A" and 90 volts "B" battery supply.

Power Consumption on electric operation — 20 watts

AIR KING PRODUCTS CO., INC.



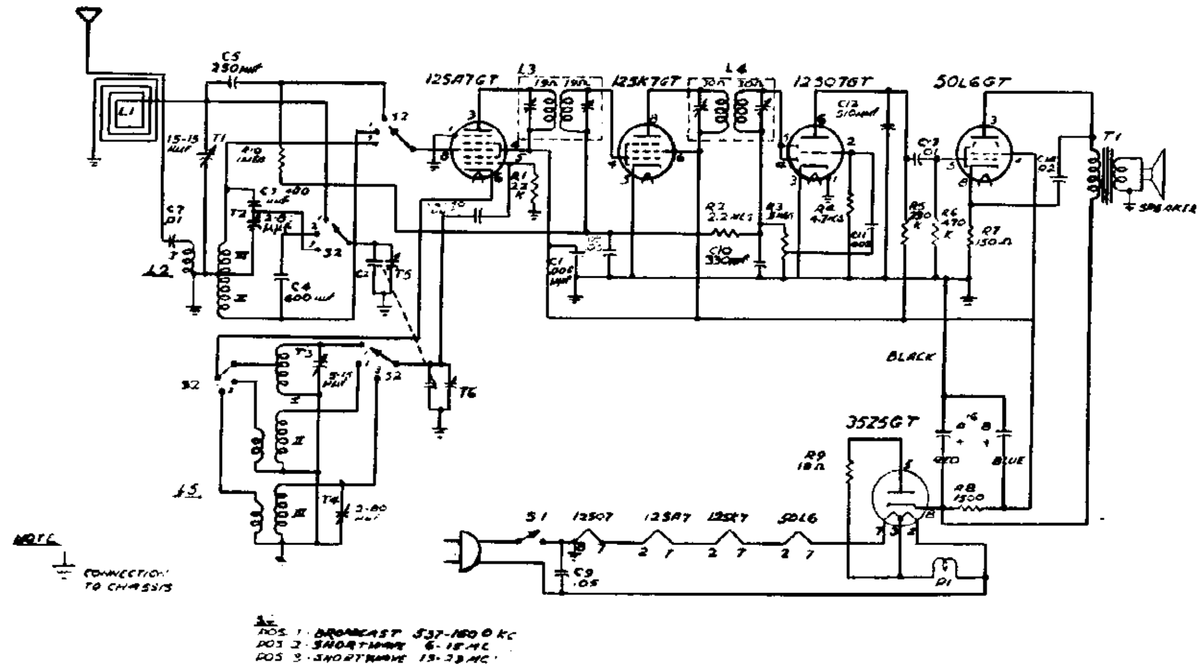


5877	Speaker	2479	Volume Control
39156	Plastic knob tuning	28182	Antenna Coil
39157	" " volume	28184	Oscillator Coil
62192	Cabinet back	3376	I.F. Transformer
	Instruction Book	5580	Antenna Hank
1673	Variable Condenser		
2073	Electrolytic cond Unit 50-30 MF		

Paper	cond.	.05/400 v.	Resistor	10K ohm ¼W.
"	"	.01/ "	"	4.7 meg. ohm ¼ w.
"	"	.002/"	"	220 ohm ¼ w.
"	"	.02/ "	"	2200 ohm 2 W
"	"	.05/200 v.	"	18 ohm ¼ w.
"	"	.005/"	"	46 " 1W.
"	"	.001/500 V.	"	330K ohm ¼ W.
Mica	"	100 mmf		
"	"	47 "		

MODELS A501, A502,
Chassis 465-4

AIR KING PRODUCTS CO., INC.



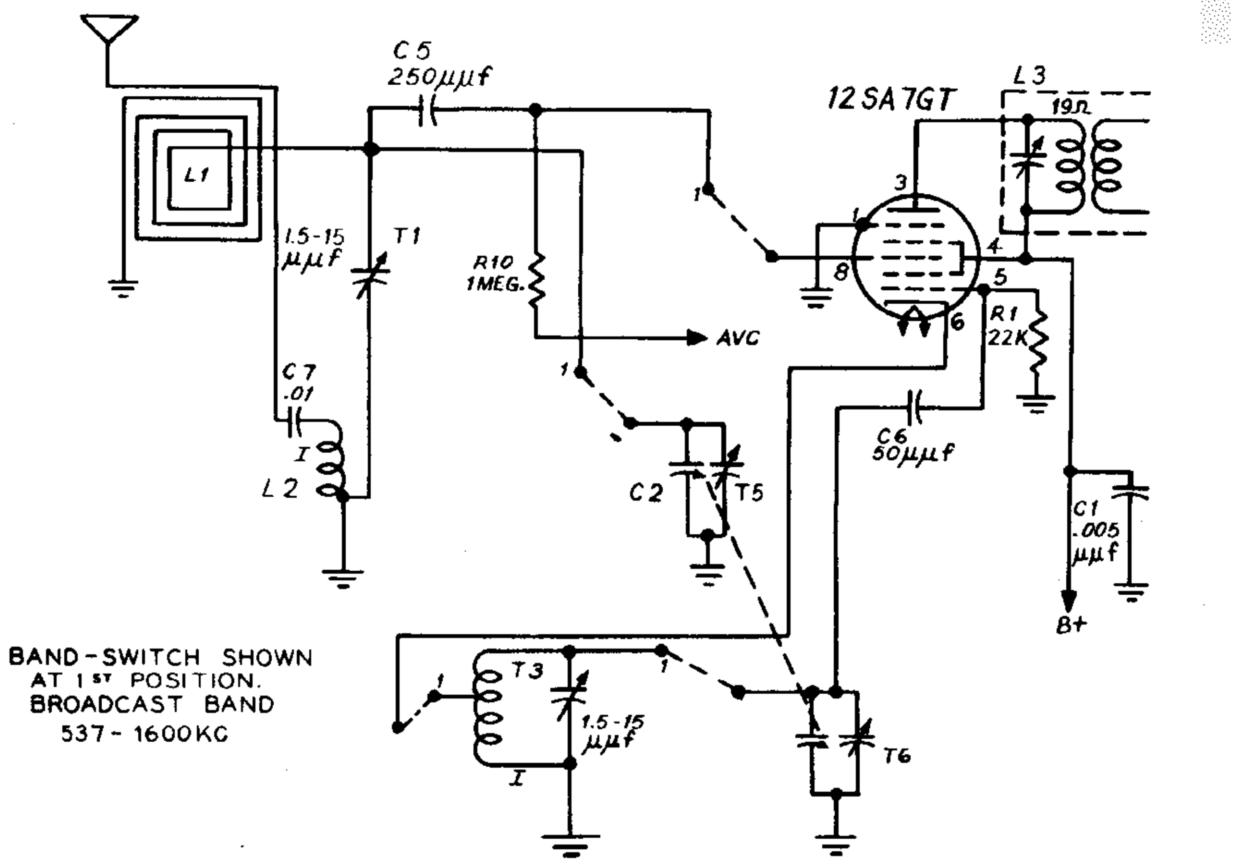
ALIGNMENT PROCEDURE

Output meter connection.......................Across voice coil
Output meter reading ... ½ watt...........1.25V for 3.2 Ohm voice coil
Connection of generator ground.......................Receiver chassis
Generator modulation.......................Approximately 30% @ 400 cycles
Position of volume control.......................Fully clockwise

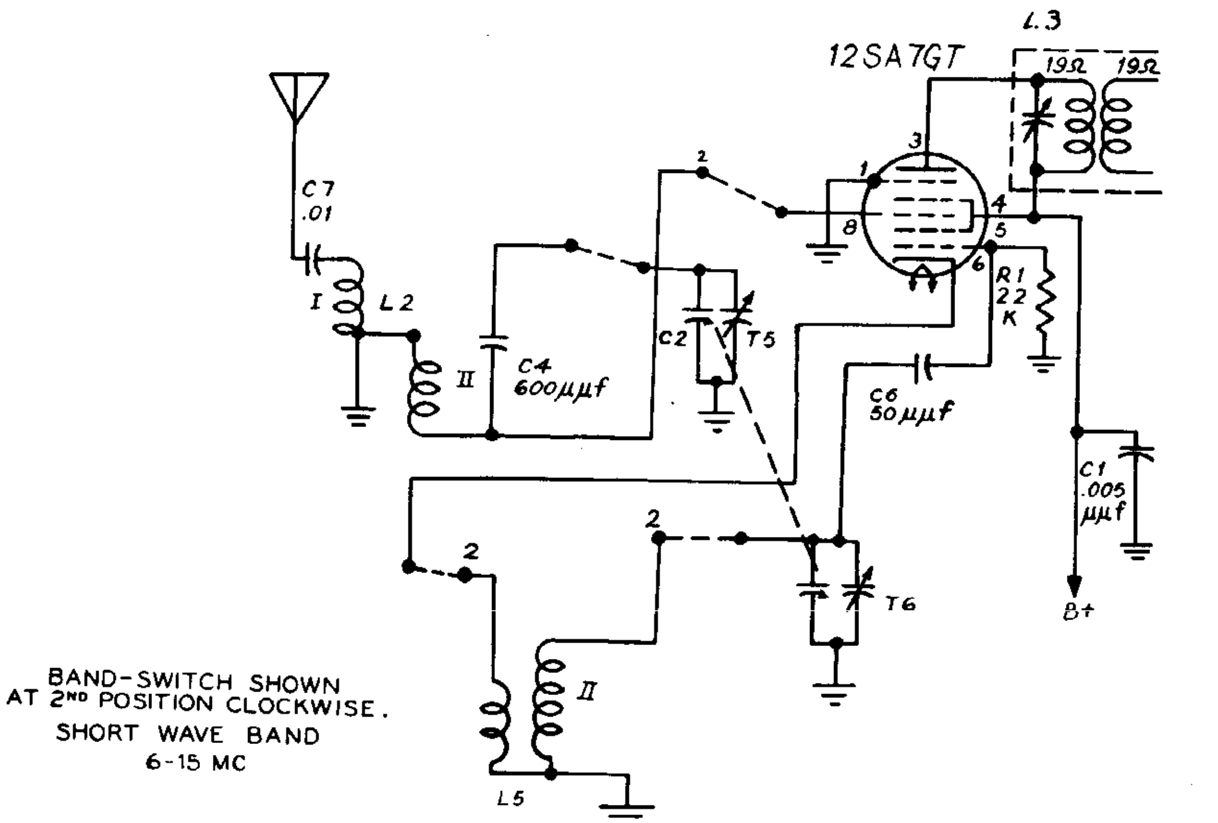
WAVE BAND SW.	POSITION OF DIAL POINTER	GEN. FREQ.	GEN. CONN.	DUMMY ANT.	TRIMMERS ADJ. IN ORDER	TRIMMER FUNCTION
B. C.	550	455	12SA7 Grid	.1 mfd.	I. F. Trimmers	I. F.
S. W. 1	14	14	Ant. Post	R.M.A. Std.	T6*	Osc.
	14	14	Ant. Post	R.M.A. Std.	T5	Osc.
S. W. 2	23	23	Ant. Post	R.M.A. Std.	T4*	Osc.
	23	23	Ant. Post	R.M.A. Std.	T2	R. F.
B. C.	1500	1500	Ant. Post	R.M.A. Std.	T3	R. F.
	1500	1500	Ant. Post	R.M.A. Std.	T1	R. F.

NOTE:
* If two peaks can be had the correct one is with the trimmer screw further out, the other peak is the image. Align set in order shown.

AIR KING PRODUCTS CO., INC.



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
537 - 1600KC

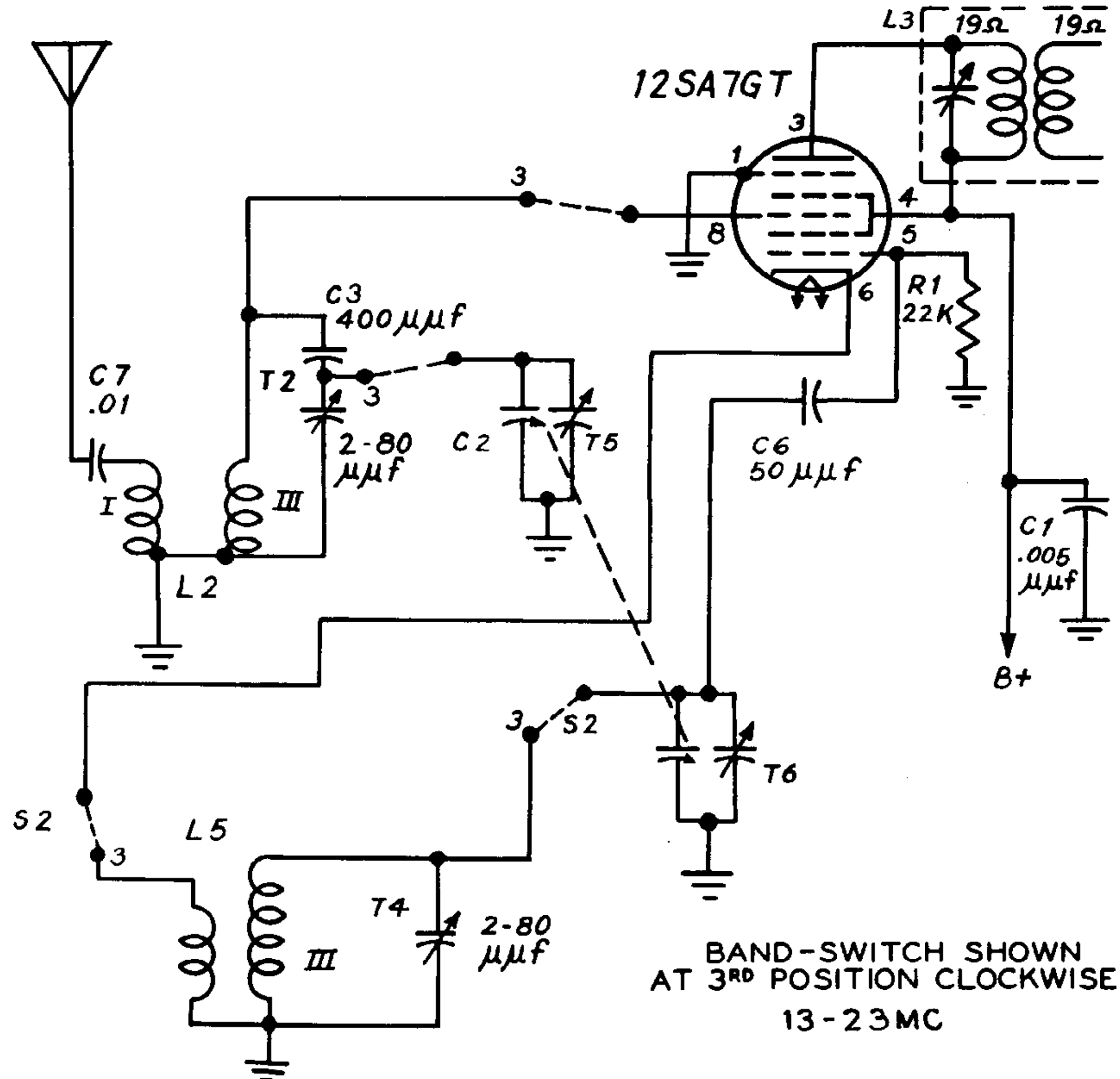


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
SHORT WAVE BAND
6-15 MC

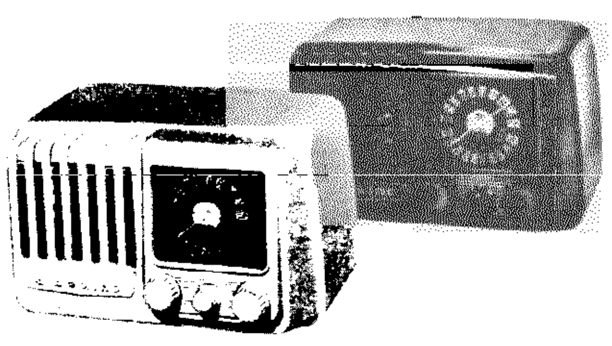
"clarified schematics"

MODELS A501, A502

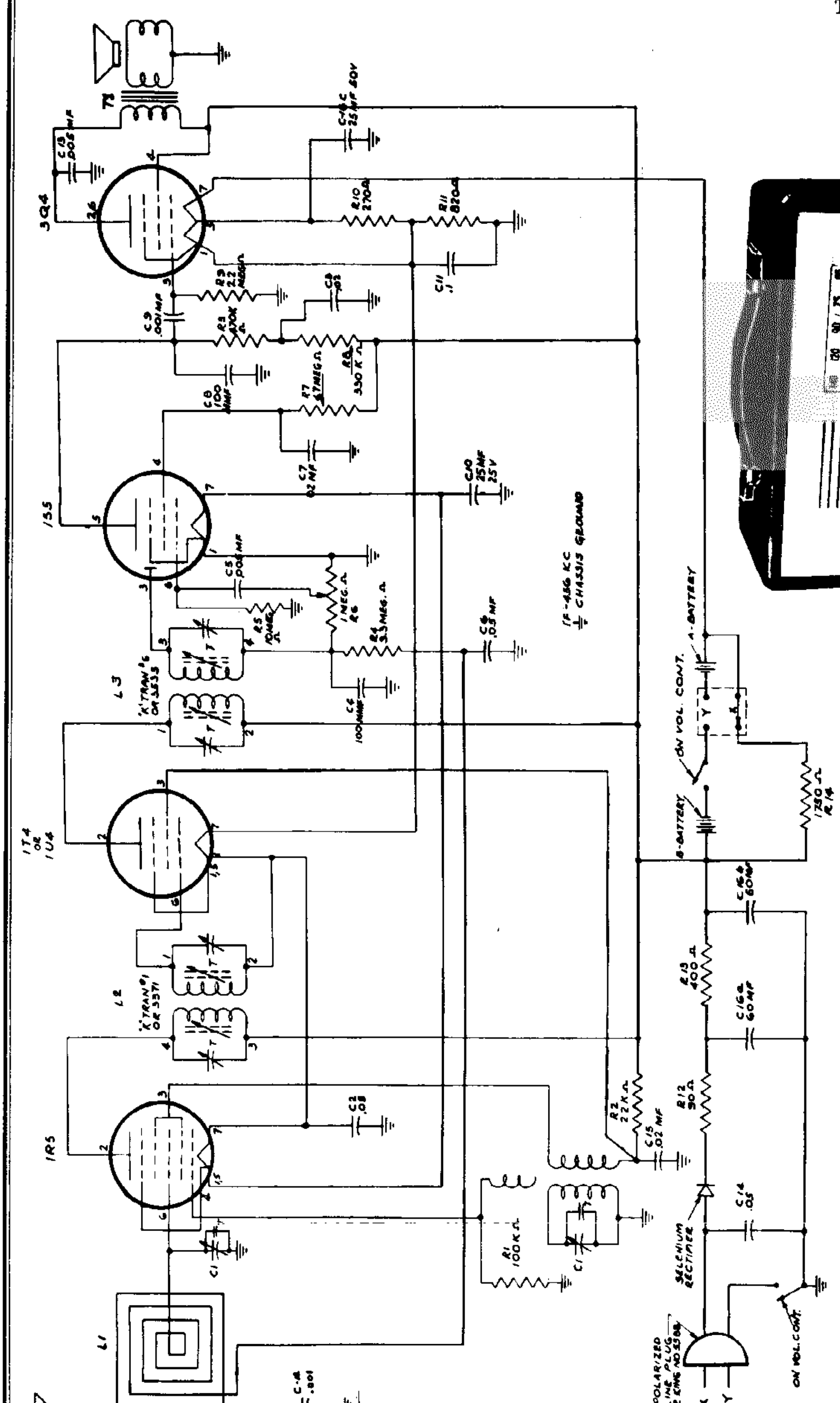
AIR KING PRODUCTS CO., INC.

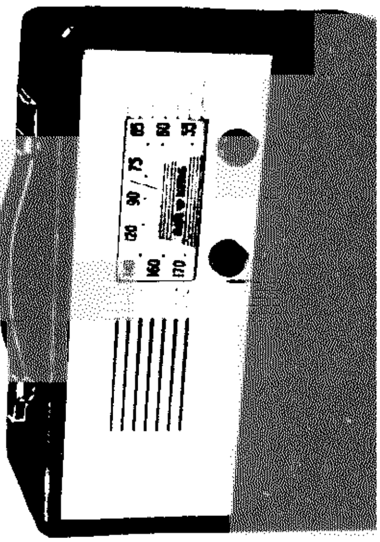


BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
13-23MC



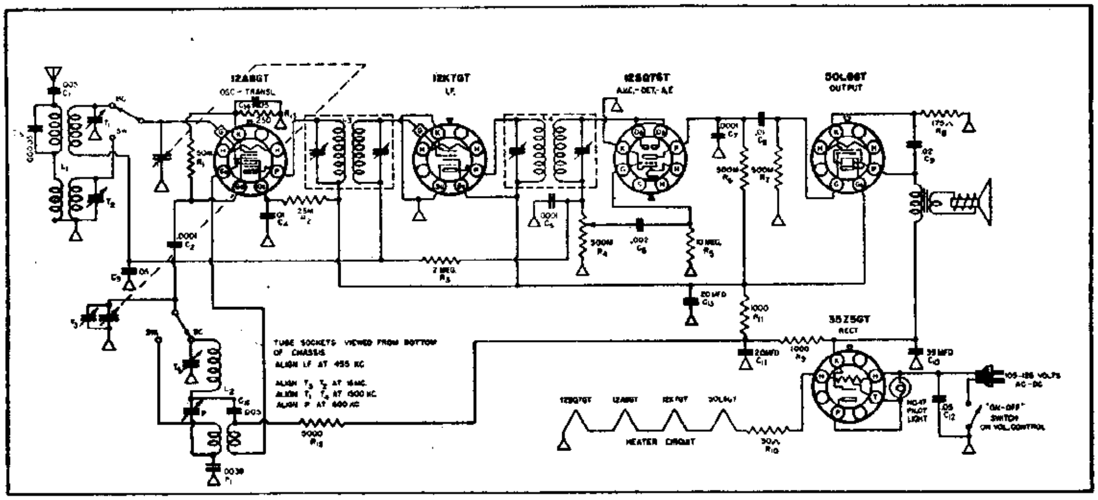
AIR KING PRODUCTS CO., INC.





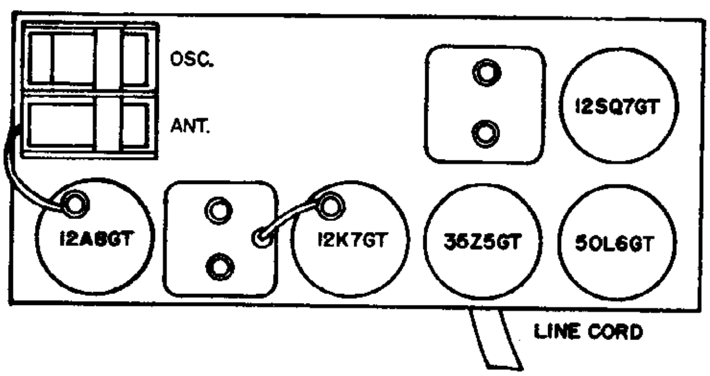
For Parts list, see P.1

AIR KING PRODUCTS CO., INC.



SCHEMATIC LOCATION	PART NUMBERS	DESCRIPTION
	110T4200	Cabinet
L1	11028108	Coil—2 band antenna
L2	11028109	Coil—2 band oscillator
L3	1103319	Coil—I.F. Input
L4	1103519	Coil—I.F. Output
P1	1101941	Condenser—Fixed mica padder
C10, C11, C13	1102055	Condenser—Electrolytic
R4	1102447	Control—Volume
	1104527	Dial—Cable
	1104062	Dial—Scale
	1104120	Dial—Pointer
	1104911	Lamp—No. 47 pilot light
	1105574	Line cord—Rubber
	1105829	Speaker—5" P.M. dynamic
	1103732	Switch—Wave change
	1101722	Trimmers—Strip of 4

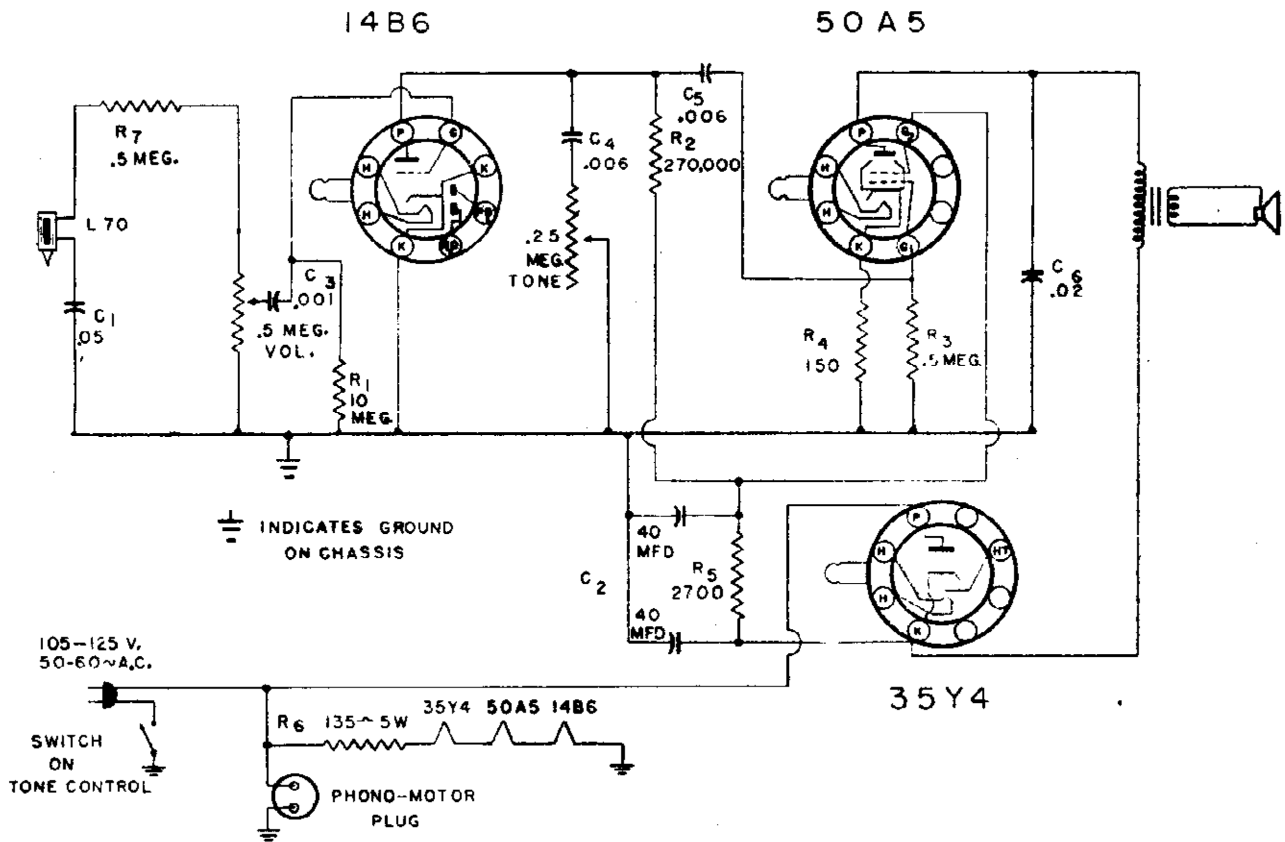
When no part number is assigned, order by description and rating.



This receiver comprises a five-tube AC-DC two-band superheterodyne incorporating an improved filter circuit, automatic volume control, beam power output tube and oversized dynamic speaker are utilized for improved performance. The tuning range of this instrument accommodates two bands of frequencies from 530 to 1730 kilocycles (standard American broadcast) and 5.75 to 18.5 megacycles (foreign broadcast).

THE RECEIVER WAS DESIGNED TO OPERATE WITHOUT A GROUND. UNDER NO CIRCUMSTANCES SHOULD A GROUND WIRE BE PERMITTED TO COME IN CONTACT WITH ANY PART OF THIS RECEIVER.

AIR KING PRODUCTS CO., INC.



PARTS LIST

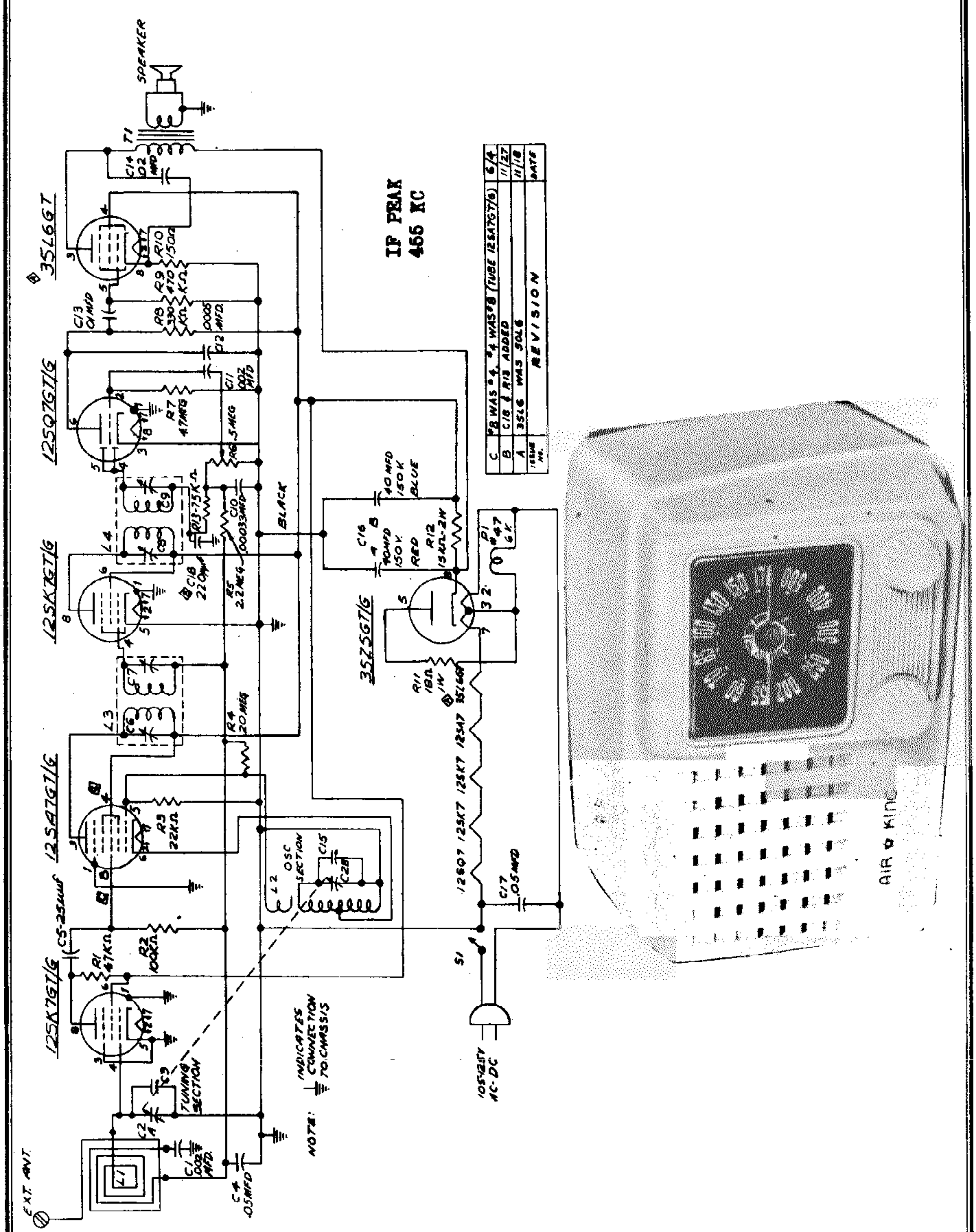
Schematic Location	Part No.	Description
	T454	Cabinet
	62180	Cover, back
C4, C5	1971	Condenser, .006 mfd, mica
C1	1967	Condenser, .05 mfd, 200V
C2	2065	Condenser, electrolytic, 40-40 mfd, 150V
C3	1956	Condenser, .001 mfd
C6	1963	Condenser, .02 mfd, 400V
	2473	Control, Tone, with switch, ¼ Meg.
	2472	Control, Volume, ½ Meg.
	5559	Cord, line
	39145	Knob (2)
	6414	Motor
	6342	Pick-up arm with cartridge, L70
	18103	Plug, speaker, male

Schematic Location	Part No.	Description
	18111	Plug, speaker, female
	18112	Plug, motor, male
	18113	Plug, motor, female
	18104	Plug, phono, female
	1861	Plug, phono, male
R6	2238	Resistor, 135 ohms, 5W, wire wound
R5	2378	Resistor, 2700 ohms, 1W
R2	2361	Resistor, 270,000 ohms, ½W
R4	2372	Resistor, 150 ohms, ½W
R3, R7	2353	Resistor, 500,000 ohms, ¼W
R1	2335	Resistor, 10 Meg., ¼W
R8	2363	Resistor, 220,000 ohms, ¼W
	5855	Speaker, 5", with output trans.
	6417	Turntable, 9"
	54220	Needle, Fidelitone Master

CAUTION: The lead wire which emerges from the rear of the tone arm and goes through the motor board is arranged so that it will not restrict the free movement of the tone arm across the record. It is important that this wire be free and loose at all times. Do not attempt to push the excess wire through the panel. Remove clip from stem before placing records on turntable.

MODELS 4705, 4706 **AIR KING PRODUCTS CO., INC.**

Chassis 467



AIR KING PRODUCTS CO., INC.

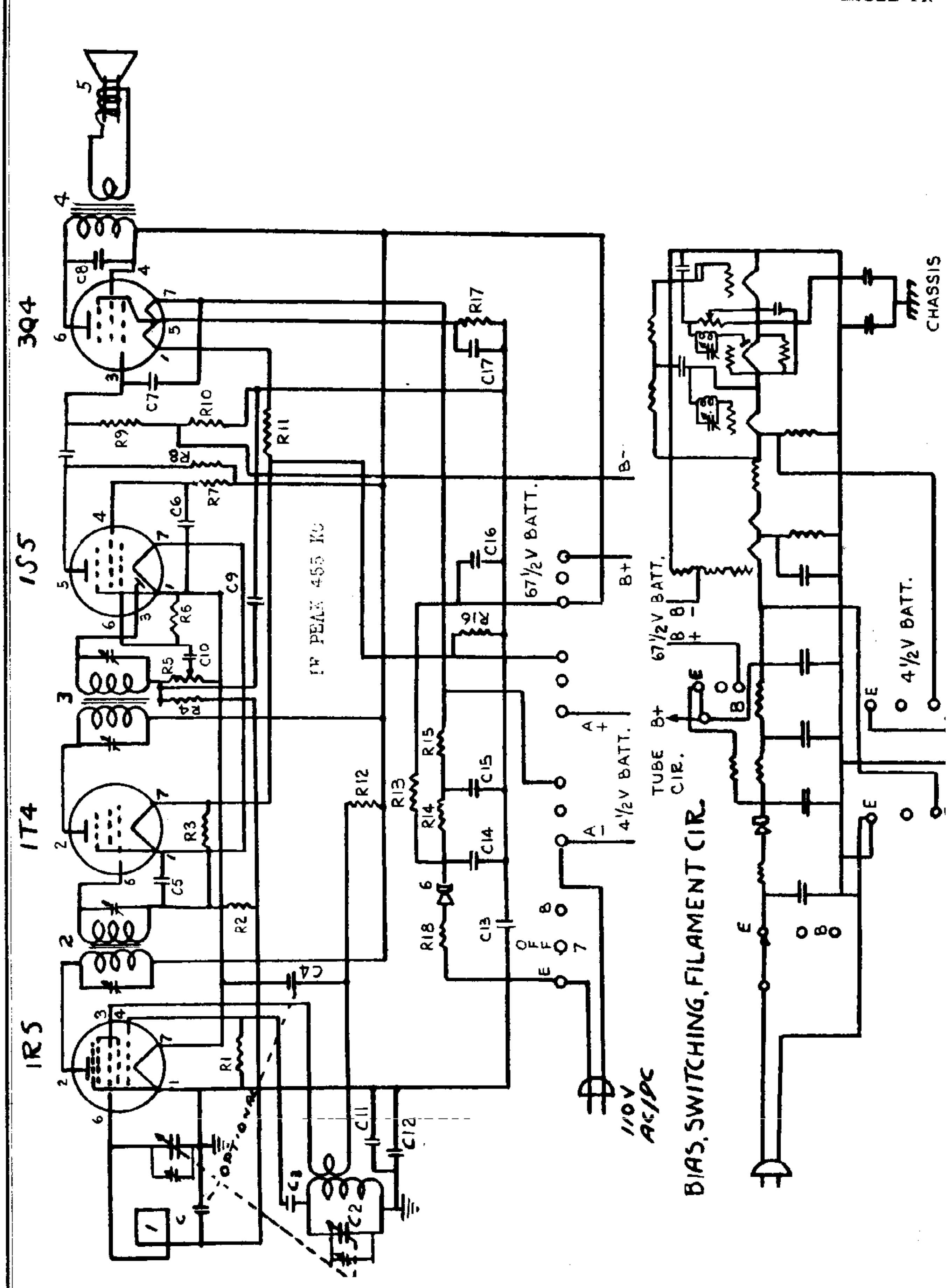
Model 4705 and 4706 Parts,

Air King No.	DESCRIPTION
4706	plastic cabinet ivory painted
4705	plastic cabinet walnut
5868	4" speaker with output transformer
39137	knobs walnut
4275	dial crystal
54165	dial pan
4139	pointer
18109	pilot socket
54172	drive shaft assembly
	dial cord spring and clasp
47	pilot light
5582	line cord
28159	franklin loop
28156	oscillator coil
3363	1st IF transformer
3583	2nd IF "
2471	volume control $\frac{1}{2}$ meg
1666	variable condenser
2071	electrolytic condenser 40-40 150 v
	330 mmf mica 500v cond
	510 " " cond
	.05 mf 400v
	.01 mf 400v
	.02 mf 400v
	.002 mf 400v
	22K ohm $\frac{1}{4}$ watt
	2.2 meg " "
	4.7 " " "
	330K ohm
	470K "
	150 ohm $\frac{1}{2}$ watt
	1500 " 2 "
	18 " 1 "
	20 meg $\frac{1}{4}$ "
54144	grommets for variable condenser
18110	sockets octal wafers
54145	spacers variable condenser

Air King #	Model A510 DESCRIPTION
6011	Cabinet complete with carton and fittings
5899	Loud speaker 4" without transformer
5340	backcover (without loop)
6246	grille
4098	dial crystal (mounted on grill)
39164	knobs (brown)
	instruction leaflet
1694	variable condenser
2075	electrolytic condenser unit (60,60,25)
20105	" " single 25mf 25 v.
	paper condensers .05mf 400 v.
	" " .005mf 200 v.
	" " .02mf 200 v.
	" " .001mf 400 v.
	" " .1mf 200 v.
	" " .2mf 200 v.
	MICA or Ceramic Condensers 100mmf
	" " " 12 mmf
2481	Volume Control 1 meg w. switch (DPST)
	Resistors 270, 820, 8200, 100K, 330K, 470K, 2.2Meg 3.3 Meg, 4.7 Meg, 10Meg, $\frac{1}{4}$ watt each
	" 33 Ohms 1 watt
2177	Filter & Filament Dropping Resistor
28197	Oscillator coil
3371	I.F. Transformer (input)
3535	I.F. Transformer (output)
1337	Output transformer
28199	Loop
54309	Dial Pan
54308	Tuning Control Bracket
4679	Drive Shaft Dial
5588	Line Cord (Polarized)
54325	Flag on-off
41106	Pointer
18131	min. tube socket (3Q4)
18130	" " " (1R5, 1U4, 1T4)
18129	Battery cable plug
18132	Wafer Switch (Batt.-A.C.)
	Dial Cord
	" " Spring only
	Speaker clips (2)
	Selenium Rectifier
	Miniature tube socket non microphonic (1S5)

ALAMO ELECTRONIC CORP.

MODEL PR-



MODEL FR-2

ALAMO ELECTRONIC CORP.

LINE OR BATTERY VOLTAGE: Designed to operate on 105-120 volts, 50-60 cycle alternating or direct current (AC/DC) or self contained batteries.

POWER CONSUMPTION: Approximately 20 watts.

BATTERIES USED:

3—1½ volt "A" - standard flashlight cells.

1—67½ volt "B" - Eveready 467, Burgess XX45 or equivalent.

TUNING RANGE: 540-1650 KCS.

TUBES USED AND FUNCTIONS:

1R5 Convertor

1T4 Amplifier

1S5 Detector AVC and Audio Amplifier

3Q4 Power Amplifier

See diagram for tube layout.

RECTIFIER: FEDERAL No. 403D2625.

CAUTION: When prolonged operation in electric position is contemplated, it is advisable to remove the "A" and "B" batteries and store them in a cool, dry place.

DO NOT LEAVE EXHAUSTED BATTERIES IN EITHER THE BATTERY TRAY OR RECEIVER PROPER AS THE CHEMICAL ACTION MAY EXPAND THE BATTERIES AND CAUSE LEAKAGE OF THE ELECTROLYTE.

BE SURE THAT BATTERY-ELECTRIC SWITCH IS IN OFF POSITION (CENTER) WHEN FINISHED WITH RECEPTION, OTHERWISE THE BATTERY WILL BE DISCHARGED AND REQUIRE REPLACEMENT IF LEFT ON FOR A CONSIDERABLE LENGTH OF TIME.

SERVICE DATA

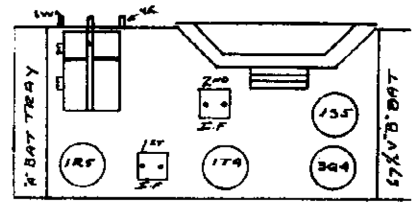
Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 1400, 1700 KCS and an output meter to be connected across the primary or secondary of the output transformer. For more accuracy a vacuum tube voltmeter should be used. If possible all alignments should be made with the volume control on maximum and the test oscillator output as low as possible.

1. Couple signal generator to loop loosely using one or two turns of wire connected to signal generator output.
2. Set signal generator to 455 KC and adjust the 4 I.F. trimmers on top of I.F. cans. An output meter may be connected across voice coil but we suggest for more accurate alignment that a vacuum tube voltmeter be connected between A-lead and tie lug connecting return lead of loop. With no signal the voltage should be approximately+1½ volt and will become negative as signal increases, adjust to maximum negative voltage.
3. The oscillator trimmer should next be set so that a 1700 KC signal comes in at minimum setting of condenser. (Plates all out.)
4. The R.F. trimmer should be set at 1400 KC. It is suggested that it be adjusted with both batteries in case and chassis as near in the case as possible, and still adjust trimmer; as the chassis affects inductance of loop.



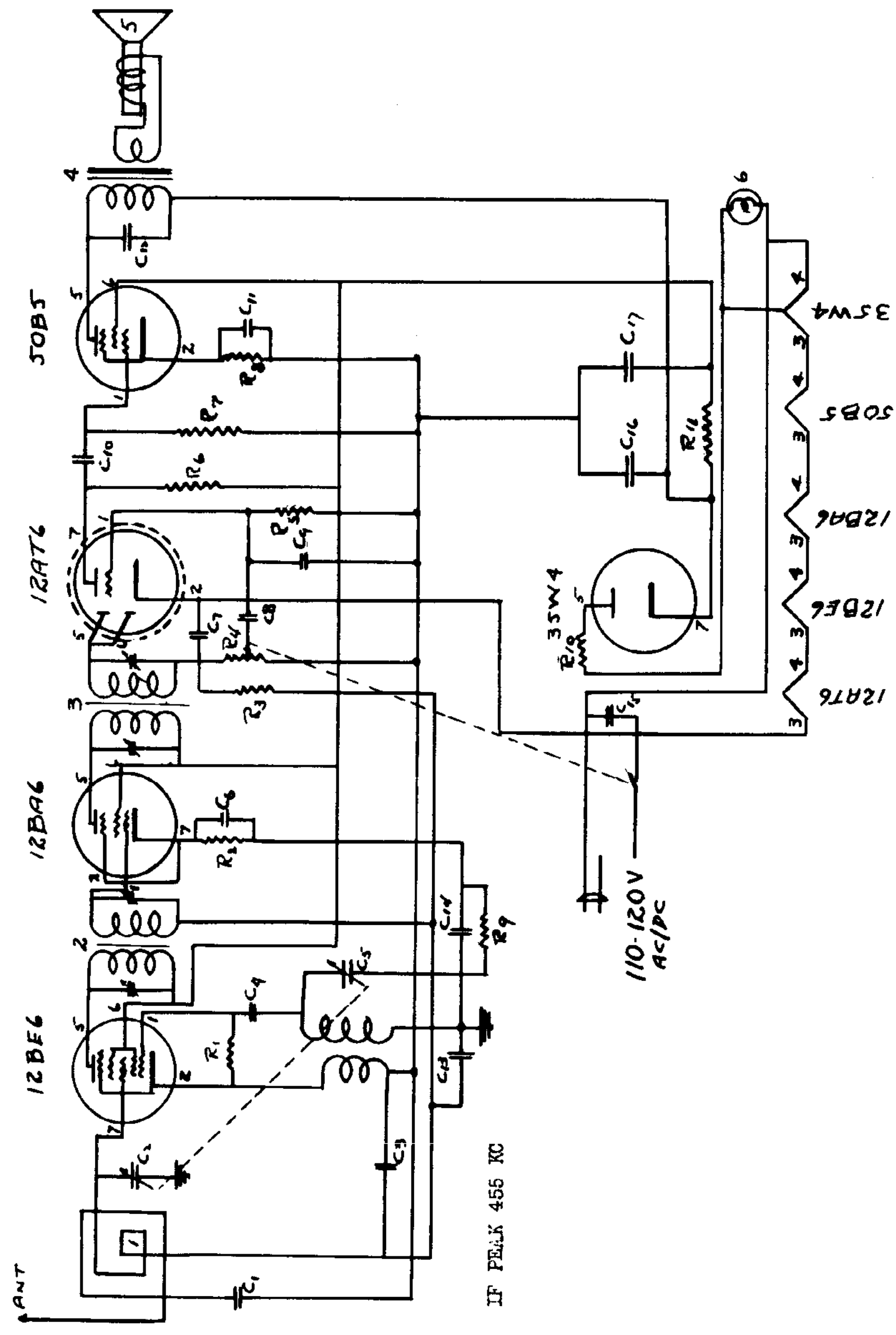
I.F FREQ. 455 KC/S

Parts No.	
R1	1000,000 ohm
R2	5 meg
R3	5 meg
R4	2 meg
R5	1 meg V.C.
R6	8 meg
R7	4 meg
R8	1 meg
R9	5 meg
R10	500 ohm
R11	27 ohm
R12	18,000 ohm
R13	3300 ohm
R14-R15	1200 ohm 5 watt
R16-R17	1500 ohm 1 watt
C1-C2	2 gang condenser
C3-C4 C5-C6	02 Paper
C18-C11 C7	.005 400 volt
C8	.0003 Mica
C9	.005 400 volt
C10	70 UUF Mica
C12-C13	.05 Paper
C14-C15	40 MFD-150 volt
C16	20 MFD-150 volt
C17	100 MFD-25 volt
1	Loop-Part of Case
2	1st I.F. Transformer
3	2nd I.F. Transformer
4	Output Transformer
5	4" P.M. Speaker
6	Selenium Rectifier No. Fed. 403D2625
7	4 pole 3 position switch

ALL RESISTORS ½ WATT AND ALL CONDENSERS 200 VOLT UNLESS OTHERWISE MARKED.

ALAMO ELECTRONIC CORP.

MODEL 5



Model 50

SERVICE DATA

PART NO.	
R1	20,000 ohm $\frac{1}{2}$ watt
R2	820
R3	2 meg
R4	45 meg
R5	5 meg
R6	.5 meg
R7	
R8	150 ohm 1 watt
R9	.5 meg optional
R10	40 ohm
R11	1500 ohm 1 watt
C1	.0008 mica
C2	2 gang condenser
C5	
C3-C6) C13)	.02 paper condenser
C4	50 UUF mica
C8) C10)	.005 paper condenser
C11	10MFD 25 volt
C12	.03 paper condenser
C14,C15	.05 paper condenser
C16-C17	40 MFD-150 volt

1. Loop Antenna
2. 1st I.F.
3. 2nd I.F.
4. Output Transformers
5. 4" P.M. Speaker
6. Pilot light #51

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

GENERAL DATE. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 1400, 1600 KCS and an output transformer. For more accuracy a vacuum tube voltmeter should be used. If possible all alignments should be made with the volume control on maximum and the test oscillator output as low as possible.

1. Couple signal generator to loop loosely with one or two turns of wire connected to signal generator output.

2. Connect Output meter to voice coil or better connect vacuum tube voltmeter to B- (AC switch) and tie lug on top of chassis connecting to loop return.

3. Set signal generator to 455 KC and adjust 4 trimmers in top of I.F. cans.

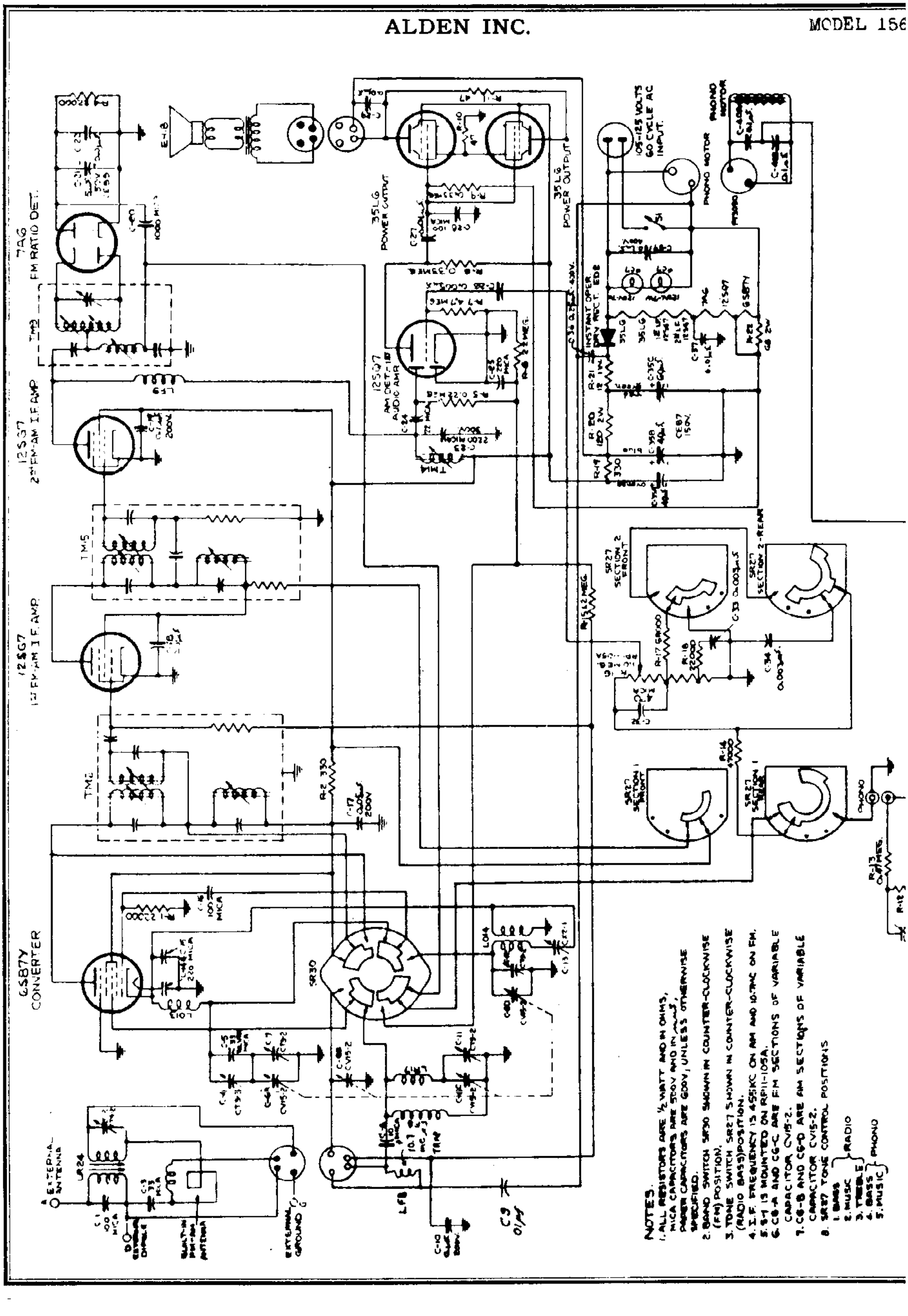
4. Set signal generator to 1600 KC - set tuning condenser to minimum capacity and adjust oscillator trimmer on condenser gang.

5. Set oscillator to 1400 KC tune in signal accurately and adjust R.F. trimmer on condenser gang.

ALL RESISTORS $\frac{1}{2}$ WATT AND ALL CONDENSERS 400 VOLT UNLESS OTHERWISE MARKED

ALDEN INC.

MODEL 156

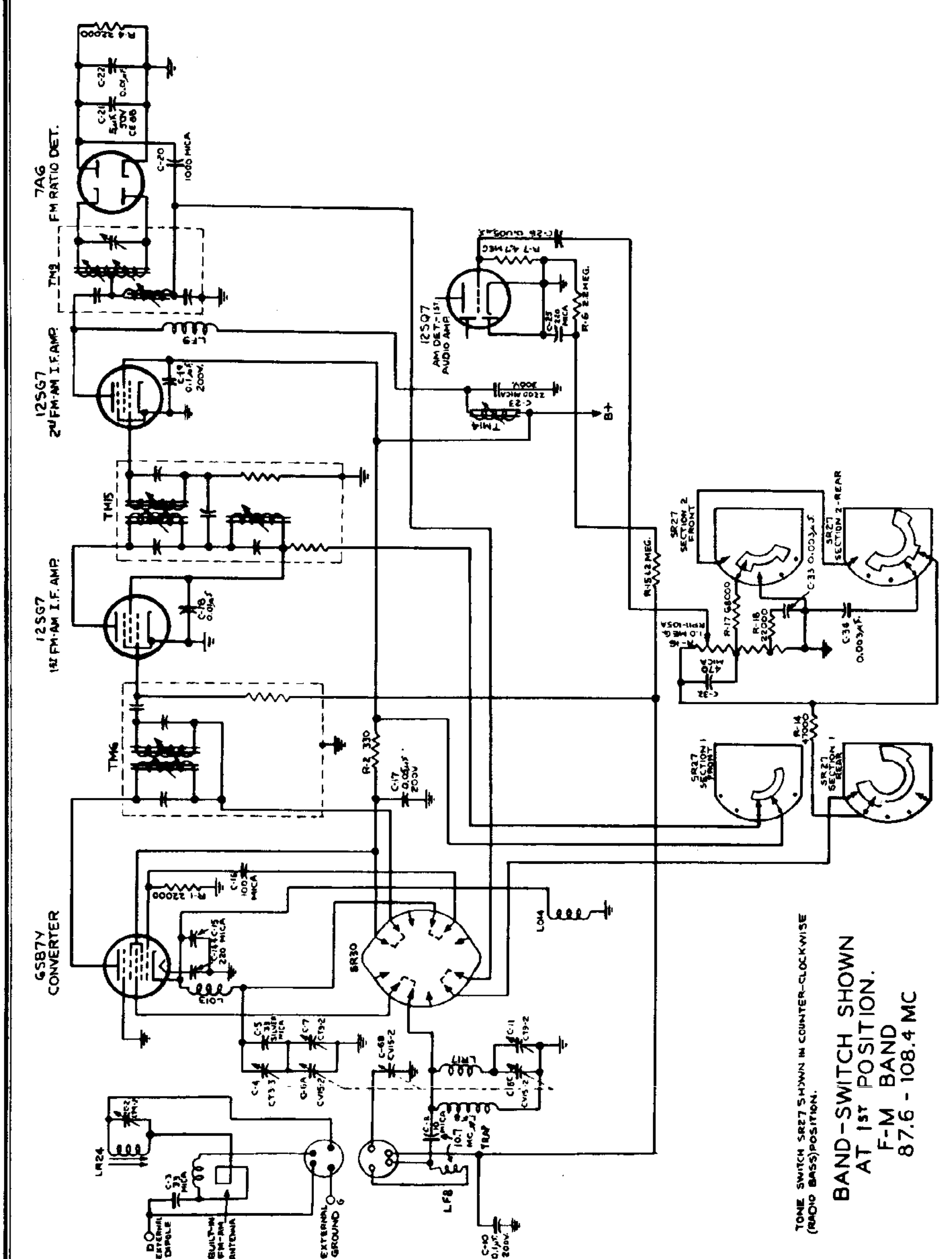


NOTES.

1. ALL RESISTORS ARE ½ WATT AND IN OHMS, MICA CAPACITORS ARE 500V AND IN $\mu\mu f$, PAPER CAPACITORS ARE 600V, UNLESS OTHERWISE SPECIFIED.
2. BAND SWITCH SR30 SHOWN IN COUNTER-CLOCKWISE (FM) POSITION.
3. TONE SWITCH SR27 SHOWN IN COUNTER-CLOCKWISE (RADIO BASS) POSITION.
4. I.F. FREQUENCY IS 455KC ON AM AND 10.7MC ON FM.
5. S-1 IS MOUNTED ON RP11-105A.
6. C6-A AND C6-C ARE FM SECTIONS OF VARIABLE CAPACITOR CV15-2.
7. C6-B AND C6-D ARE AM SECTIONS OF VARIABLE CAPACITOR CV15-2.
8. SR27 TONE CONTROL POSITIONS
   1. BASS, 2. MUSIC, 3. TREBLE } RADIO
   4. BASS, 5. MUSIC } PHONO

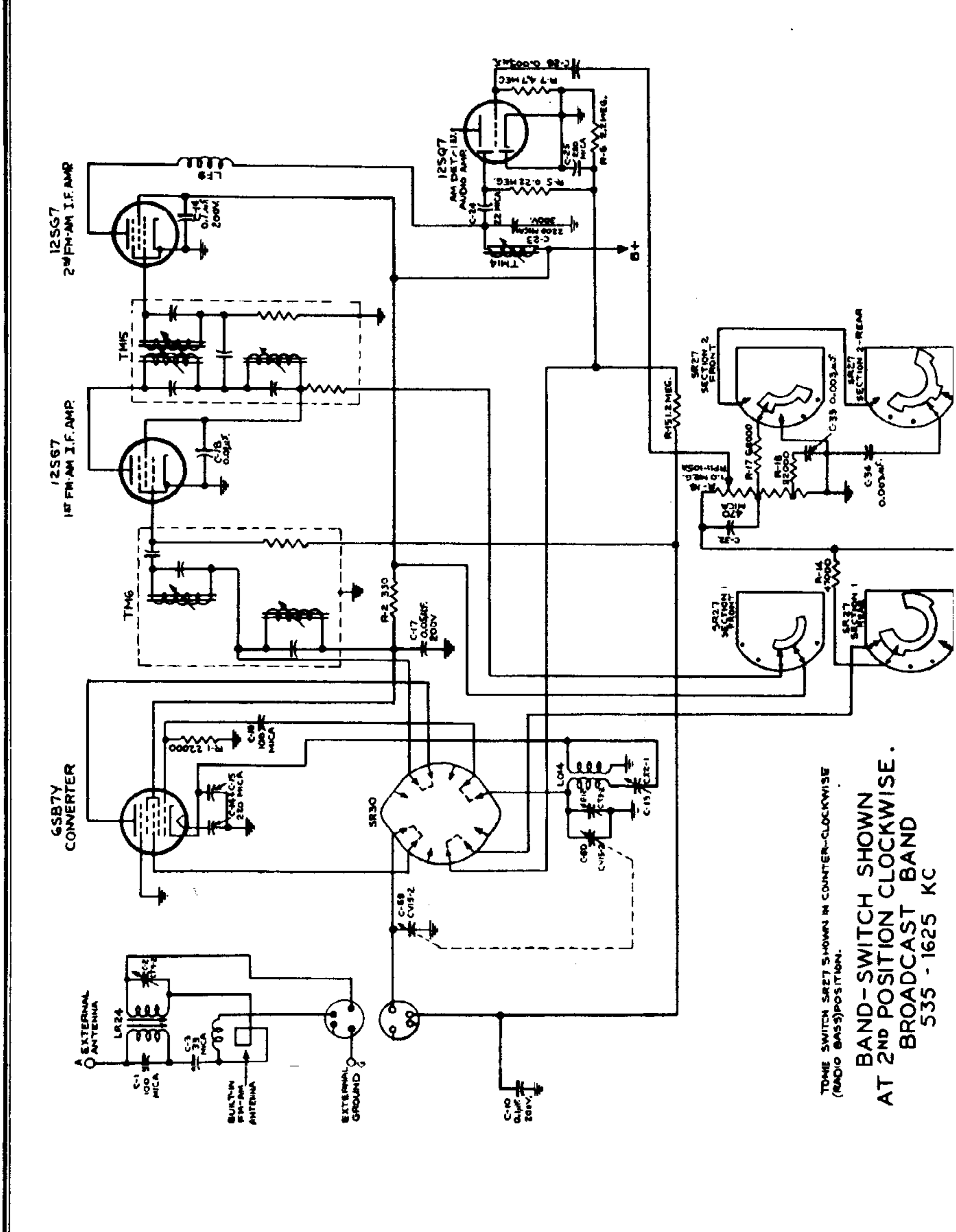
MODEL 1562

ALDEN INC.



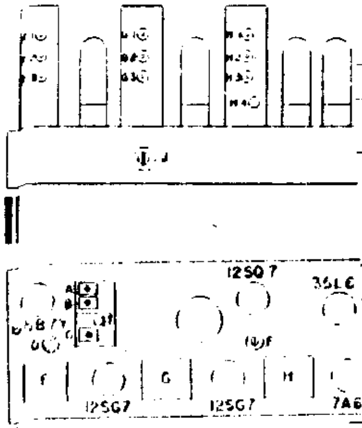
ALDEN INC.

MODEL 15



MODEL 1562

ALDEN INC.



ALIGNMENT PROCEDURE:

Dummy Antenna	Signal Generator Connection	Signal Generator Frequency	Band Switch Position	Radio Dial Setting	Adjust	Remarks
0.01 MFD	Terminal T	455 KC AM	Broadcast	1625 KC	E G-1 F-1	Adjust for maximum output Repeat for fine adjustment
0.01 MFD	Pin 4 of 12SG7 2nd FM-AM IF with FM Signal Gen.	10.7 MC FM	FM	108 MC	H-2	Adjust for maximum output (Broad adjustment)
0.01 MFD	"	10.7 MC FM	FM	108 MC	H-4	Adjust for maximum output
0.01 MFD	"	10.7 MC AM	FM	108 MC	H-1 or H-3	Adjust whichever is required for minimum output
						Repeat last two steps for fine adjustment until settings for maximum FM output coincide with settings for minimum AM output.
0.01 MFD	Pin 8 of 6SB7Y Converter	10.7 MC FM	FM	108 MC	G-3 — G-2	Adjust for maximum output
0.01 MFD		"	FM	108 MC	F-3 — F-2	Adjust for maximum output
						Repeat last two steps for fine adjustment
			Broadcast	535 KC	Pointer	Adjust pointer to reference mark
100 MMFD	"A" Post on Cabinet	600 KC AM	"	600 KC	J and Core on Ant. Coil in Cab.	Adjust for maximum output
"	"	1550 KC AM	"	1550 KC	B and trimmer on Ant. Coil	Adjust for maximum output
300 OHM Resistor	"	92 MC FM	FM	92 MC	D	Adjust for maximum output
"	"	106 MC FM	FM	106 MC	A and C	Adjust for maximum output

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube or some local condition is not responsible for faulty reception. The following is a list of the minimum equipment necessary to realign this receiver.

In the following alignment procedure the high side of the signal generator is connected to the terminal indicated in the "Signal Generator Coupling" column below. The ground side of the signal generator is connected directly to the chassis. The output meter should be connected across the voice coil of the speaker for all measurements.

1—AM signal generator covering 455 KC, 600 KC, 1550 KC and 10.7 MC

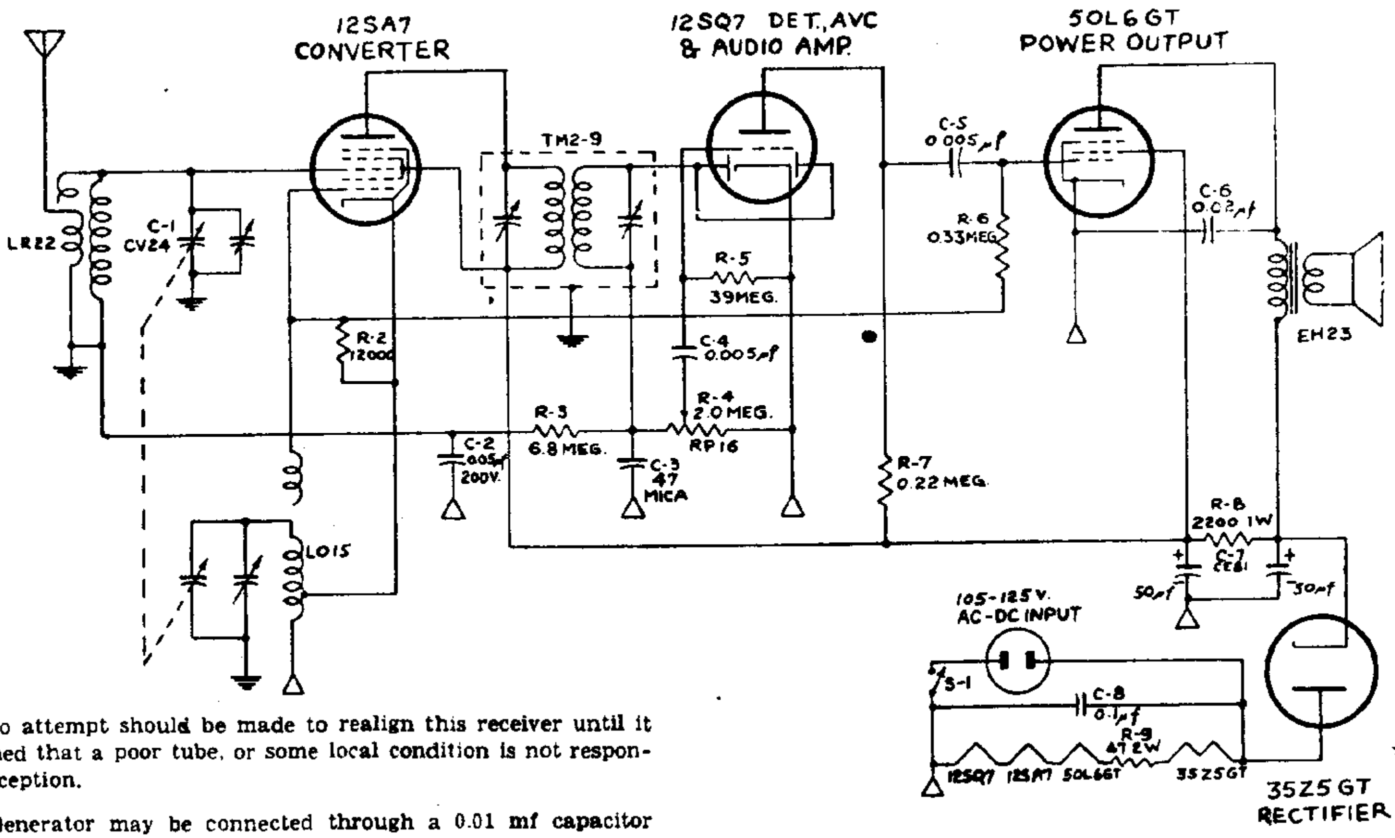
2—FM signal generator covering 10.7 MC, 92 MC and 106 MC

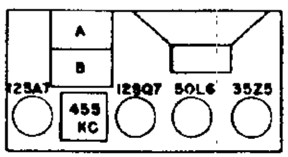
3—Output meter, rectifier type, approximately 0 to 2 volts RMS

4—Dummy antennas
300 Ohm Resistor
0.01 MFD Capacitor
100MMFD Mica Capacitor

In adjusting the radio frequency trimmers and padders it is advisable to "rock" the variable capacitor gang slightly across the signal being delivered by the signal generator until that particular signal has been accurately peaked.

ALDEN INC.





LOCATION OF TUBES

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

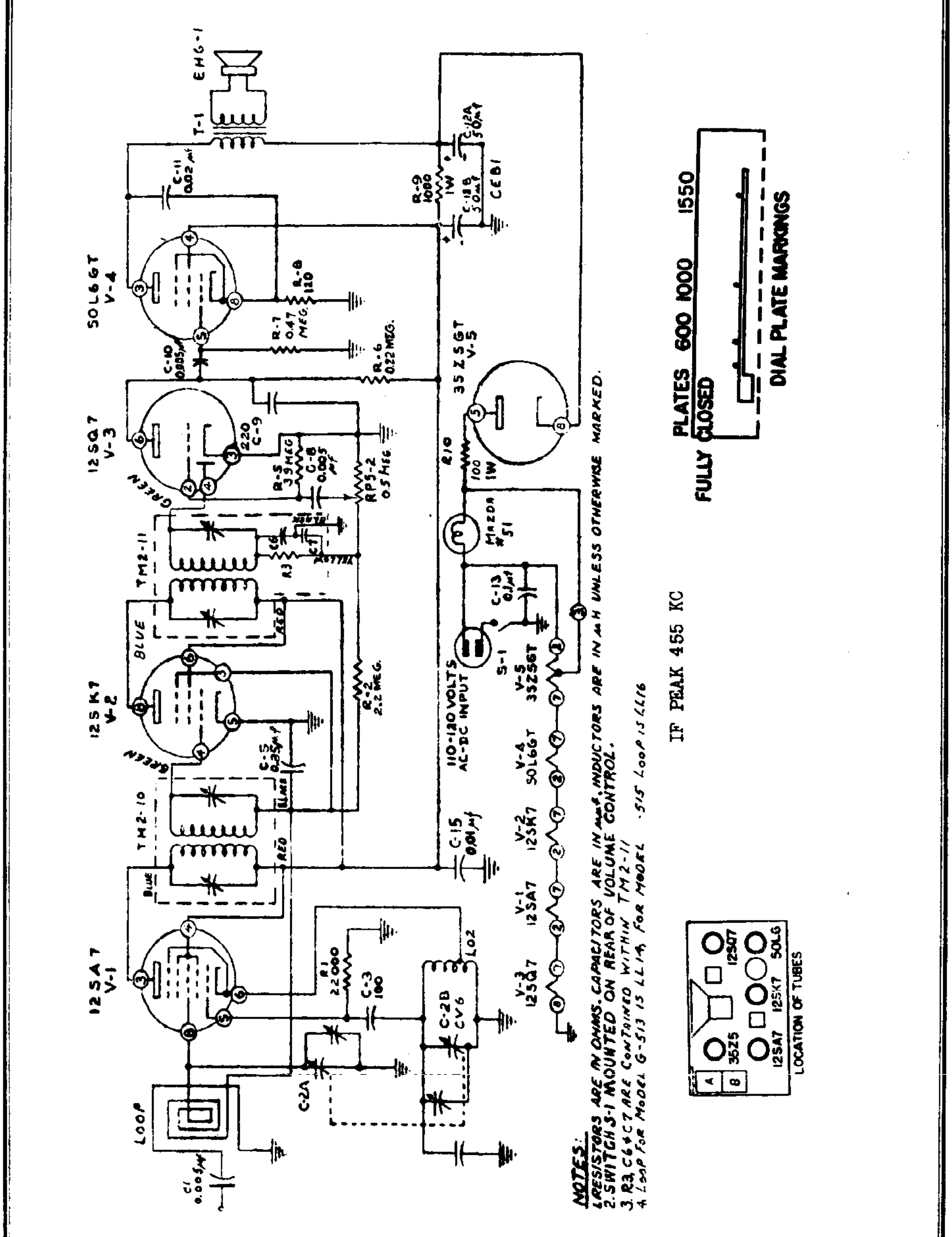
The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug of RF section of tuning capacitor. Connect ground clip of generator to a convenient B-minus point such as one of the switch terminals on the back of the volume control. An output meter may be clipped directly across the voice coil lugs. Align the IF trimmers to 455 kc using least possible input from signal generator to avoid developing A. V. C. voltage which would make the tuning adjustments very broad.

To align RF trimmer, remove the 0.01 mf capacitor and connect the signal generator hot lead to a 68 mmf mica condenser. Connect the dummy antenna thus formed to the antenna lug on the antenna coil (lug to which the antenna hank is soldered). Again, use the least possible input from the signal generator. With the tuning capacitor plates completely out of mesh, and pointed at extreme clockwise position, adjust the oscilator trimmer on front section of tuning capacitor to 1700 kc. Readjust both signal generator and tuning capacitor to 1550 kc and adjust the RF trimmer on rear section for maximum response.

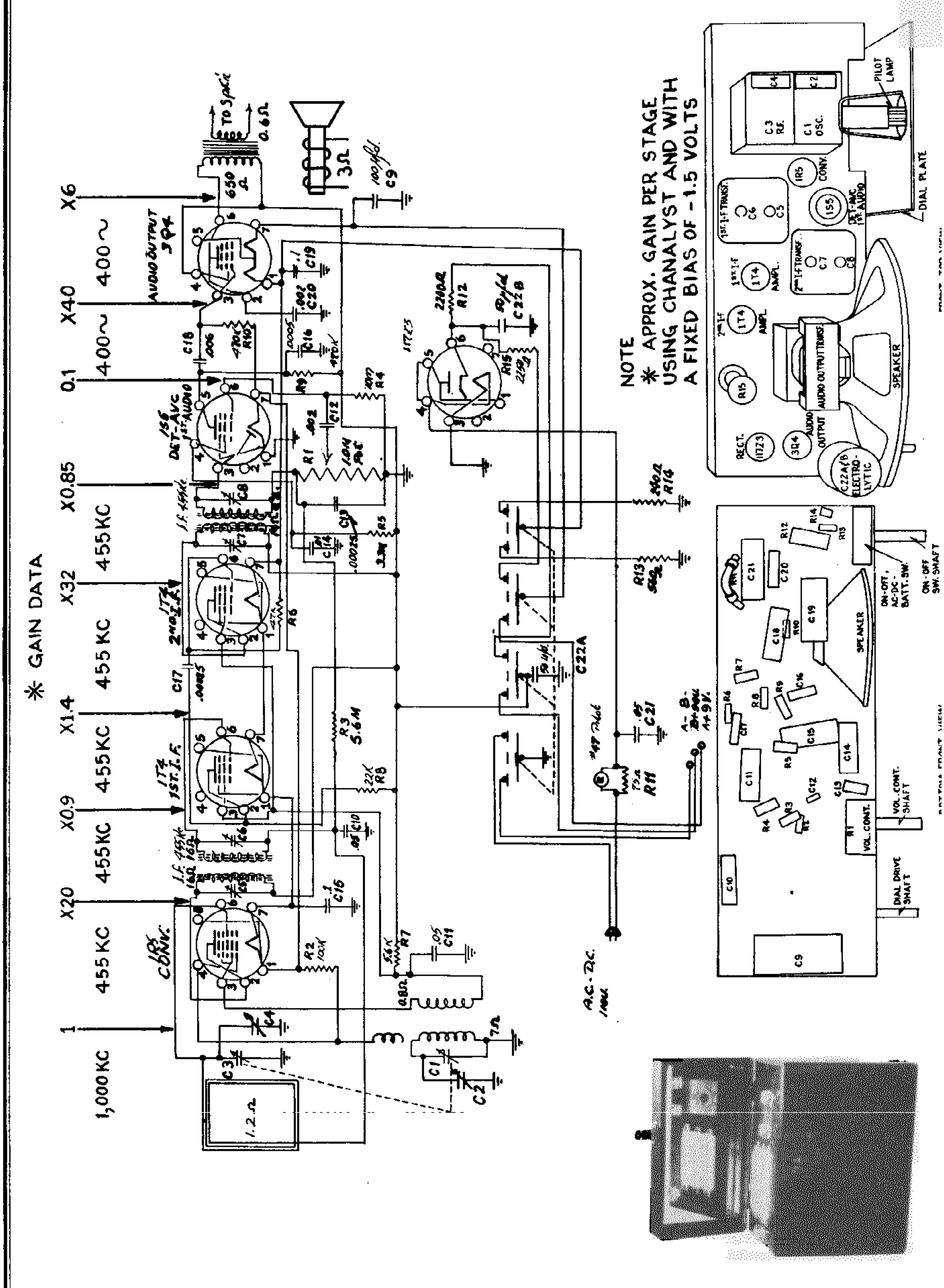
NOTES:
1. RESISTORS ARE IN OHMS AND ARE ½ WATT; CAPACITORS ARE 400V AND IN μf UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON REAR OF VOLUME CONTROL.
3. SYMBOL △ DENOTES B- AND SYMBOL ⏚ DENOTES CHASSIS.
4. I.F. FREQUENCY IS 455Kc.
5. TUNING RANGE IS 532Kc. TO 1700Kc.

MODELS 1602L, 1613L

ALDEN INC.



ALGENE RADIO CORP.



For Alignment, see P.17.

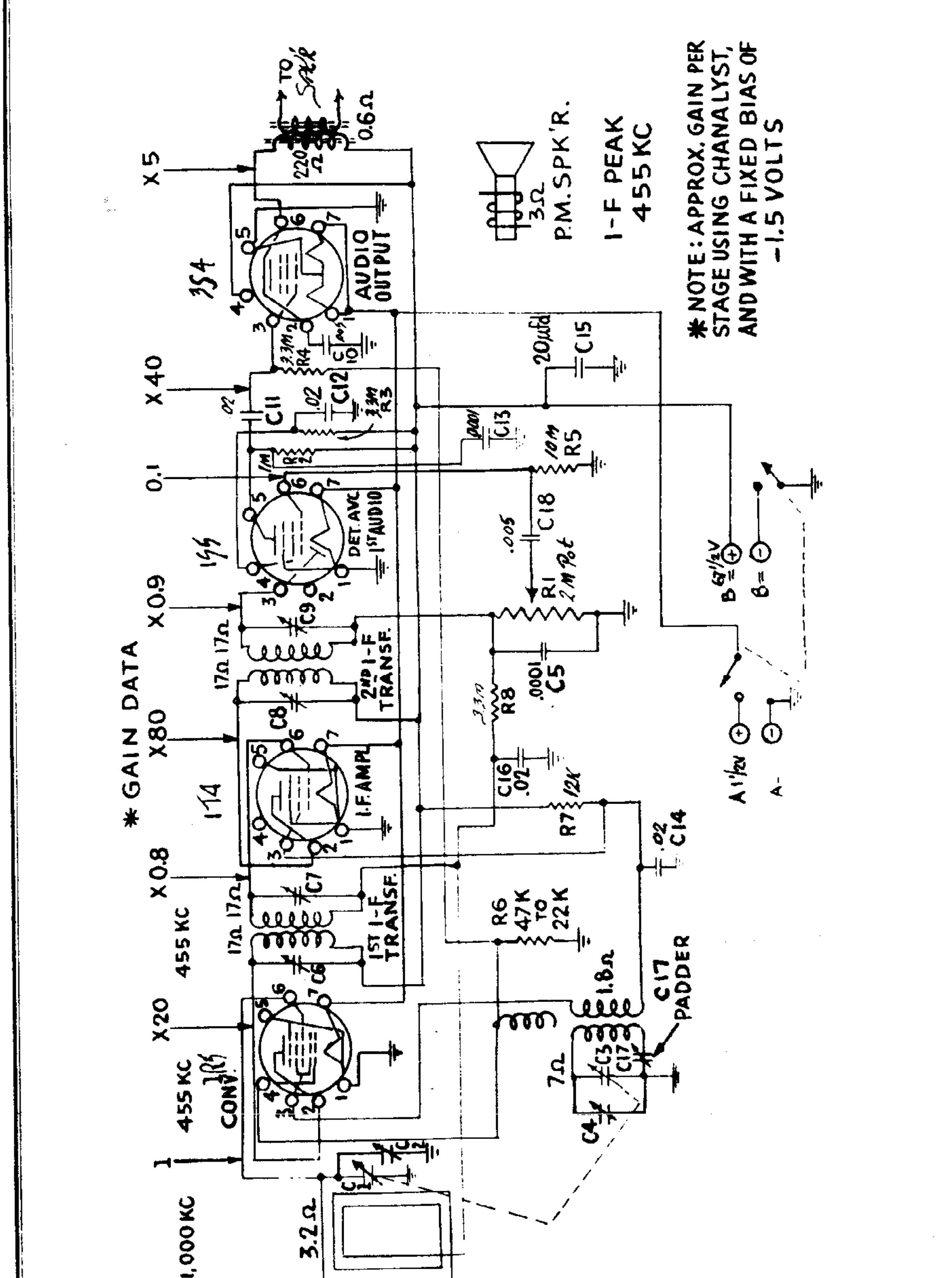
ALGENE RADIO CORP.

ALGENE MODEL AR6M

TUBE	PIN	VTVM	20,000 P.V.	1,000 P.V.	RESISTANCE
1R5	1	+1.2	+1.2	+1.2	14 Ω
	2	+ 70	+ 70	+ 70	Over 500 K
	3	+ 50	+ 50	+ 50	Over 500 K
	4	-3	-0.5	0	80 K
	5	+1.2	+1.2	+1.2	14 Ω
	6	-0.2	0	0	6 meg
	7	+2.3	+2.3	+ 2.3	24 Ω
1T4 1st I.F. Ampl	1	+2.3	+ 2.3	+ 2.3	24 Ω
	2	+ 60	+ 60	+ 60	Over 500 K
	3	+ 50	+ 50	+ 50	Over 500 K
	4	+ 70	+ 70	+ 70	Over 500 K
	5	+2.3	+2.3	+ 2.3	24 Ω
	6	-0.2	0	0	6 meg
	7	+ 3.4	+3.4	+ 3.4	32 Ω
1T4 2nd I.F. Ampl	1	+3.4	+3.4	+3.4	34 Ω
	2	+ 70	+ 70	+ 70	Over 500 K
	3	+ 50	+ 50	+ 50	Over 500 K
	4	+ 70	+ 70	+ 70	Over 500 K
	5	+ 3.4	+ 3.4	+3.4	34 Ω
	6	+ 4.4	+ 4.4	+4.4	45 K
	7	+ 4.5	+4.5	+4.5	44 Ω
1S5 Det. A.V.C 1st Audio	1	0	0	0	0
	2	-	-	-	-
	3	-0.3	0	0	1 meg
	4	+ 19	+ 16	+ 2	Over 500 K
	5	+ 28	+ 24	+ 7	Over 500 K
	6	-0.1	0	0	10 meg
	7	+1.2	+1.2	+1.2	14 Ω
3Q4 Audio Output	1	+ 4.5	+4.5	+4.5	44 Ω
	2	+ 64	+ 64	+ 64	Over 500 K
	3	+1.2	+1.2	+1.2	500 K
	4	+ 70	+ 70	+ 70	Over 500 K
	5	+ 6	+ 6	+ 6	56 Ω
	6	+ 64	+ 64	+ 64	Over 500 K
	7	+7.2	+ 72	+ 72	Over 500 K
117Z3 Rect	1	AC	AC	AC	400 Ω
	2	-	-	-	-
	3	0	0	0	-
	4	AC	AC	AC	400 Ω
	5	AC	AC	AC	400 Ω
	6	+112	+112	+112	Over 500 K
	7	-	-	-	-

NOTE: All voltage and resistance measurements made with respect to chassis ground and with a line voltage of 116 V.A.C.

ALGENE RADIO CORP.



IF ALIGNMENT

Connect an output meter across the voice coil of the receiver.

Connect a signal generator to the standard Hazeltine loop model 1150 and compile it loosely to the receiver loop.

Set the signal generator to 455 KC and fully mesh the receiver tuning capacitor.

Keep the receiver volume at maximum and the output of the signal generator sufficient to give a readable deflection on the output meter. Adjust for maximum, I.F. trimmers C9, C8, C7, and C6.

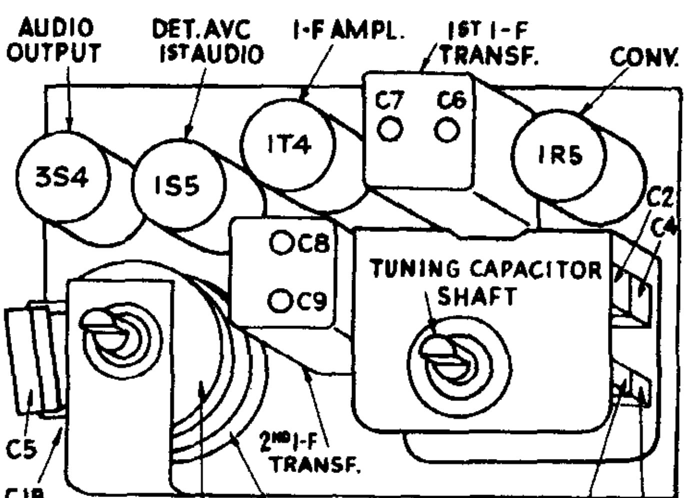
RF - Osc. Adjustment

Keeping the same setup as used for I.F. alignment, set the signal generator and receiver to 1600 KC and adjust oscillator trimmer C4 for maximum output.

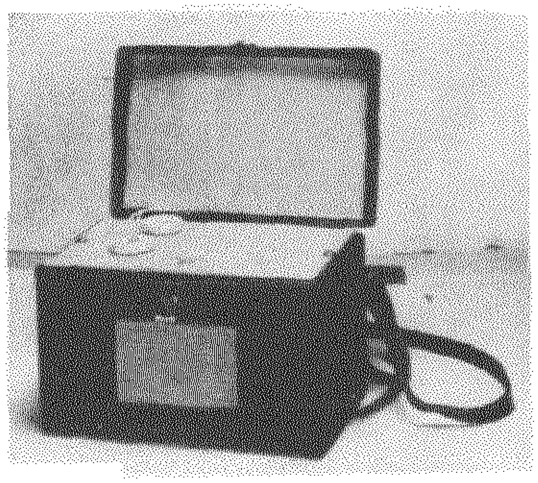
Next set the signal generator and receiver to 600 KC and adjust loop frequency padder C17 for maximum while rocking the main tuning capacitor.

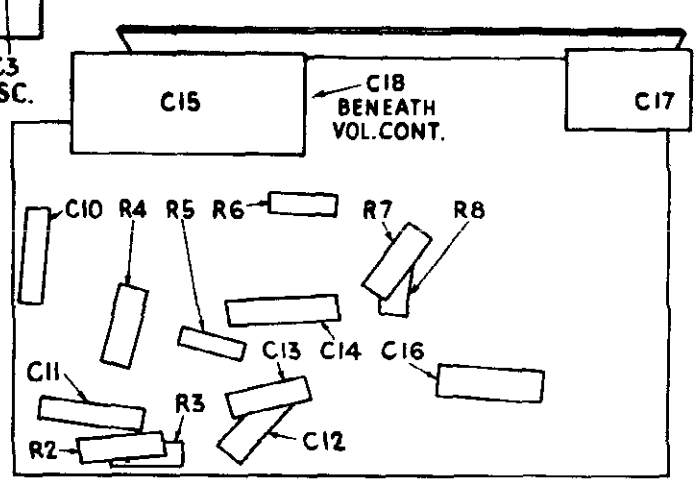
Repeat the above proceedure for R.F. - Osc. adjustment.

Next tune the signal generator and receiver to 1400 KC. and adjust antennae trimmer C2 for maximum output.



TOP VIEW



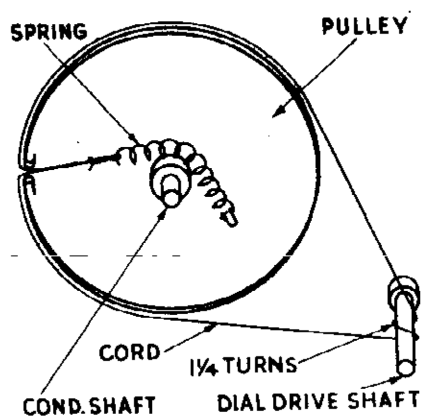


BOTTOM VIEW

ALGENE RADIO CORP.

TUBE	PIN	VTVM	20,000 OHM P.V.	1,000 OHM P.V.	RESISTANCE
1R5	1	0	0	0	0
CONV.	2	+65	+65	+62	OVER 100K
	3	+36	+36	+34	OVER 100 K
	4	-4.2	-2.6	-0.8	22K
	5	--	--	--	--
	6	-0.2	0	0	3.8 MEG.
	7	+1.4	+1.4	+1.4	2 OHM
1T4	1	0	0	0	0
IF AMPL	2	+65	+65	+62	OVER 100K
	3	+36	+36	+34	OVER 100K
	4	0	0	0	3.8 MEG.
	5	--	--	--	--
	6	-0.2	0	0	3.8 MEG.
	7	+1.4	+1.4	+1.4	2 OHM
1S5	1	0	0	0	0
DET A.V.C.	2	--	--	--	--
1ST AUDIO	3	-0.25	0	0	900K
	4	+20	+18	+2	OVER 100K
	5	+15	+12	+4	OVER 100K
	6	-0.2	0	0	10 MEG.
	7	+1.4	+1.4	+1.4	2 OHM
3S4	1	+1.4	+1.4	+1.4	2 OHM
AUDIO	2	+62	+62	+60	OVER 100K
OUTPUT	3	-3.5	-0.2	0	3.2 MEG
	4	+64	+64	+62	OVER 100K
	5	0	0	0	0
	6	+62	+62	+60	OVER 100K
	7	+1.4	+1.4	+1.4	2 OHM

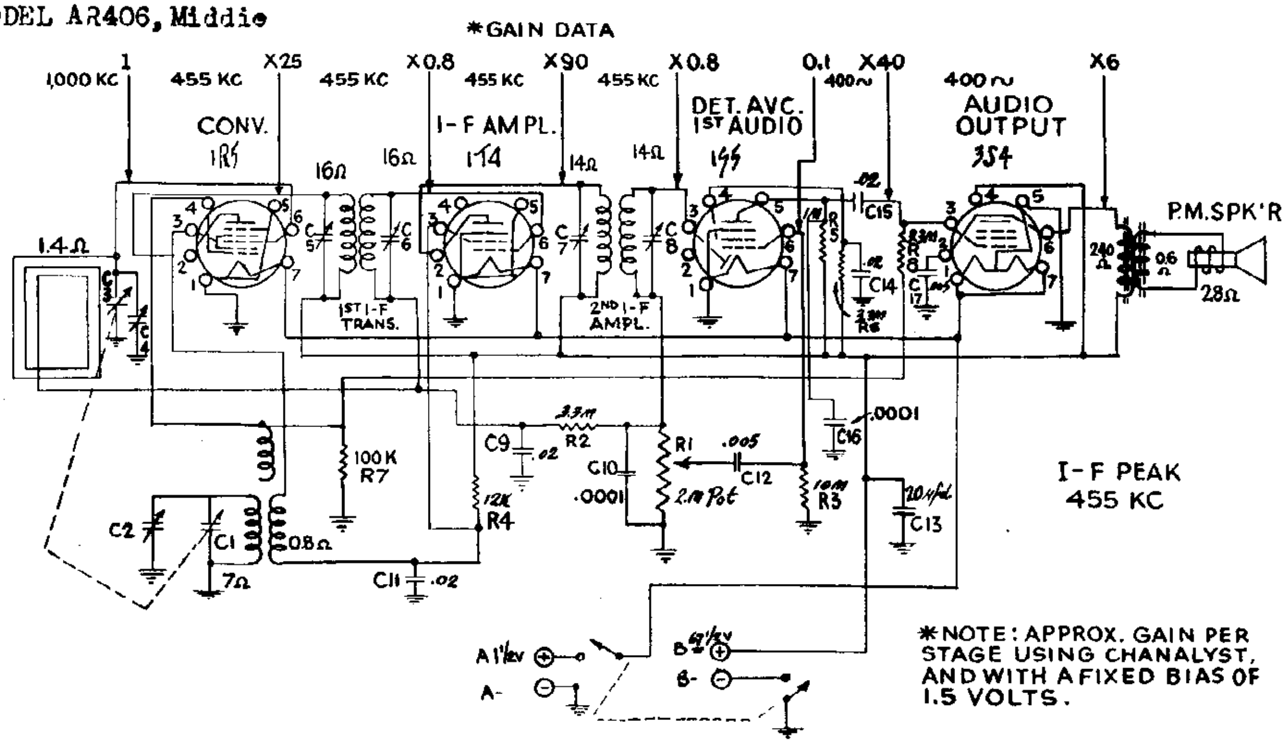
ALL VOLTAGES AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A SUPPLY VOLTAGE OF 65 V.D.C.

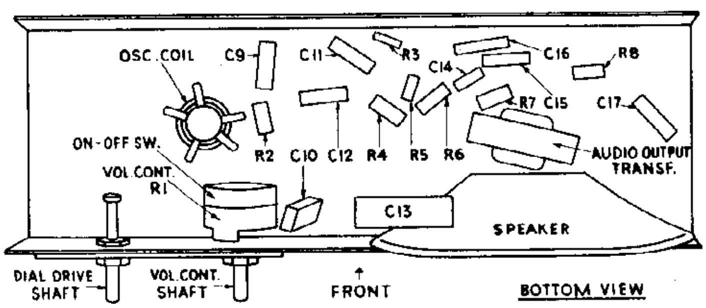


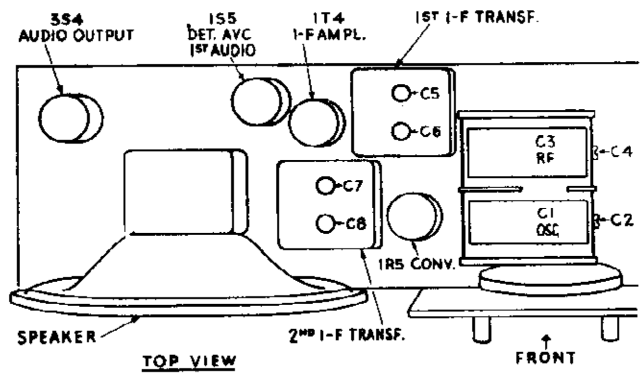
NOTE: TUNING CAPACITOR IN MAXIMUM CAPACITY POSITION.

MODEL AR6M
MODEL AR406, Middie

ALGENE RADIO CORP.







MODELS AR6M and AR406

ALIGNMENT

REMOVE RECEIVER FROM THE CABINET AND CONNECT AN OUTPUT METER ACROSS THE VOICE COIL.

CONNECT THE SIGNAL GENERATOR TO THE STANDARD HAZELTINE LOOP, MODEL 1150, AND COUPLE IT LOOSELY TO THE RECEIVER LOOP.

SET THE SIGNAL GENERATOR TO 455 KC AND FULLY MESH THE RECEIVER TUNING CAPACITOR.

KEEP THE RECEIVER VOLUME AT MAXIMUM AND THE OUTPUT OF THE SIGNAL GENERATOR SUFFICIENT TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER. ADJUST FOR MAXIMUM I.F. TRIMMERS C8, C7, C6 and C5.

R.F. OSC. ADJUSTMENT

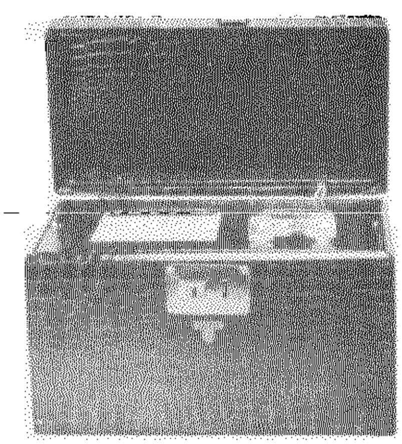
KEEP THE SAME SETUP AS USED FOR I.F. ALIGNMENT AND SET THE SIGNAL GENERATOR AND RECEIVER TO 1600 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT.

SET THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST R.F. TRIMMER C4 FOR MAXIMUM OUTPUT.

ALGENE RADIO CORP.

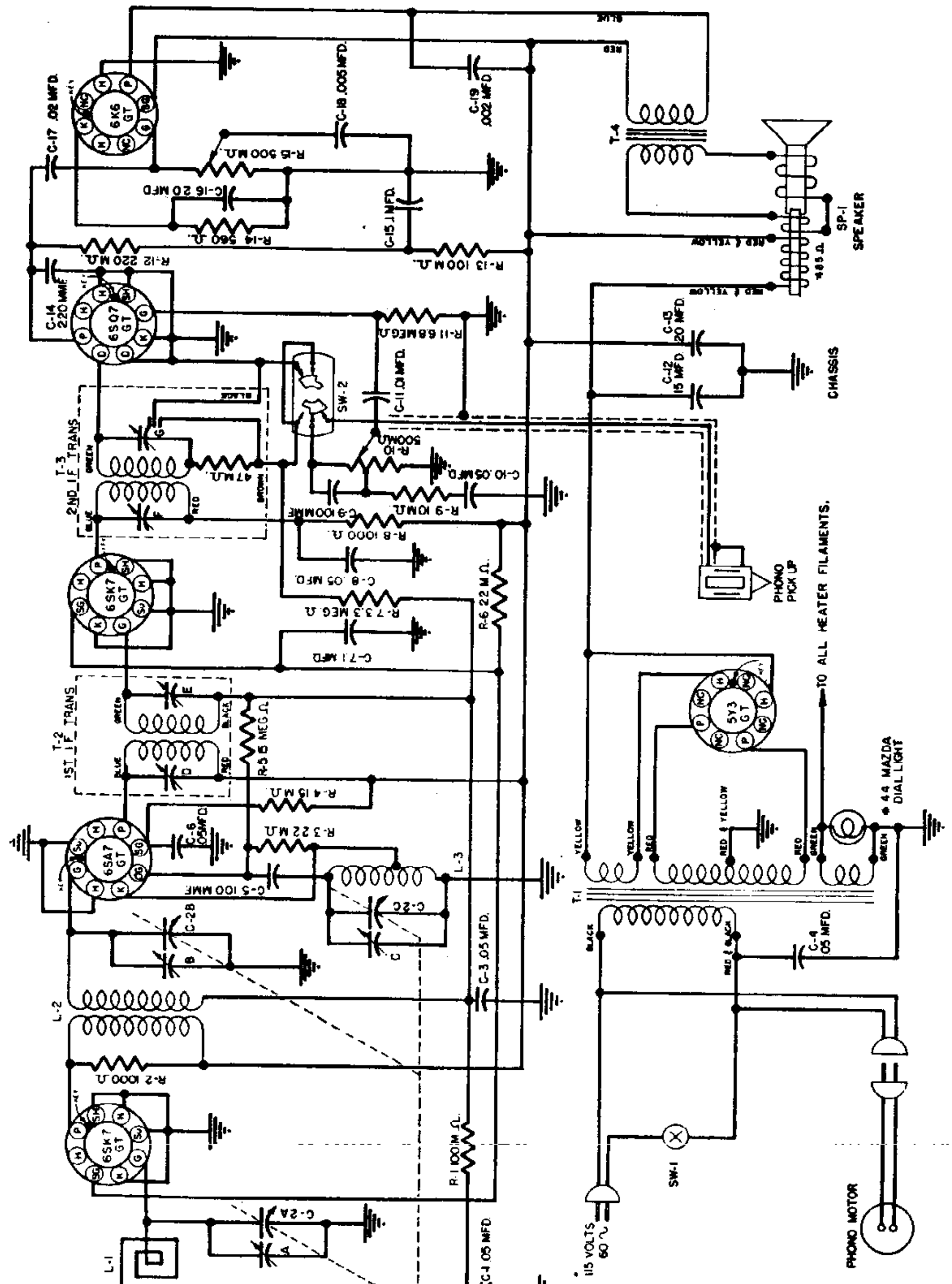
TUBE	PIN	VTVM	20,000 P.V.	1,000 P.V.	RESISTANCE
1R5	1	0	0	0	0
Conv	2	+ 65	+ 65	+ 62	Over 100 K
	3	+ 36	+ 36	+34	Over 100 K
	4	-2.5	-9.2	0	100 K
	5	-	-	-	-
	6	-0.2	0	0	4.5 meg
	7	+1.5	+1.5	+1.5	2Ω
1T4	1	0	0	0	0
I.F. Ampl	2	+ 65	+ 65	+ 62	Over 100 K
	3	+ 36	+ 36	+ 34	Over 100 K
	4	-	-	-	-
	5	-	-	-	-
	6	-0.2	0	0	4.5 meg
	7	+1.5	+1.5	+ 1.5	2Ω
1S5	1	0	0	0	0
Det A.V.C.	2	-	-	-	-
1st Audio	3	-0.2	0	0	0
	4	+ 17	+ 14	+ 2	Over 100 K
	5	+ 12	+ 10	+ 4	Over 100 K
	6	-0.2	0	0	10 meg
	7	+1.5	+1.5	+1.5	2Ω
3S4	1	+1.5	+1.5	+1.5	2Ω
Audio	2	+ 62	+ 62	+ 60	Over 100 K
Output	3	-2	-0.2	0	3.2 meg
	4	+ 65	+ 65	+ 62	Over 100 K
	5	0	0	0	0
	6	+ 62	+ 62	+ 60	Over 100 K
	7	+1.5	+1.5	+ 1.5	2Ω

NOTE: All voltage and resistance measurements made with respect to chassis ground and with a supply voltage of 65 V.



ALLIED PURCHASING, INC.

MODEL 5



455 KC IF

ALL TUBE SOCKETS SHOWN FROM PIN END VIEW.

ALL SWITCHES SHOWN IN COUNTERCLOCKWISE POSITION, SHAFT END VIEW

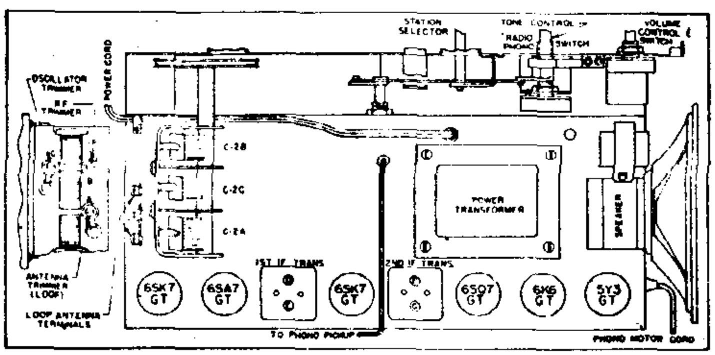
MODEL 554 ALLIED PURCHASING, INC.

ALIGNMENT PROCEDURE

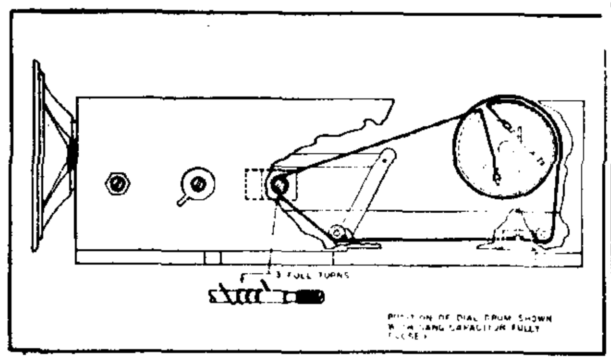
The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — RMA loop.

CONNECT GENERATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL AT	TRIMMERS	PURPOSE
6SA7GT grid	.1 mfd	455 kc.	Broadcast	HF end	D E F G	Align IF
6SK7GT RF grid	.1 mfd	1620 kc.	Broadcast	HF end	C	Set limit of band
6SK7GT RF grid	.1 mfd	1400 kc.	Broadcast	1400 kc.	B	Align RF
RMA loop	Through loop	1400 kc.	Broadcast	1400 kc.	A	Align antenna



Tube Layout



Dial Mechanism

TUBE COMPLEMENT

1—6SK7GT ....RF Amplifier tube

1—6SA7GT ....Converter tube

1—6SK7GT ....IF Amplifier tube

1—6SQ7GT ....Detector—AVC—1st Audio tube

1—6K6GT ....Power Output tube

1—5Y3GT ....Rectifier tube

NOTE: *The above glass tubes are interchangeable with their metal equivalent.*

Electrical and Mechanical Specifications

Frequency Range ....540-1600 kc.

Intermediate Frequency ....455 kc.

Power Supply .... 105-125 volts, 60 cycle A.C.

Loudspeaker ....Electrodynamic

V.C. Impedance ....3.5 ohms at 400 cycles

Power Output (Undistorted) ....1 watt

Power Output (Maximum) ....4 watts

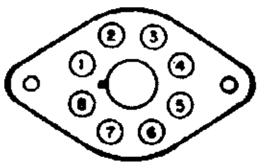
Tuning Drive Ratio ....4¾ to 1

ALLIED PURCHASING, INC.

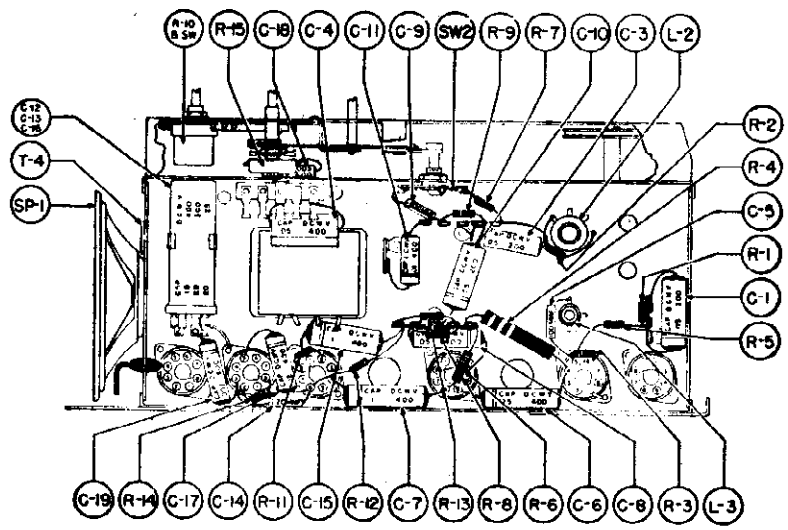
MODEL 55

SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
6SK7GT	RF Amplifier	0	0	0	0	0	93	6.3 AC	27
6SA7GT	Converter	0	6.3 AC	270	113	-7.5	0	0	0
6SK7GT	IF Amplifier	0	0	0	0	0	93	6.3 AC	26
6SQ7GT	Detector—AVC—1st Audio	0	0	0	0	0	88	6.3 AC	0
6K6GT	Power Output	0	0	250	270	0	175	6.3 AC	19
5Y3GT	Rectifier	0	310	0	290 AC	0	290 AC	0	31



NOTE: All voltages measured from chassis to socket contact indicated.
DC voltages measured with a 1000 ohm-per-volt meter.
All voltages are positive DC unless otherwise marked.
Volume control full on. No signal.
Tone Control in clockwise position.
Line Voltage 117 volts AC.



Parts Layout
Chassis Model 554

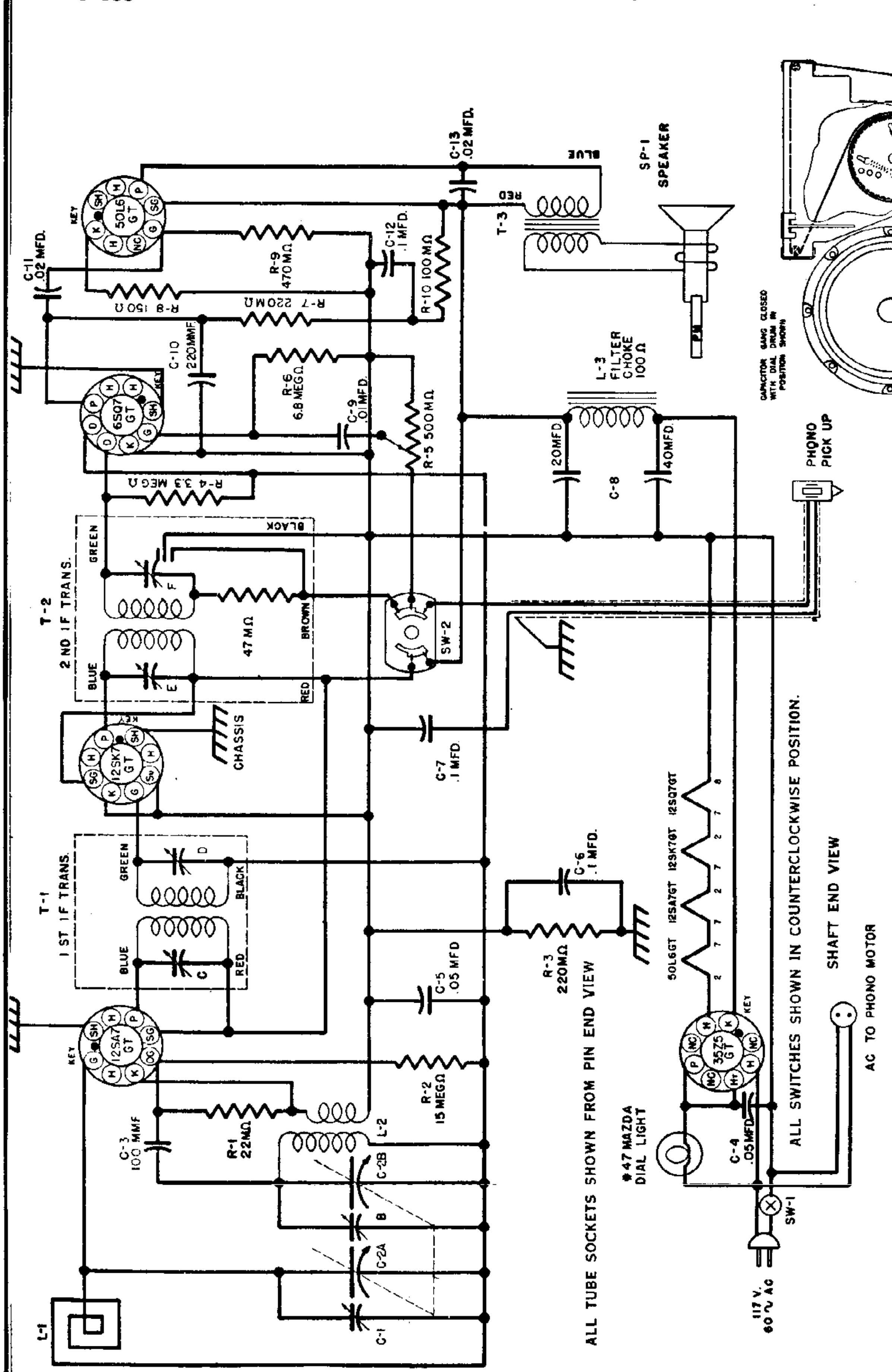
SERVICE PARTS LIST

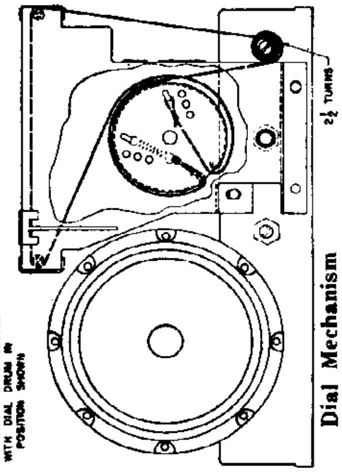
Symbol	Part No.	Description	Symbol	Part No.	Description
C-4	BC31B503	Cap., Molded, .05 mfd., 400 v.		A-2163	Cable, Dial
C-1, 3, 10	BD210503	Cap., Paper, .05 mfd., 200 v.		A-3123	Clamp, Cable
C-11	BD410103	Cap., Paper, .01 mfd., 400 v.		A-9285	Lamp, Pilot, Mazda No. 44
C-7, 15	BD410104	Cap., Paper, .1 mfd., 400 v.		A-51160-3	Cord, Power, 6 ft.
C-17	BD410203	Cap., Paper, .02 mfd., 400 v.		A-51163	Clip, Spring
C-6, 8	BD410503	Cap., Paper, .05 mfd., 400 v.	C-12, 13, 16	A-51356	Cap., Electro., 15-20-20 mfd.
C-19	BD610202	Cap., Paper, .002 mfd., 600 v.	C-2	C-51501-1	Capacitor, Variable, 3-section
C-18	BD610502	Cap., Paper, .005 mfd., 600 v.	T-1	C-51502	Transformer, Power
C-5, 9	BM78A101	Cap., Mica, 100 mmf.	L-2	B-51511	Coil, Assembly, RF
C-14	BM78A221	Cap., Mica, 220 mmf.	SP-1	C-51512	Speaker, 5" Dynamic, 485 ohm
R-14	BR16E561	Resistor, 560 ohm, 1 w.	L-3	B-51522	Coil Assembly, Osc.
R-2, 8	BR17B102	Resistor, 1000 ohm, 1/3 w.		A-51531	Shaft, Drive
R-9	BR17B103	Resistor, 10M ohm, 1/3 w.	T-2	B-51416-2	Trans. Assembly, 1st IF
R-1, 13	BR17B104	Resistor, 100M ohm, 1/3 w.	T-3	B-51417-2	Trans. Assembly, 2nd IF
R-5	BR17B156	Resistor, 15 meg., 1/3 w.		B-51591	Spring, Dial Bracket
R-3	BR17B223	Resistor, 22M ohm, 1/3 w.		A-51787	Spring, Cable
R-12	BR17B224	Resistor, 220M ohm, 1/3 w.		A-51801	Rivet, Pronged, 3/32 x 1/8
R-7	BR17B335	Resistor, 3.3 meg., 1/3 w.		B-55300-1	Channel, Rubber
R-11	BR17B685	Resistor, 6.8 meg., 1/3 w.	SW-2	B-55500-1	Switch (Radio-Phono)
R-6	BR17E223	Resistor, 22M ohm, 1 w.	R-15	B-55550-1	Potentiometer, 500M ohm
R-4	BR17G153	Resistor, 15M ohm, 2 w.	R-10	B-55575-1	Potentiometer & Switch, 500M ol

Order parts not listed by specifying (1) Part Name and (2) Model Number (include number following dash).

MODEL 558

ALLIED PURCHASING, INC.





Dial Mechanism

Frequency Range ....540-1600 kc.
Intermediate Frequency ....455 kc.
Power Supply............105-125 volts AC, 60 cycle
Loudspeaker............PM, 5-inch

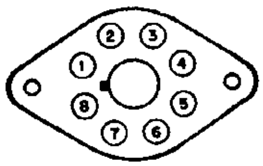
V.C. Impedance......3.5 ohms at 400 cycles
Power Output (Undistorted)......1.0 watt
Power Output (Maximum)......1.5 watts
Tuning Drive Ratio......5 to 1

RECORD CHANGER: Detrola Model 550, RCD.CH.15-1

ALLIED PURCHASING, INC.

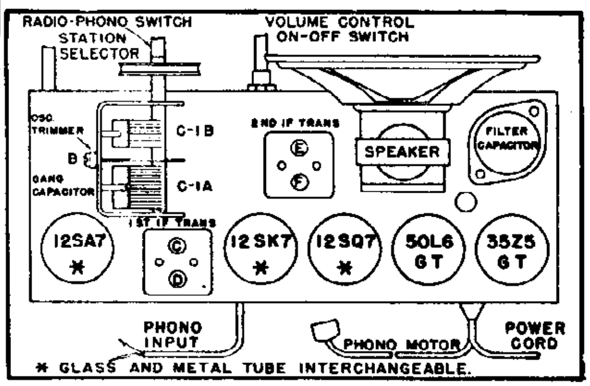
MODEL 558

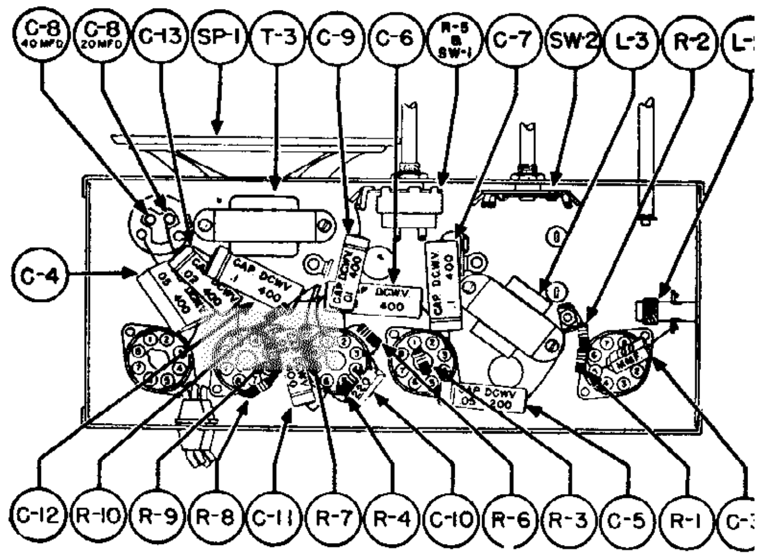
TUBE	POSITION	1	2	3	4	5	6	7	8
12SA7GT	Converter	0	36.3 AC	108	108	–5.6	0	23.8 AC	0
12SK7GT	IF Amplifier	0	11.4 AC	0	0	0	108	23.8 AC	108
12SQ7GT	Detector—1st Audio	0	0	0	0	0	43	11.4 AC	0
50L6GT	Power Output	0	85 AC	100	108	0	0	36:3 AC	7.3
35Z5GT	Rectifier	0	117 AC	112 AC	0	112 AC	0	85 AC	117



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated.
All voltages are positive DC unless otherwise marked.
Volume Control full on. No signal.
Line voltage 117 volts AC.

Parts Layout
Chassis Model 558





The following equipment is necessary to properly align this chassis:

A signal generator which will provide an accurately calibrated signal at the frequencies listed.
An output meter.
A non-metallic screwdriver.
Dummy antenna: — .1 mfd. — RMA loop.

NOTE: Intermediate Frequency and Oscillator adjustmen[ts] may be made with the loop disconnected provided [a] resistor of 10,000 to 50,000 ohms is substituted [to] close the 12SA7GT grid circuit. The loop alignme[nt] must be done with the loop and chassis mounted [in] operating position in the cabinet. A single turn loose[ly] coupled to loop may be substituted for RMA loo[p].

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12SA7GT grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max
1620 kc.	12SA7GT grid	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop*	RMA loop	1400 kc.	Ant. trimmer A	Tune to max

* Loop trimmer accessible through bottom of cabinet.

MODEL 558
MODEL 572
MODEL 579

ALLIED PURCHASING, INC.

Chassis Model 558

Symbol	Part No.	Description
C-4	BC31B503	Cap., Molded, .05 mfd., 400 v.
C-5	BD210503	Cap., Paper, .05 mfd., 200 v.
C-9	BD410103	Cap., Paper, .01 mfd., 400 v.
C-6, 7, 12	BD410104	Cap., Paper, .1 mfd., 400 v.
C-11, 13	BD410203	Cap., Paper, .02 mfd., 400 v.
C-3	BM78A101	Cap., Mica, 100 mmf.
C-10	BM78A221	Cap., Mica, 220 mmf.
R-8	BR16C151	Resistor, 150 ohm, ½ w.
R-10	BR17B104	Resistor, 100,000 ohm, ½ w.
R-2	BR17B156	Resistor, 15 megohm, ½ w.
R-1	BR17B223	Resistor, 22,000 ohm, ½ w.
R-3, 7	BR17B224	Resistor, 220,000 ohm, ½ w.
R-4	BR17B335	Resistor, 3.3 megohm, ½ w.
R-9	BR17B474	Resistor, 470,000 ohm, ½ w.
R-6	BR17B685	Resistor, 6.8 megohm, ½ w.
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot, No. 47 Mazda, 6.3 v.

Symbol	Part No.	Description
C-1	B-8296-1	Trimmer
C-8	A-8948	Capacitor, Electro., 40-20 mfd.
R-5	B-9051-3	Control, Pot.&Sw.(V.C.) 500M ohm.
T-1	B-51010-1	Transformer Assembly, 1st IF
T-2	B-51011-1	Transformer Assembly, 2nd IF
L-2	B-51159	Coil Assembly, Oscillator
	A-51160-1	Cord, AC Power, 6 ft.
	A-51163	Clip, Spring
C-2	C-51573-1	Cap., Variable
SW-2	B-51576-1	Switch, Radio-Phono
SP-1	C-51577	Speaker, 5-inch PM
T-3	B-51578-1	Transformer, Output
	B-51585-1	Cord (AC to Phono.)
	B-51591	Spring, Dial Bracket
L-1	B-51599	Coil, Loop
L-3	A-51726-2	Choke, Filter, 80 ma.
	A-51737	Spring, Cable

Chassis Model 572

Symbol	Part No.	Description
C-5	BC31B503	Cap., .05 mfd., 400 v. paper
C-2, 8, 21	BD210503	Cap., .05 mfd., 200 v. paper
C-22	BD410103	Cap., .01 mfd., 400 v. paper
C-7, 24	BD410104	Cap., .1 mfd., 400 v. paper
C-25	BD410203	Cap., .02 mfd., 400 v. paper
C-16, 28	BD410503	Cap., .05 mfd., 400 v. paper
C-1, 27	BD610202	Cap., .002 mfd., 600 v. paper
C-12	BM58D512	Cap., 5100 mmf., mica
C-11, 20	BM78A101	Cap., 100 mmf., mica
C-23	BM78A221	Cap., 220 mmf., mica
R-15	BR16E561	Resistor, 560 ohm, 1 w.
R-2, 9	BR17B102	Resistor, 1000 ohm, ½ w.
R-10	BR17B103	Resistor, 10M ohm, ½ w.
R-1, 14	BR17B104	Resistor, 100M ohm, ½ w.
R-4	BR17B150	Resistor, 15 ohm, ½ w.
R-5	BR17B156	Resistor, 15 meg., ½ w.
R-3	BR17B223	Resistor, 22M ohm, ½ w.
R-13	BR17B224	Resistor, 220M ohm, ½ w.
R-8	BR17B335	Resistor, 3.3 meg., ½ w.
R-16	BR17B474	Resistor, 470M ohm, ½ w.
R-12	BR17B685	Resistor, 6.8 meg., ½ w.
R-7	BR17E223	Resistor, 22M ohm, 1 w.
R-6	BR17G153	Resistor, 15M ohm, 2 w.
	A-2163	Cable, drive

Symbol	Part No	Description
	A-9285	Lamp, pilot, Mazda No. 44
	A-51160-1	Cord, power, 6 ft.
	B-51162-3	Shaft, drive
	A-51163	Clip, spring
	A-51260	Shield, tube
C-18, 19, 26	A-51356	Cap., electro., 15-20-20 mfd.
C-6	C-51401-1	Capacitor, variable
SP-1	C-51413	Speaker assembly, 5-inch
T-2	B-51416-1	Trans. assembly, 1st IF
T-3	B-51417-1	Trans. assembly, 2nd IF
C-17	A-51419	Cap., electro., 10 mfd., 250 v.
L-5	B-51420	Coil assembly, oscillator
T-1	C-51421	Transformer, power
L-3	B-51422	Coil assembly, antenna loading
L-4	B-51425	Coil assembly, RF
C-13	B-51428-5	Capacitor, padder
L-2	B-51430	Coil assembly, SW antenna
SW-2	B-51435-1	Switch assembly, 2-band
R-11	B-51445-1	Control, Pot. & switch 500,000 ohm.
C-9, 10, 14, 15	A-51656	Cap. assembly, trimmer (4)
C-3	A-51657	Cap. assembly, trimmer (spec.)
	A-51787	Spring, cable
C-4	B-51859-1	Cap. assembly, Ant.—BC

Chassis Model 579

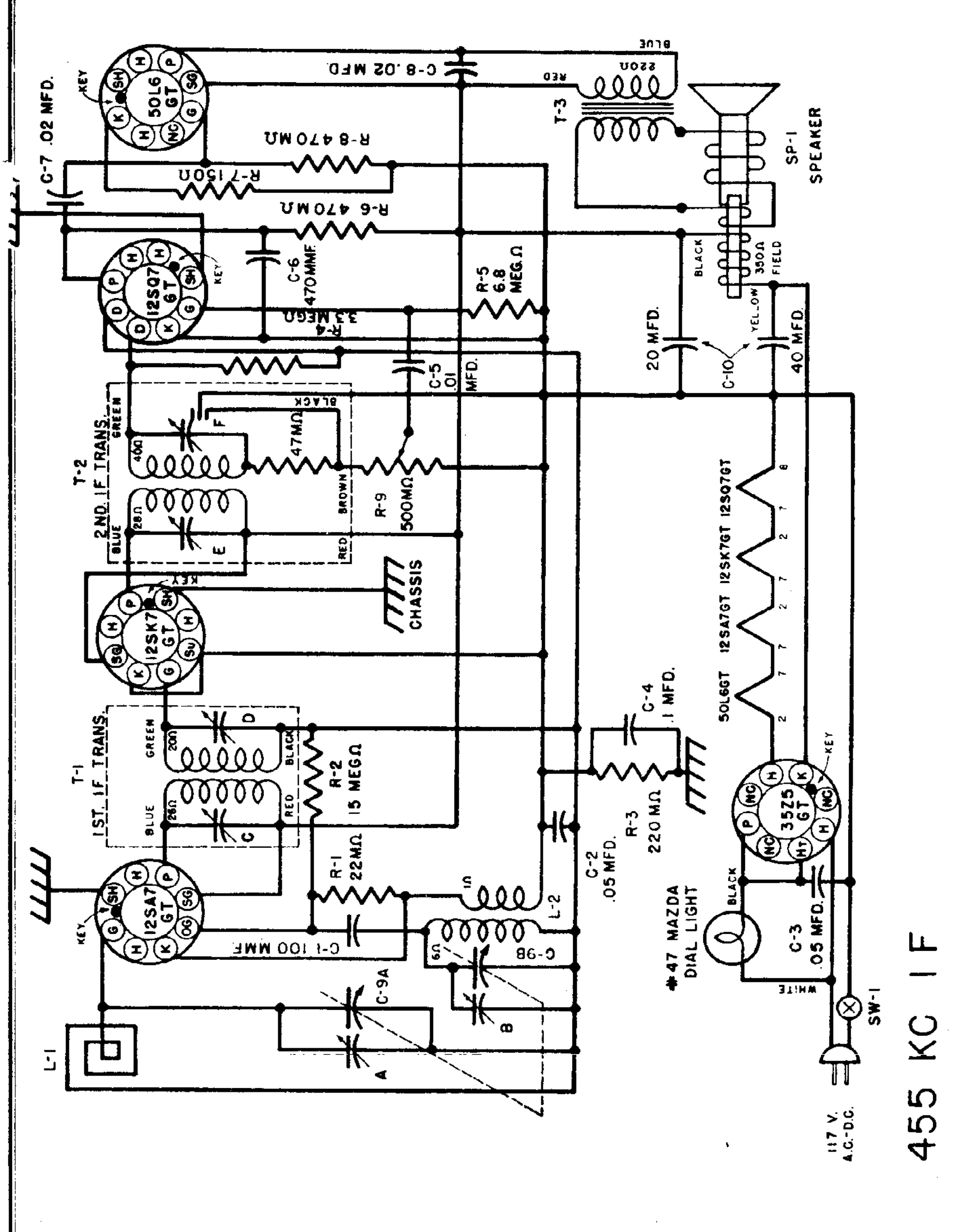
Symbol	Part No.	Description
C-4	BC31B503	Cap., paper, .05 mfd., 400 v.
C-2	BD210503	Cap., paper, .05 mfd., 200 v.
C-8	BD410103	Cap., paper, .01 mfd., 400 v.
C-6	BD410104	Cap., paper, .01 mfd., 400 v.
C-10, 11	BD410203	Cap., paper, .02 mfd., 400 v.
C-3	BM78A151	Cap., mica, 150 mmf.
C-9	BM78A221	Cap., mica, 220 mmf.
C-5	BM78A470	Cap., mica, 47 mmf.
R-9	BR16C151	Resistor, 150 ohm, ½ w.
R-3	BR17B156	Resistor, 15 megohm, ½ w.
R-1	BR17B223	Resistor, 22M ohm, ½ w.
R-2	BR17B224	Resistor, 220M ohm, ½ w.
R-5	BR17B335	Resistor, 3.3 megohm, ½ w.
R-7, 8	BR17B474	Resistor, 470M ohm, ½ w.
R-6	BR17B686	Resistor, 6.8 megohm, ½ w.
	A-2163	Cable, drive
	A-6158	Lamp, pilot, No. 47 Mazda 6.3 v.

Symbol	Part No.	Description
C-7	A-8948	Cap., electro., 40-20 mfd.
R-4	A-9051-2	Potentiometer and switch
T-1	B-51010-1	Transformer assembly, 1st IF
T-2	B-51011-1	Transformer assembly, 2nd IF
SP-1	C-51058	Speaker, 5-inch
	A-51160-1	Cord, AC line, 6 ft.
	B-51162-2	Shaft, drive
	A-51163	Clip, spring
C-1	C-51251	Capacitor, variable
L-3	B-51256	Coil, oscillator assembly
L-2	B-51257	Coil, RF assembly
	A-51260	Shield, tube
	A-51787	Spring, cable, music wire
	C-51921	Dial assembly, welded
	A-51936	Clip, indicator

Order parts not listed by specifying (1) Part Name and (2) Model Number (Including number following dash).

ALLIED PURCHASING, INC.

MODELS 571A, 571B



MODEL 571A, 571B

ALLIED PURCHASING, INC.

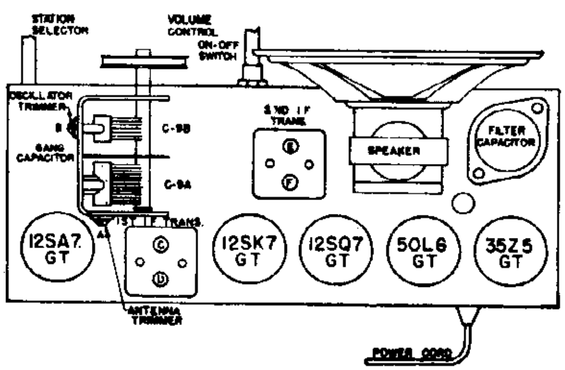
ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

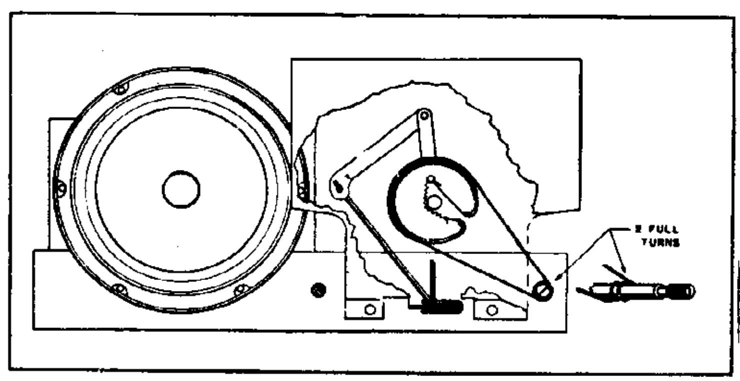
1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd., — RMA loop.

NOTE: Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12SA7GT grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12SA7GT grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
1620 kc.	Through loop	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop	RMA loop	1400 kc.	Ant. trimmer A	Tune to max.



Tube Layout



Dial Mechanism

TUBE COMPLEMENT

1—12SA7GT Oscillator and Mixer tube
1—12SK7GT IF Amplifier tube
1—50L6GT Power Output tube
1—35Z5GT Rectifier tube
1—12SQ7GT Second Detector and First Audio tube

NOTE: The above glass tubes are interchangeable with their metal equivalent.

Electrical and Mechanical Specifications

Frequency Range .... 540-1600 kc.
Intermediate Frequency .... 455 kc.
Power Supply .... 105-125 volts AC-DC
Loudspeaker .... Dynamic
V.C. Impedence .... 3.5 ohms at 400 cycles

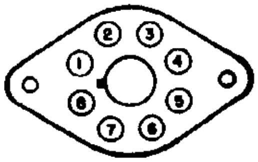
Power Output (Undistorted) ... .75 watts
Power Output (Maximum) .... 1.5 watts
Tuning Drive Ratio .... 3 to 1

ALLIED PURCHASING, INC.

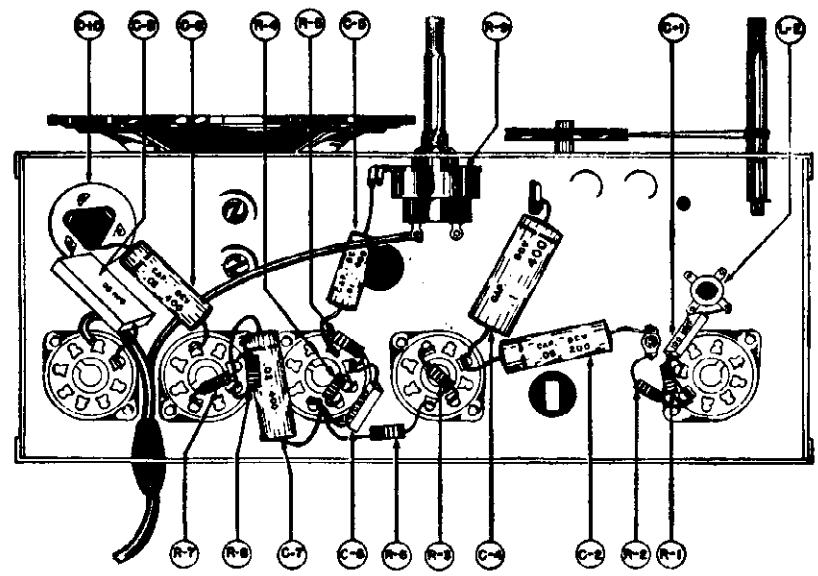
MODELS 571A, 57

SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	
12SA7GT	Osc. and Mixer	0	37.5 AC	99	99	4.2	0	24.5 AC	
12SK7GT	IF Amplifier	0	24.5 AC	0	0	0	99	12.5 AC	
12SQ7GT	2nd Det.—1st Audio	0	0	0	0	0	16	12.5 AC	
50L6GT	Power Output	0	85 AC	91.5	99	0	0	37.5 AC	5
35Z5GT	Rectifier	0	117 AC	112 AC	0	112 AC	0	85 AC	1



NOTE: All DC voltages measured with a 1000 ohm per volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measur from ON-OFF switch (—B) to socket contact indicated.
All voltages are positive DC unless otherwise marked.
Volume control full on.
Line voltage 117 volts AC.



Parts Layout Chassis Models 571A and 571B

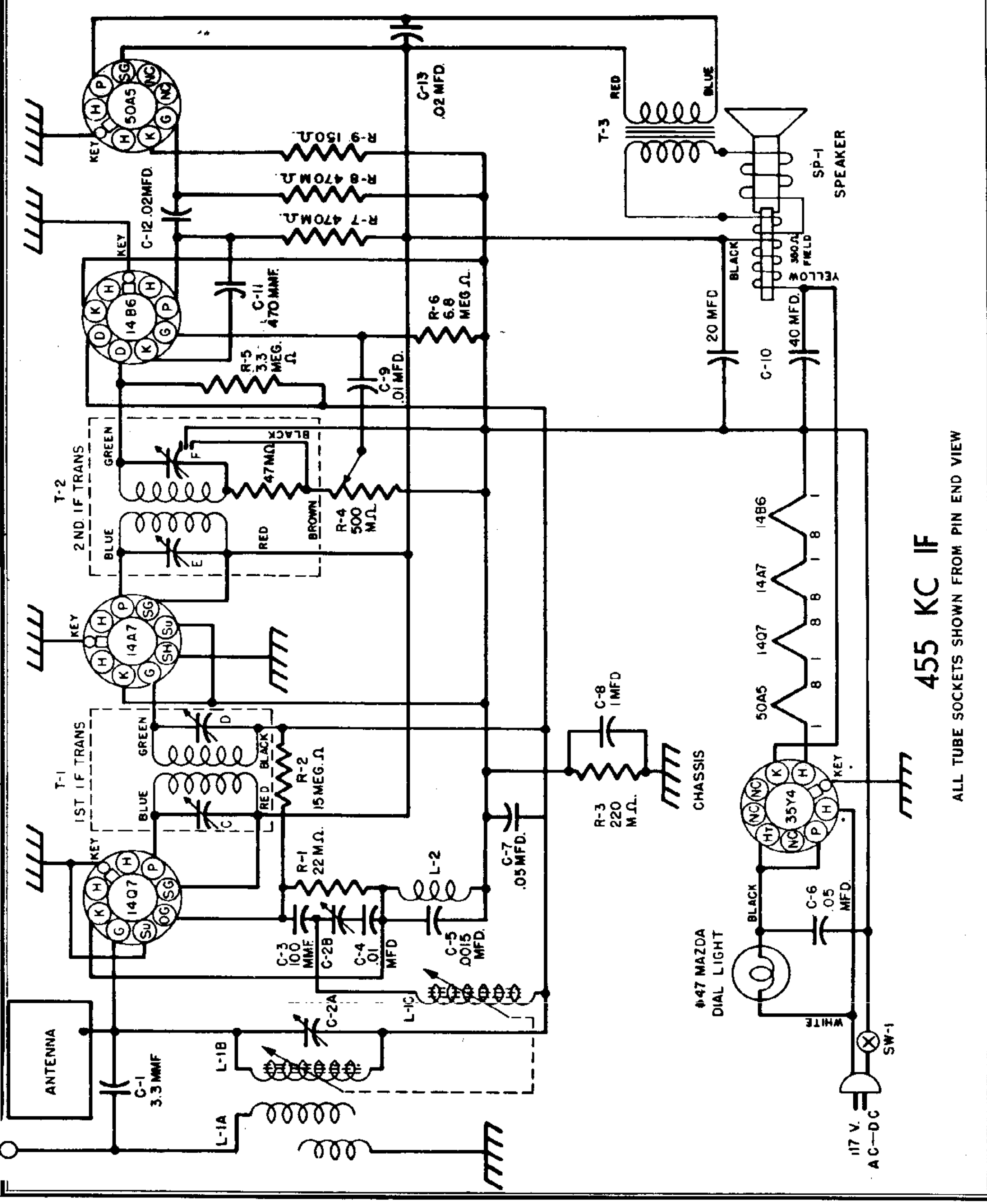
SERVICE PARTS LIST

Symbol	Part No.	Description
C-1	BM78A101	Cap., Mica, 100 mmf.
C-2	BD210503	Cap., Paper, .05 mfd., 200 v.
C-3	BC31B503	Cap., Mold., Paper, .05 mfd.
C-4	BD410104	Cap., Paper, .1 mfd., 400 v.
C-5	BD410103	Cap., Paper, .01 mfd., 400 v.
C-6	BM78A471	Cap., Mica, 470 mmf.
C-7, 8	BD410203	Cap., Paper, .02 mfd., 400 v.
C-9	C-51155-1	Cap., Variable, 2 Section
C-10	A-8948	Cap., Electro., 40-20 mfd., 150 v.
L-1	B-51243	Loop, Antenna
L-2	B-51159	Coil, Osc. Assembly
R-1	BR17B223	Resistor, 22M ohm 1/3 w.
R-2	BR17B156	Resistor, 15 meg. 1/3 w.
R-3	BR17B224	Resistor, 220M ohm 1/3 w.
R-4	BR17B335	Resistor, 3.3 meg. 1/3 w.
R-5	BR17B685	Resistor, 6.8 meg. 1/3 w.
R-6, 8	BR17B474	Resistor, 470M ohm 1/3 w.
R-7	BR16C151	Resistor, 150 ohm. 1/2 w.
R-9	B-9051-1	Control, Vol. & Sw. 500M ohm.
T-1	B-51010	Trans., Assembly, 1st IF

Symbol	Part No.	Description
T-2	B-51011	Trans., Assembly, 2nd IF
SP-1	C-51014	Speaker, 5" Dynamic, 350 oh
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot No. 47 Mazda 6.
	A-51160-1	Cord, AC-DC Line, 6 ft.
	B-51162-1	Shaft, Drive
	A-51163	Clip, Spring
	B-51177	Bracket Assembly, Dial
	A-51202	Link, Insulating
	B-51204-1	Pointer
	A-51206	Arm, Dial Drive
	A-51237-1	Paper Back, Dial
	D-51240-1	Cabinet (571-1)
	A-51241-2	Knob
	C-51242-1	Dial, Glass Indicator
	C-51247	Back, Cabinet
	A-51249	Strip, Sponge Rubber
	A-51331	Spring, Dial Bracket
	A-51787	Spring, Cable
	B-54000	Carton Assembly

MODEL 571X

ALLIED PURCHASING, INC.



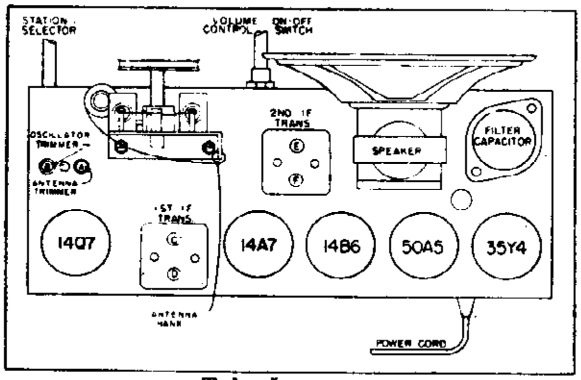
ALLIED PURCHASING, INC.

ALIGNMENT PROCEDURE

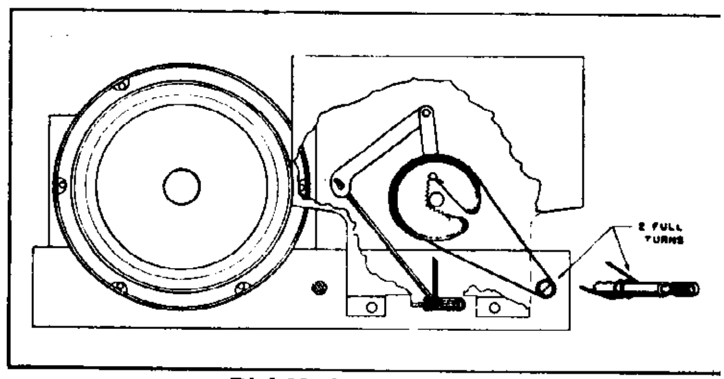
The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd., — 10 mmf

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	14Q7 grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to ma
535 kc.	14Q7 grid	10 mmf.	LF end	Osc. trimmer B	Set limit o band
1400 kc.	14Q7 grid	10 mmf.	1400 kc.	Ant. trimmer A	Tune to ma



Tube Layout



Dial Mechanism

TUBE COMPLEMENT

1—14Q7 Oscillator and Mixer tube
1—14A7 IF Amplifier tube
1—50A5 Power Output tube
1—35Y4 Rectifier tube
1—14B6 Second Detector and First Audio tube

Electrical and Mechanical Specifications

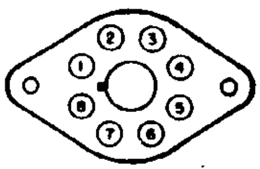
Frequency Range .... 540-1700 kc.
Intermediate Frequency .... 455 kc.
Power Supply .... 105-125 volts AC-DC
Loudspeaker .... 5-inch Dynamic
V.C. Impedance .... 3.5 ohms at 400 cycles
Power Output (Undistorted) .. .75 watts
Power Output (Maximum) .... 1.5 watts
Tuning Drive Ratio .... 3 to 1
Rated Power Input .... 32 watts

MODEL 571X

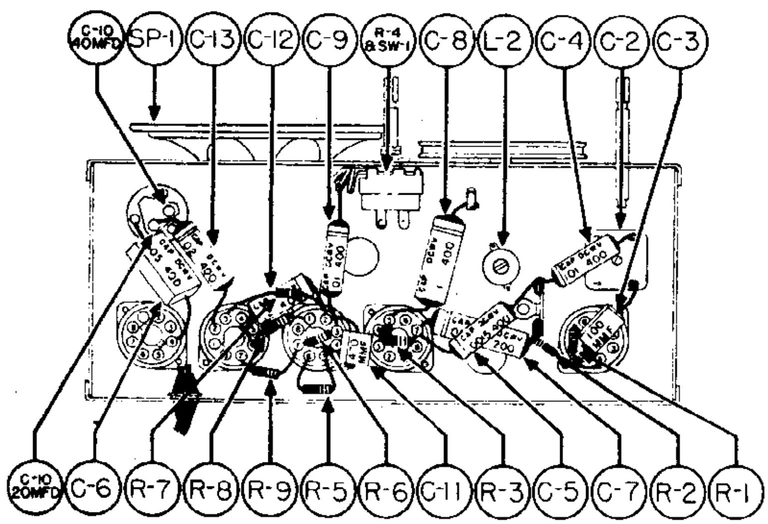
ALLIED PURCHASING, INC.

SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
14Q7	Osc. and Mixer	37.5 AC	99	99	–4.2	0	0	0	24.5 AC
14A7	IF Amplifier	12.5 AC	99	99	0	0	0	0	24.5 AC
14B6	2nd Det.—1st Audio	0	16	0	0	0	0	0	12.5 AC
50A5	Power Output	85 AC	91.5	99	0	0	0	5.9	37.5 AC
35Y4	Rectifier	117 AC	112 AC	0	112 AC	0	0	112	85 AC



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated.
All voltages are positive DC unless otherwise marked.
Volume control full on.
Line voltage 117 volts AC.



Parts Layout
Chassis Model 571X with
Loctal Tubes

SERVICE PARTS LIST

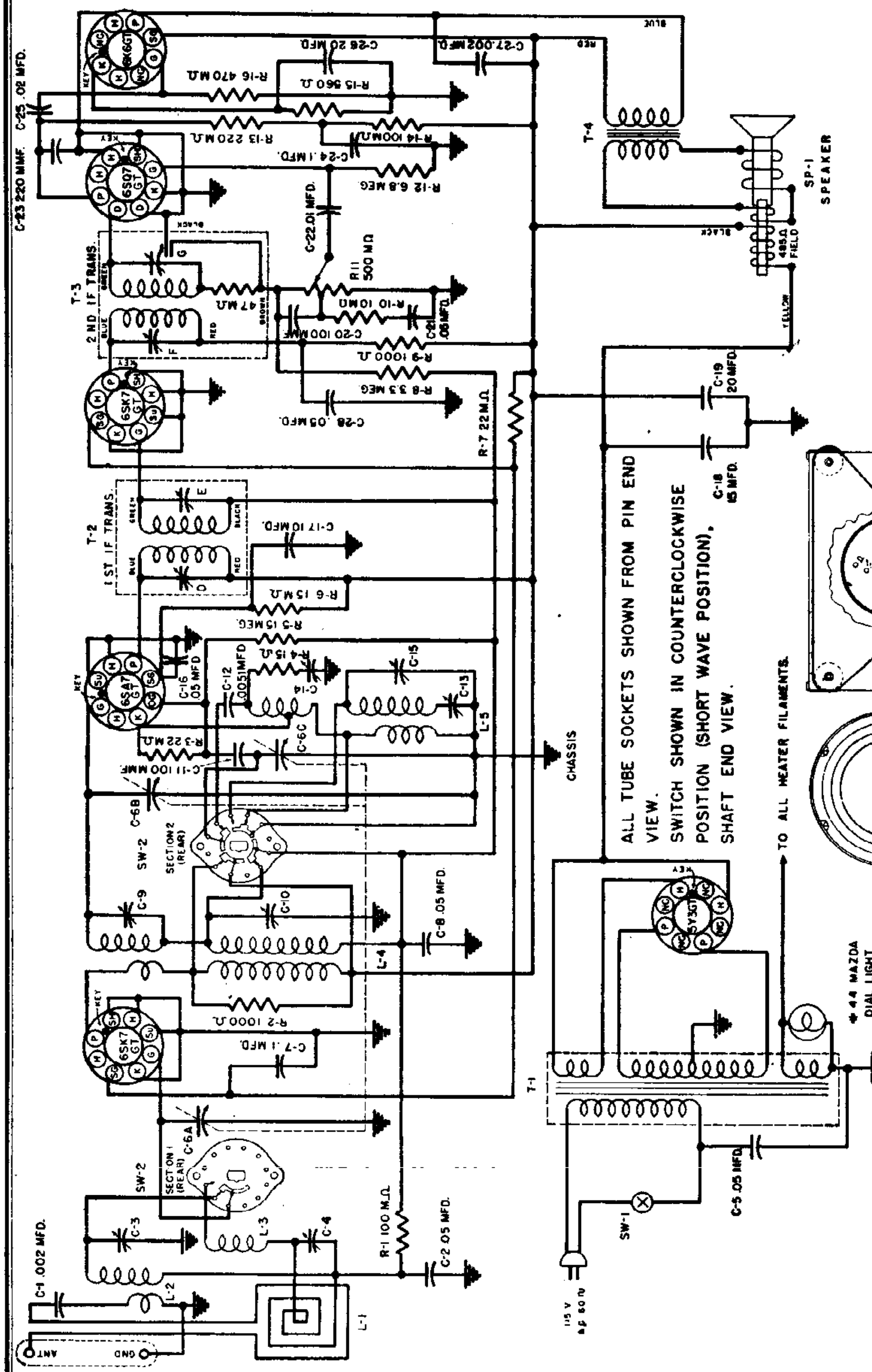
Symbol	Part No.	Description
C-6	BC31B503	Cap., Mold. Paper, .05 mfd., 400 v.
C-7	BD210503	Cap., Paper, .05 mfd., 200 v.
C-4, 9	BD410103	Cap., Paper, .01 mfd., 400 v.
C-8	BD410104	Cap., Paper, .1 mfd., 400 v.
C-12, 13	BD410203	Cap., Paper, .02 mfd., 400 v.
C-3	BM78A101	Cap., Mica, 100 mmf.
C-11	BM78A471	Cap., Mica, 470 mmf.
R-9	BR16C151	Resistor, 150 ohm, 1/2 w.
R-2	BR17B156	Resistor, 15 megohm, 1/3 w.
R-1	BR17B223	Resistor, 22,000 ohm, 1/3 w.
R-3	BR17B224	Resistor, 220,000 ohm, 1/3 w.
R-5	BR17B335	Resistor, 3.3 megohm, 1/3 w.
R-7, 8	BR17B474	Resistor, 470,000 ohm, 1/3 w.
R-6	BR17B685	Resistor, 6.8 megohm, 1/3 w.
	A-2163	Cable, Dial Drive
	A-6158	Lamp, Pilot, No. 47 Mazda, 6.3 v.
C-10	A-8948	Cap., Elec., 40-20 mfd., 150 v.
R-4	B-9051-1	Control, Vol. & Sw., 500,000 ohm.
C-5	A-9672	Cap., Paper, .0015 mfd., 400 v.

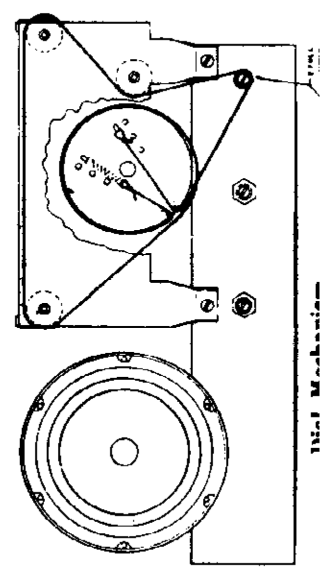
Symbol	Part No.	Description
T-1	B-51010-1	Transformer Assy., 1st IF
T-2	B-51011-1	Transformer Assy., 2nd IF
SP-1	C-51014	Speaker, 5-inch Dynamic, 350 ohm
	A-51160-1	Cord, Power, 6 ft.
	B-51162-1	Shaft, Dial Drive
	A-51163	Spring Clip for Dial Drive Shaft
	A-51202	Link, Dial Drive
	B-51330-1	Rubber Channel
	A-51331	Spring, Dial Bracket
	A-51778	Service Sheet
	A-51787	Spring, Cable
	A-51869	Antenna Reel Assembly
L-1A, L-1B, L-1C	D-54902	Permeability Tuner Assembly
L-2	B-54903	Coil Assembly, Cathode
C-2A, C-2B	B-54904-1	Capacitor, Trimmer
	B-55120-1	Stud, for Dial Drive Link

Order parts not listed by specifying (1) Part Name, (2) Model Number (include number following dash), (3) Run Number

ALLIED PURCHASING, INC.

MODEL 5'





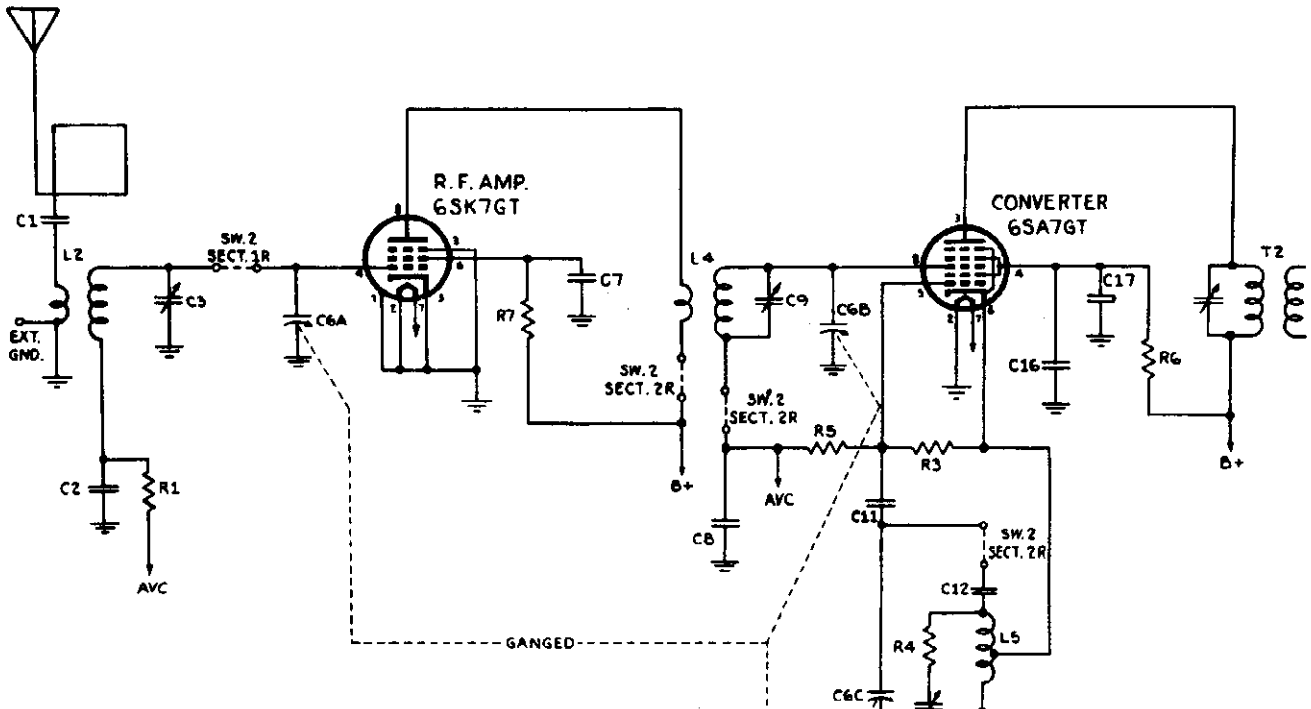
Power Output (Undistorted) ......1 watt
Power Output (Maximum) ......4 watts
Tuning Drive Ratio ......6 to 1

Frequency Range ......540-1600 kc., 6-18 mc.
Intermediate Frequency ......455 kc.
Power Supply ......105-125 volts, 60 cycle AC
Loudspeaker Type ......5" Electro Dynamic

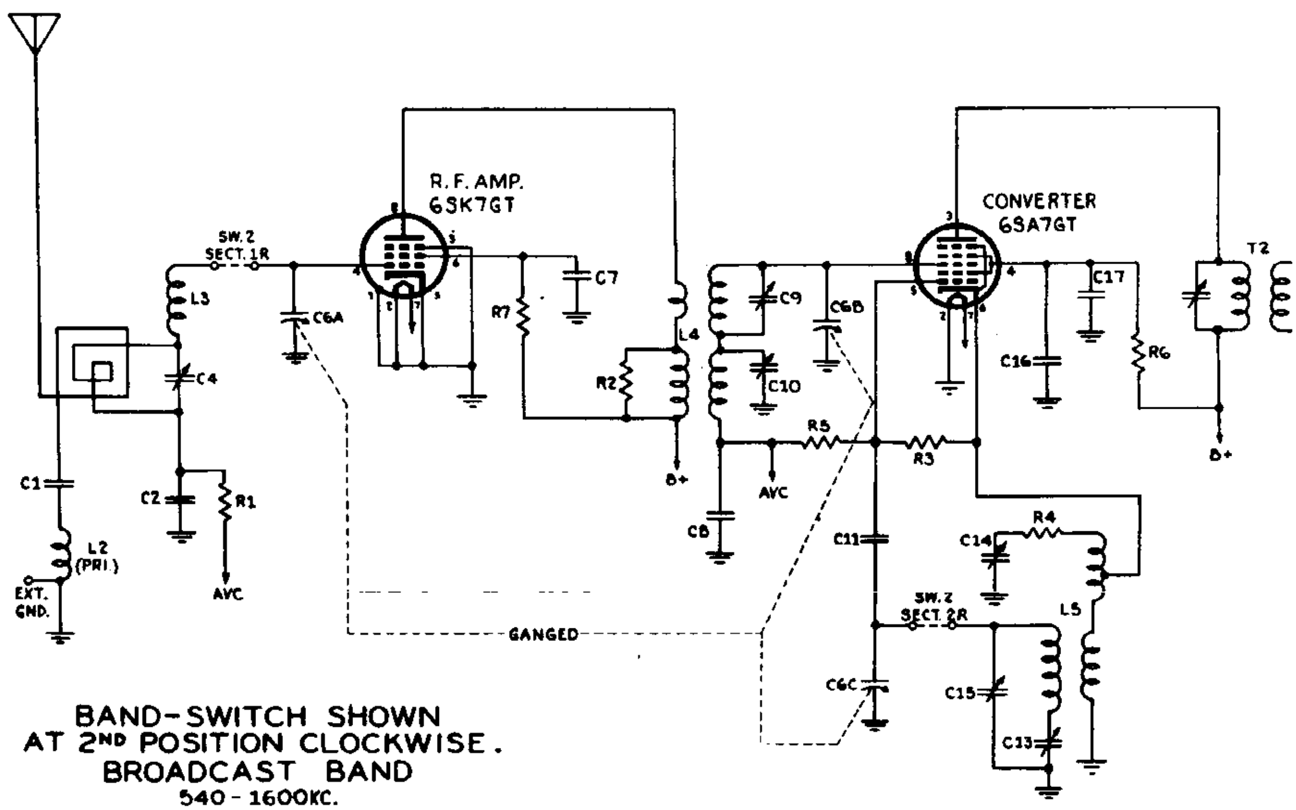
For Parts list, see P.1

MODEL 572

ALLIED PURCHASING, INC.



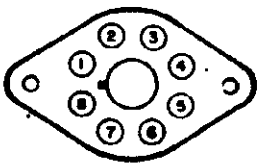
BAND-SWITCH SHOWN
AT 1ST POSITION.
SHORT WAVE BAND
6 - 18 MC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND
540 - 1600KC.

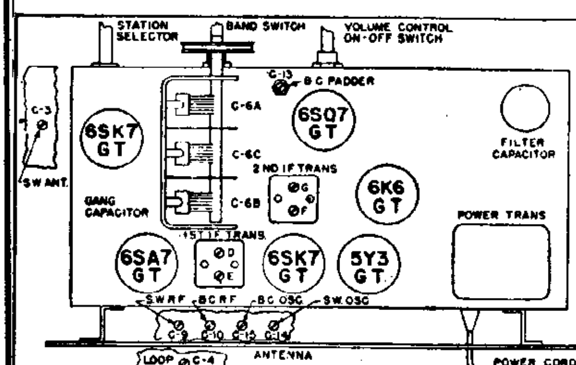
ALLIED PURCHASING, INC. MODEL 5

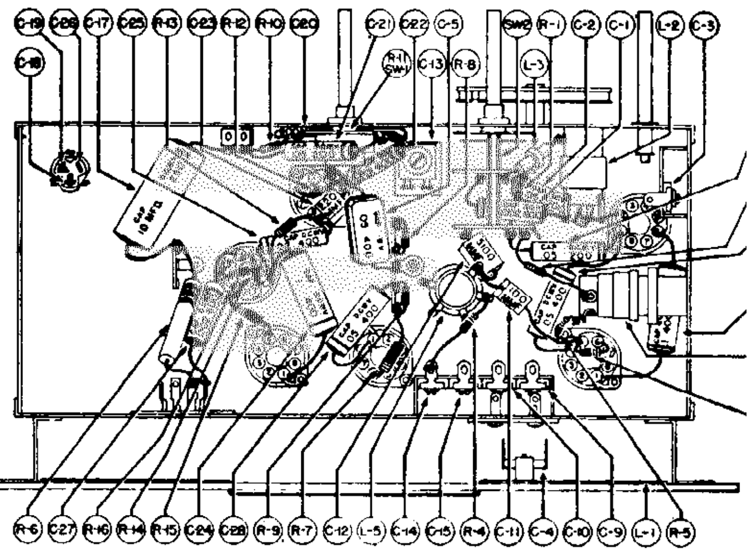
TUBE	POSITION	1	2	3	4	5	6	7
6SK7GT	RF Amplifier	0	0	0	0	0	107	6 AC
6SA7GT	Converter	0	6 AC	250	103	0	0	0
6SK7GT	IF Amplifier	0	0	0	0	0	105	6 AC
6SQ7GT	Det.—AVC—Audio	0	0	0	0	0	34	6 AC
6K6GT	Power Output	0	0	230	240	0	0	6 AC
5Y3GT	Rectifier	0	310	0	300 AC	0	300 AC	0



NOTE: All voltages measured from chassis to socket contact indicated. DC voltages measured with a 1000 ohm-per-volt meter.
All voltages are positive DC unless otherwise marked.
Volume control full on. Receiver not tuned to station.
Line voltage 117 volts AC.

Parts Layout Model 572





The following equipment is necessary to properly align this chassis:

A signal generator which will provide an accurately calibrated signal at the frequencies listed.

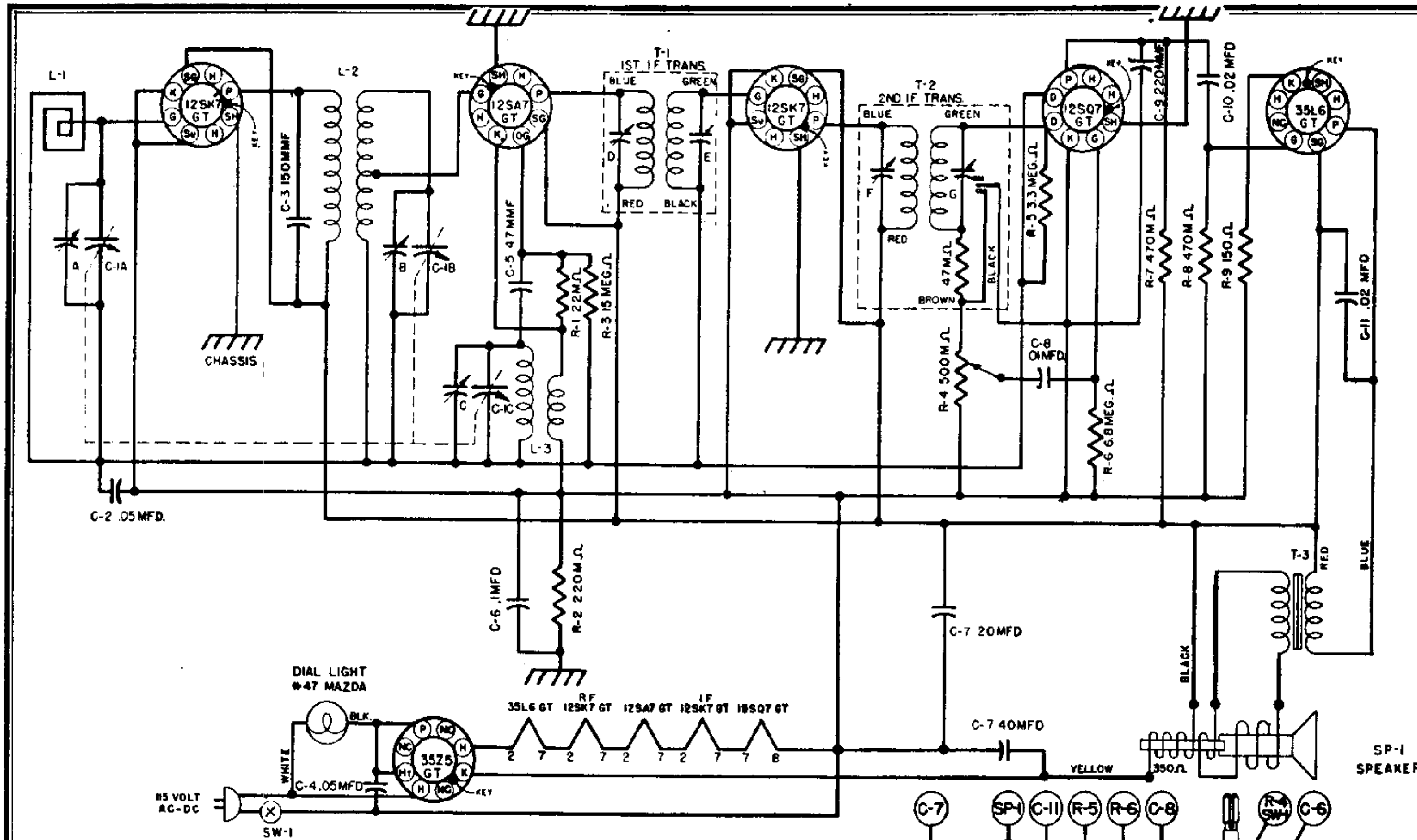
An output meter.

3. A non-metallic screwdriver.
4. Dummy antenna: .1 mfd. — 400 ohm resist RMA loop.

CONNECT TEST OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL AT	TRIMMERS	PURPOSE
6SA7GT grid	.1 mfd.	455 kc.	Broadcast	HF end	D E F G	Align IF
6SK7GT RF grid	.1 mfd.	18.3 mc.	Short wave	HF end	C-14	Set limit of b
6SK7GT RF grid	.1 mfd.	16 mc.	Short wave	16 mc.	C-9	Align RF
Antenna post	400 ohms	16 mc.	Short wave	16 mc.	C-3	Align anten
6SK7GT RF grid	.1 mfd.	1620 kc.	Broadcast	HF end	C-15	Set limit of b
6SK7GT RF grid	.1 mfd.	1400 kc.	Broadcast	1400 kc.	C-10	Align RF
6SK7GT RF grid	.1 mfd.	600 kc.	Broadcast	600 kc.	C-13	Rock gang a adjust to ma
RMA loop	Through loop	1400 kc.	Broadcast	1400 kc.	C-4	Align anten

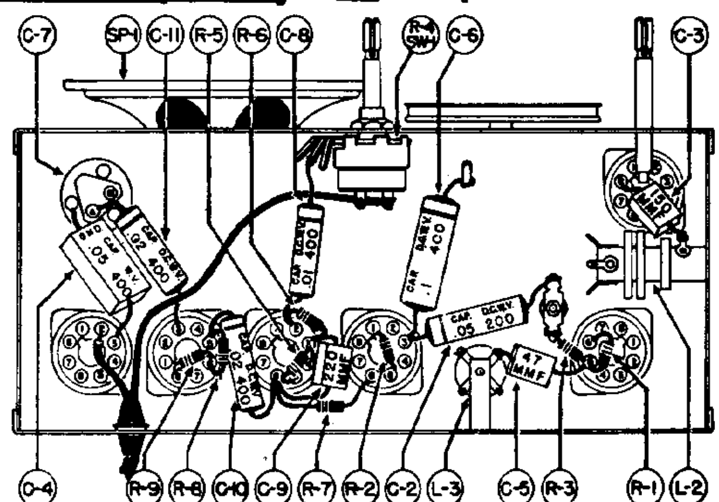
MODEL 579

ALLIED PURCHASING, INC.



ALL TUBE SOCKETS SHOWN FROM PIN END VIEW

Frequency Range	540-1600 kc.
Intermediate Frequency	455 kc.
Power Supply	105-125 volts AC-DC
Loudspeaker	Dynamic
V.C. Impedance	3.5 ohms at 400 cycles
Power Output (Undistorted)	.65 watts
Power Output (Maximum)	1.4 watts
Tuning Drive Ratio	6 to 1

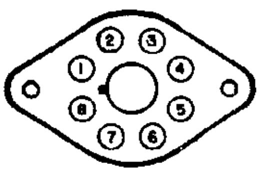


Parts Layout
Model 579

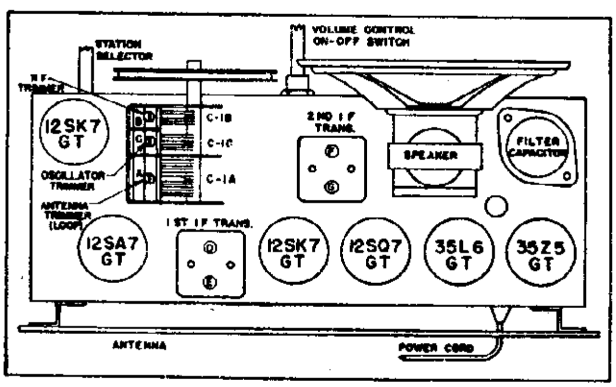
ALLIED PURCHASING, INC.

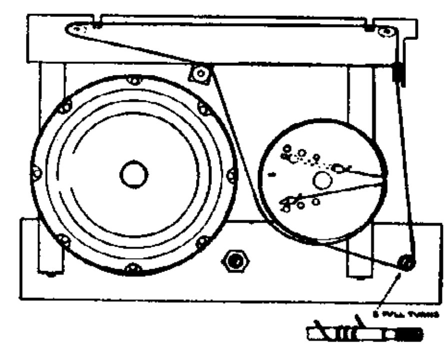
MODEL 5

TUBE	POSITION	1	2	3	4	5	6	7	8
12SK7GT	RF Amplifier	0	50 AC	0	0	0	97	38 AC	9
12SA7GT	Converter	0	25 AC	97	97	–6	0	38 AC	
12SK7GT	IF Amplifier	0	25 AC	0	0	0	97	12 AC	9
12SQ7GT	Detector, 1st Audio	0	0	0	0	0	30	12 AC	
35L6GT	Output	0	85 AC	92	97	0	0	50 AC	5.
35Z5GT	Rectifier	0	117 AC	112 AC	0	112 AC	0	86 AC	12



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated.
All voltages are positive DC unless otherwise marked.
Volume Control full on. No signal.
Line voltage 117 volts AC.





Dial Mechanism

The following equipment is necessary to properly align this chassis:

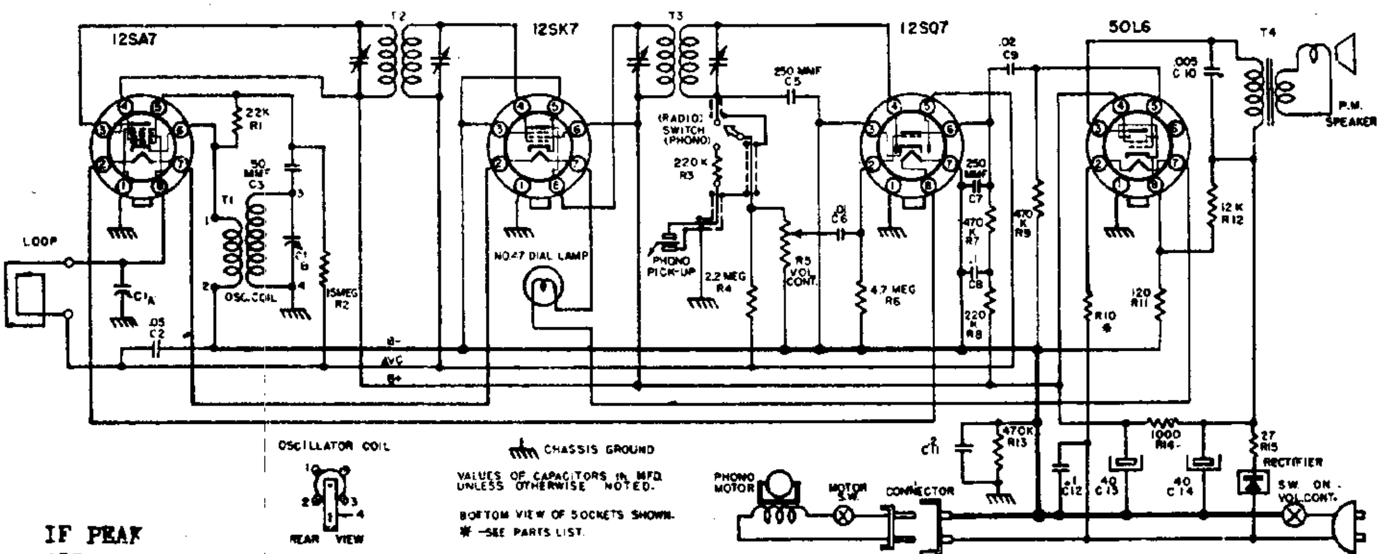
A signal generator which will provide an accurately calibrated signal at the frequencies listed.
An output meter.
A non-metallic screwdriver.
Dummy antenna: .1 mfd. — RMA loop.

Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12SK7GT grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

CONNECT TEST OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
12SA7GT grid	.1 mfd.	455 kc.	HF end	D E F G	Align IF
12SK7GT RF grid	.1 mfd.	1620 kc.	HF end	C	Set limit of ba
12SK7GT RF grid	.1 mfd.	1400 kc.	1400 kc.	B	Align RF
RMA loop	Through loop	1400 kc.	1400 kc.	A	Align antenn

ALLIED RADIO CORP.

MODEL 5C-1



IF PEAK
455 KC

* COMPENSATION CIRCUIT — PAT. APPLIED FOR

Code	Part No.	DESCRIPTION
C1A, C1B	B19-189	Variable Condenser
C2	A16-152	.03 MFD. 200 volt Condenser
C4	A15-175	50 MMFD. Mica Condenser
C9	A16-150	.02 MFD. 400 volt Condenser
C5, C7	A15-176	250 MMFD. Mica Condenser
C6	A16-156	.01 MFD. 400 volt Condenser
C8	A16-157	.1 MFD. 200 volt Condenser
C10	A16-153	.005 MFD. 600 volt Condenser
C11	A16-154	.2 MFD. 400 volt Condenser
C12	A16-160	.1 MFD. 400 volt Condenser
C13, C14	A18-280	40 MFD. 150 volt Electrolytic Condenser
R1	A60-659	22K Ohm ½ watt 20% Resistor
R2	A60-684	15 Megohm ½ watt 20% Resistor
R3, R8	A60-687	220K Ohm ½ watt 20% Resistor
R4	A60-664	2.2 Megohm ½ watt 20% Resistor
R5	A24-164	500K Ohm Volume Control with Switch
R6	A60-669	4.7 Megohm ½ watt 20% Resistor
R7, R9, R13	A60-642	470K Ohm ½ watt 20% Resistor
R10	A60-719	Special Compensating Resistor, order only from the manufacturer
R11	A60-702	120 Ohm ½ watt 10% Resistor
R12	A60-720	12K Ohm 2 watt 10% Resistor
R14	A60-699	1000 Ohm 2 watt 10% Resistor
R15	A60-721	27 Ohm 1 watt 10% Resistor
T1	B10-411	Oscillator Coil
T2	A10-460	1st I. F. Transformer
T3	B10-454	2nd I. F. Transformer
T4	B88-230	Output Transformer
	A52-199	Knob, Volume
	A52-200	Knob, Tuning
	A52-201	Knob, Phono-Radio
	A69-172	Switch, Phono-Radio
	A30-270	Drum for Variable Condenser
	B78-262	5" P. M. Speaker
	A71-32	Cover for Volume Control
	A88-301	Selenium Rectifier
	A75-32	Tuning Shaft
	A83-303	Connector
	D42-407	Cabinet, Wood
	C71-37	Cover for Dial Plate
	B87-490	Dial Scale
	A30-53	Dial Pointer
	B83-406	Dial Scale Retainer
	C83-410	Cabinet Back
	C82-42	Loop Antenna
	A83-273	Dial Diffusing Plate

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is .4 volts using a signal which is modulated 400 c.p.s.

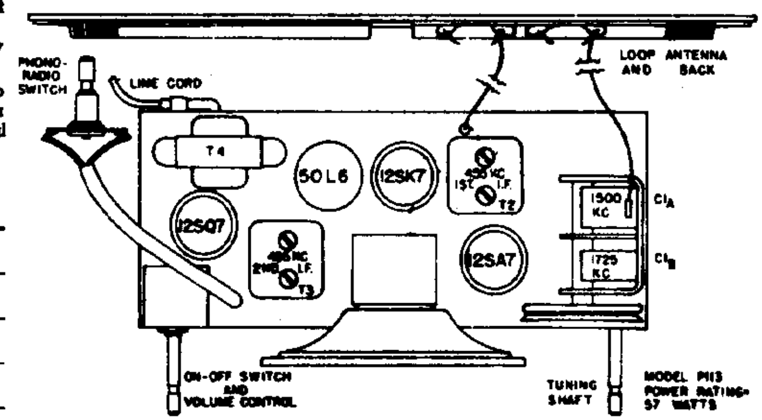
Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	* 12SA7 Grid (Stator of C1A)	T2	Input I.F.
Fully open	455 KC	.1	* 12SA7 Grid (Stator of C1A)	T3	Output I.F.
Fully open	1725 KC	.00025	* 12SA7 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1500 KC	.00025	**Loosely Coupled to Loop	C1A	Antenna

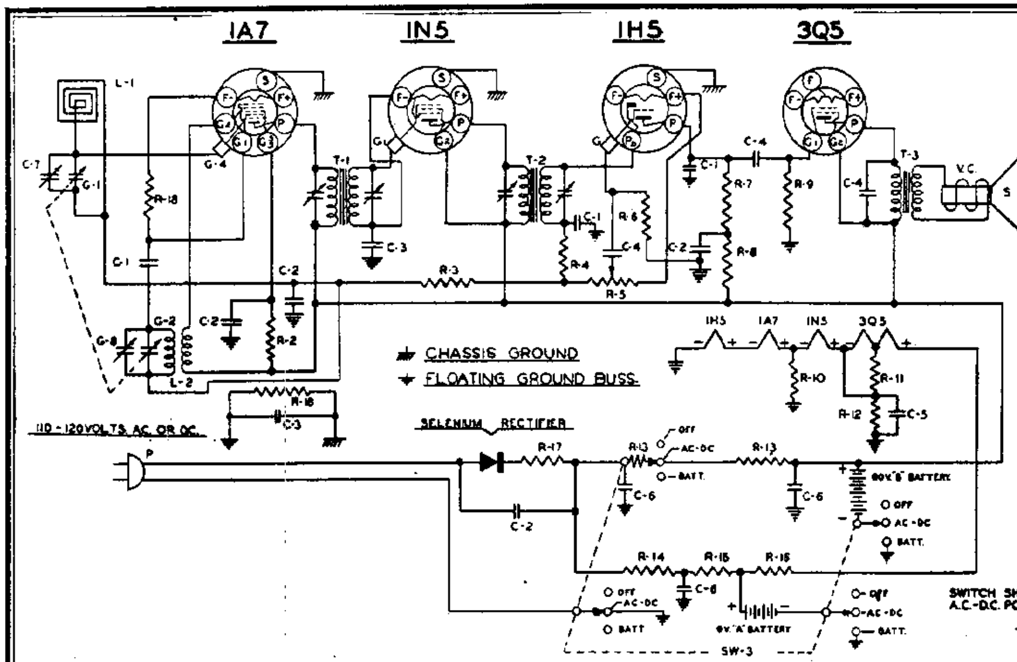
*Connect ground lead of signal generator to Common "B."

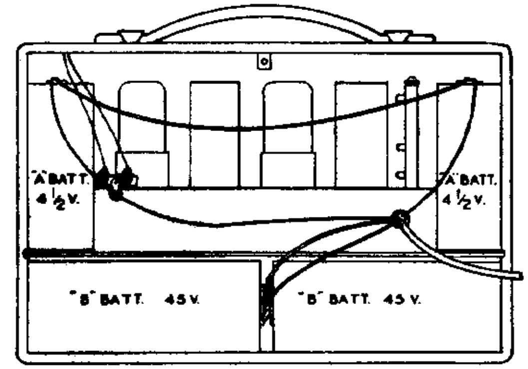
**Do not connect ground lead of signal generator.



MODEL 5C-290

ALLIED RADIO CORP.





BATTERY LOCATION

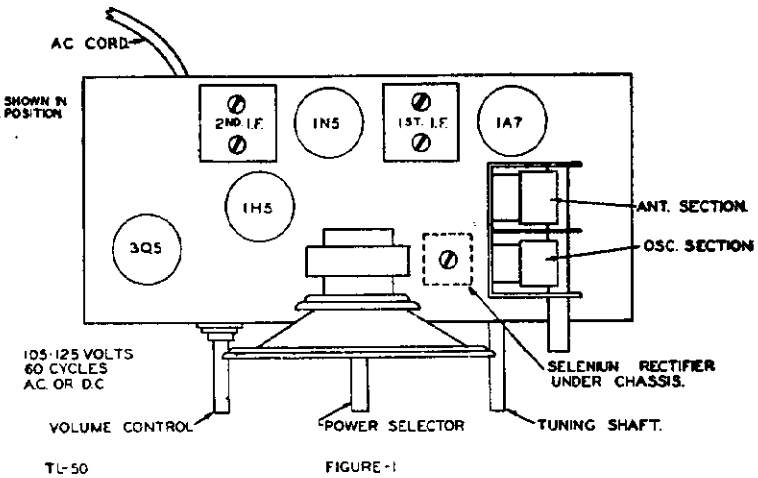


FIGURE-1

ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

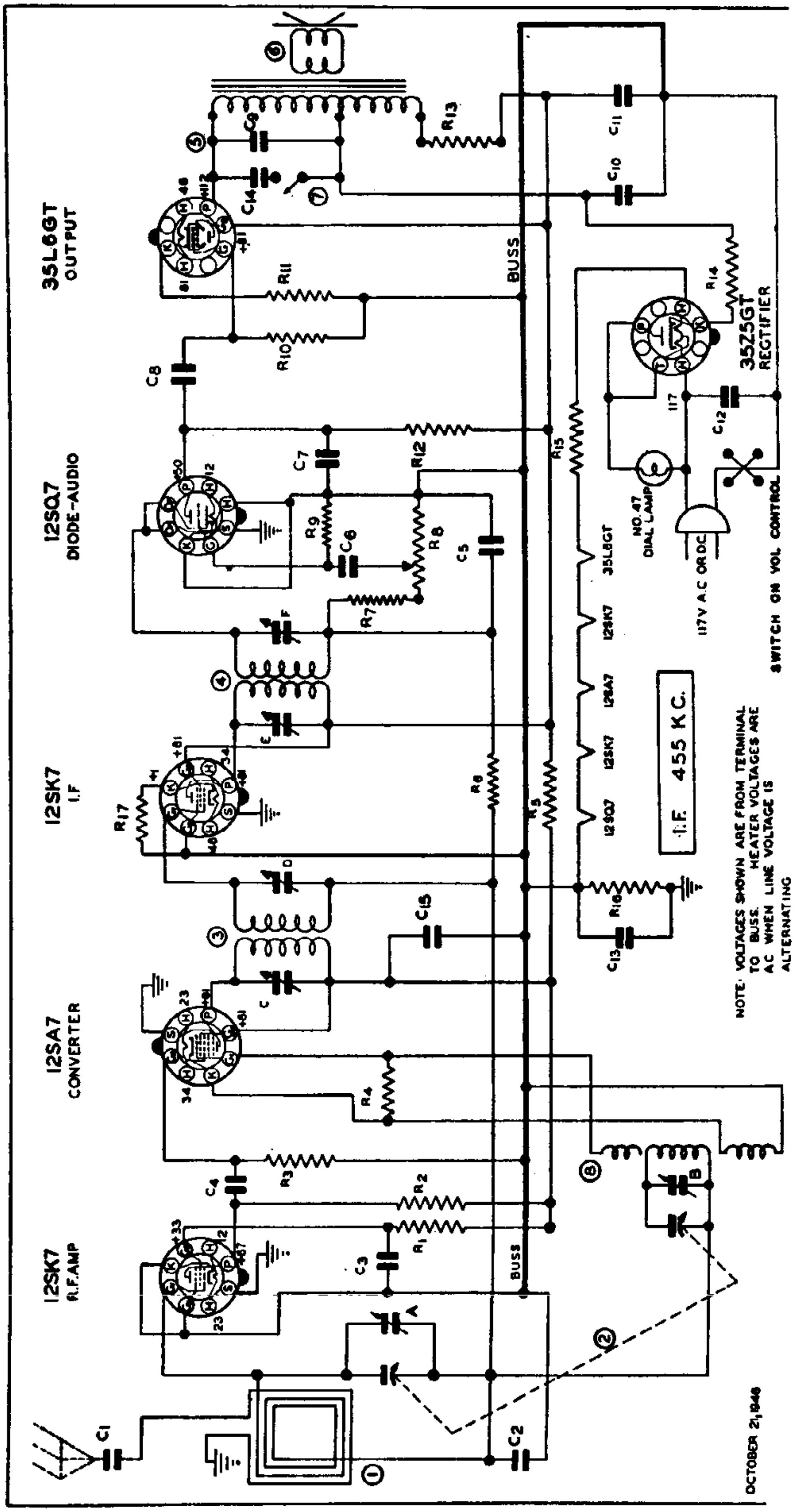
THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the top of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the top of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

PART NO.		DESCRIPTION
IR-10	R-2	47 M Ω RESISTOR 1/2 W. 20%
IR-23	R-3	3.3 MEG. RESISTOR 1/2 W. 20%
IR-31	R-4	82 M Ω RESISTOR 1/2 W. 10%
VC-2	R-5	1 MEG VOLUME CONTROL
IR-3	R-6	10 MEG. RESISTOR 1/2 W. 20%
IR-12	R-7	1 MEG. RESISTOR 1/2 W 20%
IR-11	R-8	470 M Ω RESISTOR 1/2 W. 20%
IR-13	R-9	2.2 MEG RESISTOR 1/2 W. 20%
IR-32	R-10	680 Ω RESISTOR 1/2 W. 10%
IR-33	R-11	270 Ω RESISTOR 1/2 W. 10%
IR-21	R-12	330 Ω RESISTOR 1/2 W 10%
IR-39	R-13	620 Ω RESISTOR 1/2 W. 5%
WR-3A	R-14	1050 Ω CANDOHM RESISTOR
	R-15	050 Ω
	R-16	40 Ω
IR-35	R-17	82 Ω WIREWOUND RESISTOR. 2W. 10%
IR-20	R-18	220 M Ω RESISTOR 1/2 W. 20%
MC-2	C-1	100 MMFD CONDENSER. (MICA)
PC-5	C-2	.05 MFD. CONDENSER. 400 V.
PC-8	C-3	.1 MFD CONDENSER 400 V.
PC-6	C-4	.005 MFD. CONDENSER 600 V.

PART NO.		DESCRIPTION
EC-8	C-5	70 MFD. 10V. ELECTROLYTIC
EC-4	C-6	40-40-40-150V ELECTROLYTIC
TC-7	C-7	ANTENNA TRIMMER
	G-8	OSC. TRIMMER.
GC-4	G-1, G-2	GANG CONDENSER
LL-10	L-1	LOOP ANNTENNA
LO-8	L-2	OSC. COIL
LI-3	T-1	INPUT I.F. TRANSFORMER
LI-4	T-2	OUTPUT I.F. TRANSFORMER
CO-1	P	LINE CORD
SPK-5	T-3	OUTPUT SPEAKER TRANSFORMER
	VC	VOICE COIL
	S	P.M. SPEAKER.
SW-5	SW-3	4 POLE 3 POSITION
SR-1	—	SELENIUM RECTIFIER
TU-11	—	1A7 - IN5 - IH5 - 3Q5
"A" BATTERY		9 VOLTS
"B" BATTERY		90 VOLTS.

ALLIED RADIO CORP.

MODELS 6C-225,6C-2



MODELS 6C-225, 6C-226 ALLIED RADIO CORP.

SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser. With the gang condsenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

TUNING RANGE

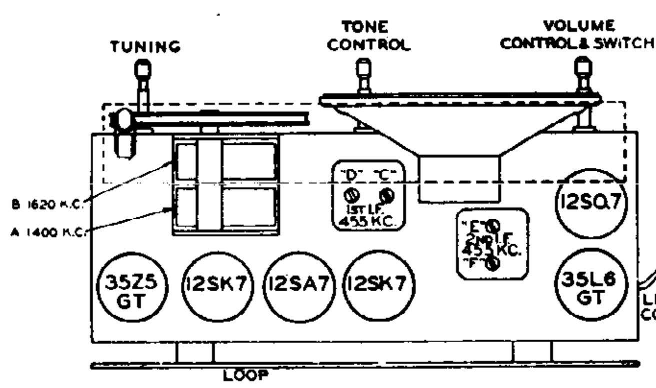
This receiver is designed to operate over the standard broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters).

DIAL CALIBRATION. The scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

GROUND. No ground connection should be used when operaitng this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

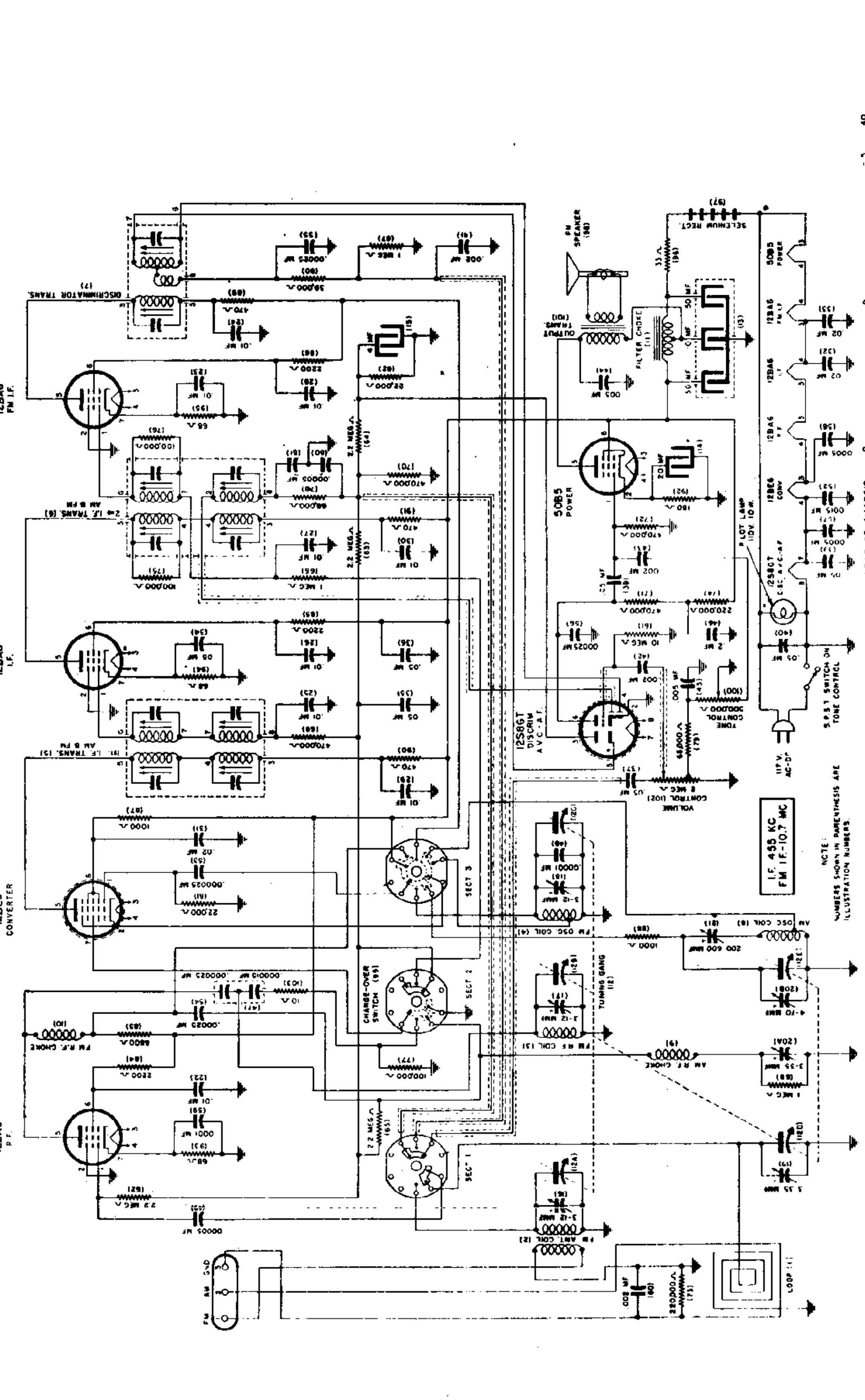
DIAG NO.	PART NO.	DESCRIPTION	DIAG NO.	PART NO	DESCRIPTION
C1	N-1344	.01 MFD 400V 20%	R6	N-1262	1 MEGOHM .5W 20%
C2	N-1345	.05 MFD 200V 20%	R7	N-4063	47,000 OHM .5W 20%
C3	N-1345	.05 MFD 200V 20%	R8	N-5026	0.5 MEGOHM VOL. CONT.
C4	N-2383	150 MMFD MICA 20%	R9	N-4061	47 MEGOHM .5W 20%
C5	N-1374	100 MMFD MICA 20%	R10	N-4027	470,000 OHM .5W 20%
C6	N-4894	.005 MFD 600V -15+40%	R11	N-4067	180 OHM .5W 10%
C7	N-4890	.0005 MFD 600V -25+60%	R12	N-4966	220,000 OHM .5W INS. 20%
C8	N-1344	.01 MFD 400V 20%	R13	N-4900	1200 OHM 1W 10%
C9	N-1344	.01 MFD 400V 20%	R14	N-4022	33 OHM .5W 20%
C10	N-3658	40 MFD 150 W.V. ELECTRO	R15	N-4628	33 OHM 1W 10%
C11		40 MFD 150 W.V. LYTIC	R16	N-4026	220,000 OHM .5W 20%
C12	N-1346	.05 MFD 400V 20%	R17	N-5657	82 OHM .5W 10%
C13	N-5160	2 MFD 200V -10+10%	1	N-5937	LOOP COIL
C14	N-1346	.05 MFD 400V 20%	2	N-5288 OR	2 GANG CONDENSER
C15	N-1351	.1 MFD 200V -10+20%	1	N-5765	LOOP COIL
			2	N-5938	2 GANG CONDENSER
			3	N-4872	1ST I.F. TRANSFORMER
			4	N-5371	2ND I.F. TRANSFORMER
R1	N-4063	47,000 OHM .5W 20%	5	N-4873	OUTPUT TRANSFORMER
R2	N-4096	2200 OHM .5W 10%	6	N-1866	5" SPEAKER
R3	N-4067	47,000 OHM .5W INS 20%	7	N-4942	TONE SWITCH
R4	N-5351	22,000 OHM .5W INS 20%	8	N-4810	OSCILLATOR COIL
R5	N-4066	470 OHM .5W 10%			

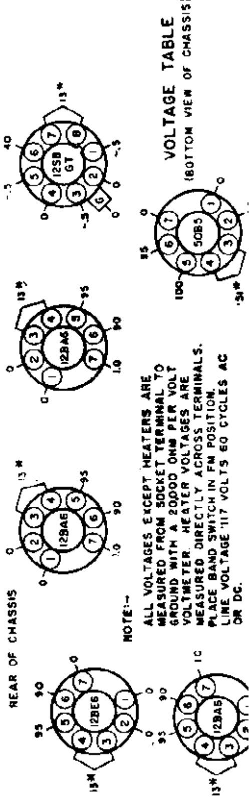


TUBE & TRIMMER LOCATIONS

ALLIED RADIO CORP.

MODELS 7B-220,7C-22





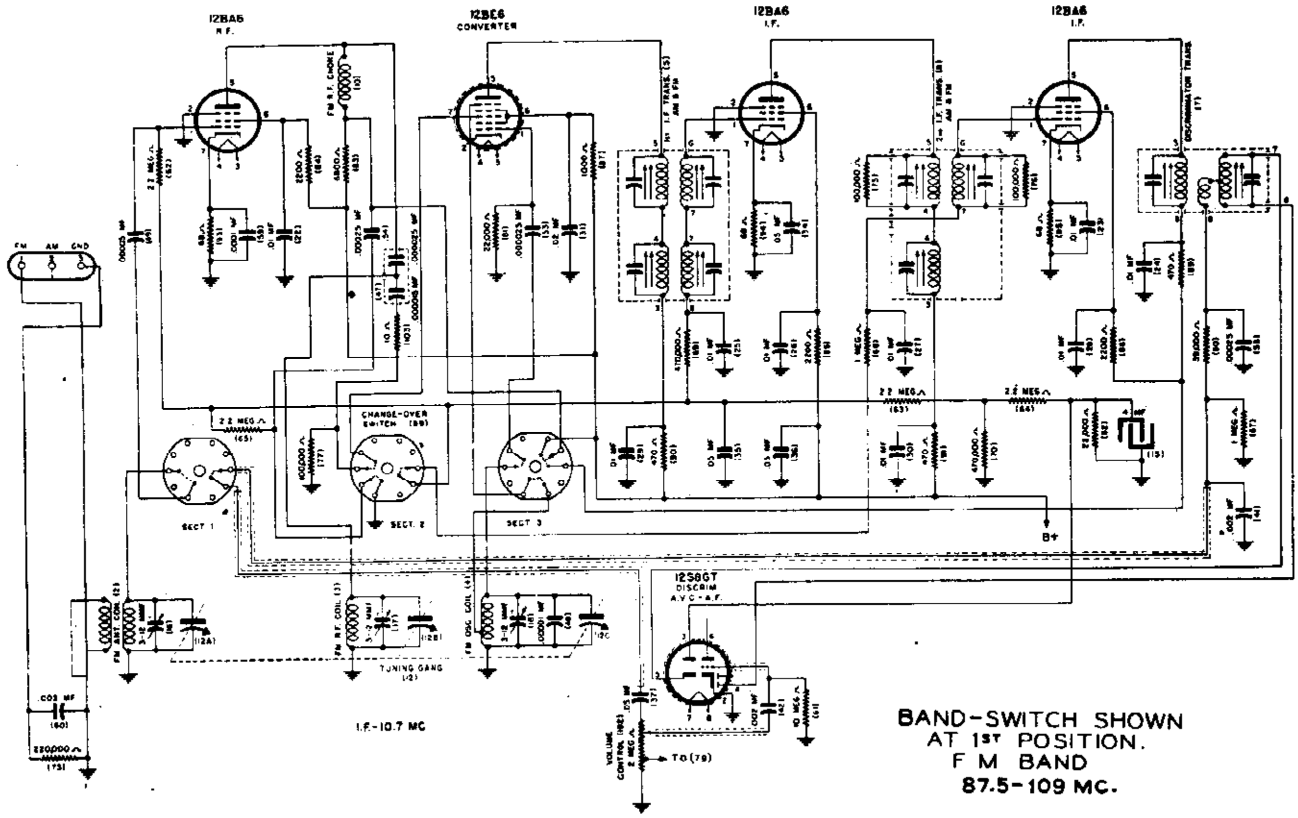
VOLTAGE RATING

THIS RADIO IS DESIGNED FOR USE ON EITHER:
110-120 VOLTS 50-60 CYCLES ALTERNATING CURRENT (AC)
OR
110-120 VOLTS DIRECT CURRENT (DC)

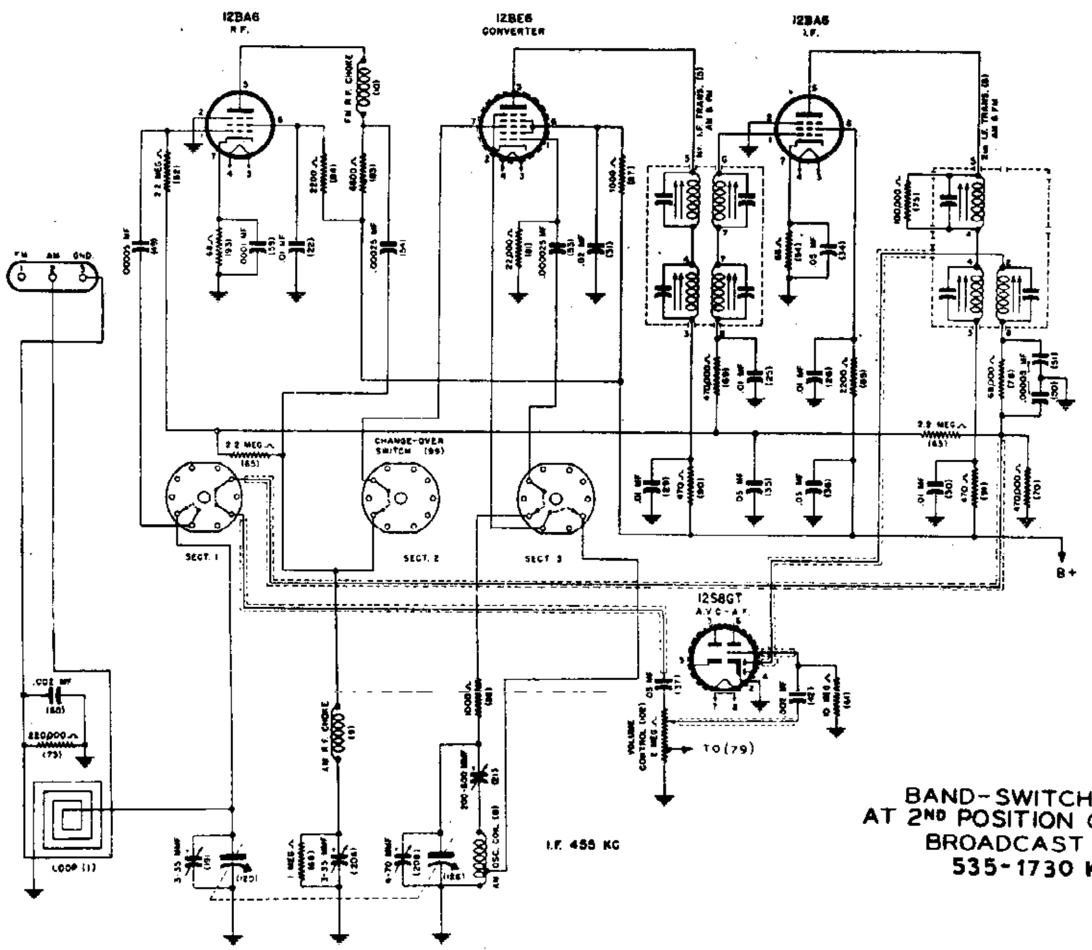
WARNING — DO NOT CONNECT A GROUND TO ANY METAL PART OF THE CHASSIS BECAUSE THIS WILL CAUSE A SHORT AND POSSIBLE DAMAGE.

MODELS 7B-220,7C-220

ALLIED RADIO CORP.



BAND-SWITCH SHOWN AT 1ST POSITION. F M BAND 87.5-109 MC.



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE BROADCAST BAND 535-1730 KC.

ALLIED RADIO CORP.

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. Make the adjustment marked (1) first, (2) next.

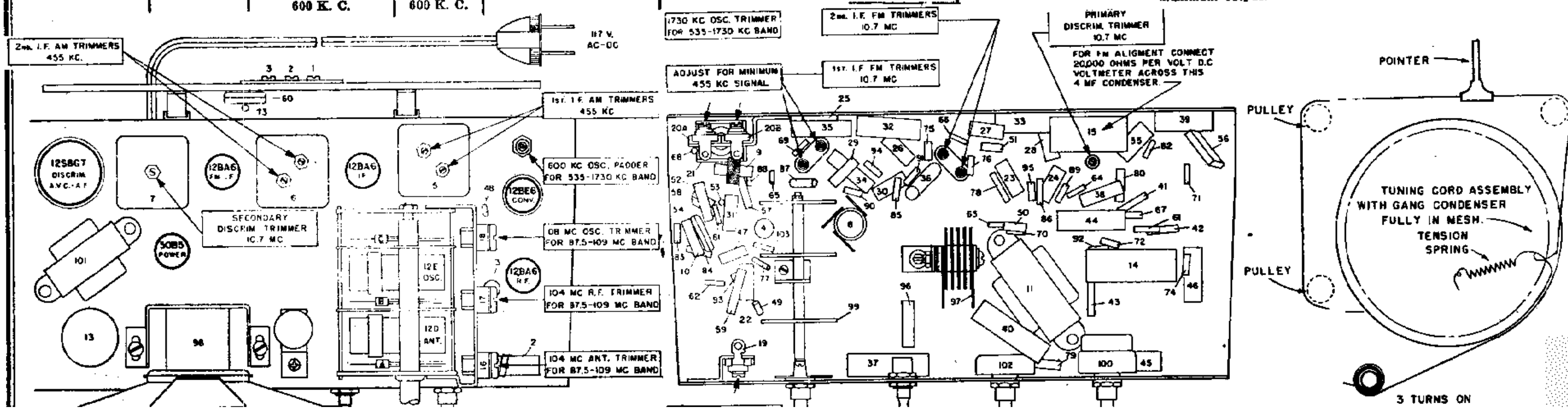
Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the AM dial calibration. If dial needle does not point exactly to last line move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) Place loop antenna in the same position it will be in when set is in the cabinet.

Steps	Place band switch for operation on:	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	AM Band position	Any point where no interfering signal is received	Exactly 455 K. C.	0.2 Mfd. Condenser	High side to AM-Osc. stator plates of tuning condenser (12E). Low side to frame of condenser through .01 Mfd. condenser.	Adjust each of the 2nd 455 K. C. AM I. F. transformer trimmers for maximum output, then adjust each of the 1st 455 K. C. I. F. transformer trimmers for maximum output.
2	AM Band position	Rotate gang condenser to maximum capacity	Exactly 455 K. C.	.00025 Condenser	High side to AM "ANT" terminal on loop back. Low side to "GND" terminal on loop back through a .01 Mfd. condenser.	Adjust 455 K. C. trimmer for MINIMUM 455 K. C. Signal.
		Exactly 1730 K. C.	Exactly 1730 K. C.			Adjust 1730 K. C. oscillator trimmer for maximum output.
		Approx. 1400 K. C.	Approx. 1400 K. C.			Adjust 1400 K. C. AM Ant. trimmer for maximum output.
		Approx. 600 K. C.	Approx. 600 K. C.			While rocking gang condenser, adjust 600 K. C. oscillator padder for maximum output.



PARTS LIST

Illus. No.	Part No.	Part Name	Description	List Price
1	20E242	Antenna	AM Loop with terminal strip	
2	2E53	Coil	FM Antenna	
3	2E54	Coil	FM R. F.	
4	2E51	Coil	FM Oscillator	
5	20E214	Coil	1st AM & FM I. F. Transformer	
6	20E215	Coil	2nd AM & FM I. F. Transformer	
7	20E213	Coil	Discriminator Transformer	
8	20E238	Coil	AM Oscillator	
9	2E19	Coil	AM R. F. Choke	
10	2E47	Coil	FM R. F. Choke	
11	22E21	Condenser	Filter Choke	
12	24E30	Condenser	Tuning, 2 Gang	
13	25E22	Condenser	Dry Elect. 50-10-50 Mfd. 150 V.	
14	25E3	Condenser	Dry Elect. 20 Mfd. 25 V.	
15	25E23	Condenser	Dry Elect. 4 Mfd. 50 V.	
16	24E28	Condenser	Trimmer, 3-12 MMF	
17	24E28	Condenser	Trimmer, 3-12 MMF	
18	24E28	Condenser	Trimmer, 3-12 MMF	
19	24E3	Condenser	Trimmer, 3-35 MMF	
20	24E29	Condenser	Trimmer, 3-35 MMF (A Section), 4-70 MMF (B Section)	
21	24E16	Condenser	Padder, 200-600 MMF	
22	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
23	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
24	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
25	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
26	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
27	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
28	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
29	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
30	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.	
31	23E2014-7	Condenser	Tubular, .02 Mfd. 200 V.	
32	23E213	Condenser	Tubular, .02 Mfd. 200 V.	
33	23E213	Condenser	Tubular, .02 Mfd. 200 V.	
34	23E2014-8	Condenser	Tubular .05 Mfd. 200 V.	
35	23E2014-8	Condenser	Tubular .05 Mfd. 200 V.	
36	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.	
37	23E2014-8	Condenser	Tubular .05 Mfd 200 V.	
38	23E2014-8	Condenser	Tubular .05 Mfd. 200 V.	
39	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.	
40	23E416	Condenser	Tubular, .05 Mfd. 400 V.	
41	23E2014-12	Condenser	Tubular, .002 Mfd. 400 V.	
42	23E2014-12	Condenser	Tubular, .002 Mfd. 400 V.	
43	23E2014-12	Condenser	Tubular .002 Mfd. 400 V.	
44	23E408	Condenser	Tubular .005 Mfd. 400 V.	
45	23E2014-3	Condenser	Tubular .005 Mfd. 200 V.	
46	23E2014-10	Condenser	Tubular [illegible] Mfd. 200 V.	
47	23E2019	Condenser	Dual Ceramic .000025 (A), .000015 (B) Mfd. 500 V.	
48	23E15	Condenser	Ceramic .00001 Mfd. 500 V.	
49	23E2009-5	Condenser	Ceramic .00005 Mfd. 500 V.	
50	23E2009-5	Condenser	Ceramic .00005 Mfd. 500 V.	
51	23E2009-5	Condenser	Ceramic .00005 Mfd. 500 V.	
52	23E2012-2	Condenser	Ceramic, .0015 Mfd. 500 V.	
53	23E16	Condenser	Ceramic, .000025 Mfd. 500 V.	
54	23E42	Condenser	Mica, .00025 Mfd. 500 V.	
55	23E42	Condenser	Mica, .00025 Mfd. 500 V.	
56	23E42	Condenser	Mica, .00025 Mfd. 500 V.	
57	23E45	Condenser	Mica, .0005 Mfd. 500 V.	
58	23E45	Condenser	Mica, .0005 Mfd. 500 V.	
59	23E11	Condenser	Mica, .0001 Mfd. 500 V.	
60	23E52	Condenser	Mica, .002 Mfd. 500 V.	
61	27E106	Resistor	Carbon, 10 Megohm, 1/3 W.	
62	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.	
63	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.	
64	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.	
65	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.	
66	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.	
67	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.	
68	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.	
69	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.	
70	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.	
71	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.	
72	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.	
73	27E224	Resistor	Carbon, 220,000 Ohm, 1/3 W.	
74	27E224	Resistor	Carbon, 220,000 Ohm, 1/3 W.	
75	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.	
76	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.	
77	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.	
78	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.	
79	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.	
80	27E393	Resistor	Carbon, 39,000 Ohm, 1/3 W.	
81	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.	
82	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.	
83	27E682	Resistor	Carbon, 6,800 Ohm, 1/3 W.	
84	27E222	Resistor	Carbon, 2,200 Ohm, 1/3 W.	
85	27E222	Resistor	Carbon, 2,200 Ohm, 1/3 W.	
86	27E222	Resistor	Carbon, 2,200 Ohm, 1/3 W.	
87	27E102	Resistor	Carbon, 1,000 Ohm, 1/3 W.	
88	27E102	Resistor	Carbon, 1,000 Ohm, 1/3 W.	
89	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.	
90	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.	
91	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.	
92	27E181-2	Resistor	Carbon 180 Ohm, 1/2 W.	
93	27E680	Resistor	Carbon, 68 Ohm, 1/3 W.	
94	27E680	Resistor	Carbon, 68 Ohm, 1/3 W.	
95	27E680	Resistor	Carbon, 68 Ohm, 1/3 W.	
96	27E330-3	Resistor	Carbon, 33 Ohm, 1 W.	
97	57E1	Rectifier	Selenium	
98	1E25	Speaker	P. M. Elliptical	
99	29E15	Switch	"AM-FM" Changeover	
100	28E22	Tone Control	500,000 Ohm	
101	22E20	Transformer	Output	
102	28E23	Volume Control	2 Megohm	
103	27E100	Resistor	Carbon, 10 Ohm, 1/3 W.	

FM ALIGNMENT

Instructions for Alignment of the Frequency Modulation I. F. Transformers, Discriminator, Oscillator, R. F. and Antenna Circuits, with equipment generally available to the service man.

The equipment necessary for this procedure consists of the following:

A sensitive DC Voltmeter having 20,000 Ohms (or better) per volt, or a Vacuum Tube Voltmeter.

An AM Signal Generator that will supply:

(A) A 10.7 M. C. Signal for I. F. alignment.

(B) A 104 M. C. and 108 M. C. Signal—a Signal Generator that only goes up to 30 M. C. but which has sufficient fourth harmonic present in the carrier could be used for this purpose.

THE GENERATOR USED NEED NOT BE FREQUENCY MODULATED.

IT IS ALWAYS DESIRABLE TO ALIGN THE AM I. F. TRANSFORMERS BEFORE MAKING ANY OF THE FM I. F. ADJUSTMENTS, and to RECHECK AM I. F. TRIMMERS AFTER COMPLETING FM I. F. ADJUSTMENTS.

BE SURE TO MAKE THE FM ADJUSTMENTS IN THE ORDER GIVEN BELOW.

(1) PROCEDURE FOR ALIGNMENT OF FM DISCRIMINATOR TRANSFORMER.

(A) Connect the Voltmeter across the 4 Mfd. condenser (Illus. No. 15 in Parts Drawing).

(B) With a .002 Mfd. Isolation Condenser in series with each Signal Generator lead, connect generator from the grid (Pin #1) of the 12BA6 FM-I. F. Amplifier Tube to chassis.

(C) Set Signal Generator to EXACTLY 10.7 M. C.

(D) Adjust 10.7 M. C. Discriminator Primary Trimmer, mounted on underside of chassis, for MAXIMUM reading on Voltmeter.

(E) Leave Signal Generator set at 10.7 M. C. and modulate with a 400 cycle note.

(F) Adjust 10.7 M. C. Secondary Discriminator Trimmer, located on top of Discriminator Shield Can, for MINIMUM 400 CYCLE RESPONSE IN THE SPEAKER. IMPORTANT—the reading on the Voltmeter will change only slightly with this adjustment. MINIMUM AUDIO RESPONSE WILL BE RATHER CRITICAL IN ADJUSTMENT and will be correct only if a high audio response is found when tuning on each side of minimum setting.

(2) PROCEDURE FOR ALIGNMENT OF FM I. F. TRANSFORMERS.

(A) Leave the Voltmeter connected across the 4 Mfd. Condenser (Illus. No. 15).

(B) Connect Signal Generator to Input Grid (Pin #7) of 12BE6 Converter tube.

(C) Set Signal Generator to EXACTLY 10.7 M. C.—if possible, mark the position where this occurs right on the Generator's calibrated dial because this becomes a reference point in checking for proper FM I. F. alignment.

(D) Adjust each of the 1st and 2nd FM I. F. Transformers' 10.7 M. C. trimmers for MAXIMUM reading on Voltmeter. KEEP OUTPUT OF SIGNAL GENERATOR SO THAT A READING OF APPROXIMATELY 2 TO 4 VOLTS IS OBTAINED ON THE VOLTMETER.

(E) After all the above FM I. F. Transformer Trimmer adjustments have been correctly completed, MAKE A NOTE OF THE READING ON THE VOLTMETER.

(F) Next, detune the signal generator to a slightly HIGHER frequency (higher than the 10.7 reference frequency), until the Voltmeter reads ONE-HALF of the figure noted in (E) above, and MAKE A NOTE OF THE GENERATOR FREQUENCY AT WHICH THIS OCCURS.

(G) Now, detune the signal generator to a LOWER frequency (lower than the 10.7 reference frequency), until the Voltmeter again reads ONE-HALF the original figure noted in (E), and AGAIN NOTE THE GENERATOR FREQUENCY AT WHICH THIS OCCURS.

The difference between the two above frequencies obtained in (F) and (G), the one lower than 10.7 M. C. reference point and the one higher, is the "Half-amplitude" Band width of the FM-I. F. system. These two frequencies (F) and (G), should be somewhat uniformly spaced on either side of the 10.7 M. C. (C) reference frequency. A SLIGHT DIFFERENCE IS NOT SERIOUS. Only when one is more than twice as far as the other from the 10.7 M. C. reference frequency, or when there is a double peak, is the discrepancy serious. Assuming the FM I. F. Transformers have been properly adjusted, a double peak, or extremely one-sided "half-amplitude" band width, is usually caused by regeneration or a defective FM I. F. Transformer.

(3) PROCEDURE FOR THE ALIGNMENT OF THE FM ANTENNA, R. F. AND OSCILLATOR CIRCUITS.

(A) Leave Voltmeter connected across the 4 Mfd. condenser (Illus. No. 15).

(B) Connect the Signal Generator to the "FM" and "GROUND" posts that are attached to the receiver loop back, through a 5 foot or more length of 300 Ohm transmission line.

(C) Set Signal Generator so that it will deliver an unmodulated 108 M. C. signal. If the generator available is not designed to deliver a 108 M. C. signal, use a generator covering at least to 30 M. C. and set this generator frequency to 27 M. C.—the fourth harmonic of which will be 108 M. C.

(D) Set Receiver Dial Pointer to EXACTLY 108 M. C.

(E) Adjust 108 M. C. Oscillator Trimmer for MAXIMUM reading on Voltmeter.

(F) Next, tune the receiver to 104 M. C.

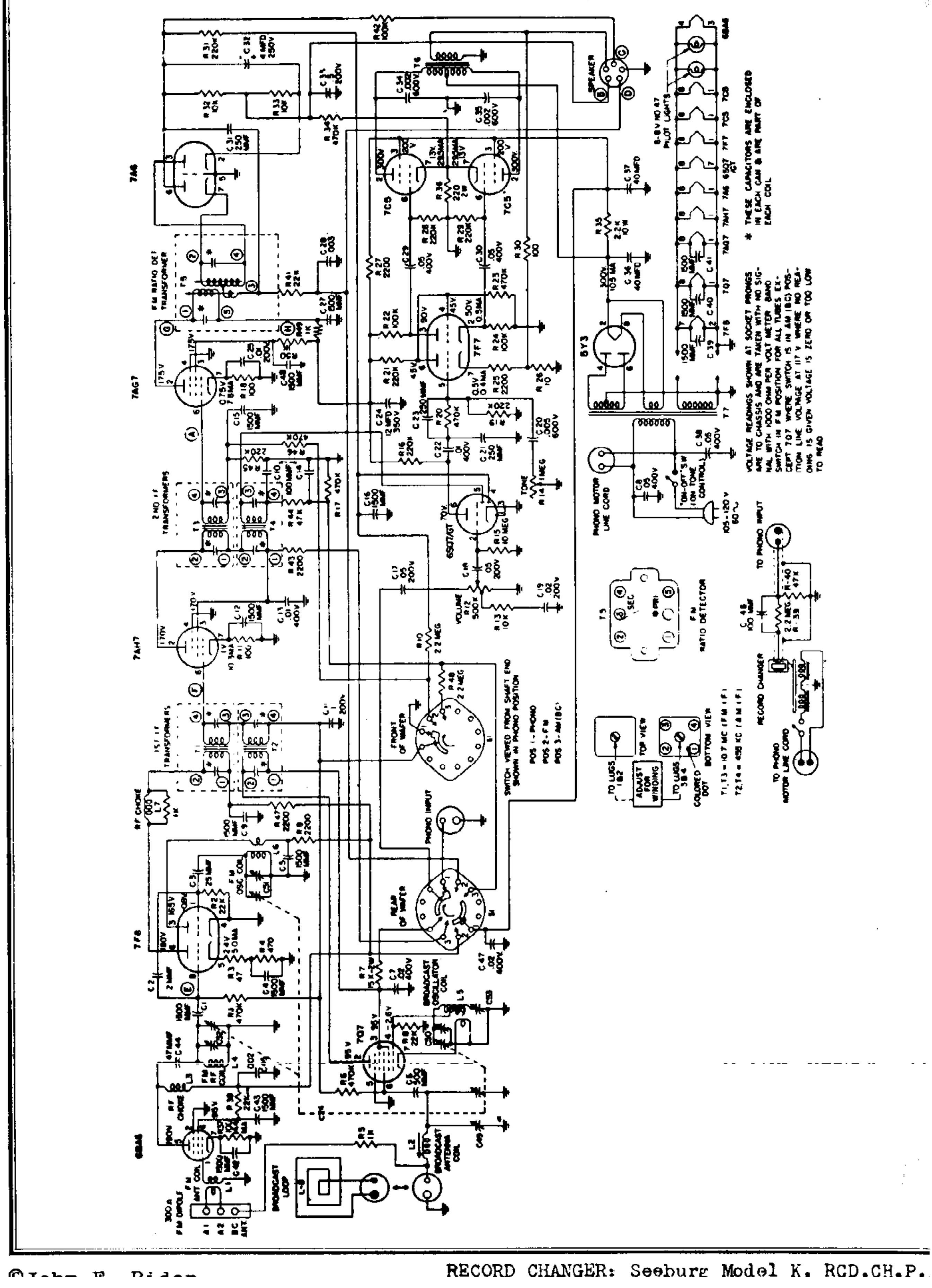
(G) Set Signal Generator to deliver a 104 M. C. unmodulated signal.

(H) Adjust 104 M. C. Antenna and R. F. Trimmers for MAXIMUM reading on Voltmeter.

It is somewhat helpful to hear the signal, so, if preferred, an AM modulation on the 108 M. C. and 104 M. C. signal frequencies may be used for alignment of the FM Oscillator, R. F. and Antenna circuits. With modulated or unmodulated signal, ALWAYS ADJUST FOR MAXIMUM READING ON VOLTMETER.

A FREQUENCY MODULATED SIGNAL GENERATOR may be used instead of an AM signal generator. When a Frequency Modulated Signal Generator is used, it is recommended that an unmodulated carrier be used for all of the above adjustments EXCEPT alignment of the Discriminator Secondary Trimmer. Use a frequency modulated signal (22.5 K. C. deviation) and align Discriminator Secondary for MAXIMUM AUDIO RESPONSE heard in speaker.

ALLIED RADIO CORP. MODEL 11B-278,11C-3



MODELS 11B-278, 11C-300 **ALLIED RADIO CORP.**

ALIGNMENT PROCEDURE FOR A.M.:

Equipment Required:
a) Broadcast Band Signal Generator.
b) Output Meter.

1. Set band switch to AM. Advance volume control to full volume setting.
2. Connect output meter across voice coil.
3. Connect the Signal Generator across the broadcast band antenna section of the variable condenser. The "high" side of the Generator should connect to the stator section and the "ground" side to the frame or chassis. Adjust the Signal Generator to 455 kc and with the receiver switched on, adjust the first and second I.F. transformers for peak output as shown on the output meter. The signal injected into the receiver should be as small in magnitude as possible, consistent with a useful deflection on the output meter.
4. Connect the "high" side of the Generator to the antenna terminal with a 200 mmf condenser inserted in series. Connect the "ground" side of the Generator to the chassis. Tune receiver to 60 on the dial, adjust Signal Generator to 600 kc. Adjust the BC padder and the BC antenna coil for maximum deflection on the output meter. Use a weak signal.
5. Tune receiver to 160 on the dial. Adjust Signal Generator to 1600 kc. Adjust BC oscillator and BC antenna trimmers for maximum output.
6. Repeat operations 4 and 5

ALIGNMENT PROCEDURE FOR F.M.:

Note: Points A. B. C. D. E. F. G. and H are noted on circuit diagram.

Points B, C, and D have been brought out to the unused contacts of the speaker socket at the rear of the chassis.

Equipment Required:
a) High frequency Signal Generator with 88-108 Mc tuning range.
b) Signal Generator capable of delivering .1 V at 10.7 mc.
c) Audio output meter.
d) D.C. vacuum tube voltmeter with zero center scale.

a. Ratio Detector Alignment:

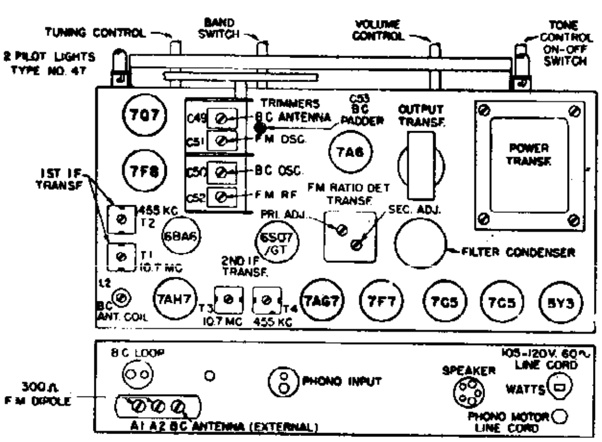
1. Connect V.T.V.M. across points "B" and "C" (A.V.C. Voltage).
2. Feed 10.7 mc unmodulated R.F. signal into 7AG7 grid (point A) through .01 µfd. condenser. This signal should be .1 volt.
3. Adjust primary of Ratio Detector (T-5) for maximum voltage indication on V.T.V.M.
4. Connect zero centered V.T.V.M. across points "B" and "D".
5. Adjust secondary of Ratio Detector (T-5) for zero indication.
6. Tune 10.7 mc Signal Generator higher in frequency (about 200 kc) until maximum voltage reading is obtained on V.T.V.M.; note this voltage, then tune signal generator lower in frequency until maximum voltage of the opposite polarity is obtained. Note this voltage, then if necessary re-adjust primary of the Det. (T-5) until the detector voltages are about equal on either the high or low side of 10.7 mc.

b. 10.7 I.F. Alignment:

1. Shunt a 1,000-ohm carbon resistor across the primary of the detector (T-5) (Points G and H).
2. Connect output meter across speaker voice coil.
3. Volume and tone controls at maximum clockwise position.
4. Connect 10.7 mc (modulated 30% signal generator through .01 µfd. condenser across point "F" and ground.
5. Adjust secondary, then primary of (T-3) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)
6. Connect 10.7 mc 30% modulated signal generator across point "E" and ground.
7. Adjust secondary, then primary of (T-1) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)
8. Remove 1000-ohm shunting resistor from across primary of (T-5).

c. Oscillator and R.F. Alignment:

1. Connect V.T.V.M. across "B" and "C" (A.V.C. voltage).
2. Connect 108 mc signal generator to FM antenna terminals. If generator impedance is low, put one 150-ohm carbon resistor in series with each of the generator leads. Tune receiver dial to 108 mc.
3. Adjust FM oscillator trimmer (C-51) for maximum V.T.V.M. reading.
4. Adjust FM R.F. trimmer (C-52) for maximum V.T.V.M. reading. During alignment reduce input signal to maintain A.V.C. voltage at 2 V.
5. Repeat steps 3 and 4.
6. Feed a 90 mc signal into antenna terminals (as in C-2), tune receiver dial to signal.
7. Adjust spacing of FM R.F. coil (L-4) for maximum V.T.V.M. reading at 90 mc. During alignment reduce input signal to maintain A.V.C voltage at 2 V.
8. Repeat steps 2 and 4 if necessary.



ALLIED RADIO CORP. MODELS 11B-278,11C-30

PARTS LIST:

C 1—1,500 mmfd., ± 300 mmfd.
C 2—2 mmfd., 20%
C 3—25 mmfd., 10%
C 4—1,500 mmfd., ±300 mmfd.
C 5—1,500 mmfd., ±300 mmfd.
C 6—500 mmfd., 20%
C 7—.02 mfd., 400 V.
C 8—.05 mfd., 400 V.
C 9—1,500 mmfd., ±300 mmfd.
C10—100 mmfd., 20%
C11—.1 mfd., 200 V.
C12—1,500 mmfd., ±300 mmfd.
C13—.01 mfd., 400 V.
C14—100 mmfd., 20%
C15—1,500 mmfd., ±300 mmfd.
C16—1,500 mmfd., ±300 mmfd.
C17—.05 mfd., 200 V.
C18—.05 mfd., 200 V.
C19—.02 mfd., 200 V.
C20—.005 mfd., 600 V.
C21—250 mmfd., 20%
C22—.01 mfd., 400 V.
C23—250 mmfd., 20%
C24—12 mfd., 350 V.
C25—.01 mfd., 200 V.
C26—Var. cond. (AM-FM) *C-6.012
C27—1,500 mmfd., ±300 mmfd.
C28—.003 mfd., 20%
C29—.05 mfd., 400 V.
C30—.05 mfd., 400 V.
C31—250 mmfd., 20%
C32—4 mfd., 250 V.
C33—.5 mfd., 200 V.
C34—.002 mfd., 600 V.
C35—.002 mfd., 600 V.
C36 & C37—40 mfd. x 40 mfd., electrolytic, 400 V.
C38—.05 mfd., 400 V.
C39—1,500 mmfd., ±300 mmfd.
C40—1,500 mmfd., ±300 mmfd.
C41—1,500 mmfd., ±300 mmfd.
C42—1,500 mmfd., ±300 mmfd.
C43—1,500 mmfd., ±300 mmfd.
Part No. NG-500

C44—47 mmfd., 10%
C45—.002 mfd., 400 V.
C46—100 mmfd., 20%
C47—.02 mfd., 400 V.
C48—1,500 mmfd., ±300 mmfd.
C49—Trimmer, compression, 3-35 mmfd.
C50—Trimmer, compression, 3-35 mmfd.
C51—Trimmer, ceramic, 1.5-7 mmfd.
C52—Trimmer, compression, 1.6-18 mmfd.
C53—Padder condenser, 275-1,000 mmfd.
R 1—470KΩ, ¼W., 20%
R 2—22KΩ, ¼W., 20%
R 3—47Ω, ¼W., 20%
R 4—470Ω, ¼W., 20%
R 5—1KΩ, ¼W., 20%
R 6—470KΩ, ¼W., 20%
R 7—15KΩ, 2W., 20%
R 8—22KΩ, ¼W., 20%
R 9—2,200Ω, ¼W., 20%
R10—2.2 Meg.Ω, ¼W., 20%
R11—100Ω, ¼W., 20%
R12—.5 Meg.Ω Volume Control (Audio Taper) tapped at 50KΩ *RA-9.069
R13—10KΩ, ¼W., 20%
R14—1 Meg.Ω Tone Control, with power switch *RA-9.070
R15—10 Meg.Ω, ¼W., 20%
R16—220KΩ, ¼W., 20%
R17—470KΩ, ¼W., 20%
R18—100Ω, ¼W., 20%
R19—220KΩ, ¼W., 20%
R20—470KΩ, ¼W., 20%
R21—220KΩ, ¼W., 20%
R22—100KΩ, ¼W., 20%
R23—470KΩ, ¼W., 20%
R24—100KΩ, ¼W., 20%
R25—2,200Ω, ¼W., 20%
R26—10Ω, ¼W., 20%
R27—2,200Ω, ¼W., 20%
* Mfg. Part. No.

R28—220KΩ, ¼W., 20%
R29—220KΩ, ¼W., 20%
R30—100Ω, ¼W., 20%
R31—220KΩ, ¼W., 20%
R32—10KΩ, ¼W., 20%
R33—10KΩ, ¼W., 20%
R34—470KΩ, ¼W., 20%
R35—2,200Ω, 10W., wirewound, 10%
R36—220Ω, 2W., 20%
R37—100Ω, ¼W., 20%
R38—22KΩ, 1W., 20%
R39—2.2 Meg.Ω, ¼W., 20%
R40—47KΩ, ¼W., 20%
R41—22KΩ, ¼W., 20%
R42—100KΩ, ¼W., 20%
R43—2,200Ω, ¼W., 20%
R44—47KΩ, ¼W., 20%
R45—220KΩ, ¼W., 20%
R46—470KΩ, ¼W., 20%
R47—2,200Ω, ¼W., 20%
R48—2.2 Meg.Ω, ¼W., 20%
R49—1KΩ, ¼W., 20%
R50—1KΩ, ¼W., 20%
T 1—FM I.F. Trans., 10.7 Mc. *ZB-2.27
T 2—AM I.F. Trans., 455 Kc. *ZB-2.27
T 3—FM I.F. Trans., 10.7 Mc. *ZB-2.27
T 4—AM I.F. Trans., 455 Kc. *ZB-2.27
T 5—FM Ratio Detector Transformer, 10.7 Mc. *ZC-2.27
T 6—Output Trans. *ZB-15.01
T 7—Power Trans. *TA-18.05
S 1—Band Switch *SA-12.06
L 1—FM Antenna Coil *LA-2.24
L 2—Antenna Coil, Broadcast *LA-2.27
L 3—R.F. Plate Choke *LA-2.27
L 4—R.F. Coil, FM *LA-2.24
L 5—Oscillator Coil, Broadcast *LA-2.2
L 6—Oscillator Coil, FM *LA-2.2
L 7—R.F. Choke, Conv. Plate *LA-2.24
L 8—Loop, Broadcast *LC-5.01
Antenna, FM, Folded Dipole (300Ω) *LA-5.01
Pilot Lamp, No. 47, 6-8 V

FAILURE OF THE RECEIVER TO OPERATE MAY BE DUE TO:

1. No current at power socket.
2. Tubes not firmly in sockets.
3. Defective tube.
4. Band switch in wrong position.
5. Low signal strength in the particular location. Change position (rotate) of loop or "folded dipole" antenna, or use an outside antenna.

Tube Complement:

1 Type 6BA6—FM RF Amplifier.
1 Type 7F8—FM Mixer, oscillator.
1 Type 7AH7—1st IF Amplifier.
1 Type 7AG7—FM Detector Driver.
1 Type 7A6—FM Detector.
1 Type 6SQ7/GT—AM Det., A.V.C. and 1st Audio Ampplifier.
1 Type 7F7—2nd Audio, Phase Inverter.
2 Type 7C5—Push-pull Power Amplifiers.
1 Type 5Y3—Rectifier.
1 Type 7Q7—AM Mixer Oscillator.

Power:

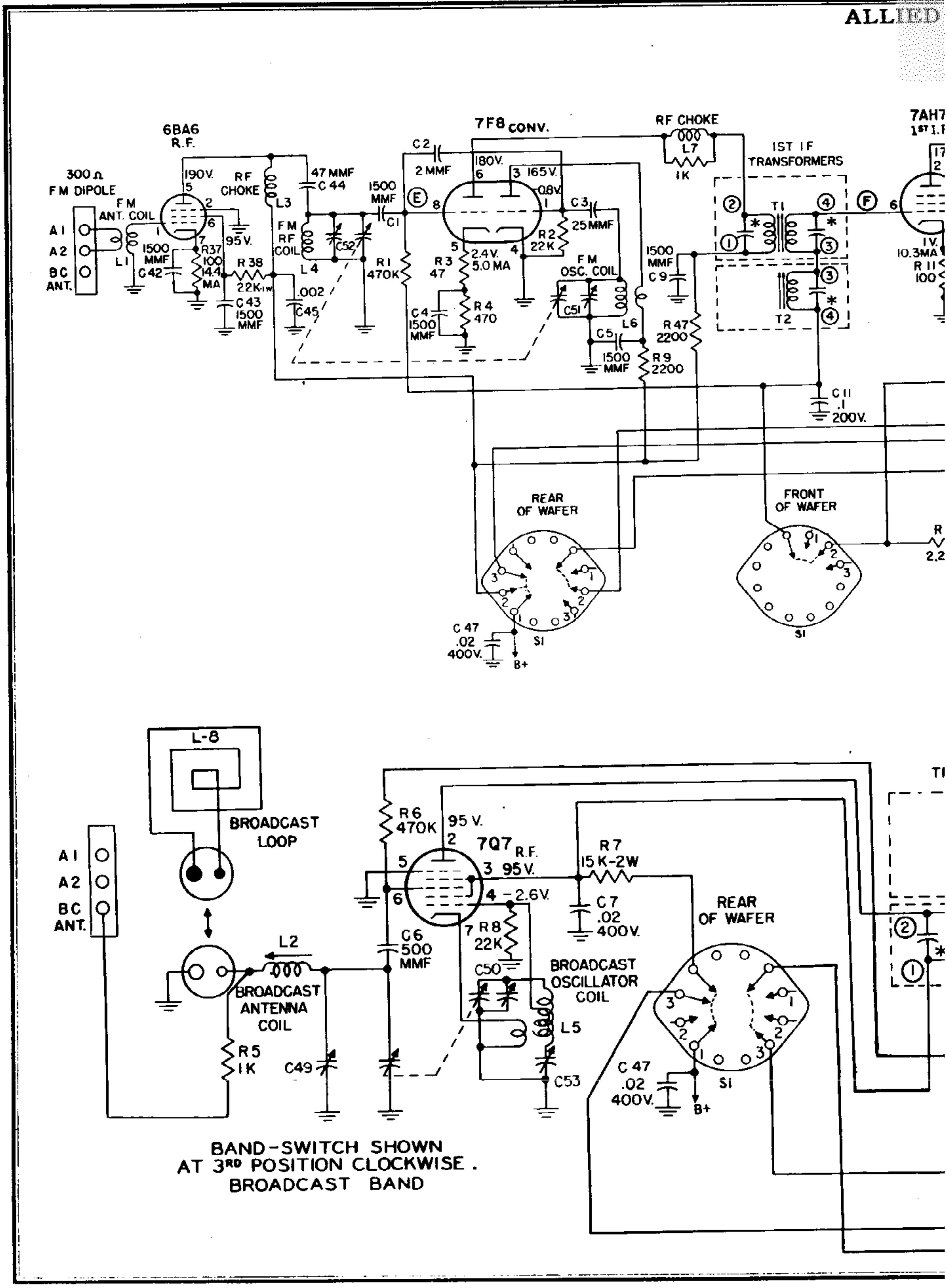
This receiver operates on 105-125 volts, 60 cyc AC. Do not plug this radio receiver into a dire current socket. Power consumption is 80 watts.

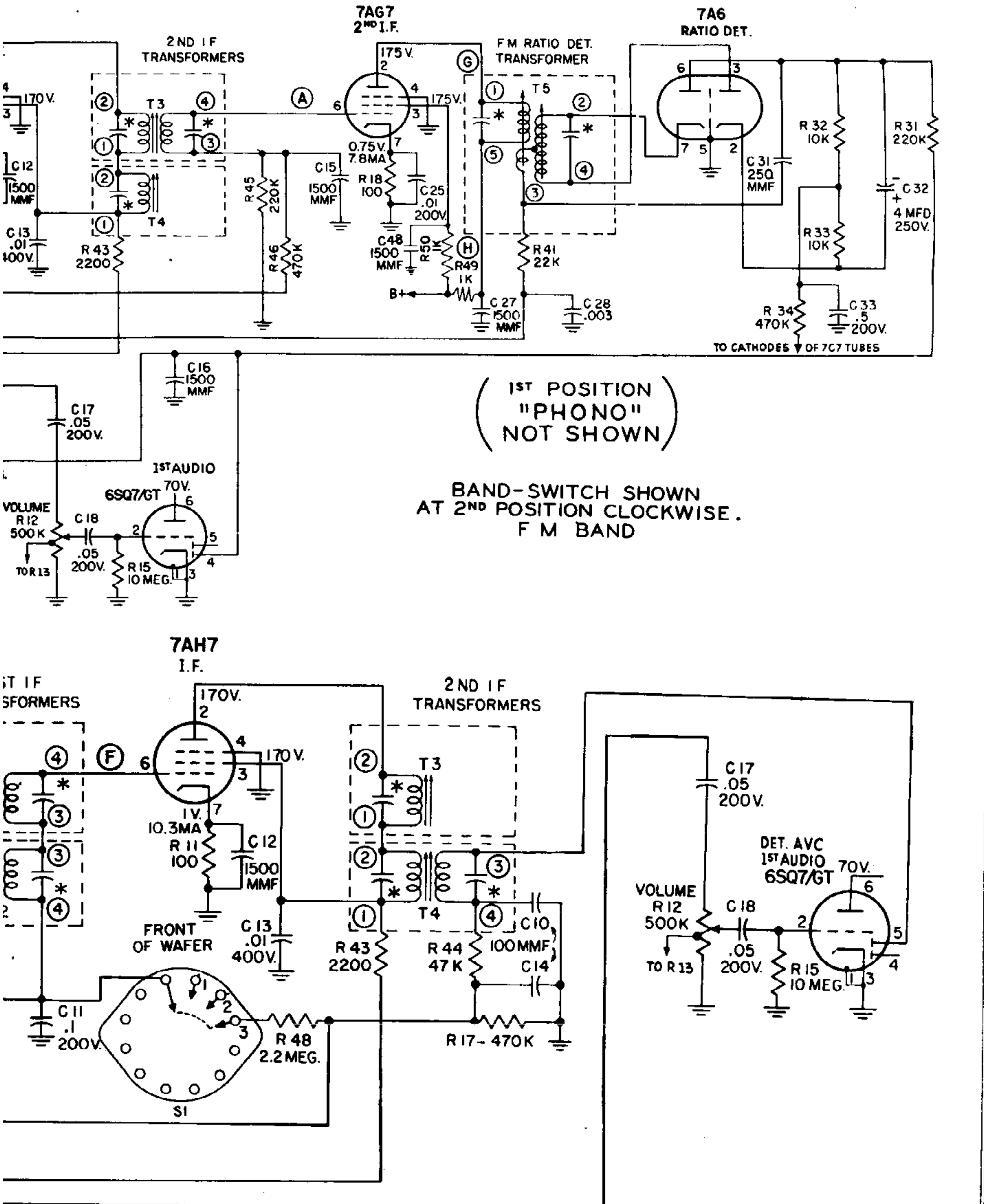
DESCRIPTION:

This receiver features the latest in post-war e gineering design. It employs 10 tubes plus a rec fier in an AM-FM superheterodyne circuit. Fo of the tubes are the dual-purpose type giving t set 15-tube performance. The tuning ranges are:

A.M. — 540 Kc. to 1700 Kc.
F. M. — 88 Mc. to 108 Mc.

The receiver has two built in antennas; a lo antenna for the AM broadcast band and a fold dipole for the FM broadcast band. Provisions a made for external antenna connections. The eas to-read "slide-rule" type dial is illuminated wh the set is on; a dial pointer of red plastic reflec illumination from the two pilot lights. A high rat drive on the tuning condenser provides smooth tu ing. High Fidelity reproduction on FM and AM the result of well-engineered circuits and the u of high quality parts.


ALLI
6BA6
R.F.
300 Ω
FM DIPOLE
FM
ANT. COIL
A1
A2
BC
ANT.
L1
190V.
RF
CHOKE
L3
95V.
1500
MMF
C42
R37
100
14.4
MA
R38
22K-1W
C43
1500
MMF
47 MMF
C44
FM
RF
COIL
L4
C52
1500
MMF
C1
.002
C45
E
7F8 CONV.
C2
2 MMF
180V.
165V.
-0.8V.
C3
25MMF
R2
22K
R1
470K
R3
47
2.4V.
5.0 MA
C4
1500
MMF
R4
470
FM
OSC. COIL
C51
L6
C5
1500
MMF
R9
2200
RF CHOKE
L7
1K
1ST IF
TRANSFORMERS
T1
T2
1500
MMF
C9
R47
2200
C11
.1
200V.
F
7AH7
1ST I.F
1V.
10.3MA
R11
100
REAR
OF WAFER
FRONT
OF WAFER
C47
.02
400V.
B+
S1
R
2,2
L-8
BROADCAST
LOOP
A1
A2
BC
ANT.
L2
BROADCAST
ANTENNA
COIL
R5
1K
C49
R6
470K
95 V.
7Q7 R.F.
3 95V.
4 -2.6V.
C6
500
MMF
R8
22K
C50
BROADCAST
OSCILLATOR
COIL
L5
C53
R7
15K-2W
C7
.02
400V.
REAR
OF WAFER
C47
.02
400V.
B+
S1
T1
BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
BROADCAST BAND


7AG7
2ND I.F.
2ND I.F TRANSFORMERS
FM RATIO DET. TRANSFORMER
7A6
RATIO DET.
1ST POSITION "PHONO" NOT SHOWN
BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. F M BAND
TO CATHODES OF 7C7 TUBES
1ST AUDIO
6SQ7/GT
VOLUME R12 500K
7AH7
I.F.
1ST IF TRANSFORMERS
FRONT OF WAFER
DET. AVC 1ST AUDIO 6SQ7/GT

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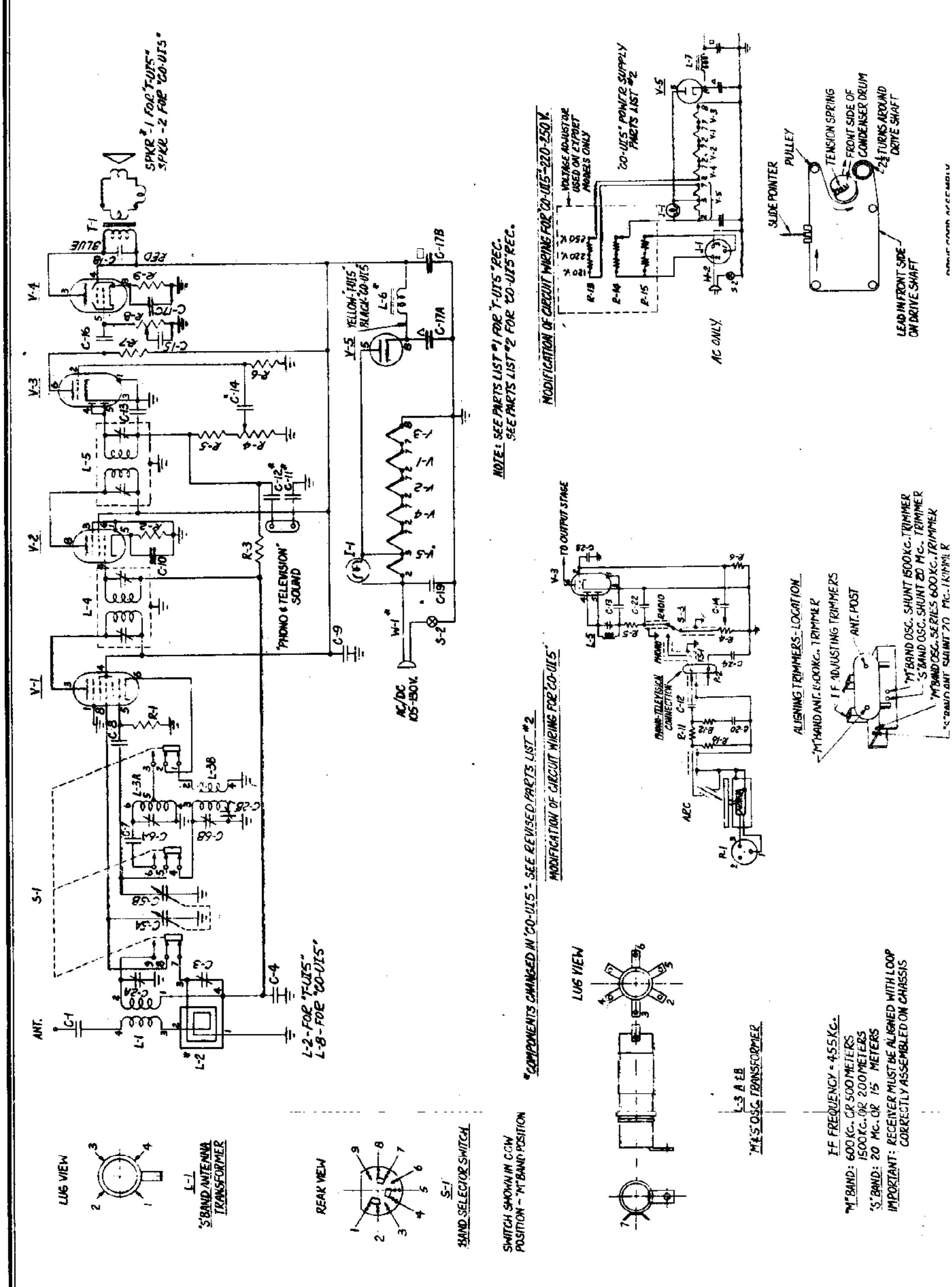
MODELS CO-U15,T-U1



RECORD CHANGER: Oak Model 6666, RCD. CH. 15

"clarified schematics"

MODELS CO-U15, T-U15

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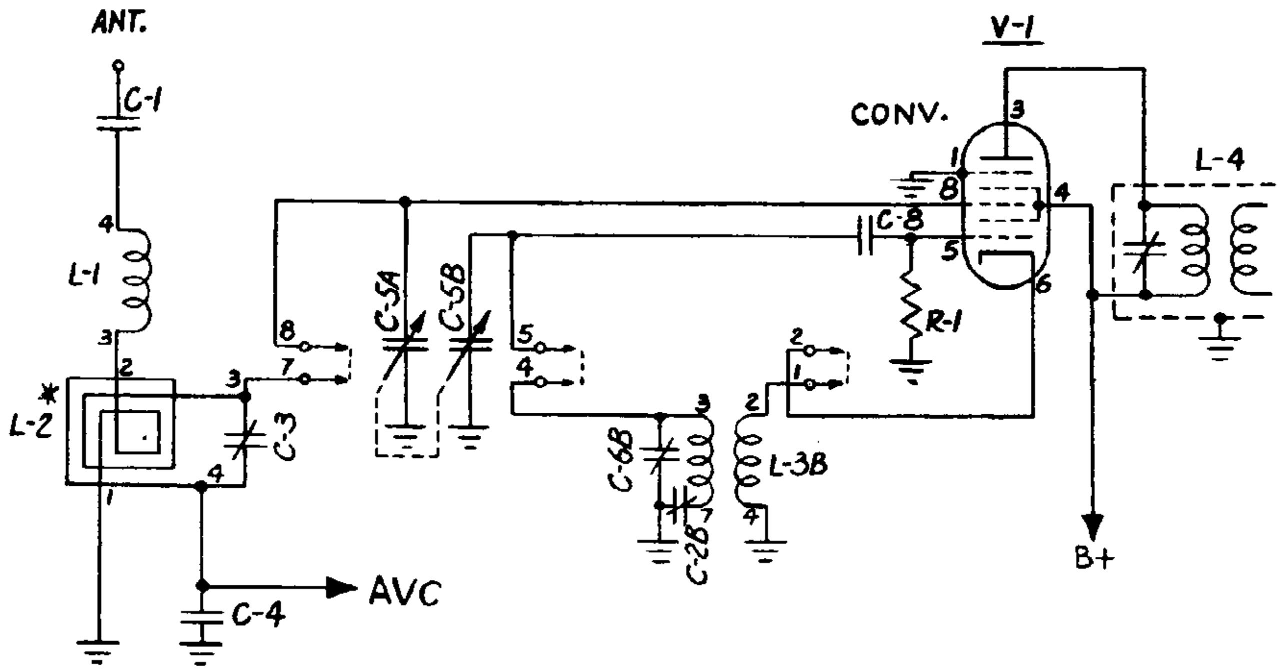
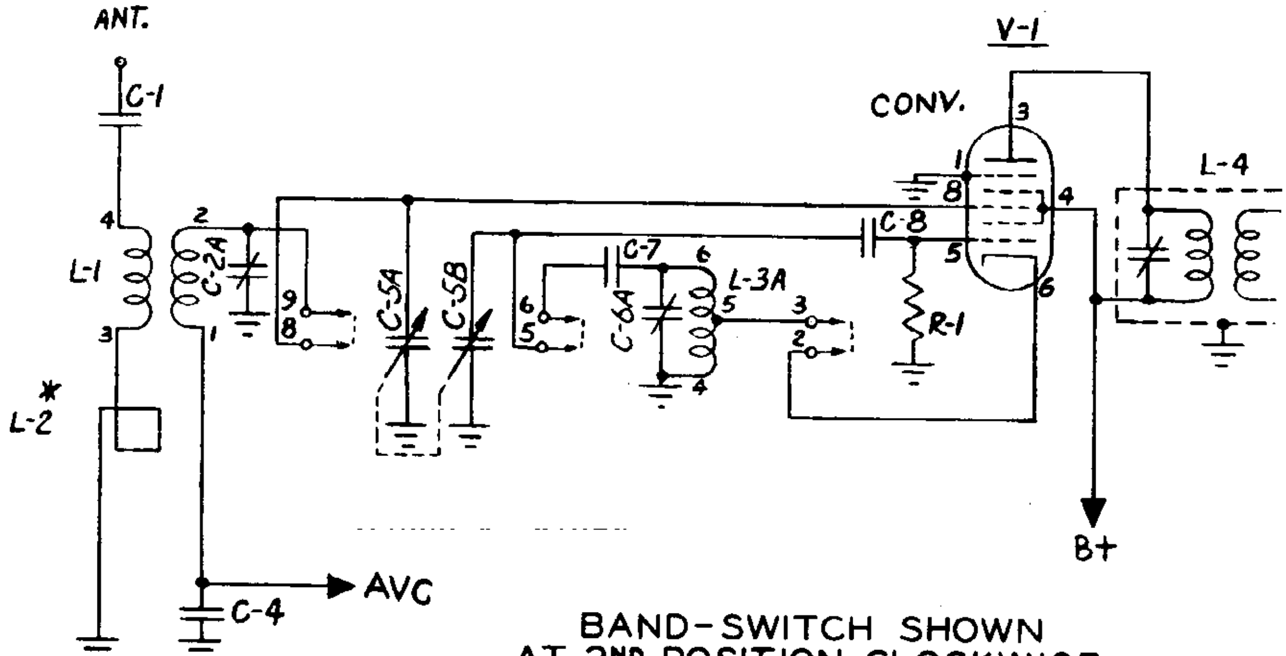


L-2-FOR "T-U15"
L-8-FOR "CO-U15"

BAND-SWITCH SHOWN AT 1ST POSITION. M BAND



L-2-FOR "T-U15"
L-8-FOR "CO-U15"

BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. S BAND

ANDREA RADIO CORP.

MODEL T-U15
FOR OPERATION ON AC OR DC
105-130 VOLTS 40/60 CYCLES
FOR 220 VOLTS USE ADAPTOR PART NO. FM-729
FOR 250 VOLTS USE ADAPTOR PART NO. FM-730

MODEL CO-U15
FOR OPERATION ON AC ONLY
DOMESTIC MODEL: 105-130 VOLTS 60 CYCLE
EXPORT MODEL: 105-130, 210-240, 240-260 VOLTS 60 CYCLE

SERVICE INSTRUCTIONS

WARNING: Always remove the line plug from the electric outlet before removing the chassis from the cabinet. Also, connect the speaker to the receiver speaker cable before switching on the power. Otherwise, damage will result.

I.F. REALIGNMENT GENERALLY SUFFICIENT: As a rule, it is not necessary to readjust the short wave oscillator and antenna shunt trimmers unless they have been tampered with, or require replacing. Consequently, careful realignment of the I.F. system is all that requires attention, ordinarily. Before making any adjustments, tune in one particular station and note the quality of reception so that you can check the improvement after the I.F. system has been realigned.

USE SIGNAL GENERATOR AND OUTPUT VOLTMETER: For realigning, use a signal generator to supply a modulated carrier of 455, 600, 1,500, and 20,000 Kilocycles, plus an output voltmeter. Alignment by any other means is not recommended. Your service test generator should be checked frequently for changes in calibration by obtaining a zero beat between the generator and broadcast stations of known frequency.

SPECIAL NOTES: Before proceeding to align the antenna and oscillator circuits bear in mind that these circuits control the accuracy of the main tuning dial calibration, particularly the oscillator trimmers. As the main dial is a part of the cabinet, servicing of the chassis can be made without the use of this dial by using the reference alignment scale 0 to 100 divisions attached permanently to the gang condenser drive drum. The table below indicates the reference dial for the required alignment frequencies. You will note that the chassis contains a self-tapping screw located just below the gang condenser drum, the purpose of which, is to enable you to wrap a piece of bare wire and thereby form a pointer to the reference scale. Set the pointer at the 100 marking on the reference scale with the gang condenser plates fully meshed (all capacity in) after which rotate the drum to the correct reference setting for proper circuit alignment and proceed in accordance with the Band Alignment instruction. Remove reference pointer from chassis before installing in cabinet.

ALIGNMENT FREQ. KC.	REFERENCE DIAL SETTING		BAND
1,500	12.5	Medium Wave	Broadcast
600	83.5	Medium Wave	Broadcast
20,000	10		Short Wave

NOTES ON REALIGNING THE BANDS: During the aligning measurements, the output of the signal generator must be kept low so that it will not cause the AVC circuit in the set to function. In other words, when the volume control on the set is turned to maximum, the output should not show more than .5 volts across the voice coil, or 50 milliwatts in the plate circuit of the output tube.

Generally, at frequencies above 7,000 Kilocycles, the signal generator frequency will change with each adjustment of the generator output attenuator control. Hence, retune the receiver each time the attenuator is adjusted.

Some generators cause trouble by direct radiation to the set at frequencies above 8 m[c]. Experience indicates that more accurate alignment is possible when the generator is separated by several feet from the receiver under test.

CAUTION: The Loop for Model CO-U15 is attached to the cabinet rear. When other than I.F. alignment is required, both the Loop and chassis must be removed from the cabinet. Bear in mind that alignment must be carried out with the Loop placed the same distance away from the chassis as when installed in the cabinet, also that the Loop is not in the field of metal parts or shielding which will upset alignment conditions.

ALIGNMENT INSTRUCTIONS

455 Kilocycles I.F. Alignment

Connect the high potential lead of the signal generator in series with a .1 mfd. capacitor to the modulator grid of the 12SA7 Pin #8 or to the stator of the mixer section on the gang condenser (rear section). Connect the low side of the signal generator in series with a .1 mfd. 400 volt condenser to the chassis. Set the signal generator to 455 Kilocycles, adjust output until a small deflection is noted on the output meter, adjust dual trimmer condensers (see circuit diagram for location) on top of 1st and 2nd I.F. transformers for maximum deflection on the output meter. The I.F. system is now aligned, disconnect the generator from the receiver.

SHORT WAVE BAND ALIGNMENT

Connect the high potential lead from the generator in series with a 400 ohm resistor to the antenna terminal on the loop, and the low side of the generator in series with a .1 mfd. 400 volt condenser to the receiver chassis. WARNING: If the condenser is not used damage may result, turn the wave band switch to the short wave position, set the generator to 20,000 KC. and the receiver reference scale to 10 (equal to 20,000 KC. alignment). Vary the short wave band oscillator shunt trimmer slowly from maximum to minimum. You will hear the signal at two settings of the trimmer, one nearer the minimum capacity (plates open) and one near the maximum (plates closed). The setting near the minimum capacity is correct as the other setting near maximum capacity is the image frequency. Proceed to adjust the antenna shunt trimmer. Be sure to rock the gang condenser back and forth slowly each time you make an adjustment to the antenna shunt trimmer. As you continue this, you will reach a point where further turning of the trimmer while rocking the gang condenser will not increase the signal response. This is the correct adjustment.

A simple method of determining if the receiver and generator are tuned for correct alignment is as follows: Set the signal generator at 20,000 Kilocycles and tune the receiver slowly from 19,000 to 20,000 KC. Two signals should be heard 910 KC. apart. One will be lower in frequency than 20,000 KC. and the other on 20,000 KC. The higher frequency as indicated on the dial is the correct aligning frequency and the lower one is the image. As a further check, leave the receiver tuned to the higher frequency. Very slowly increase the generator frequency from 20,000 KC. to about 22,000 KC. A signal will be heard about 21,000 KC., if this band is correctly aligned. If there is no signal, the original settings were on the image frequency. In that case, you must start again from the beginning, in order to be sure of accurate results.

After you have found the correct settings, the image or lower frequency response on the receiver will always sound weaker than the true signal.

BROADCAST BAND ALIGNMENT

Replace the 400 ohm resistor in the generator lead with a .00025 mfd. condenser (250 mmfd. Set the generator at 1,500 KC. Turn the wave band switch left to the Broadcast position, and set the reference dial at 12.5 (1,500 KC.). Adjust the Broadcast Band oscillator shunt trimmer and the Broadcast Band antenna trimmer for maximum response.

This band must be aligned at 600 KC. also. Set signal generator to 600 KC. and tune the receiver to 600 KC., (approximately 83.5 on the reference scale). Adjust the broadcast band oscillator series trimmer for maximum response. During this adjustment, be sure to rock the gang condenser for each small change of capacity of the series trimmer. When this adjustment has been completed, recheck the adjustments at 1,500 KC. This completes the adjustment of the Broadcast Band.

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After installing the chassis in the cabinet, turn the tuning knob until the gang condenser plates are completely meshed. Then slide pointer along cord (without opening gang until the center of the pointer is over the last diamond marking on the left side of the short wave scale. When the above is followed correctly along with the method of alignment, the pointer will match the correct scale calibration throughout.

TUBES:		
	12SA7	Converter
	12SK7	I.F. Amplifier
	12SQ7	2nd Detector, AVC and 1st Audio Amplifier
	50L6GT	Beam Power Output
	35Z5GT	Rectifier

IMPORTANT: If you find it necessary to replace any part in this receiver, bear this in mind. In order to maintain the high performance standards of Andrea Radio receivers, the component parts on all Andrea models are held to exceedingly close tolerance limits. Furthermore, Andrea components are given the exclusive "Climate Sealed" treatment which protects them from all weather and temperature conditions. Consequently, standard Andrea Radio replacement parts must be used for all service work, for the substitution of ordinary stock items will result in inferior performance.

Voltage readings at 120 Volts AC input using 1,000 ohms per volt meter:

TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	P
12SA7		12 AC	+ 95	+ 95	− 3.2		24.8 AC	
12SK7		38 AC			+ 1.6	+ 95	24.8 AC	+
12SQ7		− .2				+ 44	12 AC	
50L6GT		88 AC	+ 90	+ 95			38 AC	+
35Z5GT		120 AC	113 AC		113 AC	+ 95	88 AC	+

GENERAL EXPORT NOTES

LINE VOLTAGE ADJUSTER: Andrea Model CO-UI5 Export Combination Radio-Phonograph leaves th factory connected for 240-260 volts, 60 cycles. To change to lower voltages, the voltage adjustor connection must be changed as shown on rear of cabinet. Remove power line cord from electric outlet. Remove four (4) screws fastening metal Screen to cabinet rear. Adjustor may then be changed as required. Be certain all screw connectors are tight. Refasten Screen to cabinet back. When in use for several days retighten.

50 CYCLE OPERATION: As the Phono motor is of the synchronous type, the record turntable speed must be readjusted for 50 cycle power lines. In such cases, an Andrea 50 cycle pulley and set screw, Part No. EM-5068-69, is supplied. To change from 60 cycle, remove turntable from spindle by pulling upward on both sides of turntable. This will expose turntable drive motor. With a small screw driver, loosen pulley set screw sufficiently to pull off 60 cycle drive pulley and replace with 50 cycle pulley. Be certain to tighten pulley set screw securely. Replace turntable over spindle and press in large turntable drive wheel of motor to engage inside of turntable rim.

MODELS CO-U15,T-U15

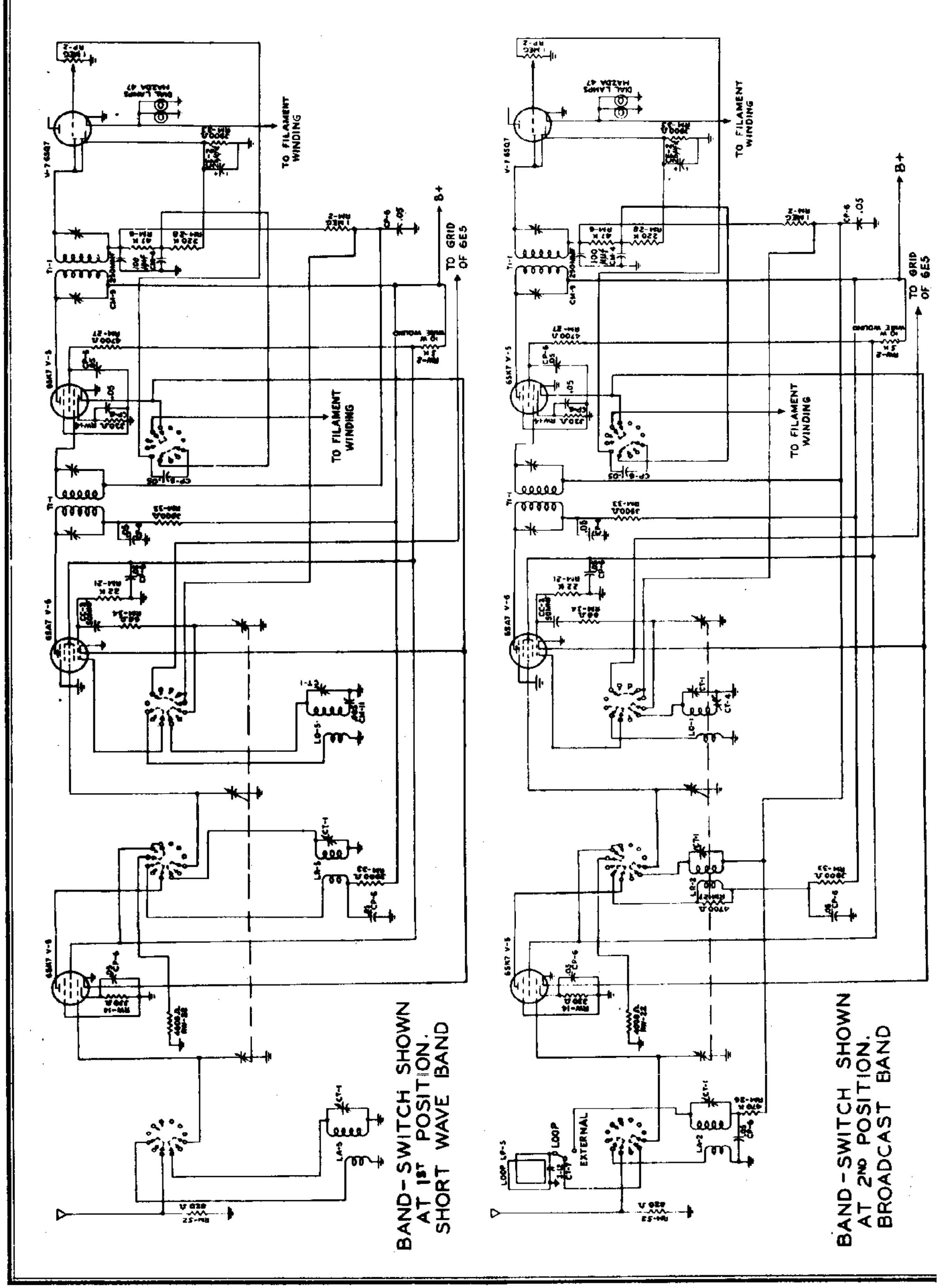
ANDREA RADIO CORP.

REF.	DESCRIPTION	PART NO.
C-1	0.01mmf 20%-400V.TUB.CAP.-MTD.ON L-2	HC-32
C-2A	TRIMMER SECTION1 OPER. 21mmf	FM-918
C-2B	TRIMMER SECTION2 OPER. 585mmf	FM-918
C-3	SEE L-2	
C-4	0.05mf 20%-200V.-TUB.CAP.	HC-6
C-5A	TUNING CAP ANT.SECT.12.6mf-530mmf	FM-897
C-5B	TUNING CAP OSC.SECT.12.6mmf-530mmf	FM-897
C-6A	TRIMMER SECT.1 OPER. 21mmf	HC-738
C-6B	TRIMMER SECT.2 OPER. 21mmf	HC-738
C-7	3500mmf 3%-500V.-MOLD.MICA CAP.	HC-105
C-8	100mmf 20%-500V. " " "	HC-93
C-9	0.25mf 20%-200V.-TUB.CAP.	HC-19
C-10	0.01mf 20%-200V.- " "	HC-9
C-11	0.05mf 20% " " "	HC-6
C-12	0.01mf 20% " " "	HC-9
C-13	170mmf 10%-500V.-MOLD.MICA CAP.	HC-95
C-14	0.003mf 20%-200V.-TUB.CAP.	HC-20
C-15	" " " " "	HC-20
C-16	0.05mf 20%-200V.- " "	HC-6
C-17A	40mf -150V.)	
C-17B	60mf -150V.) ELECTROLYTIC-DRY	HC-198
C-17C	20mf -25V)	
C-18	0.025mf 20%-600V.-TUB.CAP.	HC-192
C-19	0.1mf 20%-400V.- " "	HC-4
L-1	"S"BAND ANT. TRANSFORMER	SA-257
L-2	"M"BAND LOOP ANT. TRANSFORMER	SA-276
L-3A	"S"BAND OSC. TRANSFORMER	SA-274
L-3B	"M" " " "	SA-274
L-4	MODULATOR I-F TRANSFORMER	SA-204A
L-5	DIODE " "	SA-205D
L-6	4000HM SPEAKER FIELD CHOKE	FM-915
R-1	20K OHM 10%-$\frac{1}{4}$W-CARBON	GR-28
R-2	150 OHM 10%-$\frac{1}{2}$W-CARBON	GR-112
R-3	2M OHM 20%-$\frac{1}{4}$W-CARBON	GR-23
R-4	1M OHM POTENTIOMETER, VOL. CONTROL WITH S-2	GRV-804

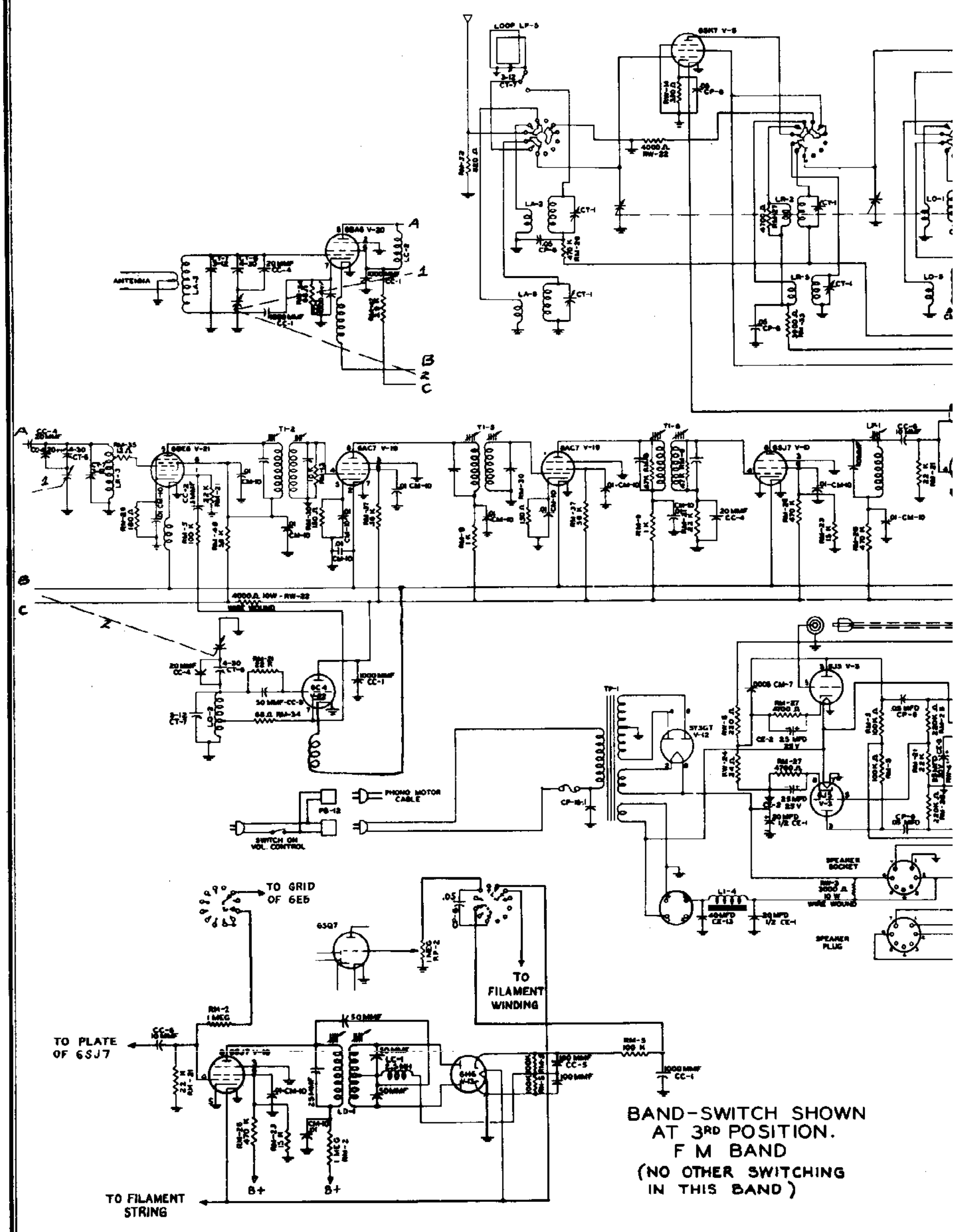
REF.	DESCRIPTION	PART NO.
R-5	100K OHM 20%-$\frac{1}{4}$W-CARBON	GR-7
R-6	5M OHM 20%-$\frac{1}{4}$W-CARBON	GR-111
R-7	240K OHM 20%-$\frac{1}{4}$W-CARBON	GR-46
R-8	$\frac{1}{2}$M OHM POTENTIOMETER, TONE CONTROL	GRY-805
R-9	150 OHM 10%-$\frac{1}{2}$W-CARBON	GR-112
S-1	BAND SELECTOR SWITCH-3POLE-2POSITION	FM-5044
S-2	ON-OFF SWITCH ON REAR OF R-4	GRV-804
T-1	OUTPUT TRANSFORMER-MTED. ON SPEAKER	FM-915
V-1	12SA7-CONVERTER	12SA7
V-2	12SK7-I-F AMP.	12SK7
V-3	12SQ7-2nd.DET., A.V.C., 1st AUDIO	12SQ7
V-4	50L6GT-OUTPUT	50L6GT
V-5	35Z5GT-RECTIFIER	35Z5GT
W-1	LINE CORD	FM-502
I-1	PILOT LIGHT	FM-696
SPKR.-1	5" DYNAMIC SPEAKER MODEL CO-U15	FM-918
C-12	SAME. RELOCATED ON EQUALIZER	
C-20	2000mmf 20%-500V.-MOLD. MICA CAP.	HCM-1606
C-22	170mmf 10%-500V.-MOLD. MICA CAP.	HC-95
C-23	100mmf 20%-500V.-MOLD. MICA CAP.	HC-93
C-24	0.25mf 20%-200V.-TUB.CAP.	HC-19
L-7	FILTER CHOKE	ST-3003
L-8	LOOP ANTENNA	SA-277
R-10	240K OHM 20%-$\frac{1}{4}$W.-CARBON	GR-46
R-11	300K OHM 20%-$\frac{1}{4}$W.-CARBON	GRC-244
R-12	100K OHM 20%-$\frac{1}{4}$W.-CARBON	GR-7
R-13	185 OHM 10%-TAP AT 150 OHM 10%-WIRE-20W.	GRW-507
R-14	390 OHM 10%-TAP AT 290 OHM 10%-WIRE-50W.	GRW-505
R-15	615 OHM 10%-TAP AT 460 OHM 10%-WIRE-50W.	GRW-506
S-3	RADIO-PHONO SWITCH	FM-5046
T-1	OUTPUT TRANSFORMER-MTD. ON SPEAKER	SL-4002
W-2	LINE CORD	FM-502-8
P-1	PHONO POWER PLUG	FM-5055
P-2	PHONO TIP PLUG	FM-5051
SPKR-2	5" PM SPEAKER HUM BUCKING COIL SHOWN ON DIAGRAM OMITTED	SL-4002
J-1	PHONO POWER SOCKET	FM-642
TS-1	PHONO-TELEVISION TERMINAL STRIP	FM-708
ARC	AUTOMATIC RECORD CHANGER	FM-5050

R11 WAS 1.5M OHM
CZ1 REMOVED

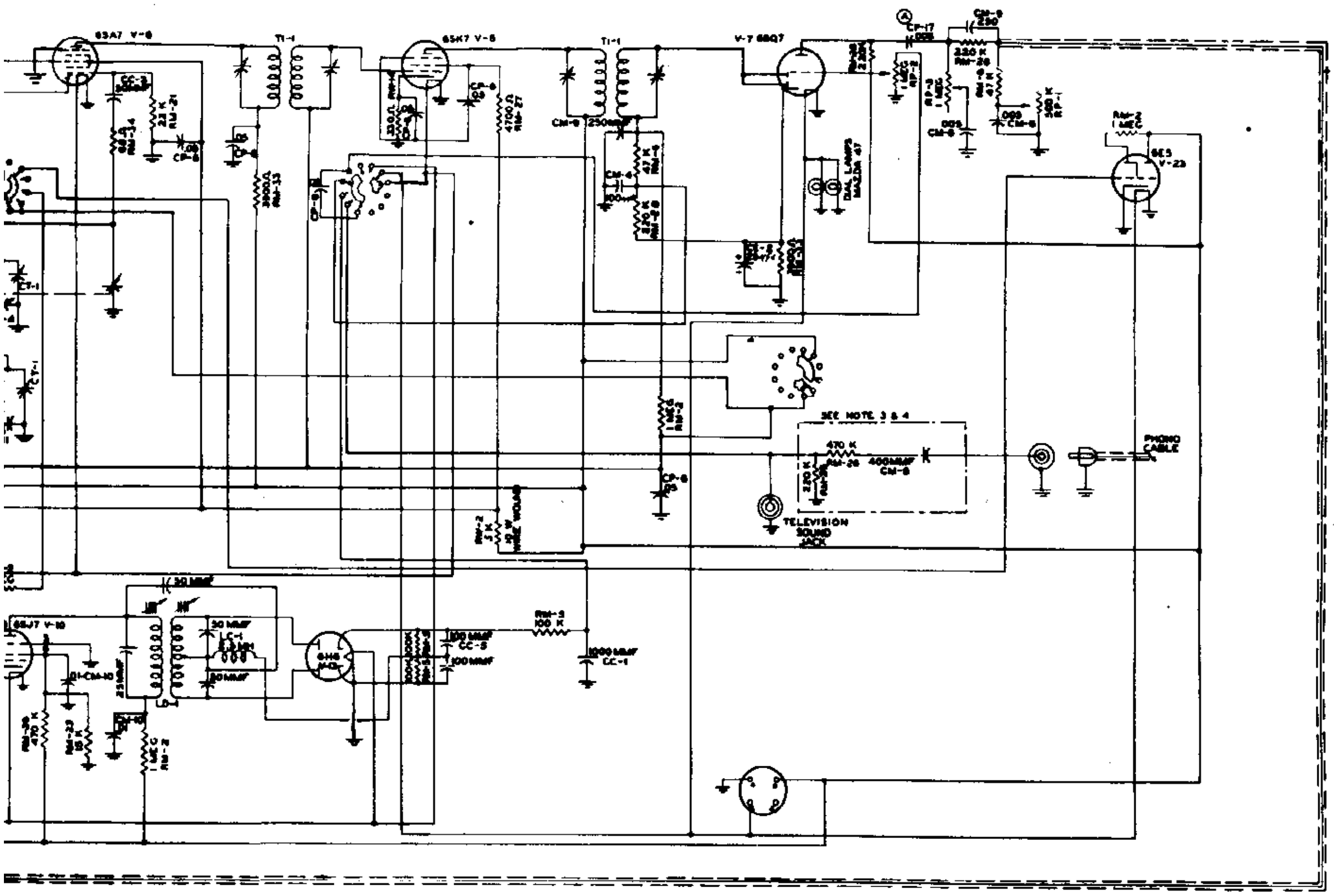
ANSLEY RADIO CORP. MODEL 5

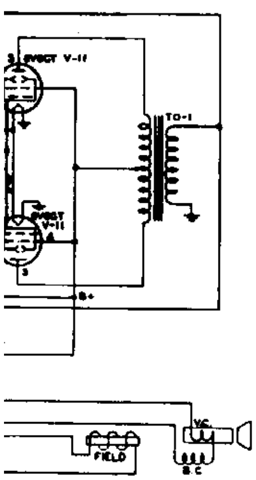


ANSLEY R

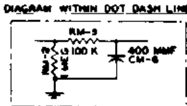


LOOP LP-5
6SK7 V-5
6BA6 V-20
ANTENNA
6BE6 V-21
6AC7 V-19
6SJ7 V-10
6C4 V-22
TP-1
5Y3GT V-12
PHONO MOTOR CABLE
SWITCH ON VOL. CONTROL
SPEAKER SOCKET
SPEAKER PLUG
TO GRID OF 6E5
6SQ7
TO FILAMENT WINDING
TO PLATE OF 6SJ7
6SJ7 V-10
6H6
TO FILAMENT STRING
B+
B+
BAND-SWITCH SHOWN
AT 3RD POSITION.
F M BAND
(NO OTHER SWITCHING
IN THIS BAND)





NOTE:
1. BAND SWITCH SHOWN IN "S.W." POSITION.
2. ALL CONDENSERS NOT MARKED ARE IN MICROFARADS
3. ON "SERIAL NUMBERS-PREFIX B-NO SUFFIX" THE PORTION OF DIAGRAM WITHIN DOT DASH LINE IS AS FOLLOWS



4. ON "SERIAL NUMBERS-PREFIX B-SUFFIX A" THE SCHEMATIC IS AS SHOWN.

1. Short Wave—6 Mc to 18 Mc
2. Standard Broadcast—540 Kc to 1750 Kc
3. Frequency Modulation—88 Mc to 108 Mc (Channels 200 to 300)

ALIGNMENT INSTRUCTIONS

1. Remove main chassis or chassis-panel Assembly (depending on cabinet model) from cabinet, first loosening all cable clamps and disconnecting inter-chassis cables and phono connections.

2. Remove main chassis bottom plate and reconnect inter-chassis cables.
Turn on switch on volume control.

3. "A.M." and "S.W." trimmer and padder adjustments are made from the bottom of the main chassis. All trimmers for "A.M." and "S.W." bands are mounted on top of the coil forms (six in number) with the exception of the "A.M." loop trimmer which is mounted directly on the loop itself. When adjusting the loop trimmer, the "ANT.-LOOP" switch must be in "LOOP" position. F.M. trimmers and padders are reached through the holes in the top of the small chassis which is attached to the tuning condenser. All I.F. adjustments are made from the top of the main chassis.

4. Align according to the table below. Make sure the dial pointer is set at the absolute left end of the scale when the tuning condenser is fully closed. Use insulated screwdriver for all padder and F.M. discriminator adjustments.

5. Make sure that the heavy braid connected between the two chassis is tightly fastened when the set is reinstalled. Failure to do this will result in excessive hum.

6. If there is still appreciable hum when the volume control is turned up, reverse the power cable plug (audio chassis to main chassis).

7. Before aligning the F.M. circuits, allow the set to warm up for at least twenty minutes with the band switch on "F.M." position.

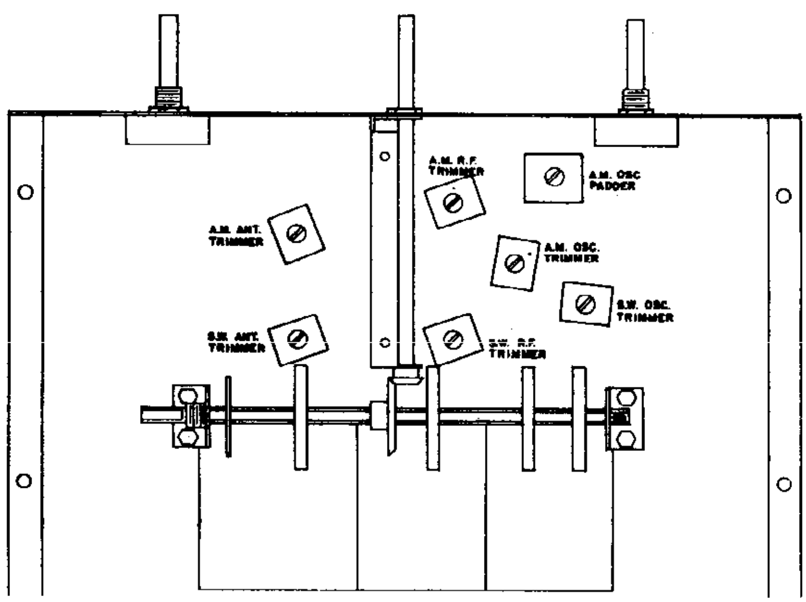
8. When replacing the type 6SQ7 tube, use a metal envelope type tube to insure low hum output.

MODEL 53

ANSLEY RADIO CORP.

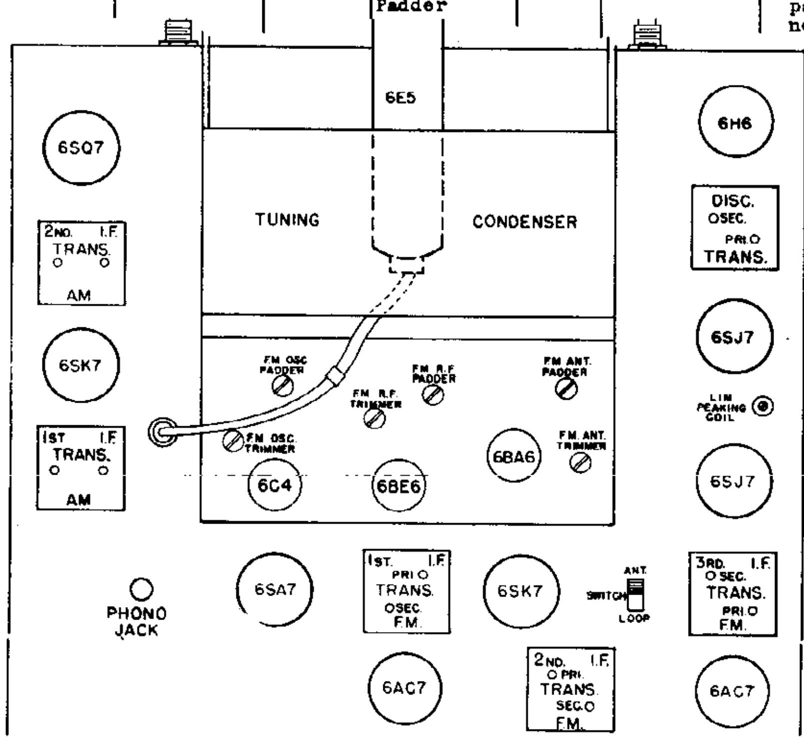
DUMMY ANT.	SIG. GEN. CONNECTION	SIG. GEN. FREQ.	BAND SWITCH POSITION	TUNING POINT	OUTPUT METER	OUTPUT METER CONNECTION	REMARKS
.05 mf.	6SK7 I.F. Grid	455 KC (Mod. 400 Cy.)	"A.M."	2nd I.F.T. A.M.	A.C.	Spk'r. Voice Coil	Set volume, bass, and treble controls fully clockwise. Set signal generator output no higher than necessary for output reading. Adjust for maximum output.
"	6SA7 Grid No. 3	"	"	1st I.F.T. A.M.	"	"	"
"	6SK7 R.F. Grid	1600 KC. Mod.	"	A.M. Osc. Trimmer	"	"	Set dial pointer to 1600 Kc.
"	"	"	"	A.M. R.F. Trimmer	"	"	"
R.M.A. St'd.	A.M. Ant. Term.	"	"	A.M. ANT. Trimmer	"	"	"
"	"	600 KC. Mod.	"	A.M. Osc. Padder	"	"	Set dial pointer to 600 Kc. Adjust for maximum output. Recheck A.M. Osc. trimmer at 1600 KC.
.05 mf.	6SK7 R.F. Grid	12 MC. Mod.	"S.W."	S.W. Osc. Trimmer	"	"	Set dial pointer at 12.0 Mc. Adjust for maximum output.
.05 mf.	"	"	"	S.W. R.F. Trimmer	"	"	"
400 ohm.	A.M. Ant. Term.	"	"	S.W. Ant. Trim.	"	"	"
—	Loop	1600 KC. Mod.	"A.M."	Loop Trimmer	"	"	Couple sig. gen. to loop with 2 turns of wire - adjust for maximum output. (Dial pointer at 1600 Kc.)
Direct	6AC7 (2nd F.M. I.F.) Grid	10.7 MC. No. Mod.	"F.M."	3rd I.F.T. F.M.	High Res. D.C. V.T.V.M.	Connect Thru 1 meg. Res. to 1st lim. Grid Resistor	Shunt both sides of 3rd I.F. Trans. with 22000 OHMS. Use only enough sig. gen. input for adequate meter indication. Leave 22000 ohm shunts on after aligning. Adjust for max. output.
"	6AC7 (1st F.M. I.F.) Grid	"	"	2nd I.F.T. F.M.	"	"	Shunt 2nd I.F. trans. same as in previous step. Use only enough input for usable meter indication.
"	"	"	"	1st Lim. Plate peaking coil	"	Connect to 1 megohm resistor from 2nd lim. grid	Adjust for max. output. Use only enough input for usable meter indication.

BOTTOM VIEW OF MAIN CHASSIS



ANSLEY RADIO CORP.

DUMMY ANT.	SIG. GEN. CONNECTION	SIG. GEN. FREQ.	BAND SWITCH POS.	TUNING POINT	OUT-PUT METER	OUTPUT METER CONNECTION	REMARKS
"	"	"	"	Disc. Primary	"	Connect to mid-point of 6H6 100,000 ohm Cathode resistors	Adjust for max. output with min. input from signal gen.
"	"	"	"	Disc. Second-ary	"	Connect to 100,000 ohm re-sistor and 1000 mmf. cond. from 6H6 Cathode	Adjust for zero output. Set sig.gen. 75 kc. higher (10.775 Mc.) and 75 kc. lower (10.625 Mc.) and record + and - voltage readings. If not equal, repeat the above 2 steps until they are. (Use enough sig. gen. output to saturate limiters well.
"	6BE6 Grid #3	"	"	1st I.F.T. F.M.	"	1 meg. res. to 1st lim. grid res.	Shunt primary of this transformer with 22000 ohm. resistor. Adjust for max. output with min. sig. gen. input.
High side of generator thru 100 ohms to left F.M. ant. strip terminal (looking at chassis from rear) low side of gen. to right term. thru 100 ohms		107.9 Mc. No Mod.	"	F.M. Osc. Trimmer	"	"	Adjust for max. output (keep below 3 volts on D.C. V.T.V.M.) with min. sig. gen. input. (remove all I.F. shunts before doing this) Check for image. Set dial pointer to F.M. channel #300. for this step. Image should be at approx. 86.5 Mc. generator freq.
"		107.9 Mc No Mod.	"	F.M. R.F. Trimmer	"	"	Adjust for max. output with min. gen. input.
"		107.9 Mc No. Mod.	"	F.M. Ant. Trimmer	"	"	"
"		87.9 Mc No Mod.	"	F.M. Osc. padder	"	"	Set dial pointer to F.M. channel #200. Adjust for max. output with min. gen. input.
"		87.9 Mc No Mod.	"	F.M. R.F. Padder	"	"	"
"		"	"	F.M. Ant. Padder	"	"	Repeat F.M. trimmer and padder adjustments until no further need exists.



MODEL 105, DYNATONE

ANSLEY RADIO CORP.

INSTRUCTIONS FOR TUNING THE DYNATONE

1. The cabinet has been designed to permit tuning the piano without removing any of the assembly. The top is hinged and back checks are provided. Tuning is best done with the volume fairly high.

2. Should it be desired to service the keys or remove the action, the fall board carrying the pre-amplifier and controls must be removed. This can be done as follows:
   a. Disconnect the coaxial cable at the right hand side of the piano.
   b. Remove two cable plugs on the right hand side of the fall board and one from the fall board to the key bed on the left hand side.
   c. Lift up the swell pedal link connecting the two levers at the left hand side of the cabinet.
   d. Remove the screws holding the fall board in place on the cabinet walls.

INSTRUCTIONS FOR CHANGING TUBES

1. Remove knobs on radio panel. (Do not remove dial plate from panel.)
2. Remove four (4) outer screws holding panel to case.
3. Remove panel by slipping it forward.

Tubes and dial lights are now accessible for replacement by reaching in over the top of the chassis. The tube layout attached to the inside of the radio compartment shows the location of each type of tube.

INSTRUCTIONS FOR REMOVING CHASSIS FOR SERVICE

NOTE—Service on any of the electronic units in the DynaTone should be attempted only by a qualified radio technician who has access to the necessary schematic diagrams and alignment instructions, which will be supplied without charge by the factory on request.

1. After proceeding as above, remove four mounting screws underneath the chassis mounting shelf.
2. Open door on the back of DynaTone behind the radio chassis.
3. Pull out connecting plugs attached to back of chassis and disconnect the antenna wires.

The chassis can now be removed for access to all the interior wiring and balancing adjustments.

Controls

All controls for operation of the radio and record player are located to the sides and beneath the "Floating Pointer" dial. These controls are marked plainly and no trouble should be encountered in using them.

There are five controls as follows:

1. Volume Control—left side of dial.
2. Tuning Control—right side of dial.
3. Bass Tone Control—lower left.
4. Band Switch Control—lower center.
5. Treble Tone Control—lower right.

The band switch control has four positions marked:—"S.W.", "A.M.", "F.M.", and "Phono". The "A.M." position is the standard broadcast band. When switching from any position to the "F.M." position, it is necessary to wait a few seconds for the heaters of the F.M. tubes to warm up. Likewise, when switching from "F.M." position to "A.M." or "S.W.", a short time is required for these tubes to warm up. This is to give you maximum tube life since the only tubes lighted at any given time are those actually in use.

The "Bass" and "Treble" controls are designed to give a separate adjustment for each end of the audio range without affecting the opposite end. Clockwise rotation of either control increases the response at that end of the audio range.

In using the tuning control, it will be found necessary to exercise a little more than the usual amount of precision while tuning on the F.M. band. In order to make F.M. tuning easier and simpler, the tuning eye in the model 53 chassis has been adapted to F.M. tuning indication as well as A.M. In using this indicator on either F.M. or A.M., the tuning control should be adjusted until the tuning eye has a minimum shadow angle.

Push Button Adjustment

The tuning condenser push buttons should be adjusted as follows:

1. Turn the receiver on and allow to warm up for at least five minutes.
2. Unscrew the button to be adjusted approximately two turns.
3. Tune in the station desired.
4. Push the button in and turn until tight.
5. Select the proper station call letters from the sheet furnished and press into the top of the button with one of the celluloid discs on top of it.

If rattles are heard on certain notes at high volume, look the room over carefully while someone strikes the offending note continuously. You will often find such a rattle to be caused by a loose window pane, lamp shade or some other object in the room. When you find it, the remedy is usually easy.

Lamp cords running across the back of the DynaTone may cause hum. Try moving them around until you find a place that causes no trouble.

Tubes used in the DynaTone, model 105 are as follows:

Piano Preamplifier Chassis
- 6C4 Oscillator
- 6SH7 Harmonic Generator
- 6SG7 R.F. Amplifier
- 6SJ7 Limiter
- 6H6 Discriminator
- 6SC7 Piano 1st Audio Amplifier
- 6SN7 Mixer

Power Chassis
- 6N7 Phase Inverter
- 6B4G / 6B4G } Power Amplifier
- 5U4G Rectifier

Radio Tuner
- 6C4 Oscillator, F.M.
- 6BA6 R.F. Amplifier, F.M.
- 6BE6 Converter, F.M.
- 6AC7 I.F. Amplifier, F.M.
- 6AC7 I.F. Amplifier, F.M.
- 6SJ7 Limiter, F.M.
- 6SJ7 Limiter, F.M.
- 6H6 Discriminator, F.M.
- 6SK7 R.F. Amplifier, A.M.
- 6SA7 Converter, A.M.
- 6SK7 I.F. Amplifier, A.M.
- 6SQ7 Detector and 1st Audio, A.M.
- 6E5 Tuning Indicator

I. Locations of components:

A. The Power Chassis is located to the left on the floor of the cabinet. It is accessible by removing the front baffle of the cabinet below the keyboard. Four bolts hold the chassis in place.

B. The Preamplifier Chassis is located on the back of the fall board above the keyboard. It is accessible by lifting the top of the cabinet. In servicing this chassis, it is best to r move the entire fall board. The chassis can be worked on without disconnecting from th fall board since the bottom plate can be removed while the chassis is in place. Remove the fall board as follows:

1. Disconnect coaxial cable at right hand side. Disconnect the plugs from the fall boar on the right hand side.
2. Disconnect plug at left hand side of the fall board.
3. Lift up on swell pedal link connecting the two levers on the left hand side of the cabi
4. Remove screws holding fall board in cabinet.

II. Adjustment of the Oscillator.

A. The oscillator located on the Preamplifier Chassis (right hand side) may require adjustment occasionally If the piano output is low or distorted, this should be done.

B. This adjustment can be made without removing the fall board as follows:

1. Connect a D.C. VTVM between the pin jack (on top of the Preamplifier Chassis) and the chassis.
2. Adjust the permeability screw on the top of the oscillator coil can (the can farthest t the right of the chassis) until the meter reads 0 volts between a positive and negativ peak.

III. Alignment Procedure for Piano Preamplifier.

A. Remove the oscillator tube, 6C4.

B. Set signal generator to 26.5 mc (no modulation). Connect signal generator output lead t the first grid of the 6SH7 harmonic generator and ground lead to chassis.

C. Connect D.C. VTVM to the center of the two cathode resistors of the 6H6 discriminator

D. Adjust permeability screws on the transformers of the harmonic generator 6SH7 and R F. amplifier 6SG7 Tune for maximum output at 26.5 mc

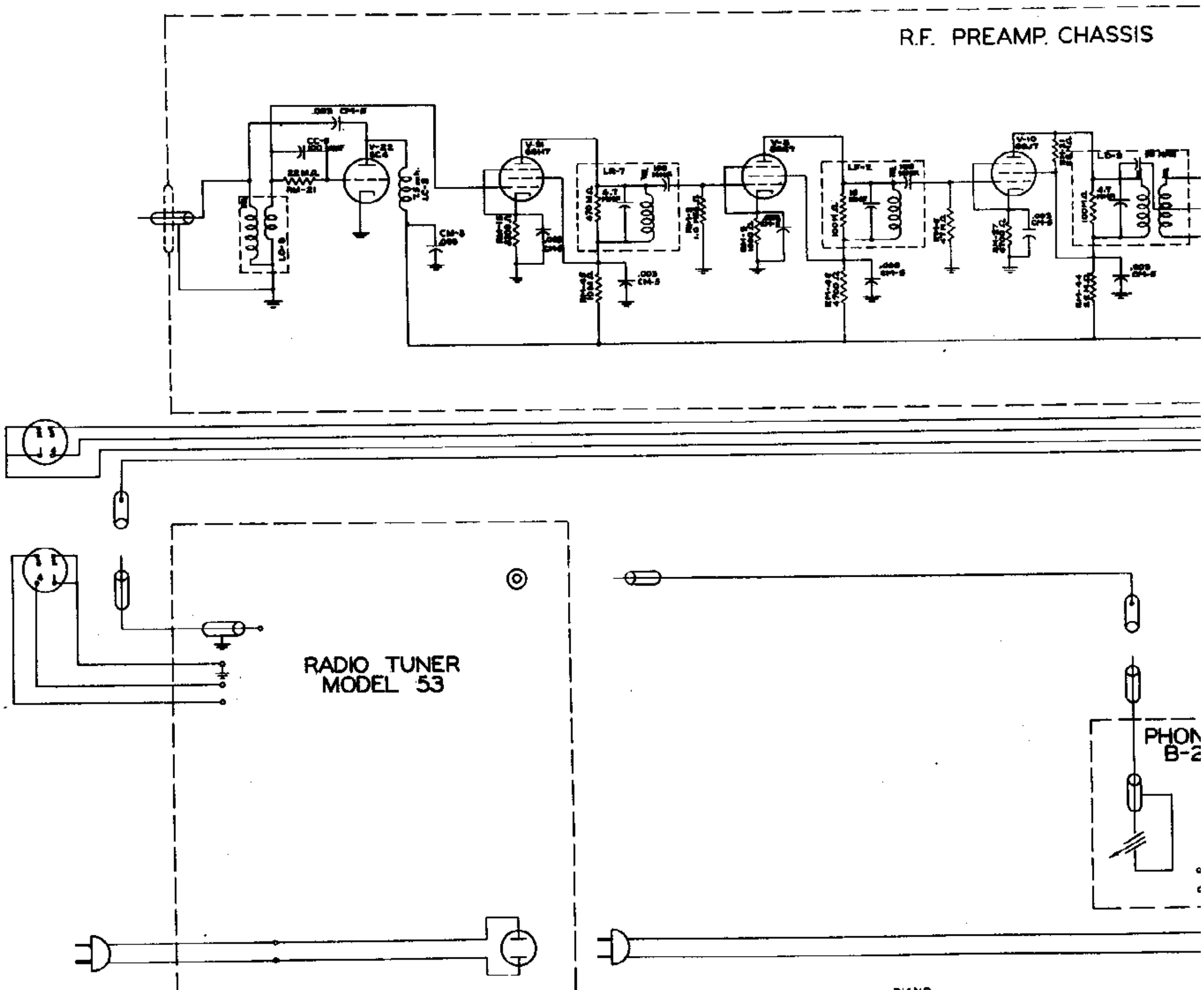
E. Adjust permeability screw on the top of the discriminator transformer can (primary) fc maximum output.

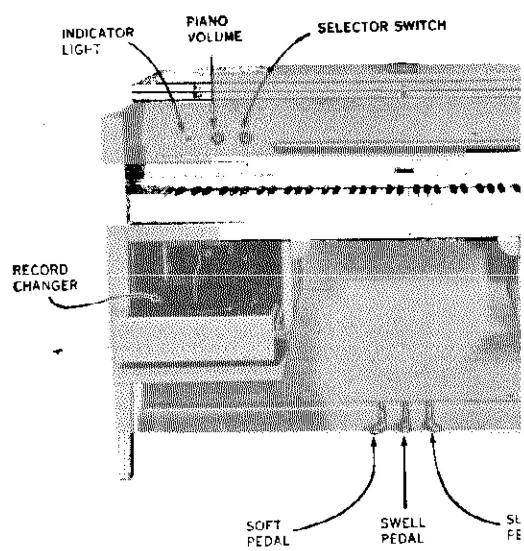
F. Connect D.C. VTVM to the jack on top of the R.F. Preamplifier Chassis. Adjust perme bility screw on bottom of discriminator transformer can (secondary) until voltage is ze between a positive and negative peak. Remove signal generator leads.

G. Replace the oscillator tube. Adjust permeability screw on the top of the oscillator coil can until the voltage is zero between a positive and negative peak.

IV. Adjustment of pick-up buttons.

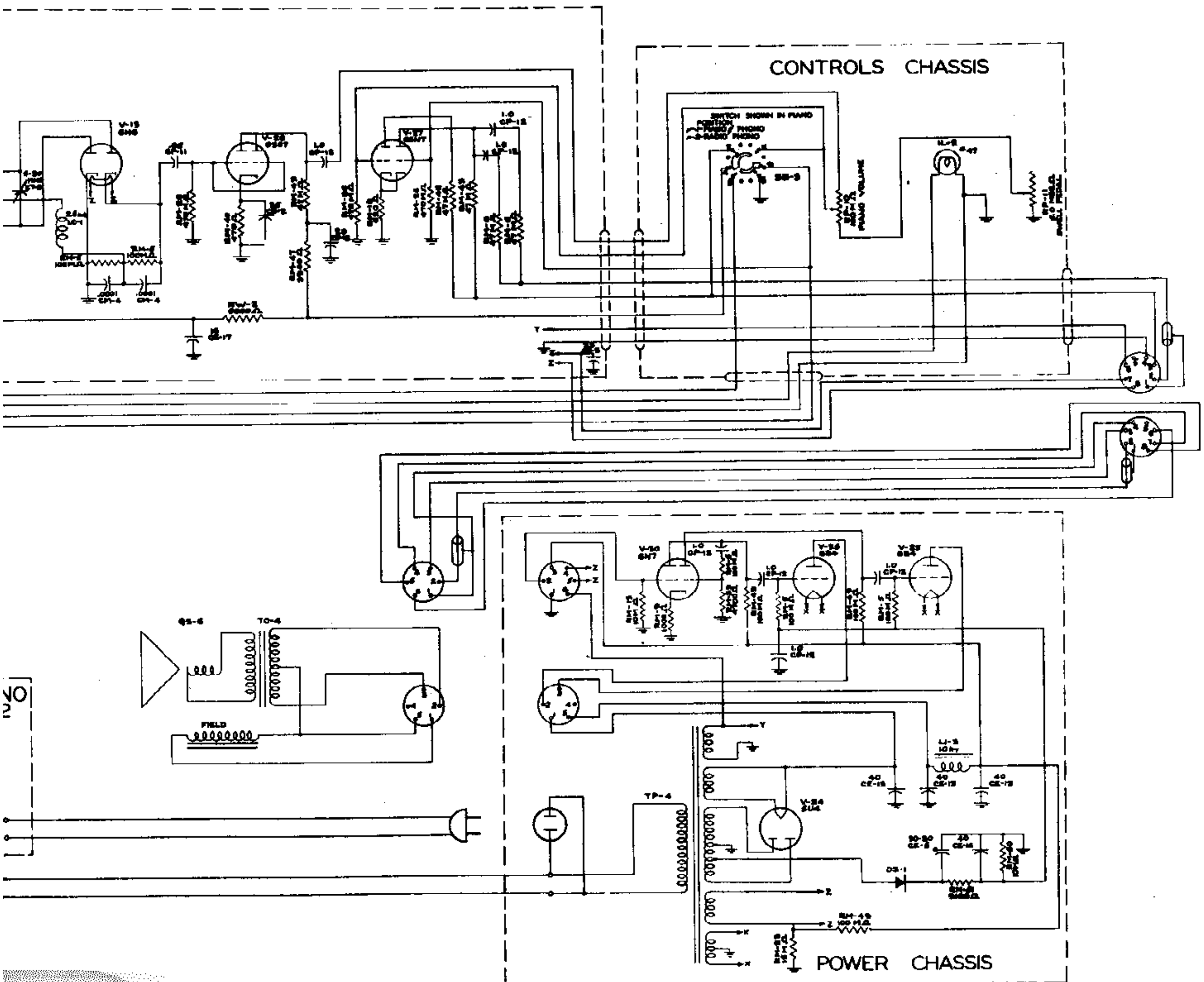
The pick-up buttons have been adjusted at the factory for optimum results. If, however a certain note exhibits noise in the output, it is probable that the string hits the button associated with it. To correct this condition, loosen nut, and back off button slightly, th tighten nut. Noise can also be caused by the lock nut not being tight.

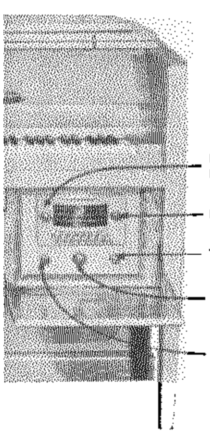




NOTE:
ALL CAPACITORS IN MICROFARADS
EXCEPT AS OTHERWISE NOTED.

ALL CP-12 CAPACITORS ARE 0.1 MICROFARADS INSTEAD OF 1.0 AS SHOWN.

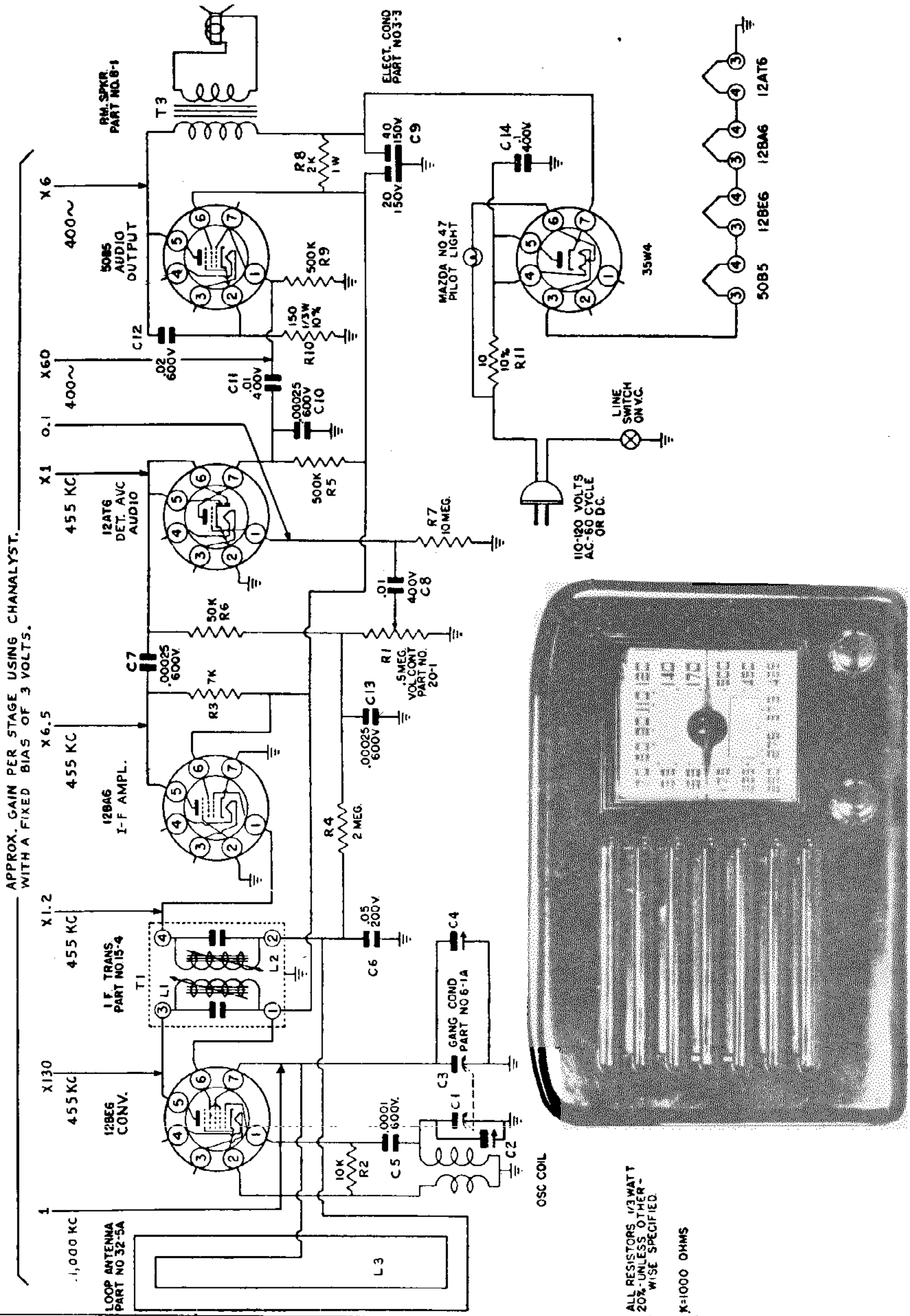




JSTAINING
EDAL

TITLE SCHEMATIC DIAGRAM - DYNATONE 105	
MATERIAL-	
FINISH-	JUNE 9, 1947
ANSLEY RADIO CORP.	
DWG. # ZS-5	

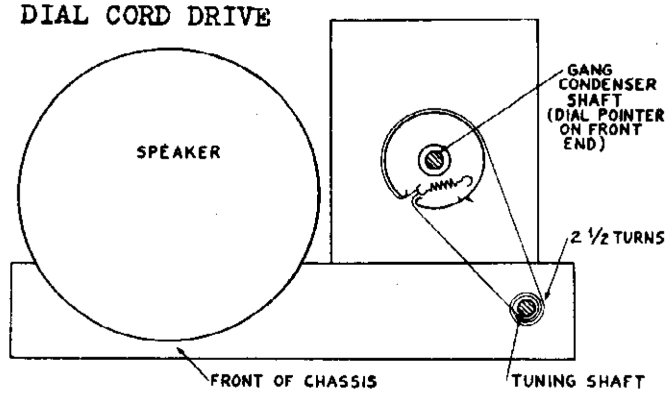
APEX RADIO & TELEV. CORP.

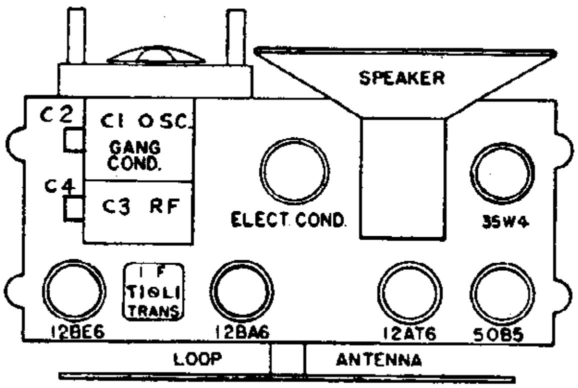


MODEL 25

APEX RADIO & TELEV. CORP.

DIAL CORD DRIVE



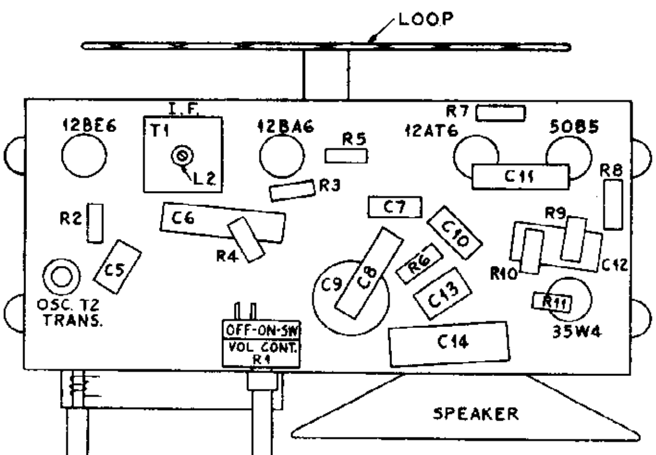


TUBE LAYOUT

Model 4B5

SOCKET	PIN	VTVM	20,000 Ω/P.V.	1,000 Ω/P.V.	RESISTANCE
12BE6 CONV.	1	-6	-6	-6 ON 100V SCALE -3.5 ON 10V SCALE	10K
	2	0	0	0	0
	3	AC	AC	AC	45 Ω
	4	AC	AC	AC	30 Ω
	5	+82	+82	+82	OVER 5 MEGS
	6	+82	+82	+82	OVER 5 MEGS
	7	-1.0	-0.5	-0.2	3 MEGS
12BA6 I.F. AMPL.	1	-1.0	-0.5	-0.2	3 MEGS
	2	0	0	0	0
	3	AC	AC	AC	25 Ω
	4	AC	AC	AC	15 Ω
	5	+25	+24	+22	OVER 5 MEGS
	6	+82	+82	+82	OVER 5 MEGS
	7	0	0	0	0
12AT6 DET. AVC AUDIO	1	-0.5	-0.2	0	10 MEGS
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	15 Ω
	5	-0.5	-0.2	0	500K
	6	-0.5	-0.2	0	500K
	7	+40	+36	+15	OVER 5 MEGS
50B5 AUDIO OUTPUT	1	0	0	0	500K
	2	+5	+6	+5	180 Ω
	3	AC	AC	AC	85 Ω
	4	AC	AC	AC	55 Ω
	5	+120	+120	+120	OVER 5 MEGS
	6	+82	+82	+82	OVER 5 MEGS
	7	--	--	--	--
35W4 RECT	1	AC	AC	AC	110 Ω
	2	--	--	--	--
	3	AC	AC	AC	85 Ω
	4	AC	AC	AC	115 Ω
	5	AC	AC	AC	115 Ω
	6	AC	AC	AC	110 Ω
	7	+125	+125	+125	OVER 5 MEGS

ALL VOLTAGE AND RESISTANCE MEASUREMENT MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V. A. C.



BOTTOM VIEW

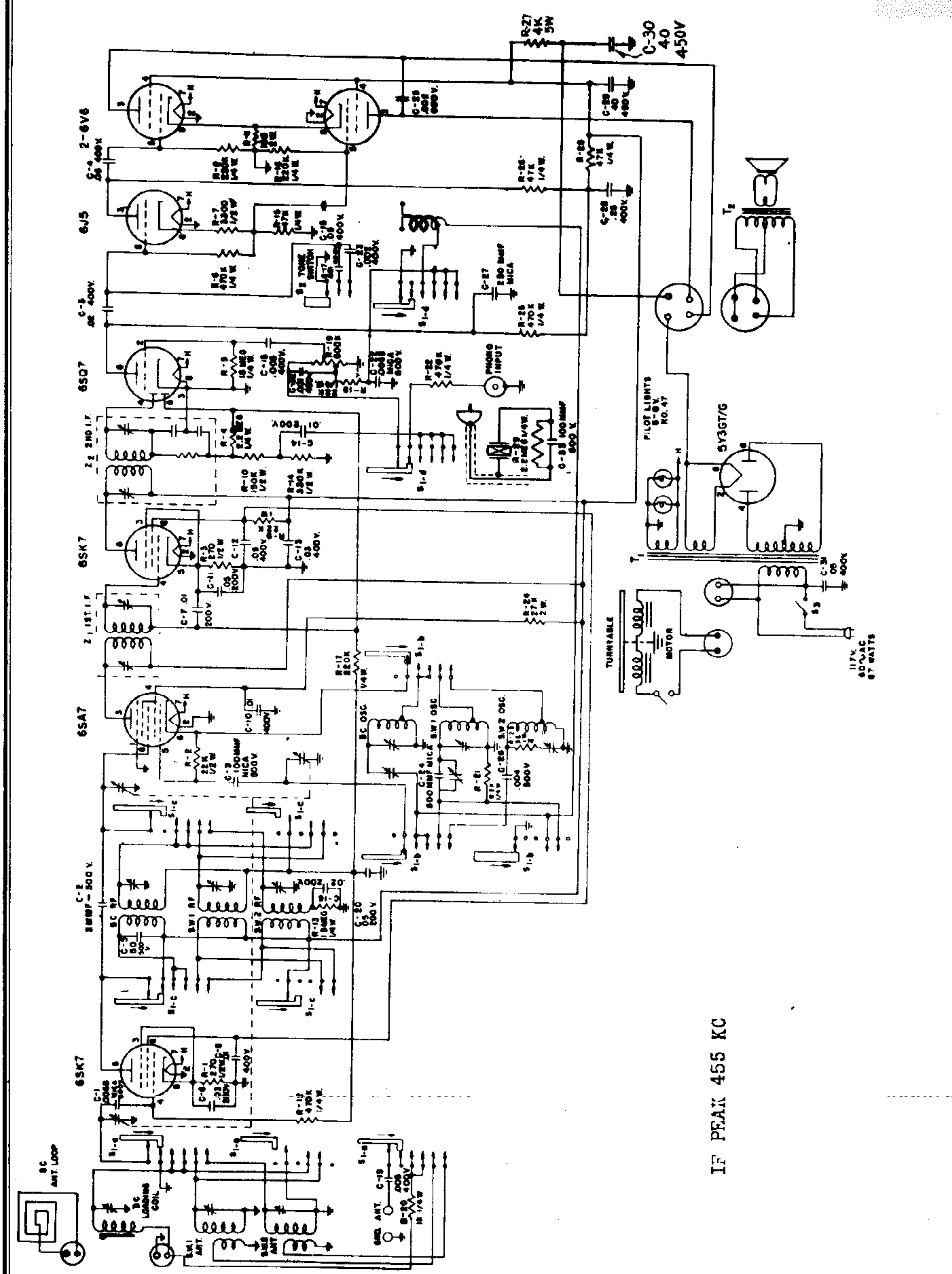
A L I G N M E N T

THE CHASSIS MUST BE REMOVED FROM THE CABINET IN ORDER TO ALIGN THE RECEIVER. CONNECT THE OUTPUT METER ACROSS THE VOICE COIL. CONNECT THE SIGNAL GENERATOR TO THE STANDARD HAZELTINE MODEL 1150 LOOP, AND COUPLE LOOSELY TO THE RECEIVER LOOP. SET THE RECEIVER VOLUME CONTROL AT MAXIMUM.

THE TUNING CONDENSER PLATES SHOULD BE FULLY MESHED WHEN THE DIAL POINTER IS AT THE INDEX MARK AT THE LOW FREQUENCY END OF THE DIAL. THE SIGNAL GENERATOR OUTPUT SHOULD BE SUFFICIENT TO GIVE HALF SCALE DEFLECTION ON THE LOWEST SCALE OF THE OUTPUT METER. SET THE SIGNAL GENERATOR TO 455 KC. ADJUST THE I.F. TUNING SLUGS FOR MAXIMUM METER DEFLECTION IN THE FOLLOWING SEQUENCE: L2, L1. SET THE GENERATOR AND RECEIVER TO 700 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT. SET THE GENERATOR AND RECEIVER TO 1400 KC AND ADJUST LOOP TRIMMER C4 FOR MAXIMUM OUTPUT

APEX RADIO & TELEV. CORP.

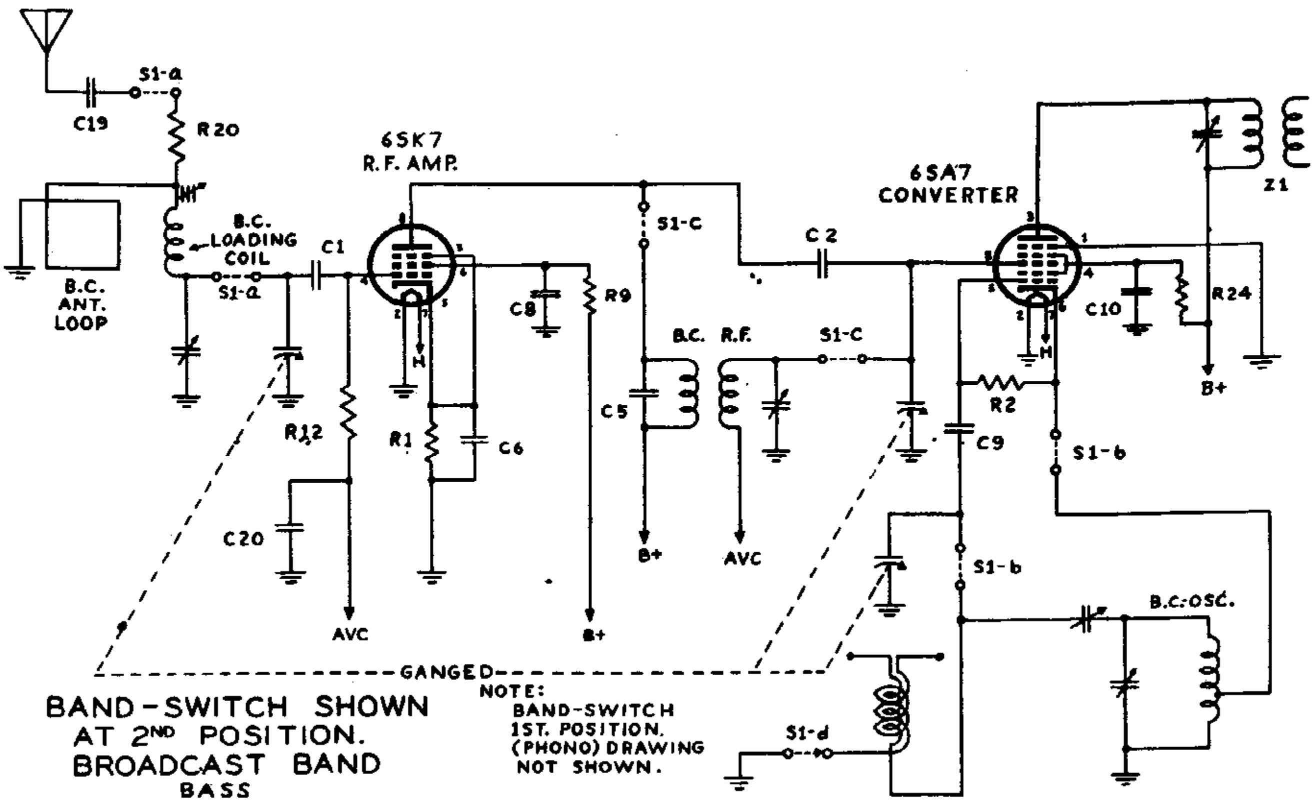
MODELS 8146, 834



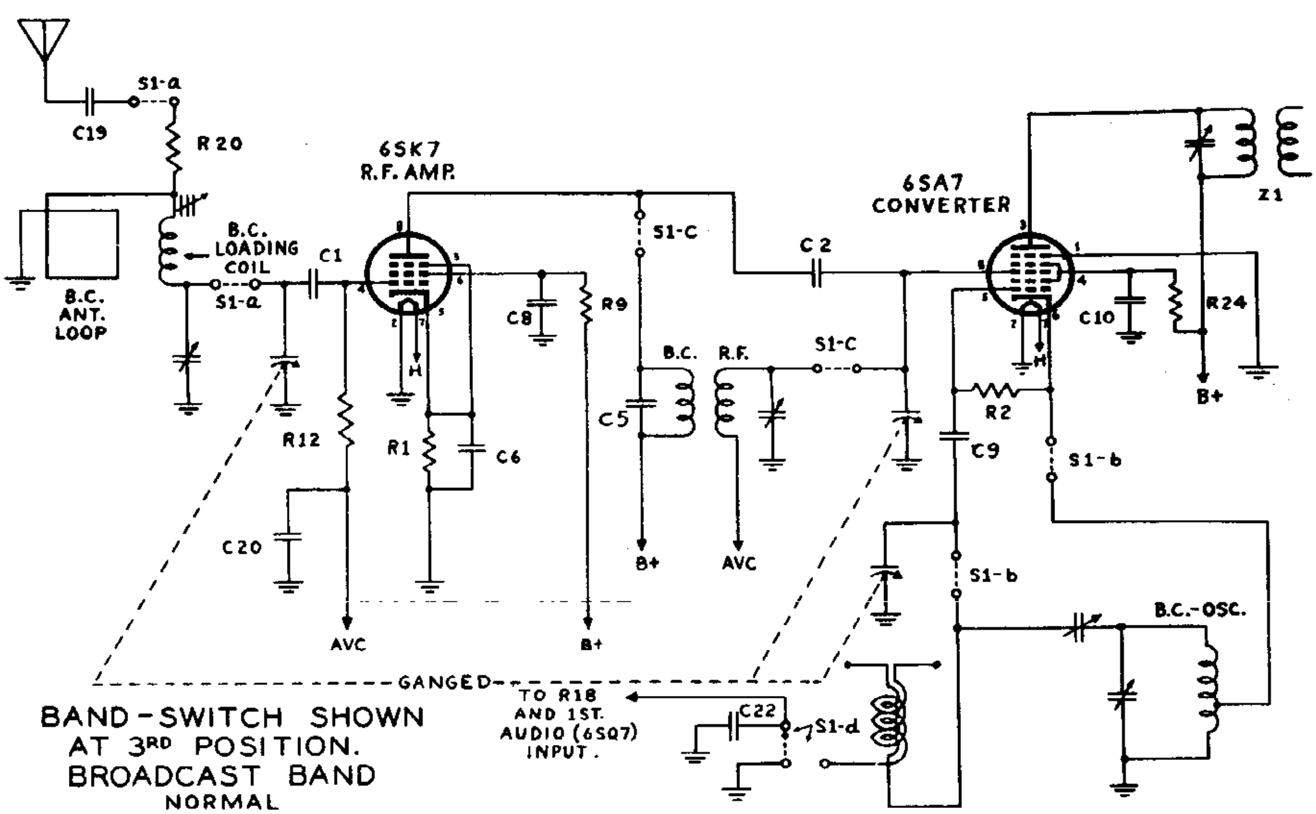
"clarified schematics"

MODELS 8146, 8347

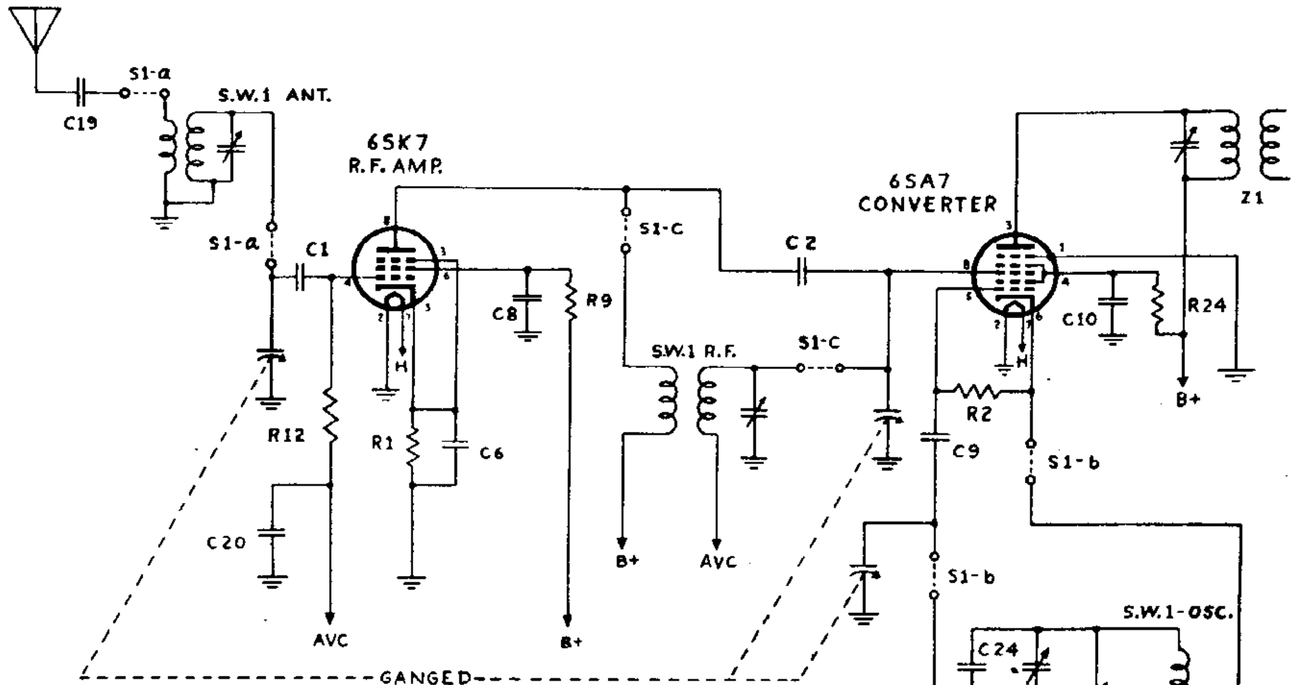
APEX RADIO & TELEV. CORP.



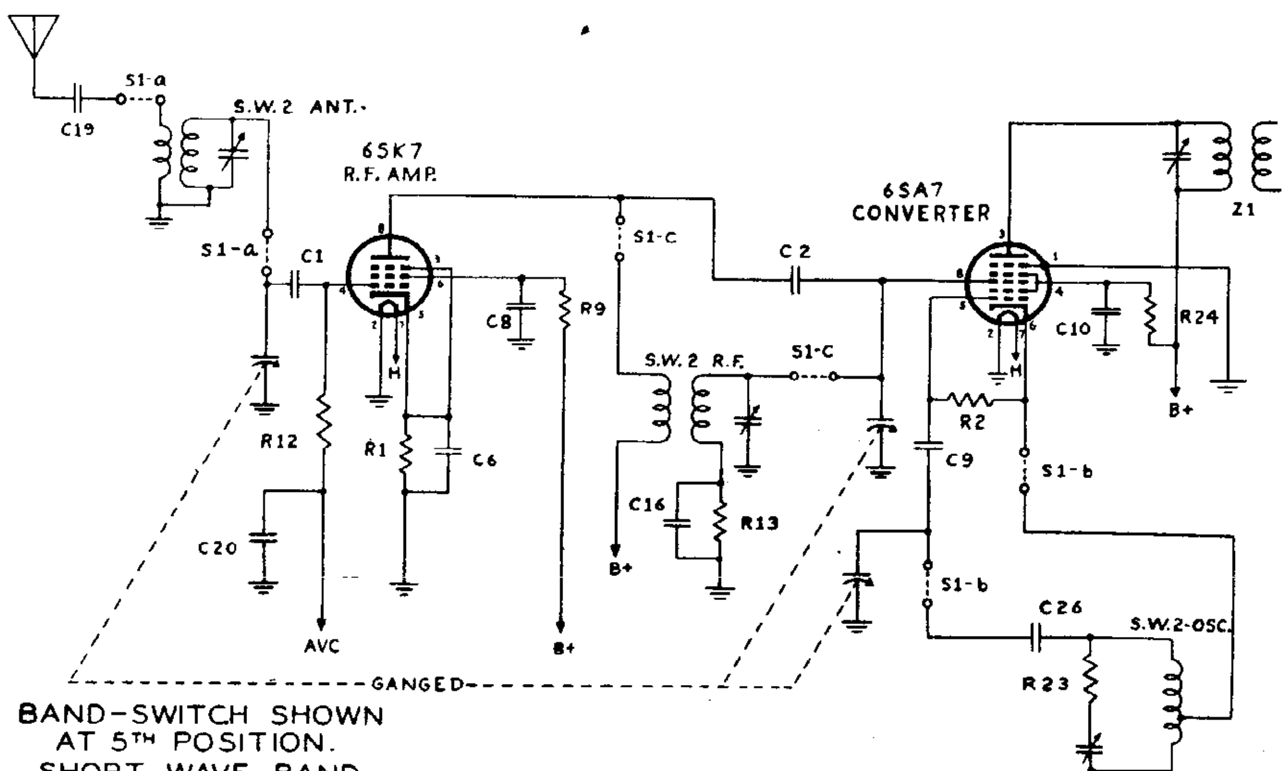
BAND-SWITCH SHOWN AT 2ND POSITION. BROADCAST BAND BASS



BAND-SWITCH SHOWN AT 3RD POSITION. BROADCAST BAND NORMAL

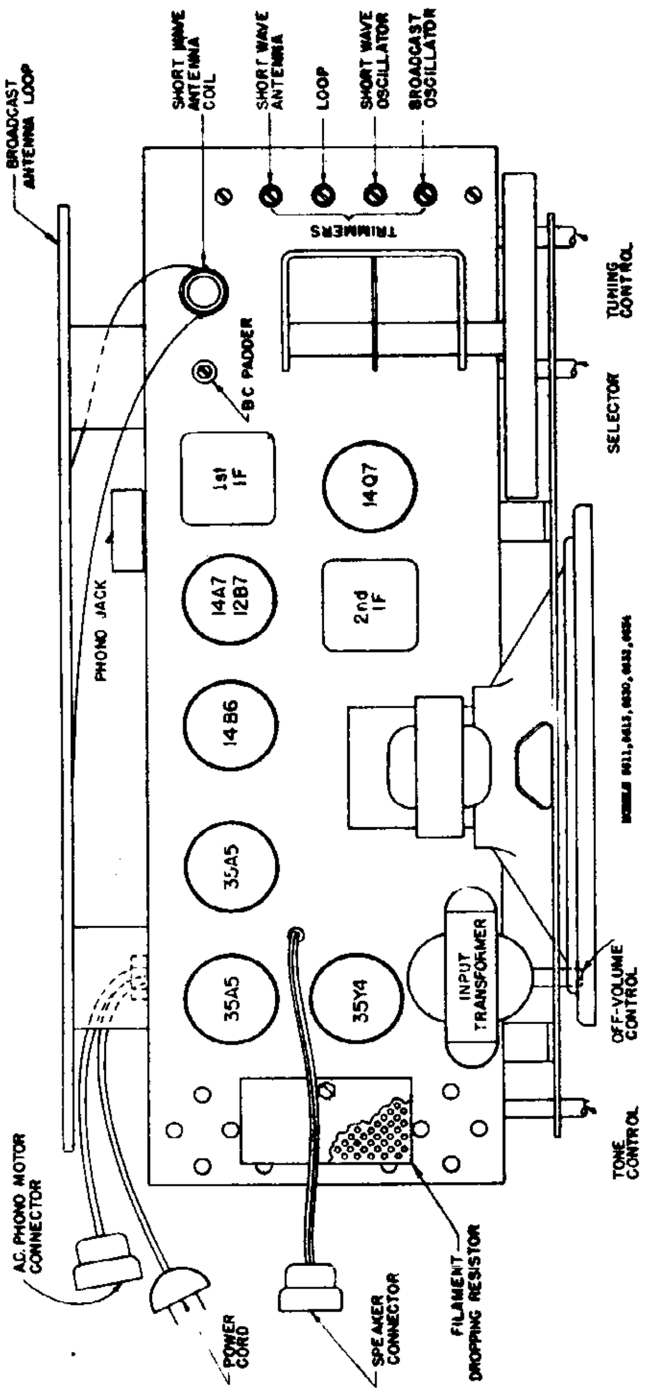


BAND-SWITCH SHOWN
AT 4TH POSITION.
POLICE BAND
2.3-7 MC.



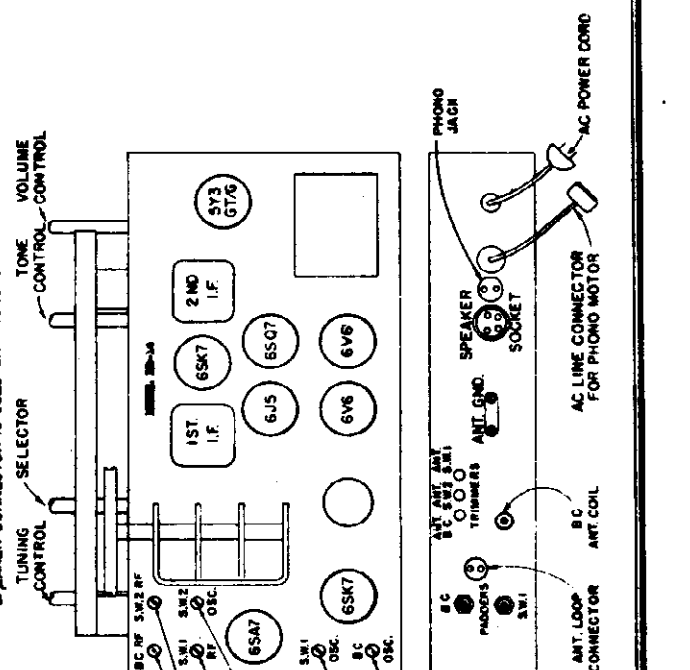
BAND-SWITCH SHOWN
AT 5TH POSITION.
SHORT WAVE BAND
7-23 MC.

MODELS 8146,8347 APEX RADIO & TELEV. CORP.

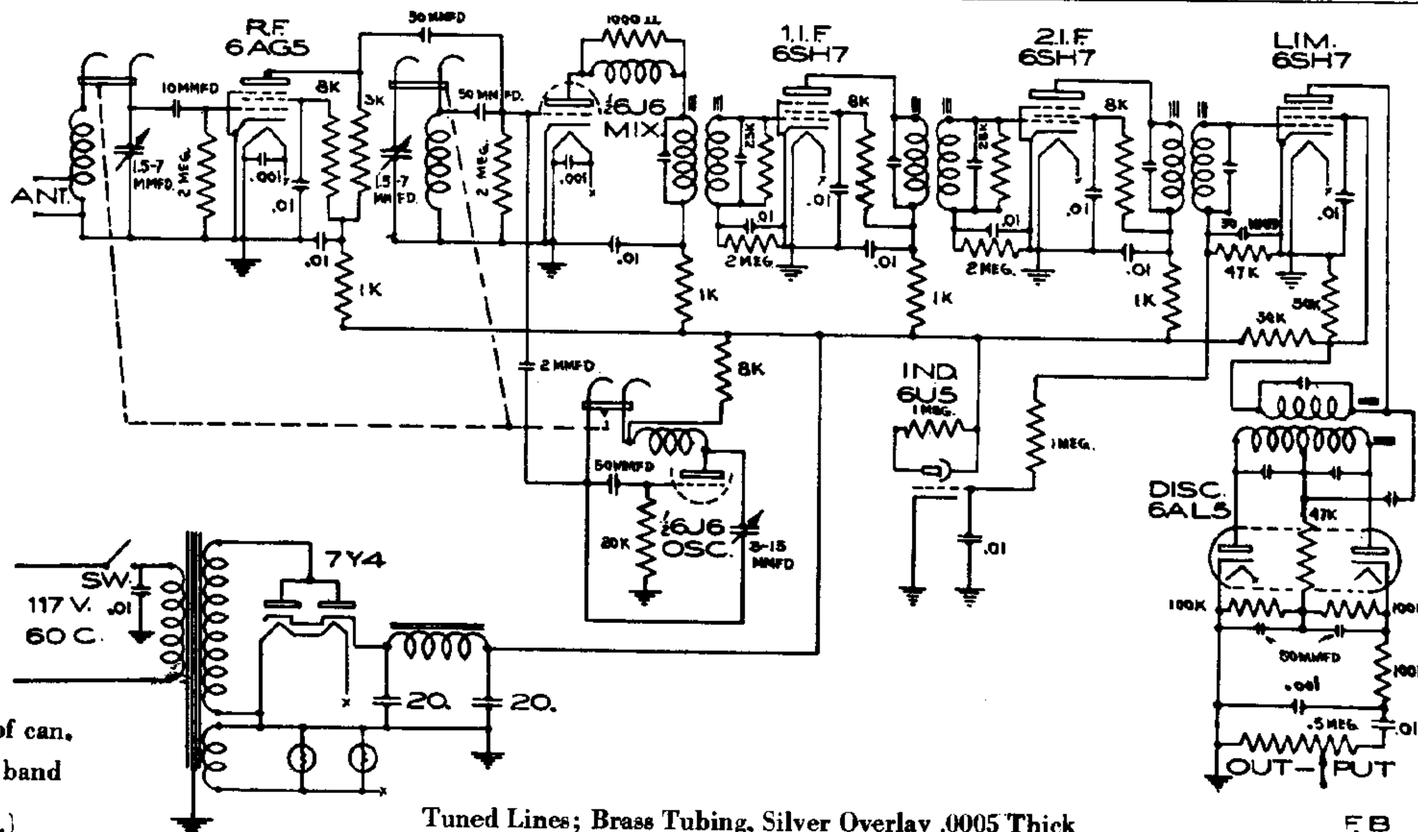


NOTE: FOR PHONO COMBINATION MODELS, SPEAKER IS REMOVED FROM CHASSIS & FILAMENT DROPPING RESISTOR IS LOCATED IN AREA WHERE SPEAKER IS SHOWN

SPEAKER CONNECTOR IS USED ON PHONO COMBINATION MODELS ONLY.



APPROVED ELECTRONIC INSTR. CORP.



Discriminator

L prim	4.03	uh.	Q —	95
L sec...	5.5	uh.	Q —	100
L o....	9.1	uh.		
L a....	9.2	uh.		
ΔL.....	1.	uh.		
M.....	.025	uh.		
K......	.005			

(All measurements made out of can. Iron all out at R.F. Overall band width at 95% Max. response.)

Tuned Lines; Brass Tubing, Silver Overlay .0005 Thick
Shorting Contacts; Phosphor Bronze, Contact Surface
Silver Overlay .0005

I. F. Transformers

L prim......	5.5	uh. at 10.7 mc	Q — 110
L sec........	4.03	uh. at 10.7 mc	Q — 100
L o..........	9.	uh.	
L a..........	9.15	uh.	
ΔL.........	.15	uh.	
M..........	.037	uh.	
K..........	.0079		

Tubes;

1-6AG5	R. F. Amplifier
1-6J6	Oscillator-Mixer
2-6SH7	IF Amplifiers
1-6SH7	Limiter
1-6AL5	Discriminator
1-6U5	Tuning Indicator
1-7Y4	Rectifier

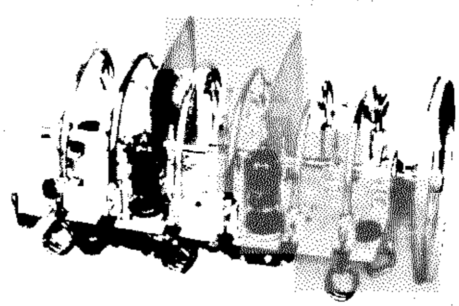
Power Supply (Built in): 117 V. 60 cycles.
Current Consumption; 35 Watts
Circuit; Superheterodyne
Tuning Range; 88-108 mc.
IF Frequency; 10.7 mc.
Sensitivity; 10uv/m
Bandwidth; 150kc.
Freq. Drift; Negligible after 5 Min.
Output Impedance; 500,000 Ohms
Output Volts; 2 Volts RMS. Average
Humlevel; — 70 db Below Average Output

A tuning indicator (6u5) has been incorporated and should be used as a rough station indicator. However when tuning for an FM station the final setting should be for minimum background noise regardless of the shadow angle indication of the 6U5.

R. F. Section

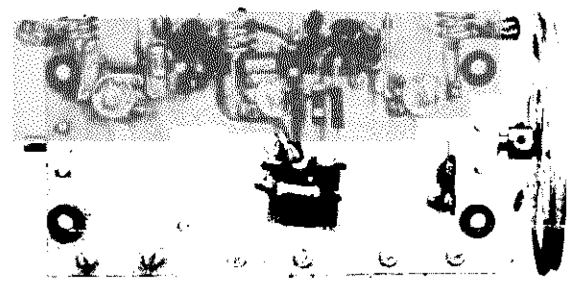
The superheterodyne circuit employed in this tuner follows the Armstrong method of reception. However the R.F. section comprising the R.F. stage, mixer and oscillator, deviate from the common type variable capacitor/inductance combinations by the complete absence of a variable condenser. Instead a new and novel form of R.F. front end has been developed.

The R.F. section of the tuner consists of three Hi-Q arcually shaped resonant lines terminating in small end inductances for a frequency coverage from 88-108 mc. with 180° rotation. Semifixed silver ceramics, temperature compensated, capacitors in circuit with the resonant lines and end inductances constitute the tuners total L/C.



TOP VIEW OF RF FRONTEND.

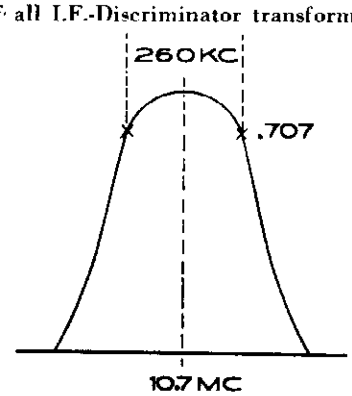
This combination allows for an exceptional Hi-Q circuit design with excellent frequency stability and sensitivity. The mechanical construction of the tuners R.F. section is such as to give complete freedom from microphonics often encountered with variable capacitors when used at high frequencies. The lines are constructed from 5/32 Od. brass tubing with a heavy silver overlay .0005 thick. The shorting contacts are formed from .007 thick flat stock phosphor bronze with a contact surface silver overlay of .0005 thickness. Silver overlay, although much more expensive than silver plating, was chosen for reasons of wearing qualities and contact surface. The shorting contacts are mounted upon lucite bars which are fastened to a common shaft to form a single control unit with the lucite bars centered between respective resonant lines and rotable over 180°. With the 4″ drive drum attached to the tuning shaft, a tuning ratio of 16:1 is obtained with a pointer travel of 6″ resulting in a large full view easy to read dial calibration. The whole front end is of unit design and rubber floated. Full use of the new miniature tubes is made by using a 6AG5 as an R.F. amplifier with a 6J6 dual triode serving as combination mixer-oscillator. The oscillator operates at a frequency 10.7 mc. lower than signal frequency.

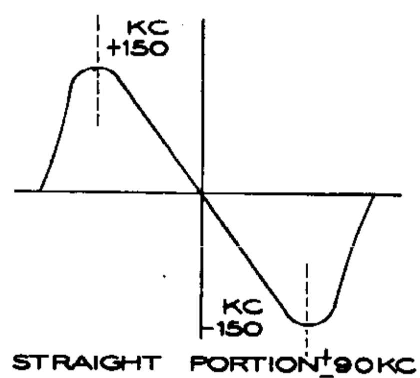


BOTTOM VIEW OF RF FRONTEND.

I. F. Section

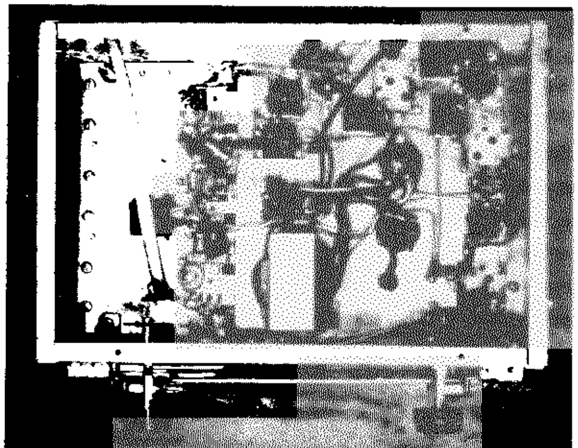
Following the mixer are two I.F. stages operating at a center frequency of 10.7 mc. into a single limiter stage which in turn feeds a standard discriminator. All I.F. transformers are constructed of high frequency ceramic throughout. Special iron cores are used that reach their peak "Q" value at 10.7 mc. The fixed ceramic capacitors are of the compensatory type. Wave shape tests have shown these transformers to possess excellent symmetry and stability. The discriminator transformer has been designed to provide extreme uniformity of wave shape with equal positive and negative peaks resulting in high voltage output with very good discrimination. A band width of 200kc. is the nominal value of all I.F.-Discriminator transformers.





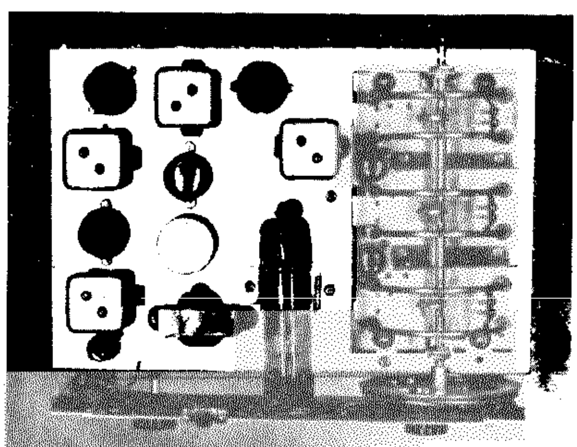
Carefully chosen L/C ratios with high "Q" maintained during production of these transformers result in high adjacent channel attenuation.

R. F. Frontend Alignment



BOTTOM VIEW OF TUNER.

To align the R.F. section of the Approved Tuner the following equipment is required. A signal generator with a frequency coverage of 88-108 mc. and preferably on fundamentals, a D.C. vacuum tube voltmeter with a low scale reading of about 3 volts or a D.C. meter having at least 20,000 ohms per volt impedance. The meter should be connected across the grid return resistor of the limiter stage. The output of the generator is then applied to the input of the tuner with the frequency set to 108 mc. and the tuner dial indicator set to read likewise 108 mc. The next step is to adjust the oscillators semifixed capacitor until the meter indicates maximum voltage. If the meter tends to read off scale, reduce the R.F. input voltage and hold the meter reading to about 2 volts average. The oscillator has been designed to operate at 10.7 mc. lower then signal frequency and proper setting of the oscillator frequency can be readily checked with a small absorption type



TOP VIEW OF TUNER.

wavemeter. At resonance, a large dip or increase i voltage reading will be noticed. The next adjustmen consists of tuning the antenna and mixer stages for maxi mum response. Like the oscillator, both stages are tunec by means of semifixed, silver ceramic capacitors.

The generator should now be set to 90 mc. and th dial indicator to the same frequency, and with noncon ducting rod adjust the oscillator inductance until th meter again reads maximum voltage. A small adjust ment of the oscillator inductance at 90 mc. may show up as a large frequency deviation at 108 mc. due to th inter-relationship of L to C. It may be necessary to re peat the alignment procedure several times before good tracking is finally obtained. With a perfectly aligned tuner, tracking error should never be more than 3 db

High Frequency Attenuator

High frequency pre-emphasis deliberately intro duced at the transmitter must be compensated for at the receiver if a linear audio response is to be expected. This de-emphasis network is connected across the dis criminator output and has a time constant of 100 u/sec. The voltage output of a discriminator does not depend upon the strength of a carrier but on the frequency swing caused by modulation and on the voltage/devia tion characteristic of the discriminator transformer Under average modulation conditions an R.M.S. vol tage of approx. 2 volts can be expected. Any audio am plifier of sufficient gain may be connected to the Ap proved FM Tuner.

Antenna

The input of the Approved Tuner has been de signed to accommodate an FM antenna with a 300 ohm downlead impedance. It must be remembered that the higher the antenna above ground the greater its effec tiveness. A simple folded di-pole antenna may be con structed from the new type 300 ohm line. For construc tion information see Fig. 5.

Audio Amplifier

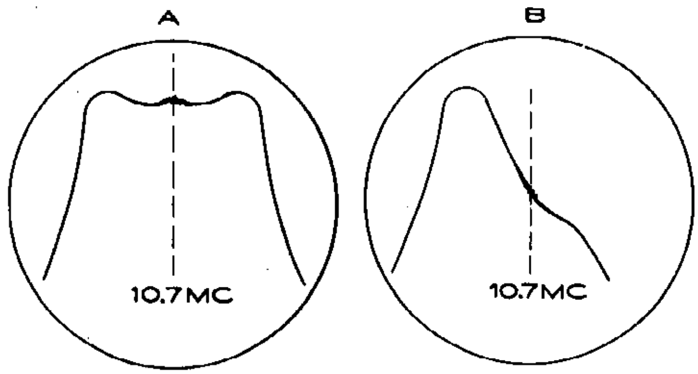
For full enjoyment of high quality reception pos sible, an amplifier having a flat response of 50-15,000 c.p.s. within 2 db. should be used with a correspond ingly good speaker.

No power connection need be made from the am plifier to the tuner. The only requirements are that a good ground connection be provided and a shielded lead from the tuner output to the amplifier input in order to avoid hum pickup. Hum level measured across the output of the tuner is — 70 db. below average rms output.

I. F. Alignment

The center frequency of the IF amplifier is 10.7 mc. Due to overcoupling of the IF transformers a bandwidth of about 150 kc. can be expected and is of the double humped variety. While it is possible to align the IF amplifier with an ordinary AM signal generator and meter, for maximum response, it does not follow that this method produces the correct alignment for proper bandpass characteristic. A much more efficient and time saving procedure of I.F. amplifier alignment is the visual method requiring a frequency modulated signal generator, an oscilloscope and for double check purposes a deviation meter to be connected across the discriminator output. The meter is a D.C. V.T.V,M, zero center and calibrated —3.—0— +3 volts. The frequency modulated signal generator must be capable of sweeping through a range of about 10.5 to 10.9 mc. in sawtooth fashion with a possible adjustment for contraction or expansion of the total sweep width and a simultaneously generated sweep voltage is necessary for horizontal deflection of the oscilloscope. A good AM signal generator with a wide spread around 10.7 mc. completes the total test instruments necessary for proper IF amplifier alignment. Using the visual method of IF alignment, the sweep voltage output of the frequency modulated signal generator must be connected to the horizontal deflection input of the oscilloscope. The controls of the scope should be adjusted that the trace covers almost the full width of the screen. Connect the vertical deflection input of the oscilloscope across the grid return resistor of the limiter stage and with the output of the frequency modulated signal generator applied to the grid of the second IF stage, adjust the generator to sweep from about 10.5 to 10.9 mc. Due to grid rectification action of the limiter stage, a signal corresponding to the amplitude response of the preceding circuits is then available, and by careful adjustment of the oscilloscope controls a picture of the response curve will be visible on the screen. Never apply more generator voltage than required to produce a good image on the screen.

In order to insure correct center frequency setting, it is now necessary to apply a marker frequency, conveniently obtained from the standard AM signal generator, unmodulated and applied in parallel with the sweep frequency generator. The output of the AM generator should be isolated by means of a small mica condenser and have sufficient R.F. voltage output to produce a small marker pip superimposed upon the response curve trace. With the AM generator set to exactly 10.7 mc. observe the position of the marker pip and if the pip falls in the center of the response curve, the alignment to follow consist of equalizing the peaks on either side of the marker pip by means of the iron core adjustment screws protruding from the top of the IF transformers. If the AM generator possesses a good frequency spread around 10.7 mc., the marker pip can be used to measure actual band width by slowly moving the AM generators frequency to either side of center frequency, noting where the pip begins to slide off the center of either hump, and adding both frequency differences from center frequency. This equals the total bandwidth.



CORRECT INCORRECT

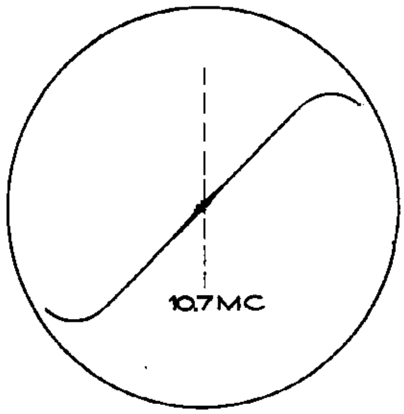
Greater amplitude of patterns indicate higher gain and therefor all adjustments made must be based not only upon symmetry but gain as well.

The generators, both AM and FM are now shifted to the grid of the preceding stage and the whole procedure as outlined repeated. It will be necessary to reduce the output of the generators due to the gain of the added stage. When this stage has been properly aligned, the signal generators are then shifted to the grid of the mixer tube (6J6), where the oscillator voltage is injected. The 6J6 tube is a dual triode and half of the tube is used as a mixer with the other half employed as an oscillator. During the alignment of the first IF transformer, the oscillator should be made inoperative by disconnecting the oscillators B + lead. The next step is to align the first IF transformers prim. and sec. The pattern appearing on the screen is then a picture of the overall response of the complete IF amplifier and should be symmetrical with the highest possible amplitude for maximum gain.

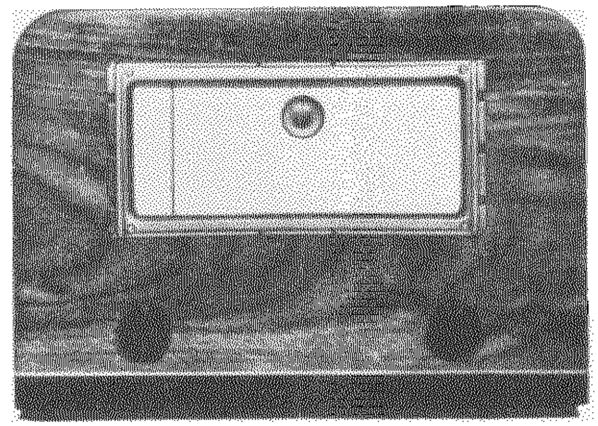
Discriminator Alignment

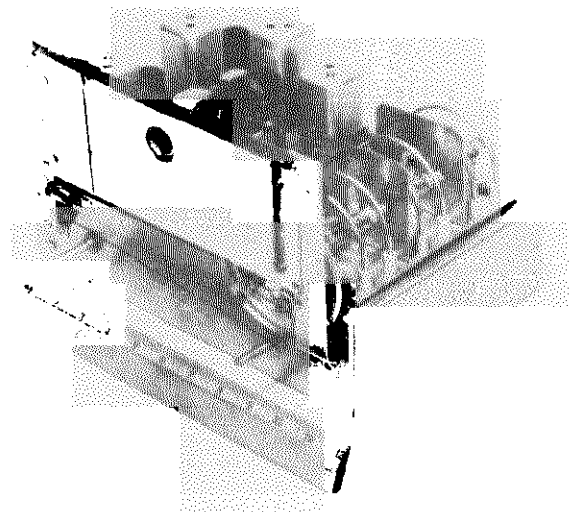
The alignment of the discriminator is comparatively easy. The output of the frequency modulated signal generator is applied to the grid of the limiter tube and the output of the AM generator is fed to the same point at 10.7 mc. The vertical input of the oscilloscope must be connected across the discriminator output with the ground side of the scope to the grounded side of the discriminator. The controls of the scope should be adjusted for the best image possible with a minimum of signal generator voltage applied to the grid of the limiter. Symmetry must be obtained around the 10.7 mc. marker pip with linearity above and below the marker pip point.

The adjustment of the primary of the discriminator transformer controls the linearity of the discriminator curve. If meter alignment is preferred, or no oscilloscope available, a simple D.C. vacuum tube voltmeter preferably one having a zero center scale and reading plus and minus 3 volts is connected across the discriminator output. A frequency of 10.7 mc. from an AM signal generator is fed to the grid of the limiter stage. The meter will probably read off center. The

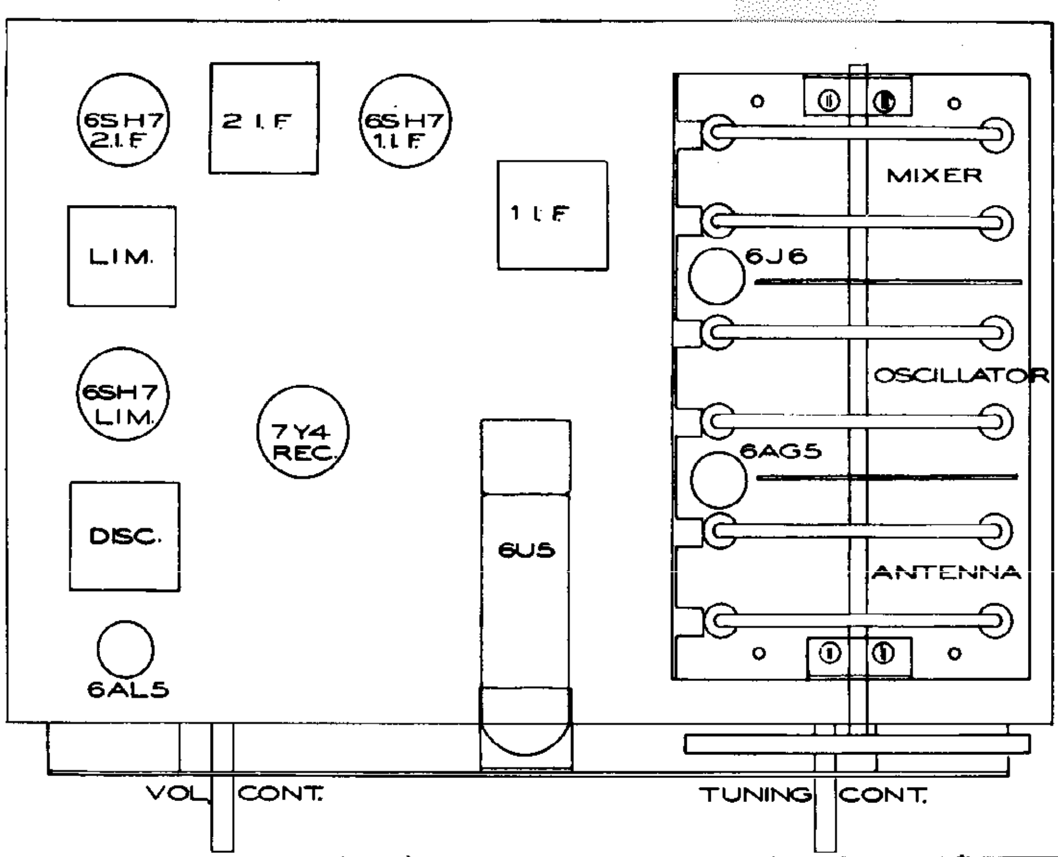


CORRECT DISCRIMINATOR ALIGNMENT PATTERN WITH 10.7 MC MARKER PIP



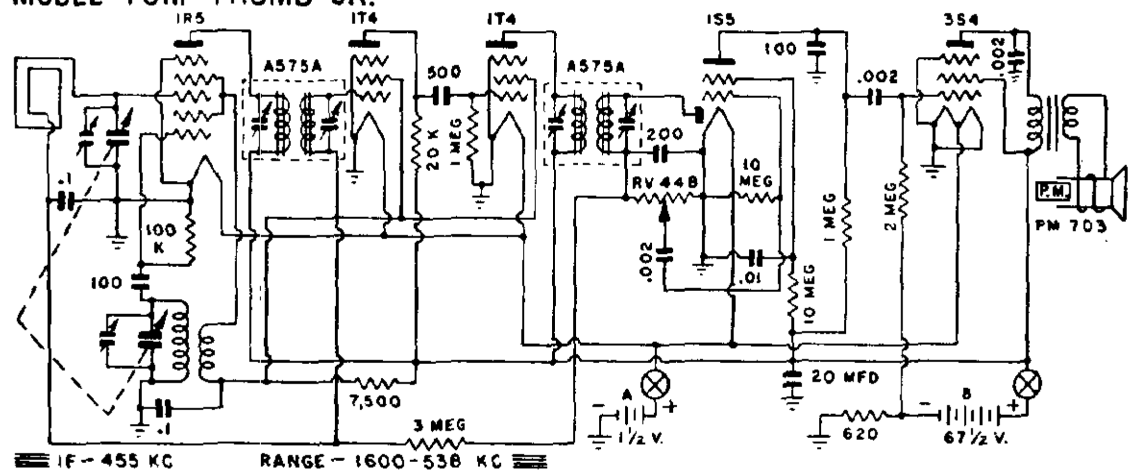


secondary of the discriminator must now be adjusted until the meter reads zero volts. Now change the generators frequency in equal steps above and below 10.7 mc. and note the voltage read on the meter. Readings should increase linearly on either side of the 10.7 mc. center frequency.

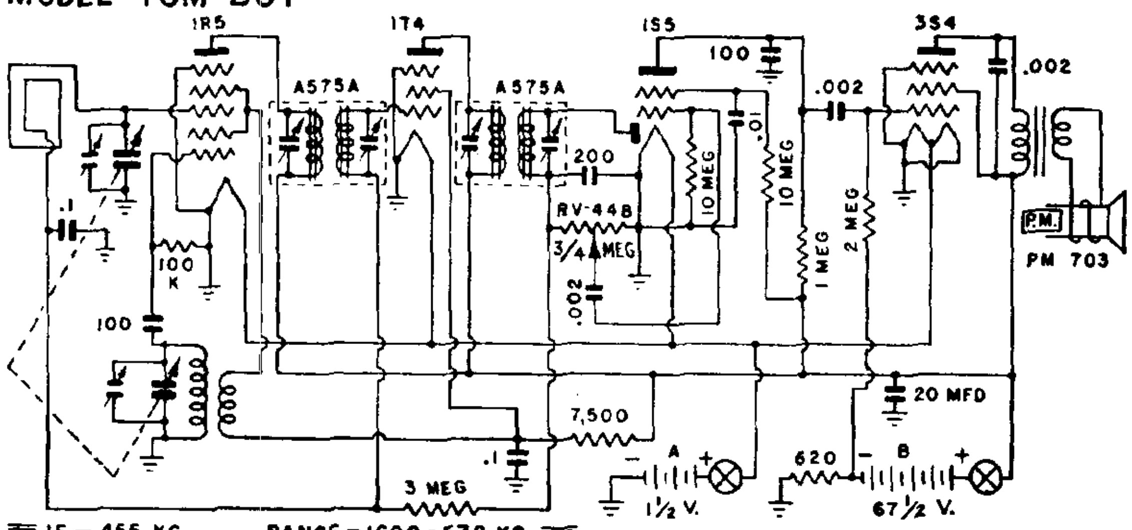


AUTOMATIC RADIO MFG. CO., INC.

MODEL TOM THUMB JR.



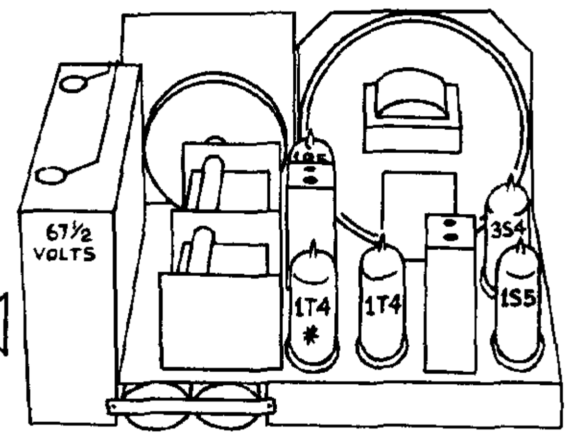
MODEL TOM BOY

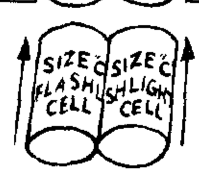


BATTERY INSTALLATION

"B" Battery

1. Remove screw on upper center of back.
2. Swing top of back away from cabinet by placing index finger in hole below screw and remove back by lifting in an upward direction.
3. Remove thumb nuts that secure battery contact strip located on the back left side of chassis.
4. Remove contact strip from threaded screws.
5. Snap socket connector on red battery lead over battery connection marked "+" (plus).
6. Insert stud connector on black battery lead into battery connection marked "—" (minus).
7. Slide "B" battery into cabinet in position shown in figure 1.



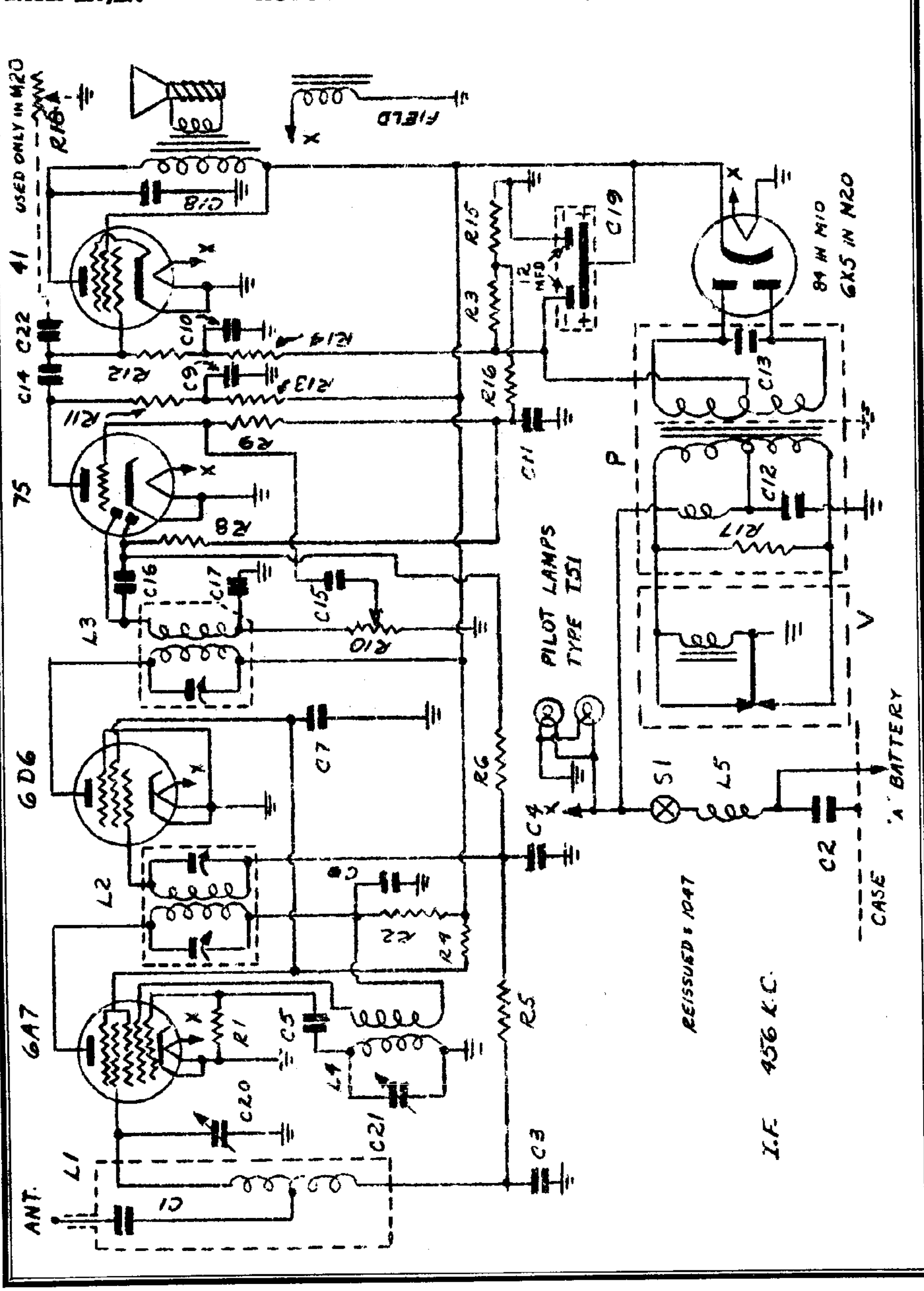


*NOTE: THIS 1T4 TUBE ON TOM THUMB JR. MODEL ONLY.

NOTE: THESE TWO 'C' CELLS MUST BE PLACED AS INDICATED BEFORE SLIDING INTO POSITION.

MODELS M10, M20

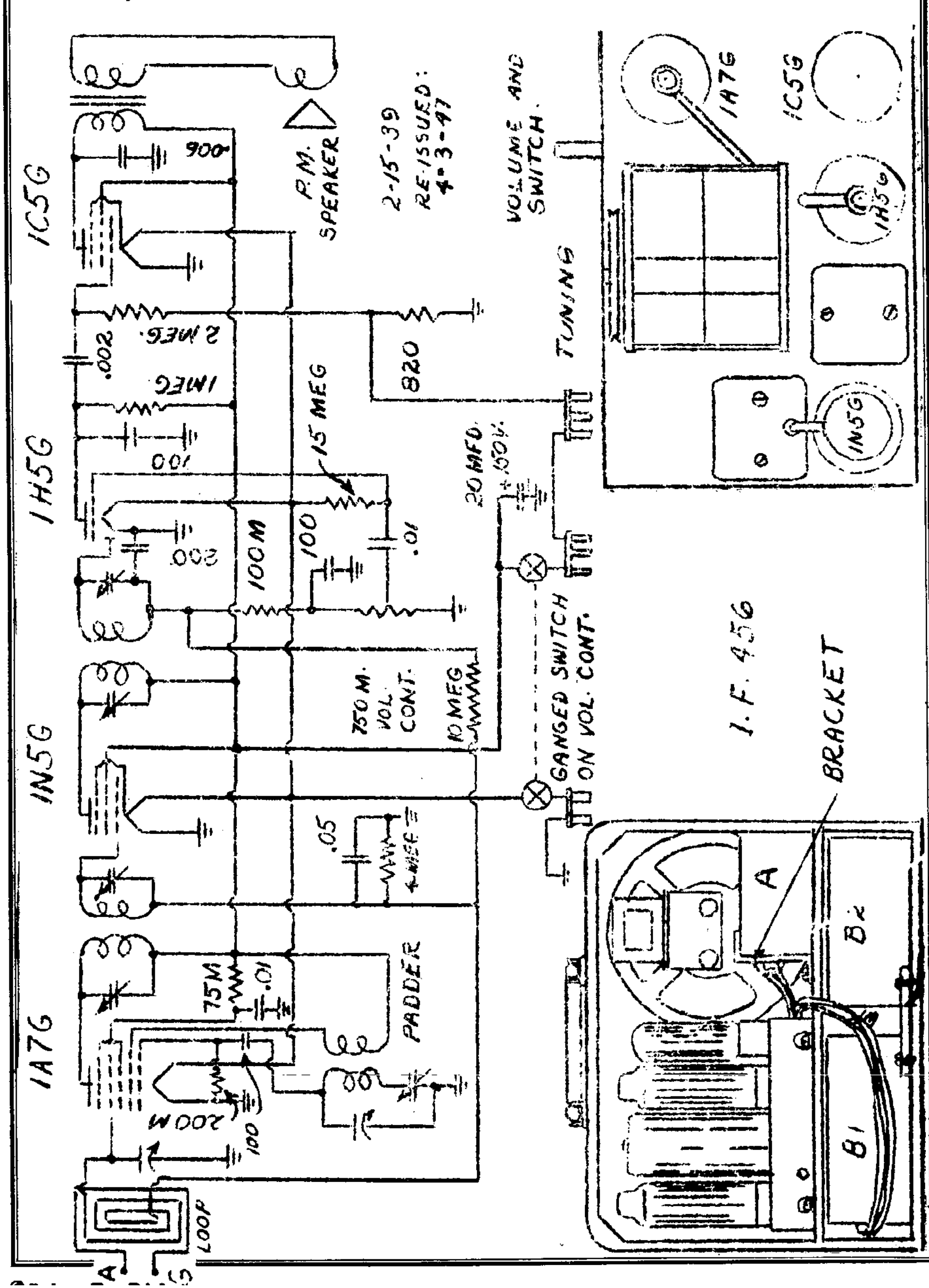
AUTOMATIC RADIO MFG. CO., INC.



AUTOMATIC RADIO MFG. CO., INC.

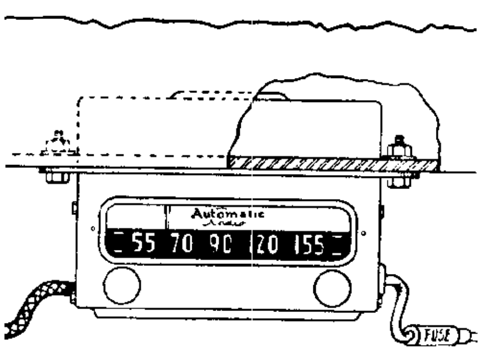
SCHEMATIC LOCATION	DESCRIPTION	PART NO.
L1	Antenna Coil	BA300
L2, L4	Composite I.F. Trans. and Osc.	LC200
L3	2nd I.F. Transformer	L300
L5	"A" R.F. Choke	RF100
----	Speaker	SD16
P	Power Transformer	P300
V	Vibrator	V200
S1	Line Switch (On Vol. Control)	----
C1, C2	Mica Condenser .0005mfd	----
C3, C4	Fixed " .05mfd--200v	----
C5, C16	Mica " 100mmfd	----
C6, C7, C9, C10, C11	Fixed " .1mfd--200v	----
C12	Fixed " .5mfd--200v	----
C13	Fixed " .007mfd--1200v	----
C14,C15	Fixed " .01mfd--400v	----
C17	Mica " 200mmfd	----
C18	Fixed " .005mfd--600v	----
C19	Electrolytic Condenser Block	CE30
C20,C21	Two Sect. Tuning Condenser	CV30
C22	Fixed Condenser .002mfd--600v	----
R1	Resistor 50,000 ohms--1/4 Watt	----
R2	" 250 ohms--1/4 Watt	----
R3	" 250 ohms--1/2 Watt	----
R4	" 25,000 ohms--1/4 Watt	----
R5	" 250,000 ohms--1/4 Watt	----
R6, R8, R9	" 1 megohm--1/4 Watt	----
R10	Volume Control--1/2 megohm	RV19
R11, R12	Resistor 1/2 megohm--1/4 Watt	----
R13, R14	" 1/4 megohm--1/4 Watt	----
R15	" 30 ohms--1/4 Watt	----
R16	" 100,000 ohms--1/4 Watt	----
R17	" 150 ohms--1/4 Watt	----
R18	Tone Control--1/2 megohm	RV30

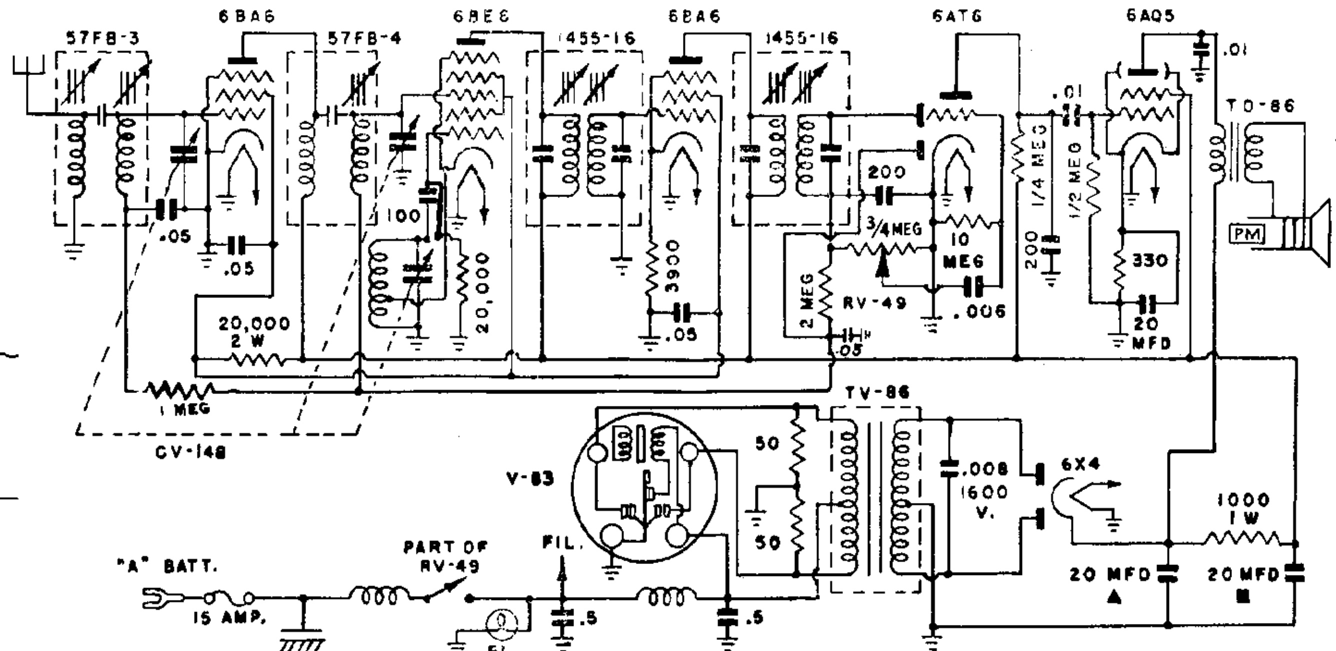
MODELS P43,P45 AUTOMATIC RADIO MFG. CO., INC.

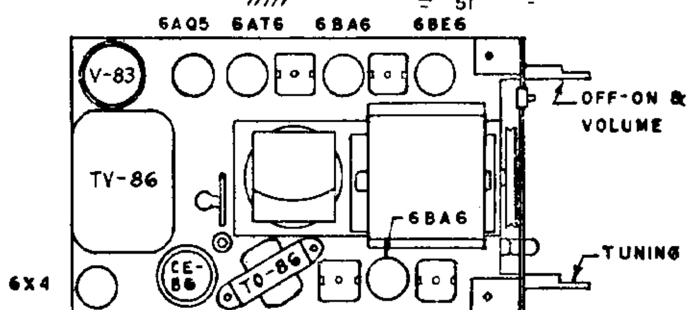


AUTOMATIC RADIO MFG. CO., INC.

RECEIVER MOUNTING DIAGRAM



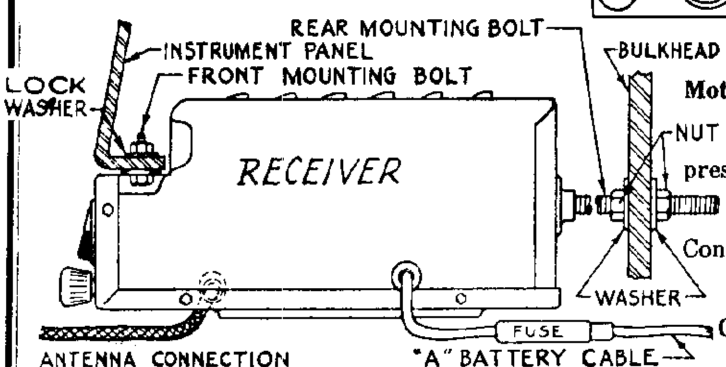




ELECTROLYTIC CONDENSER	CE-86
■ 20 MFD 350 VDC	
▲ 20 MFD 350 VDC	
20 MFD 25 VDC	
I.F. 455 KC	
RANGE 540 TO 1560 KC	

ISSUE 1047

Automatic Radio MODEL No. M-86



Motor Noise Elimination

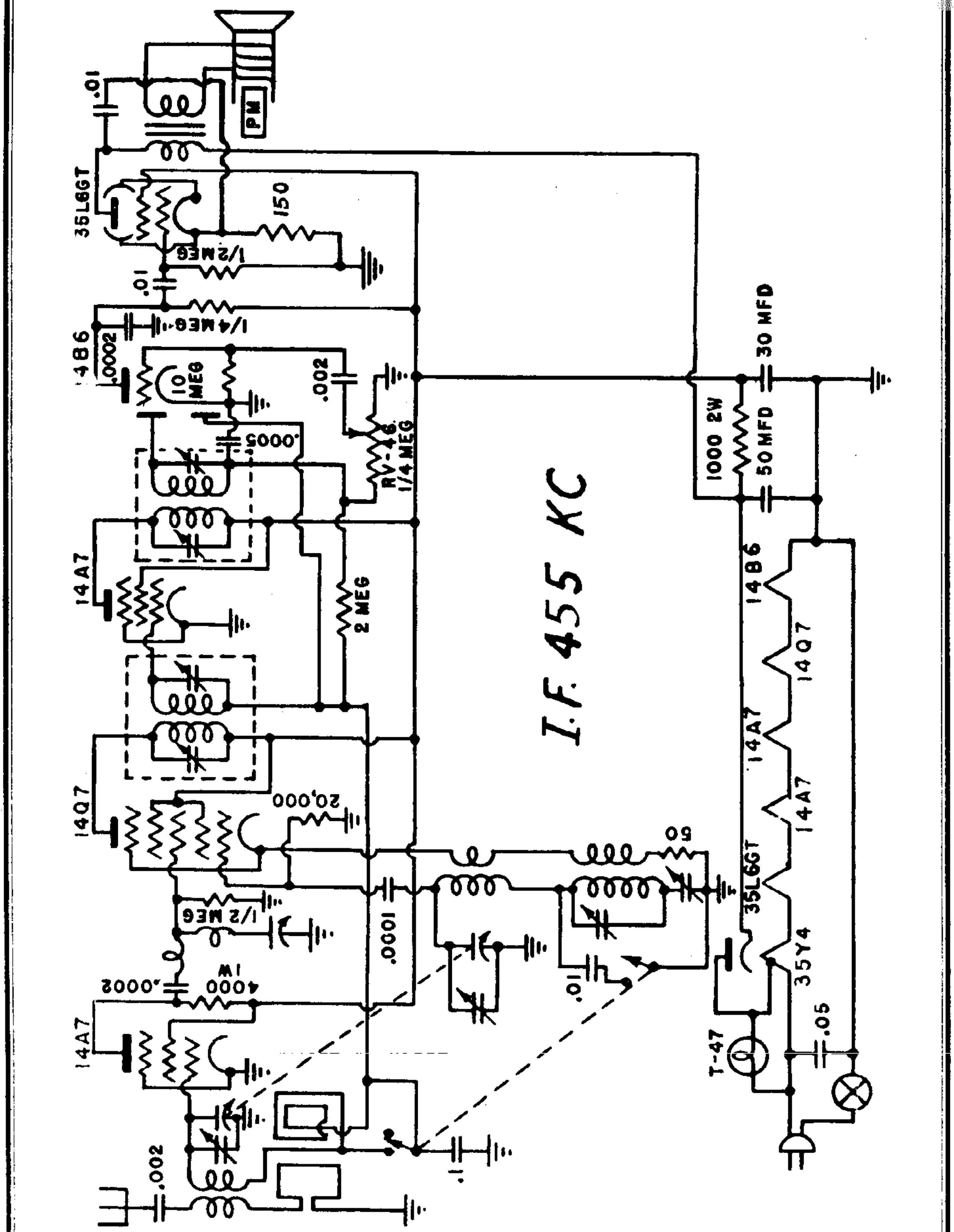
1. Disconnect the center lead in the distributor head of the motor and insert a "distributor suppressor" in the cavity and then place the lead in the top receptacle of the suppressor.

2. Clamp a "generator condenser" under the screw which mounts the cut-out on the generator. Connect the flexible terminal of the condenser to the lead on the cut-out.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

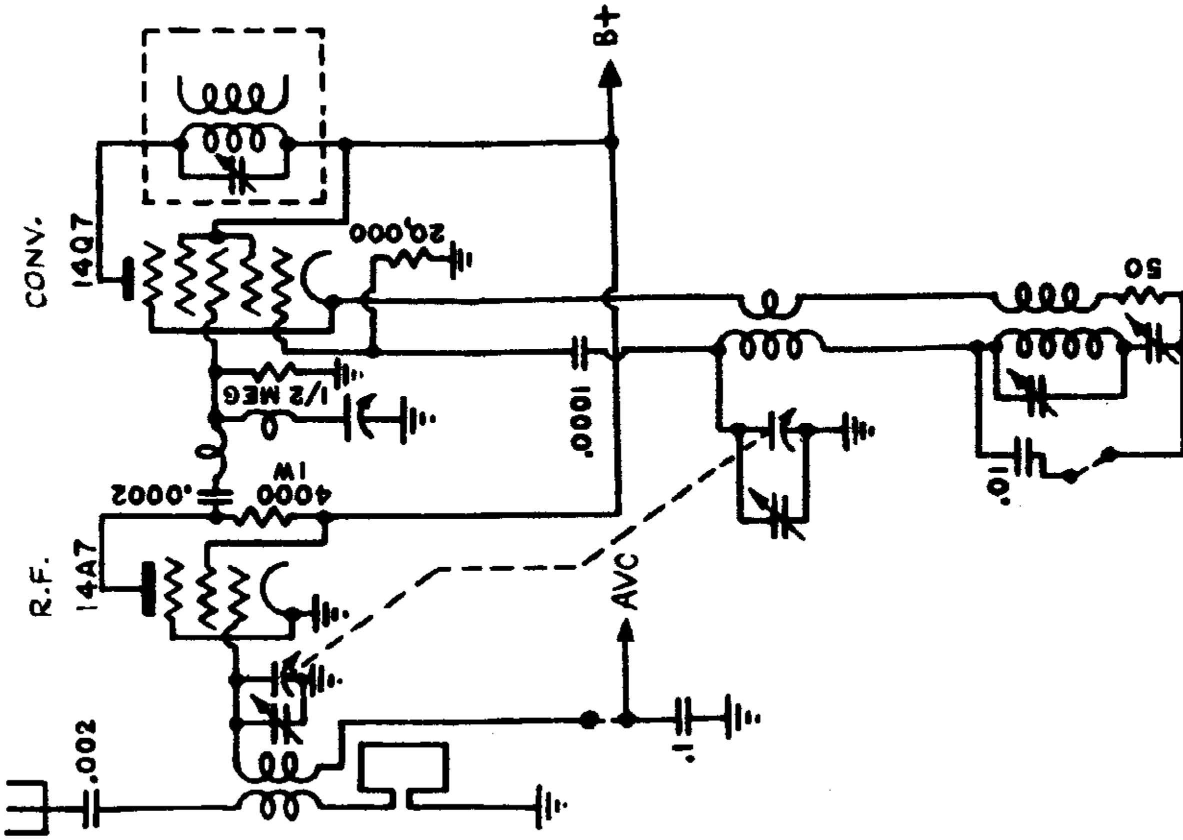
MODELS 660,662,66?
Series C

AUTOMATIC RADIO MFG. CO., INC.

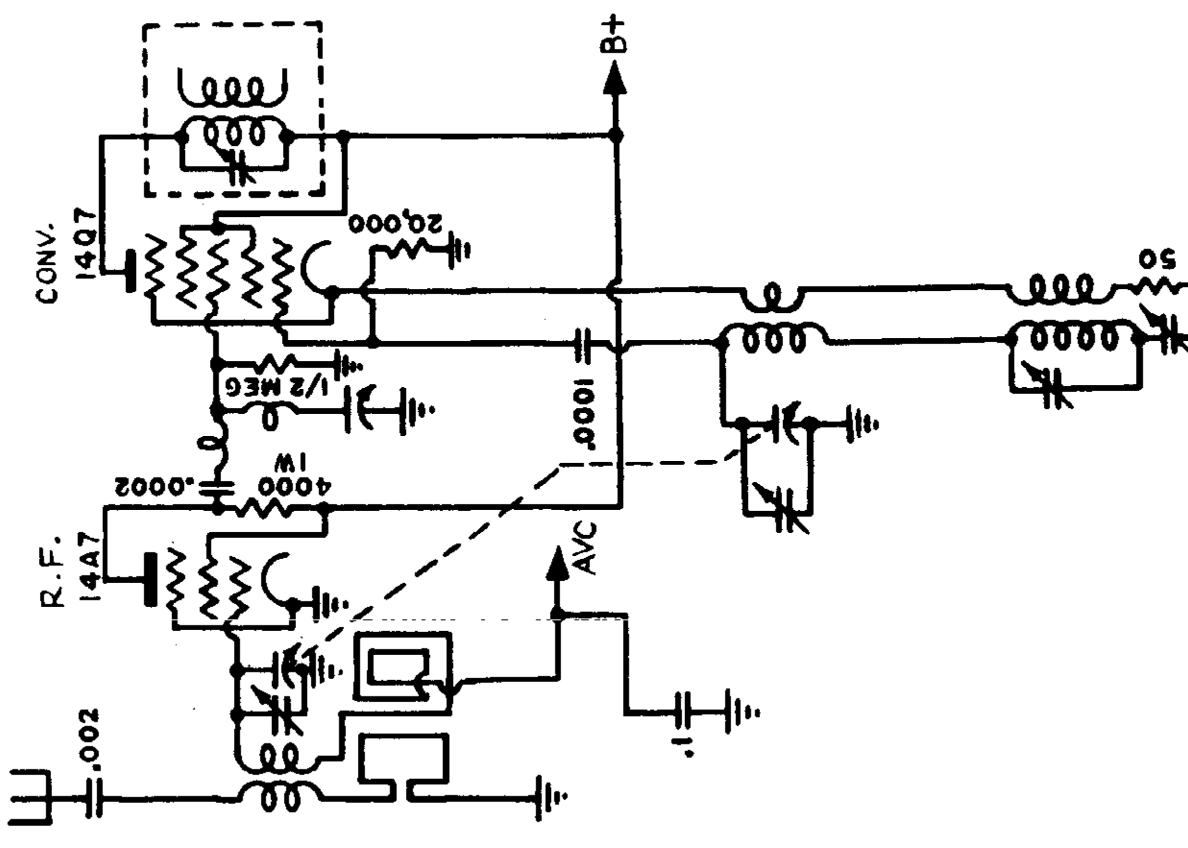


AUTOMATIC RADIO MFG. CO., INC.

MODELS 660,662,
666, Series C



BAND-SWITCH SHOWN
AT 2ND POSITION.
SHORT WAVE BAND



BAND-SWITCH SHOWN
OPEN AT 1ST POSITION.
BROADCAST BAND

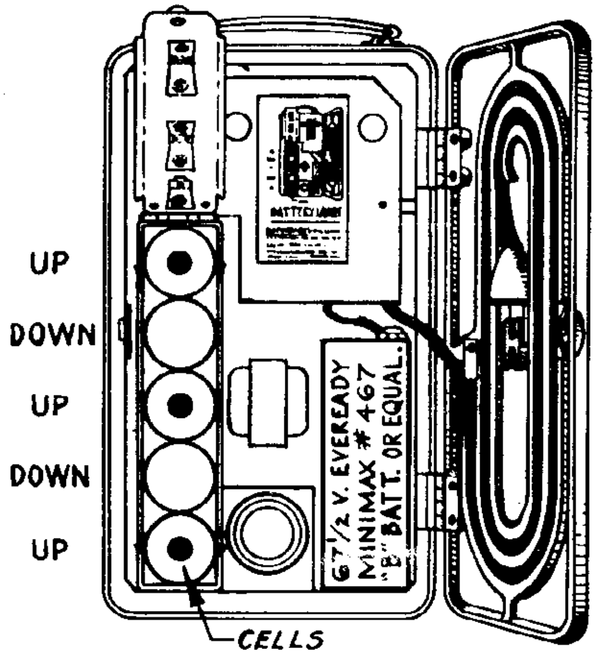
MODELS 660, 662, 666
Series C

AUTOMATIC RADIO MFG. CO., INC.

Alignment Procedure

Connect "jumper" connections from contact pin leads on chassis to contact connections on inside of case. Connect output meter across speaker voice coil. Set volume control at maximum position. Keep output of signal generator at a low value to prevent AVC of receiver from affecting accurate alignment. Connect .1 MFD condenser in series with high side of signal generator. Make all adjustments for maximum output meter indication.

SIGNAL GENERATOR FREQUENCY	SIGNAL GENERATOR CONNECTION	POSITION OF VARIABLE	ORDER OF ADJUSTMENT
455 KC	GRID OF IR5	FULLY OPEN	A1, A2, A3, A4
1600 KC	GRID OF IR5	FULLY OPEN	A5
1400 KC	RADIATE SIGNAL INTO CASE LOOP WITH 2 TURN CONNECTION.	ROTATE UNTIL SIGNAL FROM GENERATOR IS PICKED UP.	A6



BATTERY LAYOUT

IMPORTANT: 5 FLASHLIGHT CELLS SIZE "C". MUST BE INSERTED IN BATT. CASE AS SHOWN.

Battery Charging

The following procedure should be followed when a battery charge is required. (Refer to figure 3 for switch detail.)

1. Plug power line cord into AC or DC 115 Volt power line.
2. Slide "Off-On" switch to "On" position.
3. Slide 3-position Operation Selector Switch to AC-DC position. If radio operates, power outlet is working satisfactorily.
4. Slide 3-position Operation Selector Switch to charge position.

The batteries are now on charge.

Battery Installation Instructions

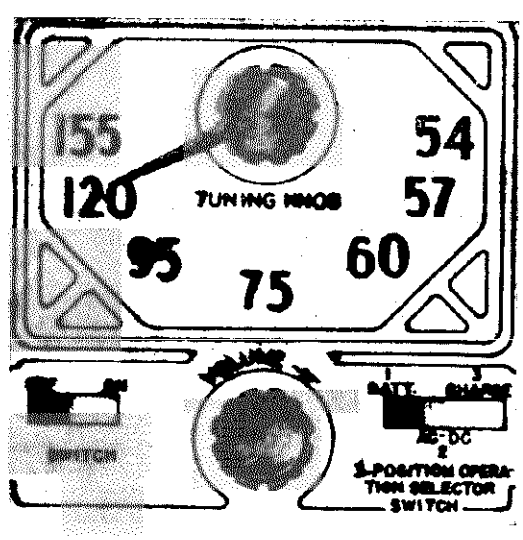
Place hand on back of radio with thumb in notch on left of back and swing back door open.

Flashlight Cell Installation

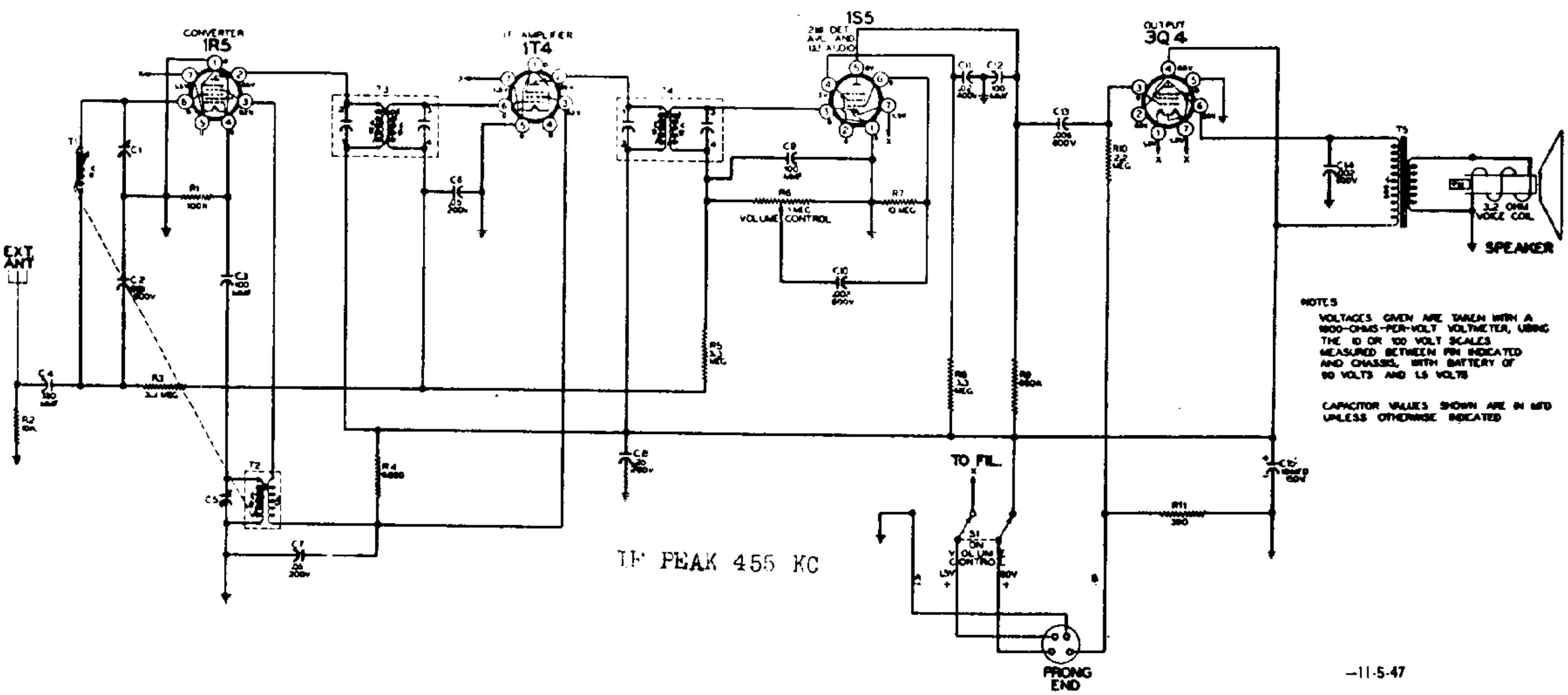
1. Turn latch, located on lower part of flashlight cell case, to the left until latch is disengaged from battery case.
2. Swing up top of battery case by lifting end containing latch.
3. Insert flashlight cells in order indicated in Figure 4.

"B" Battery Installation

1. Snap socket connector on red battery lead over connection on battery marked "+" (plus).
2. Insert stud connector on black battery lead into battery connection marked "—" (minus).
3. Slide battery into cabinet in position indicated in Figure 4.



BELMONT RADIO CORP.



ELECTRICAL SPECIFICATIONS

Power Supply .... "A" battery—1.5 volts, 250 ma.
"B" Battery — 90 volts, 14 ma.

Frequency Range .... 535 to 1625 kc.

Intermediate Freq. .... 455 kc.

Tuning .... Two permeability-tuned circuits.

Antenna .... External only. Also external ground.

Speaker .... 4-inch; P.M., voice coil impedance 3.2 ohms.

Power Output .... 155 milliwatts undistorted. 300 milliwatts maximum.

Sensitivity .... 28 microvolts average for 50-milliwatts output.

Selectivity .... 45 kc broad at 1000 times signal at 1000 kc.

Tube Complement .... 1R5, converter.
1T4, I. F. amplifier.
1S5, 2nd detector, 1st audio, AVC.
3Q4, power output.

MODEL 4B115
Series A

BELMONT RADIO CORP.

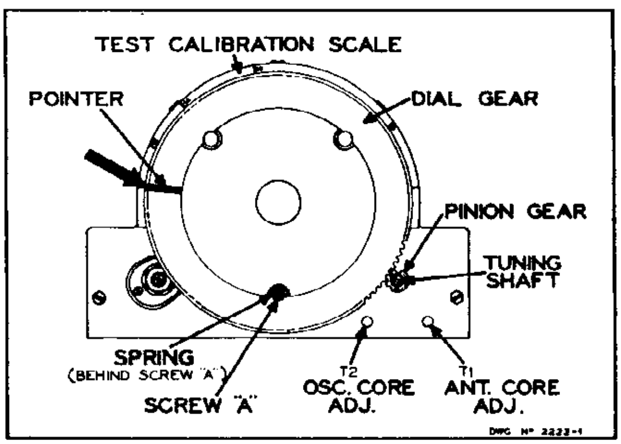
ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

The signal source must be an accurately calibrated signal generator capable of supplying R.F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurement.

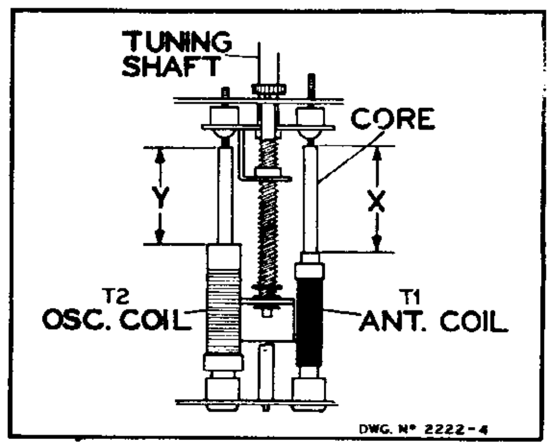
The table below lists the sensitivity at various points. All measurements are based on an output of 50-milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of .04 volts across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissable. Volume control at maximum for all adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50 MILLIWATTS OUTPUT
Frequency	*Coupling Capacitor*	*Connection to Radio*	*Ground Connection*			
455 kc	.1 mf.	1R5, Pin 7	Chassis	Iron cores all the way out	Cores in output and input I.F. cans	126 microvolts
1625 kc.	.1 mf.	1R5, Pin 7	Chassis	Iron cores all the way out	Oscillator trimmer C5	———
1625 kc.	200 mmf.	External antenna lead	Chassis	1625 kc.	Antenna trimmer C1*	28 microvolts
1400 kc.	200 mmf.	External antenna lead	Chassis	1400 kc.	Adjust position of ant. core (see coil illustration view)	28 microvolts
400 cycles	.1 mf.	1S5, Pin 6	Chassis	Volume control clockwise	———	.025 volts

*After the antenna coil has been tracked at 1400 kc, it is necessary to check the antenna trimmer C1 again at 1625 kc. If no appreciable change in trimmer adjustment is necessary, the coil is in track. If the trimmer requires considerable change, the position of the antenna core at 1400 kc must be readjusted. These two adjustments should be made several times, until no trimmer adjustment is required at 1625 kc.

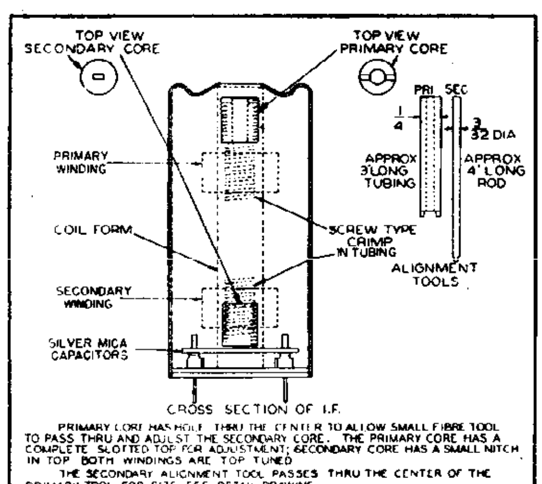


To adjust pointer travel or gear meshing, loosen screw "A". Dial ring can then be moved to disengage teeth.



With tuner tuned to 1625 kc., dimension "Y" should be approximately 1-9/32" and "X" 1-11/32".

CAUTION—The I.F. transformer construction is such that two resonance peaks occur for each winding, one peak when the slug is above its ~~coil and another peak~~ when the slug is below its coil. Be sure the upper cores are above the top coils and the lower cores are below the bottom coils (see coil drawing). →



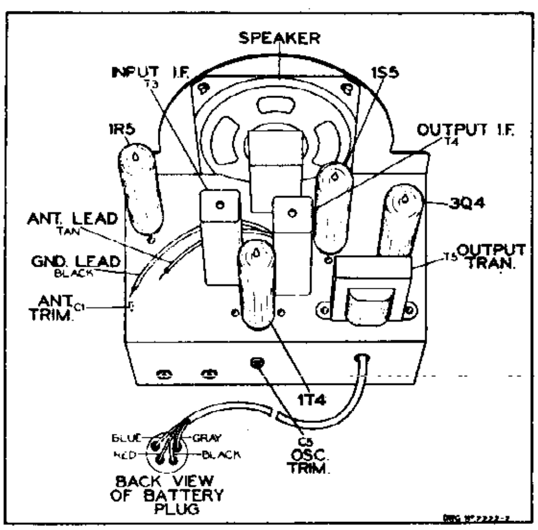
BELMONT RADIO CORP.

MODEL 4B1
SeriesA

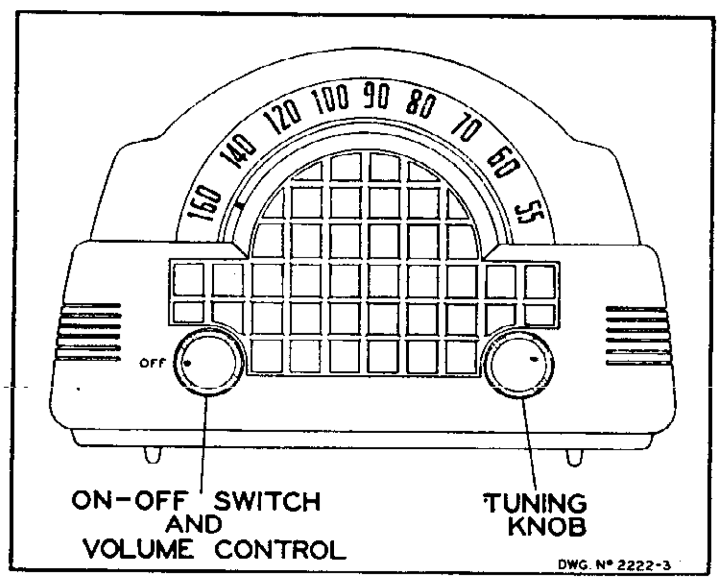
REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number, and series

Ref. No.	Part No.	Description	Qty. Used In Set	Selling Price Each
		CONDENSERS		
C10, C14	C-8D-10778	.002 mf x 600 volts	2	.25
C11	C-8D-10774	.02 mf x 400 volts	1	.25
C6, C7	C-8D-10770	.05 mf x 200 volts	2	.25
C2	C-8D-10787	.001 mf x 600 volts	1	.25
C8	C-8D-10775	.25 mf x 200 volts	1	.25
C13	C-8D-10785	.006 mf x 600 volts	1	.25
C15	A-8C-11495	10 mf x 150volts, electrolytic	1	1.40
C3, C9, C12	C-8F3-8	100 mmf, mica	3	.25
C4	C-8F3-119	330 mmf, mica	1	.25
C1, C5	A-2M-12618	Trimmer plate	2	.15
	A-6M-12616	Insulator for trimmer	1	.10
	36M-12616-S-3	Insulator, silvered	1	.15
	A-3C-12617	Spacer	2	—
		RESISTORS		
R6, S1	A-10A-13640	Volume control (1 megohm) and switch	1	1.50
R11	C-9B1-57	390 ohms, ½ watt, 10%	1	.25
R10	C-9B1-33	2.2 megohms, ½ watt, 20%	1	.25
R9	C-9B1-30	680K ohms, ½ watt, 20%	1	.25
R7	C-9B1-37	10 megohms, ½ watt, 20%	1	.25
R3, R5, R8	C-9B1-34	3.3 megohms, ½ watt, 20%	3	.25
R4	C-9B1-72	6800 ohms, ½ watt, 10%	1	.25
R1	C-9B1-25	100K ohms, ½ watt, 20%	1	.25
R2	C-9B1-74	10K ohms, ½ watt, 10%	1	.25
		COILS		
T2	A-13D-13647	Oscillator coil	1	1.00
T1	A-13E-13648	Antenna coil	1	1.00
	A-51A-12443	Iron core for osc. coil	1	.50
	A-51A-12655	Iron core for ant. coil	1	.50
	A-25A-13019	Core mounting grommet	2	.05
	A-3M-13020	Grommet insert	2	.05
	A-25A-13005	Grommet for osc. coil mounting	1	.03
	A-25A-13789	Grommet for ant. coil mounting	1	.03
T3, T4	B-13B-13643	I.F. transformer, 455 k.c.	2	1.80
		DIAL AND TUNING PARTS		
	A-23G-13753	Dial scale, decalcomania	1	.50
	B-5B-13654-37	Knob, walnut	1	.20
	B-5B-13806-37	Knob, walnut, with dot	1	.20
	A-3A-13478	Drive shaft	1	1.00
	A-3L-12388	Drive pinion	1	.50
	A-2C-12412	Dial ring gear	1	—
	A-2J-13522	Tension spring for dial	1	.10
		SPEAKER		
	B-18A-13652	P.M. speaker, 4-inch, less output transformer	1	4.00
T5	B-12C-13641	Output transformer for speaker	1	1.50
		MISCELLANEOUS		
	5C-11973-B-36	Cabinet, walnut	1	3.00
	A-15C-13174	7 prong, tube socket	4	.25
	B-14A-13653	Battery cable assembly	1	1.00

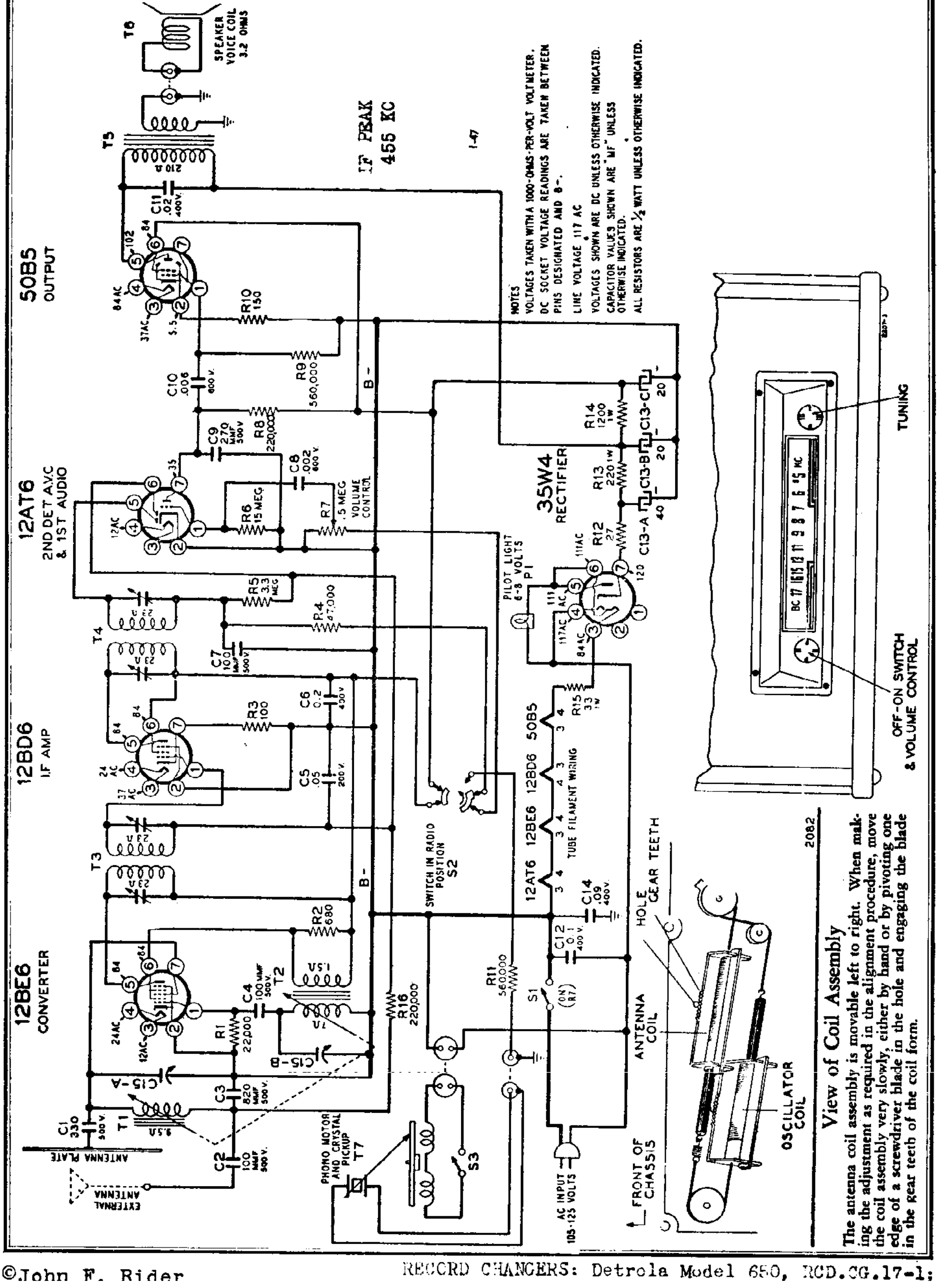


Chassis View



MODEL 5D110, Series A

BELMONT RADIO CORP.



NOTES
VOLTAGES TAKEN WITH A 1000-OHMS-PER-VOLT VOLTMETER.
DC SOCKET VOLTAGE READINGS ARE TAKEN BETWEEN PINS DESIGNATED AND B-.
LINE VOLTAGE 117 AC
VOLTAGES SHOWN ARE DC UNLESS OTHERWISE INDICATED.
CAPACITOR VALUES SHOWN ARE "MF" UNLESS OTHERWISE INDICATED.
ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE INDICATED.

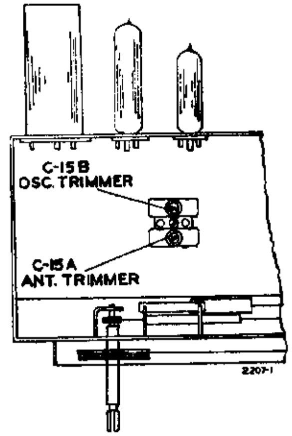
View of Coil Assembly

The antenna coil assembly is movable left to right. When making the adjustment as required in the alignment procedure, move the coil assembly very slowly, either by hand or by pivoting one edge of a screwdriver blade in the hole and engaging the blade in the rear teeth of the coil form.

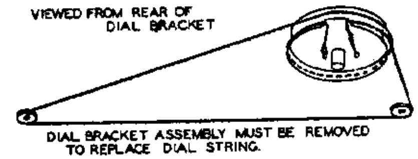
BELMONT RADIO CORP.

Ref. No.	Part No.	Description
		CAPACITORS
C13-A, C13-B, C13-C	A-8C-10077	Electrolytic, 40x20x20, 150 volts
C15-A, C15-B	A-8E-10723	Trimmer condenser, dual, antenna and oscillator
C14	C-8D-11251	.09 mf x 400 volts 10% tubular
C6	C-8D-10942	.2 mf x 400 volts 10% tubular
C5	C-8D-10770	.05 mf x 200 volts 20% tubular
C10	C-8D-10785	.006 mf x 600 volts 20% tubular
C8	C-8D-10789	.002 mf x 600 volts 20% tubular
C11	C-8D-10774	.02 mf x 400 volts 20% tubular
C12	C-8D-10760	.1 mf x 400 volts 10% tubular
C1	C-8E3-119	330 mmf x 500 volts 10% mica
C3	C-8E3-247	820 mmf x 500 volts 5% mica
C9	C-8E3-118	270 mmf x 500 volts 10% mica
C2,C4 C7	C-8E3-113	100 mmf x 500 volts 10% mica
		RESISTORS
R7 S1	A-10A-10720	Volume control (500M ohms) and switch
R15	C-9B2-44	33 ohms, 1 watt, 10%
R8	C-9B1-90	220k ohms, ½ watt, 10%
R13	C-9B2-54	220 ohms, 1 watt, 10%
R14	C-9B2-63	1200 ohms, 1 watt, 10%
R12	C-9B1-43	27 ohms, ½ watt, 10%
R4	C-9B1-82	47k ohms, ½ watt, 10%
R3	C-9B1-50	100 ohms, ½ watt, 10%
R5	C-9B1-34	3.3 megohms, ½ watt, 20%
R9 R11	C-9B1-95	560k ohms, ½ watt, 10%
R10	C-9B1-52	150 ohms, ½ watt, 10%
R6	C-9B1-302	15 megohms, ½ watt, 10%
R2	C-9B1-60	680 ohms, ½ watt, 10%
R1	C-9B1-78	22k ohms, ½ watt, 10%
		COILS AND TRANSFORMERS
T1 T2	C-211-10171	Tuner unit, permeability tuned, Ant. and Osc. coils
T3	B-13A-10728	Input I.F. transformer
T4	B-13B-10729	Output I.F. transformer
T5	B-12C-10074-1	Output speaker transformer
		DIAL AND TUNING PARTS
	A-6D-10163	Dial scale
	C-5C-10009-48	Escutcheon for dial
	A-5B-10170-1	Knobs for radio
	B-200-10980	Dial and bracket assembly
	A-55A-10093	Pilot light and bracket
P1	A-46A-10793	Pilot light bulb, 6-8 volt type
		MISCELLANEOUS
T6	B-18A-11089	4x6 oval P.M. speaker
	A-15C-10717	Tube socket
	A-2H-10718	Shield base
	A-2H-10974	Tube shield
	B-15B-10076	Mounting base for electrolytic
S2	A-20A-10722	Radio-phono switch
	A-19B-10727	Phono motor socket
	A-55A-7386-1	Phono input socket
	A-19B-11044	Speaker socket
	A-23A-10344	Line cord lock
	B-14M-11085	A.C. line cord and plug
	A-2E-12192	Needle cup
	B-2E-11038	Antenna plate
	A-5B-11239-1	Knob for radio-phono switch
	A-3A-12263	Extension shaft for radio-phono switch
	A-2M-11074	Spring clamp for shaft
	A-2C-10972	Indicator plate
		RECORD CHANGER
S3 T7	C-201-12545	Detrola record changer, 105-125 volts, AC, 60 cycles or
S3 T7	B-201-12262-1	Russel record changer, 105-125 volts AC, 60 cycles

Note: When ordering record changer parts, specify kind of changer. The Detrola changer has a belt drive and the Russell changer has a gear drive

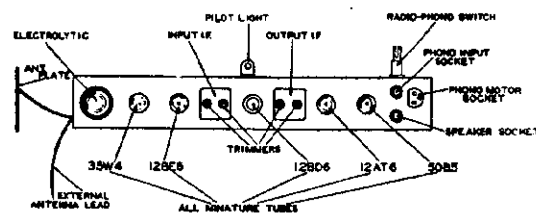


TRIMMER VIEW



DIAL STRINGING VIEW

DIAL LIGHT—If the dial lamp burns out the set should not be operated until a new lamp has been installed. Failure to heed this caution may result in a burned-out 35W4 tube. Use only a type T-47 lamp for replacement.



CHASSIS VIEW

ALIGNMENT PROCEDURE

(Refer to Chassis and Coil Views on Page 2)

- Output meter across 3.2-ohm output load.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Volume control at maximum for all adjustments.
- Connect ground post of signal generator to B− of radio.

SIGNAL GENERATOR			*TUNER SETTING*	*ADJUST FOR MAXIMUM OUTPUT (in order shown)*
Frequency	*Dummy Antenna*	*Connection to Radio*		
455 kc	.1 mf	Grid (pin 7) of 12BE6	Iron cores all the way out	Trimmers on output and input I.F. cans
1720 kc	.1 mf	Grid (pin 7) of 12BE6	Iron cores all the way out	Oscillator trimmer C-15B
1720 kc	200 mmf	Antenna lead	Iron cores all the way out	Antenna trimmer C-15A
1400 kc	200 mmf	Antenna lead	Turn dial to 1400 kc	Adjust position of antenna coil (see coil view)*

This adjustment and the previous adjustment are interlocking; therefore repeat the two adjustments alternately for best results.

ELECTRICAL SPECIFICATIONS

Power Supply..........105-125 volts, 60 cycle AC, 55 watts.

Frequency Range..........535-1720 kc.

Intermediate Freq..........455 kc.

Antenna..........Built-in plate; provisions also for external antenna connection.

Tuning..........Permeability.

Speaker..........4 x 6-inch, P.M., voice coil impedance 3.2 ohms.

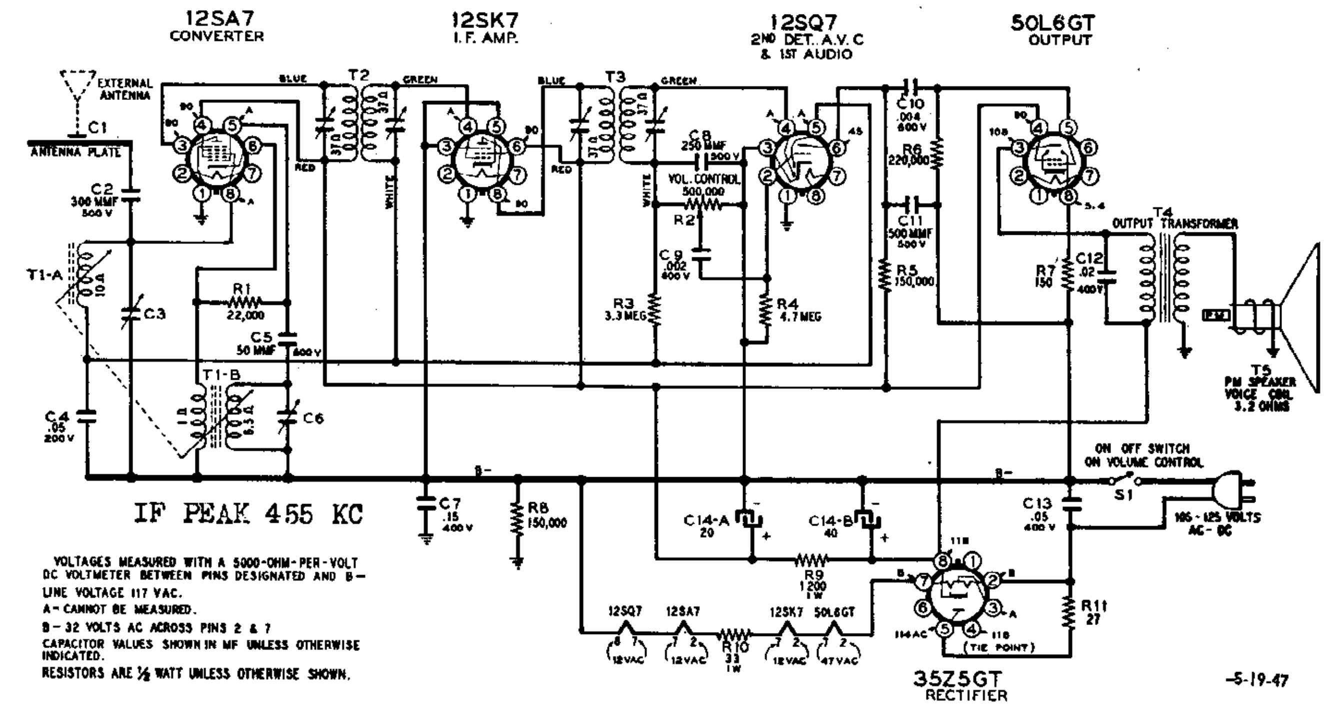
Power Output..........0.75 watt undistorted. 1.1 watts maximum.

Sensitivity..........34 microvolts average for 50-milliwatt output.

Selectivity..........55 kc broad at 1000 times signal at 1000 kc.

MODEL 5D118
Series A

BELMONT RADIO CORP.



Ref. No.	*Part No.*	*Description*	Qty. used in Set	Selling Price Each
C4	100-9	Capacitor, .05 mf, 200 volts, 25%	1	.25
C10	100-71	Capacitor, .004 mf, 600 volts, 25%	1	.25
C13	100-13	Capacitor, .05 mf, 400 volts, 25%	1	.25
C9	100-25	Capacitor, .002 mf, 600 volts, 25%	1	.25
C12	100-26	Capacitor, .02 mf, 400 volts, 25%	1	.25
C7	100-91	Capacitor, .15 mf, 400 volts, 25%	1	.25
R2 S1	101-272	Volume Control (500,000 ohms) & on-off switch	1	1.00
T4	105-139 or C-12C-11763-3	Output Transformer	1	1.50
	107-98E	Line Cord & Plug	1	.50
T2	108-157-H	Input I.F. coil complete in can. Range of trimmers: 39-73 mmf. each	1	1.25
T3	108-157-O	Output I.F. coil complete in can. Range of trimmers: 39-73 mmf. each	1	1.25
	112-1006	Dial Pointer	1	.15
	112-1008	Crystal for dial	1	.15
	112-1010C	Dial Scale	1	.65
T5	114-268	Speaker, 4" P.M.	1	3.00
C1	115-779	Antenna Plate, walnut color	1	.15
C14A C14B	119-92	Electrolytic capacitor; 40 mf x 150 volts; 20mf x 150 volts; for 60 cycles	1	1.50
	120-9	Cord for dial pointer drive		.15yd.
	120-184	Spring for dial pointer drive cord	1	.05
	121-171	Tube socket, octal, laminated	5	.15
	121-216	Socket for electrolytic capacitor	1	.10
C3—C6	124-137	Dual trimmer; 74-136 mmf (antenna) 95-175 mmf (oscillator)	1	.45

Ref. No.	*Part No.*	*Description*	Qty. used in Set	Selling Price Each
	128-523-17	Knob, walnut	2	.10
	128-657-9	Cabinet, bakelite, ivory	1	3.00
	128-736B	Grille cloth for ivory cabinet	1	.10
C11	129-2	Capacitor, 500 mmf, 20%, mica	1	.25
C8	129-12	Capacitor, 250 mmf, 20%, mica	1	.25
C5	129-39	Capacitor, 50 mmf, 20%, mica	1	.25
C2	129-114	Capacitor, 300 mmf, 20%, mica	1	.25
	131-43	Snap-in rivets for fastening crystal	2	.01
	131-193	Snap-in rivets for fastening antenna plate	2	.01
	131-356	Tee-pins for fastening antenna plate	2	.01
T1-A, T1-B	136-18	Permeability tuning unit complete, including antenna and oscillator coils	1	4.25
	A-2H-10715	Tube shield, for metal-base 12SA7GT	1	.15
	A-2H-11271	Tube shield, for bakelite-base 12SA7GT	1	.15
R5 R8	C-9B1-26	Resistor, 150,000 ohms, ½ watt, 20%	2	.25
R6	C-9B1-27	Resistor, 220,000 ohms, ½ watt, 20%	1	.25
R3	C-9B1-34	Resistor, 3.3 megohms, ½ watt, 20%	1	.25
R4	C-9B1-35	Resistor, 4.7 megohms, ½ watt, 20%	1	.25
R11	C-9B1-43	Resistor, 27 ohms, ½ watt, 10%	1	.25
R7	C-9B1-52	Resistor, 150 ohms, ½ watt, 10%	1	.25
R1	C-9B1-78	Resistor, 22,000 ohms, ½ watt, 10%	1	.25
R10	C-9B2-4	Resistor, 33 ohms, 1 watt, 10%	1	.25
R9	C-9B2-63	Resistor, 1200 ohms, 1 watt, 10%	1	.25

BELMONT RADIO CORP.

ALIGNMENT PROCEDURE

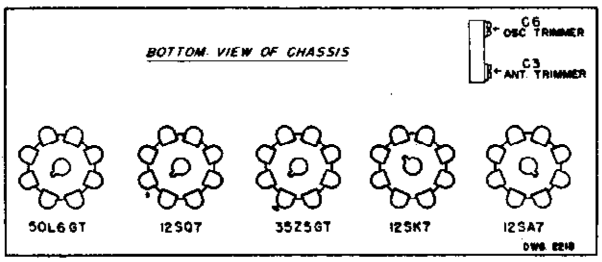
Volume control—Maximum all adjustments.

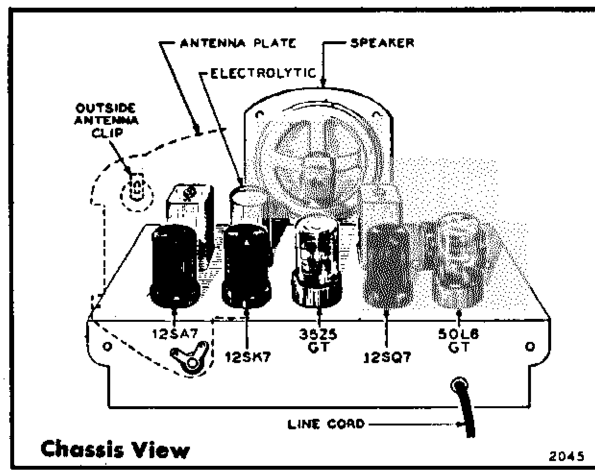
Connect B—of radio chassis (12SQ7-Pin 3) to ground post of signal generator through .1 Mfd. condenser.

SIGNAL GENERATOR			*POSITION OF IRON CORES (Dial Setting)*	*ADJUST TRIMMERS TO MAXIMUM (in order shown)*
Frequency Setting	*Dummy Antenna*	*Connection to Radio*		
455 Kc.	.1 MFD.	Connect to Metal Antenna Backplate	Iron Cores All the way out	Trimmers on output and input I. F. cans
1720 Kc.	.1 MFD.	Connect to Metal Antenna Backplate	Iron Cores All the way out	Osc. Trimmer (C6) (See voltage chart)
1720 Kc.	200 MMF.	Connect to Outside Antenna Clip	Iron Cores All the way out	Ant. Trimmer (C3) (See voltage chart)
1400 Kc.	200 MMF.	Connect to Outside Antenna Clip	Turn Dial to 1400 Kc.	Adjust position of antenna coil (See coil assembly view)
1720 Kc.	200 MMF.	Connect to Outside Antenna Clip	Turn Dial to 1720 Kc.	Adjust trimmer (C3) (See voltage chart)

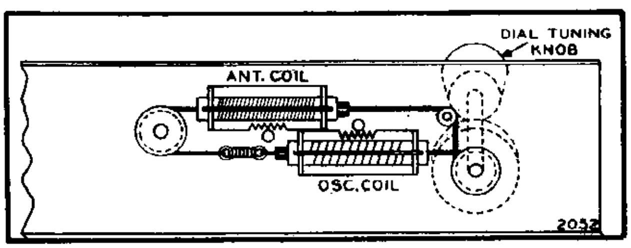
NOTE "A"—The antenna coil assembly is made so that it is movable. When making the adjustment as given in the alignment procedure move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

NOTE "B"—After the antenna coil has been tracked at 1400 Kc. it is necessary to check the antenna trimmer (C3) adjustment again at 1720 Kc. If no appreciable change in trimmer adjustment is made the coil is in track. If the trimmer requires considerable change it will be necessary to again adjust the position of the antenna coil at 1400 Kc. These two adjustments should be tried several times until no change of trimmer adjustment is required at 1720 Kc.

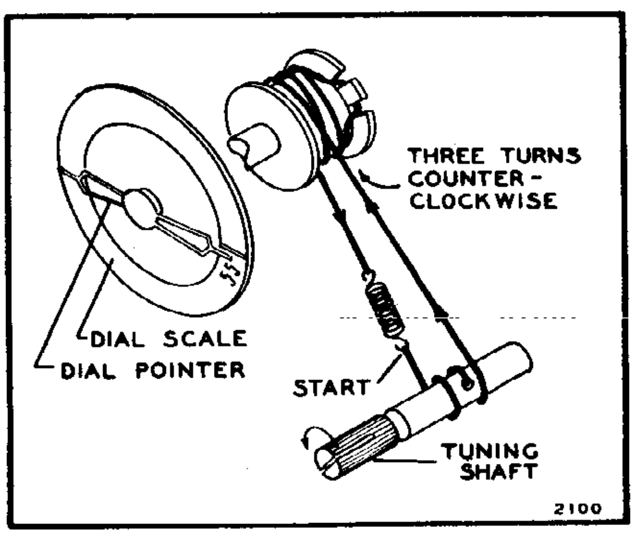




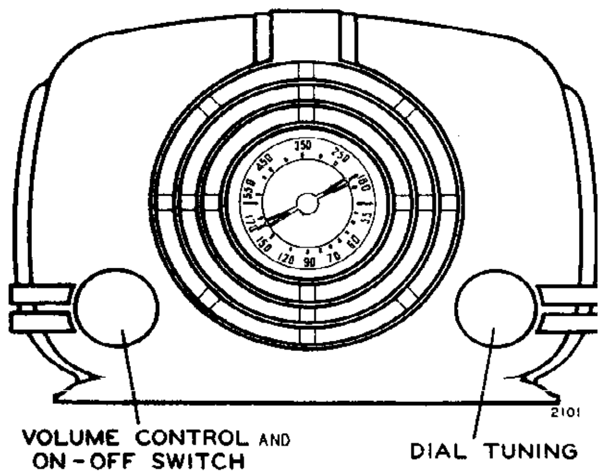
Chassis View



Coil Assembly View



Dial Stringing View

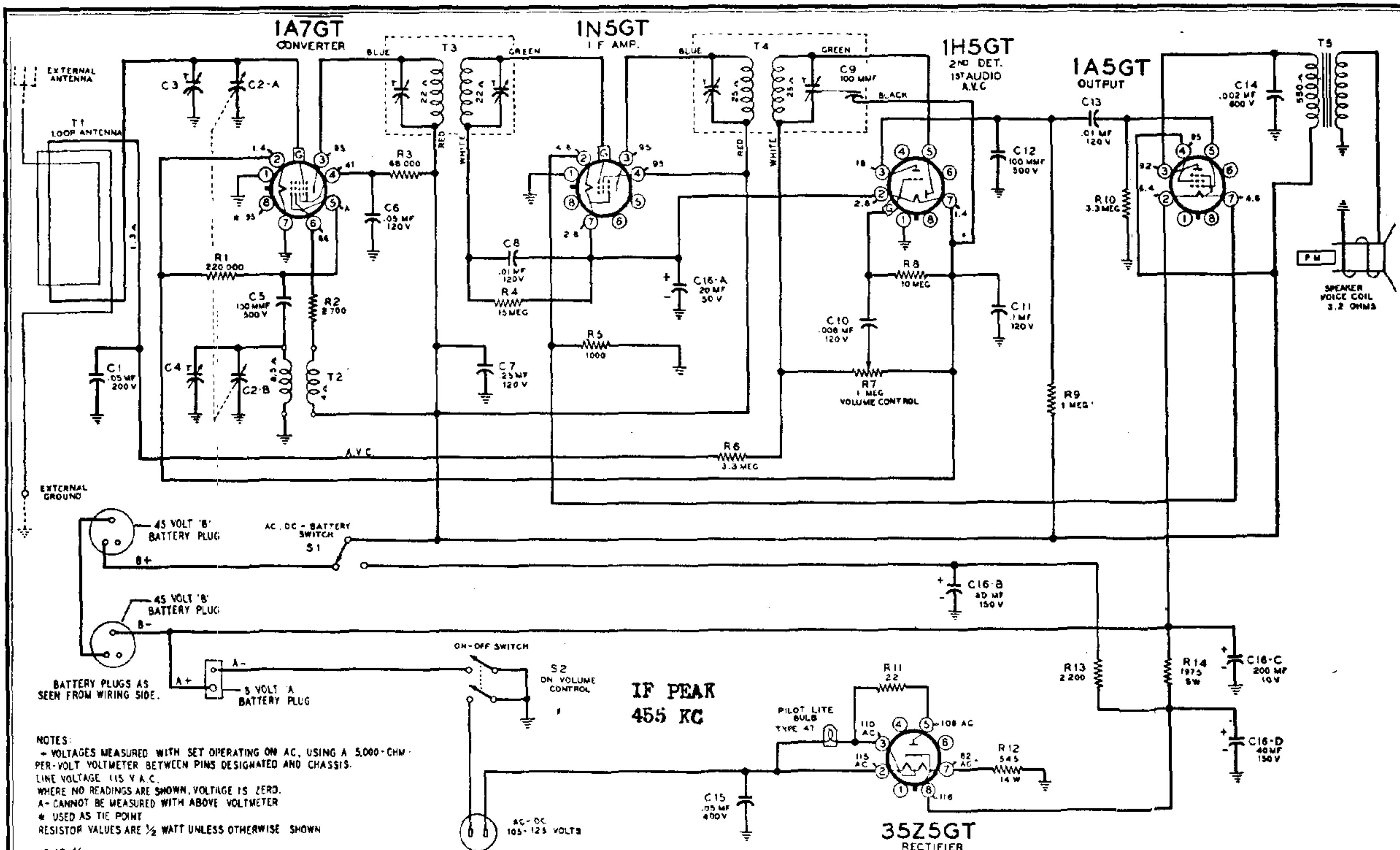


IMPORTANT NOTE ON TUBE REPLACEMENT

Replace a defective metal 12SK7 tube with another metal tube. Replace a glass 12SK7 tube with a metal tube or with an exact duplicate of the tube now in the set.

MODEL 5P19, Series A

BELMONT RADIO CORP.



NOTES:
∗ VOLTAGES MEASURED WITH SET OPERATING ON AC, USING A 5,000-OHM-PER-VOLT VOLTMETER BETWEEN PINS DESIGNATED AND CHASSIS.
LINE VOLTAGE 115 V.A.C.
WHERE NO READINGS ARE SHOWN, VOLTAGE IS ZERO.
A- CANNOT BE MEASURED WITH ABOVE VOLTMETER
USED AS TIE POINT
RESISTOR VALUES ARE ½ WATT UNLESS OTHERWISE SHOWN

9-13-46

Power Supply .... 105 to 125 volts, DC or 50-60 cycle AC, 30 watts.
Battery: A—6 volts, 58 ma.
B—90 volts, 9 ma.

Frequency Range .... 530 to 1650 kc.

Intermediate Freq. .... 455 kc.

Tuning .... Two-gang capacitor.

Antenna .... Built-in loop. Provisions also for external antenna and ground.

Speaker .... 5-inch; P.M.; voice coil impedance 3.2 ohms.

Power Output .... 80 milliwatts undistorted.
180 milliwatts maximum.

Sensitivity .... 30 microvolts average for 50-milliwatt output.

Selectivity .... 43 kc broad at 1000 times signal at 1000 kc.

PILOT LIGHT — If the pilot lamp burns out, the set should not be operated on AC or DC power until a new lamp has been installed. Failure to heed this caution may result in a burned-out 35Z5GT tube.

BELMONT RADIO CORP. MODEL 5P19, Series

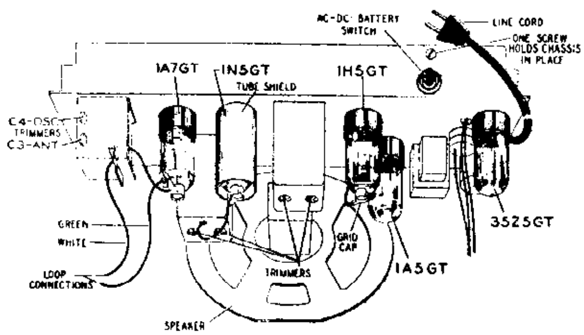
ALIGNMENT PROCEDURE

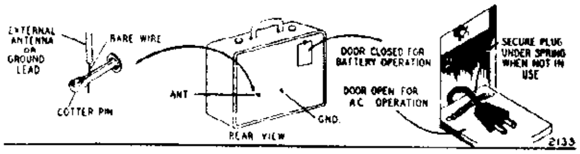
- Output meter across 3.2-ohm output load.
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

SIGNAL GENERATOR				TUNER SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	*Coupling Capacitor*	*Connection to Radio*	*Ground Connection*		
455 kc	.1 mf	1A7GT grid cap*	Chassis	Rotor full open (plates out of mesh)	Input and output trimmers on IF cans
1650 kc	.1 mf	1A7GT grid cap*	Chassis	Rotor full open (plates out of mesh)	Oscillator trimmer C4
1400 kc†	200 mmf	External antenna clip	External ground clip	1400 kc	Antenna trimmer C3

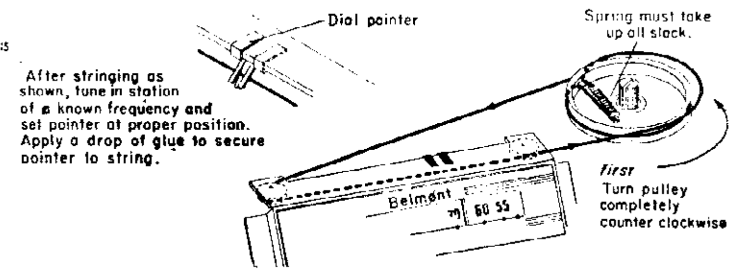
* If loop is not connected when making this adjustment, substitute a 1-megohm resistor across the loop leads.

† For this adjustment chassis should be remounted in cabinet and loop connected. Antenna trimmer can be reached through a hole in the side of the cabinet.

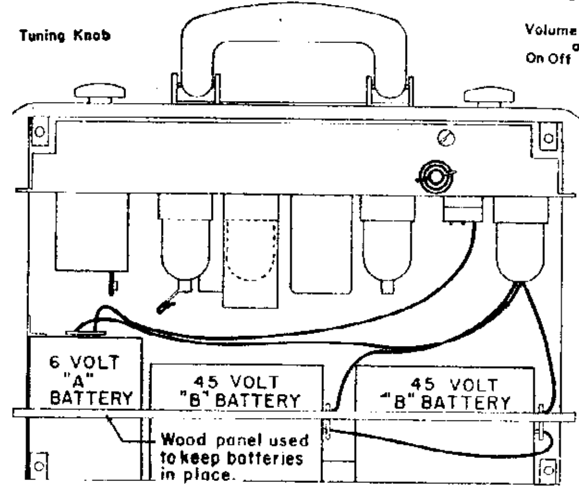




Chassis View, Showing Tube Location



Replacement of Dial Pointer Drive Cord



CAPACITORS

C1	1009	.05 mf, 200 volts, 25%
C2-A, C2-B, C3, C4	B-8A-10246	Two-gang, including antenna and oscillator trimmers. Range of gang: 14-452 mmf (ant) and 10-198 (osc).
C5, C12	1295	100 mmf, 20%, mica
C6	100128	.05 mf, 120 volts, 25%
C7	100135	.25 mf, 120 volts, 25%
C8, C13	100127	.01 mf, 120 volts, 25%
C9		Approx. 100 mmf. Part of I.F. can
C10	100134	.006 mf, 120 volts, 25%
C11	100133	.1 mf, 120 volts, 25%
C14	10025	.002 mf, 600 volts, 25%
C15	10013	.05 mf, 400 volts, 25%
C16-A, -B -C, -D	119123	Electrolytic; 20 mf x 50 volts, 40 mf x 150 volts, 200 mf x 10 volts, 40 mf x 150 volts

RESISTORS*

R1	C-9B1-27	220,000 ohms, 1/2 watt, 20%
R2	C-9B1-67	2,700 ohms, 1/2 watt, 10%
R3	C-9B1-84	68,000 ohms, 1/2 watt, 10%
R4	C-9B1-302	15 megohms, 1/2 watt, 20%
R5	C-9B1-62	1,000 ohms, 1/2 watt, 10%
R6, R10	C-9B1-34	3.3 megohms, 1/2 watt, 20%
R7, S2	101252	Volume contol (1 megohm) and on-off switch
R8	C-9B1-37	10 megohms, 1/2 watt, 20%
R9	C-9B1-31	1 megohm, 1/2 watt, 20%
R11	C-9B1-42	22 ohms, 1/2 watt, 10%
R12	130343	545 ohms, 14 watts, 5%
R13	C-9B1-66	2,200 ohms, 1/2 watt, 10%
R14	130344	1,975 ohms, 6 watts, 5%

COILS AND TRANSFORMERS

T1	B-13E-10250	Loop antenna assembly
T2	A-13D-10239	Oscillator coil
T3	108201	Input I.F. transformer. Range of trimmers: 53-97 mmf each.
T4, C9	108200	Output I.F. transformer. Range of trimmers: 39-71 mmf each.
T5	105427	Output transformer

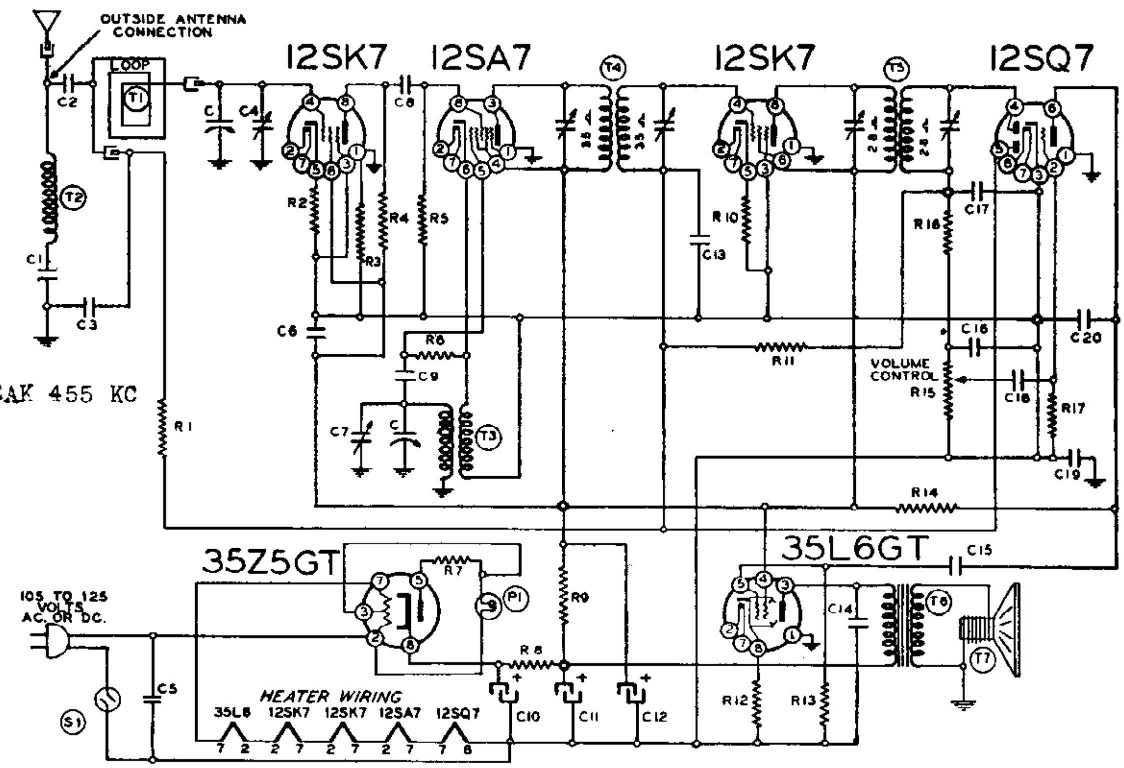
MISCELLANEOUS

	114240B	Speaker, 5-inch, P.M.
	120406	"B"-battery cable assembly
	120407	"A"-battery cable assembly
	121171	Tube socket
S1	125153	Line-battery switch
	120417	Spring for line-battery switch
	B-14M-10088	Line cord and plug
	115396B	Tube shield
	B-6D-10249	Dial scale
	112925	Diffuser
	A-2M-7758	Snap-in rivets for diffuser
	B-2M-10383	Snap-in rivets for dial scale
	112922	Dial pointer
	B-53A-11340	Drive cord for dial pointer (20")
	120197	Spring for drive cord

MODEL 6D110
Series A

BELMONT RADIO CORP.

IF PEAK 455 KC



Schematic Diagram Symbol	Part No.	Description
		CONDENSERS
C1	10011	0.01 mfd., ±25%, 400 volts, tubular
C2	129132	0.000125 mfd., ±5%, mica
C3, C14	10026	0.02 mfd., ±25%, 400 volts, tubular
C5	1001	0.1 mfd., +50%-10%., 400 volts, tubular
C6	1006	0.25 mfd., ±20%, 200 volts, tubular
C8, C9, C17, C20	1295	0.0001 mfd., ±20%, mica
C10, C11, C12	11994 or	40 mfd., 20 mfd., 20 mfd., electrolytic (for 60 cycles)
C10, C11, C12	11995	60 mfd., 40 mfd., 40 mfd., electrolytic (for 25 cycles)
C13	1009	0.05 mfd., ±25%, 200 volts, tubular
C15	100106	0.004 mfd., ±10%, 600 volts, tubular
C16	12939	0.00005 mfd., ±20%, mica
C18	10025	0.002 mfd., ±25%, 600 volts, tubular
C19	100110	0.2 mfd., +30%-10%, 400 volts
		RESISTORS*
R1, R3	A-9B1-26	150,000 ohms, ±20%, ½ watt
R2	A-9B1-50	100 ohms, ±10%, ½ watt
R4	A-9B1-70	4700 ohms, ±10%, ½ watt
R5	A-9B1-25	100,000 ohms, ±20%, ½ watt
R6	A-9B1-82	47,000 ohms, ±10%, ½ watt
R7	A-9B1-42	22 ohms, ±10%, ½ watt
R8	A-9B2-54	220 ohms, ±10%, 1 watt
R9	A-9B2-63	1200 ohms, ±10%, 1 watt
R10, R12	A-9B1-52	150 ohms, ±10%, ½ watt
R11	A-9B1-34	3.3 megohms, ±20%, ½ watt
R13	A-9B1-29	470,000 ohms, ±20%, ½ watt
R14	A-9B1-27	220,000 ohms, ±20%, ½ watt
R16	A-9B1-23	47,000 ohms, ±20%, ½ watt
R17	A-9B1-35	4.7 megohms, ±20%, ½ watt
		COILS
T1, T2	B-13E-10213	Loop antenna, complete with back and loading coil.
T3	A-13D-10215	Oscillator coil assembly, complete
T4	108140G	Input I.F. coil assembly, complete in can
T5	108145C	Output I.F. coil assembly, complete in can
		SPEAKER
T7	114191	5-inch P.M. speaker, with bracket
T6	10595B	Output transformer for speaker

NOTE:

128449B should be 128449B-1 or -2
128527-9 should be B-5B-10994-9
117424 should be A-3F-10995
B-6D-10214 should be B-6D-10214-1

Schematic Diagram Symbol	Part No.	Description
		DIAL AND TUNING PARTS
P1	107249	Pilot light bulb, 6-8 volts, type T-47
	107311	Socket assembly for pilot light
	112784	Station call letters, set of two sheets
	115448B	End plate for tuner assembly (end of chassis)
	115448D	End plate for tuner assembly (next to gang)
	115146	Cams (6 used on cam shaft)
	115143	Key washers (13 used on cam shaft)
	117528	Brass spacer (1 used on cam shaft)
	117602	Brass spacer (4 used on cam shaft)
	131181	Compression spring for locking collar
	117604	Locking collar
	117470	Brass spacer
	112746	Drive pulley
	117600	Lever shaft
	115361	Lever, assembled with cam roller
	120283	Return spring for lever
	117612	Stop rod for lever
	115543	Dial bracket with three pulleys
	112745	Pointer
	B-6D-10214 or	Dial scale, calibrated
	112-740B	Dial scale
	112744	Crystal, clear, to cover dial scale
	120285	Coil tension spring (inside of cam shaft string drum)
	117424	Locking screw, in center of tuning knob.
		MISCELLANEOUS
	121171	Tube sockets, 8-prong octal
R15, S1	101211	Volume control and on-off switch
C, C4, C7	B-8A-10212	Variable condenser, 2-gang
	10798D	Line cord and plug
	117225	Bracket for filter condenser
	128527-9	Knob (tuning), bakelite
	120388	Locking spring, for tuning knob
	128154-8	Knob (volume), tenite
	128444-9	Cabinet, bakelite
	128452	Baffle, cardboard
	131193	Cinch buttons, to fasten baffle and back of cabinet
	13141	Cinch button, for base of cabinet
	128451	Grill cloth, crinoline
	128292-8	Pushbuttons, ivory
	131102	Washer, brass, for chassis mounting screws
	132108	Screws, No. 6 x ½" hex head, for mounting chassis
	134101	Rubber bumper for bottom of cabinet
	128449B	Back for cabinet, less loop antenna assembly

BELMONT RADIO CORP.

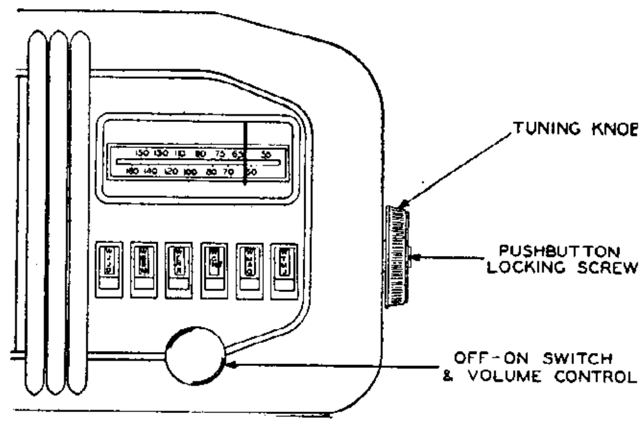
MODEL 6D110
Series A

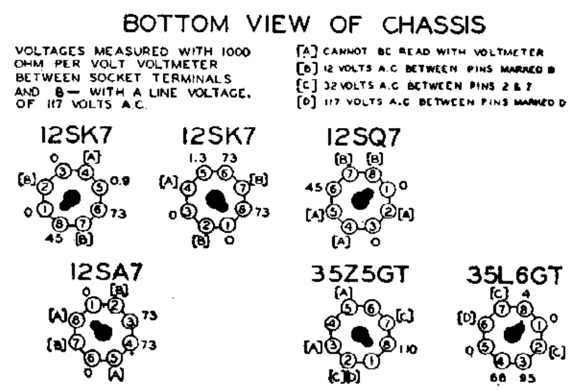
ALIGNMENT PROCEDURE

- No aligning adjustments should be attempted until all other possible causes of trouble have been checked.
- Chassis must be removed from cabinet for proper alignment. Slight adjustments of the oscillator and antenna circuits can be made, without removing the chassis, through two holes provided on the bottom of the cabinet. The two adjustment screws can be reached with a long insulated screwdriver.
- It is important that during alignment the loop antenna be maintained at the same distance from the chassis as when the chassis is installed in the cabinet.
- Turn volume control to maximum for all adjustments.
- Connect ground post of signal generator to B— of radio through a 0.1 mfd. condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.

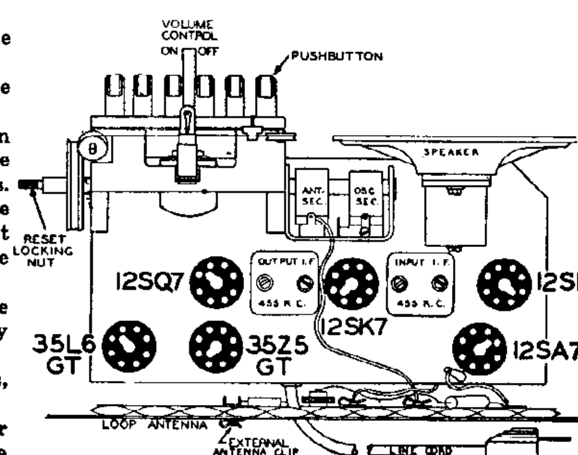
Band	Signal Generator Frequency Setting	Dummy Antenna	Connection to Radio	Tuning Condenser Setting	Adjust for maximum output (see chassis view)
I.F.	455 Kc.	.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	4 trimmers on input and output I.F. transformers
Broadcast	1650 Kc.	.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	Oscillator trimmer C7 on bottom of radio
	1400 Kc.	None	See note below	Set dial at 1400 Kc.	Antenna trimmer C2 on bottom of radio

Note: Lay output lead of generator in back of loop antenna. Turn up generator output. Loop antenna will pick up energy.





REAR OF CHASSIS



SETTING THE PUSHBUTTONS

The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations which you select. They can be set up in any order.

1. Turn on the radio. Allow it to warm up for at least one minute.
2. Push out the call letters of the six stations from the call-letter sheets.
3. Insert one call-letter tab in the rectangular opening in each of the pushbuttons, in any sequence. Press an acetate tab (supplied in small envelope) into each of the pushbuttons.
4. Check to see that the locking screw in the center of the tuning knob (see illustration) is loose. If it is not, turn it several turns to the left (counterclockwise). A coin may be used for this purpose.
5. Press the first pushbutton down all the way. With one hand hold the button down firmly and with the other carefully tune in the desired station. Release the pushbutton.
6. Follow this procedure for each of the five other buttons, adjusting each one for a different station.
7. Rotate the tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw in the center of the knob. IT IS IMPORTANT THAT THIS SCREW BE TIGHTENED VERY FIRMLY.

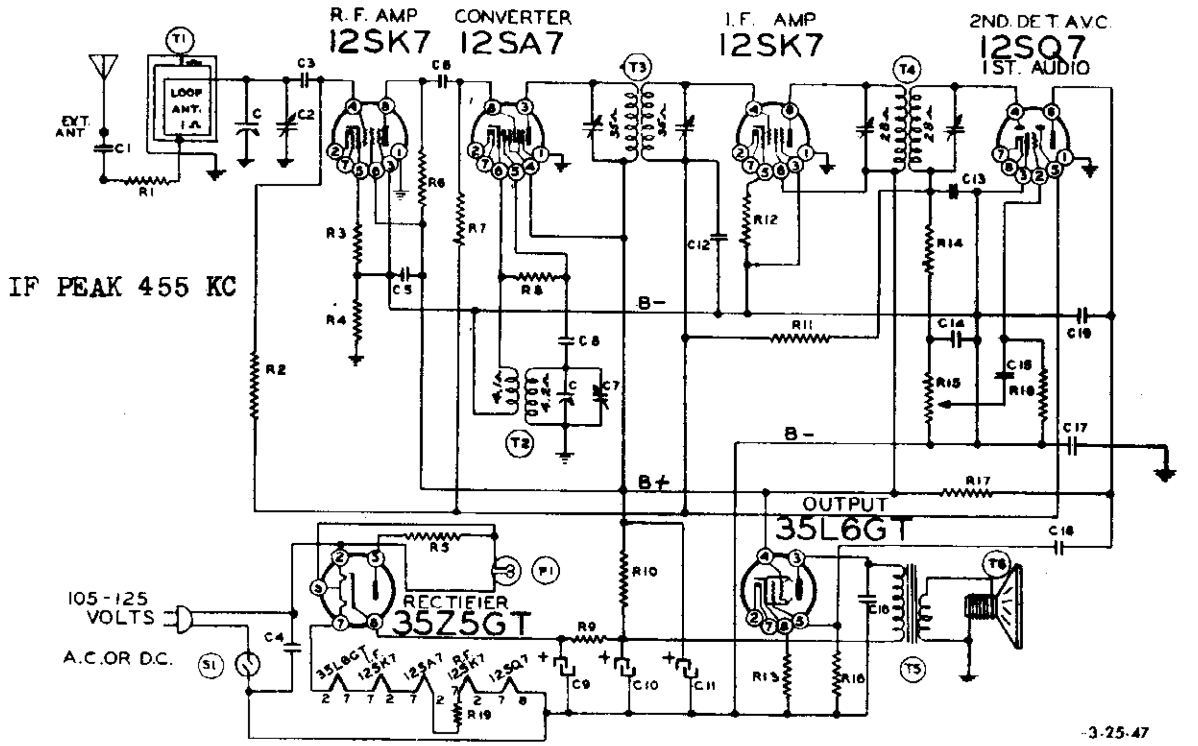
Technical Data

Tuning range .... 535 to 1650 Kc.
Intermediate frequency .... 455 Kc.
Power consumption .... 35 watts
Selectivity .... 55 Kc. broad at 1000 times signal at 1000 Kc.

Sensitivity (0.05 watt output) .... 10 microvolts ave.
Power output (in voice coil)
Undistorted .... 1 watt
Maximum .... 1.7 watts
Voice coil impedance .... 3.2 ohms

MODEL 6D121
Series A

BELMONT RADIO CORP.



Part No.	Schematic Symbol	Description
CONDENSERS		
C-8D-10953	C17	.15 MFD x 400 volts.
C-8D-10778	C1, C15	.002 x 600 volts, +40%, −15%
C-8F3-12	C3	.470 mmfd., mica, ±20%
C-8D-10760	C4	.1 x 400 volts, +20%
C-8D-10775	C5	.25 x 200 volts, ±20%
C-8F3-8	C6, C8, C19	.001, mica, ±20%
11994 or A-8C-10077	C9, C10, C11	Electrolytic (for 50-60-cycle sets), 40 mfd. x 150 volts, 20 mfd. x 150 volts, 20 mfd. x 150 volts.
C-8D-10770	C12	.05 x 200 volts, ±20%
129161	C13, C14	Dual .0001, mica, ±10%
C-8D-10774	C16	.02 x 400 volts, ±20%
C-8D-10778	C18	.004 x 600 volts, ±20%
RESISTORS		
C-9B1-13	R1	1000 ohms, ½ watt, ±20%
C-9B1-31	R2	1 megohm, ½ watt, ±20%
C-9B1-50	R3	100 ohms, ½ watt, ±10%
C-9B1-26	R4	150,000 ohms, ½ watt, ±20%
C-9B1-42	R5	22 ohms, ½ watt, ±10%
C-9B1-70	R6	4700 ohms, ½ watt, ±10%
C-9B1-25	R7	100,000 ohms, ½ watt, ±20%
C-9B1-23	R8, R14	47,000 ohms, ½ watt, ±20%
C-9B2-53	R9	180 ohms, 1 watt, ±10%
C-9B2-63	R10	1200 ohms, 1 watt, ±10%
C-9B1-34	R11	3.3 merohms, ½ watt, ±20%
C-9B1-52	R12, R13	150 ohms, ½ watt, ±10%
C-9B1-29	R16	470,000 ohms, ½ watt, ±20%
C-9B1-27	R17	220,000 ohms, ½ watt, ±20%
C-9B1-35	R18	4.7 megohms, ½ watt, ±20%
C-9B2-44	R19	33 ohms, 1 watt, ±10%
COILS		
C-212-11565	T1	Loop antenna assembly, complete on back
A-13D-10215	T2	Oscillator coil
108140H or B-13A-12023	T3	Input I.F. coil in can, 455 Kc.
108145 or B-13B-12022 (See note on page 3)	T4	Output I.F. coil in can, 455 Kc.
SOCKETS		
121210		8-prong octal tube sockets, molded
121171		8-prong socket for 12SK7, laminated
121216		Socket base, bakelite
107271 or A-47A-11470		Pilot light socket assembly
SPEAKER		
114197	T6	5-inch P.M. speaker
105104	T5	Output transformer for speaker
DIAL PARTS		
115448		End plate (right hand bracket)
115448C		End plate (left hand bracket)
115146		Cams
115143		Key washer (13 used on cam shaft)
117528		Brass spacer (one used on cam shaft)
117602		Brass spacer (four used on cam shaft)
131181		Spring washers, for locking collar
117604		Locking collar
117600		Level shaft
115361		Lever with roller
120283		Return spring for levers
115449B		Dial bracket assembly
112785		Pointer
A-53A-10989		Drive cord, 6 inches used
A-49A-11087		Spring on tuning shaft, for cord
A-3N-11086		Spacer under above spring
120143		Take-up spring for drive cord
B-6D-10241		Dial scale
112-659-1		Crystal, clear, for dial scale
A-2M-7758		Cinch buttons for fastening scale to bracket
117833		Brass spacer (for spacing pointer from dial)
MISCELLANEOUS		
10798		Line cord and plug
101218 or A-10A-10626	R15, S1	Volume control and switch, 1 megohm
B-8A-10211	C, C2, C7	2-gang variable condenser
107249	P1	Pilot light bulb, type T-47
134123		Rubber bumper (bottom of cabinet)
B-23J-11464		Cardboard back (specify color)
A-2M-10096		Cinch buttons, for fastening back to cabinet (4 used)
13141		Cinch buttons, to cover trimmer holes in cabinet
B-5B-11463-8		Pushbuttons (6 used)
A-23L-11900		Station call letters, set
A-6C-11899		Acetate tabs for call letters
5C-11228-9		Cabinet, bakelite, ivory color
128-686-8		Knob, volume, ivory color
A-5B-10994-9		Knob, tuning, ivory color
A-3F-10995		Locking screw for tuning knob.
120388		Locking spring for tuning knob
A-2H-10996		Reset key

NOTE: On some sets slug tuned I.-F.s are used instead of trimmer tuned I.-F.s. 108-140H and 108-145 are trimmer tuned. B-13A-12023 and B-13B-12022 are slug tuned. The slug tuned I-F.s are tuned from the top and bottom (secondary on top, primary on bottom).

Slug tuned I.-F.s cannot be used to substitute trimmer tuned I.-F.s but trimmer tuned I.-F.s can be used to substitute slug tuned I.-F.s.

BELMONT RADIO CORP.

MODEL 6D12
Series A

REPLACING DIAL POINTER DRIVE CORD

Six inches of cord are required in the set. Use a piece slightly longer so that knots may be tied at each end. Numbers below correspond to circled numbers in diagram.

1. Rotate tuning knob to extreme clockwise position. This closes tuning condenser. Knob should remain in this position until installation is completed.

2. Tie cord to loop in spring as shown. Wind cord one turn around shaft in direction shown.

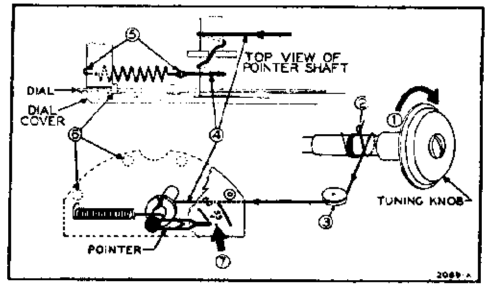
3. Pass cord over idler pulley.

4. Pass cord over pointer shaft; wind it one turn around shaft; pass it through key washer; wind it one more turn around shaft.

5. Hook spring over end of dial support. Tie cord to spring. IMPORTANT: Before tying knot stretch spring enough so that full contraction of spring will rotate pointer shaft at least one-half turn.

6. Remove dial crystal by removing Cinch buttons.

7. Make sure tuning knob is in extreme clockwise position. Then rotate pointer clockwise, against friction of shaft, until it is in horizontal position, as shown.

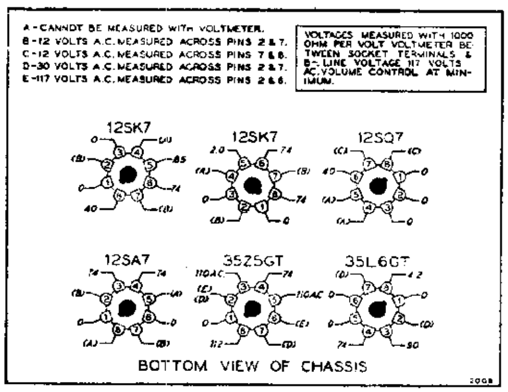


ALIGNMENT PROCEDURE

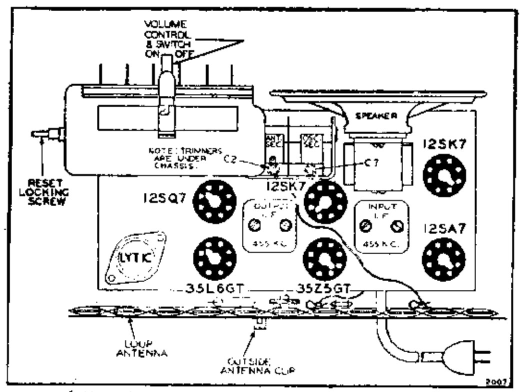
- No aligning adjustments should be attempted until all other possible causes of trouble have been checked.
- Chassis must be removed from cabinet for proper alignment. Slight adjustments of the oscillator and antenna circuits can be made without removing the chassis, through two holes provided on the bottom of the cabinet. The two adjustment screws can be reached with a long insulated screwdriver.
- It is important that during alignment the loop antenna be maintained at the same distance from the chassis as when the chassis is installed in the cabinet.
- Turn volume control to maximum for all adjustments.
- Connect ground post of signal generator to B— of radio through a 0.1 mfd. condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.

Band	Signal Generator Frequency Setting	Dummy Antenna	Connection to Radio	Tuning Condenser Setting	Adjust for Maximum Output (see chassis view)
I.F.	455 Kc.	0.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	4 trimmers on input and output I.F. transformers (See note on page 3)
Broadcast	1650 Kc.	0.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	Oscillator trimmer C7 on bottom of radio
	1400 Kc.	None	See note A	Set dial at 1400 Kc.	Antenna trimmer C2 on bottom of radio

Note A: Lay output lead of generator in back of loop antenna. Turn up generator output. Loop antenna will pick up energy.



VOLTAGES AT TUBE SOCKET TERMINALS



CHASSIS VIEW, SHOWING TUBE LOCATIONS

NOTE ON TUBE REPLACEMENT

Replace a defective metal 12SK7 tube with another metal tube. Replace a glass 12SK7 tube with either a metal tube or with an exact duplicate of the tube now in the set.

SETTING THE PUSHBUTTONS

The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations which you select. They can be set up in any order.

1. Turn on the radio. Allow it to warm up for at least one minute.

2. Push out the call letters of the six stations from the call-letter sheets supplied with this manual.

3. Insert one call-letter tab in the rectangular opening in each of the pushbuttons, in any sequence. Press an acetate tab (supplied in small envelope) into each of the pushbuttons.

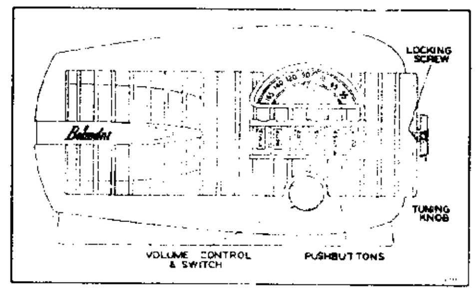
4. With the screwdriver supplied, check to see that the locking screw in the center of the tuning knob (see illustration) is loose. If it is not, turn it several turns to the left (counterclockwise).

5. Press the first pushbutton down all the way. With one hand hold the button down firmly and with the other carefully tune in the desired station. Release the pushbutton.

6. Follow this procedure for each of the five other buttons, adjusting each one for a different station.

7. Rotate the tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw in the center of the knob. IT IS IMPORTANT THAT THIS SCREW BE TIGHTENED VERY FIRMLY.

8. The pushbuttons are now properly set for automatic tuning. Any of the six stations may now be tuned in simply by pressing the proper button down as far as it will go. If it is desired to reset any of the buttons for a new station, loosen the locking screw in the center of the tuning knob, set the pushbutton as described above, and re-tighten the locking screw.

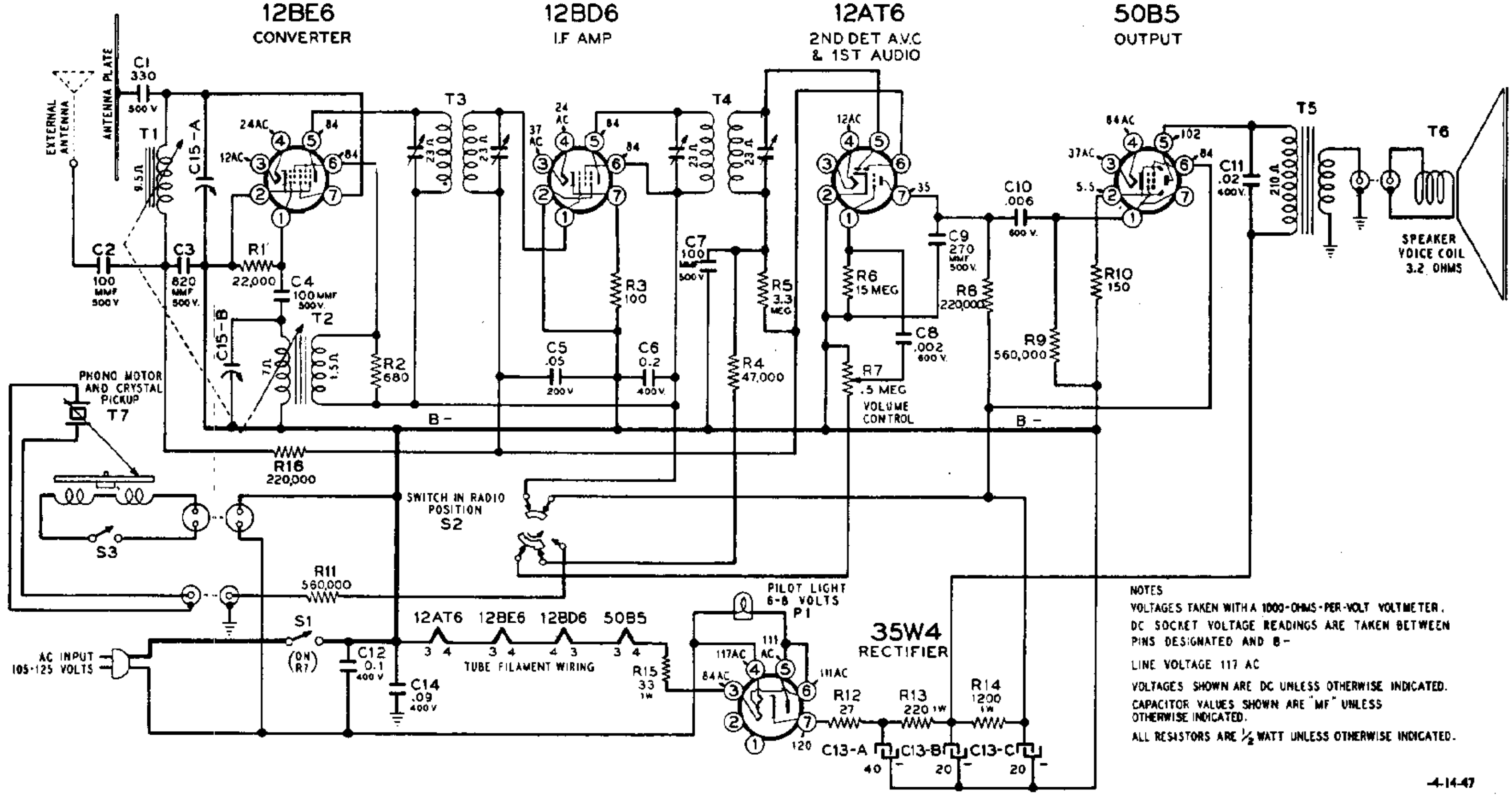


TECHNICAL DATA

Tuning range	530 to 1650 Kc.
Intermediate frequency	455 Kc.
Power consumption	35 Watts
Sensitivity (for 0.05 watt output)	13 microvolts average
Selectivity	55 Kc. broad at 1000 x signal at 1000 Kc.
Power output (in voice coil)	
Undistorted	0.8 watt
Maximum	1.0 watt
Voice coil impedance	3.2 ohms

MODEL 5240, Series A

BELMONT RADIO CORP.



ELECTRICAL SPECIFICATIONS

Power Supply..........105-125 volts, 60 cycle AC, 55 watts.

Frequency Range..........535-1720 kc.

Intermediate Freq..........455 kc.

Antenna..........Built-in plate; provisions also for external antenna connection.

Tuning..........Permeability.

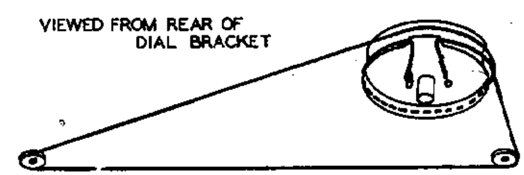
Speaker..........4 x 6-inch, P.M., voice coil impedance 3.2 ohms.

Power Output..........0.75 watt undistorted. 1.1 watts maximum.

Sensitivity..........34 microvolts average for 50-milliwatt output.

Selectivity..........55 kc broad at 1000 times signal at 1000 kc.

VIEWED FROM REAR OF DIAL BRACKET



DIAL BRACKET ASSEMBLY MUST BE REMOVED TO REPLACE DIAL STRING.

DIAL STRINGING VIEW

BELMONT RADIO CORP. MODEL 5240, Series

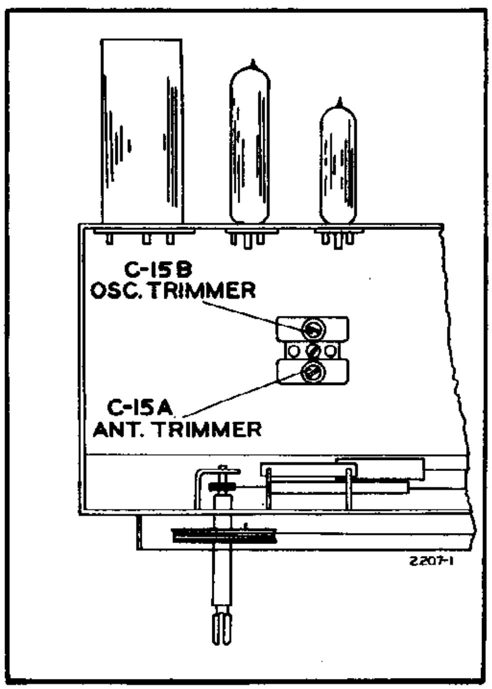
ALIGNMENT PROCEDURE

(Refer to Chassis and Coil Views on Page 2)

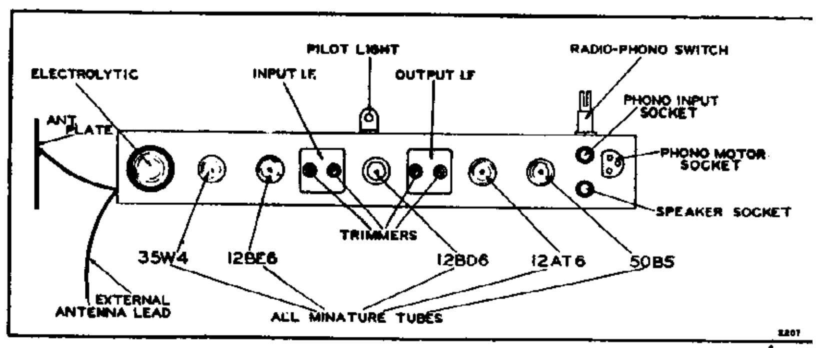
- Output meter across 3.2-ohm output load.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Volume control at maximum for all adjustments.
- Connect ground post of signal generator to B− of radio.

SIGNAL GENERATOR Frequency	Dummy Antenna	Connection to Radio	*TUNER SETTING*	*ADJUST FOR MAXIMUM OUTPUT (in order shown)*
455 kc	.1 mf	Grid (pin 7) of 12BE6	Iron cores all the way out	Trimmers on output and input I.F. cans
1720 kc	.1 mf	Grid (pin 7) of 12BE6	Iron cores all the way out	Oscillator trimmer C-15B
1720 kc	200 mmf	Antenna lead	Iron cores all the way out	Antenna trimmer C-15A
1400 kc	200 mmf	Antenna lead	Turn dial to 1400 kc	Adjust position of antenna coil (see coil view)*

*This adjustment and the previous adjustment are interlocking; therefore repeat the two adjustments alternately for best resu

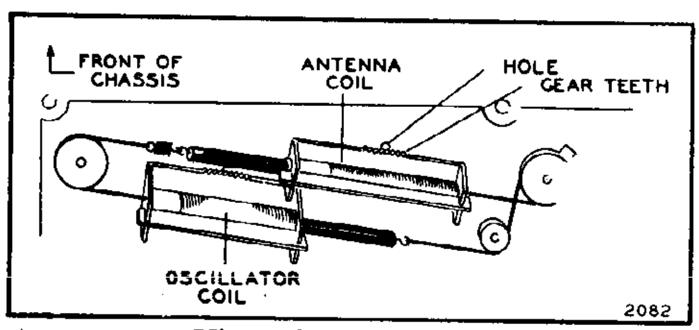


TRIMMER VIEW



CHASSIS VIEW

DIAL LIGHT—If the dial lamp burns out the set should not be operated until a new lamp has been installed. Failure to heed this caution may result in a burned-out 35W4 tube. Use only a type T-47 lamp for replacement.



View of Coil Assembly

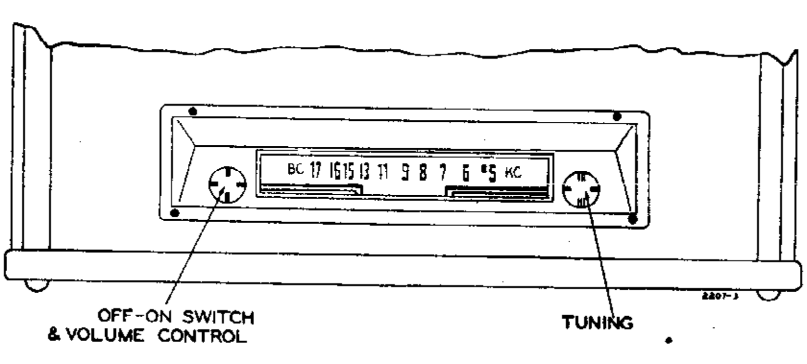
The antenna coil assembly is movable left to right. When making the adjustment as required in the alignment procedure, move the coil assembly very slowly, either by hand or by pivoting one edge of a screwdriver blade in the hole and engaging the blade in the gear teeth of the coil form.

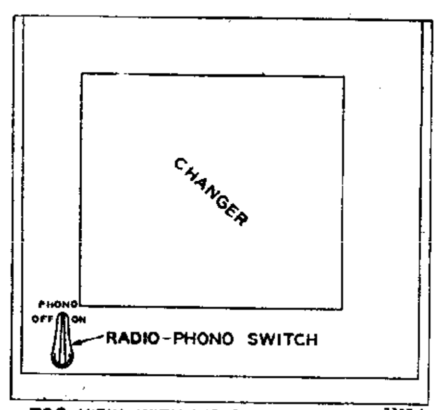
MODEL 5240, Series A — BELMONT RADIO CORP.

REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number, and series

Ref. No.	*Part No.*	*Description*
		CAPACITORS
C13-A, C13-B, C13-C	A-8C-10077	Electrolytic, 40x20x20, 150 volts
C15-A, C15-B	A-8E-10723	Trimmer condenser, dual, antenna and oscillator
C14	C-8D-11251	.09 mf x 400 volts 10% tubular
C6	C-8D-10942	.2 mf x 400 volts 10% tubular
C5	C-8D-10770	.05 mf x 200 volts 20% tubular
C10	C-8D-10785	.006 mf x 600 volts 20% tubular
C8	C-8D-10789	.002 mf x 600 volts 20% tubular
C11	C-8D-10774	.02 mf x 400 volts 20% tubular
C12	C-8D-10760	.1 mf x 400 volts 10% tubular
C1	C-8F3-119	330 mmf x 500 volts 10% mica
C3	C-8F3-247	820 mmf x 500 volts 5% mica
C9	C-8F3-118	270 mmf x 500 volts 10% mica
C2,C4 C7	C-8F3-113	100 mmf x 500 volts 10% mica
		RESISTORS
R7 S1	A-10A-10720	Volume control (500M ohms) and switch
R15	C-9B2-44	33 ohms, 1 watt, 10%
R8, R16	C-9B1-90	220k ohms, 1/2 watt, 10%
R13	C-9B2-54	220 ohms, 1 watt, 10%
R14	C-9B2-63	1200 ohms, 1 watt, 10%
R12	C-9B1-43	27 ohms, 1/2 watt, 10%
R4	C-9B1-82	47k ohms, 1/2 watt, 10%
R3	C-9B1-50	100 ohms, 1/2 watt, 10%
R5	C-9B1-34	3.3 megohms, 1/2 watt, 20%
R9 R11	C-9B1-95	560k ohms, 1/2 watt, 10%
R10	C-9B1-52	150 ohms, 1/2 watt, 10%
R6	C-9B1-302	15 megohms, 1/2 watt, 10%
R2	C-9B1-60	680 ohms, 1/2 watt, 10%
R1	C-9B1-78	22k ohms, 1/2 watt, 10%
		COILS AND TRANSFORMERS
T1 T2	C-211-10171	Tuner unit, permeability tuned, Ant. and Osc. coils
T3	B-13A-10728	Input I.F. transformer
T4	B-13B-10729	Output I.F. transformer
T5	B-12C-10074-1	Output speaker transformer
		DIAL AND TUNING PARTS
	B-6D-10968	Dial Scale
	A-6D-10163	Dial Crystal
	C-5C-10009-48	Escutcheon for dial
	A-5B-10170-1	Knobs for radio
	B-200-10980	Dial and bracket assembly
	A-55A-10093	Pilot light and bracket
P1	A-46A-10793	Pilot light bulb, 6-8 volt type
		MISCELLANEOUS
T6	B-18A-11089	4x6 oval P.M. speaker
	A-15C-10717	Tube socket
	A-2H-10718	Shield base
	A-2H-10974	Tube shield
	B-15B-10076	Mounting base for electrolytic
S2	A-20A-10722	Radio-phono switch
	A-19B-10727	Phono motor socket
	A-55A-7386-1	Phono input socket
	A-19B-11044	Speaker socket
	A-23A-10344	Line cord lock
	B-14M-11085	A.C. line cord and plug
	A-2E-12192	Needle cup
	B-2E-11038	Antenna plate
	A-5B-11239-1	Knob for radio-phono switch
	A-3A-12263	Extension shaft for radio-phono switch
	A-2M-11074	Spring clamp for shaft
	A-2C-10972	Indicator plate
		RECORD CHANGER
S3 T7	B-201-12262-1	Russel record changer, 105-125 volts AC, 60 cycles



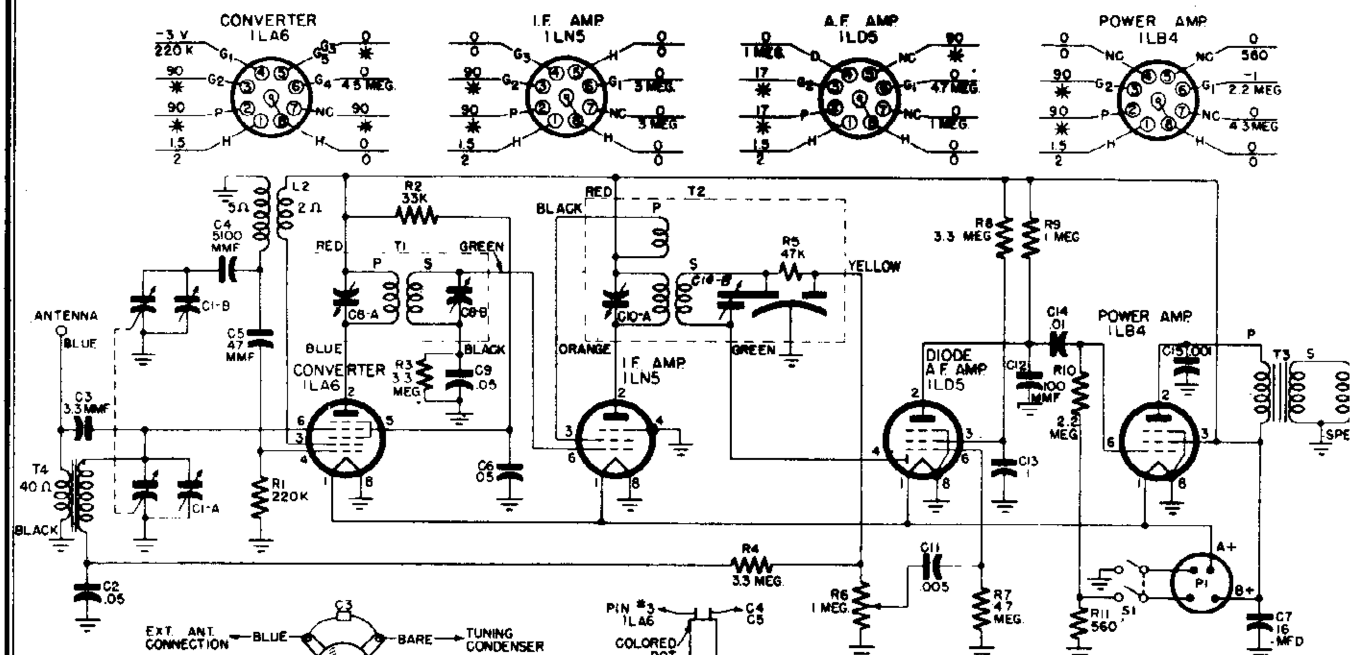


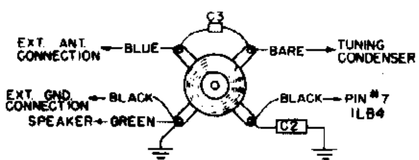
TOP VIEW WITH LID REMOVED

BENDIX RADIO DIV.

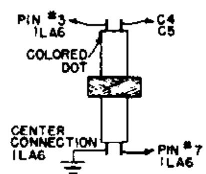
CONDITIONS OF MEASUREMENTS

ZERO SIGNAL INPUT VOL. CONT. MIN. SOCKET VOLTAGE/RESISTANCE TO COMMON GROUND D.C. AT 20,000 Ω/V.





LI- ANTENNA COIL



L2 - OSCILLATOR COIL

NOTES-
ALL CAPACITANCE IN WHOLE NUMBERS IN MMF THOSE IN DECIMINAL NUMBERS IN MF
ALL RESISTANCE IN OHMS UNLESS OTHERWISE NOTED
✱ IS RESISTANCE MEASURED ACROSS FILTER CONDENSER C7
K = 1000 Ω
⏚ CHASSIS GROUND
RANGE - 540 TO 1620 KCS

TRANSFORMER RESISTANCE IN OHMS

	ANT	OSC	1ST I F				2ND I F			OUTPUT		
SYMBOL	L1	L2	T1				T2			T3		
CODE	238	125	125	198	305	420	238	306	420	125	350	394
PRIMARY	40	15	16	16	22	24	25	20	20	1000	1000	2000
SECONDARY	15	5	16	16	22	24	25	20	20			

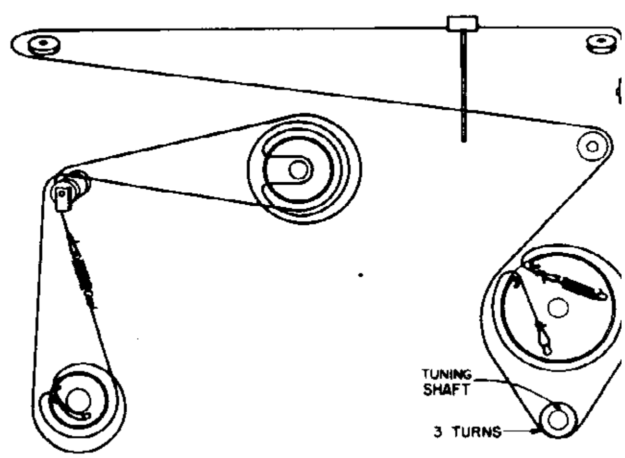
RESISTANCE LESS THAN 1 OHM NOT SHOWN.

ALIGNMENT PROCEDURE

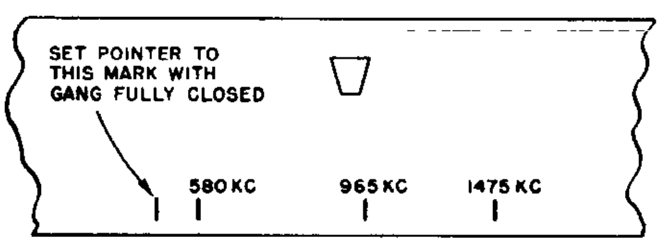
Before making any adjustments check battery voltage: the "B" supply should not be below 85 volts and the "A" supply below 1.3 volts. Connect output meter across voice coil and RF signal generator, 30% amplitude modulated, to antenna lead through a .05 mfd. capacitor for IF alignment and through 200 mfd. for oscillator and RF alignment. All adjustments made for maximum output meter reading with volume control full on. Keep output of signal generator as low as possible at all times. Rotate tuning gang to fully closed position and set dial pointer to reference mark on dial back plate before proceeding with alignment as outlined in chart below.

Input Freq.	Dial Pointer Position	Adjust
455KC	Max. to right	C10B, C10A
1475KC	1475KC	C1B, C1A
965KC	965KC	*Check Calib.
580KC	580KC	*Check Calib.

If calibration is off more than 10KC the rotor plates of the gang may be bent to correct calibration.



DIAL STRINGING DIAGRAM



DIAL REFERANCE POINTS

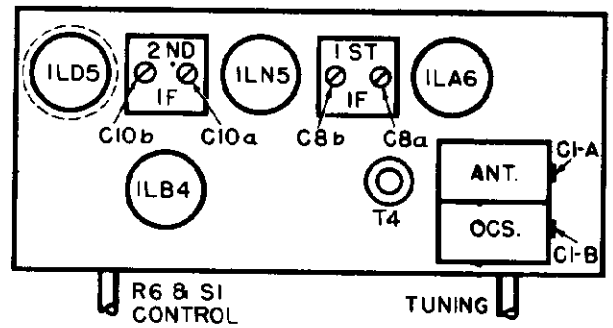
REPLACEMENT PARTS LIST

Stock Number		Description
		ELECTRICAL COMPONENTS
CC9A16	+	CAPACITOR, Ceramic 3.3 Mmf (C3)
CE1E00		CAPACITOR, Electrolytic 16 Mfd (C7)
CM5A14	+	CAPACITOR, Mica 47 Mmf (C5)
CM5A22	+	CAPACITOR, Mica 100 Mmf, 500V (C12)
CM3E15		CAPACITOR, Mica 5100 Mmf (C4)
CP2T10		CAPACITOR, Paper .001 Mfd, 200V (C15)
CP2T18	+	CAPACITOR, Paper .005 Mfd, 200V (C15)
CP2T31	+	CAPACITOR, Paper .01 Mfd, 200V (C14)
CP2T40	+	CAPACITOR, Paper .05 Mfd, 200V (C2, C8, C9)
CP2T51	+	CAPACITOR, Paper .1 Mfd, 200V (C13)
CV0B02		CAPACITOR, Variable (C1)
LO4B00		COIL, Oscillator (L2)
RC1G21	+	RESISTOR, Comp. 560 Ohms, 1/4W (R11)
RC1H42	+	RESISTOR, Comp. 33,000 Ohms, 1/4W (R2)
RC1H54	+	RESISTOR, Comp. 220,000 Ohms, 1/4W (R1)
RC1H62	+	RESISTOR, Comp. 1 Meg., 1/4W (R9)
RC1H66	+	RESISTOR, Comp. 2.2 Meg., 1/4W (R10)
RC1H68	+	RESISTOR, Comp., 3.3 Meg., 1/4W (R3, R4, R8)
RC1H70	+	RESISTOR, Comp., 4.7 Meg., 1/4W (R7)
RV4S06		POTENTIOMETER, 1 Meg (with Switch) (R6)
TA0006		TRANSFORMER, Output (T3)
TI0C05		TRANSFORMER, I.F. Input (T1)
TI0D06		TRANSFORMER, I.F. Output (T2)
TR4B00		COIL, Assembly Antenna (L1)
		MECHANICAL COMPONENTS
AD0A00		BACK PLATE ASSEMBLY
BT1S02	+	STRIP, Terminal (1 Terminal & 1 Mtg. Lug)
BT2S00	+	STRIP, Terminal (2 Terminal & 1 Lug)
CD0C12		CABLE, Dial
GR0S00	+	GROMMET, Capacitor Shockmount
HC0C00	+	CLIP, Coil Mounting

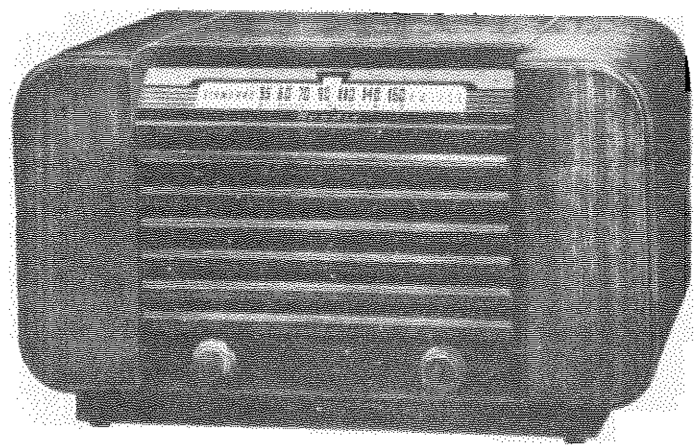
Stock Number		Description
HC0C03	+	CLAMP, Cable
HC0C05	+	CLAMP, Cable
HC0D02	+	CLIP, Dial Retainer
HC0S00	+	CLIP, Spring (Tuning Shaft)
HC0T00	+	RING, Tube Shield
HR0P00	+	RIVET, Tubular
HR0P01	+	RIVET, Tubular
HR0S02	+	RIVET, Shoulder
HS0C00	+	SPRING, Dial Cable
HS6F00	+	SLEEVE, Spacer
ID0M09		INDICATOR, Dial Pointer
IX0M00		INDICATOR, On-Off
JP4000		PLUG, 4 Contact
MB0B00	+	BEARING, Tuning Shaft
MP0I00		PULLEY, Idler
MS0T07		SHAFT, Tuning
PI0P00	+	PLATE, Line Cord
SM0C03	+	SHIELD, Metal
SM0T00	+	SHIELD, Tube
S08L01	+	SOCKET, Tube
XS0C00		PROTECTOR, Dial Cord
MP0D04		PULLEY, Drive Assembly
		CABINET AND SPEAKER COMPONENTS
BZ0R02	+	FEET, Rubber
*SP5R01		SPEAKER, 5" P.M.
DS0A10		DIAL
KC0B06		KNOB, Control
HC0D02	+	RETAINER, Dial
DZ0F08		DECAL, Nameplate
GZ0C05		GRILLE, Cloth Assembly
HK0R00	+	RING, Retainer Spring
*ZW4A00		CABINET, Wood
		GENERAL HARDWARE
	+	PALNUT, Type INI, #6-32
	+	NUT, 8-32, Hex
	+	PALNUT, 3/8-32
	+	LOCKWASHER, #8, Int. Teeth
	+	SCREW, #8x1/2 Self Tapping
	+	SCREW, #8x1/4 Self Tapping
	+	WASHER, Flat
	+	WASHER, Lockwasher, External Teeth
	+	SCREW, Rd.Hd. 8-32 x 1/2"
	+	SCREW, Rd.Hd. Wood, #4 x 3/8"
	+	SCREW, #8 x 1", Self Tapping
	+	WASHER, Flat
	+	WASHER, Flat, Brass
	+	SCREWS, Speaker, 8-32 x 7/8"

SPECIFICATION
Model 416A

POWER
1½ V, 90 V Dry Pack .... Bendix # AB200
TUNING RANGE
Broadcast - KCs 540-1626
POWER OUTPUT - WATTS
Maximum .... .285
At 10% Distortion .... .120
INTERMEDIATE FREQUENCY - KCs 455
TUNING RATIO 15:1
POINTER TRAVEL - Inches 4
LOUDSPEAKER - PM
Cone Diameter - Inches 5
Voice Coil Impedance (Ohms at 400 Cycles) 3.2
CABINET DIMENSIONS .... H 10¾" D 11" W 17½"
SHIPPING WEIGHT (Less Battery) - Lbs 14



TRIMMER LOCATION DIAGRAM



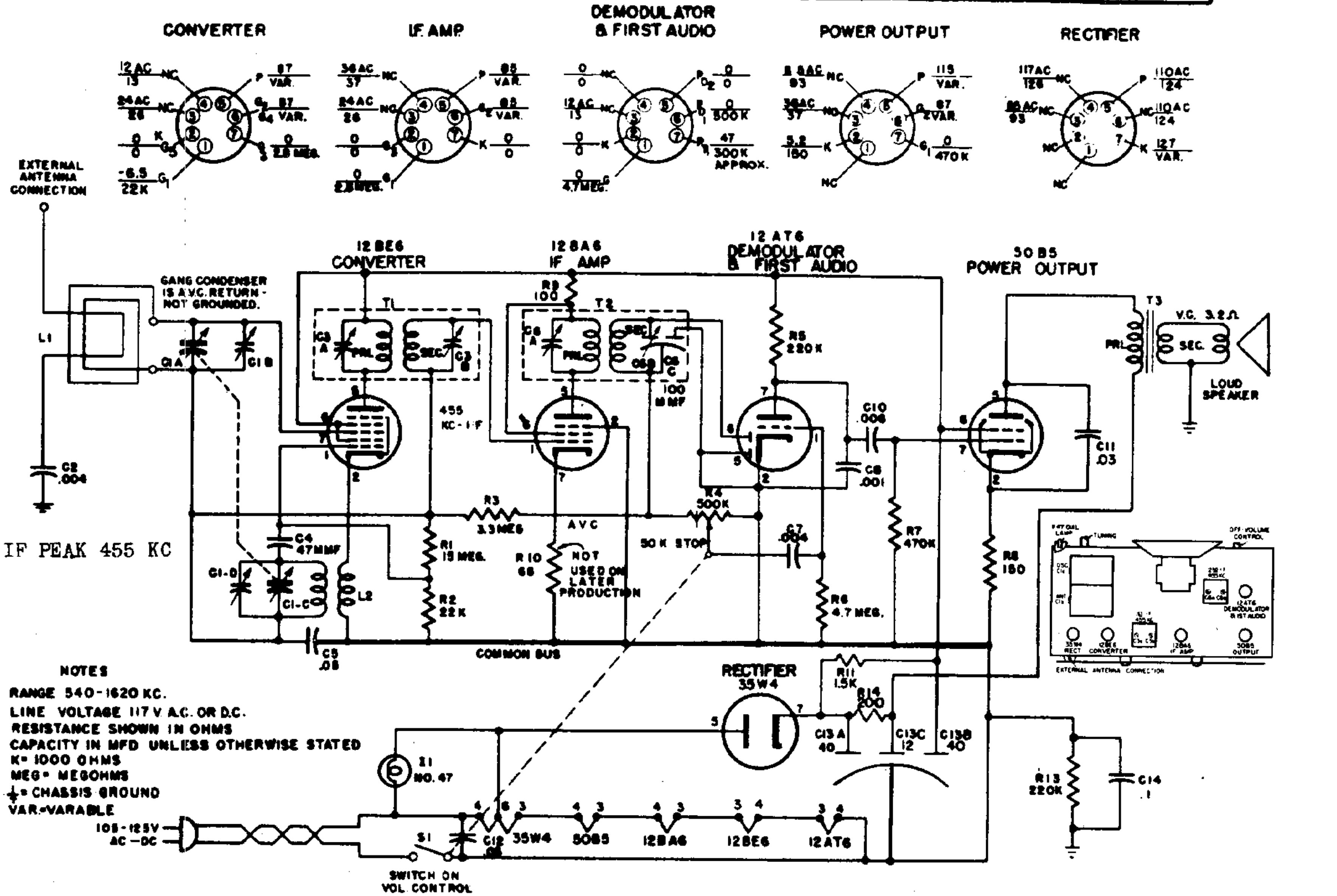
MODEL 416A

BENDIX RADIO DIV.

MODEL R526

STANDARD CONDITIONS

SOCKET VOLTAGE/RESISTANCE TO COMMON BUS ± 10%. LINE VOLTAGE - 117 V A.C. ZERO SIGNAL INPUT. VOL. CONT. MIN. D.C. AT 20,000 Ω/V A.C. AT 1,000 Ω/V



IF PEAK 455 KC

NOTES

RANGE 540-1620 KC.
LINE VOLTAGE 117 V A.C. OR D.C.
RESISTANCE SHOWN IN OHMS
CAPACITY IN MFD UNLESS OTHERWISE STATED
K= 1000 OHMS
MEG= MEGOHMS
⏚ = CHASSIS GROUND
VAR.=VARABLE

MODEL R526M

BENDIX RADIO DIV.

REPLACEMENT PARTS LIST

Stock Number	Description
	ELECTRICAL COMPONENTS
*ALOC04 +	LOOP Antenna Assy. (L1)........
CC6A30 +	CAPACITOR-Ceramic (C4) 47 mmf. 500V........................
CE3E01 +	CAPACITOR-Electrolytic 40-40-12 mfd. 150V (C13).....
CM5A46 +	CAPACITOR-Mica (C8) 1000 mmf. 500V........................
CP4T20 +	CAPACITOR-Paper (C10) .006 mfd. 400V.....................
CP4T36 +	CAPACITOR-Paper (C11) .03 mfd. 400V....................
CP4T40 +	CAPACITOR-Paper (C5) .05 mfd. 400V........................
CP4T51 +	CAPACITOR-Paper (C14) .1 mfd. 400V........................
CP6T16 +	CAPACITOR-Paper (C2) (C7) .004 mfd. 600V..............
CP6T40 +	CAPACITOR-Paper (C12) .05 mfd. 600V....................
CV0B03 +	CAPACITOR-Variable, (C1).......
IO5B02 +	COIL-Oscillator (L2)...........
RC1H10 +	RESISTOR-1/4W Comp (R10) 68 ohms......................
RC1H12 +	RESISTOR-Comp (R9) 1/4W 100 ohms......................
RC1H40 +	RESISTOR-Comp 1/4W (R2) 22,000 ohm..................
RC1H54 +	RESISTOR-Comp 1/4W (R5) (R13) 220,000 ohms................
RC1H58 +	RESISTOR-1/4W (R7) 470,000 ohms.
RC1H68 +	RESISTOR-Comp 1/4W (R3) 3.3 meg.
RC1H70 +	RESISTOR-Comp 1/4W (R6) 4.7 meg.
RC1H76 +	RESISTOR-Comp 1/4W (R1) 15 meg ohms......................
RC4026 +	RESISTOR-Comp 2W (R11) 1500 Ohms
RV0600 +	POTENTIOMETER,500,000 ohm, (R4) with switch.................
RW1B28 +	RESISTOR-Wirewound 1W (R8) 150 ohms.....................
RW1B31 +	RESISTOR-Wirewound 1W (R14) 200 ohms.....................
*SP4R00 +	SPEAKER 4" P.M. Less Transformer
TA0000	TRANSFORMER-Output (T3)........
TIOC00	TRANSFORMER-1st I.F. (T1) converter.......................
TIOD07	TRANSFORMER-2nd I.F. Output (T2)
#47 +	LAMP-Dial, Bayonet base........

Stock Number	Description
	MECHANICAL COMPONENTS
AD0B01 +	DIAL-Back Plate Assembly.......
CD0C01 +	CABLE-Dial 39 5/16"............
CL2A06 +	CORD-A.C., Ivory...............
CL2A07 +	CORD-A.C., Brown...............
HC0S00 +	CLIP-Tuning Shaft Spring.......
HC0S21 +	CLIP-Electrolytic Mounting.....
HS0C00 +	SPRING-Dial Cable Tension......
MP0I00 +	PULLEY-Idler, Tuning...........
MS0T00 +	SHAFT-Tuning...................
PI0P02 +	PLATE-Line Cord Insulator......
SM0T02	SHIELD-Tube, Metal.............
SO0D00 +	SOCKET-Dial Light..............
SO7M04	SOCKET-Miniature Tube..........
	CABINET COMPONENTS-526MC
BZ0B04 +	BACK-Cabinet (Tekwood).........
BZ0R03 +	FOOT-Cabinet Rubber............
DS0A13 +	DIAL-Glass.....................
HC0S08 +	CLIP-Control Knob..............
HZ0S01	STUD-Trimount Back Mtg.........
ID0M01 +	POINTER-Metal Dial.............
KC0G00 +	KNOB-Control Green Plastic.....
ZC0B01 +	RETAINER-Block R.H. Green Plastic......................
ZC0B02 +	RETAINER-Block L.H. Green Plastic......................
ZC0B03 +	CABINET, Bottom Section-Black Plastic......................
ZC0G00 +	CABINET-Top Section-Green Plastic......................
*ZC0T00 +	CABINET-Catalin,Green & Black...
	CABINET COMPONENTS-526MA
DS0A11 +	DIAL-Plastic Scale.............
KC0B01 +	KNOB-Brown Plastic.............
*ZP0B01 +	CABINET-Brown Plastic..........
	CABINET COMPONENTS COMMON TO 526MA-MB
BZ0D00 +	BAFFLE-Speaker.................
BZ0R00 +	FOOT-Rubber Black..............
HC0S01 +	CLIP-Baffle Retainer Spring....
HK0R00 +	RING-Knob Retainer Spring......
HP0B00 +	PLATE-Metal Base Mtg...........
HZ0S00 +	STUD-Trimount, Dial Mtg........
ID0M00 +	POINTER-Dial Metal.............
PI0B01 +	BASE PLATE-Insulator...........
	CABINET COMPONENTS-526MB
DS0A12 +	DIAL-Plastic Scale.............
KC0R00 +	KNOB-Control (Red) Plastic.....
*ZP0I01 +	CABINET-Ivory..................

SERVICE INFORMATION

Alignment Procedure

Set volume control at maximum. Use low range on output meter and keep signal generator input as low as practical. Make adjustments as shown in table for maximum output - with output meter connected across voice coil.

Precautions

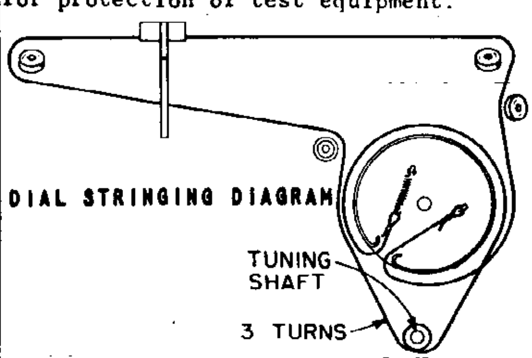
An isolating transformer should be used between the power supply and the receiver for protection of test equipment.

ALIGNMENT CHART

Before alignment begins, set middle of pointer over "Reference" line - with Gang Condenser completely closed -

CIRCUITS ALIGNED	DIAL POINTER	INPUT FREQUENCY	APPLY THROUGH	TO	ADJUST
I.F.	Max. to Right	455 K.C.	.01 Mfd	Input Grid 12BE6	C3a, C3b, C6a, C6b.
Broadcast	1475 Ref. Mark	1475 K.C.	50 Mmf	External Antenna Terminal	C1d C1b
Broadcast	965 Ref. Mark	965 K.C.	50 Mmf	"	Check Calibration*
Broadcast	580 Ref. Mark	580 K.C.	50 Mmf	"	Check Calibration*

* If calibration does not check within one pointer's width of the frequency mark, both oscillator and antenna sections of the gang condenser must be "knifed" properly.

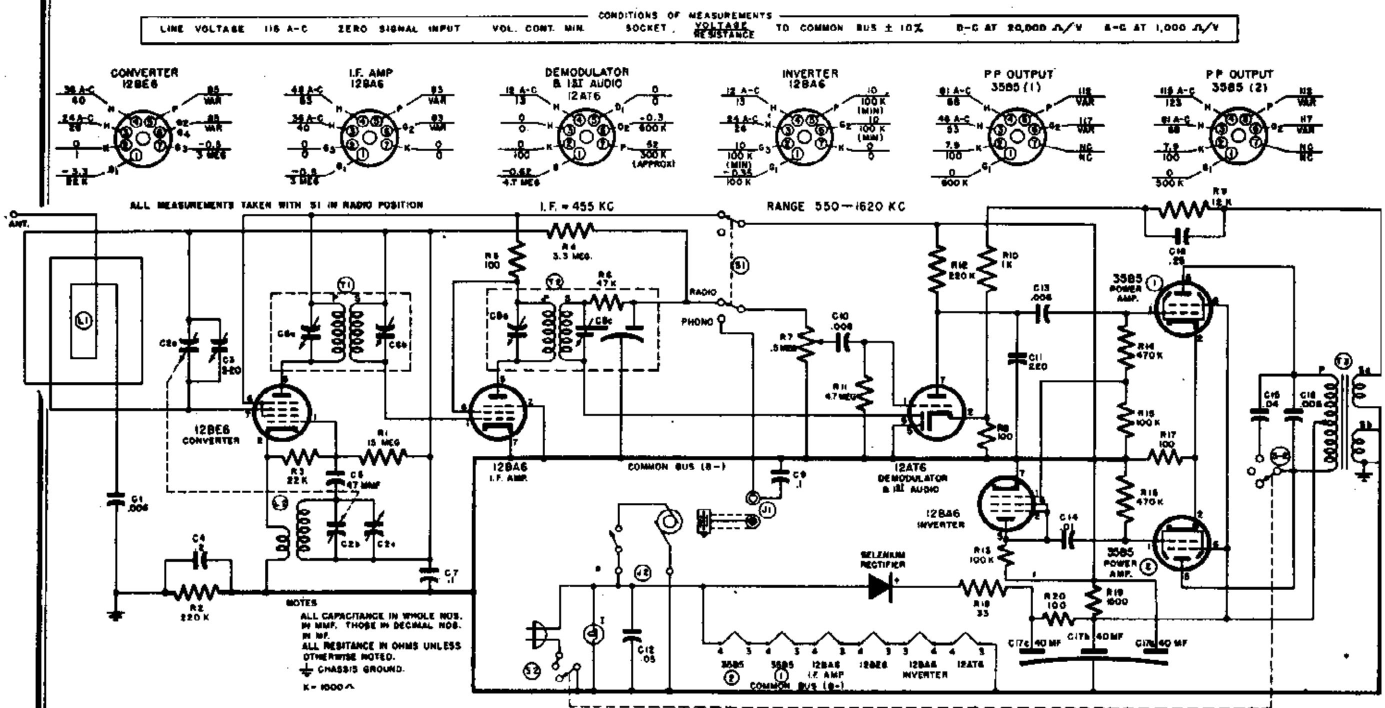


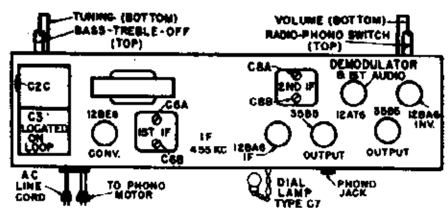
DIAL STRINGING DIAGRAM

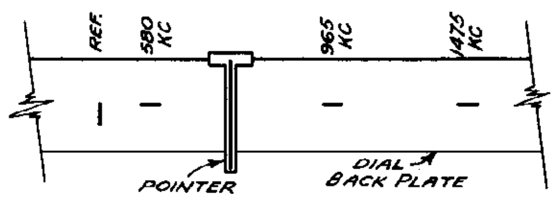
SPECIFICATIONS

Power
Voltage..........105-125 V. A.C. or D.C.
Frequency........50-60 Cycles per Second
Power Consumption................30 Watts
I.F. Frequency...................455 K.C.
Tuning Range.................540-1620 K.C.
Max. Power Output...............1.5 Watts
Loud Speaker..........................P.M.
Cone Diameter..................4 Inches
Voice Coil Impedance..400Cycles,3.2 Ohms

BENDIX RADIO DIV.







DIAL BACK PLATE REFERENCE MARKS

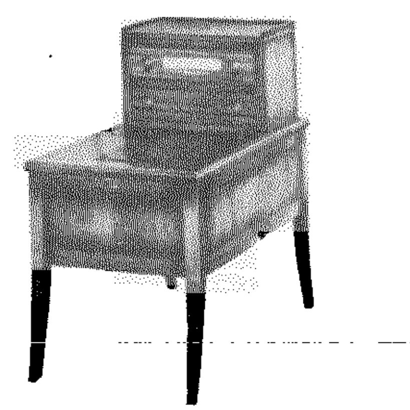
Alignment Procedure:

PRELIMINARY:
Close gang completely and set pointer directly over reference mark on back plate, Fig. 1. Connect output meter across voice coil on low scale. Rotate volume control full on, maximum clockwise. Rotate radio-phono switch to radio - full C.C.W.

PRECAUTION:
An isolating transformer should be used between the power supply and the receiver if the test equipment is AC operated.

GENERAL FREQ.	POINTER POSITION	APPLY THROUGH	TO	ADJUST FOR MAX. OUTPUT
455 KC	Max. to right	.01 Mfd	Input Grid 12BE6	C6A, C6B, C8A, C8B
1475 KC	Center of 1475 Ref. Mark	50 Mmfd or less	External Ant.Conn.	C2C, C3
965 KC	Approx. 965 Ref. Mark	"	"	* Check Calibration
580 KC	Approx. 580 Ref. Mark	"	"	"

* If calibration is not within limits inscribed on back plate, oscillator and antenna gang rotor sections must be bent.



MODEL 697A

BENDIX RADIO DIV.

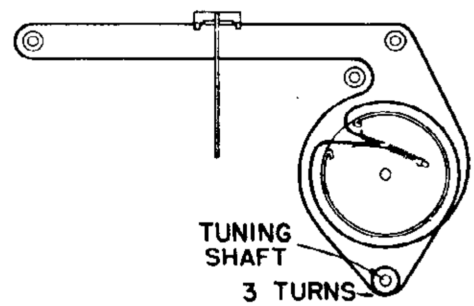
SPECIFICATIONS: Model 697A

6 Tube AC-DC and Selenium Rectifier

POWER
Voltage (Chassis only)............................105-125V AC or DC
Consumption (Including Changer)....................72 Watts, 60 Cycle AC
TUNING RANGE............................540 - 1620 K.C.
INTERMEDIATE FREQUENCY............................455 K.C.
TUBES

12BE6	Converter
12BA6	IF Amp.
12AT6	Demodulator & 1st Audio
12BA6	Inverter
35B5 (2)	Push Pull Beam Power Output

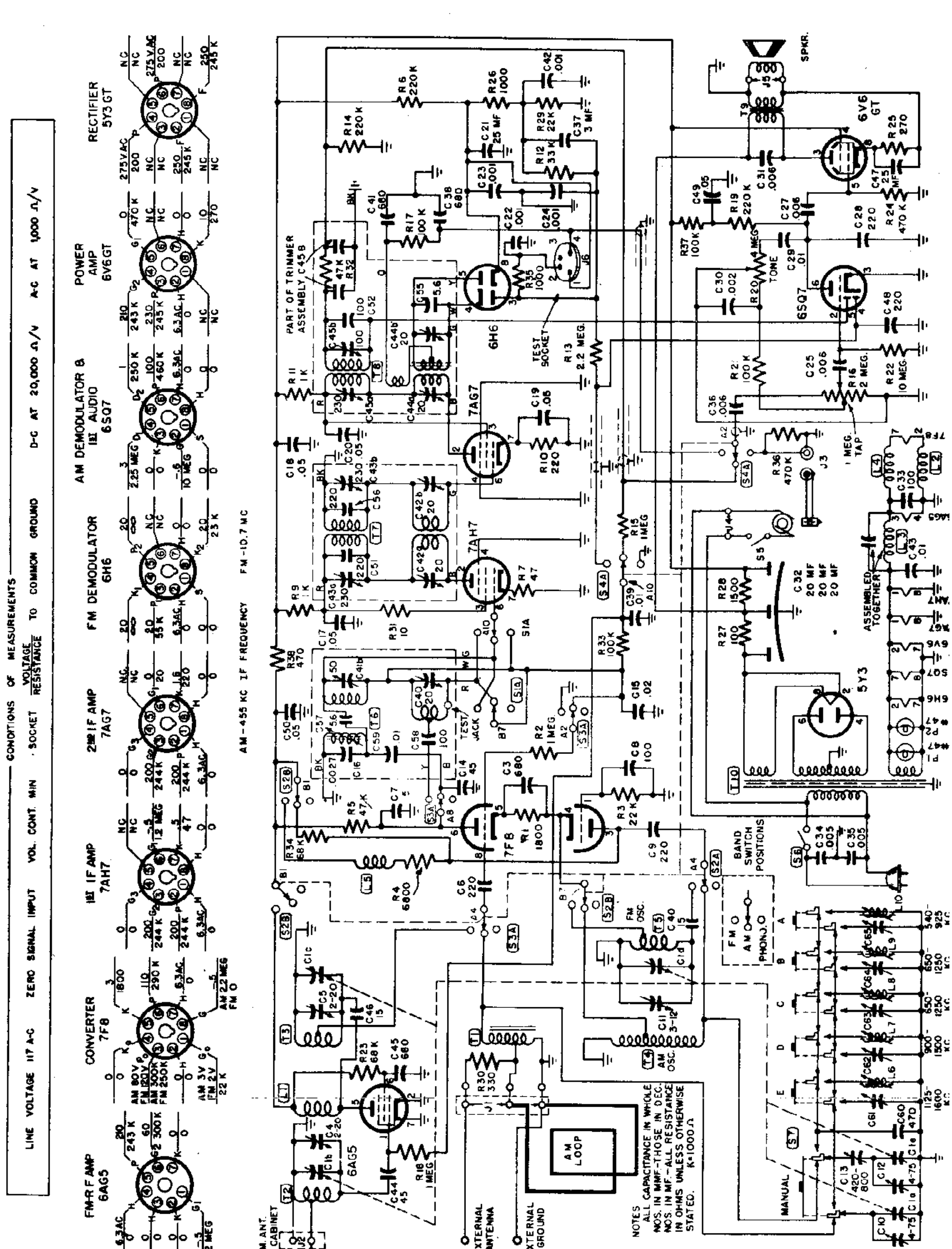
POWER OUTPUT (Max.)............................3.5 Watts
PICKUP............................High Impedance Crystal
LOUDSPEAKER --- PM
Cone Diameter............................8 Inches
V.C. Impedance - 400 Cycles............................3.2 Ohms
CABINET
28-5/8" high, 16-7/8" wide, 27-1/4" deep
Shipping Weight............................56 Pounds



DIAL STRINGING DIAGRAM

Stock Number		Description
		ELECTRICAL COMPONENTS
*AL0Z09		LOOP, Antenna Assembly........
CE3F00		CAPACITOR, Electrolytic, 40x 40x40 Mfd +100%-10% 150V....
CL2A08	+	CORD, A.C....................
CM5A14	+	CAPACITOR, Mica, 47 Mmf (C5)..
CM5A30	+	CAPACITOR, Mica, 220 Mmf (C11).
CP2T60	+	CAPACITOR, Paper, .25 Mfd 200V (C18).................
CP4T20	+	CAPACITOR, .006 Mfd, 400V (C10, C13, C16)............
CP4T31	+	CAPACITOR, Paper, .01 Mfd, 400V (C14)................
CP4T38	+	CAPACITOR, Paper, .04 Mfd, 400V (C15)................
CP4T40	+	CAPACITOR, Paper, .05 Mfd, 400V (C12)................
CP4T51	+	CAPACITOR, Paper, 0.1 Mfd, 400V (C7, C9).............
CP4T56	+	CAPACITOR, Paper Tubular, .2 Mfd 400V (C4)...............
CT1A16	+	CAPACITOR, Trimmer 1.8-18 Mmf (Loop Antenna)...........
CV0B04	+	CAPACITOR, Variable (C2).......
L05B01		COIL, Oscillator Assy. (L2)...
QR0S00		RECTIFIER, Selenium............
RC1G12	+	RESISTOR, Comp. 110 Ohms 1/4W (R8)
RC1G37	+	RESISTOR, Comp. 12,000 Ohms, 1/4W
RC1G51	+	RESISTOR, Comp. 100,000 Ohms, 1/4W (R13, R15).............
RC1G68	+	RESISTOR, Comp. 470,000 Ohms, 1/4W (R14, R16).............
RC1H12	+	RESISTOR, Comp. 100 Ohms, 1/4W (R5)
RC1H24	+	RESISTOR, Comp. 1,000 Ohms 1/4W (R10).................
RC1H40	+	RESISTOR, Comp. 22,000 Ohms, 1/4W (R3)..................
RC1H54	+	RESISTOR, Comp. .22 Meg, 1/4W (R2, R12)................
RC1H58	+	RESISTOR, Comp. .47 Meg. 1/4W..
RC1H68	+	RESISTOR, Comp. 3.3 Meg. 1/4W (R4)
RC1H70	+	RESISTOR, Comp. 4.7 Meg. 1/4W (R11)....................
RC1H76	+	RESISTOR, Comp. 15 Meg. 1/4W (R1).....................
RC4G26	+	RESISTOR, Comp. 1500 Ohms, 2W (R19)
RC4H12	+	RESISTOR, Comp. 100 Ohms, 2W, (R20)
RV0C01	+	POTENTIOMETER, 0.5 Meg. (R7)...
RW1B06	+	RESISTOR, Wirewound, 33 Ohms, 1 W (R18).................
RW1B12	+	RESISTOR, Wirewound, 100 Ohms 1 W (R17).................
TA0008		TRANSFORMER, Output...........
TI0C08		TRANSFORMER, I.F. Input (T1)..
TI0D11		TRANSFORMER, I.F. Output (T2).
*C7	+	LAMP, Type C 110 Volt.........
		MECHANICAL COMPONENTS
BT2S00	+	STRIP, Terminal (2 Terminal, 1 Mtg Lug.)...............
BT2S01	+	STRIP, Terminal (2 Terminal, 1 Mtg Lug.)...............
BT3S01	+	STRIP, Terminal (3 Terminal, 1 Mtg Lug.)...............
BT4S01	+	STRIP, Terminal (4 Terminal)..
CD0C11		CORD, Dial (Tuning & Pointer).
GR0S00	+	GROMMET, Shockmount............
HB0M44		BRACKET, Trimmer Mtg..........
HC0C03	+	CLAMP, Cable..................
HC0S00	+	CLIP, Spring..................
HC0S59		CLIP, External Cotter.........
HR0S08	+	RIVET, Shoulder...............
HS0C00	+	SPRING, Coil..................
HS0C60		SPRING, Dial Cable............
HS6F01	+	SLEEVE, Spacer................
ID0M12		INDICATOR.....................
IW0F00		WASHER, Insulating............
JR1S00	+	RECEPTACLE, Phono.............
MA0L00		LEVER, Arm Assembly...........
MB0B00		BEARING, Bushing..............
ML0M05		LINK, Lever Arm...............
ML0M06		LINK Connecting...............
MP0I00		PULLEY, Idler.................
MS0C02		SHAFT, Lever Arm Control......
MS0T10		SHAFT, Tuning.................
PA0S01	+	PLATE, Adapter................
PB0D03		PLATE, Dial Back Plate........
PI0P01	+	PLATE, Line Cord..............
SR2B01		SWITCH, Phono Radio (S1)......
SR3M00		SWITCH, Tone A.C. Single pole, 3 Position (S2)............
WE0Z04		WASHER, Felt, Control Knob Cushion....................
		CABINET & SPEAKER COMPONENTS-697A
BZ0A02		BASE, Cover...................
BZ0D11		BOARD, Baffle.................
DS0A21		DECAL, Assembly (Glass) 55-160KC
HK0R00	+	RING, Retainer................
HZ0G00	+	GLIDES, Metal Furniture.......
KY0M00	+	KNOB, Control.................
KY0M02	+	KNOB, Lower Panel.............
NP0M01	+	NEEDLE, Reproducing...........
PR0F00	+	PAD, Flat Rubber..............
*SP8R00		SPEAKER, 8" PM, (Less Transformer)
ZF0W00		DECAL, Assembly, Wood (Lower Panel).....................
ZL6G03		LID, Sliding Wood.............
*ZW6S00		CABINET, Assembly (BW81C).....
		GENERAL HARDWARE
		LOCKWASHER, #8................
		SCREW, #8, Wood...............
		SCREW, #5 Round Head..........
		SCREW, Speaker................
		TEENUT, Motorboard 10-24......
		NUT, Square, 8-32.............
		PALNUT, 8-32..................
		SCREW, #6, Self Tapping.......
		SCREW, #8, Self Tapping.......
		SCREW, #8-32 x 1/2" Rd. Hd....
		SCREW, #8-32 x 5/16" R. Hd....
		SCREW, #8-32 x 1/4" Bd. Hd....
		SCREW, #8-32 x 7/8" Bd. Hd....
		NUT, 8-32 Hex.................
		SCREW, Rd. Head...............
		NUT, 3/8-32 Palnut............
		NUT, 8-32 Hex.................
		WASHER, Flat..................
		WASHER, Flat..................
		WASHER, Flat..................
		WASHER, Spring................

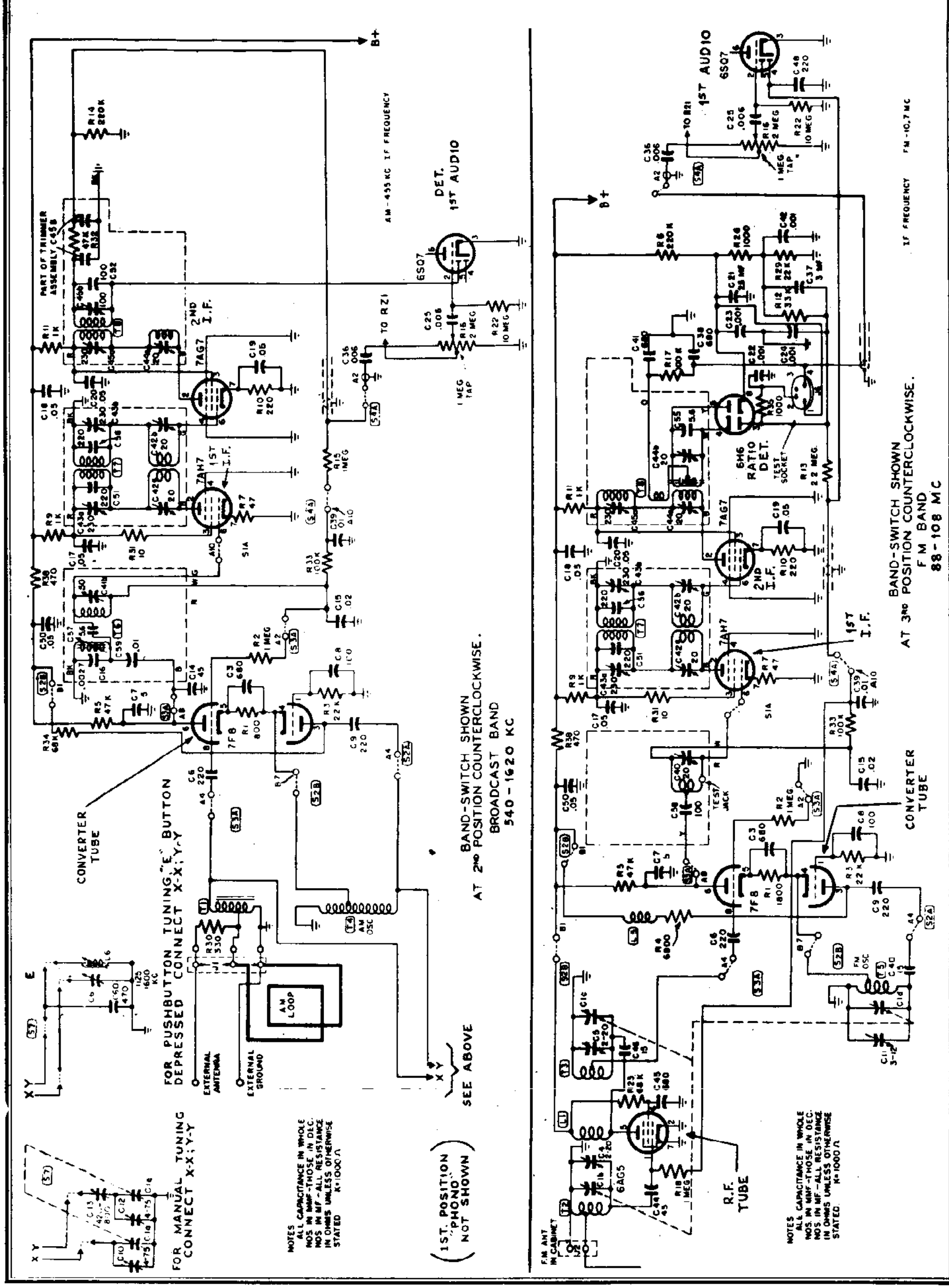
BENDIX RADIO DIV.



"clarified schematics"

MODEL 847B

BENDIX RADIO DIV.



FM ALIGNMENT

For reference marks see Fig. 3
Rotate gang condenser fully closed and set pointer to reference mark
Trimming screwdriver must be 100% insulated

A - CW METER METHOD

Generator output - pure RF or amplitude modulated
VTVM must not be AC-DC, or with GND. connected to AC line or through resistor

Gen. Freq.	Dummy Ant.	Gen. To	Band Sw. Position	Pointer Setting	Special Conditions	VTVM Connections	Adjust	Remarks
10.7 mc.	.01 mfd	Term. #3 on gang & chassis	FM-Full counter-clockwise	-------	Short FM osc. term. #5 to chassis	Test socket pins #1 (+) & #2 (-) Low Scale	1st IF-C40 2nd IF-C42A C42B 3rd IF-C44A for max. output on VTVM	Realign several times to assure max. output Signal may be fed into "Test Jack" in 1st IF can for prel. align. of C44A, C42A & C42B.
10.7 mc.	"	"	"	------	"	*Center of jumper resistors & test sock. Pin #4 - Fig. #2.	3rd. IF-C44B To zero reading on VTVM	**Alternate step #1 (C44A for max. output) & step #2 (C44B for zero) several times to assure correct alignment
106 mc.	Std. FM Fig. #4	FM ant input term's.	"	106 mc. refer. mark	Remove short from osc. term. #5	Test socket pins #1 (+) & #2 (-) Low scale	***Osc. -C11 RF -C5 Ant -C4 for max. output on VTVM	"Rock" tuning control during alignment
97 mc.	"	"	"	Approx. 97 mc ref. mark	---------	"	-----------	****Check Calibration
90 mc.	"	"	"	Approx. 90 mc. refer. mark	---------	"	-----------	****Check Calibration

* See Fig. #2 "Test Circuit for FM Alignment".

** A VTVM with a zero center scale is very convenient for use in this alignment step. A50 microammeter may be used in place of the VTVM, but is not as accurate.

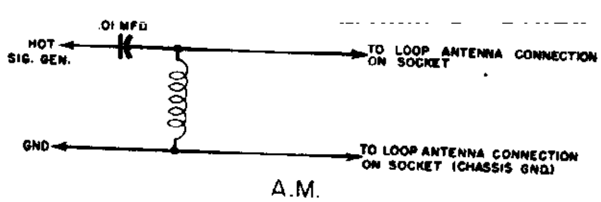
*** The oscillator circuit has been designed to operate on the high freq. side of the incoming signal. It is possible to adjust the trimmer (C11) at 106 MC such that the osc. is operating on the "image" or low freq. side of the signal. To check the osc. (C11) adjustment, set sig. gen. to 84.6 MC, freq. modulated, dial pointer at 106 MC. If signal is <u>NOT</u> heard, adjustment of C11 is correct, but if signal <u>IS</u> heard, osc. trimmer C11 has been incorrectly adjusted on the "image" frequency. Readjust C11 to other setting at 106 MC and recheck with gen. freq. at 84.6 MC. Signal <u>MUST</u> <u>NOT</u> be heard with pointer at 106 MC and sig. gen., freq. modulated, set at 84.6 MC.

**** If calibration is not within reasonable tolerance at these points, the osc. coil inductance must be adjusted. If dial pointer reading is on low freq. side, inductance is too low, and turns must be compressed slightly. If pointer reading is on high freq. side, osc. coil is too high and coil turns must be spread slightly.

To check and adjust inductance of ant. and RF coils, tune receiver to 90 MC signal and observe AVC reading. Insert iron core end of "tuning wand" into RF coil, at same time rocking tuning control to max. AVC. If reading increases as wand is inserted, RF coil inductance is too low and turns must be compressed slightly. If reading decreases, reverse wand and insert metal end into coil, again rocking tuning control to max. AVC. If reading decreases, (after iron core check), inductance is properly adjusted. If reading increases, inductance is too high and turns must be spread slightly.

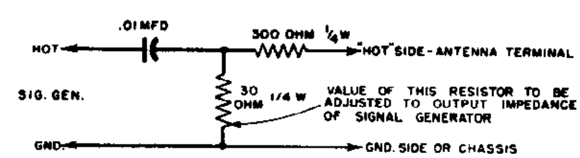
Ant coil is checked and adjusted exactly like RF coil.

NOTE: THE LATTER OPERATIONS ARE VERY DELICATE AND DIFFICULT PROCEDURE AND MUST BE ATTEMPTED ONLY BY TECHNICIANS WITH CONSIDERABLE HIGH FREQUENCY EXPERIENCE.



A.M.

COIL FOR 847B IS 3.7 MICRO-HENRY



F.M. DUMMY ANTENNA

FIG. 4 - DUMMY ANTENNA FOR 847-B

 BENDIX RADIO DIV.

FM ALIGNMENT

B - Visual Method.

Gen. Freq.	Gen. Mod.	Dummy Ant.	Generator to	Band SW. Position	Special Conditions	Dial Setting	VTVM Conn	Oscillo-scope	Adjust	Remarks
10.7 MC	Pure RF or Amplitude	.05 mfd	High side to Term. #3 Gang Cond. Low side to chassis	FM-Max. CCW.	Short Osc. Stator-Term. #5 to Chassis Gnd.	-------	Test Socket Pins #1 (+) & #2 (-) Low Scale	No conn.	1st IF C40 2nd IF C42A, C42B 3rd IF C44A	Adjust for maximum output on low range of VTVM - Realign each Cond. several times to assure max. output. Signal may be fed into "test jack" in 1st IF can for Prelim. Alignment of C44A, C42A & C42B.
Approx. 10.7 MC Adjust until Ratio Detector curve is centered on Horiz Scope Sweep Line	Freq. Mod. 60 Cy-Sweep width max. possible (should be 200 KC Min)	"	"	"	"	-------	No connection	Connect vert. input to Test Socket Pins #4 & Chassis Gnd.	3rd IF C44B	*Adjust for max. symmetrical "S" curve similar to Fig. 5. Alternate adjs. of C44A & C44B to obtain Max desired curve.
106 MC	"	Std. FM Fig. 4	FM Ant. Terms's thru dummy	"	Remove short from Term #5.	106 MC ref. mark	No connection	"	FM Osc. C11	**Adjust until "S" curve is centered on Horiz. Sweep scope line.
106 MC	"	"	"	"	----------	"	"	"	FM RF Trimmer C5. FM Ant. Trimmer C-4.	Adj. for Max. height of "S" pattern-"rock" tuning control at same time to keep "S" curve centered on Scope.
97 MC	"	"	"	"	---------	Approx. 97 MC ref. mark	"	"	------	***Check Calibration
90 MC	"	"	"	"	---------	Approx. 90 MC ref. mark	"	"	------	***Check Calibration

* Some phase shift between the Signal Generator and the scope horizontal sweep may be encountered, resulting in a double trace pattern, shown in Fig. 6. In some Oscilloscopes, provision is made for connecting this phase shift directly in the oscilloscope circuit. If so, rotate the "phase shift" control until the curves coincide as in Fig. 5. If no provision is made in the scope, the connection might be accomplished by inserting a condenser of suitable value in series with the signal generator "Synchronized Sweep Voltage" output. The condenser value will depend upon the amount of phase shift and the horizontal input impedance of the scope - approximate condenser range .01 to .1 mfd. See Fig. 7 for Instrument connection diagram.

** See *** Page 5.

*** If calibration is not within tolerance at these points, the inductance of local FM oscillator coil, RF and antenna coils must be adjusted. See **** Page 5.

NOTE: The latter operation is a very delicate and difficult procedure, and must be attempted only by technicians of considerable high frequency experience.

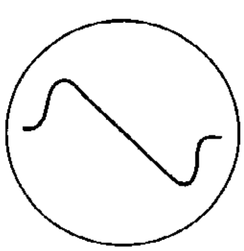


Fig. 5

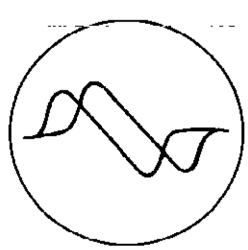


Fig. 6

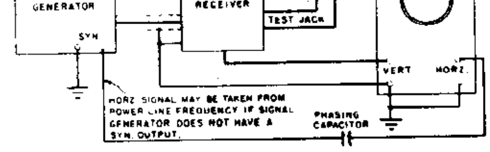
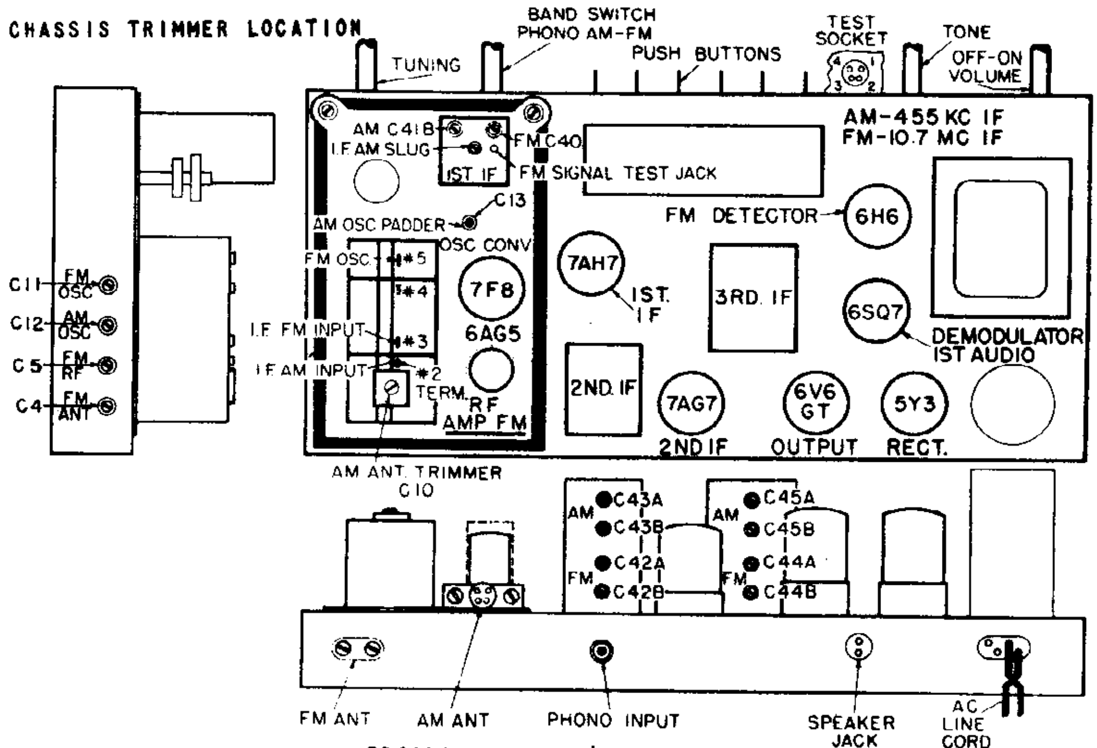


Fig. 7

FIG. 1 - CHASSIS TRIMMER LOCATION



BROADCAST BAND ALIGNMENT

See Fig. 1 for trimmer locations.
Rotate gang condenser until full closed. Set pointer to reference mark. See Fig. 3.
Connect output meter across voice coil on lowest scale.
Signal Generator amplitude modulated.
Rotate volume control full ON. Keep generator output low as practical.

Apply	Thru	To	Band Switch Position	Dial Setting	Adjust
455 KC	.05 mfd.	Term. #2 gang cond. & chassis	AM-mid-position	Gang cond. full open	IF slug, C41B, C43A, C43B, C45A, C45B for max output
580 KC	Bendix dummy loop ADOLOO	Dummy loop plugged in AM ant. socket on rear of chassis	"	580 KC ref. mark	C13 for max. output
1475 KC	"	"	"	1475 KC ref. mark	*C12,C10 for max. output
580 KC	"	"	"	Approx. 580 KC ref. mark	C13 for max. output "Rock" gang during adjustment
965 KC	"	"	"	Approx. 965 KC ref. mark	**Check Calibration
580 KC	"	"	"	Approx. 580 KC ref. mark	**Check Calibration

* Repeat 1475 KC and following 580 KC adjustment in rotation several times until receiver is properly aligned.

** If calibration does not check within 10 KC, "knife" oscillator and antenna gang sections. The latter operation must be attempted by experienced technicians only.

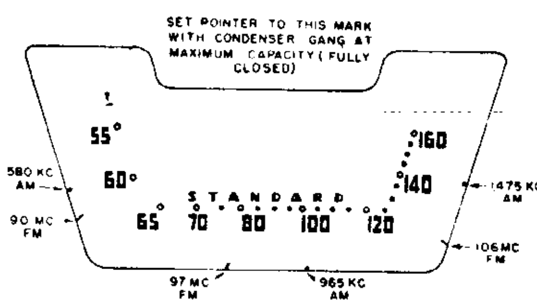
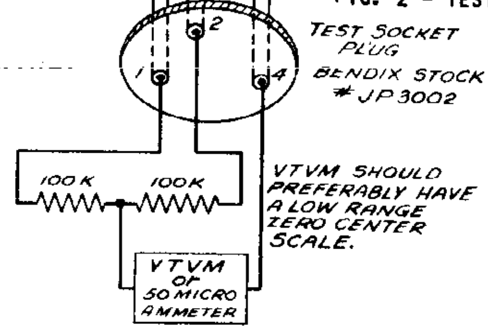


FIG. 3 - ALIGNMENT REFERENCE POINTS

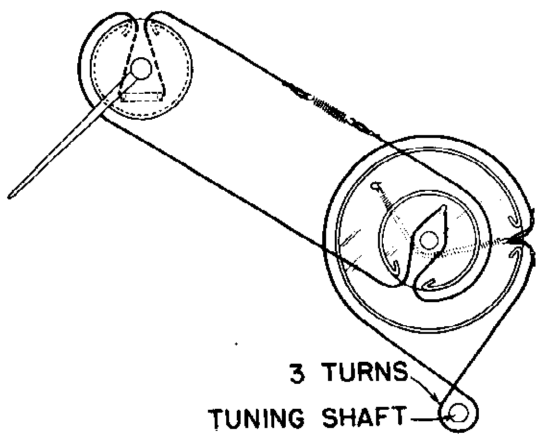
TEST CIRCUIT FOR DEMODULATOR TRANSFORMER ALIGNMENT

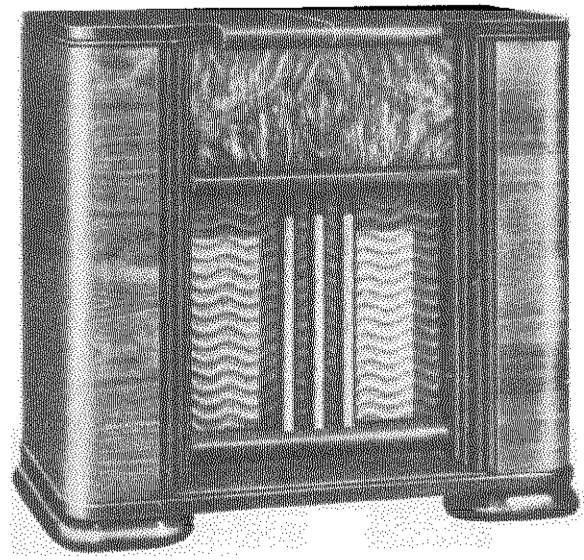
FIG. 2 - TEST CIRCUIT FOR FM ALIGNM

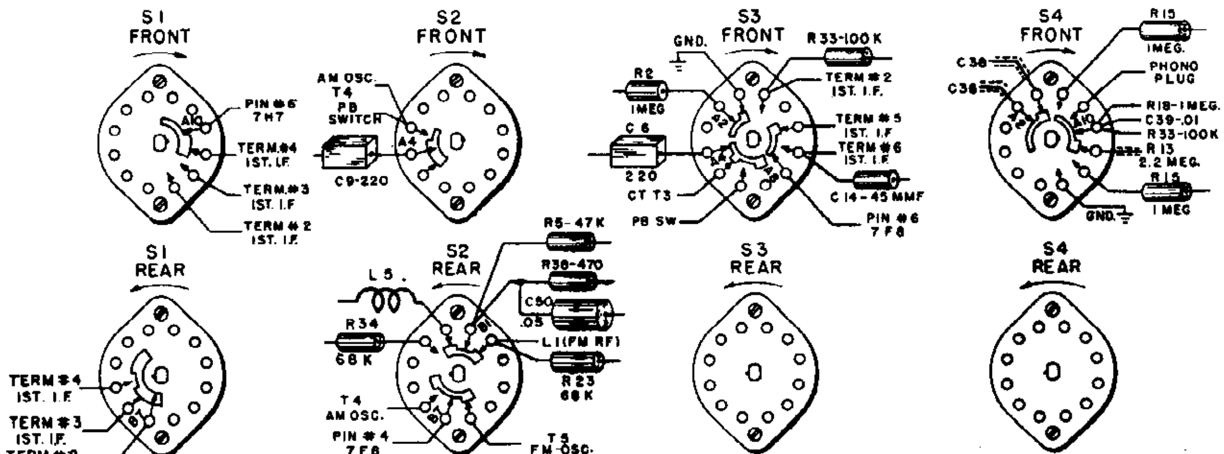


MODEL 847B

BENDIX RADIO DIV.







BAND SWITCH SECTIONS

SPECIFICATIONS

POWER
Voltage....................105-125 VAC
Frequency..................60 Cycles
Consumption................100 Watts

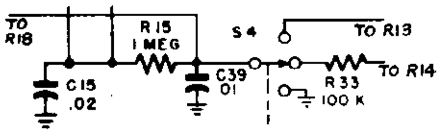
TUNING RANGE
AM.........................540-1620 KC
FM.........................88-108 MC

INTERMEDIATE FREQUENCY
AM.........................455 KC
FM.........................10.7 MC

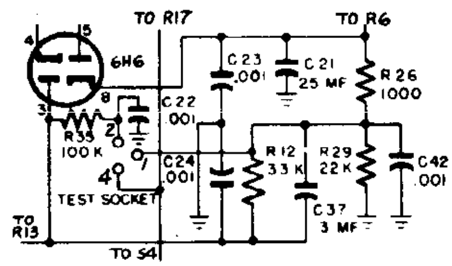
POWER OUTPUT
Maximum....................4.2 Watts

LOUDSPEAKER - PM.
Cone diameter..............10 inches
VC impedance at 400 cycle.......3.2 ohms

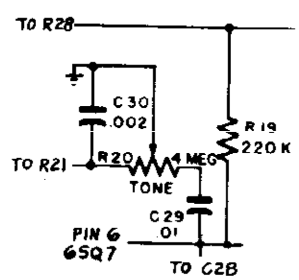
CABINET
33" high, 34-1/2" wide, 18-3/16" deep
Shipping Weight............95 pounds



Values of R15 & R33 Changed



Test Socket Connection Changed



R37 Not Used

CIRCUITS USED ON EARLY MODELS

BENDIX RADIO DIV. MODEL 847

REPLACEMENT PARTS LIST

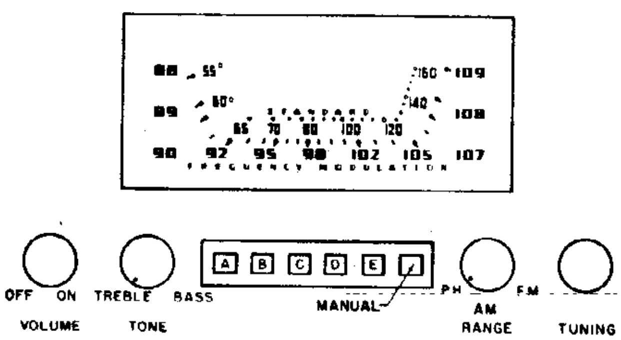
Stock Number	Description
AL0Z08*	Assy. Antenna FM Loop
AR0B00	Assy. R.F. Osc. Chassis Assy
CC8A24	Capacitor, Ceramic 15 mmf 500V (C46)
CC8A30	Capacitor, Ceramic 45 mmf 500V (C14, C44)
CC0F18	Capacitor, Ceramic 4.7 mmf 500V (C7)
CC0F19	Capacitor, Ceramic 5.6 mmf 500V (C55, C57)
CE3A01 +	Capacitor, Electrolytic 3 x 20 mfd 450V (C32)
CE1T00	Capacitor, Electrolytic 25 mmf 25 V.D.C. (C21, C47)
CE1T01	Capacitor, Electrolytic 3 mfd 50V (C37)
CL2A02 +	Cord, A C Line Brown
CM4A42	Capacitor, Mica 680 mmf 300V (C38, C41, C45)
CM5A22 +	Capacitor, Mica 100 mmf 500V (C33)
CM5A30 +	Capacitor, Mica 220 mmf 500 V.D.C. (C28, C48)
CM6A22	Capacitor, Mica 100 mmf 500V (C52)
CM7A30	Capacitor, Mica 220 mmf 500V (C51, C56)
CM4L42	Capacitor, Mica (Low Loss) 680 mmf 300V (C3)
CM5L03	Capacitor, Mica (Low Loss) 15 mmf 500V (C40)
CM5L22	Capacitor, Mica (Low Loss) 100 mmf 500V (C8)
CM5L30	Capacitor, Mica (Low Loss) 220 mmf 500V (C6, C9)
CM8S50 +	Capacitor, Mica 470 mmf 500V. D.C. (C60)
CP2M10	Capacitor, Paper .001 mfd. 200V (C22, C23, C24, C42)
CP4M34	Capacitor, Paper .02 mfd 400V (C15)
CP4M51	Capacitor, Paper .1 mfd 400V (C59)
CP4T31 +	Capacitor, Tubular Paper .01 mfd 400V 10% (C29)
CP4T40 +	Capacitor, Tubular Paper .05 mfd 400V (C17, 18, 19, 20, 49, 50)
CP6T12 +	Capacitor, Tubular Paper .002 mfd 600V (C30)
CP6T18 +	Capacitor, Paper .005 mfd 600V D.C. (C34, C35)
CP6T20 +	Capacitor, Paper .006 mfd 600V (C25, 27, 31, 36)
CP6T31 +	Capacitor, Paper .01 mfd 600V (C39, 43)
CT1A03 +	Capacitor, Trimmer 12 - 160 mmf (C61, 62)
CT1A04 +	Capacitor, Trimmer 45 - 370 mmf (C63, 64)
CT1A05 +	Capacitor, Trimmer 120 - 580 mmf (C65)
CT1A09	Capacitor, Trimmer 3 - 13 mmf (C11)
CT1A10	Capacitor, Trimmer 4 - 75 mmf (C10)
CT1A11	Capacitor, Trimmer 475-1000 mmf (C13)
CT1C00	Capacitor, Trimmer 2 - 20 mmf (Ceramic Insulator) (C4, 5)
CT1C01	Capacitor, Trimmer 4 - 75 mmf (Ceramic Insulator) (C12)
CV0D00	Capacitor, Variable (2 Section AM - 3 Section FM) (C1)
LF0A00	Coil RF Choke (T11, T12)
LF0A01	Coil, Choke R.F. (L1, L5)
LF0C00	Coil, Filament Choke Assy (L3)
LO8B00	Coil, Oscillator A.M. (T-4)
LO8F00	Coil, Oscillator F.M. (T-5)
LT0A03	Coil, Pushbutton Osc. Assy. Color Code Yellow (L-10)
LT0A04	Coil, Pushbutton, Osc. Assy. Color Code Green (L8, L9)
LT0805	Coil, Pushbutton Osc. Assy. Color Code Black (L6, L7)
RC4D26	Resistor, Comp. 1500 Ohm, 2W (R-28)

Stock Number	Description
RC2G16	Resistor, Comp. 220 Ohms 1/2W
RC2G27	Resistor, Comp. 1800 Ohms 1/2W (R1)
RC1H18	Resistor, Comp. 330 Ohms 1/4W (R30)
RC1H20 +	Resistor, Comp. 470 Ohms 1/4W (R38)
RC1H24 +	Resistor, Comp. 1000 Ohms 1/4W (R35)
RC1H40 +	Resistor, Comp. 22,000 Ohms 1/4W (R3, R29)
RC1H42 +	Resistor, Comp. 33,000 Ohms 1/4W (R12)
RC1H44	Resistor, Comp. 47,000 Ohms 1/4W (R32)
RC1H51 +	Resistor, Comp. 100,000 Ohms 1/4W (R17, 21, 33, 37)
RC1H54 +	Resistor, Comp. 220,000 Ohms 1/4W (R6, 14, 19)
RC1H58 +	Resistor, Comp. 470,000 Ohms 1/4W (R24, 36)
RC1H62 +	Resistor, Comp. 1 Meg 1/4W (R2, 15, 18)
RC1H66 +	Resistor, Comp. 2.2 Meg. 1/4W (R13)
RC1H74 +	Resistor, Comp. 10 Meg. 1/4W (R22)
RC2H00	Resistor, Comp. 10 Ohms 1/2W (R31)
RC2H06	Resistor, Comp.47 Ohms 1/2W (R7)
RC2H16	Resistor,Comp. 220 Ohms 1/2W (R10)
RC2H24	Resistor, Comp. 1,000 Ohms 1/2W (R9, 11, 26)
RC2H34	Resistor, Comp. 6,800 Ohms 1/2W (R4)
RC2H44	Resistor, Comp. 47,000 Ohms 1/2W (R5)
RC2H46	Resistor, Comp. 68,000 Ohms 1/2W (R23, 34)
RV4C00	Potentiometer, Tone 4 Meg. (R20)
RV4S10	Potentiometer, 2 Meg. (R16)
RW2A12	Resistor, Wirewound 100 Ohms 2W (R27)
RW1B34	Resistor, Wirewound 270 Ohms 1W (R25)
SP0R00*	Speaker, PM 10" Round
ST0100	Core, Iron
TA0007	Transformer, Audio Output (T9)
TI0C06	Transformer, I.F. 1st T6
TI0D08	Transformer, I.F. 3rd T8
TI0100	Transformer, I.F. 2nd T7
TP0J00	Transformer, Power T10
TR8B00	Transformer, Ant. Coil T1
TR8F00	Transformer, Ant. R.F. (FM)
TR8P00	Transformer Interstage FM Mixer Coil T3
#44 +	Lamp, Pilot
	MECHANICAL COMPONENTS
AB0C01	Assy. Pushbutton Switch
AD0E00	Assy. Dial Back Plate
AS0P00	Assy. Shaft & Pulley
BP0B00	Pushbutton
BT1S00 +	Strip Terminal (1 Terminal)
BT1S01 +	Strip Terminal
BT1S03	Strip Terminal (1) Mtg. 1 Lug
BT2S00 +	Strip Terminal
BT3S00 +	Strip Terminal
BZ0D08	Baffle & Cloth Assy
CD0C09	Dial, Cord (Indicator)
CD0C10	Dial, Cord (Tuning)
DS0A19	Dial, Scale (88-109 MC) Paper
DS0A20	Dial, Standard Broadcast
DZ0F08	Decal, Nameplate
DZ0F09	Decal, Volume
DZ0F10	Decal, Tone
DZ0F11	Decal, Range
DZ0F12	Decal, Tuning
ES0M02	Escutcheon 6 Pushbutton
ED0M01	Escutcheon, Dial
GR0100	Grommet, Rubber Insulating
GR0101	Grommet, (Color Code Black)
GR0S09	Grommet, Shockmount
GR0S10	Grommet, Rubber Shockmount
HB0M15	Bracket, Pointer Bearing Mtg.
HB0M16	Bracket, Pushbutton Mtg.

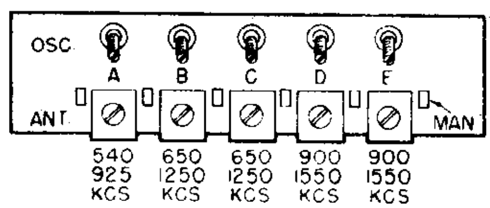
MODEL 847B BENDIX RADIO DIV.

REPLACEMENT PARTS LIST—*cont.*

Stock Number	Description
HBOM17	Bracket, Tuning Shaft Bearing....
HBOM18	Bracket, Antenna Plug Mtg........
HBOM19	Bracket, Shockmount..............
HBOM20	Bracket, Terminal................
HBOM21	Bracket, Bearing Pointer Support.
HBOM22	Bracket, Variable Condenser......
HCOC00 +	Clip, Retainer...................
HCOC03 +	Clamp, Dial Cable................
HCOC06 +	Clip, Coil.......................
HCOS06 +	Clip, Binding Post Spring........
HCOS09 +	Clip, Retainer, Ring Knob........
HCOS26	Clip, Washer "C" Blued Finish....
HKOR00 +	Clip, Retainer, Ring.............
HP6T01	Pin, Threaded 6-32...............
HSOC00 +	Spring...........................
HSOP16	Sleeve, Spacer...................
HSOP17	Spacer 3/8" OD 1/4" ID 1/2" Lg Steel.....................
HSOS05	Spacer, Thread Shoulder..........
HZOG01 +	Glides, Metal....................
HZOH00 +	Hinges, Statuary Brze (2 Lids)...
HZOS06	Lid Support L.H. Stat. Brze......
HZOS07	Lid Support, RH Stat. Brze.......
IDOM10	Indicator, Dial..................
JP1002 +	Plug 1 Contact, Male.............
JP2004	Plug 2 Contact...................
JP3000	Cable, Assy., AM Loop............
JP3002	Plug, 3 Contact..................
JR2006	Receptacle 2 Contact.............
JR3000	Receptacle 3 Contact.............
KBOR01 +	Knob, Control Indexed Push On....
KCOR06 +	Knob, Control, Brown.............
MAOT00	Adapter, Slug Adj. Screw 4-40....
MBOB02	Bushing, Tuning Shaft............
MSOT06	Shaft, Tuning....................
NPOM01 +	Needle, Reproducing..............
PFOB00 +	Pads, Felt Bumper................
SMOB00	Shield Base Min. Tube............
SMOT03	Shield Miniature Tube............
SOOD04 +	Socket, Dial Light...............
SOOD05 +	Socket, Dial Light...............
SO7M05	Socket, Miniature Tube Zip in Type
SO8L01 +	Socket, Moulded Locktal..........
SO8S01	Socket, Octal....................
SR3G00	Switch, Rotary 3 Position 4 Wafer..
SS6P00	Switch, 6 Pushbutton SW-2........
TBOP00	Call Letter Tabs.................
WPOB00 +	Windows, Pushbutton..............
WPOD00	Window, Dial.....................
XSOC01	Strip, Copper .004 x 5/16 x 1-3/16.
XSOC02	Strip, Copper .004 x 5/16 x 1-5/8..
XSOZ01 +	Strip, Fishpaper.................
XSOZ02 +	Strip, Fishpaper.................
XSOZ09	Strip, Fishpaper.................
ZL8G00	Lid, Console AM, FM..............
ZW8G00 *	Cabinet, Platt 0026 (Walnut).....
	STANDARD HARDWARE
+	Palnut (6-32)....................
+	Nut, Hexagon 4-40................
+	Nut, Hexagon 8-32 Steel..........
+	Nut #8-32 N.P....................
+	Nut 10-32 Hex (C.P.).............
+	Lockwasher, #8...................
+	Screw, Self-Tapping #8 x 1/4" Lg..
+	Screw #8 (1/2" Self Tapping).....
+	Screw, 5/16 #6-32................
+	Screw, 1/2" #8-32................
+	Screw 1/2" #1/4-20...............
+	Screw, 3/4" #4-40................
+	Screw, 1" - 1/4-20...............
+	Screw Binder Head 6-32 x 1/4.....
HROP01 +	Rivet, Tubular .121 Dia. x 1/8" Lg
HROP00 +	Rivet, Tubular .121 Dia. x 13/64"Lg
HROP06 +	Rivet, Tubular .121 Dia. x 14/64"Lg
+	Washer, Flat.....................
WFOF14 +	Washer, Insulating...............
+	Washer, Flat.....................
HL6S04 +	Lug, Soldering...................
+	Screw, #6 5/8" Lg Statuary Brze..
+	Screw, #5 Rd.Hd.Steel Bright Finish
+	Lockwasher #4....................
+	Lockwasher #6....................
+	Washer, Lock.....................
+	Washer, Lock.....................
+	Palnut 3/8 x 32..................
+	Screws, Speaker..................
+	Teenuts, Chassis Board...........
+	Teenuts, Motor Board.............
+	Lockwasher.......................



Controls--The various controls are shown in the above drawing. Controls as arranged from left to right are: Volume control, Tone control, Pushbuttons, Range control, and Tuning control. Tone Control rotates to the Bass position in a clockwise direction, to the Treble position in the counterclockwise direction. The range switch is in F.M. position at maximum CCW, broadcast position is mid-position, and phono position is maximum clockwise.



Pushbuttons--The adjustment position of the pushbutton assembly is shown below. Pushbutton operation is provided by rotating the band switch to the center position and depressing the desired Pushbutton. The extreme right hand pushbutton is depressed when MANUAL tuning operation is desired.

Access to the adjustment screws is obtained by pulling the Pushbuttons off the shaft vertically. The osc. and antenna adjustment screws, with the Pushbutton frequency ranges, is shown in the above diagram.

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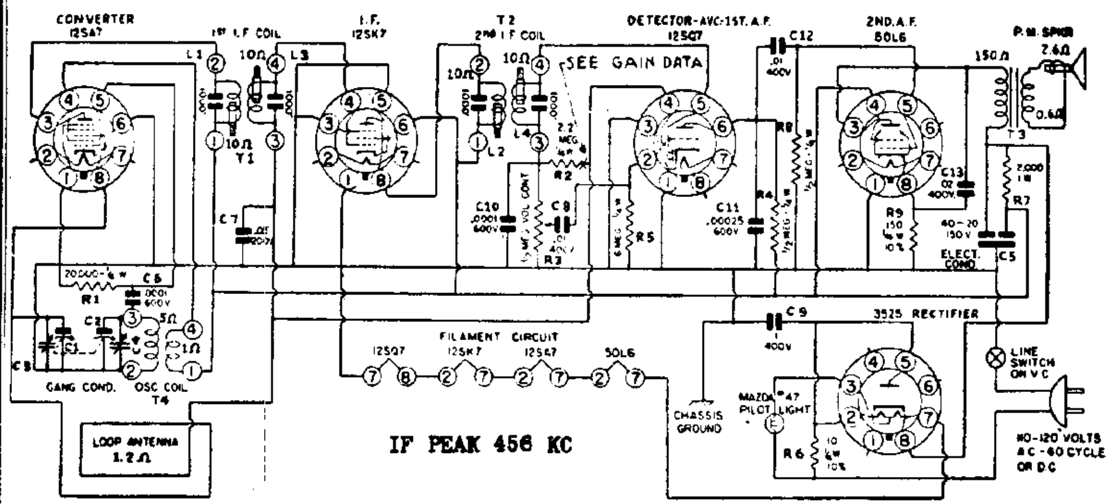
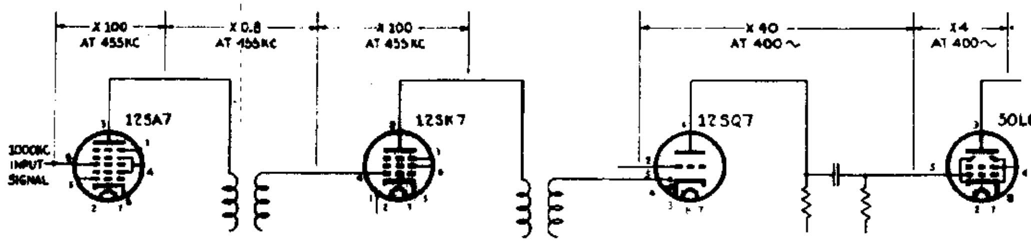


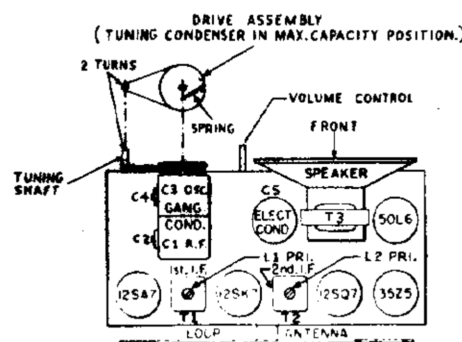


APPROXIMATE GAIN PER STAGE DATA

IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND.

TUBE	PIN	VTVM	D-C VOLTAGE 20,000 OHMS PER VOLT	1000 OHMS PER VOLT	RESISTANCE
12SA7	1	0	0	0	0
	2	0	0	0	26
	3	+80	+80	+80	5,000,000
	4	+80	+80	+80	5,000,000
	5	-6	-5.6	-2.6	19,000
	6	0	0	0	0
	7	0	0	0	40
	8	-1	-0.4	-0.4	5,000,000
12SK7	1	0	0	0	0
	2	0	0	0	16
	3	0	0	0	0
	4	-1	-0.4	-0.4	5,000,000
	5	0	0	0	0
	6	+80	+80	+76	5,000,000
	7	0	0	0	26
	8	+80	+80	+78	5,000,000
12SQ7	1	0	0	0	0
	2	-1.2	-0.8	-0.5	10,000,000
	3	0	0	0	0
	4	-1	-0.45	-0.4	5,000,000
	5	-0.7	-0.5	-0.2	500,000
	6	+54	+48	+42	5,000,000
	7	0	0	0	15
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+125	+120	+120	5,000,000
	4	+80	+80	+80	5,000,000
	5	0	0	0	450,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+5.2	+5	+5	140
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	8	130	125	125	5,000,000

The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the Standard Hazeltine Model 1150 loop, and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc. Adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L2, L3, L1. Set the generator and receiver to 1600 Kc and adjust oscillator trimmer C4 for maximum output. Set the generator and receiver to 1400 Kc and



MODEL 1A5

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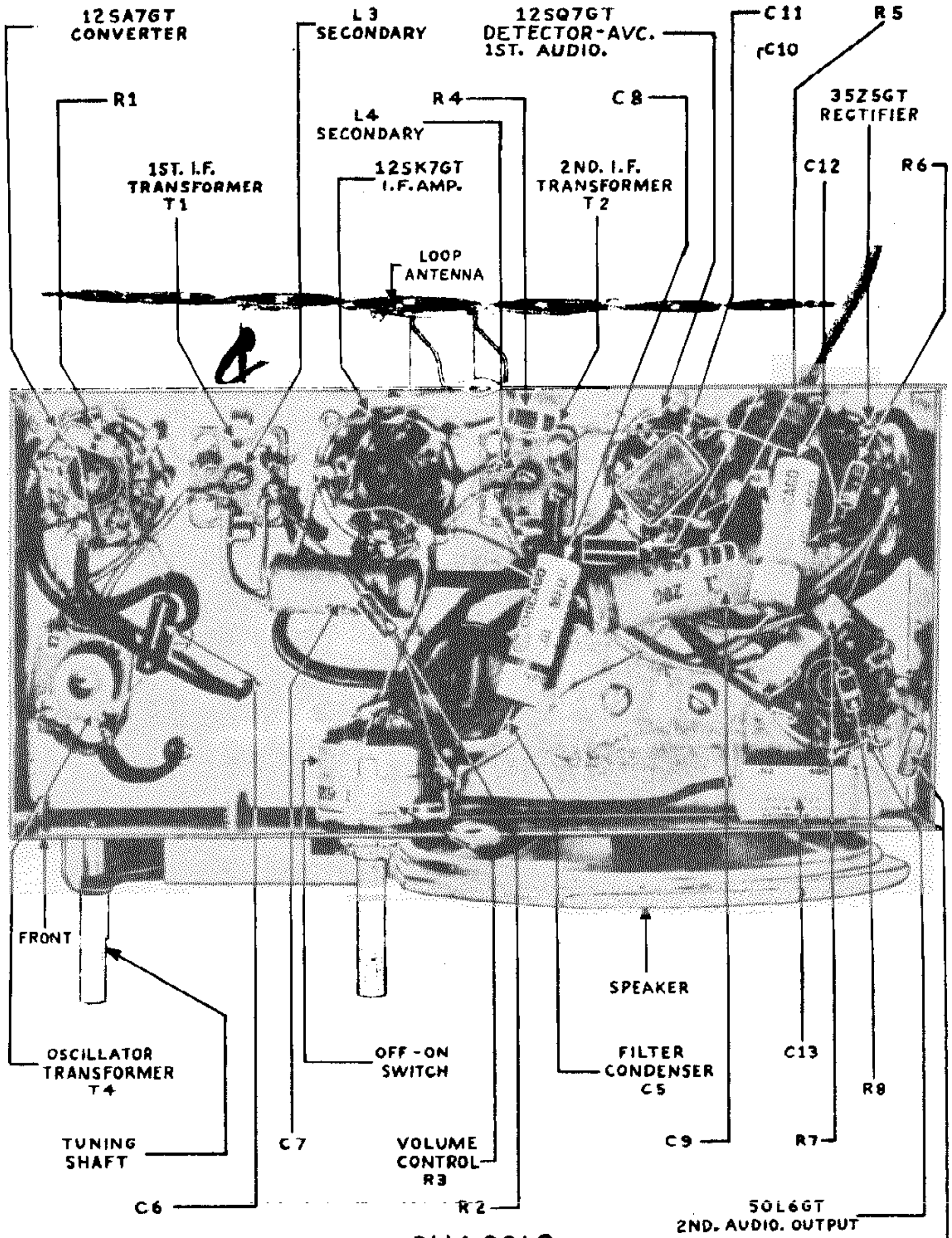
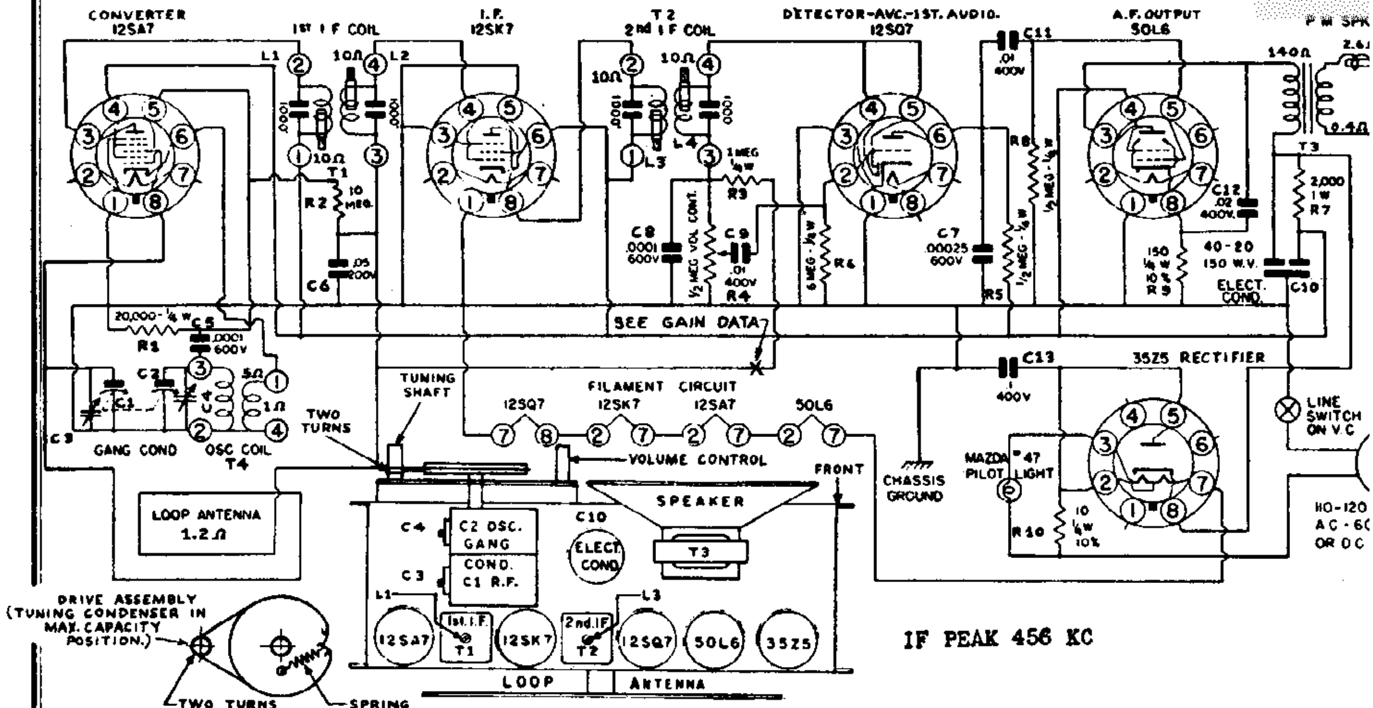


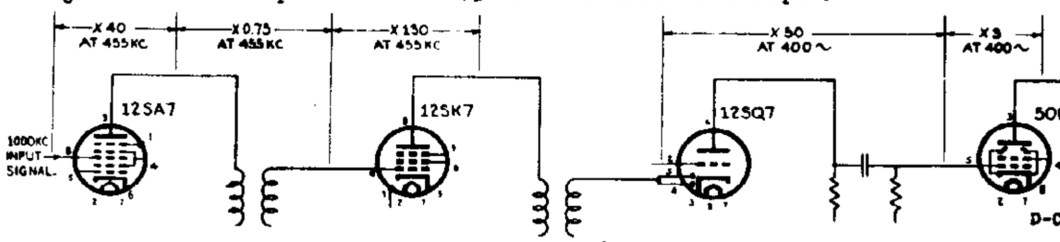
CHASSIS
BOTTOM VIEW

CITIES SERVICE OIL CO.



IF PEAK 456 KC

The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine Loop Model 1150, and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc and adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L3, L2, L1. Set the generator and receiver to 1600 Kc and adjust the oscillator trimmer C4 for maximum output. Set the generator and receiver to 1400 Kc and adjust the loop trimmer C3 for maximum output.

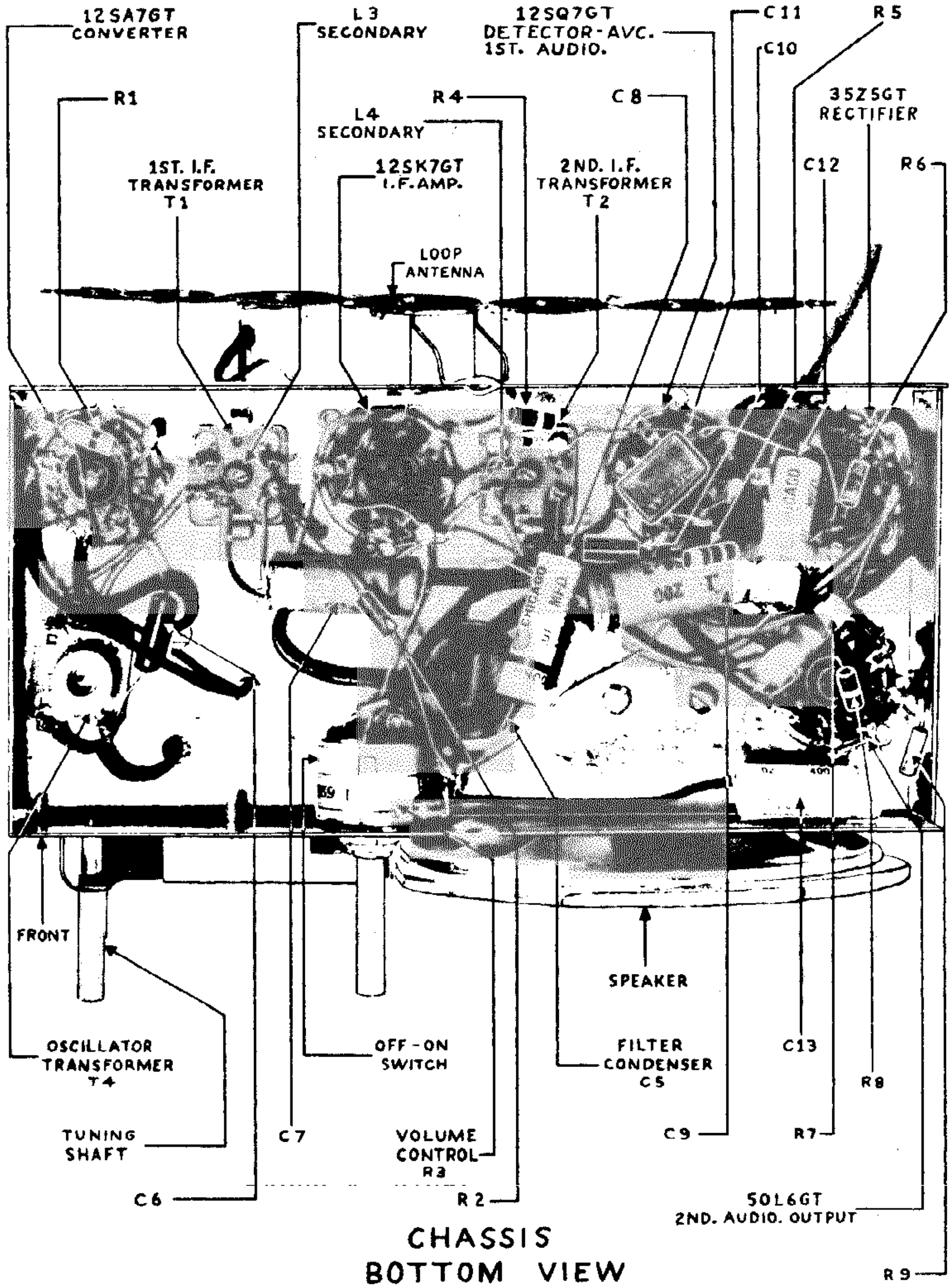


APPROXIMATE GAIN PER STAGE DATA

IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND

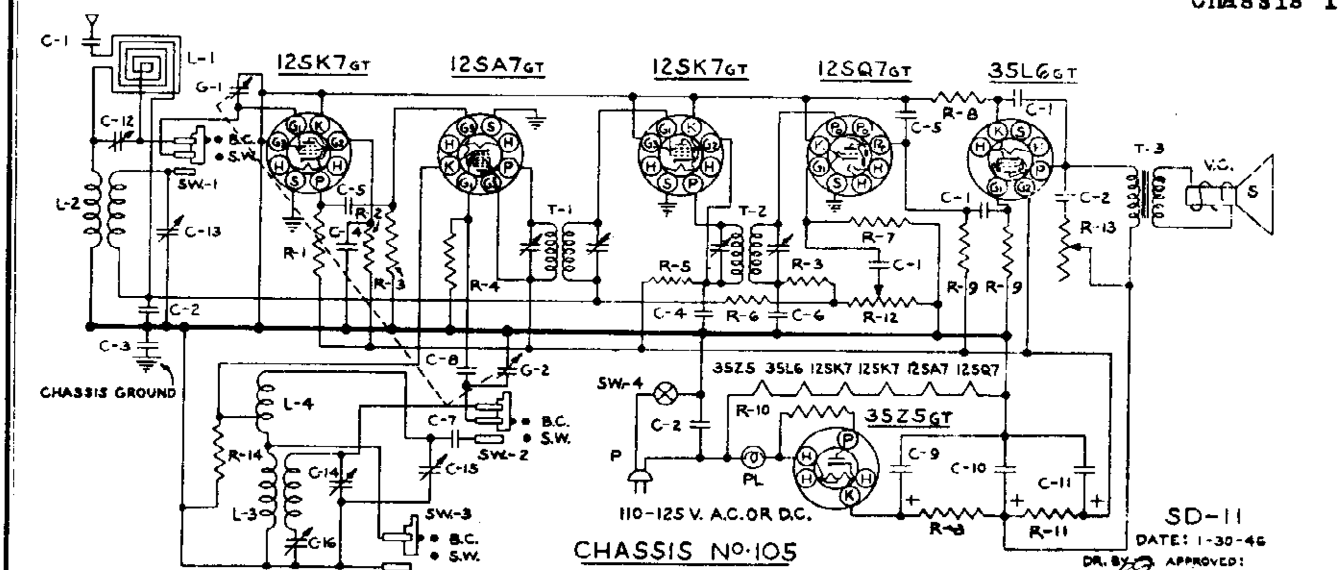
TUBE	PIN	VTVM	D-C VOLTAGE 20,000 OHMS PER VOLT	1000 OHMS PER VOLT	RESISTANCE
12SA7	1	0	0	0	0
	2	0	0	0	24
	3	+80	+80	+78	INFINITE
	4	+80	+80	+78	INFINITE
	5	-9.5	-9.5	-4.8	20,000
	6	0	0	0	1
	7	0	0	0	40
	8	-1.5	-0.8	-0.2	1,200,000
12SK7	1	0	0	0	0
	2	0	0	0	12
	3	0	0	0	0
	4	-1.5	-0.6	-0.2	1,200,000
	5	0	0	0	0
	6	+80	+80	+78	INFINITE
	7	0	0	0	26
	8	+80	+80	+78	INFINITE
12SQ7	1	0	0	0	0
	2	-0.5	-0.4	-0.2	6,000,000
	3	0	0	0	0
	4	-0.5	-0.4	-0.2	400,000
	5	-0.5	-0.4	-0.2	400,000
	6	+46	+42	+40	INFINITE
	7	0	0	0	14
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+120	+120	+120	INFINITE
	4	+80	+80	+78	INFINITE
	5	0	0	0	460,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+4.5	+4.5	+4.5	160
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	8	+120	+120	+120	INFINITE

CITIES SERVICE OIL CO.



CHASSIS BOTTOM VIEW

CONCORD RADIO CORP.



SD-11
DATE: 1-30-46
DR. BY APPROVED:

Remove the chassis from the cabinet for alignment.

A signal generator is required, having the following frequencies: 455 KC, 1400 KC, 1730 KC. 6 MC, 16 MC, and 18.3 MC. An output meter should be con nected across the speaker.

I. F. ALIGNMENT: — Connect the generator lead through a .1 MFD Condenser to the terminal lug on the "Antenna" section of the gang condenser. The ground lead from the generator should be connected to the gang frame. Set the generator at 455 KC. Adjust the trimmer screws in the 1st and 2nd I. F. cans (See Fig. 1) until a maximum reading is noted on the output meter.

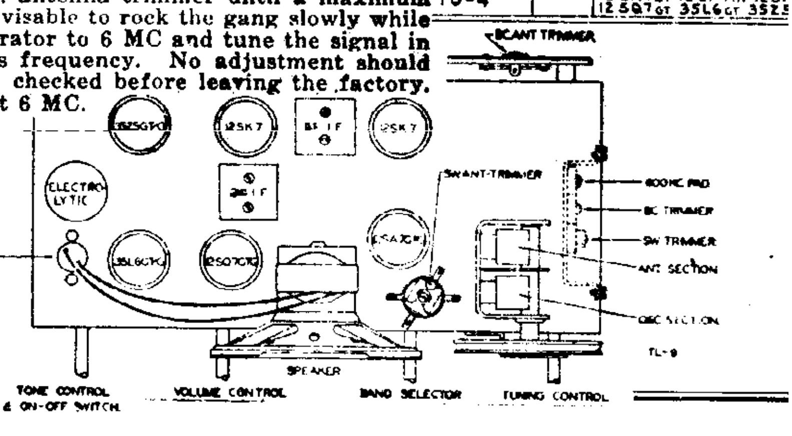
The receiver volume control should be turned to maximum during the I. F. and all subsequent alignments, to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

BC. OR BROADCAST ALIGNMENT: — With the generator leads still connected as in I. F. Alignment, rotate the tuning condenser to complete minimum capacity. Set the generator to 1730 KC. Adjust the BC. oscillator trimmer until the signal is tuned in. Next remove the hot lead of the generator from the "Ant" section of the gang condenser. Connect this lead to the antenna lead wire that projects from the back of the loop antenna through a 200 MMFD condenser. Set the generator to 1400 KC and rotate the tuning condenser until the signal is tuned in. Adjust the BC. antenna trimmer until a maximum reading is noted on the output meter. Set the generator to 600 KC and turn the tuning control until the signal is tuned in. Rock the tuning control back and forth slowly and at the same time adjust the 600 KC pad, slowly to the right or left until a maximum reading is noted on the output meter. It is advisable to return to the 1730 KC adjustment and re-check that setting to make sure it has not changed while padding at 600 KC.

S. W. OR SHORT WAVE ALIGNMENT: — Set the generator at 18.3 MC. Turn the receiver band switch to short band position. Turn the tuning condenser to complete minimum capacity. The generator leads should be connected to the antenna lead wire that projects from the back of the loop antenna through a 400 Ohm resistor. Adjust the S. W. oscillator trimmer slowly until the 18.3 MC signal is tuned in. At this point, it will be well to make sure that the fundamental signal is turned in. Turn up the generator output and tune the receiver to approximately 17.3 MC. At this point the 18.3 MC signal will be heard again but much weaker. This is the image frequency. If the image is not heard, then turn the tuning condenser back to complete minimum and readjust the S. W. oscillator trimmer. Remember, the image must always be heard (at 2 times the I. F. frequency in KC) lower the frequency than the fundamental signal. After the oscillator has been properly set, tune the signal generator to 16 MC and rotate the tuning control until the signal is tuned in. Adjust the S.W. antenna trimmer until a maximum reading is noted on the output meter. It is advisable to rock the gang slowly while adjusting the antenna trimmer. Set the generator to 6 MC and tune the signal in on the receiver. Check the alignment at this frequency. No adjustment should be necessary as the coils have been carefully checked before leaving the factory. A fixed oscillator padding condenser is used at 6 MC.

PART NO.		DESCRIPTION
IR-22	R-1	3900^ RESISTOR 1/2 W.
IR-8	R-2	22,000^ RESISTOR 1/2 W.
IR-10	R-3	47000^ RESISTOR 1/2 W.
IR-9	R-4	22,000^ RESISTOR 1/2 W.
IR-24	R-5	1000^ RESISTOR 1/2 W.
IR-23	R-6	3.9 MEG. RESISTOR 1/2 W
IR-13	R-7	2 MEG. RESISTOR 1/2 W
IR-5	R-8	220^ RESISTOR 1/2 V
IR-11	R-9	470000^ RESISTOR 1/2
IR-17	R-10	39^ RESISTOR 1/2 W.
IR-21	R-11	330^ RESISTOR 1/2 W.
VC-3	R-12	1 MEG. VOLUME CONT
VC-1	R-13	25M^ TONE CONTROL
IR-6	R-14	470^ RESISTOR 1/2 W.
PC-7	C-1	.01 MFD. CONDENSER
PC-5	C-2	.05 MFD. CONDENSER
PC-9	C-3	.25 MFD. CONDENSER
PC-8	C-4	.1 MFD. CONDENSER
MC-3	C-5	.00022 MFD. MICA CON
MC-2	C-6	.0001 MFD. MICA CON
MC-1.	C-7	.00475 MFD. MICA CON
MC-4	C-8	.00005 MFD. MICA CON
	C-9	40 MFD.
EC-4	C-10	40 MFD. 150 V. ELECTR
	C-11	40 MFD.
TC-7	C-12	LOOP ANTENNA TRIM
TC-8	C-13	S.W. ANTENNA TRIM
	C-14	B.C. OSC. TRIMMER
TC-1	C-15	S.W. OSC. TRIMMER
	C-16	B.C. OSC. PADDING C
GC-1	G-1	GANG CONDENSER
	G-2	
	SW-1	
SW-1	SW-2	BAND SWITCH
	SW-3	
	SW-4	A.C. SW. ON TONE CO
LI-1	T-1	INPUT I.F. TRANSFOR
LI-2	T-2	OUTPUT I. F. TRANSFOR
	T-3	OUTPUT SPK. TRANSFO
SPK-4	V.C.	VOICE COIL
	S	P.M. SPEAKER
PB-1	PL	PILOT BULB #47
CO-1	P	LINE CORD
LL-2	L-1	LOOP ANTENNA
LA-2	L-2	S.W. ANTENNA COIL
LO-3	L-3	B.C. OSC. COIL
LO-4	L-4	S.W. OSC. COIL
TU-4		12SK7GT 12SA7GT 12SK 12SQ7GT 35L6GT 35Z5

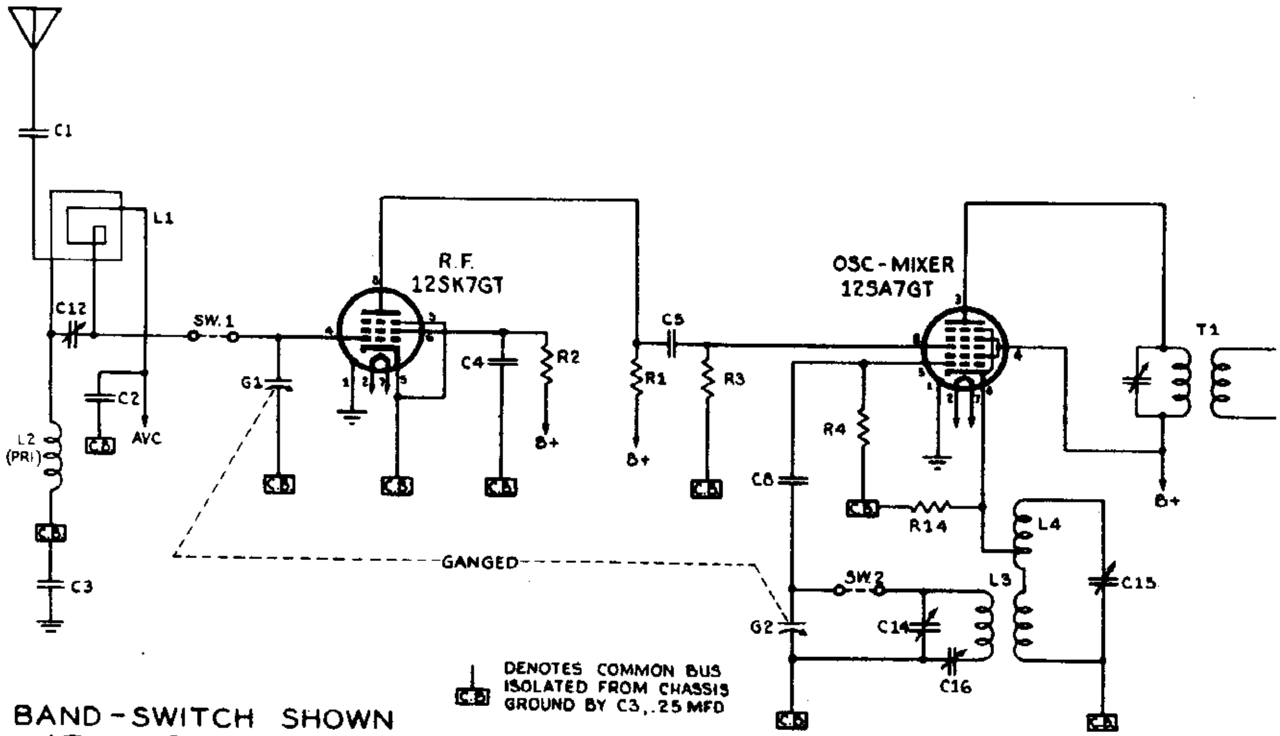
FIGURE-1
MODEL 5010-5011-5012
TUBE AND TRIMMER LOCATION
110-125 VOLTS 60 CYCLES AC-DC.



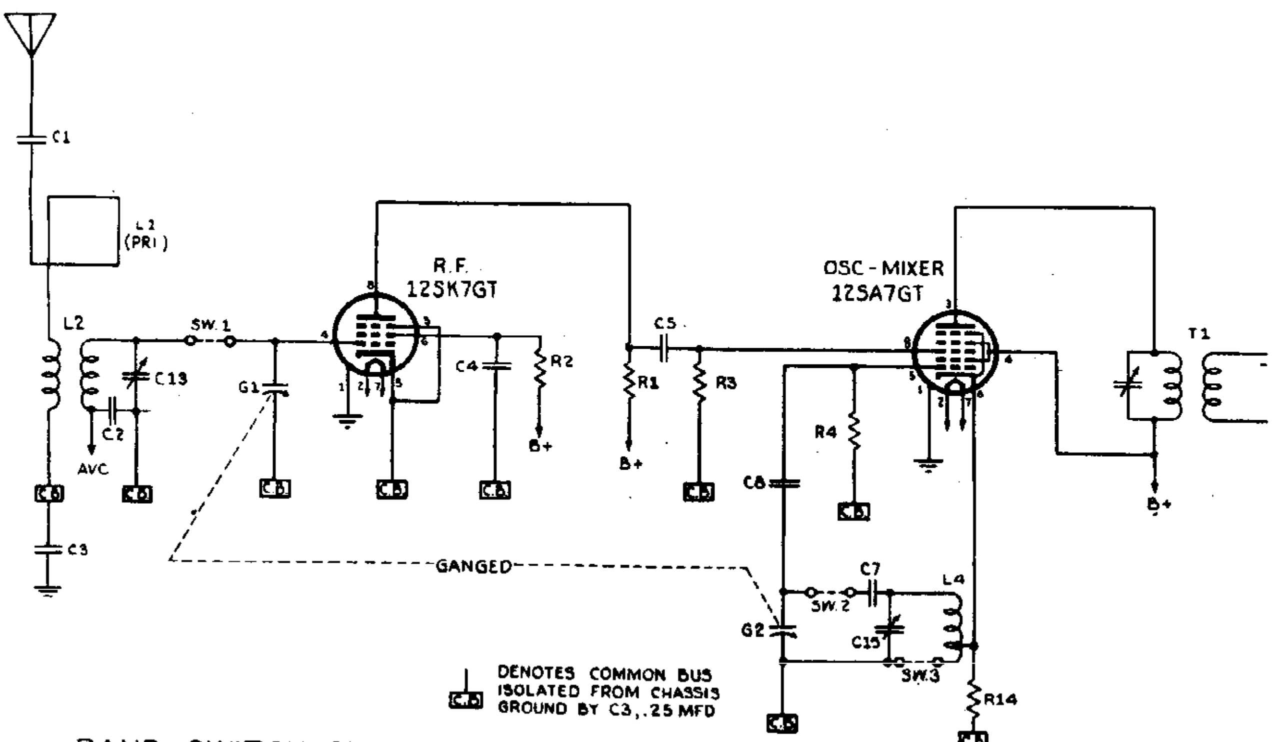
"clarified schematics"

MODEL 6F26W

CONCORD RADIO CORP.

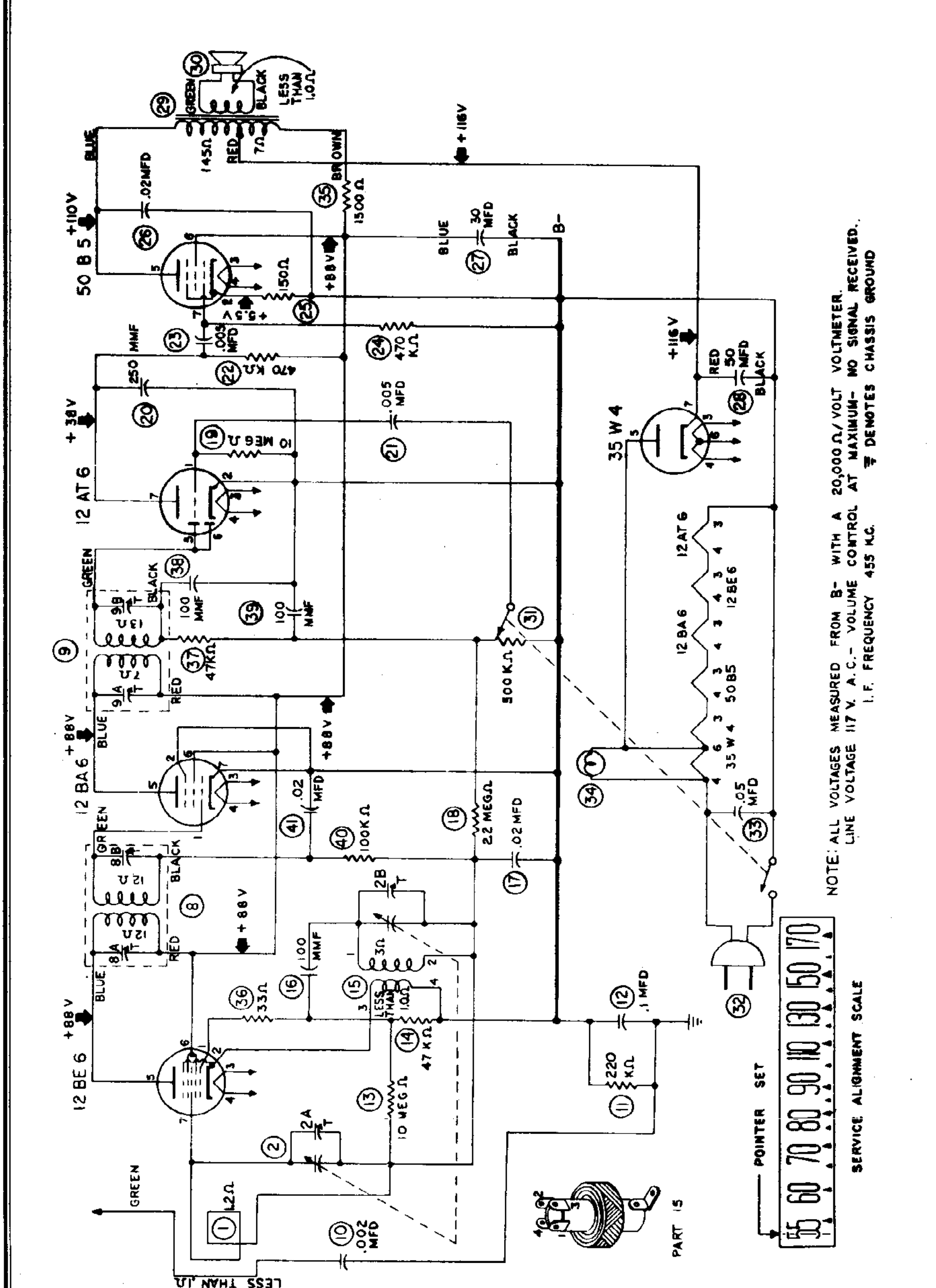


BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. SHORT WAVE BAND

CONCORD RADIO CORP.



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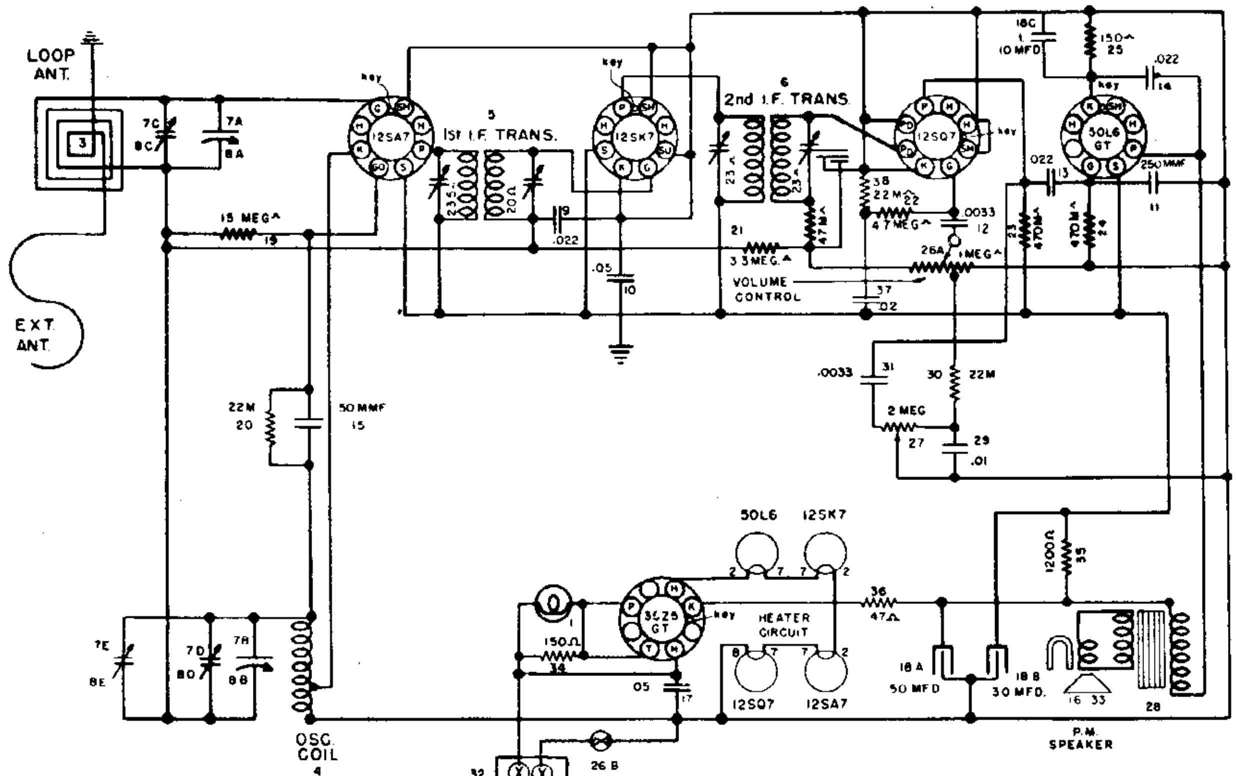
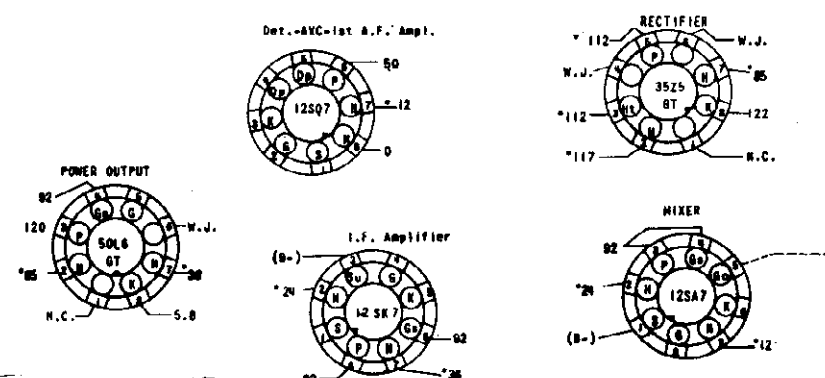
AVCO MFG. CORP.



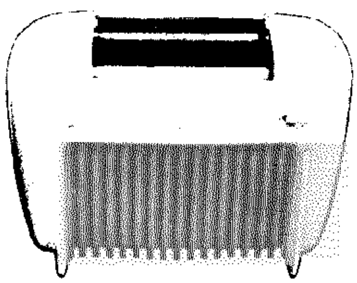
455 KC. I.F.

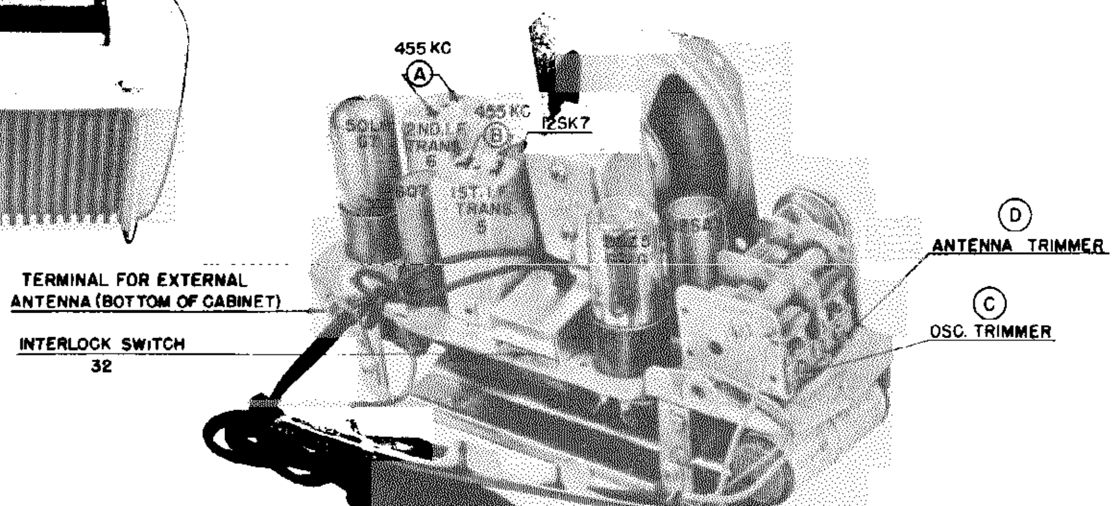
July, 1947



NOTES:
1. Bottom view of tube sockets.
2. Measure voltages from socket lug to (B-) (Pin 3 on the 12SK7).
3. Voltages are measured with an Electronic Voltmeter.
4. W.J. - Wiring Junction.
5. N.C.- No Connection.
6. " - A.C. Voltages
7. Voltage Tolerance, 10%
8. Line Voltage 117 V, 60 A.C.

OSCILLATOR GRID VOLTS	
FREQUENCY	VOLTS
540 KC.	-7





CROSLEY DIVISION
AVCO MFG. CORP.

TYPE: Five-tube superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a. c.—d. c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

POWER OUTPUT: 2 watts maximum.

TUBE COMPLEMENT:

Type	Function
12SA7	Mixer
12SK7	I.F. Amplifier
12SQ7	Detector. AVC, 1st A.F. Amplifier
50L6GT	A.F. Power Output
35Z5GT	Rectifier

DIAL BULB: Type 47, 6.3 volts, .15 amp.

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce power hum. *Under no circumstances should a ground be connected to this receiver.*

When checking or replacing tubes or aligning this receiver, the back of the cabinet must be removed. This is accomplished by removing the two screws located near the top of the cabinet back in the louvre recess. Remove the back carefully and do not exert too much pressure. When the back is removed it disengages the interlock safety switch (item 32 on schematic) and cuts off the power to the receiver. To turn on the radio when the back of the cabinet is removed, it is necessary to hold in the lever on the interlock switch and caution should be exercised not to come in contact with exposed wires on the chassis.

ALIGNMENT PROCEDURE

1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.
2. Connect the output meter across the speaker voice coil.
3. The r. f. signal input from the signal generator should be connected to the external antenna terminal screw, as indicated in the alignment chart. Connect the signal generator ground through a 0.1 mfd. condenser to—B (pin 3 on 12SK7 tube socket).
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

Alignment Sequence	Signal Generator Output			Position of Tuning Dial KC	Adjust for Maximum Outout
	Frequency in KC	In Series with	To		
1	455	200 mmf.	Ant.	1620	A & B
2	1620	200 mmf.	Ant.	1620	C
3	1400	200 mmf.	Ant.	1400	D

Item No.	Part No.	Description
1	W-48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.
2	C-132300-1	Cable and Plug (Power)
3	AC-136091	Antenna Loop & Back Assy.
4	AW-136058	Coil Assy. (Oscillator)
5	AW-137656	Transformer (1st I. F.)
6	AW-137657	Transformer (2nd I. F.)
7 A	B-136810	Condenser, Variable } Two Section
7 B		Condenser, Variable } Two Section
7 C	Part of Item 7A	Condenser, Trimmer
7 D	Part of Item 7B	Condenser, Trimmer
7 E	Part of Item 7B	Condenser, Trimmer
9	39001-80	Condenser, .02 mfd., 600 v., paper
10	39001-17	Condenser, .05 mfd., 600 v., paper
11	39001-73	Condenser, 250 mmf., 600 v., paper
12	39001-76	Condenser, .008 mfd., 600 v., paper
13	39001-80	Condenser, .02 mfd., 600 v., paper
14	39001-80	Condenser, .02 mfd., 600 v., paper
15	B-226638-53	Condenser, 50 mmf., 500 v., ceramic
16	B-136767	Speaker
17	39001-17	Condenser, .05 mfd., 600 v., paper
18 A	B-136771	Condenser, 50 mfd., 150 w. v. } Three Sec. Elec. Filter
18 B		Condenser, 30 mfd., 150 w. v. } Three Sec. Elec. Filter
18 C		Condenser, 10 mfd., 25 w. v. } Three Sec. Elec. Filter
19	39294-38	Resistor, 15 megohm, ½ w.
20	39294-21	Resistor, 22,000 ohm, ½ w.
21	39294-34	Resistor, 3.3 megohm, ½ w.
22	39294-35	Resistor, 4.7 megohm, ½ w.
23	39294-29	Resistor, 470,000 ohm, ½ w.
24	39294-29	Resistor, 470,000 ohm, ½ w.
25	39294-8	Resistor, 150 ohm, ½ w.
26 A	B-135388	Control, Volume (1 megohm) } Assy.
26 B		Switch (Power) } Assy.

*These parts will replace the original equipment parts.

Item No.	Part No.	Description
*	39368-18	Control (Volume)
*	39370-2	Shaft (Plug-in)
*	39969-1	Switch (Power)
27	B-136892	Control, (2 megohm)
*	39368-11	Control (Tone)
28	B-135388	Transformer (Output)
29	39001-13	Condenser, .01 mfd., 600 v., paper
30	39294-21	Resistor, 22,000 ohm, ½ w.
31	39001-76	Condenser, .008 mfd., 600 v., paper
32	W-135355	Switch (Interlock)
34	39294-8	Resistor, 150 ohm, ½ w.
35	39015-26	Resistor, 1200 ohm, 1 w.
36	W-137367	Resistor, 47 ohm, 1 w.
	G-39204	Socket, Tube
	39017-4	Socket, Dial Light
	AW-136809	Pulley and Pinion Drive Assy. (Var. Cond.)
	C-136827	Background, Dial
	D-136828	Face, Dial
	W-134681	Roller, Drive Cord
	W-51752	Spring, Drive Cord
	B-134657	Pointer, Dial
	W-135915	Shaft, Drive
	W-134916	Washer, Spring (Drive Shaft)
	W-51071	Ring, Retaining (Drive Shaft)
	W-134055	Grommet
	AC-138163-4	Cabinet Assy.
	W-139863	Knob
	B-135275	Lens, Dial
	W-136630	Stud, Trimount
37	39001-80	Condenser, .02 mfd., 600 v., paper
38	39294-21	Resistor, 22,000 ohm, ½ w.

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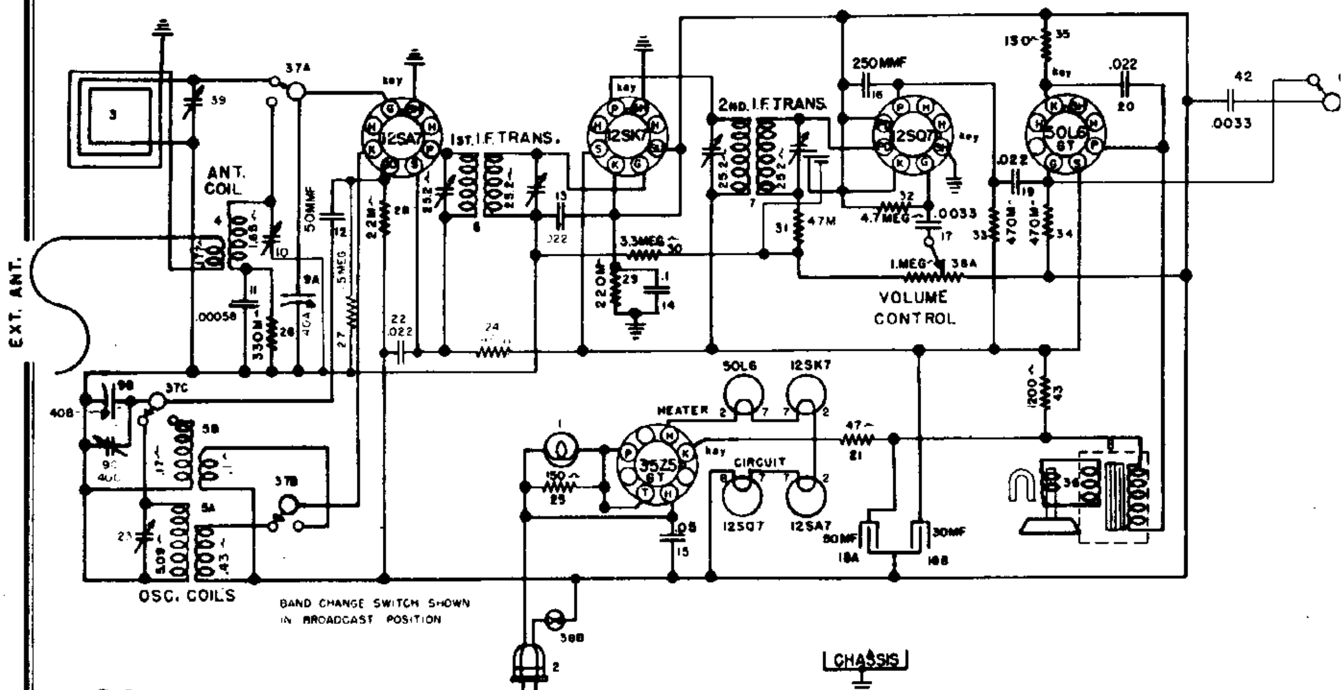
AVCO MFG. CORP.



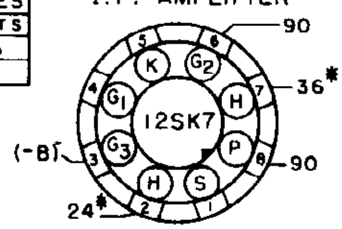
July, 1947

455 K.C. I.F.

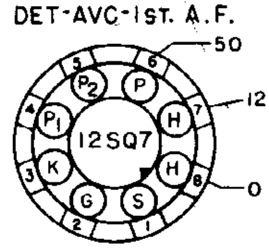
SOCKET VOLTAGE CHART

⊕ OSCILLATOR GRID VOLTAGES		
BAND	FREQUENCY	VOLTS
AMERICAN	550 KC	-5.5
OVERSEAS	5.7 MC	-4

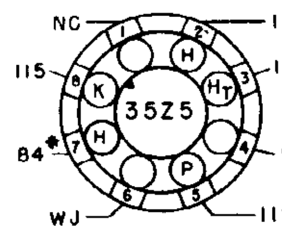
I.F. AMPLIFIER



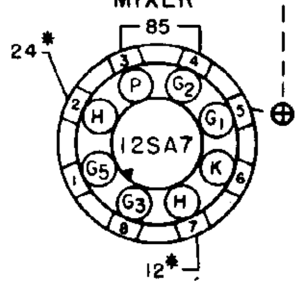
DET-AVC-1st. A.F.



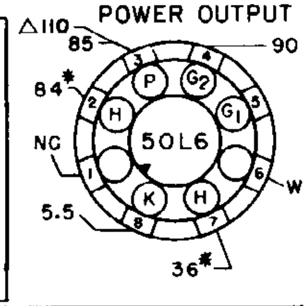
RECTIFIER



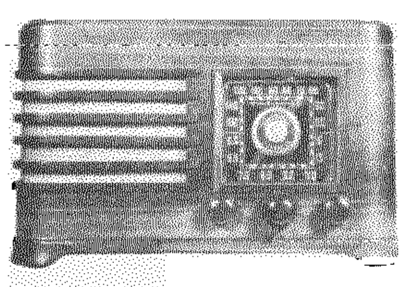
MIXER



POWER OUTPUT

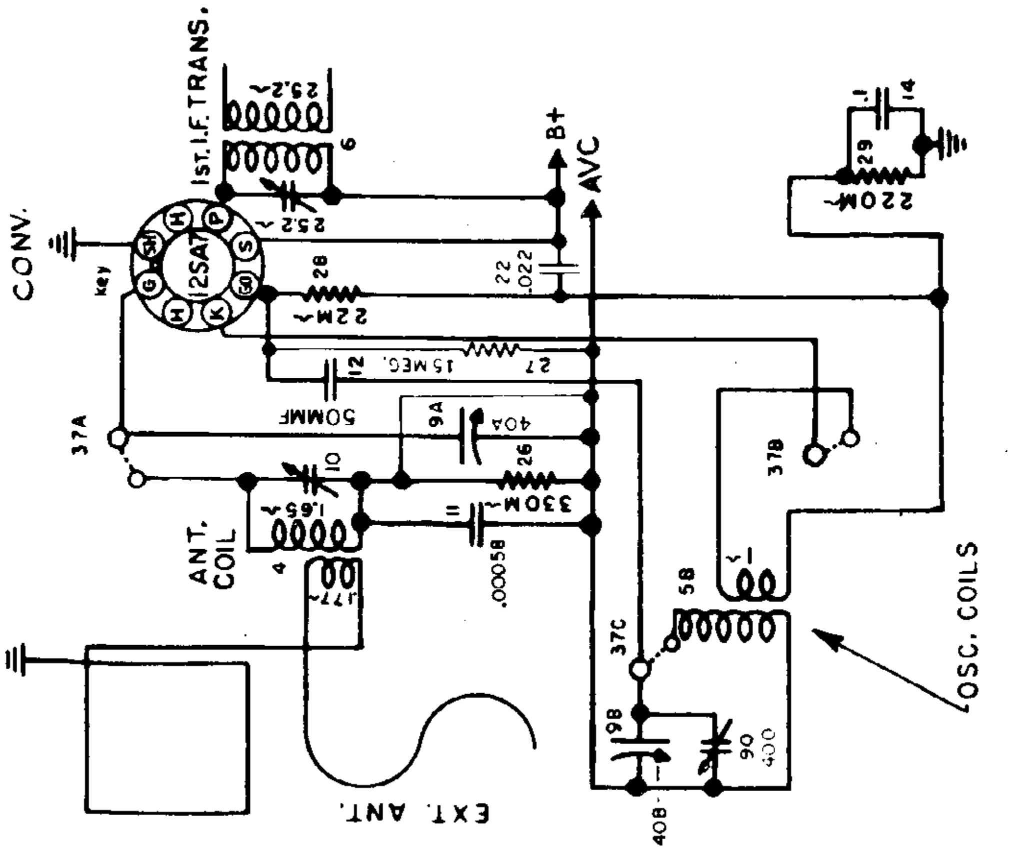


NOTES:
1. These are bottom views of sockets.
2. Measure voltages from socket lugs to -B (Pin 3 on the 12SK7)
3. These voltages measured using an electronic voltmeter.
4. W.J.- Wiring Junction
5. N.C.-No Connection
6. * - 60 Cycle AC voltage
7. Socket voltage tolerance, 10 %
8. All voltages are the same for receivers using E.M. or P.M. speakers, except where marked with Δ;. This voltage is for P.M. Speaker only.

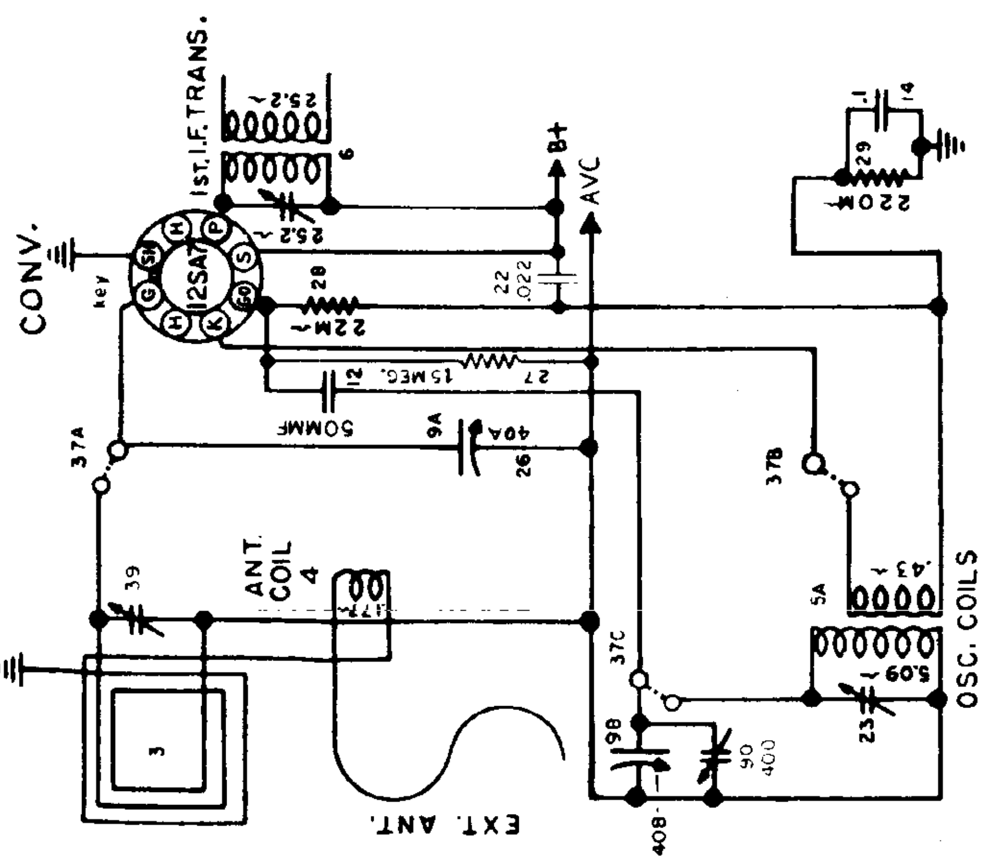


MODEL 56TN

CROSLEY DIVISION
AVCO MFG. CORP.



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. SHORT WAVE BAND 5.8 - 15 MC.



BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND 540-1600 KC.

CROSLEY DIVISION
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DESCRIPTION

TYPE: Five-tube, two-band, superheterodyne.

FREQUENCY RANGE: American Broadcast Band, 540 to 1600 kc. (Selector Switch, Counter-clockwise or Left.)

Overseas Short-wave Band: 5.8 to 15 mc. (Selector Switch, Clockwise or Right.)

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c—d.c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts nominal.

POWER OUTPUT: 1 watt minimum.

TUBE COMPLEMENT:

Type	Function
12SA7 (or GT G)	Mixer
12SK7 (or GT G)	I.F. Amplifier
12SQ7 (or GT G)	Detector, AVC, 1st A.F. Amplifier
50L6GT	A.F. Power Output
35Z5GT G	Rectifier

DIAL BULB: Type 47, 6.3 volts, .15 amp.

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce power hum. *Under no circumstances should a ground be connected to this receiver.*

ALIGNMENT PROCEDURE

1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.
2. Connect the output meter across the speaker voice coil.
3. The r.f. signal input from the signal generator should be connected to the external antenna lead. Connect the signal generator ground through a 0.1 mfd. condenser to —B (pin 3 on 12SK7 tube socket).
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 2, Chassis, Side View—Model 56TN

Alignment Sequence	Signal Generator Output			Position of		Adjust for Maximum Output
	Frequency in kc.	In Series with	To	Band Switch	Tuning Dial	
1	455	200 mmf.	Ant.	Left	1,620	A & B
2	15,300	400 ohms	Ant.	Right	15,300	C
3	15,000	400 ohms	Ant.	Right	15,000	D
4	1,400	200 mmf.	Ant.	Left	1,400	E & F

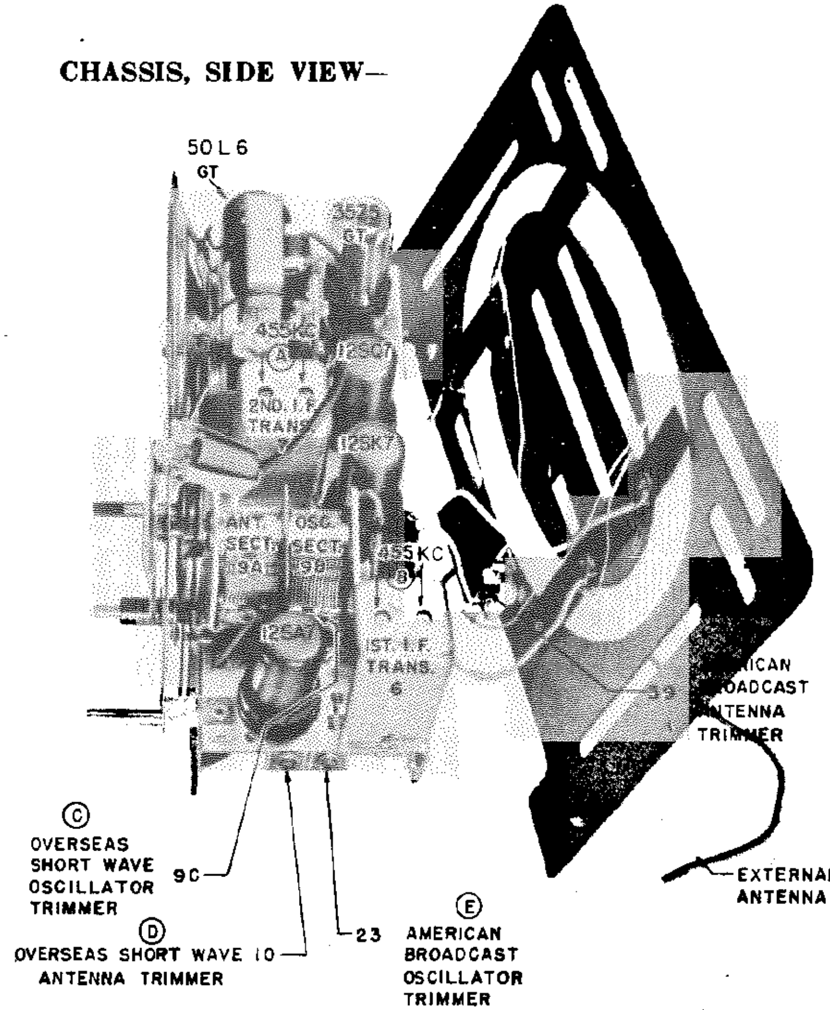
NOTE: When aligning the short-wave oscillator trimmer (C), be sure that the circuit is aligned at the correct frequency and not at the image frequency which is 910 kilocycles lower as indicated by the receiver dial. To check: Tune in the generator frequency, then increase the generator output and tune in the image frequency. The image frequency should be weaker than the fundamental and audible 910 kilocycles lower on the receiver dial. If the image cannot be tuned in, the oscillator trimmer is adjusted to the wrong peak; i.e., the oscillator trimmer may be adjusted to the image or one of the harmonics instead of the fundamental frequency. The correct peak is the second one heard as the trimmer adjustment screw is opened from the completely closed position.

MODEL 56TN

CROSLEY DIVISION
AVCO MFG. CORP.

Item No.	Part No.	Description
1	W-48858	Bulb (Dial Light), Type 47, 6.3v., .15 amp.
2	C-132300-1	Cable and Plug (power)
3	AC-134288	Antenna Loop and Back Assembly
4	AW-134994	Coil (H.F. Antenna)
5A	AW-134993	Coil (B.C. Oscillator) } Two Section
5B		Coil (H.F. Oscillator) } Two Section
6	AW-134065	Transformer (1st I.F.)
7	AW-134158	Transformer (2nd I.F.)
8	B-138069	Transformer, Output
9A	B-134995	Condenser (Variable) } Two Section
9B		Condenser (Variable) } Two Section
9C	Part of Item #9B	Condenser, Trimmer (H.F. Oscillator)
10	AB-135088	Condenser Trimmer (H.F. Antenna)
11	GC-210685-143	Condenser, 580 mmf., 300 v., Mica
12	B-226638-53	Condenser, 50 mmf., 500 v., Mica
13	39001-80	Condenser, .02 mfd., 600 v., Paper
14	39001-19	Condenser, .1 mfd., 600 v., Paper
15	39001-17	Condenser, .05 mfd., 600 v., Paper
16	39001-73	Condenser, 250mmf., 600 v., Paper
17	39001-76	Condenser, .003 mfd., 600 v., Paper
18A	B-138072	Condenser, 50 mfd., 140 v. } Two Section Elect. Filter
18B		Condenser, 30 mfd., 120 v. } Two Section Elect. Filter
19	39001-80	Condenser, .02 mfd., 600 v., Paper
20	39001-80	Condenser, .02 mfd., 600 v., Paper
21	W-137367	Resistor, 47 ohm, 1 w.
22	39001-80	Condenser, .02 mfd., 600 v., Paper
23	Part of Item #10	Condenser, Trimmer (B.C. Oscillator)
24	39373-26	Resistor, 470 Ohm, ½ w.
25	39373-47	Resistor, 4700 Ohm, ½ w.
26	39373-84	Resistor, 330,000 Ohm, ½ w.
27	39373-109	Resistor, 15 Megohm, ½ w.
28	39373-60	Resistor, 22,000 Ohm, ½ w.
29	39373-80	Resistor, 220,000 ohm, ½ w.
30	39373-100	Resistor, 3.3 megohm, ½ w.
31	39373-67	Resistor, 47,000 ohm, ½ w.
32	39373-102	Resistor, 4.7 megohm, ½ w.
33	39373-87	Resistor, 470,000 Ohm, ½ w.
34	39373-87	Resistor, 470,000 Ohm, ½ w.
35	39373-16	Resistor, 150 Ohm, ½ w.
36	AD-138073	Speaker & Transformer Assy.
37A	B-137026	Switch (Band Change) } Three Section
37B		Switch (Band Change) } Three Section
37C		Switch (Band Change) } Three Section
38A	C-46846-6	Control, Volume (1 Megohm) } Assy.
38B		Switch (Power) } Assy.
*	39368-8	Control, Volume
*	39369-1	Switch, Power
39	Part of Item #3	B. C. Ant. Trimmer
41	W-134939	Switch (Tone)
42	39001-76	Condenser, .003 mfd., 600 v., Paper
43	39373-144	Resistor, 1,200 ohm, 1 w.
	G-39204	Socket (Tube)
	39017-4	Socket Assembly (Dial Light)

CHASSIS, SIDE VIEW—

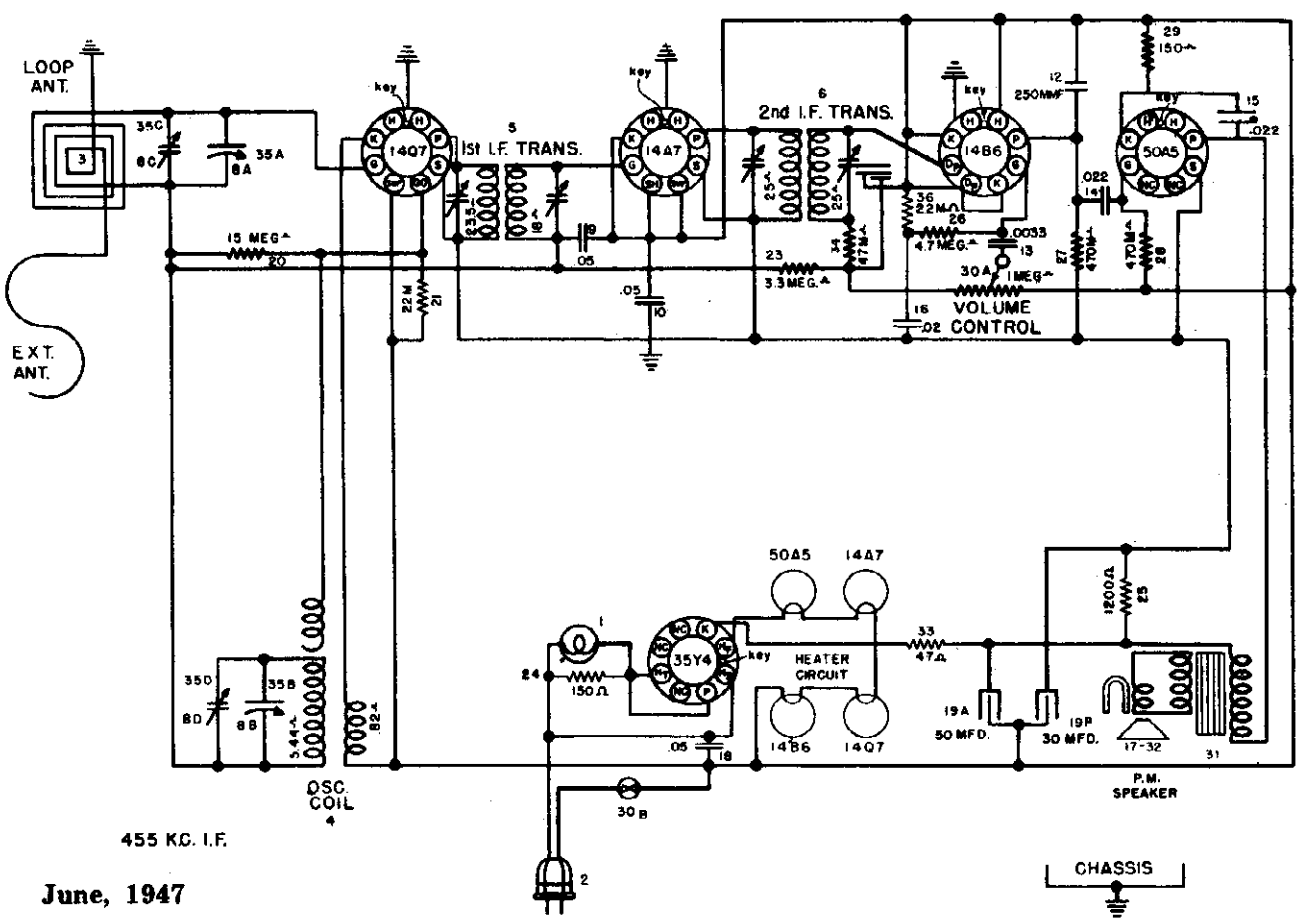


C-135175	Face (Dial)
B-134570	Pointer (Dial)
W-134667	Clip (Dial Pointer)
W-134917	Shaft (Drive)
W-51071	Ring (Retaining)
W-134916	Washer (Spring)
W-51752	Spring (Dial Cord)
AB-134697	Toggle Arm and Link Assembly
W-49829	Spring (Lock)
W-136630	Stud (Trimount)
D-137113	Cabinet
B-134610	Lens (Dial)
W-134882	Knob (Small)
W-134742	Knob (Large)

* These parts will replace the original equipment parts

CROSLEY DIVISION
AVCO MFG. CORP.

MODEL 56T



June, 1947

REPLACEMENT PARTS LIST

Figures in first column correspond to figures in Schematic Diagram

ITEM No.	PART No.	DESCRIPTION	ITEM No.	PART No.	DESCRIPTION
1	W-48858	Bulb (dial), Type 47, 6.3 v., .15 amp.	28	39294-29	Resistor, 470,000 ohm, ½ w.
2	C-132300-1	Cable and Plug (power)	29	39294-8	Resistor, 150 ohm, ½ w.
			30A	C-135127	Control, Volume (1 megohm) } Assy.
3	AC-135506	Ant. Loop and Back Assy.	30B		Switch (power) }
4	AW-135195	Oscillator Coil Assembly	31	B-137723	Transformer (output)
5	AW-137665	Transformer (1st I.F.)	33	W-137367	Resistor, 47 ohm, 1 w.
6	AW-137667	Transformer (2nd I.F.)	34	Part of Item #6	Resistor, 47,000 ohm, ½ w.
7A	B-135202	Condenser (variable) } Two		W-135371	Socket (tube)
7B		Condenser (variable) } Section		39017-5	Socket (dial light)
7C	Part of Item #7A	Condenser (trimmer)		AB-135135	Plate Assembly (dial)
7D	Part of Item #7B	Condenser (trimmer)		W-135074	Pulley (idler)
9	39001-65	Condenser, .05 mfd., 200 v., paper		B-135094	Pointer (dial)
10	39001-65	Condenser, .05 mfd., 200 v., paper		B-135075	Shaft (drive)
12	39001-73	Condenser, 250 mmf., 600 v., paper		W-134916	Washer (spring)
13	39001-10	Condenser, 3300 mmf., 600 v., paper		W-51071	Ring (retaining)
14	39001-63	Condenser, .022 mfd., 200 v., paper		W-131154-1	Cotter (external)
15	39001-63	Condenser, .022 mfd., 200 v., paper		W-51752	Spring (drive cord)
17	B-136768	Speaker		W-134055	Grommet
18	39001-65	Condenser, .05 mfd., 200 v., paper		W-135164	Bumper
19A	B-136770	Condenser, 50 mfd., 150 v. } Two Section		W-136630	Trimount Stud
19B		Condenser, 30 mfd., 150 v. } Elect. Filter		R-135146	Cabinet & Handle Assy.
20	39294-38	Resistor, 15 megohm, ½ w.		R-135444	Cabinet, Only
21	39294-21	Resistor, 22,000 ohm, ½ w.		B-135403	Handle, Only
23	39294-34	Resistor, 3.3 megohm, ½ w.		W-137511	Spring, Handle
24	39294-8	Resistor, 150 ohm, ½ w.		W-50825	Clip
25	39015-26	Resistor, 1200 ohm, 1 w.		B-135713	Dial Glass
26	39294-35	Resistor, 4.7 megohm, ½ w.		W-135454	Knob
27	39294-29	Resistor, 470,000 ohm, ½ w.		136571	Support, Dial

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for corre polarity. Reversing the position of the power plug when alternating current is used may reduce power hum. UNDER N CIRCUMSTANCES SHOULD A GROUND BE CONNECTED TO THIS RECEIVER.

MODEL 56TU

CROSLEY DIVISION
AVCO MFG. CORP.

DESCRIPTION

TYPE: Five-tube, single-band, superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.—d.c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts nominal.

POWER OUTPUT: 1 watt minimum.

TUBE COMPLEMENT:

Type	Function
14Q7	Mixer
14A7	I.F. Amplifier
14B6	Detector, AVC, 1st A.F. Amplifier
50A5	A.F. Power Output
35Y4	Rectifier

DIAL BULB: Type 47, 6.3 volts, .15 amp.

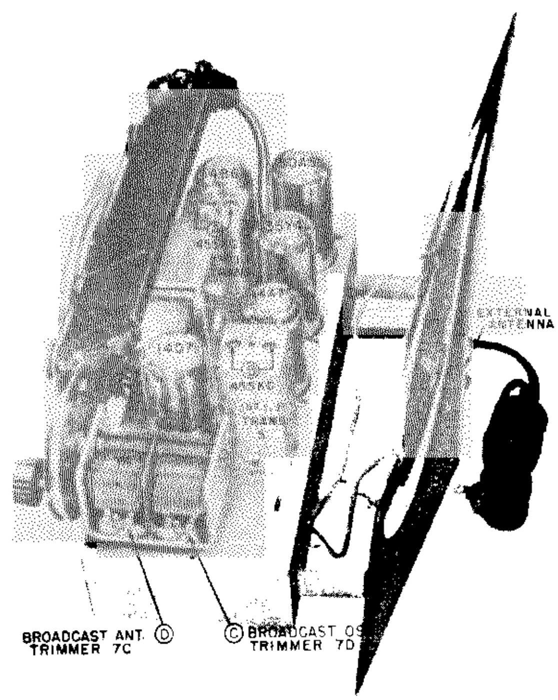
ALIGNMENT PROCEDURE

1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.
2. Connect the output meter across the speaker voice coil.
3. The r.f. signal input from the signal generator should be connected to the external antenna lead. Connect the signal generator ground through a 0.1 mfd. condensor to —B (pin 4 on 14A7 tube socket).
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

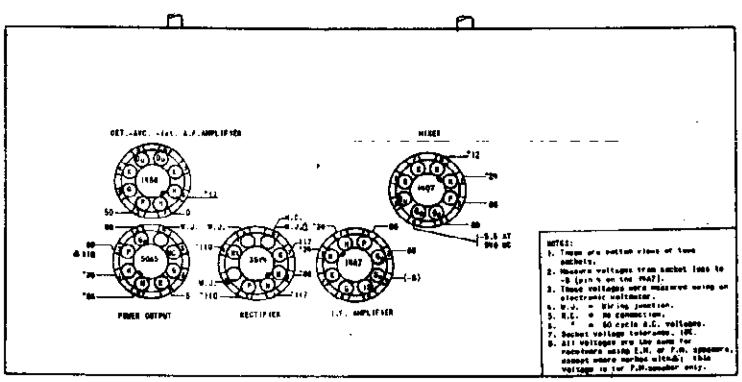
Alignment adjustment locations are shown in Chassis, Side View at the right.

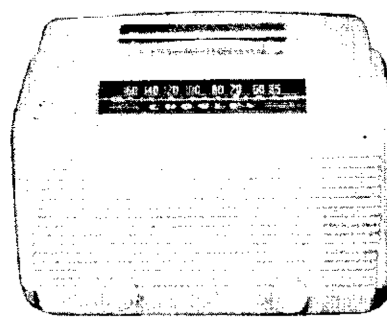
Alignment sequence	Signal Gen. Output			Position of Tuning Dial	Adjust for max. output
	Frequency in KC	In Series with	To		
1	455	200 mmf.	Ant.	1620	A & B
2	1620	200 mmf.	Ant.	1620	C
3	1400	200 mmf.	Ant.	1400	D



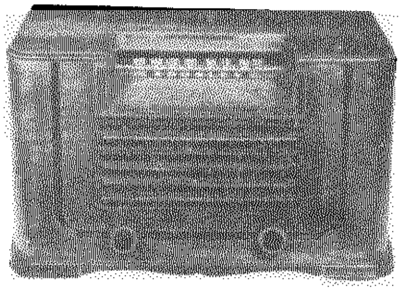
CHASSIS, SIDE VIEW

SOCKET VOLTAGE CHART





CROSLEY DIVISION
AVCO MFG. CORP.

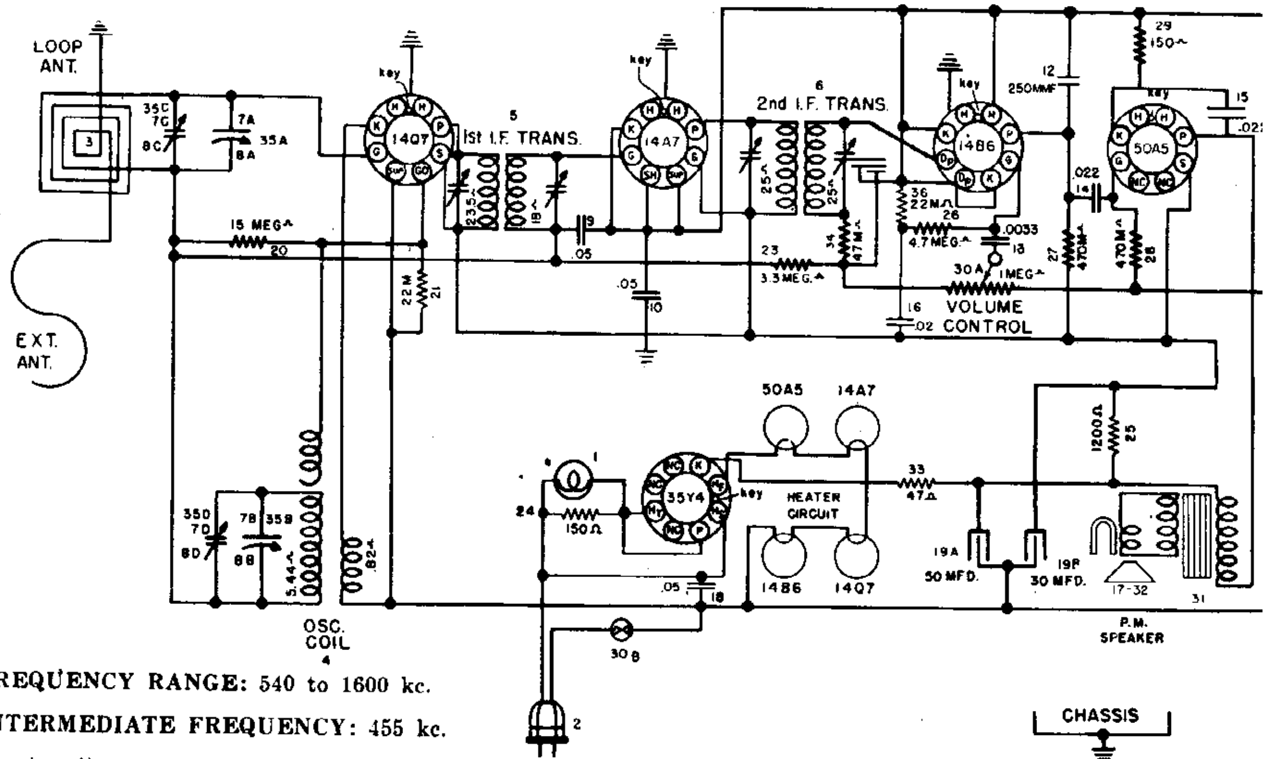


POWER SUPPLY: a.c.—d.c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts nominal.

POWER OUTPUT: 1 watt minimum.



FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for corre polarity. Reversing the position of the power plug when alternating current is used may reduce power hum. UNDER N CIRCUMSTANCES SHOULD A GROUND BE CONNECTED TO THIS RECEIVER.

ITEM No.	PART No.	DESCRIPTION
1	W-48858	Bulb (dial), Type 47, 6.3 v., .15 amp.
2	C-132300-1	Cable and Plug (power)
3	AC-135253	Ant. Loop and Back Assy.
4	AW-135195	Oscillator Coil Assembly
5	AW-137665	Transformer (1st I.F.)
6	AW-137667	Transformer (2nd I.F.)
7A	B-135202	Condenser (variable) } Two
7B		Condenser (variable) } Section
7C	Part of Item #7A	Condenser (trimmer)
7D	Part of Item #7B	Condenser (trimmer)
9	39001-65	Condenser, .05 mfd., 200 v., paper
10	39001-65	Condenser, .05 mfd., 200 v., paper
12	39001-73	Condenser, 250 mmf., 600 v., paper
13	39001-10	Condenser, 3300 mmf., 600 v., paper
14	39001-63	Condenser, .022 mfd., 200 v., paper
15	39001-63	Condenser, .022 mfd., 200 v., paper
17	B-136768	Speaker
18	39001-65	Condenser, .05 mfd., 200 v., paper
19A	B-136770	Condenser, 50 mfd., 150 v. } Two Section
19B		Condenser, 30 mfd., 150 v. } Elect. Filter
20	39294-38	Resistor, 15 megohm, ½ w.
21	39294-21	Resistor, 22,000 ohm, ½ w.
23	39294-34	Resistor, 3.3 megohm, ½ w.
24	39294-8	Resistor, 150 ohm, ½ w.
25	39015-26	Resistor, 1200 ohm, 1 w.
26	39294-35	Resistor, 4.7 megohm, ½ w.
27	39294-29	Resistor, 470,000 ohm, ½ w.

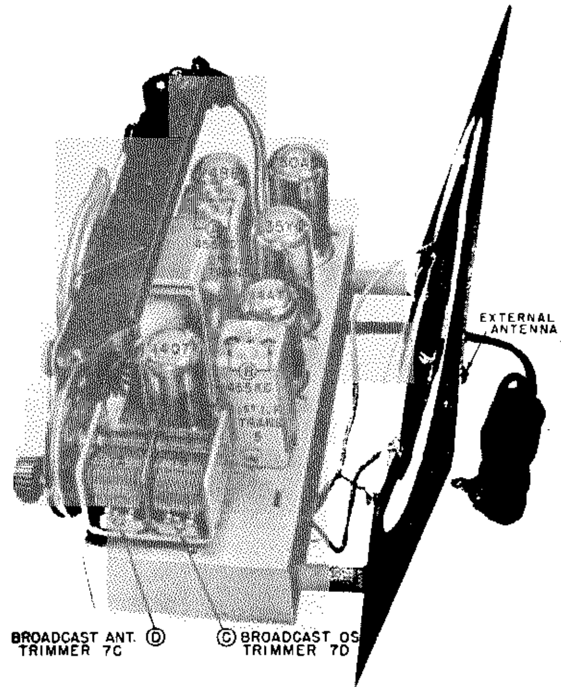
ITEM No.	PART No.	DESCRIPTION
28	39294-29	Resistor, 470,000 ohm, ½ w.
29	39294-8	Resistor, 150 ohm, ½ w.
30A	C-135127	Control, Volume (1 megohm) } Assy.
30B		Switch (power) }
31	B-137723	Transformer (output)
33	W-137367	Resistor, 47 ohm, 1 w.
34	Part of Item #6	Resistor, 47,000 ohm, ½ w.
	W-135371	Socket (tube)
	39017-5	Socket (dial light)
	AB-135135	Plate Assembly (dial)
	W-135074	Pulley (idler)
	B-135094	Pointer (dial)
	B-135075	Shaft (drive)
	W-134916	Washer (spring)
	W-51071	Ring (retaining)
	W-131154-1	Cotter (external)
	W-51752	Spring (drive cord)
	W-134055	Grommet
	W-135164	Bumper
	W-136630	Trimount Stud
	D-135235	Cabinet
	B-135713	Dial Glass
	W-135391	Knob

March, 1947

MODEL 56TY

CROSLEY DIVISION
AVCO MFG. CORP.

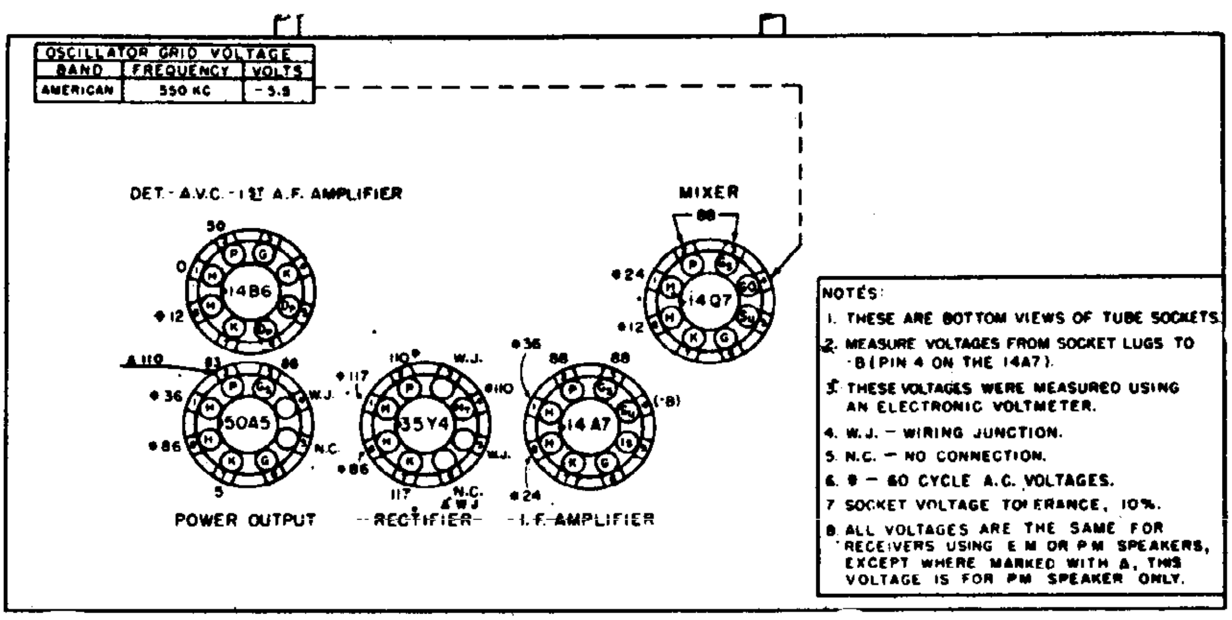
1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.
2. Connect the output meter across the speaker voice coil.
3. The r.f. signal input from the signal generator should be connected to the external antenna lead. Connect the signal generator ground through a 0.1 mfd. condenser to —B (pin 4 on 14A7 tube socket).
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.



ALIGNMENT CHART

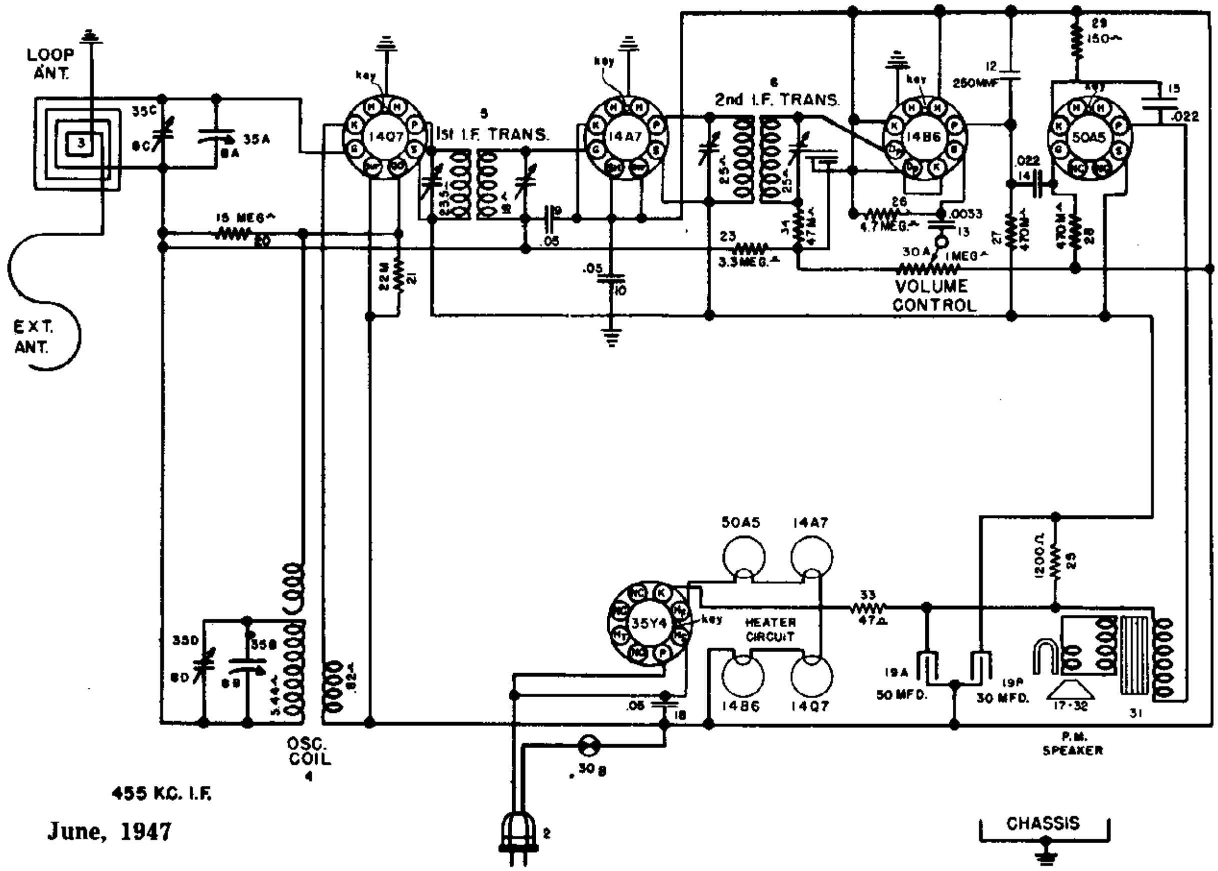
Alignment adjustment locations are shown in Chassis, Side View at the right.

Alignment sequence	Signal Gen. Output			Position of Tuning Dial	Adjust for max. output
	Frequency in KC	In Series with	To		
1	455	200 mmf.	Ant.	1620	A & B
2	1620	200 mmf.	Ant.	1620	C
3	1400	200 mmf.	Ant.	1400	D



SOCKET VOLTAGE CHART

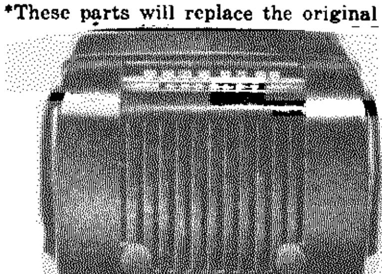
CROSLEY DIVISION
AVCO MFG. CORP.



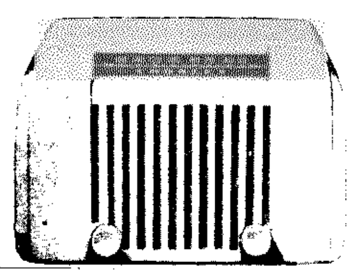
June, 1947

Item No.	Part No.	Description	Item No.	Part No.	Description
2	C-132300-1	Cable and Plug Assy., Power	30 A	C-135127	Control, Volume (1 megohm) Assy.
3	AC-135209	Loop and Back Assy., Antenna	30 B		Switch, Power
4	AW-135195	Coil Assy., Oscillator	*	39368-14	Control, Volume
5	AW-137665	Transformer, 1st I. F.		39369-1	Switch, Power
6	AW-137667	Transformer, 2nd I. F.	31	B-137723	Transformer, Ouput
8 A	B-135056	Condenser, Variable } Two	33	W-137367	Resistor, 47 ohm, 1 w.
8 B		Condenser, Variable } Section	34	Part of Item #6	Resistor, 47,000 ohm, ½ w.
8 C	Part of Item #8A	Condenser, Trimmer		W-135164	Bumper, Rubber
8 D	Part of Item #8B	Condenser, Trimmer		R-135162	Cabinet, (57TK)
9	39001-17	Condenser, .05 mfd., 600 v., paper		AW-135246	Cabinet, (57TL)
10	39001-17	Condenser, .05 mfd., 600 v., paper		W-131154-1	Cotter, External
12	39001-73	Condenser, 250 mmf., 600 v., paper		B-135713	Dial Glass
13	39001-73	Condenser, .003 mfd., 600 v., paper		W-134055	Grommet, Var. Cond. Mtg
14	39001-80	Condenser, .02 mfd., 600 v., paper		W-135391	Knob (57TK)
15	39001-80	Condenser, .02 mfd., 600 v., paper		W-135390	Knob (57TL)
17	B-136768	Speaker		AB-135135	Plate Assy., Dial
18	39001-17	Condenser, .05 mfd., 600 v., paper		B-135094	Pointer, Dial
19 A	B-136770	Cond'ser, 50 mfd., 150 v. } Two Sect.		W-135074	Pulley, Idler (Dial Drive)
19 B		Cond'ser, 30 mfd., 150 v. } Elec. Filter		W-51071	Ring, Retaining
20	39373-109	Resistor, 15 megohm, ½ w.		39220-28	Screw, Chassis Mtg.
21	39373-60	Resistor, 22,000 ohm, ½ w.		B-135075	Shaft, Dial Drive
23	39373-100	Resistor, 3.3 megohm, ½ w.		39441	Socket, Tube
25	39373-144	Resistor, 1200 ohm, 1 w.		W-51752	Spring, Dial Drive Cord
26	39373-102	Resistor, 4.7 megohm, ½ w.		W-49770	Stud, Trimount (Chassis Bottom)
27	39373-87	Resistor, 470,000 ohm, ½ w.		W-132124	Stud, Trimount (Cabinet Back)
28	39373-87	Resistor, 470,000 ohm, ¼ w.		W-136571	Support, Dial
29	39373-16	Resistor, 150 ohm, ½ w.		W-134916	Washer, Spring

*These parts will replace the original equipment parts.



57TK

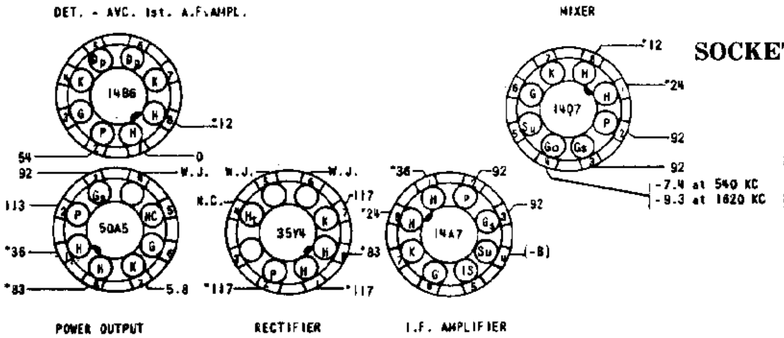


57TL

MODELS 57TK, 57TL

CROSLEY DIVISION
AVCO MFG. CORP.

SOCKET VOLTAGE CHART



NOTES:
1. These are bottom views of tube sockets.
2. Measure voltages from socket lugs to -B (pin 4 on the 14A7).
3. These voltages were measured using an electronic voltmeter. Line voltage 117.
4. W.J. = Wiring junction
5. N.C. = No connection
6. * = 60 cycle A.C. voltages.
7. Socket voltage tolerance 10%.

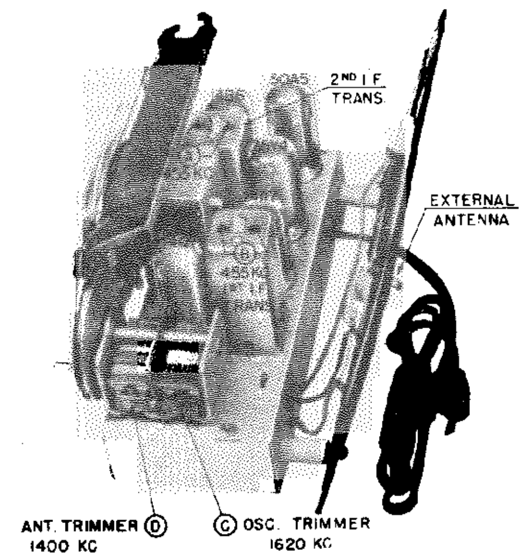
When using direct current it may be necessary to **reverse the position** of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce power hum. *Under no circumstances should a ground be connected to this receiver.*

ALIGNMENT PROCEDURE

1. **Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.**
2. **Connect the output meter across the speaker voice coil.**
3. The r. f. **signal input from the signal generator should be connected to the external antenna clip. Connect the signal generator ground through a 0.1 mfd. condenser to—B (pin 4 on 14A7 tube socket.**
4. Turn the volume control on full and adjust the signal generator output to produce approximately **mid-scale deflection of the output meter, but maintain signal generator output as low as possible to** prevent AVC action in the receiver.

Alignment Sequence	Signal Generator Output			Position of Tuning Dial KC	Adjust for Maximum Output
	Frequency in KC	In Series with	To		
1	455	200 mmf.	Ant.	1620	A & B
2	1620	200 mmf.	Ant.	1620	C
3	1400	200 mmf.	Ant.	1400	D



CHASSIS, SIDE VIEW—

TUBE COMPLEMENT:

Type	Function
14Q7	Mixer
14A7	I.F. Amplifier
14B6	Detector. AVC, 1st A.F. Amplifier
50A5	A.F. Power Output
35Y4	Rectifier

TYPE: Five-tube, single band, superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a. c.—d. c.

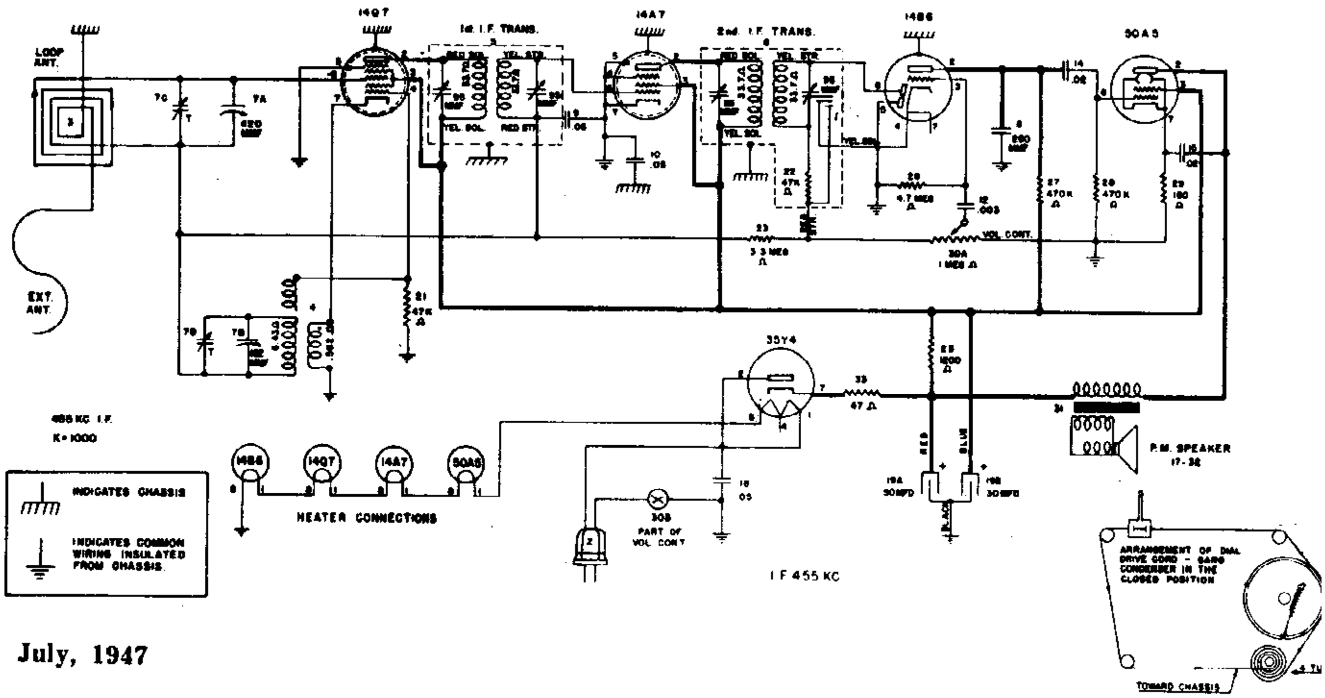
VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts nominal.

POWER OUTPUT: 1.75 watts minimum.

CROSLEY DIVISION
AVCO MFG. CORP.

MODELS 58TA, 58T



July, 1947

Item No.	Part No.	Description
2	C-132300-1	Cable and Plug Assy., Power
3	AC-139795	Antenna Loop and Back Assy.
4	AW-139584	Coil Assy., Oscillator
5	AC-139571	Transformer, 1st I. F.
6	AC-139572	Transformer, 2nd I. F.
7A	AC-137073-15	Condenser, Variable (Two
7B		Condenser, Variable Section
7C	Part of Item 7A	Condenser, Trimmer
7D	Part of Item 7B	Condenser, Trimmer
8	39001-73	Condenser, 250 mmf., 600 v., paper
9	39001-17	Condenser, .05 mfd., 600 v., paper
10	39001-17	Condenser, .05 mfd., 600 v., paper
12	39001-76	Condenser, .003 mfd., 600 v., paper
14	39001-80	Condenser, .02 mfd., 600 v., paper
15	39001-80	Condenser, .02 mfd., 600 v., paper
18	39001-17	Condenser, .05 mfd., 600 v., paper
19A	B-136770	Condenser, 50 mfd., 150 v. (Two Section
19B		Condenser, 30 mfd., 150 v. Elect. Filter
21	39373-67	Resistor, 47,000 ohm, ½ w.
22	39373-67	Resistor, 47,000 ohm, ½ w.
23	39373-100	Resistor, 3.3 megohm, ½ w.
25	39373-144	Resistor, 1200 ohm, 1 w.
26	39373-102	Resistor, 4.7 megohm, ½ w.
27	39373-87	Resistor, 470,000 ohm, ½ w.
28	39373-87	Resistor, 470,000 ohm, ½ w.
29	39373-16	Resistor, 150 ohm, ½ w.
30A	B-135127	Control, Volume (1 megohm) Assy.
30B		Switch Power
*	39368-14	Control, Volume
*	39369-1	Switch, Power
31	B-137723	Transformer, Output
32	AD-138459	Speaker
33	W-137367	Resistor, 47 ohm, 1 w.

Item No.	Part No.	Description
	R-139526-2	Cabinet (58TA)
	AW-139600	Cabinet (58TL)
	B-139605	Dial Glass
	B-138540-1	Knob (58TA)
	B-138540-2	Knob (58TL)
	W-139532	Pointer, Dial
	W-51071	Ring, Retaining
	B-135075-2	Shaft, Drive
	39441	Socket, Tube
	W-51752	Spring, Dial Drive Cord
	W-139060	Stud, Trimount (Chassis Bottom)
	W-132124	Stud, Trimount (Cabinet Back)
	W-134916	Washer, Spring

*These parts will replace the original equipment parts.

TUBE COMPLEMENT:

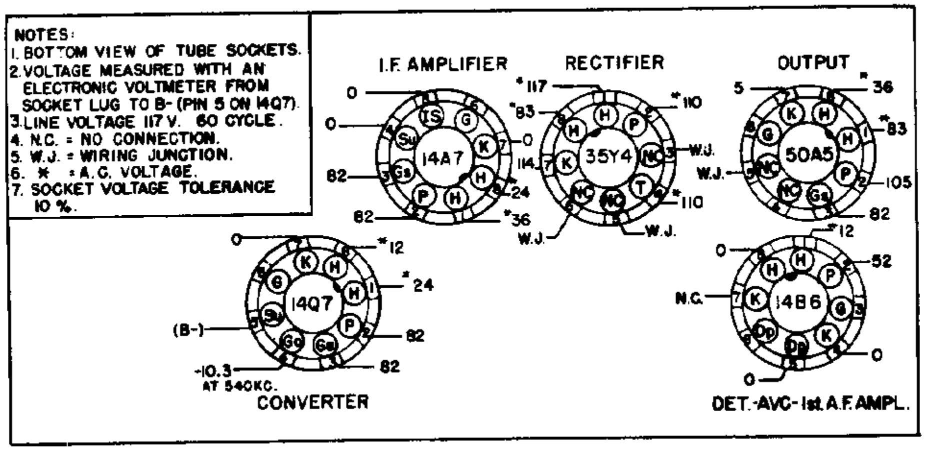
Type	Function
14Q7	Mixer
14A7	I. F. Amplifier
14B6	Detector, AVC, 1st A. F. Amplifier
50A5	A. F. Power Output
35Y4	Rectifier

When using direct current it may be necessary to reverse the position of the power plug in the electric ou for correct polarity.

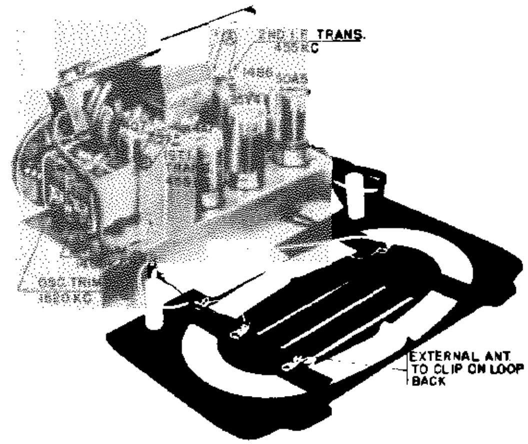
Reversing the position of the power plug when alternating current is used may reduce power hum.

Under no circumstances should a ground be connected to this receiver.

CROSLEY DIVISION
AVCO MFG. CORP.



SOCKET VOLTAGE CHART



CHASSIS REAR VIEW

ALIGNMENT PROCEDURE

1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.
2. Connect the output meter across the speaker voice coil.
3. The r. f. signal input from the signal generator should be connected to the external antenna clip. Connect the signal generator ground through a 0.1 mfd. condenser to B—(pin 5 on 14Q7 tube socket).
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, "CHASSIS REAR VIEW."

Alignment Sequence	Signal Generator Output			Position of Dial Pointer	Adjust for Maximum Output
	Frequency in kc.	In Series with	To		
1	455	200 mmf.	Ant.	1620	A & B
2	1620	200 mmf.	Ant.	1620	C
3	1400	200 mmf.	Ant.	1400	D

DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

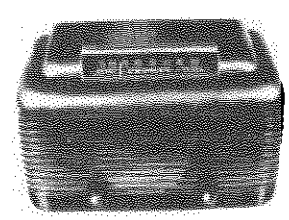
POWER SUPPLY: a.c.—d.c.

VOLTAGE RATING: 105-125 volts.

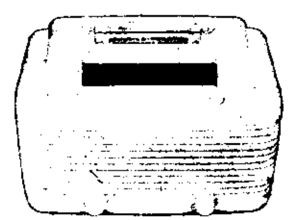
POWER CONSUMPTION: 35 watts.

POWER OUTPUT: 1.5 watts maximum.

58TC

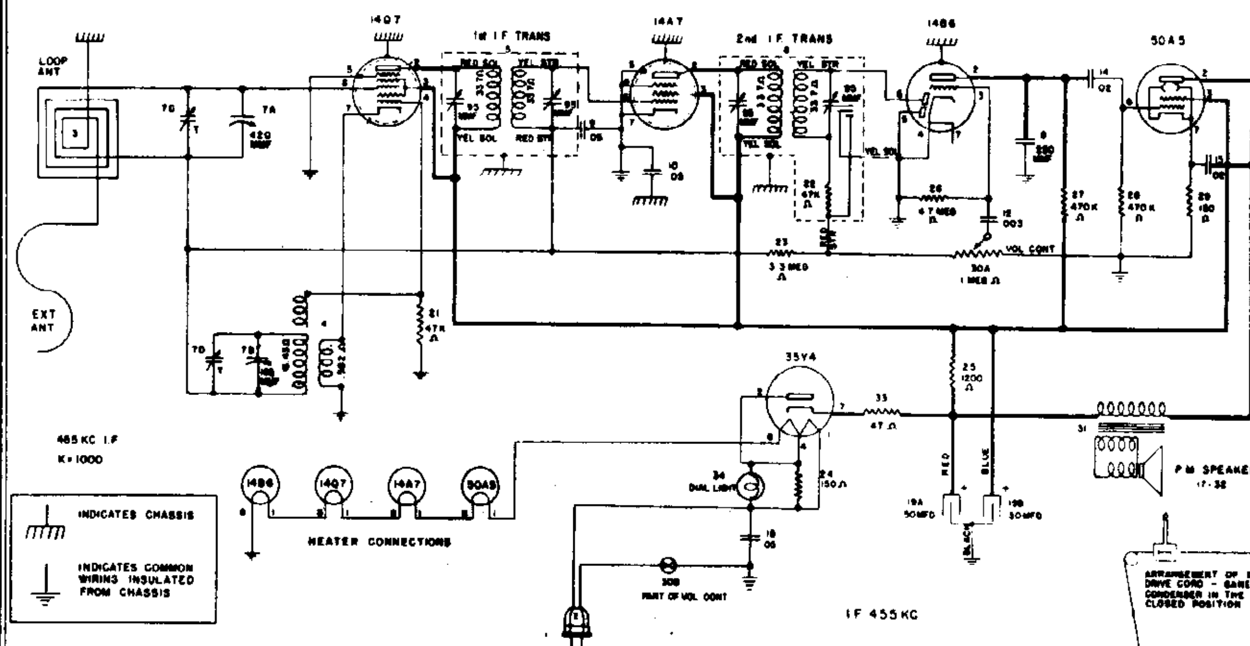


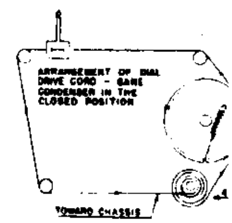
58TW



CROSLEY DIVISION
AVCO MFG. CORP.

MODELS 58TC, 58





July, 1947

Item No.	Part No.	Description
2	C-132300-1	Cable and Plug Assy., Power
3	AC-139808	Antenna Loop and Back Assy.
4	AW-139584	Coil Assy., Oscillator
5	AC-139571	Transformer, 1st I. F.
6	AC-139572	Transformer, 2nd I. F.
7A	AC-137073-15	Condenser, Variable} Two
7B		Condenser, Variable} Section
7C	Part of Item 7A	Condenser, Trimmer
7D	Part of Item 7B	Condenser, Trimmer
8	39001-73	Condenser, 250 mmf., 600 v., paper
9	39001-17	Condenser, .05 mfd., 600 v., paper
10	39001-17	Condenser, .05 mfd., 600 v., paper
12	39001-76	Condenser, .003 mfd., 600 v., paper
14	39001-80	Condenser, .02 mfd., 600 v., paper
15	39001-80	Condenser, .02 mfd., 600 v., paper
18	39001-17	Condenser, .05 mfd., 600 v., paper
19A	B-136770	Condenser, 50 mfd., 150 v.} Two Section
19B		Condenser, 30 mfd., 150 v.} Elect. Filter
21	39373-67	Resistor, 47,000 ohm, ½ w.
22	39373-67	Resistor, 47,000 ohm, ½ w.
23	39373-100	Resistor, 3.3 megohm, ½ w.
24	39373-16	Resistor, 150 ohm, ½ w.
25	39373-144	Resistor, 1200 ohm, 1 w.
26	39373-102	Resistor, 4.7 megohm, ½ w.
27	39373-87	Resistor, 470,000 ohm, ½ w.
28	39373-87	Resistor, 470,000 ohm, ½ w.
29	39373-16	Resistor, 150 ohm, ½ w.
30A	B-135127	Control, Volume (1 megohm)} Assy.
30B		Switch, Power }
*	39368-14	Control, Volume
*	39369-1	Switch, Power
31	B-137723	Transformer, Output
32	AD-138459	Speaker
33	W-137367	Resistor, 47 ohm, 1 w.
34	W-48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.

Item No.	Part No.	Description
	R-139269	Cabinet (58TC)
	AW-139594	Cabinet (58TW)
	W-50325CP	Clip, Cabinet Handle (58TW)
	B-139605	Dial Glass
	B-135403	Handle, Cabinet (58TW)
	B-138540-3	Knob (58TC)
	B-138540-2	Knob (58TW)
	W-139532	Pointer, Dial
	W-51071	Ring, Retaining
	B-135075-2	Shaft, Drive
	D-136565-4	Socket, Dial Light
	39441	Socket, Tube
	W-137511	Spring, Cabinet Handle
	W-51752	Spring, Dial Drive Cord
	W-139060	Stud, Trimount (Chassis Bottom)
	W-134916	Washer, Spring

*These parts will replace the original equipment parts.

TUBE COMPLEMENT:

Type	Function
14Q7	Mixer
14A7	I. F. Amplifier
14B6	Detector, AVC, 1st A. F. Amplifier
50A5	A. F. Power Output
35Y4	Rectifier

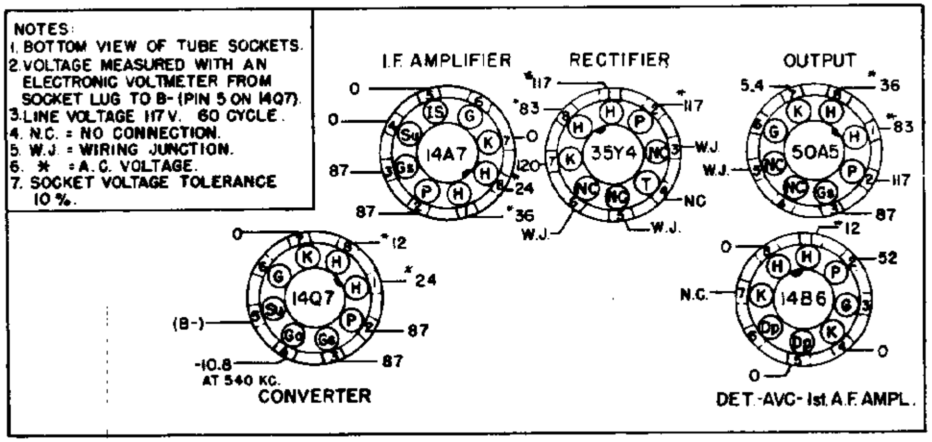
DIAL BULB: Type 47, 6.3 volts, .15 amp.

When using direct current it may be necessary to reverse the position of the power plug in the electric o for correct polarity.

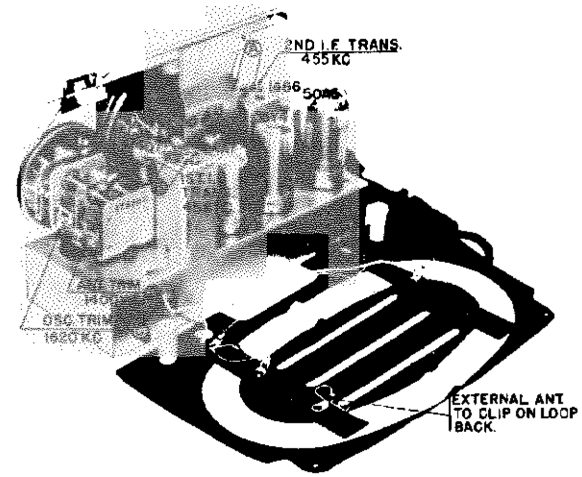
Reversing the position of the power plug when alternating current is used may reduce power hum. *Under no circumstances should a ground be connected to this receiver.*

MODELS 58TC, 58TW

CROSLEY DIVISION
AVCO MFG. CORP.



SOCKET VOLTAGE CHART



CHASSIS REAR VIEW

DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.—d.c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts.

POWER OUTPUT: 1.5 watts maximum.

ALIGNMENT PROCEDURE

1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.

2. Connect the output meter across the speaker voice coil.

3. The r. f. signal input from the signal generator should be connected to the external antenna clip. Connect the signal generator ground through a 0.1 mfd. condenser to B— (pin 5 on 14Q7 tube socket).

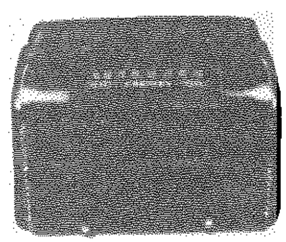
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

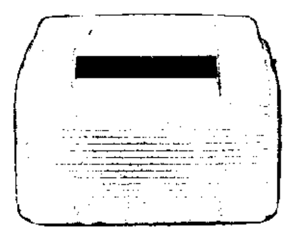
Alignment adjustment locations are shown on page 1, "CHASSIS REAR VIEW".

Alignment Sequence	Signal Generator Output			Position of Dial Pointer	Adjust for Maximum Output
	Frequency in kc.	In Series with	To		
1	455	200 mmf.	Ant.	1620	A & B
2	1620	200 mmf.	Ant.	1620	C
3	1400	200 mmf.	Ant.	1400	D

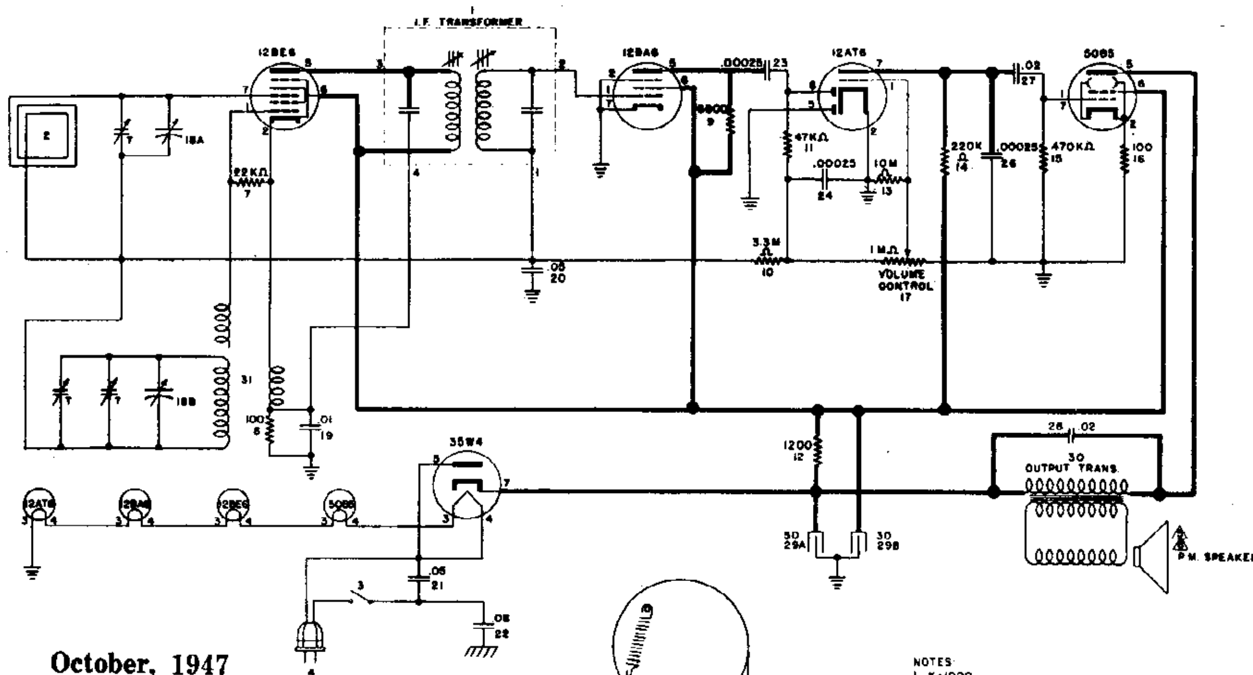
58TA



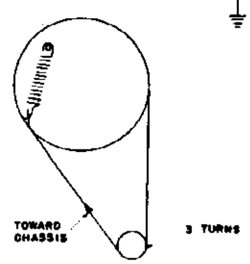
58TL



CROSLEY DIVISION
AVCO MFG. CORP.



October, 1947



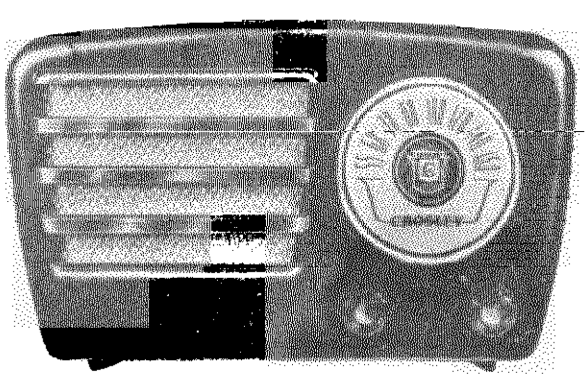
NOTES
1. K=1000
2. M=MEG
3. ALL RESISTANCE VALUES IN OHMS, & CAPACITANCE VALUES IN MFD, UNLESS OTHERWISE NOTED.
4. DENOTES CHASSIS GROUND
5. DENOTES COMMON WIRING OMITTED FROM DRAWING FOR SAKE OF CLARITY

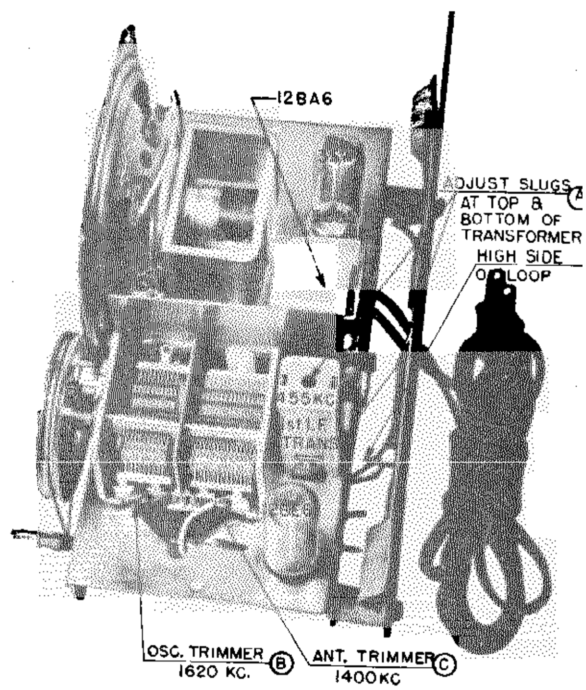
POWER SUPPLY: a.c.-d.c.
VOLTAGE RATING: 105-125 volts.
POWER CONSUMPTION: 30 watts.
POWER OUTPUT: 1.5 watts maximum.

TYPE: Five-tube, single band, Superheterodyne.
FREQUENCY RANGE: 540 to 1600 kc.
INTERMEDIATE FREQUENCY: 455 kc.

TUBE COMPLEMENT

Type	Function
12BE6	Converter
12BA6	I. F. Amplifier
12AT6	Detector, AVC, 1st A.F. Amplifier
50B5	A.F. Power Output
35W4	Rectifier





CHASSIS, TOP VIEW

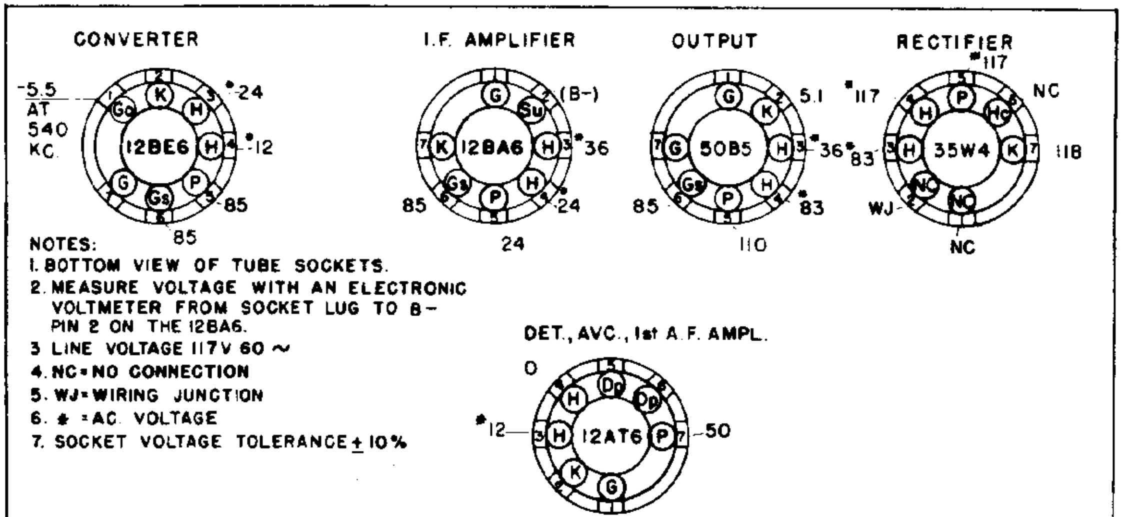
MODEL 58TK

CROSLEY DIVISION
AVCO MFG. CORP.

REPLACEMENT PARTS LIST

Item No.	Part No.	Description
1	C-139919	Transformer, I.F.
2	AC-139873	Antenna Loop and Back Assy.
3	Part of Item 17	Switch, Power
4	C-132300-2	Cable and Plug Assy., Power
5	AD-138459	Speaker (Less Transformer)
7	39373-60	Resistor, 22,000 ohm, ½ w.
8	39373-14	Resistor, 100 ohm, ½ w.
9	39373-161	Resistor, 6,800 ohm, 1 w.
10	39373-100	Resistor, 3.3 megohm, ½ w.
11	39373-67	Resistor, 47,000 ohm, ½ w.
12	39373-144	Resistor, 1,200 ohm, 1 w.
13	39373-107	Resistor, 10 megohm, ½ w.
14	39373-80	Resistor, 220,000 ohm, ½ w.
15	39373-87	Resistor, 470,000 ohm, ½ w.
16	39373-14	Resistor, 100 ohm, ½ w.
17	B-139635	Control, Volume (1 megohm) and Switch Assy.
*	39368-14	Control, Volume
*	39369-1	Switch, Power
18A	B-137073-17	Condenser, Variable } Two Section
18B		Condenser, Variable } Two Section
19	39001-13	Condenser, .01 mfd., 600 v., paper
20	39001-17	Condenser, .05 mfd., 600 v., paper
21	39001-17	Condenser, .05 mfd., 600 v., paper
22	39001-19	Condenser, .1 mfd., 600 v., paper
23	39001-73	Condenser, 250 mmf., 600 v., paper
24	39001-73	Condenser, 250 mmf., 600 v., paper
25	39001-76	Condenser, .003 mfd., 600 v., paper
26	39001-73	Condenser, 250 mmf., 600 v., paper
27	39001-80	Condenser, .02 mfd., 600 v., paper
28	39001-80	Condenser, .02 mfd., 600 v., paper
29A	B-136770	Condenser, 50 mfd., 150 v. } Two Sect. Elec. Filt.
29B		Condenser, 30 mfd., 150 v. } Two Sect. Elec. Filt.
30	B-137723	Transformer, Output
31	AW-142640	Coil Assy., Oscillator
	D-139763	Cabinet
	B-139898	Dial
	W-139947	Grill Cloth
	W-139925	Knob
	W-139899	Pointer Disc, Dial
	W-51071	Ring, Retaining
	B-135075-4	Shaft, Drive
	39462-1	Socket, Tube
	W-51752	Spring, Dial Drive Cord
	W-132124	Stud, Trimount
	W-134916	Washer, Spring

* These parts will replace the original equipment parts.



SOCKET VOLTAGE CHART

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce **hum.**

Under no circumstances should a ground be connected to this receiver.

ALIGNMENT PROCEDURE

1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected to the high side of loop antenna. Connect the signal generator ground through a 0.1 mfd. condenser to B— (pin 2 on 12BA6 tube socket).
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

Alignment Sequence	Signal Generator Output			Position of Dial Pointer	Adjust for Maximum Output
	Frequency in kc.	In Series with	To		
1	455	200 mmf.	High Side of Loop	1620	A
2	1620	*Radiated to Loop		1620	B
3	1400	*Radiated to Loop		1400	C

* Place signal generator output lead near the loop antenna.

MODELS 86CR Revised, 86CS Revised, 87CQ, 88CR

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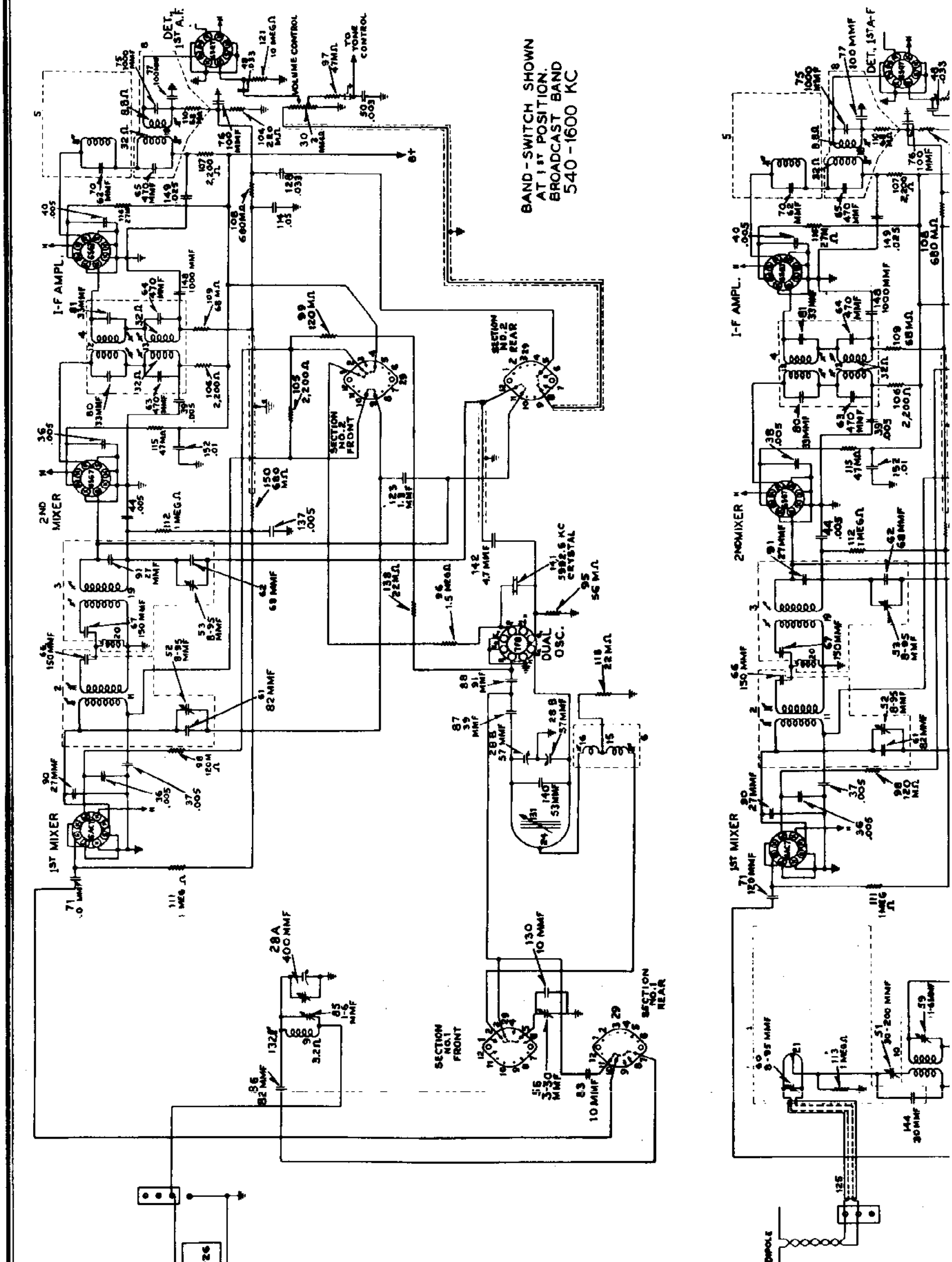
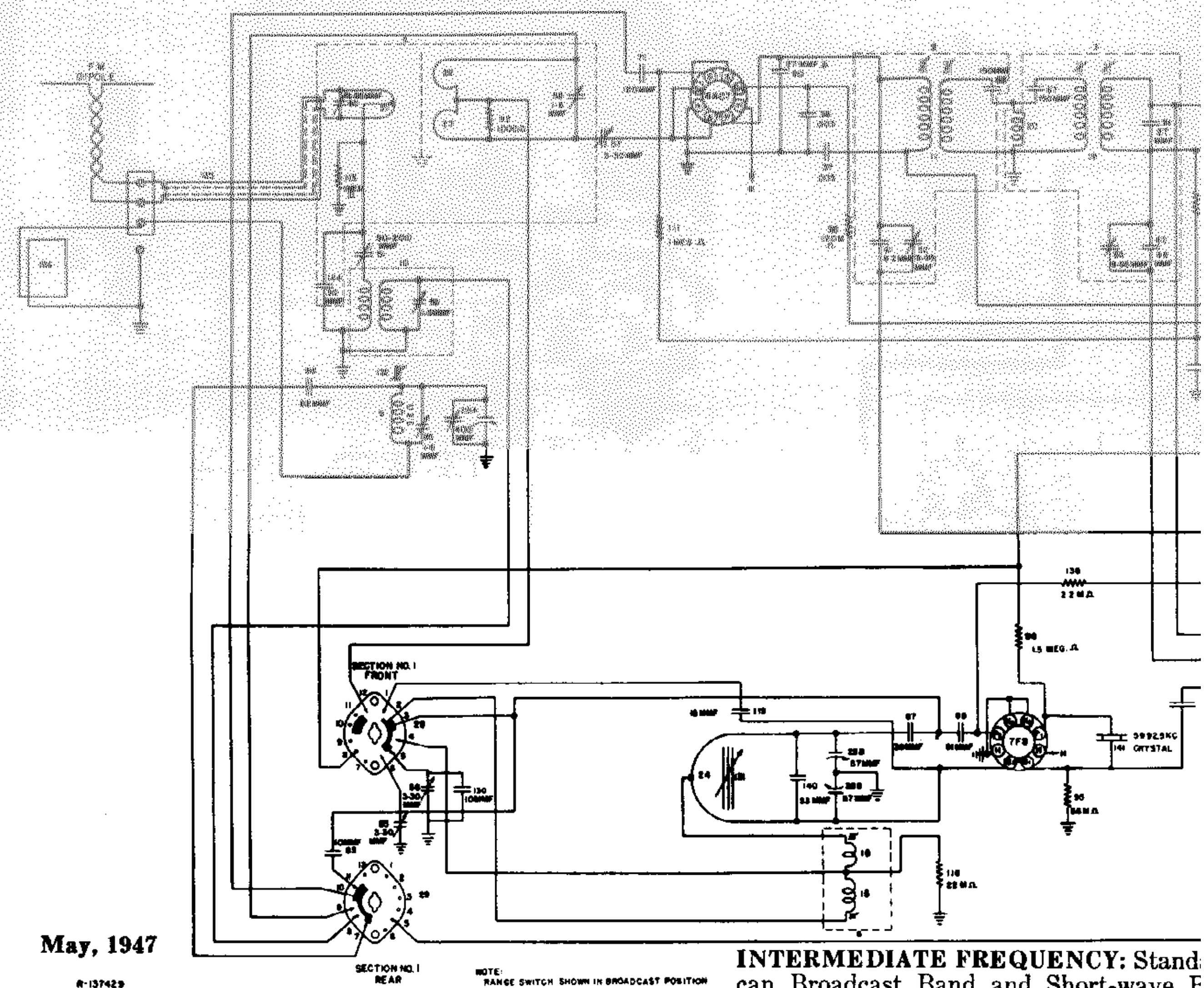




May, 1947

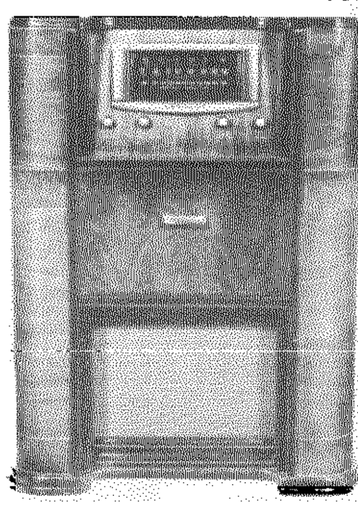
R-137429

INTERMEDIATE FREQUENCY: Stand
can Broadcast Band and Short-wave B
and 167.5 kc.
Frequency Modulation Band: 10.7 mc.

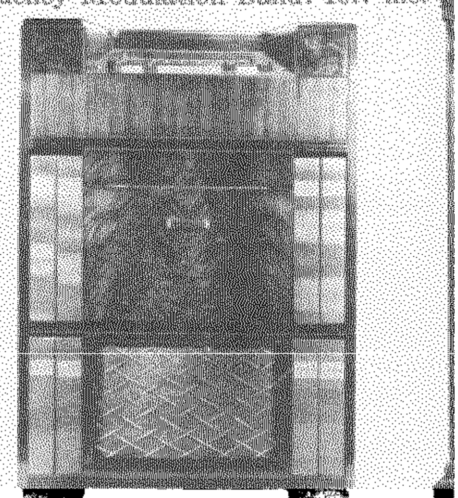
TUBE COMPLEMENT

Type	Function
6AC7	1st A. M. Mixer—F. M. Mixer
7F8	1st & 2nd A. M. Osc.— F. M. Osc.
6SG7	2nd A. M. Mixer— 1st I. F. Ampl. F. M.
6SG7	I. F. Ampl. A. M.— 2nd I. F. Ampl. F. M.
6H6	F. M. Det. (Discriminator)
6SQ7	A. M. Det. AVC, 1st A. F. Ampl.
6V6 GT/G	Output
5Y3 GT/G	Rectifier

DIAL BULB: Type 47, 6.3 v., .15 amp.



Model 87CQ



**Model 86CR—Walnut Cabinet and Albums.
Model 86CS—Mahogany Cabinet with doors. No albums.**

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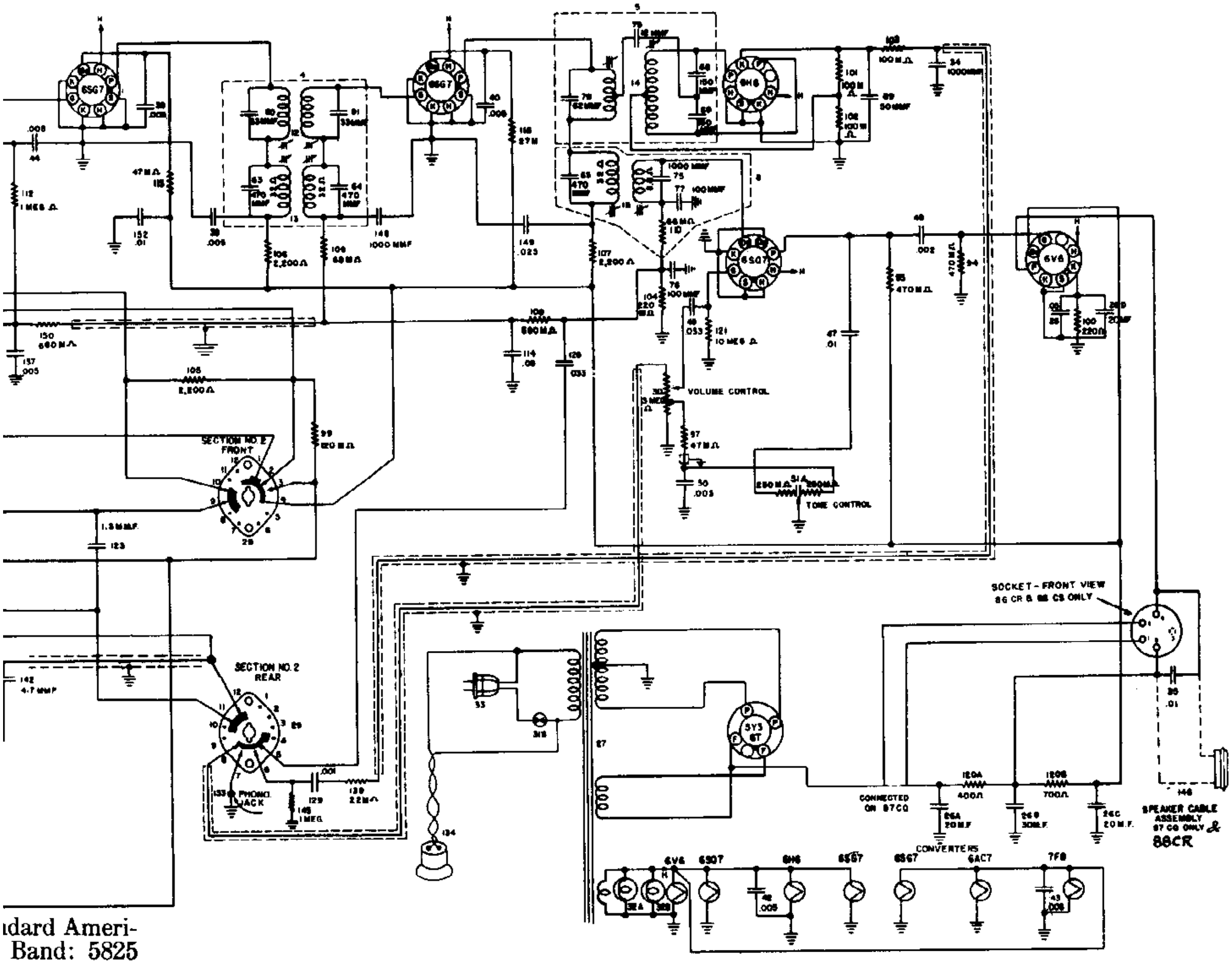
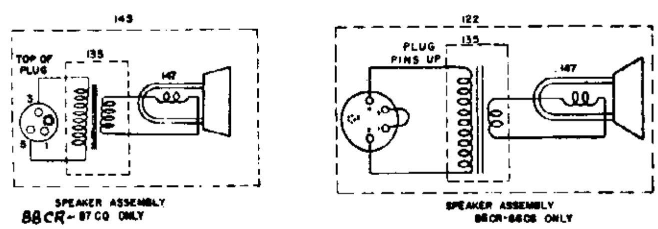
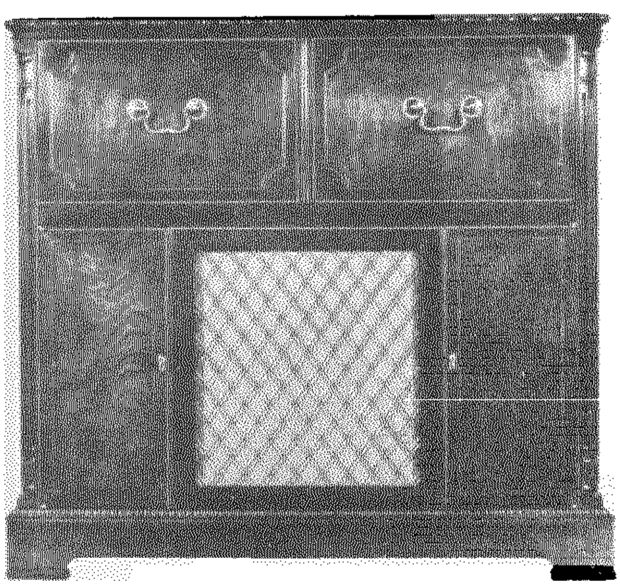
CO MFG. CORP.

MODELS 86CR Revised, 86CS Revised, 87CQ, 88CR

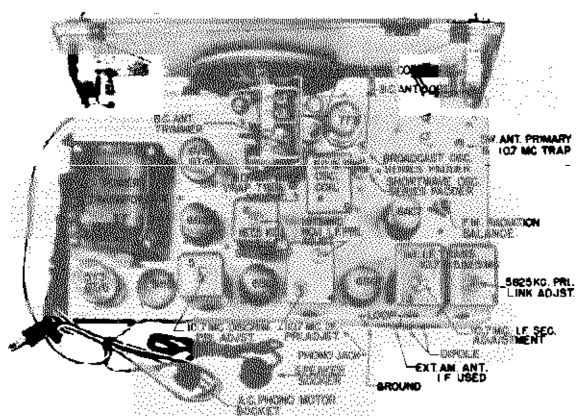


ıdard Ameri-
Band: 5825





—MODEL 88CR



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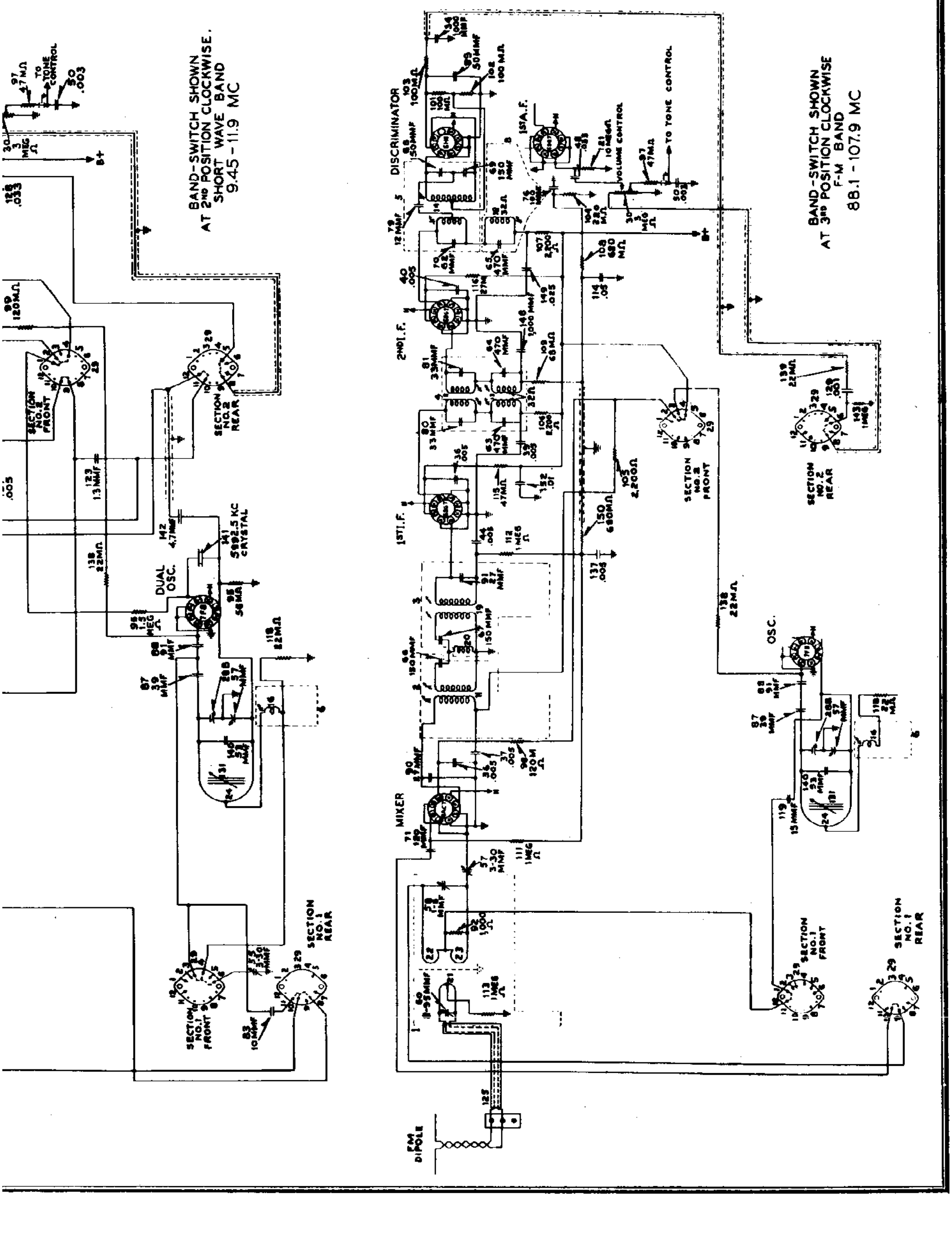
DIVISION
FG. CORP.



CROSLEY DIVISION
AVCO MFG. CORP.

MODELS 86CR Revised,86C Revised, 87CQ,88CR

TYPE: Eight-tube, three-band, Superheterodyne.

FREQUENCY RANGE: Standard American Broadcast Band: 540 to 1600 kc. (Selector Switch to AM position).

Short-wave Band: 9.45 to 11.9 mc. (Selector switch at SW position).

Frequency Modulated Band: 88.1 to 107.9 mc., Channel 201 to 300 (Selector Switch at FM position).

INTERMEDIATE FREQUENCY: Standard American Broadcast Band and Short-wave Band: 5825 and 167.5 kc.

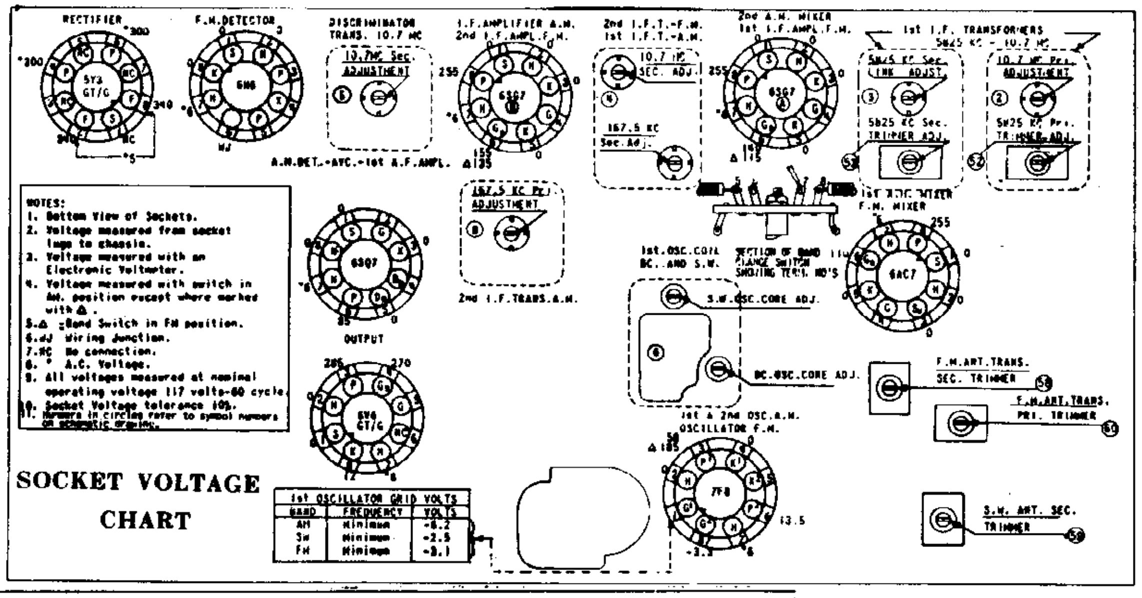
Frequency Modulation Band: 10.7 mc.

POWER SUPPLY: 60 cycle a.c. only.

VOLTAGE RATING: 105-125 volts.

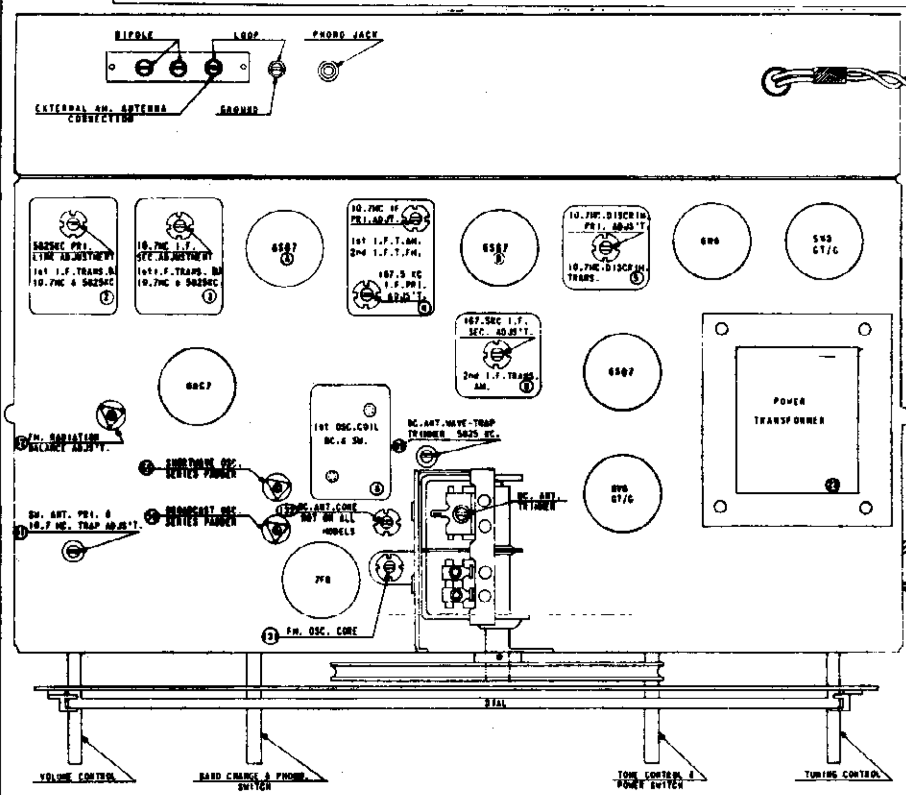
POWER CONSUMPTION: 85 watts maximum at normal power supply voltage (117 volts), 20 watts additional for record changer.

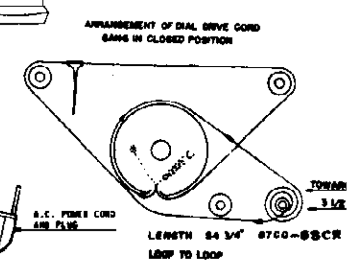
POWER OUTPUT: 8 watts maximum at 3.2 ohm load.

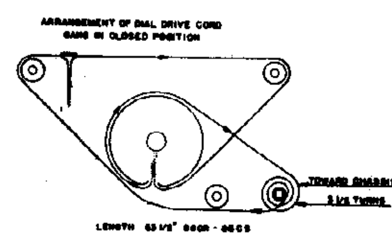


SOCKET VOLTAGE CHART

1st OSCILLATOR GRID VOLTS		
BAND	FREQUENCY	VOLTS
AM	Minimum	-6.2
SW	Minimum	-2.5
FM	Minimum	-3.1







TOP AND BACK VIEW OF CHASSIS SHOWING
TUBE LOCATIONS AND TOP ALIGNMENT ADJUSTMENTS

MODELS 86CR Revised, 86CS Revised, 87CQ, 88CR

CROSLEY DIVISION AVCO MFG. CORP.

ALIGNMENT EQUIPMENT

The following equipment is used as indicated in the alignment charts and alignment notes:

Signal Generators:

1. Amplitude Modulated Signal Generator with 400 cycle modulated signal to cover 167.5 kc. to 108 mc.
2. Frequency Modulated Signal Generator to cover 87 to 108 mc., with sweep to cover 10 to 30 kc. on narrow band and 450 kc. on wide band (Scope alignment only).

Cathode Ray Oscillograph (Scope alignment only).

Meters:

1. Suitable Output Meter.
2. Field Strength Meter (Fig. 1). This meter may consist of a D.C. 100 microampere (full scale) meter, shunted by a 1000 mmf. mica by-pass condenser; a crystal rectifier connected in series with the meter and a five foot, 75 ohm twisted, pair of leads. The open ends of the leads are connected to the dipole antenna terminals. *Connect condenser directly across meter terminals, and crystal directly to one terminal of meter. Keep connecting leads as short as possible.*

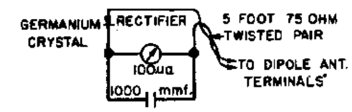


Fig. 1

Dummy Antennas:

1. 78 ohm Dummy Antenna (Fig. 2).
2. Dummy Loop Antenna (Fig. 3) is used to replace "Signal Web" antenna, when chassis is removed from cabinet.

Fig. 2

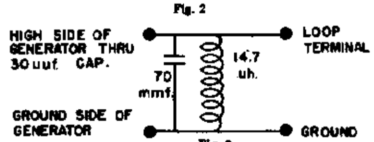


Fig. 3

Condensers:

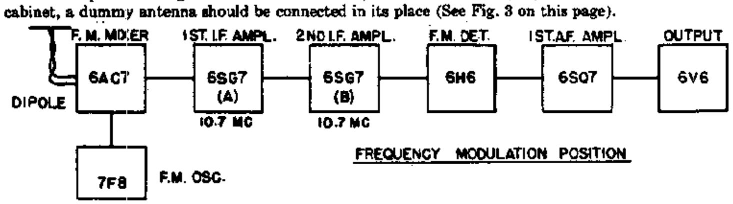
1. 0.1 mfd. Condenser.
2. 30 mmf. Condenser.

Shunts:

1. 5000 ohm carbon Resistor in series with a 0.1 mfd. Condenser.
2. *Hairpin Shorting Shunt composed of two inches of No. 14 bare tinned copper wire.

ALIGNMENT PROCEDURE (Output Meter and Scope Method)

1. This receiver has been aligned at the factory for best performance, and no attempt should be made to realign it unless the proper test equipment is available.
2. Turn the tuning condenser to full mesh, against stop, and set the dial pointer to the reference point which is to the left of Channel 200 on the dial.
3. Set tone control knob to the treble position, (extreme right).
4. When output meter is used, connect across voice coil: (3.2 ohms).
5. Feed an R. F. signal modulated 30% at 400 cycles to the receiver as indicated on the alignment chart (page 4). Connect signal generator ground terminal to the chassis of the receiver, except where noted.
6. When F. M. signal generator is used, a 30% modulated signal is equal to 22.5 kilocycles deviation.
7. Turn volume control knob to maximum clockwise position and adjust signal generator output to produce a noticeable output meter reading, (approx. 500 mw.) Keep signal generator output as low as possible to prevent excessive AVC action in the receiver.
8. The low impedance "Signal Web" antenna should remain connected, or, if the chassis is removed from cabinet, a dummy antenna should be connected in its place (See Fig. 3 on this page).

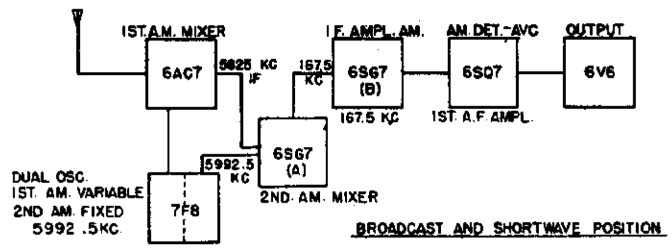


FREQUENCY MODULATION POSITION

ALIGNMENT CHART (Output Meter Method)

Alignment Sequence	A. M. Signal Generator Output: Frequency	In Series with	To	Position of: Range Switch	Dial Pointer or Var. Cond.	Adjust	Osc. Frequency	Remarks (Alignment notes begin on page 5)
1	167.5 kc.	0.1 mfd.	2nd I. F. Grid 6SG7 (B)	SW	Open	2nd I. F. Trans. (8)		See Note 1
2	167.5 kc.	0.1 mfd.	1st I. F. Grid 6SG7 (A)	SW	Open	1st I. F. Trans. (4)		See Note 2
3	10.7 mc.	30 mmf.	2nd I. F. Grid 6SG7 (B)	FM	Open	Discriminator Trans. (5)		See Note 3
4	10.7 mc.	30 mmf.	1st I. F. Grid 6SG7 (A)	FM	Open	2nd I. F. 10.7 mc. Trans. (4)		See Note 4
5	10.7 mc.	30 mmf.	See Note 5	FM	Open	1st I. F. 10.7 mc. Trans. (2) & (3)		See Note 5
6	5825 kc.	30 mmf.	*Link Coupling on 10.7 mc. I. F. No. 2	SW	Open	5825 kc. I. F. Trans. (3)	167.5 kc. Above	See Note 6—"The short lead between Transformers No. 2 & 3
7	5825 kc.	30 mmf.	6AC7 Grid	SW	Open	5825 kc. I. F. Trans. (2)	167.5 kc. Above	See Note 7
8	100 mc.	*78 ohm Dummy	F. M. Dipole Terminals	FM	Channel 260.5	F. M. Osc. Core F. M. Ant. Trims. Sec. & Prim.	10.7 mc. Above	See Note 8—"See "Dummy Antennas (1)," page 3
9	97.9 mc.	*78 ohm Dummy	F. M. Dipole Terminals	FM	Channel 250	F. M. Osc. Core	10.7 mc. Above	See Note 9—"See "Dummy Antennas (1)," page 3
10	Disconnect Generator *Connect Field Strength Meter			FM	Channel 215	Radiation Bal. Trimmer		*See Note 10—"See "Field Strength Meter" page 3
11	*9.8 mc.	30 mmf.	One F. M. Ant. Term.	SW	9.8 mc.	S. W. Oscillator Series Padder	5825 kc. Above	*Disconnect Field Strength Meter Connect Signal Generator. See Note 11
12	11.8 mc.	30 mmf.	One F. M. Ant. Term.	SW	11.8 mc.	S. W. Osc. Core	5825 kc. Above	See Note 12
13	10.7 mc.	30 mmf.	One F. M. Ant. Term.	SW	10.7 mc.	S. W. Ant. Prim. & Sec. Padder		See Note 13
14	10.7 mc.	30 mmf.	One F. M. Ant. Term.	FM	10.7 mc.	S. W. Primary (10.7 mc. Trap)		See Note 14
15	535 kc.	30 mmf.	*HI. Side of Dummy Loop Ant.	AM	Closed	B. C. Oscillator Series Padder	5825 kc. Above	*See Note 15—See "Dummy Antennas (2)," page 3
16	1620 kc.	30 mmf.	HI. Side of Dummy Loop Ant.	AM	Open	B. C. Osc. Core	5825 kc. Above	See Note 16
17	1400 kc.	80 mmf.	HI. Side of Dummy Loop Ant.	AM	1400 kc.	B. C. Antenna Trimmer		See Note 17
18	600 kc.	80 mmf.	HI. Side of Dummy Loop Ant.	AM	600 kc.	B. C. Antenna Core*		See Note 18
19	5825 kc.	80 mmf.	HI. Side of Dummy Loop Ant.	AM	1400 kc.	B. C. Wave Trap Trim.		See Note 19
20	600 kc.	See Note 20						

*Refer to remarks (with corresponding asterisk) in last column.



BROADCAST AND SHORTWAVE POSITION

ALIGNMENT NOTES (Output Meter Method)

Use the following notes in conjunction with ALIGNMENT CHART (page 4), TOP AND BACK VIEW (page 2), SOCKET VOLTAGE CHART (page 2), and SCHEMATIC DIAGRAM. Reference numbers of parts correspond to item numbers in Parts List.

1. (a) Place Shunt from link, between transformers (5) and (8), to ground (See "Shunts (1)", page 3). Adjust secondary (top) for maximum output.
   (b) Connect the Shunt from diode plate (pin No. 4) of 6SQ7 tube socket to the shielded lead junction on transformer (8). Adjust primary (bottom) for maximum output. Remove Shunt.

2. (a) Place Shunt from plate of the 6SG7 tube socket (A) to the transformer side of 2200 ohm resistor (106), See "Shunts (1)", page 3. Adjust secondary (bottom) for maximum output.
   (b) Connect the Shunt from grid of the 6SG7 tube socket (B) to Transformer side of 68,000 ohm resistor (109). Adjust primary (top) for maximum output. Remove Shunt.

3. (a) Adjust secondary (bottom) core for null point.
   (b) Tune Signal Generator for maximum Output Meter reading; approximately 75 to 100 kc. off the null point obtained in 3 (a), and note reading.
   (c) Tune Signal Generator to the opposite side of the null point for maximum reading on the Output Meter. Note this reading. If the two readings are not equal, adjust primary (top) core until equal readings are obtained.

4. (a) Set Signal Generator to peak on high side of 10.7 mc. and adjust primary (top) and secondary (bottom) for maximum output. Note meter reading.
   (b) Set Signal Generator to peak on low side of 10.7 mc. and note reading. If necessary, readjust primary (top) and secondary (bottom), slightly, until Output Meter readings and frequency spacing are equal on both sides of the 10.7 mc. null point.

5. (a) Connect Signal Generator output in series with a 30 mmf. condenser to either lug of the F. M. antenna transformer primary Trimmer (60). Connect Signal Generator ground to the receiver chassis at a point close to the trimmer. Keep lead lengths to a minimum and do not drape shielded cable, from Signal Generator output, near under side of chassis.
   (b) Set Signal Generator to peak on high side of 10.7 mc. and adjust 10.7 mc. primary (bottom) of transformer (2). Adjust 10.7 mc. secondary (top) of transformer (3). These two adjustments should be adjusted for maximum output. Note reading on Output Meter.
   (c) Set Signal Generator to peak on low side of 10.7 mc. and note Output Meter reading. If meter readings obtained on the peaks on both sides of 10.7 mc. are not equal, readjust the 10.7 mc. primary of transformer (2), and the 10.7 mc. secondary of transformer (3). The peaks should appear approximately 80 kc. on each side of 10.7 mc.

6. (a) Set Signal Generator frequency control for maximum output. Adjust 5825 kc. secondary Trimmer and secondary link adjustment, on bottom of transformer (3), for maximum output.

7. (a) Adjust 5825 kc. primary trimmer (bottom) and 5825 kc. primary link adjustment (top) of transformer (2) for maximum output.

8. (a) Adjust F. M. oscillator core (131), on top of chassis, to midway position.
   (b) Preset F. M. radiation balance adjustment (57), on top of chassis, to approximately two turns from the closed position.
   (c) Short circuit F. M. antenna primary trimmer (60), located on bottom of chassis, with Hairpin Shorting Shunt (See "Shunts (2)", page 3).
   (d) Adjust F. M. antenna secondary trimmer (58), on bottom of chassis, for maximum output.
   (e) Transfer Shorting Shunt to F. M. antenna secondary Trimmer (58) and adjust F. M. antenna primary Trimmer (60) for maximum output.
   (f) Remove Shorting Shunt.

9. (a) Adjust F. M. oscillator core (131), slowly, until 97.9 mc. signal is tuned in. Receiver should tune thru 87.9 and 107.9 mc. signal (channel 200 and 300).

10. (a) Connect Field Strength Meter to dipole antenna terminals, on back of chassis.
    (b) Adjust F. M. radiation balance trimmer (57), on top of chassis, to null point. If it is necessary to move this trimmer more than a quarter turn, repeat steps 8 and 10.

Alternate Method:—Connect a D.C. Vacuum Tube Voltmeter to No. 1 lug of 7F8 tube socket and adjust F. M. radiation balance trimmer for maximum grid volt reading.

11. (a) Set Signal Generator to 9.6 mc. modulated 30% at 400 cycles.
    (b) Turn volume control to maximum.
    (c) Adjust short-wave series padder (55), on top of chassis, for maximum output.

12. (a) Adjust short-wave oscillator core, on bottom of chassis, for maximum output. Repeat steps 11 and 12 until dial tracks at 9.6 and 11.8 mc.

13. (a) Shunt short-wave antenna primary padder (51), (lug connected to coil) to chassis with a Shorting Clip.
    (b) Increase Signal Generator output if necessary.
    (c) Adjust short-wave antenna secondary trimmer (59), for maximum output, while rocking variable condenser.
    (d) Transfer the Shorting Clip to across the short-wave antenna secondary trimmer (59)
    (e) Adjust short-wave antenna primary padder (51), for maximum output, while rocking variable condenser.
    (f) Remove Shorting Clip.

14. (a) Connect Field Strength Meter from Signal Generator side of 30 mmf. condenser to chassis.
    (b) Increase or decrease Signal Generator output until Field Strength Meter reads between 10 and 15 microamperes.
    (c) Adjust short-wave antenna primary padder (51), for lowest reading on Field Strength Meter. Make this adjustment slowly, otherwise the dip may be passed unnoticed when a highly damped meter is used.
    (d) Disconnect Field Strength Meter.

Alternate Method:—After the receiver is installed in cabinet, turn band switch to F. M. position and tune in an F. M. station. If a 10.7 kc. signal (indicated by a whistle or code) is heard in the speaker, adjust the short-wave antenna primary (51) until the interferring signal disappears or is minimized. Make this adjustment slowly.

15. (a) Connect Dummy Loop Antenna to Signal Web Antenna terminal and to ground terminal (See "Dummy Antennas (2)," page 3).
    (b) Preset broadcast antenna wave trap (85), on top of chassis, to approximately two turns from the closed position.
    (c) Adjust broadcast oscillator series padder (56), on top of chassis, for maximum output.

16. (a) Adjust broadcast oscillator core, on bottom of chassis, for maximum output.
    (b) Repeat steps 15 to 16 until frequency shift stops.

17. (a) Adjust broadcast antenna trimmer, on top of variable condenser, for maximum output.

18. (a) Adjust broadcast antenna core (132), on top of chassis, for maximum output while rocking variable condenser.

19. (a) Set dial pointer to approximately 1400 kc. and retune Signal Generator to maximum output.
    (b) Adjust Signal Generator output to approximately midscale reading on the Output Meter.
    (c) Adjust broadcast antenna wave trap trimmer (85), for lowest reading on Output Meter.
    (e) All Air Trimmers should be locked in position by applying a drop of household cement on the screw threads.

20. (a) After the receiver is placed in cabinet and all connections are made for normal operation, readjust the broadcast antenna core for maximum output at 600 kc.

MODELS 86CR Revised, 86CS Revised, 87CQ, 88CR

CROSLEY DIVISION AVCO MFG. CORP.

ALIGNMENT CHART (Scope Method)

Before using this chart, see ALIGNMENT PROCEDURE on page 3. To locate adjustments, refer to page 2.

Alignment Sequence	Type Generator	Signal Generator Output: Frequency	Signal Generator Output: In Series with	Signal Generator Output: To	Position of: Range Switch	Position of: Dial Pointer or Var. Cond.	Adjust	Type of Selectivity Curve	Osc. Frequency	Remarks
1	F. M.	167.5 kc.	0.1 mfd.	2nd I. F. Grid 6SG7 (B)	SW	Open	2nd I. F. Trans. (8), Top & Bottom	Flat or Double Peak	......	See Notes 1(a) & 2(a)
2	F. M.	167.5 kc.	0.1 mfd.	1st I. F. Grid 6SG7 (A)	SW	Open	1st I. F. Trans. (4), Bottom & Top	10% Double Peak	......	See Notes 1(a) & 2(a)
3	* A. M.	10.7 mc.	30 mmf.	1st I. F. Grid 6SG7 (A)	FM	Open	Discriminator Trans. (5), Bottom	Adjust for null point	......	*Disconnect F. M. Signal Generator and Scope See Note 5.
4	* F. M.	10.7 mc.	30 mmf.	1st I. F. Grid 6SG7 (A)	FM	Open	Discriminator Trans. (5), Top		......	*Disconnect A. M. Signal Generator and Output Meter See Notes 1(b), 2(b), & 3
5	F. M.	10.7 mc.	30 mmf.	1st I. F. Grid 6SG7 (A)	FM	Open	2nd I. F., 10.7 mc., Trans. (4), Top & Bottom		......	See Notes 1(b), 2(b), & 4 Readjust, slightly, discriminator primary (Top).
6	F. M.	10.7 mc.	30 mmf.	Grid of 6AC7	FM	Open	1st I. F., 10.7 mc., Trans. (2) & (3)		......	See Notes 1(b), 2(b), & 4 Adjust Trans. (2) bottom. Adjust Trans. (3) Top
7	A. M.	Use Alignment Chart on page 4. Begin with sequence No. 6 and continue thru to sequence No. 19, inclusive.								

*Refer to Remarks (with corresponding asterisk) in last column.

ALIGNMENT NOTES (Scope Method)

1. (a) Sweep align (Use approximately 20 to 30 kc. to sweep).
   (b) Sweep align (Use approximately 450 kc. to sweep).
2. (a) For 167.5 kc.; connect Scope to terminal No. 8 on the rear plate section of band change switch.
   (b) For 10.7 mc.; connect Scope, thru a 100,000 ohm resistor, to lug No. 6 of 6H6 tube socket.
3. Sweep Generator output 100,000 to 200,000 microvolts.
4. Scope Adjustment remains. Reduce Sweep input.
5. Connect Output Meter across voice coil. Feed an R. F. signal, calibrated at 10.7 mc. and modulated 30% at 400 cycles, to the receiver as indicated.

PARTS LIST—MODEL 87CQ, 88CR AND REVISED MODELS 86CR, 86CS

Figures in first column correspond to figures in Schematic Diagram

Item No.	Part No.	Description
1	AC-136171	Transformer Assy. (F. M. Antenna)
2	AC-136264	Transformer, 10.7 mc. and 5.825 mc. I. F. (A)
3	AC-136081	Transformer, 10.7 mc. and 5.825 mc. I. F. (B)
4	AC-136276	Transformer, 10.7 mc. and 167.5 kc. I. F.
5	AC-136260	Transformer, 10.7 mc. Discriminator
6	AC-136509	Coil Assy., 1st Oscillator (B. C. & S. W.)
8	AC-136261	Transformer, 167.5 kc., Diode
9	AW-136511	Coil, Antenna (B. C.)
10	AB-136444	Coil Assy., Antenna (S. W.)
11	Part of Item #2	Coil Assy.
12	Part of Item #4	Coil Assy.
13	Part of Item #4	Coil Assy.
14	Part of Item #5	Coil Assy.
15	Part of Item #6	Coil Assy.
16	Part of Item #6	Coil Assy.
18	Part of Item #8	Coil Assy.
19	Part of Item #3	Coil Assy.
20	Part of Item #3	Coil Assy.
21	Part of Item #1	Coil Assy.
22	Part of Item #1	Coil Assy.
23	Part of Item #1	Coil Assy.
24	W-136179	Coil, F. M. Oscillator
25	39001-17	Condenser, .05 mfd., 600 v., paper
26A	B-137028	Condenser, 20 mfd., 400 v. } Four
26B		Condenser, 30 mfd., 350 v. } Section
26C		Condenser, 20 mfd., 300 v. } Elect.
26D		Condenser, 20 mfd., 25 v. } Filter
27	B-135336	Transformer, Power
28A	C-135946	Condenser, Variable } Two
28B		Condenser, Variable } Section
29	C-136161	Switch, Band Change
30	B-135783	Control, Volume (3 megohm, Tap 720,000 ohm)
*	39368-22	Control (Volume)
*	39370-2	Shaft (Knurled Plug-in)
31A	B-135784	Control, Tone } Assembly
31B		Switch, Power } Assembly
32A	W-48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.
32B	W-48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.
33	C-132300-2	Cable and Plug Assy., Power
34	39001-7	Condenser, .001 mfd., 600 v., paper
35	39001-13	Condenser, .01 mfd., 600 v., paper
36	39001-11	Condenser, .005 mfd., 600 v., paper
37	39001-11	Condenser, .005 mfd., 600 v., paper
38	39001-11	Condenser, .005 mfd., 600 v., paper
39	39001-11	Condenser, .005 mfd., 600 v., paper
40	39001-11	Condenser, .005 mfd., 600 v., paper
41	39001-11	Condenser, .005 mfd., 600 v., paper
42	39001-11	Condenser, .005 mfd., 600 v., paper
43	39001-11	Condenser, .005 mfd., 600 v., paper
44	39001-11	Condenser, .005 mfd., 600 v., paper
45	39001-11	Condenser, .005 mfd., 600 v., paper
46	39001-13	Condenser, .01 mfd., 600 v., paper
47	39001-13	Condenser, .01 mfd., 600 v., paper
48	39001-17	Condenser, .05 mfd., 600 v., paper
49	39001-17	Condenser, .05 mfd., 600 v., paper
50	39001-76	Condenser, .003 mfd., 600 v., paper
51	C-137219-1	Condenser, Trimmer (S. W. Ant. Prim.)
52	Part of Item #2	Condenser, Trimmer (5.825 mc. Prim.)
53	Part of Item #3	Condenser, Trimmer (5.825 mc. Sec.)
55	W-136964	Condenser, Air Trimmer (S. W. Osc. Series Padder)
56	W-136964	Condenser, Air Trimmer (B. C. Osc. Series Padder)
57	W-136964	Condenser, Air Trimmer (F. M. Radiation Balance)
58	Part of Item #1	Condenser, Trimmer (F. M. Ant. Sec.)
59	Part of Item #10	Condenser, Trimmer (S. W. Ant. Sec.)
60	Part of Item #1	Condenser, Trimmer (F. M. Ant. Prim.)
61	Part of Item #2	Condenser, 82 mmf., 300 v., ceramic
62	Part of Item #3	Condenser, 68 mmf., 300 v., ceramic
63	Part of Item #4	Condenser, 470 mmf., 300 v., silver mica
64	Part of Item #4	Condenser, 470 mmf., 300 v., silver mica
65	Part of Item #8	Condenser, 470 mmf., 300 v., silver mica
66	Part of Item #2	Condenser, 150 mmf., 500 v., silver mica
67	Part of Item #3	Condenser, 150 mmf., 500 v., silver mica
68	Part of Item #5	Condenser, 150 mmf., 500 v., silver mica
69	Part of Item #5	Condenser, 150 mmf., 500 v., silver mica
70	Part of Item #5	Condenser, 62 mmf., 500 v., ceramic
71	B-226638-39	Condenser, 120 mmf., 300 v., ceramic
75	Part of Item #8	Condenser, 1000 mmf., 500 v., silver mica
76	GC-210685-182	Condenser, 100 mmf., 500 v., mica
77	Part of Item #8	Condenser, 100 mmf., 500 v., mica
79	Part of Item #5	Condenser, 12 mmf., 300 v., ceramic
80	Part of Item #4	Condenser, 33 mmf., 500 v., ceramic
81	Part of Item #4	Condenser, 33 mmf., 500 v., ceramic
83	B-226638-49	Condenser, 10 mmf., 300 v., ceramic
85	C-137219-3	Condenser, Trimmer (B. C. Ant. Wave Trap)
86	B-226638-27	Condenser, 82 mmf., 500 v., ceramic
87	B-226638-51	Condenser, 39 mmf., 300 v., ceramic
88	B-226638-52	Condenser, 91 mmf., 300 v., ceramic
89	GC-210685-183	Condenser, 50 mmf., 500 v., mica
90	B-226638-35	Condenser, 27 mmf., 500 v., ceramic
91	Part of Item #3	Condenser, 27 mmf., 500 v., ceramic
92	Part of Item #1	Resistor, 1000 ohm, ½ w.
93	39373-87	Resistor, 470,000 ohm, ½ w.
94	39373-87	Resistor, 470,000 ohm, ½ w.
95	39373-69	Resistor, 56,000 ohm, ½ w.
96	39373-94	Resistor, 1.5 megohm, ½ w.
97	39373-67	Resistor, 47,000 ohm, ½ w.
98	39373-75	Resistor, 120,000 ohm, ½ w.
99	39373-75	Resistor, 120,000 ohm, ½ w.
100	39373-129	Resistor, 220 ohm, 1 w.
101	39373-74	Resistor, 100,000 ohm, ½ w.
102	39373-74	Resistor, 100,000 ohm, ½ w.
103	39373-74	Resistor, 100,000 ohm, ½ w.
104	39373-80	Resistor, 220,000 ohm, ½ w.
105	39373-40	Resistor, 2,200 ohm, ½ w.
106	39373-40	Resistor, 2,200 ohm, ½ w.
107	39373-40	Resistor, 2,200 ohm, ½ w.
108	39373-90	Resistor, 680,000 ohm, ½ w.
109	39373-71	Resistor, 68,000 ohm, ½ w.
110	Part of Item #8	Resistor, 68,000 ohm, ½ w.
111	39373-92	Resistor, 1 megohm, ½ w.
112	39373-92	Resistor, 1 megohm, ½ w.
113	Part of Item #1	Resistor, 1 megohm, ½ w.
114	39001-17	Condenser, .05 mfd., 600 v., paper
115	39373-67	Resistor, 47,000 ohm, ½ w.
116	39373-62	Resistor, 27,000 ohm, ½ w.
118	39373-60	Resistor, 22,000 ohm, ½ w.
119	B-226638-59	Condenser, 15 mmf., 500 v., ceramic
120A	W-137021	Resistor (Wire-wound), [illegible] ohm, 4 w. } Two
120B		Resistor (Wire-wound), [illegible] ohm, 4 w. } Section
121	39373-107	Resistor, 10 megohm, ½ w.
122	C-135974	Speaker & Transformer Assy. (86CR, 86CS)
123	AW-136911	Condenser, 1.8 mmf. (Transmission Line)
124	39019-3	Terminal Board
125	W-137143	Transmission Line (75 ohm)
126	W-137143	Loop Antenna (Transmission Line)
128	39001-17	Condenser, .05 mfd., 600 v., paper
129	39001-7	Condenser, .001 mfd., 600 v., paper
130	B-226638-49	Condenser, 10 mmf., 300 v., ceramic
131	39012-59	Iron Core (F. M. Osc.)
132	39012-60	Iron Core (B. C. Ant.)
133	W-136998	Connector, Phono Pickup
134	W-137213	Cable & Plug Assy., Phono Motor
135	B-138131-2	Transformer, Output
137	39001-11	Condenser, .005 mfd., 600 v., paper
138	39373-170	Resistor, 22,000 ohm, 1 w.
139	39373-60	Resistor, 22,000 ohm, ½ w.
140	W-138531	Condenser, 53 mmf., 500 v., ceramic
141	B-138774	Crystal, 5992.5 kc.
142	W-137898-6	Condenser, 4.7 mmf., 500v.
143	39373-92	Resistor, 1 megohm, ½ w.
144	Part of Item #1	Condenser, 30 mmf., 500 v., mica
145	C-138777	Speaker & Transformer Assy. (87CQ) (88CR)
146	AB-138935	Cable & Plug Assy., Speaker (87CQ) (88CR)
147	C-138762-5	Speaker (only)
148	C-137727-8	Condenser .001 mfd., 300 v., ceramic
149	39001-61	Condenser, .025 mfd., 600 v., paper
150	39373-90	Resistor 680,000 ohm, ½ w.
152	39001-13	Condenser, .01 mfd., 600 v., paper
153	39001-11	Condenser, .005 mfd., 600 v., paper
155	39001-11	Condenser, .005 mfd., 600 v., paper
156	39001-13	Condenser, .01 mfd., 600 v., paper
157	39373-84	Resistor, 300,000 ohm, ½ w.
	W-131164-1	Cotter, External
	W-136853	Cushion (Rubber), Dial Glass
	D-138674	Dial Glass (87CQ)
	D-136252	Dial Glass (86CR, 86CS)
	D-138372	Escutcheon (87CQ)
	W-134055	Grommet, Variable Condenser Mtg.
	AW-137266	Hinge Assy., Door (86CS)
	W-137022	Knob, Band Switch; or Tone Control (86CR)
	W-137350	Knob, Band Switch; or Tone Control (86CS)
	W-135909	Knob, Dial Tuning; or Volume Control (86CR)
	W-137349	Knob, Dial Tuning; or Volume Control (86CS)
	B-138576-1	Knob (87CQ)
	W-136111	Mounting Rubber, Chassis (Front; 86CR, 86CS)
	W-33055	Mounting Rubber, Chassis (Front; 87CQ)
	W-45580	Mounting Rubber, Chassis (Rear; 86CR, 86CS)
	W-45056	Mounting Rubber, Chassis (Rear; 87CQ)
	W-45580	Mounting Rubber, Speaker (87CQ)
	AB-134935	Needle, Floating Jewel Assy.
	W-132366-2	Nut, Locking (Iron Core)
	W-134966	Nut, Spring Lock (Record Changer Mtg.)
	W-134956	Nut, Tee (Record Changer Mtg.)
	W-137199	Nut, Tee (Chassis Mtg.)
	W-136176	Pointer, Dial (86CR, 86CS)
	W-136176-2	Pointer, Dial (87CQ)
	B-137286	Pull, Door (86CS)
	B-137288	Pull, Drawer (86CS)
	W-137201	Pull, Drawer (86CR)
	W-137201-2	Pull, Drawer (87CQ)
	AB-136243	Pulley & Hub Assy., Variable Condenser (86CR, 86CS)
	AB-138726	Pulley & Hub Assy., Variable Condenser (87CQ)
	W-135074	Pulley, Idler (Small Stud)
	W-136979	Pulley, Idler (Large Stud)
	D-134945-1	Record Changer (Model "K")
	W-211101	Ring, Retaining (7F8 Socket)
	W-51071	Ring, Retaining (Drive Shaft)
	39172-200	Screw, Chassis Mtg. (Front)
	AW-137232	Screw & Washer Assy. (Record Changer Mtg.)
	W-136178	Shaft, Drive
	AW-137338	Shielded Wire & Plug Assy. (Phono)
	W-134968-1	Socket, Speaker (86CR, 86CS)
	39232-5	Socket, Tube (6AC7, 6SG7)
	W-136470	Socket, Tube (7F8)
	39232-7	Socket, Tube (6H6)
	39232-9	Socket, Tube (6SQ7)
	39232-3	Socket, Tube (6V6GT/G)
	39232-1	Socket, Tube (5Y3GT/G)
	D-136565-3	Socket Assy., Dial light
	D-136565-12	Socket Assy., Dial light (Shielded)
	39019-3	Terminal Board
	W-134916	Washer, Spring

*These parts will replace the original equipment parts.

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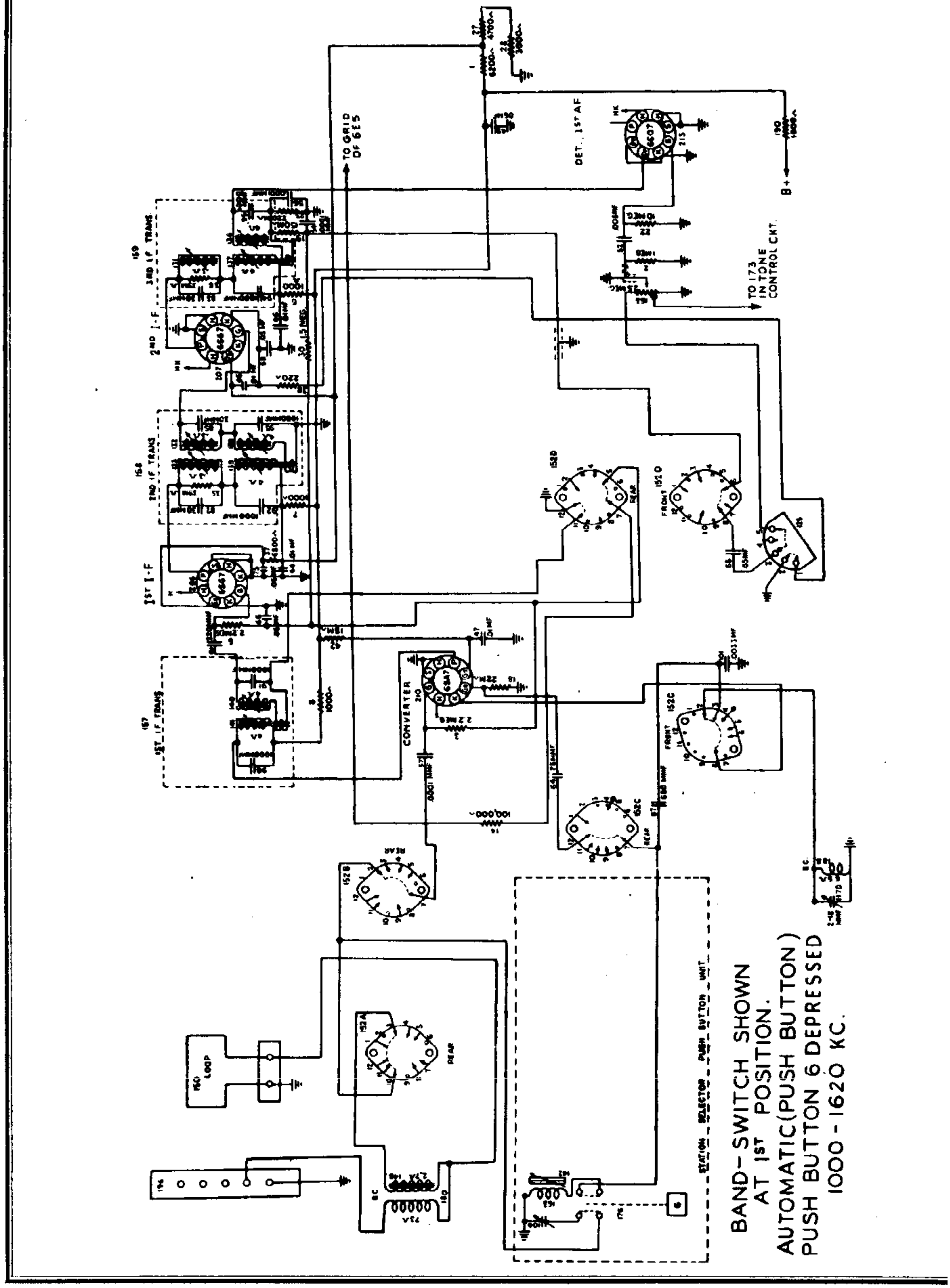
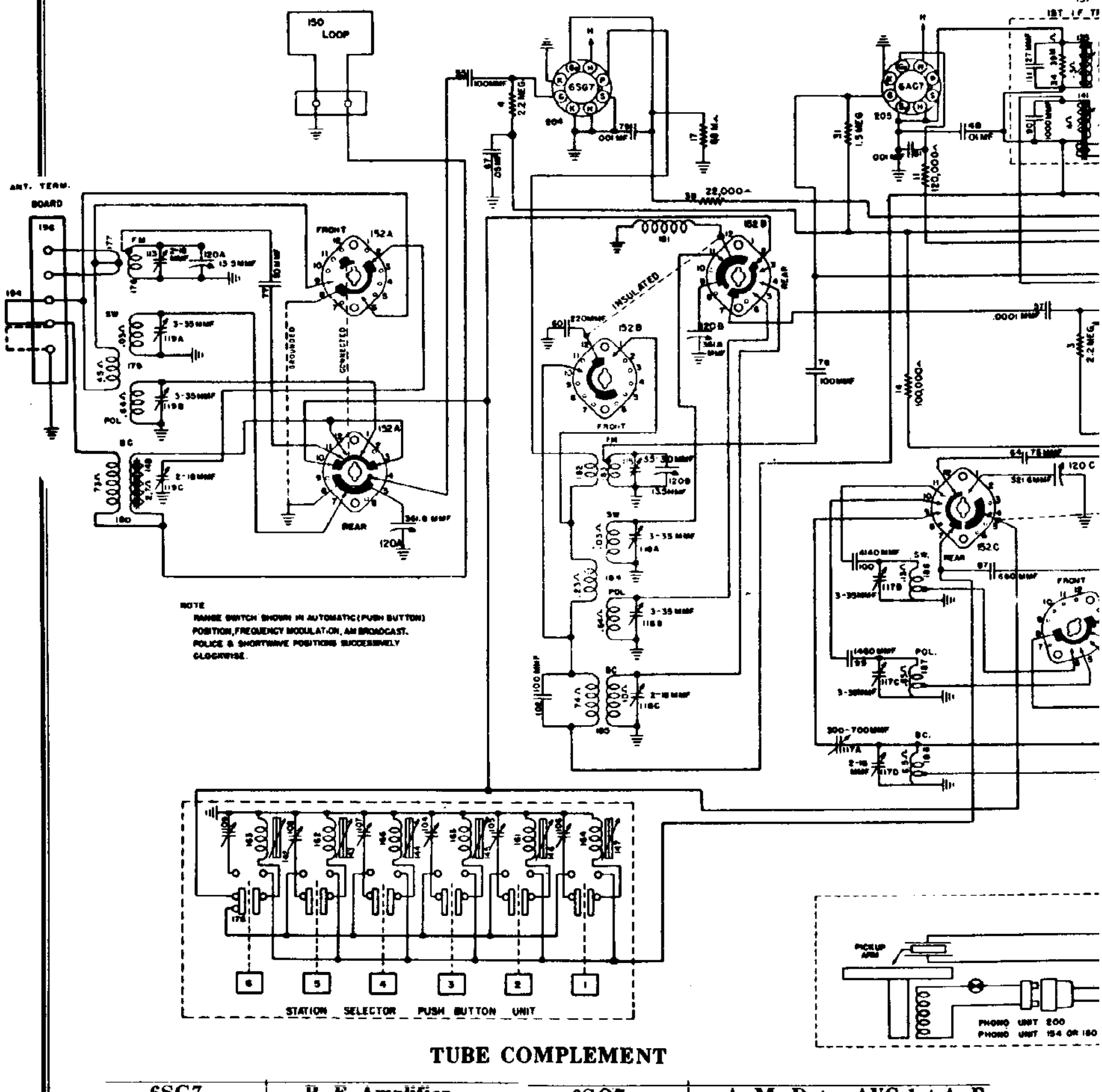
MODELS 146CS,146CS(W



BAND-SWITCH SHOWN
AT 1ST POSITION.
AUTOMATIC (PUSH BUTTON)
PUSH BUTTON 6 DEPRESSED
1000-1620 KC.

CROSL
AVCO

March, 1947



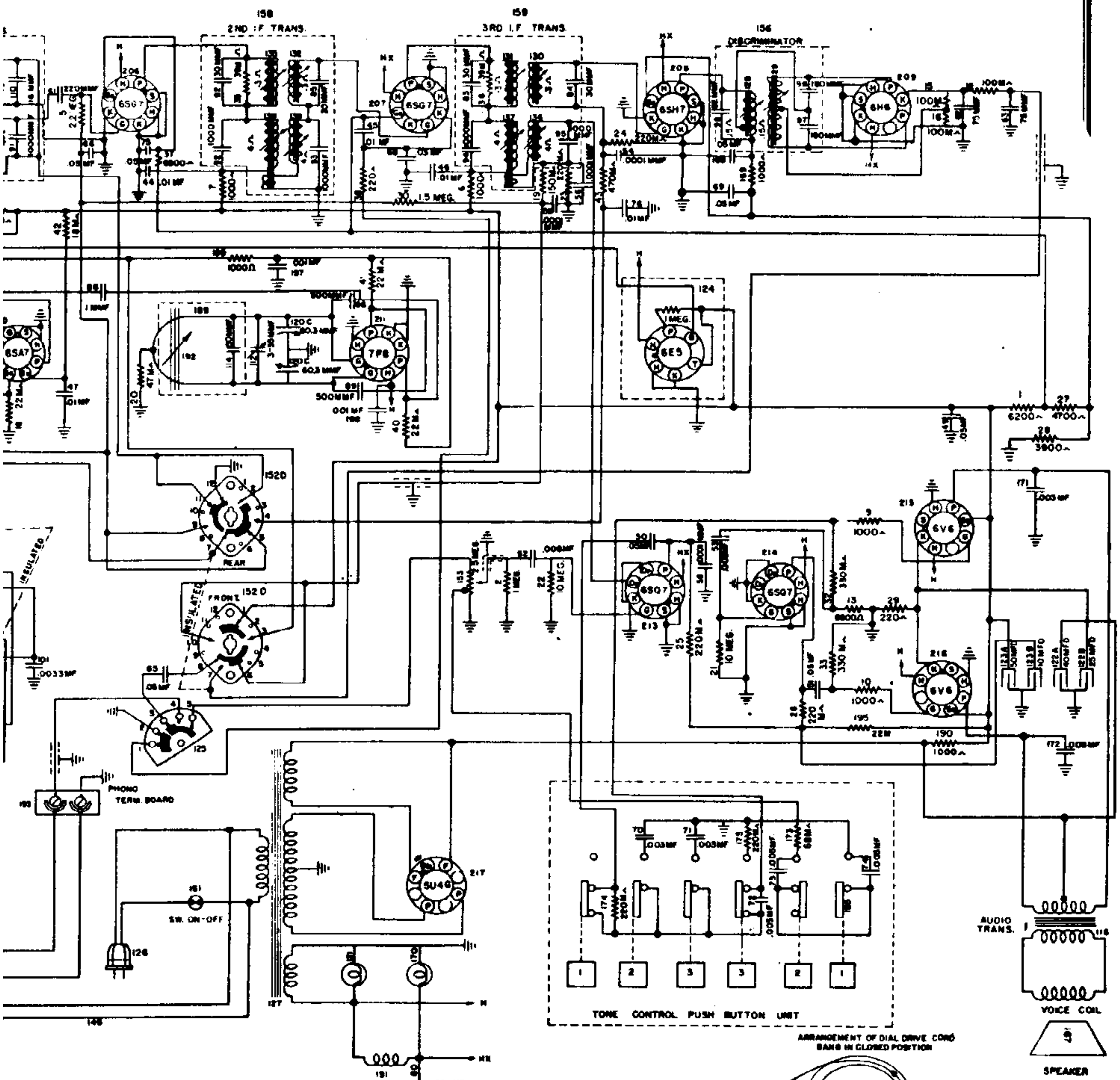
TUBE COMPLEMENT

6SG7	R. F. Amplifier	6SQ7	A. M. Det.—AVC 1st A. F. Amplifier
6SA7	A. M. Converter		
6AC7	F. M. Mixer	6SQ7	Phase Inverter
7F8	F. M. Oscillator	6V6 GT G	Output
6SG7	1st I. F. Amplifier	6V6 GT G	Output
6SG7	2nd I. F. Amplifier	5U4G	Rectifier
6SH7	3rd I. F. Amplifier	6E5	Tuning Indicator
6H6	Discriminator		

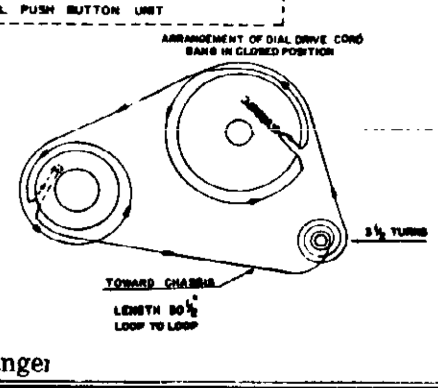
DIAL BULB: Type 51, 7.5 v., 0.2 amp.

IF PEA

NOTE:



: AM 455 KC FM 10.7 MC



del 146CS uses Model SL (Part No. D-134946-1) record changer.

del 146CS (V) uses model 400-12 (Part No. D-138927) Record Changer

MODELS 146CS,146CS(V)

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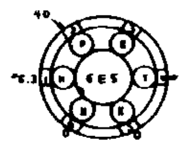
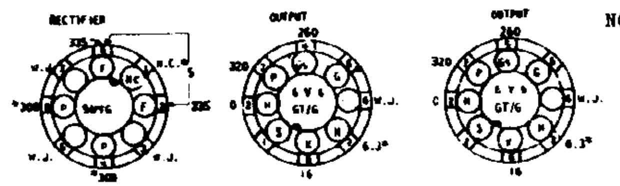
TUNING INDICATOR AT FRONT OF CHASSIS

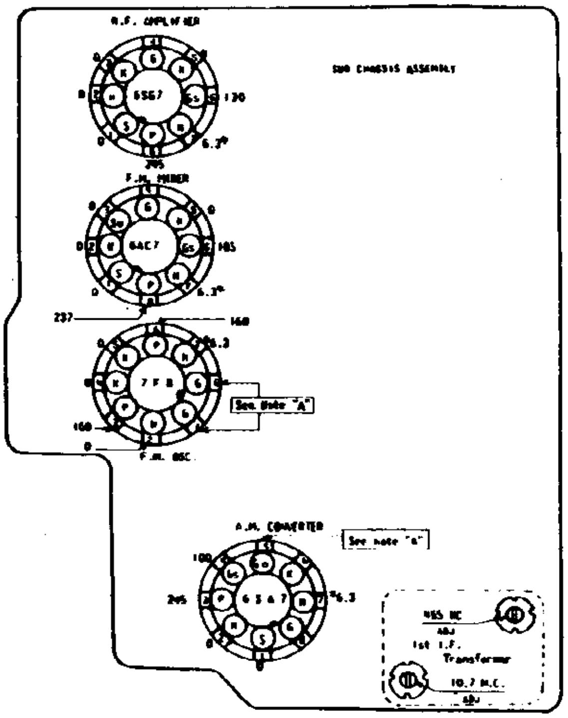


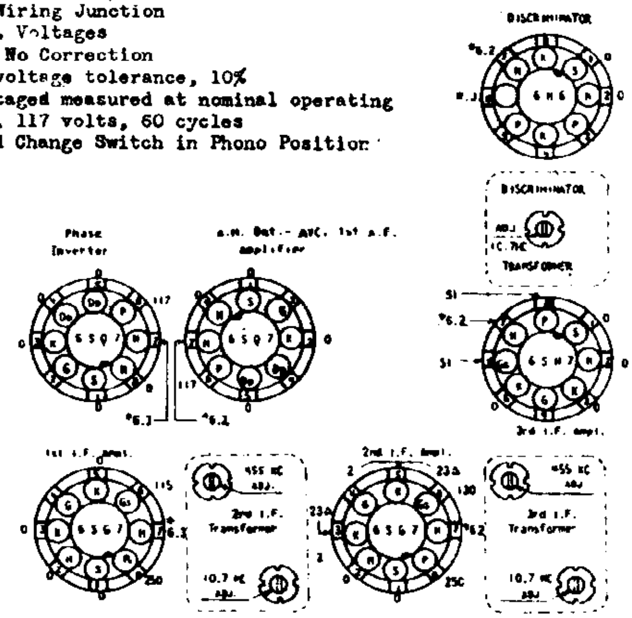


NOTE "A" OSCILLATOR GRID VOLTAGES

Band	Tube	Frequency	Volts
A.M.	6SA7	535 KC	-7.0
Police	6SA7	2.25 MC	-7.0
S.W.	6SA7	6.70 MC	-4.4
F.M.	7F8	88.1 MC	-3.6

NOTES:
1. These are bottom view of sockets
2. Measure voltages from socket lugs to chassis
3. Those voltages were measured with an Electronic Voltmeter
4. Voltages on 7F8 and 6AC7 taken with bandswitch in F.M. position. All other voltages taken with bandswitch in A.M. position.
5. W.J. = Wiring Junction
6. * = A.C. Voltages
7. N .C. = No Correction
8. Socket voltage tolerance, 10%
9. All voltaged measured at nominal operating voltage, 117 volts, 60 cycles
10. Δ = Band Change Switch in Phono Position





ALIGNMENT PROCEDURE NOTES

Sweep alignment (use approximately 500 kc. to sweep).

Sweep Generator Output .1 to 1 Volt RMS.

Scope connected to center terminal on phono switch.

Align for maximum peak amplitude. Peak separation should be 150 to 200 kc.

Scope connected to center terminal of 3rd I.F. through 200,000 ohms.

Repeat operations 8 and 9 until no change can be noted in sensitivity.

Rock gang.

Repeat operations 12, 13 and 14 for maximum sensitivity.

C=Channel number.

CIRCUIT

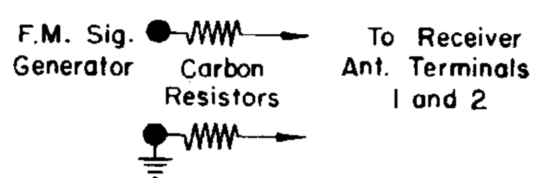
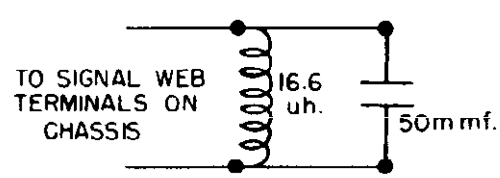


FIG. 1



When aligning the shortwave oscillator trimmer, make certain the circuit is aligned at the correct frequency and not at the image frequency which is 910 kilocycles lower in frequency as indicated on the receiver dial. To check, tune in signal generator frequency, then increase the generator output and tune in the image frequency which should be audible, but weaker than the fundamental frequency. If the image can not be tuned in, the oscillator trimmer is adjusted to the wrong peak. The correct peak is the second peak of the trimmer from the closed position.

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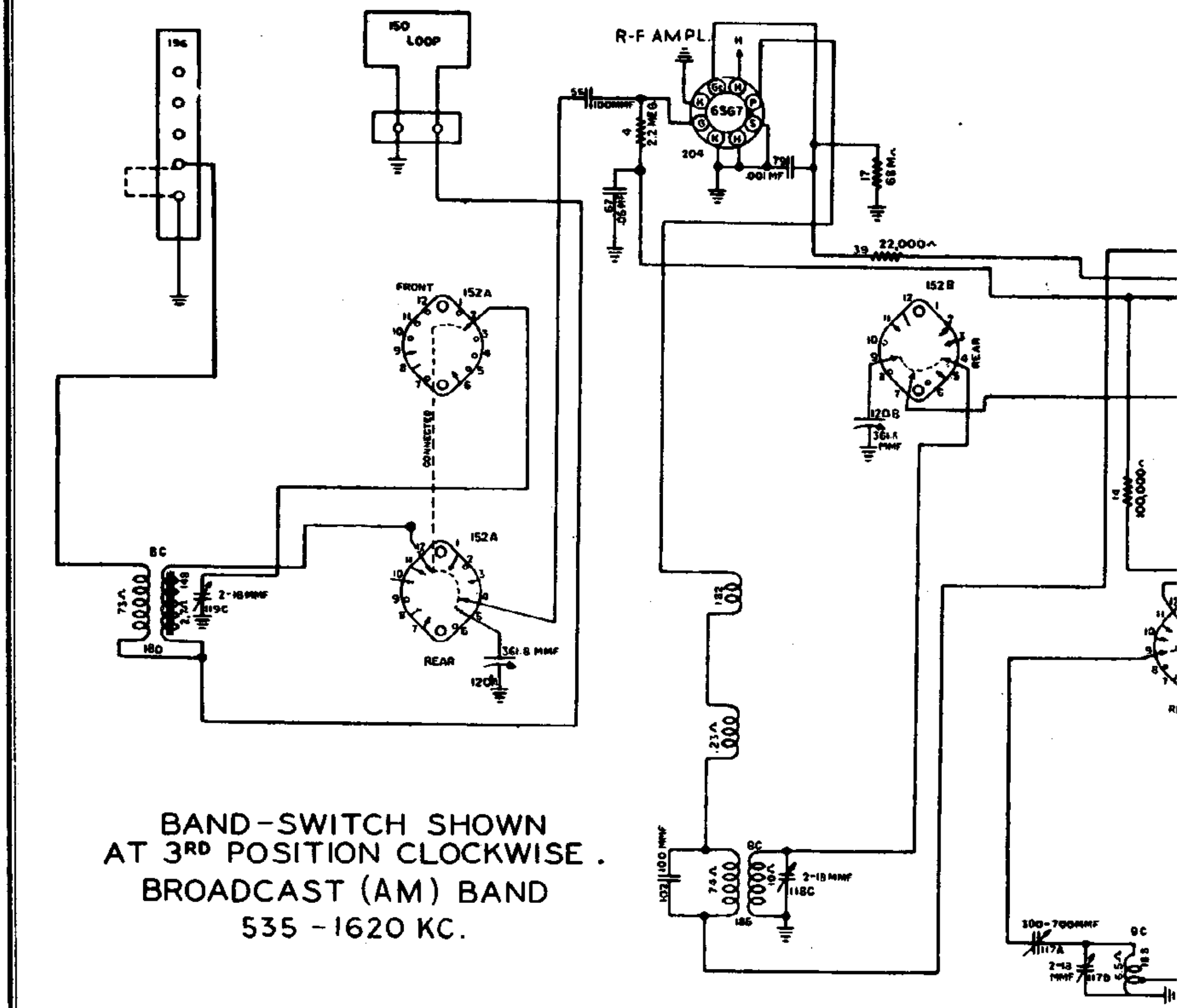

Item No.	Part No.	Description	Item No.	Part No.	Description
1	39372-10	Resistor, 6200 ohm, 10 w.	27	39373-157	Resistor, 4,700 ohm, 1 w.
2	39373-92	Resistor, 1.0 megohm, ½ w.	28	39373-155	Resistor, 3,900 ohm, 1 w.
3	39373-97	Resistor, 2.2 megohm, ½ w.	29	39373-239	Resistor, 220 ohm, 2 w.
4	39373-97	Resistor, 2.2 megohm, ½ w.	30	39373-94	Resistor, 1.5 megohm, ½ w.
5	39373-97	Resistor, 2.2 megohm, ½ w.	31	39373-94	Resistor, 1.5 megohm, ½ w.
6	39373-33	Resistor, 1,000 ohm, ½ w.	32	39373-84	Resistor, 330,000 ohm, ½ w.
7	39373-33	Resistor, 1,000 ohm, ½ w.	33	39373-84	Resistor, 330,000 ohm, ½ w.
8	39373-33	Resistor, 1,000 ohm, ½ w.	34	Part of Item 157	Resistor, 39,000 ohm, ½ w.
9	39373-33	Resistor, 1,000 ohm, ½ w.	35	Part of Item 158	Resistor, 39,000 ohm, ½ w.
10	39373-33	Resistor, 1,000 ohm, ½ w.	36	Part of Item 159	Resistor, 39,000 ohm, ½ w.
11	39373-75	Resistor, 120,000 ohm, ½ w.	37	39373-51	Resistor, 6,800 ohm, ½ w.
12	39373-74	Resistor, 100,000 ohm, ½ w.	38	39373-19	Resistor, 220 ohm, ½ w.
13	39373-51	Resistor, 6,800 ohm, ½ w.	39	39373-170	Resistor, 22,000 ohm, 1 w.
14	39373-74	Resistor, 100,000 ohm, ½ w.	40	39373-170	Resistor, 22,000 ohm, 1 w.
15	39373-74	Resistor, 100,000 ohm, ½ w.	41	39373-170	Resistor, 22,000 ohm, 1 w.
16	39373-74	Resistor, 100,000 ohm, ½ w.	42	39373-278	Resistor, 18,000 ohm, 2 w.
17	39373-71	Resistor, 68,000 ohm, ½ w.	43	39373-87	Resistor, 470,000 ohm, ½ w.
18	39373-60	Resistor, 22,000 ohm, ½ w.	44	39001-13	Condenser, .01 mfd., 600 v., paper
19	39373-77	Resistor, 150,000 ohm, ½ w.	45	39001-13	Condenser, .01 mfd., 600 v., paper
20	39373-67	Resistor, 47,000 ohm, ½ w.	46	39001-13	Condenser, .01 mfd., 600 v., paper
21	39373-107	Resistor, 10 megohm, ½ w.	47	39001-13	Condenser, .01 mfd., 600 v., paper
22	39373-107	Resistor, 10 megohm, ½ w.	48	39001-13	Condenser, .01 mfd., 600 v., paper
23	39373-80	Resistor, 220,000 ohm, ½ w.	49	39001-17	Condenser, .05 mfd., 600 v., paper
24	39373-80	Resistor, 220,000 ohm, ½ w.	50	39001-17	Condenser, .05 mfd., 600 v., paper
25	39373-80	Resistor, 220,000 ohm, ½ w.	51	39001-17	Condenser, .05 mfd., 600 v., paper
26	39373-80	Resistor, 220,000 ohm, ½ w.	52	39001-78	Condenser, .006 mfd., 600 v., paper

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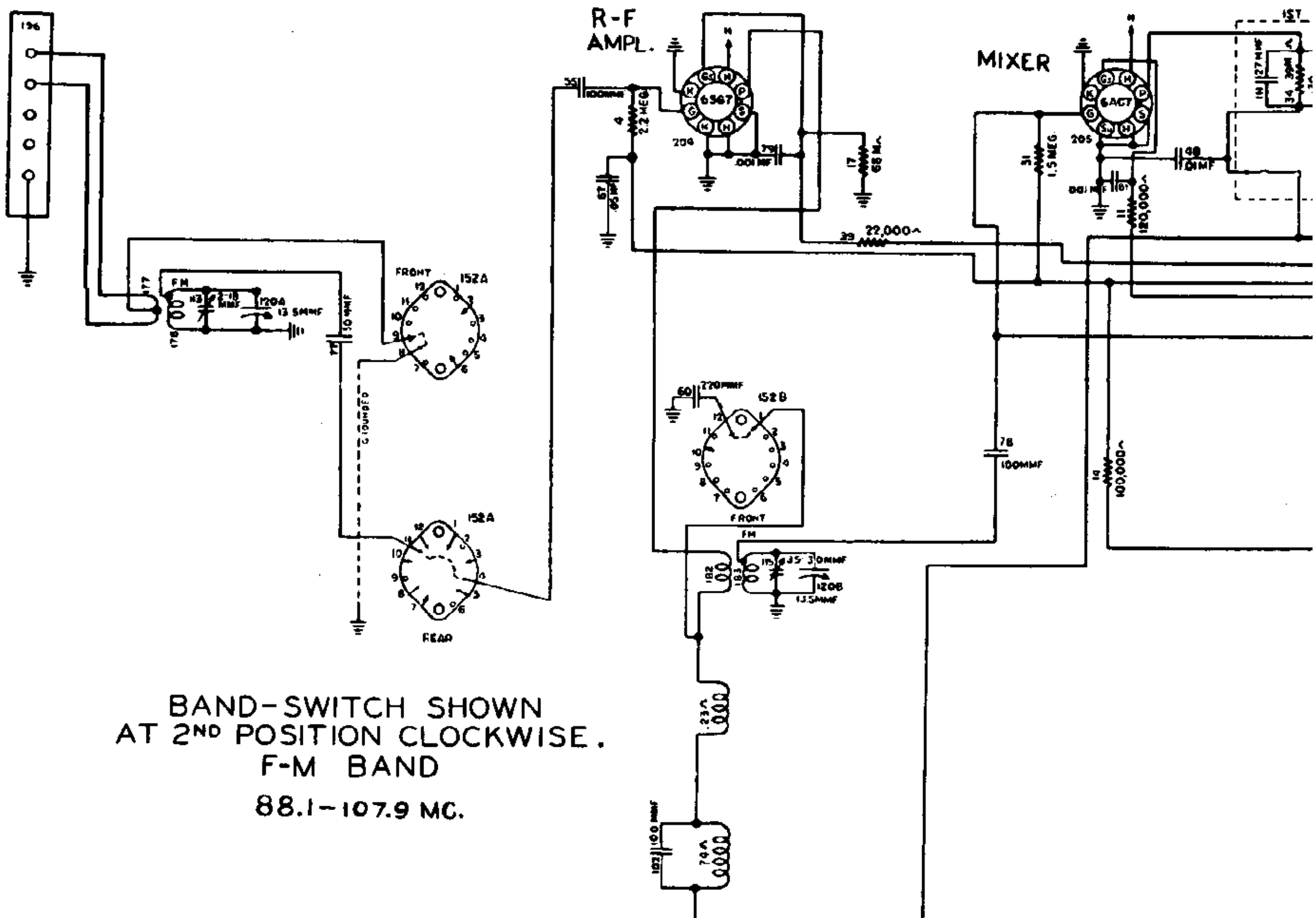
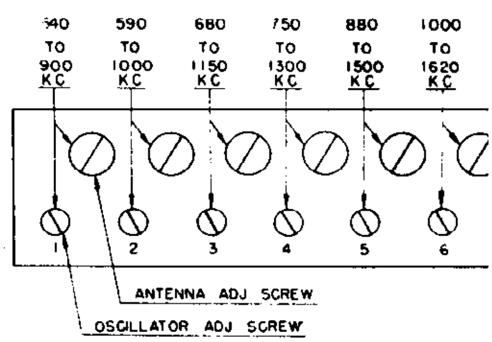


PUSH BUTTON ADJUSTMENT PROCEDURE

Each of the six push buttons, for automatic tuning, has two adjusting screws by which it may be set to a nearby American broadcast station whose frequency in kilocycles is within the kilocycle range covered that button. To gain access to these screws, carefully pull off the push button. To set No. 1 push button to a desired position, proceed as follows:



1. Turn the ANTENNA ADJ. SCREW clockwise until moderately tight, then turn the OSCILLATOR ADJ. SCREW counter-clockwise until the threaded portion extends approximately ¾ inch. **Use a small screw-driver and do not exert pressure.**
2. Turn the band selector switch to the "AM" position and manually tune in the station to which the push button is to be set. The frequency of the station selected must be between 540 and 900 kilocycles. Carefully adjust the tuning control to the point of clearest reception.
3. Turn the band selector switch to the "AUTO" position and slowly turn the OSCILLATOR ADJ. SCRE clockwise until the same station is heard. Adjust the screw for maximum volume.
4. Adjust the ANTENNA ADJ. SCREW for maximum volume.
5. Turn the band selector switch from "AUTO" to "AM" and back again to check if the adjustment h been correctly made. There should be no change in tone quality when switched from one to the other.
6. Place the tab with the call letters of the station, to which the push button has been set, in a celluloid "\ and slide it into the button from the side.

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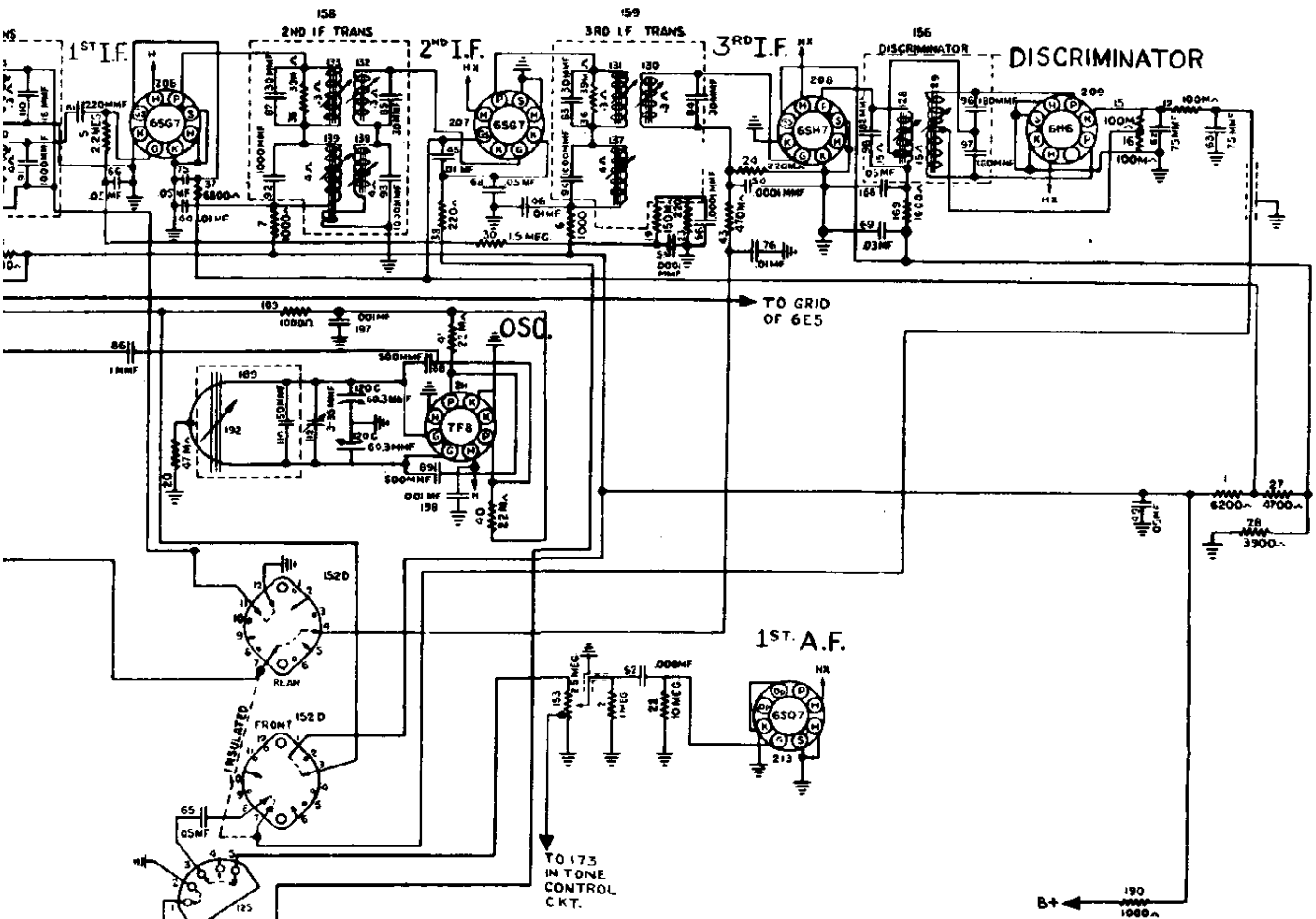

The remaining push buttons may be set in a similar manner. No adjustment of master tone control push buttons is required.

ALIGNMENT PROCEDURE

This receiver has been aligned at the factory for best performance, and no attempt should be made to re-align it unless the proper test equipment is available.

Turn the tuning condenser to full mesh, against stop, and set the dial pointer to the reference line at the end of the dial scale.

Release all tone control buttons to the out position.

Connect the output meter across the speaker voice coil (3.2 ohms).

Feed an R. F. signal modulated 30% at 400 cycle to the receiver as indicated in the alignment procedure chart. Connect signal generator ground terminal to the chassis of the receiver. When F. M. generator is used, a 30% modulated signal is equal to a deviation of 22.5 kc.

Turn the volume control knob to maximum clockwise position and adjust the signal generator output to produce a noticeable output meter reading. Keep signal generator output as low as possible to prevent excessive AVC action in the receiver.

The low impedence "Signal Web" antenna should remain connected at all times. If the chassis is removed from cabinet, use a dummy antenna consisting of a 16.6 u.h. coil in parallel with a 50 mmf. capacitor (See Circuit, Fig. 2, page 5.)

The link must be connected in external antenna position.

For complete receiver alignment see Alignment Procedure Chart.

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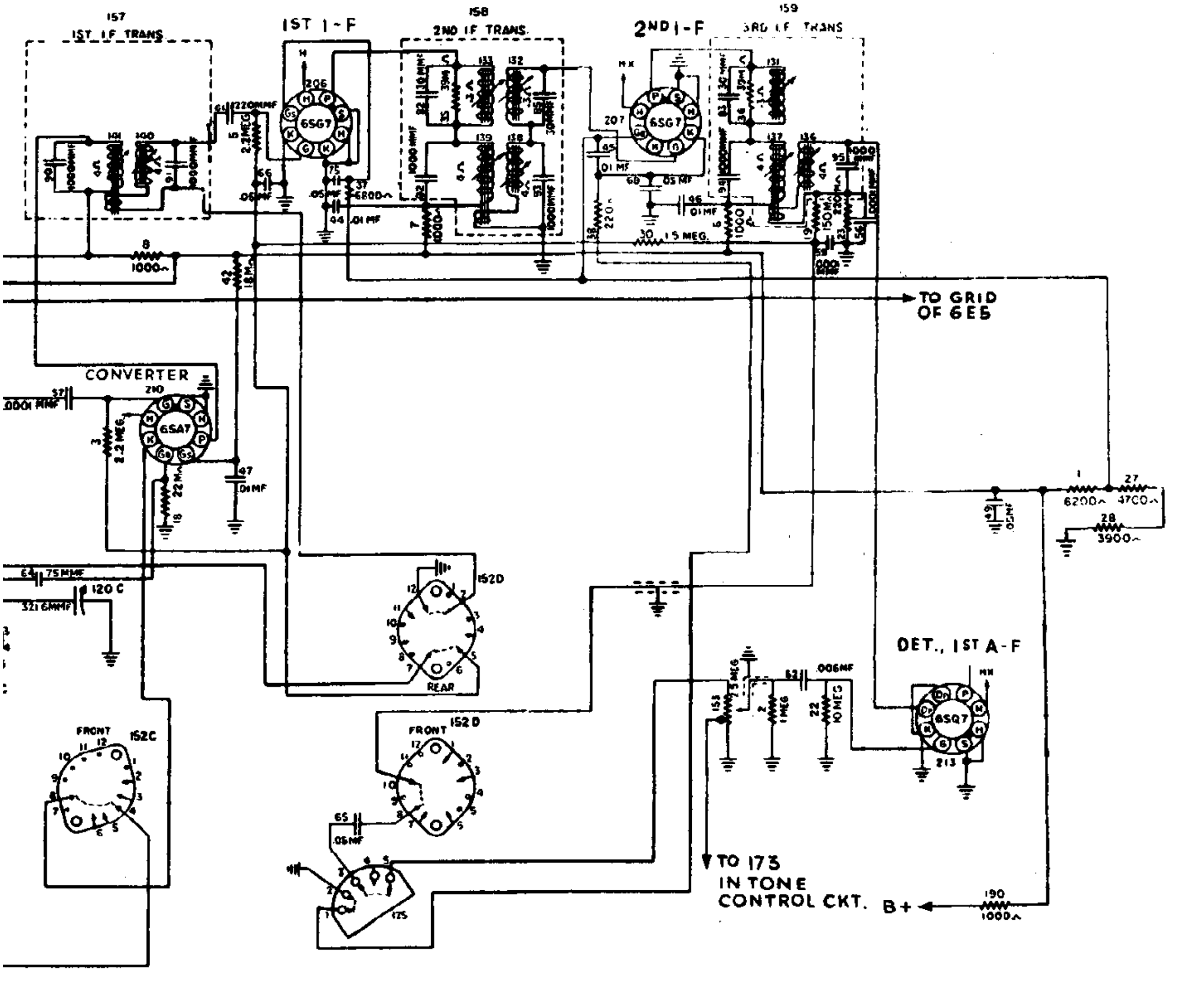

Item No.	Part No.	Description	Item No.	Part No.	Description
53	39001-78	Condenser, .006 mfd., 600 v., paper	79	B-226638-31	Condenser, .001 mfd., 300 v., ceramic
54	39001-1	Condenser, .0001 mfd., 600 v., paper	80	B-226638-31	Condenser, .001 mfd., 300 v., ceramic
55	B-226638-2	Condenser, 100 mmf., 300 v., ceramic	81	B-226638-31	Condenser, .001 mfd., 300 v., ceramic
56	39001-1	Condenser, .0001 mfd., 600 v., paper	82	Part of Item 158	Condenser, 30 mmf., 500 v., ceramic
57	39001-1	Condenser, .0001 mfd., 600 v., paper	83	Part of Item 159	Condenser, 30 mmf., 500 v., ceramic
58	39001-1	Condenser, .0001 mfd., 600 v., paper	84	Part of Item 159	Condenser, 30 mmf., 500 v., ceramic
59	39001-1	Condenser, .0001 mfd., 600 v., paper	85	Part of Item 158	Condenser, 30 mmf., 500 v., ceramic
60	39004-9	Condenser, 220 mmf., 500 v., mica	86	W-137398-2	Condenser, 1 mmf., 500 v., silver mica
61	39004-9	Condenser, 220 mmf., 500 v., mica	87	G-131502-20	Condenser, 680 mmf., 400 v., silver mica
62	B-226638-54	Condenser, 75 mmf., 500 v., ceramic	88	G-131502-5	Condenser, 500 mmf., 400 v., silver mica
63	B-226638-54	Condenser, 75 mmf., 500 v., ceramic	89	G-131502-5	Condenser, 500 mmf., 400 v., silver mica
64	B-226638-54	Condenser, 75 mmf., 500 v., ceramic	90	Part of Item 157	Condenser, 1,000 mmf., 500 v., mica
65	39001-17	Condenser, .05 mfd., 600 v., paper	91	Part of Item 157	Condenser, 1,000 mmf., 500 v., mica
66	39001-17	Condenser, .05 mfd., 600 v., paper	92	Part of Item 158	Condenser, 1,000 mmf., 500 v., mica
67	39001-17	Condenser, .05 mfd., 600 v., paper	93	Part of Item 158	Condenser, 1,000 mmf., 500 v., mica
68	39001-17	Condenser, .05 mfd., 600 v., paper	94	Part of Item 159	Condenser, 1,000 mmf., 500 v., mica
69	39001-17	Condenser, .05 mfd., 600 v., paper	95	Part of Item 159	Condenser, 1,000 mmf., 500 v., mica
70	39001-76	Condenser, .003 mfd., 600 v., paper	96	Part of Item 156	Condenser, 180 mmf., 500 v., mica
71	39001-76	Condenser, .003 mfd., 600 v., paper	97	Part of Item 156	Condenser, 180 mmf., 500 v., mica
72	39001-76	Condenser, .003 mfd., 600 v., paper	98	Part of Item 156	Condenser, 82 mmf., 500 v., silver mica
73	39001-11	Condenser, .005 mfd., 600 v., paper	99	GC-210685-179	Condenser, 1,460 mmf., 500 v., mica
74	39001-11	Condenser, .005 mfd., 600 v., paper	100	GC-210685-178	Condenser, 4,140 mmf., 500 v., mica
75	39001-17	Condenser, .05 mfd., 600 v., paper	101	GC-210685-168	Condenser, 3,300 mmf., 500 v., mica
76	39001-13	Condenser, .01 mfd., 600 v., paper	102	39004-7	Condenser, 100 mmf., 500 v., mica
77	B-226638-53	Condenser, 50 mmf., 500 v., ceramic	104	B-136327-12	Condenser, Trimmer
78	39004-7	Condenser, 100 mmf., 500 v., mica	105	B-136327-24	Condenser, Trimmer

MODELS 146CS, 146CS(V)

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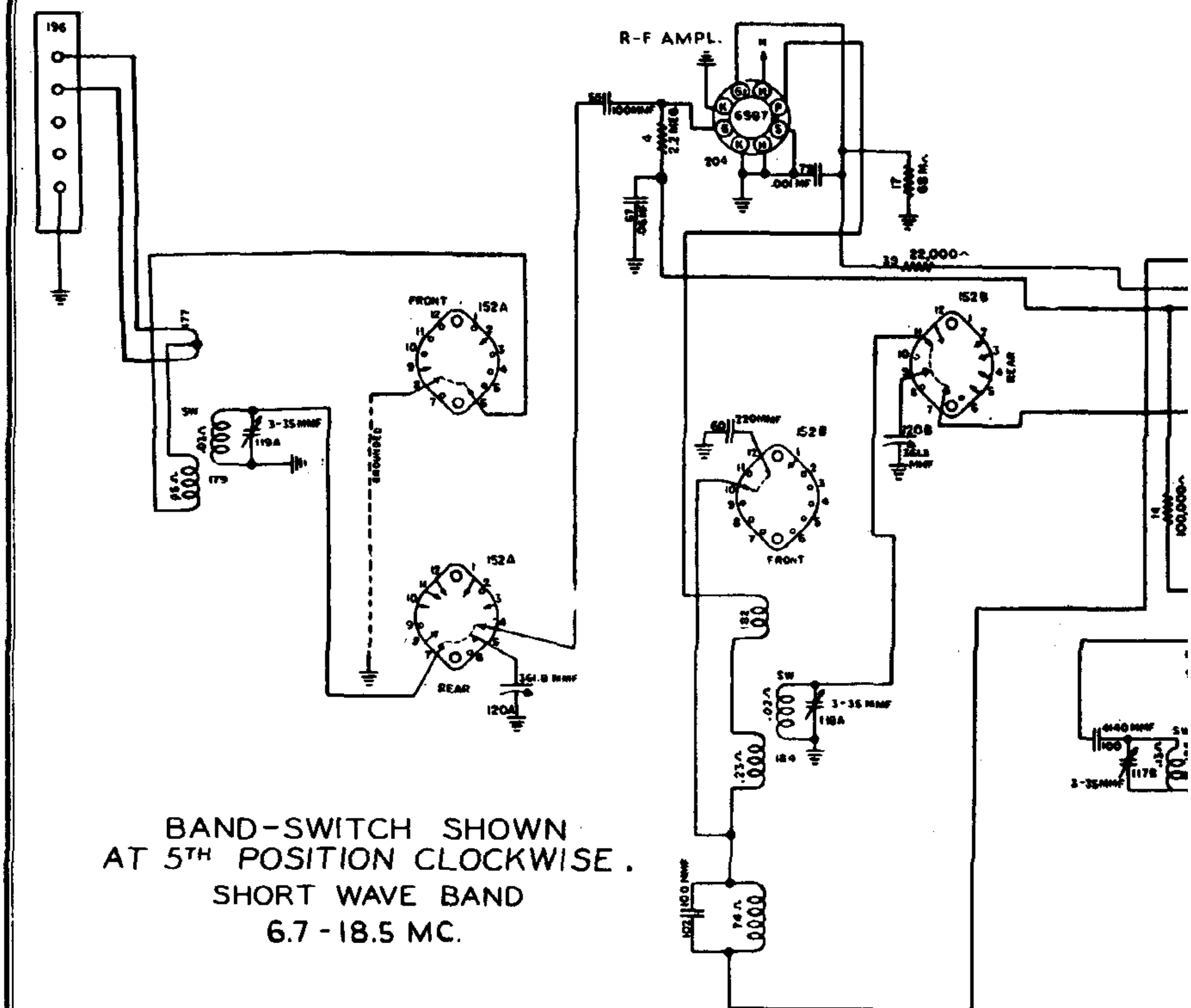
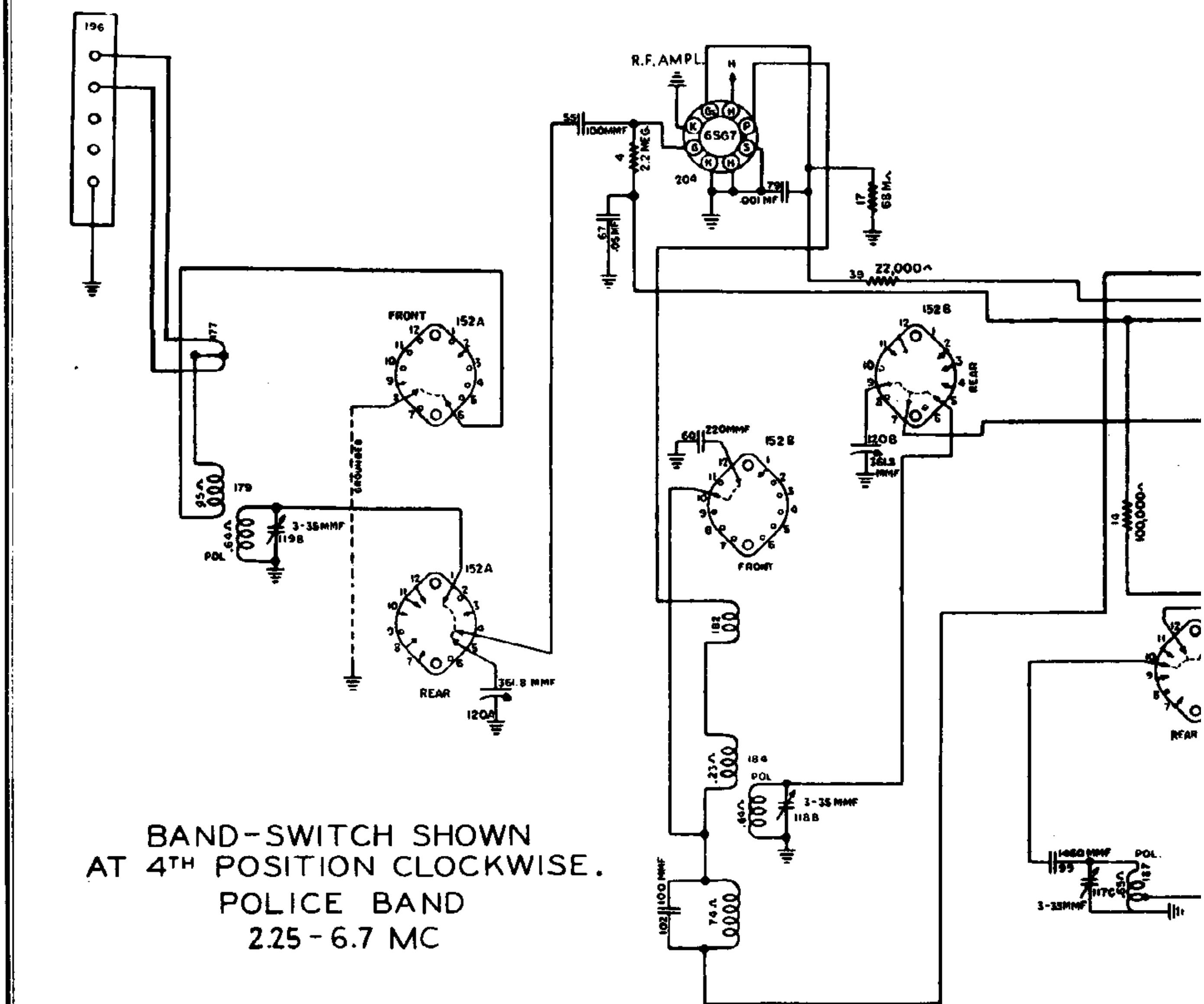


BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE.
SHORT WAVE BAND
6.7 - 18.5 MC.

Item No.	Part No.	Description
180	AW-136396	Coil, Antenna Loading
181	AW-136726	Choke, R.F.
182	AW-136732	Choke, R.F. Primary
183	AW-138245	Coil, R.F. Secondary
184	AW-136406	Coil, R.F. (S. W. & Pol.)
185	AW-136362	Coil, R. F. (B. C.)
186	AW-136392	Coil, Oscillator (S. W.)
187	AW-136393	Coil, Oscillator (Pol.)
188	AW-136364	Coil, Oscillator (B. C.)
189	AW-136682	Coil and Mtg. (H. F.)
190	39371-5	Resistor, 1,000 ohm, 10 w.
191	AW-136720	Choke, R.F., Heater
192	Part of Item 189	Iron Core, F.M. Osc.
193	39019-2	Terminal Board, Phono
194	W-136316	Tie Bar
195	39373-60	Resistor, 22,000 ohm, ½ w.
196	39019-5	Terminal Board, Antenna
197	B-226638-31	Condenser, .001 mfd., 300 v., ceramic
198	B-226638-31	Condenser, .001 mfd., 300 v., ceramic
199	39373-33	Resistor, 1,000 ohm, ½ w.
200	138927	Record Changer (400-12, Model 146CS(V)
204	39232-5	Socket, Tube (6SG7)
205	39232-5	Socket, Tube (6AC7)
206	39232-5	Socket, Tube (6SG7)
207	39232-1	Socket, Tube (6SG7)
208	39232-5	Socket, Tube (6SH7)

Item No.	Part No.	Description
209	39232-1	Socket, Tube (6H6)
210	39232-1	Socket, Tube (6SA7)
211	W-136470	Socket, Tube (7F8)
213	39232-1	Socket, Tube (6SQ7)
214	39232-1	Socket, Tube (6SQ7)
215	39204	Socket, Tube (6V6)
216	39204	Socket, Tube (6V6)
217	39232-1	Socket, Tube (5U4G)
	AC-136187	Background Assy., Dial
	AW-135502	Brackets & Bushing Assy., Pointe
	W-41405-1	Bushing (Headed), Chassis Mtg. o Mtg.
	W-41405-9	Bushing (Headed), R.F. Unit Mtg
	B-135719	Button (On-Off)
	B-135717	Button (Station)
	B-135688	Button (Tone), Treble 1
	B-135714	Button (Tone), Treble 2
	B-135715	Button (Tone), Treble 3
	B-135694	Button (Tone), Bass 1
	B-135699	Button (Tone), Bass 2
	B-135716	Button (Tone), Bass 3
	W-136168	Call Letter Sheet
	W-136144	Call Letter Covers
	R-137056-1	Cabinet (146 CS using "SL" Chan
	R-137056-2	Cabinet (146CS using "OD" Chan



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
POLICE BAND
2.25 - 6.7 MC

Item No.	Part No.	Description
106	B-136327-24	Condenser, Trimmer
107	B-136327-25	Condenser, Trimmer
108	B-136327-26	Condenser, Trimmer
109	B-136327-27	Condenser, Trimmer
110	Part of Item 157	Condenser, 16 mmf., 500 v., ceramic
111	Part of Item 157	Condenser, 27 mmf., 500 v., ceramic
112	B-136327-28	Condenser, Trimmer
113	B-136327-29	Condenser, Trimmer
114	Part of Item 189	Condenser, 50 mmf., ceramic
115	B-136327-22	Condenser, Trimmer
116	B-137001	Transformer, Output
117 A	W-135818	Condenser, Trimmer } Four
117 B		Condenser, Trimmer } Section
117 C		Condenser, Trimmer } Assy.
117 D		Condenser, Trimmer
118 A	W-135821	Condenser, Trimmer } Three
118 B		Condenser, Trimmer } Section
118 C		Condenser, Trimmer } Assy.
119 A	W-135821	Condenser, Trimmer } Three
119 B		Condenser, Trimmer } Section
119 C		Condenser, Trimmer } Assy.
120 A	C-134895	Condenser, Variable } Three
120 B		Condenser, Variable } Section
120 C		Condenser, Variable } Assy.

Item No.	Part No.	Description
121	W-43567	Bulb (Dial), Type 51, 7.5. v., 0.2 amp.
122 A	B-137003	Condenser, 40 mfd., 400 w.v. } Two Section
122 B		Condenser, 20 mfd., 25 w.v. } Elec. Filter
123 A	B-137002	Condenser, 50 mfd., 400 w.v. } Two Section
123 B		Condenser, 10 mfd., 300 w.v. } Elec. Filter
124	W-135695	Socket, Tube (6E5)
125	B-135870	Switch, Phono
126	C-132300-2	Cable and Plug, Power
127	B-135600	Transformer, Power
128	Part of Item 156	Iron Core
129	Part of Item 156	Iron Core
130	Part of Item 159	Iron Core
131	Part of Item 159	Iron Core
132	Part of Item 158	Iron Core
133	Part of Item 158	Iron Core
134	Part of Item 157	Iron Core
135	Part of Item 157	Iron Core
136	Part of Item 159	Iron Core
137	Part of Item 159	Iron Core
138	Part of Item 158	Iron Core
139	Part of Item 158	Iron Core
140	Part of Item 157	Iron Core
141	Part of Item 157	Iron Core

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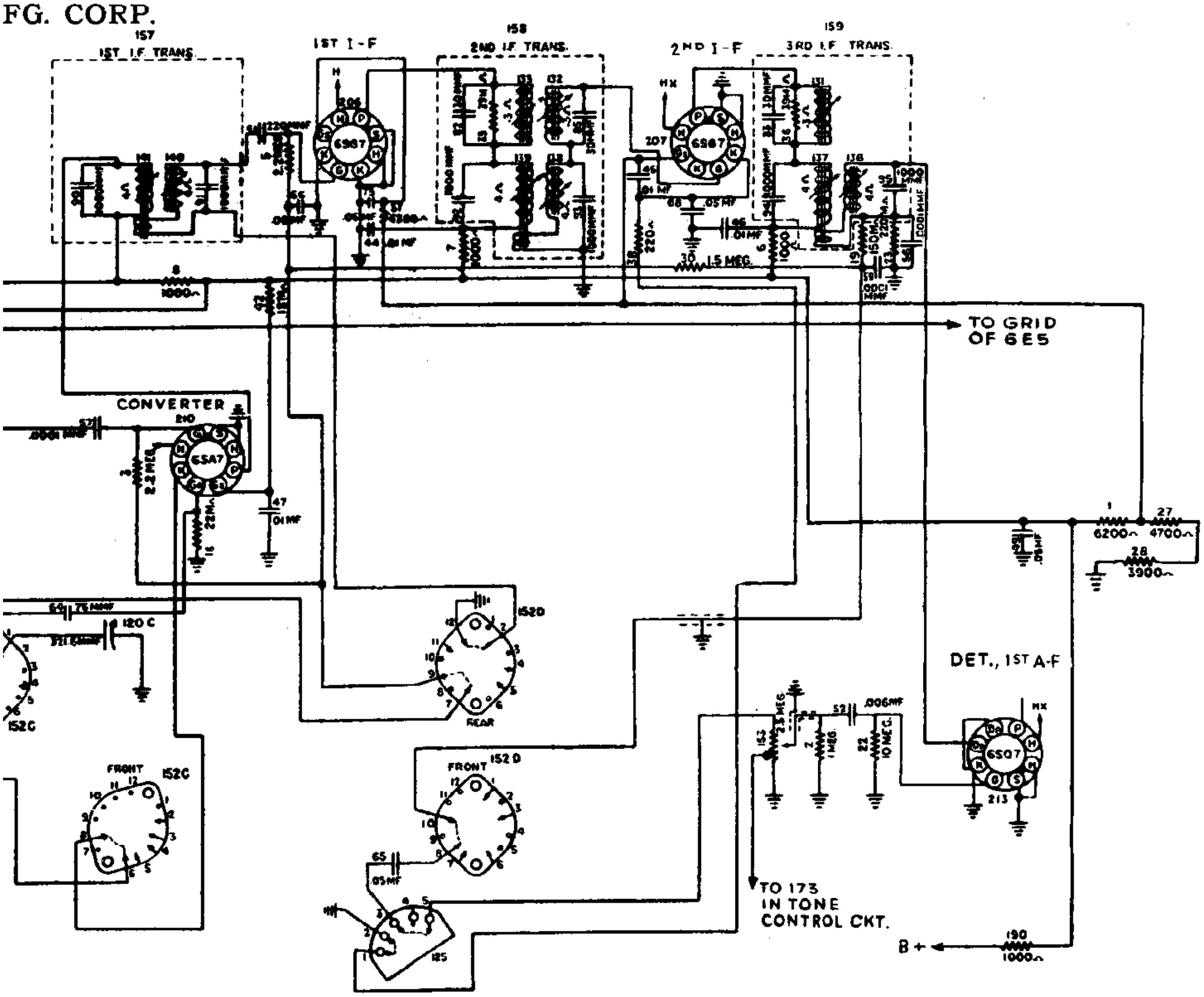

Item No.	Part No.	Description	Item No.	Part No.	Description
	R-138928	Cabinet (146CS(V) using 400-12 Changer		W-135499	Ring (Snap), Pointer Bearing
	W-135690	Clip, Escutcheon		W-211101	Ring (Retaining), Socket
	W-230529	Clip, Tube		39311-60	Screw (#8-32x3/16 C. P. Headless Set)
	W-134595	Cord, Dial Drive		W-135752	Screw, Escutcheon
	D-136142	Dial Glass		W-136102	Screw (#12-24 Hex. Hd. Ptd. Pilot Mach.)
	B-135970	Disc, Indicator		W-135350	Shaft, Drive
	D-135711	Escutcheon		D-136565-7	Socket, Dial Light
	AW-138590	Flywheel & Pinion Gear Assy.		W-132322	Spring, Chassis Mtg.
	W-136656	Gasket, Dial Glass		W-136425	Spring (Compression), Gear & Hub Assy
	W-135581	Gasket, Dial Lens		W-51752	Spring, Dial Drive Cord
	AW-136203	Gear & Hub Assy.		W-49829	Spring (Lock) Switch Shafts
	W-45580	Grommet (Rubber)		W-136113	Spring (Loop), Pointer
	AW-137266	Hinge Assy., Cabinet		C-135038-4	Strip, Terminal (2 Lug)
	B-135981	Knob (Large)		C-135038-23	Strip, Terminal (7 Lug)
	W-135989	Knob (Small)		C-135038-24	Strip, Terminal (5 Lug)
	C-134880	Lens, Dial		C-135038-31	Strip, Terminal
	AB-136215	Link Assy., Toggle		W-136760	Spring, Grounding
	AB-134935	Needle, Floating Jewel Assy.		W-137430	Spring, Static
	W-132366-2	Nut (Locking), Iron Core		C-135693	Support, Dial Lens
	W-135580	Nut (Special), Escutcheon		AB-136283	Switch Assy. (Complete), Push Button
	B-135857	Pointer, Dial		AB-136233	Toggle Assy., Double
	B-137288	Pull (Handle), Cabinet		W-134916	Washer (Spring), Indicator Disc
	B-137286	Pull (Knob), Cabinet			
	AW-136310	Pulley & Sleeve Assy.			
	W-51071	Ring (Retaining), Indicator Disc			

*These parts will replace the original equipment parts.

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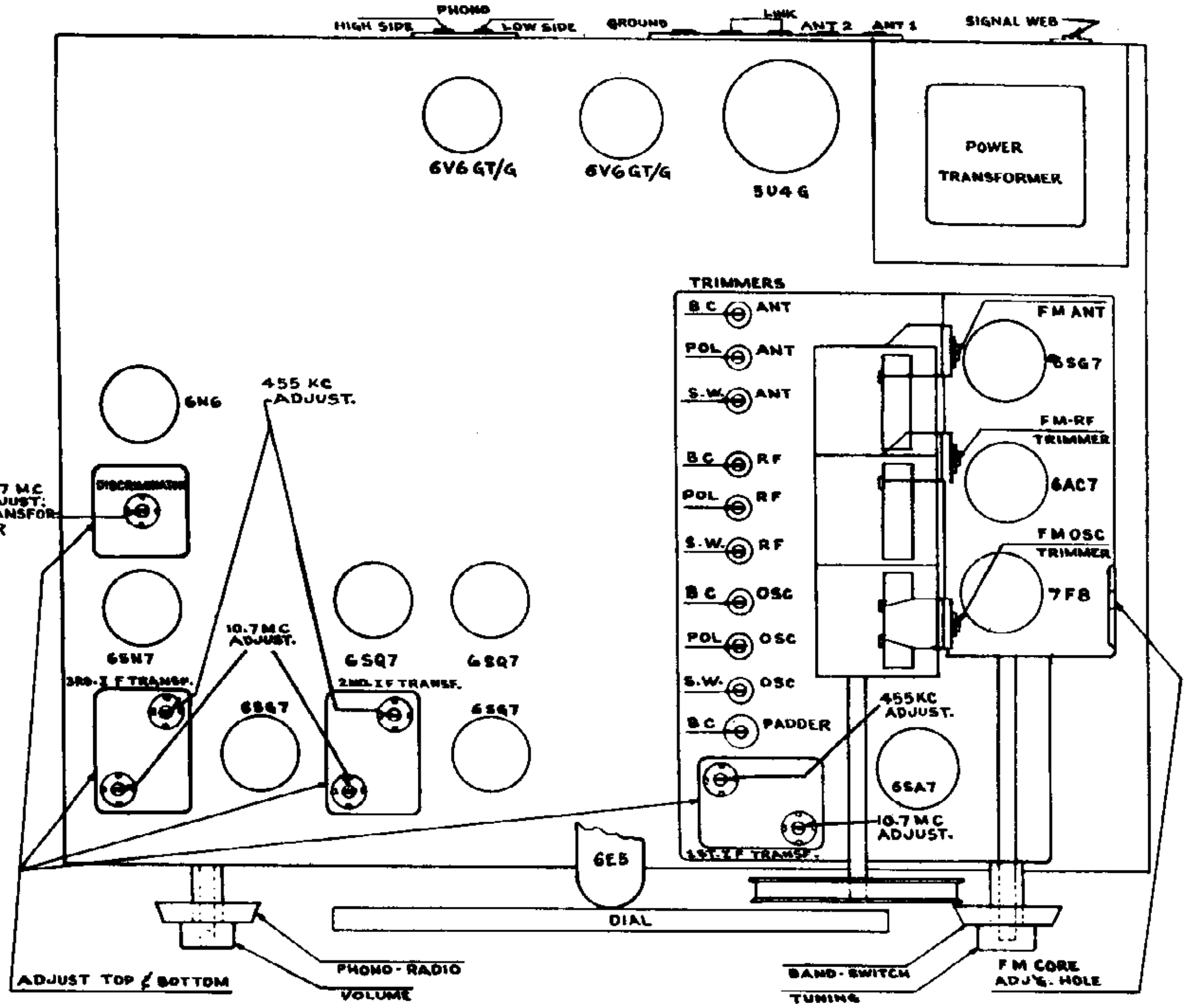
ALIGNMENT PROCEDURE CHART

Alignment Sequence	Signal Generator Output			Position of		Adjust for Maximum Output	Remarks
	Frequency	In Series with	To	Band Switch	Tuning Dial		
1	455 kc.	.1 mfd.	2nd I.F. Grid	AM	Hi. Freq. stop	3rd I.F.	
2	455 kc.	.1 mfd.	1st I.F. Grid	AM	Hi. Freq. stop	2nd I.F.	
3	455 kc.	.1 mfd.	19 plate section of center gang	AM	Hi. Freq. stop	1st I.F.	Retouch 3rd, 2nd, 1
4	10.7 mc.	.1 mfd.	3rd I.F. Grid	FM	Hi. Freq. stop	Discriminator	Notes 1, 2, 3, 4
5	10.7 mc.	.1 mfd.	2nd I.F. Grid	FM	Hi. Freq. stop	3rd I.F.	Notes 1 and 5
6	10.7 mc.	.1 mfd.	1st I.F. Grid	FM	Hi. Freq. stop	2nd I.F.	Retouch 3rd I.F.
7	10.7 mc.	.1 mfd.	3 plate section of center gang	FM	Hi. Freq. stop	1st I.F.	Retouch 3rd, 2nd,
8	1400 kc.	200 mmf.	Ant. 1	AM	1400 kc.	BC.-Osc.-RF. & Ant. Trim	
9	600 kc.	200 mmf.	Ant. 1	AM	600 kc.	Broadcast Osc. Padder	Notes 6 and 7
10	6.0 mc.	400 ohm	Ant. 1	Police	6.0 mc.	Police Osc., R.F. & Ant. Trimmers	
11	18 mc.	400 ohm	Ant. 1	SW	18 mc.	Sw. Osc., R.F., & Ant. Trimmers	Note 10
12	108.1 mc.	See Circuit Diag. Fig. 1	Ant. 1 & 2	FM	Hi. Freq. stop	FM-Osc. Trimmer	
13	87.9 mc.	See Circuit Diag. Fig. 1	Ant. 1 & 2	FM	Low Freq. stop	FM-Osc. Core	
14	105.9 mc.	See Circuit Diag. Fig. 1	Ant. 1 & 2	FM	*C-290	FM. R.F. & Ant. Trimmer	Notes 7, 8 and 9*

MODELS 146CS,146CS(V)

CROSLEY DIVISION AVCO MFG. CORP.



TOP VIEW OF CHASSIS SHOWING TRIMMERS AND TUBES

TYPE: Fourteen tube, four-band superheterodyne.

FREQUENCY RANGE: American Broadcast Band: 535 to 1620 kc. (Selector switch at AM position).

Police Band: 2.25 to 6.7 mc. (Selector switch at POLICE position).

Short-wave Band: 6.7 to 18.5 mc. (Selector switch at SW position).

Frequency Modulation Band: 88.1 to 107.9 mc. (Selector switch at FM position).

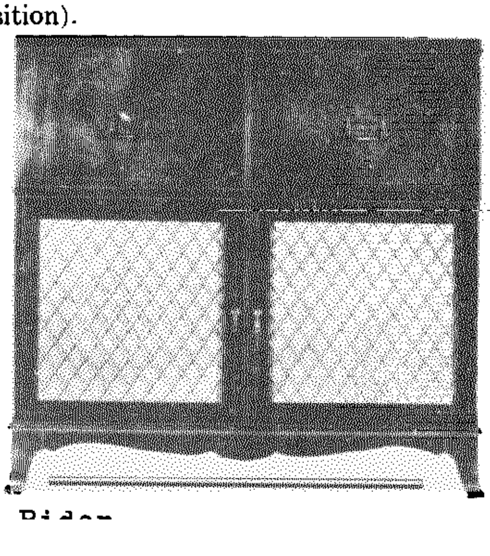
INTERMEDIATE FREQUENCY: AM, Police and SW Bands: 455 kc. FM Band: 10.7 mc.

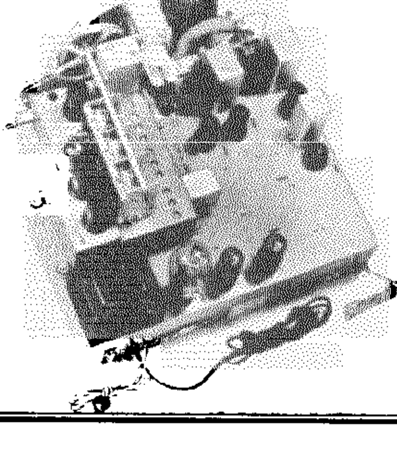
POWER SUPPLY: 60 cycle a.c. only.

VOLTAGE RATING: 105-125 volts.

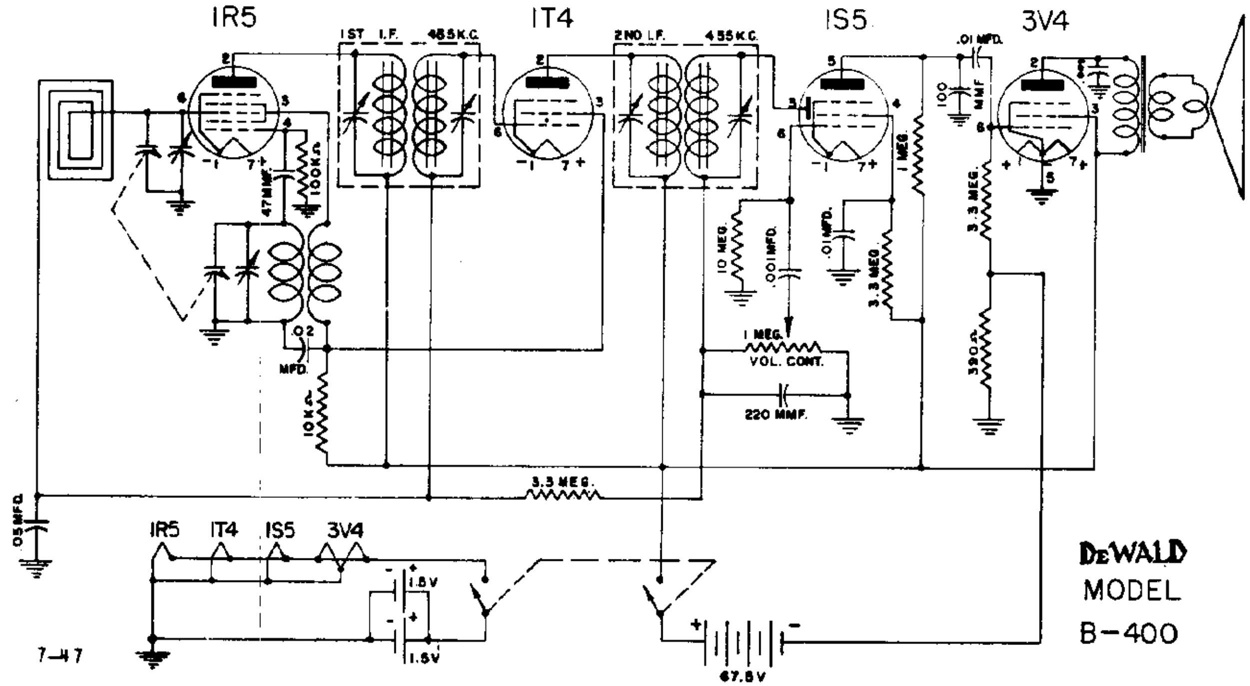
POWER CONSUMPTION: 120 watts.

POWER OUTPUT: 18 watts maximum.





DEWALD RADIO



DeWALD
MODEL
B-400

LIST OF REPLACEMENT PARTS

2-Gang Var. Cond.	2015C
Electrolytic Cond.	2018-1
Volume Control	3006B-2
Cabinet	4052
Battery Cable	5004
Dial Scale	6006
Speaker	7000A
Drive Drum	9039A
1st I. F.	1027-1
2nd I. F.	1027-2
Osc. Coil	1020
Ant. Loop.	1025A

The model B-400 is a portable battery receiver. This receiver uses the latest type tubes for best performance. The circuit used is designed for excellent reception and long battery life.

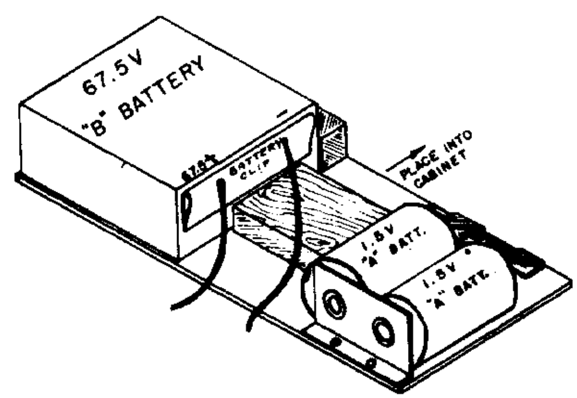
The receiver uses an "A" supply of two 1½ volt flashlight batteries and a 67½ volt battery for a "B" supply.

For good reception the life of the "B" battery is from 60 to 70 hours when the receiver is used about two hours per day. Approximately three changes of "A" batteries will be required for every change of "B" battery. The following or similar batteries may be used with this receiver:

	"A" BATTERY--TWO REQUIRED	"B" BATTERY--ONE REQUIRED
Eveready	# 950	# 467
General	# "D"	# W45A
Ray O Vac	# 2	# P4367
Burgess	# 2	# XX45

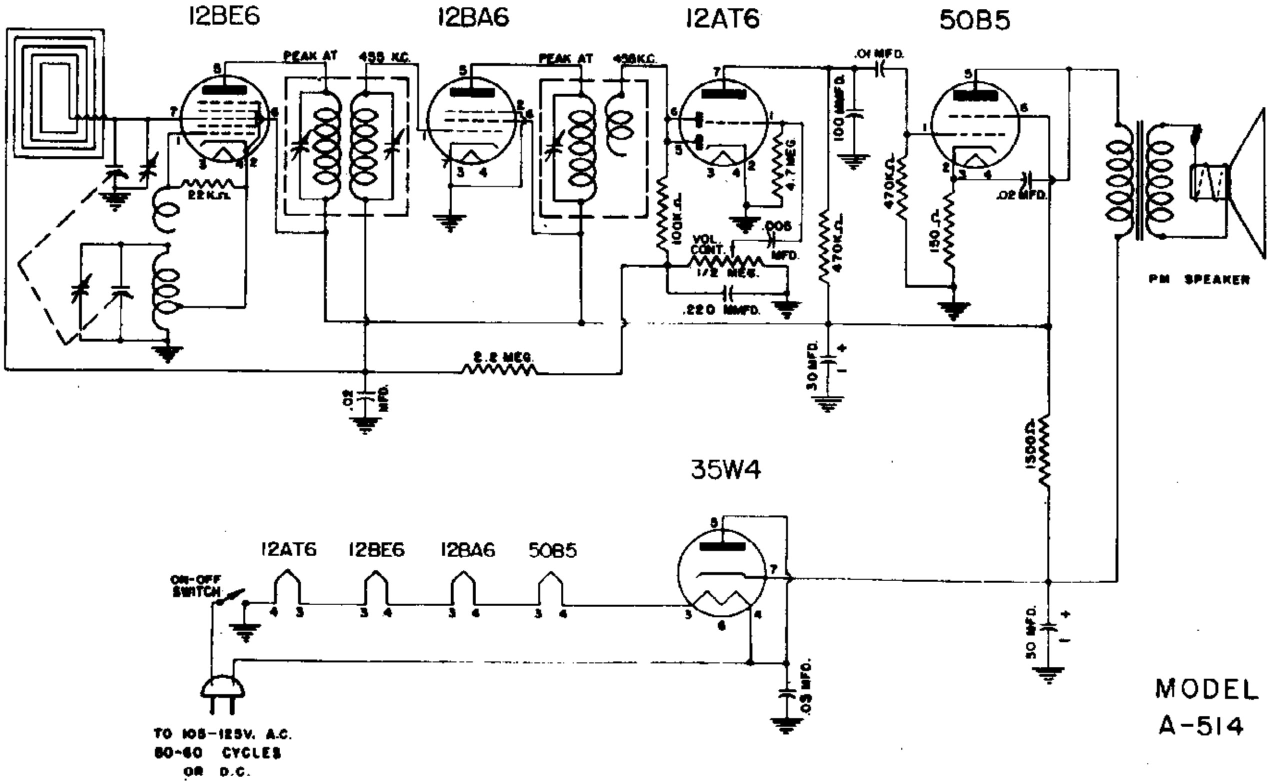
To install the batteries in the receiver, proceed as follows:

1. Open back by pulling leather tab.
2. Remove battery shelf by pulling straight back.
3. Place "A" batteries on shelf as shown in sketch. BE CAREFUL NOT TO REVERSE THESE BATTERIES, THE POSITION IS IMPORTANT.
4. Connect battery clip firmly on "B" battery and place battery on shelf as shown in sketch.
5. Replace battery shelf and close back.

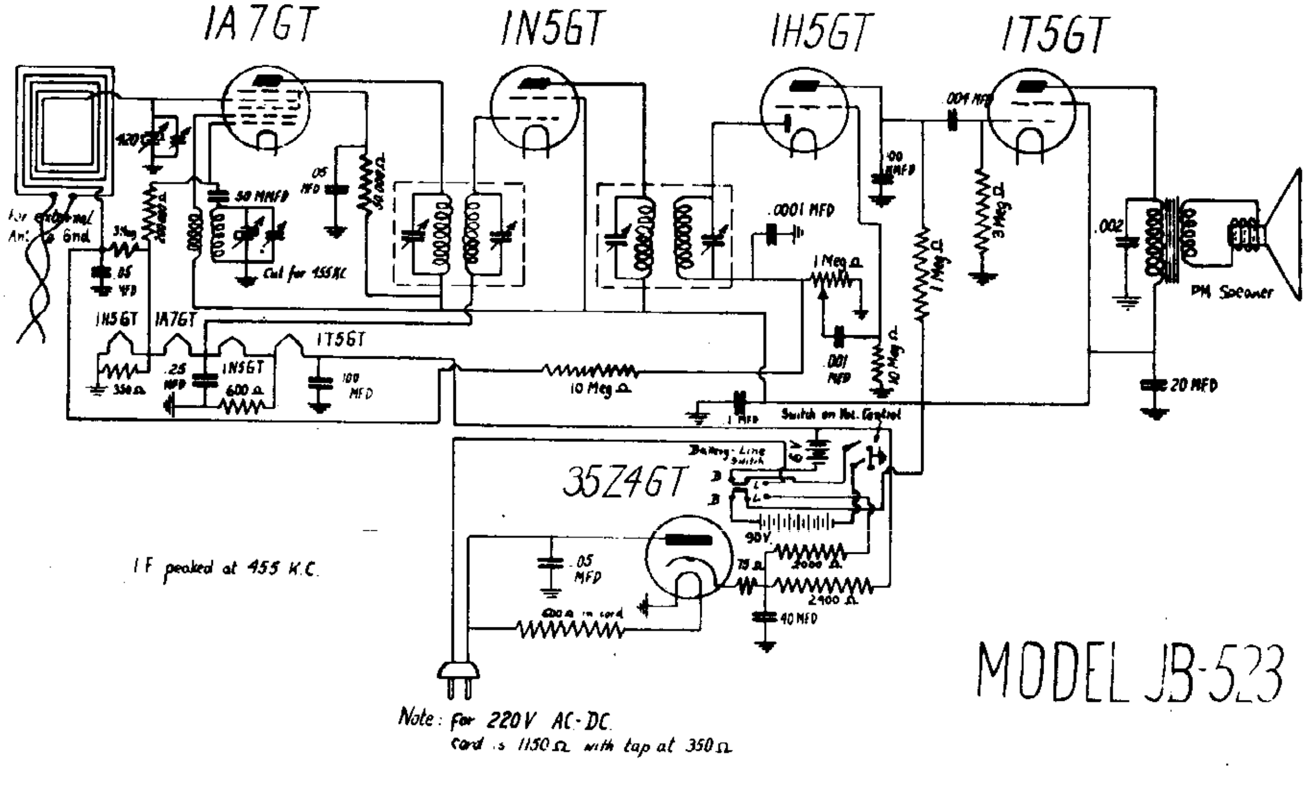


MODEL A-514
MODEL JB-523

DEWALD RADIO



MODEL A-514

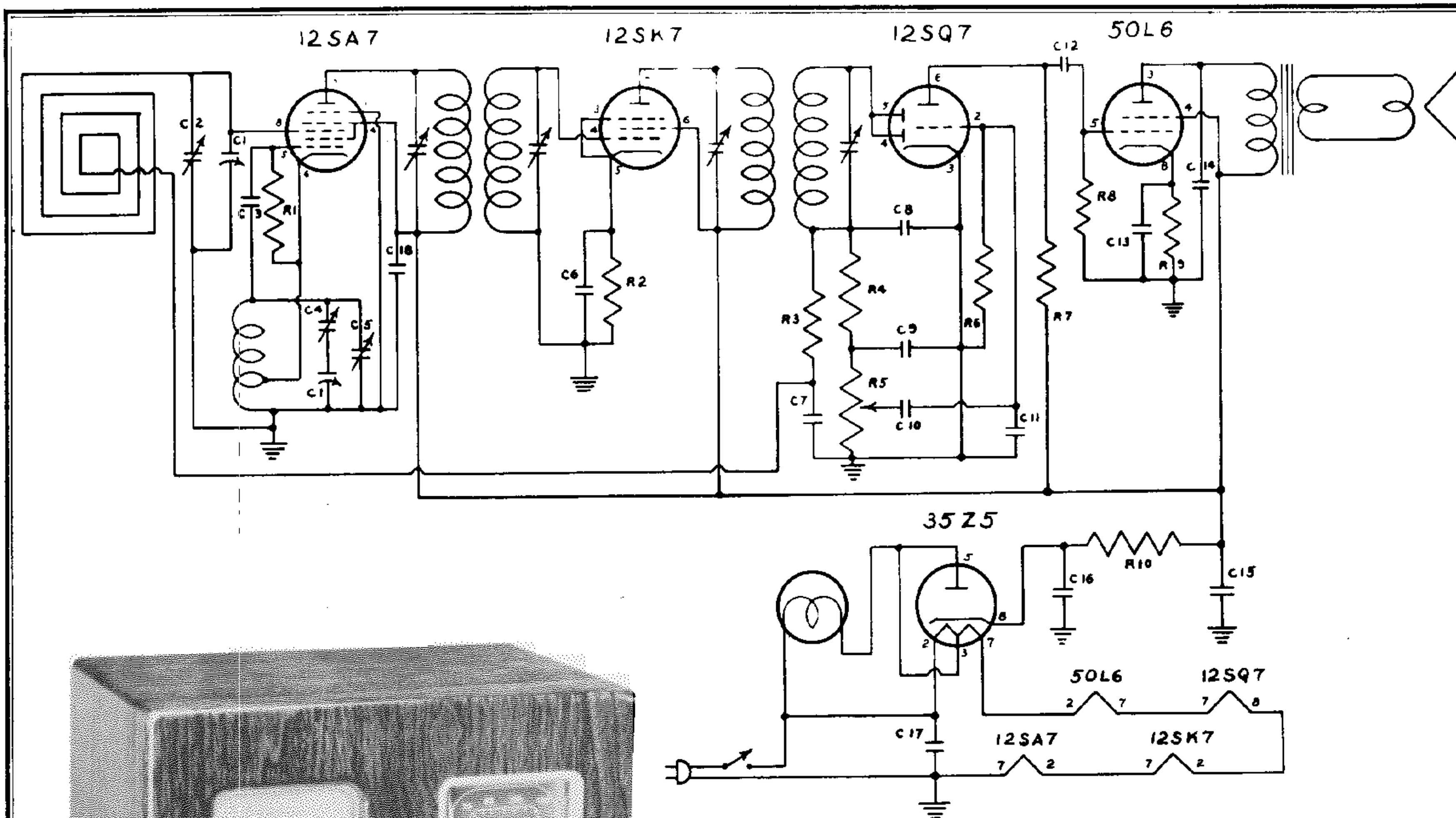


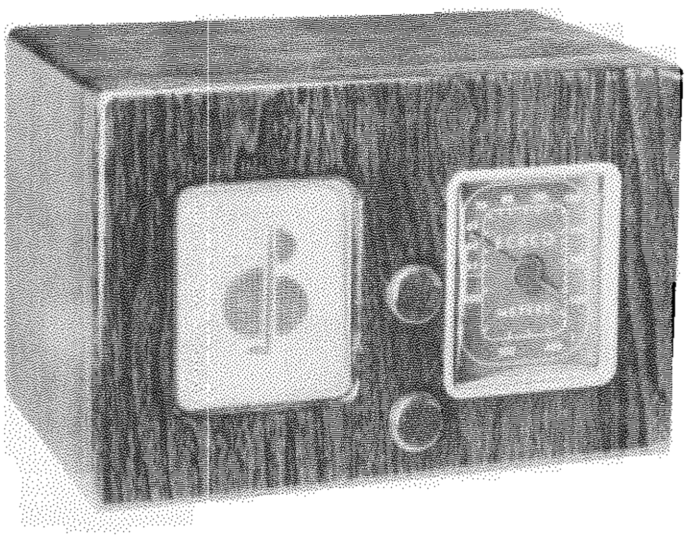
I F peaked at 455 K.C.

Note: For 220V AC-DC
cord is 1150Ω with tap at 350Ω

MODEL JB-523

ECKSTEIN RADIO AND TELEV. CO.

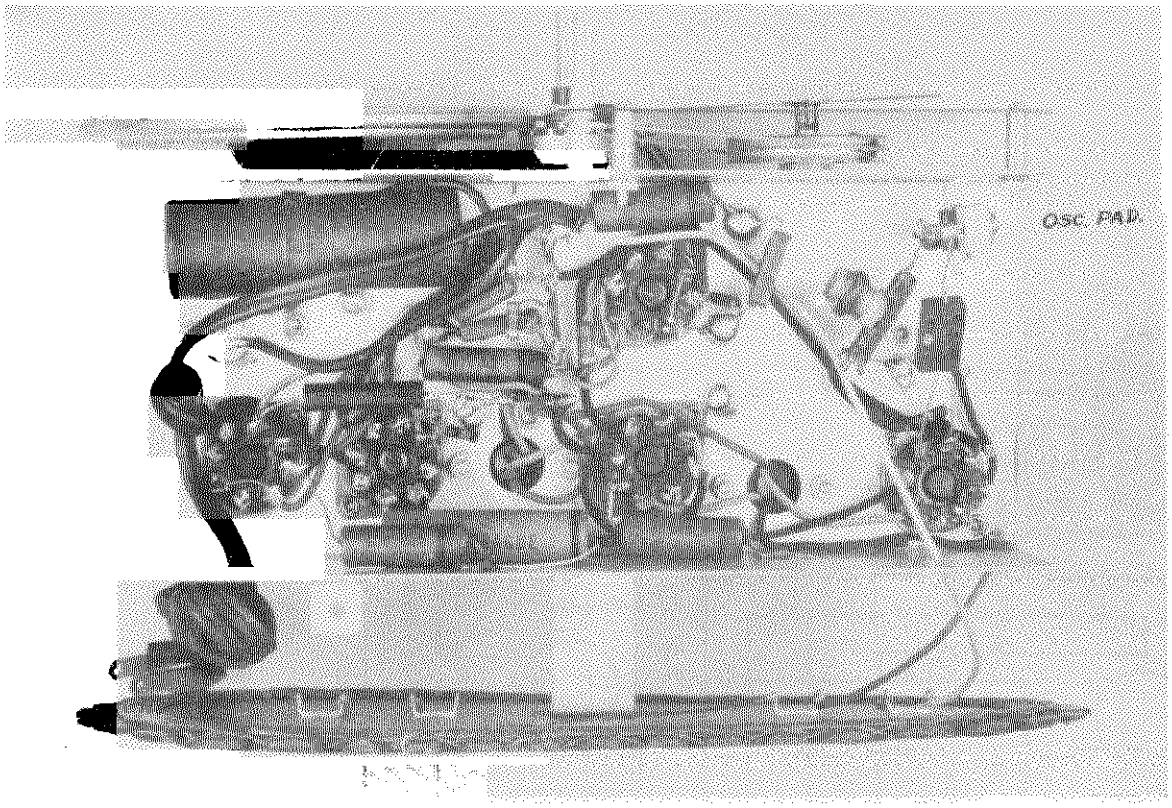


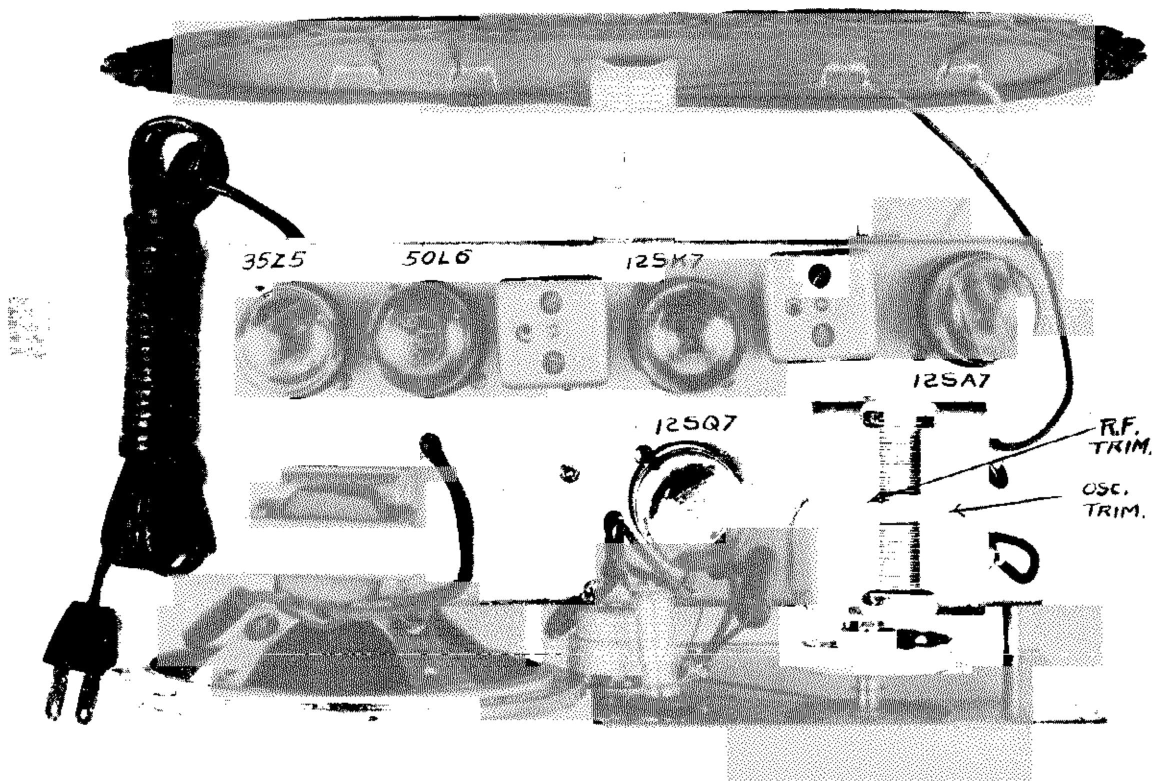


C1 - TUNING GANG
C2 - 647 VARIABLE
C3 - 100 μμf MICA
C4 - 650 VARIABLE
C5 - 647 VARIABLE
C6 - .05 μf PAPER
C7 - .05 μf PAPER
C8 - 250 μμf MICA
C9 - 250 μμf MICA
C10 - .015 μf PAPER
C11 - 500 μμf MICA
C12 - .015 μf PAPER
C13 - 10 μf PAPER
C14 - .01 μf PAPER
C16 - 16 μf ELECTROLYTIC
C17 - .05 μf PAPER
C18 - .05 μf PAPER
R1 - 25,000 Ω
R2 - 300 Ω
R3 - 2 MEG Ω
R4 - 50,000 Ω
R5 - .5 MEG Ω POT.
R6 - 1 MEG Ω
R7 - 500,000 Ω
R8 - 500,000 Ω
R9 - 300 Ω
R10 - 500 Ω 2 WATT

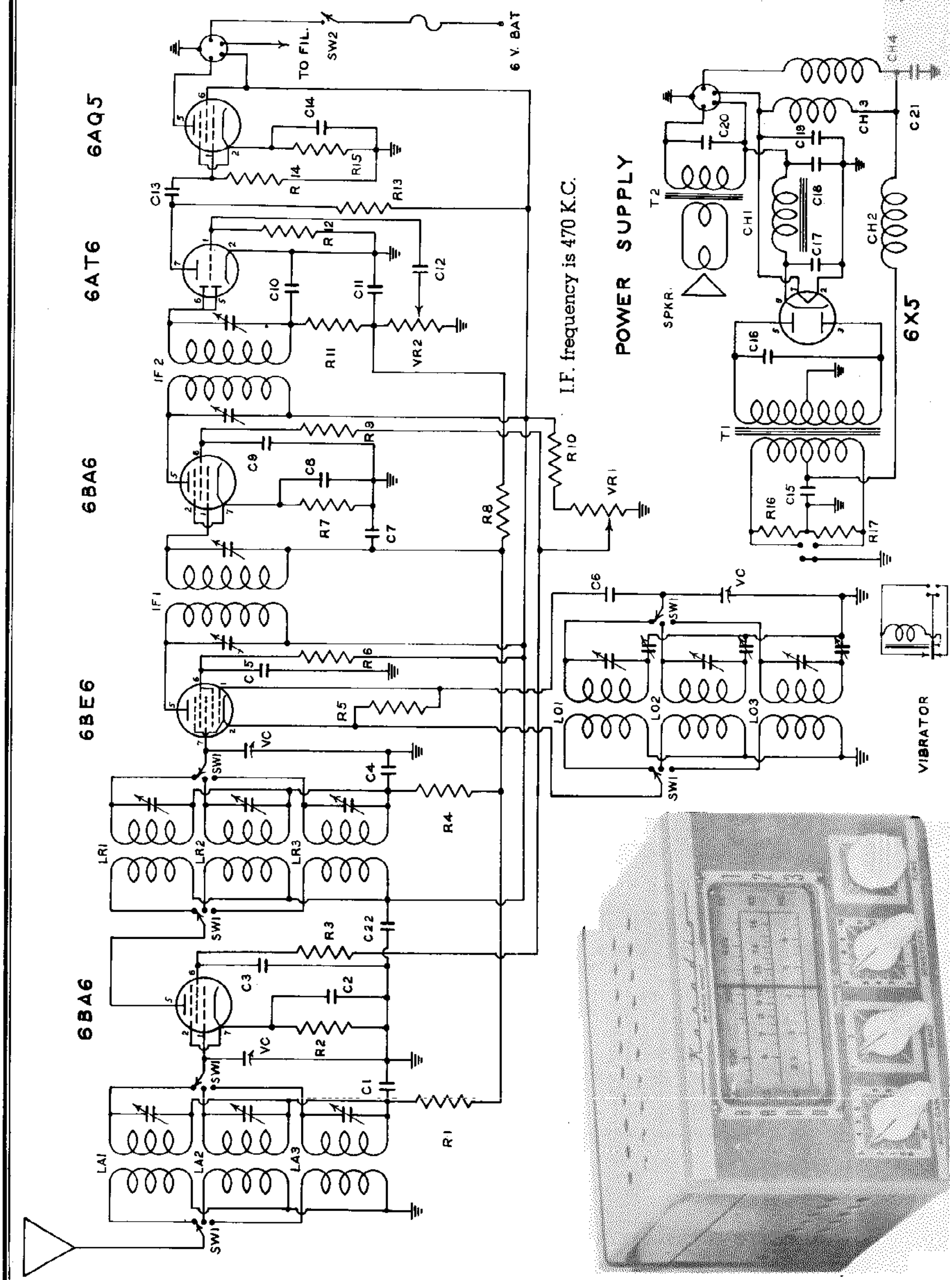
MODEL T-5

ECKSTEIN RADIO AND TELEV. CO.



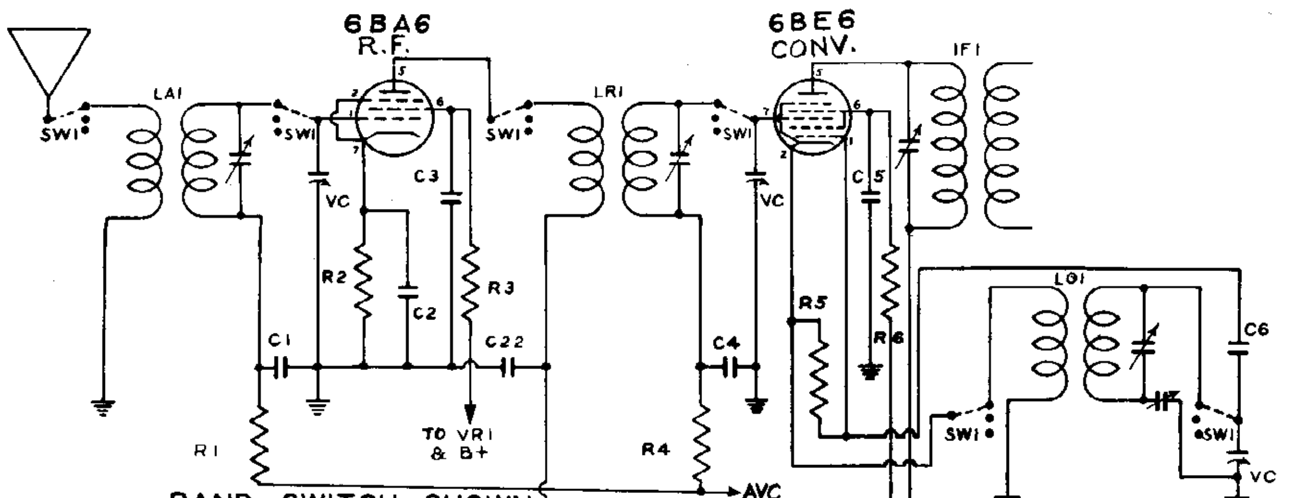


ECKSTEIN RADIO AND TELEV. CO. MODELS 80-A(The Amateur 80-B(The Airport), 80-C (The International)

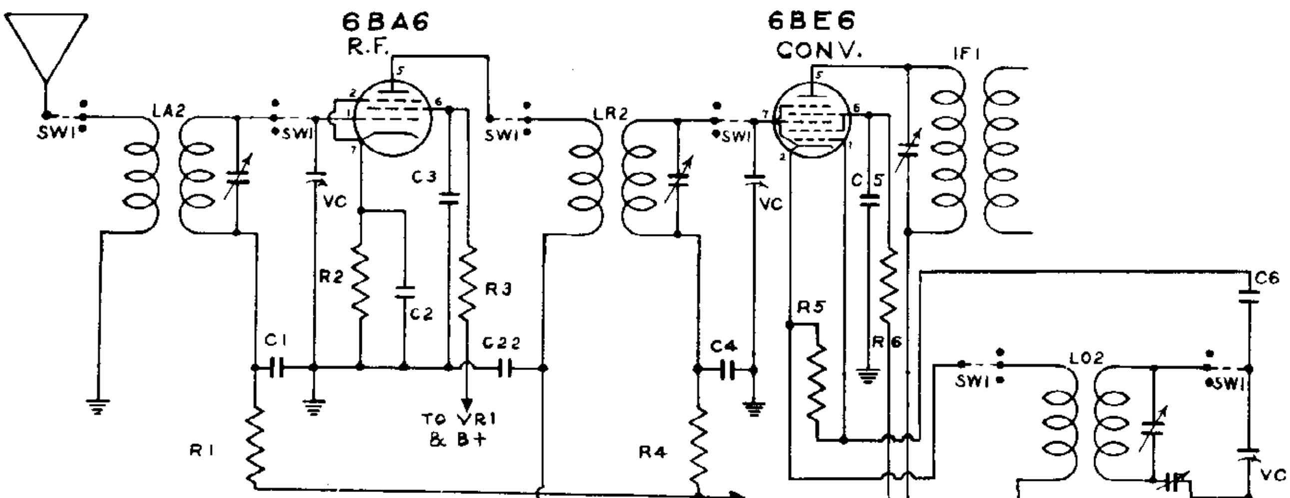


MODELS 80-A, 80-B, 80-C

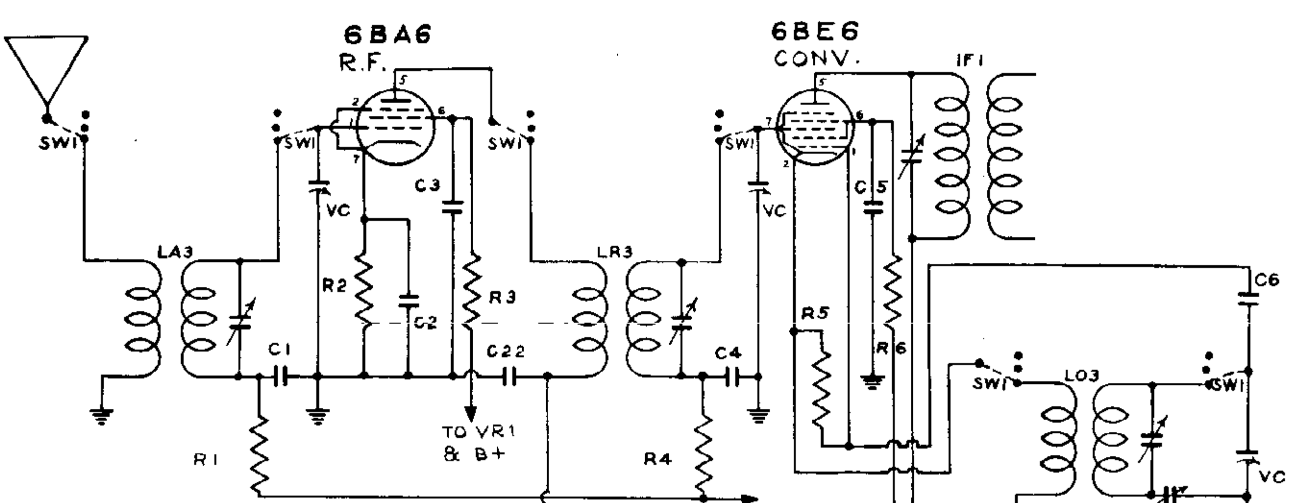
ECKSTEIN RADIO AND TELEV. CO.



BAND-SWITCH SHOWN AT 1ST POSITION. BAND 1



BAND-SWITCH SHOWN AT 2ND POSITION BAND 2



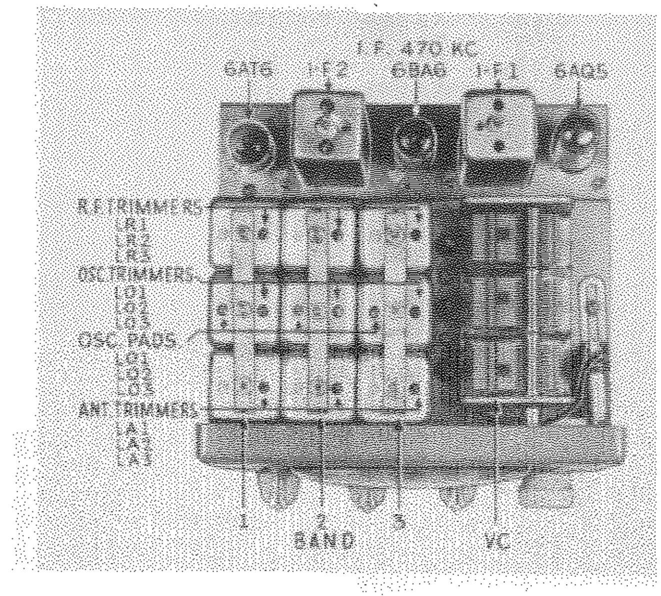
BAND-SWITCH SHOWN AT 3RD POSITION BAND 3

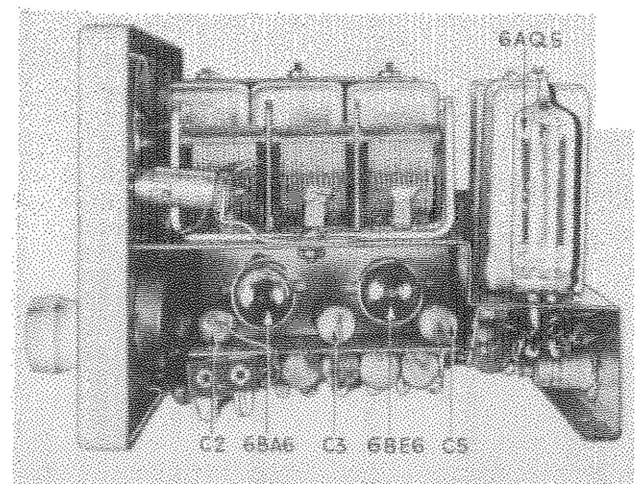
TUBE VOLTAGE CHART

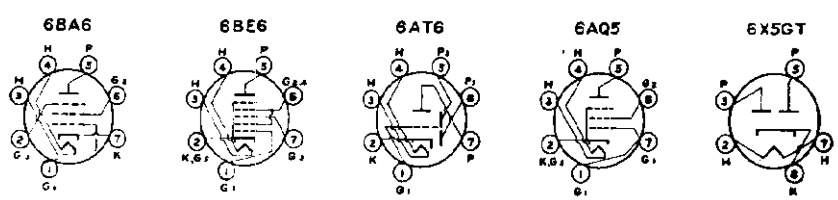
Designation	Type	Function	OPERATING VOLTAGES D.C. Plate	Screen	Cathode	Fil.
6BA6	Pentode Amplifier	R.F. Amplifier	No. 5 200	No. 6 100	No. 2-7 1.4	6.3
6BE6	Pentagrid Converter	Oscillator Mixer	No. 5 200	No. 6 100	No. 2 0	6.3
6BA6	Pentode Amplifier	I.F. Amplifier	No. 5 200	No. 6 100	No. 2-7 1.2	6.3
6AT6	Duplex-Diode High Mu Triode	Demodulator 1st Audio A.V.C.	No. 7 66	None	No. 2 0	6.3
6AQ5	Beam-Power Amplifier	Power Output	No. 5 190	No. 6 200	No. 2 11	6.3
6X5GT	Full Wave Rectifier	Rectifier	Cathode (No. 8) To Ground 225			6.3

Source Voltage 7.0

All voltages as indicated on RCA voltohmyst







Tube Base Connections Bottom View

ECKSTEIN RADIO AND TELEV. CO.

GENERAL DESCRIPTION

PURPOSE:

KARADIO model 80 is a 3-Band mobile communications radio receiver for installation in cars, trucks, buses and other vehicles for reception of radio telephone signals.

FREQUENCY RANGE:

KARADIO MODEL 80-A (THE AMATEUR)

BAND 1	540 - 1650 K.C.
2	2.8 - 7.5 M.C.
3	11.5 - 31.5 M.C.

KARADIO MODEL 80-B (THE AIRPORT)

BAND 1	190 - 420 K.C.
2	540 - 1650 K.C.
3	2.5 - 6.8 K.C.

KARADIO MODEL 80-C (THE INTERNATIONAL)

BAND 1	540 - 1650 K.C.
2	2.8 - 7.5 M.C.
3	5.8 - 17.5 M.C.

RECEIVER CIRCUIT:

KARADIO MODEL 80 is a superheterodyne receiver designed to operate from the 6-volt battery supply of any vehicle. The circuit employed in ALL ranges consists of one stage of tuned R.F., mixer and H.F. oscillator, one stage of I.F., second detector, one stage of resistance coupled A.F. and Beam Power output. Automatic volume control is also provided on all ranges. The 6" permanent magnet dynamic speaker is specially designed for communications use and is equipped with a transformer to correctly load the beam power output stage at 5500 ohms.

SENSITIVITY:

Sensitivity is such that 5 microvolts or less input signal at antenna plug will produce .5 watt audio output with a signal to noise ratio of 4:1 or higher.

POWER OUTPUT:

At least 2 watts of audio power is available with 10% or less distortion.

FREQUENCY RESPONSE:

While the KARADIO MODEL 80 is designed to emphasize the voice frequencies for communications work it is also pleasing to the ear on music.

TUBE REQUIREMENTS:

KARADIO MODEL 80 is supplied complete with set of matched tubes which are tested in the receiver at the time of alignment. The tubes are:

R.F. PRESELECTOR	- 6BA6
OSCILLATOR - MIXER	- 6BE6
I.F. AMPLIFIER	- 6BA6
DEMODULATOR - 1st AUDIO	- 6AT6
POWER AMPLIFIER	- 6AQ5
RECTIFIER	- 6X5GT

POWER REQUIREMENTS:

KARADIO MODEL 80 is designed to operate on a D.C. voltage source of 5 to 7.3 volts. It is standard practice of most car manufacturers to set the voltage control of cars and trucks at about 7.2 volts. All operating data on KARADIOS are taken with a source voltage of 7 at which voltage the current is 6 amperes. By the use of a non-synchronous vibrator and 6X5GT rectifier tube, no polarity consideration need be given in the installation of your KARADIO.

INSTALLATION INSTRUCTIONS

MOUNTING:

The radio unit may be mounted to and directly below the instrument panel at any convenient location. Two holes must be drilled in the stiffening lip of the instrument panel about ¾" back from the front of the instrument panel. These holes must be large enough to pass the two No. 8 mounting screws protruding from the top of the radio unit. After the holes are drilled, insert mounting screws of radio in holes, place lock washers and nuts on screws. These nuts must be fastened real tight. It is also very important that the paint be removed from instrument panel lip directly under nuts so that a good ground connection is made.

Drill a hole to pass a No. 10 machine screw in the fire wall or other convenient place and bolt strap with series of holes to this support and fasten other end to protruding machine screw on back of radio. This is the back support for radio unit and good ground connections must also be considered in this assembly.

The speaker power supply unit is mounted at any convenient location on the fire wall. This is accomplished by drilling a 5/16-inch hole at desired location in fire wall and mounted with threaded stud nuts and washers provided. Care is to be taken that this mounting bolt also forms a perfect ground. This can be assured by scraping the paint from the spot under the mounting nut and washer on the reverse side of the bulk head.

CONNECTIONS:

Insert the four-prong plug in lead from speaker into the socket on back side of radio. Connect fused power lead from radio to the ammeter or circuit breaker of the vehicle. A 10-ampere FUSE is provided in this cable. Never replace this fuse with one of any other size.

ANTENNA:

The antenna of the cowl type is recommended and should be 96 to 108 inches maximum length. The model 80 KARADIO is designed for an antenna of this length and a low capacity shielded lead-in of 30 inches. IT IS IMPORTANT THAT THE ANTENNA LEAD NOT BE CHANGED AS THIS LENGTH IS CORRECT TO MATCH THE ANTENNA INPUT CIRCUIT.

INSTRUCTIONS FOR ELIMINATING MOTOR IGNITION INTERFERENCE:

Cut the high tension lead that runs from the center terminal of the distributor to the coil, as close as possible to the distributor end. Screw the distributor suppressor into the lead and reconnect to the distributor.

Mount the generator condenser on the generator frame under the ground lead screw. Connect the spade tip on the condenser wire under the battery terminal of the generator. Do not connect it to the field terminal of generator.

When checking the car for motor interference, clamp the hood down tight with the hood clamps.

In some installations it may be necessary to bond the muffler or the transmission housing to the frame of the car. If necessary, bond the motor block securely to the front and rear supports. For bonding, use ½-inch copper braid. Further interference may be eliminated by bonding all metal control cables or pipes feeding from the motor side of the firewall into the car. These bonds should be made from the pipes or control cables and soldered to the firewall immediately adjacent to the motor side.

In case of tire static, collector springs should be inserted under the hub caps of the front wheels. In some cases it may be necessary to install such collectors in the rear wheels as well.

Interference from electric gas gauges may be cured by inserting a "dome light filter" in series with the lead near as possible to the gas tank.

In some instances it is beneficial to attach a by-pass condenser from one side of the ammeter to the grounded part of the instrument panel.

If the dome light is feeding interference to the antenna, the lead should be cut where it comes from the post under the dash and a switch be inserted in the instrument panel to turn the dome light off and on. A by-pass condenser connected to the dome light lead and grounded at the post would serve in lieu of a switch.

ALIGNMENT:

The I.F. frequency is 470 K.C.; alignment of each band should be made as follows:

First, oscillator trimmers should be adjusted for correct dial calibration at the high frequency end of each band. Then, oscillator padder condensers should be aligned near the low frequency end of each band after adjustment of the oscillator trimmers. Next, antenna and RF trimmers of all bands should be aligned near the high frequency end of each band. This alignment should be made at a point approximately 15% or ½ turn of the knob down from the high frequency end of each band.

In aligning a receiver, especially the antenna trimmers, it is extremely important that the correct load, which is equal to the antenna, be used. Shielded leads from signal generators or oscillators have a definite capacity and should be considered when testing or aligning is done.

It is preferable to use an indirect connection or a condenser of approximately 100 MMF in series with the signal generator lead and the antenna lead. The reason that this procedure is important is that on all three bands, the primaries of the antenna coils are of high impedance and are designed for the best impedance match at the low frequency end of each band. By using a greater capacity, a loss in accuracy would result.

Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed so as to reduce the effect of such variations to a minimum. The high frequency oscillator-first detector tubes should be selected with some care. The tolerance of the inter-electrode capacities is enough in case of some tubes to slightly alter the tuning. This change would be, however, most noticeable at the high frequency end of each band.

PARTS LIST
for
MODEL 80 KARADIO

Schematic Number		Description
C 1	.05 mfd.	200 V.
C 2	.05 mfd.	200 V.
C 3	.05 mfd.	400 V.
C 4	.05 mfd.	200 V.
C 5	.05 mfd.	400 V.
C 6	100 mmfd.	Mica
C 7	.05 mfd.	200 V.
C 8	.05 mfd.	200 V.
C 9	.05 mfd.	400 V.
C 10	250 mmfd.	Mica
C 11	250 mmfd.	Mica
C 12	.006 mfd.	600 V.
C 13	.015 mfd.	600 V.
C 14	10 mfd.	25 V. Electrolytic
C 15	.5 mfd.	100 V.
C 16	.006 mfd.	1600 V. (Oil)
C 17	30 mfd.	350 V. Electrolytic
C 18	30 mfd.	350 V. Electrolytic
C 19	500 mmfd.	Mica
C 20	.01 mfd.	600 V.
C 21	.5 mfd.	100 V.
C 22	.05 mfd.	400 V.
R 1	1 Megohm	½ Watt
R 2	150 Ohm	½ Watt
R 3	12 K Ohm	½ Watt
R 4	1 Megohm	½ Watt
R 5	25 K Ohm	½ Watt
R 6	15 K Ohm	1 Watt
R 7	150 Ohm	½ Watt
R 8	1 Megohm	½ Watt
R 9	12 K Ohm	½ Watt
R 10	15 K Ohm	1 Watt
R 11	50 K Ohm	½ Watt
R 12	10 Megohm	½ Watt
R 13	470 K Ohm	½ Watt
R 14	470 K Ohm	½ Watt
R 15	450 Ohm	2 Watt
R 16	150 Ohm	½ Watt
R 17	150 Ohm	½ Watt
VR 1	500 K Ohm	
VR 2	500 K Ohm	
VC	3 Gang Tuning Cap.	
CH-1	CH 1 S41 CHOKE	
CH-2	No. 16 CHOKE	
CH-3	No. 16 CHOKE	
CH-4	No. 14 CHOKE	
T-1	POWER TRANSFORMER	
T-2	OUTPUT TRANSFORMER	
IF-1	I. F. TRANSFORMER (108)	
IF-2	I. F. TRANSFORMER (109)	
LA-1	ANTENNAE COIL BAND 1	
LA-2	ANTENNAE COIL BAND 2	
LA-3	ANTENNAE COIL BAND 3	
LR-1	R. F. COIL BAND 1	
LR-2	R. F. COIL BAND 2	
LR-3	R. F. COIL BAND 3	
LO-1	OSCILLATOR COIL BAND 1	
LO-2	OSCILLATOR COIL BAND 2	
LO-3	OSCILLATOR COIL BAND 3	
SW-1	3 POS. 3 SEC. 6 CIR. SWITCH	
SW-2	S.P.S.T. SWITCH (on V-2)	
VIB	NON. SYN. VIBRATOR	
SPK	6" P.M. SPEAKER	

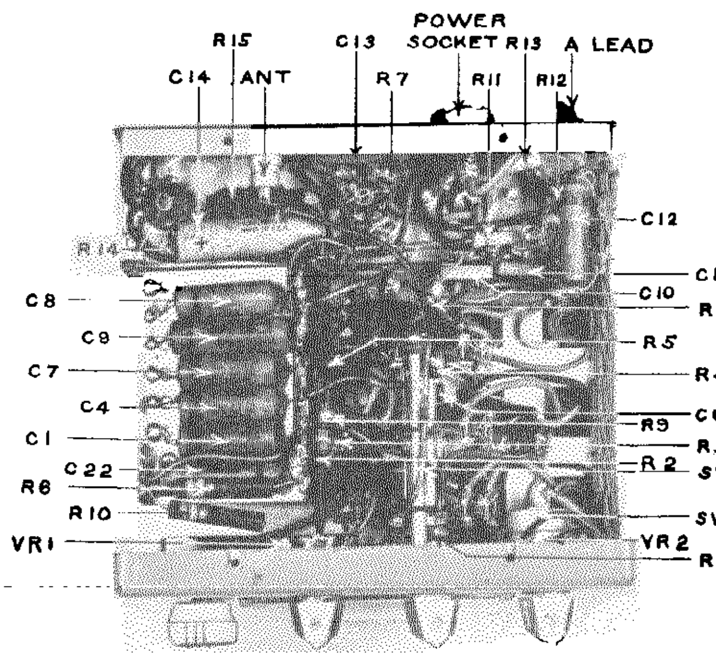
TABULATION OF PROBABLE TROUBLES, CAUSES, AND CORRECTIVE MEASURES:

Even though all component parts of the receiver have an ample factor of safety, failure may occur in certain individual cases. Of these failures, the most common will probably be due to some defect in one of the tubes. To find this defect, check tubes on a reliable tube checker, or by substituting spare tubes. If the failure is a short in either the plate or screen circuits, the filter resistors and condensers associated with the circuit in question should be checked with a reliable volt-ohmeter. To check these circuits it is preferable to use the point to point system, in which the chassis is always negative, except the hot side of the filament circuit, which will be negative if the positive automobile battery terminal is grounded to the frame of the car. Then by applying the positive lead of the volt-ohmeter directly to the tube socket contacts and the negative lead to the chassis, it will show which of the component circuits are at fault, by a total absence of voltage or a large difference from the correct voltage from those given in the chart of voltages. If a by-pass condenser is found to be at fault replace with new condenser. Also, check the resistors associated with the faulty condenser. If they have been found to have been hot due to the shorted condenser, it is best to replace it also to forestall future trouble.

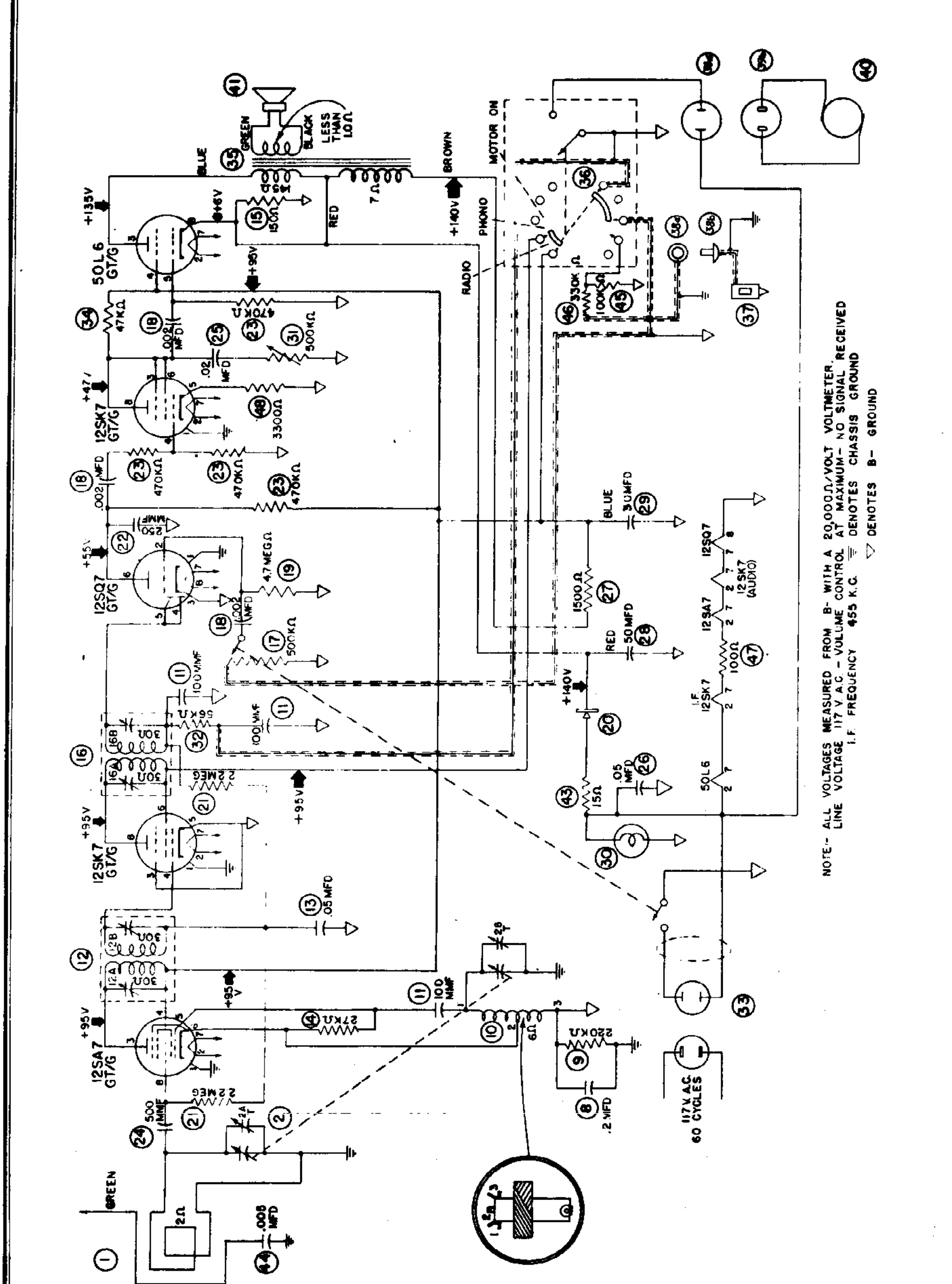
Other possible failures, such as open circuits caused by poor connections can be likewise located by the above point to point system in accordance with the chart of voltages. Open by-pass condensers are apt to cause either a loss of sensitivity or oscillation in some portion of the circuit. In such cases the fault can be easily located by temporarily connecting a condenser of known quality in parallel with each unit that is under suspicion.

Intermittent or noisy reception is almost always caused by a poor connection, a by-pass condenser intermittently opening up, or a bad tube. Such faults are often rather difficult to find, but usually can be located by lightly tapping each circuit element or component part with a light rubber hammer or insulated rod.

In case of failure, it is advisable to check the vibrator, the fuse and the "A" lead connections as the first probable causes. If the set blows fuses repeatedly, the most likely cause will be sticking vibrator; in which case the vibrator should be replaced. If the set upon test shows to be drawing excessive current immediately upon turning the set on with a good vibrator and 6X5GT in place, the most likely trouble will be shorted buffer condenser, part No. C-16. If the drain gradually builds up, the trouble most likely will be one of the filter condensers, or one of the by pass condensers.

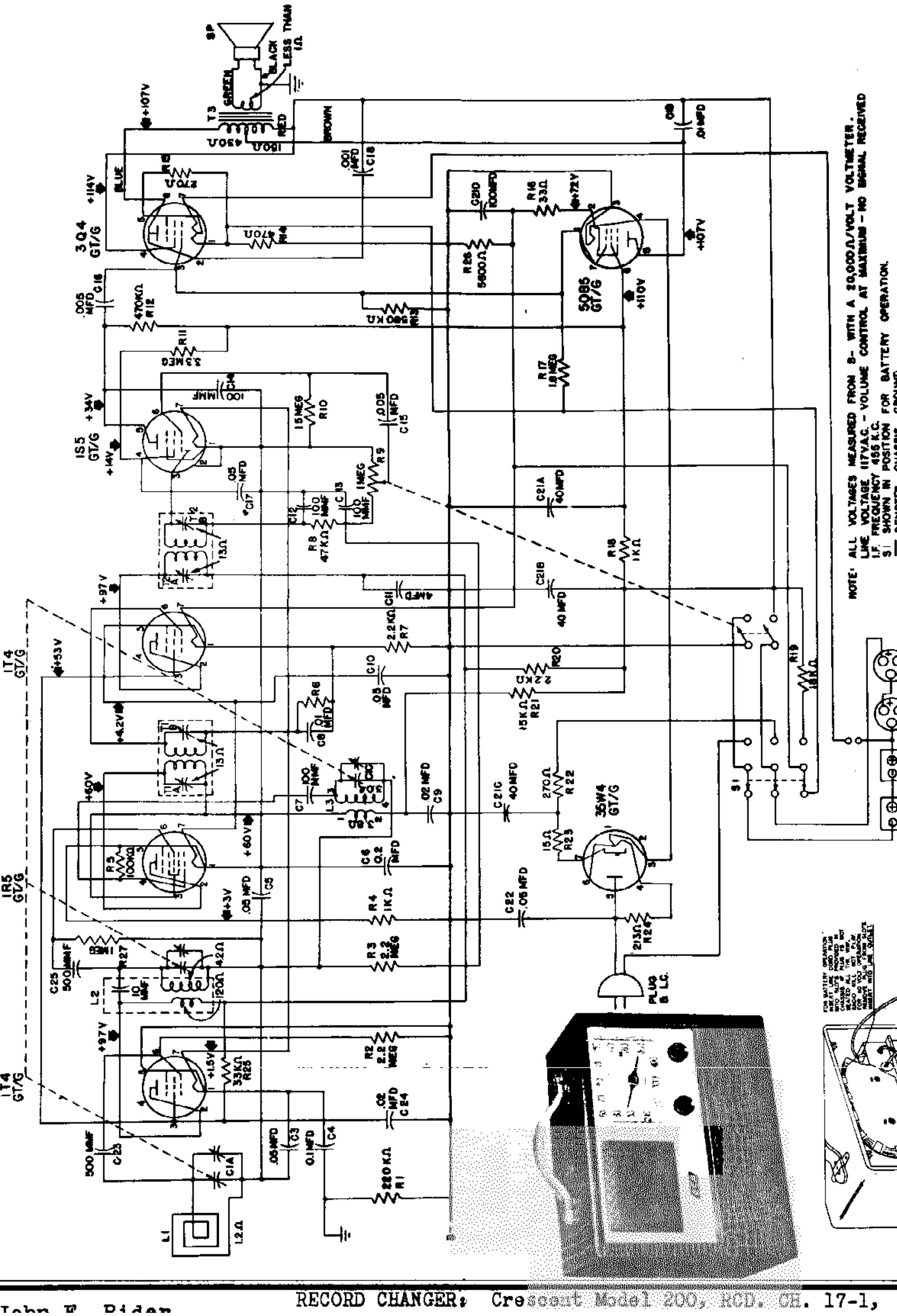


ELECTRONIC CORP. OF AMERICA



MODEL 204

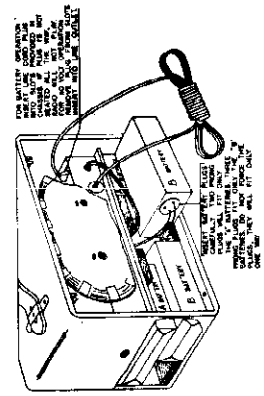
ELECTRONIC CORP. OF AMERICA



NOTE: ALL VOLTAGES MEASURED FROM B- WITH A 20,000Ω/VOLT VOLTMETER.
LINE VOLTAGE 117V.A.C. - VOLUME CONTROL AT MAXIMUM - NO SIGNAL RECEIVED
I.F. FREQUENCY 455 K.C.
S1 SHOWN IN POSITION FOR BATTERY OPERATION.
⏚ DENOTES CHASSIS GROUND.

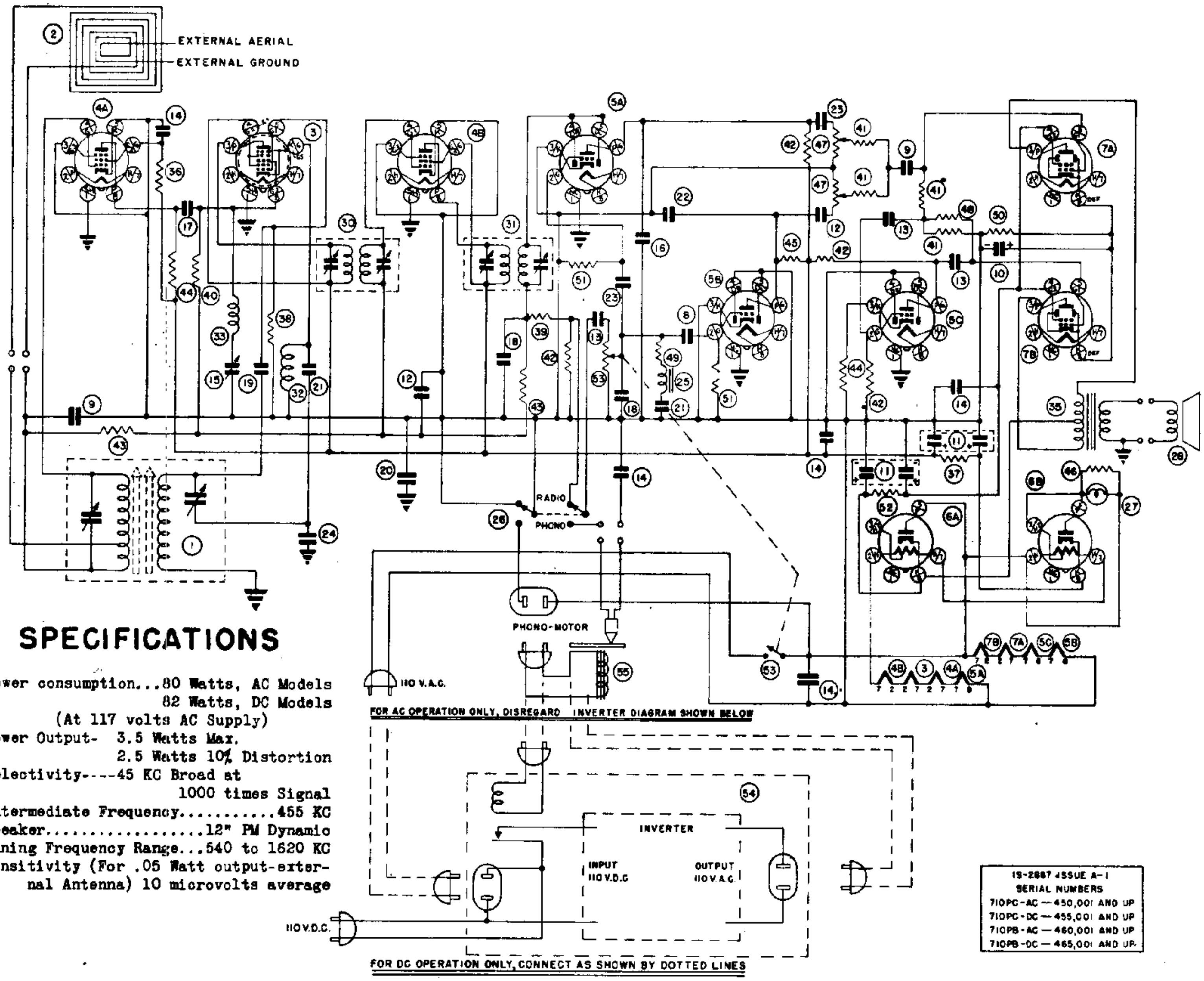
The following battery types may be used with this receiver:

	"A" Battery	"B" Battery
Burgess	G3	M30
Ray-O-Vac	P 83 A	P 7830
Everady	746	482



ELECTRONIC LABS, INC.

MODELS 710PC-AC, 710PB-AC
710PC-DC, 710PB-DC, Chassis
2887



SPECIFICATIONS

Power consumption...80 Watts, AC Models
82 Watts, DC Models
(At 117 volts AC Supply)
Power Output- 3.5 Watts Max.
2.5 Watts 10% Distortion
Selectivity----45 KC Broad at
1000 times Signal
Intermediate Frequency...........455 KC
Speaker.................12" PM Dynamic
Tuning Frequency Range...540 to 1620 KC
Sensitivity (For .05 Watt output-external Antenna) 10 microvolts average

MODELS 710PC-AC,710PB-AC, 710PC-DC,710PB-DC,Chassis 2887

ELECTRONIC LABS, INC.

ALIGNMENT PROCEDURE

Volume Control-Maximum All Adjustments.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The equipment in column at right is required for Aligning:

Signal Generator which will provide an accurately calibrated signal at test frequencies as listed.

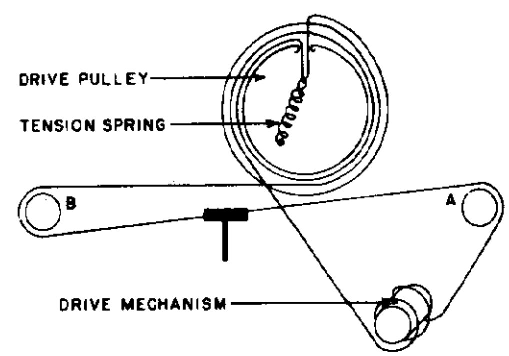
Output Indicating Meter; Non-Metallic Screwdriver.

Dummy Antennas-.01 mf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	ANTENNA CONNECTION	COUPLING	DUMMY ANTENNA	TUNER SETTING	TRIMMER ADJUSTMENT (SEE DIAGRAM)	NOTES
I.F. 455 KC	Grid of RF tube 12SK7 GTG	Ground generator to common gnd. line through 0.1 mfd condenser	0.01 mfd	Out	Adjust for Max. 1, 2, 3 and 4	No signal will be heard unless trimmer condenser under chassis is unscrewed and reduced from original setting
I.F. 455 KC	Grid of RF tube 12SK7 GT/G	Ground generator to common ground line through 0.1 mfd condenser	0.01 mfd	Out	Trim condenser under chassis for Min. output.	If it is found that regeneration prevails when the loop antenna is put in its normal position close to the tubes, then the under chassis trimmer is incorrectly set, and should be adjusted to prevent the regenerative condition.
1620 KC	Inductive Coupling to Loop	Loop coupling with leads brought out	400 ohms in series with Antenna & Gnd.leads	Out	Adjust Osc. #5 for Max. signal	
1400 KC	Inductive Coupling to Loop	Loop coupling with leads brought out	400 ohms in series with Antenna & Gnd.leads	Dial set for 1400KC	Adjust RF trimmer #6 for Max. Signal.	
700 KC	Inductive Coupling to Loop	Loop Coupling with leads brought out	400 ohms in series with Antenna & Gnd.leads	Dial set for 700KC	Adjust RF tuning core #7 for Max. Signal (care should be taken not to disturb carriage position of tuner)	Alternately adjust R.F. trimmer and R.F. slug until Maximum output is reached at both 1400 KC and 700 KC as instructed above.

DRIVE CORD REPLACEMENT

Turn the tuner so that slot in large drive pulley is at the top. Use a new cord 50" long and tie one end to the tension spring. Fasten the other end of the tension spring to the drive pulley. Pass cord through slot in pulley; wind one and one-half turns counter clockwise, progressing from center of pulley toward front. Pass cord around drive mechanism, two complete turns progressing from front to rear. Pass cord counter clockwise around idler pulley A. Pass cord in front of cord between drive pulley and drive mechanism; then clockwise around idler pulley B. Pass cord back of cord between drive pulley and drive mechanism; then counter clockwise around drive pulley for one and one-half turns, progressing from rear to center. Pass cord through slot and tie to string. Cut off excess spring. Attach dial pointer to cord between idler pulley A and B.



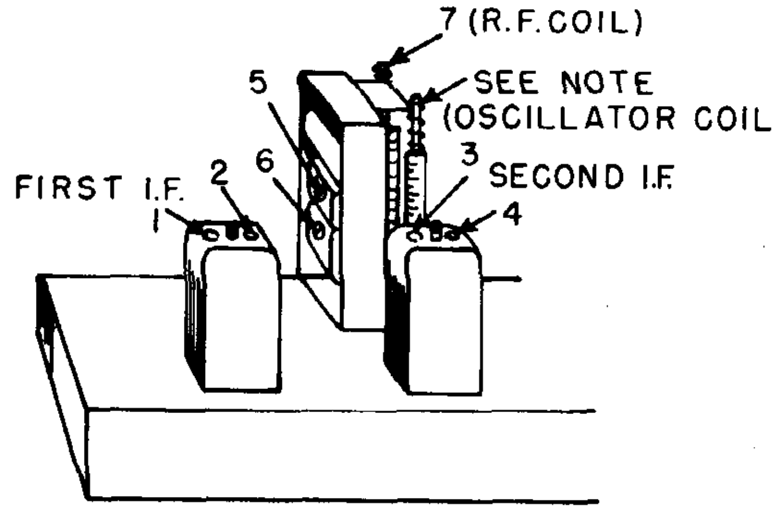
A. MECHANICAL ALIGHMENT:- The following mechanical adjustments should be made before alignment:

1. Rotate shaft of tuning unit until carriage is against top stop position.

2. Space oscillator coil slug 1-5/32" out from top of oscillator coil form.

3. Space R.F. coil slug 1-29/64" out from top end of R.F. coil winding. (Note:-The distance 1 and 2 should be measured from mounted end of the slug)

4. Adjust screw on trimmer of wave trap towards open position so that condenser plates are open at least 1/32".



B. I.F. ALIGNMENT PROCEDURE

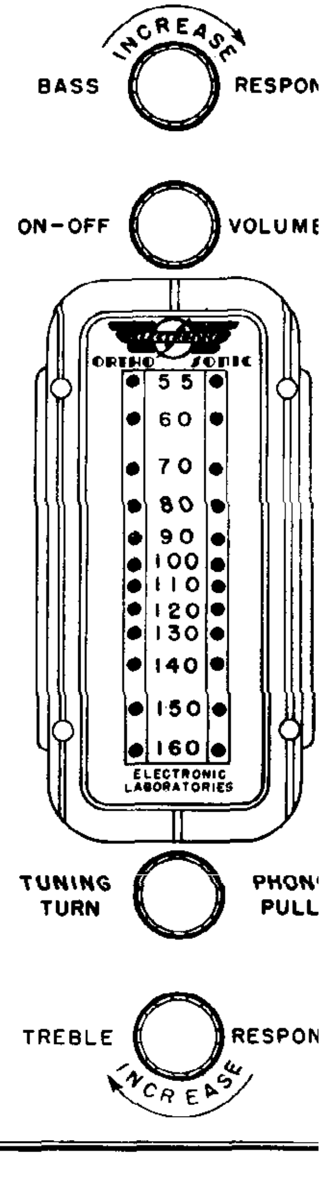
1. Feed I.F. frequency from the signal generator through a 0.01 mfd condenser to the control grid of the R. F. tube.
2. No signal will be heard unless trimmer condenser under chassis is unscrewed and reduced from original setting.
3. Turn volume control full on.
4. Make preliminary I.F. adjustment with signal level approximately 50 Mv.
5. Tune I.F. trimmers for maximum signal, reducing I.F. signal input to coupling loop to keep output voltage less than 0.5 V across the voice coil or a dummy 3 ohm resistor.
6. When maximum output has been secured, adjust trimmer condenser in the I.F. trap by turning clockwise to the minimum signal.

C. R.F. ALIGNMENT PROCEDURE

1. Volume control full on.
2. Adjust tuning unit to top stop position.
3. Feed 1620 kc signal into external loop. Hold audio output below 0.5 V. Adjust the oscillator trimmer condenser to maximum output.
4. Move slugs in by means of tuning dial so that pointer is approximately 1" from the stop end, and a signal received from the external loop on a frequency of 1400 kc. Adjust lower trimmer (R.F. trimmer) to maximum output. Reduce R.F. input to keep signal output voltage below 0.5 V across the voice coil or a dummy 3 ohm resistor.
5. Rotate tuning shaft until pointer is approximately 1" from the other end of the scale. Feed to the external loop a test signal at 700 kc. Adjust the R.F. coil slug by rotation in the Tinnerman nut to maximum output.

NOTE: Alternately adjust R.F. trimmer and R.F. slug until maximum output is reached at both 1400 kc. and 700 kc. as instructed in paragraphs C4 and C5.

CAUTION: Extreme care should be taken in the 700 kc. position to make sure that the tuner carriage is not moved by the adjusting tools or hand pressure on the slug screw. Carriage should not be held against the frame, but should be allowed to assume its normal position when adjusting the R.F. coil slug.

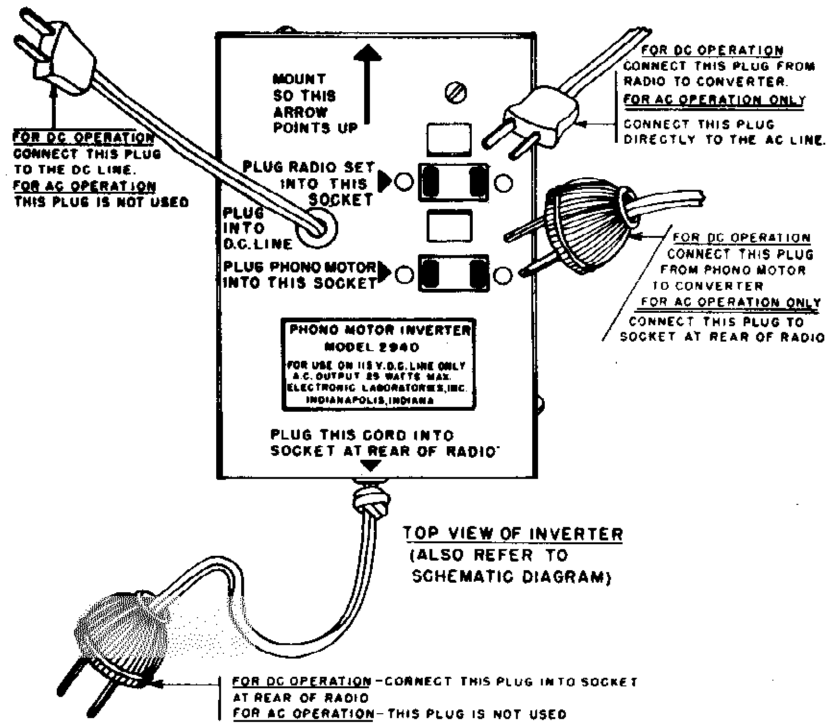


MODELS 710PC-AC, 710PB-AC, 710PC-DC, 710PB-DC, Chassis 2887

ELECTRONIC LABS, INC.

LIST OF PARTS

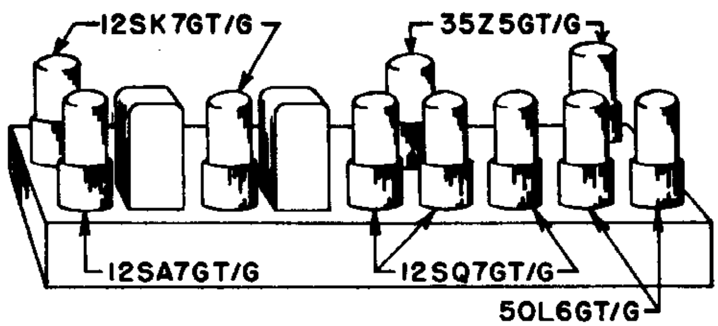
ITEM	PART NO.	DESCRIPTION	REQ'D
1	ISSUE 9-41 A-2220	TUNER ASSEMBLY	1
2	A-2272A	LOOP ASSEMBLY	1
3	12SA7GT/G	TUBE – HEPTODE	1
4	12SK7GT/G	TUBE – PENTODE	2
5	12SQ7GT/G	TUBE – DUO-DIODE-TRIODE	3
6	35Z5GT/G	TUBE – RECTIFIER	2
7	50L6GT	TUBE – POWER PENTODE	2
8	C-418A	CONDENSER 0.05 MFD 400VDC	1
9	C-460A	CONDENSER 0.1 MFD 200VDC	2
10	C-462A	CONDENSER 25 MFD 25VDC	1
11	C-466A	CONDENSER 40-40 MFD 150 VDC	2
12	C-467A	CONDENSER 0.05 MFD 200 VDC	2
13	C-468A	CONDENSER 0.01 MFD 200 VDC	3
14	C-471A	CONDENSER 0.1 MFD 400 VDC	5
15	C-483B	CONDENSER 10-160 MMF (TRIMMER)	1
16	C-492A	CONDENSER 100 MMF 500 VDC	1
17	C-493A	CONDENSER 1000 MMF 350 VDC	1
18	C-494A	CONDENSER 250 MMF 350 VDC	2
19	C-495A	CONDENSER 50 MMF 500 VDC	1
20	C-497A	CONDENSER 0.2 MFD 400 VDC	1
21	C-500A	CONDENSER 10,000 MMF 600 VDC	2
22	C-523A	CONDENSER 0.003 MFD 400 VDC	1
23	C-524A	CONDENSER 0.001 MFD 400 VDC	2
24	C-531A	CONDENSER 2000 MMF 350 VDC	1
25	T-1380A	AUDIO CHOKE 5H	1
26	E-170A	SWITCH DPDT SLIDE	1
27	H-241A	PILOT LAMP	1
28	H-256A	SPEAKER 12" P.M. 3.2 Ω	1
29			
30	T-1361A	I.F. TRANSFORMER	1
31	T-1362A	I.F. TRANSFORMER	1
32	T-1365A	R.F. CHOKE COIL 1.4 MH	1
33	T-1372A	R.F. CHOKE COIL 3.0 MH	1
35	T-1384A	OUTPUT TRANSFORMER PRI 4000 Ω SEC 3.2 Ω	1
36	W-430A	RESISTOR 15000 Ω 1/4 WATT	1
37	W-433A	RESISTOR 1000 Ω 1 WATT	1
38	W-437A	RESISTOR 22,000 Ω 1/4 WATT	1
39	W-438A	RESISTOR 47,000 Ω 1/4 WATT	1
40	W-439A	RESISTOR 100,000 Ω 1/4 WATT	1
41	W-440A	RESISTOR 220,000 Ω 1/4 WATT	4
42	W-441A	RESISTOR 470,000 Ω 1/4 WATT	4
43	W-442A	RESISTOR 2.2 MEG Ω 1/4 WATT	2
44	W-452A	RESISTOR 4700 Ω 1/2 WATT	2
45	W-468A	RESISTOR 330,000 Ω 1/4 WATT	1
46	W-473A	RESISTOR 470 Ω 1/4 WATT	1
47	W-476A	POTENTIOMETER 1 MEG Ω	2
48	W-477A	RESISTOR 270,000 Ω 1/4 WATT	1
49	W-478A	RESISTOR 33,000 Ω 1/4 WATT	1
50	W-479A	RESISTOR 75 Ω 1 WATT	1
51	W-480A	RESISTOR 4.7 MEG 1/4 WATT	2
52	W-405A	RESISTOR 220 Ω 1/2 WATT	1
53	W-489A	POTENTIOMETER & SWITCH 500,000 Ω	1
54	2940	INVERTER	1
55	A-2246	AUTOMATIC RECORD CHANGER	1

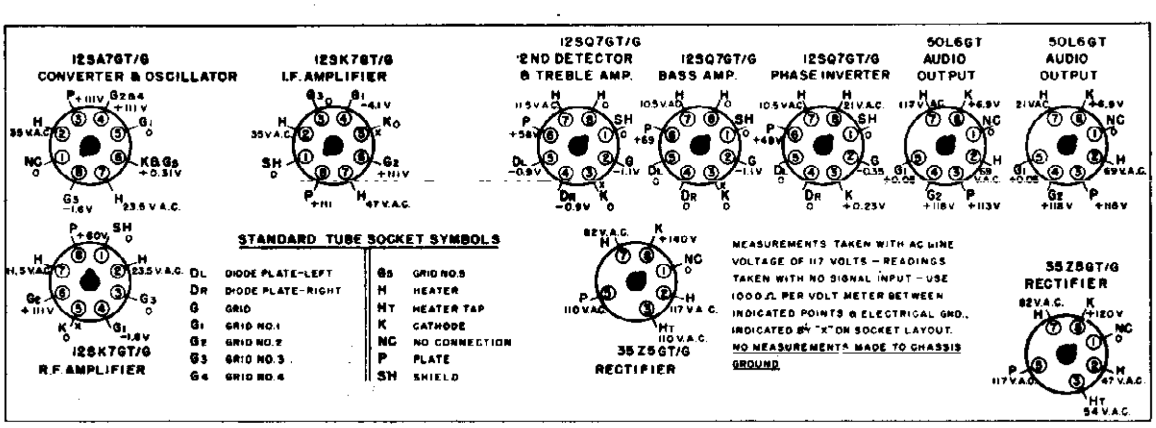


TOP VIEW OF INVERTER
(ALSO REFER TO SCHEMATIC DIAGRAM)

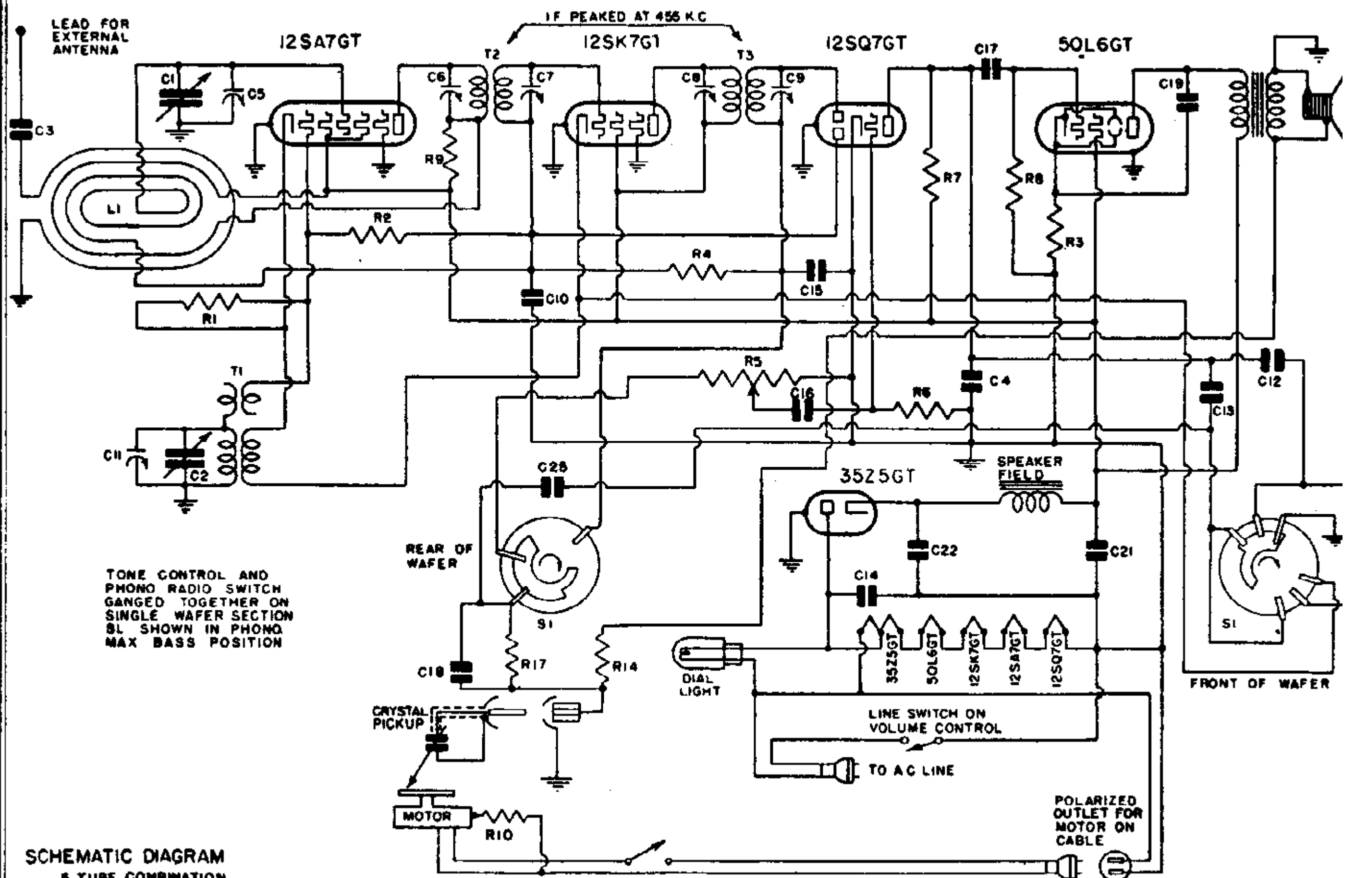
CAUTION:- If a dial lamp burns out, it should be replaced at once. A hole in the bottom of the chassis mounting board provides access to the dial lamp so that it may be replaced without removing chassis from the cabinet

Use only a No. 47 dial lamp.





EMERSON RADIO AND PHONO. CORP.



SCHEMATIC DIAGRAM
5 TUBE COMBINATION

TYPE: Single-band superheterodyne and phonograph.

FREQUENCY RANGE: 540-1600 kc.

POWER SUPPLY: A.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts for the receiver,
20 watts for the phono motor.

NUMBER OF TUBES: Five.

TYPE OF TUBES:

1—12SA7, pentagrid oscillator-modulator
1—12SK7, first i-f amplifier
1—12SQ7, diode detector, a-f amplifier, a.v.c.
1—50L6, beam power output
1—35Z5GT, half-wave rectifier.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line sw with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All rea except heaters and cathodes were taken on 250 volt scale.

Tube	Plate	Screen	Cathode	Fil.
12SA7	88	88	0	12
12SK7	88	88	0	12
12SQ7	30	—	0	12
50L6	82	88	5.6	50

Voltage at 35Z5 cathode—120 volts.

Voltage across speaker field—32 volts.

Voltage across pilot light—4.5 volts.

MODEL FS-423,
Chassis FS

EMERSON RADIO AND PHONO. CORP.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully re-aligned.

2. The color coding of the i-f transformer leads is as follows:

Grid—green	Plate—blue
Grid return—black	B plus—red

3. The receiver has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna should be used. For this purpose a lead has been brought out of the rear near the line cord.

4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

ADJUSTMENTS

An oscillator with frequencies of 455 and 1400 kc is required.

An output meter should be used across the voice coil or output transformer for observing maximum response.

Always use as weak a test signal as possible when aligning the receiver.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to the 12SA7 tube. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is mounted on top of the chassis next to the 12SK7 tube. The trimmers are accessible through holes in the top of the can.

The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the front section is for the oscillator coil.

The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

I-f Alignment

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

Note: The grid of the 12SA7 tube is connected to the lower stator lug of the rear variable condenser section. Connection may be made with a test clip to the upper stator lug.

R-f Alignment

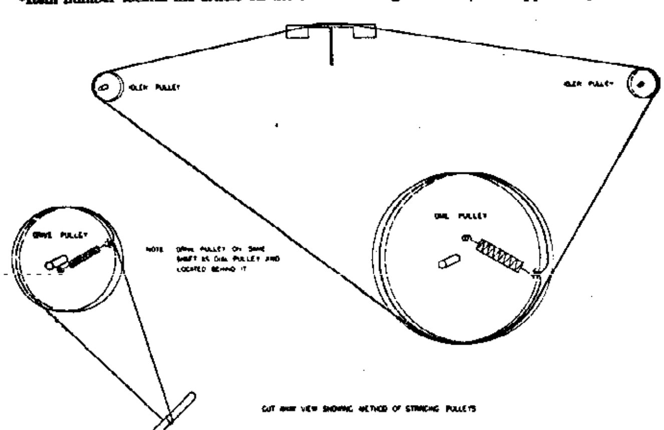
Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows: Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

REPLACEMENT PARTS LIST

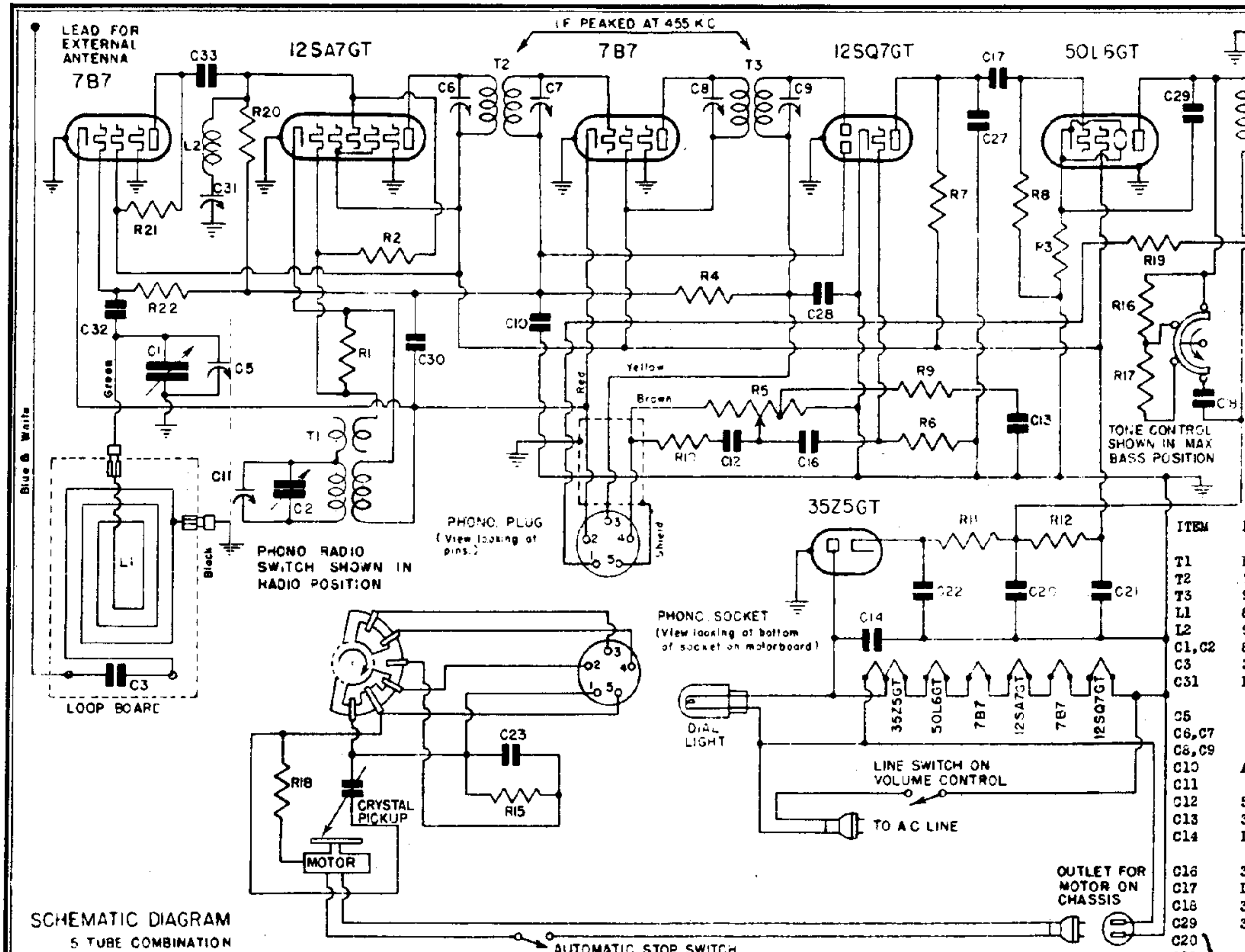
*Item	Part No.	DESCRIPTION
L1	8PW-324A	Antenna loop assembly
T1	9JT-617A	Oscillator coil
T2	8PT-586A	Double-tuned 455 kc first i-f transformer
T3	8PT-587	Double-tuned 455 kc second i-f transformer
R1	LR-60	20,000 ohm ¼ watt carbon resistor
R2, R6	4XR-327	15 megohm ¼ watt carbon resistor
R3	3FR-293	140 ohm ½ watt wire-wound resistor
R4, R17	NNR-220	3 megohm ¼ watt carbon resistor
R5	9SR-452	Volume control, .5 megohm with line switch
R7, R8, R14	KR-56	500,000 ohm ¼ watt carbon resistor
R9	KR-50	500 ohm ¼ watt carbon resistor
R10	KR-55	250,000 ohm ¼ watt carbon resistor
C1, C2	9SC-544	Two-gang variable condenser
C3, C16	3HC-274	0.002 mf, 600 volt tubular condenser
C4	3RC-373	0.0004 mf, 600 volt tubular condenser
†C5, C11		Trimmers, part of variable condenser.
†C6, C7, C8, C9		Trimmers, part of i-f transformers.
C10	AC-6	0.1 mf, 200 volt tubular condenser
C12	9JC-541	0.0006 mf, 600 volt tubular condenser
C13	9JC-542	0.0015 mf, 600 volt tubular condenser
C14	LC-64	0.05 mf, 400 volt tubular condenser
C15	5AC-384	0.0002 mf, 600 volt tubular condenser
C17	LC-65	0.02 mf, 400 volt tubular condenser
C18	IC-47	0.0005 mf, mica condenser
C19	KC-58	0.01 mf, 400 volt tubular condenser
C21, C22	6JC-426S	Dual 20 mf, 150 volt dry electrolytic condenser
C25	4HC-395A	0.000026 mf, mica condenser
	9SS-560	5" dynamic speaker (450 ohm field)
	8CPM-64H	117 volt, a.c., phono motor
	8CC-486C	Crystal pickup
	9JS-545A	Phono-radio and tone control switch
		DIAL PARTS
	7BB-77C	Pilot light socket
	6JL-104	Pilot light, 6.3 volt, .15 amp., Mazda No. 47
	9JD-132	Dial face
	9JD-133	Dial pointer
	9JH-85	Drive shaft
	6RZ-870	Drive cord
	6QZ-863	Dial cord

*Item number locates the article on the schematic diagram. †Not supplied separately.



CUT AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS

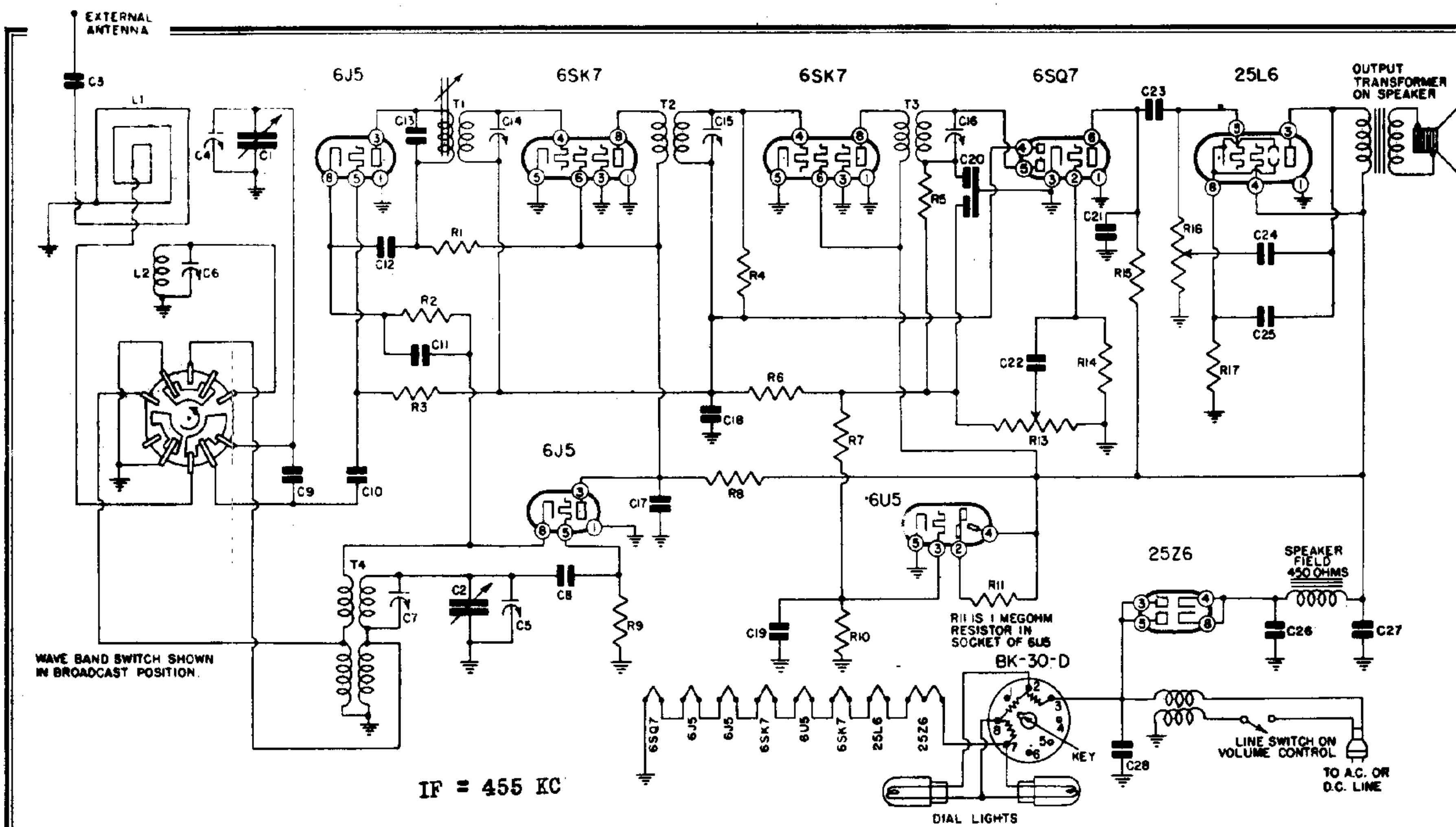
EMERSON RADIO AND PHONO. CORP.



SCHEMATIC DIAGRAM
5 TUBE COMBINATION

ITEM	PART NO.	DESCRIPTION
R1	IR-60	20000 Ω ½W
R2	4XR-327	15 meg ½W
R3	3FR-293	140 Ω ½W
R4	NMR-220	3 meg ½W
R5	8TR-423	Volume Control
R8	KR-56	500000 Ω ½W
R11	9JR-450	175 Ω 1W
R12	8JR-424	750 Ω 1W
R9	3BR-247	40000 Ω ½W
R10	KR-55	250000 Ω ½W
R16	IR-43	1000 Ω ½W
R17	7UR-394	2200 Ω ½W
R13	KR-55	250000 Ω ½W
R19	KR-56	500000 Ω ½W
R20	OR-73	25000 Ω ½W

ITEM	PART NO.	DESCRIPTION
T1	BDT-572A	Oscillator Coil
T2	TQT-548G	1st I.F. Trans.
T3	9LT-618	2nd I.F. Trans.
L1	8TW-314	Antenna Loop
L2	9LT-619	I.F. Wave Trap
C1,C2	8TC-511	Variable
C3	3HC-274	.002 uf 600 V
C31	Part of IF Wave Trap	Trimmer
C5		Trimmer
C6,C7		Trimmers
C8,C9		Trimmers
C10	AC-6	.1 uf 200 V
C11		Trimmer
C12	5LC-410A	.00011 uf Mica
C13	3HC-274	.002 uf 600 V
C14	LC-64	.05 uf 400 V
C16	3HC-274	.002 uf 600 V
C17	LC-55	.02 uf 400 V
C18	3CC-302	.15 uf 200 V
C29	3PC-306	.005 uf 600 V
C20	8JC-513	40 uf 150 V
C21		20 uf 150 V
C22		20 uf 150 V
C23	4XC-393A	.00006 uf Mica
C30	FC-29	.02 uf 200 V
C27	5LC-410A	.00011 uf Mica
C28	5LC-410A	.00011 uf Mica
C32	4XC-394A	.00022 ufd Mica



IF = 455 KC

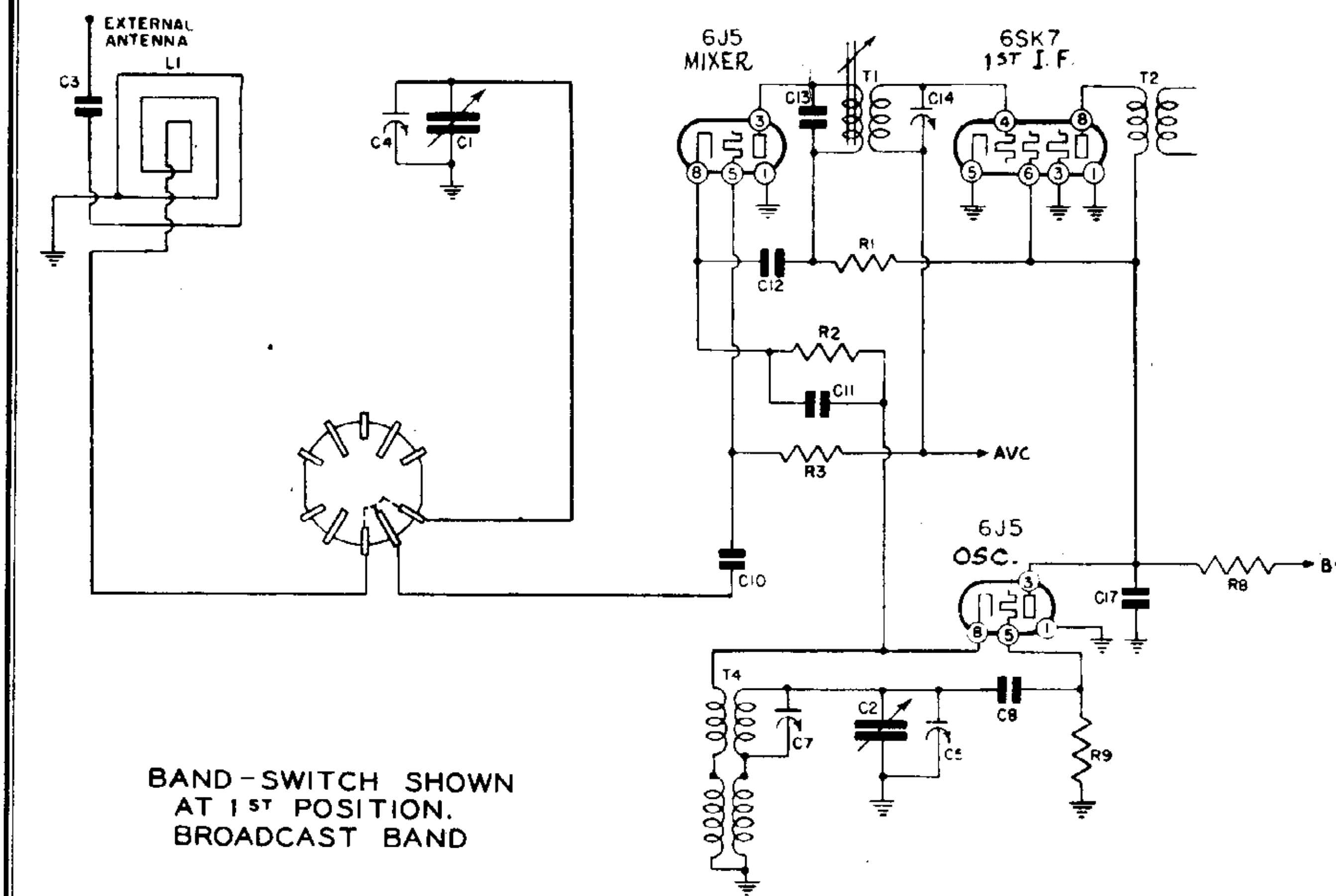
ITEM	PART NO.	DESCRIPTION
L1	10PW-390	LOOP ANTENNA
L2	10PT-649	S.W. ANTENNA COIL
T1	10PT-651	1st I.F. TRANS.
T2	10PT-652	2nd I.F. TRANS.
T3	10PT-653	3rd I.F. TRANS.
T4	10PT-650	OSC. COIL
C1, C2	10PC-578	VARIABLE
C3	3HC-274	.002 mf 600V.
C4	PART OF C1,2	TRIMMER
C5	PART OF C1,2	TRIMMER
C6	PART OF L2	TRIMMER
C7	PART OF TA	TRIMMER

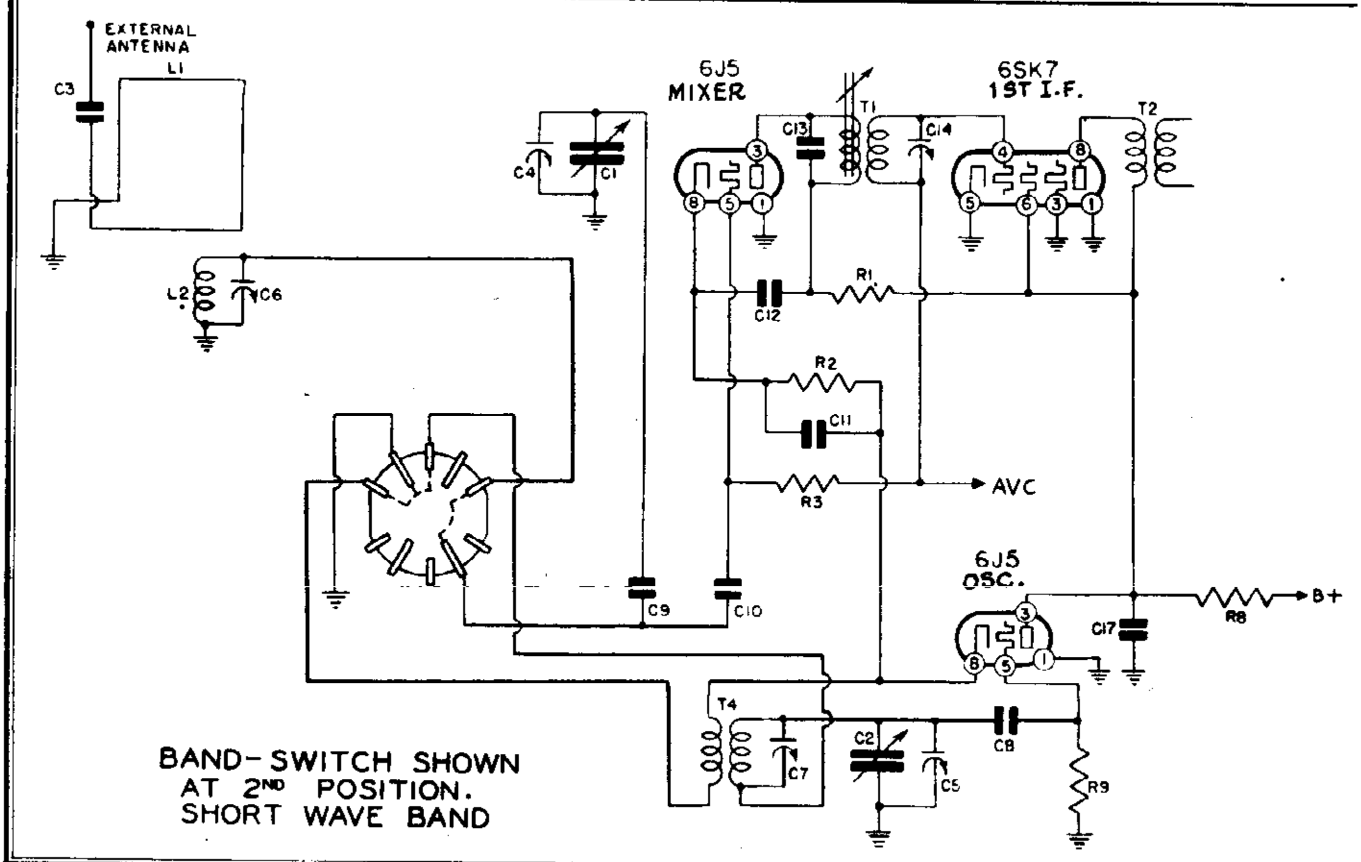
ITEM	PART NO.	DESCRIPTION
C8	5LC-410A	.00011 mf MICA
C9	10PC-589	.00053 mf MICA
C10	5LC-410A	.00011 mf MICA
C11	BC-12	.05 mf 200V
C12	KC-58	.01 mf 400V
C13	PART OF T1	
C14	PART OF T1	TRIMMER
C15	PART OF T2	TRIMMER
C16	PART OF T3	TRIMMER
C17	BC-12	.05 mf 200V
C18	BC-12	.05 mf 200V
C19	BC-12	.05 mf 200V
C20	PART OF C-16	

ITEM	PART NO.	DESCRIPTION
C21	5AC-384	.0002 mf 600V
C22	3HC-274	.002 mf 600V
C23	LC-65	.02 mf 400V
C24	5AC-384	.0002 mf 600V
C25	KC-58	.01 mf 400V
C26	6QC-437B	20 mf 150V DUAL
C27		40 mf 150V
C28	LC-64	.05 mf 400V
R1	LR-65	10,000Ω 1/4W.
R2	TUR-394	2,200 Ω 1/4W.
R3	9ZR-480	3.3 MEG 1/4W.
R4	10TR-485	220,000Ω 1/4W.
R5	PART OF T3	47,000Ω 1/4W.

ITEM	PART NO.	DESCRIPTION
R6	9ZR-480	3.3 MEG [illegible]
R7	9ZR-480	3.3 MEG. [illegible]
R8	PR-79	1000 Ω 1/4W.
R9	10TR-486	47,000Ω 1/4W.
R10	3RR-275	10 MEG 1/4W.
R11	PART OF 6U5 SOCKET	1 MEG
R12		
R13	10NR-471	VOLUME CONTROL
R14	4XR-327	15 MEG 1/4W.
R15	9ZR-479	470,000Ω 1/4W.
R16	10NR-472	TONE CONTROL
R17	3[illegible]-295	140Ω 1/2W.

EMERSON RADIO AND PHONO. CORP. MODEL 456, Chassis

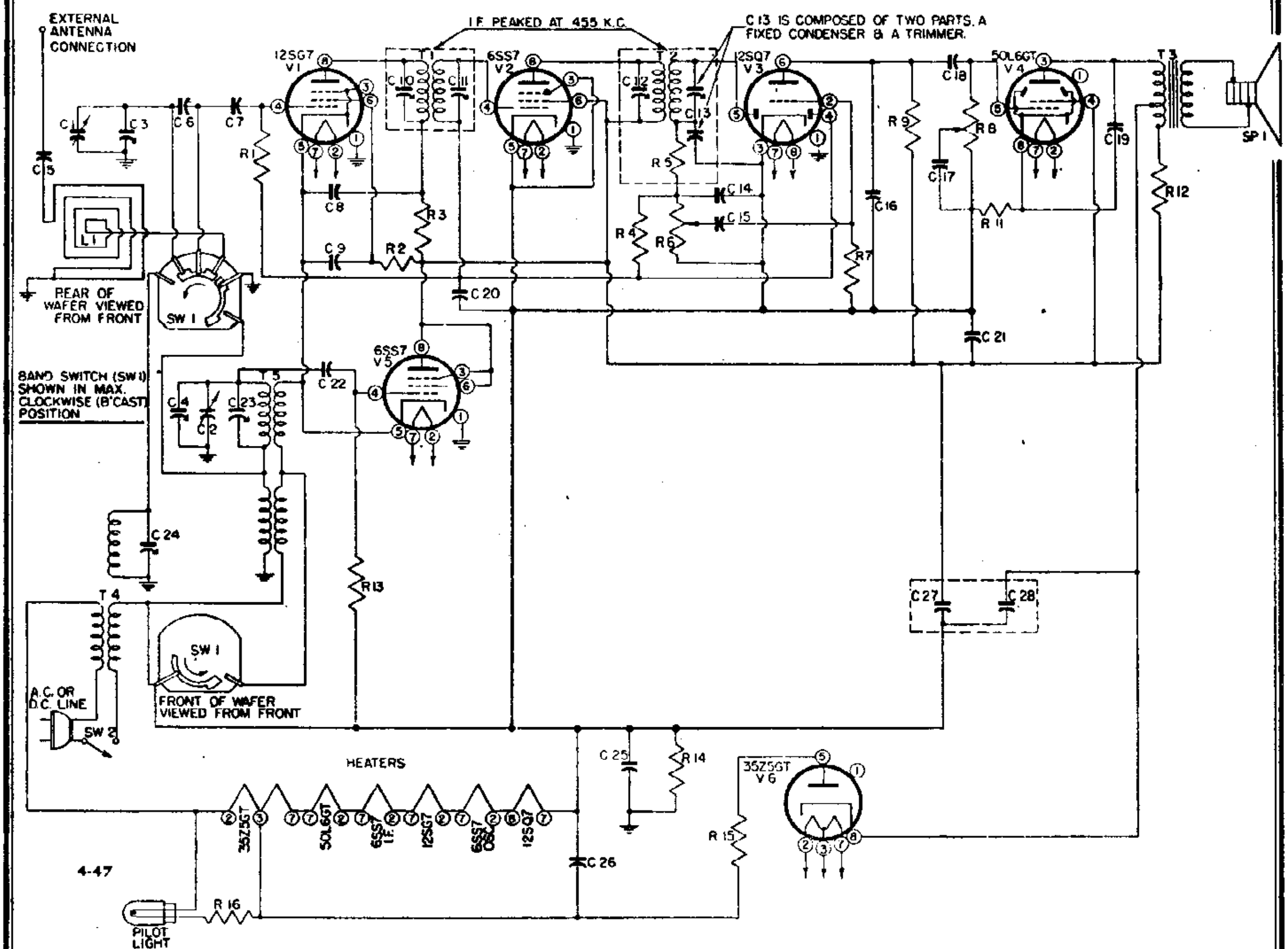




EMERSON RADIO AND PHONO. CORP.

MODELS 513, 514, 534

Chassis 120007



DESCRIPTION

TYPE: Two-band superheterodyne.

FREQUENCY RANGE:

540-1620 kc. (555-185 meters)

8.8-12.2 mc. (16.3-24.5 meters)

TYPE OF TUBES:

1—12SG7, mixer

1—6SS7, oscillator

1—6SS7 or 7B7, i-f amplifier

1—12SQ7, diode detector, a-f amplifier, a.v.c.

1—50L6GT, beam power output

1—35Z5GT, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.

2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.

3. The color coding of the i-f transformer leads is as follows:
   Grid—green Plate—blue
   Grid return—black B+—red

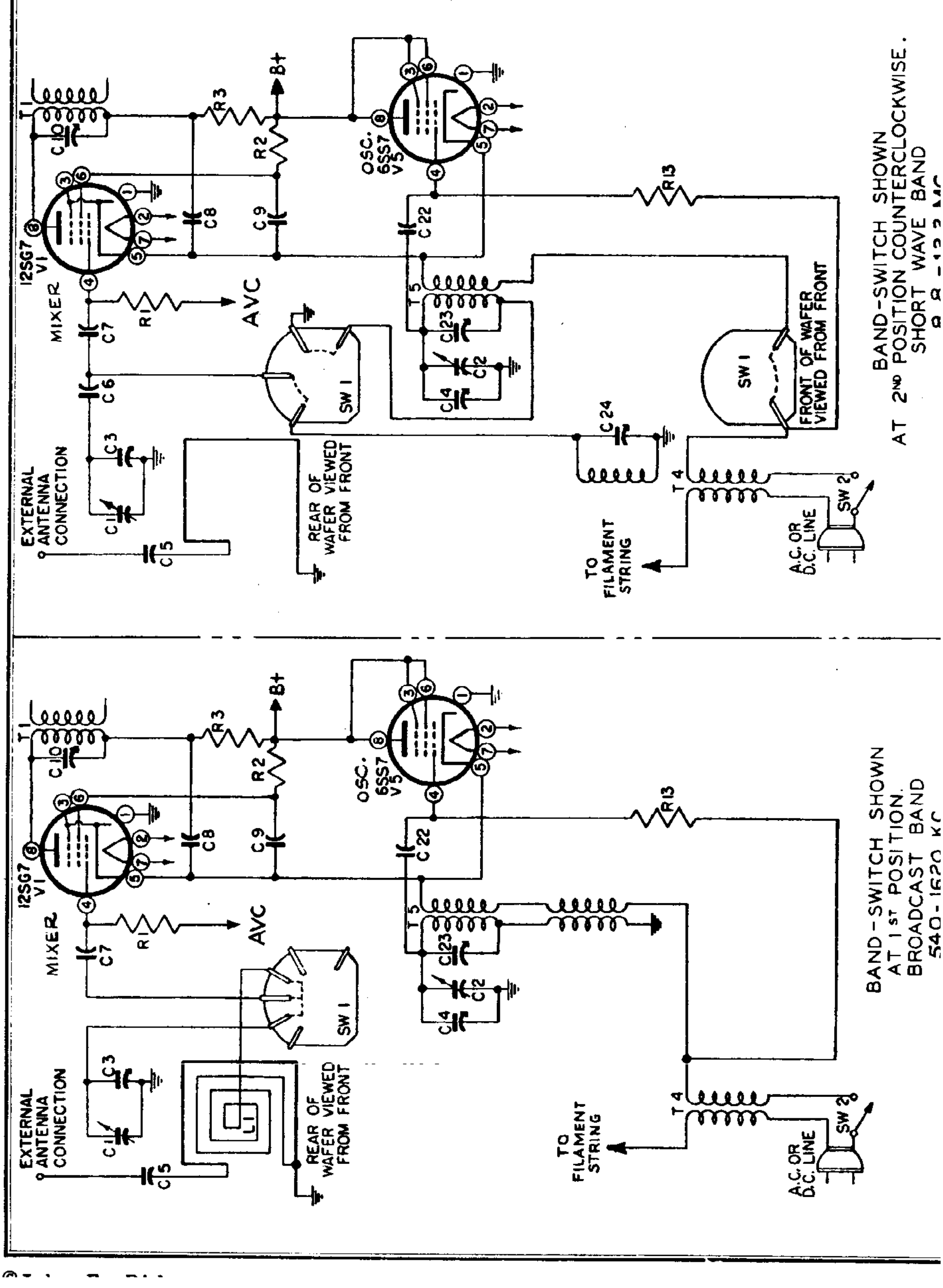
4. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out of the rear near the line cord.

5. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

6. Where 7B7 loctal tube is used in place of 6SS7 i-f amplifier, tube types are not interchangeable. Use same voltage data for both types.

EMERSON RADIO AND PHONO. CORP. MODELS 513, 514, 5

Chassis 120007



EMERSON RADIO AND PHONO. CORP.

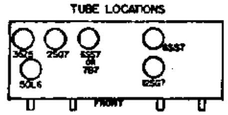
MODELS 513, 514, 534
Chassis 120007

Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900270	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
C5, C15, C17	920010	0.002 mfd., 600 volt condenser
C6	910080	0.00046 mfd. mica condenser
C7, C16	910000	0.00022 mfd. mica condenser
C8	920060	0.05 mfd., 200 volt condenser
C9, C18, C19	920020	0.02 mfd., 400 volt condenser
*C10, C11, C12		Trimmers, part of i-f transformers
*C13		Trimmer and fixed condenser, part of second i-f transformer
C14	910010	0.00011 mfd. mica condenser
C20	920040	0.1 mfd., 200 volt condenser
C21	920190	0.03 mfd., 400 volt condenser
C22	910160	0.00036 mfd. mica condenser
*C23		Trimmer, part of oscillator coil
*C24		Trimmer, part of short wave antenna coil
C25	920050	0.2 mfd., 200 volt condenser
C26	920030	0.05 mfd., 400 volt condenser
C27, C28	925012	50-50 mfd., 150 volt dual electrolytic condenser
L1	700130	Loop antenna
R1, R9, R10	321130	470,000 ohms, ¼ watt resistor

Schematic Symbol	†Part No.	DESCRIPTION
R2	310890	47,000 ohms, ¼ watt resistor
R3	310650	4,700 ohms, ¼ watt resistor
R4	321330	3.3 meg., ¼ watt resistor
*R5		47,000 ohms, ¼ watt resistor, part of second i-f transformer
R6	390190	500,000 ohms volume control
R7	397000	15 meg., ¼ watt resistor
R8	390280	400,000 ohms tone control
R11	340290	150 ohms, ¼ watt resistor
R12	370490	1,000 ohms, 1 watt resistor
R13	310810	22,000 ohms, ¼ watt resistor
R14	321050	220,000 ohms, ¼ watt resistor
R15	340030	15 ohms, ¼ watt resistor
R16	340010	10 ohms, ½ watt resistor
P1	180008	P.M. speaker
SW1	510330	Band switch
*SW2		Line switch on volume control
T1	720400	First i-f transformer
T2	720390	Second i-f transformer
T3	734100	Output transformer
T4	710010	Short wave antenna coil
T5	716700	Oscillator coil
	583160	Line cord
	807000	Pilot light, Mazda No. 47
	507215	Pilot light socket

* Not supplied separately.
† Specify part number when ordering.

TUBE LOCATIONS



VOTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at maximum and the variable condenser open and band switch in B.C. position. When the band switch is in the S.W. position, voltages marked (+) apply.

	PIN NUMBER							
TUBE	1	2	3	4	5	6	7	8
6SS7 (V1)			95 95+	—12* —5.6+		95 95+		95 95+
6SS7 (V3)				—3.8* —3.0+		65 65+		85 85+
12SK7				—3.3* —2.6+		95 95+		95 95+
12SQ7		—0.6* —0.6+		—3.3* —2.6+	—0.57* —0.5+	52* 52+		
50L6GT			112 112+	95 95+				5.35 5.35+
35W4GT				119 119+				119 119+

ADJUSTMENTS

An oscillator with frequencies of 455, 600, 1600 and 12,000 kc is required.

An output meter should be used across the voice coil or output transformer for observing maximum response.

Always use as weak a test signal as possible when aligning the receiver.

I-f Alignment

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SG7 tube through a 0.1 mfd. condenser and adjust the four i-f trimmers for maximum response.

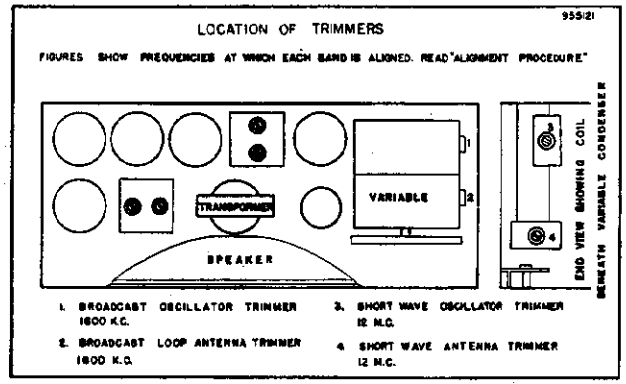
Note: The grid of the 12SG7 tube is the No. 4 pin.

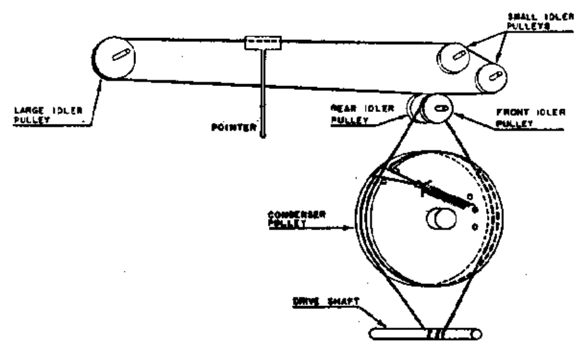
R-f Alignment

Rotate the wave-band switch counter-clockwise to the short-wave position. Set the dial pointer at 12 megacycles and using a 400 ohm carbon resistor as a dummy antenna feed 12 megacycles from the generator to the external antenna lead emerging from the rear of the chassis. Adjust first the short-wave oscillator trimmer and then the short-wave antenna trimmer for maximum response.

Rotate the wave-band switch clockwise to the broadcast position. Set the dial pointer at 160 and feed 1600 kc from the signal generator into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from the loop antenna and advance the signal generator until a deflection is obtained on the output meter. Adjust first the oscillator trimmer (rear section of the variable condenser) and then the antenna trimmer (front section of the variable condenser) for maximum response.

If the loop has been replaced it may be necessary to adjust the loop inductance as follows: Align at 1600. Set the pointer at 60 and feed 600 kc into the radiating loop. A portion of the outside turn of the loop may then be swung to either side of the center to give maximum response. Realign at 1600.

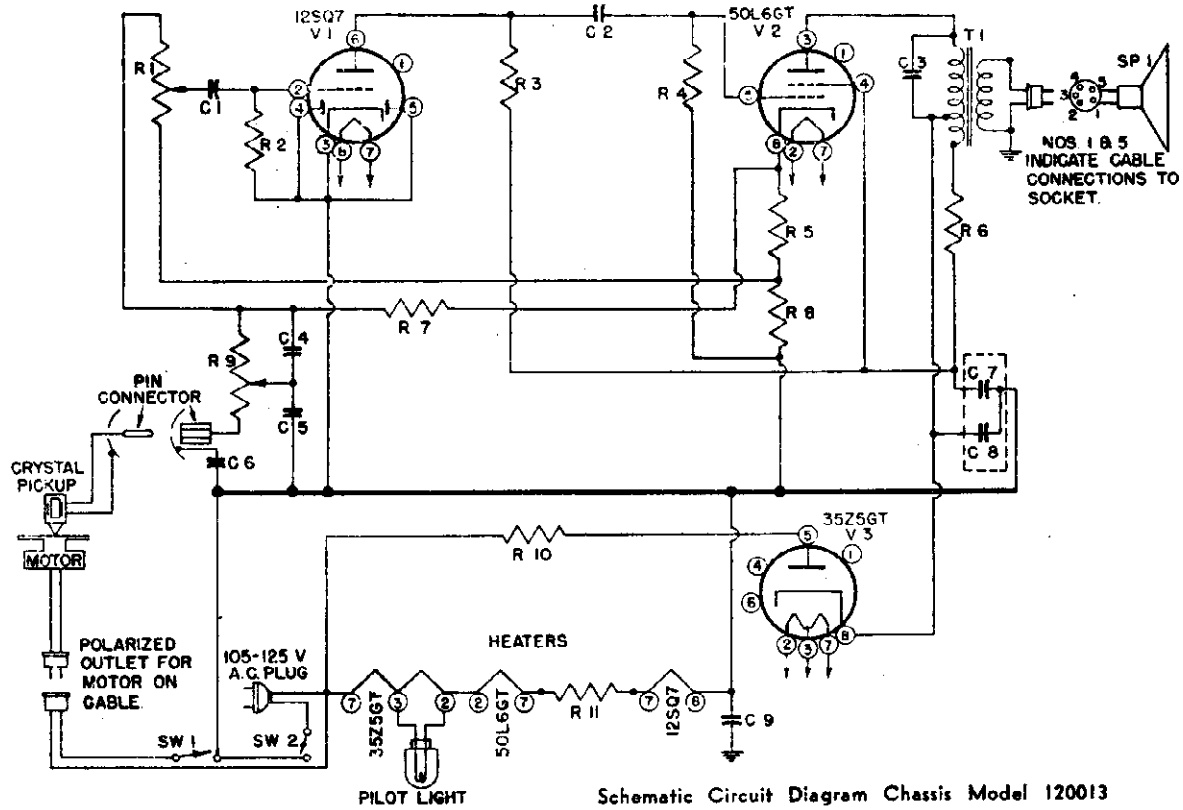




CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS.

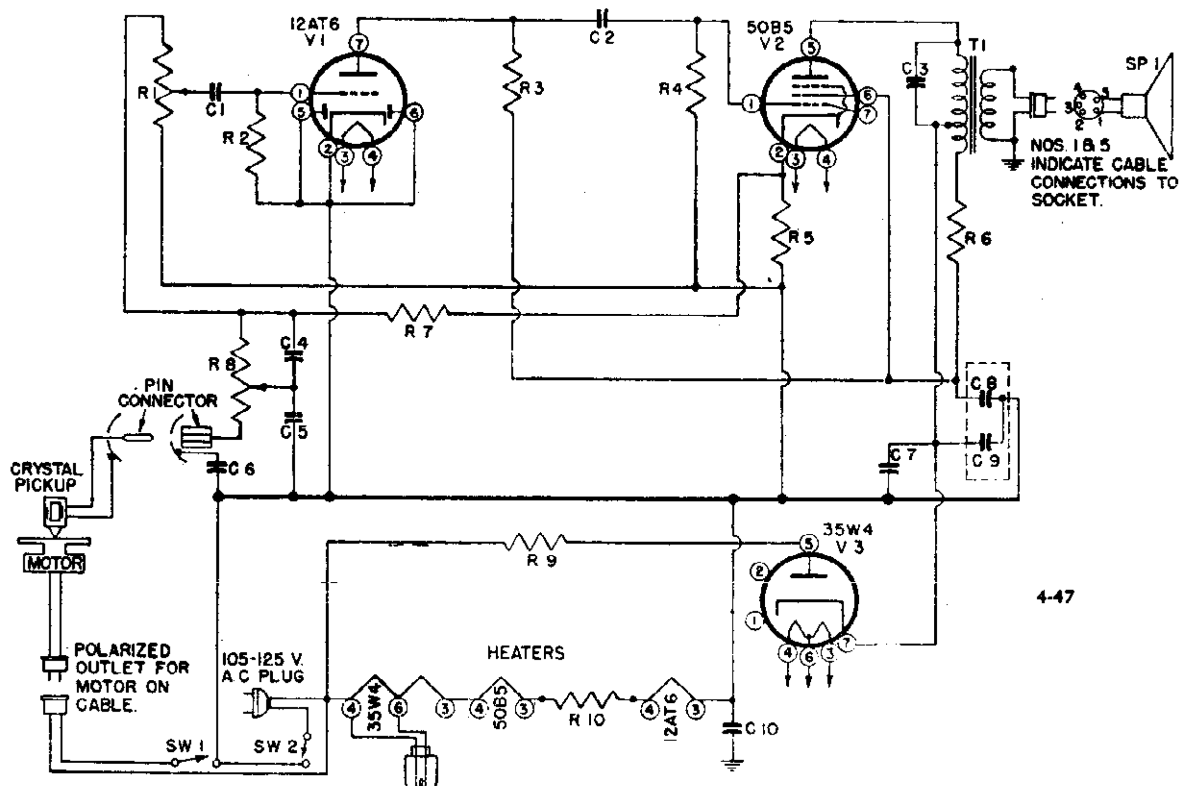
EMERSON RADIO AND PHONO. CORP.

MODEL 521,
Chassis 12001
MODEL 542,
Chassis 12003



Schematic Circuit Diagram Chassis Model 120013

IF = 455 KC



4-47

Schematic Circuit Diagram Chassis Model 120031

EMERSON RADIO AND PHONO. CORP.

Schematic Symbol	Part No.	DESCRIPTION
C1	920170	0.001 mfd., 600 volt condenser
C2, C3	920020	0.02 mfd., 400 volt condenser
C4	910010	0.00011 mfd. mica condenser
C5	910000	0.00022 mfd. mica condenser
C6	920030	0.05 mfd., 400 volt condenser
C7	925003	16 mfd., 150 volt electrolytic condenser (Chassis 120031)
C7, C8	925000	50-30 mfd., 150 volt dual electrolytic condenser (Chassis 120013)
C8, C9	925012	50-50 mfd., 150 volt dual electrolytic condenser (Chassis 120031)
C9	920420	0.15 mfd., 200 volt condenser (Chassis 120013)
C10	920420	0.15 mfd., 200 volt condenser (Chassis 120031)
R1	390000	0.5 meg. volume control
R2	397000	15 meg., ½ watt resistor
R3, R4	321130	470,000 ohms, ¼ watt resistor
R5	340290	150 ohms, ½ watt resistor
R6	340430	560 ohms, ½ watt resistor (Chassis 120031)
R6	310470	820 ohms, ¼ watt resistor (Chassis 120013)
R7	321350	3.3 meg., ¼ watt resistor (Chassis 120031)
R7	321450	10 meg., ¼ watt resistor (Chassis 120013)
R8	390370	2 meg. tone control (Chassis 120031)
R8	340050	15 ohms, ½ watt resistor (Chassis 120013)
R9	340050	15 ohms, ½ watt resistor (Chassis 120031)
R9	390370	2 meg. tone control (Chassis 120013)
R10	394160	133 ohms, 5 watt resistor (Chassis 120031)
R10	340050	15 ohms, ½ watt resistor (Chassis 120013)
R11	394160	133 ohms, 5 watt resistor (Chassis 120013)

Schematic Symbol	Part No.	DESCRIPTION
SP1	180011	P.M. Speaker (Model 521), or
SP1	180004	P.M. Speaker (Model 521)
SP1	180000	P.M. Speaker (Model 542)
*SW1		Motor switch on volume control
*SW2		Master switch on tone control
T1	734000	Output transformer
	807000	Pilot light
	505010	Speaker plug
	583180	Line cord
	508010	Pickup socket
	413279	Phono arm rest
	819024	Turntable
	140037	Cabinet (Model 521)
	140073	Cabinet (Model 542)
	450280	Handle
	460470	Knob
	820030	Crystal pickup arm, or
	820010	Crystal pickup arm
	819004	Phono motor

* Not supplied separately.
· Specify part numbers when ordering. When in doubt of chassis or model also include complete serial number.

DESCRIPTION

TYPE: Portable record player.

TYPE OF TUBES:

1—12SQ7 or 12AT6, first audio
1—50L6 or 50B5, beam power output
1—35Z5 or 35W4, half wave rectifier

POWER SUPPLY: A.C., 60 cycles.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 50 watts.

GENERAL NOTES

1. To replace tubes, remove the motor board by removing the knobs and then the screws, holding the lid support and the motorboard. Lift the motorboard out and set it aside.

2. Chassis model 120013 uses tube types 12SQ7, 50L6, 35Z5. Chassis model 120031 uses tube types 12AT6, 50B5, 35W4.

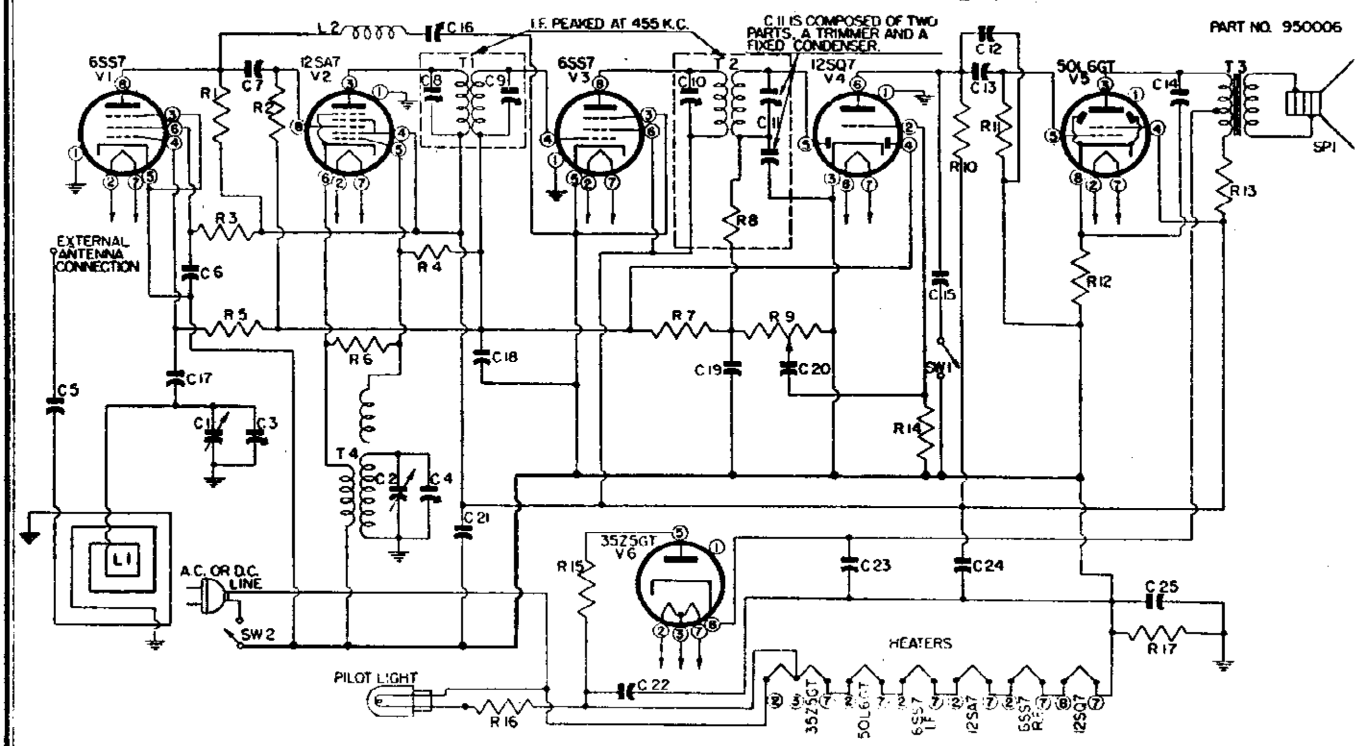
VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Take readings with the volume control set at maximum, no signal.

	PIN NUMBER							
TUBE	1	2	3	4	5	6	7	8
12SQ7		*—0.7				45		
50L6			118	123				7.5
35Z5								129
12AT6	*—0.7						45	
50B5		7.8			118	123		
35W4	128						128	

EMERSON RADIO AND PHONO. CORP.

MODEL 530, Chassis 12000
120056



4-47

Schematic circuit diagram for chassis 120006. Substitute proper pin connections for loctal tubes on chassis 120056.

DESCRIPTION

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—6SS7 or 7B7, r-f amplifier

1—12SA7 or 14Q7, pentagrid oscillator-modulator

1—6SS7 or 7B7, first i-f amplifier

1—12SQ7 or 14B6, diode detector, a-f amplifier, a.v.c.

1—50L6 or 50A5, beam power output

1—35Z5 or 35Y4, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:

Grid—green	Plate—blue
Grid return—black	B+—red

4. All models have self-contained antennas and do not require additional antenna connections. For permanent installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out of the rear near the line cord.
5. The self-contained loop antenna operates at maxim efficiency when its position is at right angles to t broadcasting source. It is important, therefore, once t station is tuned in, to rotate the cabinet back and fo through a quarter of a circle (90 degrees), leaving it the position where the station is received with maxim volume.
6. Chassis 120006 uses octal tubes. Chassis 120056 u loctal tubes. The circuit diagram and voltage readi are the same except for the base pin numbers. The oc pins are as indicated on the circuit diagram. The loc pins are as follows:

7B7
pin 1—heater
pin 2—plate
pin 3—screen grid
pin 4—suppressor grid
pin 5—internal shield
pin 6—control grid
pin 7—cathode
pin 8—heater

14B6
pin 1—heater
pin 2—triode plate
pin 3—triode grid
pin 4—connection to 7
pin 5—diode plate No. 2
pin 6—diode plate No. 1
pin 7—cathode and internal shield
pin 8—heater

14Q7
pin 1—heater
pin 2—plate
pin 3—screen grid
pin 4—oscillator grid
pin 5—suppressor grid
pin 6—grid
pin 7—cathode
pin 8—heater

50A5
pin 1—heater
pin 2—plate
pin 3—screen grid
pin 4—no connection
pin 5—no connection
pin 6—grid
pin 7—cathode and beam plates
pin 8—heater

35Y4
pin 1—heater
pin 2—plate
pin 3—no connection
pin 4—heater tap
pin 5—no connection
pin 6—no connection
pin 7—cathode
pin 8—heater

EMERSON RADIO AND PHONO. CORP.

MODEL 530, Chassis 120006,
Chassis, 120056

REPLACEMENT PARTS LIST

Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900070	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
C5, C15, C20	920010	0.002 mfd., 600 volt condenser
C6, C18	920060	0.05 mfd., 200 volt condenser
C7, C19	910010	0.00011 mfd. mica condenser
*C8, C9, C10		Trimmers, part of i-f transformers
*C11		Trimmer and fixed condenser, part of i-f transformer
C12, C17	910000	0.00022 mfd. mica condenser
C13, C14	920020	0.02 mfd., 400 volt condenser
*C16		Trimmer, part of wave-trap
C21, C22	920030	0.05 mfd., 400 volt condenser
C23, C24	925110	30-30 mfd., 150 volt dual electrolytic condenser (chassis 120006), or
C23, C24	925011	50-50 mfd., 150 volt dual electrolytic condenser (chassis 120056)
C25	920050	0.2 mfd., 200 volt condenser
L1	700010	Loop antenna
L2	708060	455 kc wave-trap
R1	310730	10,000 ohms, ¼ watt resistor
R2, R6	310810	22,000 ohms, ¼ watt resistor
R3	310870	39,000 ohms, ¼ watt resistor
R4, R14	397000	15 meg., ¼ watt resistor
R5, R10, R11	321130	470,000 ohms, ¼ watt resistor
R7	321330	3.3 meg., ¼ watt resistor
*R8		47,000 ohms resistor, part of i-f transformer
R9	390180	0.5 meg. volume control
R12	340290	150 ohms, ½ watt resistor
R13	370490	1,000 ohms, 1 watt resistor
R15	340050	15 ohms, ½ watt resistor
R16	340010	10 ohms, ½ watt resistor
R17	321050	220,000 ohms, ¼ watt resistor
SP1	180008	P.M. speaker
SW1	510120	Tone control switch
SW2	510200	Rotary line switch
T1	720380	First i-f transformer
T2	720390	Second i-f transformer
T3	734080	Output transformer
T4	716070	Oscillator coil (chassis 120006)
T4	716005	Oscillator coil (chassis 120056)
	583150	Line cord
	807000	Pilot light, Mazda No. 47
	507215	Pilot light socket

* Not supplied separately.

† Specify part numbers when ordering. When in doubt of chassis or model also include complete serial number.

VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at maximum and the variable condenser open. Convert pin number for octal tube readings.

	PIN NUMBER							
TUBE	1	2	3	4	5	6	7	8
6SS7		*		*-1.5		*50		*53
12SA7			90	90	-10.5			*-1.5
6SS7				*-1.5		90		90
12SQ7		*-1.0		*-1.5	*-0.4	*61		5.9
50L6			109	90				
35W4				116				

ADJUSTMENTS

An oscillator with frequencies of 455, 600 and 1400 kc is required.

An output meter should be used across the voice coil or output transformer for obtaining maximum response.

Always use as weak a test signal as possible when aligning the receiver.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to the loop antenna. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is mounted on top of the chassis between the 50L6 or 50A5 tube and the speaker. The trimmers are accessible through holes in the top of the can.

The 455 kc wave-trap is located below the chassis deck.

The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the front section is for the oscillator coil.

The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

I-f and Wave-trap Alignment

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 or 14Q7 tube through a 0.1 mfd. condenser and adjust the four i-f trimmers for maximum response.

Feed 455 kc to the external antenna lead and adjust the wave-trap for minimum response.

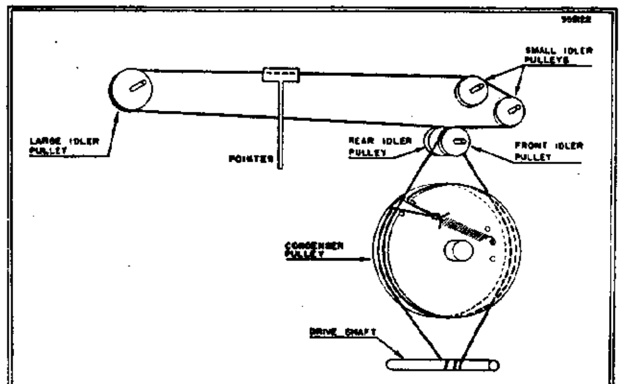
R-f Alignment

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows. Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Re-align at 140.

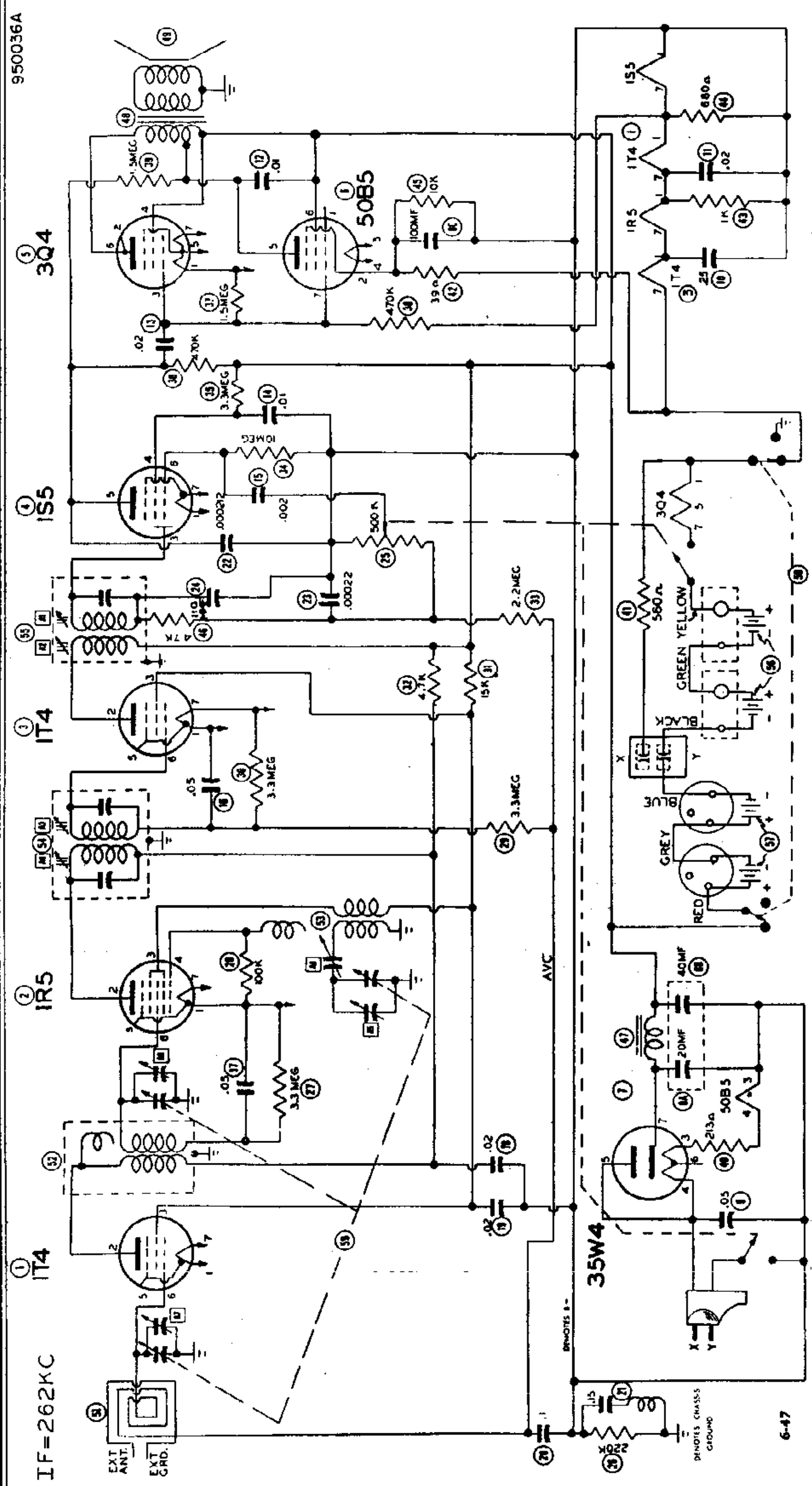
DIAL AND CABINET PARTS

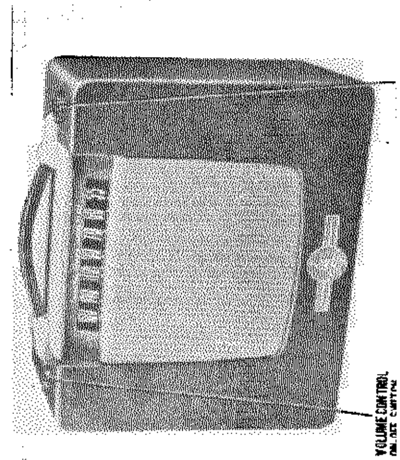
280313	Drive Shaft	520450	Dial glass
520360	Dial backplate	140104	Cabinet
525012	Dial pointer	460140	Knob

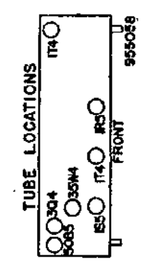


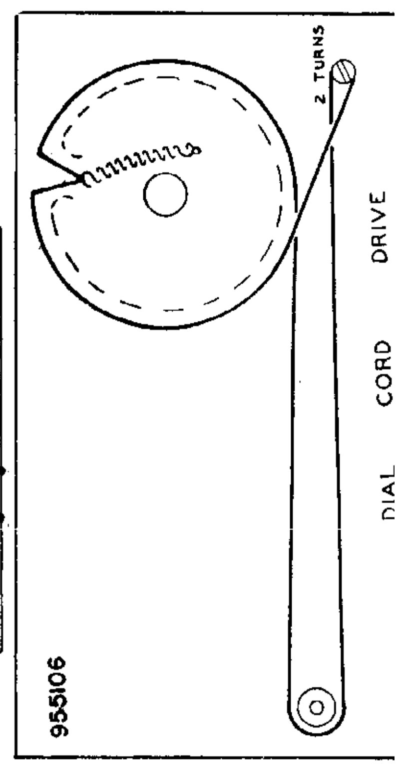
CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS

EMERSON RADIO AND PHONO. CORP. MODEL 536, Chassis 1200





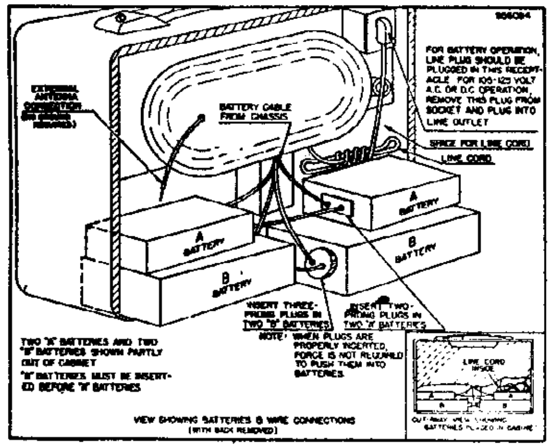




EMERSON RADIO AND PHONO. CORP.

MODEL 536, Chassis 120036

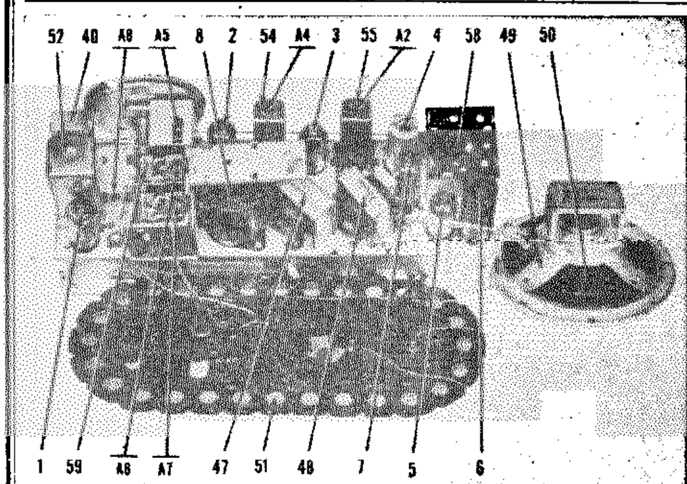
TYPE: Three-way (battery, a.c-d.c.) portable superheterodyne.
FREQUENCY RANGE: 540-1620 kc.
TYPE OF TUBES:
1—1R5, oscillator-modulator
2—1T4, r-f and i-f amplifiers
1—1S5, 2nd detector, a.v.c., a-f amplifier
1—3Q4, beam power output (battery operation)
1—50B5, beam power output (line operation)
1—35W4, half-wave rectifier (line operation)
POWER SUPPLY: Battery, a.c. or d.c.
VOLTAGE RATING:
105-125 volts (line operation)
9 volts "A" supply (battery operation)
90 volts "B" supply (battery operation)
POWER CONSUMPTION: 30 watts (line operation)
CURRENT DRAIN:
"A" battery—0.053 amp.
"B" battery—0.013 amp.
117 volts a.c.—0.24 amp.

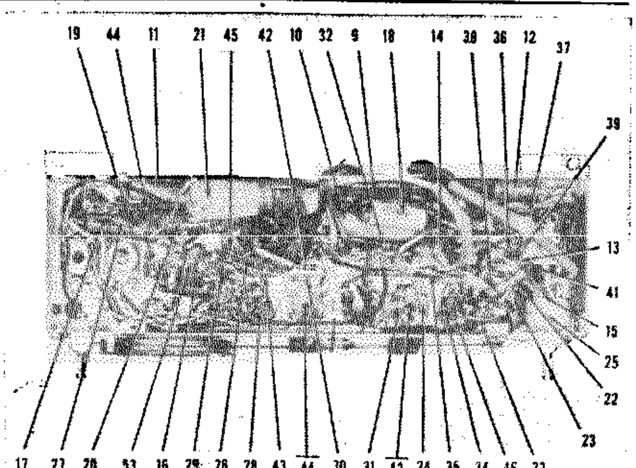


ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Use battery power when available. If a-c power is used, use an isolation transformer when available. If not, connect a 0.1 mfd. condenser in series with low side of the signal generator and B—. Volume control should be at maximum position; output of signal generator should be no highet than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 6 (grid) of 1R5. Low side to B—.	262 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If a-c power is used without an isolation transformer, reduce dummy antenna to 200 mmfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6, A7	Adjust for maximum output.
4	200 mmfd.	High side to external antenna lead. Low side to ground lead.	600 kc	Tune for maximum output.	Across voice coil.	A8	Rock variable condenser and adjust for maximum output. Repeat steps 2, 3 & 4 until no further improvement can be made.





EMERSON RADIO AND PHONO. CORP.

MODEL 536, Chassis 1200:

Symbol	Part No.	DESCRIPTION
1	1T4	Tube, r-f amplifier
2	1R5	Tube, converter
3	1T4	Tube, i-f amplifier
4	1S5	Tube, detector, a-f amplifier, a.v.c.
5	3Q4	Tube, power output (battery)
6	50B5	Tube, power output (line)
7	35W4	Tube, rectifier
8A, 8B, 8C	925004	20-40-100 mfd., 150-150-25 volt electrolytic condenser (filter)
9	920030	0.05 mfd., 400 volt condenser (line bypass)
10	920110	0.25 mfd., 100 volt condenser (filament bypass)
11	920020	0.02 mfd., 400 volt condenser (filament bypass)
12	020090	0.01 mfd., 400 volt condenser (output plate bypass)
13	920020	0.02 mfd., 400 volt condenser (audio coupling)
14	920090	0.01 mfd., 400 volt condenser (audio screen bypass)
15	920515	0.002 mfd., 400 volt condenser (audio coupling)
16	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
17	920060	0.05 mfd., 200 volt condenser (converter grid filter)
18	920020	0.02 mfd., 400 volt condenser (plate decoupling)
19	920020	0.02 mfd., 400 volt condenser (screen bypass)
20	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)
21	920420	0.15 mfd., 200 volt condenser (line isolation)
22	910000	220 mmfd., 500 volt mica condenser (audio plate bypass)
23	910000	220 mmfd., 500 volt mica condenser (diode filter)
*24		110 mfd., 500 volt mica condenser (diode filter), part of 55
25	390003	Volume control and switch, 500,000 ohms.
26	351050	220,000 ohms, ½ watt resistor (line insulation)
27	351330	3.3 meg., ½ watt resistor (converter grid)
28	350970	100,000 ohms, ½ watt resistor (oscillator grid)
29	351330	3.3 meg., ½ watt resistor (a.v.c. network)
30	351330	3.3 meg., ½ watt resistor (a.v.c. network)
31	340770	15,000 ohms, ½ watt resistor (screen dropping)
32	340650	4700 ohms, ½ watt resistor (plate decoupling)
33	351290	2.2 meg., ½ watt resistor (a.v.c. network)
34	351450	10 meg., ½ watt resistor (a-f grid)
35	351330	3.3 meg., ½ watt resistor (a-f screen dropping)
36	351130	470,000 ohms, ½ watt resistor (plate load)
37	351250	1.5 meg., ½ watt resistor (output grid)
38	351130	470,000 ohms, ½ watt resistor (output grid)
39	351250	1.5 meg., ½ watt resistor (feedback)
40	394003	213 ohms, 6 watt resistor (series filament)
41	340430	560 ohms, ½ watt resistor (filament string)

Symbol	Part No.	DESCRIPTION
42	340150	39 ohms, ½ watt resistor (filament string)
43	340490	1000 ohms, ½ watt resistor (filament string)
44	340450	680 ohms, ½ watt resistor (filament string)
45	340730	10,000 ohms ½ watt resistor (output cathode)
*46		47,000 ohms, ½ watt resistor (diode r-f filter), part of 55.
47	737001	Filter choke, 560 ohms d-c resistance
48	734002	Output transformer
49	180021	Speaker, 5" P.M.
*50		Speaker cone, part of 49
51	700001	Loop antenna
52	713001	R.F coil (alternate part 713006)
53	716006	Oscillator coil
54	720001	First i-f transformer (alternate part 720006)
55	720002	Second i-f transformer (alternate part 720007)
56		4½ volt "A" battery, 2 used
57		45 volt "B" battery, 2 used
58	510270	Power change-over switch
59	900006	3-gang variable condenser (22-416 mmfd. per section)
	585006	Battery cable
	505040	Speaker plug (alternate part 505048)

† Specify part numbers when ordering.

* Not supplied separately.

CABINET AND DIAL PARTS

140094	Cabinet
595010	Handle (alternate part 450012)
280001	Drive shaft, tuning
583006	Line cord (alternate part 583002)
520000	Dial glass
525001	Dial pointer
410011	Dial backplate
450112	Knob, volume and tuning

GENERAL NOTES

1. A.C.-D.C. Operation: Remove the rear cover; it is held in place by two spring latches. Take out the line cord, removing the plug from its receptacle at the rear of the chassis. Insert the plug in the wall outlet. If the power supply is d.c. and the receiver does not operate at first, remove the plug from the wall outlet, turn it half way around and re-insert it in the outlet, thus obtaining the proper polarity.
2. Battery Operation: Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the rear of the receiver. This is important since the receiver will not operate from batteries with the plug out of the receptacle. The loose portion of the cord can then be coiled and placed in the cabinet.
3. Battery Complement: Replace two 45 volt "B" batteries with Eveready No. 482 Minimax. Replace two 4½ volt "A" batteries with Eveready No. 746, Rayovac No. P83A or No. EM83, or Burgess No. 3G.
4. The color coding of the battery cable is as follows:
   Red—B+, 90 volts   Yellow—A+, 9 volts
   Blue—B—   Black—A—
5. The color coding of the i-f transformer leads is as follows:
   Grid—green   Plate—blue
   Grid return—black   B+—red
6. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	1.2 DC	96 DC	55 DC	0	1.2 DC	0.2 DC	2.5 DC
2	1R5	2.5 DC	98 DC	55 DC	1.4 DC	2.5 DC	0.2 DC	3.8 DC
3	1T4	3.8 DC	110 DC	55 DC	0	3.8 DC	0.6 DC	4.9 DC
4	1S5	0	0	0	26 DC	60 DC	0	1.2 DC
5	3Q4	6.3 DC	92 DC	1 DC	93 DC	7.8 DC	92 DC	9.2 DC
6	50B5	0.4 DC	6.6 DC	50 AC	0	100 DC	110 DC	—4 DC
7	35W4	60 DC	0	85 AC	117 AC	117 AC	110 AC	140 DC

Voltage Readings of Tube 5 (3Q4) Taken in Battery Position.

RESISTANCE READINGS

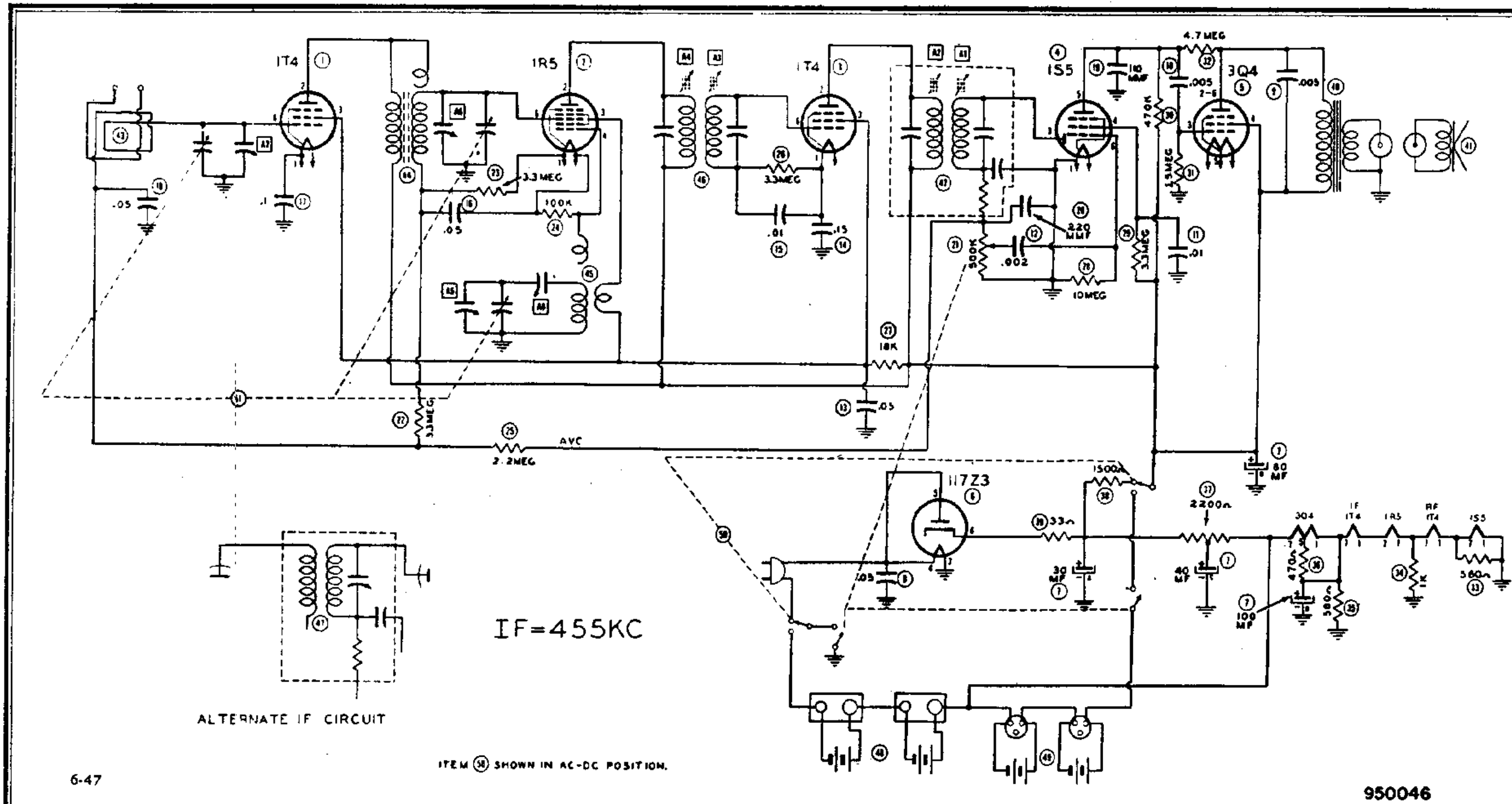
SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	*	95,000	105,000	inf.	*	1.8 meg.	*
2	1R5	*	95,000	100,000	100,000	*	3.3 meg.	*
3	1T4	*	90,000	105,000	inf.	*	3.3 meg.	*
4	1S5	0	inf.	500,000	3.4 meg.	560,000	10 meg.	*
5	3Q4	*	90,000	320,000	90,000	*	90,000	*
6	50B5	320,000	70	43	0	90,000	90,000	320,000
7	35W4	420,000	inf.	240	270	270	260	90,000

* Do Not Use Ohmmeter to Measure Filament Resistance.

1—Voltage and resistance readings taken in ac-dc position.
2—Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
3—D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1000 ohms per volt.
4—Socket connections are shown as bottom views.
5—Measured values are from socket pin to common negative.
6—Line voltage maintained at 117 volts for voltage readings.
7—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
8—Volume control at maximum, no signal applied for voltage measurements.

EMERSON RADIO AND PHONO. CORP.

MODELS 536A, 551A, 553A,
Chassis 120053A



DESCRIPTION

TYPE: Three-way (battery, a.c-d.c.) portable superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—1R5, oscillator-modulator
2—1T4, r-f and i-f amplifiers
1—1S5, 2nd detector, a.v.c., a-f amplifier
1—3Q4, beam power output
1—117Z3, rectifier

POWER SUPPLY: Battery, a.c. or d.c.

VOLTAGE RATING:

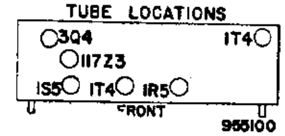
105-125 volts a.c-d.c. (line operation)
9 volts "A" supply (battery operation)
90 volts "B" supply (battery operation)

POWER CONSUMPTION: 30 watts (line operation)

CURRENT DRAIN:

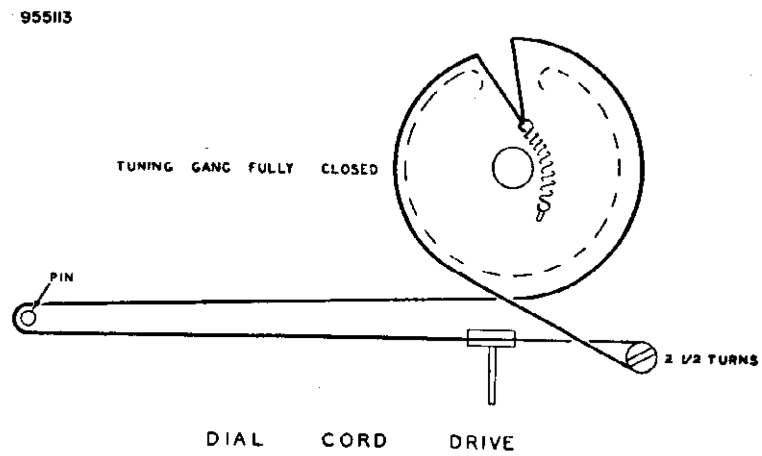
"A" battery—0.070 amp.
"B" battery—0.015 amp.
117 volts a.c.—0.150 amp.

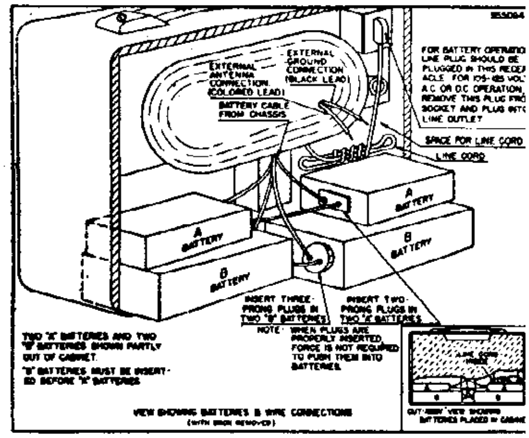
TUBE LOCATIONS



EMERSON RADIO AND PHONO. CORP.

MODELS 536A, 551A, 553A
Chassis 120053A

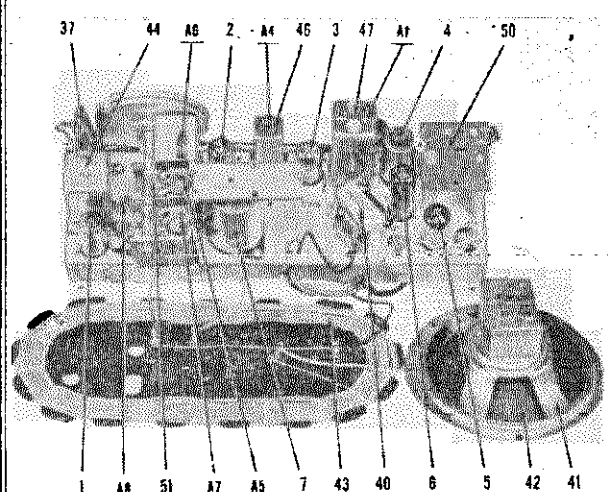


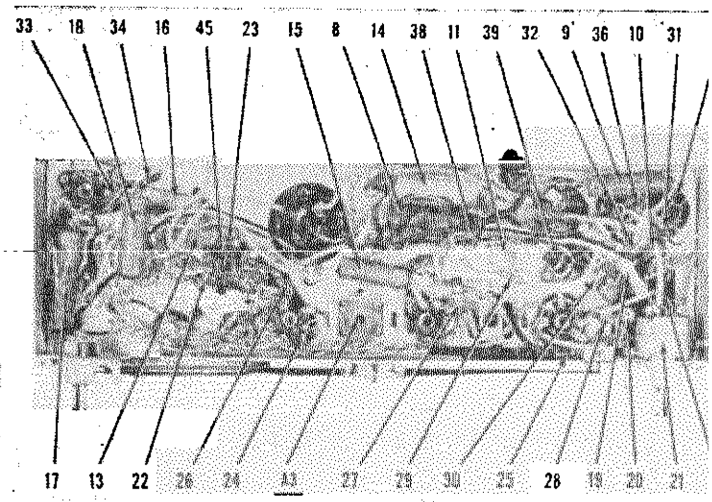


ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Use battery power wh[en] available. If a-c power is used, use an isolation transformer when available. If not, connect a 0.1 mfd. condenser in series wi[th] the low side of the signal generator and B—. Volume should be at maximum position, output of signal generator should [be] no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 6 (grid) of 1R5. Low side to chassis.	262 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If a-c power is used without an isolation transformer, reduce dummy antenna to 200 mmfd. to reduce hum modulation. A2 will not be found on sets using No. 720007 output i-f transformer.
2	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1600 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6, A7	Adjust for maximum output.
4	200 mmfd.	High side to external antenna lead. Low side to ground lead.	600 kc	Tune for maximum output.	Across voice coil.	A8	Rock variable condenser and adjust for maximum output. Repeat Steps 2, 3 and 4 until no further improvement can be made.





EMERSON RADIO AND PHONO. CORP.

MODELS 536A, 551A, 553A,
Chassis 120053A

Symbol	† Part No.	DESCRIPTION
1	1T4	Tube, r-f amplifier
2	1R5	Tube, converter
3	1T4	Tube, i-f amplifier
4	1S5	Tube, detector, a-f amplifier, a.v.c.
5	3Q4	Tube, power output
6	117Z3	Tube, rectifier
7A, B, C, D	925059	30-80-40-100 mfd., 150-150-150-25 volt electrolytic condenser (filter)
8	920030	0.05 mfd., 400 volt condenser (line bypass)
9	920180	0.005 mfd., 400 volt condenser (output plate bypass)
10	920180	0.005 mfd., 400 volt condenser (audio coupling)
11	920090	0.01 mfd., 400 volt condenser (a-f screen bypass)
12	920515	0.002 mfd., 400 volt condenser (audio coupling)
13	920060	0.05 mfd., 200 volt condenser (screen bypass)
14	920420	0.15 mfd., 200 volt condenser (filament bypass)
15	920090	0.01 mfd., 400 volt condenser (i-f grid filter)
16	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
17	920040	0.1 mfd., 200 volt condenser (filament bypass)
18	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
19	910010	0.00011 mfd., 500 volt mica condenser (a-f plate bypass)
20	910000	0.00022 mfd., 500 volt mica condenser (diode filter)
21	390003	Volume control and switch, 500,000 ohms
22	341330	3.3 meg., ½ watt resistor (a.v.c. network)
23	341330	3.3 meg., ½ watt resistor (a.v.c. network)
24	350970	100,000 ohms, ½ watt resistor (oscillator grid)
25	341290	2.2 meg., ½ watt resistor (a.v.c. network)
26	351330	3.3 meg., ½ watt resistor (i-f grid)
27	340790	18,000 ohms, ½ watt resistor (voltage dropping)
28	351450	10 meg., ½ watt resistor (a-f grid)
29	351330	3.3 meg., ½ watt resistor (a-f screen dropping)
30	351130	470,000 ohms, ½ watt resistor (a-f plate load)
31	351250	1.5 meg., ½ watt resistor (output grid)
32	351370	4.7 meg., ½ watt resistor (feedback)
33	340430	560 ohms, ½ watt resistor (filament network)
34	340490	1000 ohms, ½ watt resistor (filament network)
35	370430	560 ohms, 1 watt resistor (filament network)
36	370410	470 ohms, 1 watt resistor (filament network)
37	394008	2200 ohms, 8 watt resistor, center tapped (filter)
38	340530	1500 ohms, ½ watt resistor (filter)
39	370130	33 ohms, 1 watt resistor (surge limiter)
40	734008	Output transformer
41	180021	Speaker, 5-inch P.M.
*42		Speaker cone (part of 180021)
43	700001	Loop antenna
44	713007	R-F coil (alternate part no. 713001)
45	716006	Oscillator coil
46	720001	First i-f coil (alternate part no. 720006)
47	720007	Second i-f coil (alternate part no. 720002)
48		Battery, 4½ volt "A" (2 used)
49		Battery, 45 volt "B" (2 used)
50	510270	Power changeover switch
51	900006	3-gang variable condenser
	140092	Cabinet, Model 536A
	140112	Cabinet, Model 551A
	140107	Cabinet, Model 553A
	450112	Knob
	595002	Handle, Model 536A
	470264	Handle, Models 551A, 553A
	460019	Escutcheon, Models 551A, 553A
	525001	Dial pointer
	410011	Dial backplate
	520000	Dial glass
	280001	Drive shaft
	587040	Dial cord spring
	583007	Line cord (alternate part no. 583008)
	585005	Battery cable assembly
	505040	Speaker plug (alternate part no. 505048)

* Not supplied separately.

† Specify part numbers when ordering.

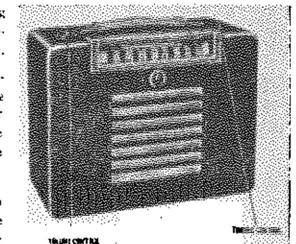
1. A.C.-D.C. Operation: Remove the rear cover of models 536A and 553A or open the door on the rear cover of model 551A. Take out the line cord, removing the plug from its receptacle at the rear of the chassis. Insert the plug in the wall outlet. If the power supply is d.c. and the receiver does not operate at first remove the plug from the wall outlet, turn it half way around and re-insert it in the outlet, thus obtaining the proper polarity.
2. Battery Operation: Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the rear of the receiver. This is important since the receiver will not operate from batteries with the plug out of the receptacle. The loose portion of the cord can then be coiled and placed in the cabinet.
3. Battery Complement: Replace two 45 volt "B" batteries with Eveready No. 482 Minimax or equivalent. Replace two 4½ volt "A" batteries with Eveready No. 746 or equivalent.
4. The color coding of the battery cable is as follows:

   Red—B+, 90 volts   Yellow—A+, 9 volts
   Blue—B—   Black—A—

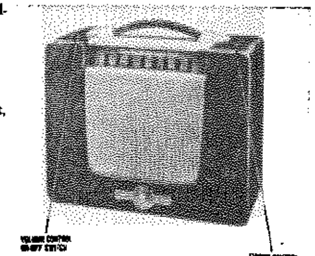
5. The color coding of the i-f transformer leads is as follows:

   Grid—green   Plate—blue
   Grid return—black   B+—red

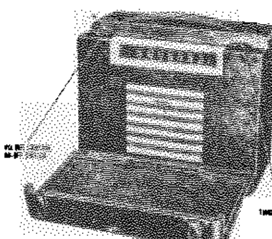
6. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.



553A



536A



551A

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage and resistance readings taken in ac-dc position.
2. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
3. D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1,000 ohms per volt.
4. Socket connections are shown as bottom views.
5. Measured values are from socket pin to common negative.
6. Line voltage maintained at 117 volts for voltage readings.
7. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
8. Volume control at maximum, no signal applied for voltage measurements.
9. Resistance readings in the B+ circuits may vary widely according to the condition of the filter capacitors.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	1.3 DC	92 DC	47 DC	0	1.3 DC	0.1 DC	2.6 DC
2	1R5	2.6 DC	92 DC	47 DC	-10 DC§	2.5 DC	0.2 DC	3.9 DC
3	1T4	3.9 DC	92 DC	47 DC	0	38 DC	0.2 DC	5.2 DC
4	1S5	0	-0.1 DC	-0.1 DC	25 DC	60 DC	0	1.3 DC
5	3Q4	5.2 DC	89 DC	0	92 DC	65 DC	89 DC	7.8 DC
6	117Z3	117 AC	0	0	117 AC	117 AC	115 DC	0

§ Taken with Vacuum Tube Voltmeter.

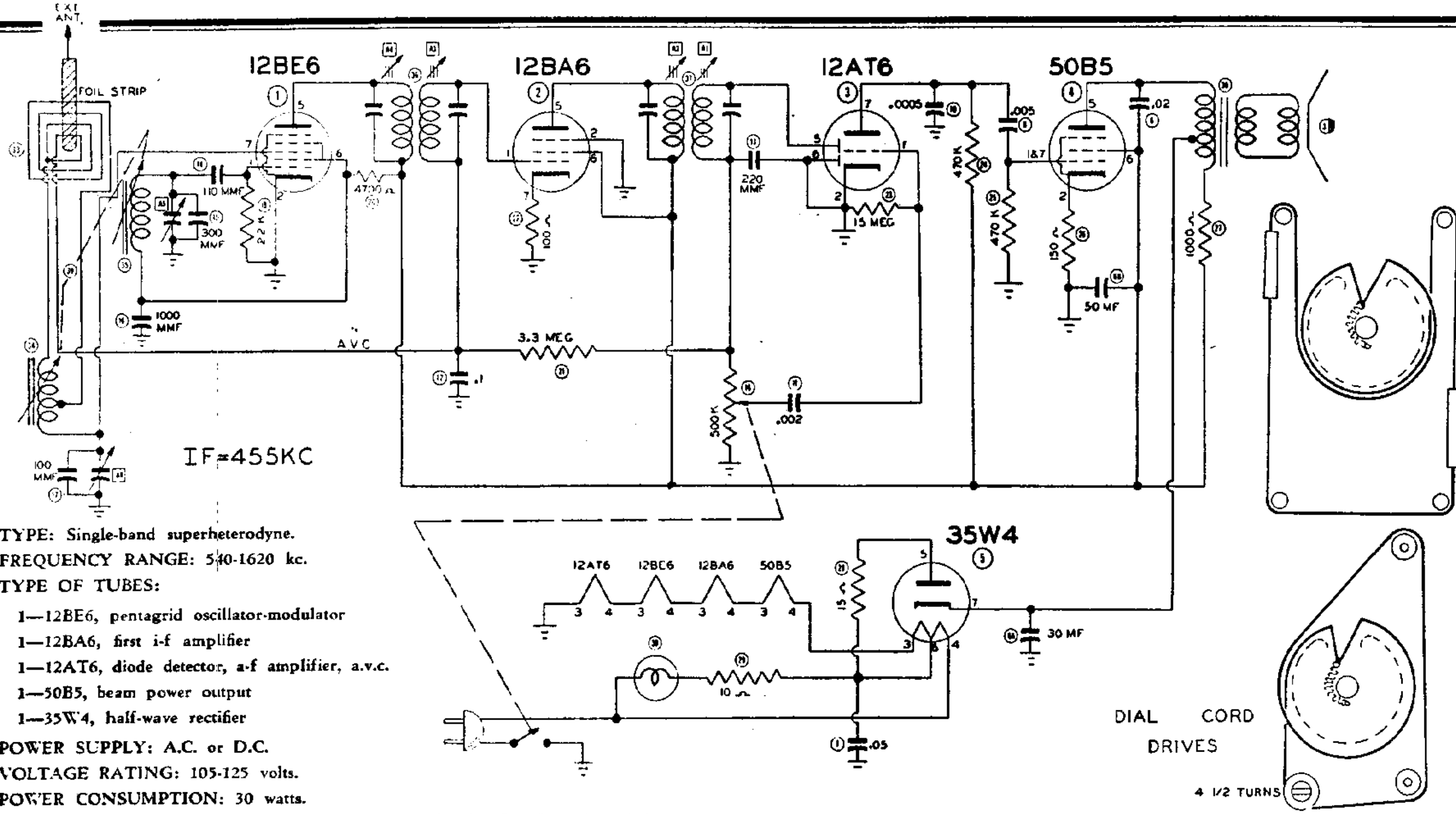
RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	*	3,800	21,000	inf.	*	2 meg.	*
2	1R5	*	3,800	21,000	100,000	*	2.3 meg.	*
3	1T4	*	3,800	21,000	inf.	*	3.5 meg.	*
4	1S5	0	490,000	540,000	3.5 meg.	470,000	10 meg.	*
5	3Q4	*	4,000	1.5 meg.	3,800	*	4,000	*
6	117Z3	405	inf.	0	405	405	2,200	inf.

* Do not use Ohmmeter to Measure Filament Resistance.

EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Chassis 12004



TYPE: Single-band superheterodyne.
FREQUENCY RANGE: 540-1620 kc.
TYPE OF TUBES:

1—12BE6, pentagrid oscillator-modulator
1—12BA6, first i-f amplifier
1—12AT6, diode detector, a-f amplifier, a.v.c.
1—50B5, beam power output
1—35W4, half-wave rectifier

POWER SUPPLY: A.C. or D.C.
VOLTAGE RATING: 105-125 volts.
POWER CONSUMPTION: 30 watts.
CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	-4.3 DC	0	12 AC	24 AC	100 DC	77 DC	-0.1 DC
2	12BA6	-0.1 DC	0	24 AC	35 AC	100 DC	100 DC	1.3 DC
3	12AT6	-0.7 DC	0	0	12 AC	-0.5 DC	0	57 DC
4	50B5	0	6.2 DC	35 AC	85 AC	115 DC	100 DC	0
5	35W4	122 DC	115 AC	85 AC	117 AC	110 DC	110 AC	122 DC

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	20,000	0	11	22	40,000	45,000	3.5 meg.
2	12BA6	3.5 meg.	0	22	32	40,000	40,000	100
3	12AT6	15 meg.	0	0	11	500,000	0	500,000
4	50B5	450,000	125,000	32	75	40,000	40,000	450,000

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
7. Volume control at maximum, no signal ap-

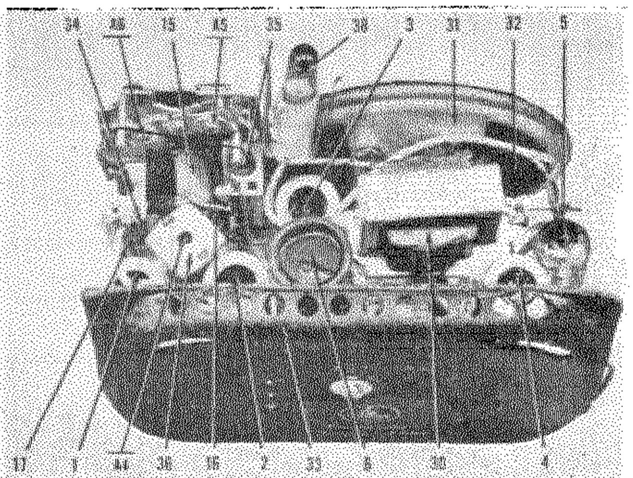
EMERSON RADIO AND PHONO. CORP.

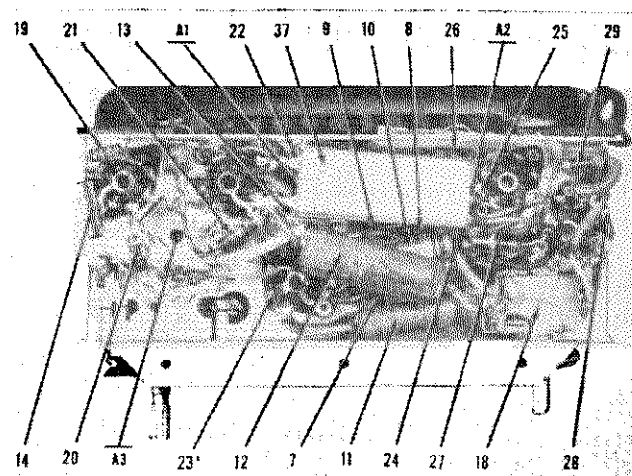
MODEL 540A, Chassis 120042A

ALIGNMENT

To set pointer turn tuning slugs completely in and set pointer to top reference dot on right side of dial backplate. Use isolation transformer if available. If not, connect a condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 7 (grid) of 12BE6. Low side to B—.	455 kc	Tuning slugs completely out.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to chassis.	1600 kc	Bottom reference dot at right side of dial backplate.	Across voice coil.	A5, A6	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to chassis.	1400 kc	Tune for maximum output.	Across voice coil.	Antenna coil (34)	Loosen screws on bracket of antenna coil (34). Adjust position of coil for maximum output. Tighten screws.





GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:

   Grid—green   Plate—blue
   Grid return—black   B+—red
4. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
5. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
6. Operate receiver on its base. Locate it away from walls and other obstructions to proper ventilation of the set.

EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Chassis 12004?

REPLACEMENT PARTS LIST

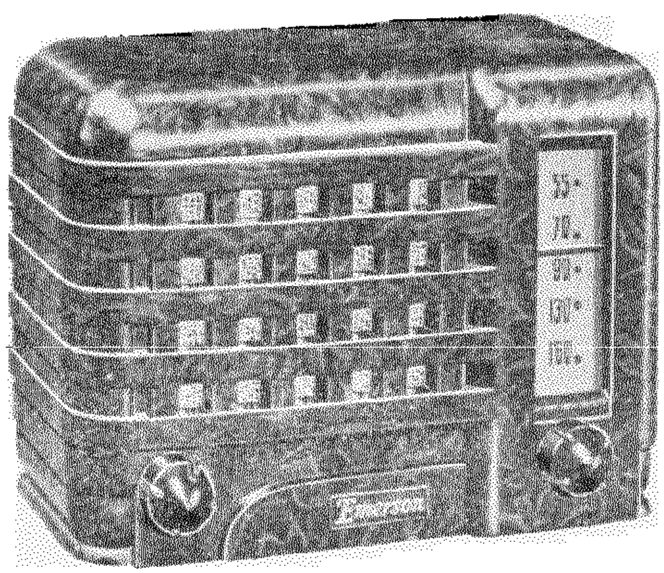
Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter
2	12BA6	Tube, i-f amplifier
3	12AT6	Tube, detector, a-f amplifier, a.v.c.
4	50B5	Tube, power output
5	35W4	Tube, rectifier
6A, 6B	925008	30-50 mfd., 150 volt electrolytic condenser (filter)
7	920030	0.05 mfd., 400 volt condenser (line bypass)
8	920020	0.02 mfd., 400 volt condenser (output plate bypass)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)
10	920240	0.0005 mfd., 600 volt condenser (audio plate bypass)
11	920010	0.002 mfd., 600 volt condenser (audio coupling)
12	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)
13	910000	220 mmfd., 500 volt mica condenser (diode filter)
14	910010	110 mmfd., 500 volt mica condenser (oscillator grid coupling)
15	910007	300 mmfd., 500 volt mica condenser (fixed trimmer)
16	910180	1000 mmfd., 300 volt mica condenser (oscillator feedback)
17	910008	80 mmfd., 500 volt mica condenser (fixed trimmer)
18	390381	Volume control and line switch, 0.5 meg.
19	340810	22,000 ohms, ½ watt resistor (oscillator grid)
20	340650	4,700 ohms, ½ watt resistor (conv ter screen dropping)
21	351330	3.3 meg., ½ watt resistor (a.v.c. r work)
22	340250	100 ohms, ½ watt resistor (i-f cathode bias)
23	397000	15 meg., ½ watt. resistor (a-f gric load)
24	351130	470,000 ohms, ½ watt resistor (a plate load)
25	351130	470,000 ohms, ½ watt resistor (o put grid load)
26	340290	150 ohms, ½ watt resistor (outp cathode bias)
27	370490	1000 ohms, 1 watt resistor (filter)
28	340050	15 ohms, ½ watt resistor (rectifie ballast)
29	340010	10 ohms, ½ watt resistor (series pilot light)
30	734006	Output transformer
31	180018	Speaker, 4" P.M.
*32		Speaker cone, part of 180018
33	700235	Loop antenna
*34		Antenna coil, part of tuner assem
*35		Oscillator coil, part of tuner assembly
36	720527	First i-f transformer (455 kc)
37	720527	Second i-f transformer (455 kc)
38	807000	Dial light, type 47
39	708147	Complete tuner assembly, includes items 34 and 35

† Specify part numbers when ordering.

* Not supplied separately.

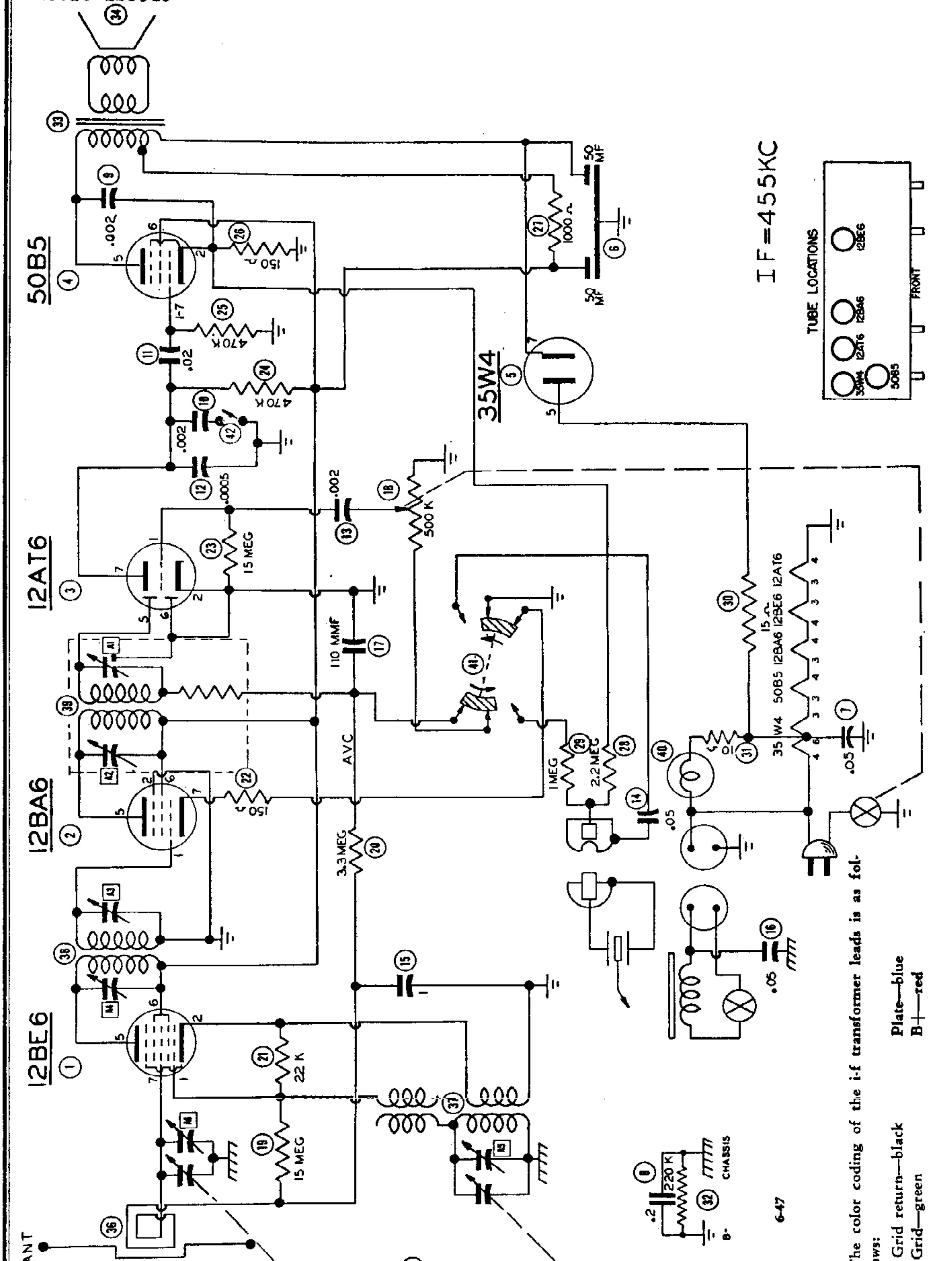
CABINET AND DIAL PARTS

140078	Cabinet, walnut
140075	Cabinet, ivory
140076	Cabinet, red
140077	Cabinet, green
520004	Dial crystal
525207	Dial pointer
520511	Dial backplate
460001	Knob (black)
583090	Line cord
280509	Drive shaft



MODEL 546,
Chassis 120049

EMERSON RADIO AND PHONO. CORP.



EMERSON RADIO AND PHONO. CORP.

MODEL 546, Chassis 1200

DESCRIPTION

TYPE: Single-band superheterodyne and automatic record changer.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—12BE6, pentagrid oscillator-modulator
1—12BA6, first i-f amplifier
1—12AT6, diode detector, a-f amplifier, a.v.c.
1—50B5, beam power output
1—35W4, half-wave rectifier

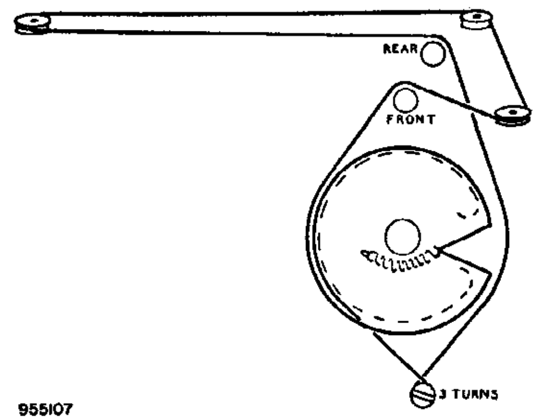
POWER SUPPLY: A.C. only, 60 cycles.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:

30 watts for the receiver.
20 watts for the phono motor.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

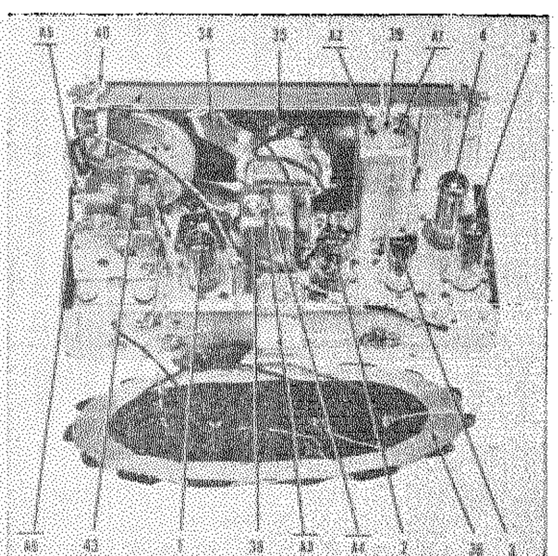


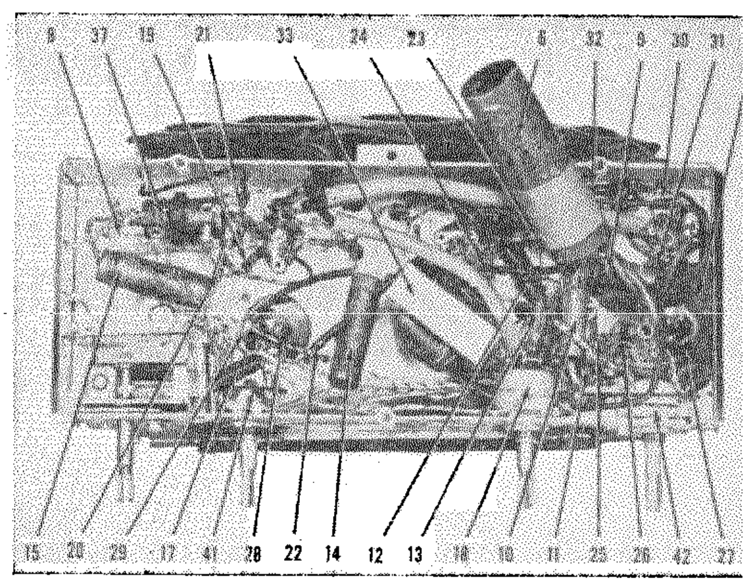
DIAL CORD DRIVE

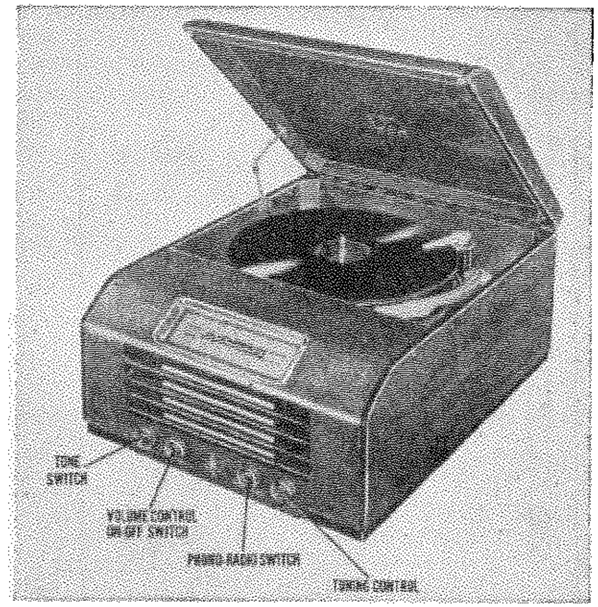
ALIGNMENT

Use an isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal gener and B—. Volume control should be at maximum position; output of signal generator should be no higher than necessary obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 7 (grid) of 12BE6. Low side to B—.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximu output. If isolation transformer is not u reduce dummy anten to 0.001 mfd. to re duce hum modulatio
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximu output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximu output.







Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter
2	12BA6	Tube, i-f amplifier
3	12AT6	Tube, detector, a-f amplifier, a.v.c.
4	50B5	Tube, power output
5	35W4	Tube, rectifier
6A, 6B	925011	50-50 mfd., 150 volt electrolytic condenser (filter)
7	920030	0.05 mfd., 400 volt condenser (line bypass)
8	920050	0.2 mfd., 200 volt condenser (line isolation)
9	920020	0.02 mfd., 400 volt condenser (output plate bypass)
10	920010	0.002 mfd., 600 volt condenser (tone compensation)
11	920020	0.02 mfd., 400 volt condenser (audio coupling)
12	920240	0.0005 mfd., 600 volt condenser (audio plate bypass)
13	920010	0.002 mfd., 600 volt condenser (audio coupling)
14	920030	0.05 mfd., 400 volt condenser (phono isolation)
15	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)
16	922101	0.05 mfd., 400 volt condenser (phono motor isolation)
17	910010	110 mmfd., 500 volt mica condenser (diode filter)
18	390190	Volume control and switch, 500,000 ohms.
19	397000	15 meg., ½ watt resistor (a.v.c. network)
20	351330	3.3 meg., ½ watt resistor (a.v.c. network)
21	340810	22,000 ohms, ½ watt resistor (oscillator grid)
22	340290	150 ohms, ½ watt resistor (i-f amplifier cathode)
23	397000	15 meg., ½ watt resistor (a-f grid)
24	351130	470,000 ohms, ½ watt resistor (a-f plate load)
25	351130	470,000 ohms, ½ watt resistor (output grid)
26	340290	150 ohms, ½ watt resistor (output cathode)
27	370490	1000 ohms, 1 watt resistor (filter)
28	351290	2.2 meg., ½ watt resistor (phono shunt)
29	351210	1 meg., ½ watt resistor (series phono)
30	340050	15 ohms, ½ watt resistor (rectifier ballast)
31	340010	10 ohms, ½ watt resistor (series pilot light)
32	351050	220,000 ohms, ½ watt resistor (line isolation)
33	734080	Output transformer
34	180008	Speaker, 4" x 6" oval P.M.
*35		Speaker cone, part of 180008
36	700000	Loop antenna
37	716010	Oscillator coil
38	720380	First i-f transformer
39	720019	Second i-f transformer
40	807000	Dial light
41	510391	Radio-phono switch
42	510120	Tone control switch
43	900270	2-gang variable condenser, 25-382 mmfd., 27-193 mmfd.
	507215	Pilot light socket
	583004	Line cord
	505040	Plug for phono pickup leads
	508010	Socket for phono pickup leads
	585072	Phono motor plug and cable
	819019	Record changer
	820034	Phono crystal cartridge

† Specify part numbers when ordering.
* Not supplied separately.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	—7 DC	0	13 AC	25 AC	97 DC	97 DC	—0.2 DC
2	12BA6	0	0	36 AC	25 AC	97 DC	97 DC	1.6 DC
3	12AT6	—0.6 DC	0	13 AC	0	—0.5 DC	0	39 DC
4	50B5	0	6 DC	87 AC	36 AC	115 DC	97 DC	0
5	35W4	117 AC	116 AC	87 AC	117 AC	111 AC	112 AC	122 DC

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	21,000	0.3	12	22	80,000	80,000	2.5 meg.
2	12BA6	18	0	33	22	80,000	80,000	140
3	12AT6	15 meg.	0	12	0	500,000	0	550,000
4	50B5	450,000	140	78	33	80,000	80,000	450,000
5	35W4	103	102	78	103	110	99	80,000

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1—Voltage readings are in volts and resistance readings in ohms unless otherwise specified.

2—D-C voltage measurements are at 200,000 ohms per volt; a-c voltages measured at 1000 ohms per volt.

3—Socket connections are shown as bottom views.

4—Measured values are from socket pin to common negative.

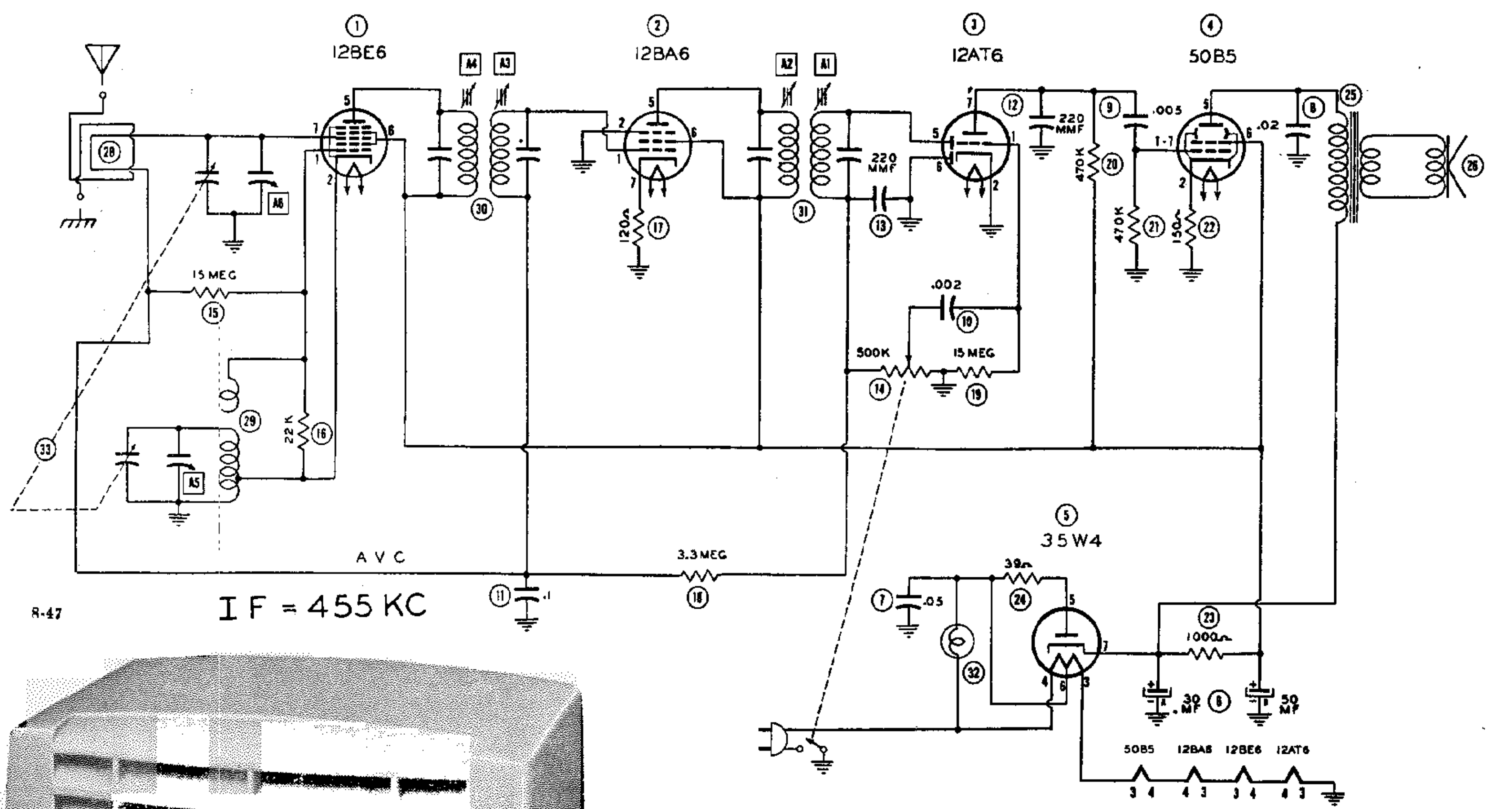
5—Line voltage maintained at 117 volts for voltage readings.

6—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.

7—Volume control at maximum, no signal applied for voltage measurements.

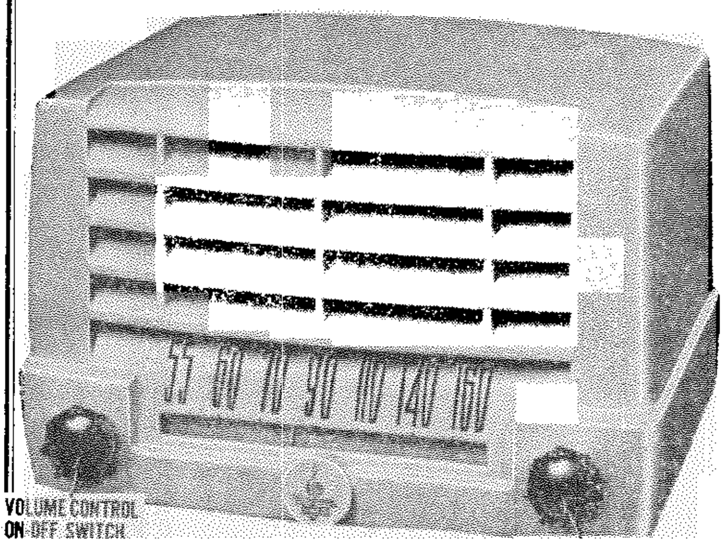
EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 12005



R-47

I F = 455 KC



TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—12BE6, pentagrid oscillator-modulator

1—12BA6, first i-f amplifier

1—12AT6, diode detector, a-f amplifier, a.v.c.

1—50B5, beam power output

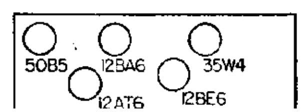
POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

TUBE LOCATIONS

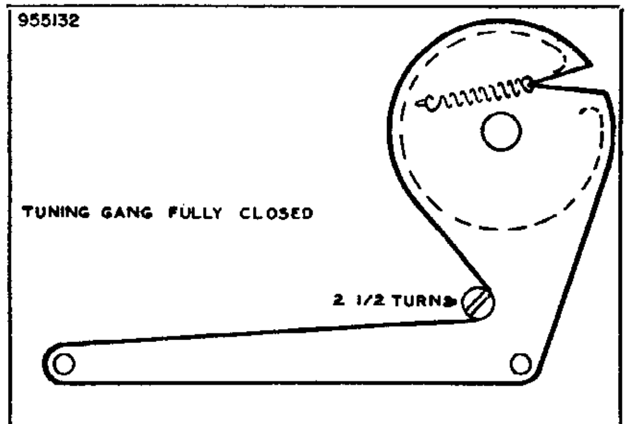


EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 120050A

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.

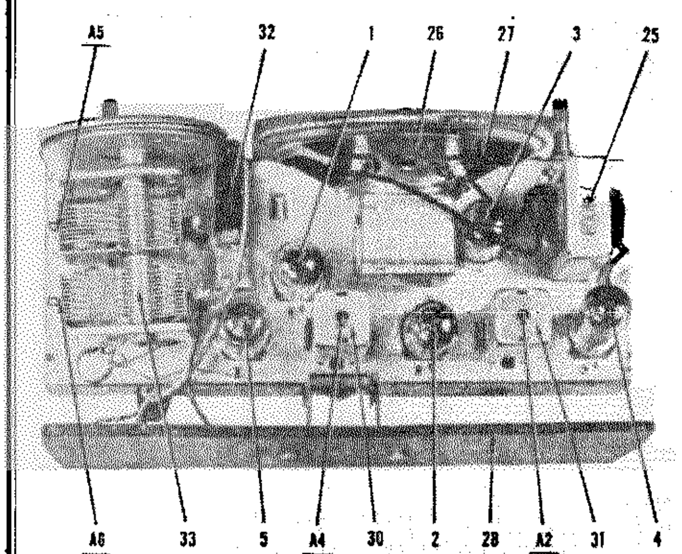


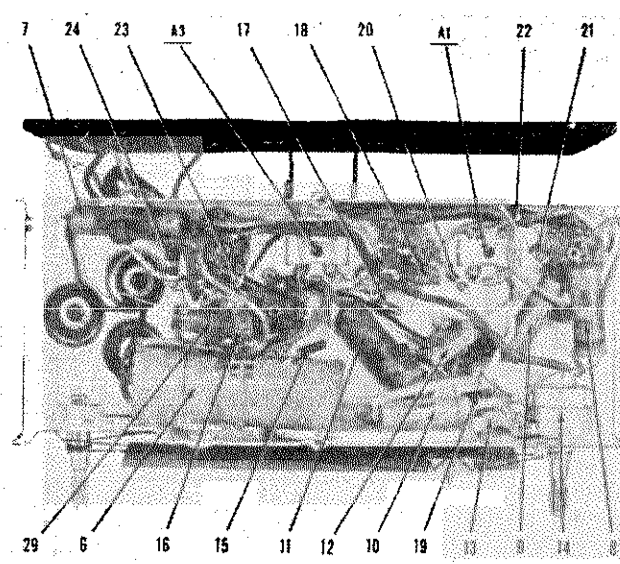
DIAL CORD DRIVE

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.





EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 12005

REPLACEMENT PARTS LIST

Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter
2	12BA6	Tube, i-f amplifier
3	12AT6	Tube, detector, a-f amplifier, a.v.c.
4	50B5	Tube, power output
5	35W4	Tube, rectifier
6A, 6B	925061	30-50 mfd., 150 volt electrolytic condenser (filter)
7	920030	0.05 mfd., 400 volt condenser (line bypass)
8	920020	0.02 mfd., 400 volt condenser (output plate bypass)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)
10	920515	0.002 mfd., 400 volt condenser (audio coupling)
11	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)
12	910000	220 mmfd., 500 volt condenser (a-f plate bypass)
13	910000	220 mmfd., 500 volt condenser (diode filter)
		(200 mmfd. ceramic condenser 928011 alternate part for 12 and 13.)
14	390024	Volume control and switch, 500,000 ohms
15	397000	15 meg., ½ watt resistor (a.v.c. network)
*16		22,000 ohms, ½ watt resistor, part of 716007 (oscillator grid)

Symbol	†Part No.	DESCRIPTION
17	340270	120 ohms, ½ watt resistor (i-f cathode)
18	351330	3.3 meg., ½ watt resistor (a.v.c. network)
19	397000	15 meg., ½ watt resistor (a-f gr
20	351130	470,000 ohms, ½ watt resistor (a plate)
21	351130	470,000 ohms, ½ watt resistor (put grid)
22	340290	150 ohms, ½ watt resistor (outp cathode)
23	370490	1000 ohms, 1 watt resistor (filt
24	370150	39 ohms, 1 watt resistor (rectifi ballast)
25	734009	Output transformer
26	180028	Speaker, 4 inch P.M. (alternate speaker 180032)
*27		Speaker cone, part of 180028
28	700006	Loop antenna
29	716007	Oscillator coil
30	720021	First i-f transformer (alternate p 720000A)
31	720021	Second i-f transformer (alternate part 720100A)
32	807000	Dial light, type 47
33	900015	Two-gang variable condenser
	507003	Dial light socket
	583005	Line cord

† When ordering, state part numbers.

* Not supplied separately.

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

CABINET AND DIAL PARTS

140100	Cabinet, ivory
450112	Knob, brown
410124	Dial backplate, gold
525001	Dial pointer, red
280035	Drive shaft
587040	Dial cord spring

VOLTAGE READINGS

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	*-6.7 DC	0	25 AC	12 AC	92 DC	92 DC	-0.1 DC
2	12BA6	-0.1 DC	0	25 AC	38 AC	92 DC	92 DC	0.8 DC
3	12AT6	-0.65 DC	0	0	12 AC	-0.3 DC	0	42 DC
4	50B5	0	5.7 DC	85 AC	38 AC	107 DC	92 DC	0
5	35W4	0	0	85 AC	117 AC	110 AC	112 AC	112 DC

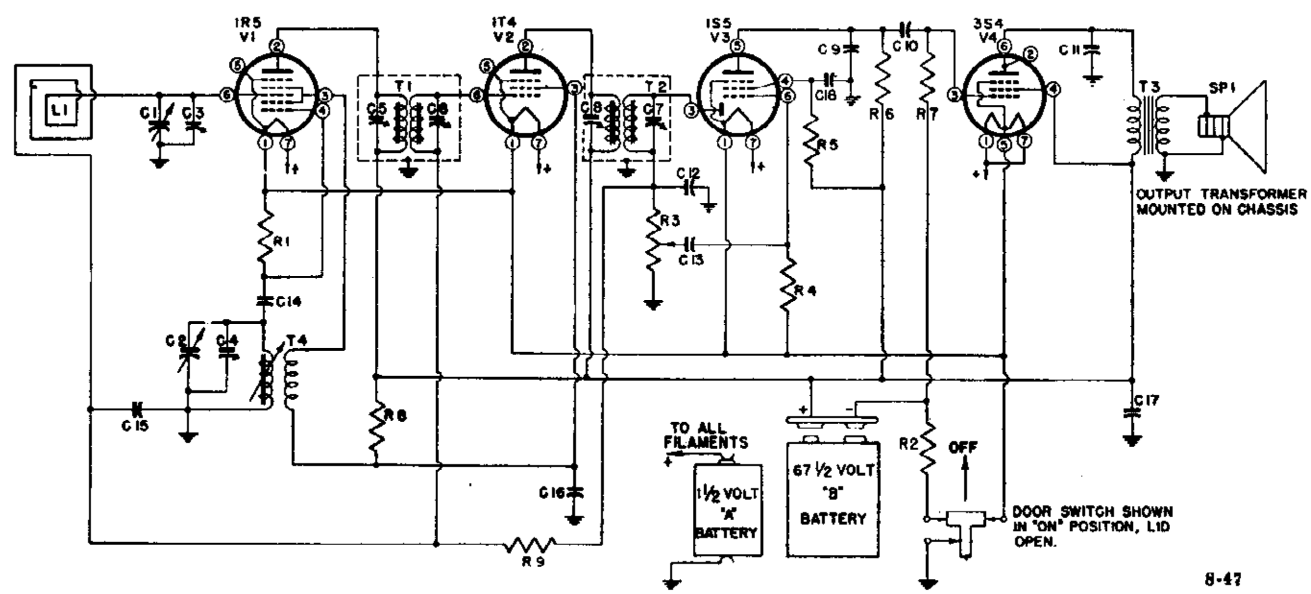
* Oscillator Grid Voltages Are Measured By Vacuum-Tube Voltmeter.

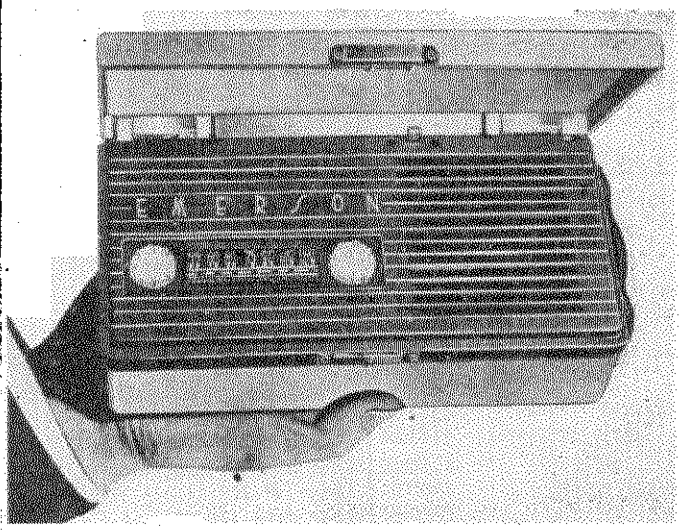
RESISTANCE READINGS

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	24,000	0.6	26	13	700,000	700,000	3.5 meg.
2	12BA6	3.5 meg.	0	26	38	700,000	700,000	118
3	12AT6	15 meg.	0	0	13	500,000	0	1.2 meg.
4	50B5	480,000	150	90	38	700,000	700,000	480,000
5	35W4	inf.	inf.	90	120	150	118	700,000

EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 120058





DESCRIPTION

TYPE: Pocket portable (battery operated) superheterodyne.

FREQUENCY RANGE: 540-1600 kc.

TYPE OF TUBES:
- 1—1R5, oscillator-modulator
- 1—1T4, i-f amplifier
- 1—1S5, 2nd detector, a.v.c, a-f amplifier
- 1—3S4, pentode output

POWER SUPPLY: "A" and "B" batteries.

VOLTAGE RATING:
"A" Battery—1.5 volts
"B" Battery—67.5 volts

CURRENT DRAIN:
"A" Battery—0.25 amp.
"B" Battery—0.0075 amp.

REPLACEMENT PARTS LIST

Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900022	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
*C5, C6		Trimmers, part of first i-f transformer
*C7, C8		Trimmers, part of second i-f transformer
C9, C14	928013	100 mmfd., ceramic condenser
C10, C13	920495	0.001 ~~mfd., 200 volt condenser~~
C11	920496	0.005 mfd., 200 volt condenser
C12	928104	212 mmfd., ceramic condenser
C15	920494	0.05 mfd., 200 volt condenser
C16	920120	0.02 mfd., 100 volt condenser
C17	925063	16 mfd., 100 volt electrolytic condenser
C18	920485	0.01 mfd., 100 volt condenser
L1	700008	Loop antenna
R1	350970	100,000 ohms, ½ watt resistor

Schematic Symbol	†Part No.	DESCRIPTION
R2	340470	820 ohms, ½ watt resistor
R3	390025	1 meg., volume control
R4	351450	10 meg., ½ watt resistor
R5, R9	351330	3.3 meg., ½ watt resistor
R6	351130	470,000 ohms, ½ watt resistor
R7	351250	1.5 meg., ½ watt resistor
R8	340730	10,000 ohms, ½ watt resistor
SP1	180029	~~Speaker, 3-inch P.M.~~
T1	720028	First i-f transformer, or
T1	720034	First i-f transformer
T2	720028	Second i-f transformer, or
T2	720035	Second i-f transformer
T3	734011	Output transformer
T4	716011	Oscillator coil
	510040	On-off lid switch
	540260	Rivet, lid switch
	585007	"B" battery cable

† Specify part numbers when ordering. * Not supplied separately.

EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 1200

VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (chassis) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Take readings with the volume control set at minimum and the variable condenser closed. Use fresh batteries.

	PIN NUMBER						
TUBE	1	2	3	4	5	6	7
1R5		60	35	*.8		*-0.2	1.5
1T4		60	35			*-0.2	1.5
1S5			*-0.2	*17	*25	*-0.1	1.5
3S4	1.5	59	*-6.5	60		59	1.5

BATTERY REPLACEMENT

1. Slide the button on the release catch near the handle in the direction of the arrow. This loosens the bottom shell and permits it to be swung open on the hinge, making the batteries accessible.
2. Insert the batteries as shown in the above diagram.
3. To reassemble, hold the chassis face down with the batteries in place. Close the bottom shell over the chassis and press the handle end of the shell so that it snaps into place.

ADJUSTMENTS

An oscillator with frequencies of 455, 600, 1420, and 1620 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible, turning down the output of the test oscillator as the alignment of the receiver progresses.

Turn the volume control on full.

Location of Coils and Trimmer Adjustments

The first i-f transformer is located next to the 1R5 tube. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is located between the 1T4 and 1S5 tubes. The single trimming core screw extends from the end of the can. Trimmers are accessible through holes in the top of the can.

The oscillator coil is located behind the on-off switch. The trimmer for the oscillator is located on the smaller variable condenser section. The 600 kc oscillator core adjustment is the brass screw protruding from the end of the oscillator coil.

The loop antenna acts as the antenna coil. The trimmer for the loop is located on the larger section of the variable condenser.

I-f Alignment

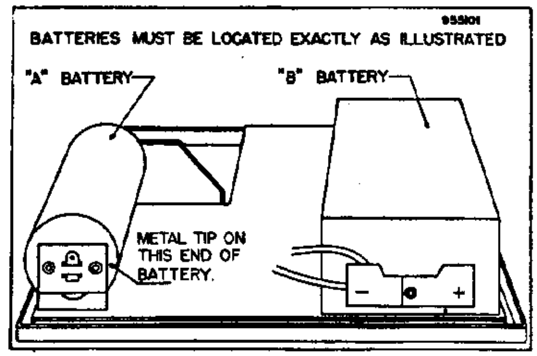
1. Rotate the variable condenser to the minimum capacity position.
2. Feed 455 kc to the grid (pin 6) of the 1R5 tube through a 0.01 mfd. condenser.
3. Adjust the four i-f trimmer screws for maximum response. (Clip the test signal lead to the stator of the larger capacity section of the variable condenser.)

R-f Alignment

1. Connect the test oscillator to a coil composed of three or four turns of wire wound in a circle approximately 12 inches in diameter. This coil should be placed parallel to and in line with the receiver loop at a distance of approximately 15 to 20 inches.
2. Radiate a signal at 1620 kc, rotate the variable condenser to minimum capacity, and adjust the oscillator trimmer, on the smaller section of the variable condenser, for maximum response.
3. Radiate a signal at 1420 kc, tune in the 1420 kc signal, and adjust the antenna trimmer, on the larger section of the variable condenser, for maximum response.
4. Radiate a signal at 600 kc, set the dial indicator to 60, and adjust the oscillator coil core trimmer while rocking the variable condenser for maximum response.
5. Return to 1620 kc and check alignment. If readjustment is necessary, repeat Steps 2 to 4 until no further improvement is noted.

CABINET AND DIAL PARTS

460029	Plastic bottom shell, black
460039	Plastic bottom shell, ivory
460069	Plastic bottom shell, green
460028	Plastic lid, black
460038	Plastic lid, ivory
460068	Plastic lid, green
630058	Plastic loop cover, black
410140	Metal front
460031	Knob, black
460037	Knob, ivory
460061	Knob, green
541170	Knob retaining clip
460009	Handle, extruded plastic
410519	Handle ring
410969	Release catch, male
410959	Release catch, female
411055	Reinforcing plate, cover release catch
540460	Rivet, male catch, cover to metal front
540160	Rivet, female catch, cover to metal front
540160	Rivet, male catch, shell to metal front
540360	Rivet, female catch, shell to metal front
410143	Lid hinge, spring loaded
410144	Lid hinge stop
540370	Rivet, lid hinge to lid
540160	Rivet, lid hinge to metal front
540470	Rivet, lid hinge to hinge stop
470259	Hinge assembly, shell to metal front
540160	Rivet, hinge to metal front
540370	Rivet, hinge to shell
520038	Dial crystal
520041	Dial backplate
525016	Dial pointer
280038	Drive shaft
587326	Dial drive spring

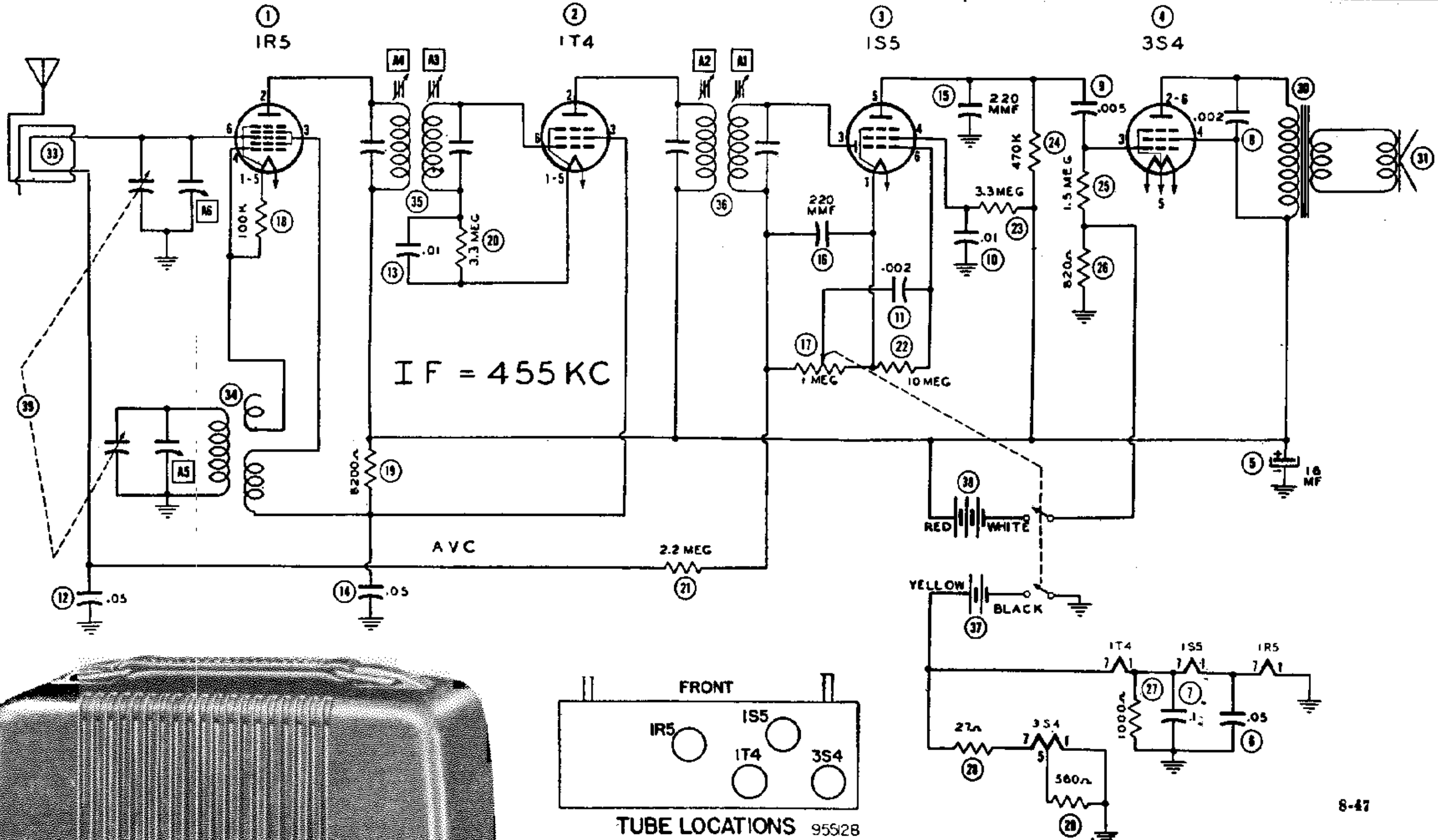


GENERAL NOTES

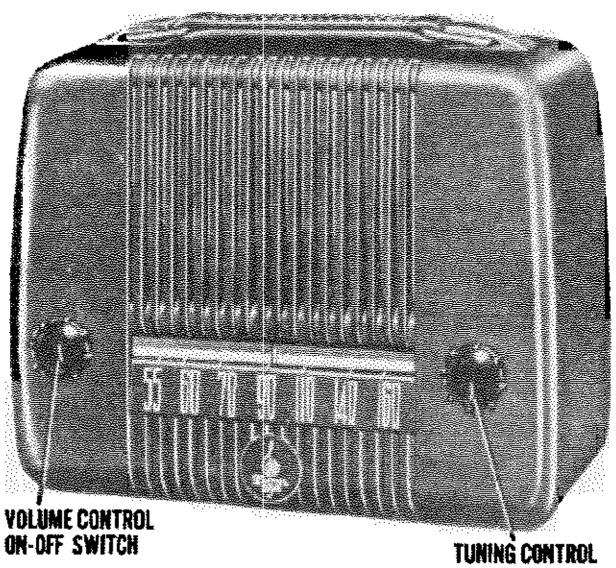
1. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and does not require additional antenna or ground connections.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
4. The receiver is turned on when the lid is open and turned off when the lid is closed. Always close the lid when the set is not in use.
5. Remove batteries as soon as they are exhausted. The "A" battery will require more frequent replacement than the "B" battery.
6. Replace the 1.5 volt "A" battery with a standard D-size flashlight cell (1—5/16" dia.). Replace the 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent.

EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 120058



TUBE LOCATIONS 95528



TYPE: Battery operated portable superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—1R5, converter
1—1T4, i-f amplifier
1—1S5, detector, a-f amplifier, a.v.c.
1—3S4 or 3Q4, power output

POWER SUPPLY: "A" and "B" batteries.

VOLTAGE RATING:

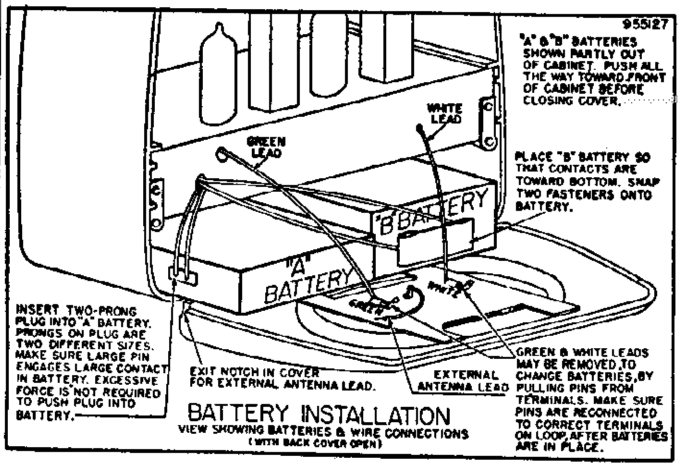
"A" Battery—4.5 volts
"B" Battery—67.5 volts

CURRENT DRAIN:

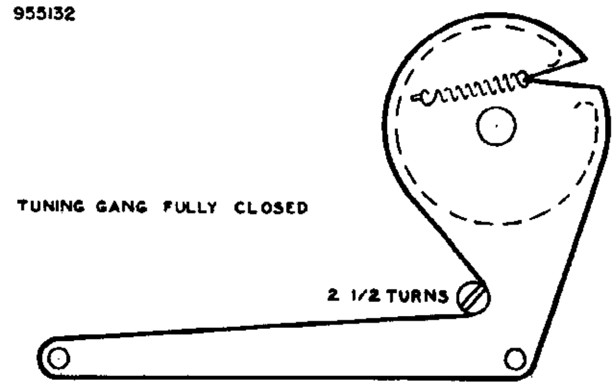
"A" Battery—104 ma.
"B" Battery—7.5 ma.

EMERSON RADIO AND PHONO. CORP.

MODEL 560, Chassis 1200[illegible]



BATTERY INSTALLATION
VIEW SHOWING BATTERIES & WIRE CONNECTIONS
(WITH BACK COVER OPEN)

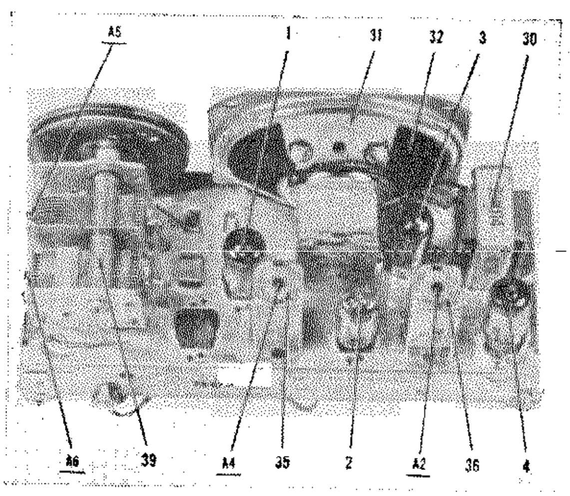


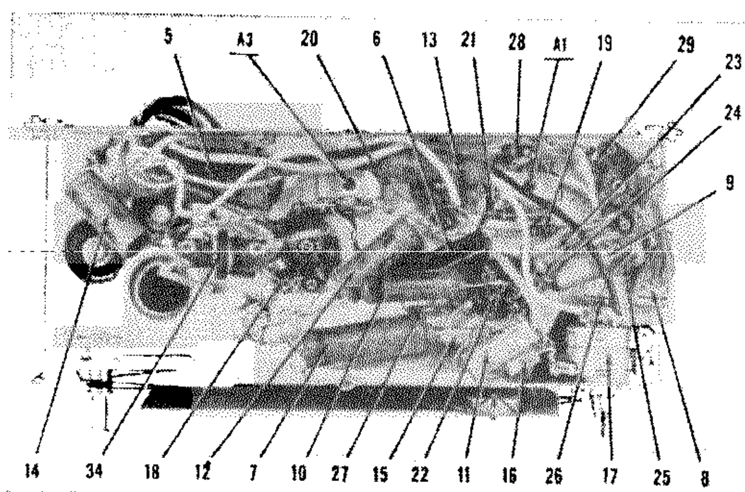
DIAL CORD DRIVE

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Connect 100,000 ohm resistor across the loop leads during Steps 1 and 2. Volume control should be at maximum position; output [illegible] signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver f[illegible] adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to rear stator of variable condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2	0.1 mfd.	High side to rear stator of variable condenser. Low side to chassis.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3		Loop	1400 kc	Tune for maximum output.	Across voice coil.	A6	Disconnect 100,000 ohm resistor from loop leads. Connect loop leads to loop. Hold chassis in same relative position t[illegible] loop as when chassis i[illegible] mounted and rear door i[illegible] closed. Radiate signal int[illegible] loop. Adjust A6 for maximum output.





REPLACEMENT PARTS LIST

Symbol	† Part No.	DESCRIPTION
1	1R5	Tube, converter
2	1T4	Tube, i-f amplifier
3	1S5	Tube, detector, a-f amplifier, a.v.c.
4	3S4 or 3Q4	Tube, power output
5	925066	16 mfd., 100 volt electrolytic condenser (power supply bypass)
6	920060	0.05 mfd., 200 volt condenser (filament bypass)
7	920040	0.1 mfd., 200 volt condenser (filament bypass)
8	920515	0.002 mfd., 400 volt condenser (output plate bypass)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)
10	920092	0.01 mfd., 400 volt condenser (a-f screen bypass)
11	920515	0.002 mfd., 400 volt condenser (audio coupling)
12	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
13	920092	0.01 mfd., 400 volt condenser (i-f grid filter)
14	920060	0.05 mfd., 200 volt condenser (decoupling filter)
15	910000	220 mmfd., 500 volt condenser (a-f plate bypass)
16	910000	220 mmfd., 500 volt condenser (diode filter) (Ceramic condenser 928011 alternate part for 15 and 16.)
17	390026	Volume control and switch, 1 meg.
18	340970	100,000 ohms, ½ watt resistor (oscillator grid)
19	340710	8200 ohms, ½ watt resistor (decoupling)
20	351330	3.3 meg., ½ watt resistor (i-f grid)
21	351290	2.2 meg., ½ watt resistor (a.v.c. network)
22	351450	10 meg., ½ watt resistor (a-f grid)
23	351330	3.3 meg., ½ watt resistor (a-f screen)
24	351130	470,000 ohms, ½ watt resistor (a-f plate)
25	351250	1.5 meg., ½ watt resistor (output grid)
26	340470	820 ohms, ½ watt resistor (bias), used with 3S4 output, or
26	340370	330 ohms, ½ watt resistor (bias); used with 3Q4 output
27	340490	1000 ohms, ½ watt resistor (filament network)
28	340110	27 ohms, ½ watt resistor (filament network)
29	340430	560 ohms, ½ watt resistor (filament network)
30	734014	Output transformer
31	180030	Speaker, 4-inch P.M.
*32		Speaker cone, part of 180030
33	700009	Loop antenna
34	716017	Oscillator coil
35	720525	First i-f transformer
36	720525	Second i-f transformer
37		"A" battery, 4.5 volts, Eveready 746 or equivalent
38		"B" battery, 67.5 volts, Eveready 467 or equivalent
39	900023	2-gang variable condenser
	585011	"B" battery cable
	585008	"A" battery cable
	580038	Pin terminal lead, a.v.c.
	580039	Pin terminal lead, grid

† Specify part numbers when ordering. * Not supplied separately.

CABINET AND DIAL PARTS

140110	Cabinet, maroon
140111	Cabinet back
595003	Handle, with rings, black
450115	Knob, black
280037	Tuning drive shaft
530002	Drive cord
587040	Drive cord spring
410124	Dial backplate, gold
525001	Dial pointer, red

GENERAL NOTES

1. If replacements are made in the r-f section of the circuit, the receiver should be carefully **realigned.**
2. The receiver has a self-contained antenna and normally does not require additional antenna or ground connection. For permanent home installations, however, in a location far removed from broadcasting stations, an additional outside antenna may be used. The outside antenna connection should be made to the colored lead at the rear of the cabinet. Use no ground connection.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, that the cabinet be rotated on its base back and forth through a quarter of a circle (90 degrees), and left at the position where the station is received with maximum volume.
4. Battery complement: Replace 4.5 volt "A" battery with Eveready No. 746 or equivalent. Replace 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent. Refer to battery installation diagram.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0	57	44	*5.2	0	0	1.45
2	1T4	2.8	57	44	0	2.8	0	4.4
3	1S5	1.45	0	0	12	27	0	2.8
4	3S4(or3Q4)	0	55	-1.3	57	1.5	55	3

* Oscillator Grid Voltages Are Measured By Vacuum-Tube Voltmeter.

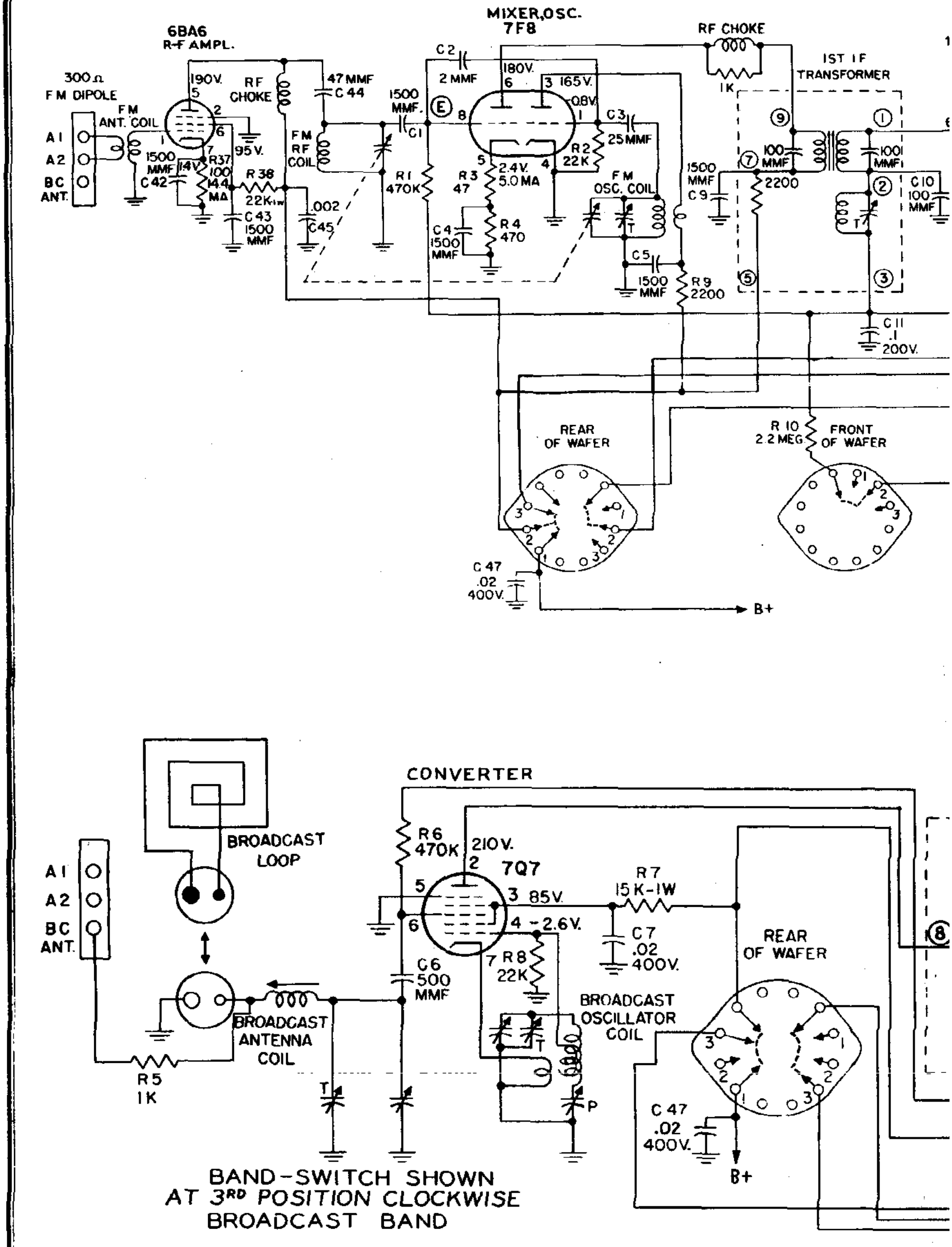
RESISTANCE READINGS

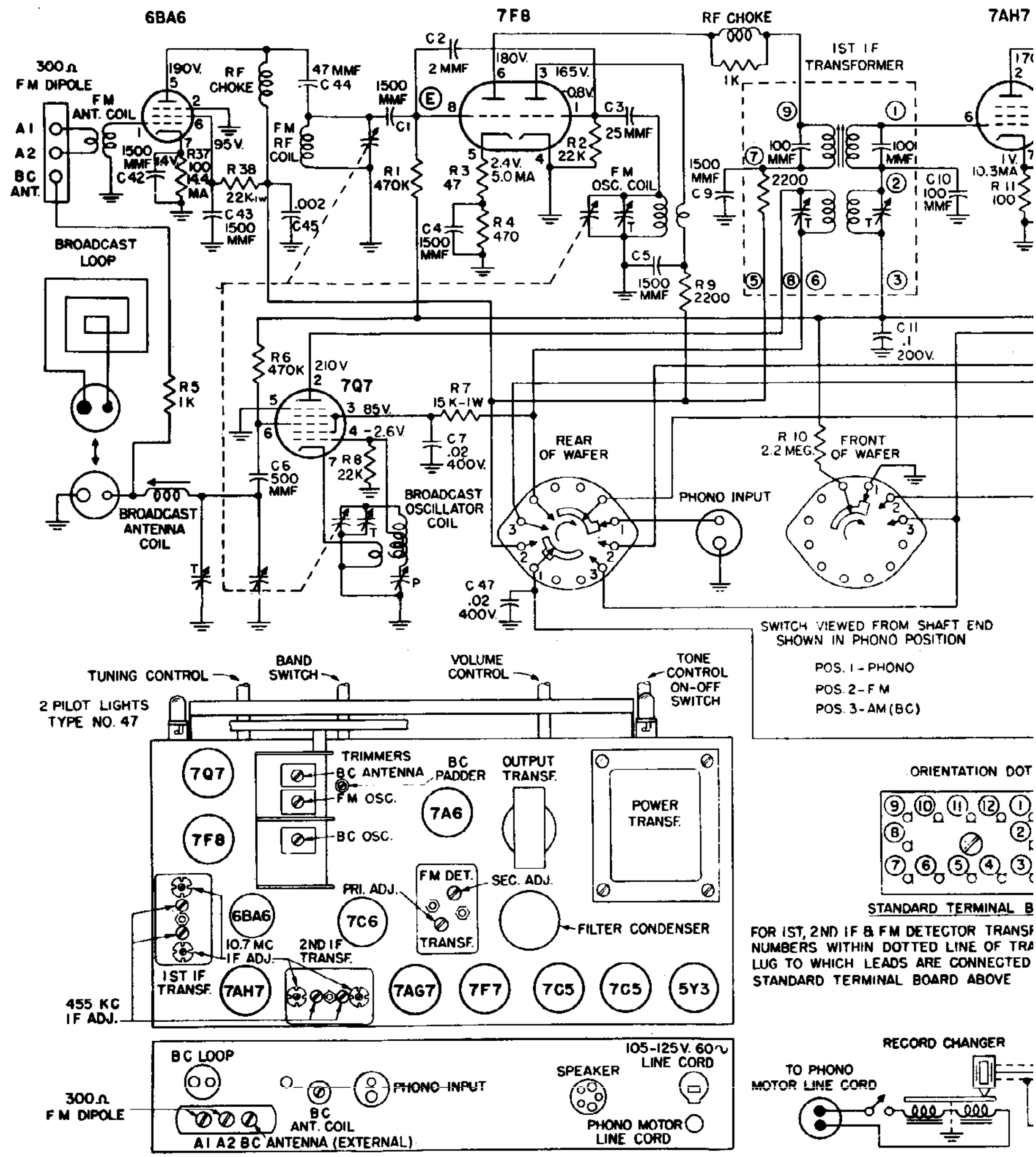
SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0	120,000	130,000	100,000	0	3.5 meg.	*
2	1T4	*	120,000	130,000	3.5 meg.	*	3.5 meg.	*
3	1S5	*	inf.	1.1 meg.	3.4 meg.	600,000	10 meg.	*
4	3S4(or3Q4)	0	120,000	1.5 meg.	120,000	*	120,000	*

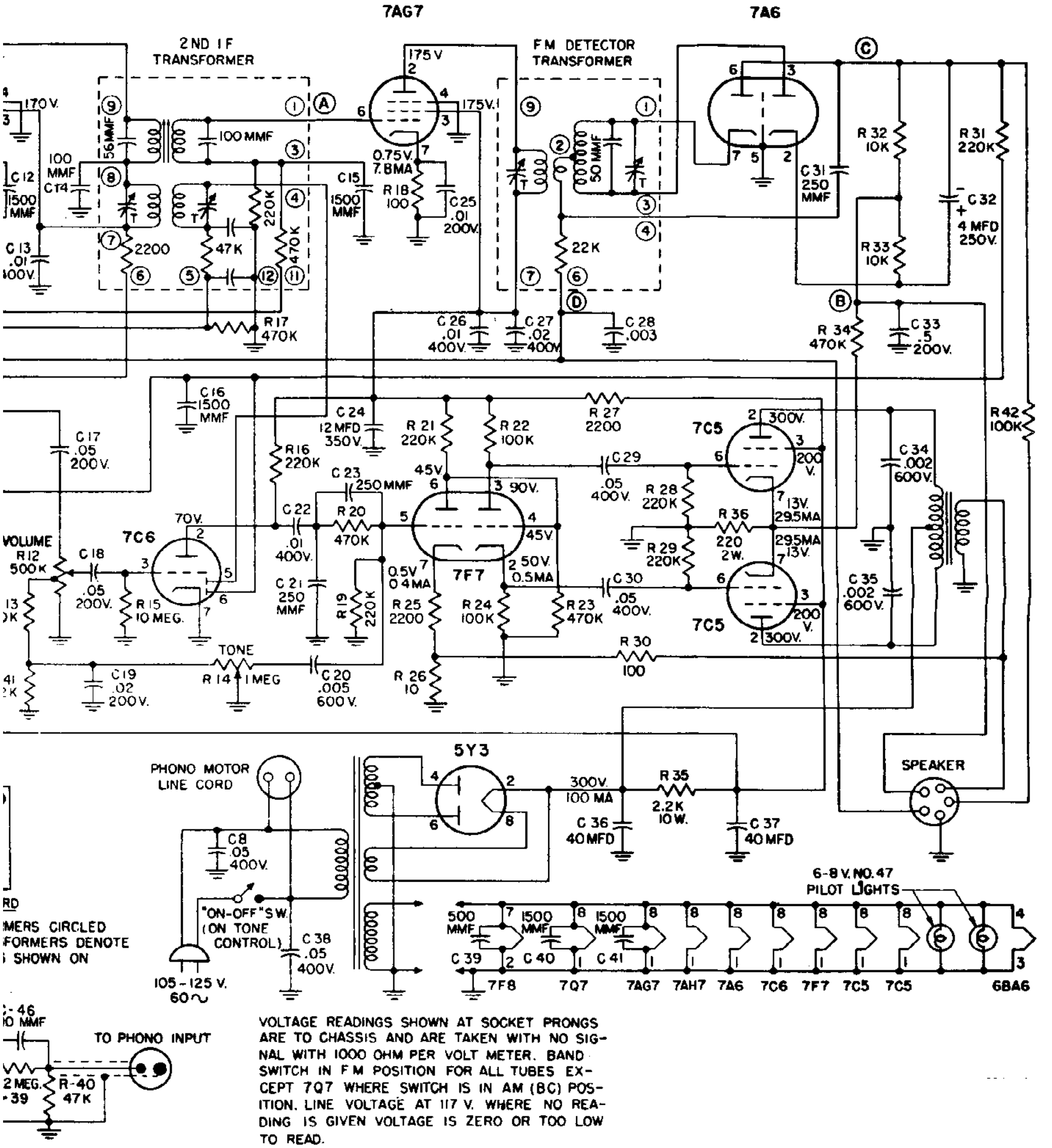
* Do Not Use Ohmmeter To Measure Filament Resistances.

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1—Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2—Voltage measurements are d-c at 20,000 ohms per volt.
3—Socket connections are shown as bottom views.
4—Measured values are from socket pin to common negative.
5—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6—Volume control at maximum, no signal applied for voltage measurements.


6BA6
R-F AMPL.
MIXER,OSC.
7F8
RF CHOKE
1ST I F
TRANSFORMER
300Ω
F M DIPOLE
FM
ANT. COIL
A1
A2
BC
ANT.
RF
CHOKE
47 MMF
C 44
1500
MMF.
C1
C2
2 MMF
180V.
165V.
.08V.
C3
25 MMF
R2
22K
190V.
95V.
1500
MMF
C 42
14V
R37
100
14.4
MA
R 38
22K-1W
C 43
1500
MMF
.002
C45
FM
RF
COIL
R1
470K
R3
47
2.4V.
5.0 MA
R 4
470
C 4
1500
MMF
FM
OSC. COIL
C5
1500
MMF
R 9
2200
1500
MMF
C 9
100
MMF
2200
1K
C10
100
MMF
C 11
.1
200V.
REAR
OF WAFER
R 10
2.2 MEG
FRONT
OF WAFER
C 47
.02
400V.
B+
CONVERTER
BROADCAST
LOOP
A1
A2
BC
ANT.
R6
470K
210V.
7Q7
3 85V.
4 -2.6V.
R7
15 K-1W
C7
.02
400V.
R8
22K
C6
500
MMF
BROADCAST
ANTENNA
COIL
BROADCAST
OSCILLATOR
COIL
R5
1K
REAR
OF WAFER
C 47
.02
400V.
B+
BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
BROADCAST BAND

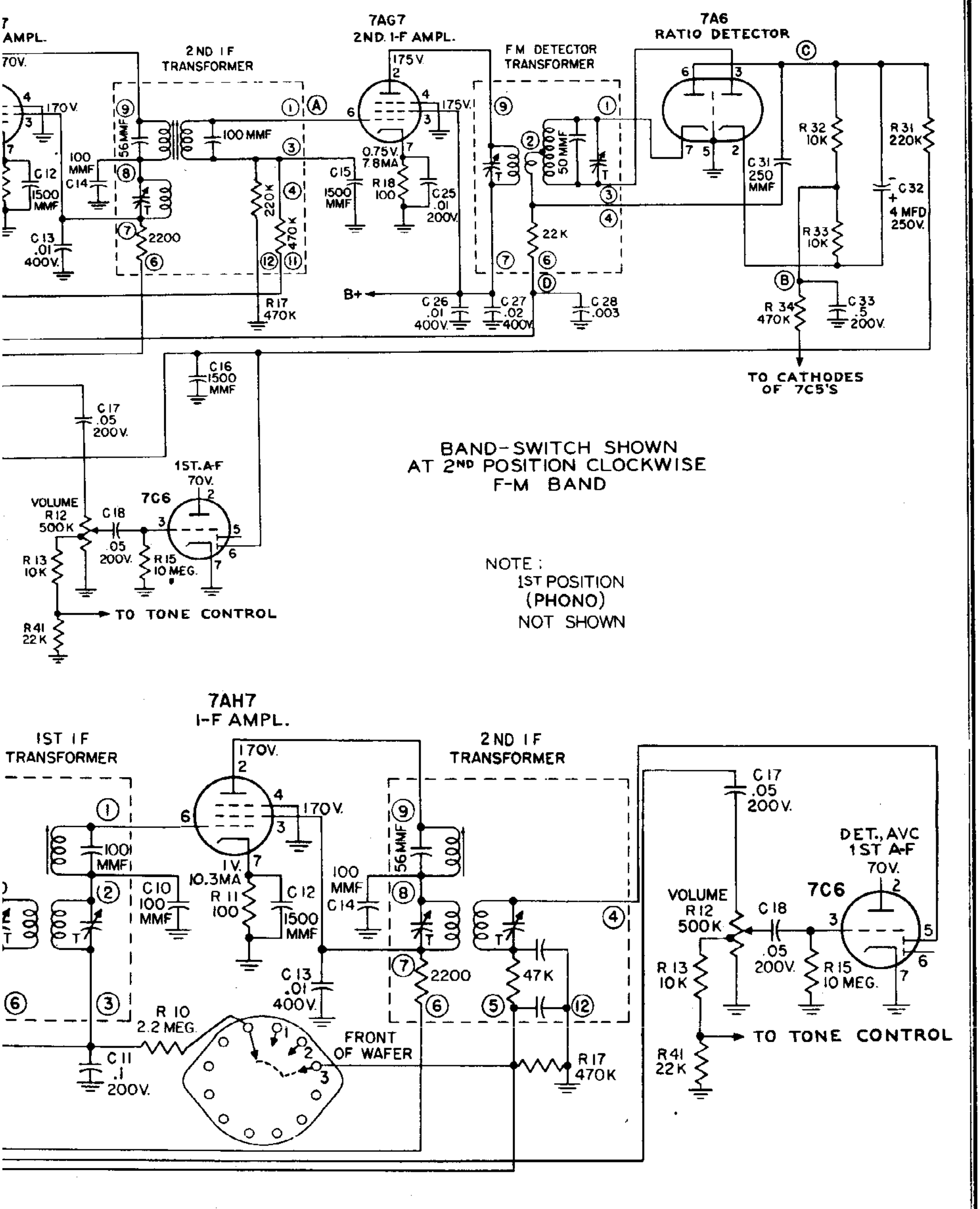

6BA6
7F8
RF CHOKE
7AH7
300Ω FM DIPOLE
FM ANT. COIL
A1
A2
BC ANT.
190V.
RF CHOKE
47 MMF C44
1500 MMF
C2
2 MMF
180V.
3 165V.
.08V.
C3
25 MMF
R2 22K
1ST IF TRANSFORMER
1K
1500 MMF C42
14V.
R37 100
144 MA
95V.
R38 22K 1W
C43 1500 MMF
.002 C45
FM RF COIL
C1
R1 470K
R3 47
2.4V. 5.0 MA
R4 470
C4 1500 MMF
FM OSC. COIL
C5 1500 MMF
R9 2200
1500 MMF C9
100 MMF
2200
100 MMF
C10 100 MMF
1V. 10.3MA
R11 100
C11 .1 200V.
BROADCAST LOOP
R5 1K
R6 470K
210V
7Q7
3 85V.
4 -2.6V
R7 15K-1W
C7 .02 400V.
R8 22K
C6 500 MMF
BROADCAST ANTENNA COIL
BROADCAST OSCILLATOR COIL
REAR OF WAFER
FRONT OF WAFER
R10 2.2 MEG.
PHONO INPUT
C47 .02 400V.
SWITCH VIEWED FROM SHAFT END SHOWN IN PHONO POSITION
POS. 1 - PHONO
POS. 2 - FM
POS. 3 - AM (BC)
TUNING CONTROL
BAND SWITCH
VOLUME CONTROL
TONE CONTROL ON-OFF SWITCH
2 PILOT LIGHTS TYPE NO. 47
TRIMMERS
BC ANTENNA
FM OSC.
BC OSC.
BC PADDER
OUTPUT TRANSF.
POWER TRANSF.
7Q7
7F8
7A6
6BA6
7C6
FM DET. TRANSF.
PRI. ADJ.
SEC. ADJ.
FILTER CONDENSER
10.7 MC IF ADJ.
2ND IF TRANSF.
1ST IF TRANSF.
455 KC IF ADJ.
7AH7
7AG7
7F7
7C5
7C5
5Y3
ORIENTATION DOT
STANDARD TERMINAL B
FOR 1ST, 2ND IF & FM DETECTOR TRANSF
NUMBERS WITHIN DOTTED LINE OF TRA
LUG TO WHICH LEADS ARE CONNECTED
STANDARD TERMINAL BOARD ABOVE
BC LOOP
300Ω FM DIPOLE
PHONO INPUT
BC ANT. COIL
A1 A2 BC ANTENNA (EXTERNAL)
105-125V. 60~ LINE CORD
SPEAKER
PHONO MOTOR LINE CORD
RECORD CHANGER
TO PHONO MOTOR LINE CORD

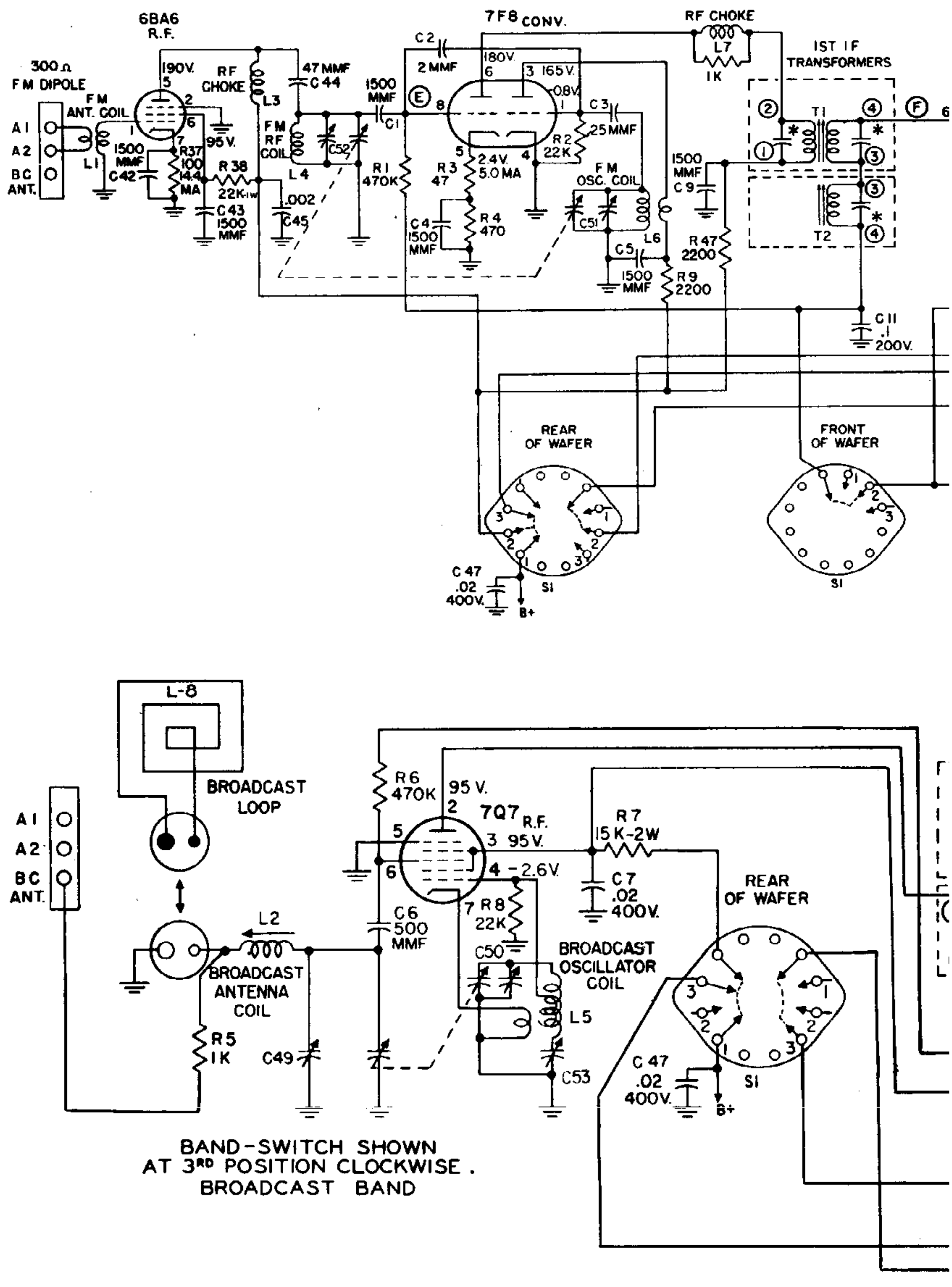


VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS AND ARE TAKEN WITH NO SIGNAL WITH 1000 OHM PER VOLT METER. BAND SWITCH IN F M POSITION FOR ALL TUBES EXCEPT 7Q7 WHERE SWITCH IS IN AM (BC) POSITION. LINE VOLTAGE AT 117 V. WHERE NO READING IS GIVEN VOLTAGE IS ZERO OR TOO LOW TO READ.

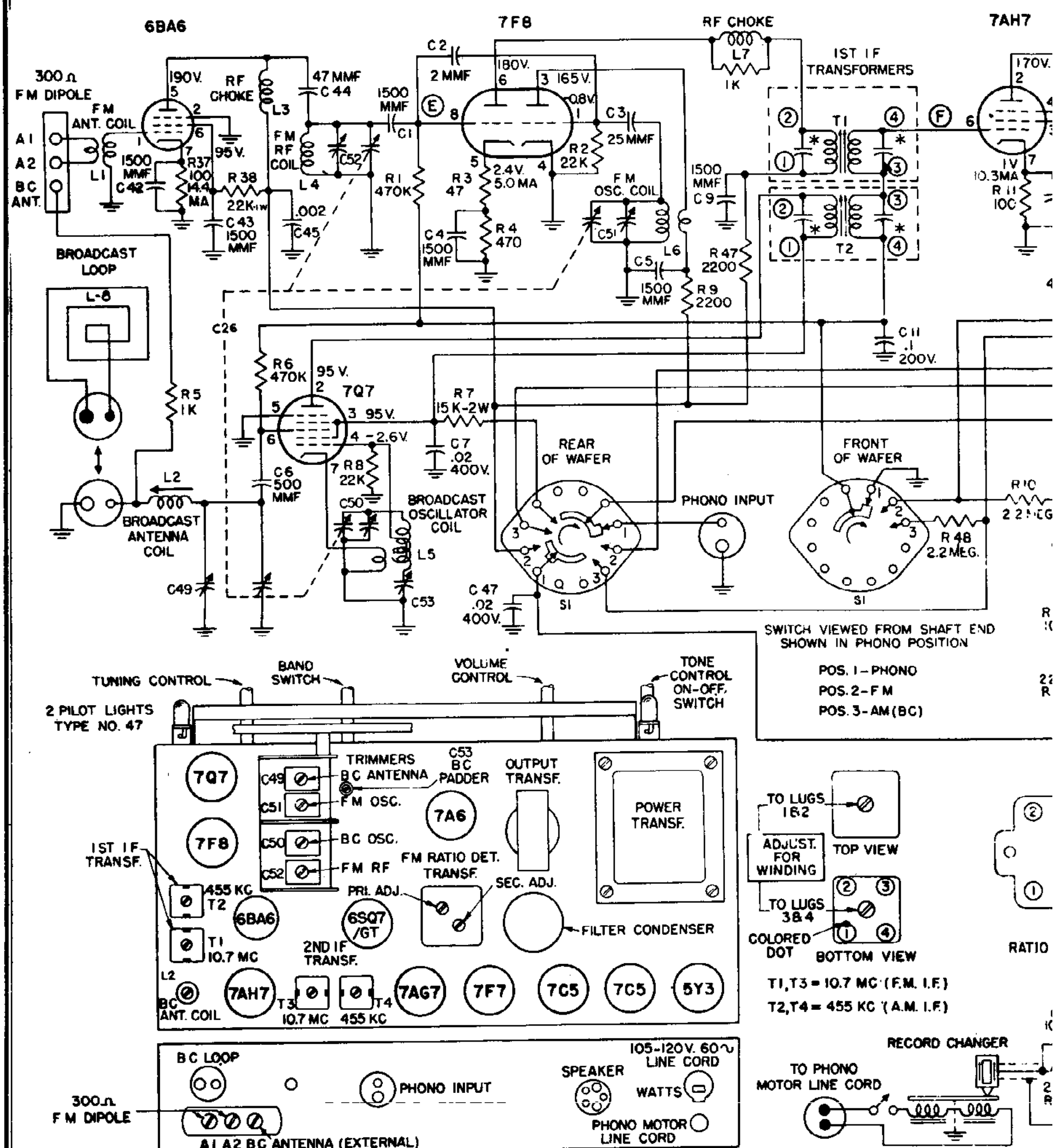
'schematics"

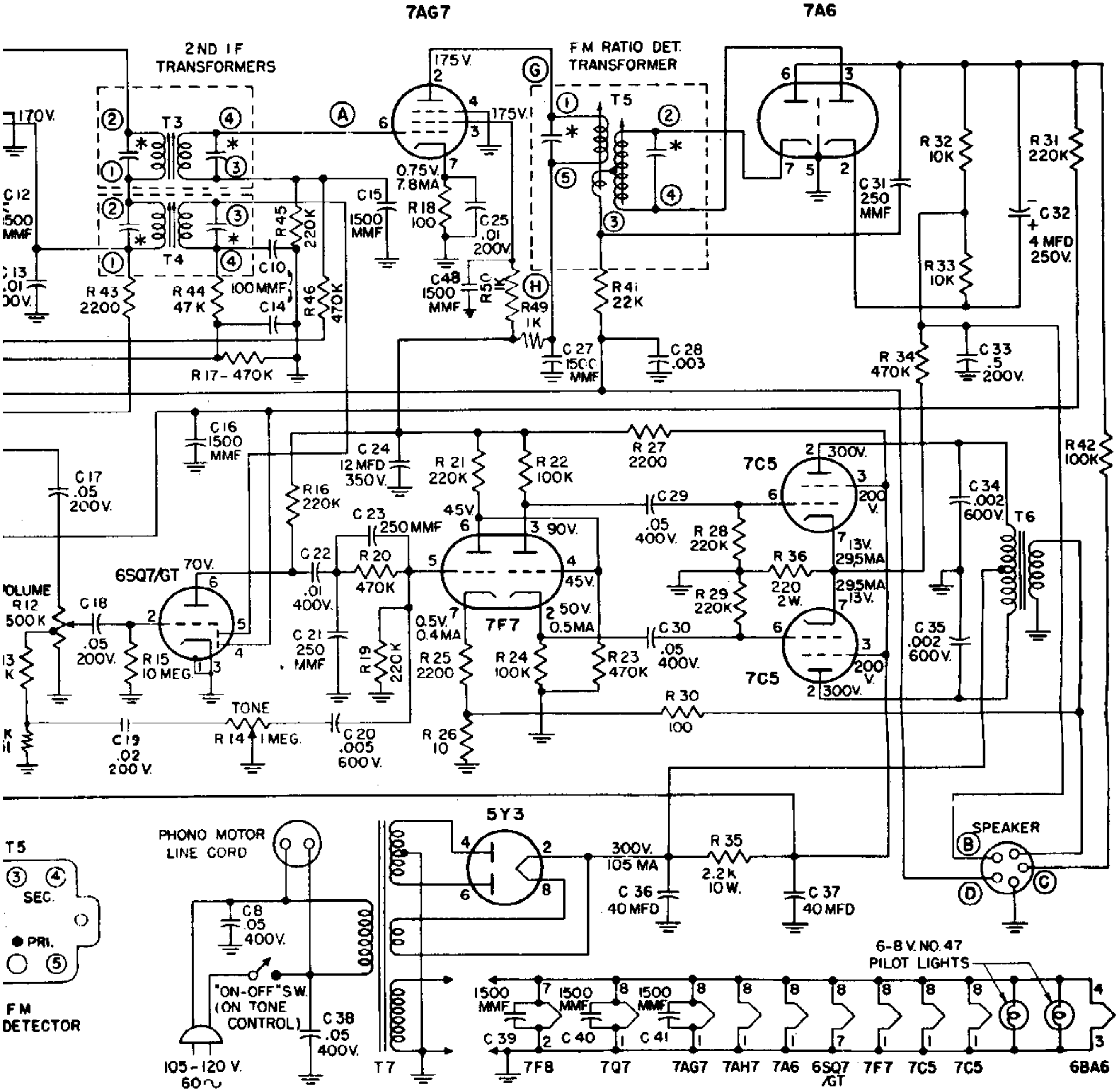
COMPANY, INC.





BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
BROADCAST BAND

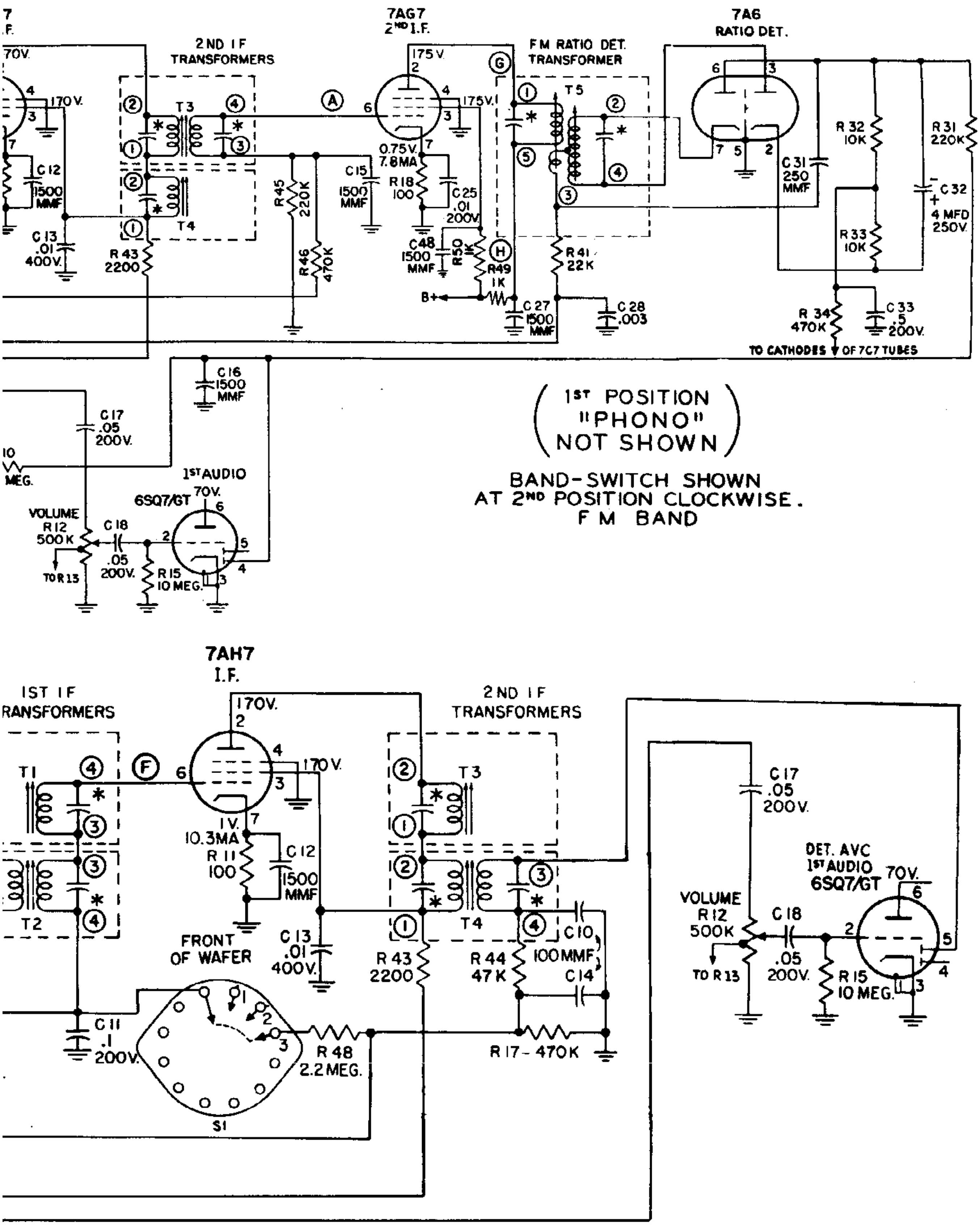

6BA6
7F8
RF CHOKE
7AH7
300 Ω
FM DIPOLE
FM
ANT. COIL
A1
A2
BC
ANT.
L1
190V.
RF
CHOKE
L3
47 MMF
C44
1500
MMF
C1
FM
RF
COIL
L4
C52
R1
470K
C2
2 MMF
180V.
165V.
0.8V.
C3
25MMF
R2
22K
R3
47
2.4V.
5.0 MA
C4
1500
MMF
R4
470
FM
OSC. COIL
C51
L6
C5
1500
MMF
R9
2200
L7
1K
1ST IF
TRANSFORMERS
T1
T2
1500
MMF
C9
R47
2200
C11
.1
200V.
170V.
1V
10.3MA
R11
100
95V.
R37
100
14.4
MA
R38
22K-1W
1500
MMF
C42
C43
1500
MMF
.002
C45
BROADCAST
LOOP
L-8
C26
R5
1K
L2
BROADCAST
ANTENNA
COIL
C49
R6
470K
95 V.
7Q7
95 V.
-2.6V.
C6
500
MMF
R8
22K
C50
BROADCAST
OSCILLATOR
COIL
L5
C53
R7
15 K-2W
C7
.02
400V.
REAR
OF WAFER
C47
.02
400V.
S1
PHONO INPUT
FRONT
OF WAFER
S1
R48
2.2 MEG.
SWITCH VIEWED FROM SHAFT END
SHOWN IN PHONO POSITION
POS. 1 - PHONO
POS. 2 - F M
POS. 3 - AM (BC)
TUNING CONTROL
BAND
SWITCH
VOLUME
CONTROL
TONE
CONTROL
ON-OFF
SWITCH
2 PILOT LIGHTS
TYPE NO. 47
7Q7
7F8
TRIMMERS
C49
BC ANTENNA
C51
FM OSC.
C50
BC OSC.
C52
FM RF
C53
BC
PADDER
OUTPUT
TRANSF.
7A6
POWER
TRANSF.
FM RATIO DET.
TRANSF.
PRI. ADJ.
SEC. ADJ.
FILTER CONDENSER
1ST IF
TRANSF.
455 KC
T2
T1
10.7 MC
6BA6
6SQ7
/GT
2ND IF
TRANSF.
L2
BC
ANT. COIL
7AH7
T3
10.7 MC
T4
455 KC
7AG7
7F7
7C5
7C5
5Y3
TO LUGS
1&2
ADJUST
FOR
WINDING
TO LUGS
3&4
TOP VIEW
COLORED
DOT
BOTTOM VIEW
RATIO
T1,T3 = 10.7 MC (F.M. I.F.)
T2,T4 = 455 KC (A.M. I.F.)
BC LOOP
PHONO INPUT
105-120V. 60~
LINE CORD
SPEAKER
WATTS
PHONO MOTOR
LINE CORD
300Ω
FM DIPOLE
A1 A2 BC ANTENNA (EXTERNAL)
RECORD CHANGER
TO PHONO
MOTOR LINE CORD



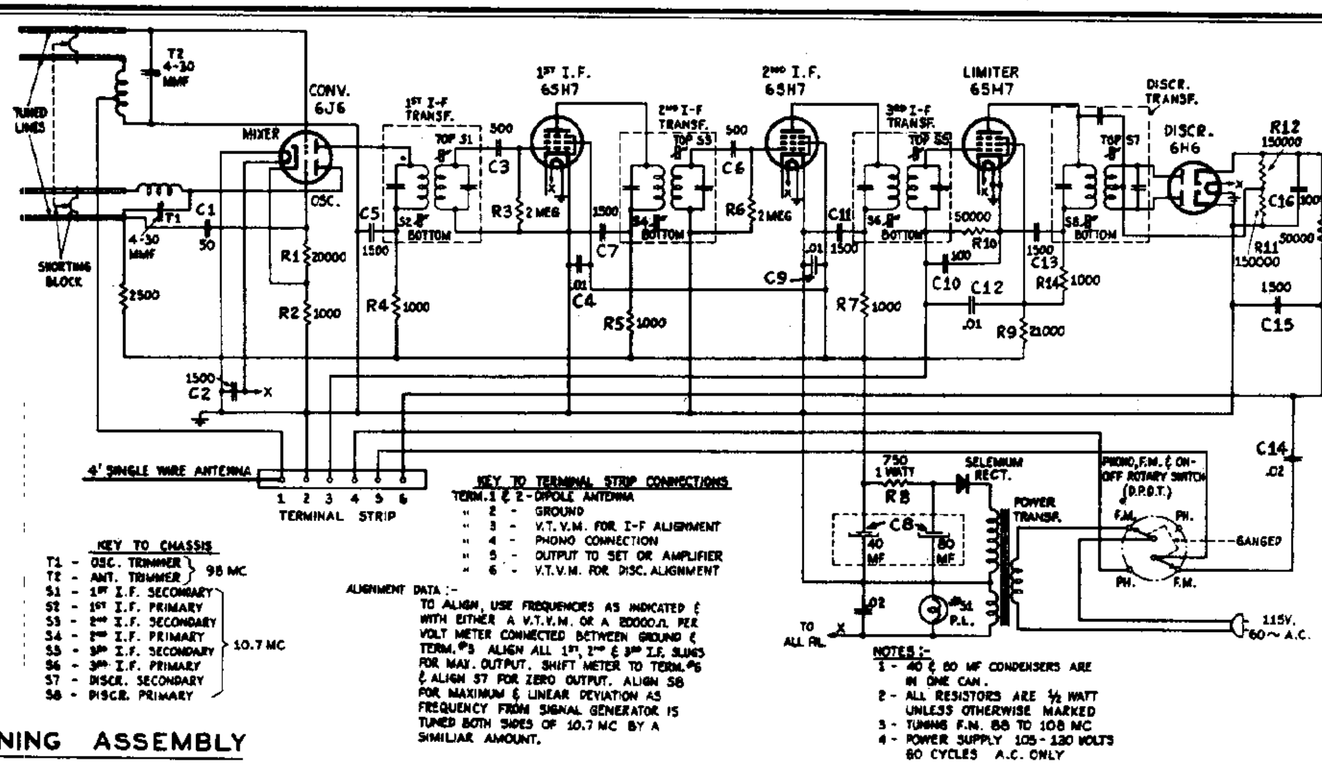
VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS AND ARE TAKEN WITH NO SIGNAL WITH 1000 OHM PER VOLT METER. BAND SWITCH IN FM POSITION FOR ALL TUBES EXCEPT 7Q7 WHERE SWITCH IS IN AM (BC) POSITION. LINE VOLTAGE AT 117 V. WHERE NO READING IS GIVEN VOLTAGE IS ZERO OR TOO LOW TO READ.

* THESE CAPACITORS ARE ENCLOSED IN EACH CAN & ARE PART OF EACH COIL.

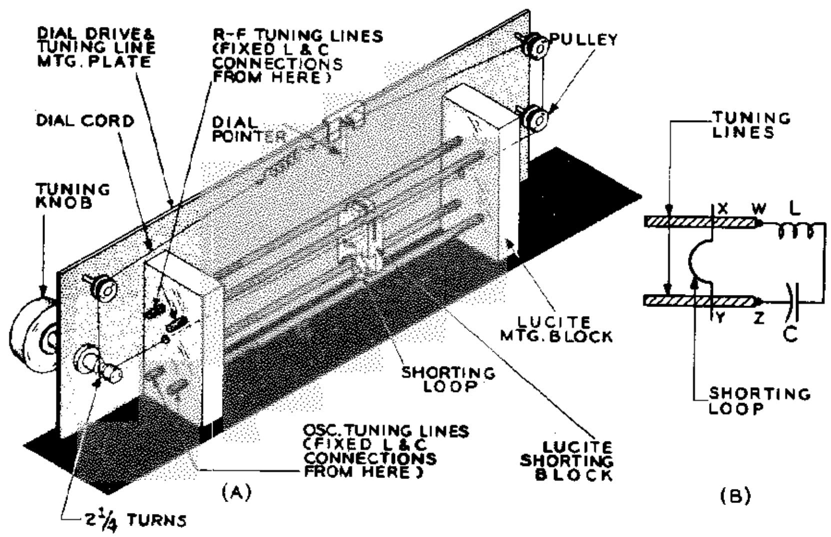
COMPANY, INC.

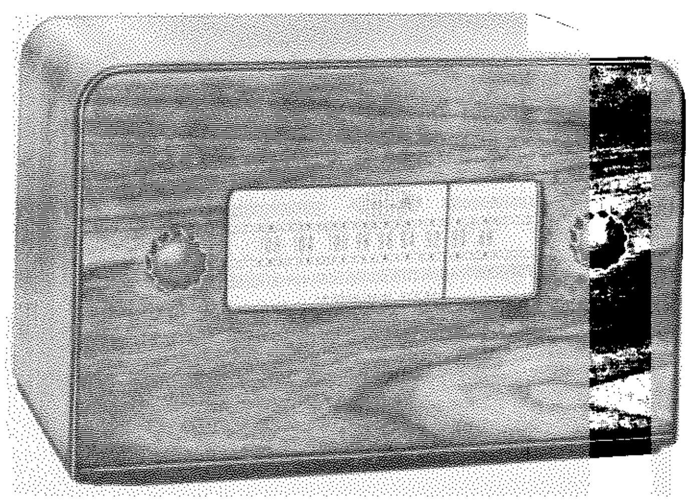

7AG7
2ND I.F.
2ND IF TRANSFORMERS
FM RATIO DET. TRANSFORMER
7A6
RATIO DET.
175V.
170V.
T3
T4
T5
C12 1500 MMF
C13 .01 400V.
R43 2200
R45 220K
R46 470K
C15 1500 MMF
0.75V. 7.8MA
R18 100
C25 .01 200V.
C48 1500 MMF
R50 5K
R49 1K
B+
C27 1500 MMF
R41 22K
C28 .003
C31 250 MMF
R32 10K
R33 10K
R31 220K
C32 4 MFD 250V.
R34 470K
C33 .5 200V.
TO CATHODES OF 7C7 TUBES
C16 1500 MMF
C17 .05 200V.
10 MEG.
1ST AUDIO
6SQ7/GT
70V.
VOLUME R12 500K
C18 .05 200V.
TO R13
R15 10 MEG.
(1ST POSITION "PHONO" NOT SHOWN)
BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. F M BAND
7AH7
I.F.
IST IF TRANSFORMERS
T1
T2
1V. 10.3MA
R11 100
2ND IF TRANSFORMERS
FRONT OF WAFER
C11 .1 200V.
R48 2.2 MEG.
S1
R44 47K
C10 100MMF
C14
R17 - 470K
DET. AVC 1ST AUDIO 6SQ7/GT

F.M. SPECIALTIES, INC.



TUNING ASSEMBLY





MODEL FIDELOTUNER

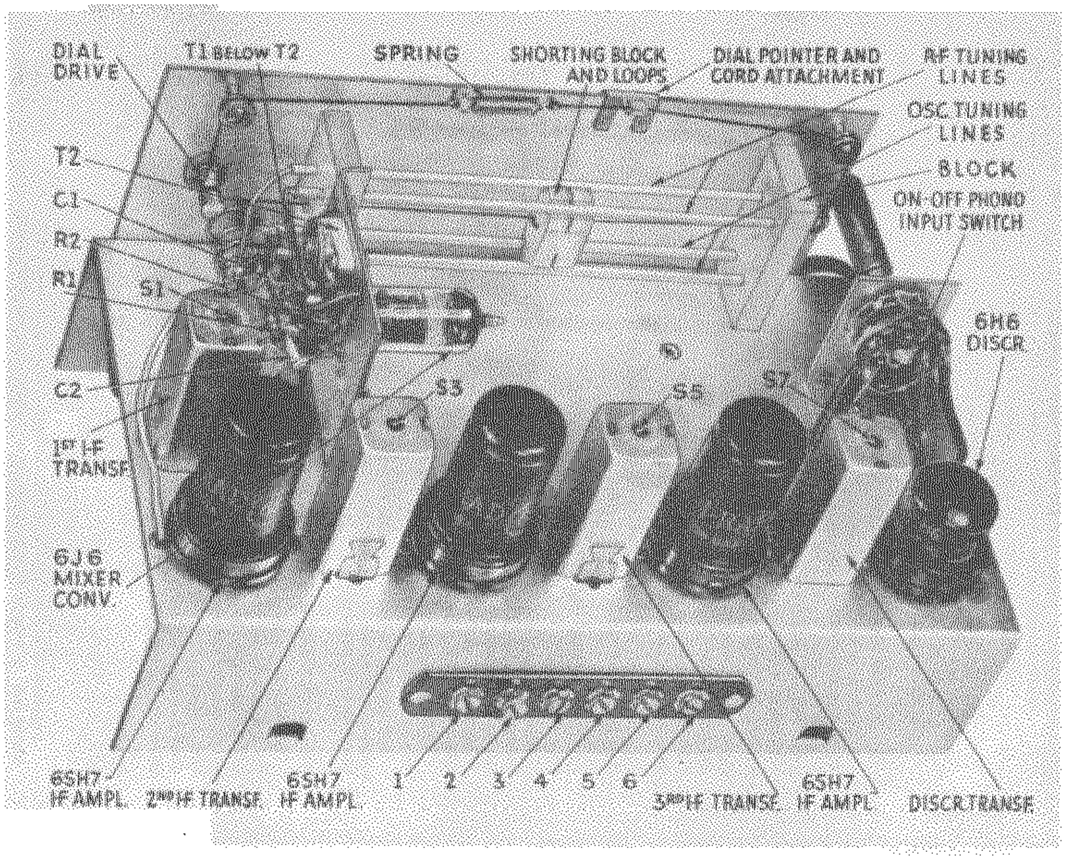
F.M. SPECIALTIES, INC.

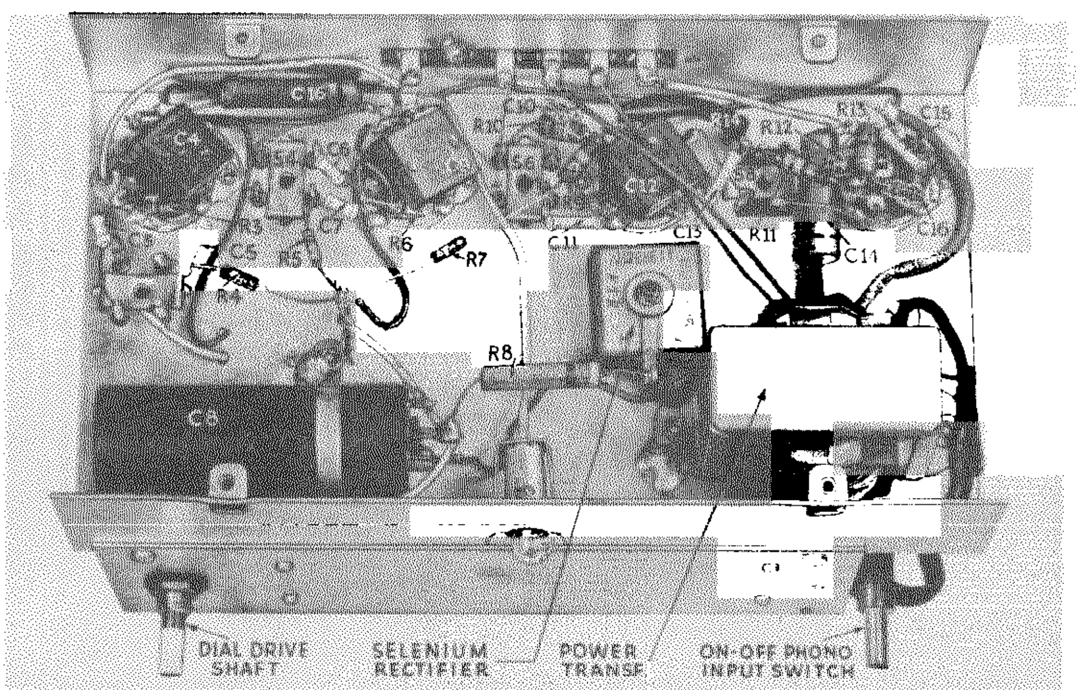
TUBE	PIN	VTVM	20,000 Ω P.V.	1,000 Ω P.V.	RESISTANCE
6J6	1	110	110	110	Over 75 K
Conv	2	92	92	92	Over 75 K
Mixer	3	0	0	0	0
	4	AC	AC	AC	0.2 Ω
	5	-2.5	1	1	22 Ω
	6	0	0	0	0
	7	6.2	4	4	1 Ω
6SH7	1	0	0	0	0
IF Ampl	2	0	0	0	0
	3	0	0	0	0
	4	-4	-0.4	-0.2	2 megs
	5	-	-	-	-
	6	120	120	120	Over 75 K
	7	AC	AC	AC	0.2 Ω
	8	115	115	115	Over 75 K
6SH7	1	0	0	0	0
IF Ampl	2	0	0	0	0
	3	0	0	0	0
	4	-8	-0.6	-0.3	2 megs
	5	0	0	0	0
	6	120	120	120	Over 75 K
	7	AC	AC	AC	0.2
	8	115	115	115	Over 75 K
6SH7	1	0	0	0	0
Limiter	2	0	0	0	0
	3	0	0	0	0
	4	-1.5	-0.4	-0.2	50 K
	5	0	0	0	0
	6	60	60	56	Over 75 K
	7	AC	AC	AC	0.2 Ω
	8	58	58	54	Over 75 K
6H6	1	0	0	0	0
Discr	2	0	0	0	0
	3	-22	-20	16	150 K
	4	-16	-15	8	300 K
	5	-16	-1	-0.4	150 K
	6	-16	-15	-8	350 K
	7	AC	AC	AC	0.2 Ω
	8	0	0	0	0

Selenium rectifier output is 130 V.D.C.

NOTE: All voltage and measurements made with respect to chassis ground and with a line voltage of 116 V.A.C.

NOTE: All measurements were made with the tuned lines shorting bars in the lowest frequency position.


DIAL DRIVE
T1 BELOW T2
SPRING
SHORTING BLOCK AND LOOPS
DIAL POINTER AND CORD ATTACHMENT
RF TUNING LINES
OSC TUNING LINES
BLOCK
ON-OFF PHONO INPUT SWITCH
T2
C1
R2
R1
S1
C2
1ST IF TRANSF.
6J6 MIXER CONV.
S3
S5
S7
6H6 DISCR.
6SH7 IF AMPL.
2ND IF TRANSF.
6SH7 IF AMPL.
1
2
3
4
5
6
3RD IF TRANSF.
6SH7 IF AMPL.
DISCR. TRANSF.


C4
C6
C12
C3
C5
R6
R7
R4
C11
C13
R11
C14
R8
C8
DIAL DRIVE SHAFT
SELENIUM RECTIFIER
POWER TRANSF.
ON-OFF PHONO INPUT SWITCH

In order to operate, the following are necessary:

1. Antenna. (In most cases of local reception, the 4 ft. indoor antenna supplied will be sufficient.)
2. 105-130 volt 60 cycle A.C. power line.
3. A radio receiver, or separate phonograph, record player, or amplifier system.

All connections to and from the Fidelotuner are made to the terminal strip on the rear of the chassis.

CONNECTIONS FROM THE *FIDELOTUNER* TO THE RECEIVER

A shielded cable is supplied with the Fidelotuner for a simple connection from the Fidelotuner to your radio receiver, or separate phonograph, record player, or amplifier system.

You will find this cable already connected to the proper terminals on the Fidelotuner, these terminals being numbers 2 and 5.

The method of connecting the cable to the radio receiver will be determined by whether the receiver is (A) a combination radio-phonograph set, (B) a radio with a phonograph outlet only, (C) a radio without a phonograph or phonograph outlet.

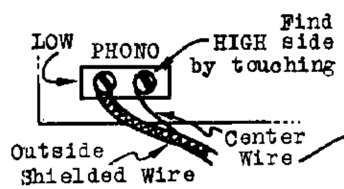
A. COMBINATION RADIO RECEIVER-PHONOGRAPH

Look at the back of your radio receiver chassis for the phonograph terminal. (It will probably be marked PHONO or TELEVISION.) There are three different general types of phonograph terminals on standard radio receivers:

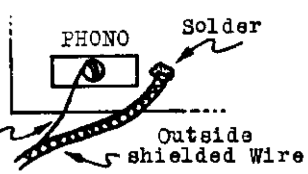
1. *Screw-type Phono Terminal*

In this type, disconnect any wires attached to the phono terminal. Mark the wires for later use.

Locate the *high* side of the phono terminal. Do this by turning the selector switch to phono position while the radio receiver is operating, and touching each of the phono terminal screws. The *high* side will produce speaker hum. (See Fig. 1). Now, to this *high* side, connect the center wire of the cable leading from the Fidelotuner. Next, connect the outside shielded wire of the cable to the other side (the *low* or grounded side) of the phono terminal.



—Fig. 1—



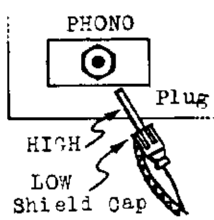
—Fig. 2—

In the event that the phono terminal has only *one screw*, this will be the *high* side, and the center wire of the cable is to be connected to it. The outside shielded wire of the cable connects to the radio receiver chassis; it is best to solder this wire to the chassis. (Fig. 2).

2. *One-hole Plug Type Phono Terminal* (Fig. 3)

Pull out phono terminal plug, and disconnect the wires attached to the plug. Mark wires for later use.

Solder, or otherwise connect the center wire of the cable leading from the Fidelotuner, into the center prong (*high* side) of the plug. Next, connect the outside shielded wire of the cable to the outside shield cap (*low* side) of the plug. Then replace the plug into the single-hole phono terminal.

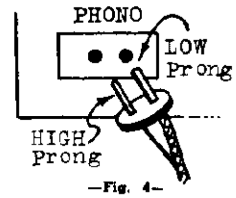


—Fig. 3—

3. *Two-hole Plug Type Phono Terminal* (Fig. 4)

Pull out phono terminal plug, and disconnect wires attached to the plug. Mark wires for later use.

Solder, or otherwise securely connect center wire of cable leading from Fidelotuner, into one prong of the plug (making it the *high* side). Next, solder, or securely connect the outside shielded wire of the cable into the other prong (*low* side) of the plug. Then replace the plug into the phono terminal.



—Fig. 4—

B. RADIO RECEIVER WITH PHONO OUTLET (without phonograph)

Follow the same directions as in A. (Connection to radio receiver with phonograph) except that there will be no phonograph leads to disconnect.

C. RADIO RECEIVER WITHOUT PHONO OUTLET OR PHONOGRAPH

In order to make this connection, the Fidelotuner has to be wired directly into your radio receiver circuit. *A radio service man is needed for this installation.*

CONNECTIONS FROM THE *FIDELOTUNER* TO A SEPARATE PHONOGRAPH, RECORD PLAYER, OR AMPLIFIER SYSTEM

If there is a phono terminal, the Fidelotuner can be connected by following the directions for connecting the Fidelotuner to a radio receiver. (See A. 1, 2, 3, above).

If there is no phono terminal, the connection will involve an installation which must be done by a radio service man.

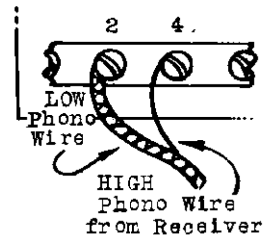
CONNECTIONS FROM RADIO RECEIVER PHONOGRAPH TO *FIDELOTUNER* (Fig. 5)

Wires disconnected from the phonograph terminal of your radio receiver (the wires you marked for later use) are to be connected to the Fidelotuner.

To *terminal* #4 of the Fidelotuner, connect the *high* side of the phonograph wire.

To *terminal* #2 of the Fidelotuner, connect the *low* side of the phonograph wire.

For normal operation of the phonograph in your combination radio-phonograph set, switch the Fidelotuner to OFF position.



—Fig. 5—

ANTENNA CONNECTIONS

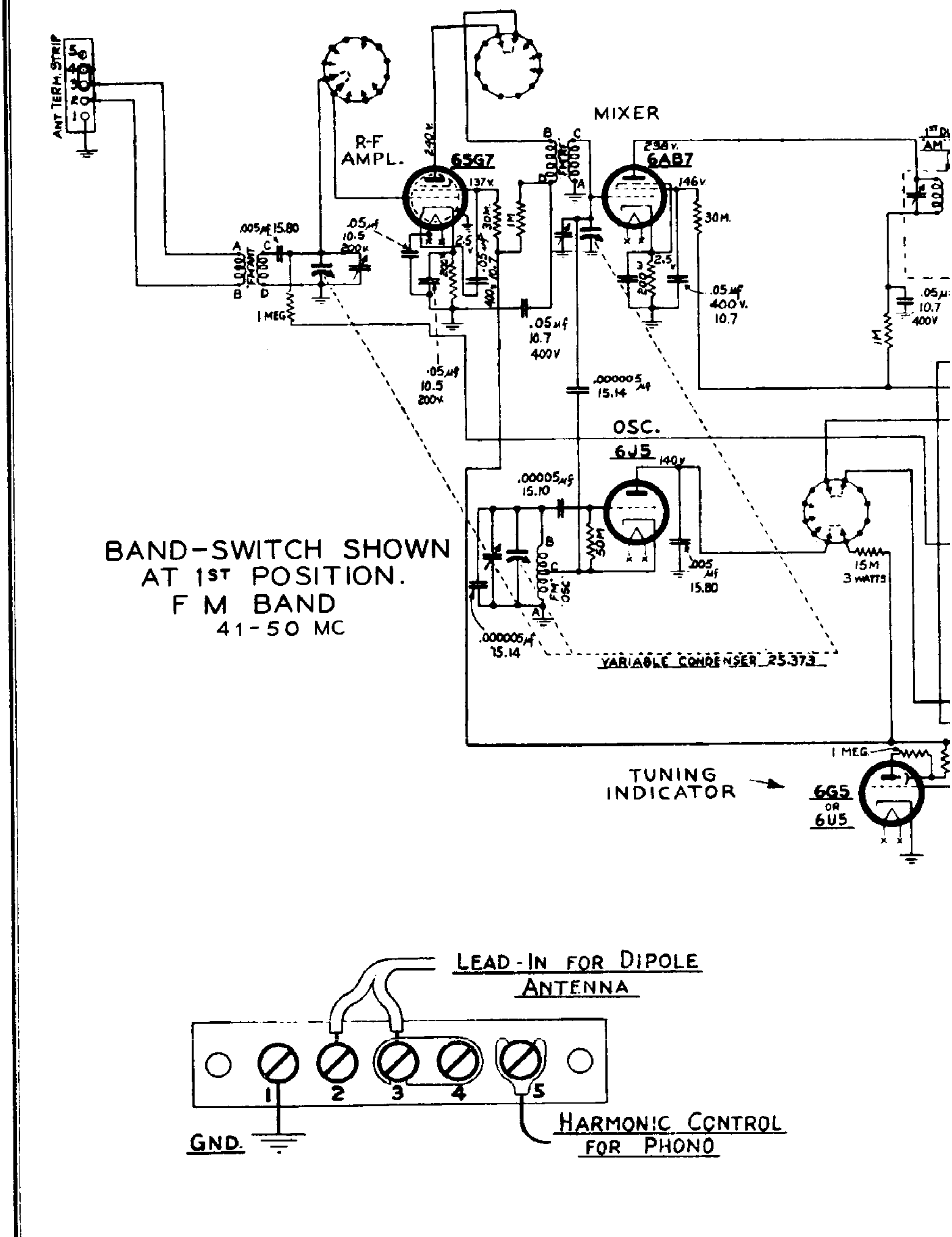
The Fidelotuner is supplied with a 4 ft. indoor antenna which is already connected to the #1 post on the terminal strip. Stretch this wire to its full length. For most city locations where F-M signals are fairly strong, this will suffice. If, however, your location is out of the primary service area, it will be necessary to use an outdoor F-M dipole equipped with a 300 ohm flat line lead-in. This antenna and lead-in is standard, and is easily obtainable from most radio supply stores. The outdoor connections should be made to terminals #1 and #2, after the 4 ft. indoor connection has been disconnected.

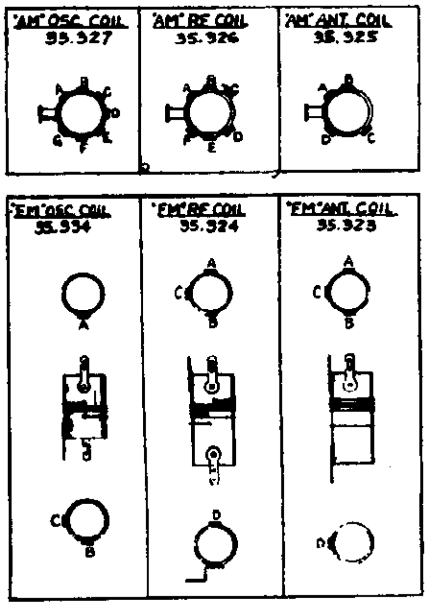
Insulated alignment tools must be used for Fidelotuner alignment. Use a DC output meter with at least a 20 volt range, or a 20,000 ohm per volt meter. Use a signal generator covering frequencies of 10.7, 90 and 106 mc.

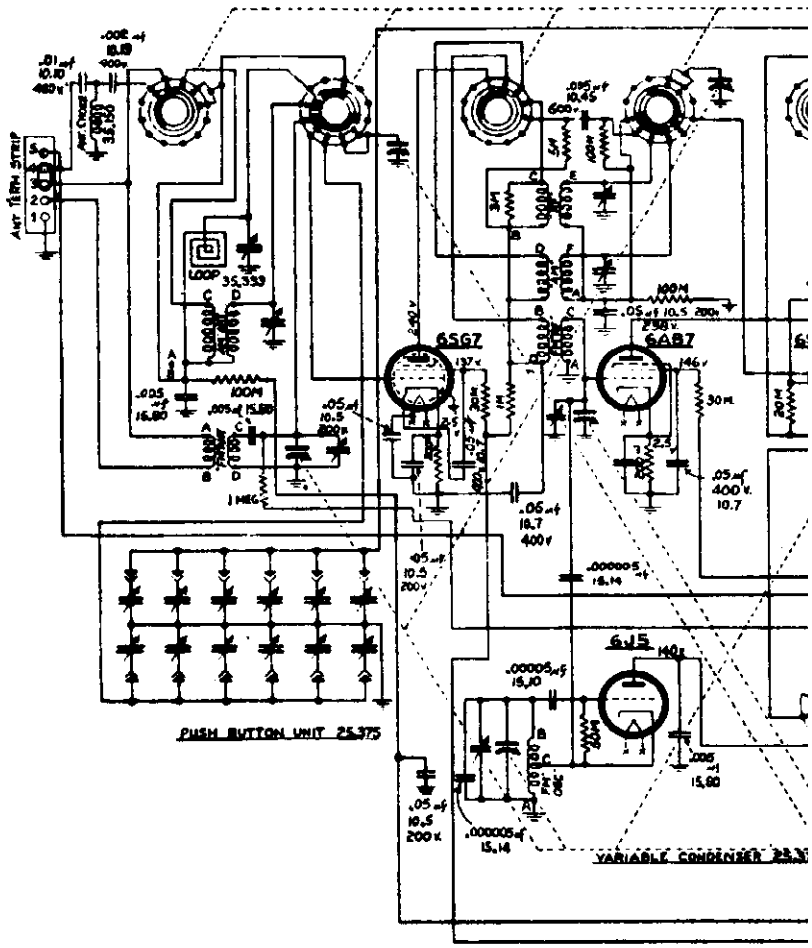
Before making any adjustments, let the Fidelotuner warm up for at least a half hour.

"clarified

FADA RADIO AND



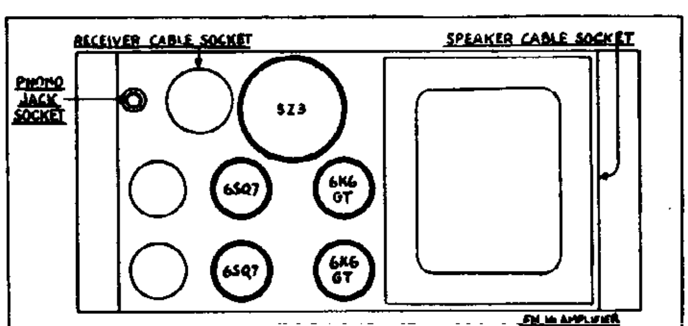




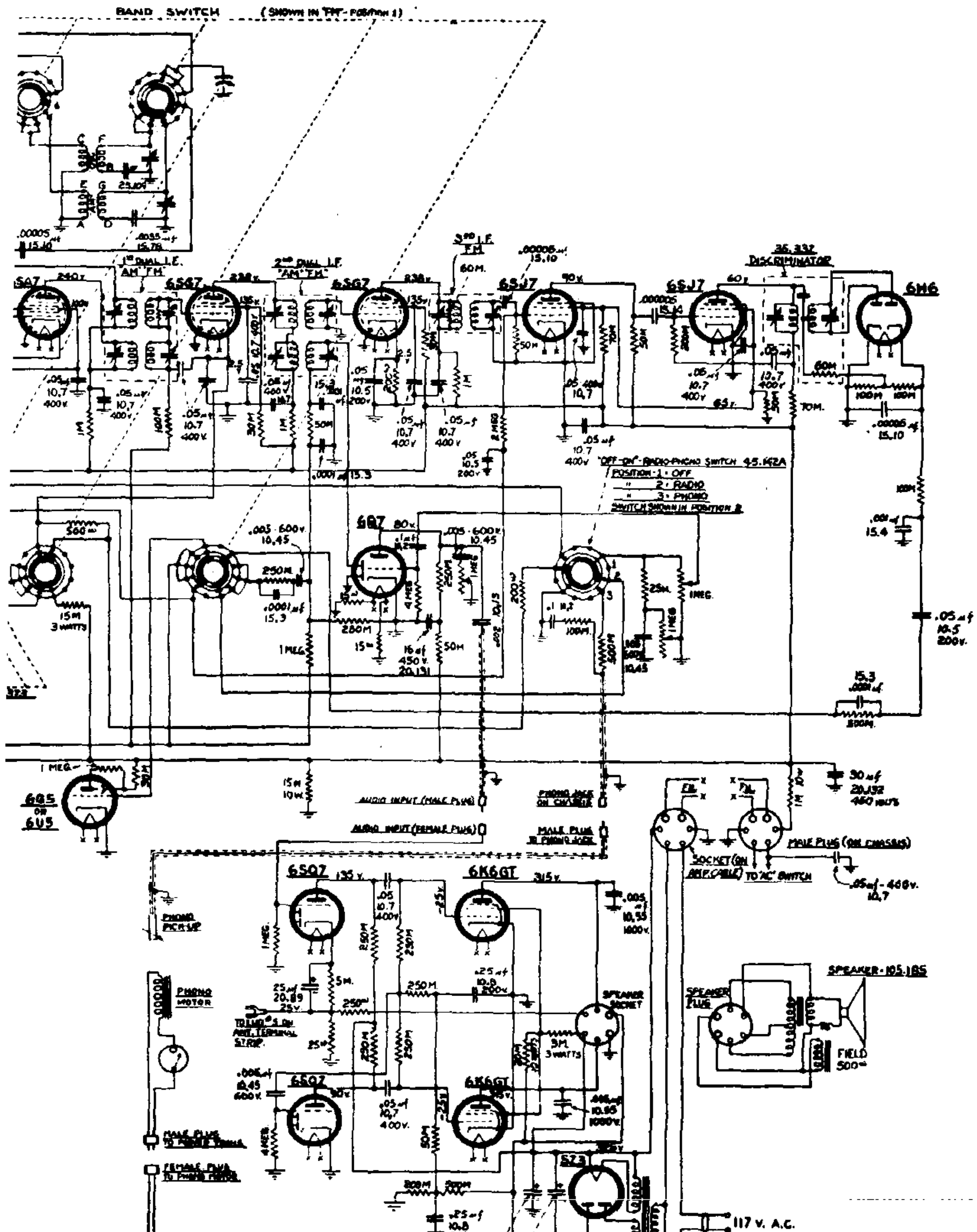
FREQUENCY RANGE -
"FM" - - - - 41 - 50 MC.
BROADCAST - 540 - 1620 KC
SHORT WAVE - 4.7 - 16 MC

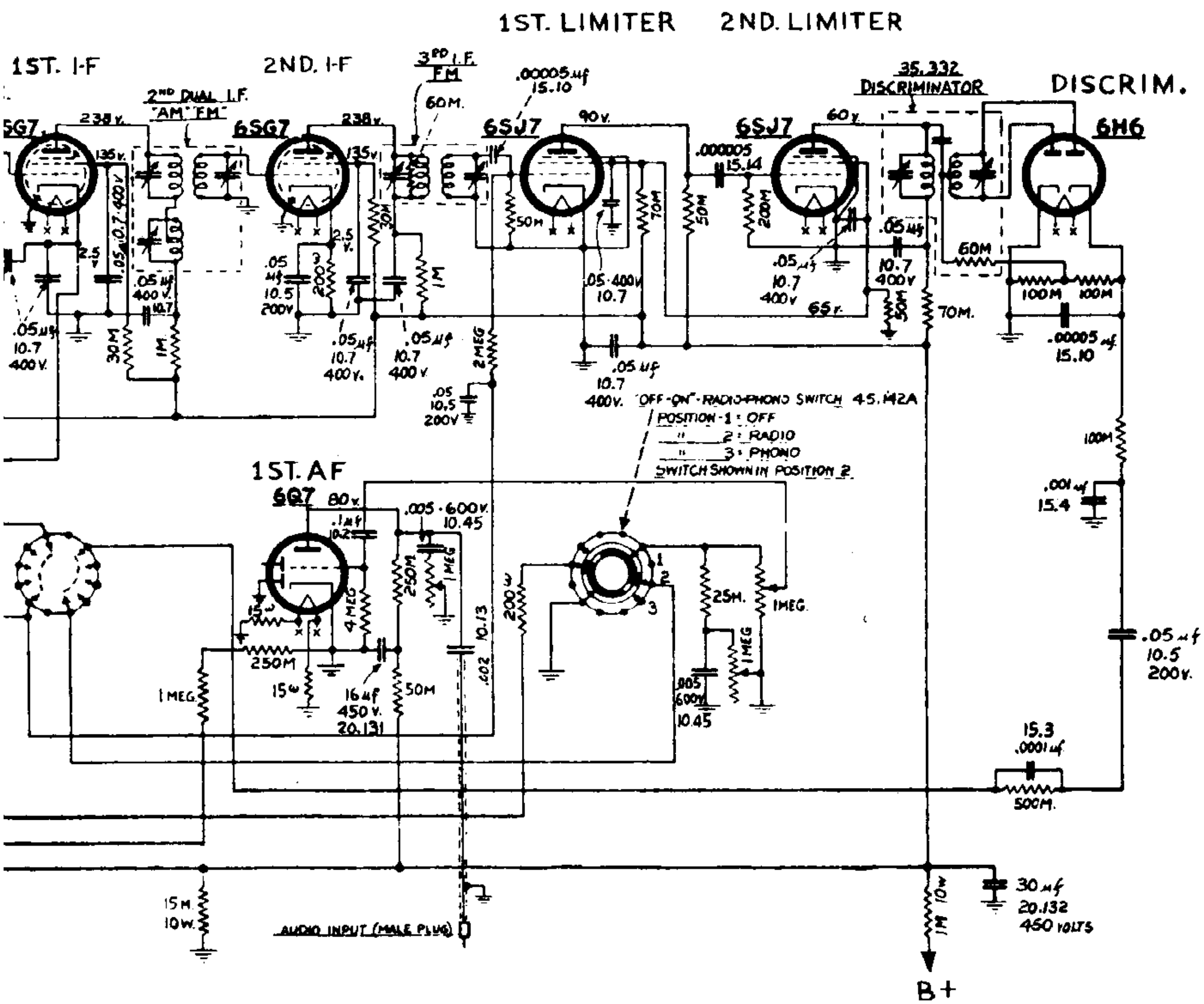
⏚ - CHASSIS
M - THOUSAND OHMS

VOLTAGES MEASURED TO GROUND WITH 1000 OHMS PER VOLT VOLTMETER

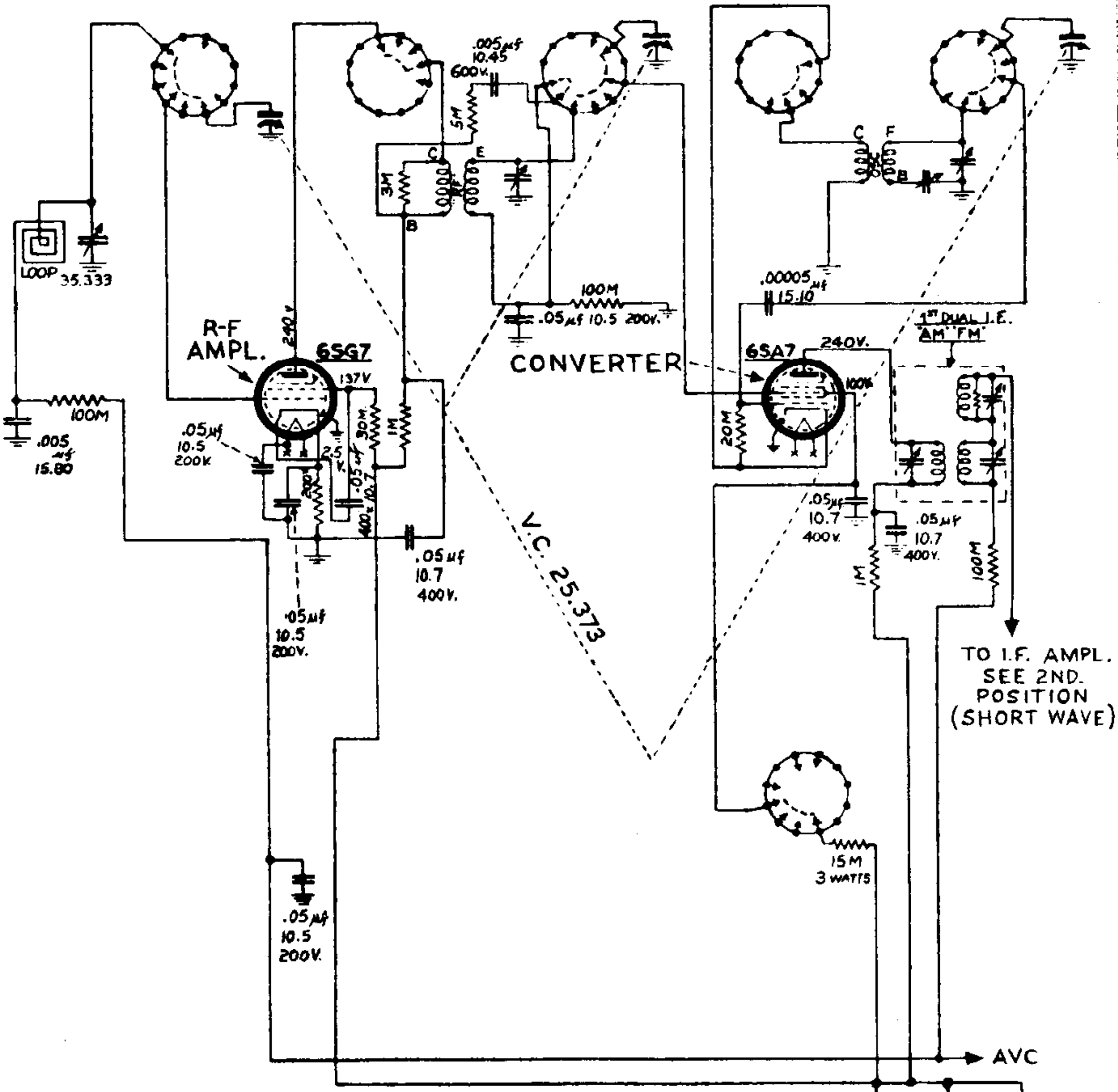


TUBE LAYOUT

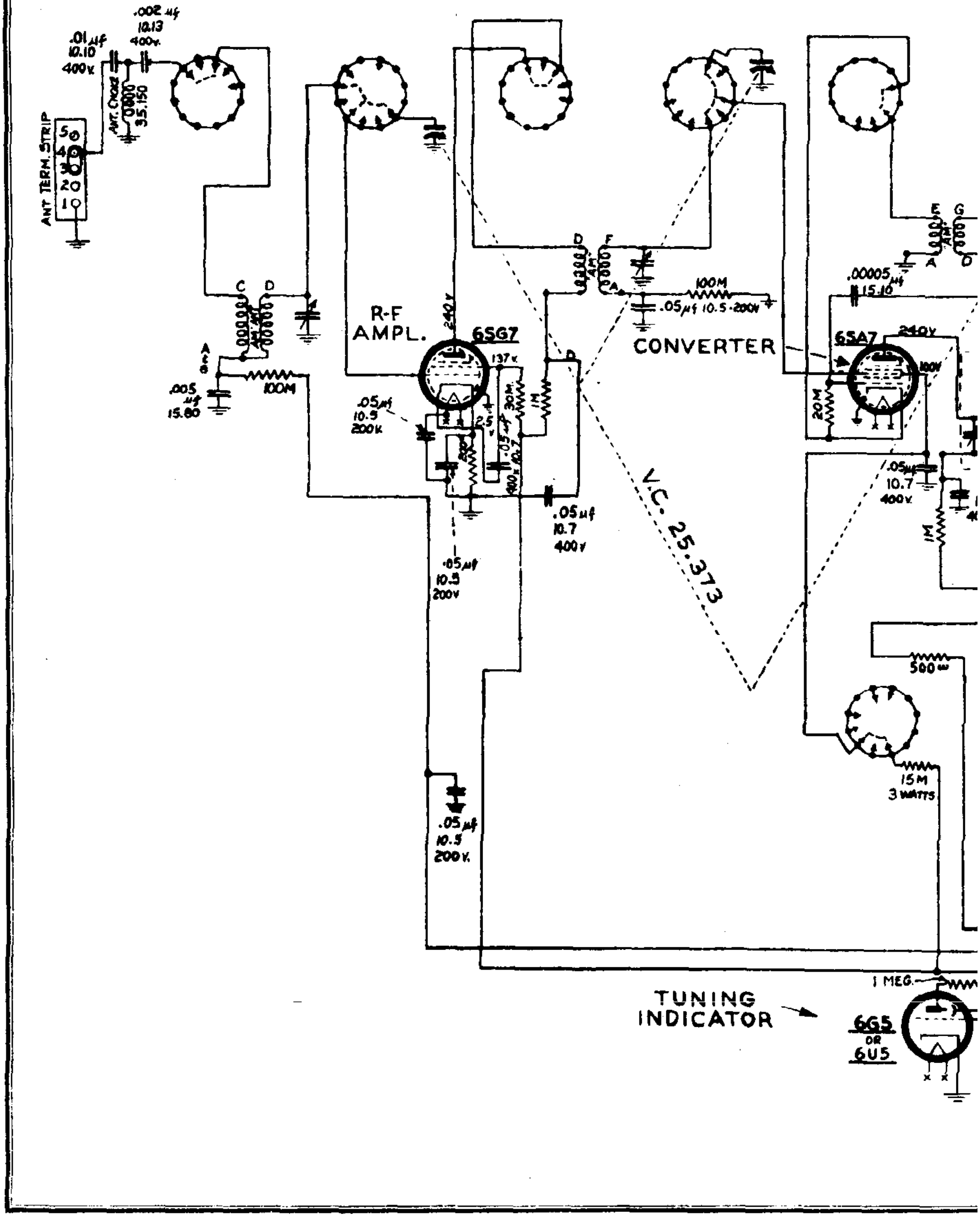

BAND SWITCH (SHOWN IN "FM" POSITION 1)
1st DUAL I.F. "AM" "FM"
2nd DUAL I.F. "AM" "FM"
3rd I.F. FM
DISCRIMINATOR
6SA7
6SG7
6SG7
6SJ7
6SJ7
6H6
6Q7
6G5 OR 6U5
"OFF-ON" RADIO-PHONO SWITCH 45.162A
POSITION 1 - OFF
2 - RADIO
3 - PHONO
SWITCH SHOWN IN POSITION 2
AUDIO INPUT (MALE PLUG)
AUDIO INPUT (FEMALE PLUG)
PHONO JACK ON CHASSIS
MALE PLUG TO PHONO JACK
PHONO PICK-UP
PHONO MOTOR
6SQ7
6K6GT
6SQ7
6K6GT
5Z3
SPEAKER SOCKET
SPEAKER PLUG
SPEAKER - 105.185
FIELD 500
SOCKET (ON AMP. CABLE) TO "AC" SWITCH
MALE PLUG (ON CHASSIS)
117 V. A.C.
FIL. 6.3v
30-30 mf 20.144 450v

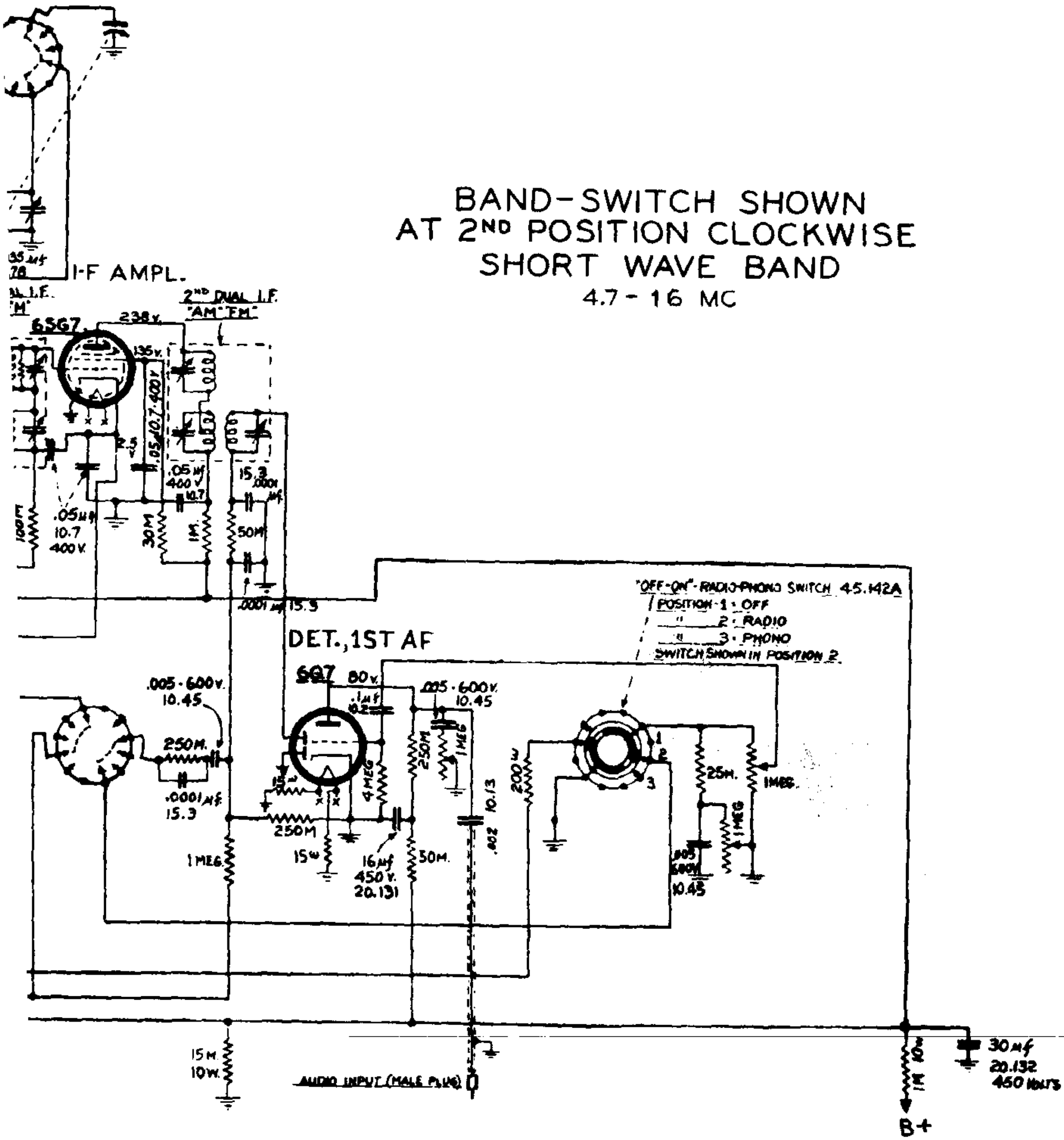

1ST. LIMITER
2ND. LIMITER
1ST. I-F
2ND. I-F
DISCRIM.
6SG7
6SJ7
6H6
1ST. AF
6Q7
35.332 DISCRIMINATOR
"OFF-ON"-RADIO-PHONO SWITCH 45.142A
POSITION-1: OFF
" 2: RADIO
" 3: PHONO
SWITCH SHOWN IN POSITION 2
AUDIO INPUT (MALE PLUG)
B+

FADA RADIO AND ELECTRIC CO., INC.

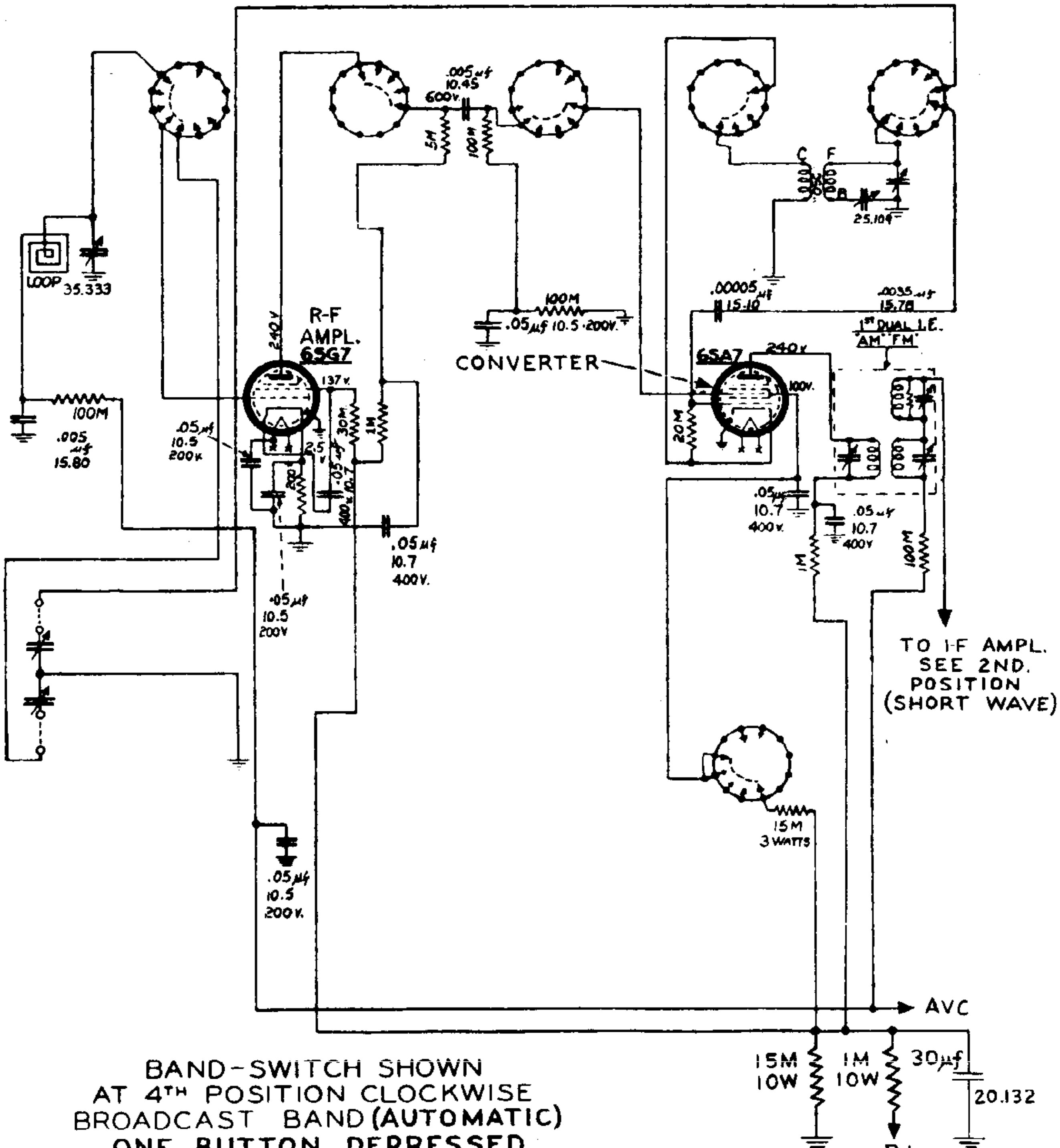


BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
BROADCAST BAND
540-1620 KC.


ANT. TERM. STRIP
.01 µf 10.10 400v.
.002 µf 10.13 400v.
ANT. CHOKE 35.150
.005 µf 15.80
100M
R-F AMPL.
6SG7
240v
137v.
.05 µf 10.5 200v
30M
1M
.05 µf 10.7 400v
.05 µf 10.5 200v
.05 µf 10.5 200v.
100M
.05 µf 10.5-200v
CONVERTER
V.C. 25.373
.00005 µf 15.10
6SA7
240v
100v
20M
.05 µf 10.7 400v.
1M
500
15M 3 WATTS
1 MEG.
TUNING INDICATOR
6G5 OR 6U5

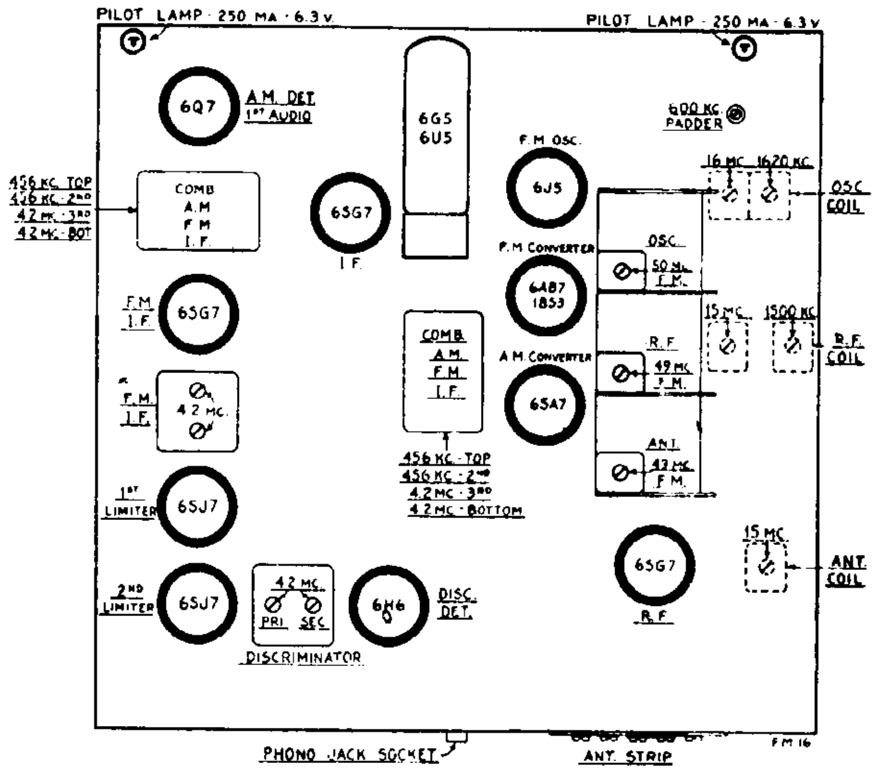

BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND
4.7 - 16 MC
I-F AMPL.
2ND DUAL I.F. "AM" "FM"
6SG7
238 V.
135 V.
.05 10.7 400 V
.05 μf 400 V 10.7
.05 μf 10.7 400 V
30 M
1M
50M
15.3 .0001 μf
.0001 μf 15.3
DET., 1ST AF
6Q7
80 V.
"OFF-ON"-RADIO-PHONO SWITCH 45.142A
POSITION-1-OFF
" 2-RADIO
" 3-PHONO
SWITCH SHOWN IN POSITION 2.
.005-600 V. 10.45
250M.
.0001 μf 15.3
1 MEG.
250M
15 W
4 MEG
16 μf 450 V. 20.131
50M.
250M
1 MEG
10.13
.002
200 W
25M.
1 MEG.
.005 600 V 10.45
15 M. 10 W.
AUDIO INPUT (MALE PLUG)
30 μf 20.132 450 VOLTS
B+

FADA RADIO AND ELECTRIC CO., INC.



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE
BROADCAST BAND (AUTOMATIC)
ONE BUTTON DEPRESSED

FADA RADIO AND ELECTRIC CO., INC.



FREQ. RANGE
B.C. - 540 TO 1620 KC.
S.W. - 4.7 TO 16 MC.
F.M. - 41 TO 50 MC.

TUBE LAYOUT AND TRIMMER LOCATIONS

MODEL FM 16

SPECIAL INSTRUCTIONS FOR SETTING AUTOMATIC PUSH-BUTTON STATION SELECTORS

Set Wave Band Switch to BROADCAST (Third position from left) and tune in the LOWEST FREQUENCY STATION desired. Next turn the switch to the extreme RIGHT and push down the button on the extreme right until a "click" is heard indicating that the Automatic Tuning is engaged. A small screw driver is inserted through "station indicator" slot directly above push-button and the LARGE SCREW visible is turned until desired station is "tuned-in". Adjustment must be very carefully made. Use the Magic Eye which will be closed to minimum position when the station has been properly "tuned in".

Further adjustment is then made by turning the SMALL SCREW next to the Large Screw. Watch the MAGIC EYE as this screw is being turned until the minimum opening is observed.

The push-button has now been properly adjusted to the first station desired. Remove the station call letters from the sheet supplied and insert in indicator slot. Cover with celluloid tab for protection.

Return Wave Band Switch to BROADCAST position and tune in next higher frequency station desired. Then turn the switch to the extreme right and "engage" the next push-button. Tune in as instructed above and follow same procedure for the balance of the stations desired.

For AM alignment see page 17-10
For FM alignment see page 17-11

FADA RADIO AND ELECTRIC CO., INC.

ALIGNMENT PROCEDURE FOR A.M.

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:
Volume Control full on.
Low range A.C. meter connected across voice coil to indicate output.
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.
Make certain that dial pointer covers entire dial scale and is balanced on both ends of the dial.

RECEIVER DIAL AT	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
A.M. I.F.	Exactly 456 KC	.1 mfd	Control grid of 6SA7 tube	Adjust for maximum output all A.M. IF. Trimmers (see tube layout sheet)
Full Open	Exactly 1620 KC	.1 mfd	Control grid of 6SA7 tube	Adjust for maximum output BROADCAST Osc. Trimmer
Approx. 1500 KC	Approx. 1500 KC	-	Lay Generator lead near Loop Antenna	Adjust for maximum output (R.F. Trimmers)
Approx. 600 KC	Approx. 600 KC	-	Lay Generator lead near Loop Antenna	Adjust padder condenser for maximum output while rocking Variable Condenser
Exactly 16 MC	Exactly 16 MC	400 ohms	Terminal strip on rear of chassis #3 screw with shorting bar in place	Adjust Oscillator Trimmer
Approx. 15 MC	Approx. 15 MC	400 ohms	Terminal strip on rear of chassis #3 screw with shorting bar in place	Adjust R.F. and Antenna trimmers for maximum output while rocking Variable Condenser. Check Image frequency (Image should be below the fundamental frequency)

For trimmer locations see page 17-9

FADA RADIO AND ELECTRIC CO., INC.

ALIGNMENT PROCEDURE (F.M. SECTION)
(Using Standard AM Signal Generator and Vacuum Tube Volt Meter method)

(Dummy Antenna- 400 ohms and .1 mfd paper condenser)

1. Align AM section first.
2. Set band switch to F.M. position and set Receiver dial to highest frequency (Variable condenser fully open).
3. F.M. Discriminator and I.F. alignment:
   Feed into last I.F. grid (last 6SG7 Tube) exactly 4.2 MC (unmodulated). Align last I.F. for maximum signal. (Use V.T. meter as a visual output meter, by connecting V.T. meter across 1st 6SJ7 grid load resistor).
4. Aligning Discriminator coil:
   With signal generator on last 6SG7 grid, detune secondary section of Discriminator coil completely. Align primary section of Discriminator coil for maximum output. (Use V.T. meter as a visual indicator - meter set to lowest range and connected across 6H6 tube diode load resistors and ground).
5. Increase signal generator output until Magic Eye tube shows maximum opening. Do not change output of generator during entire Discriminator alignment.
6. With V.T. meter in same position as above align secondary section of Discriminator coil for zero output. This point can be located easily, as a slight rotation of the trimmer will change the polarity of the voltage being measured at the diode load resistors.
7. After secondary section is aligned to zero output <u>increase</u> and then <u>decrease</u> the signal generator frequency in steps of 25 KC and note voltage reading and polarity. The voltage output at 4.225 MC and 4.175 MC should be exactly the same only different in polarity. Repeat the above procedure with the signal set to 50 KC above and then 50 KC below 4.2 MC. Repeat again with signal generator set to 75 KC, 100 KC, and 125 KC above and below the I.F. frequency (4.2 MC).

8. Retouch Primary if necessary in order to balance voltages on either side of resonance (4.2 MC). Reset secondary for zero if necessary and repeat procedures #6 and #7 until output is balanced. (A graph of voltage vs frequency will show a straight line characteristic from + 125 KC to - 125 KC.

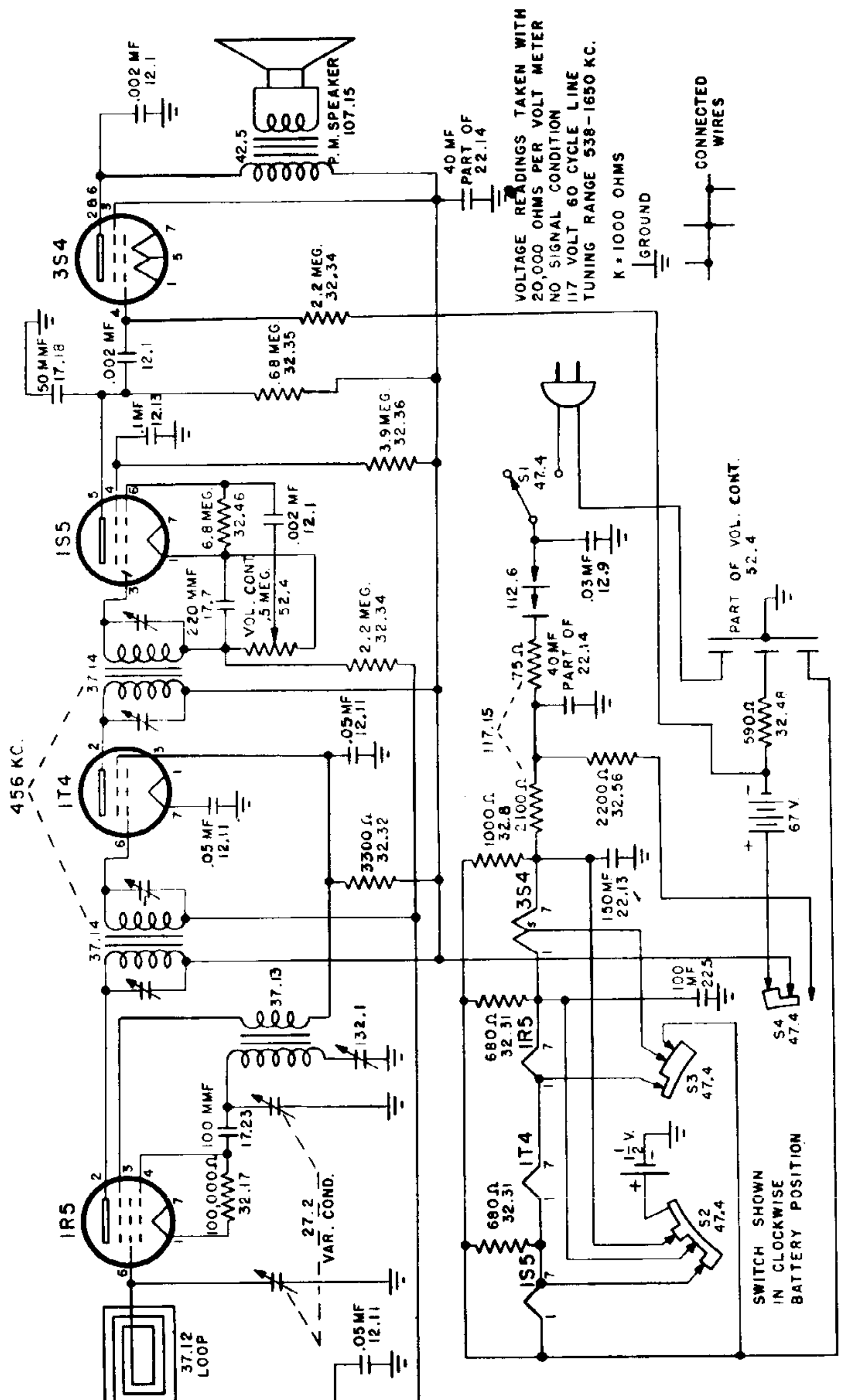
9. F.M. - I.F., R.F. Alignments:
   Set signal generator to exactly 4.2 MC. Feed signal into converter tube to control grid (6AB7 - 1853). Connect V.T. meter across grid load resistor of first limiter tube (1st 6SJ7) using V.T. meter as an output indicator, feed in enough signal so that V.T. meter will show less than half scale deflection on lowest range and align all I.F. trimmers for maximum output.

10. Set Receiver to exactly 49 MC.
    Connect signal generator to #3 terminal of Antenna strip with shorting bar in place. Adjust oscillator trimmer on F.M. section of Variable condenser for maximum output (using V.T. meter as a visual indicator). Set R.F. and antenna trimmers (also located on Variable condenser) for maximum output.

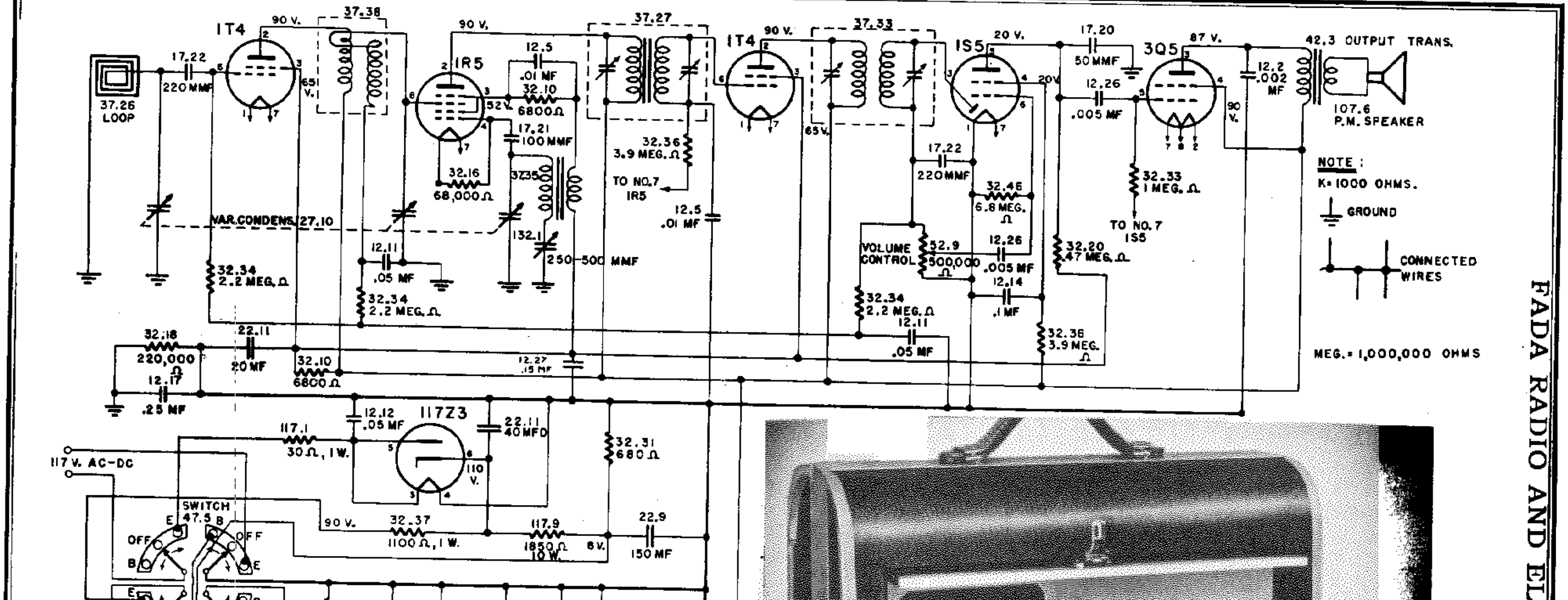
11. Connect antenna to antenna mounting strip. (on rear of chassis). Check calibration of Receiver against a known station. If station frequency does not correspond with dial setting then the Receiver oscillator section is not correctly calibrated and procedure #10 should be repeated.

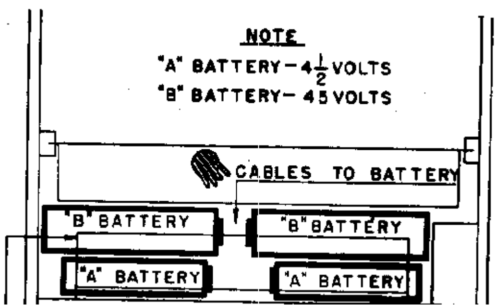
For transformer locations see page 17-9

FADA RADIO AND ELECTRIC CO., INC.



For alignment see Procedure (A), How It Works



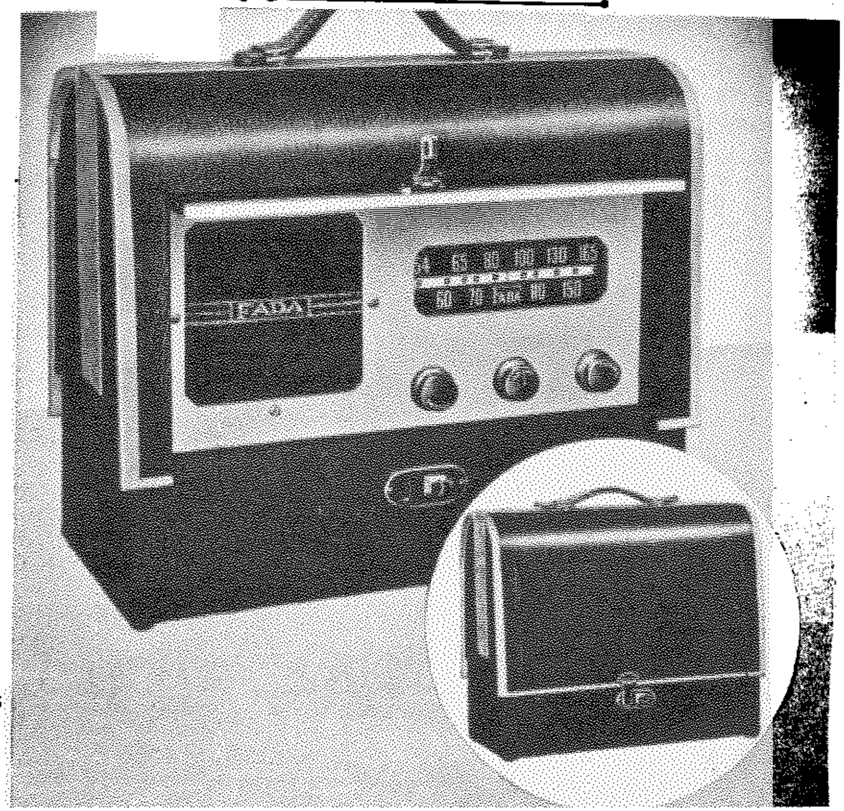


ALL VOLTAGES MEASURED TO COMMON
VOLTAGE READINGS TAKEN WITH
20,000 OHMS PER VOLT METER
117 VOLT 60 CYCLE LINE
TUNING RANGE 538-1650 Kc

I.F. Circuits: 456 KC

Speaker Voice Coil: 3.2 ohms

Speaker Transformer:
8500 ohms — 400 cycles



FADA RADIO AND ELECTRIC CO., INC.

Alignment Procedure for Model P82

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

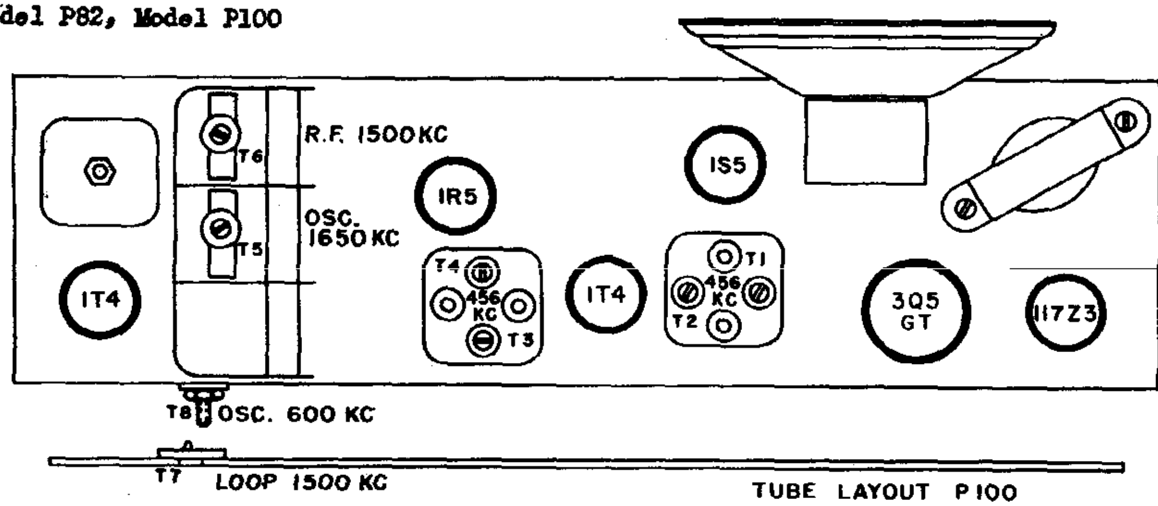
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

REMOVE CHASSIS BOTTOM PLATE

RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1 Fully closed	Exactly 456 KC	1. MF	Common Ground and Control Grid 1R5 top front section vari. cond.	Adjust for maximum output T1, T2, T3, and T4
2 Fully closed	Approx. 538 KC	1. MF	Control Grid 1T4 top rear section vari. condenser	Adjust for maximum output T8
3 Fully open	Exactly 1650 KC	1. MF	Control Grid 1T4 top rear section vari. cond.	Adjust for maximum output T5
REPEAT OPERATIONS 2 and 3.				
4 Approx. 1500 KC	Approx. 1500 KC	1. MF	Control Grid 1T4 same as N. 3	Adjust for maximum output T6
The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed				
5 Approx. 1500 KC	Approx. 1500 KC		Radiating Loop 20" from receiver	Adjust T7 for maximum output
6 Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from receiver	Adjust T8 for maximum while rocking variable condenser

Model P82, Model P100



TUBE LAYOUT P100 P82

TUNING RANGE 538-1650 KC

FADA RADIO AND ELECTRIC CO., INC.

Model P 82   Model P 100

Power Supply: 105-125V., 40-60 cyles AC
Same Voltage DC, 15 Watts Power Consumption
Battery Operation: 9 V.A — 90 V.B
Frequency Range: 1650 - 540 KC
I.F. Circuits: 456 KC

Tubes: 1T4 R.F. Amplifier — 1S5 Det Avc. A.F.
1R5 Osc. Converter — 3Q5 Power Output
1T4 I.F. Amplifier — 117z3 Rectifier

Speaker: 5" P.M., 1.47 oz. Alnico V Magnet
Speaker Transformer: 8500 ohms - 400 cycles
Speaker Voice Coil: 3.2 ohms

Part No.	Description
12.2	Tubular Condenser .002 mf 600 V
12.5	Tubular Condenser .01 mf 200 V
12.11	Tubular Condenser .05 mf 200 V
12.12	Tubular Condenser .05 mf 400 V
12.14	Tubular Condenser .1 mf 200 V
12.17	Tubular Condenser .25 mf 400 V
12.26	Tubular Condenser .005 mf 400 V
12.27	Tubular Condenser .15 mf 200 V
17.20	Mica Condenser 50 mmf ±10%
17.22	Mica Condenser 220 mmf ±10%
17.21	Mica Condenser 100 mmf ±10%
22.9	Electrolytic Condenser 150-150mf — 15 W.V.
22.11	Electrolytic Condenser 40-30-20 mf — 150 W.V.
27.10	3 Section Variable Condenser 397 mmf
37.26	Loop Antenna w Trimmer
37.27	Input I.F. Transformer
37.33	Diode I.F. Transformer
37.35	Oscillator Coil
37.30	R. F. Coil
52.9	Volume Control
47.5	Battery Electric Changeover Switch
77.54	Dial Pointer
77.50	Dial Scale (Calibrated)
97.92	Cabinet
42.3	Output Transformer
107.6	5" P. M. Speaker
117.9	1850 ohm 10-W W.W. Resistor
132.1	Padder Condenser
142.30	Tuning Knob
142.29	Volume Knob
142.28	Battery-Off-Electric Knob

The following apply to Model P82 only.

Part No.	Description
97.51	Cabinet
117.1	30 ohm 1 W — W.W. Resistor
142.12	Tuning Knob (wood)
142.13	Volume Knob (wood)
142.14	Battery-Off-Electric Knob (wood)

Models 711 and 740

Power supply: 40-60 cycles, 105-125V AC
Same Voltage DC
Power consumption: 30 Watts
Frequency Range: 530-1680 KC
I.F. Circuits: 456 KC

Tubes: Osc.-Converter 12BE6
I.F. Amplifier 12BA6
Det. Avc. A.F. 12AT6
Power Output 50B5
Rectifier 35W4

Speaker: 4" P.M. 1 oz. "Alnico V" Magnet
Speaker Transformer: 2500 ohms—400 cycles
Speaker Voice Coil: 3.2 ohms

Part No.	Description
12.4	Tubular Condenser, .005 mf, 600 V
12.6	Tubular Condenser, .01 mf, 400 V
12.9	Tubular Condenser, .03 mf, 400 V
12.11	Tubular Condenser, .05 mf, 200 V
12.12	Tubular Condenser, .05 mf, 400 V
17.5	Mica Condenser, 100 mmf, ±10%
17.8	Mica Condenser, 250 mmf, ±20%
22.16	3 Section Electrolytic Condenser 30-40-20 mf, 150 W.V.
27.17	Variable Condenser
37.57	Oscillator Coil
37.56	Loop Antenna
37.62	Input I.F. Transformer, complete
37.62	Output I.F. Transformer, complete
52.15	Volume Control with Switch
72.1	Power Cord (Approved)
77.86	Dial Scale (Calibrated)
77.87	Dial Pointer
77.85	Dial Crystal
97.73W	Cabinet, Bakelite-Walnut
97.73V	Cabinet, Bakelite-Ivory
142.27W	Cabinet Knobs—Walnut
142.27V	Cabinet Knobs—Ivory
107.16T	4" P.M. Speaker with Transformer
107.16	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for above
117.1	30 ohm 1 W. Resistor

Models 711 and 740

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

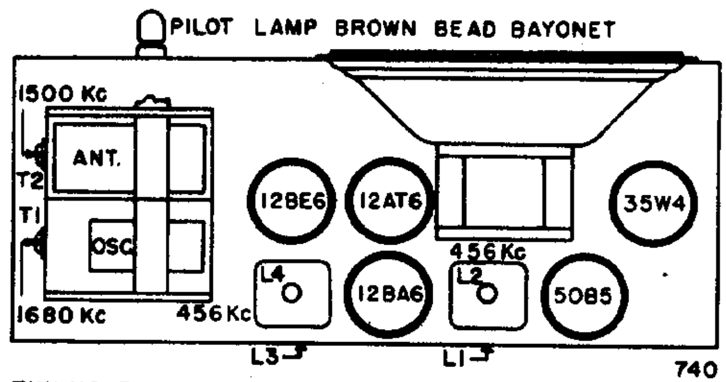
Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

Make certain that dial pointer is exactly horizontal when variable condenser is fully meshed.

	Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1	Full Open	Exactly 456 KC	.1 MF	Control Grid 12BE6 Tube (Top) Front Section Variable Condenser	Adjust for Maximum Output L1, L2, L3 & L4
2	Full Open	Exactly 1680 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Adjust for Maximum Output T1
3	Approx. 1500 KC	Approx. 1500 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Adjust for Maximum Output T2
4	Approx. 600 KC	Approx. 600 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Check tracking and bend slotted end plate (front section) of variable, if necessary.
5					

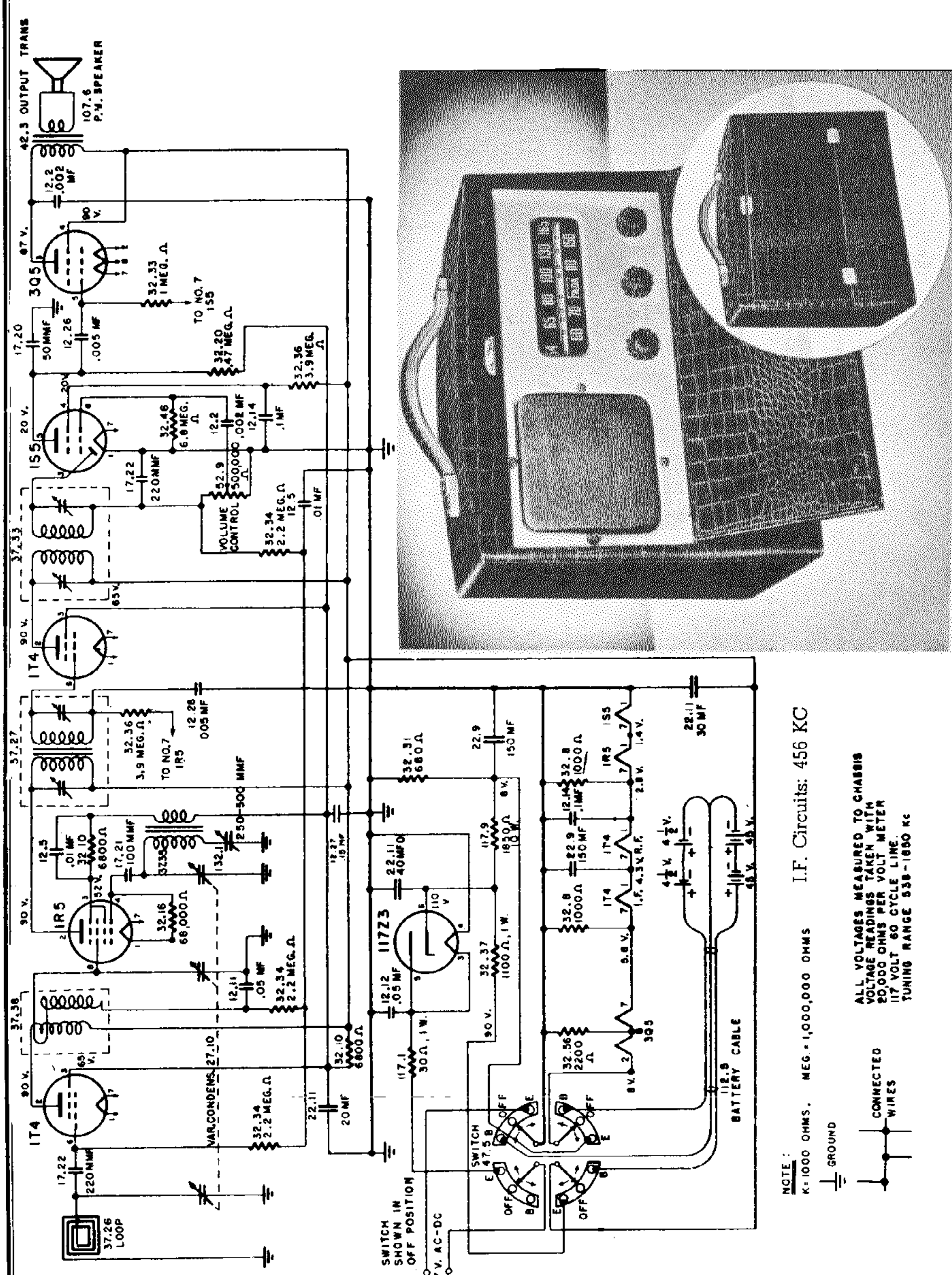


TUNING RANGE 530-1680 Kc

TUBE LAYOUT

MODEL P100

FADA RADIO AND ELECTRIC CO., INC.



ALIGNMENT PROCEDURE Model P 100

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

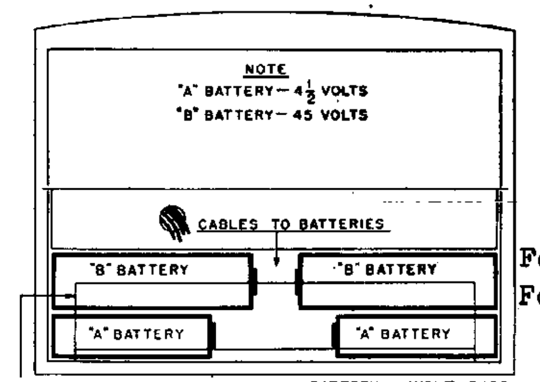
Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain ½ scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

REMOVE CHASSIS BOTTOM PLATE

	RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1	Fully closed	Exactly 456 KC	.1 MF	Common Ground and Control Grid 1R5 top front section var. cond.	Adjust for maximum output T1, T2, T3, and T4.
2	Fully closed	Approx. 538 KC	.1 MF	Control Grid 1T4 top rear section var. condenser	Adjust for maximum output T8
3	Fully open	Exactly 1650 KC	.1 MF	Control Grid 1T4 top rear section var. cond.	Adjust for maximum output T5
REPEAT OPERATIONS 2 and 3.					
4	Approx. 1500 KC	Approx. 1500 KC	.1 MF	Control Grid 1T4 same as No. 3	Adjust for maximum output T6
The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed					
5	Approx. 1500 KC	Approx. 1500 KC	.1 MF	Radiating Loop 20" from Receiver	Adjust T7 for maximum output
6	Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from Receiver	Adjust T8 for maximum while rocking variable condenser

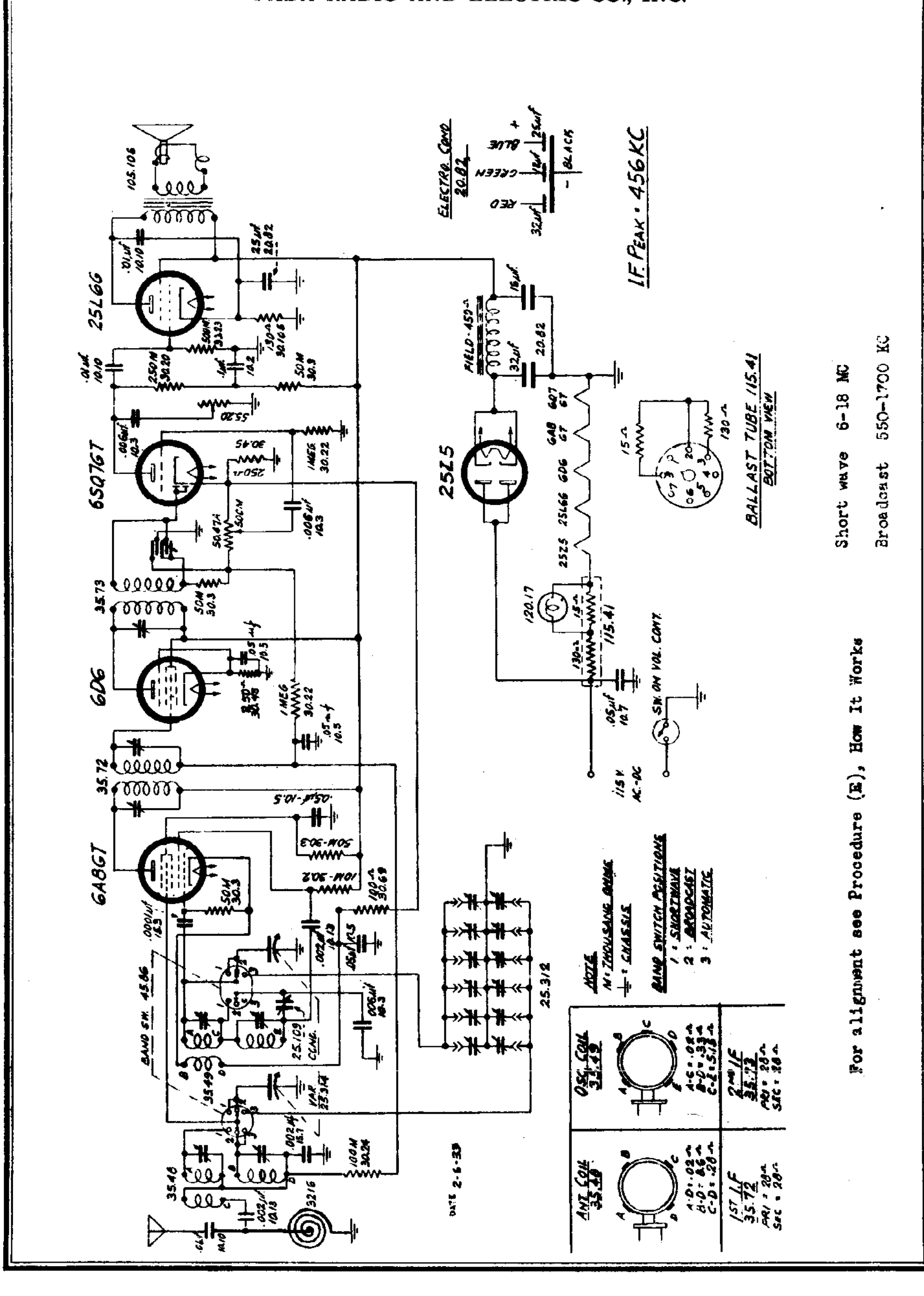


BATTERY LAYOUT P 100

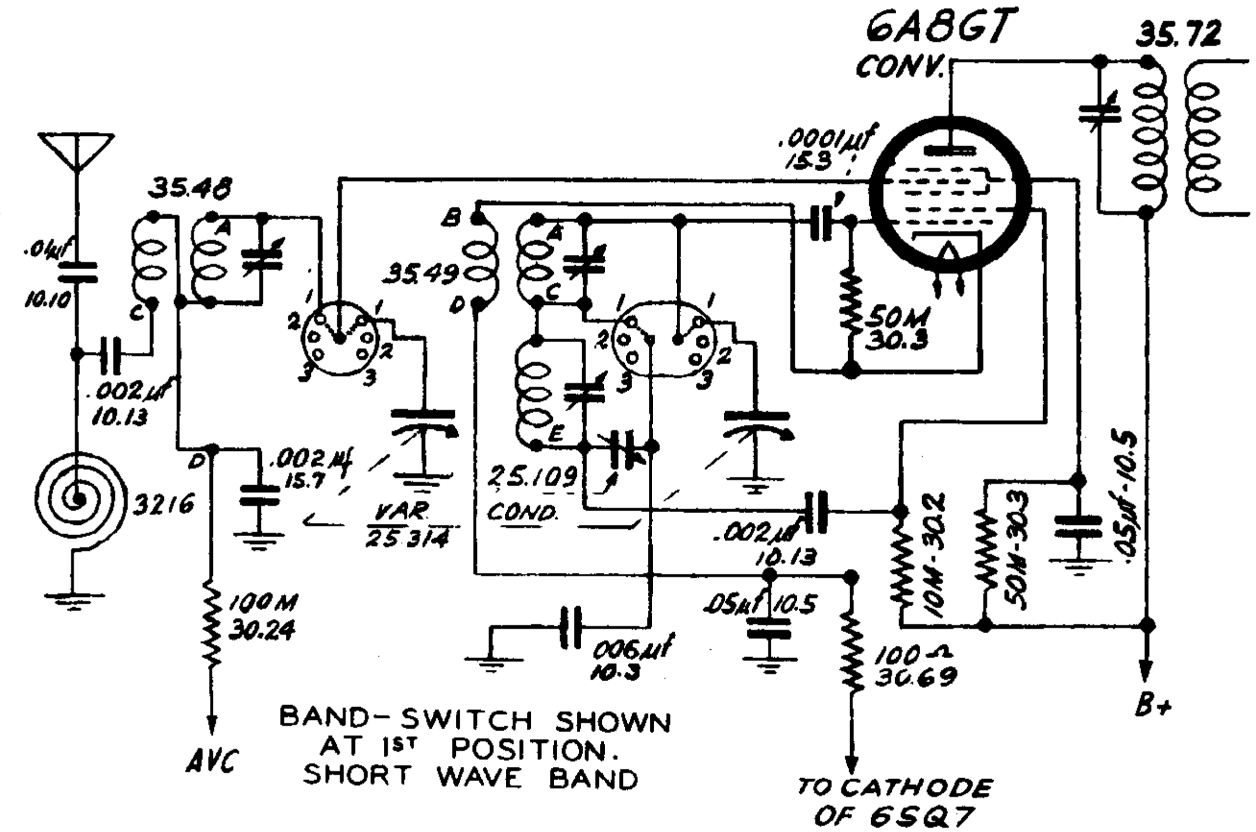
For trimmer locations for Model P100 see page 17-
For parts list for Model P100 see page 17-15

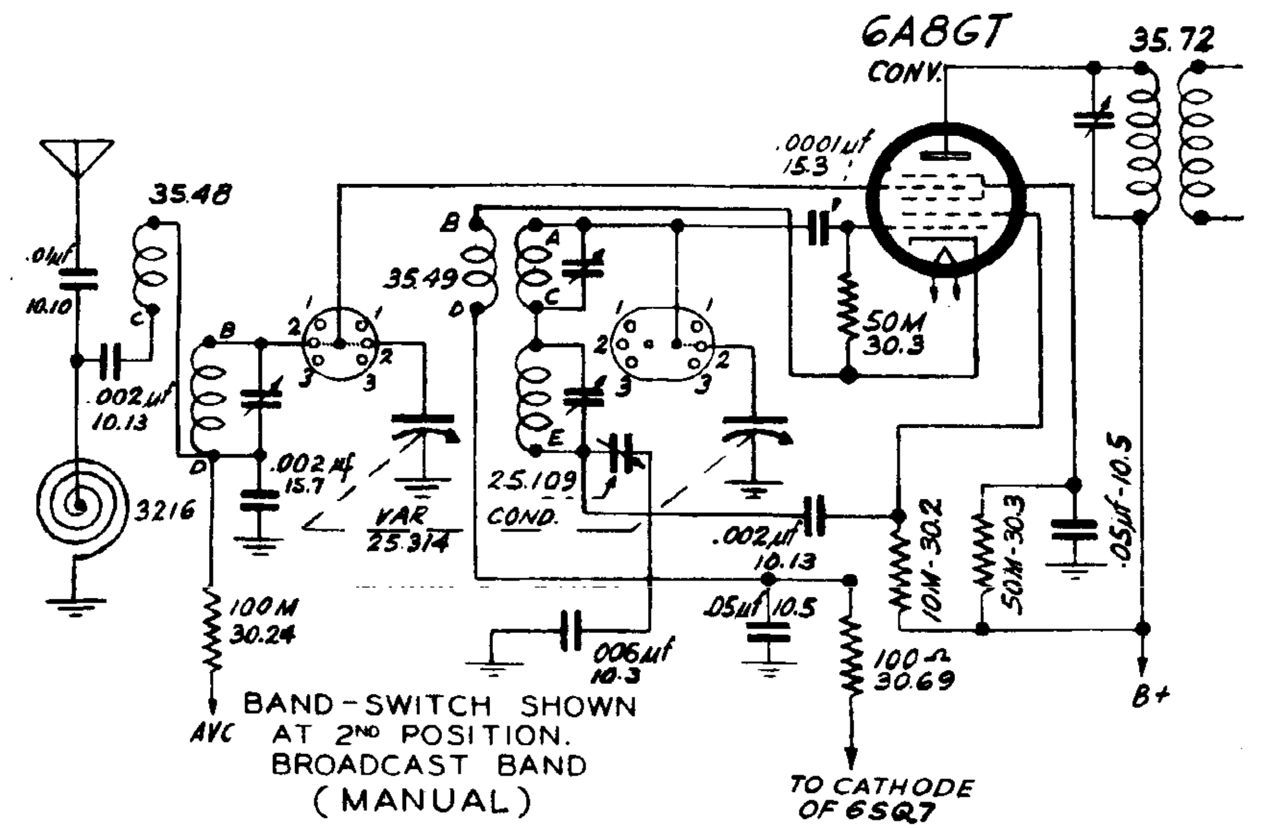
MODEL 6A39

FADA RADIO AND ELECTRIC CO., INC.



FADA RADIO AND ELECTRIC CO., INC.

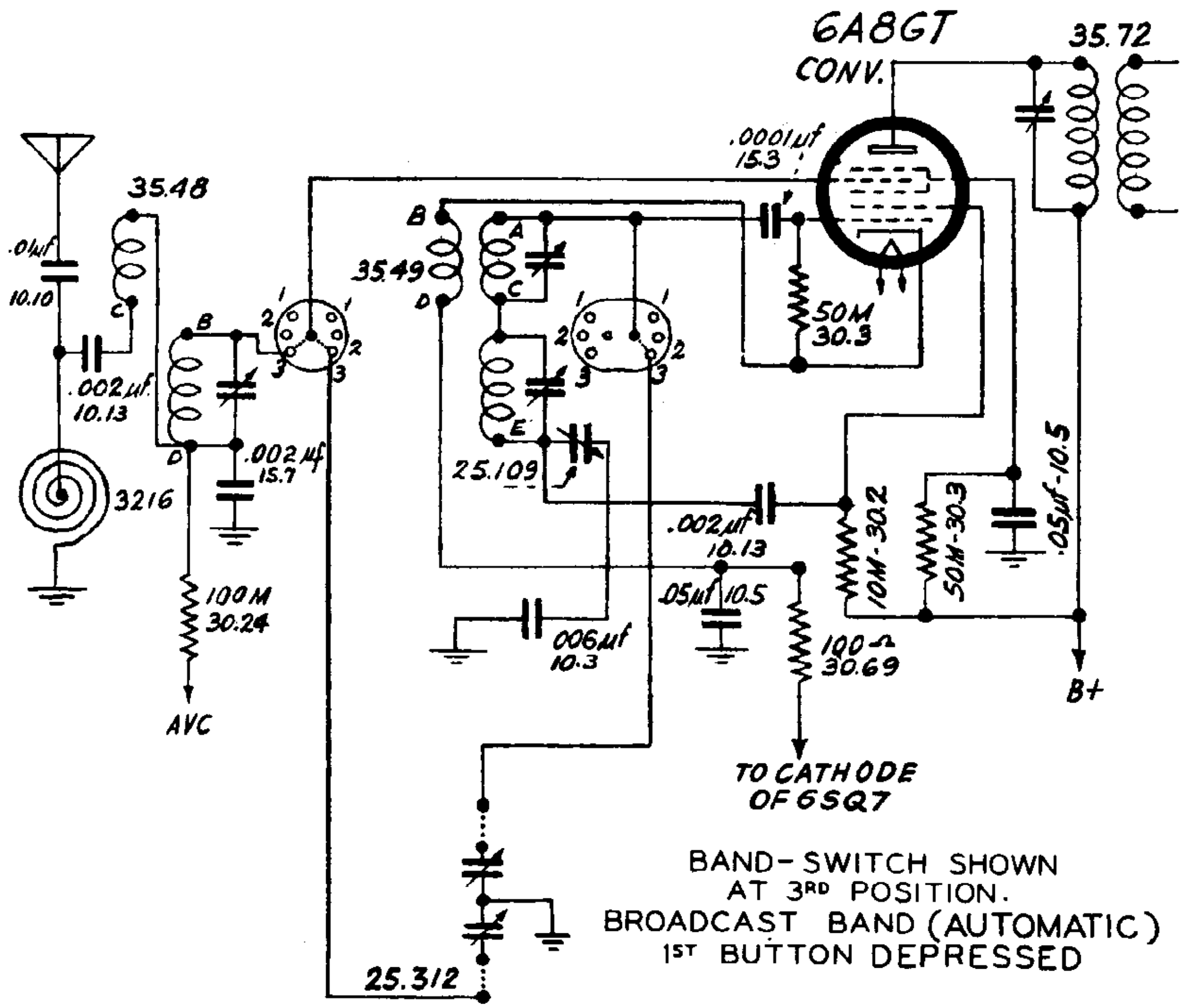




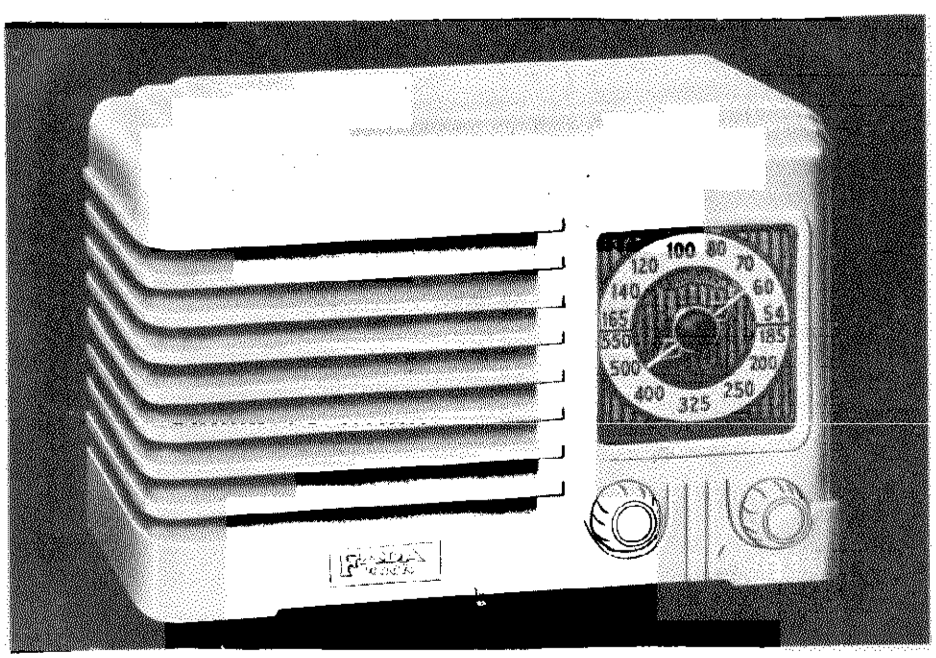
"clarified schematics"

MODEL 6A39

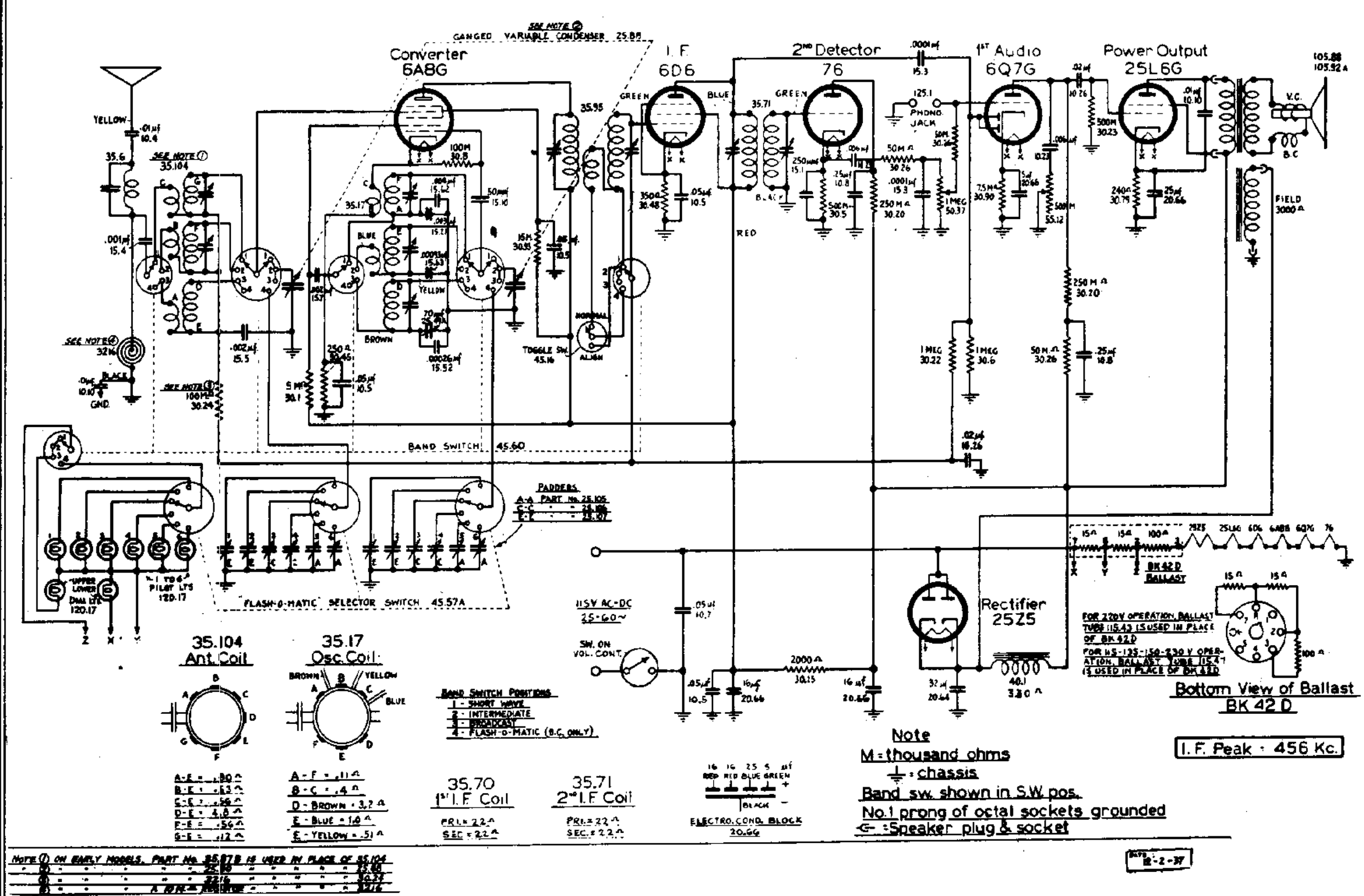
FADA RADIO AND ELECTRIC CO., INC.



BAND-SWITCH SHOWN AT 3RD POSITION.
BROADCAST BAND (AUTOMATIC)
1ST BUTTON DEPRESSED



FADA RADIO AND ELECTRIC CO., INC.



For alignment see Procedure (B), How It Works

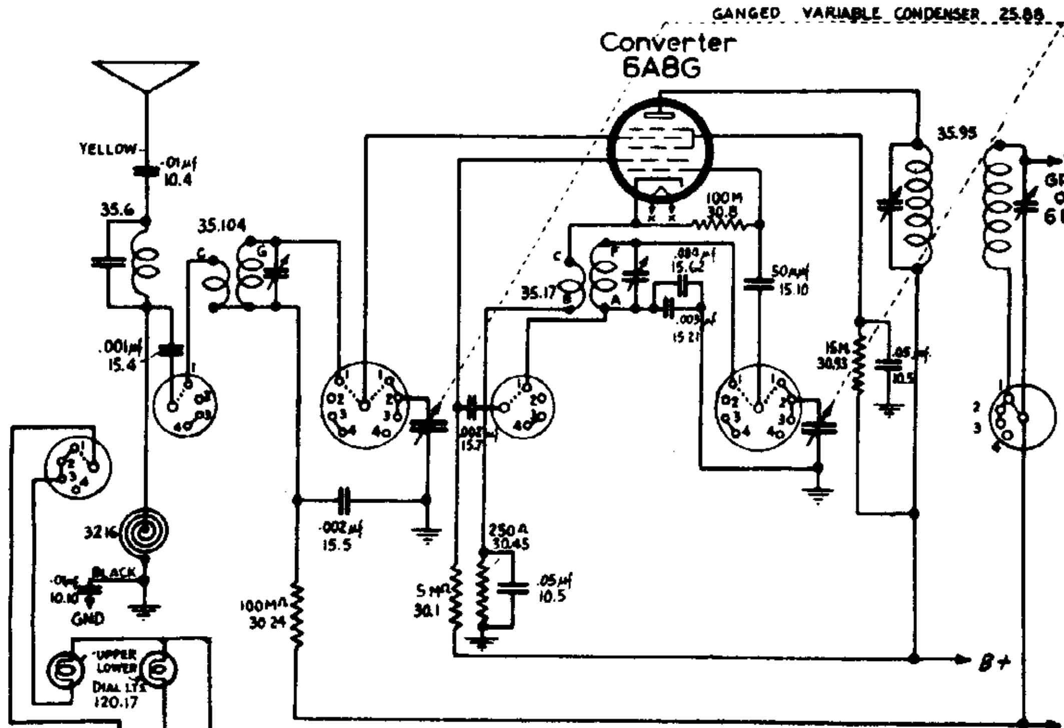
To set pushbuttons, throw Normal-Align switch to Align

Short wave 6--18 MC

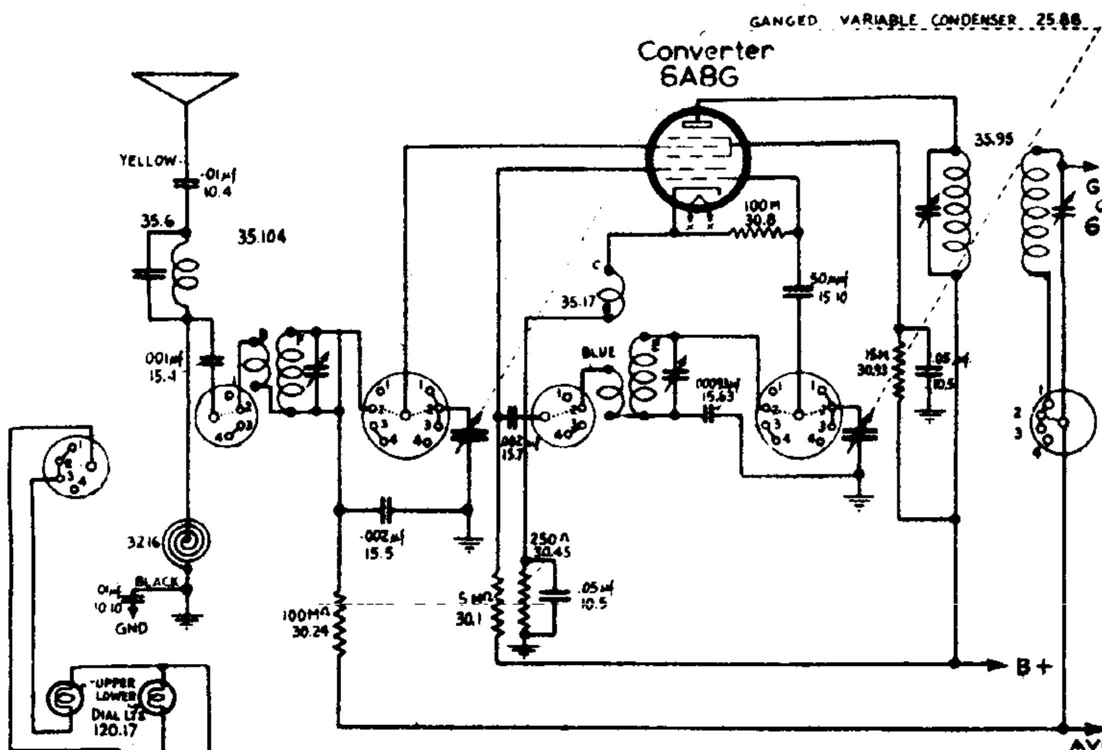
Intermediate 1.8--5.6 MC

Broadcast 550--1700KC

FADA RADIO AND ELECTRIC CO., INC.

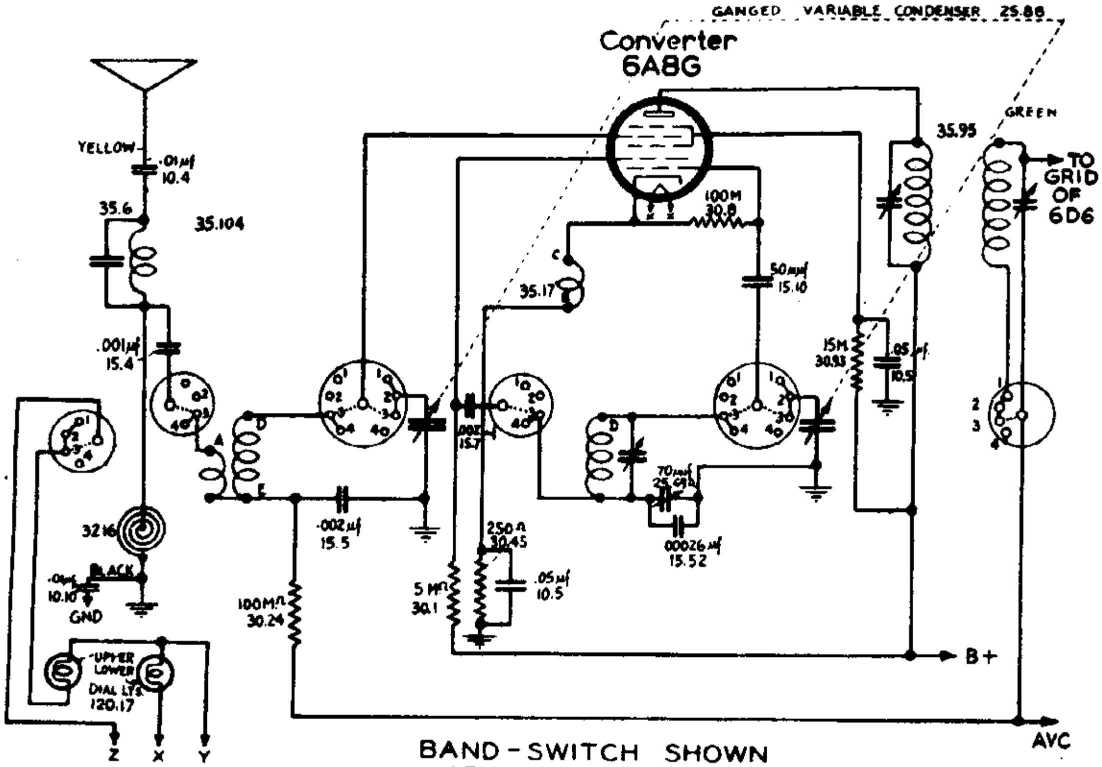


BAND-SWITCH SHOWN AT 1ST POSITION. SHORT WAVE BAND

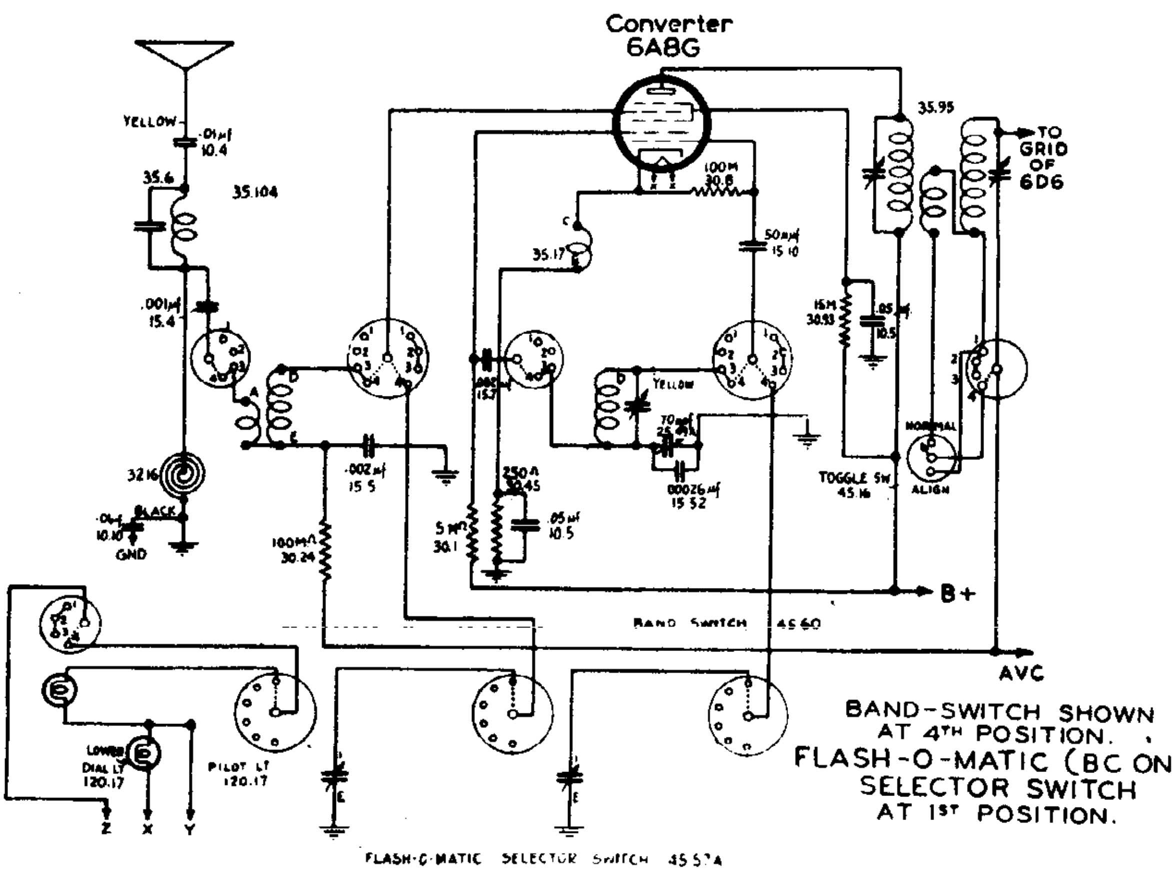


BAND-SWITCH SHOWN AT 2ND POSITION INTERMEDIATE BAND

FADA RADIO AND ELECTRIC CO., INC.

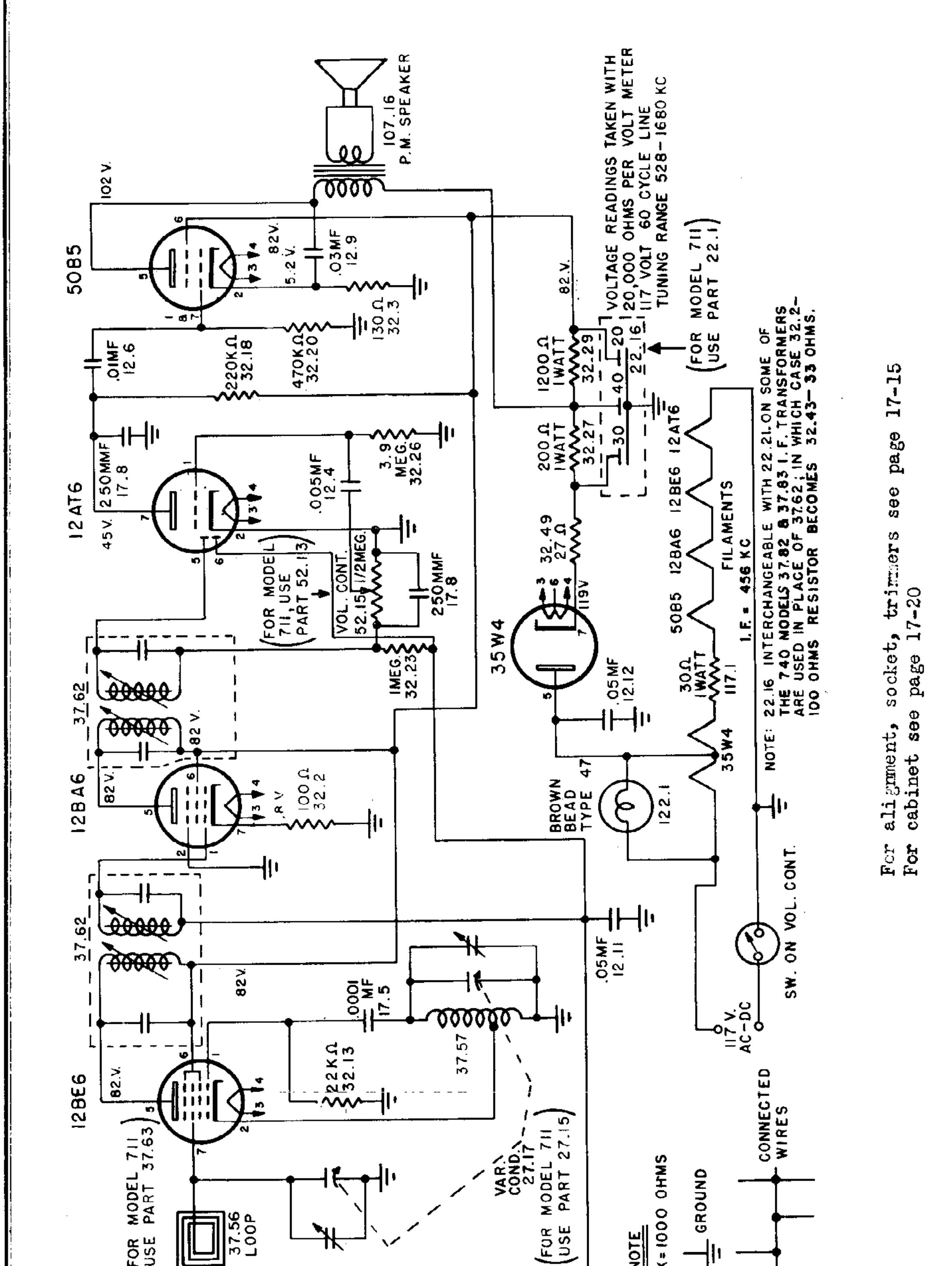


BAND-SWITCH SHOWN
AT 3RD POSITION.
BROADCAST BAND



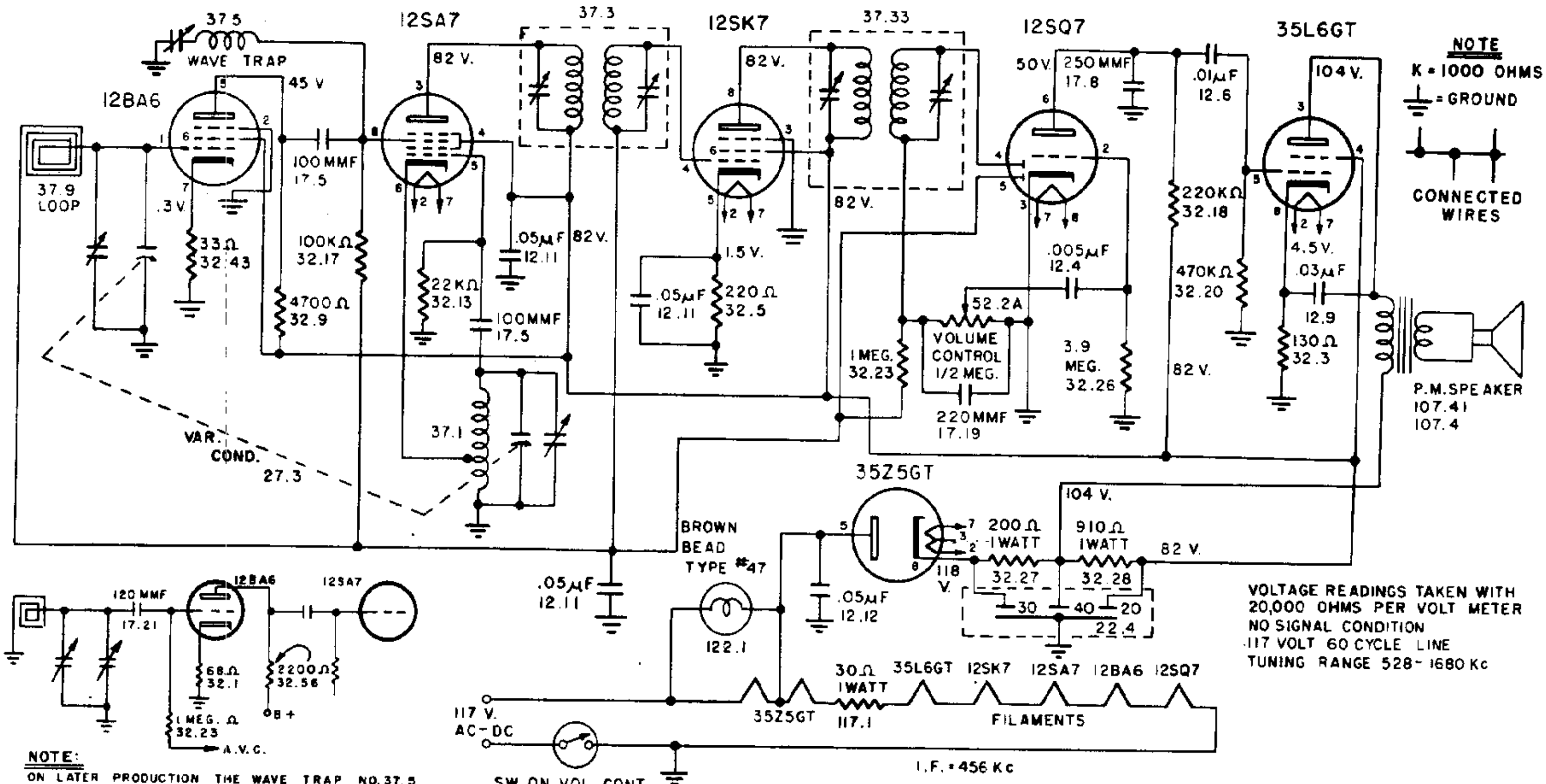
BAND-SWITCH SHOWN
AT 4TH POSITION.
FLASH-O-MATIC (BC ONLY)
SELECTOR SWITCH
AT 1ST POSITION.

FADA RADIO AND ELECTRIC CO., INC.



For alignment, socket, trimmers see page 17-15
For cabinet see page 17-20

FADA RADIO AND ELECTRIC CO., INC.



NOTE:
ON LATER PRODUCTION THE WAVE TRAP NO. 37.5 IS ELIMINATED AND THE R.F. STAGE WIRING IS ARRANGED AS SHOWN ABOVE.

Speaker 4" P.M. 1 oz. Alnico V Magnet

Speaker Transformer 2500 ohms—400 cycles

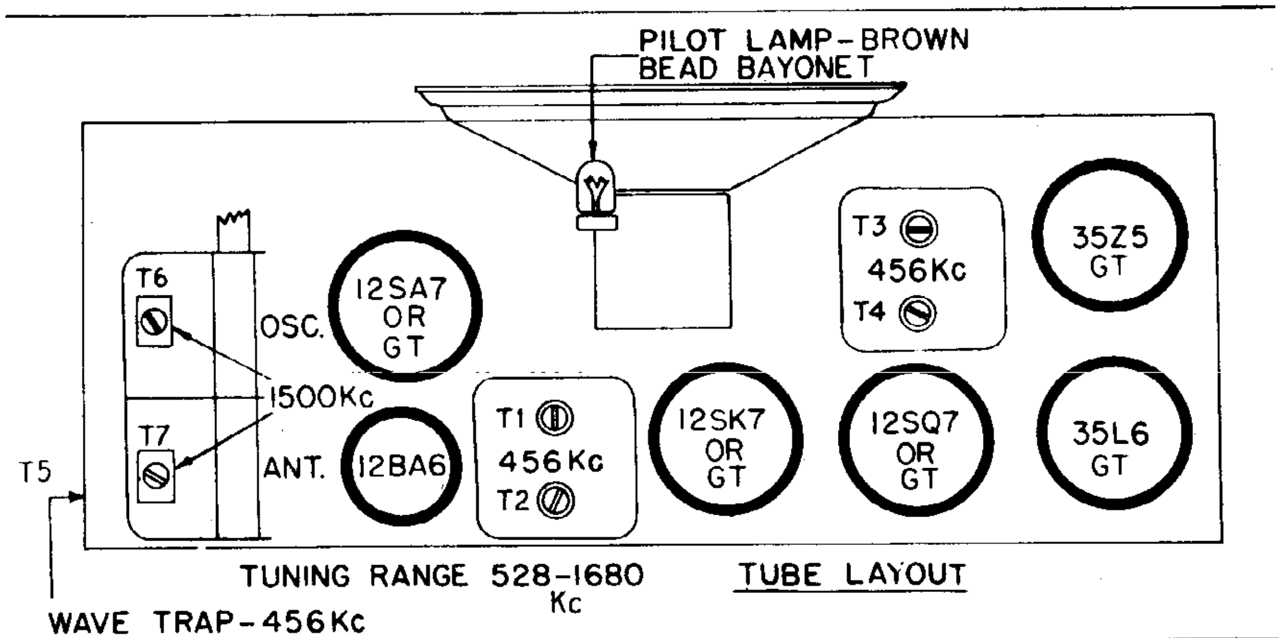
Speaker Voice Coil 3.2 ohms

FADA RADIO AND ELECTRIC CO., INC.

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:
Volume Control full on.
Low range A.C. meter connected across voice coil to indicate output.
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.
Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

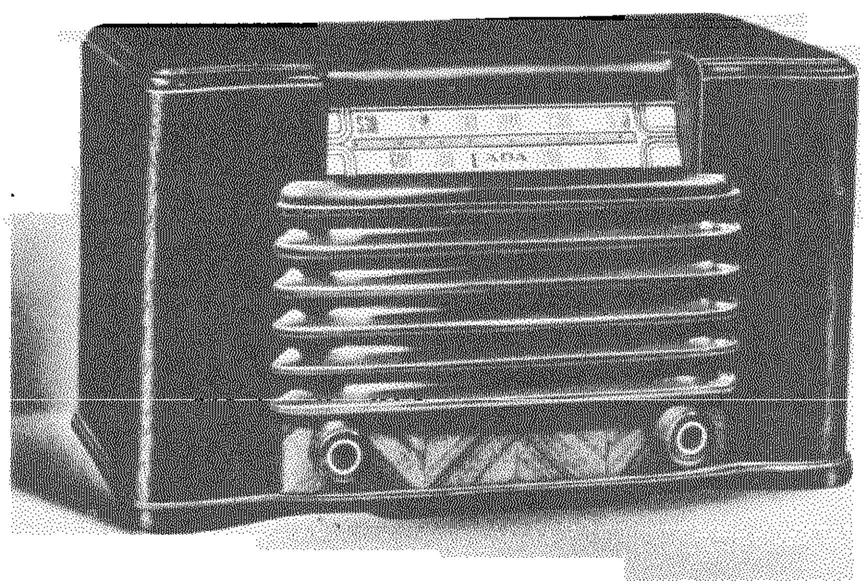
Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1				
Full Open	Exactly 456 KC	.1 MF	Control Grid 12SA7 Tube Pin No. 8 on 12SA7 Socket	Adjust for Maximum Output T1, T2, T3 & T4
2 Full Open	Exactly 456 KC	.1 MF	Control Grid 12BA6 Tube (R.F.) (Top) Rear Section Variable Condenser	Adjust for Minimum Output T5 Note: On later production this trimmer is eliminated.
3 Full Open	Exactly 1680 KC		Radiating Loop (½ meter) 20" from Receiver	Adjust for Maximum Output T6
4 Approx. 1500 KC	Approx. 1500 KC		Radiating Loop (½ meter) 20" from Receiver	Adjust for Maximum Output T7
5 Approx. 600 KC	Approx. 600 KC		Radiating Loop (½ meter) 20" from Receiver	Check tracking and bend slotted end plate (rear section) of variable if necessary.
6				



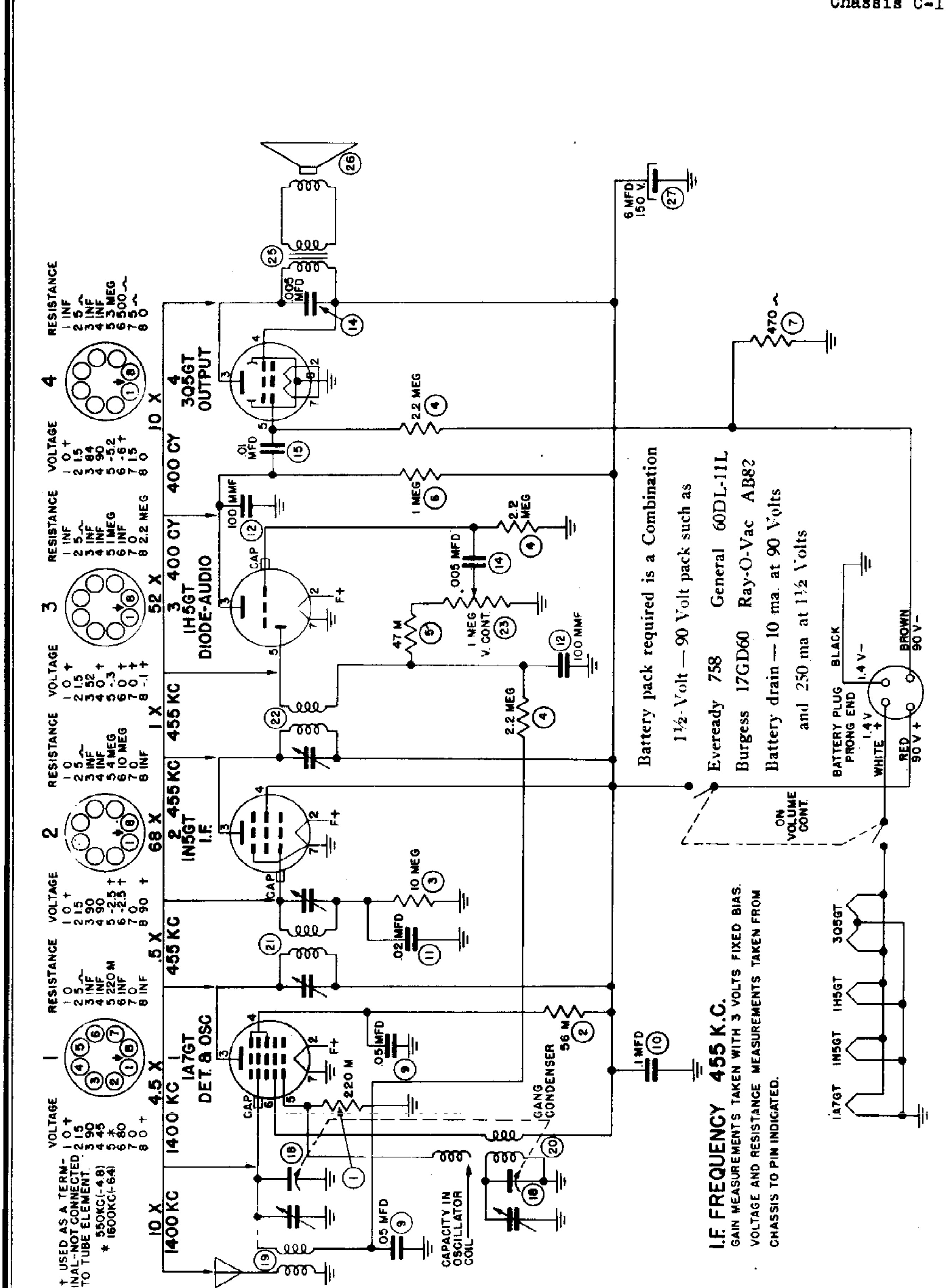
TUBE LAYOUT

PARTS LIST

Part No.	Description
12.4	Tubular Condenser .005 mf 600 V
12.6	Tubular Condenser .01 mf 400 V
12.9	Tubular Condenser .03 mf 400 V
12.11	Tubular Condenser .05 mf 200 V
12.12	Tubular Condenser .05 mf 400 V
17.5	Mica Condenser 100 mmf ± 10%
17.8	Mica Condenser 250 mmf ± 20%
22.4	3 Section Electrolytic Condenser 30-40-20 mf 150 W.V.
27.3	Variable Condenser
37.1	Oscillator Coil
37.9	Loop Antenna
37.3	Input I.F. Transformer complete
37.33	Output I.F. Transformer complete
52.2A	Volume Control w/switch
72.1	Power Cord (Approved)
77.16	Dial Pointer
77.18	Dial Scale (Calibrated)
97.18	Cabinet — Wood
142.2	Cabinet Knobs — Wood
97.19	Cabinet Back — Wood
107.4	4" P.M. Speaker with Transformer
107.41	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for Above
117.1	30 ohm 1 W. Resistor
37.5	Wave trap



FARNSWORTH TELEV. & RADIO CORP.



MODEL EF-451,
Chassis C-196

FARNSWORTH TELEV. & RADIO CORP.

ALIGNMENT

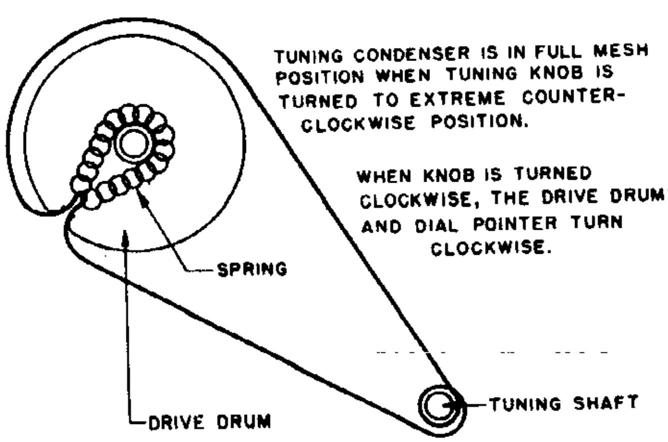
To properly align this receiver, an output meter and a signal generator are required. The generator must be calibrated at the following frequencies: 455 Kc., 600 Kc., 1400 Kc., and 1625 Kc. The volume control must be set at maximum and the signal generator at the lowest value that will give an accurate reading on the output meter. The high side of the generator is connected as given below and the low side is connected to the black lead.

TABULATION FOR ALIGNMENT

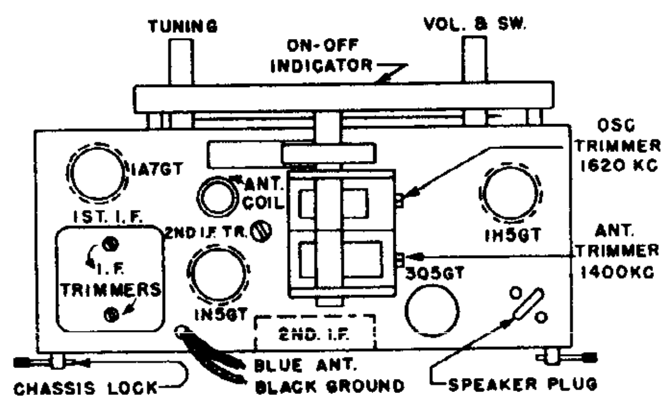
STEPS	HIGH SIDE OF GEN. TO	SET GEN. AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	SET VOLUME CONTROL AT MAXIMUM					
2.	Grid of 1A7GT	455 Kc.	Minimum	2nd I.F. Trimmer	Top of Chassis *	MAXIMUM OUTPUT
3.				1st. I.F. Trimmers	Top of I.F. Trans.	
4.	200 MMF in series with ant.	1625 Kc.	1625 Kc.	Oscillator Trimmer	On Gang *	
5.		1400 Kc.	1400 Kc.	Antenna Trimmer	On Gang *	
6.		600 Kc.	Check Pointer Calibration			

* See Chassis Layout.

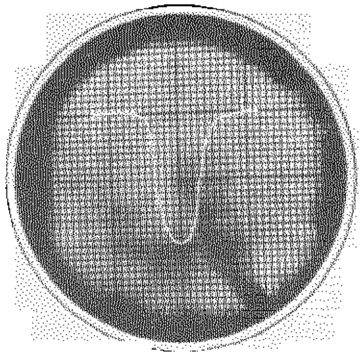
DIAL STRINGING



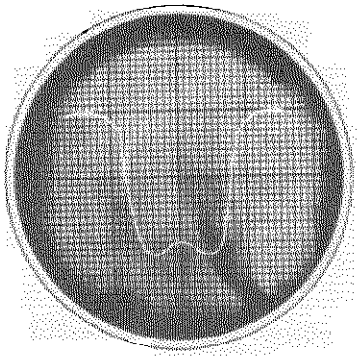
CHASSIS LAYOUT



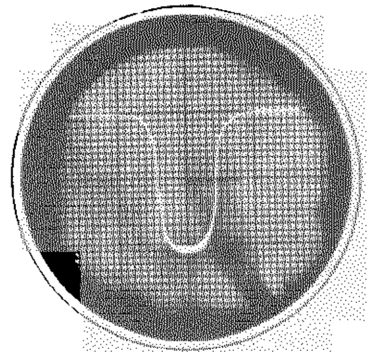
FARNSWORTH TELEV. & RADIO CORP.



A

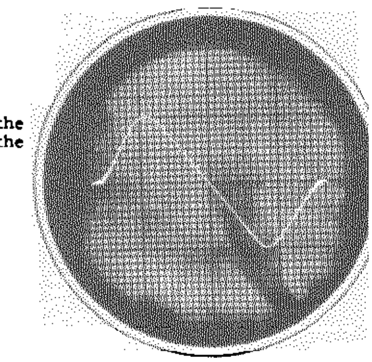


B



C

Oscilloscope patterns for FM alignment of Models GK-100, 102, 103, 104, 111, 112, 113, 114

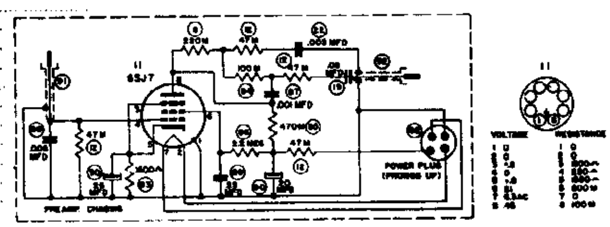


D

The Farnsworth models GK-111, 112, 114 and 115 combination instruments are identical to the GK-100, 102, 103 and 104 except that the former employ the type P56MP record changer, the latter, the type P56.

Parts list and preamplifier circuit for Models GK-111, 112, 113, 114

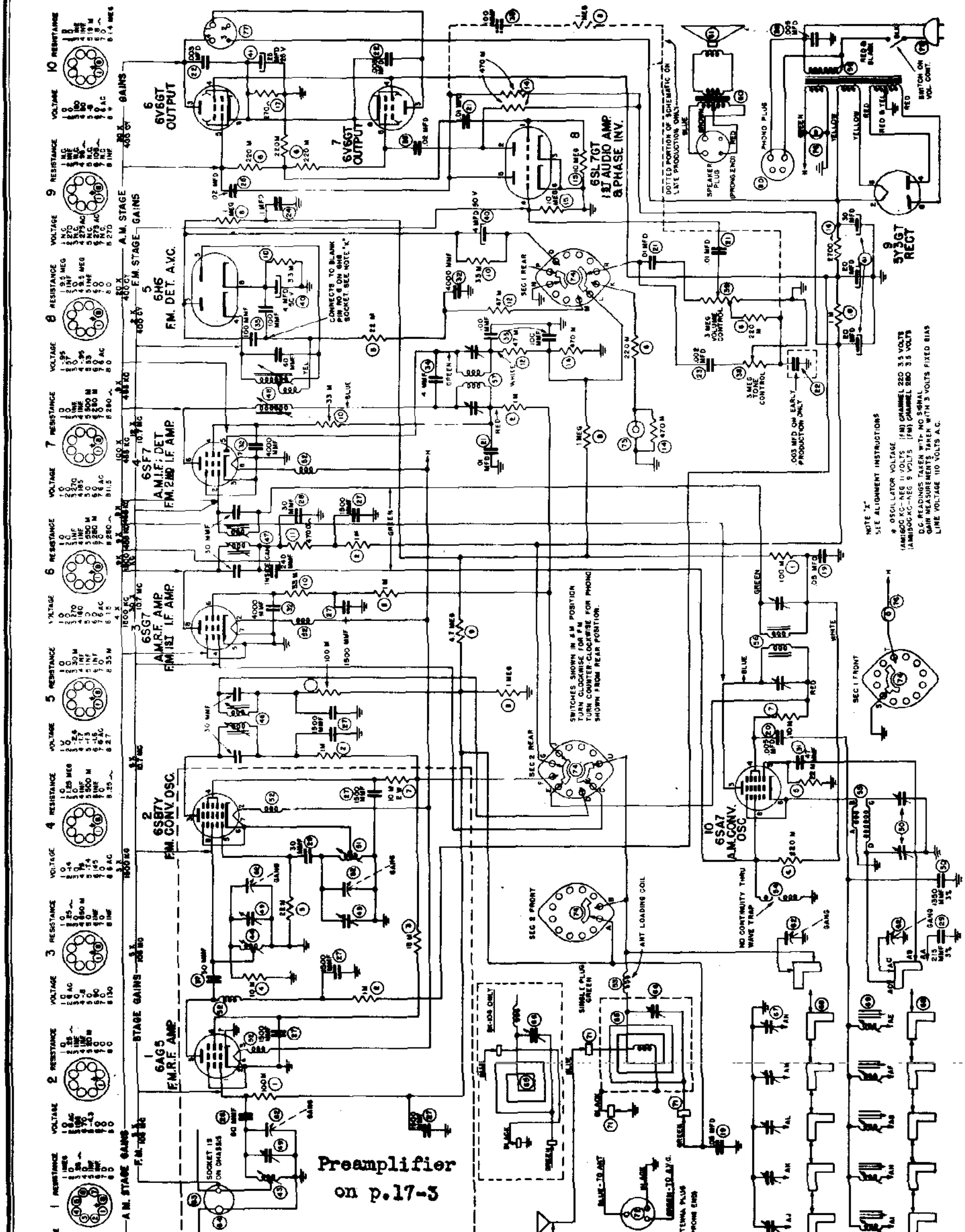
Part No.	Description
78057	Volume Control, 3 Megohms
94204	Power Transformer
94239	Output Transformer
13772	Speaker
38696	Loop Antenna for GK-102 and GK-103, GK-111, 112
38859	Loop Antenna for GK-114
26032	Loop Antenna Trimmer GK-114
22169	Pickup Cable
22170	Output Cable
22171	Power Adapter Cable
25431	Elec. Capacitor, 20 mfd. 450 v., 25 mfd. 25 v.
25432	.001 mfd. 200 V. Condenser
25433	.25 mfd. 600 V. Condenser
H-273	Cabinet for GK-114
H-291	Cabinet for GK-11 Mah.
H-292-1	Cabinet for GK-112 C.
H-292-2	Cabinet for GK-112 Bl.



Ref. No.	Part No.	Description
1	77216	220 M ohm resistor
2	77439	56 M ohm resistor
3	77274	10 megohm resistor
4	77270	2.2 megohm resistor
5	77213	47 ohm resistor
6	77218	1 megohm resistor
7	77261	470 ohm resistor
9	25196	.05 mfd. capacitor
10	25215	.1 mfd. capacitor
11	25195	.02 mfd. capacitor
12	25188	100 mmf mica capacitor
14	25183	.005 mfd. capacitor
15	25194	.01 mfd. capacitor
18	26259	Gang capacitor
19	38854	Antenna coil
20	38855	Oscillator coil
21	38856	1st. I.F. transformer
22	38857	2nd. I.F. transformer
23	78145	1 megohm volume control
25	94250	Output transformer
26	81172	6" PM speaker
27	25422	6 Mfd. 150 volt electrolytic capacitor
	31395	Dial scale
	31396	Dial window
	58775	Dial Pointer
	22163	Battery cable
	59447	Knob (Bakelite)
	H-272	Cabinet and packing

Parts list for Model EF-451, Chassis C-196

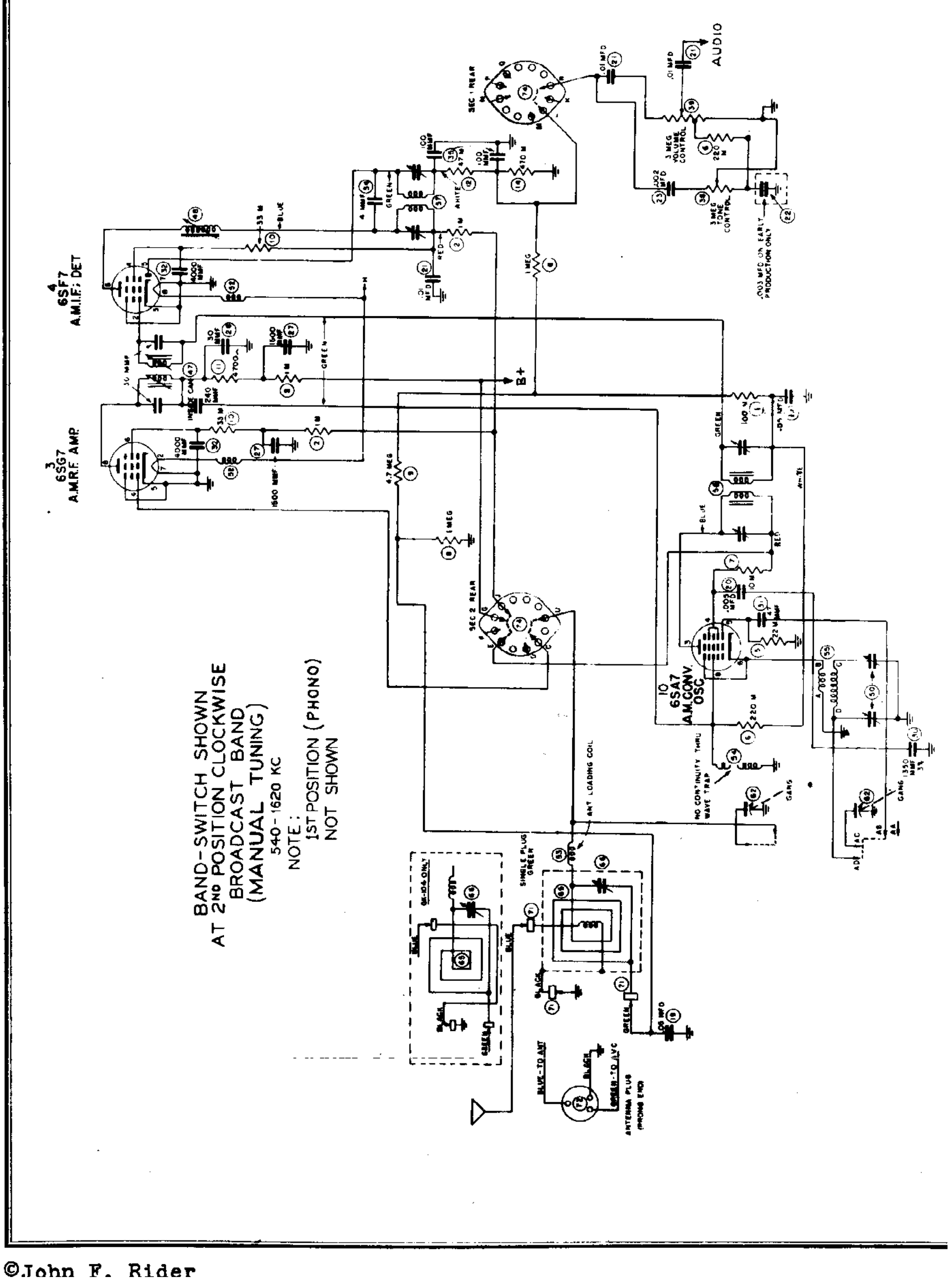
MODELS GK-100, GK-102 FARNSWORTH TELEV. & RADIO CORP.
GK-103, GK-104, GK-111
GK-112, GK-113, GK-114



RECORD CHANGERS - For Models GK-100, GK-102,104, Farnsworth

FARNSWORTH TELEV. & RADIO CORP.

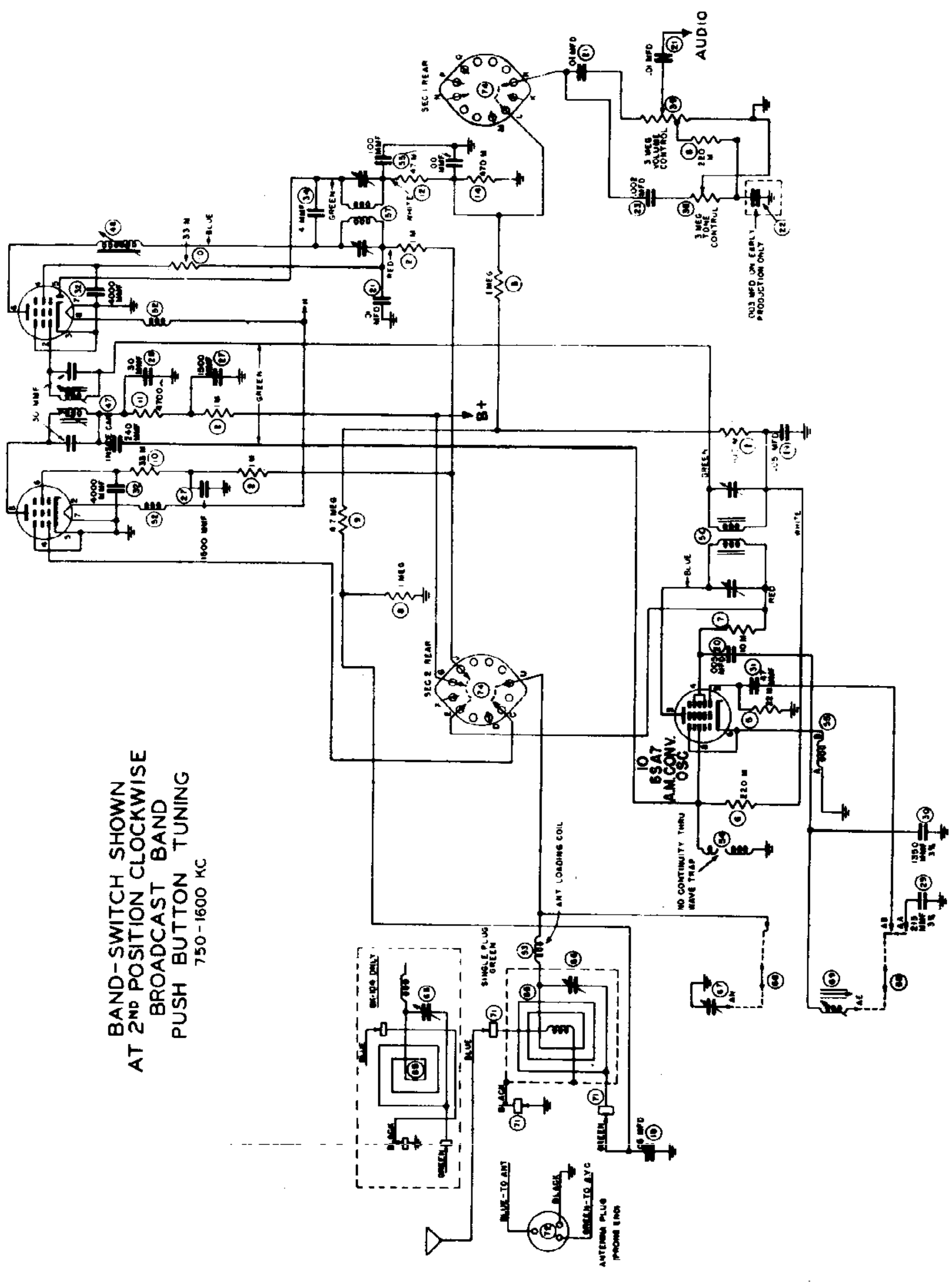
MODELS GK-10[illegible] GK-102, GK-103, GK-10[illegible] GK-111, GK-112, GK-11[illegible] GK-11[illegible]



"clarified schematics"

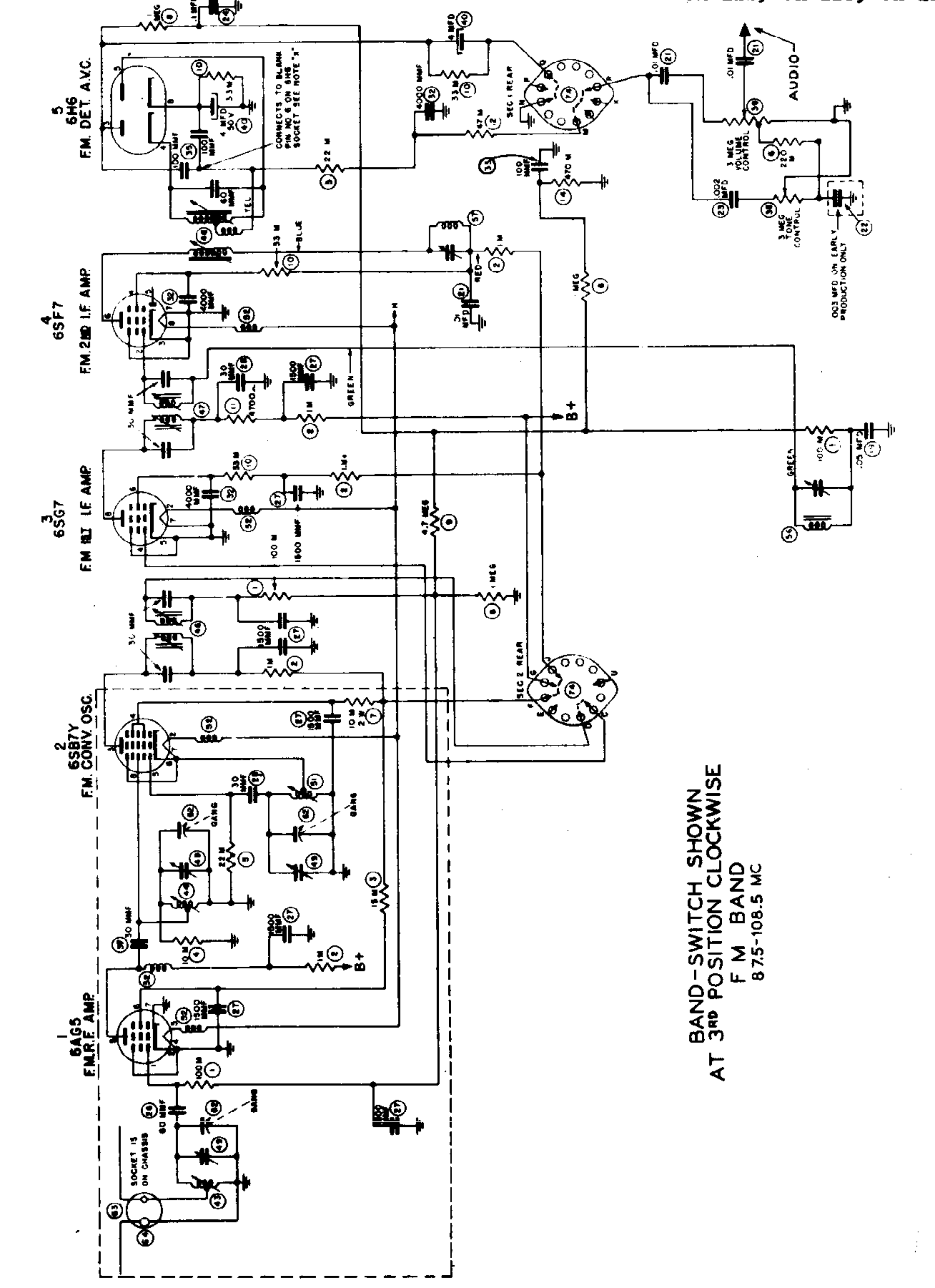
MODELS GK-100, GK-102, GK-103, GK-104, GK-111, GK-112, GK-113, GK-114

FARNSWORTH TELEV. & RADIO CORP.



FARNSWORTH TELEV. & RADIO CORP.

MODELS GK-100, GK-102,
GK-103, GK-104, GK-11
GK-112, GK-113, GK-11



FARNSWORTH TELEV. & RADIO CORP.

MODELS GK-100, GK-102,
GK-103, GK-104, GK-111,
GK-112, GK-113, GK-114

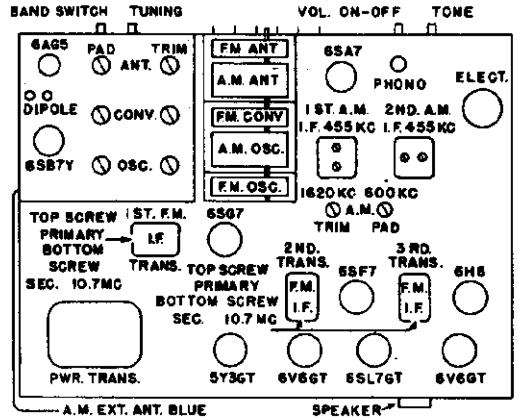
ALIGNMENT INSTRUCTIONS AM BAND

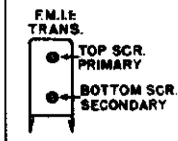
An output meter and a signal generator calibrated at 455 Kc., 600 Kc., 1500 Kc. and 1600 Kc., are required to properly align these receivers on AM band. Keep the output of the signal generator as low as possible to prevent AVC action and false settings. Connect the high side of the generator to the blue wire found at rear of set and low side to the black wire.

STEPS	DUMMY ANTENNA	SET GENER-ATOR AT	SET GANG AT	ADJUST	LOCATED	
1	SET VOLUME AND TONE CONTROLS AT MAXIMUM					
2	200 MMF.	455 Kc.	Minimum	2nd. I.F. Trimmers *	Top of I.F. Transformers	MAXIMUM OUTPUT
3				1st. I.F. Trimmers *		
4		1600 Kc.	1600 Kc.	B. C. Osc. Trimmer	See Chassis Layout	
5		1500 Kc.	1500 Kc.	B. C. R. F. Trimmer	On Loop	
6		600 Kc.	600 Kc. Rock Gang	600 Kc. Padder	See Chassis Layout	
7		Recheck 1500 Kc.				

* Recheck after FM alignment.

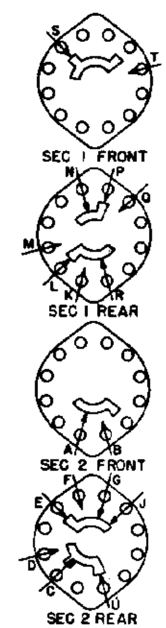
CHASSIS LAYOUT



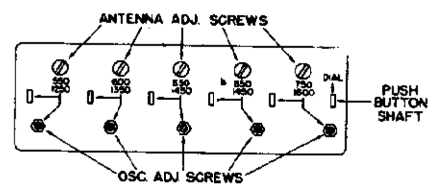


Letters on terminals of switches and coils shown on this page correspond to similiarly lettered terminals on the switches and coils shown in the circuit diagram.

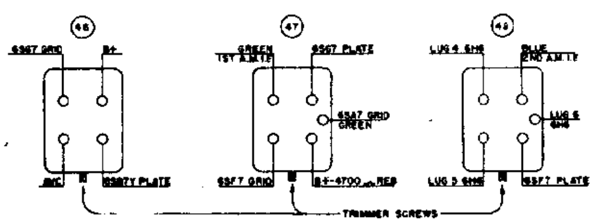
BAND SWITCH DECKS

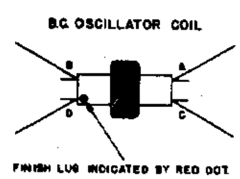


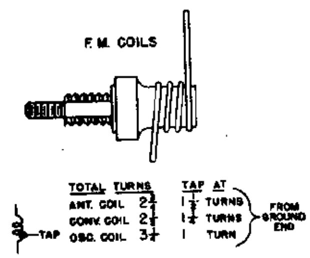
PUSH BUTTON LAYOUT



BOTTOM VIEW FM I.F. TRANS.







Oscilliscope Alignment of FM Band

1. Equipment required will be an oscilliscope, a frequency modulated signal generator covering the range 87.5 to 108.5 mc on fundamentals, a sweep generator producing a signal of 10.7 mc and sweeping at least 150 kc each side of 10.7 mc, and an output meter.

2. The vertical or "Y" axis terminals of the oscilliscope should be connected between pin 3 of the 6H6 discriminator and ground. The sweep voltage of the sweep generator should be fed to the horizontal or "X" axis terminals of the oscilliscope. The 10.7 mc output of the sweep generator should be fed into the grid of the 6SF7 tube through a condenser of approximately 3300 Mmfd.

3. Remove the negative lead of the 4 mfd. electrolytic from pin #3 of 6H6 socket. Remove 6SL7 tube from socket. Turn the set on and turn both the tone control and the volume control all the way to the right. Detune the secondary of the third FM I.F. transformer by turning the bottom slug screw out as far as possible. Adjust the primary, top slug screw, until pattern (A) appears on the oscilliscope. Adjust the secondary, bottom slug screw, until pattern (B) is obtained on the oscilliscope and until both sides of this pattern are symmetrical.

4. Remove the 10.7 mc output of the sweep generator from the grid of the 6SF7 tube and connect to the grid of the 6SG7. Align the second FM I.F. transformer as in paragraph 3.

5. Connect the 10.7 mc output of the sweep generator to the signal grid of the 6SB7Y. (pin 8). Detune secondary of the first FM I.F. transformer and tune primary as before for pattern (A). Tune secondary for pattern (C) and make both sides of pattern as symmetrical as possible. This completes alignment of the FM I.F. transformers.

6. Reconnect the negative lead of the 4 mfd. electrolytic to pin #3 of the 6H6 socket and move the oscilliscope leads to pin #6 of the 6H6 socket and ground. With the sweep generator connected to the 6SB7Y signal grid as before, the discriminator pattern (D) should appear on the oscilliscope if the I.F. alignment instuctions have been followed carefuly. Remove the ociliscope and sweep generator leads and reinstall 6SL7 tube in socket. Never adjust AM I.F. transformers without rechecking FM I.F. alignment.

7. Connect the 87.5 to 108.5 mc signal generator to the antenna socket of the receiver through a 300 ohm resistor. The generator should be frequency modulated at some frequency in the audible range. Connect output meter across secondary of output transformer. Tune receiver to channel 300 on FM dial. With signal generator set at 107.9 mc adjust oscillator trimmer condenser, third from front, for maximum reading on output meter. Set signal generator to 87.9 mc and tune receiver to channel 200 on FM dial. Adjust oscillator coil screw, third from front, (see chassis layout) for maximum reading on output meter. Recheck oscillator setting for channel 300.

8. Tune signal generator and receiver to 105 mc (channel 285 approx.). Adjust converter signal grid trimmer condenser, second from front, for maximum reading on output meter. Tune signal generator and receiver to 92 mc, (channel 220 approx.) and adjust converter coil screw, (second from front), to maximum reading on output meter. **Recheck converter trimmer at 105 mc (channel 285 approx.).**

9. Repeat operations of paragraph (7) for antenna trimmer condenser and coil. This completes FM R.F. alignment.

Alternate FM Alignment Procedure

Necessary Equipment:
Signal Generator
Voltohmyst (Vacuum Tube Voltmeter)

Connect voltohmyst from ground to pin #6 of 6H6 (audio-marked X on schematic). Connect generator tuned to 10.7 mc. to pin #4 on 6SG7. Turn secondary slug of 3rd. FM I.F. (closest to chassis) out as far as it will turn. Tune primary of 3rd IF for maximum positive voltage. Tune primary and secondary of the 2nd. FM I.F. for maximum output. Move generator to pin #8 of 6SB7Y and turn primary and secondary of 1st. FM I.F. for maximum output. Next tune secondary of 3rd. FM I.F. for zero voltage on voltohmyst The I.F. is now aligned.

RF ALIGNMENT

With Voltohmyst connected between ground and pin #3 on 6H6 socket, connect generator between ground and small pin of dipole antenna socket. Use very short leads on generator and a 300 ohm resistor as a dummy antenna. Set generator at 87.5 mc and gang closed. Adjust oscillator slug for maximum voltage. Adjust generator to 108.5 mc and gang to minimum and adjust oscillator trimmer for maximum voltage. Go back and check low frequency end. Next set generator at 92 mc, tune in signal on receiver, approximately 220 on dial. Adjust converter and antenna slug for maximum voltage output. Set generator at 105 mc. Tune in signal on receiver, approximately 280 on dial. Tune converter and antenna trimmer for maximum voltage output. Check adjustment of antenna and conveter slugs at 92 mc.

For oscilloscope patterns for FM alignment, see page 17-3

PUSH BUTTON SETUP

A Signal Generator should be used to prevent buttons being set up on wrong stations. Allow set to warm up for one-half hour.

1. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See PUSH BUTTON LAYOUT.)

2. Select the pair of adjustment screws covering the frequency of a wanted station.

3. Press the "Dial" button and manually tune in the desired station frequency or signal from generator.

4. Press the button selected for this frequency.

5. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.

6. Adjust the upper screw of the same pair until maximum volume is secured.

7. Press dial button, making certain original frequency is still tuned-in; check results on button just set up. If it is the same, proceed with the next button, until all are set up.

8. Recheck settings and correct any drift due to interaction between adjacent coils.

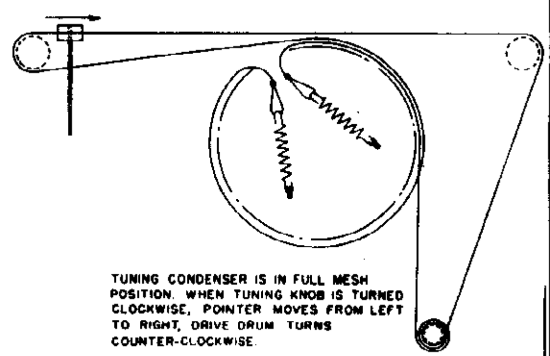
MODELS GK-100, GK-102, GK-103, GK-104, GK-111, GK-112, GK-113, GK-114

FARNSWORTH TELEV. & RADIO CORP.

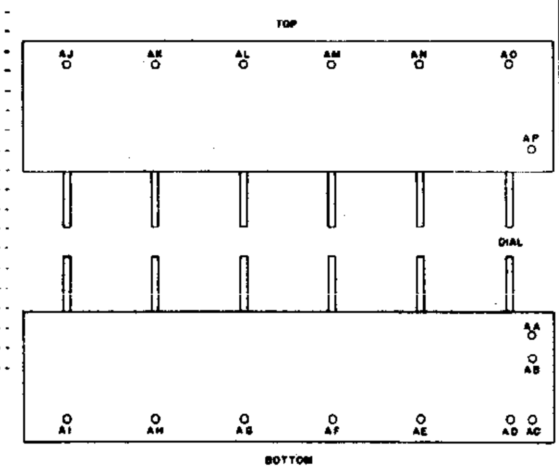
Ref. No.	Part No.	Description
1	77214	100 M Ohms
2	77262	1000 Ohms
3	77265	15 M Ohms
4	77212	10 M Ohms
5	77266	22 M Ohms
6	77216	220 M Ohms
7	77013	10 M Ohms, 2 Watt
8	77218	1 Megohm
9	77272	4.7 Megohms
10	77267	33 M Ohms
11	77211	4700 Ohms
12	77213	47 M Ohms
14	77217	470 M Ohms
15	77274	10 Megohms
16	77243	2700 Ohm Molded Resistor 4.7 Watt
17	77189	270 Ohm, 2 Watt
18	77304	1000 Ohms, 2 Watt
19	25196	.05 Mfd. 600 Volt
20	25183	.005 Mfd. 600 Volt
21	25194	.01 Mfd. 600 Volt
22	25184	.003 Mfd. 600 Volt
23	25185	.002 Mfd. 600 Volt
24	25215	.1 Mfd. 600 Volt
25	25195	.02 Mfd. 600 Volt
26	25333	60Mmf. Ceramic Capacitor, N-470
27	25273	1500 Mmf. Ceramic Capacitor
28	25329	30 Mmf. Ceramic Capacitory, N-750
29	25212	215 Mmf. Silver Mica Capacitor
30	25213	1350 Mmf. Silver Mica Capacitor
31	25193	47 Mmf. Mica Capacitor
32	25271	4000 Mmf. Ceramic Capacitor
33	25187	240 Mmf. Molded Mica Capacitor
34	25327	4 Mmf. Ceramic Capacitor
35	25188	100 Mmf. Mica Capacitor
36	25031	.005 Buffer Capacitor 600 V
37	25332	30 Mmf. Ceramic Capacitor, N-150
38	78072	Tone Control, 3 Megohms
39	78057	Volume Control, 3 Megohms
40	25316	4 Mfd., 50 V Electrolytic
41	25214	Electrolytic Capacitor 20 Mfd., 20 Mfd., 30 Mfd., 450 Volt, 20 Mfd., 25 Volt
43	38690	FM Antenna Coil
44	38691	FM Converter Coil
46	38683	1st. FM I.F. Transformer
47	38684	2nd. FM I.F. Transformer
48	38685	3rd. FM I.F. Transformer
49	26231	5-20 Mmf. Ceramic Trimmer, N-300
50	26240	BC Oscillator Trimmer Strip
51	38692	FM Oscillator Coil
52	38661	FM RF Choke
53	38845	Antenna Loading Coil
54	38484	Wave Trap Coil
55	38694	BC Oscillator Coil
56	38681	1st. AM I.F. Transformer
57	38682	2nd. AM I.F. Transformer
59	94204	Power Transformer
60	94195	Output Transformer
61	13772	Speaker
62	26237	Gang Capacitor
63	11325	FM Dipole and Plug
64	80361	FM Dipole Socket
65	38696	Loop Antenna for GK102 and GK103
65	38859	Loop Antenna for GK104
66	26031	Loop Antenna Trimmer GK102
66	26032	Loop Antenna Trimmer GK104
67	26175	Push Button Trimmer Strip
68	90118	Push Button Switch
69	38405	Push Button Coil Strip
71	80439	Loop Antenna Socket
72	80440	Antenna 3-Prong Plug
74	90214	Band Switch
75	80030	Phono Input Socket
76	42185	Dial Lamp, 250 Ma.
77	80385	Speaker Socket
79	27118	Line Cord for GK102
80	11210	Phono AC Socket and Cord

Part No.	Description
31338	Glass Dial
07373	Dial Pointer
561397	Dial Escutcheon
13529	Dial Lamp Spring Lead Assembly
59134	Knob for GK102 WA
59450	Knob for GK102 BL
59451	Knob for GK103 and GK104
17019	Drive Drum
41106	Drive Cord (42 inches) and Springs
59249	Push Button Escutcheon
59030	Push Button for GK102 WA, GK103 and GK104
59441	Push Button for GK102 BL
41101	Station Call Letter Kit
80325	Mica Filled Socket for 6SB7Y
80139	Molded Octal Socket
80239	Molded Octal Socket for Rectifier
80319	Miniature Tube Socket
80362	2-Prong FM Antenna Plug
22146	Pickup Cable GK102
22147	Pickup Cable GK103 and GK104
71223	Phono Needle
11326	Compartment Light Socket Assembly GK102 and GK103
H-270-1	Cabinet for GK102 WA
H-270-2	Cabinet for GK102 BL
H-273	Cabinet for GK104

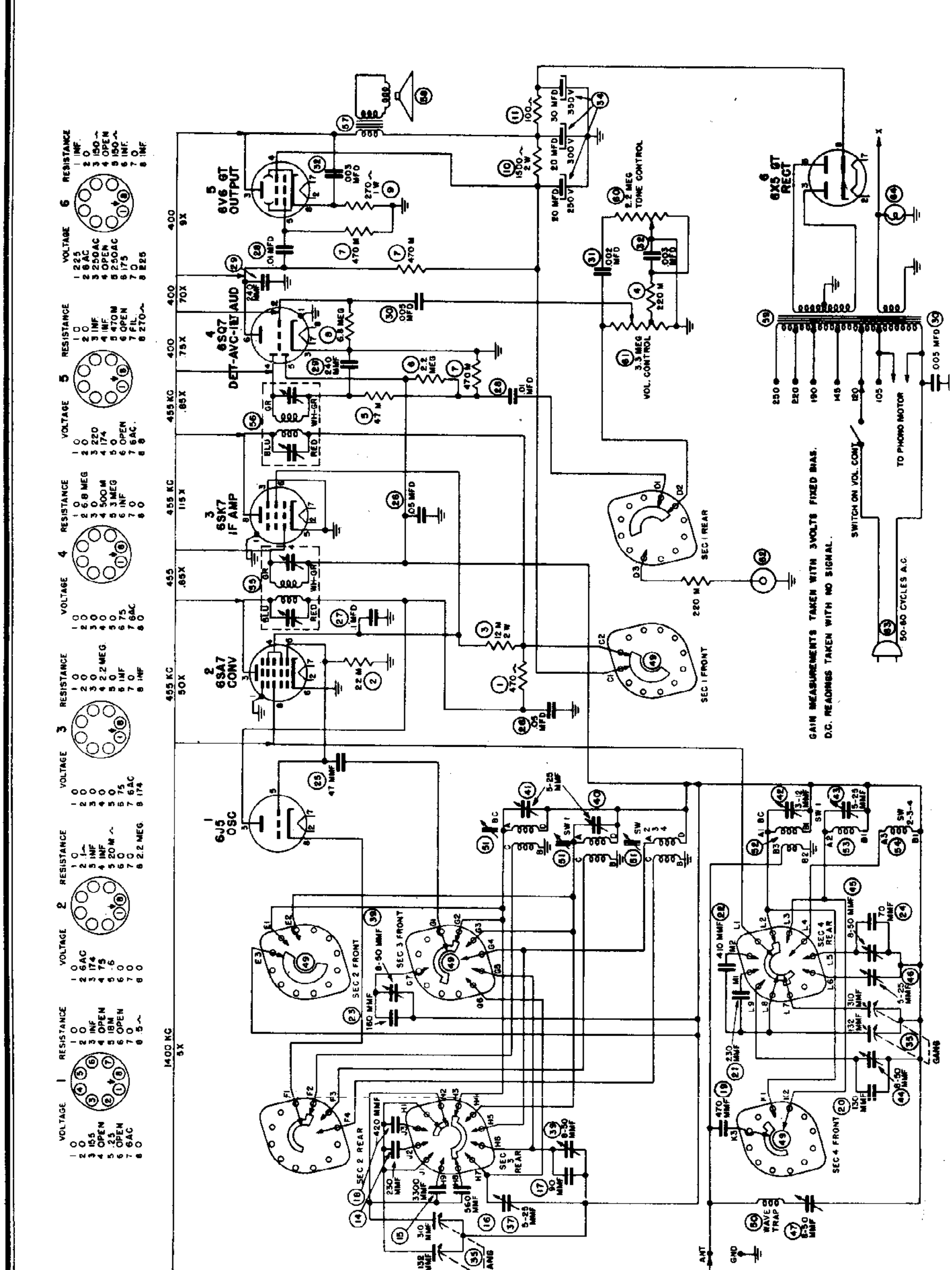
DIAL STRINGING

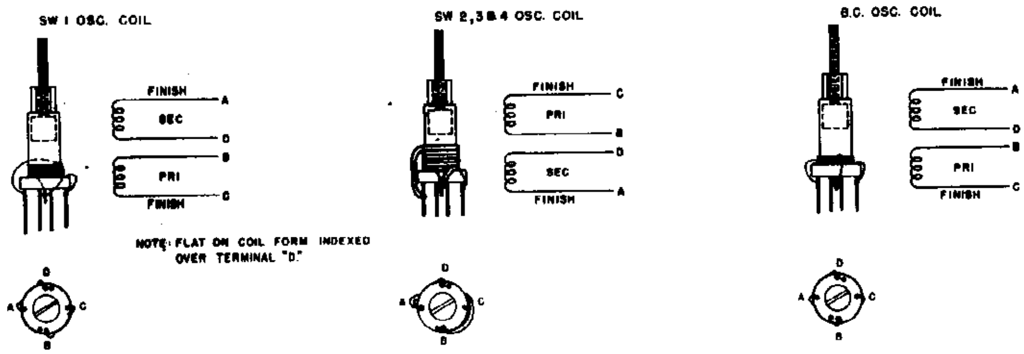


PUSH BUTTON TUNER SWITCH

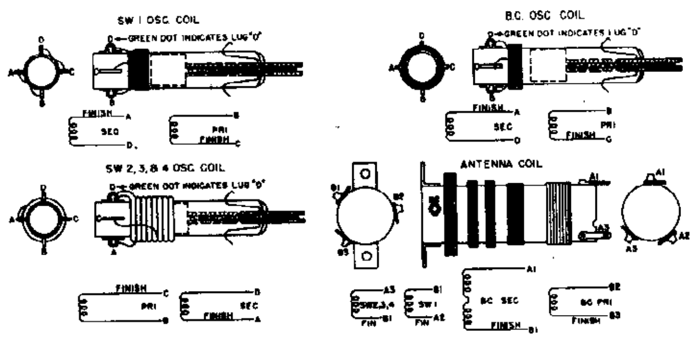


For additional parts list on Models GK-111-114, see page 17-3

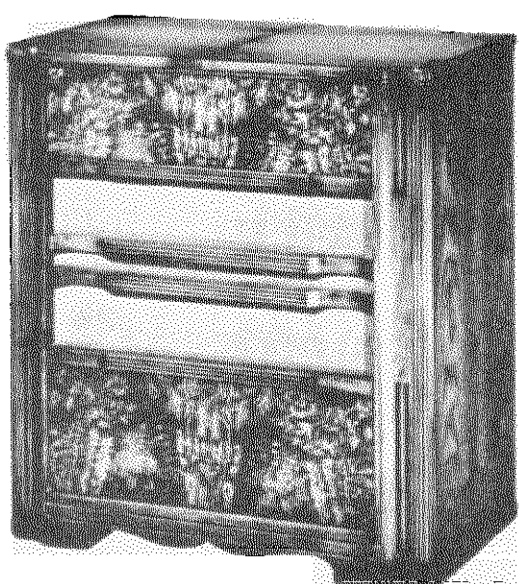

6J5 OSC
6SA7 CONV
6SK7 IF AMP
6SQ7 DET-AVC-1ST AUD
6V6 GT OUTPUT
6X5 GT RECT
VOL. CONTROL
TONE CONTROL
TO PHONO MOTOR
SWITCH ON VOL. CONT.
50-60 CYCLES A.C.
GAIN MEASUREMENTS TAKEN WITH 3VOLTS FIXED BIAS.
D.C. READINGS TAKEN WITH NO SIGNAL.
WAVE TRAP
ANT
GND



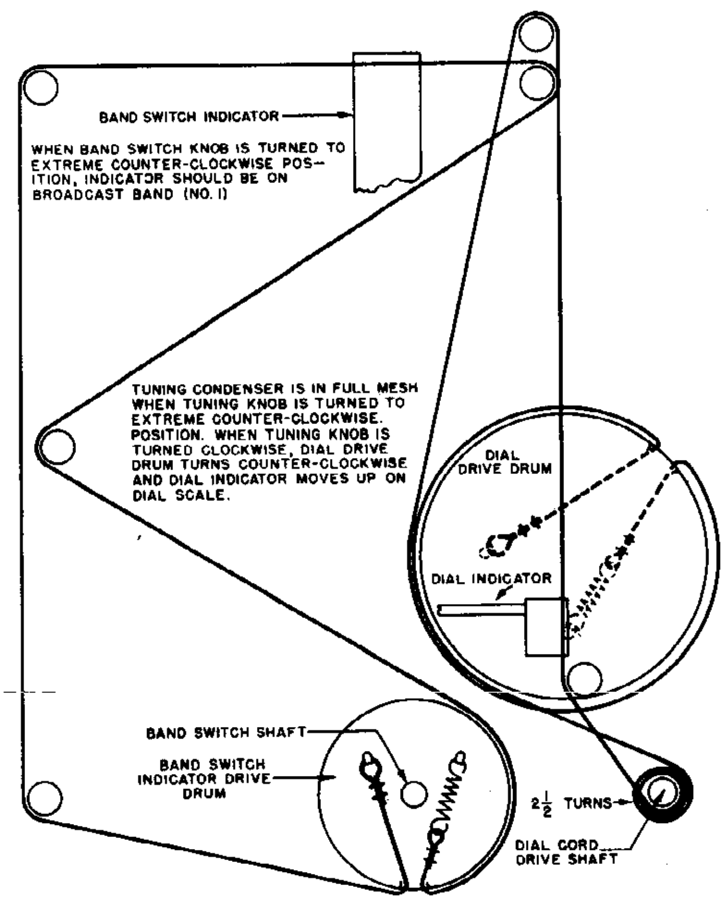
COILS USED IN EARLY PRODUCTION (ANTENNA COIL SAME AS BELOW)



COILS USED IN LATE PRODUCTION



GK-699



FARNSWORTH TELEV. & RADIO CORP. MODELS GK-699, GT-699

EQUIPMENT REQUIRED:

An output meter and signal generator are required for proper alignment of the receiver.

The signal generator must cover a range of 450 kilocycles to 23 megacycles.

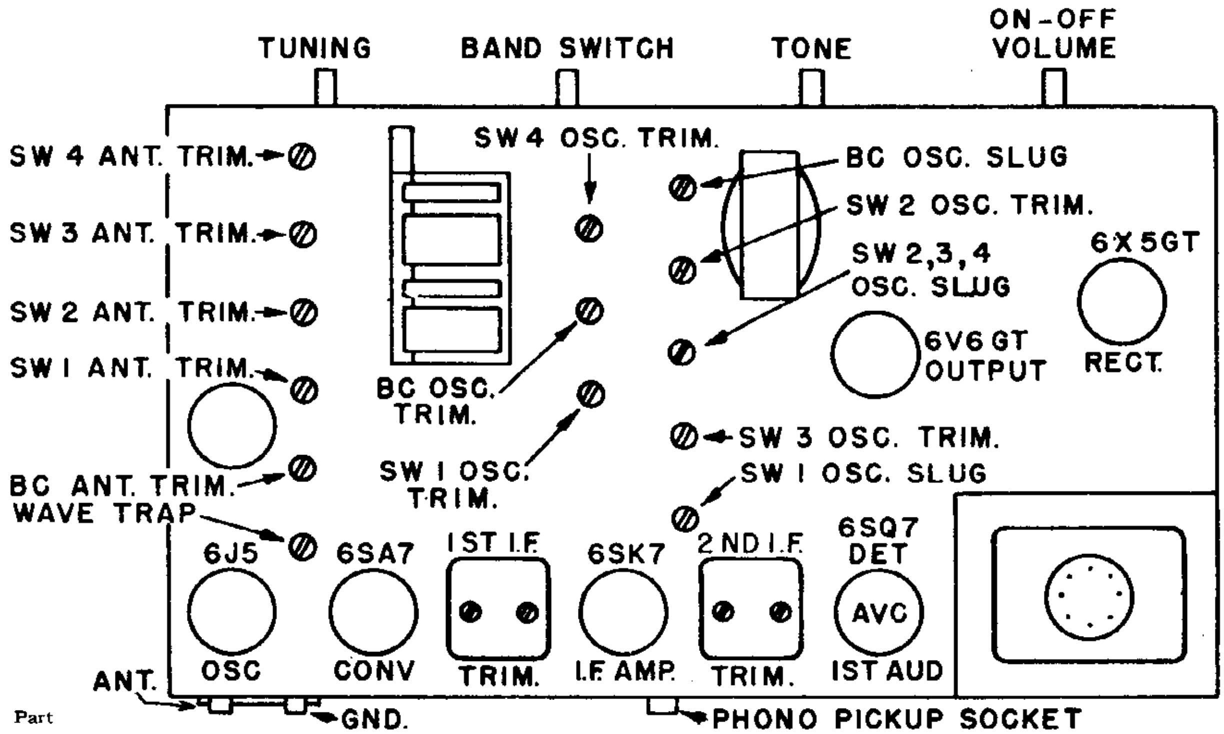
SETTING UP FOR ALIGNMENT:

1. Keep the output of the generator as low as possible to reduce A.V.C. action and consequent false settings.

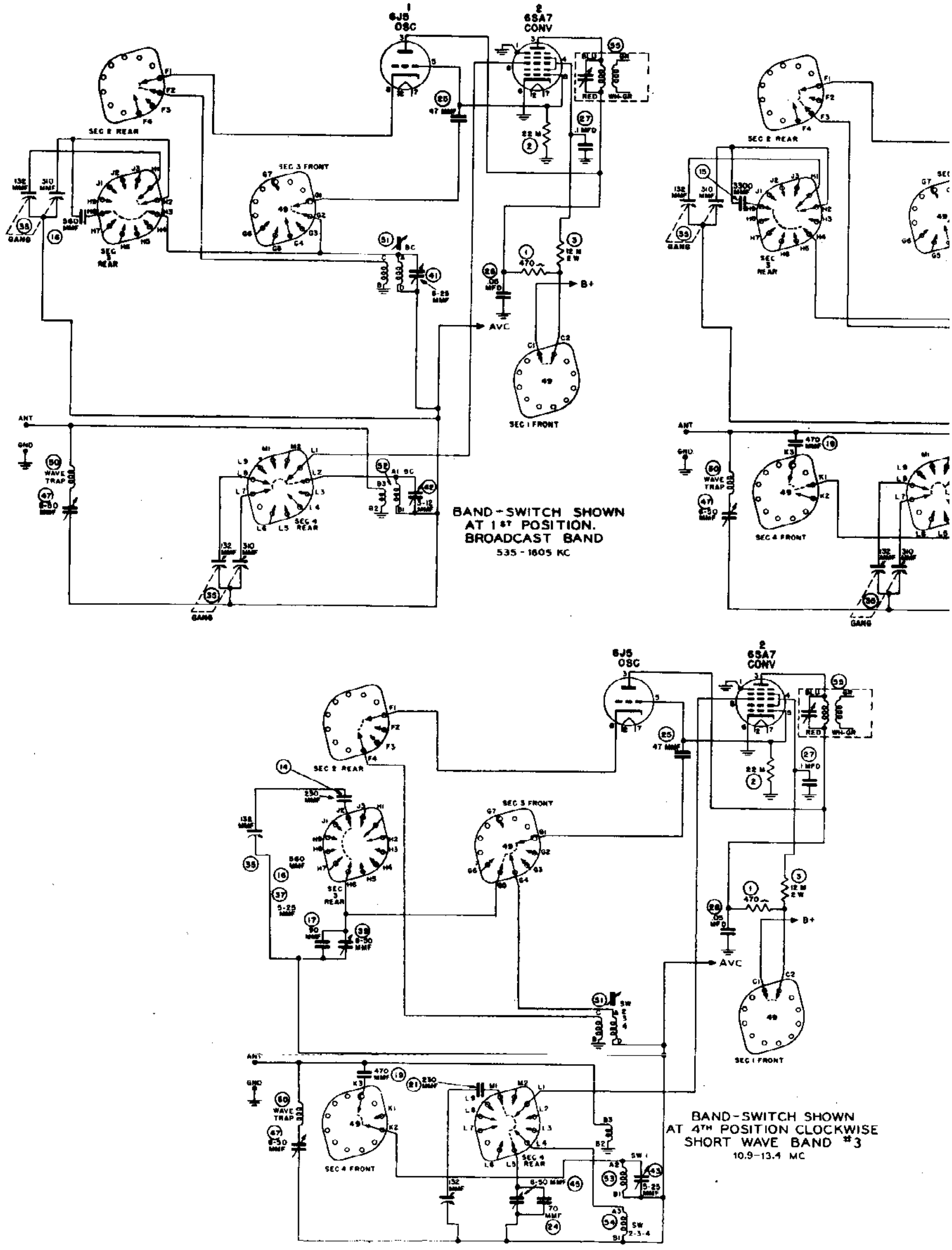
2. In adjusting the wave trap trimmer, it may be necessary to increase signal generator output to obtain a workable reading on the output meter.

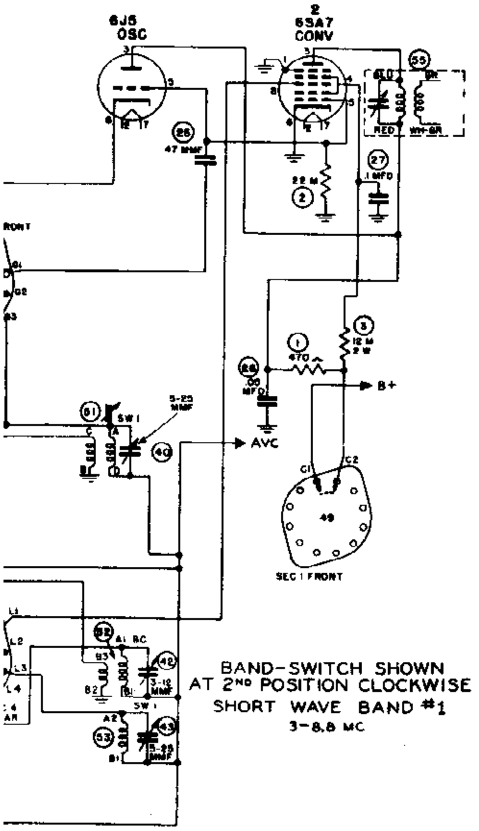
3. Connect the low (ground) side of the generator to the ground terminal screw. The high side of the generator output cable is to be connected as designated in the alignment table.

4. The band switch on the receiver must be set for the band being aligned.

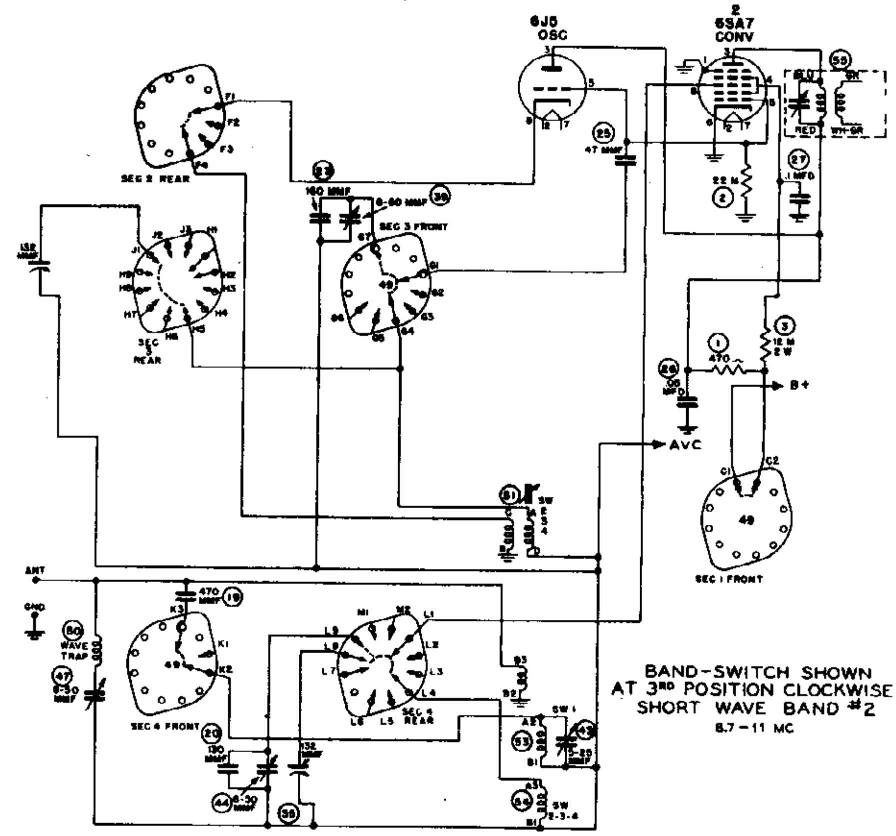


Ref.	Part No.	Description
1	77261	470 ohm resistor
2	77266	22M ohm resistor
3	77155	12M ohm 2 watt resistor
4	77216	220M ohm resistor
5	77213	47M resistor
6	77270	2.2 megohm resistor
7	77217	470M ohms resistor
8	77273	6.8 megohms resistor
9	77174	270 ohms resistor 1 watt
10	77399	1500 ohms 2 watt resistor
11	77258	100 ohms resistor
14	25338	230 mmf silver mica capacitor
15	25336	3300 mmf mica capacitor
16	25337	560 mmf silver mica capacitor
17	25408	90 mmf silver mica
18	25348	420 mmf silver mica
19	25437	470 mmf mica capacitor
20	25373	130 mmf silver mica capacitor
21	25339	230 mmf silver mica capacitor
22	25338'	410 mmf silver mica capacitor
23	25340	160 mmf silver mica capacitor
24	25374	70 mmf silver mica capacitor
25	25350	47 mmf mica capacitor
26	25413	.05 mfd molded oil paper capacitor
27	25361	.1 mfd molded oil paper capacitor
28	25364	.01 mfd molded oil paper capacitor
29	25427	240 mmf mica capacitor
30	25411	.005 mfd molded oil paper capacitor
31	25410	.002 mfd molded oil paper capacitor
32	25409	.003 mfd molded oil paper capacitor
34	25180	30 mfd 350 volt, 20 mfd 300 volt, 20 mfd 250 volt electrolytic capacitor
35	26245	Gang capacitor
37	26228	S.W. 4 oscillator trimmer
38	26229	S.W. 3 oscillator trimmer
39	26229	S.W. 2 oscillator trimmer
40	26228	S.W. 1 oscillator trimmer
41	26228	Broadcast oscillator trimmer
42	26228	Broadcast ant. trimmer
43	26228	S.W. 1 antenna trimmer
44	26229	S.W. 2 antenna trimmer
45	26229	S.W. 3 antenna trimmer
46	26228	S.W. 4 antenna trimmer
47	26229	Wave trap trimmer
49	90224	Band switch
50	38650	Wave trap coil
51	38723	Antenna coil assembly
52	38873	BC. osc. coil (late production)
	38724	BC. osc. coil (early production)
53	38874	S.W. 1 osc. coil (late production)
	38725	S.W. 1 osc. coil (early production)
54	38875	S.W. 2, 3, 4 osc. coil (late production)
	38726	S.W. 2, 3, 4 osc. coil (early production)
55	38721	1st IF transformer
56	38722	2nd IF transformer
57	94216	Output transformer
58	81171	Speaker
58	81169	Speaker
59	94217	Power transformer
59	94253	Power trans. GT-662 WAY & GT-669 WAY
60	78125	Tone control
61	78124	Volume control
62	80030	Phono input
63	27118	Line cord
64	42185	Dial lamp, 250 ma
	58550	Gang capacitor drive drum
	59383	Knob
	31386	Dial glass
	31414	Dial glass (back)
	11398	Dial pointer
	05120	Pointer cord and springs
	05121	Band indicator drive cord and sprin
	15175	Band indicator drive drum and hub
	04082	Band indicator
	80139	Molded octal socket
	80384	Amphenol shielded socket
	80236	Phono motor cable and plug assy. GK-669 WAZ
	22146	Phono pick-up cable
	71223	Phono needle
	H-297	Cabinet and carton for GT-669 WA
	H-280	Cabinet and carton for GK-669 WA

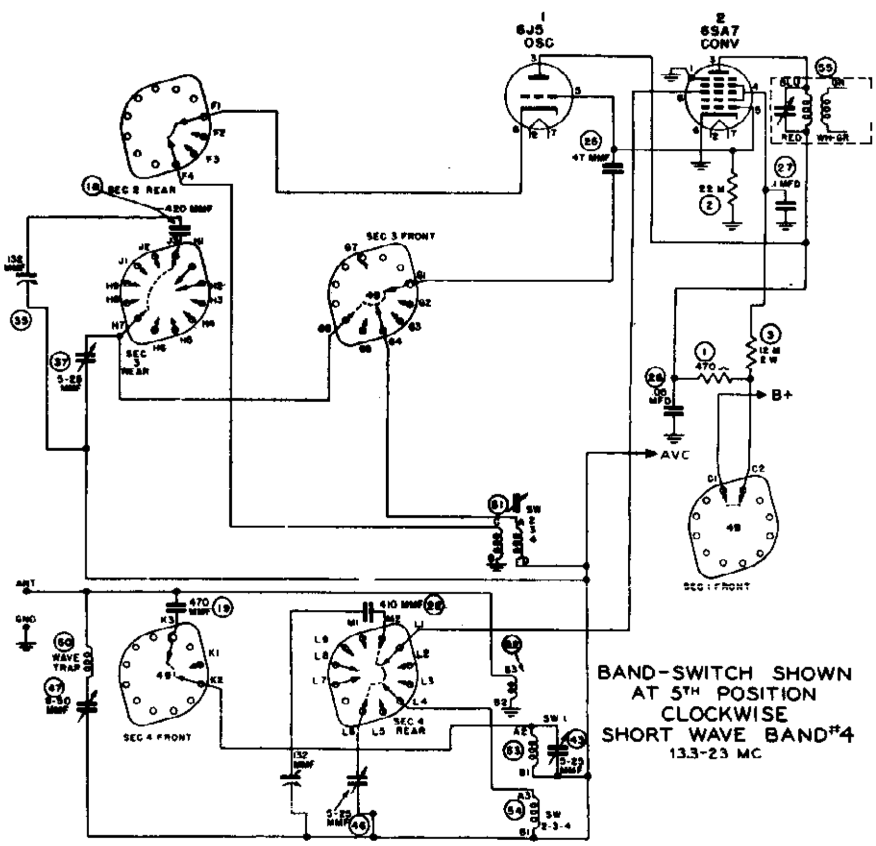

6J5 OSC
6SA7 CONV
SEC 2 REAR
SEC 3 FRONT
SEC 3 REAR
SEC 1 FRONT
SEC 4 REAR
SEC 4 FRONT
ANT
GND
WAVE TRAP
GANG
AVC
B+
BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND
535 - 1605 KC
BAND-SWITCH SHOWN AT 4TH POSITION CLOCKWISE SHORT WAVE BAND #3
10.9-13.4 MC



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE SHORT WAVE BAND #1 3-8.8 MC



BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE SHORT WAVE BAND #2 8.7-11 MC



BAND-SWITCH SHOWN AT 5TH POSITION CLOCKWISE SHORT WAVE BAND #4 13.3-23 MC

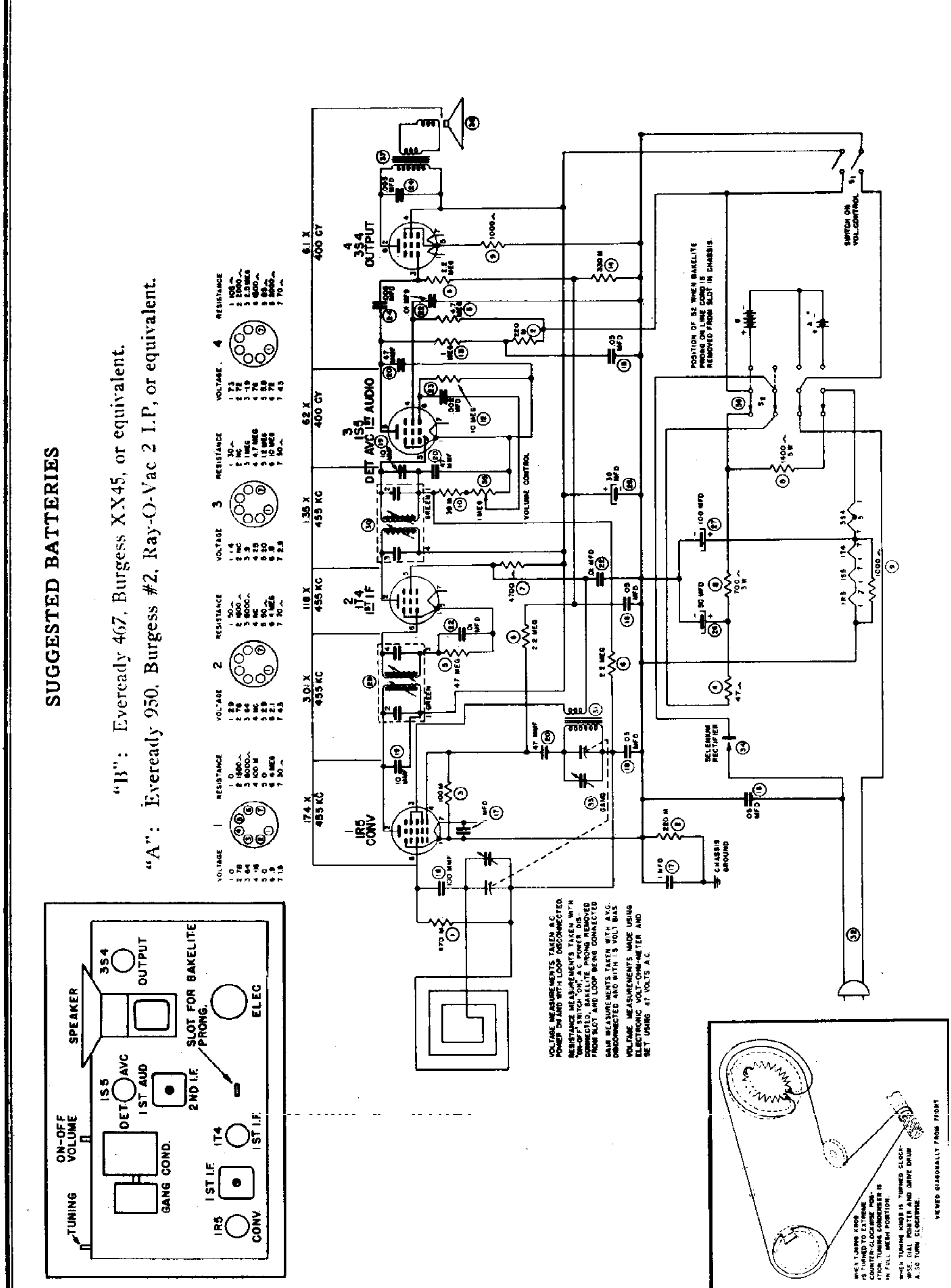
TABULATION FOR AM ALIGNMENT

STEPS	CONNECT SIGNAL GENERATOR TO	SET GEN. AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	Set volume control at maximum and tone control at treble.					
	INTERMEDIATE FREQUENCY					
2	Stator or rear section of gang through .1 mfd.	455Kc.	Minimum	2nd IF trimmers	Top of IF trimmers	Maximum Output
3				1st IF trimmers		
	BROADCAST BAND (1605 Kc to 535 Kc)					
4	Antenna terminal through 200 mmf Capacitor	455Kc.	1000Kc.	Wave trap trimmer		Minimum Output
5		600Kc.	600Kc.	B.C. Osc. slug	See Chassis Layout	Maximum Output
6		1400Kc.	1400Kc.	B.C. Osc. trimmer		
7		1400Kc.	1400Kc.	B.C. Ant. trimmer		
8	Alternate steps 6 and 7 while "rocking in" 600Kc with B.C. Osc. Slug*					
9	Check calibration at 1000Kc.					
	SHORT WAVE No. 1 (3.0 Mc to 8.8 Mc)					
10	Antenna terminal through 400 ohm. non-inductive res.	3.5 Mc	3.5 Mc	S W 1 Osc. Slug	See Chassis Layout	Maximum Output
11		8.0 Mc	8.0 Mc	S W 1 Osc. trimmer		
12		8.0 Mc	8.0 Mc	S W 1 Ant trimmer		
13	Alternate steps 11 and 12 while "rocking in" 3.5 Mc with S W 1 Osc. Slug*					
14	Check calibration at 5.0 Mc.					
	SHORT WAVE No. 2 (8.7 Mc to 11.0 Mc)					
15	Antenna terminal through 400 ohm non-inductive res.	9.0 Mc	9.0 Mc	S W 2 Osc. Slug**	See Chassis Layout	Maximum Output
16		10.9 Mc	10.9 Mc	S W 2 Osc. trimmer		
17		10.9 Mc	10.9 Mc	S W 2 Ant. trimmer		
18	Alternate steps 16 and 17 while "rocking in" 9.0 Mc with S W 2 Osc. Slug*					
19	Check calibration at 10 Mc.					
	SHORT WAVE No. 3 (10.9 Mc to 13.4 Mc)					
20	Antenna terminal through 400 ohm. non-inductive res.	13.3 Mc	13.3 Mc	S W 3 Osc. trimmer	See Chassis Layout	Maximum Output
21		13.3 Mc	13.3 Mc	S W 3 Ant. trimmer		
22	Check calibration at 11.0 Mc and 12 Mc.					
	SHORT WAVE No. 4 (13.3 Mc to 23.0 Mc)					
23	Antenna terminal through 400 ohm. non-inductive res.	22.0 Mc	22.0 Mc	S W 4 Osc. trimmer	See Chassis Layout	Maximum Output
24		22.0 Mc	22.0 Mc	S W 4 Ant. trimmer		
25	Check calibration at 14.0 Mc and 18 Mc.					

*Rock tuning gang while adjusting oscillator coil slug until maximum output is obtained. Return to oscillator and antenna trimmer and adjust them for maximum output. Repeat this procedure until output cannot be increased.

**If S W 2 oscillator slug is properly adjusted, no further adjustment is required for S W Bands No. 3 and 4.

FARNSWORTH TELEV. & RADIO CORP.



FARNSWORTH TELEV. & RADIO CORP.

ALIGNMENT OF THE RECEIVER

A signal generator calibrated at 455 Kc., 1400 Kc., and 1625 Kc., is necessary to properly align this receiver. After aligning the I. F. stages, replace receiver in cabinet and connect loop before aligning the R.F. The oscillator trimmer is on the oscillator section of the gang and the loop trimmer is on the R.F. section of the gang. When aligning this receiver it should be operated on the self contained batteries.

STEPS	USE IN SERIES WITH GENERATOR	SET GEN. AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	.02 Mfd. in each Lead. Connect High side of gen. to grid of 1R5 tube.	455 Kc	Minimum Capacity	2nd I.F. Slugs 1st. I.F. Slugs	Top and Bottom of I.F. Transformer	Maximum Output
2	Loop**	1625 Kc.	Minimum Capacity	Oscillator Trimmer	On Gang Capacitor	Maximum Output
3	Loop**	1400 Kc.	Tune in to 1400 Kc., and rock gang	Loop Trimmer	On Gang Capacitor	Maximum Output

**Loop to consist of five to ten turns of insulated wire wound on a three or four inch form to be closely coupled to the loop antenna in the door of the receiver.

Ref. No.	Part No.	DESCRIPTION
1	77217	470 M ohm resistor
2	77216	220 M ohm resistor
3	77214	100 M ohm resistor
4	77059	47 ohm wire wound resistor
5	77272	4.7 megohm resistor
6	77270	2.2 megohm resistor
7	77211	4700 ohm resistor
8	77348	Resistor, 700 ohm 3 watt, 1409 ohm 5 watt
9	77262	1000 ohm resistor
10	77355	39 M ohm resistor
12	77274	10 megohm resistor
13	77218	1 megohm resistor
14	77268	330 M ohm resistor
16	25188	100 mmf mica capacitor
17	25182	.1 mfd. 200 volt capacitor
18	25196	.05 mfd. 600 volt capacitor
19	25425	10 mmf ceramic capacitor
20	25193	47 mmf mica capacitor
22	25194	.01 mfd. 600 volt tubular
23	25185	.002 mfd. 600 volt tubular
24	25183	.005 mfd. 600 volt tubular
26	25334	50 mfd. 30 mfd. electrolytic capacitor 150 volt
27	25335	100 mfd electrolytic capacitor 50 volt
29	38710	1st. I.F. Transformer
30	38710	2nd I.F. Transformer
31	38713	Oscillator coil
32	27415	Line cord
33	11343	Gang capacitor and drive drum
34	76003	Selenium rectifier
35	78121	1 megohm volume control
36	90222	A.C. battery switch
37	94211	Output transformer
38	81159	Speaker

59395	Volume control knob
59388	Tuning knob
05103	Drive cord
59385	Dial Pointer
31343	Dial Scale
80380	Miniature Tube Socket for 1S5 Tube
80350	Miniature Tube Socket
13615	Polarized terminal strip
59453	Strain relief grommet (bakelite)
54286	A.C. Bat. Switching prong
H-289	Cabinet and Carton
13729	Handle Assembly
13785	Door and Loop Assembly
58513	Catch (for door and loop antenna)
59387	Pyralin Window
62141	Rubber feet

PROTECTION AND CARE OF LEATHERETTE COVERING

Covering a portion of the cabinet to produce a two tone effect and enclosing within the front door a high "Q" Polyethylene loop antenna, is a simulated fine-grain leather. Cabinets of this nature are subject, due to climatic conditions or handling, to loosening of the covering at edges or corners.

In re-glueing the cover, an adhesive having acetone or similar paint-solvent should not be used. Most household adhesives fall into this category. It is recommended that either an animal glue such as Le Page's or a rubber cement be employed, weighting the covering until thoroughly dried. It is to be noted that the animal glues are solvent in water and may not hold if the case is subjected to water or excessive moisture. Glue splashed upon the lacquer finish may be wiped off with a dampened cloth; excessive rubber cement may be rubbed off when dry.

SPEAKER RESPONSE

If a receiver is encountered with exhibits "flat" tonal quality, the back cover should be removed and the speaker observed for clearance from the cabinet front. It should be tight against the cabinet. Should a recessed condition be found, remove the chassis and place a suitable number of washers between the speaker frame and mounting bracket.

FARNSWORTH TELEV. & RADIO CORP. MODEL GT-050, GT-05

1

VOLTAGE	RESISTANCE
1 0	1 220M
2 24AC	2 24~
3 84DC	3 13M
4 84DC	4 13M
5 7	5 22M
6 0	6 0.7~
7 11AC	7 15~
8 -.94DC	8 3MEG

2

VOLTAGE	RESISTANCE
1 0	1 220M
2 24AC	2 24~
3 0	3 0
4 -.95DC	4 3MEG
5 0	5 0
6 83DC	6 13M
7 34AC	7 40~
8 83DC	8 13M

3

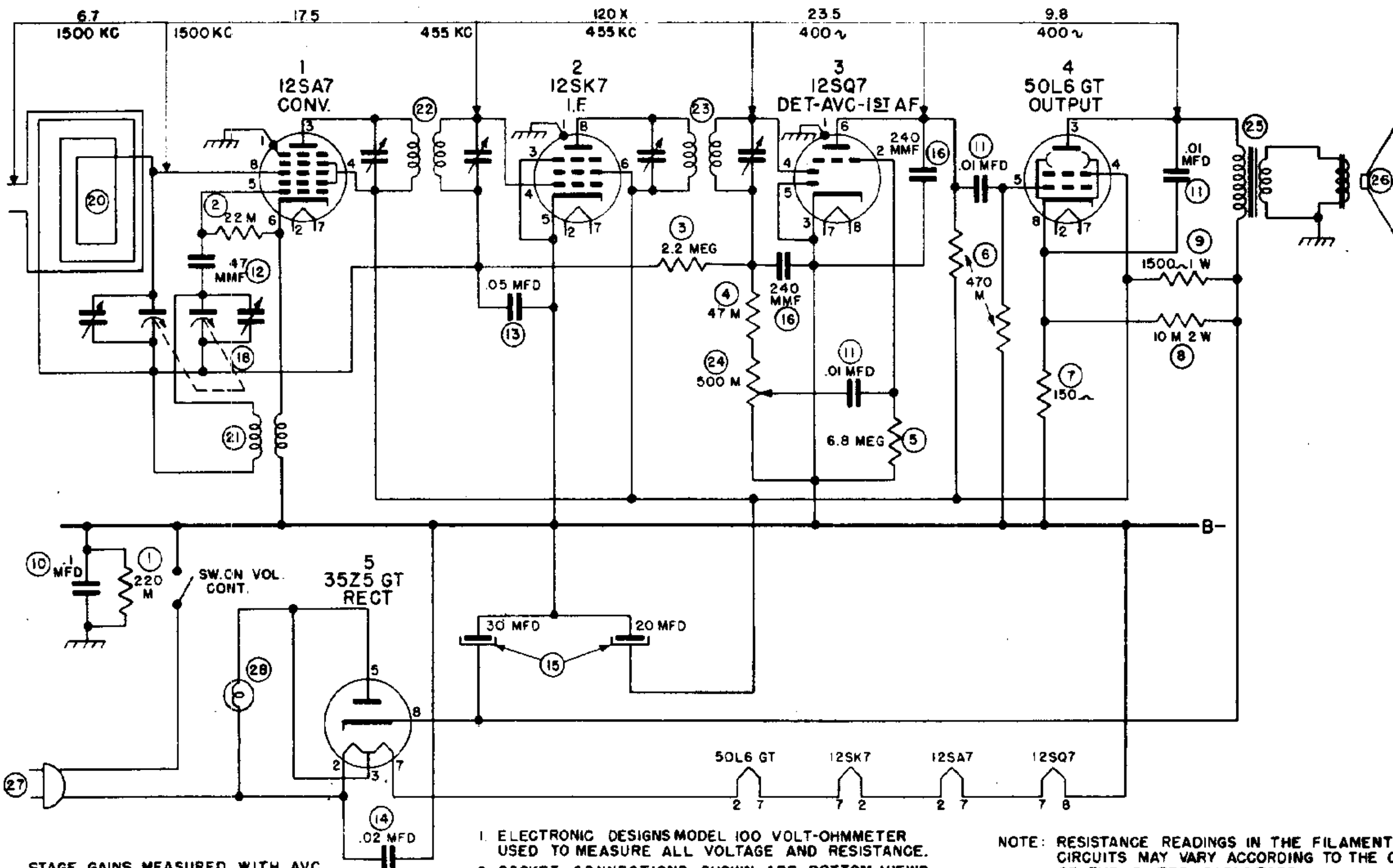
VOLTAGE	RESISTANCE
1 0	1 220M
2 -.92DC	2 6.8MEG
3 0	3 0
4 -.45DC	4 550M
5 0	5 0
6 50DC	6 500M
7 11AC	7 15~
8 0	8 0

4

VOLTAGE	RESISTANCE
1 0	1 220M
2 84AC	2 100~
3 114DC	3 10M
4 83DC	4 13M
5 +.1DC	5 470M
6 118DC	6 10M
7 34AC	7 40~
8 +6DC	8 150~

5

VOLTAGE	RESISTANCE
1 0	1 INF
2 117.5AC	2 120~
3 106AC	3 120~
4 0	4 0-SW. CLOSED INF-SW. OPEN
5 106AC	5 120~
6 0	6 INF
7 84AC	7 90~
8 120DC	8 10M



STAGE GAINS MEASURED WITH AVC MADE INOPERATIVE AND 3 VOLT BATTERY BIAS SUBSTITUTED.

LOW SIDE OF LOOP PRIMARY RUN TO B-

1. ELECTRONIC DESIGNS MODEL 100 VOLT-OHMMETER USED TO MEASURE ALL VOLTAGE AND RESISTANCE.
2. SOCKET CONNECTIONS SHOWN ARE BOTTOM VIEWS.
3. LINE VOLTAGE 117.5 FOR VOLTAGE MEASUREMENTS.
4. VOLUME CONTROL AT MAX. NO SIGNAL APPLIED FOR VOLTAGE MEASUREMENTS.

NOTE: RESISTANCE READINGS IN THE FILAMENT AND B+ CIRCUITS MAY VARY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS.

ALL RESISTANCE READINGS MEASURED FROM INDICATED PIN TO B-.

ALIGNMENT OF THE RECEIVER

EQUIPMENT REQUIRED

Signal generator, calibrated at 455 Kc, 600 Kc, 1500 Kc, and 1625 Kc.
Output Indicator.
Isolation Transformer.
Insulated Screw Driver.

PRELIMINARY INSTRUCTIONS

Volume control is set to maximum. All alignment should be done with only sufficient signal amplitude to provide a readable output on output meter. The use of an excessively strong signal is almost certain to produce misalignment.

An isolation transformer is necessary to avoid any possibility of a short circuit.

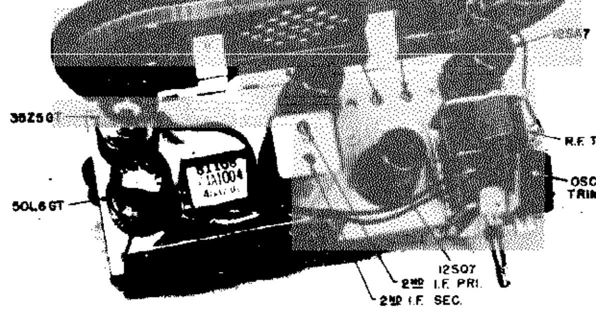
Connect the high side of the signal generator to one side of the loop primary through a 200 mmf capacitor. After connecting the other side of the primary to the B-lead, the low side of the generator is applied to the B-lead.

TABULATION FOR ALIGNMENT

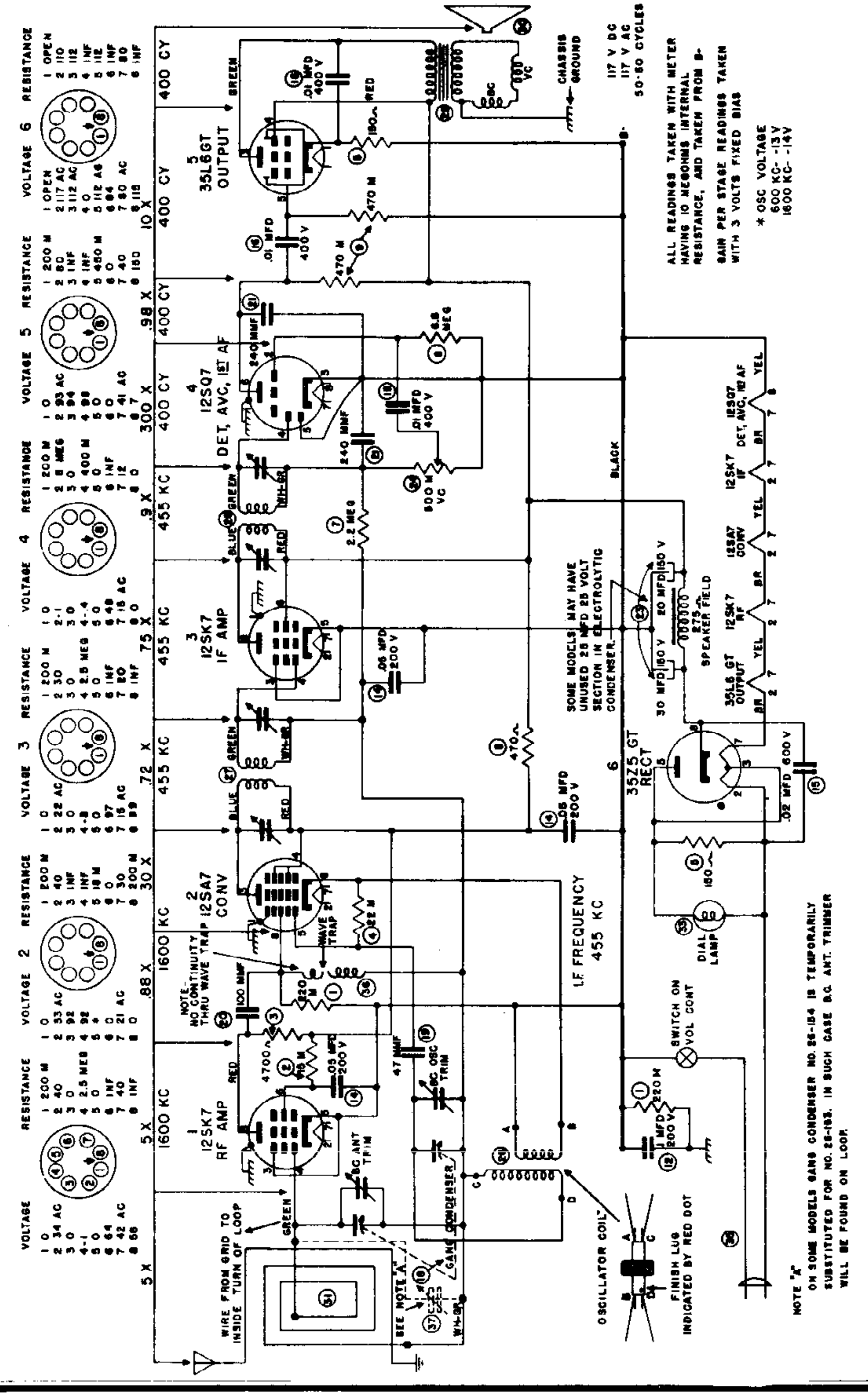
STEPS	CONNECT SIGNAL GENERATOR*	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1		Set Volume Control for Maximum				
2	To Loop Primary through 200 MMF	455 Kc	Minimum Capacity	2nd IF Trimmers	Top of IF Transformer	Maximum Output
3	To Loop Primary through 200 MMF	455 Kc	Minimum Capacity	1st IF Trimmers	See Trimmer Layout	Maximum Output
4	To Loop Primary through 200 MMF	1625 Kc	Minimum Capacity	Oscillator Trimmer	On Tuning Condenser	Maximum Output
5	To Loop Primary through 200 MMF	1500 Kc	1500 Kc	Antenna Trimmer	On Tuning Condenser	Maximum Output

*See preliminary instructions.

Ref. No.	Part Number	Description
1	77216	220M Ohm Resistor
2	77266	22M Ohm Resistor
3	77270	2.2 Megohm Resistor
4	77213	47M Ohm Resistor
5	77273	6.8 Megohm Resistor
6	77217	470M Ohm Resistor
7	77259	150 Ohm Resistor
8	77427	10M Ohm Resistor, 2 Watt
9	77342	1500 Ohm Resistor, 1 Watt
10	25182	.1 Mfd Paper Capacitor
11	25194	.01 Mfd. Tubular Capacitor, 600 Volts
12	25426	47 Mmf Ceramic Capacitor
13	25196	.05 Mfd Tubular Capacitor
14	25195	.02 Tubular Capacitor, 600 Volts
15	25022	30 Mfd, 20 Mfd, 150 Volt Electrolytic
16	25427	240 Mmf Ceramic Capacitor
18	26239	Gang Tuning Capacitor
20	38866	Loop Antenna and Back Cover
21	38706	Oscillator Coil
22	38844	1st IF Transformer
23	38840	2nd IF Transformer
24	78143	Volume Control
25	94247	Output Transformer
26	81168	Speaker
27	27118	Line Cord
28	42186	Pilot Lamp (Mazda 47)
	13721-1	Tuning Knob Assy. GT-050, GT-052
	13721-2	Tuning Knob Assy. GT-051
	59499	Volume Control Knob for GT-050, GT-052
	59465	Volume Control Knob GT-051
	31426	Dial Scale
	60594	Dial Background
	H-298	Cabinet and Carton GT-050
	H-299	Cabinet and Carton GT-051
	H-300	Cabinet and Carton GT-052

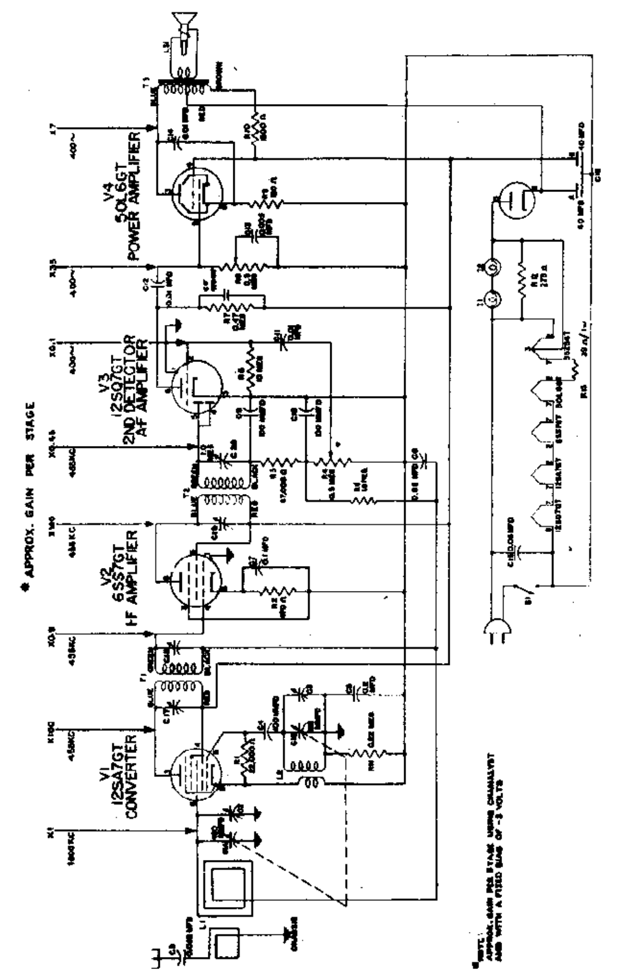


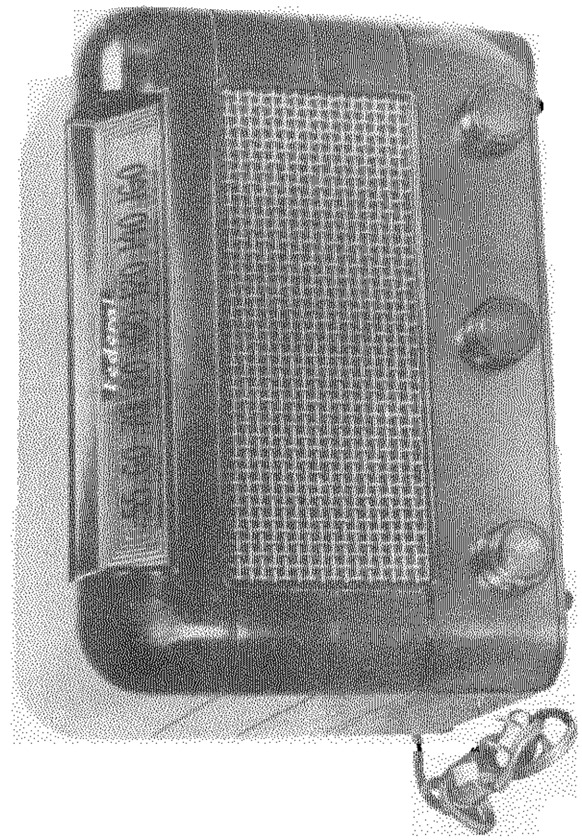
FARNSWORTH TELEV. & RADIO CORP. MODEL GT-060, GT-061
GT-064, GT-065



For alignment and additional data, see Model ET-064 on pages 15-5, 15-6, and 15-7 of Rider's Volume XV.

FEDERAL TELEPHONE AND RADIO CORP.





FEDERAL TELEPHONE AND RADIO CORP.

TUBE	PIN	VTVM	20,000 Ω P.V.	1,000 Ω P.V.	RESISTANCE
12SA7GT Conv	1	0	0	0	220 K
	2	AC	AC	AC	34 Ω
	3	88	88	88	Over 5 megs
	4	88	88	88	Over 5 megs
	5	-6	-6	-2	24 K
	6	0	0	0	0.4 Ω
	7	AC	AC	AC	14 Ω
	8	-0.3	-0.2	0	1.4 Ω
6SS7GT IF Ampl	1	0	0	0	220 K
	2	AC	AC	AC	28 Ω
	3	0	0	0	0
	4	-0.3	-0.2	0	1.4 megs
	5	2.7	2.7	2.7	440 Ω
	6	88	88	88	Over 5 megs
	7	AC	AC	AC	32 Ω
	8	88	88	88	Over 5 megs
12SQ7GT Det. A.V.C. Audio Ampl	1	0	0	0	220 K
	2	-0.7	-0.5	-0.2	10 megs
	3	0	0	0	0
	4	-0.3	-0.3	-0.2	550 K
	5	-0.3	-0.3	-0.2	550 K
	6	48	48	16	Over 5 megs
	7	AC	AC	AC	14 Ω
	8	0	0	0	220 K
50L6GT Audio Output	1	-	-	-	-
	2	AC	AC	AC	32 Ω
	3	120	120	120	Over 5 megs
	4	88	88	88	Over 5 megs
	5	0	0	0	400 K
	6	0	0	0	0
	7	AC	AC	AC	90 Ω
	8	4.7	4.7	4.7	125 Ω
35Z5GT	1	-	-	-	-
	2	AC	AC	AC	150 Ω
	3	AC	AC	AC	146 Ω
	4	88	88	88	Over 5 megs
	5	AC	AC	AC	146 Ω
	6	125	125	125	Over 5 megs
	7	AC	AC	AC	130 Ω
	8	125	125	125	Over 5 megs

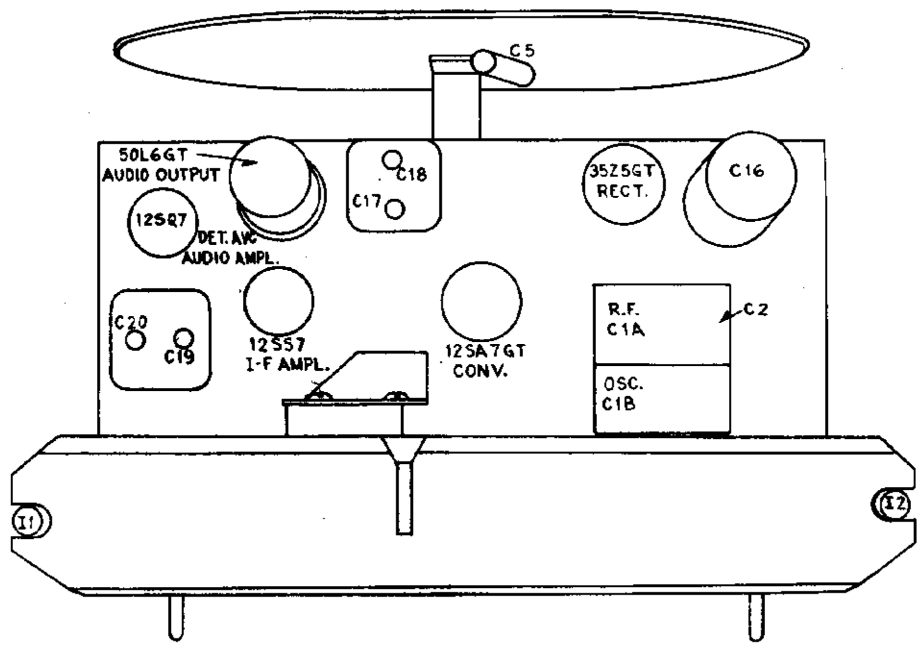
NOTE: All voltage and resistance measurements made with respect to B- and with a line voltage of 116 V.A.C.

ALIGNMENT

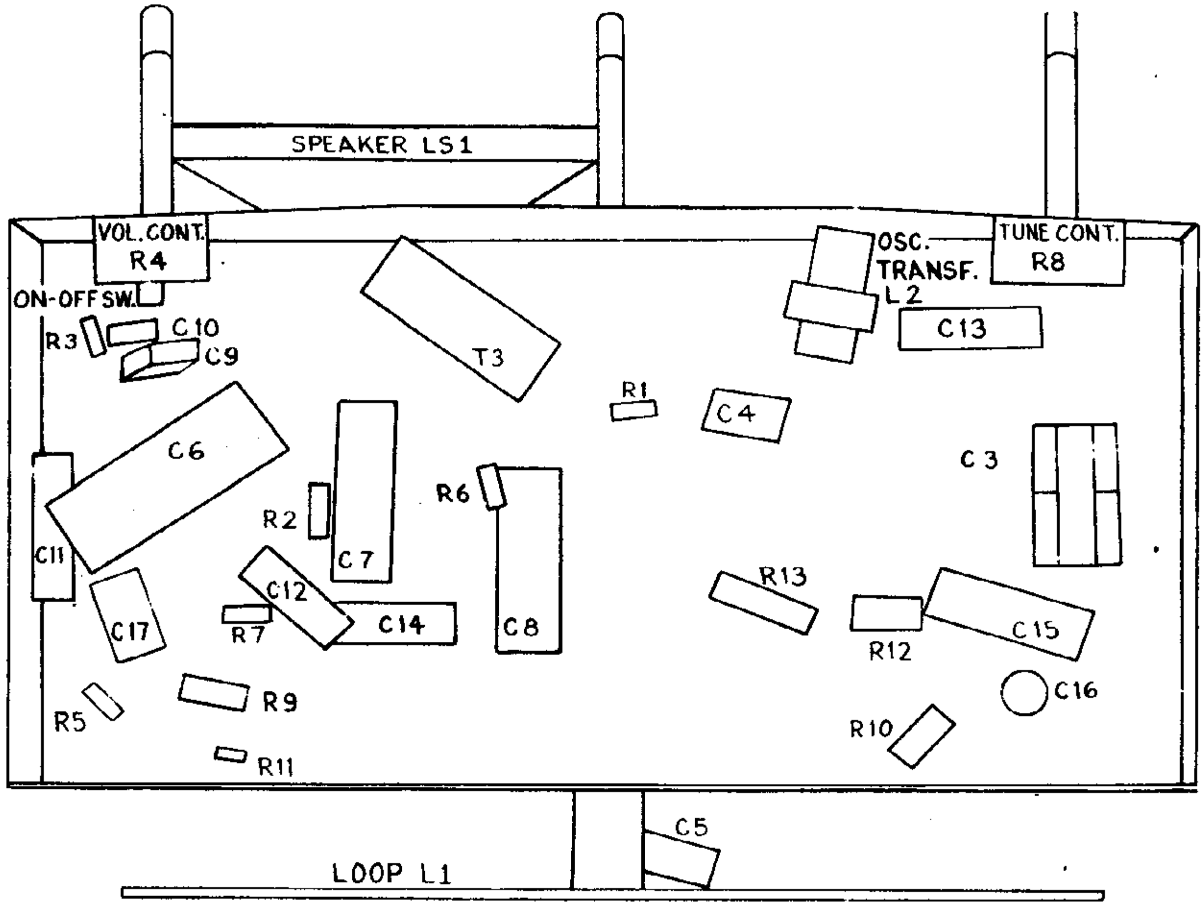
The chassis is removed from the cabinet in order to align this receiver.

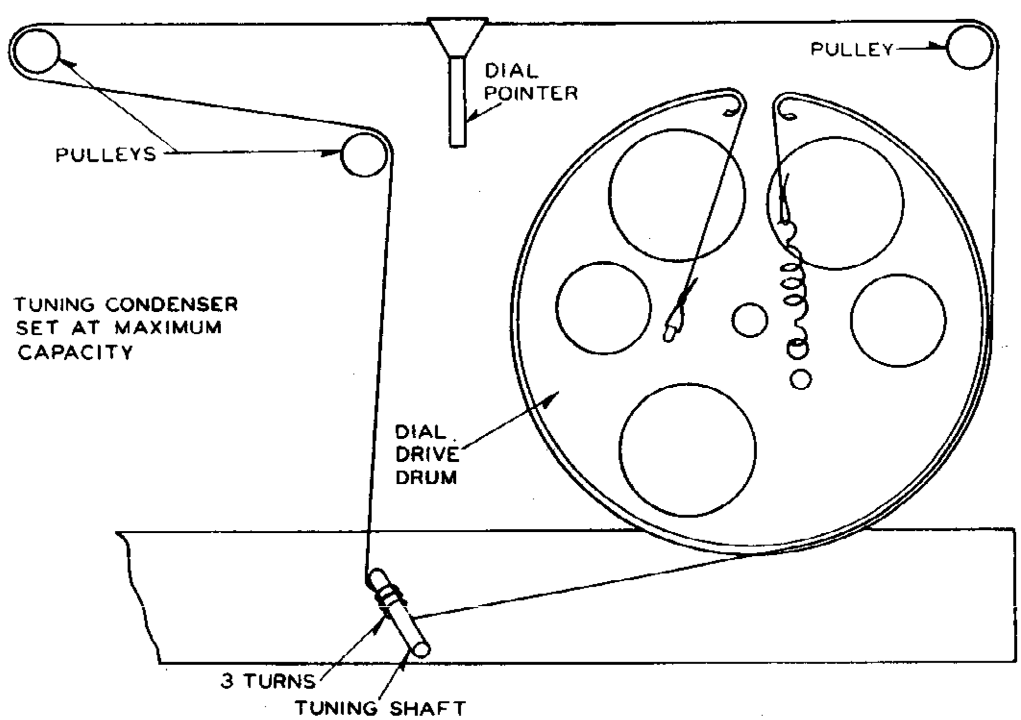
Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine loop, Model 1150, and couple loosely to the receiver loop. Set the receiver volume control to maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should be sufficient to give a readable deflection on the output meter.

Set the signal generator to 455 kc. Adjust the i.f. trimmers, C20, C19, C18, and C17, for maximum output on the output meter. Set the signal generator and receiver to 1600 kc and adjust oscillator trimmer C3 (underneath the chassis) for maximum output. Set the signal generator and receiver to 1400 kc and adjust r.f. trimmer C2 for maximum output.



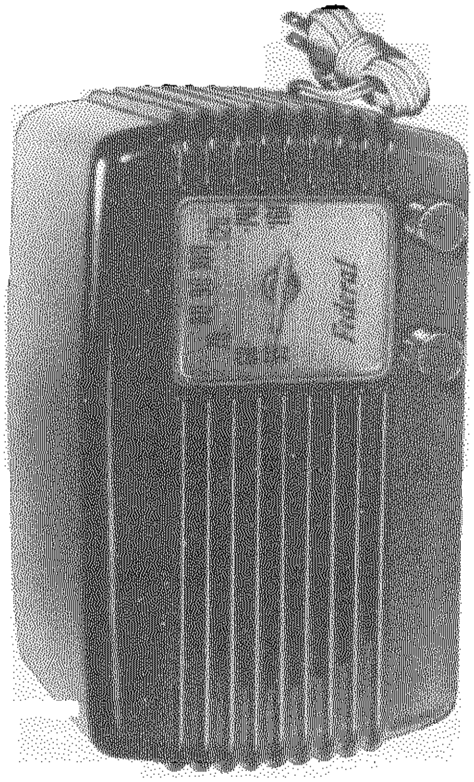
FEDERAL TELEPHONE AND RADIO CORP.

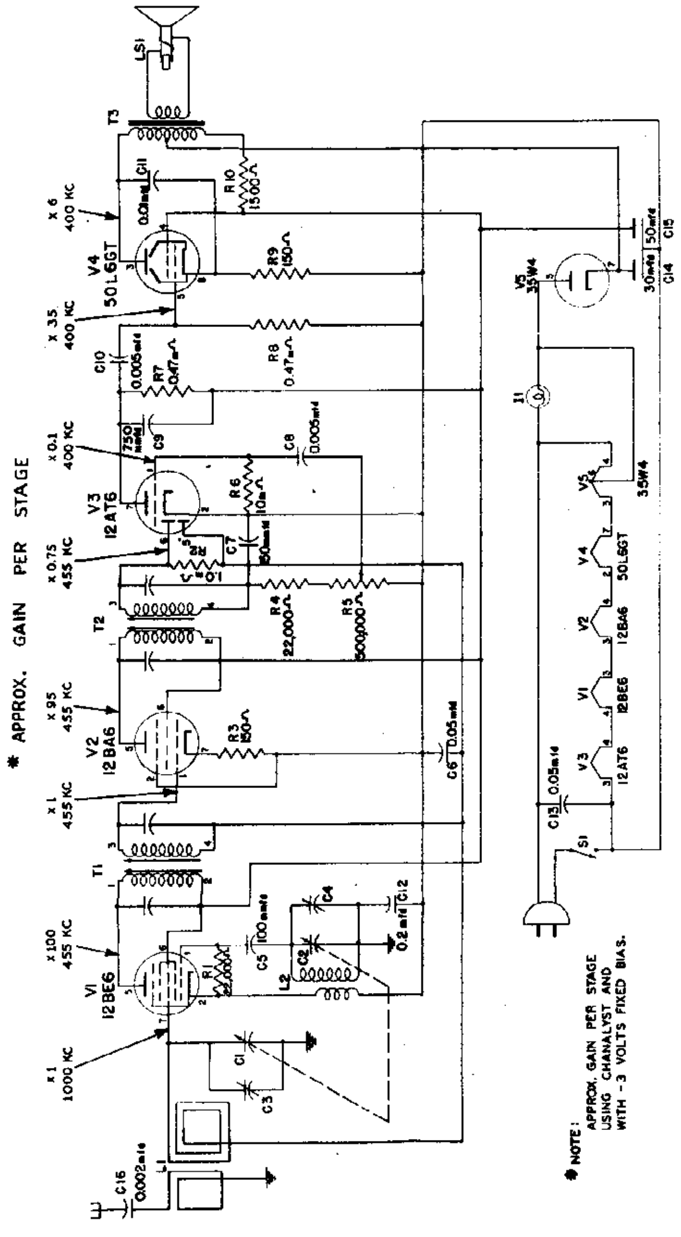


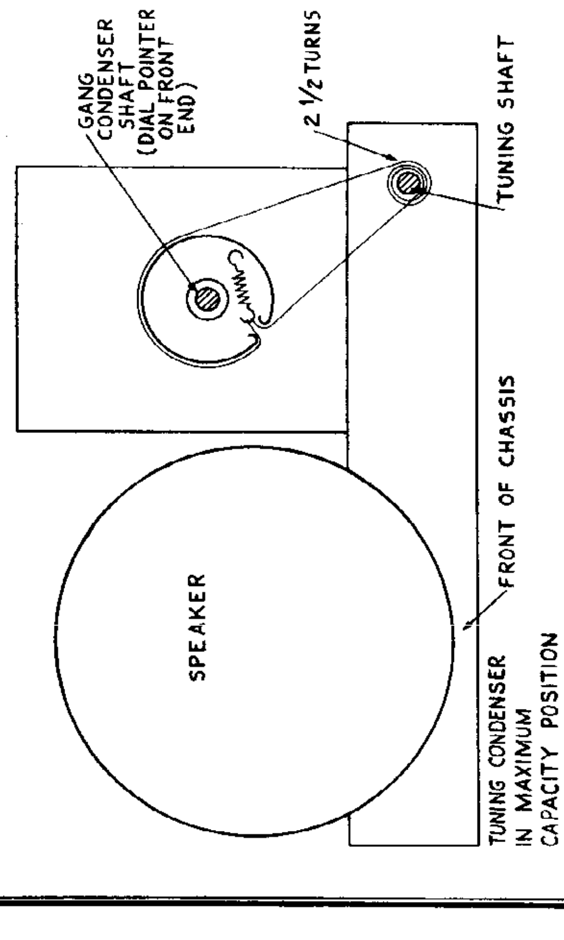


DIAL DRIVE ASSEMBLY
FRONT VIEW

MODEL 1040TB FEDERAL TELEPHONE AND RADIO CORP.



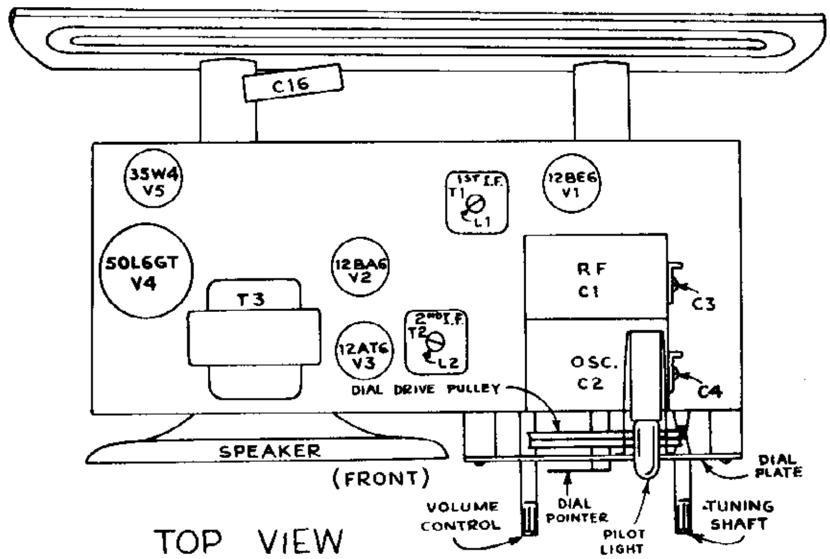




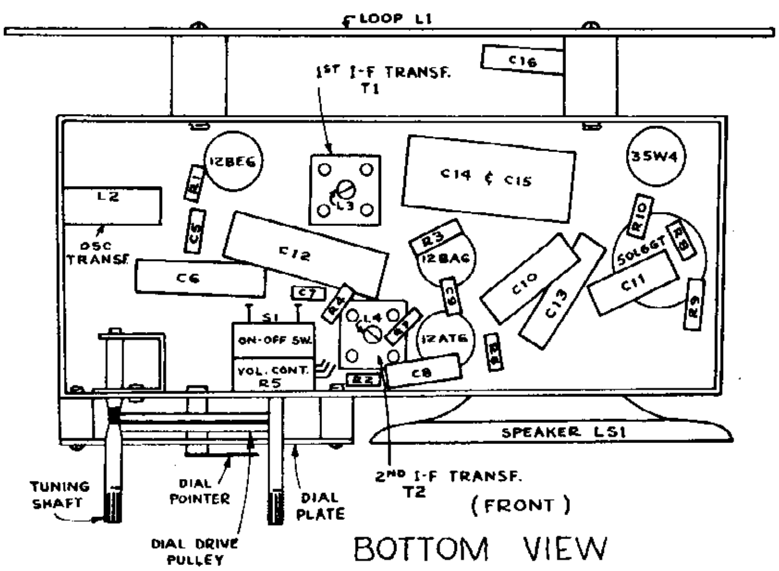
TUBE	PIN	VTVM	20,000 Ω P.V.	1,000 Ω P.V.	RESISTANCE
12BE6	1	-7	-7	-3.5	25 K
Conv	2	0	0	0	0.5
	3	AC	AC	AC	34 Ω
	4	AC	AC	AC	18 Ω
	5	92	92	92	Over 5 megs
	6	92	92	92	Over 5 megs
	7	-0.6	-0.4	-0.1	1.5 megs
12BA6					
I.F. Ampl	1	-0.6	-0.4	-0.1	1.5 megs
	2	0	0	0	0
	3	AC	AC	AC	24 Ω
	4	AC	AC	AC	36 Ω
	5	92	92	92	Over 5 megs
	6	92	92	92	Over 5 megs
	7	1.3	1.3	1.3	160 Ω
12AT6	1	-1.4	-0.6	-0.4	10 megs
Det. AVC	2	0	0	0	0
Audio Ampl	3	0	0	0	0
	4	AC	AC	AC	12 Ω
	5	-0.6	-0.4	-0.1	1.5 megs
	6	-0.5	-0.4	-0.1	500 K
	7	44	42	16	Over 5 megs
50L6GT	1	0	0	0	0
Audio	2	AC	AC	AC	34 Ω
Output	3	110	110	110	Over 5 megs
	4	92	92	92	Over 5 megs
	5	0	0	0	400 K
	6	120	120	120	Over 5 megs
	7	AC	AC	AC	85 Ω
	8	5.5	5.5	5.5	150 Ω
35W4	1	-	-	-	-
Rect	2	-	-	-	-
	3	AC	AC	AC	85 Ω
	4	AC	AC	AC	112 Ω
	5	AC	AC	AC	110 Ω
	6	AC	AC	AC	110 Ω
	7	120	120	120	Over 5 megs

NOTE: All voltage and resistance measurements made with respect to B- and with a line voltage of 116 V.A.C.

FEDERAL TELEPHONE AND RADIO CORP.



TOP VIEW



BOTTOM VIEW

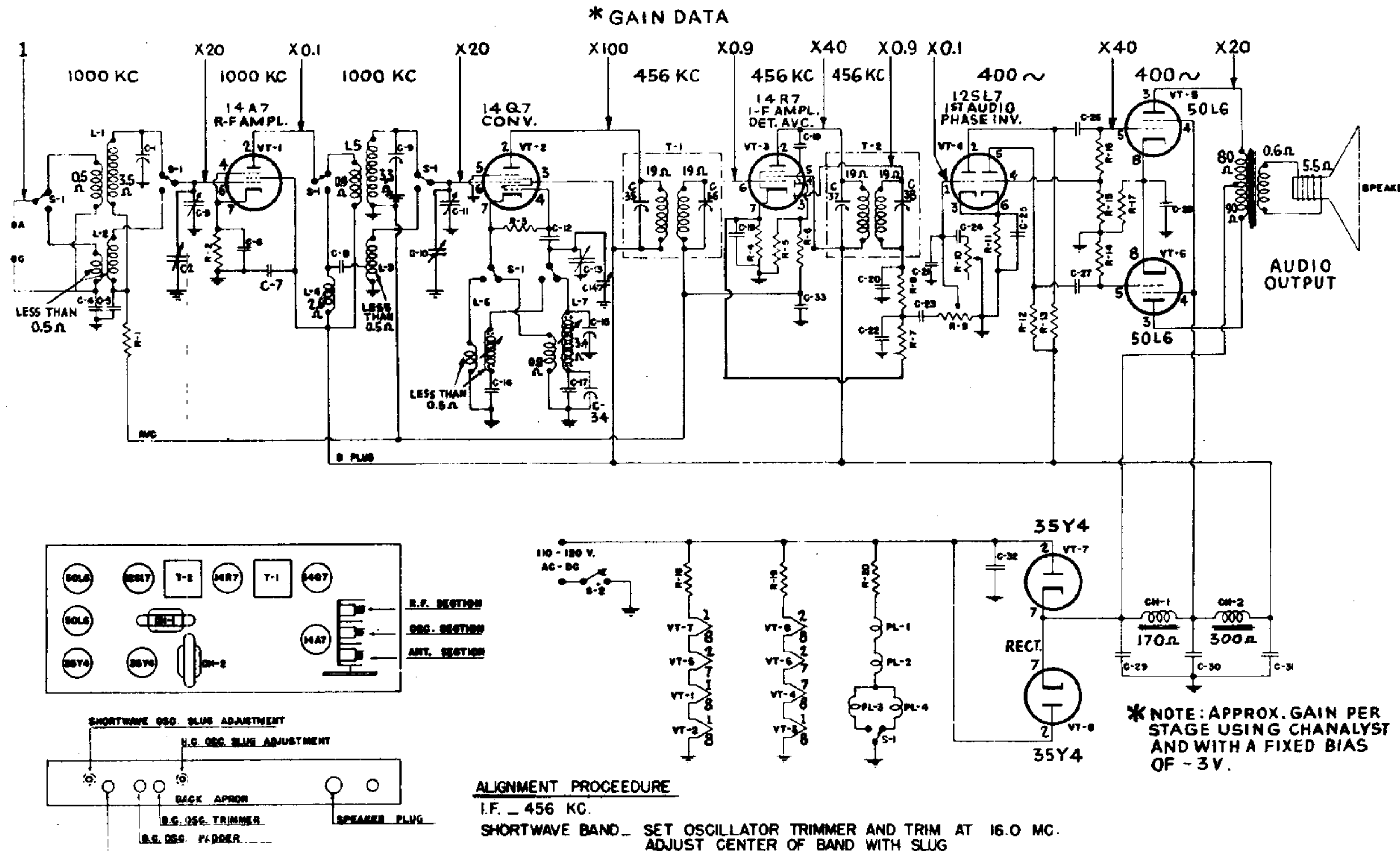
ALIGNMENT

The chassis is removed from the cabinet in order to align this receiver.

Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine loop, Model 1150, and couple loosely to the receiver loop. Set the receiver volume control to maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should be sufficient to give a readable deflection on the output meter.

Set the signal generator to 455 kc. Adjust the I.F. tuning slugs, L4, L3, L2, L1, for maximum output on the output meter. Set the signal generator and receiver to 1600 kc and adjust the oscillator trimmer C4 for maximum output. Set the signal generator and receiver to 1400 kc and adjust R.F. trimmer C3 for maximum output.

FERRAR RADIO AND TELEV. CORP.



*NOTE: APPROX. GAIN PER STAGE USING CHANALYST AND WITH A FIXED BIAS OF -3V.

NOTE - SHORTWAVE TRIMMERS LOCATED ON VARIABLE CONDENSER ALIGNMENT OF S.W. BAND MUST BE COMPLETED BEFORE LINING UP B.C. BAND.

ALIGNMENT PROCEEDURE

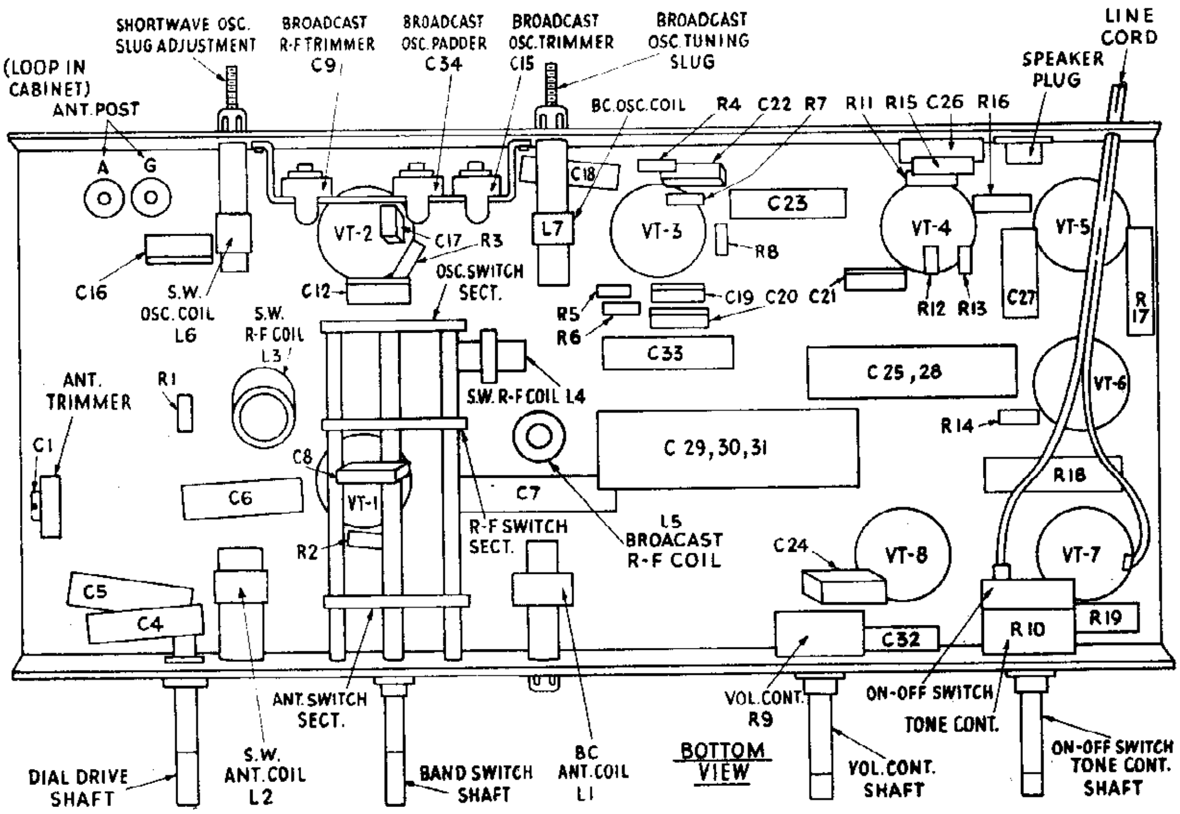
I.F. _ 456 KC.

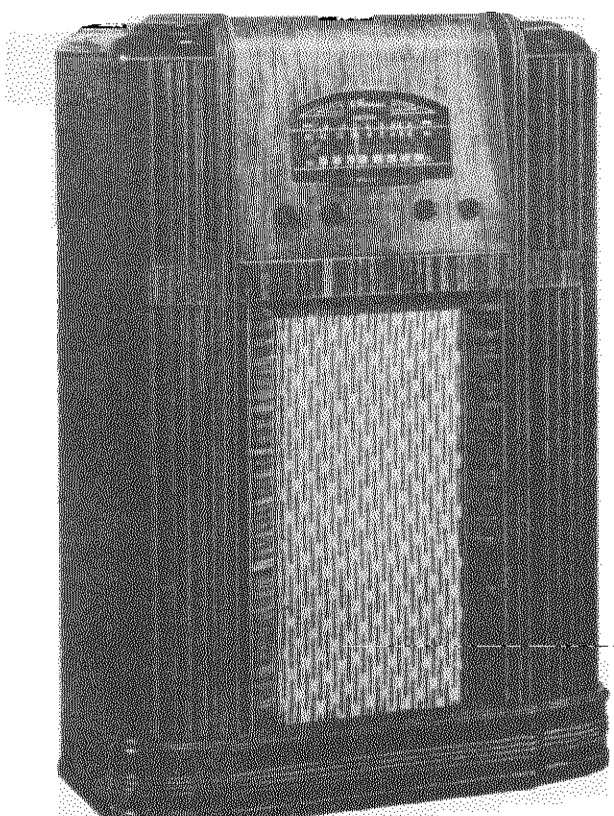
SHORTWAVE BAND_ SET OSCILLATOR TRIMMER AND TRIM AT 16.0 MC.
ADJUST CENTER OF BAND WITH SLUG
FIXED PADDER TAKES CARE OF LOW FREQUENCY END.

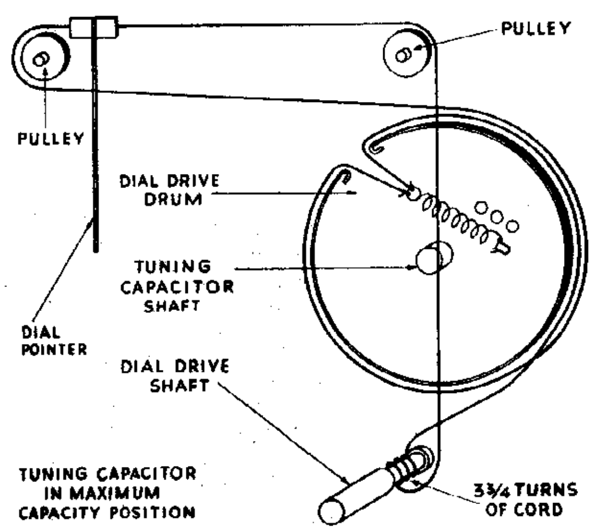
BROADCAST BAND_ SET OSCILLATOR AT 1600 KC, TRIM AT 1450 KC
ADJUST CENTER OF BAND WITH SLUG
PADDER ADJUSTED AT 600 KC

MODEL C81B

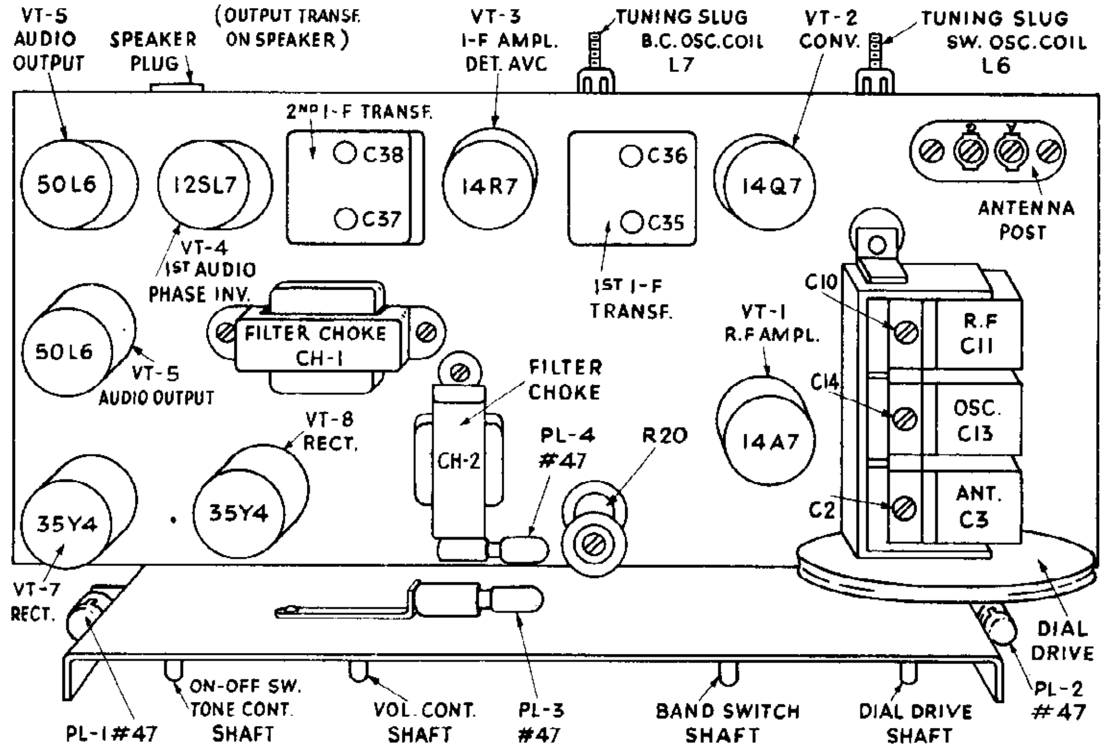
FERRAR RADIO AND TELEV. CORP.







FERRAR RADIO AND TELEV. CORP.



TOP VIEW OF CHASSIS

R1 - 100 K
R2 - 300 OHM
R3 - 20 K
R4 - 510 OHM
R5 - 1 MEG
R6 - 1 MEG
R7 - 500 K
R8 - 50 K
R9 - 500 K VOL. CONT.
R10 - 500 K TONE CONT.
R11 - 12 K
R12 - 250 K
R13 - 250 K
R14 - 500 K
R15 - 15 K
R16 - 470 K
R17 - 100 OHM
R18 - 47 OHM
R19 - 47 OHM
R20 - 80 OHM

C1 - Ant. Trimmer (BC)
C2 - Ant. Trimmer (SW)
C3 - Ant. Var. Cap.
C4 - o.01 uf
C5 - 0.1 uf
C6 - 0.1 uf
C7 - 0.25 uf
C8 - 100 uuf
C9 - RF Trimmer (BC)

C10 - RF Trimmer (SW)
C11 - RF Var. Cap.
C12 - 50 uuf
C13 - Osc. Var. Cap.
C14 - Osc. Trimmer (SW)
C15 - Osc. Trimmer (BC)
C16 - .005 uf
C17 - 450 uuf
C18 - 0.1 uf
C19 - 100 uuf
C20 - 50 uuf
C21 - 500 uuf
C22 - 100 uuf
C23 - .05 uf
C24 - .006 uf
C25 - 25 uf
C26 - .006 uf
C27 - .006 uf
C28 - 25 uf
C29 - 30 uf
C30 - 40 uf
C31 - 40 uf
C32 - 0.1 uf
C33 - 0.1 uf
C34 - Osc. Padder (BC)

35 - IF Trimmer
36 - IF TRImmer
37 - IF Trimmer
38 - IF Trimmer

MODEL C81B

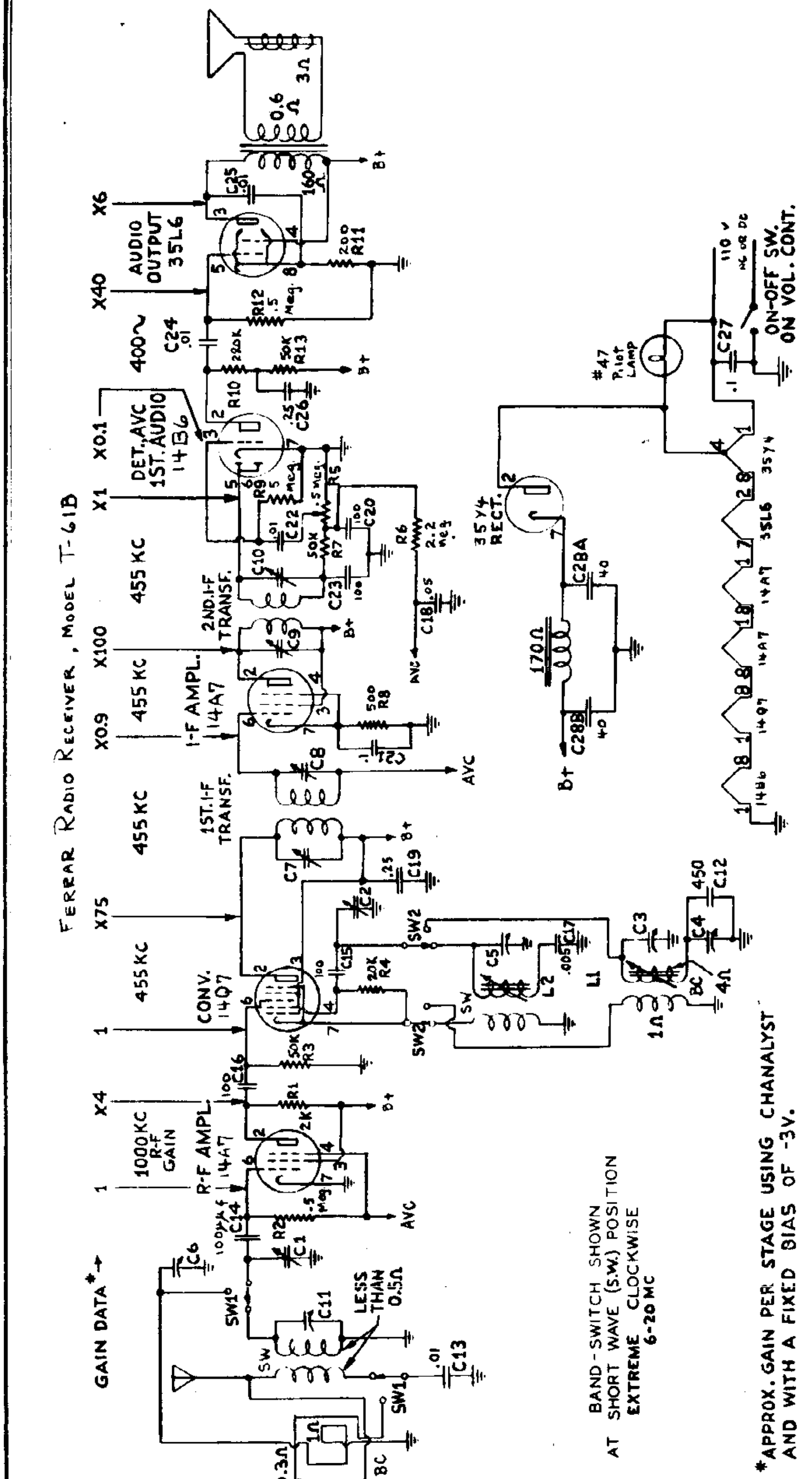
FERRAR RADIO AND TELEV. CORP.

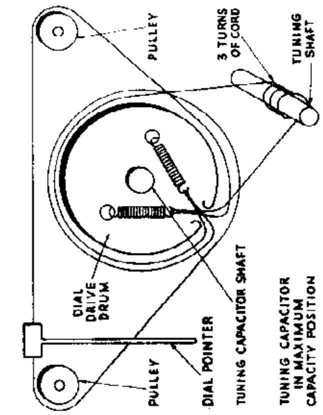
TUBE	PIN	VTVM	20,000 V	1,000 V	RESISTANCE
VT-1	1	AC	AC	AC	43 OHM
14A7	2	+105	+105	+105	OVER 500 K
RF AMPF.	3	+105	+105	+105	OVER 500 K
	4	+3.5	+3.5	+3.5	300 OHM
	5	0	0	0	0
	6	0	0	0	2 MEG
	7	+3.5	+3.5	+3.5	300 OHM
	8	AC	AC	AC	16 OHM
VT-2	1	AC	AC	AC	16 OHM
14Q7	2	+105	+105	+105	OVER 500 K
CONV.	3	+105	+105	+105	OVER 500 K
	4				
OSC. VOLT.	BC 550 KC	-6.5	-3.7	-1.4	2.2 MEG
	1600 KC	-10	-9.3	-5.4	2.2 MEG
	SW 6 MC	-5.5	-1.2	-0.3	2.2 MEG
	20 MC	-12.5	-0.2	-0.2	2.2 MEG
	5	0	0	0	1 OHM
	6	-0.7	-0.3	0	2 MEG
	7	0	0	0	1 OHM
	8	)	0	0	0
VT-3	1	AC	AC	AC	13 OHM
14R7	2	+105	+105	+105	OVER 500 K
IF AMP.	3	+1.1	+0.3	0	600 K
DET. AVC	4	-0.3	-0.3	0	1 MEG
	5	+105	+105	+105	OVER 500 K
	6	0.2	0	0	2 MEG
	7	+1.6	+1.6	+1.4	530 OHM
	8	0	0	0	0
VT-4	1	0	0	0	48 OHM
12SL7	2	+88	+86	+32	OVER 500 K
1st AUDIO	3	+1.6	+1.6	+1.3	110 K
PHASE INV.	4	0	0	0	150 K
	5	+88	+86	+33	OVER 500 K
	6	+1.6	+1.6	+1.3	110 K
	7	AC	AC	AC	24 OHM
	8	AC	AC	AC	12 OHM

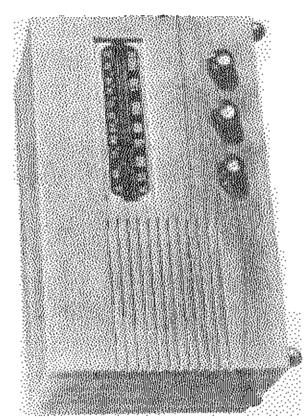
TUBE	PIN	VTVM	20,000 V	1,000 V	RESISTANCE
VT-6	1	0	0	0	0
50L6	2	AC	AC	AC	+55 OHM
AUDIO OUTPUT	3	+117	+117	+117	OVER 500 K
(Push-Pull)	4	+115	+115	+115	OVER 500 K
	5	0	0	0	560 K
	6	--	--	--	--
	7	AC	AC	AC	24 OHM
	8	+9	+9	+9	110 OHM
VT7	1	AC	AC	AC	68 OHM
35Y4	2	AC	AC	AC	70 OHM
RECT.	3	--	--	--	--
	4	--	--	--	--
	5	--	0	0	0
	6	--	--	--	--
	7	+120	+120	+120	OVER 500 K
	8	AC	AC	AC	55 OHM
VT-8	1	AC	AC	AC	68 OHM
35Y4	2	AC	AC	AC	70 OHM
RECT.	3	--	--	--	--
	4	--	--	--	--
	5	0	0	0	0
	6	--	--	+120	--
	7	+120	+120	AC	OVER 500 K
	8	AC	AC		55 OHM
VT-5	1	0	0	0	0
12SL7	2	AC	AC	AC	57 OHM
1st AUDIO	3	+110	+110	+110	OVER 500 K
(PUSH-PULL)	4	+105	+105	+105	OVER 500 K
	5	0	0	0	500 K
	6	--	--	--	--
	7	AC	AC	AC	24 OHM
	8	+9	+9	+9	110 OHM

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V.A.C. BAND SWITCH IN BROADCAST POSITION.

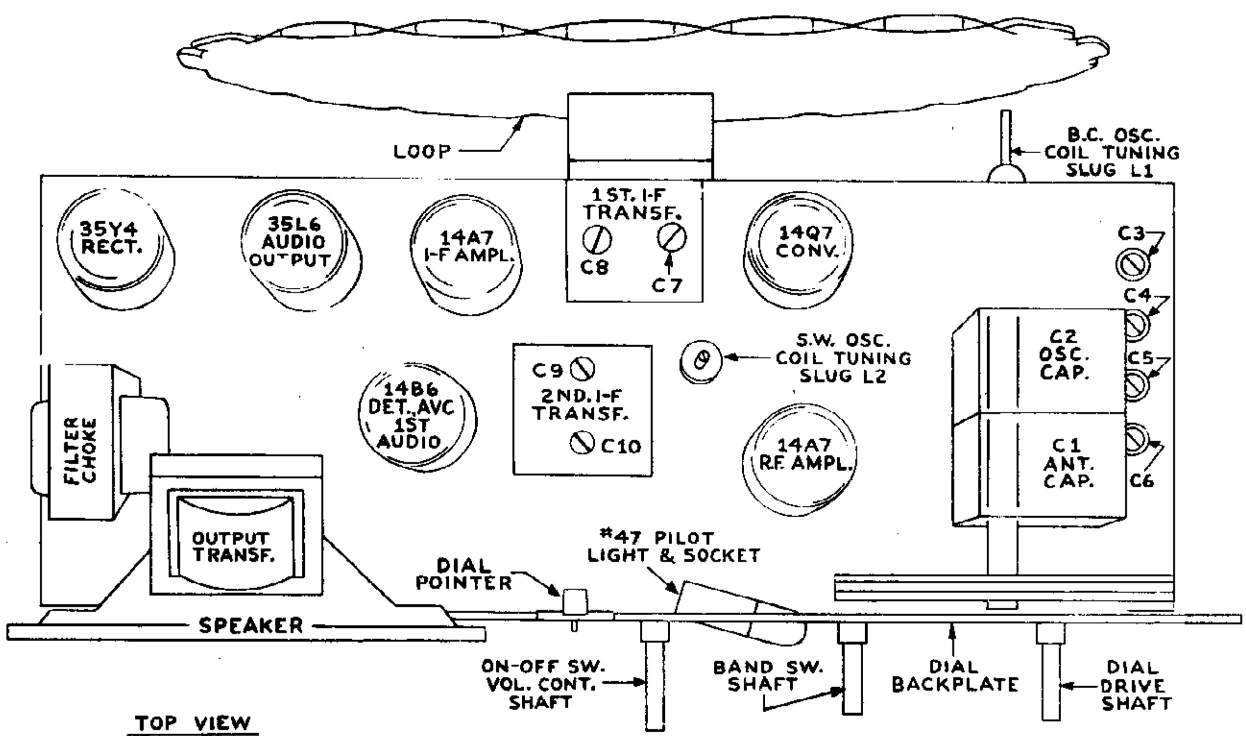
FERRAR RADIO AND TELEV. CORP.







FERRAR RADIO AND TELEV. CORP.



TOP VIEW

IF ALIGNMENT

CONNECT OUTPUT METER ACROSS THE VOICE COIL. CONNECT SIGNAL GENERATOR TO STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO RECEIVER LOOP. SET THE SIGNAL GENERATOR TO 456 KC AND FULLY MESH RECEIVER TUNING CAPACITOR. KEEP OUTPUT OF SIGNAL GENERATOR SUFFICIENT TO GIVE READABLE DEFLECTION ON OUTPUT. KEEP RECEIVER VOLUME CONTROL AT MAXIMUM. ADJUST FOR MAXIMUM OUTPUT IF TRIMMERS C10, C9, C8, C7.

RF OSC. ALIGNMENT (BC BAND)

KEEPING SAME SETUP AS USUAL FOR IF ALIGNMENT TUNE SIGNAL GENERATOR AND RECEIVER TO 1600 KC. ADJUST OSC. TRIMMER C3 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 1000 KC AND ADJUST TUNING SLUG L1 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 600 KC AND ADJUST LOW FREQUENCY PADDER C4 FOR MAXIMUM WHILE ROCKING MAIN TUNING CAPACITOR. TUNE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANT. TRIMMER C6 FOR MAXIMUM OUTPUT.

RF OSC. ALIGNMENT (SW BAND)

KEEPING SAME SETUP AS USED FOR IF ALIGNMENT, TUNE SIGNAL GENERATOR AND RECEIVER TO 18 MC. ADJUST SW OSC. TRIMMER C5 FOR MAXIMUM OUTPUT. TUNE SIGNAL GENERATOR AND RECEIVER TO 10 MC. ADJUST TUNING SLUG L2 FOR MAXIMUM OUTPUT. SET SIGNAL GENERATOR AND RECEIVER TO 16 MC. AND ADJUST ANT. TRIMMER C11 FOR MAXIMUM OUTPUT.

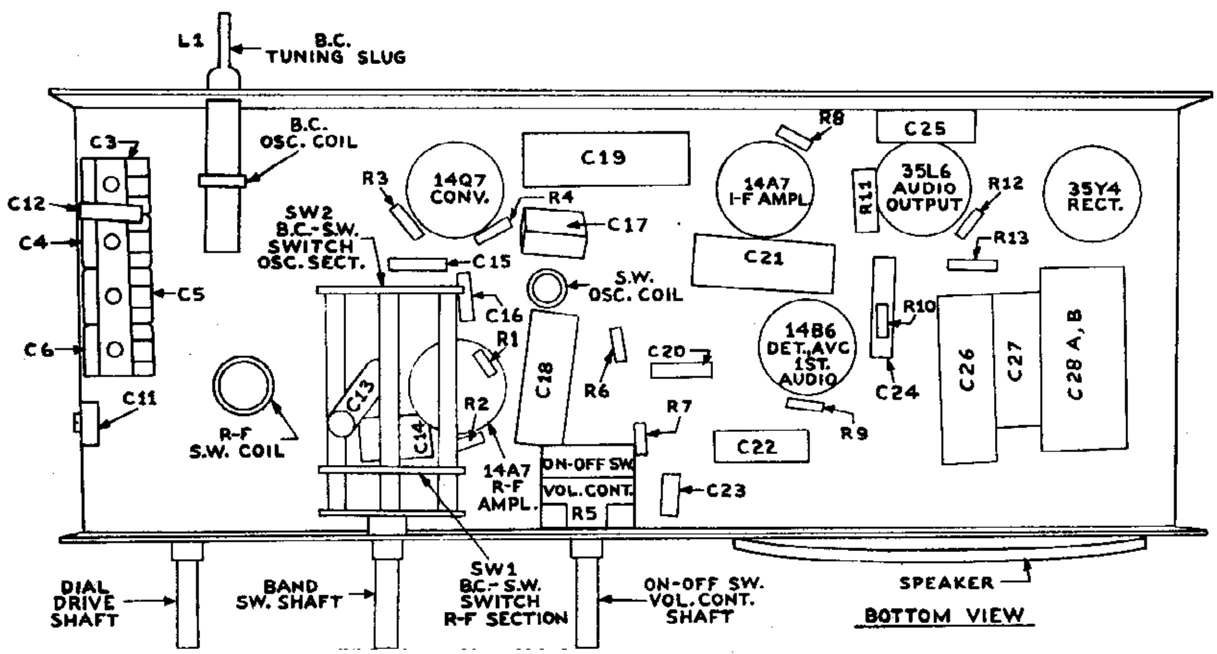
FERRAR RADIO AND TELEV. CORP.

FERRAR MODEL T-61B

TUBE	PIN	VTVM	20,000 OHM V	1,000 OHM V	RESISTANCE
14A7	1	AC	AC	AC	46 OHM
RF. AMP.	2	+78V	+78V	+78V	OVER 500 K
	3	+100	+100	+100	OVER 500 K
	4	-0.7	-0.2	0	2.8 MEG
	5	0	0	0	0
	6	-0.7	-0.2	0	3.3 MEG
	7	0	0	0	0
	8	AC	AC	AC	26 OHM
14Q7	1	AC	AC	AC	14 OHM
CONV	2	+100	+100	+100	OVER 500 K
	3	+100	+100	+100	OVER 500 K
	4				
OSC. VOLT BC	550 KC	-6.0	-4.6	-2.8	20 K
	1600 KC	-8.5	-6.0	-4.5	20 K
SW	6 MC	-6.0	-1.8	-1.0	20 K
	20 MC	-12.0	-1.0	-0.1	20 K
	5	0	0	0	1.4 OHM
	6	-1	-0.3	-0.1	60 K
	7	0	0	0	1.4 OHM
	8	AC	AC	AC	25 OHM
14A7	1	AC	AC	AC	52 OHM
IF AMP	2	+100	+100	+100	OVER 500 K
	3	+100	+100	+100	OVER 500 K
	4	+3.3	+3.3	+3.3	500 OHM
	5	0	0	0	0
	6	-0.7	-0.2	0	2.8 MEG
	7	+3.3	+3.3	+3.3	500 OHM
	8	AC	AC	AC	46 OHM
14B6	1	0	0	0	0
DET. AVC.	2	+54	+54	+28	OVER 500 K
1st AUDIO	3	-0.9	-0.6	-0.3	5 MEG
	4	0	0	0	0
	5	-0.85	-0.7	-0.4	400 K
	6	-0.85	-0.7	-0.4	400 K
	7	0	0	0	0
	8	AC	AC	AC	14 OHM

TUBE	PIN	VTVM	20,000 OHM V	1,000 OHM V	RESISTANCE
35L6	1	0	0	0	0
AUDIO OUTPUT	2	AC	AC	AC	85 OHM
	3	+85	+85	+85	OVER 500 K
	4	+90	+90	+90	OVER 500 K
	5	0	0	0	500 K
	6	--	--	--	--
	7	AC	AC	AC	52 OHM
	8	+6.5	+6.5	+6.5	200 OHM
35Y4	1	AC	AC	AC	115 OHM
RECT.	2	AC	AC	AC	112 OHM
	3	--	--	--	--
	4	AC	AC	AC	112 OHM
	5	--	--	--	--
	6	AC	AC	AC	Infinite
	7	+110	+110	+110	OVER 500 K
	8	AC	AC	AC	85 OHM

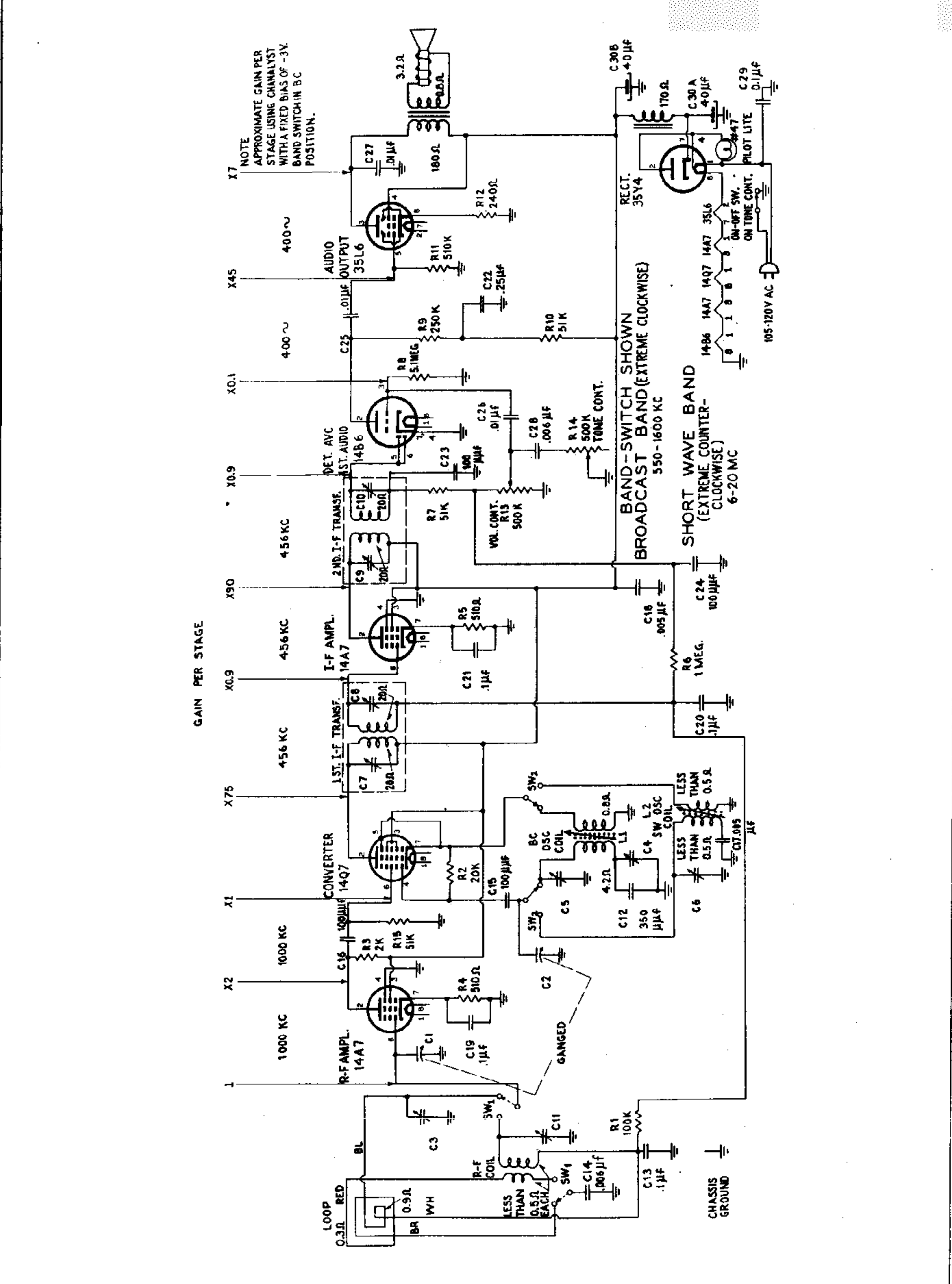
ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE SUPPLY VOLTAGE OF 116 V.A.C. BAND SWITCH IN BROADCAST BAND POSITION



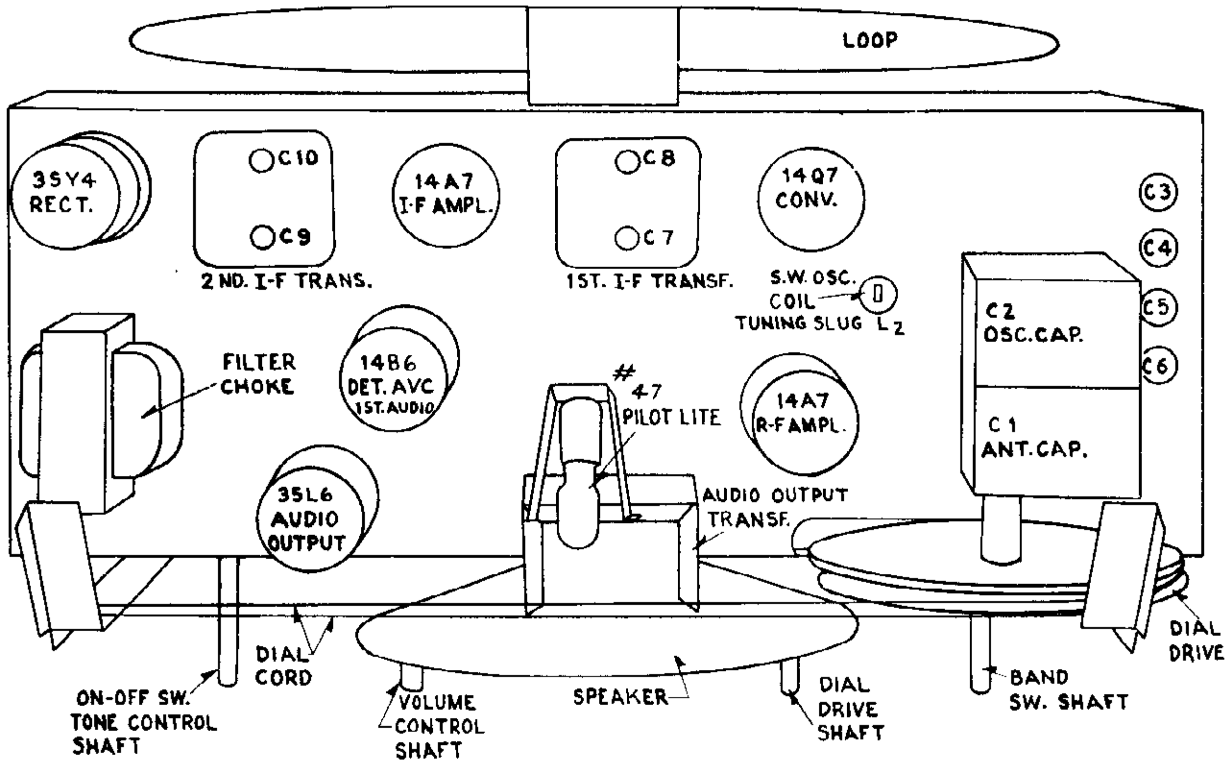
BOTTOM VIEW

MODEL TA61B

FERRAR RADIO AND TELEV. CORP.



FERRAR RADIO AND TELEV. CORP.



TOP VIEW

IF ALIGNMENT

CONNECT OUTPUT METER ACROSS THE VOICE COIL. CONNECT SIGNAL GENERATOR TO STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO RECEIVER LOOP. SET SIGNAL GENERATOR TO 456 KC AND FULLY MESH RECEIVER TUNING CAPACITOR. KEEP OUTPUT OF SIGNAL GENERATOR SUFFICIENT TO GIVE READABLE DEFLECTION ON OUTPUT METER. KEEP RECEIVER VOLUME CONTROL AT MAXIMUM. ADJUST FOR MAXIMUM I.F. TRIMMERS C10, C9, C8, C7.

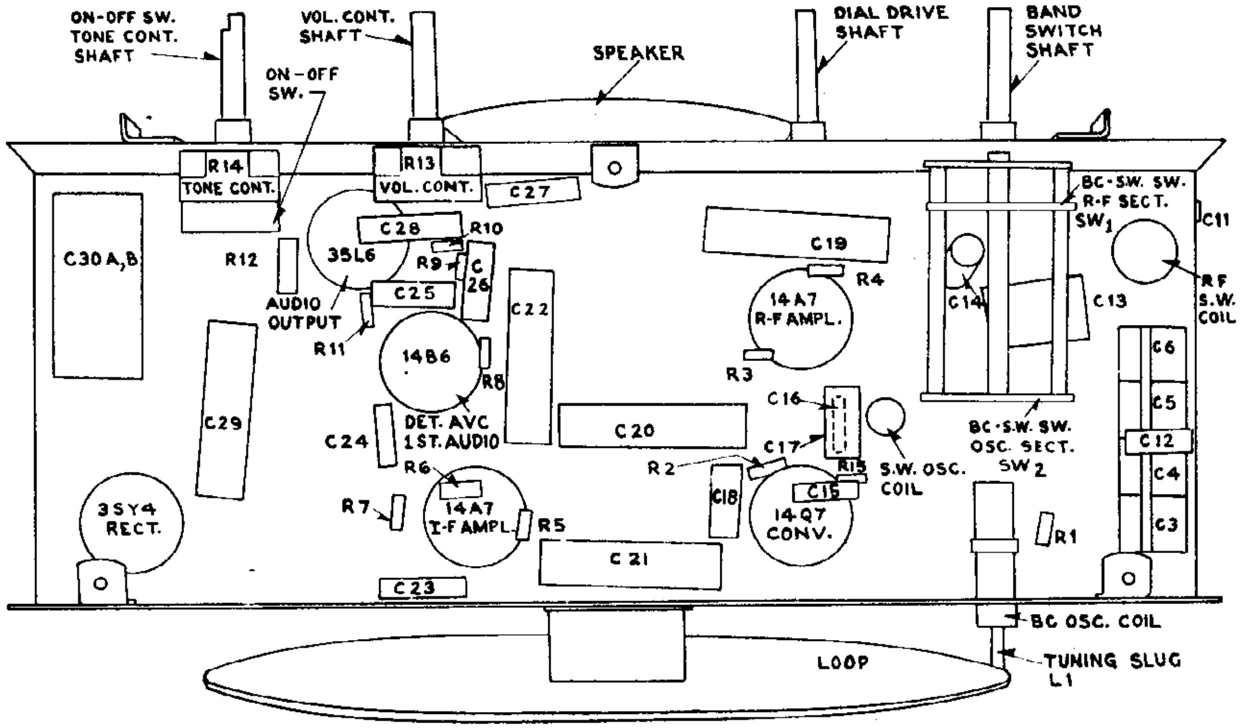
RF OSC. ALIGNMENT (BC BAND)

KEEPING SAME SETUP AS USED FOR IF ALIGNMENT, TUNE SIGNAL GENERATOR AND RECEIVER TO 1600 KC. ADJUST OSC. TRIMMER C5 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 1000 KC AND ADJUST TUNING SLUG L1 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 600 KC AND ADJUST FREQUENCY PADDER C4 TO MAXIMUM WHILE ROCKING MAIN TUNING CAPACITOR. TUNE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANTENNA TRIMMER C3 FOR MAXIMUM OUTPUT.

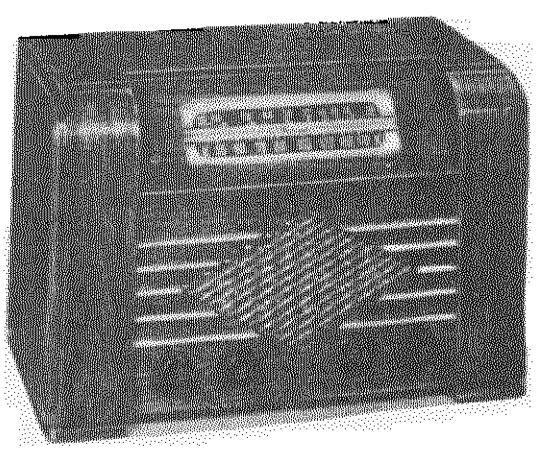
RF OSC. ALIGNMENT (SW BAND)

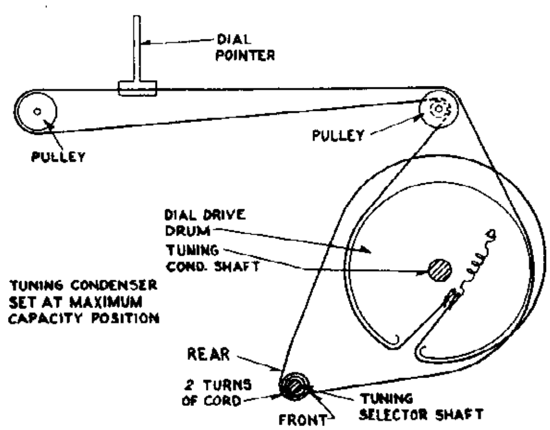
KEEPING SAME SETUP AS USED FOR IF ALIGNMENT, TUNE SIGNAL GENERATOR AND RECEIVER TO 18 MC. ADJUST S.W. OSC. TRIMMER C6 FOR MAXIMUM OUTPUT. TUNE SIGNAL GENERATOR AND RECEIVER TO 10 MC AND ADJUST TUNING SLUG L2 FOR MAXIMUM OUTPUT. SET SIGNAL GENERATOR AND RECEIVER TO 16 MC AND ADJUST ANT. TRIMMER C11 FOR MAXIMUM OUTPUT.

FERRAR RADIO AND TELEV. CORP.



BOTTOM VIEW





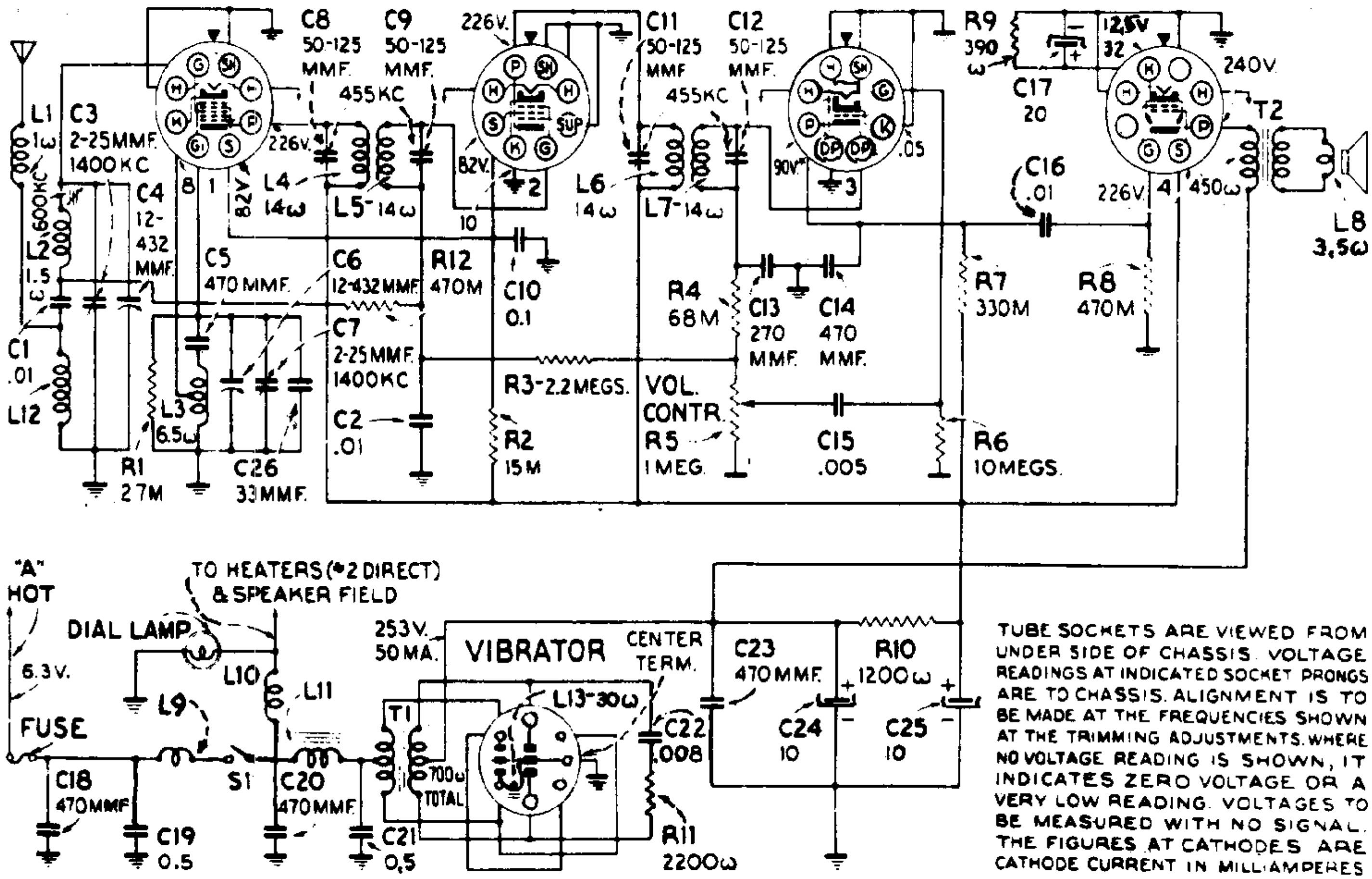
FERRAR RADIO AND TELEV. CORP.

TUBE		PIN	VTVM	20,000 OHM V	1,000 OHM V	RESISTANCE
14A7		1	AC	AC	AC	20 OHM
RF AMPL.		2	+94	+94	+94	OVER 500 K
		3	+105	+105	+10	OVER 500 K
		4	0	0	0	0
		5	0	0	0	0
		6	-0.5	0.1	+3.5	1.5 MEG
		7	+3.5	+3.5	+3.5	500 OHM
		8	AC	AC	AC	40 OHM
14Q7		1	AC	AC	AC	56 OHM
CONV.		2	+105	+105	+105	OVER 500 K
		3	+105	+105	+105	OVER 500 K
		4				
OSC.	BC	550 KC	-8	-6	-4	20 K
VOLT.		1600 KC	-9	-9	-4.5	20 K
	SW	6 MC	-6	-3.5	-2	20 K
		20 MC	-11	-3	-0.8	20 K
		5	0	0	0	0
		6	-0.3	-0.1	0	50 K
		7	0	0	0	0.8 OHM
		8	AC	AC	AC	40 OHM
14A7		1	AC	AC	AC	56 OHM
IF AMPL.		2	+105	+105	+105	OVER 500 K
		3	+105	+105	+105	OVER 500 K
		4	0	0	0	0
		5	0	0	0	0
		6	-0.5	-0.1	0	1.4 MEG
		7	+3.5	+3.5	+3.5	500 OHM
		8	AC	AC	AC	48 OHM
14B6		1	AC	AC	AC	20 OHM
Det. AVC		2	+58	+58	+26	OVER 500 K
1st AUDIO		3	-0.6	-0.5	-0.3	5 MEG
		4	0	0	0	0
		5	-0.6	-0.6	-0.3	550 K
		6	-0.6	-0.6	-0.3	550 K
		7	0	0	0	0
		8	0	0	0	0
35L6		1	0	0	0	0
AUDIO OUTPUT		2	AC	AC	AC	100 OHM
		3	+96	+96	+96	OVER 500 K
		4	+105	+105	+105	OVER 500 K
		5	0	0	0	0
		6	--	--	--	--
		7	AC	AC	AC	56 OHM
		8	+7.5	+7.5	+7.5	220 OHM
35Y4		1	AC	AC	AC	130 OHM
RECT.		2	AC	AC	AC	128 OHM
		3	--	--	--	--
		4	AC	AC	AC	128 OHM
		5	0	0	0	0
		6	--	--	--	--
		7	+105	+105	+105	OVER 500 K
		8	AC	AC	AC	100 OHM

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V.A.C. BAND SWITCH AT BROADCAST POSITION.

THE FIRESTONE TIRE & RUBBER CO.

WIRING DIAGRAM FOR ROAMER CHASSIS MODEL S7407-9



TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS. ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMING ADJUSTMENTS. WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING. VOLTAGES TO BE MEASURED WITH NO SIGNAL. THE FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES

VIBRATOR POLARITY

This radio contains a vibrator which may require change of position to accommodate it to the polarity of the grounded terminal of the car storage battery. *It is installed at the factory for use on automobiles with the positive* (+) *terminal of the battery grounded to the frame of the car,* and a "+" shows in the "vibrator Polarity" hole in the bottom of the receiver. See Figure 1, Bottom View. *If the negative* (-) *terminal of the battery is grounded to the frame of the car,* as on most General Motors' automobiles, remove the bottom cover from the receiver, pull out the plug-in vibrator (See Figure 1), turn it a half revolution, and replace in socket. When the bottom cover is replaced on the receiver, the "-" sign will show through the "vibrator Polarity" hole.

MODEL S7407-9, THE FIRESTONE TIRE & RUBBER CO.
Roamer

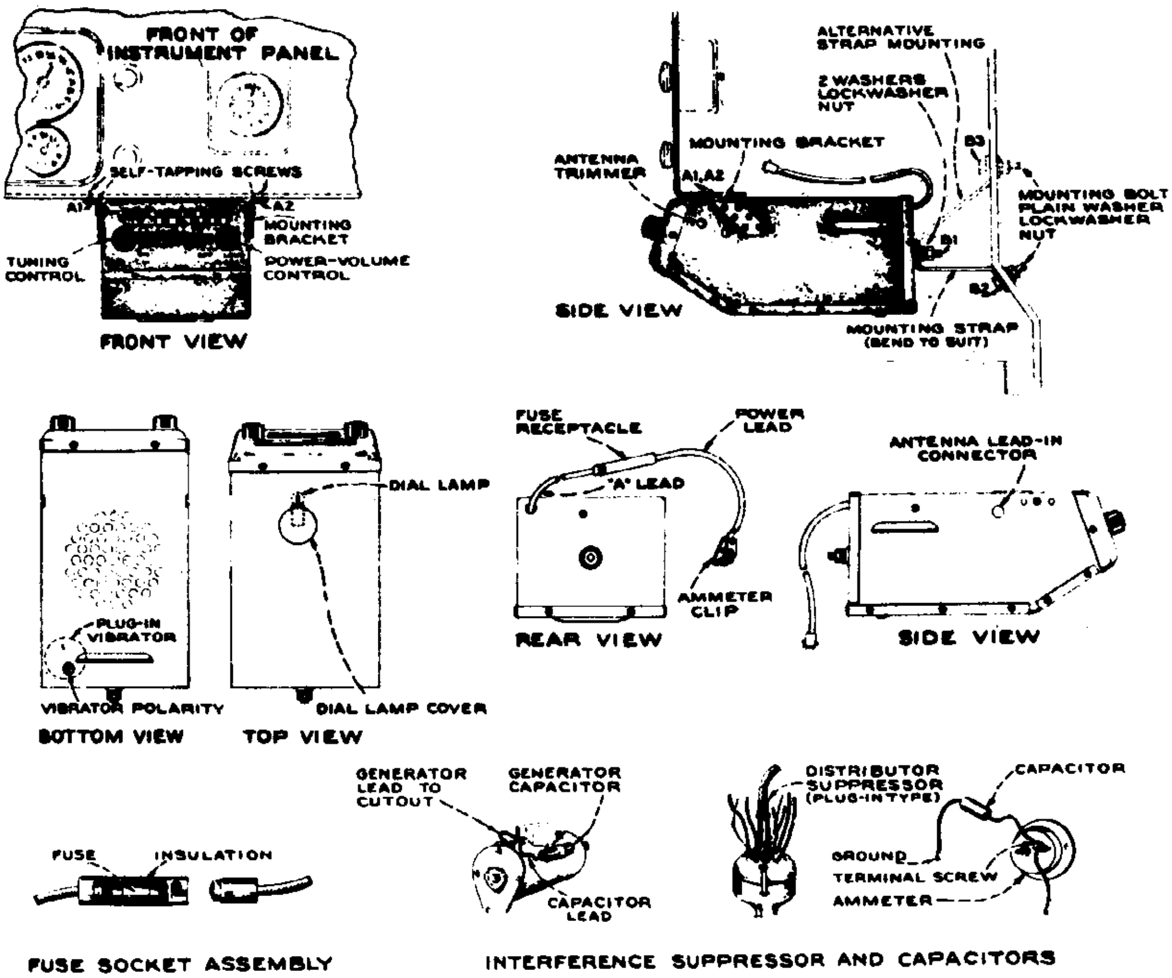


Figure 1

MOUNTING

1. The receiver is shipped with a bracket attachment screw in the center one of the three mounting holes on each side of the case. Remove these two screws and hold the receiver in the chosen location below the instrument panel. Decide on the mounting holes to be used in both brackets and in the receiver case.

2. Attach the two mounting brackets to the receiver by means of four of the self-tapping screws provided, using the holes decided upon.

3. Hold the receiver in place again, mark for drilling of instrument panel flange, and drill the two holes (A1 and A2, Figure 1) with preferably a No. 34 drill. THESE HOLES MUST NOT BE TOO LARGE AS THEY SERVE TO HOLD THE RECEIVER BY MEANS OF THE TWO SELF-TAPPING SCREWS.

4. Attach the receiver securely to the instrument panel by means of two self-tapping screws - A1 and A2, Figure 1.

5. Mark the position on the bulkhead and prepare the hole for the mounting strap. This may be an existing hole, or a new hole may have to be drilled - B2 or B3, Figure 1, Side View.

6. Bend the mounting strap to shape so that it fits over bolt protruding from rear of receiver (B1 - Figure 1) and matches up with the hole in the bulkhead (B2 or B3).

7. Attach the mounting strap to the bulkhead with the 1/4-inch bolt, lockwasher and nut provided; and to the rear of the receiver with lockwasher and nut.

EQUIPMENT

This Roamer auto radio receiver is supplied with the following installation equipment:

1 - Mounting strap with bolt, nuts, and washers for attachment to the bulkhead.
2 - Mounting brackets with self-tapping screws, 3/8 inch long, for attachment to the instrument panel.
1 - Power lead with use socket and ammeter clip.
1 - Fuse and insulating sleeve for power lead.
1 - Suppressor for distributor.
1 - Capacitor for generator.
1 - Capacitor for ammeter.

ANTENNA REQUIREMENTS

Good radio reception is dependent upon the correct antenna installation. This receiver should be used only with a vertical rod-type antenna, such as the Cowl (S-7000-5 or S-7000-4) or Hinge whip (S-7000-3) aerial.

These antennas are equipped with a shielded lead and connector. Instructions for installing these types are included with the antenna.

Your Roamer receiver has been wired at the factory for operation with a low capacity antenna, such as one of the more popular rod types. Do not use an antenna having a capacity appreciably greater than 100 mmfd.

IMPORTANT – For best reception adjust your automobile radio receiver to your particular antenna. Pry off the plug button on the right-hand side near the front of the receiver case. This gives access to a trimmer screw on the gang condenser about an inch and a half back from the case. After the receiver is operating, tune to a very weak station of about 1,400 kilocycles (140 on the dial) and adjust the trimmer for maximum output, turning carefully with a screw driver until the best position is found. Replace the cover button.

MAKING THE ELECTRICAL CONNECTIONS

First attach the antenna lead-in to the receiver. Antenna lead-ins are equipped with a plug which fits into the socket on the left-hand side of the receiver, located as shown in the lower one of the two "Side Views" – Figure 1. Assemble the ammeter lead. The fuse receptacle is of the single spring terminal bayonet type consisting of a male and female section. Insert the sleeve in the socket and the fuse in the sleeve as shown in the "Fuse Socket Assembly" Figure 1, and then attach to the plug on the single wire lead from the back of the receiver. The other end of the Power lead terminates in a spring clip for connection to one of the ammeter binding posts. The correct terminal is decided after the radio receiver is in operation, by the ammeter registering current when the receiver is turned on.

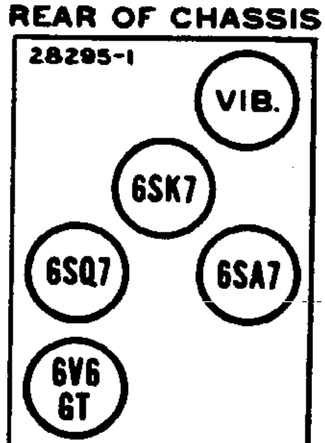
MAINTENANCE

If the dial illumination fails, the dial lamp may be replaced by loosening the self-tapping mounting screws holding the mounting brackets to the instrument panel, allowing the receiver to hang by the back mounting strap and giving access to the top of the receiver. Pry off the dial light cap shown in Figure 1, Top View, insert thumb and finger in hole and slide the dial lamp assembly towards the back of the receiver. The lamp, socket and clip are freed and may be lifted out of the hole to the length of the leads. Remove the lamp from the bayonet socket, replace with a new one and assemble back in place by means of the clip. Replace the dial light cap in its correct position so that the flattened lugs are over the lamp socket and mount receiver back in position on instrument panel.

In case the receiver fails to function after carefully following the installation instructions, it is advisable to remove the bottom cover which is secured by self-tapping screws, and check the tubes to see that they are properly seated in their respective sockets as indicated in Figure 2, and the vibrator for correct polarity. If they are in place and satisfactory reception is not obtained, the tubes should be removed and tested by a competent serviceman.

To make a complete check on tubes, remove the chassis from the case and loosen the speaker. One tube is behind the speaker cone.

REAR OF CHASSIS



POSITIONS OF TUBES

Figure 2

THE FIRESTONE TIRE & RUBBER CO.

REDUCING IGNITION INTERFERENCE

Satisfactory reception in automobile radio receivers is largely dependent upon eliminating or reducing interference noises set up by the automobile ignition system. These noises resemble static interference. Noise of this nature can usually be eliminated or reduced to a minimum by carefully following a procedure of suppression and bypassing. No fixed rule can be outlined which will be applicable to all makes of cars. Each installation may present a different problem requiring a systematic process of elimination. There are, however, a few locations which require attention in practically all installations.

The condition of your automobile will have a great deal to do with quiet reception. Do not operate your car with fouled spark plugs or burned distributor breaker points. These parts should be cleaned and adjusted periodically. Frame and body bolts should be tightened in order to reduce the resistance of the system. Bonding the motor to the bulkhead will often result in a decided reduction of interference. When bonding parts of the car, do not use ordinary solid copper wire, but copper braid or a strap of copper at least a half inch wide. The bond should not be more than three or four inches long and bolted securely to clean metal.

The generator charging rate should be advanced to compensate for the additional current drain which the radio places on the car storage battery.

The two most important points at which precaution should be taken to reduce interference is at the distributor and at the generator. A distributor suppressor is furnished with the equipment, which should be plugged into the center terminal of the distributor and the ignition wire in turn plugged into the end of the suppressor as illustrated in Figure 1.

The second point at which ignition interference should be suppressed is at the generator cut out. Various manufacturers place the cut out in different locations. Some mount it upon the generator while others locate it on the bulkhead. The bypass condenser should be mounted with the case making good electrical contact with the metal car frame while the flexible lead is attached to the same terminal of the cut out as the lead from the generator. See Figure 1. Most cut outs have four terminals which are marked. The Generator terminal is marked "GEN."

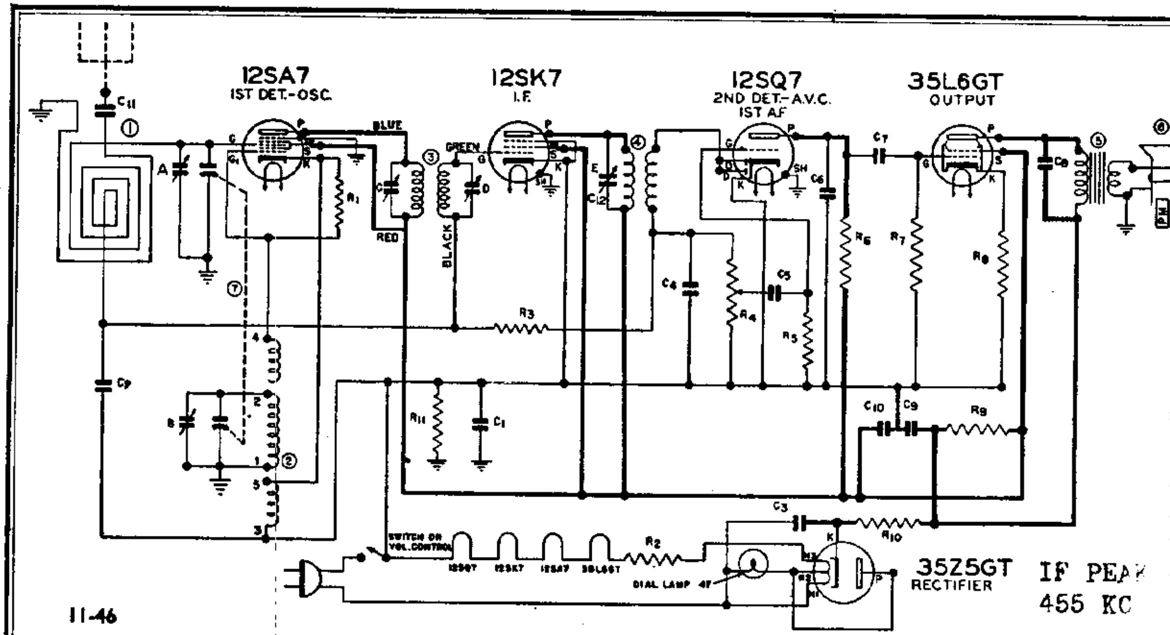
A third point, often of considerable importance is the ammeter. The ammeter bypass capacitor (the one without metal case), should be connected by one lead to the screw on the ammeter clip and by the other lead to any convenient grounded point on instrument panel or dash board. See Figure 1.

In some cases it will be found necessary to bypass the oil gauge and in some the gas gauge, while in others both gauges will require bypass condensers. When mounting the condenser or using a ground strap, paint and dirt should be carefully scraped from the metal so that a clean metal to metal contact is obtained. If generator interference is present when the generator bypass condenser has been installed it can usually be eliminated by cleaning the commutator and reseating the brushes of the generator.

The position of the antenna lead-in is sometimes of great importance. This lead should be carefully placed in the position causing least interference after the installation is complete.

If the general practice for interference elimination already outlined is not entirely successful it will be necessary to secure the services of an expert.

THE FIRESTONE TIRE & RUBBER CO.



IF PEAK 455 KC

11-46

TUNING RANGE	535 to 1720 KC
INTERMEDIATE FREQ	455 KC
LOUD SPEAKER	4 Inch P.M. Dynamic
VOICE COIL IMPEDANCE	3.2 OHM at 400 Cycles
POWER OUTPUT	Undistorted - 0.8 Watts Maximum - - 1.4 Watts

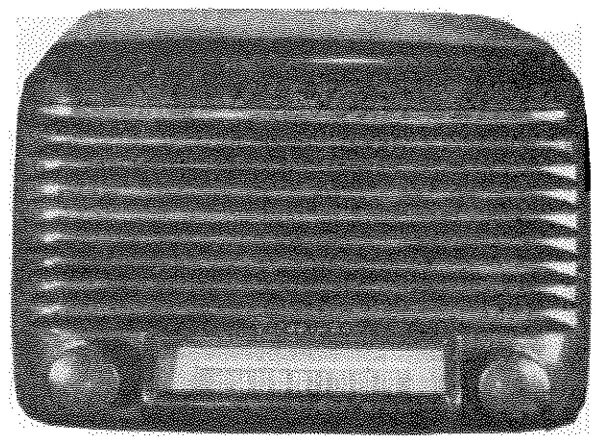


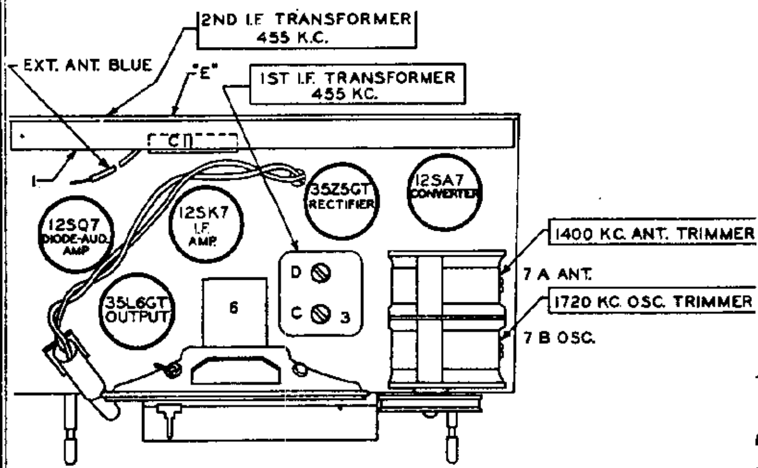
Diagram Number	Part No.	Part Name	Description	Price
1	N-5870	Antenna	Loop	$2.55
2	N-3298	Coil	Oscillator	1.05
3	N-4013	Coil	1st I. F.	2.10
4	N-4977	Coil	2nd I. F.	1.16
5	N-4011	Transformer	Output	2.25
6	N-4010	Speaker	4" P. M. Dynamic	3.44
7	N-4998	Condenser	Variable, 2 Gang & Pulley Assm.	4.15
C1	N-5160	Condenser	Paper .2 Mfd. 200 Volt	.32
C2	N-1345	Condenser	Paper .05 Mfd. 200 Volt	.19
C3	N-1346	Condenser	Paper .05 Mfd. 400 Volt	.20
C4	N-1374	Condenser	Mica .0001 Mfd. 500 Volt	.28
C5	N-4894	Condenser	Paper .005 Mfg. 600 Volt	.17
C6	N-4890	Condenser	Paper .0005 Mfd. 600 Volt	.26
C7	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C8	N-1376	Condenser	Paper .02 Mfd. 400 Volt	.18
C9-C10	**N-4015**	**Condenser**	**Electrolytic** **C9 35 Mfd. 150 Volt** **C10 30 Mfd. 150 Volt**	1.50
C11	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C12	N-4048	Condenser	Adjustable Trimmer	.45
R1	N-4025	Resistor	Carbon 22,000 Ohm 0.5 Watt	.08
R2	N-4023	Resistor	Carbon 82 Ohm 2.0 Watt	.20
R3	N-3175	Resistor	Carbon 1.0 Megohm 0.5 Watt	.08

Diagram Number	Part No.- Part Name	Description	Price
R5	N-4028 Resistor	Carbon 6.8 Megohm 0.5 Watt	.08
R6	N-4026 Resistor	Carbon 220,000 Ohm 0.5 Watt	.08
R7	N-4027 Resistor	Carbon 470,000 Ohm 0.5 Watt	.08
R8	N-4024 Resistor	Carbon 220 Ohm 0.5 Watt	.08
R9	N-5358 Resistor	Carbon 1,000 Ohm 1.0 Watt	.10
R10	N-4022 Resistor	Carbon 33 Ohm 0.5 Watt	.08
R11	N-1779 Resistor	Carbon 150,000 Ohm 0.5 Watt	.08

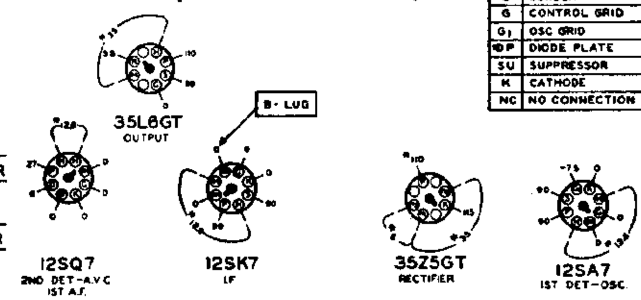
Part No.	Part Name	Description	Price
#150	**Cabinet**	**Walnut Plastic**	$2.24
N-1090	Cord	**6 Ft. Rubber Line Cord**	.55
N-4016	Dial Plate	**Dial Back Plate Less Scale**	.05
N-2655	Dial Cord	**17" of 30 lb. Dial Drive Cord**	.11
N-4018	Dial Scale	**Calibrated Scale**	.25
N-4020	Dial Shaft	**Tuning Shaft**	.13
N-4019	Dial Pointer	**Dial Indicator**	.10
N-3925	Dial Spring	Tension Spring for Drive Cord	.03
N-4093	Dial Ring	Ring for Drive Cord	.01
N-3923	Knob	For Walnut Cabinet	.05
N-4021	Pilot Lamp Socket	Pilot Lamp Socket Assembly	.22
N-1147	**Pilot Lamp**	**No. 47 Lamp, 6-8 Volts, .150 Amp.**	.16

MODEL 4-A-1, Mercury

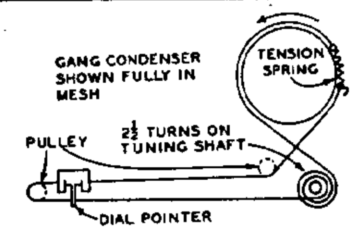
THE FIRESTONE TIRE & RUBBER CO.

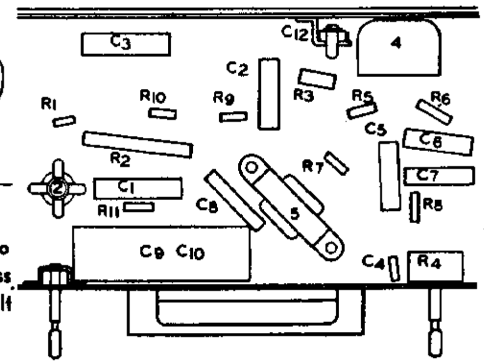


VOLTAGE TABLE
(BOTTOM OF CHASSIS)



SYM.	DESCRIPTION
SH	SHELL
H	HEATER
HT	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
G_1	OSC GRID
DP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION





REAR OF CHASSIS

All Voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

***AC except when set is used on DC.**

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last dot at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

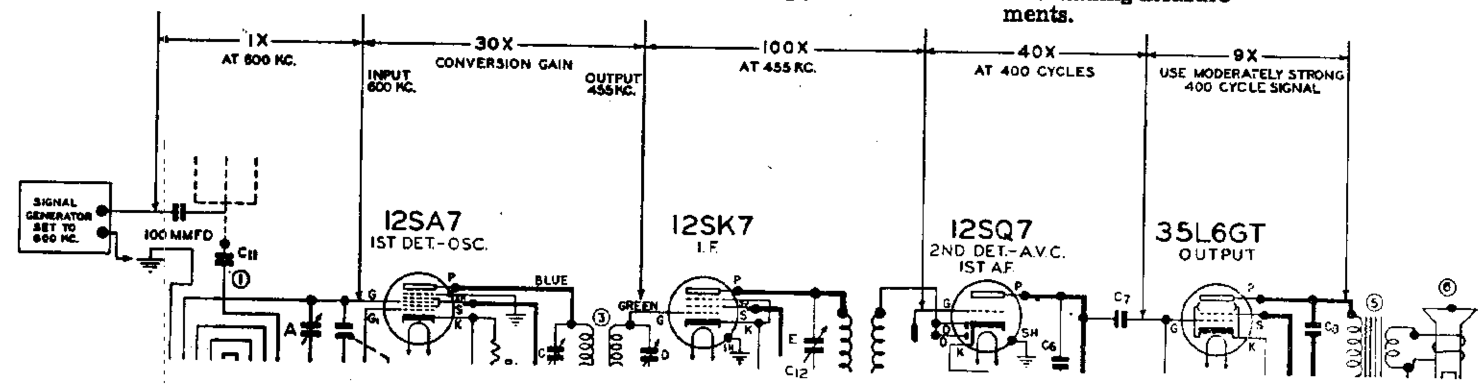
(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust the second I. F. transformer trimmer for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1720 K. C.	Exactly 1720 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1720 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

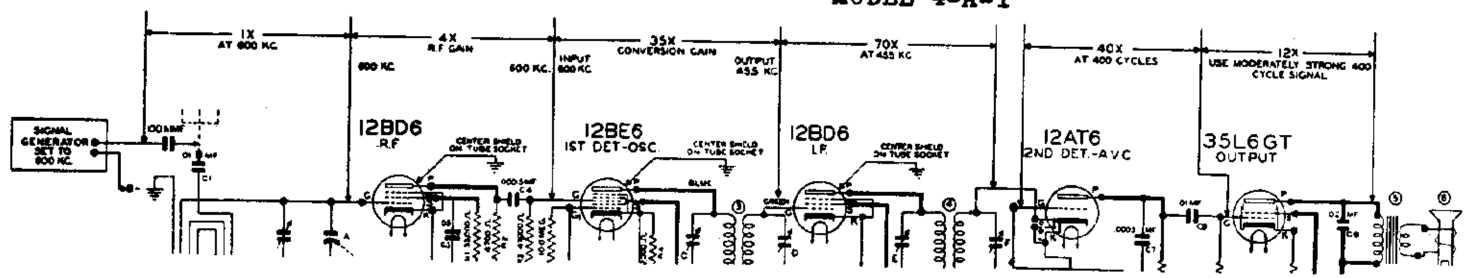
THE FIRESTONE TIRE & RUBBER CO.

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

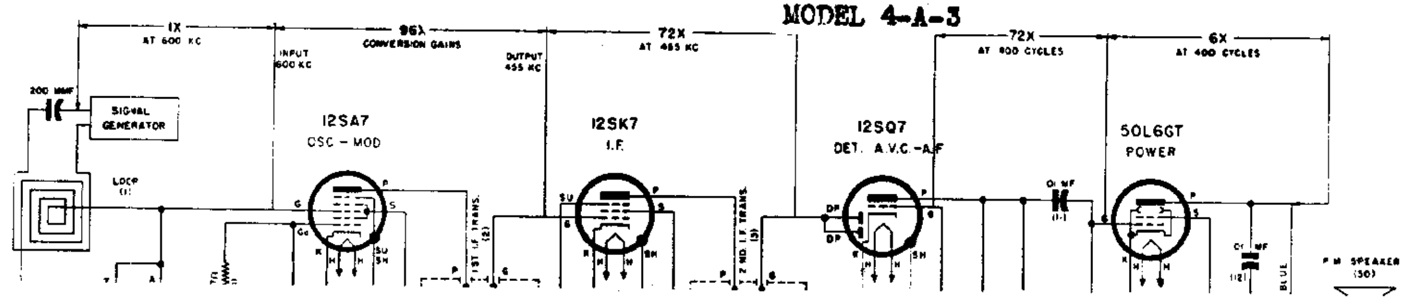
1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel type instrument carefully tune it for maximum output at desired frequency before making measurements.



MODEL 4-A-1



MODEL 4-A-3

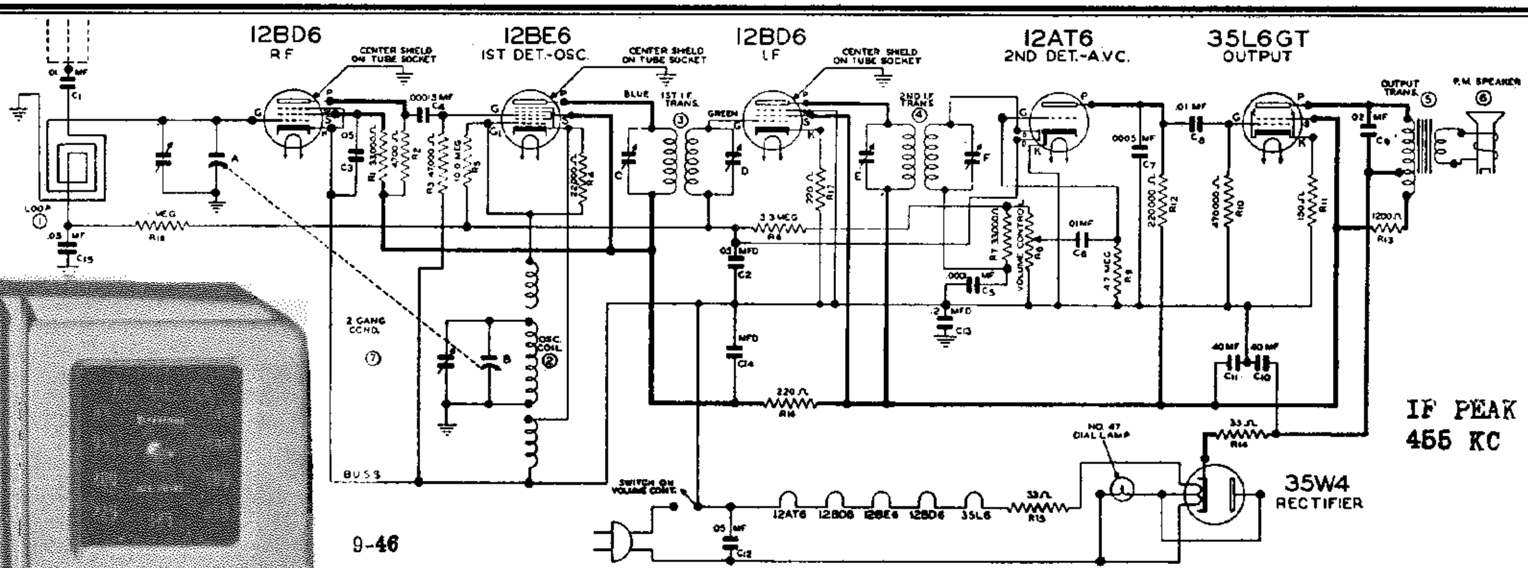


MODEL 4-A-41

Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using

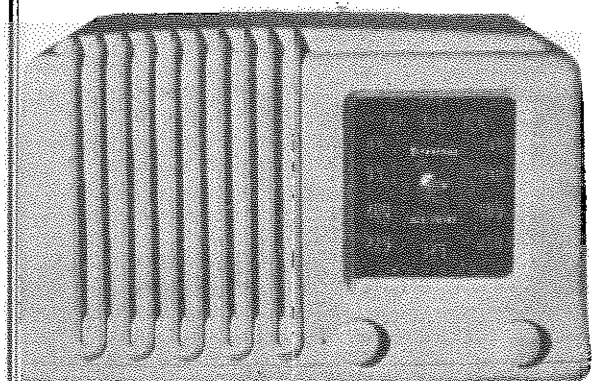
MODEL 4-A-3,
Diplomat

THE FIRESTONE TIRE & RUBBER CO.



IF PEAK
455 KC

9-46



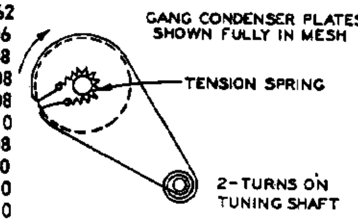


Diagram Number	Part No.	Part Name	Description	Price
1	N-3784	Antenna	Loop	$2.30
2	N-3298	Coil	Oscillator	1.05
3	N-3816	Coil	1st I. F.	2.10
4	N-3804	Coil	2nd I.F.	2.10
5	N-4875	Transformer	Output	2.40
6	N-3781	Speaker	5" P.M. Dynamic	4.36
7	N-5081	Condenser	Variable, 2 Gang & Pulley Assm.	4.15
C1	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C2	N-1345	Condenser	Paper .05 Mfd. 200 Volt	.19
C3	N-1345	Condenser	Paper .05 Mfd. 200 Volt	.19
C4	N-2383	Condenser	Mica .00015 Mfd. 500 Volt	.28
C5	N-1374	Condenser	Mica .0001 Mfd. 500 Volt	.28
C6	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C7	N-4890	Condenser	Paper .0005 Mfd. 600 Volt	.26
C8	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C9	N-1376	Condenser	Paper .02 Mfd. 400 Volt	.18
C10-C11	**N-5051**	**Condenser**	**Electrolytic C10-40 Mfd. 150 Volt C11-40 Mfd. 150 Volt**	1.23
C12	N-1346	Condenser	Paper .05 Mfd. 400 Volt	.20
C13	N-5160	Condenser	Paper .2 Mfd. 200 Volt	.32
C14	N-1351	Condenser	Paper .1 Mfd. 200 Volt	.22
C15	N-1345	Condenser	Paper .05 Mfd. 200 Volt	.19
R1	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt	.08
R2	N-4278	Resistor	Carbon, 4,700 Ohm 0.5 Watt	.08
R3	N-4063	Resistor	Carbon, 47,000 Ohm 0.5 Watt	.08
R4	N-4025	Resistor	Carbon, 22,000 Ohm 0.5 Watt	.08
R5	N-1263	Resistor	Carbon, 10.0 Megohm 0.5 Watt	.08
R6	N-4085	Resistor	Carbon, 3.3 Megohm 0.5 Watt	.06
R7	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt	$ .08
R8	**N-4076**	**Volume Control--With Switch**		1.62
R9	N-4061	Resistor	Carbon, 4.7 Megohm 0.5 Watt	.06
R10	N-4027	Resistor	Carbon, 470,000 Ohm 0.5 Watt	.08
R11	N-3663	Resistor	Carbon, 150 Ohm 0.5 Watt	.08
R12	N-4026	Resistor	Carbon, 220,000 Ohm 0.5 Watt	.08
R13	N-4900	Resistor	Carbon, 1,200 Ohm 1.0 Watt	.10
R14	N-4022	Resistor	Carbon, 33 Ohm 0.5 Watt	.08
R15	N-4628	Resistor	Carbon, 33 Ohm 1.0 Watt	.10
R16	N-5348	Resistor	Carbon, 220 Ohm 0.5 Watt	.10
R17	N-5632	Resistor	Carbon, 220 Ohm 0.5 Watt	.10
R18	N-1262	Resistor	Carbon, 1.0 Megohm 0.5 Watt	.08

Part No.	Part Name	Description	Price
#134	**Cabinet**	**Ivory Plastic**	$5.70
N-4074	Cabinet Back	For Ivory Plastic Cabinet	.20
N-1090	Cord	6 Ft. Rubber Line Cord	.55
N-4055	Dial Plate	Dial Back Plate less Scale	.08
N-2655	Dial Cord	M19" of 30 lb. Dial Drive Cord	.11
N-4054	Dial Scale	Calibrated Scale	.48
N-3787	Dial Shaft	Tuning Shaft	.11
N-3238	Dial Shaft Bushing	Bushing for Tuning Shaft	.10
N-4053	Dial Pointer	Dial Indicator	.11
N-3332	Dial Spring	Tension Spring for Drive Cord	.04
N-3887	Knob	For Ivory Cabinet	.08
N-4075	Pilot Lamp Socket	Pilot Lamp Socket Assembly	.45
N-1147	**Pilot Lamp**	**No. 47 Lamp, 6-8 Volts, 150 Amp.**	.16

TUNING RANGE 535 to 1720 KC

INTERMEDIATE FREQ 455 KC

LOUD SPEAKER — **5 Inch P.M. Dynamic**

VOICE COIL IMPEDANCE — **3.2 OHM at 400 Cycles**

POWER OUTPUT — **Undistorted - 0.8 Watts**
Maximum - - 1.4 Watts

For gain measurements see page 17-7

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

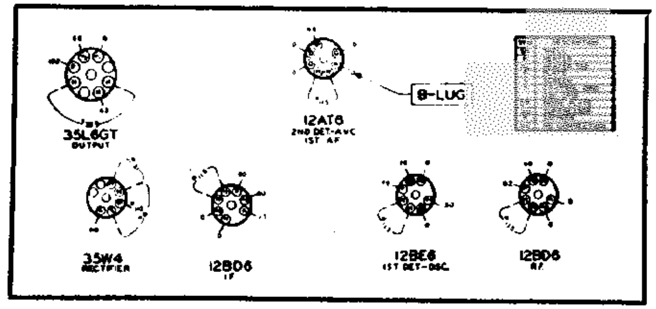
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last dot at the low frequency end of the dial calibration. If dial needle does not point exactly to last dot move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

VOLTAGE TABLE

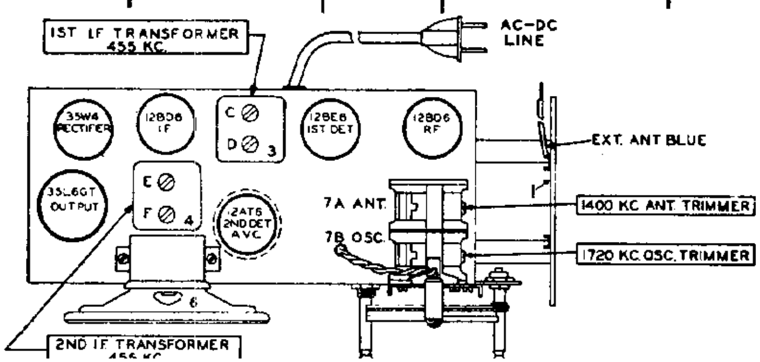
(Bottom of Chassis)

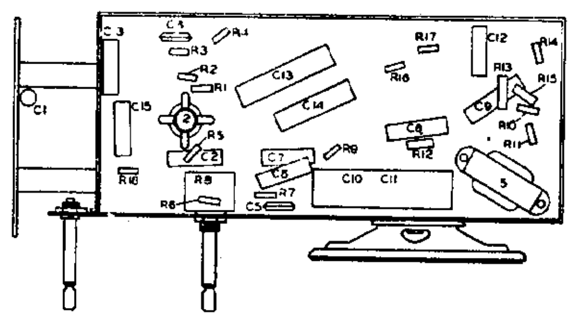


REAR OF CHASSIS

All Voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.
***AC except when set is used on DC.**

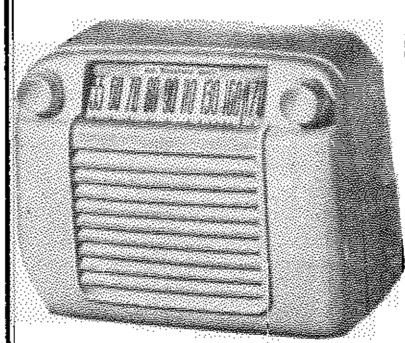
Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1720 K. C.	Exactly 1720 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1720 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

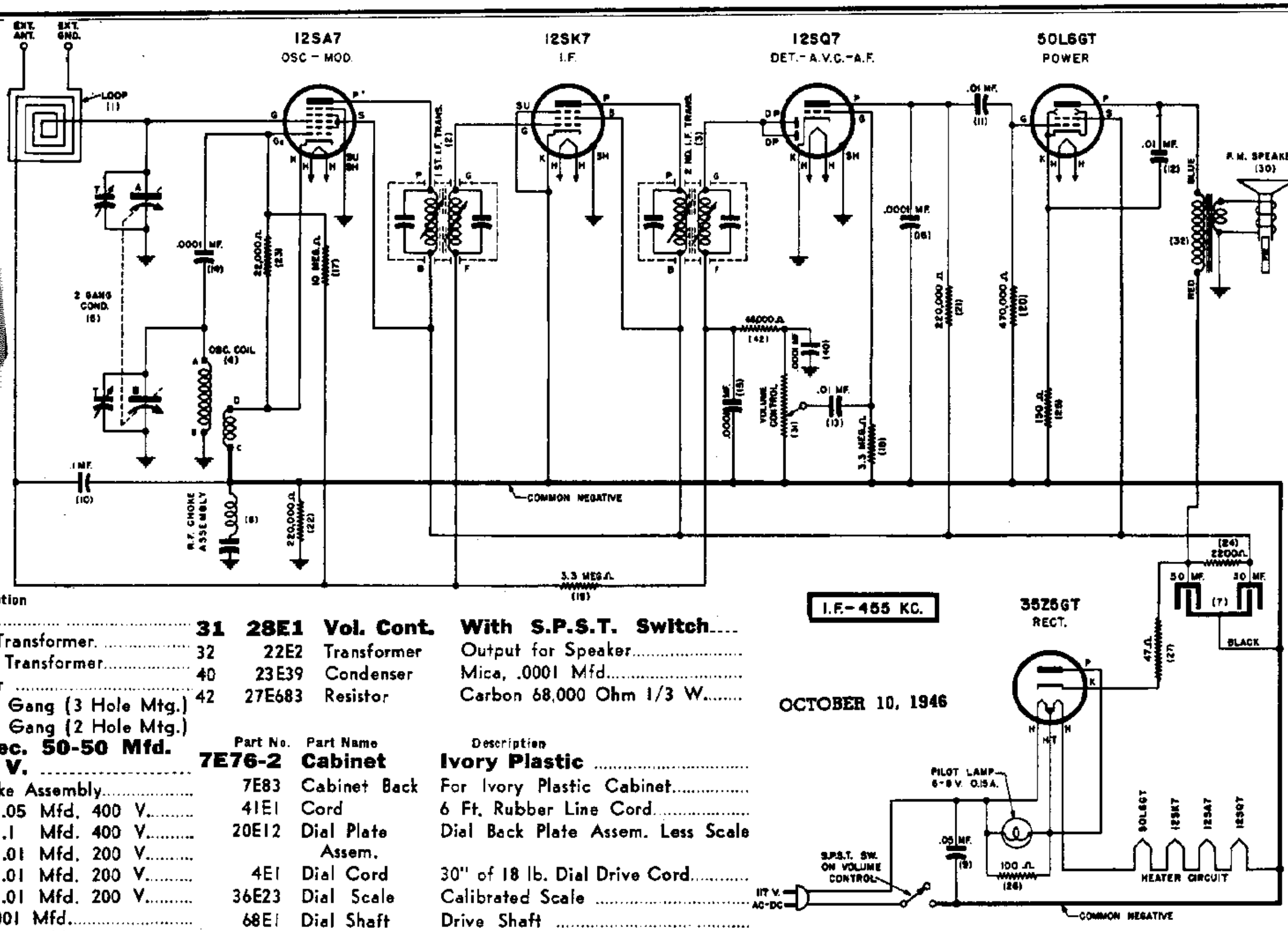




MODEL 4A-41

THE FIRESTONE TIRE & RUBBER CO.





I.F.-455 KC.

OCTOBER 10, 1946

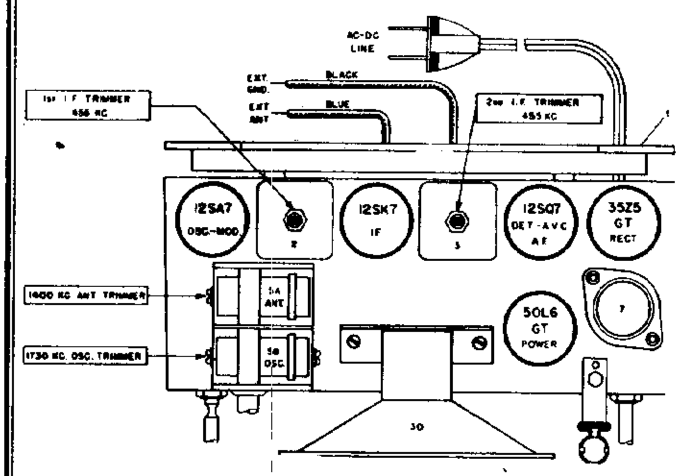
No.	Part No.	Part Name	Description
1	20E24	Antenna	Loop
2	20E21	Coil	1st I.F. Transformer
3	20E22	Coil	2nd I.F. Transformer
4	20E162	Coil	Oscillator
5	24E2	Condenser	Tuning, 2 Gang (3 Hole Mtg.)
5	24E18	Condenser	Tuning, 2 Gang (2 Hole Mtg.)
7	**25E16**	**Condenser**	**Dry Elec. 50-50 Mfd. 150 V.**
8	20E75	Choke	R.F. Choke Assembly
9	23E416	Condenser	Tubular, .05 Mfd. 400 V.
0	23E418	Condenser	Tubular, .1 Mfd. 400 V.
1	23E211	Condenser	Tubular, .01 Mfd. 200 V.
2	23E211	Condenser	Tubular, .01 Mfd. 200 V.
3	23E211	Condenser	Tubular, .01 Mfd. 200 V.
4	23E39	Condenser	Mica, .0001 Mfd.
5	23E39	Condenser	Mica, .0001 Mfd.
6	23E39	Condenser	Mica, .0001 Mfd.
17	27E106	Resistor	Carbon, 10 Megohm 1/3 W.
18	27E335	Resistor	Carbon, 3.3 Megohm 1/3 W.
19	27E335	Resistor	Carbon, 3.3 Megohm 1/3 W.
20	27E474	Resistor	Carbon, 470,000 Ohm 1/3 W.
21	27E224	Resistor	Carbon, 220,000 Ohm 1/3 W.
22	27E224	Resistor	Carbon, 220,000 Ohm 1/3 W.
23	27E223	Resistor	Carbon, 22,000 Ohm 1/3 W.
24	27E222-3	Resistor	Carbon, 2,200 Ohm 1 W.
25	27E151	Resistor	Carbon, 150 Ohm 1/3 W.
26	27E101	Resistor	100 Ohm 1/3 W., Carbon
27	27E470-2	Resistor	Carbon, 47 Ohm 1/2 W.
30	1E9	Speaker	5" P.M.
31	**28E1**	**Vol. Cont.**	**With S.P.S.T. Switch**
32	22E2	Transformer	Output for Speaker
40	23E39	Condenser	Mica, .0001 Mfd.
42	27E683	Resistor	Carbon 68,000 Ohm 1/3 W.

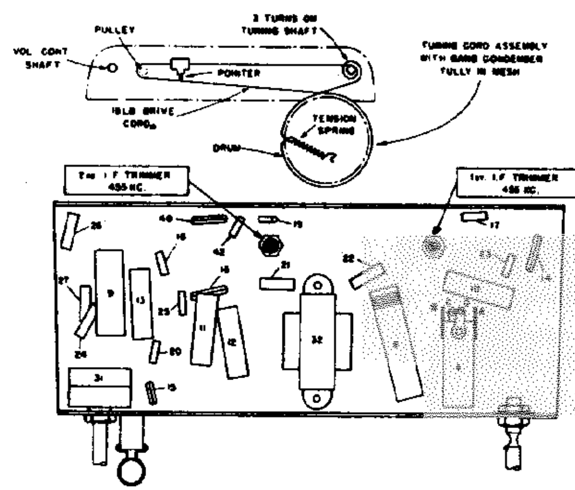
Part No.	Part Name	Description
7E76-2	**Cabinet**	**Ivory Plastic**
7E83	Cabinet Back	For Ivory Plastic Cabinet
41E1	Cord	6 Ft. Rubber Line Cord
20E12	Dial Plate Assem.	Dial Back Plate Assem. Less Scale
4E1	Dial Cord	30" of 18 lb. Dial Drive Cord
36E23	Dial Scale	Calibrated Scale
68E1	Dial Shaft	Drive Shaft
19E3	Dial Shaft Bearing	Bearing for Drive Shaft
35E8	Dial Pointer	Dial Indicator
65E2	Dial Spring	Tension Spring For Drive Cord
37E27-19	Knob	For Ivory Cabinet
20E43	Pilot Lamp Socket	Pilot Lamp Socket Assembly
40E1	**Pilot Lamp**	**6-8 Volt .150 Amp. Type 47 Lamp**

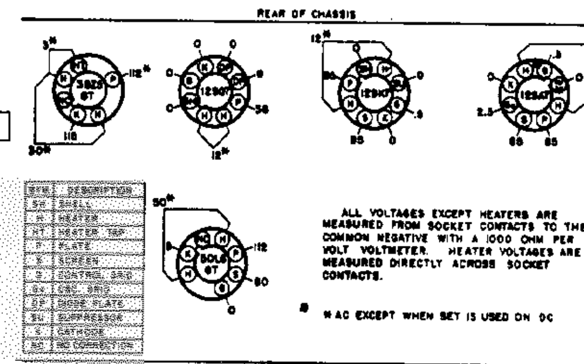
VOICE COIL IMPEDANCE	3.2 OHM at 400 Cycles
POWER OUTPUT	Undistorted - 0.9 Watts Maximum - - 1.7 Watts

TUNING RANGE	1730 to 530 KC
INTERMEDIATE FREQ	455 KC
LOUD SPEAKER	5 Inch P.M.

For gain measurements see page 17-7







VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

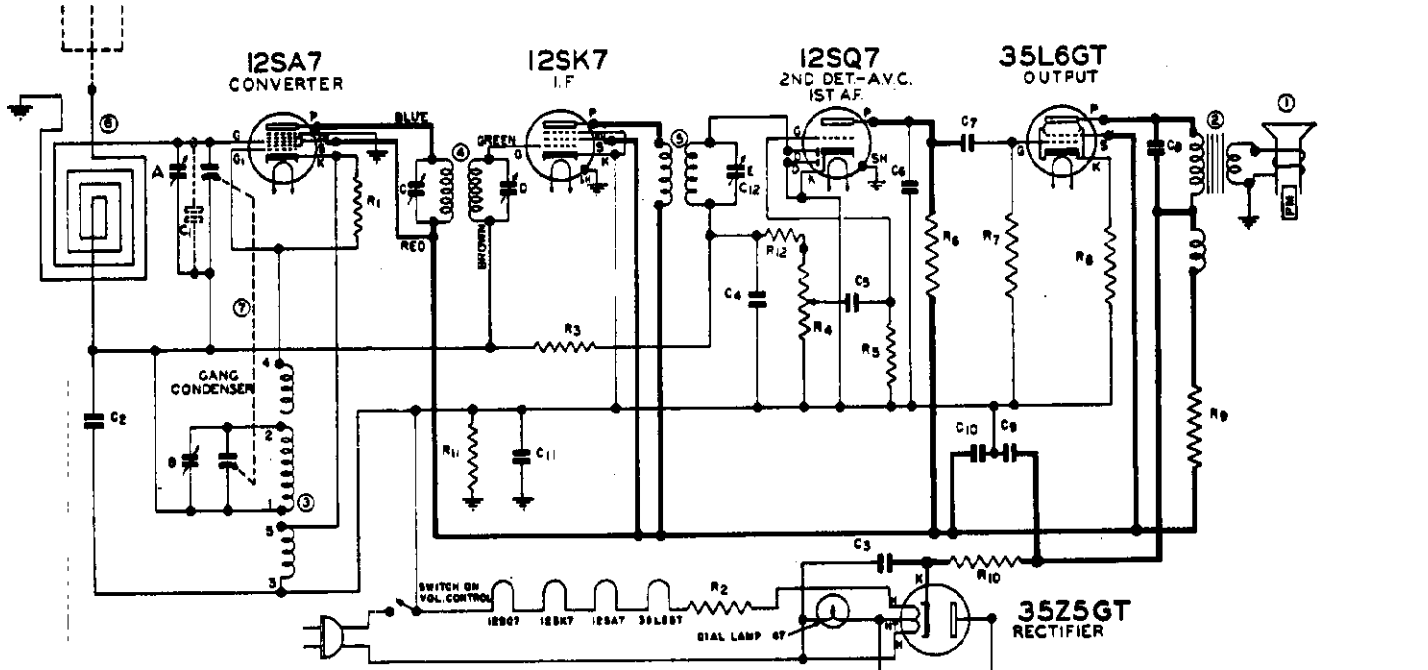
(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

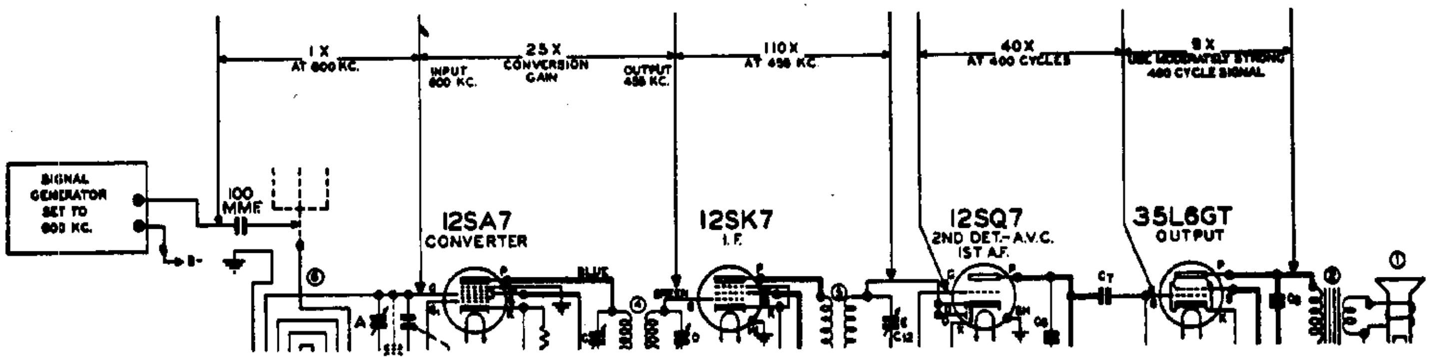
Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to front stator plates of tuning condenser. Low side to frame of condenser through a .02 Mfd. blocking condenser.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

MODEL 4A-10,
Reporter

THE FIRESTONE TIRE & RUBBER CO.



C1 Condenser required only with N-5982 Variable Condenser and N-5938 Loop Antenna.



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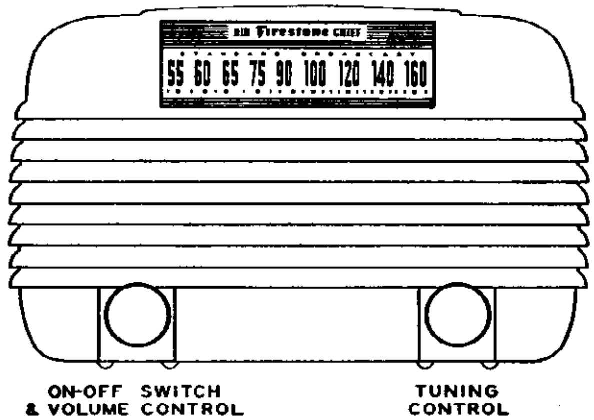
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel type instrument carefully tune it for maximum output at desired frequency before making measurements.

THE FIRESTONE TIRE & RUBBER CO.



ALIGNMENT PROCEDURE

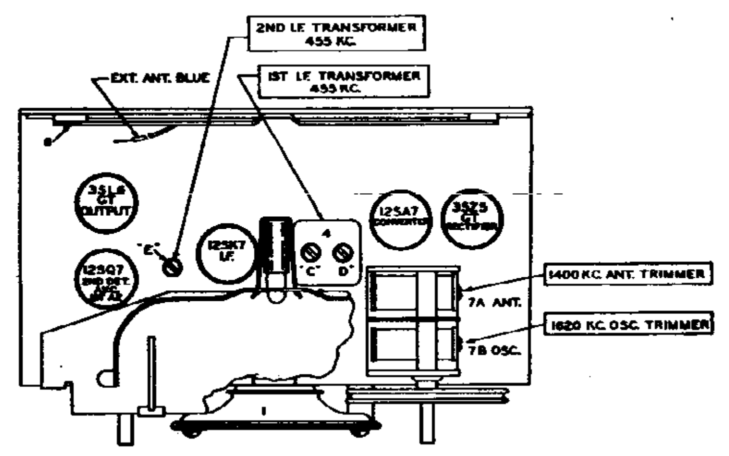
For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) thir
Before starting alignment:

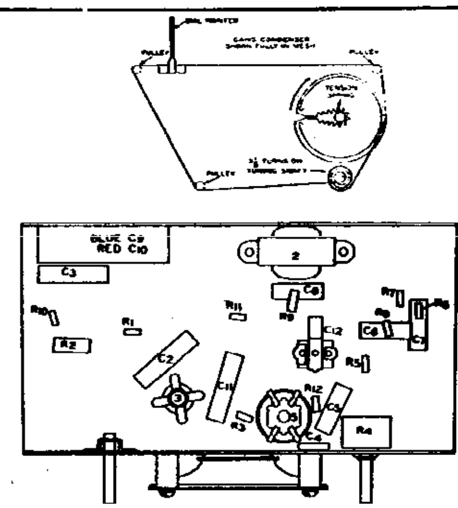
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completel in mesh) at which point the dial pointer must be exactly even with the last dot at the low frequency end of th dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINE

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust the second I. F. transformer trimmer for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1620 K. C.	Exactly 1620 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1620 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.





THE FIRESTONE TIRE & RUBBER CO.

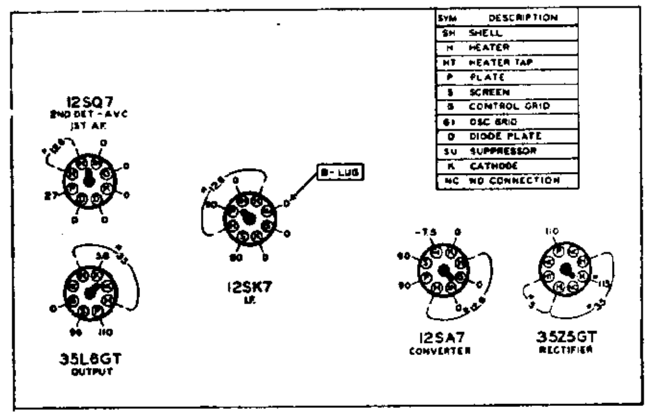
PARTS LIST

Diagram Number	Part No.	Part Name	Description
1	N-4318	Speaker	4" P.M. Dynamic
2	N-4875	Transformer	Output
3	N-4810	Coil	Oscillator
4	N-4813	Coil	1st I.F.
5	N-4846	Coil	2nd I.F.
6	N-5183	Antenna	Loop
7	N-5181 or	Condenser	Variable, 2 Gang & Pulley Assem. N-5936 Variable Condenser N-4294 Pulley
6	N-5938	Antenna	Loop
7	N-5982	Condenser	Variable, 2 Gang & Pulley Assem N-5286 Variable Condenser N-4294 Pulley
C1	N-1681	Condenser	Mica .00001 MFD 500 V.
C2	N-1345	Condenser	Paper .05 MFD 200 V.
C3	N-1346	Condenser	Paper .05 MFD 400 V.
C4	N-1374	Condenser	Mica .0001 MFD 500 V.
C5	N-4894	Condenser	Paper .005 MFD 600 V.
C6	N-4890	Condenser	Paper .0005 MFD 600 V.
C7	N-1344	Condenser	Paper .01 MFD 400 V.
C8	N-1376	Condenser	Paper .02 MFD 400 V.
C9-C10	**N-5193**	**Condenser**	**Electrolytic C9 - 35 MFD 150 V. C10 - 30 MFD 150 V.**
C11	N-1345	Condenser	Paper .05 MFD 200 V.
C12	N-2649	Condenser	Adjustable Trimmer
R1	N-4025	Resistor	Carbon 22,000 ohm .5 W.
R2	N-4023	Resistor	Carbon 82 ohm 2.0 W.
R3	N-1262	Resistor	Carbon 1.0 Megohm .5 W.
R4	**N-5185**	**Volume Control with Switch**	
R5	N-4028	Resistor	Carbon 6.8 Megohm .5 W.
R6	N-4026	Resistor	Carbon 220,000 ohm .5 W.
R7	N-4027	Resistor	Carbon 470,000 ohm .5 W.
R8	N-4067	Resistor	Carbon 180 ohm .5 W.
R9	N-5358	Resistor	Carbon 1,000 ohm 1.0 W.
R10	N-4022	Resistor	Carbon 33 ohm .5 W.
R11	N-4026	Resistor	Carbon 220,000 ohm .5 W.
R12	N-4087	Resistor	Carbon 47,000 ohm .5 W.

MISCELLANEOUS PARTS

Part No.	Part Name	Description
✱228	Cabinet	Ivory Plastic
N-1090	Cord	6 Ft. Rubber Line Cord
N-5177	Dial Plate	Dial Back Plate less Scale
N-5250	Dial Cord	3' of 30 lb. Dial Drive Cord
N-5182	Dial Scale	Calibrated Scale
N-4037	Dial Shaft	Tuning Shaft
N-5939	Dial Pointer	Dial Indicator
N-3332	Dial Spring	Tension Spring for Drive Cord
N-5041	Knob	For Ivory Cabinet
N-4075	Pilot Lamp Socket	Pilot Lamp Socket Assembly
N-1147	**Pilot Lamp**	**No. 47 Lamp, 6-8 Volts .150 AMP.**

VOLTAGE TABLE
(BOTTOM OF CHASSIS)



REAR OF CHASSIS

All voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

*AC except when set is used on DC.

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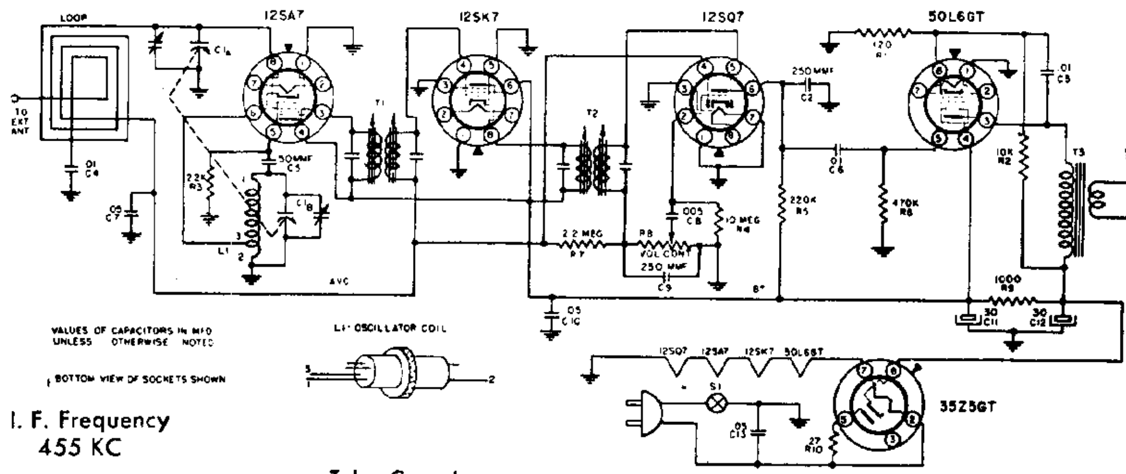


I. F. Frequency
455 KC

Loud Speaker
4 inch P. M.

Voice Coil Impedance
3.2 ohms at 400 cycles

Power Output
Maximum 1.65 watts

Tube Complement

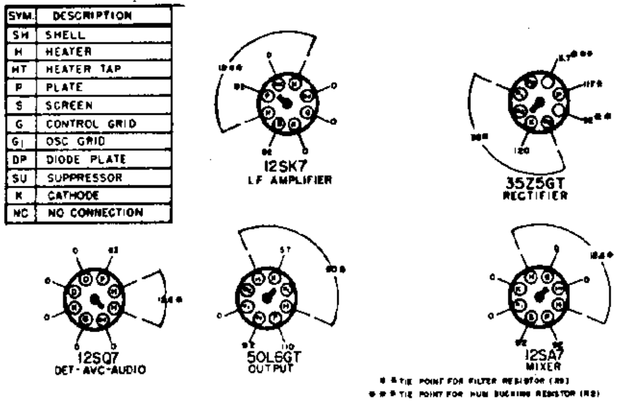
12SA7	—	Oscillator Converter
12SK7	—	I. F. Amplifier
12SQ7	—	AVC, Detector, 1st Audio
50L6GT	—	Power Output
35Z5GT	—	Rectifier

Power Supply
105-125 volt AC-DC

Tuning Range
540 to 1630 KC

VOLTAGE TABLE
(BOTTOM OF CHASSIS)

SYM.	DESCRIPTION
SH	SHELL
H	HEATER
HT	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
G1	OSC GRID
DP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION



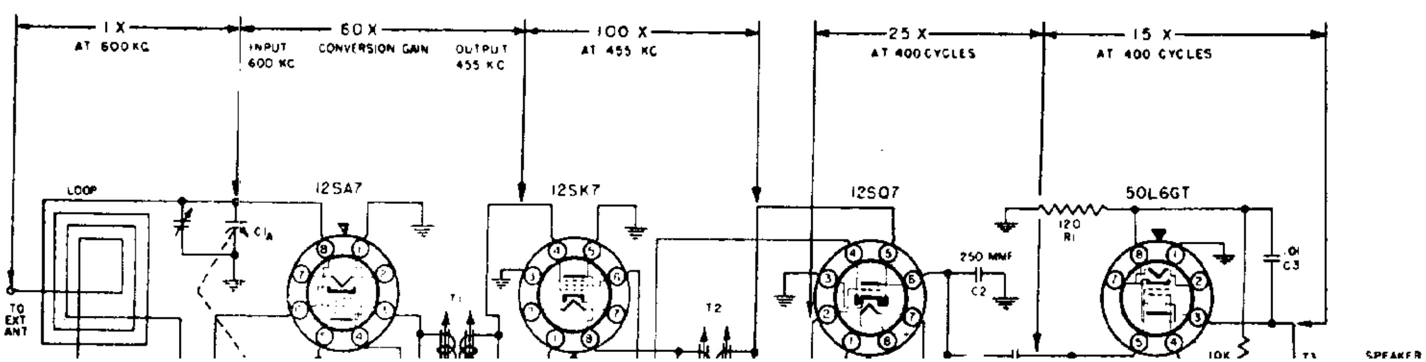
REAR OF CHASSIS

All voltages except heaters are measured from socket contacts to ground (chassis). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

*AC except when used on DC.

Before proceeding with stage measurements be sure the receiver is properly aligned. R.F. gains can be measured by a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. **For all gain measurements connect the "high" side of a signal generator to the antenna lead through a .00025 mica condenser. The ground side of the signal generator should be connected to the chassis. Use a 600 KC signal with 400 cycle modulation (use nearby frequency if local station interferes.)**
2. **Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)**
3. **When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.**



MODEL 4-A-27, Cameo

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The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

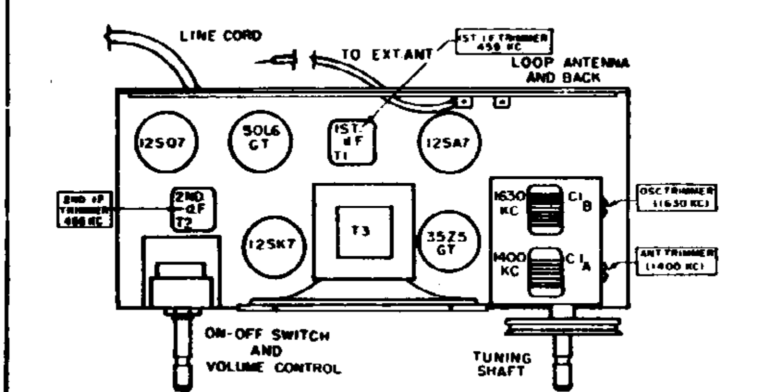
For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

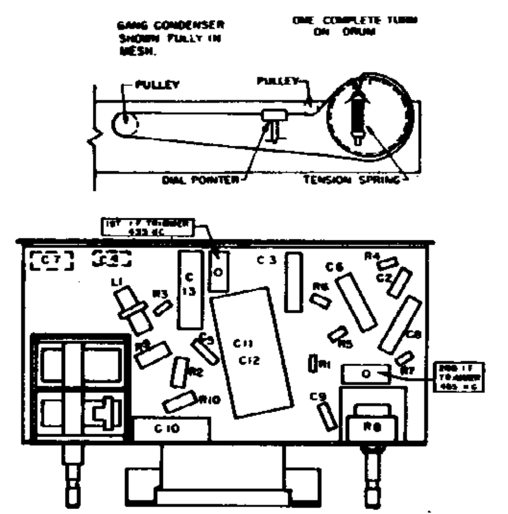
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last mark at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Minimum capacity (fully open)	455 K.C.	.1 MFD. condenser	High side to grid of tuning condenser. Low side to chassis. (through .25 MFD. Cond.)	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity (fully open)	Exactly 1630 K.C.	.00025 MFD. condenser	Receiver antenna lead. Chassis.	Adjust 1630 K.C. oscillator trimmer for maximum output.
3	Approx. 1400 K.C.	Approx. 1400 K.C.	.00025 MFD. condenser	Receiver antenna lead. Chassis.	While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.





C1A, C1B	19-173	Variable condenser
C2, C9	A15-176	250 MMFD mica condenser
C3, C4, C6	A16-156	.01 MFD 400 volt condenser
C5	A15-175	50 MMFD mica condenser
C7, C10	A16-152	.05 MFD 200 volt condenser
C8	A16-153	.005 MFD 600 volt condenser
C11, C12	B18-283	30 x 30 MFD 150 volt electrolytic cond
C13	A16-158	.05 MFD 400 volt condenser
R1	A60-702	120 ohm ½ watt resistor
R2	A60-698	10K ohm 1 watt resistor
R3	A60-659	22K ohm ½ watt resistor
R4	A60-663	10 Megohm ½ watt resistor
R5	A60-667	220K ohm ½ watt resistor
R6	A60-662	470K ohm ½ watt resistor
R7	A60-684	2.2 Megohm ½ watt resistor
R8	24-157	Volume control, 1 megohm
R9	A60-732	1000 ohm 1 watt resistor
R10	A60-690	27 ohm ½ watt resistor
T1	A10-478	1st I. F. transformer
T2	A10-479	2nd I. F. transformer
T3	A80-233	Output transformer—part of speaker
L1	B10-480	Oscillator coil

MISCELLANEOUS PARTS

48-34	Dial crystal
58-37	Dial pointer
B67-506	Dial scale
51-105	Dial cord, 15" long
79-316	Speaker, 4 inch P. M. (includes output transformer)
B82-46	Loop antenna
23-07	Line cord
A42-425	Cabinet, molded, white
C83-468	Cabinet back
A52-226	Knob, white

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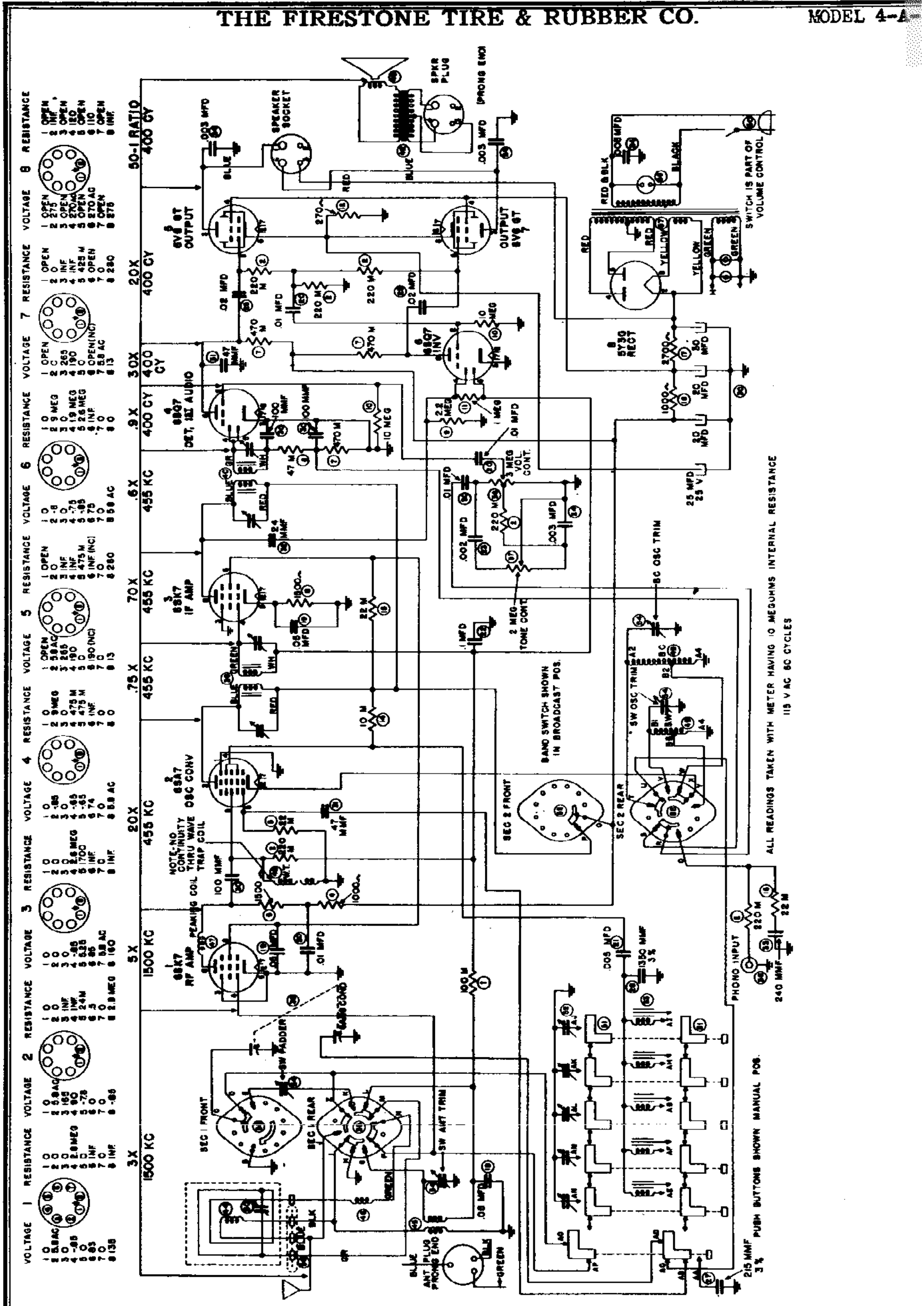
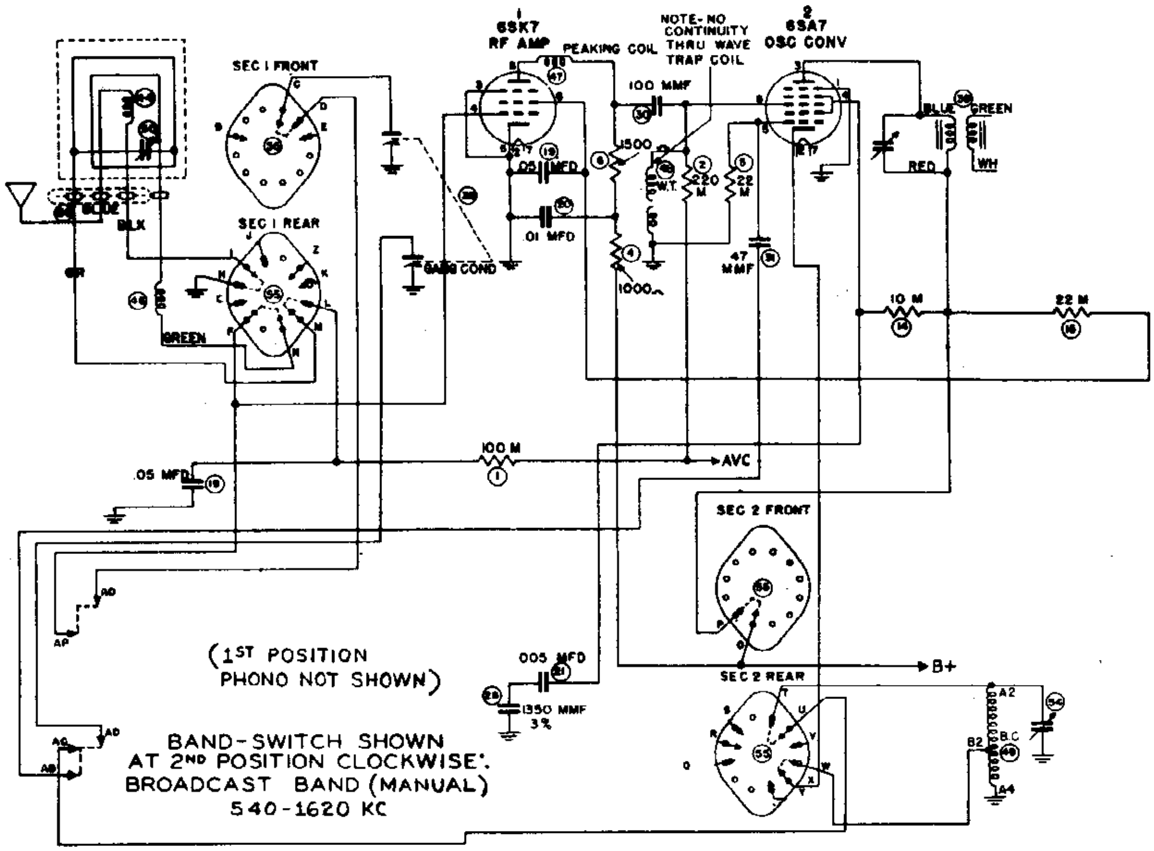
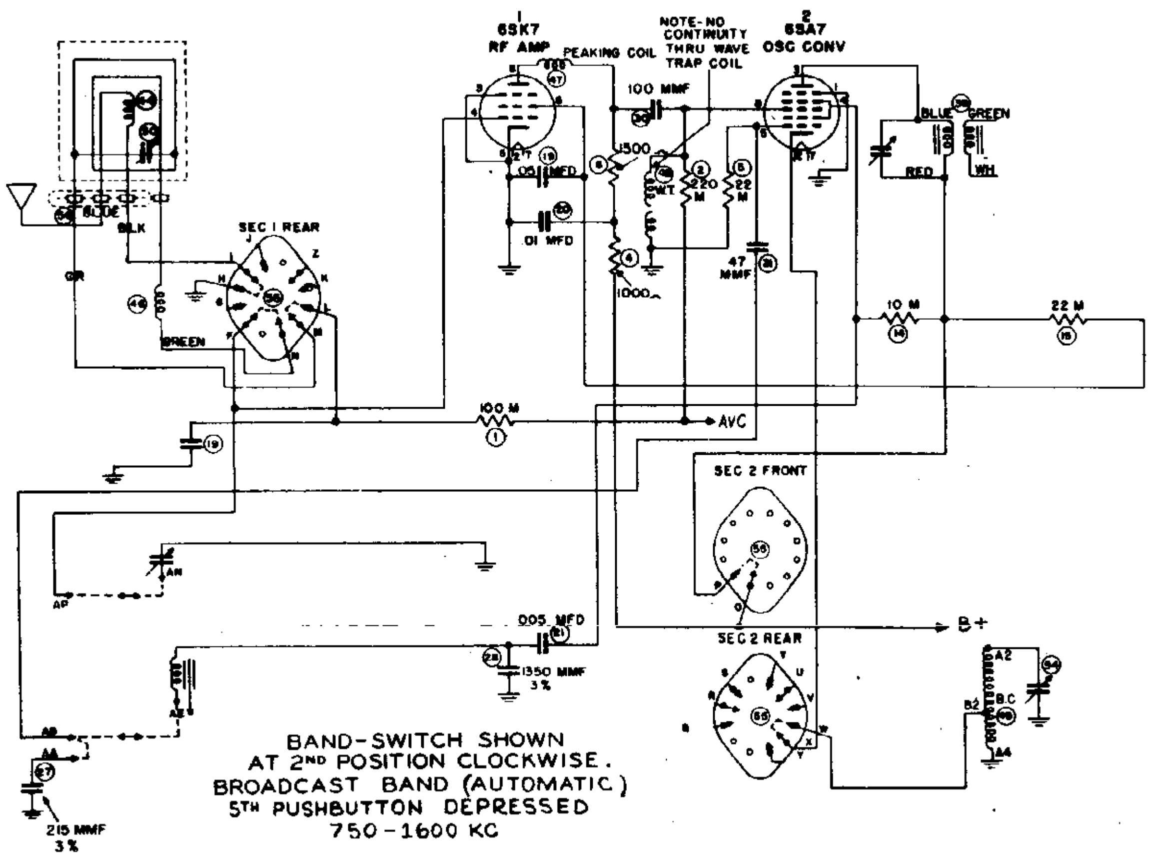


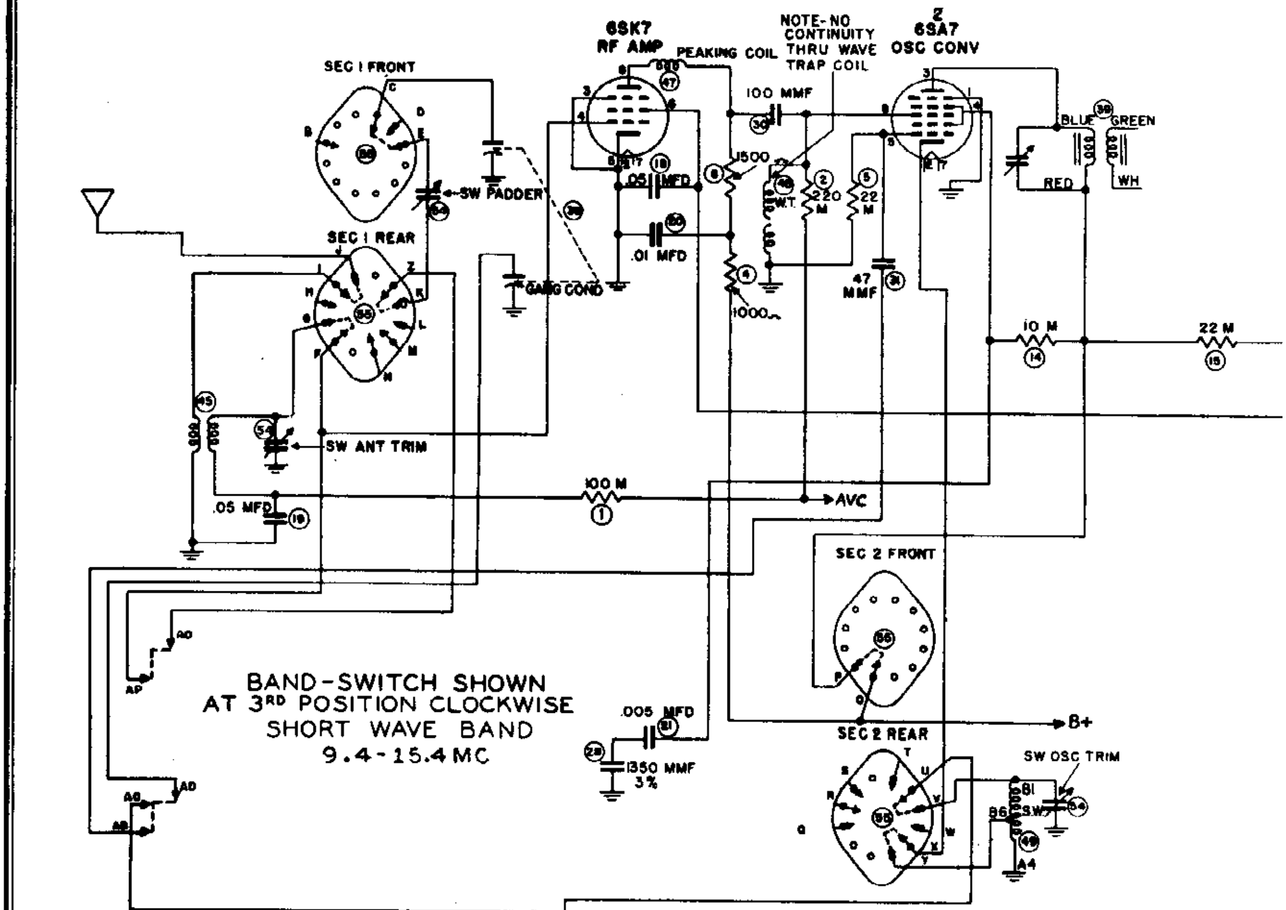
MODEL 4-A-37

THE FIRESTONE TIRE & RUBBER CO.



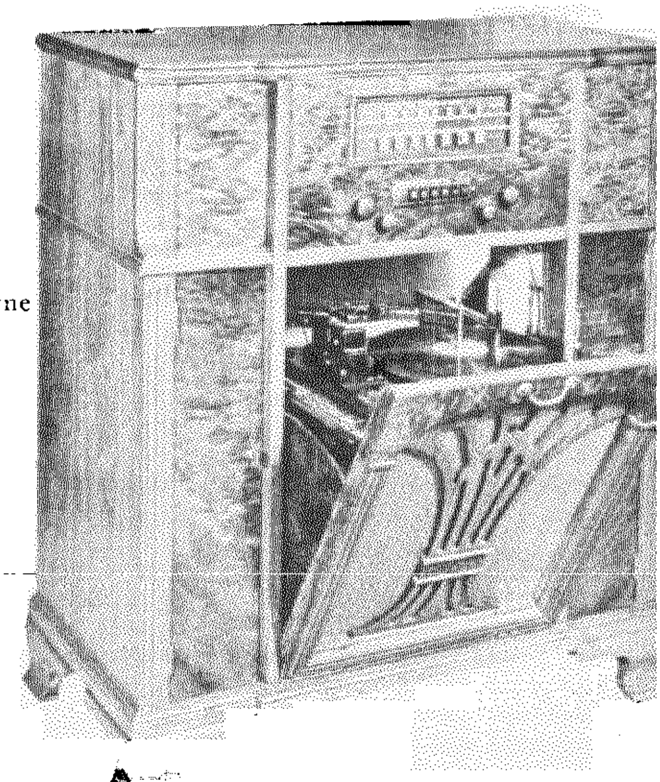


THE FIRESTONE TIRE & RUBBER CO.



ELECTRICAL SPECIFICATIONS

Eight Tube A.C. Two Band Superheterodyne
Broadcast Band..........540 Kc. — 1620 Kc.
Shortwave Band..........9.4 Mc. — 15.4 Mc.
Intermediate Frequency 455 Kc.
60 cycle A. C. 105 — 120 Volts
90 watts at 117 Volts A. C.



MODEL 4-A-37

THE FIRESTONE TIRE & RUBBER CO.

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

To properly align this receiver, a signal generator calibrated at 455 Kc., 1000 Kc., 1500 Kc., 1620 Kc., 9.7 Mc., 15 Mc., and 15.4 Mc; and also an output indicator are required. All adjustments should be made with the volume control set for maximum volume, keeping the generator output as low as possible to prevent A.V.C. action and false readings.

The loop should be placed in the approximate position relative to chassis as when the chassis is installed in the cabinet.

Connect the low side of the generator to the ground (black) wire and the high side of the generator to the antenna (red) wire.

CAUTION—Tighten S.W. oscillator trimmer screw for maximum capacity, then unscrew to second peak. Two peaks are usually found on the S.W. oscillator trimmer—one at 16.3 Mc., and one at 15.4 Mc. The lower frequency (15.4 Mc.) is used.

STEPS	USE IN SERIES WITH ANTENNA		SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	SET VOLUME CONTROL AT MAXIMUM						
2	250 MMFD.	I. F.	455 Kc.	MINIMUM	2nd. I.F. TRIMMERS	TOP 2nd. I.F. TRANS.	MAXIMUM OUTPUT
3					1st. I.F. TRIMMERS	TOP 1st. I.F. TRANS.	
4		BROADCAST	1620 Kc.	1620 Kc.	B.C. OSC. TRIMMER	See Chassis Layout*	
5			1500 Kc.	1500 KC. Rock Gang	ANT. TRIMMER	ON LOOP	
6	SET POINTER AT 1000 Kc. AND CHECK POINTER CALIBRATION						
7	400 Ohms	SHORT WAVE	15.4 Mc.	MINIMUM	S.W. OSC. TRIMMER**	See Chassis Layout*	
8			15 Mc.	15 Mc. Rock Gang	S.W. ANT. TRIMMER		
9			9.7 Mc.	9.7 Mc. Rock Gang	S.W. ANT. PADDER		
10	RECHECK 15.4 Mc.						

**See Caution above.

SETTING UP PUSH BUTTONS

A Signal Generator should be used to prevent buttons being set up on wrong stations.

1. Allow the set to warm up for about half an hour before beginning to set up the buttons.

2. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See Push Button Layout.)

3. Select the pair of adjustment screws covering the frequency of a wanted stations.

4. Press the "Dial" Button and manually tune in the desired station frequency.

5. Press the button selected for this frequency.

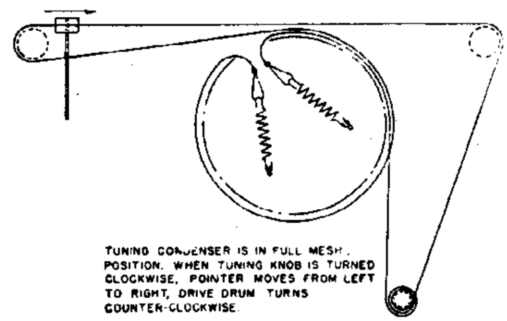
6. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.

7. Adjust the upper screw in same pair until maximum volume is secured.

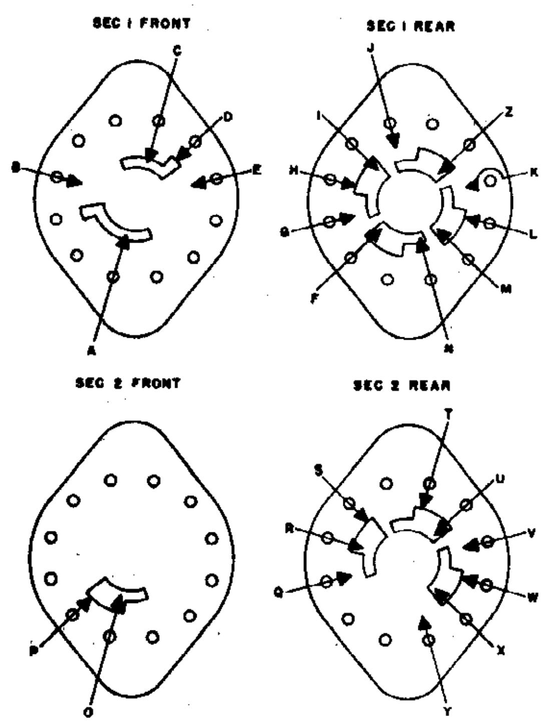
8. Press dial button making certain original frequency is still tuned in; check results on button just set up. If it is the same, proceed with the next button until all are set up.

9. Recheck settings and correct any drift due to interaction between adjacent coils.

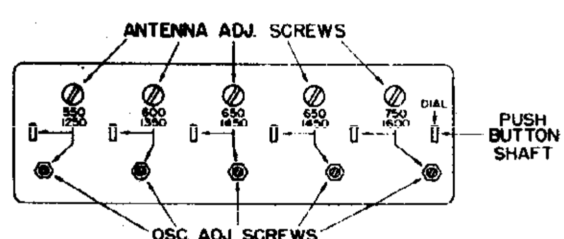
DIAL STRINGING



BAND SWITCH DECKS



PUSH BUTTON LAYOUT



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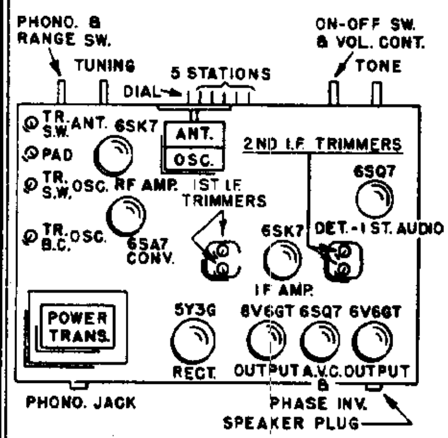
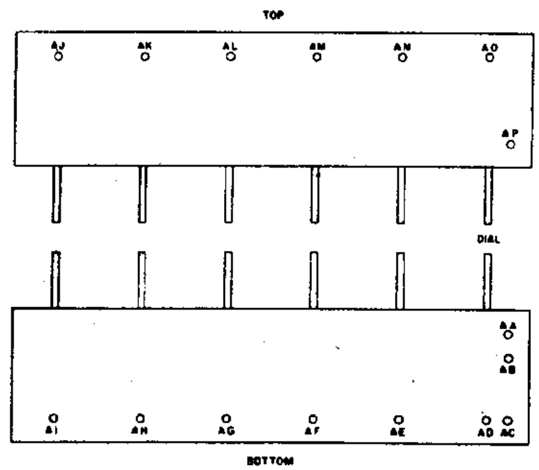
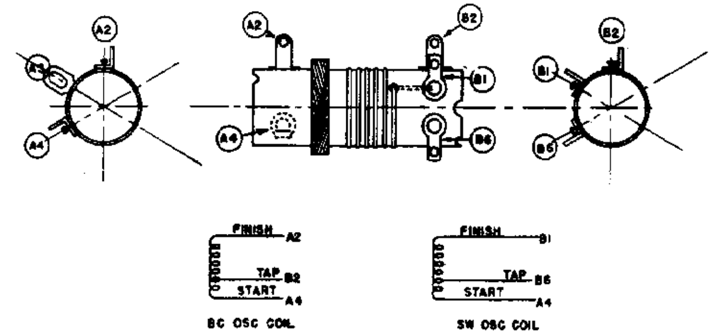
CHASSIS LAYOUT



PUSH BUTTON TUNER SWITCH



BROADCAST AND S. W. OSC. COILS

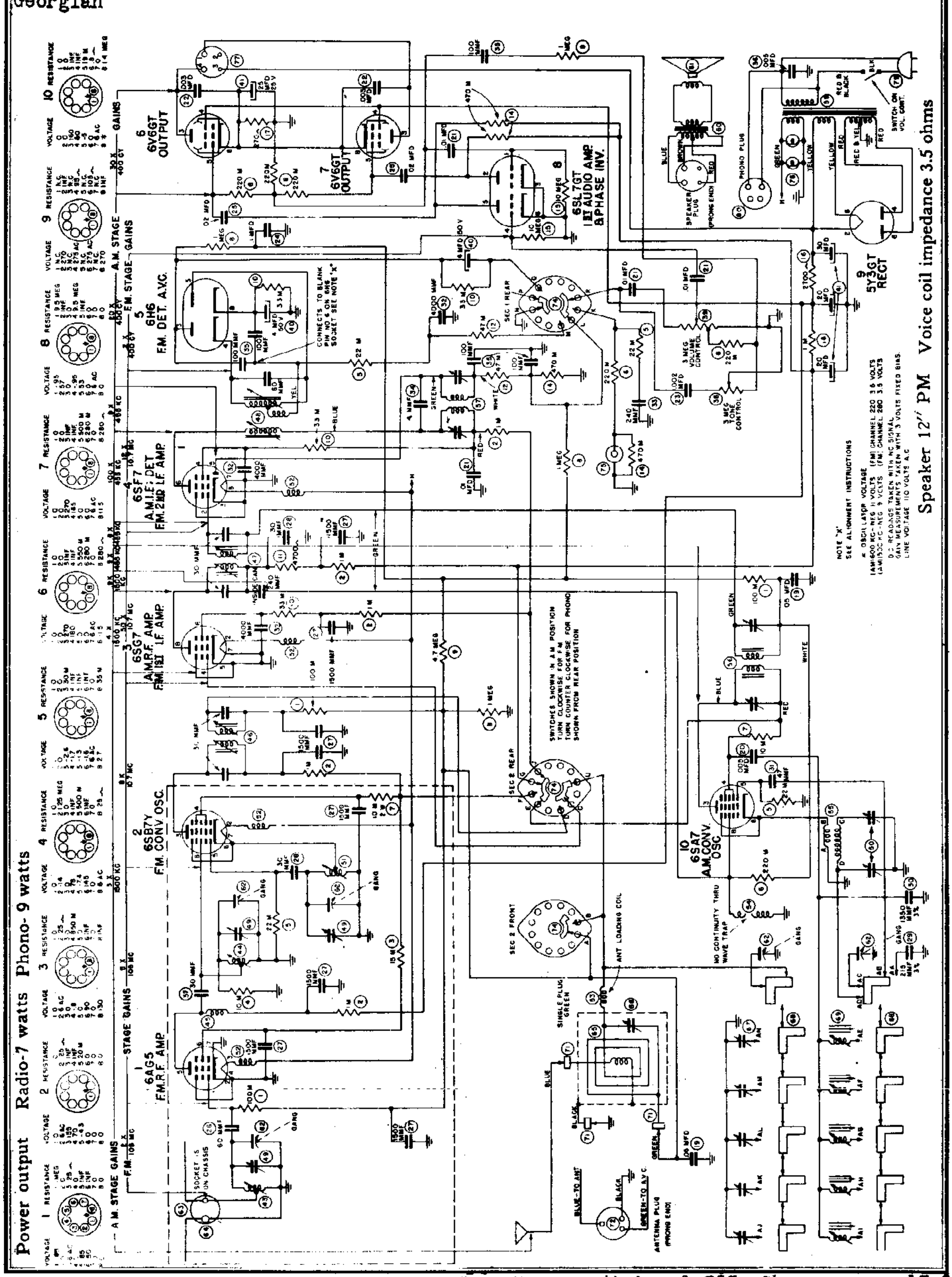


Letters on terminals of switches and coils shown on this page correspond to similarly lettered terminals on the switches and coils shown in the circuit diagram.

Refer. No.	Part Number	DESCRIPTION
1	77214	100 M Ohms
2	77216	220 M Ohms
4	77262	1000 Ohm
5	77266	22 M Ohms
6	77263	1500 Ohm
7	77217	470 M Ohms
8	77213	47 M Ohm
9	77270	2.2 Megohm
10	77274	10 Megohm
11	77218	1 Megohm
12	77189	270 Ohm 2 Watt
14	77013	10 M Ohms 2 Watt
15	77069	22 M Ohms 1 Watt
16	77304	1000 Ohm 2 Watt
17	77243	2700 Ohm 4.7 Watt Molded
19	25196	.05 Mfd. Tubular 600 Volts
20	25194	.01 Mfd. Tubular 600 Volts
21	25183	.005 Mfd. Tubular 600 Volts
22	25215	.1 Mfd. Tubular 600 Volts
23	25185	.002 Mfd. Tubular 600 Volts
24	25184	.003 Mfd. Tubular 600 Volts
25	25195	.02 Mfd. Tubular 600 Volts
27	25212	215 Mmf. Silver Mica Capacitor
28	25213	1350 Mmf. Silver Mica Capacitor
30	25188	100 Mmf. Mica
31	25193	47 Mmf. Mica
32	25192	24 Mmf. Mica
33	25187	240 Mmf. Mica
34	25031	.005 Buffer 600 Volts
35	25214	Electrolytic Capacitor -20-30-450 Volts; 25-25 Volts
36	78020	Volume Control
37	78072	Tone Control
38	26194	Gang Capacitor
40	38537	2nd. I. F. Transformer
42	94195	Output Transformer
43	81126	Speaker
44	38552	Loop Antenna
45	38542	Short Wave Antenna Coil
46	38794	Antenna Loading Coil
47	38544	Peaking Coil
48	38484	Wave Trap
49	38543	S.W. and B.C. Oscillator Coil Ass'y
50	26032	Antenna Trimmer
51	90118	Push Button Switch
52	26175	P. B. Trimmer Strip
53	38405	P. B. Coil Strip
54	26195	Trimmer Strip
55	90175	Band Switch
56	80252	Antenna Plug
56	80256	Antenna Socket
57	94104	Power Transformer
58	80030	Phono Imput Socket
59	11274	Phono A.C. Cord and Socket
60	27118	Universal Line Cord
	22174	Phono Pickup Cable
	31274	Dial
	11257	Dial Pointer
	42185	Dial Lamp (Mazda 44) 6 V. 250 Ma.
	59206	Volume Knob
	59207	Tuning Knob
	59208	Band Switch Knob
	59209	Tone Control Knob
	41106	Drive Cord Kit
	59278	Push Button
	59259	Push Button Escutcheon
	41105	Station Call Letter Kit
	17019	Drive Drum
	80139	Molded Octal Socket

MODEL 4-A-42, Georgian

THE FIRESTONE TIRE & RUBBER CO.

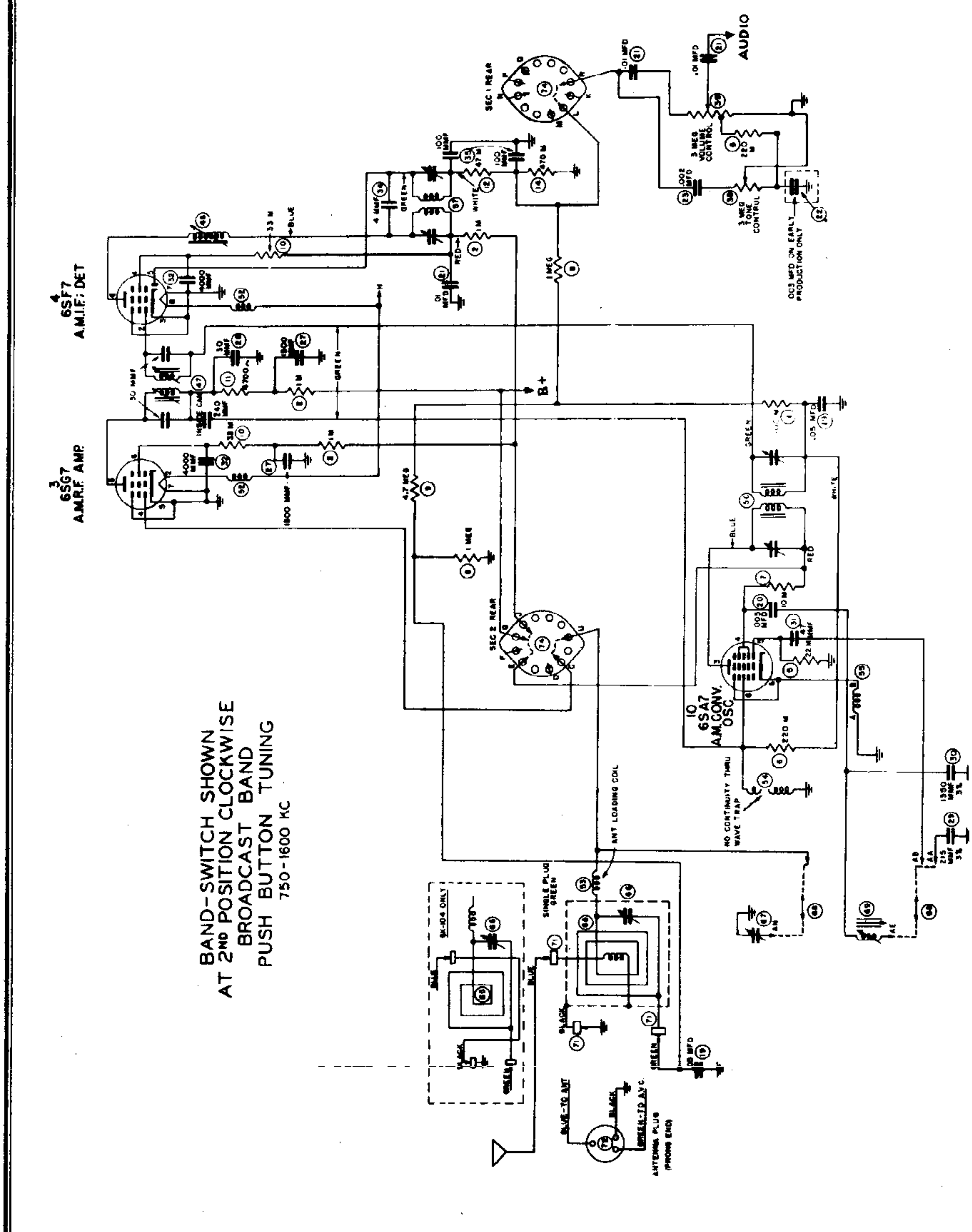


RECORD CHANGER: Farnsworth Model P57, Changes page 17-2

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A

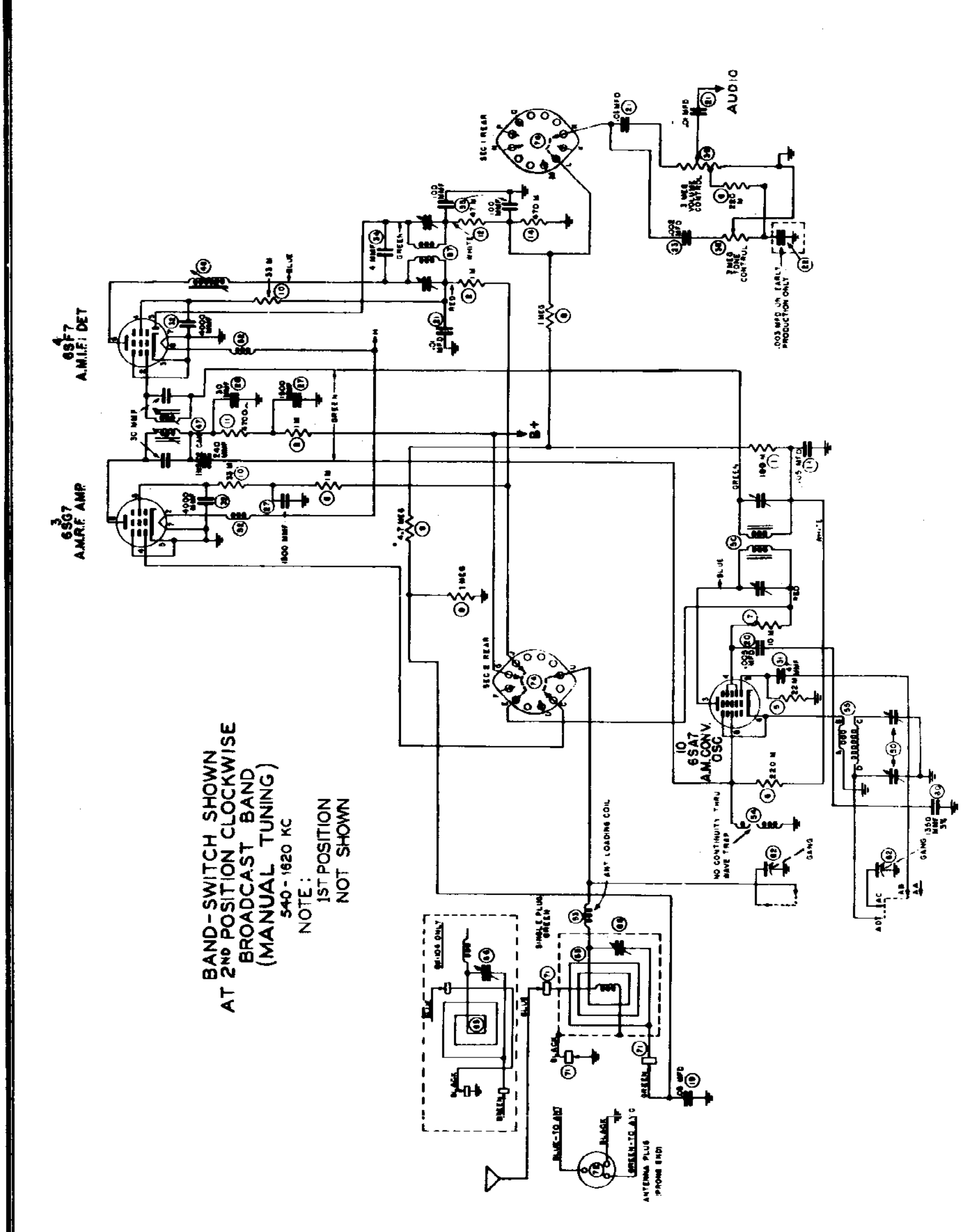
Georgian



"clarified schematics"

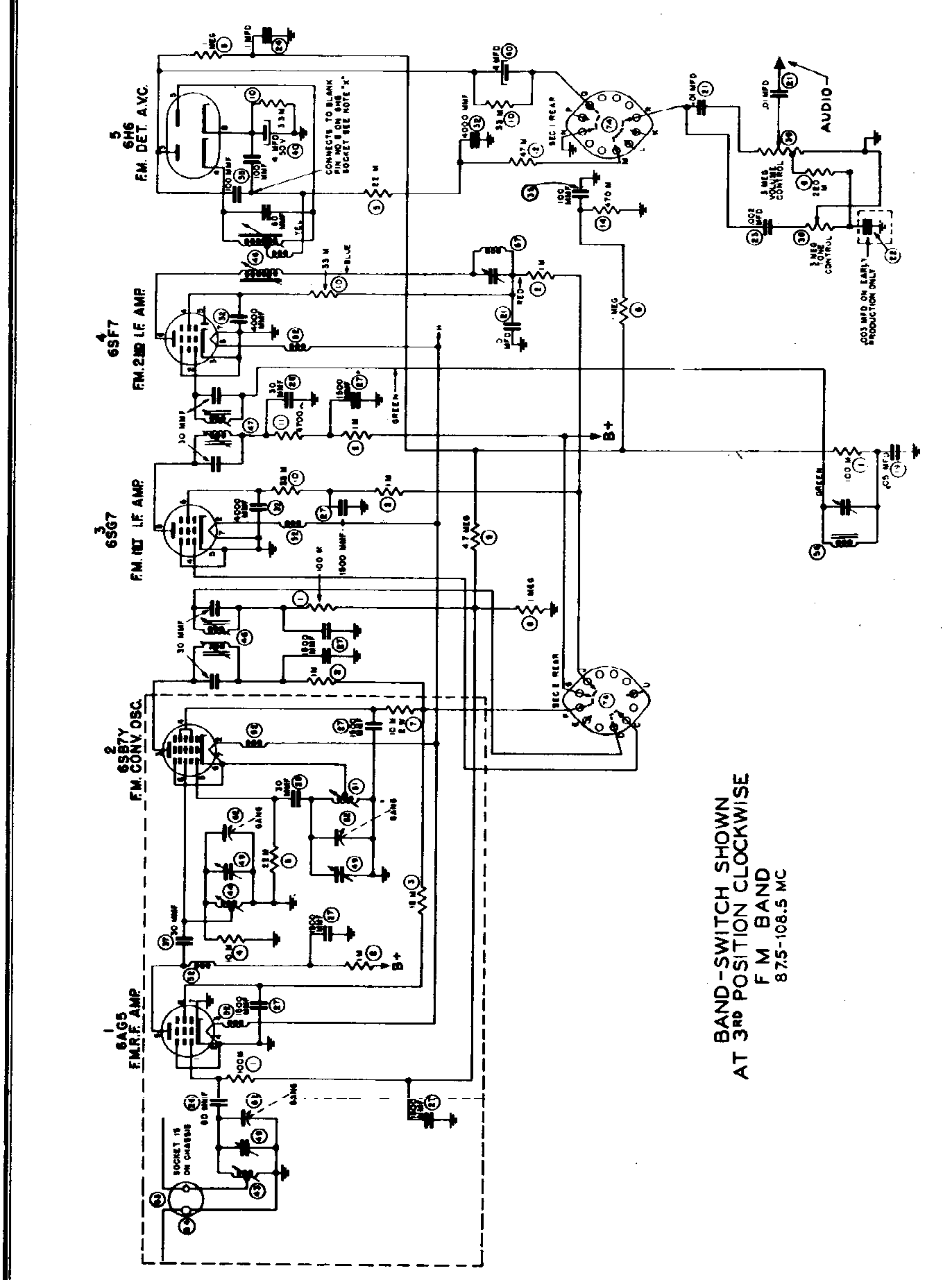
MODEL 4-A-42, Georgian

THE FIRESTONE TIRE & RUBBER CO.



THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A-4
Georgian



MODEL 4-A-42, Georgian

THE FIRESTONE TIRE & RUBBER CO.

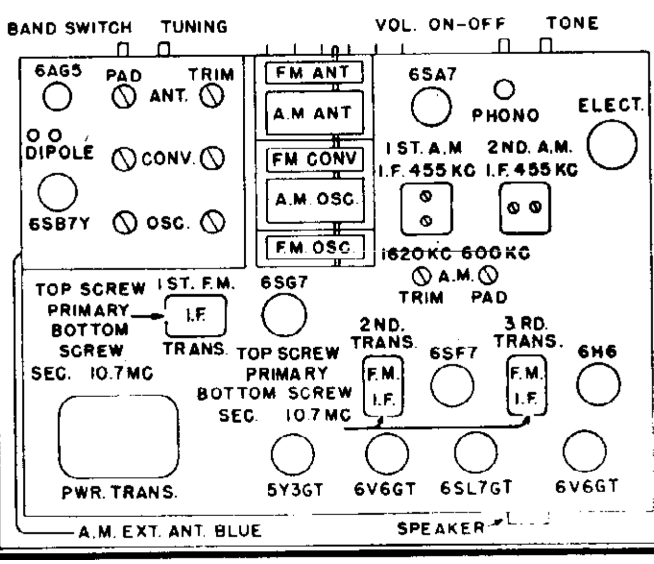
ALIGNMENT INSTRUCTIONS AM BAND

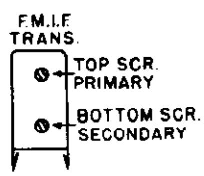
An output meter and a signal generator calibrated at 455 Kc., 600 Kc., 1500 Kc. and 1600 Kc., are required to properly align these receivers on AM band. Keep the output of the signal generator as low as possible to prevent AVC action and false settings. Connect the high side of the generator to the blue wire found at rear of set and low side to the black wire.

STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	
1	SET VOLUME AND TONE CONTROLS AT MAXIMUM					MAXIMUM OUTPUT
2	200 MMF.	455 Kc.	Minimum	2nd. I.F. Trimmers *	Top of I.F. Transformers	
3				1st. I.F. Trimmers *		
4		1600 Kc.	1600 Kc.	B. C. Osc. Trimmer	See Chassis Layout	
5		1500 Kc.	1500 Kc.	B. C. R. F. Trimmer	On Loop	
6		600 Kc.	600 Kc. Rock Gang	600 Kc. Padder	See Chassis Layout	
7		Recheck 1500 Kc.				

* Recheck after FM alignment.

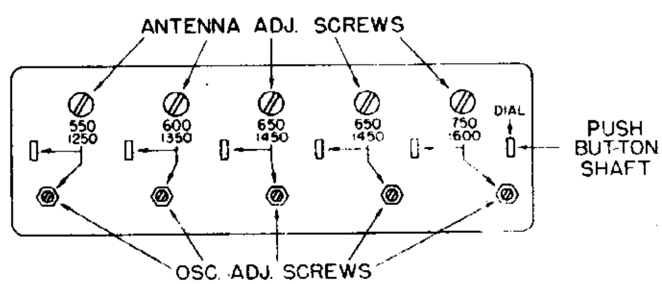
CHASSIS LAYOUT





Letters on terminals of switches and coils shown on this page correspond to similarly lettered terminals on the switches and coils shown in the circuit diagram.

PUSH BUTTON LAYOUT



OSCILLISCOPE ALIGNMENT OF FM BAND

A. Equipment required will be an oscilliscope, a frequency modulated signal generator covering the range 87.5 to 108.5 mc on fundamentals, a sweep generator producing a signal of 10.7 mc and sweeping at least 150 kc each side of 10.7 mc, and an output meter.

B. The vertical or "Y" axis terminals of the oscilliscope should be connected between pin 3 of the 6H6 discriminator and ground. The sweep voltage of the sweep generator should be fed to the horizontal or "X" axis terminals of the oscilliscope. The 10.7 mc output of the sweep generator should be fed into the grid of the 6SF7 tube through a condenser of approximately 3300 mmfd.

C. Remove the negative lead of the 4 mfd. electrolytic from pin #3 of 6H6 socket. Remove 6SL7 tube from socket. Turn the set on and turn both the tone control and the volume control all the way to the right. Detune the secondary of the third FM I.F. transformer by turning the bottom slug screw out as far as possible. Adjust the primary, top slug screw, until pattern (a) appears on the oscilliscope. Adjust the secondary, bottom slug screw. until pattern "b" is obtained on the oscilliscope and until both sides of this pattern are symmetrical.

D. Remove the 10.7 mc. output of the sweep generator from the grid of the 6SF7 tube and connect to the grid of the 6SG7. Align the second FM I.F. transformer as in paragraph "C".

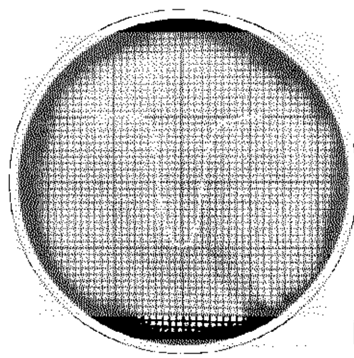
E. Connect the 10.7 mc output of the sweep generator to the signal grid of the 6SB7Y, (pin 8) Detune secondary of the first FM I.F. transformer and tune primary as before for pattern (a). Tune secondary for pattern "c" and make both sides of pattern as symmetrical as possible. This completes alignment of the FM I.R. transformers.

F. Reconnect the negative lead of the 4 mfd. electrolytic to pin #3 of the 6H6 socket and move the oscilliscope leads to pin #6 of the 6H6 socket and ground. With the sweep generator connected to the 6SB7Y signal grid as before, the discriminator pattern (d) should appear on the oscilliscope if the I.F. alignment instructions have been followed carefully. Remove the oscilliscope and sweep generator leads and reinstall 6SL7 tube in socket. Never adjust AM I.F. transformers without rechecking FM I.F. alignment.

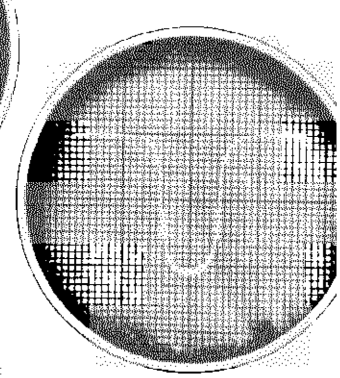
G. Connect the 87.5 to 108.5 mc signal generator to the antenna socket of the receiver through a 300 ohm resistor. The generator should be frequency modulated at some frequency in the audible range. Connect output meter across secondary of output transformer. Tune receiver to channel 300 on FM dial. With signal generator set at 107.9 mc adjust oscillator trimmer condenser, third from front, for maximum reading on output meter. Set signal generator to 87.9 mc and tune receiver to channel 200 on FM dial. Adjust oscillator coil screw, third from front, (see chassis layout) for maximum reading on output meter. Recheck oscillator setting for channel 300.

H. Tune signal generator and receiver to 105 mc (channel 285 approx.). Adjust converter signal grid trimmer condenser, second from front, for maximum reading on output meter. Tune signal generator and receiver to 92 mc, (channel 220 approx.) and adjust converter coil screw, (second from front), to maximum reading on output meter. Recheck converter trimmer setting at 105 mc (channel 285 approx.).

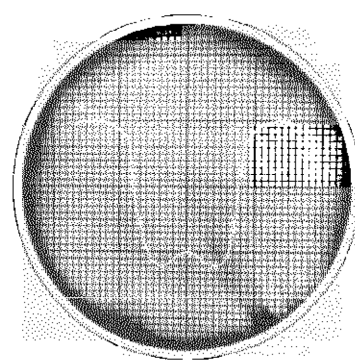
I. Repeat operations of paragraph (G) for antenna trimmer condenser and coil. This completes FM R.F. alignment.



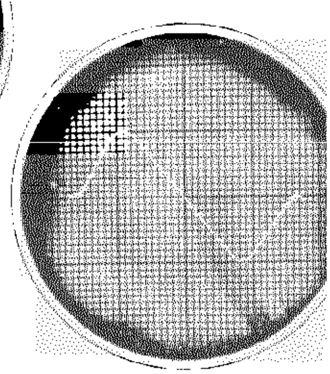
A



C



B



D

MODEL 4-A-42,
Georgian

THE FIRESTONE TIRE & RUBBER CO.

SETTING UP PUSH BUTTONS

A Signal Generator should be used to prevent buttons being set up on wrong stations.

1. Allow the set to warm up for about half an hour before beginning to set up the buttons.

2. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See Push Button Layout).

3. Sélect the pair of adjustment screws covering the frequency of a wanted station.

4. Press the "Dial" button and manually tune in the desired station frequency, or signal from generator.

5. Press the button selected for this frequency.

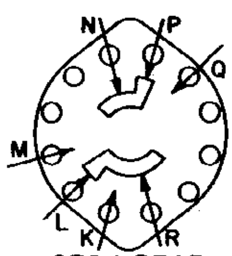
6. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.

7. Adjust the upper screw in same pair until maximum volume is secured.

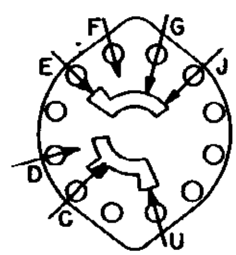
8. Press dial button making certain original frequency is still tuned-in; check results on button just set up. If it is the same, proceed with the next button until all are set up.

9. Recheck settings and correct any drift due to interaction between adjacent coils.

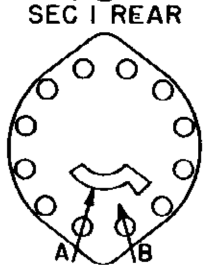
BAND SWITCH DECKS



SEC I REAR



SEC 2 REAR

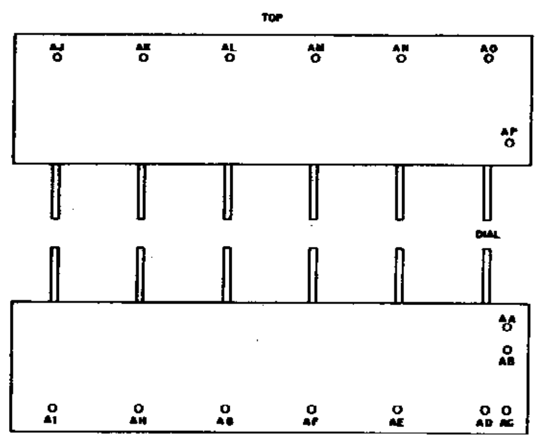


SEC 2 FRONT

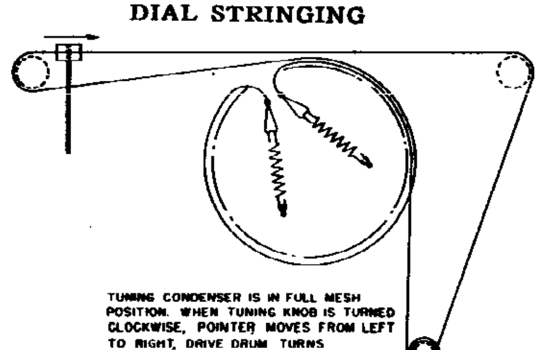
Electrical Specifications

Ten tube, 60 cycle A.C., 110-120 volt operated superheterodyne receiver with built-in loop antenna and FM folded dipole. AM Broadcast band tuning range 540 Kc. to 1620 Kc. FM band range 875 Mc. to 108 Mc. calibrated in channel numbers from 200 to 300.

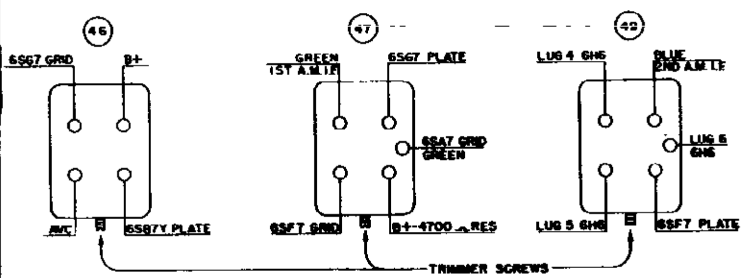
PUSH BUTTON TUNER SWITCH



DIAL STRINGING



BOTTOM VIEW FM I.F. TRANSFORMERS



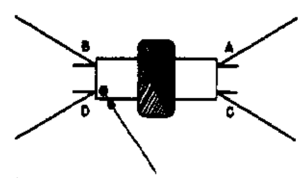
THE FIRESTONE TIRE & RUBBER CO.

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	77214	100M Ohms
2	77262	1000 Ohms
3	77265	15 M Ohms
4	77212	10 M Ohms
5	77266	22 M Ohms
6	77216	220 M Ohms
7	77013	10 M Ohms 2 Watt
8	77218	1 Megohm
9	77272	4.7 Megohms
10	77267	33 M Ohms
11	77211	4700 Ohms
12	77213	47 M Ohms
14	77217	470 M Ohms
15	77274	10 Megohms
16	77243	2700 Ohm Molded Resistor 4.7 Watt
17	77189	270 Ohms, 2 Watt
18	77304	1000 Ohms, 2 Watt
19	25196	.05 Mfd. 600 Volt
20	25183	.005 Mfd. 600 Volt
21	25194	.01 Mfd. 600 Volt
23	25185	.002 Mfd. 600 Volt
24	25215	.1 Mfd. 600 Volt
25	25195	.02 Mfd. Capacitor, 600 Volt
26	25333	60 MMF. Ceramic Capacitor N-470
27	25273	1500 MMF. Ceramic Capacitor
28	25329	30 MMF. Ceramic Capacitor, N-750
29	25212	215 MMF. Silver Mica Capacitor
30	25213	1350 MMF. Silver Mica Capacitor
31	25193	47 MMF. Mica Capacitor
32	25271	4000 MMF. Ceramic Capacitor
33	25187	240 MMF. Mica Capacitor
34	25327	4 MMF. Ceramic Capacitor
35	25188	100 MMF. Mica Capacitor
36	25031	.005 MFD. Buffer Capacitor, 600 Volt
37	25332	30 MMF. Ceramic Capacitor, N-150
38	78072	Tone Control, 3 Megohms
39	78120	Volume Control, 3 Megohms
40	25316	4 Mfd., 50 V. Electrolytic Capacitor
41	25214	Electrolytic Capacitor 20 Mfd. 20 Mfd., 30 Mfd., 450 volt, 25 Mfd., 25 Volt
43	38690	FM Antenna Coil
44	38691	FM Convertor Coil
45	38661	FM RF Choke
46	38683	1st. FM I.F. Transformer
47	38684	2nd. FM I.F. Transformer
48	38685	3rd. FM I.F. Transformer
49	26231	5-20 MMF Ceramic Trimmer N-300 Temp. Coeff.
50	26240	B. C. Osc. Trimmer Strip
51	38692	FM Oscillator Coil
52	38661	Heater R.F. Choke
53	38845	Antenna Loading Coil
54	36484	Wave Trap Coil
55	38694	BC Oscillator Coil
56	38681	1st. AM I.F. Transformer
57	38682	2nd. AM I.F. Transformer
59	94204	Power Transformer
60	94195	Output Transformer
61	81126	Speaker
62	26237	Gang Capacitor
64	80361	FM Dipole Socket
65	38701	Loop Antenna
66	26032	Loop Antenna Trimmer
67	26175	Push Button Trimmer Strip
68	90118	Push Button Switch
69	38405	Push Button Coil Strip
71	80439	Loop Antenna Socket
72	80440	Antenna 3-Prong Plug
74	90214	Band Switch
75	80030	Phono Input Socket
76	42186	Dial Lamp, 150 Ma.
77	80385	Speaker Socket
79	27118	Line Cord
80	11274	Phono AC Socket
	59435	Push Button
	59436	Push Button Escutcheon
	41105	Station Call Letter Kit
	59431	Volume Knob
	59432	Tuning Knob
	59433	Band Switch Knob
	59434	Tone Control Knob
	80210	Compartment Light Socket & Switch
	60560	Light Shield
	41285	Compartment Lamp 6 V. 250 Ma.
	31342	Glass Dial
	07395	Dial Background
	11257	Dial Pointer
	17019	Drive Drum
	41106	Drive Cord (42 inches) and springs
	80325	Mica Filled Octal Socket for 6SB7Y
	80139	Molded Octal Socket
	80239	Molded Octal Socket for Rectifier
	80362	2-Prong FM Antenna Plug
	80319	Miniature Tube Socket
	22147	Pickup Cable
	71223	Phono Needle

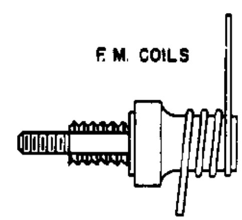
BROADCAST AND FM COILS

B.C. OSCILLATOR COIL



FINISH LUG INDICATED BY RED DOT.

F. M. COILS



TOTAL TURNS		TAP AT
ANT. COIL	$2\frac{1}{4}$	$1\frac{1}{4}$ TURNS
CONV. COIL	$2\frac{1}{4}$	$1\frac{1}{4}$ TURNS
OSC. COIL	$3\frac{1}{4}$	1 TURN

FROM GROUND END

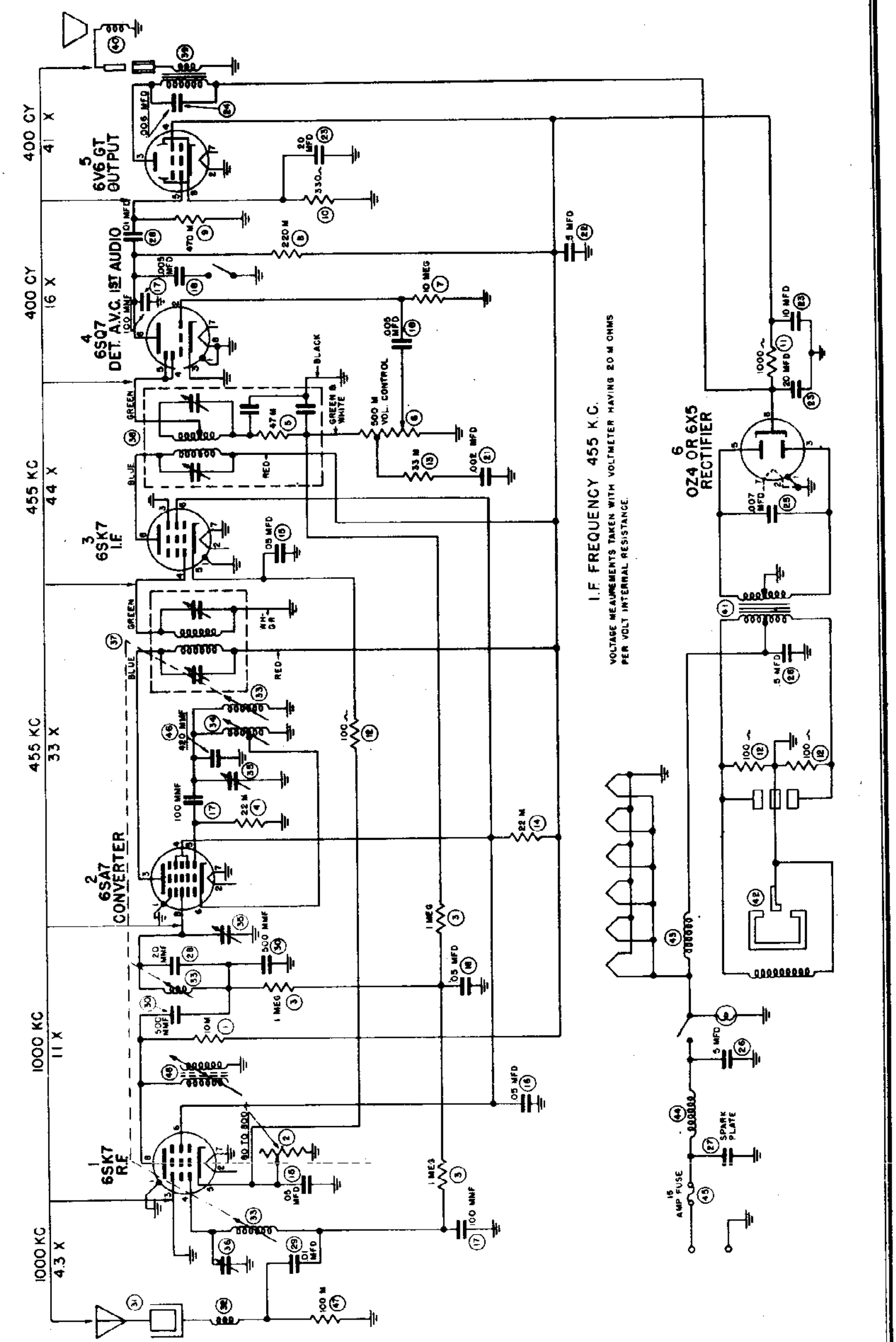
TAP

MODEL 4-B-6

THE FIRESTONE TIRE & RUBBER CO.

BOTTOM VIEW OF SOCKETS

Pin	1 Voltage	1 Resistance	2 Voltage	2 Resistance	3 Voltage	3 Resistance	4 Voltage	4 Resistance	5 Voltage	5 Resistance	6 Voltage	6 Resistance
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	-.5	10 MEG	0	0	0	0
3	0	0	230	INF	0	0	0	0	240	INF	270 AC	200 ~
4	-75	2.5 MEG	65	INF	0	11 ~	-.4	540 M	220	INF	0	NC
5	6	50-800 ~	38-75	22 M	1.4	150-800 ~	-.4	540 M	0	470 M	270 AC	200 ~
6	95	INF	0	5 ~	65	INF	95	INF	250	INF	0	NC
7	6.3	7 ~	6.3	.7 ~	6.3	7.7 ~	6.3	7.7 ~	6.3	7.7 ~	6.3	7.7 ~
8	165	INF	-.75	2.5 MEG	225	INF	0	0	11.5	330 ~	250	INF



THE FIRESTONE TIRE & RUBBER CO.

Manual Tuning Alignment Procedure

A signal generator calibrated at 455 Kc, 540 Kc, 600 Kc and 1600 Kc and an output meter are requi to properly align this receiver. Except for Wave Trap adjustment, the signal generator output should kept as low as possible and still obtain output meter reading. Connect output meter across voice coil speaker. Connect signal generator ground lead to receiver chassis. Connect signal generator outp lead to antenna connector in series with dummy antenna specified below.

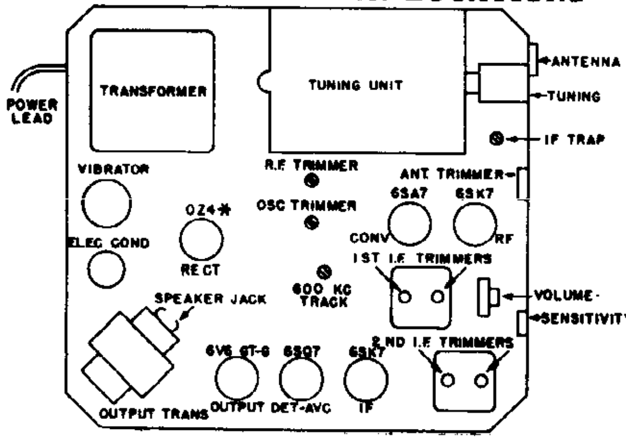
STEPS	IN SERIES WITH GEN.	SET SIGNAL GEN. AT	SET DIAL AT	ADJUST	LOCATED	TO OBTAI
1	Set Volume Control at Maximum Volume. Tone control on treble position.					
2	.1 Mfd.	455 Kc	54 Or tuning mechanism fully counter-clock-wise.	2nd. I.F. Trimmers	Top 2nd. I.F. Transformer	MAXIMUM
3				1st. I.F. Trimmers	Top 1st. I.F. Transformer	
4				Wave Trap Adjusting Screw	Top of Chassis **	MINI-MUM
5	.0001 Mfd.	1600 Kc	160 Or tuning mechanism fully clock-wise.	Osc. Trimmer		MAXIMUM
6				RF Trimmer		
7				Ant. Trimmer	End of Chassis **	
8		540 Kc	54	600 Kc Tracking	On Chassis **	
9		Recheck step 5.				
10		600 Kc	Rock 60	600 Kc Tracking	On Chassis **	

**See Tube and Trimmer layout.

STATION SELECTOR:

Stations may be tuned in with the station selector (right hand knob) as soon as the tubes become heated which requires less than a minute's wait after the receiver is turned on. Slowly turn this knob to bring the pointer over that portion of the dial where the wanted station is found. If the station frequency is known the desired station may be tuned in very close to its dial markings. The dial is calibrated in kilocycles with the last zero omitted. When the station is heard finish tuning so that the pointer is in the center of the area where the station is received. The station selector should

TUBE AND TRIMMER LOCATIONS



* 6X5 can be used if 0Z4 is not available.

MOUNTING RECEIVER

Carefui consideration to the following requirements should be made before selecting a mounting position for the receiver:

1. The radio case must not interfere with the operation of any of the car controls.
2. The mounting bolt should not encounter any obstruction on the engine side of the bulkhead.
3. The control unit flexible cables should run from the control to the receiver with as few bends as possible.
4. The position selected should be such that there is enough room to permit the cover to be removed from the receiver case for making tube replacements.

The proper location for the mounting bolt may be determined from the drilling template included with the receiver. Place the template in the chosen location and center punch the spot for drilling the mounting hole. The hole may then be drilled with a one-half inch drill.

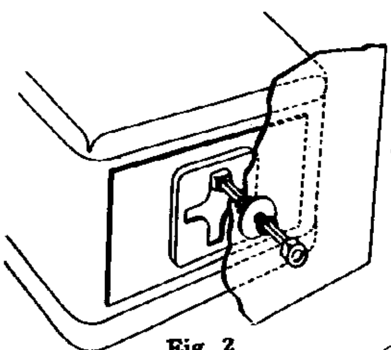
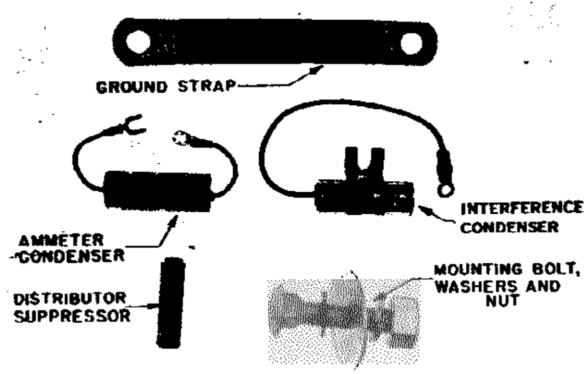


Fig. 2

Figure 2 illustrates the proper mounting of the receiver. All dirt and paint must be removed from around the mounting hole on the engine side of the bulkhead to insure proper grounding of the receiver case. Wasbers furnished should be placed in the following order. External tooth lockwasher should be placed between the bulkhead and large plain washer. Then the compression lockwasher and nut This insures a good mechanical and electrical connection between the bulkhead and receiver. Ignition interference may result upon failure to observe this precaution. The mounting nut should be tightened after the car has been driven about 500 miles.



Connecting the Receiver

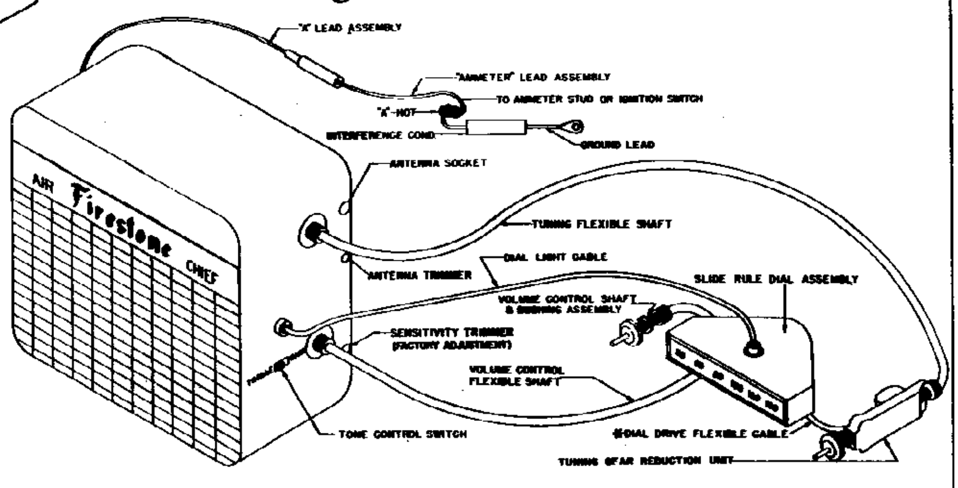


Fig. 3

* Furnished with control kit.

Plug the antenna shielded lead-in into its receptacle in the side of the receiver case. Be sure the antenna lead-in inside the car is shielded, to avoid ignition interference.

Insert the fibre insulating bushing and fuse in the fuse-holder and couple together the two parts of the fuseholder on the leads. The connector at the end of the lead and one wire of the ammeter condenser (the condenser with the cardboard wrapper) should be fastened to the ammeter stud at the back of the ammeter. The connection may be made to either stud but the current taken by the radio will register on the ammeter only if the connection is made to the proper stud. If your car does not have an ammeter, the connection should be made to the battery supply lead connection behind the instrument panel. Ground the other wire of the ammeter condenser under a convenient nut or screw behind the instrument panel. Be sure that a tight and clean connection is made.

NOISE SUPPRESSION EQUIPMENT INSTALLATION

The center high tension cable is cut near the distributor and the cut ends screwed into the distributor suppressor as shown in figure No. 4.

The interference condenser with metal case is mounted on the generator by using any one of the generator assembly bolts. Any paint or dirt should be removed so bright metal to metal contact is secured. The flexible lead is connected to the generator output terminal. See figure 5. Do not connect to field terminal.

The copper braid ground strap is used to bond the engine to the bulkhead. One end of the braid is fastened to the bulkhead by means of a nut or bolt and the other end to is secured under a cylinder head bolt, leaving enough slack for normal engine movement. A flat washer should be used under the head of the bolt fastening the braid.

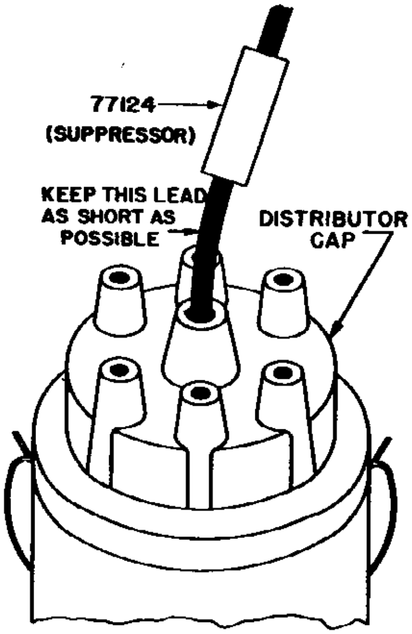


Fig. 4

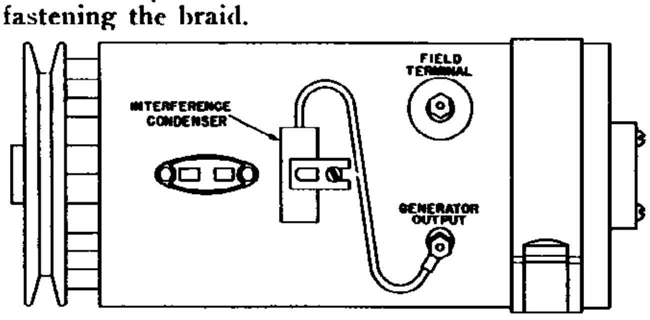


Fig. 5 NOTE—DO NOT CONNECT INTERFERENCE CONDENSER TO FIELD TERMINAL.

FORD MOTOR INTERFERENCE:

To eliminate motor interference, two additional interference condensers #25120 must be used. One from the oil pressure gauge terminal on the block to ground, the other from the temperature gauge terminal on the motor head which is highest above ground electrically to ground. Sometimes the generator interference condenser will be more effective when connected to the generator output termina of the voltage regulator than on the generator.

REMEDIES FOR UNUSUAL NOISE:

If ignition noise exists after ordinary precaution are taken, the following procedure is suggested

1. See that the antenna lead-in shield is wel grounded to the car body direct and that n portion of the antenna lead-in is unshielde
2. An additional capacitor may be tried fron various hot wires under panel to ground.
3. Solder a bond from hood to bulkhead near th antenna.
4. If noise persists, reduce the distance of th distributor rotor from the stationary termin als by extending the distributor rotor approx imately ten thousandths by peaning.

OPERATION

ON-OFF SWITCH AND VOLUME CONTROL

The left hand knob is turned all the way to the lef to switch off the receiver and eliminate all drai from the car battery.

The receiver is turned on by rotating this kno toward the right until the dial becomes illuminated The desired volume is obtained by further rotatio of this knob after a station has been properly tune in with the Station Selector Knob.

The Automatic Volume Control circuit, built int the receiver, will tend to maintain the volume con stant once it has been adjusted by means of th Volume Control knob. However, due to the ver large differences in receiving conditions encountere when driving a car, the volume may change beyon the limits for which compensation is possible.

As the sensitivity of the receiver automaticall changes to compensate for variations in statio strength, the noise background also may vary When the station is strong, there will be no nois background. As the station becomes weaker, th noise background will increase. Reception als will be noisy when driving in "electrically noisy" districts. This will be particularly true when driv ing near trolley lines, high tension power lines, etc

THE TONE CONTROL:

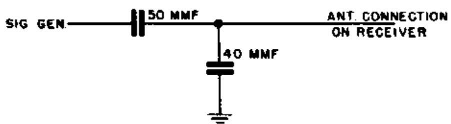
Moving the switch located on the right hand sid of the receiver, toward the rear of the receiver wil increase the bass response and make the tone mel low. This position is desirable for some types o music and also may be used to minimize static an electrical noises. When this switch is moved to ward the front of the receiver, the treble is mor predominate and the program more brilliant.

THE FIRESTONE TIRE & RUBBER CO.

TRACKING IRON CORES IN MANUAL PERMEABILITY TUNER

To check or realign the iron cores in the permeability tuner the following procedure may be used:

The values shown in the antenna dummy in this paragraph must be used, otherwise, the antenna coil will not track with the RF and Oscillator coils.



Set tuner to high frequency end of dial (clockwise) and generator at 1600 Kc and adjust Osc., RF and Ant. trimmers for maximum output. Set tuner to low frequency end of dial (counter-clockwise) and generator at 540 Kc and adjust 600 Kc tracking adjustment for maximum output.

Recheck high frequency end after each adjustment of the low frequency end.

Set generator to 1400 Kc and tune manual to maximum output of 1400 Kc signal. Adjust iron cores of only the RF and Ant. coils by turning iron cores in mounting to maximum output. Tuner should be tracked now and low frequency output may be further increased by rocking tuner with generator set at 600 Kc.

Iron cores should be cemented after the above adjustment to eliminate possibility of vibration changing adjustments.

STAGE GAINS MEASUREMENTS

Stage gains measurements shown on schematic are approximate practical measurements and can be duplicated with a signal generator, audio oscillator and output meter. These measurements are given to aid the servicemen in approximating the relative condition of stages in the receiver for completely checking a repair or for analyzing the location of trouble.

Connect output meter to voice coil terminals of speaker (Note: A resistor of 4 ohms connected in place of speaker voice coil will give better results). Connect audio generator 400 cycles to grid of the 6V6 tube and increase output of generator until output meter registers 4 volts (standard output of 1 watt across 4 ohm load). Output voltage divided by input voltage equals stage gain.

Substitute generator output to diode of 6SQ7 tube and reduce output of generator to show standard output of 4 volts. The input voltage of the following stage divided by the input voltage of stage being measured equals the stage gain for this tube.

Set signal generator to 455 Kc with modulation and make IF measurements in same manner as audio measurements were made.

Set signal generator to 1000 Kc with modulation and tune receiver on manual position to maximum output and proceed with measurements of 6SA7, 6SK7 and Antenna in similar manner as outlined in above paragraphs.

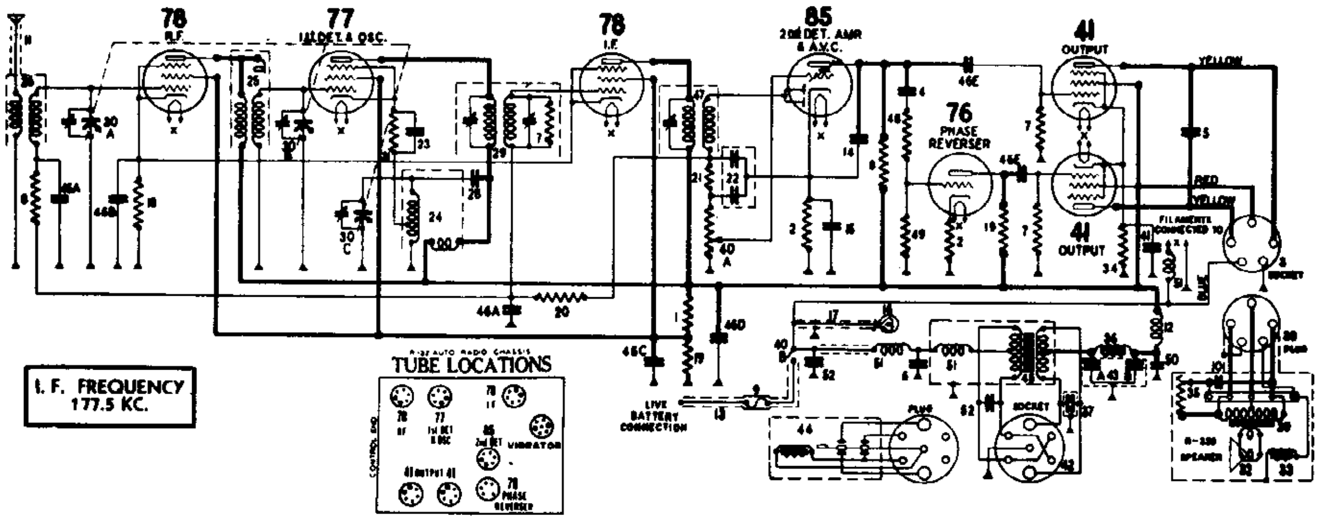
Parts

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1.	77212	10 M Ohm	34.	38838	Shunt Tracking Coil
2.	78146	Sensitivity Control	35.	26235	Trimmer Assembly
3.	77218	1 Megohm	36.	26236	Antenna Trimmer
4.	77266	22 M Ohm	37.	38889	1st I.F. Assembly
5.	77213	47 M Ohm	38.	38890	2nd I.F. Assembly
6.	78042	.5 Meg. Vol. Control	39.	94229	Output Transformer
7.	77274	10 Megohms	40.	81154	Speaker
8.	77216	220 M Ohm	41.	94078	Power Transformer
9.	77217	470 M Ohm	42.	76001	Vibrator
10.	77260	330 Ohm	43.	38277	Vibrator Choke
11.	77123	1000 Ohm 1 watt	44.	38278	"A" Choke
12.	77258	100 Ohm	45.	48012	Fuse, 15 Amp.
13.	77267	33 M Ohm	46.	25124	420 MMF. Silver Mica Cond.
14.	77069	22 M Ohm, 1 watt	47.	77214	100 M Ohm
15.	25102	.05—200 V. Capacitor	48.	38733	Wave Trap
16.	25102	.05—200 V.	49.	90071	Tone Control Switch
17.	25188	100 MMF Mica		11160	Ammeter Lead Assy
18.	25104	.005—400 V.		11159	"A" Lead Assembly
20.	25108	.01—400 V.		25120	Condenser, Ammeter
21.	25119	.002—200 V.		15057	Flex. Control Shaft, Tuning or Vol. Cont.
22.	25366	.5—400 V.			
23.	25099	Electrolytic Capacitor		15100	Extra long (36") Flex. Control Shaft, Tuning or Vol. Cont.
24.	25110	.006—1200 V.		11172	Pilot Light & Cable Assembly
25.	25109	.007—1600 V.		13428	Slide Rule Dial Assembly
26.	25118	.5—100 V.		31427	Dial Glass, Horizontal
27.	25100	Spark Plate		31428	Dial Glass, Vertical
28.	25121	20 MMF Mica		13538	Tuning Control Worm Reduction
29.	25112	.01—200 V.		13537	Vol. Control Shaft Bushing
30.	25189	500 MMF Mica		41131	Kit of 2 Knobs (Neutral Shade)
31.	561367	Antenna Cable Recep.		55376	Flexible Dial Shaft
32.	38279	Ant. Spark Choke		77124	Distributor Suppressor
33.	38281	Permeability Tuner		25107	Interference Condenser

Unless otherwise specified, all resistors are ½ watt.

IMPORTANT: For replacement use only proper type Firestone Air Chief Tubes. DO NOT ATTEMPT TO ADJUST VIBRATOR. Replace with Part No. 76001.

THE FIRESTONE TIRE & RUBBER CO.



I. F. FREQUENCY
177.5 KC.

Diag. No.	Part No.	DESCRIPTION	List Price
1	66023	60,000 ohm 1 watt carbon resistor	$0.25
2	67303	2,000 ohm ¼ watt carbon resistor	.25
3	81951	Speaker socket	.10
4	83007	.02 mfd. 600 volt paper condenser	.35
5	83011	.004 mfd. 600 volt paper condenser	.30
6	83063	.5 mfd. 100 volt paper condenser	.45
7	83072	510,000 ohm ¼ watt carbon resistor	.15
8	83082	260,000 ohm ¼ watt carbon resistor	.20
9	83207	15 ampere fuse	.05
10	83219	.01 mfd. 600 volt paper condenser	.30
11	83723	Antenna lead	.75
12	83770	"B" supply R. F. choke	.40
23	84282	.001 mfd. mica condenser	$0.25
24	84814	Oscillator coil	1.50
25	84822	R. F. coil	1.50
26	84825	Antenna coil	1.40
28	84833	.00007 mfd. mica condenser	.20
29	84838	1st I. F. transformer	2.75
30A, 30B, 30C	84866	Three gang variable condenser with mounting plate, shaft cplg.	6.00
31	85051	8000 ohm ¼ watt carbon resistor	.20
32	85058	Diaphragm and shell assembly	3.50
33	85098	Field coil and bracket assembly	3.25
34	85114	500 ohm 2 watt resistor	.25
35	85179	80,000 ohm tone control	.90
36	85183	Filter choke	1.50
37	85190	.005 mfd. 1200 volt paper condenser	.85
38	85193	Speaker plug and cable assembly	1.25
39	85195	Output transformer	3.25
40A, 40B	85215	250,000 ohm volume control; On-off switch	1.20
41	85216	10 mfd. 50 volt dry electrolytic condenser	.80
42	85217	Vibrator Socket	.15
43	85237	Dual 8 mfd. electrolytic condenser	3.00
44	85243	Vibrator	6.50
45	85256	Power transformer	5.00
46A	85259	.05 mfd. 300 volt cond. (green-white lead)	~~2.75~~
46B	85259	.5 mfd. 100 volt cond. (orange lead)	
46C	85259	.25 mfd. 300 volt cond. (white lead)	
46D	85259	.1 mfd. 400 volt cond. (red lead)	
46E	85259	.02 mfd. 600 volt cond. (yellow and green leads)	
47	85262	2nd I. F. transformer	2.50
48	85265	600,000 ohm ¼ watt carbon resistor	.20
49	85266	70,000 ohm ¼ watt carbon resistor	.20
50	85267	.01 mfd. mica condenser	.50
51	85391	R. F. choke assembly	.30
52	85394	.0005 mfd. mica condenser	.25

Diag. No.	Part No.	DESCRIPTION	List Price
13	83777	Shielded battery lead and fuse housing	$0.50
14	83784	.0011 mfd. mica condenser	.22
15	83803	12 mfd. 25 volt dry electrolytic condenser	.80
16	84058	Pilot lamp	.15
17	84099	Pilot light cable	.35
18	84131	400 ohm ½ watt resistor	.20
19	84198	110,000 ohm ¼ watt resistor	.20
20	84235	1.1 meg. ¼ watt carbon resistor	.20
21	84238	11,000 ohm ¼ watt carbon resistor	.20
22	84281	Dual .00026 mfd. mica condenser	.35

Part No.	DESCRIPTION	List Price
17166	Mounting Nut	$0.05
83144	15,000 Ohm Spark Plug Suppressor	.35
83145	10,000 Ohm Distributor Suppressor	.35
83242	Back Cover Self-Tapping Screws	.02
83319	Fuse Insulator Tube	.02
83737	Special Knurled Nuts	.06
84981	Tube Shield Section	.08
84982	Tube Shield Section (slotted)	.08
84983	Tube Shield Spring Ring	.02
84990	Mounting Plate	.80
85012	Mounting Bolt	.06
85022	Receiver Back Cover	1.00
85026	Dash Support Washer	.05
85191	Grill Cloth	.20
85219	Vibrator Shield	.15
85232	Speaker Back Cover and Mounting Bolt	1.25
85239	Receiver Front Cover	1.00
85240	Case Assembly (less covers)	4.00
85249	Tone Control Knob	.15
84871	Tuning Shaft, 24 inches long	$1.50
84873	Volume Control Shaft, 24 inches long	1.50
84882	Tuning Shaft, 36 inches long	2.00
84883	Volume Control Shaft, 36 inches long	2.00
84886	Tuning Shaft, 30 inches long	2.00
84887	Volume Control Shaft, 30 inches long	2.00
85381	Tuning Shaft, 18 inches long	2.00
85382	Volume Control Shaft, 18 inches long	2.00
84060	Flexible Shaft Set Screw	.02
84067	Steering Post Mtg. Bracket	.25
84075	Bezel and Glass Assembly	1.50
84076	Dial Light Button and Socket	.25
84106	Volume Control Knob	.25
85233	Dial Face	.25
85246	Complete Accessories for Installation	5.25
85248	Remote Control Head (less shafts)	6.00

CALIBRATION AND ALIGNMENT

A good modulated oscillator and a sensitive output meter are necessary for proper calibration and alignment of the R.F. and I.F. stages of this receiver. The output of the oscillator must be adjustable to give a very weak signal which will not actuate the A.V.C. of the receiver. The output meter must be sensitive enough to give sufficient reading with such a weak signal.

The output meter should be connected across the 41 plates through a .25 mfd. condenser or across the voice coil, depending upon its sensitivity. A convenient point to connect to the 41 plates is at the two terminals of the speaker socket to which the yellow leads are attached. Be sure the speaker plug is inserted in its socket.

I. F. ALIGNMENT

The I.F. trimmers are located on the top of the I.F. transformers which may be reached by removing the front cover. The modulated test oscillator should be set to exactly 177.5 K.C. and connected from the 77 control grid to ground. Adjust the oscillator output to give about half-scale reading of the output meter. Tune in the set to make certain that no station or signal is tuned in since this would affect the output meter reading. Adjust all three I.F. trimmers to give maximum output reading.

In adjusting the I.F. transformer trimmers, it is desirable to use a bakelite screw driver or one having only a small metal tip. After the I.F. trimmers have been aligned once, go back and repeat the procedure, since any adjustment of one will affect the others to some extent.

DIAL CALIBRATION

The dial of the Auto Radio is calibrated in kilocycles except that the last two zeros have been omitted. Inasmuch as changes in the position of the flexible shafts may cause the calibration to vary, the set should be calibrated when the arrangement of the shafts has been completed. Calibration is accomplished as follows:

Tune in a station of known frequency between 800 and 1100 KC. Insert a screw driver in the slotted end of the dial shaft projecting through the back of the control head. Hold the tuning control knob so that the station remains tuned in properly and by turning the screw driver adjust the dial pointer so that it indicates the exact station frequency.

If the set is badly out of calibration such that it calibrates correctly at one part of the dial but not at another, it is necessary to adjust the oscillator shunt trimmer as explained below.

The gang condenser trimmers can be reached by removing the back cover. Connect a .00025 mfd. mica condenser in series with the output of the test oscillator and the aerial lead of the receiver. This condenser is absolutely necessary to secure proper alignment of the antenna stage.

Set the test oscillator to exactly 600 KC. Tune the radio set to maximum volume. Calibrate the dial at the low frequency end by setting the pointer to exactly 6.0 (600 KC.). Set the test oscillator to exactly 1400 KC. Turn the tuning knob until the dial pointer indicates 14.0 (1400 KC.) and then adjust the oscillator shunt trimmer (third one from shaft end of the variable condenser) until the signal produces maximum output. Then adjust the other two gang condenser trimmers as directed under R.F. alignment.

R. F. ALIGNMENT

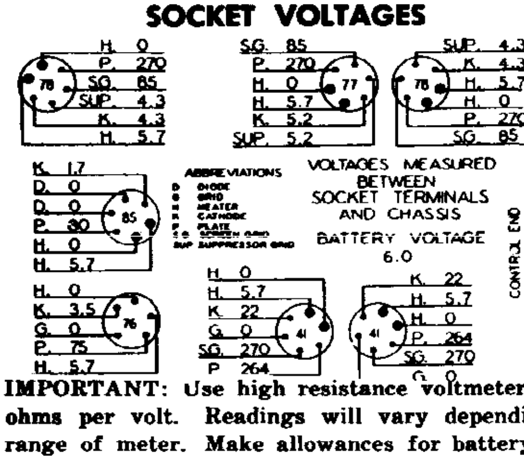
With the test oscillator set to approximately 1400 KC., tune the set very carefully for maximum output.

Adjust the output of the test oscillator to the minimum value which will give sufficient output meter deflection. Adjust the two trimmers nearest to the shaft end of the gang condenser to give maximum output meter reading.

NOTE: The vibrator may be inserted in the socket in either of two positions. The correct position is dependent upon which car battery terminal is grounded. If the negative (—) terminal is grounded the vibrator should be inserted so that the arrow points away from the adjacent transformer cover. If the positive (+) battery terminal is grounded the vibrator should be inserted so that the arrow points toward the adjacent transformer cover.

Failure to follow these instructions may result in damage to the vibrator or the filter circuit.

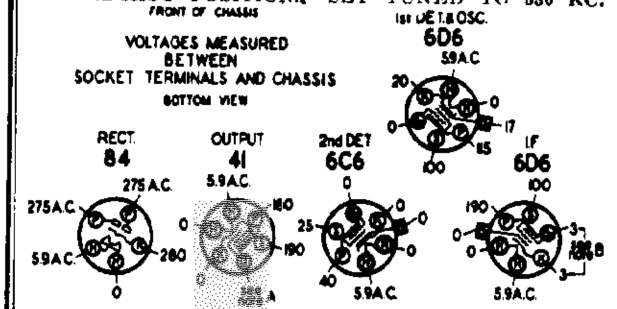
SOCKET VOLTAGES



IMPORTANT: Use high resistance voltmeter of 1000 ohms per volt. Readings will vary depending upon range of meter. Make allowances for battery voltage variations.

THE FIRESTONE TIRE & RUBBER CO.

LINE VOLTAGE 115 VOLTS. VOLUME CONTROL ON FULL. ANTENNA GROUNDED RANGE SWITCH SET ON BROADCAST POSITION. SET TUNED TO 530 KC.



IMPORTANT: Use a high resistance voltmeter of 1000 ohms per volt. Readings will vary depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltage.

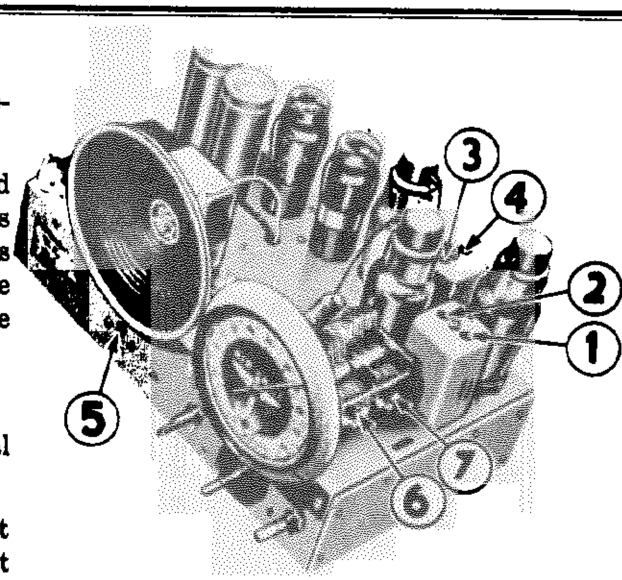
NOTE A: The bias on the 6F6 output is — 14 volts measured across the flexible wire wound resistor No. 15 in the circuit diagram.

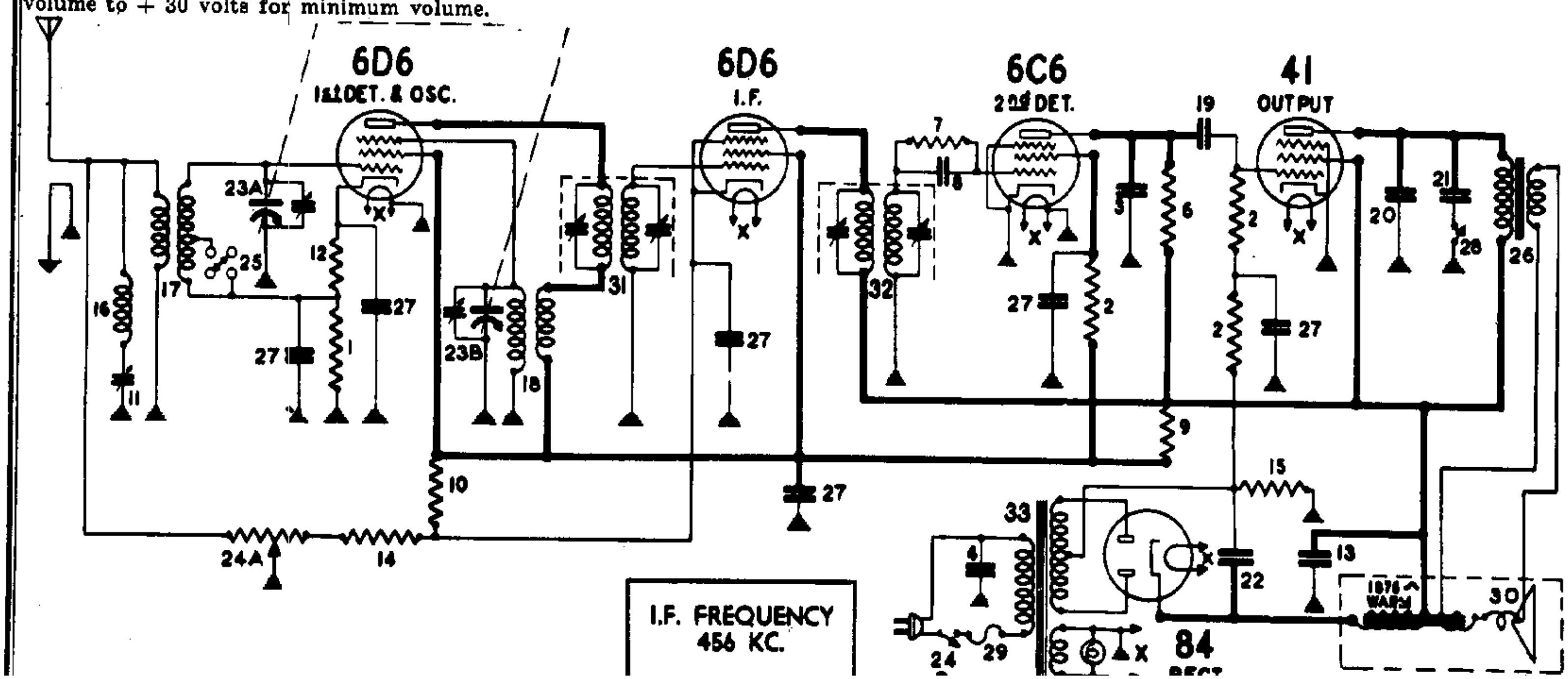
NOTE B: The cathode voltage varies with the setting of the volume control, from + 3 volts for maximum volume to + 30 volts for minimum volume.

DIAL CALIBRATION

If the receiver should require calibration, proceed as follows:

1. Turn the gang condenser to full mesh and check to see that the dial pointer indicates 530 KC. If it does not, remove the dial glass and turn the pointer to 530 KC. when the gang condenser is in full mesh. Replace the dial glass.
2. Adjust the test oscillator to 1400 KC.
3. Turn the condenser gang until the dial pointer indicates 1400 KC.
4. Adjust trimmer No. 6 (oscillator shunt trimmer) for maximum output without changing the setting of the gang condenser.





Part Number	Description	List Price
13923	Spring washer (for drive disc)	$0.05
67590	Flat washer for chassis mounting	.01
81090	Escutcheon mounting screw No. 1 x ¼ oval head W.S...per C	.60
83552	Chassis mounting screw, No. 10 x ⅞	.03
88056	Fuse mounting	.15
88057	Fuse cover	.08
88106	Dial gasket	.01
88108	Dial escutcheon	.50
88162	Tube shield	.08
88164	Tube shield cap	$0.06
89361	Dial frame and bracket assembly	.25
89363	Pilot lamp socket and bracket	.16
89365	Driven disc and bearing assembly	.36
89374	Dial pointer	.03
89378	Drive disc and shaft assembly	.30
89386	Dial glass	.15
89387	Knob (vol. control and range switch)	.18
89388	Knob (tuning control)	.18
89399	Dial scale	.45

Diag. No.	Part No.	Description	List Price
1	71657	3000 Ohm ¼ watt Carbon Resistor	$0.25
2	83082	260,000 Ohm ¼ watt Carbon Resistor	.12
3	83539	260 mmfd. Mica Condenser	.20
4	83976	.012 mfd. 1000 volt Paper Condenser	.40
5	83278	Dial lamp 6-8 volts	.15
6	84198	110,000 ohm ¼ watt Carbon Resistor	.12
7	84235	1.1 megohm ¼ watt Carbon Resistor	.12
8	85061	51 mmfd. Mica Condenser	.15
9	85064	10,000 ohm 1 watt Carbon Resistor	.20
10	85266	70,000 ohm ¼ watt Carbon Resistor	.20
11	85285	456 KC. Wave Trap Trimmer	.40
12	85691	500 ohm ½ watt Wire Wound Resistor	.20
13	88007	8 mfd. 250 volt Electrolytic Condenser	1.00
14	88009	200 ohm ½ watt Wire Wound Resistor	.12
15	88010	320 ohm 1½ watt Wire Wound Resistor	.15
16	88014	456 KC. Wave Trap Coil	.50
17	88018	Antenna Coil	1.00
18	88019	Oscillator Coil	.70
19	88026	.02 mfd. 400 volt Paper Cond.	.25
20	89826	.004 mfd. 750 v. Paper Cond.	.24
21	88030	.01 mfd. 400 volt Paper Cond.	.25
22	88033	8 mfd. 350 volt Electrolytic Condenser	1.00
23A&B	89359	2 Gang Variable Condenser	4.00
24 A, B	88036	Vol. Control, 22,000 ohm; Line Switch	1.25
25	88037	Range Switch	.60
26	88040	Output Transformer	1.50
27	88046	.1 mfd. 150 volt Paper Cond.	.25
28	88054	Tone Control Switch	.30
29	IMPORTANT	¾ Amp. Fuse (Use This Size Only)	
30	88100	Diaphragm and voice coil	1.50
31	88389	1st I. F. Transformer	2.00
32	88390	2nd I. F. Transformer	2.00
33	88393	Power Transformer, 115 V-60 cycle (used on 165AS)	4.20
23A&B	89359	2 Gang Variable Condenser	4.00
33	89756	Power Transformer, 105 to 250 V.— 50 to 133 cycles (used on 16SWS)	7.00
20	89826	.004 mfd. 750 v. Paper Cond.	.24
	R-246-A	Speaker — 5 inch	4.50

ALIGNING PROCEDURE

The step by step routine given below should be carefully followed. The trimmer numbers referred to are shown in the illustration.

1. Connect the output meter in series with a .25 mfd. condenser between the plate of the 41 tube and ground, or across the voice coil, depending on the type of meter.
2. Turn the volume control to the maximum volume position. (Note: the volume control should be kept in this position throughout the entire alignment procedure.) Ground the antenna lead to the chassis.
3. Turn the range switch to the right (clockwise) to the broadcast position.
4. Adjust the test oscillator to exactly 456 KC. and connect its output in series with a .1 mfd. condenser to the control grid of the 6D6 first detector tube and the chassis.
5. Align I. F. trimmers No. 1, 2, 3 and 4 for maximum output as indicated on the output meter. No inward or sideward pressure should be applied to the alignment tool, or the condenser may spring back to a different setting as soon as the tool is removed.
6. Repeat all I. F. trimmer adjustments since the changing of each trimmer will affect the others to a certain extent.

456 KC. WAVE TRAP ADJUSTMENT

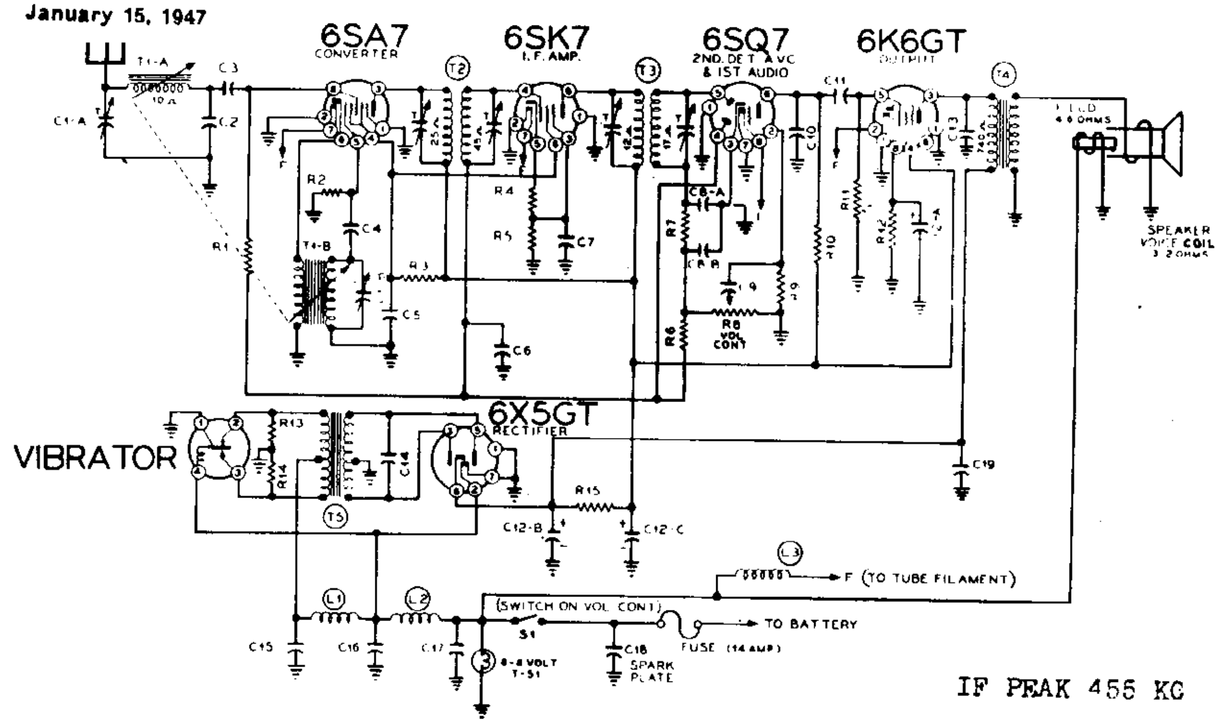
1. Disconnect the antenna lead from ground.
2. Connect the test oscillator output in series with a .00025 mfd. condenser to the antenna lead, and connect the test oscillator ground lead to the receiver chassis. Ground the chassis.
3. Without changing the test oscillator from the frequency setting used in aligning the I. F. stage, adjust trimmer No. 5 for **MINIMUM** ouput. Increase the test oscillator output as a minimum is reached, in order to obtain a clearly defined setting of the trimmer. **NOTE:** If code interference transmitted on a frequency in the neighborhood of 456 KC. is troublesome, the wave trap should be adjusted for **MINIMUM** output with the test oscillator set to the same frequency as the signal that is causing interference.

R. F. ALIGNMENT

1. Set the test oscillator to 1400 KC. and apply the signal to the receiver antenna lead through a .00025 mfd. condenser.
2. Tune the receiver to the signal for maximum output.
3. Adjust trimmer No. 7 (detector shunt trimmer) for maximum output.

GAMBLE-SKOGMO, INC.

January 15, 1947



IF PEAK 455 KC

ON SOME SETS R-5 AND C-7 IS ELIMINATED AND THE CATHRODE OF THE 6SK7 IS GROUNDED

2206

Part No.	Schematic Diagram Reference	Description	No. Used in Set
		CONDENSERS	
100-26	C9	.02 x 400 Volt Tubular	1
100-87	C13	.01 x 600 Volt Tubular	1
100-13	C6	.05 x 400 Volt Tubular	1
100-20	C7	.1 x 200 Volt Tubular	1
100-9	C5	.05 x 260 Volt Tubular	1
100-125	C14	.0035 x 1600 Volt Tubular	1
100-25	C11	.002 x 600 Volt Tubular	1
100-31	C15, C16, C17	.5 x 120 Volt Oval Type	3
100-81		.5 Mfd. Generator Cond.	1
100-82		.5 Mfd. Ammeter Cond.	1
119-105	C12 A-B-C	Electrolytic Filter Condenser—20 Mfd. x 25 Volt; 15 Mfd. x 350 Volt; 15 Mfd. x 350 Volt	1
124-187	C1-A-B	Ant. and Osc. Dual Trimmer	1
129-161	C8A-B	.0001 Dual Mica—10%	1
129-2	C3, C10	.0005 Mica Type—20%	2
129-188	C2	.00008 Mica Type—3%	1
129-21	C4	.0002 Mica Type—20%	1
129-12	C19	.00025 Mica Type—20%	1
11749B	C18	Spark Plate	1
		RESISTORS	
C-9B1-35	R9	4.7 Megohm, ½ Watt—20%	1
C-9B1-27	R10	220K Ohm, ½ Watt—20%	1
C-9B1-29	R11	470K Ohm, ½ Watt—20%	1
C-9B1-60	R12	680 Ohm, ½ Watt—10%	1
C-9B1-34	R6	3.3 Megohm, ¼ Watt—20%	1
C-9B1-23	R7	47K Ohm, ½ Watt—20%	1
C-9B1-31	R1	1 Megohm, ½ Watt—20%	1
C-9B1-22	R2	33K Ohm, ½ Watt—20%	1
C-9B2-76	R3	15K Ohm, 1 Watt—10%	1
C-9B2-64	R15	1500 Ohm, 1 Watt—10%	1
C-9B1-50	R13, R14	100 Ohm, ½ Watt—10%	2
C-9B1-52	R4	150 Ohm, ½ Watt—10%	1
C-9B1-56	R5	330 Ohm, ½ Watt—10%	1
		COILS	
108139B	T2	Input I.F. Coil	1
108211	T3	Output I.F. Coil	1
C-211-10961 T1-A; T1-B		Permeability Tuning Unit Complete with Ant. and Osc. Coils	1
10566	L3	"A" Choke No. 16 Wire	1
10568	L1-L2	"A" Choke No. 18 Wire	2
		TRANSFORMERS	
104295	T5	Power Transformer	1
B-12C-10235	T4	Output Transformer for Speaker	1

Part No.	Schematic Diagram Reference	Description	No. Used in Set
		SPEAKER	
B-18B10236		Five Inch Electrodynamic Speaker Less Output Transformer	
		VIBRATOR UNIT	
12629		Plug-in Vibrator Unit	
		DIAL AND TUNER PARTS	
A-6D-10740		Dial Scale	
D-4B-10750		Escutcheon	
1121029		Set of Station Call Letters	
128773-45		Knob—For Tuning and Volume	
115860		Shaft for Volume Control	
128766-45		Pushbuttons	
1121027		Pointer	
A-53A-10989		String for Pointer	
120442		Tension Spring for Pointer String	
1121026		Diffuser for Dial	
A-2M-7758		Snap-in Rivet to Fasten Diffuser	
107400		Socket Assembly for Pilot Lite	
10797		6-8 Volt Lite. Type T-51	
115807		Pushrod—For Pushbuttons	
115799		"U" Cam—With Set Screw	
120-184		Return Spring—For Pushrods	
117924		Tuning Shaft	
117311		Pinion Gear—Drives Crown Gear	
13623		Drum Assembly Complete with 115800 Crown Gear	
120441		Tension Spring for Slug String	
		MISCELLANEOUS	
107360B		Antenna Cable	
107244		Ammeter Cable	
131225		Fuse—14 Amp.—Type SFE	
115713		Mounting Strap Bracket	
115808		Case Mouning Bracket—Left	
115809		Case Mounting Bracket—Right	
115810		Case Mounting Bracket—Short Left	
117929		Mounting Spacer	
132293		No. 10-32 x ¾ Fancy Head Screw	
131145		Flat Steel Washer—For Above Screw	
131403		Extruded Washer for Chevrolet 1941-42-46	
131397		Extruded Washer for Dodge—DeSoto—Plymouth—Chrysler 1940-41-42-46	
13625		Complete Kit of Mounting Hardware Including Brackets, Condensers, Screw etc.	
131-50		Buzz, Clips—for case	

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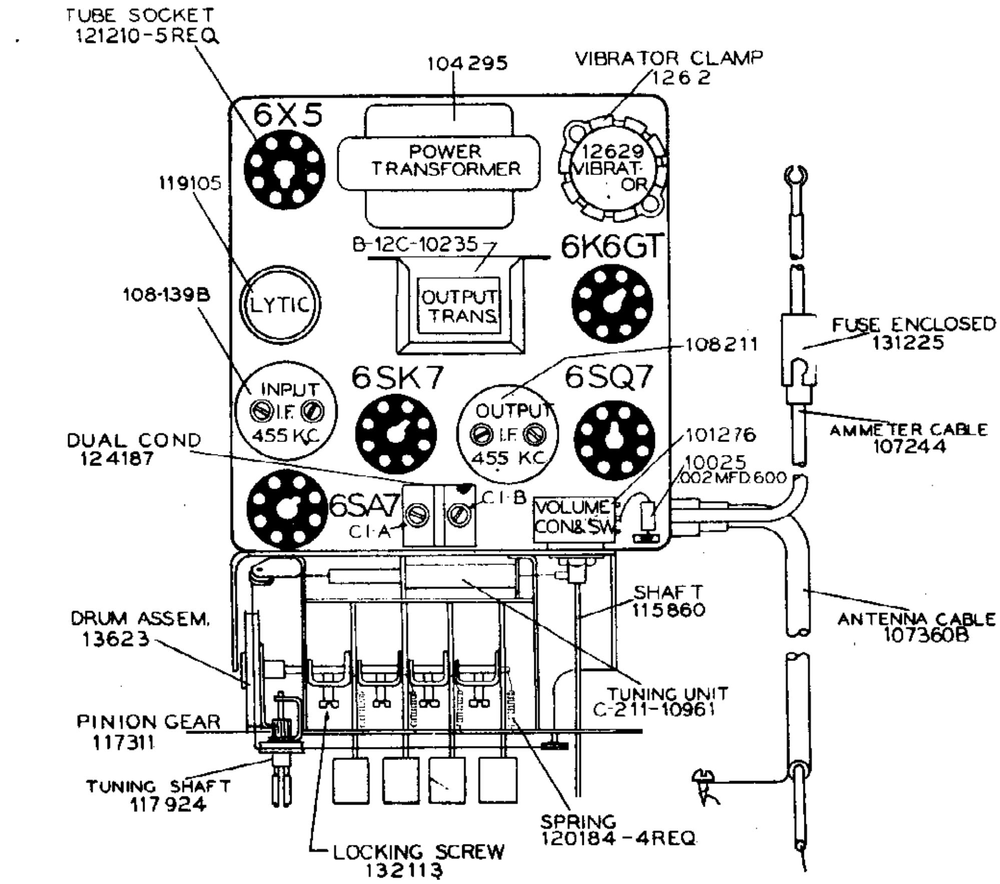


ALIGNMENT PROCEDURE

(Refer to Chassis View)

Output meter across 3.2-ohm output load.
Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

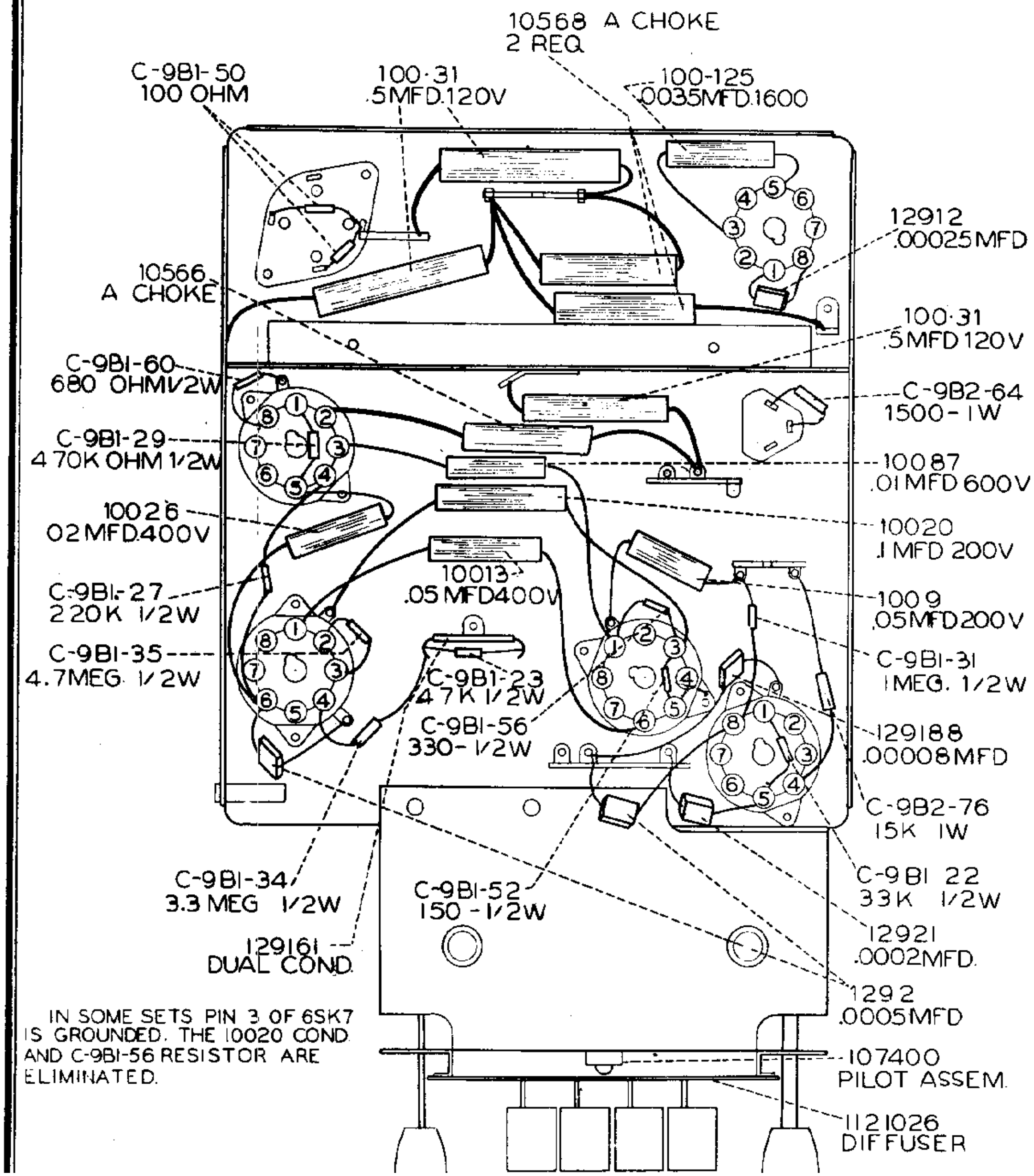
- **Volume control at maximum for all adjustments.**
- **Connect ground post of signal generator to radio chassis.**

BAND	*SIGNAL GENERATOR* Frequency	Dummy Antenna	Connection to Radio	Ground Connection	*ADJUSTMENT* Adjust for Max. Output
I.F.	455 kc	.1 mfd.	Pin #4 Grid 6SK7 Tube	Chassis	Adjust Trimmers of T3 output I.F.
I.F.	455 kc	.1 mfd.	Pin #8 Grid 6SA7 Tube	Chassis	Adjust Trimmers of T2 input I.F.
Broadcast Band	1600 kc	30 mmfd.	Antenna Lead	Chassis	Adjust Trimmers C1-B Oscillator and C1-A Antenna.
Broadcast Band	1400 kc	30 mmfd.	Antenna Lead	Chassis	*Slide Antenna Coil lengthwise for max. output by means of a screw driver.
Broadcast Band	1600 kc	30 mmfd.	Antenna Lead	Chassis	**Adjust Antenna Trimmer C1-A to maximum output.

*This adjustment will seldom be necessary in service work as the Antenna Coil is adjusted and sealed in place at the factory. The necessity of this adjustment can be checked quickly by tuning set to a 1400 kc. signal and adjusting C1-A. If a large increase in output is noted the Antenna Coil should be adjusted.

**If Antenna Coil is adjusted, C1-A should be readjusted at 1600 kc. These two adjustments (Antenna Trimmer C1-A and Antenna Coil) should be repeated until no further improvement is noted.

NOTE: At 1600 kc., the Oscillator Core should extend 31/32 inch from the edge of the Coil Form.



IN SOME SETS PIN 3 OF 6SK7 IS GROUNDED. THE 10020 COND AND C-9B1-56 RESISTOR ARE ELIMINATED.

ELIMINATING MOTOR NOISE

GENERATOR CONDENSER

A Generator Condenser must be connected in all cases from the battery terminal of the generator to the Generator frame.

This condenser must not be connected across the field winding terminal on late cars which use Automatic Cutouts.

It is advisable that you find out from your local car dealers where the manufacturer recommends the condenser be connected for each make of car.

DISTRIBUTOR SUPPRESSOR

A Distributor Suppressor is required in practically all cases, except Ford V8's where none is used. The high tension lead must be removed from the distributor head and the suppressor inserted in its place. The high tension lead is then plugged into the suppressor.

AMMETER CONDENSER

A .5 Mfd. by pass condenser should be connected from one ammeter terminal to a good ground on the instrument panel. Usually this condenser plus the generator condenser and distributor suppressor will remove all objectionable ignition noise.

ELECTRICAL ACCESSORIES

If the above procedure has not reduced the noise sufficiently, it will be necessary to continue by passing sources of noise.

Accessories such as lighters, electric motor heaters, horns, light switches, automatic relays, electrical gauges such as oil, water and gas are often a source of interference. In these cases the procedure is to try a condenser from ground to various accessories until the interference is eliminated, then install the condensers in those places permanently. Spark intensifiers should not be used.

HIGH AND LOW TENSION LEADS

In many cars the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. **It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.**

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead

MOUNTING LOCATIONS

The chart below shows the mounting positions for cars back to 1939. Most cars previous to 1939 will require under-dash mounting.

To use the chart, note the position letters for the required car, then refer to the small drawing for the location of the letter or letters. The word dash indicates that the radio will fit the dash, similar to a custom installation. The following pages show the method of dash installation on cars requiring no dash panel kits.

The 1941, 1942 and 1946 Ford; the 1941, 1942 and 1946 Pontiac; and the 1942 and 1946 Mercury will take a dash installation, but require panel kits for mounting and trim. Instructions for mounting the radio and panel kit are included with each panel kit, however, refer to this manual for connections and motor noise suppression.

Make of Car	1946	1942	1941	1940	1939
Buick	C	C	C	C - D	C
Cadillac			B - C		
Chevrolet	Dash - C	Dash - C	Dash - C	C - E	D - E
Chrysler	Dash	Dash	Dash	Dash	C
De Soto	Dash	Dash	Dash	Dash—B - D	C
Dodge	Dash A	Dash - A	Dash - B	Dash—B - D - E	C
Ford	*Dash	*Dash	*Dash - C	B - D	B
Hudson	D - E	C - D - E	C - D - E	C - E	B - C - D
Lincoln	B - C - D	B - C - D	None		
Mercury	*Dash	*Dash	*Dash	A - B - D	B
Nash	C	C	C	A - C	E
Oldsmobile	C - D - E	A - C - E	A - D - E -	***C - with Add. Brkt.	C
Packard	C - D	C - D	C - D	D - E	D - E
Plymouth	Dash	Dash	Dash	Dash—B - D	C
Pontiac	*Dash - D - E	*Dash - D - E	*Dash—D - E	C - D - E	C - D - E
Studebaker	C	C	C	C	C
Americar		**Dash - B - D - E	**Dash		

*Use special dash mounting plate.

**Cut dial opening as per dimensions shown on Willy's Americar drawing on page 4.

***Oldsmobile 1940. The radio can be mounted under the dash below the plastic portion, however, it must be supported by a metal strap. Another rear mounting strap, Part No. 115713 will be suitable. Bolt the radio to the metal strap and bolt the strap to the metal dash panel lip.

ELECTRICAL SPECIFICATIONS

Speaker....................5-inch; electro dynamic voice coil impedance 3.2 ohms.

Power Output....................1 watt undistorted; 1.6 watts maximum.

Sensitivity....................20 microvolts average for 500-milliwatt output.

Selectivity....................50 kc broad at 1000 times signal at 1000 kc.

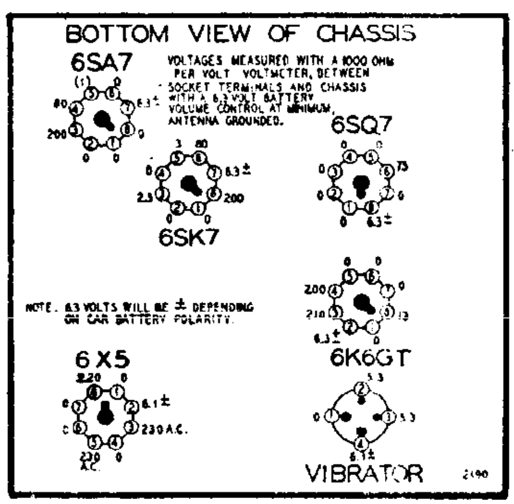
Power Supply....................6 volts D.C.

Frequency Range....................530 to 1600 kc.

Intermediate Freq....................455 kc.

Tuning....................Two permeability-tuned circuits.

Antenna System....................Adjustable to accommodate various car antennae capacities.



VOLTAGE CHART

GAMBLE-SKOGMO, INC.

IMPORTANT (ALL INSTALLATIONS)

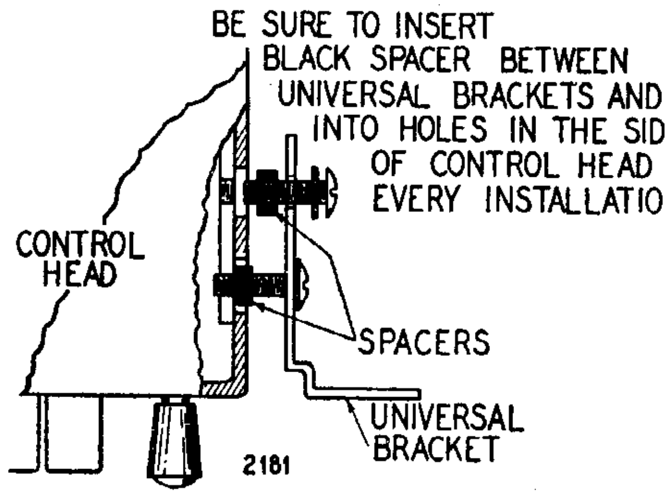
Two universal mounting brackets are supplied with the kit of hardware and are mounted in various positions on the chassis for installation in or under the dash of different cars.

In all installations it is very important that the black metal spacers be used between the front mounting brackets and the side of the chassis. The spacers must fit into the holes in the side of the chassis. They are packed in the kit of hardware.

Be sure to draw the rear mounting strap up tight so that it holds the chassis rigid.

In some installations it may be necessary to adjust the antenna trimmer before bolting the chassis to the dash.

Two pairs of extruded washers are supplied for use when bolting the chassis to the dash. Be sure the washers seat properly in the dash mounting holes and use the pair which fits the holes snugly.

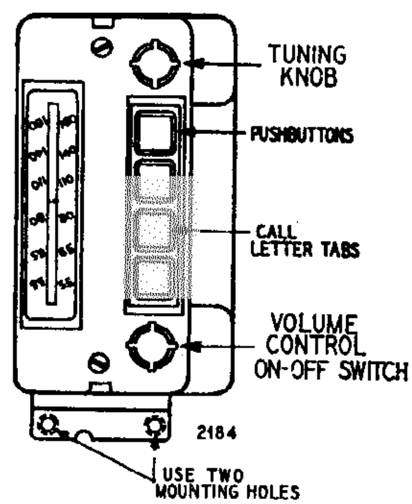


Dash Panel Mounting

1940, 1941, 1942 and 1946 Models of Chrysler, De Soto, Dodge, Plymouth

Mount the chassis as shown with the dial vertical. A special bracket marked "short" is supplied with the kit of hardware. Mount this bracket to the chassis, using the solid black holes shown in the left hand drawing. Note that the chassis should be mounted with the tuning knob at the top. It may be necessary in some installations to reverse the bolt in the cowl lever to prevent it from hitting the speaker grill. On Plymouth cars remove Pal nut behind dash at top of dial opening so the dial will come up flush.

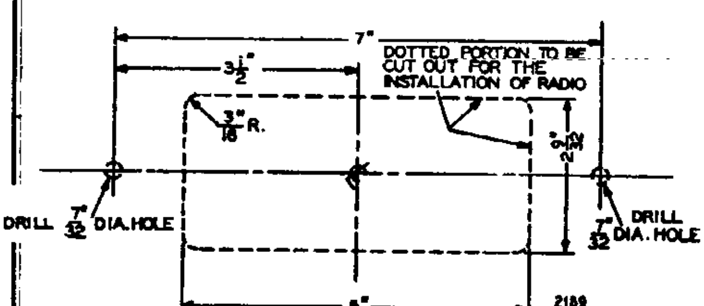
The call letters must be carefully trimmed to fit the push-buttons horizontally. Be sure to use the black spacers pictured above when mounting the front (short) bracket.



DIAL VIEW WHEN MOUNTED

1941 and 1942 Americar Models (Willys)

Remove the panel from the left side of the dash and cut an opening, using the dimensions below. Mount the chassis the same as in the Chevrolet installation.



FINAL CONNECTIONS

The antenna cable should be connected and the shie grounded to the car body.

Connect the battery cable to the hot side of the ammet behind the instrument panel and then insert the fuse in t cable receptor.

ANTENNA TRIMMER

(See Chassis View)

The input circuit has been especially designed to be us with a low capacity antenna of the fish pole or whip typ

Truetone antennas are especially designed to be us with this radio.

Tune in a station on the high frequency end of the di and adjust the antenna trimmer for maximum volum A weak station which does not fade is best for th adjustment.

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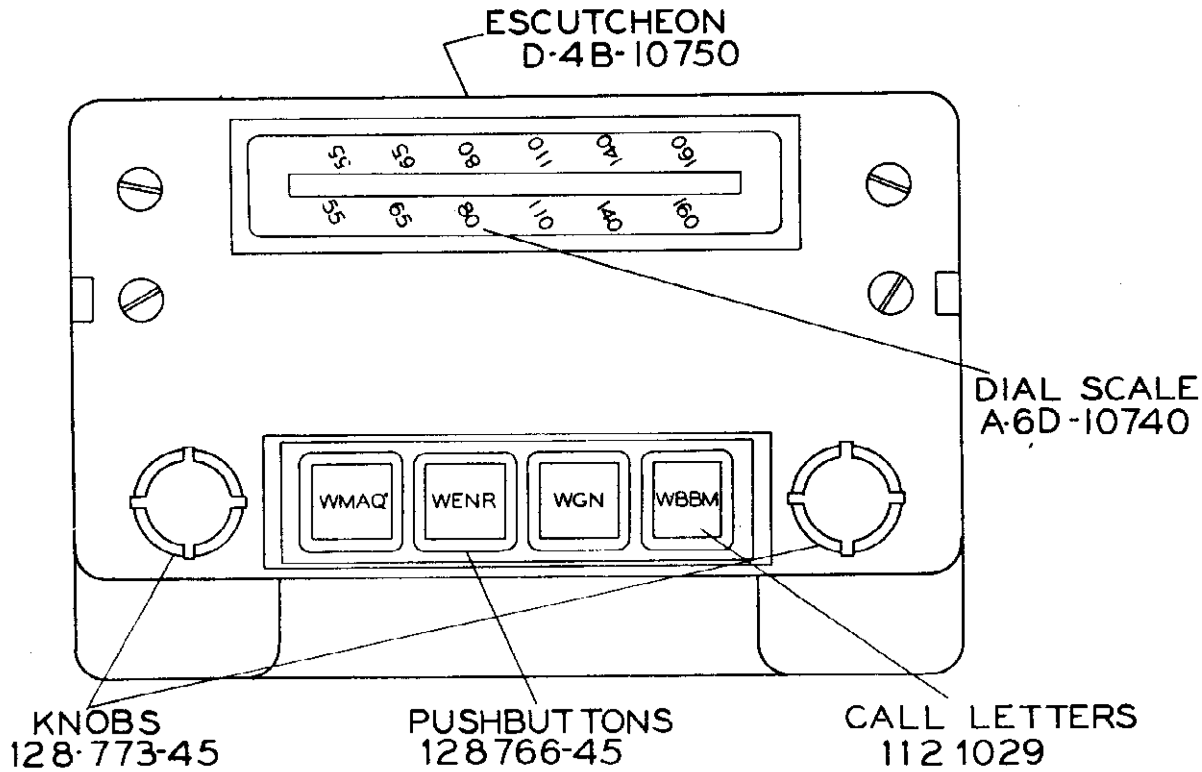


VOLUME CONTROL AND ON-OFF SWITCH

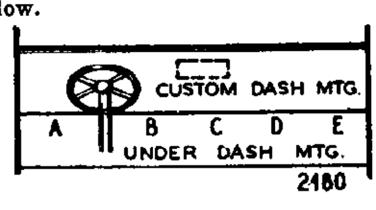
Turning this knob to the right turns the radio on and increases the volume. Turning it all the way to the left lowers the volume until the switch clicks and the radio goes off.

TUNING KNOB

This knob tunes the radio for Manual Tuning.

After the automatic pushbuttons have been set to your favorite stations, any of them may be quickly tuned by pressing the proper button firmly all the way in.

4 stations may be tuned automatically — Instructions for setting your favorite stations on the automatic are given in detail below.



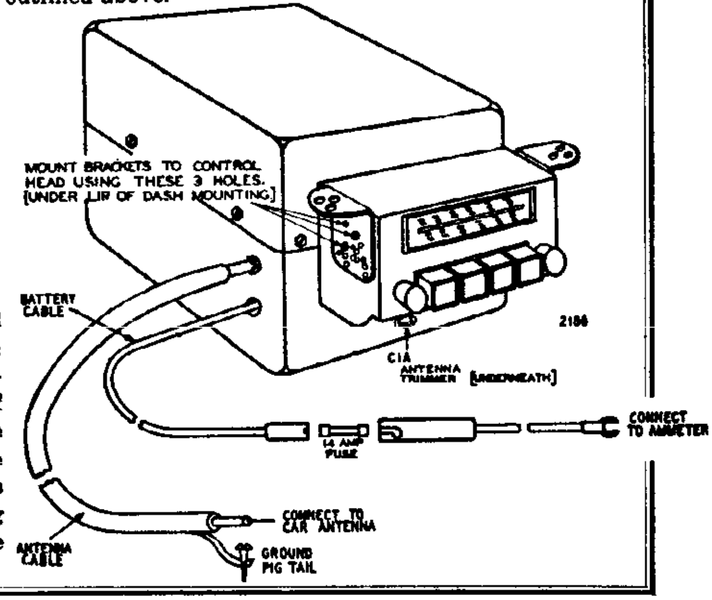
SETTING THE PUSHBUTTONS

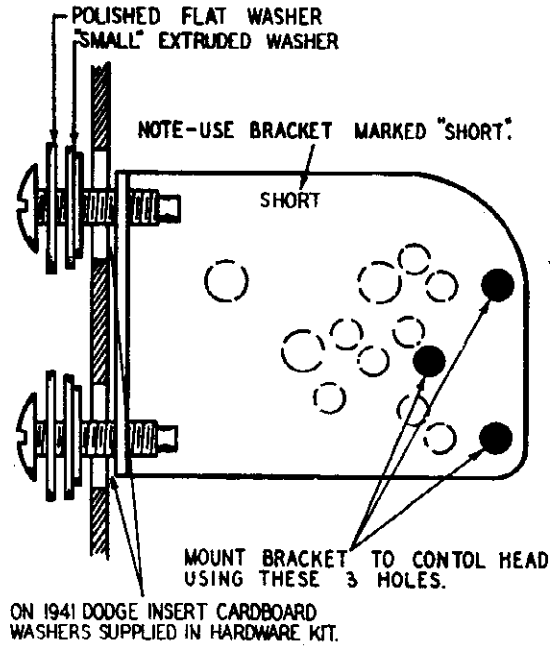
Make a list of your four favorite stations and push out the call letters of these stations from the call letter sheets supplied. Next, pull the pushbuttons off their levers. Alongside of the lever is a hole as shown in the picture above.

Press the first pushbutton lever in firmly and the locking screw will show up in the hole. Unscrew the locking screw several turns to the left with a screw driver. Hold the pushbutton lever pressed in firmly and tune in the desired station. With the pushbutton lever still pressed in, tighten the pushbutton locking screw. Continue to set up the other three pushbuttons in the same manner. Replace the pushbuttons on the levers and insert the call letters. Stations may be changed whenever desired by pulling one or all of the pushbuttons off and re-setting to any desired station as outlined above.

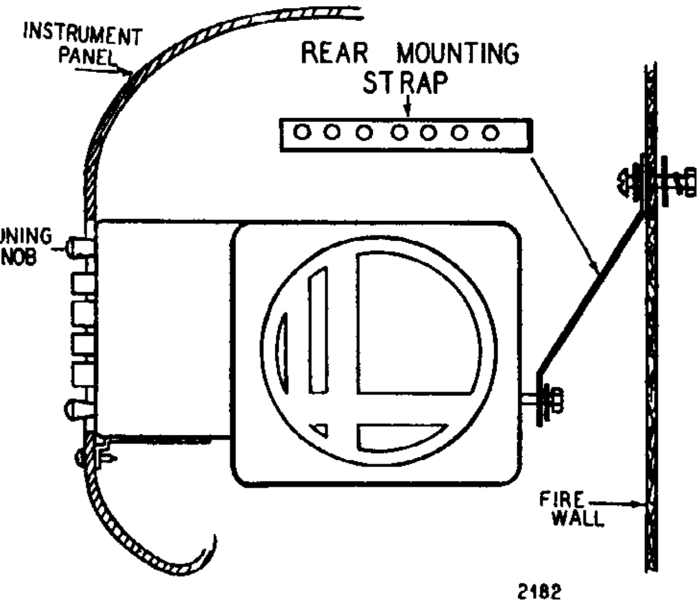
Universal Under Dash Mounting

This view shows the battery cable, antenna and ground cable and the two mounting brackets at the side of the tuning dial which are used to mount the radio to the underlip of the dash. These brackets are packed with the kit of hardware and should be fastened to the chassis using the holes shown in solid black. They are then bolted to the underlip of the dash and the rear mounting strap used as shown in the Chevrolet installation. Under Dash Mounting must be used on cars not shown as Dash Mounting in the chart





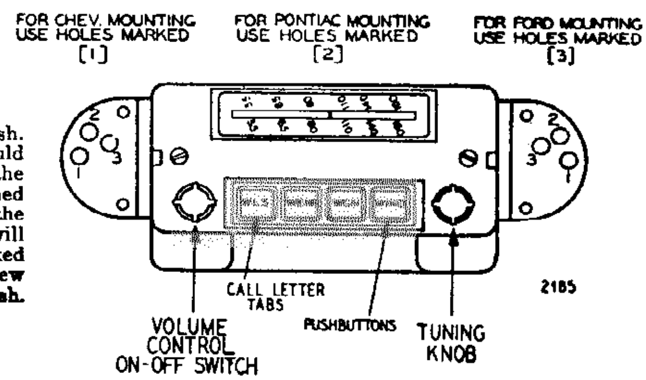
NOTE: Lay the bracket on drawing above to identify holes. Bracket when mounted will of course be at bottom of tuner.



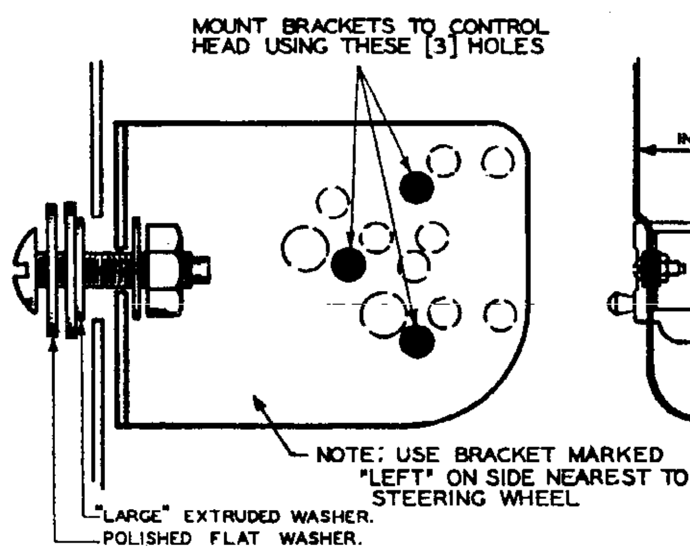
NOTE: Mount Chassis as shown — Be sure to use Rear Mounting Strap

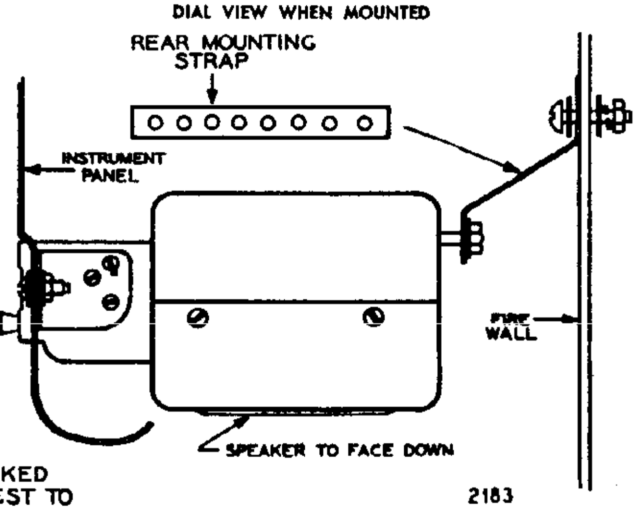
1941, 1942 and 1946 Chevrolet

This view shows how the chassis is mounted to the dash. The rear mounting strap (in the kit of hardware) should be bent as shown and used to support the chassis at the back. The two front mounting brackets should be fastened to the chassis using the solid black holes as shown. Lay the bracket on the left hand drawing and the black circles will show through the holes to be used. The two holes marked No. 1 in the front brackets, as shown in the Dial View Drawing, should be used to bolt the chassis to the dash.



DIAL VIEW WHEN MOUNTED





NOTE: Mount Chassis as shown with the speaker face down. Be sure to use rear mounting strap.

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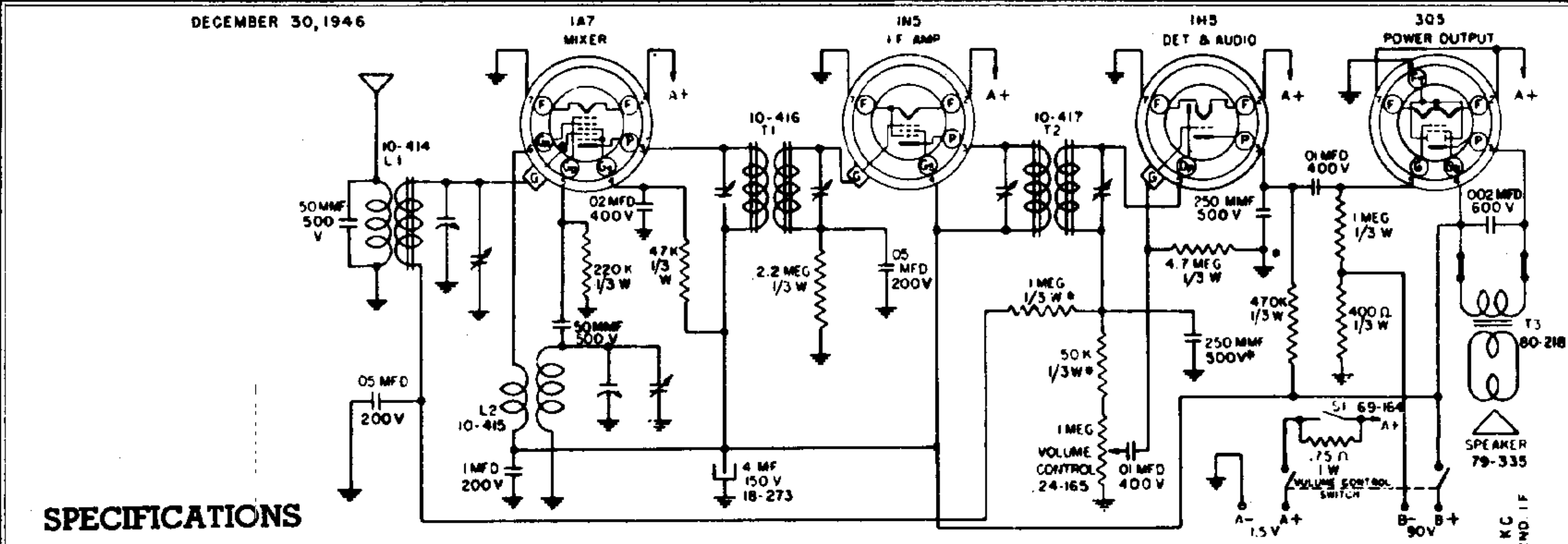
DECEMBER 30, 1946



SPECIFICATIONS

Power Output..........170 Milliwatts at 10% Dist'n.
Selectivity ....26 KC. at 100X at 1000 KC.
Intermediate Frequency...................455 KC.

Speaker ....6¼" P.M.
Tuning Frequency Range..........535 to 1725 KC.
Sensitivity.................35 Microvolts Average

CONTINUITY AND VOLTAGE

Tube sockets as shown on the schematic diagram have each element numbered with respect to the guide pin. Tube sockets on the chassis are also numbered in the same manner. All voltage measurements are average and were taken with a new battery or one known to be good, volume control full on, antenna and ground wires shorted together, using a volt meter with a resistance of 1000 ohms per volt. The correct voltages are shown in the voltage chart.

A complete realignment of all tuned circuits will be necessary after replacing an I.F. transformer, the antenna coil, or the oscillator coil. Never attempt realignment unless all other circuit components have been checked and found to be normal. If realignment is necessary follow the instructions under "ALIGNMENT PROCEDURE". After alignment has been completed repeat the procedure as a final check.

VOLTAGE CHART

All voltages measured with a 1000 ohm per volt meter on the 150 volt scale. For the following voltages the "B" battery section of the power pack should read 90 volts under load. Where no voltages are shown the voltage is O or is too low to be read with this type of voltmeter.

	PIN NO.	VOLTS
1A7GT TUBE		
Plate-P—to ground	3	85
Screen-G3 & G5—to ground	4	37
Grid-G2—to ground	6	85
1N5GT TUBE		
Plate-P—to ground	3	85
Screen-G2—to ground	4	85
1H5GT TUBE		
Plate-P—to ground	3	17
3Q5GT TUBE		
Plate-P—to ground	3	83
Screen-G2—to ground	4	85

ALIGNMENT EQUIPMENT

Do not attempt to realign this chassis without the equipment listed below:

1—Signal generator, capable of giving a modulated signal from 455 KC to 1725 KC.
2—Non-metallic screwdriver.
3—Dummy antennas, .1 MFD. and .00025 MFD. condensers.
4—Output meter.

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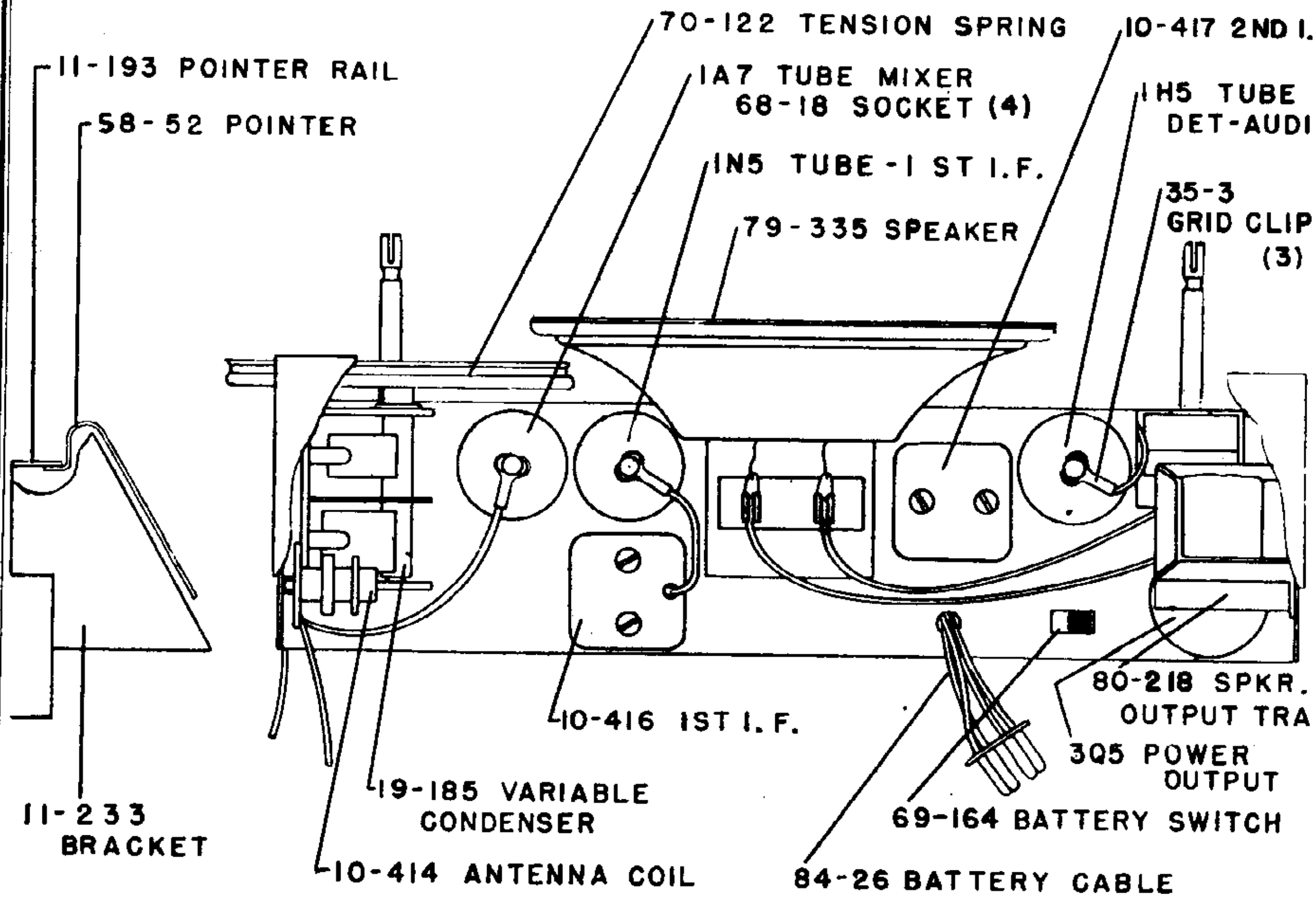

ALIGNMENT PROCEDURE

Volume control maximum all adjustments.
Connect ground lead of signal generator to chassis.
Connect dummy antenna in series with output lead of signal generator.
Connect output meter across voice coil of speaker.

Variable Condenser Setting	Generator Frequency	Dummy Antenna Mfd.	Connection to Radio	Trimmer Adjustment	Trimmer Function
Minimum Capacity (Fully Opened)	455 K.C.	.1	Grid of 1A7GT Tube	Two Trimmers on top of T2	Output I.F.
Minimum Capacity (Fully Opened)	455 K.C.	.1	Grid of 1A7GT Tube	Two Trimmers on top of T1	Input I.F.
Minimum Capacity (Fully Opened)	1725 K.C.	.00025	Antenna Lead	C1B (on gang)	Oscillator Trimmer
Tune in Signal From Generator	1500 K.C.	.00025	Antenna Lead	C1A (on gang)	Antenna Trimmer

With an output meter connected across the voice coil of the speaker, the output meter reading for 50 millwatts is .4 volts using a signal which is modulated 400 c.p.s.

Frequency Range
535 to 1725 K.C.
I.F. Frequency 455K.C.

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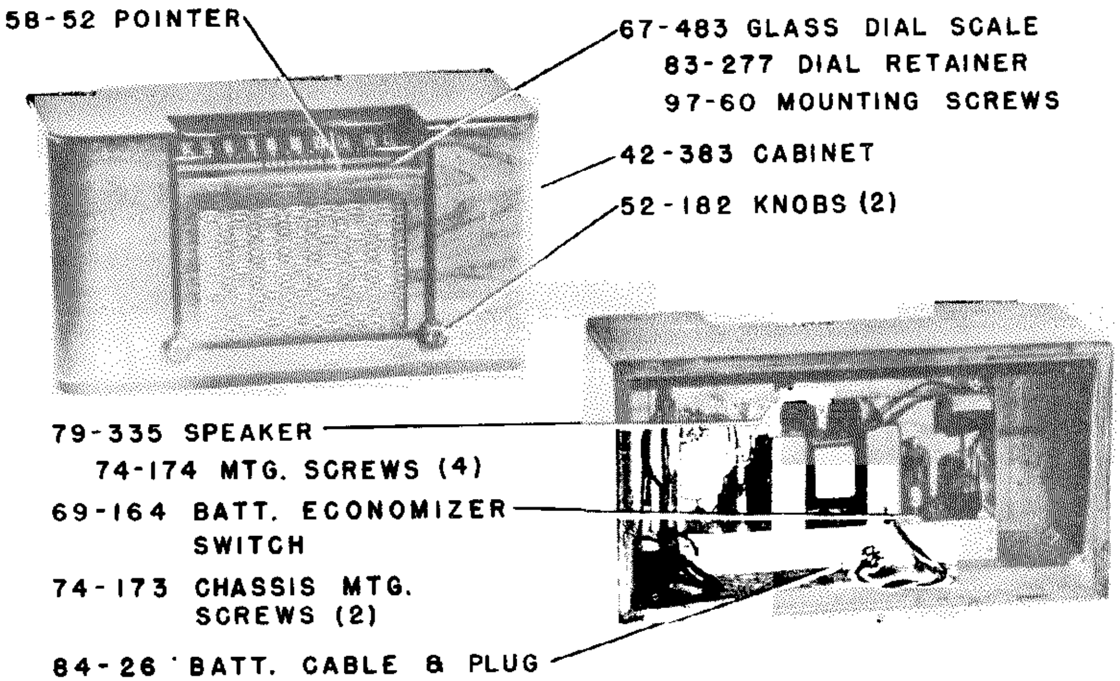
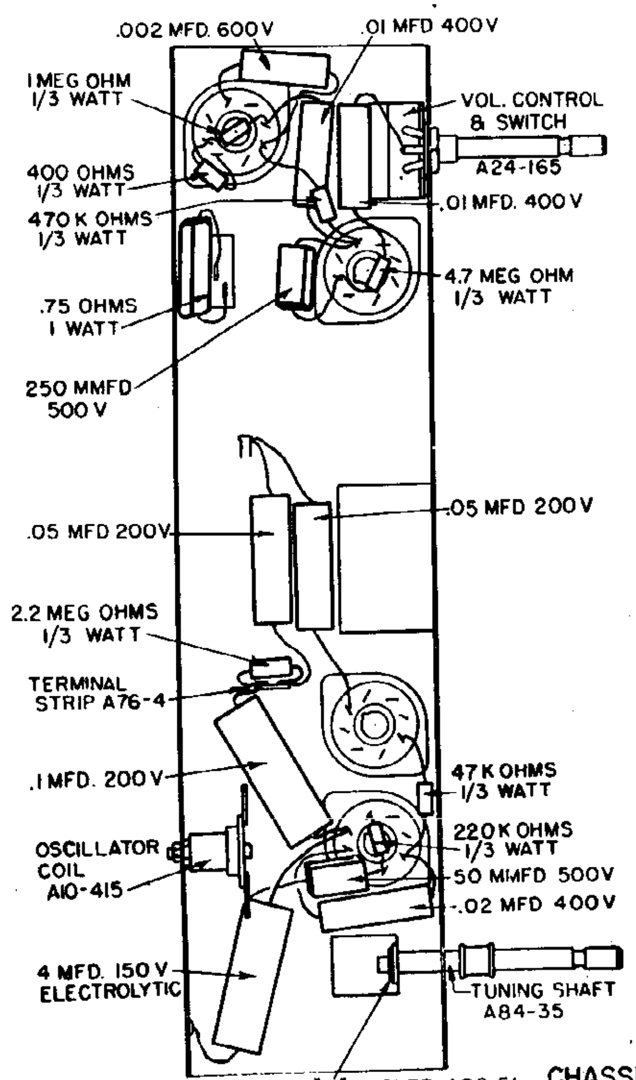
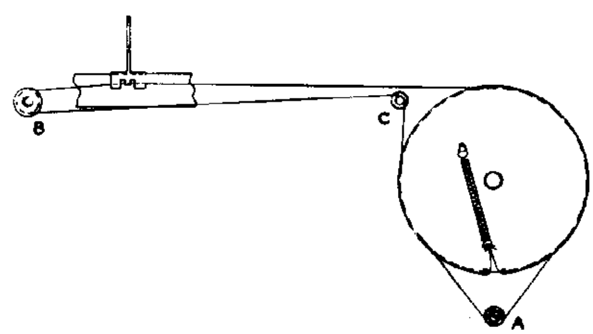




CHASSIS BOTTOM VIEW

DRIVE CORD REPLACEMENT



Turn gang condenser to fully open position. Use a new drive cord and fasten one end to tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the drive cord through the slot in the drive pulley rim and continue over the top of pulley counter-clockwise completely around through the string guide, around pulley B, over pulley C, around idler A counter-clockwise two times. Pass cord through slot in pulley rim, stretch the tension spring and fasten free end of cord to the spring.

CIRCUIT DESCRIPTION

This receiver is a four tube battery operated superhetrodyne. The battery used is of the combination "A" and "B" type, with 1¼ volts for filament current, and 90 volts for the high voltage circuits.

The tubes used, and their circuit application are as follows:

1—1A7GT—Oscillator converter
1—1N5GT—I. F. Amplifier
1—1H5GT—AVC, Detector, Audio Amplifier
1—3Q5GT—Power Output

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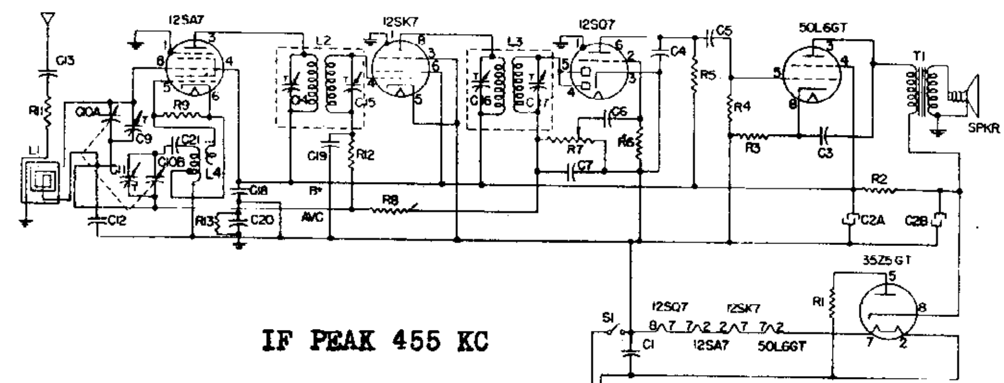
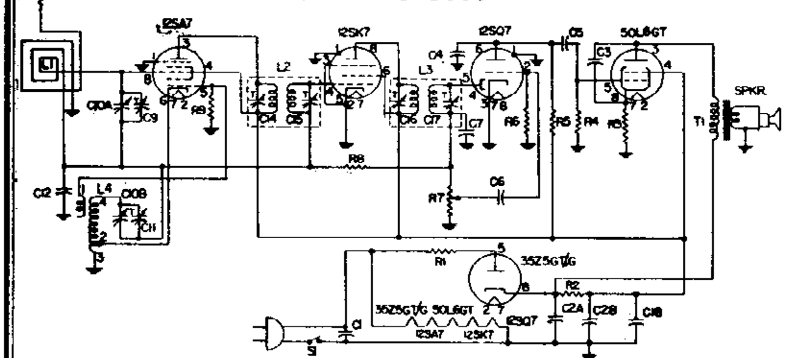
May 1, 1947

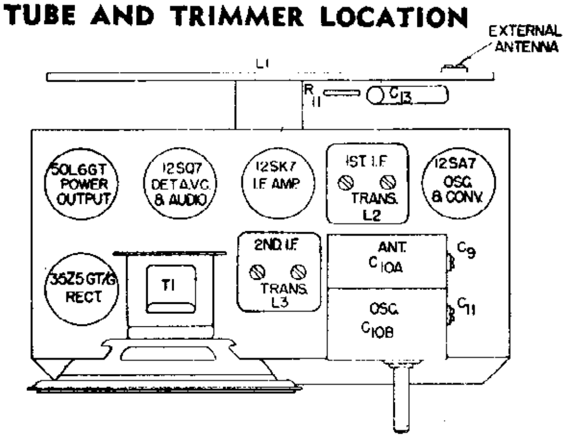


MODELS 43-8177, 43-817

MODEL 43-8179

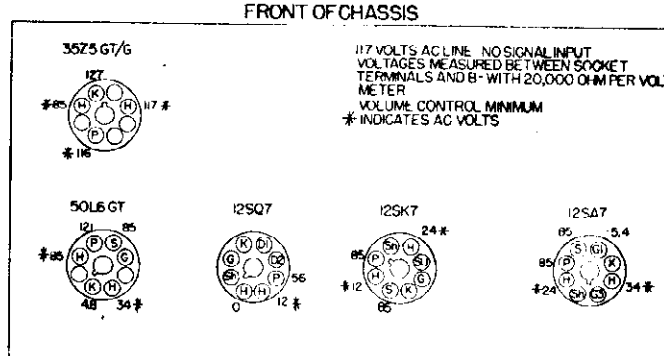


TUBE AND TRIMMER LOCATION



SOCKET VOLTAGE DIAGRAM

FRONT OF CHASSIS



BOTTOM VIEW OF CHASSIS

ALIGNMENT PROCEDURE

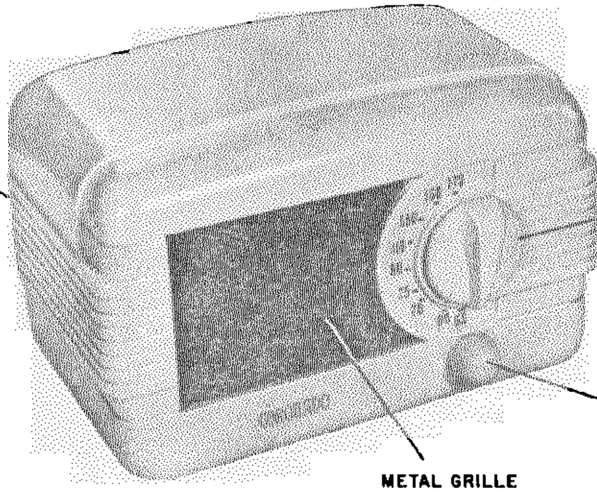
Allow unit to heat for a few minutes before starting alignment.
Volume control set to maximum.
Output meter across speaker.
Align for maximum output.
Reduce input as needed to keep output near 1.0 volt.

Note: If signal generator is AC operated, use an isolatin transformer between the power supply and the radio re ceiver power input. The use of an isolating capacitor not recommended as AC through the capacitor will in troduce hum and/or create the possibility of a burne out signal generator attenuator.

FREQUENCY	SIGNAL GENERATOR COUPLING CAPACITOR	CONNECTION TO RADIO	GROUND CONNECTION	TUNER SETTING	ADJUST TRIMMERS FOI MAXIMUM OUTPUT (in order shown)
455 KC	0.1 mf	Converter grid	B-	Wide open	2nd IF transformer trimme 1st IF transformer trimme
1725 KC	200 mmf	Receiver antenna post	B-	Wide open	Oscillator trimmer C11
1500 KC	200 mmf	Receiver antenna post	B-	Tune for maximum output	Antenna trimmer C9

MODELS 43-8177, 43-8178, 43-8179

GAMBLE-SKOGMO, INC.



SPECIFICATIONS

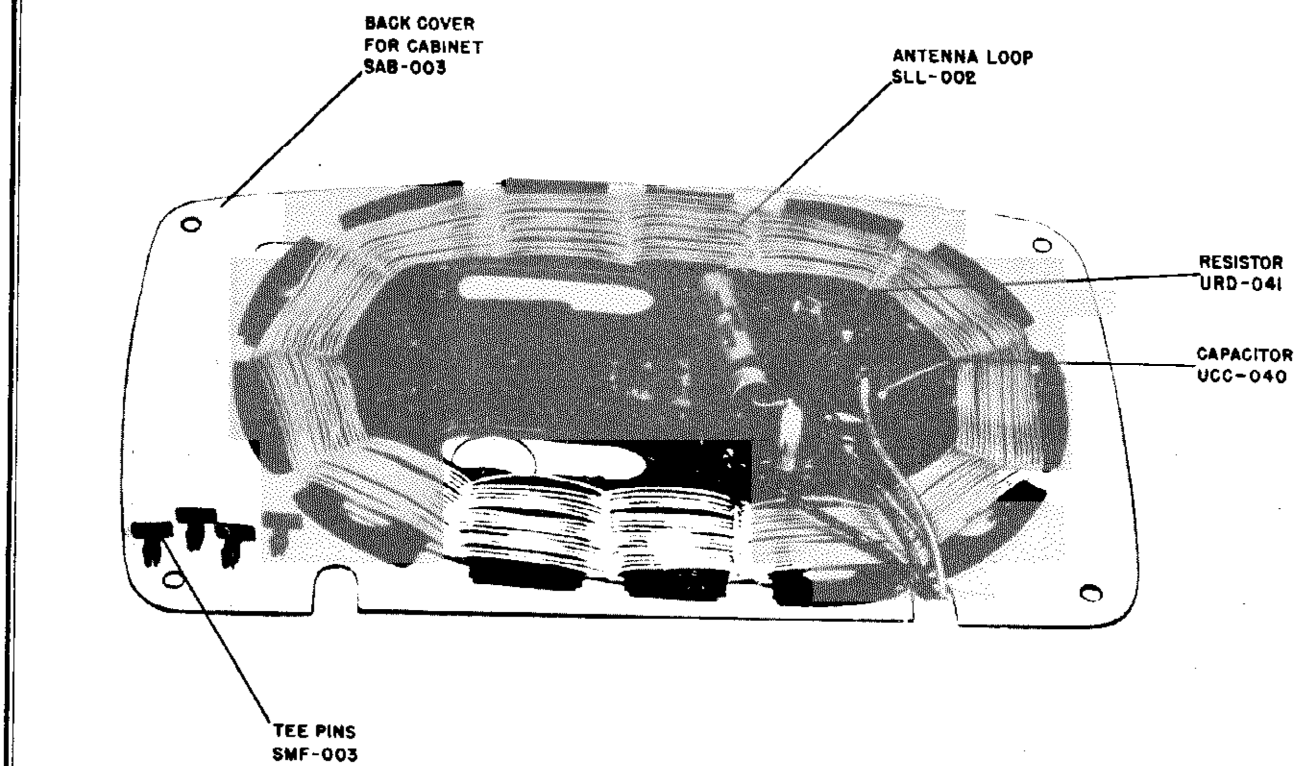
5 tube Superheterodyne, including rectifier tube
Intermediate Frequency ---------------- 455 KC
Antenna Sensitivity ----- 89 mv. average for 0.5 w output
Selectivity -- 70 KC broad at 1000 times signal at 1000 KC
Power Output ------- 0.8 w undistorted, 1.5 w minimum full power output
Frequency range ---------------------- 540 to 1720 KC
Tuning -------------- Direct drive—2 gang condenser
Power supply --------------- 105 to 125 Volts, AC or DC
Frequency on AC --------------------- 40 to 60 cycles
Power Consumption ---------------- 28 watts at 117V.
Speaker ------- 4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
Antenna ------------ Self contained loop antenna, also provision for external antenna

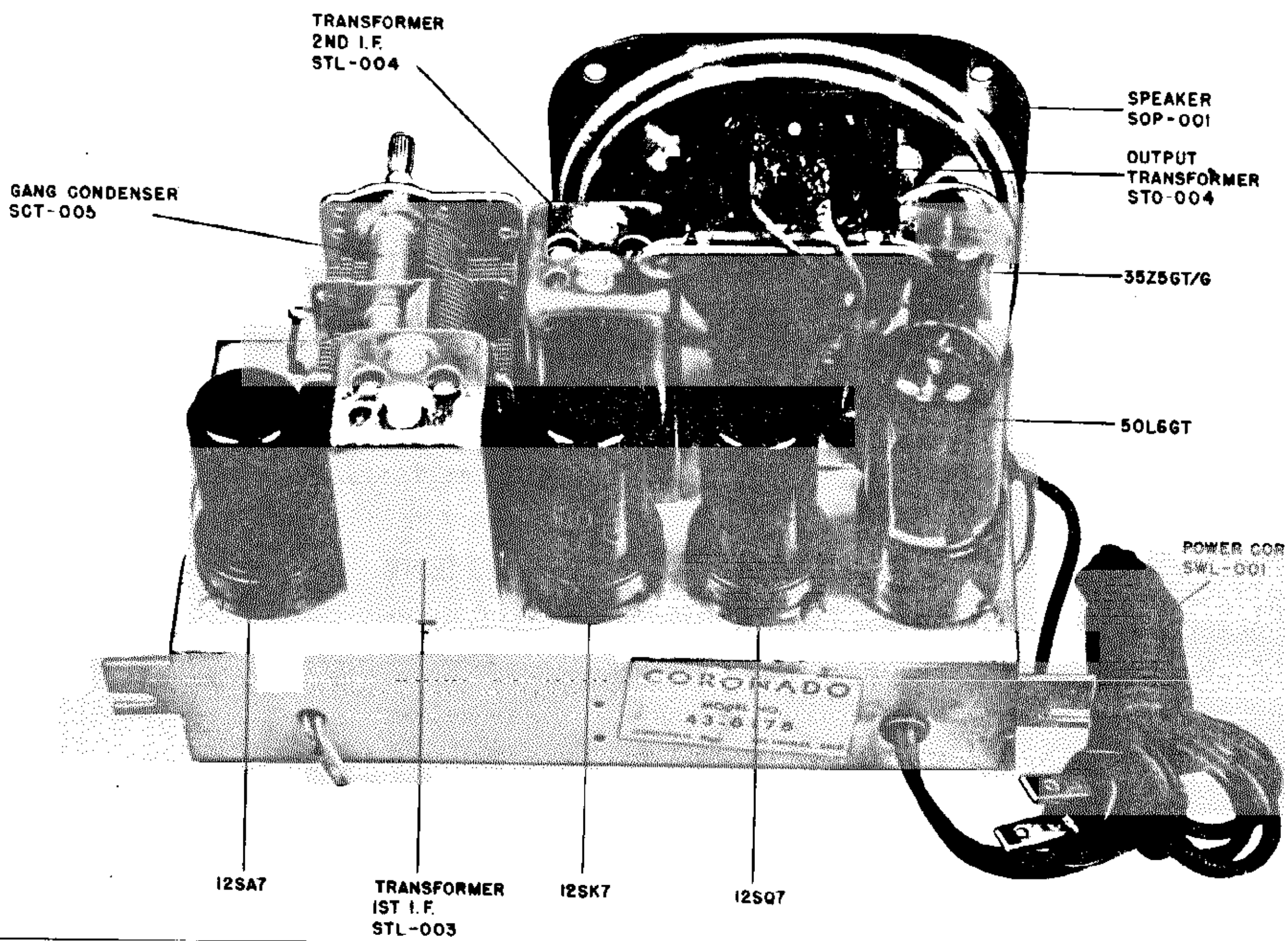
CATALOG NO.	SYMBOL	TITLE	VALUE	RATING	TOLERANCE
UCC-045	C1	Paper Capacitor	.05 mf	600WVDC	+40 - 15%
SCE-003	C2A	Electrolytic Capacitor	40 mf	150WVDC	+100 - 10%
SCE-003	C2B	Electrolytic Capacitor	40 mf	150WVDC	+100 - 10%
UCC-041	C3	Paper Capacitor	.02 mf	600WVDC	±20%
UCU-1040	C4	Mica Capacitor	330 mmf	500WVDC	±10%
UCC-040	C5	Paper Capacitor	.01 mf	400WVDC	±20%
UCC-039	C6	Paper Capacitor	.006 mf	600WVDC	+40 - 15%
UCU-1040	C7	Mica Capacitor	330 mmf	500WVDC	±10%
*	C9	Antenna Trimmer			
*	C10A	Variable Condenser ant. section			
*	C10B	Variable Condenser osc. section			
*	C11	Oscillator Trimmer			
UCC-045	C12	Paper Capacitor	.05 mf	400WVDC	±20%
UCC-039	C13	Paper Capacitor	.005 mf	600WVDC	±20%
UCC-045	C18	Paper Capacitor	.05 mf	400WVDC	±20%
URE-007	R1	Carbon Resistor	22 ohm	½ W	±20%
URF-053	R2	Carbon Resistor	1500 ohm	2 W	±20%
URD-029	R3	Carbon Resistor	150 ohm	½ W	±20%
URD-113	R4	Carbon Resistor	470,000 ohm	½ W	±20%
URD-105	R5	Carbon Resistor	220,000 ohm	½ W	±20%
URD-145	R6	Carbon Resistor	10 megohm	½ W	±20%
SRC-004	R7	Volume Control	500,000 ohm		
URD-129	R8	Carbon Resistor	2.2 megohm	½ W	±20%
URD-081	R9	Carbon Resistor	22,000 ohm	½ W	±20%
URD-041	R11	Carbon Resistor	470 ohm	½ W	±20%
*	L1	Antenna Loop			
*	L2	1st IF Transformer			
*	L3	2nd IF Transformer			
SLC-001	L4	Oscillator Coil			
*	T1	Output Transformer			
SRC-004	S1	Power Switch with R7			
*	SPKR	4" PM Speaker			
SJS-002		Socket-Octal base tube			
SMS-003		Speed Nuts—for fastening metal grille in cabinet			

ADDITIONAL PARTS FOR MODEL 43-8179

CATALOG NO.	SYMBOL	TITLE	VALUE	RATING	TOLERANCE
UCC-039	C19	Paper Capacitor	.005 mf	600WVDC	
UCC-048	C20	Paper Capacitor	.1 mf	400WVDC	
UCC-040	C21	Paper Capacitor	.01 mf	400WVDC	
URD-113	R12	Carbon Resistor	470,000 ohm	½ W	±20%
URD-113	R13	Carbon Resistor	470,000 ohm	½ W	±20%

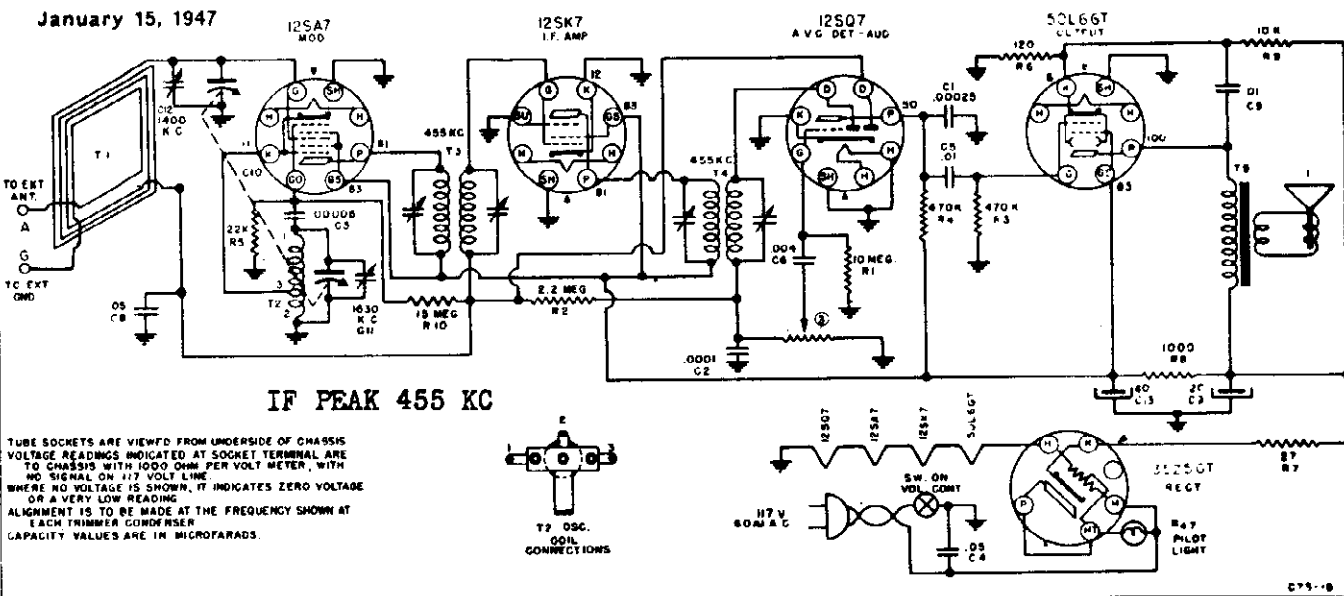
*See listings on pictures


BACK COVER
FOR CABINET
SAB-003
ANTENNA LOOP
SLL-002
RESISTOR
URD-041
CAPACITOR
UCC-040
TEE PINS
SMF-003


TRANSFORMER
2ND I.F.
STL-004
SPEAKER
SOP-001
OUTPUT
TRANSFORMER
STO-004
GANG CONDENSER
SCT-005
35Z5GT/G
50L6GT
POWER COR
SWL-001
CORONADO
43-8178
12SA7
TRANSFORMER
IST I.F.
STL-003
12SK7
12SQ7

GAMBLE-SKOGMO, INC.

January 15, 1947



TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS
VOLTAGE READINGS INDICATED AT SOCKET TERMINAL ARE TO CHASSIS WITH 1000 OHM PER VOLT METER, WITH NO SIGNAL ON 117 VOLT LINE.
WHERE NO VOLTAGE IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING
ALIGNMENT IS TO BE MADE AT THE FREQUENCY SHOWN AT EACH TRIMMER CONDENSER
CAPACITY VALUES ARE IN MICROFARADS.

CODE	PART NO	DESCRIPTION
R 1		10 MEGOHM 1/4 WATT RESISTOR
R 2		2.2 " " " "
R 3		470 K " "
R 4		470 K " "
R 5		22 K " "
R 6		120 " "
R 7		27 " "
R 8		1000 1/2 WATT "
R 9		10 K 1 WATT "
R 10		15 MEG 1/3 WATT "

CODE	PART NO.	DESCRIPTION
C 1		.00025 MFD MICA CONDENSER
C 2		.0001 " " "
C 3		.00005 " " "
C 4		.05 MFD. 400 V. TUBULAR CONDENSER
C 5		.01 " " " "
C 6		.004 " " " "
C 7		
C 8		.05 " 200 V. " "
C 9	18-272	20 MFD. 150 W.V. ELECTROLYTIC
C 10	19-177	2 GANG VARIABLE CONDENSER (ALSO C11 & C12)
C 13	18-280	4 MFD. 150 W.V. ELECTROLYTIC

CODE	PART NO	DESCRIPTION
T 1	82-30	LOOP ANTENNA
T 2	10-394	OSCILLATOR COIL
T 3	10-369	1ST I.F. TRANSFORMER
T 4	10-370	2ND I.F. TRANSFORMER
T 5	80-212	OUTPUT TRANSFORMER USED WITH 79-307A SPR
	79-339	5" P.M. SPEAKER WITH 80-224 OUTPUT TRANS
(1)	79-307A	5" P.M. SPEAKER
(3)	24-193	500K OHM VOLUME CONTROL WITH SW.

ALIGNMENT PROCEDURE

EQUIPMENT NECESSARY:

Signal Generator
Output Meter
.1 MFD. Condenser
.00025 MFD. Condenser, mica
Insulated Screwdriver

ALIGNMENT FREQUENCIES

I.F. .... 455 K.C.
Osc. .... 1630 K.C.
Ant. .... 1400 K.C.

GENERAL:

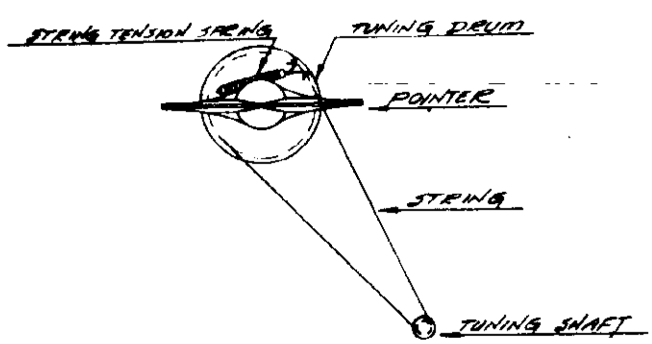
1. Connect output meter across voice coil of speaker.
2. Adjust volume control to maximum.
3. Keep output from signal generator at lowest possible level to prevent A.V.C. action from interfering with correct alignment.
4. With the output meter connected across the voice coil of the speaker the output meter reading for 50 milliwatts is .4 volts.
5. Repeat alignment procedure as a final check.

CAUTION: This is an A.C.-D.C. type receiver and when aligning the set it is necessary to isolate the signal generator or the receiver from the line by use of a transformer or by placing a .2 MFD. condenser in both test leads of the signal generator.

Variable Condenser Setting	Generator Frequency	Dummy Antenna MFD.	Connection to Radio	Trimmer Adjustment	Trimmer Function
Minimum Capacity (Fully opened)	455 K.C.	.1	*Stator of Ant. section of gang	T3-T4	I.F.
Minimum Capacity (Fully opened)	1630 K.C.	.00025	**Ant. terminal on loop	C11	Osc.
Tune in signal from generator	1400 K.C.	.00025	**Ant. terminal on loop	C12	Ant.

*Connect ground side of signal generator lead to chassis.
**Connect ground side of signal generator lead to terminal marked "G" on back of the loop.

DRIVE CORD REPLACEMENT



Turn gang condenser to fully open position. Use a new drive cord and fasten one end to the tension spring. Pass drive cord through slot in the drive pulley rim and continue over top of pulley and counter-clockwise around pulley to turning shaft, wrap around 2½ turns, fasten free end to cord tension spring. Cross over cord before fastening.

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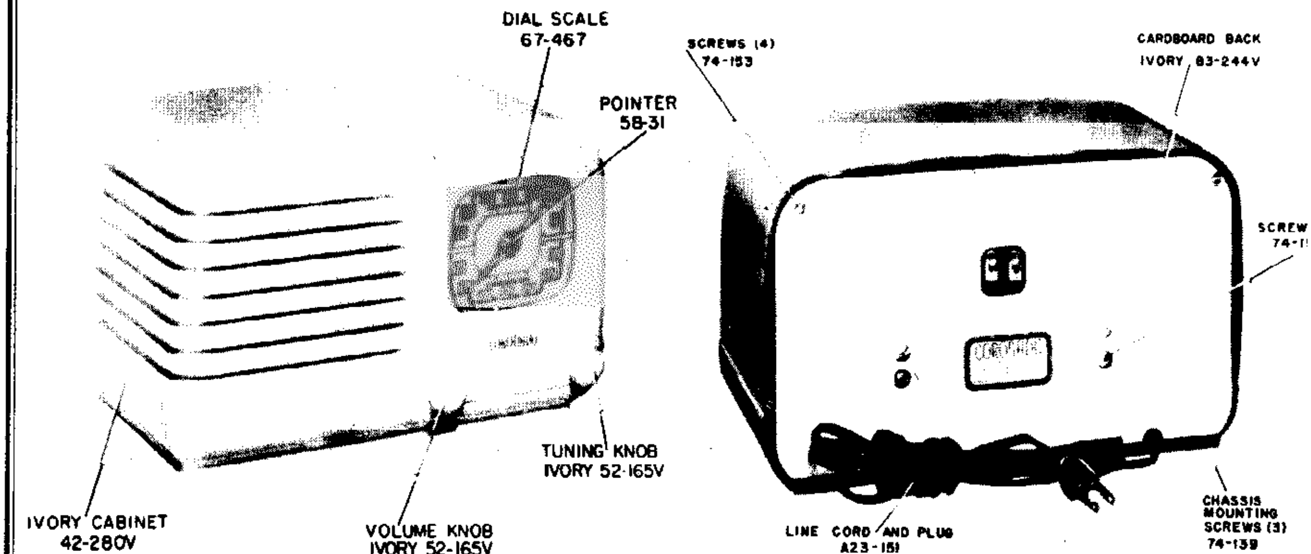
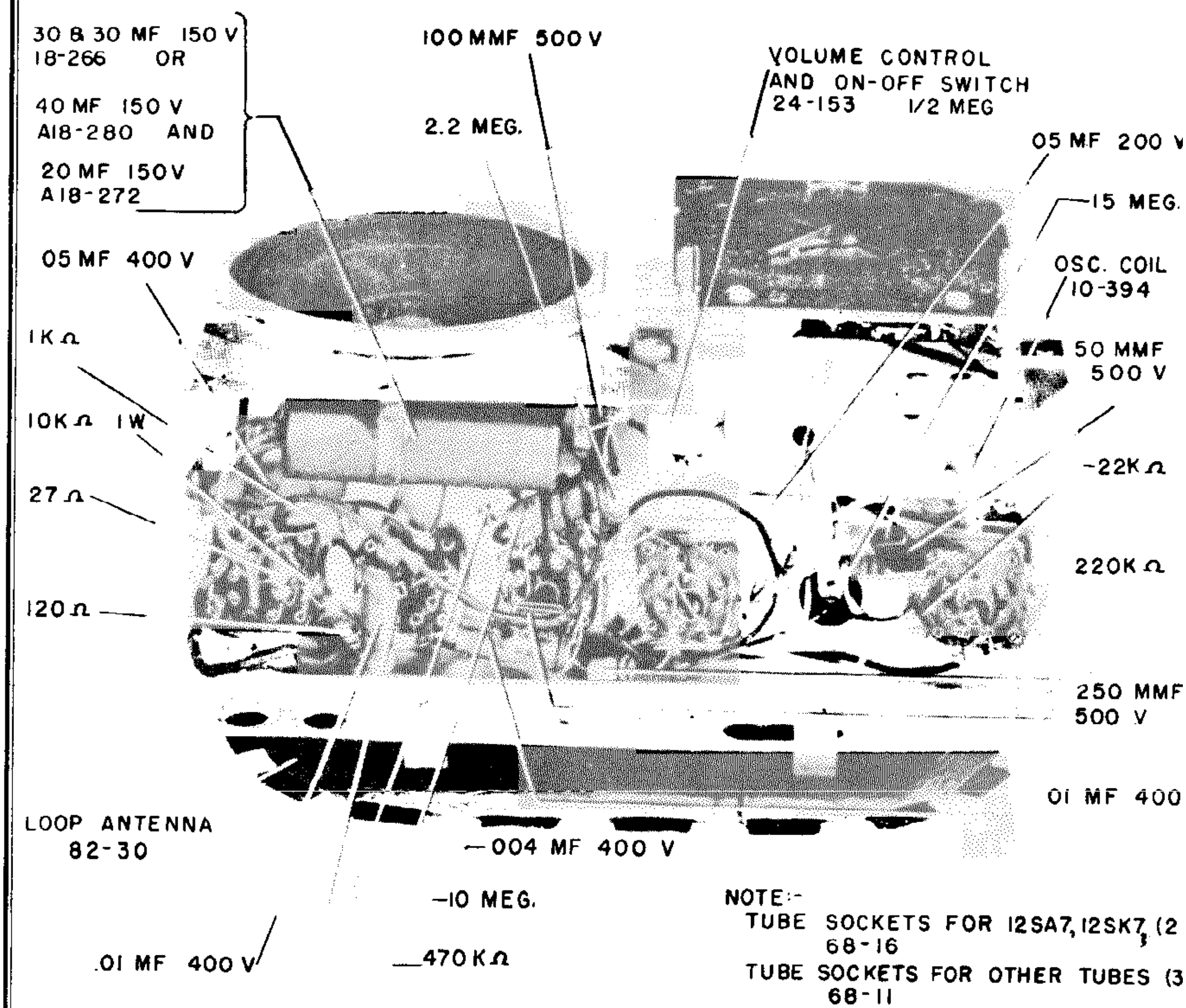
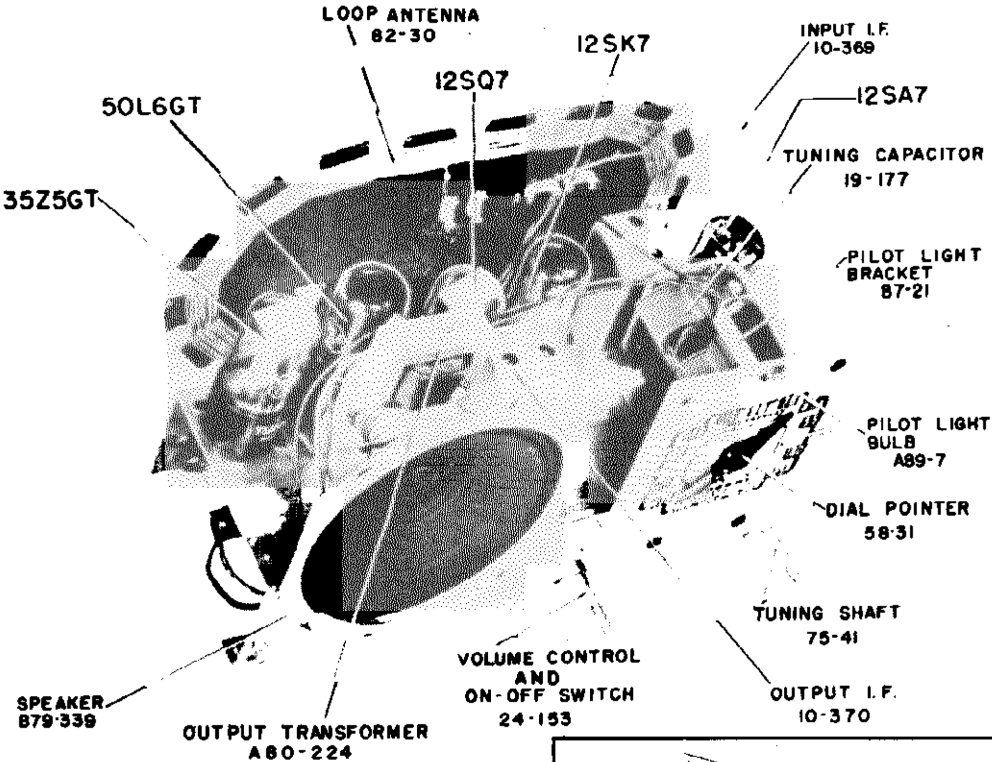


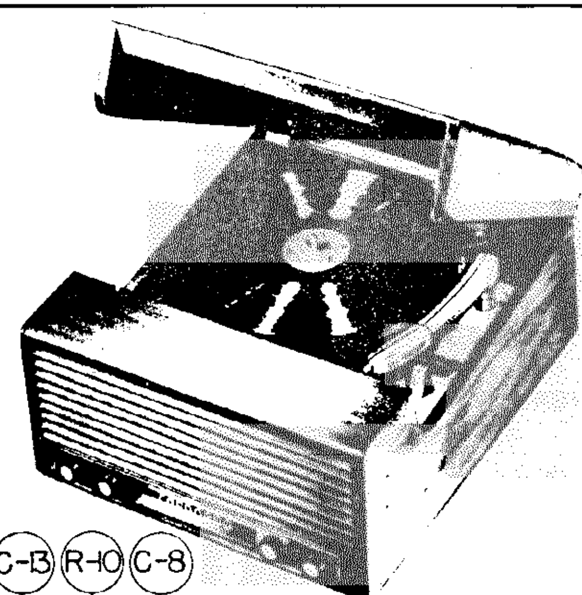


NOTE:-
TUBE SOCKETS FOR 12SA7, 12SK7, (2
68-16
TUBE SOCKETS FOR OTHER TUBES (3
68-11

MODEL 43-8180
MODEL 43-9196

GAMBLE-SKOGMO, INC.

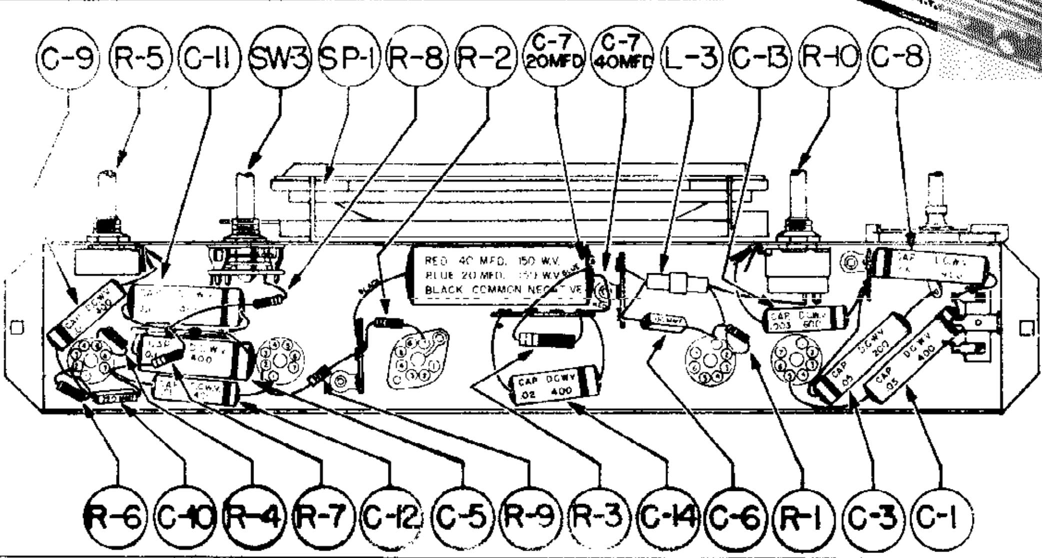




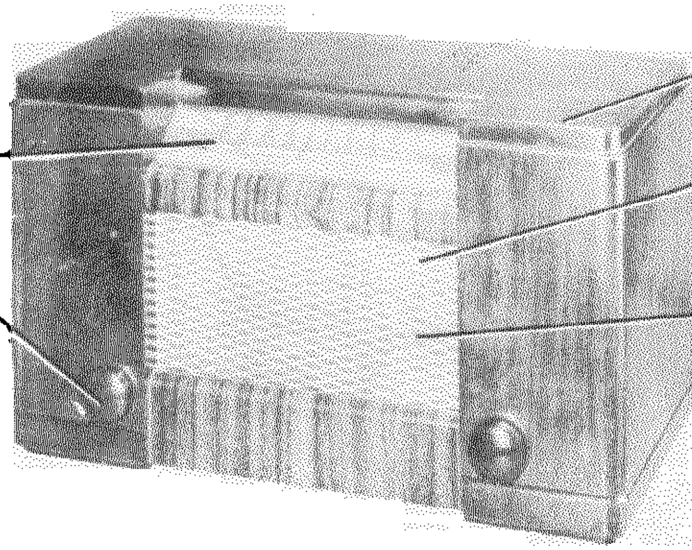
SPECIFICATIONS

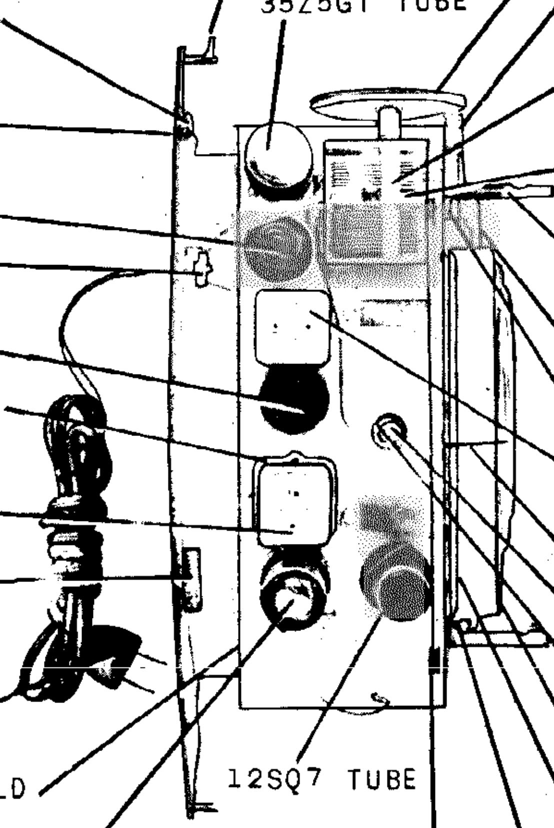
Power Supply................117 V. AC or DC 50-60 cycles
Power Consumption..................................30 W
Power Output (with 117 V. input) undistorted.........86 W
Frequency Range....................540 to 1630 Kilocycles
Speaker...5" P.M.

Selectivity......80 kc. broad at 1000 times signal at 1000 kc.
Sensitivity......Hazeltine method 600 kc., 1000 kc., 1400 kc., 160 mv., 110 mv., 98 mv.
Tuning...540-1630 kc.
Intermediate Frequency...............................455 kc.

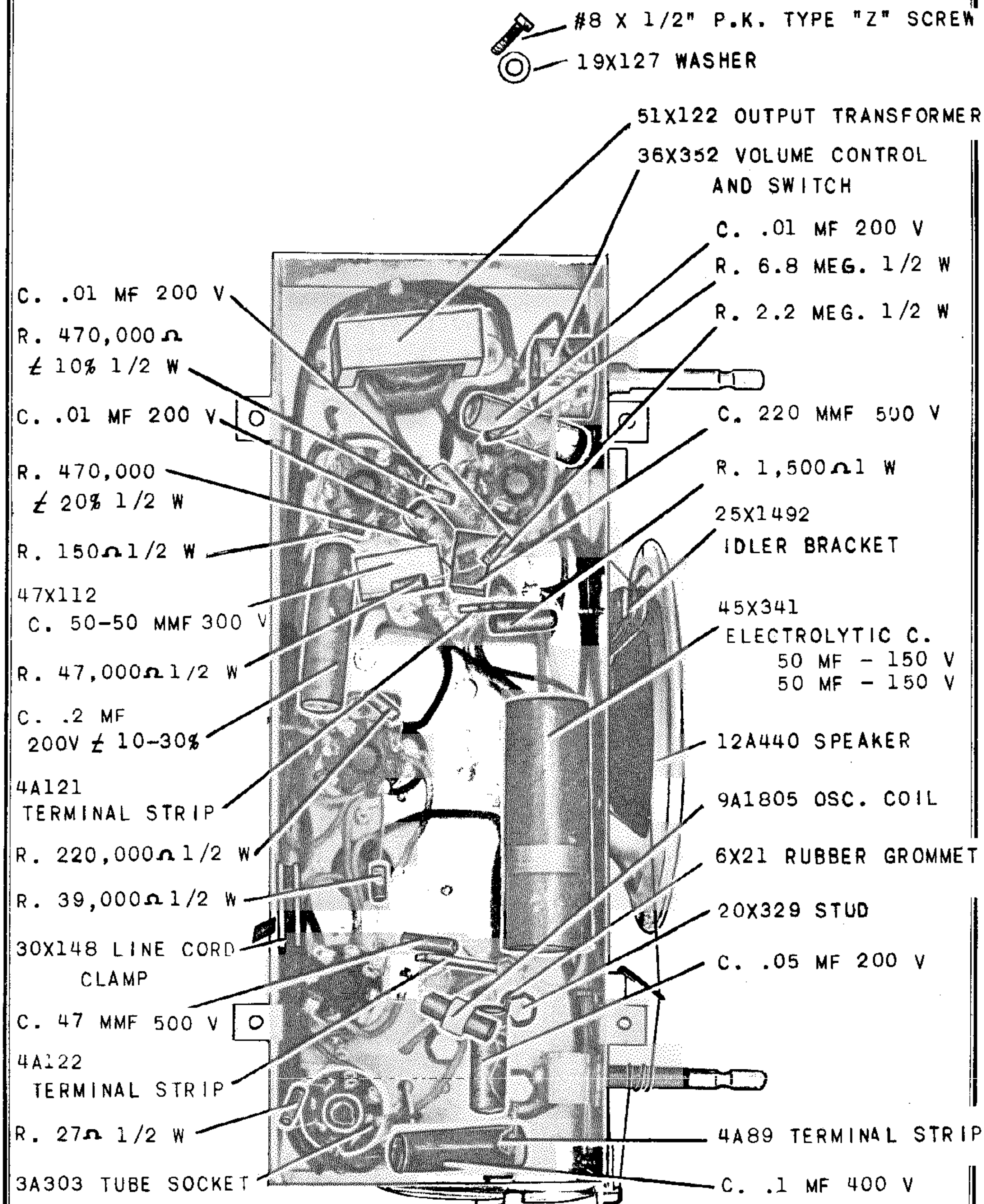


GAMBLE-SKOGMO, INC.



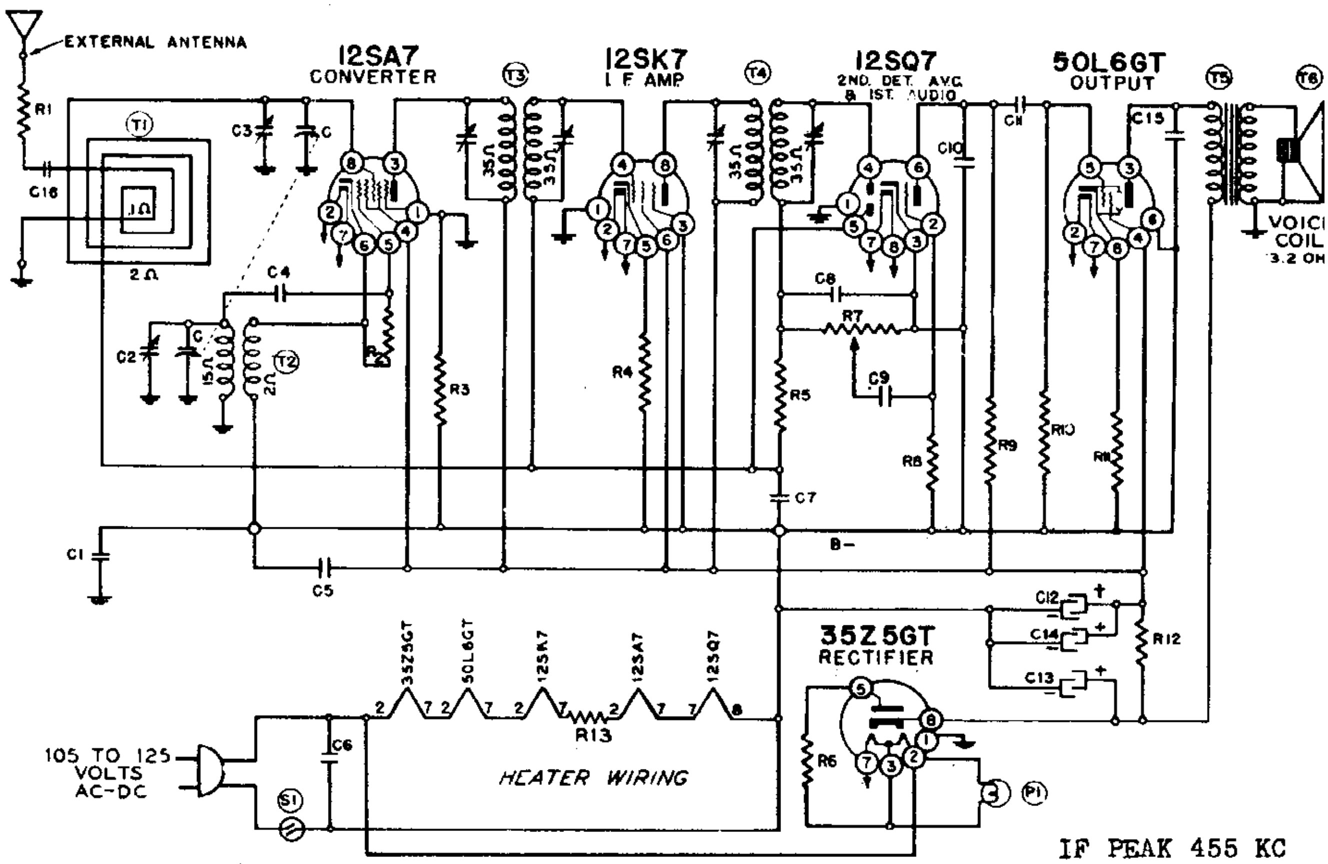


For schematic and additional data see pages 15-1 and 15


#8 X 1/2" P.K. TYPE "Z" SCREW
19X127 WASHER
51X122 OUTPUT TRANSFORMER
36X352 VOLUME CONTROL AND SWITCH
C. .01 MF 200 V
R. 6.8 MEG. 1/2 W
R. 2.2 MEG. 1/2 W
C. 220 MMF 500 V
R. 1,500Ω 1 W
25X1492 IDLER BRACKET
45X341 ELECTROLYTIC C. 50 MF - 150 V 50 MF - 150 V
12A440 SPEAKER
9A1805 OSC. COIL
6X21 RUBBER GROMMET
20X329 STUD
C. .05 MF 200 V
4A89 TERMINAL STRIP
C. .1 MF 400 V
C. .01 MF 200 V
R. 470,000Ω ± 10% 1/2 W
C. .01 MF 200 V
R. 470,000 ± 20% 1/2 W
R. 150Ω 1/2 W
47X112 C. 50-50 MMF 300 V
R. 47,000Ω 1/2 W
C. .2 MF 200V ± 10-30%
4A121 TERMINAL STRIP
R. 220,000Ω 1/2 W
R. 39,000Ω 1/2 W
30X148 LINE CORD CLAMP
C. 47 MMF 500 V
4A122 TERMINAL STRIP
R. 27Ω 1/2 W
3A303 TUBE SOCKET

GAMBLE-SKOGMO, INC.

DECEMBER 30, 1946



Note: Some sets of this model were built with a 2-section electrolytic condenser — a 40-mf section (C13) and a 20-mf section (C12 or C14).

CONDENSERS

C	2-gang variable
C1	.15 x 400 volts
C2	Oscillator trimmer on gang
C3	Antenna trimmer
C4	.0002 mica
C5	.05 x 200 volts
C6	.1 x 400 volts
C7	.05 x 200 volts
C8	.0001 mica
C9	.002 x 600 volts
C10	.0005 mica
C11	.004 x 600 volts
C12	Electrolytic, 20 x 150 volts
C13	Electrolytic, 40 x 150 volts
C14	Electrolytic, 20 x 150 volts
C15	.02 x 400 volts
C16	.002 x 600 volts

RESISTORS

R1	1000 ohms, 20%, ½ watt
R2	47,000 ohms, 10%, ½ watt
R3	220,000 ohms, 20%, ½ watt
R4	47 ohms, 10%, ½ watt
R5	3.3 megohms, 20%, ½ watt
R6	22 ohms, 10%, ½ watt
R7	Volume control, 1 megohm
R8	10 megohms, 20%, ½ watt
R9	470,000 ohms, 20%, ½ watt
R10	680,000 ohms, 20%, ½ w
R11	150 ohms, 10%, ½ watt
R12	1200 ohms, 10%, 1 watt
R13	33 ohms, 20%, 1 watt

MISCELLANEOUS

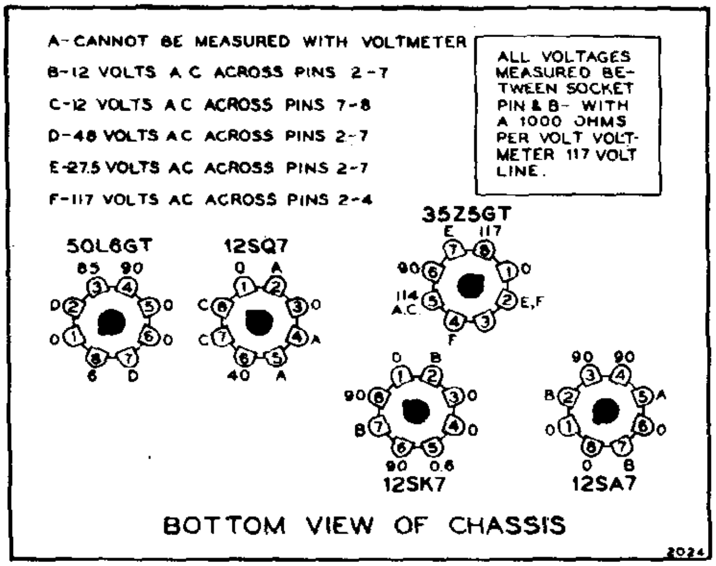
P1	Pilot light, 6-8 volts
S1	On-off switch on volume control
T1	Loop antenna assembly
T2	Oscillator coil
T3	Input I.F. coil
T4	Output I.F. coil
T5	Output transformer
T6	5-inch P.M. speaker

SPECIFICATIONS

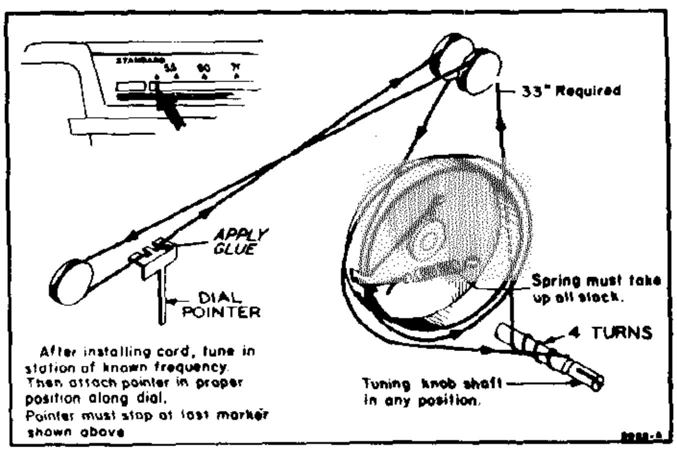
6 Tube Superheterodyne, including rectifier tube

Power Consumption........35 w.
Power Output........0.8 w. undistorted, 1.5 w. maximum
Selectivity........52 kc. broad at 1,000 times signal at 1,000 kc.
Antenna........Built-in loop, also provision for external antenna
Intermediate Frequency........455 kc.
Speaker........5 in. 0.7 oz. P.M. voice coil imp. 3.2 o
Tuning........Two-gang capac
Sensitivity........30 mv. avg. for 50 mw. ou
Frequency Range........530 to 1,650
Power Supply........105-125 v. D.C., 50-60 cycle A.C., also made for 25 cy
Output Transformer........Impedance ratio 2,500

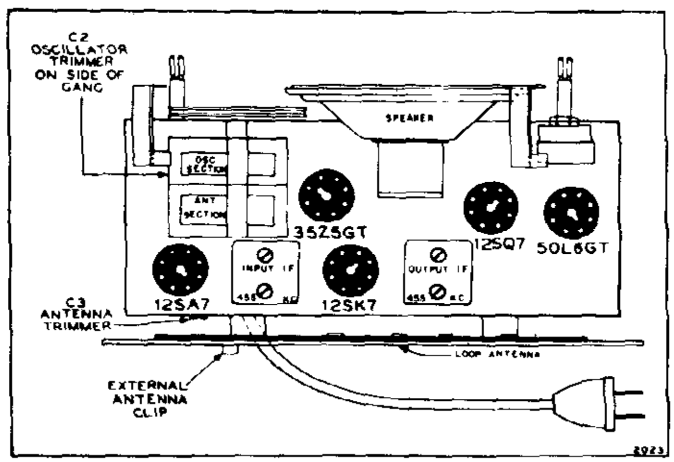
GAMBLE-SKOGMO, INC.



DRIVE CORD REPLACEMENT



CHASSIS VIEW



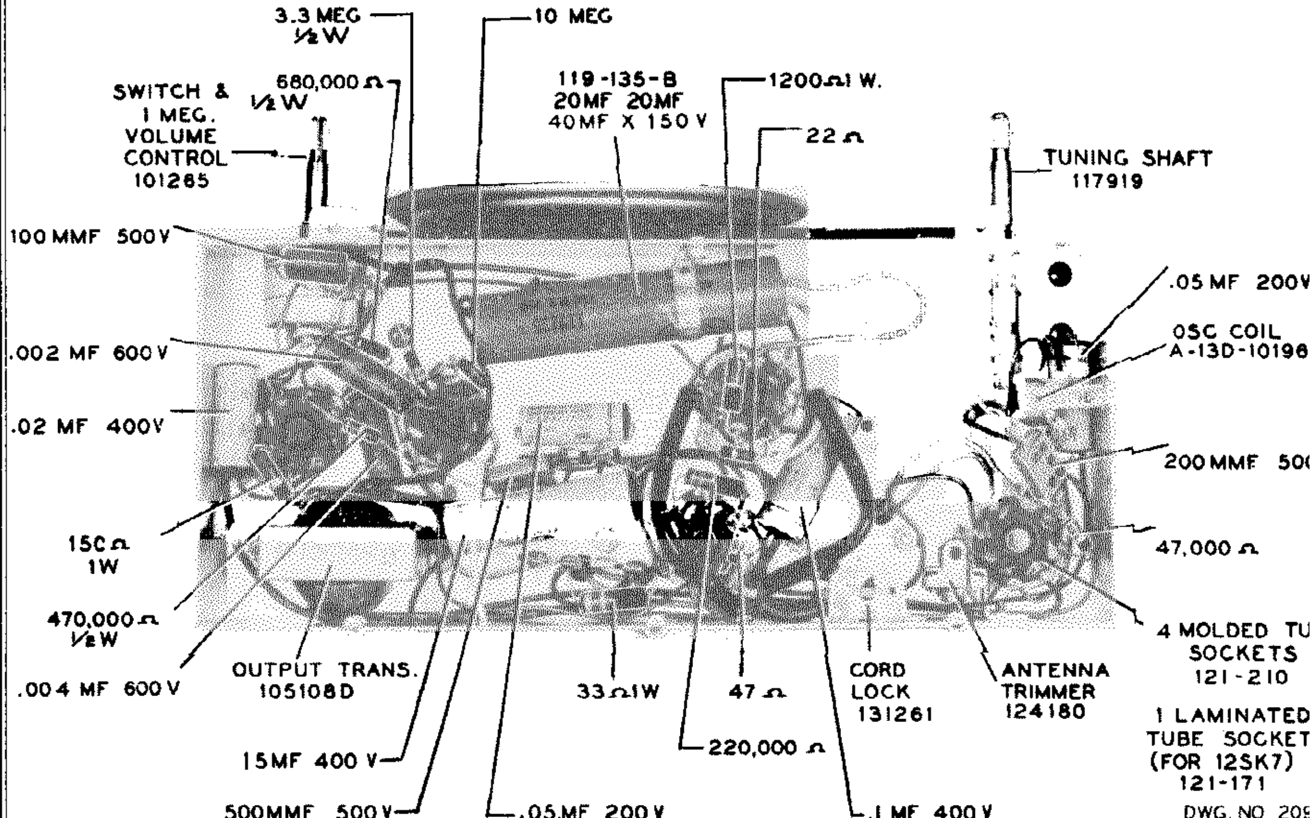
ALIGNMENT PROCEDURE

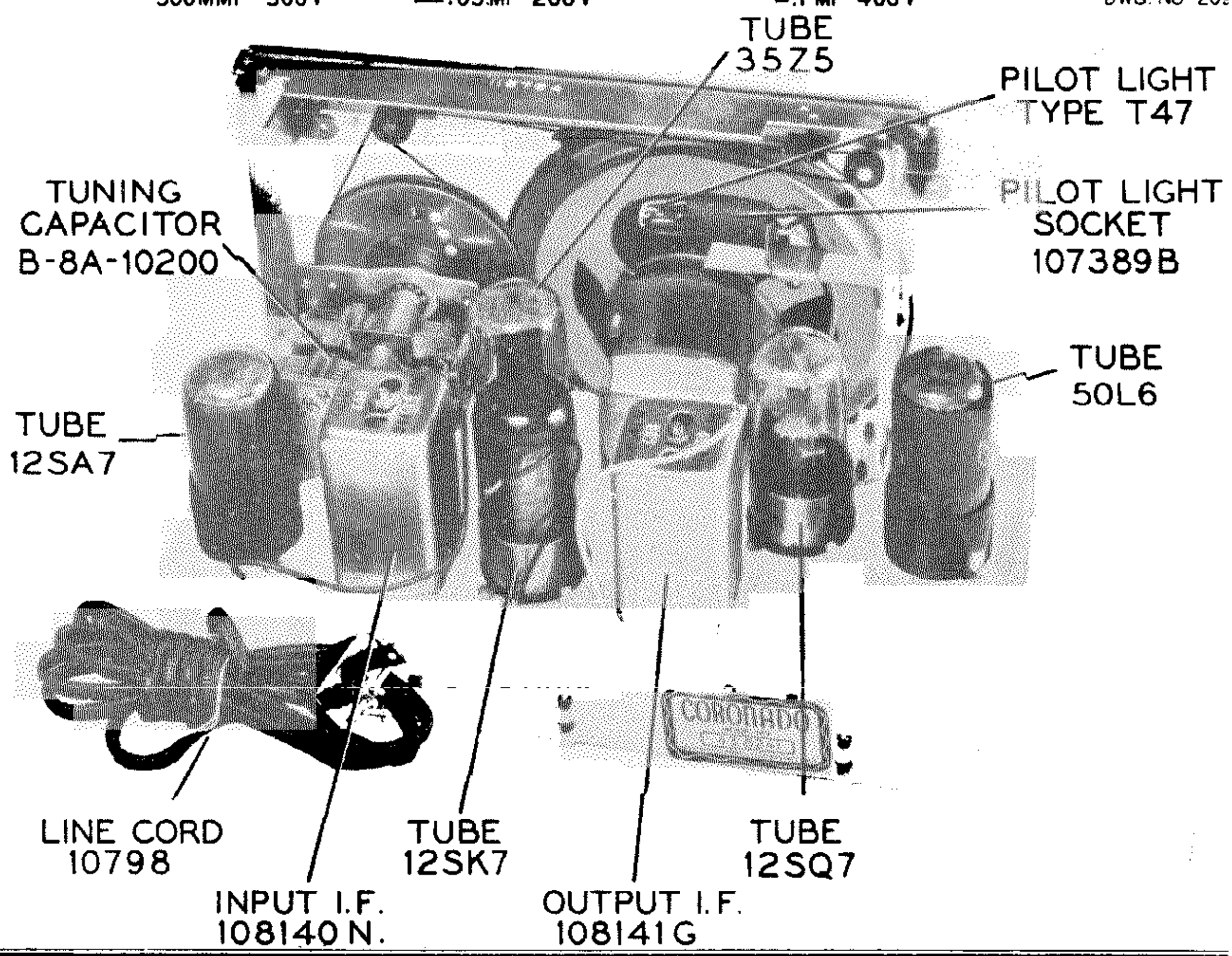
- No aligning adjustments should be attempted until all other possible causes of trouble have been checked.
- The loop antenna should be connected to the radio and in its proper position during all adjustments.
- Turn volume control to maximum (extreme clock-wise) for all adjustments.
- Connect ground post of signal generator to B— of radio through a .1 mfd. condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.

Band	Signal Generator Frequency Setting	Dummy Antenna	Connection to Radio	Tuning Condenser Setting	Adjust for Maximum Output
I.F.	455 Kc.	.1 mfd.	Grid of 12SK7	Rotor full open (plates out of mesh)	2 trimmers on top of output I.F. (see chassis view)
	455 Kc.	.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	2 trimmers on top of input I.F. (see chassis view)
Broadcast	1650 Kc.	.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	Oscillator trimmer C2 on gang (see chassis view)
	1400 Kc.	None	See note below	Set dial at 1400 Kc.	Antenna trimmer C3 (see chassis view)

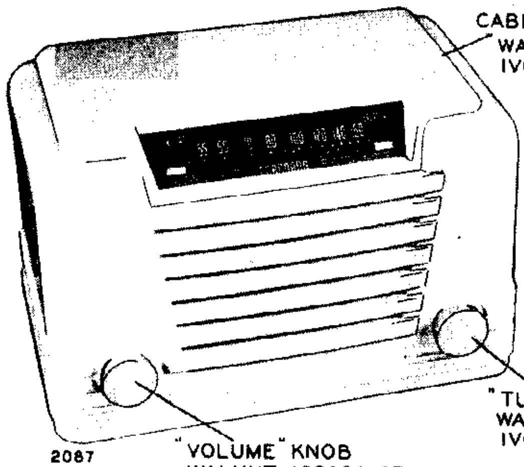
Note: Lay output lead of generator in back of loop antenna. Turn up generator output. Loop antenna will pick up energy.

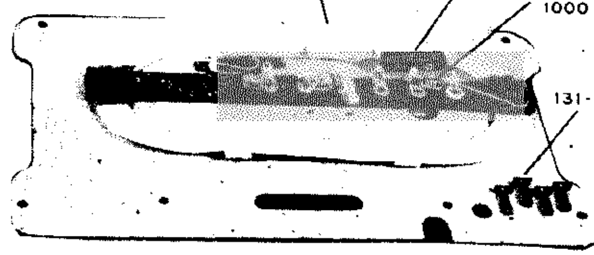
GAMBLE-SKOGMO, INC.

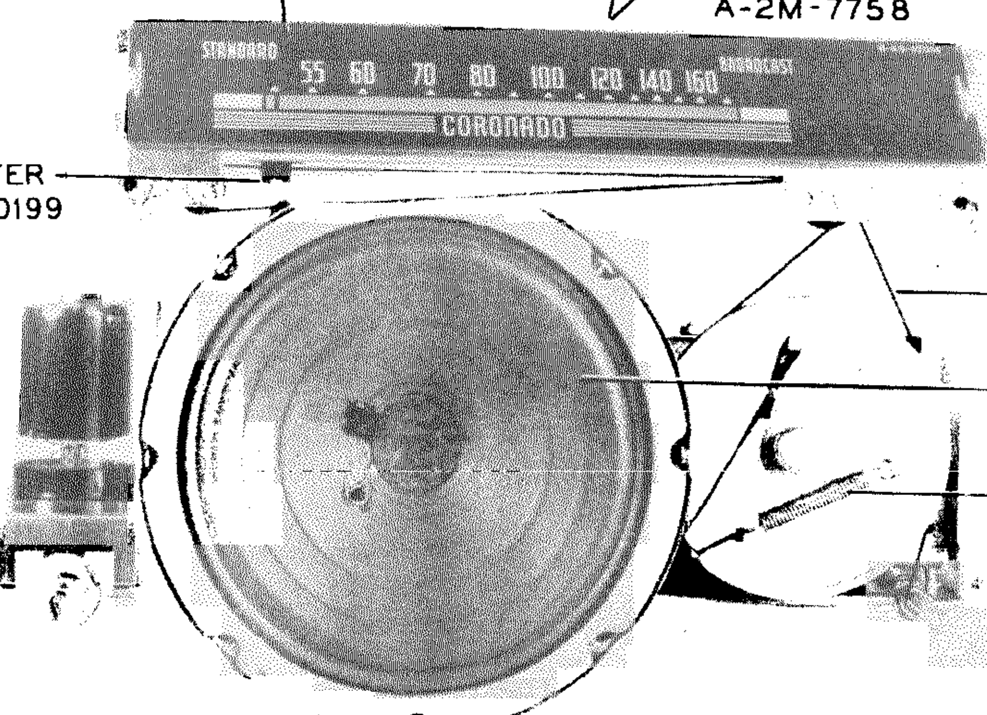




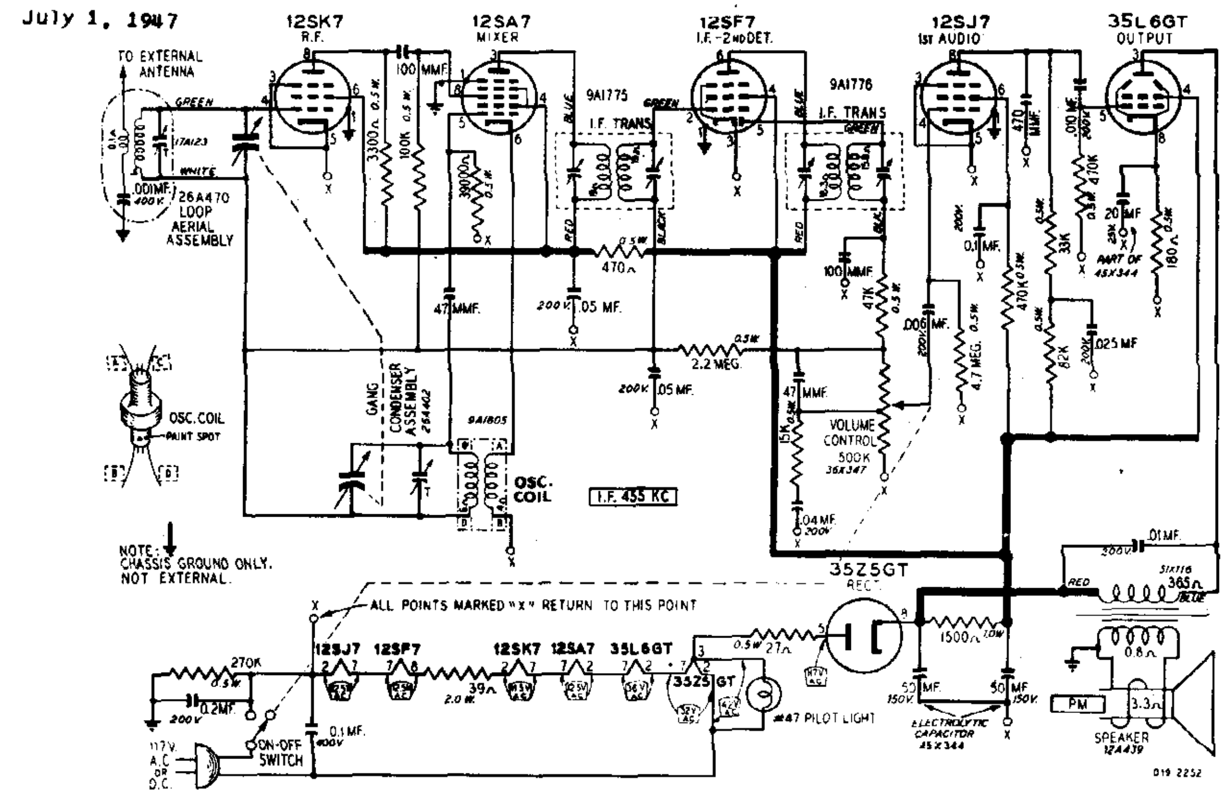
GAMBLE-SKOGMO, INC.







July 1, 1947



IF PEAK 455 KC

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.

Volume Control—Maximum All Adjustments.

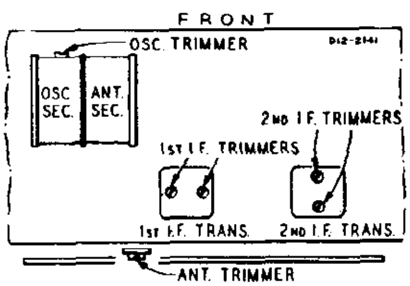
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

Dummy Antennas—.1 mf., 50 mmf.

The equipment in column at right is required aligning:

Signal Generator, which will provide an accura calibrated signal at the test frequencies as lis

Output Indicating Meter; Non-Metallic Screwdr



NOTE A: Index line is on dial background strip. See DIAL CALIBRATION paragraph.

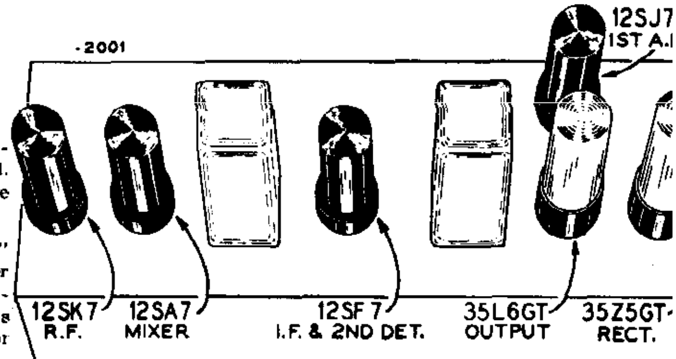
Signal Generator Frequency Setting	Signal Generator Antenna Connection	Ground Connection	Coupling Capacitor	Dial Setting	Adjust Trimmers to Maximum (See Trimmer Illustration)
455 KC	Control Grid 12SF7 - I.F. (Prong No. 2)	Point "X" 12SK7 - R.F. (Prong No. 3)	.1 mf.	1600 KC	2nd I.F. Trimmers
455 KC	Control Grid 12SA7 - 1st Det. (Prong No. 8)	Point "X" 12SK7 - R.F. (Prong No. 3)	.1 mf.	1600 KC	1st I.F. Trimmers
1400 KC	External Antenna Clip on Loop	Point "X" 12SK7 - R.F. (Prong No. 3)	50 mmf.	1400 KC Index Line. See Note A	Oscillator Trimmer
1400 KC	External Antenna Clip on Loop	Chassis	50 mmf.	1400 KC Index Line. See Note A	R-F Trimmer Antenna Trimmer

NOTE A: Index line is on dial background strip. See DIAL CALIBRATION Paragraph.

DIAL CALIBRATION

In order to align the receiver, the dial pointer must be positioned on the dial string correctly with reference to the dial. Index lines are provided on the dial background attached to the chassis bottom plate for this purpose.

To position the dial pointer, adjust the radio to the "stop" position at the low frequency end of the dial. The dial pointer should be directly over the dial pointer index line. (See illustration.) If not, move the pointer on the drive cord until it is directly over the index line. The 1,400 KC index lines are for use when aligning the receiver.

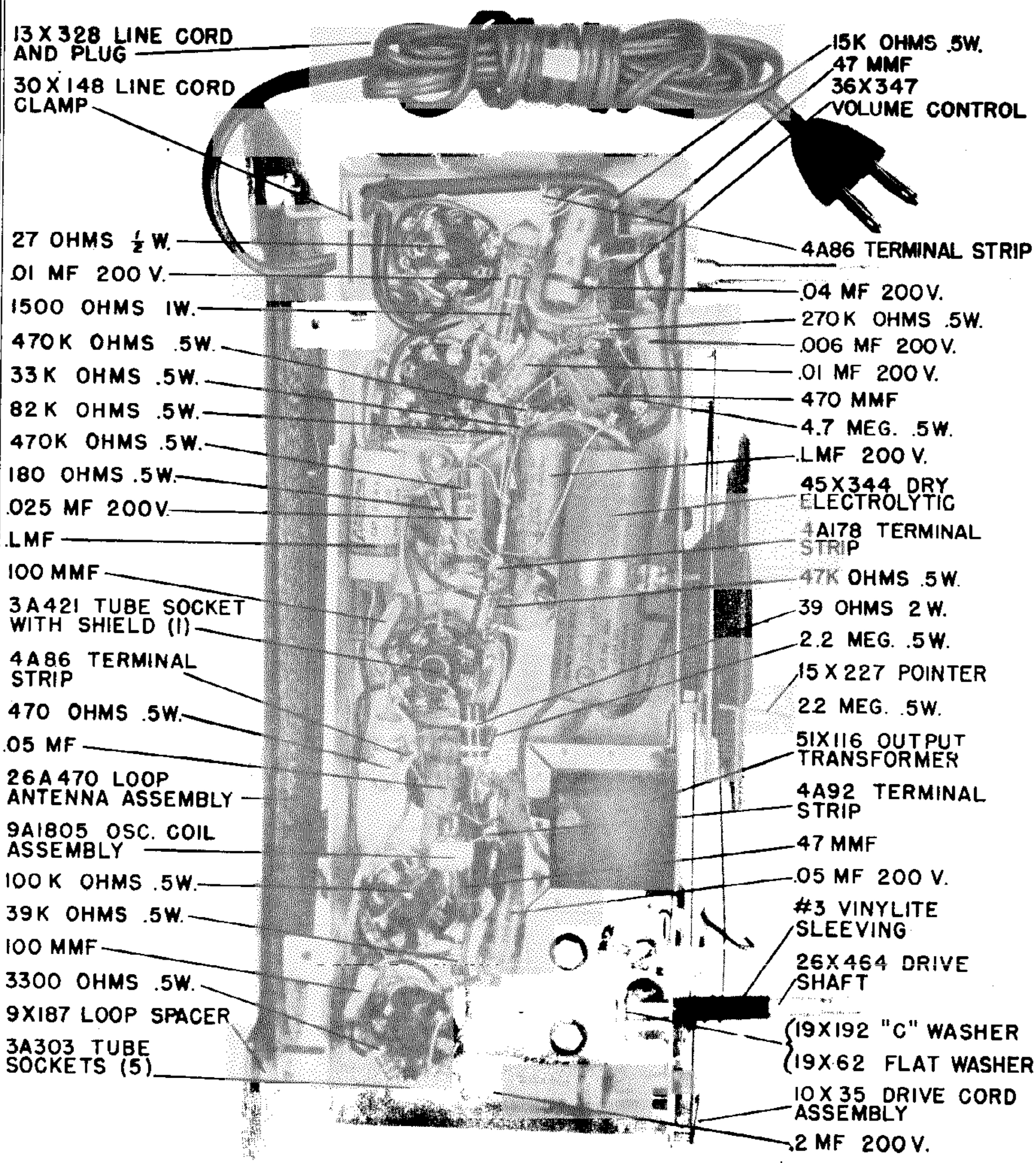


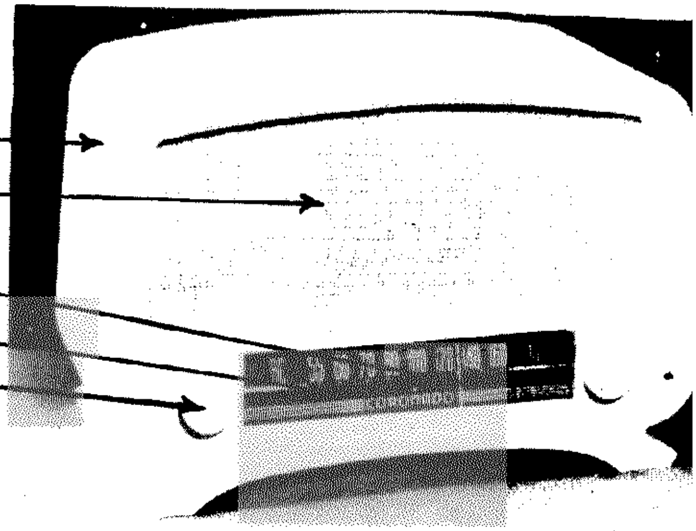
GAMBLE-SKOGMO, INC.

SPECIFICATIONS

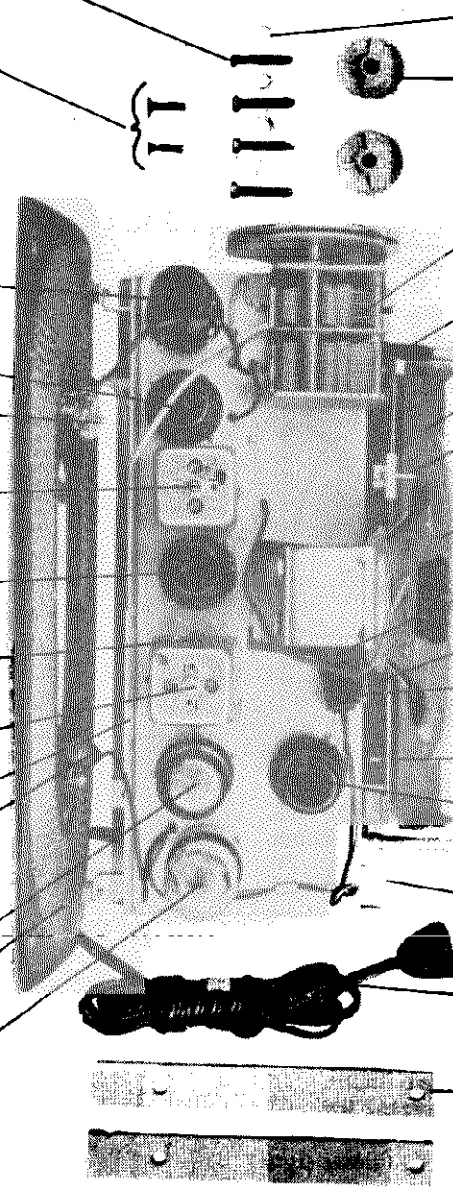
6 Tube Superheterodyne, including Rectifier Tube.
Speaker.............................5-inch PM Dynamic
Intermediate Frequency.........................455 KC
Selectivity.............50 KC Broad at 1,000 Times Signal
Sensitivity (for .05 watt output with external antenna)........................15 microvolts average
Power Consumption............35 watts (at 117 volts AC)
Power Output..1.5 watt maximum, .9 watt (10% harmonics)

BOTTOM CHASSIS VIEW

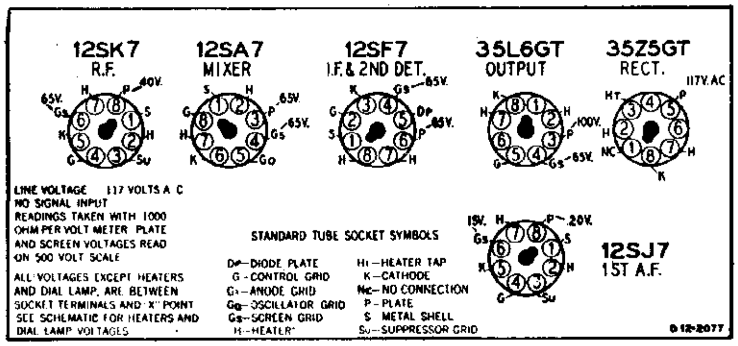


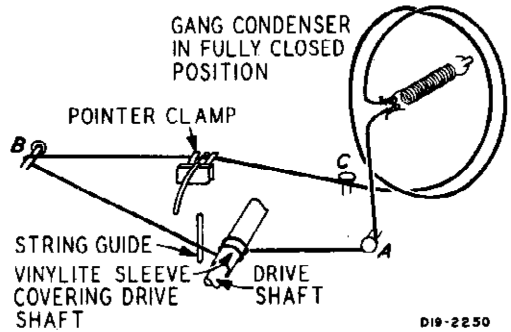


TOP CHASSIS VIEW



GAMBLE-SKOGMO, INC.

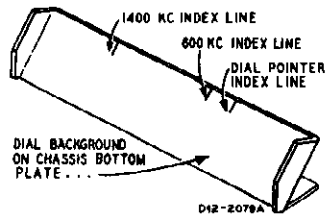


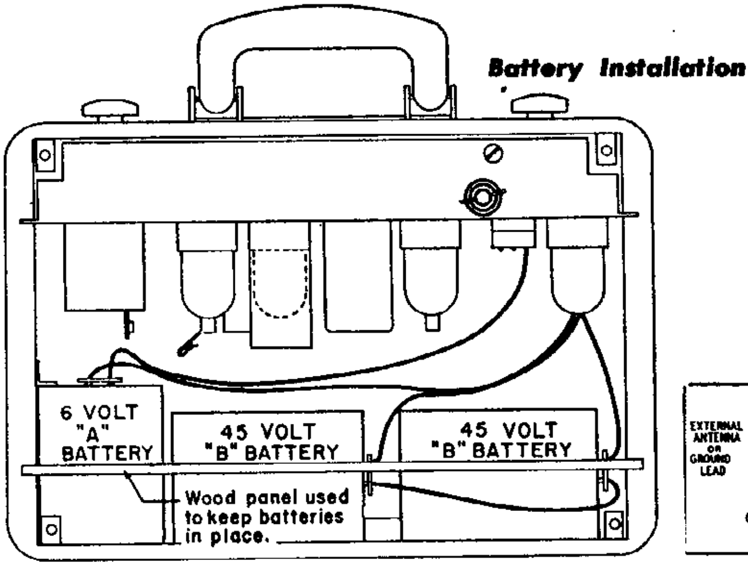


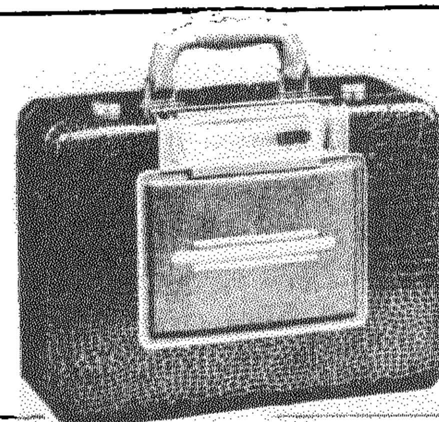
DRIVE CORD REPLACEMENT

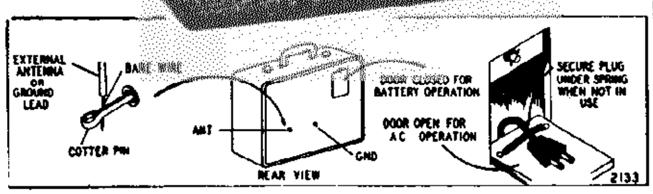
Turn the large drive pulley to the maximum counter-clockwise position. Use a new drive cord and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim and continue around pulley ½ turn counter-clockwise. Pass cord around stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord around studs B and C, then under drive pulley and wind 1½ turns counter-clockwise around drive pulley. Stretch tension spring and fasten free end of cord to spring.

Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.





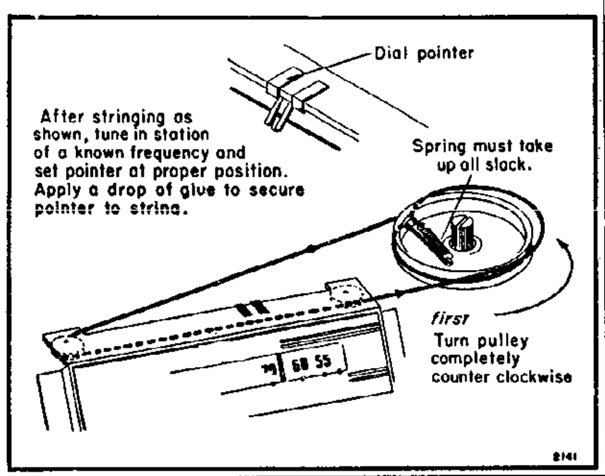




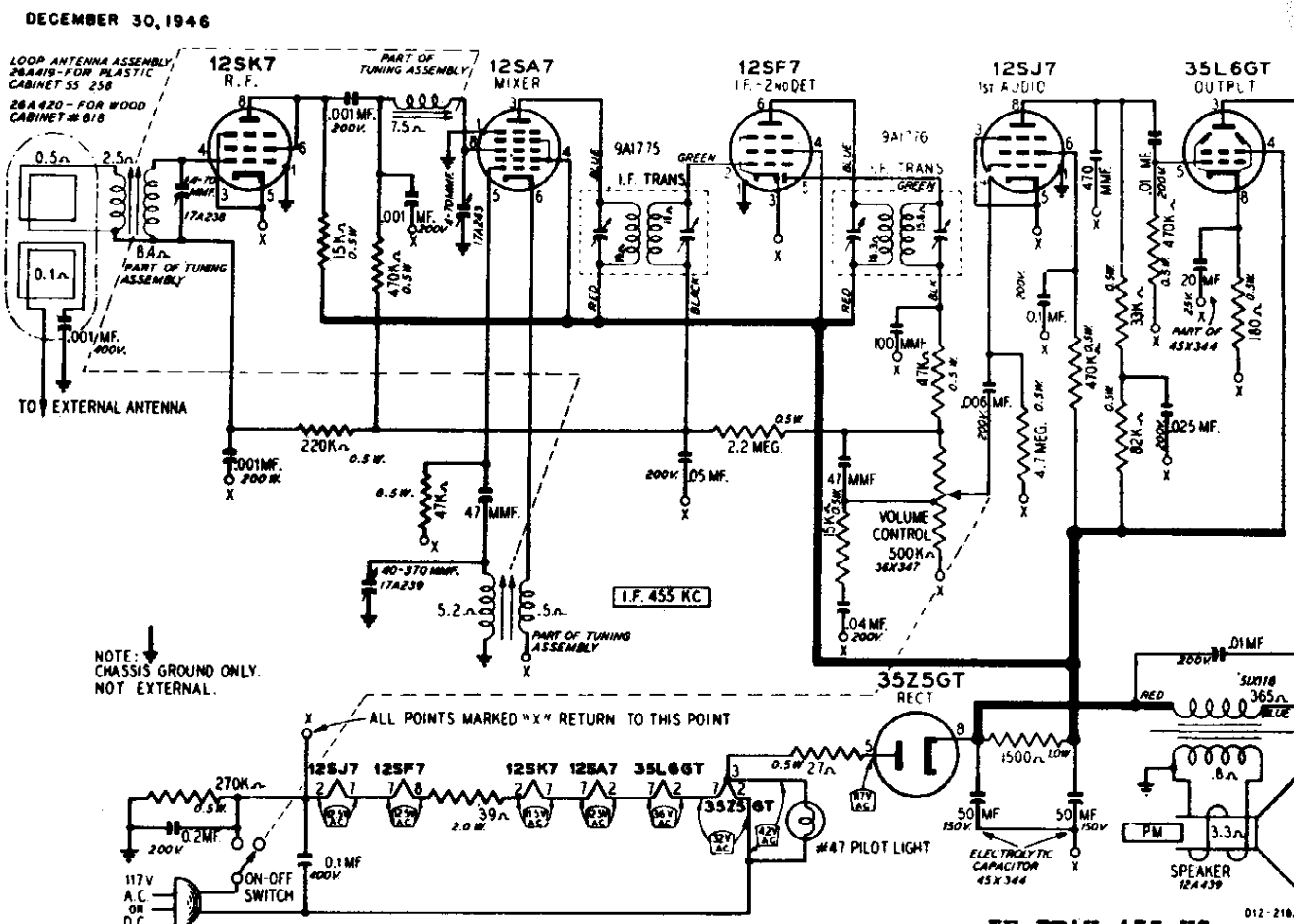
ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, DC or 50-60 cycle AC, 30 watts. Battery: A—6 volts, 58 ma. B—90 volts, 9 ma.
Frequency Range	530 to 1650 kc.
Intermediate Freq.	455 kc.
Tuning	Two-gang capacitor.
Antenna	Built-in loop. Provisions also for external antenna and ground.
Speaker	5-inch; P.M.; voice coil impedance 3.2 ohms.
Power Output	80 milliwatts undistorted. 180 milliwatts maximum.
Sensitivity	30 microvolts average for 50-milliwatt output.
Selectivity	43 kc broad at 1000 times signal at 1000 kc.

DRIVE CORD REPLACEMENT



DECEMBER 30, 1946

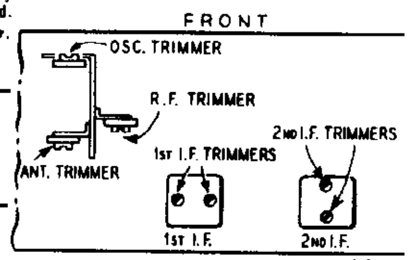


IF PEAK 455 KC

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.
Volume Control—Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.
Dummy Antennas—.1 mf., 50 mmf.

The equipment in column at right is required for aligning:
Signal Generator, which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.

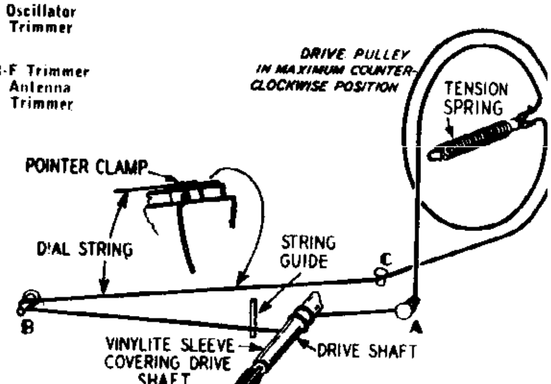


SIGNAL GENERATOR Frequency Setting	Antenna Connection	Ground Connection	Coupling Capacitor	Dial Setting	Adjust Trimmers to Maximum (See Trimmer Illustration)
455 KC	Control Grid 12SF7 - I.F. (Prong No. 2)	Point "X" 12SK7 - R.F. (Prong No. 3)	.1 mf.	1600 KC	2nd I.F. Trimmers
455 KC	Control Grid 12SA7 - 1st Det. (Prong No. 8)	Point "X" 12SK7 - R.F. (Prong No. 3)	.1 mf.	1600 KC	1st I.F. Trimmers
1400 KC	External Antenna Clip on Loop	Point "X" 12SK7 - R.F. (Prong No. 3)	50 mmf.	1400 KC Index Line. See Note A	Oscillator Trimmer
1400 KC	External Antenna Clip on Loop	Chassis	50 mmf.	1400KC Index Line. See Note A	R-F Trimmer Antenna Trimmer

DRIVE CORD REPLACEMENT

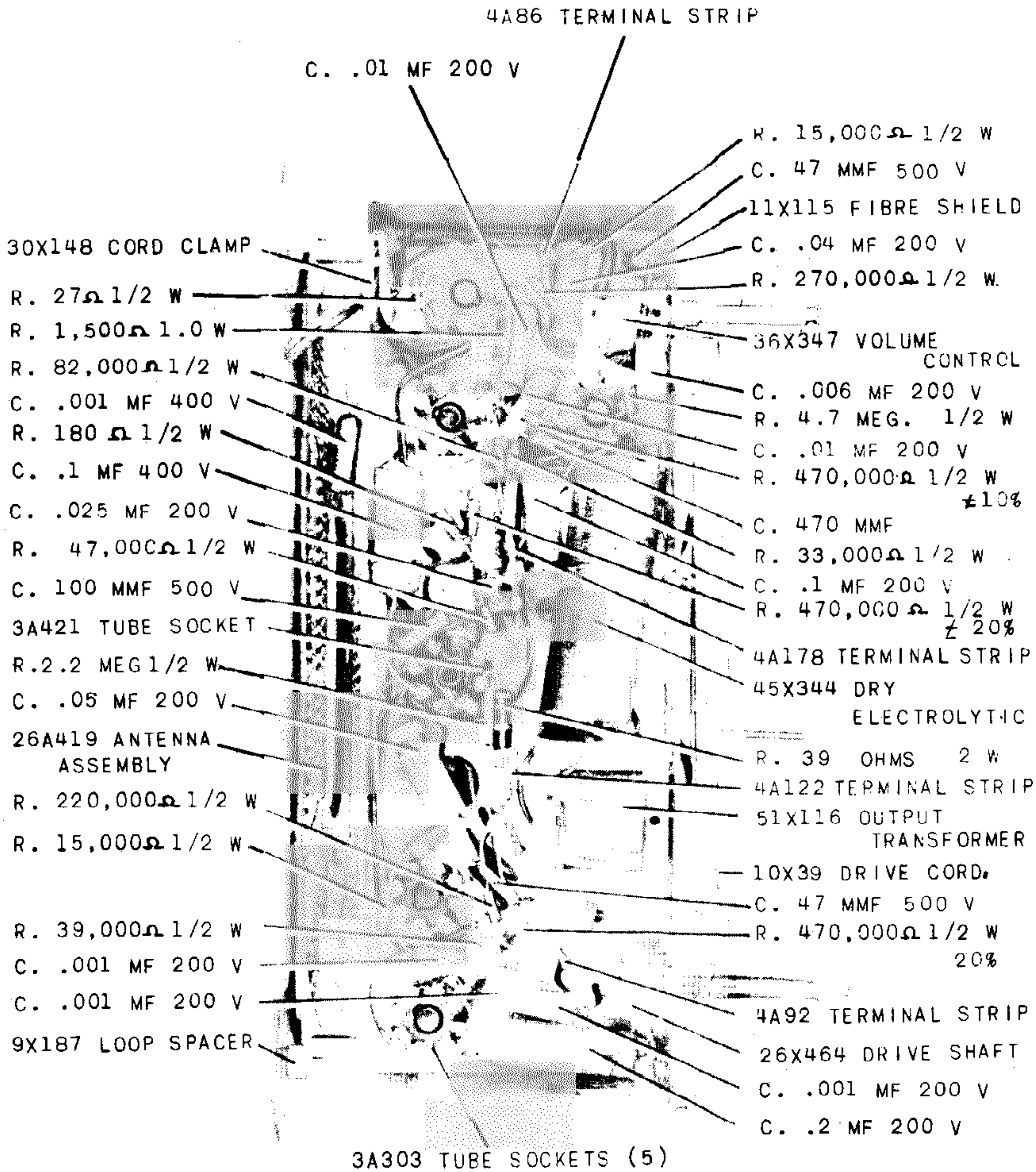
Turn the large drive pulley to the maximum counter-clockwise position. Use a new drive cord and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim and continue around pulley ½ turn counter-clockwise. Pass cord around stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord around studs B and C, then under drive pulley and wind 1¼ turns counter-clockwise around drive pulley. Stretch tension spring and fasten free end of cord to spring.

Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.



MODEL 43-8312

GAMBLE-SKOGMO, INC.

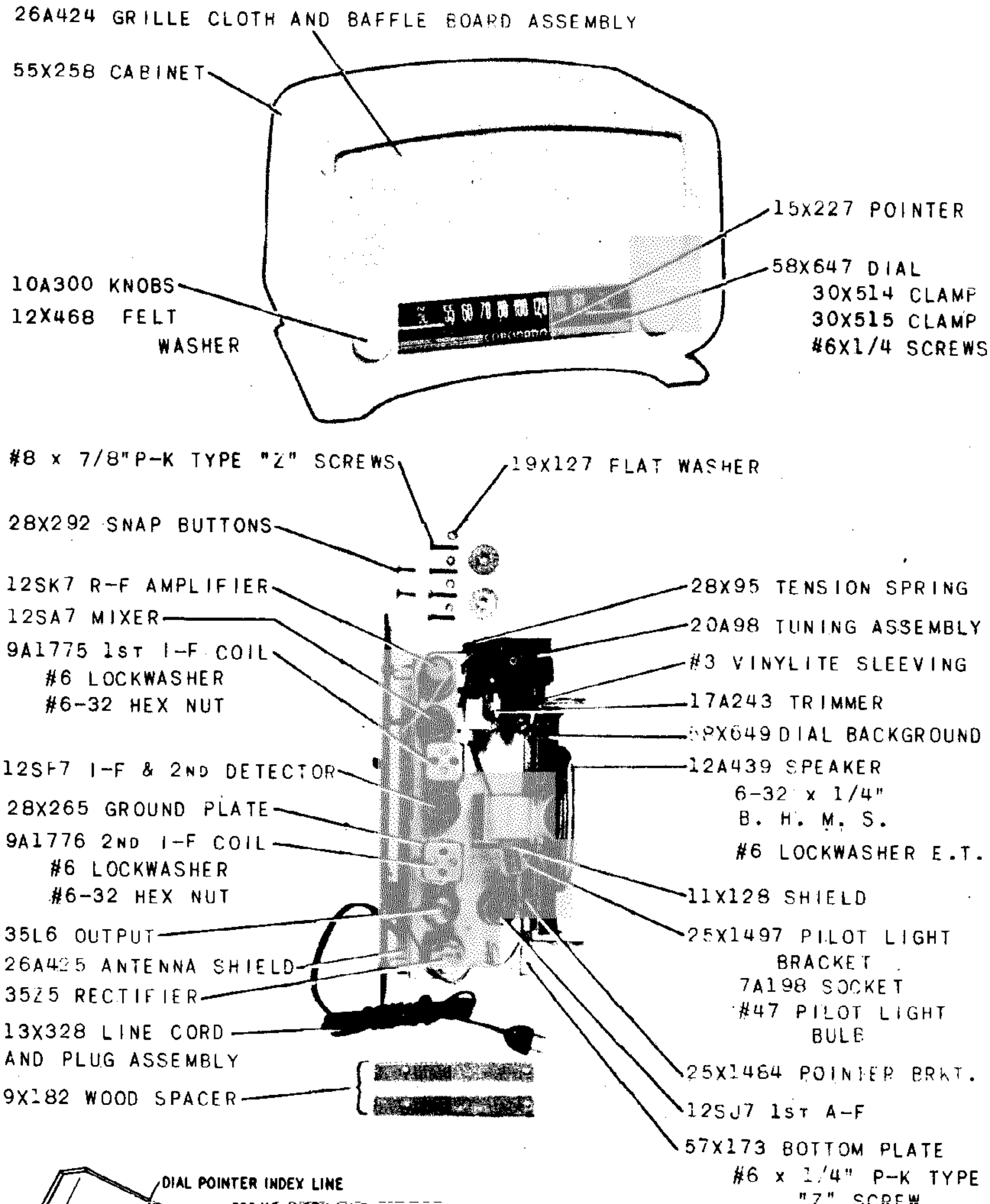


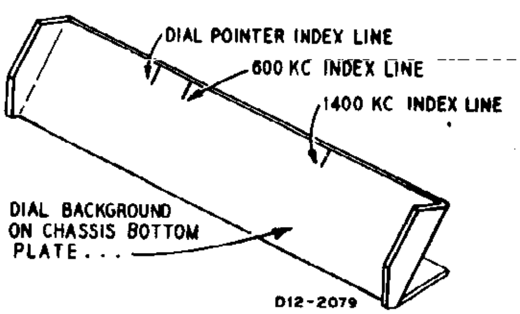
SPECIFICATIONS

6 Tube Superheterodyne, including Rectifier Tube.
Speaker..............................5-inch PM Dynamic
Intermediate Frequency..........................455 KC
Selectivity............50 KC Broad at 1,000 Times Signal

Sensitivity (for .05 watt output with external antenna).........................15 microvolts average
Power Consumption............35 watts (at 117 volts AC)
Power Output..1.5 watt maximum, .9 watt (10% harmonics)

GAMBLE-SKOGMO, INC.





DIAL CALIBRATION

In order to align the receiver, the dial pointer must be positioned on the dial string correctly with reference to the dial. Index lines are provided on the dial background attached to the chassis bottom plate for this purpose.

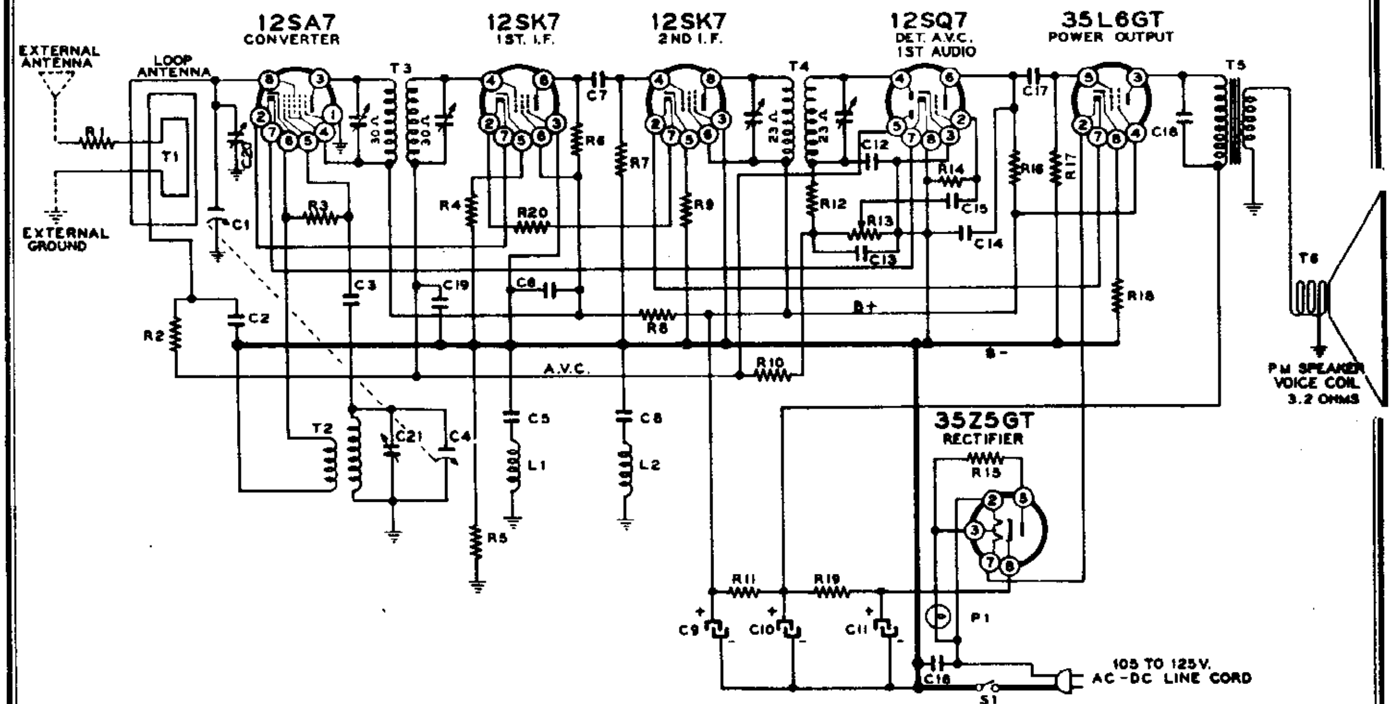
To position the dial pointer, adjust the radio to the "stop" position at the low frequency end of the dial. The dial pointer should be directly over the dial pointer index line. (See illustration.) If not, move the pointer on the drive cord until it is directly over the index line. The 1,400 KC index lines are for use when aligning the receiver.

MODELS 43-8351, 43-8352

GAMBLE-SKOGMO, INC.

DECEMBER 18, 1946

IF PEAK 455 KC



SCHEMATIC DIAGRAM LEGEND

RESISTORS

R1	1000 ohms, 20%, ½ watt
R2	150,000 ohms, 20%, ½ watt
R3	22,000 ohms, 20%, ½ watt
R4	100 ohms, 10%, ½ watt
R5	150,000 ohms, 20%, ½ watt
R6	10,000 ohms, 10%, ½ watt
R7	470,000 ohms, 20%, ½ watt
R8	1000 ohms, 10%, ½ watt
R9	220 ohms, 10%, ½ watt
R10	3.3 megohms, 20%, ½ watt
R11	1200 ohms, 10%, 1 watt
R12	100,000 ohms, 20%, ½ watt
R13	1 megohm, vol.cont. & switch
R14	4.7 megohms, 20%, ½ watt
R15	22 ohms, 10%, ½ watt
R16	220,000 ohms, 20%, ½ watt
R17	1 megohm, 20%, ½ watt
R18	150 ohms, 10%, ½ watt
R19	220 ohms, 10%, 1 watt
R20	33 ohms, 10%, 1 watt

CONDENSERS

C1	Antenna section of gang
C2	.05 x 200 volts, 25%
C3	.0001 mica, 20%
C4	Oscillator section of gang
C5	.2 x 400 volts, +80%, −10%
C6	.1 x 200 volts, 25%
C7	.0001, mica, 20%
C8	.02 x 400 volts, 25%
C9	Electrolytic, 20 x 150 volts
C10	Electrolytic, 20 x 150 volts
C11	Electrolytic, 40 x 150 volts NOTE: C9, C10, and C11 are in one unit.
C12	.0001, mica, 20%
C13	.0001, mica, 20%
C14	.0001, mica, 20%
C15	.002 x 600 volts, 25%
C16	.1 x 400 volts, +50%, −10%
C17	.02 x 400 volts, 25%
C18	.02 x 400 volts, 25%
C19	.05 x 200 volts, 25%
C20	Antenna trimmer
C21	Oscillator trimmer

MISCELLANEOUS

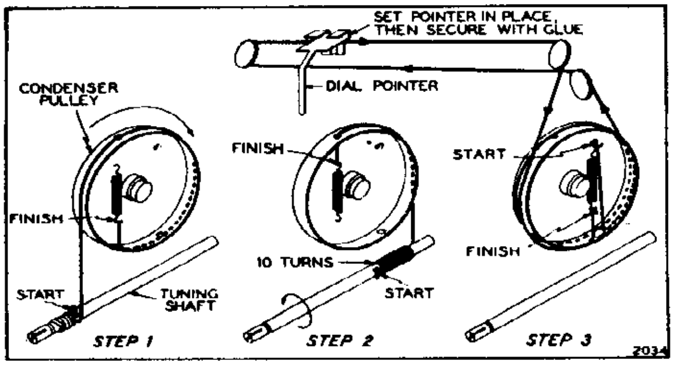
L1	I.F. filter choke
L2	Filter choke
P1	Pilot light, 6-8 volts, type T-47
T1	Loop antenna.
T2	Oscillator coil
T3	Input I.F. coil
T4	Output I.F. coil
T5	Output transformer
T6	4" x 6" oval P.M. speaker

SPECIFICATIONS

6 Tube Superheterodyne, including rectifier tube

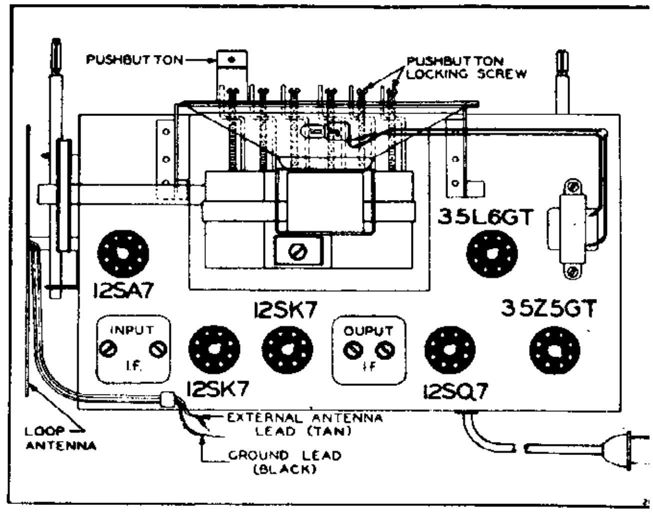
Power Consumption........35 w.
Power Output........0.74 w. undistorted, 0.9 w. maximum
Selectivity........51 kc. broad at 1,000 times signal at 1,000 kc.
Antenna........Built-in loop, also provision for external antenna and ground
Intermediate Frequency........455 kc.
Speaker........4x6 in. 1 oz. P.M. voice coil imp. 3.2 ohms
Tuning........Two-gang capacitor, 6 pushbutton
Sensitivity........18 mv. avg. for 50 mw. output
Frequency Range........535 to 1,720 kc.
Power Supply........105-125 v. D.C., 50-60 cycle A.C., also made for 25 cycles
Output Transformer........Impedance ratio 3,500:3.2

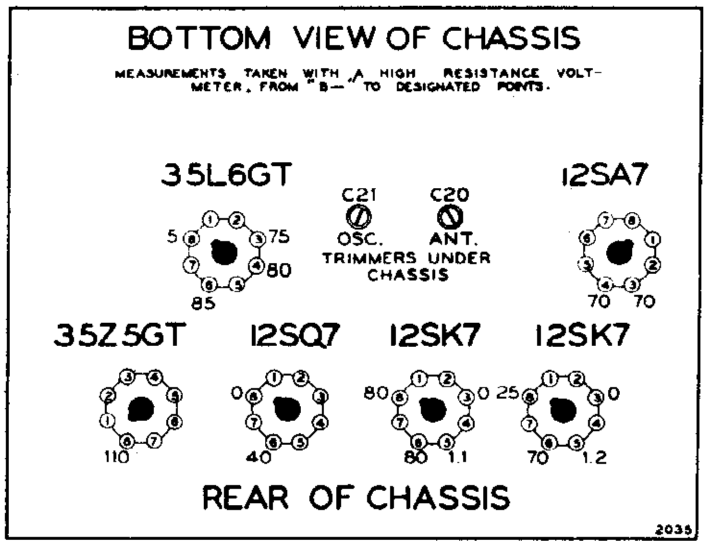
DRIVE CORD REPLACEMENT



1. Steps 1 and 2 are for tuning shaft, step 3 for dial pointer.
2. Direction and number of turns must be as illustrated.
3. In step 1, first turn condenser pulley to extreme clockwise position (viewing it as shown).
4. In step 3, after installing string, tune to known station and set dial pointer at proper position along dial before glueing.

CHASSIS VIEW





ALIGNMENT PROCEDURE

- No alignment adjustments should be attempted until all other causes of trouble have been checked.
- It is important that during alignment the loop antenna be maintained at the same distance from the chassis as when the chassis is installed in the cabinet.
- Align for maximum output. Reduce input as needed t keep output near 0.4 volts.
- Connect output meter across 3.2-ohm output load (re sistor may be substituted for voice coil).
- Turn volume control to maximum for all adjustments.

Band	Signal Generator Frequency	Dummy Antenna	Connection to Radio	Ground Connection	Tuning Capacitor Setting	Adjust for Maximum Outpu (in order shown)
I.F.	455 kc	.1 mf	Pin 4 of 12SK7 2nd I.F.	B—*	Rotor full open (plates out of mesh)	Two trimmers on top output I.F. transforn
	455 kc	.1 mf	Pin 8 of 12SA7	B—*	Rotor full open (plates out of mesh)	Two trimmers on top input I.F. transform
BROADCAST	1720 kc	.1 mf	Pin 8 of 12SA7	B—*	Rotor full open (plates out of mesh)	)scillator trimmer C (see tube socket view
	1400 kc	200 mmf	External antenna lead	External ground lead	Set dial at 1400 kc	Antenna trimmer C: (see tube socket view

*Insert a .1 mf capacitor between ground post of signal generator and B— of set.

MODELS 43-8351
43-8352

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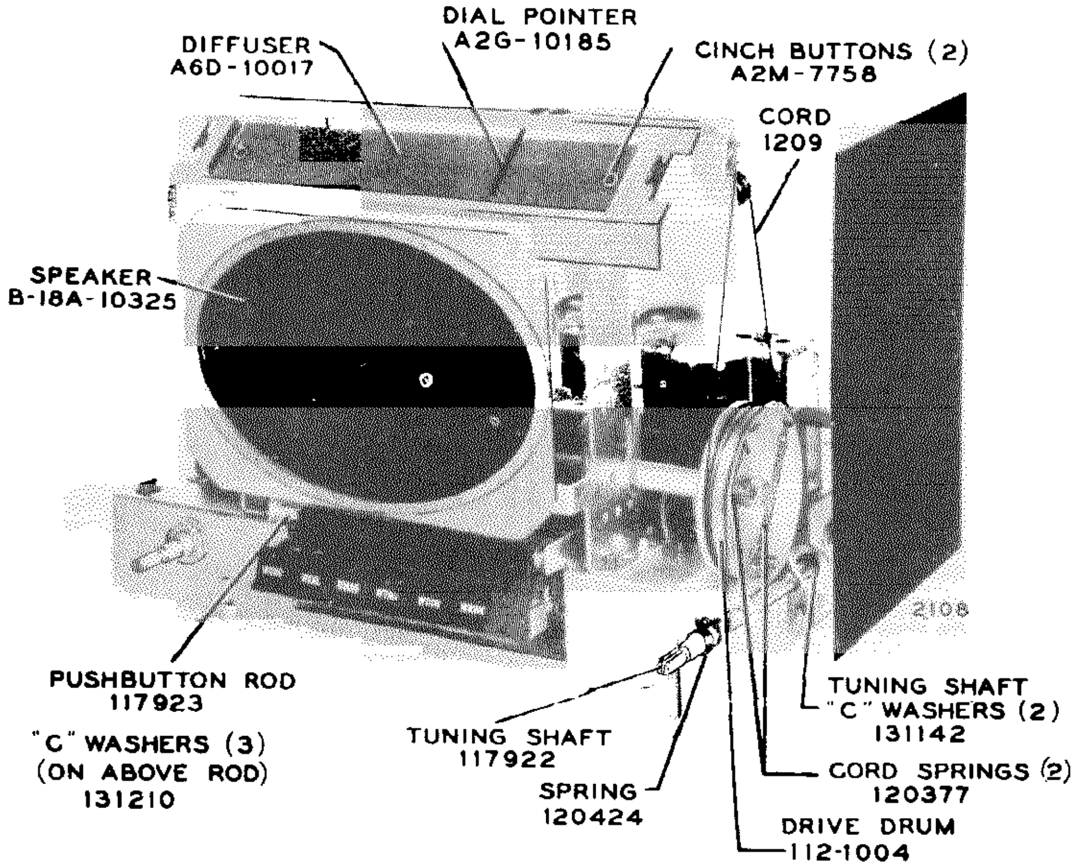

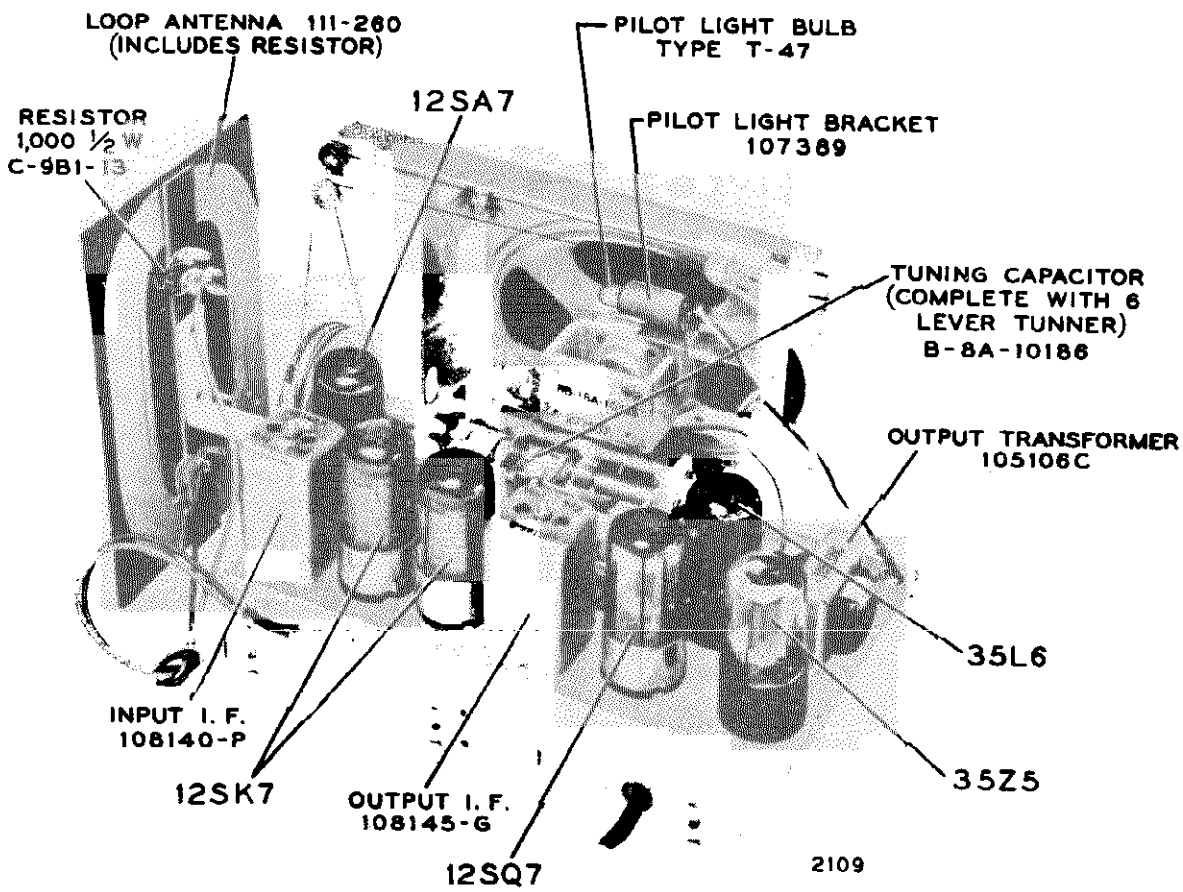

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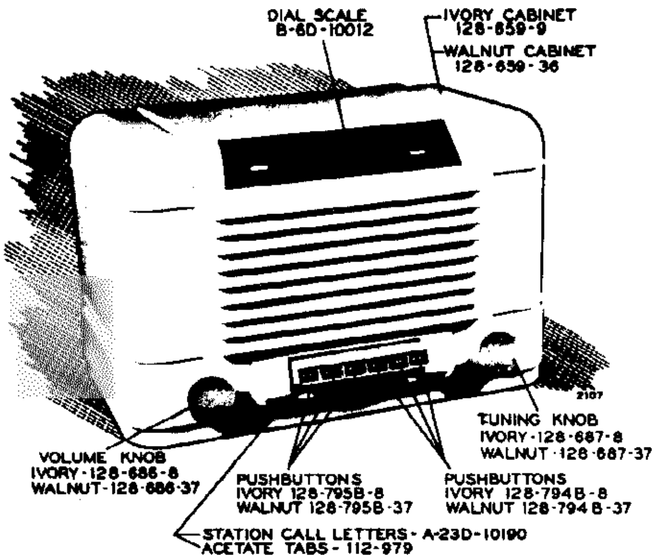
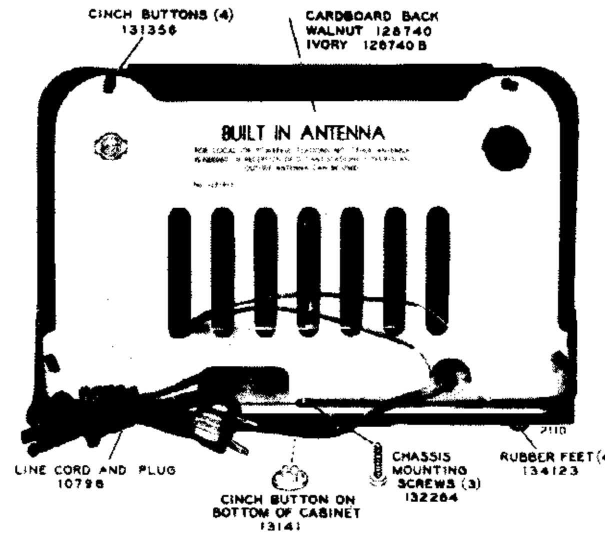
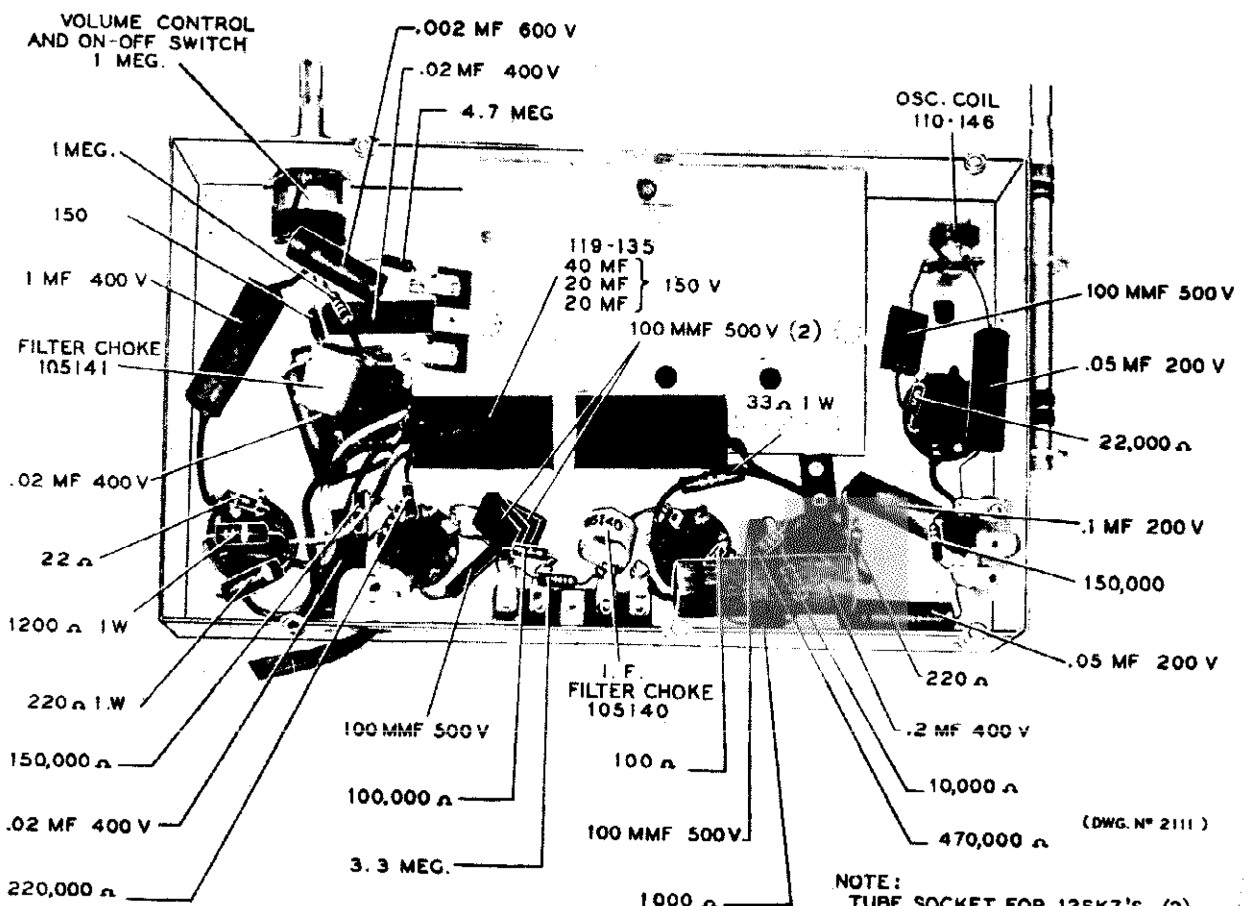






NOTE:
TUBE SOCKET FOR 12SK7'S (2) 121-171
TUBE SOCKETS FOR OTHER TUBES. (4) 121-210

MODEL 43-8470

GAMBLE-SKOGMO, INC.

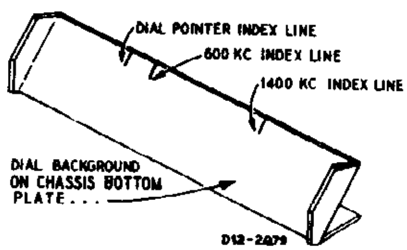
SPECIFICATIONS

6 Tube Superheterodyne, including rectifier tube
Power Consumption.................................35 w. (at 117 v. A.C.)
Power Output..........................1.5 w. maximum .9 w. (10% harmonics)
Selectivity...............................50 kc. broad at 1,000 times signal
Intermediate Frequency...455 kc.
Speaker..5 inch P.M. dynamic
Tuning Frequency Range......................................540 to 1,600 kc.
Sensitivity..............(for .05 w. output with external antenna) 15 mv. avg.

DIAL CALIBRATION

In order to align the receiver, the dial pointer must be positioned on the dial string correctly with reference to the dial. Index lines are provided on the dial background attached to the chassis bottom plate for this purpose.

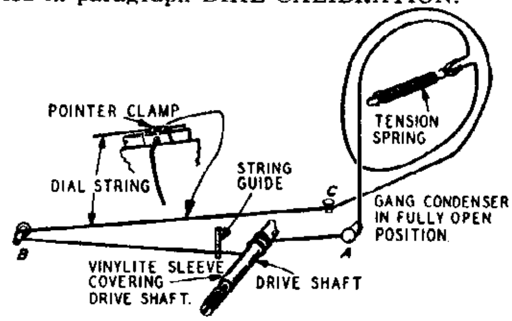
To position the dial pointer, turn the gang condenser to the fully closed position. The dial pointer should be directly over the dial pointer index line. (See illustration). The 600 KC and 1400 KC index lines are for use when aligning the receiver.

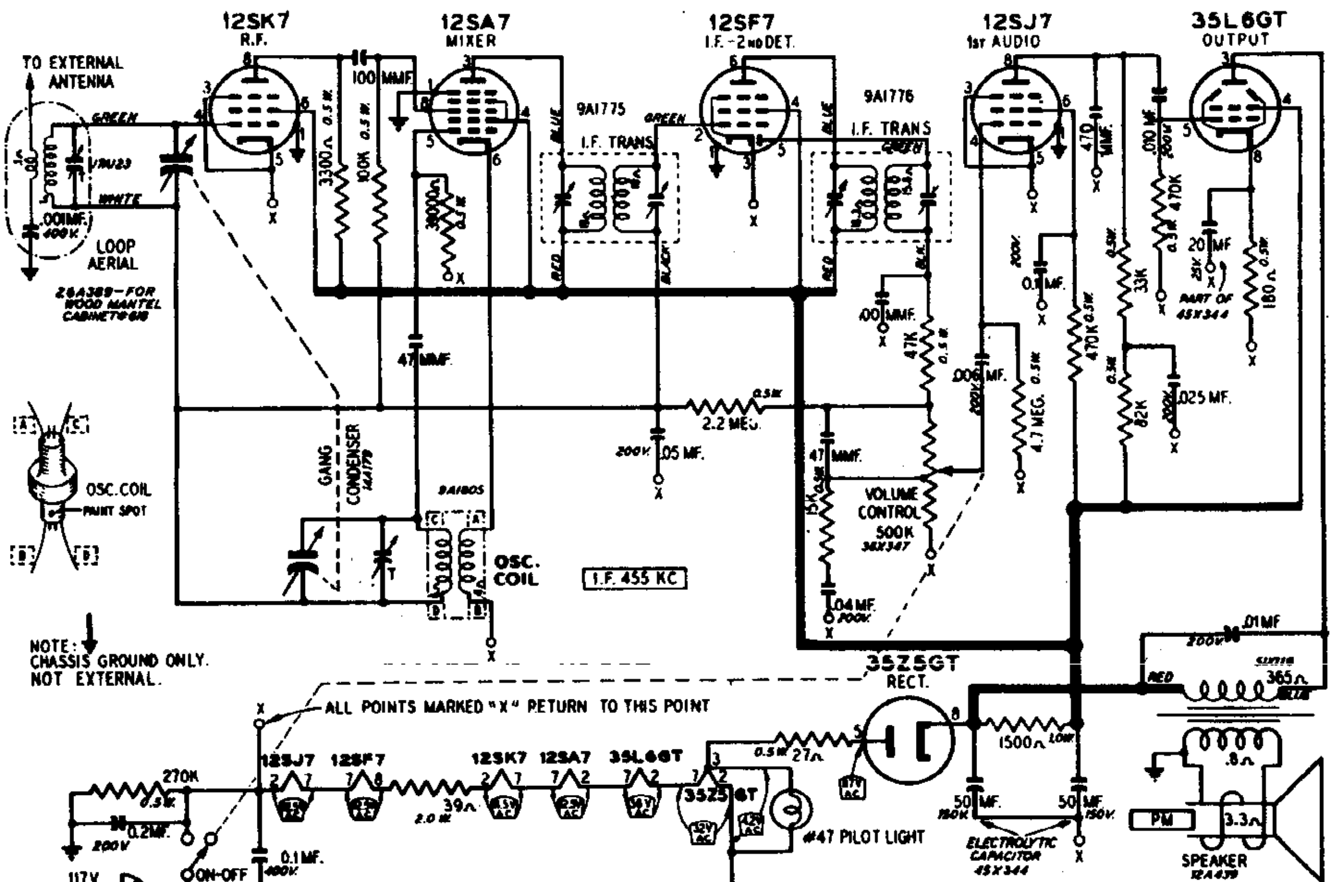


DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully open position. Use a new drive cord and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim and continue around pulley ½ turn counterclockwise. Pass cord around stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord around studs B and C, then under drive pulley and wind 1½ turns counterclockwise around drive pulley. Stretch tension spring and fasten free end of cord to spring.

Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.





DECEMBER 18, 1946

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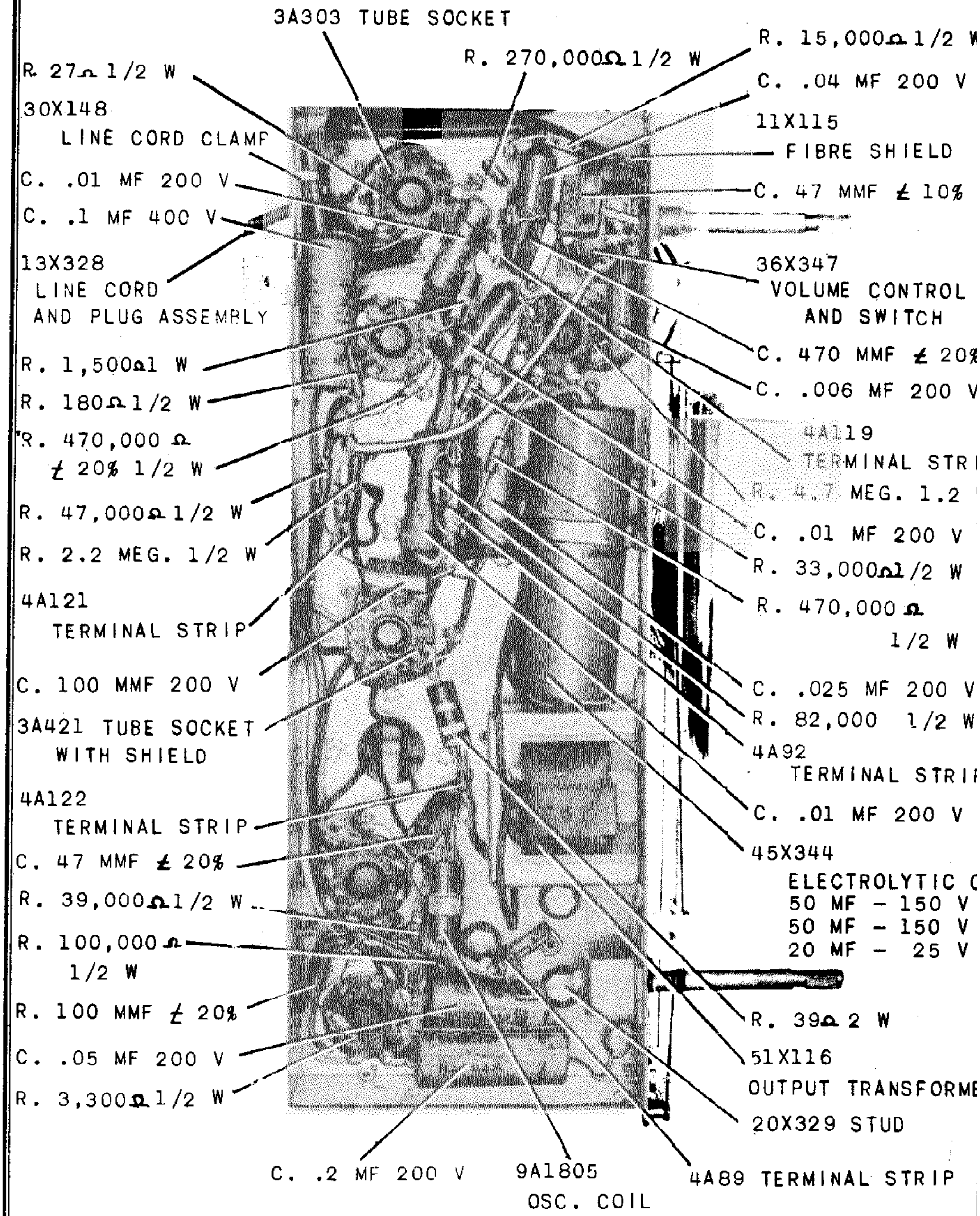
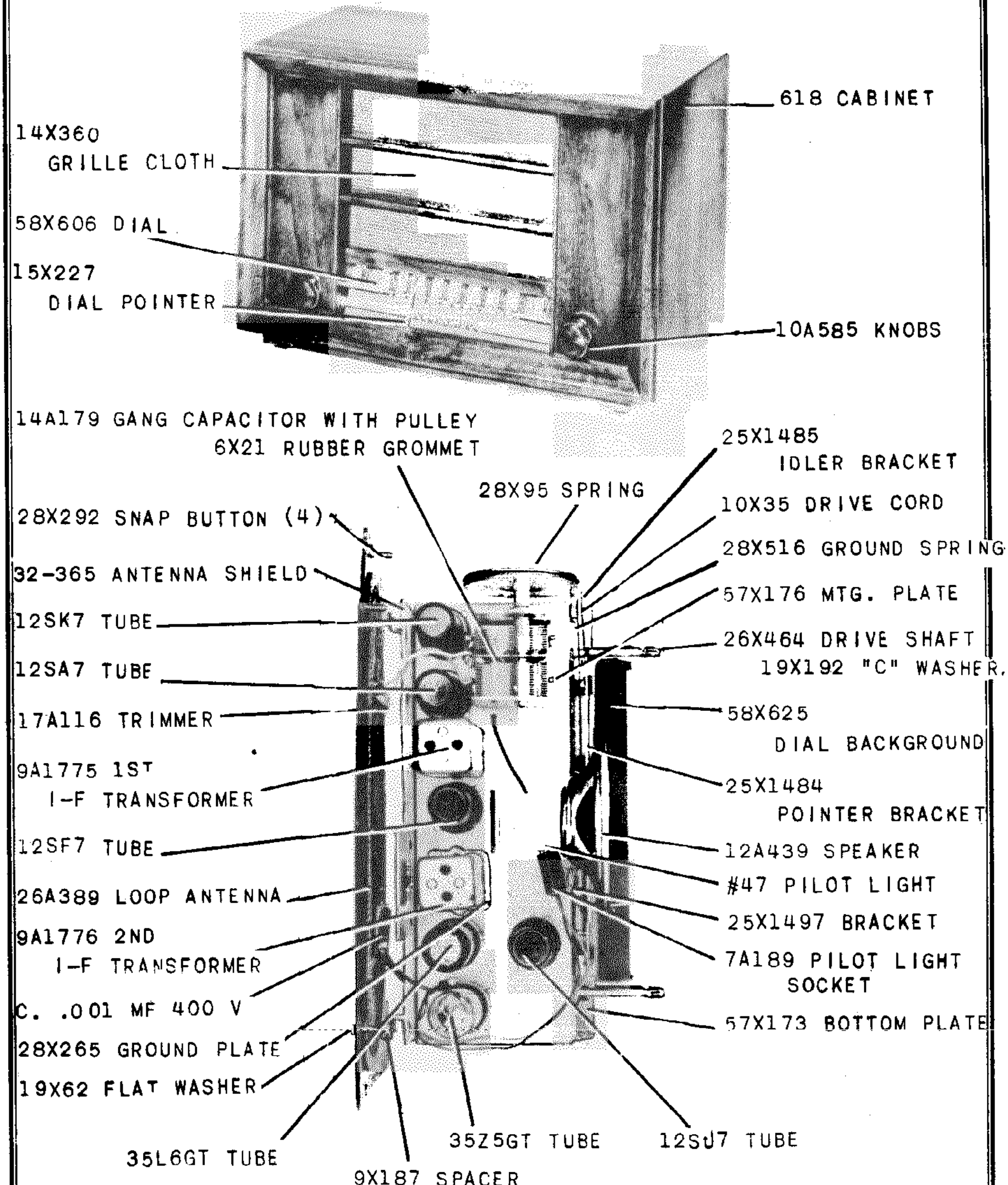



618 CABINET
14X360 GRILLE CLOTH
58X606 DIAL
15X227 DIAL POINTER
10A585 KNOBS
14A179 GANG CAPACITOR WITH PULLEY
6X21 RUBBER GROMMET
25X1485 IDLER BRACKET
28X95 SPRING
10X35 DRIVE CORD
28X292 SNAP BUTTON (4)
28X516 GROUND SPRING
32-365 ANTENNA SHIELD
57X176 MTG. PLATE
12SK7 TUBE
26X464 DRIVE SHAFT
19X192 "C" WASHER.
12SA7 TUBE
58X625 DIAL BACKGROUND
17A116 TRIMMER
9A1775 1ST I-F TRANSFORMER
25X1484 POINTER BRACKET
12SF7 TUBE
12A439 SPEAKER
#47 PILOT LIGHT
26A389 LOOP ANTENNA
25X1497 BRACKET
9A1776 2ND I-F TRANSFORMER
7A189 PILOT LIGHT SOCKET
C. .001 MF 400 V
57X173 BOTTOM PLATE
28X265 GROUND PLATE
19X62 FLAT WASHER
35Z5GT TUBE
12SJ7 TUBE
35L6GT TUBE
9X187 SPACER

GAMBLE-SKOGMO, INC.

MODEL 43-8470

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.
Volume Control—Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for several Minutes.
The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 50 mmf.

SIGNAL GENERATOR FREQUENCY SETTING	ANTENNA CONNECTION	GROUND CONNECTION	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration)
455 KC	Control Grid 12SF7—I.F. (Prong No. 2)	Point "X" 12SK7—R.F. (Prong No. 3)	.1 mf.	Turn Rotor to full open	2nd I.F. Trimmers
455 KC	Control Grid 12SA7—1st Det. (Prong No. 8)	Same As Above	.1 mf.	Turn Rotor to full open	1st I.F. Trimmers
1400 KC	External Antenna Clip on Loop	Same As Above	50 mmf.	Turn Rotor to 1400 KC Index Line. See Note A	Oscillator Trimmer
1400 KC	External Antenna Clip on Loop	Chassis	50 mmf.	Turn Rotor to 1400 KC Index Line. See Note A	Antenna Trimmer

MODEL 43-8471

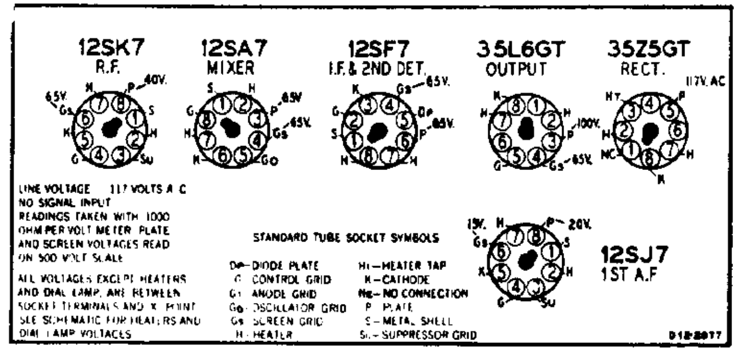
ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.
Volume Control—Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

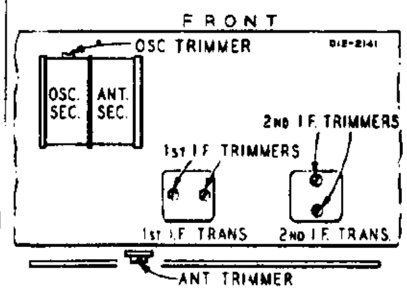
The equipment in column at right is required for aligning:
Signal Generator, which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 50 mmf.

SIGNAL GENERATOR Frequency Setting	Antenna Connection	Ground Connection	Coupling Capacitor	Dial Setting	Adjust Trimmers to Maximum (See Trimmer Illustration)
455 KC	Control Grid 12SF7 - I.F. (Prong No. 2)	Point "X" 12SK7 - R.F. (Prong No. 3)	.1 mf.	1600 KC	2nd I.F. Trimmers
455 KC	Control Grid 12SA7 - 1st Det. (Prong No. 8)	Point "X" 12SK7 - R.F. (Prong No. 3)	.1 mf.	1600 KC	1st I.F. Trimmers
1400 KC	External Antenna Clip on Loop	Point "X" 12SK7 - R.F. (Prong No. 3)	50 mmf.	1400 KC Index Line. See Note A	Oscillator Trimmer
1400 KC	External Antenna Clip on Loop	Chassis	50 mmf.	1400KC Index Line. See Note A	R-F Trimmer Antenna Trimmer

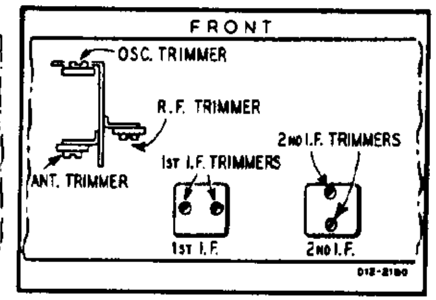
MODEL 43-8470



MODEL 43-8470

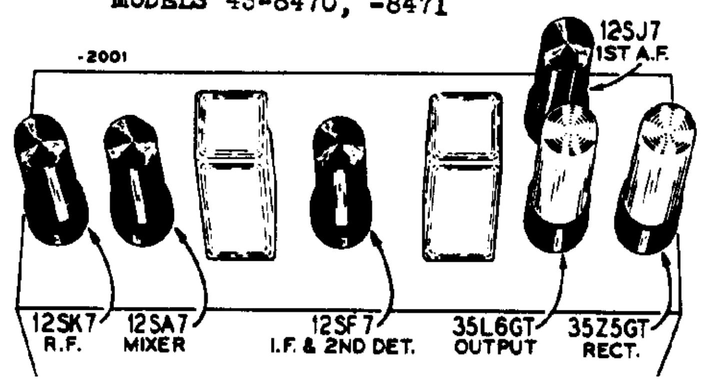


MODEL 43-8471



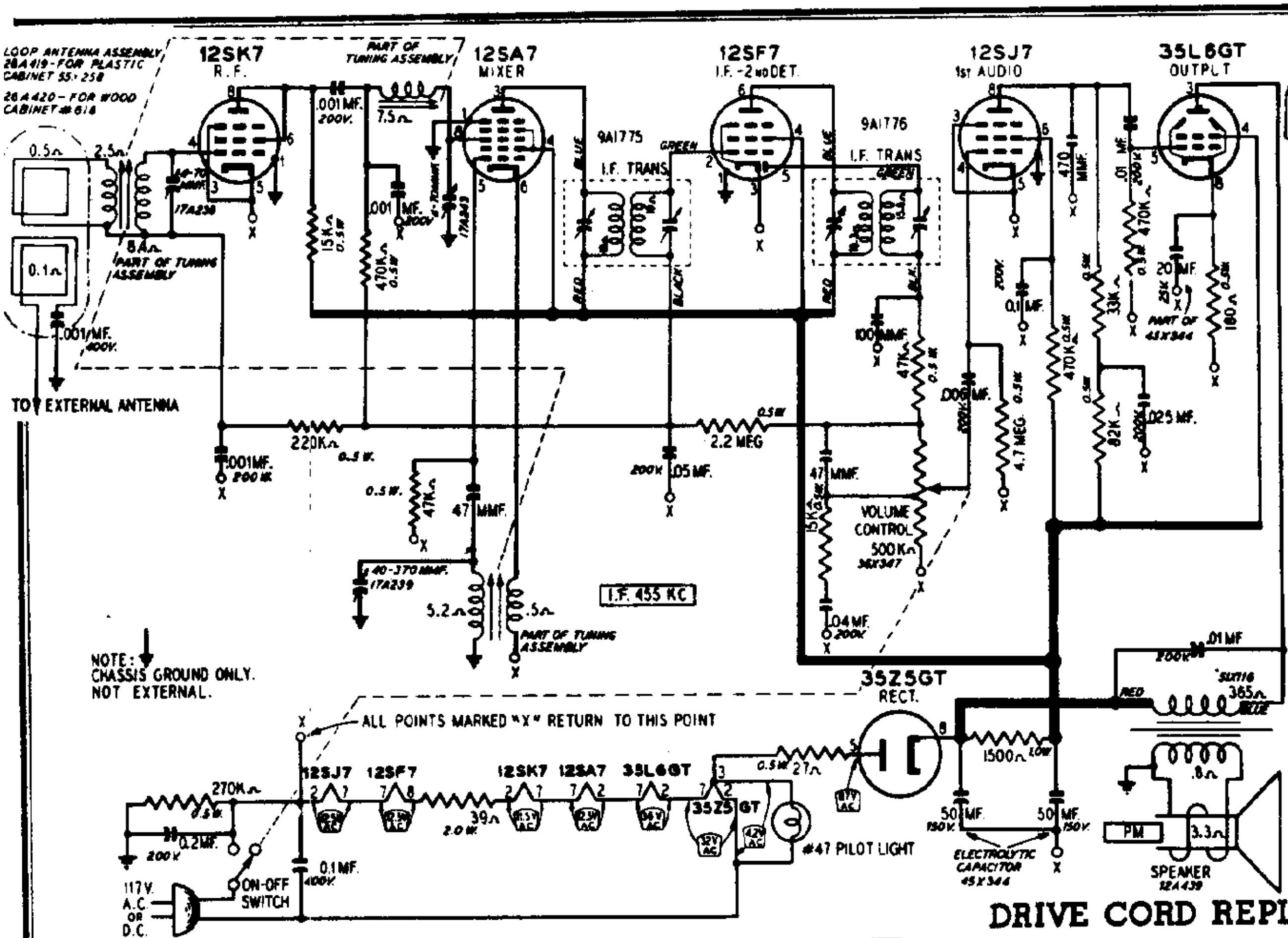
NOTE A: Index line is on dial background strip. See DIAL CALIBRATION paragraph.

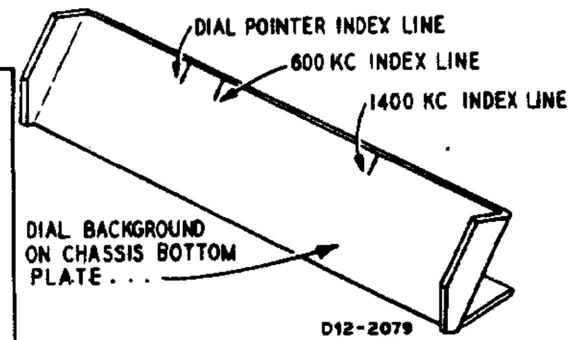
MODELS 43-8470, -8471

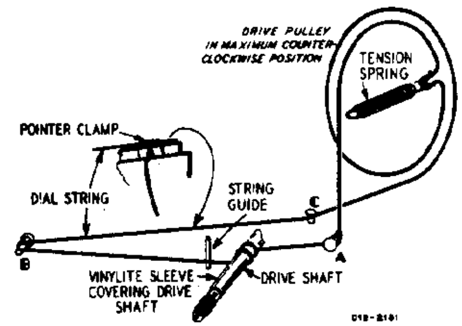


MODEL 43-8471

GAMBLE-SKOGMO, INC.







DECEMBER 18, 1946

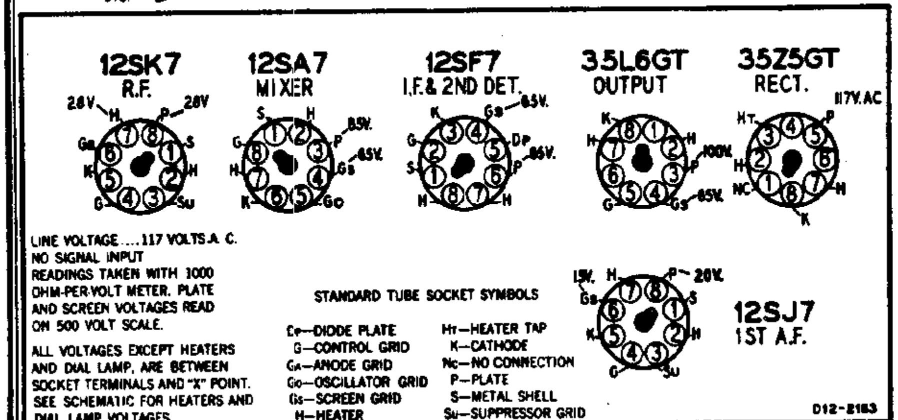
DRIVE CORD REPLACEMENT

Turn the large drive pulley to the maximum counter-clockwise position. Use a new drive cord and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim and continue around pulley ½ turn counter-clockwise. Pass cord around stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord around studs B and C, then under drive pulley and wind 1½ turns counter-clockwise around drive pulley. Stretch tension spring and fasten free end of cord to spring.

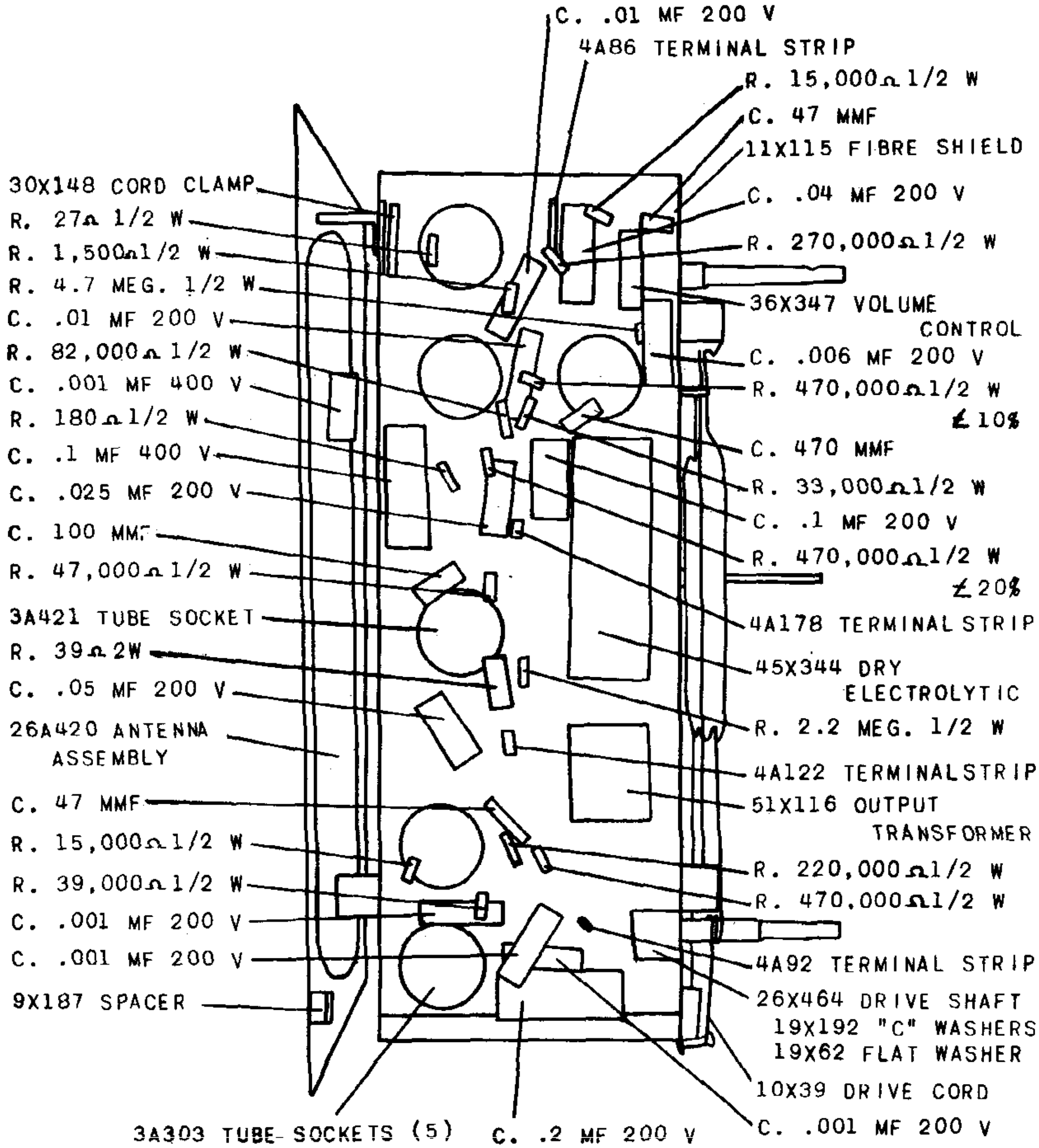
Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.

DIAL CALIBRATION

To position the dial pointer, adjust the radio to the "stop" position at the low frequency end of the dial. The dial pointer should be directly over the dial pointer index line. (See illustration.) If not, move the pointer on the drive cord until it is directly over the index line. The 1,400 KC index lines are for use when aligning the receiver.



GAMBLE-SKOGMO, INC.

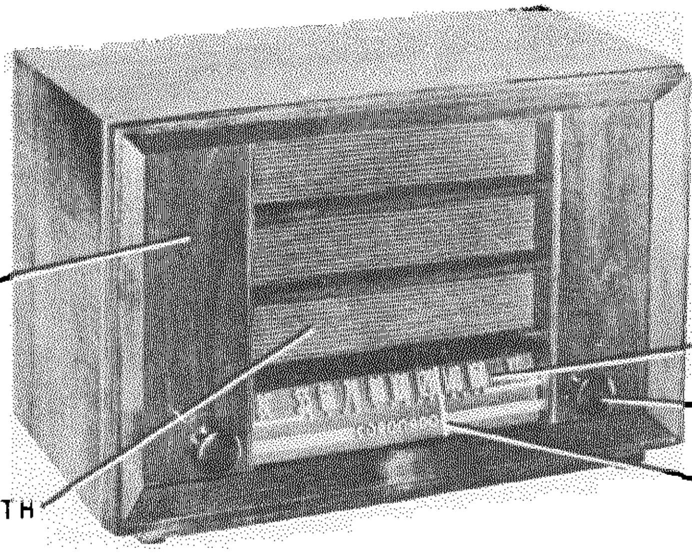


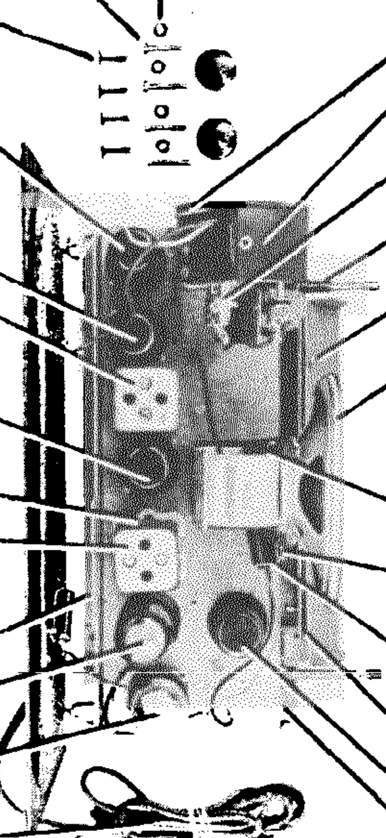
MODEL 43-8471 GAMBLE-SKOGMO, INC.

SPECIFICATIONS

6 Tube Superheterodyne, including Rectifier Tube.
Speaker................................5-inch PM Dynamic
Intermediate Frequency..........................455 KC
Selectivity.............50 KC Broad at 1,000 Times Signal

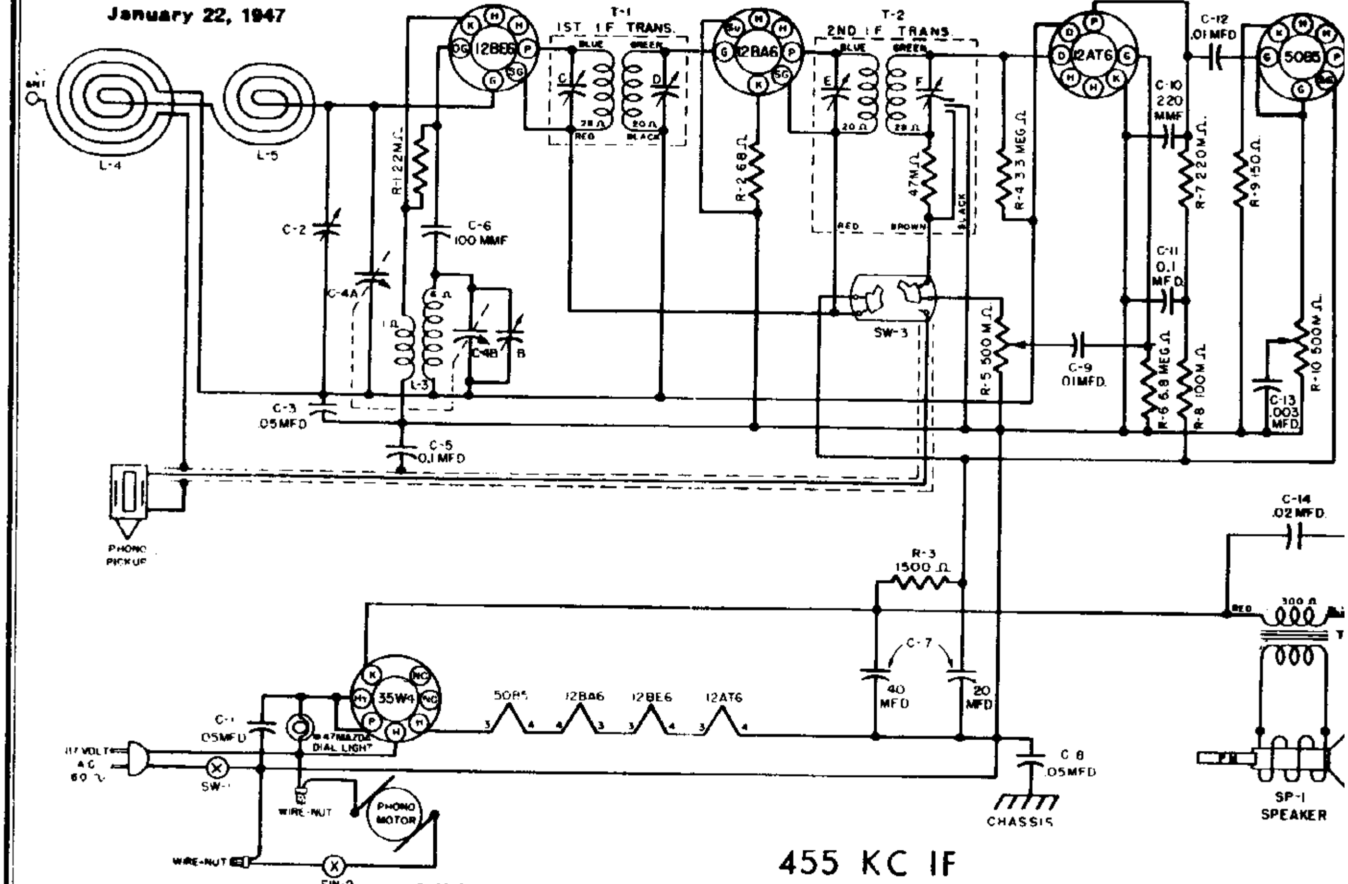
Sensitivity (for .05 watt output with external antenna).........................15 microvolts average
Power Consumption............35 watts (at 117 volts AC)
Power Output..1.5 watt maximum. .9 watt (10% harmonics)





GAMBLE-SKOGMO, INC.

January 22, 1947



455 KC IF

ALL TUBE SOCKETS SHOWN FROM PIN END VIEW. ALL SWITCHES SHOWN IN COUNTERCLOCKWISE POSITION SHAFT END VIEW

Electrical and Mechanical Specifications

Frequency Range	540-1600 kc.	V.C. Impedance	3.2 ohms at 400 cycle
Intermediate Frequency	455 kc.	Power Output (Undistorted)	.8 watt
Power Supply	117 volts AC, 60 cycle	Power Output (Maximum)	1.5 watt
Loudspeaker	5x7 elliptical type PM	Tuning Drive Ratio	7 to

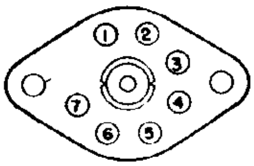
SERVICE PARTS LIST

Symbol	Part No.	Description
C-3	BD210503	Capacitor, Paper, .05 mfd., 200 v.
C-9, C-12	BD410103	Capacitor, Paper, .01 mfd., 400 v.
C-5, C-11	BD410104	Capacitor, Paper, 0.1 mfd., 400 v.
C-14	BD410203	Capacitor, Paper, .02 mfd., 400 v.
C-1, C-8	BD410503	Capacitor, Paper, .05 mfd., 400 v.
C-13	BD610302	Capacitor, Paper, .003 mfd., 600 v.
C-6	BM74A101	Capacitor, Mica, 100 mmf.
C-10	BM74A221	Capacitor, Mica, 220 mmf.
R-2	BR16B680	Resistor, 68 ohm, ⅓ w.
R-9	BR16C151	Resistor, 150 ohm, ½ w.
R-8	BR17B104	Resistor, 100,000 ohm, ⅓ w.
R-1	BR17B223	Resistor, 22,000 ohm, ⅓ w.
R-7	BR17B224	Resistor, 220,000 ohm, ⅓ w.
R-4	BR17B335	Resistor, 3.3 megohm, ⅓ w.
R-6	BR17B685	Resistor, 6.8 megohm, ⅓ w.
R-3	BR17E152	Resistor, 1500 ohm, 1 w.
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot, No. 47 Mazda, 6.3 v.
	A-6182-1	Socket, Dial Light
C-7	B-9564-1	Cap., Electro., 40-20 mfd., 150 v.
	A-51163	Clip, Spring
	B-51427-5	Grommet (large)
	B-51427-8	Grommet (small)
SW-3	B-51576-2	Switch, Radio-Phono
	A-51787	Spring, for Dial Cable
	A-54122	Button, Plug
R-5	B-54466-2	Control, Volume, 500,000 ohm
T-2	B-56718-1	Transformer Assembly, 2nd IF
T-1	B-56722-1	Transformer Assembly, 1st IF
	B-57262-6	Cord, AC Phono.
R-10	B-57841-1	Control, Tone & Switch, 500,000 oh
	B-57842	Coil Assembly, Oscillator
SP-1	C-57843	Speaker, 5x7 PM
	B-57848-1	Shaft, Tuning Drive
	B-57857-1	Pointer, Dial
	B-57858-1	Strip Assembly, Light Diffusing
C-4	C-57859-1	Capacitor, Variable
	A-57863	Sheet, Operating and Service
L-4 & L-5	D-57870	Coil Assembly, Loop
	C-57872-1	Knob
	E-57873-1	Cabinet (1120)
	A-57878	Clip, Gang Mounting
C-2	B-57879-1	Capacitor Assembly, Trimmer
	C-57882-1	Crystal and Indicator, Dial
	B-58069-1	Cord, AC Power

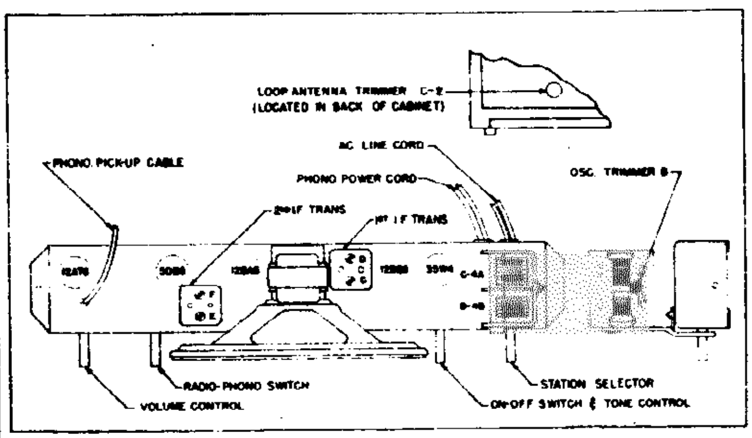
 GAMBLE-SKOGMO, INC.

SOCKET VOLTAGES

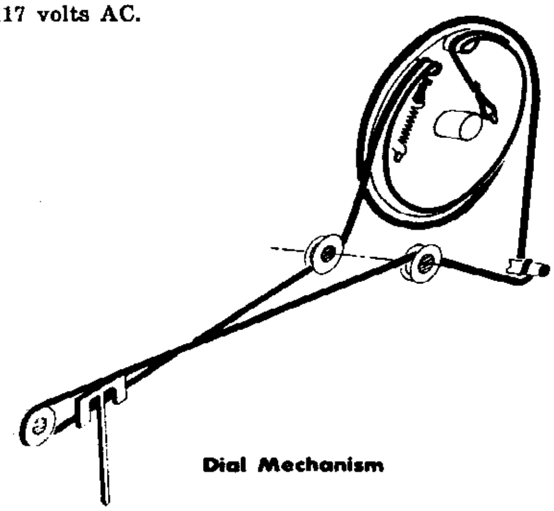
TUBE	POSITION	1	2	3	4	5	6	7
12BE6	Converter	—5	0	24 AC	12 AC	88	88	0
12BA6	I.F. Amplifier	0	0	24 AC	35 AC	88	88	0.7
12AT6	2nd DET.—1st AF—AVC	0	0	12 AC	0	0	0	12
50B5	Power Output	0	5	85 AC	35 AC	115	88	0
35W4	Rectifier	0	0	85 AC	117 AC	112 AC	112 AC	122



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated. All voltages are positive DC unless otherwise marked. Volume Control full on. No signal input. Line voltage 117 volts AC.



Tube Layout



Dial Mechanism

ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

A signal generator which will provide an accurately calibrated signal at the frequencies listed.
An output meter.
A non-metallic screwdriver.
Dummy antenna: — .1 mfd. — RMA loop.

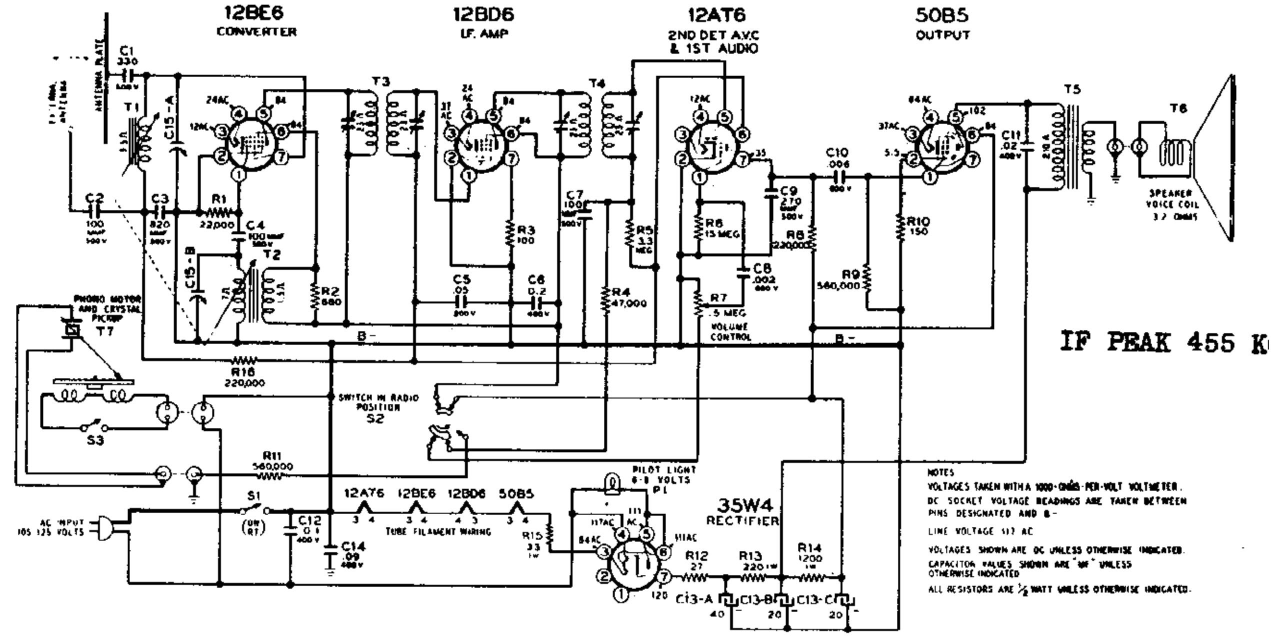
NOTE: Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12BE6 grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12BE6 grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
1620 kc.	12BE6 grid	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop*	RMA loop	1400 kc.	Ant. trimmer C-2	Tune to max.

* Loop trimmer accessible through back of cabinet.

GAMBLE-SKOGMO, INC.

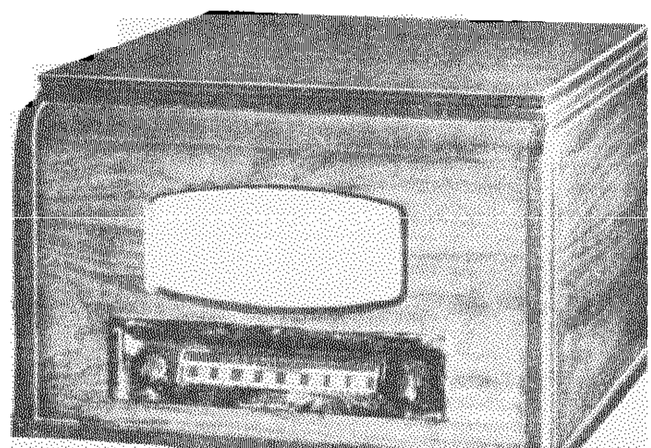
January 15, 1947



IF PEAK 455 K

Ref. No.	Part No.	Description
		CAPACITORS
C13-A, C13-B, C13-C	A-8C-10077	Electrolytic, 40x20x20, 150 volts
C15-A, C15-B	A-8E-10723	Trimmer condenser, dual, antenna and oscillator
C14	C-8D-11251	.09 mf x 400 volts 10% tubular
C6	C-8D-10942	.2 mf x 400 volts 10% tubular
C5	C-8D-10770	.05 mf x 200 volts 20% tubular
C10	C-8D-10785	.006 mf x 600 volts 20% tubular
C8	C-8D-10789	.002 mf x 600 volts 20% tubular
C11	C-8D-10774	.02 mf x 400 volts 20% tubular
C12	C-8D-10760	.1 mf x 400 volts 10% tubular
C1	C-8F3-119	330 mmf x 500 volts 10% mica
C3	C-8F3-247	820 mmf x 500 volts 5% mica
C9	C-8F3-118	270 mmf x 500 volts 10% mica
C2, C4, C7	C-8F3-113	100 mmf x 500 volts 10% mica
		RESISTORS
R7, S1	A-10A-10720	Volume control (500M ohms) and switch
R15	C-9B2-44	33 ohms, 1 watt, 10%
R8	C-9B1-90	220k ohms, 1/2 watt, 10%
R13	C-9B2-54	220 ohms, 1 watt, 10%
R14	C-9B2-63	1200 ohms, 1 watt, 10%
R12	C-9B1-43	27 ohms, 1/2 watt, 10%
R4	C-9B1-82	47k ohms, 1/2 watt, 10%
R3	C-9B1-50	100 ohms, 1/2 watt, 10%
R5	C-9B1-34	3.3 megohms, 1/2 watt, 20%
R9, R11	C-9B1-95	560k ohms, 1/2 watt, 10%
R10	C-9B1-52	150 ohms, 1/2 watt, 10%
R6	C-9B1-302	15 megohms, 1/2 watt, 10%
R2	C-9B1-60	680 ohms, 1/2 watt, 10%
R1	C-9B1-78	22k ohms, 1/2 watt, 10%
		COILS AND TRANSFORMERS
T1, T2	C-211-10171	Tuner unit, permeability tuned, Ant. and Osc. coils
T3	B-13A-10728	Input I.F. transformer
T4	B-13B-10729	Output I.F. transformer
T5	B-12C-10074-1	Output speaker transformer

Ref. No.	Part No.	Description
		DIAL AND TUNING PARTS
	A-6D-10163	Dial scale
	C-5C-10009-48	Escutcheon for dial
	A-5B-10170-1	Knobs for radio
	B-200-10980	Dial and bracket assembly
	A-55A-10093	Pilot light and bracket
P1	A-46A-10793	Pilot light bulb, 6-8 volt type
		MISCELLANEOUS
T6	B-18A-11089	4x6 oval P.M. speaker
	A-15C-10717	Tube socket
	A-2H-10718	Shield base
	A-2H-10974	Tube shield
	B-15B-10076	Mounting base for electrolytic
S2	A-20A-10722	Radio-phono switch
	A-19B-10727	Phono motor socket
	A-55A-7386-1	Phono input socket
	A-19B-11044	Speaker socket
	A-23A-10344	Line cord lock
	B-14M-11085	A.C. line cord and plug
	A-2E-12192	Needle cup
	B-2E-11038	Antenna plate
	A-5B-11239-1	Knob for radio-phono switch
	A-3A-12263	Extension shaft for radio-phono switch
	A-2M-11074	Spring clamp for shaft
	A-2C-10972	Indicator plate



ELECTRICAL SPECIFICATIONS

Power Supply..................105-125 volts, 60 cycle AC, 55 watts.

Frequency Range............535-1720 kc.

Intermediate Freq..........455 kc.

Antenna..........................Built-in plate; provisions also for external antenna connection.

Tuning..............................Permeability.

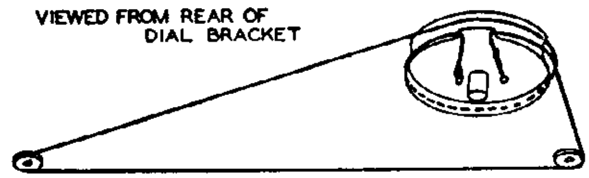
Speaker............................4 x 6-inch, P.M., voice coil impedance 3.2 ohms.

Power Output................0.75 watt undistorted. 1.1 watts maximum.

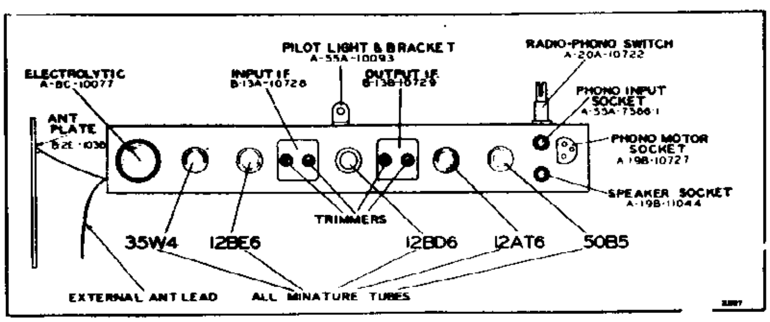
Sensitivity......................34 microvolts average for 50-milliwatt output.

Selectivity......................55 kc broad at 1000 times signal at 1000 kc.

DRIVE CORD REPLACEMENT

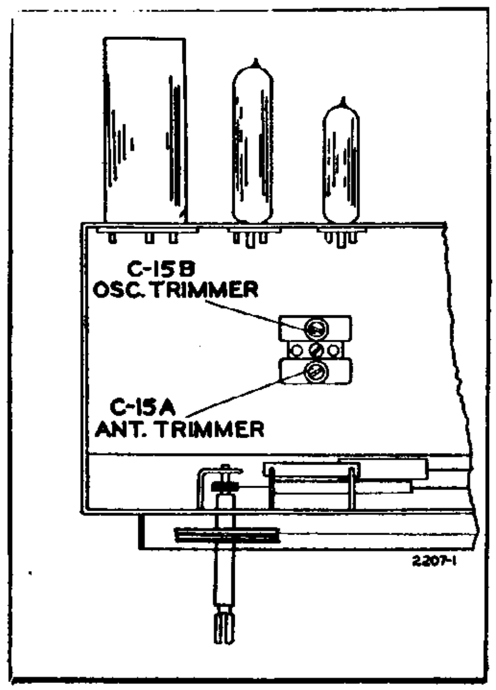


DIAL BRACKET ASSEMBLY MUST BE REMOVED TO REPLACE DIAL STRING.



43-9201

CHASSIS VIEW



TRIMMER VIEW

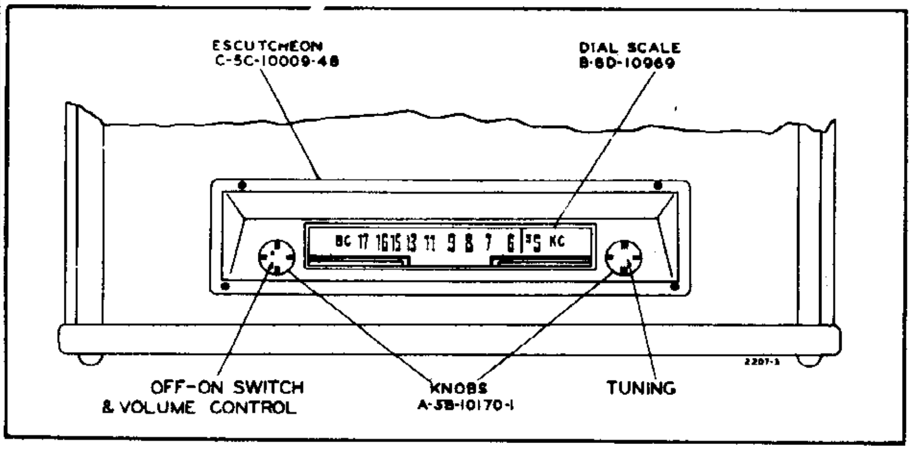
ALIGNMENT PROCEDURE

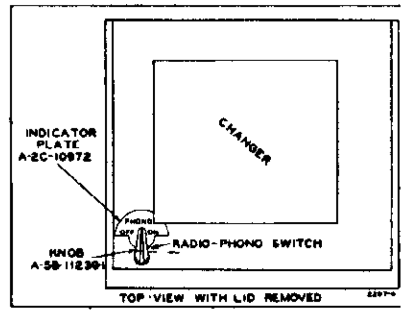
- Output meter across 3.2-ohm output load.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Volume control at maximum for all adjustments.
- Connect ground post of signal generator to B− of radio.

SIGNAL GENERATOR Frequency	Dummy Antenna	Connection to Radio	TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT (in order shown)
455 kc	.1 mf	Grid (pin 7) of 12BE6	Iron cores all the way out	Trimmers on output and input I.F. cans
1720 kc	.1 mf	Grid (pin 7) of 12BE6	Iron cores all the way out	Oscillator trimmer C-15B
1720 kc	200 mmf	Antenna lead	Iron cores all the way out	Antenna trimmer C-15A
1400 kc	200 mmf	Antenna lead	Turn dial to 1400 kc	Adjust position of antenna coil (see coil view)*

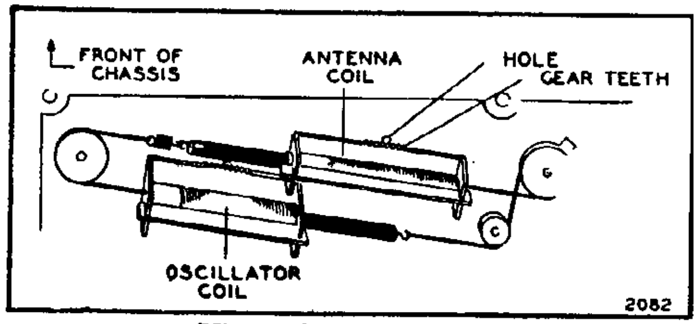
*This adjustment and the previous adjustment are interlocking; therefore repeat the two adjustments alternately for best results

GAMBLE-SKOGMO, INC.



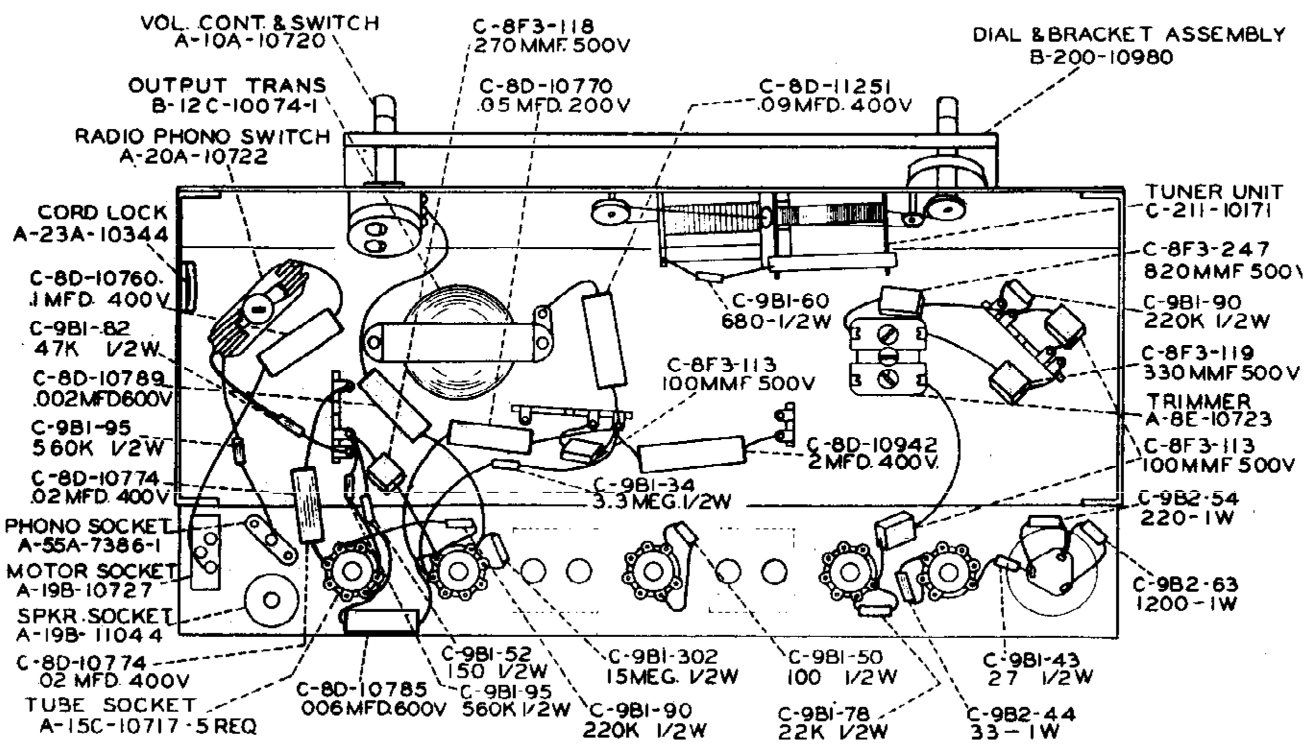


DIAL LIGHT—If the dial lamp burns out the set should not be operated until a new lamp has been installed. Failure to heed this caution may result in a burned-out 35W4 tube. Use only a type T-47 lamp for replacement.



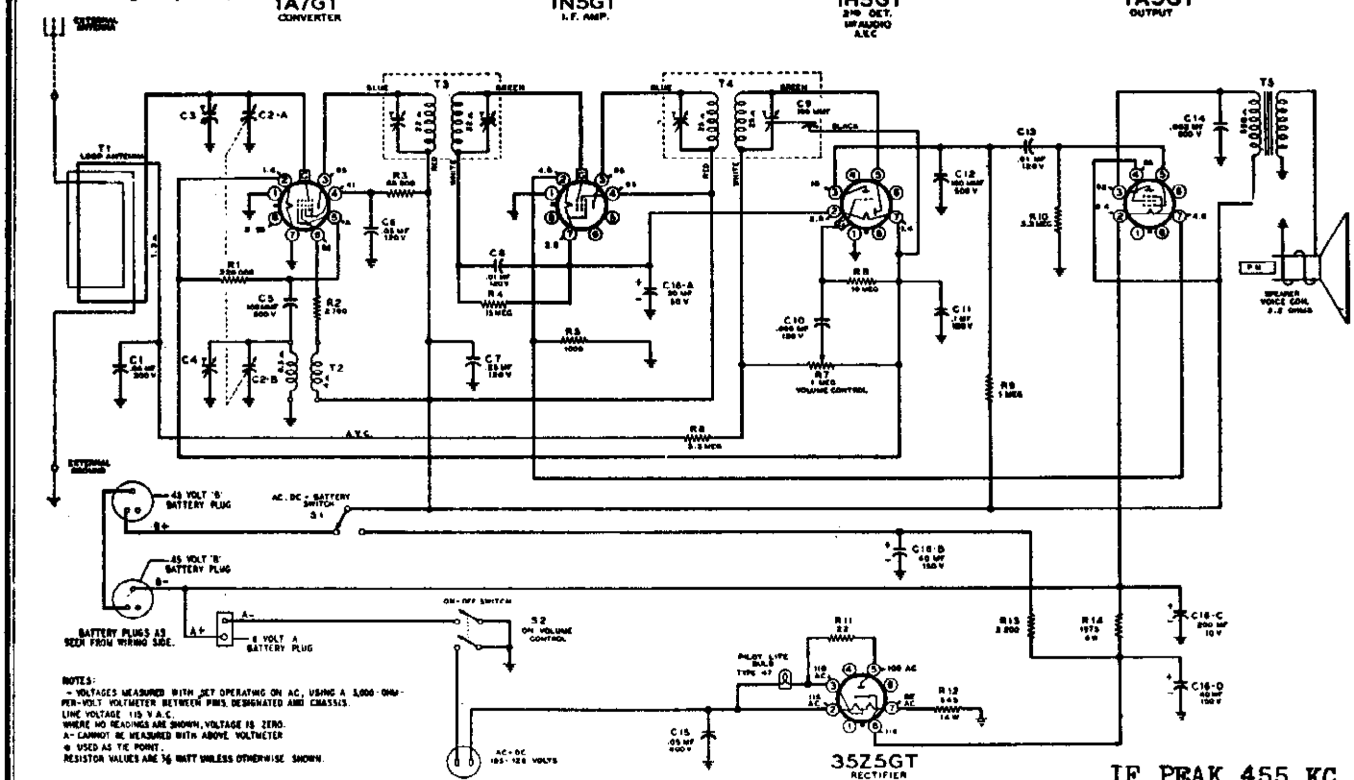
View of Coil Assembly

The antenna coil assembly is movable left to right. When making the adjustment as required in the alignment procedure, move the coil assembly very slowly, either by hand or by pivoting one edge of a screwdriver blade in the hole and engaging the blade in the gear teeth of the coil form.



MODEL 43-9751 GAMBLE-SKOGMO, INC.

January 15, 1947



IF PEAK 455 KC

Ref. No.	Part No.	Description
		CAPACITORS
C1	1009	.05 mf, 200 volts, 25%
C2-A, C2-B, C3, C4	B-8A-10246	Two-gang, including antenna and oscillator trimmers. Range of gang: 14-452 mmf (ant) and 10-198 (osc).
C5, C12	1295	100 mmf, 20%, mica
C6	100128	.05 mf, 120 volts, 25%
C7	100135	.25 mf, 120 volts, 25%
C8, C13	100127	.01 mf, 120 volts, 25%
C9		Approx. 100 mmf. Part of I.F. can
C10	100134	.006 mf, 120 volts, 25%
C11	100133	.1 mf, 120 volts, 25%
C14	10025	.002 mf, 600 volts, 25%
C15	10013	.05 mf, 400 volts, 25%
C16-A, -B -C, -D	119123	Electrolytic; 20 mf x 50 volts, 40 mf x 150 volts, 200 mf x 10 volts, 40 mf x 150 volts
		RESISTORS*
R1	C-9B1-27	220,000 ohms, ½ watt, 20%
R2	C-9B1-67	2,700 ohms, ½ watt, 10%
R3	C-9B1-84	68,000 ohms, ½ watt, 10%
R4	C-9B1-302	15 megohms, ½ watt, 20%
R5	C-9B1-62	1,000 ohms, ½ watt, 10%
R6, R10	C-9B1-34	3.3 megohms, ½ watt, 20%
R7, S2	101252	Volume contol (1 megohm) and on-off switch
R8	C-9B1-37	10 megohms, ½ watt, 20%
R9	C-9B1-31	1 megohm, ½ watt, 20%
R11	C-9B1-42	22 ohms, ½ watt, 10%
R12	130343	545 ohms, 14 watts, 5%
R13	C-9B1-66	2,200 ohms, ½ watt, 10%
R14	130344	1,975 ohms, 6 watts, 5%

Ref. No.	Part No.	Description
		COILS AND TRANSFORMERS
T1	B-13E-10250	Loop antenna assembly
T2	A-13D-10239	Oscillator coil
T3	108201	Input I.F. transformer. Range of trimmers: 53-97 mmf each.
T4, C9	108200	Output I.F. transformer. Range of trimmers: 39-71 mmf each.
T5	105127	Output transformer
		MISCELLANEOUS
	114240B	Speaker, 5-inch, P.M.
	120406	"B"-battery cable assembly
	120407	"A"-battery cable assembly
	121171	Tube socket
S1	125153	Line-battery switch
	120417	Spring for line-battery switch
	B-14M-10088	Line cord and plug
	115396B	Tube shield
	B-6D-10249	Dial scale
	112925	Diffuser
	A-2M-7758	Snap-in rivets for diffuser
	B-2M-10383	Snap-in rivets for dial scale
	112922	Dial pointer
	B-53A-11340	Drive cord for dial pointer (20")
	120197	Spring for drive cord
	107249	Pilot light, 6-8 volts, type T-47
	107362	Socket assembly for pilot light
	128641	Cabinet back
	120410	Spring for securing line cord plug
	112910-2	Escutcheon for dial
	128643-1	Escutcheon for grille
	128645-31	Knob, tuning
	128647-31	Knob, volume
	131253	Snap-in rivet, for trimmer hole
	13448B	Rubber grommet for trimmer hole

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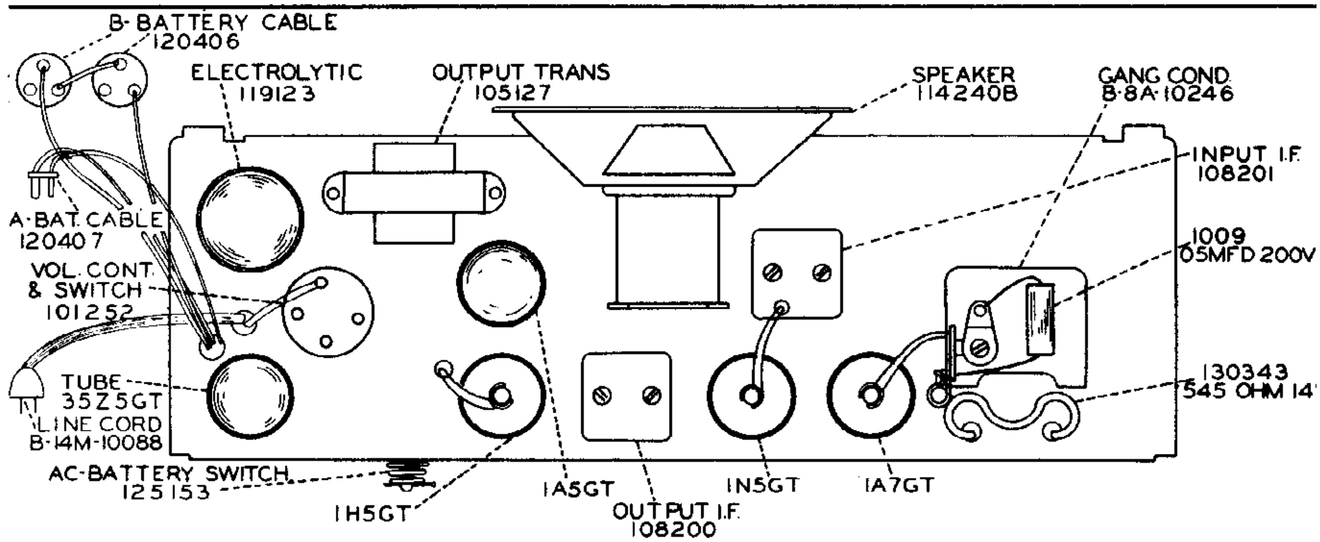
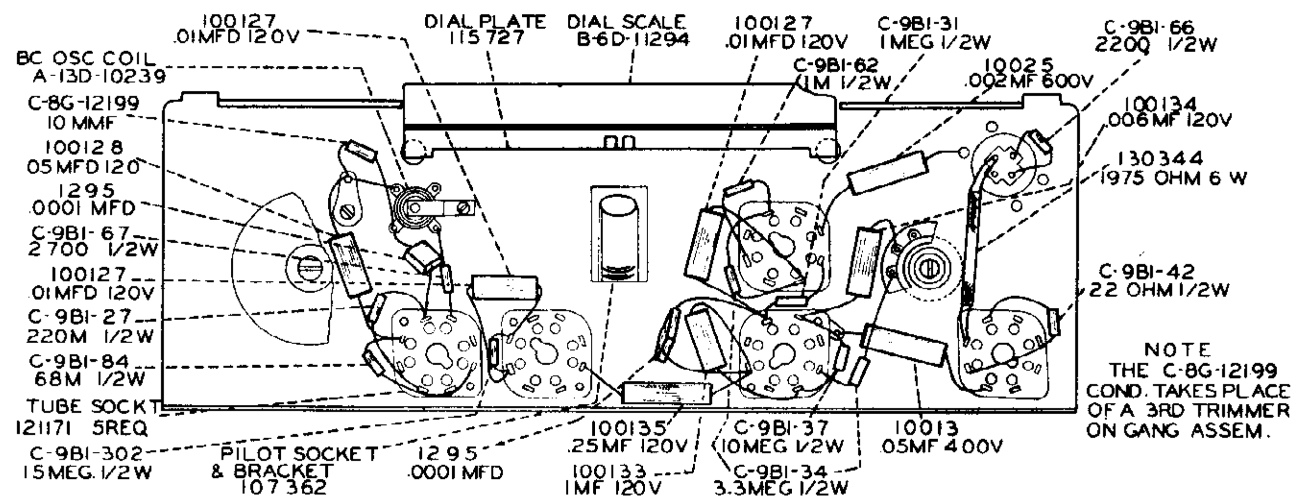




ALIGNMENT PROCEDURE

(Refer to Chassis View on Page 2)

- Output meter across 3.2-ohm output load.
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

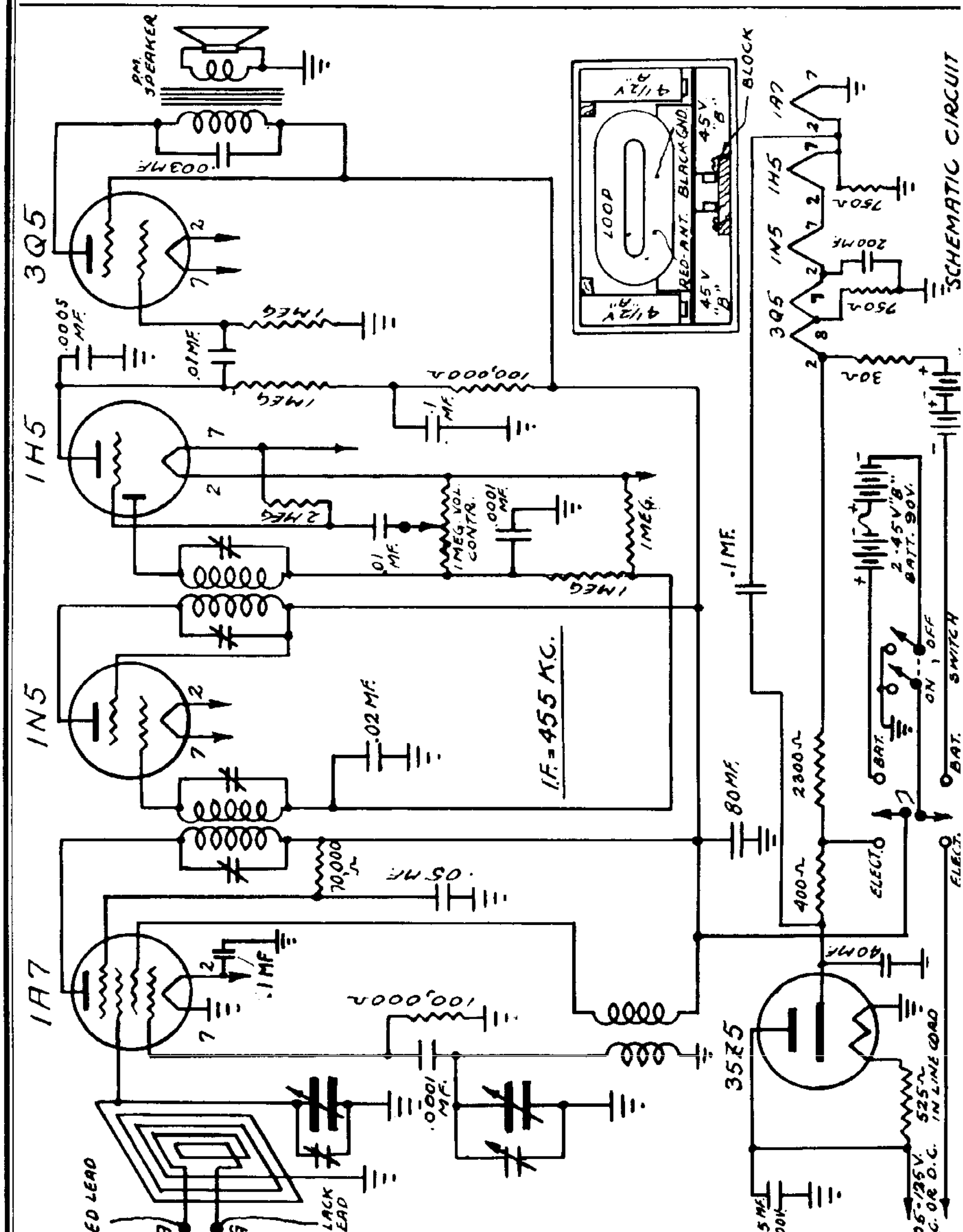
SIGNAL GENERATOR				*TUNER SETTING*	*ADJUST TRIMMERS TO MAXIMUM OUTP[UT] (in order shown)*
Frequency	*Coupling Capacitor*	*Connection to Radio*	*Ground Connection*		
455 kc	.1 mf	1A7GT grid cap*	Chassis	Rotor full open (plates out of mesh)	Input and output trimmers on IF cans
1650 kc	.1 mf	1A7GT grid cap*	Chassis	Rotor full open (plates out of mesh)	Oscillator trimmer C4
1400 kc†	200 mmf	External antenna clip	External ground clip	1400 kc	Antenna trimmer C3

* If loop is not connected when making this adjustment, substitute a 1-megohm resistor across the loop leads.

† For this adjustment chassis should be remounted in cabinet and loop connected. Antenna trimmer can be reached through a [hole] in the side of the cabinet.

GAROD RADIO CORP.

MODELS BP24, BP



MODELS BP24, BP25

GAROD RADIO CORP.

This receiver will operate either from batteries contained within the case or from the regular Electric mains (AC or DC) on voltages from 105 to 125. A self-contained antenna is built in and will give good performance from stations not too remote. Where signal strength is poor or where reception from great distances is required, Antenna (A) and Ground (G) leads are provided, (RED-Antenna, BLACK-Ground). These may be reached thru the small door on the rear of the case. An Antenna from 50 to 100 feet long may be used.

BATTERIES - The following batteries are required where no electric power is available:
4½ Volt "A" - EVEREADY #746, USALITE #683, BURGESS #G-3, RAYOVAC #P-83A or equivalent. (3-29/32" X 1-5/16" X 4-11/16") - 2 Required
45 Volt "B" - EVEREADY #482, USALITE #640, BURGESS #M-30, RAYOVAC #P-5S30 or equivalent. (3½" X 1-3/4" X 5-7/16") -2 Required

TO INSTALL BATTERIES - To install batteries, the back of the cabinet must be removed,by loosening the four screws which hold it. Insert the plugs into the corresponding batteries. The "A" batteries are then slid in over the shelf on each side of the chassis with the plugs down. The "B" batteries are placed below the shelf with the plugs facing each other. A block to hold the "B"'s is then screwed down. (See sketch.)

With the ELEC-BATT switch on the front panel in the BATT position, the receiver is now ready for operation as a portable unit. When prolonged operation in the "ELECTRIC" position is contemplated (as during the winter season), it is advisable to remove the batteries and store them in a cool,dry place. DO NOT leave exhausted batteries in the carrying case as chemical action may expand the batteries and make it difficult to remove them.

WAVE BAND: The range covered is as follows:
182 - 555 Meters (1650 - 540 KC)
Station frequencies are listed in Newspapers and Radio periodicals.

OPERATION

BATTERY

After the batteries have been installed in accordance with the instructions given above, set the slide switch on the front of the cabinet to the right.

ELECTRIC

Open the small door on the rear of the cabinet providing access to the power cord which can be plugged into any outlet (105 to 125 Volts AC or DC.) Slide the switch on the front of the cabinet to the left. (Elec)

The receiver may now be operated by turning the LEFT hand knob to the right,(Clockwise). The Volume is turned up and the station tuned in. (Right hand knob.) By rotating the cabinet slowly (when the self-contained loop is used) maximum signal with minimum noise may be obtained. The directional effect is lost when a large antenna is used, but in this case, ample signal is obtained to be heard above the noise level. The volume is adjusted for the desired level.

NOTE:- When this set is to be operated from the 115-125 Volt DC line and no signal can be tuned in with the power switch in the "ELECTRIC" position, reverse the plug in the light socket. When operating on AC, a slight hum may be heard on some stations. Reversing the line plug in the socket will alleviate this condition.

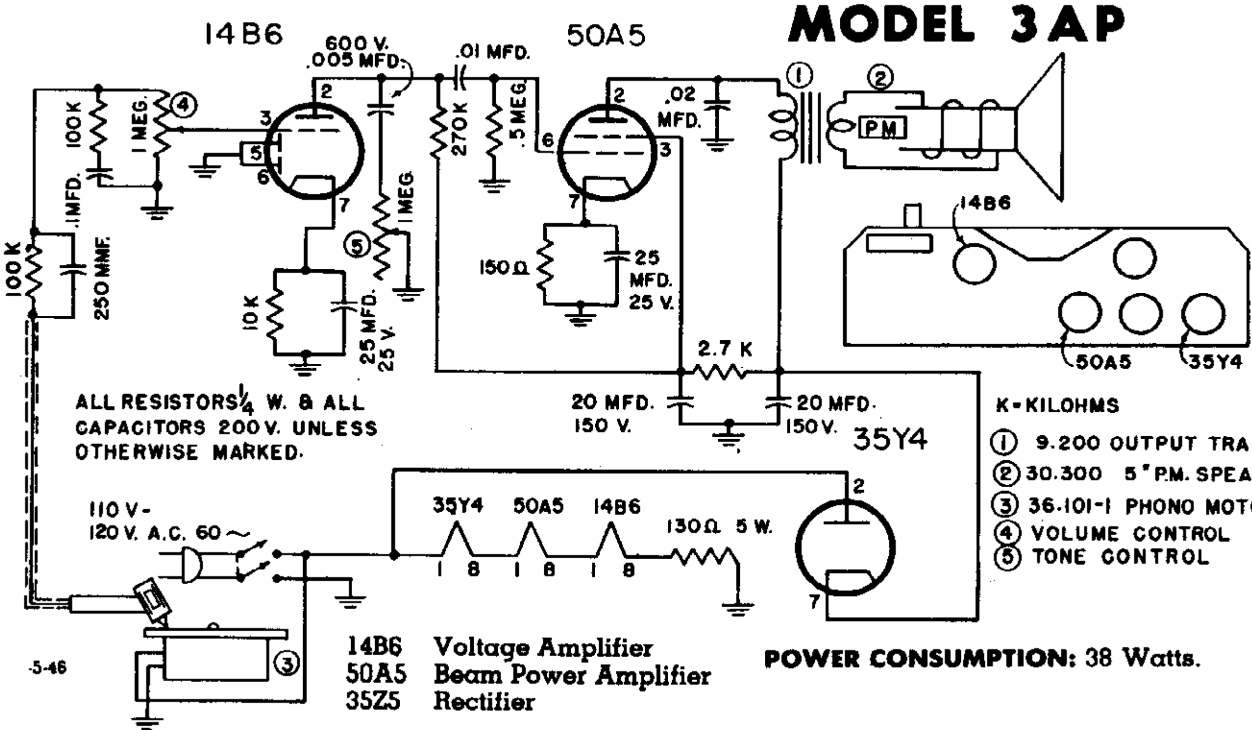
ELECTRICAL SPECIFICATIONS

CIRCUIT - Super-heterodyne incorporating Automatic Volume Control and Class "A" beam power output.

TUBES - 1A7GT, 1N5GT, 1H5GT, 3Q5GT, 35Z5GT.
For placement of these tubes, see diagram on the rear of the chassis.

LOUDSPEAKER - 5" PERMANENT MAGNET DYNAMIC.

MODEL 3AP



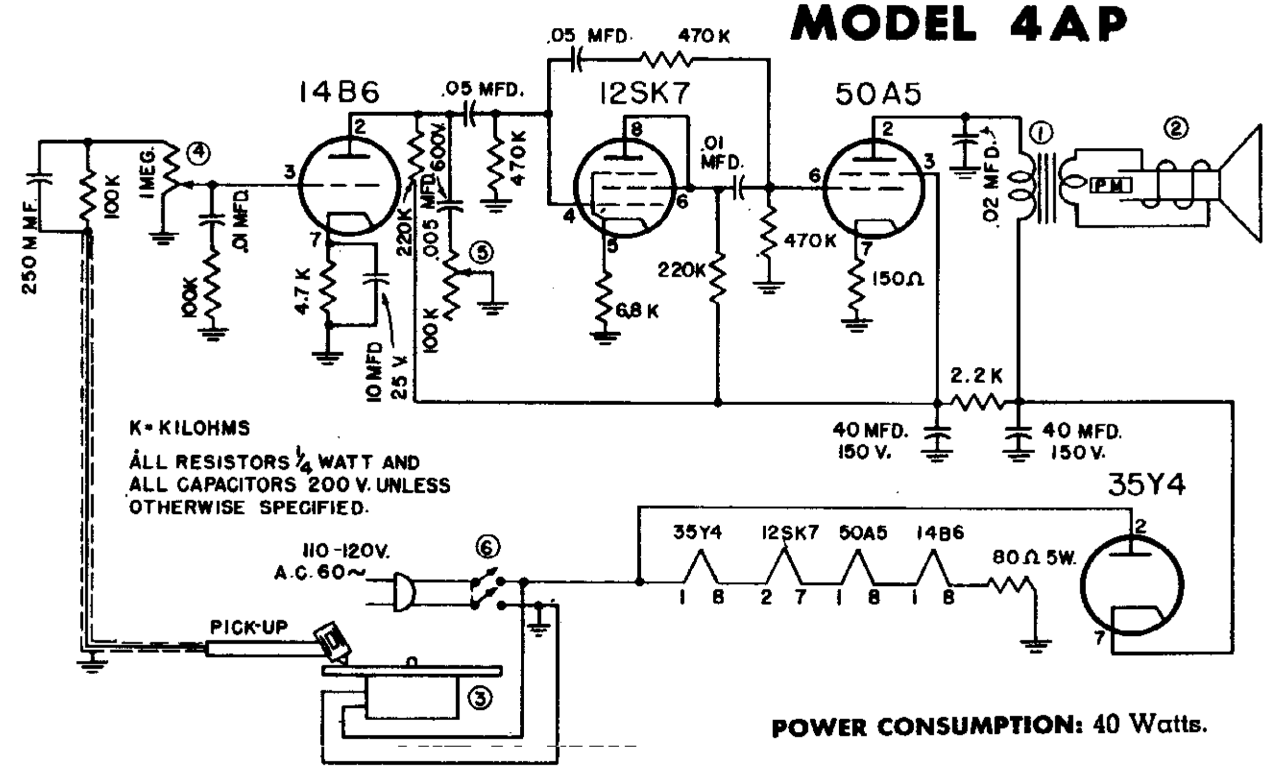
ALL RESISTORS ¼ W. & ALL CAPACITORS 200 V. UNLESS OTHERWISE MARKED.

K=KILOHMS
① 9.200 OUTPUT TRANS
② 30.300 5" P.M. SPEAKE
③ 36-101-1 PHONO MOTOR
④ VOLUME CONTROL
⑤ TONE CONTROL

14B6 Voltage Amplifier
50A5 Beam Power Amplifier
35Z5 Rectifier

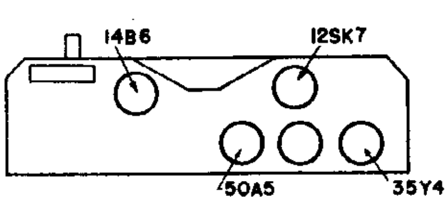
POWER CONSUMPTION: 38 Watts.

MODEL 4AP



K=KILOHMS
ALL RESISTORS ¼ WATT AND ALL CAPACITORS 200 V. UNLESS OTHERWISE SPECIFIED.

POWER CONSUMPTION: 40 Watts.



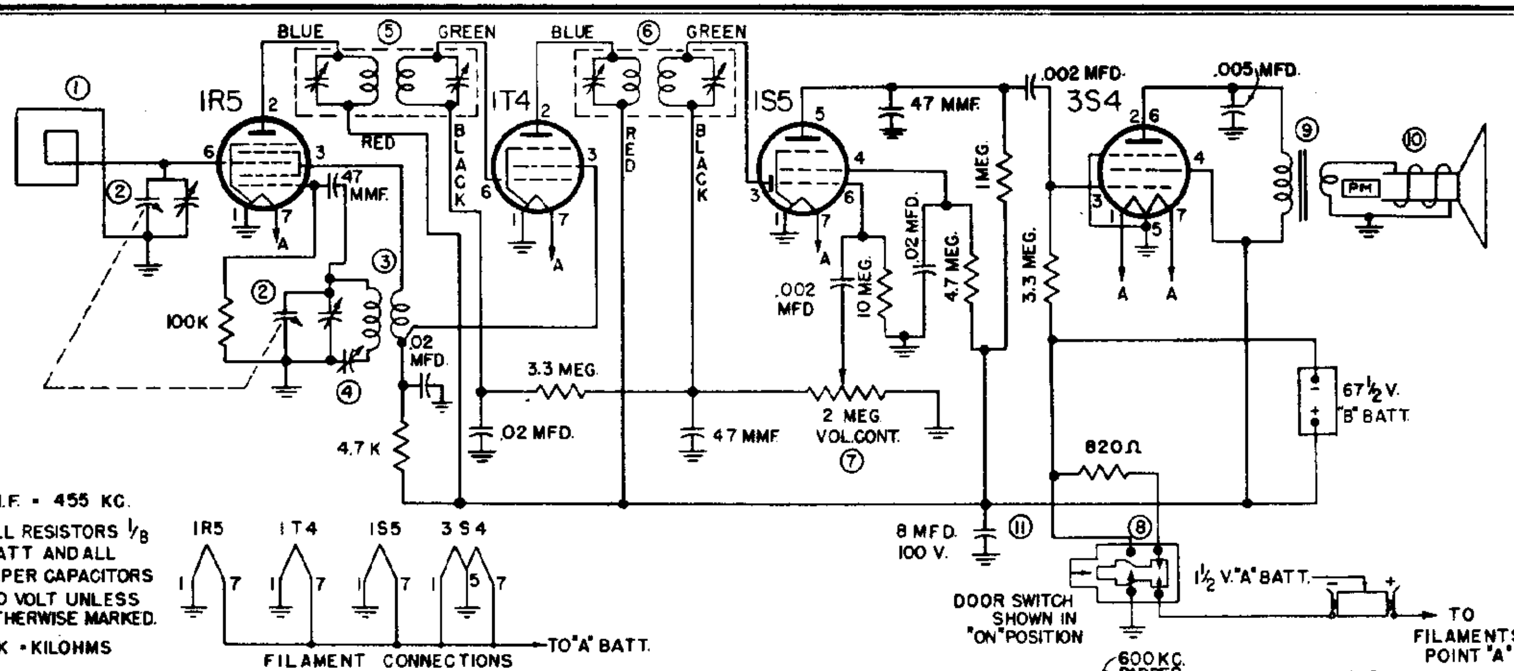
① 9.200 OUTPUT TRANSFORMER
② 30.300 5" PM SPEAKER
③ 36-101-1 PHONO MOTOR
④ VOLUME CONTROL
⑤ TONE CONTROL
⑥ D.P.D.T. "ON-OFF" SWITCH

14B6 Voltage Amplifier
12SK7 Voltage Amplifier
50A5 Beam Power Amplifier
35Z5 Rectifier

-5-46

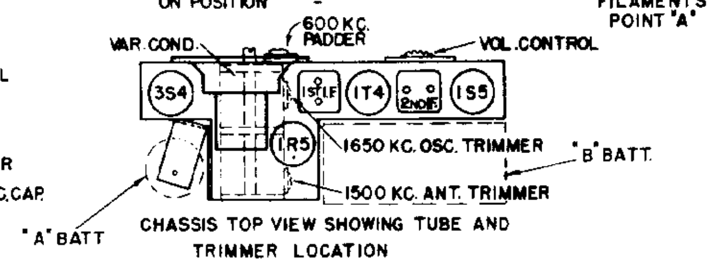
MODELS 4A-1, 4A-2

GAROD RADIO CORP.



I.F. = 455 KC.
ALL RESISTORS 1/8 WATT AND ALL PAPER CAPACITORS 150 VOLT UNLESS OTHERWISE MARKED.
K = KILOHMS

(1) 1.460 LOOP ANTENNA
(2) 2.212 2 GANG VARIABLE CONDENSER
(3) 1.462 OSCILLATOR COIL
(4) 4.112 PADDER CAPACITOR
(5) 1.412 1ST. I.F. TRANSFORMER
(6) 1.413 2ND. I.F TRANSFORMER
(7) 8.204 VOLUME CONTROL
(8) 11.214 DOOR SWITCH
(9) 9.207 OUTPUT TRANS.
(10) 30.315 2½" P.M. SPEAKER
(11) 5.417 8MFD. 100V. ELEC.CAP.



CHASSIS TOP VIEW SHOWING TUBE AND TRIMMER LOCATION

ALIGNMENT: (Receiver removed from cabinet.) Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the signal generator to 455 KC and connect to the stator lug (rear section) of variable capacitor. Extend the loop leads and solder to original points. Connect the signal generator ground lead to the chassis. Connect a suitable output meter across the speaker voice coil connections. Turn the volume control to the maximum position. Turn the variable capacitor to the extreme clockwise position (minimum capacity).

(2) Adjust the trimmers located at the top of the first and second I.F. Transformers for maximum output, as indicated on the output meter.

(3) Loosely couple the signal generator lead to the loop and set to 1650 KC.

(4) With the variable capacitor set at minimum capacity, tune in the 1650 KC signal by means of the oscillator trimmer on the variable capacitor (front section).

(5) Set the signal generator to 1500 KC and turn the tuning control until this frequency is heard. Adjust the antenna trimmer on the variable capacitor (rear section) for maximum output.

(6) Set the signal generator to 600 KC and turn the tuning control until this frequency is heard. Adjust the oscillator padder located adjacent to the front of the variable capacitor for maximum response while "rocking" the variable capacitor. Recheck the 1500 KC high frequency adjustment until no further improvement can be made.

(7) Install the chassis into the cabinet and re-adjust the antenna trimmer at 1500 KC.

BATTERY VOLTAGE: This personal receiver is designed for operation from a self contained 1½ volt "A" battery and a 67½ volt "B" battery.

BATTERY REQUIREMENTS: The following batteries are required:

QUANTITY	TYPE	MANUFACTURER
1	1½ volt "A"	Eveready size "D", Burgess No. 2, Ray-O-Vac size "D" or equivalent.
1	67½ volt "B"	Eveready #467, Burgess Type XXD, Ray-O-Vac Type 4367 or equivalent.

TUNING RANGE: Broadcast 540 to 1650 Kilocycles (180 to 555 meters).

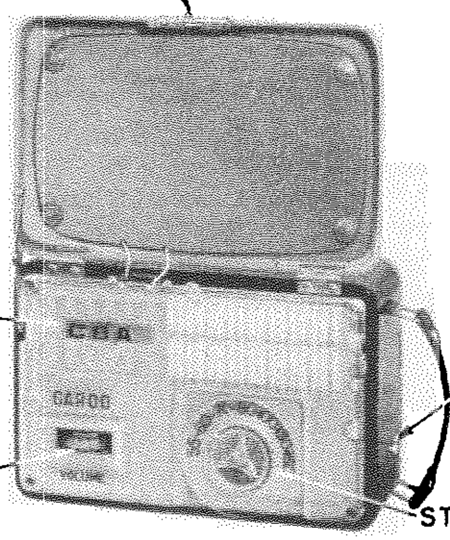
DIAL SCALE: The dial scale is calibrated in kilocycles. Example: Read "60" as 600 Kc.

TUBES: The tubes used and their functions are as follows:

1R5 Converter	1S5 Detector, AVC and Audio Amp.
1T4 I.F. Amplifier	3S4 Power Amplifier

For the placement of these tubes, see the diagram showing tube layout.

FIG 2 REAR VIEW - BACK COVER REMOVED SHOWING LOCATION OF BATTERIES



The following procedure should be followed for the installation of the "A" and "B" batteries (see Fig. 2).

(a) Remove the back cover by depressing the back cover release button adjacent to the handle while sliding the back upward and out.

CAUTION: In removing the back cover, raise the lock end of the back cover only enough to clear the case edge before sliding the cover toward the strap handle to release the opposite end from the two protruding bottom case tabs that hold it down. Failure to observe this precaution may result in breaking out the two bottom holes from the cover.

(b) Insert the 1½ volt "A" battery into the spring holder with the protruding center contact at the top of the "A" battery always facing the position shown on the diagram rear of back cover or Fig. 2. Do not insert the "A" battery in the opposite position in the spring holder.

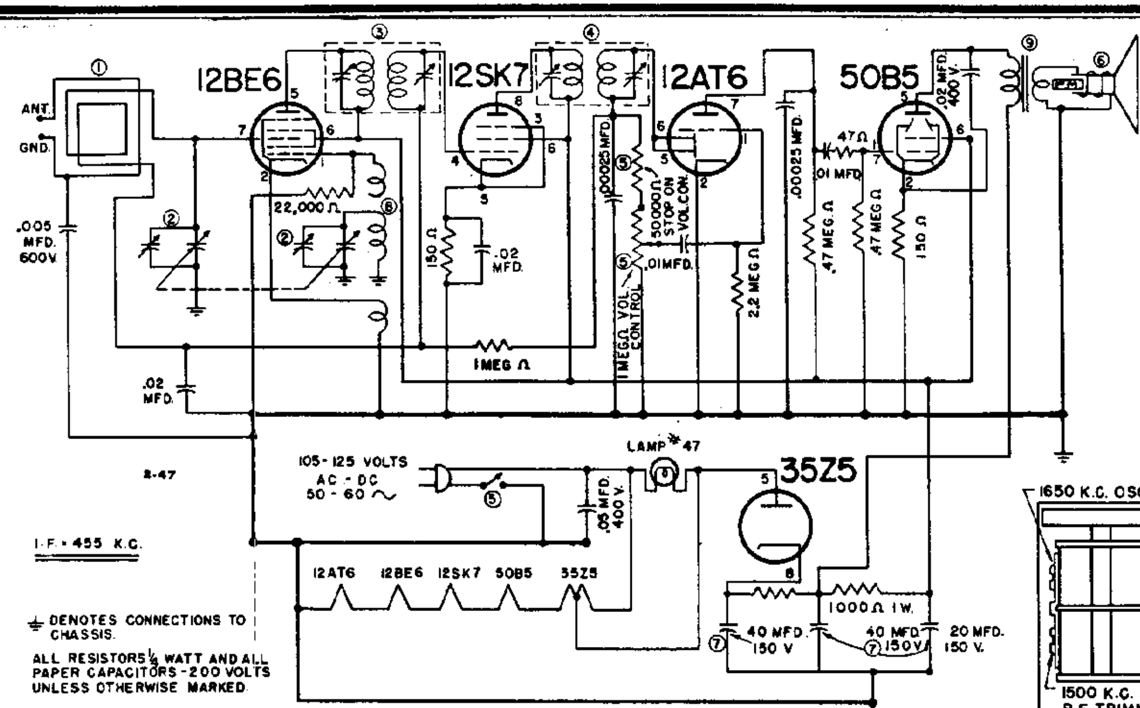
(c) Connect the "B" battery contact strip fitted with snap fasteners to the corresponding contacts on the "B" battery.

(d) Insert the "B" battery into the compartment provided as shown on the diagram rear of back cover or Fig. 2.

(e) Replace back cover by inserting the two holes at the bottom edge of the back cover into the two protruding case tabs at the rear edge of the case and slide forward while depressing the back cover release button. The receiver is now ready for operation.

MODEL 5A2-Y

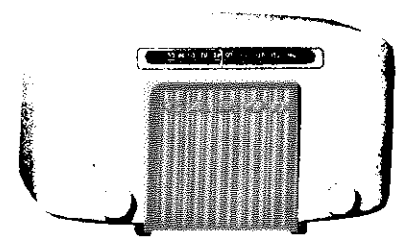
GAROD RADIO CORP.

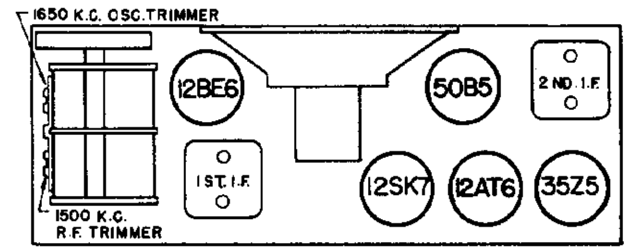


⏚ DENOTES CONNECTIONS TO CHASSIS.

ALL RESISTORS ¼ WATT AND ALL PAPER CAPACITORS - 200 VOLTS UNLESS OTHERWISE MARKED.

① 1.403 LOOP ASSEMBLY
② 2.163 2GANG VARIABLE COND.
③ 1.259 1ST. I.F. TRANSFORMER
④ 1.409 2ND. I.F. TRANSFORMER
⑤ 8.200-1 VOLUME CONTROL & SWITCH
⑥ 30,300 P.M. 5" SPEAKER
⑦ 5.400-8 ELECTROLYTIC CAP. 40-40-20 MFD.
⑧ 1.402 OSCILLATOR COIL
⑨ 9.200 OUTPUT TRANSFORMER





TRIMMER AND TUBE LOCATION DIAGRAM

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.

(2) Adjust the trimmers located at the top of the first and second I. F. Transformers for maximum output as indicated on the Output Meter.

(3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.

(4) With the Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).

(5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

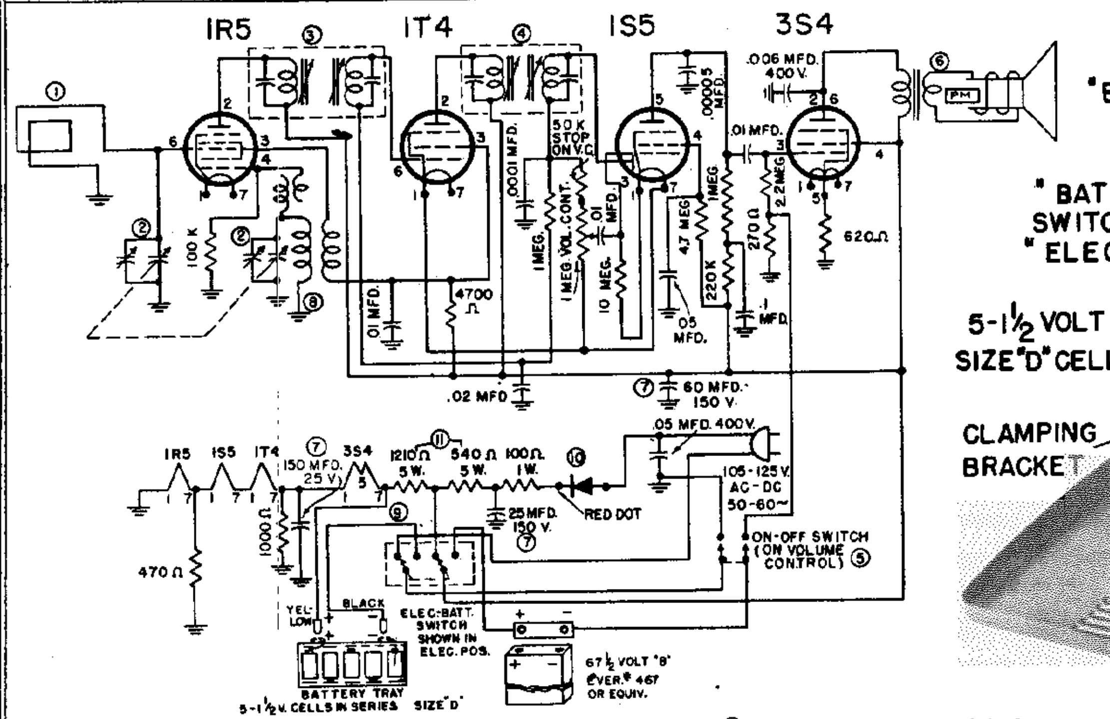
TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

DIAL: The Dial Scale is calibrated in Kilocycles times 10.

TUBES: The tubes used, and their functions, are as follows:

12BE6 Converter	12AT6 Detector, Avc and Audio Amp.
12SK7 I. F. Amplifier	50B5 Beam Power Amplifier
35Z5GT Rectifier	

GAROD RADIO CORP.



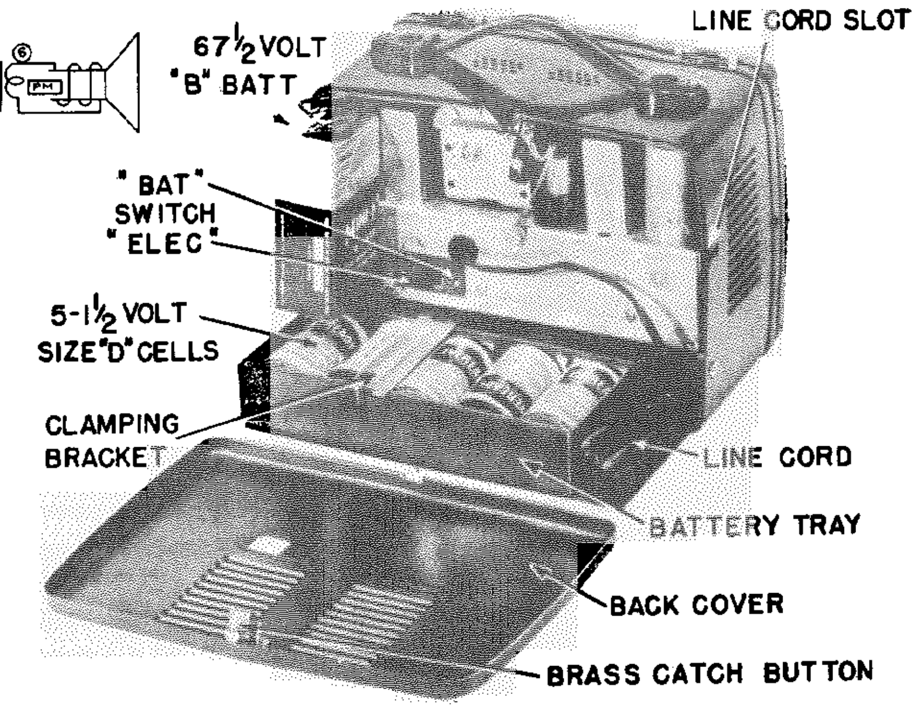
ALL RESISTORS ¼ WATT AND ALL PAPER CAPACITORS 200 VOLTS UNLESS OTHERWISE MARKED.

K = KILOHMS

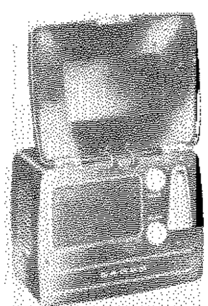
I.F. = 455 K.C.

9-47

①	1.437	LOOP ANTENNA
②	2.210	2 GANG VARIABLE CONDENSER
③	1.445	1ST I.F. TRANSFORMER
④	1.445	2ND I.F. TRANSFORMER
⑤	8.200-2	VOLUME CONTROL & SWITCH
⑥	30.312	5" P.M. SPEAKER & OUTPUT TRANS.
⑦	5.415-3	ELECTROLYTIC CAP. 60-25-150 MFD.
⑧	1.414	OSCILLATOR COIL
⑨	11.210	ELECTRIC-BATTERY SWITCH
⑩	36.111	5 PL. SELENIUM RECTIFIER
⑪	6.208-1	METAL CLAD RESISTOR



MODEL 5D-5 REAR VIEW



BATTERY OR LINE VOLTAGE: This receiver is designed for operation on 105-125 volts, 50-60 cycles either Alternating or Direct Current (AC-DC) and also from self contained batteries.

POWER CONSUMPTION: 20 Watts on Electric Operation.

BATTERY REQUIREMENTS: The following batteries are required for battery operation:

QUANTITY	TYPE	MANUFACTURER
5	1½ volt "A"	Eveready #950, Burgess #2 or equivalent.
1	67½ volt "B"	Eveready #467, Burgess #XX45 or equivalent.

TUNING RANGE: Broadcast 540 to 1650 Kilocycles (180 to 555 meters).

DIAL: The dial scale is calibrated in kilocycles times 10 to correspond with newspaper or periodical listings.

TUBES: The tubes used and their function are as follows:

1R5 Converter	1S5 Detector, AVC and Audio Amp.
1T4 I.F. Amplifier	3S4 Power Amplifier

For the placement of these tubes, see the diagram showing tube layout.

RECTIFIER: 36.111 Selenium Rectifier.

GAROD RADIO CORP.

ALIGNMENT: (Electric Operation) Receiver removed from cabinet. Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the Signal Generator to 455 KC and connect to the stator lug (rear section of variable capacitor. Extend the loop leads and connect grid lead to the terminal connecting the wire from the Ant. Section of the variable capacitor. Connect the other lead to the chassis. Connect the Signal Generator ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the variable capacitor to the extreme counter clockwise position (minimum capacity).

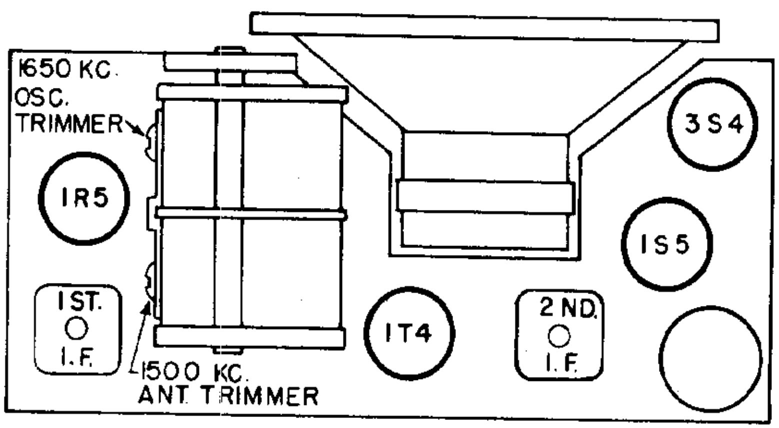
(2) Adjust the iron cores located at the top and bottom of the first and second I. F. transformers for maximum output as indicated on the output meter.

(3) Loosely couple the Signal Generator lead to the Loop (open position) and set to 1650 KC.

(4) With the variable capacitor set at the extreme counter clockwise position (minimum capacity), tune in the 1650 KC signal by means of the oscillator trimmer on the variable capacitor (front section).

(5) Set the Signal Generator to 1500 KC and turn the tuning control so that this frequency is indicated on the dial. Adjust the antenna trimmer on the variable capacitor (rear section) for maximum output.

(6) Install the chassis into cabinet and check the dial calibration. If further adjustment is required, remove the two plug buttons on the side of the cabinet adjacent to the variable capacitor and adjust the oscillator trimmer as required. Adjust the antenna trimmer for maximum output and replace plug buttons.



TRIMMER AND TUBE LOCATION DIAGRAM

CAUTION: Before releasing back cover for battery installation, disconnect line cord from power receptacle, and set the "Elec-Bat" slide switch at rear of cabinet to "Bat" position.

(1) The following procedure should be followed in opening the hinged back cover: While depressing the top of the cabinet, at either side of the catch button with the left hand, push the catch button outward with the thumb of the right hand, and allow the back cover to clear the "A" battery tray.

(2) Slide out "A" battery tray located in compartment below receiver chassis.

(3) Remove the battery clamping bracket and insert the five 1½ volt Size D "A" batteries polarized as shown on the diagram at the base of the tray. Since all five "A" batteries are connected in series, it is important that intimate contact be made with the end spring contact points, otherwise the receiver will be inoperative. Replace the battery clamping bracket, locating it between the batteries as shown on the photograph on the opposite page.

(4) Check the insertion of the contact pins at the end of the "black" (minus) and "yellow" (plus) wires from the receiver into "black" and "yellow" marked receptacle contact lugs located at the rear of the battery tray.

(5) Slide battery tray back into compartment.

(6) Connect the "B" battery contact strip fitted with snap fasteners to the corresponding contacts on the "B" battery.

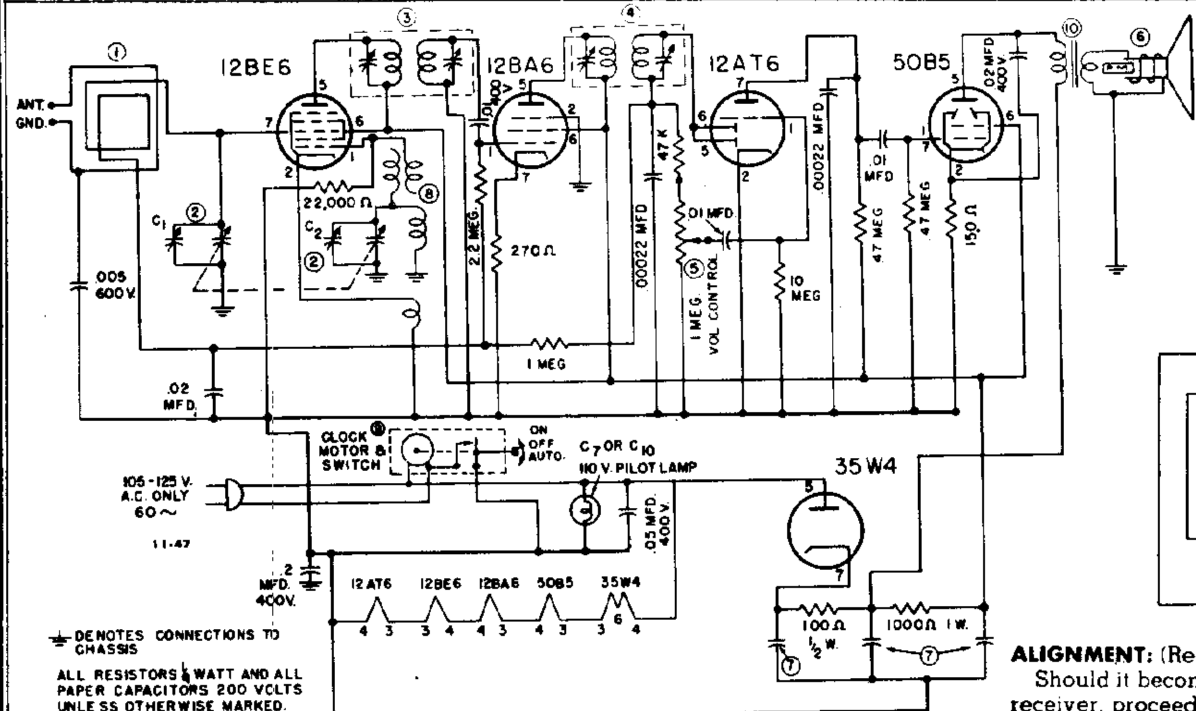
(7) Insert the "B" battery into the compartment on the left side of the receiver.

(8) Close the hinged back cover by depressing the top of the cabinet while sliding the cover forward until the catch button engages into the opening at the top center of the cabinet.

(9) Reverse the above procedure for replacement of "A" or "B" batteries. The Receiver is now ready for battery operation. When prolonged operation in the "Elec." position is contemplated (as during the winter season), it is advisable to remove the "A" and "B" batteries and store them in a cool dry place. DO NOT leave exhausted "A" batteries in the battery tray as chemical action may expand the batteries and cause leakage of the electrolyte.

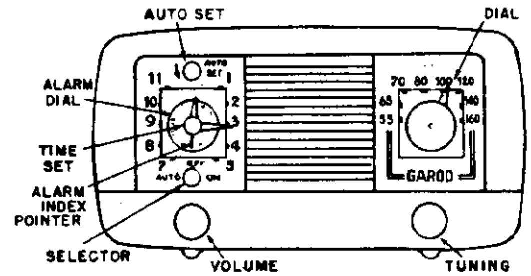
Should the battery tray become corroded due to leakage of the electrolyte from the "A" batteries, the bottom of the tray and the contact springs should be cleaned with carbon tet or the battery tray replaced with a new one.

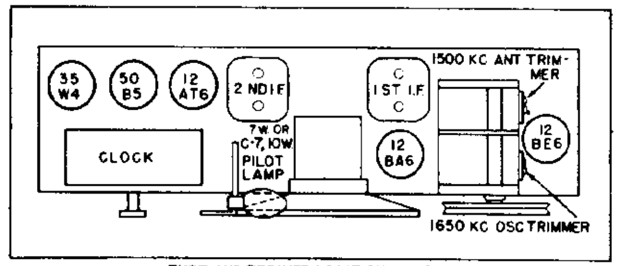
GAROD RADIO CORP.



⏚ DENOTES CONNECTIONS TO CHASSIS

ALL RESISTORS ½ WATT AND ALL PAPER CAPACITORS 200 VOLTS UNLESS OTHERWISE MARKED.





TUBE AND TRIMMER LOCATION DIAGRAM

(1) 1.464 LOOP ANTENNA
(2) 2.213 2 GANG VARIABLE COND.
(3) 1.259 1ST I.F. TRANSFORMER
(4) 1.409 2ND I.F. TRANSFORMER
(10) 9.200 OUTPUT TRANSFORMER
(5) 8.200-11 VOLUME CONTROL
(6) 30.300 OR 30.316 P.M. SPEAKER
(7) 5.415-1 ELECTROLYTIC CAP. 20-20-20 MFD.
(8) 1.402-1 OSCILLATOR COIL
(9) 36.113 TELECHRON CLOCK ASSEMBLY

ALIGNMENT: (Receiver removed from cabinet.)
Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the variable capacitor. Connect the signal generator ground lead to the chassis. Connect a suitable output meter across the speaker voice coil connections. Turn the volume control to the maximum position. Turn the variable capacitor to the extreme clockwise position.

(2) Adjust the trimmers located at the top of the first and second I.F. Transformers for maximum output as indicated on the output meter.

(3) Loosely couple the signal generator lead to the loop and set to 1650 KC.

(4) With the variable capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the oscillator trimmer on the variable capacitor (front section).

(5) Set the signal generator to 1500 KC and turn the tuning control so that this frequency is indicated on the dial. Adjust the antenna trimmer on the variable capacitor (rear section) for maximum output. No other adjustments are necessary.

TO OPERATE THE RADIO: Turn the Selector knob located at the bottom of the clock face so that its index points to on. This turns on the power to the radio. Next, turn the Volume control knob at the bottom left of the cabinet about half way in the clockwise direction, or to the right. Wait a few seconds for the tubes to warm up. Turn the Tuning control knob so that the dial pointer indicates the frequency of the desired station, tuning carefully for best and clearest reception.

To turn the radio off, turn the Selector knob so that the index points to the upright or center position.

TO OPERATE YOUR "RADALARM" RADIO AS A MUSICAL ALARM: You may set your clock radio to automatically turn on a program you wish to hear during the next eleven hours. Proceed by tuning in the station which will carry the program desired. Then set the Volume control knob at the level you want, as for the regular radio operation. Turn the Auto set knob at the top of the clock face, which rotates the disc forming the alarm dial of the clock.

Stop rotation when the time you desire the radio to go on is directly under the short index pointer on the opposite end of the hour hand. Now turn the Selector knob so that the index points to Auto that is points to the left.

After setting the alarm, if you wish to return to normal radio operation, turn the Selector knob so that the index points to on. Then operate the radio as described in preceding paragraphs. Be sure to turn the Selector knob back to the Auto position if you want a program to be turned on

TUBES: The tubes used, and their function are as follows:

12BE6 Converter
12BA6 I.F. Amplifier
12AT6 Detector, AVC and Audio Amp.
50B5 Beam Power Amplifier
35W4 Rectifier

LINE VOLTAGE: This clock-radio receiver is designed for operation on 105-125 volts, 60 cycles alternating current only.

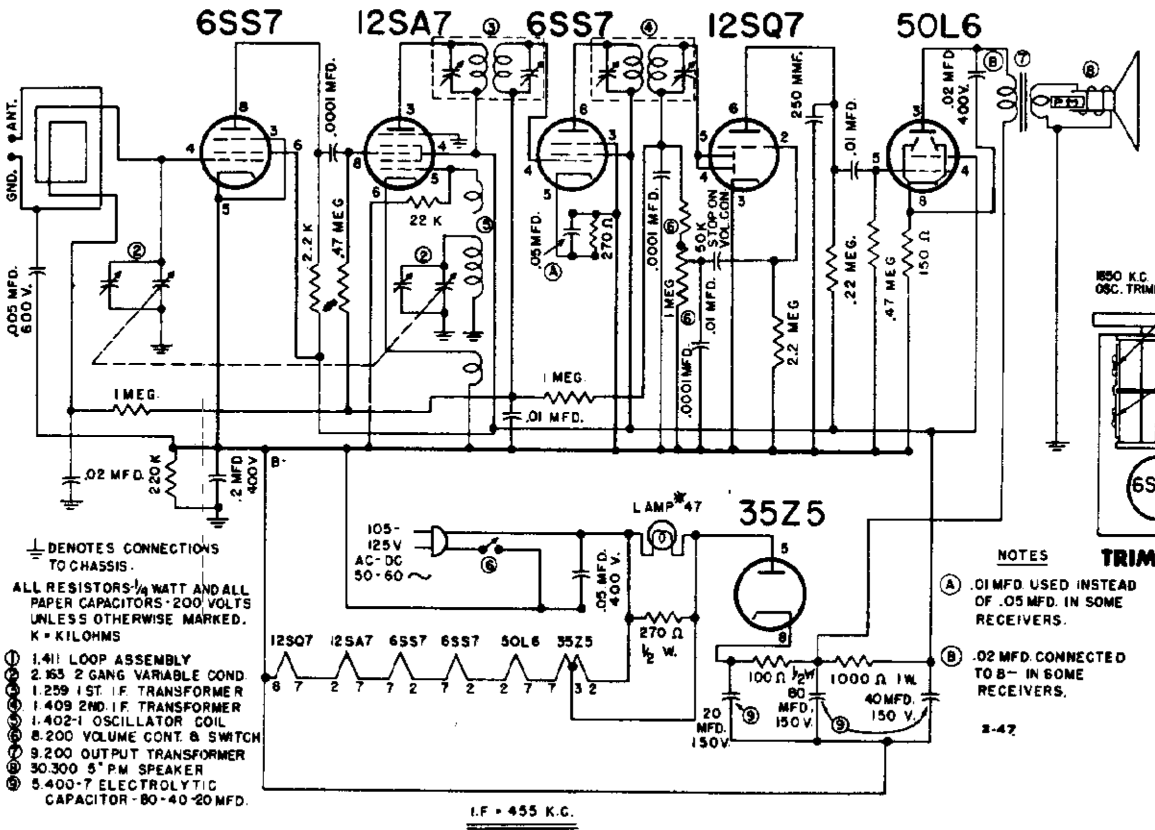
POWER CONSUMPTION: 40 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 Meters).

DIAL: The dial scale is calibrated in kilocycles. Example: Read 60 as

MODEL 6A

GAROD RADIO CORP.



NOTES

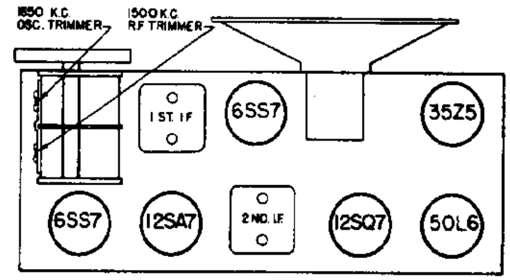
Ⓐ .01 MFD. USED INSTEAD OF .05 MFD. IN SOME RECEIVERS.

Ⓑ .02 MFD. CONNECTED TO B- IN SOME RECEIVERS.

2-47

TUBES: The tubes used, and their functions, are as follows:

6SS7 R. F. Amplifier
12SA7 Converter
6SS7 I. F. Amplifier
12SQ7 Detector, Avc and Audio Amp.
50L6GT Beam Power Amplifier
35Z5GT Rectifier



TRIMMER AND TUBE LOCATION DIAGRAM

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the Signal Generator to 455 KC and connect to the grid of the 6SS7 R. F. Amplifier, or to the Stator Lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground Lead to a "–B" point underneath the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. First turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.

(2) Adjust the trimmers located at the top of the first and second I. F. Transformers for maximum output as indicated on the Output Meter.

(3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.

(4) With the Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).

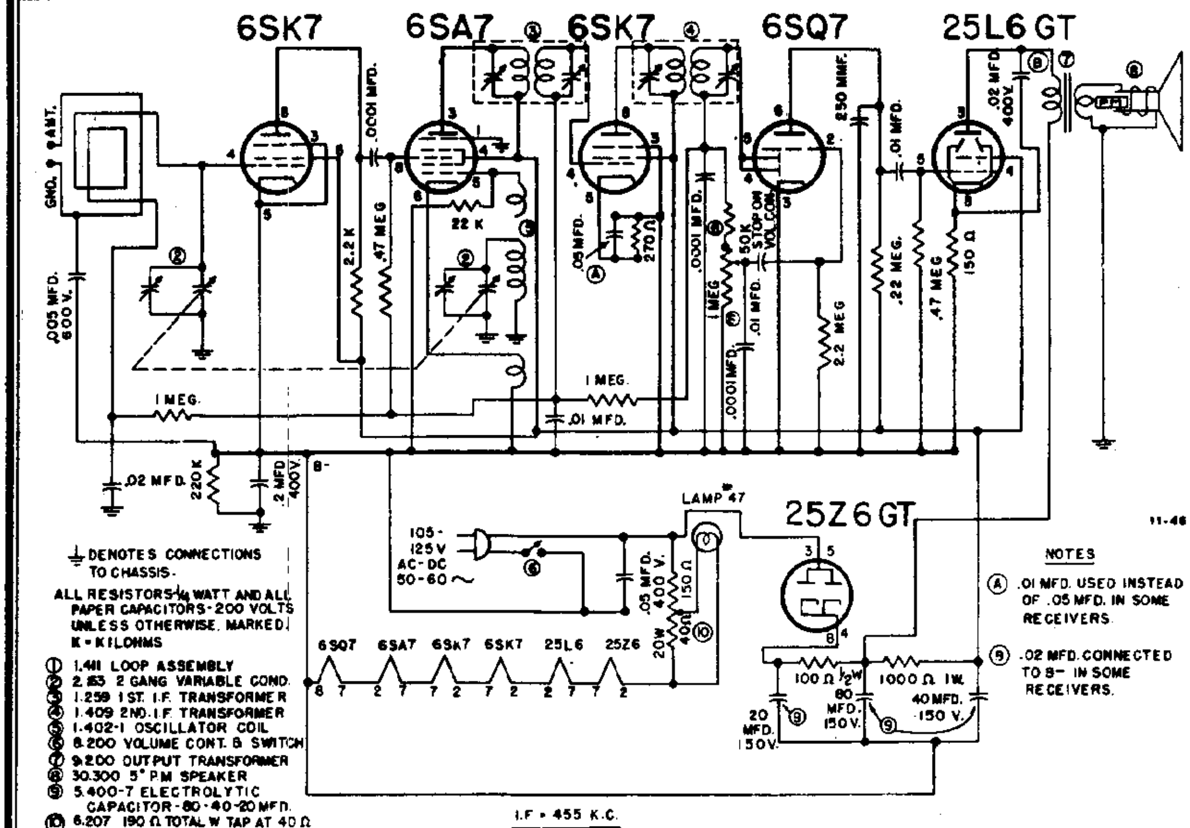
(5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.

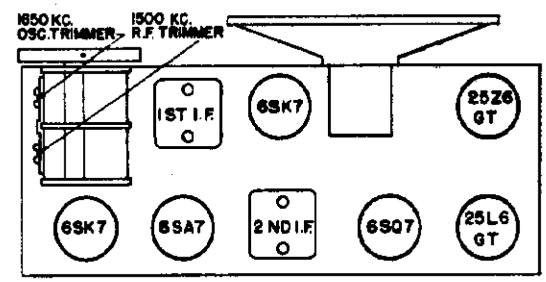
LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC)

POWER CONSUMPTION: 30 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

DIAL: The Dial Scale is calibrated in Kilocycles.





TRIMMER AND TUBE LOCATION DIAGRAM

TUBES: The tubes used, and their functions, are as follows:

6SK7 R. F. Amplifier
6SA7 Converter
6SK7 I. F. Amplifier
6SQ7 Detector, Avc and Audio Amp.
25L6GT Beam Power Amplifier
25Z6GT Rectifier

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the Signal Generator to 455 KC and connect to the grid of the 6SK7 R. F. Amplifier, or to the Stator Lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground Lead to a "–B" point underneath the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. First turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.

(2) Adjust the trimmers located at the top of the first and second I. F. Transformers for maximum output as indicated on the Output Meter.

(3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.

(4) With the Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable

(5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC)

POWER CONSUMPTION: 30 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

DIAL: The Dial Scale is calibrated in Kilocycles.

GENERAL ELECTRIC CO.

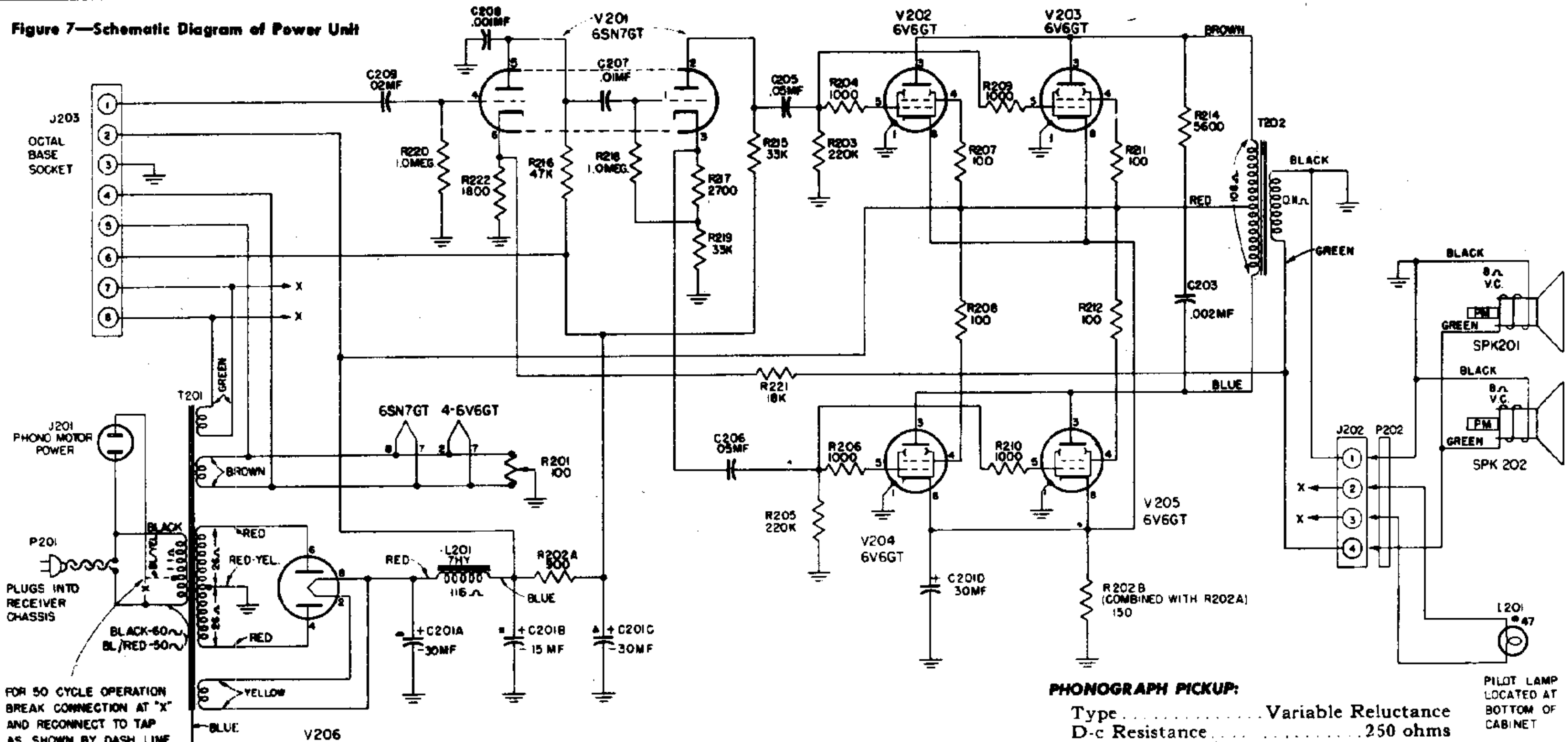


Figure 7—Schematic Diagram of Power Unit

POWER OUTPUT (117 volts line):

Undistorted .... 18 watts
Maximum .... 25 watts

PHONOGRAPH PICKUP:

Type .... Variable Reluctance
D-c Resistance .... 250 ohms

LOUDSPEAKER:

(2) Type .... Alnico 5 PM
Size .... 10 inches
Voice Coil Impedance (400 cps) .. 8 ohms

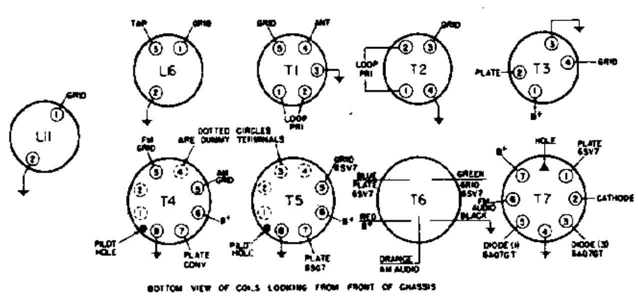


Figure 4—Terminal Identification of Coil Assemblies
(Numbers correspond with schematic)

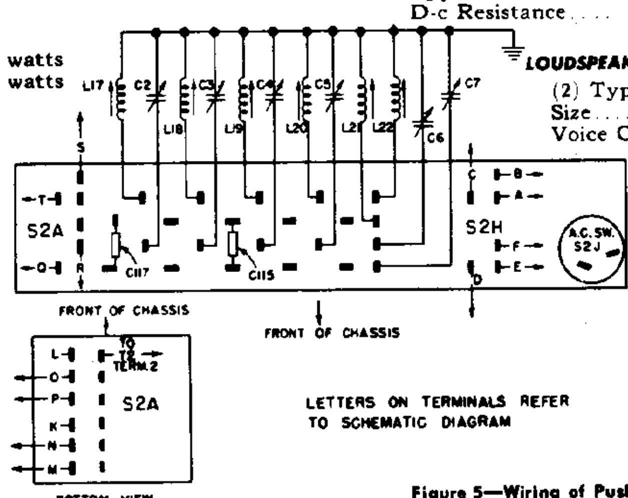


Figure 5—Wiring of Push-button Switch

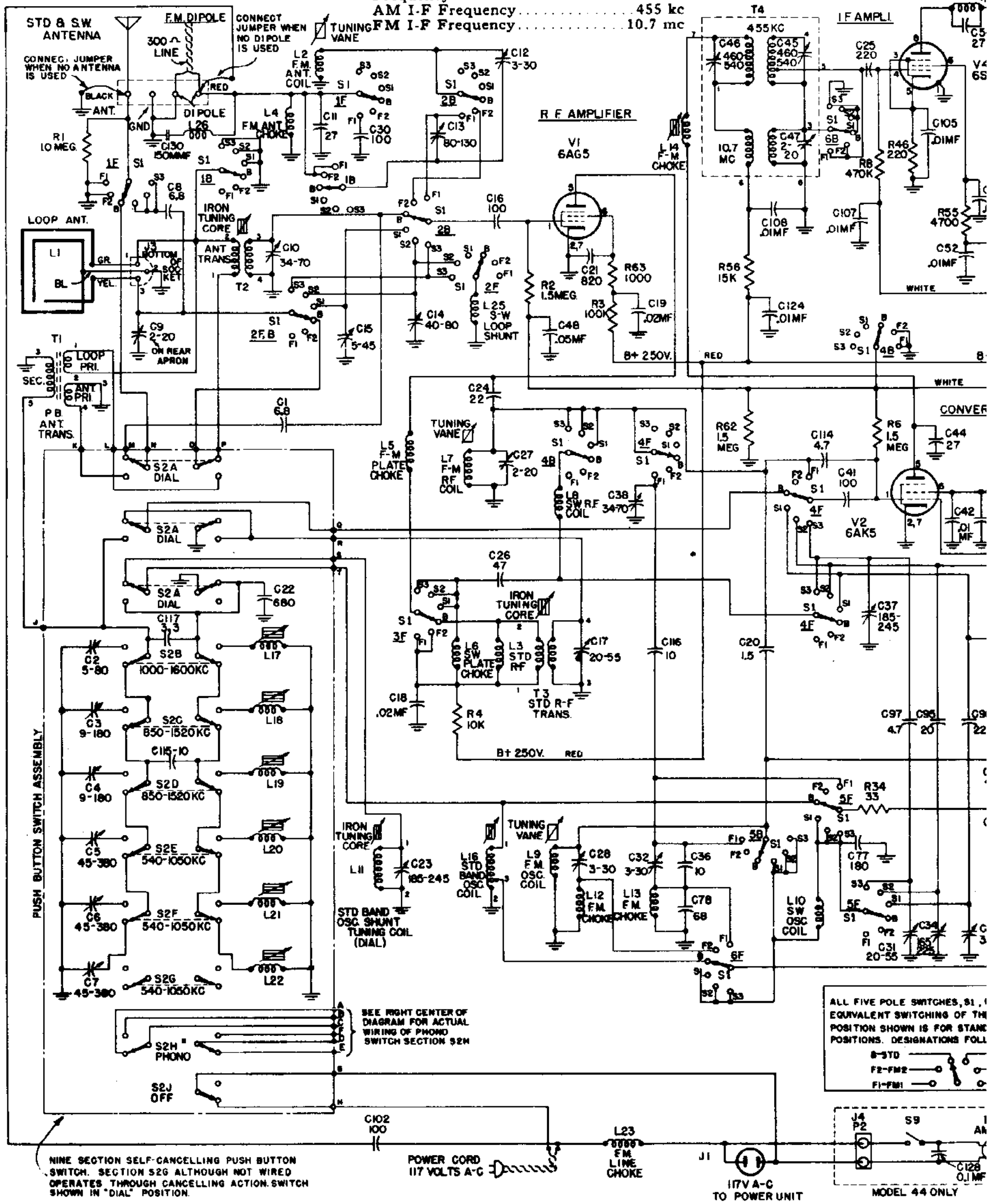
GENERAL ELE

ELECTRICAL RATING:

Voltage . . . . 105–125 v. a-c
Frequency (All Models) . . . . 60 cycles
Models 42 and 44 available in . . 50 cycles
Wattage (Radio only) . . . . 185 watts
(With phono) . . . . 210 watts

OPERATING FREQUENCIES:

Standard Band . . . . 540 to 1600 kc
Short Wave 1 . . . . 9.4 to 9.8 mc
Short Wave 2 . . . . 11.5 to 12.0 mc
Short Wave 3 . . . . 14.8 to 15.5 mc
Frequency Modulation 1 . . . . 42 to 49 mc
Frequency Modulation 2 . . . 88 to 108 mc
AM I-F Frequency . . . . 455 kc
FM I-F Frequency . . . . 10.7 mc



:LECTRIC CO.

MODELS MUSAPHONIC
41, 42, 43, 44, 45

ANTENNA INPUTS:

Broadcast and Short Wave.........conventional antenna
FM....................300-ohm input for folded dipole

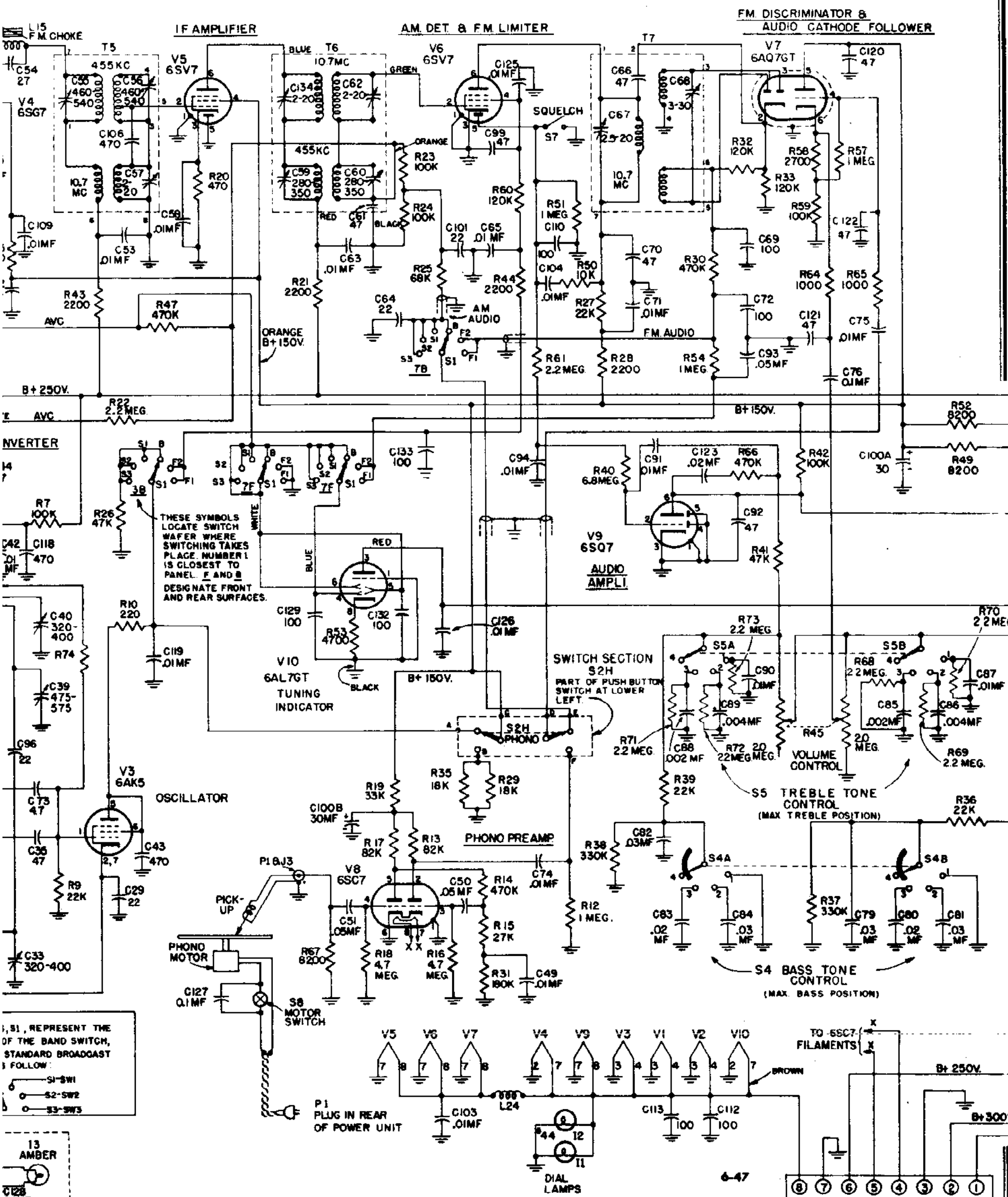
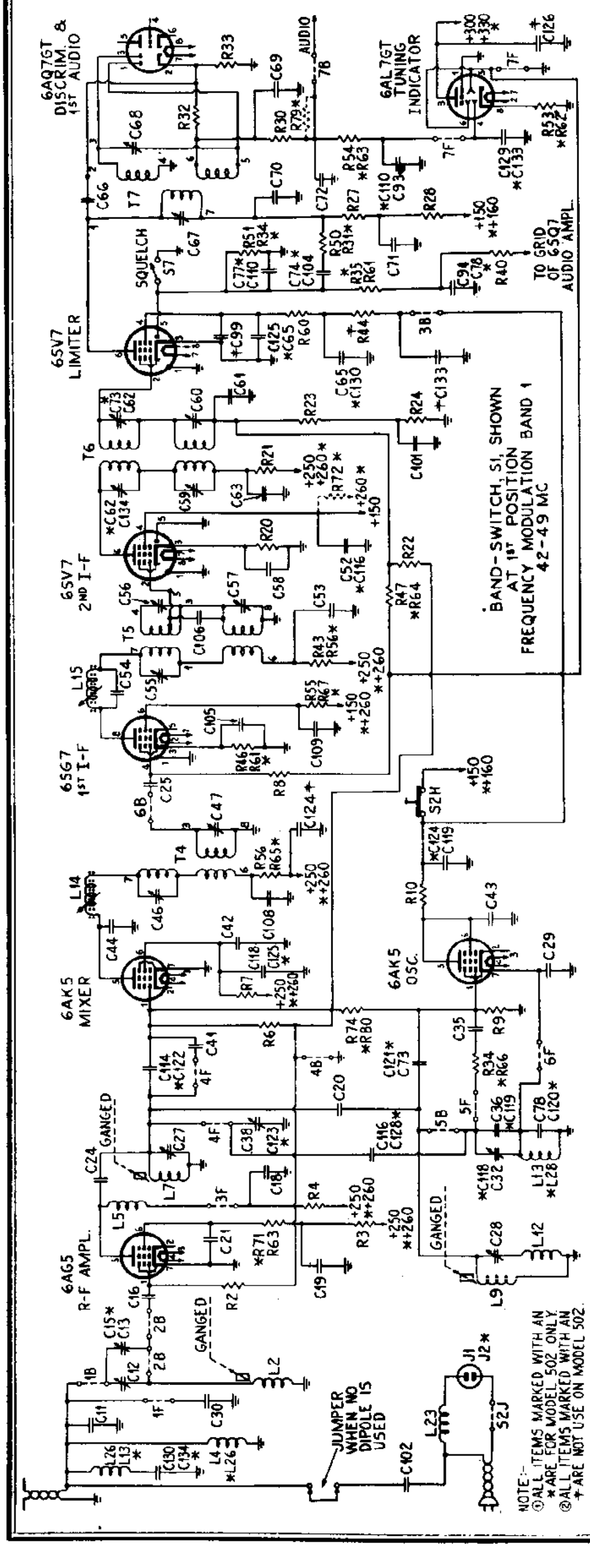


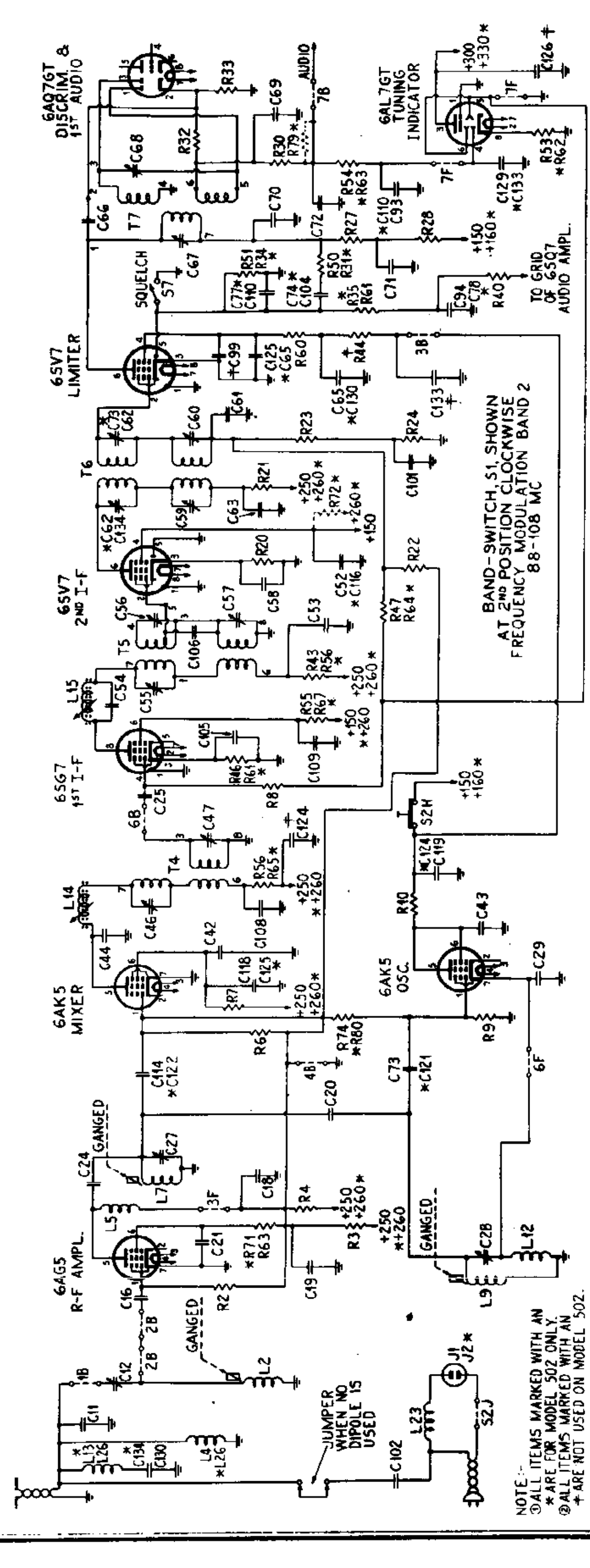
Figure 8—Schematic Diagram, Musaphonic Model 41 through 45

"clarified schematics"

MODELS MUSAPHONIC
41, 42, 43, 44, 45
MODEL 502

GENERAL ELECTRIC CO.

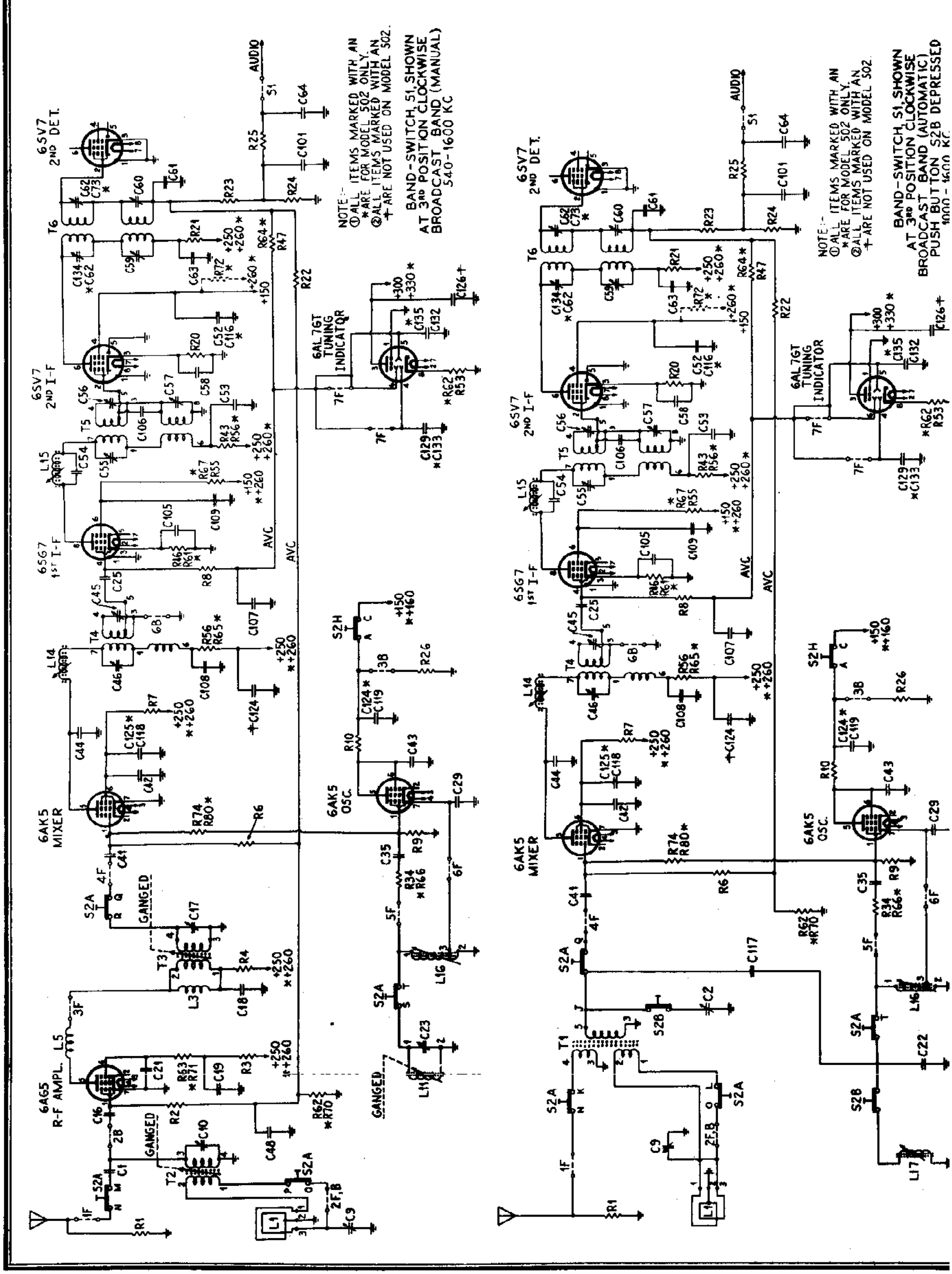




"clarified schematics"

GENERAL ELECTRIC CO.

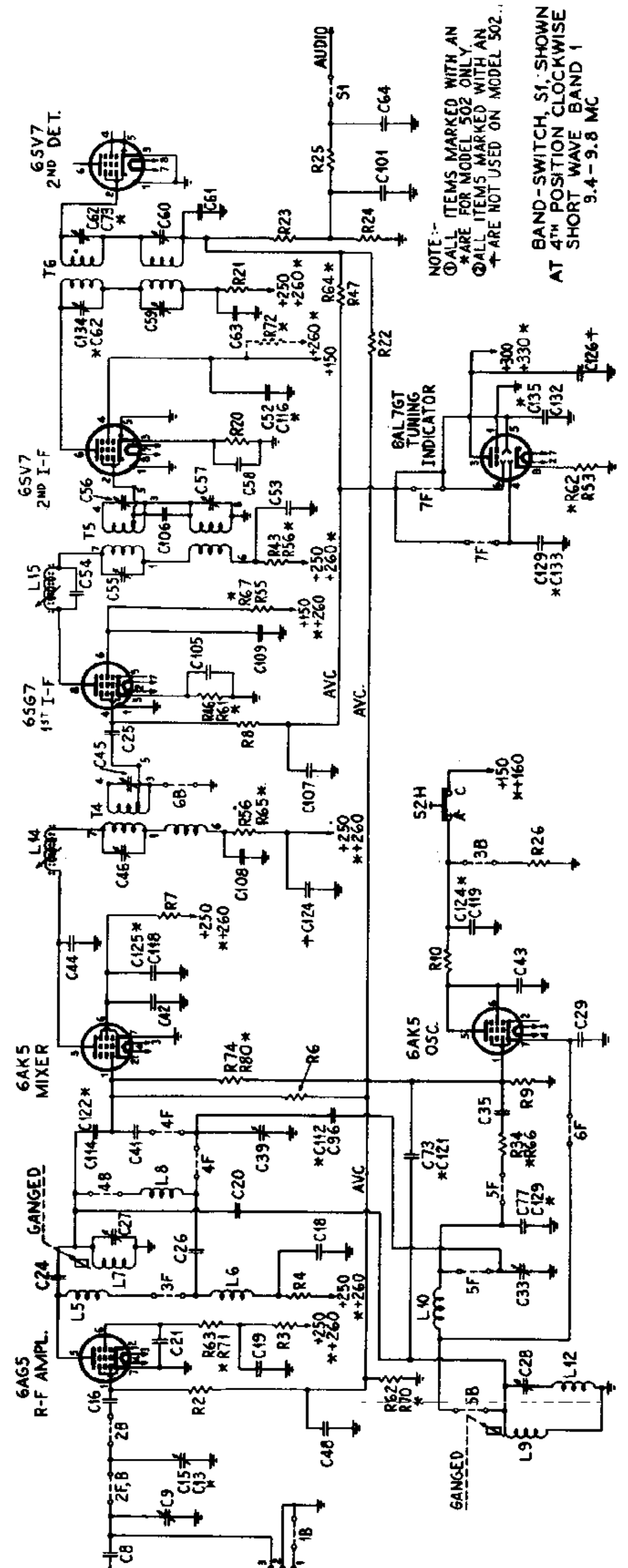
MODELS MUSAPHONIC 41, 42, 43, 44,
MODEL 502

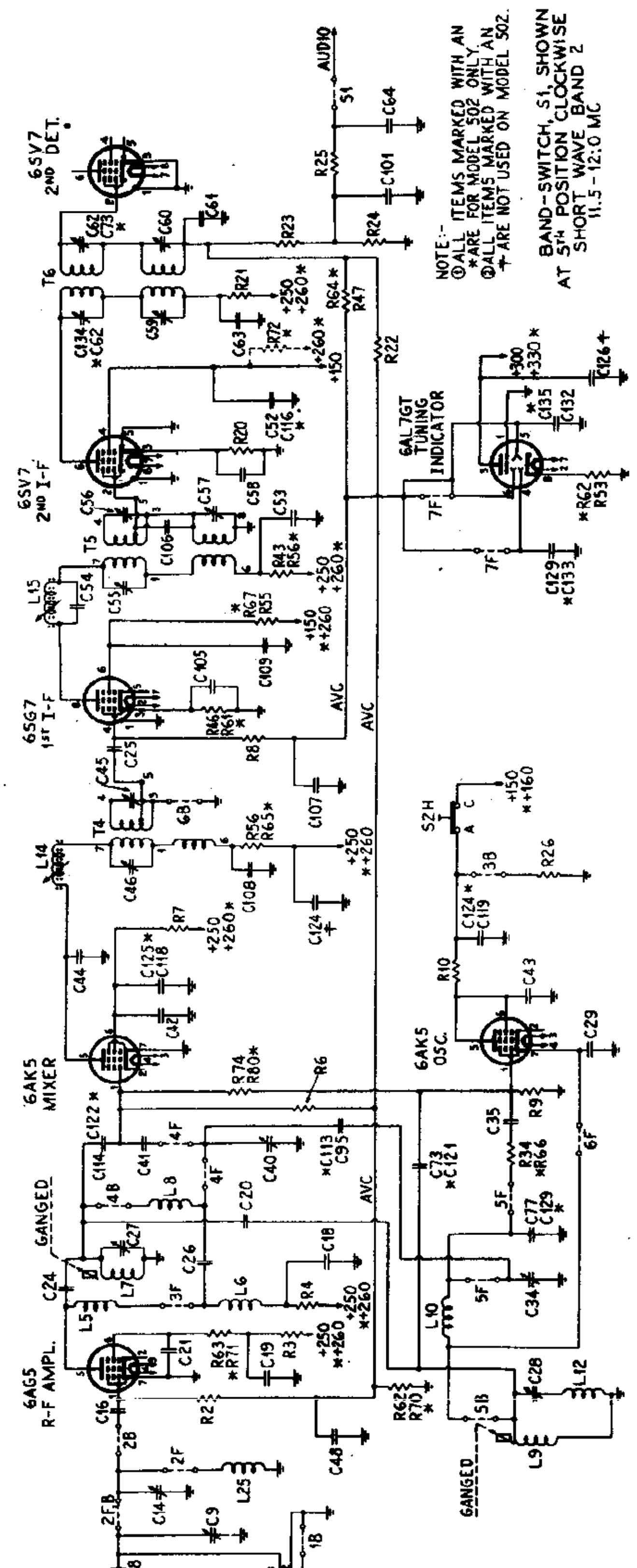


"clarified schematics"

MODELS MUSAPHONIC
41, 42, 43, 44, 45
MODEL 502

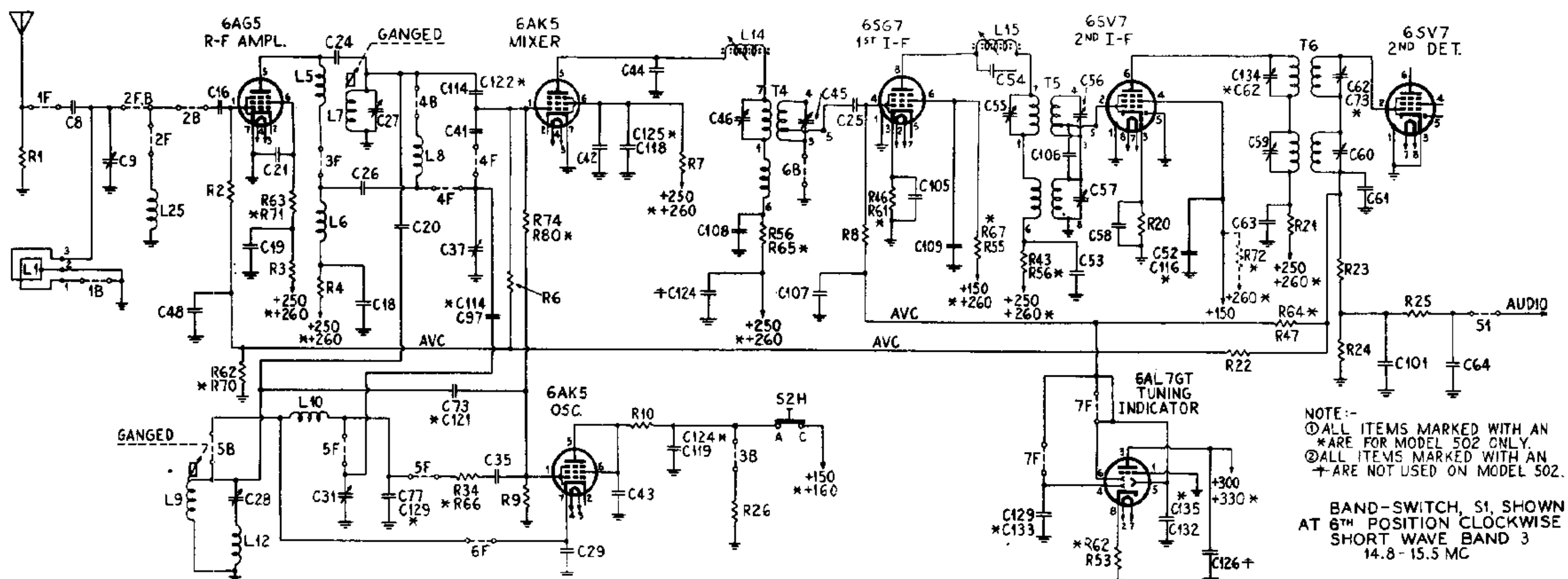
GENERAL ELECTRIC CO.

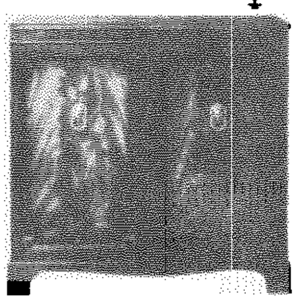


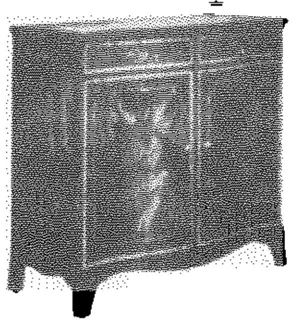


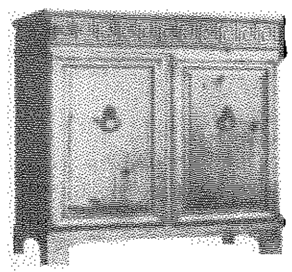
GENERAL ELECTRIC CO.

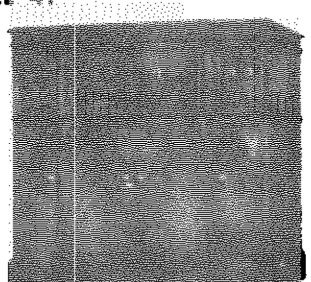
MODELS MUSAPHONE 41, 42, 43, 44,
MODEL 502

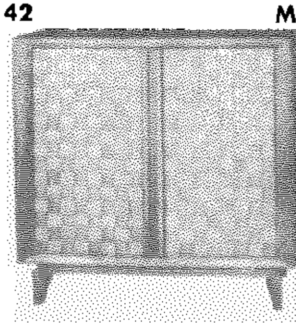



MODEL 41


MODEL 42


MODEL 43





SPECIFICATIONS

CABINET:

Model	Name	Material	Color	Height	Width	Depth
41	St. James	Walnut	Walnut	35 15/16"	36 11/16"	18 1/2"
	Berkeley Square	Mahogany	Mahogany	35 15/16"	36 11/16"	18 1/2"
	Hanover	Mahogany	Blonde Mahogany	35 15/16"	36 11/16"	18 1/2"
42	Stockton	Mahogany	Mahogany	36 5/8"	37 5/16"	20 1/4"
43	Standish	Knotty Pine	Knotty Pine	36 9/16"	36 1/8"	18 1/2"
44	Otley	Walnut	Walnut	37 3/4"	39 5/8"	19 5/8"
	St. Martin's	Mahogany	Mahogany	37 3/4"	39 1/8"	19 1/8"
	Claydon	Mahogany	Champagne Finish	37 3/4"	39 1/8"	19 1/8"
45	Westchester	Ash	Ash	41 1/8"	43"	19"

GENERAL INFORMATION

INTRODUCTION

The information contained in this service note covers the MUSAPHONIC Models 41 thru 45 completely except for the record player.

THE TUNING SYSTEM

The "r-f end" of the receiver is unusual in a number of respects. Variable inductance tuning is employed instead of using a conventional tuning capacitor. This design makes possible two distinct advantages. First, it provides a high efficiency FM circuit in the 88 to 108 megacycle range which would not be possible with the more conventional methods of tuning. Second, it provides stable shortwave spread-bands which tune as easily as the broadcast band. Other advantages are also obtained but the two mentioned above are the most important.

Tuning is accomplished by an "elevator" which consists of a rigid plastic horizontal plate raised and lowered by means of a windlass controlled by the tuning knob at the panel. From this plate are suspended three powdered iron cores which tune the broadcast r-f, converter, and oscillator coils; and three tuning "vanes" which tune three low-inductance circuits. These latter circuits are employed in both FM bands and both shortwave bands with the exception of the antenna circuit for the shortwave spread-bands when a broad tuned antenna coil is used and the r-f guillotine tuner is switched out. They are called "guillotine" tuners because of their appearance.

FACTS ABOUT "GUILLOTINE" TUNING

The "guillotine" tuners are designed primarily for the 88-108 megacycle FM band where special technique is needed to realize high gain and circuit stability. Ordinary coils, tuned by a variable capacitor are inefficient at these frequencies, first, because of the low inductances required to reach these frequencies when a variable tuning capacitor is employed and, second, because shunt capacity reduces the gain of the amplifier circuit; shunt capacity must be kept very low. Another disadvantage of standard tuning arrangments at these frequencies is that common coupling is obtained through the shaft of a ganged tuning capacitor unless insulated single sections are used (cumbersome and costly). Common coupling of this type tends to cause oscillation or general instability and precludes high gain per stage. The guillotines make possible short leads, completely isolated sections, stable tuning, high Q circuits, low shunt capacity, and location of each tuner in the best physical and electrical position in the assembly. Furthermore, since the shunt capacity is small and the inductance is consequently at its highest corresponding value, the additional unavoidable inductance introduced in the wiring, band switch, etc., produces a minimum of circuit losses and unbalance.

The guillotine tuner consists of a heavy, silver-plated, two-turn square coil, rigidly supported between two plastic posts. A flat, solid vane slides up and down between the two turns. It is guided in grooves in the plastic posts so that it passes between the two sections of the coil without touching them. The posts are so moulded and the coil so constructed that the whole assembly is held rigidly at a predetermined spacing. The tuning vane is raised and lowered by the tuning elevator. When the elevator is all the way up (set tuned to lowest frequency), the vane is completely above the coil which then acts as a simple two-turn coil. As the set is tuned toward the higher frequencies, the vane moves downward into the field of the coil until, finally, it is all the way in. The vane reduces the inductance of the coil through two principles. First, it acts as a shorted turn, and thus reduces inductance directly; second, it provides a barrier between the two turns of the coil which reduces the mutual coupling and thus also reduces inductance.

The tuners described above are identified as L2, L7, and L9 on the schematic diagram.

FM BANDS

Guillotine tuners L2, L7, and L9 are used as the tuned circuits for the r-f amplifier, converter, and local oscillator respectively, in both FM bands. In the higher frequency band, the tuner is used with only a small shunt trimmer for adjusting distributed capacity. In the lower band, a higher value shunt trimmer is used to reduce the frequency. The layout of band switch, tuners, and tube sockets is arranged to give the shortest possible leads when the FM bands are in use. The lead length in the other bands is not nearly so critical.

Part No.	Symbol	Description
		UNIVERSAL REPLACEMENT PARTS
UCC-035	C208	CAPACITOR—.001 mfd., 500 v., paper
UCC-036	C85, 88	CAPACITOR—.002 mfd., 600 v., paper
UCC-040	C42, 49, 52, 53, 58, 63, 65, 71, 74, 75, 87, 90, 91, 94, 103, 104, 105, 107, 108, 109, 119, 124, 125, 126, 207	CAPACITOR—.01 mfd., 600 v., paper
UCC-041	C19, 18, 80, 83, 123, 209	CAPACITOR—.02 mfd., 600 v., paper
UCC-042	C79, 81, 82, 84	CAPACITOR—.03 mfd., 600 v., paper
UCC-045	C48, 50, 51, 93, 205, 206	CAPACITOR—.05 mfd., 600 v., paper
UCC-048	C76	CAPACITOR—.10 mfd., 600 v., paper
UCC-056	C203	CAPACITOR—.002 mfd., 500 v., paper
UCG-2048	C22	CAPACITOR—680 mmf., mica
UCN-502	C20	CAPACITOR—1.5 mmf., ceramic
UCN-505	C97	CAPACITOR—4.7 mmf., ceramic
UCN-506	C1, 8	CAPACITOR—6.8 mmf., ceramic
UCN-1504	C117	CAPACITOR—3.3 mmf., ceramic
UCN-1550	C21	CAPACITOR—820 mmf., mica
UCU-012	C64, 101	CAPACITOR—22 mmf., mica
UCU-020	C92	CAPACITOR—47 mmf., mica
UCU-028	C72, 102, 110, 133	CAPACITOR—100 mmf., mica
UCU-520	C26, 61, 66, 70, 99, 120, 121, 122	CAPACITOR—47 mmf., mica
UCU-536	C25	CAPACITOR—220 mmf., mica
UCU-544	C43, 106, 118	CAPACITOR—470 mmf., mica
UCU-1504	C95, 113, 115	CAPACITOR—10 mmf., mica
UCU-1512	C96	CAPACITOR—22 mmf., mica
UCU-1532	C30, 130	CAPACITOR—150 mmf., mica
UCW-012	C24	CAPACITOR—22 mmf., ceramic
UCW-1004	C36, 116	CAPACITOR—10 mmf., ceramic
UCW-1014	C11, 44, 54	CAPACITOR—27 mmf., ceramic
UCW-1024	C78	CAPACITOR—68 mmf., ceramic
UCW-1028	C69	CAPACITOR—100 mmf., ceramic
UDL-005	I1, 2	PILOT LITE
UDL-008	I201	PILOT LITE—Bayonet base
UJB-027		ANTENNA TERMINAL BOARD
UOP-1011		SPEAKER—10-inch PM speaker
URD-013	R34	RESISTOR—33 ohms, ½ w., carbon
URD-025	R207, 208, 211, 212	RESISTOR—100 ohms, ½ w., carbon
URD-033	R10, 46	RESISTOR—220 ohms, ½ w., carbon
URD-041	R20	RESISTOR—470 ohms, ½ w., carbon
URD-049	R63, 64, 65, 71, 204, 206, 209, 210	RESISTOR—1000 ohms, ½ w., carbon
URD-055	R222	RESISTOR—1800 ohms, ½ w., carbon
URD-057	R21, 28, 43, 44	RESISTOR—2200 ohms, ½ w., carbon
URD-059	R58, 217	RESISTOR—2700 ohms, ½ w., carbon
URD-065	R53, 55	RESISTOR—4700 ohms, ½ w., carbon
URD-071	R49, 52, 67, 217, 31	RESISTOR—8200 ohms, ½ w., carbon
URD-077	R56	RESISTOR—15,000 ohms, ½ w., carbon
URD-079	R221	RESISTOR—18,000 ohms, ½ w., carbon
URD-081	R9, 27, 36, 39	RESISTOR—22,000 ohms, ½ w., carbon
URD-083	R15	RESISTOR—27,000 ohms, ½ w., carbon
URD-085	R19, 215, 219	RESISTOR—33,000 ohms, ½ w., carbon
URD-089	R216, 41	RESISTOR—47,000 ohms, ½ w., carbon
URD-093	R25	RESISTOR—68,000 ohms, ½ w., carbon
URD-095	R13, 17	RESISTOR—82,000 ohms, ½ w., carbon
URD-097	R3, 7, 23, 24 42, 59	RESISTOR—100,000 ohms, ½ w., carbon
URD-099	R32, 33, 60	RESISTOR—120,000 ohms, ½ w., carbon
URD-103	R31	RESISTOR—180,000 ohms, ½ w., carbon
URD-105	R203, 205	RESISTOR—220,000 ohms, ½ w., carbon
URD-109	R37, 38,	RESISTOR—330,000 ohms, ½ w., carbon
URD-127	R8, 14, 30, 47, 66	RESISTOR—470 ohms, ½ w., carbon
URD-121	R1, 12, 54, 57, 51, 218, 220	RESISTOR—1.0 meg., ½ w., carbon
URD-125	R2, 6, 62	RESISTOR—1.5 meg., ½ w., carbon
URD-129	R22, 61, 68, 69, 70, 71, 72, 73	RESISTOR—2.2 meg., ½ w., carbon
URD-133	R74, 80	RESISTOR—3.3 meg., ½ w., carbon
URD-137	R16, 18	RESISTOR—4.7 meg., ½ w., carbon
URD-141	R40	RESISTOR—6.8 meg., ½ w., carbon
URE-067	R214	RESISTOR—5600 ohms, 1 w., carbon
URE-073	R50, 4	RESISTOR—10,000 ohms, 1 w., carbon
URE-089	R26	RESISTOR—47,000 ohms, 1 w., carbon
URF-079	R29, 35	RESISTOR—18,000 ohms, 2 w., carbon

SHORTWAVE SPREAD-BANDS

Band spread tuning in the shortwave bands is obtained in the converter and oscillator circuits by inserting the guillotine tuners in series with a higher inductance so that the two inductances together form the "L" part of the shortwave tuned circuit. The small percentage change in inductance obtained in the tuner provides smooth, wide, and stable tuning. The "C" part of the tuned circuit consists primarily of a shunt trimmer. Switching from one shortwave band to the other is accomplished by selecting a different shunt trimmer.

The converter grid circuit, as an example, includes L8 and L7 in series in the SW1, SW2 and SW3 bands. Tuner L7 is in the ground end of the circuit and the signal is fed into the grid end through C26. The shunt tuning capacity is C37, C39, or C40, depending upon which of the three shortwave bands is used. Additional oscillator coupling capacitors C95, C96 and C97 are also added to compensate for the lower coupling through C20 when the higher shunt capacitors are in the circuit.

In the r-f stage, a section of the loop is used as the grid circuit. It is tuned for resonance by a shunt capacitor (C9, C14, or C15) and a shunt inductance (L25). Because a tuned circuit of this type is inherently broad, tuning through the relatively narrow spread-band offers little advantage and is not done.

STANDARD BROADCAST BAND

When manual tuning is employed (band switch in STD position), the receiver employs an r-f stage, a converter, and an oscillator, all of which are tuned by iron slugs suspended from the tuning elevator. When push buttons are used, the r-f stage is not used. Instead, a separate antenna coil is used which couples the antenna and loop directly into the converter. A separate coil is used in order to make the tuning circuit independent of the dial tuning mechanism so that it may be tuned by trimmers in the push-button assembly.

Switching from manual to push-button tuning is accomplished in the oscillator by using an oscillator coil which is tuned by a separate shunt inductance. In manual tuning, the inductance is one which is tuned by the tuning elevator. In push-button tuning, a fixed shunt capacity C22 plus one of a series of push-button selected coils tunes the oscillator.

I-F AMPLIFIER

The i-f amplifier consists of a composite 455 kc and 10.7 mc circuit. The electrical changes required to transfer between AM and FM service are made by the band switch. When the switch is in either the FM1 or FM2 position, the amplifier operates at 10.7 megacycles and delivers the i-f signal into an FM discriminator circuit. When the switch is in any of the other positions, the amplifier operates at 455 kc. Screen voltage is removed from the tube which acted as an FM limiter and this tube then acts as an AM diode detector. Thus, the AM audio signal appears across R24 while the FM audio signal appears across R32. A section of the band switch switches the audio input circuit from one to the other. The AVC bus is also shorted out for FM.

REPLACEMENT OF DRIVE CORDS

Dial Stringing

Push the tuning elevator all the way down and string the dial as shown in Figure 1. This illustration shows the stringing as viewed from behind the dial scale, as you would see it when working on it. The numbers and arrows indicate the progression of the dial cord from start to finish. Notice that the dial cord, in progressive steps 9, 10, 11, and 12, is made to travel behind the start and end of cord stringing, as viewed in Figure 1. The procedure will be easier if pulley C is by-passed until the rest of the work is finished after which the cord can be pulled tight over that pulley. During the procedure, locate the two brass eyelets so that they fall between pulleys A and B. When finished, crimp the eyelets on the cord in the proper positions to act as minimum and maximum stops for the tuning mechanism. Insert pins through the cord and glue to prevent eyelets from moving. Clip the pointer on the cable halfway between the eyelets.

Separate detail drawings are given to show the three different methods of attaching the ends of the cord. The arrangement with the standard helical spring was used in some earlier production receivers. If the cord and spring are to be replaced, the Type 1 spring should be used. It fits the same drum and is an improved type. The Type 2 spring should be used with the later type of drum (with two tabs). When stringing the mechanism with either the Type 1 or Type 2 spring, load the spring by pulling the hook over the projection at the other end of the spring, string the dial and, as a final step, release the hook so that it pulls up the slack in the dial cord.

Elevator Stringing

The step-by-step procedure for stringing the elevator windlass is shown in Figure 2, a rear view of the mechanism. Start by inserting the metallic cord in slot as shown in Step 1. Observe that the cord is measured five inches from end of loop to where it enters the slot. Now bring the loop end around the pulley counterclockwise, as in Step 2. Next, thread loop through hole in elevator top plate, fastening it to the hoist cord tension spring, as viewed in Step 3. Steps 4, 5, 6, and 7 show how the free end of cord progresses on the pulley, going clockwise and that each turn is laid progressively one in back of the other and in back of the vertical section, going to the tension spring in tuner plate. In Step 6, pass the free end of cord down through the hole in chassis, grasping its end with long-nosed pliers and drawing tension on cord while running elevator completely down to the bottom. Keeping tension on cord and forcing large dial drive drum so that hoist cord

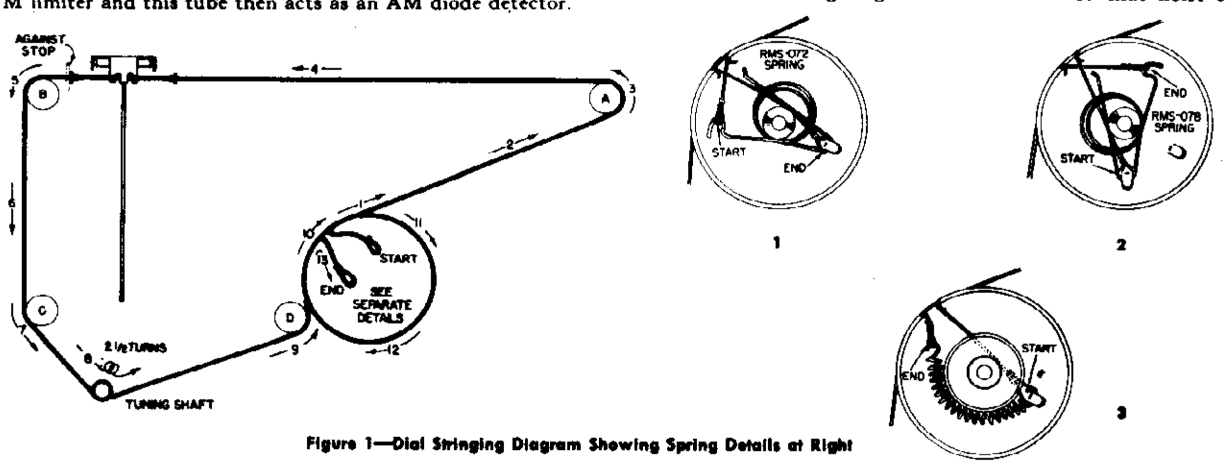


Figure 1—Dial Stringing Diagram Showing Spring Details at Right

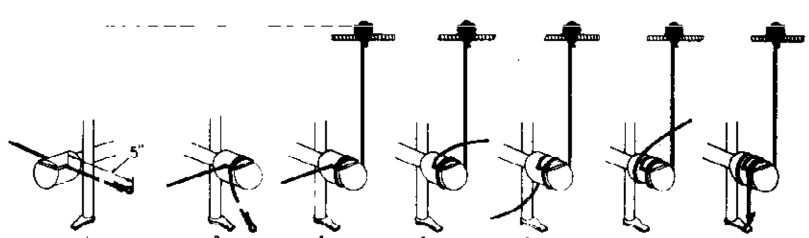


Figure 2 —Elevator Windlass Stringing Procedure

GENERAL ELECTRIC CO.

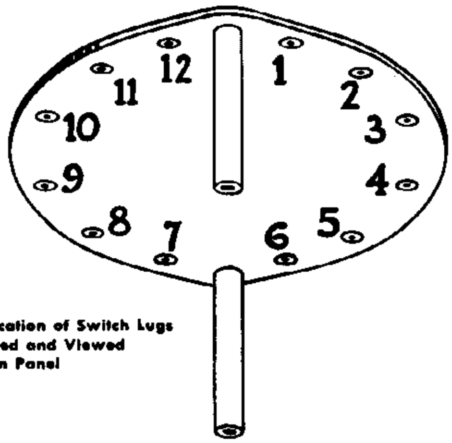


Figure 3—Identification of Switch Lugs —Set Inverted and Viewed from Panel

spring is compressed, complete Step 7 making a one turn loop of the cord's free end around the lug shown on end of elevator shaft, and solder.

Concluding Comments

After replacing the dial cord or the elevator cord, it may be found that some correction in relative positioning is needed. This can be done by loosening the setscrews in the large drive pulley directly behind the dial scale and repositioning it on the shaft. The object, of course, is to permit the tuning control to drive the elevator through its full tuning range. Slight errors in final setting are not serious since leeway is provided in the location of the dial pointer itself.

WIRING OF BAND SWITCH

In order to facilitate repair, replacement, and circuit tracing, a table and diagrams are supplied with reference to the connections made in the band switch. If used properly, these will be of invaluable aid. The remarks which follow are intended to clarify the make-up of the tables and diagrams—read them carefully before using the table.

The table is broken down into seven parts, one for each switch wafer. Section 1 is nearest the front and Section 7 is the rearmost wafer.

Individual lugs on each wafer are numbered from 1 to 12, depending upon their position on the wafer. The method of numbering is illustrated in Figure 3. In determining the number, turn the chassis upside down and look from the front toward the rear of the chassis. Thus, lugs 1 and 12 are the ones which are at the bottom when the set is in its normal position; lugs 3 and 4 are on the side with the broadcast band coils; and lugs 9 and 10 are on the side with the 6AK5 tubes. The numbering refers to lugs whether they be on the front or rear of the wafer.

Figure 6 shows the physical location of various components and terminals to which reference is made in the table.

In those cases where a component symbol number is given in column two, instead of a wire, that component is connected by its own lead wire directly to the switch lug and the connection of the *other* end of the component is given in the last column.

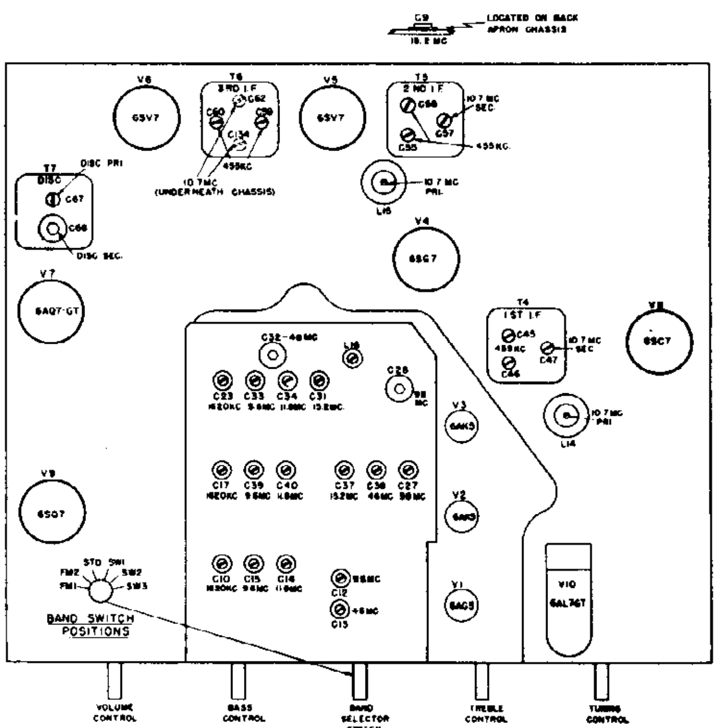


Figure 9—Location of Tubes and Adjusters

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed have a tolerance of ±20%. AM IF measurements should be taken with low signal so that AVC is not effective. R-f measurements should be made by measuring the d-c voltage developed at the r-f tube grid (V1) or converter tube grid (V2) by rectification of the signal.

(1) *R-F and I-F Stage Gains*

Signal applied through IRE dummy antenna:

Antenna post to V1 grid....................3 @ 1000 kc
Antenna post to V1 grid..................2.5 @ 9.6 mc
Antenna post to V1 grid..................2.0 @ 11.8 mc
Antenna post to V1 grid..................2.0 @ 15.2 mc

Signal applied through 300 ohms, including signal generator impedance.

Dipole terminals to V1 grid................1.5 @ 45 mc
Dipole terminals to V1 grid................1.5 @ 98 mc

These checks made with oscillator tube (V3) removed:

V1 grid to V2 grid........................10 @ 1000 kc
V1 grid to V2 grid..........................6 @ 9.6 mc
V1 grid to V2 grid..........................7 @ 11.8 mc
V1 grid to V2 grid........................12 @ 15.2 mc
V1 grid to V2 grid..........................7 @ 45 mc
V1 grid to V2 grid..........................6 @ 98 mc

These checks with oscillator tube (V3) removed:

V2 grid to V4 grid........................24 @ 455 kc
V2 grid to V4 grid........................42 @ 10.7 mc
V4 grid to V5 grid........................17 @ 455 kc
V4 grid to V5 grid........................56 @ 10.7 mc
V5 grid to V6 grid........................50 @ 455 kc
V5 grid to V6 grid........................20 @ 10.7 mc

(2) *Audio Gain*

.065 volts at 400 cps to V7 grid with volume control set at maximum will give approximately ½-watt output across the speaker voice coil.

0.35 volts at 400 cps at input of power amplifier chassis (V201, pin 4) will give approximately ½-watt output across the speaker voice coil.

(3) *Oscillator Grid Bias*

D-c voltage developed across R9 (average):

12 v. @ 1000 kc........................6.5 v. @ 15.2 mc
2.8 v. @ 9.6 mc........................4.6 v. @ 45 mc
4.7 v. @ 11.8 mc.......................3.5 v. @ 98 mc

(4) *Socket Pin Voltages*

Figures 10 and 11 show typical tube pin voltages. All readings should be made from the pins to ground unless otherwise indicated.

WIRING OF BAND SWITCH

(Wire length given from end to end before stripping)

SECTION 1

At this lug—	—connect this—	—the other end of which is connected to this—
1	Insulated green wire, 13¾" lg.	Antenna terminal at rear of chassis
2-3		
3		
4	Capacitor C8	Switch section 2, lug 11
5		
6	(Front lug) capacitor C30 (Rear lug) short copper strap	Chassis Trimmer C12, lug nearer T2
**7	a. C11 b. One side of 300-ohm transmission line	Tube socket V1, pin 2 Hot dipole terminal at rear of chassis
8		
9	a. Short bus with spaghetti, 1¾" long b. Short bus with spaghetti	Chassis Section 1, terminal 12
10	Insulated white wire, 5½" long	Dial switch S2-A terminal N
11	a. Insulated green wire, 3¾" lg. b. Insulated orange wire, 6" lg. c. Insulated green wire, 12¾" lg.	Antenna transformer T2, terminal 2 Push-button transformer T1, terminal 2 Loop socket J3, at rear of chassis, terminal 1
12	See lug 9 above	

SECTION 2

At this lug—	—connect this—	—the other end of which is connected to this—
1	Choke, L25	Ground on band switch shield
2	a. Insulated green wire, 3¼" lg. b. Capacitor, C1	Trimmer C10, lug nearer T2 Section 2, lug 12
3	Insulated green wire, 2¼" lg.	Trimmer C15, lug nearer T2
4	Insulated green wire, 2" long	Trimmer C14, lug nearer T2
5		
6	Short copper strap	Trimmer C13, lug nearer tube V1
7	Short copper strap	Tuner L2, terminal nearer rear of chassis
8	Capacitor C16	Tube socket V1, pin 1
9		
10	Insulated brown wire, 6" lg.	Dial switch S2-A, terminal O
**11	a. Insulated yellow wire, 12¾" long b. See section 1, lug 4	Loop socket J3 at rear of chassis, terminal 3
12	a. Insulated blue wire, 6½" lg. b. See lug 2, above	Dial switch S2-A, terminal M

SECTION 3

At this lug—	—connect this—	—the other end of which is connected to this—
1		
2	a. Choke, L6 b. Capacitor, C18 c. Insulated red wire, 3" long d. Insulated red wire, 5¾" long	Switch section 3, lug 9 Ground on band switch shield RF transformer T3, terminal 1 Terminal strip 1, terminal 2
3	Insulated green wire 2¼" long	RF transformer T3, terminal 2
4-5		
5		
6	Short bus with spaghetti, 1¾" long	Terminal strip 2, terminal 4
7	Insulated yellow wire, 16" lg.	Resistor R44 on terminal board on chassis rear apron
8	a. Resistor R10 b. Capacitor, C119 c. Insulated blue wire, 8¼" lg.	Tube socket V3, pin 5 Ground lug on band switch shield Push-button switch S2H, terminal A
9	a. See lug 2 (a), above b. Capacitor C26	Section 4, lug 11
10	Resistor, R26	Ground lug on terminal strip 2
11-12		

SECTION 4

At this lug—	—connect this—	—the other end of which is connected to this—
1	Copper strap with tubing, 3" long	Trimmer C38, lug nearer L7
2	Copper strap with tubing, 2½" long	Coil L8, terminal 2
3	Insulated brown wire, 7" lg.	Dial switch S2A, terminal Q
4	Insulated green wire, 2¼" lg.	Trimmer C39, lug nearer T3
5	Insulated green wire, 2" long	Trimmer C40, lug nearer T3
6	Short copper strap	Trimmer C37, lug nearer L7
7	Short copper strap	Tuner L7, rear terminal
8	Capacitor, C41	Tube socket V2, pin 1
9	Bus with spaghetti, 2" long	Ground lug on terminal strip 2
10	Insulated white wire, 2½" lg.	Terminal strip 2, terminal 1
11	a. See section 3, lug 9 b. Copper strap with tubing, 3½" long	Coil L8, terminal 1
12		

SECTION 5

At this lug—	—connect this—	—the other end of which is connected to this—
1	a. Bus with spaghetti, 2" long b. Capacitor C36	Section 5, lug 6 Section 6, lug 1
2	a. Insulated green wire, 2¾" lg. b. Insulated blue wire, 6½" lg.	Broadcast oscillator coil L16, terminal 1 Dial switch S2A, terminal T
3	Insulated green wire, 2½" lg.	Trimmer C33, lug nearer L11
4	Insulated green wire, 2" lg.	Trimmer C34, lug nearer L11
5	a. Capacitor, C97 b. Copper strap with tubing, 2" lg.	Trimmer C37, lug nearer T3 Trimmer C31, lug nearer L16
6	a. See lug 1(a) above b. Capacitor, C116 c. Copper strap with tubing, 3¾" long	Trimmer C38, lug nearer tuner L7 Air trimmer C32, right-hand terminal*
7	Short copper strap	Tuner L9, left-hand terminal*
8	Resistor R34	Capacitor, C35
9		
10	a. Short copper strap b. Copper strap with tubing, 3½" long	Section 6, lug 11 SW oscillator coil L10, terminal 2
11	a. Capacitor C77 b. Copper strap with tubing, 3" lg.	Chassis ground SW oscillator coil L10, terminal 1
12		

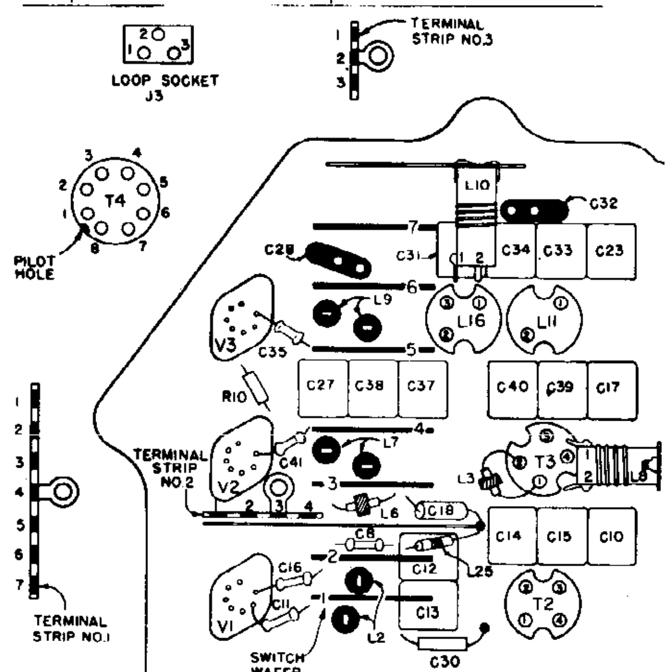


Figure 6—Physical Location of Components Listed in Band Switch Wiring Table

MODELS MUSAPHONIC
41, 42, 43, 44, 45

GENERAL ELECTRIC CO.

WIRING OF BAND SWITCH (Cont'd)

SECTION 6

At this lug—	—connect this—	—the other end of which is connected to this—
1	a. See section 5, lug 1 b. Capacitor C78 c. Copper strap with tubing, 6" lg.	Tuner L9, right-hand terminal* Air trimmer C32, left-hand terminal*
2	Insulated black wire, 5¼" lg.	1st IF transformer T4, terminal 8
3	Insulated green wire, 2¼" lg.	Broadcast oscillator coil L16, terminal 3
4		
5		
6		
7	Short copper strap	Air trimmer C28, right-hand terminal*
8	Copper strap, 2" long	Tube socket V3, pin 7
9	Insulated green wire, 3½" lg.	1st IF transformer T4, terminal 5
10	Insulated yellow wire, 4¼" lg.	1st IF transformer T4, terminal 3
11	See section 5, lug 10(a)	
12		

SECTION 7

At this lug—	—connect this—	—the other end of which is connected to this—
1		
2	Shielded green wire, 12¾" lg.	Discriminator audio output at R30
3		
4	Insulated blue wire of tuning eye cable	Tuning eye tube socket V10, pin 4
5		
6	Insulated blue wire, 4" lg.	Terminal strip 3, terminal 3
7	Bus wire with spaghetti, 2" lg.	Trimmer C31, terminal nearer C32
8		
9		
10	Shielded green wire, 8¾" lg.	Phono switch S2H, terminal E
11	Insulated green wire, 10½" lg.	Resistor R54 on main chassis
12	Shielded green wire, 11¼" lg.	AM audio output at R25

* Looking from front, chassis inverted.
** Double lug (front and rear) soldered together.

ALIGNMENT

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation. (See Table.)
2. D-c voltmeter or microammeter. (See Notes 2 and 3.)
3. A-c voltmeter, 1.41 volts. (See Note 6.)
4. Insulated hex wrench, ¼-inch.
5. .01 mfd. paper capacitor.
6. 400-ohm, ½ watt resistor.
7. 200 mmf. mica capacitor.

Step	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note	Remarks
				AM IF ALIGNMENT			
1	455 kc	Conv. grid directly	STD	....	Peak C60 & C59	4, 5, 6	
2	455 kc	Conv. grid directly	STD	....	Peak C56 & C55	4, 5, 6	
3	455 kc	Conv. grid directly	STD	....	Peak C45 & C46	4, 5, 6	
				FM IF ALIGNMENT			
4	10.7 mc	2nd 6SV7 grid thru .01 mf	FM1	....	C68 for zero**	1, 2	Adjust C68 for *zero* meter reading. Apply 1-volt signal input.
5	......	2nd 6SV7 grid thru .01 mf	FM1	....	Signal Generator	1, 2	Detune signal generator to point of maximum meter reading.
6	As in step 5	2nd 6SV7 grid thru .01 mf	FM1	....	Peak C67	1, 2	
7	10.7 mc	1st 6SV7 grid thru .01 mf	FM1	....	Peak C62 & C134	1, 3	6AQ7GT tube removed from socket.
8	10.7 mc	6SG7 grid thru .01 mf	FM1	....	Peak C57 & L15	1, 3	6AQ7GT tube removed from socket.
9	10.7 mc	Conv. grid directly	FM1	....	Peak C47 & L14	1, 3, 4	6AQ7GT tube removed from socket.
				FM RF ALIGNMENT			
10	98 mc	DIPOLE terminals	FM2	98 mc—3.55 to 3.65 in.*	Peak C28**	1, 3, 7, 10	Set dial accurately—then adjust C28.
11	98 mc	DIPOLE terminals	FM2	For max. output	Peak C27	1, 3, 8	Tune dial for maximum output—then peak C27 while rocking dial.
12	98 mc	DIPOLE terminals	FM2	Do not change	Peak C12	1, 3	
13	46 mc	DIPOLE terminals	FM1	46 mc—3.25 to 3.35 in.*	Peak C32**	1, 3, 7, 10	Set dial accurately—then adjust C32.
14	46 mc.	DIPOLE terminals	FM1	For max. output	Peak C38	1, 3, 8	Tune dial for maximum output then peak C38 while rocking dial.
15	46 mc	DIPOLE terminals	FM1	Do not change	Peak C13	1, 3	

* Important! See Note 7.
** Use insulated hex wrench, ¼ inch.

ALIGNMENT TABLE (Cont'd)

Step	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note	Remarks
SW RF ALIGNMENT							
16	15.2 mc	Antenna thru 400-ohms	SW3	15.2 mc—3.7 to 3.8 in.*	Peak C31	5, 6, 7, 10	Set dial accurately—then adjust C31.
17	15.2 mc	Antenna thru 400-ohms	SW3	Do not change	Peak C37	5, 6, 8	Peak C37 while rocking dial.
SW RF ALIGNMENT continued							
18	15.2 mc	Antenna thru 400-ohms	SW3	Do not change	Peak C9	5, 6, 11	C9 is located on back apron of chassis
19	11.8 mc	Antenna thru 400-ohms	SW2	11.8 mc—3.35 to 3.45 in.*	Peak C34	5, 6, 7, 10	Set dial accurately—then adjust C34
20	11.8 mc	Antenna thru 400-ohms	SW2	Do not change	Peak C40	5, 6, 8	Peak C40 while rocking dial.
21	11.8 mc	Antenna thru 400-ohms	SW2	Do not change	Peak C14	5, 6, 11	
22	9.6 mc	Antenna thru 400-ohms	SW1	9.6 mc—4.0 to 4.1 in.*	Peak C33	5, 6, 7, 10	Set dial accurately—then adjust C33.
23	9.6 mc	Antenna thru 400-ohms	SW1	Do not change	Peak C39	5, 6, 8	Peak C39 while rocking dial.
24	9.6 mc	Antenna thru 400-ohms	SW1	Do not change	Peak C15	5, 6, 11	
BROADCAST RF ALIGNMENT							
25	1620 kc	Antenna thru 200 mmf	STD	Extreme right-hand position	Peak C23	5, 6	
26	1620 kc	Antenna thru 200 mmf	STD	Extreme right-hand position	Peak C17	5, 6	
27	1620 kc	Antenna thru 200 mmf	STD	Extreme right-hand position	Peak C10	5, 6, 11	
28	1500 kc	Antenna thru 200 mmf	STD	1500 kc—1.35 to 1.45 in.*	Osc. coil L11 iron slug	5, 6, 7, 9	L11 iron slug is the rear one on left side.
29	1000 kc	Antenna thru 200 mmf	STD	For max. output	R-F coil, T3 iron slug	5, 6, 9	T3 iron slug is the center one on left side.
30	1000 kc	Antenna thru 200 mmf	STD	Do not change	Ant. coil, T2 iron slug	5, 6, 9	T2 iron slug is the front one on left side.
31	580 kc	Antenna thru 200 mmf	STD	For max. output	Peak L16	5, 6, 8	Peak L16 while rocking dial.
32							Repeat steps 25-31.

* Important! See Note 7

Notes in Connection with Alignment Table:

1. Use *unmodulated* signal.
2. Connect 20,000 ohms-per-volt meter from junction of R30 and C72 to chassis. Use ten-volt scale (steps 4-6).
3. Connect 20,000 ohms-per-volt meter from grid (pin 2) of 6SV7 LIMITER to chassis with a 200,000-ohm resistor connected in series. The resistor must be connected directly to the grid so that capacity loading will be negligible and so that the meter is isolated from the i-f signal voltage. Keep signal generator output down so that the meter indicates not more than one volt at the grid (5 microamperes through 200,000 ohms) (alignment steps 7 to 15).
4. Connect signal generator directly to the converter grid at some convenient point. The generator lead must be shielded up to this connection so that not more than 1/16 inch of exposed lead exists. Ground the shield solidly by clamping it firmly to the chassis or a shield as close to the connection as possible. (Steps 1-3, 9.)
5. Use 400-cycle modulation.
6. Connect a standard output meter across the speaker voice coil. Turn volume control fully on. Keep signal generator output down so that the meter indicates not more than 1/2 watt output (1.41 volts) during alignment.
7. If dial scale is not available, index pointer as follows: Turn pointer to right-hand limit of travel. Mark the dial backplate at a reference edge of the pointer slider. Then set pointer by turning dial knob until the indicated dimension exists between the reference edge and the mark.
8. "Rocking" consists of adjusting the indicated adjuster while turning the dial a small amount back-and-forth through peak output. The object is to find the maximum peak. Rocking is necessary and is permissible only when interlocking circuits are being adjusted.
9. The main iron tuning slugs are suspended from the left side of the tuning "elevator." They are individually adjustable by loosening the locknut and turning the supporting screw into which the suspending wire is soldered.
10. *Two* oscillator settings may give response. The higher frequency response point is the correct one; the other is the image. If in doubt, start with the trimmer screw loosened completely and adjust for the *first* response.
11. Loop antenna must be plugged in when aligning antenna trimmers C9, C10, C14, and C15.

MODELS MUSAPHONIC
41, 42, 43, 44, 45

GENERAL ELECTRIC CO.

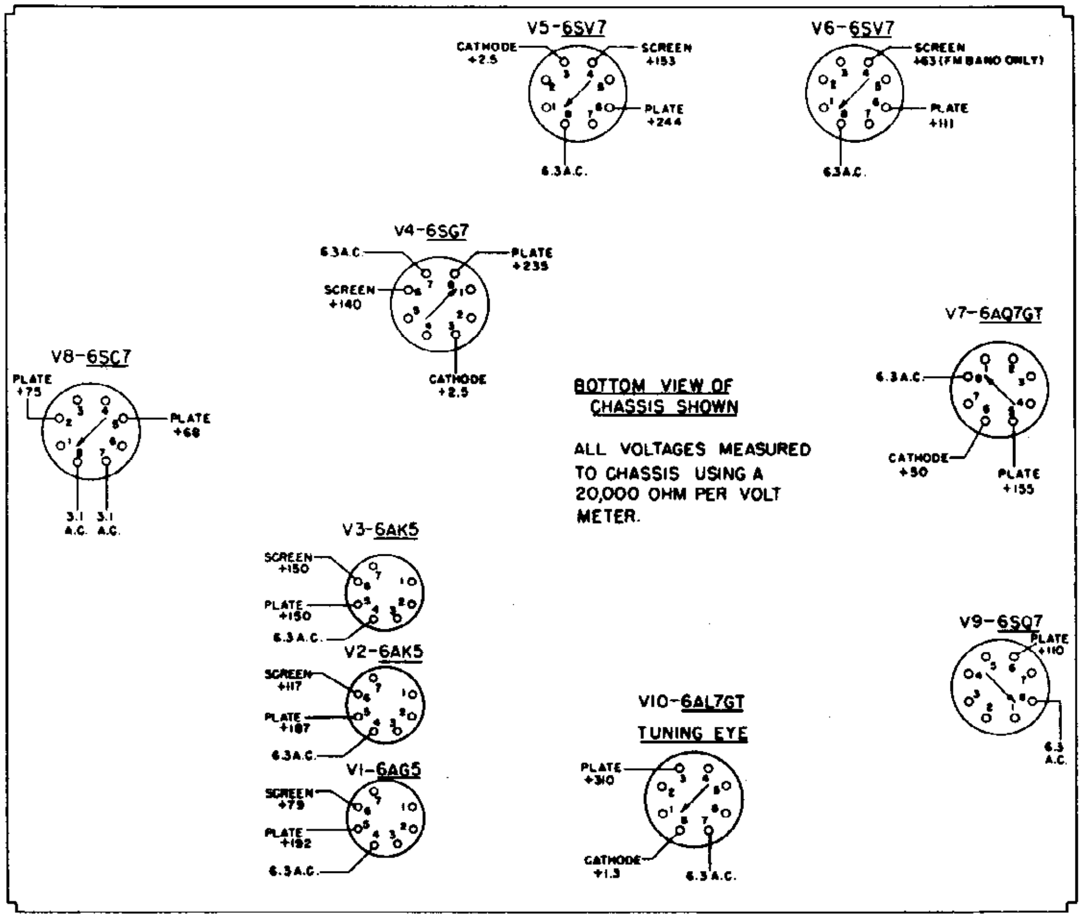
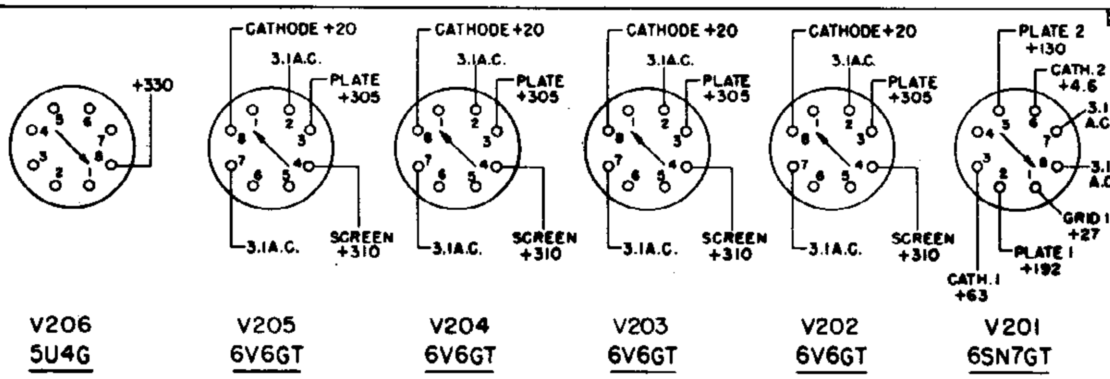


Figure 10—Socket Voltage Diagram of Main Chassis



BOTTOM VIEW OF CHASSIS SHOWN

ALL VOLTAGES MEASURED TO CHASSIS USING A 20,000 OHM PER VOLT METER

Figure 11—Socket Voltage Diagram of Power Chassis

SPECIALIZED REPLACEMENT PARTS

Part No.	Symbol	Description
RAB-028	L1	LOOP AND BACK ASSEMBLY Model 41, Walnut
RAB-029	L1	LOOP AND BACK ASSEMBLY—Model 41, Mahogany
RAB-030	L1	LOOP AND BACK ASSEMBLY—Model 41, Blonde Mahogany
RAB-031	L1	LOOP AND BACK ASSEMBLY—Model 42, Mahogany
RAB-032	L1	LOOP AND BACK ASSEMBLY—Model 43, Knotty Pine
RAB-033	L1	LOOP AND BACK ASSEMBLY—Model 44, Walnut
RAB-034	L1	LOOP AND BACK ASSEMBLY—Model 44, Mahogany
RAB-035	L1	LOOP AND BACK ASSEMBLY—Model 44, Champagne Finish Mahogany
RAB-042	L1	LOOP AND BACK ASSEMBLY—Model 42, Mahogany, 50 cycles
RAB-044	L1	BACK AND LOOP ASSEMBLY—Model 45
RAD-018		BRACKET—Band switch (front)
RAD-019		BRACKET—Band switch (rear)
RAD-020		BRACKET—For coil on rear bracket of band switch
RAD-023		MOUNTING BRACKET Dial scale
RAL-001		BEZEL—Dark
RAL-002		BEZEL—Light
RAX-014		BRACKET AND ROLLER FORK ASSEMBLY —For tuning hoist
RCC-038	C86, 89	CAPACITOR—.004 mfd., 600 v., paper
RCE-019	C201A, B, C, D	CAPACITOR—30 mfd., 15 mfd., 30 mfd., 30 mfd., electrolytic
RCE-032	C100A,	CAPACITOR—30 mfd., 400 v., electrolytic
	C100B	CAPACITOR—30 mfd., 350 v., electrolytic
RCM-001	C127	CAPACITOR—.01 mfd., metal cased
RCM-002	C128	CAPACITOR—.01 mfd., metal cased
RCW-024	C29	CAPACITOR—44 mmf., ceramic
RCW-025	C73, 114	CAPACITOR 4.7 mmf., ceramic
RCW-1028	C11, 16, 41, 113, 129, 132	CAPACITOR—100 mmf., ceramic
RCX-012	C2, 3, 4, 5, 6	TRIMMER STRIP—Push button
RCX-024	C12, 13	TRIMMER STRIP—3-30 mmf., 80-130 mmf., trimmer capacitor
RCX-025	C23, 31, 33, 34	TRIMMER STRIP—185-245 mmf., 20-55 mmf., 320-400 mmf., 165-225 mmf., trimmer capacitor
RCX-026	C17, 39, 40	TRIMMER STRIP 20-55 mmf., 475-575 mmf., 320-400 mmf., trimmer capacitor
RCX-027	C27, 37, 38	TRIMMER STRIP 2-20 mmf., 185-245 mmf., 34-70 mmf., trimmer capacitor
RCX-028	C10, 14, 15	TRIMMER STRIP—34-70 mmf., 40-80 mmf., 5-45 mmf., trimmer capacitor
RCY-011	C9	CAPACITOR—2-20 mmf., trimmer
RCY-017	C28, 32	TRIMMER STRIP 3-30 mmf., 3-30 mmf., trimmer capacitor
RDB-006		KEY—Push-button key (brown)
RDB-007		KEY—Push-button key (tan)
RDC-019		CORD—Hoist cord, 6½ inches long
RDC-025		DRIVE CORD ASSEMBLY
RDF-003		FELT WASHER—(Dark), for control knobs
RDF-006		FELT WASHER—(Light), for control knobs
RDF-008		FELT STRIP—Dial scale
RDK-042		KNOB—(Plain) Pine, Blonde Mahogany, and Champagne
RDK-043		KNOB—(Plain) Mahogany
RDK-044		KNOB—(Plain) Walnut
RDK-045		KNOB—(Arrow) Pine, Blonde Mahogany, and Champagne
RDK-046		KNOB—(Arrow) Mahogany
RDK-047		KNOB—(Arrow) Walnut
RDK-092		KNOB—(Plain) for Model 45 only
RDK-080		KNOB—(Arrow) for Model 45 only
RDP-025		POINTER ASSEMBLY—Model 43 only
RDP-026		POINTER ASSEMBLY—Models 41, 42, 44, 45
RDS-023		DIAL SCALE ASSEMBLY
RDS-045		SCALE—Dial scale
RDX-020	S6, L17, 18, L19, 20, 21, L22	PUSH-BUTTON SWITCH ASSEMBLY
REI-006		IRON CORE AM tuning
RHE-001		EYELET—For connecting FM coil links
RHG-007		GROMMET—Rubber grommet for tuning eye cable
RHG-008		GROMMET—Rubber grommet for tuner plate
RHG-009		GROMMET—Rubber grommet for tuner plate near tuning shaft
RHG-010		GROMMET—For 6SC7 tube socket
RHM-012		CUSHION—Dial scale
RHM-024		LINK—Hoist link, holding end of hoist cord
RHM-025		RING—Retaining ring for shaft, mounting push-button keys
RHN-004		NUT—Hex nut for tuning vane adjustment
RJC-001		CONTACT PIN—For speaker connection
RJJ-001		RECEPTACLE—Receptacle for octal plug on receiver chassis
RJJ-002	J3	~~RECEPTACLE—For loop~~
RJJ-003		RECEPTACLE—6AL7 tuning eye socket
RJP-004	P1	PLUG—Male phono input, from preamplifier
RJP-006		SHELL—For loop plug
RJP-007	J1	RECEPTACLE—117 v. a-c output to SPU chassis
RJP-008		PLUG—On power cable
RJP-009	J201	RECEPTACLE—Special power unit a-c
RJP-015	J202	RECEPTACLE—For pilot light and speaker cable plug
RJS-012		MOUNTING PLATE—For mounting electrolytic on SPU chassis
RJS-017	J203	TUBE SOCKET—Octal base socket on SPU chassis
RJS-030		SOCKET—For tubes V4, V5, V6, and V7
RJS-044		TUBE SOCKET Tube socket for V1, V2, and V3
RJS-052		SOCKET—Tube socket for V9, V201, V202, V203, V204, V205, and V206
RJS-065		SOCKET Pilot light socket and leads
RJS-066		MOUNTING PLATE—Electrolytic mounting plate, on SPU chassis
RJS-073		SOCKET—Phono-lite socket
RJS-085		SOCKET—Tube socket for V8
RJX-003	J3	RECEPTACLE—Phono input
RJX-005	P202	PLUG 4-pin amphenol for pilot light and speaker cable
RJX-006		OCTAL PLUG RECEPTACLE AND LOCK RING—For power receptacle on main chassis
RLA-006	T1	B.C.P.B. ANTENNA TRANSFORMER
RLA-009	T2	COIL—Broadcast band antenna coil
RLA-012	L4, 13, 28	COIL—FM antenna choke, FM1 oscillator cathode choke, oscillator cathode choke
RLB-006	T3	COIL—Broadcast band RF coil
RLB-008	L6	COIL SW band RF plate choke coil
RLB-009	L3	COIL—Broadcast RF primary dummy
RLC-015	L10	COIL—SW oscillator loading coil
RLC-016	L16	COIL Broadcast band oscillator shunt coil
RLC-017	L8	COIL—SW band RF loading coil
RLF-003	L24	CHOKE—IF filament choke
RLF-010	L201	CHOKE Filter for power supply
RLI-005	L23	CHOKE—FM power line choke
RLI-002	L12	CHOKE FM oscillator cathode choke
RLI-018	L25	COIL—SW2 loop shunt coil
RLP-005	L14, 15	CHOKE IF plate choke
RLP-008	L5, 26	COIL—FM choke; RF plate and IF wavetrap
RLP-018	L5	COIL—FM RF plate choke
RLX-002		COIL AND MOUNTING BRACKET ASSEMBLY—For push buttons
RLX-003		TRIMMER STRIP BRACKET AND COIL ASSEMBLY For push buttons
RMC-012		CLAMP For holding cover on RF unit
RMC-013		CLIP—Support for clamp, holding cover on RF unit
RMF-003		CLIP—For tube shield on 6AQ7GT
RMM-009		SPACER—Metal sleeve on hoist pulley shaft
RMM-010		VANE—Tuner vane for FM coils L2 and L7
RMM-011		VANE—Tuner vane for FM oscillator coil L9
RMM-034		SHIELD—Lite shield for bezel
RMM-035		SHIELD—Tube shield for 6AQ7GT
RMM-036		SUPPORT—Fibre support for push-button coils
RMM-037		DRAWER SLIDES—Cabinet drawer slides
RMR-002		ROLLER—Presses against hoist shaft
RMS-039		WASHER—"C" washer for idler pulley shaft
RMS-040		SPRING—Flat spring against hoist pulley shaft
RMS-041		SPRING—Wire spring against hoist pulley shaft
RMS-042		SPRING Hoist cord tension spring
RMS-043		SCREW—Iron core adjusting screw
RMS-044		SPRING—Guide wire connecting tuning vanes to adjustment screws
RMS-076		SCREW—For tuning vane adjustment
RMS-078		SPRING Type 2 dial cord spring (late production)
RMU-030		SHAFT—For mounting push-button keys
RMU-031		SHAFT—Tuning shaft
RMW-013		FLYWHEEL—Less setscrew
RMW-016		PULLEY Main tuning drum
RMW-018		PULLEY—Hoist
RMW-032		PULLEY—Idler pulley for dial cord
RMX-006		CABLE ASSEMBLY—For tuning eye
RMX-018		FLYWHEEL—With setscrew
RMX-019		PULLEY—Hoist pulley and shaft
RMX-021		TUNER TOP PLATE AND SHAFT ASSEMBLY
RMX-094		BRACKET AND SPRING ASSEMBLY—For push buttons
RRC-026		TONE CONTROL ASSEMBLY—Bass
RRC-027		TONE CONTROL ASSEMBLY—Treble
RRC-050	R45A, B	RESISTOR—2 meg., dual potentiometer
RRT-001	R202A, B	RESISTOR—900 ohms, 6 w., 150 ohms, 6 w., wirewound
RRW-016	R201	RESISTOR—100 ohms, 2 w., variable resistor
RSP-004		SWITCH—Push-button switch
RSP-006		PLUG—Loop plug
RSS-003	S7	SWITCH—Squelch switch
RSW-029	S1	SWITCH—Band change switch
RSX-010		SWITCH ASSEMBLY—Phono-lite
RTD-001	T7	FM DISCRIMINATOR TRANSFORMER
RTL-017	T4	BC 1st IF TRANSFORMER
RTL-022	T5	BC 2nd IF TRANSFORMER
RTL-043	T6	BROADCAST 3rd IF TRANSFORMER
RTO-026	T202	TRANSFORMER—Audio output to speakers
RTP-035	T201	TRANSFORMER—Power transformer, 60 cycles
RTP-036	T201	TRANSFORMER—Power transformer, 50 cycles
RWL-004		CORD AND PLUG—For 117 v. a-c to main chassis
RWM-001	P201	CORD—Cord and plug for 117 v. a-c to special power unit, Model 41 and 42
RWM-003	P201	CORD Cord and plug for 117 v. a-c to special power unit, Model 43
RWM-004	P201	CORD—Cord and plug for 117 v. a-c to special power unit, Model 44
RWM-005	P201	CORD—Cord and plug for 117 v. a-c to special power unit, Model 45
RYC-006		~~TAB—Push-button key tab (phono)~~
RYC-007		STATION CALL LETTERS—For push-button keys
RYC-008		TAB—Push-button key tab (OFF)

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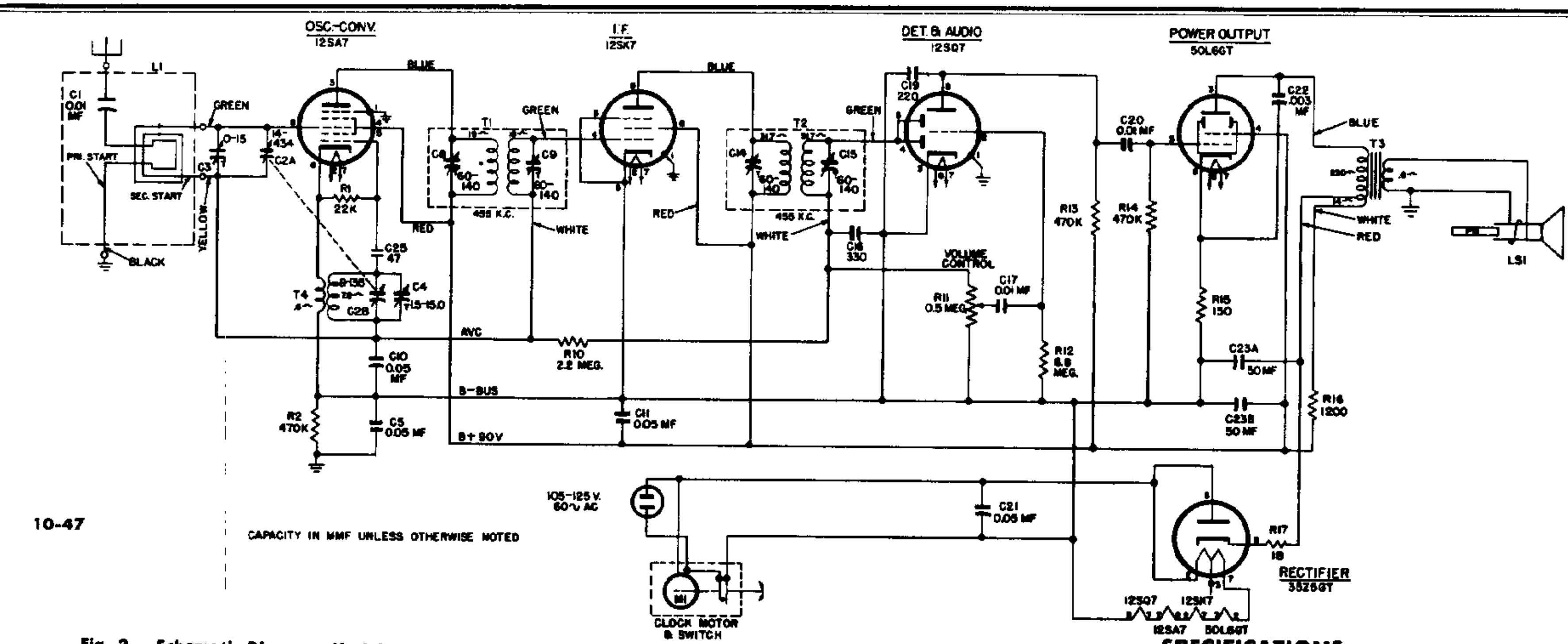
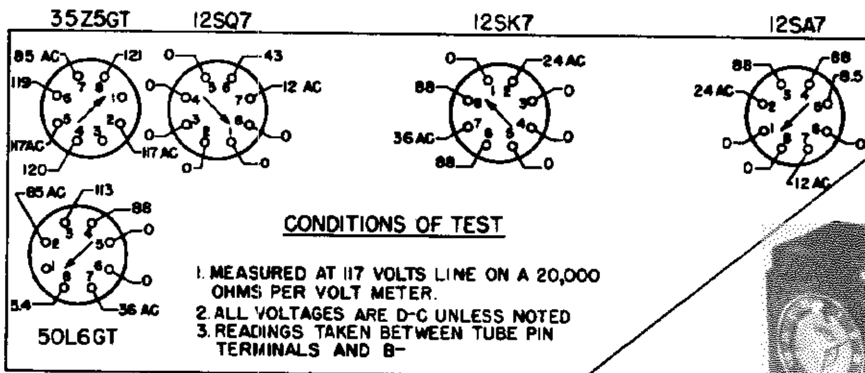


Fig. 2. Schematic Diagram, Models 60 and 62

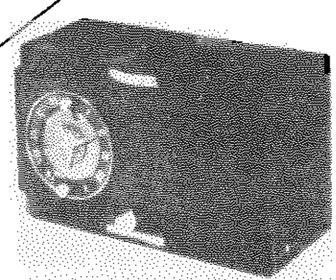


CONDITIONS OF TEST

1. MEASURED AT 117 VOLTS LINE ON A 20,000 OHMS PER VOLT METER.
2. ALL VOLTAGES ARE D-C UNLESS NOTED
3. READINGS TAKEN BETWEEN TUBE PIN TERMINALS AND B-

VIEWED FROM BOTTOM OF CHASSIS

Fig. 3. Socket Voltages



SPECIFICATIONS

CABINET:

Model	60	62
Color	Mahogany	Ivory
Height	6 3/16 in.	6 3/16 in.
Width	10 1/2 in.	10 1/2 in.
Depth	5 3/8 in.	5 3/8 in.

ELECTRICAL RATING (INPUT):

Voltage .... 105-125 volts, a-c
Frequency .... 60 cycles
Wattage .... 35 watts

OPERATING FREQUENCIES:

Intermediate Frequency .... 455 kc
Broadcast Band .... 540-1600 kc

POWER OUTPUT:

Undistorted 1.2
Maximum 2.0

LOUDSPEAKER:

Type .... Alnico PM
Outside Cone Diameter 4-inch
Voice Coil Impedance (400 cycles) .... 3.5 ohms

CAUTION: One side of the power line is connected to B −. Avoid any ground connections direct to B −. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

CLOCK SERVICE

Figure 4 shows clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Alarm-Radio is a pull-off knob.
2. Remove Bezel, Hands and Dial Face.
3. Remove the motor assembly by removing two screws (A) and break two soldered joints on Field. The Field and Rotor Assembly (R) can now be removed. The Rotor is held by friction only to the Field.
4. Remove Switch Assembly (B) by removing two screws from base plate.
5. Remove Switch Shaft Assembly (C) and spacer.
6. Remove Alarm-Set Shaft Assembly (D) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove Alarm Gear Sleeve Assembly (E), Hour Gear Sleeve Assembly (F), Minute Gear Sleeve Assembly (G), and Sweep Second Gear Shaft Assembly (H).
9. Remove Alarm Cam Gear Assembly (I) and Spring Washer (J).
10. Remove Alarm-Set Gear (K).
11. Remove Time-Set Gear and Shaft Assembly (L).
12. Remove Switch Cam Lever (M).

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (J) should curve away from the gear when placed on the Alarm Cam Gear Assembly (I).
2. The Switch Cam Lever (M) fork must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second Gear (H) through the hole in the base plate to make sure it is free to turn.
4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Alarm-Radio shaft to ALARM position.
2. Slowly rotate Time Set shaft clockwise until the contacts of the Switch Assembly (B) close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands and Dial so that they indicate 12 o'clock. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm Set knob pulled out, continue to rotate Time Set shaft clockwise and note that the vibrator arm (N) drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (±1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction on minute hand sleeve assembly, defective rotor. Clock time set shaft bent and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

RADIO REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
		UNIVERSAL G-E REPLACEMENT PARTS
UCC-623	C22	CAPACITOR .003 mf., 600 v., paper
UCC-630	C1, 17, 20	CAPACITOR .01 mf., 600 v., paper
UCC-635	C5, 10, 11, 21	CAPACITOR .05 mf., 600 v.
UCU-036	C19	CAPACITOR—220 mmf., mica
UCU-040	C16	CAPACITOR 330 mmf., mica
UCW-020	C25	CAPACITOR—47 mmf., ceramic
UOP-418	LS1	SPEAKER—4-inch PM speaker
URD-029	R15	RESISTOR—150 ohms, ½ w., carbon
URD-081	R1	RESISTOR—22,000 ohms, ½ w., carbon
URD-113	R2, 13, 14	RESISTOR 470,000 ohms, ½ w., carbon
URD-129	R10	RESISTOR—2.2 meg., ½ w., carbon
URD-141	R12	RESISTOR—6.8 meg., ½ w., carbon
URF-051	R16	RESISTOR—1200 ohms, 2 w., carbon
		SPECIALIZED G-E REPLACEMENT PARTS
RAB-054	L1	BACK—Cabinet back cover (includes loop antenna)
RAU-020		CABINET—Mahogany plastic cabinet (Model 60)
RAU-021		CABINET—Ivory plastic cabinet (Model 62)
RCE-050	C23A, B	CAPACITOR 50 mfd., 150 v.; 50 mfd., 150 v., dry electrolytic
RCT-021	C2A, B	CONDENSER Tuning condenser, oscillator, and r-f section
RDK-028		KNOB Volume control knob (Models 60 or 62)
RDK-094		KNOB Tuning dial wheel (Models 60 or 62)
RDS-047		SCALE Dial scale (Model 60)
RDS-050		SCALE Dial scale (Model 62)
RJS-003		SOCKET Octal tube socket (Type 12SA7)
RJS-006		SOCKET Octal tube socket
RLC-051	T4	COIL Oscillator coil
RRC-054	R11	POTENTIOMETER 0.5 megohm, volume control
RRW-008	R17	RESISTOR 18 ohms, 1 watt, wirewound
RTL-050	T1	TRANSFORMER 1st I-F transformer
RTL-051	T2	TRANSFORMER 2nd I-F transformer
RTO-036	T3	TRANSFORMER—Output transformer
RWL-009		CORD—Power cord, brown (Model 60)
RWL-014		CORD—Power cord, white (Model 62)
RZC-005	M1	CLOCK—60 cycle, 105-125 v., clock assembly
RZC-006	M1	CLOCK—50 cycle, 105-125 v., clock assembly

CLOCK REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
		MISCELLANEOUS
XC3X49	Q	TIME SET SHAFT KNOB—Bronze
XC4X5		ALARM SET KNOB—Ivory
XC10X131	L	TIME SET GEAR AND SHAFT ASSEMBLY
XC11X11	D	ALARM SET SHAFT ASSEMBLY
XC31X26		SWEEP SECOND HAND
XC32X167		HOUR AND MINUTE HANDS
XC34X139	O	FRONTPLATE ASSEMBLY
XC53X100		INNER BEZEL—2 9/16 in., round, maroon
XC54X29		OUTER BEZEL—Brass
XC55X11		ALARM DIAL
XC58X16		CRYSTAL 2 9/16 in., round
XC59X234		NUMERAL COLOR RING—Bronze
XC59X699	C	SWITCH SHAFT ASSEMBLY
XC59X716		SWITCH KNOB—Ivory
XC60X712		DIAL FACE—(On frontplate)
		CLOCK MOVEMENT
XC1X1	A	SCREW—Holds Field, No. 4-40X1 1/8 in. R.H.
XC1X2		No. 1204 LOCKWASHER
XC1X6		SCREW No. 4-40 x 5/8 in. R.H.
XC1X43		HEX NUT
XC13X11	F	HOUR GEAR SLEEVE ASSEMBLY
XC14X15	G	MINUTE GEAR SLEEVE ASSEMBLY
XC15X3	E	ALARM GEAR SLEEVE ASSEMBLY
XC16X14	H	SWEEP SECOND GEAR SHAFT ASSEMBLY
XC17X8	I	ALARM GEAR SHAFT ASSEMBLY
XC35X39		BASEPLATE ASSEMBLY
XC40X13		RIVET—Vibrator
XC40X76		SWITCH ASSEMBLY—Consists of: Contact Block, Contact Block, Contact Spring Insulator
XC40X77	K	ALARM SET GEAR ASSEMBLY
XC40X78	M	SWITCH CAM LEVER ASSEMBLY
XC40X79		UPPER CONTACT SPRING ASSEMBLY
XC40X80		LOWER CONTACT SPRING AND TIP ASSEMBLY
XC40X202		SPREADER POST
XC40X252	J	CAM GEAR SPRING WASHER
XC40X260		SPACER—Switch shaft
XC40X261		TIME SET SHAFT SPACER
XC40X262		TIME SET SHAFT SPACER
XC40X263		ALARM SHUT-OFF SPACER
XC44X38		ROTOR UNIT—60 cycles
XC45X69	R	FIELD COIL ASSEMBLY 60 cycle
XC64X1-2-3		FRONTPLATE SCREW

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

R-F .... 1500 kc
I-F .... 455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1 ½ volts full scale.
3. 0.05 mf. paper capacitor.
4. 200 mmf. mica capacitor.
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the index should read approximately 3/16-inch to the right of the 550 kc scale calibration mark. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. CAUTION: Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified.

ALIGNMENT CHART

Step	Connect Test Oscillator to—	Test Osc. Setting	Dial Drum Setting	Adjust Trimmers for Maximum Output
1	12SK7 grid (4) in series with 0.05 mf. cap.	455 kc	1600 kc	2nd i-f trans. trimmers, C14 and C15
2	12SA7 grid (8) in series with 0.05 mf. cap.	455 kc	1600 kc	1st i-f trans. trimmers, C8 and C9
3	Antenna Post in series with 200 mmf. cap.	1500 kc	1500 kc	C4 (oscillator)
4	Antenna Post in series with 200 mmf. cap.	1500 kc	1500 kc	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

(1) R-F and I-F Stage Gains.
Antenna Post to 12SA7 Grid .... 2 @ 1000 kc
12SA7 Grid to 12SK7 Grid .... 50 @ 455 kc
12SK7 Grid to 12SQ7 Diode Plate .... 70 @ 455 kc

(2) Audio Gain.
0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately ½-watt output across the loudspeaker, LS1, voice coil.

(3) Oscillator Grid Bias.
D-c voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc.

(4) Socket Pin Voltages.
Figure 3 shows voltages from all tube pins to B — unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

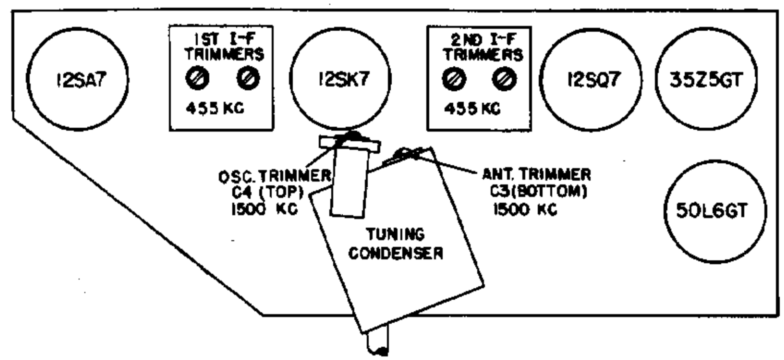


Fig. 1. Tube and Trimmer Location

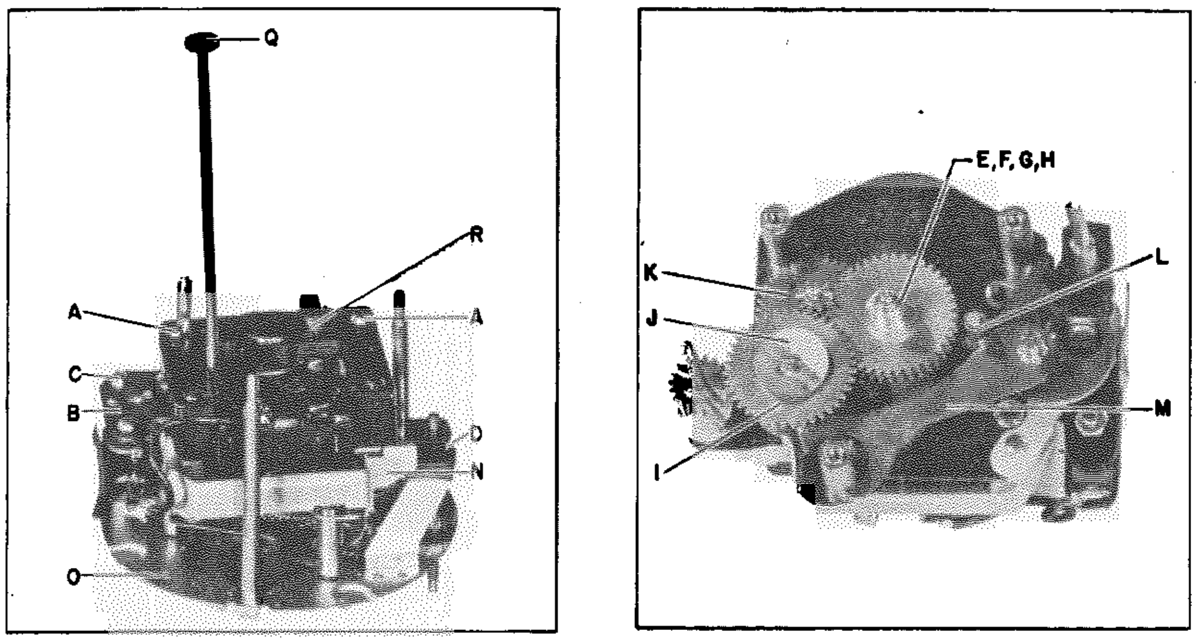
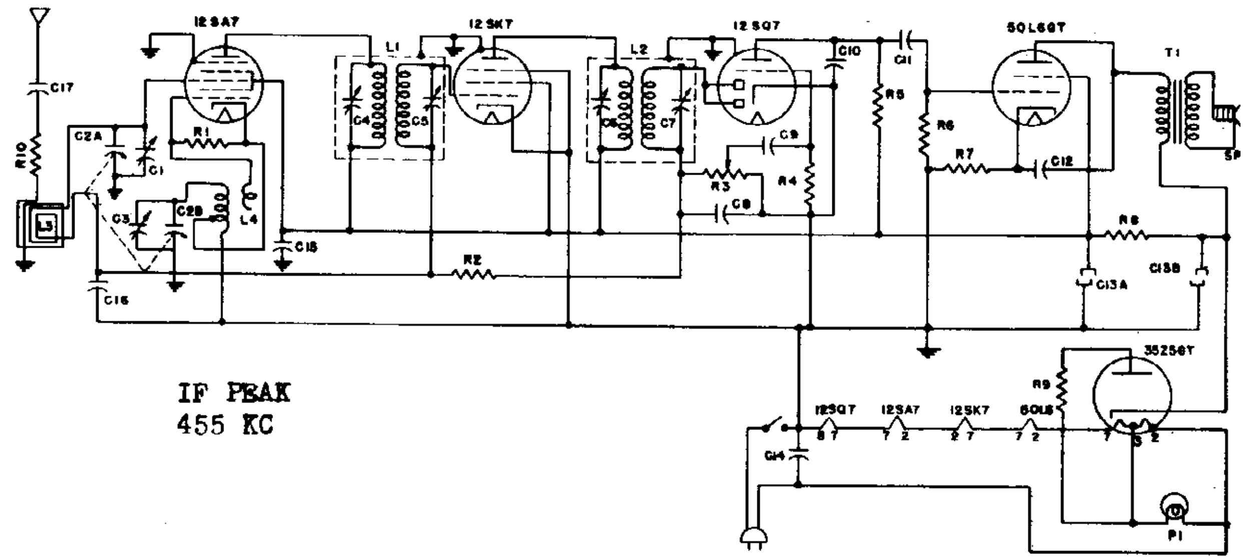


Fig. 4. Clock Part Identification

GENERAL ELECTRIC CO.

MODELS YRB 79-1, YRB 79-2, YRB 8



IF PEAK
455 KC

Fig. 3. Schematic Diagram

PARTS DESCRIPTION LIST

MODELS YRB 83-1, YRB 79-1, YRB 79-2

Symbol	Description	Symbol	Description	Symbol	Description
C1	Antenna trimmer condenser	C14	.05 mfd paper capacitor	R1	22,000 ohm carbon resistor
C2A	Tuning condenser, antenna section	C15	.05 mfd paper capacitor	R2	2.2 megohm carbon resistor
C2B	Tuning condenser, oscillator section	C16	.05 mfd paper capacitor	R3	Volume control, .5 megohm
C3	Oscillator trimmer condenser	C17	.01 mfd paper capacitor	R4	4.7 megohm carbon resistor
C8	220 mmfd mica capacitor	L1	1st I.F. transformer	R5	470,000 ohm carbon resistor
C9	.005 mfd paper capacitor	L2	2nd I.F. transformer	R6	470,000 ohm carbon resistor
C10	220 mmfd mica capacitor	L3	Loop assembly	R7	150 ohm carbon resistor
C11	.01 mfd paper capacitor	L4	Oscillator coil	R8	2700 ohm carbon resistor
C12	.02 mfd paper capacitor	P1	Pilot lamp	R9	18 ohm carbon resistor
C13A	30 mfd electrolytic capacitor	T1	Output transformer	R10	470 ohm carbon resistor
C13B	30 mfd electrolytic capacitor				

REPLACEMENT PARTS LIST

MODELS YRB 83-1, YRB 79-1, YRB 79-2

Stock No.	Description
	SPECIALIZED G-E REPLACEMENT PARTS
SAB 004	Back cover, Model YRB 83-1
SAB 005	Back cover. Models YRB 79-1, 79-2
SAU 007	Cabinet, Model YRB 79-1
SAU 008	Cabinet, Model YRB 79-2
SAV 004	Cabinet, Model YRB 83-1
SCE 002	Capacitor, filter electrolytic, 30-30 mfd, 150 volts, C13A, C13B
SCT 002	Capacitor, tuning, C2A, C2B
SDC 001	Dial drive cord
SDK 001	Knob, Model YRB 83-1
SDK 010	Knob, Model YRB 79-1
SDK 011	Knob, Model YRB 79-2
SDP 001	Pointer. Dial scale
SDS 004	Dial scale, Model YRB 83-1
SDS 005	Dial scale. Models YRB 79-1, 79-2
SHC 001	Hair pin cotter for dial drive
SJP 002	Connector, female to speaker
SJS 001	Pilot lamp socket
SJS 003	Socket, octal tube
SLC 001	Oscillator coil
SLL 001	Antenna loop
SMF 003	Fastener, back cover to cabinet
SM S001	Spring, dial drive drum
SMU 001	Shaft, dial drive
SMF 002	Snap button
SMW 001	Pulley, dial drive wood
SRC 003	Volume control, 0.5 megohm with power switc
STL 001	Transformer, 1st I.F.
STL 002	Transformer, 2nd I.F.
STO 001	Transformer, output
SWL 001	Power cord
	UNIVERSAL G-E REPLACEMENT PARTS
UCC 039	Capacitor, .005 mfd paper, C9
UCC 040	Capacitor, .01 mfd paper, C17
UCC 041	Capacitor, .02 mfd paper, C12
UCC 045	Capacitor. .05 mfd paper, C14, C15, C16
UCU 1036	Capacitor, 220 mmfd mica, C8, C10
UDL 013	Pilot lamp, Mazda 51
UOP 526	Speaker, 5¼-in. PM dynamic
URD 007	Resistor, 18 ohm ½ watt carbon, R9
URD 029	Resistor, 150 ohm ½ watt carbon, R7
URD 041	Resistor, 470 ohm ½ watt carbon, R10
URD 081	Resistor, 22,000 ohm ½ watt carbon, R1
URD 113	Resistor, 470,000 ohm ½ watt carbon, R5, R6
URD 129	Resistor, 2.2 megohm ½ watt carbon, R2
URD 137	Resistor, 4.7 megohm ½ watt carbon, R4
URE 059	Resistor, 2700 ohm 1 watt carbon, R8

MODELS YRB 79-1, YRB 79-2, YRB 83-1

GENERAL ELECTRIC CO.

Rating: 105–125 volts d-c
105–125 volts 40–60 cycles a-c
28 watts at 117 volts

Tuning Frequency Range: .... 540–1720 KC

Intermediate Frequency: .... 455 KC

LOUDSPEAKER "ALNICO V" MAGNET DYNAMIC

Outside Cone Diameter .... 5¼ in.
Voice Coil Impedance (400 cycles) .... 3.2 ohms

TUBES

Converter and Oscillator 12SA7
I.F. Amplifier 12SK7
Det. Audio, AVC 12SQ7
Power Output 50L6GT
Rectifier 35Z5GT
Pilot Lamp .... GE 51

GENERAL INFORMATION

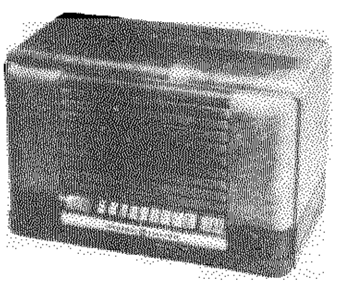
Model YRB 83-1 is a 5-tube (including rectifier) superheterodyne receiver in a distinctively styled wood cabinet; Models YRB 79-1 and YRB 79-2 are of rich brown or ivory plastic cabinets. These receivers incorporate built-in antenna automatic volume control, oversize permanent magnet speaker, and beam power output.

ALIGNMENT PROCEDURE

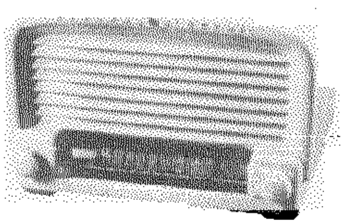
ALIGNMENT FREQUENCIES

I.F. .... 455 KC
R.F. .... 1720 and 1500 KC

The location of all trimmers is shown in Fig. 1.



Model YRB 83-1



Model YRB 79-2

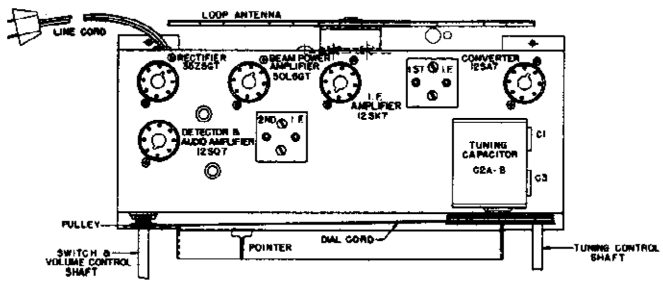


Fig. 1. Tube and Trimmer Location

I.F. ALIGNMENT

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the converter grid through a .05 mfd capacitor and align progressively the trimmers in the 2nd and 1st I.F. transformer cans.

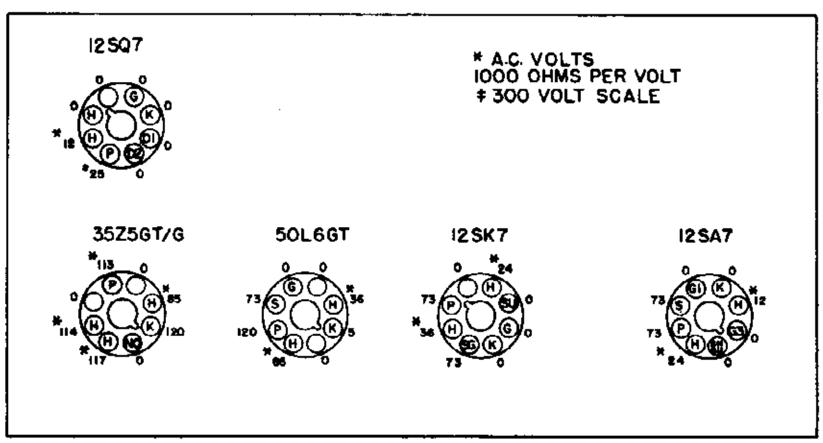
R.F. ALIGNMENT

Apply the R.F. alignment signals through a standard I.R.E. dummy antenna to the receiver antenna post. With the gang condenser wide open, align the oscillator trimmer (C17B) to 1720 KC. Change the generator signal to 1500 KC, tune the receiver to the signal and peak antenna trimmer (C17A) for maximum output.

PRECAUTION

If the signal generator is A-C operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended, as A-C through the capacitor will introduce hum modulation and/or create the possibility of a burned-out signal generator attenuator.

FRONT OF CHASSIS

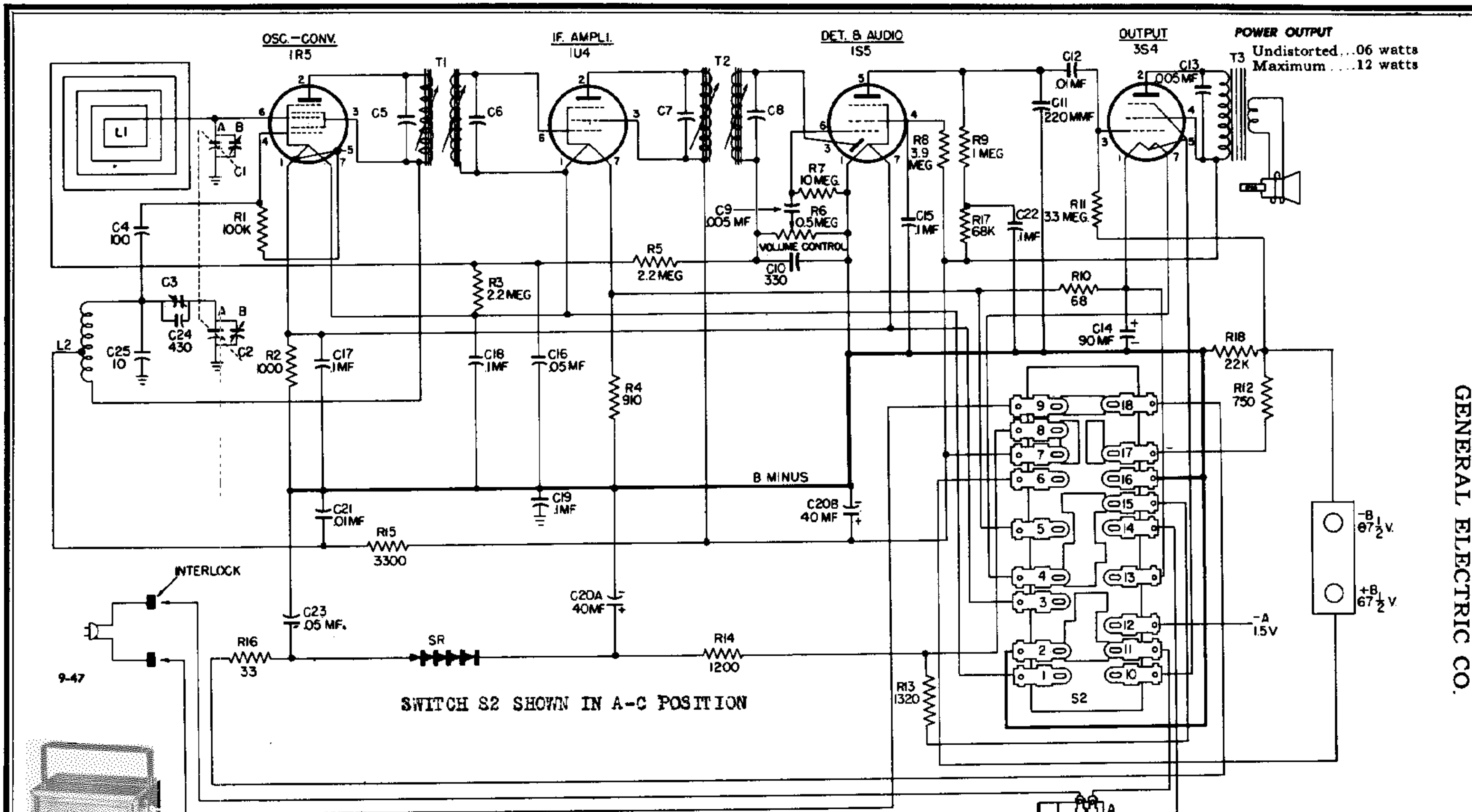


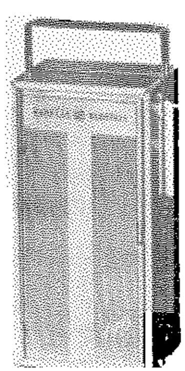
BOTTOM VIEW OF CHASSIS

LINE VOLTS - 117 VOL. CONT. MAX. NO SIGNAL

Fig. 2. Socket Voltage Diagram

GENERAL ELECTRIC CO.





POWER OUTPUT

Undistorted . . . .06 watts
Maximum . . . .12 watts

POWER SUPPLY

(AC-DC Operation)

Voltage . . . . 105–125 volts
Frequency (on a-c) . . . . 50–60 cycles
Power Consumption . . . . 25 watts

(Battery Operation)

2—1½-volt "A" Batteries. Eveready No. 950 or equivalent
1—67½-volt "B" Battery. Eveready No. 467 or equivalent

OPERATING FREQUENCIES

Broadcast Band . . . . 540–1600 kc

LOUDSPEAKER

Type . . . . Alnico 5
Outside Cone Diameter . . . . 3½ in.
Voice Coil Impedance (400 cycles) . . 3.2 ohms

CIRCUIT CHANGES (BATT—AC OR DC)

The selector switch S2 in AC-DC position connects the tube filaments in a series circuit fed by B+ voltage and a return to the B-buss. With the switch in Batt. position, the tube filaments are paralleled and connected to the 1½-volt "A" battery circuit. Note that in Batt. position, pins 1 and 7 of the 3S4 tube are connected together and connected to "A" battery positive while the filament tap, pin 5, goes to B—.

CABINET INTERLOCK

Primarily as a safety device, so that contact with live wires and short circuits be avoided, the interlock provides a means by which the AC-DC power cord circuit is broken when the receiver chassis is taken out from the cabinet for battery replacement or receiver servicing.

The interlock receptacle is mounted in the top of and on the right side of the cabinet, while the interlock plug is mounted in the top of the receiver chassis so that its pins align with the receptacle.

BATTERY—AC OR DC SELECTOR SWITCH

A selector switch S2 located on the front of the panel near the bottom selects operation from the internal battery source, in the position marked "Batt." The other position of the selector switch marked AC-DC prepares the receiver for operation from the external power outlet for which a power cord and plug is provided.

DOOR SWITCH

The door switch S1-A, -B functions as the on-off switch in the receiver. S1-A, -B operates so that when the cabinet door is closed the "A" battery positive lead circuit is broken by contacts S1-B, and one side of the AC-DC power cord circuit is broken by contacts S1-A.

ELECTRICAL CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES

R-F .... 1620, 1500 and 580 kc
I-F .... 455 kc

EQUIPMENT REQUIRED

1. Test oscillator with tone modulation.
2. A-c output meter.
3. .05 mfd. paper capacitor.
4. Insulated screwdriver.
5. Insulated screwdriver blade with flexible coupling.

ALIGNMENT PROCEDURE

1. The alignment procedure is given in table form. The major part of alignment will be made with the chassis removed from the cabinet. The location of i-f and r-f adjustments is shown in Figure 2. There are two adjustments for each i-f transformer, one in the top, the other in the bottom. To adjust the bottom slugs, it will be necessary to use an insulated screwdriver blade with some form of flexible coupling.

2. The output meter should be connected across the voice coil terminals on the speaker. The low side of the test oscillator output should be connected to the chassis ground; the high side of the oscillator output should be connected as indicated in the Alignment Chart. During the entire alignment procedure, the volume control should be at its maximum (clockwise) position. The test oscillator should be attenuated so that the output meter reading doesn't exceed ½ volt.

3. For alignment of the oscillator trimmer, oscillator padder and converter trimmer the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locate the loop about one foot from the radio loop antenna. To prevent possible errors in peak readings, the position of the loop with respect to the radio loop antenna should not be changed during any one set of adjustments.

4. In step 6 of the Alignment Chart, "Rocking-in" of the oscillator's padder consists of turning the dial back-and-forth through signal for maximum while peaking the oscillator padder.

5. Since the cabinet has a definite effect upon the alignment because of its shielding of r-f components, it will be necessary to "touch-up" the converter trimmer after the major alignment is completed and the chassis assembled back into the cabinet. It is obvious that the adjustment must be made while the chassis is exposed and the output readings taken with the chassis and cabinet assembled.

Rather than adjust the trimmer at random, it would be helpful to learn whether more or less capacity is necessary. This can be done by wanding the radio antenna loop for an indicated gain. "Wanding" is the procedure where more or less gain will be indicated by an increase or decrease in output when a shorted one-turn loop is coupled to the radio antenna loop. If a gain is indicated the trimmer capacity must be decreased. In a similar manner, a field of powdered iron cores may be coupled to the loop. In this case a gain would indicate that capacity must be increased. When no gain is apparent with either the shorted turn wand or the iron field wand, the adjustment of the trimmer is peaked.

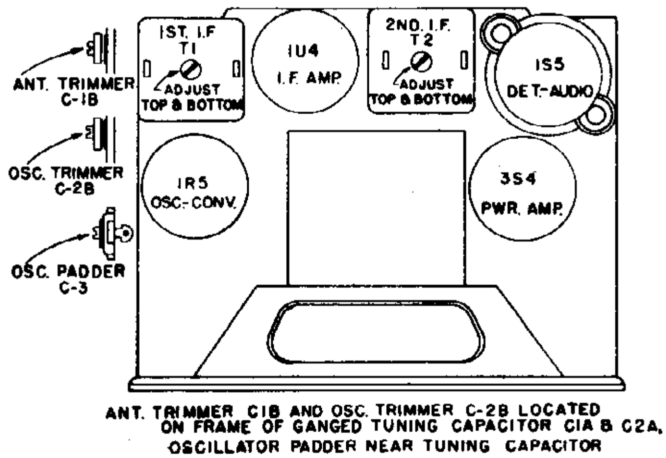


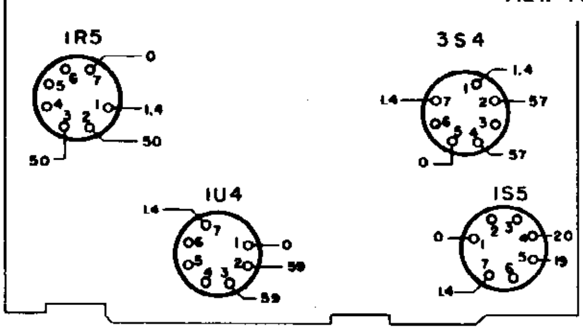
Fig. 2. Tube and Trimmer Location

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Oscillator Setting	Radio Dial Setting	Adjust for Maximum Output
		I-F ALIGNMENT		
1	1U4 i-f grid (pin 6) in series with .05 mfd.	455 kc	550 kc	2nd i-f transformer (T2) cores
2	Conv. trimmer lug C1-B in series with .05 mfd.	455 kc	550 kc	1st i-f transformer (T1) cores
3	Repeat steps 1 and 2			
		R-F ALIGNMENT		
4	Inductively coupled	1620 kc	Max. freq. cond. open	Oscillator trimmer, C2-B.
5	Inductively coupled	1500 kc	1500 kc	Converter trimmer, C1-B.
6	Inductively coupled	580 kc	For max.	Rock-in oscillator padder, C3 (see General Procedure, 4).
7	Inductively coupled	1500 kc	1500 kc	Converter trimmer, C1-B.

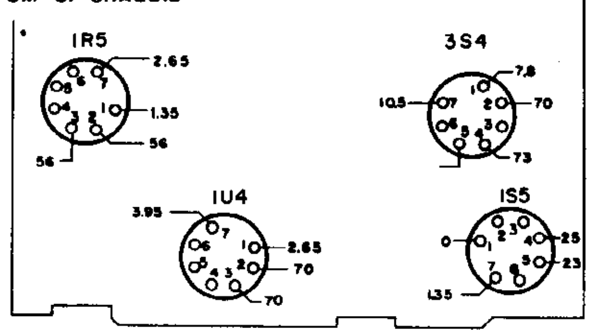
GENERAL ELECTRIC CO.

VIEW FROM BOTTOM OF CHASSIS



CONDITION OF TEST
RECEIVER POWERED BY BATTERY SUPPLY
MEASURED WITH 20,000 OHM/VOLT METER
ALL VOLTAGES TAKEN BETWEEN SOCKET PIN & B
SWITCH S-2 IN BATTERY POSITION

Fig. 3. Socket Voltage Diagram



CONDITION OF TEST
RECEIVER POWERED BY AC-DC LINE 117 V.
MEASURED WITH 20,000 OHM/VOLT METER
ALL VOLTAGES TAKEN BETWEEN SOCKET PIN &
SWITCH S-2 IN AC-DC POSITION

Fig. 4. Socket Voltage Diagram

STAGE GAIN AND VOLTAGE CHECKS

Stage gain by vacuum tube voltmeter or similar measuring devices may be used to check circuit performances and isolate trouble. The gain values listed may have tolerances of 20 per cent. Readings should be taken with low signal input so that AVC is not effective.

(1) R-F STAGE GAINS.

1R5 conv. grid to 1U4 i-f grid............28 at 1000 kc
1U4 i-f grid for .05 w. output........3600 uv at 455 kc

(2) AUDIO GAIN.

.040 volt at 400 cycles across volume control (R6) wi control set at maximum will give approximately .(watt output across speaker voice coil.

(3) D-c voltage developed across oscillator grid resistor F averages 16.2 volts at 1000 kc.

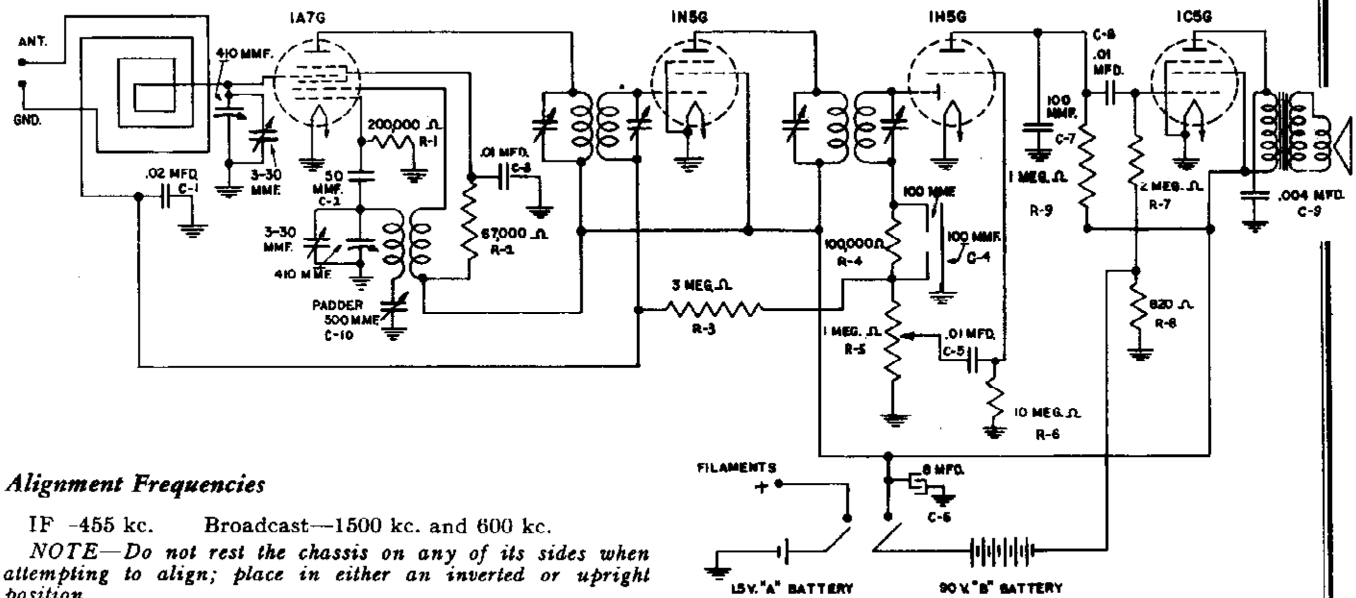
(4) SOCKET PIN VOLTAGES.

Figures 3 and 4 show voltages from all tube pins to B - Voltage readings much lower than those specified ma help localize defective components or tubes.

Cat. No.	Symbol	Description
		UNIVERSAL REPLACEMENT PARTS
UCC-028	C23	CAPACITOR—.05 mf., 400 v., paper
UCC-048	C19	CAPACITOR—.1 mf., 600 v., paper
UCG-543	C24	CAPACITOR 430 mmf., silver mica
UCU-528	C4	CAPACITOR—100 mmf., mica
UCU-536	C11	CAPACITOR—220 mmf., mica
UCU-540	C10	CAPACITOR 330 mmf., mica
URD-1146	R10	RESISTOR—68 ohms, ½ w., carbon
		SPECIALIZED REPLACEMENT PARTS
RAC-046		COVER—(Plastic) for cabinet door
RAD-027		DOOR—For cabinet (with loop connecting strips only)
RAD-028		DOOR—Door access to power cord, (less hinge)
RAT-007		CABINET ASSEMBLY—Complete with handle assembly, handle retainers, interlock receptacle, and trim
RAX-016		DOOR ASSEMBLY With loop L1
RAX-017		DOOR ASSEMBLY—Door access to power cord, with hinge and tab
RCC-075	C12, 21	CAPACITOR .01 mf., 400 v., paper
RCC-076	C9, 13	CAPACITOR .005 mf., paper
RCC-077	C15, 17, 18	CAPACITOR—.1 mf., paper
RCC-078	C16	CAPACITOR .05 mf., paper
RCE-051	C20A, B	CAPACITOR 40 mf., electrolytic
RCE-052	C14	CAPACITOR—90 mf., electrolytic
RCT-023	C1, 2	CAPACITOR Tuning capacitor
RCW-020	C25	CAPACITOR—10 mmf., ceramic
RCY-030	C3	CAPACITOR—Oscillator padder
RDE-026		ESCUTCHEON
RDK-098		KNOB ASSEMBLY—Door knob and lock spring
RDK-099		KNOB ASSEMBLY—Knob with spring for volume or tuning control
REC-001		CONNECTOR—Contact strip for "B" battery
REX-004		RECTIFIER ASSEMBLY
RHC-008		CLIP—For mounting C20A, B, 40 mf. dual electrolytic capacitor
RHC-013		COTTER PIN—(Hair pin type) inserted in tube socket shield
RHF-002		FELT FOOT—On bottom of receiver
RHG-014		GROMMET—Fibre grommet for power cord
RHH-007		RETAINER—Plastic handle retainer (right)
RHH-008		RETAINER—Plastic handle retainer (left)
RHI-002		HINGE—Cabinet door top hinge
RHI-003		HINGE—Cabinet door bottom hinge

Cat. No.	Symbol	Description
		SPECIALIZED REPLACEMENT PARTS (Cont.)
RHI-004		HINGE—For door to cord access
RHS-010		SHIELD—Tube shield for 1S5 tube
RHY-006		HANDLE ASSEMBLY—With retainers and cov
RII-002		BARRIER—Fibre strip insulator between swi and chassis
RII-003		SHIELD—Fibre strip insulator between switch escutcheon
RII-004		STRIP—Insulating strip (insulates right side of from cabinet)
RII-005		STRIP—Insulating strip (insulates left side of from cabinet)
RII-007		BARRIER—Fibre insulating barrier insulating r from chassis
RJJ-006		RECEPTACLE ASSEMBLY—Female interlock r ed on cabinet
RJP-017		PLUG ASSEMBLY—Male interlock plug, fit female interlock receptacle
RJS-090		SOCKET—Tube socket for 1R5, 1U4 and 3S4
RJS-091		SOCKET Tube socket for 1S5 (rubber mounte
RLC-054	L2	COIL—Oscillator
RLL-024	L1	LOOP—Antenna loop only
RMC-018		BATTERY CUP ASSEMBLY—"A" battery ne connector
RMX-103		BRACKET ASSEMBLY—(With shield barrie mounting volume control and tuning capacitor
RMX-104		BATTERY CONNECTOR ASSEMBLY—Consi one copper and two fibre strips ("A" positive)
ROP-012		LOUDSPEAKER
RRC-055	R6	RESISTOR—.5 meg., volume control
RRH-061	R15	RESISTOR 3300 ohms, ⅓ w., carbon
RRH-081	R18	RESISTOR—22,000 ohms, ⅓ w., carbon
RRH-093	R17	RESISTOR—68,000 ohms, ⅓ w., carbon
RRH-097	R1	RESISTOR 100,000 ohms, ⅓ w., carbon
RRH-121	R9	RESISTOR—1 meg., ⅓ w., carbon
RRH-129	R3, 5	RESISTOR—2.2 meg., ⅓ w., carbon
RRH-133	R11	RESISTOR 3.3 meg., ⅓ w., carbon
RRH-135	R8	RESISTOR—3.9 meg., ⅓ w., carbon
RRH-145	R7	RESISTOR—10 meg., ⅓ w., carbon
RRH-1046	R12	RESISTOR 750 ohms, ⅓ w., carbon
RRH-1048	R4	RESISTOR—910 ohms, ⅓ w., carbon
RRH-1049	R2	RESISTOR—1000 ohms, ⅓ w., carbon
RRM-001	R16	RESISTOR 33 ohms, 3 w., carbon
RRW-019	R14	RESISTOR—1200 ohms, w.w.
RRW-020	R13	RESISTOR—1320 ohms, w.w.
RSW-034	S2	SWITCH—AC-DC battery switch
RSW-035	S1A, B	SWITCH—Power switch
RTL-052	T1, 3	TRANSFORMER—I-F transformer
RTO-034	T3	TRANSFORMER Output transformer
RWL-015		CORD—Power cord

MODEL GB-400 GENERAL ELECTRIC CO.



Alignment Frequencies

IF -455 kc. Broadcast—1500 kc. and 600 kc.

NOTE—Do not rest the chassis on any of its sides when attempting to align; place in either an inverted or upright position.

IF Alignment

To align the IF, it will be necessary to remove the chassis from the cabinet. Connect an output meter across the voice coil. Set the volume control for maximum.

Adjust the test oscillator to 455 kc. and apply the signal to the control grid of the 1A7G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 1A7G tube. Keep the test oscillator output as low as possible to give a readable output. Adjust all four IF trimmers for maximum output.

RF Alignment

The following alignment should be made with the receiver fastened in the case. Turn the receiver to its inverted position and make trimmer and padder alignments through the holes provided in the bottom of the case.

Connect the ground lead of the signal generator to the receiver chassis and the other lead to the receiver antenna terminal (located underneath cabinet). A dummy antenna consisting of a 250 mmf. capacitor in series with 200 ohms should be connected in the antenna lead of the signal generator. Apply a 600 kc. modulated signal and adjust the oscillator padder for a maximum output while rocking the gang condenser in vicinity of 600 kc. mark on the dial.

Using the same dummy antenna with a 1500 kc. signal generator input, adjust the oscillator trimmer for a maximum output. Now remove signal generator leads, tune in a station at approximately the 1500 kc. point on dial and then peak the RF trimmer for a maximum signal.

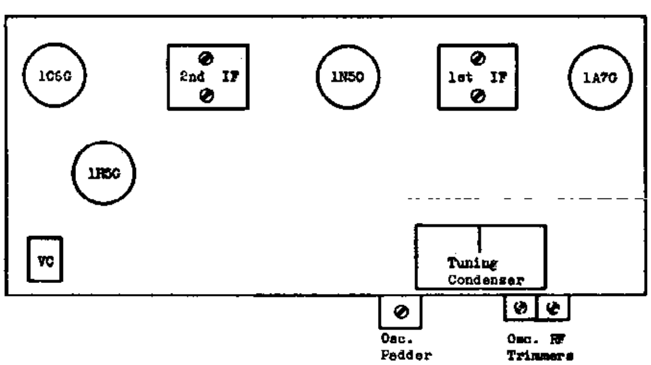


Fig. 1. Trimmer Location

SERVICE DATA

Physical Specifications

Model GB-400
Height .... 9⅜ inches
Width .... 13 inches
Depth .... 8¼ inches

Tuning Control Drive Ratio 1:1

Batteries Required

1—1½-volt "A" battery (Eveready No. 741 or equivalent).
2—45-volt "B" batteries (Eveready No. 762 or equivalent).

Tuning Frequency Range .... 540–1600 kc.

Alignment Frequency

IF .... 455 kc.
RF .... 600 and 1500 kc.

Loud-speaker—Permanent Magnet

Over-all diameter .... 5 inch
Cone Coil Impedance (400 cycles) ..... 3.0 ohms

Tubes

Converter and Oscillator GE-1A7G
IF Amplifier GE-1N5G
Detector and 1st Audio GE-1H5G
Power Amplifier GE-1C5G

For parts list see page 17-25

SERVICE INFORMATION

Voltages—Line 117 Volts AC and DC. Power Consumption 20 Watts.

Plate (3) 1N5GT R.F. tube to common ground	90 volts
Screen (4) of 1N5GT R.F. tube to common ground	90 volts
Plate (3) of 1A7GT Converter tube to common ground	90 volts
Oscillator Plate (6) of 1A7GT Converter tube to com gnd	90 v.
Screen (4) of 1A7GT Converter tube to common ground	50 volts
Plate (3) of 1N5GT I.F. tube to common ground	90 volts
Screen (4) of 1N5GT I.F. tube to common ground	90 volts
Plate (3) of 1H5GT Detector & 1st Audio Tube (approx.)	25 v.
Plate (3) of 3Q5GT Power A.F. Tube	90 volts
Screen (4) of 3Q5GT Power A.F. Tube	90 volts
Cathode (8) of 35Z5GT Rectifier Tube	120 volts
Heater (2) & (7) of 1N5GT R. F. Tube	1.35-1.4 volts DC
Heater (2) & (7) of 1A7GT Converter Tube	1.35-1.4 volts DC
Heater (2) & (7) of 1N5GT I. F. Tube	1.35-1.4 volts DC
Heater (2) & (7) of 1H5GT Det. & 1st Aud.	1.35-1.4 volts DC
Heater (7) & (8) of 3Q5GT Power A. F. Tube	1.35-1.4 volts DC
Heater (8) & (2) of 3Q5GT Power A. F. Tube	1.35-1.4 volts DC
Heater (2) & (7) of 35Z5GT Rectifier Tube	36-42 volts AC

TYPE BATTERIES

The "A" battery recommended is the Eveready Type No. 746 or equivalent, and the type "B" battery recommended is the Eveready No. 482 or equivalent. It is necessary to use two "A" batteries and two "B" batteri in each receiver.

To connect the batteries to the receiver, open the bac and place the batteries in the proper position, as show on the label, which is inside of the cabinet. Insert batte plugs firmly into their respective battery sockets.

ANTENNA

This receiver is equipped with a removable Intercept Beam-a-Scope that has a flexible cable attached. Th permits the Beam-a-Scope to be removed from the bac of the cabinet and placed at a remote point, suc as the window of an automobile or train, etc. The flexib cable is to extend through the opening in the top of th back cover.

Two suction cups are attached to the hinges of th Beam-a-Scope which permit suitable temporary fastenin to the window. The Beam-a-Scope may be set at the de sired angle giving best reception. When the Beam-a-Scop is inserted into the cabinet, the two slide rails permit to be placed on the back, and the cable of the Beam-a Scope may be wrapped around the two suction cups.

LINE CORD POSITION: A small box between the bat teries houses the line cord.

MODEL LB-673
REPLACEMENT PARTS LIST

G. E. Part Number	Part Name	Description
RL-390-W	Coil	Antenna Choke
RT-3038-W	Transformer	1st I. F. Transformer
RT-3039-W	Transformer	2nd I. F. Transformer
RL-5006-W	Beam-a-Scope	Loop Antenna
RL-2084-W	Coil	Oscillator
RL-175-W	Coil	Interstage R. F. Coil
RC-7078-W	Condenser	Tuning (3 gang)
RC-5213-W	Condenser	Comb. Electrolytic 40-|-20 Mfd. 150V
RC-009	Condenser	Tubular .001 mfd. 400V
*RC-011	Condenser	Tubular .002 mfd. 400V
*RC-072	Condenser	Tubular .05 mfd. 200V
*RC-146-W	Condenser	Tubular .25 mfd. 100V
*RC-092	Condenser	Tubular .05 mfd. 400V
*RC-193	Condenser	Tubular .008 mfd. 400V
*RC-136	Condenser	Tubular .25 mfd. 200V
*RC-235	Condenser	Mica 100 mmfd.
*RC-259	Condenser	Mica 250 mmfd.
RV-151-W		Volume Control & Switch
*RQ-1263	Resistor	Carbon 1500 Ohm 1/4 W. (Pkg.5)
*RQ-1253	Resistor	" 560 Ohm 1/4 W. (Pkg.5)
*RQ-1314	Resistor	" 200M Ohm 1/4 W. (Pkg.5)
*RQ-1300-W	Resistor	" 50M Ohm 1/4 W. (Pkg.5)
*RQ-1331	Resistor	" 1 Meg. Ohm 1/4 W. (Pkg.5)
*RQ-1343	Resistor	" 3 Meg. Ohm 1/4 W. (Pkg.5)
*RQ-1355	Resistor	" 10 Meg. Ohm 1/4 W. (Pkg.5)
*RQ-1303	Resistor	" 68,000 Ohm 1/4 W. (Pkg.5)
*RQ-1259	Resistor	" 1,000 Ohm 1/2 W. (Pkg.5)
RR-368-W	Resistor	Wire Wound—2100 Ohm
RR-369-W	Resistor	Wire Wound—70 Ohm
RC-8249-W	Cord	Resistor Line Cord
RC-8250-W	Cable	Battery Cable
RD-789-W		Glass Dial Scale
RS-1097-W	Speaker	5" P.M. with Output Trans.
RT-4034-W		Output Transformer for Speaker
RC-9058-W		Speaker Cone
*RS-238	Tube Socket	8 Prong Octal 1 5/16"
RX-114	Suction Cups	For Beam-a-Scope (Pkge 2)
*RS-3084-W	Switch	Battery-electric switch
RK-1076-W	Knob	Indicator Knob (with dot)
RK-1077-W	Knob	Tuning Knob
RP-1037-W	Pointer	Dial Pointer

*Used on previous receivers.

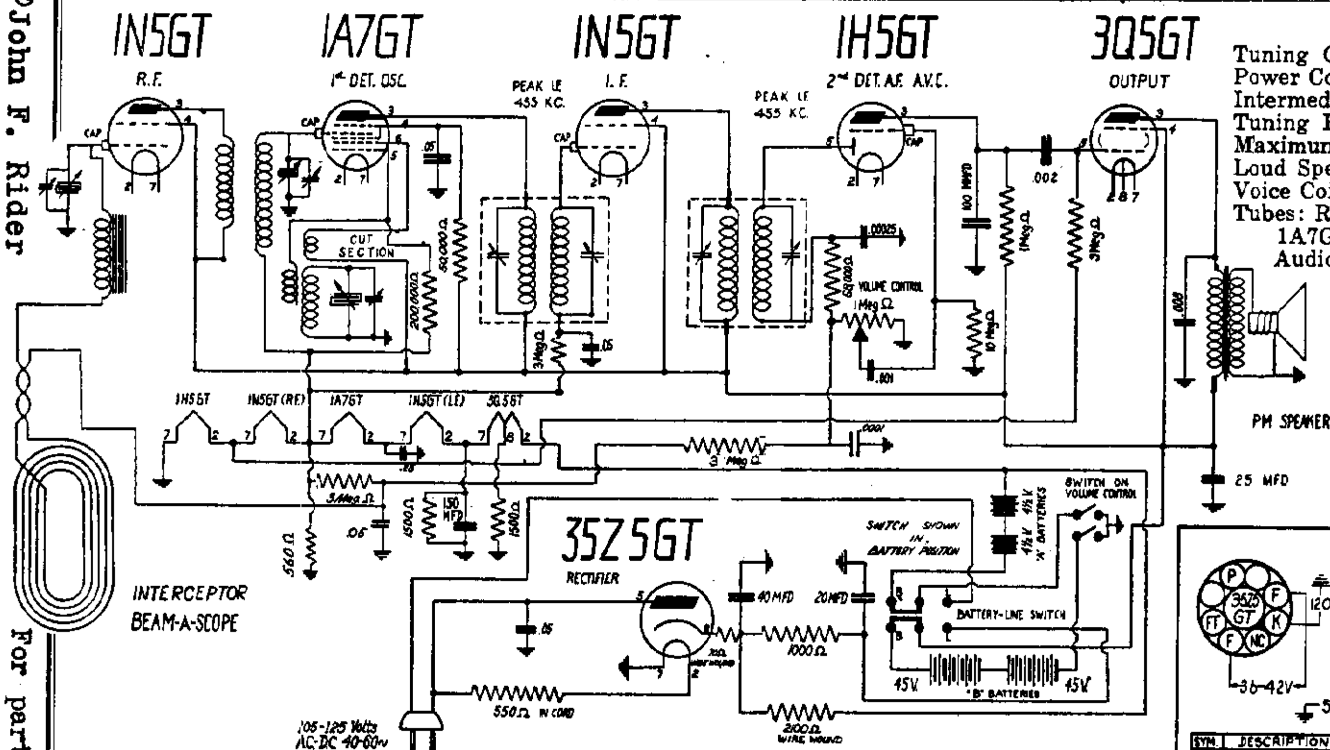
REPLACEMENT PARTS LIST MODEL GB-400

Stock No.	Description
RB-1001W	BOARD—Ant.-Gnd. terminal board
*RC-018	CAPACITOR—.004 mfd, 600 V. paper (C-9)
*RC-039	CAPACITOR—.01 mfd. 600 V. paper (C-3, 5, 8)
*RC-048	CAPACITOR—.02 mfd. 600 V. paper (C-1)
*RC-216	CAPACITOR—50 mmf., mica (C-2)
*RC-235	CAPACITOR—100 mmf., mica (C-7)
RC-237W	CAPACITOR—Dual 100 mmf., mica (C-4)
RC-738W	CONDENSER—Tuning condenser
*RC-5118	CAPACITOR—8 mfd. 150 V. dry electrolytic (C-6)
RC-6504W	CAPACITOR—Oscillator padding capacitor
RC-6505W	CAPACITOR—Dual osc. & RF trimmer
RC-8110W	CABLE—Battery cable and plugs
RC-9002W	CONE—Speaker cone
RD-096W	SCALE—Dial scale
RD-097W	SCALE—Volume scale
RL-076W	COIL—Antenna—RF coil (loop)
RL-280W	COIL—Oscillator coil
*RQ-1257	RESISTOR—820 ohm, 1/2-w. carbon (R-8) (Pkg. 5)
*RQ-1303	RESISTOR—67,000 ohm, 1/2-w. carbon (R-2) (Pkg. 5)
*RQ-1307	RESISTOR—100,000 ohm, 1/2-w. carbon (R-4) (Pkg. 5)
*RQ-1315	RESISTOR—200,000 ohm, 1/2-w. carbon (R-1) (Pkg. 5)
*RQ-1331	RESISTOR—1.0 megohm, 1/2-w. carbon (R-9) (Pkg. 5)
*RQ-1339	RESISTOR—2.2 megohm, 1/2-w. carbon (R-7) (Pkg. 5)
*RQ-1343	RESISTOR—3.0 megohm, 1/2-w. carbon (R-3) (Pkg. 5)
*RQ-1355	RESISTOR—10 megohm, 1/2-w. carbon (R-6) (Pkg. 5)
RS-197W	SHIELD—1N5 tube shield
RS-198W	SHIELD—1A7 tube shield
*RS-200	SOCKET—Octal base tube socket (Pkg. 5)
*RS-223	SOCKET—1H5 tube socket (Pkg. 5)
RS-241W	SOCKET—Speaker socket
RS-1003W	SPEAKER—5-inch P.M. speaker
RT-299W	TRANSFORMER—1st IF transformer
RT-300W	TRANSFORMER—2nd IF transformer
RT-455W	TRANSFORMER—Output transformer
RV-059W	VOLUME CONTROL—1.0 megohm volume control (R-5)

* Used on previous production receivers.

MODEL LB-673

GENERAL ELECTRIC CO.

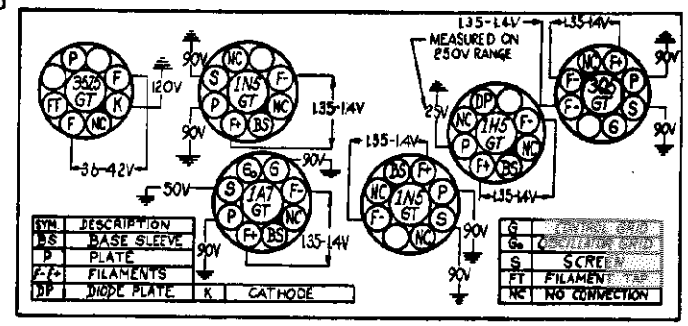


SERVICE NOTES

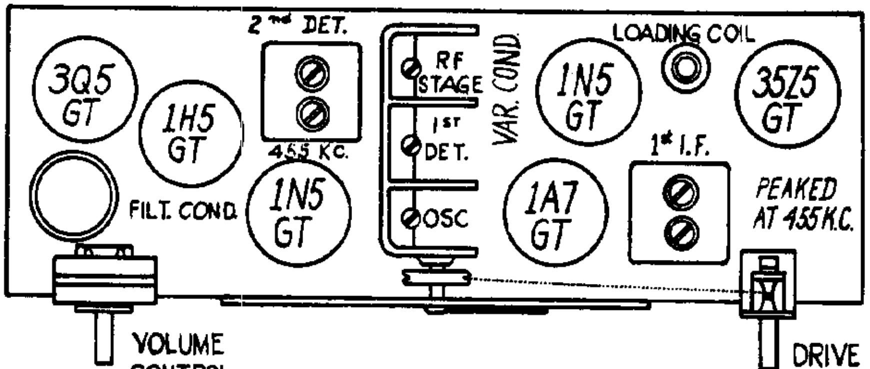
Tuning Control Drive Ratio 8:1
Power Consumption on Line ....20 watts
Intermediate Frequency ....455 K.C.
Tuning Frequency Range ....540-1700 K.C.
Maximum Power Output ....240 Milli-watts
Loud Speaker Cone Diameter ....5 inches
Voice Coil Impedance ....(at 400 cycles) 3.5 ohms
Tubes: R. F. amplifier 1N5GT; Converter oscillator 1A7GT; I. F. 1N5GT; Detector A. V. C. and 1st Audio 1H5GT; Power Output 3Q5GT; Rectifier 35Z5GT

Alignment Frequencies

I. F. ....455 K. C.
R. F. ....1700 & 1400 K. C.



BOTTOM VIEW OF CHASSIS
ALL FILAMENT VOLTAGES MEASURED ACROSS SOCKET TERMINALS. OTHER VOLTAGES MEASURED FROM SOCKET TERMINAL TO GROUND WITH A 1000Ω PER VOLT VOLTMETER.



TOP VIEW OF CHASSIS

General Electric portable radio Model LB-673 is a portable battery-electric superheterodyne receiver with a self-contained removable Interceptor Beam-a-Scope. This receiver will operate with an "A" supply of 9 Volts and a "B" supply of 90 Volts. It will also operate on a line voltage of 105-125 Volts, 40-60 Cycles AC or DC. The tuning range coverage is from 540 K.C. to 1700 K.C. This range covers the standard broadcast range as well as some police calls.

I. F. Alignment

Connect an output meter across the voice coil. **Rotate** the volume control to maximum. Set test oscillator to 455 kilocycles and apply signal to control grid of 1A7GT through a .05 mfd. capacitor. Align the second I. F. transformer trimmers, next adjust the first I. F. transformer trimmers. Keep the test oscillator output to a level that will give a good meter reading.

R. F. Alignment

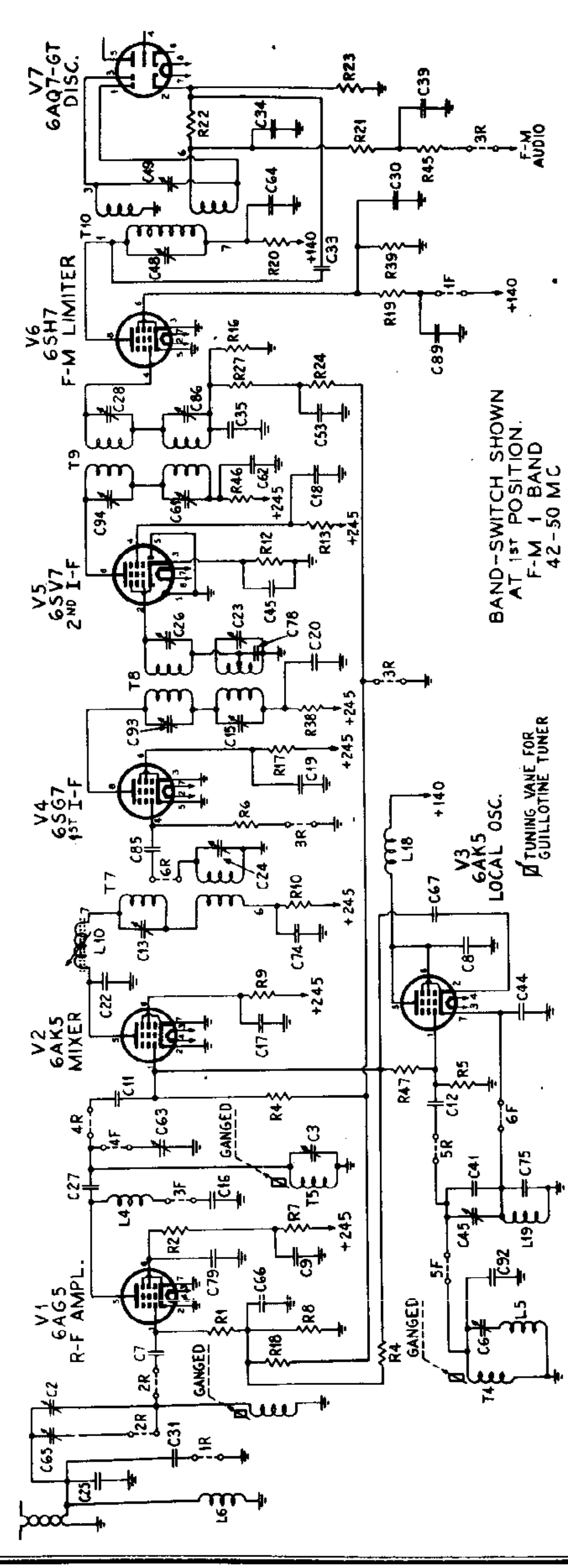
Place the Beam-a-Scope in the same relative position to chassis as when mounted in cabinet. Next, connect a one-turn loop to a signal generator or test oscillator which is to be placed approximately 12" from the Beam-a-Scope. Set receiver at 1700 K. C. with tuning condenser completely open. Adjust test oscillator to 1700 K. C., set oscillator trimmer of receiver to maximum signal. Set test oscillator at 1400 K. C., then tune receiver to this signal and peak the R. F. stage and first detector trimmers for maximum signal.

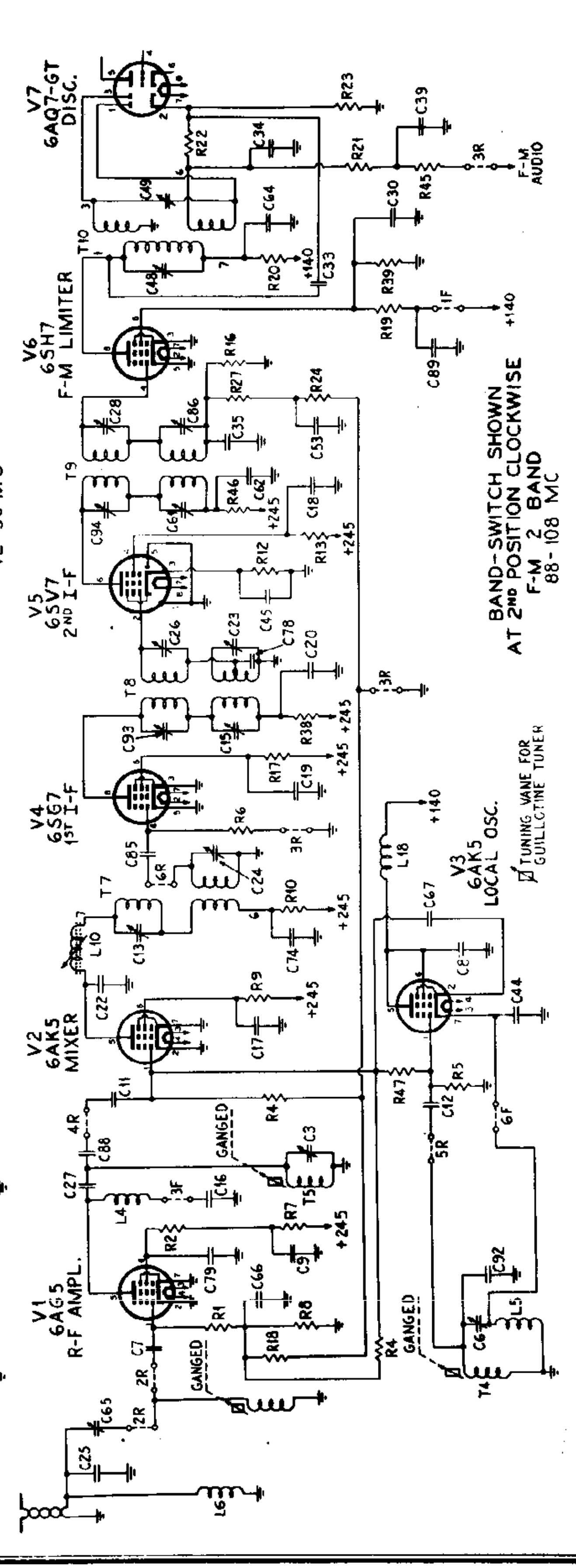
For parts list and service notes see page 17-25

"clarified schematics"

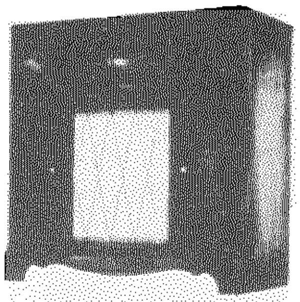
GENERAL ELECTRIC CO.

MODEL 417A





GENERAL E



CABINET:

Model	417A
Material	Wood
Color	Mahogany
Height	35 in.
Width	35 in.
Depth	17½ in.

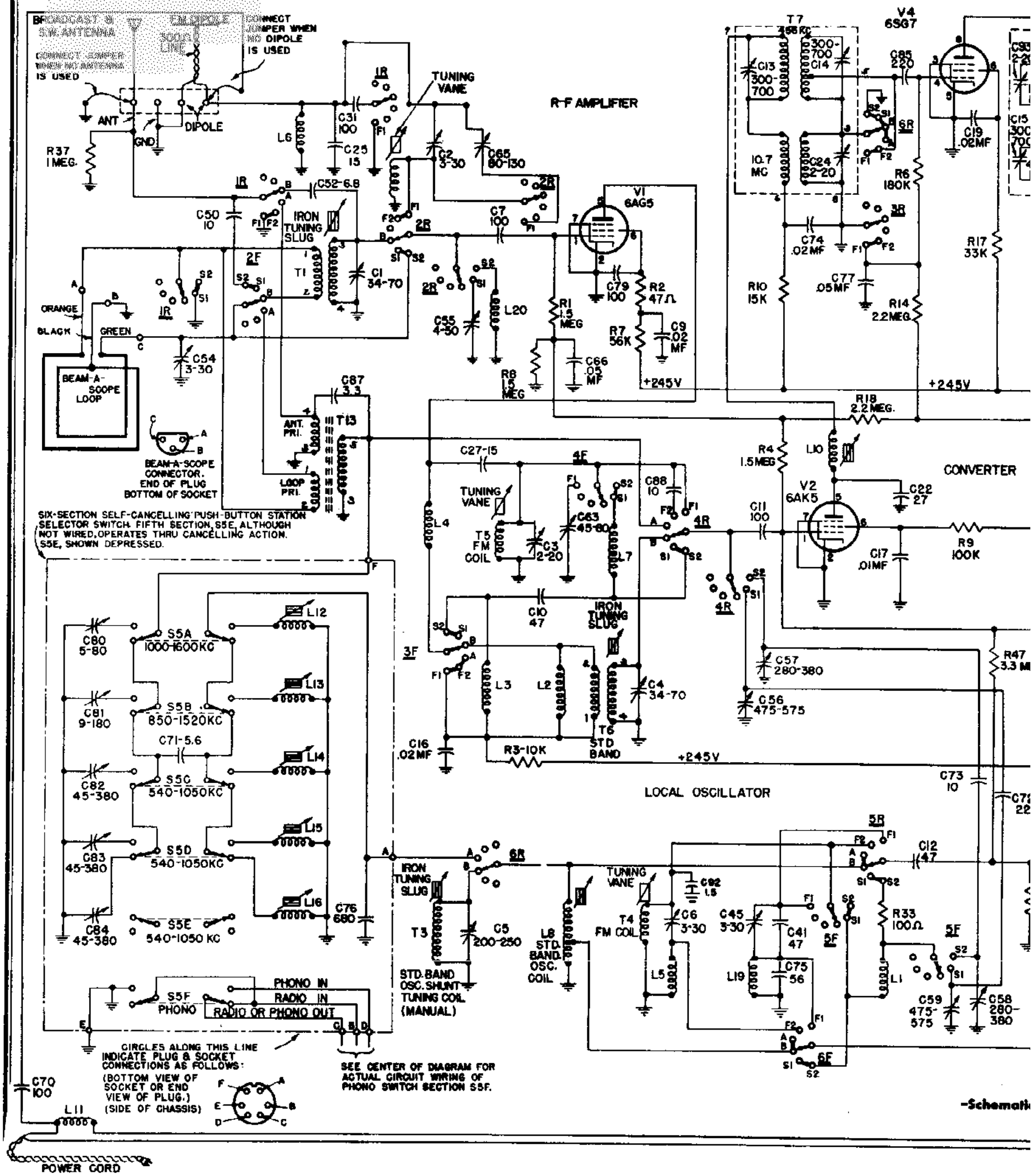
ELECTRICAL RATING (INPUT):	Rating A5	Rating A6
Voltage	100–125	100–125
Frequency	50 cycles	60 cycles
Wattage	105	105

OPERATING FREQUEN

Standard Band
Short Wave 1..
Short Wave 2..
Frequency Mod
Frequency Mod
AM I-F Freque
FM I-F Freque

POWER OUTPUT (117

Undistorted...
Maximum.....



-Schemati

)UENCIES:

and . . . . 540 to 1600 kc
1 . . . . 9.4 to 9.9 mc
2 . . . . 11.6 to 12.1 mc
Modulation 1 . . . . 42 to 50 mc
Modulation 2 . . . . 88 to 108 mc
quency . . . . 455 kc
quency . . . . 10.7 mc

(117 volts line):

. . . . 4.0 watts
. . . . 5.5 watts

LOUDSPEAKER:

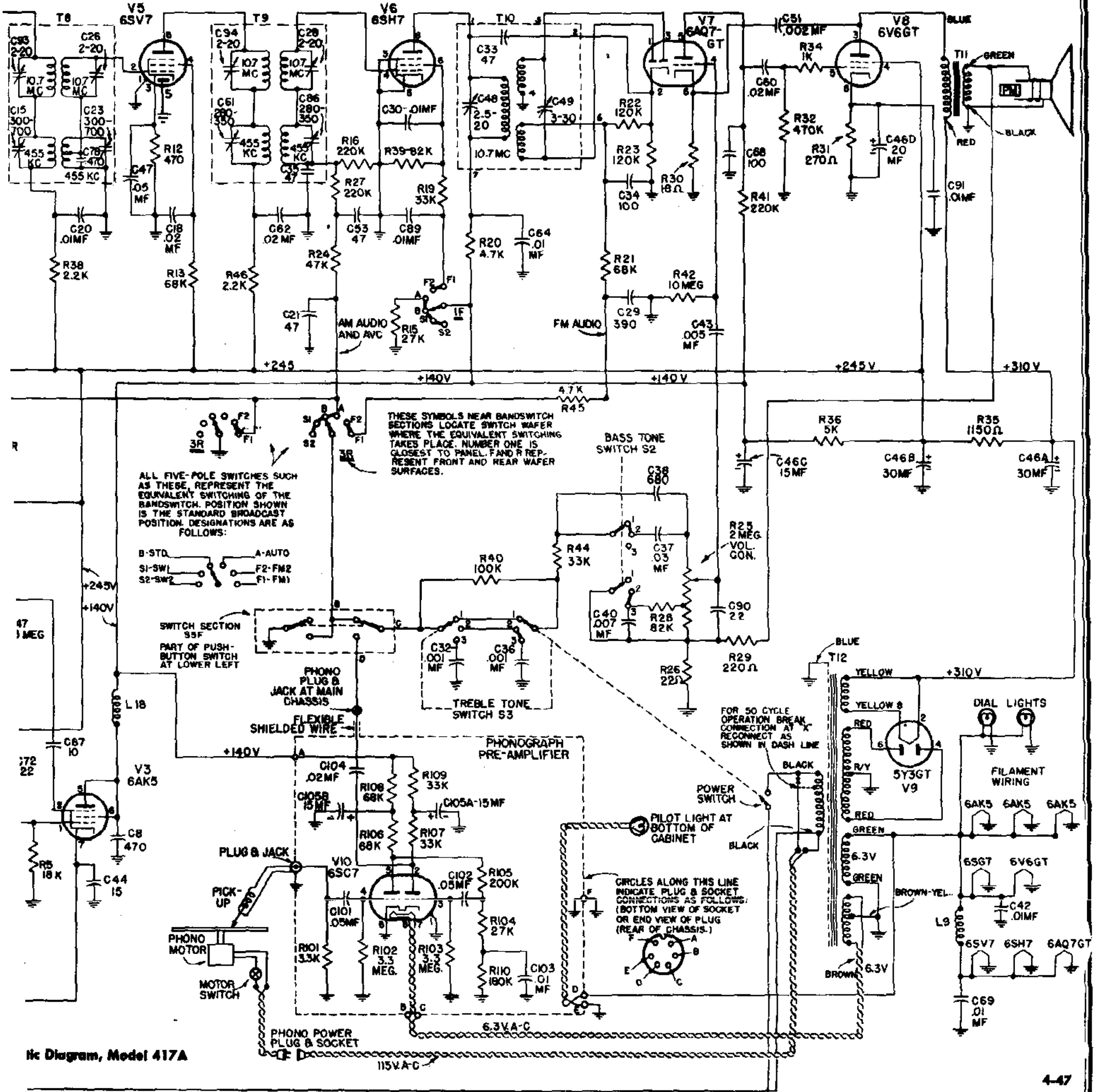
Type . . . . Alnico PM
Size . . . . 12 inches
Voice Coil Impedance (400 cps) . . . . 8 ohms

ANTENNA INPUTS:

Broadcast and Short Wave—conventional antenna
FM—300-ohm input for folded dipole

PHONOGRAPH PICK-UP:

Type . . . . Variable Reluctance
D-C Resistance . . . . 250 ohms

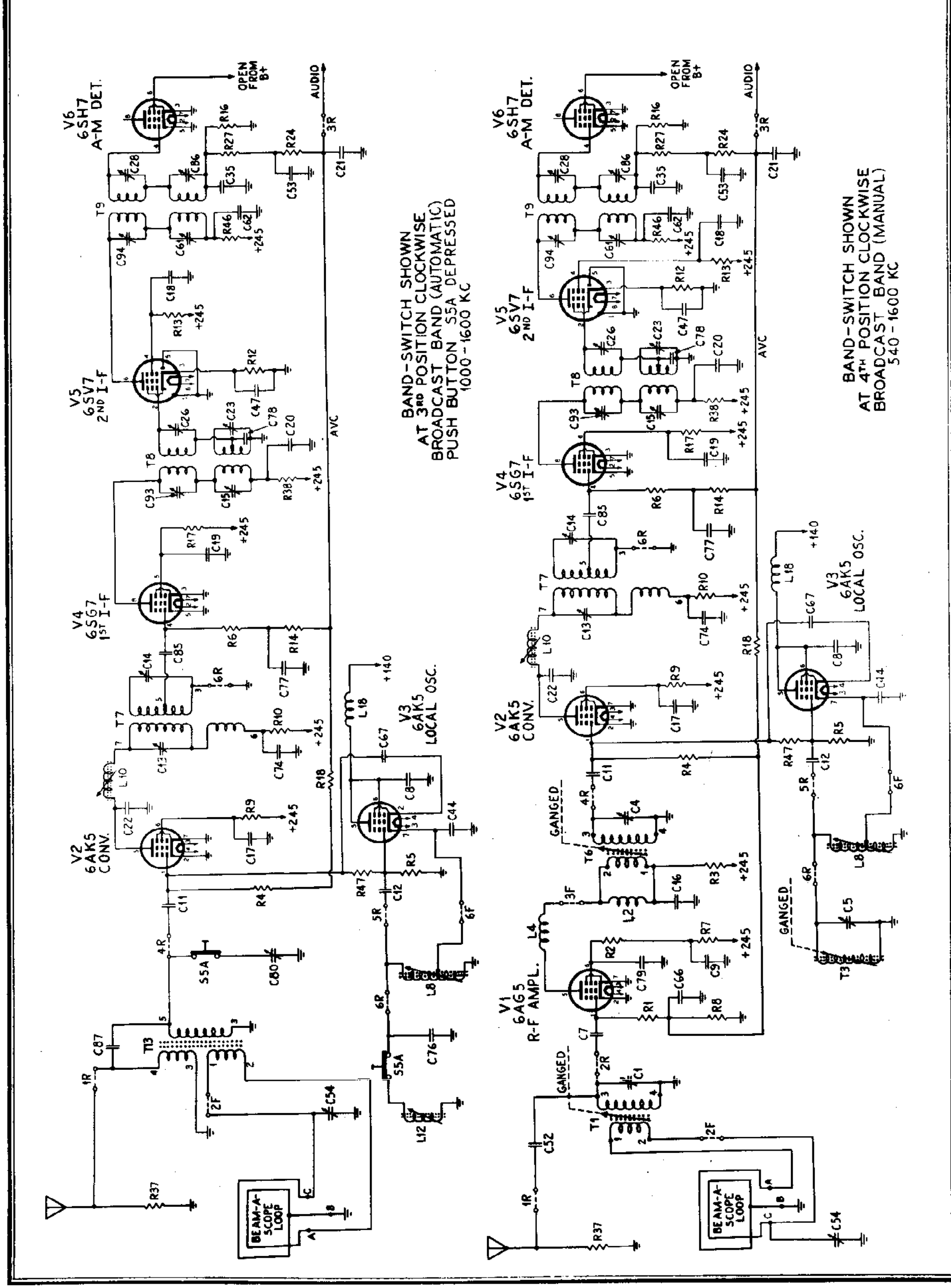


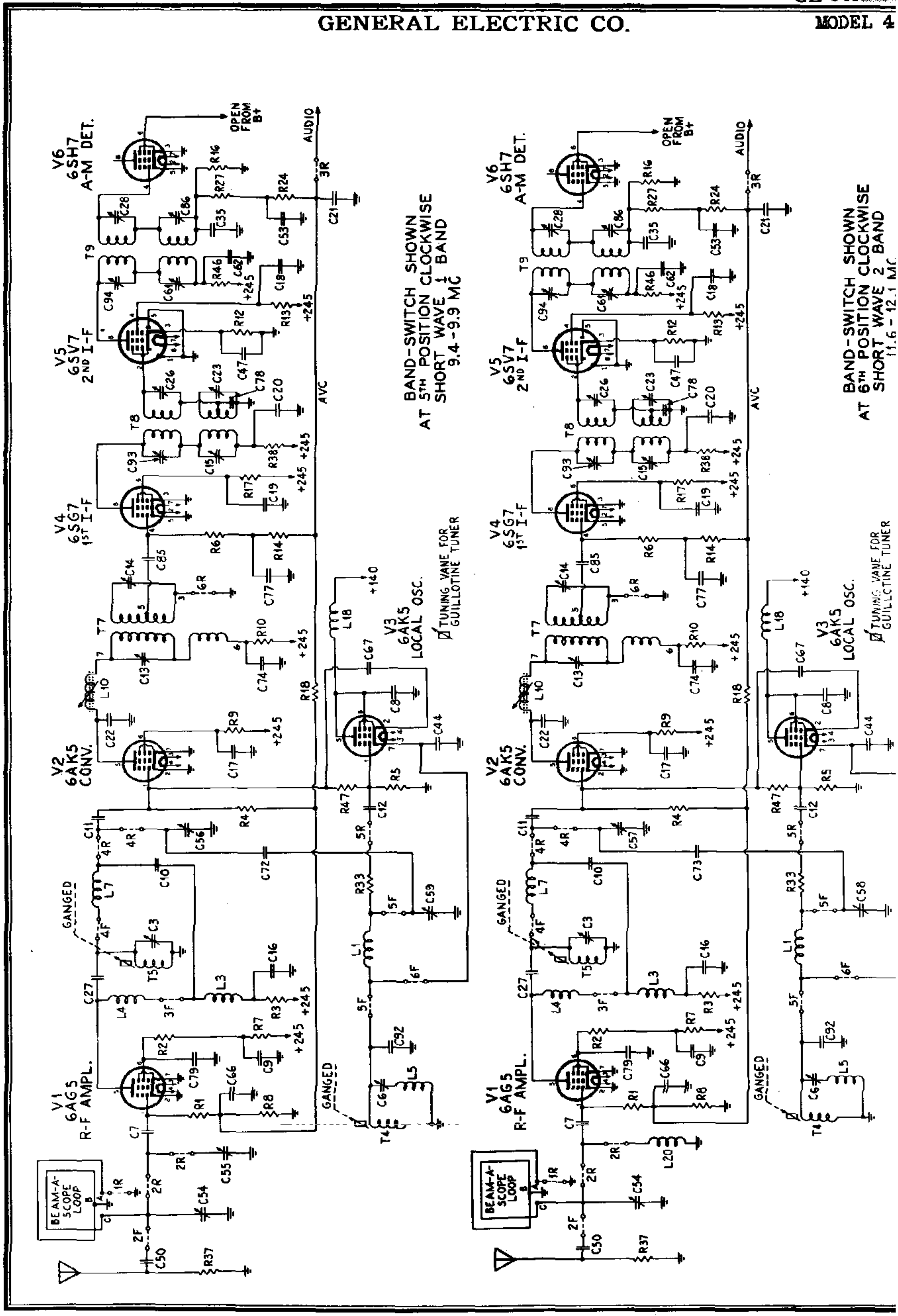
ic Diagram, Model 417A

"clarified schematics"

MODEL 417A

GENERAL ELECTRIC CO.




V1
6AG5
R-F AMPL.
V2
6AK5
CONV.
V3
6AK5
LOCAL OSC.
V4
6SG7
1ST I-F
V5
6SV7
2ND I-F
V6
6SH7
A-M DET.
BEAM-A-SCOPE LOOP
GANGED
AVC
AUDIO
OPEN FROM B+
TUNING VANE FOR GUILLOTINE TUNER
BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE
SHORT WAVE 1 BAND
9.4 - 9.9 MC
BAND-SWITCH SHOWN
AT 6TH POSITION CLOCKWISE
SHORT WAVE 2 BAND
11.6 - 12.1 MC

MODEL 417A

GENERAL ELECTRIC CO.

ALIGNMENT

EQUIPMENT REQUIRED:

1. Test Oscillator with tone modulation. (See Table.)
2. D-C Voltmeter or Microammeter. (See notes 2 and 3.)
3. A-C Voltmeter, 2 volts. (See note 6.)
4. Insulated hex wrench, ¼". (See steps 1, 10, 13.)
5. .01 MF Paper Capacitor. (See steps 1 to 5.)
6. 400-ohm, ½-watt resistor. (See steps 16 to 21.)
7. 200 mmf. mica capacitor. (See steps 22 to 28.)

Important detailed instructions and references in connection with the alignment table which follows are keyed in by means of column 7, headed "See Note." The notes are included in numerical order after the table. They are important—refer to them carefully.

ALIGNMENT TABLE

Step	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note	Remarks
				FM IF ALIGNMENT			
1	10.7 mc	6SH7 grid thru .01 mf	FM1	....	C49 for zero**	1, 2	Adjust C49 for *zero* meter reading. Apply 1-volt signal input.
2	See last column	6SH7 grid thru .01 mf	FM1	....	Signal Generator	1, 2	Detune signal generator to point of *maximum* meter reading.
3	As in step 2	6SG7 grid thru .01 mf	FM1	....	Peak C48	1, 2	
4	10.7 mc	6SV7 grid thru .01 mf	FM1	....	Peak C28 & C94	1, 3	6AQ7GT tube removed from its socket.
5	10.7 mc	6SG7 grid thru .01 mf	FM1	....	Peak C26 & C93	1, 3	6AQ7GT tube removed from its socket.
6	10.7 mc	Conv. grid directly	FM1	....	Peak C24 & L-10	1, 3, 4	6AQ7GT tube removed from its socket.
				AM IF ALIGNMENT			
7	455 kc	Conv. grid directly	STD	....	Peak C86 & C61	5, 6	
8	455 kc	Conv. grid directly	STD	....	Peak C15 & C23	5, 6	
9	455 kc	Conv. grid directly	STD	....	Peak C13 & C14	5, 6	
				FM RF ALIGNMENT			
10	88 mc	DIPOLE terminals	FM2	88 mc—6.8 to 6.9 in.*	Peak C6**	1, 3, 7, 10	Set dial accurately—then adjust C6.
11	98 mc	DIPOLE terminals	FM2	For max. output	Peak C3	1, 3, 8	Tune dial for maximum output, then peak C3 while rocking dial.
12	98 mc	DIPOLE terminals	FM2	Do not change	Peak C2	1, 3	
13	43 mc	DIPOLE terminals	FM1	43 mc—6 to 6.1 in.*	Peak C45**	1, 3, 7	Set dial accurately—then adjust C45.
14	46 mc	DIPOLE terminals	FM1	For max. output	Peak C63	1, 3, 8	Tune dial for maximum output, then peak C63 while rocking dial.
15	46 mc	DIPOLE terminals	FM1	Do not change	Peak C65	1, 3	
				SW RF ALIGNMENT			
16	11.8 mc	Antenna thru 400 ohms	SW2	11.8 mc—4.5 to 4.6 in.*	Peak C58	5, 6, 7, 10	Set dial accurately—then adjust C58.
17	11.8 mc	Antenna thru 400 ohms	SW2	Do not change	Peak C57	5, 6, 8	Peak C57 while rocking dial.
18	11.8 mc	Antenna thru 400 ohms	SW2	Do not change	Peak C54	5, 6	C54 is located on back apron of chassis.
19	9.6 mc	Antenna thru 400 ohms	SW1	9.6 mc—4.5 to 4.6 in.*	Peak C59	5, 6, 7, 10	Set dial accurately—then adjust C59.
20	9.6 mc	Antenna thru 400 ohms	SW1	Do not change	Peak C56	5, 6, 8	Peak C56 while rocking dial.
21	9.6 mc	Antenna thru 400 ohms	SW1	Do not change	Peak C55	5, 6	

* Important! See Note 7.
**Use insulated hex wrench, ¼".

ALIGNMENT TABLE (Cont'd)

Step	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note	Remarks
				BROADCAST RF ALIGNMENT			
22	1620 kc	Antenna via 200 mmf	STD	Extreme right-hand position	Peak C5	5, 6	
23	1620 kc	Antenna via 200 mmf	STD	Extreme right-hand position	Peak C4	5, 6	
24	1620 kc	Antenna via 200 mmf	STD	Extreme right-hand position	Peak C1	5, 6	
25	1500 kc	Antenna via 200 mmf	STD	1500 kc—1.4 to 1.5 in.*	Osc. Coil T3 iron slug	5, 6, 7, 9	T3 iron slug is the rear one on left side. Adjust for peak.
26	1000 kc	Antenna via 200 mmf	STD	For max. output	Conv. coil T6 iron slug	5, 6, 9	T6 iron slug is the center one on left side. Adjust for peak.
27	1000 kc	Antenna via 200 mmf	STD	Do not change	R-F coil T1 iron slug	5, 6, 9	T1 iron slug is the front one on left side. Adjust for peak.
28	580 kc	Antenna via 200 mmf	STD	For max. output	Peak L8	5, 6, 8	Peak L8 while rocking dial.
29							Repeat steps 22 to 28.

* Important! See Note 7.

Notes in Connection with Alignment Table

1. Use *unmodulated* signal.
2. Connect 20,000-ohm-per-volt meter from junction of R21 and C29 to chassis. Use ten-volt scale. (Steps 1-3.)
3. Connect 20,000-ohm-per-volt meter from grid pin 4 of 6SH7 to chassis with a 200,000-ohm resistor in series. The resistor must be connected directly to the grid so that capacity loading will be negligible and so that the meter is isolated from the i-f signal voltage. Keep signal generator output down so that the meter indicates not more than one volt at the grid (5 micro-amperes through 200,000 ohms). (Alignment steps 4 to 6, 10, to 15).
4. Connect signal generator directly to the converter grid at some convenient point. The generator lead must be shielded up to this connection so that not more than 1/16 inch of exposed lead exists. Ground the shield solidly by clamping it firmly to the chassis or a shield as close to the connection as possible. (Steps 6-9.)
5. Use 400-cycle modulation. (Steps 7 to 9, 16 to 28.)
6. Connect a standard output meter across speaker voice coil. Turn volume control fully on. Keep signal generator output down so that the meter indicates not m than ½-watt output (2 volts) during alignment. (St 7 to 9, 16 to 28.)
7. If dial scale is not available, index pointer as follo Turn pointer to right-hand limit of travel. Mark dial back plate at a reference edge of the pointer slid Then set pointer by turning dial knob until the indica dimension exists between the reference edge and mark.
8. "Rocking" consists of adjusting the indicated adjus while turning the dial a small amount back and fo through peak output. The object is to find the maxim peak. Rocking is necessary and is permissible only wh interlocking circuits are being adjusted.
9. The main tuning iron slugs are suspended from the side of the tuning "elevator." They are individua adjustable by loosening the locknut and turning the su porting screw into which the suspending wire is solder
10. *Two* oscillator settings will give response. The hig frequency response point is the correct one; the othe the image. If in doubt, start with the trimmer scr loosened completely and adjust for the *first* response

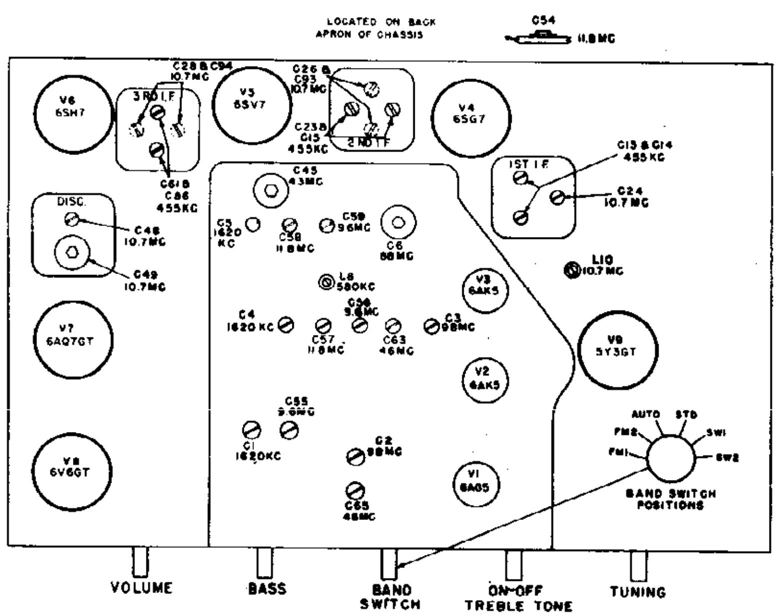


Figure 7—Location of Tubes and Adjusters

GENERAL ELECTRIC CO.

WIRING OF BAND SWITCH

(Wire length given from end to end before stripping)

SECTION 1

At this lug—	—connect this—	—the other end of which is connected to this—
1	Insulated wire, 5" lg.	Antenna transformer T13, terminal 4
2	a. Insulated wire, 11½" lg. b. Insulated wire, 8" lg. c. Capacitor C50	Antenna terminal at rear of chassis Switch Section 1, lug 6 Switch Section 2, lug 1
3	Capacitor C52	Switch Section 2, lug 3
4	a. Insulated wire, 1¼" lg. b. Insulated wire, 14" lg. c. Insulated wire, 5½" lg.	Antenna transformer T1, terminal 1 Beam-a-scope plug, terminal A Antenna transformer T13, terminal 2
5	a. Short bare bus b. Resistor R15	Ground lug on C65 Switch Section 1, lug 11
6	See lug 2b, above	
7	Insulated wire, 11" lg.	Terminal strip 1, lug 4
8	Capacitor C31	Front terminal of T2
9	a. Insulated wire, 9" lg. b. Insulated wire, 7" lg.	Terminal strip 2, lug 5 Filter capacitor, C46C
11	See lug 5b, above	

SECTION 2

At this lug—	—connect this—	—the other end of which is connected to this—
1	See Section 1, lug 2c	
3	a. Insulated wire, 2½" lg. b. See Section 1, lug 3	Trimmer C1, lug nearer T1
4	Insulated wire, 1½" lg.	Trimmer C55, lug nearer T1
5	Coil L20	Ground lug on trimmer C2
6	Short bare bus	Trimmer C65, left-hand terminal*
7	Short bare bus	Trimmer C2, left-hand terminal*
8	Capacitor C7	Tube socket V1, pin 1
9	Insulated wire, 4" lg.	Antenna transformer T13, terminal 1
10	Insulated wire, 3½" lg.	Antenna transformer T1, terminal 2
11**	Insulated wire, 11½" lg.	Beam-a-scope plug, terminal C

SECTION 3

At this lug—	—connect this—	—the other end of which is connected to this—
1	Shielded wire, 8¾" lg.	Terminal strip 2, lug 6
2	Insulated wire, 1½" lg.	Switch Section 3, lug 12
3	a. Insulated wire, 2½" lg. b. Capacitor C16 c. Choke L3	Converter coil T6, terminal 1 Ground lug on terminal strip 3 Switch Section 3, lug 11
4	Insulated wire, 7½" lg.	Terminal strip 2, lug 3
5	Insulated wire, 1⅜" lg.	Converter coil T6, terminal 2
6	Short bus with spaghetti	Chassis
7	Short bare bus	Terminal strip 3, lug 4
10	Shielded wire, 10½" lg.	Terminal strip 2, lug 2
11	a. See lug 3c, above b. Capacitor C10	Switch Section 4, lug 3
12	a. See lug 2, above b. Shielded wire, 7¾" lg.	Push-button socket, terminal B

SECTION 4

At this lug—	—connect this—	—the other end of which is connected to this—
1	a. Insulated wire, 5½" lg. b. Insulated wire, 7¼" lg.	Antenna transformer T13, terminal Push-button socket, terminal F
2	Insulated wire, 2½" lg.	Trimmer C4, lug nearer T6
3	a. See Section 3, lug 11b b. Short bus with spaghetti c. Short jumper	Coil L7, terminal 2 (toward front) Switch Section 4, lug 4 (adjacent)
4	See lug 3c, directly above	
5**	Short bare bus	Trimmer C63, lug nearer front
6	Capacitor C88	Tuner T5, left-hand terminal*
7	Short bare bus	Tuner T5, left-hand terminal
8	Capacitor C11	Tube socket V2, pin 1
9	a. Capacitor C72 b. Insulated wire, 2½" lg.	Section 5, lug 11 Trimmer C56, front terminal
10	a. Capacitor C73 b. Insulated wire, 2½" lg.	Section 5, lug 12 Trimmer C57, front terminal
12	Bus with spaghetti, 2½" lg.	Coil L7, terminal 1

SECTION 5

At this lug—	—connect this—	—the other end of which is connected to this—
1	a. Bus with spaghetti, 1¾" lg. b. Resistor R33	Coil L1, terminal 1 Section 5, lug 4
2	a. Insulated wire, 3" lg. b. Insulated wire, 1⅛" lg	Coil L8, terminal 1 Section 6, lug 4
4	See Section 5, lug 1b	
5	Bus with spaghetti, 3" lg.	Coil L1, terminal 2
6	a. Bus with spaghetti, 3" lg. b. Bus with spaghetti, 1½" lg.	Capacitor C45, left-hand terminal* Section 5, lug 10
7**	Short bare bus	Tuner T4, left-hand terminal*
8	Capacitor C12	Tube socket V3, pin 1
9	Insulated wire, 4" lg.	Trimmer C5, lug nearer T3
10	a. See Section 5, lug 6b b. Capacitor C41	Section 6, lug 6
11	a. Insulated wire, 3¾" lg. b. See Section 4, lug 9a	Trimmer C59, lug nearer front
12	a. Insulated wire, 3½" lg. b. See Section 4, lug 10a	Trimmer C58, lug nearer front

SECTION 6

At this lug—	—connect this—	—the other end of which is connected to this—
1	Insulated wire, 4½" lg.	I-F transformer T7, terminal 8
2	Bus with spaghetti, 1½" lg.	Coil L1, terminal 2
4	See Section 5, lug 2b	
5	Insulated wire, 12" lg.	Push-button socket, terminal A
6	a. Bus with spaghetti, 2" lg. b. Capacitor C75 c. See Section 5, lug 10b	Trimmer C45, center terminal Ground at C59
7	Short bare bus	Trimmer C6, center terminal
8	Bare bus, 1" lg.	Tube socket V3, pin 7
9	Insulated wire, 2¼" lg.	I-F transformer T7, terminal 5
10	Insulated wire, 2¾" lg.	I-F transformer T7, terminal 3
12	Insulated wire, 3½" lg.	Coil L8, terminal 3

* Looking from front, chassis inverted.
** Double lug (front and rear) soldered together.

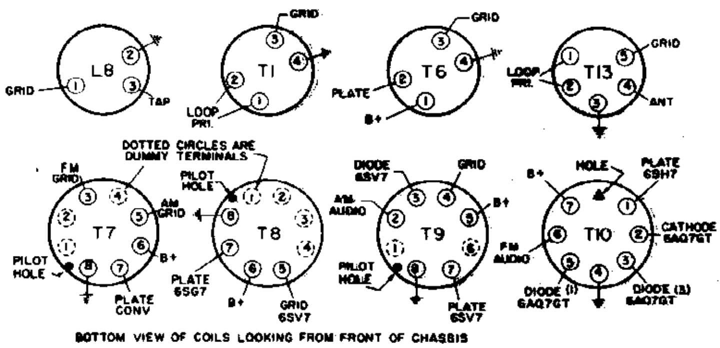


Figure 3—Terminal Identification of Coil Assemblies (Numbers correspond with schematic)

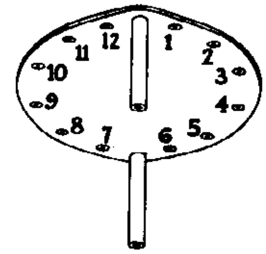


Figure 5—Identification of Switch Lugs —Set Inverted and Viewed from Panel

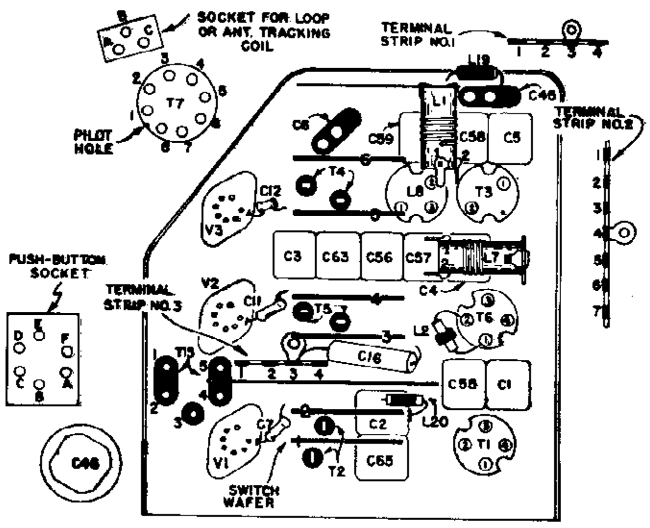


Figure 4—Physical Location of Components Listed in Band Switch Wiring Table

TUBE COMPLEMENT:

R-F Amplifier 6A
Converter 6A
Oscillator 6A
1st I-F Amplifier 6S
2nd I-F Amplifier 6S
FM Limiter—AM Detector 6S
Discriminator—1st A-F Amplifier 6AQ7-
Power Amplifier 6V6
Phono Pre-Amplifier 6S
Rectifier 5Y3
Dial Lamp (2) .... GE No.
Pilot Lamp (bottom of cabinet) .... GE No.

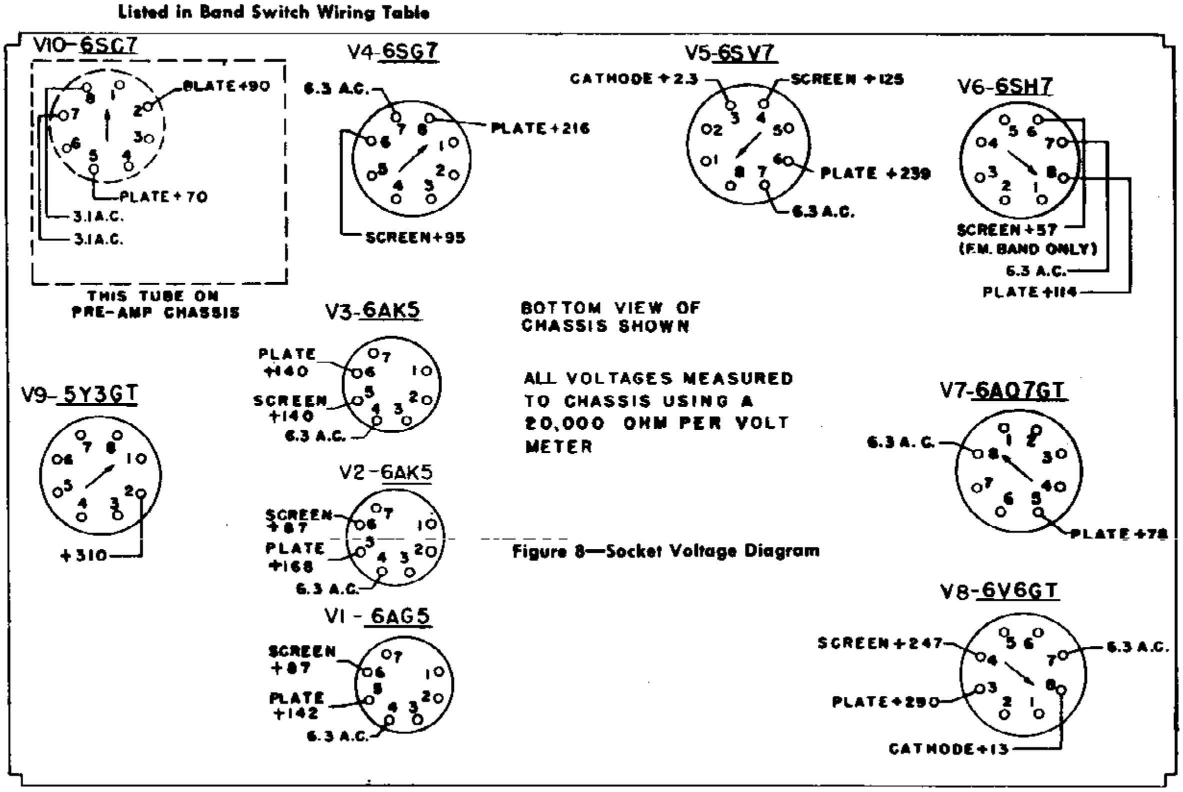


Figure 8—Socket Voltage Diagram

GENERAL INFORMATION

INTRODUCTION

The information contained in this service note covers the Model 417A completely except for the record player.

THE TUNING SYSTEM

The "r-f end" of the receiver is unusual in a number of respects. Variable inductance tuning is employed instead of using a conventional tuning capacitor. This design makes possible two distinct advantages. First, it provides a high efficiency FM circuit in the 88 to 108 megacycle range which would not be possible with the more conventional methods of tuning. Second, it provides stable short-wave spread-bands which tune as easily as the broadcast band. Other advantages are also obtained but the two mentioned above are the most important.

Tuning is accomplished by an "elevator" which consists of a rigid plastic horizontal plate raised and lowered by means of a windlass controlled by the tuning knob at the panel. From this plate are suspended three powdered iron cores which tune the broadcast r-f, converter, and oscillator coils; and three tuning "vanes" which tune three low-inductance circuits. These latter circuits are employed in both FM bands and both short-wave bands with the exception of the antenna circuit for the short-wave spread-bands when a broad tuned antenna coil is used and the r-f guillotine tuner is switched out. They are called "guillotine" tuners because of their appearance.

FACTS ABOUT "GUILLOTINE" TUNING

The "guillotine" tuners are designed primarily for the 88–108 megacycle FM band where special technique is needed to realize high gain and circuit stability. Ordinary coils, tuned by a variable capacitor, are inefficient at these frequencies, first, because of the low inductances required to reach these frequencies when a variable tuning capacitor is employed and, second, because shunt capacity reduces the gain of the amplifier circuit; shunt capacity must be kept very low. Another disadvantage of standard tuning arrangements at these frequencies is that common coupling is obtained through the shaft of a ganged tuning capacitor unless insulated single sections are used (cumbersome and costly). Common coupling of this type tends to cause oscillation or general instability and precludes high gain per stage. The guillotines make possible short leads, completely isolated sections, stable tuning, high Q circuits, low shunt capacity, and location of each tuner in the best physical and electrical position in the assembly. Furthermore, since the shunt capacity is small and the inductance is consequently at its highest corresponding value, the additional unavoidable inductance introduced in the wiring, band switch, etc., produces a minimum of circuit losses and unbalance.

The guillotine tuner consists of a heavy, silver-plated, two-turn square coil, rigidly supported between two plastic posts. A flat, solid vane slides up and down between the two turns. It is guided in grooves in the plastic posts so that it passes between the two sections of the coil without touching them. The posts are so moulded and the coil so constructed that the whole assembly is held rigidly at a predetermined spacing. The tuning vane is raised and lowered by the tuning elevator. When the elevator is all the way up (set tuned to lowest frequency), the vane is completely above the coil which then acts as a simple two-turn coil. As the set is tuned toward the higher frequencies, the vane moves downward into the field of the coil until, finally, it is all the way in. The vane reduces the inductance of the coil through two principles. First, it acts as a shorted turn, and thus reduces inductance directly; second, it provides a barrier between the two turns of the coil which reduces the mutual coupling and thus also reduces inductance.

The tuners described above are identified as T2, T4, and T5, on the schematic diagram.

FM BANDS

Guillotine tuners T2, T5, and T4 are used as the tuned circuits for the r-f amplifier, converter, and local oscillator respectively, in both FM bands. In the higher frequency band, the tuner is used with only a small shunt trimmer for adjusting distributed capacity. In the lower band, a higher value shunt trimmer is used to reduce the frequency. The layout of band switch, tuners, and tube sockets is arranged to give the shortest possible leads when the FM bands are in use. The lead length in the other bands is not nearly so critical.

SHORT-WAVE SPREAD-BANDS

Bandspread tuning in the short-wave bands is obtained in the converter and oscillator circuits by inserting the guillotine tuners in series with a higher inductance so that the two inductances together form the "L" part of the short-wave tuned circuit. The small percentage change in inductance obtained in the tuner provides smooth, wide, and stable tuning. The "C" part of the tuned circuit consists primarily of a shunt trimmer. Switching from one short-wave band to the other is accomplished by selecting a different shunt trimmer.

The converter grid circuit, as an example, includes L7 and T5 in series in both the SW1 and SW2 bands. Tuner T5 is in the ground end of the circuit and the signal is fed into the grid and through C10. The shunt tuning capacity is either C56 or C57, depending upon which of the two short-wave bands is used. Additional oscillator coupling capacitors, C72 or C73, are also added to compensate for the lower coupling through C67 when the higher shunt capacitors are in the circuit.

In the r-f stage, a section of the loop is used as the grid circuit. It is tuned for resonance by a shunt capacitor (C54 and C55) and a shunt inductance (L20). Because a tuned circuit of this type is inherently broad, tuning through the relatively narrow spread-band offers little advantage and is not done.

STANDARD BROADCAST BAND

When manual tuning is employed (Band Switch in STD position), the receiver employs an r-f stage, a converter, and an oscillator, all of which are tuned by iron slugs suspended from the tuning elevator. In the automatic position (Band Switch in the AUTO position), the r-f stage is not used. Instead, a separate antenna coil is used which couples the antenna and loop directly into the converter. A separate coil is used in order to make the tuning circuit independent of the dial tuning mechanism so that it may be tuned by trimmers in the push-button assembly.

Switching from manual to automatic tuning is accomplished in the oscillator by using an oscillator coil which is tuned by a separate shunt inductance. In manual tuning, the inductance is one which is tuned by the tuning elevator. In automatic tuning, a fixed shunt capacity (C-76) plus one of a series of push-button selected coils tunes the oscillator.

I-F AMPLIFIER

The i-f amplifier consists of a composite 455 kc and 10.7 mc circuit. The electrical changes required to transfer between AM and FM service are made by the Band Switch. When the switch is in either the FM1 or FM2 position, the amplifier operates at 10.7 megacycles and delivers the i-f signal into an FM discriminator circuit. When the switch is in any of the other positions, the amplifier operates at 455 kc. Screen voltage is removed from the tube which acted as an FM limiter and this tube then acts as an AM diode detector. Thus, the AM audio signal appears across R16 while the FM audio signal appears across R22. A section of the Band Switch switches the audio input circuit from one to the other. The AVC bus is also shorted out for FM.

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal so that AVC is not effective.

(1) R-F and I-F Stage Gains

Signal applied through IRE dummy antenna:

Antenna post to V1 grid	4 @ 1000 kc
Antenna post to V1 grid	2 @ 9.6 mc
Antenna post to V1 grid	2 @ 11.8 mc

Signal applied through 300 ohms, including signal generator impedance:

Dipole terminals to V1 grid	1.5 @ 45 mc
Dipole terminals to V1 grid	2 @ 98 mc

These checks with oscillator tube (V3) removed:

V1 grid to V2 grid	13 @ 1000 kc
V1 grid to V2 grid	6 @ 9.6 mc
V1 grid to V2 grid	9 @ 11.8 mc
V1 grid to V2 grid	13 @ 45 mc
V1 grid to V2 grid	10 @ 98 mc

These checks with oscillator tube (V3) removed:

V2 grid to V4 grid	23 @ 455 kc
V2 grid to V4 grid	37 @ 10.7 mc
V4 grid to V5 grid	23 @ 455 kc
V4 grid to V5 grid	60 @ 10.7 mc
V5 grid to V6 grid	40 @ 455 kc
V5 grid to V6 grid	25 @ 10.7 mc

(2) Audio Gain

.07 volts at 400 cps across volume control with control set at maximum will give approximately ½ watt output across the speaker voice coil.

(3) Oscillator Grid Bias

D-c voltage developed across R5 (average):

13 v. @ 1000 kc — 2.7 v. @ 11.8 mc
2.7 v. @ 9.6 mc — 5.5 v. @ 45 mc
7 v. @ 98 mc

(4) Socket Pin Voltages

Fig. 8 shows typical tube pin voltages. All readings should be made from the pins to ground unless otherwise indicated.

REPLACEMENT OF DRIVE CORDS

DIAL STRINGING:

Push the tuning elevator all the way down and string the dial as shown in Figure 1. This illustration shows the stringing as viewed from behind the dial scale, as you would see it when working on it. The numbers and arrows indicate the progression of the dial cord from start to finish. Notice that the dial cord, in progressive steps 9, 10, 11, and 12, is made to travel behind the start and end of cord stringing, as viewed in Figure 1. The procedure will be easier if pulley C is bypassed until the rest of the work is finished after which the cord can be pulled tight over that pulley. During the procedure, locate the two brass eyelets so that they fall between pulleys A and B. When finished, crimp the eyelets on the cord in the proper positions to act as minimum and maximum stops for the tuning mechanism and clip the pointer on the cable half-way between the eyelets.

Separate detail drawings are given to show the three different methods of attaching the ends of the cord. The arrangement with the standard helical spring was used in some earlier production receivers. If the cord and spring are to be replaced, the Type 1 spring should be used. It fits the same drum and is an improved type. The Type 2 spring should be used with the later type of drum (with two tabs). When stringing the mechanism with either the Type 1 or Type 2 spring, load the spring by pulling the hook over the projection at the other end of the spring, string the dial and, as a final step, release the hook so that it pulls up the slack in the dial cord.

Elevator Stringing

The step-by-step procedure for stringing the elevator windlass is shown in Figure 2, a rear view of the mechanism. Start by inserting the metallic cord in slot as shown in Step 1. Observe that the cord is measured five inches from end of loop to where it enters the slot. Now bring the loop end around the pulley counterclockwise, as in Step 2. Next, thread loop through hole in elevator top plate, fastening it to the hoist cord tension spring, as viewed in Step 3. Steps 4, 5, 6, and 7 show how the free end of cord progresses on the pulley, going clockwise and that each turn is laid progressively one in back of the other and in back of the vertical section, going to the tension spring in tuner plate. In Step 6, pass the free end of cord down through the hole in chassis, grasping its end with long-nosed pliers and drawing tension on cord whil running elevator completely down to the bottom. Keepin tension on cord and forcing large dial drive drum so tha hoist cord spring is compressed, complete Step 7 making one turn loop of the cord's free end around the lug show on end of elevator shaft and solder.

Concluding Comment

After replacing the dial cord or the elevator cord, it may b found that some correction in relative positioning is neede This can be done by loosening the set screws in the large driv pulley directly behind the dial scale and re-positioning it o the shaft. The object, of course, is to permit the tuning contr to drive the elevator through its full tuning range. Sligh errors in final setting are not serious since leeway is provide in the location of the dial pointer itself.

WIRING OF BAND SWITCH

In order to facilitate repair, replacement, and circuit trac ing, a table and diagrams are supplied with reference to th connections made in the band switch. If used properly, thes will be of invaluable aid. The remarks which follow are in tended to clarify the make-up of the tables and diagrams—read them carefully before using the table.

The table is broken down into six parts, one for each switc wafer. Section 1 is nearest the front and section 6 is the rear most wafer.

Individual lugs on each wafer are numbered from 1 to 12, de pending upon their position on the wafer. The method of num bering is illustrated in Figure 5. In determining the number turn the chassis upside down and look from the front towar the rear of the chassis. Thus, lugs 1 and 12 are the ones whic are at the bottom when the set is in its normal position; lug 3 and 4 are on the side with the broadcast band coils; and lugs 9 and 10 are on the side with the 6AK5 tubes. The numbering refers to lugs whether they be on the front or rear o the wafer.

Figure 4 shows the physical location of various components and terminals to which reference is made in the table.

In those cases where a component symbol number is given in column two, instead of a wire, that component is connected by its own lead wire directly to the switch lug and the connection of the *other* end of the component is given in the last column.

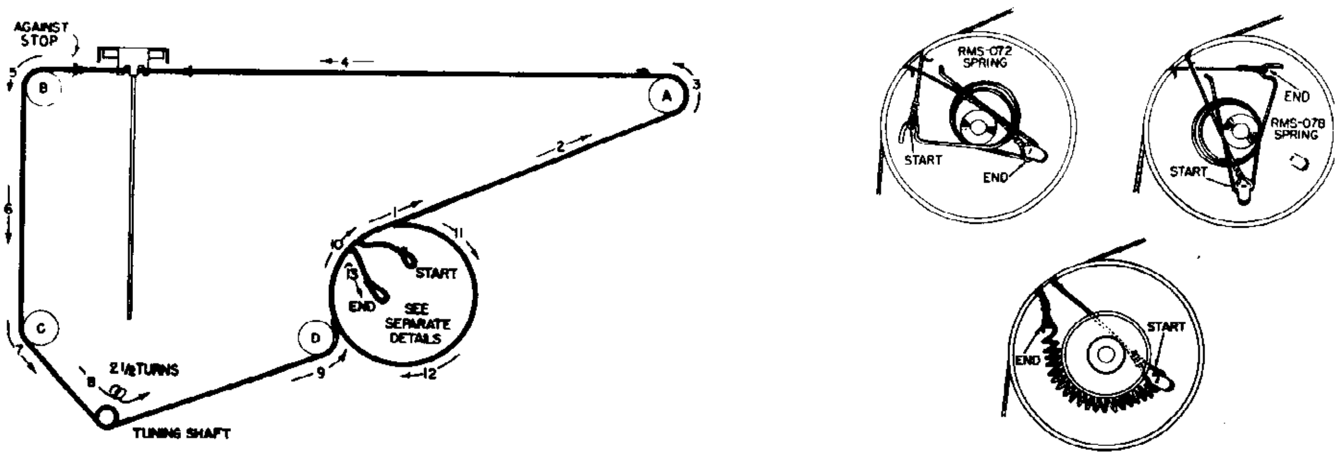


Figure 1—Dial Stringing Diagram Showing Later Production Springs

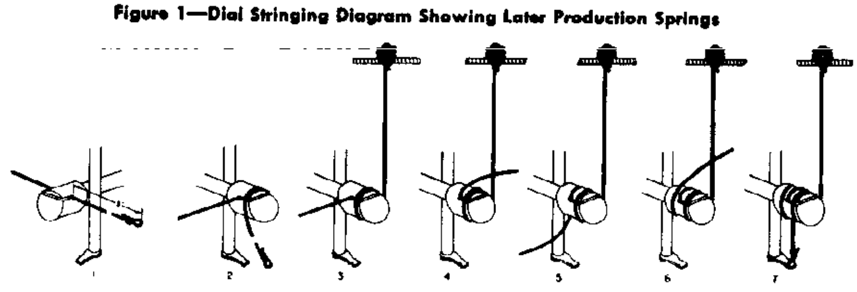


Figure 2—Elevator Windlass Stringing Procedure

MODEL 417A

GENERAL ELECTRIC CO.

REPLACEMENT PARTS LIST

UNIVERSAL REPLACEMENT PARTS

Part No.	Symbol	Description
UCC-039	C43	CAPACITOR—.005 mfd., 600 v., paper
UCC-040	C17, 30, 64, 69, 89, 91, 103	CAPACITOR—.01 mfd., 600 v., paper
UCC-041	C9, 18, 74, 104	CAPACITOR—.02 mfd., 600 v., paper
UCC-042	C37	CAPACITOR—.03 mfd., 600 v., paper
UCC-045	C47, 66, 77, 101, 102	CAPACITOR—.05 mfd., 600 v., paper
UCG-2048	C76	CAPACITOR—680 mmfd., 500 v., silver mica
UCN-506	C52	CAPACITOR—6.8 mmf., ceramic
UCU-020	C21, 53	CAPACITOR—47 mmf., 500 v., mica
UCU-028	C68	CAPACITOR—100 mmf., 500 v., mica
UCU-048	C38	CAPACITOR—680 mmf., 500 v., mica
UCU-520	C10	CAPACITOR—47 mmf., mica
UCU-528	C70, 79, 31	CAPACITOR—100 mmf., 500 v., mica
UCU-536	C85	CAPACITOR—220 mmf., 500 v., mica
UCU-1042	C29	CAPACITOR—390 mmfd., 500 v., mica
UCU-1504	C73	CAPACITOR—10 mmfd., mica
UCU-1512	C72, 90	CAPACITOR—22 mmfd., 500 v., mica
UCU-1544	C8	CAPACITOR—470 mmfd., mica
UCW-1004	C50	CAPACITOR—10 mmf., ceramic
UCW-1014	C22	CAPACITOR—27 mmf., ceramic
UCW-1020	C41	CAPACITOR—47 mmf., ceramic
UCW-1028	C34	CAPACITOR—100 mmf., ceramic
UCW-2022	C75	CAPACITOR—56 mmf., ceramic
UIC-001		CEMENT—Speaker cone replacement cement
UJB-014		TERMINALS—4 lug terminal strip
UJB-018		TERMINALS—2 lug terminal strip
UOP-1230		SPEAKER—12-in. permanent magnet speaker
UOX-002		CONE—Loudspeaker replacement cone assembly
URD-007	R30	RESISTOR—18 ohms, ½ w., carbon
URD-009	R26	RESISTOR—22 ohms, ½ w., carbon
URD-017	R2	RESISTOR—47 ohms, ½ w., carbon
URD-025	R33	RESISTOR—100 ohms, ½ w., carbon
URD-033	R29	RESISTOR—220 ohms, ½ w., carbon
URD-041	R12	RESISTOR—470 ohms, ½ w., carbon
URD-049	R34	RESISTOR—1000 ohms, ½ w., carbon
URD-057	R38, 46	RESISTOR—2200 ohms, ½ w., carbon
URD-061	R101	RESISTOR—3300 ohms, ½ w., carbon
URD-065	R20, 45	RESISTOR—4700 ohms, ½ w., carbon
URD-077	R10	RESISTOR—15,000 ohms, ½ w., carbon
URD-083	R104	RESISTOR—27,000 ohms, ½ w., carbon
URD-085	R19, 44	RESISTOR—33,000 ohms, ½ w., carbon
URD-089	R24	RESISTOR—47,000 ohms, ½ w., carbon
URD-091	R7	RESISTOR—56,000 ohms, ½ w., carbon
URD-093	R13, 21	RESISTOR—68,000 ohms, ½ w., carbon
URD-095	R28, 39	RESISTOR—82,000 ohms, ½ w., carbon
URD-097	R9, 40	RESISTOR—100,000 ohms, ½ w., carbon
URD-099	R22, 23	RESISTOR—120,000 ohms, ½ w., carbon
URD-103	R6	RESISTOR—180,000 ohms, ½ w., carbon
URD-105	R16, 27, 41	RESISTOR—220,000 ohms, ½ w., carbon
URD-113	R32	RESISTOR—470,000 ohms, ½ w., carbon
URD-121	R37	RESISTOR—1.0 meg., ½ w., carbon
URD-125	R1, 4, 8	RESISTOR—1.5 meg., ½ w., carbon
URD-129	R14, 18	RESISTOR—2.2 meg., ½ w., carbon
URD-133	R47, 102, 103	RESISTOR—3.3 meg., ½ w., carbon
URD-145	R42	RESISTOR—10.0 meg., ½ w., carbon
URD-1079	R5	RESISTOR—18,000 ohms, ½ w., carbon
URD-1104	R105	RESISTOR—200,000 ohms, ½ w., carbon
URE-035	R31	RESISTOR—270 ohms, 1 w., carbon
URE-073	R3	RESISTOR—10,000 ohms, 1 w., carbon
URE-083	R15	RESISTOR—27,000 ohms, 1 w., carbon
URE-085	R17	RESISTOR—33,000 ohms, 1 w., carbon

SPECIALIZED REPLACEMENT PARTS

Part No.	Symbol	Description
RAB-021	L17	BEAM-A-SCOPE—Cabinet back and loop assembly
RAD-016		BRACKET—For band switch mounting at front
RAX-007	L12, 13, 14, 15, 16	COIL—Pushbutton coils mounted on bracket
RAX-008		BRACKET—Bracket and roller fork for elevator shaft
RCC-001	C40	CAPACITOR—.007 mfd., 600 v., paper
RCC-035	C32, 36	CAPACITOR—.001 mfd., 600 v., paper
RCC-040	C20	CAPACITOR—.01 mfd., 600 v., paper
RCC-041	C16, 19, 60, 62	CAPACITOR—.02 mfd., 600 v., paper
RCC-056	C51	CAPACITOR—.002 mfd., 1000 v., paper
RCE-029	C46A	CAPACITOR—30 mfd., 400 v., dry electrolytic
	C46B	CAPACITOR—30 mfd., 400 v., dry electrolytic
	C46C	CAPACITOR—15 mfd., 400 v., dry electrolytic
	C46D	CAPACITOR—20 mfd., 25 v., dry electrolytic
RCE-030	C105A	CAPACITOR—15 mfd., 350 v., dry electrolytic
	C105B	CAPACITOR—15 mfd., 350 v., dry electrolytic
RCW-001	C12	CAPACITOR—47 mfd., ceramic
RCW-013	C67, 88	CAPACITOR—10 mmf., ceramic
RCW-014	C25, 27, 44	CAPACITOR—15 mmf., ceramic
RCW-015	C87	CAPACITOR—3.3 mmf., ceramic
RCW-017	C92	CAPACITOR—1.5 mmf., ceramic
RCW-060	C71	CAPACITOR—5.6 mmf., ceramic
RCW-1028	C7, 11	CAPACITOR—100 mmf., ceramic
RCX-011	C80	CAPACITOR—5-80 mmf., pushbutton antenna trimmer
	C81	CAPACITOR—9-180 mmf., pushbutton antenna trimmer
	C82	CAPACITOR—45-380 mmf., pushbutton antenna trimmer
	C83	CAPACITOR—45-380 mmf., pushbutton antenna trimmer
	C84	CAPACITOR—45-380 mmf., pushbutton antenna trimmer
RCX-016	C5	CAPACITOR—200-250 mmf., trimmer capacitor
	C58	CAPACITOR—280-380 mmf., trimmer capacitor
	C59	CAPACITOR—475-575 mmf., trimmer capacitor
RCX-022	C3	CAPACITOR—2-20 mmf., trimmer capacitor
	C4	CAPACITOR—34-70 mmf., trimmer capacitor
	C56	CAPACITOR—475-575 mmf., trimmer capacitor
	C57	CAPACITOR—280-380 mmf., trimmer capacitor
	C63	CAPACITOR—45-80 mmf., trimmer capacitor
RCX-023	C1	CAPACITOR—34-70 mmf., trimmer capacitor
	C55	CAPACITOR—4-50 mmf., trimmer capacitor
RCX-024	C2	CAPACITOR—3-30 mmf., trimmer capacitor
	C65	CAPACITOR—80-130 mmf., trimmer capacitor
RCY-011	C54	CAPACITOR—3-30 mmf., trimmer for loop

UNIVERSAL REPLACEMENT PARTS (Cont'd)

Part No.	Symbol	Description
RCY-017	C6, 45	CAPACITOR—3-30 mmf., air trimmer
RDB-001		PUSHBUTTON—Black pushbutton used at bottom of strip only
RDB-004		PUSHBUTTON—Black pushbutton used in upper five positions only
RDC-019		CORD—Hoist cord 6½" long
RDC-021		CORD—Drive cord 40¼"
RDE-016		ESCUTCHEON—For dial scale and pushbuttons
RDG-003		BACK PLATE—Large metal panel plate
RDK-004		KNOB—Black knob, plain
RDK-032		KNOB—Black control knob with pointer
RDO-001		ESCUTCHEON ORNAMENT—Left-hand plastic escutcheon ornament
RDP-016		POINTER—Dial pointer and slide
RDP-022		POINTER—Dial pointer
RDS-018		SCALE—Tuning dial scale
REX-002		CORE—Iron core with glass tubing for broadcast antenna, r-f, and oscillator coils
RHC-007		PIN—Hairpin cotter for securing shaft through pushbuttons
RHC-009		PIN—Hairpin cotter for idler wheel
RHC-010		SPRING CLIP—Holds FM coil assembly
RHE-001		EYELET—For connecting FM coil links
RHM-016		CLIP—Mounting clip for L1 and L7
RHM-024		LINK—Hoist link holding end of hoist cord
RHM-025		RING—Retaining ring for flywheel
RHM-026		COIL LINK—Rectangular coil link for assembling FM coils T2 and T5
RHM-027		COIL LINK—Rectangular coil link for assembling FM coil, T4
RII-001		POST—Mycalex posts for assembling all FM coils
RJC-001		CONTACT PIN—For speaker connection
RJJ-004		RECEPTACLE—Pre-amp. and pushbutton receptacle
RJP-002		PLUG—Six-prong pre-amp. power plug
RJP-003		PLUG—Phono power male plug
RJP-004		PLUG—Male phono plug from pre-amplifier
RJP-005		PLUG—Plug and cover for pushbutton cable
RJP-010		SOCKET—Phono input socket
RJP-011		PLUG—Shipping screw hole plug
RJS-003		SOCKET—Octal socket for V5, V6, and V7
RJS-012		PLATE—For mounting electrolytic
RJS-027		SOCKET—Dial light socket
RJS-030		SOCKET—Octal socket for V4, V8, and V9
RJS-044		TUBE SOCKET—Tube socket for V1, V2, and V3
RJS-049		SOCKET—Phono power female socket
RJS-051		RECEPTACLE—3 pin receptacle for Beam-a-scope
RJX-009		PLUG—Plug attached to Beam-a-scope
RLA-009	T1	COIL—Broadcast band antenna coil
RLA-011	L6	COIL—FM antenna choke coil
	L19	COIL—FM oscillator cathode choke coil
	L20	COIL—SW loop shunt coil
RLA-016	T13	COIL—Pushbutton antenna coil
RLB-005	T2, 5	COILS—FM antenna coil and FM RF coil
RLB-006	T6	COIL—Broadcast band RF coil
RLB-007	L5	COIL—FM oscillator cathode choke coil
RLB-008	L3	COIL—SW band RF plate choke coil
RLB-009	L2	COIL—Broadcast band plate choke dummy
RLB-010	L4	COIL—FM RF plate choke coil
RLC-013	T4	COIL—FM band oscillator coil
RLC-014	T3	COIL—Broadcast band oscillator coil
RLC-015	L1	COIL—SW oscillator loading coil
RLC-016	L8	COIL—Broadcast band oscillator shunt coil
RLC-017	L7	COIL—SW band RF loading coil
RLF-003	L9	COIL—Filament choke coil
RLI-002	L11	CHOKE—Power line choke
RLP-004	L10	COIL—FM IF plate coil
RLP-006	L18	COIL—Oscillator plate choke coil
RMC-012		CLAMP—For holding cover on RF unit
RMC-013		CLIP—Support for clamp RMC-012
RMC-014		CLIP—For holding shielded phono cable
RMM-009		SPACER—Metal sleeve on hoist pulley shaft
RMM-010		VANE—Tuner vane for FM coils T2 and T5
RMM-011		VANE—Tuner vane for FM oscillator coil, T4
RMM-015		SUPPORT—Cabinet drop-lead support
RMR-002		ROLLER—Presses against hoist shaft
RMS-032		SPRING—Maintains pushbutton tension
RMS-039		WASHER—"C" washer on idler pulley
RMS-040		SPRING—Flat spring against hoist pulley shaft
RMS-041		SPRING—Wire spring against hoist pulley shaft
RMS-042		SPRING—Hoist cord tension spring
RMS-043		SCREW—Iron core adjusting screw
RMS-044		SPRING—Guide wire spring in elevator plate
RMS-072		SPRING—Type 1 dial cord spring (earlier production)
RMS-078		SPRING—Type 2 dial cord spring (later production)
RMU-016		SHAFT—Manual tuning shaft
RMW-016		PULLEY—Main tuning drum
RMW-017		PULLEY—Small idler pulley
RMX-018		FLYWHEEL—Flywheel with setscrew
RMX-019		PULLEY—Hoist pulley and shaft
RMX-021		PLATE AND SHAFT—Elevator top plate and vertical shaft
RRC-014	R25	VOLUME CONTROL—2 meg. potentiometer tapped at 1 meg.
RRC-031	S2	SWITCH—Bass tone switch
RRW-010	R35, 36	RESISTOR—1150 and 5000 ohm, w.w.
RSP-002	S5	SWITCH—Pushbutton switch
RSW-023	S1	SWITCH—Band change switch
RSX-003	S3	SWITCH—Treble tone and power switch
RTD-001	T10	TRANSFORMER—Discriminator
RTL-017	T7	TRANSFORMER—1st I-F transformer
RTL-044	T8	TRANSFORMER—2nd I-F transformer
RTL-045	T9	TRANSFORMER—3rd I-F transformer
RTO-012	T11	TRANSFORMER—Output transformer
RTP-020	T12	TRANSFORMER—Power transformer
RWL-004		CORD—Power cord
RWX-004		WIRE—Guide wire for pointer.
RYC-003		STATION LIST—Call letter cards

GENERAL ELECTRIC CO.

ALIGNMENT

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation. (See Table.)
2. D-c voltmeter or microammeter. (See Notes 2 and 3.)
3. A-c voltmeter, 2.0 volts. (See Note 6.)
4. Insulated hex wrench, ¼-inch.
5. .01 mfd. paper capacitor.
6. 400-ohm, ½ watt resistor.
7. 200 mmf. mica capacitor.

ALIGNMENT TABLE

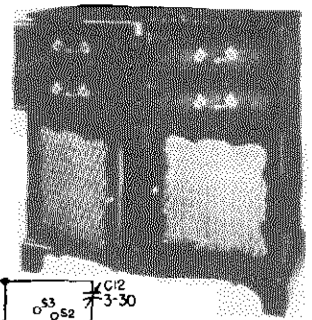
Step	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note	Remarks
				AM-IF ALIGNMENT			
1	455 kc	Conv. grid directly	STD	—	Peak C60 & C59	4, 5, 6	
2	455 kc	Conv. grid directly	STD	—	Peak C56 & C55	4, 5, 6	
3	455 kc	Conv. grid directly	STD	—	Peak C45 & C46	4, 5, 6	
				FM-IF ALIGNMENT			
4	10.7 mc	2nd 6SV7 grid thru .01 mf	FM1	—	C68 for zero**	1, 2	Adjust C68 for *zero* meter reading. Apply 1 volt signal input.
5	—	2nd 6SV7 grid thru .01 mf	FM1	—	Signal Generator	1, 2	Detune signal generator to point of maximum meter reading.
6	As in step 5	2nd 6SV7 grid thru .01 mf	FM1	—	Peak C67	1, 2	
7	10.7 mc	1st 6SV7 grid thru .01 mf	FM1	—	Peak C62 & C73	1, 3	6AQ7GT tube removed from socket.
8	10.7 mc	6SG7 grid thru .01 mf	FM1	—	Peak C57 & L15	1, 3	6AQ7GT tube removed from socket
9	10.7 mc	Conv. grid directly	FM1	—	Peak C47 & L14	1, 3, 4	6AQ7GT tube removed from socket.
				FM-RF ALIGNMENT			
10	98 mc	DIPOLE terminals	FM2	98 mc—3.55 to 3.65 in.*	Peak C28**	1, 3, 7, 10	Set dial accurately—then adjust C28.
11	98 mc	DIPOLE terminals	FM2	For max. output	Peak C27	1, 3, 8	Tune dial for maximum output—then peak C27 while rocking dial.
12	98 mc	DIPOLE terminals	FM2	Do not change	Peak C12	1, 3	
13	46 mc	DIPOLE terminals	FM1	46 mc—3.25 to 3.35 in.*	Peak C118**	1, 3, 7, 10	Set dial accurately—then adjust C118.
14	46 mc	DIPOLE terminals	FM1	For max. output	Peak C123	1, 3, 8	Tune dial for maximum output—then peak C123 while rocking dial.
15	46 mc	DIPOLE terminals	FM1	Do not change	Peak C15	1, 3	
				SW-RF ALIGNMENT			
16	15.2 mc	Antenna thru 400 ohms	SW3	15.2 mc—3.7 to 3.8 in.*	Peak C31	5, 6, 7, 10	Set dial accurately—then adjust C31.
17	15.2 mc	Antenna thru 400 ohms	SW3	Do not change	Peak C37	5, 6, 8	Peak C37 while rocking dial.
18	15.2 mc	Antenna thru 400 ohms	SW3	Do not change	Peak C9	5, 6, 11	C9 is located on back apron of chassis.
19	11.8 mc	Antenna thru 400 ohms	SW2	11.8 mc—3.35 to 3.45 in.*	Peak C34	5, 6, 7, 10	Set dial accurately—then adjust C34

*Important! See Note 7.
**Use insulated hex wrench, ¼".

GENERAL EL

CABINET:

Model	502
Material	Wood
Color	Mahogany
Height	34¾ in.
Width	33⅞ in.
Depth	18¼ in.



ELECTRICAL RATING:

	Rating
Voltage	105-1
Frequency	50 cyc
Wattage (Radio only)	110 wa
(With phono)	135 wa

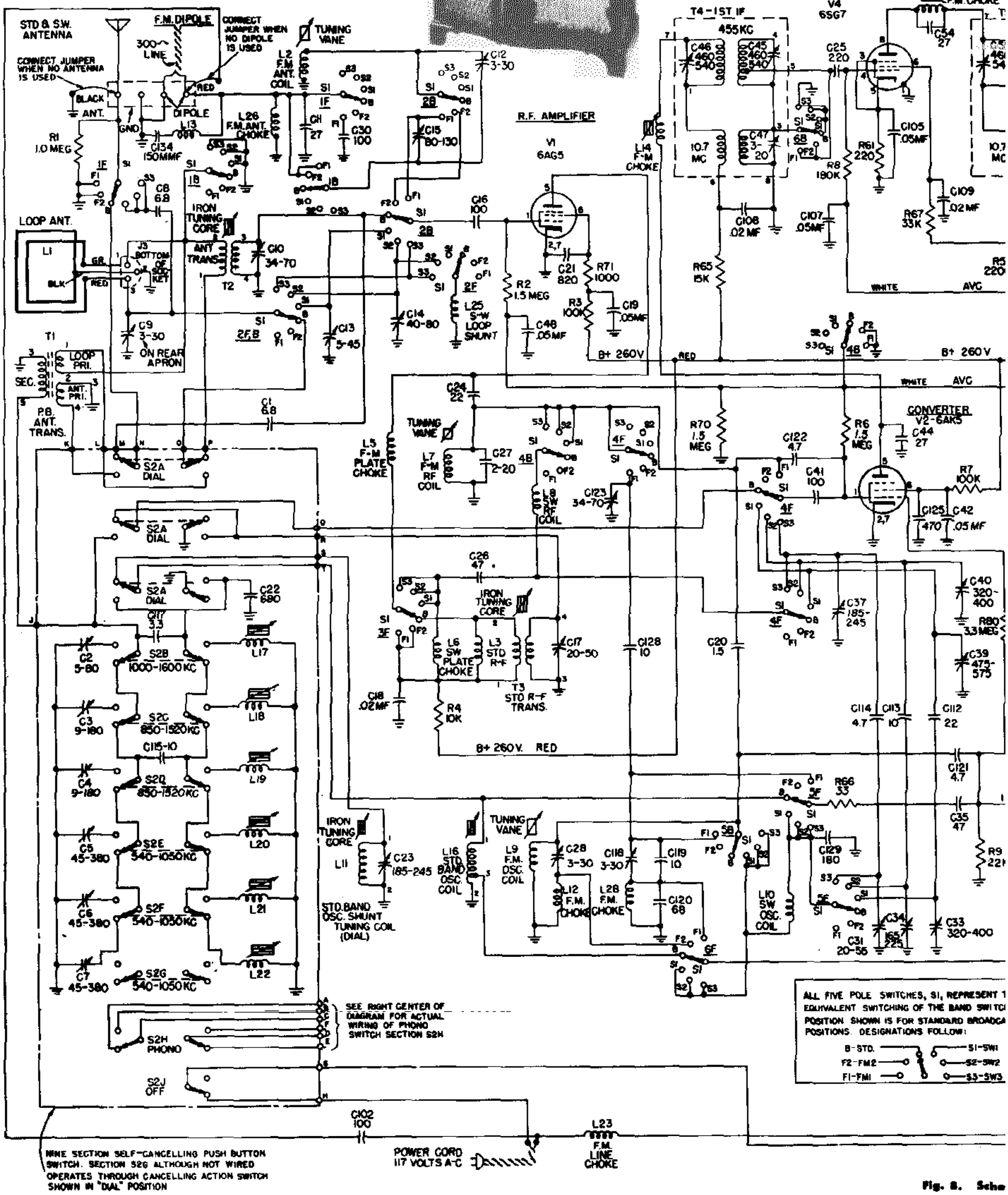


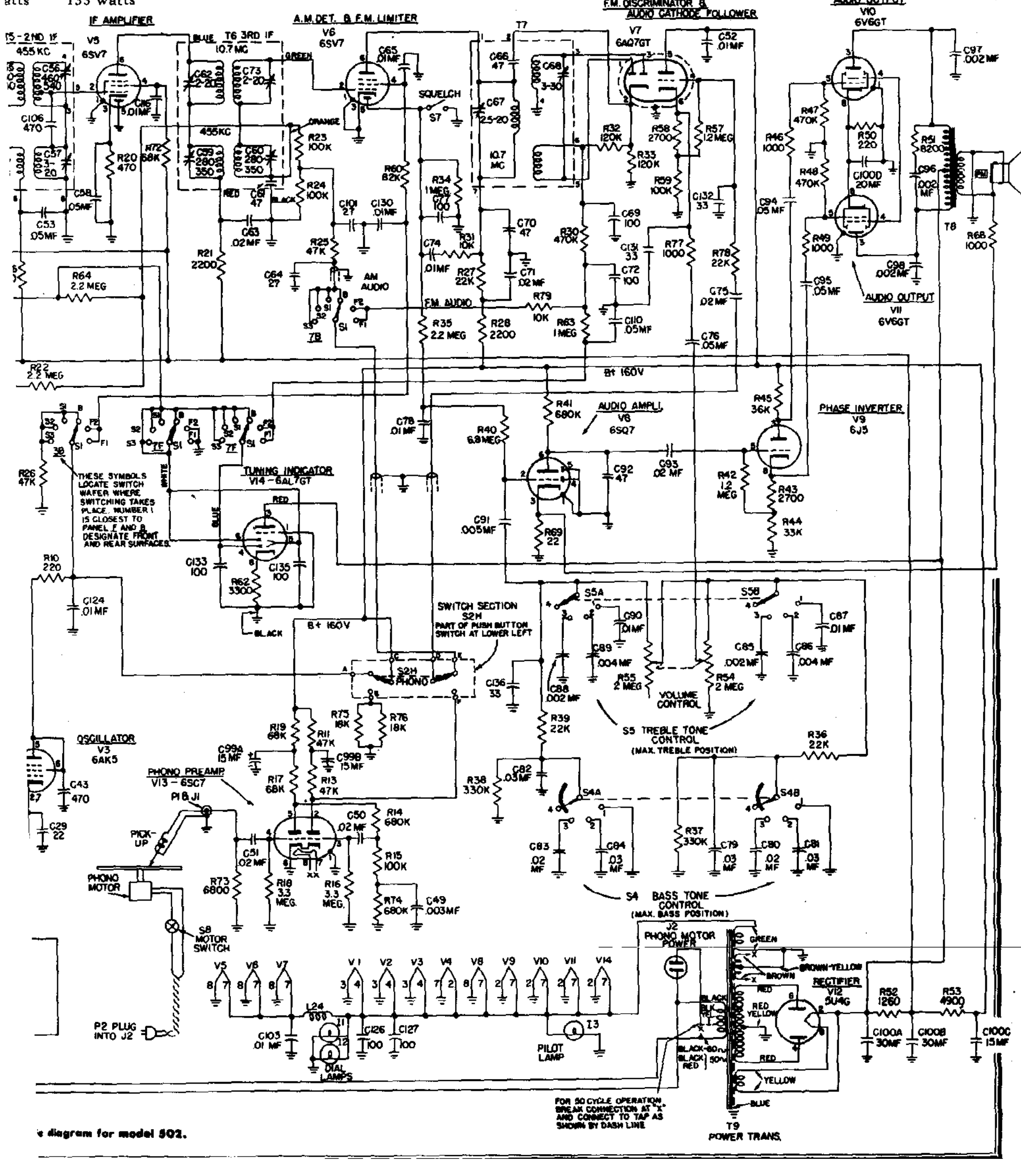
Fig. 8. Sche

LECTRIC CO. MODEL 502

A5	*Rating A6*
·125	105–125
cles	60 cycles
atts	110 watts
atts	135 watts

OPERATING FREQUENCIES:

Frequency Modulation 1	42–49 mc
Frequency Modulation 2	88–108 mc
Broadcast	540–1600 kc
Shortwave 1	9.4–9.8 mc
Shortwave 2	11.5–12.0 mc
Shortwave 3	14.8–15.5 mc
AM Intermediate Frequency	455 kc
FM Intermediate Frequency	10.7 mc



·e diagram for model 502.

MODEL 502 GENERAL ELECTRIC CO.

ALIGNMENT TABLE (Cont'd)

Step	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note	Remarks
				SW-RF ALIGNMENT (Cont'd)			
20	11.8 mc	Antenna thru 400 ohms	SW2	Do not change	Peak C40	5, 6, 8	Peak C40 while rocking dial.
21	11.8 mc	Antenna thru 400 ohms	SW2	Do not change	Peak C14	5, 6, 11	
22	9.6 mc	Antenna thru 400 ohms	SW1	9.6 mc—4.0 to 4.1 in.*	Peak C33	5, 6, 7, 10	Set dial accurately—then adjust C33.
23	9.6 mc	Antenna thru 400 ohms	SW1	Do not change	Peak C39	5, 6, 8	Peak C39 while rocking dial.
24	9.6 mc	Antenna thru 400 ohms	SW1	Do not change	Peak C13	5, 6, 11	
				BROADCAST RF ALIGNMENT			
25	1620 kc	Antenna thru 200 mmf	STD	Extreme right-hand position	Peak C23	5, 6	
26	1620 kc	Antenna thru 200 mmf	STD	Extreme right-hand position	Peak C17	5, 6	
27	1620 kc	Antenna thru 200 mmf	STD	Extreme right-hand position	Peak C10	5, 6, 11	
28	1500 kc	Antenna thru 200 mmf	STD	1500 kc—1.35 to 1.45 in.*	Osc. coil L11 iron slug	5, 6, 7, 9	L11 iron slug is the rear one on left side.
29	1000 kc	Antenna thru 200 mmf	STD	For max. output	R-F coil, T3 iron slug	5, 6, 9	T3 iron slug is the center one on left side.
30	1000 kc	Antenna thru 200 mmf	STD	Do not change	Ant. coil, T2 iron slug	5, 6, 9	T2 iron slug is the front one on left side.
31	580 kc	Antenna thru 200 mmf	STD	For max. output	Peak L16	5, 6, 8	Peak L16 while rocking dial.
32							Repeat steps 25-31.

* Important! See Note 7.

** Use insulated hex wrench, ¼".

Notes in Connection with Alignment Table

1. Use *unmodulated* signal.

2. Connect 20,000 ohms-per-volt meter from junction of R30 and C72 to chassis. Use ten volt scale (steps 4-6).

3. Connect 20,000 ohms-per-volt meter from grid (pin 2) of 6SV7 LIMITER to chassis with a 200,000-ohm resistor connected in series. The resistor must be connected directly to the grid so that capacity loading will be negligible and so that the meter is isolated from the i-f signal voltage. Keep signal generator output down so that the meter indicates not more than one volt at the grid (5 microamperes through 200,000 ohms) (alignment steps 7 to 15).

4. Connect signal generator directly to the converter grid at some convenient point. The generator lead must be shielded up to this connection so that not more than 1/16 inch of exposed lead exists. Ground the shield solidly by clamping it firmly to the chassis or a shield as close to the connection as possible. (Steps 1-3, 9.)

5. Use 400-cycle modulation.

6. Connect a standard output meter across the speaker voice coil. Turn volume control fully on. Keep signal generator output down so that the meter indicates not more than ½ watt output (2.0 volts) during alignment.

7. If dial scale is not available, index pointer as follows: Turn pointer to right-hand limit of travel. Mark the dial backplate at a reference edge of the pointer slider. Then set pointer by turning dial knob until the indicated dimension exists between the reference edge and the mark.

8. "Rocking" consists of adjusting the indicated adjuster while turning the dial a small amount back-and-forth through peak output. The object is to find the maximum peak. Rocking is necessary and is permissible only when interlocking circuits are being adjusted.

9. The main iron tuning slugs are suspended from the left side of the tuning "elevator." They are individually adjustable by loosening the locknut and turning the supporting screw into which the suspending wire is soldered.

10. *Two* oscillator settings may give response. The higher frequency response point is the correct one; the other is the image. If in doubt, start with the trimmer screw loosened completely and adjust for the *first* response.

11. Loop antenna must be plugged in when aligning antenna trimmers C9, C10, 13, and C14.

For trimmer locations see page 17-45

GENERAL ELECTRIC CO.

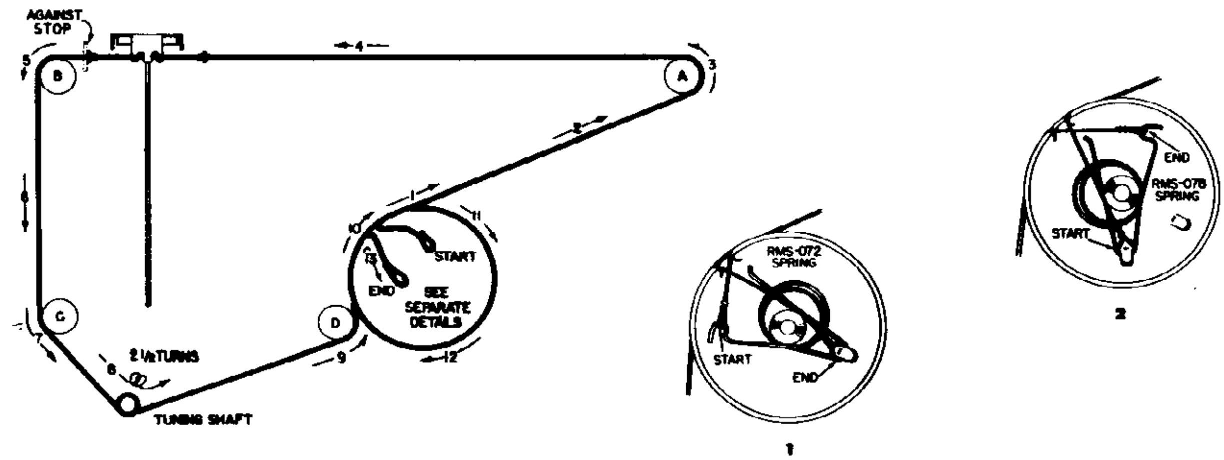


Fig. 1. Dial stringing diagram showing spring details at right.

POWER OUTPUT (117 volts line):

Undistorted . . . . 10 watts
Maximum . . . . 12 watts

LOUDSPEAKER:

Type . . . . Alnico PM
Size . . . . 12 inches
Voice Coil Impedance . . . . 8 ohms

ANTENNA INPUTS:

Broadcast and Shortwave . . . . Conventional antenna
FM . . . . 300-ohm input for folded dipole

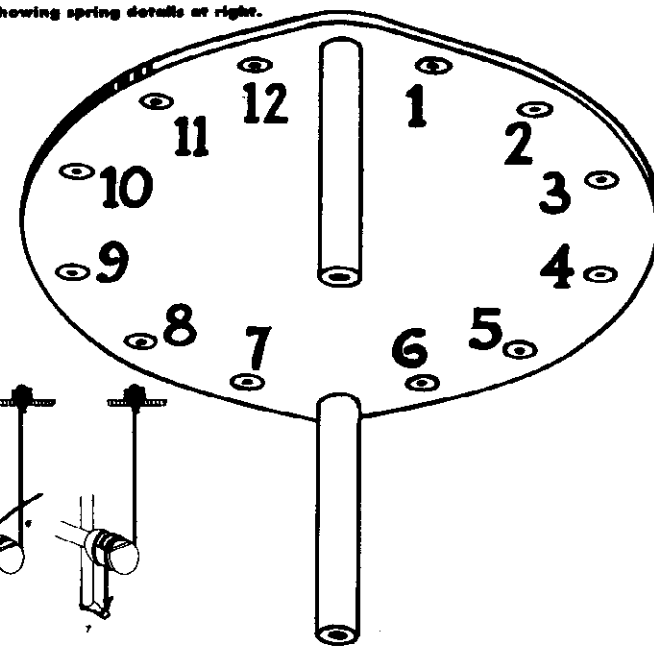


Fig. 3. Identification of switch lugs set inverted and viewed from panel.

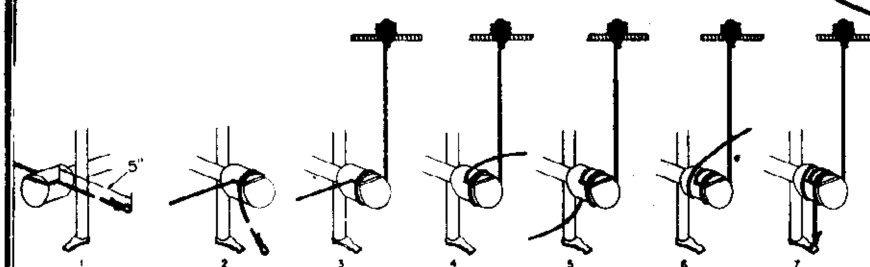


Fig. 2. Elevator windlass stringing procedure.

PHONOGRAPH PICK-UP:

Type . . . . Variable reluctance
D-c Resistance . . . . 250 ohms

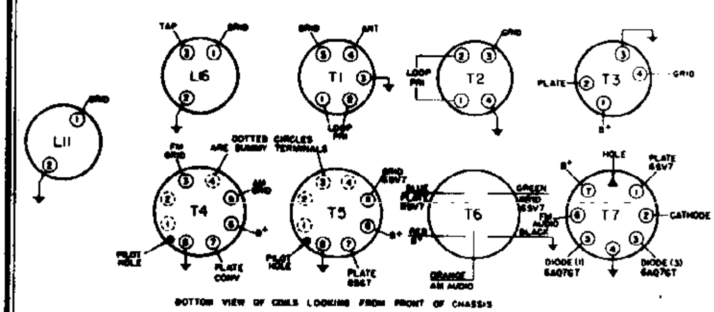


Fig. 4. Terminal identification of coil assemblies (Numbers correspond with schematic).

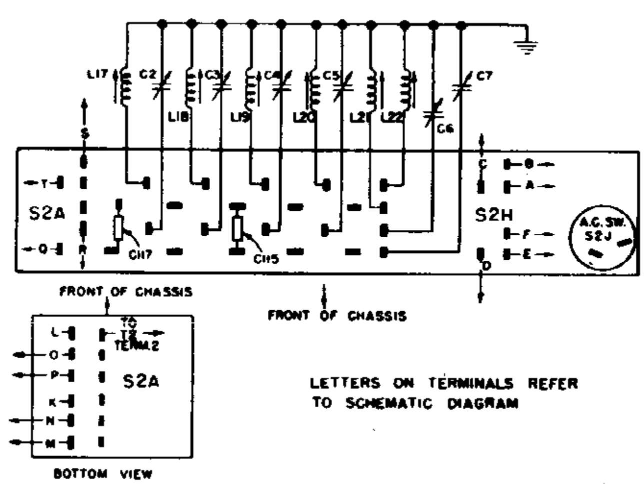


Fig. 7. Wiring of push-button switch.

MODEL 502

GENERAL ELECTRIC CO.

WIRING OF BAND SWITCH

Wire length given from end to end before stripping

SECTION 1

At this lug—	—connect this—	—the other end of which is connected to this—
1	Insulated green wire, 13¾" long	Antenna terminal at rear of chassis
2-3		
3		
4	Capacitor C8	Switch section 2, lug 11
5		
6	(Front lug) capacitor C30 (Rear lug) short copper strap	Chassis Trimmer C12, lug nearer T2
**7	a. C11 b. One side of 300-ohm transmission line	Tube socket V1, pin 2 Hot dipole terminal at rear of chassis
8		
9	a. Short bus with spaghetti, 1¾" long b. Short bus with spaghetti	Chassis Section 1, terminal 12
10	Insulated white wire, 5½" long	Dial switch S2-A terminal N
11	a. Insulated green wire, 3¾" long b. Insulated orange wire, 6" long c. Insulated green wire, 12¾" long	Antenna transformer T2, terminal 2 Push-button transformer T1, terminal 2 Loop socket J3, at rear of chassis, terminal 1
12	See lug 9 above	

SECTION 2

At this lug—	—connect this—	—the other end of which is connected to this—
1	Choke, L25	Ground on band switch shield
2	a. Insulated green wire, 3¼" long b. Capacitor, C1	Trimmer C10, lug nearer T2 Section 2, lug 12
3	Insulated green wire, 2¼" long	Trimmer C13, lug nearer T2
4	Insulated green wire, 2" long	Trimmer C14, lug nearer T2
5		
6	Short copper strap	Trimmer C15, lug nearer tube V1
7	Short copper strap	Tuner L2, terminal nearer rear of chassis
8	Capacitor C16	Tube socket V1, pin 1
9		
10	Insulated brown wire, 6" long	Dial switch S2-A, terminal O
**11	a. Insulated yellow wire, 12¾" long b. See section 1, lug 4	Loop socket J3 at rear of chassis, terminal 3
12	a. Insulated blue wire, 6½" long b. See lug 2, above	Dial switch S2-A, terminal M

SECTION 3

At this lug—	—connect this—	—the other end of which is connected to this—
1		
2	a. Choke, L6 b. Capacitor, C18 c. Insulated red wire, 3" long d. Insulated red wire, 5⅜" long	Switch section 3, lug 9 Ground on band switch shield RF transformer T3, terminal 1 Terminal strip 1, terminal 2
3	Insulated green wire, 2¼" long	RF transformer T3, terminal 2
4		
5		
6	Short bus with spaghetti, 1¾" long	Terminal strip 2, terminal 4
7	Insulated yellow wire, 16" long	Resistor R60 on terminal board on chassis rear apron
8	a. Resistor, R10 b. Capacitor, C124 c. Insulated blue wire, 8¼" long	Tube socket V3, pin 5 Ground lug on band switch shield Push-button switch S2H, terminal A
9	a. See lug 2 (a), above b. Capacitor, C26	Section 4, lug 11
10	Resistor, R26	Ground lug on terminal strip 2
11-12		

SECTION 4

At this lug—	—connect this—	—the other end of which is connected to this—
1	Copper strap with tubing, 3" long	Trimmer C123, lug nearer L7
2	Copper strap with tubing, 2½" long	Coil L8, terminal 2
3	Insulated brown wire, 7" long	Dial switch S2A, terminal Q
4	Insulated green wire, 2¼" long	Trimmer C39, lug nearer T3
5	Insulated green wire, 2" long	Trimmer C40, lug nearer T3
6	Short copper strap	Trimmer C37, lug nearer L7
7	Short copper strap	Tuner L7, rear terminal
8	Capacitor, C41	Tube socket, V2, pin 1
9	Bus with spaghetti, 2" long	Ground lug on terminal strip 2
10	Insulated white wire, 2½" long	Terminal strip 2, terminal 1
11	a. See section 3, lug 9 b. Copper strap with tubing, 3½" long	Coil L8, terminal 1
12		

SECTION 5

At this lug—	—connect this—	—the other end of which is connected to this—
1	a. Bus with spaghetti, 2" long b. Capacitor, C119	Section 5, lug 6 Section 6, lug 1
2	a. Insulated green wire, 2¾" long b. Insulated blue wire, 6½" long	Broadcast oscillator coil, L16, terminal 1 Dial switch S2A, terminal T
3	Insulated green wire, 2½" long	Trimmer C33, lug nearer L11
4	Insulated green wire, 2" long	Trimmer C34, lug nearer L11
5	a. Capctior, C114 b. Copper strap with tubing, 2" long	Trimmer C37, lug nearer T3 Trimmer C31, lug nearer L16
6	a. See lug 1 (a) above b. Capacitor, C128 c. Copper strap with tubing, 3¼" long	Trimmer C123, lug nearer tuner L7 Air trimmer C118, right-hand terminal*
7	Short copper strap	Tuner L9, left-hand terminal*
8	Resistor, R66	Capacitor, C35
9		
10	a. Short copper strap b. Copper strap with tubing, 3½" long	Section 6, lug 11 SW oscillator coil L10, terminal 2
11	a. Capacitor, C129 b. Copper strap with tubing, 3" long	Chassis ground SW oscillator coil L10, terminal 1
12		

*Looking from front, chassis inverted.
**Double lug (front and rear) soldered together.

SECTION 6

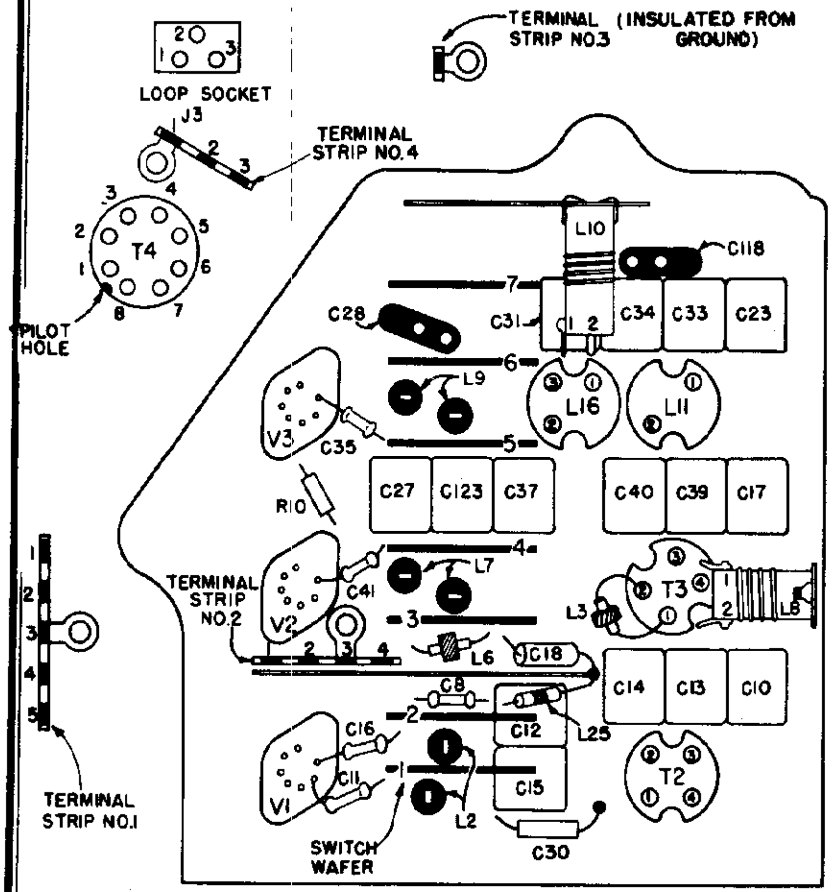
At this lug—	—connect this—	—the other end of which is connected to this—
1	a. See section 5, lug 1 b. Capacitor C120 c. Copper strap with tubing, 6" long	Tuner L9, right-hand terminal* Air trimmer C118, left-hand terminal*
2	Insulated black wire, 5¼" long	1st IF transformer T4, terminal 8
3	Insulated green wire, 2¼" long	Broadcast oscillator coil L16, terminal 3
4		
5		
6		
7	Short copper strap	Air trimmer C28, right-hand terminal*
8	Copper strap, 2" long	Tube socket V3, pin 7
9	Insulated orange wire, 3½" long	1st IF transformer T4, terminal 5
10	Insulated green wire, 4¼" long	1st IF transformer T4, terminal 3
11	See section 5, lug 10(a)	
12		

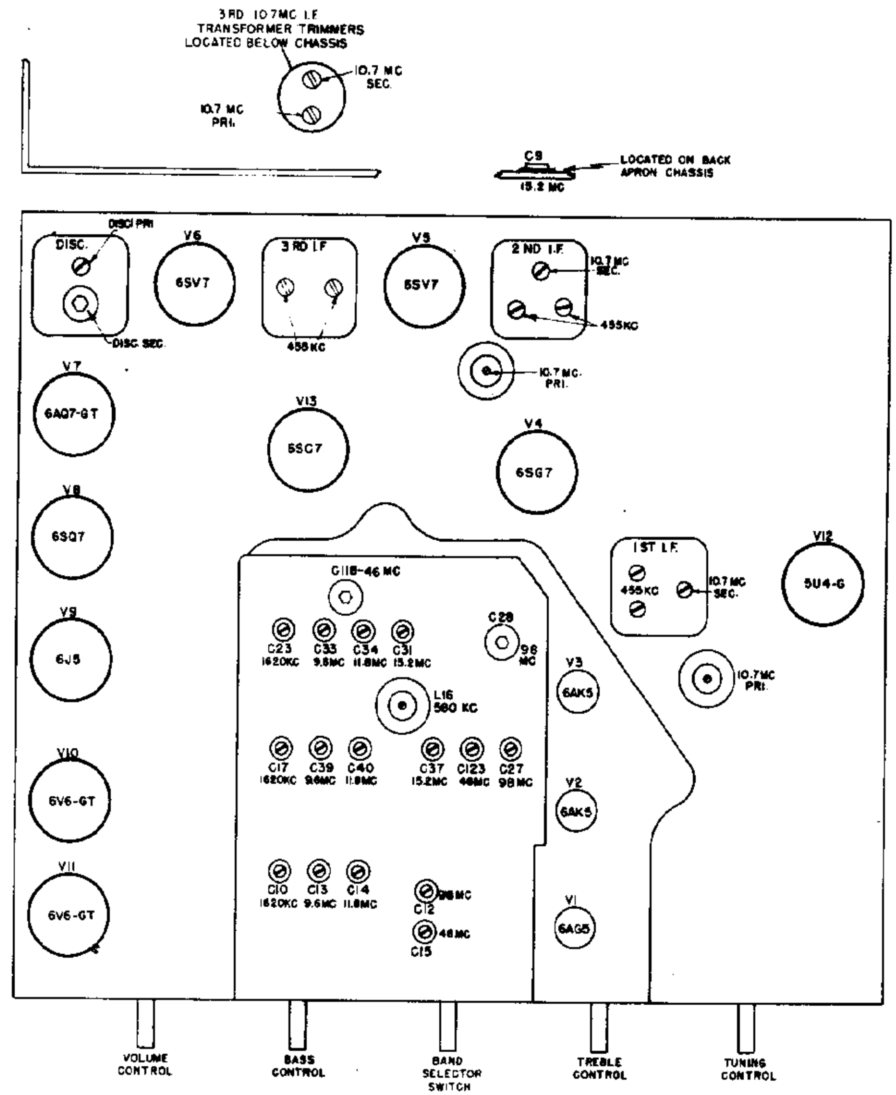
WIRING OF BAND SWITCH (CONT'D)

SECTION 7

At this lug—	—connect this—	—the other end of which is connected to this—
1		
2	Shielded blue wire, 8¼" long	Discriminator audio output at R79
3		
4	Insulated blue wire of tuning eye cable	Tuning eye tube socket V10, pin 4
5		
6	Insulated white wire, 5½" long	Terminal strip 3, terminal 3
7	Bus wire with spaghetti, 2" long	Trimmer C31, terminal nearer C118
8		
9		
10	Shielded green wire, 8¾" long	Phone switch S2H, terminal E
11	Insulated blue wire, 14" long	Resistor R63 on main chassis
12	Shielded green wire, 11¼" long	AM audio output at R25

*Looking from front, chassis inverted.
**Double lug (front and rear) soldered together.





STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed have a tolerance of ±20%. AM i-f measurements should be taken with low signal so that AVC is not effective. R-f measurements should be made by measuring the d-c voltage developed at the r-f tube grid (V1) or converter tube grid (V2) by rectification of the signal.

(1) R-F AND I-F STAGE GAINS

Signal applied through IRE dummy antenna:

Antenna post to V1 grid....................3 @ 1000 kc
Antenna post to V1 grid....................1.5 @ 9.6 mc
Antenna post to V1 grid....................1.3 @ 11.8 mc
Antenna post to V1 grid....................1.2 @ 15.2 mc

Signal applied through 300 ohms, including signal generator impedance:

Dipole terminals to V1 grid................1.5 @ 45 mc
Dipole terminals to V1 grid................1.0 @ 98 mc

These checks made with oscillator tube (V3) removed:

V1 grid to V2 grid........................10 @ 1000 kc
V1 grid to V2 grid........................6 @ 9.6 mc
V1 grid to V2 grid........................7 @ 11.8 mc
V1 grid to V2 grid........................11 @ 15.2 mc
V1 grid to V2 grid........................7 @ 45 mc
V1 grid to V2 grid........................6 @ 98 mc
V2 grid to V4 grid........................24 @ 455 kc
V2 grid to V4 grid........................30 @ 10.7 mc
V4 grid to V5 grid........................17 @ 455 kc
V4 grid to V5 grid........................56 @ 10.7 mc
V5 grid to V6 grid........................50 @ 455 kc
V5 grid to V6 grid........................20 @ 10.7 mc

(2) AUDIO GAIN

.12 volts at 400 cps to V7 grid with volume control set at maximum will give approximately ½ watt output across the speaker voice coil.

.10 volts at 400 cps at grid of V8 will give approximately ½ watt output across the speaker voice coil.

(3) OSCILLATOR GRID BIAS

D-c voltage developed across R9 (average):

12 v. @ 1000 kc........................6.5 @ 15.2 mc
2.8 v. @ 9.6 mc........................4.6 @ 45 mc
4.7 v. @ 11.8 mc.......................3.0 @ 98 mc

(4) SOCKET PIN VOLTAGES

Figure 6 shows typical tube pin voltages. All readings should be made from the pins to ground unless otherwise indicated.

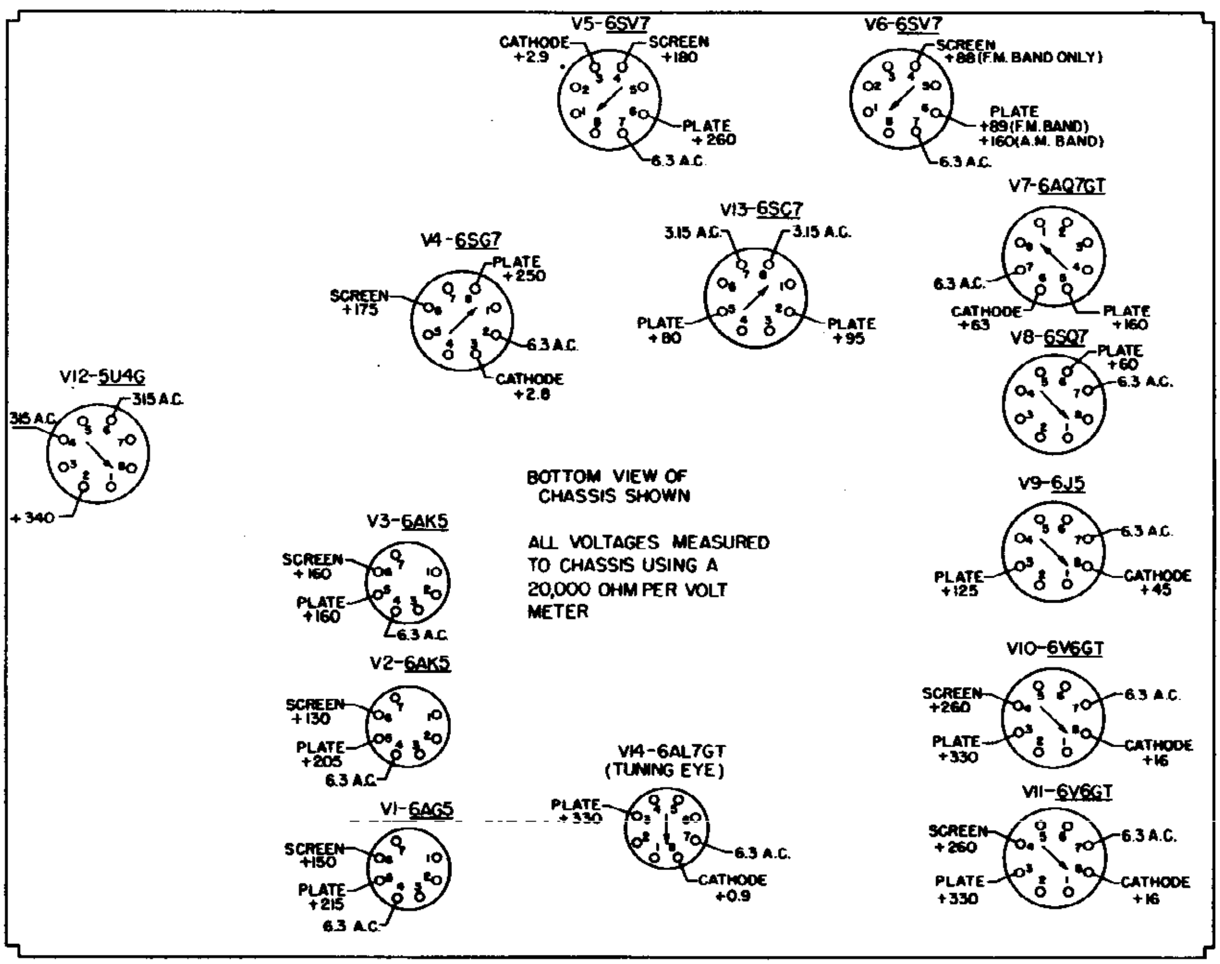
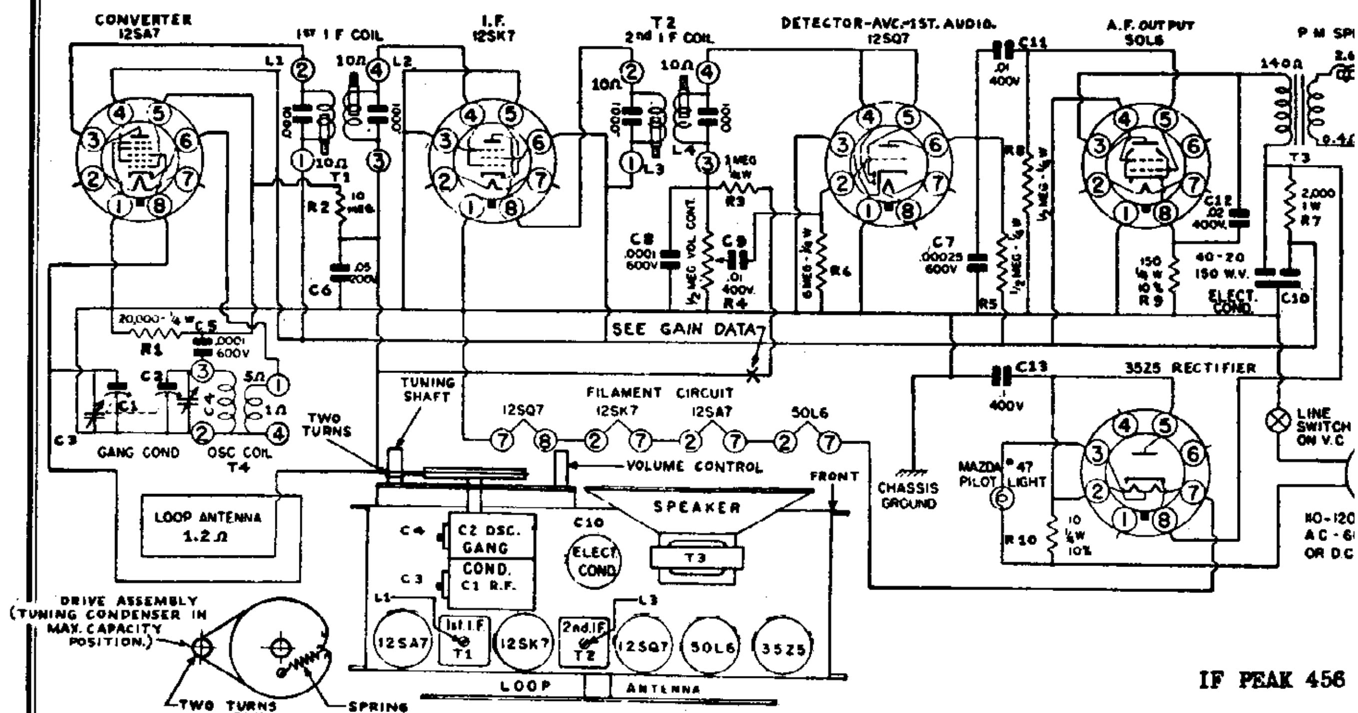


Fig. 6. Socket voltage diagram.

MODEL 502—REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION
		UNIVERSAL REPLACEMENT PARTS
UCC-036	C85, 88	CAPACITOR—.002 mfd., 600 v., paper
UCC-037	C49	CAPACITOR .003 mfd., 600 v., paper
UCC-039	C91	CAPACITOR—.005 mfd., 600 v., paper
UCC-040	C52, 65, 74, 78, 87, 90, 103, 116, 124	CAPACITOR—.01 mfd., 600 v., paper
UCC-041	C18, 50, 51, 63, 71, 75, 80, 83, 93, 108, 109	CAPACITOR—.02 mfd., 600 v., paper
UCC-042	C79, 81, 82, 84	CAPACITOR .03 mfd., 600 v., paper
UCC-045	C48, 53, 76, 105, 107, 110, 58, 19, 42	CAPACITOR—.05 mfd., 600 v., paper
UCG-3034	C129	CAPACITOR—180 mmf., mica
UCN-502	C20	CAPACITOR—1.5 mmf., ceramic
UCN-505	C114	CAPACITOR—4.7 mmf., ceramic
UCN-506	C1, 8	CAPACITOR—6.8 mmf., ceramic
UCN-1550	C21	CAPACITOR—820 mmf., ceramic
UCU-020	C92	CAPACITOR 47 mmf., mica
UCU-028	C77, 102	CAPACITOR—100 mmf., mica
UCU-516	C131, 132, 136	CAPACITOR—33 mmf., mica
UCU-520	C26, 70	CAPACITOR 47 mmf., mica
UCU-528	C72	CAPACITOR 100 mmf., mica
UCU-536	C25	CAPACITOR 220 mmf., mica
UCU-544	C43, 125	CAPACITOR—470 mmf., mica
UCU-1014	C64, 101	CAPACITOR—27 mmf., mica
UCU-1504	C113, 115	CAPACITOR 10 mmf., mica
UCU-1512	C112	CAPACITOR 22 mmf., mica
UCU-1532	C134	CAPACITOR—150 mmf., mica
UCW-012	C24	CAPACITOR—22 mmf., ceramic
UCW-1004	C119, 128	CAPACITOR—10 mmf., ceramic
UCW-1014	C44, 54	CAPACITOR—27 mmf., ceramic
UCW-1024	C120	CAPACITOR—68 mmf., ceramic
UCW-1028	C69	CAPACITOR—100 mmf., ceramic
UCW-1504	C117	CAPACITOR—3.3 mmf., ceramic
UDL-005	I1, 2	PILOT LIGHT—Mazda No. 44
UDL-008	I3	BEZEL LIGHT—Mazda No. 47
UOP-1230		SPEAKER—12-inch speaker
URD-009	R69	RESISTOR—22 ohms, ½ w., carbon
URD-013	R66	RESISTOR—33 ohms, ½ w., carbon
URD-033	R10, 61	RESISTOR—220 ohms, ½ w., carbon
URD-041	R20	RESISTOR—470 ohms, ½ w., carbon
URD-049	R46, 49, 68, 71, 77	RESISTOR—1000 ohms, ½ w., carbon
URD-057	R21, 28, 56	RESISTOR—2200 ohms, ½ w., carbon
URD-059	R43, 58	RESISTOR—2700 ohms, ½ w., carbon
URD-061	R62	RESISTOR 3300 ohms, ½ w., carbon
URD-069	R73	RESISTOR—6800 ohms, ½ w., carbon
URD-073	R31, 79	RESISTOR—10,000 ohms, ½ w., carbon
URD-077	R65	RESISTOR—15,000 ohms, ½ w., carbon
URD-081	R9, 27, 36, 39, 78	RESISTOR—22,000 ohms, ½ w., carbon
URD-085	R44, 67	RESISTOR—33,000 ohms, ½ w., carbon
URD-089	R11, 13, 25	RESISTOR—47,000 ohms, ½ w., carbon
URD-093	R17, 19, 72	RESISTOR—68,000 ohms, ½ w., carbon
URD-095	R60	RESISTOR 82,000 ohms, ½ w., carbon
URD-097	R3, 7, 15, 23, 24, 59	RESISTOR—100,000 ohms, ½ w., carbon
URD-099	R32, 33	RESISTOR—120,000 ohms, ½ w., carbon
URD-103	R8	RESISTOR—180,000 ohms, ½ w., carbon
URD-109	R37, 38	RESISTOR—330,000 ohms, ½ w., carbon
URD-113	R30, 47, 48	RESISTOR—470,000 ohms, ½ w., carbon
URD-117	R14, 41, 74	RESISTOR 680,000 ohms, ½ w., carbon
URD-121	R1, 34, 63	RESISTOR—1 meg., ½ w., carbon
URD-123	R42, 57	RESISTOR—1.2 meg., ½ w., carbon
URD-125	R2, 6, 70	RESISTOR 1.5 meg., ½ w., carbon
URD-129	R22, 35, 64	RESISTOR—2.2 meg., ½ w., carbon
URD-133	R16, 18, 80	RESISTOR—3.3 meg., ½ w., carbon
URD-141	R40	RESISTOR—6.8 meg., ½ w., carbon
URD-1086	R45	RESISTOR 36,000 ohms, ½ w., carbon
URE 071	R51	RESISTOR—8200 ohms, 1 w., carbon
URE-073	R4	RESISTOR—10,000 ohms, 1 w., carbon
URE-089	R26	RESISTOR—47,000 ohms, 1 w., carbon
URF-035	R50	RESISTOR—220 ohms, 2 w., carbon
URF-079	R75, 76	RESISTOR 18,000 ohms, 2 w., carbon
RAB-024	L1	BACK Cabinet back assembly, 50 cycle
RAB-025	L1	BACK—Cabinet back assembly, 60 cycle
RAD-018		BRACKET Band switch front
RAD-019		BRACKET Band switch rear
RAD-020		BRACKET For coil on rear bracket of band switch
RAL-001		BEZEL—Pilot light bezel
RAX-014		BRACKET AND ROLLER—Fork assembly for tuning hoist
RCC-038	C86, 89	CAPACITOR—.004 mfd., 600 v., paper
RCC-044	C22	CAPACITOR—680 mmf., mica
RCC-045	C94, 95	CAPACITOR—.05 mfd., 600 v., paper
RCC-056	C96, 97, 98	CAPACITOR—.002 mfd., 1000 v., paper
RCE-002	C99A, B	CAPACITOR—15 mfd., dual electrolytic
RCE-014	C100A, B, C, D	CAPACITOR—Electrolytic
RCW-001	C35	CAPACITOR—47 mmf., ceramic
RCW-024	C29	CAPACITOR—22 mmf., ceramic
RCW-025	C121, 122	CAPACITOR—4.7 mmf., ceramic
RCW-1028	C16, 30, 41, 126, 127, 133, 135	CAPACITOR—22 mmf., ceramic

CAT. NO.	SYMBOL	DESCRIPTION
		UNIVERSAL REPLACEMENT PARTS
RCX-012	C2, 3, 4, 5, 6, 7	TRIMMER STRIP—Push button
RCX-021		TRIMMER STRIP AND COIL ASSEMBLY—Push button
RCX-024	C12, 15	TRIMMER STRIP ASSEMBLY—3-30 mmf., 80-130 mmf., trimmer capacitor
RCX-025	C23, 31, 33, 34	TRIMMER STRIP 185-245 mmf., 20-55 mmf., 320 400 mmf., 165-225 mmf., trimmer capacitor
RCX-026	C17, 39, 40	TRIMMER STRIP—20-55 mmf., 475-575 mmf., 320-400 mmf., trimmer capacitor
RCX-027	C27, 37, 123	TRIMMER STRIP—2-20 mmf., 185-245 mmf., 34-70 mmf., trimmer capacitor
RCX-028	C10, 13, 14	TRIMMER STRIP—34-70 mmf., 40-80 mmf., 5-45 mmf., trimmer capacitor
RCY-011	C9	CAPACITOR—3-30 trimmer
RCY-017	C28, 118	TRIMMER STRIP 3-30 mmf., 3-30 mmf., trimmer capacitor
RDB-008		PUSH BUTTON—Mahogany
RDC-025		DRIVE CORD ASSEMBLY
RDF-003		WASHER—Felt for control knobs
RDK-036		KNOB—Mahogany (plain)
RDK-039		KNOB—Mahogany (arrow)
RDP-026		POINTER—Assembly
RDS 021		SCALE—Dial scale
RDS-028		SCALE ASSEMBLY—Dial
RDX-019	S2	SWITCH ASSEMBLY—Push button
REI-006		IRON CORE AM tuning
RHE-001		EYELET—For connecting FM links
RHM-024		LINK—Hoist link, holding end of hoist cord
RHN-004		NUT—Hex nut for tuning vane adjustment
RJP-004	P1	PLUG—Phono, male
RJP-006		PLUG—Three-prong loop plug
RJP-007	J2	RECEPTACLE—110 v.
RJP-008		SOCKET—Tuning eye
RJS-012		MOUNTING PLATE For C99
RJS-034		SOCKET—Pilot light
RJS-037		MOUNTING PLATE—For C100
RJS-044		TUBE SOCKET—For V1, V2, and V3
RJS-051		SOCKET—Three prong at rear of chassis
RJS-053		SOCKET—Tube for V13
RJS-054		SOCKET—Tube
RJS-065		SOCKET—Dial light socket and leads
RJX-003	J1	JACK—Phono
RLA-006	T1	TRANSFORMER—B.C.P.B. antenna
RLA-009	T2	TRANSFORMER B.C. antenna transformer
RLA-012	L26, 28	CHOKE—FM antenna choke, FM oscillator cathode choke
RLA-025	L17, 18, 19	COILS—Push-button oscillator tuning coils
RLA-026	L20, 21, 22	COILS—Push-button oscillator tuning coils
RLB-006	T3	COIL—Broadcast band r-f coil
RLB-008	L6	COIL—SW band r-f plate choke coil
RLB-009	L3	COIL—Broadcast r-f primary dummy
RLC-014	L11	COIL—Broadcast band oscillator shunt tuning coil
RLC-015	L10	COIL—SW oscillator coil
RLC-016	L16	COIL—Broadcast band oscillator coil
RLC-017	L8	COIL—SW r-f coil
RLF-007	L24	COIL—I-f filament choke
RLI-002	L23	COIL—FM power line choke
RLI-005	L12	COIL—FM oscillator cathode choke
RLI-018	L25	COIL—SW loop shunt coil
RLP-005	L14, 15	COIL—I-f plate choke
RLP-008	L5, 13	COIL—FM r-f plate choke and i-f wavetrap inductance
RMM-010		VANE—Tuner vane for coils L2 and L7
RMM-011		VANE—Tuner vane for oscillator coil L9
RMN-016		PULLEY—Drive pulley
RMR-002		ROLLER—Presses against hoist shaft
RMS-040		SPRING—Flat spring against hoist pulley shaft
RMS-041		SPRING—Wire spring against hoist pulley shaft
RMS-042		SPRING—Hoist cord tension spring
RMS-043		SCREW—Iron core adjusting screw
RMS-044		SPRING—Guide wire connecting tuning vanes to adjustment screws
RMS-076		SCREW—For tuning vane adjustment
RMS-078		SPRING Type 2 dial cord spring
RMW-013		FLYWHEEL—Less setscrew
RMW-018		PULLEY—Hoist pulley
RMX-019		PULLEY—Hoist pulley and shaft
RMX-021		TUNER—Top plate and shaft assembly
RPX-010		PHONO PICK-UP—Less tone arm
RRC-019	R54, 55	VOLUME CONTROL—2 meg., dual
RRW-004	R52, 53	RESISTOR—Wirewound
RSS-003	S7	SWITCH—Squelch switch
RSW-016	S5	SWITCH—Treble wafer switch
RSW-017	S4	SWITCH—Bass wafer switch
RTD-001	T7	TRANSFORMER—FM discriminator transformer
RTL-017	T4	TRANSFORMER—1st i-f transformer
RTL-019	T6	TRANSFORMER—3rd i-f transformer
RTL-022	T5	TRANSFORMER—2nd i-f transformer
RTO-014	T8	TRANSFORMER Output transformer
RTP-023	T9	TRANSFORMER Power transformer, 60 cycle
RTP-032	T10	TRANSFORMER—Power transformer, 50 cycle
RWL-004		CORD AND PLUG—For 117 v. a-c to main chassis
RYC-002		MANUAL LIST
RYC-006		TAB—Push-button key tab (phono)
RYC-007		STATION CALL LETTERS—For push-button keys
RYC-008		TAB—Push-button key tab (OFF)



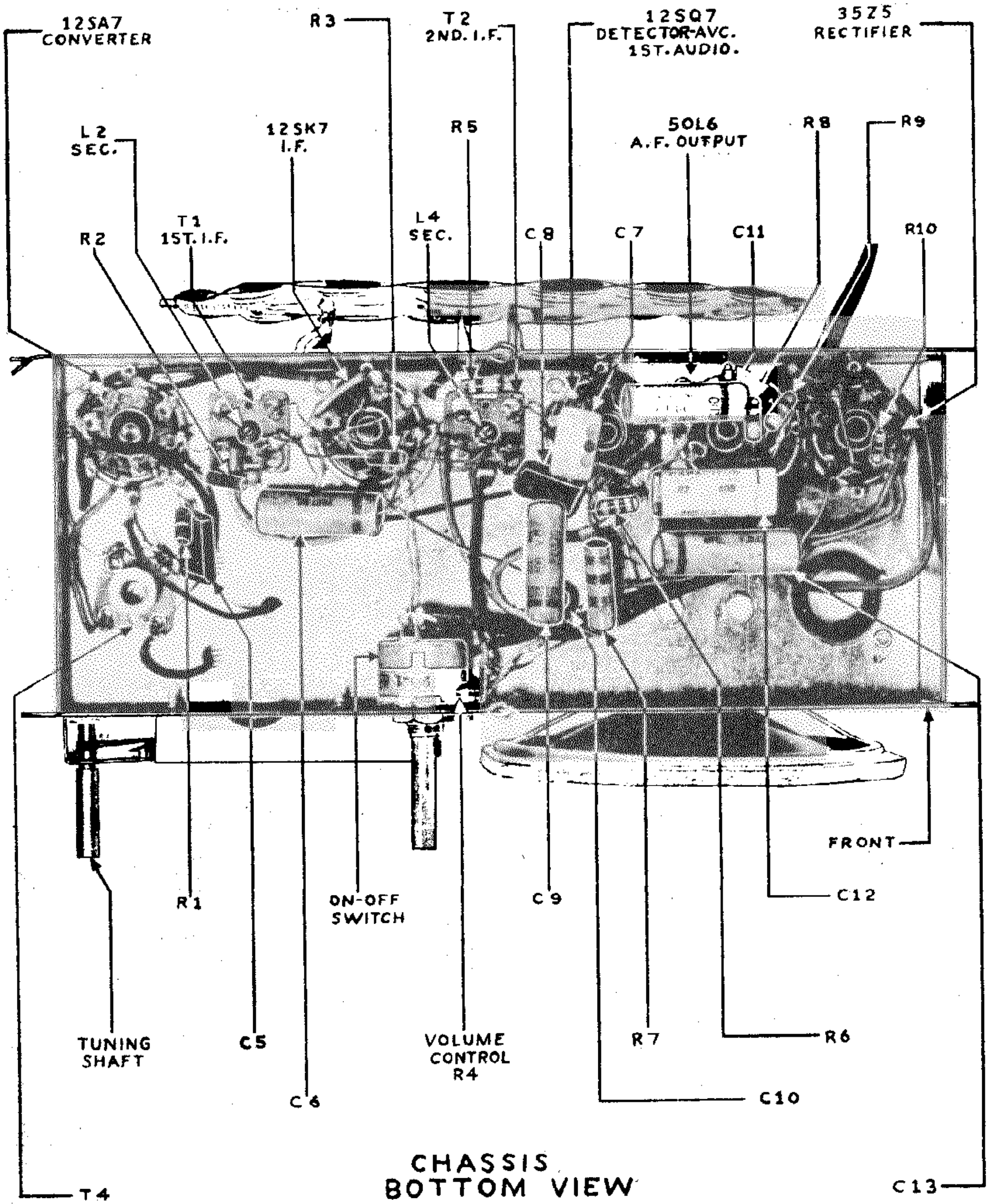
IF PEAK 456

ALIGNMENT

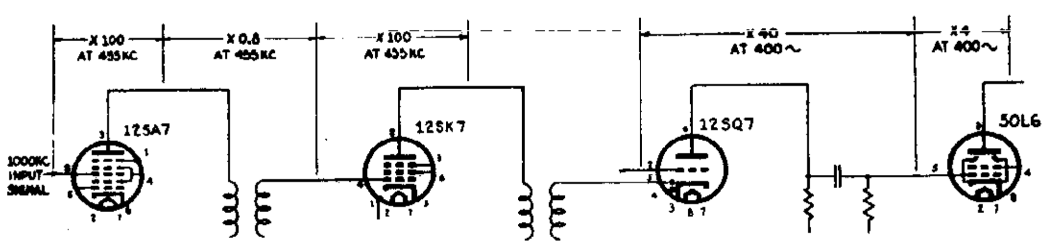
The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine Loop Model 1150 and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc and adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L3, L2, L1. Set the generator and receiver to 1600 Kc and adjust the oscillator trimme C4 for maximum output. Set the generator and receiver to 1400 Kc and adjust the loop trimmer C3 for maximum output.

			D-C VOLTAGE		RESISTANCE
TUBE	PIN	VTVM	20,000 OHMS PER VOLT	1000 OHMS PER VOLT	
12SA7	1	0	0	0	0
	2	0	0	0	.26
	3	+80	+80	+80	5,000,000
	4	+80	+80	+80	5,000,000
	5	-6	-5.6	-2.6	19,000
	6	0	0	0	0
	7	0	0	0	40
	8	-1	-0.4	-0.4	5,000,000
12SK7	1	0	0	0	0
	2	0	0	0	16
	3	0	0	0	0
	4	-1	-0.4	-0.4	5,000,000
	5	0	0	0	0
	6	+80	+80	+78	5,000,000
	7	0	0	0	26
	8	+80	+80	+78	5,000,000
12SQ7	1	0	0	0	0
	2	-1.2	-0.8	-0.5	10,000,000
	3	0	0	0	0
	4	-1	-0.45	-0.4	5,000,000
	5	-0.7	-0.5	-0.2	500,000
	6	+54	+48	+42	5,000,000
	7	0	0	0	16
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+125	+120	+120	5,000,000
	4	+80	+80	+80	5,000,000
	5	0	0	0	450,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+5.2	+5	+5	140
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	8	130	125	125	5,000,000

GENERAL IMPLEMENT CORP.



CHASSIS
BOTTOM VIEW

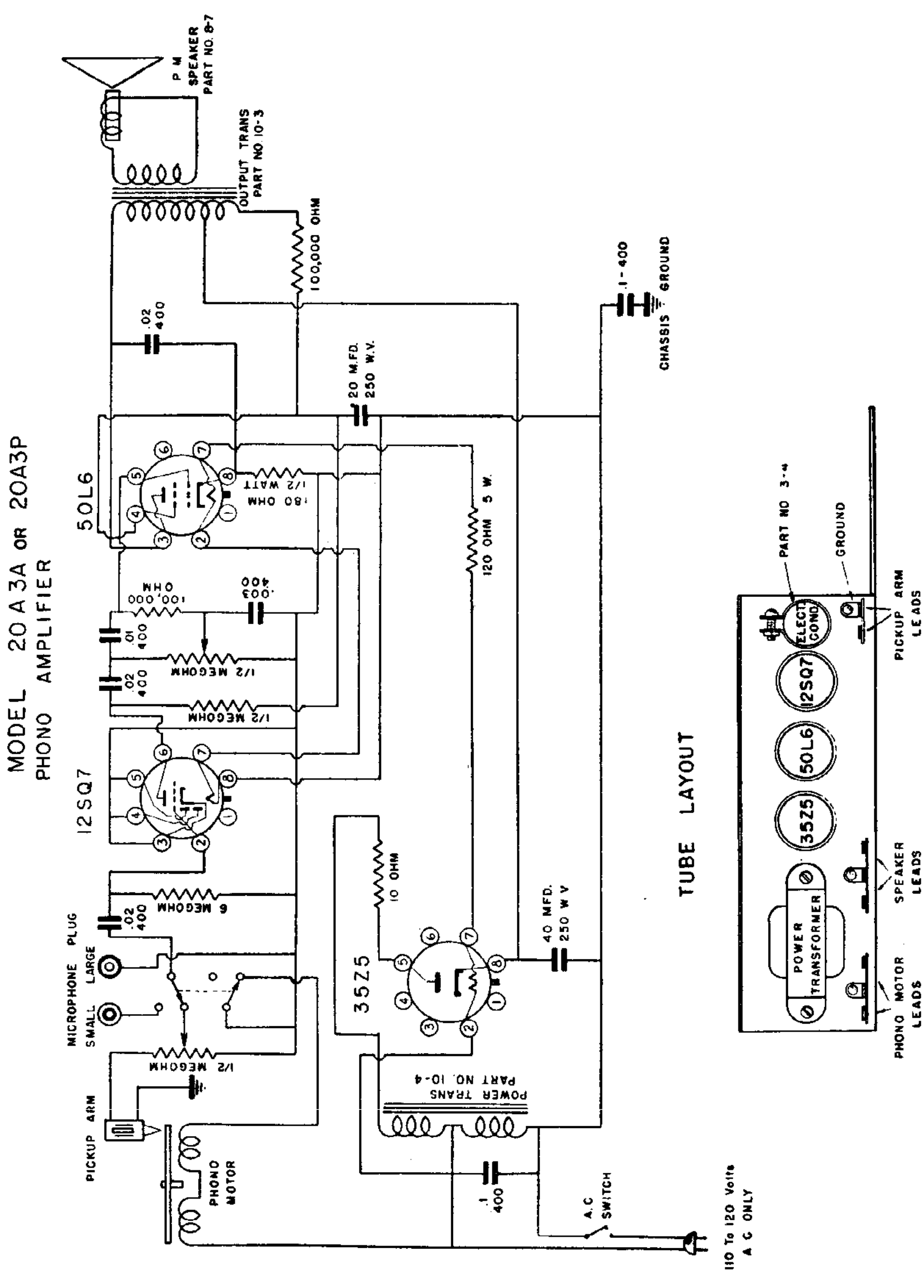


APPROXIMATE
GAIN PER STAGE
DATA

IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND.

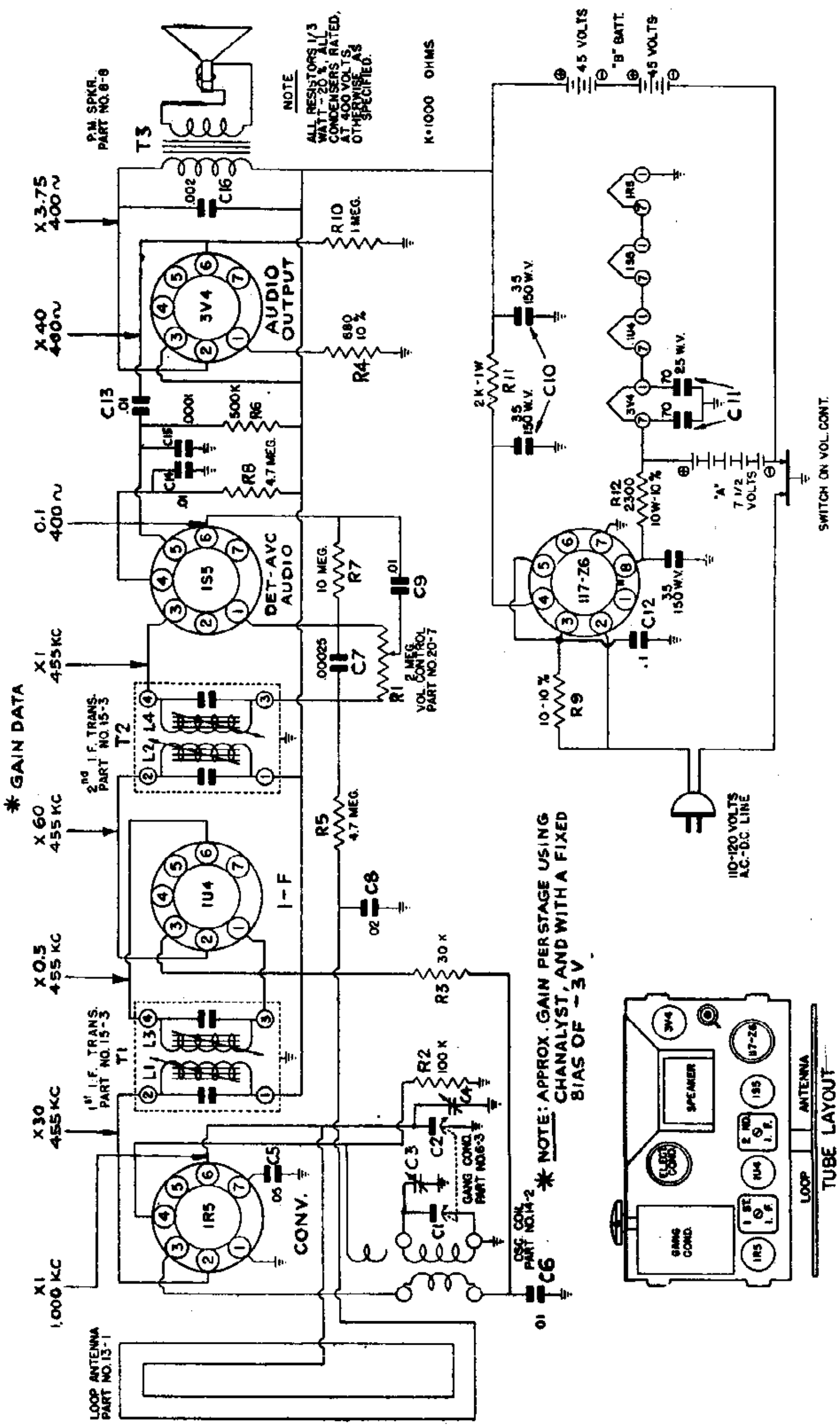
GENERAL TELEV. & RADIO CORP.

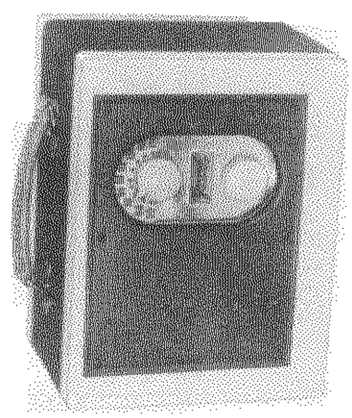
MODELS 20A3
20A3P

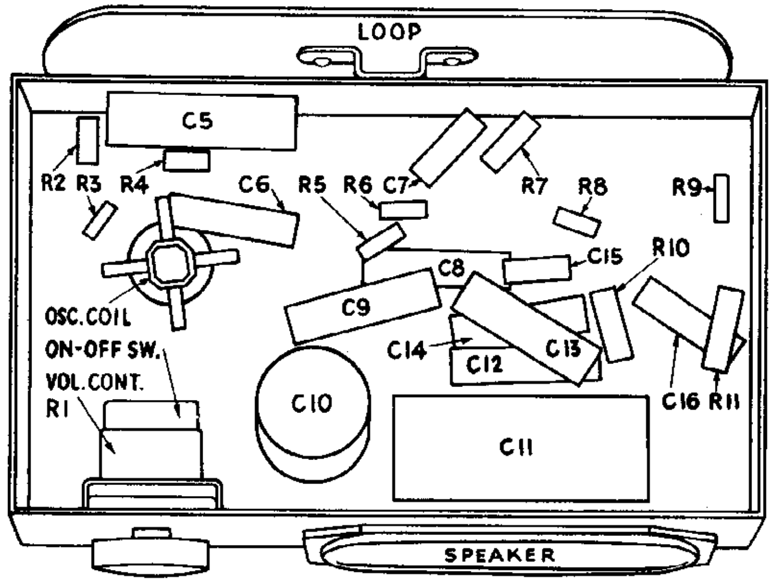


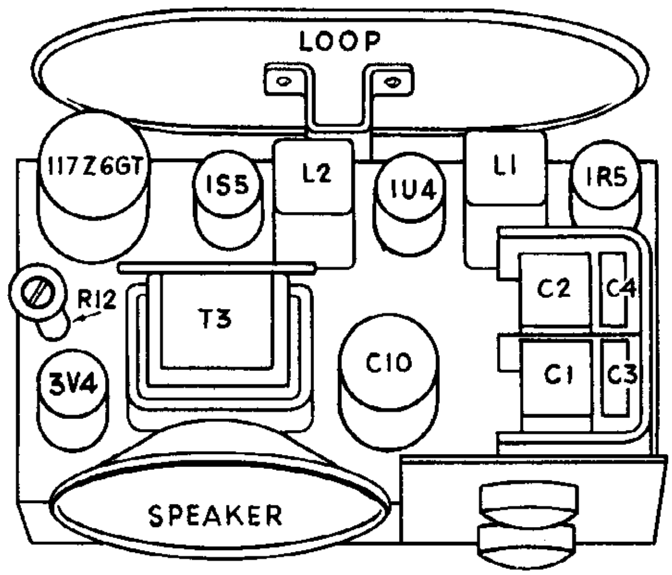
RECORD CHANGER: Seeburg Model K, RCD. CH. 1

MODEL 26B5 GENERAL TELEV. AND RADIO CORP.









ALIGNMENT

The chassis is removed from the cabinet in order to align this receiver.

Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine loop, Model 1150, and couple loosely to the receiver loop. Set the receiver volume control to maximum. The tuning condenser plate should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should be sufficient t give a readable deflection on the output meter.

Set the signal generator to 455 kc. Adjust the I.F. tuning slugs, L4, L3, L2, L1, for maximum output on the output meter. Set the signal generator and receiver to 1600 kc and adjust the oscillator trimmer C4 for maximum output. Set the signal generator and receiver to 1400 kc and adjust R.F. trimmer C3 for maximum output.

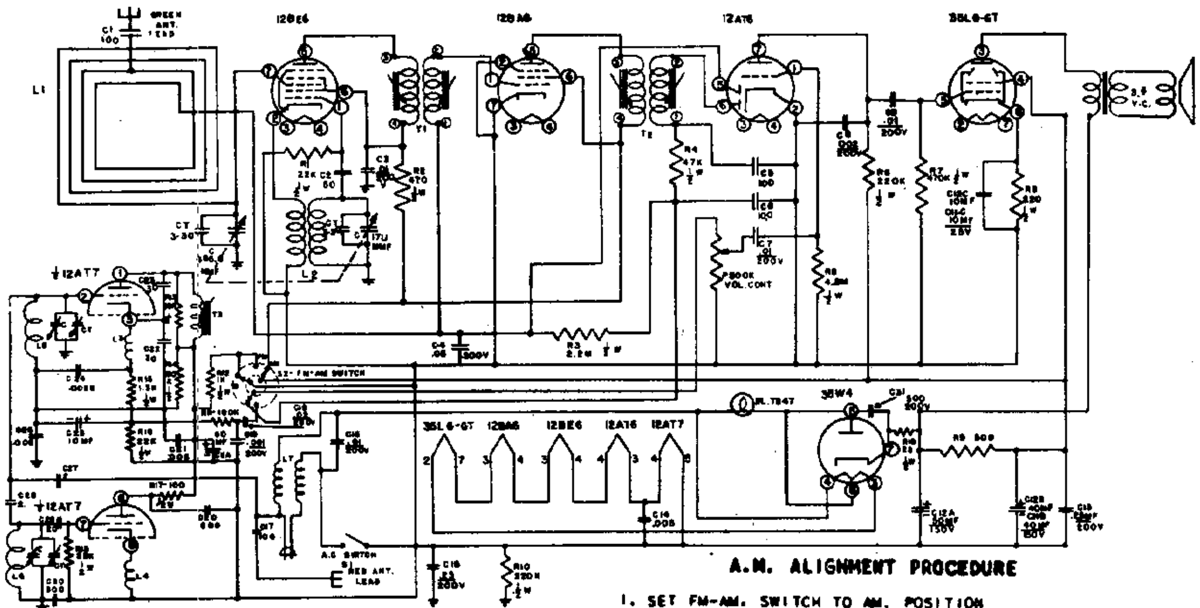
MODEL 26B5

GENERAL TELEV. AND RADIO CORP.

GENERAL TELEVISION MODEL 26B5

TUBE	PIN	VTVM	20,000 P.V.	1,000 P.V.	RESISTANCE
IR5	1	0	0	0	0
Conv	2	105	105	105	Over 5 megs
	3	44	44	42	Over 5 megs
	4	-5	-2.6	0	100 K
	5	0	0	0	0
	6	0	0	0	5.5 megs
	7	1.7	1.7	1.7	12 Ω
IU4					
I.F. Ampl	1	3.3	3.3	3.3	22 Ω
	2	105	105	105	Over 5 megs
	3	105	105	105	Over 5 megs
	4	0.6	0.1	0	5.5 megs
	5	3.6	3.6	3.6	22 Ω
	6	3.3	3.3	3.3	34 Ω
	7	5	5	5	34 Ω
IS5	1	1.7	1.7	1.7	12 Ω
Det. AVC	2	0	0	0	0
Audio Amp	3	1.2	0.2	0	1.7 megs
	4	23	20	3	5.5 megs
	5	46	42	12	Over 5 megs
	6	1.1	0	0	8 megs
	7	3.3	3.3	3.3	22 Ω
3V4	1	5	5	5	32 Ω
Audio	2	100	100	100	Over 5 megs
Output	3	105	105	105	Over 5 megs
	4	105	105	105	Over 5 megs
	5	-	-	-	-
	6	0	0	0	1 meg
	7	8	8	8	52 Ω
117Z6	1	0	0	0	0
Rect	2	AC	AC	AC	235 Ω
	3	AC	AC	AC	240 Ω
	4	135	135	135	Over 5 megs
	5	AC	AC	AC	240 Ω
	6	105	105	105	Over 5 megs
	7	0	0	0	0
	8	120	120	120	Over 5 megs

All values are positive unless indicated otherwise.

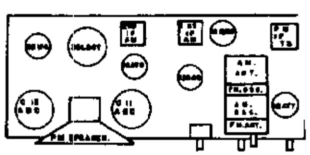


FM. ALIGNMENT PROCEDURE

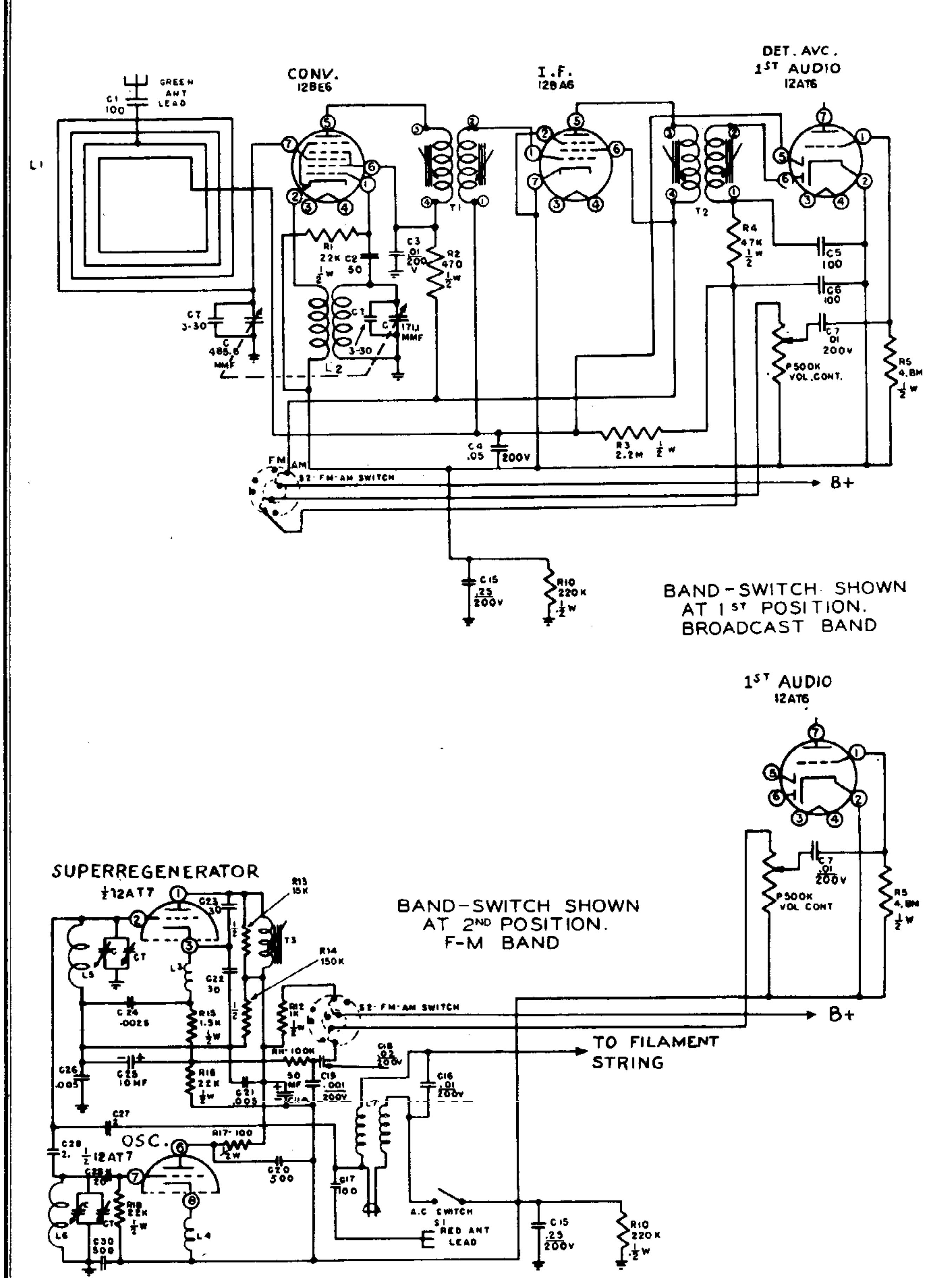
1. SET FM-AM SWITCH TO FM POSITION.
2. SET CONDENSER GANG TO FULL OPEN
3. ADJUST DIAL POINTER TO DASH MARK UNDER 1600 KC.
4. CONNECT SIGNAL GENERATOR OUTPUT LEAD TO RED ANTENNA LEAD AND TO TEMPORARY CHASSIS GROUND (THRU .01 ISOLATING CONDENSER
5. SET SIGNAL GENERATOR TO 21.75 MC. WITH AM. MODULATION. ADJUST T5 FOR MAXIMUM RESPONSE INDICATED BY OUTPUT METER CONNECTED TO SPEAKER VOICE COIL.
6. THE MAJOR REASON FOR RF. ADJUSTMENT SHOULD BE TO COMPENSATE FOR THE DIFFERENCE IN TUBE CAPACITIES WHEN REPLACING TUBES. THIS CAN BE DONE WITH AN AM. SIGNAL GENERATOR WHICH COVERS THE FM. BAND. SET SIGNAL GENERATOR AND RECEIVER DIAL TO 108 MC. WITHOUT MODULATION. ADJUST BOTH FM. OSCILATOR AND FM. ANTENNA TRIMMERS FOR MAXIMUM QUIETING AS INDICATED ON THE OUTPUT METER. EXPECT SOME "PULL-IN" BETWEEN THE TWO TRIMMERS. ROCK EITHER THE SIGNAL GENERATOR OR RECEIVER TUNING TO DETERMINE MAXIMUM QUIETING AND CORRECT DIAL CALIBRATION. TRACKING ACROSS THE BAND IS ADEQUATE IF NOT GREATER THAN A 2-1 INPUT CHANGE AT THE SIGNAL GENERATOR PRODUCES THE SAME DEGREE OF QUIETING. IF ALIGNMENT AT THE LOW FREQUENCY END OF THE BAND IS REQUIRED, BEND ANTENNA OR OSCILLATOR COILS SLIGHTLY AND CHECK FOR IMPROVED QUIETING AND DIAL CALIBRATION. REPEAT ABOVE ALIGNMENT AT 108 MC. PROPER SUPER-REGENERATION TUNING SHOWS TWO PEAKS, ONE ON EACH SIDE OF THE CREST OF THE SELECTIVITY CURVE. THIS IS WHY ALIGNMENT SHOULD BE DONE AGAINST MAXIMUM QUIETING RATHER THAN WITH MAXIMUM SIGNAL FROM A MODULATED SOUND.
7. INSTALL CHASSIS IN CABINET PER (8) FOR AM. ALIGNMENT.

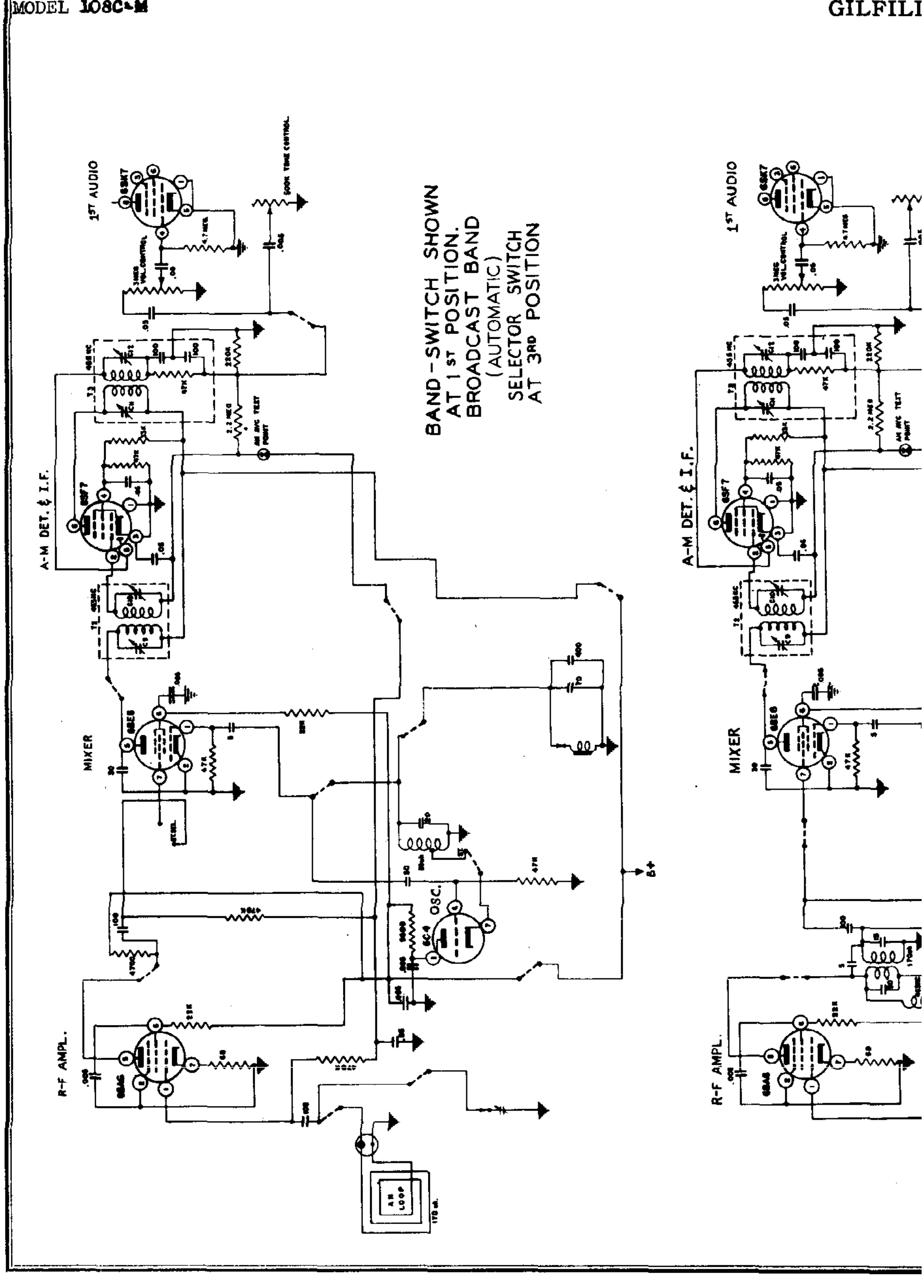
A.M. ALIGNMENT PROCEDURE

1. SET FM-AM. SWITCH TO AM. POSITION
2. SET CONDENSER GANG TO FULL OPEN.
3. ADJUST DIAL POINTER TO DASH MARK UNDER 1600 KC.
4. SPACE LOOP 1½ INCHES FROM CHASSIS.
5. CONNECT SIGNAL GENERATOR OUTPUT LEAD TO GREEN ANTENNA CONNECTION ON LOOP IN SERIES WITH .00005 (50 MMF.) CONDENSER.
6. SET SIGNAL GENERATOR TO 455 KC. THEN ADJUST I.F. TRIMMERS FOR PEAK RESPONSE INDICATED BY OUTPUT METER CONNECTED TO SPEAKER VOICE COIL TERMINALS. FINAL ADJUSTMENT MADE WITH VOLUME CONTROL FULL ON AND SIGNAL GENERATOR OUTPUT ADJUSTED TO GIVE OUTPUT METER READING OF 1/2 VOLT A.C. MAXIMUM.
7. SET SIGNAL GENERATOR TO 1500 KC. TURN TUNING KNOB TO SET POINTER ON 1500 KC., THEN ADJUST OSCILLATOR TRIMMER FOR MAXIMUM RESPONSE ON OUTPUT METER. NOW ADJUST R.F. TRIMMER FOR MAXIMUM INDICATION ON OUTPUT METER.
8. INSTALL CHASSIS IN CABINET. MAKE CERTAIN LOOP RESTS AGAINST BACK OF CABINET (SCREW ACCESSIBLE THRU BOTTOM PLATE).

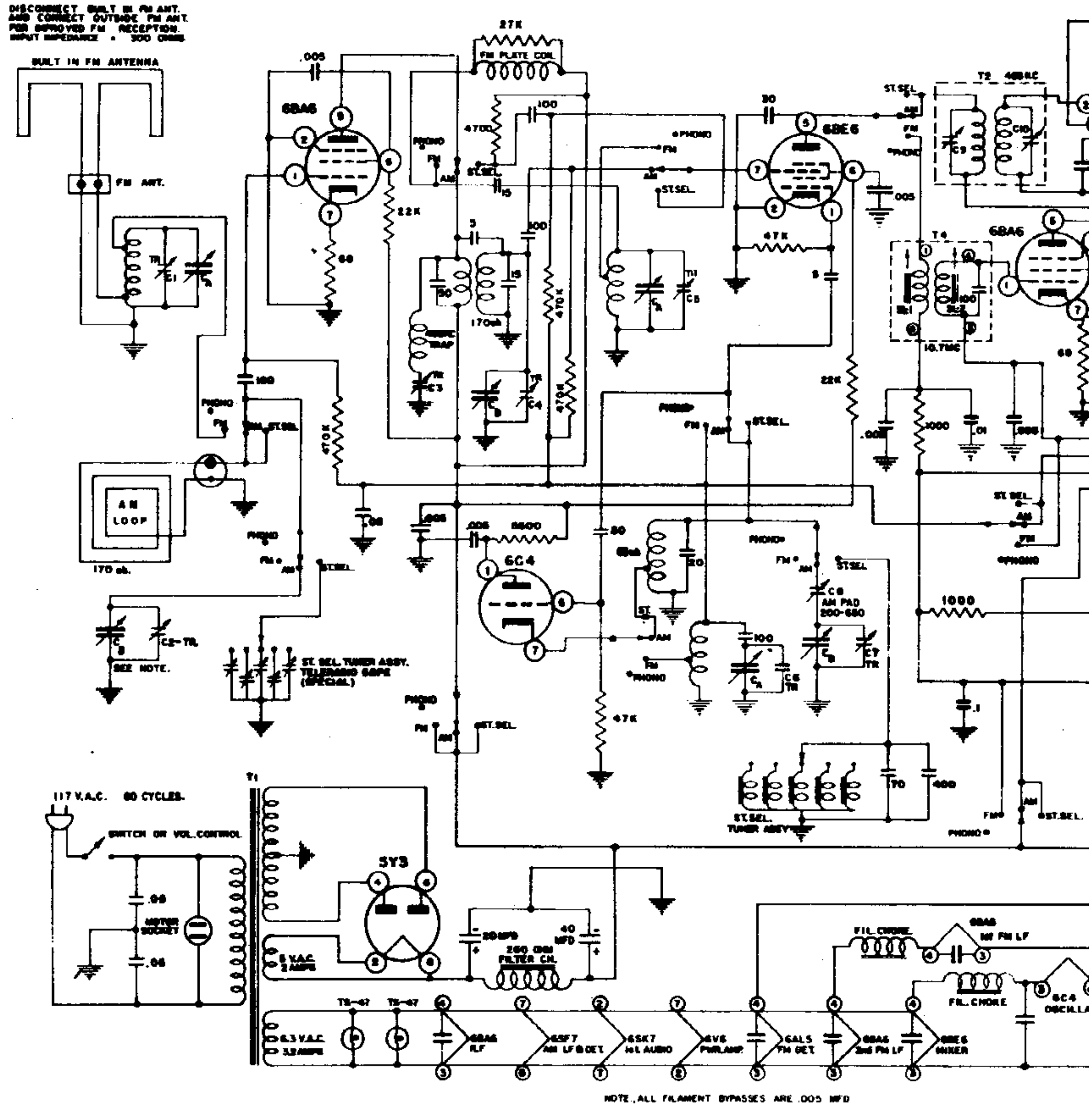


GILFILLAN BROS., INC.



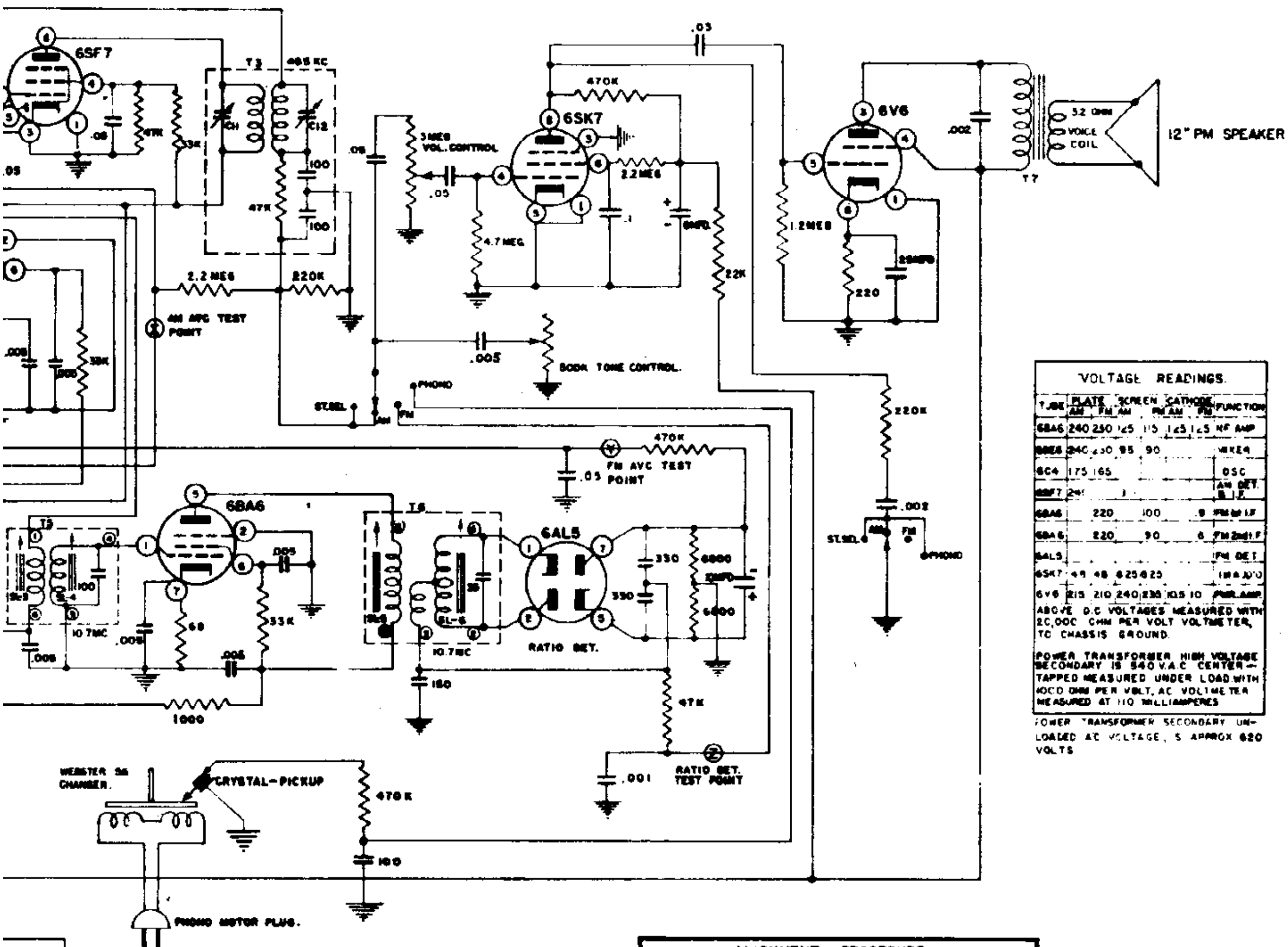

BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
(AUTOMATIC)
SELECTOR SWITCH
AT 3RD POSITION
1ST AUDIO
6SK7
A-M DET. & I.F.
6SF7
MIXER
OSC.
6C4
R-F AMPL.
AM LOOP
B+

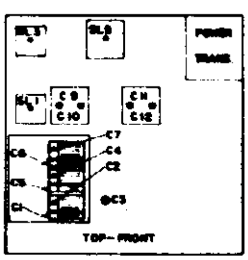
GILFILLAN

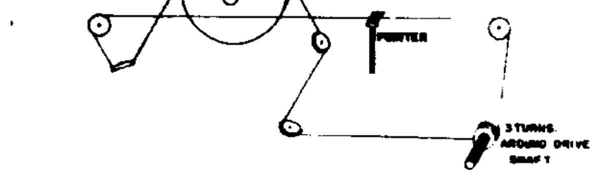


NOTE; C_B = 3 GANG VARIABLE 485 mmfd per section
C_A = 3 " " 15 mmfd per section

ALL CONDENSERS SMALLER THAN .001 MFD ARE SHOWN IN MMFD UNLESS NOTED







VOLTAGE READINGS.

TUBE	PLATE AM	PLATE FM	SCREEN AM	SCREEN FM	CATHODE AM	CATHODE FM	FUNCTION
6BA6	240	250	125	115	1.25	1.25	RF AMP
6BE6	240	230	95	90			MIXER
6C4	175	165					OSC
6SF7	24[illegible]		[illegible]				AM DET. & I.F.
6BA6		220		100		.9	FM 1st I.F
6BA6		220		90		6	FM 2nd I.F
6AL5							FM DET
6SK7	49	48	.625	.625			[illegible]
6V6	215	210	240	230	10.5	10	PWR.AMP.

ABOVE D.C VOLTAGES MEASURED WITH 20,000 OHM PER VOLT VOLTMETER, TO CHASSIS GROUND.

POWER TRANSFORMER HIGH VOLTAGE SECONDARY IS 540 V.A.C CENTER-TAPPED MEASURED UNDER LOAD WITH 1000 OHM PER VOLT, AC VOLTMETER MEASURED AT 110 MILLIAMPERES

POWER TRANSFORMER SECONDARY UN-LOADED AC VOLTAGE, S APPROX 620 VOLTS

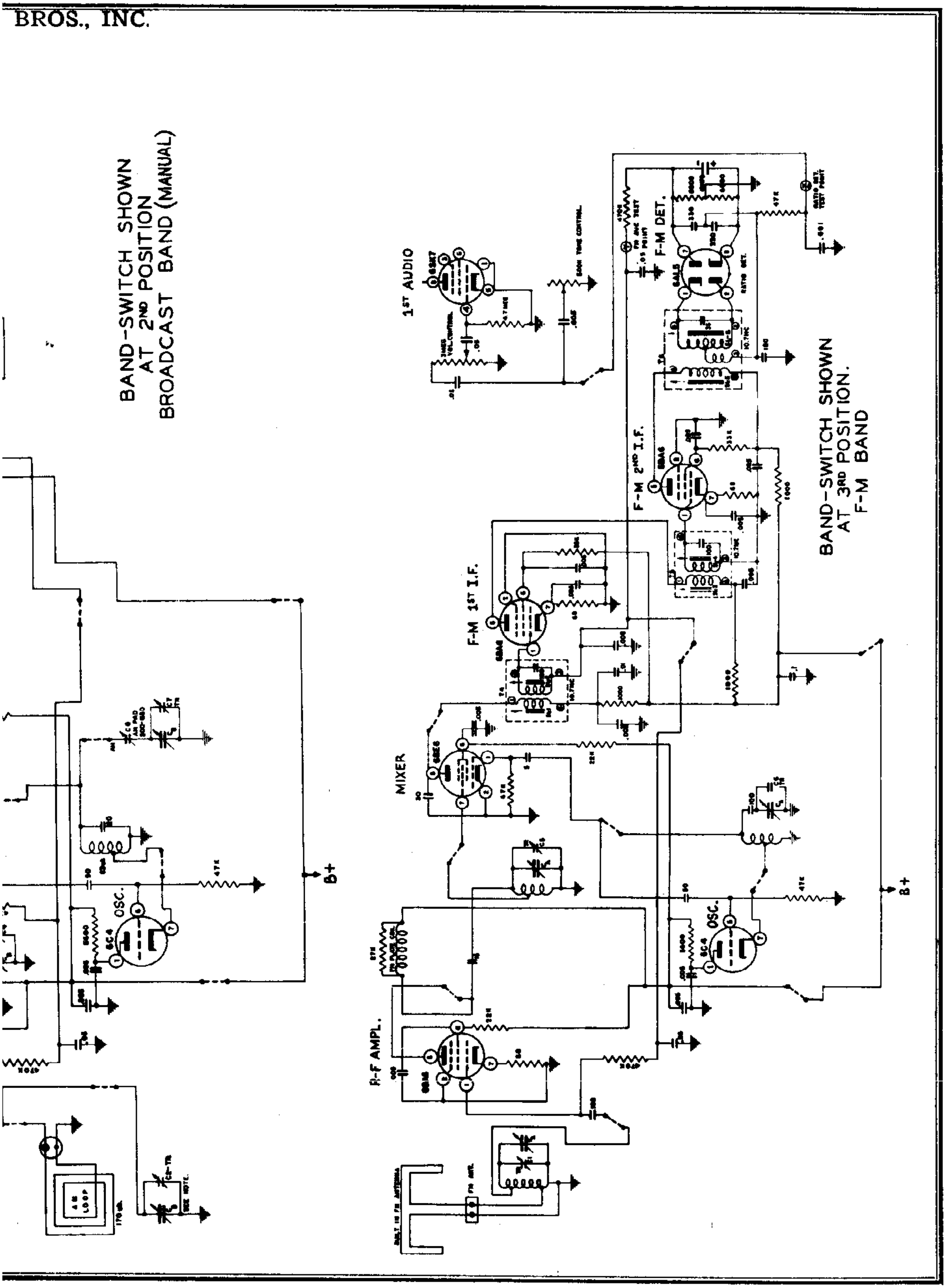
ALIGNMENT PROCEDURE.

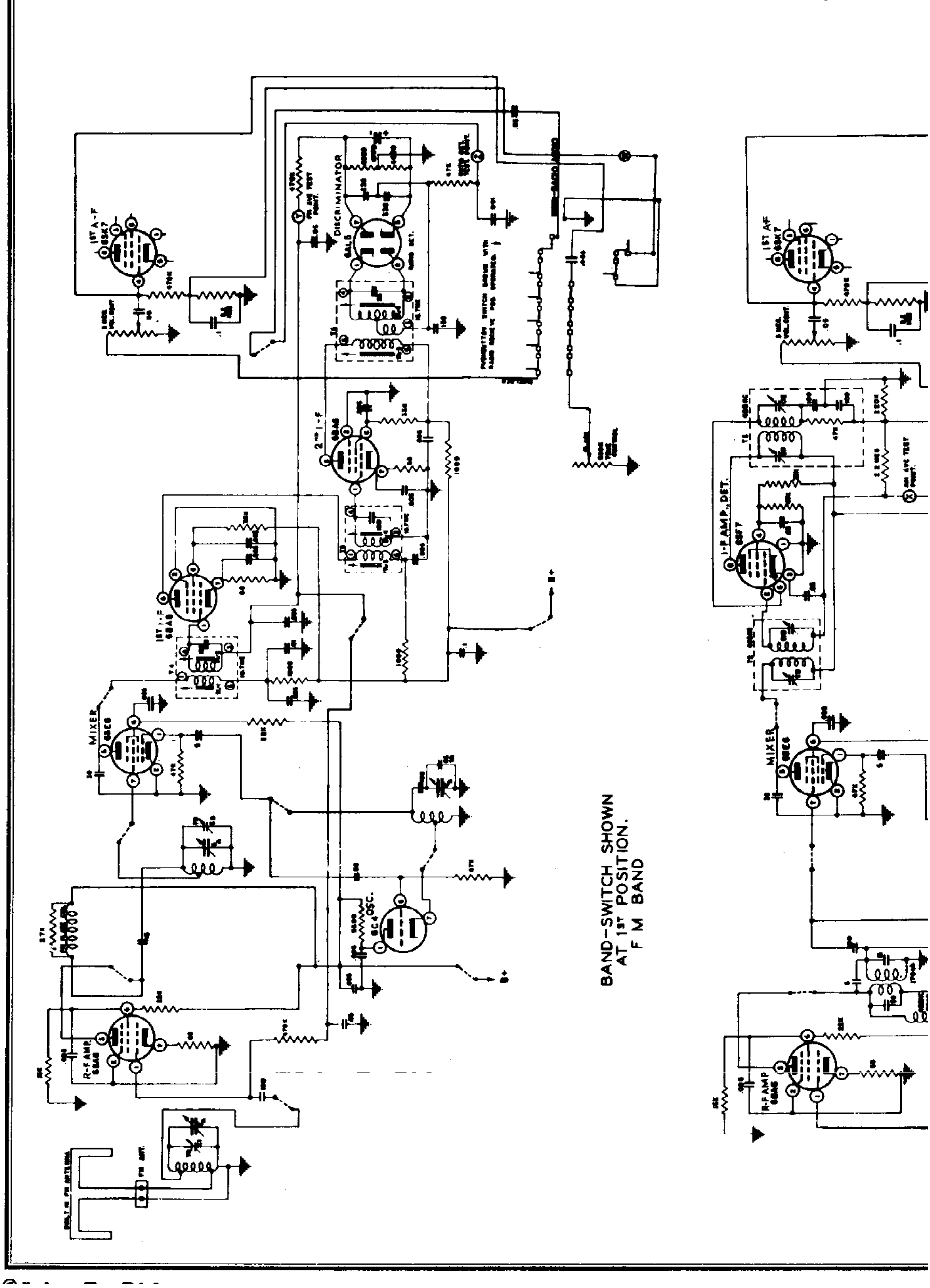
AM

1. FEED A MODULATED 455KC SIGNAL INTO AM LOOP PLUG TERMINALS ALIGN FIRST & SECOND AM IF TRANSFORMERS, BY ADJUSTING C9, C10, C11, AND C12, FOR MAXIMUM, NEGATIVE, AVC VOLTAGE AS INDICATED ON A VACUUM TUBE VOLTMETER (VOLTOHMYST) CONNECTED AT TEST POINT X.
2. ADJUST TRAP TRIMMER C3 FOR MINIMUM VOLTAGE
3. MAKE CERTAIN POINTER IS LINED UP WITH TRIANGLE ON DIAL AT LEFT END OF POINTER TRAVEL
4. SET POINTER AT 1500KC. CONNECT OUTPUT OF SIGNAL GEN TO A TWO TURN LOOP AND RADIATE A MODULATED 1500KC SIGNAL INTO THE AM LOOP FROM A DISTANCE OF AT LEAST 12"
5. ADJUST OSCILLATOR TRIMMER C7 UNTIL SIGNAL IS HEARD
6. ADJUST RF AND ANT TRIMMERS C2 AND C4 FOR MAXIMUM AVC VOLTAGE.
7. SET POINTER AND GENERATOR AT 600KC AND ADJUST C8 AM OSCILLATOR PAD, UNTIL SIGNAL IS HEARD
8. ROCK GANG AND ADJUST C8 FOR MAX.AVC VOLTAGE.
9. RECHECK OSC TRIMMER C7 AT 1500KC.

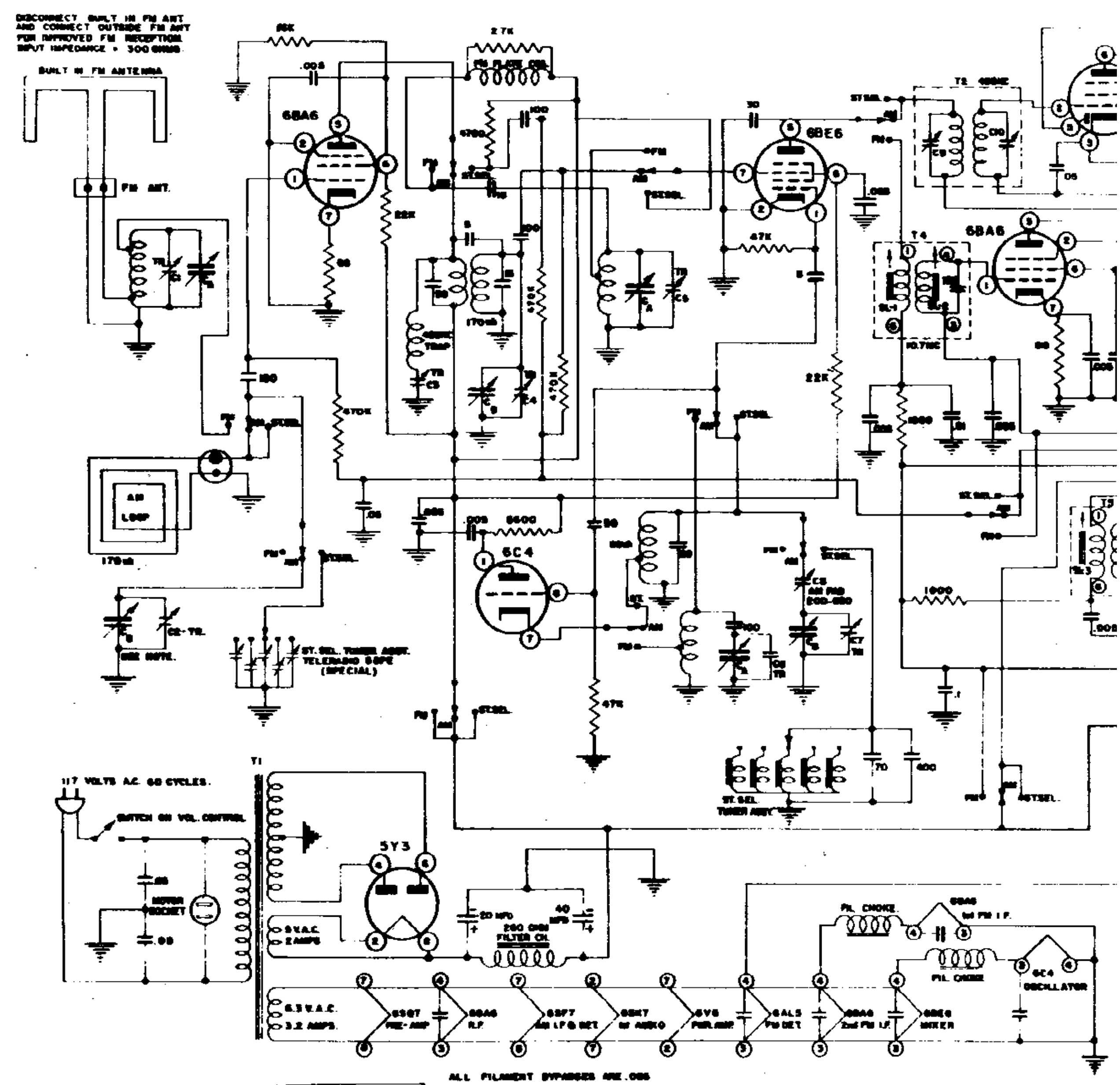
FM

1. SET BANDSWITCH TO FM POSITION
2. FEED AN UNMODULATED 10.7MC SIGNAL INTO 6BE6 GRID (PIN 7) WITH 6C4 OSCILLATOR TUBE REMOVED. ADJUST SL1, 2, 3, 4, 5 FOR MAXIMUM NEGATIVE VOLTAGE AS INDICATED AT TEST POINT Y. OUTPUT OF SIGNAL GEN SHOULD BE SET, FOR FINAL PEAKING, SO THAT AVC VOLTAGE DOES NOT EXCEED -1.5 VOLTS.
3. ADJUST SL6 FOR 0 DC VOLTAGE BALANCE AT TEST POINT Z. SWITCH VOLTMETER FROM PLUS TO MINUS VOLTS AND CHECK FOR 0 VOLTAGE IN EACH POSITION
4. REPLACE OSC TUBE AND SET POINTER TO 105MC FEED A 105MC SIGNAL INTO FM ANT TERMINALS, ON BACK OF CHASSIS, IN SERIES WITH A 270 OHM RESISTOR
5. ADJUST OSC TRIMMER C6 UNTIL SIGNAL IS HEARD.
6. ADJUST ANT-RF TRIMMERS C1, C5 FOR MAXIMUM AVC VOLTAGE.
7. RECHECK C6, C1, C5 FOR MAX. AVC VOLTAGE.


BAND-SWITCH SHOWN
AT 2ND POSITION
BROADCAST BAND (MANUAL)
BAND-SWITCH SHOWN
AT 3RD POSITION.
F-M BAND
1ST AUDIO
F-M DET.
F-M 2ND I.F.
F-M 1ST I.F.
MIXER
OSC.
OSC.
R-F AMPL.
B+
B+


1ST A-F 6SK7
DISCRIMINATOR 6AL5
2ND I-F 6BA6
1ST I-F 6BA6
MIXER 6BE6
OSC. 6C4
R-F AMP. 6BA6
1ST AF 6SK7
I-F AMP. DET. 6SF7
MIXER 6BE6
R-F AMP. 6BA6
B+
BAND-SWITCH SHOWN
AT 1ST POSITION.
F M BAND

GILFILLA



ALIGNMENT PROCEDURE.

AM

1. FEED A MODULATED 455KC SIGNAL INTO AM LOOP PLUG TERMINALS. ALIGN FIRST & SECOND AM IF TRANSFORMERS, BY ADJUSTING C9, C10, C11 AND C12. FOR MAXIMUM, NEGATIVE AVC VOLTAGE AS INDICATED ON A VACUUM TUBE VOLTMETER CONNECTED AT TEST POINT X
2. ADJUST TRAP TRIMMER C3 FOR MINIMUM VOLTAGE.
3. MAKE CERTAIN POINTER IS LINED UP WITH TRIANGLE ON DIAL AT LEFT END OF POINTER TRAVEL
4. SET POINTER TO 1500 K.C. CONNECT OUTPUT OF GENERATOR TO A TWO TURN LOOP AND RADIATE A MODULATED 1500 K.C. SIGNAL INTO THE AM LOOP FROM A DISTANCE OF AT LEAST 12"
5. ADJUST OSCILLATOR TRIMMER C7 UNTIL SIGNAL IS HEARD.
6. ADJUST LOOP AND RF TRIMMERS C2 & C4 FOR MAXIMUM AVC VOLTAGE
7. SET POINTER AND GENERATOR AT 600K C AND ADJUST AM OSCILLATOR PAD C8 UNTIL SIGNAL IS HEARD.
8. ROCK GANG AND ADJUST C8 FOR MAXIMUM AVC VOLTAGE.
9. RECHECK OSC. TRIMMER C7 AT 1500KC.

FM.

1. SET BANDSWITCH TO FM POSITION
2. FEED AN UNMODULATED 10.7 MC SIGNAL INTO 6BE6 GRID, (PIN 7) WITH 6C4 OSCILLATOR TUBE REMOVED. ADJUST SL-1, 2, 3, 4, & 5 FOR MAXIMUM AVC VOLTAGE INDICATED AT TEST POINT Y [illegible] GENERATOR OUTPUT, FOR FINAL PEAKING, SHOULD BE SET SO THAT AVC VOLTAGE DOES NOT EXCEED 1.5 VOLTS NEGATIVE
3. ADJUST SL6 FOR 0 DC VOLTAGE BALANCE AT TEST POINT Z SWITCH VTVM FROM PLUS TO MINUS VOLTS AND CHECK FOR 0 VOLTAGE IN EACH POSITION.
4. REPLACE OSCILLATOR TUBE AND SET POINTER TO 108 MC. FEED A MOD 108 MC SIGNAL INTO FM ANT TERMINALS, ON CHASSIS, IN SERIES WITH A 270 OHM RESISTOR.
5. ADJUST OSC TRIMMER C6 UNTIL SIGNAL IS HEARD.
6. ADJUST ANT.-RF TRIMMERS C1, C5 FOR MAXIMUM AVC VOLTAGE
7. RECHECK C1, C5, AND C6 FOR MAX AVC VOLTAGE.

VOLTAGE READINGS

TUBE	PLATE AM	PLATE FM	SCREEN AM	SCREEN FM	CATHODE AM	CATHODE FM	FUNCTION
6BA6	260	[illegible]			125	125	RF AMP.
6BE6	260	255	80	75			MIXER
6C4	90	[illegible]					OSC.
6SF7	260		90				AM DET & I.F.
6BA6		240		110			FM 1st I.F.
6BA6		240		100			FM 2nd I.F.
6AL5							FM DET.
6SK7	75	75	8	8			1st AUDIO
6V6	240	235	260	255	10.5	10	PWR.AMP.
6SQ7	438	.	.	.	.	.	PRE AMP.

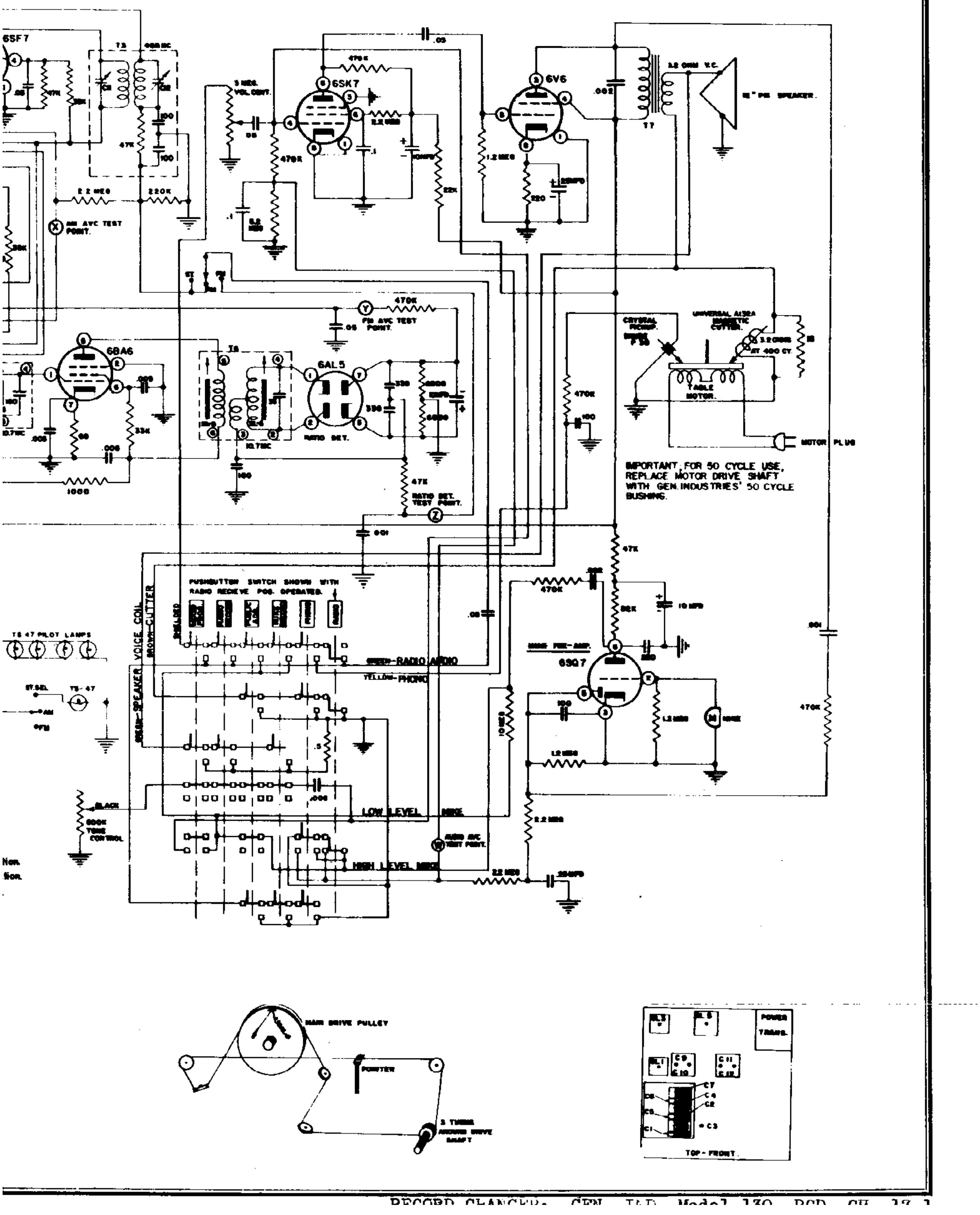
ABOVE DC VOLTAGES MEASURED WITH 20,000 OHM PER VOLT METER TO CHASSIS GROUND.
POWER TRANSFORMER HIGH VOLTAGE SECONDARY IS 600 V.A.C. CENTER TAPPED MEASURED UNDER LOAD (120 MILLS) WITH 1000 OHM PER VOLT METER. ABOVE AC VOLTAGE IS FOR TRANSFORMER - NO 6210 -

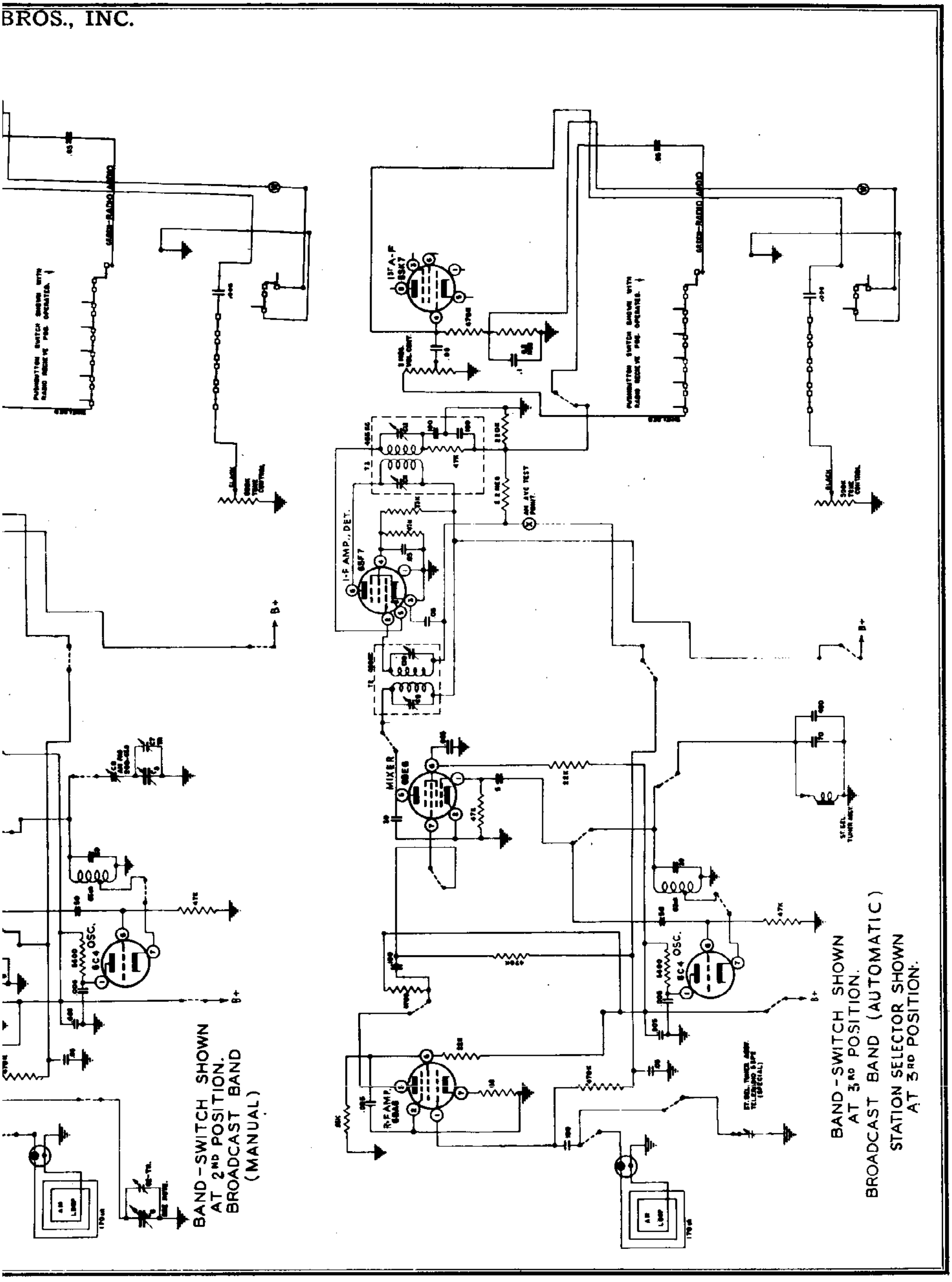
SETS HAVING POWER TRANS. 6141 WILL HAVE 5 TO 10% LOWER D.C. VOLTAGES DUE TO 540 V.A.C. SEC AT 110 MILL LOAD

NOTE ; Ca- 3 GANG VARIABLE 485 mmfd per
Cb 3 GANG VARIABLE 15 mmfd per

ALL CONDENSERS SMALLER THAN .001 MFD ARE SHOWN IN MM
UNLESS NOTED

SERVICE NOTE
POWER TRANSFORMER 6210, UNLOADED SECONDARY 13,640 V.A.C


6SF7
T3
47K
2.2 MEG
220K
AM AVC TEST POINT.
3 MEG. VOL. CONT.
6SK7
470K
2.2 MEG
22K
470K
6V6
1.2 MEG
220
.002
3.2 OHM V.C.
T7
FM AVC TEST POINT.
470K
6BA6
33K
1000
6AL5
RATIO DET.
10.7MC
330
330
47K
RATIO DET. TEST POINT.
.001
CRYSTAL PICKUP.
UNIVERSAL A132A MAGNETIC CUTTER.
3.2 OHMS AT 400 CY.
TABLE MOTOR.
MOTOR PLUG
470K
IMPORTANT: FOR 50 CYCLE USE, REPLACE MOTOR DRIVE SHAFT WITH GEN. INDUSTRIES' 50 CYCLE BUSHING.
47K
470K
.002
10 MFD
PUSHBUTTON SWITCH SHOWN WITH RADIO RECEIVE POS. OPERATED.
SPEAKER VOICE COIL
BROWN-CUTTER
SHIELDED
RADIO AUDIO
YELLOW-PHONO
TS 47 PILOT LAMPS
ST.SEL
TS-47
6SQ7
10 MEG
1.2 MEG
470K
.001
LOW LEVEL MIKE
BLACK
TONE CONTROL
AUDIO AVC TEST POINT.
HIGH LEVEL MIKE
2.2 MEG
2.2 MEG
MAIN DRIVE PULLEY
POINTER
3 TURNS AROUND DRIVE SHAFT
POWER TRANS.
C7
C4
C2
C5
C6
C1
C3
C9
C10
C11
C12
TOP - FRONT.


BAND-SWITCH SHOWN
AT 2ND POSITION.
BROADCAST BAND
(MANUAL)
BAND-SWITCH SHOWN
AT 3RD POSITION.
BROADCAST BAND (AUTOMATIC)
STATION SELECTOR SHOWN
AT 3RD POSITION.
1ST A-F
6SK7
I-F AMP., DET.
6SF7
MIXER
6SE8
6C4 OSC.
R-F AMP.
6BA6
AVC TEST POINT
B+

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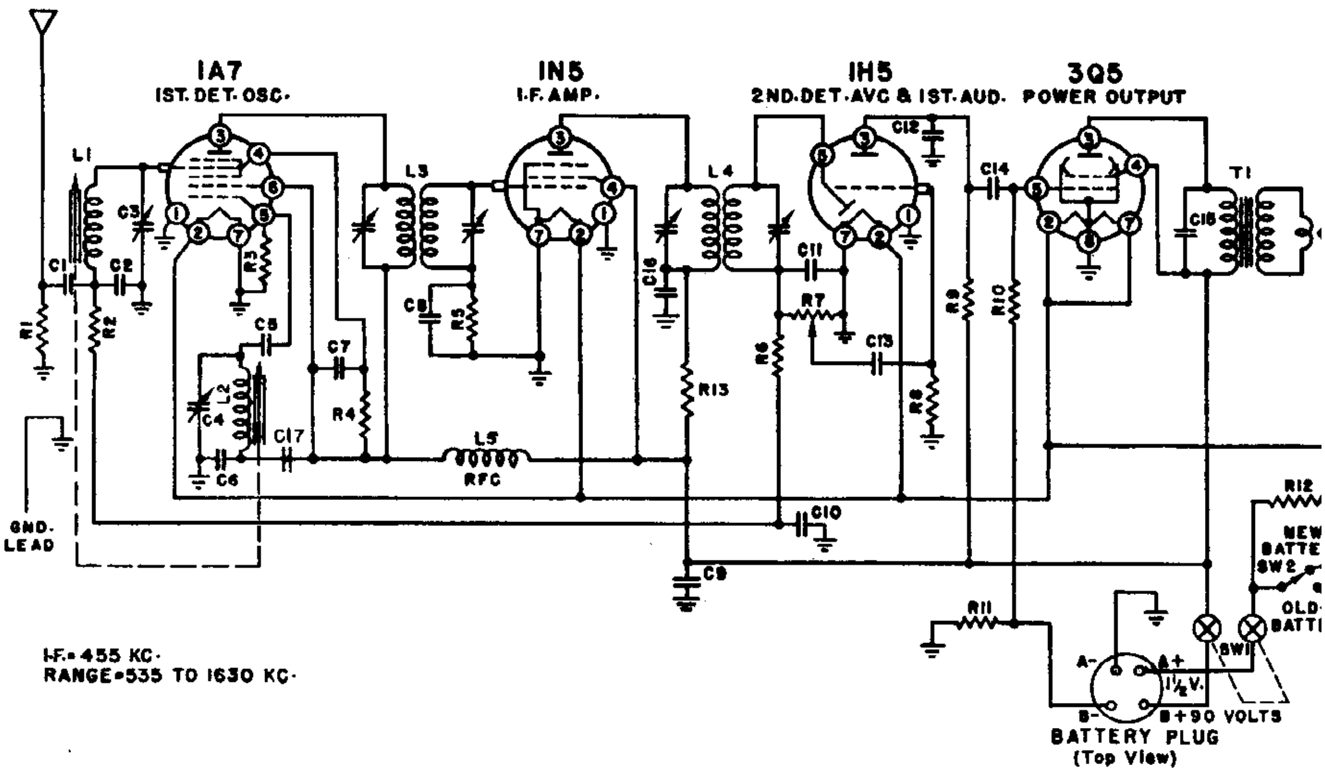


ALIGNMENT PROCEDURE

IMPORTANT—Check to see that dial pointer reaches each end of dial scale when Station Selector Control is turned from one end to the other.

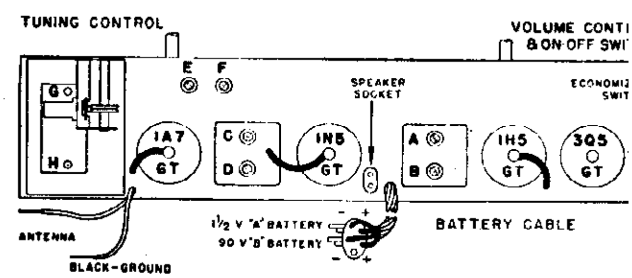
Volume control—Maximum for all adjustments.

Connect radio chassis to ground post of signal generator with a short heavy lead.

Connect dummy antenna value in series with generator output lead, when needed (see below).

Connect output meter across voice coil of speaker.

Allow chassis and signal generator to warm up for several minutes.



● Use lowest Output setting of Signal Generator capable producing adequate Output Meter indication and then proc as indicated in the chart below.

Band	Signal Generator Frequency	Dummy Antenna	Connection to Radio	Receiver Dial Setting	Trimmers Adjusted (In Order Shown)	Trimmer Function	Type of Adjustme
I. F.	455 KC.	.1 MFD.	Grid of 1A7 (Cap)	High frequency end of dial	A-B—2nd I.F.	Output I.F.	Adjust to maximum output
	455 KC.	.1 MFD.	Grid of 1A7 (Cap)	High frequency end of dial	C-D—1st I.F.	Input I.F.	Adjust to maximum output
BROAD-CAST	1630 KC.	.0002 MFD.	Antenna Lead	High frequency end of dial	E—(See note below) F—(See note below)	Oscillator Antenna	Adjust to maximum output
	1300 KC.	.0002 MFD.	Antenna Lead	1300 KC.	G H	Oscillator Antenna	Adjust to maximum output

NOTE: Before adjusting trimmers "E" and "F", make sure that each iron core is 1⅜" or more outside of its coil form. If necessary, turn adjustments "G" and "H" to accomplish this.

MODEL R743-W

THE B. F. GOODRICH COMPANY

POWER SUPPLY

This receiver is designed to operate on a single unit Ensign AB48, Ray-O-Vac No. AB-82, Burgess 17G-D60, Eveready 748, Bond 0528 or General 60DL-11L Battery. No other batteries are required as this battery is a combination 90 volt "B" battery and a 1½ volt "A" battery. The life of this battery is approximately 750 hours. The "A" and "B" sections are so proportioned that equal life may be expected from both. The "A" section will give satisfactory performance as low as 1.2 volts and the "B" section as low as 68 volts. This battery life may be expected with an average usage of several hours daily. If the reception becomes weak when the Economizer Switch is in the "USED" position, a new battery should be installed. A battery compartment is provided in the rear of the cabinet, and the battery cable simply plugs into the battery.

ANTENNA

Use a standard outside antenna whose length, including the lead-in, is at least 50 feet. There are two leads extending from the rear of the chassis at the left hand side. Connect the antenna to the "colored" lead and the ground to the "black" lead.

GROUND

IT IS NECESARY THAT A GOOD GROUND BE EMPLOYED WITH THIS TYPE OF RECEIVER. Water pipes make a very desirable ground connection. The ground wire is to be connected to the "black" lead at the rear of the chassis. All connections must be tight and clean.

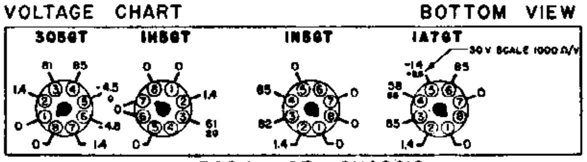
ECONOMIZER SWITCH

The battery Economizer Switch is located on the top of the chassis, right side (see figure on last page of this instruction folder or model label on chassis). ALWAYS HAVE THIS ECONOMIZER SWITCH IN THE "NEW" BATTERY POSITION WHEN THE RADIO IS NEW OR AFTER A NEW BATTERY HAS BEEN INSTALLED. When the volume or tone of stations decreases noticeably (after 200 or 300 hours of actual use), this switch should be pushed forward to the "USED" battery position.

VOLTAGE DATA

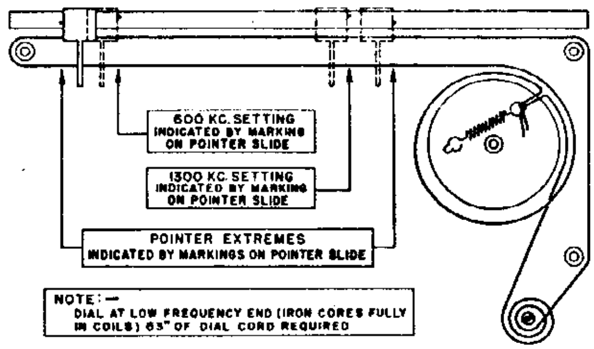
All readings made between tube socket terminals and chassis. Voltages indicated have been obtained using a Vacuum Tube Voltmeter. A second voltage reading is shown made with a 1000 ohm-per-volt meter, when use of this instrument would result in appreciably lower readings. The voltages were measured using a fresh battery, volume control full on, dial at the high frequency end, and no signal.

VOLTAGE CHART BOTTOM VIEW



BACK OF CHASSIS

POINTER SETTINGS AND DIAL CORD STRINGING



REPLACEMENT PARTS

CONDENSERS

Symbol	Description	Part No.
C1	Paper, .01 mfd., 400 V.	64B1-25
C2	Mica, .0008 mfd. ±10%	65B5-31
C3	Trimmer, Antenna	66A10-1
C4	Trimmer, Oscillator	66A10-1
C5	Mica, .0001 mfd. ±20%	65B7-17
C6	Mica, .0008 mfd. ±10%	65B5-31
C7	Paper, .01 mfd., 400 V.	64B1-25
C8	Paper, .002 mfd., 600 V.	64B1-14
C9	Elect., 4 mfd., 150 V.	67A4-2
C10	Paper, .05 mfd., 200 V.	64B1-32
C11	Mica, .00025 mfd. ±20%	65B7-22
C12	Mica, .00025 mfd. ±20%	65B7-22
C13	Paper, .01 mfd., 400 V.	64B1-25
C14	Paper, .01 mfd., 400 V.	64B1-25
C15	Paper, .005 mfd., 600 V.	64B1-12
C16	Paper, .01 mfd., 400 V.	64B1-25
C17	Paper, .01 mfd., 400 V.	64B1-25

RESISTORS

Symbol	Description	Part No.
R1	15,000 ohm ±10%, ½W.	60B8-153
R2	470,000 ohm ±10%, ¼W.	60B2-474
R3	220,000 ohm ±10%, ½W.	60B8-224
R4	33,000 ohm ±10%, ½W.	60B8-333
R5	4,700,000 ohm ±10%, ¼W.	60B2-475
R6	2,200,000 ohm ±10%, ¼W.	60B2-225
R7	1 megohm Volume Control & Switch	75B1-1
R8	4,700,000 ohm ±10%, ¼W.	60B2-475
R9	1,000,000 ohm ±10%, ¼W.	60B2-105
R10	1,000,000 ohm ±10%, ¼W.	60B2-105
R11	390 ohm ±10%, ¼W.	60B2-391
R12	0.75 ohm ±10%, ½W. (Wire)	61A2-1
R13	2200 ohm ±10%, ¼W.	60B2-222

TRANSFORMERS AND COILS

Symbol	Description	Part No.
L1	Antenna Coil	AC105-1
L2	Oscillator Coil	A1020
L3	1st I.F. Transformer	72B5
L4	2nd I.F. Transformer	72B6
L5	Choke Coil (RF)	AB103-1
T1	Output Transformer	98A5

MISCELLANEOUS

Description	Part No.
Background, Dial	X22C5-1
Cabinet, R743-W	34D10
Cable, Battery (complete with plug)	A1026
Cap, Grid	90A1-2
Clip, Baffle Mounting	2B10-21-68
Clip, Dial Glass	18A2
Cord, Dial (5" on tuner and 63" on dial drive)	50A1-3
Dial Scale, glass	21B25-2
Drum and Hub, Tuning	A1035
Escutcheon	23A8-1
Iron Slug, with wire (Oscillator)	71B1-3
Iron Slug, with wire (Antenna)	71B1-4
Knob	33A7-2
Plug, Battery, 5 Prong	88A4-4
Pointer, Dial	25A9-1
Pulley, Fibre Dial	17A1-3
Screw Studs (for iron cores)	27A4
Shaft, Tuning	28A1-1
Shaft and Pulley (Tuner)	A1040
Shield, Tube	87A8
Socket, Octal Tube	87A5-1
Socket, Speaker	87A4-3
Speaker and Output Transformer	78B15-2
Spring, Dial Drum Cord Tension	19B1-7
Spring, Hairpin (To hold Ant. or Osc. coil)	19A3-1
Spring, Tuner Slide Cord Tension	19B1-8
Spring, Tuner, back bearing takeup	19A6
Spring, Tuner, front bearing takeup	19A5
Spring, Tuner Slide Pressure	18A9
Switch, SPST (Economizer) SW2	77B1-6
Washer, C	4A4-1
Washer, spring (coils)	4A6-12-0
Washer, spring (shaft)	4A6-3-0

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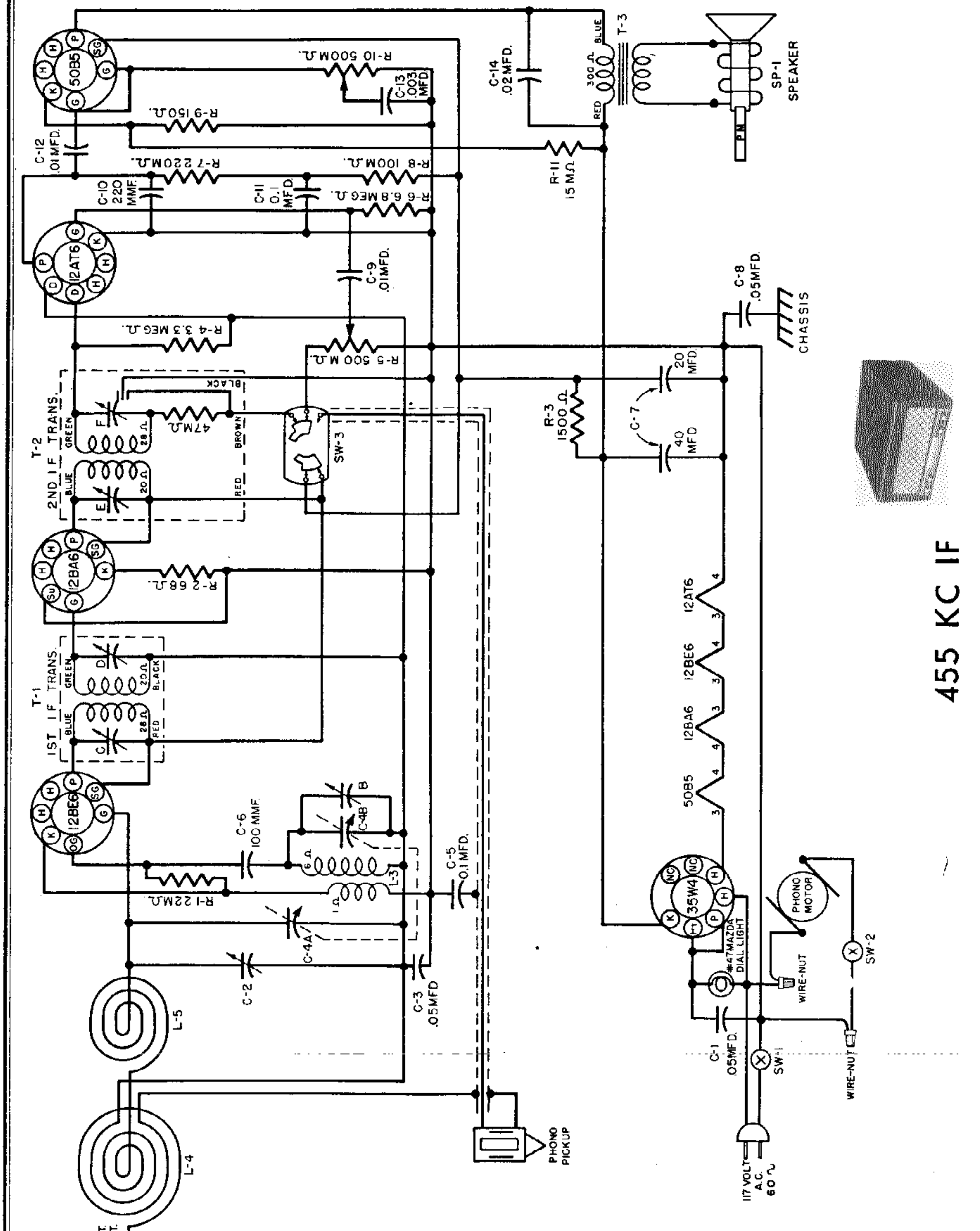

MODEL R75152

THE B. F. GOODRICH COMPANY

ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — RMA loop.

NOTE: Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12BE6 grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12BE6 grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
1620 kc.	12BE6 grid	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop*	RMA loop	1400 kc.	Ant. trimmer C-2	Tune to max.

* Loop trimmer accessible through back of cabinet.

SERVICE PARTS LIST

Symbol	Part No.	Description
C-3	BD210503	Capacitor, Paper, .05 mfd., 200 v.
C-9, C-12	BD410103	Capacitor, Paper, .01 mfd., 400 v.
C-5, C-11	BD410104	Capacitor, Paper, 0.1 mfd., 400 v.
C-14	BD410203	Capacitor, Paper, .02 mfd., 400 v.
C-1, C-8	BD410503	Capacitor, Paper, .05 mfd., 400 v.
C-13	BD610302	Capacitor, Paper, .003 mfd., 600 v.
C-6	BM74A101	Capacitor, Mica, 100 mmf.
C-10	BM74A221	Capacitor, Mica, 220 mmf.
R-2	BR16B680	Resistor, 68 ohm, ⅓ w.
R-9	BR16C151	Resistor, 150 ohm, ½ w.
R-8	BR17B104	Resistor, 100,000 ohm, ⅓ w.
R-1	BR17B223	Resistor, 22,000 ohm, ⅓ w.
R-7	BR17B224	Resistor, 220,000 ohm, ⅓ w.
R-4	BR17B335	Resistor, 3.3 megohm, ⅓ w.
R-6	BR17B685	Resistor, 6.8 megohm, ⅓ w.
R-3	BR17E152	Resistor, 1500 ohm, 1 w.
R-11	BR17E153	Resistor, 15,000 ohm, 1 w.
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot, No. 47 Mazda, 6.3 v.
	A-6182-1	Socket, Dial Light
C-7	B-9564-1	Cap., Electro., 40-20 mfd., 150 v.
	A-51163	Clip, Spring
	B-51427-5	Grommet (large)
	B-51427-8	Grommet (small)
SW-3	B-51576-2	Switch, Radio-Phono
	A-51787	Spring, for Dial Cable
	A-54122	Button, Plug
R-5	B-54466-2	Control, Volume, 500,000 ohm
T-2	B-56718-1	Transformer Assembly, 2nd IF
T-1	B-56722-1	Transformer Assembly, 1st IF
	B-57262-6	Cord, AC Phono.
R-10	B-57841-1	Control, Tone & Switch, 500,000 ohm
	B-57842	Coil Assembly, Oscillator
SP-1	C-57843	Speaker, 5x7 PM
	B-57848-1	Shaft, Tuning Drive
	B-57857-1	Pointer, Dial
	B-57858-1	Strip Assembly, Light Diffusing
C-4	C-57859-1	Capacitor, Variable
L-4 & L-5	D-57870	Coil Assembly, Loop
	C-57872-1	Knob
	A-57878	Clip, Gang Mounting
C-2	B-57879-1	Capacitor Assembly, Trimmer
	C-59414	Crystal and Indicator, Dial
	B-58069-1	Cord, AC Power

Order parts not listed by specifying (1) Part Name, (2) Model Number (inc. number following dash) and (3) Run Number.

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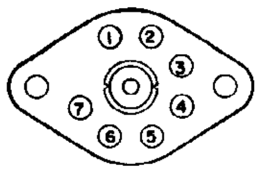
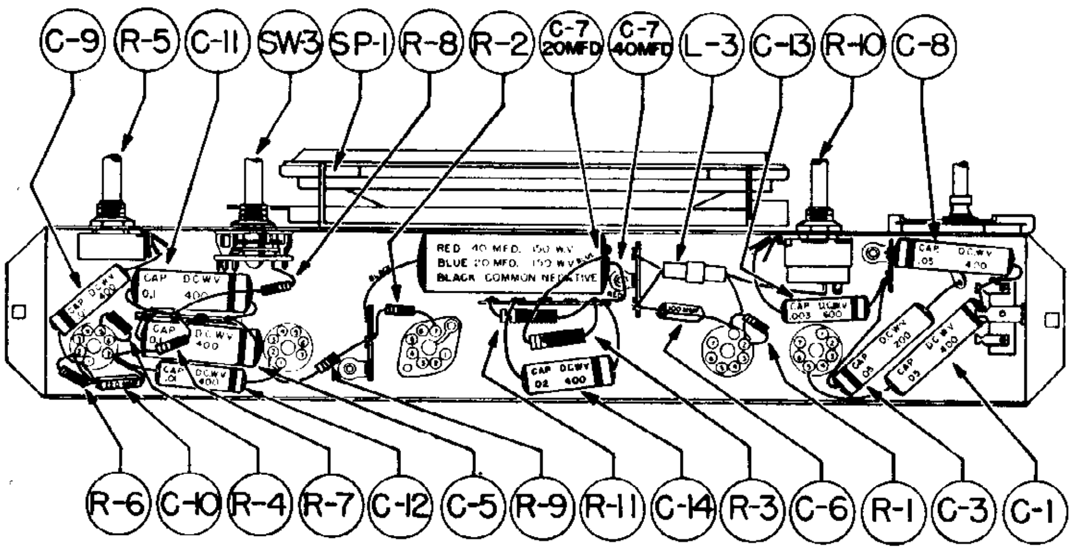
SOCKET VOLTAGES

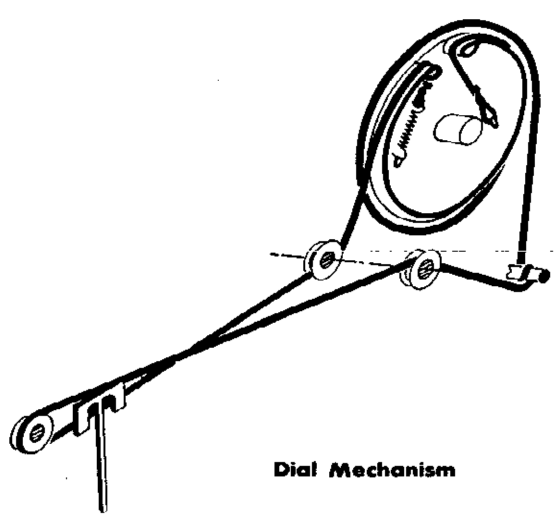
TUBE	POSITION	1	2	3	4	5	6	7
12BE6	Converter	–5	0	24 AC	12 AC	88	88	0
12BA6	I.F. Amplifier	0	0	24 AC	35 AC	88	88	0.7
12AT6	2nd DET.—1st AF—AVC	0	0	12 AC	0	0	0	12
50B5	Power Output	0	5	85 AC	35 AC	115	88	0
35W4	Rectifier	0	0	85 AC	117 AC	112 AC	112 AC	122



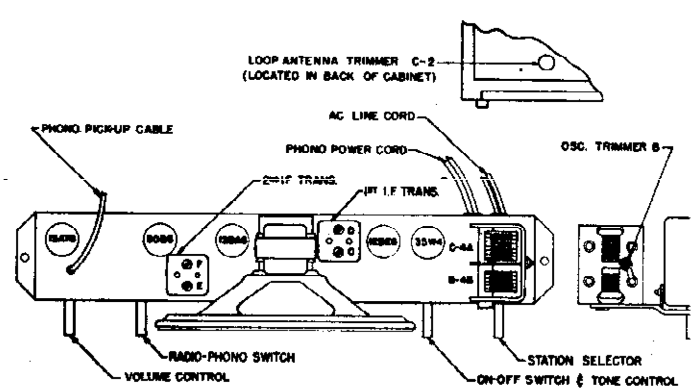
NOTE: All DC voltages measured with a 1000 ohm-per-volt meter fr ON-OFF switch (—B) to socket contact indicated. All AC vo ages are measured from ON-OFF switch (—B) to socket cont indicated. All voltages are positive DC unless otherwise mark Volume Control full on. No signal input.
Line voltage 117 volts AC.



Parts Layout—Factory Model 7156-15



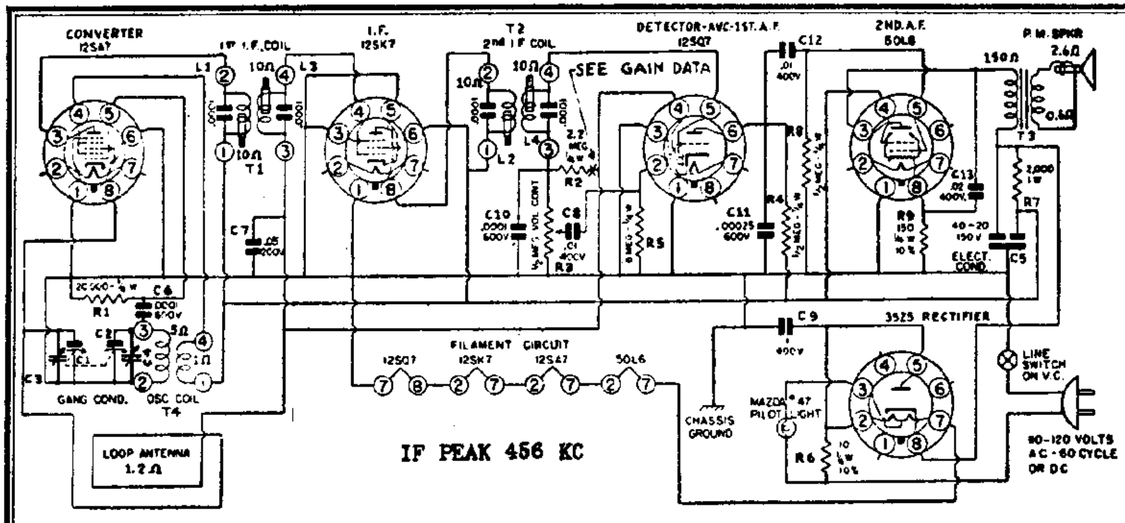
Dial Mechanism

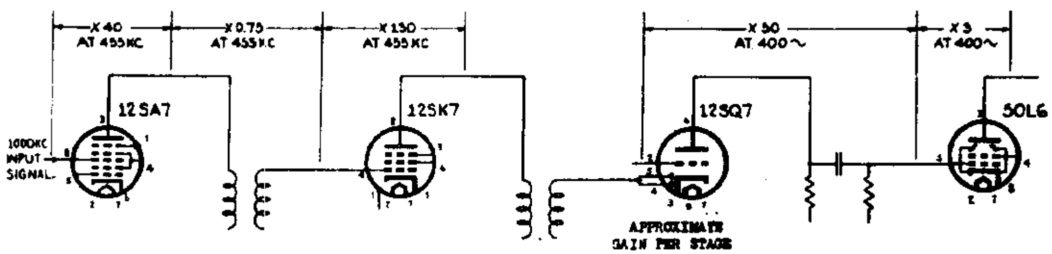


Tube Layout

MODEL 75434

THE B. F. GOODRICH COMPANY





APPROXIMATE GAIN PER STAGE DATA

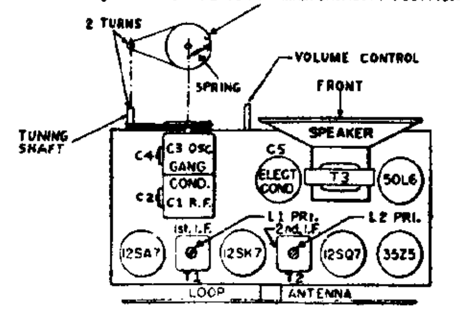
IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND

TUBE	PIN	D-C VOLTAGE VTVM	20,000 OHMS PER VOLT	1000 OHMS PER VOLT	RESISTANCE
12SA7	1	0	0	0	0
	2	0	0	0	24
	3	+80	+80	+78	INFINITE
	4	+80	+80	+78	INFINITE
	5	-9.5	-9.5	-4.8	20,000
	6	0	0	0	1
	7	0	0	0	40
	8	-1.6	-0.8	-0.2	1,200,000
12SK7	1	0	0	0	0
	2	0	0	0	12
	3	0	0	0	0
	4	-1.5	-0.6	-0.2	1,200,000
	5	0	0	0	0
	6	+80	+80	+78	INFINITE
	7	0	0	0	26
	8	+80	+80	+78	INFINITE
12SQ7	1	0	0	0	0
	2	-0.5	-0.4	-0.2	6,000,000
	3	0	0	0	0
	4	-0.5	-0.4	-0.2	400,000
	5	-0.5	-0.4	-0.2	400,000
	6	+46	+42	+40	INFINITE
	7	0	0	0	14
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+120	+120	+120	INFINITE
	4	+80	+80	+78	INFINITE
	5	0	0	0	460,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+4.5	+4.5	+4.5	150
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	8	+120	+120	+120	INFINITE

ALIGNMENT

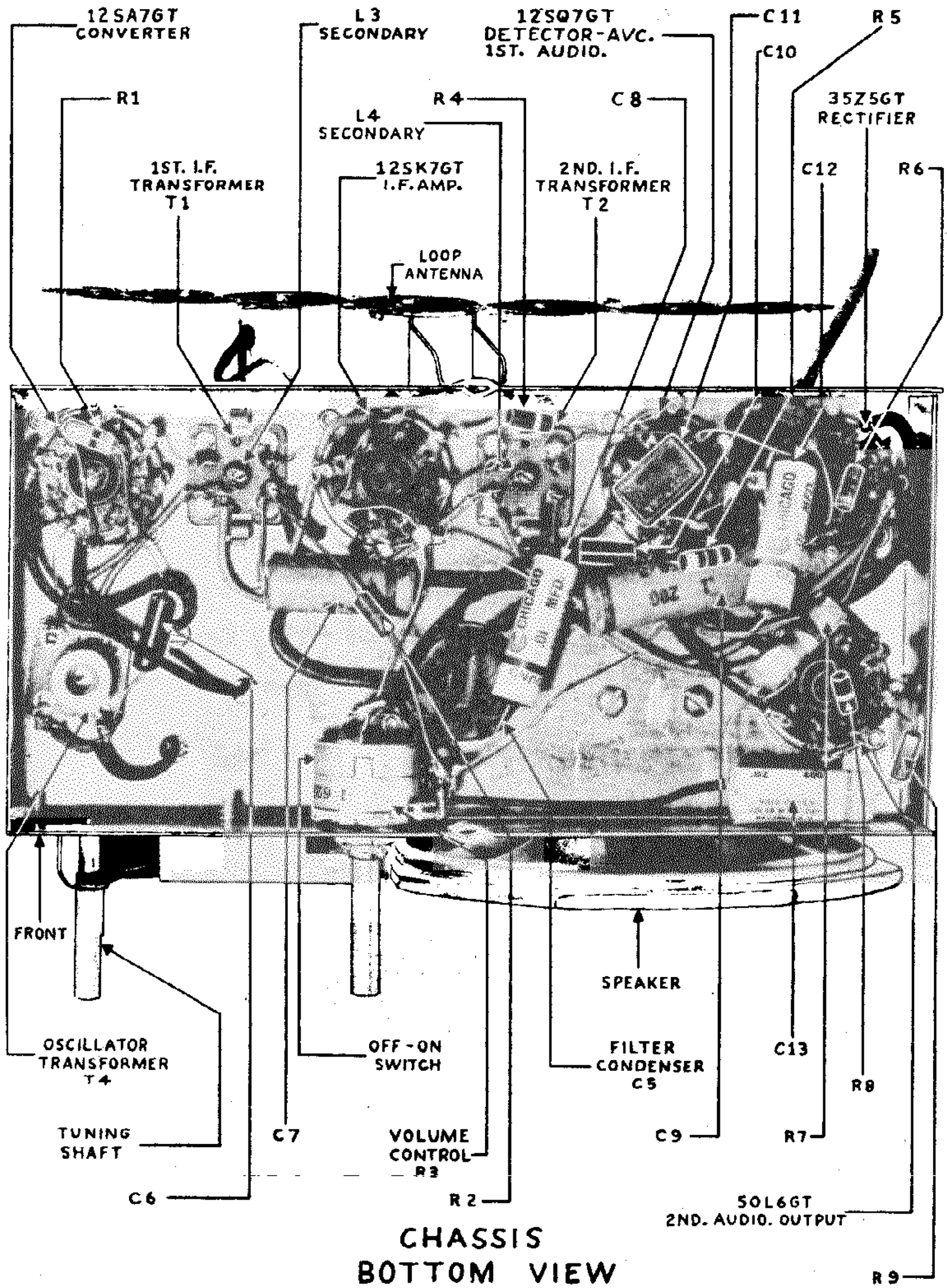
The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the Standard Hazeltine Model 1150 loop, and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc. Adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L2, L3, L1. Set the generator and receiver to 1600 Kc and adjust oscillator trimmer C4 for maximum output. Set the generator and receiver to 1400 Kc and adjust loop trimmer C3 for maximum output.

DRIVE ASSEMBLY
(TUNING CONDENSER IN MAX. CAPACITY POSITION.)



TUBE LAYOUT

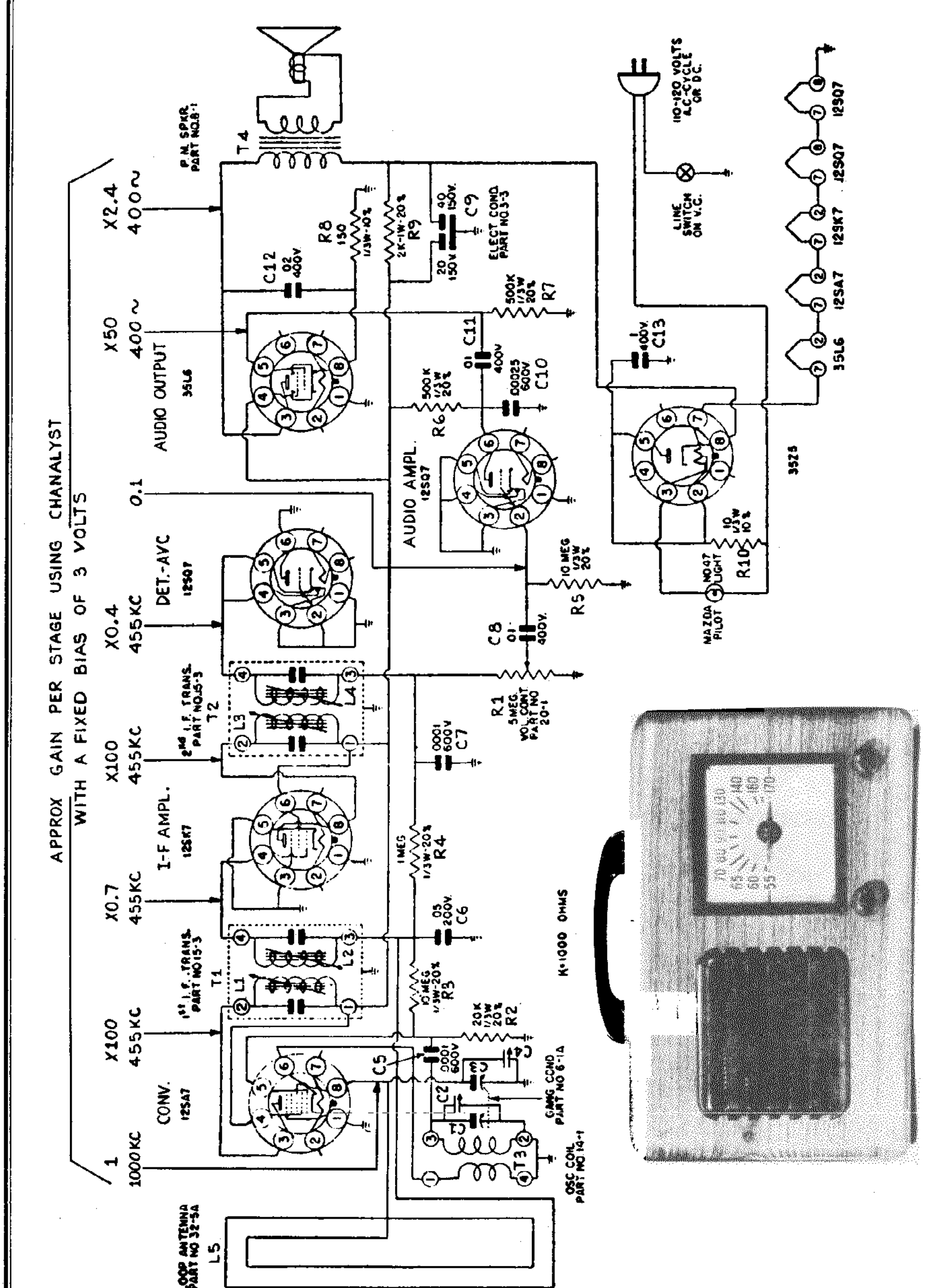
THE B. F. GOODRICH COMPANY



CHASSIS
BOTTOM VIEW

MODEL 76143

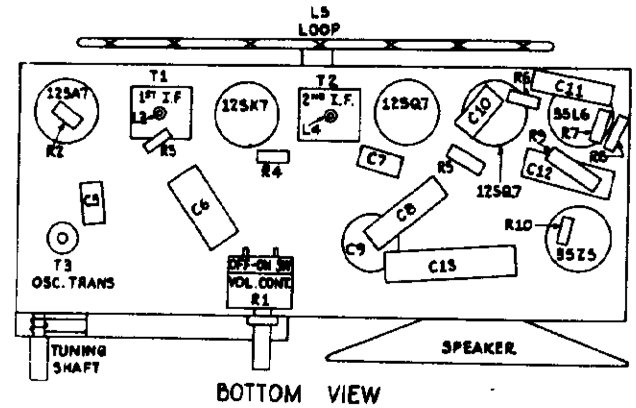
THE B. F. GOODRICH COMPANY



THE B. F. GOODRICH COMPANY

SOCKET	PIN	VTVM	20,000Ω/P.V.	1,000Ω/P.V.	RESISTANCE
12SA7	1	0	0	0	0
CONV.	2	AC	AC	AC	70
	3	+84	+84	+84	OVER 5 MEGS
	4	+84	+84	+64	OVER 5 MEGS
	5	-11	-10	-9 ON 100V SCALE -5 ON 10V SCALE	17K
	6	0	0	0	1.2 Ω
	7	AC	AC	AC	70 Ω
	8	-1.5	-0.6	-0.4	1 MEG
12SK7	1	0	0	0	0
I-F AMPL	2	AC	AC	AC	30 Ω
	3	0	0	0	0
	4	-1.5	-0.6	-0.4	1 MEG
	5	0	0	0	0
	6	+84	+84	+84	OVER 5 MEGS
	7	AC	AC	AC	45 Ω
	8	+84	+84	+84	OVER 5 MEGS
12SQ7	1	0	0	0	0
DET	2	0	0	0	0
AVC	3	0	0	0	0
	4	-0.5	-0.4	-0.2	450K
	5	-0.5	-0.4	-0.2	450K
	6	0	0	0	0
	7	AC	AC	AC	30 Ω
	8	AC	AC	AC	20 Ω
12SQ7	1	0	0	0	0
AUDIO	2	-0.8	-0.6	-0.2	9 MEG
AMPL.	3	0	0	0	0
	4	0	0	0	0
	5	0	0	0	0
	6	+52	+48	+14	OVER 5 MEG
	7	AC	AC	AC	15 Ω
	8	0	0	0	0
35L6	1	0	0	0	0
AUDIO	2	AC	AC	AC	56 Ω
OUTPUT	3	+125	+125	+125	OVER 5 MEGS
	4	+84	+84	+84	OVER 5 MEGS
	5	0	0	0	525K
	6	--	--	--	--
	7	AC	AC	AC	90 Ω
	8	+4.5	+4.5	+4.5	150 Ω
35Z5	1	--	--	--	--
RECT.	2	AC	AC	AC	120 Ω
	3	AC	AC	AC	110 Ω
	4	AC	AC	AC	0
	5	AC	AC	AC	120 Ω
	6	AC	AC	AC	115 Ω
	7	AC	AC	AC	85 Ω
	8	+130	+130	+130	OVER 5 MEGS

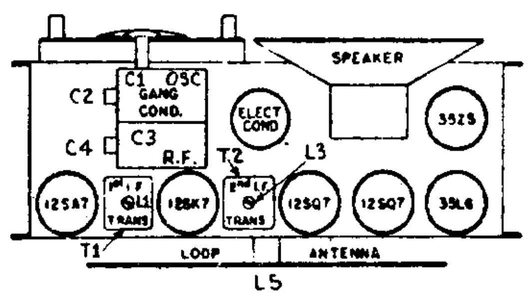
ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V.A.C.



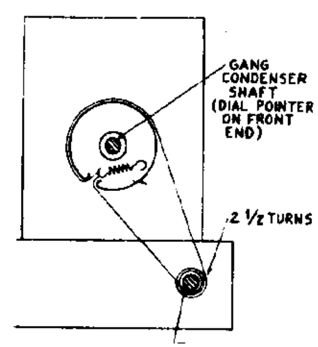
BOTTOM VIEW

ALIGNMENT

THE CHASSIS MUST BE REMOVED FROM THE CABINET IN ORDER TO ALIGN THE RECEIVER. CONNECT THE OUTPUT METER ACROSS THE VOICE COIL. CONNECT THE SIGNAL GENERATOR TO THE STANDARD HAZELTINE MODEL 1150 LOOP, AND COUPLE LOOSELY TO THE RECEIVER LOOP. SET THE RECEIVER VOLUME CONTROL AT MAXIMUM. THE TUNING CONDENSER PLATES SHOULD BE FULLY MESHED WHEN THE DIAL POINTER IS AT THE INDEX MARK AT THE LOW FREQUENCY END OF THE DIAL. THE SIGNAL GENERATOR OUTPUT SHOULD BE JUST SUFFICIENT TO OBTAIN HALF SCALE DEFLECTION ON THE LOWEST SCALE OF THE OUTPUT METER. SET THE SIGNAL GENERATOR TO 455 KC. ADJUST THE I.F. TUNING SLUGS FOR MAXIMUM OUTPUT IN THE FOLLOWING SEQUENCE: L4, L3, L2, L1. SET THE GENERATOR AND RECEIVER TO 1600 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT. SET THE GENERATOR AND RECEIVER TO 1400 KC AND ADJUST R.F. TRIMMER C4 FOR MAXIMUM OUTPUT.

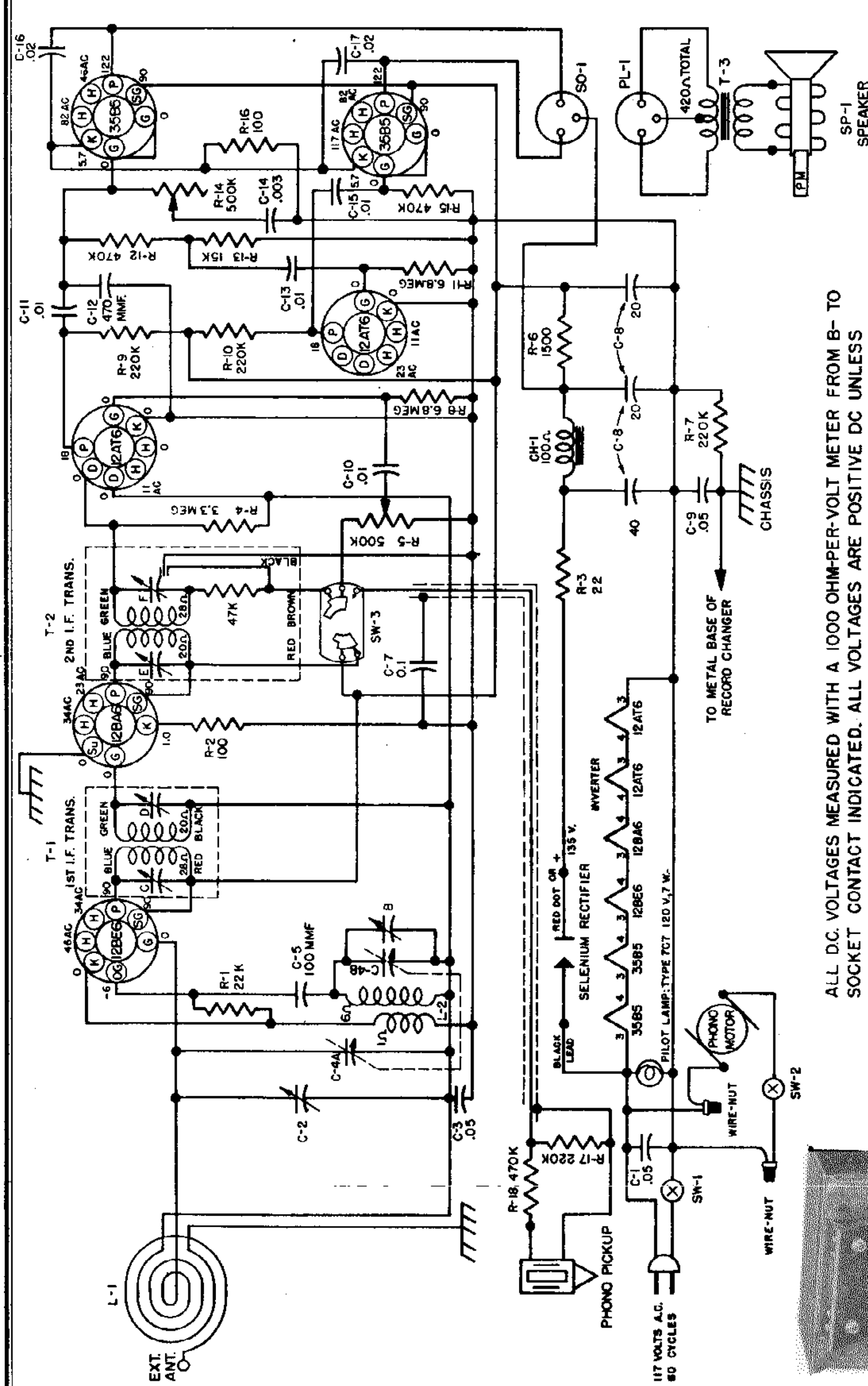


DIAL CORD DRIVE



MODEL R76162

THE B. F. GOODRICH COMPANY



ALL D.C. VOLTAGES MEASURED WITH A 1000 OHM-PER-VOLT METER FROM B- TO SOCKET CONTACT INDICATED. ALL VOLTAGES ARE POSITIVE DC UNLESS OTHERWISE NOTED.

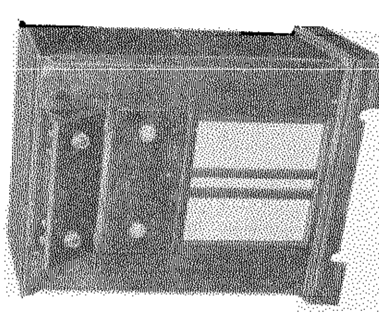
VOLUME CONTROL FULL ON. NO SIGNAL INPUT.

RADIO-PHONO SWITCH SHOWN IN RADIO POSITION, SHAFT END VIEW.

ALL TUBE SOCKETS SHOWN FROM PIN END VIEW.

455 KC IF

RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.
"K" EQUALS 1000 OHMS, "MEG" EQUALS 1,000,000 OHMS.
CAPACITY VALUES ARE IN MICROFARADS UNLESS OTHERWISE NOTED.



ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — RMA loop.

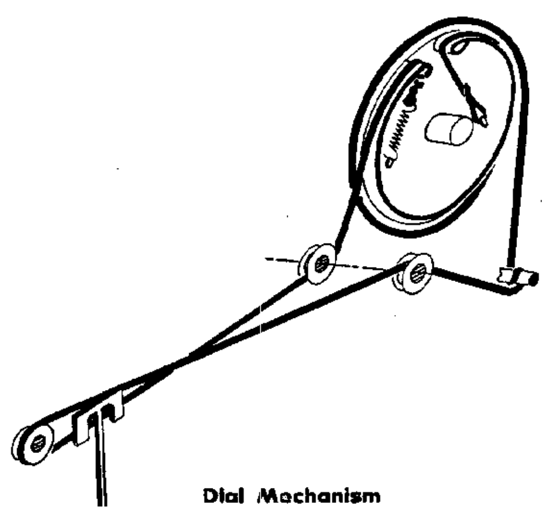
NOTE: Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12BE6 grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12BE6 grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
1620 kc.	12BE6 grid	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop	RMA loop	1400 kc.	Ant. trimmer C-2	Tune to max.

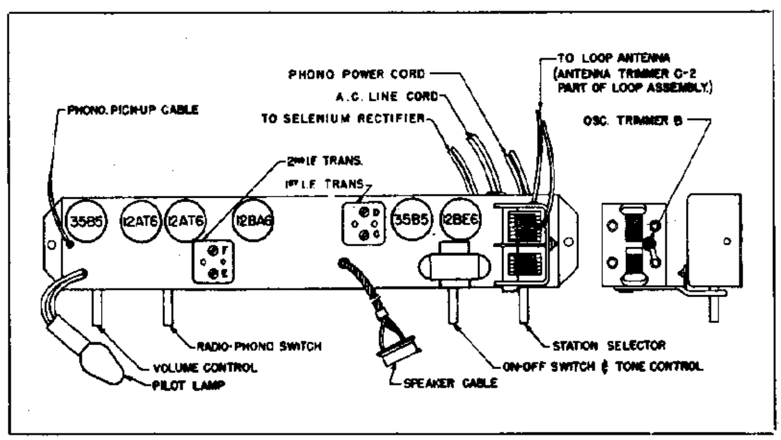
Electrical and Mechanical Specifications

Frequency Range .... 540-1600 kc.
Intermediate Frequency .... 455 kc.
Power Supply .... 105 to 125 volts AC, 60 cycle
Loudspeaker .... 10-inch, PM

V.C. Impedance .... 3.2 ohms at 400 cycles
Power Output (Undistorted) .... 2 watts
Power Output (Maximum) .... 3.2 watts
Tuning Drive Ratio .... 7 to 1



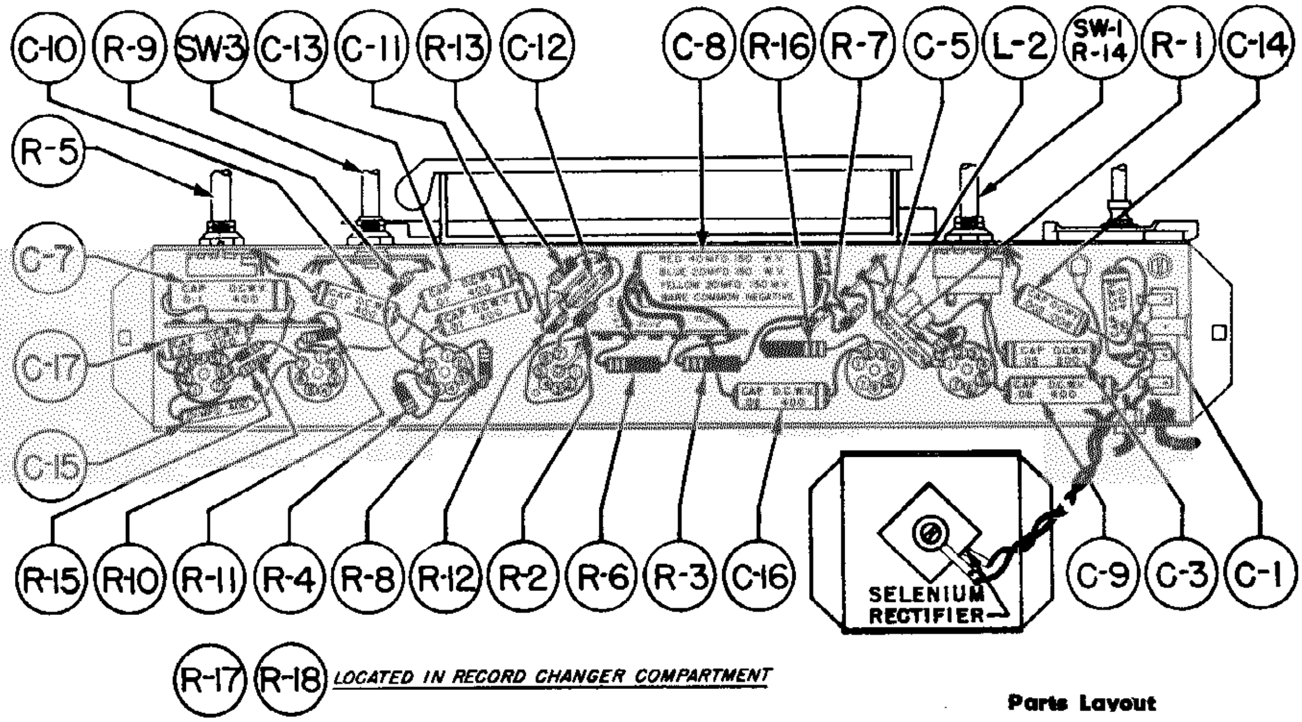
Dial Mechanism



Tube Layout

MODEL R76162

THE B. F. GOODRICH COMPANY



Parts Layout

TUBE COMPLEMENT

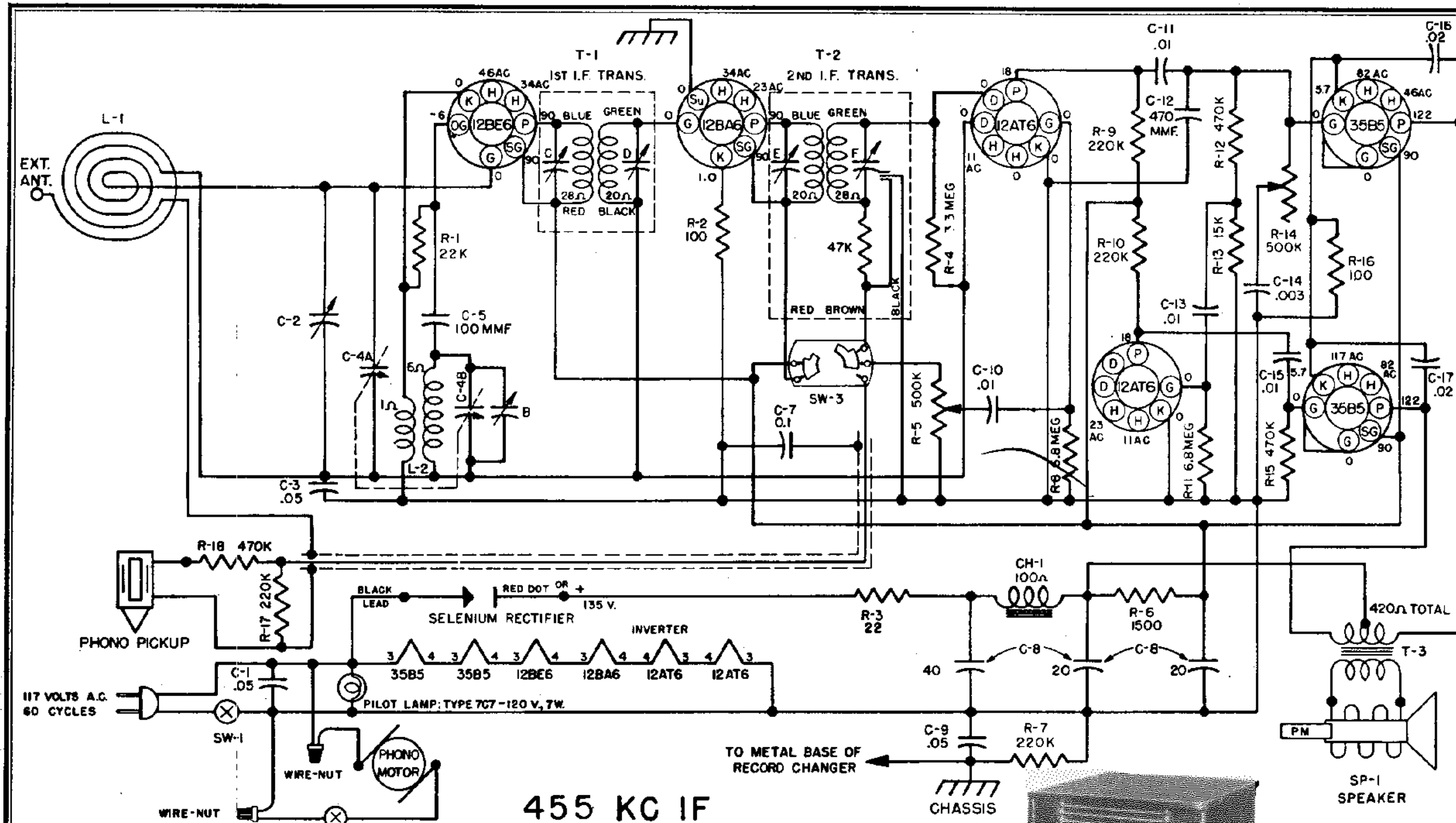
1—12BE6 Converter tube
1—12BA6 IF Amplifier tube
1—12AT6 Detector—AVC—First Audio tube
1—12AT6 Phase Inverter
2—35B5 Power Output tubes

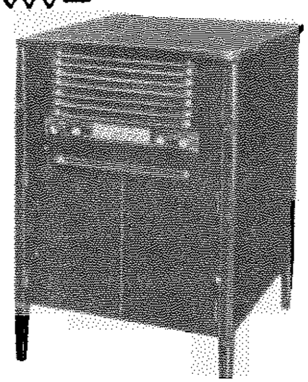
SERVICE PARTS LIST

Symbol	Part No.	Description
	E59413-1	Cabinet
C-4	C57859-1	Capacitor, Variable
	A2163	Cable, Dial
C-8	B55487-1	Cap., Elect. 40-20-20 mfd., 150v.
C-15	BC31B103	Cap., Mold. Paper .01 mfd., 400v.
C-3	BD210503	Cap., Paper .05 mfd., 200v.
C-10, 11, 13	BD41013	Cap., Paper .01 mfd., 400v.
C-7	BD410104	Cap., Paper 0.1 mfd., 400v.
C-16, 17	BD410203	Cap., Paper .02 mfd., 400v.
C-1, 9	BD410503	Cap., Paper .05 mfd., 400v.
C-14	BD610302	Cap., Paper .003 mfd., 600v.
C-5	BM74A101	Cap., Mica 100 mmf.
C-12	BM74A471	Cap., Mica 470 mmf.
	B55823	Carton, Complete
CH-1	B58635-1	Choke, Filter
L-2	B57842	Coil Assy., Osc.
L-1	C59420	Coil Assy., Loop
R-5	B54466-2	Control, Pot. 500 000 ohm, (V.C.)
R-14	B57841-1	Control, Pot. & Sw. 500,000 ohm, (T.C.)
	C-59414	Crystal & Indicator, Dial
	B57262-8	Cord, (A.C. Phono)
	B58069-3	Cord, Power
	C59416-1	Knob, Magnifying Insert
	A55431	Lamp, Pilot, 7w., 120v.

Symbol	Part No.	Description
	B51524-5	Lead Shielded
	A58723	Needle, Osmium Point
	B57857-1	Pointer, Dial
	A9027	Pulley, Idler
	A58612	Rectifier, Selenium
	A58700	Retainer, Dial Crystal
R-2	BR16B101	Resistor, 100 ohm, ⅛w.
R-16	BR16E101	Resistor, 100 ohm, 1w.
R-13	BR16B153	Resistor, 15.000 ohm, ⅛w.
R-12, 18	BR16B474	Resistor, 470,000 ohm, ⅛w.
R-1	BR17B223	Resistor, 22,000 ohm, ⅛w.
R-7, 9, 10, 17	BR17B224	Resistor, 220,000 ohm, ⅛w.
R-4	BR17B335	Resistor, 3.3 megohm, ⅛w.
R-15	BR17B474	Resistor, 470,000 ohm, ⅛w.
R-8, 11	BR17B685	Resistor, 6.8 megohm, ⅛w.
R-6	BR17E152	Resistor, 1,500 ohm, 1w.
R-3	BR17E220	Resistor, 22 ohm, 1w.
	B57848-1	Shaft, Drive
	B55440-1	Socket, Dial Light
SO-1	B59417-1	Socket & Cable Assy.
SP-1	C59415	Speaker, 10-inch PM
	C58711-1	Strip, Light Diffusing
SW-3	B51576-2	Switch, (Radio-Phono)
T-2	B56718-2	Transformer Assy., 2nd IF
T-1	B56722-2	Transformer Assy., 1st IF

THE B. F. GOODRICH COMPANY





ALL D.C. VOLTAGES MEASURED WITH A 1000 OHM-PER-VOLT METER FROM B- TO SOCKET CONTACT INDICATED. ALL VOLTAGES ARE POSITIVE DC UNLESS OTHERWISE NOTED.

VOLUME CONTROL FULL ON. NO SIGNAL INPUT.

RADIO-PHONO SWITCH SHOWN IN RADIO POSITION, SHAFT END VIEW.

ALL TUBE SOCKETS SHOWN FROM PIN END VIEW.

RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

"K" EQUALS 1000 OHMS, "MEG" EQUALS 1,000,000 OHMS.

CAPACITY VALUES ARE IN MICROFARADS UNLESS OTHERWISE NOTED.

 THE B. F. GOODRICH COMPANY

ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — RMA loop.

NOTE: Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12BE6 grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12BE6 grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
1620 kc.	12BE6 grid	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop*	RMA loop	1400 kc.	Ant. trimmer C-2	Tune to max.

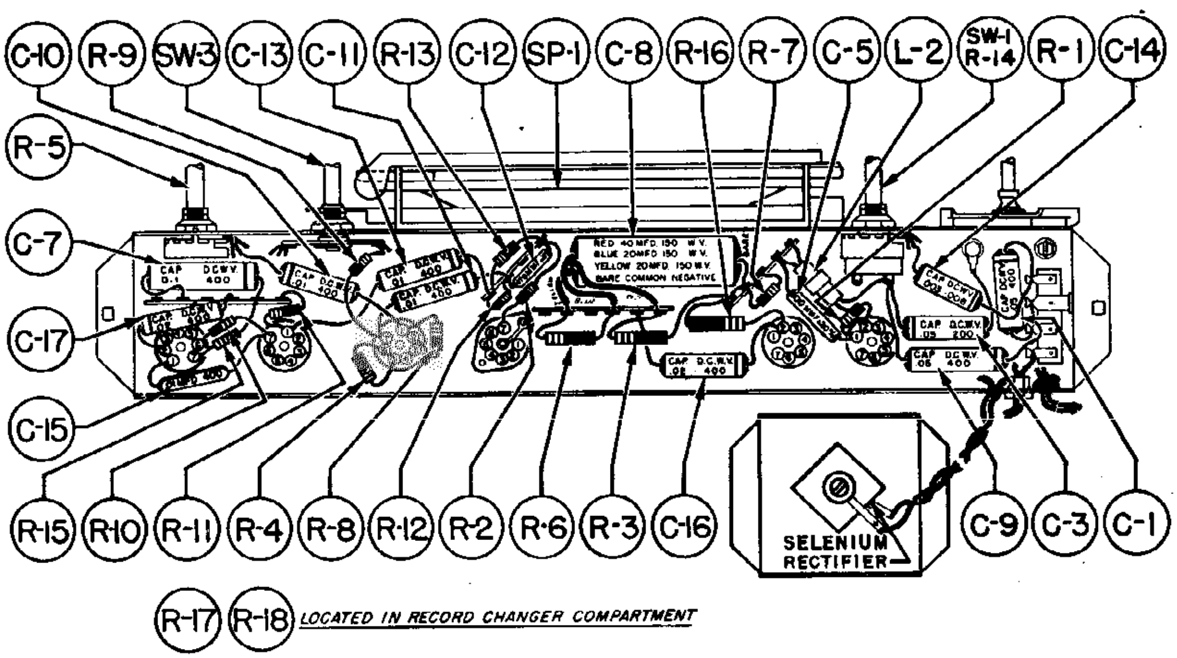
* Loop trimmer accessible through back of cabinet drawer.

Electrical and Mechanical Specifications

Frequency Range........540-1600 kc.
Intermediate Frequency........455 kc.
Power Supply........105 to 125 volts AC, 60 cycle
Loudspeaker........5x7 elliptical type PM
V.C. Impedance........3.2 ohms at 400 cycles
Power Output (Undistorted)........2 watts
Power Output (Maximum)........3.2 watts
Tuning Drive Ratio........7 to 1

TUBE COMPLEMENT

1—12BE6 Converter tube
1—12BA6 IF Amplifier tube
1—12AT6 Detector—AVC—First Audio tube
1—12AT6 Phase Inverter
2—35B5 Power Output tubes
1—35W4 Rectifier tube

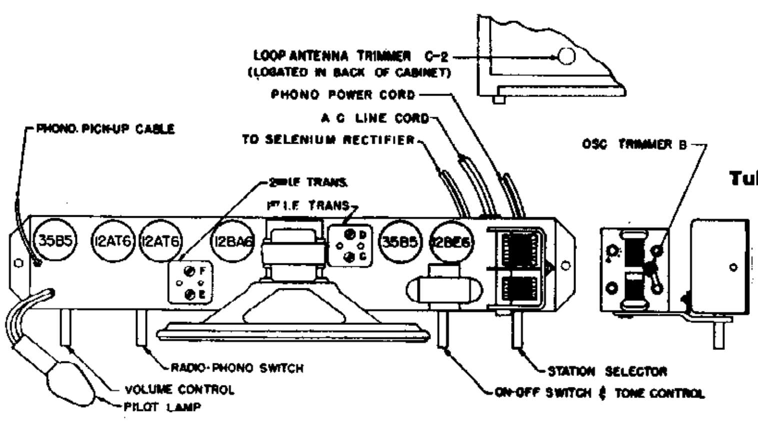


Parts Layout

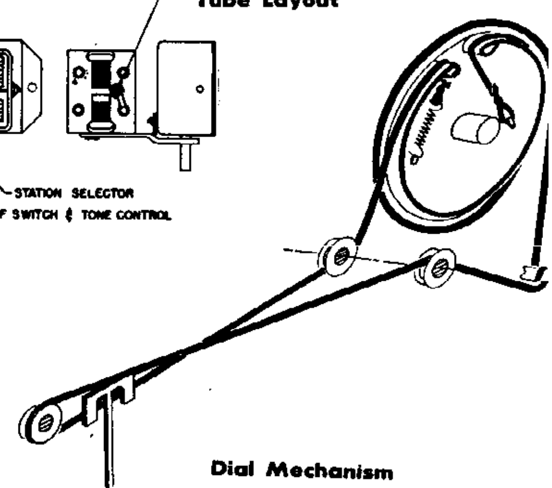
SERVICE PARTS LI.

Symbol	Part No.	Description
	E58626-1	Cabinet
C-2	B-57879-1	Cap., Assy. Trimmer
C-3	BD210503	Cap., Paper, .05 mfd., 200 v.
C-4	C-57859-1	Cap., Var., 2 Sec. Tuning
C-5	BM74A101	Cap., Mica, 100 mmf
C-7	BD410104	Cap., Paper, 0.1 mfd., 400 v.
C-8	B-55487-1	Cap., Electro., 40-20-20 mfd., 150 v.
C-1, 9	BD410503	Cap., Paper, .05 mfd., 400 v.
C-12	BM74A471	Cap., Mica, 470 mmf
C-10, 11, 13	BD410103	Cap., Paper, .01 mfd., 400 v.
C-14	BD610302	Cap., Paper, .003 mfd., 600 v.
C-15	BC31B103	Cap., Molded Paper, .01 mfd., 400 v.
C-16, 17	BD410203	Cap., Paper, .02 mfd., 400 v.
CH-1	B-58635-1	Choke, Filter
L-1	D-57870	Coil Assy., Loop
L-2	B-57842	Coil Assy., Oscillator
	B-57262-6	Cord, A.C. Phono
	B-58069	Cord, Power, 8 ft.
R-5	B-54466-2	Control, Pot., 500,000 ohm (V.C.)
	C-59414	Crystal and Indicator Dial
	C-59416-1	Knob, Magnifying Insert

Symbol	Part No.	Description
	A-58612	Rectifier, Selenium
	B-57857-1	Pointer, Dial
	A-9027	Pulley Idler
	A-55431	Lamp, Pilot, 7 w., 120 v.
R-1	BR17B223	Resistor, 22,000 ohm, ½ w.
R-2	BR16B101	Resistor, 100 ohm, ⅓ w.
R-3	BR17E220	Resistor, 22 ohm, 1 w.
R-4	BR17B335	Resistor, 3.3 megohm, ½ w.
R-6	BR17E152	Resistor, 1500 ohm, 1 w.
R-8, 11	BR17B685	Resistor, 6.8 megohm, ½ w.
R-12	BR16B474	Resistor, 470,000 ohm, ⅓ w.
R-13	BR16B153	Resistor, 15,000 ohm, ⅓ w.
R-14	B-57841-1	Control, Pot. and Sw. 500,000 ohm (T.C.)
R-16	BR16E101	Resistor, 100 ohm, 1 w.
R-7, 9, 10, 17	BR17B224	Resistor, 220,000 ohm, ½ w.
R-15, 18	BR17B474	Resistor, 470,000 ohm, ½ w.
SP-1	C-58621	Speaker, 5x7-inch, P.M.
	B-57848-1	Shaft, Drive
	A-50147	Spring, Conical
	C-58711-1	Strip, Light Diffusing
SW-3	B-51576-2	Switch (Radio-Phono.)
T-1	B-56722-2	Transformer Assy., 1st I.F.
T-2	B-56718-2	Transformer Assy., 2nd I.F.



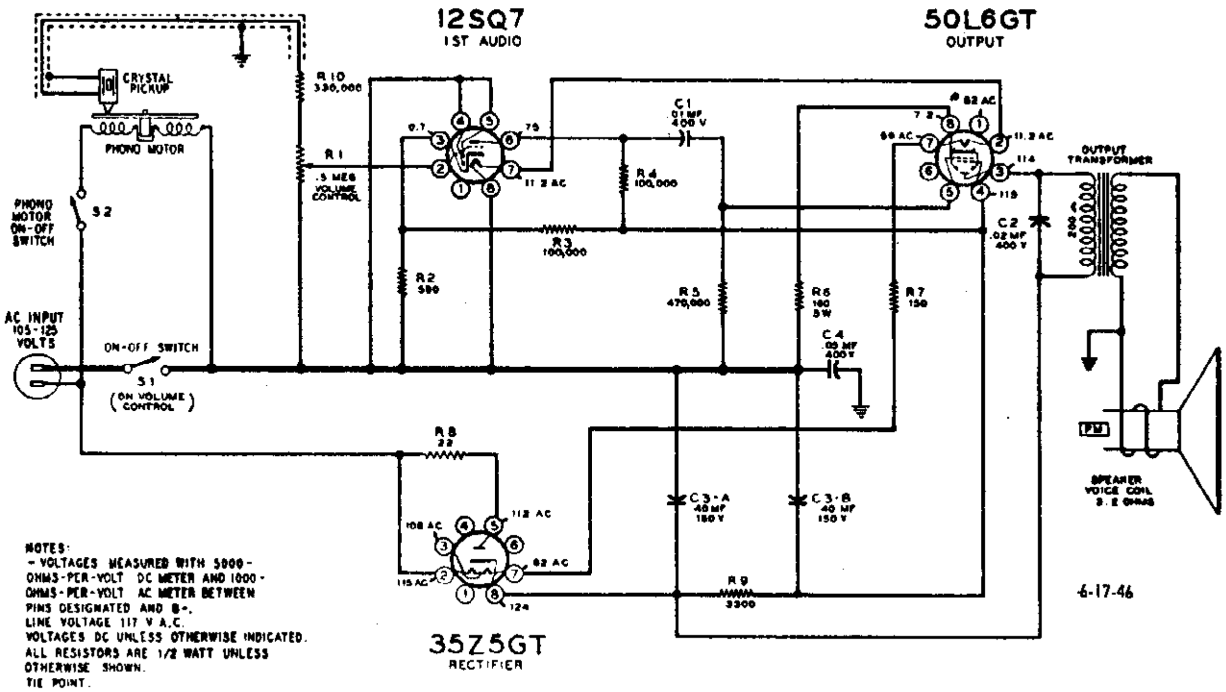
Tube Layout



Dial Mechanism

W. T. GRANT COMPANY

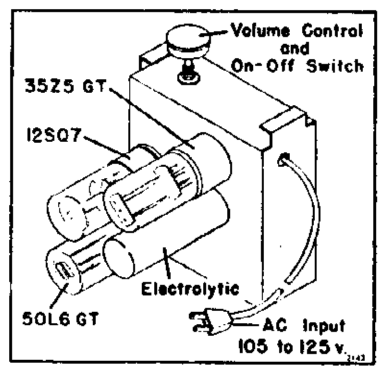
MODEL 300, Series



Power Supply........105 to 125 volts AC, 60 cycles, 50 watts.

Power Output........0.75 watt undistorted (0.6 volt input). 1.8 watts maximum.

Speaker................5-inch (or 4-inch x 6-inch oval), P. M., voice coil impedance 3.2 ohms.



Amplifier Chassis

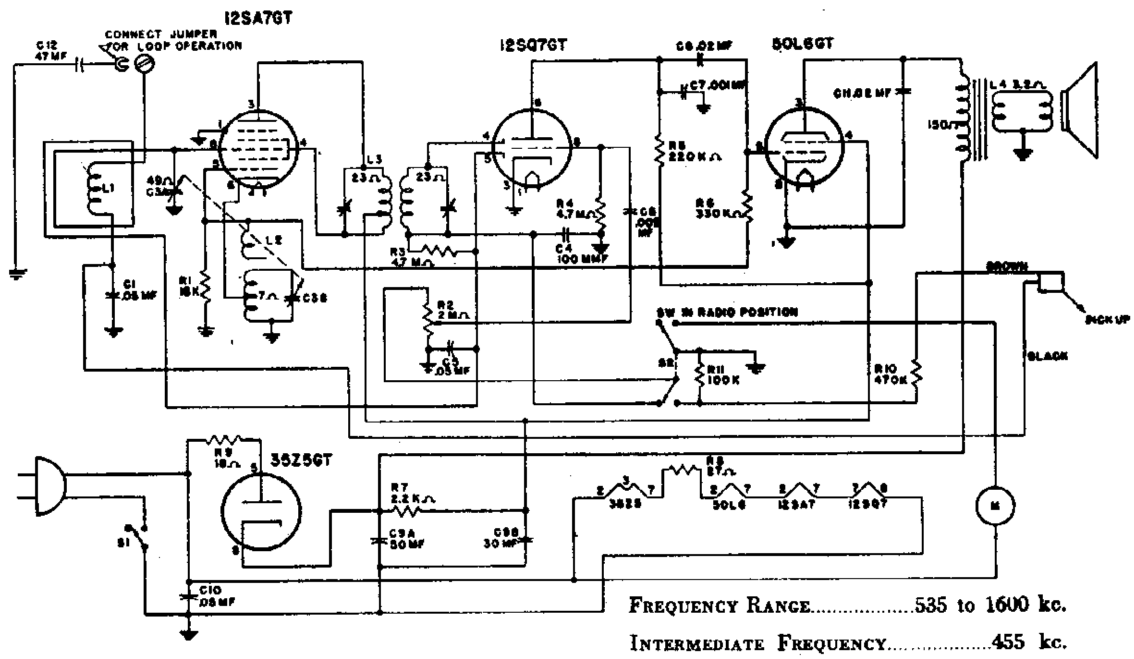
Ref. No.	*Part No.*	*Description*
		CAPACITORS
C1	C-8D-10761	.01 mf, 400 volts, 20%
C2	C-8D-10774	.02 mf, 400 volts, 20%
C3-A, -B	A-8C-11415-1 or A-8C-11119	Electrolytic; 40 mf x 150 volts, 40 mf x 150 volts
C4	C-8D-10813	.05 mf, 400 volts, 20%
		RESISTORS*
R1, S1	A-10A-11377	Volume control (500,000 ohms) and on-off switch
R2	C-9B1-59	560 ohms, 1/2 watt, 10%
R3	C-9B1-86	100,000 ohms, 1/2 watt, 10%
R4	C-9B1-25	100,000 ohms, 1/2 watt, 20%
R5	C-9B1-29	470,000 ohms, 1/2 watt, 20%
R6	A-9C-11355	160 ohms, 5 watts, 10%, wirewound
R7	C-9B1-8	150 ohms, 1/2 watt, 20%
R8	C-9B1-3	22 ohms, 1/2 watt, 20%
R9	C-9B1-16	3300 ohms, 1/2 watt, 20%
R10	C-9B1-28	330,000 ohms, 1/2 watt, 20%

MISCELLANEOUS

	B-12C-10074-3	Output transformer
	B-14M-10088	Line cord and plug
	A-15B-10440	Tube socket
	A-49A-11356	Tube retainer (for 12AT6)
	A-49A-11357	Tube retainer (for 35W4, 50B5)
	B-18A-10952-1 or B-18A-11381	Speaker, 5-inch, P. M. Speaker, 4-inch x 6-inch oval, P. M
	D-21H-10816	Phono motor and turntable
	48C-11884	Pickup arm, less mounting base ar crystal cartridge
	23B-11886	Mounting base for pickup arm
	8K-11885	Crystal cartridge
S2	A-20C-10317	Phono motor on-off switch
	202-11360	Cabinet
	B-2K-11364	Grille
	A-5B-11370-17	Knob
	A-25B-11390	Rubber feet

MODEL 405/7

W. T. GRANT COMPANY



FREQUENCY RANGE..................535 to 1600 kc.

INTERMEDIATE FREQUENCY..................455 kc.

Alignment Procedure

- Output meter across 3.2-ohm output load.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Volume control at maximum for all adjustments.
- Chassis must be removed from cabinet for proper alignment.

SIGNAL GENERATOR				
Frequency	*Dummy Antenna*	*Connection to Radio*	*Condenser Setting*	*Adjust Trimmers to Maximum Output (in order shown)*
455 kc	.1 mf	Variable Condenser R.F. Section	Any	Trimmers on I.F. can
1590 kc	* *	* *	Condenser at Minimum Capacity-Plates Out of Mesh	Oscillator trimmer
1590 kc	* *	* *	Condenser at Minimum Capacity-Plates Out of Mesh	Antenna trimmer

* * Run a wire from the output terminal of the generator near the receiver. However, no connection is made between the signal generator and the receiver.

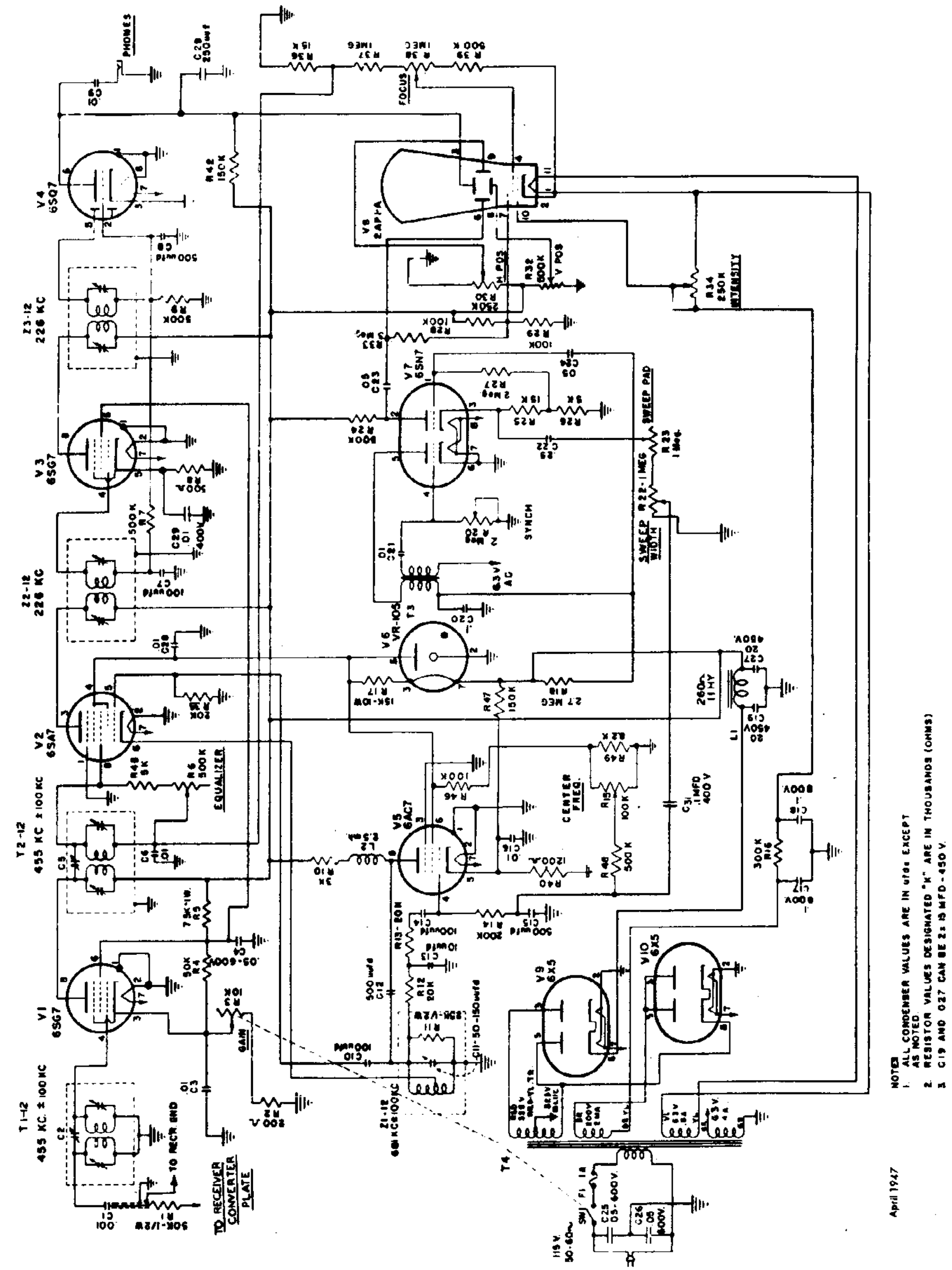
PARTS LIST

Schematic Location	*Part No.*	*Description*
	T-470	Cabinet, Wood
L1	28186	Back Cover with Loop
C1, C10		Condenser, Paper, .05 Mfd. 400 V.
C6		Condenser, Paper, .002 Mfd. 400 V.
C8, C11		Condenser, Paper, .02 Mfd. 400 V.
C5		Condenser, Paper, .05 Mfd. 200 V.
C7		Condenser, Paper, .001 Mfd. 500 V.
C4		Ceramic, 100 Mmfd.
C12		Ceramic, 47 Mmfd.
C3	1675	Condenser, Variable Air - 2 Gang
C9	2073	Condenser, Electrolytic 50-30 Mfd. 150 V.
R2	2480	Control, Volume with Switch, 2 Megohms
		Cord, Line 6' long

Schematic Location	*Part No.*	*Description*
L2	28184	Coil Oscillator
	39160	Knob, Tuning
	39161	Knob Volume, or Phone-Radio
R1		Resistor, 18K ohms, 1/4 W.
R3, R4		Resistor, 4.7 Megohms, 1/4 W.
R5, R10		Resistor, 220K ohms, 1/4 W.
R7		Resistor, 2200 ohms, 2 W.
R9		Resistor, 18 ohms, 1/2 W.
R6		Resistor, 330K ohms, 1/4 W.
R11		Resistor, 100K ohms, 1/4 W.
R8		Resistor, 27 ohms, 1/2 W.
L4	5877	Speaker & Output Transformer
	3376	Transformer, I.F.

THE HALLICRAFTERS CO.

MODEL SP-44
SKYRIDER, PANORAM



MODEL SP-44
Skyrider Panoramic

THE HALLICRAFTERS CO.

TROUBLE SHOOTING CHART.

Symptom	Causes and Cures
No illumination of the cathode ray tube, V8.	1. AC power is off. a. See if tubes are lit. b. Fuse inside chassis burned out. c. Check ON-OFF switch. 2. INTENSITY and FOCUS controls out of adjustment. 3. Defective cathode ray tube, or rectifiers V9, V10. 4. Defective high voltage power supply. 5. Tubes not seated properly in sockets. 6. Shorted filter condensers C17, C18. 7. Open resistors R16, R34.
Baseline trace cannot be made sharp and bright.	1. AC power input below 115V. 2. Check high voltage power supply (V10). 3. Defective cathode ray tube. 4. Check condition of INTENSITY and FOCUS controls for possible opens. 5. Check resistance of R16, R36, R37 and R39.
Baseline trace cannot be made to coincide with screen baseline.	1. Check high voltage power supply (V10). 2. Check V4 if unable to get vertical position. 3. Check R31. 4. Check the voltage on the cathode ray tube deflection plates against the voltages specified on the Voltage Chart.
4. Stationary spot on the screen.	1. Check V7. 2. Trace the sawtooth voltage with an oscilloscope from the blocking oscillator V7 to V8. 3. Check R18, R20.
5. Jumpy baseline or flickering images.	1. Sawtooth Generator is not synchronized to half the line frequency. Change V7. Check the values of the resistors and condensers R18, R19, R20, R21, C20, C21. 2. Feed the AC voltage from pin No. 7. of "V4" through a 500 mmf condenser to pin No. 2 of the same tube. Adjust syncronization potentiometer under the chassis until two stationary peaks appear on the screen, when the adjustment is completed, remove the AC voltage from pin No. 2.
6. No signals.	1. Check connection to receiver. 2. Turn up GAIN control. 3. Check operation of the receiver.
	4. Test PANADAPTOR for center deflection with a signal generator set at 455KC (or I.F. of receiver) to the input (disconnected from receiver). 5. Increase SWEEPWIDTH control to maximum sweep.
7. Whole baseline moves vertically when receiver is tuned.	1. F.M. sweep is not operating, and set behaves as though the SWEEPWIDTH control is set at zero. Check V5. Use an oscilloscope to check sawtooth at pin #4 of V5. 2. Strong local stations coming through the receiver and beating against one another in the input stages of the PANADAPTOR to produce 226KC. Remedy would be to align receiver or install wave traps.
8. Baseline remains at top of the screen regardless of tuning.	1. I.F. amplifier may be oscillating Change V3, V6. Check C4, C28. Compare V3 voltage against voltage chart. 2. Video amplifier V4 may be inoperative. Change V4. Compare V4 voltages against Voltage Chart.
9. Low gain. Able to hear weak signals but cannot see them on PANADAPTOR screen.	1. Check all tubes. Most likely to be weak V3, V4. 2. Check voltages, especially screen voltage of V3. 3. Misaligned I.F. transformers. *Note*: Do not attempt alignment until *absolutely* certain that alignment is at fault.
10. Symptoms of misalignment. a. Low gain. b. "Pips" too wide. c. The double peaked response of the band pass amplifier is not peaked at points 10KC from each end of the scale. d. Frequency range of signals on the screen is other than 200KC at maximum sweepwidth. e. Range of the CENTER FREQ. control is less than 200KC. f. Pip generated by an unmodulated signal is non-symmetrical.	1. Do not attempt alignment until the set has been thoroughly checked for faults. Be sure that the error limits, as given in the specifications, for the PANADAPTOR, are exceeded before concluding that alignment is necessary.

VOLTAGE CHART.

Voltmeter 1,000 ohms per volt.
Line voltage 115V

Circuit Symbol	Type	Function	PIN NUMBER 1	2	3	4	5	6	7	8	9	10	11
V1	6SG7	R. F. Amplifier	0	0	17	0	17	115	6.3AC	380	......	......	......
V2	6SA7	Converter	0	0	380	105	0	0	6.3AC	−1.3	......	......	......
V3	6SG7	I. F. Amplifier	0	0	2.4	0	2.4	115	6.3AC	380	......	......	......
V4	6SQ7	Det. Video Amp.	0	0	0	0	0	125	6.3AC	0	......	......	......
V5	6AC7	Reactor	0	0	0	0	3.3	105	6.3AC	360	......	......	......
V6	VR105	Voltage Reg.	......	......	380	......	105	......	380	......	......	......	......
V7	6SN7	Sawtooth Gen. and Amplifier	0	60	5	−0.2	3	0	6.3AC	0	......	......	......
V8	2AP1-A	CRT Indicator	−420	−420	140	−100	0	SL	160	175	155	−490	−420
V9	6 x 5	L. V. Rectifier	......	......	325AC	......	325AC	......	6.3AC	390	......	......	......
V10	6 x 5	H. V. Rectifier	......	......	−700	......	−700	......	6.3AC	325AC	......	......	......

Notes:—GAIN at minimum, SWEEPWIDTH at maximum, all other controls at normal position. SL indicates slight movement.

VOLTAGE CHART.

Voltmeter 25,000 ohms per volt.
Line voltage 115V.

Circuit Symbol	Type	Function	PIN NUMBER 1	2	3	4	5	6	7	8	9	10	11
V1	6SG7	R. F. Amplifier	0	0	20	0	20	120	6.3AC	380	......	......	......
V2	6SA7	Converter	0	0	380	105	0	0	6.3AC	−3.0	......	......	......
V3	6SG7	I. F. Amplifier	0	0	2.7	0	2.7	120	6.3AC	380	......	......	......
V4	6SQ7	Det. Video Amp.	0	0	0	0	0	150	6.3AC	0	......	......	......
V5	6AC7	Reactor	0	0	0	0	3.4	105	6.3AC	360	......	......	......
V6	VR105	Voltage Reg.	......	......	380	......	105	......	380	......	......	......	......
V7	6SN7	Sawtooth Gen. and Amplifier	0	150	8.2	−7.3	50	0	6.3AC	0	......	......	......
V8	2AP1-A	CRT Indicator	−600	−600	165	−380	0	115*	185	250	185	−650	−600
V9	6 x 5	L. V. Rectifier	......	......	325AC	......	325AC	......	6.3AC	390	......	......	......
V10	6 x 5	H. V. Rectifier	......	......	−740	......	−740	......	6.3AC	325AC	......	......	......

Notes:—GAIN at minimum, SWEEPWIDTH at maximum, all other controls at normal position. *Voltage reading varies according to scale used.

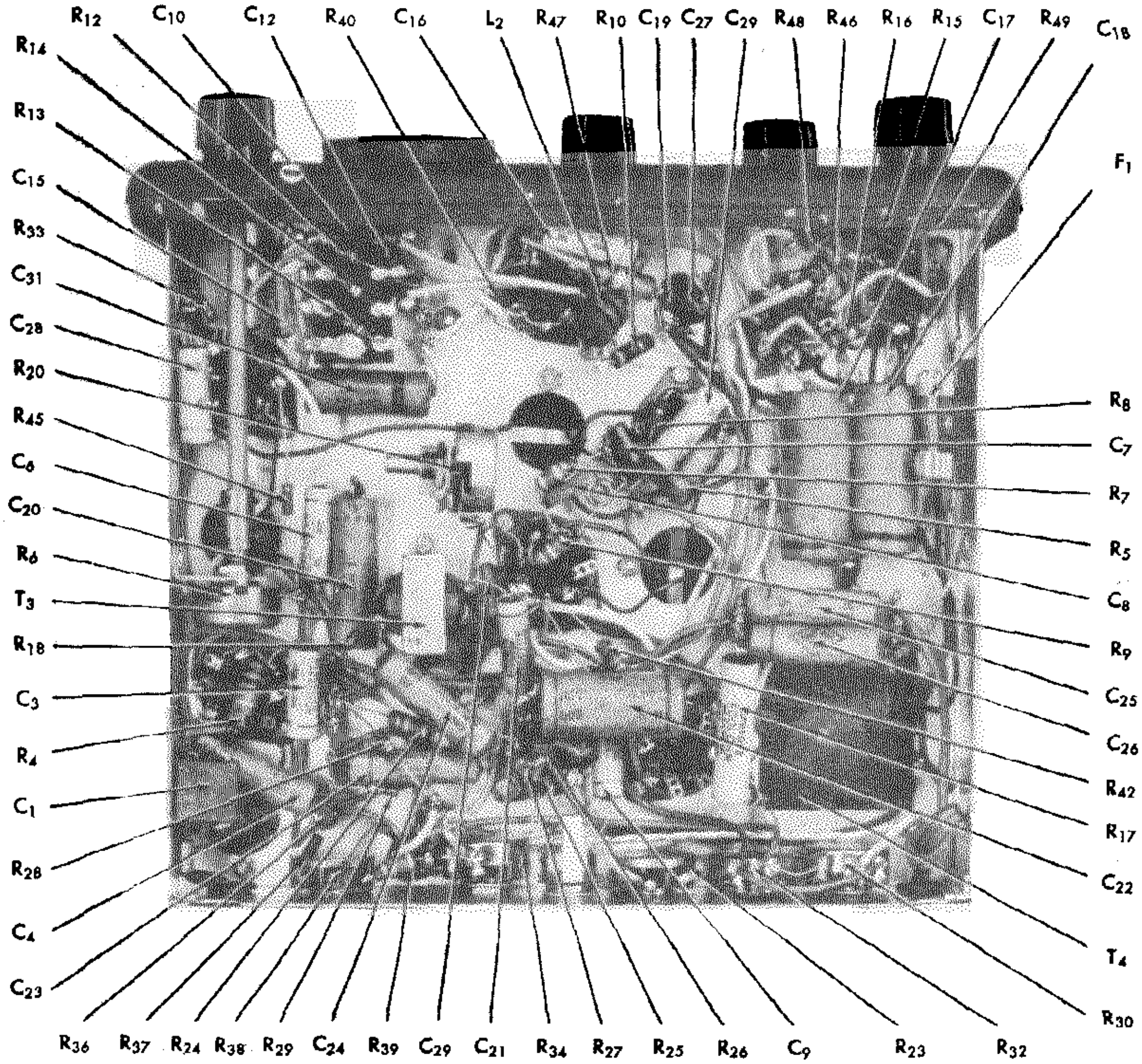
RESISTANCE CHART.

Circuit Symbol	Type	Function	PIN NUMBER 1	2	3	4	5	6	7	8	9	10	11
V1	6SG7	R. F. Amplifier	0	0	200	20	200	40K	0	50K	......	......	......
V2	6SA7	Converter	0	0	50K	70K	20K	5	0	15K	......	......	......
V3	6SG7	I. F. Amplifier	0	0	500	1 Meg.	500	40K	0	50K	......	......	......
V4	6SQ7	Det. Video Amp.	0	500K	0	......	500K	250K	0	0	......	......	......
V5	6AC7	Reactor	0	0	0	300K	1K	70K	0	53K	......	......	......
V6	VR105	Voltage Reg.	......	0	50K	......	70K	......	50K	......	......	......	......
V7	6SN7	Sawtooth Gen. and Amplifier	2 Meg.	550K	20K	1.3Meg.	3.5Meg.	0	0	0	......	......	......
V8	2AP1-A	CRT Indicator	2.5Meg.	2.5Meg.	250K	1.5Meg.	......	3 Meg.	75K	150K	75K	2.5Meg.	2.5Meg.
V9	6 x 5	L. V. Rectifier	......	0	270	2.5Meg.	250	......	0	50K	......	......	......
V10	6 x 5	H. V. Rectifier	......	0	3 Meg.	3 Meg.	3 Meg.	......	0	250	......	......	......

Notes:—GAIN and SWEEPWIDTH at maximum, all other controls at normal position. K = 1,000 ohms, Meg. = megohms, all other resistances are in ohms.

THE HALLICRAFTERS CO.

MODEL SP-44
Skyrider Panorami



Bottom view of chassis showing components location

REAR PANEL CONNECTIONS: Consists of a line cord with plug, phone jack for monitoring purposes, and R-F coupling cable to companion receiver.

POWER SUPPLY DATA: 105-125 volts AC, 50-60 cycles, power drain is approximately 55 watts.

TUBE TYPES AND FUNCTIONS: 6SG7 R-F amplifier, 6SA7 converter, 6SG7 I-F amplifier, 6SQ7 detector-video amplifier, 6AC7 reactor, VR-105 voltage regulator, 6SN7 saw tooth generator and amplifier, 2AP1 cathode ray tube, 6X5 low voltage rectifier, 6X5 high voltage rectifier.

Skyrider Panoramic Model SP-44, view showing operating controls.

MODEL SP-44
Skyrider Panoramic

THE HALLICRAFTERS CO.

REPLACEMENT PARTS LIST FOR MODEL SP-44 PANORAMIC ADAPTOR

Ref. No.	Description	Hallicrafters Part No.
	RESISTORS	
R2	200 ohm, ½ W.	RC20AE201J
R8	500 ohm, ½ W.	RC20AE510J
R40	1200 ohm, ½ W.	RC20AE122J
R10	3000 ohm, ½ W.	RC20AE302J
R26, 45	5000 ohm, ½ W.	RC20AE512J
R25, 36	15,000 ohm, ½ W.	RC20AE153M
R49	8200 ohm, ½ W.	RC20AE822J
R12, 13	18,000 ohm, ½ W., 10%	RC20AE183J
R35	20,000 ohm, ½ W.	RC20AE203J
R11	25,000 ohm, ½ W.	RC20AE273K
R1, 4	50,000 ohm, ½ W. 10%	RC20AE513J
R28, 29	100,000 ohm, ½ W.	RC20AE104M
R42	150,000 ohm, ½ W.	RC20AE154K
R14	200,000 ohm, ½ W.	RC20AE204J
R16	300,000 ohm, ½ W.	RC20AE304J
R7, 9, 48, 39 and 24	500,000 ohm, ½ W.	RC20AE514J
R37	1. megohm, ½ W.	RC20AE105M
R27	2. megohm, ½ W.	RC20AE205J
R18	2.7 megohm, ½ W.	RC20AE275J
R33	3. megohm, ½ W.	RC20AE305J
R47	150,000 ohm, 1 W.	RC35CE154J
R46	100,000 ohm, 1 W.	RC35CE104J
R5	75,000 ohm, 1 W.	RC35CE753J
R17	15,000 ohm, 10 W.ww	24BG153E
	POTENTIOMETERS	
R3	10,000 ohms, W./sw	25B678
R15	100,000 ohms	25B679
R22	100,000 ohms, no slot	25B677
R6	500,000 ohms, no slot	25B680
R30, 34	250,000 ohms	25B682
R22	1. meg	25B683
R23, 38	1. meg., slotted	25B684
R20	2. meg., slotted	25B681

Ref. No.	Description	Hallicrafters Part No.
	CAPACITORS, MICA	
C13	10 uuf	CM20A100J
C7, 10, 14	100 uuf	CM20A101M
C29	250 uuf	CM20A241J
C8, 12, 15	500 uuf	CM20A511J
C1	.001 mfd	CM25A102M
	CAPACITORS, PAPER	
C3, 6, 9, 16, 28, 30, 21	.01 400 VDC	46AW103H
C4, 23, 24, 25, 26	.05 400 VDC	46AW503H
C20, 31	.1 400 VDC	46AV104E
C17, 18	.1 800 VDC	46A081
C22	.25 600 VDC	46AV104H
C19, 27	20-20 MFD 450 VDC electrolytic	45A117
	TRANSFORMERS	
L1	Choke, RF	53A120
L2	Choke, power filter	56B087
T3	Sawtooth generator transf.	51B978
T4	Power trdnsformer	52C150
T1, 2	RF transformer	51B979
Z2, 3	IF transformer	50C219
Z1	Oscillator coil	51B980

MISCELLANEOUS

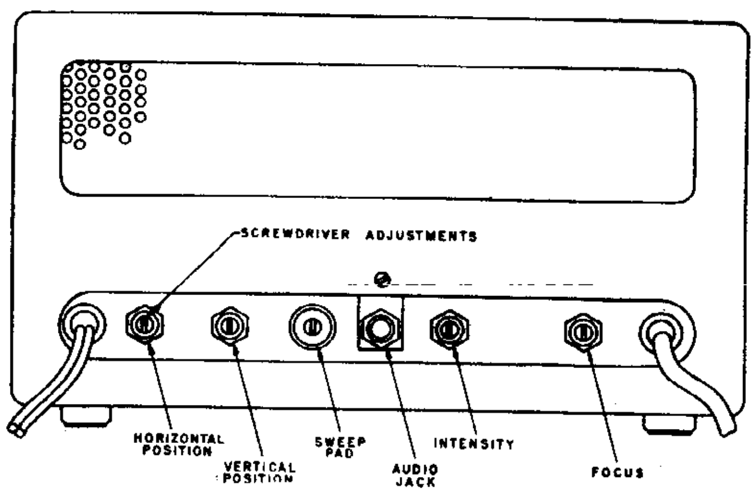
Fuseholder	6A287	RF cable	87A960
Phone jack	36A040	Spring clip connector	76A376
Knob	15A058	Octal socket	6A035
Screen, CRT	22A190	CRT socket	6A288
Fuse, 1 amp.	39A321	Line cord and plug	87B1577
Alligator clip	76A375		

a. ALIGNMENT PROCEDURE. — Allow the PANADAPTOR to reach operating temperature to assure stable operation. This may require 10-20 minutes. Adjust the screwdriver controls, INTENSITY and FOCUS, for optimum brightness and sharpness of the baseline trace. Note: Reduction of the intensity and proper adjustment of the Focus control produces a sharp baseline. Bring the baseline trace in coincidence with the lowest horizontal line on the screen by means of the VERTICAL POSITION Control.

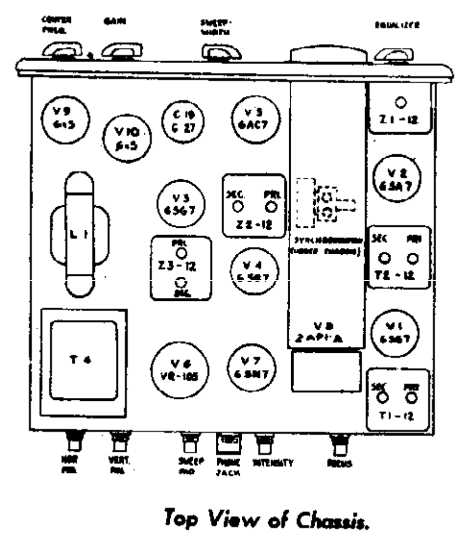
Adjust the HORIZONTAL POSITION Control so that the baseline is approximately centered along the horizontal axis.

Determine whether the horizontal sweep is synchronized to half the line of frequency by introducing hum into the grid (pin #2) of the 6SQ7 (use finger or screwdriver). A double hump should appear on the baseline if the circuit is operating correctly. If it does not, refer to the Troubleshooting Chart.

The Panoramic screen is used as the alignment indicator. Signals should be kept below the saturation level by limiting the signal generator output voltage. *continued*



View showing operating control functions



Top View of Chassis.

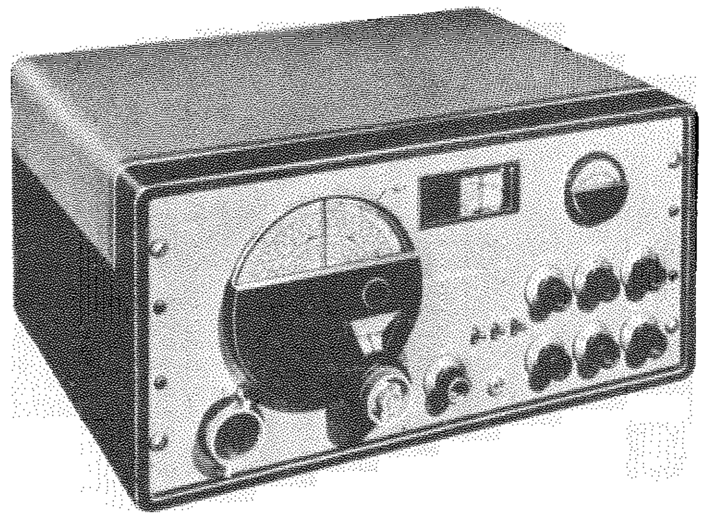
Alignment of	Signal Generator Output	Position of Controls	Procedure
I.F. Amplifier	226KC unmodulated to pin #8 of V2.	SWEEPWIDTH at zero position. CENTER FREQ. turned extreme counter-clockwise.	Entire baseline deflects upward. Adjust the trimmers in the I.F. transformers (Z2-12, Z3-12) for maximum deflection.
F.M. Oscillator	455KC (or I.F. of the receiver) unmodulated to pin #8 of V2.	SWEEPWIDTH at maximum. SWEEP PAD set half way. CENTER FREQ. at center or zero position.	A "pip" will appear on the screen. Adjust the trimmer in the oscillator transformer Z1-12, to bring "pip" to the center of the screen. Turn the SWEEPWIDTH control to almost zero for more accurate indications of proper trimmer adjustment. Return the SWEEPWIDTH control to maximum and adjust the HORIZONTAL POSITION control so that the "pip" is directly over the zero mark on the screen.
Linearity of Sweep	355KC - 555KC (or I.F. of the receiver ±100KC) unmodulated to pin #8 of V2.	SWEEPWIDTH at maximum. CENTER FREQ. at center or zero position.	Set the signal generator for 555KC *(or receiver I.F. +100KC)* and bring the "pip" to the —100KC mark by means of the SWEEP PAD. Shift the signal generator frequency to 355KC *(or receiver I.F. —100KC)*. The "pip" should be at the +100KC mark. If the linearity is incorrect, the deflections appear more than 10KC or ½ division from each end with 455KC *or I.F. deflection* in the center of the screen. Some correction is possible by trial and error adjustment of the oscillator trimmer (Z1-12) and the CENTER FREQ. control. If after the adjustment is made the CENTER FREQ. control knob is off center for a 455KC *(or receiver I.F.)* deflection at the zero mark on the screen, unscrew and reset the knob to the center position.
R.F. Bandpass Amplifier	365KC - 545KC (or I.F. of receiver) ±90KC) unmodulated to a 50K resistor in series with the *full length* of input cable to the PANADAPTOR.	Set GAIN to maximum. Turn EQUALIZER fully clockwise. Set CENTER FREQ. control to zero.	Set the signal generator at 545KC *(or receiver I.F. +90)*. Back off the side side trimmers on both R.F. transformers (T1-12, T2-12) and align the top trimmers for maximum deflection. Shift signal generator to 365KC *(or receiver I.F.* —90) and tune the two side trimmers for maximum deflection. Repeat both adjustments. The ratio of the peak to center heights (peak to valley) should be greater than 20:1.

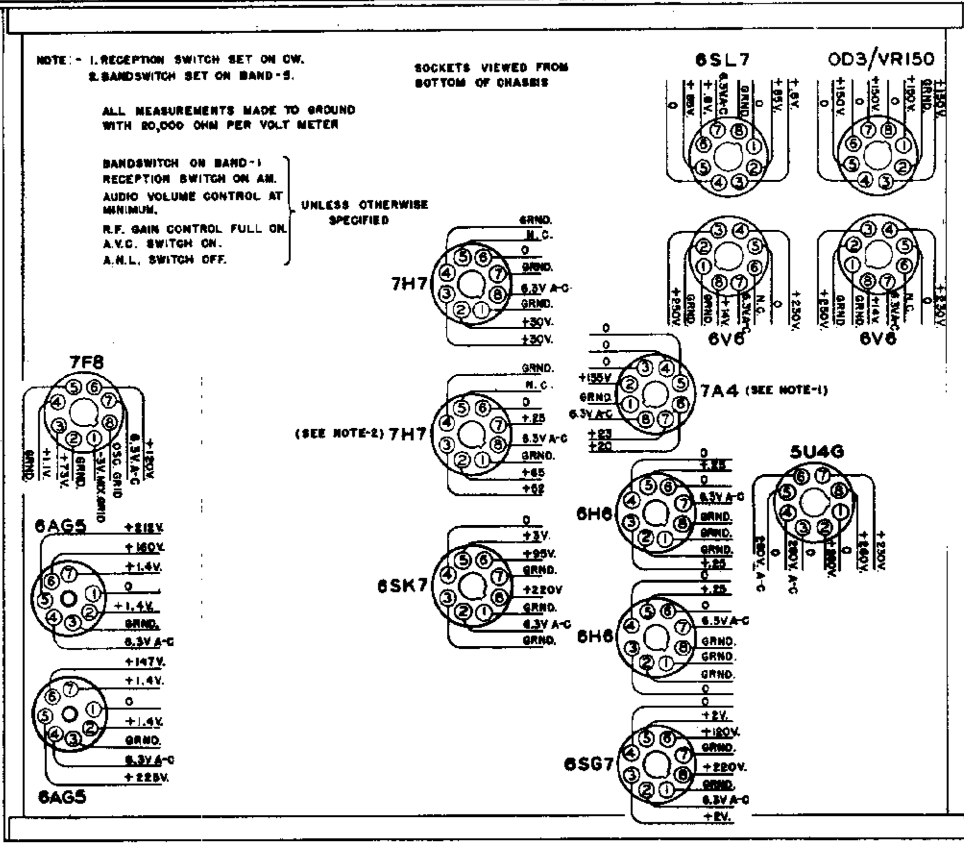
MODEL SX-42 THE HALLICRAFTERS CO.

FREQUENCY COVERAGE:

BAND	COVERAGE	TYPE OF RECEPTION
1	540 to 1620 kilocycles	AM/CW
2	1.62 to 5 megacycles	AM/CW
3	5 to 15 megacycles	AM/CW
4	15 to 30 megacycles	AM/CW
5	27 to 55 megacycles	AM/FM/CW
6	55 to 110 megacycles	AM/FM/CW

Adequate overlap is provided at ends of all bands.





VOLTAGE CHART

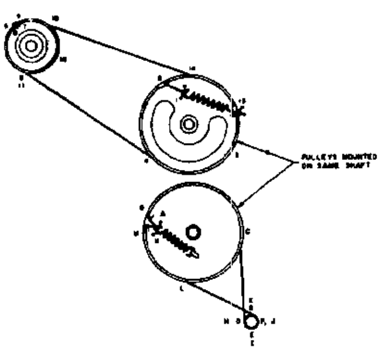


FIG. 2. DIAL CABLE STRINGING PROCEDURE

HOW TO RESTRING DIAL CORD

To restring the main tuning dial cord, cut a 25" length of 18 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1", Fig. #2. Follow the numbers "1" through "14", wind the cord on the pulley and knob drive shaft. At position "14", stretch the tension spring and tie cord securely. Cut off excess cord. To restring the bandspread tuning dial cord, follow the same procedure as explained above except start at position "A" and proceed through position "N" on tension spring.

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MODEL SX-42

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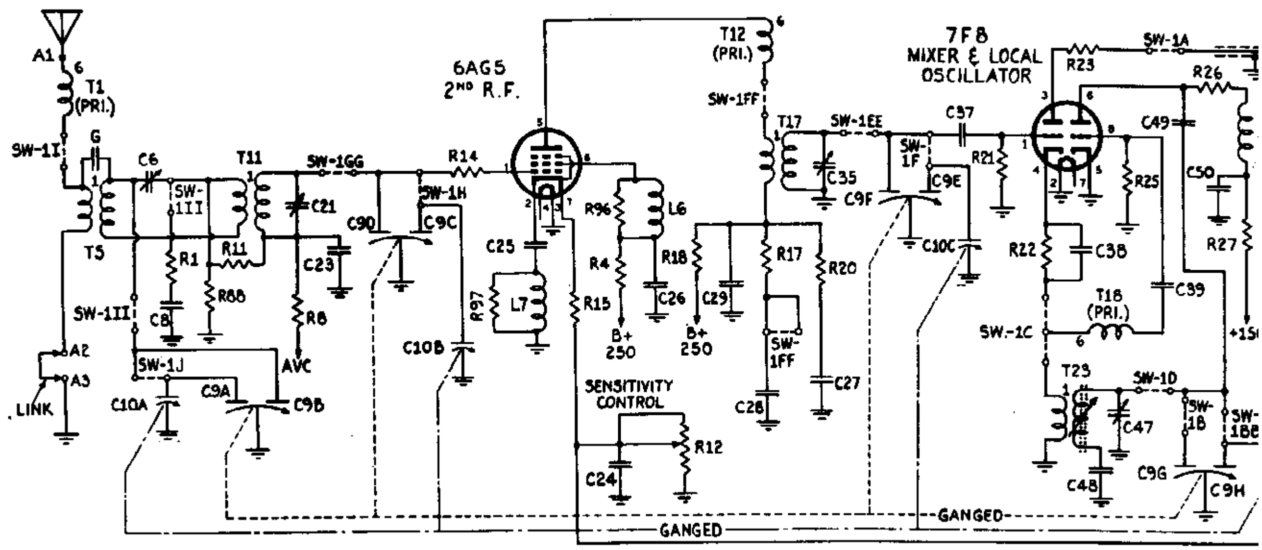
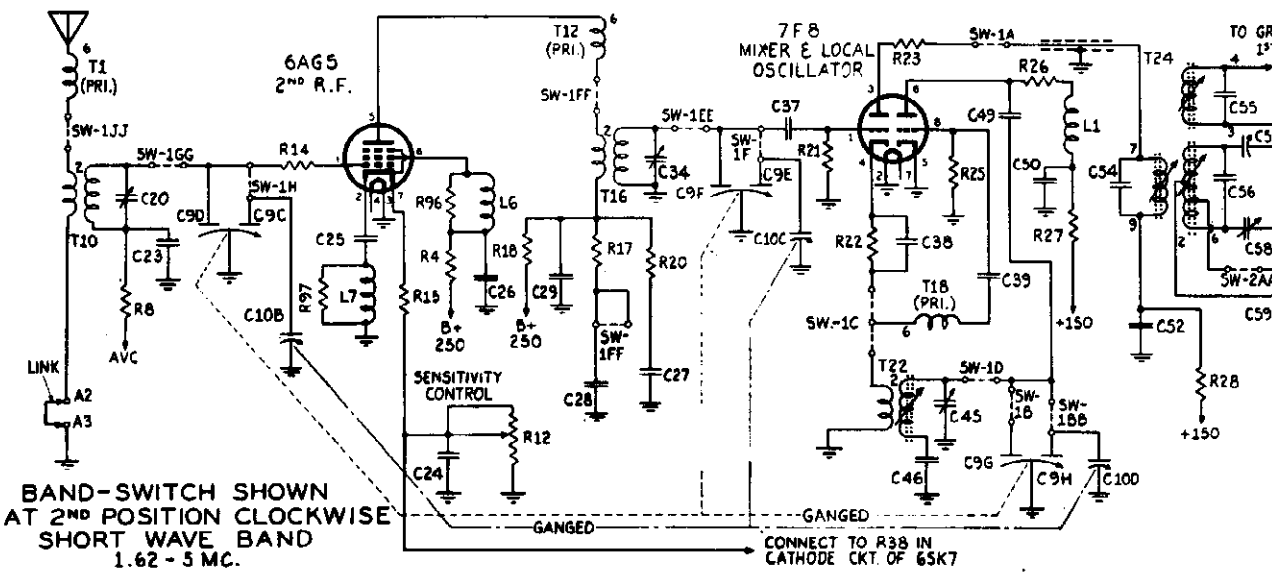
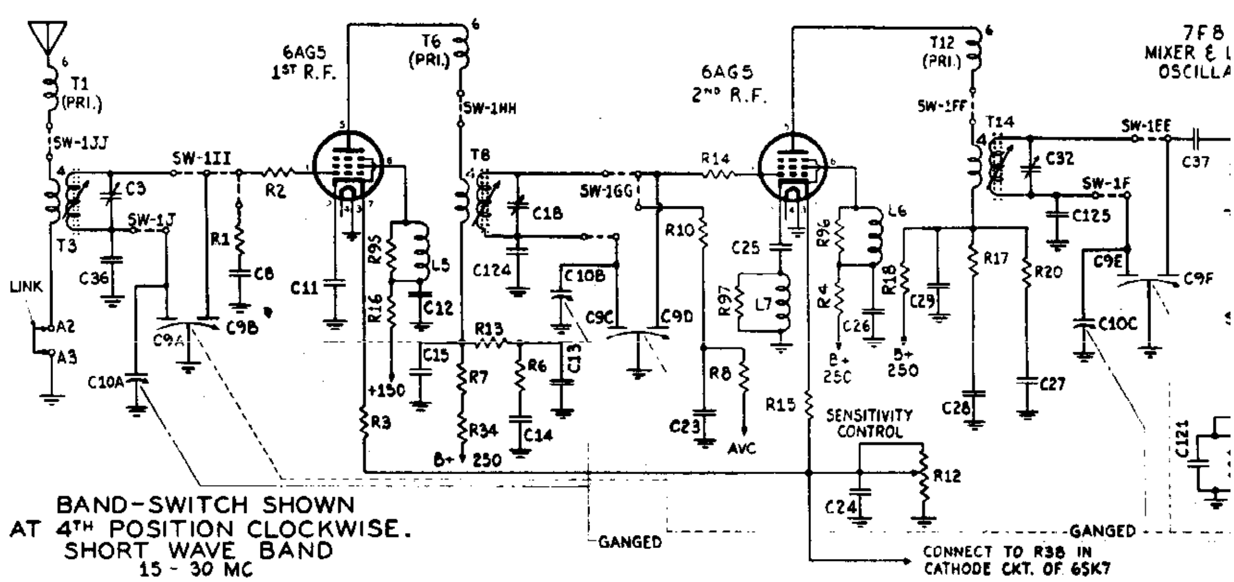
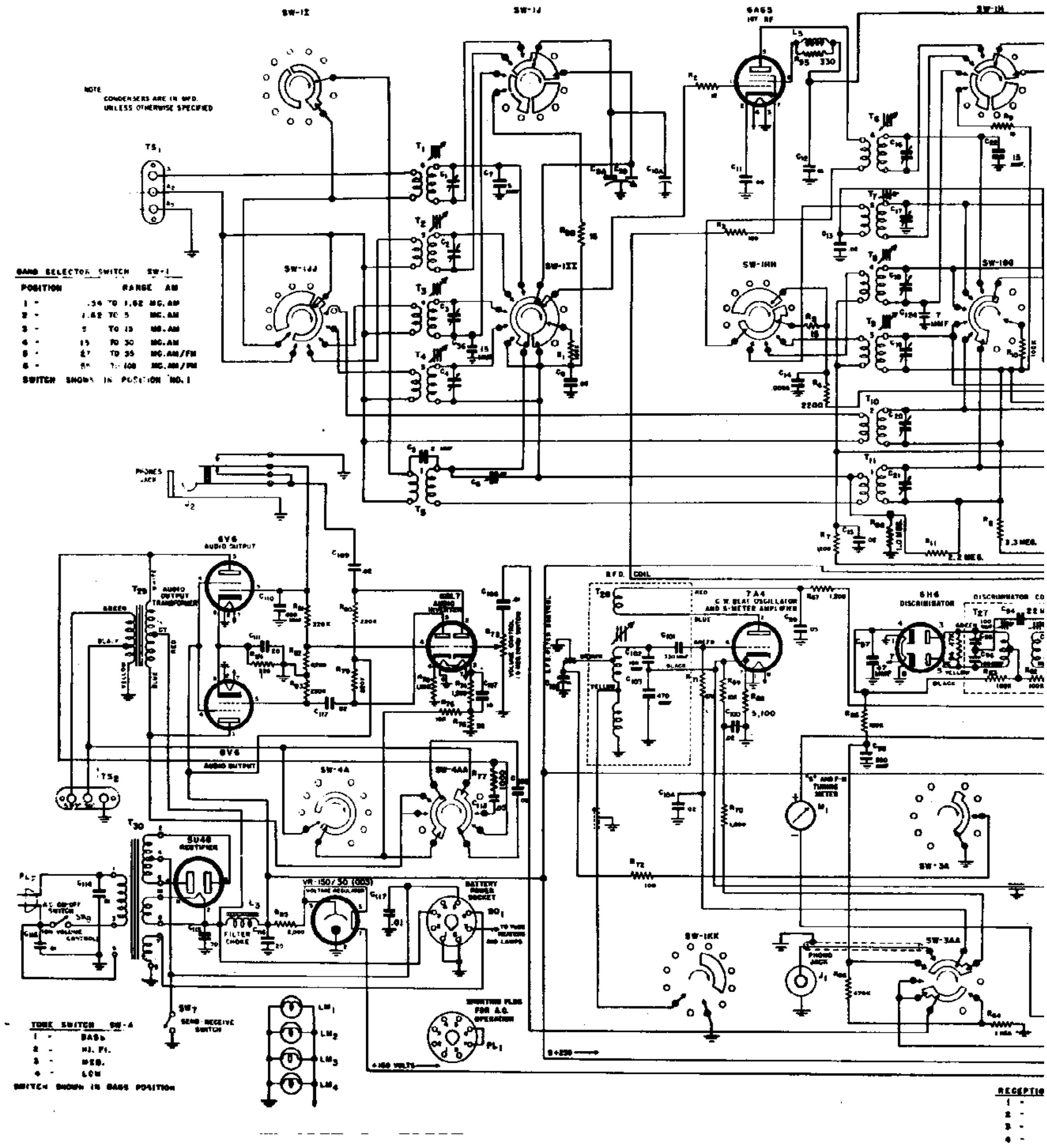




BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND
1.62 - 5 MC.

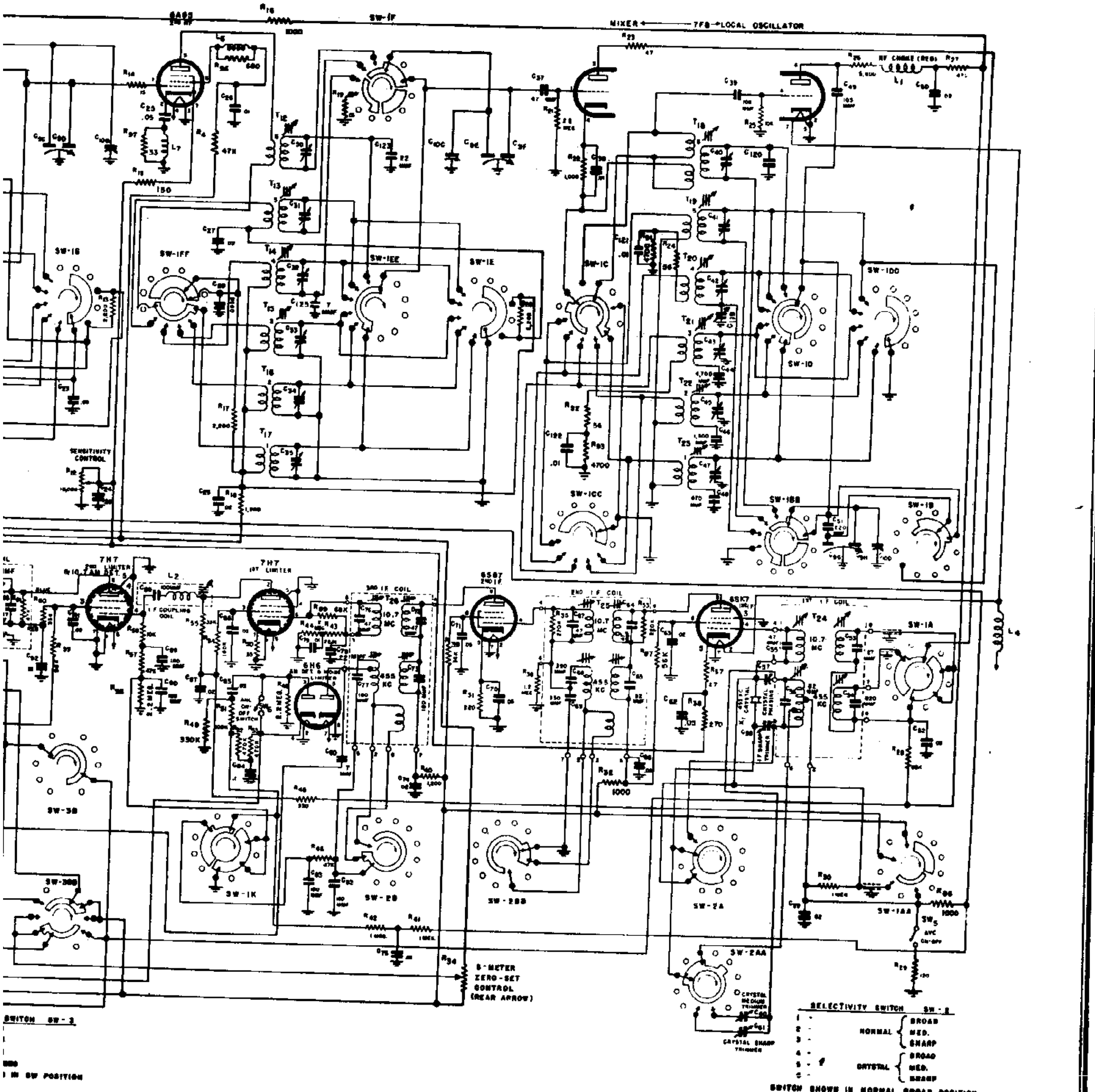


BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
SHORT WAVE BAND
15 - 30 MC



DC operation - filament 6.3 volts at 5 amperes; "B" supply 270 volts at 150 ma. (The 6 volt drain for vibrator type supply for "B" voltage will run about 16 amperes.)

POWER SUPPLY DATA: AC operation - 105 to 125 volts, 50/60 cycles single phase source. (Also 1 150/220/250 volt, 25 to 60 cycles single phase source with special power transformer available, crafters part no. 52C131.) Power consumption is 110 watts at 117 volts a-c.



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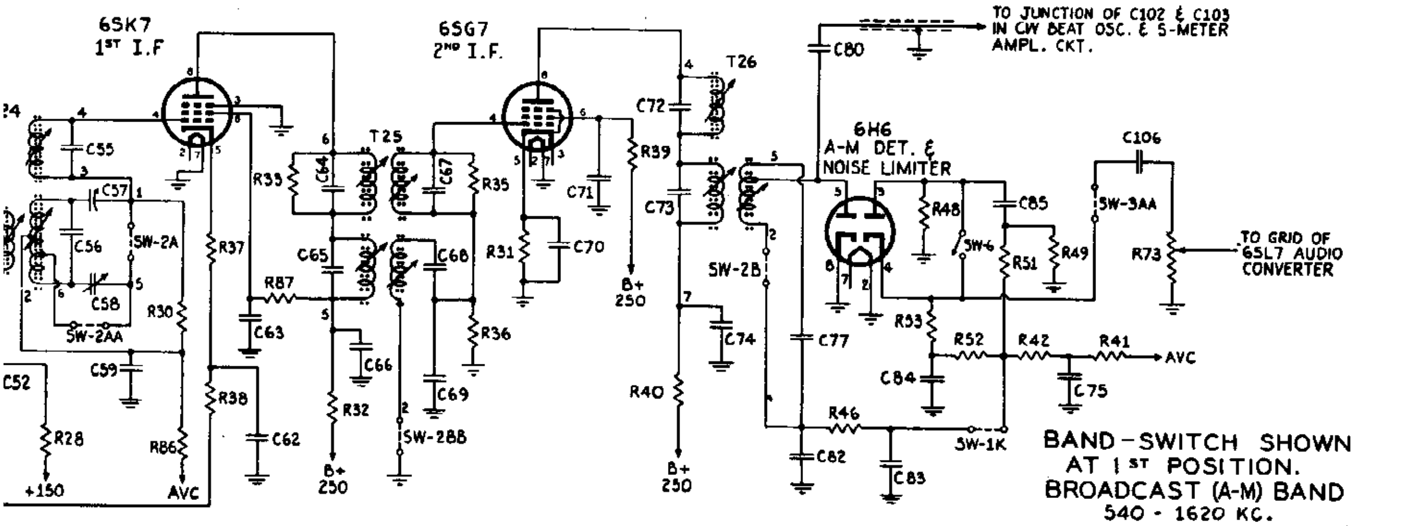
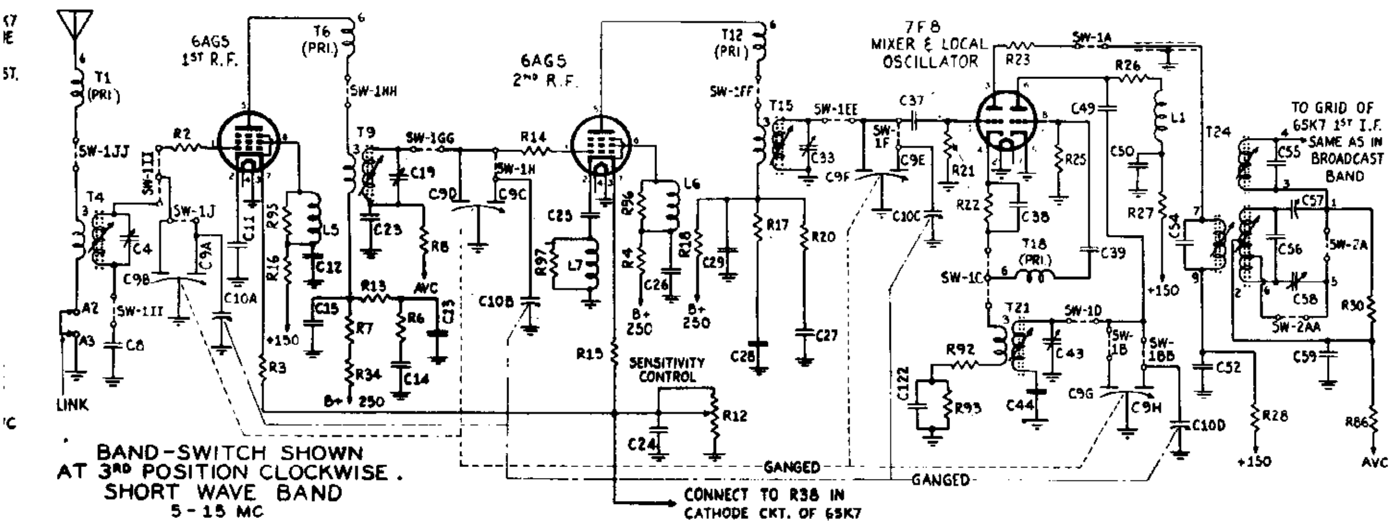
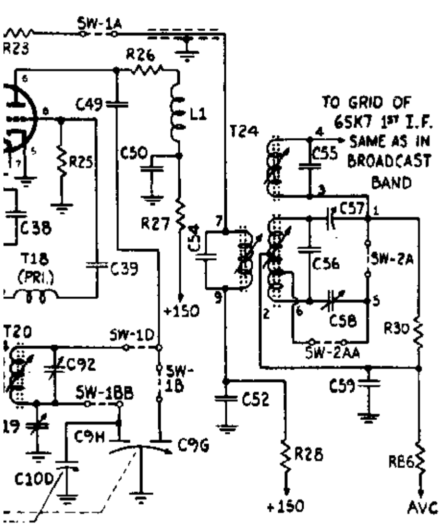
REAR PANEL CONNECTIONS: Consists of AC line cord with plug, antenna and ground connector strip, speaker connector strip, phono input jack, and d-c power input socket.



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST (A-M) BAND
540 - 1620 KC.



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
SHORT WAVE BAND
5 - 15 MC

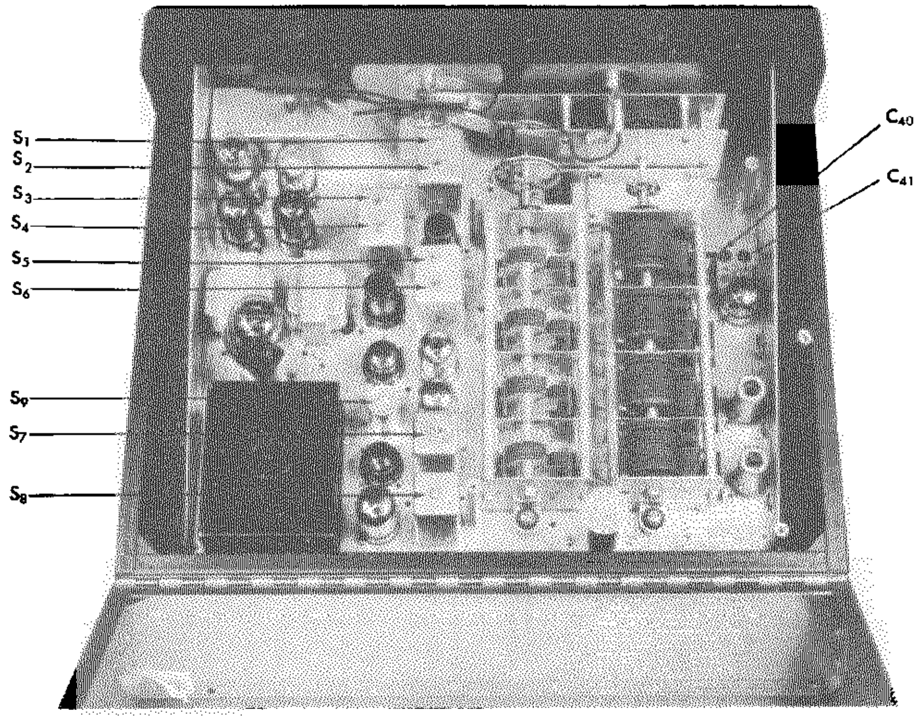


NOTES

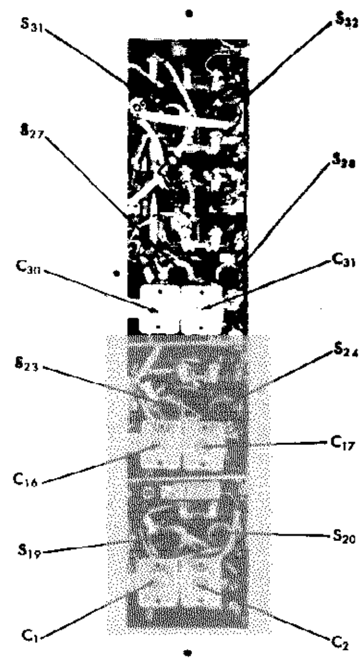
TONE SWITCH (SW-4) IS SHOWN IN POSITION 2 (HI FI)
RECEPTION SWITCH (SW-3) IS SHOWN IN POSITION 2 (A.M.)
SELECTIVITY SWITCH (SW-2) IS SHOWN IN POSITION 3 (NORMAL SHARP)

THE HALLICRAFTERS CO.

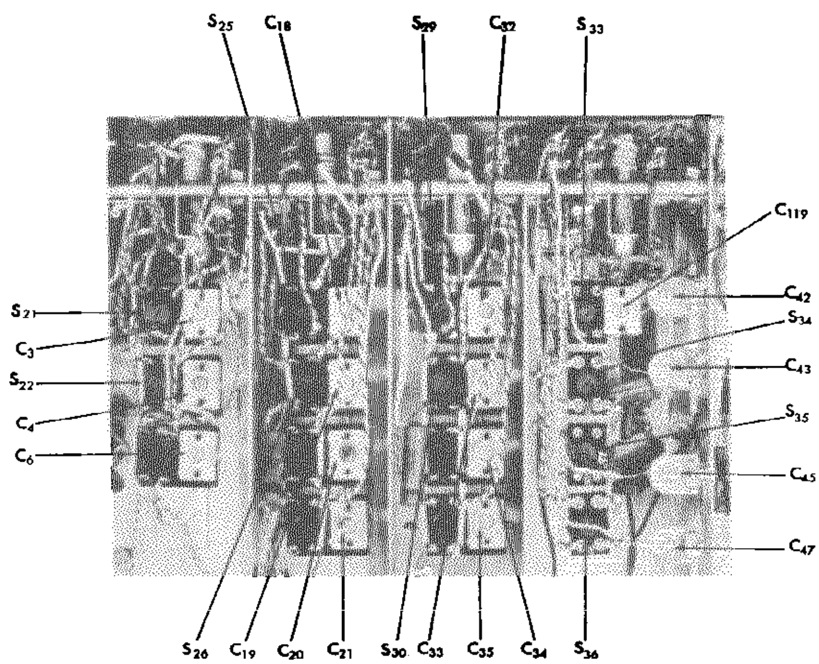
MODEL SX-42



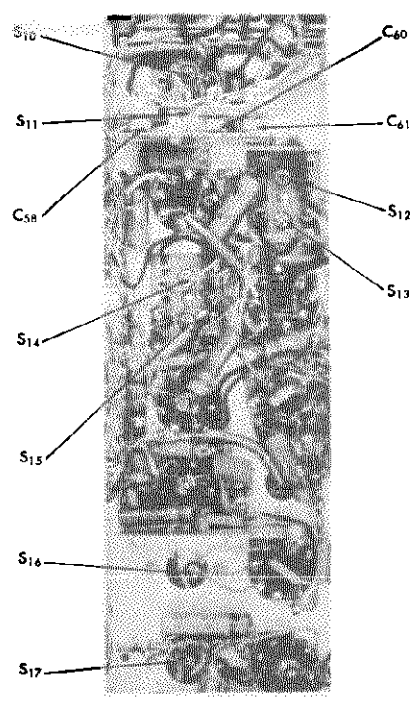
TOP VIEW



SIDE VIEW

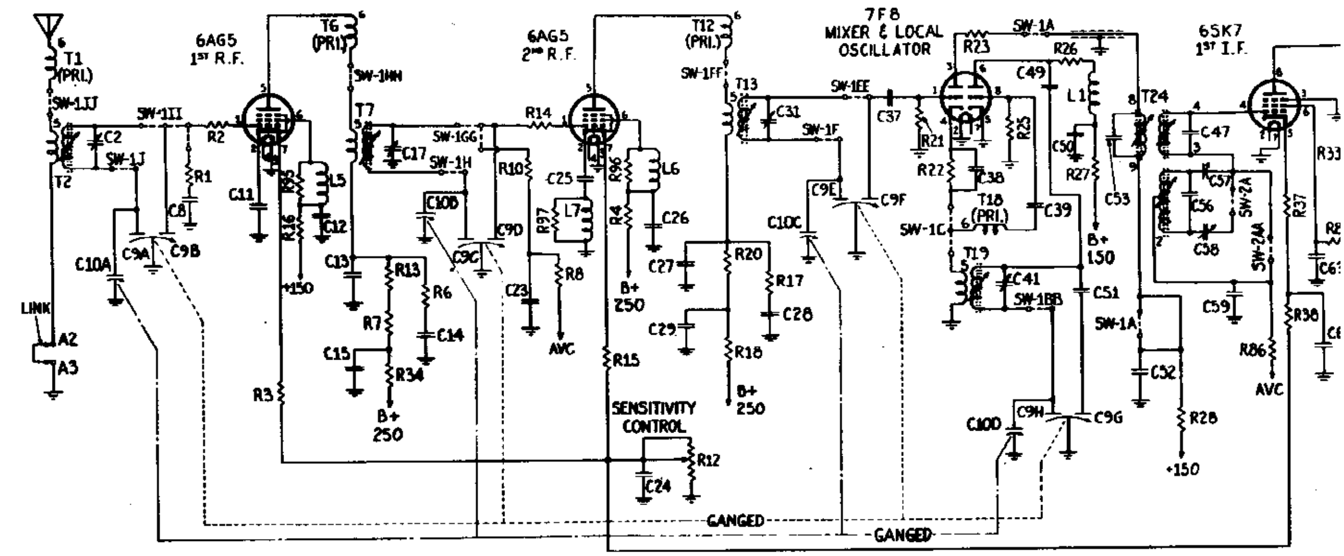


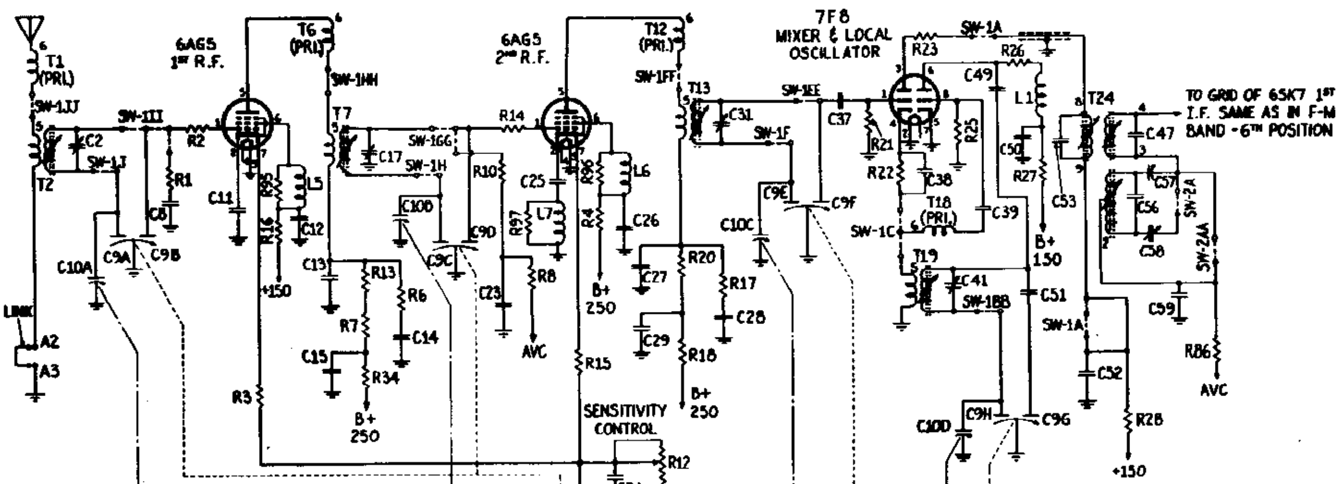
BOTTOM VIEW



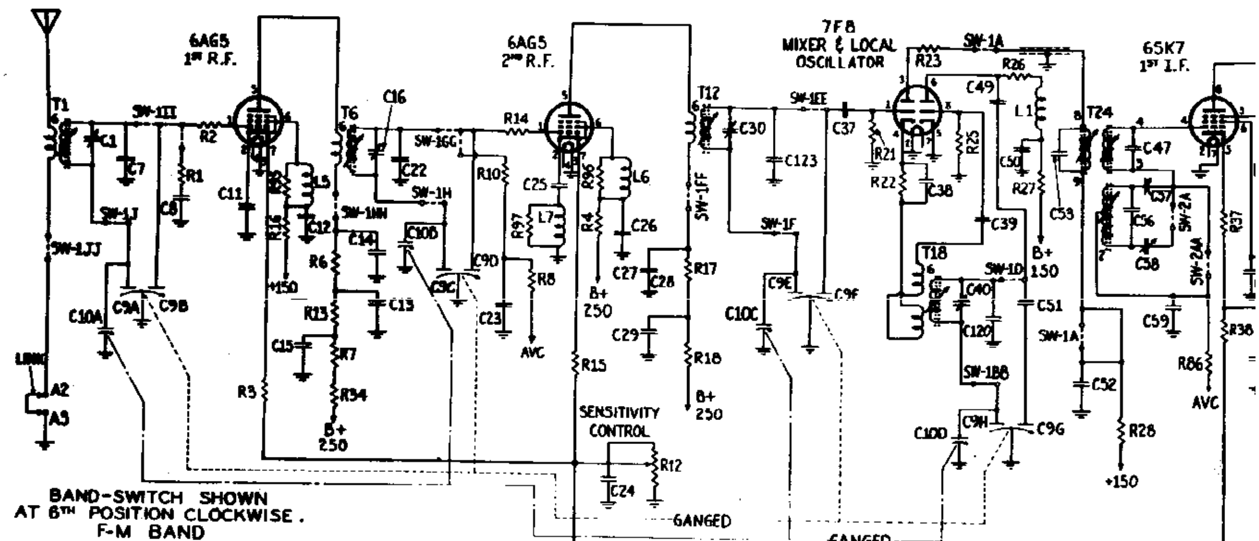
BOTTOM VIEW

TOP, BOTTOM AND SIDE VIEWS SHOWING ADJUSTMENT POINTS





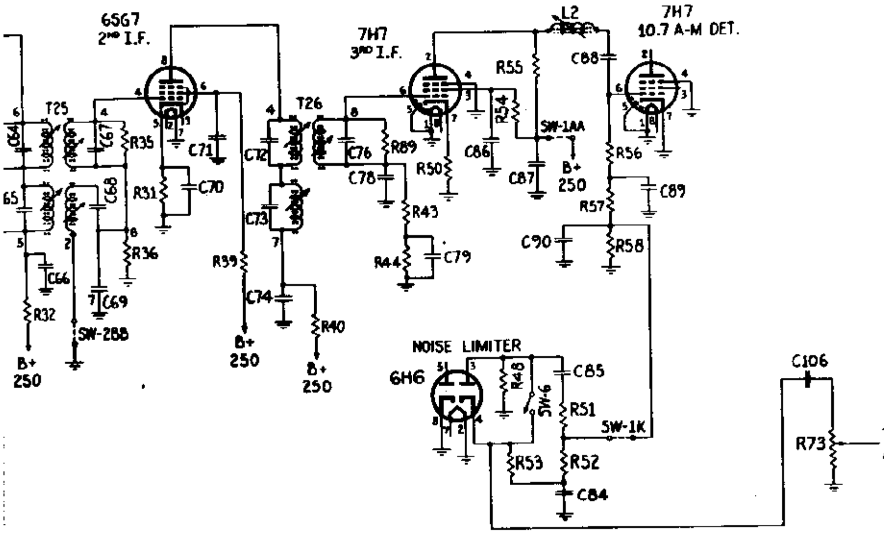
BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE.
F-M BAND
27-55MC



BAND-SWITCH SHOWN
AT 6TH POSITION CLOCKWISE.
F-M BAND
55-108 MC

ICRAFTERS CO.

MODEL SX-42

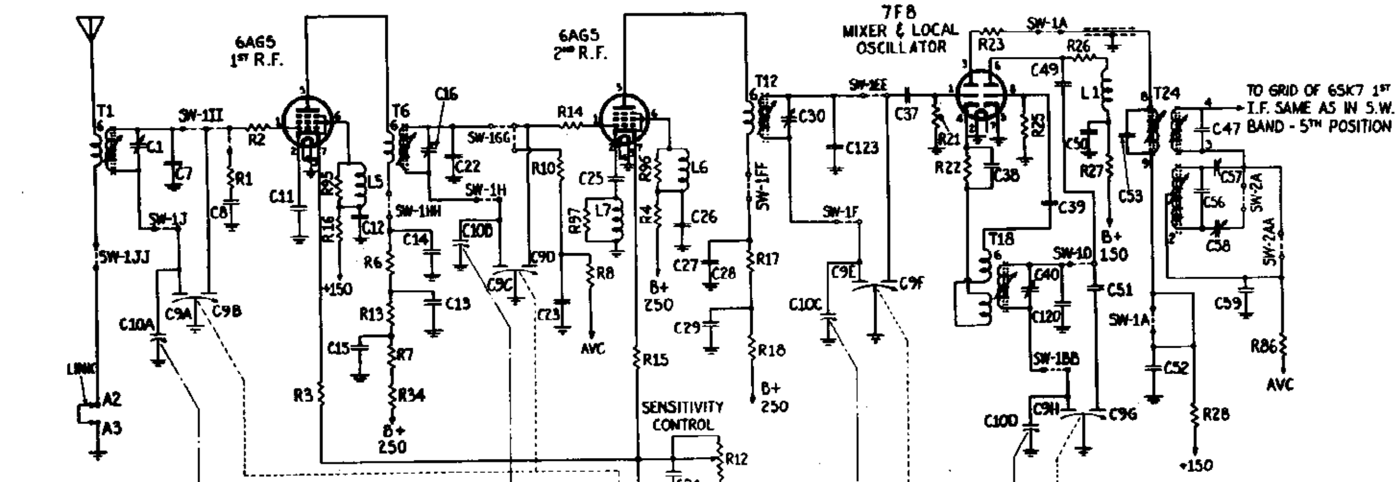


(FOR 5TH & 6TH S.W. POSITIONS)

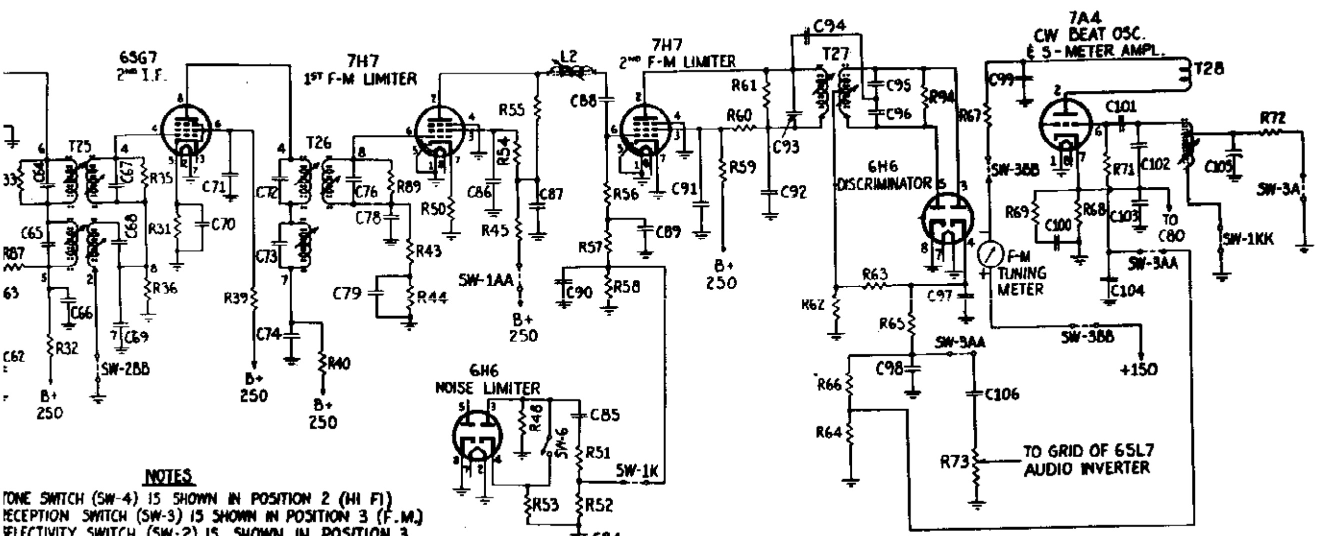
NOTES

TONE SWITCH (SW-4) IS SHOWN IN POSITION 2 (HI FI)
RECEPTION SWITCH (SW-3) IS SHOWN IN POSITION 2 (A.M.)
SELECTIVITY SWITCH (SW-2) IS SHOWN IN POSITION 3 (NORMAL SHARP)

BAND-SWITCH SHOWN AT 5TH POSITION CLOCKWISE. SHORT WAVE BAND · 27 - 55 MC



BAND-SWITCH SHOWN AT 6TH POSITION CLOCKWISE. SHORT WAVE BAND 55 - 108 MC



NOTES

TONE SWITCH (SW-4) IS SHOWN IN POSITION 2 (HI FI)
RECEPTION SWITCH (SW-3) IS SHOWN IN POSITION 3 (F.M.)
SELECTIVITY SWITCH (SW-2) IS SHOWN IN POSITION 3 (NORMAL SHARP)

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
	TERMINAL STRIPS	
TS-1	Antenna-ground connections	88A567
TS-2	Same as TS-1; speaker connections	
	METER	
M-1	Carrier level; tuning meter	82B100
	CRYSTALS	
X-1	455 kc crystal assembly	19A123
	JACKS	
J-1	PHONO jack	36A029
J-2	PHONE jack	36B030
	CHOKES AND COILS	
L-1	R-f choke; oscillator	53B008
L-2	I-f coupling coil	53B104
L-3	Filter choke	56B067
L-4	R-f choke; filament	53B009
L-5	Screen choke	53A117
L-6	Screen choke	53A116
L-7	Cathode Choke	53A118
	LINE CORD	
	A-c line cord with two prong plug	87A078
	SOCKETS	
	Tube sockets; octal type; plain	6A095
	Tube sockets; midget ceramic	6A198
	Tube sockets; loktal type; bakelite	6A213
	Tube sockets; loktal type; mica	6A228
	Pilot light socket; main tuning	6A258
	Pilot light socket; logging	6A259
	Pilot light socket; bandspread	6A260
	Pilot light socket; tuning meter	6A262
	KNOBS	
	VOLUME control knob assembly	15A060
	PITCH CONTROL and CRYSTAL PHASING knob assembly	15A061
	RECEPTION control knob assembly	15A045
	SELECTIVITY control knob assembly	15A063
	TONE control knob assembly	15A062
	SENSITIVITY control knob assembly	15A064
	BAND SELECTOR control knob assembly	15A067
	MAIN TUNING knob and dial assembly 0-100 Div.	41X8403
	BANDSPREAD knob	15A054
	MISCELLANEOUS COMPONENTS	
	Tube shield (Miniature tube)	69A065
	Adjustable tuning core	77A068
	Gear drive assembly	71C177
	Main tuning dial	83C285
	Bandspread dial	83B287
	Bandspread dial escutcheon less window	7B019
	Bandspread escutcheon window	22A160
	Main tuning dial escutcheon less pointer	7D020
	Main tuning pointer	82A110
	Main tuning escutcheon fastener clip	76A364
	Bandspread escutcheon fastener clip	76A309

ALIGNMENT INSTRUCTIONS

EQUIPMENT:

1. Signal generator capable of the ranges indicated in the alignment chart, including a 400 cycle audio modulator.
2. Output meter capable of handling 1.5 watts of audio power.
3. Standard RMA dummy antenna---Consisting of a 200 MMF cond in series with a 20 uh R.F. choke shunted by a 400 MMF condenser in series with 300 OHM resistor.
4. Non-metallic screw driver.
5. One 300 ohm carbon resistor (Dummy ant for bands #5 and 6.)

CONNECTIONS: Connect the generator "cold" lead to the receiver chassis; the "hot" lead is connected as indicated in the chart.

Connect the output meter across the 500 ohm speaker terminals.

CONTROL SETTINGS: Turn VOLUME control clockwise and allow about 15 minutes for tubes to heat up, then set the receiver controls as follows:

VOLUME	maximum	BANDSPREAD	zero
SENSITIVITY	maximum	*RECEPTION	AM
AVC	off	CRYSTAL PHASING	0
NOISE LIMITER	noise limiter, off	CW PITCH	0
		TONE	optional
*SELECTIVITY	crystal sharp	RECEIVE-STANDBY	receive

* For f-m alignment set RECEPTION control at FM and SELECTIVITY switch at normal broad.

RADIO RECEIVER MODEL SX-42
I-F ALIGNMENT INSTRUCTIONS

455 K.C. I-F ALIGNMENT:

A. Set Controls as follows:

1. Bandswitch on #1 Band.
2. M.T. Dial set to approximately 1 m.c.
3. R. F. gain full on.
4. ANL off, AVC off, Standby on.
5. FM-AM switch on AM.
6. Tone control on HiFi.
7. I.F. Selectivity switch on sharp I.F.
8. Connect output meter to 500 ohm speaker terminal.

B. Unsolder small mica capacitor C37, only, from #1 Pin of 7F8 mixer, osc. stage and connect hot side of signal generator thru a .1 capacitor to the #1 pin. Connect cold side of generator to the receiver chassis.

C. Increase generator output until a signal is heard and then align slugs S_1, S_3, S_5, S_{10}, S_{12}, and S_{14} for maximum output.

D. Turn on BFO and adjust pitch control knob to zero and then adjust slug S_8 until the beat note is heard. Continue turning S_8 until the beat note is zero beat with the generator signal.

E. Next adjust pitch control knob until the BFO note is about 1000 cycles off zero beat.

F. Turn selectivity knob to broad crystal and while slowly adjusting S_{10}, "rock" the signal generator until the output, as observed on the output meter, decreases and then slowly increases. Tune signal generator to the other side of zero beat and adjust crystal phasing knob for the null point.

Crystal phasing is left now in this position for this and following adjustments. At the point of minimum output, the slug S_{10} is correctly set. This occurs between two maximum outputs, one with slug turned further in, and one with slug turned further out.

G. Next turn to sharp crystal and with C_{61} at near minimum capacity, slowly turn trimmer in (increase capacity) while "rocking" the signal generator and adjust for maximum output meter reading. It may be necessary to reduce the set gain to prevent needle on output meter from hitting right hand stop. This is done by turning the R.F. sensitivity control down as well as reducing generator output to prevent overload. Volume control is left full on. After maximum output has been reached from the sharp crystal adjustment, turn trimmer further inward until a drop of about 2 DB occurs. At this point the sharp crystal will have very good selectivity without sacrificing too much gain.

H. Next, tune I-F generator to exact crystal frequency and by using the R.F. sensitivity control, adjust for an output meter reading of about 3/4 of full scale reading. Now turn to broad crystal and note the drop and its reading on the output meter. Then switch to medium crystal and with C_{60} at near minimum capacity, slowly adjust trimmer for increase in capacity, while rocking generator. When the output meter reaches the point that is about midway between the output reading in sharp crystal and in broad crystal, the medium crystal adjustment is complete.

J. Return to sharp crystal and rock signal generator for maximum output (adjust R-F sensitivity control for a suitable reading). When the signal generator is on exact crystal frequency, switch over to sharp I-F and repeak slugs S_1, S_3, S_5, S_{12}, S_{14}, and C58 for maximum output.

10.7 M.C. I-F ALIGNMENT:

A. Set controls as follows: Bandswitch on #5 Band, M.T. Dial about center scale. FM-AM switch on AM-ANL off, AVC off, Tone Control on Hi Fi- AF gain at maximum, R.F. gain at maximum.

B. Same as "B" in 455 K.C. I-F alignment.

C. Increase generator output (set at 10.7 mc) until a signal is heard and adjust slugs S_4, S_6, S_9, S_{13}, S_{15} for maximum output. As the signal increases, reduce generator output to prevent overloading. After S_4, S_6, S_9, S_{13}, S_{15} are set for maximum output then set slugs S_2, S_{11}, for maximum output. Do not readjust the slugs S_4, S_6, S_9, S_{13}, S_{15}.

D. With a moderately loud signal now being received, switch over to CW on and adjust Slug S_{17} (after having set the pitch control knob to zero on dial) for zero beat. The BFO adjustment is now complete.

E. Switch to FM position on AM-FM switch and adjust slug S_{16} for maximum output. Then adjust slug S_7 for null, or minimum output, as indicated on output meter. Next, slowly rock signal generator either side of 10.7 mc. and observe the maximum output readings obtained. If the outputs, either side of center are unequal, they may be equalized by adjusting slug S_{16}. When the balance has been obtained the FM adjustment is complete. Note: Make sure that the output meter is not off full scale when checking balance. Control this by reducing R-F sensitivity.

R. F. ALIGNMENT

DUMMY ANT. IN SERIES WITH SIG. GENERATOR	CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER	SIGNAL GEN. FREQUENCY SETTING	BAND SWITCH SETTING	RECEIVER DIAL SETTING	ADJUST SLUG, PADDER, OR TRIMMER NO.	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT —MAKE ADJUSTMENT FOR:	BAND SPREAD SETTING
			BAND #1 ADJUSTMENT					
RMA	A-1 ON ANT. STRIP AND GROUND	1.4 MC	.54 - 1.62	1.4 MC	C47	osc.	Calibration	At zero
RMA		.6 MC	.54 - 1.62	.6 MC	S36	osc.	Calibration	At zero
RMA	"	1.4 MC	.54 - 1.62	1.4 MC	C6	ant.	Max. Output	At zero
RMA	"	1.4 MC	.54 - 1.62	1.4 MC	C21	band pass	Max. Output	At zero
RMA	"	1.4 MC	.54 - 1.62	1.4 MC	C35	mixer	Max. Output	At zero
			BAND #2 ADJUSTMENT					
RMA	A-1 ON ANT. STRIP AND GROUND	4.0 MC	1.62 - 5.0	4.0 MC	C45	osc.	Calibration	At zero
RMA		2.0 MC	1.62 - 5.0	2.0 MC	S35	osc.	Calibration	At zero
RMA	"	4.0 MC	1.62 - 5.0	4.0 MC	C20	ant.	Max. Output	At zero
RMA	"	4.0 MC	1.62 - 5.0	4.0 MC	C34	mixer	Max. Output	At zero
			BAND #3 ADJUSTMENT					
RMA	A-1 ON ANT. STRIP AND GROUND	14.0 MC	5 - 15	14.0 MC	C43	osc.	Calibration	At zero
RMA		7.0 MC	5 - 15	7.0 MC	S34	osc.	Calibration	At zero
RMA	"	14.0 MC	5 - 15	14.0 MC	C4	ant.	Max. Output	At zero
RMA	"	14.0 MC	5 - 15	14.0 MC	C19	r-f	Max. Output	At zero
RMA	"	14.0 MC	5 - 15	14.0 MC	C33	mixer	Max. Output	At zero
RMA	"	7.0 MC	5 - 15	7.0 MC	S22	ant.	Max. Output	At zero
RMA	"	7.0 MC	5 - 15	7.0 MC	S26	r-f	Max. Output	At zero
RMA	"	7.0 MC	5 - 15	7.0 MC	S30	mixer	Max. Output	At zero

DUMMY ANT. IN SERIES WITH SIG. GENERATOR	CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER	SIGNAL GEN. FREQUENCY SETTING	BAND SWITCH SETTING	RECEIVER DIAL SETTING	ADJUST SLUG, PADDER, OR TRIMMER NO.	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT —MAKE ADJUSTMENT FOR:	BAND SPREAD SETTING
			BAND #4 ADJUSTMENT					
RMA	A-1 ON ANT. STRIP AND GROUND	28 MC	15 - 30	10 Meter BS dot	C42	osc.	Calibration	28 MC
RMA	"	18 MC	15 - 30	18 MC	S33	osc.	Calibration	Zero

NOTE: If the above two adjustments have been made correctly, it will be found that 28 MC on the bandspread dial will be exactly on calibration when the main tuning dial is set on the 10 meter bandspread dot. Now turn the bandspread dial to 29 MC and note if 29 MC falls high or low in calibration. If 29 MC is high in calibration trimmer C119 must be set at a higher capacity, after which the above two calibration adjustments must be repeated. If 29 MC is low in calibration trimmer C119 must be decreased in capacity, after which the above two calibration adjustments must be repeated.

RMA	A-1 ON ANT. STRIP AND GROUND	28 MC	15 - 30	28 MC	C3	ant.	Max. Output	Zero
RMA		28 MC	15 - 30	28 MC	C18	r-f	Max. Output	Zero
RMA	"	28 MC	15 - 30	28 MC	C32	mixer	Max. Output	Zero
RMA	"	18 MC	15 - 30	18 MC	S21	ant.	Max. Output	Zero
RMA	"	18 MC	15 - 30	18 MC	S25	r-f	Max. Output	Zero
RMA	"	18 MC	15 - 30	18 MC	S29	mixer	Max. Output	Zero

BAND #5 ADJUSTMENT

300 ohms	A-1 ON ANT. STRIP AND GROUND	50 MC	28 - 55	5 Meter BS dot	C41	osc.	Calibration	50 MC
300 ohms	"	30 MC	28 - 55	30 MC	S32	osc.	Calibration	Zero
300 ohms	"	50 MC	28 - 55	50 MC	C2	ant.	Max. Output	Zero
300 ohms	"	50 MC	28 - 55	50 MC	C17	r-f	Max. Output	Zero
300 ohms	"	50 MC	28 - 55	50 MC	C31	mixer	Max. Output	Zero
300 ohms	"	30 MC	28 - 55	30 MC	S20	ant.	Max. Output	Zero
300 ohms	"	30 MC	28 - 55	30 MC	S24	r-f	Max. Output	Zero
300 ohms	"	30 MC	28 - 55	30 MC	S28	mixer	Max. Output	Zero

NOTE: Remove plate from left side of chassis for Band #5 and #6 R.F. adjustment.

BAND #6 ADJUSTMENT

300 ohms	A-1 ON ANT. STRIP AND GROUND	105 MC	55 - 108	105 MC	C40	osc.	Calibration	Zero
300 ohms	"	60 MC	55 - 108	60 MC	S31	osc.	Calibration	Zero
300 ohms	"	105 MC	55 - 108	105 MC	C1	ant.	Max. Output	Zero
300 ohms	"	105 MC	55 - 108	105 MC	C16	r-f	Max. Output	Zero
300 ohms	"	105 MC	55 - 108	105 MC	C30	mixer	Max. Output	Zero
300 ohms	"	60 MC	55 - 108	60 MC	S19	ant.	Max. Output	Zero
300 ohms	"	60 MC	55 - 108	60 MC	S23	r-f	Max. Output	Zero
300 ohms	"	60 MC	55 - 108	60 MC	S27	mixer	Max. Output	Zero

THE HALLICRAFTERS CO.

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
	CAPACITORS	
C-1,2,16,17,30,31	Trimmer, dual mounting assembly	44B165
C-3,4,6,18,19, 20,21,32,33, 34 & 35	R-F Trimmer (2-6 mmf) Ceramic	44B179
C-5	Capacitor (2 mmf 10%) Molded Bakelite	49A002
C-7	Capacitor (5 mmf ±.5 mmf .00075 T.C.) Ceramic	CC20UK050D
C-8,11,23,25	Capacitor (.05 mfd 150V) Paper	46A094
C-9	Capacitor, Main Tuning	48C158
C-10	Capacitor, Bandspread	48C159
C-12,26	Capacitor (.01 mfd +40-15% 400V) Paper	46AB103J
C-13,15,27,29, 50,59,63,74, 86,87,91,100, 104,109 & 112	Capacitor (.02 mfd +40-15% 400V) Paper	46AW203J
C-14,28	Capacitor (5600 mmf 20% 500V) mica	CM35A562M
C-22,36	Capacitor (15 mmf 10% .00075 T.C.) Ceramic	CC20UK150K
C-24	Capacitor (.25 mfd +40-15% 200V) paper	46AT254J
C-37,97	Capacitor (47 mmf 10% 500V) Mica	CM20A470K
C-38	Capacitor (.01 mfd 150V) Paper	46A095
C-39,49	Capacitor (110 mmf 5% .00075 T.C.) Ceramic	CC25UK111J
C-40,41	Trimmer (4-20 mmf) Ceramic	44A078
C-42,119	Trimmer (6-8 mmf) Mica	44A205
C-43,45	Trimmer (3-6 mmf) Ceramic	44A077
C-44	Capacitor (4700 mmf 2% 500V) Mica	CM35C472G
C-46	Capacitor (1500 mmf 2% 500V) Mica	CM30C152G
C-47	Trimmer (4-20 mmf) Ceramic	44A075
C-48	Capacitor (470 mmf 2% 500V) Mica	CM20A471G
C-51	Capacitor (220 mmf 2% 500V) Mica	CM25A221G
C-52,66,71,99, 108 & 118	Capacitor (.05 mfd +40-15% 400V) Paper	46AW503J
C-57,105	Capacitor, Variable (CW Pitch & Crystal Phasing)	48A064
C-58,60,61	Trimmer Assembly (Triple, 1.5 mmf to 25 mmf, 1.3 mmf to 15 mmf, 1.5 mmf to 25 mmf)	44B164
C-62,70,85	Capacitor (.05 mfd +40-15% 200V) Paper	46AU503J
C-75,79,81,92, 122,106,121	Capacitor (.01 mfd +40-15% 400V) Paper	46AW103J
C-78	Capacitor (22 mmf 10% 500V) Mica	CM20A220K
C-80,120,124,125	Capacitor (7 mmf 10% .00075 T.C.) Ceramic	CC20UK070K
C-82,83,89,90	Capacitor (180 mmf 10% 500V) Mica	CM20A181K
C-84	Capacitor (.1 mfd +40-15% 200V) Paper	46AU104J
C-98	Capacitor (560 mmf 10% 500V) Mica	CM25A561K
C-107	Capacitor (10 mfd +75-10% 25V) Electrolytic	45A064
C-110	Capacitor (680 mmf 10% 500V) Mica	CM25A681K
C-111,113,116	Capacitor, Electrolytic	45AC41
C-114,115,117	Capacitor (.01 mfd 40-15% vdcw) Paper	46AG103J
C-123	Capacitor (22 mmf 10% .00075) Ceramic	CC20UK220K
	RESISTORS	
R-1,10,51	Resistor (1,000,000 ohm 20% 1/2 watt) Carbon	RC20AE104M
R-2	Resistor (12 ohm 10% 1/2 watt) Carbon	RC20AE120K
R-3,15	Resistor (150 ohm 10% 1/2 watt) Carbon	RC20AE151K
R-4	Resistor (47,000 ohm 10% 1 watt) Carbon	RC30AE473K
R-5,9,14,19	Resistor (15 ohm 20% 1/2 watt) Carbon	RC20AE150M
R-6,13,17,20	Resistor (2200 ohm 20% 1/2 watt) Carbon	RC20AE222M
R-7,18,40,67, 74 & 78	Resistor (1200 ohm 10% 1/2 watt) Carbon	RC20AE122K
R-12	Sensitivity Control (10,000 ohm Pot. 1/2 watt)	25A548
R-16,22,32,70,86	Resistor (1000 ohm 20% 1/2 watt) Carbon	RC20AE102M
R-21,48,58	Resistor (2.2. megohm 20% 1/2 watt) Carbon	RC20AE225M
R-23	Resistor (47 ohm 20% 1/2 watt) Carbon	RC20AE470M
R-25,56,75,69	Resistor (10,000 ohm 10% 1/2 watt) Carbon	RC20AE103K
R-26	Resistor (5600 ohm 10% 1/2 watt) Carbon	RC20AE562K
R-27	Resistor (470 ohm 20% 1/2 watt) Carbon	RC20AE471M
R-28	Resistor (68,000 ohm 10% 1 watt) Carbon	RC30AE683K
R-29	Resistor (120 ohm 10% 1/2 watt) Carbon	RC20AE121K
R-30,41,42,64,88	Resistor (1 megohm 20% 1/2 watt) Carbon	RC20AE105M
R-31	Resistor (220 ohm 10% 1/2 watt) Carbon	RC20AE221K
R-34	Variable resistor (500 ohm) "S" type	25C022
R-36	Resistor (1.2 megohm 10% 1/2 watt) Carbon	RC20AE125K
R-37	Resistor (27 ohm 10% 1/2 watt) Carbon	RC20AE270K
R-38	Resistor (270 ohm 10% 1/2 watt) Carbon	RC20AE271K
R-39,59,87	Resistor (56,000 ohm 10% 1/2 watt) Carbon	RC20AE563K
R-43	Resistor (22,000 ohm 10% 1/2 watt) Carbon	RC20AE223K
R-44	Resistor (2 megohm 20% 1/2 watt) Carbon	RC20AE205M
R-45,95	Resistor (330 ohm 20% 1 watt) Carbon	RC30AE331M
R-46,57,71,94	Resistor (47,000 ohm 10% 1/2 watt) Carbon	RC20AE473K
R-49	Resistor (330,000 ohm 10% 1/2 watt) Carbon	RC20AE334K
R-50,97	Resistor (33 ohm 10% 1/2 watt) Carbon	RC20AE330K
R-52,53,66	Resistor (470,000 ohm 20% 1/2 watt) Carbon	RC20AE474M
R-54	Resistor (100,000 ohm 10% 1 watt) Carbon	RC30AE104K
R-55	Resistor (33,000 ohm 10% 1/2 watt) Carbon	RC20AE333K
R-60	Resistor (330 ohm 10% 1/2 watt) Carbon	RC20AE331K
R-65	Resistor (150,000 ohm 10% 1/2 watt) Carbon	RC20AE154K
R-68	Resistor (5100 ohm 5% 1/2 watt) Carbon	RC20AE512J
R-72	Resistor (100 ohm 10% 1/2 watt) Carbon	RC20AE101K
R-73	Volume Control (1 meg. pot. 1/2 watt) includes power switch Sw-8	25A549
R-76,24,92	Resistor (56 ohm 10% 1/2 watt) Carbon	RC20AE560K
R-77	Resistor (1000 ohm 10% 2 watt) Carbon	RC40AE102K
R-79,80,81,83	Resistor (220,000 ohm 10% 1/2 watt) Carbon	RC20AE224K
R-82	Resistor (8200 ohm 10% 1/2 watt) Carbon	RC20AE822K
R-84	Resistor (220 ohm 10% 2 watt) Carbon	RC40AE221K
R-85	Resistor (2000 ohm 5% 10 watt) Wirewound	24BG202D
R-89	Resistor (68,000 ohm 10% 1/2 watt) Carbon	RC20AE683K
R-90	Resistor (15 ohm, 20% 1/2 watt) Carbon	RC20AE150M
R-91,93	Resistor (4700 ohm 10% 1/2 watt) Carbon	RC20AE472K
R-96	Resistor (680 ohm, 20% 1/2 watt) Carbon	RC20AE681M

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
	PILOT LAMP	
LM-1,2,3	6-8 volt; 250 ma; bayonet type	39A018
LM-4	6-8 volt; 150 ma; bayonet type	39A019
	PLUG	
PL-1	Shorting plug; octal	35A015
	SWITCHES	
SW-1	Band Selector	60D241
SW-2	Selectivity	60A234
SW-3	Reception	60C235
SW-4	Tone	60C236
SW-5,6,7	AVC, Noise Limiter, Receiver—Standby toggle with bat handle; SPST	60A138
SW-8	Power-off; not a replaceable part; shown for reference only; part of volume control R-73	
	TRANSFORMERS	
T-1	Antenna Coil; Band #6	51B829
T-2	Antenna Coil; Band #5	51B828
T-3	Antenna Coil; Band #4	51B827
T-4	Antenna Coil; Band #3	51B826
T-5	Antenna Coil; Band #1	51B823
T-6	R-F Coil; Band #6	51B833
T-7	R-F Coil; Band #5	51B832
T-8	R-F Coil; Band #4	51B831
T-9	R-F Coil; Band #3	51B830
T-10	R-F Coil; Band #2	51B825
T-11	R-F Coil; Band #1	51B824
T-13	Converter Coil; Band #5	51B844
T-14	Converter Coil; Band #4	51B843
T-15	Converter Coil; Band #3	51B842
T-16	Converter Coil; Band #2	51B841
T-17	Converter Coil; Band #1	51B840
T-18	Oscillator Coil; Band #6	51B839
T-19	Oscillator Coil; Band #5	51B838
T-20	Oscillator Coil; Band #4	51B837
T-21	Oscillator Coil; Band #3	51B836
T-22	Oscillator Coil; Band #2	51B835
T-23	Oscillator Coil; Band #1	51B834
T-24	1st I-F Transformer	50C198
T-25	2nd I-F Transformer	50C190
T-26	3rd I-F Transformer	50C197
T-27	Discriminator Transformer	50C191
T-28	BFO Transformer	54C032
T-29	Audio Output Transformer	55B077
T-30	Power Transformer	52C141

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MODEL S-47

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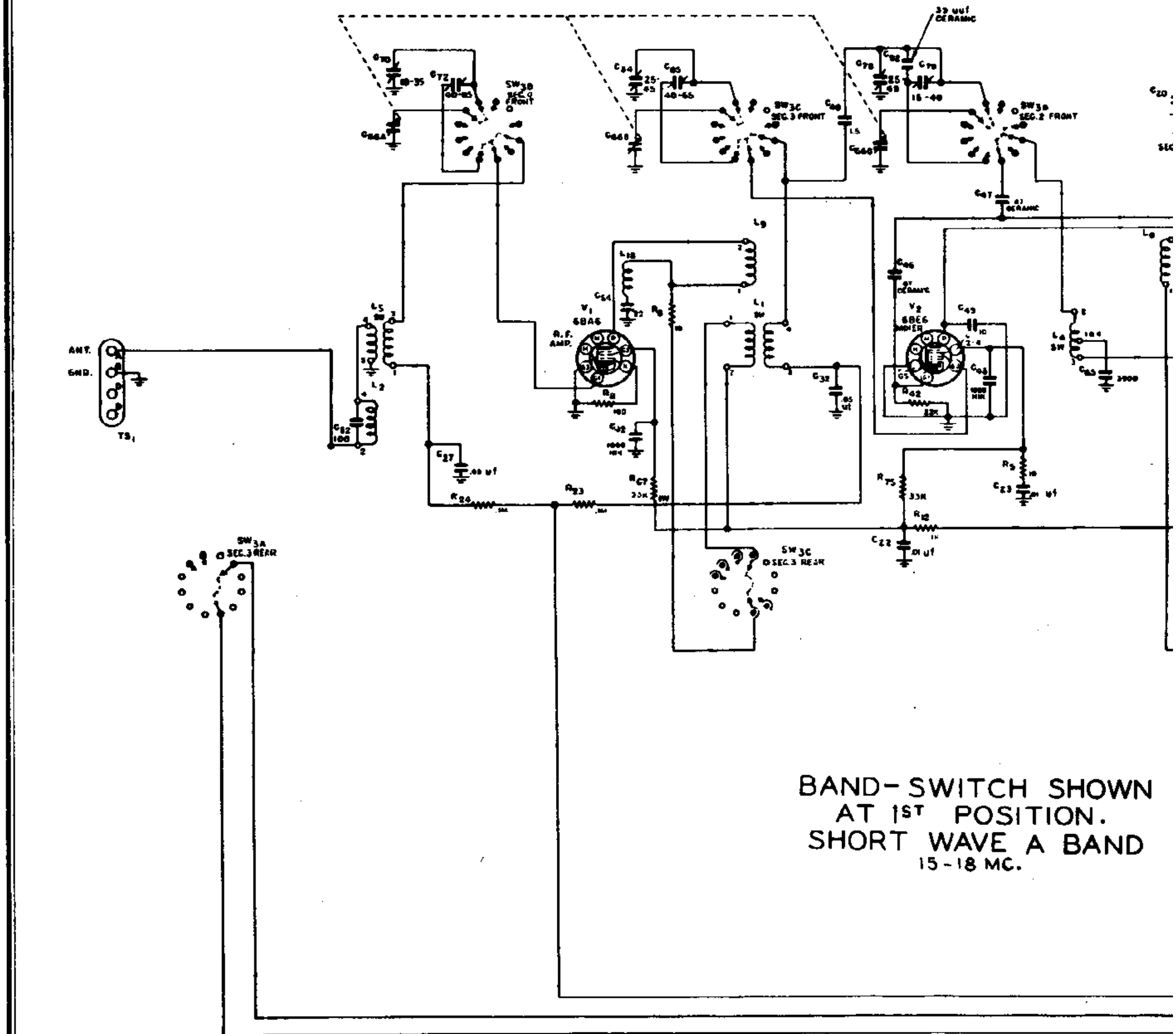
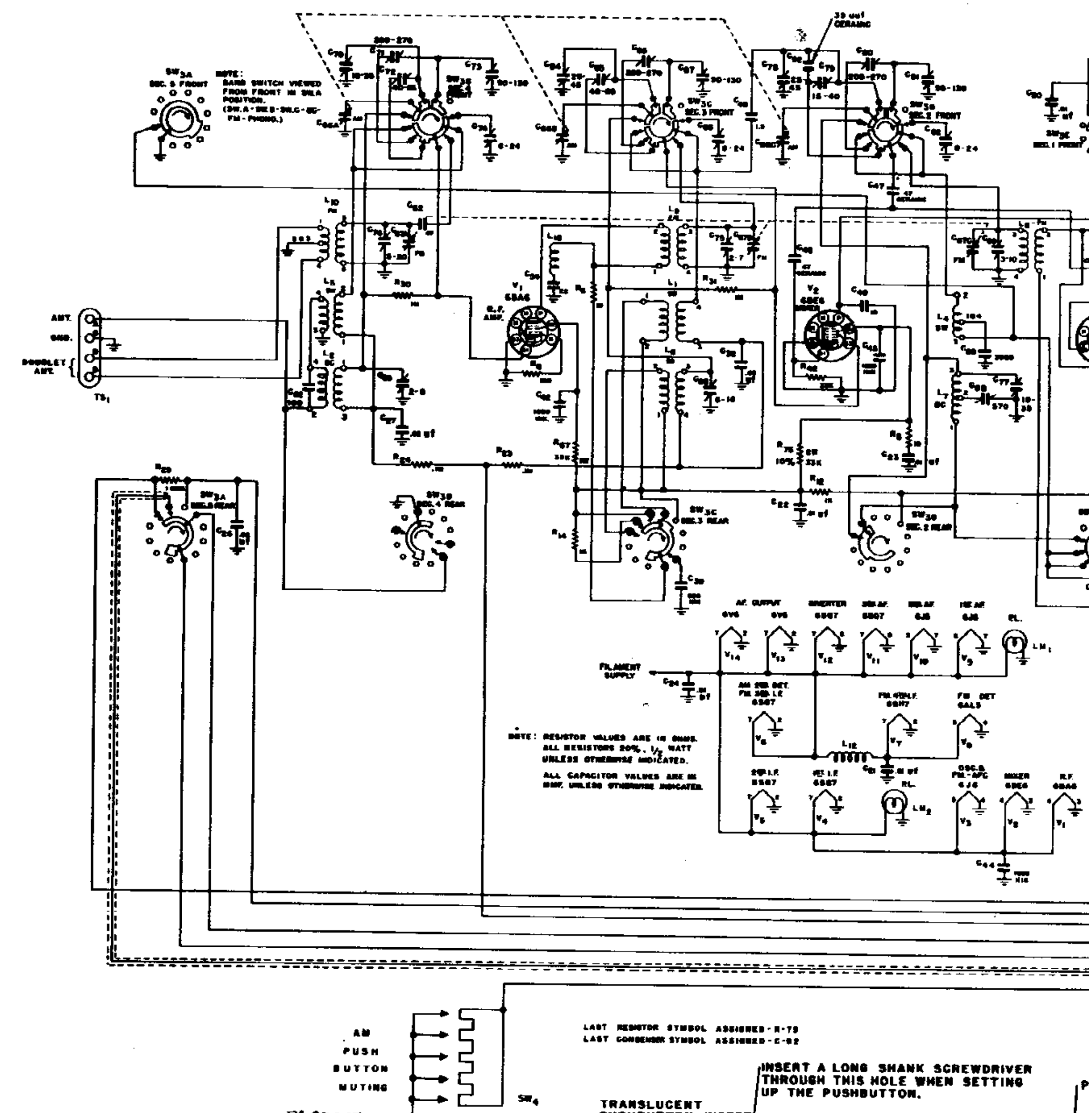


SERVICE PARTS LIST

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
	CAPACITORS	
C-1,3,4,5,6,8,9, 12,13,14,15,16, 17,18,20,21,22, 23,24,35,90	.01 mfd 600 V., tubular paper	46AZ103F
C-2,26,27,28	.02 mfd 600 V., tubular paper	46AY203F
C-7,11,31,32,50, 51	.05 mfd 600 V., tubular paper	46AY503F
C-25	.01 mfd 600 V., molded paper	46AG103J
C-30	.1 mfd 200 V., tubular paper	46AU104H
C-33	.005 mfd 600 V., tubular paper	46AZ502J
C-34	.003 mfd 600 V., tubular paper	46AZ302J
C-36	60-20 mfd 450 V., 20 mfd. 30 V. electrolytic	45B099
C-37	40-10 mfd 450 V., 20 mfd. 30 V., electrolytic	45B100

C-38,39	500 mmf 50
C-40,42,43,44	1000 mmf 5
C-41	10,000 mmf.
C-45	10 mmf 500
C-46,47	47 mmf 500
C-48	1.5 mmf., c
C-49	10 mmf 500
C-52,64	100 mmf 50
C-54	22 mmf 500
C-55	22 mmf 500
C-56,57,58	220 mmf 50
C-59	330 mmf 50
C-60,61,62	47 mmf 500
C-63	.001 mfd 5
C-65	.0039 mfd
C-66	Tuning conc
C-67	Tuning conc
C-68	570 mmf. t
C-69,70,71, 72,73,74	Trimmer as stage.
C-75	Trimmer, F
C-76	Trimmer, F
C-77,78,79,80,81, 82	Trimmer as stage.
C-83,84,85,86,87, 88	Trimmer as stage.



Tubes . . . . Fifteen
Speaker output impedance . . 500 ohms.
Antenna. . . . . Provisions for external long wire antenna for AM bands and a folded dipole (300-ohm) for FM band.
Tuning . . . . Manual and mechanical push buttons. (Five channels for AM and five channels for FM.)
Tuning Range . . . . (BC) 540kc - 1700 kc.
(A) 15 mc - 18 mc.
(B) 9 mc - 12 mc.
(C) 5.8 mc - 18 mc.
(FM) 88 mc - 108 mc.

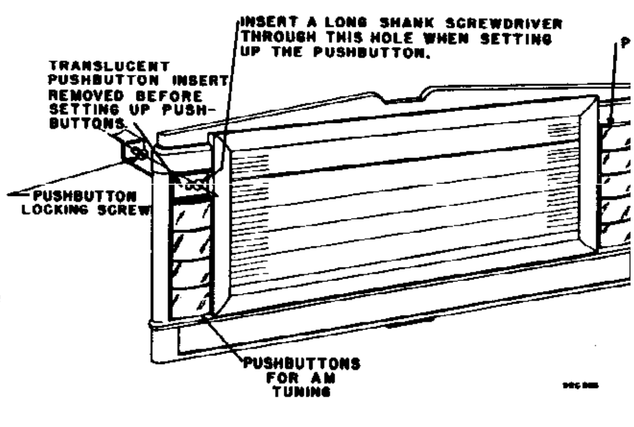
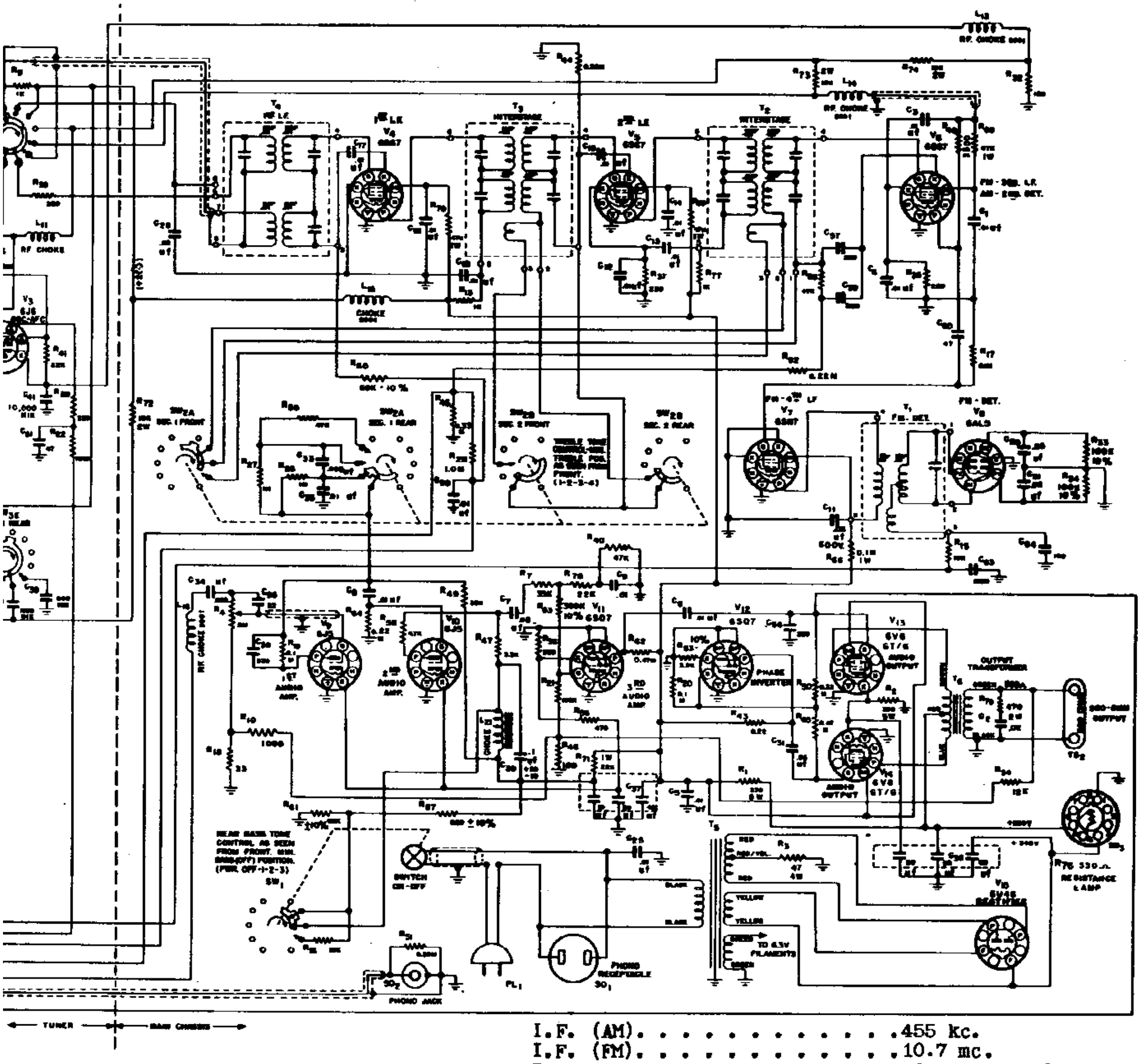


Fig. 1. View showing pushbutton setup.

:ALLICRAFTERS CO. MODEL S-47



I.F. (AM). . . . . .455 kc.
I.F. (FM). . . . . .10.7 mc.
Power Supply . . . . .105-125 V. 60 cycles A.C.
Power Consumption. . . . . .180 watts.

BUTTON SETTING:

SHBUTTONS FOR FM TUNING

Note - Insulate the muting switch springs before setting the AM buttons.

1. Select any one pushbutton.
2. Pull translucent insert straight out.
3. Insert screw driver blade through large hole of pushbutton into slot of locking screw. (See Fig. 1).
4. Loosen locking screw about one-half turn. (Not more than one full turn.)
5. With pushbutton depressed, carefully tune in desired station with the manual control and tighten the locking screw.

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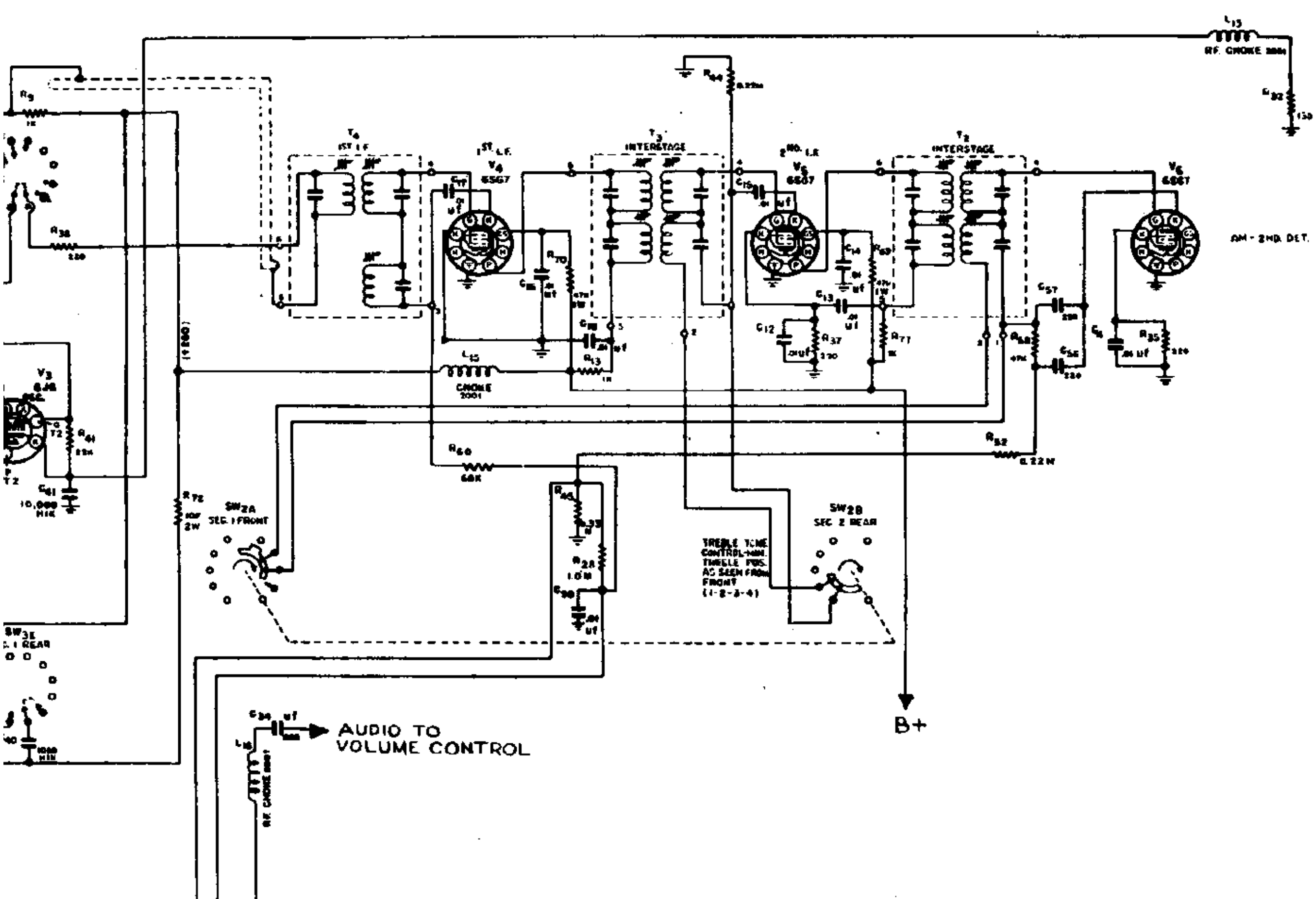

ceramic	47A147
, ceramic	47A148
v., ceramic	47B32103N1
ceramic	47A149
ceramic	47A150
c	47A160-3
mica	CM20A100K
, mica	CM20A101M
mica.	CM20A220K
mica.	CM20A220M
, mica.	CM20A221M
, mica.	CM20A331M
mica	CM20A470M
., mica.	CM30A102M
/., mica.	CM35A392J
r, "AM"	48C176
r, "FM"	48C175
r.	44A189
y, ant.	44B190
ker stage.	44A192
t. stage.	44A194
y, osc.	44B195
y, mixer	44B196

C-89	Trimmer, FM, osc. stage	44A218
C-92	39 mmf. 500 v., ceramic	CC30SH390M

RESISTORS

R-1, 2	330 ohms 5 watts, WW.	24A864
R-3	47 ohms 4 watts, Carbon.	RC65CE470M
R-4	2 meg-ohms, volume control	25A685
R-5, 6	10 ohms ½ watt, carbon	RC20AE100M
R-7, 49	33,000 ohms ½ watt, carbon	RC20AE333M
R-8	100 ohms ½ watt, carbon	RC20AE101M
R-9, 10, 12, 13, 14, 77	1000 ohms ½ watt, carbon	RC20AE102M
R-15, 16	10,000 ohms ½ watt, carbon	RC20AE103M
R-17, 19, 20, 21, 22, 23, 24	100,000 ohms ½ watt, carbon	RC20AE104M
R-18	33 ohms ½ watt, carbon	RC20AE330M
R-26, 27, 28, 29, 30, 31	1 meg-ohm ½ watt, carbon	RC20AE105M
R-32	150 ohms ½ watt, carbon	RC20AE151M
R-33, 34	100,000 ohms ½ watt, carbon	RC20AE104K
R-35, 36, 37, 38, 39	220 ohms ½ watt, carbon	RC20AE221M
R-40, 58, 59	47,000 ohms ½ watt, carbon.	RC20AD473M
R-41, 42, 78	22,000 ohms ½ watt, carbon	RC20AE223M
R-43, 44, 52, 64	220,000 ohms ½ watt, carbon	RC20AE224M
R-45, 50, 51	330,000 ohms ½ watt, carbon	RC20AE334M
R-46	100 ohms ½ watt, carbon	RC20AE101K
R-47, 48	3300 ohms ½ watt, carbon	RC20AE332M
R-53	3900 ohms ½ watt, carbon	RC20AE392K
R-54	12,000 ohms ½ watt, carbon	RC20AE123K
R-55	470 ohms ½ watt, carbon	RC20AE471M
R-56	4700 ohms ½ watt, carbon	RC20AE472M
R-57	820 ohms ½ watt, carbon	RC20AE821K
R-60, 61	68,000 ohms ½ watt, carbon.	RC20AE683K
R-62, 65	470,000 ohms ½ watt, carbon	RC20AE474M
R-63	390,000 ohms ½ watt, carbon	RC20AE394K
R-66	100,000 ohms 1 watt, carbon	RC30AE104M
R-67	33,000 ohms 1 watt, carbon.	RC30AE333M
R-68, 69, 70	47,000 ohms 1 watt, carbon.	RC30AE473M
R-71	22,000 ohms 1 watt, carbon	RC30AE223M
R-72, 73, 74	10,000 ohms 2 watt, carbon	RC40AE103M

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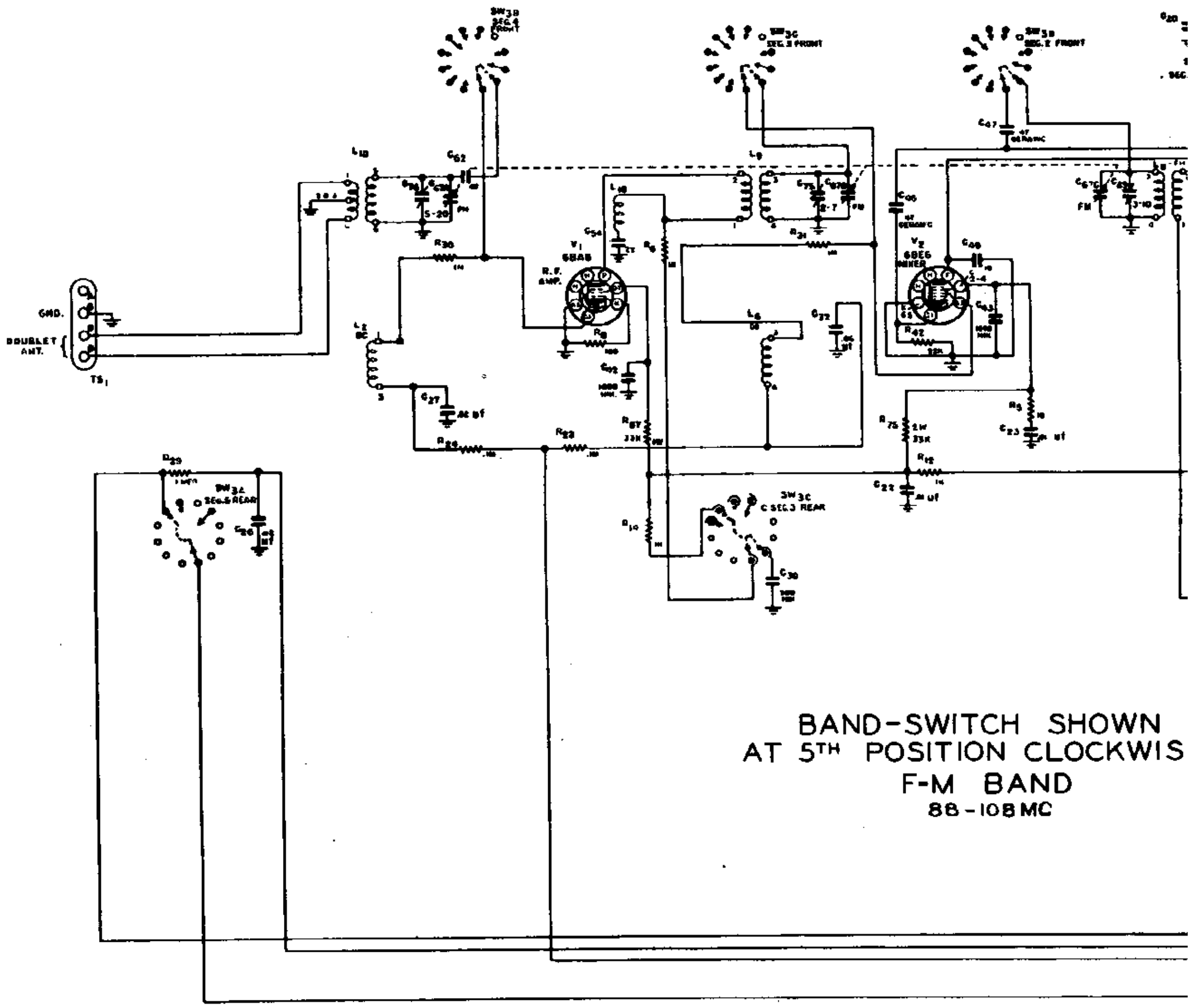
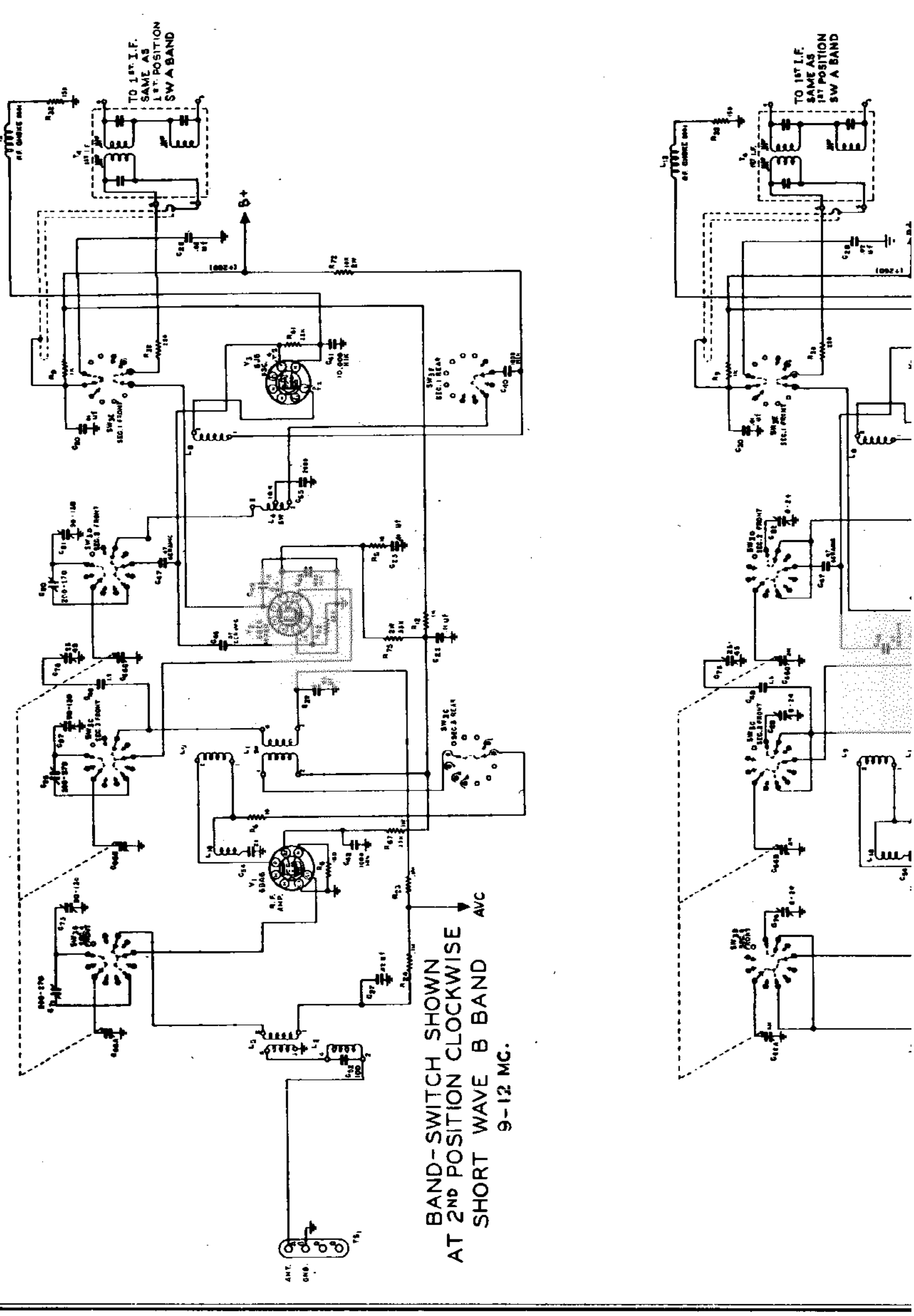


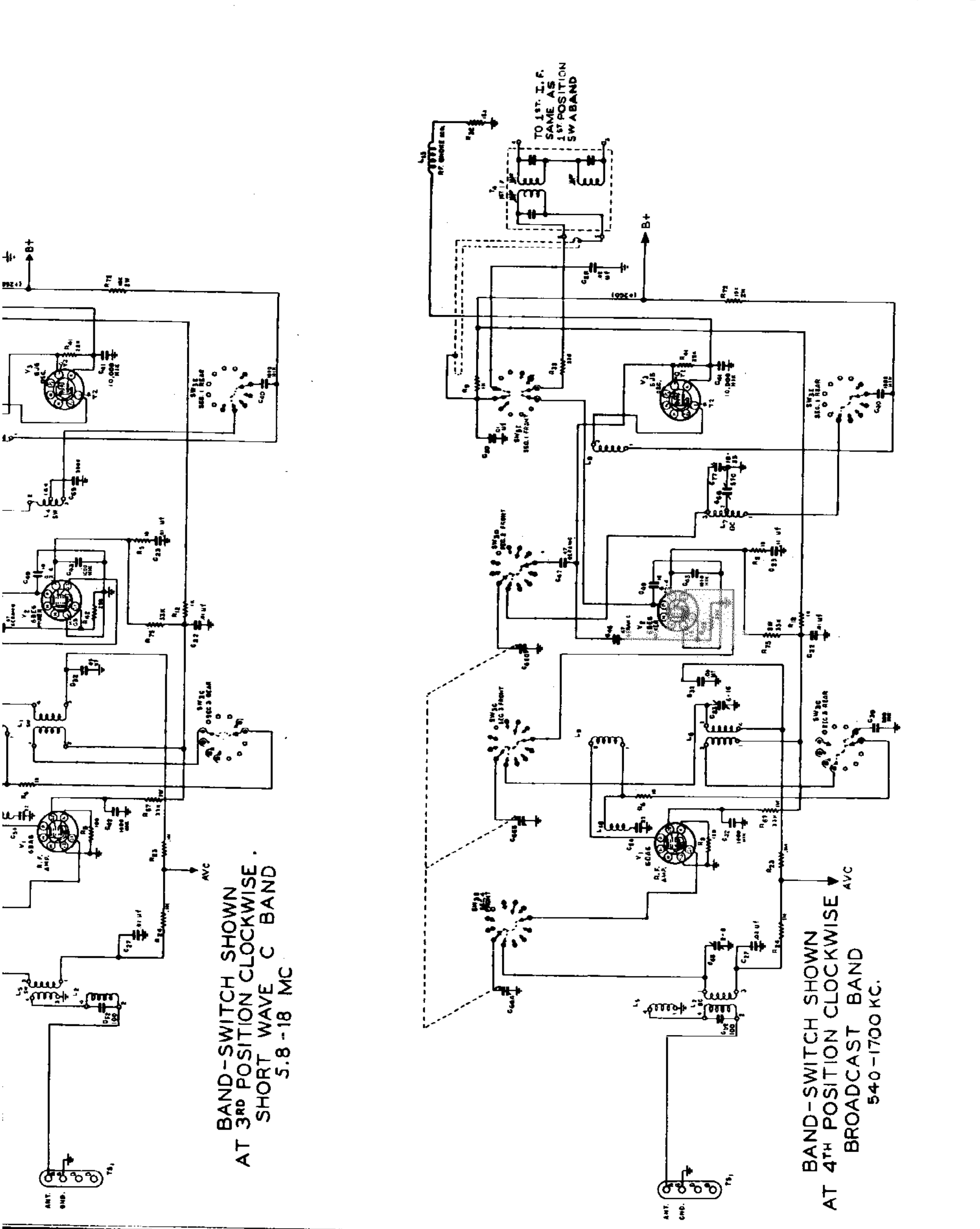
SERVICE PARTS LIST (Continued)

REF. NO	DESCRIPTION	HALLICRAFTER'S PART NUMBER
	RESISTORS (Continued)	
R-75	33,000 ohms 2 watts, carbon	RC40AE333K
R-76	330 ohms, plug-in ballast	24B870
R-79	470 ohms 2 watts, carbon	RC40AE471M
	TRANSFORMERS AND COILS	
T-1	Transformer, FM detector	50C208
T-2,3	Transformer, interstage I.F.	50C209
T-4	Transformer, 1st. I.F.	50C210
T-5	Transformer, power	52C151
T-6	Transformer, audio output	55B096
L-1	Mixer coil for SW band	51B905
L-2	Antenna coil for BC band	51B955
L-4	Oscillator coil for SW band	51B908
L-5	Antenna coil for SW band	51B909
L-6	Mixer coil for BC band	51B910
L-7	Oscillator coil for BC band	51B911
L-8	Oscillator coil for FM band	51B914
L-9	Mixer coil for FM band	51B915
L-10	Antenna coil for FM band	51B916
L-11	Plate choke, osc. stage	53B008
L-12	Filament choke	53B009

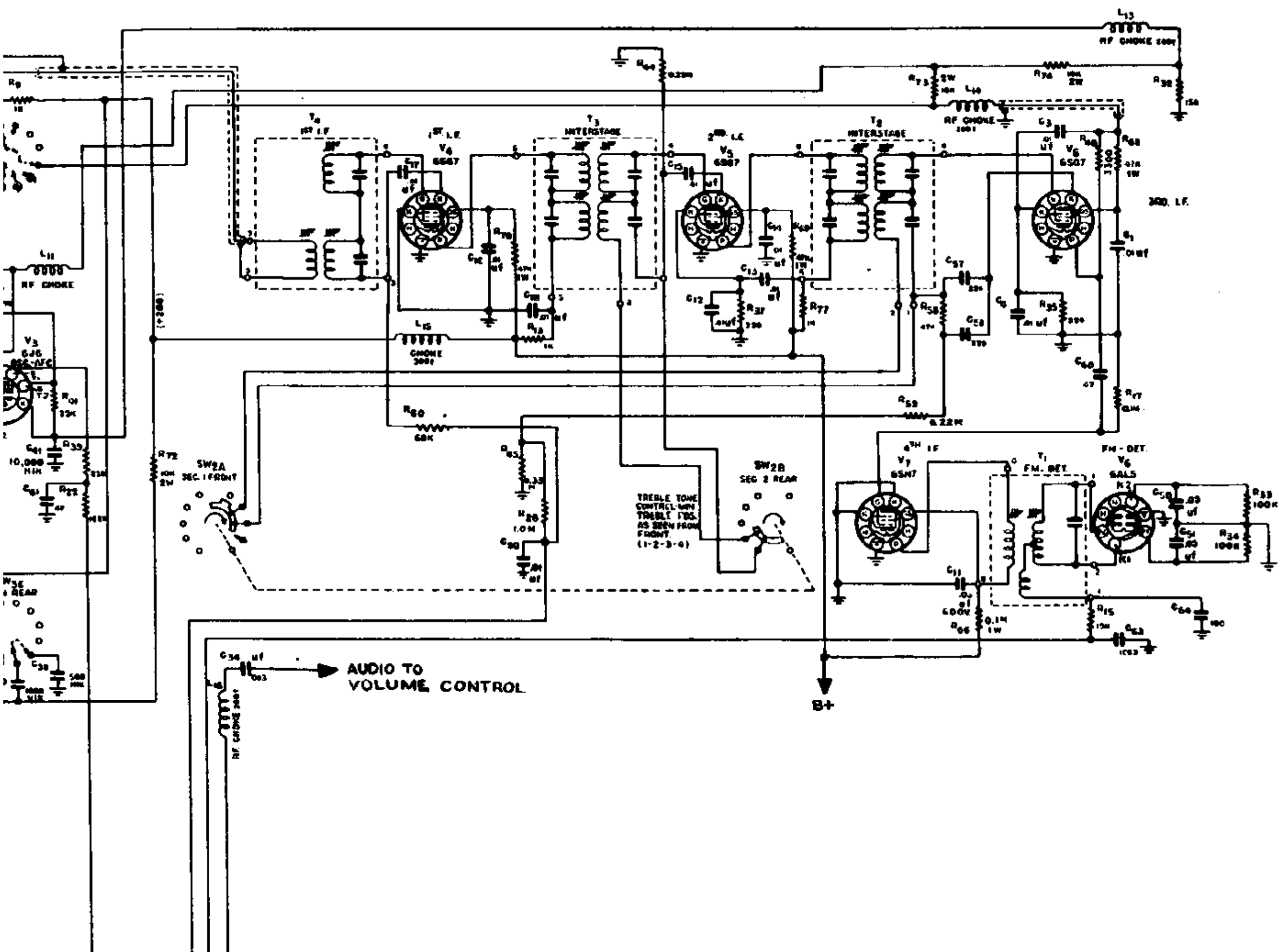
L-13,14,15,16	R.F. choke
L-18	R.F. choke,
L-21	Audio choke
	S
SW-1	Power & Bas
SW-2	Treble swi
SW-3	Band switcl
SW-4	Muting swi
	PLUGS
PL-1	Line cord
SO-1	Receptacle
SO-2	Jack, phon
SO-3	Receptacle,
	Socket, oc
	Socket, mi
	Pilot ligh
	L.H.
	Pilot ligh
	R.H.
	TUBES
V-1	Type 6BA6,
V-2	Type 6BE6,



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE
SHORT WAVE B BAND
9-12 MC.


TO 1ST I.F. SAME AS 1ST POSITION SW A BAND
B+
AVC
BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE SHORT WAVE C BAND 5.8-18 MC
BAND-SWITCH SHOWN AT 4TH POSITION CLOCKWISE BROADCAST BAND 540-1700 KC.

RAFTERS CO.



	53A106
stage plate	53A115
	56B082

IES

e switch ass'y	60B307
s'y.	60B264
	60C266
	18A092

LAMPS

ug	87B1625
o motor	10A015
-up	36A034
ast	6A190
ube)	6A190
e (tube)	6A276
et & bracket,	86A046
et & bracket,	86A047

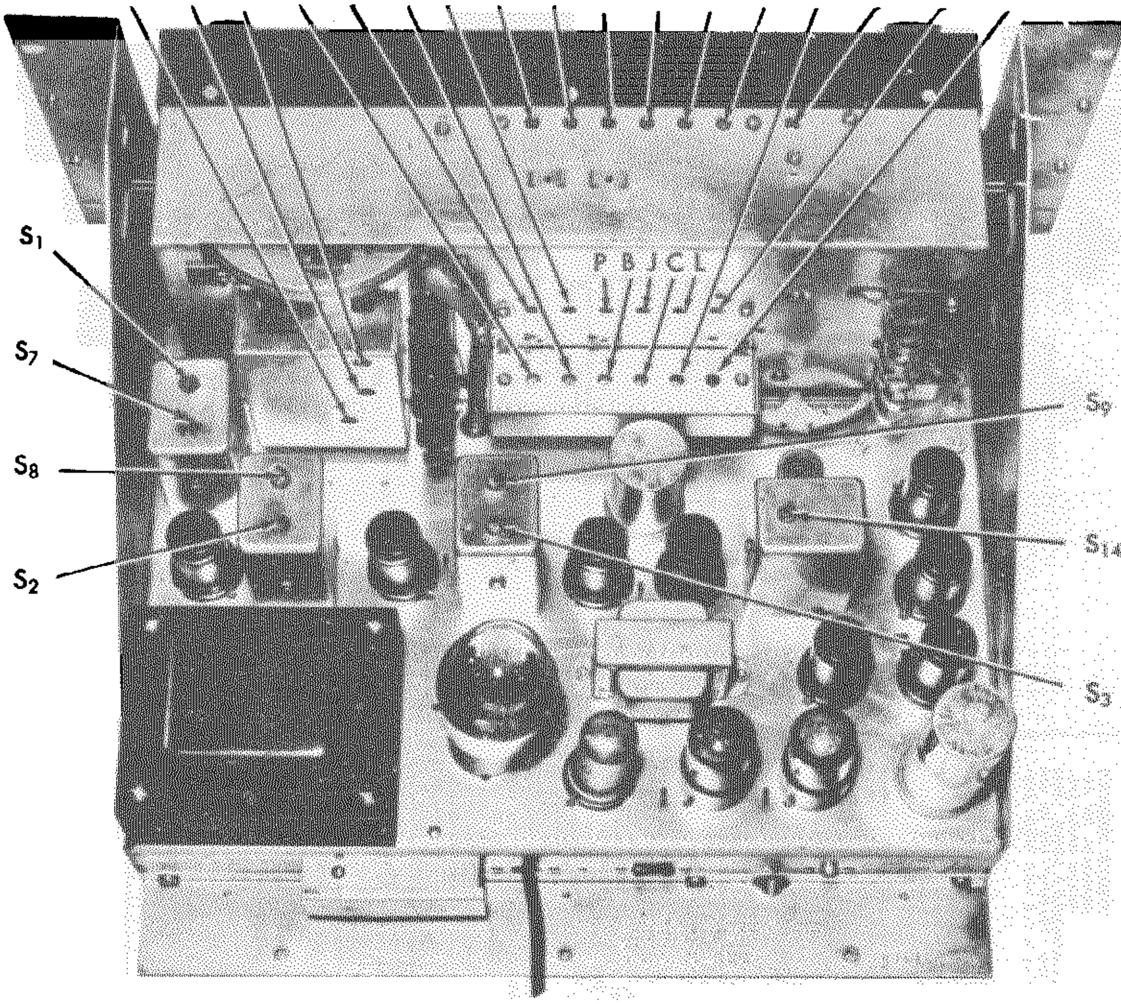
OCKETS

na	90X6BA6
	90X6BE6

V-3	Type 6J6, Oscillator and A.F.C.	90X6J6
V-4,5,6	Type 6SG7, I.F. amplifier	90X6SG7
V-7	Type 6SH7, I.F. amplifier	90X6SH7
V-8	Type 6AL5, F.M. detector	90X6AL5
V-9,10	Type 6J5, A.F. amplifier	90X6J5
V-11,12	Type 6SQ7, Phase inverter	90X6SQ7
V-13,14	Type 6V6GT/G, A.F. power amplifier	90X6V6GT
V-15	Type 5U4G, Rectifier	90X5U4G
LM-1,2	Lamp, 6-8 V., 150 MA. G.E.#47	39A004

MISCELLANEOUS COMPONENTS

	Shield base, tube (miniature tube)	69A169
	Shield, tube (miniature tube)	69A104
	Spring, tube retainer	75A076
	Carriage, pointer	67B645
	Pointer, FM	82B138
	Pointer, AM	82B143
	Spring, pointer	75A132
	Push-button (black)	17B028-1
	Insert, push-button, lucite	17A027
	Insert, push-button, metal	17A029
	Call letters	17A025-1
	Spring, dial	75A006
	Cord, dial	38A017
	Escutcheon	70D39-1
	Dial glass, upper	22B184
	Dial glass, lower	22B193
	Knob	15A131
TS-1	Terminal strip, antenna	88A277
TS-2	Terminal strip, speaker	88A334-1
	Shield, speaker terminal	69C173



Top view showing alignment points.

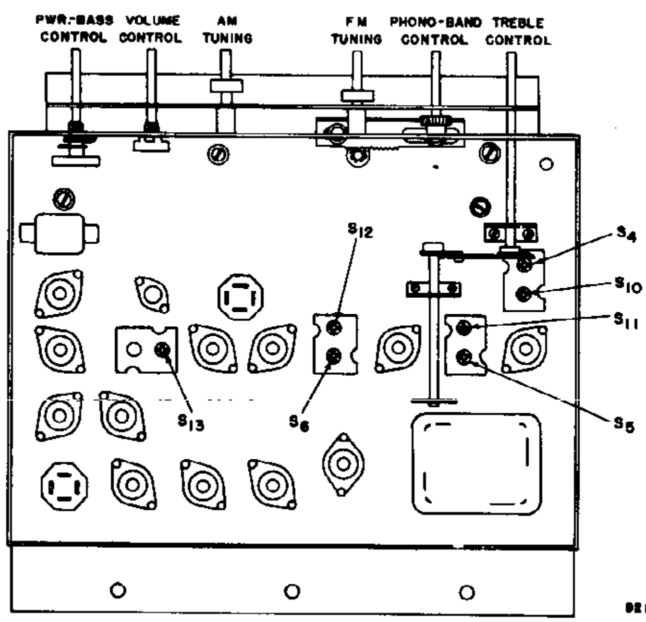


Fig. 5. Bottom view showing alignment points.

REPLACING DIAL LAMP:

Refer to Fig. 10 for location of the two pilot lamps. To gain access to the lamps remove the four front panel screws holding the panel to the cabinet and three chassis screws located under the cabinet. Pull the chassis clear of the cabinet. Unfasten and remove the knobs. Remove the four panel screws holding the panel to the chassis to release the panel exposing the pilot lamps for service. Replace pilot lamps with 6-8V. 150 ma. Mazda #47 equivalent.

ALIGNMENT PROCEDURE:

It will be necessary to remove the receiver chassis from the cabinet and remove the chassis bottom plate to gain access to some of the I. F. transformer iron core adjustments. See Fig. 5.

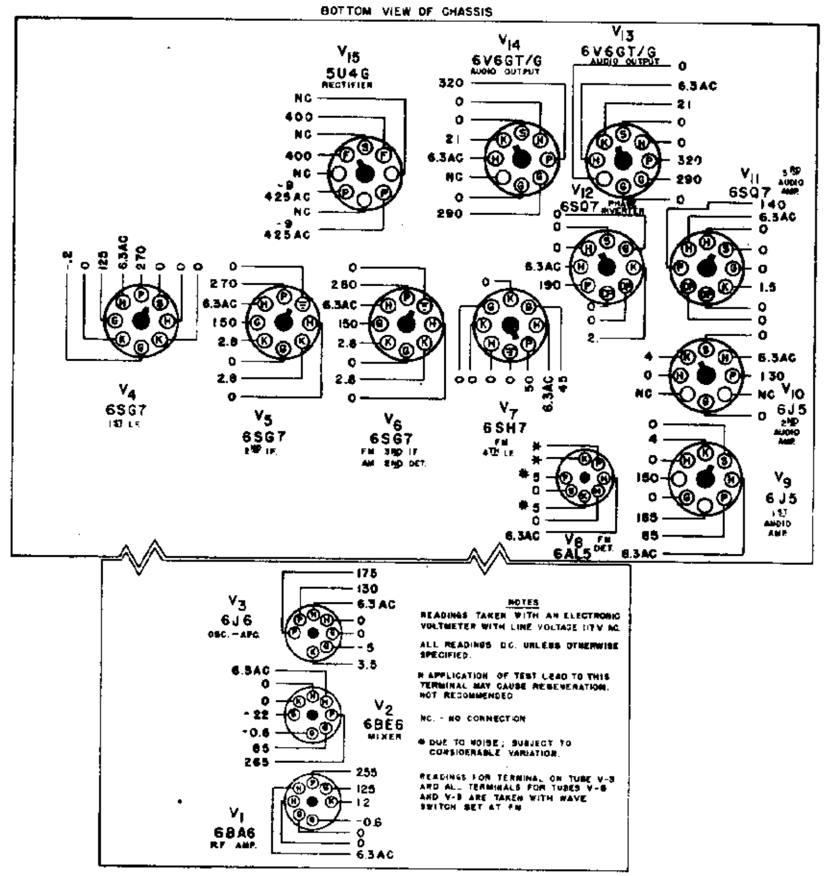
The receiver is equipped with AUTOMATIC FREQUENCY CONTROL on the "FM" band to compensate for mechanical variations in the push-button mechanism. Correction factor is approximately 5 times: "Take hold" characteristics are: "Before" 100 kc and "Release" before 450 kc at a 0.2 volt input signal.

The standard RMA dummy mentioned in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

ALIGNMENT PROCEDURE

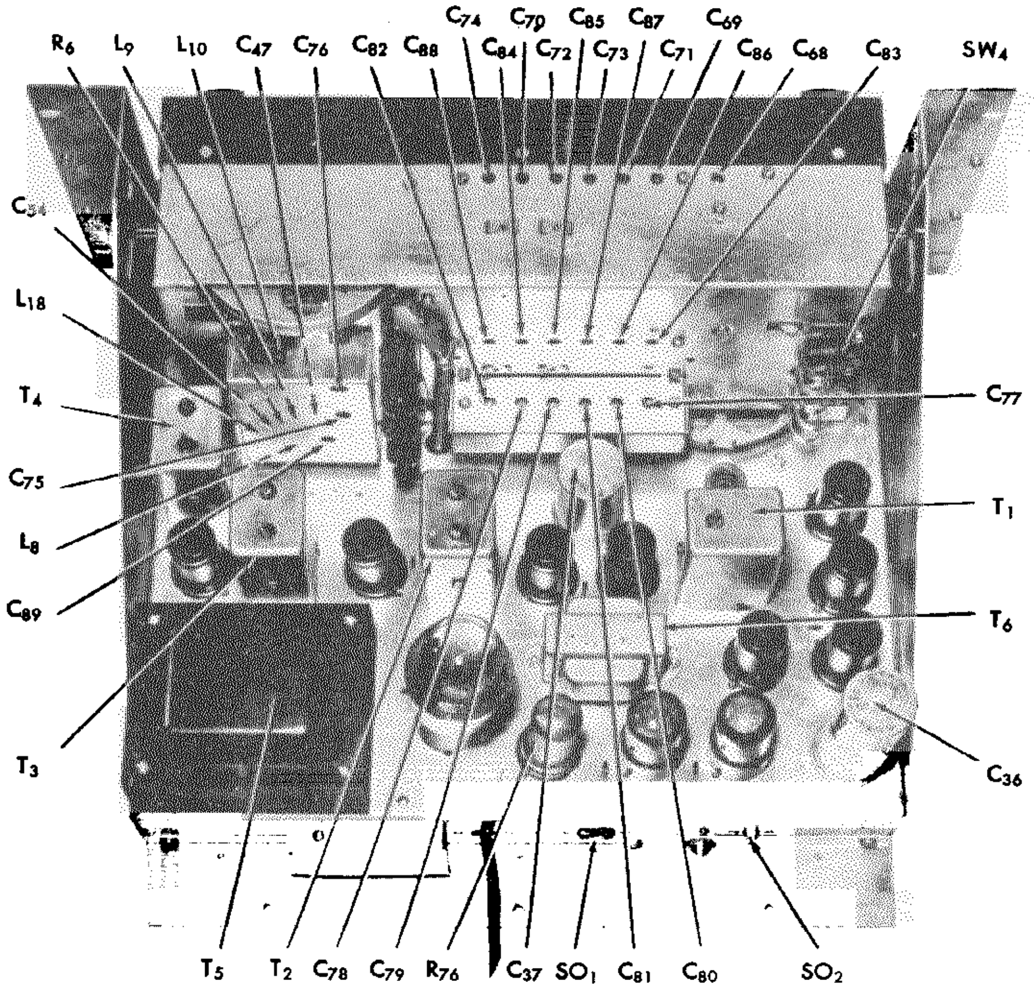
Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Pos.	Radio Dial Setting	Adjust	Remarks
1	0.01 mfd cap.	To stator plates of center section of AM tuning cap.	455 kc *	"BC"	1000 kc	S3, S6, S2, S5, S1 & S4	Adjust for max. output. TREBLE tone control set at No. 1.
2	0.01 mfd cap.	To stator plates of center section of FM tuning cap.	10.7 mc (No modulation)	"FM"	Mid-scale	S9, S12, 13 S8, S11, S7 & S10	Adjust for max. AVC voltage as measured between pin #7 of 6AL5 and ground with a 20,000-ohm per volt meter.
3	0.01 mfd cap.	To stator plates of center section of FM tuning cap.	10.7 mc (No modulation)	"FM"	Mid-scale	S14	Adjust for zero voltage as measured between junction of L16 and C34 with a 20,000-ohm per volt meter.
4	Std. RMA dummy.	To terminals "A" and "G" on ant. term. strip	1600 kc	"BC"	1600 kc	F*, H and I	Adjust for max. output
			600 kc	"BC"	600 kc	G*	
5	Std. RMA dummy	To terminals "A" and "G" on ant. term. strip	16 mc	"C"	16 mc	E*, R and S	Adjust for max. output.
6	Std. RMA dummy	To terminals "A" and "G" on ant. term. strip.	18 mc	"A"	18 mc	A*, O and N	Adjust for max. output
			15 mc	"A"	15 mc	B*, P, and Q	
7	Std. RMA dummy	To terminals "A" and "G" on ant. term. strip.	12 mc	"B"	12 mc	C*, J and K	Adjust for max. output.
			9 mc	"B"	9 mc	D*, L	
8	Two 150 ohm carbon resistors	To terminals "D" and "D" on ant. term. strip; one 150 ohm resistor in each lead.	108 mc	"FM"	108 mc	T*, U and V	Adjust for max. output.

* NOTE - Calibration adjustments.

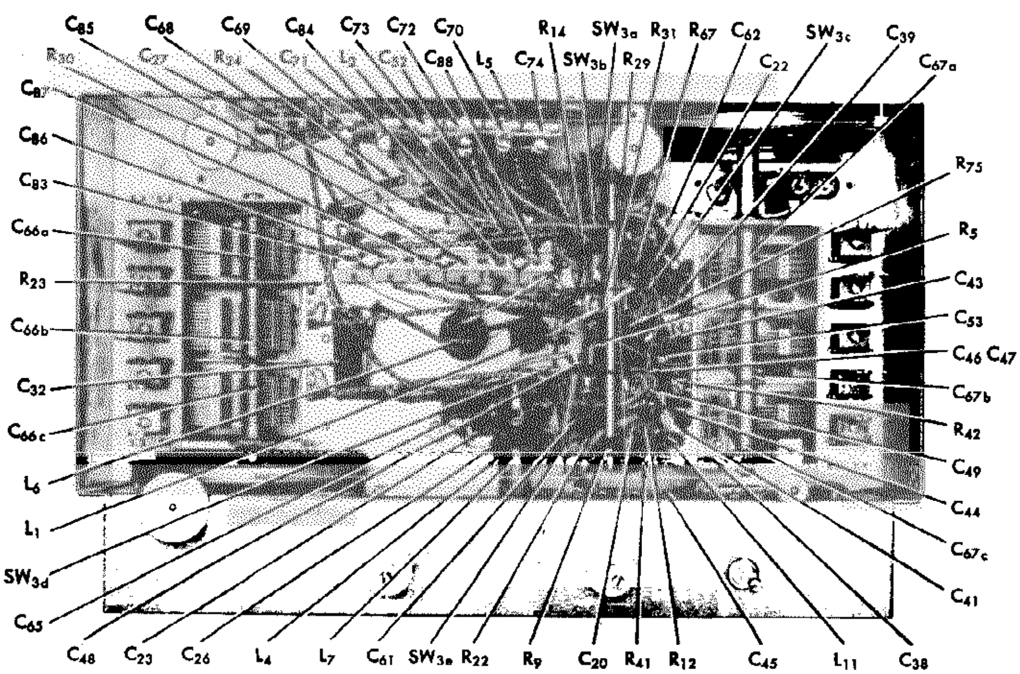


Tube voltage chart.

THE HALLICRAFTERS CO.



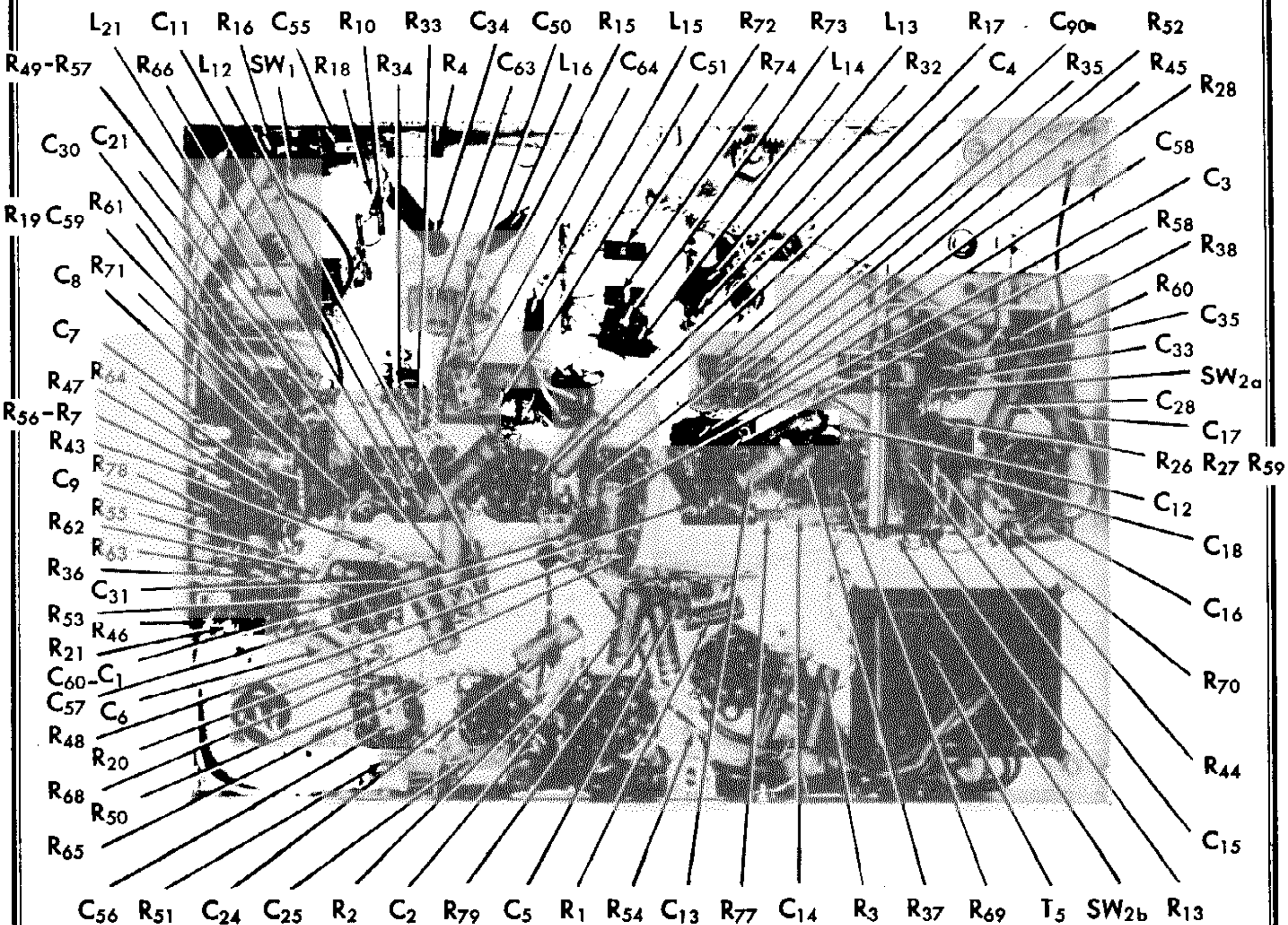
Top view showing component location.



Front view of R.F. chassis showing component location.

MODEL S-47

THE HALLICRAFTERS CO.



Bottom view of receiver showing component location.

INSERTING CALL LETTERS INTO TRANSLUCENT INSERT ASSEMBLY:

1. Slide out metal insert from translucent insert assembly. (See Fig. 2).
2. Insert call letter tab.
3. Replace metal insert.
4. Replace translucent insert assembly into push-button.

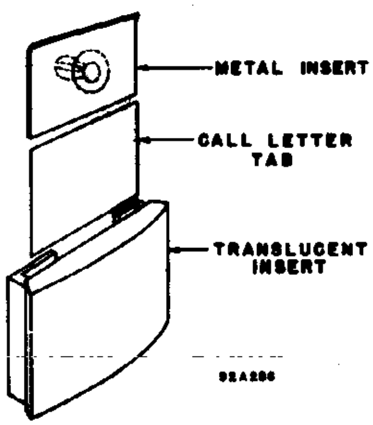
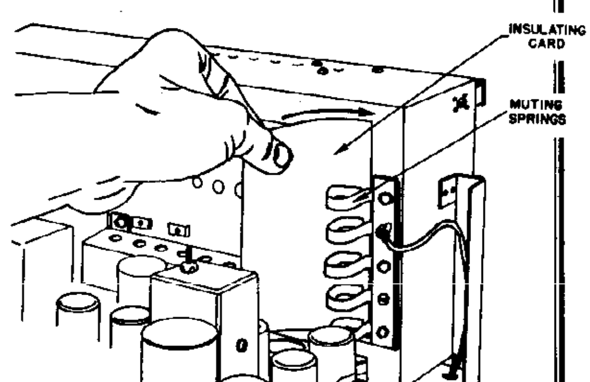
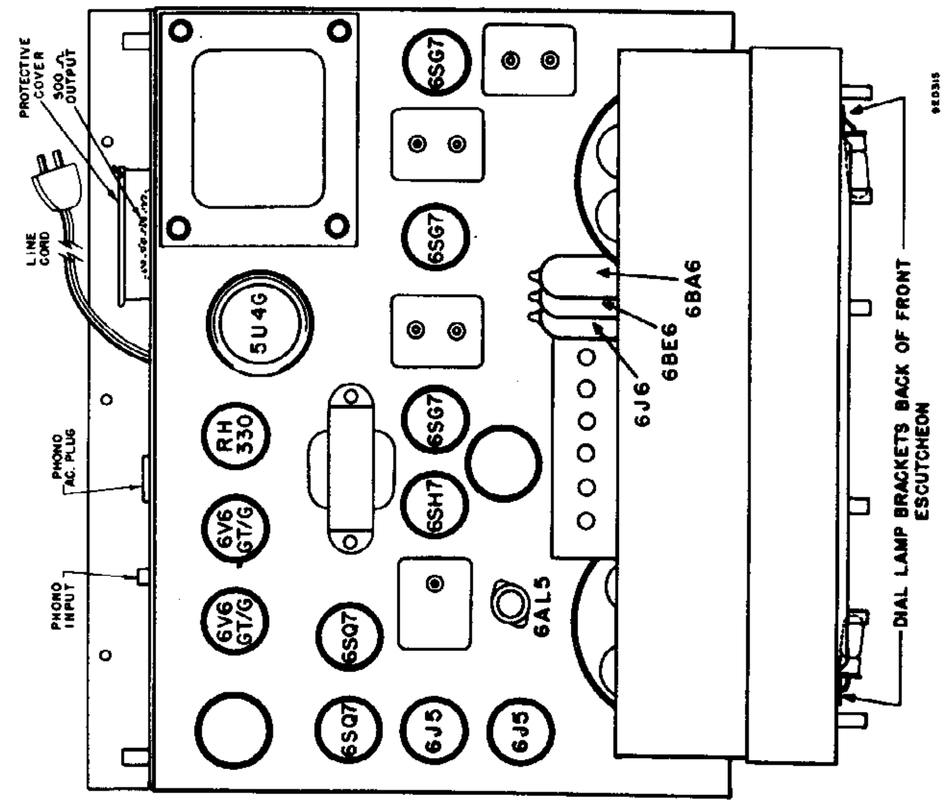


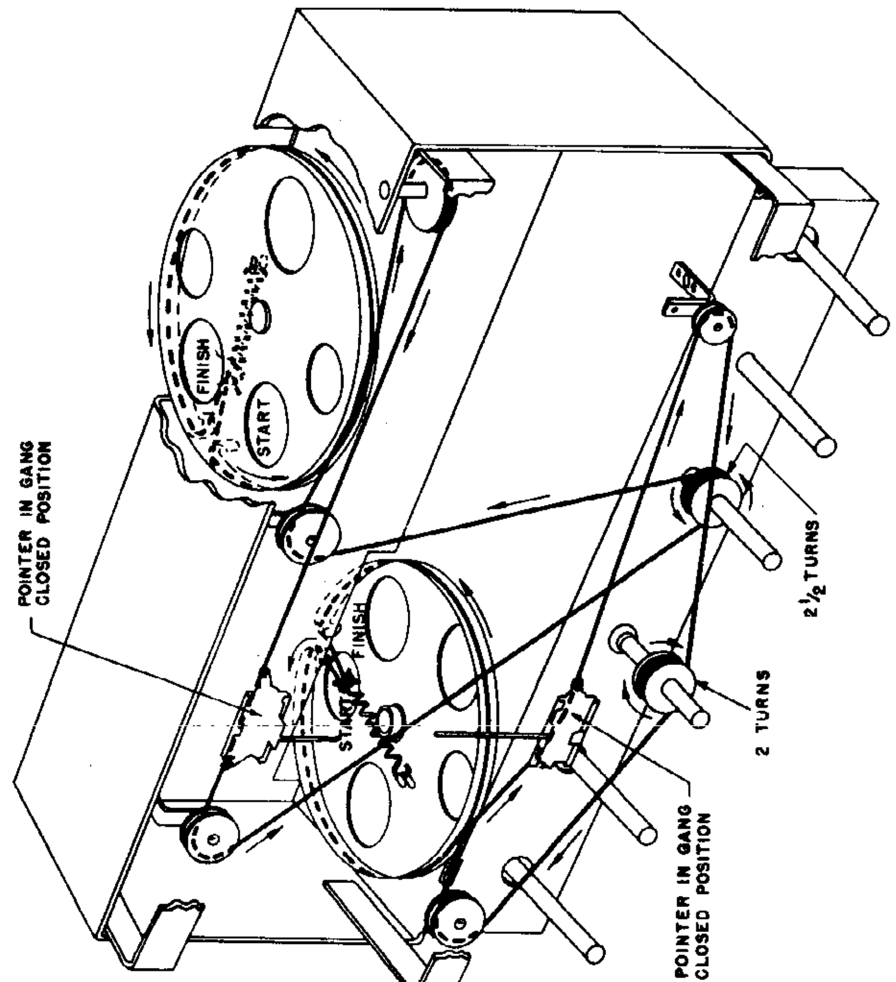
Fig. 2. View showing call letter installation.



Insulating the muting switch contacts



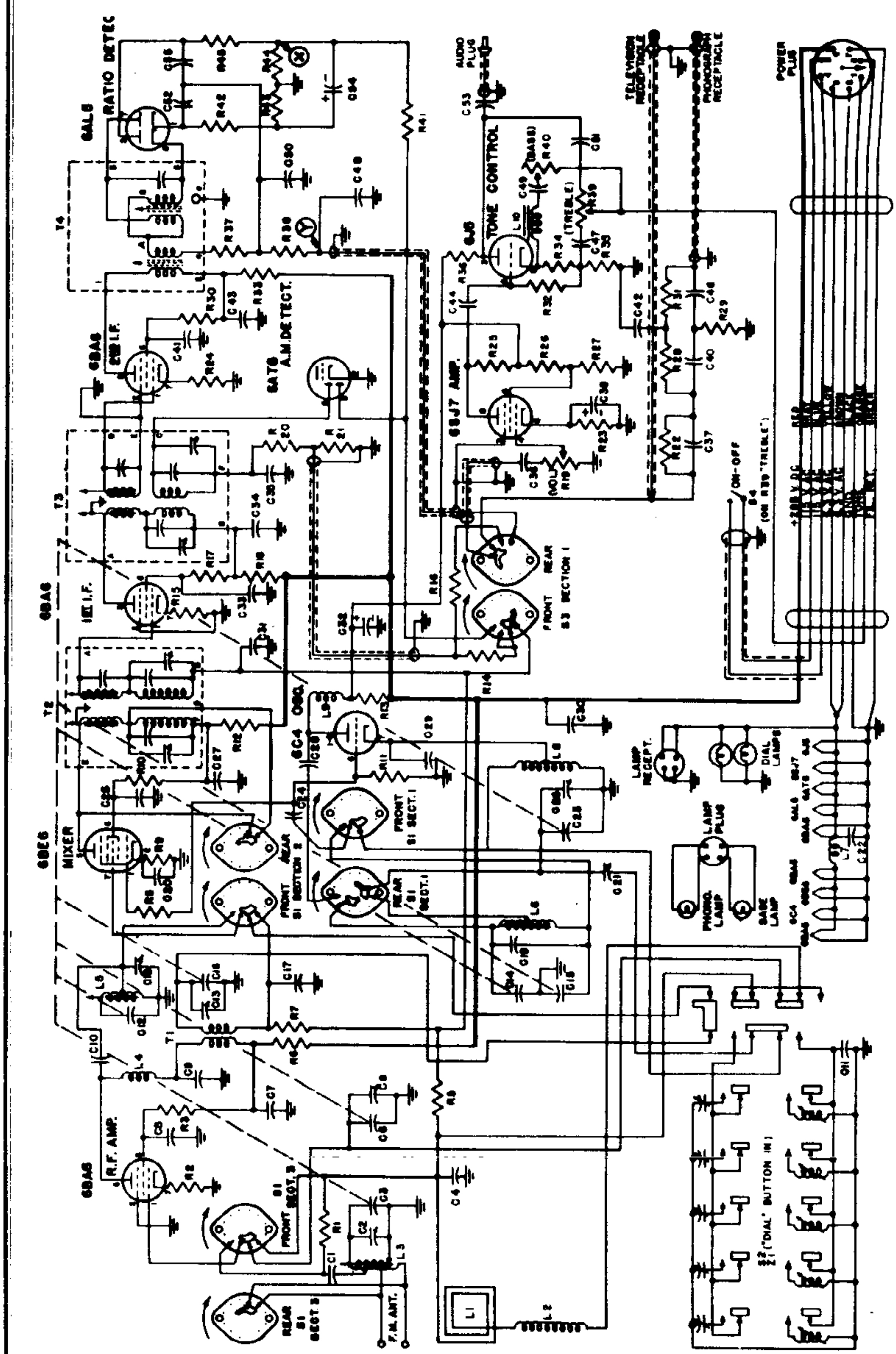
Top view, location of tubes and dial lamps.



Dial cable stringing procedure.

HOFFMAN RADIO CORP.

MODELS B502, chassis 1
B504, chassis 123



NORMAL OPERATING CURRENTS

5U4G Cathode Current .... 170 Ma
6V6 Cathode Current (both tubes) .... 75 Ma

SPECIFICATIONS

TUNING RANGES
Broadcast Band .... 535 Kc to 1650 Kc
FM Band .... 88 Mc to 108 Mc
INTERMEDIATE FREQUENCIES:
Broadcast Band .... 455 Kc

MODELS B502, chassis 113, HOFFMAN RADIO CORP.

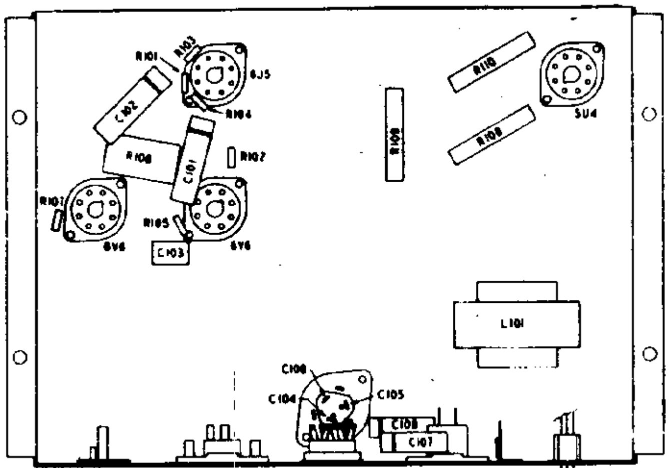
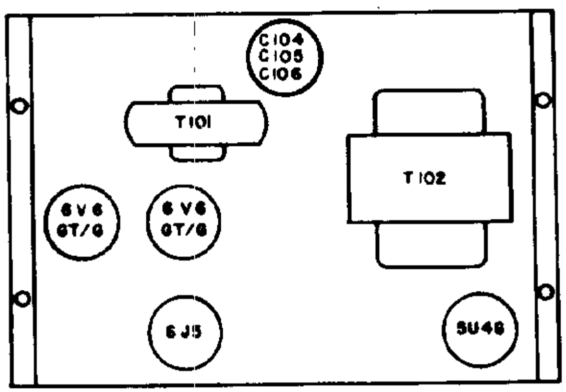


Fig. 4—Bottom of Power Supply Chassis



Power Supply Chassis

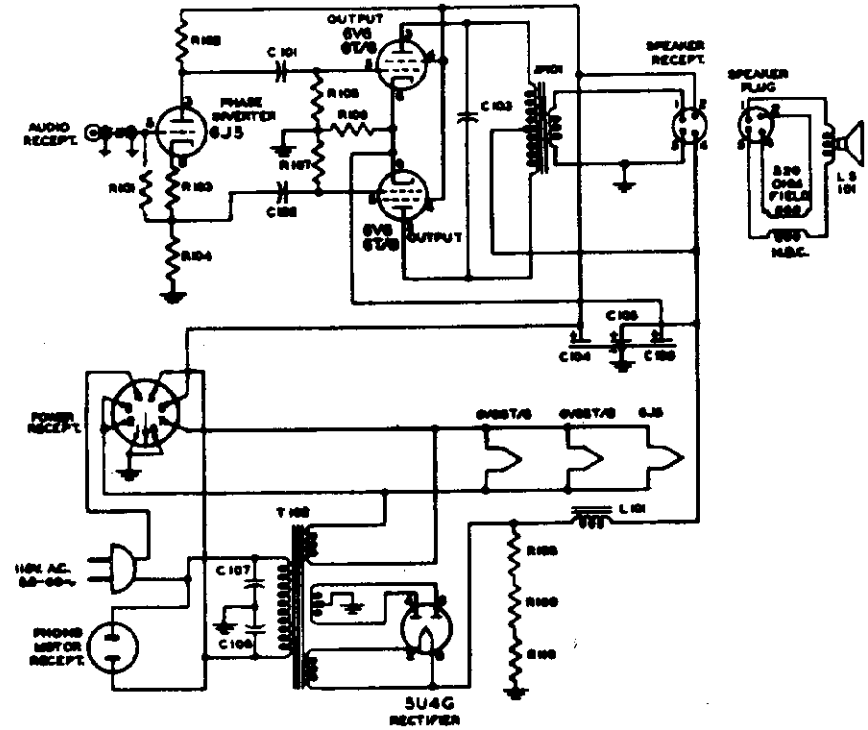


Fig. 5—Power Supply Schematic Diagram

POWER SUPPLY CHASSIS

SYMBOL	DESCRIPTION	HOFFMAN NO.
C101, C102	.05 Mfd. 400 Volt Tub. Paper	4101
C103	470 Mmf. ±20% Mica	4003
C104, C105 C106	20/20 Mfd. 450V. 20 Mfd. 25V. Electrolytic	4200
C107, C108	.01 Mfd. 600 Volt, Metal Case	4105
R101	1 Meg. ±20% ½ Watt	4513
R102, R104	47000 Ohm ±10% ½ Watt	4559
R103	2200 Ohm ±20% ½ Watt	4512
R105, R107	.22 Meg. ±20% ½ Watt	4500
R106	220 Ohm ±20% 3 Watt W.W.	4706
R108, R109 R110	10,000 Ohm ±10% 2 Watt	4503
L101	Filter Choke	5116
T101	Audio Output Transformer	5108
T102	Power Transformer	5007
LS101	Speaker—12" Electrodynamic	9044

*Prices Subject To Change Without Notice

AUTOMATIC RECORD CHANGER

The automatic record changer used with this receiver is a Webster Model 56

NOTE

IT IS PARTCULARLY IMPORTANT THAT AM ALIGNMENT BE DONE BEFORE FM ALIGNMENT. THIS IS TO AVOID POSSIBLE INTERACTION BETWEEN FM AND AM ADJUSTMENTS.

AM ALIGNMENT

I.F. ALIGNMENT:

1. Set tuning condenser on high frequency end of tuning range (minimum capacity).
2. Set band switch to AM position.
3. Depress Manual pushbutton.
4. Turn receiver on and let it warm up for fifteen minutes or longer in order to minimize drift effects.
5. Connect output meter across speaker voice coil and set meter on lowest range, but not below 2.5 volt scale.
6. Connect output of signal generator to stator of C16 (see schematic diagram and chassis layout) through a .1 mfd. condenser; connect ground side of generator directly to chassis of receiver. Set signal generator on 455 Kc modulated.
7. Adjust I.F. trimmers on T2 and T3 for maximum reading on the output meter. Keep the meter reading on the lower half of the scale.

(NOTE: The above mentioned trimmers are on the top of their respective I.F. cans and are not to be confused with the iron core adjustments also coming out of the tops of the FM IF cans. Keep the signal generator output low and the volume control on the receiver wide open during adjustment.)

R.F. ALIGNMENT:

After following the steps outlined above for I.F. alignment, proceed as follows:

1. Connect signal generator to "hot" side of loop through a .1 mfd condenser and a 400 ohm resistor in series.
2. Set signal generator to 1650 Kc (modulated) and adjust oscillator trimmer (C26) to signal frequency. (Tuning gang should be at minimum capacity setting for this adjustment).
3. Set signal generator to 535 Kc. (Modulated) and adjust oscillator padder (C21) to signal frequency. (Gang should be at maximum capacity setting for this adjustment.
4. Repeat steps 2 and 3 to insure correct adjustment.
5. Set signal generator to 1400 Kc. (modulated). Tune signal in by rotating condenser gang until signal is heard. Adjust trimmers C8 and C13 for maximum reading on output meter. Keep signal generator output low so that meter reading is on lower half of scale.

FM ALIGNMENT

I.F. ALIGNMENT:

1. Set band switch in the FM position.
2. Set tuning condenser to high frequency end of tuning range (minimum capacity).
3. Solder a 5,000 ohm 1/2 w. carbon resistor between terminals A and B of T2. Solder another 5,000 ohm 1/2 w. carbon resistor between terminals D and E of transformer T3. DO NOT USE WIRE WOUND RESISTORS.
4. Connect the negative side of a 20,000 ohm/volt D.C. voltmeter or vacuum tube voltmeter to point "X" on diagram. Connect the positive side of meter to ground.
5. Connect output of signal generator directly to stator of C12. Adjust signal generator to 10.7 Mc.
6. Adjust the tuning slugs on transformers T2 and T3 for maximum output. (Note: There are two slugs on each I.F. transformer, one on the top of the can and one on the bottom of the can under the chassis. It is desirable to make this adjustment with an insulated alignment screw driver.) While making the above adjustments, keep the output of the signal generator low so that the D.C. reading on the meter is always between 1/2 volt and 1 volt.
7. Adjust the iron slug on the top only of T4 for maximum reading on the meter as outlined in step 6 above.
8. Remove meter lead from point "X" and connect to point "Y" Set meter to most sensitive D.C. voltage range.
9. Adjust the iron slug on the bottom only of T4 for a zero reading on the meter. It will be noted that as this slug is adjusted the meter will go from a positive indication to a negative indication. Proper adjustment is obtaine when the meter is at the zero point between negativ and positive swings of the meter. (CAUTION: This ad justment must be made with an insulated alignmen screw driver).

NOTE

The above adjustments must be made in sequence and operator should take particular care that the frequency ting on the signal generator is not touched during al ment. BE SURE THAT THE TWO 5,000 OHM RESIST ARE REMOVED FROM THE CIRCUIT AFTER I.F. ALI MENT IS COMPLETED. The above adjustments should made on the basis of meter readings only and no at tion should be paid to what is heard coming out of speaker.

R.F. ALIGNMENT:

1. Set tuning condenser to 100 Mc on the dial.
2. Set band switch to FM position.
3. Connect DC voltmeter to point "X" as outlined abov step 4.
4. Connect output of signal generator to antenna termi on receiver through 150-ohm carbon resistors. One sistor should be connected in series with the "hot" of the signal generator and the other resistor shoul connected in series with the ground side of the ge ator. Set signal generator on 100 Mc.
5. Adjust tuning slug on L6 for maximum indication meter.
6. Set signal generator to 90 Mc.
7. Tune set by rotating gang condenser until meter re maximum. Now adjust tuning slugs on L3 and L5 maximum meter reading. While making the above justments keep the output on the signal generator so that the meter reading is between 1/2 volt and 1
8. Set signal generator to 106 Mc.
9. Tune set by rotating gang condenser until meter re maximum. Now adjust tubular trimmers C2 and C18 maximum meter reading.
10. Repeat steps 6 through 9 inclusive twice for proper ignment.

CAUTION: The above adjustments should be made on basis of meter readings only and no attention should paid to what is heard coming out of the speaker.

PUSHBUTTON ADJUSTMENTS

The frequency ranges for the pushbuttons are given in ure 2. A layout of the pushbutton adjustments is showr Figure 3. Note that in this figure, pushbutton number now to the extreme right, since the pushbutton assembl being viewed from the rear. To make pushbutton adj ments, proceed as follows:

1. Turn the receiver on and let it warm up for fifteen r utes or longer in order to minimize drift effects.
2. Depress the DIAL pushbutton and tune in the sta which is to be set on pushbutton number 1.
3. Now depress pushbutton number 1 and adjust tur slug 1a and trimmer 1b (Figure 3) until the statio accurately tuned in again.

PUSHBUTTON NO	1	2	3	4	5
FREQUENCY RANGE IN KILOCYCLES	550 TO [illegible]	590 TO [illegible]	[illegible] TO 1370	[illegible] TO 1370	[illegible] TO 1740

Figure 2—Pushbutton Frequencies

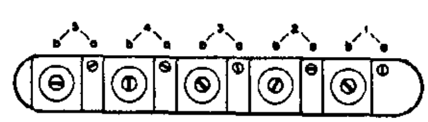
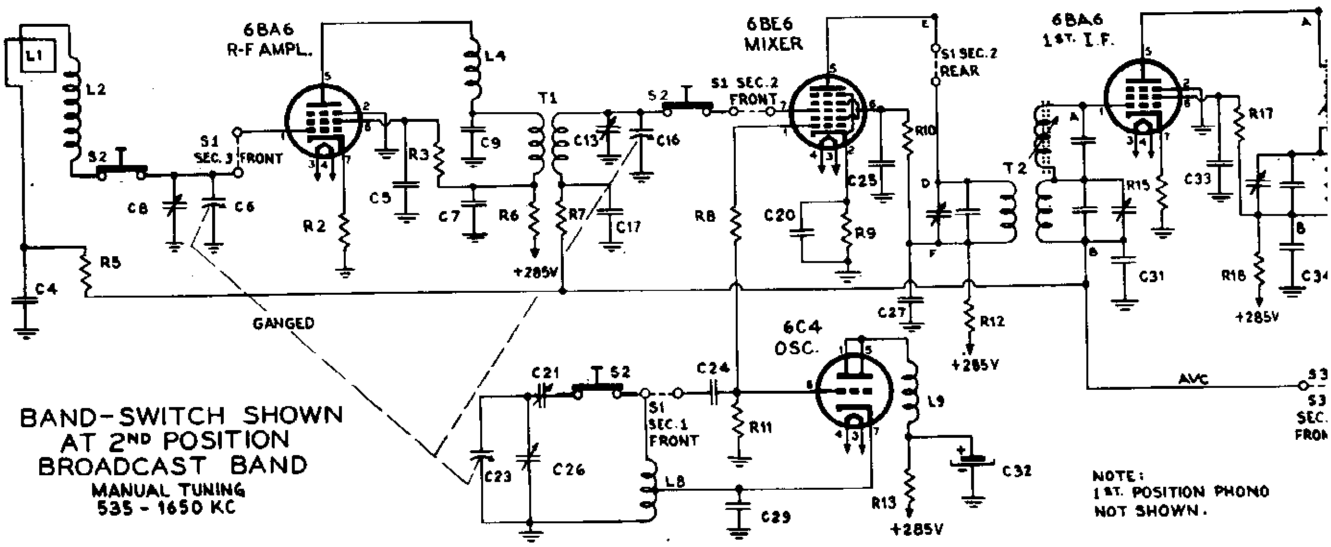
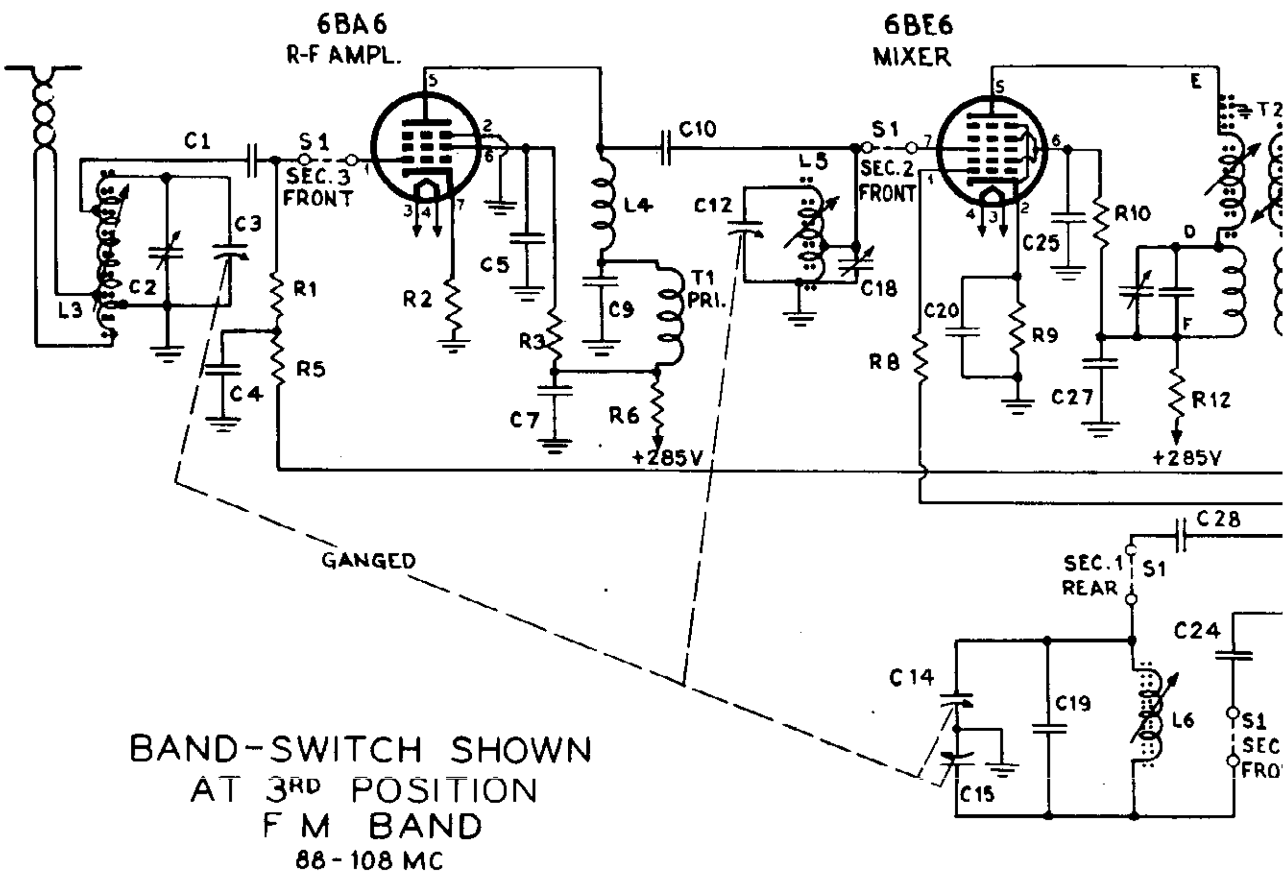
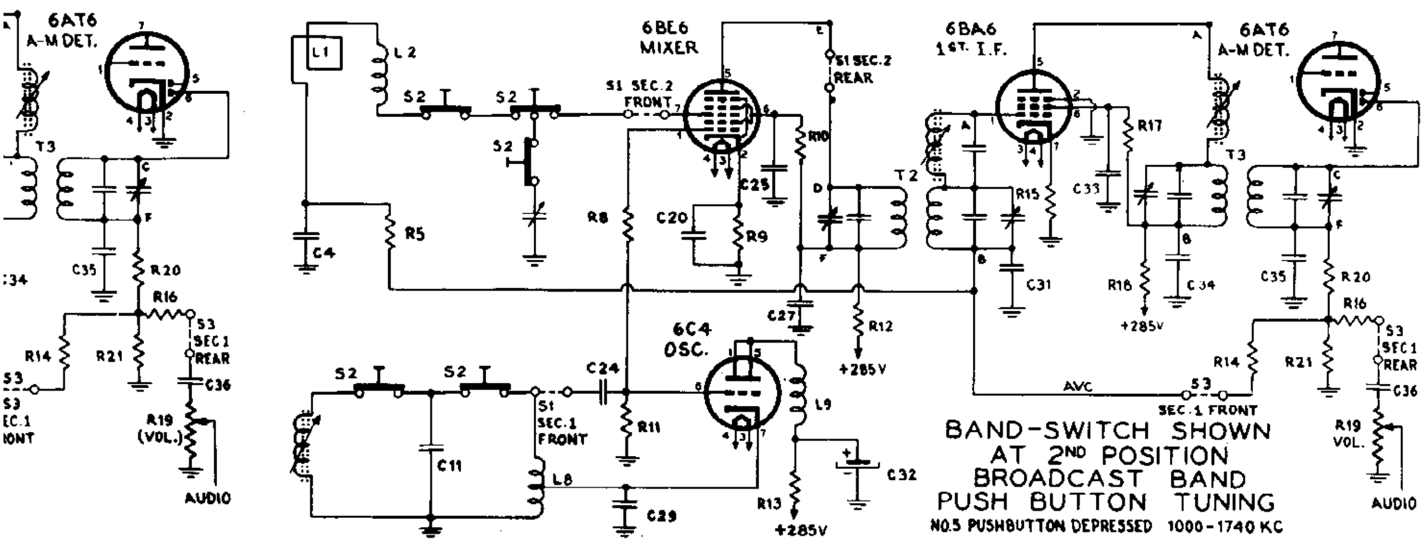
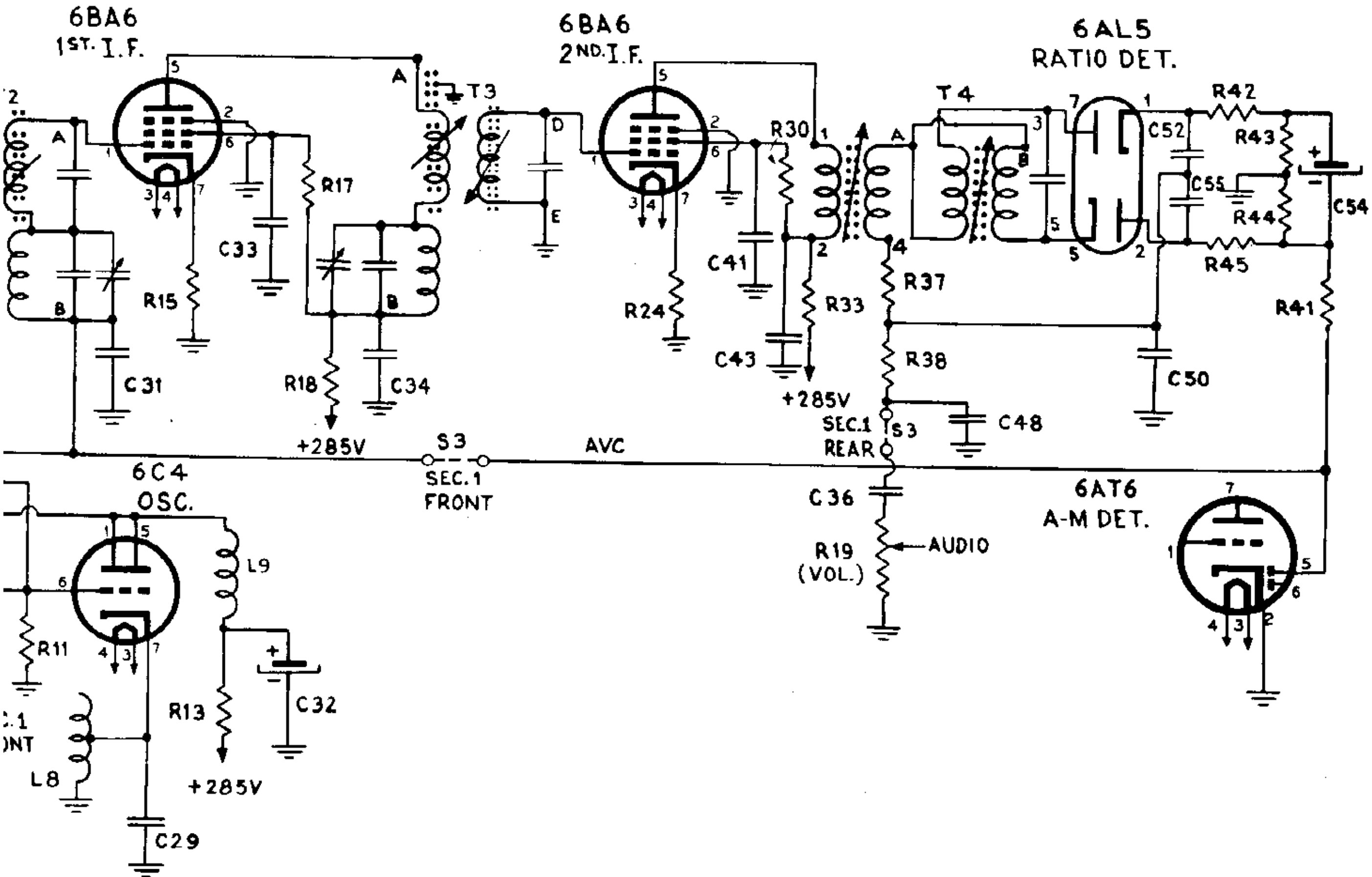


Figure 3—Pushbutton Adjustments


6BA6
R-F AMPL.
6BE6
MIXER
6BA6
1ST. I.F.
6C4
OSC.
S1 SEC.3 FRONT
S1 SEC.2 FRONT
S1 SEC.2 REAR
S1 SEC.1 FRONT
GANGED
AVC
+285V
BAND-SWITCH SHOWN
AT 2ND POSITION
BROADCAST BAND
MANUAL TUNING
535 - 1650 KC
NOTE:
1ST. POSITION PHONO
NOT SHOWN.


6BA6
R-F AMPL.
6BE6
MIXER
S1 SEC.3 FRONT
S1 SEC.2 FRONT
SEC.1 S1 REAR
T1 PRI.
GANGED
+285V
BAND-SWITCH SHOWN
AT 3RD POSITION
F M BAND
88 - 108 MC


6AT6
A-M DET.
6BE6
MIXER
6BA6
1ST. I.F.
6AT6
A-M DET.
6C4
OSC.
S1 SEC.2 FRONT
S1 SEC.2 REAR
S1 SEC.1 FRONT
S3 SEC.1 REAR
S3 SEC.1 FRONT
AVC
+285V
R19 (VOL.)
AUDIO
BAND-SWITCH SHOWN
AT 2ND POSITION
BROADCAST BAND
PUSH BUTTON TUNING
NO.5 PUSHBUTTON DEPRESSED 1000-1740 KC


6BA6
1ST. I.F.
6BA6
2ND. I.F.
6AL5
RATIO DET.
T3
T4
R42
R43
R44
R45
C52
C55
C54
R41
R30
R33
R37
R38
C41
C43
C50
C48
+285V
S3
SEC.1
FRONT
AVC
SEC.1
REAR
C36
R19
(VOL.)
AUDIO
6AT6
A-M DET.
6C4
OSC.
L9
R11
R13
C32
L8
C29
R15
R17
R18
R24
C31
C33
C34

MODELS B502, B504

HOFFMAN RADIO CORP.

POWER SUPPLY CHASSIS

Pin No.	1	2	3	4	5	6	7	8
6J5	0	0	+190	—	+65*	+80	6.3 AC	+85
6V6	0	0	+310	+285	0	—	6.3 AC	+16.5
6V6	0	0	+310	+285	0	—	6.3 AC	+16.5
5U4	0	+335 5.0 AC★	—	370 AC	—	370 AC	—	+335 5.0 AC★

D.C. voltages measured with 20,000 ohm/volt meter.

A.C. voltages measured with 1000 ohm/volt meter.

*Measured with V.T.V.M. (subject to wide variations because of tubes and V.T.V.M. used).

All voltages measured with reference to chassis except as follows:
★Measured between pin numbers 2 and 8 on 5U4 socket.

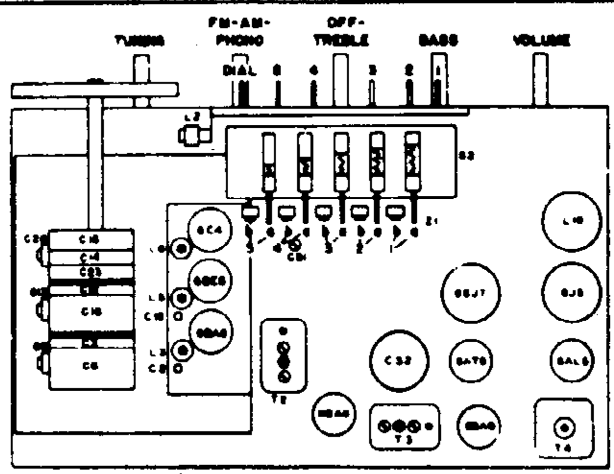
NOTE: Above readings are obtained with no signal input to receiver and band switch in phono position.

NORMAL OPERATING VOLTAGES

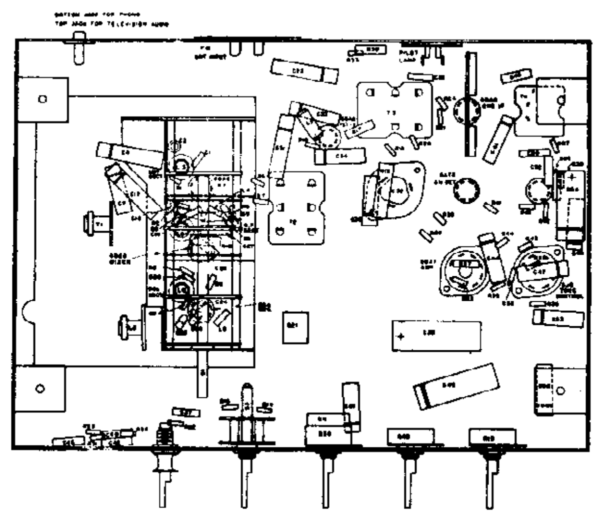
The following tables list the normal operating voltages to be expected at the various tube socket terminals.

TUNER CHASSIS

Pin No.	1	2	3	4	5	6	7	8
6BA6 (R.F.)	—.4*	0	6.3AC	0	+260	+97	+1.0	—
6BE6 (Conv.)	—14*	—.4	6.3AC	0	+270	+65	—.4*	—
6C4 (Osc.)	+230	—	6.3AC	0	+230	—14*	0	—
6BA6 (1st I.F.)	—.4*	0	6.3AC	0	+260	+97	+1.0	—
6BA6 (2nd I.F.)	0	0	6.3AC	0	+260	+93	+1.0	—
6AL5 Ratio Det.	+.5*	—.5*	6.3AC	0	+.25*	—	+.25*	—
6AT6 AM Det.	—	0	6.3AC	0	—.5*	—.5*	—	—
6SJ7 A.F.	0	6.3AC	0	0	+1.0	+23	0	+155
6J5 Tone Control	0	6.3AC	+180	+230	+40*	+44	0	+50



Tuner Chassis

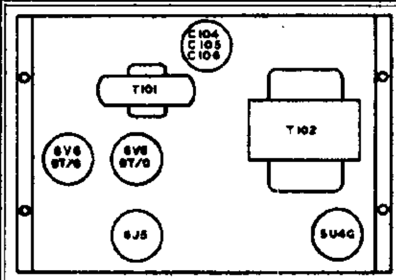


Bottom of Tuner Chassis

TUNER CHASSIS

SYMBOL	DESCRIPTION	HOFFMAN NO.
C1, C9, C10, C28, C35, C37	100 Mmf. ±10% Ceramic	4012
C2, C18	1 - 8 Mmf. Trimmer	4315
C3, C6, C12, C14, C15, C16, C23	3 Sect. Variable with Split Stator	4408
C4, C17, C22, C31	.05 Mfd. 200 Volt Tub. Paper	4100
C5, C25	470 Mmf. ±20% Mica	4003
C7, C30, C34, C44, C51, C53	.01 Mfd. 400 Volt Tub. Paper	4112
C8, C13, C26	1.8 - 30 Mmf. Trimmer	4313
C11	500 Mmf. ±5% Silver Mica	4004
C19	50 Mmf. ±2% Ceramic	4023
C20	220 Mmf. ±20% Ceramic	4026
C21	110-560 Mmf. Trimmer	4301
C24	22 Mmf. ±10% Ceramic	4021
C27	5000 Mmf. (Min.) Ceramic	4029
C29	50 Mmf. ±20% Ceramic	4031
C32	20 Mfd. 450 Volt Electrolytic	4207
C33, C41	.001 Mfd. 600 Volt Tub. Paper	4104
C36	.02 Mfd. 400 Volt Tub. Paper	4106
C38	25 Mfd. 25 Volt Electrolytic	4205
C40, C46, C50, C52, C55	330 Mmf. ±5% Mica	4010
C42	650 Mmf. ±5% Mica	4011
C47	.005 Mfd. 600 Volt Tub. Paper	4102
C48	.002 Mfd. 600 Volt Tub. Paper	4118
C49	.5 Mfd. 200 Volt Tub. Paper	4110
C54	5 Mfd. 50 Volt Electrolytic	4209
C43	2300 Mmf. ±5% Mica	4006
R1	.27 Meg. ±20% ½Watt	4545
R2, R9, R15, R24	56 Ohm ±10% ½Watt	4561
R3, R10, R17, R30	33,000 Ohm ±20% 1 Watt	4556
R5, R7	.1 Meg. ±20% ½Watt	4511
R6, R12, R18, R33	1500 Ohm ±20% ½Watt	4534
R8	22 Ohm ±20% ½Watt	4560
R11, R35, R36	22,000 Ohm ±20% ½Watt	4501
R13	4700 Ohm ±20% 2 Watt	4551
R14	2.2 Meg. ±20% ½Watt	4502
R16, R32	1 Meg. ±20% ½Watt	4513
R19	.5 Meg. Pot. (Volume)	4804
R20, R38	47,000 Ohm ±20% ½Watt	4506
R21	.68 Meg. ±20% ½Watt	4555
R22	4.7 Meg. ±20% ½Watt	4544
R23, R34	2200 Ohm ±20% ½Watt	4512
R25	.22 Meg. ±20% ½Watt	4500
R26	.12 Meg. ±10% ½Watt	4548
R27	15,000 Ohm ±20% ½Watt	4521
R28, R31	47,000 Ohm ±10% ½Watt	4559
R29	22,000 Ohm ±5% ½Watt	4538
R37	120 Ohm ±10% ½Watt	4546
R39	.25 Meg. Pot. With Switch (Treble)	4805
R40	50,000 Ohm Pot. (Bass)	4806
R41	.47 Meg. ±20% ½Watt	4506
R42, R45	390 Ohm ±10% ½Watt	4549
R43, R44	6800 Ohm ±10% ½Watt	4557
L1	Loop Antenna	55210
L2	Antenna Coil—Broadcast	5265
L3	Coil—F.M. Ant.	5253
L4, L9	Coil—R.F.	5254
L5	Coil—F.M. R.F.	5252
L6	Coil—F.M. Osc.	5251
L7	Coil—Fil. R.F.	5266
L8	Coil—B.C. Osc.	5263
L10	Choke—Bass	5108
S1	Band Switch (R.F.)	6014
S2	Pushbutton Switch Assem.	6004
S3	Band Switch (Audio)	6015
T1	Transformer—R.F. Interstage	5269
T2	Transformer—1st I.F.	5272
T3	Transformer—2nd I.F.	5273
T4	Transformer—Ratio Detect.	5270
Z1	Pushbutton Tuning Assembly	55200

HOFFMAN RADIO CORP.



Power Supply Chassis

RECORDER CHASSIS		
SYMBOL	DESCRIPTION	HOFFMAN NO.
C1	25 Mfd—25 Volt, Electrolytic	4205
C2	10 Mfd. 450 Volt, Electrolytic	4203
C3 C4	.01 Mfd. 400 Volt, Tubular paper	4112
C5	.005 Mfd. 600 Volt, Tubular Paper	4102
C6	.02 Mfd. 400 Volt, Tubular Paper	4106
R1	2200 Ohm 20% ½ Watt	4512
R2	10,000 Ohm. 20% ½ Watt	4515
R3	.47 Megohm 20% 1 Watt	4506
R4	.5 Megohm Potentiometer	4802
R5	10 Megohm 20% ½ Watt	4505
R6	.22 Megohm 20% ½ Watt	4500
R7	1.0 Ohm 20% ½ Watt Wire Wound	4707
R8	47,000 Ohm 20% 1 Watt	4516
R9, R10	1.0 Megohm 20% ½ Watt	4513
R11	.1 Megohm 29% ½ Watt.	4511
S1	Monitor on-off Switch (Part of R4)	
S2	Recorder On-off. Switch	6003
R12	.5 Ohm 20% ½ Watt Wire Wound	4708

POWER SUPPLY CHASSIS		
SYMBOL	DESCRIPTION	HOFFMAN NO.
C101, C102	.05 Mfd. 400 Volt, Tubular Paper	4101
C103	470 Mmf 20% Mica	4003
C104, C105, C106	20 Mfd 25V, 20 20 Mfd 450V. Electro.	4200
C107, C108	.01 Mfd. 600 Volt, Metal Case	4105
C109	.005 Mfd. 600 Volt Tubular Paper	4102
R101, R114	1 Meg. 20% ½ Watt	4513
R102, R104	47000 Ohm 10% ½ Watt	4559
R103	2200 Ohm 20% ½ Watt	4512
R105, R107, R111, R112	.22 Meg. 20% ½ Watt	4500
R106	220 Ohm 20% 3 Watt W.W.	4706
R108, R109, R110	10.000 Ohm 10% 2 Watt	4503
R113	.47 Meg 20% ½ Watt	4506
L101	Filter Choke	5116
T101	Audio Output Transformer	5108
T102	Power Transformer	5007
LS101	Speaker—12" Electrodynamic	9044

RECORDER CHASSIS
Microphone AMP 6SJ7
Audio AMP 6SQ7
Volume Level Indicator 6U5/6G5
Power Supply .... 115 V.A.C. 50-60 C.P.S.
Power Consumption (incl. Phono.) .... 185 Watts
Undistorted Audio Output .... 14 Watts

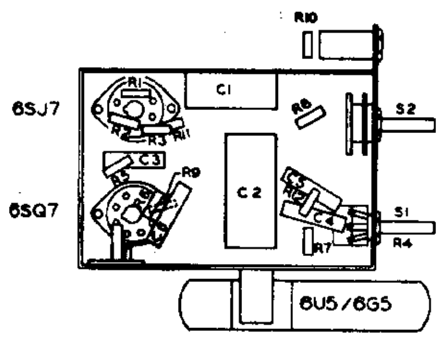
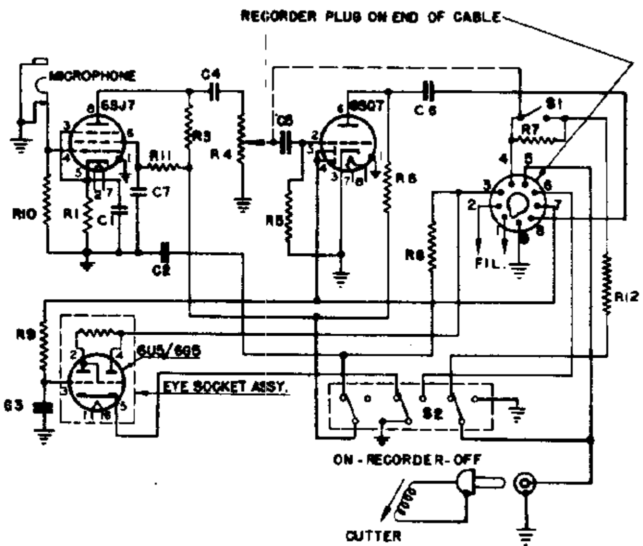
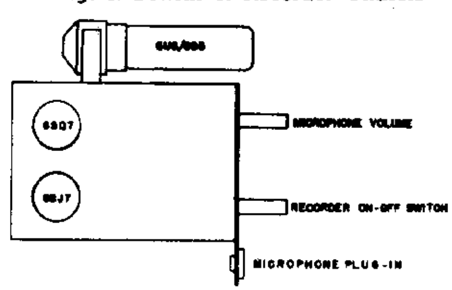


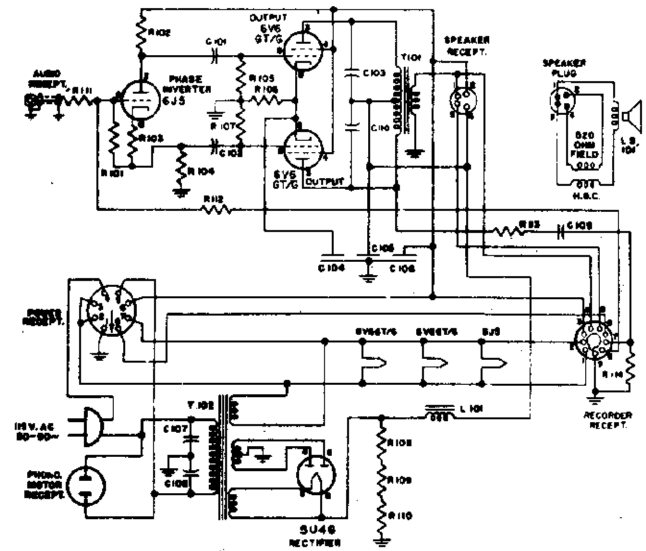
Fig. 6. Bottom of Recorder Chassis



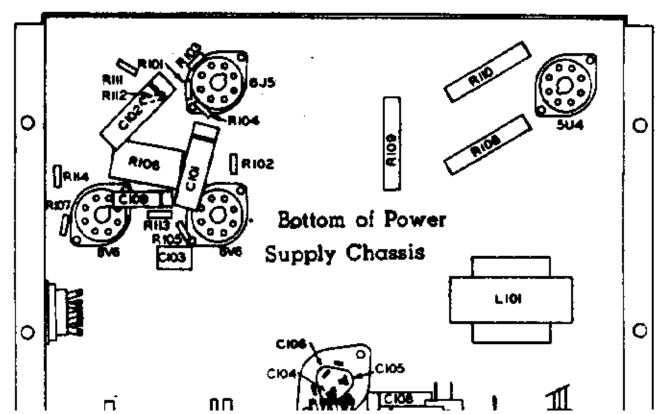
Recorder Schematic Diagram



Recorder Chassis
Figure 1—Top of Chassis



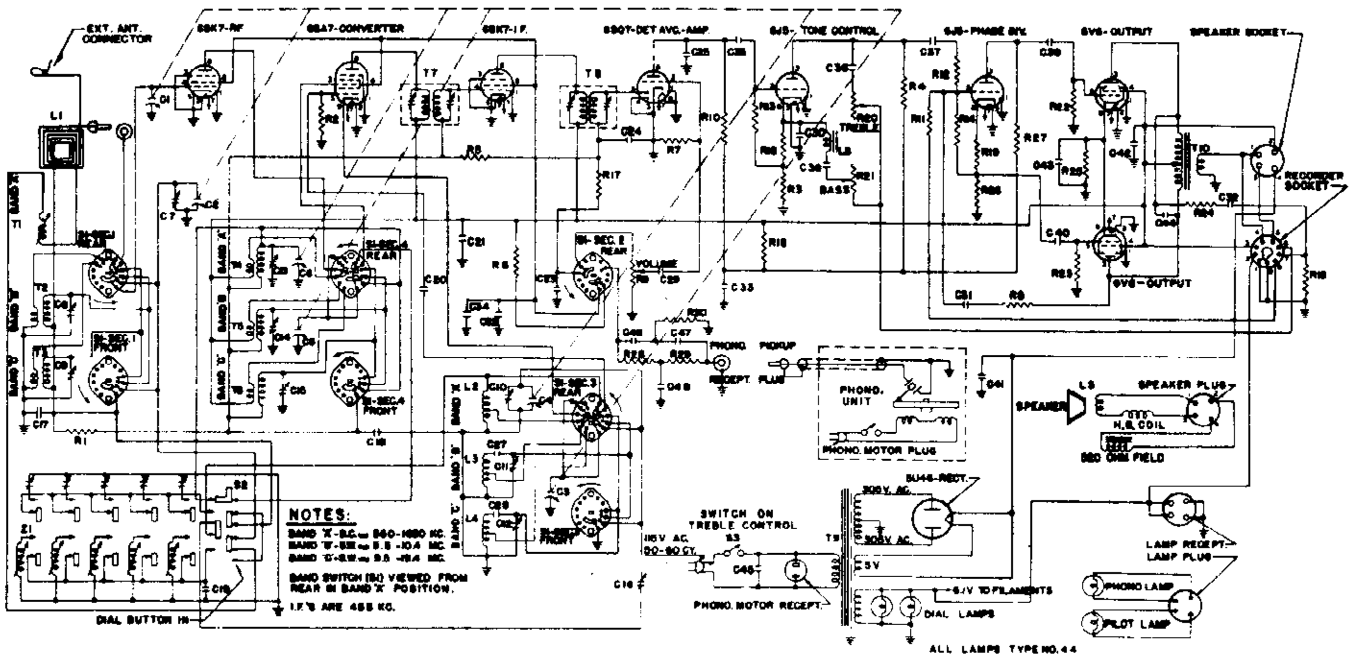
Power Supply Schematic Diagram



RECORDER CHASSIS								
Pin No.	1	2	3	4	5	6	7	8
6SJ7	0	3.3AC	+1.1	0	+1.1	+17	3.3AC	+49
6SQ7	0	−4	0	−.5	−.5	+100	3.3AC	3.3AC
6U5/6G5	3.3AC	+60	−.5	+290	0	3.3AC	—	—

MODEL B503, chassis 115

HOFFMAN RADIO CORP.



NORMAL OPERATING VOLTAGES

The following table lists the normal operating voltages to be expected at the various tube socket terminals.

(Tuner Chassis) **NORMAL OPERATING CURRENTS**

5U4G	Cathode Current	115 Ma.
6V6	Cathode Current (both tubes)	70 Ma.

TUNER CHASSIS

PIN NO.	1	2	3	4	5	6	7	8
6SK7 (R.F.)	0	0	0	—.1	0	+95	6.2 AC	+290
6SA7 (Conv.)	0	0	+290	+95	—5 to —10	0	6.2 AC	—.15
6SK7 (I.F.)	0	0	0	—.15	0	+95	6.2 AC	+290
6SQ7	0	—.2	0	—.25	0	+75	6.2 AC	0
6J5 (Tone)	0	0	+130	0	+20 □	0	6.2 AC	+22
6J5 (Inverter)	0	0	+105	0	+50 #	0	6.2 AC	+43
6V6	0	0	+290	+290	0	0	6.2 AC	+17
6V6	0	0	+290	+290	0	0	6.2 AC	+17
5U4G	0	+350 5.2 AC*	0	335 AC	0	335 AC	0	+350 5.2 AC *

D.C. voltages measured with 20,000 ohm/volt meter.
A.C. voltages measured with 1,000 ohm/volt meter.
Line voltage 117.
measured at junction of R13 and R16.
□ measured at junction of R15 and R17.

All voltages measured with reference to chassis except as follows:
* measured between pins 2 and 8; not to chassis.

NOTE The above readings are obtained with no signal input to receiver and band switch in position "A".

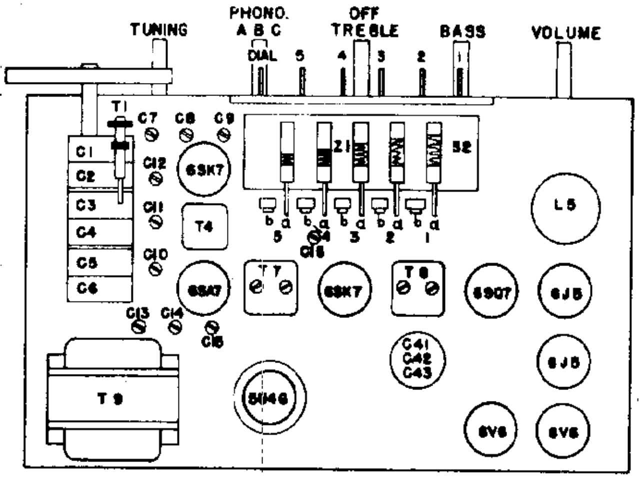
RECORDER CHASSIS

Pin No.	1	2	3	4	5	6	7	8
6SJ7	0	6.1AC	+9	0	+.9	+15	0	+48
6SQ7	0	—.3	0	—.4	—.4	+93	0	6.1AC
6U5/6G5	6.1AC	+33	—.3	+260	0	0	0	0

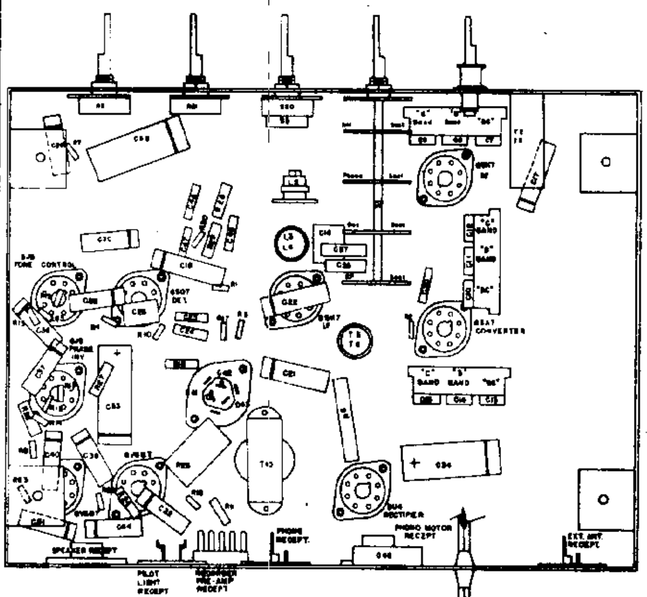
All voltages measured with reference to chassis with no signal input.

For alignment procedure see Model A501, page 15-9

HOFFMAN RADIO CORP.



Tuner Top View



Bottom of Tuner Chassis

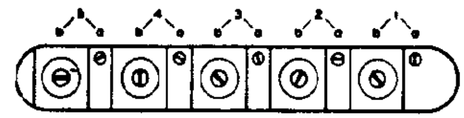
SPECIFICATIONS

TUNING RANGES:

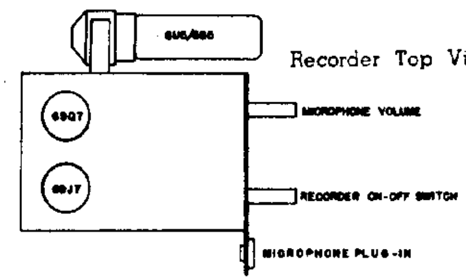
Band "A"	540 Kc to 1600 Kc.
Band "B"	5.6 MC to 10.4 Mc.
Band "C"	9.4 Mc to 19.4 Mc
Intermediate Frequency	455 Kc
Power Supply	115V. A.C., 50-60 C.P.S.
Power Consumption (incl. phono)	150 Watts

TUNER CHASSIS		
SYMBOL	DESCRIPTION	HOFFMAN No.
C1-C2, C3-C4, C5-C6	Three-Section Variable with Split Stator (160-260, 160-260, 160-260 Mmf.)	4403
C7, C8, C9	Three-Section Trimmer Assembly	4300
C10, C11, C12	Three-Section Trimmer Assembly	4300
C13, C14, C15	Three-Section Trimmer Assembly	4300
C16	110-560 Mmf., Padder, Band "A"	4301
C17, C18,	.05 Mfd., 200 Volt, Tubular Paper	4100
C19	500 Mmf., ·5% Silver Mica	4004
C20	47 Mmf., · 10% Mica	4007
C21 C22	.05 Mfd., 400 Volt, Tubular Paper	4101
C23, C24, C25	100 Mmf., · 20% Mica	4000
C27	1050 Mmf., · 5% Mica	4005
C28	2300 Mmf., · 5% Mica	4006
C29, C30, C31, C32	.005 Mfd. 600 Volt, Tubular Paper	4102
C33, C34	10 Mfd. 450 Volt, Tubular Electrolytic	4203
C35, C36, C37	.01 Mfd., 400 Volt Tubular Paper	4112
C38	.5 Mfd. 200 Volt Tubular Paper	4110
C39, C40	.02 Mfd., 400 Volt, Tubular Paper	4106
C41, C42, C43	20-20-20 Mfd. 450-450 25V. Electrolytic	4200
C44	.001 Mfd., 600 Volt, Tubular Paper	4104
C45	.01 Mfd, 600 V. Tubular Paper, Metal Can.	4105
C46, C47	330 Mmf. · 5% Mica	4010
C48	650 Mmf. · 5% Mica	4011
L1	Loop Antenna	55210
L2	Oscillator Coil (Band "A")	5215
L3, L4	Oscillator Coil (Bands "B" and "C")	5218
L5	Choke-Bass Boost	5103
L5	12" Loudspeaker (Electrodynamic)	9044
R1	.1 Megohm · 20% ½ Watt	4511
R2, R3, R4	22,000 Ohm · 20% ½ Watt	4501
R5	2.2 Megohm · 20% ½ Watt	4502
R6	10,000 Ohm · 10% 2 Watt	4503
R7	10 Megohm · 20% ½ Watt	4505
R8	5 Megohm · 20% ½ Watt	4544
R9	.5 Megohm Potentiometer—Volume Control	4804
R10, R11, R12	.22 Megohm · 20% ½ Watt	4500
R13, R14, R15	1 Megohm · 20% ½ Watt	4513
R16	47,000 Ohm · 20% 1 Watt	4516
R17	47,000 Ohm · 20% ½ Watt	4504
R18, R19	2,200 Ohm · 20% ½ Watt	4512
R20	.25 Meg. Pot. with Switch—Treble Control	4805
R21	50,000 Ohm Potentiometer—Bass Control	4806
R22, R23, R24	.47 Megohm 20% ½ Watt	4506
R25	220 Ohm · 20% 3 Watt	4519
R26, R27, R28, R29	47,000 Ohm · 5% ½ Watt	4537
R30	22,000 Ohm · 5% ½ Watt	4538
S1	Band Change Switch	6005
S2	Pushbutton Switch Assembly	6004
S3	On-Off Switch (on treble Control)	
T1	Antenna Coil (Band "A")	5220
T2, T3	Antenna Coil (Bands "B" and "C")	5217
T4	R.F. Coil Shielded (Band "A")	5216
T5, T6	R.F. Coil (Bands "B" and "C")	5219
T7	Input I.F. Transformer	5213
T8	Output I. F. Transformer	5214
T9	Power Transformer	5001
T10	Audio Output Transformer	5108
Z1	Pushbutton Tuning Assembly	55200

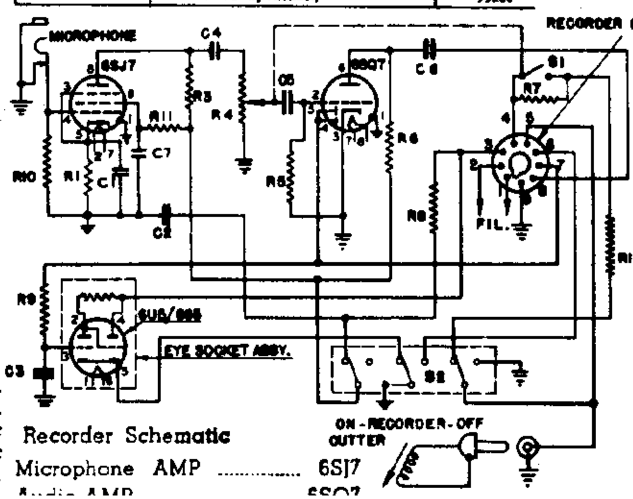
RECORDER CHASSIS		
SYMBOL	DESCRIPTION	HOFFMAN NO.
C1	25 Mfd—25 Volt, Electrolytic	4205
C2	10 Mfd. 450 Volt, Electrolytic	4208
C3, C4	.01 Mfd. 400 Volt, Tubular paper	4112
C5	.005 Mfd. 600 Volt, Tubular Paper	4102
C6	.02 Mfd. 400 Volt, Tubular Paper	4106
R1	2200 Ohm ±20% ½ Watt	4512
R2	10,000 Ohm. ±20% ½ Watt	4515
R3	.47 Megohm ±20% 1 Watt	4506
R4	.5 Megohm Potentiometer	4802
R5	10 Megohm ±20% ½ Watt	4505
R6	.22 Megohm ±20% ½ Watt	4500
R7	1.0 Ohm ±20% ½ Watt Wire Wound	4707
R8	47,000 Ohm ±20% 1 Watt	4516
R9, R10	1.0 Megohm ±20% ½ Watt	4513
R11	.1 Megohm ±20% ½ Watt	4511
S1	Monitor on-off Switch (Part of R4)	
S2	Recorder On-off- Switch	6003
R12	.5 Ohm ±20% ½ Watt Wire Wound	4708



Pushbutton Adjustments

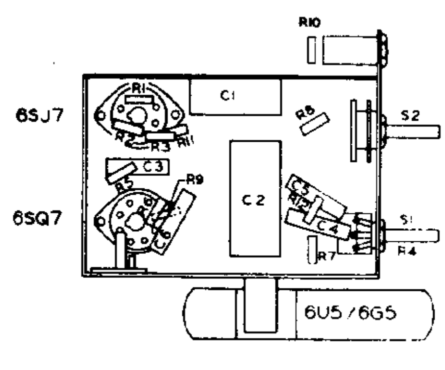


Recorder Top View



Recorder Schematic

Microphone AMP	6SJ7
Audio AMP	6SQ7

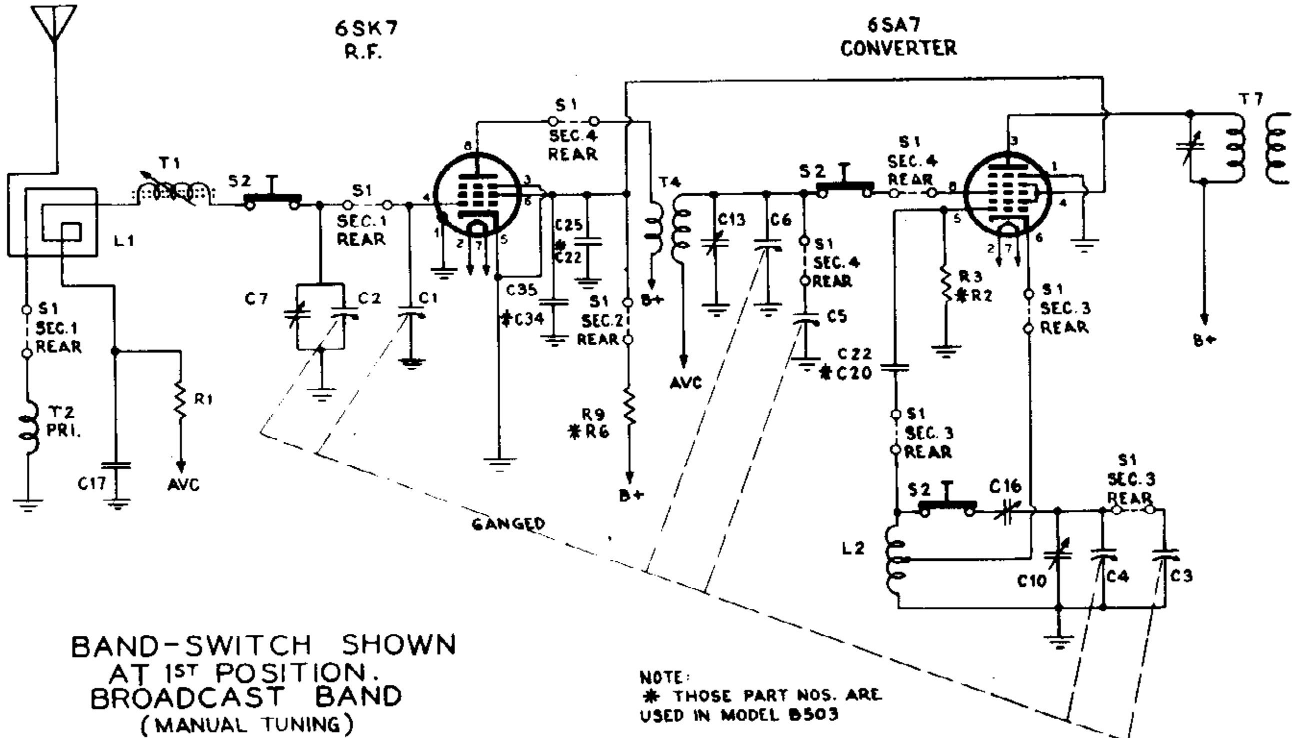


Bottom View of Recorder

"clarified schematics"

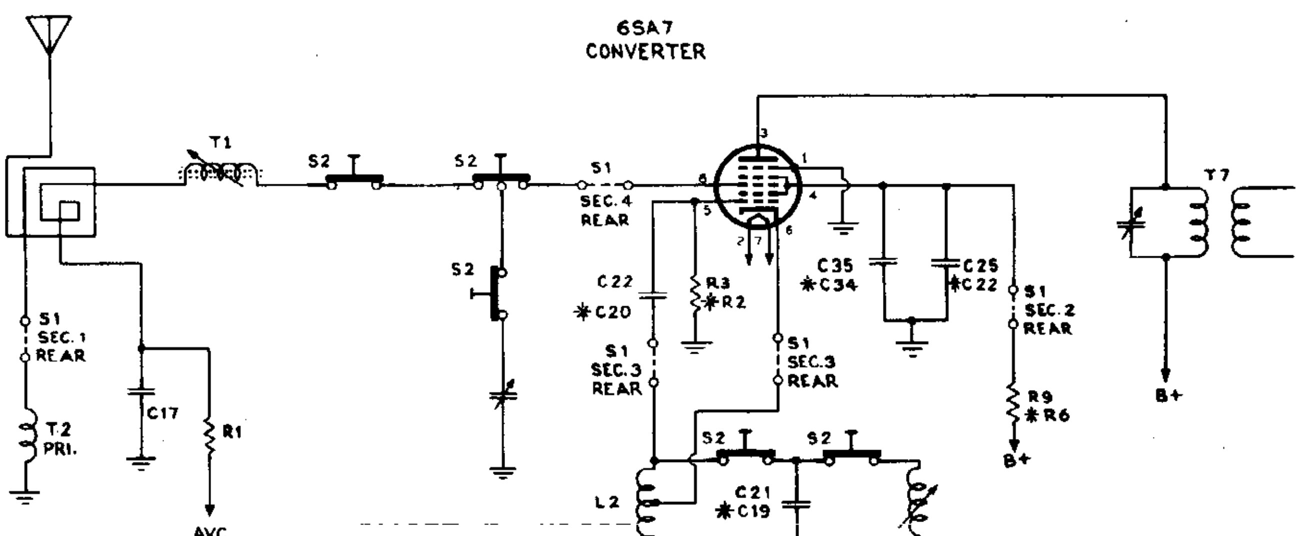
MODELS B503,
B1000

HOFFMAN RADIO CORP.



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
(MANUAL TUNING)
540 - 1600KC

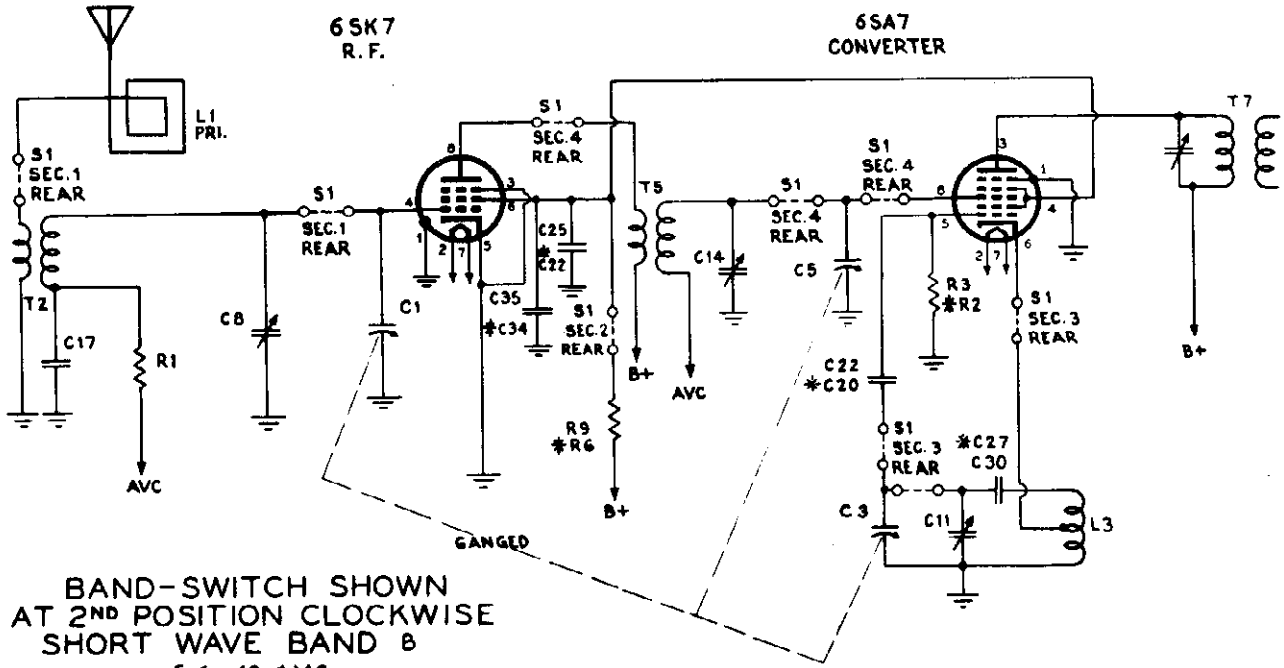
NOTE:
* THOSE PART NOS. ARE
USED IN MODEL B503



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
(PUSH BUTTON TUNING)
ONE PUSH BUTTON DEPRESSED

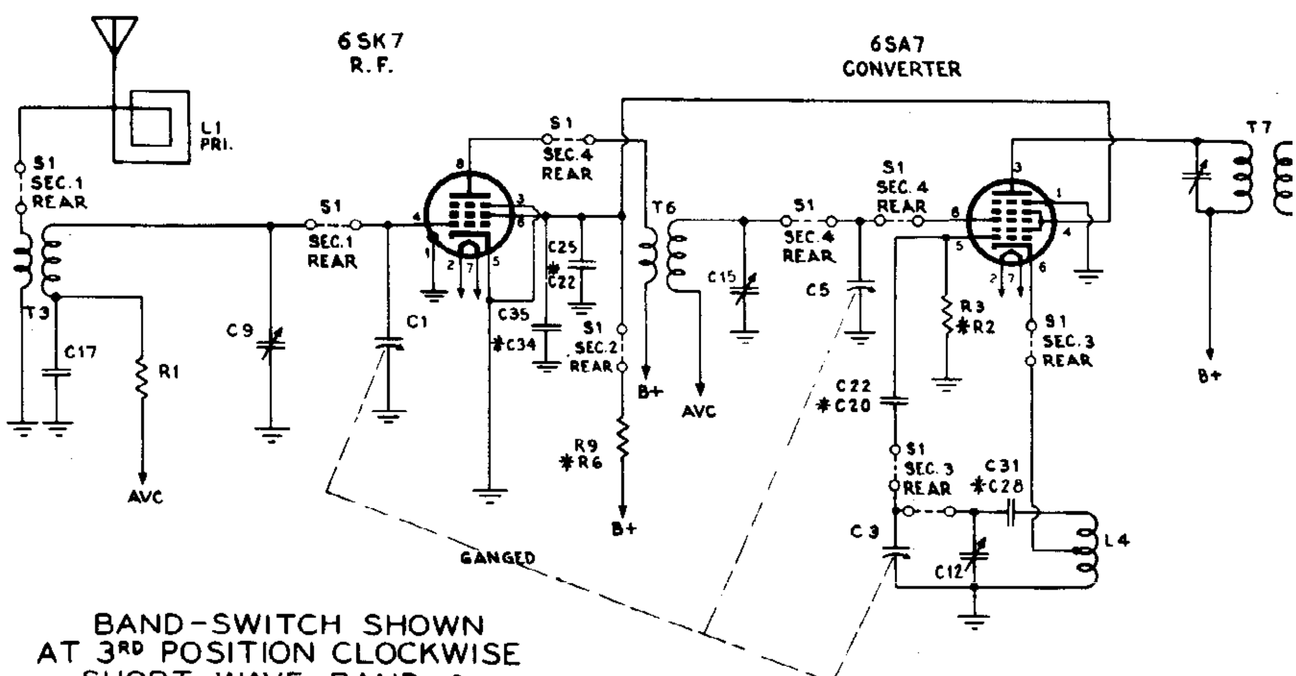
NOTE:
* THESE PART NOS. ARE
USED IN MODEL B 503

HOFFMAN RADIO CORP.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND B
5.6 - 10.4 MC.

NOTE:
* THOSE PART NOS. ARE
USED IN MODEL B503

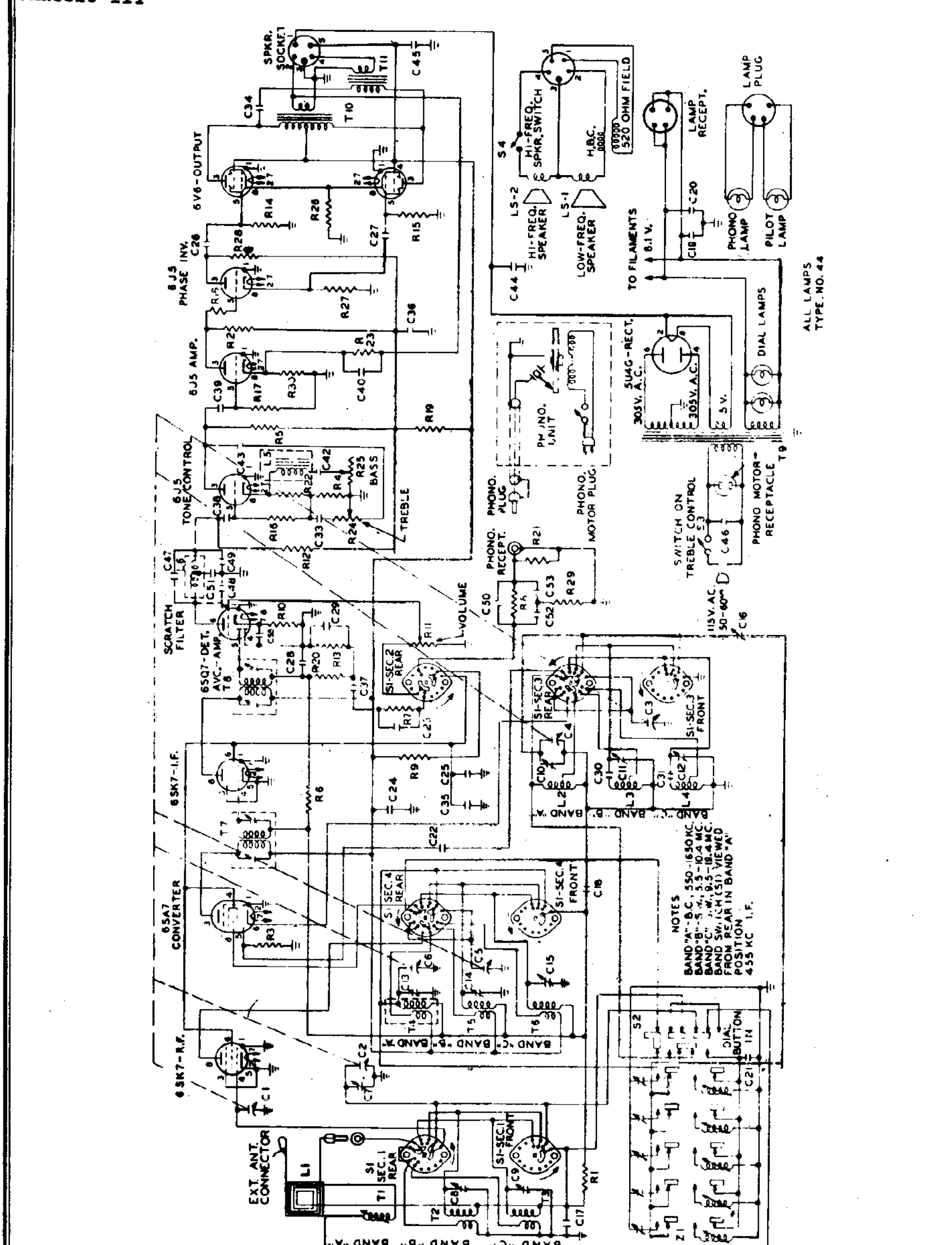


BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
SHORT WAVE BAND C
9.4 - 19.4 MC.

NOTE:
* THOSE PART NOS. ARE
USED IN MODEL B503

MODEL B1000,
Chassis 114

HOFFMAN RADIO CORP.



RECORD CHANGER: Webster Model 56, RCD. CH. 15-8

For clarified schematics see Model B503, pages 17-10, 17-11

HOFFMAN RADIO CORP.

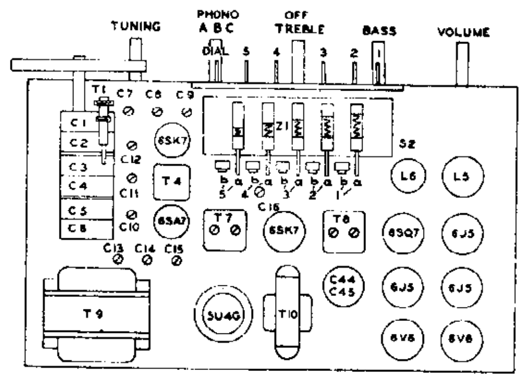
NORMAL OPERATING VOLTAGES

The following table lists the normal operating voltages to be expected at the various tube socket terminals.

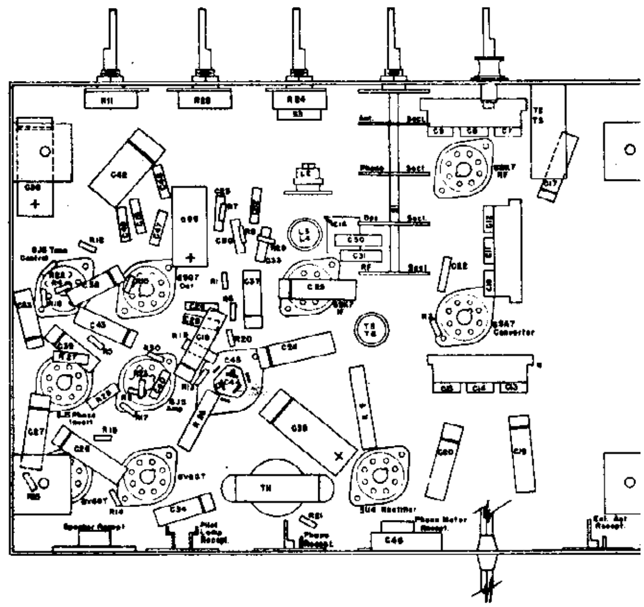
PIN NO.	1	2	3	4	5	6	7	8
6SK7	0	6.2 AC	0	—.4	0	+103	6.2 AC	+270
6SA7	0	6.2 AC	+270	+103	—5.3	0	6.2 AC	—.3
6SK7	0	6.2 AC	0	—.3	0	+103	6.2 AC	+270
6SQ7	0	0	+.8	—2.3	0	+103	6.2 AC	6.2 AC
6J5 (Tone)	0	6.2 AC	+113	0	+7	+30	6.2 AC	+6.8
6J5 (Audio)	0	6.2 AC	+22	0	0	+125	6.2 AC	+1.1
6J5 (Inv.)	0	6.2 AC	+102	0	+4	0	6.2 AC	+26
6V6GT	0	6.2 AC	+260	+270	0	0	6.2 AC	+16
6V6GT	0	6.2 AC	+260	+270	0	0	6.2 AC	+16
5u4G	0	+340	0	310 AC	0	310 AC	+103	+340

D.C. voltages measured with 20,000 ohm/volt meter.
A.C. voltages measured with 1.00 ohm/volt meter.
Line voltage 117.
All voltages measured with reference to chassis.

NOTE: The above readings are obtained with no signal inpu to receiver and band switch in position "A".



Top of Chassis



Bottom of Chassis

SYMBOL	DESCRIPTION	HOFFMAN No.
C1-C2, C3-C4, C5-C6	Three-Section Variable with Split Stator (160-260, 160-260, 160-260 Mmf.)	4403
C7, C8, C9	Three-Section Trimmer Assembly—Ant.	4300
C10, C11, C12	Three-Section Trimmer Assembly—Osc.	4300
C13, C14, C15	Three Section Trimmer Assembly—R.F.	4300
C16	110-560 Mmf., Padder, Band "A"	4301
C17, C18, C19, C20	.05 Mfd., 200 Volt, Tubular Paper	4100
C21	500 Mmf., 5% Silver Mica	4004
C22	47 Mmf., 10% Mica	4007
C24, C25, C26, C27	.05 Mfd., 400 Volt, Tubular Paper	4101
C28, C23, C29	100 Mmf., 20% Mica	4000
C30	1050 Mmf., 5% Mica	4005
C31	2300 Mmf., 5% Mica	4006
C33, C34	.005 Mfd. 600 Volt, Tubular Paper	4102
C35, C36	10 Mfd. 450 Volt, Tubular Electrolytic	4203
C37, C39	.01 Mfd., 400 Volt Tubular Paper	4112
C40	470 Mmf., 20% Mica	4003
C42	.2 Mfd., 200 Volt, Tubular Paper	4108
C43	.02 Mfd., 400 Volt, Tubular Paper	4106
C44, C45	20-20-20 Mfd. 450-25V. Electrolytic	4200
C46	.01 Mfd., 600 Volt, Tubular Paper—Metal Can	4105
C47, C48, C49, C50	330 Mmfd., 5% Mica	4010
C51	850 Mmfd., 5% Mica	4011
C52, C53	1500 Mmfd., 5% Mica	4016
C38	.001 Mfd., 600 Volt, Tubular Paper	4104
L1	Loop Antenna Assembly	55210
L2	Oscillator Coil (Band "A")	5215
L3, L4	Oscillator Coil (Bands "B" and "C")	5218
L5	Choke-Bass Boost	5113
LS-1	12" Loudspeaker, Electrodynamic, Bass	9036
LS-2	5" Loudspeaker, P.M., Hi-Frequency	9035
R1	.1 Megohm 20% ½ Watt	4511
R3, R4	22,000 Ohm 20% ½ Watt	4501
R6, R8	2.2 Megohm 20% ½ Watt	4502
R9	10,000 Ohm 10% 2 Watt	4503
R10, R22	2,200 Ohm 20% ½ Watt	4512
R11	.5 Megohm Potentiometer—Volume Control	4804
R2, R13, R14, R15	22 Megohm 20% ½ Watt	4500
R16, R17, R7	1 Megohm 20% ½ Watt	4513
R19	47,000 Ohm 20% 1 Watt	4516
R20, R12	47,000 Ohm 20% ½ Watt	4504
R18	4.7 Megohm 20% ½ Watt	4544
R23, R5	10,000 ohm 20% ½ Watt	4515
R24	.25 Meg. Pot. with Switch—Treble Control	4805
R25	50,000 Ohm Potentiometer—Bass Control	4806
R26	220 Ohm 20% 5 Watt	4519
R27, R28, R29	47,000 Ohm 5% ½ Watt	4537
R30	4,700 Ohm 20% ½ Watt	4543
S1	Band Change Switch	6005
S2	Pushbutton Switch Assembly	6004
S3	On-Off Switch (on treble Control)	
T1	Antenna Coil (Band "A")	5220
T2, T3	Antenna Coil (Bands "B" and "C")	5217
T4	R.F. Coil, Shielded (Band "A")	5216
T5, T6	R F Coil (Bands "B" and "C")	5219
T7	Input I.F. Transformer	5213
T8	Output I. F. Transformer	5214
T9	Power Transformer	5001
T10	Audio Output Transformer—Bass Speaker	5115
T11	Audio Output Transformer—Hi-Frequency Spkr.	5100
Z1	Pushbutton Tuning Assembly	55200
L6	Scratch Filter Choke	5114
S4	Speaker Switch, Hi-Frequency	6001
C55	25 Mfd 25 Volt, Electrolytic	4205
R21	.47 Meg. 20%, ½ Watt	4506

SPECIFICATIONS

TUNING RANGES:

Band "A" .... 540 Kc to 1600 Kc
Band "B" .... 5.6 Mc to 10.4 Mc
Band "C" .... 9.4 Mc to 19.4 Mc
Intermediate Frequency .... 455 Kc
Power Supply .... 115 V. A.C. 50-60 C.P.S.
Power Consumption (incl. phono.) .... 127 Watts
Undistorted Audio Output .... 12 Watts

NORMAL OPERATING CURRENTS

5U4G	Cathode Current	115 Ma
6V6	Cathode Current (both tubes)	70Ma

PUSHBUTTON NO.	1	2	3	4	5
FREQUENCY RANGE IN KILOCYCLES	[illegible] TO [illegible]	[illegible] TO [illegible]	[illegible] TO 1070	[illegible] TO 1070	[illegible] TO 1740

Pushbutton Frequencies

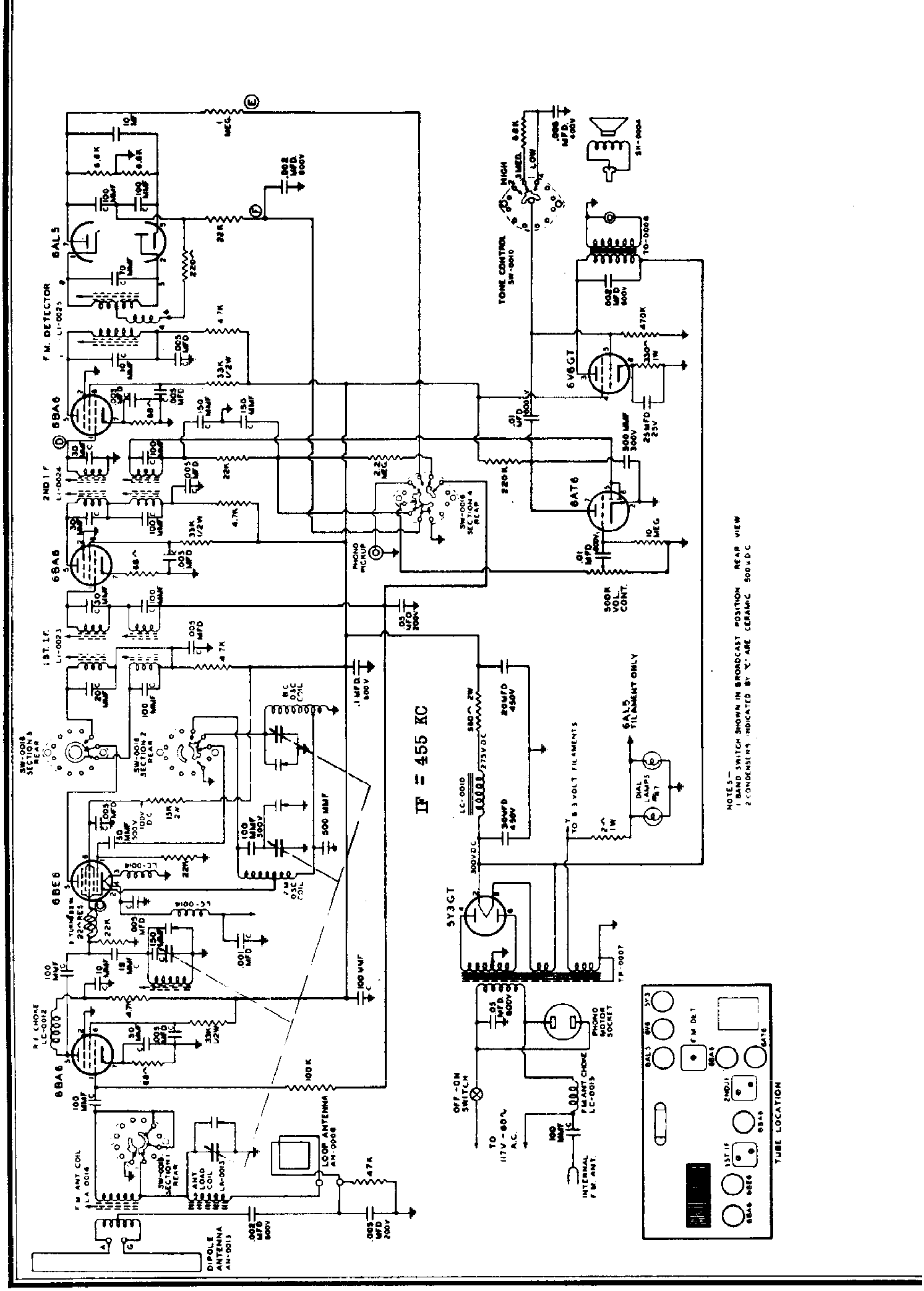
AUTOMATIC RECORD CHANGER

The automatic record changer used with this receiver is a Webster Model 56.

CAUTION:

No alignment adjustments should be attempted withou first thoroughly checking over all other possible causes o trouble such as defective tubes, resistors, and condensers

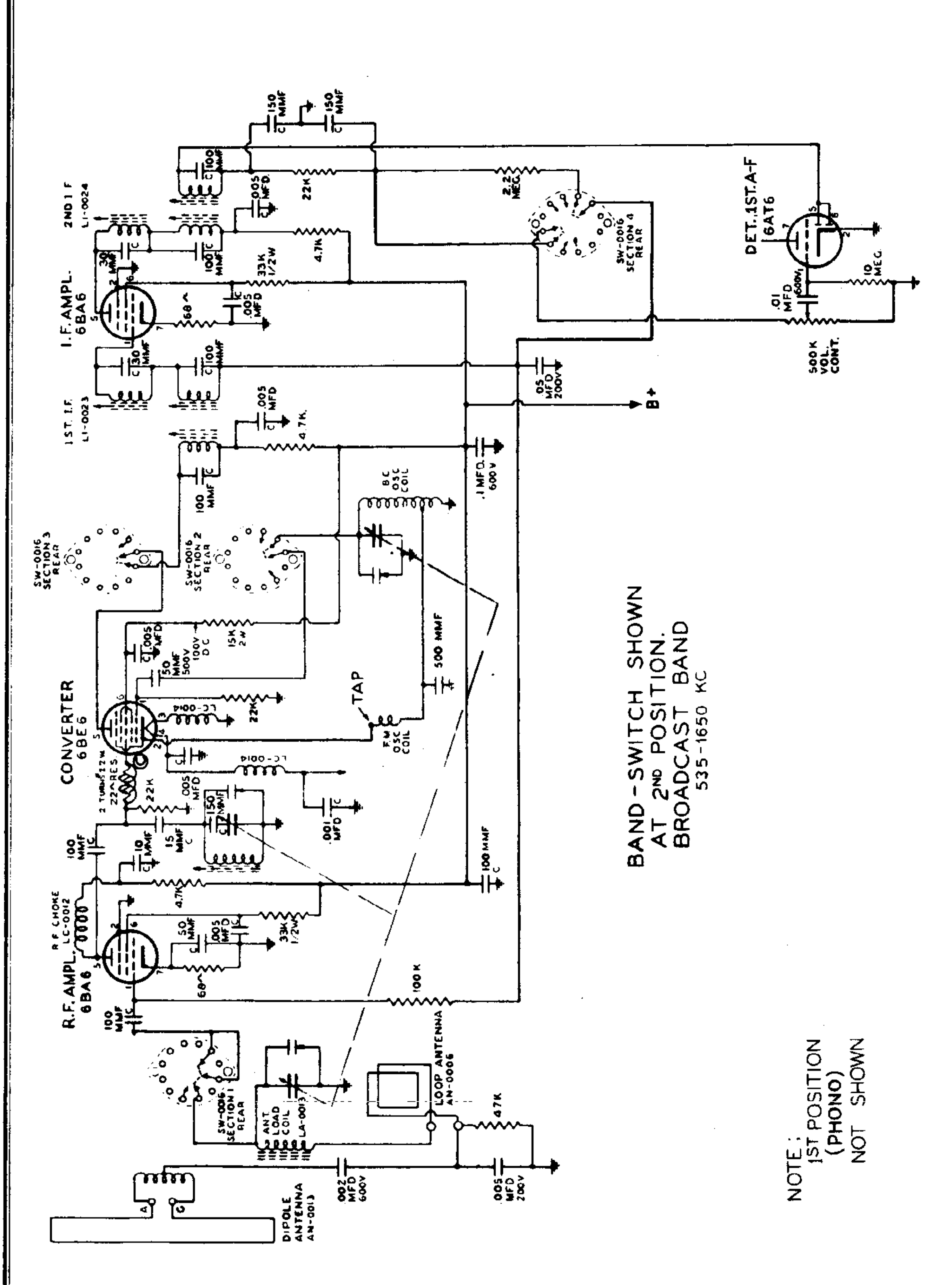
HOWARD RADIO CO



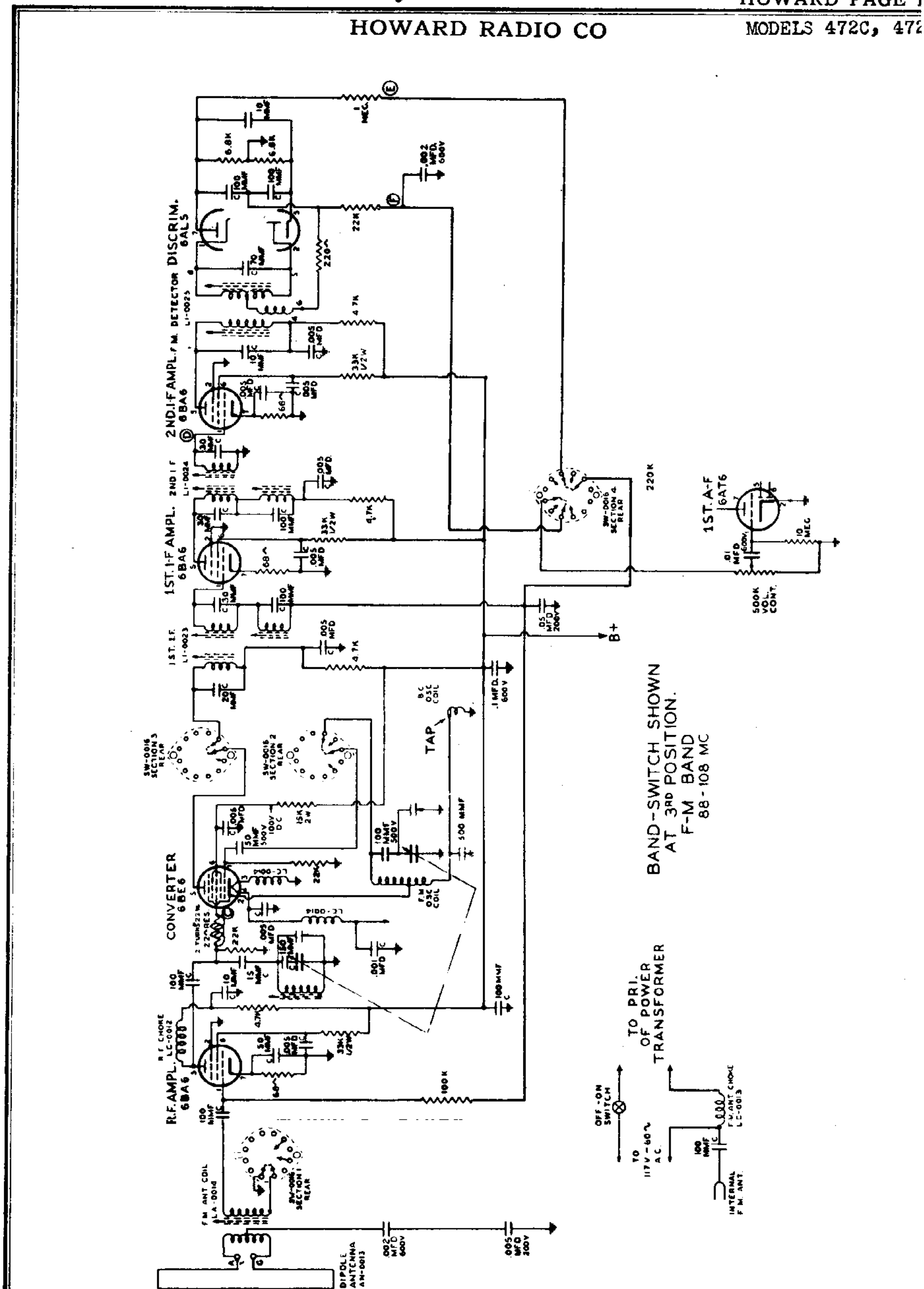
"clarified schematics"

MODELS 472C, 472F

HOWARD RADIO CO



HOWARD RADIO CO



MODELS 472C, 472F
MODELS 472AC, 472AF

HOWARD RADIO CO

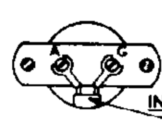
ALIGNMENT CHART USING MODULATED GENERATOR

SEE DUMMY GEN. CHART	SIG. GEN. CONNECTION	GEN. FREQ.	BAND SW. POSITION	DIAL SETTING	ORDER OF SLUG AND TRIMMER ADJUSTMENTS	TRIMMER OR SLUG FUNCTION	SEE NOTES BELOW
2	Point C on Circuit Diagram	455 KC.	AM	Gang Closed	1 2 3 4 Green Dots	A.M.I.F.	A & B
1	Ant. Post at rear of chassis, loop connected	1400 KC.	AM	1400 KC.	5 6	A.M. - Osc. and R.F. Trim.	C & D
2	Point D on Circuit Diagram	10.7 MC.	FM	Gang Closed	7	F.M. Det. Adj.	E & F
2	Point D on Circuit Diagram	10.7 MC.	FM	Gang Closed	8 Adjust to zero Voltage	F.M. Det. Adj.	G
2	Point C on Circuit Diagram	10.7 MC.	FM	Gang Closed	9 10 11 12 7 (Red Dots)	F.M. - I.F.	H
3	Ant and Grd. Back of Chassis	105 MC.	FM	105 MC.	13 14	Osc. and R.F. F.M.	I & J
3	Ant. and Gnd. Back of Chassis	90 MC.	FM	90 MC.	15	F.M. - R.F. Ind. Adj.	K & L
3	Ant. and Gnd. Back of Chassis	101 MC.	FM	101 MC.	16	F.M. Ind. Adj.	M

POWER SUPPLY: (Standard Models) 105-120 V. 60 cycle. Consumption 65 watts 18 watts phono motor.

ANTENNA SYSTEM: Built in loop for AM reception. Built in FM dipole. In sections remote from broadcast stations an external antenna from 25 to 100 feet long and connected to the (A) terminal on the back of the receiver may improve pickup. If FM Reception is other than local or interference is experienced on the FM Band an outside dipole is recommended, in which case the FM Ant. will act as broadcast aerial.

ANTENNA AND GROUND TERMINALS



INTERNAL FM ANTENNA
CONNECT TO A & G.

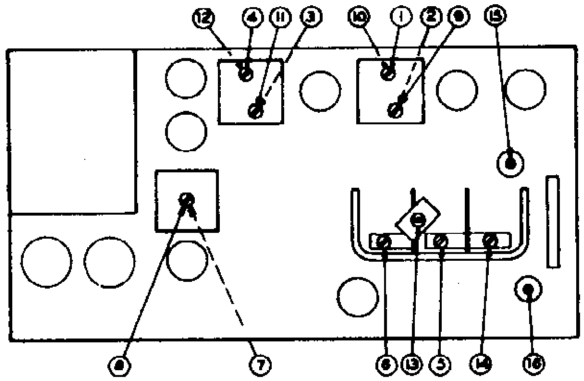
FOR EXTERNAL DIPOLE ANTENNA — DISCONNECT INTERNAL ANTENNA AND CONNECT TRANSMISSION LINE TO A & G.

TUNING RANGES:
AM - 535. to 1650. KC.
FM - 88. to 108. MC.

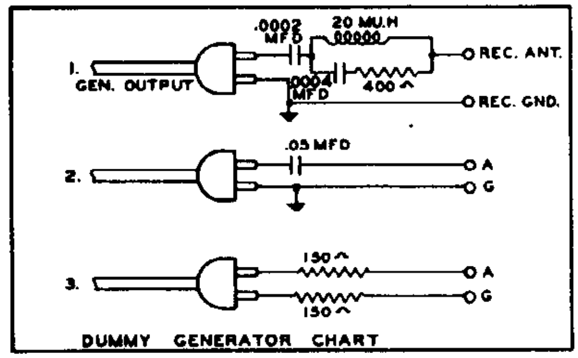
POWER OUTPUT: Max. 4½ watts. U.P.O. 3 watts.

HOWARD RADIO CO

MODELS 472C, 472F
MODELS 472AC, 472A



TRIMMER LOCATION CHART



DUMMY GENERATOR CHART

ALIGNMENT NOTES

A. Low voltage AC voltmeter across voice coil.
B. Repeat operation until no further improvement can be found.

C. Before adjusting set pointer on heavy gold line below 560 KC. with gang closed.
D. Check complete dial for sensitivity.and calibration.

E. Signal generator modulation off and turned up to about 100,000 microvolts.
F. Connect electronic volt meter (equivalent to voltohmist) at point E on the wiring diagram and turn slug (7) on trimmer location chart to extreme counter clockwise position. Turn clockwise to 1st peak and adjust to maximum.

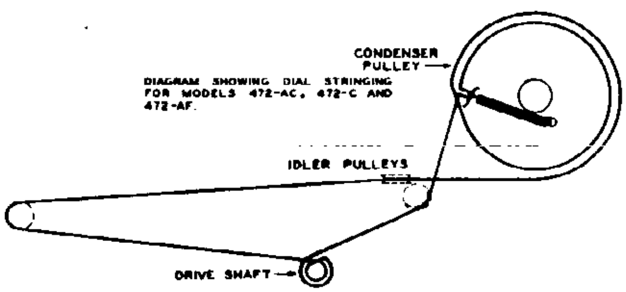
G. Turn slug (8) to extreme counter clockwise position.
Connect electronic voltmeter to Point F on wiring diagram and turn slug (8) until voltmete is to zero voltage. Repeat adjustments given in notes F & G until no further improvement can be made.

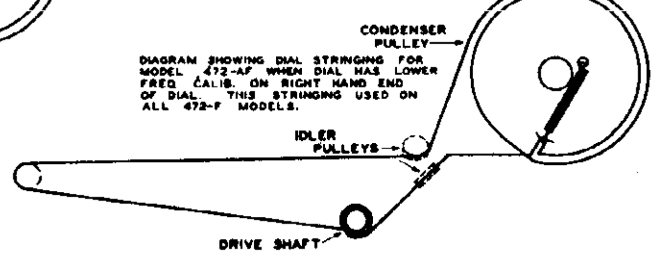
H. Connect voltmeter to point E and generator at point C. Adjust (9) (10) (11) (12) then retrim (7). Move voltmeter to post F and recheck zero voltage (retrim if necessary). These adjustments should be made with input signal necessary to produce approximately .7 volts at point E.

I. Change generator dummy as shown on dummy antenna chart picture 3, and modulation on.
J. Use meter across voice coil if using RF generator, but use AVC voltage if working with AM generator.

K. Should 90 MC. signal not fall in at 90 MC. on the dial, adjust F.M. Osc. Coil to correct calibration. It is only necessary to slightly press together or open spacing on one turn to do so. Now adjust slug (15).
L. Repeat adjustments (13) (14) and then (15) until no further improvement can be made.

M. Adjust (16) for maximum sensitivity.





DIAL STRINGING

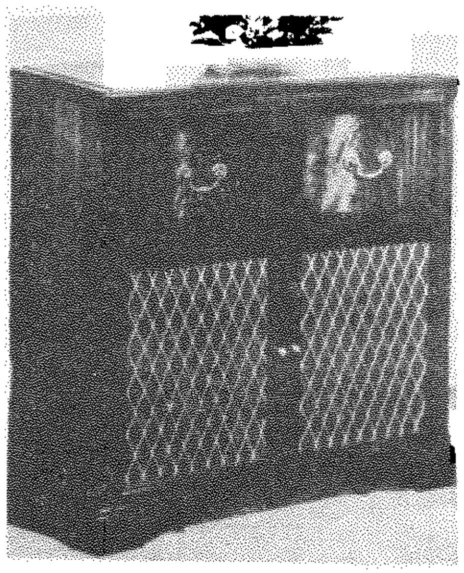
MODELS 472C, 472F
MODELS 472AC, 472AF

HOWARD RADIO CO

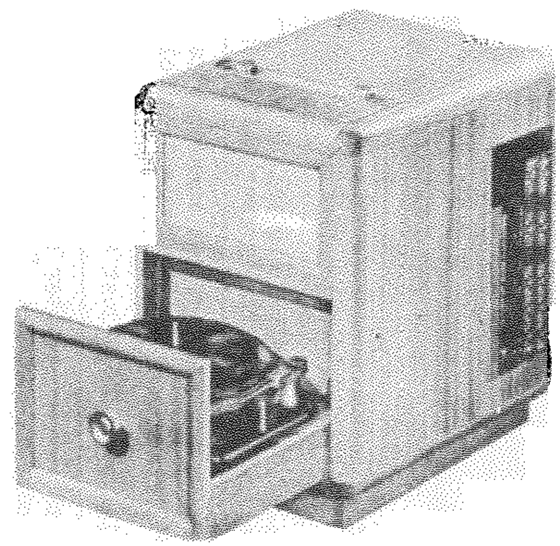
TO REMOVE CHASSIS FROM REGENCY CABINET: Remove both control knobs. Take out the 4 wood screws near the edge of the top panel. Lift off wood panel. Remove 4 machine screws in chassis bracket. With drawer pulled out, remove 2 machine screws found on the bottom of the drawer. Remove back from radio. Pull out plugs from rear of chassis. Chassis is then free to be lifted out.

TO REMOVE CHASSIS FROM CHAIRSIDE CABINET: Take knobs off volume control and tuning control by loosening set screws. Remove the wood screws that are located inside the record storage space at the top rear of cabinet. The entire top panel lifts out by pushing upward (inside the storage space), and then remove panel by lifting to the rear of the cabinet. After the panel is removed it is easy to see the mounting nuts that hold the chassis.

TO REMOVE DRAWER: Pull the drawer out to its full extremity. Place your hands (one on each side) beneath the drawer about 3 inches from the back and feel along the track until you hit two little metal flaps that are the stops for the drawer. Lift these up with your index fingers and the drawer can then be pulled right out of the cabinet.



MODELS
472F and 472AF



MODELS
472C and 472AC

HOWARD RADIO CO

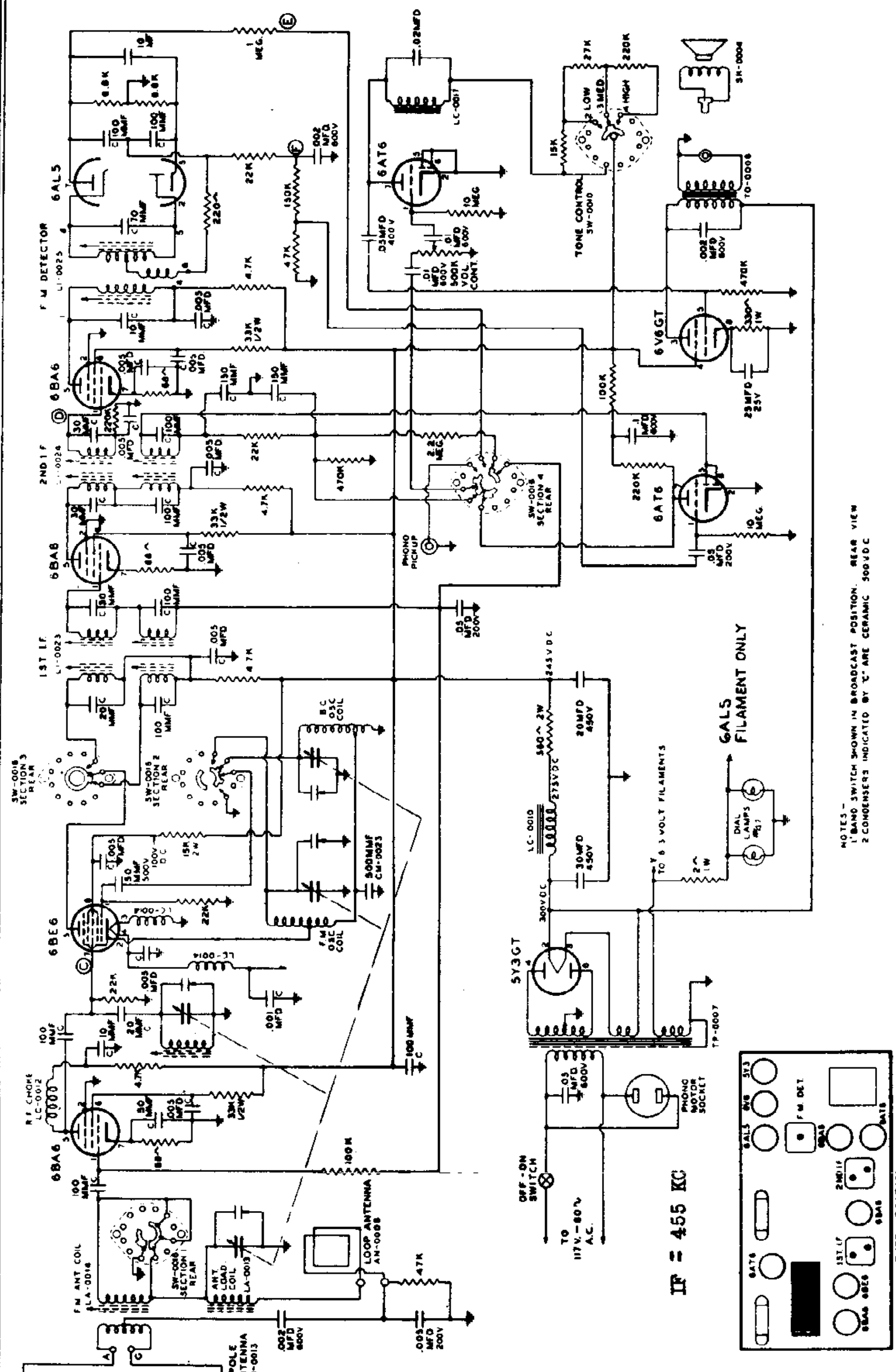
MODELS 472C, 472F
MODELS 472AC, 472AF

PARTS LIST

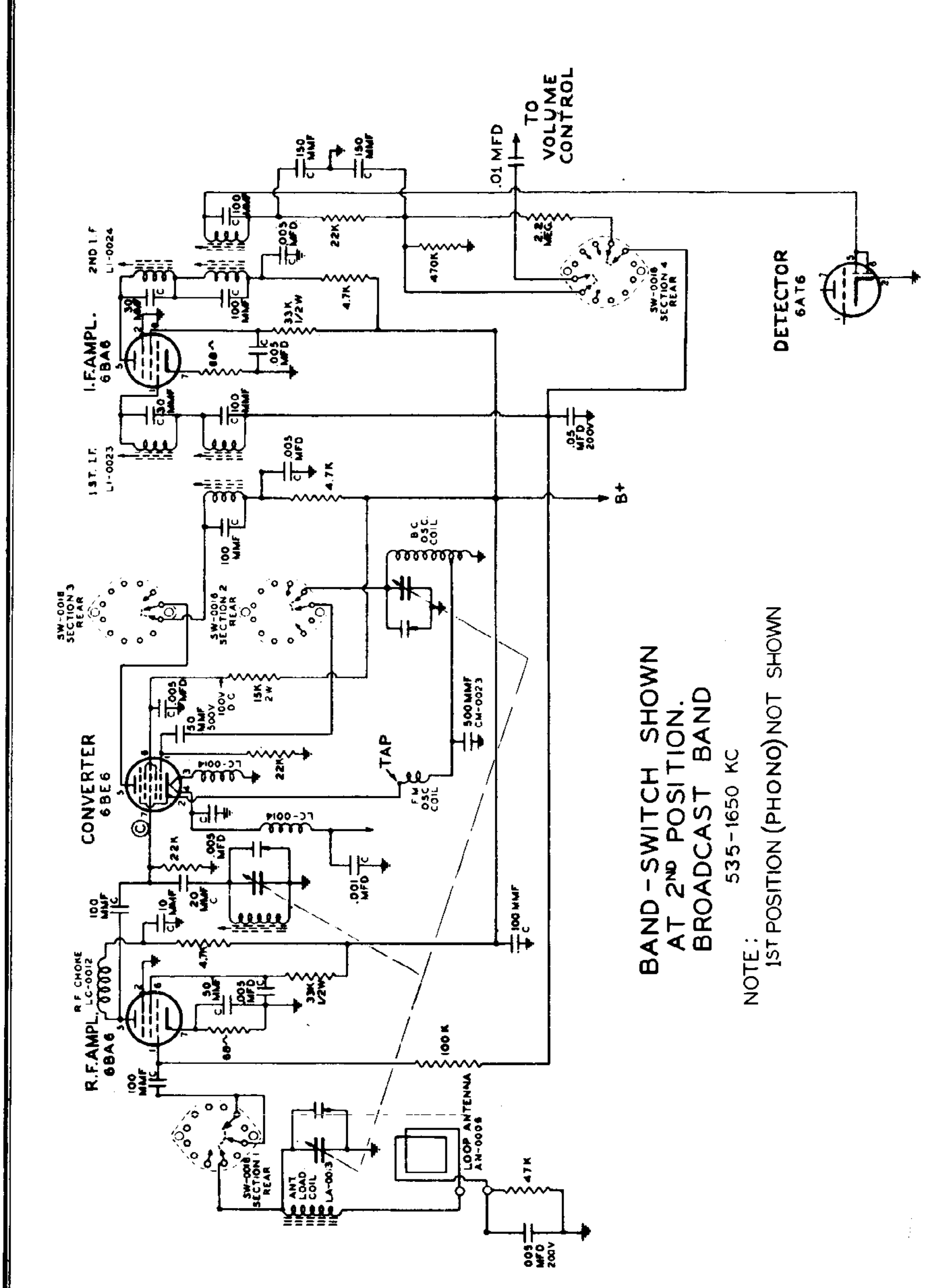
	CONTROL
VC-0005	Volume Control with AC Switch
	or
VC-0006	Volume Control With AC Switch
	CONDENSERS
AC-0008	Variable Condenser with Gear & Hub Assy.
CE-0009	Capacitor-Electrolytic 30-20 Mfd 450 V., 25 Mfd. 25 V.
CE-0018	Capacitor-Electrolytic 8Mfd. 25 V.
CC-0034 or	5000 M.M.F.D. Round Wafer condenser marked Green-Black-Red
CC-0024	5000 M.M.F.D.
	COILS
AN-0013	Built in dipole antenna F.M.
AN-0006	Loop Antenna (Low Impedance)
LI-0023	1st I.F. Transformer
LI-0024	2nd I.F. Transformer
LI-0025	Discriminator Transformer
LO-0014	Oscillator Coil for A.M.
LO-0023	Oscillator Coil for F.M.
LA-0013	Antenna Loading Coil for A.M.
LA-0014	Antenna Loading Coil for F.M.
LR-0007	R.F. Coil Assy for F.M.
LC-0012	R.F. Choke Coil
LC-0013	F.M. Antenna Choke
	DIAL AND CONTROL ACCESSORIES
AS-0213	Tuning Shaft Assy
AS-0217	Dial Pointer Assy
AR-0019	Dial Light Bracket Assy (right side)
AR-0024	Dial Light Bracket Assy (left side)
SP-0010	Dial Drive Spring
DC-0001	Dial Cord 51" long
DG-0017	Dial Scale (Low Freq. at right side)
DG-0019	Dial Scale (Low Freq. at left side)
LS-0002	#44 Blue Bead Pilot Lamp
ES-0004-1	Metal Escutcheon (Mahogany)
ES-0004-2	Metal Escutcheon (Blonde)
ES-0004-3	Metal Escutcheon (Mahogany) for 472F and 472AF
	KNOBS
AR-0042	Thumb Wheel Assy (Tone Control)
AR-0058	Thumb Wheel Assy (Phono-B'cast-F.M.)
AR-0025	Thumb Wheel Assy (Tone Control) for A.F.
AR-0065	Thumb Wheel Assy (Phono-B'cast-F.M.) for A.F.
	KNOBS--Continued
KB-0015-1	Knob-tuning & Volume (Mahogany) for C & F
KB-0015-3	Knob-Tuning & Volume (Blonde) fo C
KB-0014-1	Knob for Drawer (Mahogany) for C
KB-0014-2	Knob for Drawer (Blonde) for C
HW-0005	Drawer Pull } For F cabinet
HW-0006	Knob for Doors } For F cabinet
	SPEAKER
SK-0004	Speaker 9" Elliptical P.M.
	TRANSFORMER
TO-0008	Speaker output Transformer
LC-0010	Power Choke - 500 Ohm D.C.
TP-0007	Power Transformer - 60 Cycle 110 V.
LC-0017	Bass Boost Audio Choke - for 472 only
	SOCKETS and PLUGS
SO-0017	Tube Sockets
SO-0013	Miniature Tube Sockets
SO-0010	Phono and Speaker Sockets (female)
TL-0005	Phono and Speaker Plug (male)
TB-0008	Terminal Strip (External Antenna & Ground)
	SWITCHES
SW-0016	Phono B'cast and F.M. Switch (4 gang 3 pos)
SW-0010	Tone Switch (3 position)
	CABINET
CW-0009-1	Cabinet (Mahogany)
CW-0009-2	Cabinet (Blonde)
AA-0008-1	Drawer Sub-assy (Mahogany)
AA-0008-2	Drawer Sub-Assy (Blonde)
AW-0015	Carriage Assy
CW-0007	Cabinet - Regency Style
AA-0027	Radio Drawer Sub-Assy (for Regency)
AA-0026	Drawer-Sub Assy (for Regency)
AA-0025	Door Sub-Assy (for Regency)
BP-0087	Cabinet back
	LINE CORD
CA-0039	Line Cord- 8 Ft and moulded plug
CA-0043	Line Cord & Plug 42" long for record changer motor
CA-0053	Antenna Jumper - 300 Ohm line

MODELS 472AC, 472AF

HOWARD RADIO CO

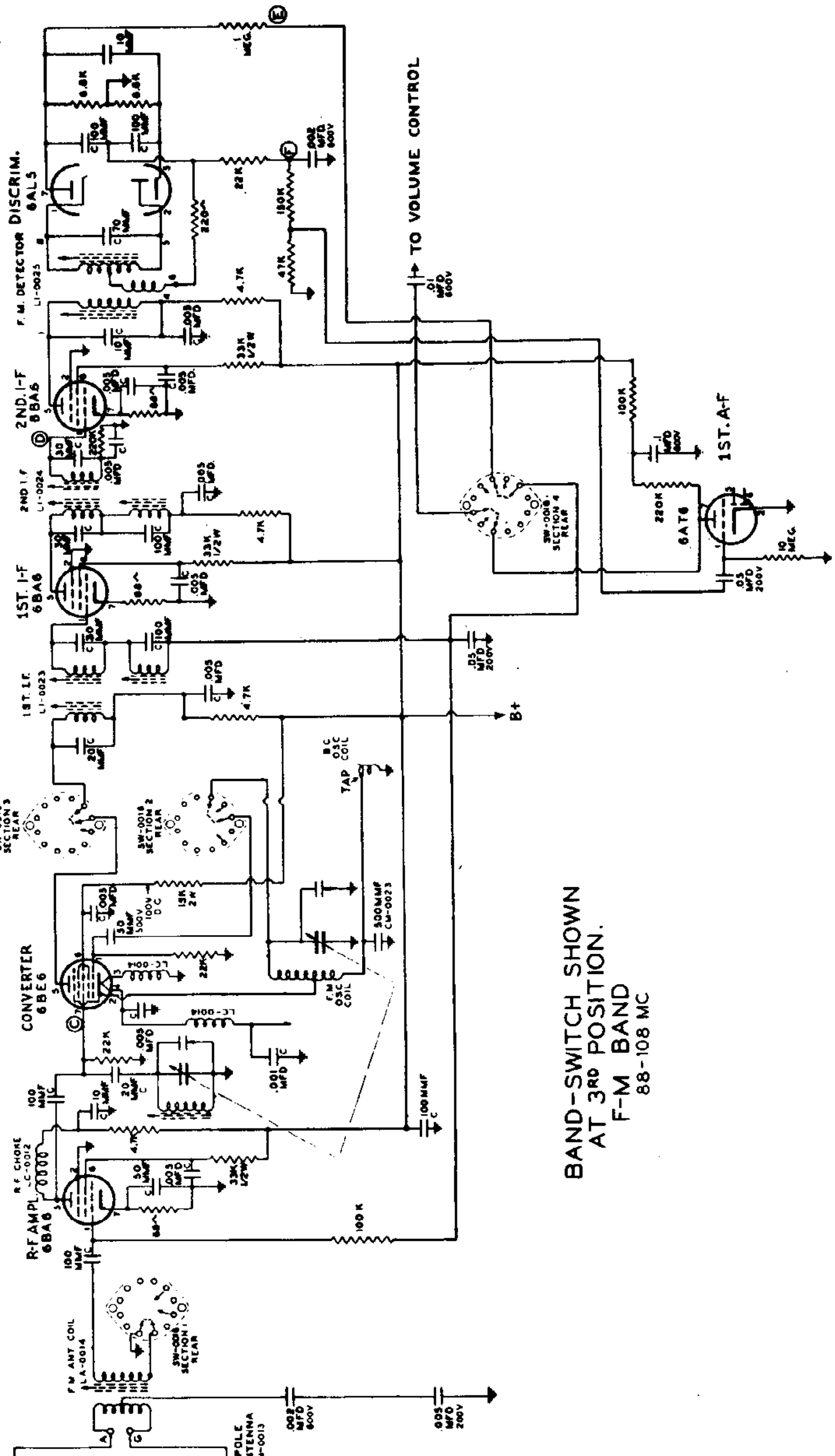


For alignment procedure and other data see Models 472C, 472F, pages 17-4 through 17-7

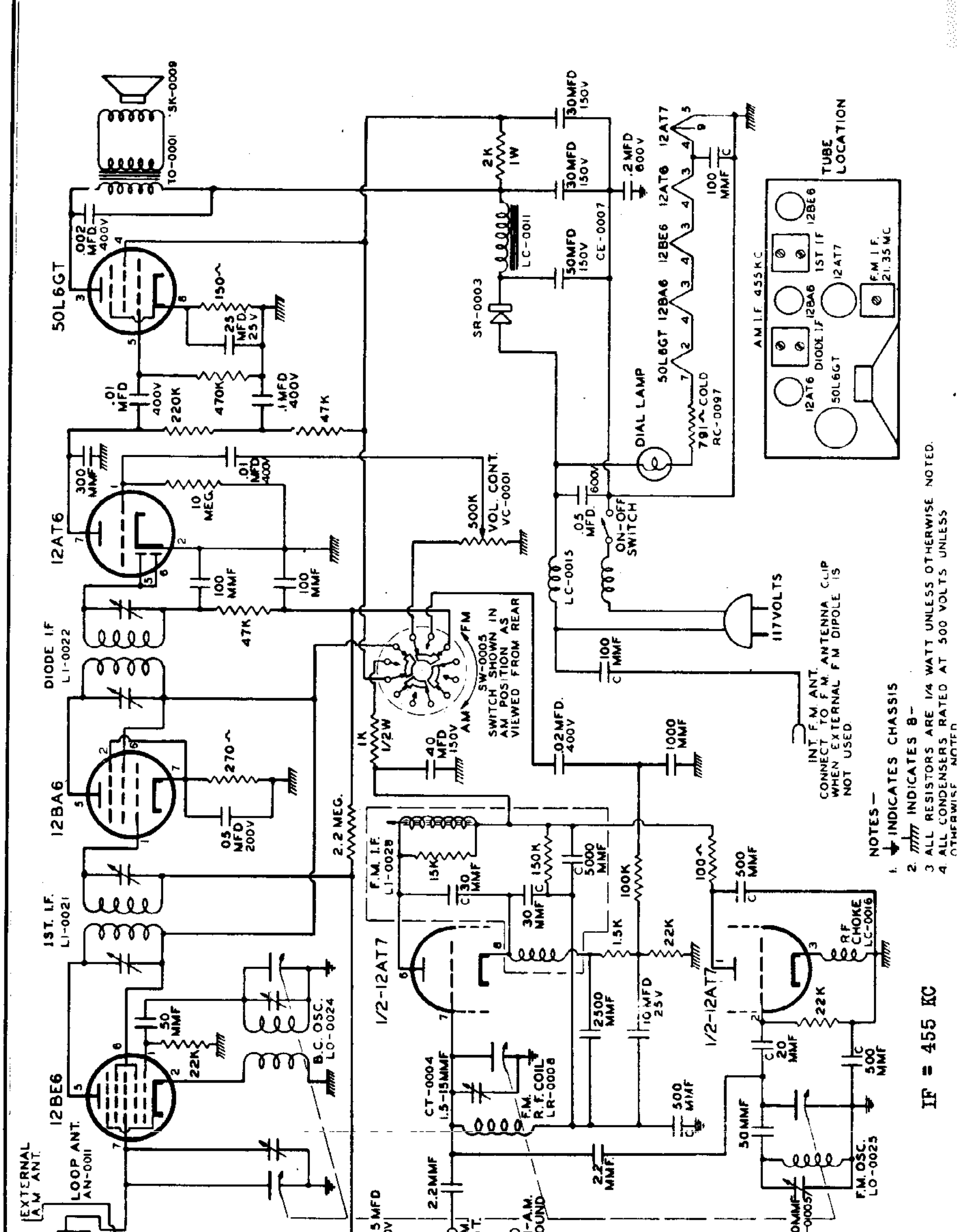

TO VOLUME CONTROL
.01 MFD
2ND I.F. LI-0024
1ST. I.F. LI-0023
I.F. AMPL. 6BA6
DETECTOR 6AT6
SW-0018 SECTION 4 REAR
SW-0018 SECTION 3 REAR
SW-0018 SECTION 2 REAR
SW-0018 SECTION 1 REAR
B+
BC OSC. COIL
FM OSC COIL
TAP
CONVERTER 6BE6
R.F. AMPL. 6BA6
R F CHOKE LC-0012
ANT LOAD COIL LA-0013
LOOP ANTENNA AN-0008
BAND-SWITCH SHOWN AT 2ND POSITION. BROADCAST BAND
535-1650 KC
NOTE: 1ST POSITION (PHONO) NOT SHOWN

MODELS 472AC, 472AF

HOWARD RADIO CO

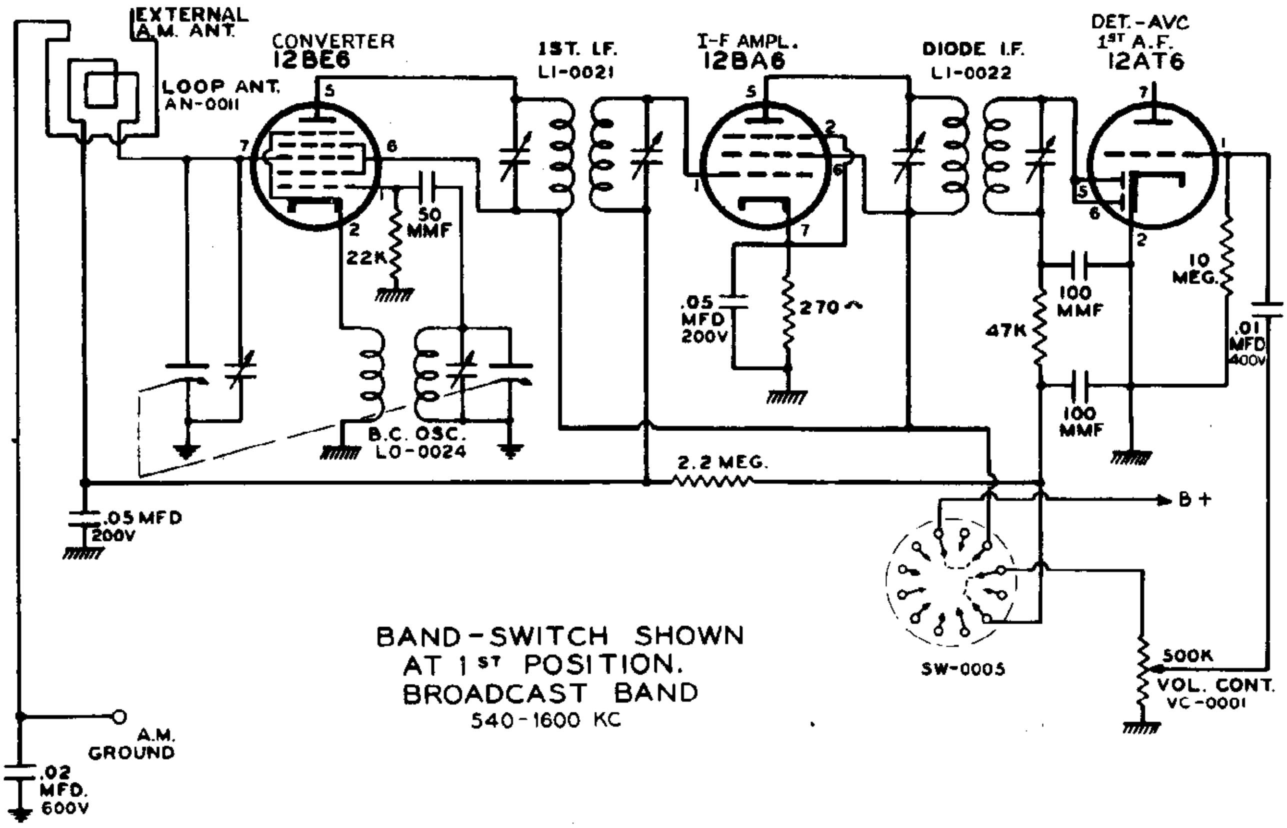


HOWARD RADIO CO

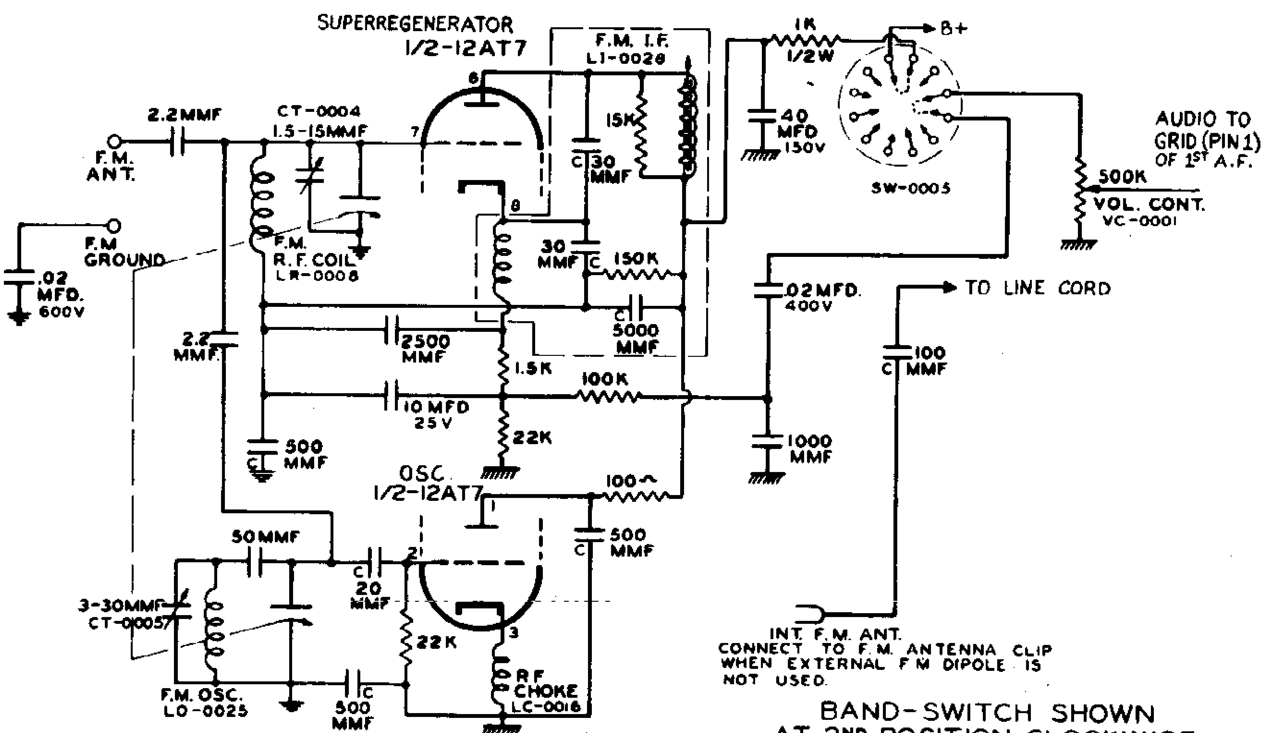


"clarified schematics"

HOWARD RADIO CO



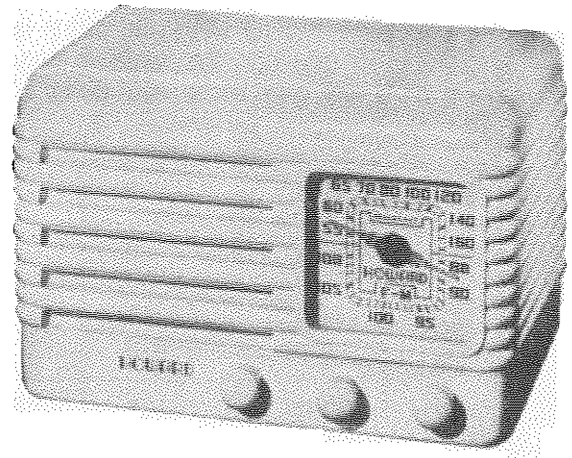
BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
540-1600 KC



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
F-M BAND
88-108 MC

HOWARD RADIO CO

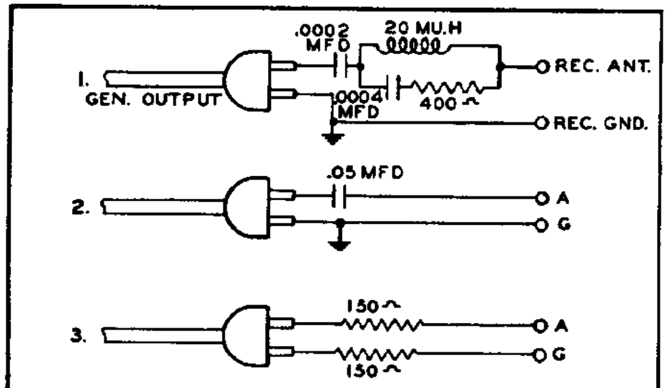
See Dummy Antenna Chart	Sig. Gen. Connection To	Gen. Freq.	Band Position	Dial Setting	Order of Trimmer Adj.	FUNCTION	See Note
2	Grid of 12BE6	455 K.C.	B.C.	Off Station	① ② ③ ④	I.F. Peak to Max. Output	
1	A.M. Ant. Clip	1400 K.C.	B.C.	1400 K.C.	⑤ ⑥	B.C. Osc. and R.F.	A
2	F.M. Ant. Clip	21.35 M.C.	F.M.	Off Station	⑦	F.M.-I.F.	B
3	F.M. Ant. Clip	105 M.C.	F.M.	105 M.C.	⑧ ⑨	F.M. Osc. Peak to Max. Output	C



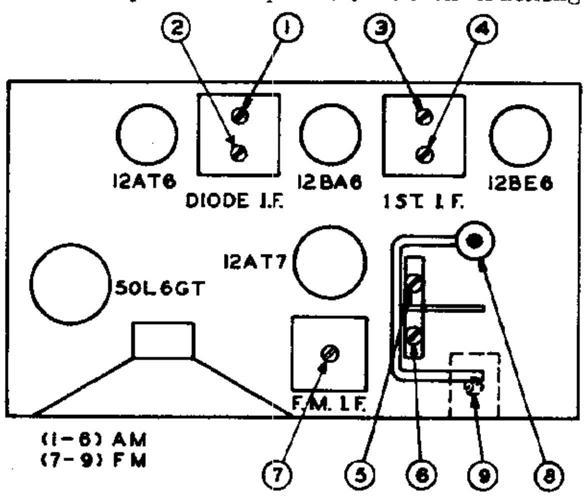
Note A. Set pointer in horizontal position with condenser gang closed.

Note B. Adjust for minimum noise with modulation off.

Note C. Adjust ⑧ to 105 M.C.- Oscillator section. While adjusting ⑨, rock condenser gang slowly back and forth for point of optimum. Check tracking of R.F. at 90 to 100 M.C.



DUMMY GENERATOR CHART



TRIMMER LOCATION CHART

No. 9 adjustment up

POWER SUPPLY: (Standard Models) 105 to 125 V. AC-DC. 25 to 60 cycle. (Write our Export Sales Manager relative to special voltages). Consumption 30 watts. See label on back of chassis.

ANTENNA SYSTEM: Built in loop on back of cabinet for AM reception. Provision is also made for use of outside antenna on AM distant reception. Built in FM antenna, but provision is also made for exterior FM aerial, either dipole or single wire. (See antenna instructions on rear of cabinet.) If distortion occurs on strong FM local stations, remove antenna from clip marked "FM. ANT" on rear of cabinet and leave disconnected.

TUNING RANGE: FM 88 to 108 M.C.

HOWARD RADIO CO

PARTS LIST
474-FM

CONTROL
VC-0001 Volume Control & On-off Switch

CONDENSERS
AC-0009 Tuning Gang with Mounting Assy.
CE-0016 Capacitor Electrolytic 40 Mfd. 150 volts
CE-0019 Capacitor Electrolytic 10 Mfd. 150 volts
CE-0007 Capacitor Electrolytic 50-30-30 Mfd. 150 volts
CE-0005 Capacitor Electrolytic 25 Mfd. 25 volts

COILS
AN-0011 Loop Antenna
LO-0024 Broadcast Oscillator Coil
LI-0021 1st I.F. Transformer
LI-0022 2nd I.F. Transformer
LC-0016 F.M.- R.F. Choke Coil
LO-0025 F.M. Osc. Coil
LR-0008 F.M.- R.F. Coil
LI-0028 F.M. - I.F. Transformer

DIAL AND CONTROL ASSESSORIES
SM-0074 Dial Drive Shaft
HD-0002 Dial Pointer Hand
SL-0004 Dial Light Socket
LS-0001 Dial Lamp Type #47. Min. Bayonet
AR-0064 Calibrated Dial Plate
SP-0010 Dial Cord Spring - 8 Oz. load
GR-0001 Rubber Grommet
WG-0001 Dial Window

KNOBS
KB-0003 Knob - White
KB-0003-1 Knob - White Stamped "AM-FM"
KB-0005 Knob - Brown
KB-0005-1 Knob - Brown Stamped "AM-FM"

SOCKETS
SO-0009 Socket - 8 Prong
SO-0022 Tube Socket - 9 Pin - Low Loss Bakelight
SO-0013 Tube Socket - 7 Pin

SPEAKER
SK-0009 Speaker 5" P.M.

TRANSFORMER
TO-0001 Speaker output Transformer
LC-0011 Power Choke (150 Ohms D.C.)
LC-0015 A.C. Input Choke

TUBE COMPLEMENT
TU-12AT6 Tube
TU-12BA6 Tube
TU-12BE6 Tube
TU-12AT7 Tube
TU-50L6 Tube

SWITCH
SW-0005 Band Switch

CABINET
CB-0002 Plastic Cabinet - Ivory
CB-0004 Plastic Cabinet - Mottled Walnut

LINE CORD
CA-0038 Line Cord with plastic plug (6 feet)

MISCELLANEOUS
SR-0003 Selenium Rectifier
PR-0097 Base Clip for Tube Shield
MP-0324 Gang Cover
PR-0096 Miniature Tube Shield
RC-0097 Negative Temp. Coefficient Resistor
791 Ohms cold - 100 Ohms hot
(takes surge off pilot light voltage)

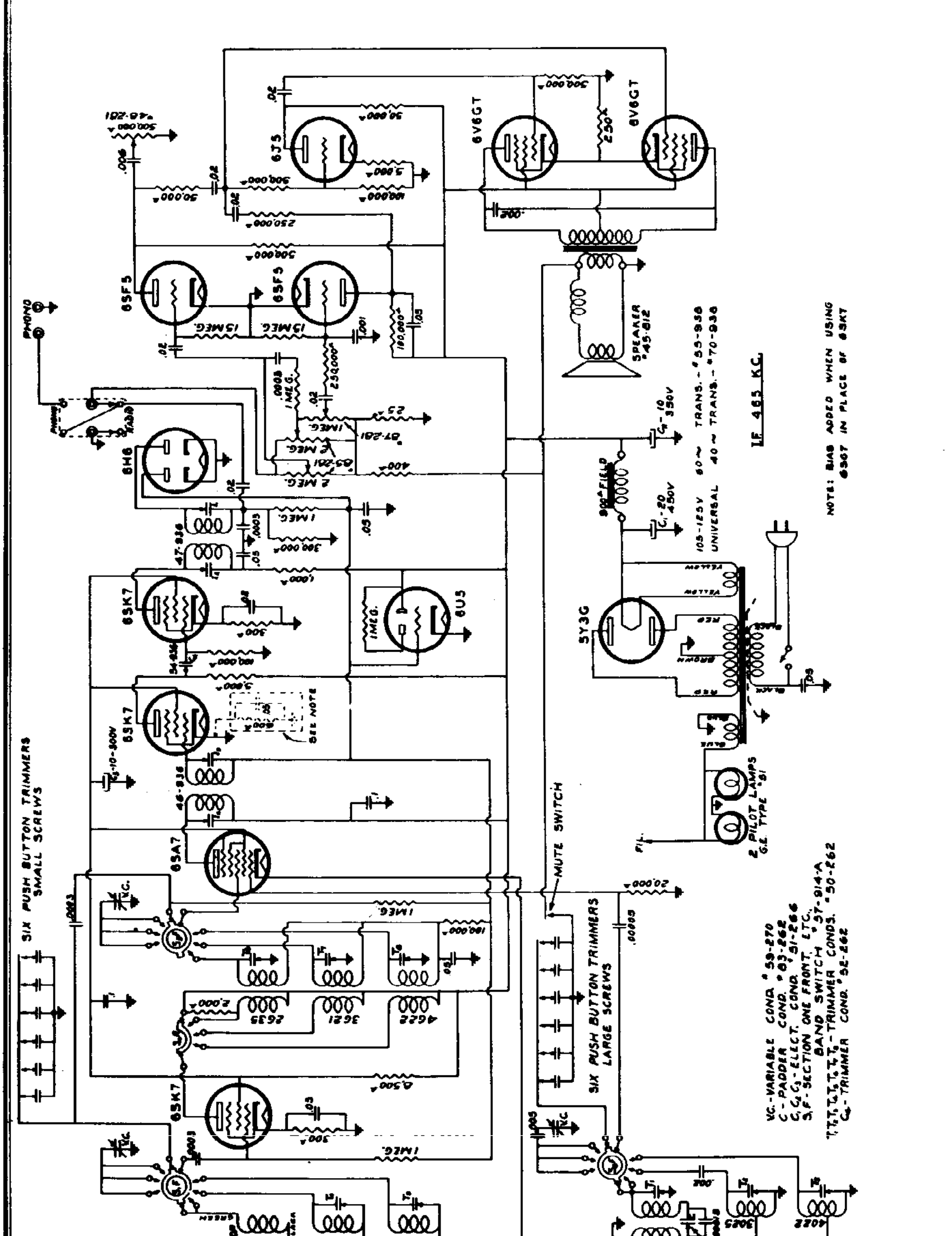
SOCKET VOLTAGE READINGS

Tube	Function	Cath.	Screen Grid	Plate
12BE6	Mixer	0	100	98
12BA6	I.F. Amp.	1	100	98
12AT7	FM Tube	Pin 8 14 V.	-	120
12AT6	Det.	0	0	65
50L6	Output	6.8	100	130

All voltages taken from the buss bar (B-) to the socket contacts, with a 20,000 Ohm per volt D.C. meter and the line voltage fixed at 117 Volts A.C.

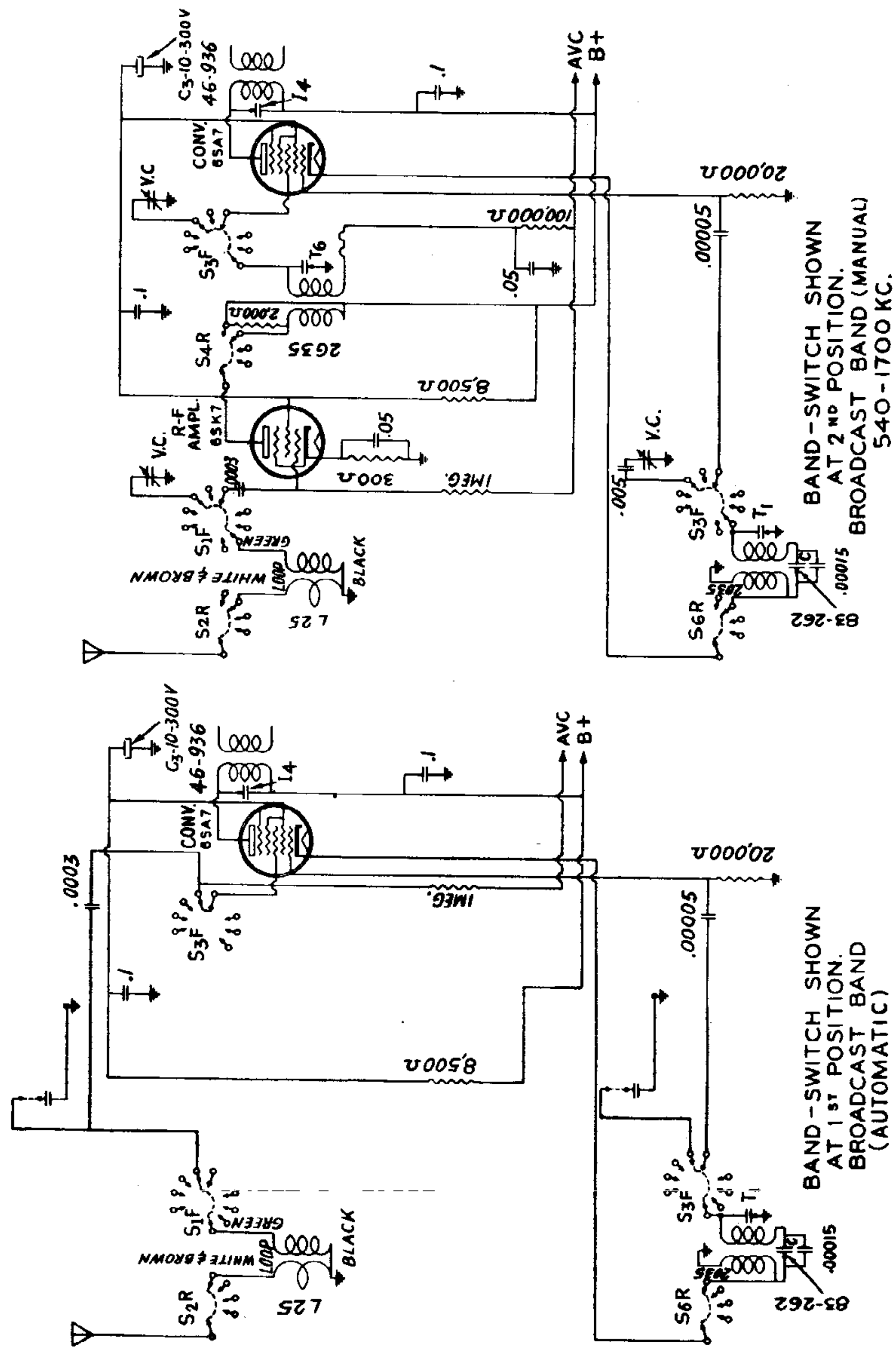
HOWARD RADIO CO

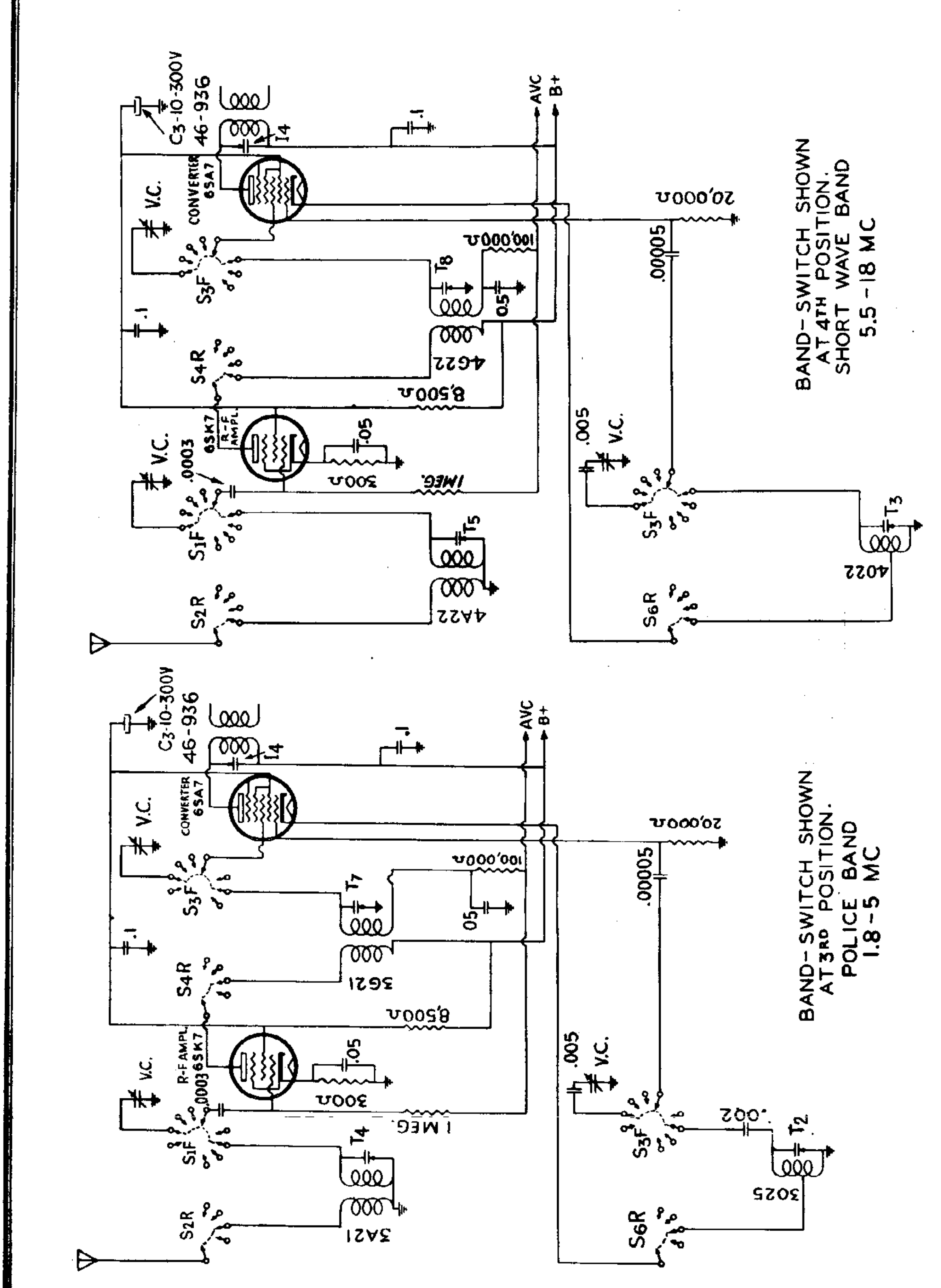
MODEL 718, Series



"clarified schematics"

HOWARD RADIO CO




BAND-SWITCH SHOWN AT 4TH POSITION. SHORT WAVE BAND 5.5-18 MC
CONVERTER 6SA7
R-F AMPL. 6SK7
C3-10-300V
46-936
AVC
B+
20,000Ω
100,000Ω
8,500Ω
300Ω
1MEG.
.00005
.0003
.005
.05
4G22
4A22
4022
S1F
S2R
S3F
S4R
S6R
V.C.
BAND-SWITCH SHOWN AT 3RD POSITION. POLICE BAND 1.8-5 MC
3G21
3A21
3025
.002

MODEL 718, Series X

HOWARD RADIO CO

GENERAL SPECIFICATIONS

12 Tube, 3 Band, R. F. Stage on all bands, Loop for Broadcast band only, Electric Push Button Tuning with muting switch action, Built-in Phono Switch, Bass and Treble Controls, Beam Power Output, Inverse Feed-Back, 6 Ohm Voice Coil. Power Consumption 105 Watts, Alternating Current Only.

SOCKET VOLTAGE READINGS FOR MODEL 718-X

* Socket Terminal Number

Voltage taken from ground with voltage at 117 Volts AC. Drop across speaker field 105 V. Use at least a 1000 Ohm per Volt Meter. High voltage reading off rectifier 355 V. DC.

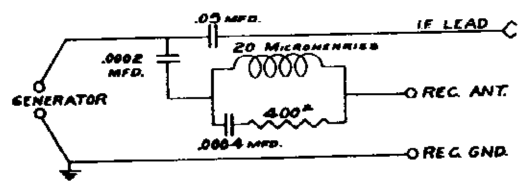
TUBE	FUNCTION	CATH.	*	SG.		PLATE			
6SK7	R. F.	1.7	5	110	6	250	8		
6SA7	Converter		6	110	4	245	3		
6SK7	1st I. F.		5	110	6	220	8		
6SK7	2nd I. F.	4	5	110	6	230	8		
6H6	Det.								
6U5	Tuning eye					250			

TUBE	FUNCTION	CATH.		SG.		PLATE			
6SF5	A. F.					115	5		
6SF5	Bass					65	5		
6J5	Inverter	8	8			155	3		
6V6GT	Output	16	8	250	4	240	3		
6V6GT	Output	16	8	250	4	240	3		
5Y3G	Rectifier								

ALIGNMENT PROCEDURE FOR 718-X SERIES

EQUIPMENT REQUIRED:

1. SIGNAL GENERATOR to accurately cover the alignment frequencies as shown below.
2. OUTPUT METER (0 to 3 V. AC if used in voice coil circuit).
3. DUMMY ANTENNA. Although the values as shown in below table for antenna load may be satisfactory, we urgently recommend the circuit as shown at the right to properly take care of the various frequencies to accomplish the correct alignment.



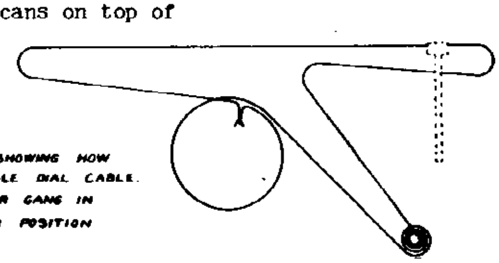
START ALIGNMENT WITH:

Treble and Bass controls turned toward left, Volume Control full ON to right and Band Switch in Broadcast position. After checking for pointer travel to last line above 550, set dial to point where there is no interference with generator signal and proceed with IF alignment.

DUMMY ANTENNA	SIG. GEN. CONNECTION TO	GEN. FREQ.	BAND SW. POSITION	DIAL SETTING	ORDER OF TRIMMER ADJUSTMENTS	TRIMMER FUNCTION	SEE NOTE
.05 Mfd.	Grid of 6SA7	465 KC	BC	Off Station	See Fig. 1. ①②③④⑤⑥	I.F. peak to Max. Output	1
400 Ohm Resistor	Ant.	1400 KC	BC	1400 KC	See Fig. 2. ⑦ then ⑧	BC Osc. - R.F.	2
"	"	600 KC	BC	600 KC	⑨ Rock Dial	BC Osc. Pad.	2
"	"	5 MC	Police Band	5 MC	⑩ ⑪ ⑫	Pol. Band Osc. RF Ant. Check Image at 4.1	2
"	"	16 MC	SW	16 MC	⑬ ⑭ ⑮	Short Wave Osc.-RF- Ant. Check Image at 15.1	2

NOTE 1: The I.F. adjustments are reached through holes in top of cans on top of chassis.

NOTE 2: Peak for greatest deflection of output meter.

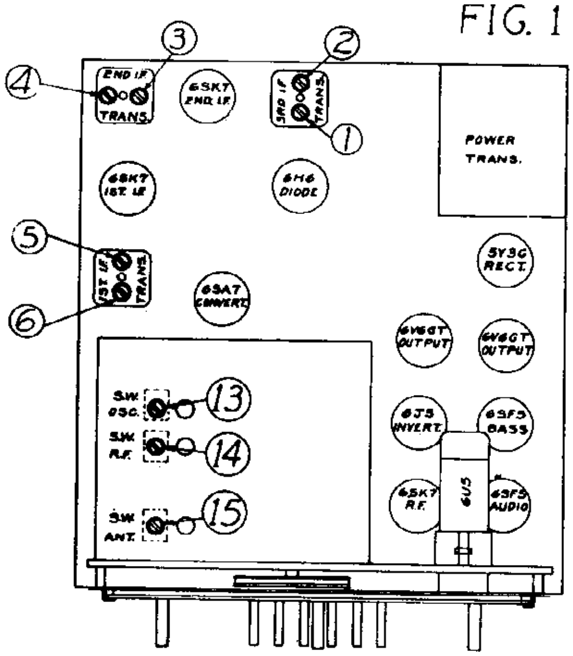


LAYOUT SHOWING HOW TO ASSEMBLE DIAL CABLE CONDENSER GANG IN MAXIMUM POSITION

HOWARD RADIO CO

MODEL 718, Series

FIG. 1



TOP VIEW MODEL 718X

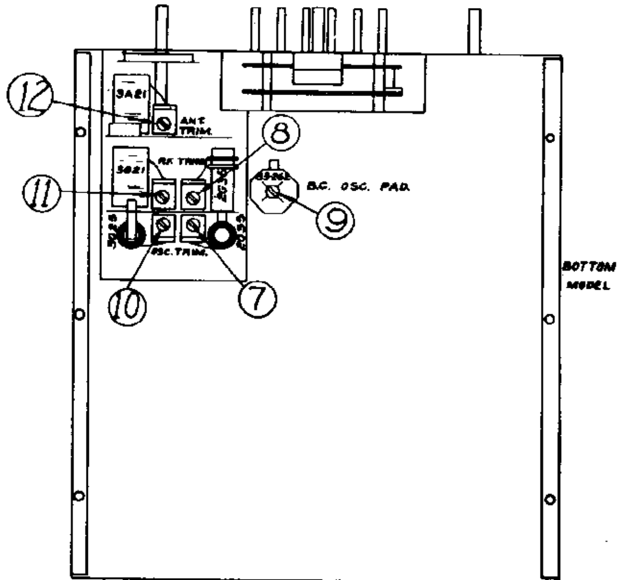


FIG. 2

REPLACEMENT PARTS LIST

For prompt and accurate service with any correspondence or replacement parts orders pertaining to this mod include the IDENTIFICATION NUMBERS as shown on black and white card accessible at back of cabinet.

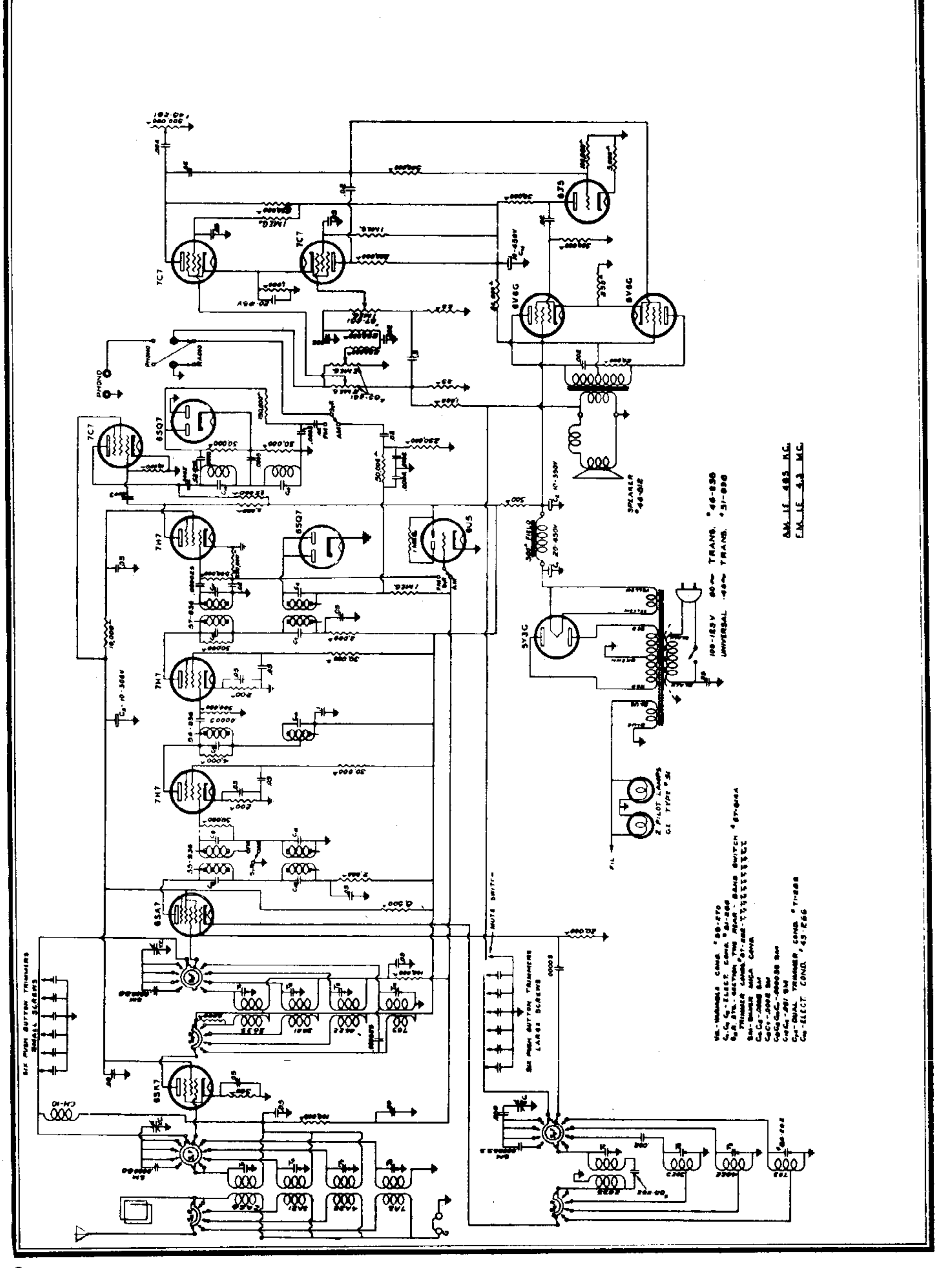
The following parts list includes the vital receiver parts only. This list does not include any part pertaining to the cabinet or any type record mechanism. When the IDENTIFICATION NUMBER is specified to us we have the complete record of your model and can furnish complete service information for the particular typ cabinet (or record mechanisms with combination models) that you may have.

Part No.	DESCRIPTION
	CABINETS
51-190	Chippendale . . . .
53-190	"C" Type. . . . .
54-190	"A" Type. . . . .
	CONTROLS
48-281	Tone. . . . .
87-281	Bass Boost. . . . .
85-281	Radio-Phono Volume. . . . .
	CONDENSERS
59-270	Tuning. . . . .
83-262	Padding BC. . . . .
50-262	Single trimmer. . . . .
51-266	Filter, 20-10-10 mfd. 450,350,300 Volts . . . . . .
	COIL ASSEMBLIES
L25	Ant. Loop - Console . . . . . .
2035	Osc. Coil 1700-540 KC . . . . .
2G35	R.F. Coil 1700-540 KC . . . . .
3A21	Ant. Coil 5-1.8 MC. . . . . . .
3025	Osc. Coil 5-1.8 MC. . . . . . .
3G21	R.F. Coil 5-1.8 MC. . . . . . .
4A22	Ant. Coil 18-5.5 MC . . . . . .
4022	Osc. Coil 18-5.5 MC . . . . . .
4G22	R.F. Coil 18-5.5 MC . . . . . .
46-936	1st I.F. Assembly Complete. . .
54-936	2nd I.F. Assembly Complete. . .
47-936	Last I.F. Assembly Complete . .
	DIAL & CONTROL PARTS
207-310A	Calibration - Tuning. . . . . .
2-498	Dial Lamp - Bayonet . . . . . .
22-427	Dial Window . . . .
1-288	Drive String. . . . .
53-352	Escutcheon with Window. . . . .
45-352	Escutcheon - Push Button Trim .
31-448	Tuning Hand . . . .

Part No.	DESCRIPTION
	DIAL & CONTROL PARTS - Cont'd.
11-966	Push Button Tuning Assembly . .
17-182	Push Button Plain . . . .
5-609	Pulley with Hub . . . .
3-609	String Guide Pulleys. . . . . .
80-720	Shaft - Tuning. . . . .
43-829	Spring, Drive Cord Tension. . .
	KNOBS
19-490	Wood - 1-1/4. . . . .
19-490-2	Wood - 1-1/4. . . . .
	LINE CORDS
1-290	Standard. . . . .
	MOUNTING HARDWARE
966	Rubber cushions, chassis mtg . . . .
1-703	Wing Screws ("C" cab. only) . .
	RECORD CHANGER - AUTOMATIC
10-615	117 V. 60 Cycle . . . .
	SOCKETS, PLUGS, JACKS, CONNECTORS
24-768	Dial Lamp Socket - Bayonet. . .
6-772	Speaker Socket - 4 hole . . . .
25-771	Tuning Eye Socket & Cable . . .
23-771	Tube Socket-Octal . . . .
14-844	Terminal ANT-GND. . . . .
	SPEAKERS
45-812	12" Console ("C" & "A") . . . .
1-809	Twin to 2-809 (Chippendale) . .
2-809	Twin to 1-809 (Chippendale) . .
	SWITCHES
57-914A	Band Switch . . . .
26-917	Radio-Phono . . . .
	TRANSFORMERS
19-961	Output - Audio. . . . .
55-938	105-120 V. 60 Cy. Stan. . . . .
70-938	117-135-230 V. 40/60 cy . . . .

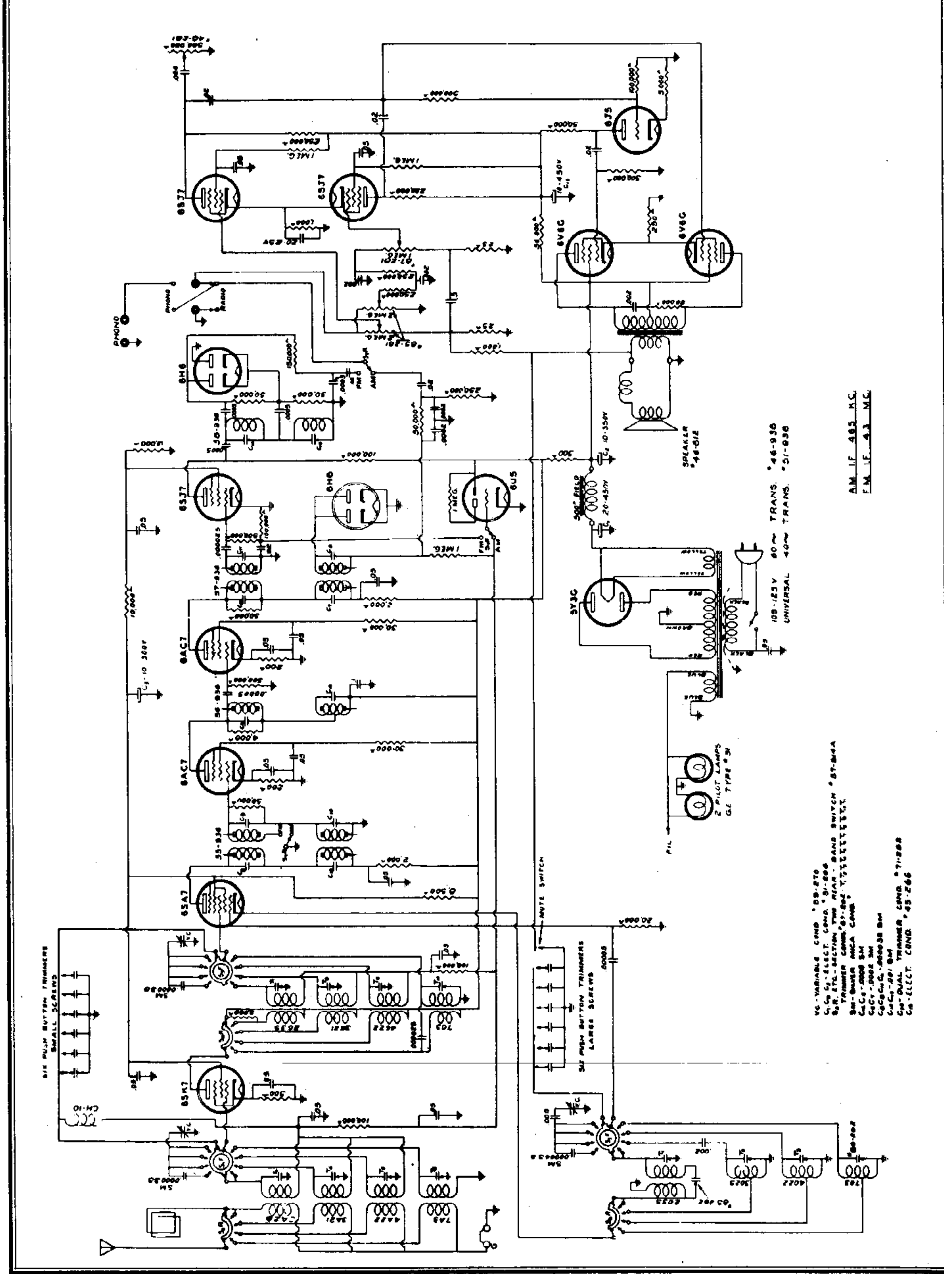
NOTE When ordering any component part for any speaker, specify part number on speaker including the pr fix letter that precedes the part number on certain models.

HOWARD RADIO CO



HOWARD RADIO CO

MODEL 718-FM- -5-6



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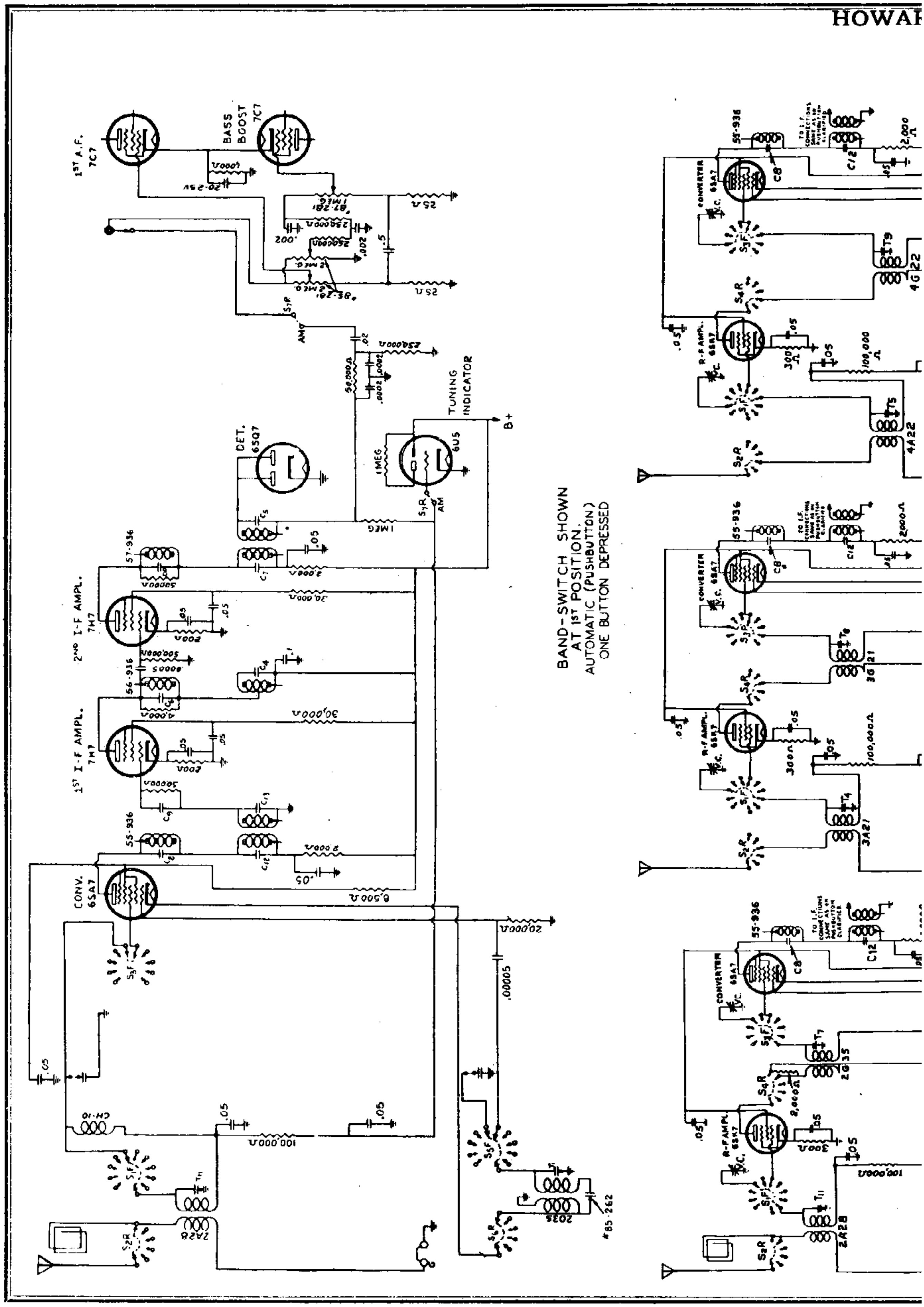
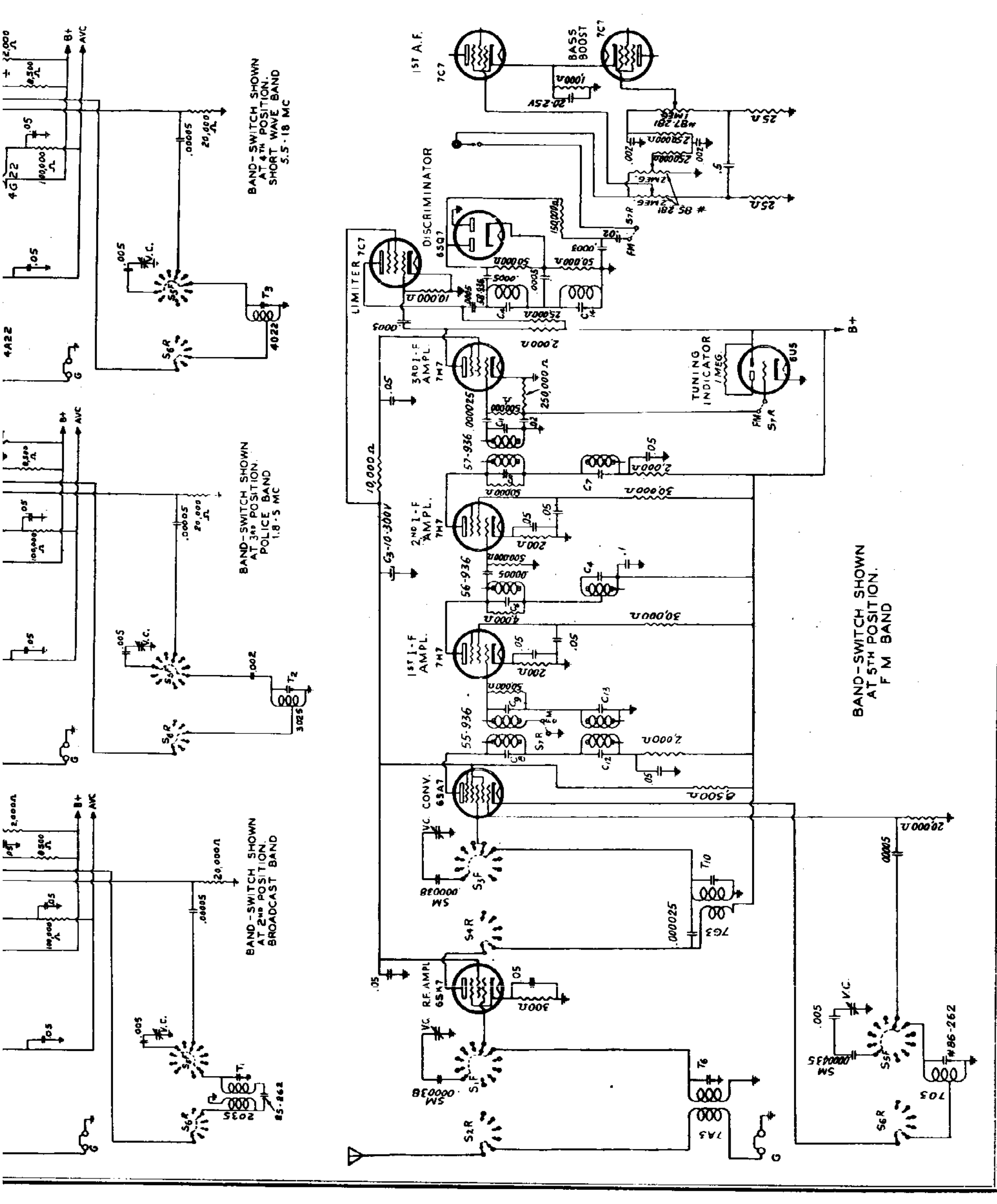




BAND-SWITCH SHOWN AT 4TH POSITION. SHORT WAVE BAND 5.5-18 MC
BAND-SWITCH SHOWN AT 3RD POSITION. POLICE BAND 1.8-5 MC
BAND-SWITCH SHOWN AT 2ND POSITION. BROADCAST BAND
BAND-SWITCH SHOWN AT 5TH POSITION. F M BAND
1ST A.F. 7C7
BASS BOOST 7C7
DISCRIMINATOR 6SQ7
LIMITER 7C7
3RD I-F AMPL. 7H7
2ND I-F AMPL. 7H7
1ST I-F AMPL. 7H7
CONV. 6SA7
R.F. AMPL 6SK7
TUNING INDICATOR 6U5

HOWARD RADIO CO

* Socket Terminal Number

Voltage taken from ground with voltage at 117 Volts AC. Drop across speaker field 65 V. Use at least a 1000 Ohm per Volt Meter. High voltage reading off rectifier 300 V. DC.

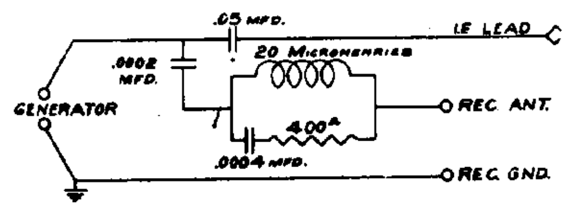
TUBE	FUNCTION	CATH.		SG.		PLATE			
6SK7	R.F.	5	* 5	100	6	230	8		
6SA7	Converter			100	4	220	3		
6AC7	1st. I.F.	3	5	155	6	225	8		
6AC7	2nd I.F.	3	5	155	6	210	8		
6SJ7	Limiter			65	6	65	8		
6H6	FM Des-Det.								
6H6	AM Det.								

TUBE	FUNCTION	CATH.		SG.		PLATE			
6SJ7	A.F.	1	5	20	6	25	8		
6SJ7	Bass Boost	1	5	20	6	25	8		
6U5	Tuning Eye					230			
6J5	Inverter	6	8			80	3		
6V6GT	Output	14	8	235	4	225	3		
6V6GT	Output	14	8	235	4	225	3		
5Y3G	Rectifier								

ALIGNMENT PROCEDURE FOR FM718-5-6

EQUIPMENT REQUIRED:

1. SIGNAL GENERATOR to accurately cover the alignment frequencies as shown below.
2. GALVANOMETER 75 microamperes center "O" (Such as Simpson Type 25) USE SERIES RESISTOR OF 100,000 Ohms in positive lead. Leads from meter to set to be as short as possible.
3. OUTPUT METER (0 to 3 V. AC if used in voice coil circuit).
4. DUMMY ANTENNA. Although the values as shown in below table for antenna. load may be satisfactory we urgently recommend the circuit as shown at the right to properly take care of the various frequencies to accomplish the correct alignment.



START ALIGNMENT WITH:

Treble and Bass controls turned toward left, Volume Control full ON to right and Band Switch in Broadcast position. After checking for pointer travel to last line above 550, set dial to point where there is no interference with generator signal and proceed with AM-IF alignment.

DUMMY ANTENNA	SIG. GEN. CONNECTION TO	GEN. FREQ.	BAND SW. POSITION	DIAL SETTING	ORDER OF TRIMMER ADJUSTMENTS	TRIMMER FUNCTION	SEE NOTE
.05 Mfd.	Grid of 6SA7	465 KC	BC	Off Station	See Fig. 1 ① ② ③ ④ ⑤	AM I.F. peak to max. output	A
"	Grid of 6SA7 - remove tuned circuit	4.3 MC Unmod.	FM	"	See Fig. 2 ⑥ ⑦ ⑧ ⑨ ⑩	FM I.F. See Fig.1 Galvanometer Position	B
"	"	4.4 MC	FM	"	Turn ⑪ down tight - Then adjust ⑫	FM Detector See Fig. 2	C
"	"	4.3 MC	FM	"	After ⑫, adjust ⑪ for zero deflection	FM Detector See Fig. 2	D
400 Ohm Resistor	"A" Ant. post	1400 KC	BC	1400 KC	See Fig. 1 ⑬ then ⑭	BC Osc. and RF	E
"	"	600 KC	BC	600 KC	⑮ Rock Dial	BC Osc. Pad.	E
"	"	5 MC	Police	5 MC	⑯ ⑰ ⑱	Osc. - RF - Ant. Check image at 4.1	E
"	"	16 MC	S.W.	16 MC	⑲ ⑳ ㉑	Osc. - RF - Ant. Check image at 15.1	E
"	"	48 MC 8th Har. of 6 MC	FM	48 MC	㉒ ㉓ ㉔	FM Osc.- RF - Ant	E

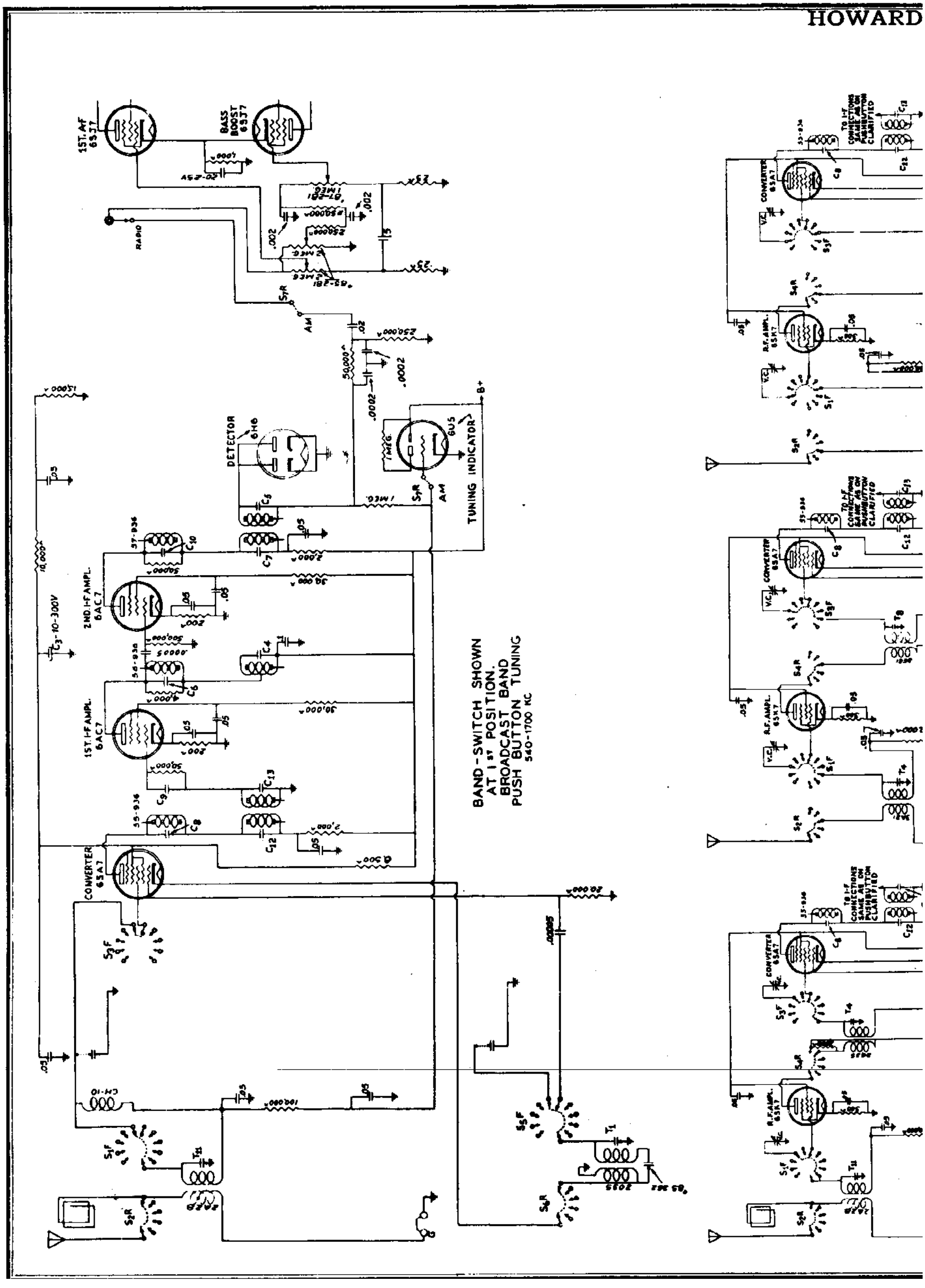
NOTE A: When a re-alignment is made of either the AM I.F. or FM I.F. it should not be necessary to turn the adjustments very far in either direction. The AM I.F. adjustments are reached through holes in the base from underside of chassis. Should the screws be turned too far in, they might fall out of position which would require that the coil be re-assembled. At the other extreme, if the screws are forced too far out, there is danger of breaking the iron cores.

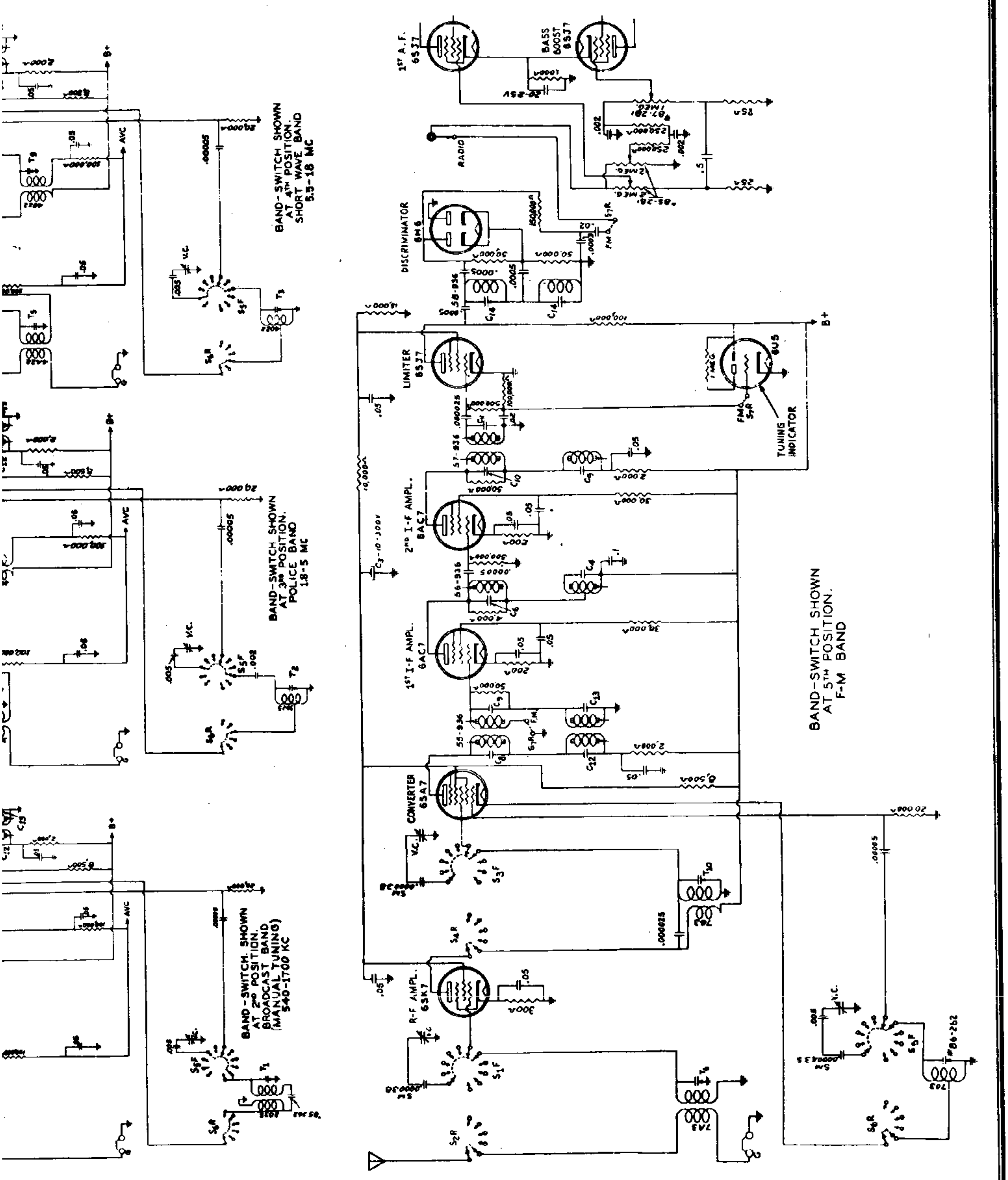
NOTE B: Connect Galvanometer from tap of limiter grid load circuit to ground. See Fig. 1. Adjust for max. current. Normal gain should give deflection (with meter as specified) of 22 with 2,000 to 3,000 microvolt input. Now shift generator frequency each side of 4.3; that is, to 4.2 and 4.4. The drop-in meter deflection should be approximately proportional to change in frequency. If not, recheck alignment.

NOTE C: With Galvanometer connected to FM Detector output (See Fig. 1) and Trimmer 11 turned all the way in temporarily, adjust Trimmer 12 for max. deflection at 4.4 MC. Normal gain should give deflection of 9 with 2,000 to 3,000 microvolts input.

NOTE D: After trimmer 12 is adjusted to 4.4, adjust Trimmer 11 to zero deflection at 4.3. Then shift generator to 4.2 MC. Meter should then show deflection approximately same as at 4.4 at reverse polarity. If the I.F. circuits are ever readjusted, always recheck detector afterwards.

NOTE E: Peak for greatest deflection of output meter.


1ST. A-F 6SJ7
BASS BOOST 6SJ7
RADIO
DETECTOR 6H6
TUNING INDICATOR 6U5
B+
2ND. I-F AMPL. 6AC7
1ST. I-F AMPL. 6AC7
CONVERTER 6SA7
R.F. AMPL. 6SK7
BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND PUSH BUTTON TUNING 540-1700 KC


1ST A.F. 6SJ7
BASS BOOST 6SJ7
RADIO
DISCRIMINATOR 6H6
LIMITER 6SJ7
6U5
TUNING INDICATOR
2ND I-F AMPL. 6AC7
1ST I-F AMPL. 6AC7
CONVERTER 6SA7
R-F AMPL. 6SK7
BAND-SWITCH SHOWN AT 5TH POSITION. F-M BAND
BAND-SWITCH SHOWN AT 4TH POSITION. SHORT WAVE BAND 5.5-18 MC
BAND-SWITCH SHOWN AT 3RD POSITION. POLICE BAND 1.8-5 MC
BAND-SWITCH SHOWN AT 2ND POSITION. BROADCAST BAND (MANUAL TUNING) 540-1700 KC
AVC
B+

MODEL 718-FM- -5-6

HOWARD RADIO CO

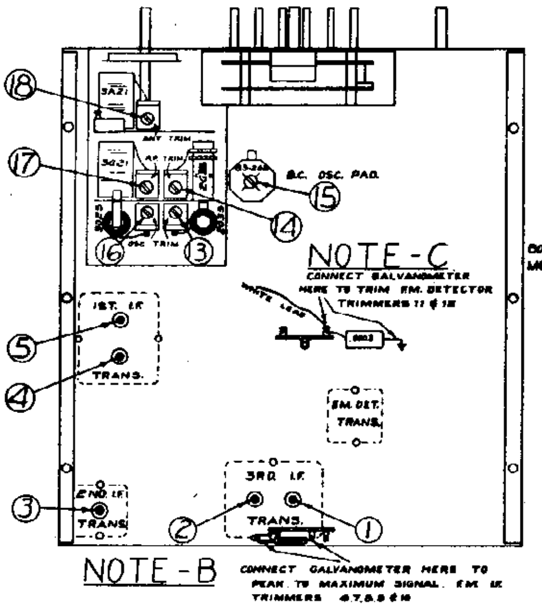
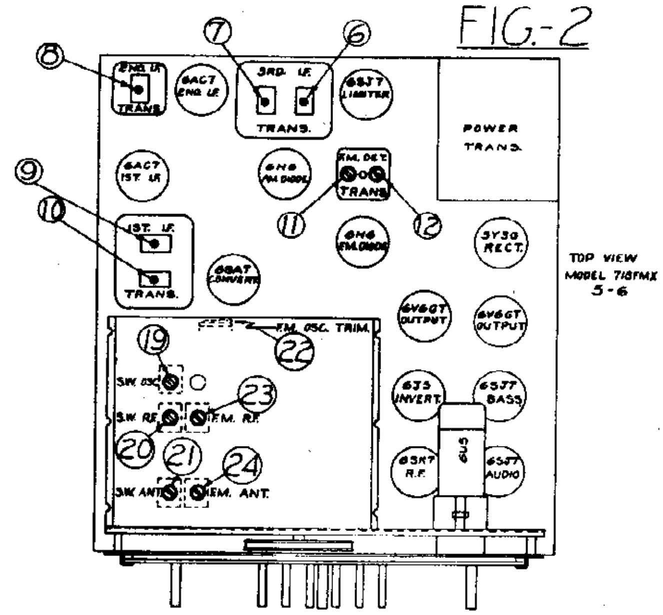
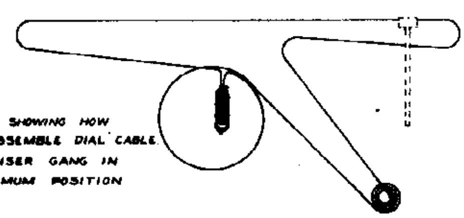


FIG-1





LAYOUT SHOWING HOW TO ASSEMBLE DIAL CABLE CONDENSER GANG IN MAXIMUM POSITION

REPLACEMENT PARTS LIST

- NOTICE -

For prompt and accurate service with any correspondence or replacement parts orders pertaining to this model, include the IDENTIFICATION NUMBER as shown on the black and white card accessible at the back of cabinet

The following parts list includes the vital receiver parts only. This list does not include any parts pertaining to the cabinet or any type record mechanism. When the IDENTIFICATION NUMBER is specified to us we have the complete record of your model and can furnish complete service information for the particular type cabinet (or record mechanism with combination models) that you may have.

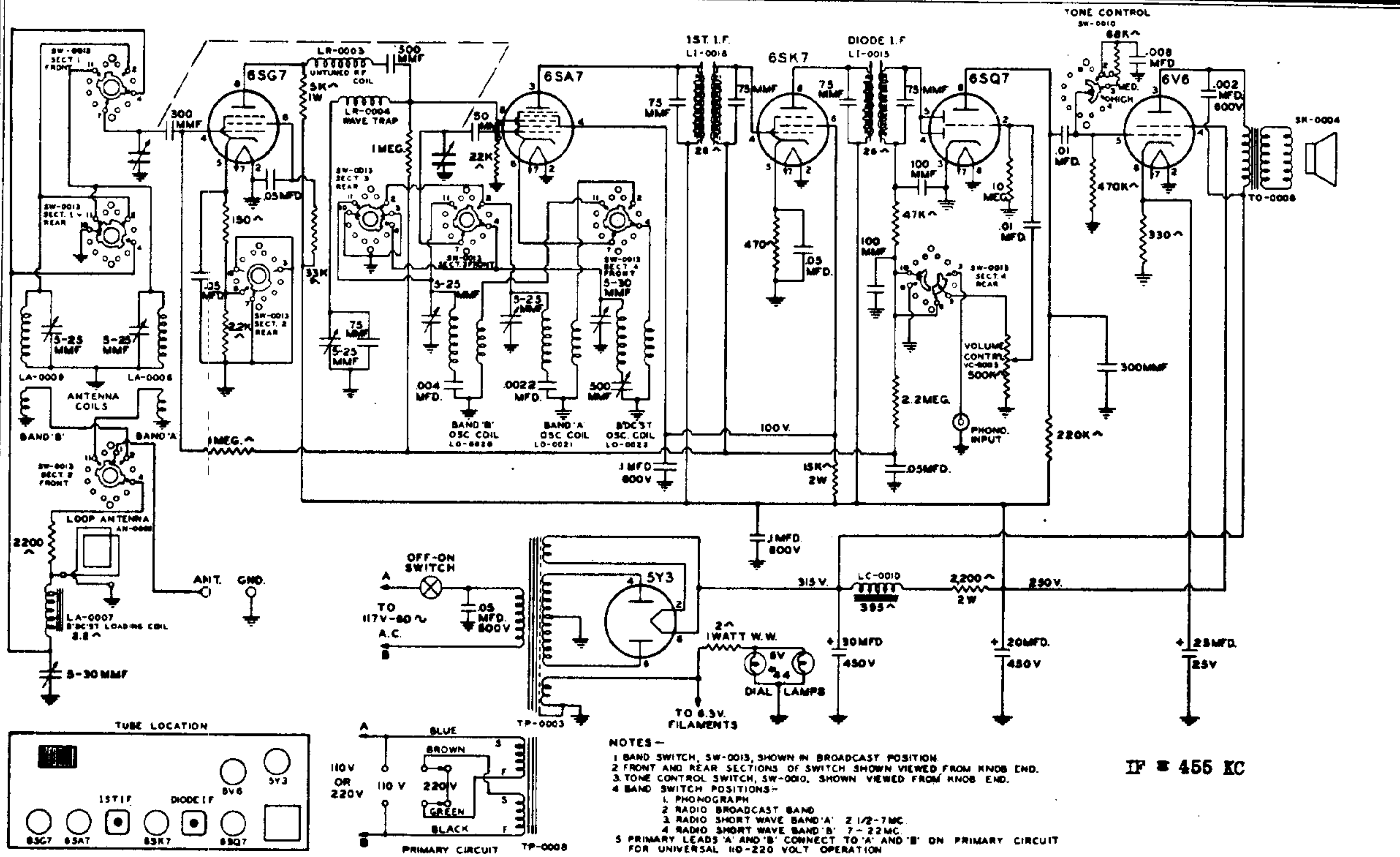
Part No.	DESCRIPTION
	CABINETS
51-190	Chippendale
53-190	"C" type.
54-190	"A" type.
	CONTROLS
48-281	Tone.
87-281	Bass Boost & Sw
54-281	Radio-Phono Volume (to 5th run)
85-281	Radio-Phono Volume.
	CONDENSERS
59-270	Tuning.
83-262	Padding BC.
50-262	Single Trimmer.
86-262	Single Trimmer.
51-266	Filter, 20-10-10-mfd. 450, 350, 300 Volts.
	COIL ASSEMBLIES
2A28	Ant. Coil
CH-10	Ant. Choke.
2035	Osc. Coil 1700-540 KC
2035	R.F. Coil 1700-540 KC
3A21	Ant. Coil 5-1.8 MC.
3025	Osc. Coil 5-1.8 MC.
3021	R.F. Coil 5-1.8 MC.
4A22	Ant. Coil 18-5.5 MC

Part No.	DESCRIPTION
	COIL ASSEMBLIES--Continued
4022	Osc. Coil 18-5.5 MC
4022	R.F. Coil 18-5.5 MC
7A3	Ant. Coil FM Band
703	Osc. Coil FM Band
703	R.F. Coil FM Band
55-936	1st Dual AM-IF.
56-936	2nd Dual AM-IF.
57-936	FM Descriminator AM Det
58-936	FM Det.-Limiter
	DIAL & CONTROL PARTS
210-310	Calibration - Tuning.
2-498	Dial lamp - Bayonet
22-427	Dial Window
1-288	Drive String.
53-552	Escutcheon with Window.
~~45-352~~	~~Escutcheon - P.B. trim.~~
31-448	Tuning Hand
11-966	Push Button Tuning Assembly
17-186	Push Button - Plain
5-609	Pulley with Hub
3-609	String Guide Pulleys.
80-720	Shaft - Tuning.
43-829	Spring Drive Cord Tension

Part No.	DESCRIPTION
	KNOBS
15-490	Wood -1-1/4
	LINE CORDS
1-290	Standard.
	MOUNTING HARDWARE
966	Rubber cushions, chassis mtg.
1-703	Wing Screws ("C" cab. only)
	RECORD CHANGER - AUTOMATIC
10-615	117 V. 60 Cycle
	SOCKETS, PLUGS, JACKS, CONNECTORS
24-768	Dial Lamp Socket.
6-772	Speaker Socket - 4 hole
25-771	Tuning eye socket & cable
23-771	Tube Socket - Octal
31-771	Socket - Octal shielded
14-844	Terminal ANT-GND.
	SPEAKERS
48-812	Console 12"
	SWITCHES
57-914A	Band Switch
26-917	Radio-Phono
	TRANSFORMERS
21-961	Output - Audio.
46-938	*105-120 V. 60 cy. Stan.
51-938	117-135-230 V.40/60 cy.

NOTE 1: All 200 Volt paper fixed condensers . . . .
NOTE 2: All 400 or 600 Volt paper fixed condensers.
NOTE 3: All 1/2 Watt Carbon Resistors . . . .
NOTE 4: When ordering any component part for any speaker, specify part number on speaker including the prefix letter that precedes the part number or certain models.

HOWARD RADIO CO

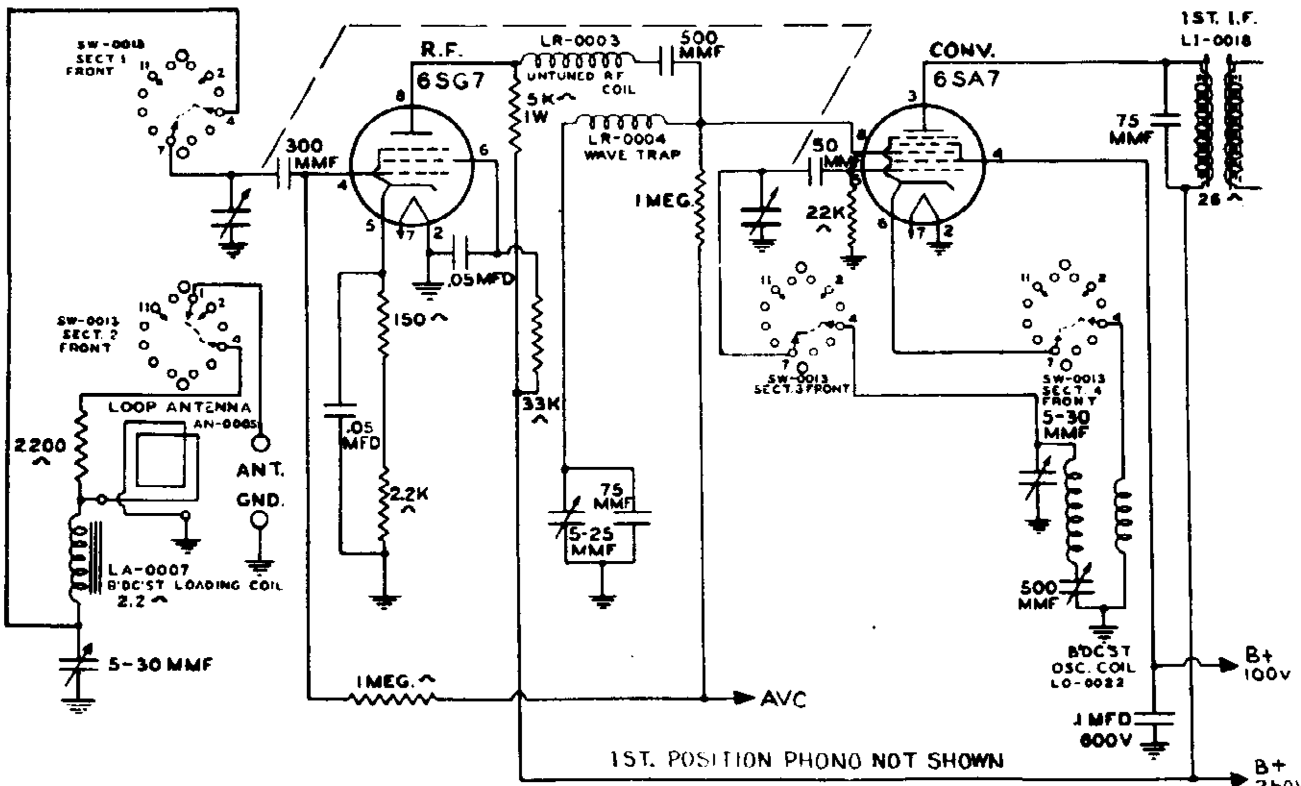


NOTES–
1 BAND SWITCH, SW-0013, SHOWN IN BROADCAST POSITION.
2 FRONT AND REAR SECTIONS OF SWITCH SHOWN VIEWED FROM KNOB END.
3 TONE CONTROL SWITCH, SW-0010, SHOWN VIEWED FROM KNOB END.
4 BAND SWITCH POSITIONS–
1. PHONOGRAPH
2 RADIO BROADCAST BAND
3 RADIO SHORT WAVE BAND 'A' 2 1/2-7MC.
4 RADIO SHORT WAVE BAND 'B' 7-22MC.
5 PRIMARY LEADS 'A' AND 'B' CONNECT TO 'A' AND 'B' ON PRIMARY CIRCUIT FOR UNIVERSAL 110-220 VOLT OPERATION

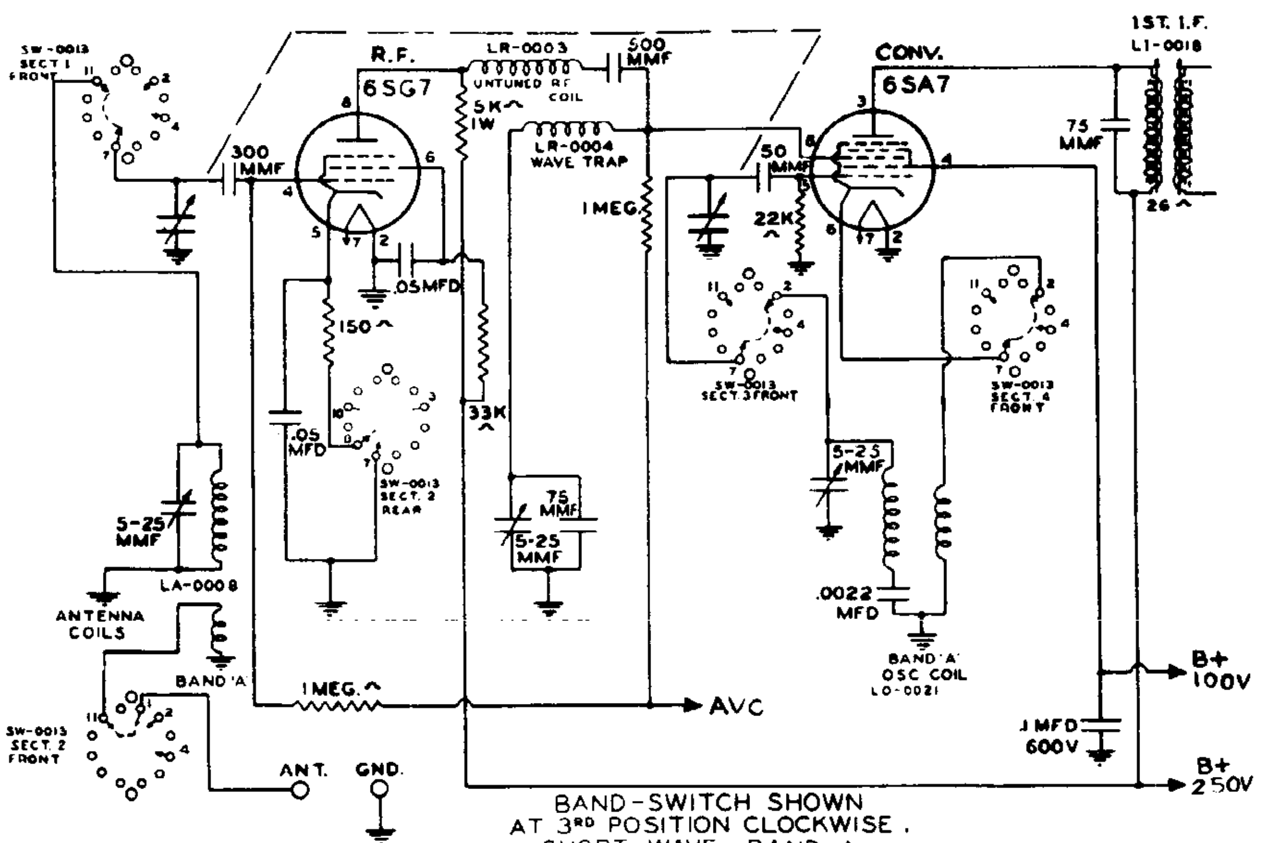
GENERAL SPECIFICATIONS

Six tubes (including rectifier; A.C. Superheterodyne. High gain R.F. stage for greater sensitivity. 2 dual purpose tubes giving 8 tube performance. Wave trap to reduce image rejection. Low-impedance, "High O" antenna, giving unusual pickup and low noise level. Condenser gang rubber mounted, incorporating 2:1 gear reduction for precision tuning. Speaker is 6 x 9 inch elliptical float mounted HOWARD P.M., using large alnico No. 5 core capable of 6 watt output. Undistorted power output 3 watts; maximum output

HOWARD RADIO CO

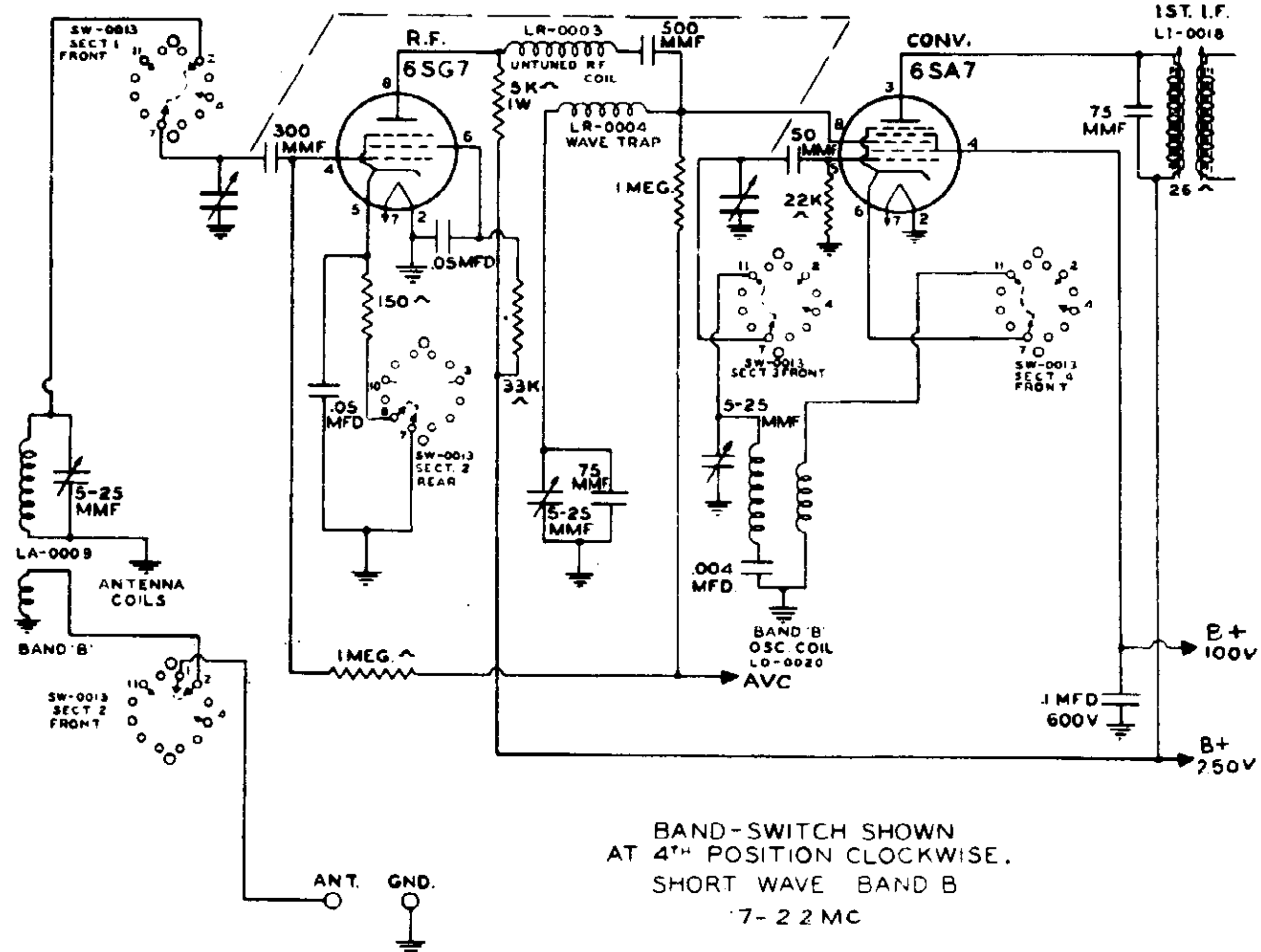


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
SHORT WAVE BAND A
2.5-7 MC

HOWARD RADIO CO



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
SHORT WAVE BAND B
7-22 MC

ALIGNMENT CHART

Set controls at indicated positions before following alignment chart.

Loop attached to chassis
Volume control on full
Set dial between broadcast stations
Radio phono control at radio

	DUMMY ANTENNA	SIG. GEN. CONNECTION	GEN. FREQ.	BAND POSITION	DIAL SETTING	ORDER OF TRIMMER ADJUSTMENTS	TRIMMER FUNCTION	SEE NOTE
1	.05 Mfd.	Grid of 6SA7	455 KC	BC	Off Station	①②③④	I.F. Peak to Maximum	A
2	.05 Mfd.	Ant.	455 KC	BC	Off Station	⑤	Null	B
3	400 Ohm. Line	"A" Ant. Post	600 KC	BC	600 KC	⑦	Maximum	C
4	400 Ohm. Line	"A" Ant. Post	1400 KC	BC	1400 KC	⑥⑧	BC Osc. and R.F.	D
5	Repeat operations 3 and 4							E
6	400 Ohm. Line	"A" Ant. Post	6 MC	A	6 MC	⑨⑩	Maximum	F
7	400 Ohm. Line	"A" Ant. Post	20 MC	B	20 MC	⑪⑫	Maximum	G
8	Accurately set signal generator at one MC and check through both short wave dials, harmonics to be one MC apart.							

NOTE A. The I.F. adjustments are iron core slug tuning and it should not be necessary to move them very far in either direction from the factory setting, since they are of a very stable nature.

NOTE B. Important. Connect the signal generator to the antenna screw on the outside of the radio chassis and keep the metal of the chassis between the generator lead and the wave trap coil. Use your signal generator to the desired turned up powerful position and adjust the wave trap trimmer to null.

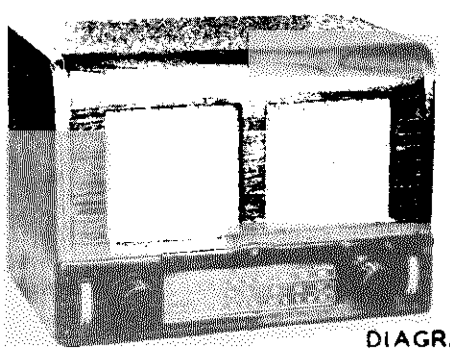
NOTE C. Padding condenser adjustment for calibration at low frequency end of broadcast band.

NOTE D. Set dial at 1400 KC. Adjust oscillator and R.F. trimmer for maximum sensitivity.

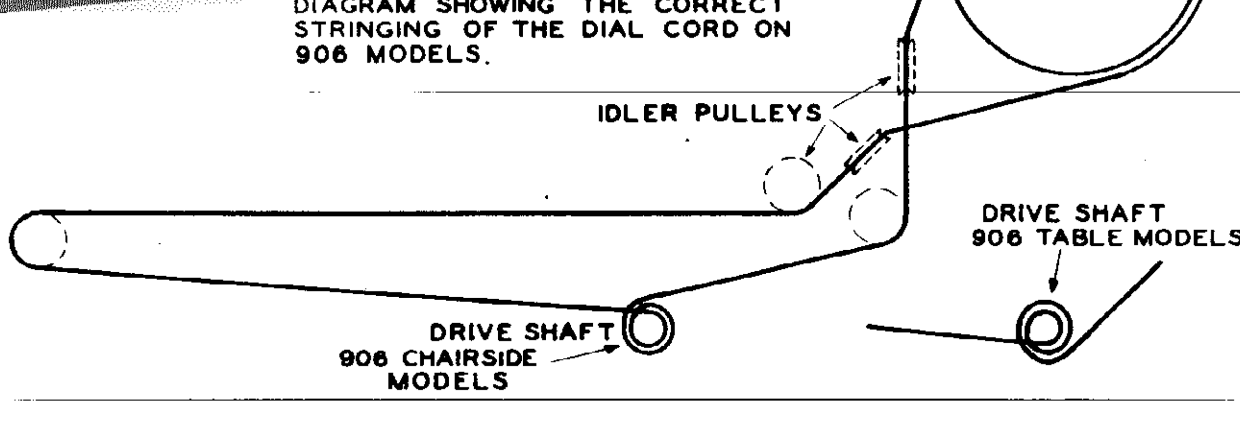
NOTE E. Check broadcast stations across dial for accuracy.

NOTE F. True Signal at 6. Image at 5.

NOTE G. True signal at 20. Image at 19.



DIAL CORD STRINGING

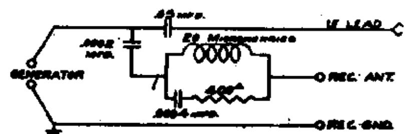


VOLTS
220 110

Models equipped with 110-230 volt, 40-60 cycle transformers have a switch and label on the rear of chassis indicating the position for the switch to operate with the proper voltage.

To make change, remove metal cover that holds switch in position by taking off nuts at both ends. If line voltage runs from 100 to 125 volts, push switch towards 110 V. position. If line voltage is from 200 to 240 V., push switch to 220 V. position. After switch has been properly set, replace metal plate and nuts to LOCK it in position.

RECOMMENDED DUMMY ANTENNA. Although the values as shown in above table for antenna load may be satisfactory, we urgently recommend the circuit as shown at the right to properly take care of the various frequencies to accomplish the correct alignment.



SOCKET VOLTAGE READINGS

Voltage reading taken from ground with voltage at line set at 117 volts A.C. These readings were taken with a vacuum tube voltmeter of the VoltOhmyst Junior type.

TUBE	FUNCTION	CATH.	*	SC.	*	PLATE	*	B	*
6SG7	R.F	7.2	5 3	200.	6	210.	8		
6SA7	Convertor			-10. 85.	5 4	225.	3		
6SK7	1st. I.F.	3.	5	90.	6	230.	8		
6SQ7	Det. & 1st. Audio.					110.	6		
6V6	Output.	13.	8	230.	4	280.	3		
5Y3	Rectifier							290.	8

Voltage drop across filter choke 10 volts

* Socket Terminal Number.

PARTS LIST

CONTROLS

VC-0005 Volume Control with Switch
or
VC-0006 Volume Control with Switch

CONDENSERS

AC-0005 Tuning Gang with Gears and Drive Hub
CE-0009 Capacitor-Electrolytic 30-20-20 mfd. 450 volts or the following capacitors
CE-0005 Capacitor - 25 mfd. 25 volts
CE-0011 Capacitor - 30 mfd. 450 volts
CE-0012 Capacitor - 20 mfd. 450 volts

COILS

AN-0005 Loop Antenna
LA-0007 Loop Load Coil
LA-0008 Antenna Coil "A" Band
LA-0009 Antenna Coil "B" Band
LI-0018 1st IF Transformer in can
LI-0015 2nd IF Transformer in can
LO-0021 Oscillator Coil "A" Band
LO-0020 Oscillator Coil "B" Band
LO-0022 Oscillator Coil - Broadcast
LR-0004 Wave Trap 455 KC
LR-0003 Untuned RF Coil

KNOBS

AR-0025 Thumb Wheel Assembly (Tone Control)
AR-0044 Thumb Wheel Assembly (Radio Phono Broadcast "A"-"B")
KB-0015-1 Knobs Brown Bakelite

SPEAKER

SK-0004 Speaker 9" Elliptical PM

TRANSFORMERS

TO-0006 Speaker Output Transformer
TP-0003 Power Transformer - 60 cycle 110 volt
TP-0008 Power Transformer - 40-50-60 Cycle 110-220 volt
LC-0010 Power Choke (395 ohms D.C.)

TUBE COMPLEMENT

TU-5Y3 Tube
TU-6SK7 Tube
TU-6SA7 Tube
TU-6SQ7 Tube
TU-6V6 Tube
TU-6SG7 Tube

SOCKETS

SO-0010 Phono Socket
SO-0017 Tube Socket
TB-0007 Terminal Strip, External Antenna

DIAL AND CONTROL ACCESSORIES

AS-0213 Tuning Shaft Assembly
AS-0217 Dial Pointer Assembly
AR-0019 Dial Light Bracket Assembly - Right Side
AR-0024 Dial Light Bracket Assembly - Left Side
ES-0001 Dial Covering - Plastic Escutcheon for cabinet
SP-0010 Dial Drive Spring
DC-0001 Dial Drive Cord 52" long
GR-0001 Rubber Grommets for Tuning Gang and Speaker Mounting
DG-0005 Calibrated Lucite Dial
LS-0002 #44 Blue Bead Pilot Lamp

SWITCHES

SW-0001 D.P.D.T. Slide Switch 110-220 volt
SW-0013 Band and Phono Switch (4 position)
SW-0010 Tone Switch (3 position)

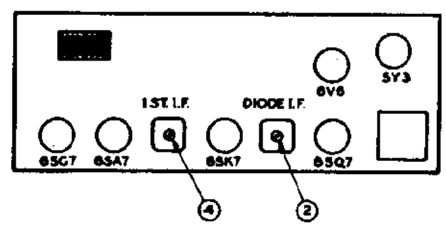
CABINET

CW-0008 Cabinet complete with Plastic Dial Covering
AS-0240 Metal Grill Assembly
BC-0009 Baffle used with above item

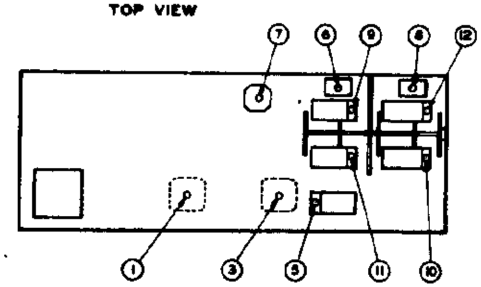
LINE CORD

CA-0038 Line Cord - 6 ft. and Moulded Plug

TUBE AND TRIMMER LOCATION CHART

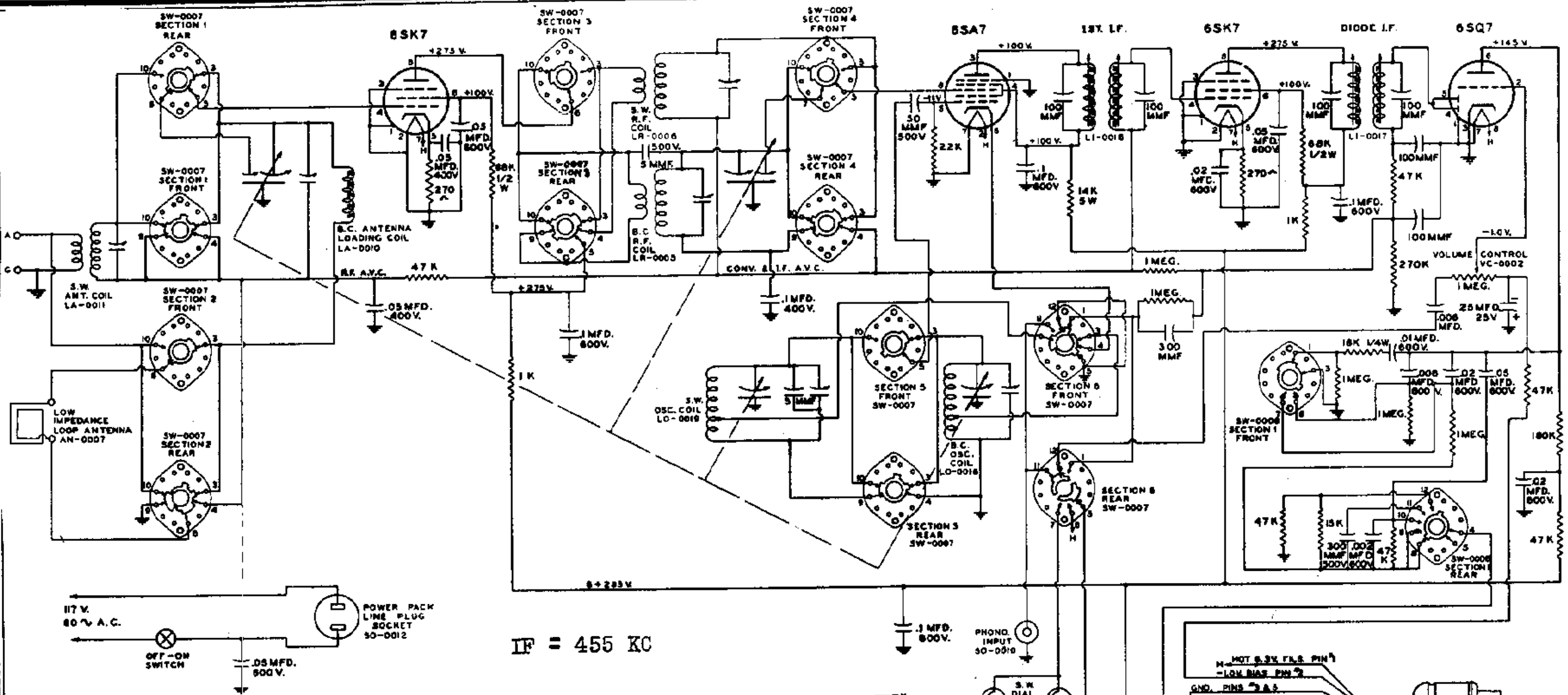


TOP VIEW



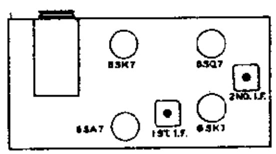
BOTTOM VIEW

HOWARD RADIO CO



IF = 455 KC

NOTES-
1. SW-0007, SIX SECTION-THREE POSITION BAND SWITCH SHOWN IN POSITION #1.
NO. 1 POSITION IS PHONO.
2 POSITION IS RADIO BROADCAST.
3 POSITION IS RADIO SHORT WAVE.
2. SW-0008 ONE SECTION-FIVE POSITION TONE SWITCH SHOWN IN "FULL" POSITION.
3. ALL SWITCH SECTIONS SHOWN IN COUNTER-CLOCKWISE POSITION AS VIEWED FROM KNOB END OF SHAFT.
4. RESISTORS ARE ±20% - 1/4W. UNLESS OTHERWISE SPECIFIED.
5. 'K'=1000 OHMS



TUBE LOCATION

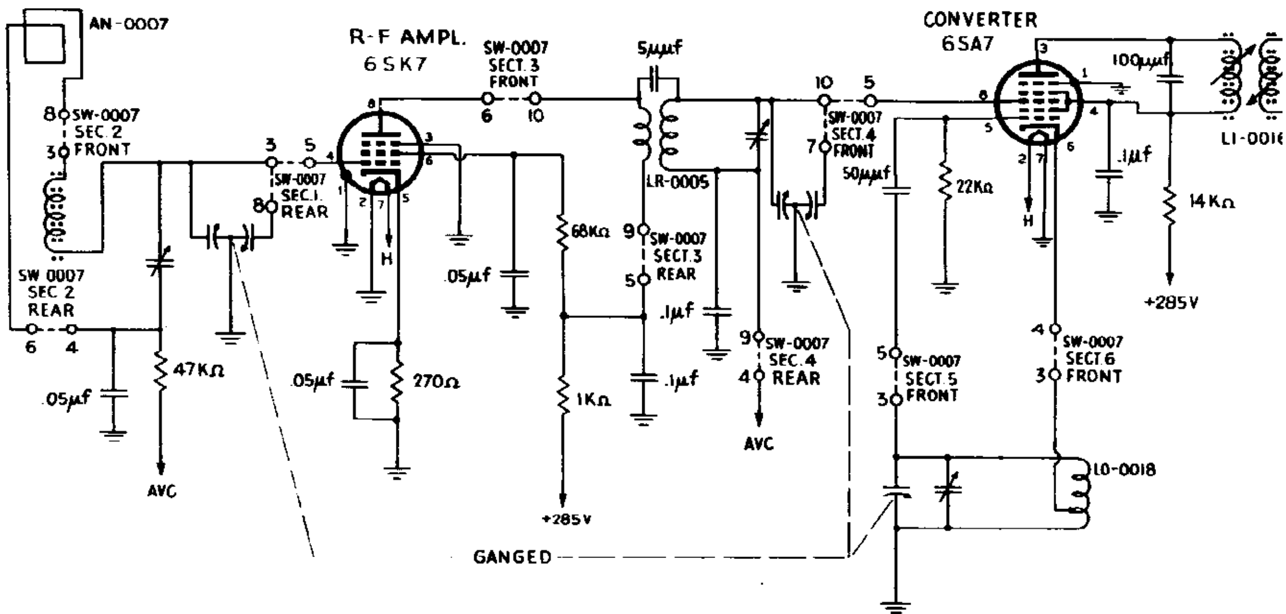
GENERAL SPECIFICATIONS

Nine tubes (including rectifier); A.C. Superheterodyne. High gain R.F. stage. Three section tuning gang. Condenser gang rubber mounted incorporating 2:1 gear reduction for precision tuning. Low impedance, "High Q" antenna. Two unit chassis. Full coverage five position tone control. Inverse feedback. Phase inversion. Push-pull amplification. Large two band dial individually illuminated. Speaker is 6 x 9 inch elliptical P.M. with an exceptionally heavy Alnico No. 5 magnet.

TO REMOVE DRAWER

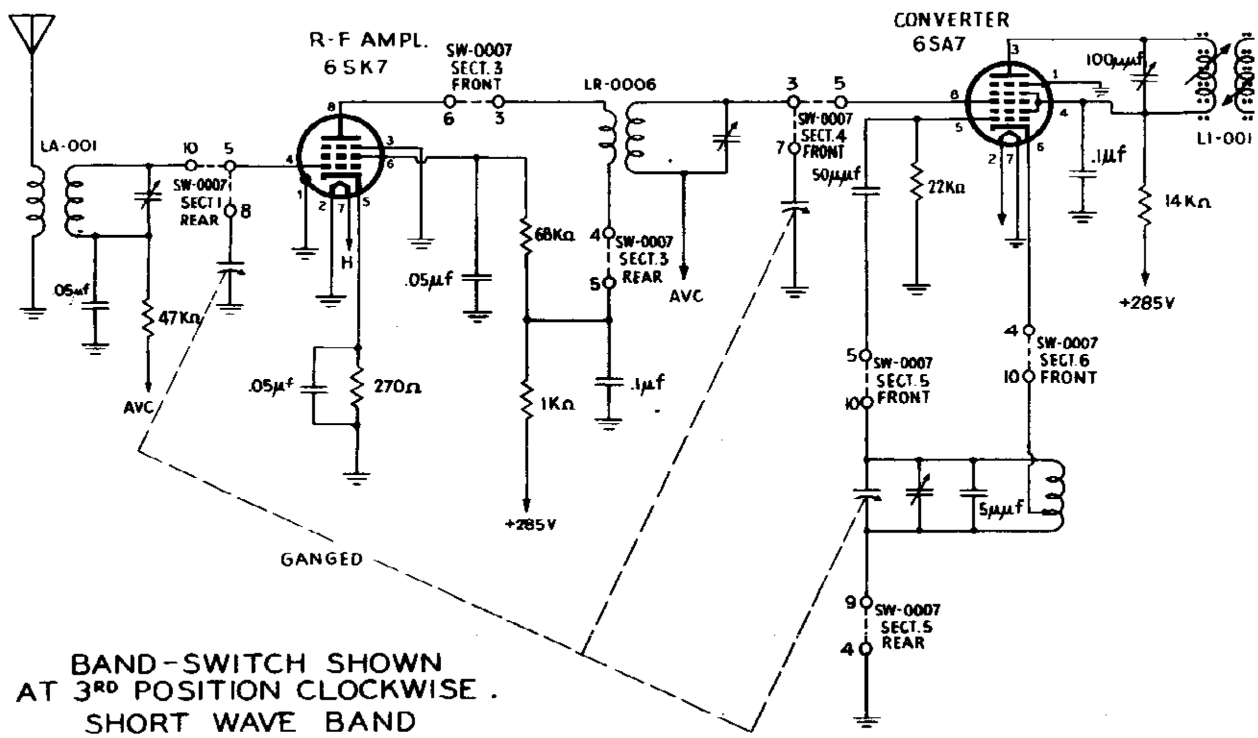
Pull the drawer out to its full extremity. Place your hands (one on each side) beneath the drawer about 3 inches from the back and feel along the track until you hit two little metal flaps that are the stops for the drawer. Lift these up with your index fingers and the drawer can then be pulled right out of the cabinet.

HOWARD RADIO CO



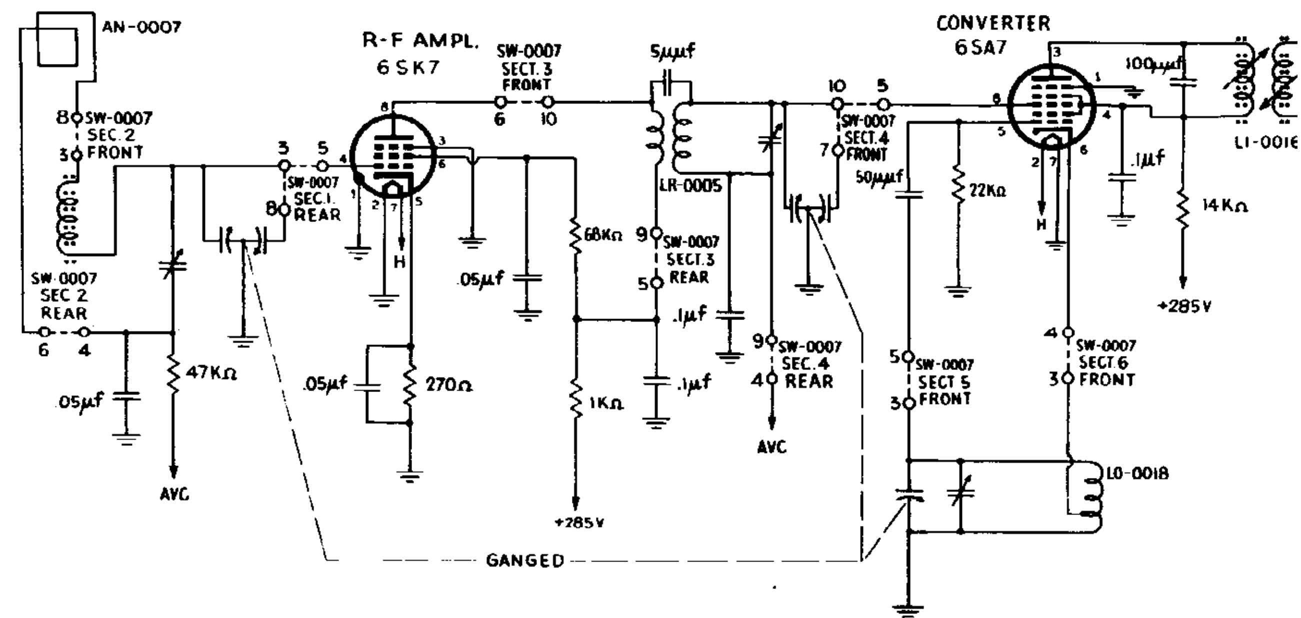
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND

NOTE: 1ST POSITION "PHONO" NOT SHOWN.



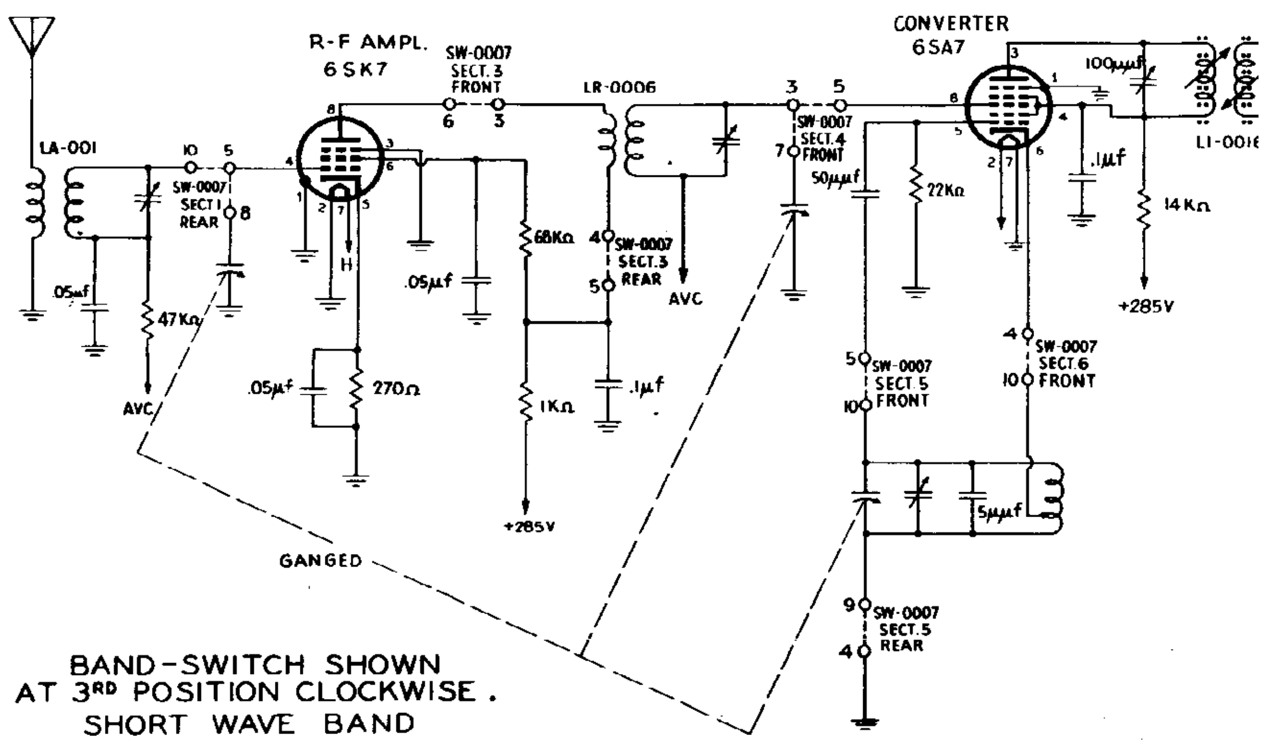
BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
SHORT WAVE BAND

HOWARD RADIO CO



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND

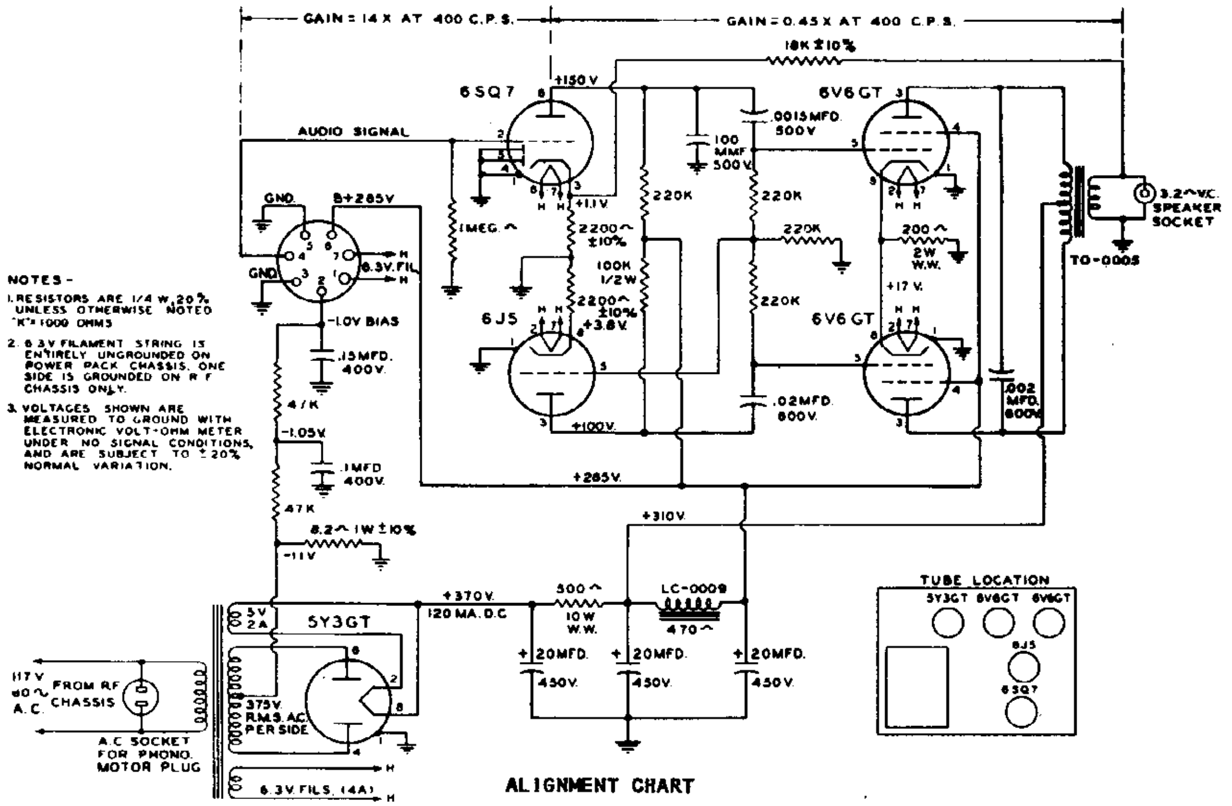
NOTE: 1ST POSITION "PHONO"
NOT SHOWN.



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
SHORT WAVE BAND

MODEL 909-M

HOWARD RADIO CO



ALIGNMENT CHART

Set controls at indicated positions before following chart.

Loop attached to chassis.
Volume control on full.
Set Dial between broadcast stations at low frequency end of dial.
Tone Control set at clockwise position (normal).
Band Switch at broadcast position.
Adjust all trimmers for maximum sensitivity.

	DUMMY ANTENNA	SIG. GEN. CONNECTION	GEN. FREQ.	BAND POSITION	DIAL SETTING	ORDER OF TRIMMER ADJUSTMENTS	TRIMMER FUNCTION	SEE NOTE
1	.05 Mfd.	Grid of 6SA7	455 KC	BC	Low end of BC	1,2,3,4	I.F.	A
2	.05 Mfd.	Pin #4 6SK7	1400 KC	BC	1400 KC	5,6	BC Osc. and R.F.	
3	Note B	Note B	1400 KC	BC	1400 KC	7	Loop	B
4	400 Ohm. Line	Antenna on loop	11.9 MC	SW	11.9 MC	8,9,10	SW	C
5	Accurately set signal generator at one MC and check through short wave dial, harmonics to be one MC apart.							

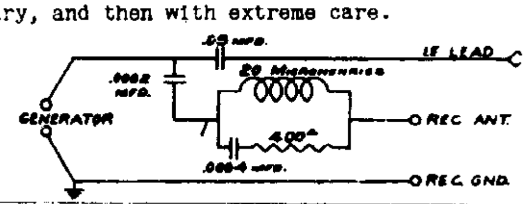
NOTE A. The I.F. adjustments are iron core slug tuning and it should not be necessary to move them very far in either direction from the factory setting, since they are of a very stable nature.

NOTE B. Inductively couple signal generator to loop by wrapping one or two turns of wire around outside wire of loop and fasten one end to the high side of the signal generator.

NOTE C. In adjusting trimmer #8, be sure the image of the I.F. is at approximately 11.MC.

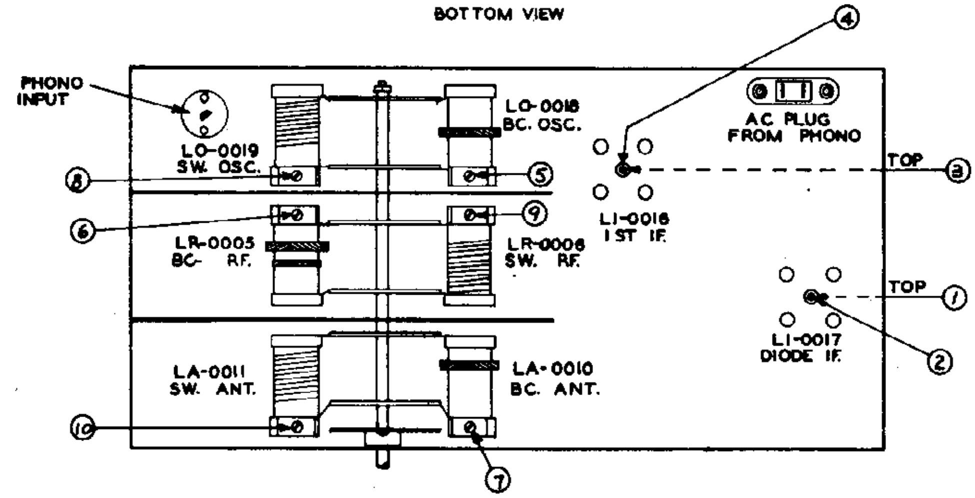
CAUTION: Do not knife gang unless absolutely necessary, and then with extreme care.

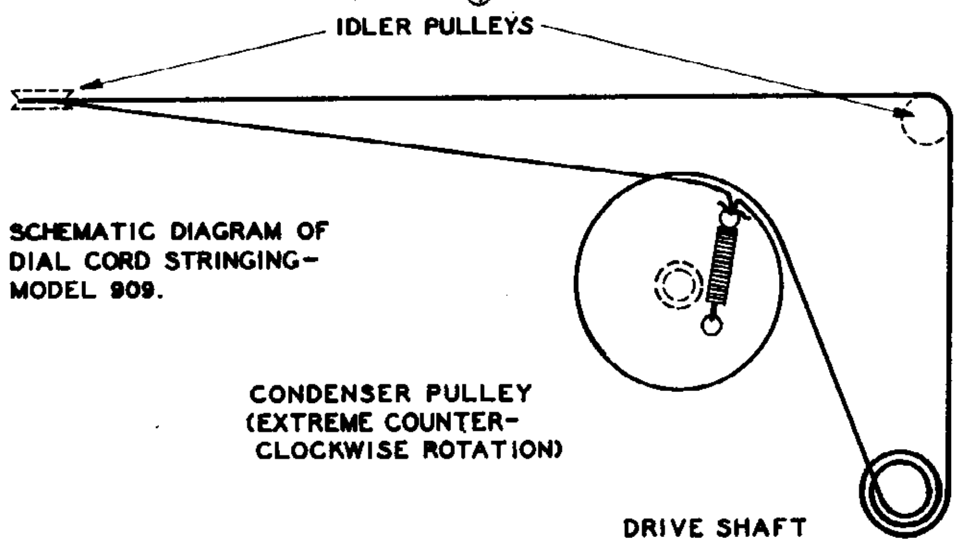
RECOMMENDED DUMMY ANTENNA. Although the values as shown in above table for antenna load may be satisfactory, we urgently recommend the circuit as shown at the right to properly take care of the various frequencies to accomplish the correct alignment.



HOWARD RADIO CO

TRIMMER LOCATION CHART
BOTTOM VIEW





SCHEMATIC DIAGRAM OF DIAL CORD STRINGING- MODEL 909.

REPLACEMENT PARTS LIST

CONTROL

VC-0002 Volume Control with Switch

CONDENSERS

AC-0006 Tuning Gang with Gears and Drive Hub
CE-0006 Capacitor - Electrolytic 30-20-20 MFD 450 volts
CE-0005 Capacitor - 25 MFD 25 volts

COILS

AN-0007 Loop Antenna and Backboard
LA-0010 Antenna Coil - Broadcast
LA-0011 Antenna Coil - Shortwave
LO-0018 Oscillator Coil - Broadcast
LO-0019 Oscillator Coil - Shortwave
LR-0005 R.F. Coil - Broadcast
LR-0006 R.F. Coil - Shortwave
LI-0016 1st I.F. Transformer
LI-0017 2nd I.F. Transformer

SWITCHES

SW-0007 Band Switch - 6 Section - 3 position
SW-0006 Tone Switch - 5 position

DIAL AND CONTROL ACCESSORIES

AS-0220 Tuning Shaft Assembly
AS-0218 Pointer and Slide Assembly
DC-0001 Dial Cord 54"
SP-0010 Spring - Dial - 40 oz. Load Spring Steel
AS-0242 Dial Light Assembly - Left
AS-0243 Dial Light Assembly - Right
DG-0001 Dial - Broadcast (Lower)
DG-0002 Dial - Shortwave (Upper)
DG-0003 Dial - Howard Name
PL-0010 Antenna Cable Plug - 4 Prong
LS-0002 Pilot Lamp (Type #44) 6-8 volt .25 Amp. Blue Bead
LS-0003 Pilot Lamp (Type #51) 6-8 volt .20 Amp. White Bead
PR-0070-1 Metal Escutcheon (Mahogany)
PR-0070-2 Metal Escutcheon (Blond)

KNOBS

KB-0015-3 Knob - Tuning and Volume
KB-0007 Knob - Acousticolor
KB-0006 Knob - Selector Switch
KB-0016 Knob - 1" Dia. (door)
KB-0016 Knob - 2" Dia. (drawer)

TRANSFORMERS

TO-0006 Output Transformer
LC-0009 Filter Choke (395 Ohms D.C.)
TP-0001-1 Power Transformer (60 cycle 110 volts) or
TP-0001-2 Power Transformer (60 cycle 110 volts) or
TP-0004 Power Transformer (half shell type) (60 cycle 110 volts)

9-TUBE COMPLEMENT

TU-6SA7 Tube
TU-6SK7 Tube 2 used
TU-6SQ7 Tube 2 used
TU-6J5 Tube
TU-6V6 Tube 2 used
TU-5Y3 Tube

SOCKETS

SO-0010 Phono Socket
SO-0011 Socket - 7 prong wafer
SO-0012 Socket - Power Outlet
SO-0007 Tube Socket, Octal

LINE CORD

CA-0039 Line Cord with Plastic Plug - 8 ft.
CA-0038 Line Cord with Plastic Plug - 6 ft. for Changer
CA-0043 Line Cord with Plastic Plug - 42" (Power Pack Chassis)

CABINETS

CW-0006-1 Cabinet (Mahogany)
CW-0006-2 Cabinet (Blond)
AA-0003-1 Radio Drawer (Mahogany)
AA-0003-2 Radio Drawer (Blond)

SPEAKER

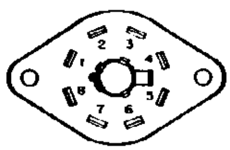
SK-0006 Speaker 6" x 9" Elliptical P.M.

INTERNATIONAL DETROLA CORP.

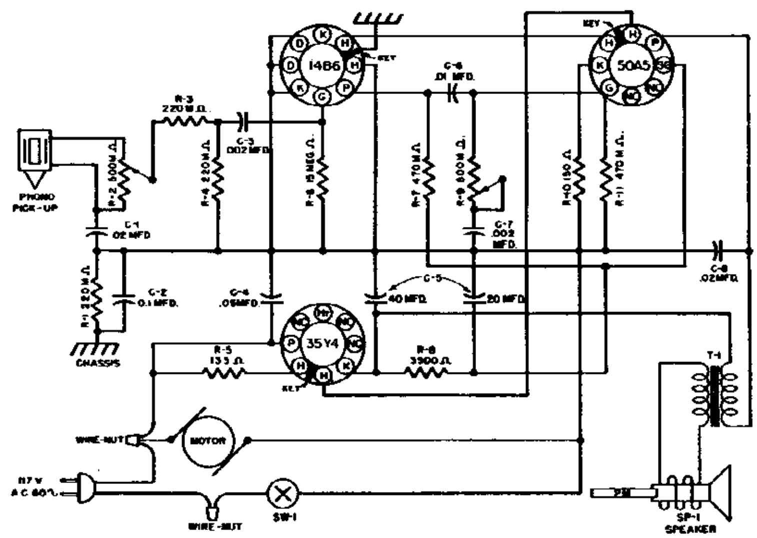
Model 626 with Loctal Tubes

SOCKET VOLTAGES

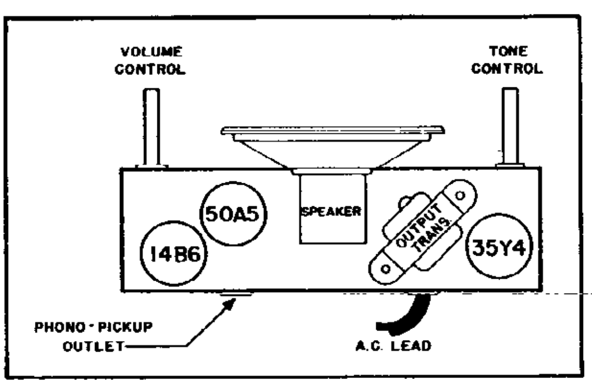
TUBE	POSITION	1	2	3	4	5	6	7	8
14B6	AF Amplifier	0	40	0	0	0	0	0	12 AC
50A5	Power Output	54 AC	118	125	0	40	0	9.0	12 AC
35Y4	Rectifier	85 AC	117 AC	0	85 AC	0	125	127	54 AC



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from B— to socket contact indicated. All voltages are positive DC unless otherwise marked.
Volume control full on. Zero input.
Tone control in clockwise position.
Line voltage 117 volts AC.



Wiring Diagram Model 626 With Loctal Tubes

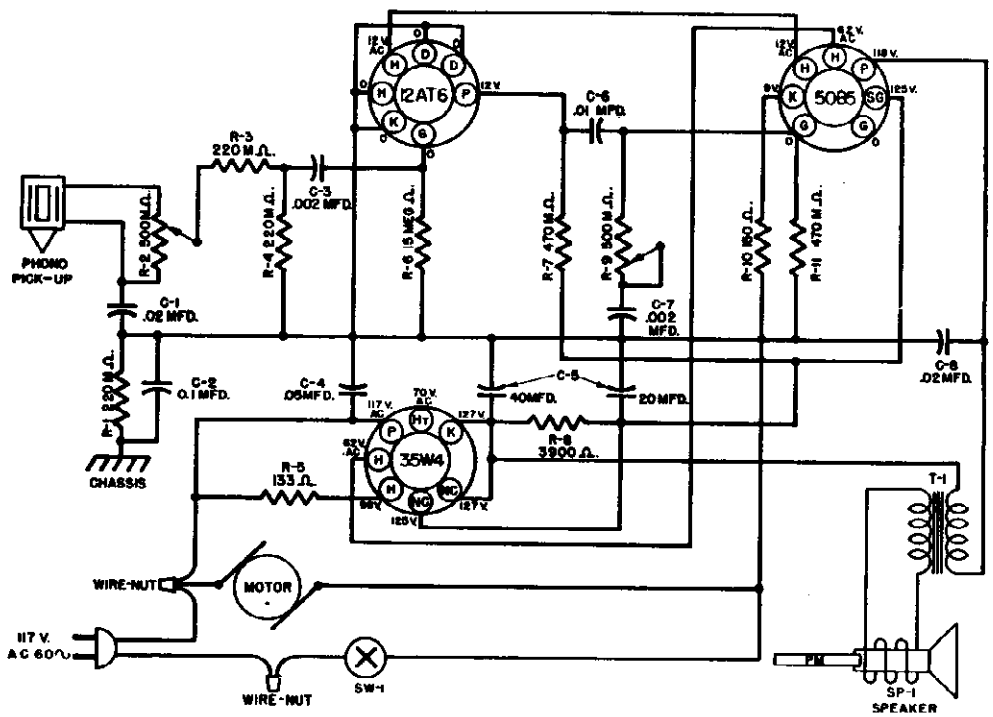


Tube Layout

AMPLIFIER WITH LOCTAL TUBES

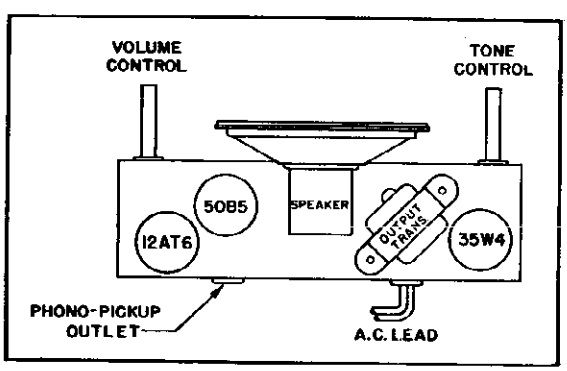
Symbol	Part No.	Description
C-4	BC31B503	Capacitor, .05 mfd., 400 v.
C-6	BD410103	Capacitor, .01 mfd., 400 v.
C-2	BD410104	Capacitor, 0.1 mfd., 400 v.
C-1, 8	BD410203	Capacitor, .02 mfd., 400 v.
C-3, 7	BD610202	Capacitor, .002 mfd., 600 v.
R-8	BR16C392	Resistor, 3900 ohm, ½ w.
R-10	BR16E151	Resistor, 150 ohm, 1 w.
R-6	BR17B156	Resistor, 15 meg., ⅓ w.
R-1, 3, 4	BR17B224	Resistor, 220M ohm, ⅓ w.
R-7, 11	BR17B474	Resistor, 470M ohm, ⅓ w.
C-5	A-8948	Cap., Elec., 40-20 mfd., 150 v. (Metal Container)
R-5	A-9528	Resistor, 133 ohm, 5 w.
C-5	B-9564-1	Cap., Elec., 40-20 mfd., 150 v. (Paper Container)
	A-51160-1	Cord, Line
	B-51318-6	Knob
T-1	A-51578-2	Transformer, Output
R-2, 9	B-54466-1	Control (Tone and Volume), 500M ohm.
SP-1	B-56029	Speaker, 4-inch PM

Model 626 with Miniature Tubes



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from B – to socket contact indicated. All voltages are positive DC unless otherwise marked.
Volume control full on. Zero signal input.
Tone control in clockwise position.
Line voltage 117 volts AC.
Controls shown in clockwise position.
All tube sockets shown from pin end view.

Wiring Diagram Model 626 With Miniature Tubes



Tube Layout

AMPLIFIER WITH MINIATURE TUBES

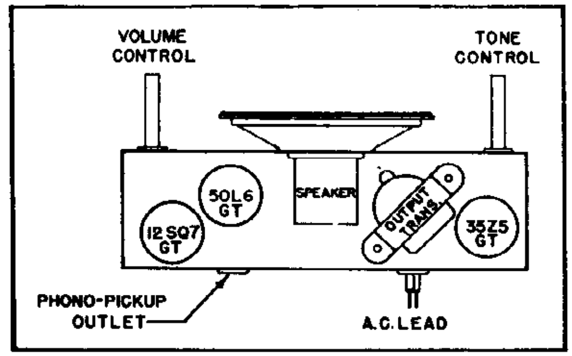
Symbol	Part No.	Description
C-4	BC31B503	Capacitor, .05 mfd., 400 v.
C-6	BD410103	Capacitor, .01 mfd., 400 v.
C-2	BD410104	Capacitor, .1 mfd., 400 v.
C-1, 8	BD410203	Capacitor, .02 mfd., 400 v.
C-3, 7	BD610202	Capacitor, .002 mfd., 600 v.
R-10	BR16E151	Resistor, 150 ohm, 1 w.
R-8	BR16C392	Resistor, 3900 ohm, ½ w.
R-6	BR17B156	Resistor, 15 meg., ⅓ w.
R-1, 3, 4	BR17B224	Resistor, 220M ohm, ⅓ w.
R-7, 11	BR17B474	Resistor, 470M ohm, ⅓ w.
C-5	A-8948	Cap., Elec., 40-20 mfd., 150 v. (Metal Container)
R-5	A-9528	Resistor, 133 ohm, 5 w.
C-5	B-9564-1	Cap., Elec., 40-20 mfd., 150 v. (Paper Container)
	A-51160-1	Cord, Line
T-1	B-51578-2	Transformer, Output
R-2, 9	B-54466-1	Control (Tone and Volume), 500M ohm.
SP-1	B-56029	Speaker, 4-inch PM
	A-56171	Sheet, Service

INTERNATIONAL DETROLA CORP.

AMPLIFIER WITH OCTAL TUBES

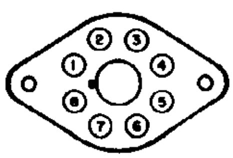
Symbol	Part No.	Description
C-3	BC31B503	Capacitor, .05 mfd., 400 v.
C-6	BD410103	Capacitor, .01 mfd., 400 v.
C-2	BD410104	Capacitor, .1 mfd., 400 v.
C-1, 8	BD410203	Capacitor, .02 mfd., 400 v.
C-4, 7	BD610202	Capacitor, .002 mfd., 600 v.
R-7	BR16C392	Resistor, 3900 ohm, ½ w.
R-10	BR16E151	Resistor, 150 ohm, 1 w.
R-6	BR17B156	Resistor, 15 meg., ⅓ w.
R-2, 3, 5	BR17B224	Resistor, 220M ohm, ⅓ w.
R-8, 11	BR17B474	Resistor, 470M ohm, ⅓ w.
C-5	A-8948	Cap., Elec., 40-20 mfd., 150 v. (Metal Container)
R-4	A-9528	Resistor, 133 ohm, 5 w.
C-5	B-9564-1	Cap., Elec., 40-20 mfd., 150 v. (Paper Container)
	A-51160-1	Cord, Line
	B-51318-6	Knob
T-1	A-51578-2	Transformer, Output
R-1, 9	B-54466-1	Control (Tone and Volume), 500M ohm.
SP-1	B-56029	Speaker, 4-inch PM

Model 626 With Octal Tubes

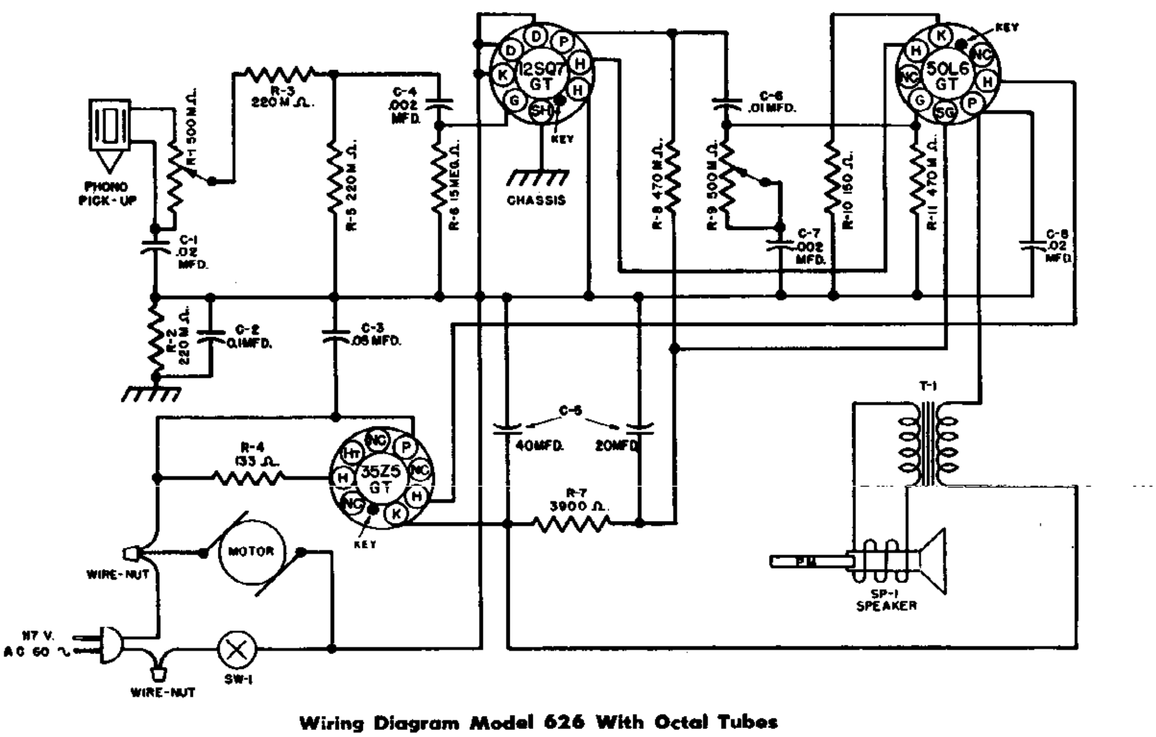


SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
12SQ7GT	AF Amplifier	0	0	0	0	0	40	12 AC	0
50L6GT	Power Output	0	54 AC	118	125	0	0	12 AC	9.0
35Z5GT	Rectifier	0	85 AC	85 AC	0	117 AC	125	54 AC	127

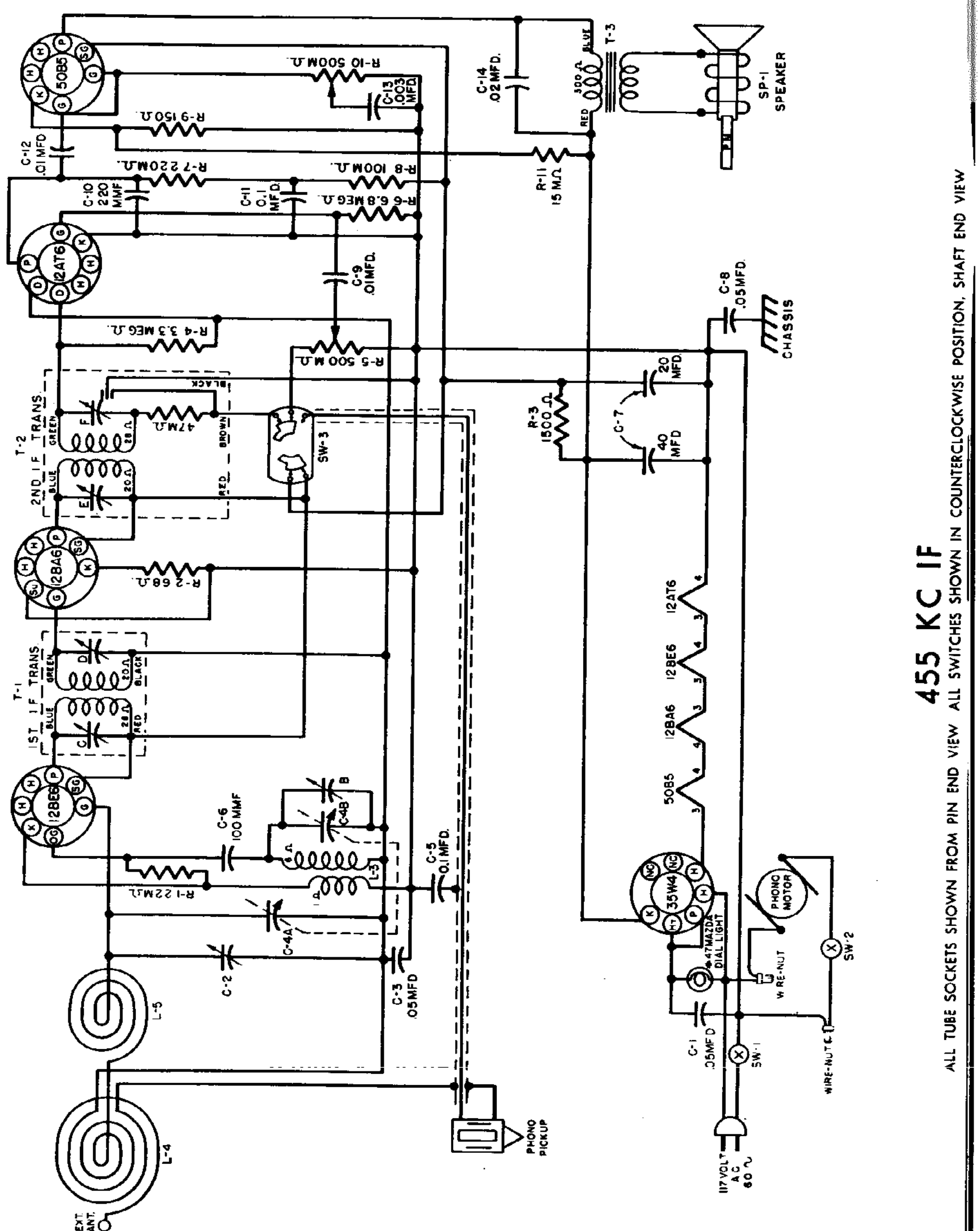


NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from B- to socket contact indicated. All voltages are positive DC unless otherwise marked. Volume control full on. Zero input. Tone control in clockwise position. Line voltage 117 volts AC.



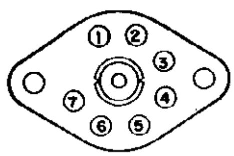
Wiring Diagram Model 626 With Octal Tubes
(For Run Number 3 and Up)

INTERNATIONAL DETROLA CORP.

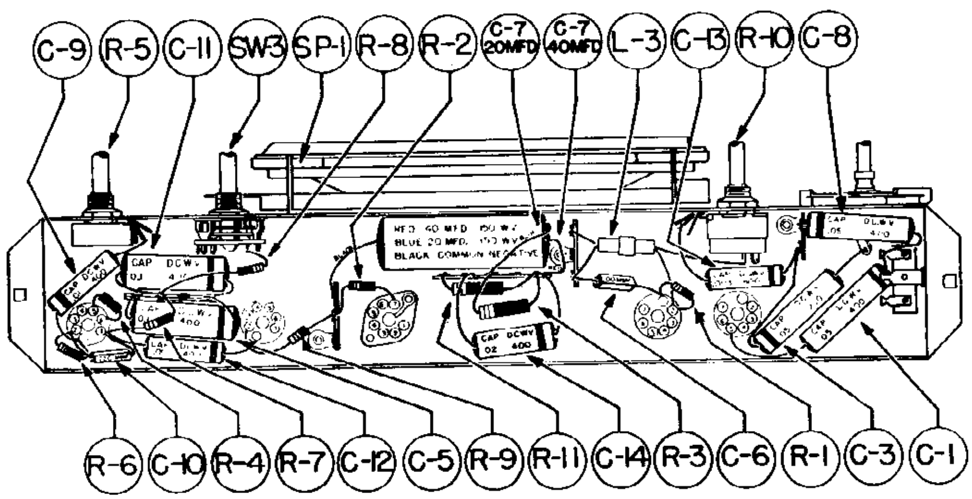


SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7
12BE6	Converter	-5	0	24 AC	12 AC	88	88	0
12BA6	I.F. Amplifier	0	0	24 AC	35 AC	88	88	0.7
12AT6	2nd DET.—1st AF—AVC	0	0	12 AC	0	0	0	12
50B5	Power Output	0	5	85 AC	35 AC	115	88	0
35W4	Rectifier	0	0	85 AC	117 AC	112 AC	112 AC	122



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated. All voltages are positive DC unless otherwise marked. Volume Control full on. No signal input. Line voltage 117 volts AC.



Parts Layout—Model 7156

SERVICE PARTS LIST

Symbol	Part No..	Description
C-3	BD210503	Capacitor, Paper, .05 mfd., 200 v.
C-9, C-12	BD410103	Capacitor, Paper, .01 mfd., 400 v.
C-5, C-11	BD410104	Capacitor, Paper, 0.1 mfd., 400 v.
C-14	BD410203	Capacitor, Paper, .02 mfd., 400 v.
C-1, C-8	BD410503	Capacitor, Paper, .05 mfd., 400 v.
C-13	BD610302	Capacitor, Paper, .003 mfd., 600 v.
C-6	BM74A101	Capacitor, Mica, 100 mmf.
C-10	BM74A221	Capacitor, Mica, 220 mmf.
R-2	BR16B680	Resistor, 68 ohm, ½ w.
R-9	BR16C151	Resistor, 150 ohm, ½ w.
R-8	BR17B104	Resistor, 100,000 ohm, ½ w.
R-1	BR17B223	Resistor, 22,000 ohm, ½ w.
R-7	BR17B224	Resistor, 220,000 ohm, ½ w.
R-4	BR17B335	Resistor, 3.3 megohm, ½ w.
R-6	BR17B685	Resistor, 6.8 megohm, ½ w.
R-3	BR17E152	Resistor, 1500 ohm, 1 w.
R-11	BR17E153	Resistor, 15,000 ohm, 1 w.
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot, No. 47 Mazda, 6.3 v.
	A-6182-1	Socket, Dial Light
C-7	B-9564-1	Cap., Electro., 40-20 mfd., 150 v.
	A-51163	Clip, Spring

Symbol	Part No.	Description
	B-51427-5	Grommet (large)
	B-51427-8	Grommet (small)
SW-3	B-51576-2	Switch, Radio-Phono
	A-51787	Spring, for Dial Cable
	A-54122	Button, Plug
R-5	B-54466-2	Control, Volume, 500,000 ohm
T-2	B-56718-1	Transformer Assembly, 2nd IF
T-1	B-56722-1	Transformer Assembly, 1st IF
	B-57262-6	Cord, AC Phono.
R-10	B-57841-1	Control, Tone & Switch, 500,000 ohm
	B-57842	Coil Assembly, Oscillator
SP-1	C-57843	Speaker, 5x7 PM
	B-57848-1	Shaft, Tuning Drive
	B-57857-1	Pointer, Dial
	B-57858-1	Strip Assembly, Light Diffusing
C-4	C-57859-1	Capacitor, Variable
L-4 & L-5	D-57870	Coil Assembly, Loop
	C-57872-1	Knob
	A-57878	Clip, Gang Mounting
C-2	B-57879-1	Capacitor Assembly, Trimmer
	B-58069-1	Cord, AC Power

INTERNATIONAL DETROLA CORP.

TUBE COMPLEMENT

1—12BE6 Converter tube
1—12BA6 IF Amplifier tube
1—12AT6 Detector—AVC—First Audio tube
1—50B5 Power Output tube
1—35W4 Rectifier tube

ALIGNMENT PROCEDURE

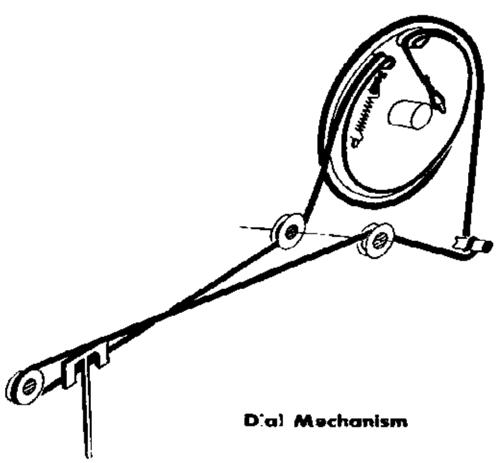
The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — RMA loop.

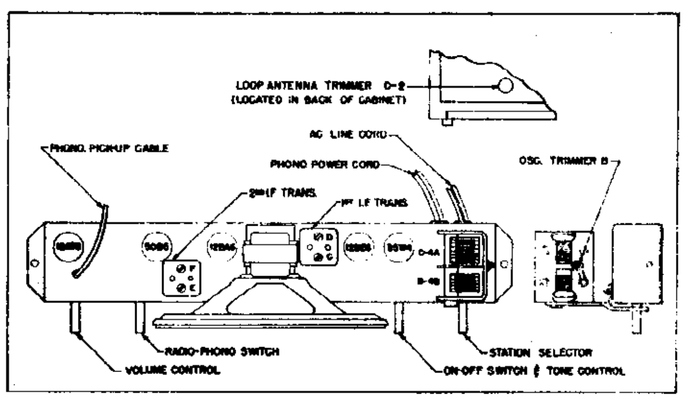
NOTE: Intermediate Frequency and Oscillator adjustments may be made with the loop disconnected provided a resistor of 10,000 to 50,000 ohms is substituted to close the 12BE6 grid circuit. The loop alignment must be done with the loop and chassis mounted in operating position in the cabinet. A single turn loosely coupled to loop may be substituted for RMA loop.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12BE6 grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
1620 kc.	12BE6 grid	RMA loop	HF end	Osc. trimmer B	Set limit of band
1400 kc.	Through loop*	RMA loop	1400 kc.	Ant. trimmer C-2	Tune to max.

* Loop trimmer accessible through back of cabinet.



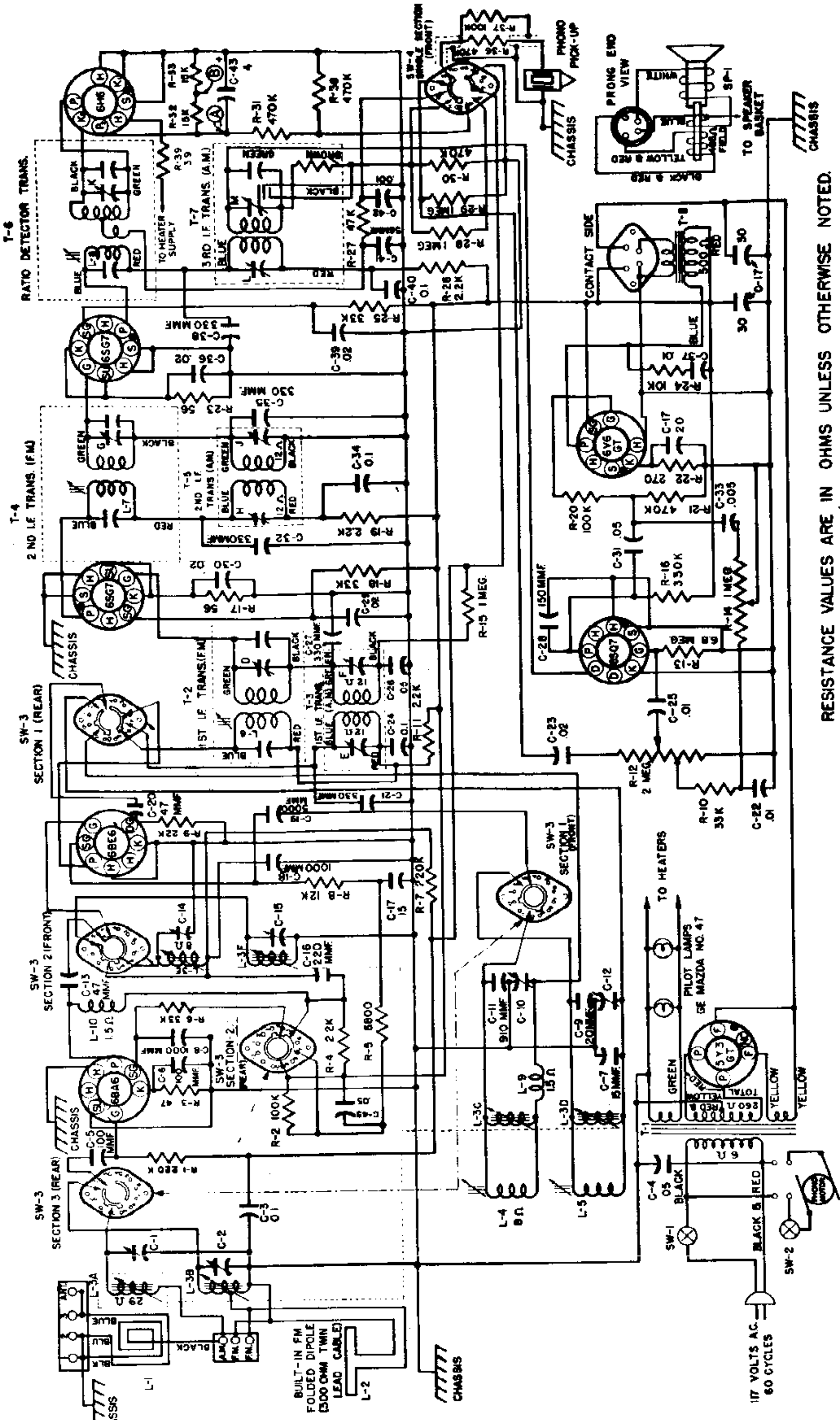
Dial Mechanism



Tube Layout

V.C. Impedance........................3.2 ohms at 400 cycles

INTERNATIONAL DETROLA CORP.



RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.
"K" EQUALS 1000 OHMS. "MEG" EQUALS 1,000,000 OHMS.

CAPACITY VALUES ARE IN MICROFARADS UNLESS OTHERWISE NOTED

F.M.- 10.7 M C I.F.

ALL TUBE SOCKETS ARE SHOWN FROM PIN END VIEW.
SWITCHES ARE SHOWN IN EXTREME COUNTERCLOCKWISE POSITION (PHONO POSITION) SHAFT END VIEW.

A.M.- 455 K C I.F.

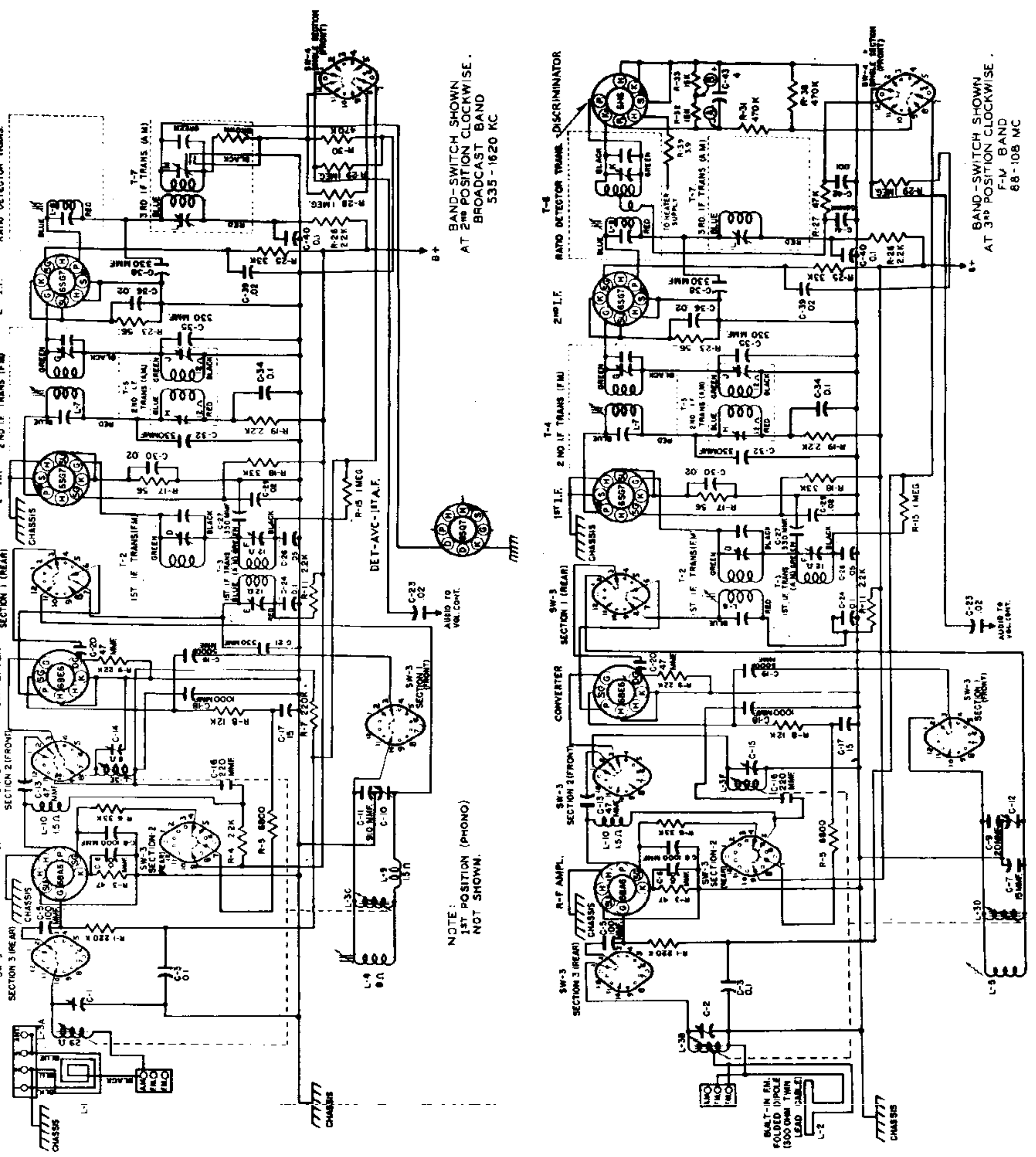
V.C. Impedance..................3.2 ohms at 400 cycles

RECORD CHANGERS: Int. Det. Model 650, RCD. CH. 17-
Int. Det. Model 7000, RCD. CH. 1

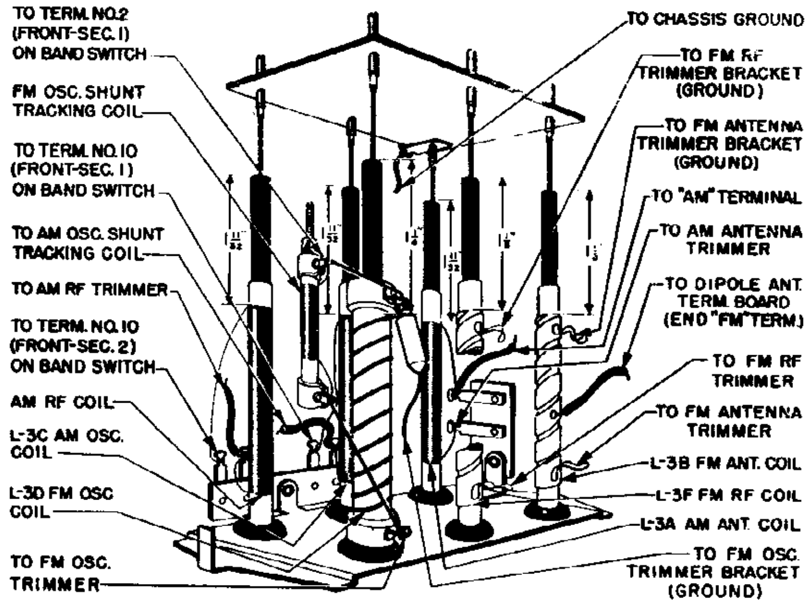
"clarified schematics"

MODEL 7901

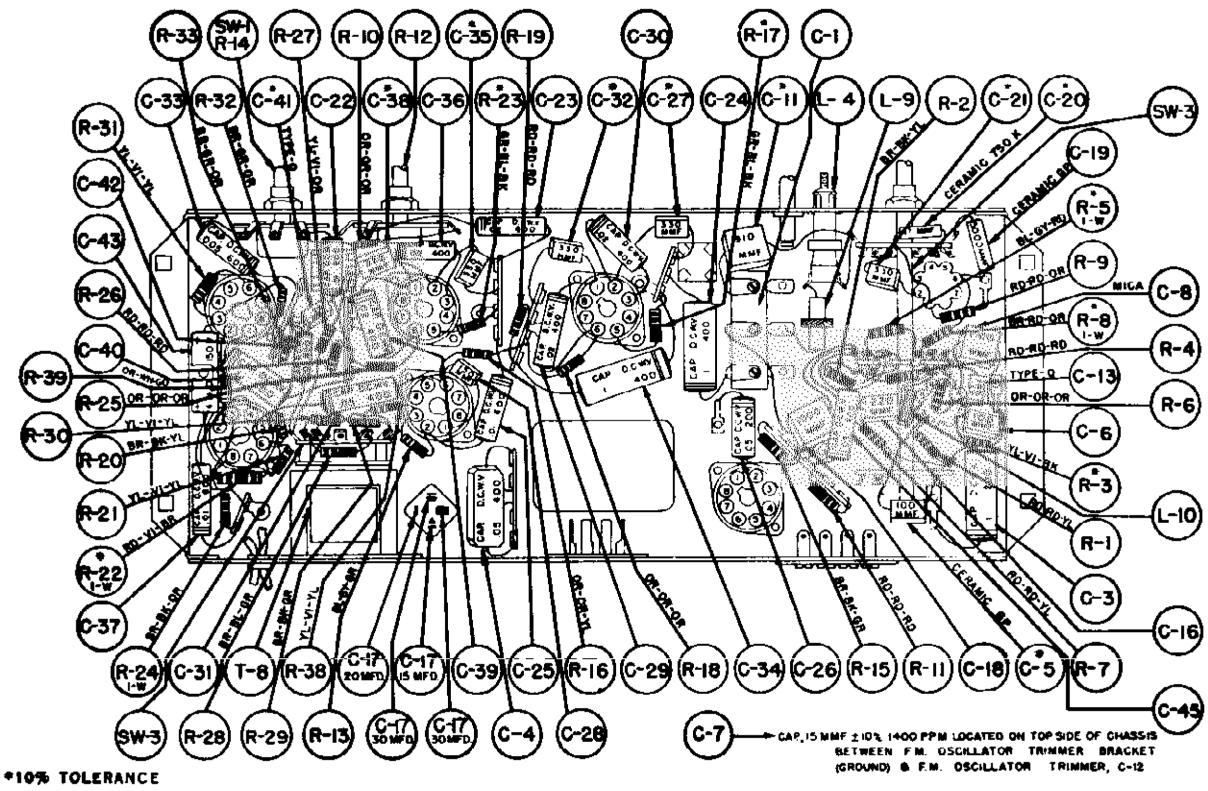
INTERNATIONAL DETROLA CORP.



INTERNATIONAL DETROLA CORP.



Permeability Tuner Illustration



*10% TOLERANCE

Bottom View— Parts Layout

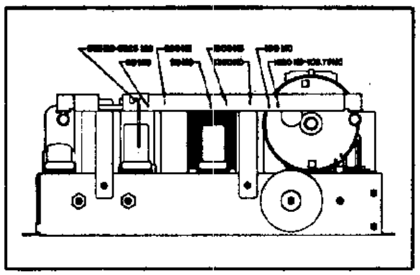
ALIGNMENT PROCEDURE

First determine if factory adjustments of the permeability tuner cores have been altered. This may be done by checking core positions against dimensions shown in tuner illustration. Broken wax seals on the core adjustments may also indicate altering. If the slug adjustments have been changed, it will be necessary to first adjust them in accordance with the dimensions given in tuner illustration before proceeding with alignment.

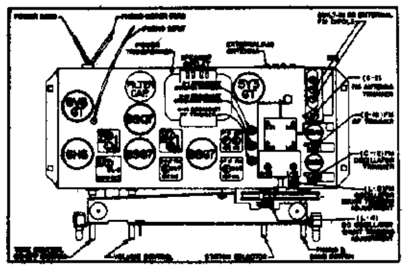
The following equipment is necessary to properly align this receiver:

1. AM signal generator with frequency coverage from 455 kc. to 1700 kc.
2. FM or CW signal generator covering the FM band from 87.25 mc. to 108.75 mc. and the 10.7 mc. frequency for FM IF alignment.
3. Vacuum Tube Voltmeter (VTVM).
4. Output meter—to match 4 ohms, 5 watts maximum.
5. Insulated alignment screwdriver.
6. Dummy antenna—0.1 mfd. capacitor, 300 ohm carbon resistor and inductive loop (fashioned from several turns of wire).

NOTE: Oscilloscope equipment not required if aligned according to the following procedure:
The accuracy of the AM RF and AM antenna slug adjustments may be determined by noting the trimmer adjustment at each end of the band when the oscillator is set for proper coverage. The proper setting of the AM or FM oscillator slugs is indicated by proper tracking of the receiver at the center of the respective band. The FM RF and FM antenna slugs must be adjusted to dimensions given in the permeability tuner illustration.



Calibration Points



Trimmer Location

Reference Notes to Alignment Chart

Note 1—If 1620 kc. signal is received lower in frequency than the 1620 kc. dial calibration, turn BC oscillator shunt tracking adjustment (L-4) outward. Retrack at 535 kc. (Step 2). If higher than the 1620 kc. dial calibration, screw adjustment inward and retrack at 535 kc. Repeat until 535 kc. and 1620 kc. signals coincide with their respective dial calibrations.

Note 2—Adjust input voltage to give approximately 5 volts AVC before final adjustment is made.

For STEPS 6 and 8A—Voltmeter "common" lead to chassis.

For STEP 7—Voltmeter "common" lead to point "B" on wiring diagram. The desired zero position is at the point where the meter indicates a polarity change from plus to minus or vice-versa.

Note 3—For all tests requiring an FM signal, the generator output (22.5 kc. deviation, 400 cycles) must be adjusted to give approximately one-half watt receiver output before final adjustments are made. Either STEP 8A or 8B may be used depending on equipment available.

Note 4—If 108.75 mc. signal is received lower in frequency than the 108.75 mc. dial calibration, turn FM oscillator shunt tracking adjustment (L-5) outward. Retrack at 87.25 mc. (STEP 9). If higher than the 108.75 mc. dial calibration, screw adjustment inward and retrack at 87.25 mc. Repeat until 87.25 mc. and 108.75 mc. signals coincide with their respective dial calibrations.

ALIGNMENT CHART

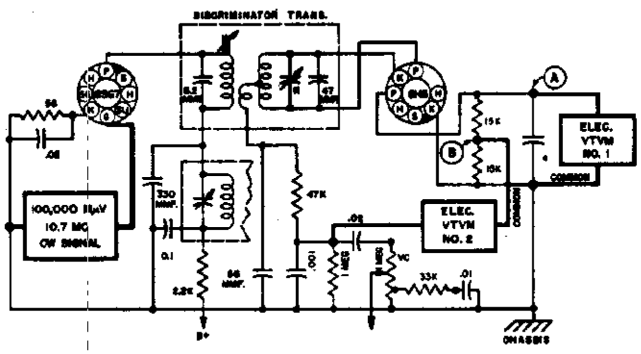
Step No.	Band Switch Position	Signal Generator	Connection at Receiver	Dummy Antenna	Dial Setting	Adjust Trimmer	Remarks
1	AM	455 kc.	6BE6 Converter Grid Pin No. 7	0.1 mfd.	HF end	E, F, H, J, L, M, AM IF Trimmers	Adjust for Maximum Output.
2	AM	535 kc.	6BA6 Grid Pin No. 1	0.1 mfd.	LF end	C-10 AM Osc. Trimmer	Adjust for Maximum Output.
3	AM	1620 kc.	6BA6 Grid Pin No. 1	0.1 mfd.	HF end	L-4 AM Osc. Shunt Tracking Adjustment. (Remove Flywheel from Shaft of Tuning Control.)	Adjust for Band Coverage. (See Note 1.)
4	AM	535 kc.	6BA6 Grid Pin No. 1	0.1 mfd.	LF end	C-14 AM RF Trimmer	Adjust for Maximum Output.
5	AM	1400 kc.	Thru Loop (With Receiver Loop Connected to Set.)	Inductive Loop	1400 kc.	C-1 AM Antenna Trimmer	Adjust for Maximum Output.
6	FM	10.7 mc. (CW Signal)	6SG7 Driver Grid Pin No. 4	0.1 mfd.	HF end	L-8 Ratio Detector Primary	Adjust for Maximum AVC between Point "A" on Wiring Diagram and Chassis using Electronic Voltmeter. See Notes 2 and 3.
7	FM	10.7 mc. (CW Signal)	6SG7 Driver Grid Pin No. 4	0.1 mfd.	HF end	K Ratio Detector Secondary	See Note 2. Adjust for Zero Position (Using Electronic Voltmeter) from No. 12 Position on Single Section Switch and Point "B" on Wiring Diagram.
8A	FM	10.7 mc. (CW Signal)	6BE6 Converter Grid Pin No. 7	0.1 mfd.	HF end	L-6, D, L-7, G 1st and 2nd FM IF	See Note 2. Adjust for Maximum AVC.
8B	FM	10.7 mc. (CW Signal)	6BE6 Converter Grid Pin No. 7	0.1 mfd.	HF end	L-6, D, L-7, G 1st and 2nd FM IF	See Note 3. Adjust for Maximum Output.
9	FM	87.25 mc. (FM Signal)	6BA6 Grid Pin No. 1	0.1 mfd.	LF end	C-12 FM Osc. Trimmer	Adjust for Maximum Output.
10	FM	108.75 mc. (FM Signal)	6BA6 Grid Pin No. 1	0.1 mfd.	HF end	L-5 FM Osc. Shunt Tracking Adjustment	Adjust for Band Coverage. (See Note 4.)
11	FM	87.25 mc. (FM Signal)	6BA6 Grid Pin No. 1	0.1 mfd.	LF end	C-15 FM RF Trimmer	Adjust for Maximum Output.
12	FM	87.25 mc. (FM Signal)	Thru 300 ohm Carbon Resistor to End FM Antenna Terminal and Center FM Antenna Terminal.	300 ohm Carbon Resistor	87.25 mc.	C-2 FM Antenna Trimmer	Adjust for Maximum Output.

INTERNATIONAL DETROLA CORP.

RATIO DETECTOR

Proper operation of the ratio detector stage is extremely important for best performance on the FM band of this receiver.

The performance of the ratio detector stage may be checked by closely following the procedure and diagram given below.



Wiring Diagram—Ratio Detector

1. After setting up the signal generator and VTVM, turn the trimmer adjustment screw "K" until tight. Turn the core adjustment "L" to maximum counterclockwise position. These two adjustments are on the top of the Ratio Detector transformer. (See Trimmer Location diagram.)

2. Now turn adjustment "L" clockwise until VTVM in No. 1 position indicates maximum voltage. This maximum value should be from five to seven volts with input as indicated in above diagram. Then slowly turn adjustment "K" in a counterclockwise direction, observing VTVM in No. 2 position. It will approach a maximum value and then rapidly drop to zero. If adjustment "K" is turned beyond this point, VTVM in No. 2 position will indicate a polarity change. The proper adjustment of "K" is at the point where the VTVM indicates zero volts between the polarity change.

3. Shift the 10.7 mc. signal to 10.725 mc. (10.7 mc. +25 kc.). VTVM in No. 2 position should now indicate a plus .3 volts minimum.

4. Change the 10.725 mc. signal to 10.675 mc. (10.7 mc. —25 kc.). VTVM in No. 2 position should indicate a minus .3 volts minimum. STEPS 3 and 4 constitute a sensitivity check on the ratio detector transformer.

5. Place the polarity switch of VTVM in No. 2 position to "plus" position and observe VTVM as the frequency of the signal generator is increased above 10.7 mc. It should indicate an increasing positive voltage. Continue increasing the frequency until the meter indicates a peak and begins to decrease. Reduce the generator frequency slightly until the peak is obtained. Record the generator frequency.

6. Set the polarity switch of VTVM to "minus" position. Repeat STEP 5, reducing the generator frequency from 10.7 mc. instead of increasing. Record the generator frequency when VTVM in No. 2 position indicates a peak.

7. The difference between the generator frequencies noted in STEPS 5 and 6 is the "Static Band Width" of the Ratio Detector transformer. This should be approximately 220 kc.

TUBE COMPLIMENT

1	6BA6	RF Amplifier	1	6SQ7	AM Detector—AVC—1st Audio (AM-FM)
1	6BE6	Oscillator-Converter	1	6H6	FM Detector
1	6SG7	1st IF Amplifier	1	6V6GT	Power Output
1	6SG7	2nd IF Amplifier	1	5Y3GT	Rectifier

SOCKET VOLTAGES

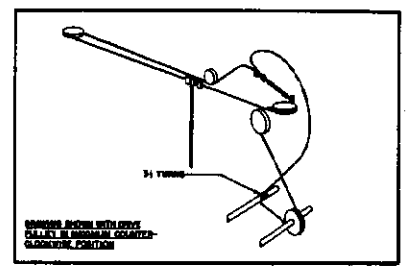
TUBE	POSITION	1	2	3	4	5	6	7	8
6BA6	RF Amplifier	0	0	6.3 AC	0	250	100	.6	
6BE6	Oscillator-Converter.	0	0	6.3 AC	0	250	90	0	
6SG7	1st IF Amplifier	0	0	.6	0	.6	125	6.3 AC	250
6SG7	2nd IF Amplifier	0	0	.6	0	.6	125	6.3 AC	250
6SQ7	AM Detector—AVC—1st Audio (AM-FM)	0	0	0	0	0	90	6.3 AC	0
6H6	FM Detector	0	6.3 AC	0	0	0	0	0	0
6V6GT	Power Output	NC	0 *	240	260	0	260	6.3 AC	14
5Y3GT	Rectifier	NC	325	NC	325 AC	NC	325	NC	325

NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from B— to socket contact indicated. All voltages are positive DC unless otherwise marked. Volume control full on. Zero signal input.

Tone control in clockwise position.
Band switch in "AM" position.
Line voltage 117 volts, 60 cycle AC.

CHASSIS REMOVAL – Remove the receiver power cord from the electrical outlet before starting to remove chassis.

1. Turn the tuning control so that the dial pointer is in the extreme left-hand position (low frequency end).
2. Unhook the dial cable from dial pointer and slide the pointer to center of cutout in the pointer track. The dial pointer may be removed, if necessary, by turning it clockwise and clearing it through the cutout.
3. Remove the loop and dipole antenna leads from their respective terminals.
4. Detach the phono-motor cord (plug and socket connection).
5. Remove the phono input leads at the terminal board on the chassis shelf and remove the speaker plug from receptacle at back of chassis.
6. Remove knobs and the four chassis mounting screws. The chassis can now be removed from the cabinet.



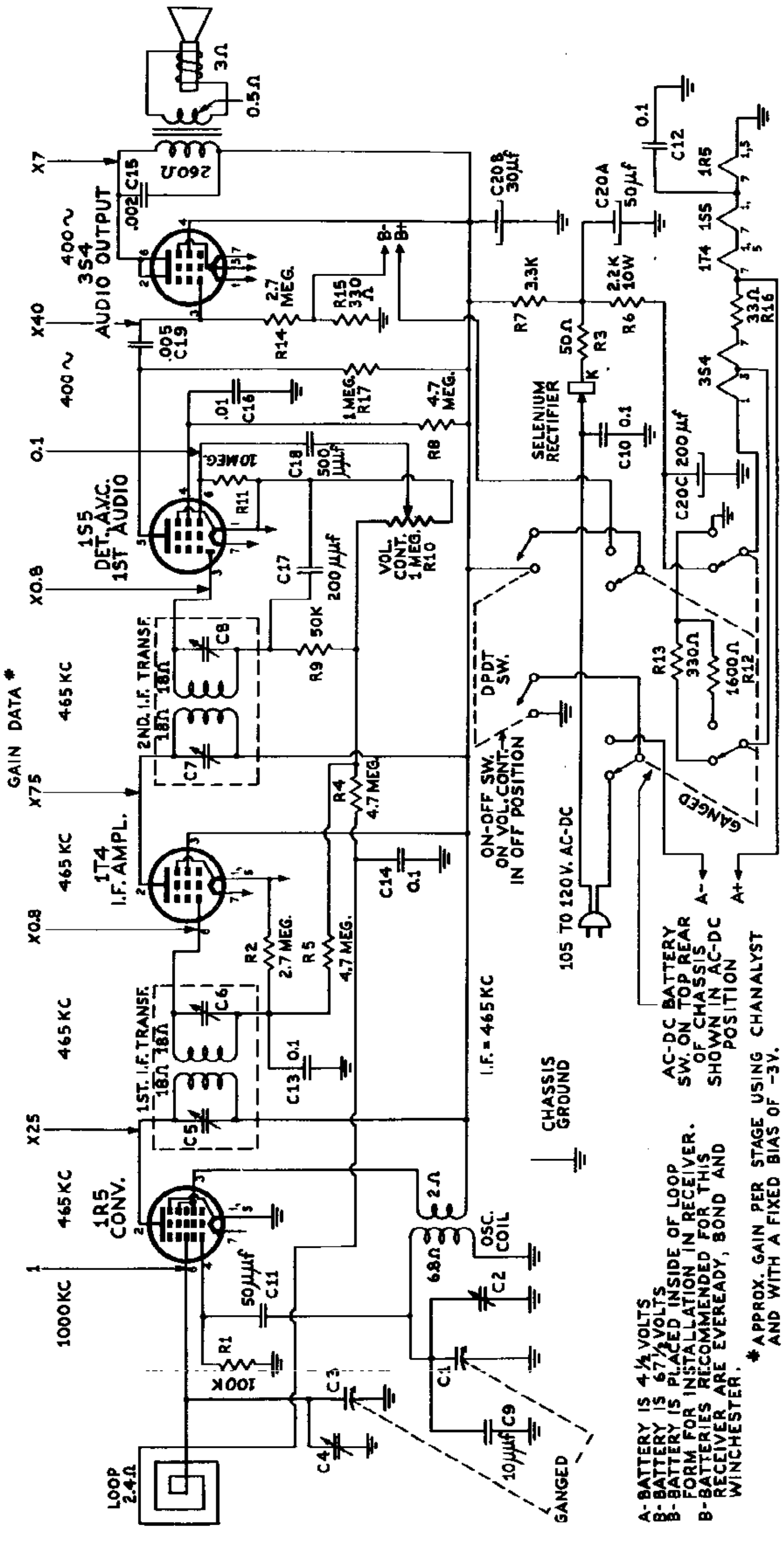
Dial Stringing

INTERNATIONAL DETROLA CORP.

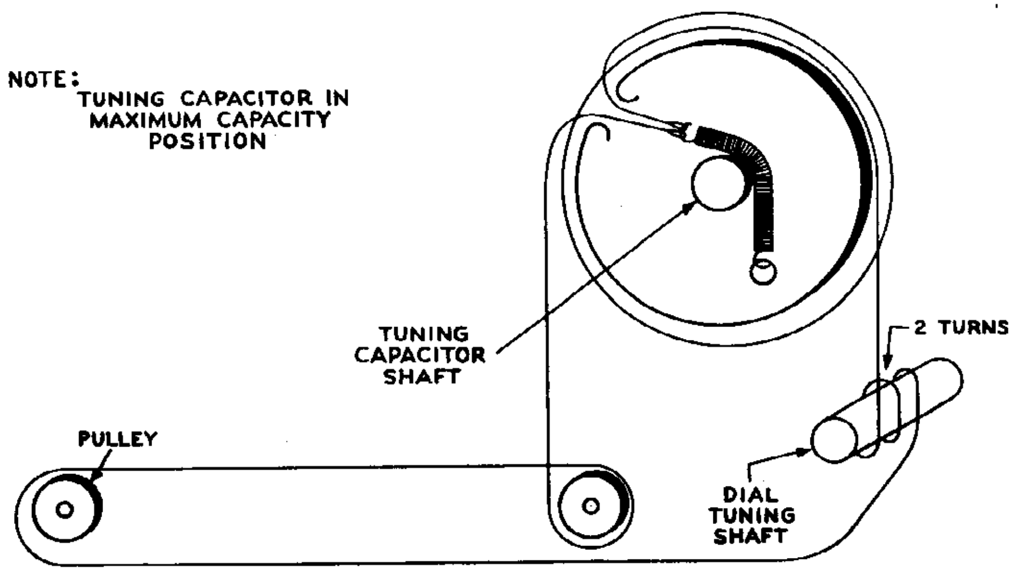
Symbol	Part No.	Description
	A-6158	Lamp, Pilot No. 47
	B-51524-4	Lead, Shielded
	B-57922	Link, Band Switch
L-3A, 3B, 3C, 3D, 3E, 3F, and L-5	D-57920	Permeability Tuner Assy.
		Perm. Tuner Assembly (on exchange basis only)
	A-59316-1	Pointer, Dial
R-39	B-55513-1	Resistor, 3.9 ohm, ½ w.
R-3	BR16B470	Resistor, 47 ohm, ⅓ w.
R-17, 23	BR16B560	Resistor, 56 ohm, ⅓ w.
R-22	BR16E271	Resistor, 270 ohm, 1 w.
R-4, 11, 19, 26	BR17B222	Resistor, 2,200 ohm, ⅓ w.
R-5	BR16E682	Resistor, 6,800 ohm, 1 w.
R-24	BR17E103	Resistor, 10,000 ohm, 1 w.
R-8	BR16E123	Resistor, 12,000 ohm, 1 w.
R-32, 33	BR17B153	Resistor, 15,000 ohm, ⅓ w.
R-9	BR17B223	Resistor, 22,000 ohm, ⅓ w.
R-6, 10, 18, 25	BR17B333	Resistor, 33,000 ohm, ⅓ w.
R-27	BR17B473	Resistor, 47,000 ohm, ⅓ w.
R-2. 20 37	BR17B104	Resistor, 100,000 ohm, ⅓ w.
R-1, 7,	BR17B224	Resistor, 220,000 ohm, ⅓ w.
R-16	BR17B334	Resistor, 330,000 ohm, ⅓ w.
R-21, 30, 31, 36, 38	BR17B474	Resistor, 470,000 ohm, ⅓ w.
R-15, 28 29	BR17B105	Resistor, 1 megohm, ⅓ w.
R-13	BR17B685	Resistor, 6.8 megohm, ⅓ w.
	A-51801	Rivet, Pronged
	B-55280-1	Shaft, Drive
	B-51469-3	Socket, Dial Light
	A-57996	Socket, Miniature
	A-54726	Socket, Octal
	A-51403	Socket, Speaker
	B-55180-3	Spacer, Metal
	A-51787	Spring, Cable
	A-50147	Spring, Conical
T-3	B-57954-1	Transformer Assembly, 1st IF AM
T-5	B-57958-1	Transformer Assembly, 2nd IF AM
T-7	B-57963-1	Transformer Assembly, 3rd IF AM
T-2	B-57972-1	Transformer Assembly, 1st IF FM
T-4	B-57976-1	Transformer Assembly, 2nd IF FM
T-6	B-57994-1	Transformer Assembly, Ratio Det.
T-8	B-57997-1	Transformer, Output
T-1	C-57934	Transformer, Power

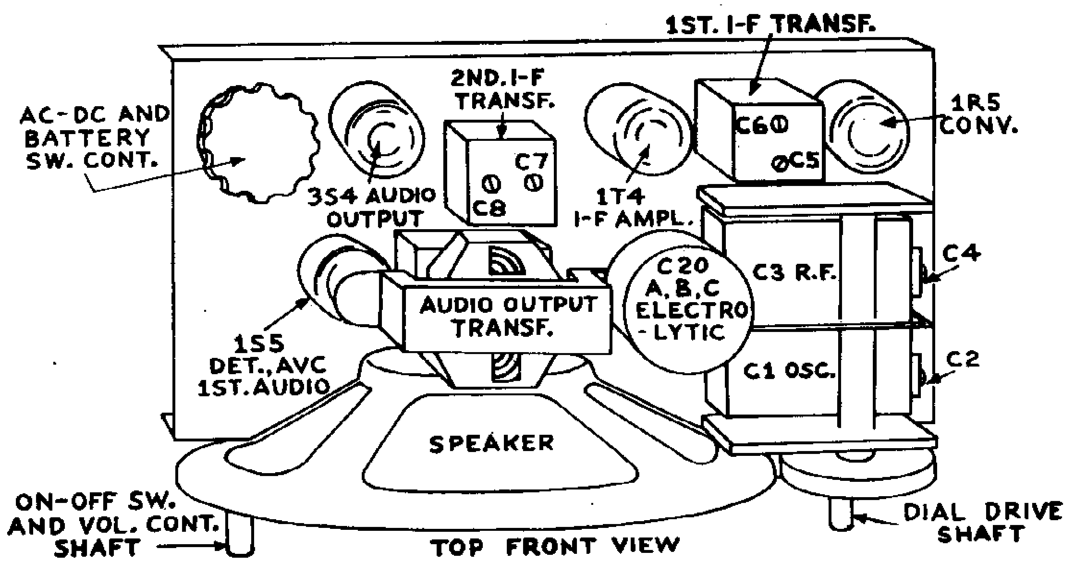
Symbol	Part No.	Description
	A-51729	Bushing, Shaft
	A-54848	Bushing, Strain Relief
	A-58341	Cable, Dial
C-33	BD610502	Capacitor, .005 mfd., 600 v.
C-42	BD610102	Capacitor, .001 mfd., 600 v.
C-22, 35, 37	BD610103	Capacitor, .01 mfd., 600 v.
C-23, 29, 30, 36, 39	BD410203	Capacitor, .02 mfd., 400 v.
C-26	BD210503	Capacitor, .05 mfd., 200 v.
C-31, 45	BD410503	Capacitor, .05 mfd., 400 v.
C-4	BC31B503	Capacitor, .05 mfd., 400 v.
C-3	BD210104	Capacitor, .1 mfd., 200 v.
C-24, 34, 40	BD410104	Capacitor, .1 mfd. 400 v.
C-1	B-57942-1	Capacitor Assy., Trimmer (3 sec.)
C-19	B-58802-11	Capacitor, Ceramic, 5000 mmf., G.P.
C-5	B-58801-18	Capacitor, Ceramic, 100 mmf., G.P.
C-20	B-58800-27	Capacitor, Ceramic, 47 mmf. (—750 ppm)
C-7	B-58803-16	Capacitor, Ceramic, 15 mmf. (—1400 ppm)
C-43	B-55520-1	Cap., Electro., 4 mfd., 150 v.
C-17	A-57950	Cap., Electro., 30-30-75 mfd., 400 v.—20 mfd., 25 v.
C-8, 18	BM74A102	Capacitor, Mica, 1000 mmf.
C-11	BM64A911	Capacitor, Mica, 910 mmf.
C-21, 27, 32, 35, 38	BM55A331	Capacitor, Mica, 330 mmf.
C-16	BM74A221	Capacitor, Mica, 220 mmf.
C-28	BM74A151	Capacitor, Mica, 150 mmf.
C-6	BM74A101	Capacitor, Mica, 100 mmf.
C-41	B-58902-11	Capacitor, Mica Mold., Type Q, 56 mmf.
C-13	B-58900-6	Capacitor, Mica Mold., Type Q, 47 mmf.
C-2	B-57939-2	Cap., Trimmer, 10-25 mmf.
C-12, 15	B-57939-1	Cap., Trimmer, 1.5—14 mmf.
	B-55260-1	Clip, Capacitor Mtg.
	A-57925	Cup, Spring
L-10	A-57931	Coil Assy., R.F. Choke
L-9	B-57933	Coil Assy., Series Track. BC Osc.
L-4	B-57929	Coil Assy., Shunt Track. BC Osc.
R-14	B-58219-1	Control, Pot. and Sw., 1 megohm (T.C.)
R-12	B-58218-1	Control, Pot., 2 meg. (V.C.)
	B-57262-7	Cord, AC-Phono.
	B-58069-2	Cord, Power
	A-57999	Crank, Switch Lever
	A-59321	Flywheel, Tuning Shaft
	B-57998	Hub Crank

LEANDER ELECTRONICS CORP.



LEANDER ELECTRONICS CORP.





IF ALIGNMENT

CONNECT AN OUTPUT METER ACROSS THE VOICE COIL OF THE RECEIVER. CONNECT A SIGNAL GENERATOR TO THE STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO THE RECEIVER LOOP.

SET THE SIGNAL GENERATOR TO 465 KC AND FULLY MESH THE RECEIVER TUNING CAPACITOR.

KEEP THE RECEIVER VOLUME CONTROL AT MAXIMUM, AND THE OUTPUT OF THE SIGNAL GENERATOR SUFFICIENT TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER.

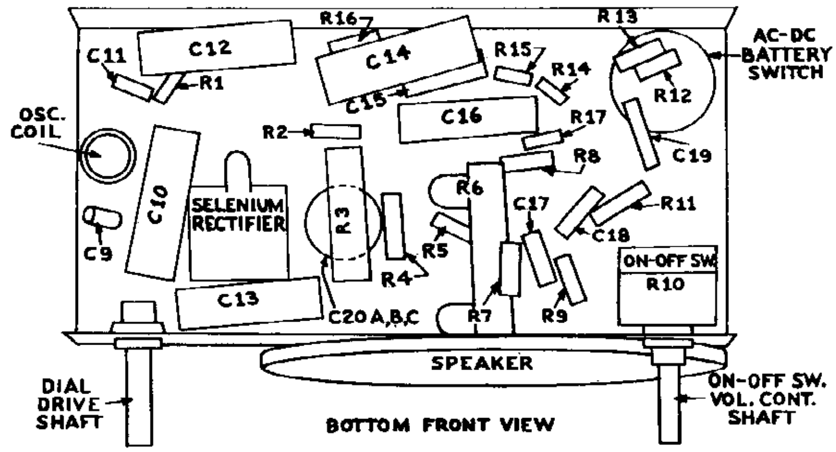
ADJUST FOR MAXIMUM I.F. TRIMMERS C8, C7, C6 AND C5.

RF OSC. ADJUSTMENT

KEEPING THE SAME SETUP AS USED FOR I.F. ALIGNMENT, SET THE SIGNAL GENERATOR AND RECEIVER TO 1600 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT.

NEXT, SET THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANTENNA TRIMMER C4 FOR MAXIMUM OUTPUT.

LEANDER ELECTRONICS CORP.

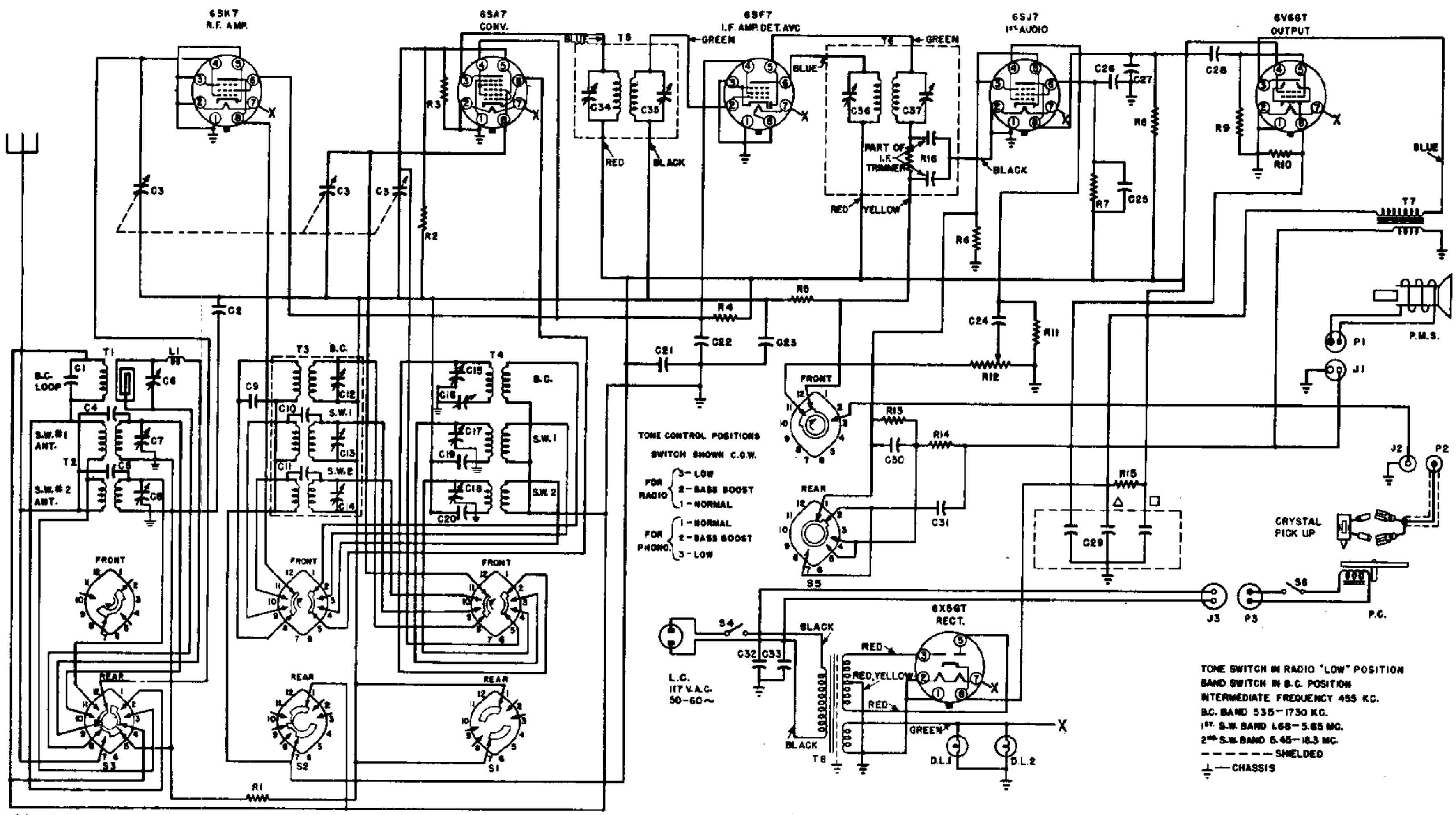


TUBE	PIN	VTVM	20,000 OHM P.V.	1,000 OHM P.V.	RESISTANCE
1R5	1	0	0	0	0
CONV.	2	+66	+66	+66	5.5 K
	3	+66	+66	+66	5.5 K
OSC. VOLTAGE	4				
	550 KC	-10	-5	-0.5	100 K
	1600 KC	-20	-12	-4.5	100 K
	5	--	--	--	--
	6	+0.4	0	0	5.5 MEG
	7	+1.2	+1.2	+1.2	12 OHM
1T4	1	+2.3	+2.3	+2.3	26 OHM
I.F. AMPL.	2	+66	+66	+66	5.5 K
	3	+66	+66	+66	5.5 K
	4	-0.4	0	0	5.5 MEG
	5	+2.3	+2.3	+2.3	26 OHM
	6	-1.3	-0.2	0	1.75 MEG
	7	+3.5	+3.5	+3.5	36 OHM
1S5	L	+1.2	+1.2	+1.2	12 OHM
DET. AVC	2	+0.6	-0.2	0	900 K
1st AUDIO	3	+0.6	-0.2	0	900 K
	4	+17	+14	+2	4.5 MEG
	5	+38	+36	+6	800 K
	6	0	0	0	9 MEG
	7	+2.3	+2.3	+2.3	26 OHM
3S4	1	+7.4	+7.4	+7.4	75 OHM
AUDIO	2	+64	+64	+64	5.5 K
OUTPUT	3	0	0	0	2.5 MEG
	4	+66	+66	+66	5.5 K
	5	+5.6	+5.6	+5.6	60 OHM
	6	+64	+64	+64	5.5 K
	7	+4.6	+4.6	+4.6	55 OHM
SELENIUM RECTIFIER	K	+125	+125	+125	2.2 K

NOTE: ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V.A.C. AC-DC BATTERY SWITCH IS IN AC-DC POSITION

LEAR, INC.

MODELS 6610, 6611, 661[illegible]
6610PC, 6611PC, 6612P[illegible]
Early production



DWG. SYM.	PART NO.	DESCRIPTION
T1	54448	B.C. LOOP ASSEMBLY
T2	B65025	S.W. BAND 1&2 ANT. COIL ASSEMBLY
T3	B65325	B.C.-S.W.1&S.W.2 R.F. " "
T4	B65022	" " " " " OSC. " "
T5	B63350	NO.1 I.F. TRANSFORMER "
T6	54990	" 2 " " "
T7	B53941	OUTPUT "
T8	B53942	POWER " "
C1	B56053	22 MMFD. MICA CAPACITOR
C2	C56596	.02 MFD. 200V. PAPER CAPACITOR
C3	B52642	3 GANG VARIABLE CAPACITOR & PULLEY
C4	A52655	3 MMFD. FIXED "
C5	A52655	3 " " "
C6	A52686	B.C. ANT TRIMMER ASSEMBLY
C7	A52684	S.W.1 " " "
C8		" 2 " " "
C9	B56055	47 MMFD. MICA CAPACITOR
C10	A52674	3 " FIXED "
C11	A52674	3 " " "

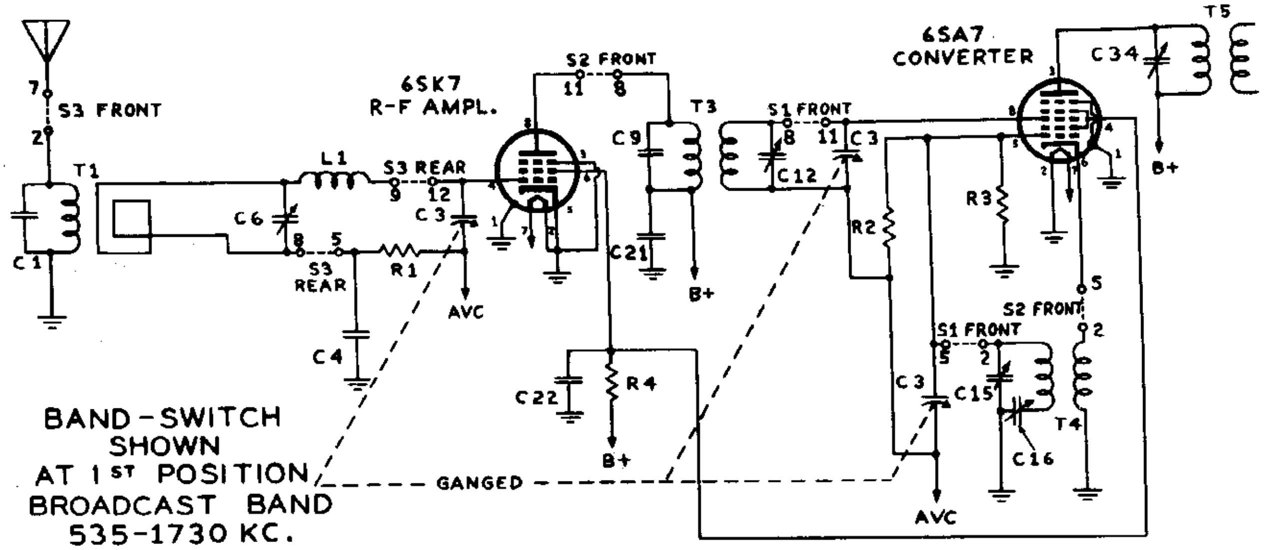
DWG. SYM.	PART NO.	DESCRIPTION
C12		B.C. RF. TRIMMER ASSEMBLY
C13	A52644	S.W.1 " " "
C14		" 2 " " "
C15	A52665	B.C. OSC. " "
C16		" " PADDER "
C17	A52664	S.W.1 " TRIMMER "
C18		" 2 " " "
C19	A50236	1250 MMFD. MICA CAPACITOR. TOL. ± 5%
C20	A51931	3800 " " " " " "
C21	C56631	0.1 MFD 400V. PAPER CAPACITOR
C22	A54146	8 " 250V. ELECTROLYTIC
C23	C56596	.02 " 200V. PAPER CAPACITOR
C24	C56596	.02 " " " "
C25	C56622	.01 " 400V. " "
C26	C56628	.05 " " " "
C27	C56613	.001 " " " "
C28	C56624	.02 " " " "
C29	B53939	20 " 25V. ELECTROLYTIC
		10 △ " 350V. " "
		20 □ " " " "

DWG. SYM.	PART NO.	DESCRIPTION
C30	C56600	.05 MFD. 200V. PAPER CAPACITOR
C31	C56594	.01 " " " "
C32	C56628	.05 " 400V. " "
C33	C56628	.05 " " " "
C34,C35		NO.1 I.F. TRIMMERS (PART OF ASS'Y.)
C36,C37		NO.2 " " (" " ")
R1	B55485	220,000 OHM 1/2W. CARBON RESISTOR
R2	B55496	15 MEG. " " "
R3	B55479	22,000 OHM " " "
R4	B55952	12,000 " 2 W. " "
R5	B55491	2.2 MEG. 1/2W. " "
R6	B55472	1500 OHM " " "
R7	B55491	2.2 MEG. " " "
R8	B55487	470,000 OHM " " "
R9	B55487	470,000 " " " "
R10	B55733	220 " 1 W. " "
R11	B55491	2.2 MEG. 1/2W. " "
R12,S4	D58340	500,000 OHM VOL. CONTROL & SWITCH
R13	B55481	47,000 1/2W. CARBON RESISTOR

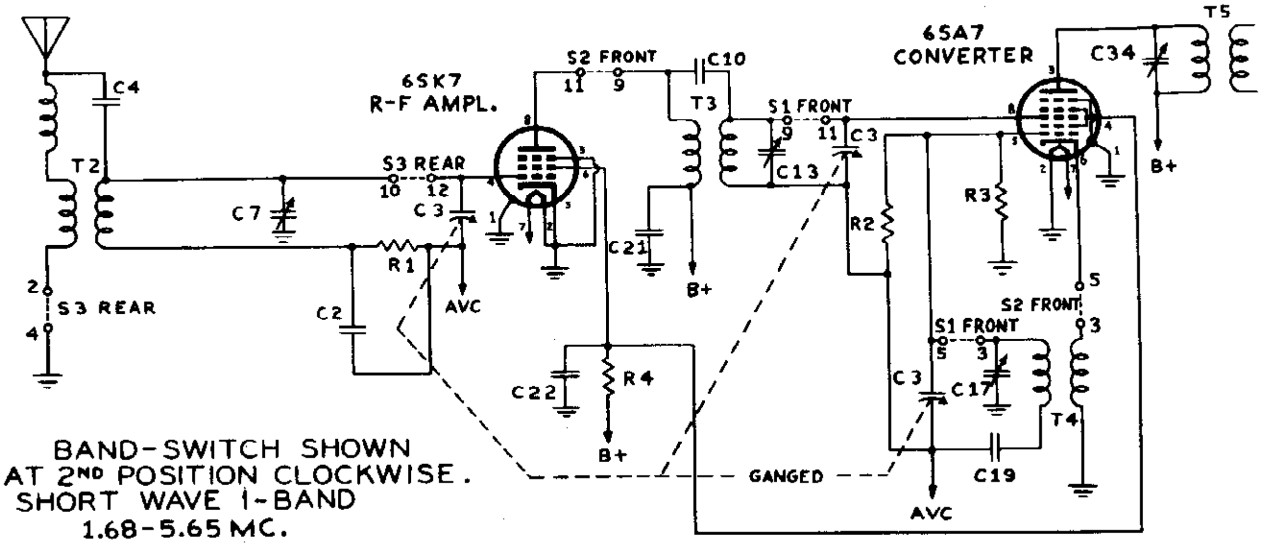
DWG. SYM.	PART NO.	DESCRIPTION
R14	B55478	15,000 OHM 1/2W. CARBON RESISTOR
R15	B55940	1,200 " 2 W. " "
R16		47,000 " 1/2W. " "
D.L.1,2	A70535	DIAL LIGHTS, TYPE 47
L1	B53365	LOADING COIL
L.C.	54175	LINE CORD
P.M.S.	53933	10" PERMANENT MAGNET SPEAKER ASS'Y.
S1,S2,S3	B52646	BAND SWITCH ASSEMBLY
S5	A53940	RADIO-PHONO TONE CONTROL
S6	30834-05	PHONO SWITCH (PART OF CHANGER)
P.C.	PC-206	RECORD CHANGER ASS'Y.
P1		SPEAKER CONNECTOR (MALE)
J1		" " (FEMALE)
P2		PHONO PICK UP CONNECTOR (MALE)
J2		" " " " (FEMALE)
P3		" POWER " (MALE)
J3		" " " (FEMALE)

MODELS 6610, 6611, 6612
6610PC, 6611PC, 6612PC
Early production

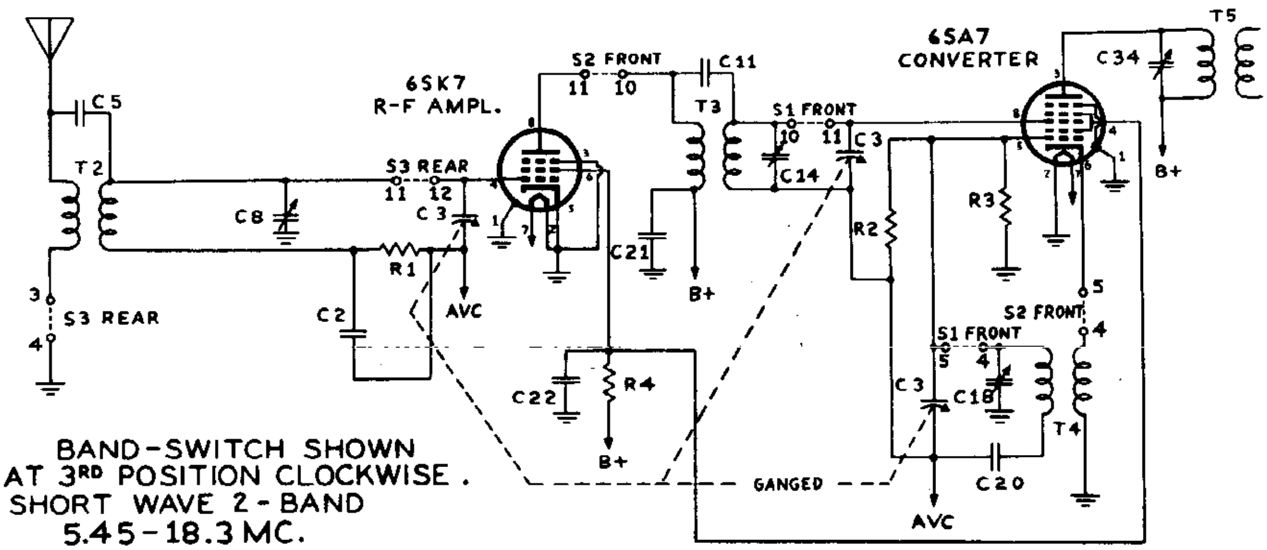
LEAR, INC.



BAND-SWITCH SHOWN AT 1ST POSITION BROADCAST BAND 535-1730 KC.

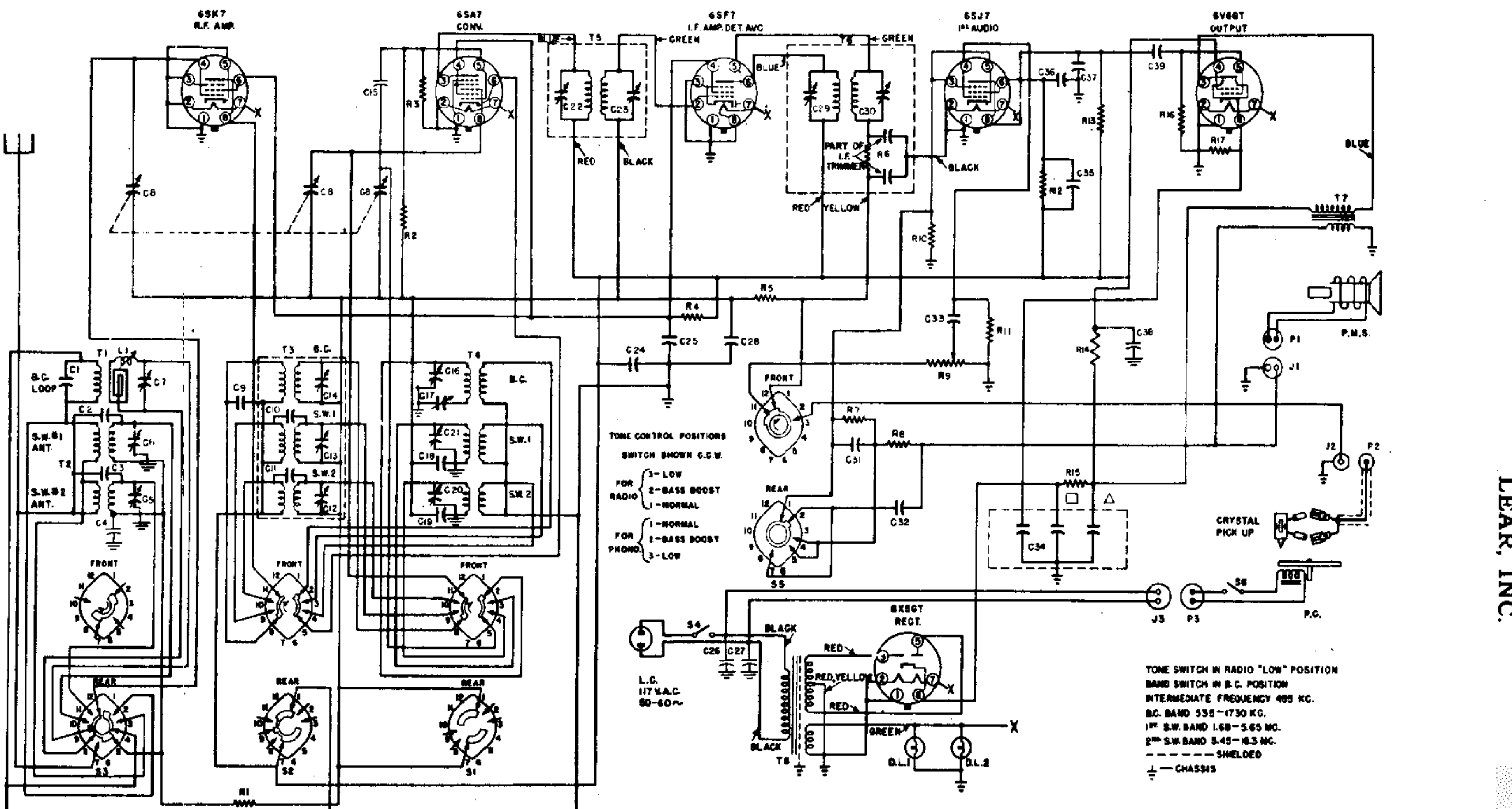


BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. SHORT WAVE 1-BAND 1.68-5.65 MC.



BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE. SHORT WAVE 2-BAND 5.45-18.3 MC.

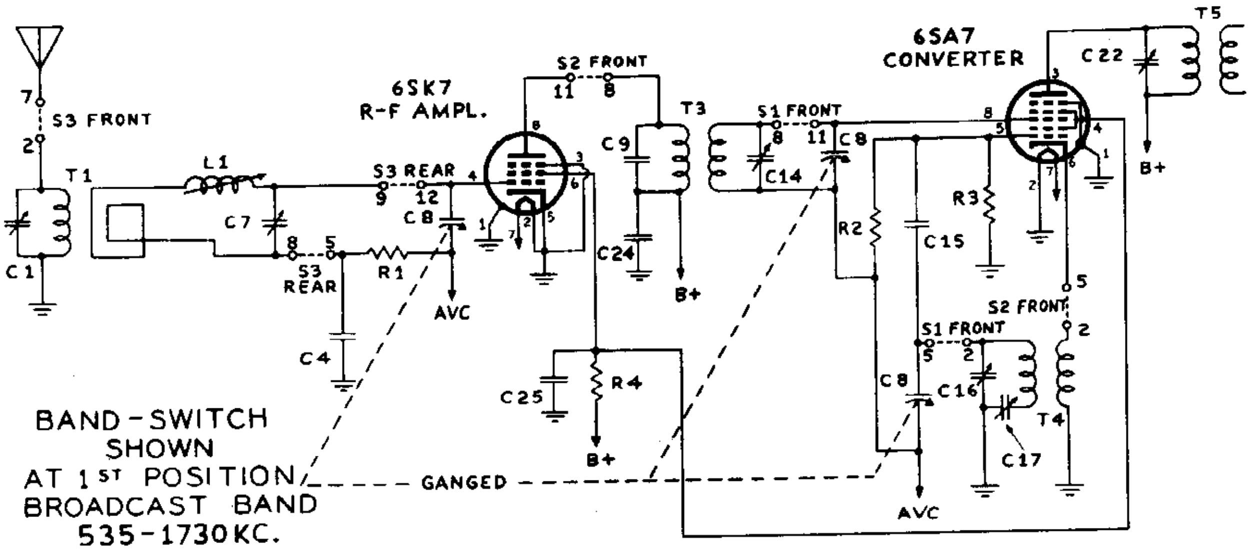
LEAR, INC.



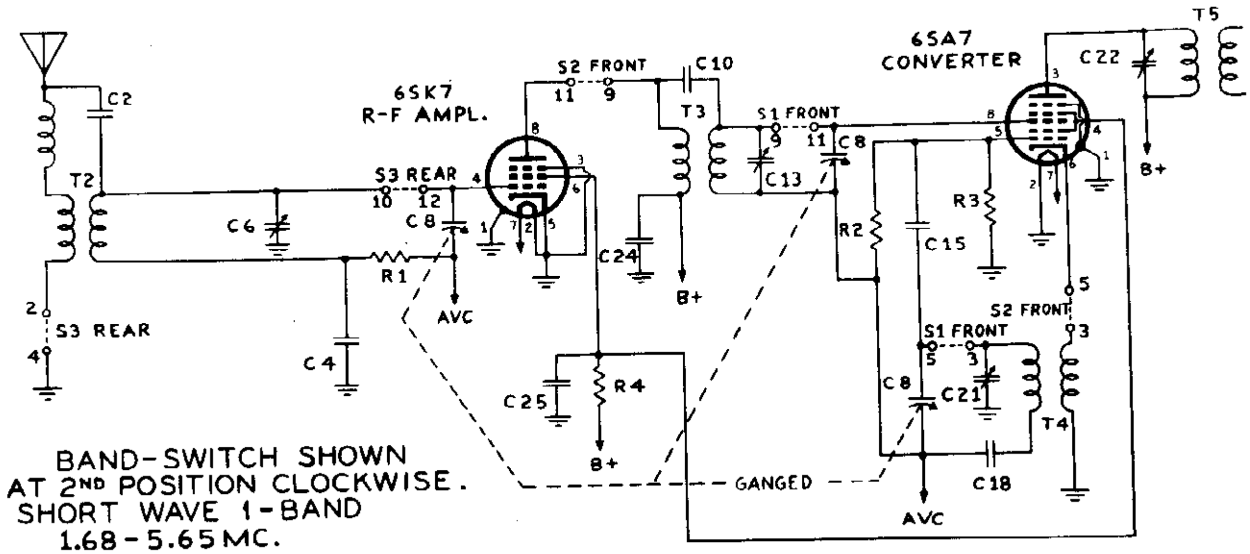
DWG. SYM.	PART NO.	DESCRIPTION
T1	B52651	B.C. LOOP ASSEMBLY
T2	B59025	S.W. BAND 1&2 ANT. COIL ASSEMBLY
T3	B59026	B.C.-S.W.1&S.W.2 R.F. " "
T4	B59022	" " " " " OSC. " "
T5	B53350	NO.1 I.F. TRANSFORMER "
T6	B53351	" 2 " " "
T7	▲ B53941	OUTPUT "
T8	B53942	POWER " "
C1	B56065	82 MMFD. MICA CAPACITOR
C2	A52655	3 MMFD FIXED "
C3	A52855	3MMFD. " "
C4	C56596	.02MFD 200V PAPER CAPACITOR
C5	A52664	SW 2 ANT. TRIMMER ASSEMBLY
C6		" 1 " " "
C7	A52686	BC ANT TRIMMER ASSEMBLY
C8	B52642	3GANG VARIABLE CAPACITOR & PULLEY
C9	B56057	100MMF MICA CAPACITOR
C10	A52674	3 MMFD. FIXED "
C11	A52674	3 " " "
C12	A52644	SW 2 R.F TRIMMER ASSEMBLY
C13		" 1 " " "
C14		BC R F TRIMMER ASSEMBLY
C15	B56057	100 MMF MICA CAPACITOR
C16	A52665	B C OSC TRIMMER ASSEMBLY
C17		" " PADDER "
C18	A50235	250 MMFD MICA CAPACITOR TOL±5%
C19	A54931	3900 " " " " "
C20	A52664	SW 2 OSC TRIMMER ASSEMBLY
C21		" 1 " " "
C22,C23		NO 1 I F TRIMMER (PART OF ASS'Y)
C24	C5663	.01 MFD 400V PAPER CAPACITOR
C25	A54146	10 " 350V. ELECTROLYTIC
C26	C56628	.05 MFD 400V PAPER CAPACITOR
C27	C56628	.05 " " " "
C28	C56596	.02 " 200V " "
C29,C30		NO 2 I F TRIMMER (PART OF ASS'Y)
C31	C56800	.05 MFD 200V PAPER CAPACITOR
C32	C56594	.01 " " " "
C33	C56596	.02 MFD 200V PAPER CAPACITOR
C34	B53939	20 " 25 V ELECTROLYTIC; 10△ " 350V "; 20□ " " "
C35	C56622	.01 " 400V PAPER CAPACITOR
C36	C56628	.05 " " " "
C37	C56613	.001 " " " "
C38	A54146	10 350V ELECTROLYTIC
C39	C56624	.02 MFD 400V PAPER CAPACITOR
R1	B55485	220,000 OHM 1/2 W CARBON RESISTOR
R2	B55496	15 MEG " " "
R3	B55479	22,000 OHM " " "
R4	B53952	12,000 " 2W " "
R5	B55491	2.2 MEG 1/2W " "
R6	B55481	47,000 " " (PART OF I F ASS'Y)
R7	B55481	47,000 " " " "
R8	B55478	15,000 " " " "
R9,S4	D56340	500,000 OHM VOL. CONTROL & SWITCH
R10	B55472	1500 OHM 1/2W CARBON RESISTOR
R11	B55491	2.2 MEG 1/2W CARBON RESISTOR
R12	B55491	" " " " "
R13	B55487	470,000 OHM " " "
R14	B55940	1200 OHM 2W " "
R15	B55999	200 " 2W " "
R16	B55487	470,000 " 1/2W " "
R17	B55733	220 " 1W " "
D.L. 1,2	A70535	DIAL LIGHT TYPE 47
L1	B61752	LOADING COIL
L.C.	B54175	LINE CORD
P.M.S.	B53933	10" PERMANENT MAGNET SPEAKER
S1,S2,S3	B52646	BAND SWITCH ASS'Y
S5	A53940	RADIO-PHONO TONE CONTROL
S6	30634-03	PHONO SWITCH (PART OF CHANGER
P.C.	PC-206	RECORD CHANGER ASS'Y
P1		SPEAKER CONNECTOR (MALE)
J		" " (FEMALE)
P2		PHONO PICK UP CONNECTOR (MALE)
J2		" " " " (FEMALE)
P3		" POWER " (MALE)
J3		" " " (FEMALE)

MODELS 6610, 6611, 6612,
6610PC, 6611PC, 6612PC
Late production

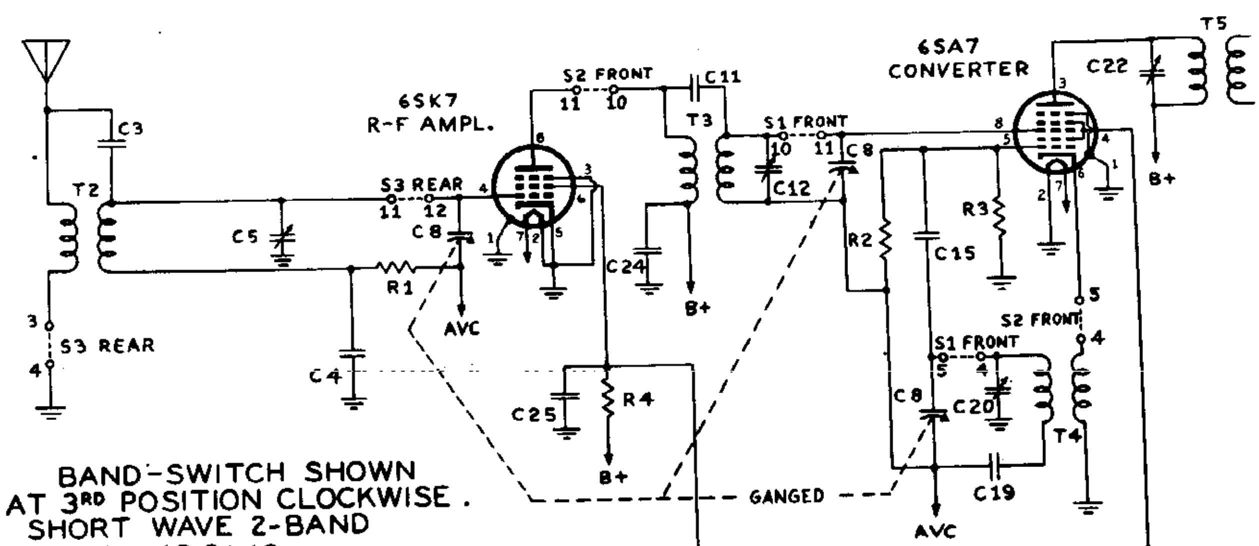
LEAR, INC.



BAND-SWITCH SHOWN AT 1ST POSITION BROADCAST BAND 535-1730KC.



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. SHORT WAVE 1-BAND 1.68-5.65MC.



BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE. SHORT WAVE 2-BAND 5.45-18.3MC.

LEAR, INC.

MODELS 6610, 6611, 6612
6610PC, 6611PC, 6612PC
Early and late production

ALIGNMENT CHART

OPERATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANTENNA	GENERATOR FREQUENCY	BAND SWITCH SETTING	DIAL AND CONDENSER SETTING	TRIMMER	REMARKS
1	Set dial pointer to last mark at Low frequency end of dial with gang condenser closed.							
2	2nd. I.F.	6SA7 Grid	.05 Mf.	455 KC	BC	Open	C29 & C30	Max. Output
3	1st. I.F.	and Gnd.					C22 & C23	Max. Output
4	BC	Antenna	200 mmf.	1500 KC	BC	1500 KC	C16*, C12, C7	Max. Output
5		Lead &		600 KC		600 KC	C17	(osc. padder)
6		Gnd.		Repeat operations 4 and 5 until alignment frequencies fall on correct calibration points				
7				600	BC	600	L1	Max. Output
8				Recheck C7 at 1500 KC and L1 at 600 KC				Max. Output
9	SW1	Antenna	400 ohms	5 MC	1	5 MC	C21, C13, C6	Max. Output
10		Lead &Gnd.	(res)	1800 KC		1800 KC	* *	* **
11	SW 2	Antenna	400 ohms	16 MC	2	16 MC	C20* C14, C5	Max. Output
12		Lead &Gnd.	(res)	6 MC		6 MC	**	**

NOTES: * Rock dial while trimming C20 at 16 MC. ** Check sensitivity and dial calibration
C7 and L1 are located on Loop Antenna.

VOLTAGE CHART

Line Voltage: 117 volts, 60 cycles AC
Position of Band Switch: Broadcast Band
Position of Volume Control: Full (with no signal)
Position of Tone Switch: Radio - "Normal"

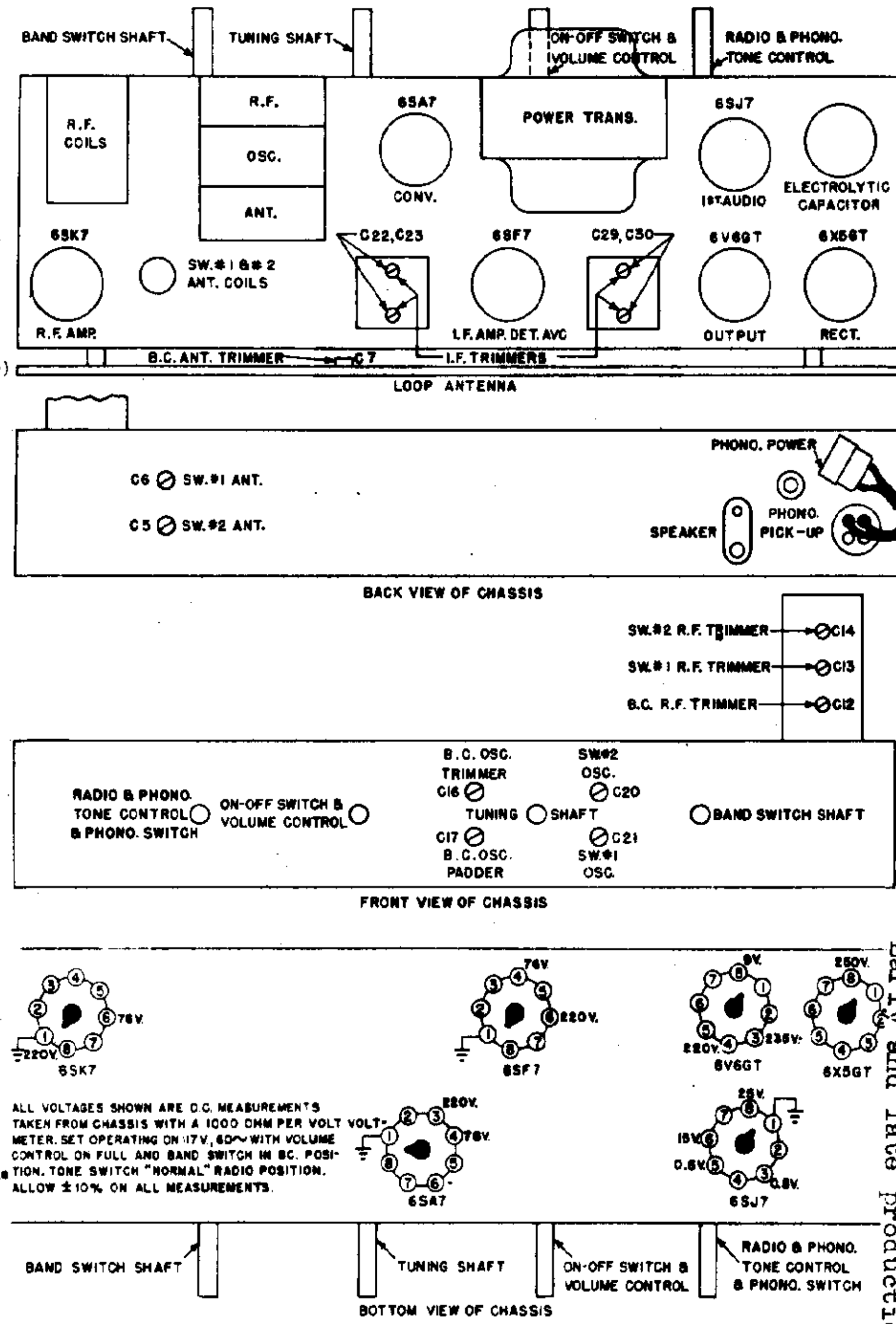
TUBE	FUNCTION	Voltage of each socket prong to Ground (Chassis) No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
6SK7	R-F Amplifier	0	0	0	0	0	76.B	6.1*	220.A
6SA7	Oscillator-Converter	0	0	220.A	76.B	0	0	6.1*	0
6SF7	I-F Amp.-Detector-AVC	0	0	0	76.B	0	220.A	6.1*	0
6SJ7	1st Audio Amplifier	0	0	.5D	0	.5D	15.A	6.1*	25.A
6V6GT	Beam Power Amplifier	0	0	235.A	220.A	0	--	6.1*	9.C
6X5GT	Rectifier	0	0	250.*	---	250.*	--	6.1*	250.A

* AC Volts A-250 Volt Scale B-100 Volt Scale C-25 Volt Scale D-5 Volt Scale

Voltage readings are for schematic diagram in this bulletin. Allow 10% ± on all measurements

All DC voltages made with 1000 ohms per volt voltmeter

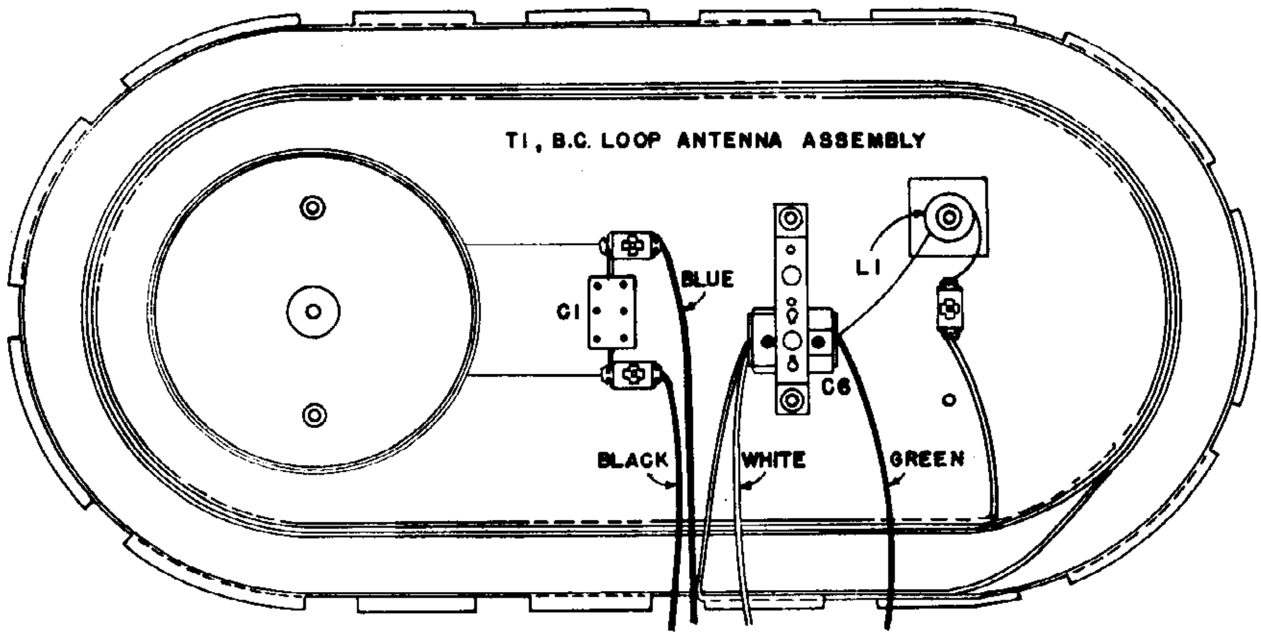
Voltages are DC unless otherwise specified.



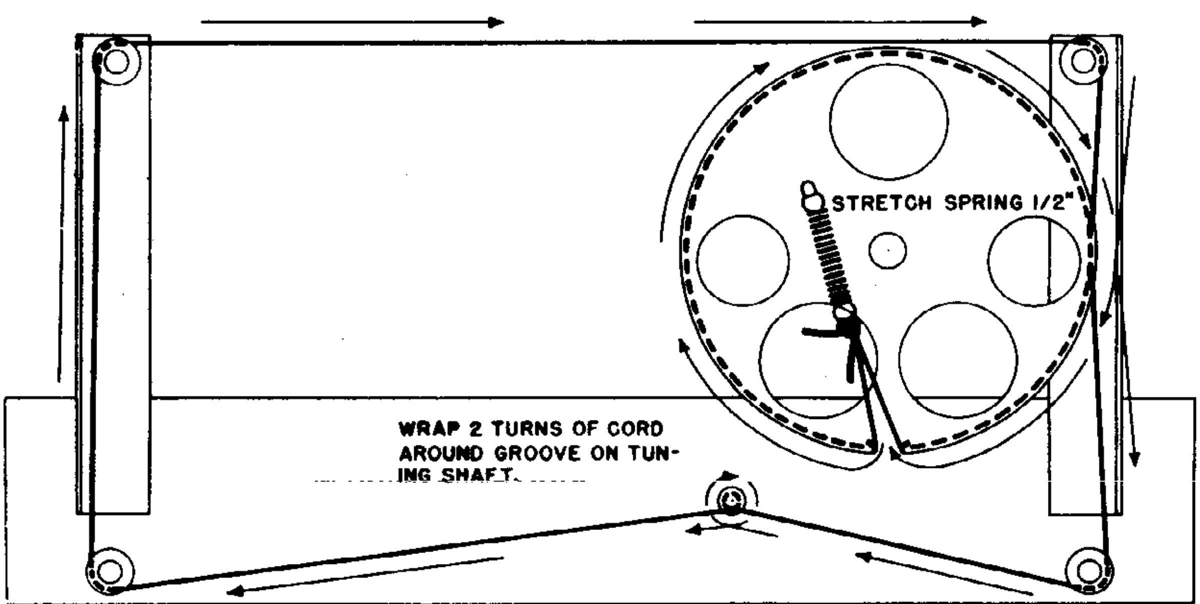
MODELS 6610, 6611, 6612,
6610PC, 6611PC, 6612PC
Early and late production

LEAR, INC.

LOOP WIRING DIAGRAM

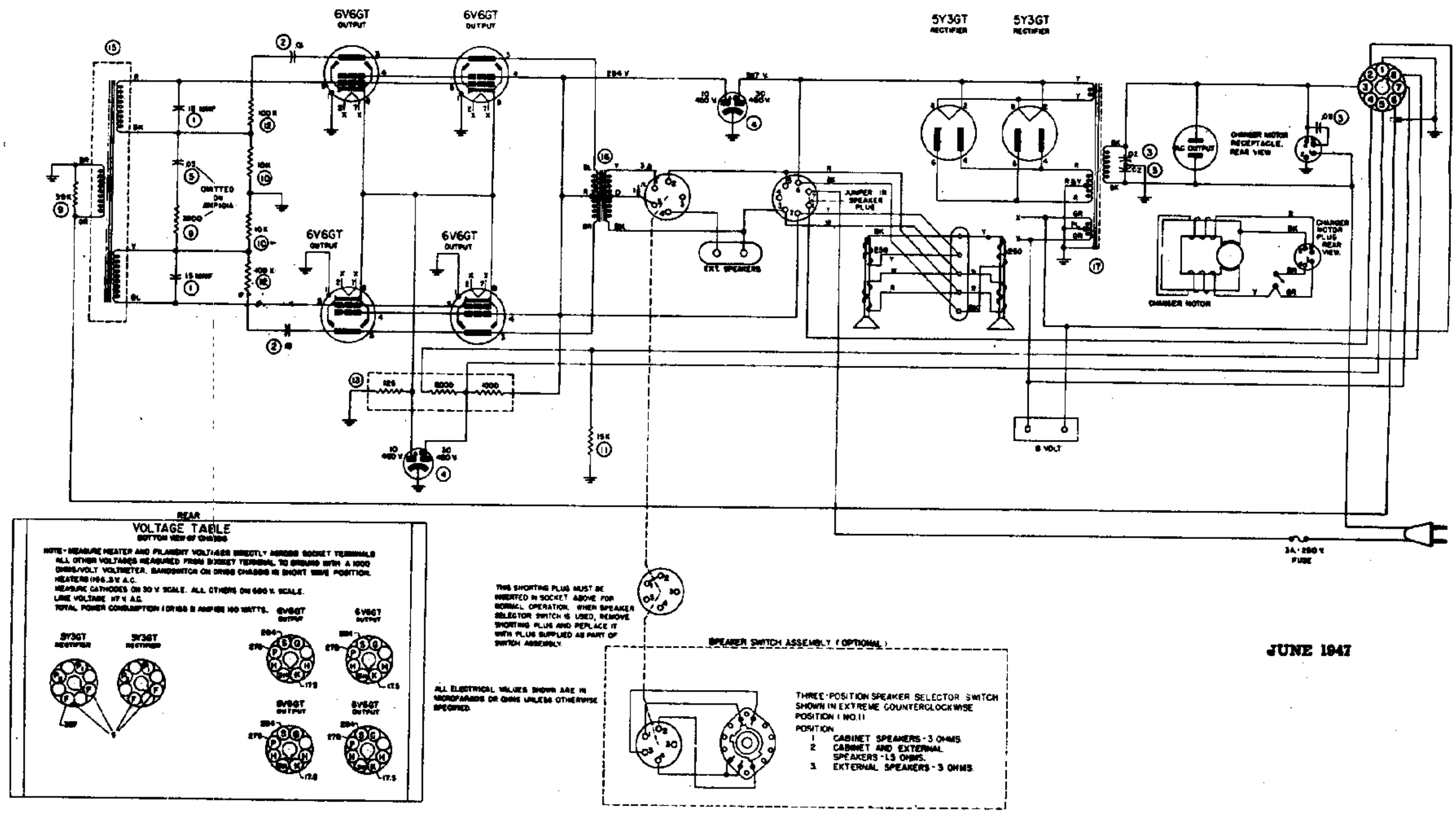


DIAL DRIVE DIAGRAM



FRONT VIEW

THE MAGNAVOX CO.



JUNE 1947

SPECIFICATIONS

Power supply.................117 volts 50/60 cycles AC
Power consumption.................*140 watts
Power output.................20 watts
Output impedance.................2.5/1.7 ohms

Tubes:
Power output (push-pull parallel stage).................(4) 6V6GT
Rectifiers.................(2) 5Y3G

Speakers:

	No. 582815	No. 582869
Field coil resistance	250 ohms	250 ohms
Voice coil impedance (400 cycles)	5.0 ohms	5.0 ohms

*Power consumption is for amplifier and CR-188 radio chassis.

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Capacitor, molded mica, 15 mmf	250107G93
2	Capacitor, paper, .01 mfd. 600 V	250129G2
3	Capacitor, paper, .02 mfd. 600 V	250129G3
4	Capacitor, electrolytic, 30-10 mfd. 450 V	270023G2
5	Capacitor, paper, .03 mfd. 400 V. [AMP-101B only]	250129G4
8	Resistor, composition, 3900 ohm ± 10% ½ W.	2300084G69
9	Resistor, composition, 39,000 ohm ½ W.	230084G81
10	Resistor, composition, 10,000 ohm ½ W.	230084G19
11	Resistor, composition, 15,000 ohm 2 W.	230086G20
12	Resistor, composition, 100,000 ohm 1 W.	230085G25
13	Resistor, wire wound, 125-8000-1000 ohm	240037G1
15	Transformer, input	320017G1
16	Transformer, output	330024G1
17	Transformer, power, 117 V. 50-60 cycle	300026G1
19	Cable and plug assembly	460557G1
20	Socket, speaker connection	180504G16
21	Socket, speaker switch	180504G6
22	Socket, power connection	180428G1
23	Socket, phonograph motor connection	180501G5
24	Socket, 6-volt	189788G2
	Socket, octal	180194G4
	Terminal board—external speaker connection	209601G2
	Fuse mounting	182467G1
	Fuse cover	182467G2
	Fuse, 3 amp. 250 V., cartridge	180157G10
	Fuse clip for spare fuse (2 required)	180236G1

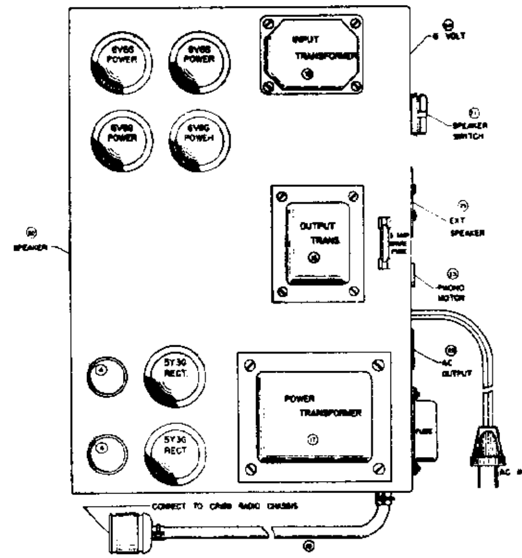
METHOD FOR REMOVING CHASSIS FROM CABINET

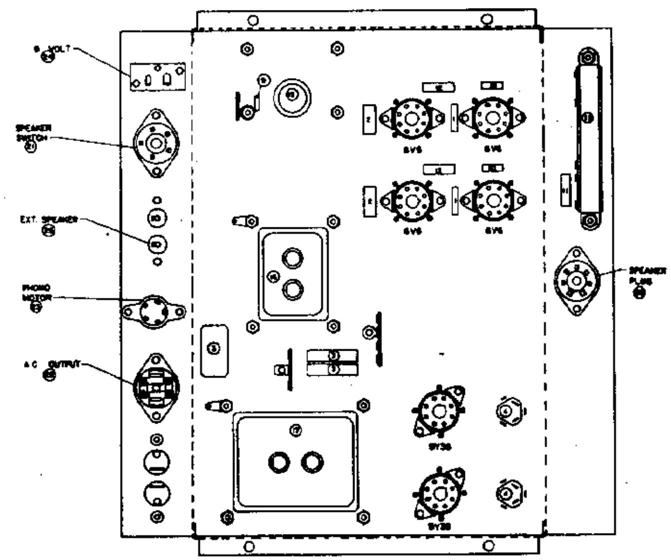
To remove the chassis, first remove all plugs and cables from the receptacles and the connector from the rear of the radio chassis. The amplifier chassis is mounted to the cabinet shelf with four screws and nuts; after they have been removed, the amplifier may be lifted from the cabinet.

ACCESSORIES

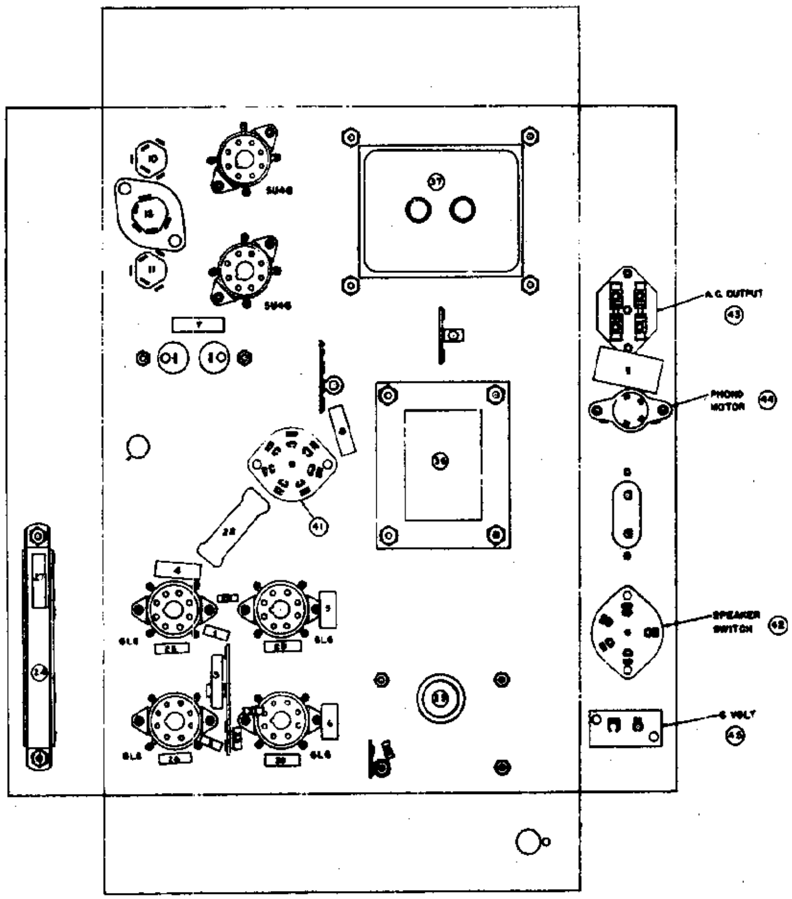
EXTENSION SPEAKER—Two screw terminals are provided on the rear of the amplifier chassis for the connection of an extension speaker line. High-fidelity permanent-magnet extension speakers are available through all authorized Magnavox dealers.

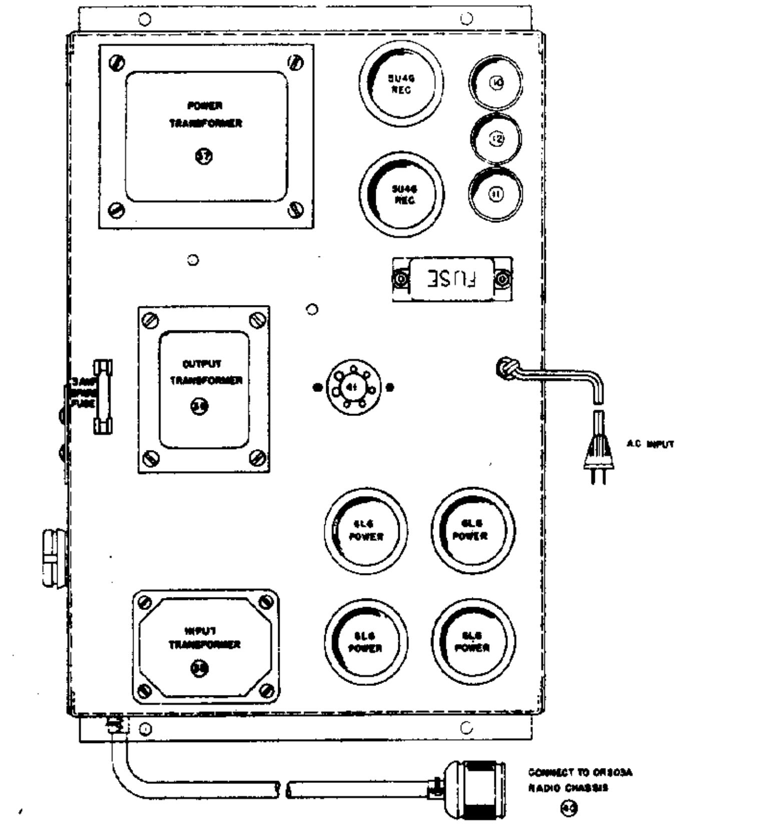
SPEAKER SELECTOR SWITCH—Provision is made in this amplifier for connecting extension speakers and a speaker selector switch. By means of this switch, the cabinet and extension speakers may be operated separately or together while maintaining the proper load on the amplifier. This is accomplished by means of a rotary switch with a connecting plug that may be purchased from any authorized Magnavox dealer. When shipped from the factory, a shorting plug is inserted in the amplifier receptacle stamped SPEAKER SWITCH. This plug must not be removed unless the speaker selector switch is added. Then the shorting plug is replaced with a plug that is supplied as a part of the selector switch assembly.





THE MAGNAVOX CO.



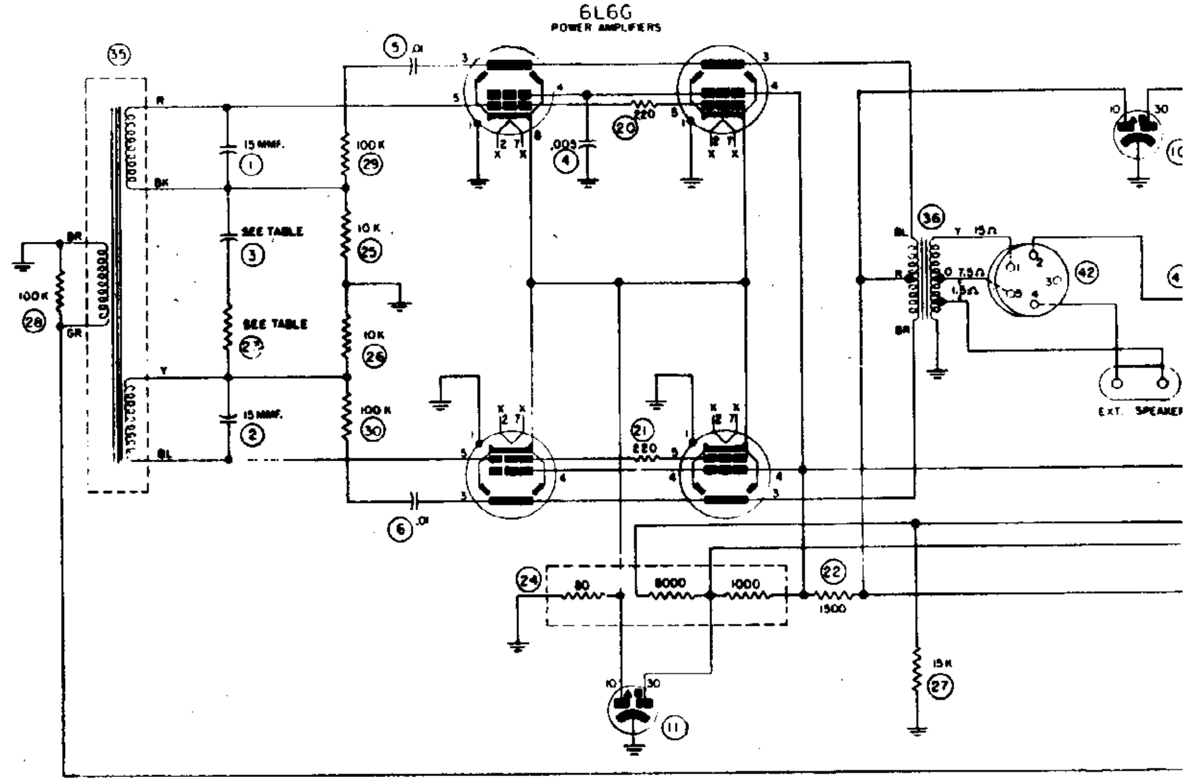


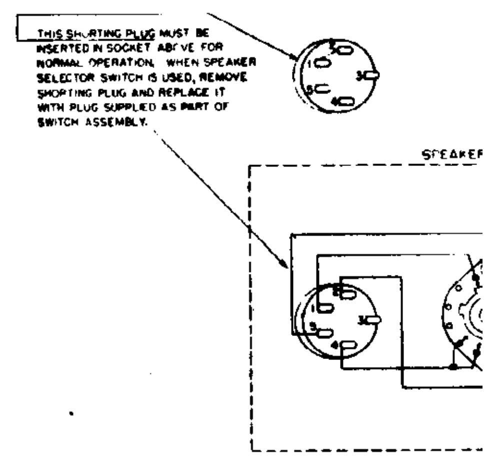
SPECIFICATIONS

Power supply	117 volts 50/60 cycles AC
Power consumption	*220 watts
Power output	45 watts
Output impedance	15/7.5/1.5 ohms
Tubes:	
Power output (push-pull parallel stage)	(4) 6L6G
Rectifiers	(2) 5U4G

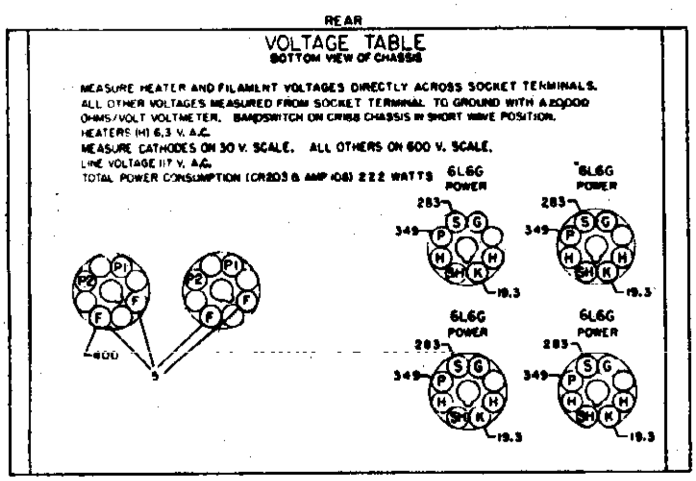
*Power consumption is for amplifier and CR-203 or CR-207 radio chassis.
†Voice coil resistance of one speaker.

AMP-108A Speakers:	No. 583002 (Bass)	(3) No. 583003 (Tweeter)
Field coil resistance	150 ohms	PM
Voice coil resistance	12 ohms	†3.2 ohms
AMP-108B Speakers:	No. 583002 (Bass)	No. 580005 (Tweeter)
Field coil resistance	150 ohms	PM
Voice coil resistance	12 ohms	11 ohms
or;	No. 582999	No. 580006
Field coil resistance	(Bass)	(Tweeter)
Field coil resistance	PM	150 ohms
Voice coil resistance	12 ohms	11 ohms





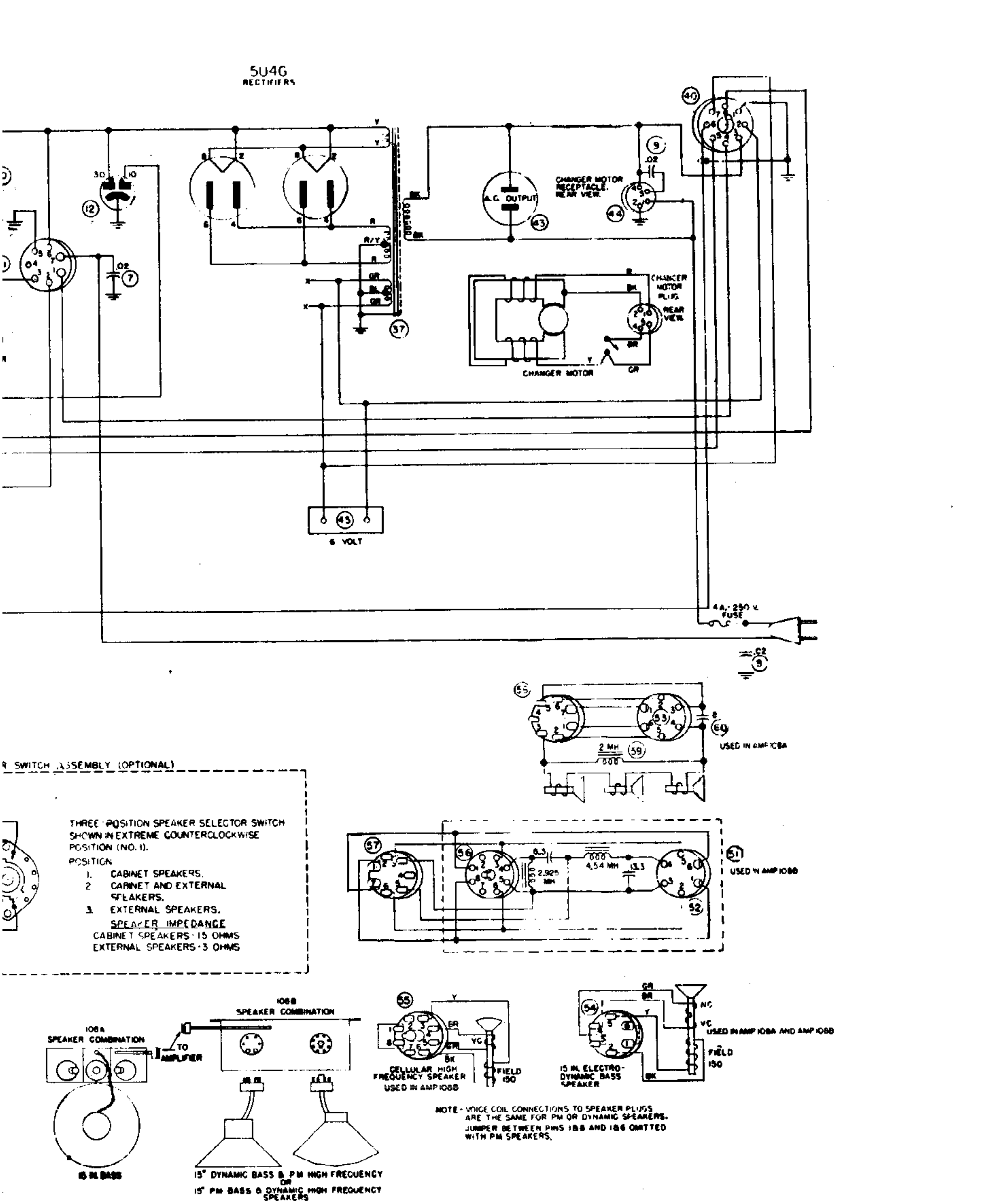
ALL ELECTRICAL VALUES SHOWN ARE IN MICROFARADS OR OHMS UNLESS OTHERWISE SPECIFIED.



MODEL	ITEM 3	ITEM 23
108A	.03	3900
108B	OMIT	OMIT

AUGUST, 1947

AGNAVOX CO.


5U4G
RECTIFIERS
A.C. OUTPUT
CHANGER MOTOR RECEPTACLE, REAR VIEW.
CHANGER MOTOR PLUG REAR VIEW
CHANGER MOTOR
6 VOLT
4 A. - 250 V. FUSE
USED IN AMP 108A
2 MH
USED IN AMP 108B
4.54 MH
2.925 MH
SWITCH ASSEMBLY (OPTIONAL)
THREE POSITION SPEAKER SELECTOR SWITCH SHOWN IN EXTREME COUNTERCLOCKWISE POSITION (NO. 1).
POSITION
1. CABINET SPEAKERS.
2. CABINET AND EXTERNAL SPEAKERS.
3. EXTERNAL SPEAKERS.
SPEAKER IMPEDANCE
CABINET SPEAKERS - 15 OHMS
EXTERNAL SPEAKERS - 3 OHMS
108A SPEAKER COMBINATION
TO AMPLIFIER
15 IN. BASS
108B SPEAKER COMBINATION
15" DYNAMIC BASS & P M HIGH FREQUENCY OR 15" PM BASS & DYNAMIC HIGH FREQUENCY SPEAKERS
CELLULAR HIGH FREQUENCY SPEAKER USED IN AMP 108B
FIELD 150
15 IN. ELECTRO-DYNAMIC BASS SPEAKER
USED IN AMP 108A AND AMP 108B
NOTE - VOICE COIL CONNECTIONS TO SPEAKER PLUGS ARE THE SAME FOR PM OR DYNAMIC SPEAKERS.
JUMPER BETWEEN PINS 1&8 AND 1&6 OMITTED WITH PM SPEAKERS.

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Capacitor, molded mica, 15 mmf	250159G93
2	Capacitor, molded mica, 15 mmf	250159G93
3	Capacitor, paper, .03 mfd, 400 V, (AMP 108A only)	250152G25
4	Capacitor, paper, .005 mfd, 600 V	250152G41
5	Capacitor, molded paper, .01 mfd, 600 V	250159G2
6	Capacitor, molded paper, .01 mfd, 600 V	250159G2
7	Capacitor, molded paper, .02 mfd, 600 V	250159G3
8	Capacitor, molded paper, .02 mfd, 600 V	250159G3
9	Capacitor, molded paper, .02 mfd, 600 V	250159G3
10	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
11	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
12	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
20	Resistor, composition, 220 ohm, ½ W	230084G9
21	Resistor, composition, 220 ohm, ½ W	230084G9
22	Resistor, wire wound, 1500 ohm, ± 10%, 10 W	240021G12
23	Resistor, composition, 3900 ohm, ± 10%, ½ W (AMP 108A only)	230084G69
24	Resistor, wire wound, 80-8000-1000 ohm, 3 W	240038G1
25	Resistor, composition, 10,000 ohm, ½ W	230084G19
26	Resistor, composition, 10,000 ohm, ½ W	230084G19
27	Resistor, composition, 15,000 ohm, 2 W	230086G20
28	Resistor, composition, 100,000 ohm, ± 10%, ½ W	230084G86
29	Resistor, composition, 100,000 ohm, 1 W	230085G25
30	Resistor, composition, 100,000 ohm, 1 W	230085G25
35	Transformer, input	320017G1
36	Transformer, output	330028G1
37	Transformer, power, 117 V, 50-60 cycle	300039G1
40	Cable & Plug assembly	460616G1
41	Socket, speaker connection	180504G16
42	Socket, speaker switch	180504G6
43	Socket, FM power connection	180428G1
44	Socket, phonograph motor connection	180501G5
45	Socket, 6 volt outlet	189788G2
46	Terminal board-external speaker connection	209601G2
51	Filter assembly (AMP 108B only)	350041G1
52	Socket, 15" speaker connection to filter (AMP 108B only)	180504G2
53	Socket, 15" speaker to tweeters (AMP 108A only)	180504G2
54	Plug, 15" speaker	180503G3
55	Plug, tweeter (AMP 108B only)	180503G5
56	Socket, octal (AMP 108B only)	180194G4
57	Plug, filter to Amplifier connection (AMP 108B only)	180503G4
58	Plug, tweeter to Amplifier connection (AMP 108A only)	180503G4
59	Coil, choke, A.F. (AMP 108A only)	350042G1
60	Capacitor, paper, 8 mfd, 100 V (AMP 108A only)	250167G1

METHOD FOR REMOVING CHASSIS FROM CABINET

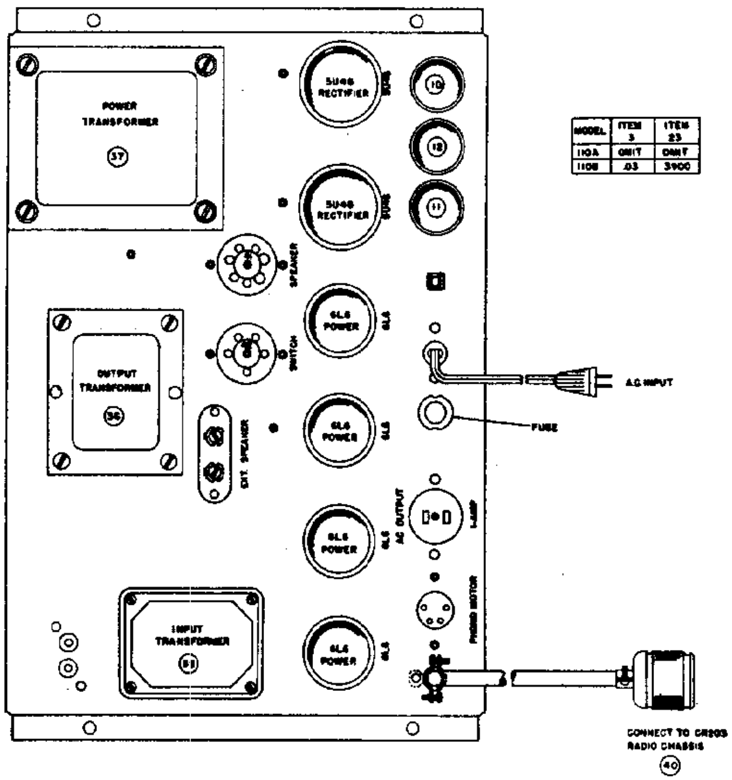
To remove the chassis, first remove all plugs and cables from the receptacles and the connector from the rear of the radio chassis. The amplifier chassis is mounted to the cabinet shelf with four screws. After they have been removed, the amplifier may be lifted from the cabinet.

ACCESSORIES

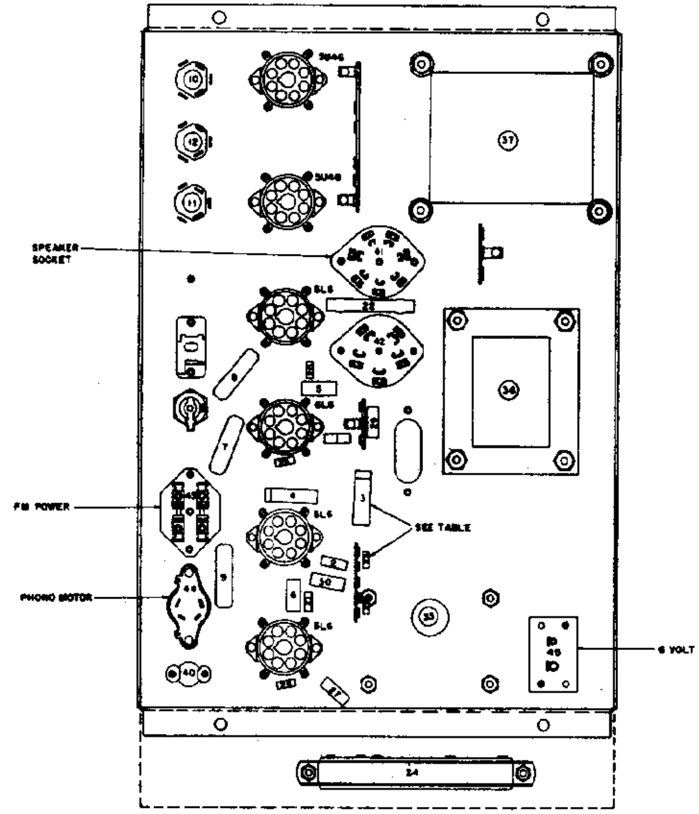
SPEAKER SELECTOR SWITCH—Provision is made in this amplifier for connecting extension speakers and a speaker selector switch. By means of this switch, the cabinet and extension speakers may be operated separately or together while maintaining the proper load on the amplifier. This is accomplished by means of a rotary switch with a connecting plug that may be purchased from any authorized Magnavox dealer. When shipped from the factory, a shorting plug is inserted in the amplifier receptacle stamped SPEAKER SWITCH. This plug must not be removed unless the speaker selector switch is added. Then the shorting plug is replaced with a plug that is supplied as a part of Selector switch assembly No. 880364.

EXTENSION SPEAKER—Two screw terminals are provided on the rear of the amplifier chassis for the connection of an extension speaker line. No. 582888 12-inch permanent-magnet extension speakers are available through all authorized Magnavox dealers.

THE MAGNAVOX CO.



MODEL	ITEM 3	ITEM 23
110A	OMIT	OMIT
110B	.03	3900



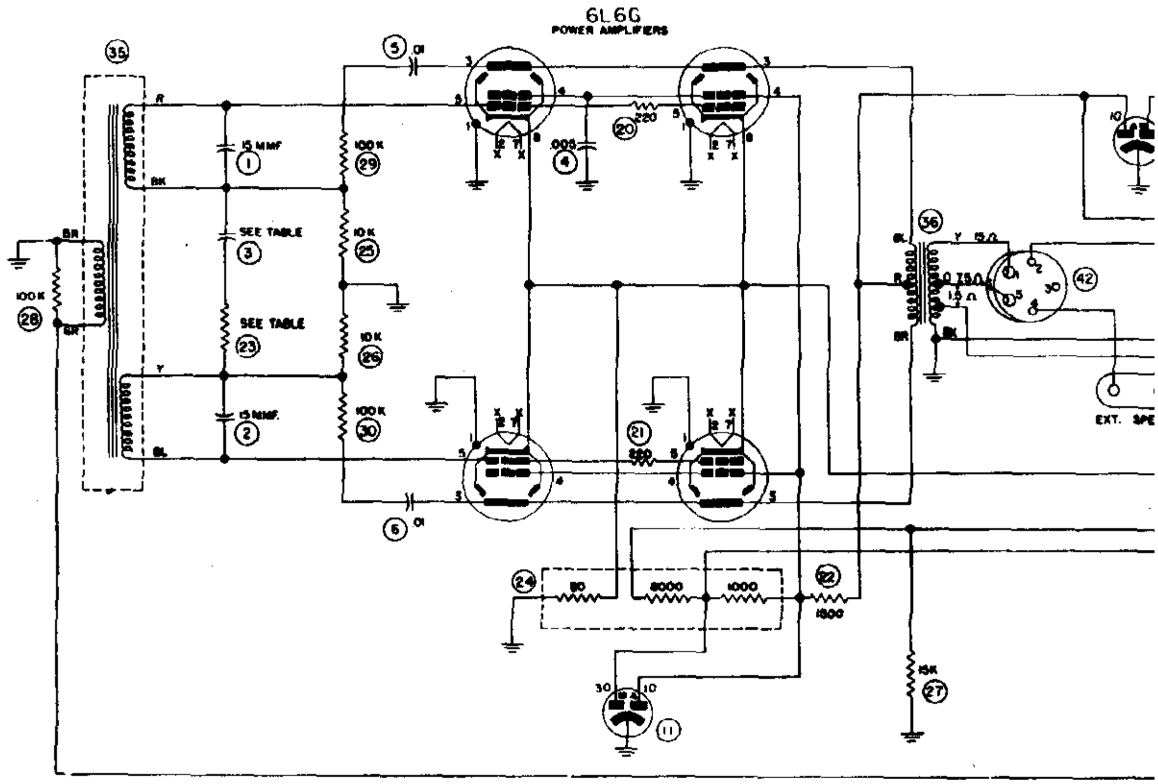
SPECIFICATIONS

Power supply .... 117 volts 50/60 cycles AC
Power consumption .... *220 watts
Power output .... 45 watts
Output impedance .... 15/7.5/1.5 ohms

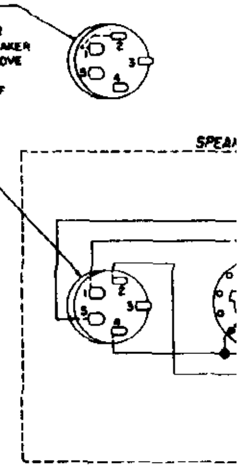
Tubes:
Power output (push-pull parallel stage) .... (4) 6L6G
Rectifiers .... (2) 5U4G

*Power consumption is for amplifier and CR-203 or CR-207 radio chassis.
†Voice coil resistance of one speaker.

AMP-110A Speakers:	No. 583002 (Bass)	No. 580005 (Tweeter)
Field coil resistance	150 ohms	PM
Voice coil resistance	12 ohms	11 ohms
or;	No. 582999 (Bass)	No. 580006 (Tweeter)
Field coil resistance	PM	150 ohms
Voice coil resistance	12 ohms	11 ohms
AMP-110B Speakers:	No. 583002 (Bass)	(3) No. 583003 (Tweeter)
Field coil resistance	150 ohms	PM
Voice coil resistance	12 ohms	†3.2 ohms



THIS SHORTING PLUG MUST BE INSERTED IN SOCKET ABOVE FOR NORMAL OPERATION. WHEN SPEAKER SELECTOR SWITCH IS USED, REMOVE SHORTING PLUG AND REPLACE IT WITH PLUG SUPPLIED AS PART OF SWITCH ASSEMBLY.



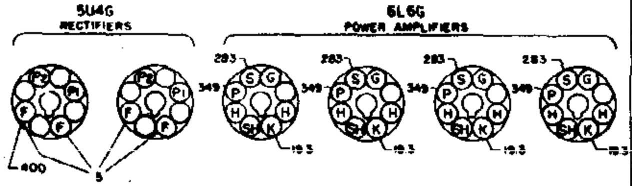
ALL ELECTRICAL VALUES SHOWN ARE IN MICROFARADS OR OHMS UNLESS OTHERWISE SPECIFIED.

REAR

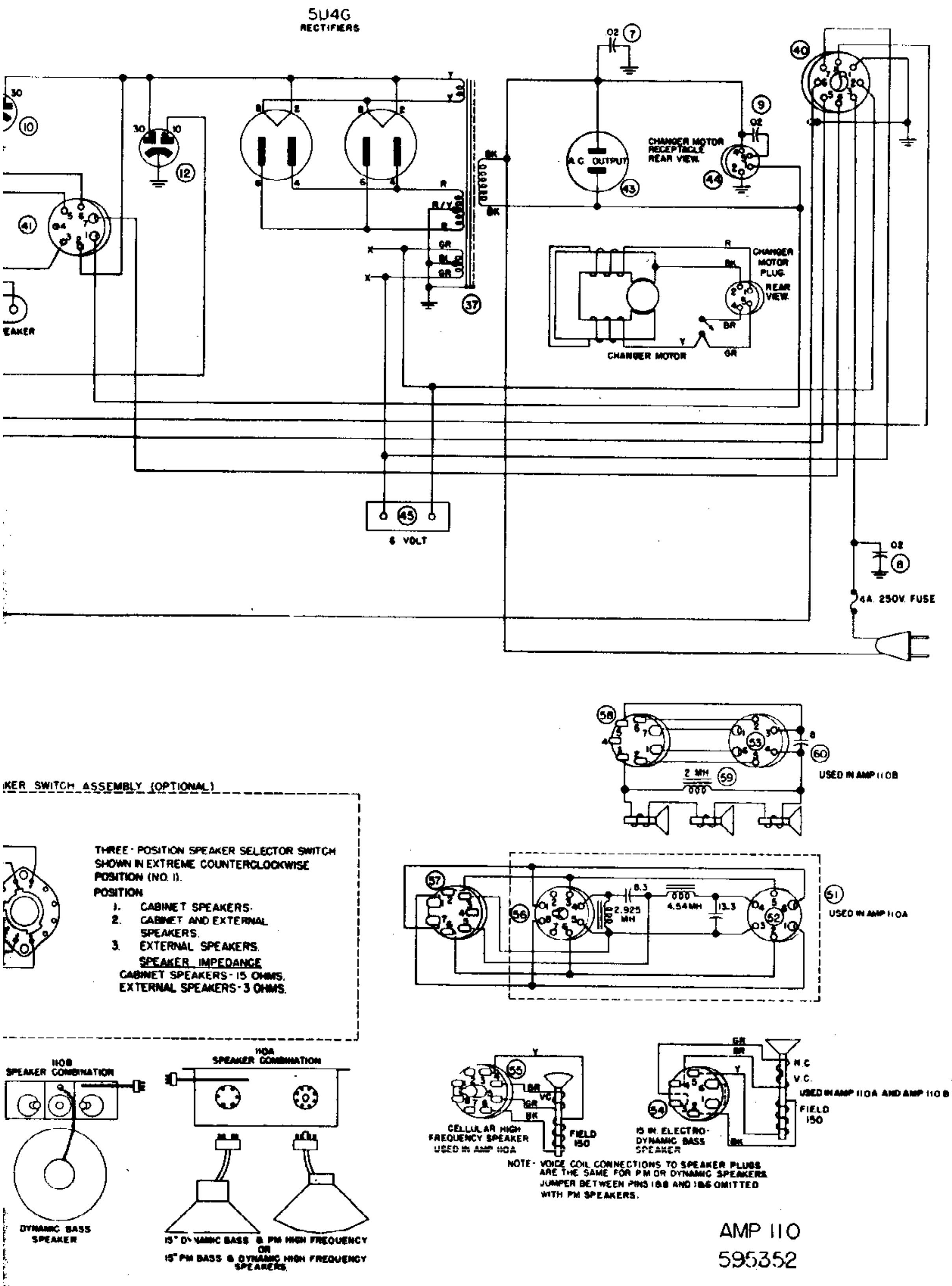
VOLTAGE TABLE

BOTTOM VIEW OF CHASSIS

MEASURE HEATER AND FILAMENT VOLTAGES DIRECTLY ACROSS SOCKET TERMINALS.
ALL OTHER VOLTAGES MEASURED FROM SOCKET TERMINAL TO GROUND WITH A 20,000 OHMS/VOLT VOLTMETER. BAND SWITCH ON CR 203 CHASSIS IN SHORT WAVE POSITION.
HEATERS (H) 6.3 V. A.C.
MEASURE CATHODES ON 30 V. SCALE. ALL OTHERS ON 600 V. SCALE.
LINE VOLTAGE 117 V. A.C.
TOTAL POWER CONSUMPTION (CR 203 & AMP 110) 222 WATTS



110B	03	3900
110A	OMIT	OMIT
MODEL	ITEM 3	ITEM 23


5U4G
RECTIFIERS
A.C. OUTPUT
CHANGER MOTOR RECEPTACLE REAR VIEW
CHANGER MOTOR PLUG REAR VIEW
CHANGER MOTOR
6 VOLT
4A. 250V. FUSE
2 MH
USED IN AMP 110B
2.925 MH
4.54 MH
USED IN AMP 110A
KER SWITCH ASSEMBLY (OPTIONAL)
THREE-POSITION SPEAKER SELECTOR SWITCH SHOWN IN EXTREME COUNTERCLOCKWISE POSITION (NO. 1).
POSITION
1. CABINET SPEAKERS.
2. CABINET AND EXTERNAL SPEAKERS.
3. EXTERNAL SPEAKERS.
SPEAKER IMPEDANCE
CABINET SPEAKERS - 15 OHMS.
EXTERNAL SPEAKERS - 3 OHMS.
110B SPEAKER COMBINATION
110A SPEAKER COMBINATION
DYNAMIC BASS SPEAKER
15" DYNAMIC BASS & PM HIGH FREQUENCY
OR
15" PM BASS & DYNAMIC HIGH FREQUENCY SPEAKERS.
CELLULAR HIGH FREQUENCY SPEAKER USED IN AMP 110A
FIELD 150
15 IN. ELECTRO-DYNAMIC BASS SPEAKER
USED IN AMP 110A AND AMP 110B
NOTE - VOICE COIL CONNECTIONS TO SPEAKER PLUGS ARE THE SAME FOR PM OR DYNAMIC SPEAKERS. JUMPER BETWEEN PINS 1&8 AND 1&6 OMITTED WITH PM SPEAKERS.
AMP 110
595352

THE MAGNAVOX CO.

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Capacitor, molded mica, 15 mmf	250159G93
2	Capacitor, molded mica, 15 mmf	250159G93
3	Capacitor, paper, .03 mfd, 400 V, (AMP 110B only)	250152G25
4	Capacitor, paper, .005 mfd, 600 V	250152G41
5	Capacitor, molded paper, .01 mfd, 600 V	250159G2
6	Capacitor, molded paper, .01 mfd, 600 V	250159G2
7	Capacitor, molded paper, .02 mfd, 600 V	250159G3
8	Capacitor, molded paper, .02 mfd, 600 V	250159G3
9	Capacitor, molded paper, .02 mfd, 600 V	250159G3
10	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
11	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
12	Capacitor, electrolytic, 30-10 mfd, 475 V	270023G2
20	Resistor, composition, 220 ohm, ½ W	230084G9
21	Resistor, composition, 220 ohm, ½ W	230084G9
22	Resistor, wire wound, 1500 ohm, ± 10%, 10 W	240021G12
23	Resistor, composition, 3900 ohm, ± 10%, ½ W, (AMP 110B only)	230084G69
24	Resistor, wire wound, 80-8000-1000 ohm, 3 W	240038G1
25	Resistor, composition, 10,000 ohm, ½ W	230084G19
26	Resistor, composition, 10,000 ohm, ½ W	230084G19
27	Resistor, composition, 15,000 ohm, 2 W	230086G20
28	Resistor, composition, 100,000 ohm ± 10%, ½ W	230084G86
29	Resistor, composition, 100,000 ohm, 1 W	230085G25
30	Resistor, composition, 100,000 ohm, 1 W	230085G25
35	Transformer, input	320017G1
36	Transformer, output	330028G1
37	Transformer, power, 117 V, 50-60 cycle	300039G1
40	Cable & Plug assembly	460616G1
41	Socket, speaker connection	180504G16
42	Socket, speaker switch	180504G6
43	Socket, FM power connection	180428G1
44	Socket, phonograph motor connection	180501G5
45	Socket, 6 volt outlet	189788G2
46	Terminal board-external speaker connection	209601G2
51	Filter assembly (AMP 110A only)	350041G1
52	Socket, 15" speaker connection to filter (AMP 110A only)	180504G2
53	Socket, 15" speaker to tweeters (AMP 110B only)	180504G2
54	Plug, 15" speaker	180503G3
55	Plug, tweeter (AMP 110A only)	180503G5
56	Socket, octal (AMP 110A only)	180194G4
57	Plug, filter to Amplifier connection (AMP 110A only)	180503G4
58	Plug, tweeter to Amplifier connection (AMP 110B only)	180503G4
59	Coil, choke, A.F. (AMP 110B only)	350042G1
60	Capacitor, paper, 8 mfd, 100 V (AMP 110B only)	250167G1

METHOD FOR REMOVING CHASSIS FROM CABINET

To remove the chassis, first remove all plugs and cables from the receptacles and the connector from the rear of the radio chassis. The amplifier chassis is mounted to the cabinet shelf with four screws. After they have been removed, the amplifier may be lifted from the cabinet.

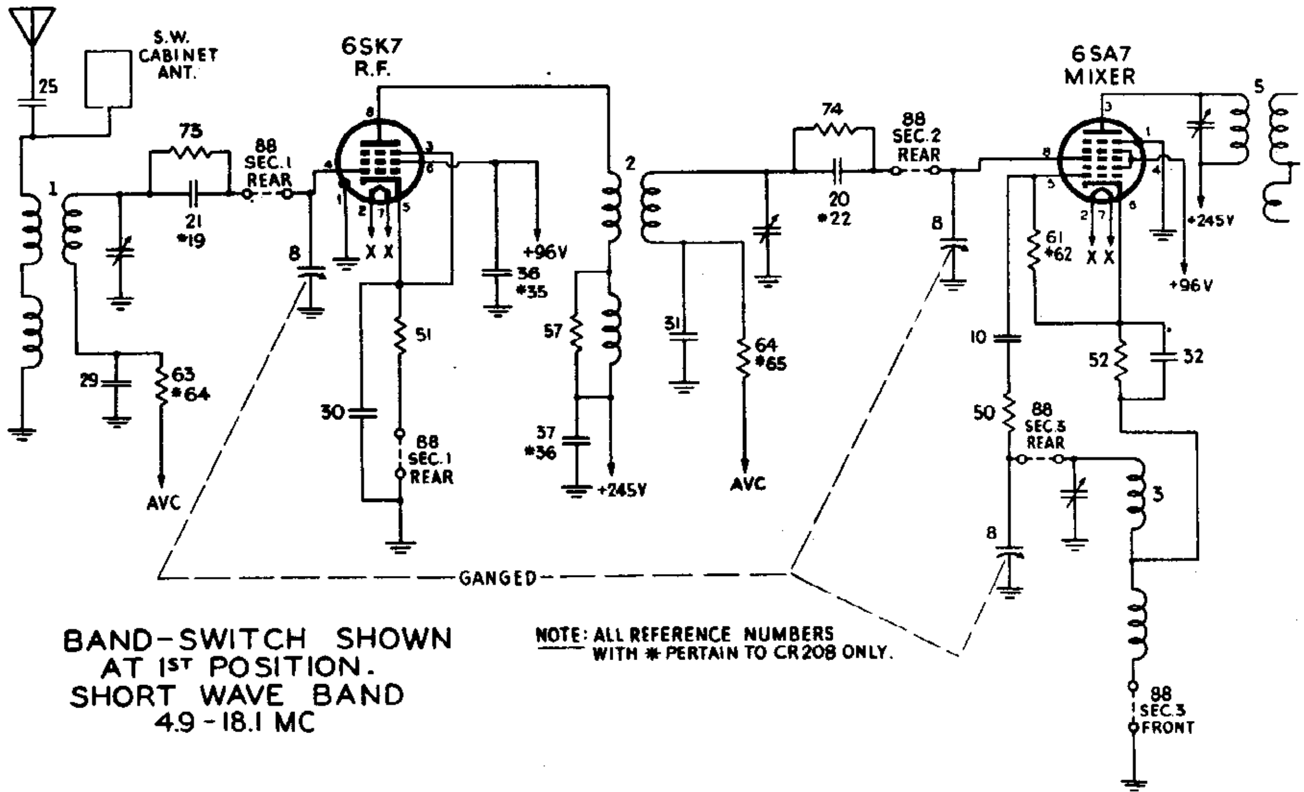
ACCESSORIES

SPEAKER SELECTOR SWITCH—Provision is made in this amplifier for connecting extension speakers and a speaker selector switch. By means of this switch, the cabinet and extension speakers may be operated separately or together while maintaining the proper load on the amplifier. This is accomplished by means of a rotary switch with a connecting plug that may be purchased from any authorized Magnavox dealer. When shipped from the factory, a shorting plug is inserted in the amplifier receptacle stamped SPEAKER SWITCH. This plug must not be removed unless the speaker selector switch is added. Then the shorting plug is replaced with a plug that is supplied as a part of Selector switch assembly No. 880364.

EXTENSION SPEAKER—Two screw terminals are provided on the rear of the amplifier chassis for the connection of an extension speaker line. No. 582888 12-inch permanent-magnet extension speakers are available through all authorized Magnavox dealers.

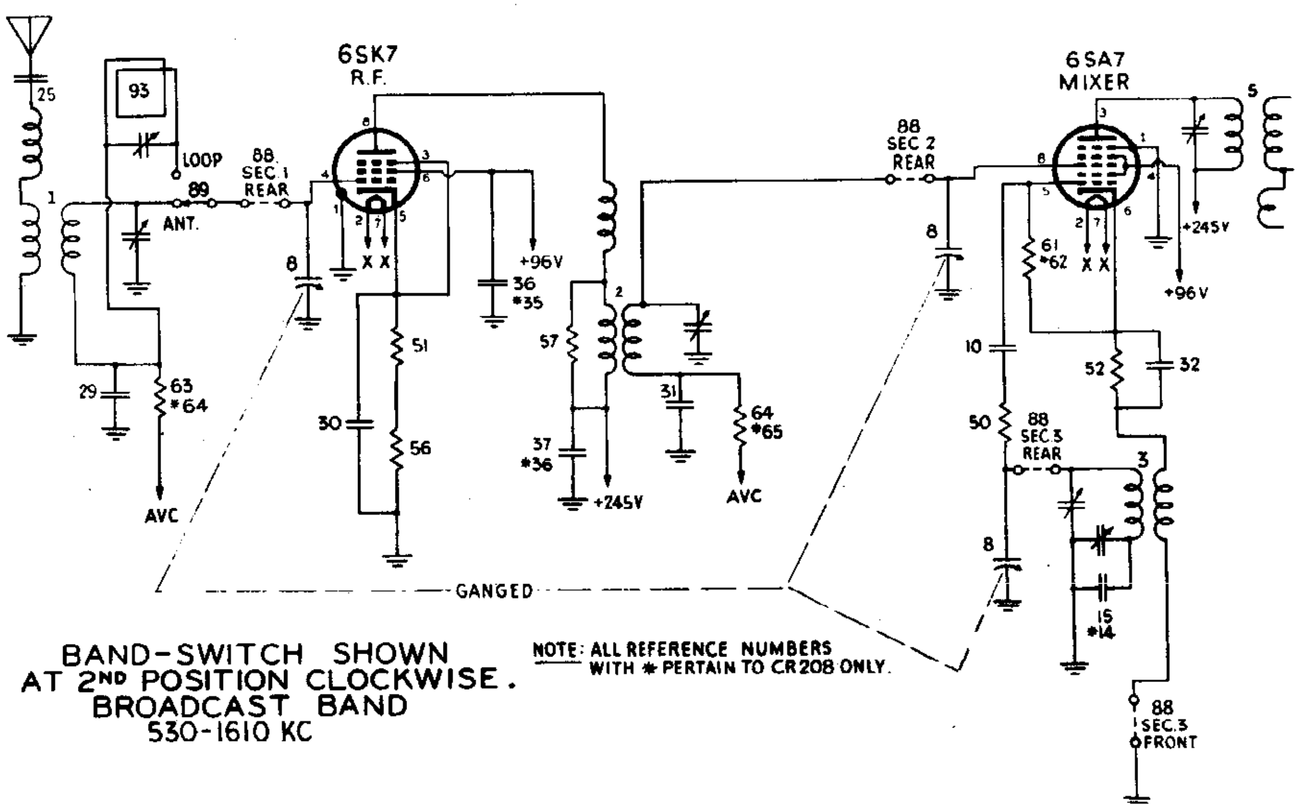
THE MAGNAVOX CO.

MODELS CR-203A,-B
MODELS CR-207A,-B,-C,-D
MODELS CR-208A,-B



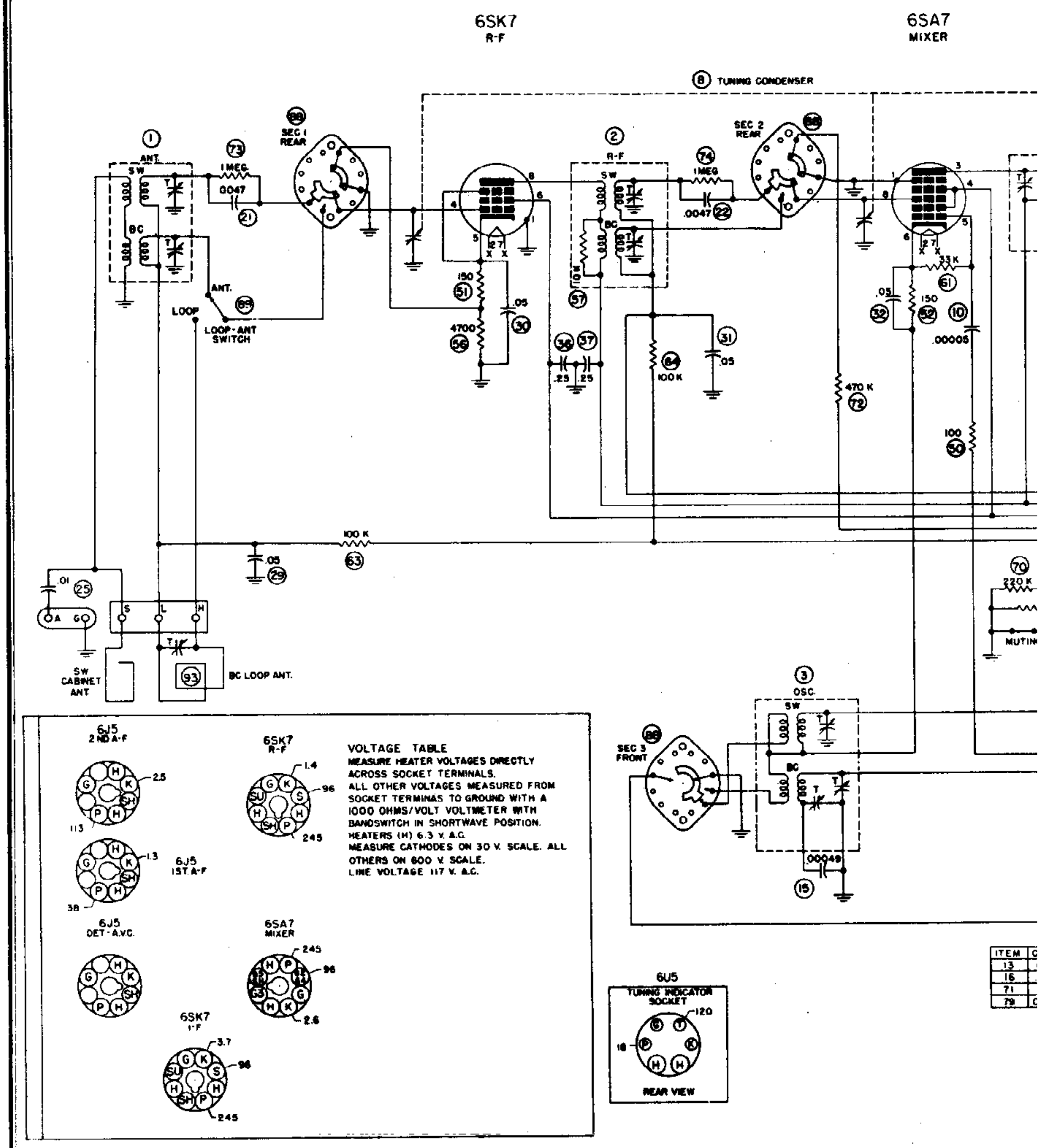
BAND-SWITCH SHOWN AT 1ST POSITION. SHORT WAVE BAND 4.9-18.1 MC

NOTE: ALL REFERENCE NUMBERS WITH * PERTAIN TO CR208 ONLY.



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. BROADCAST BAND 530-1610 KC

NOTE: ALL REFERENCE NUMBERS WITH * PERTAIN TO CR208 ONLY.



Intermediate frequency ....455 kc.

Tuning frequency range:

Broadcast band ....530—1610 kc.

Short wave band ....4.9—18.1 mc.

Tubes:

R-F Amplifier ....

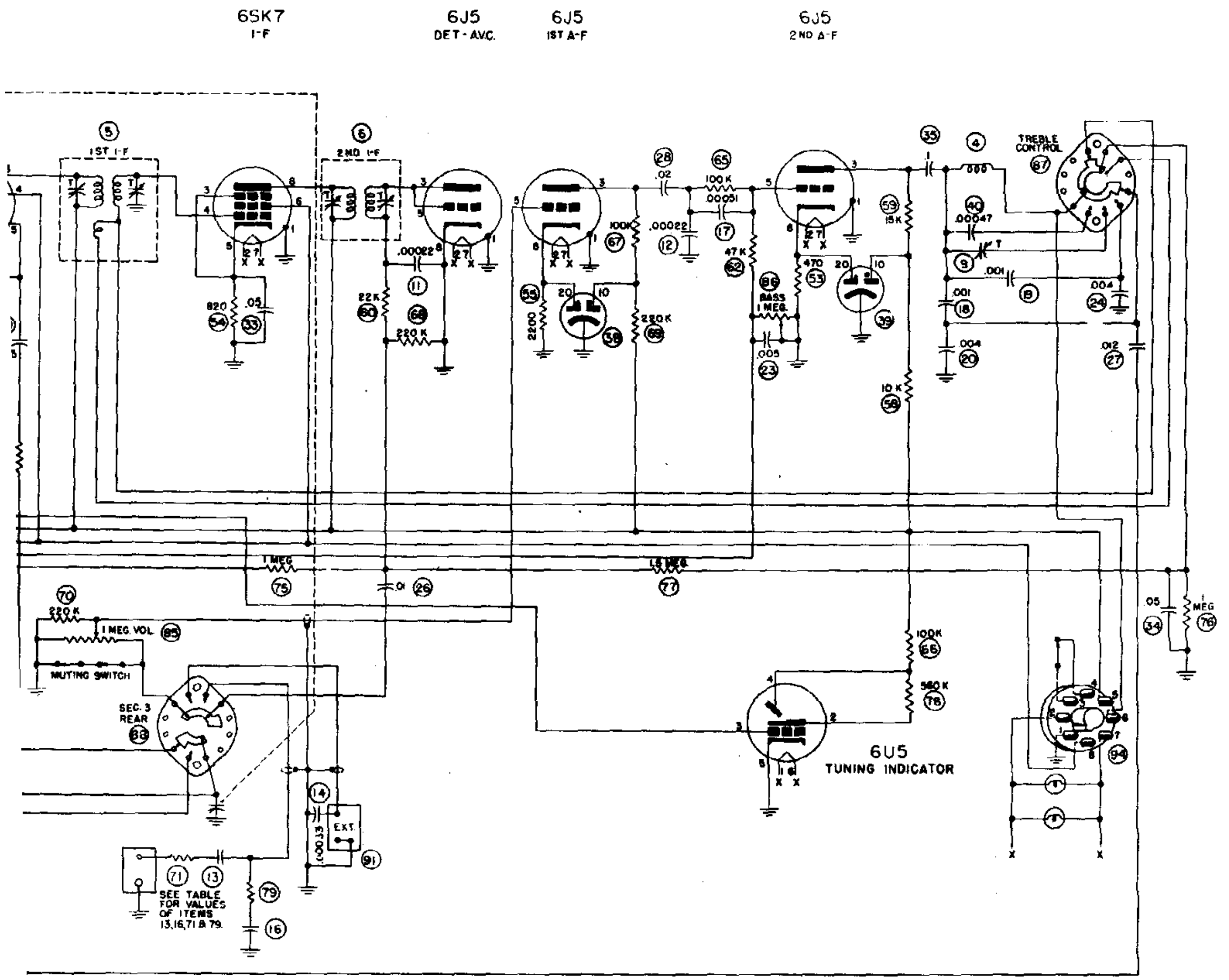
Converter ....

I-F Amplifier ....

Detector and AVC..........................

THE MAGNAVOX CO.

MODELS CR-203A, CR-203B



ITEM	CR203A	CR203B
13	.00033	.00051
16	.00051	.00051
71	220K	OMITTED
79	OMITTED	47K

I-F 455 KC

BAND SELECTOR SWITCH SHOWN WITH ITS CONTROL KNOB IN THE EXTREME COUNTERCLOCKWISE POSITION (SHORT WAVE).

ALL ELECTRICAL VALUES SHOWN ARE IN OHMS OR MICROFARADS UNLESS OTHERWISE SPECIFIED.

JULY 1947

.... 6SK7	First Audio 6J5
.... 6SA7	Second Audio 6J5
.... 6SK7	Tuning Indicator 6U5
.... 6J5	Dial lamps .... Mazda No. 44

CONDENSER GANG DRIVE ADJUSTMENTS

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are effected; otherwise the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring, Spring Retainer and Flywheel in the manner shown on Figure 3. Note that the Tuning Shaft must extend ¾" from the front of the assembly and that the spacing between the rear of the Drive Collar and the front of the Flywheel must be 3-5/64". Any excess length in the Tuning Shaft may extend beyond the rear of the Flywheel. See Figure 2.
2. The distance between the rubber-tired Drive Wheel and the smaller diameter section of the Spring Retainer must be 1/32" to 1/16" (Figure 3). This adjustment is effected by loosening the two No. 6 Allen set screws in the Drive Wheel hub and sliding the wheel on its shaft until the required clearance is obtained. When the adjustment is completed, tighten the two screws in the hub of the Drive Wheel.
3. While pressing down on the Treadle Bar at the location shown on Figure 3, adjust the Thrust Bracket until the clearance between the rear of the Flywheel and the projection on the Thrust Bracket is .010" as shown on the diagram. To make this adjustment, loosen the two No. 6 Allen set screws (use No. 6 Allen Wrench—Magnavox Part No. 800044G2) in the hub of Thrust Bracket and rotate the bracket until the specified clearance is obtained when the push buttons are NOT actuated. Tighten the two screws securely when the adjustment is completed. Press each push button and check that the Drive Collar is pushed away from the rubber-tired Drive Wheel.
4. Next, adjust the clearance in the muting switch contacts by turning the Phillips-head screw designated Adjustment "A" on Figure 2, until the specified clearance of .025" is obtained (when the push buttons are NOT actuated.)
5. While pressing any one of the push buttons in as far as possible, turn the screw designated Adjustment "B" until a minimum clearance of .015" is obtained between the front surface of the Drive Collar and the switch spring directly in front of it. This setting should also cause a minimum clearance of .010" between the switch contacts actuated by pressure of the front surface of the Drive Collar, when the Tuning Shaft is pulled out. The function of this switch is to open the muting circuit when setting up the push buttons. As its contacts are wired in series with the large muting switch (contacts are shorted by pressing any push button), pulling out on the Tuning Shaft causes the small switch contacts to open the muting circuit so that a station can be heard while the push button is held in and tightened.

On rare occasions it may be necessary to adjust the relation between the push button bars and the Treadle Bar. Such adjustment might be required if when pushing any of the push buttons, sufficient motion is not transmitted to the Treadle Bar to cause a disengagement between the Drive Collar and the Drive wheel.

This can usually be accomplished by loosening the two screws designated "C" and "D" on Figure 3, and moving plate "B" in the direction required to correct this condition.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:	
600 kc.	7.0
6 mc.	1.63
R-F to Converter Grid at:	
600 kc.	3.4
6 mc.	3.4
R-F on Converter Grid to I-F Grid at:	
600 kc.	40.0
6 mc.	35.5
I-F on Converter Grid to I-F Grid at:	
455 kc.	59
I-F Grid to Detector Plate at:	
455 kc.	68

AUDIO GAIN

Voltage required across Volume Control to produce 0.1 watt speaker output** at 400 cycles is .0072 volt with Band Selector Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across Oscillator Grid Resistor at:

600 kc.	5.9
6 mc.	6.6

* Variations of ±20% are permissible. All readings made with sufficient input signal to provide .05 watt speaker output.

** .05 watt speaker output at 400 cycles is equivalent to a reading of 0.28 volts as measured by a high resistance AC voltmeter across the voice coil of either speaker.

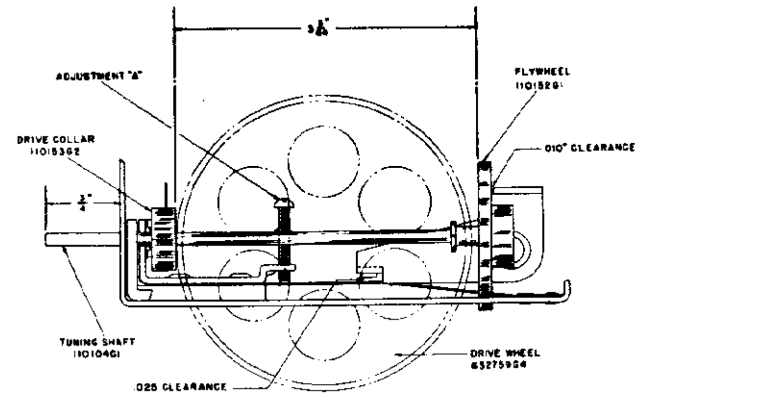


FIGURE 2

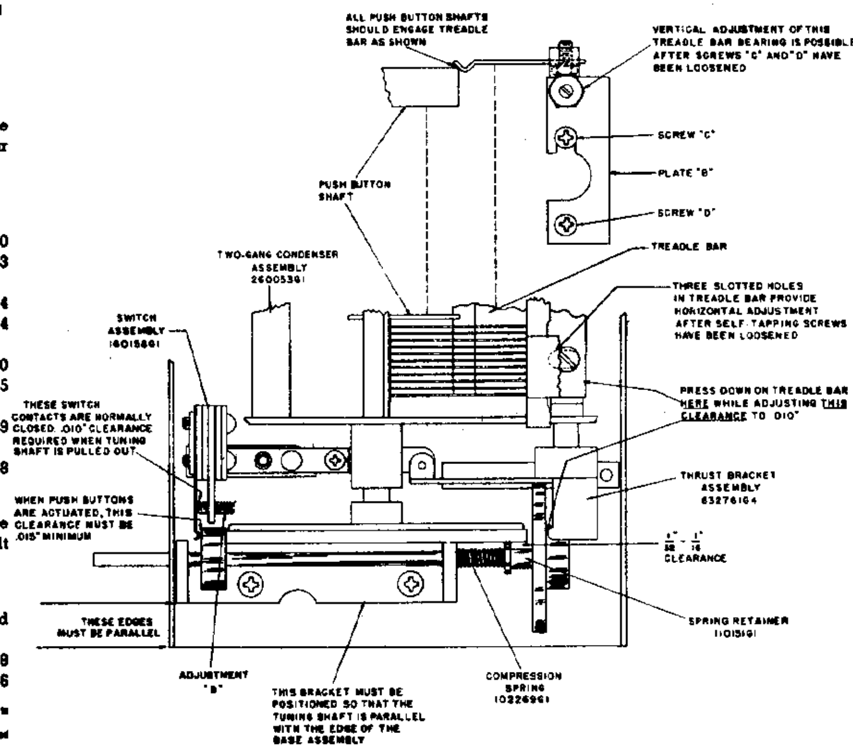


FIGURE 3

ALIGNMENT PROCEDURE

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 5. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings. *Always set the Treble Control to SHARP TUNE before aligning the i-f stages.* This is done by turning the Treble Control Knob to the No. 1 position.

I-F ALIGNMENT

1. Connect the output of the signal generator to the control grid (pin No. 8) of the 6SA7 tube through a .00025 mfd. capacitor. The ground on the signal generator should be connected to the radio chassis ground.
2. Turn the condenser gang until it is completely meshed, (low-frequency end of dial calibration) and set the band selector switch to BDCST as for broadcast band reception.
3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

On some models of the CR-203 chassis, the two i-f trimmers are located in the top of the respective i-f transformers as shown in the layout diagram Figure 7. In other models, one trimmer is accessible from the top and the other from the bottom of each transformer.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it to the radio antenna terminal through the .00025 mfd. capacitor. The ANT-LOOP switch (89) must be in the ANT. setting.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, loosen the set screws in the hub of pulley "D" shown on Figure 1 and make the necessary adjustment.
3. With the band selector still set for broadcast band reception, adjust the signal generator and the radio receiver to 600 kc. While rocking the gang condenser a few degrees to the right and to the left, adjust the 600 kc. oscillator padder for maximum indication on the output meter.
4. Set the signal generator and the radio receiver to 1400 kc.; adjust the 1400 kc. oscillator trimmer and the 1400 kc. antenna trimmer for maximum output. If considerable adjustment was necessary, recheck the 600 kc. padder setting.
5. If the loop antenna trimmer is out of adjustment it should be set after the radio chassis is in the cabinet. Set the ANT-LOOP switch (89) to the LOOP position. Adjust the signal generator to 1400 kilocycles and connect its output to a loop containing approximately five turns of wire eight inches in diameter placed eighteen inches from the receiver loop and in the same plane.
6. Set the receiver to 1400 kc. and adjust the trimmer on the receiver loop for maximum output.

SHORT WAVE BAND ALIGNMENT

1. Set the band selector switch to SW as for short wave reception and substitute a 400 ohm resistor for the capacitor in series with the signal generator lead connected to the antenna terminal on the receiver.
2. Set the signal generator and the radio receiver to 15 mc.; then adjust the 15 mc. oscillator trimmer and the 15 mc. antenna trimmer for maximum output. While adjusting the 15 mc. oscillator trimmer two peaks may be observed; only one is the correct peak for 15 mc. alignment. Screw in the trimmer to maximum capacity—then decrease the capacity until the first peak is observed. This is the correct one.

10 KC FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment, the following procedure should be observed.

1. Turn the Treble Control to FULL RANGE (No. 4 position).
2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer (9) for minimum output.
4. If an audio oscillator is not available for making this adjustment, set the band selector to BDCST, connect an antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D." If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting.

Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B," around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C," and over the top of pulley "D." Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow ¼" to 5/16" of cable between the spring and the inside rim of pulley "D." Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

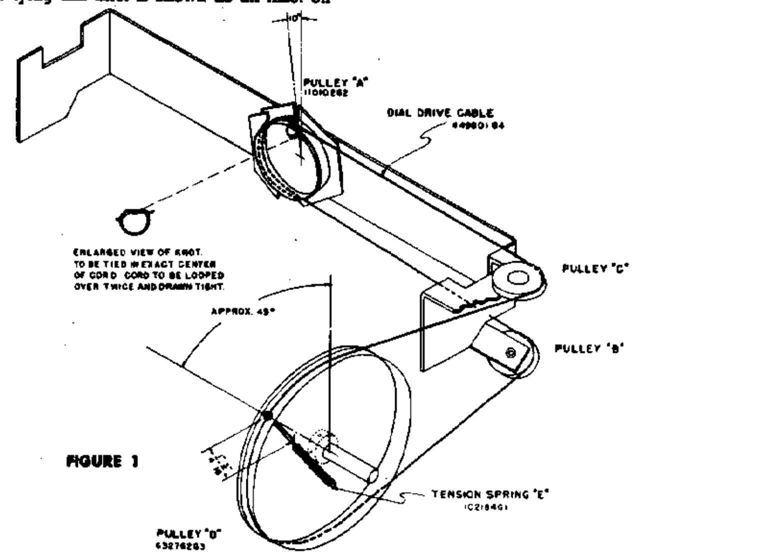


FIGURE 1

THE MAGNAVOX CO.

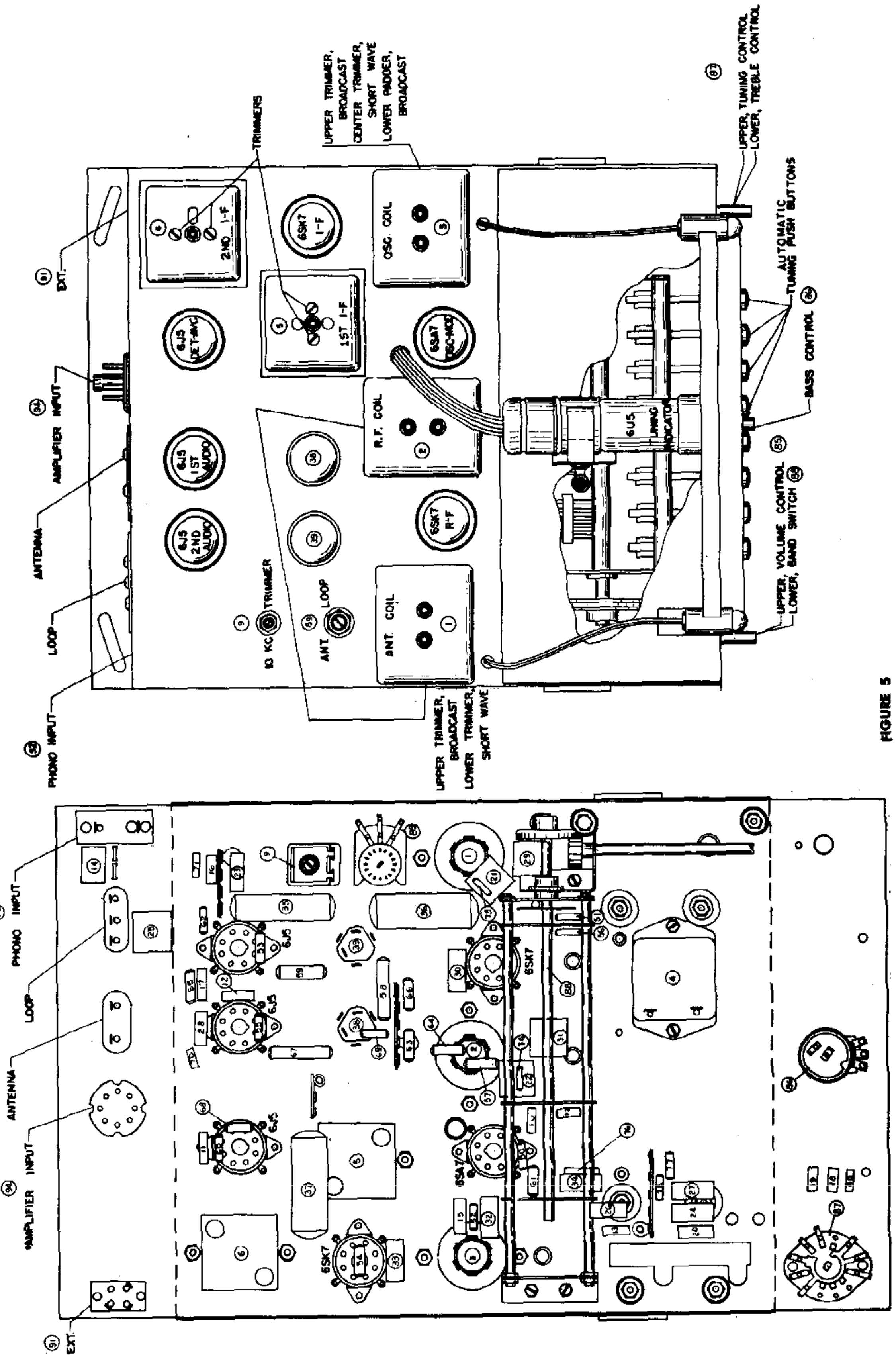


FIGURE 5

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil assembly, antenna, two band	360254G3
2	Coil assembly, r-f, two band	360254G4
3	Coil assembly, oscillator, two band	360253G2
4	Coil assembly, 10kc, filter	360244G1
5	Transformer, first i-f	360024G1
6	Transformer, second i-f	360025G1
8	Capacitor, variable, three-gang tuning	260054G2
	Push Button Assembly for 260054G2	260064G1
9	Capacitor, variable, 10kc, trimmer	259610G2
10	Capacitor, ceramic, 50 mmf	250088G25
11	Capacitor, molded mica, 220 mmf	250159G100
12	Capacitor, molded mica, 220 mmf	250159G100
13	Capacitor, molded mica, 330 mmf—CR-203A only	250159G88
	Capacitor, molded mica, 510 mmf—CR-203B only	250159G64
14	Capacitor, molded mica, 330 mmf	250159G88
15	Capacitor, silvered mica, 490 mmf, ±1%	250085G32
16	Capacitor, molded mica, 510 mmf	250159G64
17	Capacitor, molded mica, 510 mmf	250159G64
18	Capacitor, molded mica, .001 mfd	250159G133
19	Capacitor, molded mica, .001 mfd	250159G133
20	Capacitor, paper, .004 mfd	250129G7
21	Capacitor, molded mica, .0047 mfd, ±5%	250161G24
22	Capacitor, molded mica, .0047 mfd, ±5%	250161G24
23	Capacitor, paper, .005 mfd	250129G10
24	Capacitor, paper, .004 mfd	250129G7
25	Capacitor, paper, .01 mfd	250129G9
26	Capacitor, paper, .01 mfd	250129G9
27	Capacitor, paper, .012 mfd	250129G13
28	Capacitor, paper, .02 mfd	250129G3
29	Capacitor, paper, .05 mfd	250129G5
30	Capacitor, paper, .05 mfd	250129G5
31	Capacitor, paper, .05 mfd	250129G5
32	Capacitor, paper, .05 mfd	250129G5
33	Capacitor, paper, .05 mfd	250129G5
34	Capacitor, paper, .05 mfd	250129G5
35	Capacitor, paper, 0.1 mfd	250152G22
36	Capacitor, paper, 0.25 mfd	250152G21
37	Capacitor, paper, 0.25 mfd	250152G21
38	Capacitor, electrolytic, 20 mfd, 25 V., 10 mfd, 450 V	270023G6
39	Capacitor, electrolytic, 20 mfd, 25 V., 10 mfd, 450 V	270023G6
40	Capacitor, molded mica, 470 mmf, ±10%	250159G90
50	Resistor, composition, 100 ohm, ½ W	230084G7
51	Resistor, composition, 150 ohm, ½ W	230084G8
52	Resistor, composition, 150 ohm, ½ W	230084G8
53	Resistor, composition, 470 ohm, ½ W	230084G11
54	Resistor, composition, 820 ohm, ±10%, ½ W	230084G61
55	Resistor, composition, 2200 ohm, ½ W	230084G15
56	Resistor, composition, 4700 ohm, ½ W	230084G17
57	Resistor, composition, 10,000 ohm, ½ W	230084G19
58	Resistor, composition, 10,000 ohm, 1 W	230085G19
59	Resistor, composition, 15,000 ohm, 1 W	230085G20
60	Resistor, composition, 22,000 ohm, ½ W	230084G21
61	Resistor, composition, 33,000 ohm, ½ W	230084G22
62	Resistor, composition, 47,000 ohm, ½ W	230084G23
63	Resistor, composition, 100,000 ohm, ½ W	230084G25
64	Resistor, composition, 100,000 ohm, ½ W	230084G25
65	Resistor, composition, 100,000 ohm, ½ W	230084G25
66	Resistor, composition, 100,000 ohm, ½ W	230084G25
67	Resistor, composition, 100,000 ohm, 1 W	230085G25
68	Resistor, composition, 220,000 ohm, ½ W	230084G27
69	Resistor, composition, 220,000 ohm, ½ W	230084G27
70	Resistor, composition, 220,000 ohm, ±10%, ½ W	230084G90
71	Resistor, composition, 220,000 ohm, ±10%, ½ W	230084G90
72	Resistor, composition, 470,000 ohm, ½ W	230084G29
73	Resistor, composition, 1 megohm, ½ W	230084G31
74	Resistor, composition, 1 megohm, ½ W	230084G31
75	Resistor, composition, 1 megohm, ½ W	230084G31
76	Resistor, composition, 1 megohm, ½ W	230084G31
77	Resistor, composition, 1.5 megohm, ½ W	230084G32
78	Resistor, composition, 560,000 ohms, (in tuning eye socket) ±10%, ½ W	230084G95
79	Resistor, composition, 47,000 ohm ½ W.—CR-203B only	230084G23
85	Control, volume, 1 megohm	220044G15
86	Control, bass, 1 megohm, (with switch)	220045G2
87	Switch, rotary, treble control	160161G1
88	Switch, rotary, band selector	160160G1
89	Switch, rotary, loop to outdoor antenna	160157G1
91	Socket, external, input	180061G1
92	Socket, phonograph input	189741G1
93	Antenna, loop assembly	
94	Plug, octal, amplifier connection	180427G1
	Dial Glass Assembly	150285G1

* The part number of the loop antenna changes with different cabinets. It is therefore important that you specify the *STYLE NUMBER* of the instrument when ordering a replacement loop antenna assembly.

GENERAL

Model CR-203 radio chassis is a two-band tuner that must be used in conjunction with a power amplifier, such as the Model AMP-108A for speaker operation. Heater and plate voltages for the CR-203 radio chassis are supplied from the amplifier chassis; it is therefore essential that the radio and amplifier chassis be interconnected during alignment or for other electrical service operations. Models CR-203A and 203B are alike mechanically; they differ electrically in the phonograph input circuit. Circuit variations are shown on the table on Figure 4.

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-203 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service. To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet—it has been properly positioned to bring the radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hooks should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated S-L-H. The end of the short wave antenna that is fastened to the inside of the cabinet connects to S. Always disconnect this antenna from terminal S when an outdoor antenna is used as it may pick up noise. The two terminals on the loop are designated L and H. The leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

THE MAGNAVOX CO.

MODELS CR-207B, CR-207D

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 4 and 5 are correct; otherwise, the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring and Flywheel in the order shown on Figure 5. The distance between the front of the Drive Collar and the front of the Tuning Shaft must be 1⅛ inches as specified on Figure 4. Install the Flywheel on the rear of the Tuning Shaft and slide it forward until it nearly touches the edge of the Drive Wheel; then tighten one of the set screws in the Flywheel hub. Insert a .010" gauge between the Flywheel and the Pin, and while holding the gauge in this position, loosen the set screw in the Flywheel hub that was previously tightened. The Compression Spring should force the Flywheel back against the gauge—when this occurs, tighten both set screws in the Flywheel hub.

2. Adjust the Muting Switch contact clearance by loosening the two screws in the Contact Bracket and sliding the bracket in the required direction until a 1/16" clearance is obtained. If this adjustment cannot be obtained in the manner prescribed, bend the Contact Bracket until proper clearance is realized.

3. The Drive Wheel is properly located on its shaft when its edge nearest the hub is in line with the outside edge of the Drive Collar as shown on Figure 5. Two Allen set screws in the Drive Wheel hub provide a means of adjusting the position of this wheel.

4. When the adjustment outlined in paragraph 2 is correct, the proper contact clearance will automatically be obtained when the Muting Switch is to be "unmuted" while the push buttons are being set. While pressure is applied to any one of the push buttons while they are being set up, a pressure applied simultaneously to the Tuning Control knob will cause the Muting Switch contacts to open. Detailed instructions on setting up these push buttons are shown elsewhere in this bulletin.

5. If the push button shafts at both ends do not engage the Treadle Bar as shown on Figure 5, the three screws in the Treadle Bar must be loosened and the Treadle Bar should be moved until the required condition is obtained.

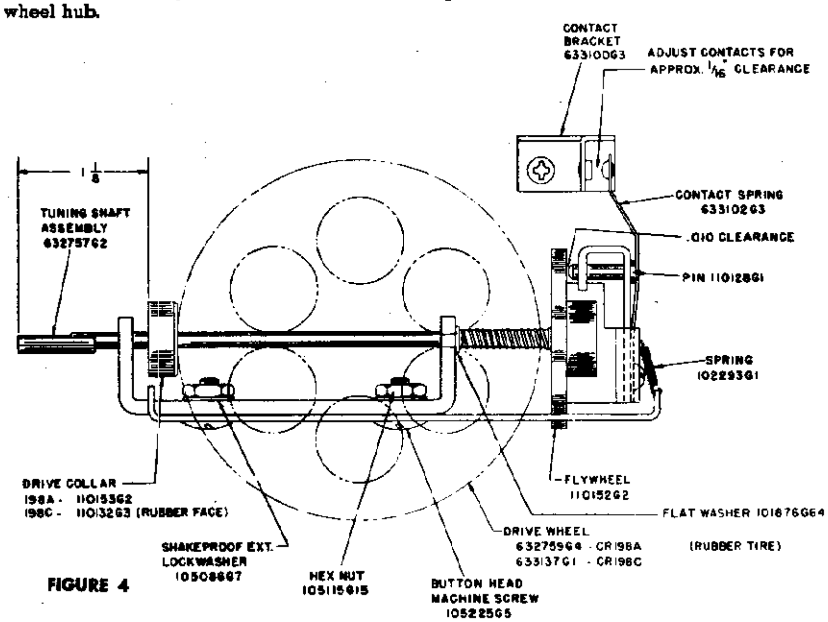


FIGURE 4

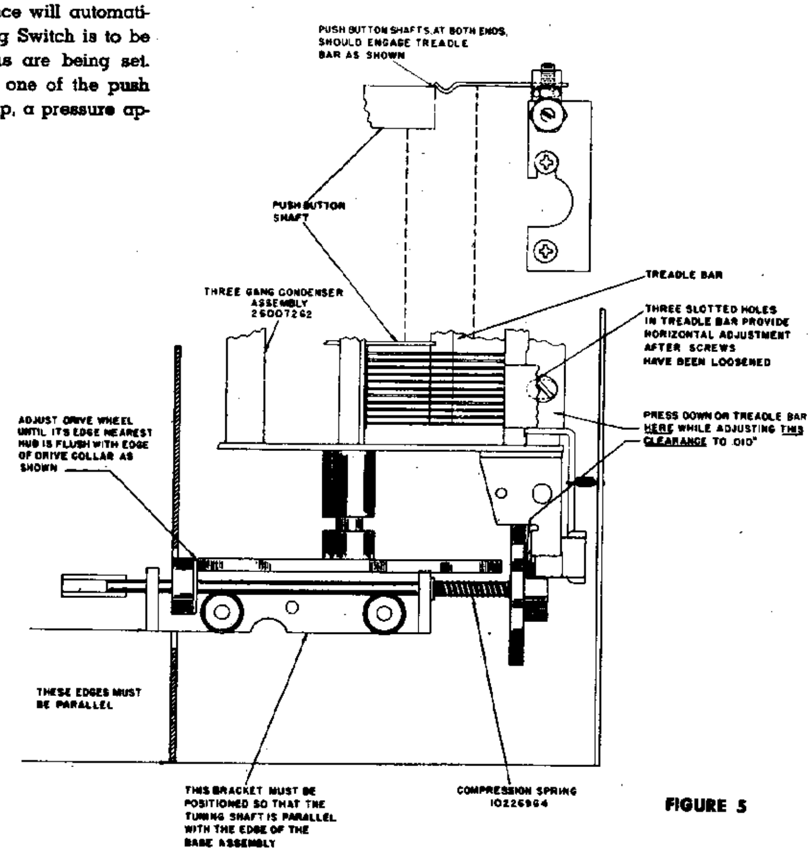


FIGURE 5

ALIGNMENT PROCEDURE

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 7. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings. *Always set the Treble Control to SHARP TUNE before aligning the I-f stages.* This is done by turning the Treble Control Knob to the No. 1 position.

I-F ALIGNMENT

1. Connect the output of the signal generator to the control grid (pin No. 8) of the 6SA7 tube through a .00025 mfd. capacitor. The ground on the signal generator should be connected to the radio chassis ground.
2. Turn the condenser gang until it is completely meshed, (low-frequency end of dial calibration) and set the band selector switch to BDCST as for broadcast band reception.
3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

On some models of the CR-207 chassis, the two i-f trimmers are located in the top of the respective i-f transformers as shown in the layout diagram Figure 7. In other models, one trimmer is accessible from the top and the other from the bottom of each transformer.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it to the radio antenna terminal through the .00025 mfd. capacitor. The ANT-LOOP switch (89) must be in the ANT. setting.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, loosen the set screws in the hub of pulley "D" shown on Figure 1 and make the necessary adjustment.
3. With the band selector still set for broadcast band reception, adjust the signal generator and the radio receiver to 600 kc. While rocking the gang condenser a few degrees to the right and to the left, adjust the 600 kc. oscillator padder for maximum indication on the output meter.
4. Set the signal generator and the radio receiver to 1400 kc.; adjust the 1400 kc. oscillator trimmer and the 1400 kc. antenna trimmer for maximum output. If considerable adjustment was necessary, recheck the 600 kc. padder setting.
5. If the loop antenna trimmer is out of adjustment it should be set after the radio chassis is in the cabinet. Set the ANT-LOOP switch (89) to the LOOP position. Adjust the signal generator to 1400 kilocycles and connect its output to a loop containing approximately five turns of wire eight inches in diameter placed eighteen inches from the receiver loop and in the same plane.
6. Set the receiver to 1400 kc. and adjust the trimmer on the receiver loop for maximum output.

SHORT WAVE BAND ALIGNMENT

1. Set the band selector switch to SW as for short wave reception and substitute a 400 ohm resistor for the capacitor in series with the signal generator lead connected to the antenna terminal on the receiver.
2. Set the signal generator and the radio receiver to 15 mc.; then adjust the 15 mc. oscillator trimmer and the 15 mc. antenna trimmer for maximum output.

While adjusting the 15 mc. oscillator trimmer two peaks may be observed; only one is the correct peak for 15 mc. alignment. Screw in the trimmer to maximum capacity—then decrease the capacity until the first peak is observed. This is the correct one.

10 KC FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment, the following procedure should be observed.

1. Turn the Treble Control to FULL RANGE (No. 4 position).
2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer (9) for minimum output.
4. If an audio oscillator is not available for making this adjustment, set the band selector to BDCST, connect an antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D." If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting.

Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B," around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C," and over the top of pulley "D." Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow ¼" to 5/16" of cable between the spring and the inside rim of pulley "D." Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

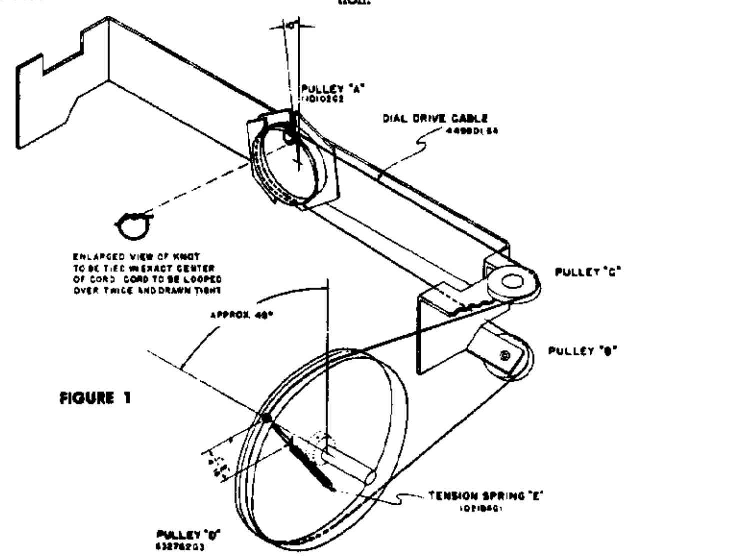
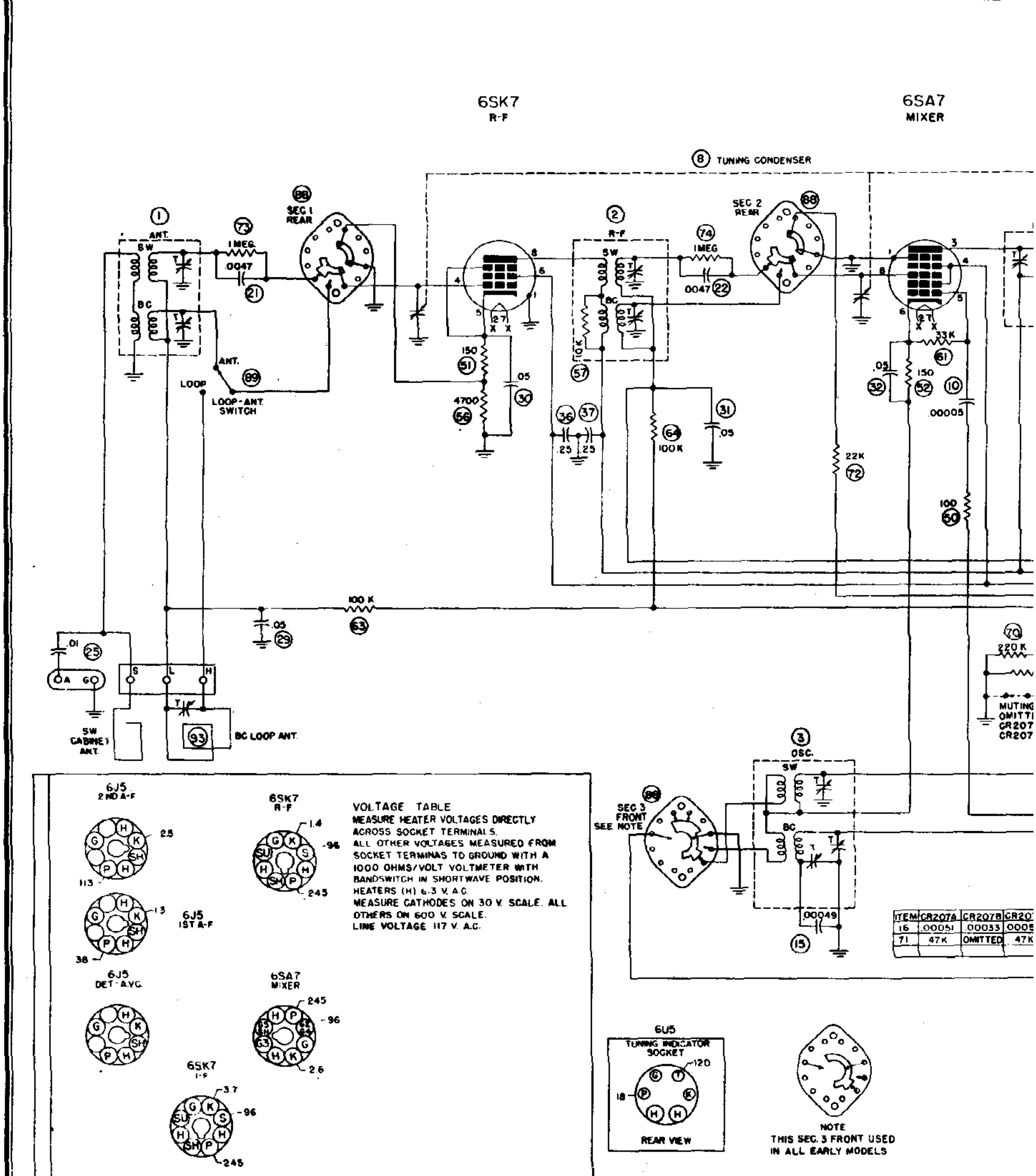


FIGURE 1

THE



ITEM	CR207A	CR207B	CR20
16	.00051	.00033	.0005
71	47K	OMITTED	47K

Intermediate frequency .... 455 kc.

Tuning frequency range:

Broadcast band .... 530—1610 kc.

Short wave band .... 4.9—18.1 mc.

Tubes:

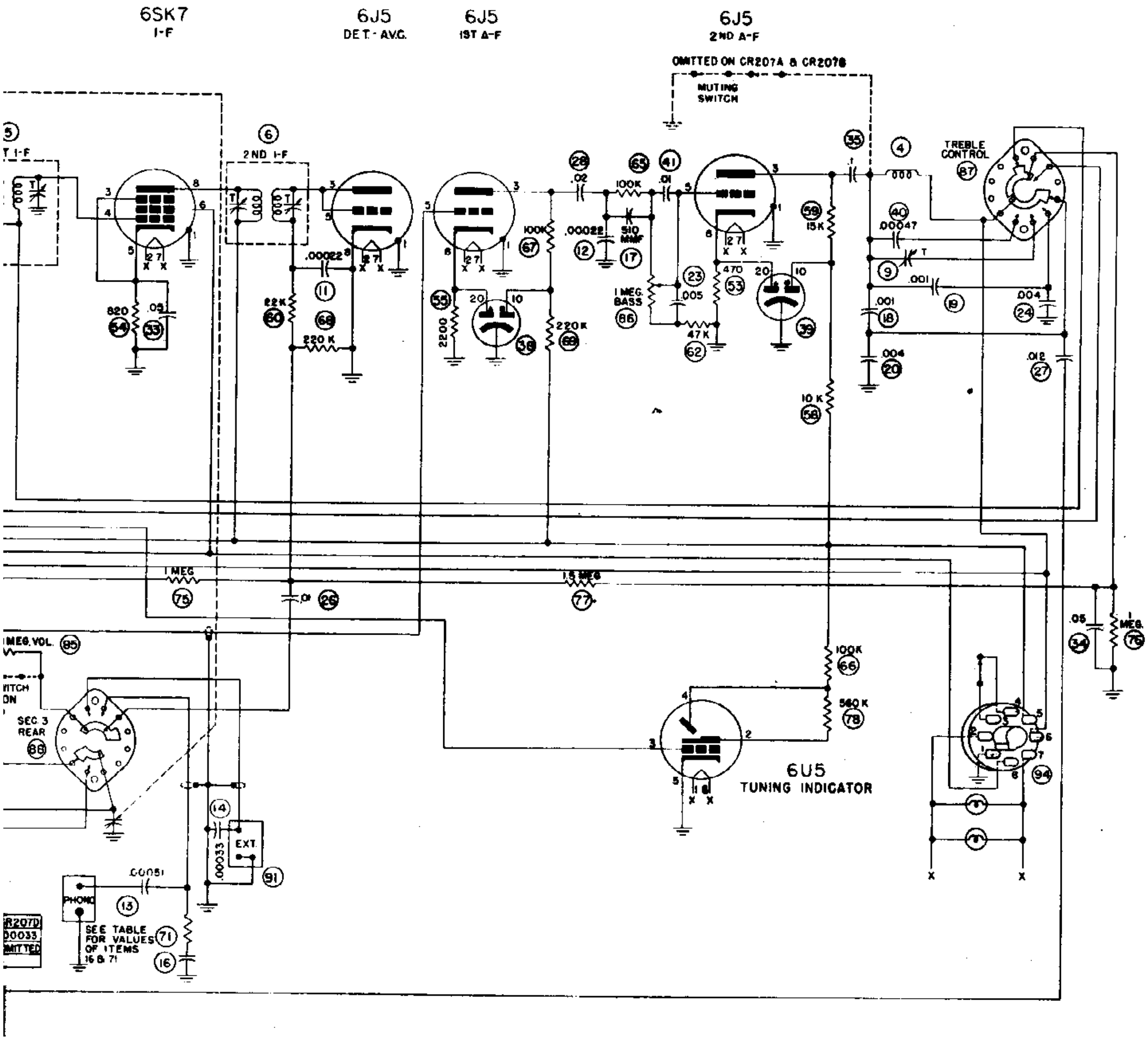
R-F Amplifier ....

Converter ....

I-F Amplifier ....

Detector and AVC..........

First Audio ....



I-F 455 KC

BAND SELECTOR SWITCH SHOWN WITH ITS CONTROL KNOB IN THE EXTREME COUNTERCLOCKWISE POSITION (SHORT WAVE).

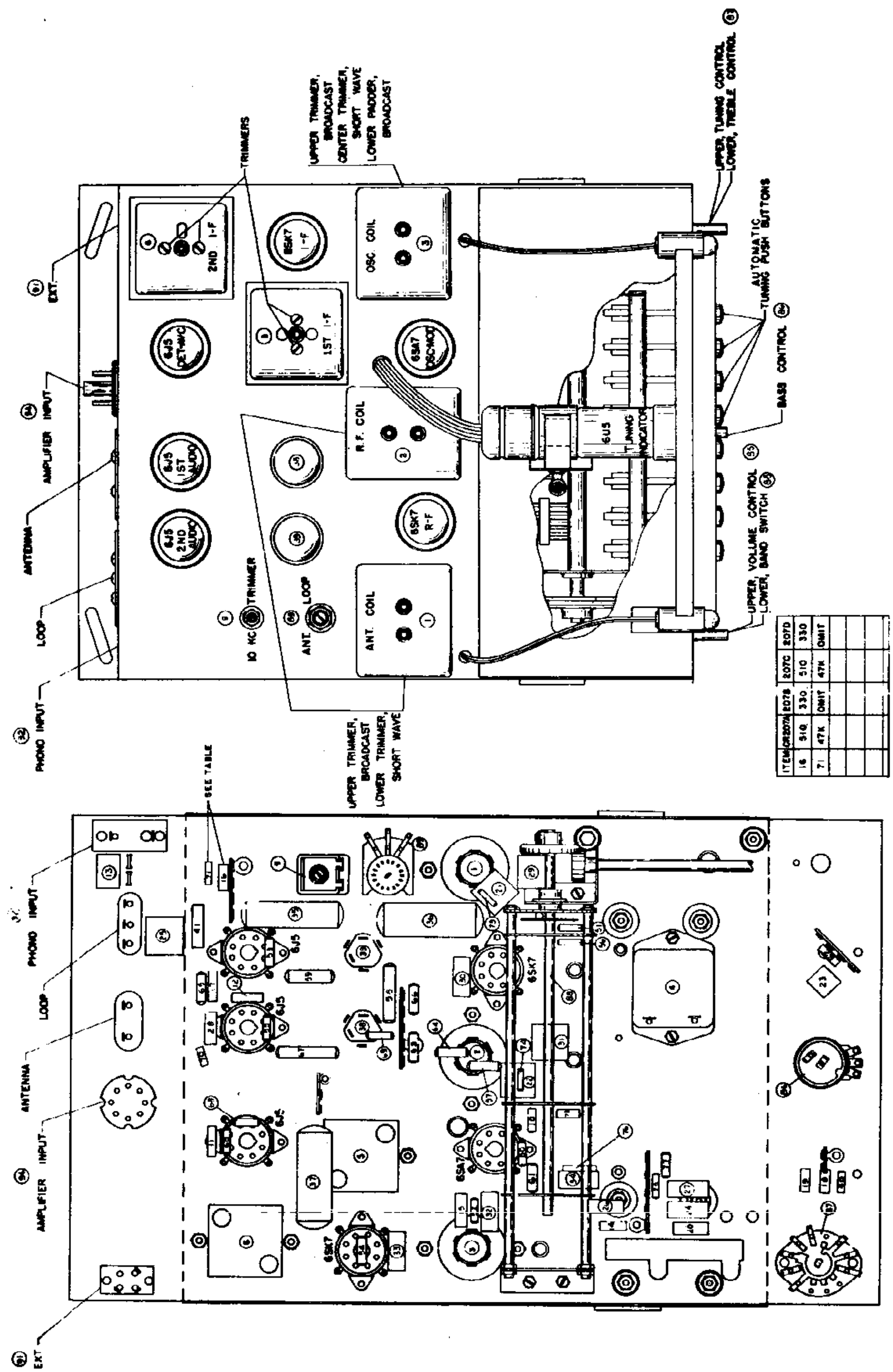
ALL ELECTRICAL VALUES SHOWN ARE IN OHMS OR MICROFARADS UNLESS OTHERWISE SPECIFIED

....	6SK7
....	6SA7
....	6SK7
....	6J5
....	6J5

Second Audio	6J5
Tuning Indicator	6U5
Dial lamps	Mazda No. 44

For clarified schematics see page 17-13

MODELS CR-207A,-B,-C,-D THE MAGNAVOX CO.



ITEM	CR207A	207B	207C	207D
16	510	330	510	330
71	47K	OMIT	47K	OMIT

FIGURE 7

CONDENSER GANG DRIVE ADJUSTMENTS

MODELS CR-207A, CR-207C

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are effected; otherwise the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring, Spring Retainer and Flywheel in the manner shown on Figure 3. Note that the Tuning Shaft must extend ¾" from the front of the assembly and that the spacing between the rear of the Drive Collar and the front of the Flywheel must be 3-5/64". Any excess length in the Tuning Shaft may extend beyond the rear of the Flywheel. See Figure 2.

2. The distance between the rubber-tired Drive Wheel and the smaller diameter section of the Spring Retainer must be 1/32" to 1/16" (Figure 3). This adjustment is effected by loosening the two No. 6 Allen set screws in the Drive Wheel hub and sliding the wheel on its shaft until the required clearance is obtained. When the adjustment is completed, tighten the two screws in the hub of the Drive Wheel.

3. While pressing down on the Treadle Bar at the location shown on Figure 3, adjust the Thrust Bracket until the clearance between the rear of the Flywheel and the projection on the Thrust Bracket is .010" as shown on the diagram. To make this adjustment, loosen the two No. 6 Allen set screws (use No. 6 Allen Wrench—Magnavox Part No. 800044G2) in the hub of Thrust Bracket and rotate the bracket until the specified clearance is obtained when the push buttons are NOT actuated. Tighten the two screws securely when the adjustment is completed. Press each push button and check that the Drive Collar is pushed away from the rubber-tired Drive Wheel.

4. Next, adjust the clearance in the muting switch contacts by turning the Phillips-head screw designated Adjustment "A" on Figure 2, until the specified clearance of .025" is obtained (when the push buttons are NOT actuated.)

5. While pressing any one of the push buttons in as far as possible, turn the screw designated Adjustment "B" until a minimum clearance of .015" is obtained between the front surface of the Drive Collar and the switch spring directly in front of it. This setting should also cause a minimum clearance of .010" between the switch contacts actuated by pressure of the front surface of the Drive Collar, when the Tuning Shaft is pulled out. The function of this switch is to open the muting circuit when setting up the push buttons. As its contacts are wired in series with the large muting switch (contacts are shorted by pressing any push button), pulling out on the Tuning Shaft causes the small switch contacts to open the muting circuit so that a station can be heard while the push button is held in and tightened.

On rare occasions it may be necessary to adjust the relation between the push button bars and the Treadle Bar. Such adjustment might be required if when pushing any of the push buttons, sufficient motion is not transmitted to the Treadle Bar to cause a disengagement between the Drive Collar and the Drive wheel.

This can usually be accomplished by loosening the two screws designated "C" and "D" on Figure 3, and moving plate "B" in the direction required to correct this condition.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:	
600 kc.	7.0
6 mc.	1.63
R-F to Converter Grid at:	
600 kc.	3.4
6 mc.	3.4
R-F on Converter Grid to I-F Grid at:	
600 kc.	40.0
6 mc.	35.5
I-F on Converter Grid to I-F Grid at:	
455 kc.	.59
I-F Grid to Detector Plate at:	
455 kc.	.68

AUDIO GAIN

Voltage required across Volume Control to produce 0.1 watt speaker output** at 400 cycles is .0072 volt with Band Selector Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across Oscillator Grid Resistor at:

600 kc.	5.8
6 mc.	6.6

* Variations of ±20% are permissible. All readings made with sufficient input signal to provide .05 watt speaker output

** .05 watt speaker output at 400 cycles is equivalent to a reading of 0.35 volts as measured by a high resistance AC voltmeter across the voice coil of 15-inch speaker.

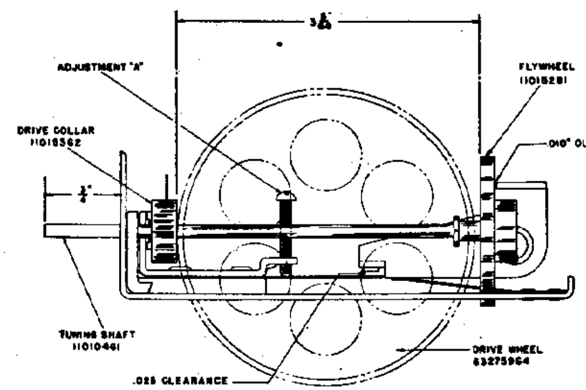


FIGURE 2

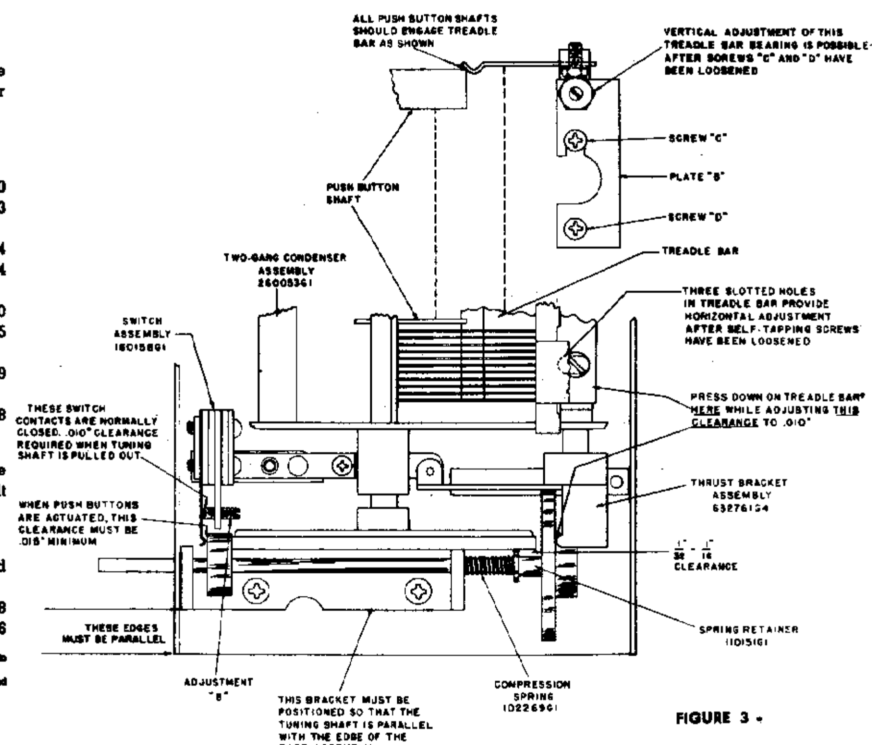


FIGURE 3

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil assembly, antenna, two band	360254G3
2	Coil assembly, r-f, two band	360254G4
3	Coil assembly, oscillator, two band	360253G2
4	Coil assembly, 10kc, filter	360244G1
5	Transformer, first i-f	360024G1
6	Transformer, second i-f	360025G1
8	Capacitor, variable, three-gang tuning	260054G2
	Push Button Assembly for 260054G2	260064G1
9	Capacitor, variable, 10kc, trimmer	259610G2
10	Capacitor, ceramic, 50 mmf	250088G25
11	Capacitor, molded mica, 220 mmf	250159G100
12	Capacitor, molded mica, 220 mmf	250159G100
13	Capacitor, molded mica, 510 mmf	250159G64
	Capacitor, molded mica, 510 mmf—CR-203B only	250159G64
14	Capacitor, molded mica, 330 mmf	250159G88
15	Capacitor, silvered mica, 490 mmf, ±1%	250085G32
16	Capacitor, molded mica, 510 mmf (CR-207A/207C only)	250159G64
	Capacitor, molded mica, 330 mmf (CR-207B/207D only)	250159G88
17	Capacitor, molded mica, 510 mmf	250159G64
18	Capacitor, molded mica, .001 mfd	250159G133
19	Capacitor, molded mica, .001 mfd	250159G133
20	Capacitor, paper, .004 mfd 600V	250129G7
21	Capacitor, molded mica, .0047 mfd, ±5%	250161G24
22	Capacitor, molded mica, .0047 mfd, ±5%	250161G24
23	Capacitor, paper, .005 mfd 400 V	250129G10
24	Capacitor, paper, .004 mfd. 600 V	250129G7
25	Capacitor, paper, .01 mfd. 400 V	250129G9
26	Capacitor, paper, .01 mfd. 400 V	250129G9
27	Capacitor, paper, .012 mfd. 200 V	250129G13
28	Capacitor, paper, .02 mfd 600 V	250129G3G
29	Capacitor, paper, .05 mfd. 120 V	250129G5
30	Capacitor, paper, .05 mfd. 120 V	250129G5
31	Capacitor, paper, .05 mfd. 120 V	250129G5
32	Capacitor, paper, .05 mfd. 120 V	250129G5
33	Capacitor, paper, .05 mfd. 120 V	250129G5
34	Capacitor, paper, .05 mfd. 120 V	250129G5
35	Capacitor, paper, 0.1 mfd. 400 V	250152G22
36	Capacitor, paper, 0.25 mfd. 400 V	250152G21
37	Capacitor, paper, 0.25 mfd. 400 V	250152G21
38	Capacitor, electrolytic, 20 mfd, 25 V., 10 mfd, 450 V	270023G6
39	Capacitor, electrolytic, 20 mfd, 25 V., 10 mfd, 450 V	270023G6
40	Capacitor, molded mica, 470 mmf, ±10% 500 V	250159G90
50	Resistor, composition, 100 ohm, ½ W	230084G7
51	Resistor, composition, 150 ohm, ½ W	230084G8
52	Resistor, composition, 150 ohm, ½ W	230084G8
53	Resistor, composition, 470 ohm, ½ W	230084G11
54	Resistor, composition, 820 ohm, ±10%, ½ W	230084G61
55	Resistor, composition, 2200 ohm, ½ W	230084G15
56	Resistor, composition, 4700 ohm, ½ W	230084G17
57	Resistor, composition, 10,000 ohm, ½ W	230084G19
58	Resistor, composition, 10,000 ohm, 1 W	230085G19
59	Resistor, composition, 15,000 ohm, 1 W	230085G20
60	Resistor, composition, 22,000 ohm, ½ W	230084G21
61	Resistor, composition, 33,000 ohm, ½ W	230084G22
62	Resistor, composition, 47,000 ohm, ½ W	230084G23
63	Resistor, composition, 100,000 ohm, ½ W	230084G25
64	Resistor, composition, 100,000 ohm, ½ W	230084G25
65	Resistor, composition, 100,000 ohm, ½ W	230084G25
66	Resistor, composition, 100,000 ohm, ½ W	230084G25
67	Resistor, composition, 100,000 ohm, 1 W	230085G25
68	Resistor, composition, 220,000 ohm, ½ W	230084G27
69	Resistor, composition, 220,000 ohm, ½ W	230084G27
70	Resistor, composition, 220,000 ohm, ±10%, ½ W	230084G90
71	Resistor, composition, 47,000 ohm, ½ W (CR-207A/207C only)	230084G23
72	Resistor, composition, 22,000 ohm, ½ W	230084G21
73	Resistor, composition, 1 megohm, ½ W	230084G31
74	Resistor, composition, 1 megohm, ½ W	230084G31
75	Resistor, composition, 1 megohm, ½ W	230084G31
76	Resistor, composition, 1 megohm, ½ W	230084G31
77	Resistor, composition, 1.5 megohm, ½ W	230084G32
78	Resistor, composition, 560,000 ohms, (in tuning eye socket) ±10%, ½ W	230084G95
79	Resistor, composition, 47,000 ohm ½ W.—CR-203B only	230084G23
85	Control, volume, 1 megohm	220044G15
86	Control, bass, 1 megohm, (with switch)	220045G2
87	Switch, rotary, treble control	160161G1
88	Switch, rotary, band selector	160160G1
89	Switch, rotary, loop to outdoor antenna	160157G1
91	Socket, external, input	180060G1
92	Socket, phonograph input	189741G1
93	Antenna, loop assembly	*
94	Plug, octal, amplifier connection	180427G1
	Dial Glass Assembly	150285G1

* The part number of the loop antenna changes with different cabinets. It is therefore important that you specify the STYLE NUMBER of the instrument when ordering a replacement loop antenna assembly.

GENERAL

Model CR-207 radio chassis is a two-band tuner that must be used in conjunction with a power amplifier, such as the Model AMP-108 or AMP-110 for speaker operation. Heater and plate voltages for the CR-207 radio chassis are supplied from the amplifier chassis; it is therefore essential that the radio and amplifier chassis be interconnected during alignment or for other electrical service operations. Models CR-207A and 207C are alike electrically; they differ mechanically in the dial drive assembly. Models CR-207B and 207D are also alike electrically and differ mechanically in the dial drive assembly. Figures 2 and 3 illustrate the CR-207A and CR-207C dial drive and Figures 4 and 5 illustrate the CR-207B and CR-207D assembly. The electrical differences between CR-207A/207C and CR-207B/207D are shown on the schematic diagram, Figure 6.

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-207 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service. To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet—it has been properly positioned to bring the radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hooks should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated S-L-H. The end of the short wave antenna that is fastened to the inside of the cabinet connects to S. Always disconnect this antenna from terminal S when an outdoor antenna is used as it may pick up noise. The two terminals on the loop are designated L and H. The leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 7. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings. *Always set the Treble Control to SHARP TUNE before aligning the i-f stages.* This is done by turning the Treble Control Knob to the No. 1 position.

I-F ALIGNMENT

1. Connect the output of the signal generator to the control grid (pin No. 8) of the 6SA7 tube through a .00025 mfd. capacitor. The ground on the signal generator should be connected to the radio chassis ground.
2. Turn the condenser gang until it is completely meshed, (low-frequency end of dial calibration) and set the band selector switch to BDCST as for broadcast band reception.
3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

On some models of the CR-207 chassis, the two i-f trimmers are located in the top of the respective i-f transformers as shown in the layout diagram Figure 7. In other models, one trimmer is accessible from the top and the other from the bottom of each transformer.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it to the radio antenna terminal through the .00025 mfd. capacitor. The ANT-LOOP switch (89) must be in the ANT. setting.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, loosen the set screws in the hub of pulley "D" shown on Figure 1 and make the necessary adjustment.
3. With the band selector still set for broadcast band reception, adjust the signal generator and the radio receiver to 600 kc. While rocking the gang condenser a few degrees to the right and to the left, adjust the 600 kc. oscillator padder for maximum indication on the output meter.
4. Set the signal generator and the radio receiver to 1400 kc.; adjust the 1400 kc. oscillator trimmer and the 1400 kc. antenna trimmer for maximum output. If considerable adjustment was necessary, recheck the 600 kc. padder setting.
5. If the loop antenna trimmer is out of adjustment it should be set after the radio chassis is in the cabinet. Set the ANT-LOOP switch (89) to the LOOP position. Adjust the signal generator to 1400 kilocycles and connect its output to a loop containing approximately five turns of wire eight inches in diameter placed eighteen inches from the receiver loop and in the same plane.
6. Set the receiver to 1400 kc. and adjust the trimmer on the receiver loop for maximum output.

SHORT WAVE BAND ALIGNMENT

1. Set the band selector switch to SW as for short wave reception and substitute a 400 ohm resistor for the capacitor in series with the signal generator lead connected to the antenna terminal on the receiver.
2. Set the signal generator and the radio receiver to 15 mc.; then adjust the 15 mc. oscillator trimmer and the 15 mc. antenna trimmer for maximum output. While adjusting the 15 mc. oscillator trimmer two peaks may be observed; only one is the correct peak for 15 mc. alignment. Screw in the trimmer to maximum capacity then decrease the capacity until the first peak is observed. This is the correct one.

10 KC FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment, the following procedure should be observed.

1. Turn the Treble Control to FULL RANGE (No. 4 position).
2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer (9) for minimum output.
4. If an audio oscillator is not available for making this adjustment, set the band selector to BDCST, connect an antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D." If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting.

Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B," around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C," and over the top of pulley "D." Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow ¼" to 5/16" of cable between the spring and the inside rim of pulley "D." Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

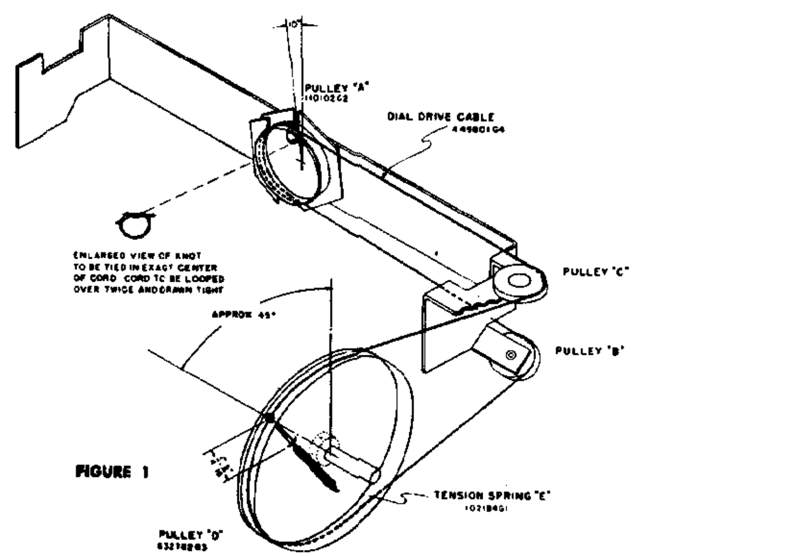
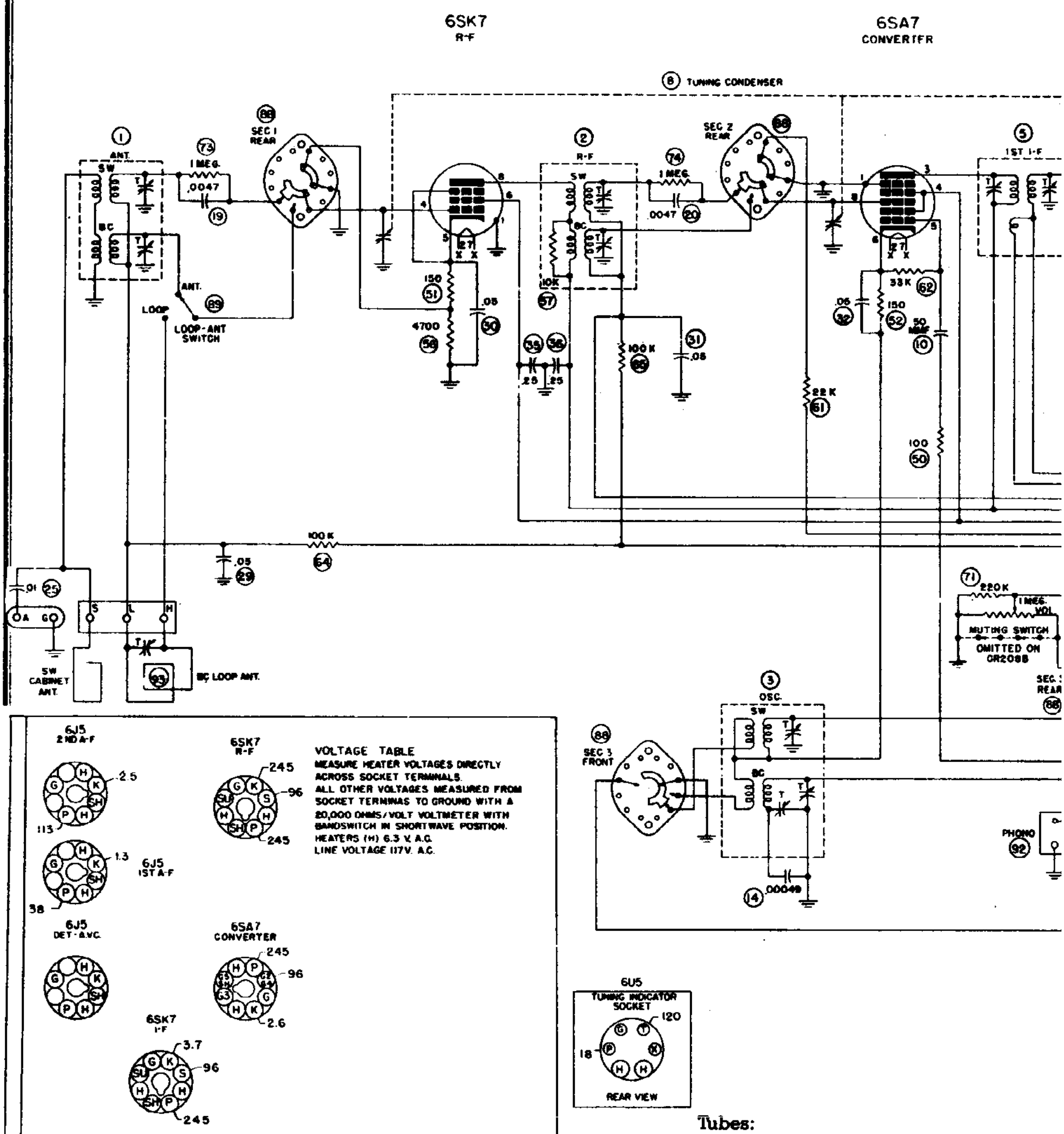


FIGURE 1



Intermediate frequency ....455 kc.

Tuning frequency range:

Broadcast band..530—1610 kc.

Short wave band..4.9—18.1 mc.

Tubes:

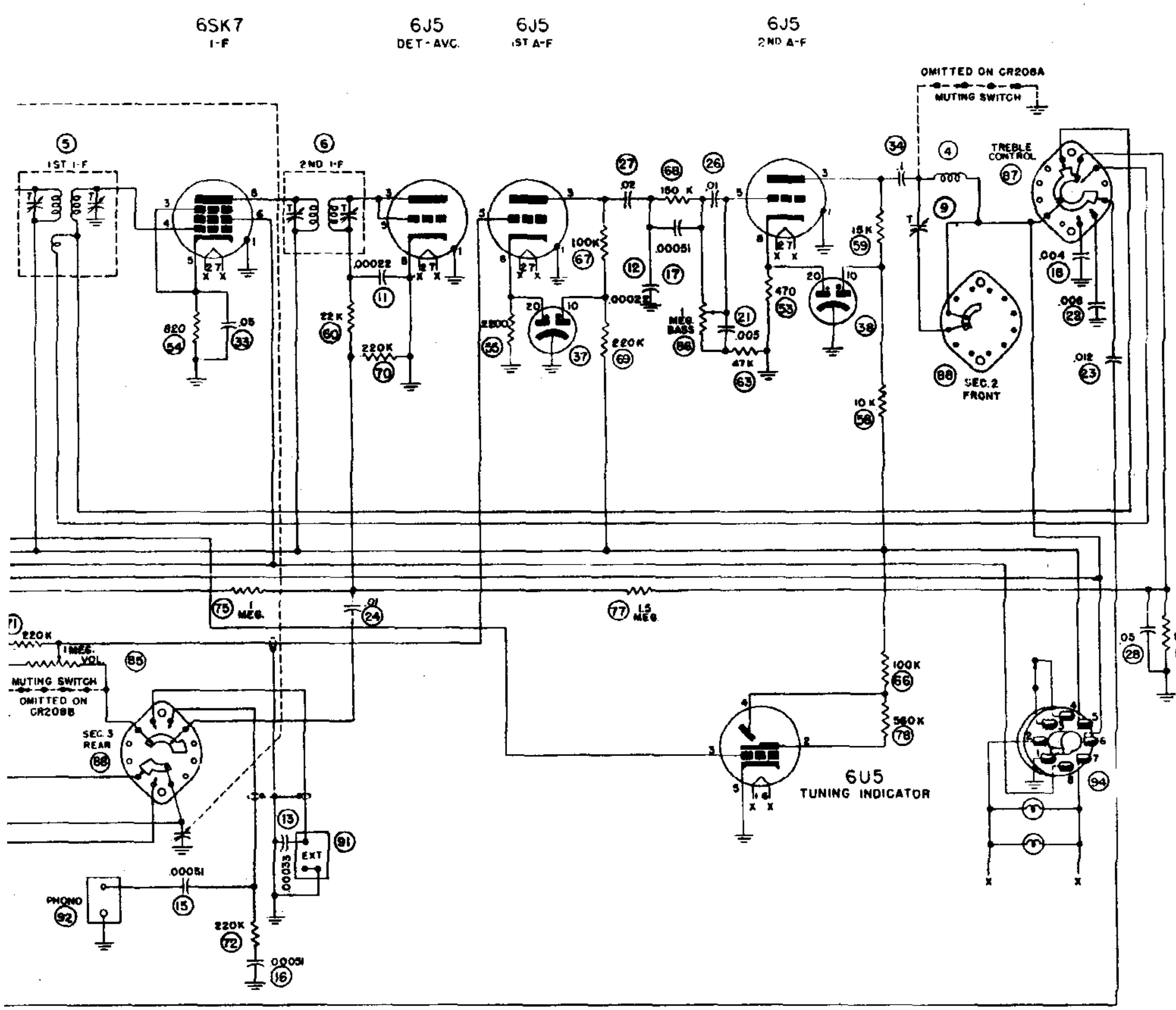
R-F Amplifier ....

Converter ....

I-F Amplifier ....

Detector and AVC..........

First Audio ....



I-F 455 KC

BAND SELECTOR SWITCH SHOWN WITH ITS CONTROL KNOB IN THE EXTREME COUNTERCLOCKWISE POSITION (SHORT WAVE).

ALL ELECTRICAL VALUES SHOWN ARE IN OHMS OR MICROFARADS UNLESS OTHERWISE SPECIFIED.

...	6SK7
...	6SA7
...	6SK7
...	6J5
...	6J5
Second Audio	6J5
Tuning Indicator	6U5
Dial lamps	*Mazda No. 44*

For clarified schematics see page 17-13

THE MAGNAVOX CO.

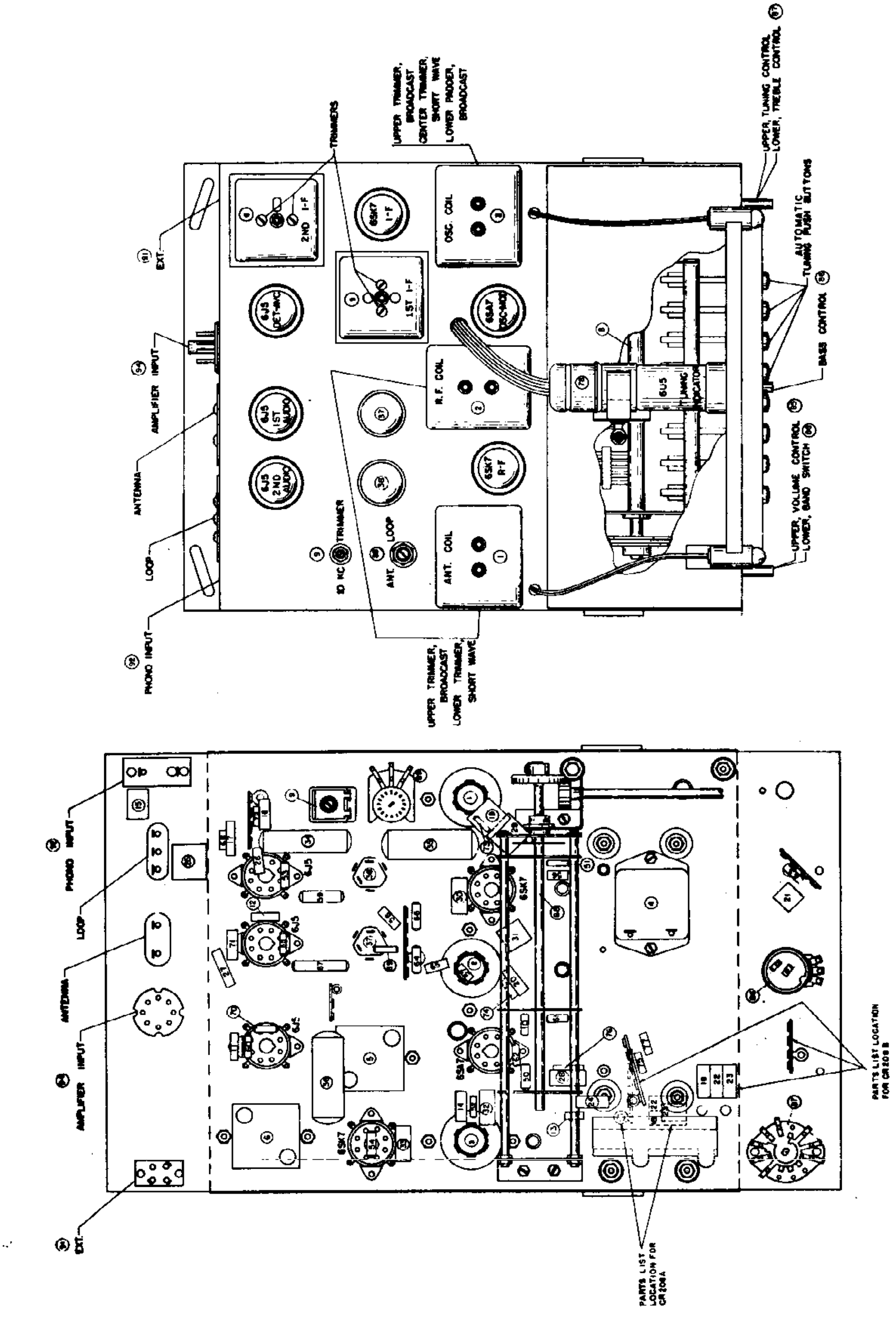


FIGURE 7

CONDENSER GANG DRIVE ADJUSTMENTS

MODEL CR-208A

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are effected; otherwise the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring, Spring Retainer and Flywheel in the manner shown on Figure 3. Note that the Tuning Shaft must extend ¾" from the front of the assembly and that the spacing between the rear of the Drive Collar and the front of the Flywheel must be 3-5/64". Any excess length in the Tuning Shaft may extend beyond the rear of the Flywheel. See Figure 2.
2. The distance between the rubber-tired Drive Wheel and the smaller diameter section of the Spring Retainer must be 1/32" to 1/16" (Figure 3). This adjustment is effected by loosening the two No. 6 Allen set screws in the Drive Wheel hub and sliding the wheel on its shaft until the required clearance is obtained. When the adjustment is completed, tighten the two screws in the hub of the Drive Wheel.
3. While pressing down on the Treadle Bar at the location shown on Figure 3, adjust the Thrust Bracket until the clearance between the rear of the Flywheel and the projection on the Thrust Bracket is .010" as shown on the diagram. To make this adjustment, loosen the two No. 6 Allen set screws (use No. 6 Allen Wrench—Magnavox Part No. 800044G2) in the hub of Thrust Bracket and rotate the bracket until the specified clearance is obtained when the push buttons are NOT actuated. Tighten the two screws securely when the adjustment is completed. Press each push button and check that the Drive Collar is pushed away from the rubber-tired Drive Wheel.
4. Next, adjust the clearance in the muting switch contacts by turning the Phillips-head screw designated Adjustment "A" on Figure 2, until the specified clearance of .025" is obtained (when the push buttons are NOT actuated.)
5. While pressing any one of the push buttons in as far as possible, turn the screw designated Adjustment "B" until a minimum clearance of .015" is obtained between the front surface of the Drive Collar and the switch spring directly in front of it. This setting should also cause a minimum clearance of .010" between the switch contacts actuated by pressure of the front surface of the Drive Collar, when the Tuning Shaft is pulled out. The function of this switch is to open the muting circuit when setting up the push buttons. As its contacts are wired in series with the large muting switch (contacts are shorted by pressing any push button), pulling out on the Tuning Shaft causes the small switch contacts to open the muting circuit so that a station can be heard while the push button is held in and tightened.

On rare occasions it may be necessary to adjust the relation between the push button bars and the Treadle Bar. Such adjustment might be required if when pushing any of the push buttons, sufficient motion is not transmitted to the Treadle Bar to cause a disengagement between the Drive Collar and the Drive wheel.

This can usually be accomplished by loosening the two screws designated "C" and "D" on Figure 3, and moving plate "B" in the direction required to correct this condition.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:	
600 kc.	3.4
6 mc.	2.26
R-F to Converter Grid at:	
600 kc.	3.6
6 mc.	3.6
R-F on Converter Grid to I-F Grid at:	
600 kc.	34
6 mc.	26
I-F on Converter Grid to I-F Grid at:	
455 kc.	50.5
I-F Grid to Detector Plate at:	
455 kc.	68

AUDIO GAIN

Voltage required across Volume Control to produce 0.1 watt speaker output** at 400 cycles is .015 volt with Band Selector Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across Oscillator Grid Resistor at:

600 kc.	7.26
6 mc.	7.59

* Variations of ±20% are permissible. All readings made with sufficient input signal to provide .05 watt speaker output

** 0.1 watt speaker output at 400 cycles is equivalent to a reading of 0.548 volts as measured by a high resistance AC voltmeter across the voice coil of either speaker.

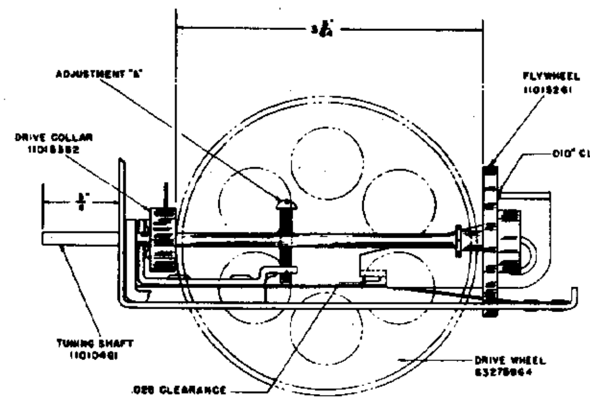


FIGURE 2

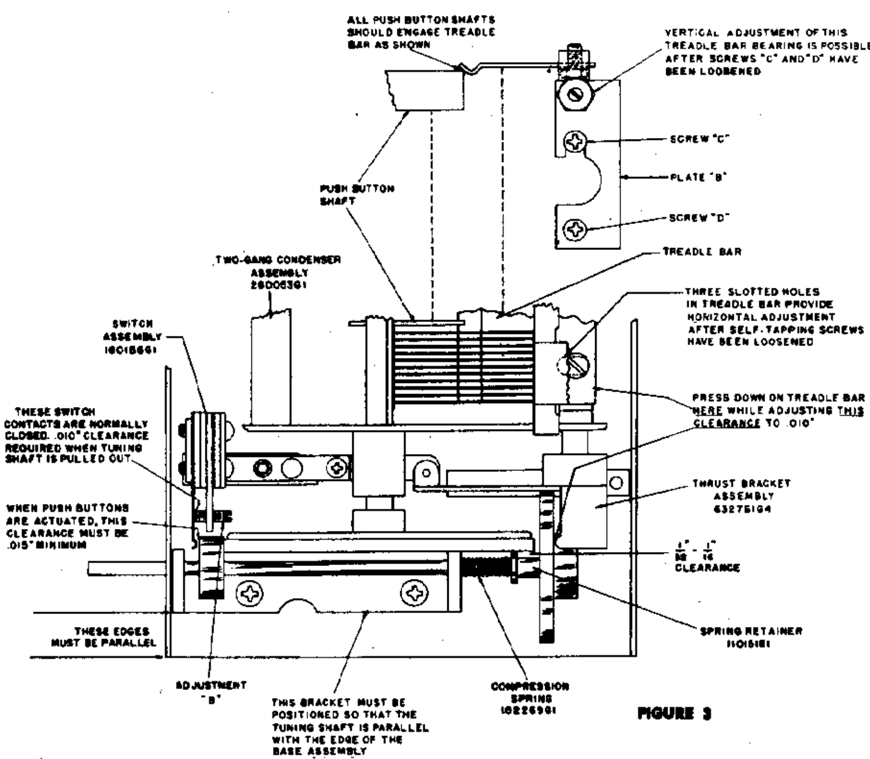


FIGURE 3

MODEL CR-208B

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 4 and 5 are correct; otherwise, the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. **Assemble the** Tuning Shaft, Drive Collar, Compression Spring and Flywheel in the order shown on Figure 5. The distance between the front of the Drive Collar and the front of the Tuning Shaft must be 1⅛ inches as specified on Figure 4. Install the Flywheel on the rear of the Tuning Shaft and slide it forward until it nearly touches the edge of the Drive Wheel; then tighten one of the set screws in the Flywheel hub. Insert a .010" gauge between the Flywheel and the Pin, and while holding the gauge in this position, loosen the set screw in the Flywheel hub that was previously tightened. The Compression Spring should force the Flywheel back against the gauge—when this occurs, tighten both set screws in the Flywheel hub.

2. Adjust the Muting Switch contact clearance by loosening the two screws in the Contact Bracket and sliding the bracket in the required direction until a 1/16" clearance is obtained. If this adjustment cannot be obtained in the manner prescribed, bend the Contact Bracket until proper clearance is realized.

3. The Drive Wheel is properly located on its shaft when its edge nearest the hub is in line with the outside edge of the Drive Collar as shown on Figure 5. Two Allen set screws in the Drive Wheel hub provide a means of adjusting the position of this wheel.

4. When the adjustment outlined in paragraph 2 is correct, the proper contact clearance will automatically be obtained when the Muting Switch is to be "unmuted" while the push buttons are being set. While pressure is applied to any one of the push buttons while they are being set up, a pressure applied simultaneously to the Tuning Control knob will cause the Muting Switch contacts to open. Detailed instructions on setting up these push buttons are shown elsewhere in this bulletin.

5. If the push button shafts at both ends do not engage the Treadle Bar as shown on Figure 5, the three screws in the Treadle Bar must be loosened and the Treadle Bar should be moved until the required condition is obtained.

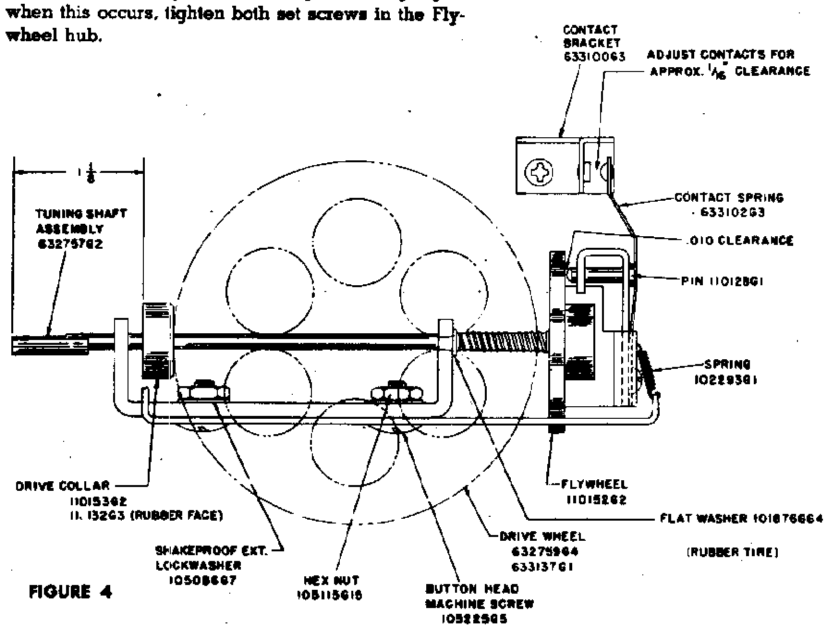


FIGURE 4

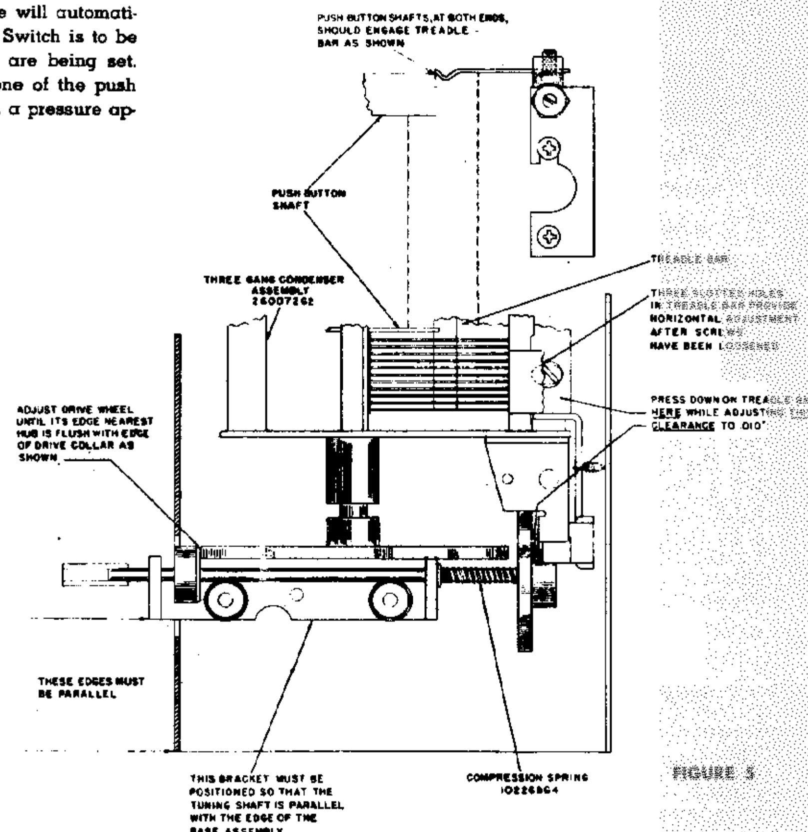


FIGURE 5

THE MAGNAVOX CO.

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil assembly, antenna, two-band	360254G3
2	Coil assembly, r-f, two-band	360254G4
3	Coil assembly, oscillator, two-band	360253G2
4	Coil assembly, 10kc, filter	360244G1
5	Transformer, first i-f	360024G1
6	Transformer, second i-f	360025G1
8	Capacitor, variable, three gang tuning	260054G2
9	Capacitor, variable, 10kc, trimmer	259610G2
10	Capacitor, ceramic, 50 mmf, 500 V	250088G25
11	Capacitor, molded mica, 220 mmf, 500 V	250159G100
12	Capacitor, molded mica, 220 mmf, 500 V	250159G100
13	Capacitor, molded mica, 330 mmf, 500 V	250159G88
14	Capacitor, silvered mica, 490 mmf, ±1%, 500 V	250085G32
15	Capacitor, molded mica, 510 mmf, 500 V	250159G64
16	Capacitor, molded mica, 510 mmf, 500 V	250159G64
17	Capacitor, molded mica, 510 mmf, 500 V	250159G64
18	Capacitor, paper, .004 mfd, 600 V	250129G7
19	Capacitor, paper, .0047 mfd, ±5%, 500 V	250161G24
20	Capacitor, paper, .0047 mfd, ±5%, 500 V	250161G24
21	Capacitor, paper, .005 mfd, 400 V	250129G10
22	Capacitor, paper, .008 mfd, ±10%, 400 V	250152G1028
23	Capacitor, paper, .012 mfd, ±10%, 400 V	250152G1071
24	Capacitor, paper, .01 mfd, 400 V	250129G9
25	Capacitor, paper, .01 mfd, 400 V	250129G9
26	Capacitor, paper, .01 mfd, 600 V	250152G38
27	Capacitor, paper, .02 mfd, 600 V	250129G3
28	Capacitor, paper, .05 mfd, 120 V	250129G5
29	Capacitor, paper, .05 mfd, 120 V	250129G5
30	Capacitor, paper, .05 mfd, 120 V	250129G5
31	Capacitor, paper, .05 mfd, 120 V	250129G5
32	Capacitor, paper, .05 mfd, 120 V	250129G5
33	Capacitor, paper, .05 mfd, 120 V	250129G5
34	Capacitor, paper, .1 mfd, 400 V	250152G22
35	Capacitor, paper, .25 mfd, 400 V	250152G21
36	Capacitor, paper, .25 mfd, 400 V	250152G21
37	Capacitor, electrolytic, 20 mfd, 25 V, 10 mfd, 450 V	270023G6
38	Capacitor, electrolytic, 20 mfd, 25 V, 10 mfd, 450 V	270023G6
50	Resistor, composition, 100 ohm, ½ W	230084G7
51	Resistor, composition, 150 ohm, ½ W	230084G8
52	Resistor, composition, 150 ohm, ½ W	230084G8
53	Resistor, composition, 470 ohm, ½ W	230084G11
54	Resistor, composition, 820 ohm, ½ W, ±10%	230084G61
55	Resistor, composition, 2200 ohm, ½ W	230084G15
56	Resistor, composition, 4700 ohm, ½ W	230084G17
57	Resistor, composition, 10,000 ohm, 1 W	230084G19
58	Resistor, composition, 10,000 ohm, 1 W	230085G19
59	Resistor, composition, 15,000 ohm, ½ W	230085G20
60	Resistor, composition, 22,000 ohm, ½ W	230084G21
61	Resistor, composition, 22,000 ohm, ½ W	230084G21
62	Resistor, composition, 33,000 ohm, ½ W	230084G22
63	Resistor, composition, 47,000 ohm, ½ W	230084G23
64	Resistor, composition, 100,000 ohm, ½ W	230084G25
65	Resistor, composition, 100,000 ohm, ½ W	230084G25
66	Resistor, composition, 100,000 ohm, ½ W	230084G25
67	Resistor, composition, 100,000 ohm, 1 W	230085G25
68	Resistor, composition, 150,000 ohm, ½ W	230084G26
69	Resistor, composition, 220,000 ohm, ½ W	230084G27
70	Resistor, composition, 220,000 ohm, ½ W	230084G27
71	Resistor, composition, 220,000 ohm, ½ W ±10%	230084G90
72	Resistor, composition, 220,000 ohm, ½ W ±10%	230084G90
73	Resistor, composition, 1 megohm, ½ W	230084G31
74	Resistor, composition, 1 megohm, ½ W	230084G31
75	Resistor, composition, 1 megohm, ½ W	230084G31
76	Resistor, composition, 1 megohm, ½ W	230084G31
77	Resistor, composition, 1.5 megohm, ½ W	230084G32
78	Resistor, composition, 560,000 ohm, ½ W, ±10% (in tuning eye socket)	230084G95
85	Control, volume, 1 megohm	220044G15
86	Control, bass, 1 megohm (with switch)	220045G2
87	Switch, rotary, treble control	160161G1
88	Switch, rotary, band selector	160160G2
89	Switch, rotary, (LOOP-ANT)	160157G1
91	Socket, external, input	180060G1
92	Socket, phono, input	189741G1
93	Antenna loop assembly	*
94	Plug, octal, amplifier connection	180427G1
	Dial Glass Assembly	150285G1

* The part number of the loop antenna assembly changes with different cabinets. It is therefore important that you specify the *STYLE NUMBER* of the instrument when ordering a replacement loop antenna assembly.

GENERAL

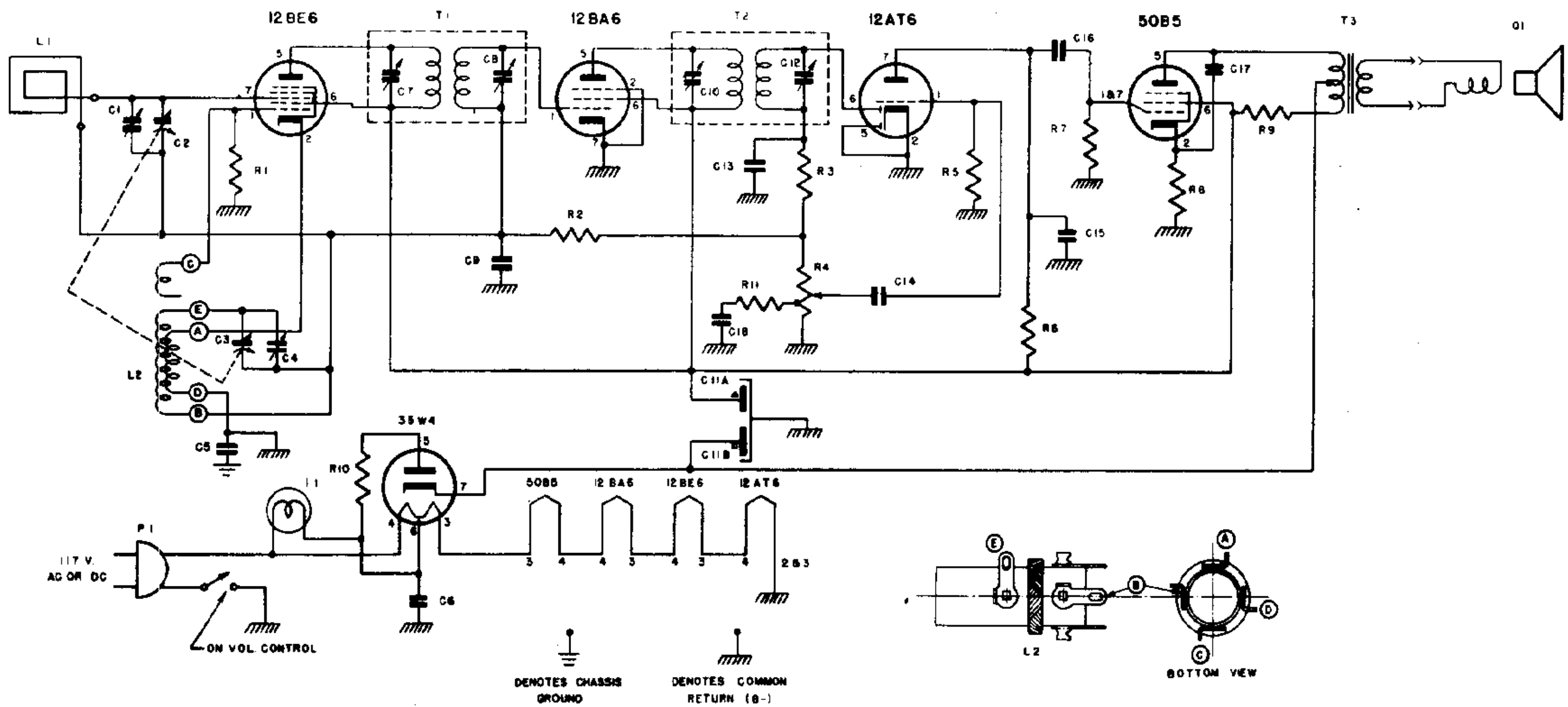
Model CR-208 radio chassis is a two-band tuner that must be used in conjunction with a power amplifier such as the AMP-101 for speaker operation. Heater and plate voltages for the CR-208 radio tuner are supplied from the amplifier chassis; it is therefore essential that the radio and the amplifier chassis be inter-connected during alignment or for other electrical service operations. Models CR-208A and 208B are alike electrically; they differ mechanically in the dial drive assembly. Figures 2 and 3 illustrate the CR-208A dial drive and Figures 4 and 5 the CR-208B assembly.

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-208 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service. To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet it has been properly positioned to bring the radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hooks should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated S-L-H. The end of the short wave antenna that is fastened to the inside of the cabinet connects to S. Always disconnect this antenna from terminal S when an outdoor antenna is used as it may pick up noise. The two terminals on the loop are designated L and H. The leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

MAJESTIC RADIO & TELEV. CORP.

MODEL 5AK711
Chassis 5B01



ALIGNMENT

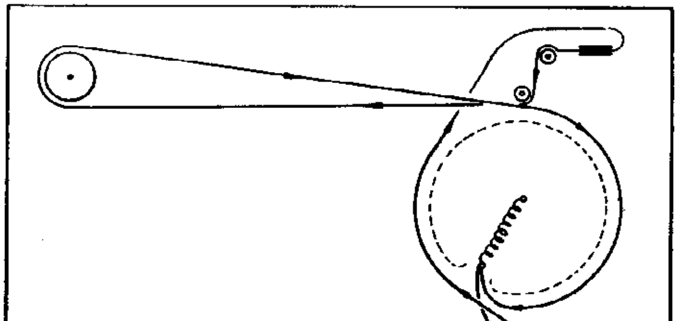
Before aligning, set the dial pointer as follows: Close the tuning gang condenser (plates fully closed). Set the dial pointer so that it is in line with the last mark at the low frequency end of the dial scale.

While aligning this receiver, turn the volume control full on, and keep the signal generator output as low as possible to prevent AVC action and false readings.

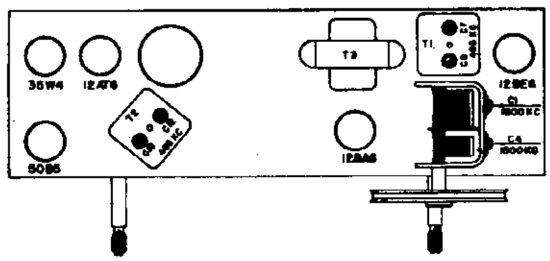
OPERATION	CONNECT OSC. TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJ. TRIMMERS	PURPOSE
1	Pin 7 on Converter Tube 12BE6 Socket	.05MFD	455KC Modulated	600KC	C7, C8, C10 and C12	Align I.F. Channel for Maximum Output
2	2 Turns Loosely Cpld. to Loop Ant.		1500KC Modulated	1500KC	C4	Set Oscillator to Dial Scale
3	2 Turns Loosely Cpld. To Loop Ant.		1500KC Modulated	1500KC	C1	Align Ant. for Maximum Output

MODEL 5AK711

MAJESTIC RADIO & TELEV. CORP.



DIAL STRING



TUBE LAYOUT

VOLTAGE TABLE

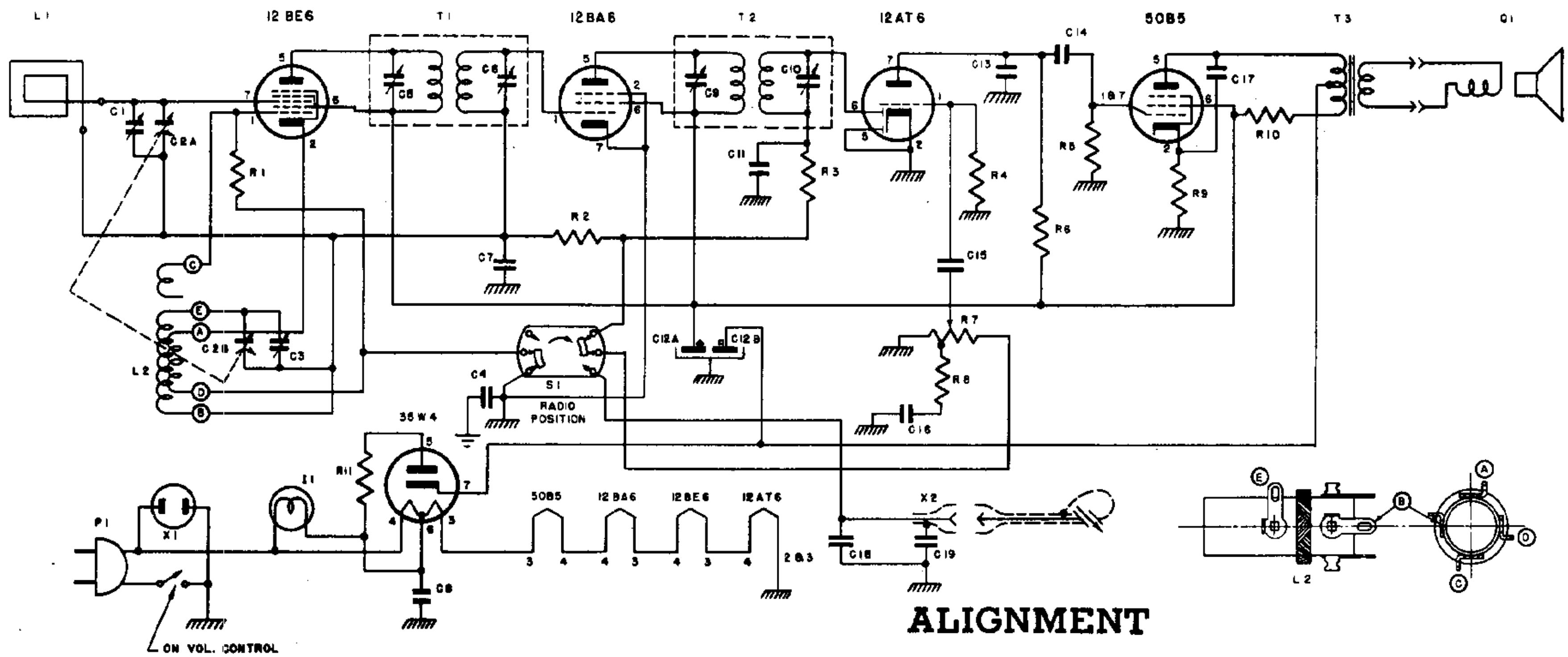
TUBE	ELEMENT	PIN	VOLTS
	Plate	5	88
12BE6 Converter	Screen Grid	6	88
	Grid	7	0.6
	Plate	5	88
12BA6 I.F. Amp.	Screen Grid	6	88
	Grid	1	-0.6
12AT6	Plate	7	38
2nd Det., AVC	Grid	1	-0.6
	Plate	5	107
50B5 Output	Screen Grid	6	88
	Cathode	2	4.9
	Grid	1 & 7	0
35W4	Plate	5	117AC
Rectifier	Cathode	7	115

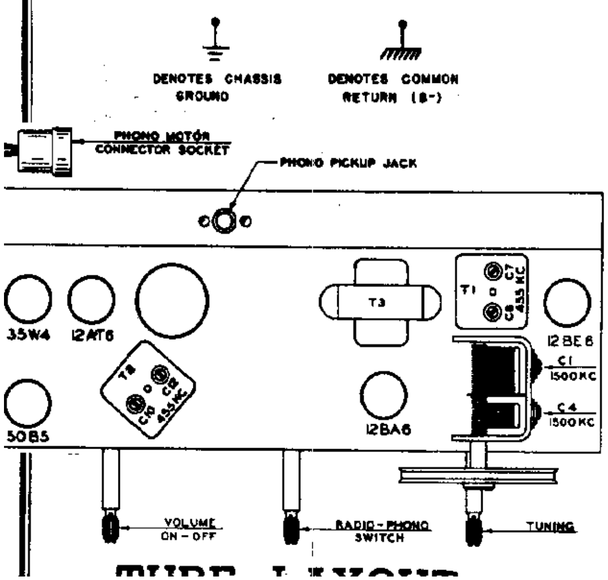
NOTE: All voltages measured with a vacuum tube voltmeter, to B--. A full line voltage of 117 volts AC, and the volume control at minimum.

PARTS LIST

ITEM		DESCRIPTION
C1	-------	Ant. Trimmer (on Gang) . .
C2,C3	7-31	Gang Condenser . . . . . .
C4	-------	Osc. Trimmer (on Gang) . .
C5,C9	5-39	.01 mfd. 200V. . . . . . .
C6	5-40	.05 mfd. 200V. . . . . . .
C7,C8	-------	On 1st I.F. Transformer. .
C10,C12	-------	On 2nd I.F. Transformer. .
C11a,C11B	19-25	20 mfd. 40 mfd. 150V Electrolytic . . . . . .
C13,C15	6-151	220 mmf. 500V Mica . . . .
C14	5-52	.002 mfd. 200V . . . . . .
C16,C18	5-57	.01 mfd. 200V. . . . . . .
C17	5-58	.04 mfd. 400V. . . . . . .
R1,R3	01-143	22K ohms, 1/4 watt . . . .
R2	01-234	3.3 megohm, 1/4 watt . . .
R4	13-33	500K ohm volume control. .
R5	01-255	10 megohm, 1/4 watt. . . .
R6	02-192	330K ohm, 1/2 watt . . . .
R7	01-199	470K ohm, 1/4 watt . . . .
R8	03-52	150 ohm, 1 watt. . . . . .
R9	03-90	1200 ohm, 1 watt . . . . .
R10	01-20	27 ohm, 1/4 watt . . . . .
R11	01-139	18K ohm, 1/4 watt. . . . .
L1	S-1347	Loop Assembly. . . . . . .
L2	S-1348	Oscillator coil. . . . . .
T1	3-161	1st I.F. Transformer . . .
T2	3-193	2nd I.F. Transformer . . .
T3	2-20	Output Transformer . . . .
P1	27-319	Plug and Line Cord . . . .
I1	26-2	Dial Lamp Mazda #47. . . .
Q1	22-11	Speaker. . . . .
	15-132	Socket, Miniature tube . .
	111-249	Tuning Shaft . . . .
	112-374	Dial plate bracket . . . .
	112-376	Dial plate . . . .
	117-93	Dial scale . . . .
	129-29	Dial spring. . . . .
	134-7	Dial cord. . . . .
	135-16	Dial pointer . . . .
	116-10	Cabinet top (10 colors). .
	116-11	Cabinet bottom . . . . . .
	128-67	Knobs. . . . .
	143-5	Grill screen (speaker) . .
	143-6	Grill screen (ventilator).
	148-84	Carton, with fillers . . .
	119-219	Instruction sheet. . . . .

MAJESTIC RADIO & TELEV. CORP. MODELS 5AK731, 5AK78
Chassis 5B05A





ALIGNMENT

Before aligning, set the dial pointer as follows: Close the tuning gang condenser (plates fully closed). Set the dial pointer so that it is in line with the last mark at the low frequency end of the dial scale.

While aligning this receiver, turn the volume control full on, and keep the signal generator output as low as possible to prevent AVC action and false readings.

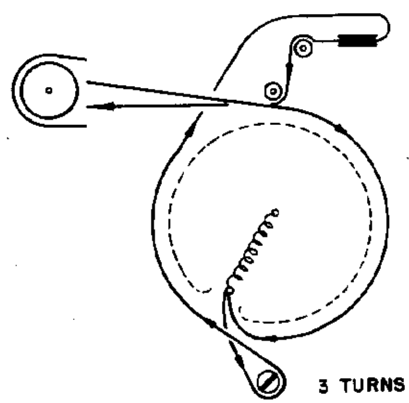
OPERATION	CONNECT OSC. TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJ. TRIMMERS	PURPOSE
1	Pin 7 on converter tube 12BE6 socket	.05mfd	455KC Modulated	600KC	C5,C6,C9 and C10	Align I.F. channel for maximum output
2	2 turns loosly cpld. to loop ant.	------	1500KC Modulated	1500KC	C3	Set oscillator to dial scale
3	2 turns loosly cpld. to loop	------	1500KC Modulated	1500KC	C1	Align ant. for maximum output

MODELS 5AK731, 5AK780

MAJESTIC RADIO & TELEV. CORP.

ITEM	PART NO.	DESCRIPTION
C1	.....	Ant. Trimmer (on gang)
C2a, C2b	7-31	Gang condenser
C3	.....	Osc. trimmer (on gang)
C4	5-39	0.1 mfd. 200V
C5, C6	.....	On 1st I.F. Transformer
C7, C8, C19	5-40	.05 mfd. 200V
C9, C10	.....	On 2nd I.F. Transformer
C11, C13, C18	6-151	220 mmf. 500V mica
C12a, C12b	19-25	20 mfd. 40 mfd. 150V Electrolytic
C14, C16	5-57	.01 mfd. 200V
C15	5-52	.002 mfd. 200V
C17	5-58	.04 mfd. 400V
R1, R3	01-143	22K ohm, 1/4 watt
R2	01-234	3.3 megohm, 1/4 watt
R4	01-255	10 megohm, 1/4 watt
R5	01-199	470K ohm, 1/4 watt
R6	02-192	330K ohm, 1/2 watt
R7	13-28	500K ohm volume control
R8	01-139	18K ohm, 1/4 watt
R9	03-52	150 ohm, 1 watt
R10	03-90	1200 ohm, 1 watt
R11	01-20	27 ohm, 1/4 watt
L1	8-1354	Loop Assembly
L2	8-1374	Oscillator coil
T1	3-161	1st I.F. Transformer
T2	3-193	2nd I.F. Transformer
T3	2-20	Output Transformer
P1	27-201	Plug and Line Cord
I1	26-2	Dial Lamp, Mazda #47
Q1	22-36	Speaker
S1	11-66 or 11-67	Radio-Phono Switch
X1	15-123	AC Receptacle (phono motor)
X2	15-87	Phono Pickup Socket
	111-252	Tuning Shaft
	112-376	Dial plate
	117-72	Dial background
	117-94	Dial scale
	129-29	Dial spring
	134-7	Dial cord
	135-19	Dial pointer
	21-3	Needle
	21-20	Aero Record Changer (5AK731)
	21-21	Milwaukee Record Changer (5AK731)
	21-22	VM800 Record Changer (5AK731)
	116-18-1	Cabinet (Aero cut-out) 5AK731
	116-18-2	Cabinet (Milwaukee cut-out) 5AK731

ITEM	PART NO.	DESCRIPTION
	116-18-3	Cabinet (VM 800 cut-out) 5AK731
	122-36	Escutcheon, metal (5AK731)
	126-23	Screen, speaker (5AK731)
	127-230	Handle, cabinet (5AK731)
	128-66	Knobs 5AK731
	128-79	Knob (phono-radio) 5AK731
	148-86	Carton with fillers, 5AK731
	119-225	Instruction sheet, 5AK731
	21-25	Aero changer (5AK780)
	21-28	Milwaukee changer (5AK780)
	115-38-1	Cabinet, Aero cut-out (5AK780)
	115-38-2	Cabinet, Milwaukee cut-out (5AK780)
	122-47	Escutcheon, metal (5AK780)
	128-62	Knobs (5AK780)
	128-80	Knob (phono-radio) 5AK780
	148-102	Carton, with fillers (5AK780)
	119-260	Instruction sheet, 5AK780



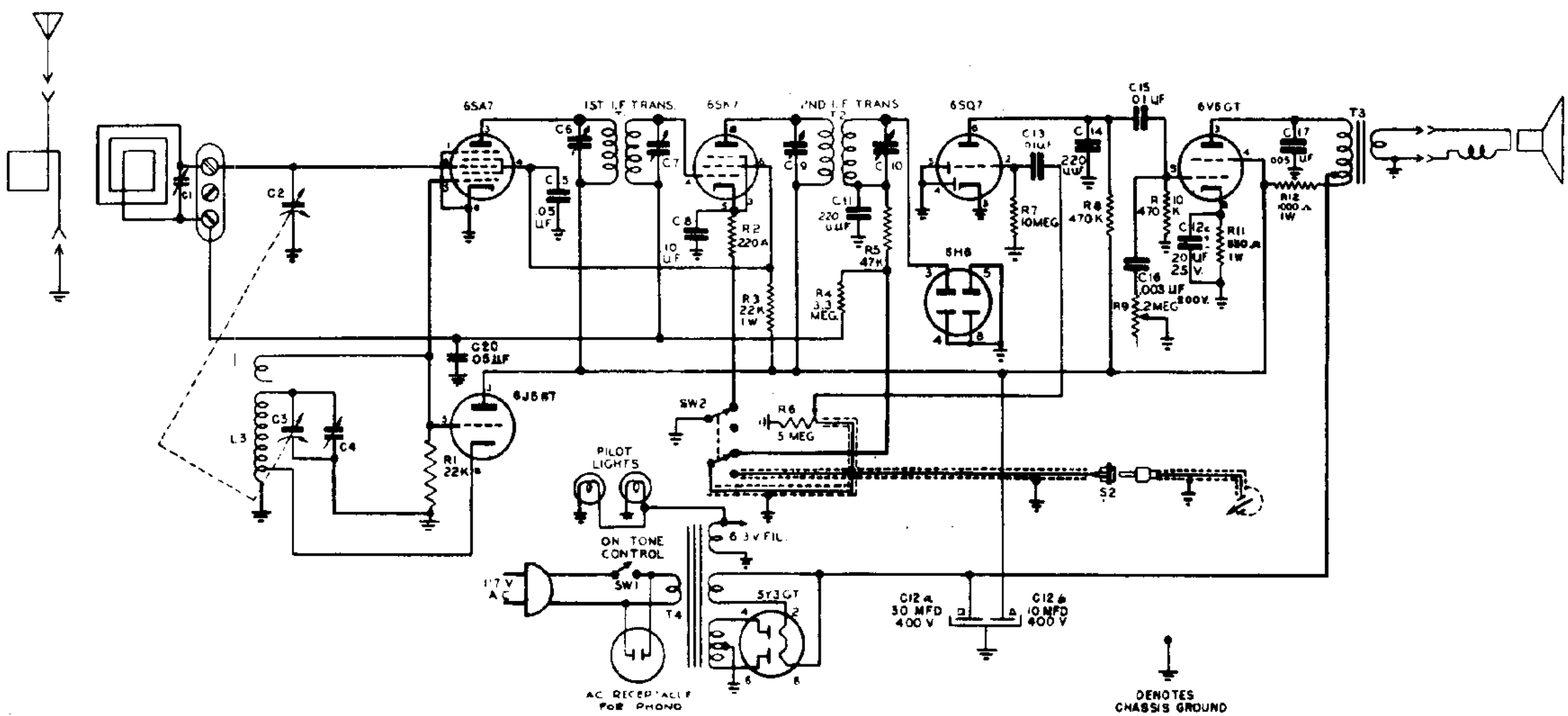
DIAL STRING

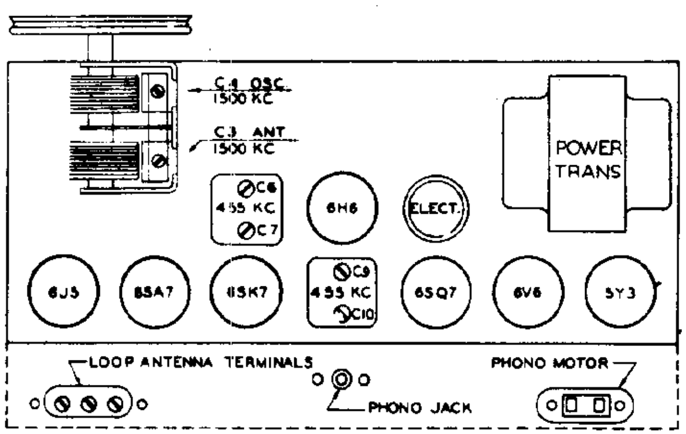
VOLTAGE TABLE

TUBE	ELEMENT	PIN	VOLTS
12BE6 Converter	Plate	5	88
	Screen Grid	6	88
	Grid	7	0.6
12BA6 I.F. Amp.	Plate	5	88
	Screen Grid	6	88
	Grid	1	-0.6
12AT6 2nd Det., AVC	Plate	7	38
	Grid	1	-0.6
50B5 Output	Plate	5	107
	Screen Grid	6	88
	Cathode	2	4.9
	Grid	1 & 7	0
35W4 Rectifier	Plate	5	117AC
	Cathode	7	115

NOTE: All voltages measured with a vacuum tube voltmeter to B--. A full line voltage of 117 V.A.C., volume control at minimum and "Radio-Phono" switch in the "radio" position.

MAJESTIC RADIO & TELEV. CORP.





TUBE LAYOUT

VOLTAGE TABLE

TUBE	PLATE	SCREEN	CATHODE
6SA7 (Conv.)	244	74	---
6J5 (Osc.)	244	---	---
6SK7 (I.F.)	244	74	1.6
6SQ7 (A.F.)	75	---	---
6V6 (Out)	268	243	7.5

NOTE: All voltages measured to ground with 1,000 ohm per volt meter; line 117 VAC values may vary

MODEL 7JK777R MAJESTIC RADIO & TELEV. CORP.

ITEM	PART NO.	DESCRIPTION
C1	7-28	Trimmer, (on gang)
C2,C3	7-28	Gang Condenser
C4		Trimmer, (on gang)
C5	5-77	.05 mfd. 600V
C6,C7		Trimmer, (on 1st IF)
C8	5-39	0.1 mfd. 200V
C9,C10		Trimmer, (on 2nd IF)
C11,C14	6-151	220 mmf. 500V mica
C12	19-26	10 mfd.-400V, 30 mfd.-400V, 20 mfd.-25V electrolytic
C13	5-57	.01 mfd. 200V
C15	6-132	.01 mfd. 400V
C16	015-3	.003 mfd. 200V.
C17	5-61	.005 mfd. 600V.
C20	5-40	.05 mfd. 200V
R1	01-143	22K ohm, 1/4 watt
R2	01-59	220 ohm, 1/4 watt
R3	03-143	22K ohm, 1 watt
R4	01-234	3.3 megohm, 1/4 watt
R5	01-157	47K ohm, 1/4 watt
R6	13-19	Volume control, 500K ohm
R7	01-255	10 megohm, 1/4 watt
R8	02-199	470K ohm, ½ watt
R9	14-6	Tone control, 200K ohm

ITEM	PART NO.	DESCRIPTION
R10	01-199	470K ohm, 1/4 watt
R11	03-65	330 ohm, 1 watt
R12	03-87	1000 ohm, 1 watt
T1	3-159	1st IF transformer
T2	3-160	2nd IF transformer
T3	12-26	Output transformer
T4	2-16	Power transformer
L3	3-158	Oscillator coil
SW-2	11-52	Phono-radio switch
	15-87	Phono pickup socket
	15-135	A.C. receptacle
	24-117	3 screw terminal strip
	26-2	Lamp Mazda #47
	27-201	Power cord & plug
	117-85	Dial scale plate
	129-29	Dial spring
	134-7	Dial cord
	135-22	Dial pointer
	S1466	Loop antenna assembly
	21-10	Record changer VM-800
	21-11	Record changer, Milwaukee
	21-12	Record changer, Oak
	21-18	Record changer, Aero
	22-30	Speaker, 8" PM
	115-28	Cabinet

ALIGNMENT

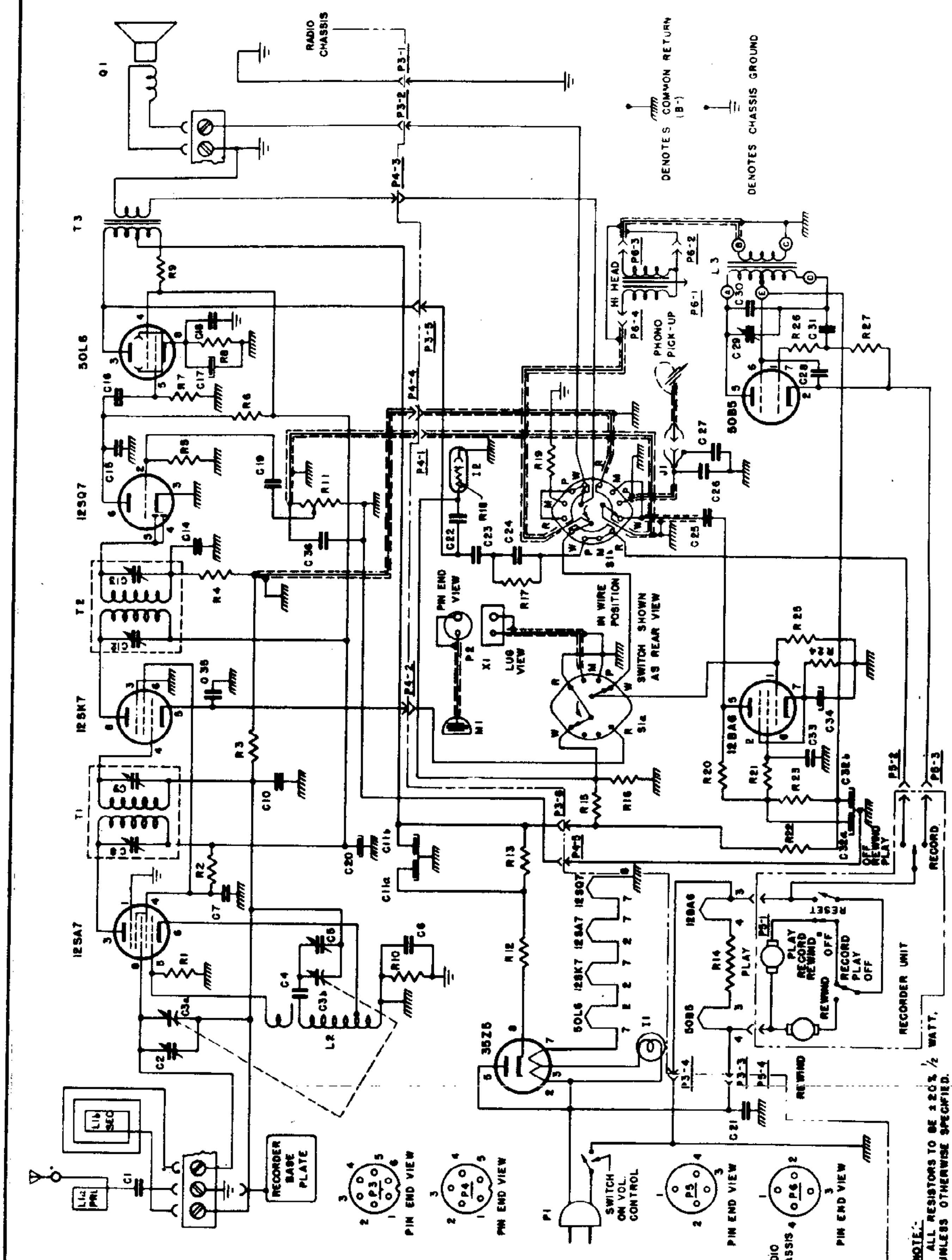
Before aligning, set the dial pointer as follows: Close the gang condenser (plates fully closed). Set the dial pointer so that it is in line with the last mark at the low frequency end of the dial scale.

While aligning this receiver, turn the volume control full on, and keep the signal generator output as low as possible to prevent AVC action and false readings.

OPERATION	CONNECT OSC. TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJ. TRIMMERS	PURPOSE
1	Pin 8 on Converter Tube 6SA7 Socket	.05mfd.	455 KC Modulated	600 KC	C6, C7, C9 and C10	Align I.F. Channel for maximum output.
2	2 turns Loosly Cpld. to Loop Ant.	-------	1500 KC Modulated	1500 KC	C4	Set oscillator to dial scale.
3	2 turns Loosly Cpld. to Loop Ant.	-------	1500 KC Modulated	1500 KC	C1	Align ant. for maximum output.

MAJESTIC RADIO & TELEV. CORP.

MODEL 7YR75
Chassis 7BC

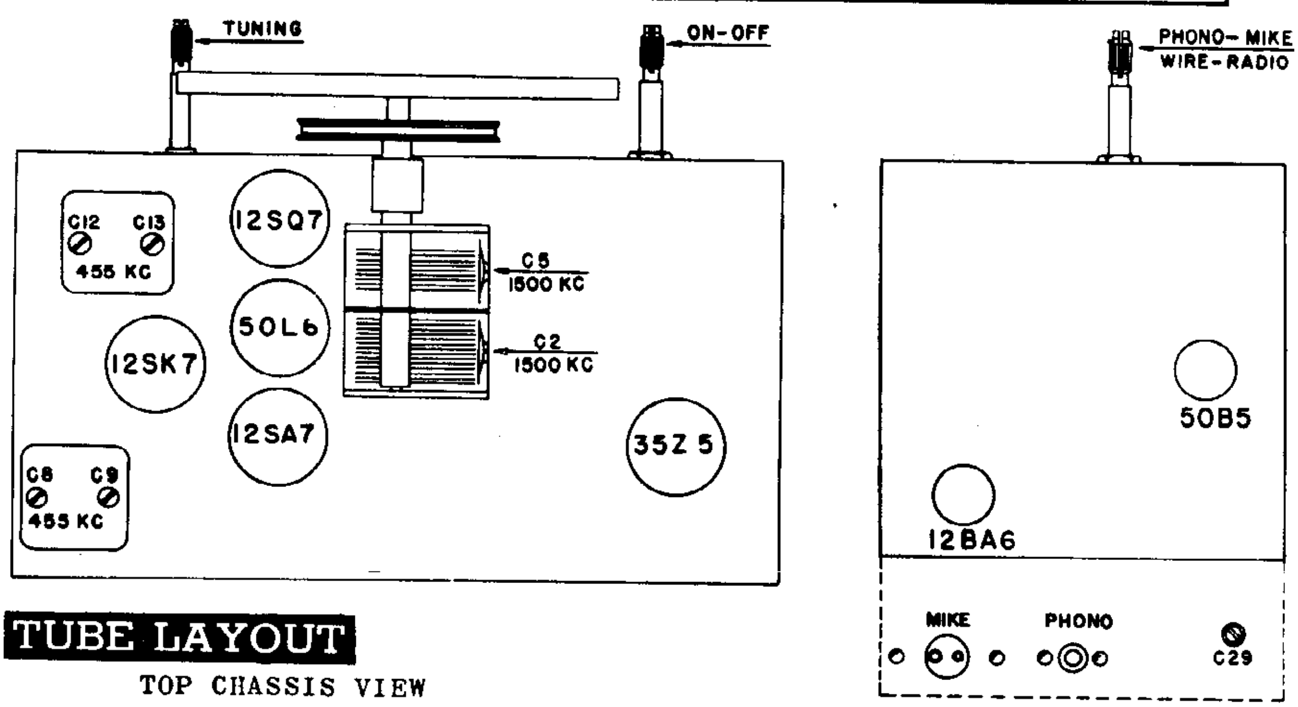


MODEL 7YR752 MAJESTIC RADIO & TELEV. CORP.

ALIGNMENT

Before aligning, set dial pointer as follows; close the tuning gang condenser (plates fully closed). Set the dial pointer so that it is in line with the last mark at the low frequency end of the dial scale. While aligning this receiver, turn the volume control full on, and keep the signal generator output as low as possible to prevent AVC action and false readings.

OPERATION	CONNECT GENERATOR TO	DUMMY ANT.	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJUST TRIMMERS	PURPOSE
1	Pin 8 on 12SA7 Converter	.05 mf.	455KC Modulated	600KC	C8, C9. C12, C13	Align. IF Channel for Maximum output.
2	2 turns Loosely Coupled to Loop Ant.		1500KC Modulated	1500KC	C5	Set oscillator to dial scale
3	2 turns Loosely Coupled to Loop Ant.		1500KC Modulated	1500KC	C2	Align. Ant. for Max. Output.



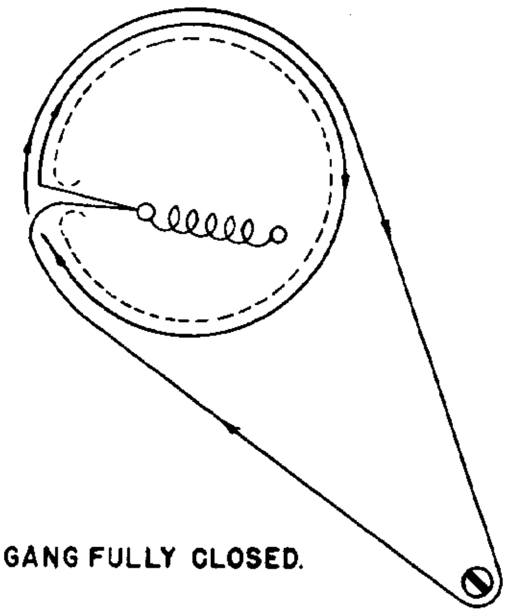
TUBE LAYOUT

TOP CHASSIS VIEW

On the small pre-amplifier sub-chassis may be seen the oscillator trimmer C29 which sets the frequency of the 40 KC erase oscillator.

DIAL STRINGING DIAGRAM

The dial stringing on this radio is conventional and presents no particular problem. If any slippage is encountered a small amount of rosin should be applied to the string.



SHOWN WITH GANG FULLY CLOSED.

VOLTAGE TABLES

RECEIVER CHASSIS

Voltage measured with switch in "Radio" position

TUBE	ELEMENT	PIN	VOLTS
12SA7 CONVERTER	Plate	3	80
	Screen Grid.	4	65
	Control Grid.	8	-0.7 (Zero Sig.)
	Osc. Grid.	5	-7
12SK7 IF AMP	Plate	8	80
	Screen Grid.	6	65
	Control Grid.	4	-0.7 (Zero Sig.)
12SQ7 2nd DET & AVC	Plate	6	48
	Control Grid.	2	-0.9
50L6 OUTPUT	Plate	3	100
	Screen Grid.	4	80
	Control Grid.	5	Zero
	Cathode	8	4.5
35Z5 RECTIFIER	Plate	5	117 A.C.
	Cathode	8	115

OSCILLATOR CHASSIS

Voltage measured with switches set to "Record" & "Mike"

TUBE	ELEMENT	PIN	VOLTS
12BA6 AMPLIFIER	Plate	5	35
	Screen Grid.	6	6
	Control Grid.	1	-0.3
	Cathode	7	.3
50B5 40KC OSC.	Plate	5	86
	Screen Grid.	6	86
	Control Grid.	7	-21

NOTE--
All voltages measured with a vacuum tube voltmeter to B- (not chassis).
Line Voltage 117 V.A.C. and volume control set at minimum.

MODEL 7YR52

MAJESTIC RADIO & TELEV. CORP.

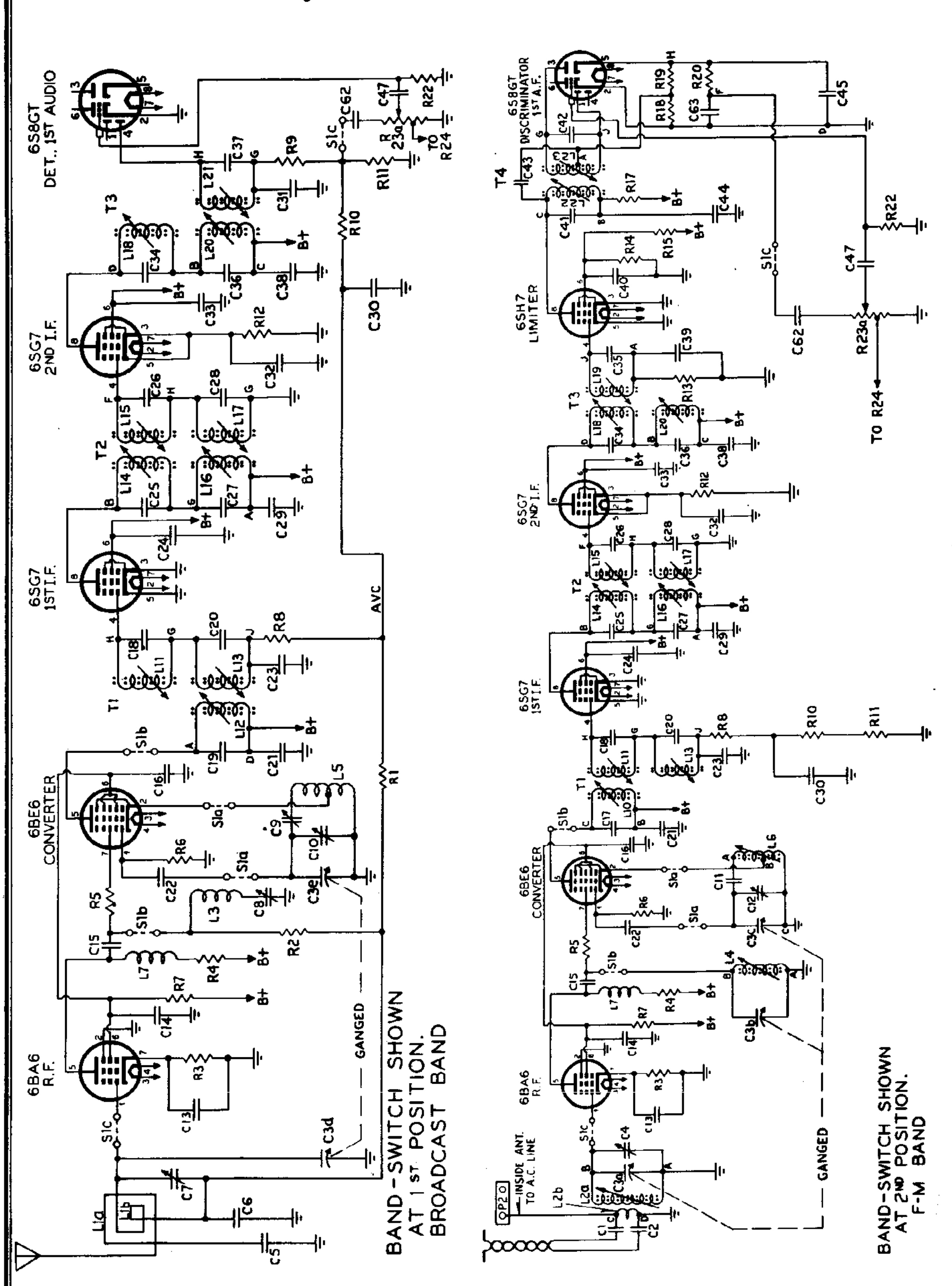
ITEM	PART NO.	DESCRIPTION
C1,C7,C16	015-5	.01 mfd. 200V
C2	——	Ant. trimmer, on gang
C3a,C36	7-24 or 7-21	Gang condenser
C4,C6,C10, C21,C27,C35	015-8	
C5	——	Osc.trimmer, on gang
C8,C9	——	1st IF Trimmers
C11a,C11b	19-24	40 mfd-150V, 20mfd-150V electrolytic
C12,C13	——	2nd IF trimmer
C14,C15	020-53	220 mmf. 500V mica
C17,C34	19-36	100 mfd. 10V electrolytic
C18	5-58	.04 mfd. 400V
C19	017-2	.002 mfd. 600V
C20	19-32	20 mfd. 150V electrolytic
C22	017-4	.005 mfd. 600V
C23	016-8	.05 mfd. 400V
C24	017-1	.001 mfd. 600V
C25	016-5	.01 mfd. 400V
C26	6-230	1000 mmf. 300V ceramic
C28	5-51	.2 mfd. 200V
C29	8-33	330-960 mmf.trimmer
C30	021-56	5600 mmf.500V mica
C31	021-24	1500 mmf.500V mica
C32a,C32b	19-25	20 mfd.150V.40mfd. 150V
C33	015-9	.1 mfd. 200V
C36	6-228	700 mmf.500V mica
R1,R4,R27	02-143	22K ohms ½ watt
R2,R24	02-100	2200 ohm ½ watt
R3	02-234	3.3 megohm ½ watt
R5	02-255	10 megohm ½ watt
R6	02-192	330K ohm ½ watt
R7,R16,R20 R25	02-199	470K ohm ½ watt
R8	03-52	150 ohm 1 watt
R9	03-90	1200 ohm, 1 watt
R10	02-185	220K ohm ½ watt
R11	13-14	volume control, 500K ohm
R12	02-17	22 ohm ½ watt
R13	04-59	220 ohm, 2 watt
R14	9-335	375 ohm candohm
R15	02-206	680 K ohm ½ watt
R17	02-167	82K ohm ½ watt

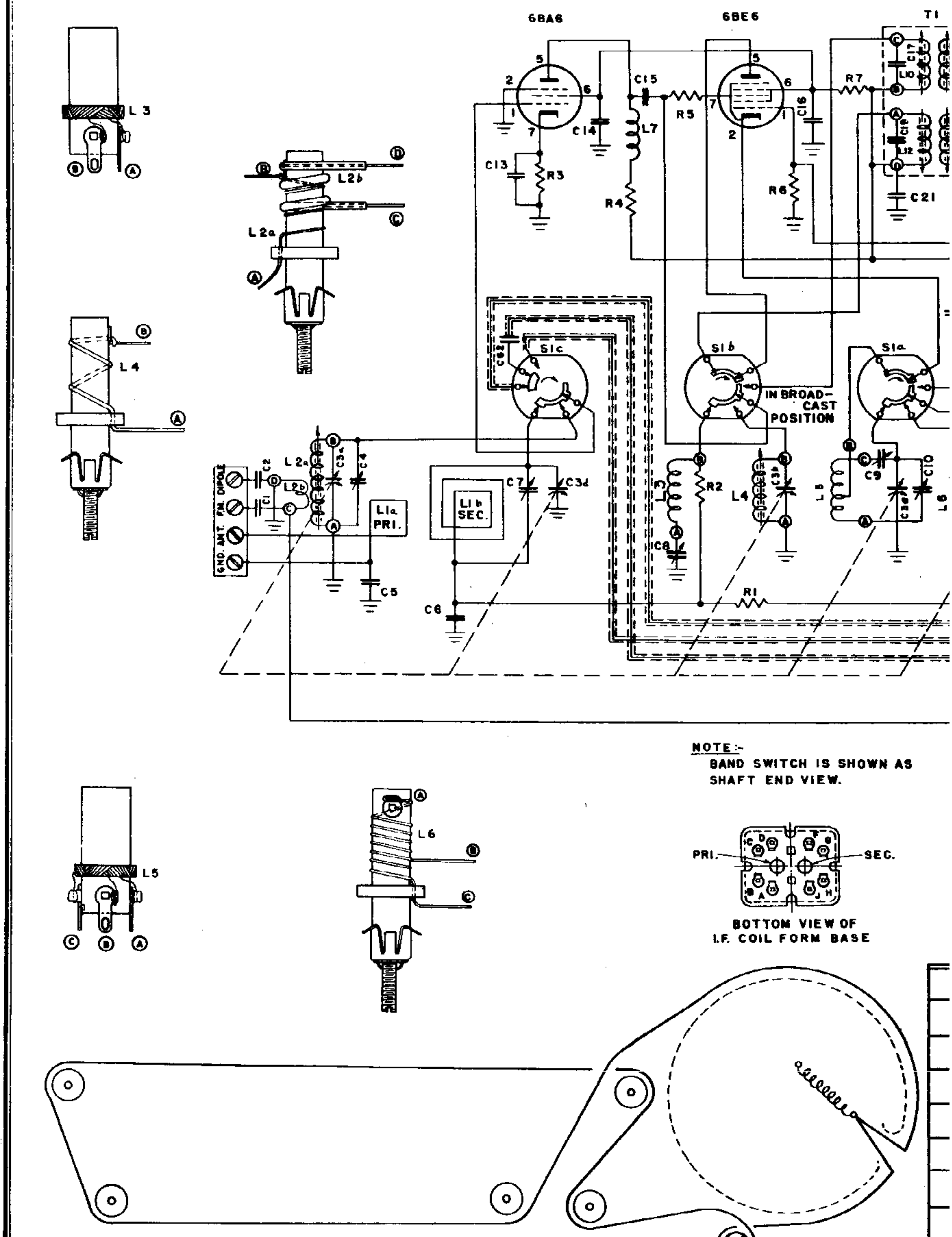
ITEM	PART NO.	DESCRIPTION
R18	——	100K ohm, Part of I2
R19	9-336	3 ohm, 1 watt
R21	02-227	2.2 megohm ½ watt
R22	03-52	150 ohm, 1 watt
R23	02-174	120K ohm ½ watt
R26	02-65	330 ohm ½ watt
T1	3-116	1st IF transformer
T2	3-117	2nd IF transformer
T3	12-20	Output transformer
L1	20-30	Loop antenna assembly
L2	3-158	Oscillator coil
L3	S-1572	Oscillator coil assembly 40 K C
Q1	22-32	Speaker
I1	26-2	Pilot lamp, Mazda #47
I2	26-19	Neon bulb
P1	27-202	Plug and line cord
P2	18-56	Plug-microphone cable
X1	15-146	Socket, microphone receptacle
J1	15-87	Phono receptacle
M1	22-47	Microphone
H1		Wire pickup head
P3	15-145 18-55	Socket, 6 contact Plug, 6 contact
P4	15-101 18-54	Socket, 5 contacts Plug, 5 contacts
P5	18-125 18-56	Socket, 4 contact Plug, 4 contact
P6	15-144	Cable connector - record head
S1	11-75	Rotary switch
	38-5	Insulator-phono pickup socket
	117-66	Dial Scale
	129-29	Dial cord spring
	134-7	Dial cord
	135-14	Pointer
	21-23	Wire recorder unit
	115-39	Cabinet
	119-261	Instruction sheet
	122-38	Crystal and escutcheon
	127-205	Pilot lamp jewel
	128-54	Knob-tuning
	128-78	Knob, Radio-phono-mike-wire
	128-56	Knob, volume
	148-101	Carton with fillers

"clarified schematics"

MAJESTIC RADIO & TELEV. CORP.

MODEL 8FM744

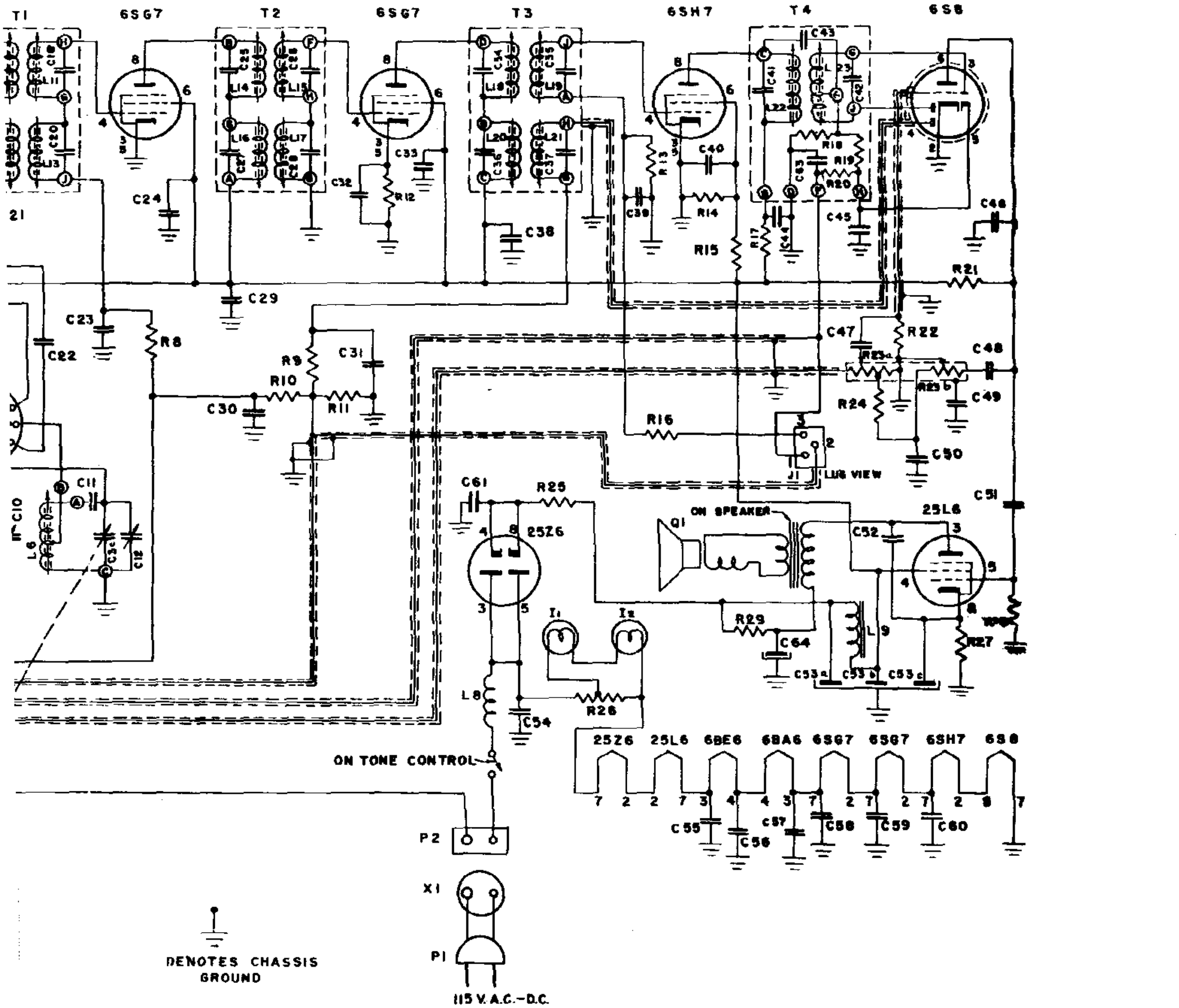



6BA6
6BE6
T1
L3
L2b
L2a
L4
L5
L6
S1c
S1b
S1a
IN BROAD-CAST POSITION
L1a PRI.
L1b SEC.
GND. ANT. F.M. DIPOLE
C1
C2
C3a
C4
C5
C6
C7
C8
C9
C10
C13
C14
C15
C16
C21
R1
R2
R3
R4
R5
R6
R7
L7
NOTE:-
BAND SWITCH IS SHOWN AS
SHAFT END VIEW.
PRI.
SEC.
BOTTOM VIEW OF
I.F. COIL FORM BASE
2 TURNS

DIAL STRING

RADIO & TELEV. CORP.

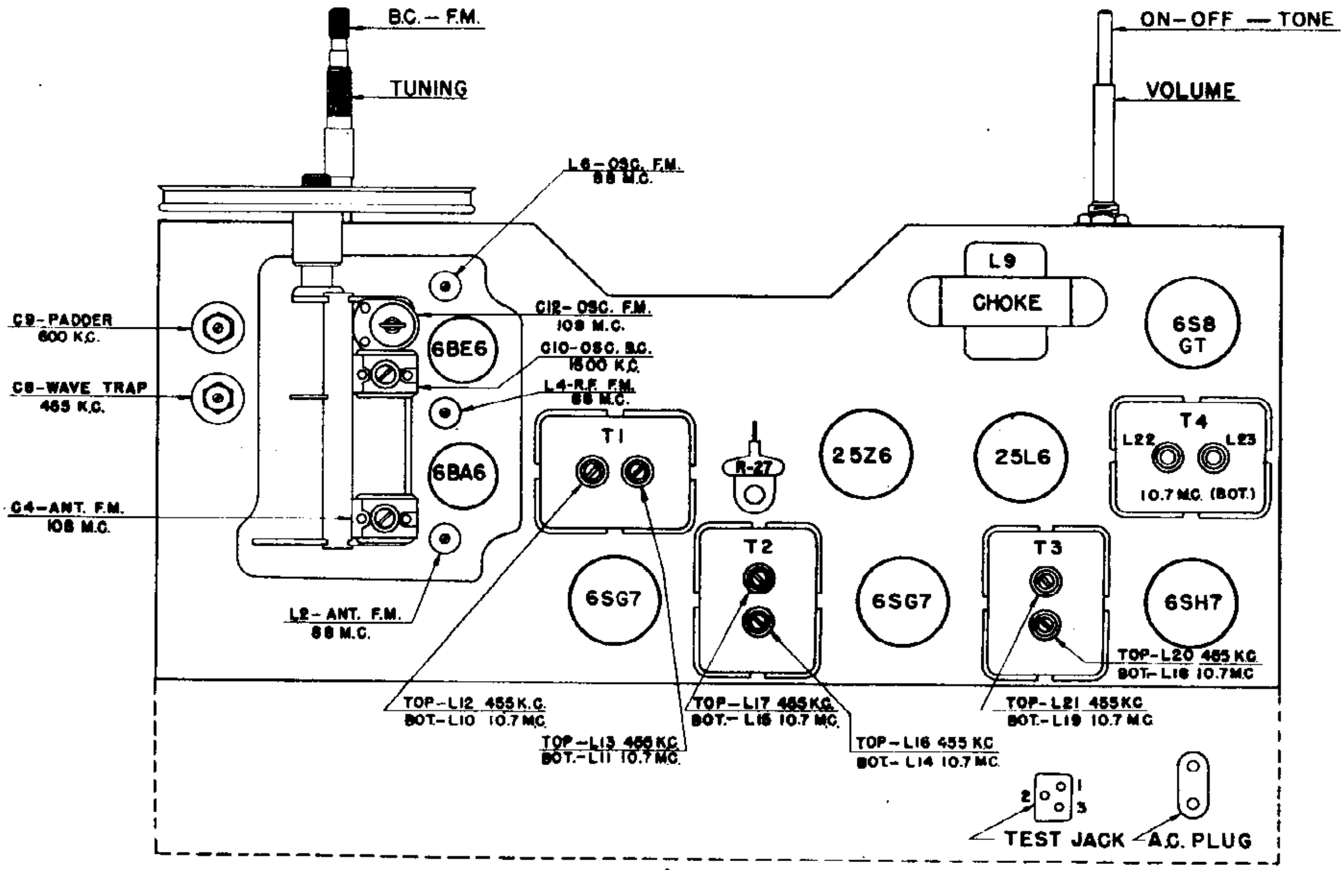
MODEL 8FM744
Chassis 8B06D



VOLTAGE TABLE

TUBE	FUNCTION	PLATE	CATHODE	SCREEN	GRID
6BA6	R.F. Amplifier	80	0.5	78	----
6BE6	Converter	100	0	78	----
6SG7	1st I.F. Amplifier	100	0	100	-0.6
6SG7	2nd I.F. Amplifier	100	.7	100	----
6SH7	Limiter Amplifier	70	0	21	-0.4
6S8GT	Discriminator, Det., AVC	50	0	---	----
25L6	Power Amplifier	105	7	100	----
2525	Rectifier	117AC	105	---	----

MAJESTIC RADIO & TELEV. CORP.



TUBE LAYOUT

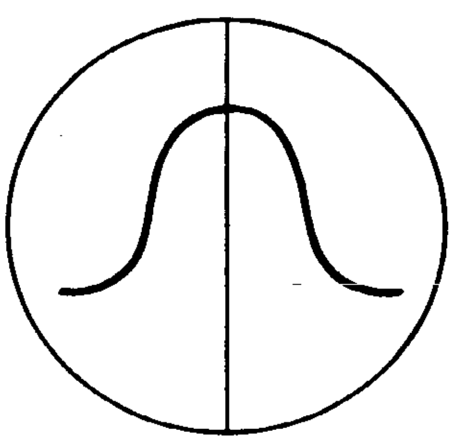


FIGURE 1

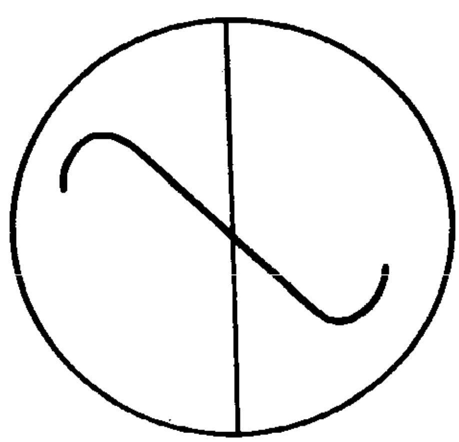


FIGURE 2

ALIGNMENT

OPERATION	CONNECT TEST OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST TRIMMERS	PURPOSE
1	Stator Plates of C3d	.05mfd.	455 KC	BC	600 KC	L12, L13, L16, L17, L20, L21	Align if channel for maximum output.
2	Stator Plates of C3d	.05mfd.	455 KC Modulated	BC	600 KC	C8	Adjust wave trap for maximum output.
3		-------	1500 KC Modulated	BC	1500 KC	C10	Set oscillator to dial scale.
4		-------	1500 KC Modulated	BC	1500 KC	C7	Align antenna for maximum output.
5		-------	600 KC Modulated	BC	600 KC	C9	Rock gang to track BC padder.
6(a)	Pin 4 (Grid) on 6SH7 Limiter Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L22 Coil Slug Primary Discriminator	Align Primary of discriminator for maximum reading.
7(b)	Pin 4 (Grid) on 6SH7 Limiter Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L23 Coil Slug Secondary Discriminator	Adjust secondary of discriminator for zero reading.
8(c)	Pin 4 (Grid) on 6SG7 2nd IF Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L18 and L19, Pri. and Sec. 3rd IF Coil	Align 3rd IF Transformer for maximum reading.
9(c)	Pin 4 (Grid) on 6SG7 1st IF Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L14 and L15 Pri. and Sec. 2nd IF Coil	Align 2nd IF Transformer for maximum reading.
10(c)	Lug "B" on Coil L4	.05mfd.	10.7 MC Unmodulated	FM	------	L10 and L11 Pri. and Sec. 1st IF Coil	Align 1st IF Transformer for maximum reading.
11(c)	Antenna Terminals	300ohm Resistor	106 MC Unmodulated	FM	106 MC	C12 Oscillator Trimmer	Set oscillator to dial scale.
12(c)	Antenna Terminals	300ohm Resistor	106 MC Unmodulated	FM	106 MC	C4 Antenna Trimmer	Align antenna stage for maximum reading.
13(c)	Antenna Terminals	300ohm Resistor	88 MC Unmodulated	FM	88 MC	L6 Oscillator Slug	Set oscillator to dial scale.
14(c)	Antenna Terminals	300ohm Resistor	88 MC Unmodulated	FM	88 MC	L4, L2 Slugs	Align Antenna and RF stages for maximum reading.
15(c)	Antenna Terminals	Repeat steps 11, 12, 13, and 14 until tracking is perfect at 88 and 106 MC.					

IMPORTANT: Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustment has been tampered with. A vacuum tube voltmeter must be used for FM alignment. An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments. The signal generator output should be kept just high enough to get a n indication on the meter.

NOTES: (a) Vacuum tube voltmeter pin "A" on discriminator transformer to chassis (half discriminator load).
(b) Vacuum tube voltmeter pin 1 of test jack to chassis (full discriminator load).
(c) Vacuum tube voltmeter pin 3 of test jack to chassis (limiter grid load).

A much more satisfactory IF and discriminator alignment may be obtained by using a 10.7 MC signal generator, frequency modulated at an audio frequency and swept approximately 600 KC (±300 KC). An oscilloscope should be connected to test jack pin 3 and all IF slugs adjusted for a symetrical pattern of highest amptitude. See Fig. 1. For discriminator alignment, connect oscilloscope to test jack pin 1 and adjust T4 for highest linear symetrical pattern. See Fig. 2.

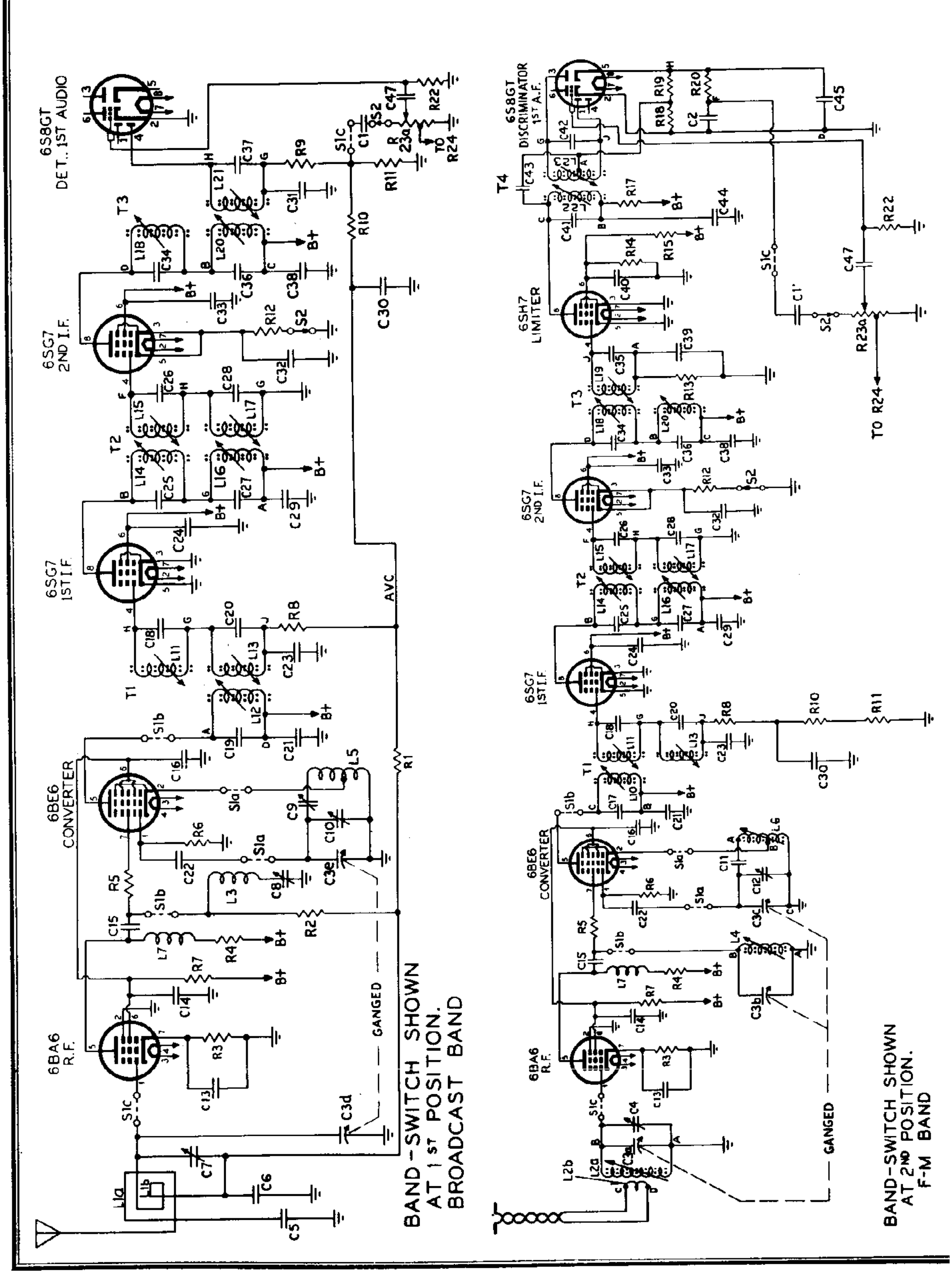
MAJESTIC RADIO & TELEV. CORP.

PARTS LIST

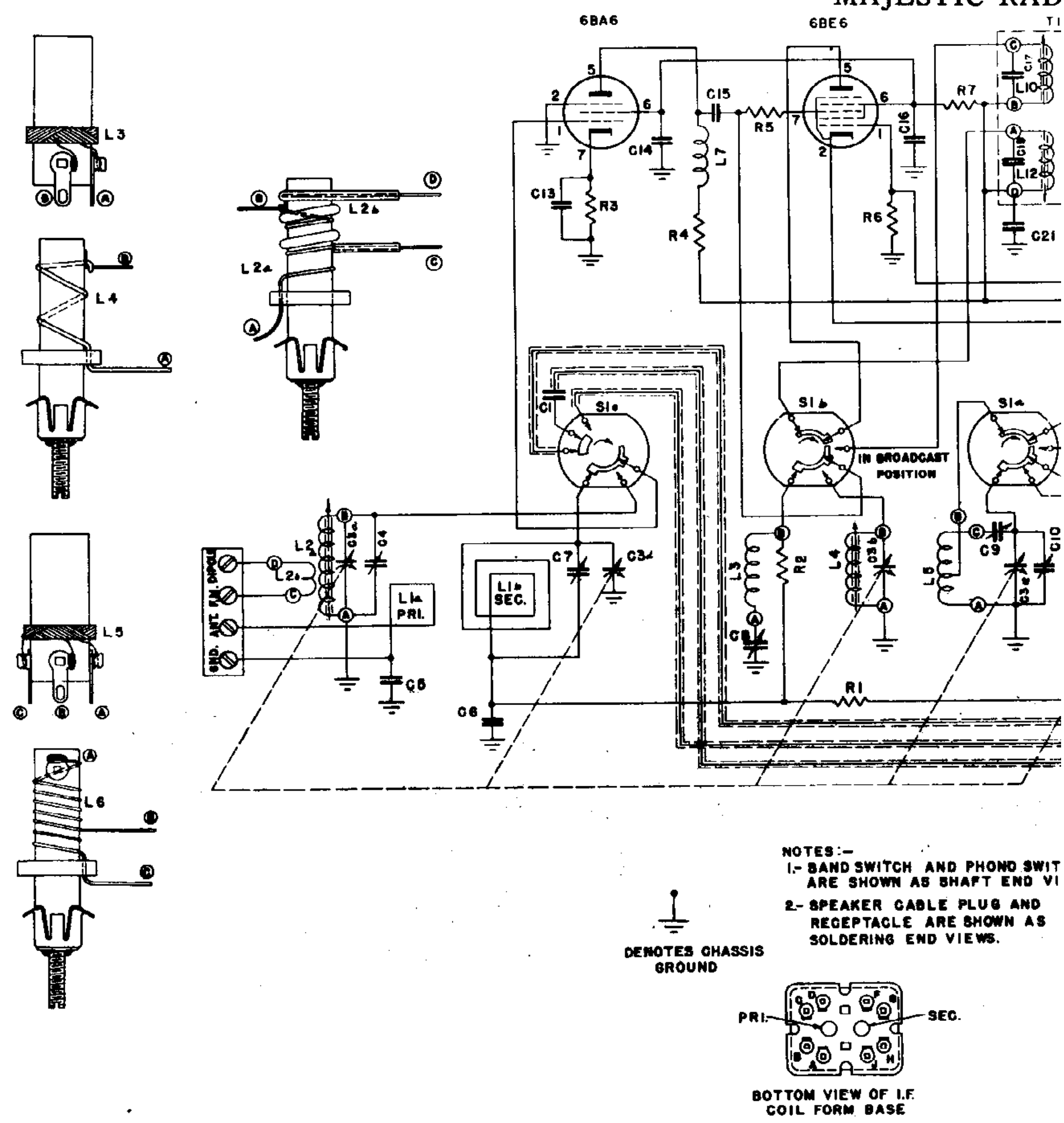
ITEM	PART NO.	DESCRIPTION
C1,C2,C39,C45	6-232	100 mmf, 500V Mica
C3	7-25	Gang Condenser FM-AM
C4,C10	8-35	Trimmer 2.5 - 30 mmf
C5,C23,C30,C32, C49,C50	015-5	.01 mfd, 200V
C6	015-8	.05 mfd, 200V
C7	8-59	Trimmer 2-30 mmf
C8	8-63	Trimmer 15-115
C9	8-65	200 - 600 mmf Padder
C11	6-218	1000 mmf, 500V Mica
C12	8-38	Trimmer 3-13 mmf
C13,C22	6-159	47 mmf, 500V Ceramic
C14,C15,C16,C55, C56,C57,C63	6-230	1000 mmf 300V Ceramic
C17,C41	6-247	24 mmf Ceramic,Special
C18,C25,C26,C34,C35	6-246	33 mmf Ceramic,Special
C19,C20,C27,C28, C36,C37	6-250	750 mmf Mica, Special
C21,C29,C38,C44,C51	016-5	.01 mfd, 400V
C24,C33,C40,C58, C59,C60	6-259	.005 mfd minimum disk - type Ceramic, Special
C31,C46,C61	6-151	220 mmf, 500 V Mica
C42	6-249	62 mmf Ceramic, Special
C43	6-248	15 mmf Ceramic, Special
C47	017-2	.002 mfd, 600V
C48,C62	017-4	.005 mfd, 600V
C52	017-5	.01 mfd, 600V
C53	19-44	50 mfd - 150V, 30 mfd-150V, 100 mfd 10 volt Electrolytic
C54	016-8	.05 mfd, 400V
C64	19-32	20 mfd, 150V Electrolytic
R1,R8,R11,R16,R21, R28	01-199	470K ohms, 1/4 watt
R2,R13,R17,R20	01-157	47K ohms, 1/4 watt
R3,R12	01-37	68 ohms, 1/4 watt
R4,R14	02-108	3300 ohms, 1/2 watt
R5	01-3	10 ohms, 1/4 watt
R6,R9	01-143	22K ohms, 1/4 watt
R7	01-101	2200 ohms 1/4 watt
R10	01-227	2.2 meg ohm, 1/4 watt
R15	02-132	12K ohms, 1/2 watt
R18,R19	01-174	120K ohms, 1/4 watt
R22	01-255	10 meg ohm, 1/4 watt
R23	13-32	Volume - tone control with switch
R24	01-132	12K ohms, 1/4 watt
R25	03-20	27 ohms, 1 watt
R26	9-332	100 ohm candohm
R27	02-52	150 ohm, 1/2 watt
R29	02-59	220 ohm, 1/2 watt
L1	S-1400	Loop Antenna Assembly
L2	S-1407	F.M. Antenna Coil
L3	S-1410	Wave Trap Coil
L4	S-1408	FM RF coil
L5	S-1411	AM Oscillator Coil
L6	S-1409	FM Oscillator Coil
L7	S-1384	RF Plate Choke
L8	S-1385	Line Choke
L9	2-32	Filter Choke
T1	S-1389	1st IF Transformer
T2	S-1390	2nd IF Transformer
T3	S-1391	3rd IF Transformer
T4	S-1392	Discriminator Transformer
Q1	22-42	Speaker, 8" PM
S1	11-71	Switch Shaft
S1a	11-71-1	Switch Wafer Section 1
S1b	11-71-2	Switch Wafer Section 2
S1c	11-71-3	Switch Wafer Section 3
I1, I2	26-2	Dial Lamp, Mazda #47
J1	15-91	Test Jack
P1	27-201	Line Cord and Plug
P2	18-50	Plug - power connector
X1	15-137	Socket, power connector
	115-24	Cabinet, Table Model
	122-37	Escutcheon
	119-244	Instruction Sheet
	15-81	Tube Socket, Octal
	15-114	Tube Socket, Miniature
	16-34	Tube Shield, Miniature
	16-39	Tube Shield, 6S8 Tube
	34-20	I.F. Coil Iron Cores, Threaded
	117-81	Dial Scale
	117-84	Dial Backing
	129-29	Dial Spring
	134-7	Dial Cord
	135-21	Dial Pointer
	128-70	Knob, Volume
	128-71	Knob, Band Switch
	128-72	Knob, Tuning
	128-73	Knob, Tone-on-off
	148-96	Carton with fillers

MAJESTIC RADIO & TELEV. CORP.

MODEL 8FM776



MAJESTIC RAD

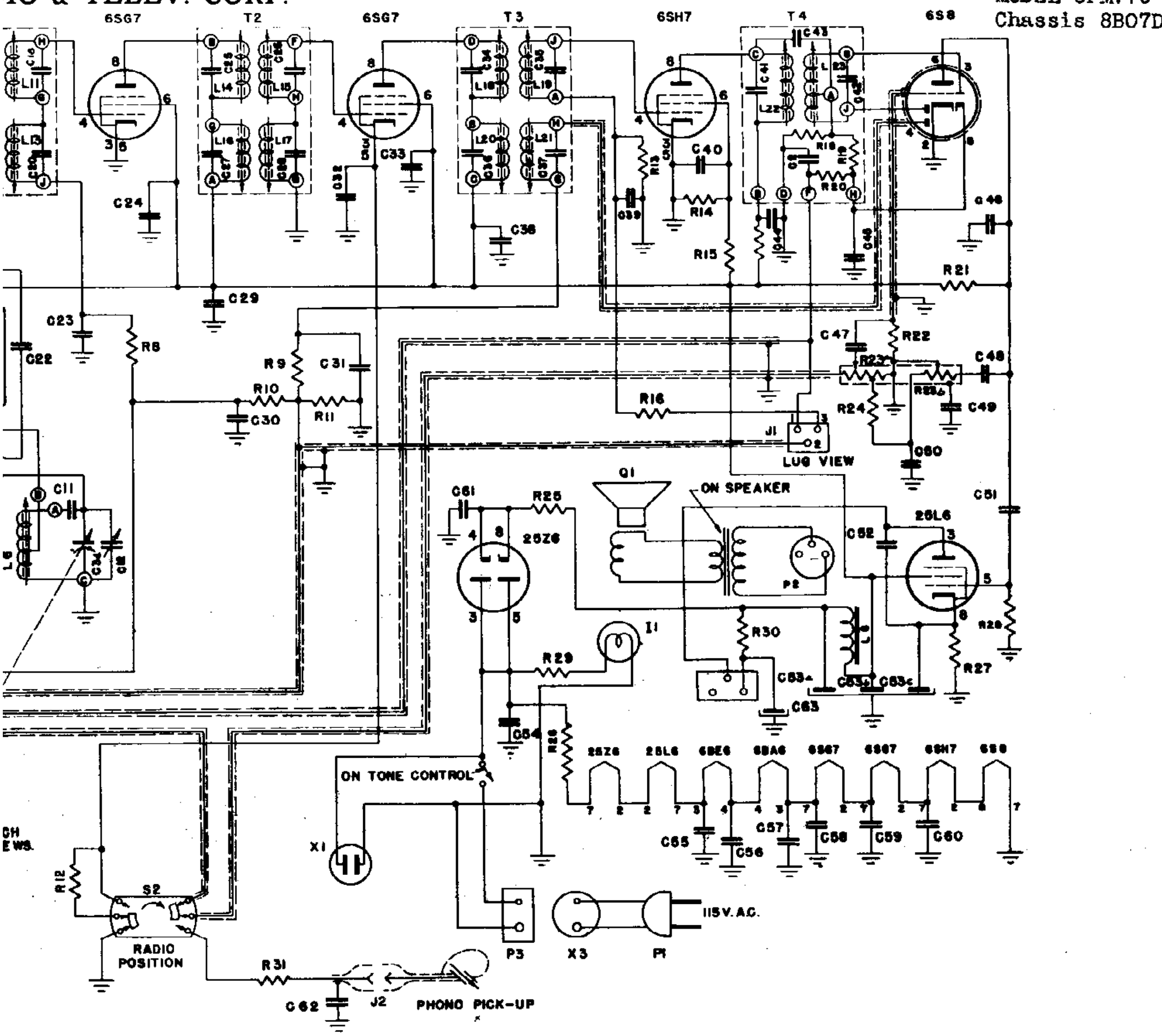


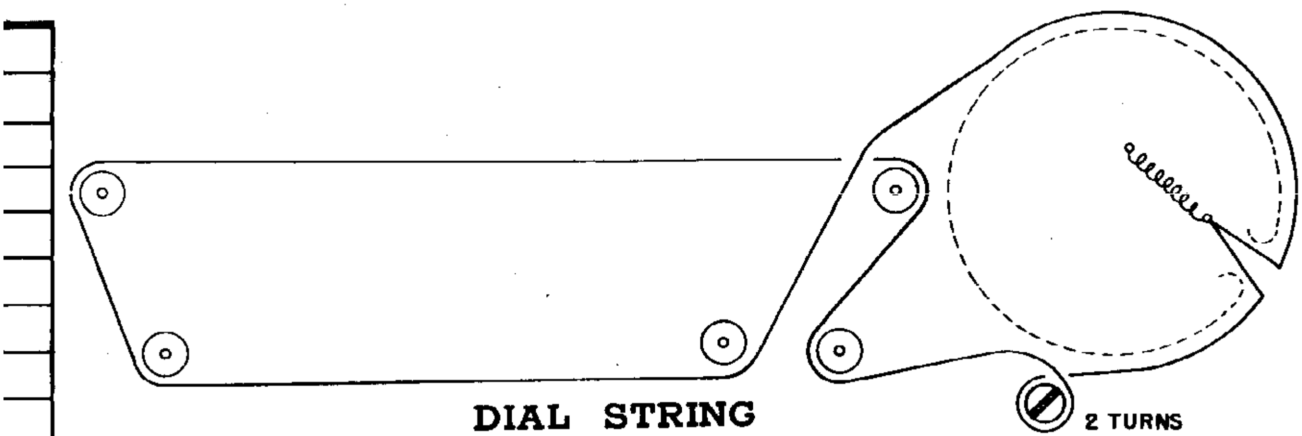
VOLTAGE TABLE

TUBE	FUNCTION	PLATE	CATHODE	SCREEN	GRID
6BA6	RF Amplifier	80	0.5	78	----
6BE6	Converter	100	0	78	----
6SG7	1st IF Amplifier	100	0	100	-0.6
6SG7	2nd IF Amplifier	100	.7	100	----
6SH7	Limiter Amplifier	70	0	21	-0.4
6S8GT	Discriminator, Det., AVC	50	6	---	----
25L6	Power Amplifier	105	7	100	----
2525	Rectifier	117AC	105	---	----

IO & TELEV. CORP.

MODEL 8FM776
Chassis 8B07D

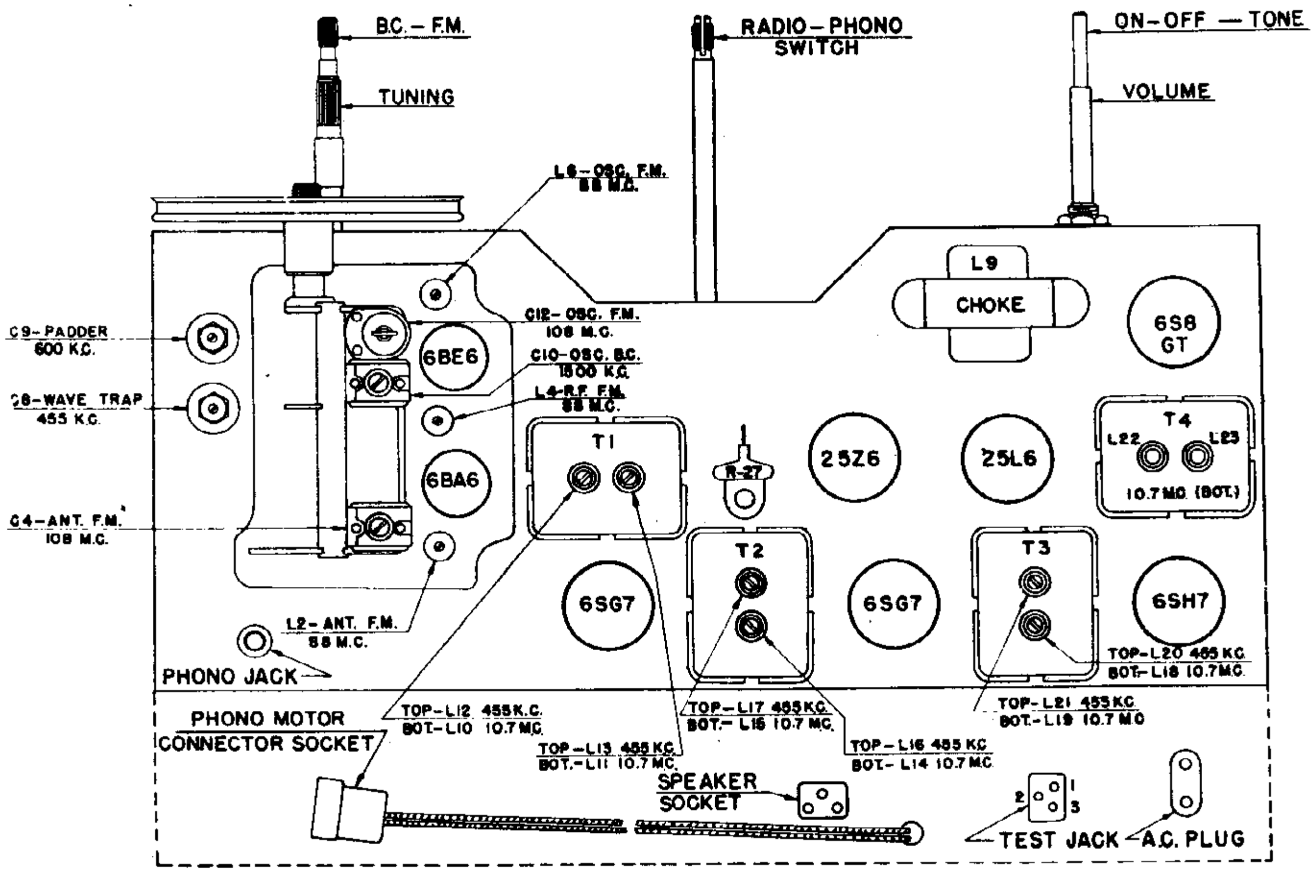




DIAL STRING

MODEL 8FM776

MAJESTIC RADIO & TELEV. CORP.



TUBE LAYOUT

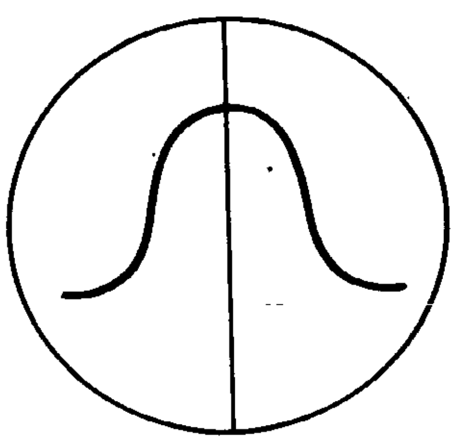


FIGURE 1

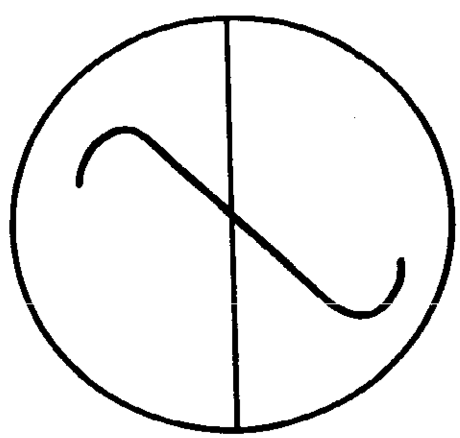


FIGURE 2

ALIGNMENT

OPERATION	CONNECT TEST OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST TRIMMERS	PURPOSE
1	Stator Plates of C3d	.05mfd.	455 KC	BC	600 KC	L12, L13, L16, L17, L20, L21	Align if channel for maximum output.
2	Stator Plates of C3d	.05mfd.	455 KC Modulated	BC	600 KC	C8	Adjust wave trap for maximum output.
3	2 TURNS 8" DIAMETER COUPLED LOOSELY TO LOOP ANTENNA	------	1500 KC Modulated	BC	1500 KC	C10	Set oscillator to dial scale.
4		------	1500 KC Modulated	BC	1500 KC	C7	Align antenna for maximum output.
5		------	600 KC Modulated	BC	600 KC	C9	Rock gang to track BC padder
6(a)	Pin 4 (Grid) on 6SH7 Limiter Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L22 Coil Slug Primary Discriminator	Align Primary of discriminator for maximum reading.
7(b)	Pin 4 (Grid) on 6SH7 Limiter Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L23 Coil Slug Secondary Discriminator	Adjust secondary of discriminator for zero reading.
8(c)	Pin 4 (Grid) on 6SG7 2nd IF Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L18 and L19, Pri. and Sec. 3rd IF Coil	Align 3rd IF Transformer for maximum reading.
9(c)	Pin 4 (Grid) on 6SG7 1st IF Socket	.05mfd.	10.7 MC Unmodulated	FM	------	L14 and L15 Pri. and Sec. 2nd IF Coil	Align 2nd IF Transformer for maximum reading.
10(c)	Lug "B" on Coil L4	.05mfd.	10.7 MC Unmodulated	FM	------	L10 and L11 Pri. and Sec. 1st IF Coil	Align 1st IF Transformer for maximum reading.
11(c)	Antenna Terminals	300ohm Resistorr	106 MC Unmodulated	FM	106 MC	C12 Oscillator Trimmer	Set oscillator to dial scale.
12(c)	Antenna Terminals	300ohm Resistor	106 MC Unmodulated	FM	106 MC	C4 Antenna Trimmer	Align antenna stage for maximum reading.
13(c)	Antenna Terminals	300ohm Resistor	88 MC Unmodulated	FM	88 MC	L6 Oscillator Slug	Set Oscillator to dial scale.
14(c)	Antenna Terminals	300ohm Resistor	88 MC Unmodulated	FM	88 MC	L4, L2 Slugs	Align Antenna and RF stages for maximum reading.
15(c)	Antenna Terminals	Repeat steps 11, 12, 13, and 14 until tracking is perfect at 88 and 106 MC.					

IMPORTANT: Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustment has been tampered with. A vacuum tube voltmeter must be used for FM alignment. An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments. The signal generator output should be kept just high enough to get an indication on the meter.

NOTES:
(a) Vacuum tube voltmeter pin "A" on discriminator transformer to chassis (half discriminator load).
(b) Vacuum tube voltmeter pin 1 of test jack to chassis (full discriminator load).
(c) Vacuum tube voltmeter pin 3 of test jack to chassis (limiter grid load).

A much more satisfactory IF and discriminator alignment may be obtained by using a 10.7 MC signal generator, frequency modulated at an audio frequency and swept approximately 600 KC (±300 KC). An oscilloscope should be connected to test jack pin 3 and all IF slugs adjusted for a symetrical pattern of highest amptitude. See Fig. 1. For discriminator alignment, connect oscilloscope to test jack pin 1 and adjust T4 for highest linear symetrical pattern. See Fig. 2.

MODEL 8FM776

MAJESTIC RADIO & TELEV. CORP.

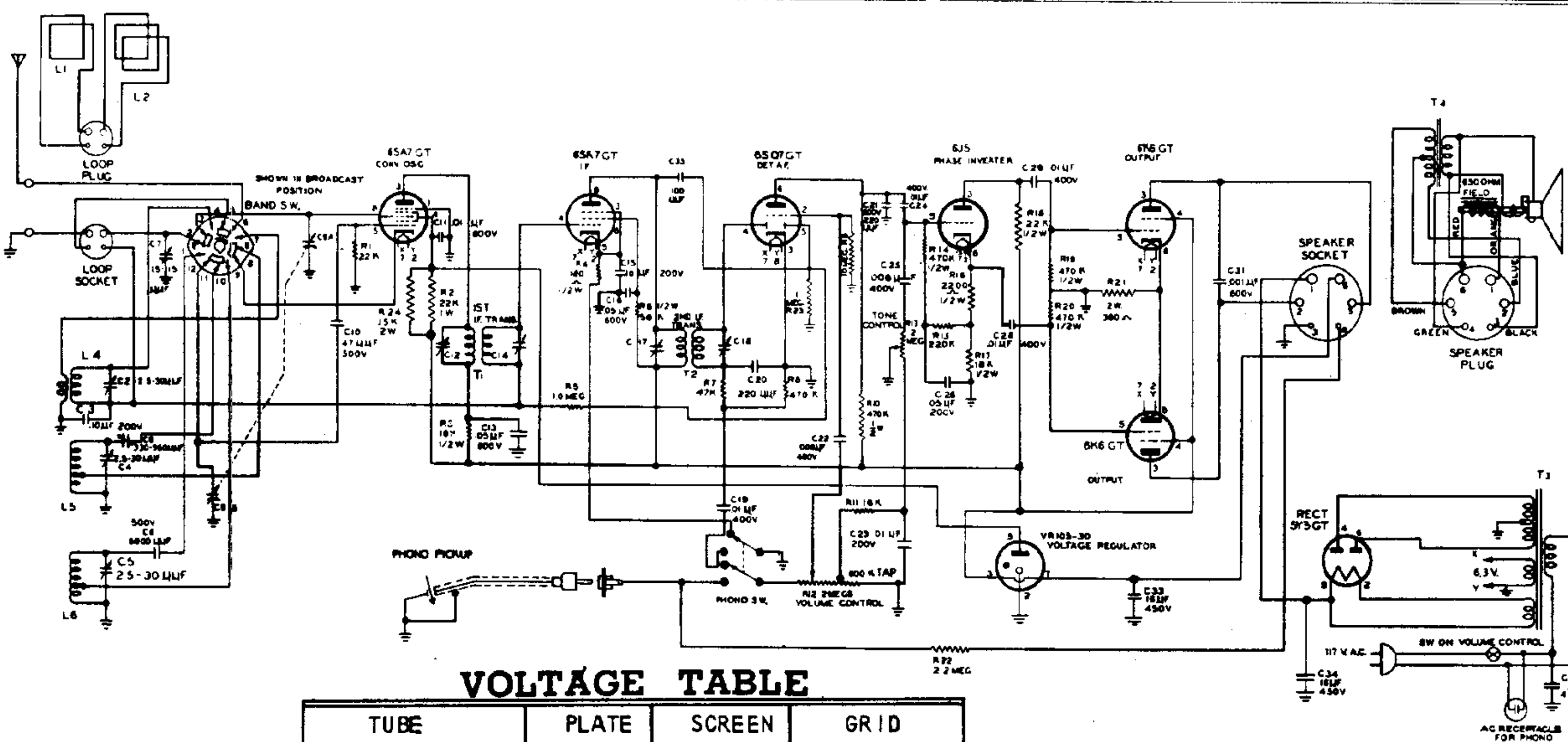
PARTS LIST

ITEM	PART NO.	DESCRIPTION
C1,C48	017-4	.005 mfd, 600V
C2,C14,C15,C16, C55,C56,C57	6-230	1000 mmf, 300V Ceramic
C3	7-25	Gang Tuning Condenser FM-AM.
C4,C10	8-35	Trimmer, 2.5 - 30 mmf.
C5,C23,C30,C32, C49,C50	015-5	.01 mfd, 200V.
C6,C62	015-8	.05 mfd, 200V.
C7	8-59	Trimmer, 2-30 mmf
C8	8-63	Trimmer, 1 5-115 mmf
C9	8-65	200 - 600 mmf Padder
C11	6-218	1000 mmf, 500V, Mica
C12	8-38	Trimmer, 3-13 mmf.
C13,C22	6-159	47 mmf, 500V Ceramic
C17,C41	6-247	24 mmf, Ceramic Special.
C18,C25,C26,C34,C35	6-246	33 mmf, Ceramic Special.
C19,C20,C27,C28, C36,C37	6-250	750 mmf Mica Special
C21,C29,C38,C44,C51	016-5	.01 mfd, 400V.
C24,C33,C40,C58, C59,C60	6-259	.005 mfd minimum disk-type Ceramic
C31,C46,C61	6-151	220 mmf, 500V Mica
C39,C45	6-232	100 mmf, 500V Mica
C42	6-249	62 mmf, Ceramic, Special
C43	6-248	15 mmf, Ceramic, Special
C47	017-2	.002 mfd, 600V
C52	017-5	.01 mfd, 600V.
C53	19-37	100 mfd— 150V, 200 mfd - 150B, 200 mfd - 10V Electrolytic
C54	016-8	.05 mfd, 400V.
C63	19-32	20 mfd 150V Electrolytic
R1,R8,R11,R16, R21,R28	01-199	470K ohm, 1/4 watt
R2,R13,R17,R20	01-157	47K ohm, 1/4 watt.
R3,R12	01-37	68 ohm, 1/4 watt
R4,R14	02-108	3300 ohm, 1/2 watt
R5	01-3	10 ohm, 1/4 watt
R6,R9	01-143	22K ohm, 1/4 watt.
R7	01-101	2200 ohm, 1/4 watt
R10,R31	01-227	2.2 meg ohm, 1/4 watt.
R15	02-132	12K ohm, 1/2 watt.
R18,R19	01-174	120K ohm, 1/4 watt
R22	01-255	10 meg ohm, 1/4 watt
R23	03-32	Volume - Tone Control with switch.
R24	01-132	12K ohm, 1/4 watt.
R25	02-20	27 ohm, 1/2 watt
R26	9-332	100 ohm candohm.
R27	02-52	150 ohm, 1/2 watt.
R29	04-69	390 ohm, 2 watt.

ITEM	PART NO.	DESCRIPTION
R30	01-45	100 ohm, 1/4 watt
L1	S1400	Loop Antenna Assembly
L2	S1407	FM Antenna Coil
L3	S-1410	Wave Trap Coil.
L4	S-1408	FM RF Coil.
L5	S-1411	AM Oscillator Coil.
L6	S-1409	FM Oscillator Coil.
L7	S-1384	R.F. Plate Choke.
L8	2-32	Filter Choke.
T1	S-1389	1st I.F. Transformer.
T2	S-1390	2nd I.F. Transformer.
T3	S-1391	3rd I.F. Transformer.
T4	S-1392	Discriminator Transformer
Q1	22-45	Speaker, 10" PM
I1		Dial Lamp
J1	15-91	Test Jack
J2	15-87	Phono Jack.
S1	11-71	Switch Shaft.
S1a	11-71-1	Switch Wafer, Section 1
S1b	11-71-2	Switch Wafer, Section 2
S1c	11-71-3	Switch Wafer, Section 3
S2	11-72	Phono Switch.
P1	27-201	Plug and line cord.
X1	15-123	A.C. Receptacle (Phono)
X2	15-91	Speaker Receptacle.
P3	18-50	Plug, power connector
X3	15-137	Socket, power connector
	18-81	Tube, Socket, Octal
	15-87	Socket, Phono Pickup.
	15-114	Socket, miniature tube.
	16-34	Miniature tube shield
	16-39	Tube Shield, 6S8 tube
	34-20	I.F. Iron Core.
	38-5	Insulator, Phono Pickup Socket.
	38-8	Insulator, Shaft.
	38-9	Insulator, Plug
	117-95	Dial Scale.
	129-21	Dial Spring
	134-7	Dial Cord
	135-21	Dial Pointer.
	21-24	Oak Record Changer.
	115-37-1	Cabinet, Oak Cut-out.
	122-37	Escutheheon
	123-28	Back, Cabinet
	128-70	Knob (Volume)
	128-71	Knob (band switch) (Phono-Radio)
	128-72	Knob (Tuning)
	128-73	Knob (Tone, On-Off)
	128-76	Knob (Dummy).
	148-97	Carton and fillers.
	19-262	Instruction Sheet

MAJESTIC RADIO & TELEV. CORP.

MODEL 8JL771
Chassis 4810

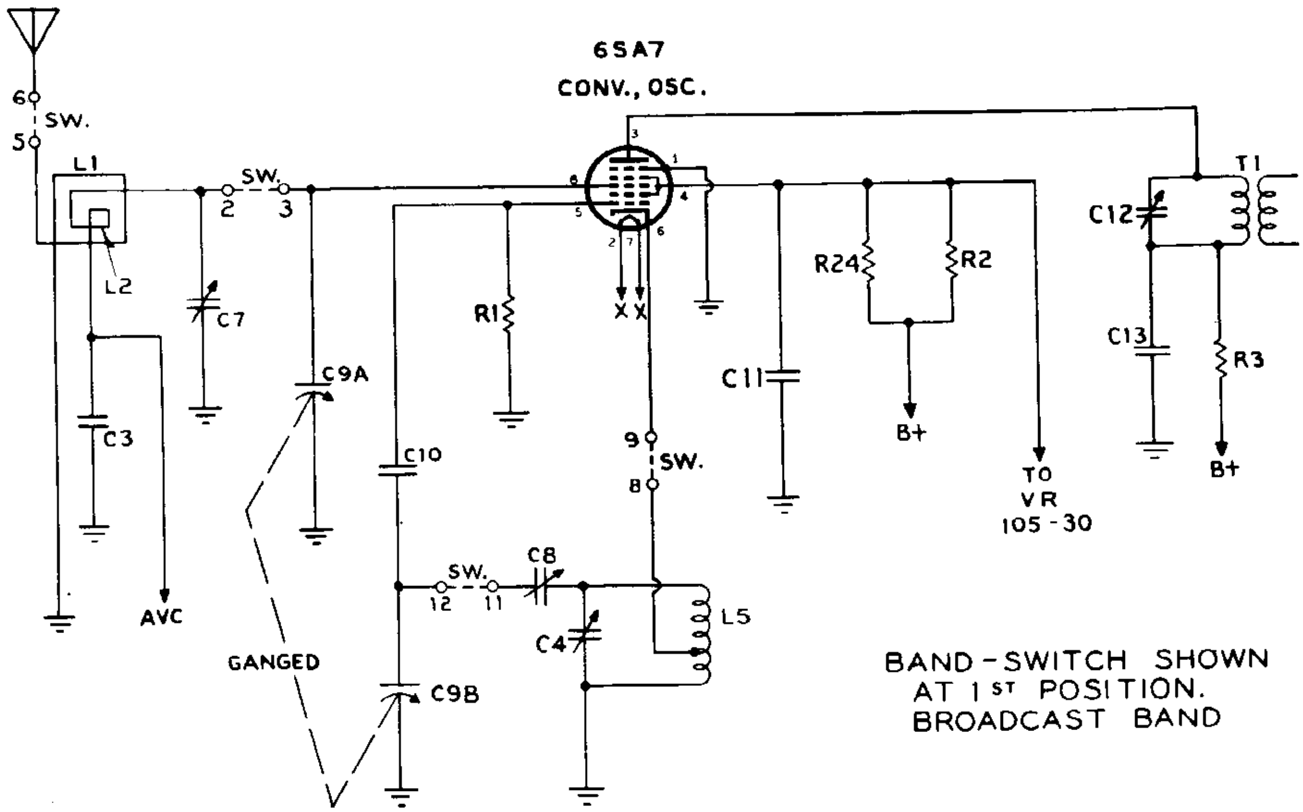


VOLTAGE TABLE

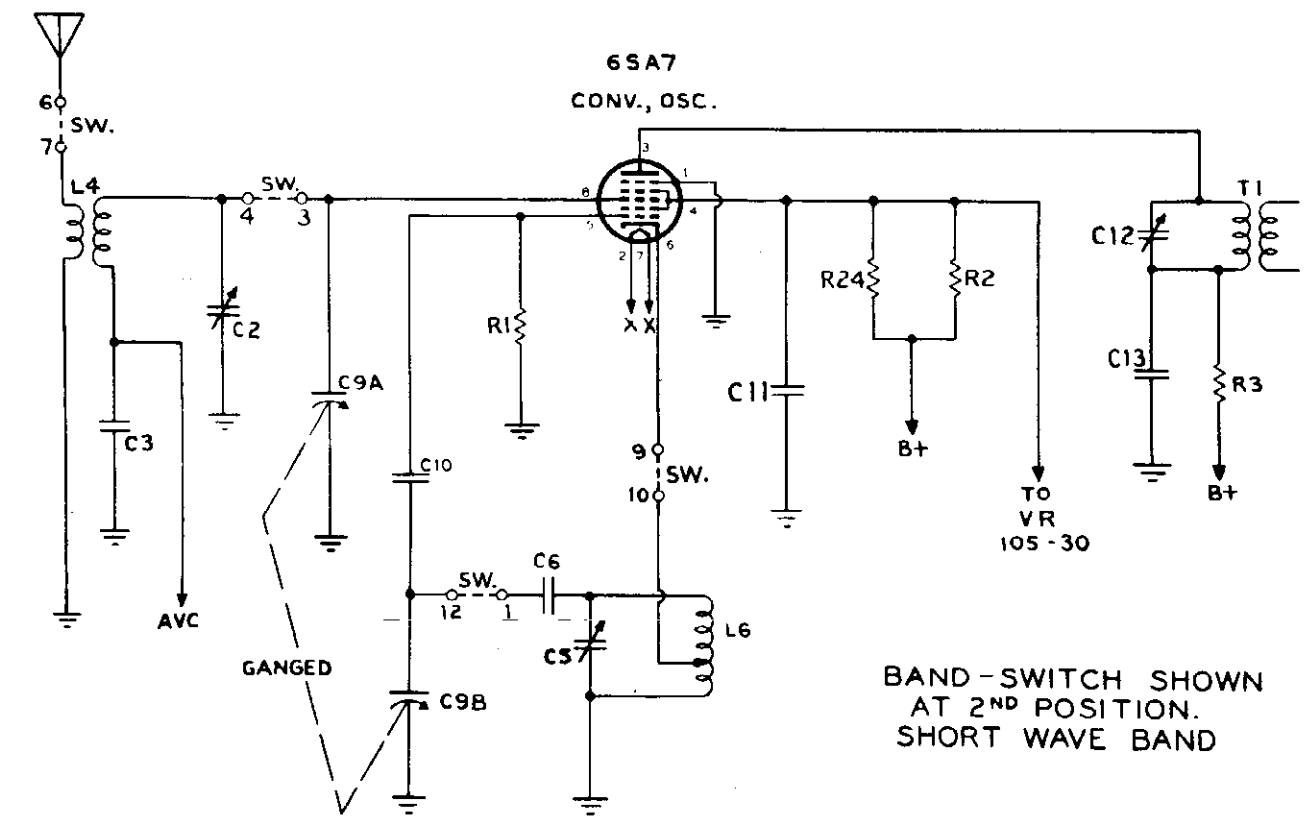
TUBE	PLATE	SCREEN	GRID
6SA7 (Conv.)	240-265	105	0
6SK7 (I.F.)	282-296	106-122	2.1 - 2.5
6SQ7 (A.F.)	72-84	---	0
6J5 (Ph.Inv.)	208-220	---	6.0 - 7.5
6K6 (Out)	270-280	280-285	22.5 - 24
VR-105	105	---	---

NOTE: All voltages measured to ground with 1,000 ohm per voltmeter

MAJESTIC RADIO & TELEV. CORP.

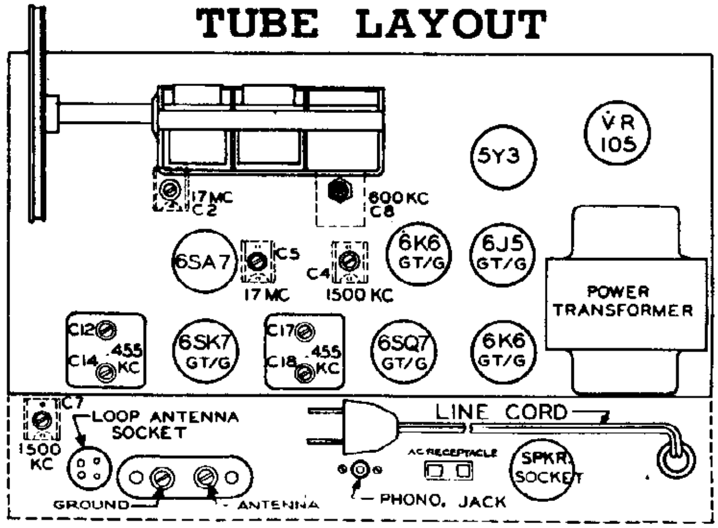


BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND



BAND-SWITCH SHOWN
AT 2ND POSITION.
SHORT WAVE BAND

TUBE LAYOUT



ALIGNMENT

Before aligning, close tuning condenser (plates fully meshed). Set pointer to center of extreme left hand mark on the dial.

When aligning broadcast band, connect to output of the signal generator a loop, about 12 inches in diameter, consisting of two or three turns of wire. Place this loop in a plane parallel to that of the receiver loop antenna and about a foot away from it. The receiver loop antenna should be in about the same portion relative to the chassis as it is when installed in the cabinet.

While aligning, turn the volume control full on and keep the signal generator output as low as possible.

STEP	DUMMY ANTENNA	TEST OSCILLATOR CONNECTION	TEST OSCILLATOR FREQUENCY	RECEIVER BAND-SWITCH	RE-CEIVER DIAL	ADJUST FOR MAXIMUM	NOTES
1	.01 mfd	6SA7 grid	455 KC	BC	Any quiet spot	C18,C17 C14,C12	-----
2	Loop	---------	1500 KC	BC	150	C4,C7	-----
3	Loop	---------	600 KC	BC	60	C8	Note #1
4	400 ohms	Receiver antenna post	17 MC	SW	17	C2,C5	-----

Note #1 - Rock gang while making this adjustment. Then recheck step 2.

MAJESTIC RADIO & TELEV. CORP.

PARTS LIST

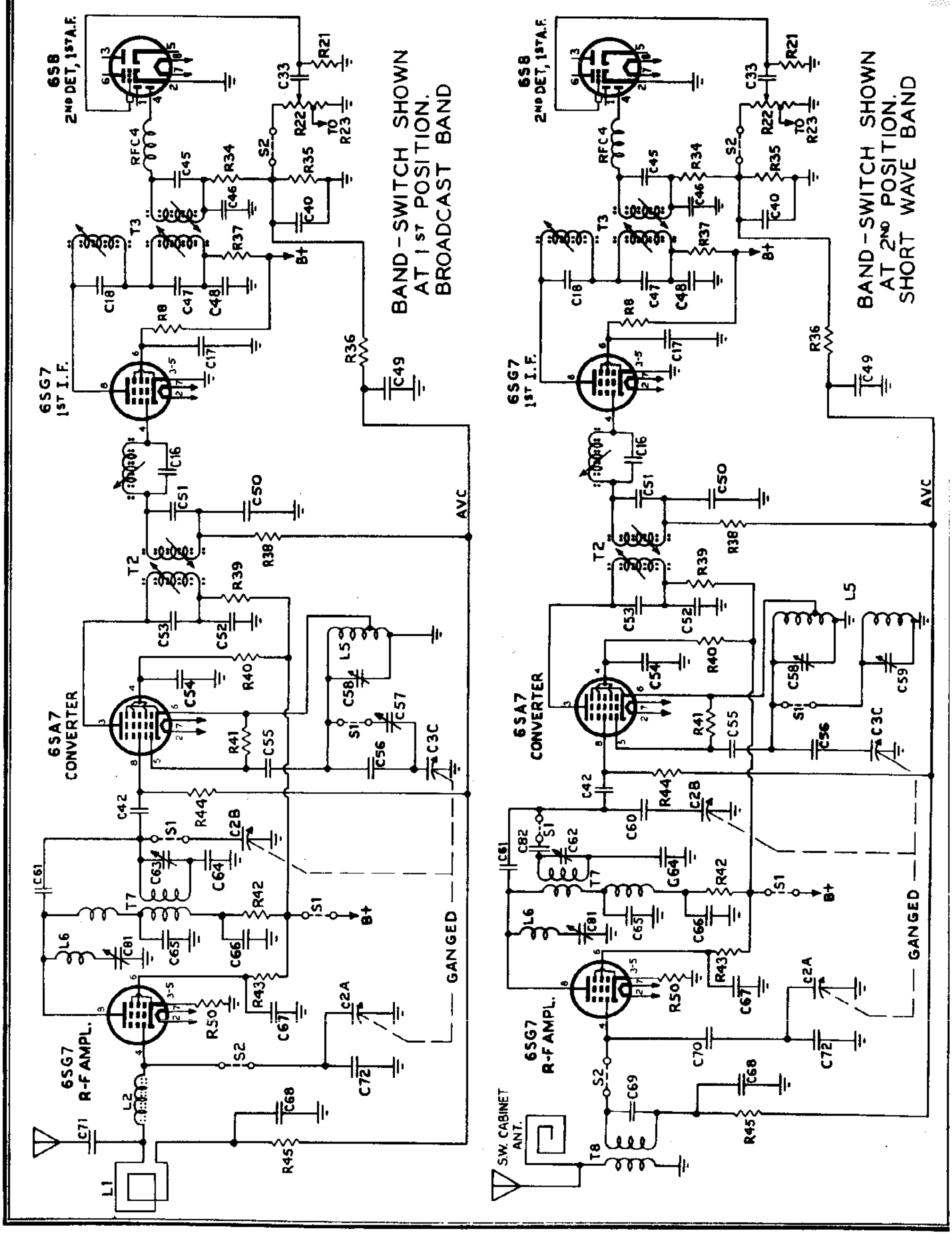
ITEM	PART NO.	DESCRIPTION
C2,C4,C5	8-35	Trimmer, 2.5 - 30 mmfd
C3,C15	5-39	.1 mfd ± 40% - 10% 200 v paper
C6	6-177	6900 mmfd ± 10% 500 v mica
C7	8-36	Trimmer, 1.5 - 15 mmfd
C8	8-33	Padder, 330 - 960 mmfd
C9a,C9b,C9c	7-22 or 7-23	Tuning Condenser
C10	6-159	47 mmfd ± 20% 500 v ceramic
C11	5-74	.01 mfd 20% 600 v paper
C19,C24,C28 C29,C36	6-132	.01 mfd ± 30% - 10% 400 v paper
C12,C14,C17,C18	8-41	Dual trimmer
C13,C16	5-77	.05 mfd 20% 600 v paper
C20,C21	6-151	220 mmfd ± 20% mica
C22,C25	6-133	.006 mfd ± 20% 400 v paper
C23	5-57	.01 mfd ± 40% - 10% 200 v paper
C26	5-40	.05 mfd ± 40% - 10% 200 v paper
C30,C31,C32	5-79	.001 mfd ± 50% -25% 600 v paper
C33,C34	19-16	16-16 mfd 450 v electrolytic
C35	6-232	100 mmfd ± 20% 500 v mica
R1	9-222	22,000 ohms 20% 1/4 watt
R2	9-186	22,000 ohms 10% 1 watt
R3	9-17	10,000 ohms 10% ½ watt
R4	9-272	180 ohms 10% ½ watt
R5,R23	9-255	1 megohm 20% 1/4 watt
R6	9-177	56,000 ohms 10% ½ watt
R7	9-226	47,000 ohms 10% 1/4 watt
R8	9-227	470,000 ohms 10% 1/4 watt
R9	9-213	10 megohms 20% 1/4 watt
R10,R14,R19,R20	9-234	470,000 ohms 10% ½ watt
R11	9-225	18,000 ohms 10% 1/4 watt
R12	13-15	Volume control, 2 megohm with SPST switch
R13	14-4	Tone control, 2 megohms
R15	9-220	220,000 ohms 20% 1/4 watt
R16	9-107	2200 ohms 10% ½ watt
R17	9-95	18,000 ohms 10% ½ watt

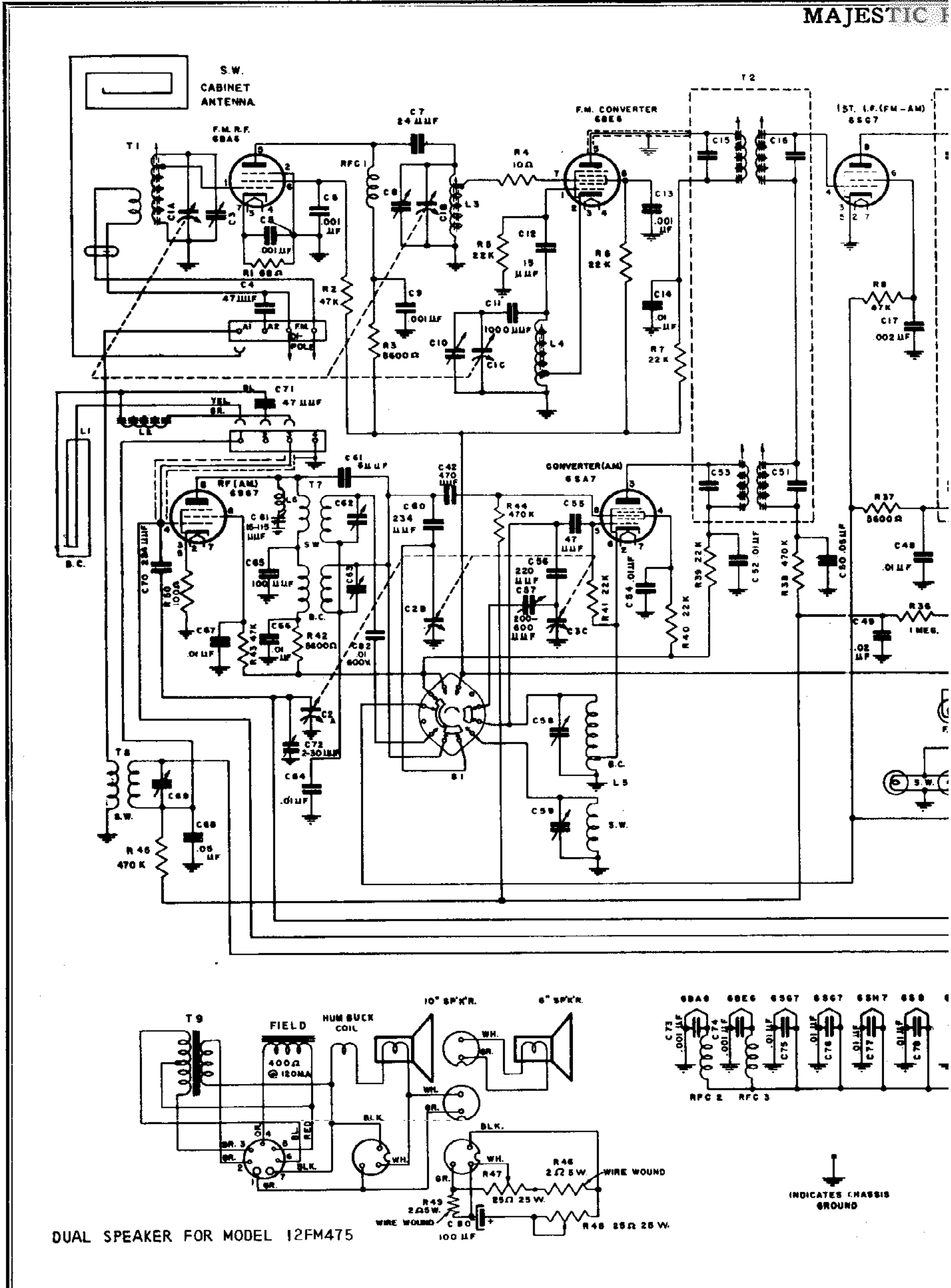
ITEM	PART NO.	DESCRIPTION
R18	9-180	22,000 ohms 10% ½ watt
R21	9-185	390 ohms 10% 2 watt
R22	9-296	2.2 megohms 20% 1/4 watt
R24	9-299	15,000 ohms 20% 2 watt
L4	3-120	S.W. antenna coil
L5,L6	3-118	Oscillator coil
T1	3-165	1st I-F transformer
T2	3-166	2nd I-F transformer
T3	2-12	Power transformer
T4	22-8-2	Output transformer
	11-46 or 11-64	Bandswitch
	11-45 or 11-63	Phono-Radio Switch
	15-98	Phono-motor receptacle
	26-7	Pilot light, Mazda #44
	135-29	Dial pointer
	129-29	Dial cord spring
	S-1263	Dial cord
	128-45	Knob, phono-radio
	128-46	Knob, off-volume
	128-47	Knob, B.C. - S.W.
	128-48	Knob, bass-treble
	128-49	Knob, tuning
	128-32	Knob, plain
	20-8	Loop antenna assembly
	21-26	Record changer, aero
	22-46	Speaker, with output transformer
	22-46-1	Output transformer
	115-35	Cabinet, console combination
	122-42	Escutcheon, including glass
	117-92	Dial scale glass
	148-98	Carton, with fillers

MAJESTIC RADIO & TELEV. CORP.

MODEL 12FM475

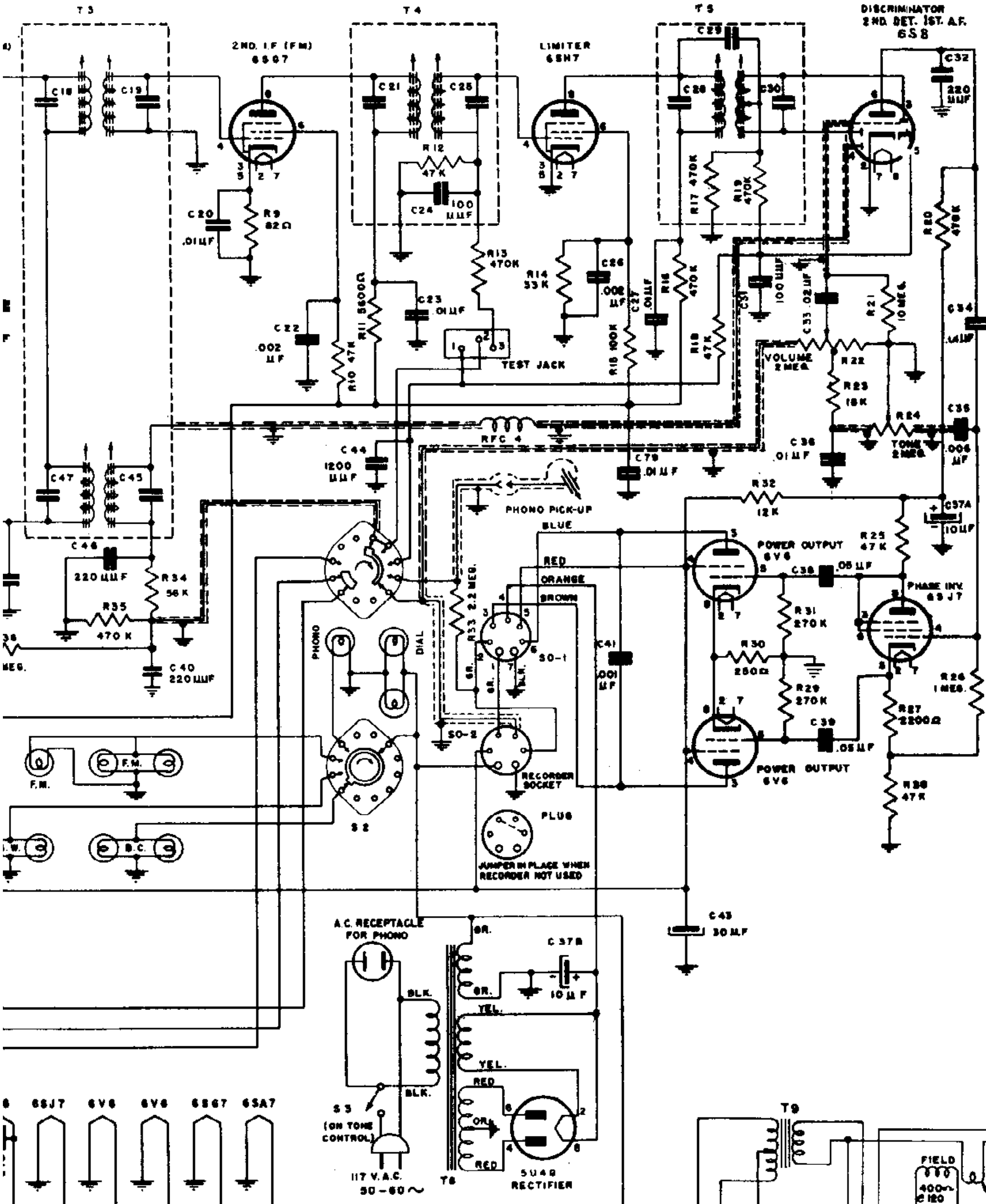
MODELS 12FM778, 12FM779

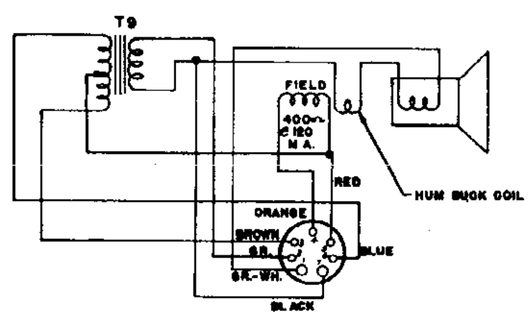



S.W. CABINET ANTENNA
F.M. R.F. 6BA6
F.M. CONVERTER 6BE6
T2
1ST. I.F. (FM-AM) 6SG7
RF (AM) 6SG7
CONVERTER (AM) 6SA7
T1
T7
T8
T9
L1
L3
L4
L5
B.C.
S.W.
FIELD 400Ω @ 120MA
HUM BUCK COIL
10" SPK'R.
6" SPK'R.
RFC 2
RFC 3
WIRE WOUND
INDICATES CHASSIS GROUND
DUAL SPEAKER FOR MODEL 12FM475

C RADIO & TELEV. CORP.

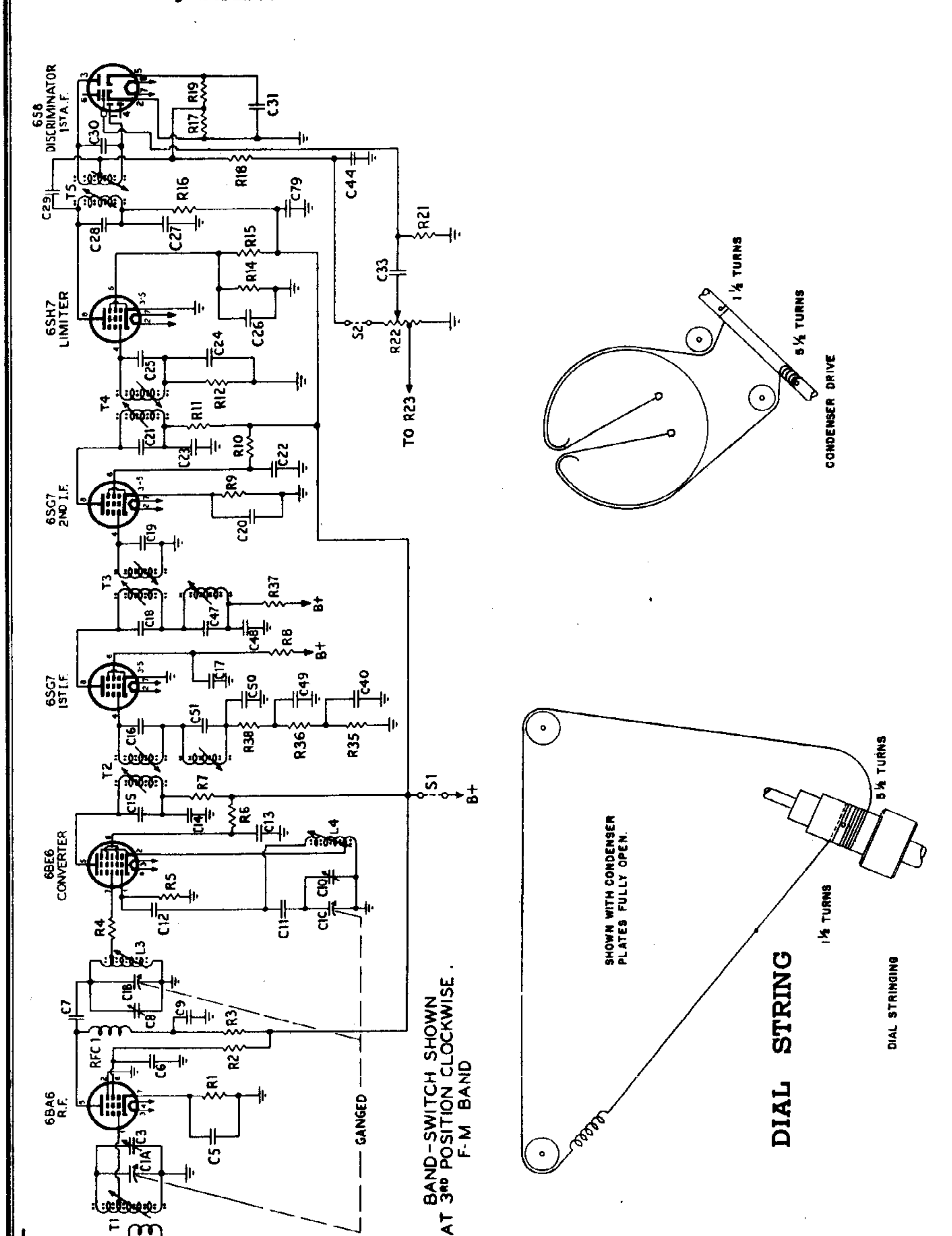
MODEL 12FM475, Chassis 41201
MODELS 12FM778, 12FM779, Chassis 12B26E





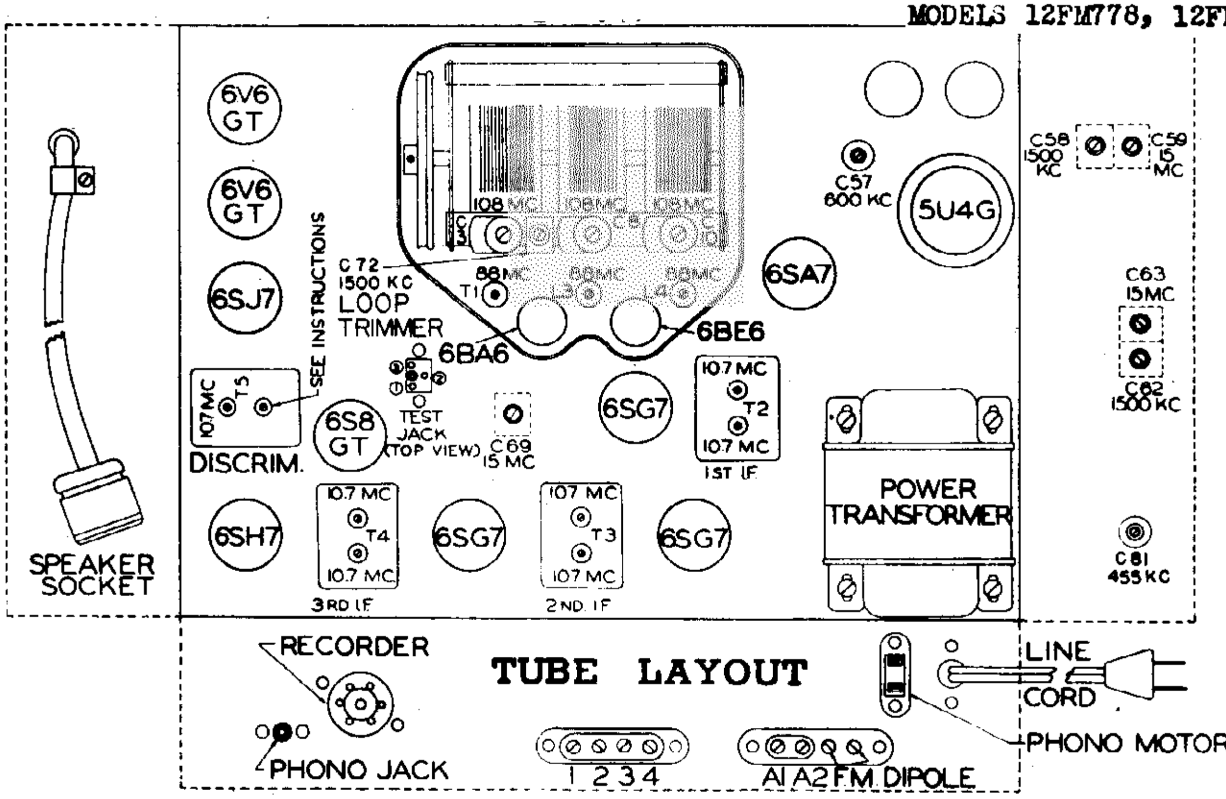
SINGLE SPEAKER FOR
MODELS 12FM778 AND 12FM779

MODEL 12FM475 MAJESTIC RADIO & TELEV. CORP.
MODELS 12FM778, 12FM779



MAJESTIC RADIO & TELEV. CORP.

MODEL 12FM4
MODELS 12FM778, 12FM7



TUBE LAYOUT

VOLTAGE TABLE

Measurements made at 117 volts line; volume control at minimum; zero signal input. Measurements made to chassis ground with vacuum tube voltmeter.

FUNCTION	TYPE	E_F	E_P	E_S	E_K	E_G
FM RF AMP.	6BA6	6.3	210	90	1	0
FM CONVERTER	6BE6	6.3	210	100	0	0
AM RF AMP.	6SG7	6.3	260	180	1	-1
AM CONVERTER	6SA7	6.3	250	90	0	---
1ST IF AMP.	6SG7	6.3	240	125	0	-1
2ND IF AMP.	6SG7	6.3	240	125	1	0
LIMITER	6SH7	6.3	3	60	0	-.6
DISC.; 2ND AMDET: AUDIO	6S8GT	6.3	80	---	0	-.8
PHASE INVERTER	6SJ7	6.3	160	---	80	0
POWER AMP.	6V6GT	6.3	260	270	15	
POWER AMP.	6V6GT	6.3	260	270	15	
RECTIFIER	5V4G	5	---	---	300	

TOTAL B CURRENT FROM RECTIFIER 120 MA.

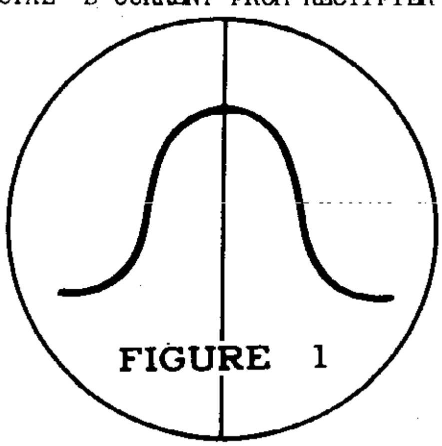


FIGURE 1

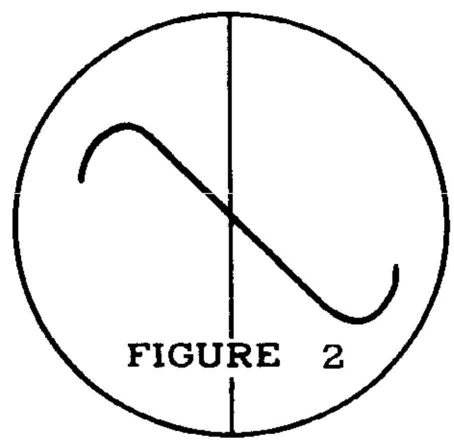


FIGURE 2

MODEL 12FM475
MODELS 12FM778, 12FM779

MAJESTIC RADIO & TELEV. CORP.

ALIGNMENT

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL AT	TRIMMERS	PURPOSE
1	Conv. Grid	.01mfd	455 KC	BC	600 KC	T2,T3 Bottom	Align I.F.'s
2	ONE TURN LOOP MADE WITH GENERATOR LEADS		455 KC	BC	600KKC	C81	I.F. trap adjustment for minimum I.F. signal
3			1500 KC	BC	1500 KC	C58	Set BC osc. to scale at 1500 KC
4			1500 KC	BC	1500 KC	C63,C72	Align BC RF. and Loop
5			600 KC	BC	600 KC	C57	Rock Gang to track BC padder
6	Al-Gnd.	400ohn	15 MC	SW	15 MC	C59	Scale osc. at 15 MC
7	Al-Gnd.	400ohn	15 MC	SW	15 MC	C62,C69	Align SW RF and Ant.
8	6SG7 2nd I.F. Grid	.01mfd.	10.7 MC	FM	88 MC	T4 top	Align for max. voltage at test jack pin 3 Rock gen. over 10.7 MC to check for symmetrical I.F. response.
9	6SG7 1st. I.F. Grid	.01mfd.	10.7 MC	FM	88 MC	T3 top	Align for max. voltage at test jack pin 3 Rock gen. over 10.7 MC to check for symmetrical I.F. response.
10	Converter	.01mfd.	10.7 MC	FM	88 MC	T2 top	Align for max. voltage at text jack pin 3 Rock gen. over 10.7 MC to check for symmetrical I.F. response. Re-check peaking of T4, and T3.
11	Converter grid 6BE6	.01mfd.	10.7 MC	FM	88 MC	T5 primary	Align for max. voltage across ½ discriminator Load (un-used Lug bottom of T5 to ground)
12	Converter grid 6B6E	.01mfd.	10.7 MC	FM	88 MC	T5 secondary	Align for zero voltage across full discriminator load (Test jack pin 1 to ground)
13	FM ant.term.	direct	108 MC	FM	108 MC	C10	Scale OSC at 108 MC (max. voltage Test jack pin 3.
14	FM ant.term.	direct	108 MC	FM	108 MC	C8,C3	Align FM RF and Ant. (max. voltage Test jack pin 3.
15	FM ant.term.	direct	88 MC	FM	88 MC	L4	Scale osc. at 88 MC.
16	FM ant.term.	direct	88 MC	FM	88 MC	L3,T1	Align RF and Ant. at 88 MC repeat steps 13, 14, 15, 16 as necessary.

NOTE: 1.
A much more satisfactory IF and discriminator alignment may be obtained by using a 10.7 MC Signal generator frequency modulated at an audio frequency and swept approximately 600 KC (±300 KC). An oscilloscope should be connected to Test jack pin 3 and all IF screws adjusted for a symmetrical pattern of highest amptitude. See Fig. 1. For discriminator alignment, connect scope to Test jack pin 1 and adjust T5 for highest symmetrical pattern. See Fig. 2.

NOTE: 2.
In all FM alignment calling for a voltage measurement at Test jack pin 3 (limiter grid resistor) keep signal generator output to such a value as will result in approximately 2 volts measured with a vacuum Tube voltmeter such as the Voltohmyst, Vomax or equiv.

MAJESTIC RADIO & TELEV. CORP.

MODEL 12FM475
MODELS 12FM778
12FM77

ITEM	PART NO.	DESCRIPTION
C1,C2	7-17	Ganged Tuning Condenser. . . . .
C3,C8,C10	8-38	Trimmer, 3-3 mmf.. . . . .
C4,C55,C71	6-159	47 mmf, 500V, ceramic. . . . .
C5,C6,C9		
C13,C73,C74	6-230	.001 mfd., 400V. ceramic . . . .
C7	6-143	24 mmf, 500V ceramic . . . .
C11	6-218	1000 mmf. 500V Mica. . . . .
C12	6-199	15 mmf. 500V ceramic . . . .
C14,C23,C27,C34, C48,C52,C54,C66,C67 C79,C82	5-74	.01 mfd 600V . . . .
C15,C16,C51		
C53	.....	Part of 1st. IF transformer, T2. . . .
C17,C22,C26	6-231	.002 mfd. 400V Ceramic . . . .
C18,C19,C45,C47	.....	Part of 2nd IF transformer, T3 . . . .
C21,C24,C25	.....	Part of 3rd. IF transformer, T4. . . .
C28,C29,C30	.....	Part of discriminator transformer, T5.
C31	6-232	100 mmf. 500V Mica . . . .
C32,C40,C46	6-86	220 mmf. 500V. Mica. . . . .
C33,C49	5-63	.02 mfd. 500V. . . . .
C35	5-69	.006 mfd. 600V.. . . . .
C37A,C37B	19-34	10-10 mfd. 450V Electrolytic . . . . .
C38,C39	5-77	.05 mfd. 600V. . . . .
C41	5-64	.001 mfd. 1600 V.. . . . .
C42	6-102	470 mmf. Mica 500V.. . . . .
C43	19-35	30 mfd. 450 V. Electrolytic. . . . . .
C44	6-234	1200 mmf. 500V.. . . . .
C50,C68	5-64	.05 mfd. 400V. . . . .
C56	6-207	220 mmf. 2% 500V. Ceramic. . . . . . .
C57	8-65	200-600 Podder . . . .
C58,C59	.....	Part of coil assembly L5 . . . .
C61,C62,C63,C65	.....	Part of coil assembly T7 . . . .
C69	.....	Part of coil assembly T8 . . . .
C72	8-35	Trimmer 2½ 30 mmf. ceramic . . . . . .
C75,C76,C77,C78	6-182	.01mfd. 500V Mica. . . . .
C81	8-63	15-115 mmf. Trimmer (Wave Trap). . . .
L1	20-27	Broadcast Loop Antenna . . . .
L2	.....	Loading Coil, Part of Loop 20-27 . . .
L3	3-184	FM RF Coil . . . .
L4	3-189	FM Oscillator Coil . . . .
L5	3-171	AM Oscillator Coil Assembly. . . . . .
L6	S-1468	Wave Trap Coil Assembly. . . . .
R1	9-294	68 ohms 1/4 watt . . . .
R2	9-293	47,000 ohms, 1 watt. . . . .
R3,R11,R37,R42	9-130	5600 ohms 1 watt . . . .
R4	01-2	10 ohms 1/4 watt . . . .
R5,R41	9-222	22,000 ohms 1/4 watt . . . .
R6,R40	9-209	22,000 ohms 2 watt . . . .
R7,R39	9-253	22,000 homs 1/2 watt . . . .
R8,R10,R25,R28, R43	9-235	47,000 ohms 1/2 watt . . . .
R9	9-283	82 ohms 1/2 watt . . . .
R12	.....	47,000 ohms (Part of T4) . . . .
R13,R20,R35, R38,R44,R45	9-223	470,000 ohms 1/4 watt. . . . .
R14	9-256	33,000 ohms 1/2 watt . . . .
R15	9-8	100,000 ohms 1/2 watt. . . . .
R16	9-211	470,000 ohms 1/2 watt. . . . .
R17,R19	.....	470,000 ohms (part of T5). . . . . . .
R18	9-121	47,000 ohms 1/4 watt . . . .
R21	9-213	10 megohms 1/4 watt. . . . .

ITEM	PART NO.	DESCRIPTION
R22	13-25	Volume Control, 2 megohms. . . . .
R23	9-225	18,000 ohms 1/4 watt . . . .
R24	14-7	Tone control, 2 megohms, with switch . .
R26,R36	9-255	1 megohm 1/4 watt. . . . .
R27	9-7	2200 ohms 1/2 watt . . . .
R29,R31	9-295	270,000 ohms 1/4 watt. . . . .
R30	9-290	250 ohms 5 watt, wire wound. . . . . . .
R32	9-264	12,000 ohms 1/2 watt . . . .
R33	9-240	2.2 megohms 1/2 watt . . . .
R34	01-160	56K ohms 1/4 watt. . . . .
R50	01-44	100 ohm 1/4 watt . . . .
RFC2	3-187	6BA6 plate choke . . . .
RFC2,RFC3	3-188	Filament chokes. . . . .
RFC4	3-104	Diode plate choke. . . . .
S1	11-58	Band switch (r.f.) . . . .
S2	11-59	Band switch (pilot lights and audio) . .
S3	.....	Part of tone control . . . .
T1	3-183	F.M. Ant. transformer. . . . .
T2	3-173	1st IF transformer . . . .
T3	3-174	2nd IF transformer . . . .
T4	3-175	3rd IF transformer . . . .
T5	3-176	Discriminator transformer. . . . .
T6	2-19	Power transformer. . . . .
T7	3-186	B. C. and S. W. R. F. Transformer. . . .
T8	3-185	S.W. Ant. transformer. . . . .
	15-87	phone pickup socket. . . . .
	15-98	A.C. receptacle (phono). . . . .
	26-7	pilot lamp #44 blue bevel. . . . .
	26-2	pilot lamp #47 brown bevel . . . .
	S-1277	condenser push rod . . . .
	129-46	tension spring, dial . . . .
	134-7	dial cord, silk. . . . .
	135-4	dial pointer . . . .
	117-63	dial plate FM. . . . .
	117-61	dial plate BC 41201 chassis. . . . . . .
	117-90	dial plate BC 12B26E chassis . . . . . .
	117-62	dial plate SW 41201 chassis. . . . . . .
	117-91	dial plate SW 12B26E chassis . . . . . .
C80	19-36	100 MF 10V electrolytic Model 12FM475. .
R46	9-297	2 ohm 5 watt wirewound, Model 12FM475. . . .
R47,R48	13-23	Potentiometer, 25 ohm, 25 watt, Model 12FM475
	22-17	6" speaker, P.M. Model 12FM475 . . . .
	22-28	10" speaker with output transformer and cable Model 12FM475. . . . .
	22-43	12" speaker with transformer and cable Model 12FM778--12FM779 . . . .
T9	22-28-2	Output transformer Model 12FM475 . . . . .
T9	22-43-2	Output transformer Model 12FM778--12FM779.
	115-13	Cabinet Model 12FM475. . . . .
	115-34	Cabinet Model 12FM778. . . . .
	115-40	Cabinet Model 12FM779. . . . .
	122-16	Dial grill Model 12FM475 . . . .
	122-44	Dial grill Model 12FM778--12FM779. . . .
	21-13	Record changer, VM 400 . . . .
	122-20	Escutcheon glass all Models. . . . . . .
	S1424	Push button assembly - all Models. . . .
	122-25	Push button Base escutcheon - all Models .
	117-50	Dial masking plate - all Models. . . . .
	128-61	Knob - "Acoustic Blender" Model 12FM475. .
	128-60	Knob - "Hi-Lo-Balancer" Model 12FM475. . .
	128-44	Knob Band Switch all Models. . . . . . .
	128-37	Knob Tone, Tuning, volume all Models . . .
	129-46	Spring Band Switch Knob. . . . .
		R.F. Shelf Assy. . . . .

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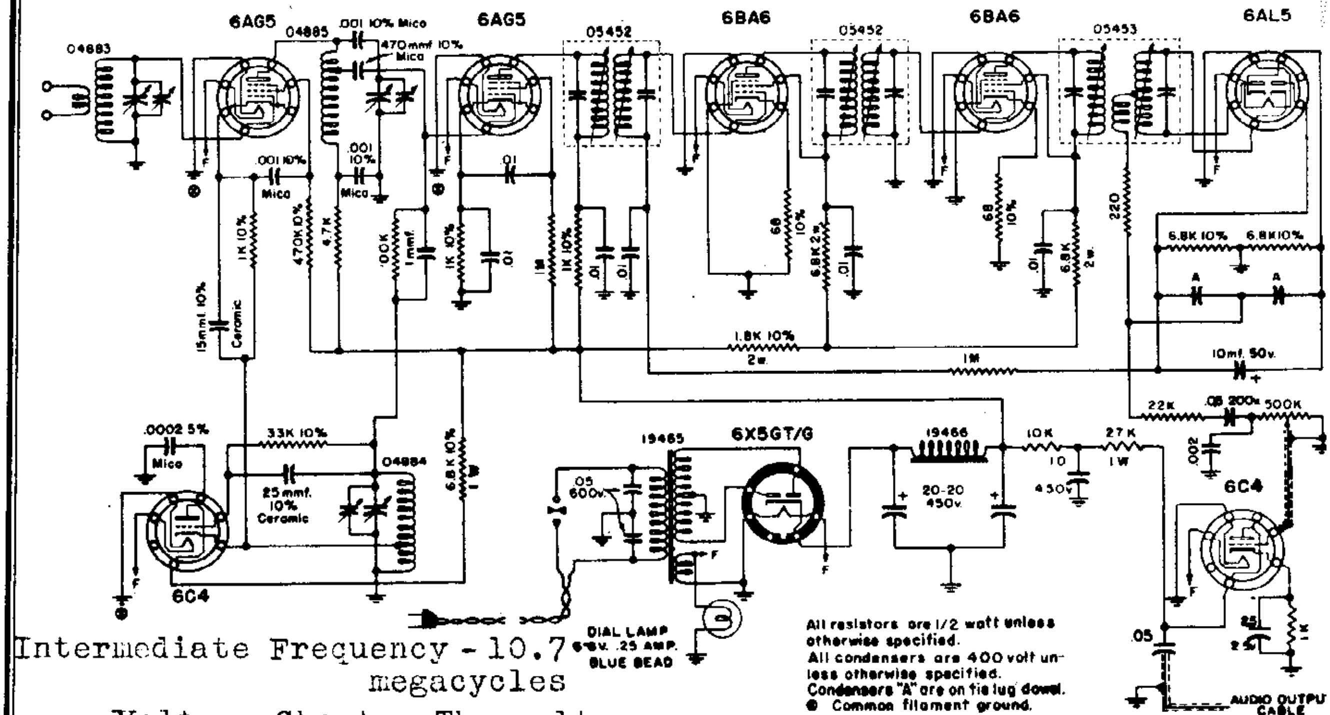
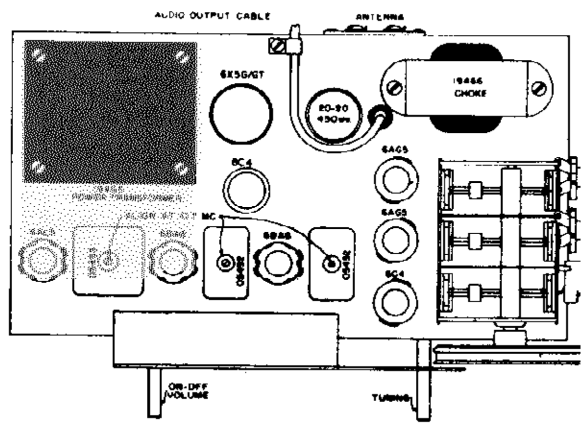


Intermediate Frequency - 10.7 megacycles

Voltage Chart - The voltages tabulated in the table below are the correct voltages which should be measured between the socket terminal and chassis with nominal line voltage and no signal. All voltages measured with a high impedance voltmeter. Allowance should be made for loading if a low impedance voltmeter is used for checking.



Power consumption - 35 watts

VOLTAGE CHART

Terminal Number	1	2	3	4	5	6	7	8
6AG5 1st Converter	0	2.1	6.3V RMS	0	260	63	2.1	
6AG5 2nd Converter	0	1.2	6.3V RMS	0	270	37	1.2	
6C4 Oscillator	184	0	6.3V RMS	0	184	—	0	
6BA6 1st I.F. Amp	-0.4	0	6.3V RMS	0	95	95	0.95	
6BA6 2nd I.F. Amp	0	0	6.3V RMS	0	84	84	0.95	
6AL5 Detector	0	0	6.3V RMS	0	0	0	0	
6C4 Audio	105	0	6.3V RMS	0	150	0	3.4	
6X5GT/G Rectifier	NC	0	240V RMS	Tie Point	240V RMS	Tie Point	6.3V RMS	287

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POWER SUPPLY

Connections: This receptor must be operated on 105 - 125 volt, 50 or 60 cycle A.C. supply only.

The power cord may be inserted in the line receptacle in either one of two ways, but a reversal should be tried for any possible hum reduction during reception.

CONNECTIONS TO AN A.C. RECEIVER

Although the receptor will operate with any radio receiver, large or small, that has terminals for a phonograph pickup, the audio quality inherent in the Frequency Modulation System will be more apparent when it is used with a regular type radio receiver having a large speaker and baffle as well as a good audio amplifier. The shielded rubber-covered lead from the receptor carries the audio output of the unit and is to be connected to the phonograph input terminals of the receiver.

Various input arrangements to the audio amplifier will be encountered in receivers of different manufacture, such as jacks of various types, terminal strips and binding posts. Your dealer will be able to supply an appropriate plug to make connections with the jack on your set. For instance, if the radio with which it is to be used is provided with a phonograph "jack", the corresponding type "plug" should be connected to the shielded lead, the outside metal shielding being connected to the frame of the plug and the inside insulated wire being connected to the high-potential (tip) side of the plug. With the receptor placed conveniently close to the receiver, the phonograph plug may be inserted and the receptor is ready for use. When terminal strips or binding posts are used, the shielded lead from the receptor connects directly to these points without additional parts. In all cases, the outside shielding connects to the terminal which connects directly (or through a coupling condenser) to the chassis.

If your receiver has no "Phono" or "Television Sound" terminals, the additional switch and terminals can easily be installed by any competent radio service man.

CONNECTIONS TO A.C.-D.C. RECEIVER

This receptor is not recommended for use with any A.C.-D.C. receiver because of the hazards involved in connecting this unit to an A.C.-D.C. set and because of almost insurmountable hum troubles on such sets.

OPERATING THE RECEPTOR

Turn the left hand control knob clockwise till the click is heard and the dial scale is illuminated. The radio receiver to which the receptor is connected must also be turned on, switched to the "Phonograph" position, and its volume control well advanced. Allow period of about 30 seconds warm-up time. Now with the receptor volume control turned counterclockwise, advance the volume control on

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the radio receiver until the hum level can be heard, but not far enough that the hum level is objectionable. This is the correct operating point for the receiver volume control and it should be returned to approximately this setting whenever the receptor is used. If the above procedure is not used for determining the correct setting of the radio receiver volume control, then unsatisfactory reception may result due to overload and distortion in the receptor. Stations are selected by the right hand or tuning knob. Proper tuning will be accomplished when maximum volume level and maximum noise reduction have been attained. Although these points are very nearly coincident, tuning should always be accomplished by tuning for the "no noise" point after the maximum volume point has been located.

It is characteristic of F.M. receptors using the "ratio detector" system to show three points of tuning, located very close together on the dial, for each station. Only the center point of these three points will give best noise reduction and this is the one that should always be chosen.

NORMAL CARE AND MAINTENANCE

No maintenance of this receptor should be necessary except when poor performance indicates the deterioration of tubes or components. In case poor performance indicates the tubes and components should be checked, it should be done only by a competent service man who is equipped for the servicing of F.M. equipment.

ALIGNMENT

The equipment required fo proper alignment of this receptor is an unmodulated R.F. signal generator which will cover 10.7 megacycles and a range of 88 to 108 megacycles, and a D.C voltmeter having a low range o 1 to 5 volts D.C.

Connect the positive lead of the D.C. voltmeter to pin #5 of the 6AL5 detector tube and the negative lead to pin #7 of the 6AL5. Apply an unmodulated 10.7 megacycle signal to the grid of the second 6BA6 I.F. amplifier tube, through an .05 microfarad coupling condenser. Tune the bottom adjustment screw of the detector coil for maximum indication on the D.C. voltmeter. This completes this part of the adjustment. Next, locate the 22,000 ohm resistor which is in series with the audio lead from the detector coil. Connect the negative lead of the D.C. voltmeter to the junction of this 22,000 ohm resistor and a 200 ohm resistor. Connect the positive lead of the voltmeter to the receptor chassis. With the 10.7 megacycle signal still applied to the grid of the second 6BA6, tune the top adjustment screw of the detector coil for a point of zero voltage. If more than a half turn adjustment was necessary in either of the preceeding steps then both of the adjustments should be repeated.

I.F. ALIGNMENT

Without changing the signal generator frequency, introduce the 10.7 megacycle signal at a relatively high level into the antenna terminals. Connect the D.C. voltmeter between pins #5 and 7 of the 6AL5 detector tube. Ro-

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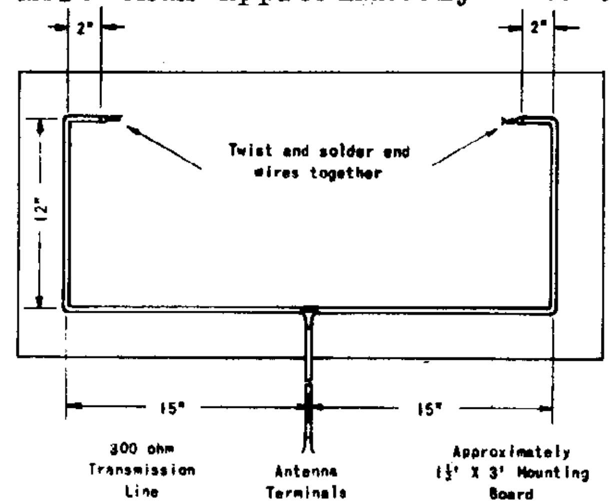
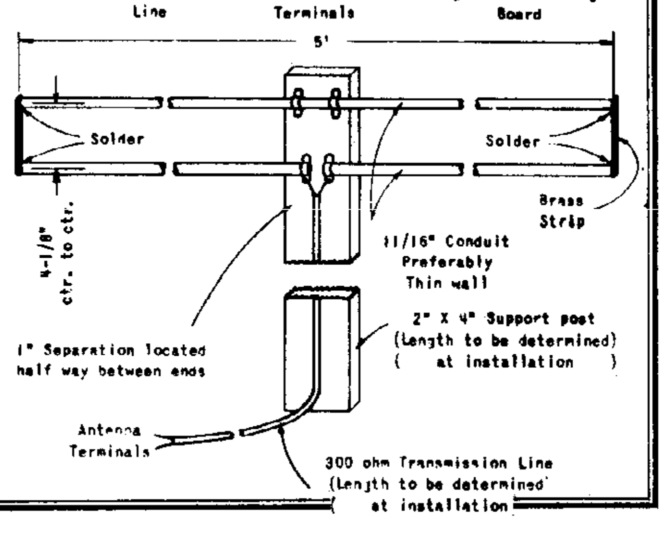
tate the tuning knob slightly to determine that the receptor is not receiving a harmonic of the signal generator and is receiving the 10.7 megacycle signal. Adjust both top and bottom screws of the two I.F. transformers for maximum D.C. indication on the meter, keeping the signal level from the generator low enough so that this D.C. voltage does not exceed 5 volts.

R.F. ALIGNMENT

The R.F. section contains a double converter system in which the oscillator operates at one half signal frequency, minus 5.35 megacycles. The image frequency is so far away from the signal frequency that it is normally not necessary to locate or pay any particular attention to the image during the alignment procedure. The D.C. voltmeter should be connected to pins #5 and #7 of the 6AL5 as it was during the alignment of the I.F. Since the chassis must be removed from the cabinet and away from the dial scale for any alignment work, index points have been stamped on the dial backing plate to facilitate alignment. Rotate the tuning knob until the gang condenser is in the fully meshed position and index the pointer with the calibration marker line farthest from the dial drum. Now rotate the gang condenser until the pointer is indexed with the marker line nearest the dial drum. The receptor should now be tuned to 108 megacycles. If the signal generator indicates that it is not tuned to 108 megacycles, rotate the oscillator trimmer (nearest the dial drum) a small amount until the signal is tuned in with the maximum voltage indication on the meter. The receptor is now properly calibrated to the dial markers and the antenna trimmer (farthest from the dial drum) and the converter trimmer (center) should be adjusted for maximum voltage indication on the D.C. voltmeter. The converter trimmer has a slight effect on the oscillator circuit and the tuning knob should be rocked back and forth slightly during the alignment of the converter trimmer in order to locate the point of maximum output. This completes the alignment of the receptor. The sensitivity should be checked over the band and normally should not vary more than approximately 6 d.b.





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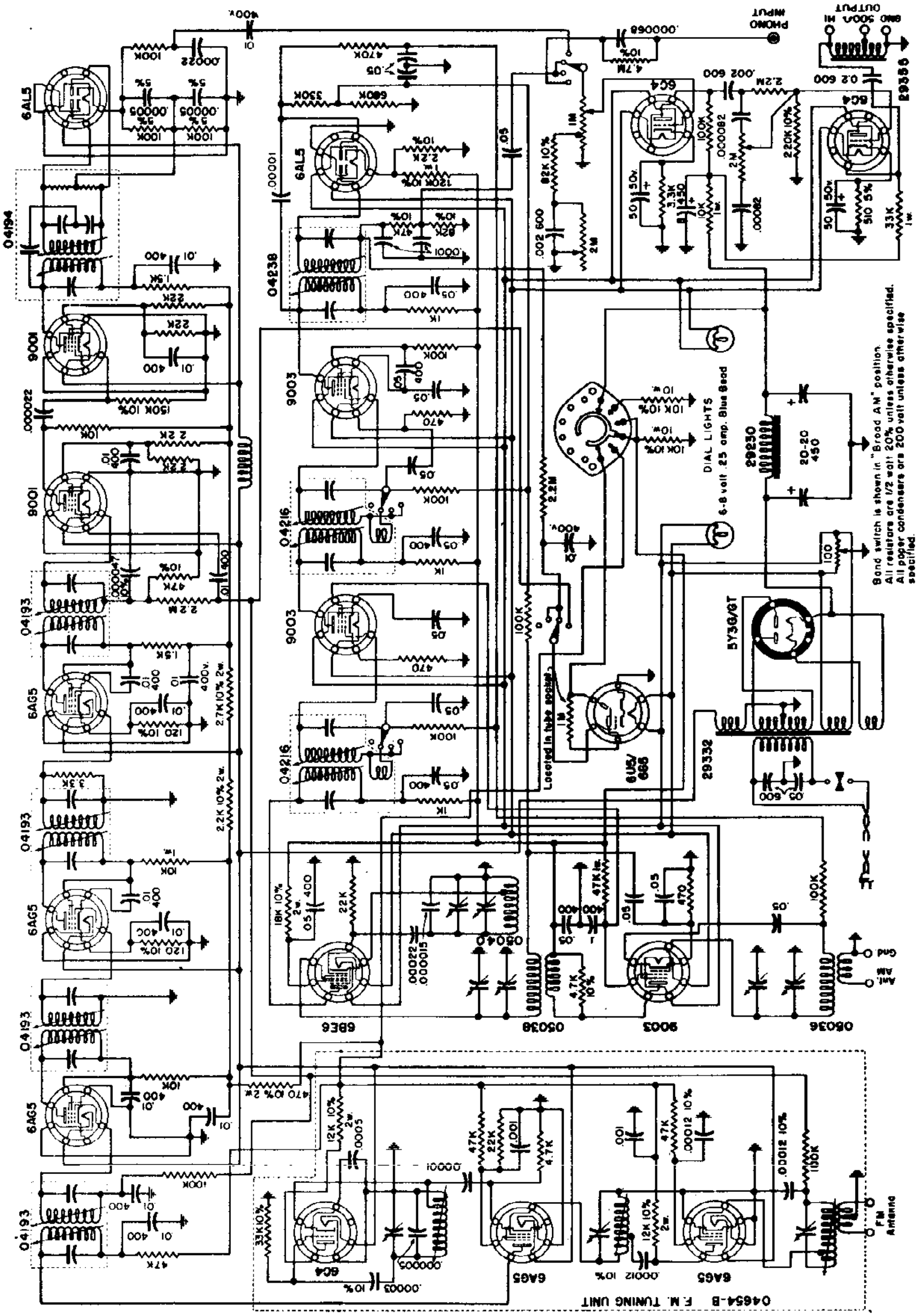
MODELS 9-1091
9-1091B



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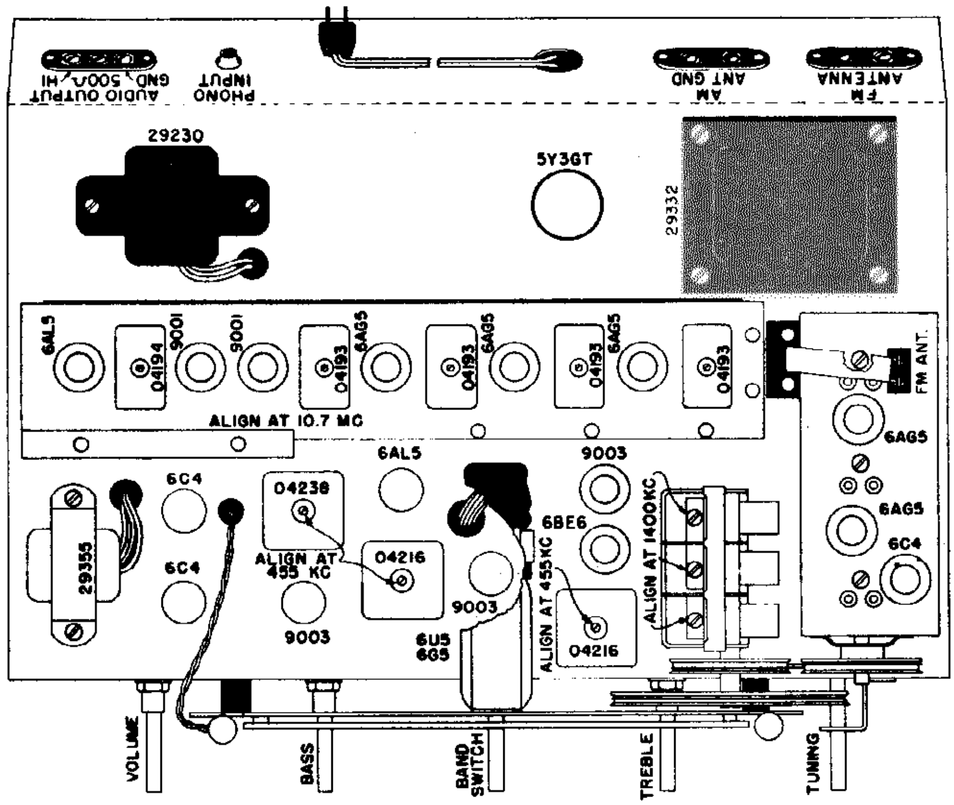

NOMINAL PERFORMANCE

Sensitivity - Less than 10 Microvolts.

Audio Fidelity - Flat within ± 2 d.b. from 30 to 15,000 cycles.

Band Width at 1,000 Kc. - Sharp 7.5 Kc. Broad 18.5 Kc.

Hum - 60 d.b. below rated output.

Distortion - Less than 5%.

Output - 8 Volts at High Impedance - 0.75 Volts at 500 Ohms.

POWER AMPLIFIER

A power amplifier should be used, which will give full output when driven with 5 to 7 volts at high impedance or with 0.45 to 0.65 volts at 500 ohms. If the power amplifier has a gain control, this control should be set to meet the above requirement and should be left at this setting. If the power amplifier requires more than this input to produce full output, then the full benefit of the automatic bass compensation in the tuner cannot be realized and the possibility of over-loading the output stages of the tuner and producing distortion is increased.

If the power amplifier requires less than the above voltages to produce full output, then again the full benefit of automatic bass compensation cannot be realized and the possibility of hum pickup in the line connecting the tuner to the amplifier is increased.

If the power amplifier requires only a small voltage input to produce full output and has no volume control, then the tuner could be connected to the

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power amplifier through a potentiometer of .1 to 1 megohm or a voltage divider consisting of two carbon resistors, to reduce the tuner output to the proper level. Still another possibility in using such an amplifier would be to connect the low impedance output terminals of the tuner to the high impedance input terminals of the amplifier, and omit the voltage divider.

OUTPUT

Output terminals are located on back of chassis (See Fig. 1).

Two output impedances are provided, one for high impedance output and one for 500 ohm output. The high impedance output may be used for connection to an amplifier located only a few feet from the tuner and whose input impedance is 30,000 ohms or more. If the amplifier impedance is greater than 30,000 ohms and if the cable capacity approaches 1,000 µµf., then the high audio frequency response may be improved by shunting the amplifier input terminals with a carbon resistor of such a value that the resulting impedance will be approximately 30,000 ohms. As a typical example, if the input of the amplifier is a 100,000 ohm volume control, then shunting it with a 50,000 ohm carbon resistor would result in an impedance of approximately 33,000 ohms, which is close enough to the required 30,000.

Connection should be made through a low capacity, fully shielded cable, to prevent hum pickup. If the cable capacity is over 1,000 µµf., then serious attenuation of the high audio frequencies will result and a 500 ohm line should be used, instead of the high impedance connection.

If a 500 ohm transmission line is used, then the amplifier may be located a considerable distance from the tuner and, except in the presence of strong electric fields, the line need not be shielded to prevent hum pickup. If the amplifier is not equipped for 500 ohm input, a line coupling transformer must be provided for coupling the transmission line into the amplifier.

HUM BALANCE

The tuner is equipped with a hum balance which is designed to balance out the hum originating within the tuner to a level 60 d.b. below full output. If the tuner is connected to an amplifier which is not adequately isolated from the power line, then hum will develop. Also under certain conditions, if the power amplifier is not adequately isolated from the power line, hum modulation may appear on certain stations when they are tuned in. The hum balance control, mentioned above, is only for the purpose of balancing out the hum originating in the tuner. It is pre-set at the factory and readjustment is not required, except when the 6C4 audio amplifier tubes are changed.

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This control cannot be used successfully to balance out hum which originates in the power amplifier used with the tuner.

NORMAL CARE AND MAINTENANCE

The tubes in this instrument should be checked only when poor performance indicates that the tubes have deteriorated and should be checked only by a competent service man. Whenever tubes are removed, care should be taken to replace them in their proper sockets.

Two dial lights of the 6-8 volt, .25 amp. type are used. They may be replaced in Model 9-1091B by removing the dust cover, and in Model 9-1091A by removing the unit from the cabinet. A slight counterclockwise turn with a slight downward pressure will remove the lamps from their sockets.

IF TUNER FAILS TO OPERATE

If operation of the tuner is unsatisfactory, the instructions should be read again. The antenna and ground connections should be re-checked and the power source should be re-checked to see that it is of the correct voltage and frequency and that power is available at the outlet. The power amplifier used with the tuner should be checked to see that it is functioning properly.

VOLUME CONTROL

The volume control (See Fig. 1) is provided with automatic bass compensation to take care of the bass characteristic of the human ear. At low levels, the response of the human ear to bass is low, so that a considerable amount of bass boost can be used with a pleasing effect, but at high levels, the bass response of the human ear goes up, and with normal program material, no bass boost can be tolerated. This is automatically compensated by making the bass boost circuit less effective as the volume control is turned toward maximum. To secure the full benefit of the bass control in this unit, it should be operated into an amplifier whose gain is as specified in paragraph "Power Amplifier".

TUBES

6AG5	R.F. Amplifier (FM)
6AG5	Converter (FM)
6C4	Osc. (FM)
6AG5	I.F. Amplifier (10.7 Mc.)
6AG5	I.F. Amplifier (10.7 Mc.)
6AG5	I.F. Amplifier (10.7 Mc.)
9001	Limiter (FM)
9001	Limiter (FM)
6AL5	Detector (FM)
9003	R.F. Amplifier (AM)
6BE6	Osc.-Converter (AM)
9003	I.F. (455 Kc.)
9003	I.F. (455 Kc.)
6AL5	Detector (AM)
6C4	Audio
6C4	Audio
6U5/6G5	Tuning Indicator
5Y3GT/G	Rectifier

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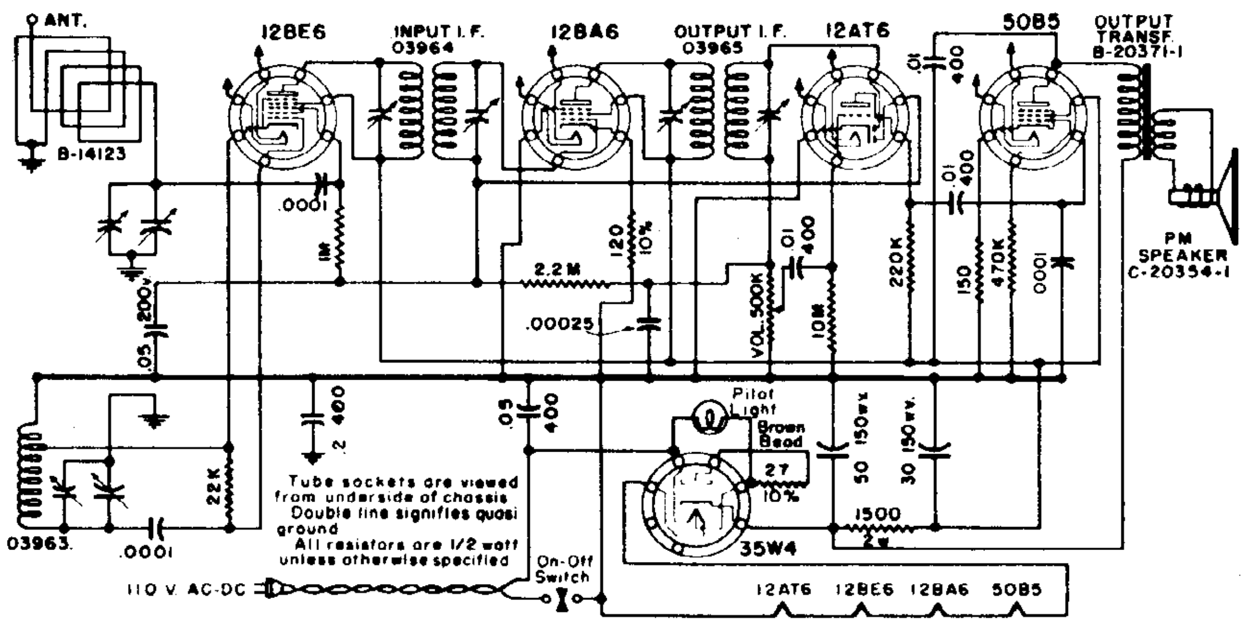
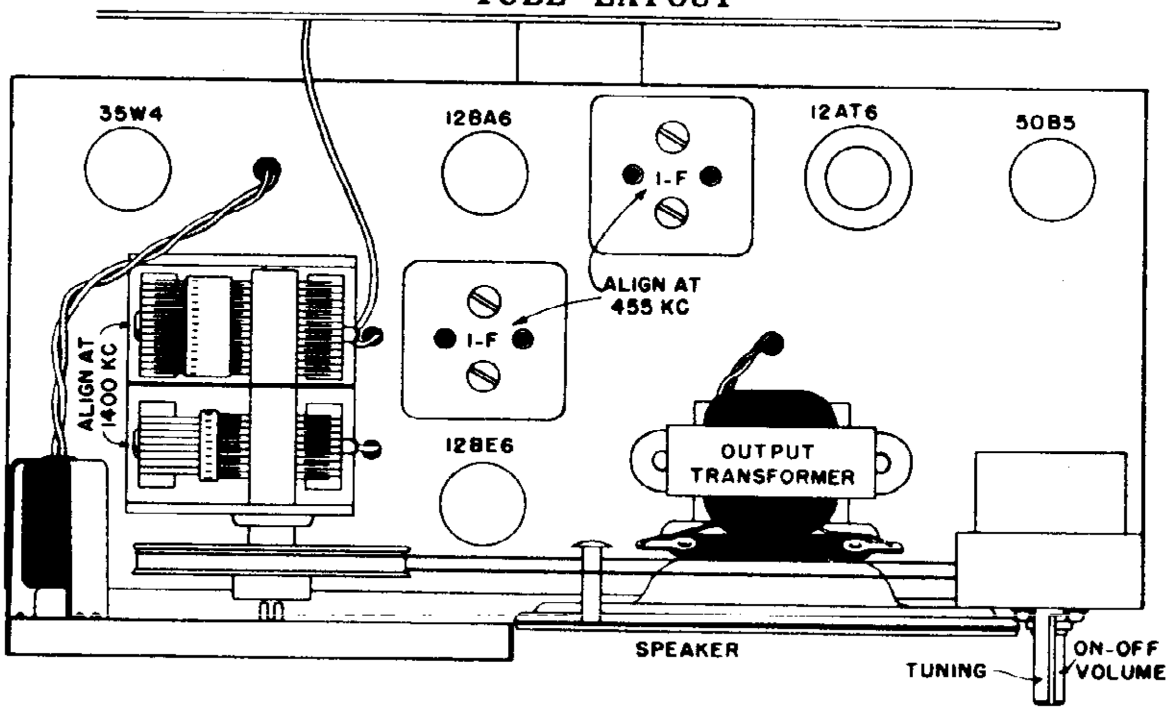
CIRCUIT DIAGRAM



TUBE LAYOUT



MODELS 6H, 661

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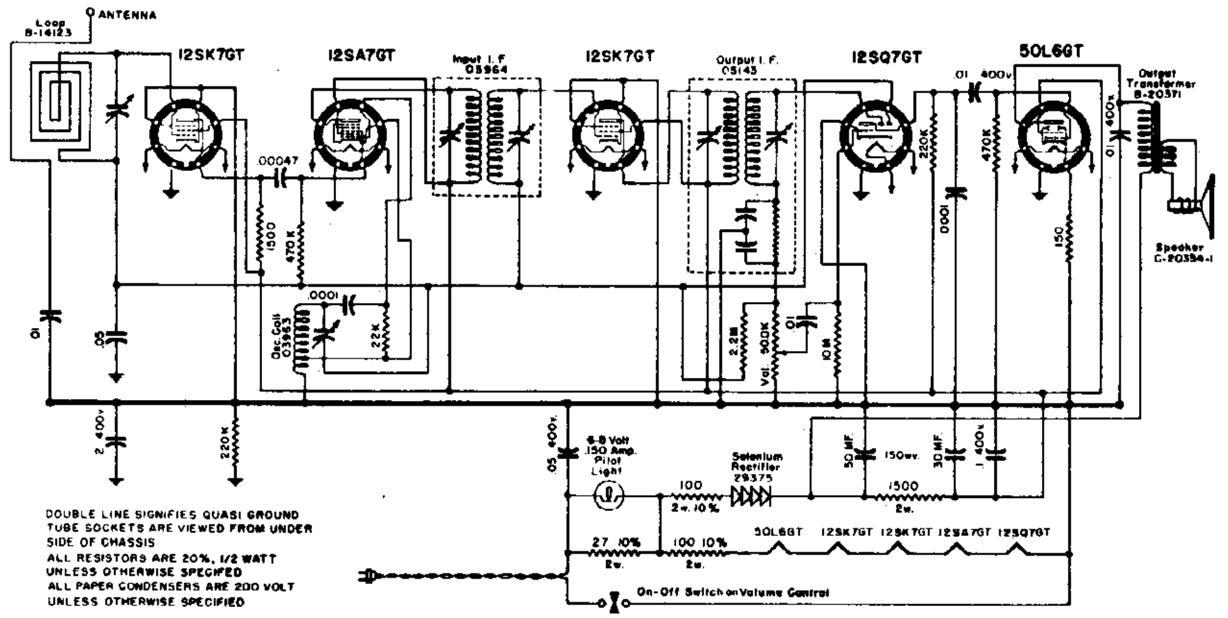
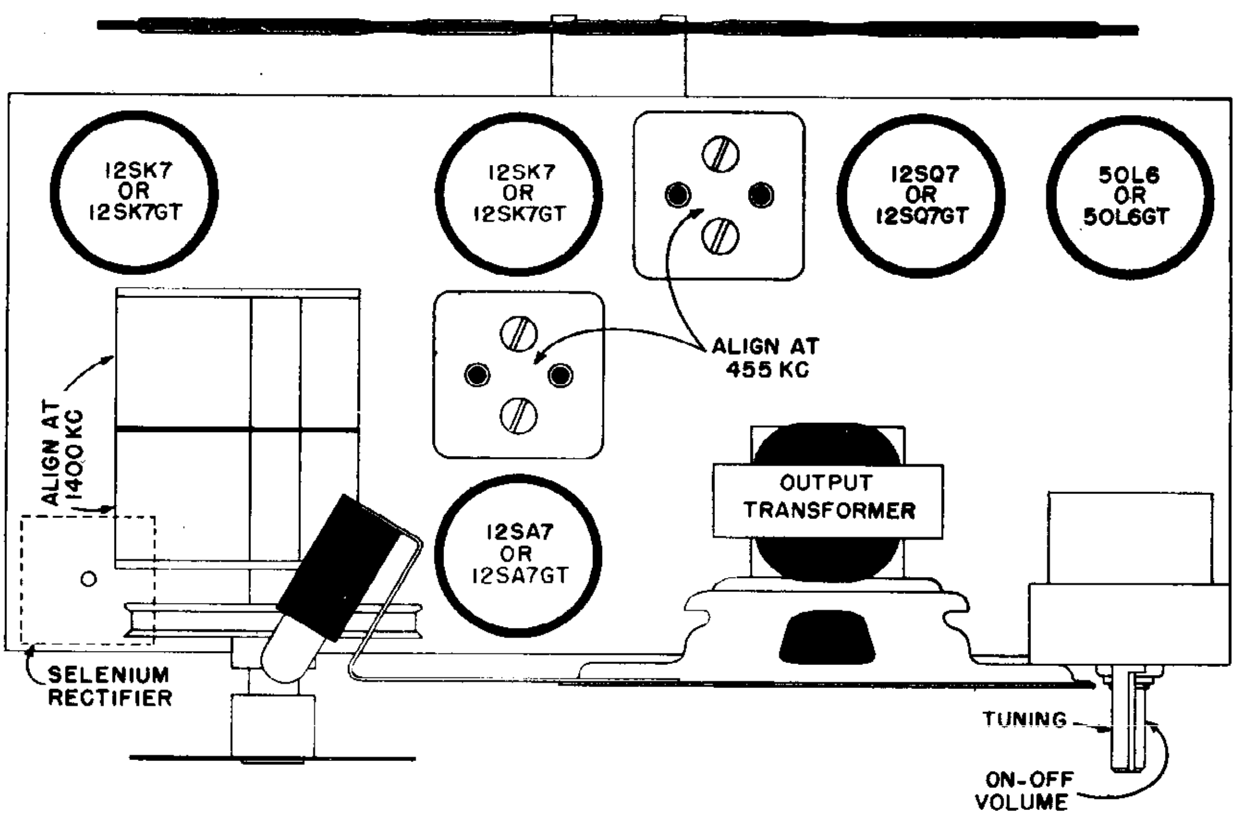
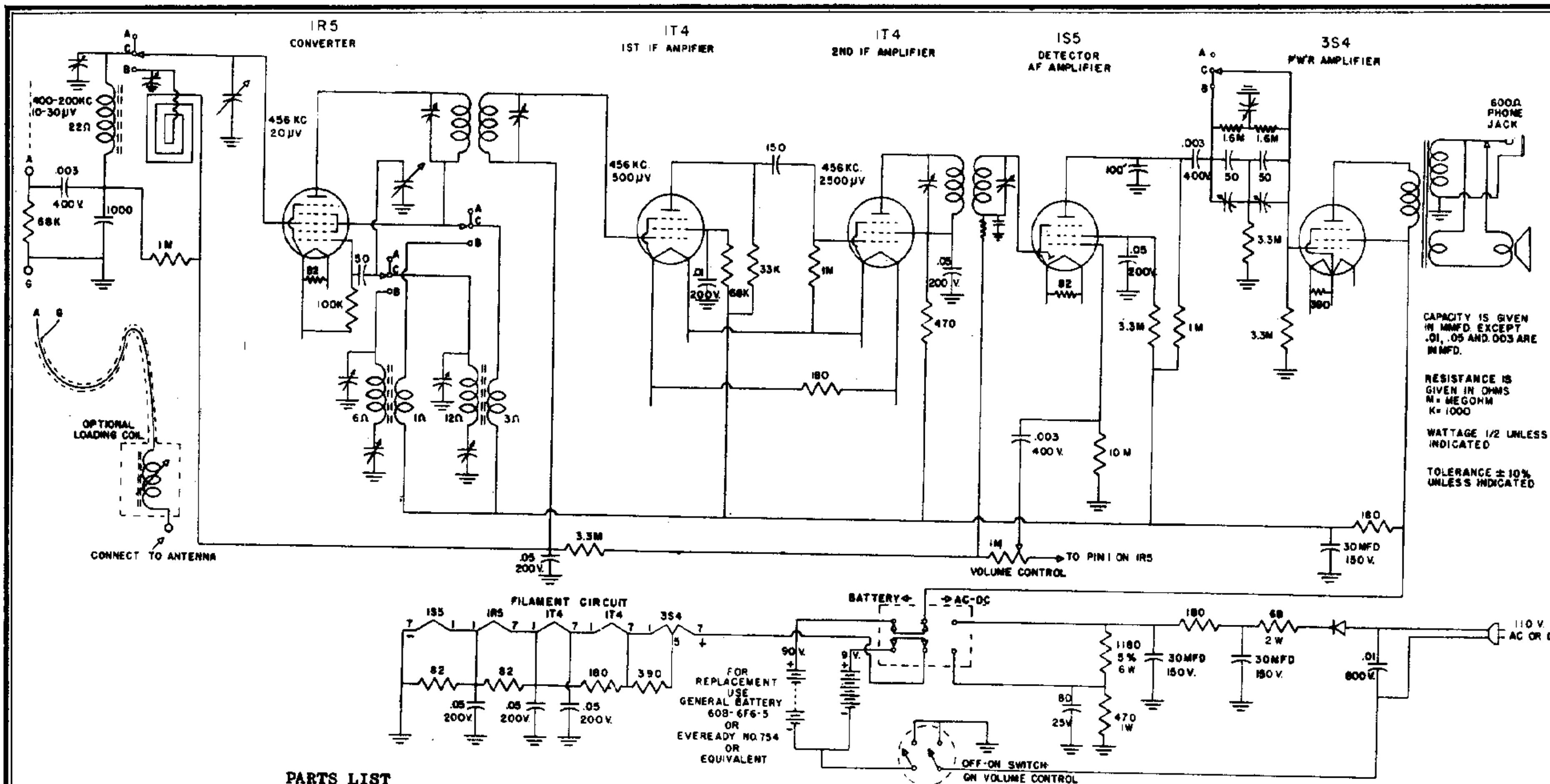


DOUBLE LINE SIGNIFIES QUASI GROUND
TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS
ALL RESISTORS ARE 20%, 1/2 WATT UNLESS OTHERWISE SPECIFIED
ALL PAPER CONDENSERS ARE 200 VOLT UNLESS OTHERWISE SPECIFIED



MIDWEST RADIO CORP.



PARTS LIST

PART NO.	DESCRIPTION
AD-5	Dial face
AE-4	Escutcheon.
AH-1	Leather handle.
AP-1	Wood pulley
AP-13	Metal pulley.
AS-1	Stud for wood pulley.
CE-8	Elec. cond. 80 mfd. 25V
CE-9	Elec. cond. 30 mfd. 150V.
CR-1	Selenium rectifier.
CV-1	Tuning condenser.
CV-10	Padder condenser, dual.
CV-12	3-section trimmer
ET-2	Antenna-Ground strip.
HT-2	Felt foot
JP-2	Headphone jack.
KB-9	Knob.
PC-6	Battery plug.
RV-4	Volume control.
SP-3-2	Speaker
SR-2	Band switch
SS-1	Slide switch.
TA-1	Output transformer.
TR-2	1st. IF transformer
TR-3	3rd. IF transformer
UK-4	RF-Oscillator plate

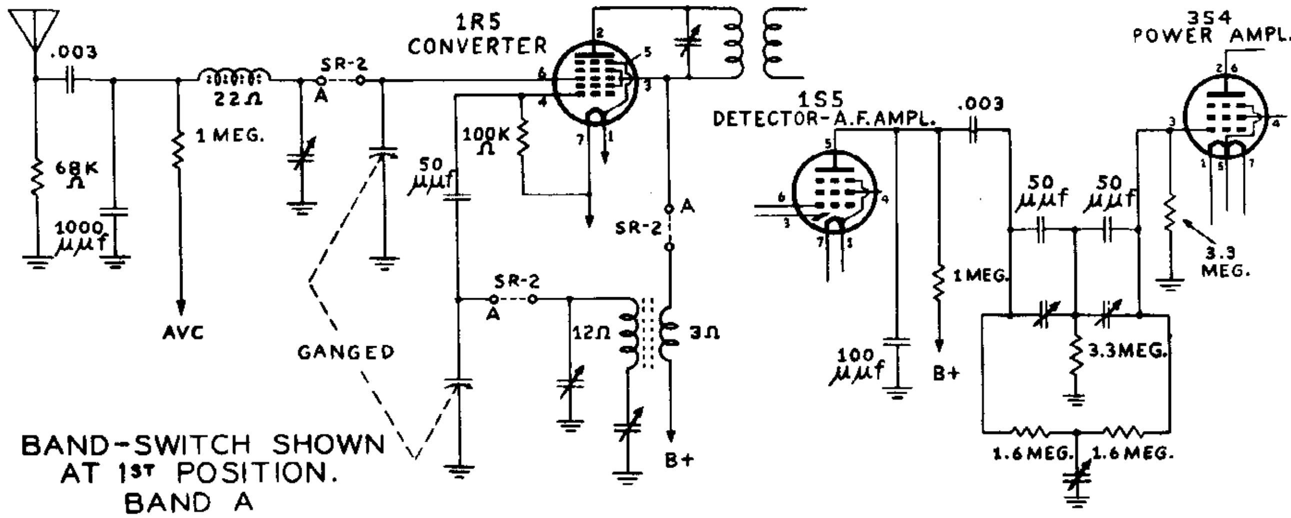
NOTE: Order resistors and condensers by value, tolerance and wattage or voltage.

NOTE: When ordering include serial number of chassis, since records of changes in parts specifications are kept by that number.

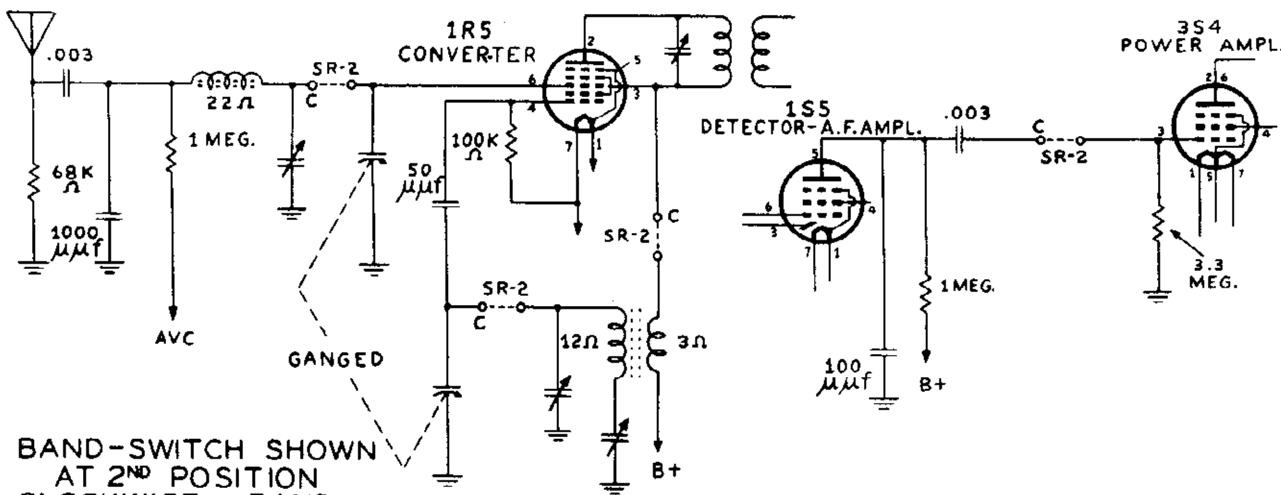
"clarified schematics"

MODELS P-6, PB-6

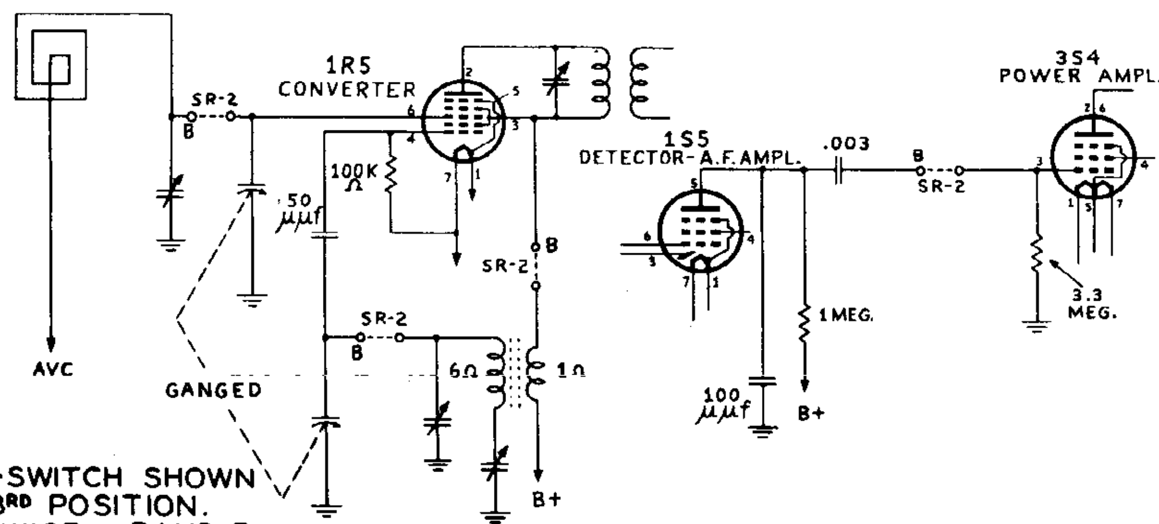
MIDWEST RADIO CORP.



BAND-SWITCH SHOWN AT 1ST POSITION.
BAND A
200-400 KC



BAND-SWITCH SHOWN AT 2ND POSITION
CLOCKWISE BAND C
200-400 KC



BAND-SWITCH SHOWN AT 3RD POSITION.
CLOCKWISE BAND B
BROADCAST BAND

MIDWEST RADIO CORP.

Battery replacements should be made with General Dry Battery 60B-6F6-5 or Eveready Mini-Max No. 754, or equivalent. For reception on the aircraft band, a 10 to 25 foot length of wire should be connected to the receiver.

OPERATION

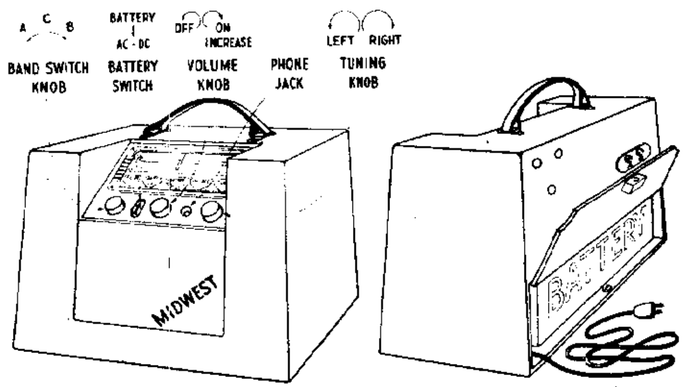


Figure 2. Model P-6 Controls

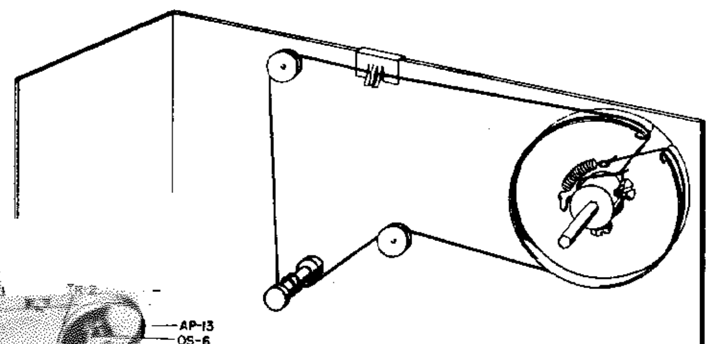
BATTERY OR AC-DC? If a source of nominal 110 volts AC or DC is not available slide the switch marked BATT UP upwards. When AC or DC power is available it should be used, to conserve batteries; simply plug the cord contained in the receiver as shown in figure 2, into the available outlet and be sure to slide the BATT. SWITCH downwards otherwise you may be wasting battery current while assuming you are operating on house current.

ALIGNMENT. A VTVM should be used to read avc voltage when aligning this receiver; for 50 milliwatts audio avc voltage is approximately 0.6. The schematic shows various sensitivities which can be used to trace any lack of gain.

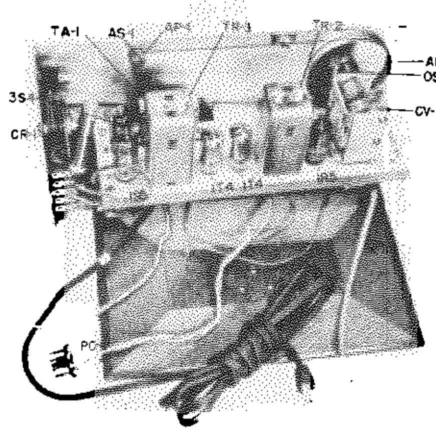
ALIGNMENT CHART

Connection	Signal	Band	Dial	Adjustment
Through .05 mfd. to converter grid.	456 KC	B	1000 KC	Peak 1st and 3rd IF transformer trimmers.
Through 50 mfg. to antenna post	400 KC	C	400 KC	Peak C RF and Oscillator trimmers.
	200 KC	C	200 KC	Peak C oscillator padder.
None	Use local stations at either end. Peak B oscillator padder on low end and peak B RF and oscillator trimmers at the high end.			

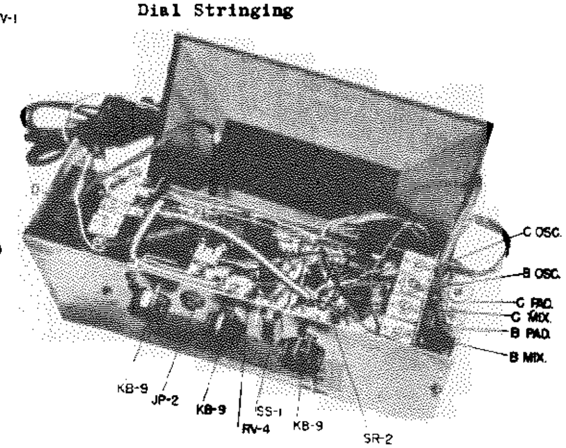
DIAL STRINGING. Use a light weight flexible dial cord when replacing worn or broken cord, such as Beven-Wilcox FSN-25-12.



Dial Stringing

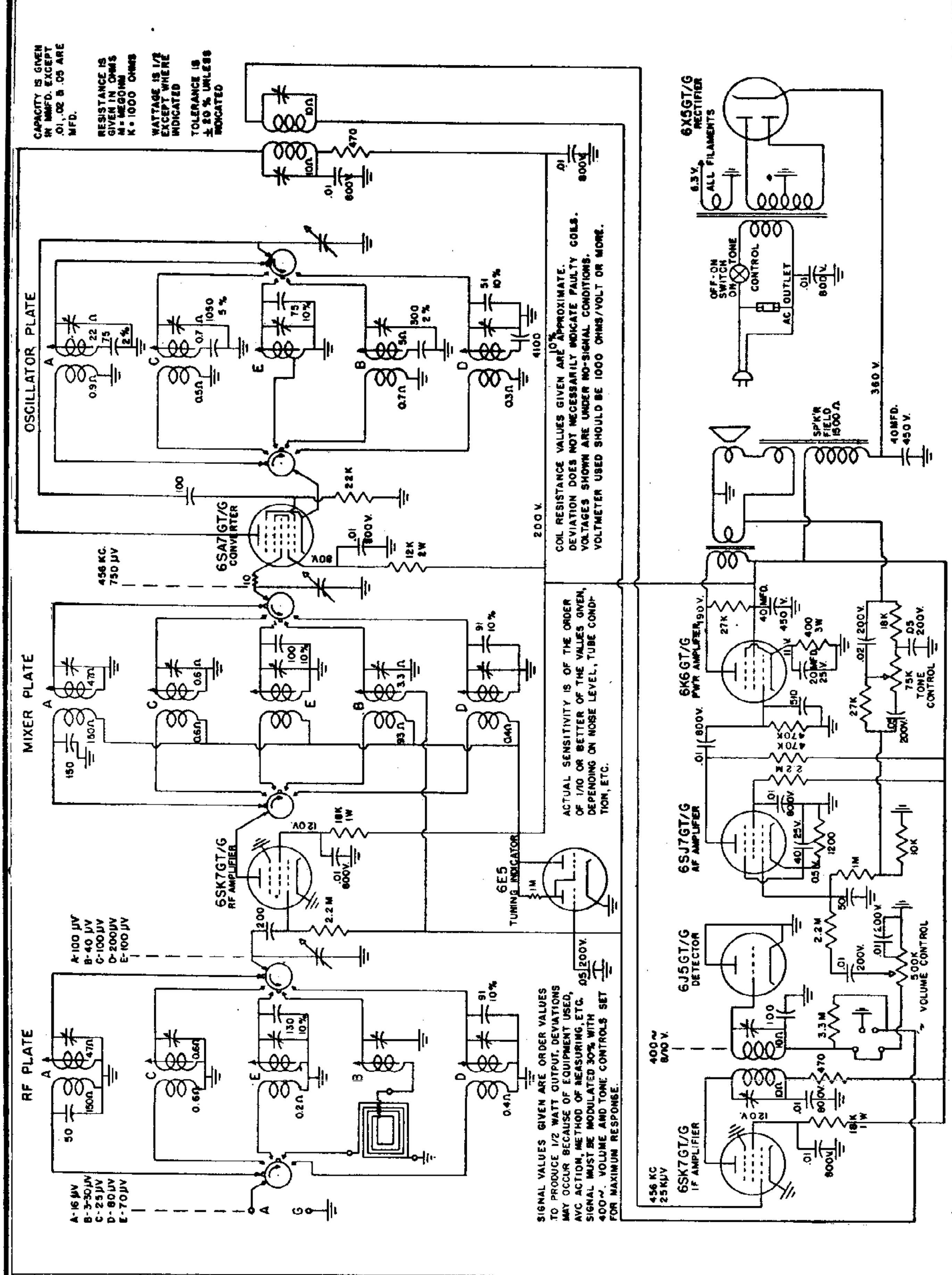


Top View.



RANGE FILTER. This is a parallel T filter which rejects the 1020 cycle range tone. It should be touched up on an actual range signal. If the adjustment of the trimmers has been completely lost this procedure can be used: Feed a 1000 cycle audio tone into top of volume control through a .05 condenser. Connect a sensitive audio output meter across the headphone winding of the output transformer. Trim the condenser marked D on the bottom view, Figure 3, for minimum output. Trim simultaneously the other two trimmers for minimum output. Repeat until further reduction does not occur. Then retouch the adjustments by ear on an actual range signal. Usually the fundamental 1020 signal will completely disappear leaving some second harmonic.

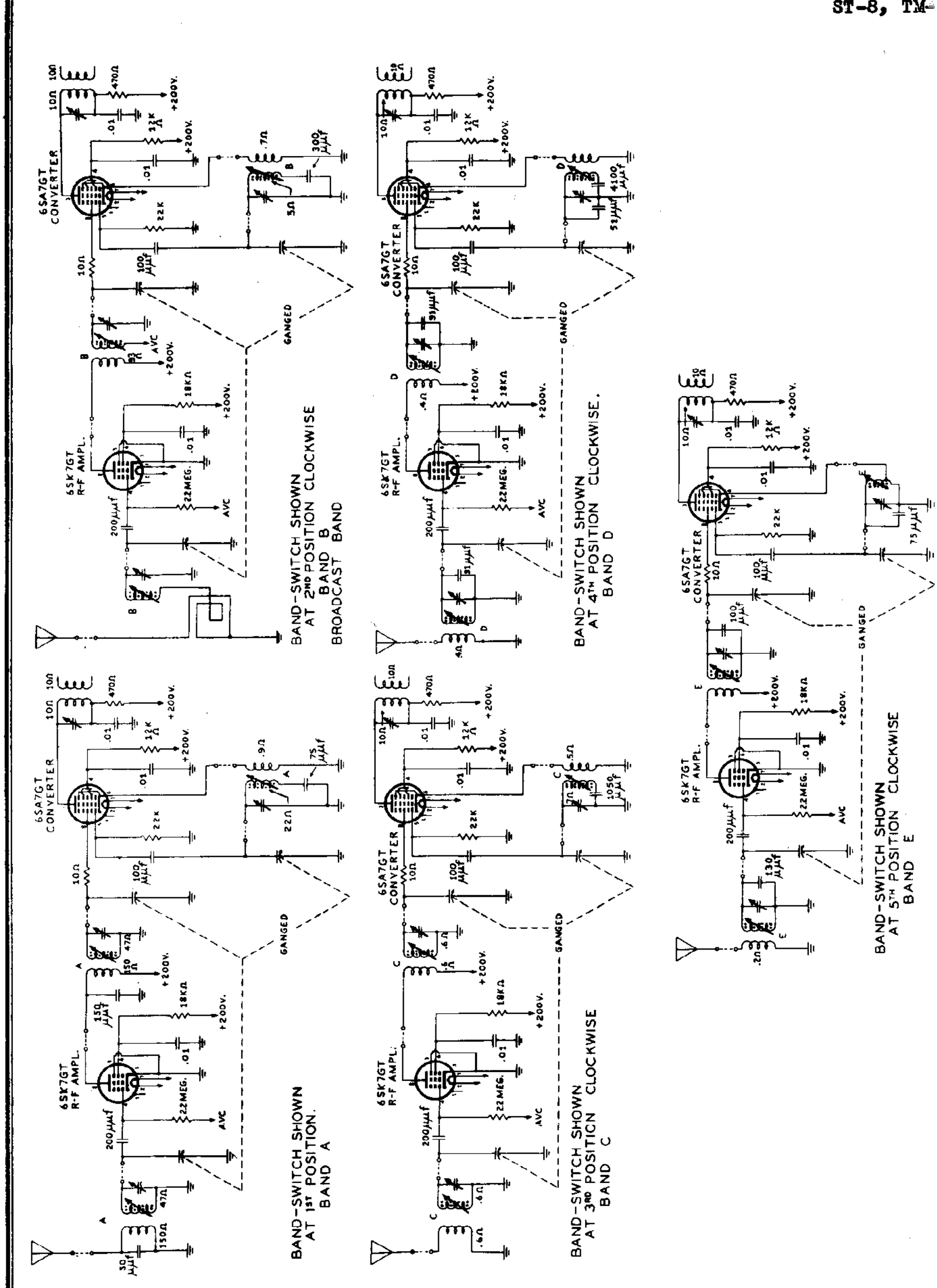
MIDWEST RADIO CORP.



For alignment procedure see Model 712, page 16-3

"clarified schematics"

MIDWEST RADIO CORP.



SERVICE — Series 8, Model 78, **is a straight forward design, containing no trick** circuits. Servicing of the coil **plates or IF transformers should be avoided, except** under special conditions, and **rather than attempt to repair these assemblies a** replacement should be ordered.

The Midwest Radio Corporation **is anxious to help the service technician in** every way; inquiries for special data **will be promptly answered and your comments** will be most welcome.

PARTS LIST

Part	Description
AD-2	Dial
AE-2	Escutcheon
AK-2	Coil plate cover
AP-1	Wood pulley
AP-6	Pointer
AS-1	Wood pulley mtg. stud
CE-3	Filter condenser 40-40-20
CE-4	Cathode by pass 40 mfd. 25 v
*CV-2-1	Tuning gang
EG-2	Speaker mtg. grommet
FS-13	Tube shield
HE-1	Speaker mtg. eyelet
IL-1	Panel Lamp, 6-8 volts
KB-3	Tuning knob
KB-4	Volume control knob
KB-8	Tone or Band knob
OG-1	Miter gear, pair
OS-3	Dial string spring
PC-3	Loop plug
PC-4	Phonograph plug
RV-2	Tone control
RV-3	Volume control
*SP-1	Speaker, oval 6 x 9
TP-1	Power transformer
TP-2	Universal power transformer
*TR-4	1st I.F. transformer
*TR-5	2nd I.F. transformer
*UK-1	R. F. coil plate
*UK-2	Mixer coil plate
*UK-3	Oscillator coil plate

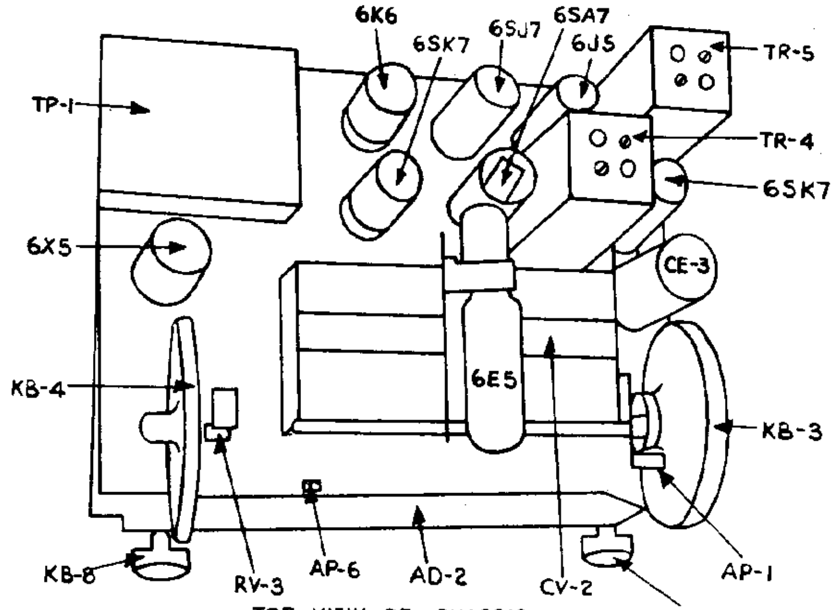
Note: Order resistors and condensers by value, **tolerance and** wattage or voltage.
Note: When ordering include serial number of **chassis, since** Midwest records of changes in parts specifications **are kept by that number.**

REPLACEMENT PARTS — **Certain parts are** available on an exchange basis; these are shown on the parts **list with an "*." Figures 4** and 5 identify certain mechanical parts not shown by the **schematic diagram.**

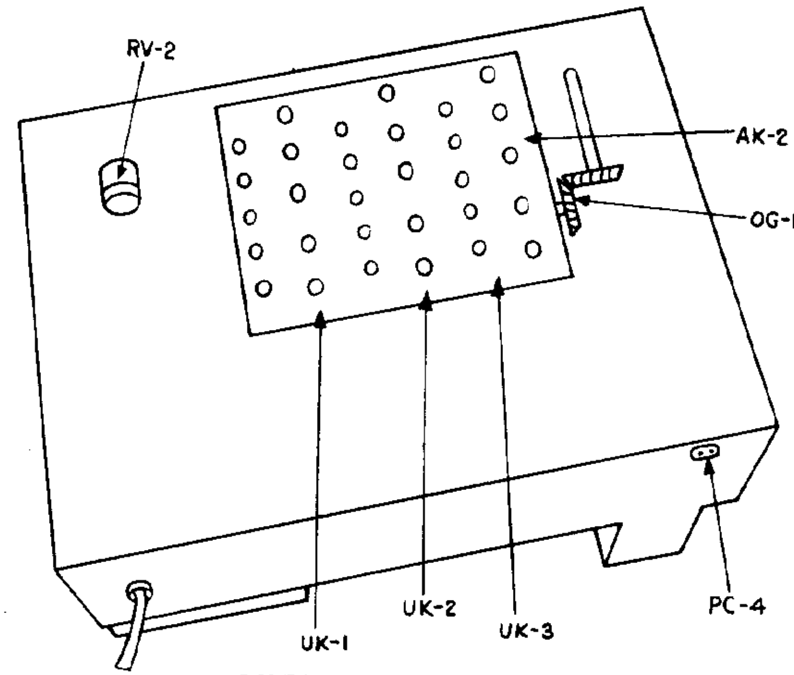
Note: Modulate the signal **with 400 cycles 30%. The output indicator may be an audio meter at the voice coil or a VTVM on the avc. The sensitivity figures shown on the schematic are for a ½ watt output; the voltage at the voice coil is 1.2 and the avc. voltage is between 2.5 and 3.5 for ½ watt output. Do not use signals for** ALIGNMENT **which will give output in excess of ½ watt.**

ALIGNMENT — The schematic includes the various signal strengths necessary for standard output of 0.5 watt. The output indicator may be an audio frequency meter across the voice coil or a vacuum tube voltmeter at the avc. For 0.5 watt the voltage at the voice coil is 1.2 volts or 2.5 to 3.5 volts avc. if a 30% modulated signal is used. I.F. alignment should be made with band switch on "B," pointer tuned to 1000 kc. and signal to mixer grid through a .05 mfd. condenser. Trim both I.F. transformers for maximum reading.

R. F. alignment should be made in the usual manner. There is no inter-action between bands. The only precaution is that a dummy antenna be used between the generator and the antenna post on the receiver. This may be simply a 200 micro micro farad condenser in series with a 400 ohm resistor. The B band RF padder, 550 KC, is very broad and should not be adjusted. The loop must be plugged in when adjusting the B band RF trimmer, 1600 kc.

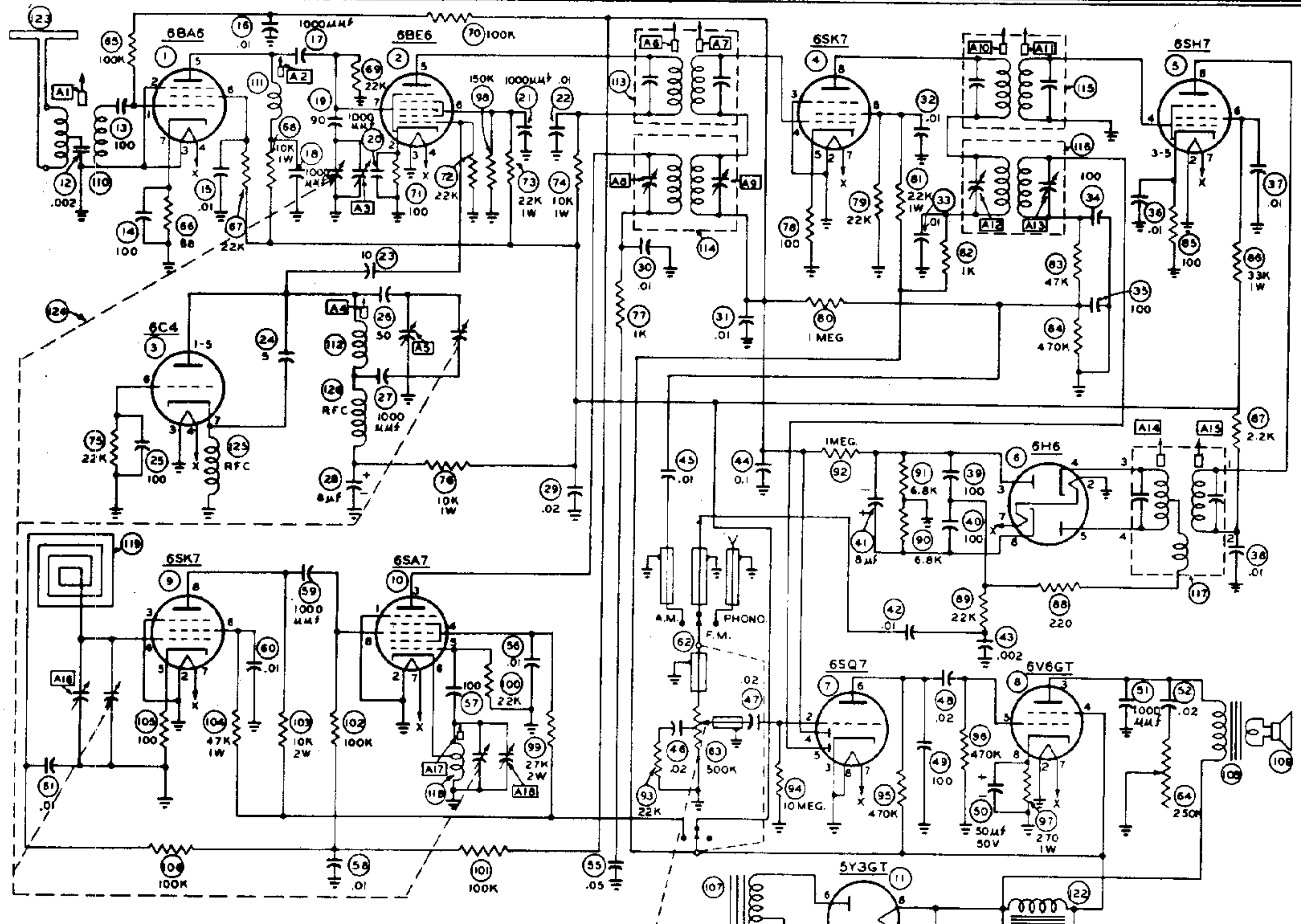


TOP VIEW OF CHASSIS



BOTTOM VIEW OF CHASSIS

MONITOR EQUIPMENT CORP.



RESISTORS - ½ WATT EXCEPT AS NOTED
VALUES IN OHMS
K=1000
MEG=1,000,000

MONITOR MODEL M-3070

Band switch changes B+ connections only.

INTERMEDIATE FREQUENCIES: A-M, 456 KC; F-M, 10.7 MC.
FREQUENCY RANGES: A-M, 540-1600 KC.

POWER CONSUMPTION:
RADIO, 80 watts.
RADIO AND PHONOGRAPH 85 watts.

POWER SOURCE: 105-125 volts, 60 cycles.

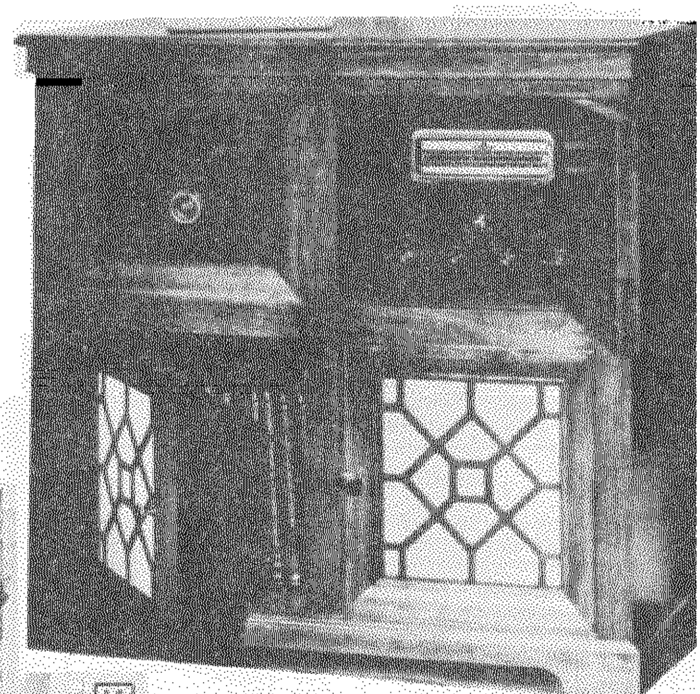
MONITOR EQUIPMENT CORP.

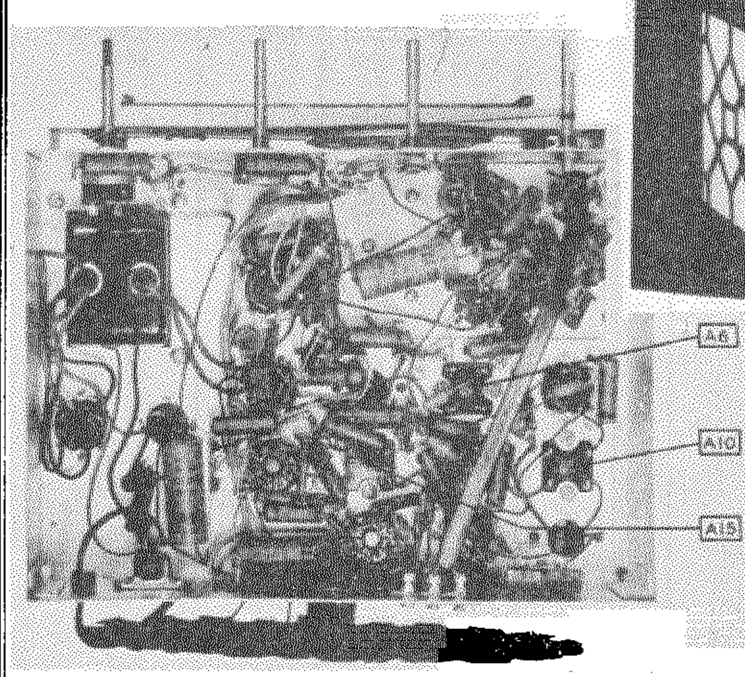
A-M Alignment

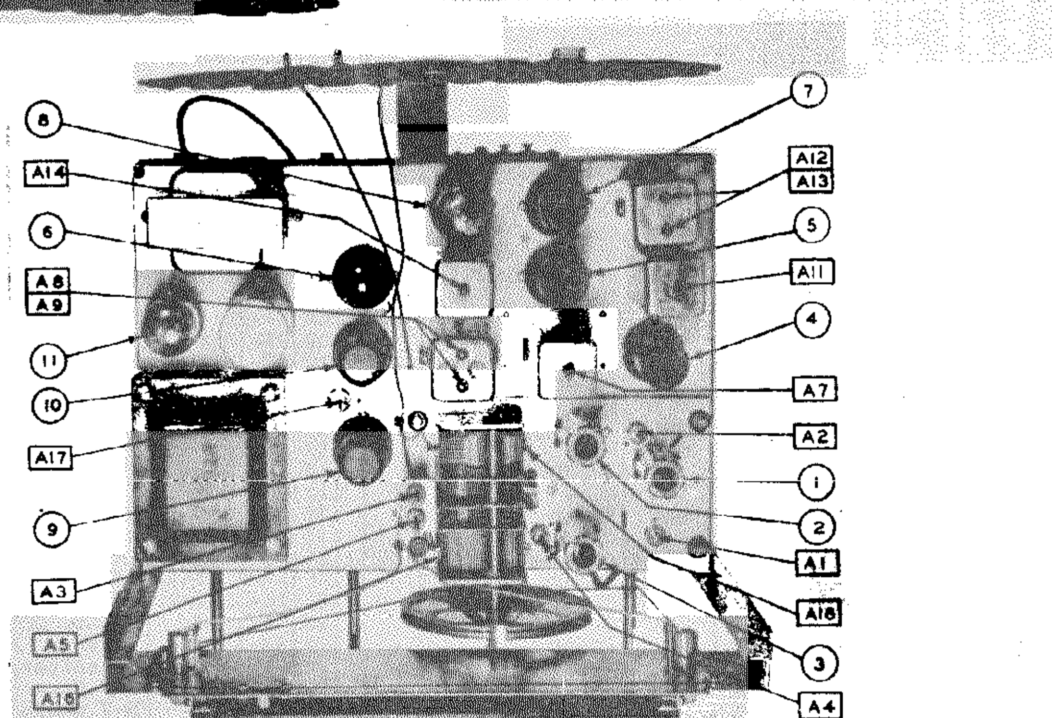
Turn gang condenser to fully meshed position. Set dial pointer on the small dot to the left of the end calibration. Turn volume control to maximum volume. Use a standard A-M signal generator, with the high side coupled to the input point through a .01 uf capacitor. Ground the other side to the chassis. Connect the output meter across the voice coil of output transformer 108. The output of the signal generator should be no higher than necessary to obtain the output reading. Where loop coupling is specified, connect the signal generator output to two or three turns of wire spaced about two feet from the antenna loop.

Signal Generator and Coupling Capacitor	Signal Generator Frequency	Input to	Tuning Dial Setting	Output Meter	Adjust	Remarks
A-M Signal Generator .01 uf.	455 KC	Pin 8 6SA7	Low-Freq. End.	Across Voice Coil of 108	A13, A12, A9, A8	Adjust for max. output. Repeat
	600 KC	"	600 KC	"	A17	Adjust for max. output.
	1600 KC	"	1600 KC	"	A18	" " " "
	600 KC	"	600 KC	"	A17	" " " "
	1400 KC	Loop Coupling	Tune to signal at 1400 KC	"	A16	" " " "
		F-M Alignment				
A-M .002 uf	10.7 MC	Pin 4 6SH7	Low-Freq. End.	Use D-C VTVM. Pin 3 6H6 to gnd.	A15, bottom of ratio-detector can	Adjust for max. reading.
A-M .002 uf	"	"	"	Use D-C VTVM. High Side of capacitor 43 to gnd.	A14, top of ratio-detector can	Adjust for zero voltage. At the correct setting, the slightest movement of A14 will throw the voltage positive or negative. A slow approach to zero indicates that A14 should be turned in the opposite direction.
A-M .002 uf	"	Pin 3 6SK7 item 4	Low-Freq. End.	Use D-C VTVM. Pin 3 6H6	A11, A10	Adjust for max. reading.
A-M .002 uf	"	Pin 7 6BE6	"	"	A7, A6	" " " "
						Repeat last two steps.
F-M Signal Generator Set for 75 Kc. Deviation and 400-cycle Modulation	88 MC	Dipole antenna terminals	88 MC	Output meter across voice coil of 108	A4	Adjust for max. output.
"	"	"	"	"	A2	" " " "
"	108 MC	"	108 MC	"	A5	" " " "
"	"	"	"	"	A3	" " " "
						Repeat last four steps until properly tracked.
"	98 MC	"	Tune to signal at 98 MC	"	A1	Adjust for max. output.

MONITOR EQUIPMENT CORP.







MODEL M3070

MONITOR EQUIPMENT CORP.

PARTS LIST

TUBES

Item No.	Type	Function
1	6BA6	R-F Amplifier (AM)
2	6BE6	Mixer (FM)
3	6C4	Oscillator (FM)
4	6SK7	I-F Amplifier (AM-FM)
5	6SH7	I-F Amplifier (FM)
6	6H6	Second Detector (FM)
7	6SQ7	Second Detector (FM)
8	6V6GT	Beam Power Amplifier
9	6SK7	R-F Amplifier (AM)
10	6SA7	Pentagrid Converter (AM)
11	5Y3GT	Full-Wave Rectifier

CAPACITORS

Capacitances in uf for electrolytic and paper capacitors, uuf for mica.

Item No.	Part No.	Cap.	Volts dcw	
12	CD-1227-3	.002	400	Paper
13	CD-1157-13	100	500	Mica
14	CD-1157-13	100	500	Mica
15	CD-1227-8	.01	400	Paper
16	CD-1227-8	.01	400	Paper
17	CD-1160-5	1000	500	Mica
18	CD-1160-5	1000	500	Mica
19	CD-1158-17	91	500	Mica
20	CD-1085-20	1000	300	Mica
21	CD-1085-20	1000	300	Mica
22	CD-1227-8	.01	400	Paper
23	CD-1245-2	10	500	Silver Mica
24	CD-1245-1	5	500	Silver Mica
25	CD-1157-13	100	500	Mica
26	CD-1245-5	50	500	Silver Mica
27	CD-1160-5	1000	500	Mica
28	CD-1247	8	450	Dry Electrolytic
29	CD-1227-10	.02	400	Paper
30	CD-1227-8	.01	400	Paper
31	CD-1227-8	.01	400	Paper
32	CD-1227-8	.01	400	Paper
33	CD-1227-8	.01	400	Paper
34	CD-1071-22	100	500	Mica
35	CD-1071-22	100	500	Mica
36	CD-1227-8	.01	400	Paper
37	CD-1227-8	.01	400	Paper
38	CD-1227-8	.01	400	Paper
39	CD-1071-22	100	500	Mica
40	CD-1071-22	100	500	Mica
41	CD-1247	8	450	Dry Electrolytic
42	CD-1227-8	.01	400	Paper
43	CD-1227-3	.002	400	Paper
44	CD-1227-15	0.1	400	Paper
45	CD-1227-8	.01	400	Paper
46	CD-1227-10	.02	400	Paper
47	CD-1227-10	.02	400	Paper
48	CD-1227-10	.02	400	Paper
49	CD-1071-22	100	500	Mica
50	CD-1246	50	50	Dry Electrolytic
51	CD-1160-5	1000	500	Mica
52	CD-1227-10	.02	400	Paper
53	CD-1248	40-40	450	Dry Electrolytic
54	CD-1227-8	.01	400	Paper
55	CD-1227-13	.05	400	Paper
56	CD-1227-8	.01	400	Paper
57	CD-1071-22	100	500	Mica
58	CD-1227-8	.01	400	Paper
59	CD-1085-20	1000	300	Mica
60	CD-1227-8	.01	400	Paper
61	CD-1227-8	.01	400	Paper

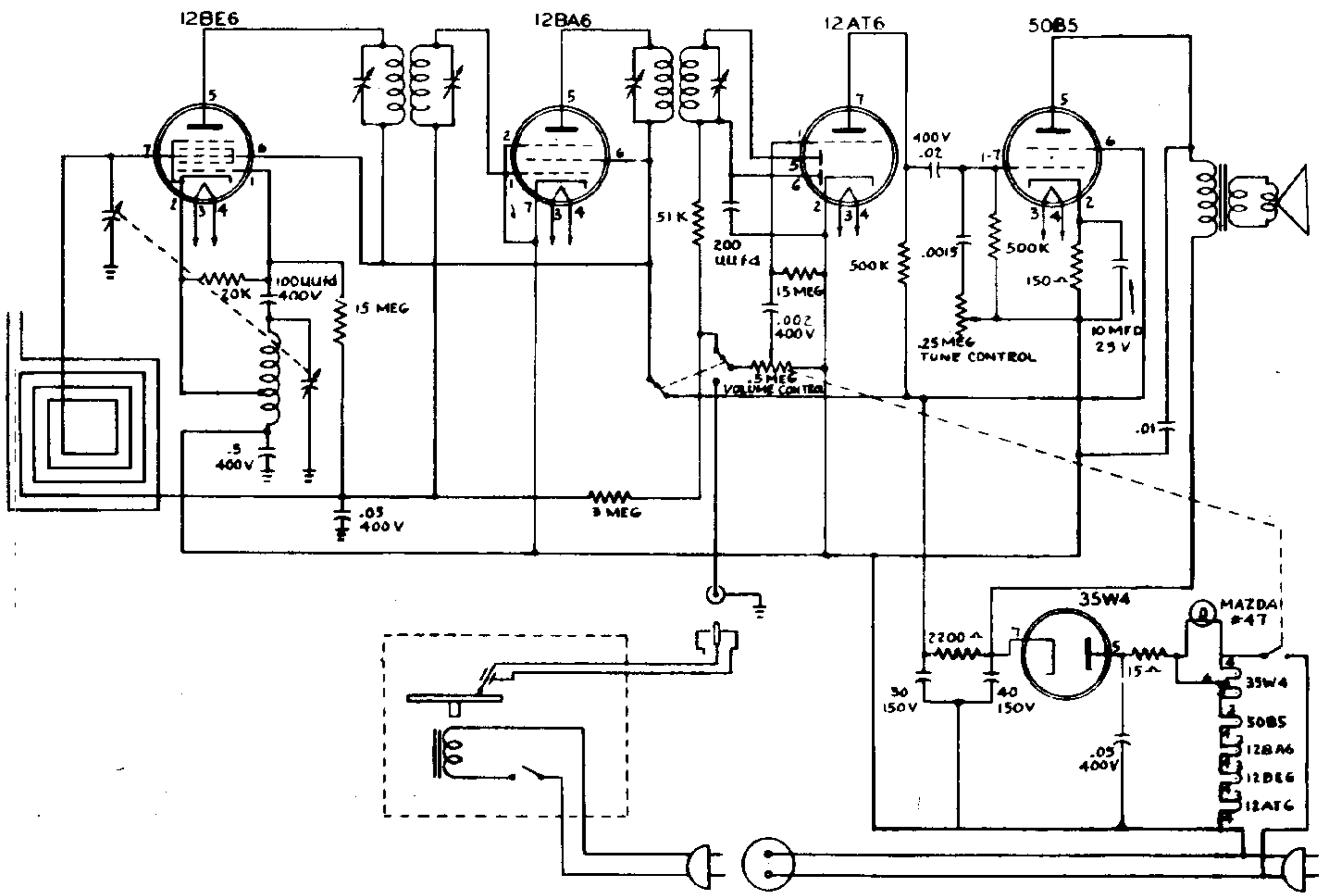
RESISTORS, FIXED

Item No.	Part No.	Res.	Watts
65	RE-1166-107	100K	1/2
66	RE-1139-683	68	1/2
67	RE-1166-226	22K	1/2
68	RE-1168-106	10K	1
69	RE-1166-226	22K	1/2
70	RE-1166-107	100K	1/2
71	RE-1139-104	100	1/2
72	RE-1166-226	22K	1/2
73	RE-1168-226	22K	1
74	RE-1168-106	10K	1
75	RE-1166-226	22K	1/2
76	RE-1168-106	10K	1
77	RE-1166-105	1K	1/2
78	RE-1139-104	100	1/2
79	RE-1166-226	22K	1/2
80	RE-1139-108	1 meg	1/2
81	RE-1168-226	22K	1
82	RE-1166-105	1K	1/2
83	RE-1166-476	47K	1/2
84	RE-1166-477	470K	1/2
85	RE-1139-104	100	1/2
86	RE-1168-336	33K	1
87	RE-1166-225	2.2K	1/2
88	RE-1139-224	220	1/2
89	RE-1166-226	22K	1/2
90	RE-1166-685	6.8K	1/2
91	RE-1166-685	6.8K	1/2
92	RE-1139-108	1 meg	1/2
93	RE-1166-226	22K	1/2
94	RE-1139-109	10 meg	1/2
95	RE-1166-476	470K	1/2
96	RE-1166-477	470K	1/2
97	RE-1063-274	270	1
98	RE-1062-157	150K	1/2
99	RE-1046-276	27K	2
100	RE-1166-226	22K	1/2
101	RE-1166-107	100K	1/2
102	RE-1166-107	100K	1/2
103	RE-1046-106	10K	2
104	RE-1153-476	47K	1
105	RE-1139-104	100	1/2
106	RE-1166-107	100K	1/2

MISCELLANEOUS

Item No.	Part No.	
62	SW-1069	Switch, Radio-Phono
63	RE-1181	Pot. Vol.Cont.and Sw., 500K
64	RE-1182	Pot., Tone Control, 250K
107	TR-1061	Transformer, Power
108	TR-1060	Transformer, Output
109	SK-1016	Speaker
110	TR-1064	Transformer, Antenna
111	CI-1057	R-F Coil (FM)
112	CI-1058	Oscillator Coil (FM)
113	TR-1065	Transformer, IF (FM)
114	TR-1052	Transformer, First IF (AM)
115	TR-1065	Transformer, IF (FM)
116	TR-1051	Transformer, Second IF (AM)
117	TR-1066	Transformer, Ratio Detector
118	CI-1059	Oscillator Coil
119	AT-1019	Antenna Loop
120	LA-1014-32	Pilot Light
121	LA-1014-32	Pilot Light
122	CK-1040	Filter Choke
123	AS-3599	Antenna (FM)
124	CDC-5001	Capacitor, Variable, Tuning
125	CK-1036	R-F Choke
126	CK-1036	R-F Choke

MONITOR EQUIPMENT CORP.



ALIGNMENT PROCEDURE

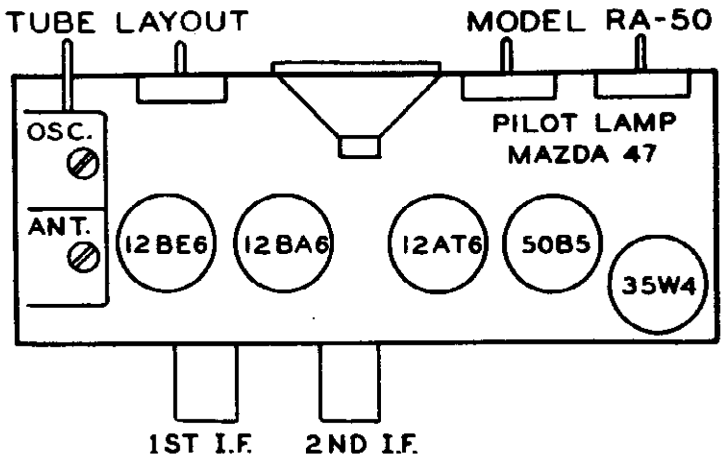
1. Turn gang condenser to full mesh position. Set dial pointer on the small dot to the left of the last calibration.
2. Connect the output meter across the voice coil.
3. Connect the output of the Signal Generator to a two-turn loop of wire and place about one foot away from loop on the set.
4. Turn volume full on. Keep output of Signal Generator as low as

ALIGNMENT CHART

Alignment Sequence	Signal Generator	Position of Dial Pointer	Adjust for Maximum Output
1	456 kc.	Full mesh 55	2nd I.F. (2 trimmers)
2	456 kc.	Full mesh 55	1st I.F. (2 trimmers)
3	1400 kc.	1400	Oscillator Section of Gang Condenser
4	1400 kc.	1400	Antenna Section of Gang Condenser

MODEL RA50

MONITOR EQUIPMENT CORP.



TYPE: Five tube, single band, superheterodyne with Record Changer.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 456 kc.

POWER SUPPLY: a.c.—60 cycle.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts. (Phonograph: 15 watts additional)

POWER OUTPUT: 1.5 watts.

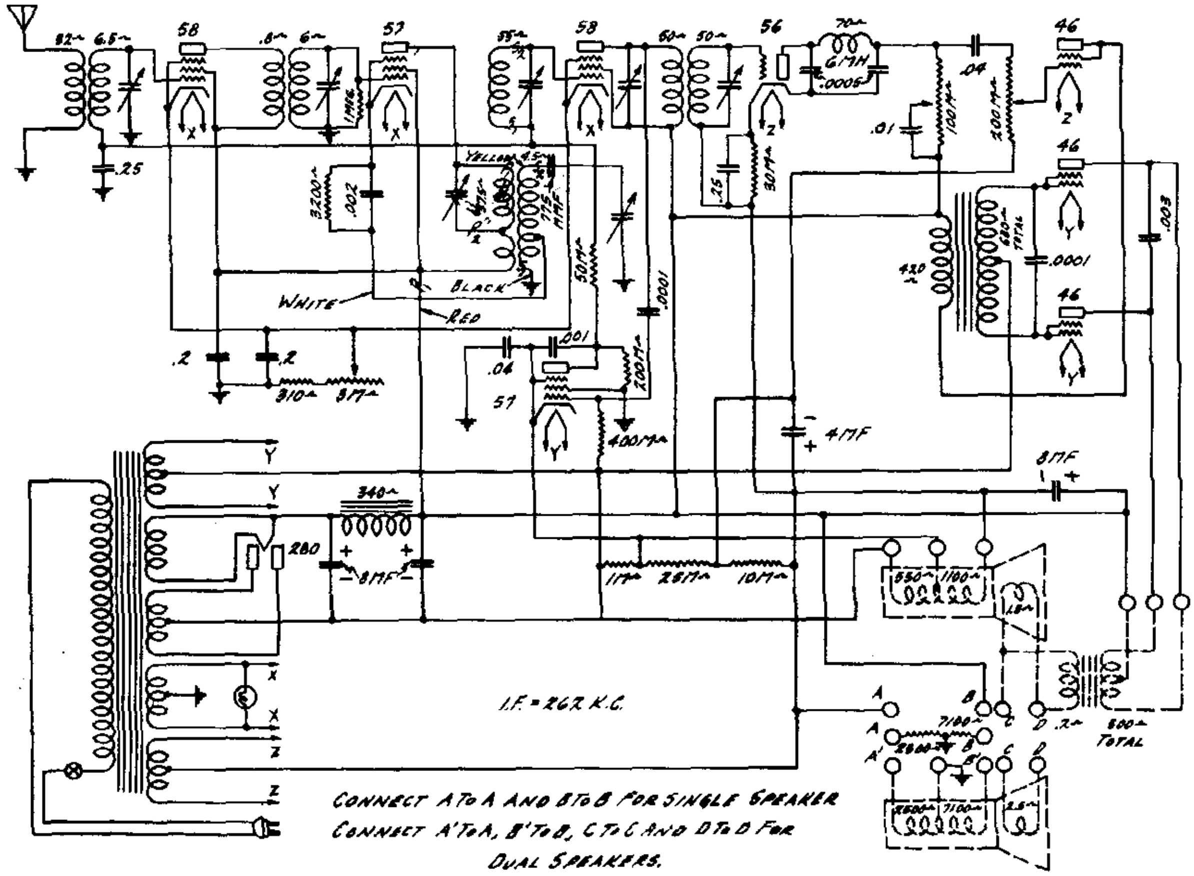
TUBE COMPLEMENT:

Type	Function
12BE6	Oscillator, mixer
12BA6	I.F. Amplifier
12AT6	Detector, A.V.C. Audio Amplifier
50B5	Power output
35W4	Rectifier

Pilot Lamp: Masda 47

PARTS LIST

PART No.	DESCRIPTION	PART No.	DESCRIPTION
LA-1014-32	Bulb, dial lamp, Masda 47	AS-3362	Dial Glass (Calibrated)
AT-1018	Ant. loop	KN-1053	Knob
CI-1049	Oscillator coil	CD-1071-28	Condenser, 250 mmfd., mica
TR-1052	Transformer, 1st I.F.	CD-1071-22	Condenser, 100 mmfd., mica
TR-1051	Transformer, 2nd I.F.	CD-1227-3	Condenser, .002 mfd., 400 volt, tubular
CD-1217	Condenser, variable, two-section	CD-1227-10	Condenser, .02 mfd., 400 volt, tubular
BU-1120	Condenser drive bushing	CD-1227-13	Condenser, .05 mfd., 400 volt, tubular
CX-1025	Condenser drive bushing clip	CD-1227-19	Condenser, .5 mfd., 400 volt, tubular
SW-1060	Phono-radio switch	CD-1227-2	Condenser, .0015 mfd., 400 volt, tubular
RE-1165	Tone control potentiometer	CD-1227-8	Condenser, .01 mfd., 400 volt, tubular.
RE-1164	Volume control and switch	CD-1224	Condenser, 10 mfd., 25 volt, electrolytic
SK-1011	Speaker with output transformer	CD-1226	Condenser, 30-40 mfd., 150 volt, tubular electrolytic.
SO-1060	Socket (Tube)	RE-1169	Resistor, 15 ohm.
SO-1064	Socket (pilot lamp)	RE-1168-225	Resistor, 2200 ohm, 1 watt
SE-1033	Tube Shield	RE-1166-516	Resistor, 51 K ohm, ½ watt
BE-1048	Tube Shield Base	RE-1166-159	Resistor, 15 megohm, ½ watt
SO-1061	Phono input jack	RE-1166-308	Resistor, 3 megohm, ½ watt
SO-1059	A.C. outlet (Phono)	RE-1166-507	Resistor, .5 megohm, ½ watt
AS-3361	Dial drive cable assembly	RE-1166-206	Resistor, 20 K ohm, ½ watt
IN-1024	Dial Pointer	RE-1003-154	Resistor, 150 ohm, ½ watt



In order to adjust the four I.F. trimmer condensers it is necessary to remove the chassis from the cabinet. The I.F. trimmer adjusting screws are located on the underside of the chassis sub-panel and protrude through the porcelain bases of the I.F. transformer. The intermediate frequency in this chassis is 262 kilocycles. In aligning this receiver a "dummy" 57 tube (one which has one filament prong removed) should be inserted in the AVC socket. This will remove any possibility of AVC action. Alignment in this chassis should not be attempted without any tube in the AVC socket as the lack of the tube capacity in the circuit will cause an incorrect alignment to be made. The tube shield should be in position when making any alignment adjustments.

September, 193

Twenty-Five Cycle Chassis

The 25 cycle chassis uses power transformer No. instead of power transformer No. U4107.

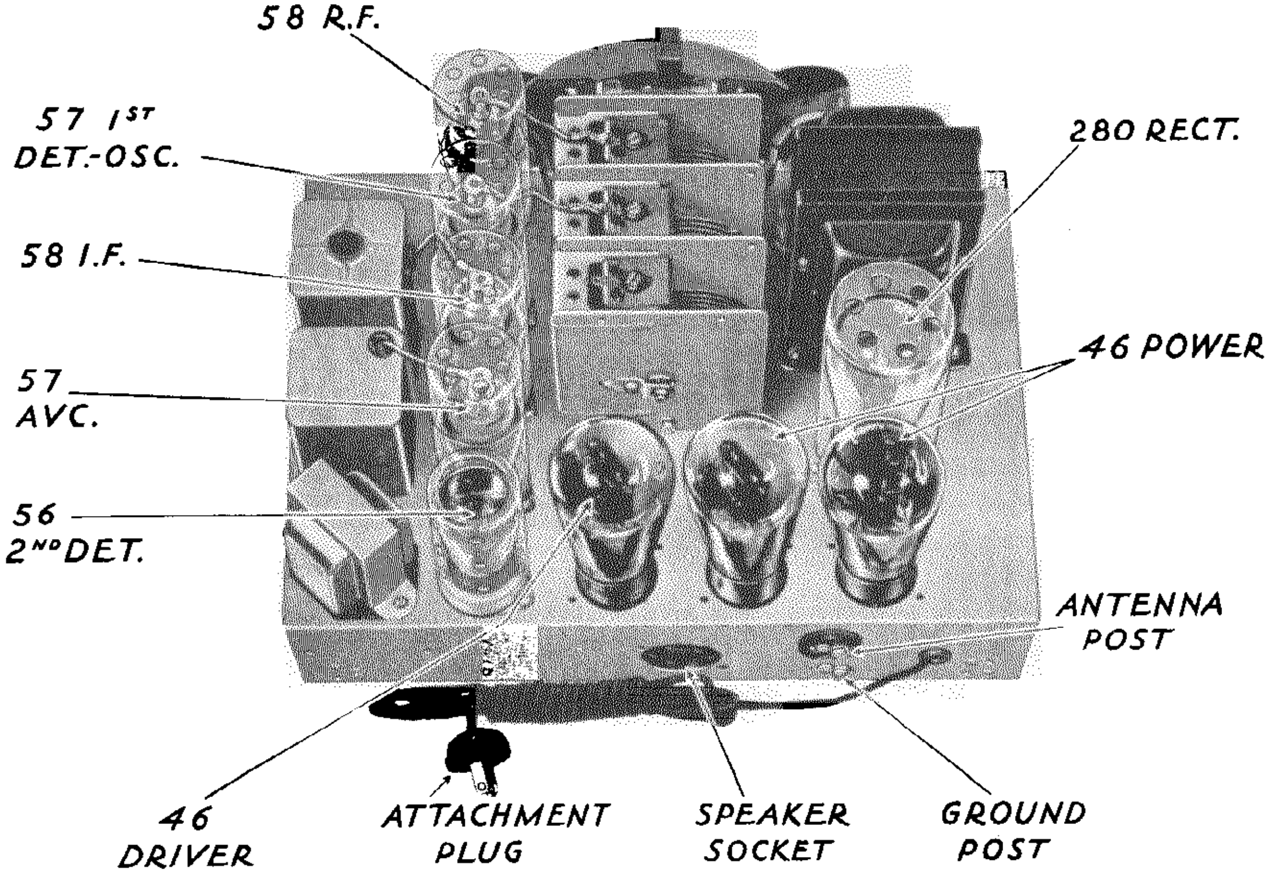
VOLTAGES AT SOCKETS — LINE VOLTAGE 115 — VOLUME CONTROL AT MAXIMUM NOISE SUPPRESSOR CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Gr Te M.
58	1	R. F.	2.25	125	5.0	125	1.7	5.0	6.0	10.
57	2	1st Det.	2.25	125	5.0 (2)	125	.3 (2)	5.0 (2)	1.2 (2)	2.
58	3	I. F.	2.25	125	5.0 (1)	125	1.7	5.0	6.0	10.
57	4	A.V.C.	2.25	100 (3)	24.0 (4)	145	0	24.0	0	
56	5	2nd Det.	2.25	150	12.0	....	....	12.0	.4	
46	6	Driver	2.25	215	19.0 (5)	....	....	....	25.0	30.
46	7	Power	2.25	320	0	....	....	....	5.0 (6)	13.
46	8	Power	2.25	320	0	....	....	....	5.0 (6)	13.
280	9	Rect.	4.8	....	....	....	....	....	41. Per Plate	....

(1) Measured from movable arm of Noise Suppressor control to ground. Reads 26 volts with Noise suppressor control at minir
(2) Values read with analyzer plug in socket. Actual values different as analyzer prevents oscillator from oscillating.
(3) Measured with 600,000 Ohm Meter.
(4) Measured across 1000 Ohm Resistor.
(5) Measured across 10,000 Ohm Carbon Voltage Divider Resistor.
(6) Plate current at no signal. At full output plate current is 60 to 70 MA.

MODELS 62-49, 62-68, 62-68X, 62-88

MONTGOMERY WARD



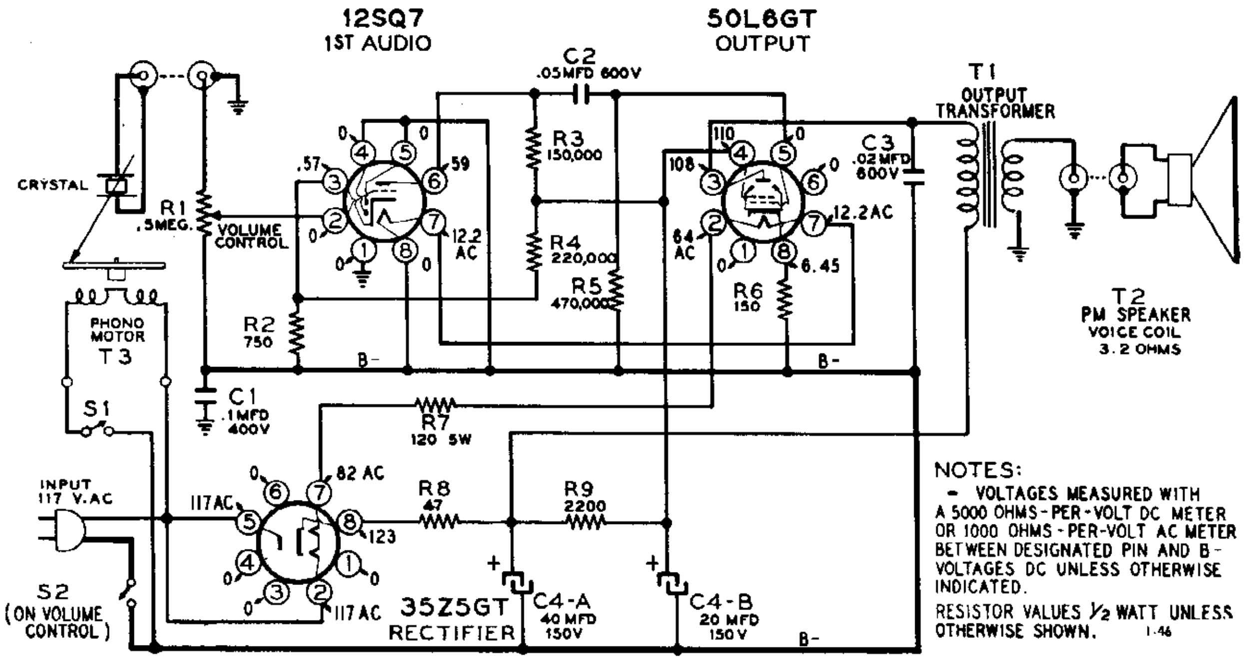
Part No.	Description	No. Used in Set
U 115	Pilot Light Lamp	2
U 678	Ground Binding Post	1
U 701	Tube Socket—280	1
U 705	Resistor, 25,000 Ohm, Carbon, 1 Watt	1
U 861	Attachment Cord and Plug	1
U 962	Grid Cap	4
U1358	Condenser, .04 Mfd. Tubular	1
U1751	Resistor, 200,000 Ohm, Carbon, 1 Watt	1
U2240	Resistor, 400,000 Ohm, Carbon, 1 Watt	1
U2333	Antenna Binding Post	1
U2716	Condenser, .01 Mfd. Tubular	1
U2851	Condenser, .04 Mfd. Tubular	1
U2857	Resistor, 10,000 Ohm, Carbon, 1 Watt	1
U2858	Resistor, 1 Megohm, Carbon, 1/10 Watt	1
U3063	Resistor, 30,000 Ohm, Carbon, 1 Watt	1
U3146	Pilot Lamp Socket, with Bracket and Leads	2
U3358	Vertical Insulated Terminal	3
U3371A	Resistor, 3200 Ohm, Candohm	1
U3446	Oscillator Series Condenser, 775 Mmfd.	1
U3704	Condenser, .002 Mfd. Bypass	1
U4079	Resistor, 50,000 Ohm, in Insulating Tubing	1
U4107	Power Transformer, 105-125 Volts, 60 Cyc.	1
U4108	Power Transformer, 105-125 Volts, 25 Cyc.	1
U4116	Filter Condenser, Dual 8 Mfd., Electrolytic	1
U4117	Tube Socket—57	2
U4118	Tube Socket—58	2
U4124	Volume Control and Power Switch, 200,000 Ohm	1
U4125	Noise Suppressor Control, 8,000 Ohm	1
U4126	Tone Control, 100,000 Ohm	1
U4128	Dry Electrolytic Condenser Clamp	1
U4129	Tube Socket—46	3
U4130	Tube Socket—56	1
U4131	Speaker Socket	1
U4144	Condenser, 4 Mfd. Dry Electrolytic Bypass	1
U4180	Three-gang Tuning Condenser	1
U4197	Condenser, .25 Mfd. Tubular	2
U4198	Condenser, .2-.2 Mfd. Tubular	1
U4492	Tube Shield—56	1
U4524	Detector Plate Choke Assembly	1
U4663	Tuning Condenser Drive Support Bracket	1
U4664	Station Selector Pointer Arm and Bracket	1
U4665	Dial Plate with Dial Charts and Pointers	1
U4666	Dial Drive Shaft Assembly	1
U4667	Dial Drive Disc with Hub and Set Screws	1
U4720	Walnut Knob, Station Selector	1
U4721	Walnut Knob, Tone Control, Noise Suppressor, Volume Control	3
U4793	Antenna Transformer	1
U4795	1st Detector Transformer	1
U4801	I.F. Transformer, Complete with Shield Can	1
U4802	Oscillator-I. F. Assembly, Complete with Shield Can	1

Replacing R.F., Oscillator, or I.F. Transformers

The antenna and first detector transformers are contained in shielding cans under the chassis sub-panel, and it is not necessary to remove these cans in order to replace the transformers. Unscrew and remove the screw holding the transformer mounting bracket to the sub-panel and bring the transformer out as far as the leads will permit. Unsolder the leads to the transformer terminal lugs. Put the new transformer into position and solder the leads to the lugs. Replace the screw holding the transformer mounting bracket to the sub-panel. After the two transformers have been installed, re-align the tuning condensers. To replace the oscillator and first I.F. assembly, unsolder the leads to the lugs on the porcelain base and unsolder the 4 leads extending through the base. Remove the two nuts from the studs extending through the chassis sub-panel, after which the assembly may be removed.

Part No.	Description	No. Used in Set
U4199	Filter Condenser, 8 Mfd. Dry Electrolytic	1
U4230A	Pointer Spring, Tone Control	1
U4231A	Pointer Spring, Noise Suppressor and Volume Control	2
U4246	8″ Electrodynamic Speaker, with Input Transformer	1
U4247	8″ Electrodynamic Speaker, without Input Transformer	1
U4251	Condenser, 100 Mmfd.	2
U4252	Condenser, 3000 Mmfd.	1
U4254	Condenser, 1000 Mmfd.	1
U4255	Condenser, 500 Mmfd.	2
U4263	Audio Transformer	1
U4271	Pointer "Fish Line," 22″ Length	1
U4321	Filter Choke	1
U4340	Collar and Set Screw	3
U4369	Resistor, 1,000 Ohm, Carbon, 1 Watt	1
U4467	Tube Shield Base—280	1
U4468	Tube Shield—280	1
U4471	Tube Shield Base—56, 57 and 58	5
U4472	Tube Shield Can—57 and 58	4
U4473	Tube Shield Cap—57 and 58	4

MONTGOMERY WARD



NOTES:
- VOLTAGES MEASURED WITH A 5000 OHMS-PER-VOLT DC METER OR 1000 OHMS-PER-VOLT AC METER BETWEEN DESIGNATED PIN AND B- VOLTAGES DC UNLESS OTHERWISE INDICATED.

RESISTOR VALUES ½ WATT UNLESS OTHERWISE SHOWN. 1-46

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C1	A-8J-909	.1 mf, 400 volts, 10%	1
C2	A-8J-1995	.05 mf, 600 volts, 20%	1
C3	A-8J-4352	.02 mf, 600 volts, 20%	1
C4-A C4-B	11992	Dual electrolytic; 40 mf x 150 volts, 20 mf x 150 volts	1
		RESISTORS	
R1, S2	101230	Volume control (.5 megohm) and amplifier on-off switch	1
R2	A-9B1-6345	750 ohms, 10%, ½ watt	1
R3	A-9B1-88	150,000 ohms, 10%, ½ watt	1
R4	A-9B1-90	220,000 ohms, 10%, ½ watt	1
R5	A-9B1-94	470,000 ohms, 10%, ½ watt	1
R6	A-9B1-52	150 ohms, 10%, ½ watt	1
R7	A-9C-10925	120 ohms, 10%, 5 watts, wirewound	1
R8	A-9B1-46	47 ohms, 10%, ½ watt	1
R9	A-9B1-66	2200 ohms, 10%, ½ watt	1

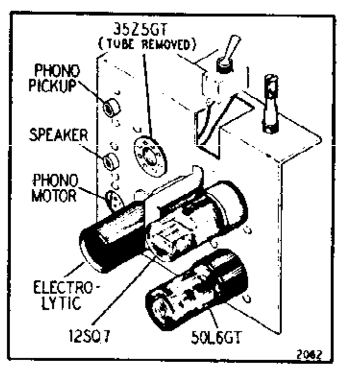
Ref. No.	Part No.	Description	Qty. Used in Set
		MISCELLANEOUS	
T2	B-18A-10952	Speaker, 5-inch, P. M.	1
	121210	Socket, octal, for tubes	3
	121216	Socket, for electrolytic capacitor	1
	A-19B-10727	Socket, for motor leads	1
	121282	Socket, for speaker leads	1
	121280	Socket, for pickup leads	1
	A-19A-10947	Plug for motor leads	1
	121285	Plug for speaker leads	1
	10724	Plug for pickup arm leads	1
T1	105128	Output transformer	1
	107266	Line cord and plug	1
S1	A-20C-5945	Switch, on-off, for motor	1
T3	D-2H-10816	Phono motor and turntable	1
	C-48C-10954	Pickup arm, complete (includes rest and crystal pickup (Astatic L-40)	1
	128660-9	Knob	1
	24D-10924	Case	1
	B-2K-10943	Grill screen	1

ELECTRICAL SPECIFICATIONS

Power supply . . . . . 105 to 125 volts AC, 60 cycles
Power output of amplifier . . . . 1.5 watts maximum
Sensitivity (for 1 watt output) . . . 0.25 volts average

*The values of all resistors listed above are based on RMA standards. Due to conditions beyond our control some receivers have been shipped with resistors of pre-standardized values. This receiver will operate equally well with resistors of either group. An illustration of the difference follows:

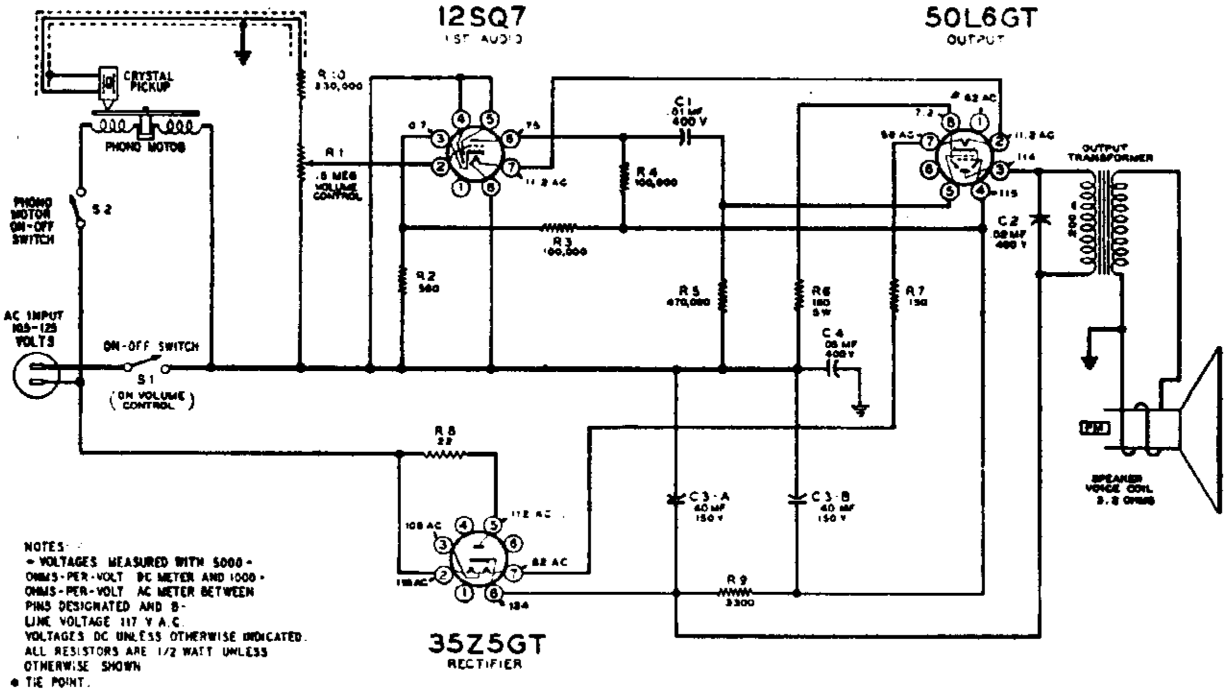
Pre-standardized value—50,000 ohms, ±10%, ⅓ watt
RMA value—47,000 ohms, ±10%, ½ watt



Amplifier Chassis

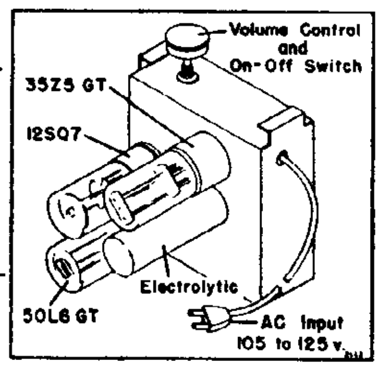
To reach amplifier chassi Remove turntable, volum control knob, nut on mo tor toggle switch, an four corner screws. Care fully lift up platform an disconnect phono moto and pickup plugs fron amplifier chassis sockets Platform can then b removed.

MONTGOMERY WARD



ELECTRICAL SPECIFICATIONS

105 to 125 volts AC, 60 cycles, 50 watts.
0.75 watt undistorted (0.6 volt input).
1.8 watts maximum.
5-inch (or 4-inch x 6-inch oval), P. M., voice coil impedance 3.2 ohms.



Amplifier Chassis

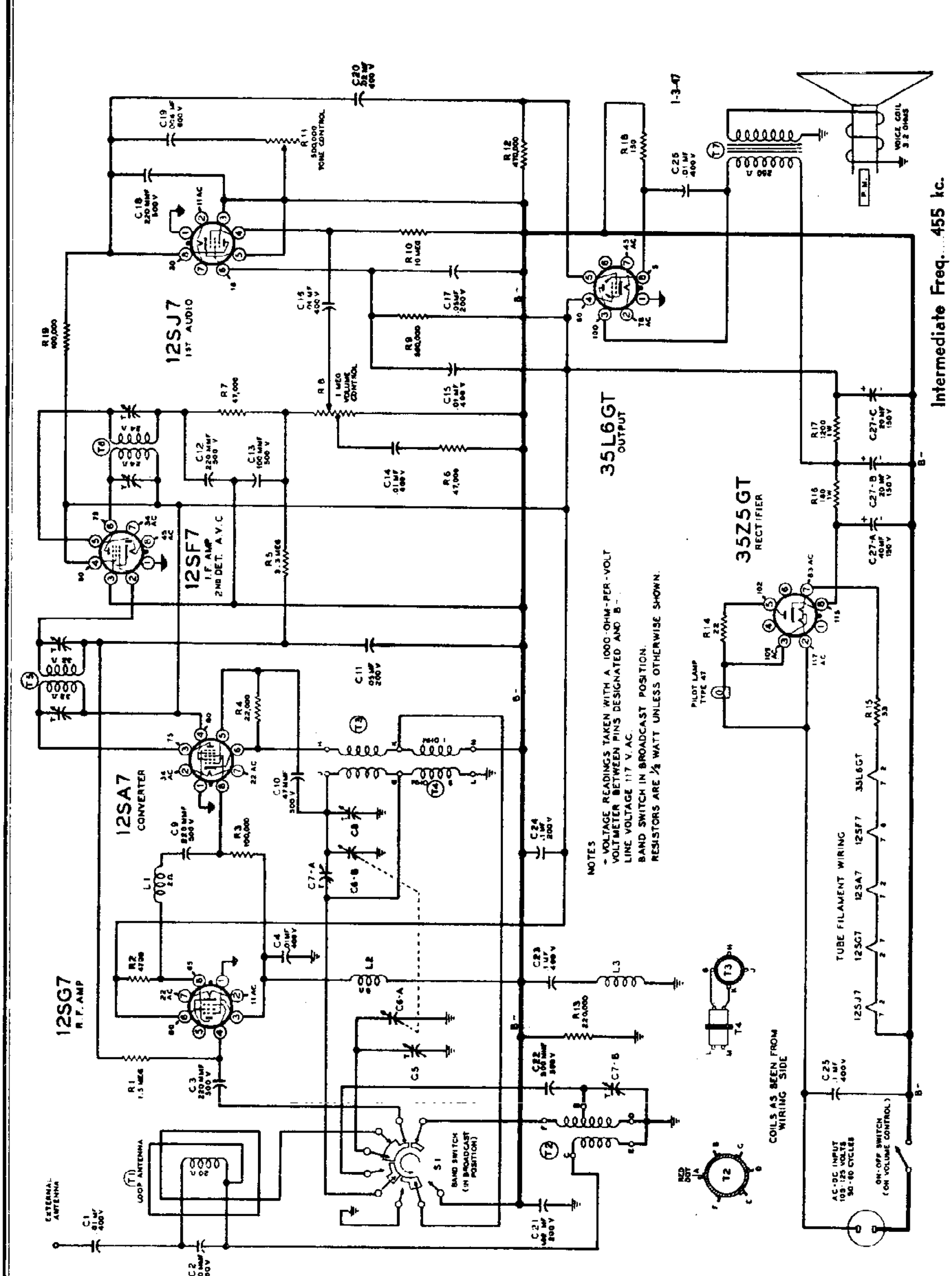
To reach amplifier chassis, remove four corner screws holding platform to cabinet. Lift platform carefully to avoid breaking connections to speaker. Chassis may be dismounted by removal of volume control knob and two mounting screws.

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C1	BEC-8D-10761	.01 mf, 400 volts, 20%	1
C2	BEC-8D-10774	.02 mf, 400 volts, 20%	1
C3-A,-B	BEA-8C-11415-1 or BEA-8C-11119	Electrolytic; 40 mf x 150 volts, 40 mf x 150 volts	1
C4	BEC-8D-10813	.05 mf, 400 volts, 20%	1
		RESISTORS*	
R1, S1	BEA-10A-11377	Volume control (500,000 ohms) and on-off switch	1
R2	BEC-9B1-59	560 ohms, 1/2 watt, 10%	1
R3	BEC-9B1-86	100,000 ohms, 1/2 watt, 10%	1
R4	BEC-9B1-25	100,000 ohms, 1/2 watt, 20%	1
R5	BEC-9B1-29	470,000 ohms, 1/2 watt, 20%	1
R6	BEA-9C-11355	160 ohms, 5 watts, 10%, wire-wound	1
R7	BEC-9B1-8	150 ohms, 1/2 watt, 20%	1
R8	BEC-9B1-3	22 ohms, 1/2 watt, 20%	1
R9	BEC-9B1-16	3300 ohms, 1/2 watt, 20%	1
R10	BEC-9B1-28	330,000 ohms, 1/2 watt, 20%	1

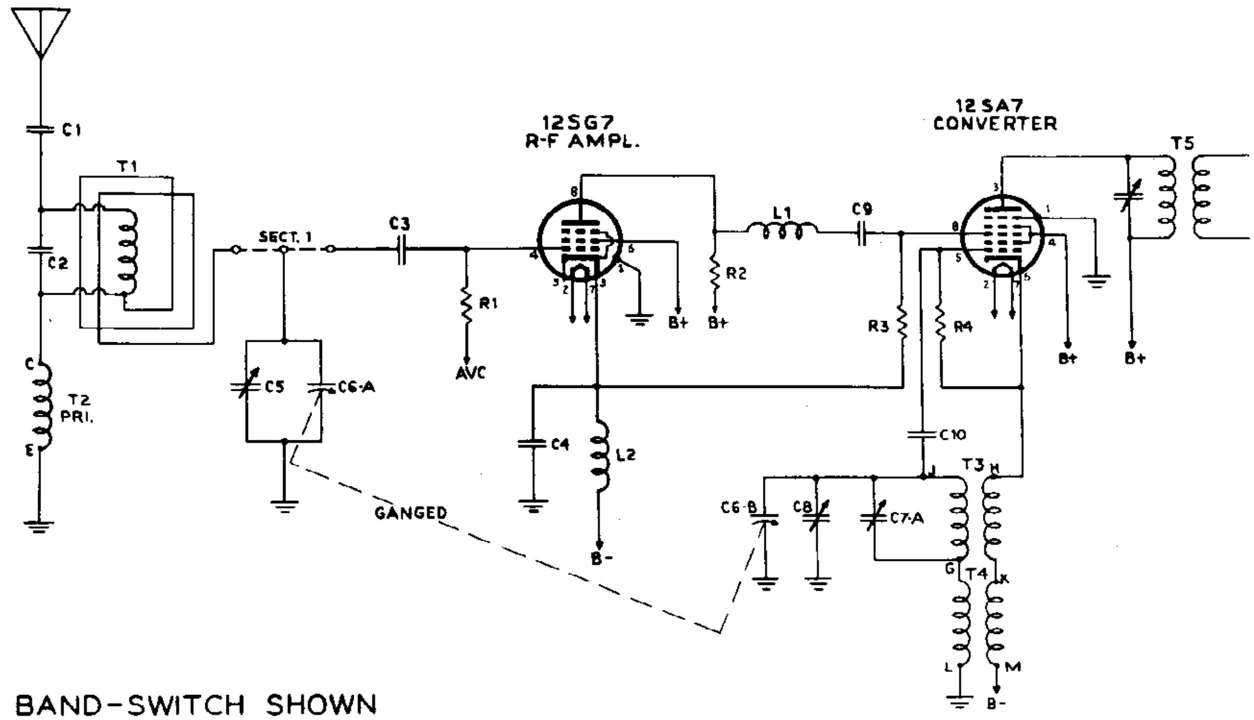
MISCELLANEOUS

	BEB-12C-10074-3	Output transformer	1
	BEB-14M-10088	Line cord and plug	1
	BEA-15B-10440	Tube socket	3
	BEA-49A-11356	Tube retainer (for 12AT6)	1
	BEA-49A-11357	Tube retainer (for 35W4, 50B5)	2
	BEB-18A-10952-1 or BEB-18A-11381	Speaker, 5-inch, P. M. / Speaker, 4-inch x 6-inch oval, P. M.	1
	BED-21H-10816	Phono motor and turntable	1
	BE48C-12025	Pickup arm, less crystal cartridge	1
	BE8K-12026	Crystal cartridge (Shure P87B)	1
S2	BEA-20C-10317	Phono motor on-off switch	1
	BE202-11360-1	Cabinet	1
	BEB-2K-11364	Grille	1
	BEA-5B-11370-17	Knob	1
	BEA-25B-11390	Rubber feet	8

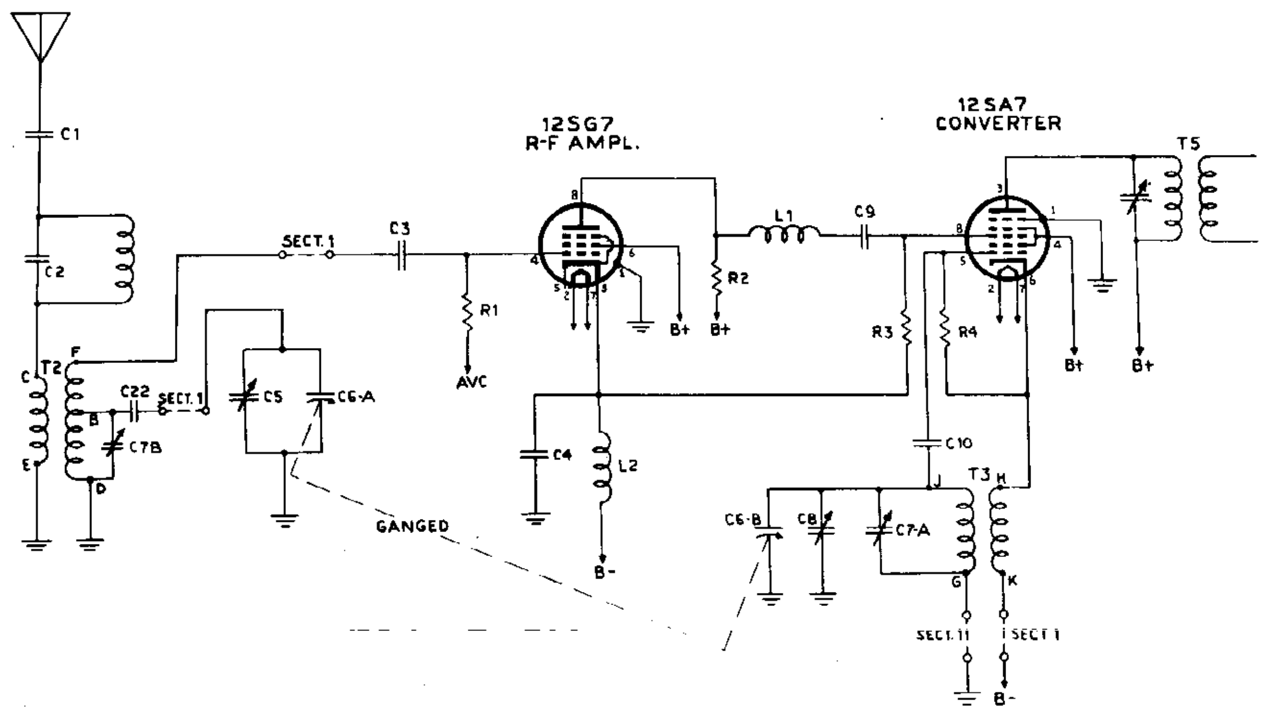
MONTGOMERY WARD MODELS 64BR-1513A, 64BR-151
74BR-1513B, 74BR-1514B



MODELS 64BR-1513A, 64BR-1514A, MONTGOMERY WARD
74BR-1513B, 74BR-1514B

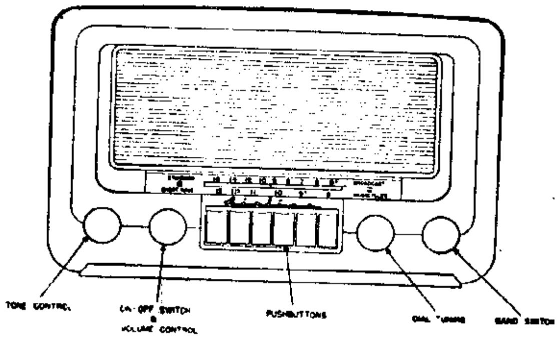


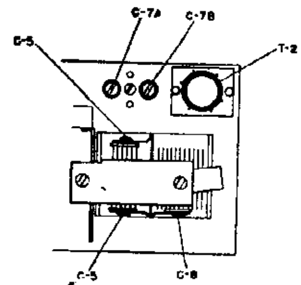
BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
530 - 1600 KC



BAND-SWITCH SHOWN
AT 2ND POSITION.
SHORT WAVE BAND
9-12 MC

MONTGOMERY WARD MODELS 64BR-1513A, 64BR-151
74BR-1513B, 74BR-1514B





NOTE: C-5 should read C-8.
C-8 should read C-5.

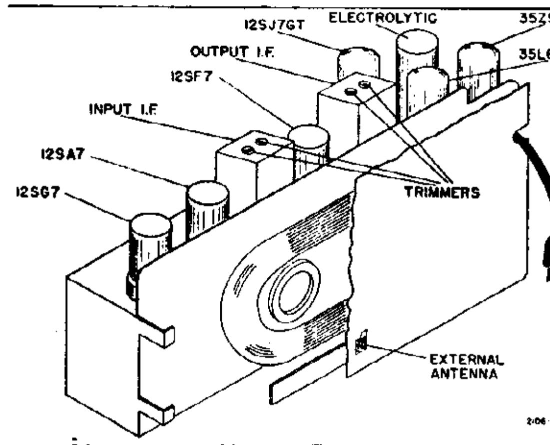
RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of 0.4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected.

The signal source must be an accurately calibrated signal generator capable of supplying the necessary frequencies modulated 30% with a 400-cycle audio signal. Variations of plus or minus 25% are usually permissible.

The volume control must be set on maximum.

The tone control must be set at maximum high.



Chassis View, Showing Trimmer Location

SIGNAL GENERATOR				INPUT FOR 50-MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection	
1000 kc	200 mmf or RMA dummy antenna	External antenna clip	Pin 3 of 12SF7 (B-of set)	11 microvolts
1000 kc	0.1 mf	Grid (pin 8) of converter (12SA7)	Pin 3 of 12SF7 (B-of set)	138 microvolts
455 kc	0.1 mf	Grid (pin 8) of converter (12SA7)	Pin 3 of 12SF7 (B-of set)	107 microvolts
455 kc	0.1 mf	Grid (pin 2) of I.F. amp. (12SF7)	Pin 3 of 12SF7 (B-of set)	3200 microvolts
12 mc	200 mmf or RMA dummy antenna	External antenna clip	Pin 3 of 12SF7 (B-of set)	15 microvolts

ALIGNMENT PROCEDURE

- Output meter across 3.2-ohm output load.
- Volume control at maximum for all adjustments.
- Tone control at maximum high.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Loop antenna should be connected to receiver and in its proper position when making adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc	0.1 mf	Grid (pin 2) of 12SF7	Pin 3 of 12SF7 (B-of set)	Capacitor full open (plates out of mesh)	2 trimmers on T6 output IF can
455 kc	0.1 mf	Grid (pin 8) of 12SA7	Pin 3 of 12SF7 (B-of set)	Capacitor full open (plates out of mesh)	2 trimmers on T5 input IF can
1400 kc	200 mmf	External antenna clip	Pin 3 of 12SF7 (B-of set)	Set dial pointer at 1400 kc	Ant. trimmer C5 and oscillator trimmer C8 on gang
12 mc	200 mmf	External antenna clip	Pin 3 of 12SF7 (B-of set)	Set dial pointer at 12 m.c.	Ant. trimmer C7-B and oscillator trimmer C7-A

MODELS 64BR-1513A, 64BR-1514A, 74BR-1513B, 74BR-1514B

MONTGOMERY WARD

REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

HOW TO ORDER PARTS—When ordering, specify *PART* number, schematic diagram reference number when applicable, and *CHASSIS MODEL* number. The model number appears on a label on the chassis.

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS*	
C6-A, C6-B	B-8A-10827	Two gang variable condenser with C5 and C8 trimmers	1
C27-A, C27-B C27-C.	A-8C-10077	Electrolytic filter condenser 40 mfd., 150 volts, 20 mfd., 150 volts, 20 mfd., 150 volts	1
C7-B, C7-A.	A-8H-10839	Dual trimmer—for short-wave antenna and oscillator	1
C19	C-8D-10783	.004 mf x 600 volts, tubular	1
C20	C-8D-10774	.02 mf x 400 v., 20%, tubular	1
C23-C25	C-8D-10760	.1 mf x 400 v., 10%, tubular	2
C24	C-8D-10771	.1 mf x 200 v., 10%, tubular	1
C11-17	C-8D-10770	.05 mf x 200 v., 20%, tubular	2
C1-C4-14-15 16-26	C-8D-10761	.01 mf x 400 v., 20%, tubular	6
C21	C-8D-11304	.02 mf x 200 v., 20%, tubular	1
C3-9-12-18	C-8F3-10	220 mmf, 500 v., 20%, mica	4
C10	C-8F3-109	47 mmf, 500 v., 10%, mica	1
C22	C-8F3-10910	500 mmf, 500 v., 3%, silver mica	1
C13	C-8F3-8	100 mmf, 500 v., 20%, mica	1
C2	C-8F3-115	150 mmf, 500 v., 10%, mica	1
		RESISTORS*	
R8	A-10A-10688	Volume control—1 megohm, and on-off switch	1
R11	A-11B-10690	Tone control—500K ohm	1
R14	C-9B1-42	22 ohm, ½ watt, 10%	1
R16	C-9B2-53	180 ohm, 1 watt, 10%	1
R18	C-9B1-52	150 ohm, ½ watt, 10%	1
R10	C-9B1-37	10 megohm, ½ watt, 20%	1
R5	C-9B1-34	3.3 megohm, ½ watt, 20%	1
R4	C-9B1-78	22K ohm, ½ watt, 10%	1
R12	C-9B1-94	470K ohm, ½ watt, 10%	1
R2	C-9B1-70	4700 ohm, ½ watt, 10%	1
R1	C-9B1-32	1.5 megohm, ½ watt, 20%	1
R17	C-9B2-63	1200 ohm, 1 watt, 10%	1
R19	C-9B1-86	100K ohm, ½ watt, 10%	1
R9	C-9B1-95	560K ohm, ½ watt, 10%	1
R7-R6	C-9B1-82	47K ohm, ½ watt, 10%	2
R13	C-9B1-27	220K ohm, ½ watt, 20%	1
R3	C-9B1-25	100K ohm, ½ watt, 20%	1
R15	C-9B2-44	33 ohm, 1 watt, 10%	1
		COILS	
T6	B-13B-10794-1	Output I. F. coil	1
T5	B-13B-10091-2	Input I. F. coil	1
T2	B-13E-10834	S. W. antenna coil	1
T3	B-13D-10833	S. W. oscillator coil	1
T4	A-13D-10838	B. C. oscillator coil	1
L2	A-16A-10835	R. F. choke	1
L3	A-16A-10836	R. F. choke	1
L1	A-16A-10837	R. F. choke	1
T1	C-212-11095	Loop antenna assembly—Walnut—for 62-1513	1
		—or—	
T1	C-212-11095-1	Loop antenna assembly—Ivory—for 62-1514	1

DIAL AND TUNING PARTS

Part No.	Description	Qty.
B-6D-10704-1	Dial scale—for 62-1513	1
B-6D-10704	Dial scale—for 62-1514	1
A-6A-10687	Diffuser	1
A-2G-10685	Pointer	1
B-5B-10710-17	Band switch knob—Walnut	1
B-5B-10710-8	Band switch knob—Ivory	1
B-5B-10711-17	Tuning knob—Walnut	1
B-5B-10711-8	Tuning knob—Ivory	1
B-5B-10712-17	Volume control knob—Walnut	1
B-5B-10712-8	Volume control knob—Ivory	1
B-5B-10713-17	Tone control knob—Walnut	1
B-5B-10713-8	Tone control—Ivory	1
B-5B-10041-17	Pushbutton—Walnut	6
B-5B-10041-8	Pushbutton—Ivory	6
B-2C-10707	Dial plate	1
A-23L-10934	Set station call letters	1
A-6C-10819	Set acetate tabs—(6)	1
200-10683	Lever assembly—Right hand roller	4
200-10683-1	Lever assembly—Left hand roller	2
A-3F-10656	Yoke lock screw	1
A-2C-10658	Cam	6
A-2C-10680	Key washer	13
B-29E-1812	Spring washer	1
B-3C-11069	Spacer, ¼" inside x .285 long	2
B-3C-10698	Spacer, ¼" inside x .519 long	2
B-3C-11071	Spacer, ¼" inside x .754 long	1
B-3C-11072	Spacer, ¼" inside x .498 long	1
B-3C-11073	Spacer, ¼" inside x .156 long	1
A-2D-11077	Take-up arm	1
A-49A-10646	Spring for take-up arm	1
A-49A-12484	Springs for levers	6
B-2C-10695	Diffuser plate	1
A-49A-10887	Spring for dial string and pointer	1
A-53A-10989	String for dial (30" used)	1 yd.
A-52A-870	Set screw—6/32x⅛ for drum	1
A-200-10884	Segment gear and bushing assembly	1
A-3L-7192	Pinion gear—for tuning shaft	1
A-3A-10675	Manual tuning shaft—less pinion gear	1
A-2C-10655	Cam yoke	1
A-2C-10654	Retainer yoke—U shape	1
	OUTPUT TRANSFORMER	
B-12C-10826	Output transformer for speaker	1
	SPEAKER	
B-18A-10260	Speaker—4x6 inch P. M., less output transformer	
	MISCELLANEOUS	
121-171	Tube socket	1
A-15B-10440	Tube socket	5
A-23A-7240	Line cord lock	1
B-14M-10088	Line cord and plug	1
B-20A-10259	Band change switch	1
A-47A-10694	Pilot light socket	1
A-46A-10793	T-47, 6-8 volt, Pilot light bulb	1
5C-10002-46	Bakelite cabinet—Walnut	1
5C-10002-9	Bakelite cabinet—Ivory colored	1
B-2M-7758	Snap-in rivets, to fasten diffuser	2
B-2M-11205	Stud—(short) for antenna mounting	5
A-2M-10096	Stud—(long) for antenna mounting	2
A-2J-10981	Clip—for antenna mounting brackets	4
42A-10874	No. 8-18x¾ hex. head chassis mounting screw	2
B-2G-10702	Grille escutcheon	1
B-5C-12219	Grille	1
B-23K-12447	Grille cloth	1
B-23J-12448	Baffle	1
C-23J-11328	Back only for loop	1

*The values of the resistors and mica capacitors listed above are based on RMA standards. Due to conditions beyond our control some receivers have been shipped with components of pre-standardized values. This receiver will operate equally well with components of either group. An illustration of the differences in both resistors and capacitors follows:

Pre-standardized value—50,000 ohms, ⅓ watt, 10%
RMA value—47,000 ohms, ½ watt, 10%
Pre-standardized value—220 mmf, 500 volts, 20%
RMA value—220 mmf, 500 volts, 20%

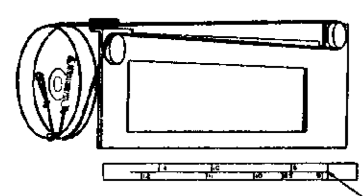
Dial Stringing Diagram

REPLACING DIAL STRING

1- RESTRING DIAL AS SHOWN

2- TURN TUNING SHAFT CLOCKWISE TO COMPLETELY CLOSE THE GANG

3- FASTEN POINTER TO STRING AT STARTING MARKER ON CALIBRATION SCALE.



ELECTRICAL SPECIFICATIONS

Power Supply .... 105 to 125 volts, DC or 50-60 cycle AC, 25 watts.

Frequency Range .. 530 to 1600 kc.; 9 mc to 12 mc.

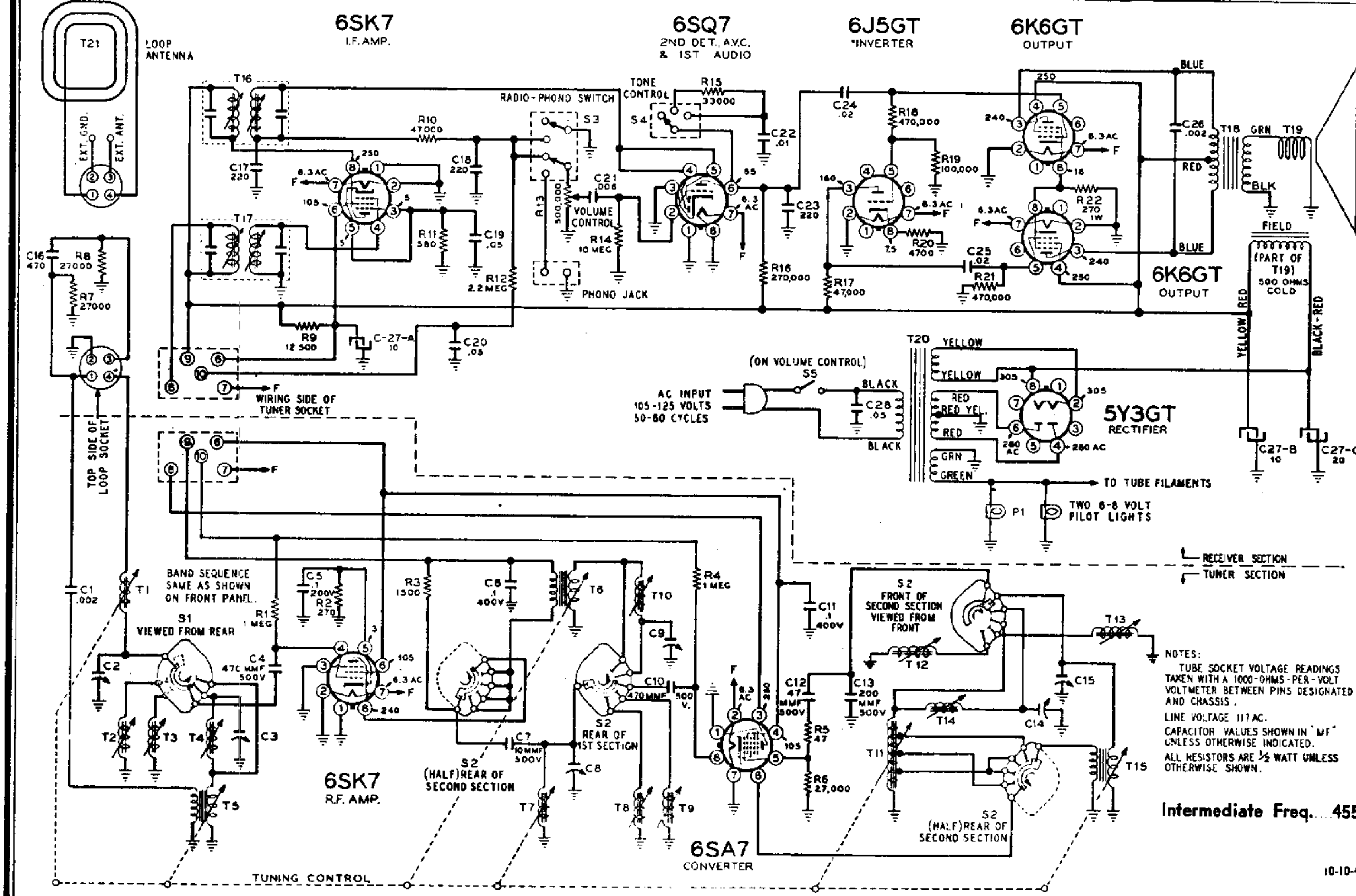
Selectivity .... At 1000 kc, 56 at 1000 x signal.
At 10 mc, 85 kc at 1000 x signal.

Sensitivity .... 10 microvolts average for .05-watt output on broadcast band.
15 microvolts average for short-wave band.

Power Output .... 0.85 watt undistorted, 1.0 watt maximum.

Loud Speaker .... 4" x 6" oval, P.M., v.c. impedance 3.2 ohms.

MONTGOMERY WARD



NOTES:
TUBE SOCKET VOLTAGE READINGS TAKEN WITH A 1000-OHMS-PER-VOLT VOLTMETER BETWEEN PINS DESIGNATED AND CHASSIS.
LINE VOLTAGE 117 AC.
CAPACITOR VALUES SHOWN IN "MF" UNLESS OTHERWISE INDICATED.
ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE SHOWN.

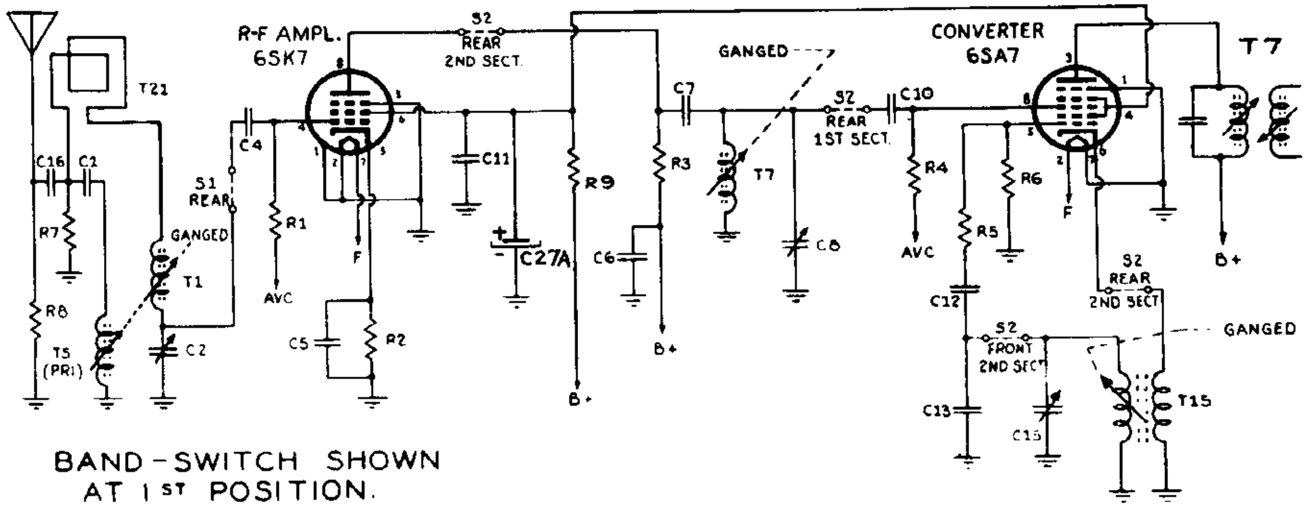
Intermediate Freq.... 455 kc.

10-10-46

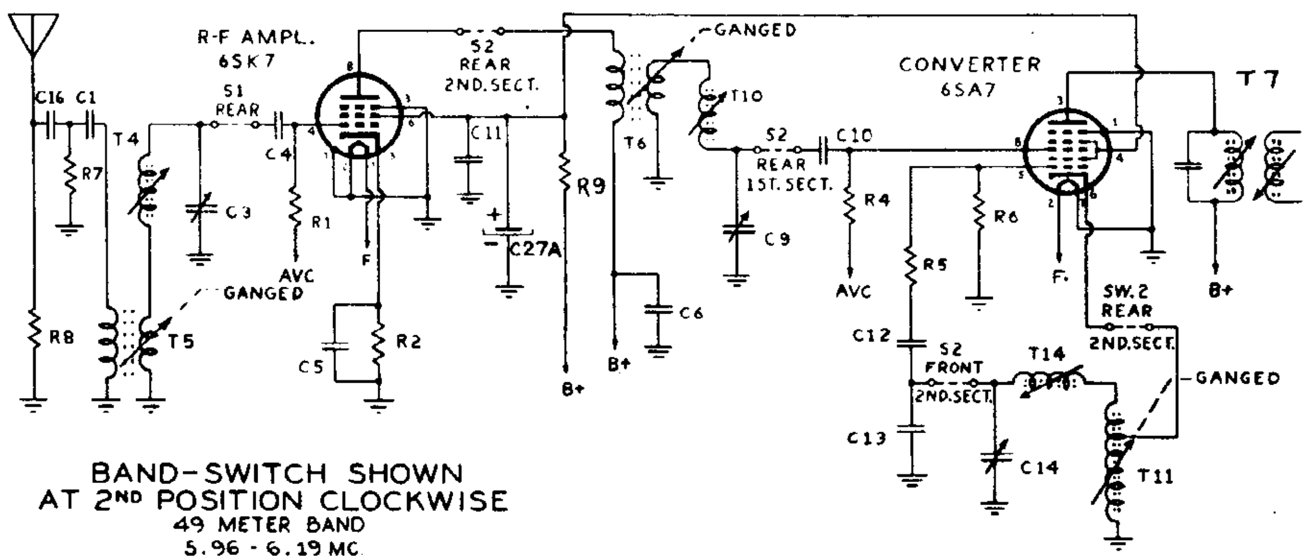
Power Supply	105 to 125 volts AC, 50-60 cycles, 70 watts. Also made for 25- and 40-cycle AC.
Frequency Ranges	Broadcast band—540 to 1600 kc. 49-meter band—5.96 to 6.19 mc. 31-meter band—9.1 to 10 mc. 25-meter band—11.45 to 12.16 mc.
Selectivity	at 1000 kc, 35 kc at 1000 x signal
Sensitivity	3.75 microvolts average for ½ watt output.
Power Output	5.5 watts undistorted, 7.5 watts maximum.
Loud Speaker	8" electrodynamic. Voice coil

MODEL 64BR-1808A

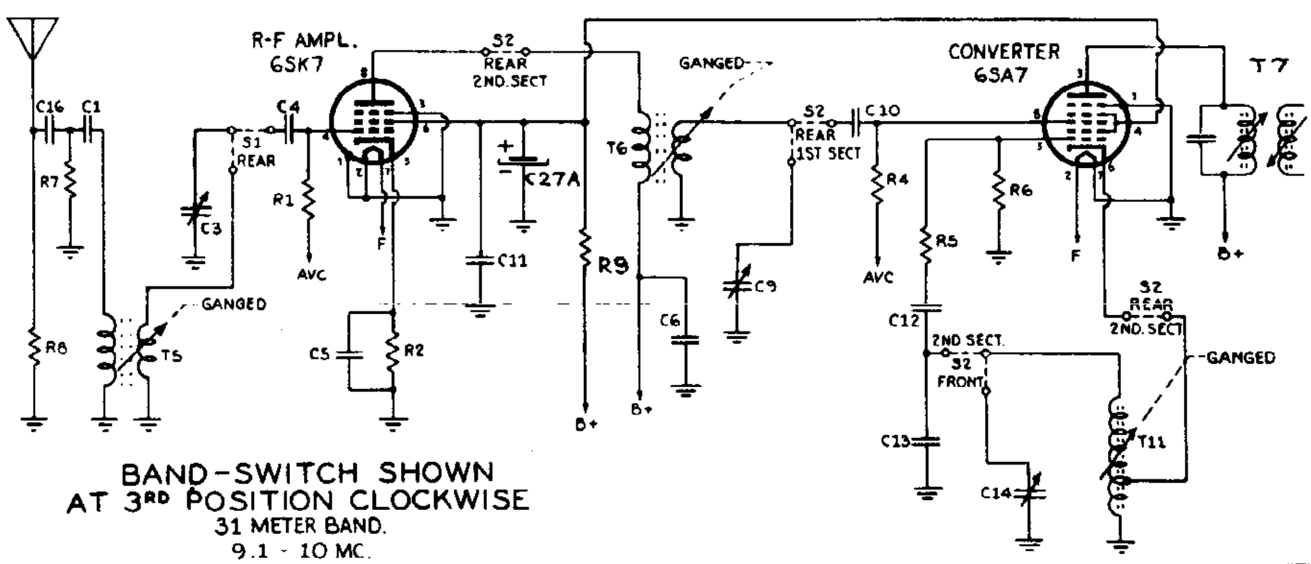
MONTGOMERY WARD



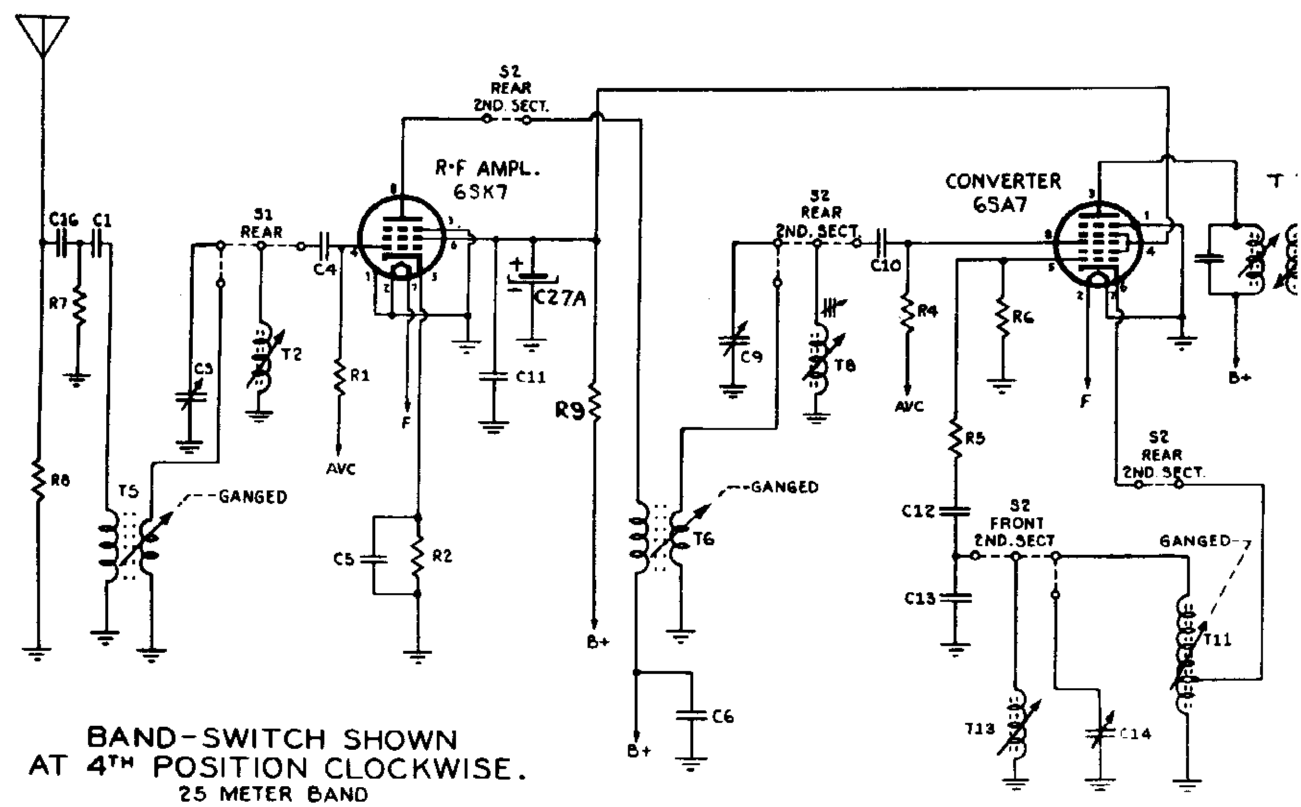
BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
540-1600 KC



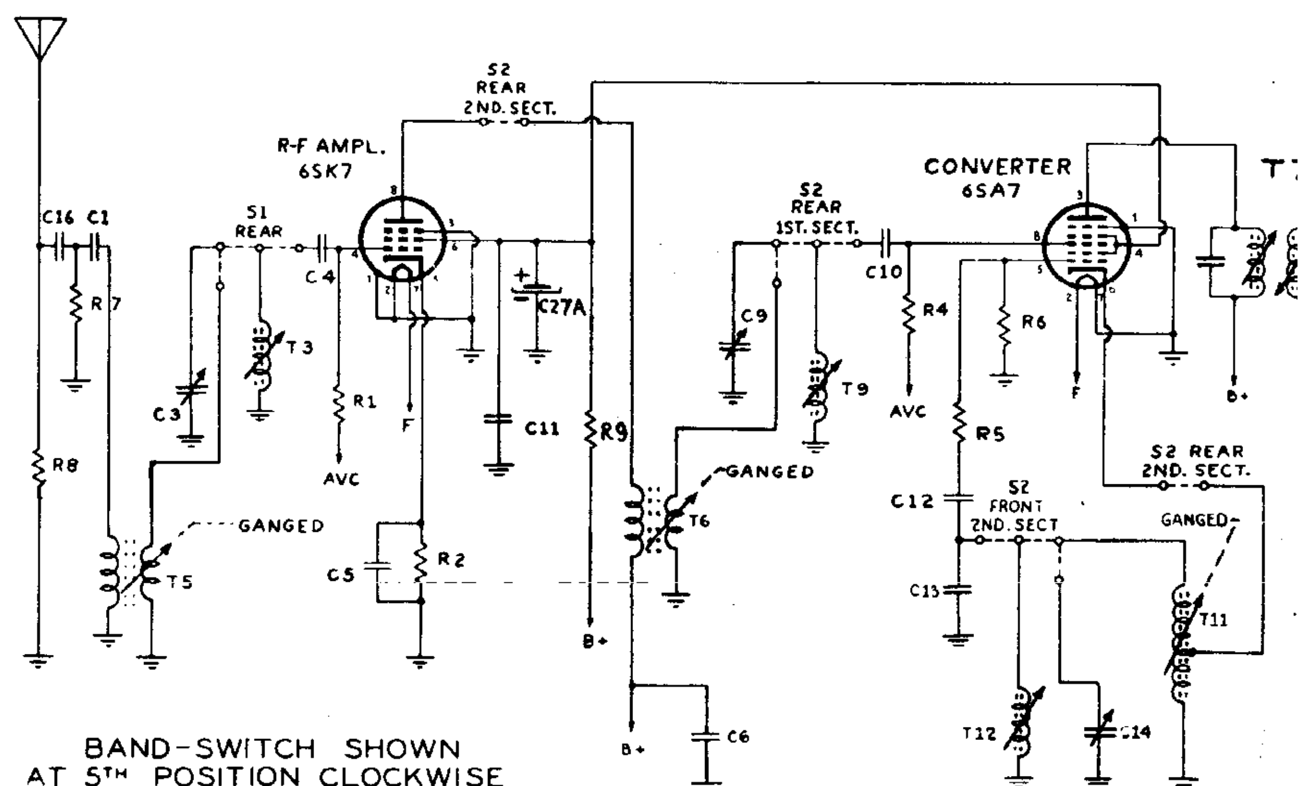
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
49 METER BAND
5.96 - 6.19 MC



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
31 METER BAND.
9.1 - 10 MC.



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
25 METER BAND
11.45 - 12.16MC.



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE
19 METER BAND
14.94 - 15.46 MC.

MONTGOMERY WARD

ALIGNMENT PROCEDURE

MECHANICAL ADJUSTMENT—**The core tuning bar (see illustration of coils below) and dial pointer must be adjusted** mechanically before any electrical alignment is attempted. Rotate the manual tuning control until the core bar is farthest from the coils. For proper adjustment the bar should be approximately 1/32 of an inch from the two rod guide angles.

With the core bar in this position, adjust the dial pointer to coincide with 1600 kc on the dial scale.

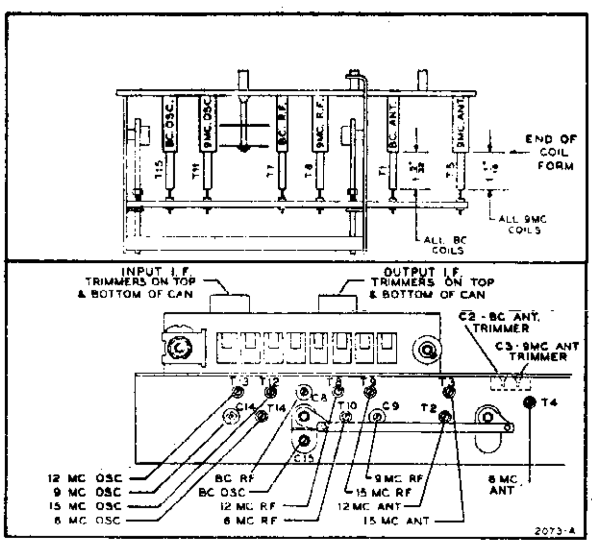
Rotate the cores of each of the three broadcast coils (see illustration) until the end of the core is 1-5/32" from the end of the coil form. Rotate the three 9-mc cores until this dimension is 1-1/6" for these coils. After these adjustments have been made, the unit can be aligned electrically.

ELECTRICAL ADJUSTMENT—To align the set make the following preliminary adjustments: Set the tone pushbutton for treble tone; set the volume control at maximum; connect the ground post of the signal generator to the radio chassis; connect the output meter across a 3.2-ohm output load; and allow the receiver and signal generator to warm up for several minutes.

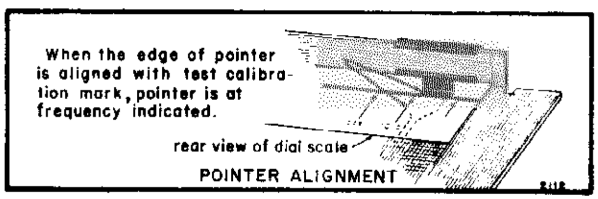
Align the set according to the sequence given in the chart. The indicated coupling capacitor is to be connected in series between the signal generator output lead and the receiver. Adjust the set for maximum output; reduce the input as needed to keep the output near 1.3 volts.

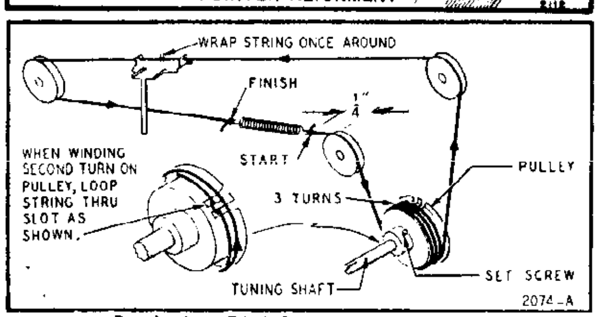
Locations of all the trimmers and coils are shown in the illustrations below. After adjustment, seal the coil cores with collodion or a similar substance (do not use cement).

BAND SWITCH SETTING	SIGNAL GENERATOR			DIAL POINTER SETTING	ADJUST TO MAXIMUM OUTPUT IN ORDER SHOWN
	Frequency	Coupling Capacitor	Connection to Receiver		
Broadcast (for I. F.)	455 kc	.1 mf	Grid (pin 8) of Converter (6SA7)	1600 kc	Trimmers on output and input I. F. cans
Broadcast	1600 kc	200 mmf	Antenna lead	1600 kc	BC Osc. trimmer C15 BC R. F. trimmer C8 BC Ant. trimmer C2
	1400 kc	200 mmf	Antenna lead	1400 kc	Rotate cores of BC R. F. coil T7 and BC Ant. coil T1
31 Meter	9.6 mc	400 ohms	Antenna lead	9.6 mc	9 mc Osc. trimmer C14 9 mc R. F. trimmer C9 9 mc Ant. trimmer C3
49 Meter	6.1 mc	400 ohms	Antenna lead	6.1 mc	6 mc Osc. coil T14 6 mc R. F. coil T10 6 mc Ant. coil T4
25 Meter	11.8 mc	400 ohms	Antenna lead	11.8 mc	12 mc Osc. coil T13 12 mc R. F. coil T8 12 mc Ant. coil T2
19 Meter	15.2 mc	400 ohms	Antenna lead	15.2 mc	15 mc Osc. coil T12 15 mc R. F. coil T9 15 mc Ant. coil T3



View of Trimmers and Tuning Coils





Replacing Dial Pointer Drive Cord

After stringing, spring must be 1/4" from idler when tuning shaft is in extreme counterclockwise position. To do this: Loosen set screw; hold tuning shaft firm and turn pulley by hand until spring is 1/4" from idler; tighten screw.

MONTGOMERY WARD

REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

HOW TO ORDER PARTS—When ordering, specify *PART* number, schematic diagram reference number when applicable, and *CHASSIS MODEL* number. The model number appears on a label on the chassis.

REMOVABLE TUNER ASSEMBLY

CAPACITORS*

Ref. No.	Part No.	Description	Qty. Used in Set
C1	BEB-8F-10767	.002 mf, 500 volts, 10%, mica	1
C2, C3	BE-124143	Dual, broadcast (67-123 mmf) and 9 mc (95-175 mmf) ant. trimmers	1
C4, C10	BEB-8F3-121	470 mmf, 500 volts, 10%, mica	2
C5	BEC-8D-10771	.1 mf, 200 volts, +20%—10%	1
C6, C11	BEC-8D-10760	.1 mf, 400 volts, +20%—10%	2
C7	BEB-8F5-101	10 mmf, 500 volts, 10% silver mica	1
C8	BEA-8G-7205	Broadcast RF trimmer (120-220 mmf)	1
C9	BEA-8G-7206	9 mc RF trimmer (60-110 mmf)	1
C12	BEB-8F3-109	47 mmf, 500 volts, 10%, mica	1
C13	BEB-8F-10763	200 mmf, 500 volts, 3%, silver mica	1
C14	BE-124145	9 mc oscillator trimmer (7-35 mmf)	1
C15	BE-124144	Broadcast oscillator trimmer (15-27 mmf)	1

MAIN CHASSIS

CAPACITORS*

Ref. No.	Part No.	Description	Qty. Used in Set
C16	BEC-8F3-12	470 mmf, 20%, mica	1
C17, C18, C23	BEC-8F3-10	220 mmf, 20%, mica	3
C19, C20	BEC-8D-10770	.05 mf, 200 volts, 20%	2
C21	BEC-8D-10785	.006 mf, 600 volts, 20%	1
C22	BEC-8D-10761	.01 mf, 400 volts, 20%	1
C24, C25	BEC-8D-10774	.02 mf, 400 volts, 20%	1
C26	BEC-8D-10778	.002 mf, 600 volts, +40%—15%	1
C27-A,-B,-C	BEA-8C-10272	Electrolytic, 10 mf-10mf-20 mf, 450 volts	1
C28	BEC-8J-11388	.05 mf, 600 volts, 20%	1

RESISTORS*

Ref. No.	Part No.	Description	Qty. Used in Set
R1, R4	BEC-9B1-31	1 megohm, 1/2 watt, 20%	2
R2	BEC-9B1-55	270 ohms, 1/2 watt, 10%	1
R3	BEC-9B1-64	1500 ohms, 1/2 watt, 10%	1
R5	BEC-9B1-46	47 ohms, 1/2 watt, 10%	1
R6	BEC-9B1-79	27,000 ohms, 1/2 watt, 10%	1
R7, R8	BEC-9B1-1987	27,000 ohms, 1/2 watt, 20%	2
R9	BE10662	12,500 ohms, 3 watts, 10%	1
R10	BEC-9B1-23	47,000 ohms, 1/2 watt, 20%	1
R11	BEC-9B1-59	560 ohms, 1/2 watt, 10%	1
R12	BEC-9B1-33	2.2 megohms, 1/2 watt, 20%	1
R13, S5	BEA-10A-10810	Volume control (500,000 ohms) and on-off switch	1
R14	BEC-9B1-37	10 megohms, 1/2 watt, 20%	1
R17	BEC-9B1-82	47,000 ohms, 1/2 watt, 10%	1
R18	BEC-9B1-94	470,000 ohms, 1/2 watt, 10%	1
R19	BEC-9B1-86	100,000 ohms, 1/2 watt, 10%	1
R20	BEC-9B1-70	4700 ohms, 1/2 watt, 10%	1
R21	BEC-9B1-29	470,000 ohms, 1/2 watt, 20%	1
R22	BEC-9B1-55	270 ohms, 1 watt, 10%	1

COILS (complete with core)

Ref. No.	Part No.	Description	Qty. Used in Set
T1	BE-111195	Broadcast antenna coil	1
T2	BE-111191	12 mc antenna coil	1
T3	BE-111192	15 mc antenna coil	1
T4	BE-111189	6 mc antenna coil	1
T5	BE-111190	9 mc antenna coil	1
T6	BE-10959	9 mc RF coil	1
T7	BE-10962	Broadcast RF coil	1
T8	BE-10960	12 mc RF coil	1
T9	BE-10961	15 mc RF coil	1
T10	BE-10958	6 mc RF coil	1
T11	BE-110157	9 mc oscillator coil	1
T12	BE-110159	15 mc oscillator coil	1
T13	BE-110158	12 mc oscillator coil	1
T14	BE-110156	6 mc oscillator coil	1
T15	BE-110161	Broadcast oscillator coil	1

COILS AND TRANSFORMERS

Ref. No.	Part No.	Description	Qty. Used in Set
T16	BEB-203-1813-3	Output I.F. transformer	1
T17	BEB-203-1813-2	Input I.F. transformer	1
T18	BEB-12C-10234-1	Output transformer	1
T20	BE104202-D	Power transformer	1
T21	BED-212-11429	Loop antenna assembly	1

SOCKETS

Ref. No.	Part No.	Description	Qty. Used in Set
	BE121210	Tube socket (all tubes but 6SK7, I.F. amp.)	1
	BE121273	Tube socket, laminated, (for 6SK7, I.F. amp.)	1
	BE121200	Socket, 4-terminal, for loop	1
	BEA-15B-11538	Socket, 4-terminal, for speaker	1
	BEA-55A-7386-1	Socket for phono connection	1
	BE121279	Socket, 5-terminal, for tuner plug	1
	BEB-47A-10808-2	Socket assembly for dial light	1

MISCELLANEOUS

Ref. No.	Part No.	Description	Qty. Used in Set
	BEC-18B-11003	Speaker, 8" electrodynamic	1
	BEA-19A-11539	Plug on speaker leads	1
	BEA-19A-11322	Plug on loop antenna leads	1
	BE1075	Line cord and plug	1
	BEC-6D-10897	Dial scale	1
	BEC-5C-10257-48	Escutcheon for dial scale	1
	BEB-5C-10269-48	Escutcheon for pushbuttons	1
	BEB-2G-10511	Dial pointer	1
	BEB-53A-10989	Cord for dial pointer drive	3'
	BE120377	Spring for drive cord	1
	BE10794	Dial light, 6-8 volts, Type 44	2
	BEB-5B-10377-37	Knob, tuning	1
	BEB-5B-10376-37	Knob, volume	1
	BE128683-37	Knob, band switch	1
	BE112961	Station call letters	1 set
S1	BEB-20A-10526 or BEB-20A-11053	Band switch, antenna	1

MISCELLANEOUS

Ref. No.	Part No.	Description	Qty. Used in Set
S3	BE-125129	Radio-phono switch	1
S4	BEA-20F-7322-1	Tone switch, 3-position	1
	BE-121210	Socket, octal, molded (6SA7)	1
	BE-121171	Socket, laminated (6SK7GT)	1
	BEA-3A-10476	Tuning shaft	1
	BE-117798	Pinion gear on tuning shaft	1
	BE-120393	Spring, intermediate link, under ends of treadle bar	2
	BE-131251	Washer, "C," on slug tuning bar	4
	BEB-2C-7245	Gear segment	1
	BEA-2J-7439	Spring clip for coils	9
	BE-131316B	Washer, "C," for 9 mc coils	3
	BE-134134	Grommet for core mounting (all broadcast and 9 mc coils)	6
	BE-134126	Grommet for coil mounting (broadcast RF and antenna coils)	2
	BE-134125	Grommet for coil mounting (broadcast oscillator coil)	1
	BEA-25A-7619	Grommet for all 9 mc coils	3
	BE-115659B	Pushrod, tone switch	1
	BE-115670	Pushrod, radio-phono switch	1
	BEB-202-10475	Pushrod assembly, station selectors	6
	BE-120366	Spring, pushrod return	6
	BEA-2J-7176	Cam-locking spring on pushrod ass'y	6
	BEA-2J-7627-1	Retainer spring on pushrod ass'y	6
	BE-121281	Plug, 5-prong	1
	BE-128678-37	Pushbutton	8
	BE-131210	Washer, "C," on end plate	2

*The values of the resistors and mica capacitors listed above (except C13) are based on RMA standards. Due to conditions beyond our control some sets have been shipped with components of pre-standardized values. This set will operate equally well with components of either group. An illustration of the differences in both resistors and capacitors follows:

Pre-standardized value—50,000 ohms, 1/3 watt, 10%
RMA value—47,000 ohms, 1/2 watt, 10%
Pre-standardized value—200 mmf, 500 volts, 20%
RMA value—220 mmf, 500 volts, 20%

MODEL 64BR-1808A

MONTGOMERY WARD

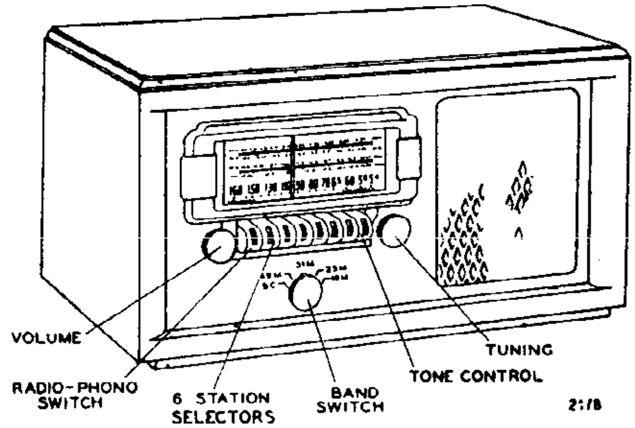
RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivities at the inputs of various stages. All measurements are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum.

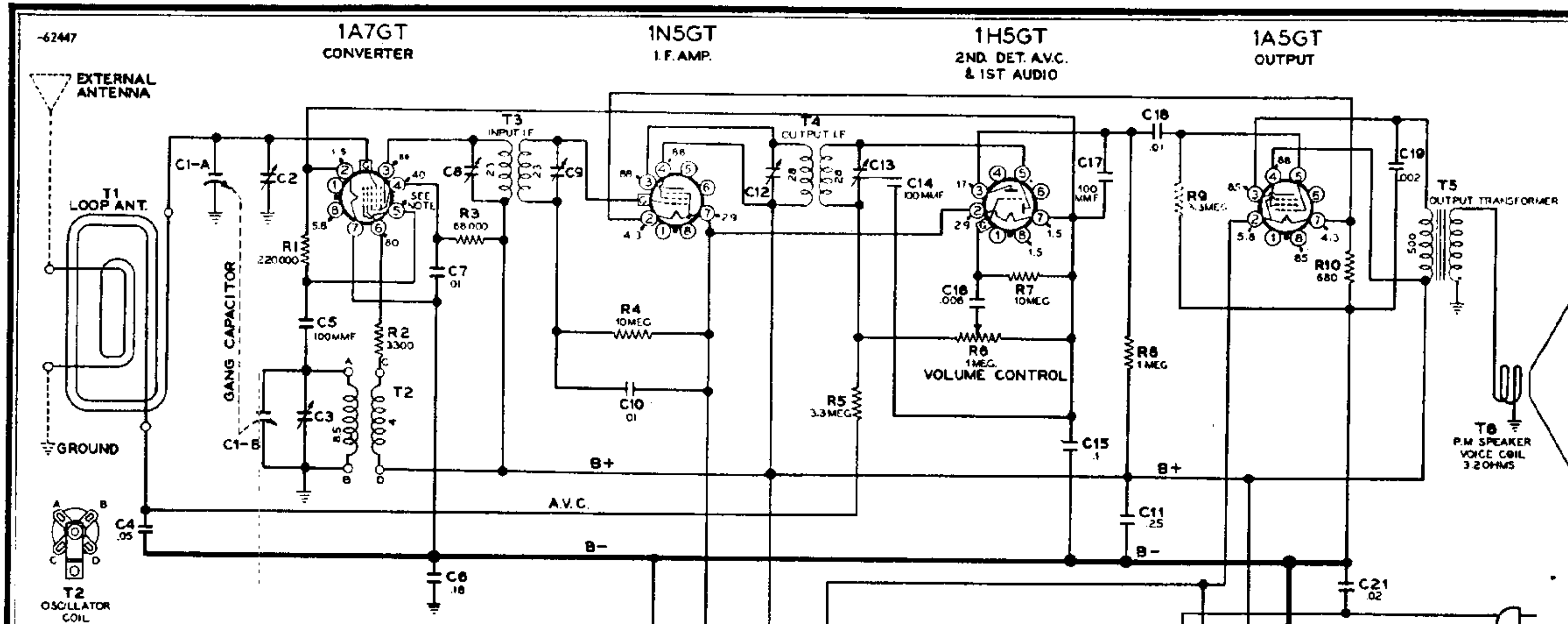
The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. Variations in sensitivities of plus or minus 25% are usually permissible.

BAND	SIGNAL GENERATOR				INPUT FOR 500-MILLIWATT OUTPUT
	Frequency	Dummy Antenna	Connection to Receiver	Ground Connection	
Broadcast	1000 kc	200 mmf	External Antenna clip	Chassis	3.5 microvolts
	1000 kc	.1 mf	Grid (pin 4) of R. F. amp. (6SK7)	Chassis	8.9 microvolts
	1000 kc	.1 mf	Grid (pin 8) of Converter (6SA7)	Chassis	125 microvolts
	455 kc	.1 mf	Grid (pin 8) of converter (6SA7)	Chassis	100 microvolts
	455 kc	.1 mf	Grid (pin 4) of I. F. amp. (6SK7)	Chassis	4500 microvolts
	400 cycles	.1 mf	Grid (pin 2) of Audio amp. (6SQ7)	Chassis	.1 volt
	400 cycles	.1 mf	Grid (pin 5) of Inverter (6J5GT)	Chassis	4.8 volts
31 meter*	9.6 mc	400 ohms	External Antenna clip	Chassis	1.6 microvolts
49 meter*	6.1 mc	400 ohms	External Antenna clip	Chassis	3.0 microvolts
25 meter*	11.8 mc	400 ohms	External Antenna clip	Chassis	5.0 microvolts
19 meter*	15.2 mc	400 ohms	External Antenna clip	Chassis	9.0 microvolts

*Average sensitivity on short-wave bands at grid (pin 4) of R. F. amplifier is 8.5 microvolts.



MONTGOMERY WARD



NOTES

FIGURES OPPOSITE SOCKET PIN NUMBERS ARE VOLTAGES MEASURED WITH A 5000-OHMS-PER-VOLT METER BETWEEN SOCKET TERMINALS AND B-. WHERE NO READING IS SHOWN VALUE IS ZERO.

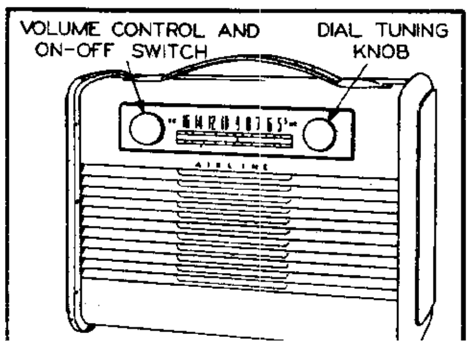
LINE VOLTAGE 117 VOLTS AC.

VOLUME CONTROL AT MAXIMUM.

VOLTAGE AT PIN 5 OF 1A7GT CANNOT BE MEASURED WITH STANDARD VOLTMETER.

RESISTOR AND COIL VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MF UNLESS OTHERWISE SPECIFIED.

NOTE: Pins No. 1 on all tubes are grounded excepting on 1A5 tube.



Power Supply	105-125 volts DC or 50-60 cycle AC, 35 watts. Battery: Wards Battery Pack No. 62-30 Size: 10-9/16" by 2¾" by 4¼". "A"—6 volts, 50 milliamperes. "B"—90 volts, 8.5 milliamperes.
Frequency Range	530 to 1650 kc.
Intermediate Freq.	455 kc.
Selectivity	At 1000 kc, 48 kc at 1000 x signal.
Sensitivity	40 microvolts average for .05 watt output.
Power Output	80 milliwatts undistorted. 180 milliwatts maximum.

GENERAL DESCRIPTION

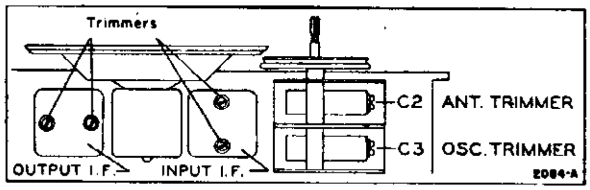
This model is a 3-way portable radio with 4 tubes plus rectifier. It contains a built-in loop antenna and clips for external antenna and ground connections. When battery operation is desired, the line-cord plug is inserted into a socket switch on the chassis; the insertion automatically moves the switch contacts for battery operation. When the line-cord plug is out of the chassis socket and ready for insertion into a 105 to 125 volt outlet, the battery is automatically disconnected.

MONTGOMERY WARD

ALIGNMENT PROCEDURE

- Output meter across 3.2 ohm output load.
- Volume control at maximum for all adjustments.
- Align for maximum output.
- Reduce input as needed to keep output near 0.4 volts.

NOTE: Temporarily remove middle screw in loop end of cabinet to reach antenna trimmer C2.



SIGNAL GENERATOR				DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT in order shown
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc	.1 mf	1A7GT grid cap*	1A7GT Pin 7	Rotor full open (plates out of mesh)	Input and output trimmers on IF cans
1650 kc	.1 mf	1A7GT grid cap*	1A7GT Pin 7	Rotor full open (plates out of mesh)	Osc. trimmer on gang (see trimmer view)
1400 kc	Chassis installed in cabinet. Lay lead from generator about 1 ft. from loop. Back cover must be snapped shut. Trimmer is reached thru small hole in end of cabinet. Do not move loop leads after alignment.				Set dial to 1400 kc. Ant. trimmer on gang (see trimmer view)

*For these adjustments chassis must be removed from cabinet. Insert a 1 megohm resistor between A.V.C. Buss and 1A7GT grid cap. It is assumed loop is disconnected from chassis.

Ref. No.	Part No.	Description	Qty. Used In Set
		CAPACITORS	
C1-A, C1-B	BEB-8A-10113	Two-gang variable capacitor	1
C2		Antenna trimmer on gang	1
C3		Oscillator trimmer on gang	1
C4	BEC-8D-10770	.055 mf, 20%, 200 volts	1
C5, C17	BEC-8F3-8	100 mmf, 20%, mica	2
C6	BEC-8D-11111	180 mf, ±10%, 400 volts	1
C7, C10, C18	BEC-8D-10761	.01 mf, 20%, 400 volts	3
C8		Primary trimmer on input IF transformer, range 53 to 97 mmf	1
C9		Secondary trimmer on input IF transformer, range 53 to 97 mmf	1
C11	BEC-8D-10775	.25 mf, 25%, 200 volts	1
C12		Primary trimmer on output IF transformer, range 39 to 71 mmf	1
C13		Secondary trimmer on output IF transformer, range 39 to 71 mmf	1
C14		100 mmf, +30%—10%, part of output IF can	1
C15	BEC-8D-10771	.1 mf, 20%, 200 volts	1
C16	BEC-8D-10785	.006 mf, 20%, 600 volts	1
C19	BEC-8D-10784	.002 mf, 25%, 600 volts	1
C20-A, C20-B, C20-C, C20-D	BE119-126	Dry electrolytic for 50-60 cycles; 20 mf, 150 volts; 40 mf, 150 volts; 200 mf, 10 volts; 40 mf, 150 volts	1
C21	BEC-8D-10774	.07 mf, 20%, 400 volts	1
		RESISTORS	
R1	BEC-9B1-27	220,000 ohms, 20%, ½ watt	1
R2	BEC-9B1-16	3,300 ohms, 20%, ½ watt	1
R3	BEC-9B1-84	68,000 ohms, 10%, ½ watt	1
R4, R7	BEC-9B1-37	10 megohms, 20%, ½ watt	2
R5, R9	BEC-9B1-34	3.3 megohms, 20%, ½ watt	2
R6, S1	BE101-258	1 megohm volume control with switch	1
R8	BEC-9B1-31	1 megohm, 20%, ½ watt	1
R10	BEC-9B1-60	680 ohms, 10%, ½ watt	1
R14	BEC-9B4-48	68 ohms, 10%, 2 watts	1
R11	BEC-9B1-42	22 ohms, 10%, ½ watt	1
R12	BEC-9B1-68	3300 ohms, 10%, ½ watt	1
R15	A-9D-12776	2450 ohms, 5%, 6 watts, wire-wound	1
		COILS AND TRANSFORMERS	
T1	BEB-13E-13418	Loop antenna assembly	1
T2	BEA-13D-10239	Oscillator coils	1
T3	BE108-201B	Input IF transformer complete in can with trimmers	1
T4	BE108-200B	Output IF transformer complete in can with trimmers and C14	1
T5	BE105-132	Output transformer	1
		SPEAKER	
T6	BE114-246B	5" P.M. speaker	1
		SOCKETS	
	BE121-171	Octal wafer socket	5
	BE121-243	Bakelite socket base for filter capacitor	1
		DIAL AND TUNING PARTS	
	BEB-6D-13271	Dial scale	1
	BEA-2G-13349	Pointer	1
	BE120-145	Coiled tension spring for dial string	1
	BE120-9	String for dial	2½' yd.
	BE117-896	Tuning shaft	1
	BE131-210	"C" washer	1
	BEB-5B-13396-57	Knob, "Plain", for tuning	1
	BEB-5B-13397-57	Knob, "With Dot",	1
		MISCELLANEOUS	
S2	BE125-161	Line-battery socket switch	1
S3	BE125-166	Battery economizer switch	1
	BE120-416	Battery cable switch	1
	BE107-370	Line cord and plug	1
	BE115-396	Tube shield	2
	BEA-21J-12775	Selenium rectifier	1
	D-2C-13262	Metal front cover	1
	D-2C-13263	Metal rear cover	1
	D-24D-13265	Wood end piece for cabinet	2
	B-23A-13270	Handle for cabinet	1

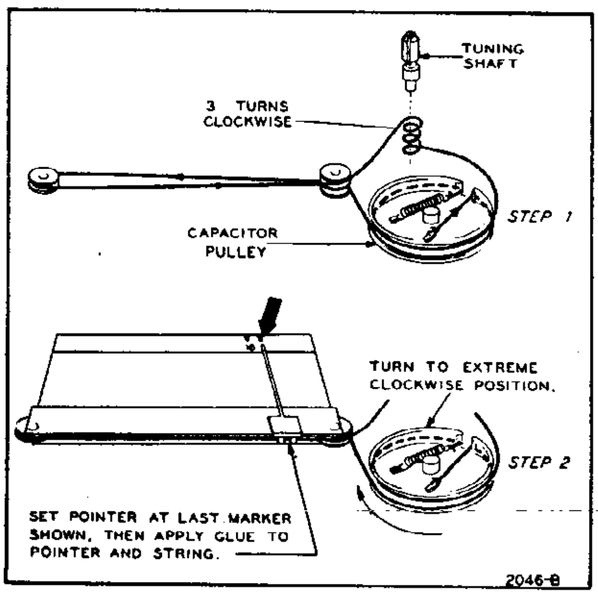
RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivities at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50 milliwatt output with speaker connected. The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivities of plus or minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR 50 MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection	
1000 kc	200 mmf or RMA dummy antenna	External * antenna clip	External ground clip	25 microvolts
1000 kc	.05 mf	Converter (1A7GT) grid cap	1A7GT Pin 7	140 microvolts
455 kc	.05 mf	Converter (1A7GT) grid cap	1A7GT Pin 7	100 microvolts
455 kc	.05 mf	IF amp. (1N5GT) grid cap	1A7GT Pin 7	4500 microvolts
400 cycles	.05 mf	AF amp. (1H5GT) grid cap	1A7GT Pin 7	.06 volts
400 cycles	.05 mf	Power amp. (1A5GT) grid (pin 5)	1A7GT Pin 7	3 volts

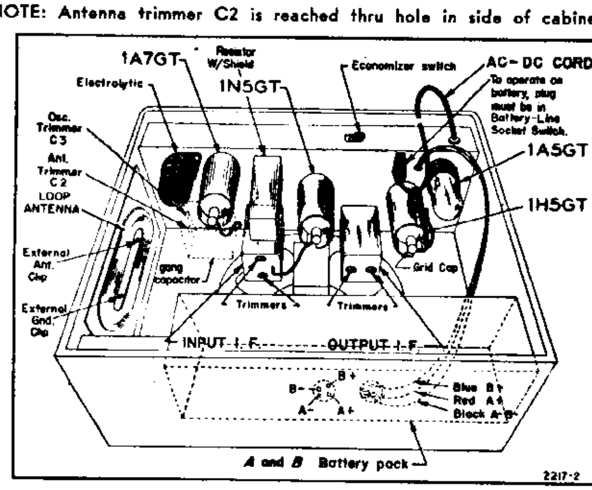
*Back of case must be snapped shut. Run generator leads along with line cord in notch of rear cover.



REPLACING DIAL POINTER DRIVE CORD

NOTE: Disregard information on setting pointer. 16 is actually on the other end of the calibration scale. Set pointer to end marker next to 16. Gang must be in open position. Procedure is the same otherwise.

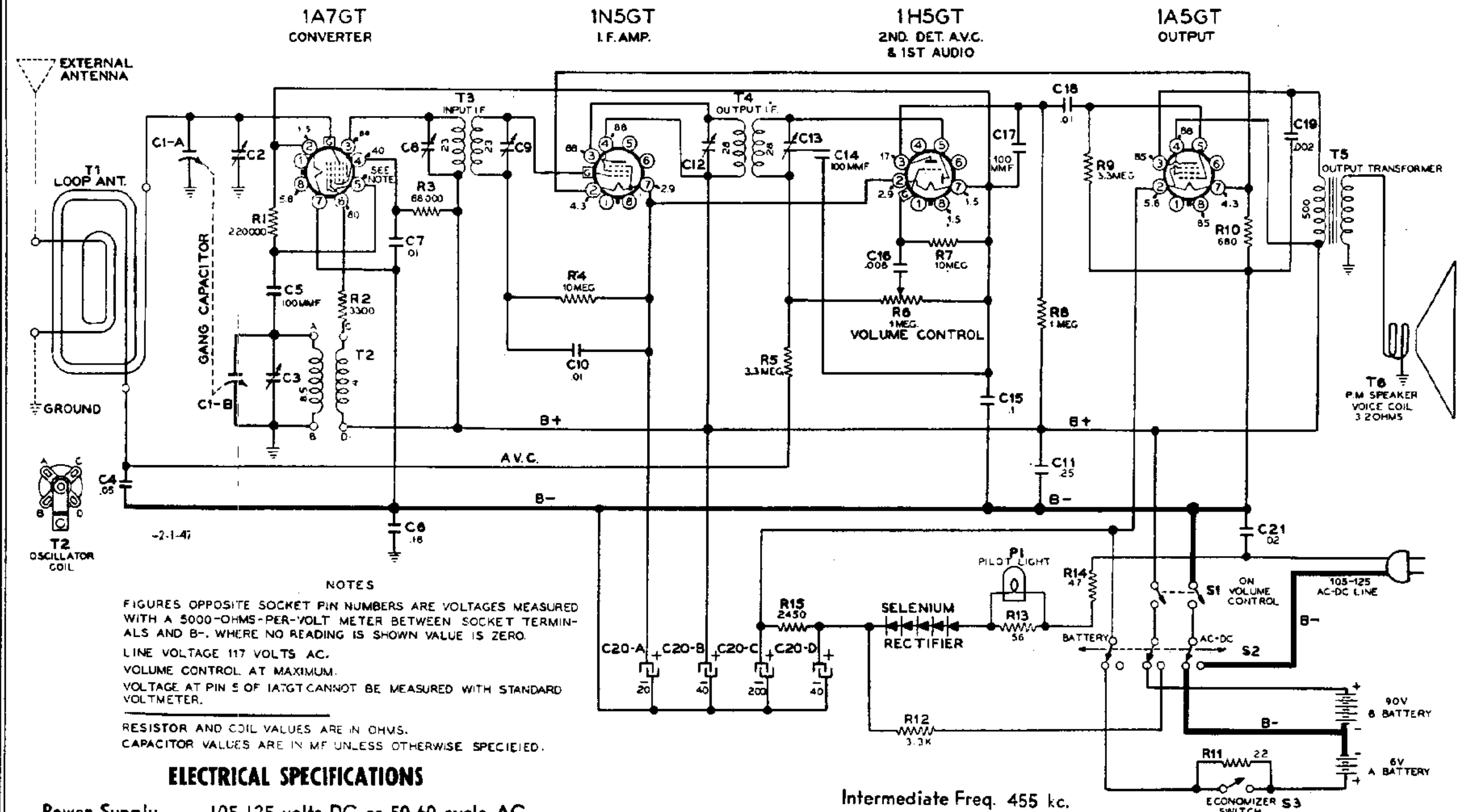
NOTE: Antenna trimmer C2 is reached thru hole in side of cabinet.



CHASSIS VIEW

Note: For battery operation, line cord plug must be inserted in battery-line socket switch as shown; switch contacts are automatically moved.

MONTGOMERY WARD



NOTES

FIGURES OPPOSITE SOCKET PIN NUMBERS ARE VOLTAGES MEASURED WITH A 5000-OHMS-PER-VOLT METER BETWEEN SOCKET TERMINALS AND B-. WHERE NO READING IS SHOWN VALUE IS ZERO.

LINE VOLTAGE 117 VOLTS AC.

VOLUME CONTROL AT MAXIMUM.

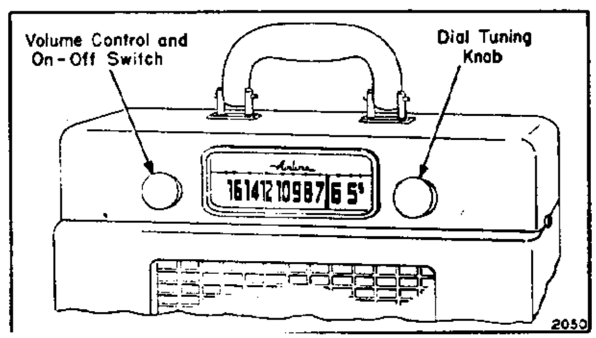
VOLTAGE AT PIN 5 OF 1A7GT CANNOT BE MEASURED WITH STANDARD VOLTMETER.

RESISTOR AND COIL VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MF UNLESS OTHERWISE SPECIFIED.

Intermediate Freq. 455 kc.

ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts DC or 50-60 cycle AC, 35 watts.
	Battery: Wards Battery Pack No. 62-30 Size: 10-9/16" by 2¾" by 4¼". "A"—6 volts, 50 milliamperes. "B"—90 volts, 8.5 milliamperes.
Frequency Range	530 to 1650 kc.
Selectivity	At 1000 kc, 48 kc at 1000 x signal.
Sensitivity	40 microvolts average for .05 watt output.
Power Output	80 milliwatts undistorted. 180 milliwatts maximum.
Loud Speaker	5", P.M., v.c. impedance 3.2 ohms.



RECEIVER STAGE SENSITIVITIES

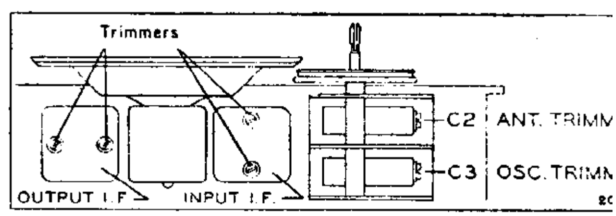
The table below lists the sensitivities at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50 milliwatt output with speal connected. The volume control must be set to maximu

The signal source must be an accurately calibrat signal generator capable of supplying both 1000 KC a 455 KC signals modulated 30% with a 400 cycle aud signal. Variations in sensitivities of plus or minus 25' are usually permissible.

SIGNAL GENERATOR				
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection	INPUT FOR 50 MILLIWATT OUTPUT
1000 kc	200 mmf or RMA dummy antenna	External antenna clip	External ground clip	25 microvolts
1000 kc	.05 mf	Converter (1A7GT) grid cap	1A7GT Pin 7	140 microvolts
455 kc	.05 mf	Converter (1A7GT) grid cap	1A7GT Pin 7	100 microvolts
455 kc	.05 mf	IF amp. (1N5GT) grid cap	1A7GT Pin 7	4500 microvolts
400 cycles	.05 mf	AF amp. (1H5GT) grid cap	1A7GT Pin 7	.06 volts
400 cycles	.05 mf	Power amp. (1A5GT) grid (pin 5)	1A7GT Pin 7	3 volts

ALIGNMENT PROCEDURE

- Output meter across 3.2 ohm output load.
- Volume control at maximum for all adjustments.
- Align for maximum output.
- Reduce input as needed to keep output near 0.4 volts.



SIGNAL GENERATOR				DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT in order shown
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc	.1 mf	1A7GT grid cap*	1A7GT Pin 7	Rotor full open (plates out of mesh)	Input and output trimmers on IF cans
1650 kc	.1 mf	1A7GT grid cap*	1A7GT Pin 7	Rotor full open (plates out of mesh)	Osc. trimmer on gang (see trimmer view)
1400 kc	200 mmf	External antenna clip	External ground clip	1400 kc	Ant. trimmer on gang (see trimmer view)

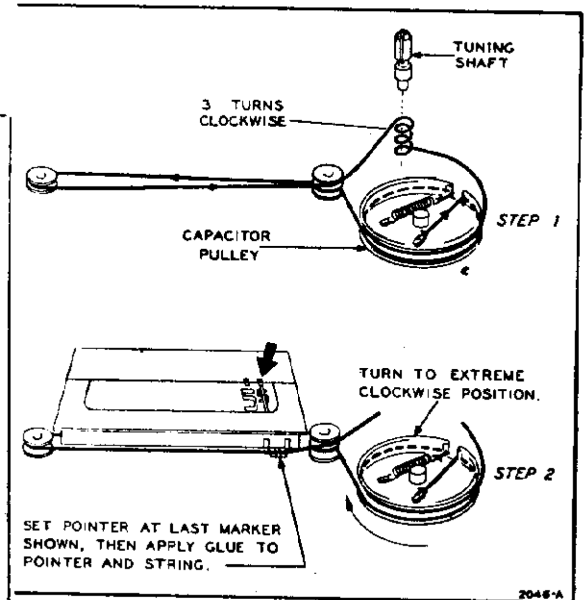
*For these adjustments insert a 1 megohm resistor between loop antenna and 1A7GT grid cap.

REPLACEMENT PARTS LIST

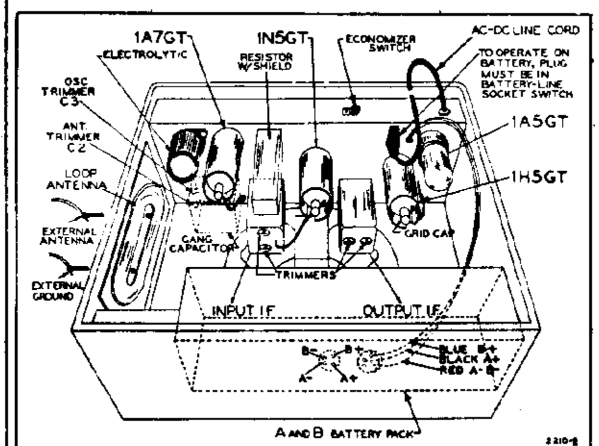
Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C1-A, C1-B	BEB-8A-10113	Two-gang variable capacitor	1
C2		Antenna trimmer on gang	1
C3		Oscillator trimmer on gang	1
C4	BEC-8D-10770	.05 mf, 20%, 200 volts	1
C5, C17	BEC-8F3-8	100 mmf, 20%, mica	2
C6	BEC-8D-11111	.180 mf ±10%, 400 volts	1
C7, C10, C18	BEC-8D-10761	.01 mf, 20%, 400 volts	3
C8		Primary trimmer on input IF transformer, range 53 to 97 mmf	1
C9		Secondary trimmer on input IF transformer, range 53 to 97 mmf	1
C11	BEC-8D-10775	.25 mf, 25%, 200 volts	1
C12		Primary trimmer on output IF transformer, range 39 to 71 mmf	1
C13		Secondary trimmer on output IF transformer, range 39 to 71 mmf	1
C14		100 mmf +30% —10%, part of output IF can	1
C15	BEC-8D-10771	.1 mf, 20%, 200 volts	1
C16	BEC-8D-10785	.006 mf, 20%, 600 volts	1
C19	BEC-8D-10784	.002 mf, 25%, 600 volts	1
C20-A, C20-B, C20-C, C20-D	BE119-126	Dry electrolytic for 50-60 cycles; 20 mf, 150 volts; 40 mf, 150 volts; 200 mf, 10 volts; 40 mf, 150 volts	1
C21	BEC-8D-10774	.02 mf, 20%, 400 volts	1
		RESISTORS	
R13	BEC-9B2-47	56 ohms, 10%, 1 watt	1
R1	BEC-9B1-27	220,000 ohms, 20%, 1/2 watt	1
R2	BEC-9B1-16	3,300 ohms, 20%, 1/2 watt	1
R3	BEC-9B1-84	68,000 ohms, 10%, 1/2 watt	1
R4, R7	BEC-9B1-37	10 megohms, 20%, 1/2 watt	2
R5, R9	BEC-9B1-34	3.3 megohms, 20%, 1/2 watt	2
R6, S1	BE101-258	1 megohm volume control with switch	1
R8	BEC-9B1-31	1 megohm, 20%, 1/2 watt	1
R10	BEC-9B1-60	680 ohms, 10%, 1/2 watt	1
R14	BEC-9B2-46	47 ohms, 10%, 1 watt	1
R11	BEC-9B1-42	22 ohms, 10%, 1/2 watt	1
R12	BEC-9B1-68	3300 ohms, 10%, 1/2 watt	1

Ref. No.	Part No.	Description	Qty. Used in Set
R15	A-9D-12776	2450 ohms, 5%, 6 watts, wire-wound	1
		COILS AND TRANSFORMERS	
T1	BEB-13E-10240	Loop antenna assembly	1
T2	BEA-13D-10239	Oscillator coils	1
T3	BE108-201B	Input IF transformer complete in can with trimmers	1
T4	BE108-200B	Output IF transformer complete in can with trimmers and C14	1
T5	BE105-132	Output transformer	1
		SPEAKER	
T6	BE114-246B	5" P.M. speaker	1
		SOCKETS	
	BE121-171	Octal wafer socket	5
	BE121-243	Bakelite socket base for filter capacitor	1
		DIAL AND TUNING PARTS	
	BEB-6D-10115	Dial scale	1
	BE112-949	Pointer	1
	BE120-145	Coiled tension spring for dial string	1
	BE120-9	String for dial	2½'
	BE115-[illegible]1	Plate for dial, with pulleys	1
	BE117-896	Tuning shaft	1
	BE131-210	"C" washer	1
	BE128-660-39	Knob, "Volume"	1
	BE128-661-39	Knob, "Tuning"	1
P1	BE107-249	Pilot bulb, 6-8 volt, No. T-47	1
	BE107-371	Pilot light socket assembly	1
		MISCELLANEOUS	
S2	BE125-161	Line-battery socket switch	1
S3	BE125-166	Battery economizer switch	1
	BE120-416	Battery cable assembly	1
	BEB-2K-10114	Grill screen	1
	BE128-673-1	Grill cloth	1
	BE112-947	Escutcheon for dial	1
	BE107-370	Line cord and plug	1
	BE115-396	Tube shield	2
	BEA-21J-12775	Selenium rectifier	1



REPLACING DIAL POINTER DRIVE CORD

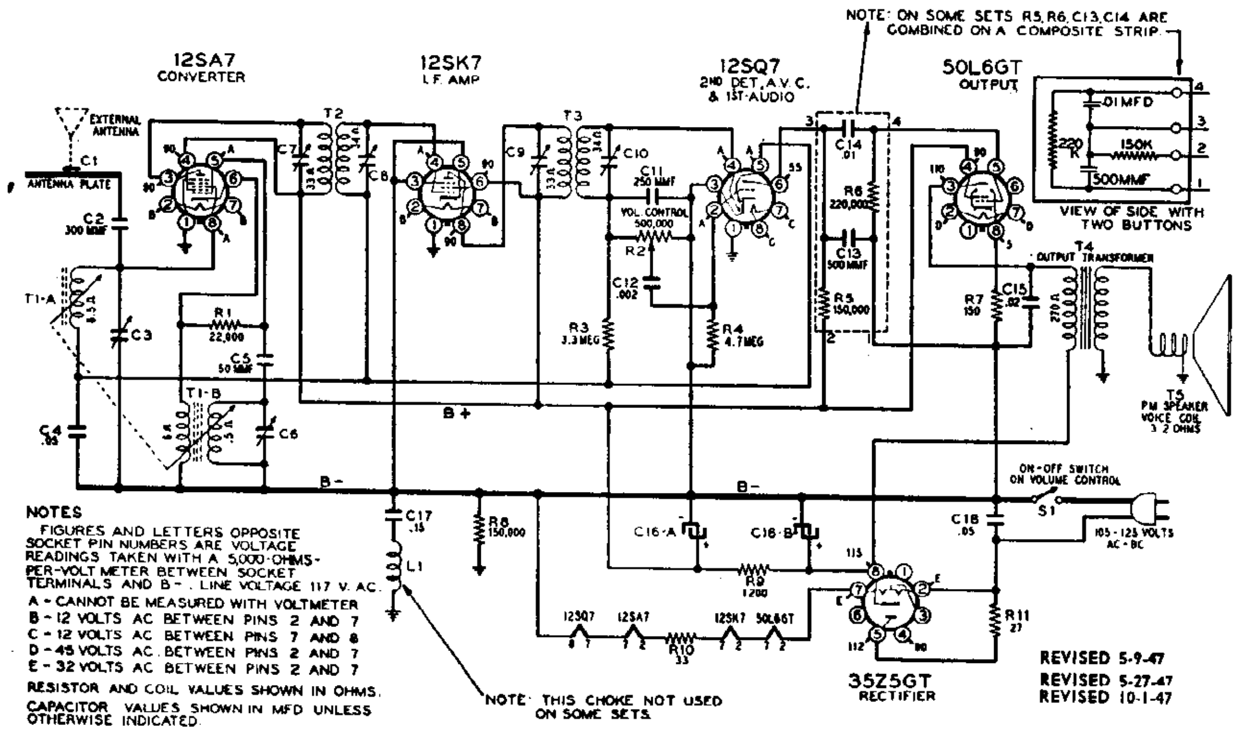


CHASSIS VIEW

Note: For battery operation, line cord plug must be inserted in battery-line socket switch as shown; switch contacts are automatically moved.

MONTGOMERY WARD

MODELS 74BR-1501B
74BR-1502B



NOTES: On some sets dual trimmer C3, C6 is grounded to chassis instead of to B— as shown above. On some sets R6 is 470K ohms and R5 is 220K ohms. On some sets R10 is not used.

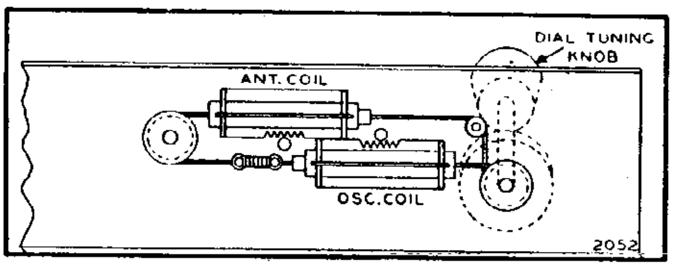
GENERAL DESCRIPTION

This radio is a permeability-tuned, AC-DC set using 4 tubes plus a rectifier. The metal back plate of the cabinet serves as a self-contained antenna. A clip is provided for connection of an external antenna; it is riveted to a washer which is capacity-coupled to the back plate. Simple AVC voltage is applied to the converter and IF-amplifier tubes. The filament string is across the AC line.

ELECTRICAL SPECIFICATIONS

Power Supply.......... 105 to 125 volts, DC or 50-60 cycle AC, 28 watts. Also made for 25-cycles AC.

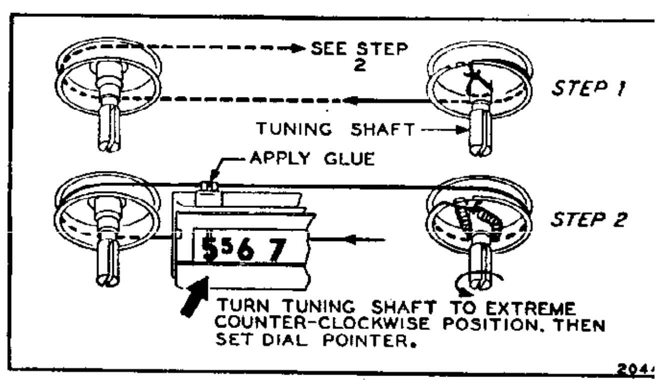
Frequency Range...... 540 to 1720 kc.
Intermediate Freq.... 455 kc.
Selectivity.............. At 1000 kc, 69 kc at 1000 x signa
Sensitivity.............. 28 microvolts average for .05 wat output.
Power Output.......... 0.96 watts undistorted, 1.58 watt maximum.
Loud Speaker.......... 4", P.M., v.c. impedance 3.2 ohm
Tube Complement ... 12SA7, converter
12SK7, I.F. amplifier
12SQ7, detector, AVC, audio amplifier
50L6GT, output amplifier
35Z5GT, rectifier



View of Tuning Coil Assembly

ANTENNA COIL ADJUSTMENT

The antenna coil assembly (see illustration) is made so that it is movable left or right. When making the adjustment as required in the alignment procedure, move the coil asembly very slowly, either by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.



NOTES ON DRIVE CORD REPLACEMENT

1. Eighteen inches (18") of cord are required.
2. When tying the string to the tension spring (step 2)), mak sure that the spring takes up all slack.

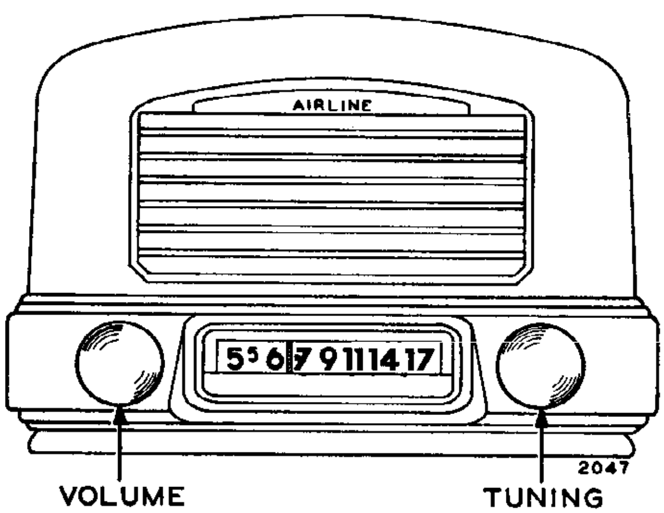
ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

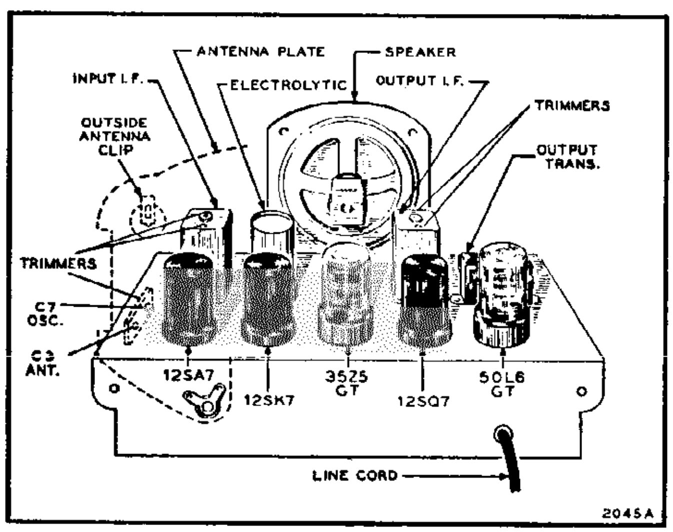
The signal source must be an accurately calibrated signal generator capable of supplying R. F. signals modulated 30% with a 400-cyle audio signal. A 400-cycle source is necessary for the audio measurement.

The table below lists the sensitivity at various points. All measurements are based on an output of 50-milli-watts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissable. Volume control at maximum for all adjustments.

SIGNAL GENERATOR						
Frequency	**Coupling Capacitor**	**Connection to Radio**	**Ground Connection**	**TUNER SETTING**	**ADJUST FOR MAXIMUM OUTPUT**	**INPUT FOR 50-MILLIWATT OUTPUT**
455 kc	.1 mf	Metal antenna plate	12SQ7 Pin 3	Iron cores all the way out	Trimmers on output and input I.F. cans	———
1720 kc	.1 mf	Metal antenna plate	12SQ7 Pin 3	Iron cores all the way out	Oscillator trimmer C6	———
1720 kc	200 mmf	External antenna clip	12SQ7 Pin 3	Iron cores all the way out	Antenna trimmer C3	———
1400 kc	200 mmf	External antenna clip	12SQ7 Pin 3	1400 kc	Adjust position of ant. coil (see coil illustration view)	31 microvolts
1720 kc	200 mmf	External antenna clip	12SQ7 Pin 3	1720 kc	Antenna trimmer C3*	31 microvolts
1000 kc	200 mmf	External antenna clip	12SQ7 Pin 3	1000 kc	———	28 microvolts
455 kc	.1 mf	12SA7, Pin 8	12SQ7 Pin 3	Iron cores all the way out	———	82 microvolts
400 cycles	.1 mf	12SQ7, Pin 2	12SQ7 Pin 3	———	———	.05 volts

*After the antenna coil has been tracked at 1400 kc, it is necessary to check the antenna trimmer C3 again at 1720 kc. If no appreciable change in trimmer adjustment is necessary, the coil is in track. If the trimmer requires considerable change, the position of the antenna coil at 1400 kc must be readjusted. These two adjustments should be made several times, until no trimmer adjustment is required at 1720 kc.





NOTE: C7 SHOULD READ C6

REPLACEMENT PARTS LIST

74BR-1501B, 1502B

Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description	Qty. Used In Set
		CAPACITORS	
C1		Washer capacitor mounted on antenna plate	1
C2	BE129114	300 mmf, 20%, mica, 500 volts	1
C3, C6	BE124137 or BEA-201-13143	Antenna and oscillator trimmers; dual mounted; C3 (ant.) range is 74 to 136 mmf, C6 (osc.) range is 95 to 175 mmf	1
C4	BE1009	.05 mf, 25%, 200 volts	1
C5	BE12939	50 mmf, 20%, mica, 500 volts	1
C11	BE12912	250 mf, 20%, mica, 500 volts	1
C12	BE10025	.002 mf, 25%, 600 volts	1
C13	BE1292	500 mmf, 20%, mica, 500 volts	1
C14	BE10011	.01 mf, 25%, 400 volts	1
C15	BE10026	.02 mf, 25%, 400 volts	1
C16-A, C16-B	BE11992	Dual electrolytic for 50-60 cycle model: 20 mf, 150 volts: 40 mf, 150 volts	1
	or BE11993	Dual electrolytic for 25 cycle models: 40 mf, 150 volts 60 mf, 150 volts	1
C17	BE10091	.15 mf, 25%, 400 volts	1
C18	BE10013	.05 mf, 25%, 400 volts	1
		RESISTORS	
R1	BEA-9B1-78	22,000 ohms, 10%, 1/2 watt	1
R2, S1	BE101255	500,000-ohm volume control with on-off switch	1
R3	BEA-9B1-34	3.3 megohms, 20%, 1/2 watt	1
R4	BEA-9B1-35	4.7 megohms, 20%, 1/2 watt	1
R5, R8	BEA-9B1-26	150,000 ohms, 20%, 1/2 watt	2
R6	BEA-9B1-27	220,000 ohms, 20%, 1/2 watt	1
R7	BEA-9B1-52	150 ohms, 10%, 1/2 watt	1
R9	BEA-9B2-63	1200 ohms, 10%, 1 watt	1
R10	BEA-9B2-4	33 ohms, 20%, 1 watt	1
R11	BEA-9B1-43	27 ohms, 10%, 1/2 watt	1
	BE-201-13151	Audio coupling assembly (on some sets, this unit replaces R5, R6, C13, C14).	1
		COILS AND TRANSFORMERS	
L1	BE105138	RF choke coil	1
T1-A, T1-B	BE13614	Antenna and oscillator coil tuning assembly complete with cores, drive cord, and tuning drive shaft	1
T2, C7, C8	BE108157H	Input IF transformers complete in can with trimmers. (Trimmer range 39 to 73 mmf)	1
T3, C9, C10	BE108157I	Output IF transformers complete in can with trimmers. (Trimmer range 39 to 73 mmf)	1
T4	BE105-128	Output transformer for speaker	1
	or BE105128B	Output transformer for speaker	1
	or BEB12C11763-3	Output transformer for speaker	1
		SPEAKER	
T5	BEB-18A-10251	4-inch P. M. speaker	1
		SOCKETS	
	BE121171	Tube socket	5
	BE121216	Bakelite socket for electrolytic capacitor	1
		DIAL AND TUNING PARTS	
	BEA6D10049-1	Dial scale, ivory	1
	BEA-2D-10050	Dial background	1
	BE115731	Dial bracket	1
	BEA-2G-10051	Dial pointer	1
	BE120214	Dial pointer drive cord	18" yd.
	BE120364	Coil spring for drive cord	1
	BE112-788	Idler pulley (fits on volume control shaft)	1
	BE128660-9 or B-5B-13091-9	Knob, "VOLUME", ivory	1
	BE128660-46	Knob, "VOLUME", walnut	1
	BE128661-9 or B-5B-13092-9	Knob, "TUNING", ivory	1
	BE128661-46	Knob, "TUNING", walnut	1

NOTE: How to order Ivory Knobs to match:
128660-9 and 128661-9 have raised wording.
B-5B-13091-9 and B-5B-13092-9 have gold-filled recessed wording.

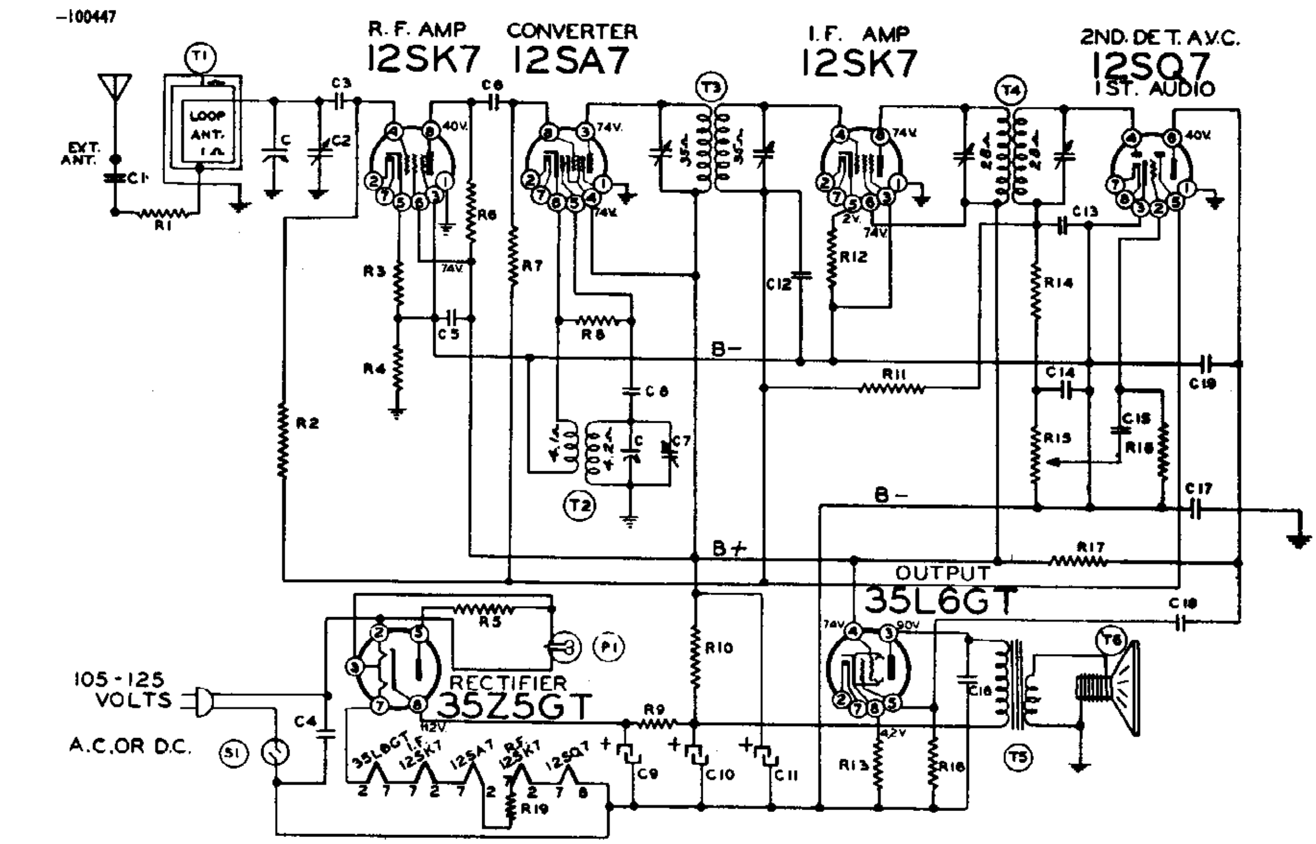
Ref. No.	Part No.	Description	Qty. Used In Set
		MISCELLANEOUS	
	BE115597C	Antenna plate (back plate of cabinet, includes capacitor C1), ivory	1
	BE115597	Antenna plate (back plate of cabinet, includes capacitor C1), walnut	1
	BE131193	Cinch buttons, for fastening antenna plate to cabinet	4
	BE128652-9	Cabinet, bakelite, ivory	1
	BE128652-46	Cabinet, bakelite, walnut	1
	BE10798E	Line cord and plug	1
	BE134103	Rubber washers for mounting chassis	2
	BE131263	Offset washers for mounting chassis	2
	BE13220	Screws, 6-32 x 3/8", for mounting chassis	2 doz
	BEA-2H-11271	Tube shield (for bakelite-base 12SA7GT tube)	
	BEA-2H-10715	Tube shield (for metal-base 12SA7GT tube)	

74BR-1507A, 1508A

Ref. No.	Part No.	Description
		CONDENSERS
C17	C-8D-10953	15 MFD x 400 volts.
C1, C15	C-8D-10778	.002 x 600 volts, +40%, —15%
C3	C-8F3-12	470 mmfd., mica, ±20%
C4	C-8D-10760	.1 x 400 volts, +20%
C5	C-8D-10775	.25 x 200 volts, ±20%
C6, C8, C19	C-8F3-8	.001 mica, ±20%
C9, C10, C11	11994 or A-8C-10077	Electrolytic (for 50-60 cycle sets), 40 mfd. x 150 volts, 20 mfd x 150 volts, 20 mfd. x 150 volts
C12	C-8D-10770	.05 x 200 volts, ±20%
C13, C14	129161	Dual .0001, mica, ±10%
C16	C-8D-10774	.02 x 400 volts, ±20%
C18	C-8D-10788	.004 x 600 volts, ±20%
		RESISTORS
R1	C-9B1-13	1000 ohms, 1/2 watt, ±20%
R2	C-9B1-31	1 megohm, 1/2 watt, ±20%
R3	C-9B1-50	100 ohms, 1/2 watt, ±10%
R4	C-9B1-26	150,000 ohms, 1/2 watt, ±20%
R5	C-9B1-42	22 ohms, 1/2 watt, ±10%
R6	C-9B1-70	4700 ohms, 1/2 watt, ±10%
R7	C-9B1-25	100,000 ohms, 1/2 watt, ±20%
R8, R14	C-9B1-23	47,00 ohms, 1/2 watt, ±20%
R9	C-9B2-53	180 ohms, 1 watt, ±10%
R10	C-9B2-63	1200 ohms, 1 watt, ±10%
R11	C-9B1-34	3.3 merohms, 1/2 watt, ±20%
R12, R13	C-9B1-52	150 ohms, 1/2 watt, ±10%
R16	C-9B1-29	470,00 ohms, 1/2 watt, ±20%
R17	C-9B1-27	220,000 ohms, 1/2 watt, ±20%
R18	C-9B1-35	4.7 megohms, 1/2 watt, ±20%
R19	C-9B2-44	33 ohms, 1 watt, ±10%
		COILS
T1	C-212-11565-2	Loop antenna assembly, complete on back
T2	A-13D-10215	Oscillator coil
T3	108140H or B-13A-12023	Input I.F. coil in can, 455 Kc.
T4	108145 or B-13B-12022	Output I.F. coil in can, 455 Kc.
(See note on page 3)		
		SOCKETS
	121210	8-prong octal tube sockets, molded
	121171	8-prong socket for 12SK7, laminated
	121216	Socket base, bakelite
	107271 or A-47A-11470	Pilot light socket assembly
		SPEAKER
T6	114197	5-inch P.M. speaker
T5	105104	Output transformer for speaker
		DIAL PARTS
	115448	End plate (right hand bracket)
	115448C	End plate (left hand bracket)
	115146	Cams
	115143	Key washer (13 used on cam shaft)
	117528	Brass spacer (one used on cam shaft)
	117602	Brass spacer (four used on cam shaft)
	131181	Spring washers, for locking collar
	117604	Locking collar
	117600	Level shaft
	115361	Lever with roller
	120283	Return spring for levers
	115449B	Dial bracket assembly
	112785	Pointer
	A-53A-10989	Drive cord, 6 inches used
	A-49A-11087	Spring on tuning shaft, for cord
	A-3N-11086	Spacer under above spring
	120143	Take-up spring for drive cord
	B-6D-10241	Dial scale
	112-659-1	Crystal, clear, for dial scale
	A-2M-7758	Cinch buttons for fastening scale to bracket
	117833	Brass spacer (for spacing pointer from dial)
		MISCELLANEOUS
	10798	Line cord and plug
R15, S1	101218 or A-10A-10626	Volume control and switch, 1 meg.
C, C2, C7	B-8A-10211	2-gang variable condenser
P1	107249	Pilot light bulb, type T-47
	134123	Rubber bumper (bottom of cabinet)
	A-2M-10096	Cinch buttons, for fastening back to cabinet (4 used)
	13141	Cinch buttons, to cover trimmer holes in cabinet
	B-5B-11463-8	Pushbuttons (6 used), ivory
	A-23L-11900	Station call letters, set
	A-6C-11899	Acetate tabs for call letters
	5C-11228-9	Cabinet, bakelite, ivory color
	128-686-8	Knob, volume, ivory color
	A-5B-10994-9	Knob, tuning, ivory color
	A-3F-10995	Locking screw for tuning knob
	120388	Locking spring for tuning knob
	A-2H-10996	Reset key
	5C-11228-36	Cabinet, walnut
	128-686-37	Knob, volume, walnut
	A-5B-10994-36	Knob, tuning, walnut
	B-5B-11463-37	Pushbuttons, walnut

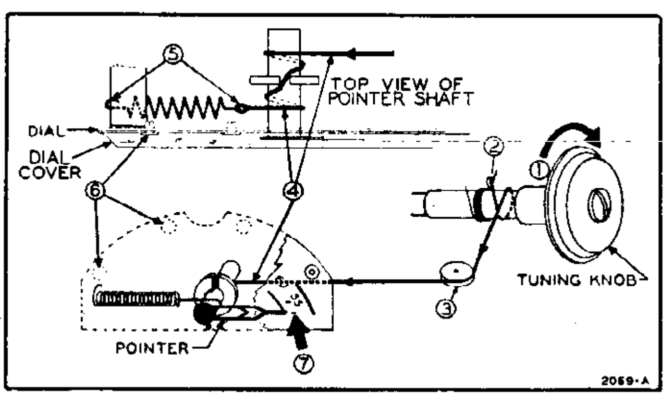
MODELS 74BR-1507A, 74BR-1508A

MONTGOMERY WARD



NOTE: On some sets slug tuned I.-F.'s are used instead of trimmer tuned I.-F.'s. 108-140H and 108-145 are trimmer tuned. B-13A-12023 and B-13B-12022 are slug tuned. The slug tuned I.-F.'s are tuned from the top and bottom (secondary on top, primary on bottom).
Slug tuned I.-F.'s cannot be used to substitute trimmer tuned I.-F.'s but trimmer tuned I.-F.'s can be used to substitute slug tuned I.-F.'s.

Power Supply	105 to 125 volts, DC or 50-60 cycle AC, 35 watts.
Frequency Range	530 to 1650 kc.
Intermediate Freq.	455 kc.
Selectivity	At 1000 kc, 55 kc at 1000 x signal.
Sensitivity	13 microvolts average for .05 watt output.
Power Output	0.8 watts undistorted, 1 watt maximum.
Loud Speaker	5" P.M., v.c. impedance 3.2 ohms.



REPLACING DIAL POINTER DRIVE CORD— Six inches of cord are required in the set. Use a piece slightly longer so that knots may be tied at each end. Numbers below correspond to circled numbers in diagram.

1. Rotate tuning knob to extreme clockwise position. This closes tuning condenser. Knob should remain in this position until installation is completed.
2. Tie cord to loop in spring as shown. Wind cord one turn around shaft in direction shown.
3. Pass cord over idler pulley.
4. Pass cord over pointer shaft; wind it one turn around shaft; pass it through key washer; wind it one more turn around shaft.
5. Hook spring over end of dial support. Tie cord to spring. *IMPORTANT:* Before tying knot stretch spring enough so that full contraction of spring will rotate pointer shaft at least one-half turn.
6. Remove dial crystal by removing Cinch buttons.
7. Make sure tuning knob is in extreme clockwise position.

Then rotate pointer clockwise, against friction of shaft, until it is in horizontal position, as shown.

MONTGOMERY WARD MODELS 74BR-150'
74BR-1508A

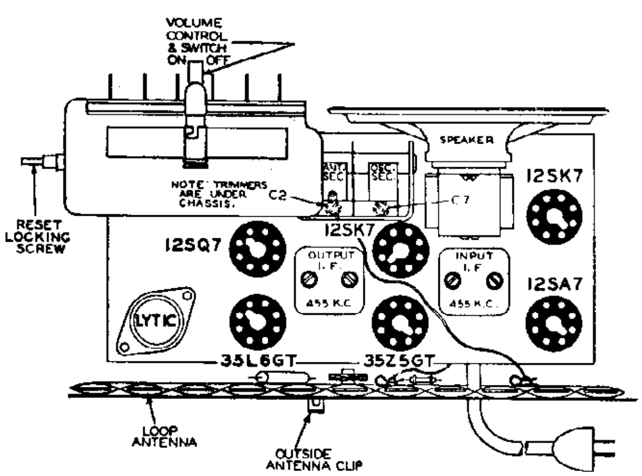
ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

The signal source must be an accurately calibrated signal generator capable of supplying R. F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurement.

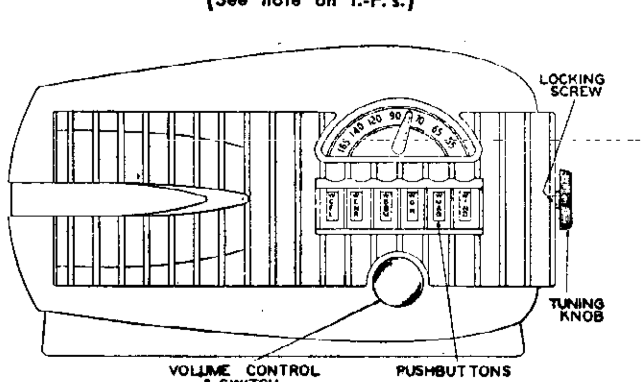
The table below lists the sensitivity at various points. All measurements are based on an output of 50-milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-w resistor across the secondary winding of the output tra former. A reading of .4 volts AC across this resis will be equivalent to a 50-milliwatt output with t speaker connected. Variations of plus or minus 25% a usually permissable. Volume control at maximum for adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50-MILLIWAT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection			
455 kc.	.1 mf.	Pin No. 8 of 12SA7	12SQ7 Pin 3	Rotor full open	Trimmers on output and input I.F. cans	100 microvol
1650 kc.	.1 mf.	Pin No. 8 of 12SA7	12SQ7 Pin 3	Rotor full open	Oscillator trimmer C7 (on bottom)	————
1400 kc.	none	See note A	none	Set dial at 1400	Antenna trimmer C2 (on bottom)	————
1400 kc.	200 mmf.	External antenna clip	12SQ7 Pin 3	1400 kc.	————	13 microvolt
400 cycles	.1 mf.	12SQ7, Pin 2	12SQ7 Pin 3	————	————	.05 volts

Note A: Lay output lead of generator in back of loop antenna. Turn up generator output. Loop antenna will pick up energy.

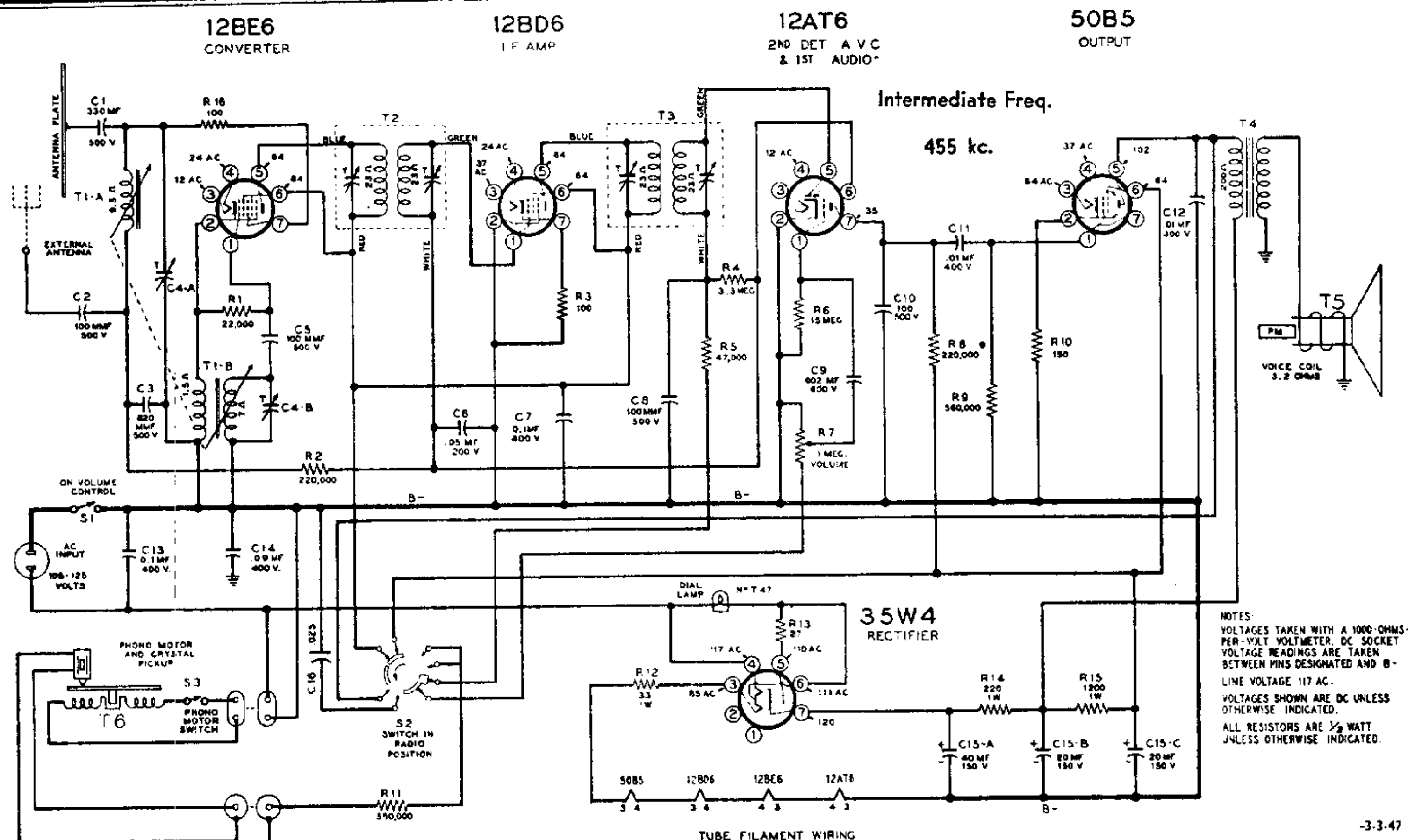


CHASSIS VIEW, SHOWING TUBE LOCATIONS
(See note on I.-F.'s.)

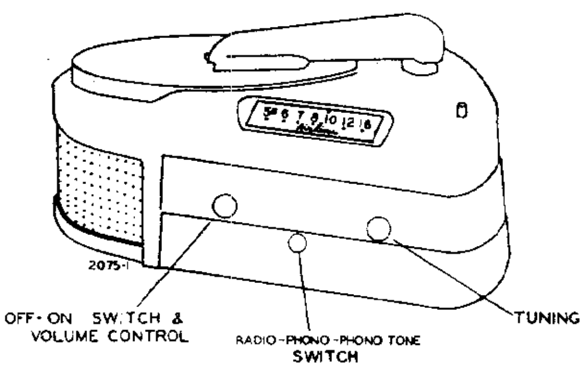


SETTING THE PUSHBUTTONS—The pushbuttons may I used, after proper adjustment, for the automatic tuni of any six stations which you select. They can be s up in any order.

1. Turn on the radio. Allow it to warm up for at lea one minute.
2. Push out the call letters of the six stations from t call-letter sheets supplied with this manual.
3. Insert one call-letter tab in the rectangular ope ing in each of the pushbuttons, in any sequence. Pr an acetate tab (supplied in small envelope) into ea of the pushbuttons.
4. With the screwdriver supplied, check to see th the locking screw in the center of the tuning knob (s illustration) is loose. If it is not, turn it several turns the left (counterclockwise).
5. Press the first pushbutton down *all the way*. W one hand hold the button down *firmly* and with the otl carefully tune in the desired station. Release the pu button.
6. Follow this procedure for each of the five otl buttons, adjusting each one for a different station.
7. Rotate the tuning knob on the side of the cabi as far to the right as it will go. Tighten the locki screw in the center of the knob. IT IS IMPORTA THAT THIS SCREW BE TIGHTENED VERY FIRML'
8. The pushbuttons are now properly set for automa tuning. Any of the six stations may now be tur ed simply by pressing the proper button down as far as will go. If it is desired to reset any of the buttons a new station, loosen the locking screw in the center the tuning knob, set the pushbutton as described abo and re-tighten the locking screw.



NOTE:—R13 (27 ohms) should be connected between pin no. 7 of the 35W4 tube and junction of R14 and C15-A.



ELECTRICAL SPECIFICATIONS

Power Supply..........105 to 125 volts, 60 cycles AC, watts.

Frequency Range .... 535 to 1690 kc.

Selectivity .... At 1000 kc. 52 kc at 1000 x signal.

Sensitivity ....23 microvolts average for .05 watts output.

Power Output ....0.75 watts undistorted, 1.0 watts maximum.

Loud Speaker.......... 4" x 6" oval, P.M., v.c. impedance 3.2 ohms.

ALIGNMENT PROCEDURE

(Trimmer and coil views on next page)

Output meter across 3.2-ohm output load.

Volume control at maximum for all adjustments.

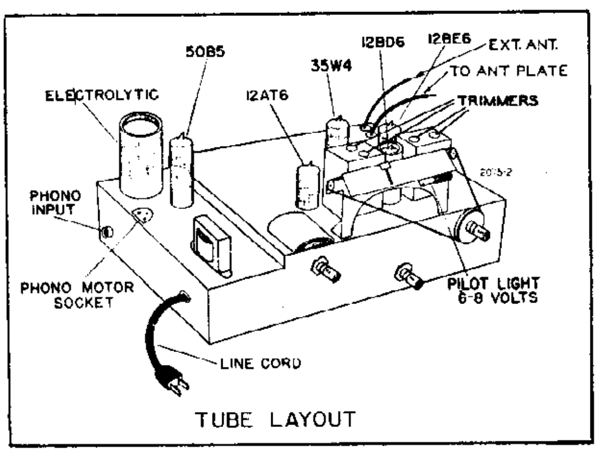
Align for maximum output.

Reduce input as needed to keep output near 0.4 volts.

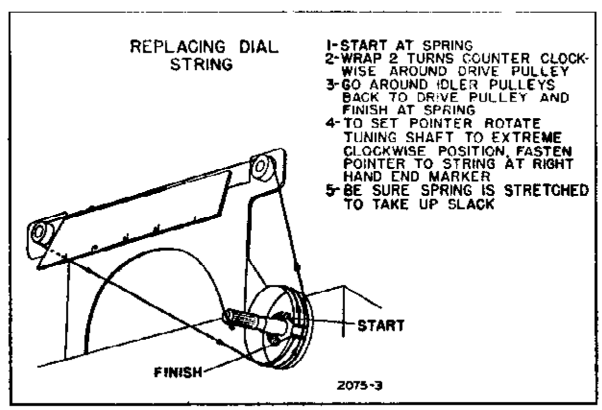
IMPORTANT: Adjustment of the oscillator and antenna trimmers should be done thru the trimmer holes in the base plate. If the antenna plate is not used while making adjustments, a 20-MMFD. COND. should be connected from the antenna plate lead to chassis to compensate for distributed capacity.

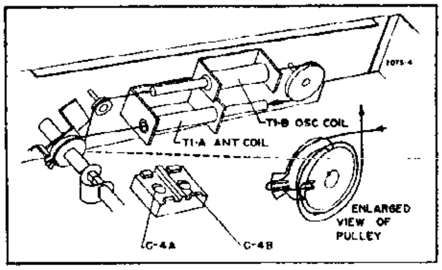
SIGNAL GENERATOR				TUNER SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc	.1 mf	Metal antenna plate	12AT6 Pin 2	Iron cores all the way out	Trimmers on output and input I.F. cans
1690 kc	.1 mf	Metal antenna plate	12AT6 Pin 2	Iron cores all the way out	Oscillator trimmer C4-B
1690 kc	200 mmf	External antenna lead	12AT6 Pin 2	Iron cores all the way out	Antenna trimmer C4-A
1400 kc	200 mmf	External antenna lead	12AT6 Pin 2	Turn dial to 1400 kc	Adjust position of ant. coil (See coil assembly view)
1690 kc	200 mmf	External antenna lead	12AT6 Pin 2	Turn dial to 1690 kc	Antenna trimmer C4-A*

*After the antenna coil has been tracked at 1400 kc, it is necessary to check the antenna trimmer C4-A again at 1690 kc. If no appreciable change in trimmer adjustment is necessary, the coil is in track. If the trimmer requires considerable change, the position of the antenna coil at 1400 kc must be readjusted. These two adjustments should be made several times, until no trimmer adjustment is required at 1690 kc.



Chassis View, Showing Trimmer Location





View of Tuning Coil Assembly

ANTENNA COIL ADJUSTMENT

The antenna coil assembly (see illustration) is made so that it is movable left or right. When making the adjustment as required in the alignment procedure, move the coil assembly very slowly, either by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

Ref. No.	Part No.	Description	Qty. Used in Set
		CONDENSERS	
C15A, C15B, C15C.	A-8C-10937	Electrolytic, 40-20-20 x 150 volts	1
C7, C13	C-8D-10760	.1 x 400 volts, tubular	2
C4-A, C4-B	A-8E-11240	Dual trimmer—ant. and osc.	1
C11, C12	C-8D-10761	.01 x 400 volts, tubular	2
C9	C-8D-10778	.002 x 600 volts, tubular	1
C6	C-8D-10770	.05 x 200 volts, tubular	1
C14	C-8D-11251	.09 x 400 volts, tubular	1
C2-C5-C8-C10	C-8F3-8	100 mf x 500 volts, 20%, mica	4
C1	C-8F3-119	330 mf x 500 volts, 10%, mica	1
C3	C-8F3-247	820 mf x 500 volts, 5%, mica	1
C16	C-8D-10997	.025 x 400 volts, tubular	1
		RESISTORS*	
R7, S1	A-10A-11332	Volume control (1 megohm) and switch	1
R2, R8	C-9B1-27	220K ohms, 1/2 watt, 20%	2
R1,	C-9B1-78	22K ohms, 1/2 watt, 10%	1
R9, R11	C-9B1-95	560K ohms, 1/2 watt, 10%	2
R4	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R3	C-9B1-50	100 ohms, 1/2 watt, 10%	1
R5	C-9B1-23	47K ohms, 1/2 watt, 20%	1
R6	C-9B1-302	15 megohms, 1/2 watt, 20%	1
R10	C-9B1-52	150 ohms, 1/2 watt, 10%	1
R13	C-9B1-43	27 ohms, 1/2 watt, 10%	1
R14	C-9B2-54	220 ohms, 1 watt, 10%	1
R15	C-9B2-63	1200 ohms, 1 watt, 10%	1
R12	C-9B2-44	33 ohms, 1 watt, 10%	1
R16	C-9B1-7	100 ohms, 1/2 watt, 20%	1
		COILS AND TRANSFORMERS	
T1-A, T1-B.	C-211-11222	Antenna and oscillator, permeability tuned coil assembly	1
T2	B-13A-10728-1	Input I. F. coil	1
T3	B-13B-10729	Output I. F. coil	1
T4	B-12C-11230	Output audio transformer (for speaker)	1
		SPEAKER	
T5	B-18A-11219	P. M., 4" x 6" oval—less output transformer	1
		DIAL AND TUNING PARTS	
	B-6D-11241	Dial scale	1
	A-2G-11123	Pointer	1
	B-53A-11340	String for dial (20" long)	1
	A-49A-10078	Tension spring for dial string	1
	B-5B-13170-8	Knob, Ivory, "Tuning"	1
	B-5B-13171-8	Knob, Ivory, "Volume"	1
	B-5B-13172-8	Knob, Ivory, "Radio-Phono-Tone"	1
	A-3A-11215	Tuner shaft	1
	A-2C-11120	Drive pulley	1
	B-29C-10393	"C" washer	1
	A-49A-11208	Spring coupling	1
	A-6A-11210	Diffuser plate	1
	B-2M-7758	Snap-in rivets, for diffuser plate	2
	B-2D-11234	Bracket for dial scale	1
		PHONO PARTS	
T6	C-201-11406-3	Phono motor and turntable assembly	1
	48C-11884-9	Pick-up arm—ivory color—less mounting base and crystal cartridge	1
	8K-11885	Crystal cartridge only (CR-1)	1
	23B-11886-9	Mounting base (ivory color) for pick-up arm	1
	A-19A-11010	Plug—for pick-up lead	1
	55A-11400	Play-back—needle	1
S3	A-20A-11482	Stop switch	1
	A-3B-11499	Actuator collar	1
	A-2D-11498	Actuator	1
	A-2D-11500	Switch bracket	1
		MISCELLANEOUS	
	C-5C-11329-9	Cabinet—ivory color	1
	B-23J-11220	Antenna plate	1
	B-2K-11237	Metal grille	1
	B-2D-11352	Grille band	1
	D-2E-11238	Bottom plate	1
	A-25A-11212	Rubber grommet for bottom plate	5
	A-25F-11407	Rubber bumper—bottom of plate	4
	A-15C-10717	Tube socket	5
	A-2H-10718	Shield base for tube shield	1
	A-2H-10974	Tube shield	1
	A-2M-11428	Tube retainer	4
	B-15B-10076	Mounting base for electrolytic	1
	A-19B-12170	Phono input socket	1
	A-19B-10727	Phono motor socket	1
	A-20A-11114	Radio-phono, phono-tone switch	1
	A-47A-11209	Pilot lite assembly	1
	A-46A-10793	Pilot lite bulb, T-47 (6-8 volts)	1

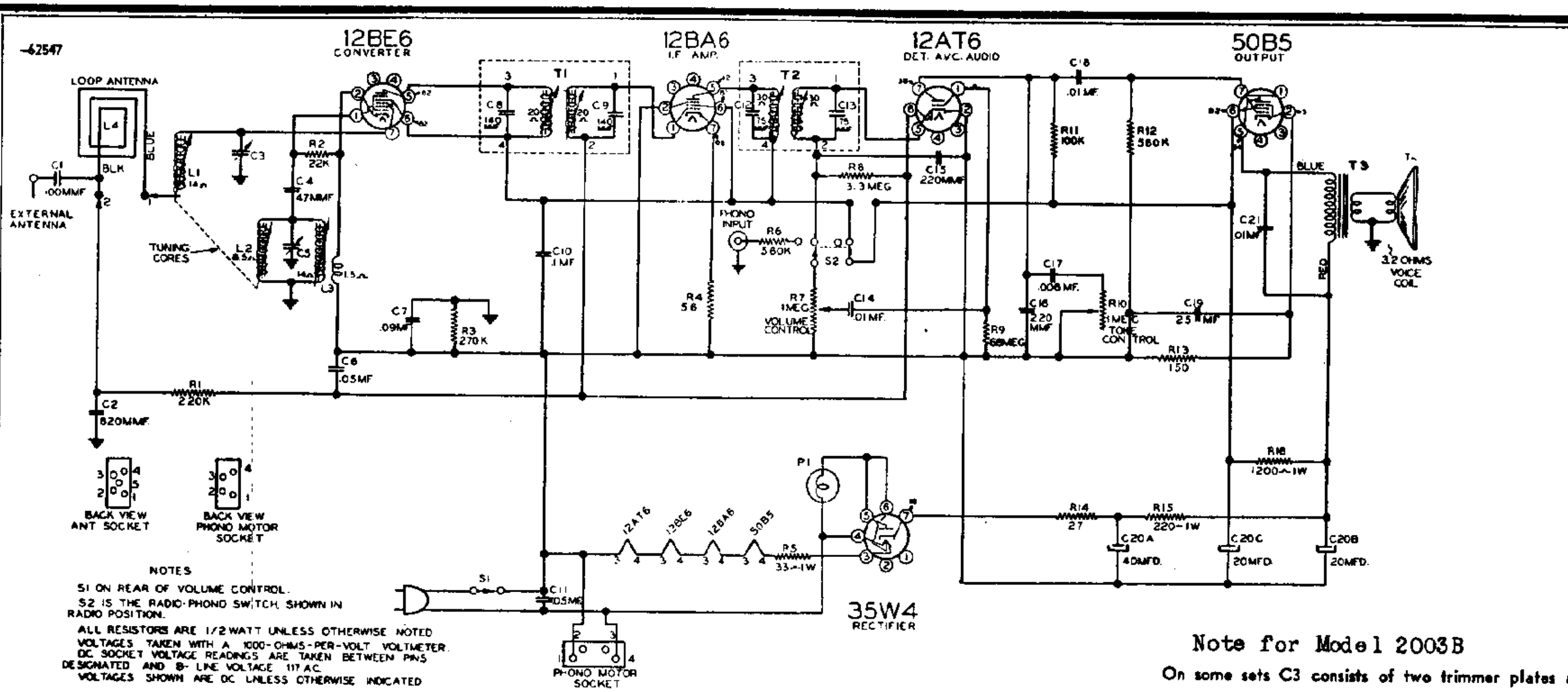
RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivities at the input of each stage. The receiver should be tuned to 1000 kc for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000-kc and 455-kc signals modulated 30% with a 400-cycle audio signal. Variations of plus or minus 25% are usually permissible.

SIGNAL GENERATOR				
Frequency	**Coupling Capacitor**	**Connection to Radio**	**Ground Connection**	**INPUT FOR 50-MILLIWATT OUTPUT**
1000 kc	200 mmf or RMA dummy antenna	External antenna lead	12AT6, Pin 2	23 microvolts
1000 kc	.1 mf	Converter 12BE6, pin 7	12AT6, Pin 2	70 microvolts
455 kc	.1 mf	Converter 12BE6, pin 7	12AT6, Pin 2	56 microvolts
455 kc	.1 mf	I. F. amplifier 12BD6, pin 1	12AT6, Pin 2	3400 microvolts
400 cycles	.1 mf	Audio amplifier 12AT6, pin 1	12AT6, Pin 2	.06 volts
400 cycles	.1 mf	Power amplifier 50B5, pin 1	12AT6, Pin 2	2.0 volts

MONTGOMERY WARD



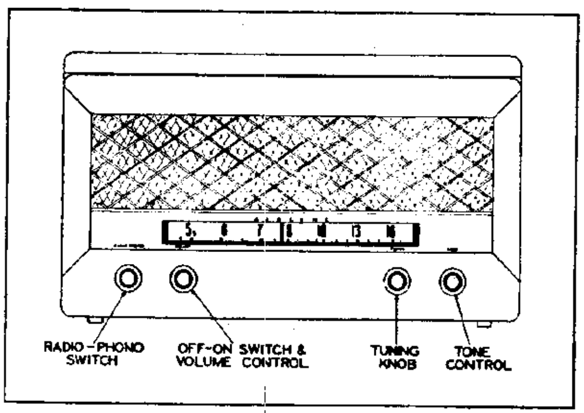
Note for Model 2003B

On some sets C3 consists of two trimmer plates and two insulators.

C3 is then returned to B— instead of to GROUND.

Also C2 is returned to B— instead of to ground.

On some sets R5, Part No. C-9B2-44 is not used.

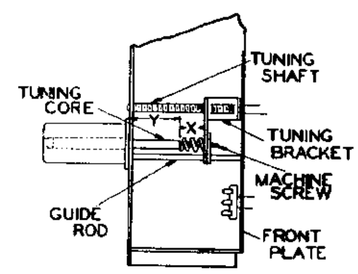


GENERAL DESCRIPTION

This radio-phonograph is a permeability-tuned, AC set using 4 miniature tubes plus a rectifier. A loop antenna is built into the back of the cabinet. A clip is ... ple AVC voltage is applied to the converter and IF-amplifier tubes. The filament string is across the AC line.

ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts; 60 cycles AC, 60 watts.
Frequency Range	535 to 1620 kc.
Intermediate Freq.	455 kc.
Selectivity	At 1000 kc. 50 kc. at 1000 x signal.
Sensitivity	10 microvolts average for .05 watts output.
Power Output	0.75 watts undistorted, 1.0 watts maximum.
Loud Speaker	4" x 6" oval, P.M., v.c. impedance 3.2 ohms.
Tube Complement	12BE6, converter 12BA6, I.F. amplifier. 12AT6, detector, AVC, audio amplifier 50B5, output amplifier 35W4, rectifier Pilot lite, 6-8 volts, T-47.



BOTH TUNING CORES PROTRUDE 1 1/32" OUT OF BASE OF TUNING COIL ASSEMBLIES, WHEN THE TUNING BRACKET IS AGAINST THE FRONT PLATE AS SHOWN IN DRAWING, (DIMENSION Y)
THE TOTAL LENGTH OF MACHINE SCREW IS 3/4 IN. DIMENSION X: APPROX. 7/16 IN.

MODELS 74BR-2003A, 74BR-2003B

MONTGOMERY WARD

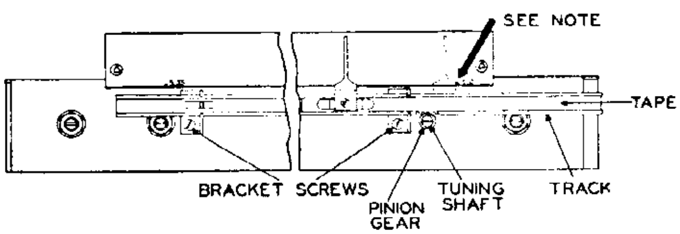
ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

The signal source must be an accurately calibrated signal generator capable of supplying R. F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurement.

The table below lists the sensitivity at various points. All measurements are based on an output of 50-milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of .04 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissable. Volume control at maximum for all adjustments. Tone control at maximum treble.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50-MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection			
455 kc.	.1 mf	12BE6, Pin 7	12AT6, Pin 2	Iron cores all the way out	Trimmers on output and input I.F. cans	28 microvolts
1620 kc.	.1 mf	12BE6, Pin 7	12AT6, Pin 2	Iron cores all the way out	Oscillator trimmer C5	————
535 kc.	200 mmf	External antenna clip	12AT6, Pin 2	Iron cores all the way in	Shunt osc. coil L3	11 microvolts
1620 kc.	200 mmf	External antenna clip	12AT6, Pin 2	1620 kc.	Antenna trimmer C3*	8 microvolts
1400 kc.	200 mmf	External antenna clip	12AT6, Pin 2	1400 kc.	Adjust position of ant. core (see coil illustration view)	8 microvolts
400 cycles	.1 mf	12AT6, Pin 1	12AT6, Pin 2	————	————	.03 volts

*After the antenna coil has been tracked at 1400 kc, it is necessary to check the antenna trimmer C3 again at 1620 kc. If no appreciable change in trimmer adjustment is necessary, the coil is in track. If the trimmer requires considerable change, the position of the antenna core at 1400 kc must be readjusted. These two adjustments should be made several times, until no trimmer adjustment is required at 1620 kc.



POINTER ADJUSTMENT

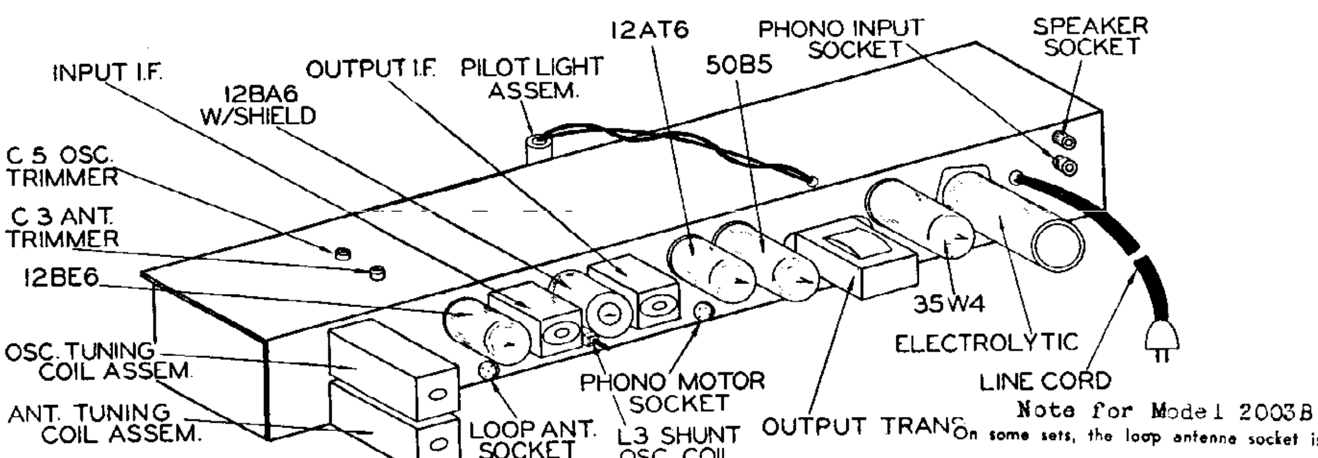
ROTATE TUNING SHAFT FULLY CLOCKWISE SO THAT POINTER IS AT RIGHT SIDE OF DIAL. LOOSEN BRACKET SCREWS AND LIFT UP TRACK. SLIDE POINTER SO THAT RIGHT EDGE OF POINTER SKIRT COINCIDES WITH LEFT EDGE OF 16.2 KC CALIBRATION MARK.

PULL TRACK DOWN SO THAT TAPE TEETH ENGAGE PINION GEAR AND TIGHTEN BRACKET SCREWS. CAREFULL ADJUSTMENT OF TAPE PRESSURE ON PINION GEAR TEETH WILL GIVE A SMOOTH MOTION TO THE TUNING SHAFT. IF IT FEELS "GEARY" DECREASE PRESSURE OF TAPE ON GEAR TEETH SLIGHTLY. IF THERE IS LOST MOTION BETWEEN TAPE TEETH AND GEAR TEETH INCREASE PRESSURE SLIGHTLY.

CAUTION: The I.F. transformer construction is such that two resonance peaks occur for each winding, one peak when the slug is above its coil and another peak when the slug is below its coil. Be sure the upper cores are above the top coils and the lower cores are below the bottom coils (see coil drawing).

Note for Model 2003B

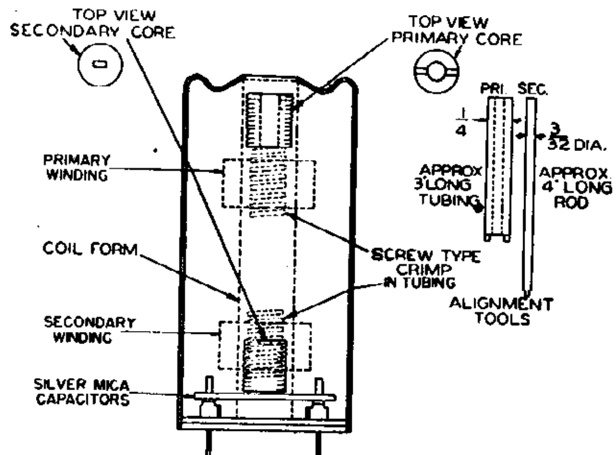
On some sets, pairs of punch marks on the inside of the tape guide are used as calibration markers. They are in the same relative position as the frequencies shown above. The end of the tape is then used as the indicator line.



Note for Model 2003B
On some sets, the loop antenna socket is eliminated and leads are brought out thru the hole.

MONTGOMERY WARD

MODELS 74BR-200
74BR-2003B



CROSS SECTION OF I.F.

PRIMARY CORE HAS HOLE THRU THE CENTER TO ALLOW SMALL FIBRE TOOL TO PASS THRU AND ADJUST THE SECONDARY CORE. THE PRIMARY CORE HAS A COMPLETE SLOTTED TOP FOR ADJUSTMENT; SECONDARY CORE HAS A SMALL NITCH IN TOP. BOTH WINDINGS ARE TOP TUNED.

THE SECONDARY ALIGNMENT TOOL PASSES THRU THE CENTER OF THE PRIMARY TOOL, FOR SIZE SEE DETAIL DRAWING

Parts list for Model 2003B is the same as for Model 2003A with the following exceptions.

		CONDENSERS	
C20A, B, C	A-8C-10077 or A-8C-10937	40 mf; 20 mf; 20 mf; 150 volts Electrolytic filter condenser	1
			1
C3	A-2M-14054	Trimmer plate	1
C3	A-6M-14203	Insulator for trimmer (laminated)	
		DIAL AND TUNING PARTS	
	A-6B-13277 or	Diffuser	1
	B-6B-14151	Diffuser	1

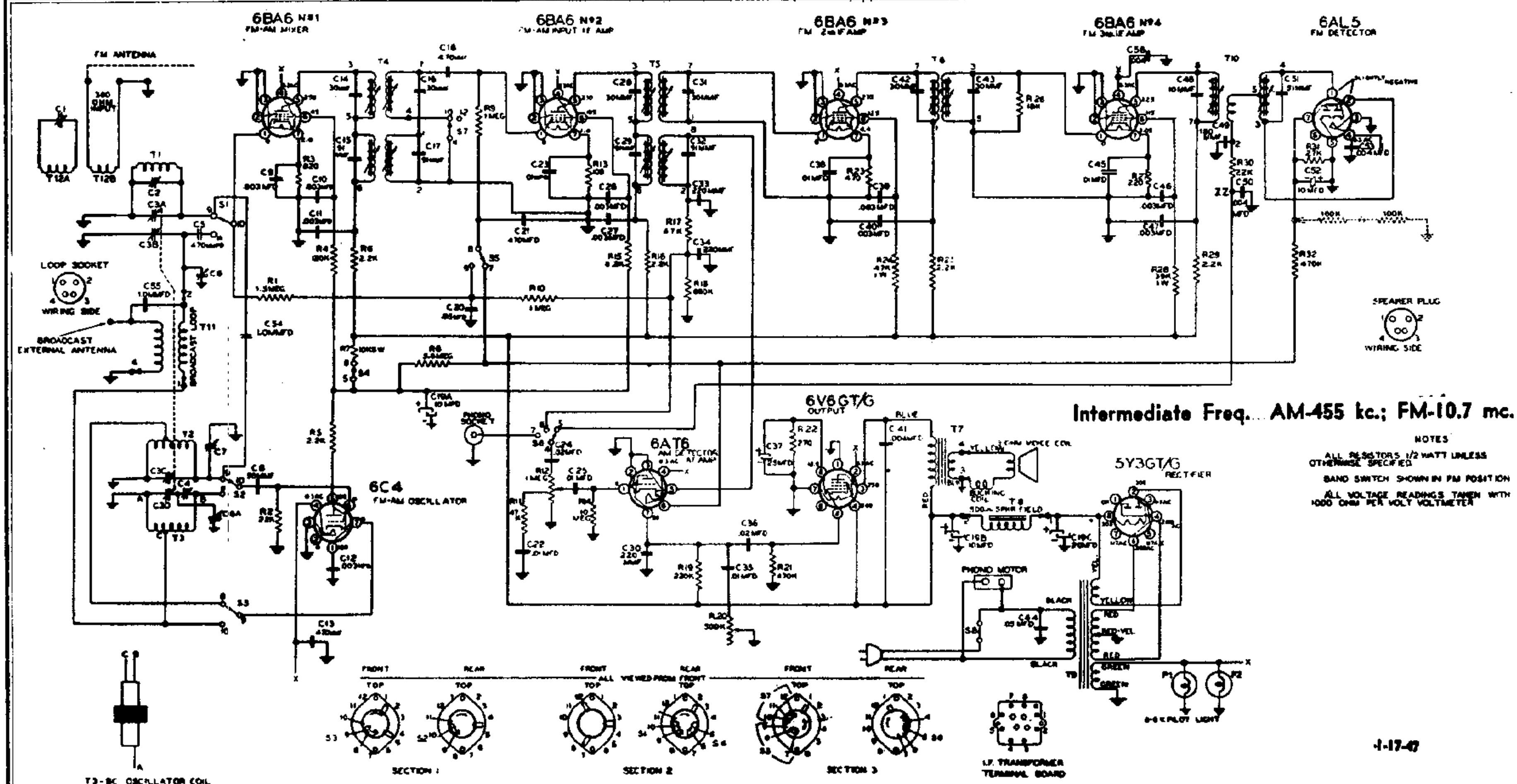
PARTS LIST

Ref. No.	Part No.	Description	Qty. Used In Set
		CONDENSERS	
C20A, B, C	A-8C-10077	40 mf; 20 mf; 20 mf; 150 volts Electrolytic filter condenser	1
A-2M-12618	C3, 5	Trimmer plate	2
A-6M-12616		Insulator for trimmer	2
C10	C-8D-10771	.1 mf x 200 volts, 20%	1
C14, 18, 21	C-8D-10761	.01 mf x 400 volts, 20%	3
C11	C-8D-10813	.05 mf x 400 volts 20%	1
C6	C-8D-10770	.05 mf x 200 volts, 20%	1
C7	C-8D-11251	.09 mf x 400 volts, 10%	1
C17	C-8D-12243	.006 mf x 600 volts, 10%	1
C19	A-8C-11678	Electrolytic condenser, 25 mf x 25 volts	1
C15, C16	C-8F3-10	220 mmf x 500 volts, 20%, mica	2
C2	C-8F3-124	820 mmf x 300 volts, 10%, mica	1
C4	C-8G-12198	47 mmf, 10%, ceramic	1
C1	C-8G-11734	100 mmf, ceramic	1
		RESISTORS	
R7, S1	A-10A-12654	Volume (1 megohm) control and switch	1
R10	A-11B-12659	Tone control, 1 megohm	1
R3	C-9B1-91	270K ohms, ½ watt, 10%	1
R4	C-9B1-47	56 ohms, ½ watt, 10%	1
R14	C-9B1-43	27 ohms, ½ watt, 10%	1
R5	C-9B2-44	33 ohms, 1 watt, 10%	1
R11	C-9B1-86	100K ohms, ½ watt, 10%	1
R13	C-9B1-52	150 ohms, ½ watt, 10%	1
R15	C-9B2-54	220 ohms, 1 watt, 10%	1
R16	C-9B2-63	1200 ohms, 1 watt, 10%	1
R2	-9B1-78	22K ohms, ½ watt, 10%	1
R1	C-9B1-90	220K ohms, ½ watt, 10%	1
R6, R12	C-9B1-95	560K ohms, ½ watt, 10%	2
R8	C-9B1-34	3.3 megohms, ½ watt, 20%	1
R9	C-9B1-36	6.8 megohms, ½ watt, 20%	1
		COILS AND TRANSFORMERS	
T1, C8, 9	B-13A-13071	Input I.F. coil	1
T2, C12, 13	B-13B-13072	Output I.F. coil	1
L4	C-13E-13305	Loop antenna assembly	1

Ref. No.	Part No.	Description	Qty. Used In Set
L3	B-13D-12371	Osc. shunt coil assembly	1
L2	A-23D-12667	Osc. tuning coil	1
L1	A-13E-12668	Antenna tuning coil	1
T3	B-12C-12356	Output transformer for speaker	1
		SPEAKER	
T4	B-18A-12839-1	4" x 6", P.M. speaker, less output transformer	1
		PHONO PARTS	
	D-21H-13293	Record changer	1
	P30	Crystal cartridge, with phono needle	1
		Phono needle, see manual 62P-5050	
		DIAL AND TUNING PARTS	
	C-6D-13315	Dial scale	1
	B-5B-13390-58	Knob	4
	A-2G-13281	Pointer	1
	32F4-10830	Screw, 4-40 x ⅛", to fasten pointer	1
	B-2J-13282	Rack tape, with teeth	1
	A-200-13288	Tuning shaft assembly	1
	A-6B-13277	Diffuser	1
	B-2M-7758	Snap-pin rivets to fasten diffuser	2 d
	A-47A-13360	Pilot lite and bracket assembly	1
P1	A-46A-10793	Pilot lite bulb, 6-8 volt, type T-47	1
		MISCELLANEOUS	
	A-15C-10717	Miniature 7 prong tube socket	5
	B-15B-10076	Mounting plate for lytic	1
	A-19B-12644	Phono motor socket	1
	A-19B-12645	Loop antenna socket	1
	A-19B-11044	Pick-up socket	1
	A-23A-10344	Line cord lock	1
	A-19B-12170	Speaker socket	1
S2	A-20A-12653	Radio-phono switch	1

MODELS 74BR-2702A, 74BR-2702B

MONTGOMERY WARD



ELECTRICAL SPECIFICATIONS

Power Supply..........105 to 125 volts, AC, 60-cycles; Chassis only 85 watts. With phono operation 110 watts.

Frequency Ranges.....Broadcast Band—540 to 1600 kc. F. M. band—88 to 108 mc.

Loud Speaker..........10" electrodynamic. Voice coil impedance 3.2 ohms, 400 cycles.

Selectivity................AM-50kc. broad at 1000 times signal, measured at 1000 kc.

I.F. FM-180 kc. broad at 2 times down.

I.F. FM-290 kc. broad at 10 times down.

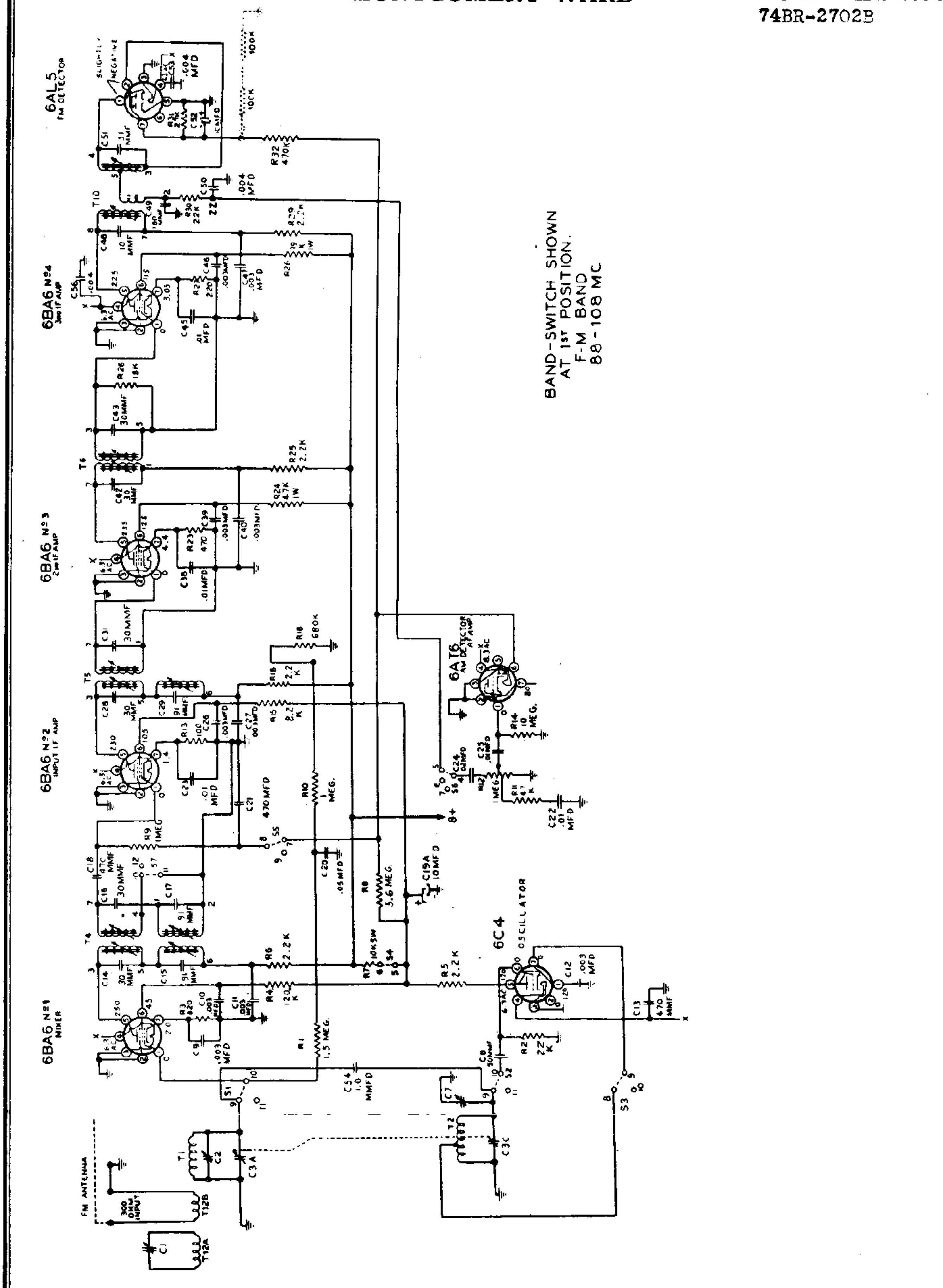
AM Sensitivity.........(For .5 watt output with external antenna)—20 microvolts average

FM Sensitivity..........(For .5 watt output)—15 microvolts average.

Power Output..........3.5 watts 10% distortion. 7 watts maximum.

MONTGOMERY WARD

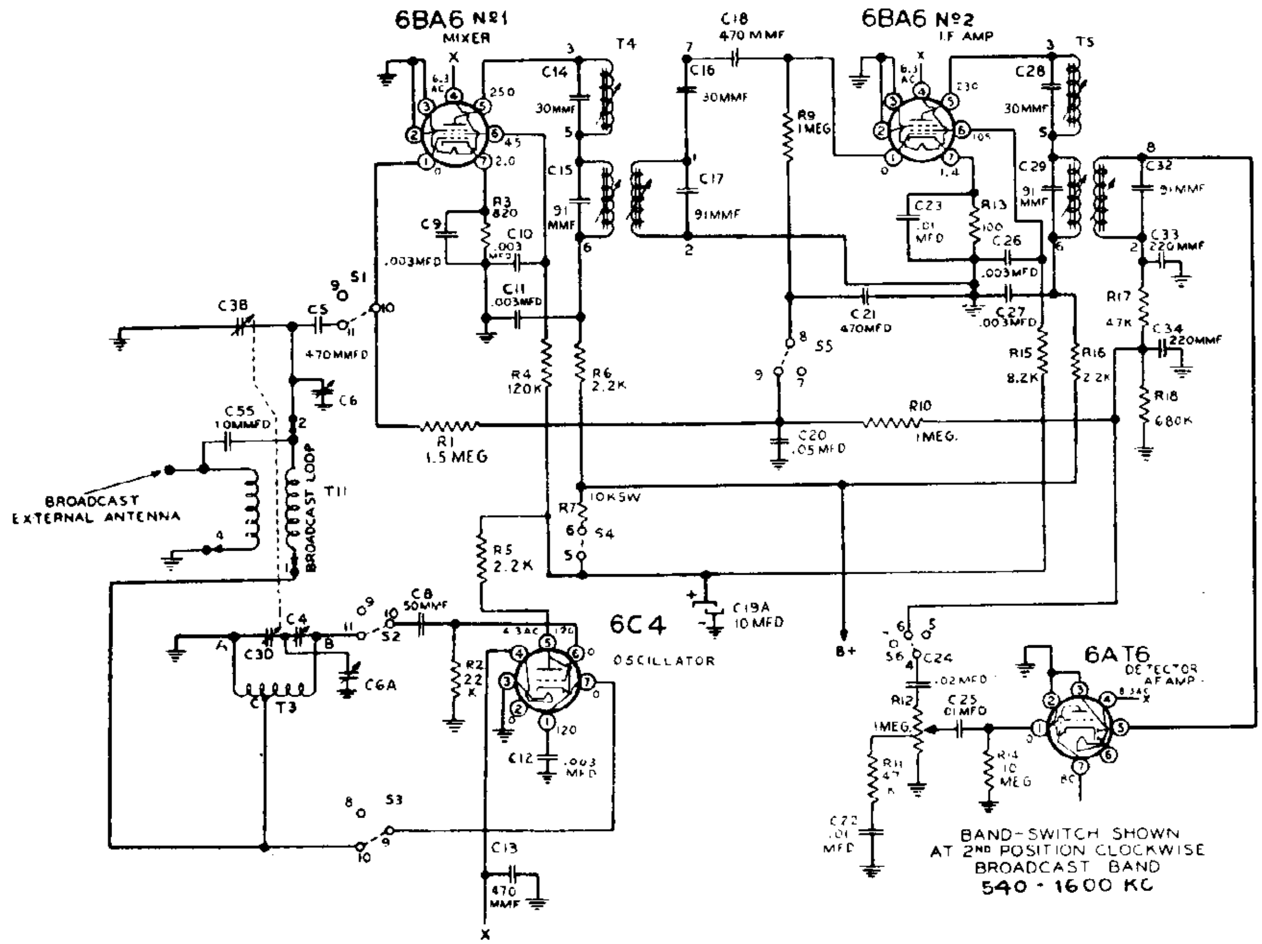
MODELS 74BR-2702A
74BR-2702B



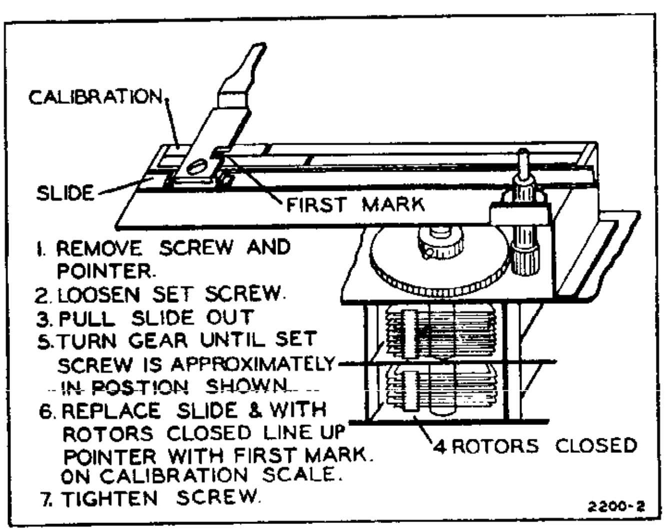
"clarified schematics"

MODELS 74BR-2702A, 74BR-2702B

MONTGOMERY WARD



Procedure for disassembly and assembly of dial mechanism



ALIGNMENT PROCEDURE

Broadcast Band Section I.F. and R.F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of ½ watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.3 volts AC across this resistor will be approximately equivalent to a ½-watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for m imum treble.

The signal source must be an accurately calibrated signal ge rator capable of supplying the frequencies designated, modula 30% with a 400-cycle audio signal. A 400 cycle audio signal required for the audio measurement. Variations in sensitivities plus or minus 25% are usually permissible.

AM - I. F. ALIGNMENT

Band Switch in AM Position. Tune Set to 1400 Kc. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENT TO BE MADE	ADJUST FOR
455 Kc. Use 2100 microvolts	Pin No. 1 of 6BA6 No. 2 and ground	Primary and Secondary of T5 AM windings. See top and bottom views	Maximum output. Should be ½ watt
455 Kc. Use 64 microvolts	Pin No. 1 of 6BA6 No. 1 and ground	Primary and Secondary of T4 AM windings. See top and bottom views	Maximum output. Should be ½ watt
400 cycles. Use 63 millivolts	Pin No. 1 of 6AT6 and ground	None	Maximum output. Should be ½ watt

BROADCAST BAND - R. F. ALIGNMENT

Check Pointer so that is is Exactly Over Calibration Marker to the Extreme Left When Gang is Fully Closed. For Adjustment Loosen Set Screw on Large Gear (see dial mechanism illustration.)

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST
1400 Kc. Use 15 microvolts	Antenna and Ground	200 mmf.	C6A for maximum. ½ watt
600 Kc. Use 25 microvolts	Antenna and Ground	200 mmf.	C4 for maximum. ½ watt
1400 Kc.	Antenna and Ground	200 mmf.	C6 See Note

NOTE: Recheck first two adjustments after this adjustment because of inter-locking effects.

ALIGNMENT PROCEDURE

FM Band Section. I.F. and R.F.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over long periods of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube voltmeter which has a "floating ground". In other words, the meter, when used as a vacuum tube voltmeter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM - I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENT TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No.1 of 6BA6 no. 4 and ground	Pin no. 7 of 6AL5 and ground	Primary of T10	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No.1 of 6BA6 no. 4 and ground	See note "A"	Secondary of T10	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 4000 microvolts	Pin No.1 of 6BA6 no. 3 and ground	Pin no. 7 of 6AL5 and ground	Primary and Secondary of T6	Resonance should be about 3 volts
10.7 Mc. Use about 150 microvolts	Pin No.1 of 6BA6 no. 2 and ground	Pin no. 7 of 6AL5 and ground	Primary and Secondary of 10.7 mc. windings of T5. See top and bottom views	Resonance should be about 3 volts
10.7 Mc. Use 3000 microvolts	FM Antenna input and ground	Pin no. 7 of 6AL5 and ground	Primary and Secondary of 10.7 mc. windings of T4. See top and bottom views	Resonance should be about 3 volts See Note "C"
10.7 Mc.	FM Antenna input and ground	Pin no. 7 of 6AL5 and ground	C1	Minimum reponse. This is a trap circuit

NOTES ON FM—I.F. ALIGNMENT:

NOTE "A" Connect two resistors, 100K OHMS each, from Pin No. 7 of 6AL5 to ground. These resistors must be matched within 5%. Connect as shown in dotted lines on schematic diagram. Connect vacuum tube voltmeter between the mid point of the resistors and point zz.

NOTE "B" If T10 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

GENERAL: Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

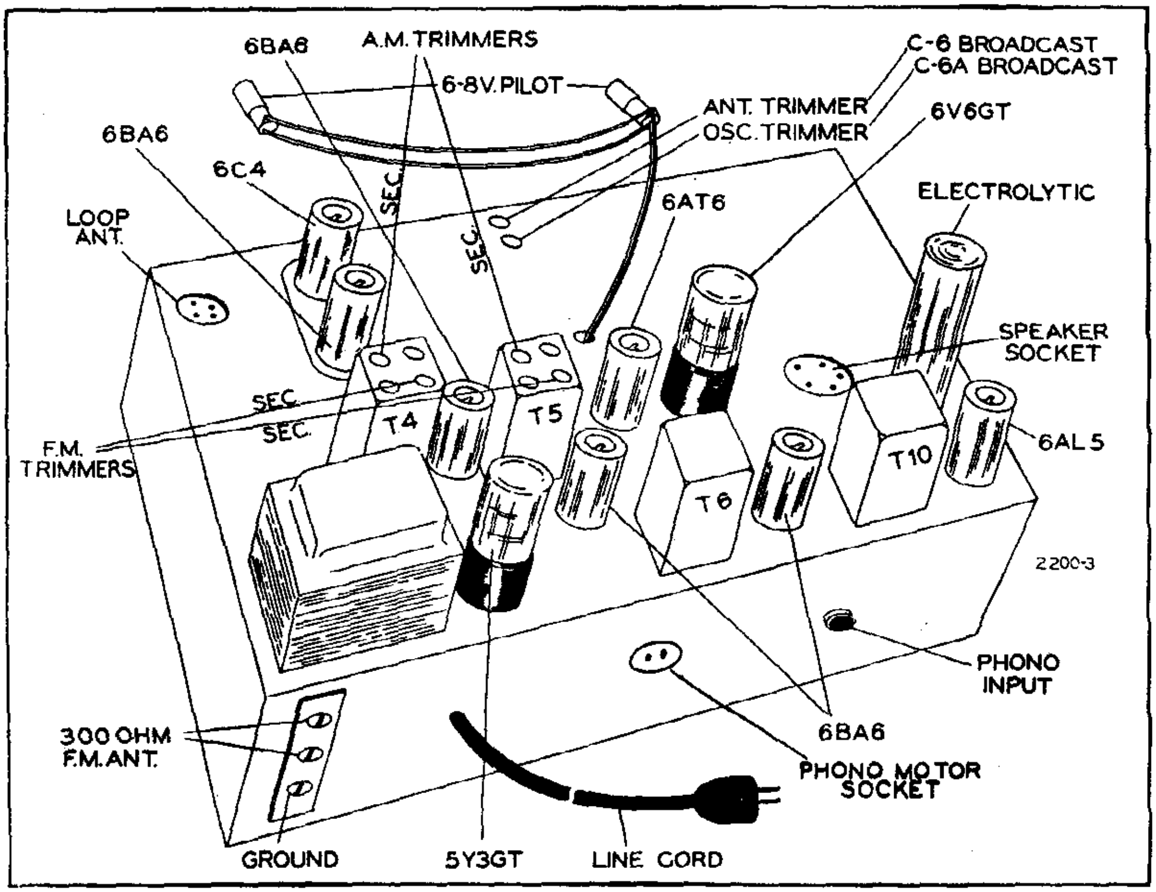
NOTE "C" The input microvolts specified is based on the trap circuits being adjusted.

FM - R. F. ALIGNMENT

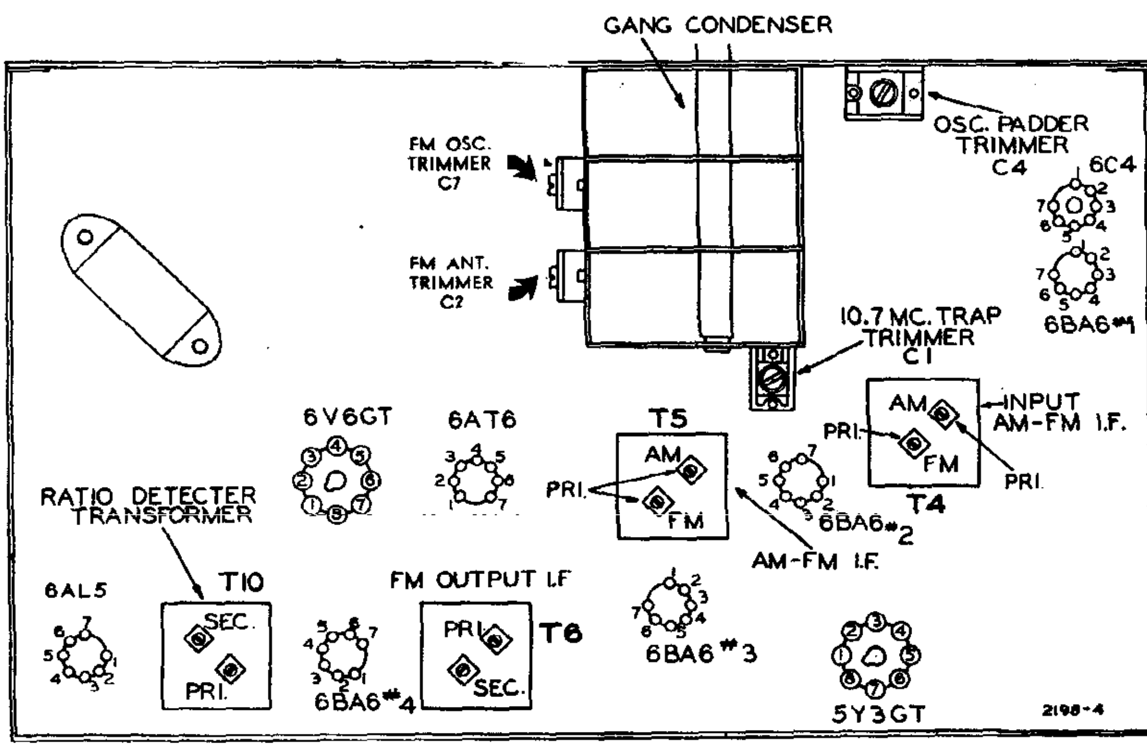
Check Pointer so that is is Exactly Over Calibration Marker to the Extreme Left When Gang is Fully Closed. For Adjustment Loosen Set Screw on Large Gear (see dial mechanism illustration.)

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	DUMMY ANTENNA	ADJUST	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUST TO
100 Mc. Use about 15 microvolts	FM Antenna lead	300 ohms	C7 Osc. C2 Ant.	Pin No. 7 of 6AL5 and Ground	Resonance about 3 volts

NOTE: If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the F. M. Band and to use the vacuum tube volt meter as above for resonance indication. A weak carrier, however will not produce 3 volts.



Chassis—top view



Chassis—bottom view

MONTGOMERY WARD

HOW TO ORDER PARTS—When ordering, specify *PART* number, schematic diagram reference number when applicable, and *CHASSIS MODEL* number. The model number appears on a label on the chassis.

REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

R. F. TUNER PARTS

CONDENSERS

Ref. No.	Part No.	Description	Qty. Used in Set
C3A-B-C-D	B-8A-11275	Two gang split stator variable	1
C2	A-8E-12079	Trimmer cond. F.M. antenna	1
C1	A-8E-11506	Trimmer cond. I.F. trap	1
C7	A-8E-11279	Trimmer cond. F.M. osc. trimmer	1
C6, C6A	A-8E-12557	Trimmer cond. B.C. antenna and oscillator	1
C4	A-8E-12177	Padder cond.—B.C. Band	1
C8	C-8G-11484	50 mmf, ±10%, ceramic	1
C55	C-18G-12408	1.0 mmf, ±.2 mmf, ceramic	1
C-9-10-11-12	C-8G-11486	3000 mmf, ±20%, ceramic	4
C5-13	C-8F3-12	470 mmf, 500 volts, ±20% mica	2

RESISTORS

Ref. No.	Part No.	Description	Qty. Used in Set
R3	C-9B1-61	820 ohms, ½ watt, 10%	1
R12	A-10B-11263	Volume control (1 megohm)	1
R20, S8	A-11A-11262	Tone control (500M ohms) and switch	1
R5, R6	C-9B1-15	2200 ohms, ½ watt, 20%	2
R1	C-9B1-32	1.5 megohm, ½ watt, 20%	1
R2	C-9B1-78	22K megohms, ½ watt, 10%	1

MISCELLANEOUS

Ref. No.	Part No.	Description	Qty. Used in Set
	A-15C-11491	7-prong miniature tube socket	1
	A-15A-11276	Miniature tube socket, ceramic with base	1
	A-2H-12337	Socket shield base	1
	A-2H-11494	Tube shield	2
	200-12862	Spur gear assembly—consists of two gears, two springs and bushing	1
	A-49A-11673	Spring for above assembly	2
S1-2-3-4-5-6-7	B-20A-11261	Band switch and phono-radio switch	1
	B-2C-11188-1	Dial plate assembly with tape guide, bushing, shaft and pinion gears	1
	A-3J-11182	Pinion gear—inner side of plate	1
	A-3J-11183	Pinion gear—outer side of plate	1
	A-3A-11181	Shaft—for pinion gears	1
	B-2J-11190	Rack tape—with teeth and bracket	1
	A-200-11511	Pointer with bracket	1
	A-49A-12960	Pointer tension spring	1
	32F4-10830	B. H. M. S. 4-40 x 1/8 screw, to fasten pointer and bracket to tape bracket	1

COILS

Ref. No.	Part No.	Description	Qty. Used in Set
T2	A-13D-11282	88-108 mc oscillator coil	1
T1	A-13E-11283	88-108 mc antenna coil secondary	1
T12A, T12B	A-13E-11284	88-108 mc antenna coil primary with trap	1

MAIN CHASSIS PARTS

Ref. No.	Part No.	Description	Qty. Used in Set
C52	A-8C-11495	Electrolytic condenser 10 mfd x 150 volts	1
C37	A-8C-11496	Electrolytic condenser 25 mfd x 25 volts	1
C19A, B, C	A-8C-10272	Electrolytic condenser 10 mfd x 10 mfd x 20 mfd	1
C24, C36	C-8D-10774	.02 mfd x 400 v., 20%, tubular	2
C20	C-8D-10770	.05 mfd x 200 v., 20%, tubular	1
C22	C-8D-11738	.01 mfd x 200 v., 20%, tubular	1
C25, 35	C-8D-10761	.01 mfd x 400 v., 20%, tubular	2
C41, 50, 53, 56	C-8D-10788	.004 mfd x 600 v., 20%, tubular	4
C49	C-8F3-116	180 mmfd x 500 v., 10%, mica	1
C23, 38, 45	C-8F9-20	10K mmfd x 300 v., 20%, mica	3
C21, 18	C-8F3-12	470 mmfd x 500 v., 20%, mica	2
C30, 33, 34	C-8F3-10	220 mmfd x 500 v., 20%, mica	3
C44	C-8J-11388	.05 mfd x 600 v., 20%, molded case paper	1
C26-27-39 40-46-47	C-8G-12449	3000 mmfd, 20%, ceramic-insulated	6
C14, 16, 28, 31, 42, 43	C-8G-12159	30 mmfd, 500 volts, 5%, ceramic	6
C48	C-8G-11789	10 mmfd, 10%, ceramic	1
C51	C-8G-11891	51 mmfd, 5%, ceramic	1
C15-17	C-8G-12160	91 mmfd, 5%, ceramic	2
C29-32	C-8F5-224	91 mmfd, 5%, silver mica	2

RESISTORS

Ref. No.	Part No.	Description	Qty. Used in Set
R4	C-9B1-87	120K ohms, ½ watt, 10%	1
R15	C-9B1-73	8200 ohms, ½ watt, 10%	1
R26	C-9B1-77	18K ohms, ½ watt, 10%	1
R18	C-9B1-96	680K ohms, ½ watt, 10%	1
R24	C-9B2-82	47K ohms, 1 watt, 10%	1
R28	C-9B2-81	39K ohms, 1 watt, 10%	1
R7	B-9C-11489	10K ohms, 5 watts, 10%, wire-wound	1
R30	C-9B1-78	22K ohms, ½ watt, 10%	1
R21	C-9B1-29	470K ohms, ½ watt, 20%	1
R22	C-9B1-55	270 omhs, ½ watt, 10%	1
R16, 25, 29	C-9B1-15	2200 ohms, ½ watt, 20%	3
R8	C-9B1-107	5.6 megohms, ½ watt, 10%	1
R9, 10	C-9B1-31	1 megohm, ½ watt, 20%	2
R13	C-9B1-50	100 ohms, ½ watt, 10%	1
R11, R17	C-9B1-23	47K ohms, ½ watt, 20%	2
R19	C-9B1-27	220K ohms, ½ watt, 20%	1
R14	C-9B1-37	10 megohms, ½ watt, 20%	1
R27	C-9B1-54	220 ohms, ½ watt, 10%	1
R32	C-9B1-94	470K ohms, ½ watt, 10%	1
R31	C-9B1-79	27K ohms, ½ watt, 10%	1
R23	C-9B1-58	470 ohms, ½ watt, 10%	1

COILS

Ref. No.	Part No.	Description	Qty. Used in Set
T3	A-13D-11285	B.C. oscillator coil	1
T4	C-203-11743	Input I.F. coil combination assembly. 455 kc and 10.7 mc	1
T5	C-203-11746	2nd I.F. coil combination assembly. 455 kc and 10.7 mc	1
T6	C-203-11744	3rd I.F. coil assembly 10.7 mc	1
T10	C-203-11745	Ratio detector I.F. coil assembly 10.7 mc	1
T11, C56	C-13E-12340	Loop antenna assembly with 1.0 mmfd cond. C-8G-12408	1

TRANSFORMERS

Ref. No.	Part No.	Description	Qty. Used in Set
T7	B-12C-11253	Output transformer for speaker	1
T9	B-12A-11259	Power transformer—105-125 volts AC, 60 cycles primary	1

SPEAKER

Ref. No.	Part No.	Description	Qty. Used in Set
T8	B-18B-10617	Electrodynamic speaker, 10-inch, less output transformer	1

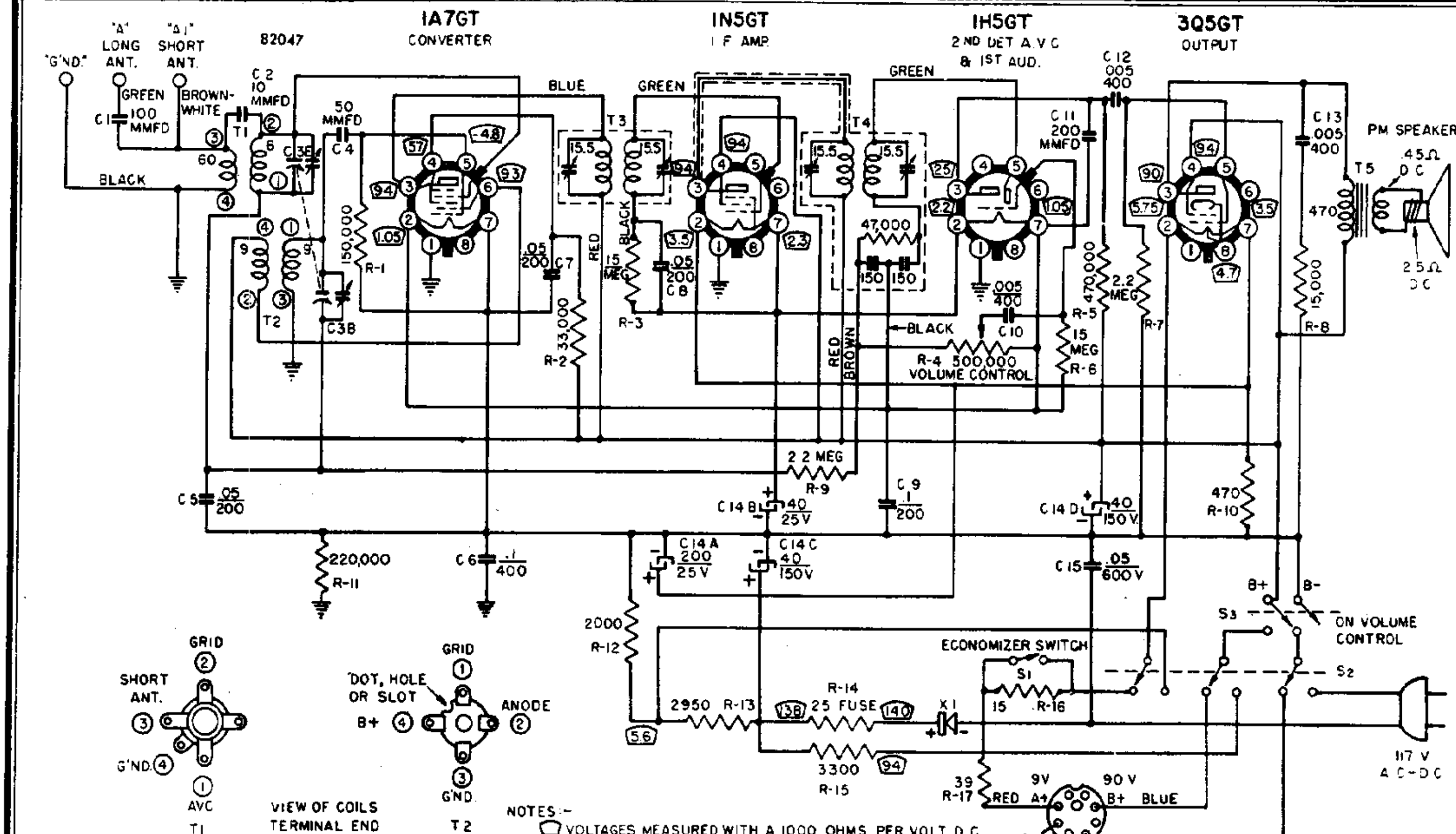
MISCELLANEOUS

Ref. No.	Part No.	Description	Qty. Used in Set
	C-6D-12008	Dial scale	1
	D-5C-10006-37	Escutcheon	4
	A-2M-11541	Clip, holds scale to escutcheon	4
	B-5B-10376-37	Knob, "Volume"	1
	B-5B-11672-37	Knob, "Bandswitch"	1
	B-5B-10377-37	Knob, "Tuning"	1
	B-5B-10378-37	Knob, "Tone"	1
	55A-11400	Fidelitone needle	1
	A-23J-12508	Shield (dial)	1
	B-47A-10808-3	Pilot lite assembly	1
P1, P2	A-46A-11739	Pilot lite bulb, 6-8volt, T-44	2
	A-19B-11009	Socket for phono motor	1
	A-15B-11536	Speaker socket	1
	A-19B-12170	Socket for tone arm lead	1
	A-19B-11272	Antenna socket	1
	A-15B-10440	8-prong, octal, tube socket	2
	A-15C-10717	7-prong, miniature tube socket	5
	A-2H-10718	Shield base	5
	A-2H-10974	Shield can	5
	B-14M-11479	A.C. line cord	1
	A-23A-10344	Line cord lock	1

The parts lists for Models 2702A and 2702B are identical with the following exceptions for Model 2702B:

T10	C-203-11745 or C-13M-13348	Ratio detector I.F. coil assembly 10.7 mc
L1	A-16A-13034	Filament choke

MONTGOMERY WARD



NOTES:-

◯ VOLTAGES MEASURED WITH A 1000 OHMS PER VOLT D.C. METER BETWEEN B- AND POINTS DESIGNATED.

SET OPERATED ON 117 V.A.C.

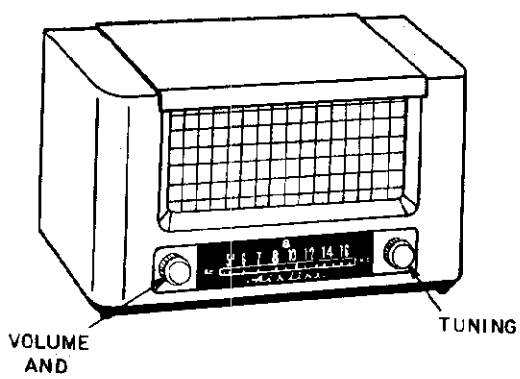
CAPACITOR VALUES IN MFD UNLESS OTHERWISE SPECIFIED.

RESISTOR AND COIL VALUE IN OHMS.

WHERE VALUE OF COILS IS NOT SHOWN, RESISTANCE IS LESS THAN ONE OHM

SEE PARTS LIST FOR RESISTOR TOLERANCES

SWITCH S2 SHOWN IN BATTERY POSITION.



Power Supply	105-125 volts AC or DC. 12 watts, 90 volts and 9 volt battery pack.
Frequency Range ...	540-1620 KC.
Intermediate Frequency	455 KC.
Selectivity	42 KC broad at 1000 times ...
Sensitivity	(for .05 watts output with external antenna) 30 microvolts average.
Power Output	210 milliwatts maximum, 120 milliwatts at less than 10% distortion.
Loud Speaker	5" PM dynamic.
Voice Coil Impedance	3.2 ohms at 400 cycles.

MONTGOMERY WARD

ANTENNA—An antenna of 50 feet or longer should be connected to the long *antenna* lead "A." An antenna of less than 50 feet should be connected to the antenna lead "A-1."

DIAL CORD REPLACEMENT—Is *best accomplished by* replacing complete cord assembly No. 26060 which is made up to correct length. In an emergency 30 lb. fish line *may* be used. *See picture of chassis for correct* installation.

ALIGNMENT PROCEDURE

VOLUME CONTROL — MAXIMUM FOR ALL ADJUSTMENTS.

Connect radio to ground connections of Signal Generator. (See Page 1).

Allow the chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

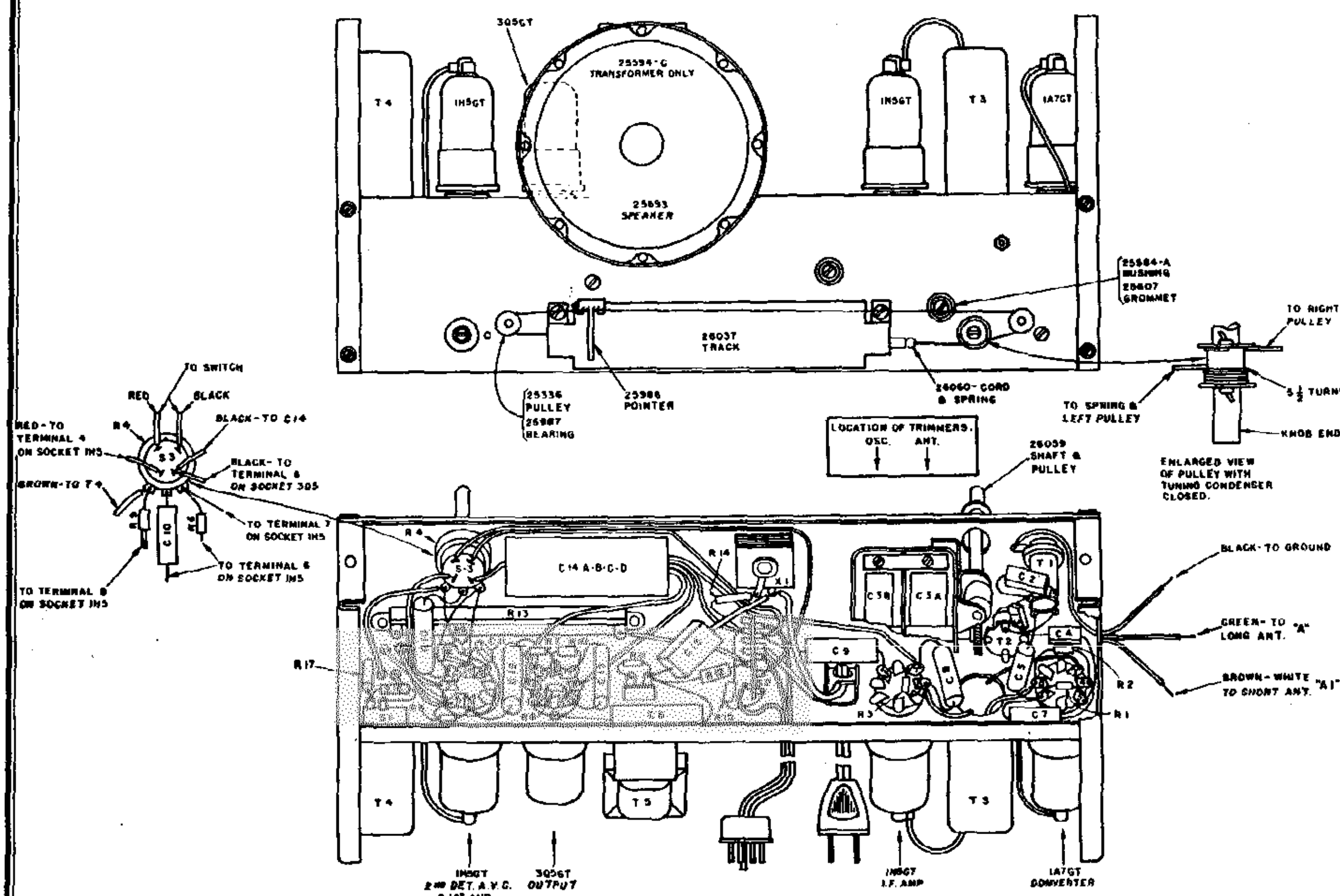
A signal generator *which will provide an* accurately calibrated signal at the test frequencies as listed.

Output indicating meter; non-metallic screw driver.

Dummy antennas — .1 mfd., 200 mmfd condensers.

Signal Generator		Connection To Radio	Condenser Setting	Adjust Trimmers To Maximum
Frequency Setting	Dummy Antenna			
455 kc.	.1 Mfd.	1A7, CAP	Turn rotor plates *to full open*	1st IF Transformer. *2nd IF Transformer.*
1620 kc.	200 Mmfd.	Antenna Lead "A"	Turn rotor plates to full open	Osc. trimmer on tuning condenser.
1400 kc.	200 Mmfd.	Antenna Lead "A"	Tune rotor to Maximum output.	Ant. section trimmer on tuning condenser.

The dial pointer may be adjusted to the scale calibration by slipping the pointer on the dial cord.



MONTGOMERY WARD

OPERATING VOLTAGES — This radio is designed for operation on the following power supplies:

POWER LINE
105-125 Volts AC 50-60 Cycles
or 105-125 Volts DC

BATTERY
Wards Battery #62-54
"A" Section 9 Volts
"B" Section 90 Volts

BATTERY OPERATION—To operate this receiver on battery pack it is necessary to insert the line cord plug in the battery line socket switch, which is located top center of chassis.

RECEIVER STAGE SENSITIVITIES

The following table lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .05 watts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resitser across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a .05 watt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supply both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus of Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR .05 WATT OUTPUT
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	
1000 kc.	200 mmf or RMA Dummy Antenna	External Antenna Lead "A"	Chassis	30 Micro-volts
1000 kc.	Same as above	1A7GT Top cap	1A7 Pin 7	180 Microvolts
455 kc.	Same as above	1A7GT Top cap	Same as above	480 Microvolts
455 kc.	Same as above	1N5GT Top cap	Same as above	8000 Microvolts
400 cycles	.05 mfd.	C.T. of Volume Control	Same as above	.058 Volts
400 cycles	.05 mfd.	3Q5GT Output Pin 5	Same as above	1.9 Volts

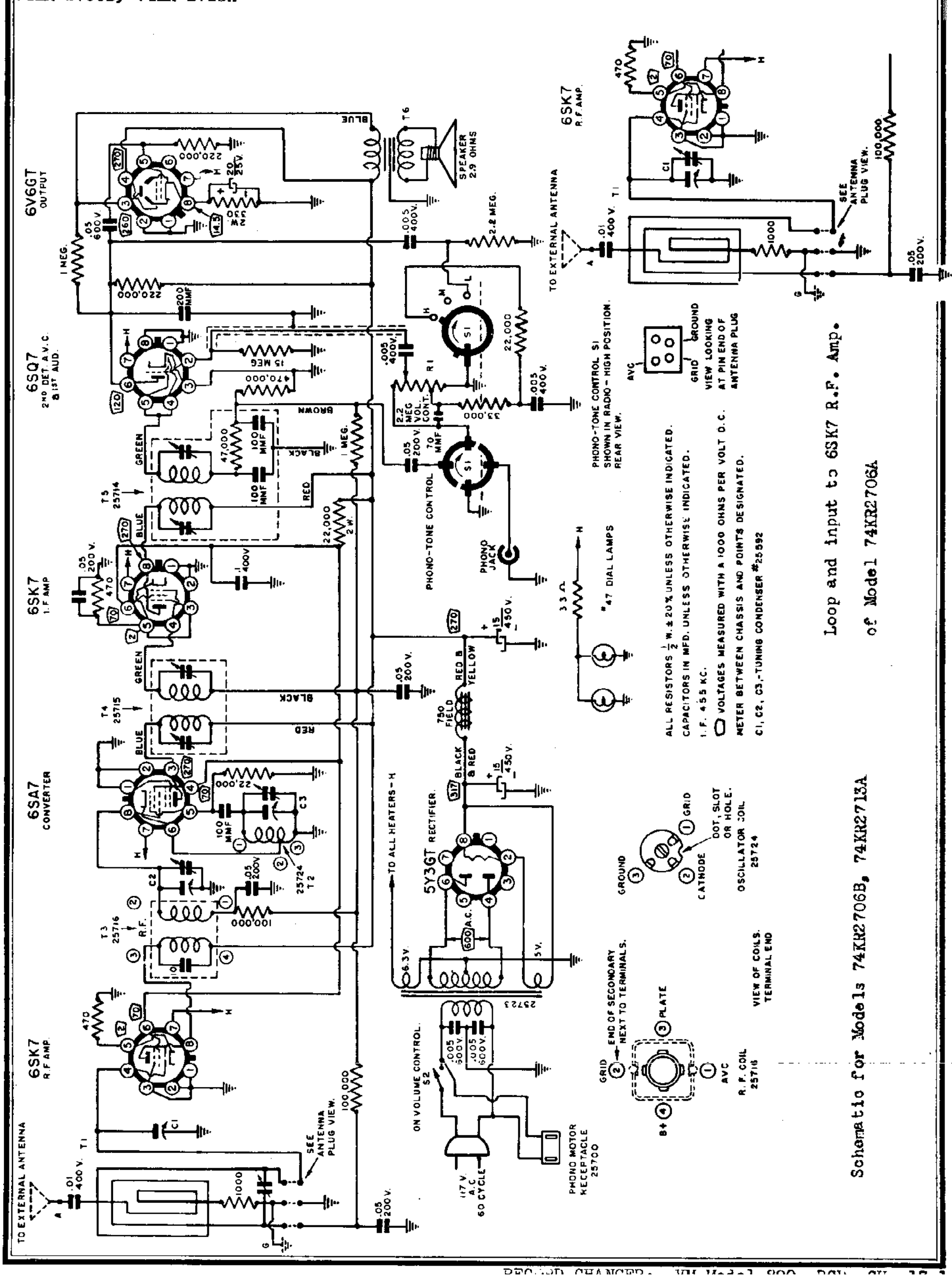
REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Quantity Used
		CAPACITORS	
C 1	8872	100 MMFD Mica	1
C 2	25997	10 MMFD Mica	1
C 3E-B	26028	Gang Tuning With Trimmers	1
C 4	17091	50 MMFD Mica	1
C 5-7-8	8661	.05 MFD. 200V. Tubular	3
C 6	17647	.1 MFD. 400V. Tubular	1
C 9	8582	.1 MFD. 200V. Tubular	1
C 10-12-13	17646	.005 MFD. 400V. Tubular	3
C 11	14370	200 MMFD. Mica	1
C 14 A-B-C-D	25991	Electrolytic 40-40 MFD. 150 V., 40-200 MFD. 25 V	1
C 15	25996	05 MFD. 600V. Paper	1
		RESISTORS	
R 1	14616	150,000 Ohm ½ W. Carbon	1
R 2	25144	33,000 Ohm ½ W Carbon	1
R 3-6	14365	15 Megohm ½ W. Carbon	2
R 4	25990	Volume Control 500,000 Ohm With Sw. S 3	1
R 5	25042	470,000 Ohm ½ W. Carbon	1
R 7-9	25134	2.2 Megohm ½ W. Carbon	2
R 8	17164	15,000 Ohm ½ W Carbon	1
R 10	26003	470 Ohm ½ W. Carbon	1
R 11	25041	220,000 Ohm ½ W. Carbon	1
R 12	26004	2000 Ohm 1 W. Carbon	1
R 13	26008	2950 Ohm 10W. Wire Wound	1
R 14	26006	25 Ohm Fuse Wire Wound	1
R 15	25385	3300 Ohms ½ W. Carbon	1
R 16	26005	15 Ohm ½ W. Wire Wound	1
R 17	26007	39 Ohm ½ W. Wire Wound	1

Ref. No.	Part No.	Description	Quantity Used
		TRANSFORMERS AND COILS	
T 1	25989	Antenna Coil	1
T 2	25988	Oscillator Coil	1
T 3	25621	Transformer I.F. Input	1
T 4	25622	Transformer I.F. Output	1
T 5	25594C	Transformer Output Speaker	1
		DRIVE AND DIAL ASSEMBLY	
	25987	Bearing for Wood Pulleys	2
	25584	Bushing-Headed	3
	25554	Bracket for Tuning Condenser	2
	26060	Cord-Dial and Spring	1
	25966	Dal Scale-Plastic	1
	25986	Dial Pointer	1
	26038	Knob-Volume	1
	26021	Knob-Tuning	1
	25336	Pulley-Wood Small	2
	26059	Tuning Shaft and Pulley	1
	26113	Tuning Shaft Bushing	1
	26037	Track-Dial Pointer	1
	25607	Rubber Grommets	3
	26026	Set Screw for Worm Drive	2
	25100	Screws-Dial Scale No. 2	4
	25033	Spring-Dial Cord	1
		MISCELLANEOUS	
	25593	Speaker 5" PM With Transformer	1
	25620	Socket-Octal	4
	25068	Cord-AC and Plug	1
	25999	Plug-Battery Cable	1
X 1	26002	Rectifier 100MA	1
	26000	Shell-Battery Cable	1
S 1	25319	Switch-Economizer	1
S 2	26011	Switch-Change AC To Battery	1

MODELS 74KR-2706A,
74KR-2706B, 74KR-2713A

MONTGOMERY WARD



MONTGOMERY WARD

RECEIVER STAGE SENSITIVITIES

The following table lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resister across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supply both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
Frequency	Coupling Capacitor	Connection to Reciever	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	External Antenna Lead	Chassis	5 microvolts
1000 kc	.05 mfd.	6SA7 Mixer, Pin 8	Same as above	175 microvolts
455 kc.	.05 mfd.	6SA7 Mixer, Pin 8	Same as above	160 microvolts
455 kc.	.05 mfd.	6SK7 1-F, Pin 4	Same as above	1600 microvolts
400 cycles	.05 mfd.	6SQ7 1st A-F, Pin 2	Same as above	.12 volts
400 cycles	.05 mfd.	6V6GT Output, Pin 5	Same as above	4.32 volts

ALIGNMENT PROCEDURE

VOLUME CONTROL — MAXIMUM FOR ALL ADJUSTMENTS.

Tone control — In "HIGH" position.

Connect radio chassis to ground connection of Signal Generator.

Allow the chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

A signal generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output indicating meter; non-metallic screw driver.

Dummy antennas — .1 mfd., 200 mmfd.

Place loop antenna in its normal relation to the chassis.

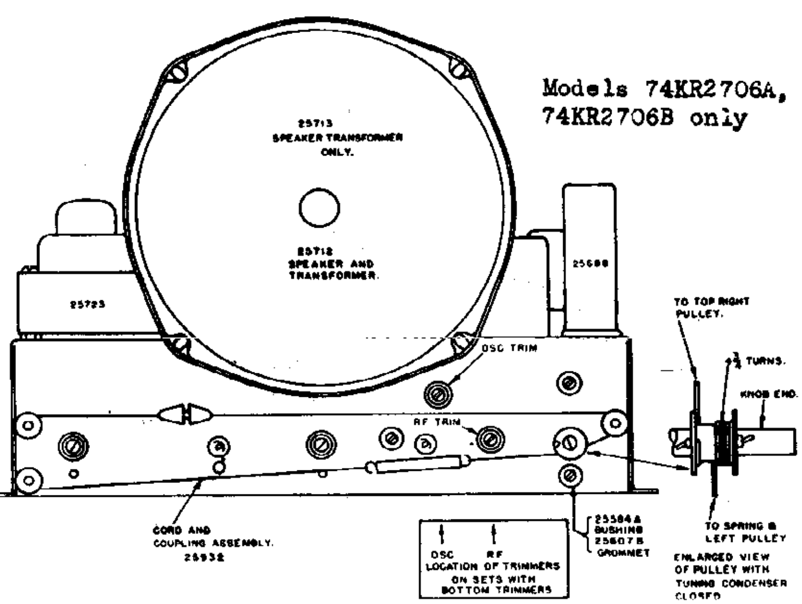
Signal Generator		Dummy Antenna	Condenser Setting	Adjust Trimmers To Maximum
Frequency Setting	Connection To Radio			
455 kc	.1 Mfd.	6SA7, Pin 8	Turn rotor plates to full open	1st IF Transformer. 2nd IF Transformer.
1620 kc	200 Mmfd.	Antenna Lead	Turn rotor plates to full open	Osc. trimmer on tuning condenser.
1400 kc	200 Mmfd.	Antenna Lead	Tune rotor to maximum output.	RF Section trimmer on tuning condenser. Antenna trimmer on loop antenna.

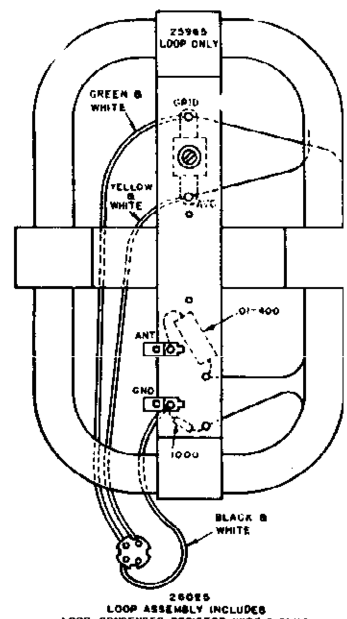
The dial pointer may be adjusted to the scale calibration by slipping the pointer coupling on the dial cord.

Trimmer locations for Model 74KR2713A are on page 17-46

Models 74KR2706B, 74KR2713A only

Models 74KR2706A, 74KR2706B only





REPLACEMENT PARTS INFORMATION

HOW TO ORDER PARTS — When ordering, specify PART number, schematic diagram reference, number when applicable, and CHASSIS MODEL NUMBER. The model number on a label on the chassis. Parts should be ordered from the nearest Wards Mail Order House.

Ref. No.	Part No.	Description	Qty. Used In Set
		CAPACITORS	
C 1-2-3	25592	Gang Tuning Capacitor Trimmers	1
	25688	Electrolytic 15-15 Mfd. 450V., 20 Mfd. 25V	1
	8878	.05 Mfd.—600V, Tubular	1
	8661	.05 Mfd.—200V. Tubular	5
	17646	.005 Mfd.—400V. Tubular	3
	17647	.1 Mfd.—400V. Tubular	1
	8583	.01 Mfd. — 400V Tubular	1
	14370	.0002 Mfd. Mica	1
	8872	.0001 Mfd. Mica	1
	25689	.005 Mfd. 600V. Moulded	2
	25964	70 Mmfd. Mica	1
		RESISTORS	
	25414	1000 Ohm ½W. Carbon	1
	25742	330 Ohm 2W. Carbon	1
	25085	470 Ohm ½W. Carbon	2
	25721	22,000 Ohm, 2W. Carbon	1
	25038	22,000 Ohm ½W. Carbon	2
	25144	33,000 Ohm ½W. Carbon	1
	25042	470,000 Ohm ½W. Carbon	1
	8885	100,000 Ohm ½W. Carbon	2
	25041	220,000 Ohm ½W. Carbon	2
	8766	1,000,000 Ohm ½W. Carbon	2
	25134	2.2 Megohm ½W. Carbon	1
	14365	15 Megohm ½W. Carbon	1
	25836	3.3 Ohm ½W. Wire Wound	1
R 1	25690	Volume Control With Switch S2	1
		TRANSFORMERS AND COILS	
T 1	25965	Loop Antenna	1
T 2	25724	Coil — Oscillator	1
T 3	25597	Coil — RF	1
T 4	25715	Transformer — IF Input	1
T 5	25714	Transformer — IF Output	1
T 6	25713	Transformer — Output Speaker	1
	25723	Transformer — Power — 60 cycle	1

Parts list for Model 74KR2706A same as above with following exception.

T 1	25692	Loop Antenna	1

Parts list for Model 74KR2713A same as above with following exceptions.

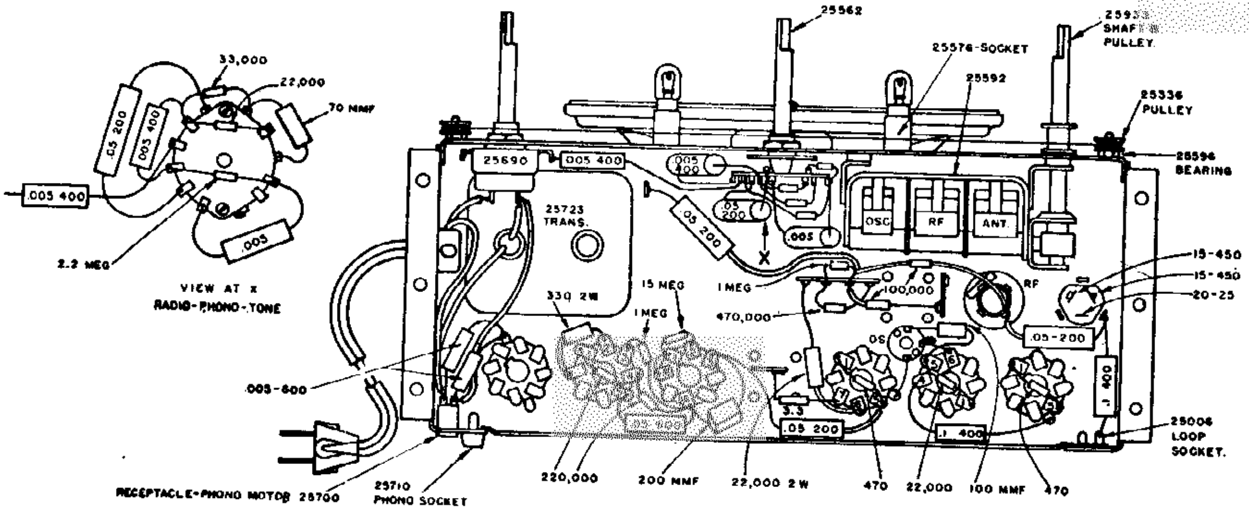
	25951	Track	1
	26114	8" EM SPEAKER — With Transformer and Plug	1
	26116	Storage Shaft Assembly	1

Ref. No.	Part No.	Description	Qty. Used In Set
		DIAL AND DRIVE ASSEMBLY	
	25596	Bearing for Wood Pulleys	3
	25572	Bracket - Tuning Condenser — Front	1
	25573	Bracket - Tuning Condenser — Rear	1
	25932	Cord-Dial (Includes Pointer Coupling)	1
	25947	Dial Scale — Plastic	1
	25578	Dial Pointer	1
	25829	Knob — Tone	1
	25696	Knob - Volume — Tuning	2
	25336	Pulley — Wood — Small	3
	25933	Pulley — Manual Drive With Shaft	1
	25607	Rubber — Grommets	3
	26026	Screw — Set for Worm Gear (Tuning Condenser)	2
	25576	Socket — Dial Lamp	2
	25963	Spring — Dial Cord	1
	25936	Track — Assembly	1
	25952	Washer — Track	2
		MISCELLANEOUS	
	25712	8" EM Speaker — With Transformer	1
	25620	Socket — Octal	6
	25700	Receptacle — Phono Motor	1
	25006	Socket - For Loop Antenna	1
	25710	Socket - Phono Pick-up	1
S 1	25562	Switch — Tone	1
	25574	Bracket — Speaker	1 *
	25068	Cord — AC and Plug	1
	25693	Plug — For Loop	1
		RECORD CHANGER PARTS	
	26034	Motor, 60 cycle, 117 volts	1
	26035	Shure P-30 Crystal Pickup Cartridge and Needle	1
	26036	Replacement Needle Only	1

*In Models 74KR2706A, 74KR2706B only

Power Supply	105-125 volts AC, 60 cycles, 55 watts. (80 watts phono operating).
Frequency Range	540 - 1620 KC.
Intermediate Frequency	455 KC.
Selectivity	40 KC broad at 1000 times signal, 1000 KC.
Sensitivity	(for .5 watt output) with external antenna 5 microvolts average.
Power Output	6 watts maximum, 3.2 watts 10% distortion.
Loud Speaker	8" EM dynamic, 750 ohms.
Voice Coil Impedance	3.2 ohms at 400 cycles.

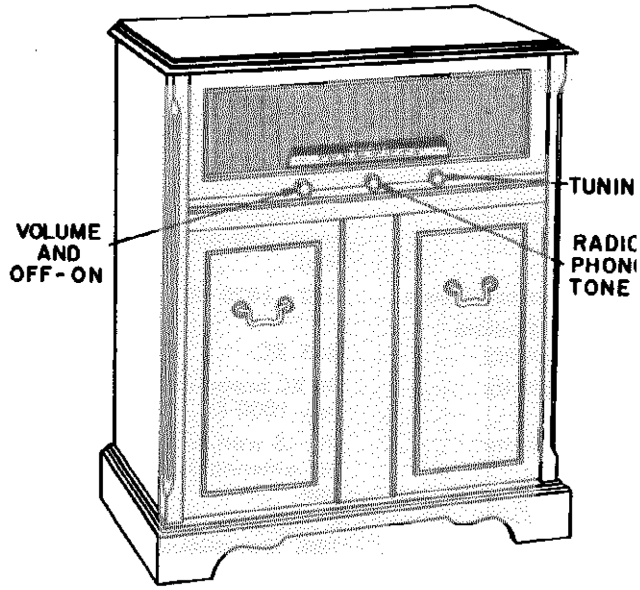
MONTGOMERY WARD



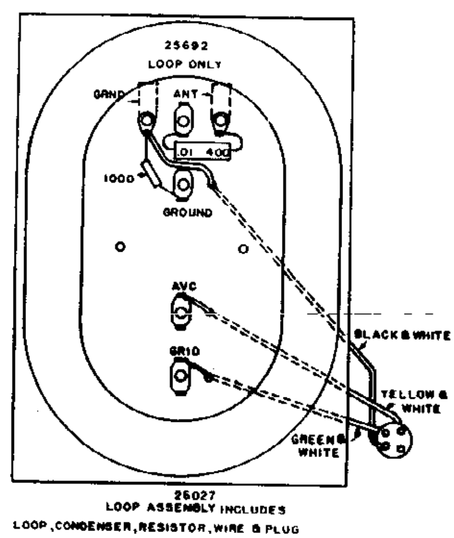
INSTALLING CHASSIS — Replace chassis in cabinet—noting that shafts are approximately centered in holes. Replace screws under mounting board of cabinet, replace loop plug, push knobs on shafts. Hold the pointer, back of dial, near center of scale, with your finger or any small instrument, turn the tuning knob to the right or left until the pointer drive coupling connects itself with the pointer.

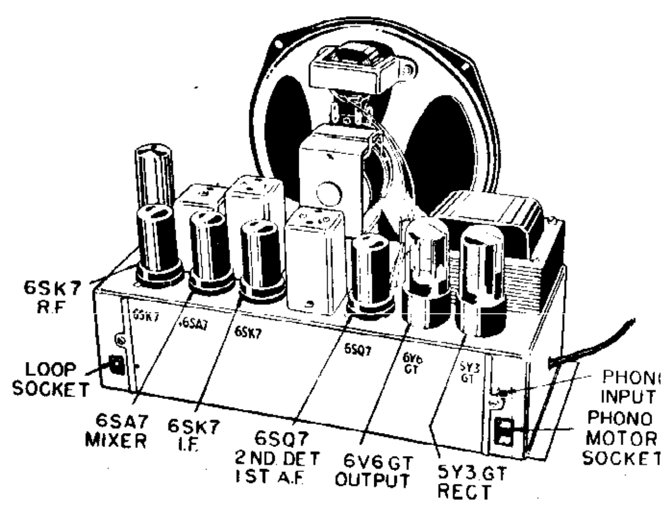
DIAL CORD REPLACEMENT—Is best accomplished by replacing complete cord assembly No. 25932 which is made up to correct length. In an emergency 30 lb. fish line may be used. See picture of chassis for correct installation.

DIAL SCALE REPLACEMENT — The dial scale is held in by means of spring plungers. The dial scale may be lifted out from front of cabinet after slightly loosening the two wood screws which holds the pointer track to cabinet. Remove two wood screws in baffle

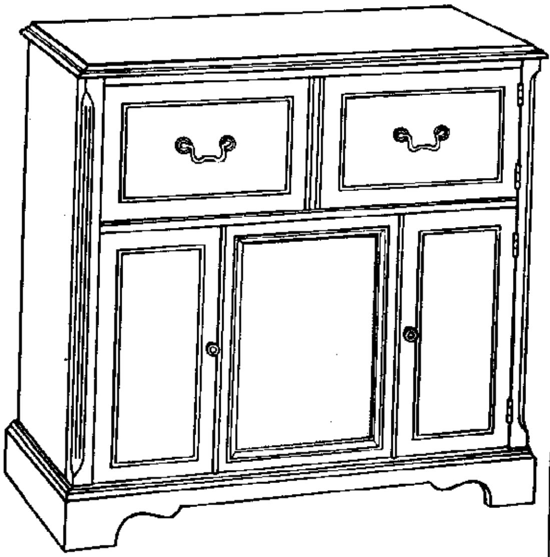


Model 74KR2706A only



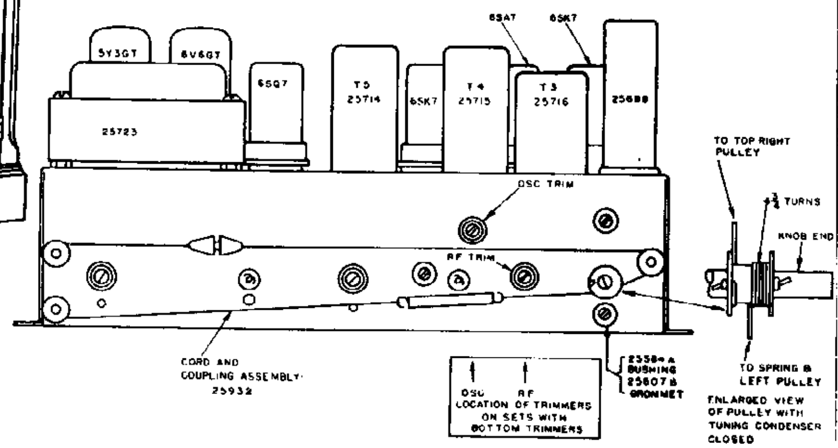


MONTGOMERY WARD

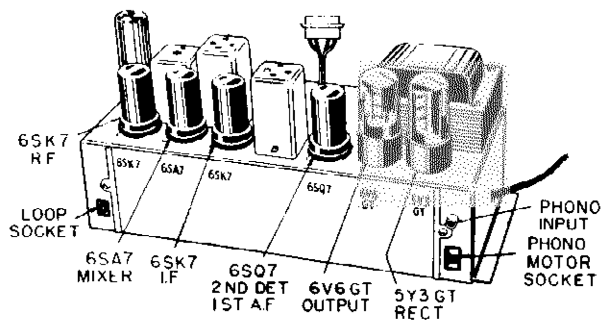


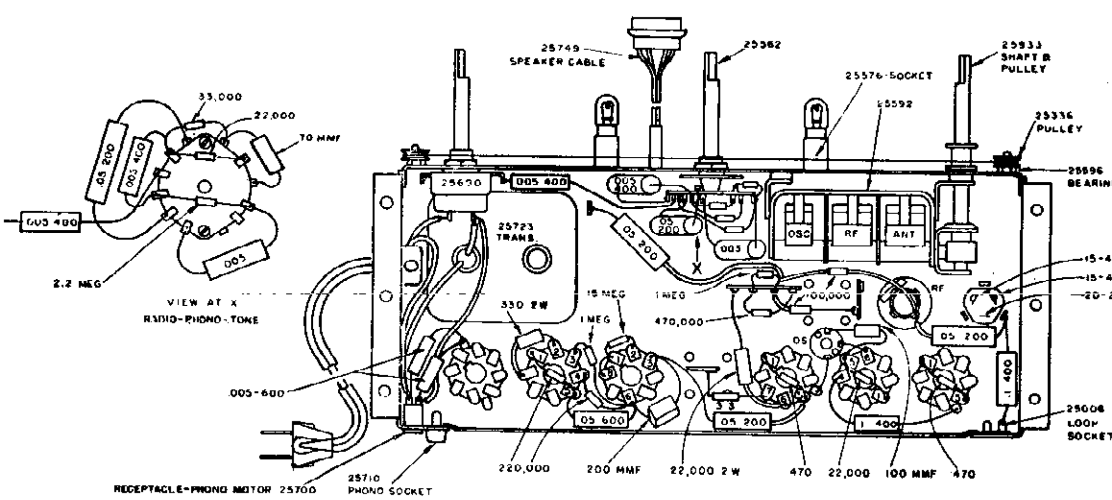
DIAL CORD REPLACEMENT—Is best accomplished by replacing complete cord assembly No. 25932 which is made up to correct length. In an emergency 30 lb. fish line may be used. See picture of chassis for correct installation.

DIAL SCALE REPLACEMENT—The dial scale is held in by means of two wood blocks. To remove wood blocks, remove wood screws from the inside of the cabinet and lift off blocks. The dial scale now may be lifted out of the cabinet.

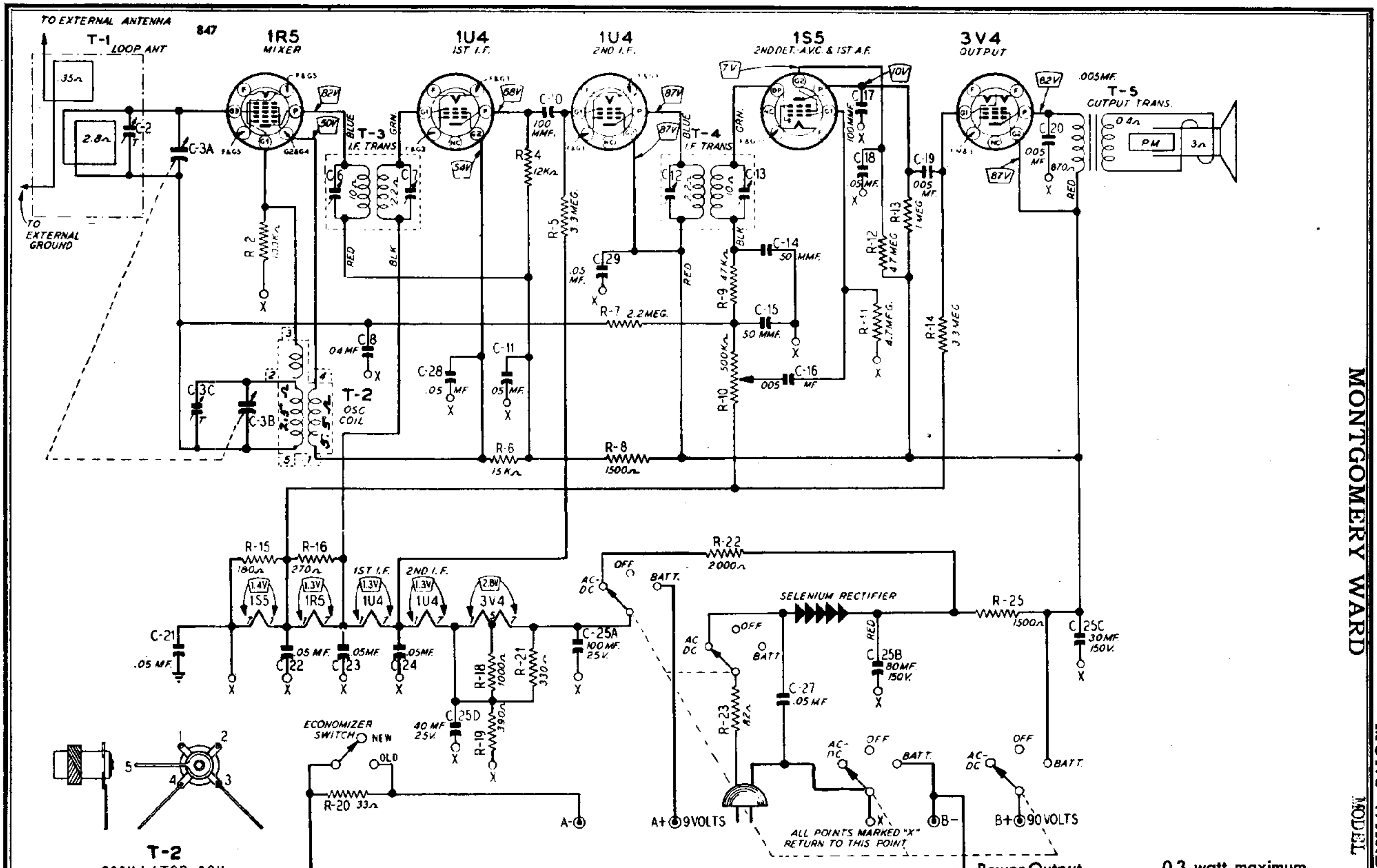


Power Supply	.....	105-125 volts AC, 60 cycles, 55 watts. (80 watts phono operating).
Frequency Range	..	540 - 1620 KC.
Intermediate Frequency	....	455 KC.
Selectivity	....	40 KC broad at 1000 times signal, 1000 KC.
Sensitivity	....	(for .5 watt output) with external antenna 5 microvolts average.
Power Output	.....	6 watts maximum, 3.2 watts 10% distortion.
Loud Speaker	....	8" EM dynamic, 750 ohms.
Voice Coil Impedance		3.2 ohms at 400 cycles.





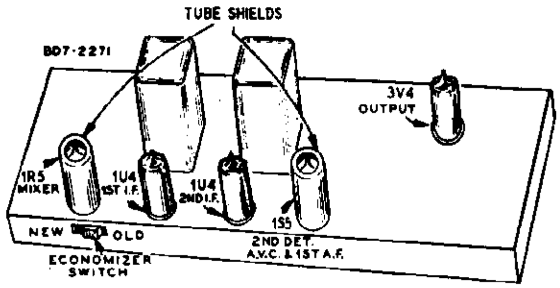
MONTGOMERY WARD



Power Supply............"A" Battery Supply—9 Volts, 50 Ma. "B" Battery Supply—90 Volts, 11 Ma. or 105-125 volts AC, 25-60 cycles, 12 watts or 105-125 volts DC

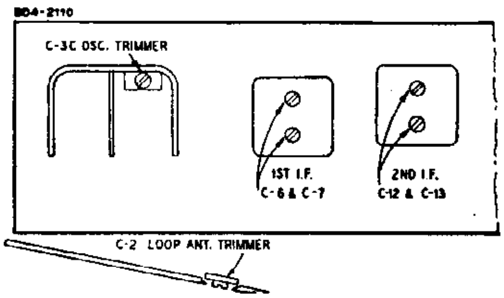
Frequency Range..........540-1600 KC
Intermediate Frequency. 455 KC
Selectivity.......................At 1000 KC, 45 KC wide at 1000 times signal
Sensitivity.......................(for .05 watt output with external

Power Output...............0.3 watt maximum
0.125 watt 10% distortion
Loud Speaker................5¼" PM dynamic
Voice Coil Impedance...3.2 ohms at 400 cycles



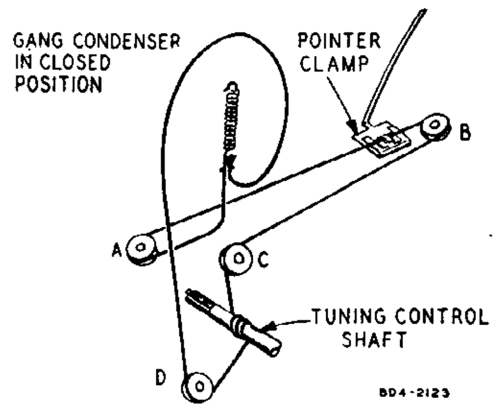
REMOVAL OF CHASSIS FROM CABINET

Pull off the three control knobs and disconnect the battery plug. Unwrap the power cord from the radio at the top of the cabinet if necessary. Remove the four screws that fasten the chassis to the cabinet (2 on the outside at each end of the cabinet). Tip the chassis slightly forward and at the same time withdraw it from the cabinet.



DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully closed position. Use a new 10X52 Drive Cord Assembly and fasten one end to the tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the cord through the slot in the drive pulley rim and continue around pulley rim ¼ turn clockwise. Pass cord around pulleys A, B, and C as shown in the illustration. Wind three turns clockwise (viewed from rear of chassis) around tuning control shaft. The turns must progress toward rear of chassis. Pass cord around pulley D and continue ¾ turn clockwise around large drive pulley. Pass cord through the slot in the pulley rim then stretch the tension spring and fasten free end of cord to it.



ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter; Non-Metallic Screwdriver.

Dummy Antenna—.1 mf., 50 mmf.

SIGNAL GENERATOR				CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration
Frequency Setting	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc	.1 mf	Control Grid 1U4—1st I-F Pin 6	Point "X" At Electrolytic Capacitor Black Lead	Turn Rotor to full open	2nd I-F (C13) & (C12)
455 kc	.1 mf	Control Grid 1R5—Mixer Pin 6	Same as above	Turn Rotor to full open	1st I-F (C7) & (C6)
1620 kc	.1 mf	Control Grid 1R5—Mixer Pin 6	Same as above	Turn Rotor to full open	Oscillator (C3C)
1400 kc	50 mmf	External Antenna Clip on Loop See Note A	External Ground connection on loop	Turn Rotor to Max. Output Set Indicator to 1400 KC See Note B	Antenna (C2)

NOTE A—Re-assemble chassis in cabinet and close the cabinet back before making adjustment.

NOTE B—Tune in a 1400 KC signal. If pointer is not at the 1400 KC mark on the dial scale, move the pointer on the string to the 1400 KC mark.

MONTGOMERY WARD

RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt AC across this resistor will be equivalent to a 50 milliwatt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Output variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	INPUT FOR 50 MILLIWATT OUTPUT
1000 kc	200 mmf or RMA Dummy Antenna	Loop Antenna—External antenna clip	Ext. Gnd. Clip	5.0 microvolts
1000 kc	.1 mf.	1R5 Mixer—Pin 6	Point "X" (1S5 Pin 1)	25 microvolts
455 kc	.1 mf.	1R5 Mixer—Pin 6	Same as above	22 microvolts
455 kc	.1 mf.	1U4 1st I-F—Pin 6	Same as above	340 microvolts
455 kc	.1 mf.	1U4 2nd I-F—Pin 6	Same as above	1500 microvolts
400 cycles	.1 mf.	1S5 1st A-F—Pin 6	Same as above	.022 volt
400 cycles	.1 mf.	3V4 Output—Pin 3	Same as above	1.8 volts

CAPACITORS

Ref. No.	Part No.	Description	Qty. Used in Set
C-2	17A123	1.5 uuf - 12 uuf Trimmer	1
C-3A, C-3B, C-3C	14A186	Gang Condenser with Drive Pulley	1
C-6, C-7		Part of T-3 (1st I-F Transformer)	
C-8	B66403	.04 uf 200 V Tubular	1
C-10, C-17	47X476	100 uuf Moulded	2
C-11, C-18, C-21, C-22, C-23, C-24, C-28, C-29	B66503	.05 uf 200 V Tubular	8
C-12, C-13		Part of T-4 (2nd I-F Transformer)	
C-14, C-15	47X112	50 uuf Dual Mica	1
C-16, C-19	B66502	.005 uf 200 V Tubular	2
C-20	D66502	.005 uf 400 V Tubular	1
C-25A, C-25B, C-25C, C-25D	45X356	100 uf 25 V; 80 uf 150 V; 30 uf 150 V; 40 uf 25 V Dry Elect. Condenser	1
C-27	D66503	.05 uf 400 V Tubular	1

RESISTORS

Ref. No.	Part No.	Ohms	Watts	Qty. Used in Set
R-2	B84104	100 K	0.5	1
R-4	B84123	12 K	0.5	1
R-5, R-14	B85335	3.3 meg	0.5	2
R-6	B84153	15 K	0.5	1
R-7	B85225	2.2 meg	0.5	1
R-8, R-25	B84152	1500	0.5	2
R-9	B85473	47 K	0.5	1
R-10	36X370	500 K	Volume Control	1
R-11, R-12	B85475	4.7 meg	0.5	2
R-13	B84105	1.0 meg	0.5	1
R-15	B84181	180	0.5	1
R-16	B84271	270	0.5	1
R-18	B84102	1000	0.5	1
R-19	B84391	390	0.5	1
R-20	B85330	33	0.5	1
R-21	B84331	330	0.5	1
R-22	43X221	2000	Shielded Wire Wound	1
R-23	43X223	82	2.0	1

TRANSFORMERS AND COILS

Ref. No.	Part No.	Description	Qty. Used in Set
T-1	9A1928	"B" Range Loop Antenna	1
T-2	9A1927	Oscillator Coil Assembly	1
T-3	9A1840	1st I-F Transformer and Can Assembly	1
T-4	9A1841	2nd I-F Transformer and Can Assembly	1
T-5		Output Transformer (see Miscellaneous)	

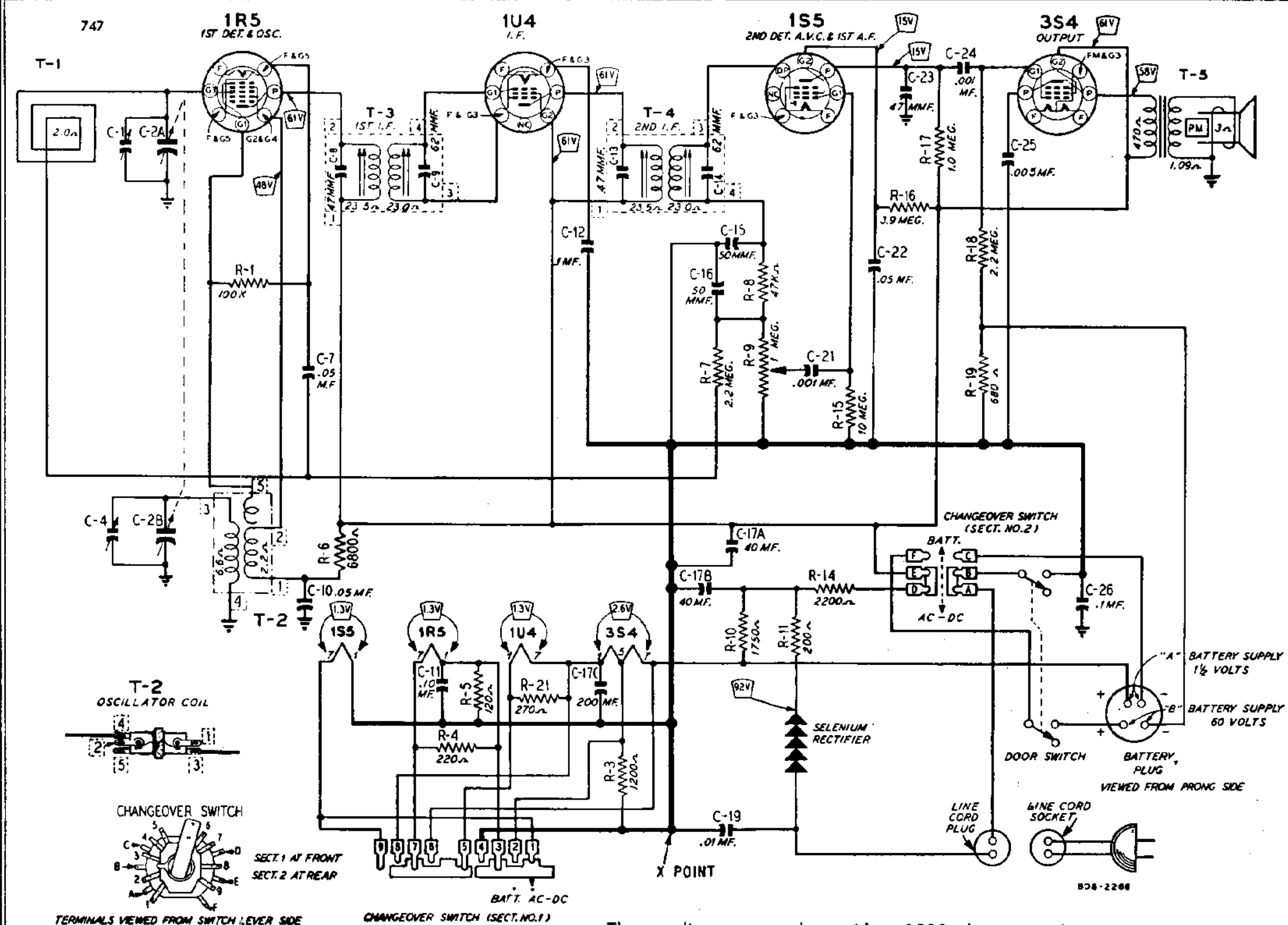
DIAL AND DRIVE ASSEMBLY

Part No.	Description	Qty. Used in Set
25X1504	Dial Brace Bracket	1
58X693	Dial Scale	1
17X97	Celluloid Crystal	1
15X191	Pointer (For Dial Scale)	1
25X832	Gang Condenser Mounting Bracket	1
6X21	Grommet (Mtg. Gang Condenser)	3
20X329	Cond. Cushion Stud (Mtg. Gang Condenser)	3
28X95	Drive Cord Tension Spring	1
10X52	Drive Cord Assembly	1
4X989	Escutcheon	1
26X505	Drive Shaft	1
19X192	"C" Washer for Drive Shaft	2

MISCELLANEOUS

Part No.	Description	Qty. Used in Set
12A443	5¼" P.M. Speaker complete with Output Transformer	1
3A312	Tube Socket (Miniature)	5
32X221	Tube Shield (1R5 and 1S5)	2
2A175	Battery Saver Switch	1
2A371	AC-DC-Off-Batt. Switch	1
13X429	Battery Cable and Plug Assembly	1
10A626	Knob, Switch	1
10A627	Knob, Tuning	1
10A628	Knob, Volume	1
13X546	Line Cord and Plug Assembly	1
11X117	Shield, Volume Control and Switch (Paper)	1
32X368	Shield, Volume Control and Switch (Metal)	1
66X7	Selenium Rectifier	1

MONTGOMERY WARD



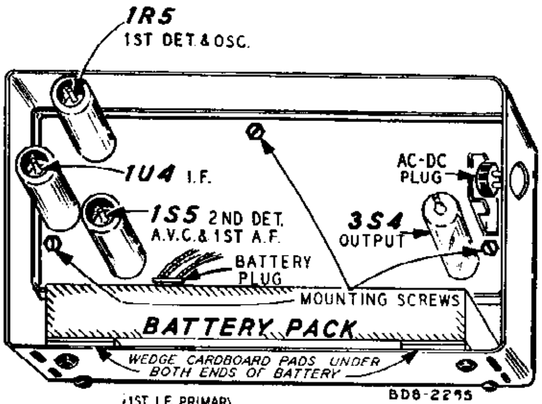
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages except those fo: the filaments are between the socket terminal and the black or negative lead on C-17.

The readings were taken with a 1000 ohm per volt meter and all plate and screen voltages read on a 500 volt scale. Conditions of measurement are:

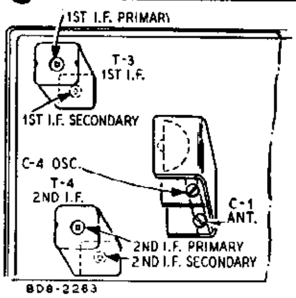
Line voltage....................117 volts AC
Volume control....................maximum
Signal input....................none

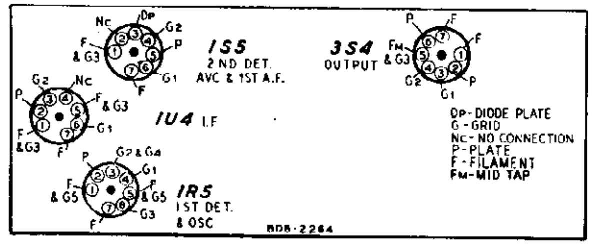
A vcriation of $\pm 10\%$ is usually permissible.



REMOVAL OF CHASSIS FROM CASE

To remove the chassis from the case it will be necessary to remove the line cord if connected, and the back panel from the case. Open the front cover and carefully remove the two control knobs and the screw on the front panel above the tuning knob at the side of the ON-OFF switch plunger. Withdraw the battery pack from the case and disconnect the plug connecting to the battery pack. Then remove the 3 chassis mounting screws protruding above the chassis as shown in the tube position illustration. Carefully lift the chassis, and move it over into the battery space. Unsolder the two antenna wires at the door hinges.





ALIGNMENT PROCEDURE

Volume Control — Maximum All Adjustments.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning.

A Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter — Non-Metallic Screwdriver.

Dummy Antenna—.1 mf.

SIGNAL GENERATOR				RECEIVER	
Frequency Setting	Coupling Capacitor	Connection to Radio	Ground Connection	Condenser Setting	Adjust for maximum output. See trimmer illustration.
	Remove chassis from case (See paragraph Removal of Chassis From Case) and temporarily solder a 50,000 ohm resistor across the two antenna leads on the chassis.				
455 kc	.1 mf	Control Grid 1R5—Pin 6	"X" Point See Note "B"	Rotor to full open	1st IF Pri. & Sec. 2nd IF Pri. & Sec.
	Remove temporary resistor, replace chassis in case and solder antenna leads to hinges.				
1610 kc	.1 mf	Door Hinge Above Tuning Control	"X" Point See Note "B"	Rotor to full open	Oscillator (C-4)
1500 kc	.1 mf	Door Hinge Above Tuning Control	Same as Above	Turn Rotor to Maximum Output	Set Tuning Knob at 1500 kc
1400 kc		Loop See Note A	Loop See Note A	Turn Rotor to Maximum Output	Antenna (C-1)

NOTE A: Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Place radio approximately 2 feet from loop.

NOTE B: Heavy lines (B-) on circuit diagram designate "X" Point.

RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt across this resistor will be equivalent to a 50 milliwatt output. The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of plus or minus 25% are usually permissible.

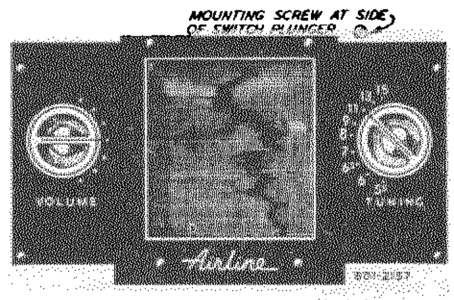
SIGNAL GENERATOR				INPUT FOR 50 MILLIWATT OUTPUT
Freq.	Coupling Capacitor	Connection to Receiver	Ground Connection	
1000 kc	.05 mf	1R5 Mixer Pin 6	C-17 Black Lead	148 microvolts
455 kc	.05 mf	1R5 Mixer Pin 6	Same as above	118 microvolts
455 kc	.05 mf	1U4 IF Amp. Pin 6	Same as above	5000 microvolts
400 cycles	.05 mf	1S5 2nd Det. Pin 6	Same as above	.068 volt
400 cycles	.05 mf	3S4 Output Pin 3	Same as above	4.2 volts

MONTGOMERY WARD

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C-1, C-4		Part of C-2 (Gang Condenser)	
C-2A, C-2B	14A197	Gang Condenser	1
C-7, C-10	B66503	.05 mf 200 V Tubular	2
C-8, C-9		47 mmf, 62 mmf (Part of T-3 1st I-F Transformer)	
C-11	46X390	.10 mf 200 V Tubular	1
C-12	46X330	.10 mf 120 V Tubular	1
C-13, C-14		47 mmf, 62 mmf (Part of T-4 2nd I-F Transformer)	
C-15, C-16		50-50 mmf (Part of 76X1 Resistor-Capacitor Comb. See "Miscellaneous.")	
C-17A, C-17B, C-17C	45X357	40 mf 150 V, 40 mf 150 V, 200 mf 12 V Dry Electrolytic	1
C-19	46X392	.01 mf 400 V Tubular	1
C-21	46X334	.001 mf 120 V Tubular	1
C-22	46X391	.05 mf 200 V Tubular	1
C-23	47X495	47 mmf Ceramic	1
C-24	B67102	.001 mf 200 V Tubular	1
C-25	B66502	.005 mf 200 V Tubular	1
C-26	D67104	.10 mf 400 V Tubular	1
		RESISTORS	
		OHMS WATTS	
R-1	B84104	100 K 0.5 Carbon	1
R-3	B84122	1200 0.5 Carbon	1
R-4	B84221	220 0.5 Carbon	1
R-5	B84121	120 0.5 Carbon	1
R-6	B84682	6800 0.5 Carbon	1
R-7, R-18	B85225	2.2 meg 0.5 Carbon	2
R-8		47 K (Part of 76X1 Resistor-Capacitor Comb. See "Miscellaneous.")	
R-9	36X305	1.0 meg Volume Control	1
R-10	43X107	1750 4.0 Wire wound	1
R-11	43X222	200 5.0 Wire wound	1
R-14	C84222	2200 1.0 Carbon	1
R-15	B85106	10 meg 0.5 Carbon	1
R-16	B84395	3.9 meg 0.5 Carbon	1
R-17	B85105	1.0 meg 0.5 Carbon	1
R-19	B84681	680 0.5 Carbon	1
R-21	B84271	270 0.5 Carbon	1
		TRANSFORMERS AND COILS	
T-1	9A1922	"B" Band Loop Antenna	1
T-2	9A1920	"B" Range Oscillator Coil Assembly	1
T-3, T-4	9A1921	1st I-F Transformer Assembly, 2nd I-F Transformer Assembly	2
T-5	51X94	Output Transformer	1
		MISCELLANEOUS	
	76X1	Resistor-Capacitor combination	1
	12A447	4" P.M. Dynamic Speaker	1
	66X7	Selenium Rectifier	1
	3A312	Miniature Tube Socket	4
	32X221	Miniature Tube Shield	3
	13X453	"A" and "B" Battery Cable & Plug Assembly	1

Ref. No.	Part No.	Description	Qty. Used in Set
	2A201	On-Off Switch	1
	26A409	Change-Over Switch Assembly	1
	13X545	Line Cord and Socket Assembly	1
	6A299	Line Plug (on Chassis)	1
	26A476	Case and Cover Assembly complete with Loop, Loop Cover, and Back, Escutcheon and Speaker Grille	1
	26A477	Case Bottom Assembly	1
	10A629	Knobs	2



GENERAL DESCRIPTION

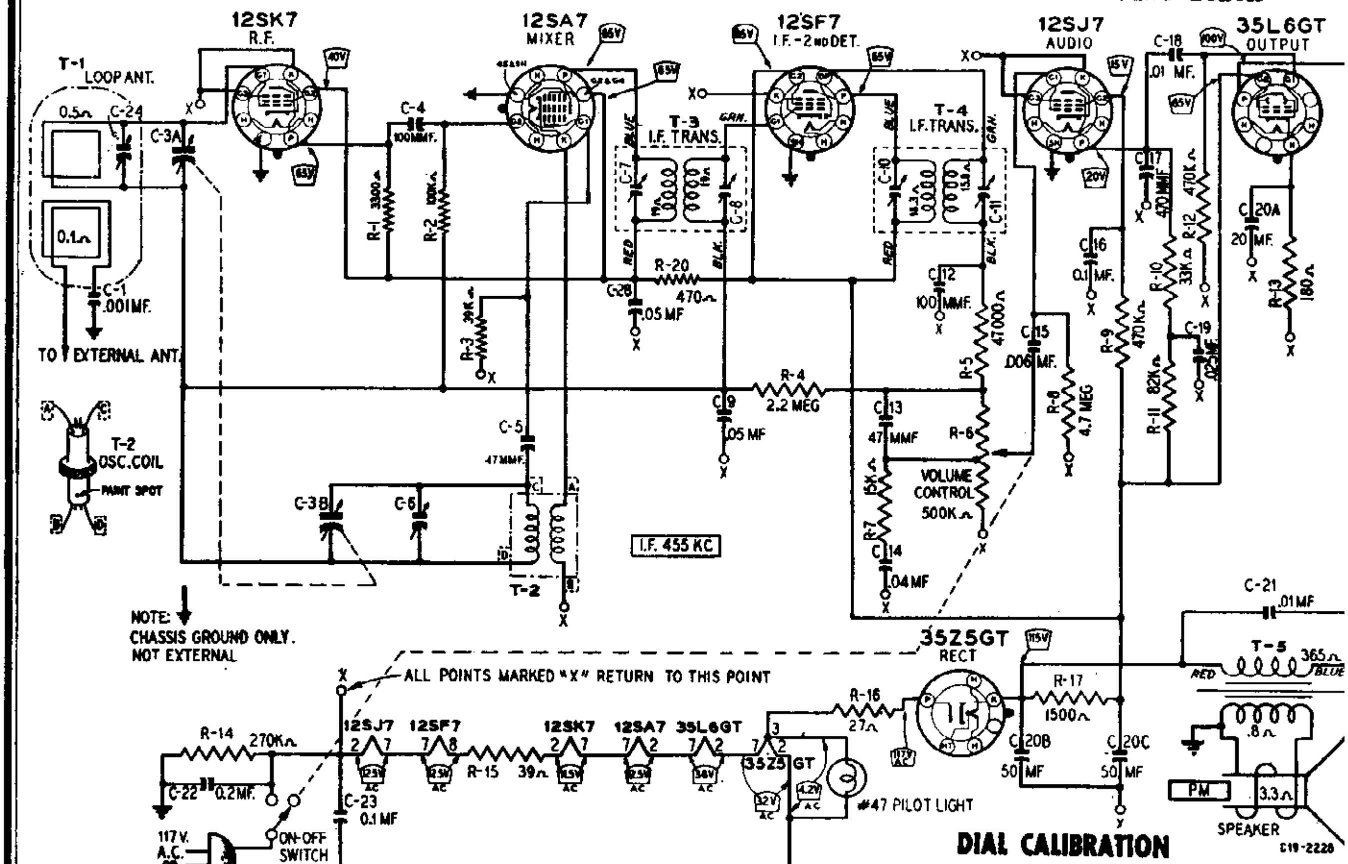
This model is a 4 tube AC-DC or battery operated portable radio receiver. Controls are provided for tuning, volume, and AC-DC or battery selection. Features include a built-in Airwave Loop Aerial, automatic volume control, PM dynamic speaker and a Selenium rectifier for AC operation. The dial scale is calibrated to cover frequencies between 540-1600 kilocycles. Filament switching is provided to connect the tube filaments in series for AC-DC operation and in parallel for battery operation.

ELECTRICAL SPECIFICATIONS

Power Supply	A Battery Supply 1.5 volts, .250 amp. B Battery Supply 60 volts, 8 MA or 105-125 volts AC, 25-60 cycles, 10 watts or 105-125 volts DC
Battery Pack	Wards Battery Pack No. 62-32
Frequency Range	540-1600 kc
Intermediate Frequency	455 kc
Selectivity	At 1000 kc, 40 kc wide at 1000 times signal
Sensitivity	300 microvolts per meter average (for .05 watt output)
Power Output	.130 watt maximum .070 watt 10% distortion
Loud Speaker	4" PM Dynamic
Voice Coil Imp	3.2 ohms at 400 cycles

Tube Complement		
1	1R5	Mixer
1	1U4	IF Amplifier
1	1S5	2nd Detector AVC and 1st AF Amplifier
1	3S4	Output

MONTGOMERY WARD

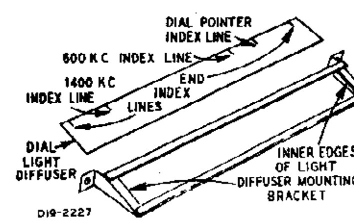


DIAL CALIBRATION

In order to align the receiver, the dial pointer must b positioned on the dial string correctly with reference to th dial. Index lines are provided on the dial light diffuser fc this purpose.

Before aligning the receiver (or when replacing the dic light diffuser) check the position of the diffuser strip, makin certain that the two end index lines are aligned with th inner edges of the diffuser mounting bracket opening. Th bracket should be crimped at one point to prevent move ment of the diffuser strip. To position the dial pointer, tur the gang condenser to the fully closed position. The dic pointer should be directly over the dial pointer index line (See illustration)

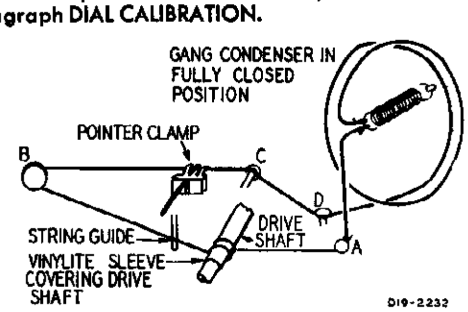
The 1400 KC index line is for use when aligning th receiver.



DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully closed position. Use a new drive cord 42" long and tie one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim, under stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord over pulley B and stud C and under stud D. Pass cord under drive pulley and wind 1¾ turns counterclockwise around drive pulley. Stretch tension spring and tie free end of cord to spring. Cut off any excess cord.

Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.



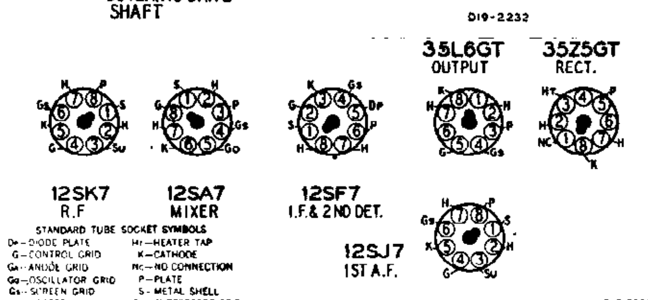
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages except those for the heater and dial lamp are between the socket terminal and "X" point.

The readings were taken with a 1000 ohm-per-volt meter and all plate and screen voltages read on a 500 volt scale. Conditions of measurement are:

Line voltage....................117 volts AC
Volume control....................maximum
Signal input....................none

A variation of ±10% is usually permissible.



MONTGOMERY WARD

RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt AC across this resistor will be equivalent to a 50 milliwatt output. The volume control must be set to maximum.
The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR 50 MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	Loop Antenna—External antenna clip	Chassis	19.5 microvolts
1000 kc	.05 mf.	12SA7 Mixer—Pin 8	Point "X" (12SK7 Pin 3)	150 microvolts
455 kc	.05 mf	12SA7 Mixer—Pin 8	Same as above	100 microvolts
455 kc	.05 mf	12SF7 I-F—Pin 2	Same as above	3500 microvolts
400 cycles	.05 mf	12SJ7 1st A-F—Pin 4	Same as above	.042 volt
400 cycles	.05 mf	35L6GT Output—Pin 5	Same as above	1 volt

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.

Volume Control—Maximum All Adjustments.

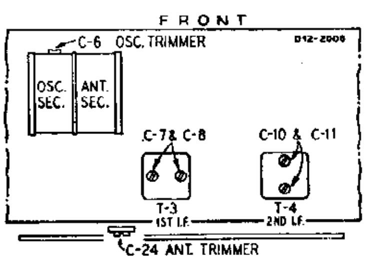
Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter; Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 50 mmf.

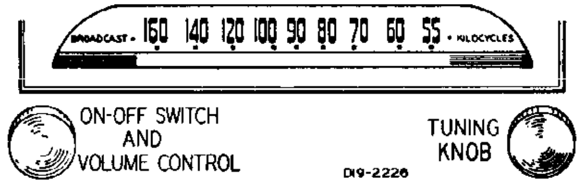


NOTE A:—Index line is on dial light diffuser strip. See DIAL CALIBRATION paragraph.

SIGNAL GENERATOR			Coupling Capacitor	DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT IN ORDER SHOWN (See Trimmer Illustration)
Frequency Setting	Connection to Receiver	Ground Connection			
455 kc	Control Grid 12SF7—I-F (Prong No. 2)	Point "X" 12SK7—R-F (Prong No. 3)	.1 mf	Turn Rotor to full open	2nd I-F (C10) & (C11)
455 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to full open	1st I-F (C7) & (C8)
1620 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to fully open position	Oscillator (C6)
1400 kc	External Antenna Clip "on" Loop	Chassis	50 mmf	Turn Rotor to 1400 kc Index Line. See Note A	Antenna (C24)

ELECTRICAL SPECIFICATIONS

Power Supply........105-125 volts AC, 50-60 cycles, 35 watts or 105-125 volts DC
Frequency Range.....540-1600 KC
Selectivity............At 1000 KC, 50 KC wide at 1000 times signal
Sensitivity............(for .05 watt output with externa antenna) 15 microvolts average
Power Output.........1.3 watts maximum
.75 watt 10% distortion
Loud Speaker.........4"x 6" PM dynamic
Voice Coil Impedance...3.2 ohms at 400 cycles



OPERATING VOLTAGES—Chassis for Models 74WG-1509A and 74WG-1510A are available for operation on the following power supplies: 105-125 volts AC, 50-60 cycles or 105-125 volts DC.

HOW TO ORDER PARTS—Should it be necessary to w us or to order any repair parts, it is important that the c plete model number which appears on the label attac to the rear of the chassis be specified. Repair parts sh be ordered from your nearest Wards Retail Store, Cat Order Office or Mail Order House.

REPLACEMENT PARTS LIST

Use only genuine factory tested parts to insure service jobs you can depend on and to obtain original set performa

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C-1	D67102	.001 mf 400 V Tubular	1
C-3A, C-3B	26A402	Gang condenser and pulley assembly	1
C-4, C-12	47X476	100 mmf Molded	2
C-5	47X446	47 mmf Molded	1
C-6		Part of C-3	
C-7, C-8		Part of T-3, 1st I-F Transformer	
C-9	B66503	.05 mf 200 V Tubular	1
C-10, C-11		Part of T-4, 2nd I-F Transformer	
C-13	47X463	47 mmf Molded	1
C-14	B67403	.04 mf 200 V Tubular	1
C-15	B67602	.006 mf 200 V Tubular	1
C-16	B66104	.1 mf 200 V Tubular	1
C-17	47X467	470 mmf Molded	1
C-18, C-21	B66103	.01 mf 200 V Tubular	2
C-19	B67253	.025 mf 200 V Tubular	1
C-20A, C-20B, C-20C	45X344	20 mf 25 V, 50 mf 150 V, 50 mf 150 V Dry electrolytic condenser	1
C-22	B67204	0.2 mf 200 V Tubular	1
C-23	D67104	.1 mf 400 V Tubular	1
C-24	17A123	1.5-12 mmf Trimmer	1
C-28	B67503	.05 mf 200 V Tubular	1

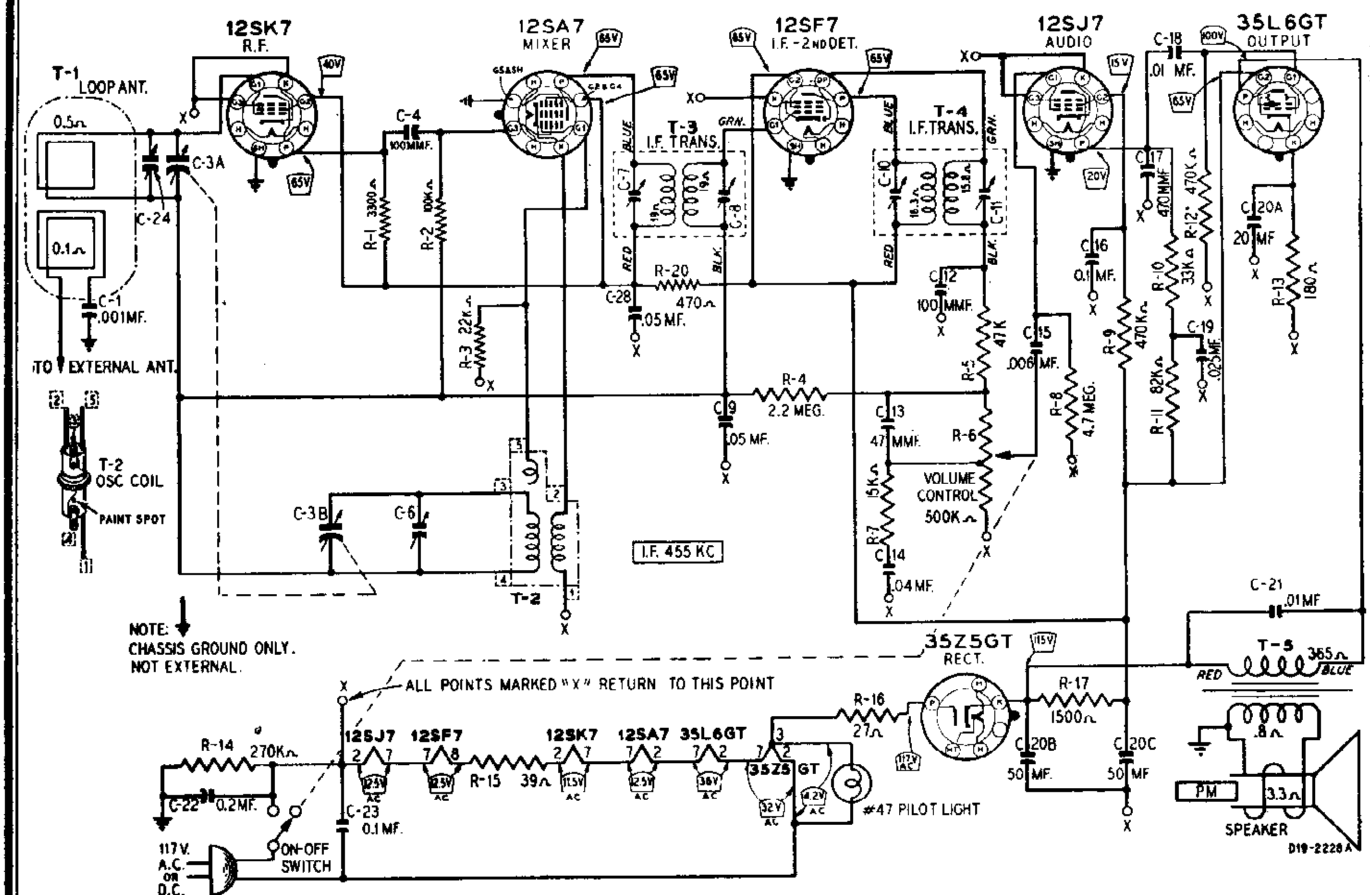
RESISTORS

Ref. No.	Part No.	Ohms	Watts	Description	Qty.
R-1	B84332	3300	0.5	Carbon	1
R-2	B85104	100,000	0.5	Carbon	1
R-3	B84393	39,000	0.5	Carbon	1
R-4	B85225	2.2 meg.	0.5	Carbon	1
R-5	B85473	47,000	0.5	Carbon	1
R-6	36X347	500,000		Volume control and switch	1
R-7	B84153	15,000	0.5	Carbon	1
R-8	B85475	4.7 meg.	0.5	Carbon	1
R-9	B84474	470,000	0.5	Carbon	1
R-10	B84333	33,000	0.5	Carbon	1
R-11	B84823	82,000	0.5	Carbon	1
R-12	B85474	470,000	0.5	Carbon	1
R-13	B83181	180	0.5	Carbon	1
R-14	B84274	270,000	0.5	Carbon	1
R-15	D84390	39	2.0	Carbon	1
R-16	B84270	27	0.5	Carbon	1
R-17	C84152	1500	1.0	Carbon	1
R-20	B85471	470	0.5	Carbon	1

Ref. No.	Part No.	Description	Qty. Used in Set
		TRANSFORMERS AND COILS	
T-1	26A448	"B" Range loop antenna assembly (ivory)	1
T-1	26A447	"B" Range loop antenna assembly (walnut)	1
T-2	9A1805	Oscillator coil assembly	1
T-3	9A1775	1st I-F Transformer and can assembly	1
T-4	9A1776	2nd I-F Transformer and can assembly	1
T-5	51X116	Output transformer	1
		DIAL AND DRIVE ASSEMBLY	
	6X21	Rubber grommet } Gang cond	3
	20X329	Cond. cushion stud } mtg	3
	58X674	Dial (for ivory cabinet)	1
	58X675	Dial (for walnut cabinet)	1
	26A446	Pointer bracket assembly	1
	15X217	Pointer	1
	25X1398	Pilot light bracket	1
	7A192	Pilot light socket assembly	1
		Pilot light No. 47	1
		42" drive cord	1
	28X95	Drive cord tension spring	1
	26X464	Drive shaft	1
	19X192	"C" washer (for drive shaft)	2
	41X81	Dial light diffuser	1
		MISCELLANEOUS	
	12A431	4" x 6" speaker with mounting bracket	1
		Cone and voice coil assembly (specify part number and letters stamped on speaker)	1
	3A303	Tube socket—octal (8 prong) molded	5
	3A421	Tube socket with shield	1
	10A297	Knob (walnut) on-off switch, volume control and tuning	2
	10A300	Knob (ivory)	2
	28X292	Snap button (mounting loop to cabinet)	2
		6 x 1/4" slotted hex head P-K type "Z" screw (mounting loop to chassis)	2
	13X328	Line cord and plug assembly	1
	55X249	Cabinet, plastic (ivory)	1
	55X264	Cabinet, plastic (walnut)	1

MODELS 74WG-1509B, 74WG-1510B

MONTGOMERY WARD

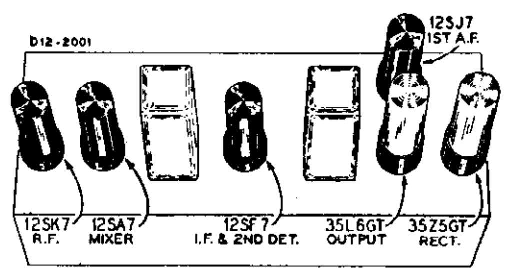


Parts list is the same as that for Models 74WG-1509A and 1510A with the following exceptions:

Ref. No.	Part. No.	Description	Qty. Used in Set
		CAPACITORS	
C-24		Part of C-3	
		DIAL AND DRIVE ASSEMBLY	
	7A103	Pilot Light	1
	10X44	Drive Cord Assembly	1
		RESISTORS	
R-3	884223	22,000 0.5 Carbon	1
		TRANSFORMERS AND COILS	
T-1	9A1925	"B" Range Loop Antenna Assembly (Ivory)	1
T-1	9A1926	"B" Range Loop Antenna Assembly (Walnut)	1
T-2	9A1911	Oscillator Coil Assembly	1

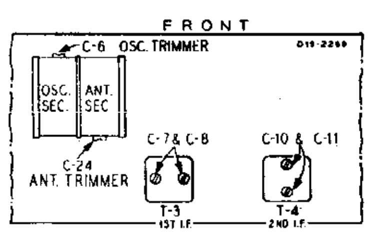
Tube and Dial Light Complement

- 1 12SK7 R-F Amplifier
- 1 12SA7 Mixer
- 1 12SF7 I-F and 2nd Detector
- 1 12SJ7 1st A-F
- 1 35L6GT Power Output
- 1 35Z5GT Rectifier
- 1 47 Dial Lamp

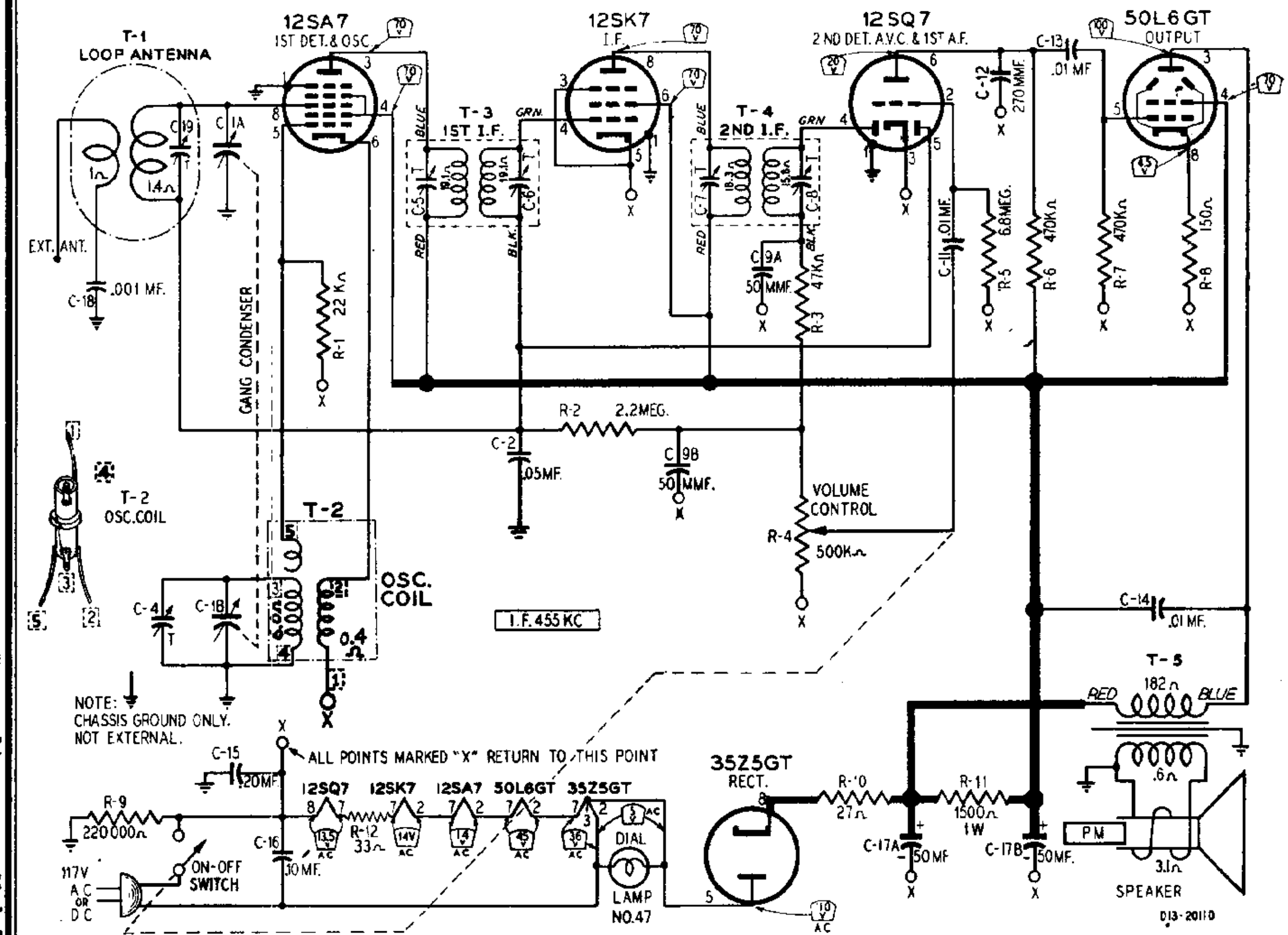


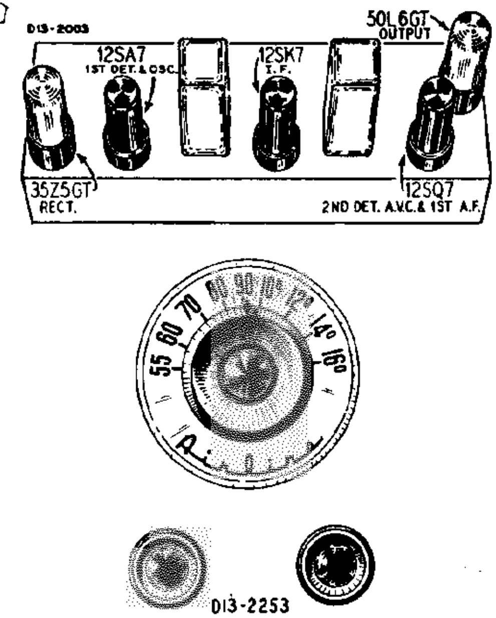
DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully closed position. Use a new 10X44 drive cord assembly and tie one end to the tension spring. Continue as for Models 74WG-1509A and 1510A.



MONTGOMERY WARD





Intermediate Frequency...... 455 KC

ELECTRICAL SPECIFICATIONS

Power Supply............	105-125 volts AC—25-60 cycles—30 watts 105-125 volts DC
Frequency Range...........	540 to 1600 KC
Selectivity...............	55.5 KC broad at 1000 times signal, 1000 KC
Sensitivity (for .05 watt output) with external antenna.....	25 microvolts average
Power Output............	1.5 watts maximum, .9 watt (10% distortion)
Loud speaker............	5" PM dynamic
Voice coil impedance........	3.2 ohms at 400 cycles

MONTGOMERY WARD

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 50 mmf.

SIGNAL GENERATOR				CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration
Frequency Setting	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc	.1 mf	Control Grid 12SK7—I-F Prong No. 4	Point "X" 12SK7 I-F Prong No. 3	Turn Rotor to full open	2nd I-F (C7) & (C8)
455 kc	.1 mf	Control Grid 12SA7—1st Det. Prong No. 8	Same as above	Turn Rotor to full open	1st I-F (C5) & (C6)
1620 kc	.1 mf	Control Grid 12SA7—1st Det. Prong No. 8	Same as above	Turn Rotor to full open	Oscillator (C4)
1400 kc	50 mmf	External Antenna Clip on Loop See Note A	Chassis	Turn Rotor to Max. Output Set Indicator 1400 KC—See Note B	Antenna (C19)

NOTE A— Re-assemble chassis in cabinet. Replace back on cabinet.

NOTE B—Tune in a 1400 KC signal. If pointer is not at the 1400 KC mark on the dial scale, pull pointer off shaft. Set pointer at the 1400 KC mark and push back on shaft.

RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt across this resistor will be equivalent to a 50 milliwatt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR 50 MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	Loop Antenna—external antenna clip	Chassis	24 microvolts
1000 kc	.05 mf	12SA7 1st Detector Pin 8	Point "X" (12SK7 Pin 3)	125 microvolts
455 kc	.05 mf	12SA7 1st Detector Pin 8	Same as above	100 microvolts
455 kc	.05 mf	12SK7, I-F Amp. Pin 4	Same as above	2500 microvolts
400 cycles	.05 mf	12SQ7, 1st A-F, Pin 2	Same as above	.042 volt
400 cycles	.05 mf	50L6GT Output, Pin 5	Same as above	1.9 volts

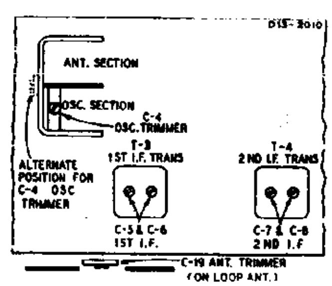
REMOVAL OF CHASSIS FROM CABINET

To remove the chassis from the cabinet it is necessary to pull the two control knobs and the dial pointer from their shafts. Likewise remove the phono-radio knob located inside the record player compartment and disconnect the record player cables from the chassis. Remove the four screws in the bottom of the cabinet and the four snap pins that hold the cabinet back in place.

Care must be taken when removing the dial pointer that it is not damaged in a manner that will make reinstallation impossible.

When reinstalling the pointer, reach inside the cabinet and hold the tuning condenser while pressing the pointer onto the shaft. Damage to the receiver may result if this is not observed.

TRIMMER POSITIONS



OPERATING VOLTAGES — Chassis for Models 74WG-1802A are available for operation on the following power supplies:

MODEL 74WG-1802A 105-125 volts AC 25-60 cycles or 105-125 volts DC

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C-1A, C-1B	14A176	Gang condenser with pulley	1
C-2	B66503	.05 mf 200 V Tubular	1
C-4		Part of C-1	
C-5, C-6		Part of T-3 1st I-F Transformer	
C-7, C-8		Part of T-4 2nd I-F Transformer	
C-9A, C-9B	47X112	50 mmf Dual mica	1
C-11, C-13, C-14	B66103	.01 mf 200 V Tubular	3
C-12	47X445	270 mmf Molded	1
C-15	B67204	.20 mf 200 V Tubular	1
C-16	D67104	.10 mf 400 V Tubular	1
C-17A, C-17B	45X341	50 mf 150 V, 50 mf 150 V Dry electrolytic	1
C-18	D67102	.001 mf 400 V Tubular	1
C-19	17A123	1.5-12 mmf Trimmer	1
		RESISTORS (Ohms, Watts)	
R-1	B84223	22,000 0.5 Carbon	1
R-2	B85225	2.2 meg 0.5 Carbon	1
R-3	B85473	47,000 0.5 Carbon	1
R-4	36X368	.5 meg Volume control and switch	1
R-5	B85685	6.8 meg 0.5 Carbon	1
R-6	B84474	470,000 0.5 Carbon	1
R-7	B85474	470,000 0.5 Carbon	1
R-8	B84151	150 0.5 Carbon	1
R-9	B85224	220,000 0.5 Carbon	1
R-10	B84270	27 0.5 Carbon	1
R-11	CB5152	1500 1.0 Carbon	1
R-12	CB5330	33 1.0 Carbon	1

Ref. No.	Part No.	Description	Qty. Used in Set
		TRANSFORMERS AND COILS	
T-1	26A467	"B" Band Loop antenna assembly	1
T-2	9A1911	Oscillator coil assembly	1
T-3	9A1775	1st I-F Transformer and can assembly	1
T-4	9A1783	2nd I-F Transformer and can assembly	1
T-5	51X132	Output Transformer	1
		MISCELLANEOUS	
	12A429	5" P.M. speaker	1
	3A303	Tube socket—octal (8 prong) molded	5
	10A625	Knob	2
	28X292	Snap button (mounting loop to cabinet)	4
	13X546	Line cord and plug assembly	1
		DIAL AND DRIVE ASSEMBLY	
	25X1559	Gang condenser mounting bracket	1
	58X685	Dial	1
	58X686	Dial Background	1
	15X239	Pointer	1
	26X504	Drive shaft	1
	19X192	"C" washer	2
	7A185	Pilot light cable & socket assembly	1
		No. 47 Pilot light bulb	1
	28X310	Drive cord tension spring	1
	10X45	Drive cord assembly	1

HOW TO ORDER PARTS — Should it be necessary to write us or to order any repair parts, it is important that the complete model number which appears on the label attached to the rear of the chassis be specified. Repair parts should be ordered from your nearest Wards Retail Store, Catalog Order office or Mail Order House.

OPERATING VOLTAGES — Chassis for Model 74WG-2004A are available for operation on 105-125 volts AC 60 cycles.

MODEL 74WG-2004A

Ref. No.	Part No.	Description	Qty. Used in Set
		CAPACITORS	
C-1A, C-1B	14A176	Gang Condenser with pulley	1
C-2	B66503	.05 mf 200 V Tubular	1
C-4		Part of C-1	
C-5, C-6		Part of T-3 1st I-F Transformer	
C-7, C-8		Part of T-4 2nd I-F Transformer	
C-9A, C-9B	47X112	50 mmf Dual mica	1
C-10	B66803	.08 mf 200 V Tubular	1
C-11, C-13, C-14	B66103	.01 mf 200 V Tubular	3
C-12	47X445	270 mmf Molded	1
C-15	B67204	.20 mf 200 V Tubular	1
C-16	D67104	.10 mf 400 V Tubular	1
C-17A, C-17B	45X341	50 mf 150 V, 50 mf 150 V Dry electrolytic	1
C-18	D67102	.001 mf 400 V Tubular	1
C-19	17A123	1.5-12 mmf Trimmer	1
		RESISTORS (Ohms, Watts)	
R-1	B84223	22,000 0.5 Carbon	1
R-2	B85225	2.2 meg 0.5 Carbon	1
R-3	B85473	47,000 0.5 Carbon	1
R-4	36X368	.5 meg Volume control and switch	1
R-5	B85685	6.8 meg 0.5 Carbon	1
R-6	B84474	470,000 0.5 Carbon	1
R-7	B85474	470,000 0.5 Carbon	1
R-8	B84151	150 0.5 Carbon	1
R-9	B85224	220,000 0.5 Carbon	1
R-10	B84270	27 0.5 Carbon	1
R-11	CB5152	1500 1.0 Carbon	1
R-12	B85105	1 meg 0.5 Carbon	1
R-13	CB5330	33 1.0 Carbon	1

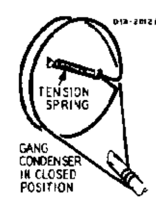
Ref. No.	Part No.	Description	Qty. Used in Set
		TRANSFORMERS AND COILS	
T-1	26A468	"B" Band Loop Antenna Assembly	1
T-2	9A1911	Oscillator coil assembly	1
T-3	9A1775	1st I-F Transformer and can assembly	1
T-4	9A1783	2nd I-F Transformer and can assembly	1
T-5	51X132	Output Transformer	1
		MISCELLANEOUS	
	12A429	5" P.M. speaker	1
	3A303	Tube socket—octal (8 prong) molded	5
	3A305	Single pin tip socket (Phono)	1
	10A297	Knob	2
	10A526	Knob (Phono-Switch)	1
	28X292	Snap button (mounting loop to cabinet)	4
	13X546	Line cord and plug assembly	1
	2A355	Radio phono switch	1
	28A112	Phono-motor assembly	1
	2A170	Phono on-off switch	1
	6A227	Two prong motor plug	1
	Astatic L-75	Crystal cartridge	1
	13X542	Phono motor socket and cable assembly	1
		DIAL AND DRIVE ASSEMBLY	
	25X1559	Gang Condenser mounting bracket	1
	58X685	Dial	1
	58X686	Dial Background	1
	15X239	Pointer	1
	26X504	Drive shaft	1
	19X192	"C" washer	2
	7A185	Pilot light cable and socket assembly	1
		No. 47 Pilot light bulb	1
	28X310	Drive cord tension spring	1
	10X45	Drive cord assembly	1

DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully closed position. Use a new 10X45 drive cord assembly or a piece of cord 18 inches in length and tie one end to the tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the cord through the slot in the drive pulley rim and continue around pulley one half turn, counterclockwise. Wind 3½ turns counterclockwise (from front of chassis around tuning shaft. Turns should progress toward rear of chassis.

Wind cord counterclockwise around drive pulley in back of previous ½ turn. Pass cord through the slot in the pulley rim. Stretch tension spring and tie free end of cord to the spring.

MODEL 74WG-2004A, 74WG-1802A
74WG-1803A



DRIVE CORD DIAGRAM

TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages except those for the heater and dial lamp are between the socket terminal and "X" point.

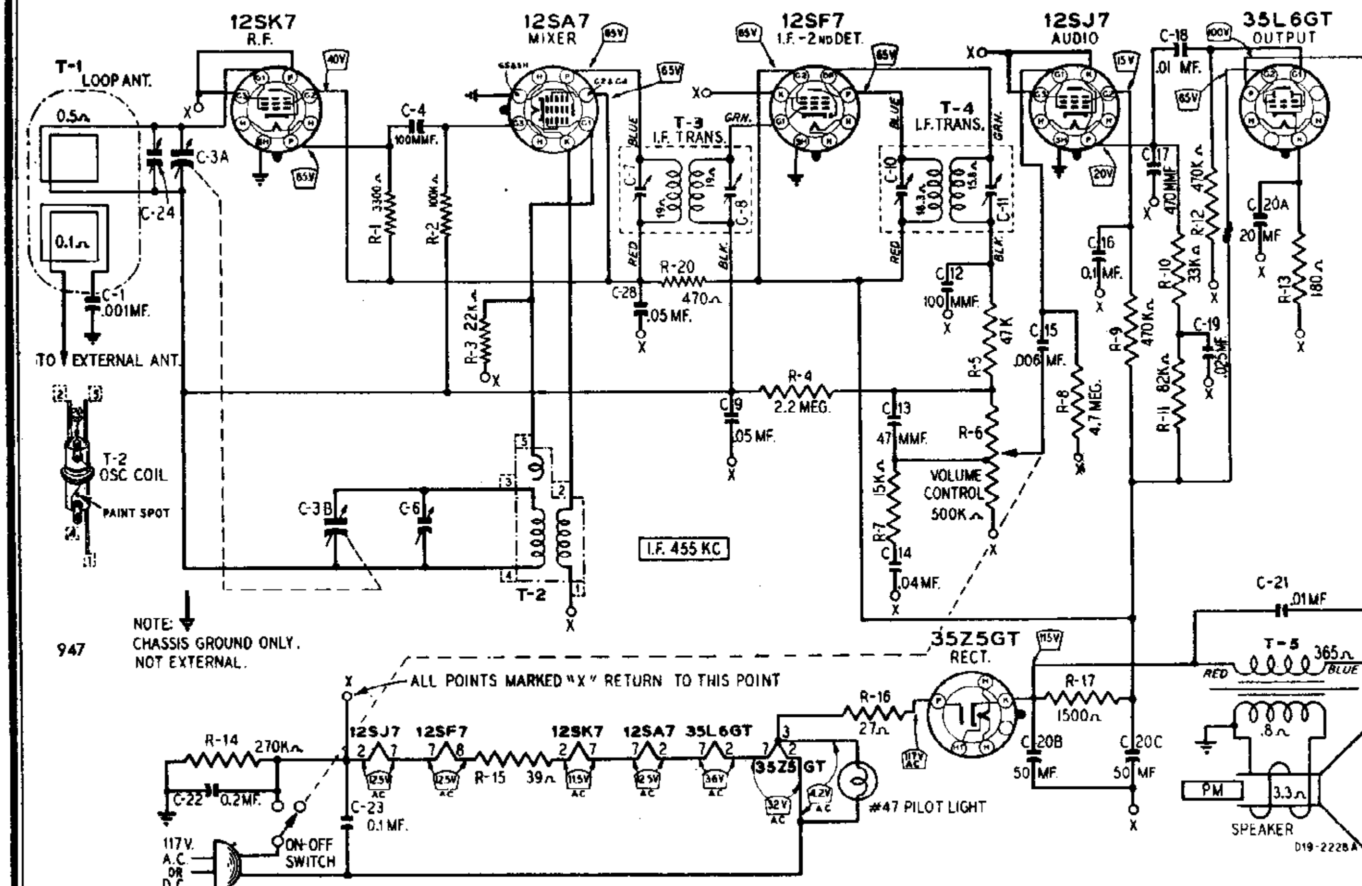
The readings were taken with a 1000 ohm per volt meter and all plate and screen voltages read on a 500 volt scale. Conditions of measurement are:

Line voltage .... 117 volts AC
Volume control .... maximum
Signal input .... none

A variation of ±10% is usually permissible.

MODELS 74WG-1804D, 74WG-1805A

MONTGOMERY WARD



Power Supply........105-125 volts AC, 25-60 cycles, 35 watts or 105-125 volts DC

Frequency Range.....540-1600 KC

Intermediate Frequency.455 KC

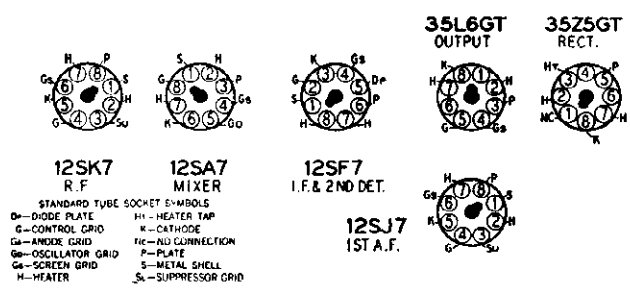
Selectivity............At 1000 KC, 50 KC wide at 1000 times signal

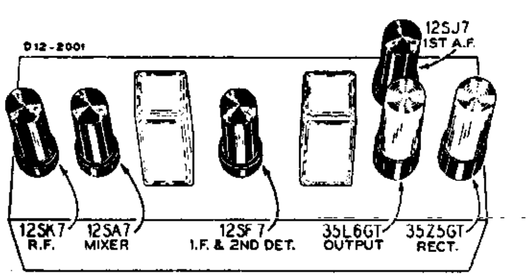
Sensitivity...........(for .05 watt output with external antenna) 15 microvolts average

Power Output.........1.3 watts maximum
.75 watt 10% distortion

Loud Speaker.........4"x 6" PM dynamic

Voice Coil Impedance...3.2 ohms at 400 cycles





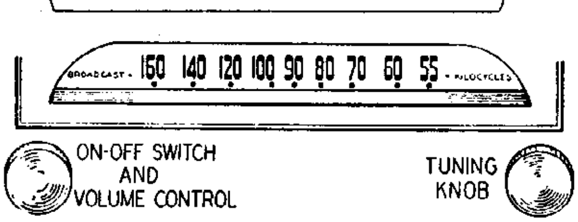
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages except those for the heater and dial lamp are between the socket terminal and "X" point.

The readings were taken with a 1000 ohm-per-volt meter and all plate and screen voltages read on a 500 volt scale. Conditions of measurement are:

Line voltage..117 volts AC
Volume control......................................maximum
Signal input...none

A variation of $\pm 10\%$ is usually permissible.



MONTGOMERY WARD

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.

Volume Control—Maximum All Adjustments.

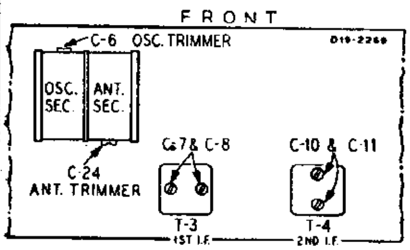
Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately cc brated signal at the test frequencies as listed.

Output Indicating Meter; Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 50 mmf.



NOTE A:—Index line is on dial light diffuser strip. See DIAL CALIBRATION paragraph.

SIGNAL GENERATOR Frequency Setting	Connection to Receiver	Ground Connection	Coupling Capacitor	DIAL SETTING	ADJUST TRIMMERS MAXIMUM OUTPU IN ORDER SHOWN (S Trimmer Illustratio
455 kc	Control Grid 12SF7—I-F (Prong No. 2)	Point "X" 12SK7—R-F (Prong No. 3)	.1 mf	Turn Rotor to full open	2nd I-F (C10) & (C11)
455 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to full open	1st I-F (C7) & (C8)
1620 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to fully open position	Oscillator (C6)
1400 kc	External Antenna Clip on Loop	Chassis	50 mmf	Turn Rotor to 1400 kc Index Line. See Note A	Antenna (C24)

RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt AC across this resistor will be equivalent to a 50 milliwatt output. The vc ume control must be set to maximum.

The signal source must be an accurately calibrated signal generat capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of Plus or Min 25% are usually permissible.

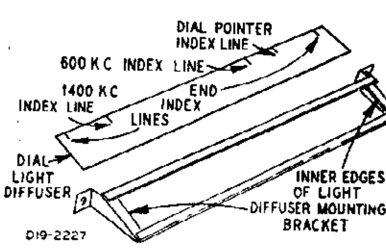
SIGNAL GENERATOR Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	INPUT FOR 50 MILLIWATT OUTPUT
1000 kc	200 mmf or RMA Dummy Antenna	Loop Antenna—External antenna clip	Chassis	19.5 microvolts
1000 kc	.05 mf.	12SA7 Mixer—Pin 8	Point "X" (12SK7 Pin 3)	150 microvolts
455 kc	.05 mf	12SA7 Mixer—Pin 8	Same as above	100 microvolts
455 kc	.05 mf	12SF7 I-F—Pin 2	Same as above	3500 microvolts
400 cycles	.05 mf	12SJ7 1st A-F—Pin 4	Same as above	.042 volt
400 cycles	.05 mf	35L6GT Output—Pin 5	Same as above	1 volt

DIAL CALIBRATION

In order to align the receiver, the dial pointer must be positioned on the dial string correctly with reference to the dial. Index lines are provided on the dial light diffuser for this purpose.

Before aligning the receiver (or when replacing the dial light diffuser) check the position of the diffuser strip, making certain that the two end index lines are aligned with the inner edges of the diffuser mounting bracket opening. The bracket should be crimped at one point to prevent movement of the diffuser strip. To position the dial pointer, turn the gang condenser to the fully closed position. The dial pointer should be directly over the dial pointer index line. (See illustration)

The 1400 KC index line is for use when aligning th receiver.

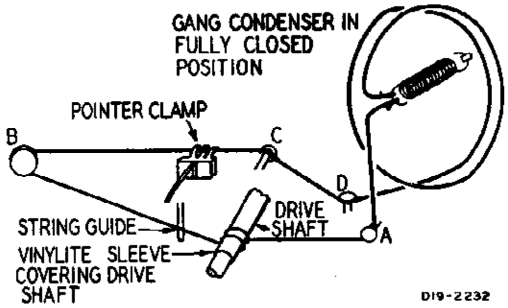


MONTGOMERY WARD

DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully closed position. Use a new 10X44 drive cord assembly and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot on the drive pulley rim, under stud A and wind two turns clockwise (from front of chassis) around the tuning shaft. Turns must progress away from chassis. Pass cord over pulley B and stud C under stud D. Pass cord under drive pulley and wind 1¾ turns counterclockwise around drive pulley Stretch tension spring and fasten free end of cord to spring.

Attach the dial pointer to the cord and position as instructed in paragraph DIAL CALIBRATION.



D19-2232

CAPACITORS

Ref. No.	Part No.	Description	Qty. Used in Set
C-1	D67102	.001 mf 400 V Tubular	1
C-3A, C-3B	14A194	Gang condenser and pulley assembly	1
C-4, C-12	47X476	100 mmf Molded	2
C-6		Part of C-3	
C-7, C-8		Part of T-3, 1st I-F Transformer	
C-9	B66503	.05 mf 200 V Tubular	1
C-10, C-11		Part of T-4, 2nd I-F Transformer	
C-13	47X463	47 mmf Molded	1
C-14	B67403	.04 mf 200 V Tubular	1
C-15	B67602	.006 mf 200 V Tubular	1
C-16	B66104	.1 mf 200 V Tubular	1
C-17	47X467	470 mmf Molded	1
C-18, C-21	B66103	.01 mf 200 V Tubular	2
C-19	B67253	.025 mf 200 V Tubular	1
C-20A, C-20B, C-20C	45X344	20 mf 25 V, 50 mf 150 V, 50 mf 150 V Dry electrolytic condenser	1
C-22	B67204	0.2 mf 200 V Tubular	1
C-23	D67104	.1 mf 400 V Tubular	1
C-24		Part of C-3	
C-28	B67503	.05 mf 200 V Tubular	1

RESISTORS

Ref. No.	Part No.	Ohms	Watts	Description	Qty. Used in Set
R-1	B84332	3300	0.5	Carbon	1
R-2	B85104	100,000	0.5	Carbon	1
R-3	B85223	22,000	0.5	Carbon	1
R-4	B85225	2.2 meg.	0.5	Carbon	1
R-5	B85473	47,000	0.5	Carbon	1
R-6	36X347	500,000		Volume control and switch	1
R-7	B84153	15,000	0.5	Carbon	1
R-8	B85475	4.7 meg.	0.5	Carbon	1
R-9	B84474	470,000	0.5	Carbon	1
R-10	B84333	33,000	0.5	Carbon	1
R-11	B84823	82,000	0.5	Carbon	1
R-12	B85474	470,000	0.5	Carbon	1
R-13	B83181	180	0.5	Carbon	1
R-14	B84274	270,000	0.5	Carbon	1
R-15	D84390	39	2.0	Carbon	1
R-16	B84270	27	0.5	Carbon	1
R-17	C84152	1500	1.0	Carbon	1
R-20	B85471	470	0.5	Carbon	1

TRANSFORMERS AND COILS

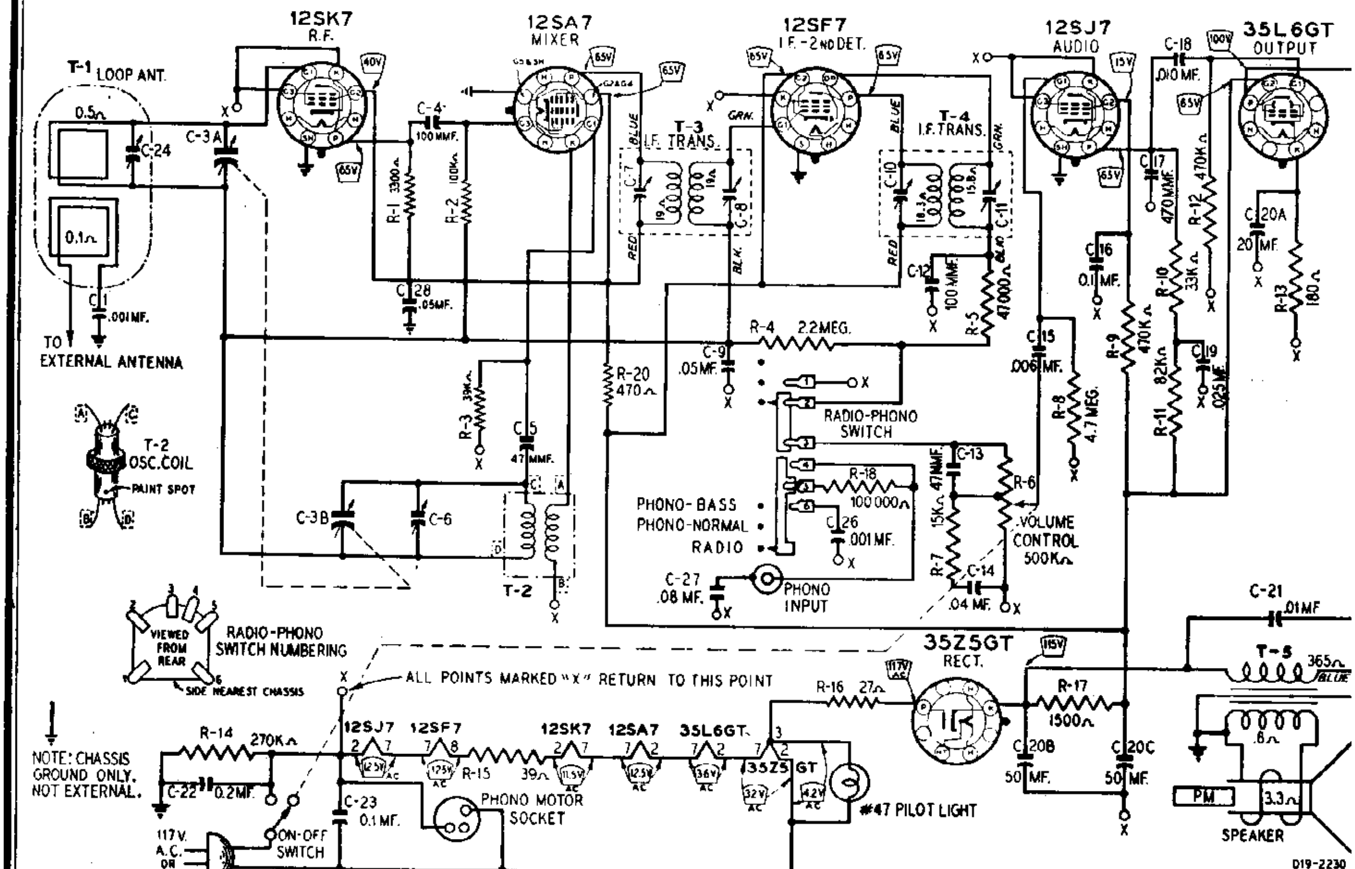
Ref. No.	Part No.	Description	Qty. Used in Set
T-1	9A1944	"B" Range loop antenna	1
T-2	9A1911	Oscillator coil assembly	1
T-3	9A1775	1st I-F Transformer and can assembly	1
T-4	9A1776	2nd I-F Transformer and can assembly	1
T-5	51X116	Output transformer	1

DIAL AND DRIVE ASSEMBLY

Part No.	Description	Qty. Used in Set
6X21	Rubber grommet } Gang cond. mtg.	3
20X329	Cond. cushion stud } Gang cond. mtg.	3
58X667	Dial (for Walnut Cabinet)	1
58X700	Dial (for Blonde Cabinet)	1
25X1461	Dial bracket	1
26A446	Pointer bracket assembly	1
15X217	Pointer	1
25X1398	Pilot light bracket	1
7A192	Pilot light socket assembly	1
7A103	Pilot light No. 47	1
10X44	Drive cord assembly	1
28X95	Drive cord tension spring	1
26X464	Drive shaft	1
19X192	"C" washer (for drive shaft)	2
41X81	Dial light diffuser	1
4X884	Escutcheon (for Walnut Cabinet)	1
4X1000	Escutcheon (for Blonde Cabinet)	1
25X1460	Escutcheon mounting bracket	2

MISCELLANEOUS

Part No.	Description	Qty. Used in Set
12A431	4" x 6" speaker with mtg. bracket	1
3A303	Tube socket—octal (8 prong) molded	5
3A421	Tube socket with shield	1
10A297	Knob (walnut) on-off switch, volume control and tuning	2
10A649	Knob (Blonde)	2
28X292	Snap button (mtg. loop to cabinet)	2
	6 x ¼" slotted hex head P-K type "Z" screw mounting loop to chassis)	2
13X328	Line cord and plug assembly	1



Intermediate Frequency 455 KC

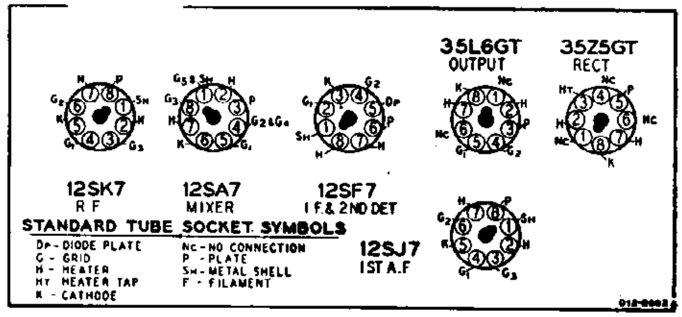
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages except those for the heater and dial lamp are between the socket terminal and "X" point.

The readings were taken with a 1000 ohm-per-volt meter and all plate and screen voltages read on a 500 volt scale. Conditions of measurement are:

Line voltage .... 117 volts AC
Volume control .... maximum
Signal input .... none

A variation of ±10% is usually permissible.

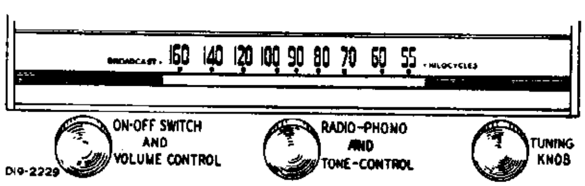


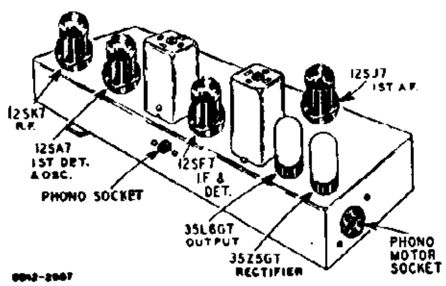
PHONO MOTOR CONNECTION

If the phono motor plug is ever disconnected from the chassis, it must be reinserted in the chassis socket with the red paint mark on the plug adjacent to the red paint mark on the chassis. If this is not observed the phono motor will not operate.

ELECTRICAL SPECIFICATIONS

Power Supply .... 105-125 volts AC, 60 cycles, 35 watts (55 watts phono operating)
Frequency Range .... 540-1600 KC
Selectivity .... At 1000 KC, 50 KC wide at 1000 times signal
Sensitivity .... (for .05 watt output with external antenna) 15 microvolts average
Power Output .... 1.3 watts maximum .75 watt 10% distortion
Loud Speaker .... 4"x6" PM dynamic
Voice Coil Impedance .... 3.2 ohms at 400 cycles
Record Changer .... See Manual No. 5031A

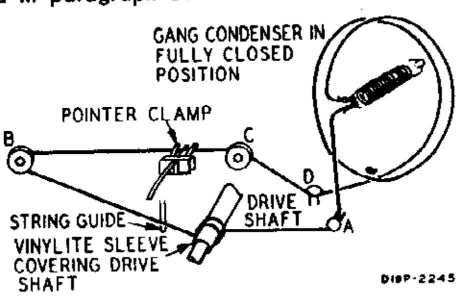




DRIVE CORD REPLACEMENT

The illustration below shows the method of stringing the drive cord. Use a new drive cord 10X44 or a piece of cord 48" long and fasten one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley. Pass the cord through the slot in the pulley rim and continue counterclockwise around the pulley as shown. Three turns must be wound around the tuning shaft in a clockwise direction with the turns progressing away from the chassis. (On sets with a black vinylite sleeve on the tuning shaft, wind only two turns around the shaft.)

Attach the dial. pointer to the cord and position, as instructed in paragraph DIAL CALIBRATION.

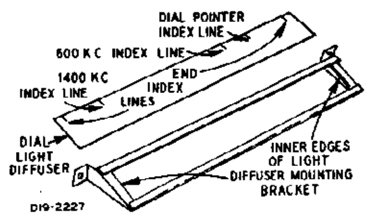


DIAL CALIBRATION

In order to align the receiver, the dial pointer must be positioned on the dial string correctly with reference to the dial. Index lines are provided on the dial light diffuser for this purpose.

Before aligning the receiver (or when replacing the dial light diffuser) check the position of the diffuser strip, making certain that the two end index lines are aligned with the inner edges of the diffuser mounting bracket opening. The bracket should be crimped to prevent movement of the diffuser strip. To position the dial pointer, adjust the radio to the "stop" position at the low frequency end of the dial. The dial pointer should be directly over the dial pointer index line. (See illustration.) If not, move the pointer along the drive cord until it is directly over the index line.

The 1400 KC index line is for use when aligning the receiver.



50 CYCLE OPERATION

If it is desired to use the radio and record player on a 50 cycle power supply, it will be necessary to install a new bushing on the motor shaft and to wire a 70 ohm, 20 watt resistor in series with the motor and the AC supply.

To install the new bushing, align the upper part of the center spindle with the lower part of the spindle and turn the record shelf to the 12" position. Lift the turntable off the record changer. On record players having a turned metal bushing fastened on with a set screw, loosen the set screw holding the old bushing to the motor shaft, remove the old pulley and install the new bushing No. G-25-72438.

On record players having a spring bushing on the motor shaft, remove the old spring bushing and install a new spring bushing No. G-33-72435.

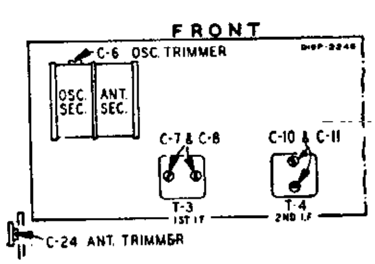
On record players having no bushing on the motor shaft, install a spring bushing No. G-33-72436.

When replacing the turntable on the record player, make certain that the turntable rim is placed over both of the rubber drive pulleys.

ALIGNMENT PROCEDURE

Check dial pointer position, see Dial Calibration paragraph.
Volume Control—Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for several Minutes.
The equipment in column at right is required for aligning:

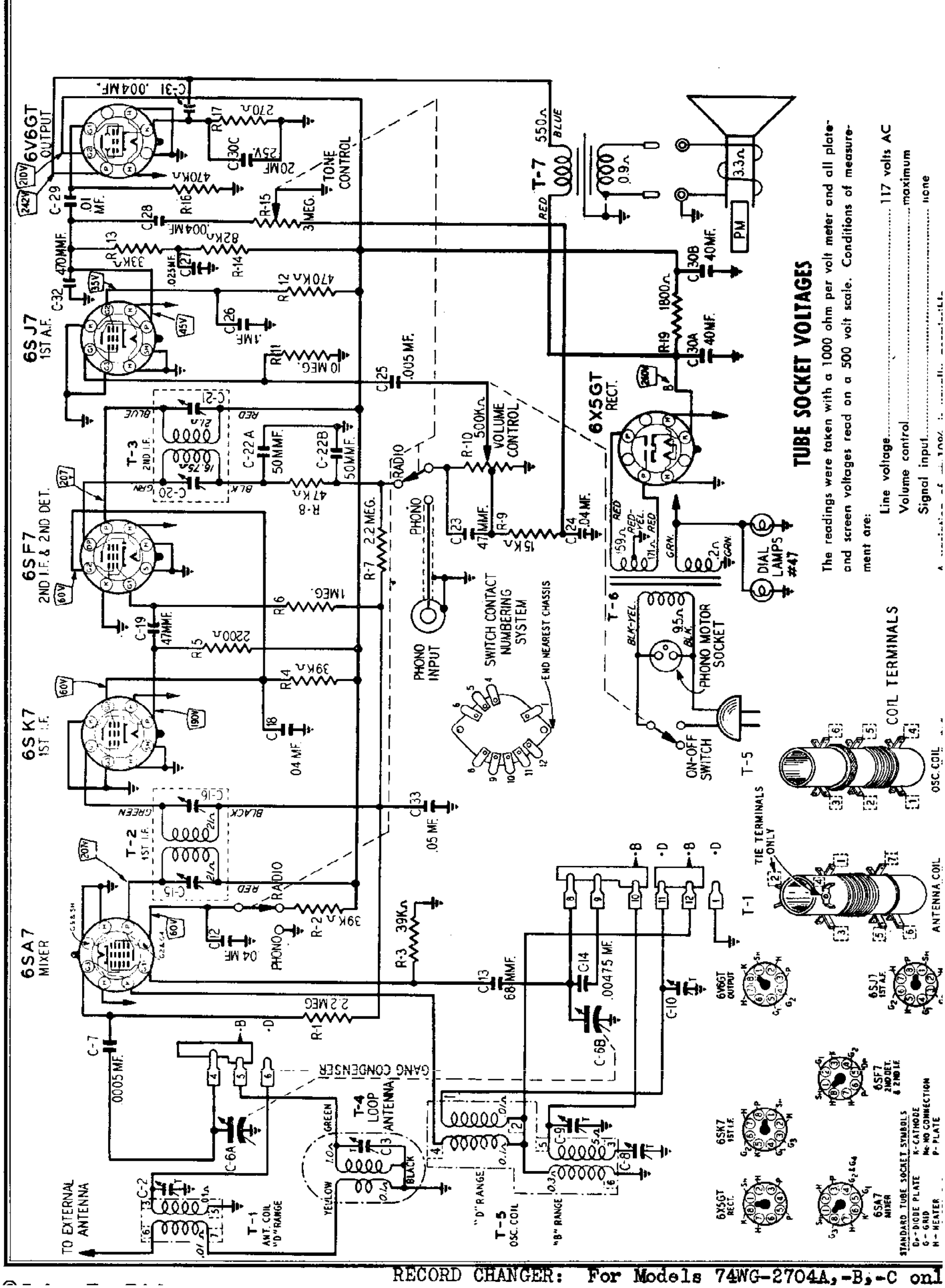
Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 50 mmf.



SIGNAL GENERATOR			Coupling Capacitor	DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT IN ORDER SHOWN (See Trimmer Illustration)
Frequency Setting	Connection to Receiver	Ground Connection			
455 kc	Control Grid 12SF7—I-F (Prong No. 2)	Point "X" 12SK7—R-F (Prong No. 3)	.1 mf	1600 KC	2nd I-F (C-10) & (C-11)
455 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	1600 KC	1st I-F (C-7) & (C-8)
1620 kc	Control Grid 12SA7—1st Det. (Prong No. 8)	Same as above	.1 mf	Turn Rotor to Fully Open Position	Oscillator (C-6)
1400 kc	External Antenna Clip on Loop	Chassis	50 mmf	Turn Rotor to 1400 KC Index Line. See Note A	Antenna (C-24)

*NOTE A:—Index line is on dial light diffuser strip. See DIAL CALIBRATION paragraph.

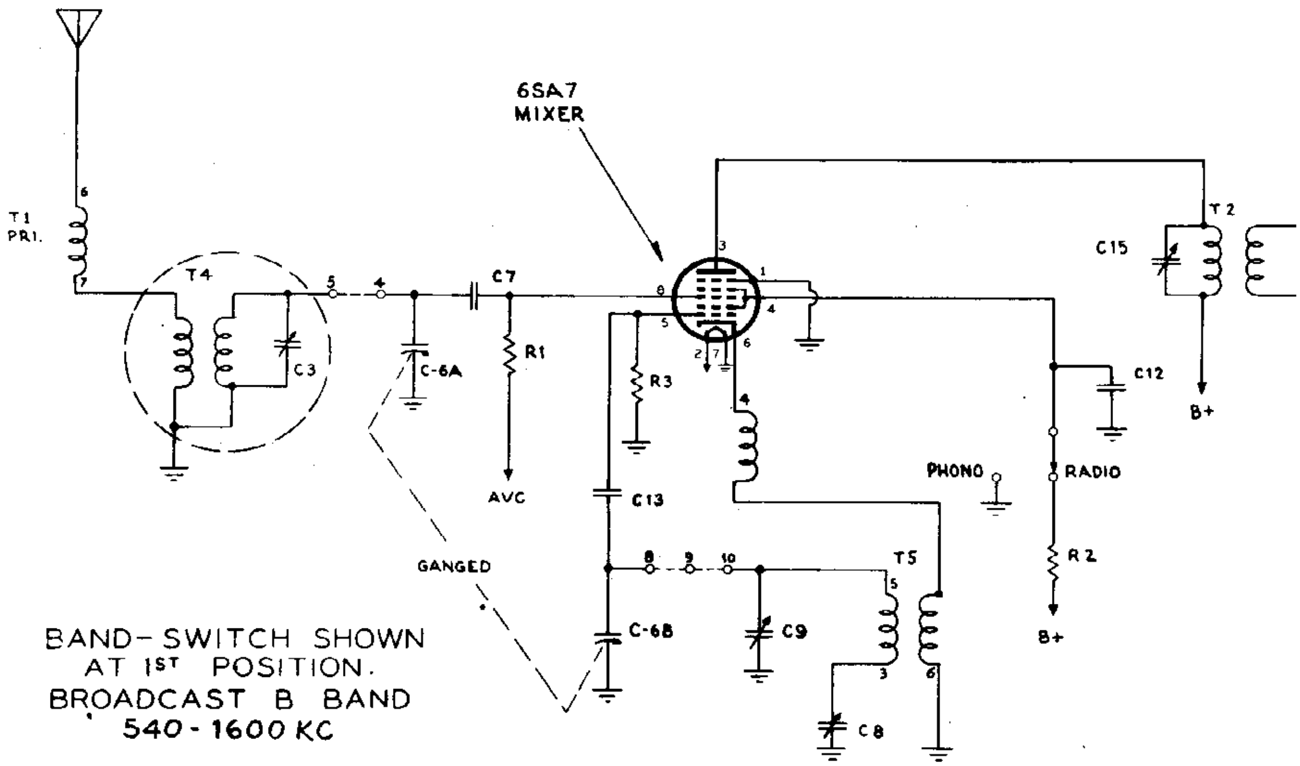
MONTGOMERY WARD MODELS 74WG-2504A,-B,-
MODELS 74WG-2704A,-B,-



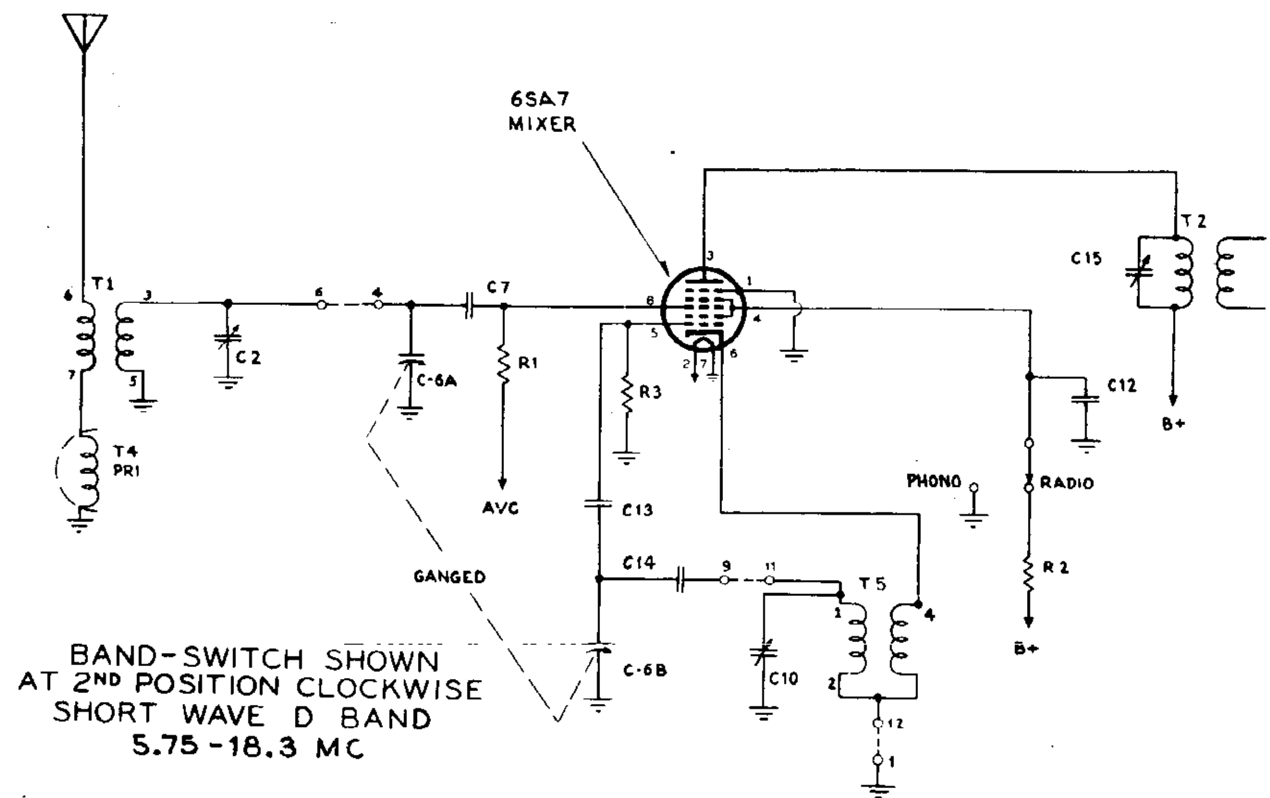
"clarified schematics"

MODELS 74WG-2504A,-B,-C
MODELS 74WG-2704A,-B,-C

MONTGOMERY WARD

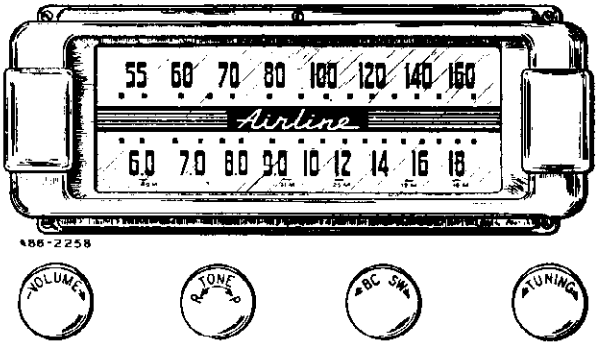


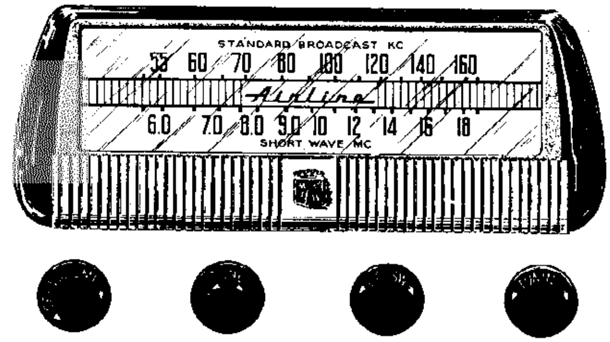
BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST B BAND
540-1600 KC



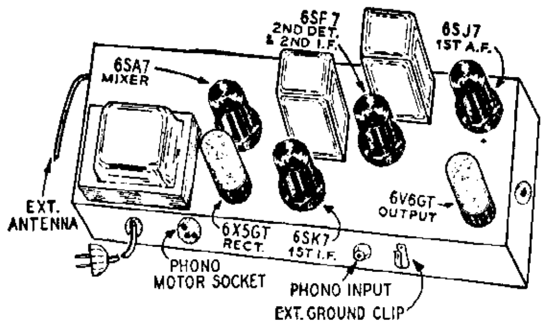
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE D BAND
5.75-18.3 MC

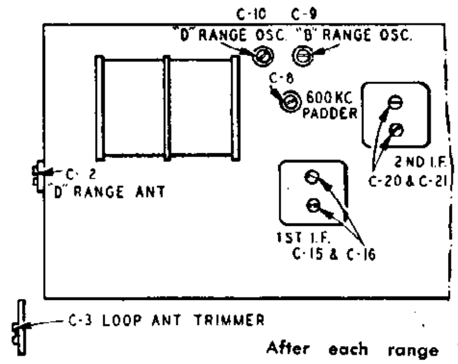
2504A, 2704A





2504C, 2704C





ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 50 mmf., and 400 ohms.

After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1400 KC on the dial, re-set pointer at the 1400 KC mark on the dial scale.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained

	SIGNAL GENERATOR		Dummy Antenna	Band Switch Setting	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
	Frequency Setting	Connection at Radio				
I-F	455 kc	6SA7, Pin 8	.1 mf	B Range	Turn Rotor to Full Open	2nd I-F (C-20) & (C-21) 1st I-F (C-15) & (C-16)
RANGE B	1620 kc	Antenna Lead	50 mmf	B Range	Turn Rotor to Full Open	Oscillator Range B (C9)
	1400 kc	Antenna Lead	50 mmf	B Range	Tune Rotor to Max. Output. Set Indicator to 1400 KC. See Note A	Antenna Range B (C3)
	600 kc	Antenna Lead	50 mmf	B Range	Tune Rotor to Max. Output	600 kc (C8) Rock Rotor—See Note B
Repeat above oscillator adjustments at 1620 and 600 KC until readjusting the oscillator Range B Trimmer (C9) causes no further improvement in output.						
RANGE D	18.3 mc	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C10)
	16 mc	Antenna Lead	400 Ohm	D Range	Tune Rotor to Max. Output	Antenna Range D (C2) Rock Rotor—See Note B
LOOP RANGE B	Reassemble chassis in cabinet. 1400 kc	Antenna Lead	50 mmf	B Range	Tune Rotor to Max. Output	Antenna Range B (C3)

MONTGOMERY WARD

GENERAL DESCRIPTION

This model is a five tube (plus rectifier tube) AC console receiver with automatic record changer. Controls are provided for tuning, volume, tone, and band selection. The dial scale is calibrated in two bands, the broadcast band in channel numbers to cover frequencies between 540-1600 KC and the short wave band directly in megacycles from 5.75 to 18.3 MC. Other features include a built-in Air Wave Aerial, automatic volume control, beam power audio output stage and a PM dynamic speaker. A switch is provided on the tone control for selection of either radio or phono operation. This applies to Models 2504A, B, and C with the exception that the latter have no record changers.

ELECTRICAL SPECIFICATIONS

Frequency Range............B range—540-1600 KC
D range—5.75 to 18.3 MC
Intermediate Frequency..455 KC
Selectivity.........................40 KC broad at 1000 times signal, 1000 KC
Sensitivity.........................(for .5 watt output) with external antenna
B range—9 microvolts average
D range—20 microvolts average
Power Output..................4 watts maximum
2.3 watts, 10% distortion
Loud Speaker..................10" PM dynamic
Voice Coil Impedance....3.2 ohms at 400 cycles
Record Changer...............See Manual No. 5050

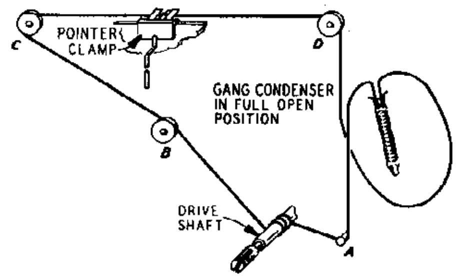
Tube and Dial Light Complement
1 6SA7 Mixer
1 6SK7 1st I-F Amplifier
1 6SF7 2nd I-F Amplifier & 2nd Det.
1 6SJ7 1st A-F Amplifier
1 6V6GT Power Output
1 6X5GT Rectifier
2 No. 47 Dial Lamps

Operating Voltages--Chassis for Models 2504A and 2704A are available for operation on the following power supply:

105-125 volts, AC, 60 cycles

Operating Voltages--Chassis for Models 2504C and 2704C are available for operation on the following power supply:

105-125 volts AC, 50-60 cycles.



2504A, 2704A DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully open position. Use a new 10X63 drive cord assembly or a piece of cord 48 inches long and tie one end to the tension spring. Hook the other end of the tension spring to the tab on the drive pulley. Pass the cord through the slot in the drive pulley rim around idler stud A and wind three and one-half turns clockwise around the tuning shaft (turns must progress away from chassis). Then pass cord over idler pulley B and around pulleys C and D. Wrap cord counterclockwise around drive pulley, stretch tension spring and tie free end of cord to spring.

2504C, 2704C DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully open position. Use a new 10X65 drive cord assembly or a piece of cord 48 inches long and tie one end to the tension spring. Hook the other end of the tension spring to the tab on the drive pulley. Pass the cord through the slot in the drive pulley rim around idler stud A and wind three and one-half turns clockwise around the tuning shaft (turns must progress away from chassis). Then pass cord over idler pulleys B and C. Wrap cord counterclockwise around drive pulley, stretch tension spring and fasten free end of cord to spring.

RECEIVER STAGE SENSITIVITIES

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output with the speaker connected. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				INPUT FOR .5 WATT OUTPUT
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	
1000 kc	200 mmf or RMA Dummy Antenna	External antenna lead	Chassis	9 microvolts
1000 kc	.05 mf	6SA7 Mixer, Pin 8	Same as above	42 microvolts
455 kc	.05 mf	6SA7 Mixer, Pin 8	Same as above	40 microvolts
455 kc	.05 mf	6SK7 1st I-F, Pin 4	Same as above	1075 microvolts
455 kc	.05 mf	6SF7 2nd I-F, Pin 2	Same as above	3900 microvolts
400 cycles	.05 mf	6SJ7 1st A-F, Pin 4	Same as above	.08 volt
400 cycles	.05 mf	6V6GT Output, Pin 5	Same as above	3.75 volts

MONTGOMERY WARD

2504B,C REPLACEMENT PARTS LIST 2704B,C

CAPACITORS

Ref. No.	Part No.	Description			Qty. Used in Set
C-2	17A164	5-50 mmf		Trimmer	1
C-3	17A235	2-24 mmf		Trimmer	1
C-6A, C-6B	14A196	Gang Condenser with Drive Pulley			1
C-7	B66501	.0005 mf	200 V	Tubular	1
C-8	17A155	350-430 mmf		Trimmer	1
C-9, C-10	17A109	2.5-35 mmf		Dual Trimmer	1
C-12, C-18	D66403	.04 mf	400 V	Tubular	2
C-13	47X466	68 mmf		Moulded	1
C-14	46X289	.00475 mf		Tubular	1
C-15, C-16		Part of T-2 (1st I-F Coil Assy.)			
C-19, C-23	47X463	47 mmf		Moulded	2
C-20, C-21		Part of T-3 (2nd I-F Coil Assy.)			
C-22A, C-22B	47X112	50-50 mmf		Dual Mica	1
C-24	D64403	.04 mf	400 V	Tubular	1
C-25	D66502	.005 mf	400 V	Tubular	1
C-26	D67104	.10 mf	400 V	Tubular	1
C-27	D64253	.025 mf	400 V	Tubular	1
C-28	D66402	.004 mf	400 V	Tubular	1
C-29	D66103	.01 mf	400 V	Tubular	1
C-30A, C-30B, C-30C	45X346	40 mf / 40 mf / 20 mf	450 V / 450 V / 25 V	3 Section Electrolytic	1
C-31	H66402	.004 mf	800 V	Tubular	1
C-32	47X467	470 mmf		Moulded	1
C-33	B66503	.05 mf	200 V	Tubular	1

RESISTORS

Ref. No.	Part No.	OHMS	WATTS	Description	Qty. Used in Set
R-1, R-7	B85225	2.2 meg.	0.5	Carbon	2
R-2, R-4	C84393	39 K	1.0	Carbon	2
R-3	B84393	39 K	0.5	Carbon	1
R-5	B84222	2200	0.5	Carbon	1
R-6	B85105	1 meg.	0.5	Carbon	1
R-8	B85473	47 K	0.5	Carbon	1
R-9	B84153	15 K	0.5	Carbon	1
R-10	36X358	500 K		Volume Control & Line Switch	1
R-11	B85106	10 meg.	0.5	Carbon	1
R-12, R-16	B85474	470 K	0.5	Carbon	2
R-13	B84333	33 K	0.5	Carbon	1
R-14	B84823	82 K	0.5	Carbon	1
R-15	40X276	3.0 meg.		Tone Control & Radio Phono Switch	1
R-17	C84271	270	1.0	Carbon	1
R-19	D84182	1800	2.0	Carbon	1

This list applies also to Models 2504A and 2704A with the exception that the description of capacitor C-31 should read: C-31 F66402 .004 mf 600 V Tubular 1

TRANSFORMERS AND COILS

Part No.	Ref. No.	Description	Qty. Used in Set
T-1	9A1917	"D" Range Antenna Coil Assembly	1
T-2	9A1814	1st I-F Coil Assembly	1
T-3	9A1815	2nd I-F Coil Assembly	1
T-4	26A474	"B" Range Loop Antenna Assembly	1
T-5	9A1918	"B" & "D" Range Oscillator Coil Assembly	1
T-6	53X282	117 Volt, 60 Cycle, Standard Power Transformer	1
T-7	51X134	Output Transformer	1

DIAL AND DRIVE ASSEMBLY

Ref. No.	Description	Qty. Used in Set
6X21	Rubber Grommet } Mtg. Gang Cond.	3
20X329	Cond. Cushion Stud } Mtg. Gang Cond.	3
26X485	Drive Shaft	1
19X192	"C" Washer (For Drive Shaft)	2

MISCELLANEOUS

Ref. No.	Description	Qty. Used in Set
12A476	10" P.M. Speaker	1
3A303	Tube Socket—Octal (8 prong) moulded	6
3A304	Phono Motor Socket	1
3A305	Phono Socket—Single Pin Tip	1
2A372	Band Change Switch	1
13X328	Line Cord and Plug Assembly	1

2504C, 2704C

DIAL AND DRIVE ASSEMBLY

S-58X13	Dial Bracket Assembly (including Dial Bracket, Idler Pulley, Rivets, and Dial Glass)	1
15X241	Pointer	1
28X113	Drive Cord Tension Spring	1
10X65	Drive Cord Assembly	1
7A199	Pilot Light Socket Assembly	1
7A103	No. 47 Pilot Light Bulb	2
58X696	Dial Glass	1
4X999	Escutcheon	1

MISCELLANEOUS

10A644	Knob (Tuning)	1
10A645	Knob (Off-On Volume)	1
10A646	Knob (SW-BC)	1
10A643	Knob (Tone—R.P.)	1

CAPACITORS 2504A, 2704A

C-35	D67204	.2 mf	400 V	Tubular	1

DIAL AND DRIVE ASSEMBLY

26A473	Dial Bracket Assembly (including Dial Bracket, Idler Pulley, Rivets, and Dial Background)	1
15X190	Pointer	1
28X113	Drive Cord Tension Spring	1
10X63	Drive Cord Assembly	1
7A214	Pilot Light Socket Assembly	1
	No. 51 Pilot Light Bulb	2
58X690	Dial Glass	1
4X962	Escutcheon	1

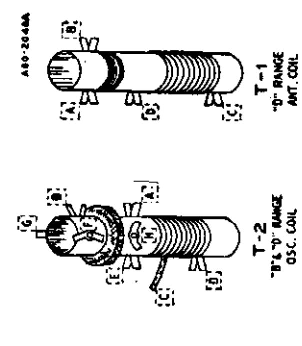
MISCELLANEOUS

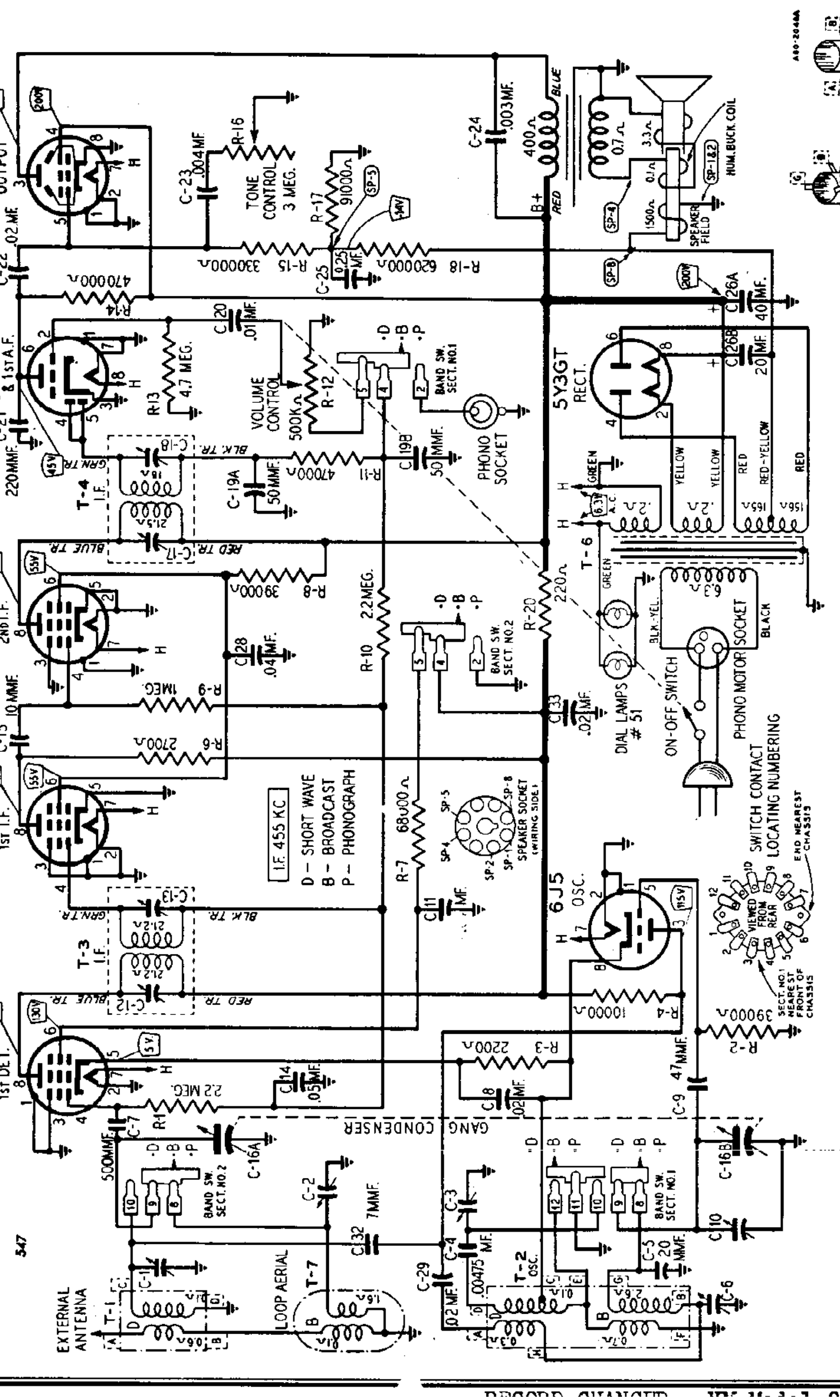
10A604	Knob (Tuning)	1
10A605	Knob (Off-On Volume)	1
10A606	Knob (SW-BC)	1
10A581	Knob (Tone—R.P.)	1

2704A, 2704B, 2704C
TYPE V-28A139 RECORD CHANGER PARTS

V-961-B	Motor Assembly, 60 cycles, 115-120 V	1
Shure P30-1	Crystal Cartridge and Semi-Permanent Needle Assembly	1
	Semi-Permanent Needle	1
	(Specify part number and let-	

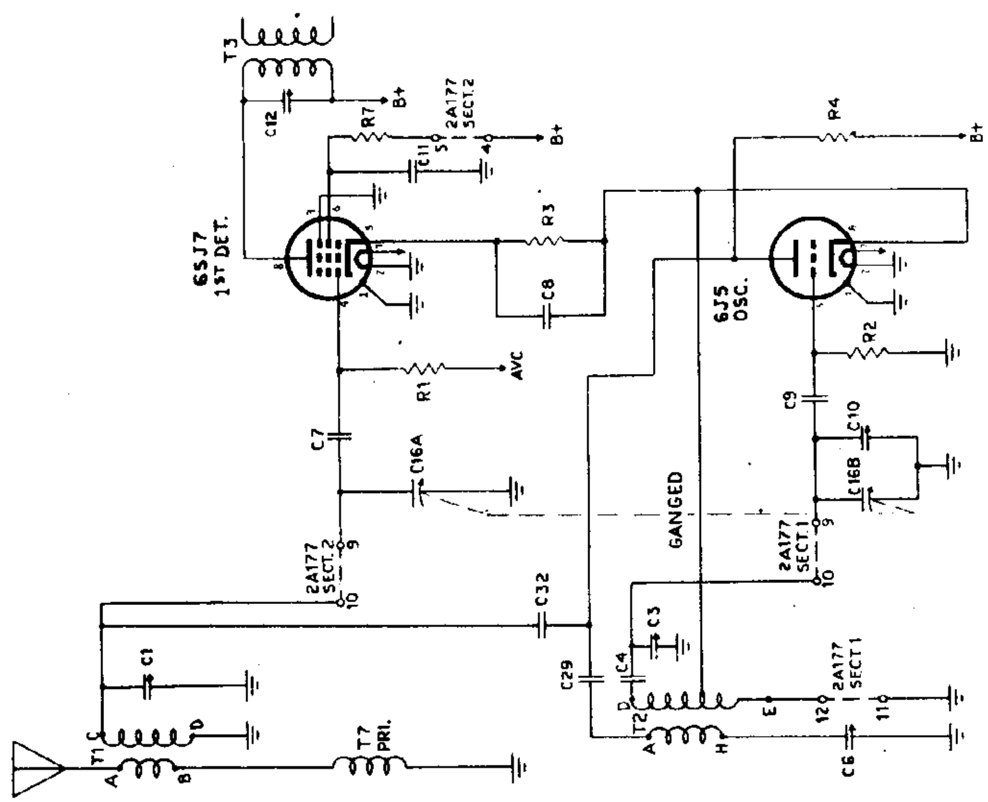
MONTGOMERY WARD



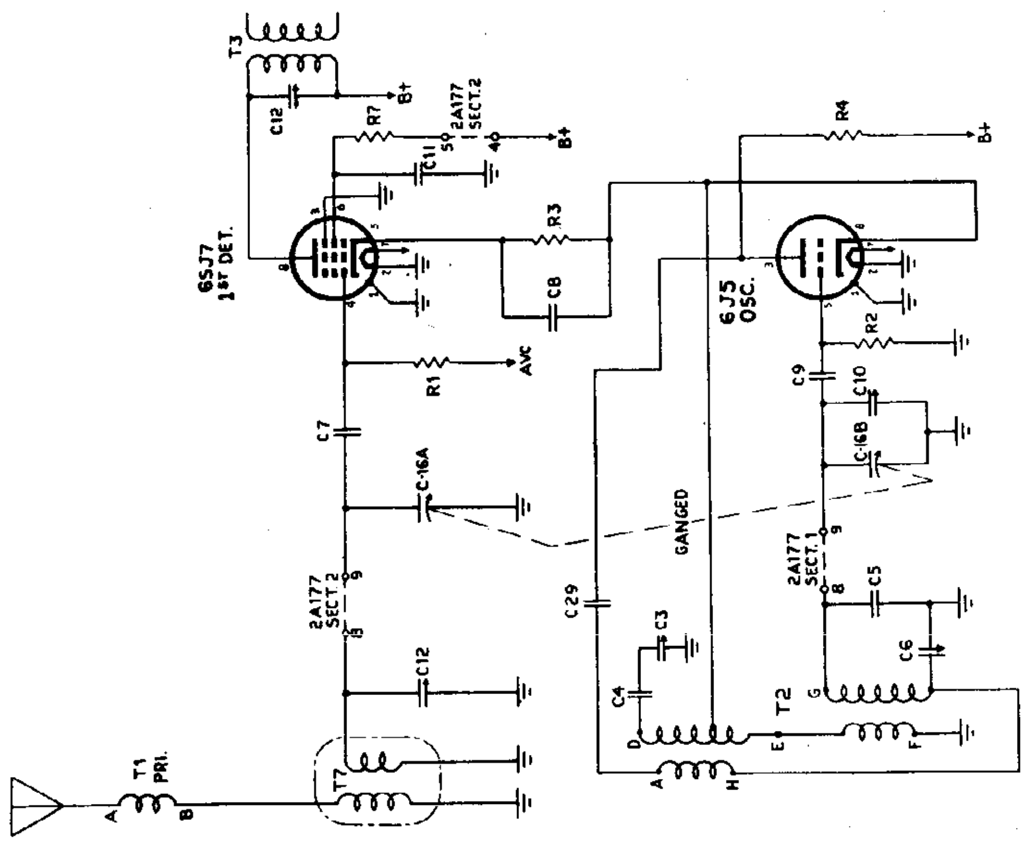


Power Supply	105-125 volts AC, 60 cycles, 55 watts normal, 77 watts phono operating
Frequency Range	B range—540-1600 KC D range—5.75 to 18.3 MC
Intermediate Frequency	455 KC
Selectivity	43 KC broad at 1000 times signal, 1000 KC
Sensitivity	(for .5 watt output) with external antenna B range—2.5 microvolts average D range—12 microvolts average
Power Output	3.5 watts maximum 2 watts, 10% distortion
Loud Speaker	Electro dynamic
Voice Coil Impedance	3.2 ohms at 400 cycles

MONTGOMERY WARD



BAND-SWITCH SHOWN AT 2ND POSITION.
D RANGE
5.71 - 18.3 MC

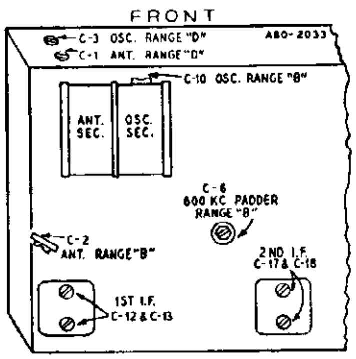


BAND - SWITCH SHOWN AT 1ST POSITION.
B RANGE
540 - 1600 KC

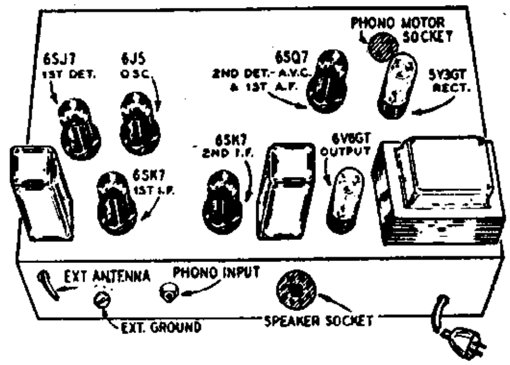
MONTGOMERY WARD

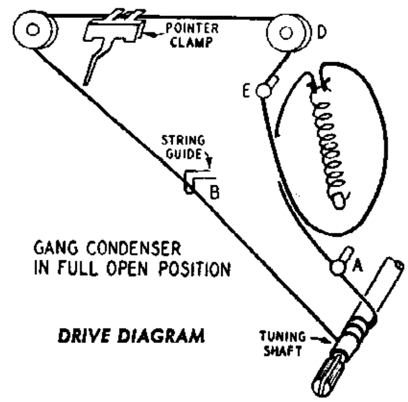
DRIVE CORD REPLACEMENT

Turn the gang condenser to the fully open position. Use a new 10X64 drive cord or a piece of cord 46" long and tie one end to the tension spring. Hook the other end of the tension spring to the tab on the drive pulley. Pass the cord through the slot in the drive pulley rim and continue one half turn counterclockwise around the drive pulley. Then pass the cord around idler stud A and wind three turns clockwise around the tuning shaft (turns must progress away from chassis). Pass cord through string guide B, over pulleys C and D and around idler stud E. Wrap ¾ turn counterclockwise around drive pulley, stretch the tension spring and tie free end of the cord to spring.



TRIMMER POSITIONS





DRIVE DIAGRAM

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 100 mmf., and 400 ohms.

	SIGNAL GENERATOR		Dummy Antenna	Band Switch Setting	Condenser Setting	ADJUST TRIMMERS TO MAXIMUM
	Frequency Setting	Connection at Radio				
I-F	455 kc	6SJ7, Pin 4	.1 mf	B Range	Turn Rotor to Full Open	2nd I-F (C17) & (C18) 1st I-F (C12) & (C13)
RANGE B	1600 kc	Antenna Lead	100 mmf	B Range	Turn Rotor to Full Open	Oscillator Range B (C10)
	1400 kc	Antenna Lead	100 mmf	B Range	Turn Rotor to Max. Output Set Indicator to 1400 KC See Note A	Antenna Range B (C2)
	600 kc	Antenna Lead	100 mmf	B Range	Turn Rotor to Max. Output	600 kc (C6) Rock Rotor—See Note B
Repeat above oscillator adjustments at 1600 and 600 kc until readjusting the oscillator Range B Trimmer (C10) causes no further improvement in output.						
RANGE D	18,300 kc	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C3)
	17,000 kc	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Antenna Range D (C1) Rock Rotor—See Note B
LOOP RANGE B	Reassemble chassis in cabinet. 1400 kc	Antenna Lead	100 mmf	B Range	Turn Rotor to Max. Output	Antenna Range B (C2)

After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1400 KC on the dial, re-set pointer at the 1400 KC mark on the dial scale.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

MONTGOMERY WARD

The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of .5 watt. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of 1.26 volts across this resistor will be equivalent to a .5 watt output. The volume control must be set to maximum.

The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations of Plus or Minus 25% are usually permissible.

SIGNAL GENERATOR				
Frequency	Coupling Capacitor	Connection to Receiver	Ground Connection	INPUT FOR .5 WATT OUTPUT
1000 kc	200 mmf or RMA Dummy Antenna	External antenna lead	Chassis	2.3 microvolts
1000 kc	.05 mf	6SJ7 1st Detector, Pin 4	Same as above	17 microvolts
455 kc	.05 mf	6SJ7 1st Detector, Pin 4	Same as above	13.0 microvolts
455 kc	.05 mf	6SK7 1st I-F, Pin 4	Same as above	1300 microvolts
455 kc	.05 mf	6SK7 2nd I-F, Pin 4	Same as above	3400 microvolts
400 cycles	.05 mf	6SQ7 1st A-F, Pin 2	Same as above	.07 volt
400 cycles	.05 mf	6V6GT Output, Pin 5	Same as above	3.8 volts

CAPACITORS

Ref. No.	Part No.	Description			Qty. Used in Set
C-1, C-3	17A163	2-25 mmf Ant. "D" Range Trimmer; 2-25 mmf Osc. "D" Range Trimmer			1
C-2	17A149	1.8-12 mmf Loop aerial trimmer			1
C-4	46X289	.00475 mf	180 V	Tubular	1
C-5	47X482	20 mmf		Molded	1
C-6	17A234	300-450 mmf	600 kc	Padder	1
C-7	D67501	.0005 mf	400 V	Tubular	1
C-8, C-29	B66203	.02 mf	200 V	Tubular	2
C-9	47X463	47 mmf		Molded	1
C-10		Part of gang condenser C-16			
C-11, C-28	D66403	.04 mf	400 V	Tubular	2
C-12, C-13		Part of 1st I-F Assembly			
C-14	B66503	.05 mf	200 V	Tubular	1
C-15	47X477	10 mmf		Molded	1
C-16	14A150	Gang condenser assembly			1
C-17, C-18		Part of 2nd I-F Assembly			
C-19A, C-19B	47X112	50 mmf		Dual Mica	1
C-20	B66103	.01 mf	200 V	Tubular	1
C-21	47X468	220 mmf		Molded	1
C-22, C-33	D66203	.02 mf	400 V	Tubular	2
C-23	B66402	.004 mf	200 V	Tubular	1
C-25	B66254	.25 mf	200 V	Tubular	1
C-26A, C-26B	45X277	40 mf; 20 mf	400 V; 450 V	Dry electrolytic	1
C-32	47X182	7 mmf		Ceramic	1

RESISTORS

Ref. No.	Part No.	Ohms	Watts	Description	Qty. Used in Set
R-1, R-10	B85225	2.2 meg.	0.5	Carbon	2
R-2	B84393	39,000	0.5	Carbon	1
R-3	B84222	2200	0.5	Carbon	1
R-4	C84103	10,000	1.0	Carbon	1
R-6	B84272	2700	0.5	Carbon	1
R-7	B84683	68,000	0.5	Carbon	1
R-8	C84393	39,000	1.0	Carbon	1
R-9	B85105	1.0 meg.	0.5	Carbon	1
R-11	B85473	47,000	0.5	Carbon	1
R-12	36X311	500,000		Volume control, ON-OFF switch	1
R-13	B85475	4.7 meg.	0.5	Carbon	1
R-14	B85474	470,000	0.5	Carbon	1
R-15	B85334	330,000	0.5	Carbon	1
R-16	40X259	3 meg.		Tone control	1
R-17	B83913	91,000	0.5	Carbon	1
R-18	B83624	620,000	0.5	Carbon	1

TRANSFORMERS AND COILS

Ref.	Part No.	Description	Qty.
T-1	9A1451	Antenna transformer assembly "D" range	1
T-2	9A1452	Oscillator coil assembly	1
T-3	9A1810	1st I-F Transformer and can assembly	1
T-4	9A1811	2nd I-F Transformer and can assembly	1
T-5	51X97	Output transformer	1
T-6	53X235	117 volt, 60 cycle standard power transformer	1
T-7	9A1395	"B" Band loop antenna	1

MISCELLANEOUS

Part No.	Description	Qty.
12A455	10" Electro dynamic speaker	1
3A303	Tube Socket—octal (8 prong) molded	7
3A293	Speaker socket—octal (8 prong) molded	1
3A304	Phono motor socket	1
3A305	Single pin-tip socket (phono)	1
10A530	Knob (Volume control)	1
10A531	Knob (Tuning)	1
10A532	Knob (Tone control)	1
10A533	Knob (Band change)	1
13X328	Line cord and plug assembly	1
2A177	Band and phono switch	1
8X99	Rubber chassis cushions (chassis to cabinet)	4

DIAL AND DRIVE ASSEMBLY

Part No.	Description	Qty.
25X839	Gang mounting bracket	1
6X26	Rubber grommets — Mounting gang condenser and bracket to chassis	4
20X347	Con. cushion studs — Mounting gang condenser and bracket to chassis	4
19X432	Flat washer — Mounting gang condenser and bracket to chassis	4
26A382	Pulley Mtg. Plate Assem. Complete with idler pulleys, idler studs, brace bracket, string guide and dial background	1
58X593	Dial scale glass	1
30X475	Glass clamp	2
4X871	Dial escutcheon	1
15X225	Pointer	1
10X64	Drive cord	1
28X113	Drive cord tension spring	1
26X336	Drive shaft	1
25X580	Drive shaft bracket	1
19X192	"C" washers for drive shaft	2
7A142	Pilot light socket assembly	2
	Dial lamp (No. 51)	2
41X75	Light shield	2

TYPE V-28A139 RECORD CHANGER PARTS

Part No.	Description
V-961-B	Motor Assembly, 60 cycle 115-120 V.
Shure P30-1	Crystal Cartridge and Semi-Permanent Needle Assembly.

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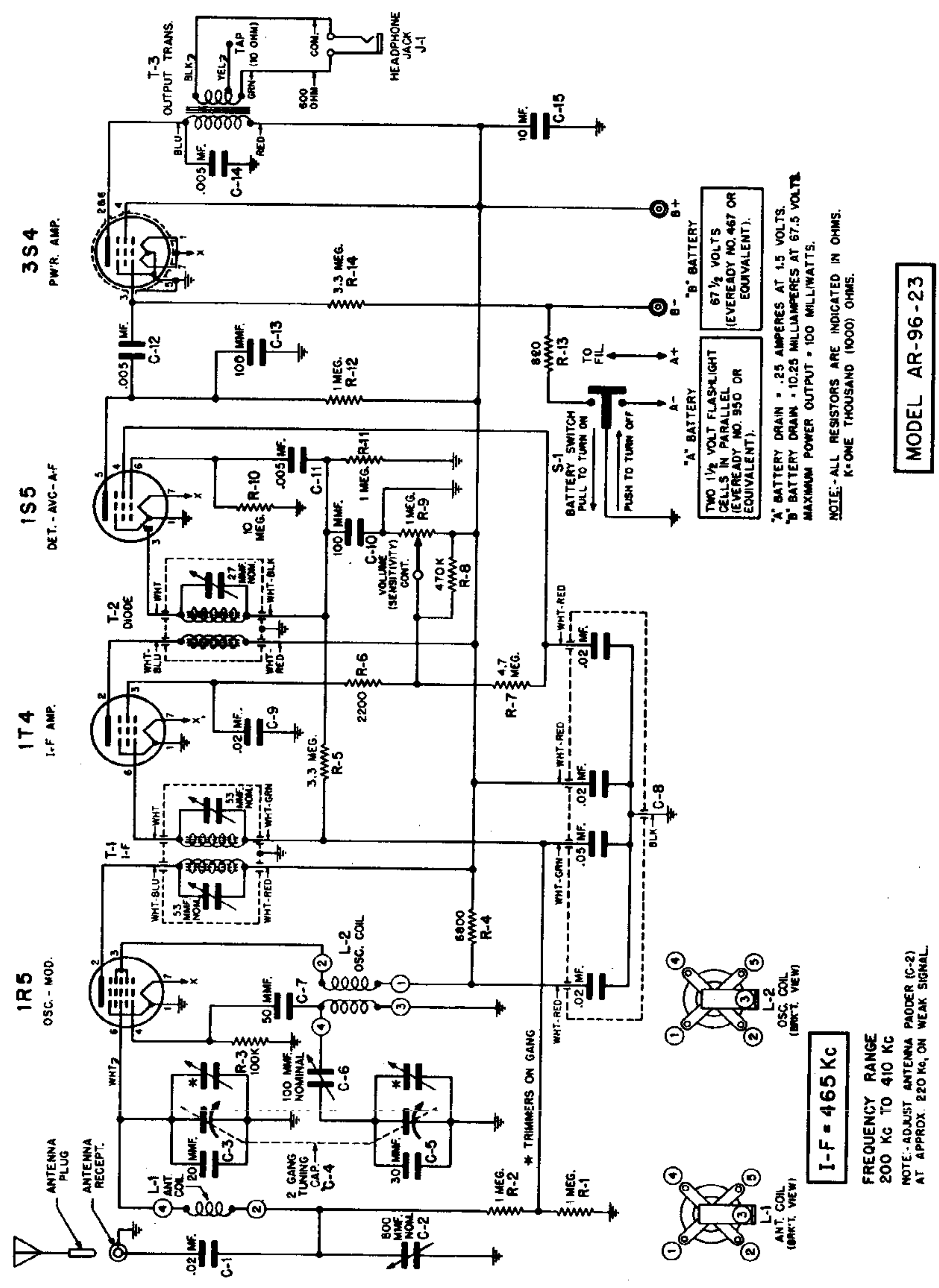

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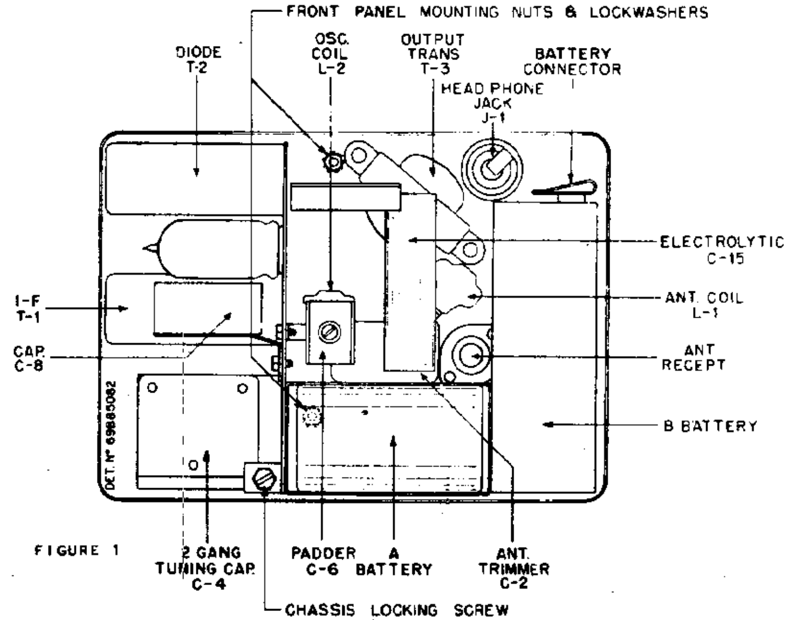


FIGURE 1

REMOVING CHASSIS FROM HOUSING:

1. Unlatch back cover and remove.
2. Remove 'A' and 'B' batteries.
3. Remove the three Phillips head screws which fastens the front panel.
4. Remove chassis locking screw (See figure 1.)
5. The front panel and chassis may now be removed from the wrap-around housing.

NOTE:

1. When replacing chassis be sure to place the tube retainer and cardboard packing if removed.

2: Do not remove tape from housing, as it serves as insulation.

REMOVING CHASSIS FROM FRONT PANEL:

1. Remove tuning and volume control knobs; don't lose the two cork washers and spring washer under tuning knob. When replacing, the spring washer is between the cork washers.
2. Remove knob from ON-OFF switch. This knob is threaded. Remove by turning to the left.
3. Remove the following wires:
   a. The red and blue leads of the output transformer from the 3S4 tube socket.
   b. The three leads to the ON-OFF switch.
   c. The white lead from the ant. trimmer to the 1R5 tube socket; also the bare lead from the trimmer to chassis.
   d. The white lead from the antenna coil and the 1 megohm resistor lead.
   e. Remove the front panel mounting nuts and lockwashers. (See figure 1.)
   f. The front panel is now free from the chassis.

NOTE:

1. The removal of the front panel will ease the replacement of components which are wired to tube sockets.

2. Be sure to make the proper connections when replacing. Refer to the schematic diagram.

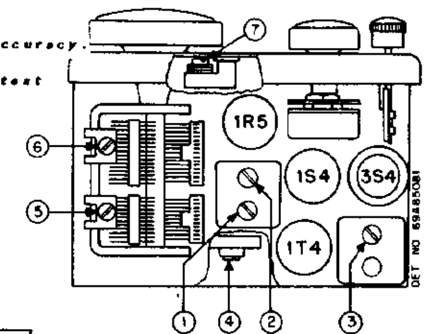
ALIGNMENT PROCEDURE

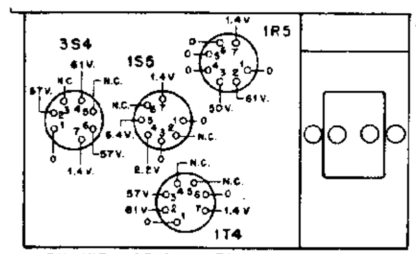
1. Remove chassis from housing.
2. Volume set at maximum for all operations.
3. The adjusting screwdriver or alignment tool should be of the insulated type, such as Motorola Part No. 66A71008.
4. Connect output meter with 600 ohm resistor in parallel across phone jack.

OPERATIONS IN ORDER	GANG CAPACITOR SET AT	DUMMY ANTENNA	GENERATOR CONNECTED TO	ADJUST TRIMMER NO.	SET GENERATOR AT	AVERAGE INPUT FOR 5.35V OUTPUT
1	Min.	.1 mf	Osc-Mod Grid	1-2-3	465 Kc	
2	200 Kc	200 mmf	Ant.Recpt.	4	200 Kc	
3	220 Kc	200 mmf	Ant.Recpt.	5	220 Kc	25 uv.
4	400 Kc *	200 mmf	Ant.Recpt.	6	400 Kc	
5	380 Kc	200 mmf	Ant.Recpt.	7	380 Kc	
6	400 Kc *	200 mmf	Ant.Recpt.	6	400 Kc	

Repeat above steps for maximum accuracy.

** Rock gang capacitor until greatest output is obtained.*

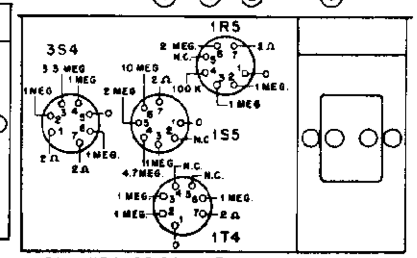




PIN VIEW OF SOCKETS

NOTE:

VOLTAGE MEASUREMENTS MADE UNDER THE FOLLOWING CONDITIONS:
1- 67-1/2 V. 'B' BATTERY CONNECTED.
2- 2 2-1/2 V. 'A' BATTERIES CONNECTED.
3- VOLUME CONTROL ON FULL.
4- SWITCH ON.
5- ANTENNA DISCONNECTED.
6- USING WESTON, MODEL 772, ANALYZER 20,000 OHMS PER VOLT VOLTMETER.



PIN VIEW OF SOCKETS

NOTE:

RESISTANCE MEASUREMENTS MADE UNDER THE FOLLOWING CONDITIONS:
1- BATTERIES DISCONNECTED.
2- C-15 ELECTROLYTIC DISCONNECTED.
3- VOLUME CONTROL ON FULL.
4- SWITCH ON.
5- USING WESTON, MODEL 772, ANALYZER.
6- ANTENNA DISCONNECTED.

C-1 8A25558 Capacitor, fixed: paper: .02 mf 20% 100 vdc
C-2 20K51566 Capacitor, variable: mica; 300-800 mmf
C-3 21K31492 Capacitor, fixed: ceramic; 200 mmf 5% 100 vdc
C-4 19K54849 Capacitor, variable: 2 gang (tuning)
C-5 21K65815 Capacitor, fixed: ceramic; 30 mmf 10% 500 vdc
or 21K54680
C-6 20A51567 Capacitor, variable: mica; nominal 100 mmf (osc. padder)
C-7 21K35392 Capacitor, fixed: ceramic; 50 mmf 10% 500 vdc
C-8 8K25549 Capacitor, fixed: paper: 4 section (see schematic diagram)
C-9 8A25558 Capacitor, fixed: paper; .02 mf 20% 100 vdc
C-10 21R6651 Capacitor, fixed: mica; 100 mmf 20% 300 vdc
C-11 8A24966 Capacitor, fixed: paper; .005 mf 20% 100 vdc
C-12 8A24966 Capacitor, fixed: paper; .005 mf 20% 100 vdc
C-13 21R6651 Capacitor, fixed: mica; 100 mmf 20% 300 vdc
C-14 8A24966 Capacitor, fixed: paper; .005 mf 20% 100 vdc
C-15 23A14727 Capacitor, fixed: electrolytic: 10 mf 150 vdc
J-1 9K54609 Jack, Phone: open circuit; includes washer and nut
L-1 24A51564 Coil, antenna
L-2 24A51568 Coil, oscillator
R-1 6R6004 Resistor, fixed: carbon; 1 megohm 20% 1/2W Ins.
R-2 6R6004 Resistor, fixed: carbon; 1 megohm 20% 1/2W Ins.
R-3 6R6031 Resistor, fixed: carbon; 100,000 ohms 10% 1/2W Ins.
R-4 6R6426 Resistor, fixed: carbon; 6,800 ohms 10% 1/2W Ins.
R-5 6R2118 Resistor, fixed: carbon; 3.3 megohm 20% 1/2W Ins.
R-6 6R6290 Resistor, fixed: carbon, 2,200 ohm 20% 1/2W Ins.
R-7 6R2122 Resistor, fixed: carbon; 4.7 megohm 20% 1/2W Ins.
R-8 6R6032 Resistor, fixed: carbon; 470,000 ohm 20% 1/2W Ins.
R-9 18A24916 Resistor, variable; carbon; 1 megohm (volume control)
R-10 6R2109 Resistor, fixed: carbon; 10 megohm 20% 1/2W Ins.
R-11 6R6004 Resistor, fixed: carbon; 1 megohm 20% 1/2W Ins.
R-12 6R6004 Resistor, fixed: carbon; 1 megohm 20% 1/2W Ins.
R-13 6R6069 Resistor, fixed: carbon; 820 ohms 10% 1/2W N.I.
R-14 6R2118 Resistor, fixed: carbon; 3.3 megohms 20% 1/2W Ins.
T-1 1X24689 Coil, I.F. and shield
T-2 1X24686 Coil, Diode and shield
T-3 25A51574 Transformer, Output
1X51573 Assembly, Antenna lead-in
1X51565 Assembly, Antenna ferrule and receptacle
1X54552 Assembly, Hank antenna
1X72595 Assembly, Tube retainer strip
1X51999 Assembly, Wrap Around (housing)
26A24869 Base, tube shield
1X24676 Bracket, battery assembly
7A24861 Bracket, capacitor mtg. (C-4)
7A24940 Bracket, sliding latch (back cover)
7A24872 Bracket, Volume control mtg. (R-9)
38A71758 Button, plug
51B80111 Cord CD-507A (Microphone cord)
1X54571 Cover, back: includes slide latch and button
1X51562 Cover, front: screened, includes jack, switch, output trans. etc.

40K60112 Jack, microphone
36A54548 Knob, switch
36A51604 Knob, tuning, includes setscrew
36A51605 Knob, volume
3S7247 Lockscrew: 6-32 x 3/16 S1 HH WS; Cad. Pl. (gang mtg.)
4S7686 Lockwasher, steel: #5 Ext.; Cad. Pl. (C-2 mtg.)
4S7650 Lockwasher, steel: #6 Int; Cad. Pl. (term. strip mtg.)
4S7655 Lockwasher, steel: 3/8 Int; Cad. Pl. (jack mtg.)
4S7657 Lockwasher, steel: #8 Ext.; Cad. Pl. (Front plate mtg.)
29R5207 Lug, soldering: L-6; Hot tin (Batt. brkt. assembly)
2S7051 Nut, Palnut: 3/8-32 x 9/16; Cad. Pl. (gang mtg.)
2S7010 Nut, steel: 5-40 x 1/4 hex; Cad. Pl. (C-2 mtg.)
2S7003 Nut, steel: 8-32 x 3/16 hex: Cad. Pl. (Front plate mtg.)
29K12867 Plug, Antenna (Ant. lead-in)
or 29K26752
5S8469 Rivet, steel: 5/32 x .122; Blk. Nkl. (output trans. mtg.)
5S7706 Rivet, steel: 1/8 x .122; Pol. Nkl. (battery brkt.)
5S7701 Rivet, steel: 3/16 x .122; Pol. Nkl. (latch mtg.)
5S6823 Rivet, steel: 1/8 x .122; Blk. Nkl. (Ant. recept. mtg.)
or 5S6647
5S6611 Rivet, steel: 1/8 x .088; Pol. Nkl. (socket & base mtg.)
5S7707 Rivet, steel: 5/32 x .122; Pol. Nkl. (Vol. cont. brkt. mtg. & term strip mtg.)
5S7700 Rivet, steel: 1/4 x .122' Pol. Nkl. (batt. contact mtg.)
3S2679 Screw, steel: #4 x 1/4 PKA Ph Sv. H; Cad. Pl. (chassis mtg.)
3S7454 Screw, steel: #8 x 1/4 PKZ P1 HH; Cad. Pl. (chassis mtg.)
3S7506 Screw, steel: #6 x 1/4 PKZ P1 HH; Cad. Pl. (C-6, 8 & L-2 mtg.)
3S7107 Setscrew; 8-32 x 1/4 S1 Hdlss (tuning knob)
26A24970 Shield, tube: midget
9A70455 Socket, tube: miniature; molded
9A70469 Socket, tube and cushion spring
31A4577 Strip, terminal
31A15555 Strip, terminal: 2 ins. #3 mtg.
39A24874 Strip, battery contact (pos.)
31A24927 Strip, "B" battery terminal
40A54549 Switch, battery: DPST
4S7555 Washer, steel: 1/4-.128-.063; Cad. Pl. (Output trans. mtg.)
4S7557 Washer, steel: 3/8-11/64-.033; Cad. Pl. (Front plate mtg.)
4A54759 Washer, knob: cork (tuning knob)
4A22908 Washer, spring (tuning knob)
4A16556 Washer, spring (latch mtg.)
4S7578 Washer, brass: 5/16-.130-.025 (latch mtg.)

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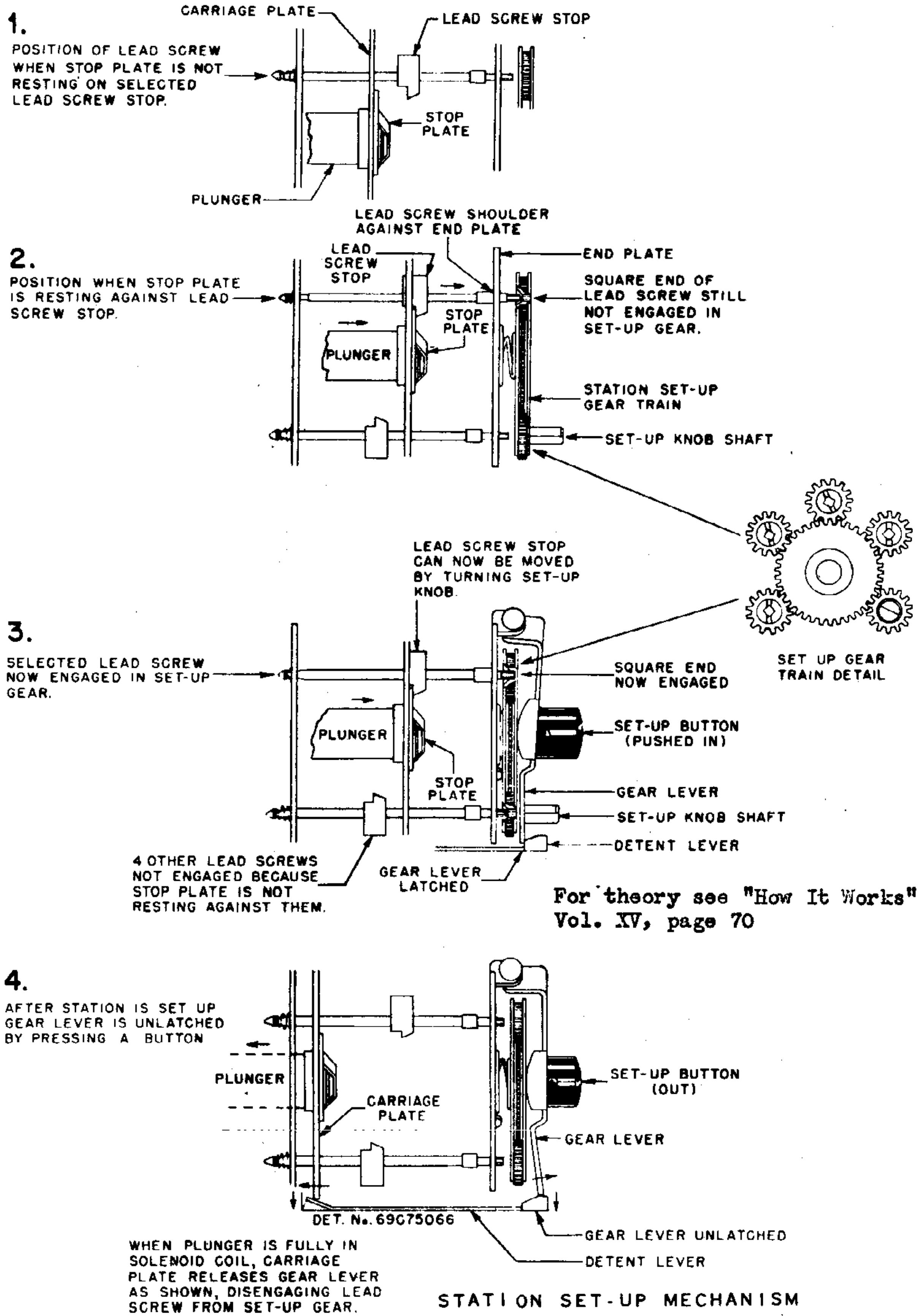


For theory see "How It Works", Vol. XV, page 70

STATION SET-UP MECHANISM

MOTOROLA INC.

SERVICE NOTES

FAILURE OF SOME LEAD SCREWS TO ENGAGE IN SET-UP GEARS

If some of the lead screws fail to engage in the set-up gears during station setting up procedure, check to see if the gear lever is bent out of shape. When the set-up button is pushed in and the gear lever latches on the detent lever, the set-up gear train should be parallel with the tuner end plate and the bottom of the gear train should be resting on the raised portions of the tuner end plate.

LUBRICATION

Should lubrication ever be required, it is recommended that a very fine grease, commercially called Lubriplate, or its equivalent, be used.

Remove all old and sticky lubricant with a solvent such as carbon tetrachloride and then very sparingly lubricate only the following points:

1. Carriage guide rods.

2. Actuator rod.

3. Manual lead screw.

IMPORTANT:

Do not lubricate or permit lubricant to get on Selector Switch contacts. The friction drag is required for proper operation of tuner.

LEAD DRESSING

Make sure that the selector switch and solenoid coil leads are dressed so that carriage plate does not rub against them. Leads rubbing against the carriage plate may cause the tuner to stick, especially at the high frequency end.

REPLACEMENT OF SOLENOID COIL OR SOLENOID PLUNGER

Should replacement of the solenoid coil or solenoid plunger be required, it will be necessary to replace the entire tuner. A close fit between solenoid plunger and solenoid coil form is required; a proper match can only be secured at the factory. When service of this kind is required, return the tuner to the factory for exchange.

ALIGNMENT

If the event that some part of the R.F. circuit has been changed or the adjustments shifted by mishandling, it is suggested that the receiver be realigned.

The tuner must be in good working order and assembled onto the chassis before attempting alignment of its tuned circuits.

TO REPLACE ANT. R.F., OR OSC. COILS

IMPORTANT: When ordering replacement coils, order by part number and also specify the color coding (paint dots) on old coil.. THE REPLACEMENT COIL SHOULD CARRY THE SAME COLOR CODING AS THE ORIGINAL OR THE TUNER WILL NOT TRACK PROPERLY.

1. The top coil is readily accessible and may be replaced while tuner is mounted on receiver chassis. To reach the two bottom coils it will be necessary to remove the tuner from the chassis as outlined under "TO REMOVE TUNER FROM CHASSIS".

2. Unsolder the two lugs by which the coil has been spotted to the tuner plate.

3. Carefully remove the old coil Save the thin paper washer that is found at the base of the coil.

4. Slip the paper washer over the replacement coil and slip coil into shield can.

5. Orient coil so its lugs are in same position as before and resolder to tuner plate.

6. Reassemble tun.r and install in receiver.

7. Realign ANT., R.F. and OSC. stages per instructions on page 7 of this Service Manual.

TO REPLACE ANT. R.F. OR OSC. COIL TUNING CORES.

IMPORTANT: When ordering coil tuning cores, order by part number and also specify the color coding (paint spot) on the old core. ALL 3 TUNING CORES MUST CARRY THE SAME COLOR CODING OR THE TUNER WILL NOT TRACK PROPERLY.

1. The core which tunes the top coil is readily accessible and presents no replacement problem. To readily reach the two bottom coil tuning cores, it will be necessary to remove the tuner from the chassis base as outlined under "TO REMOVE TUNER FROM CHASSIS."

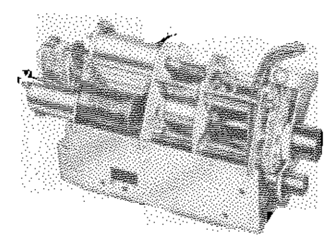
2. Remove the carriage return spring.

3. Move the carriage plate back as far as it can go. The tuning cores can now be screwed 'out' or 'in' by grasping the portion that sticks out the back of the coil. When installing a new core, make sure that the insulating washer and adjustment clip are replaced properly. The insulating washer goes on the core side; the core adjustment clip has an ear on it and this ear must fit into a hole in the bakelite insulator on the carriage plate. Refer to Figure 25.

4. Replace the carriage return spring.

5. Install tuner in receiver.

6. Realign ANT., R.F. and OSC, stages per instructions outlined on page 7 of this Service Manual.



SOLENOID TUNER ST-54

PLUNGER RATCHET ADJUSTMENT

The plunger ratchet mechanism is shown in Figure 21. This mechanism rotates the actuator rod which in turn, rotates the carriage stop plate and the selector switch 60° for each inward motion of the plunger.

If this adjustment is incorrect, tuner may operate continuously once current is applied.

Correct ratchet adjustment is indicated when 1/64 to 1/32'' clearance is observed between selector switch contacts and the selector switch rotor as shown in Figure 22. Slowly work the plunger by hand and observe clearance at each contact position. If the average clearance is not 1/64 to 1/32'', correction can be made by loosening ratchet adjustment set-screw and turning actuator rod by hand until correct clearance is observed.

Before ratchet adjustment set-screw is finally tightened, push fixed ratchet 1/32'' back into plunger. This increases spring tension against rotating ratchet, thus insuring more positive operation.

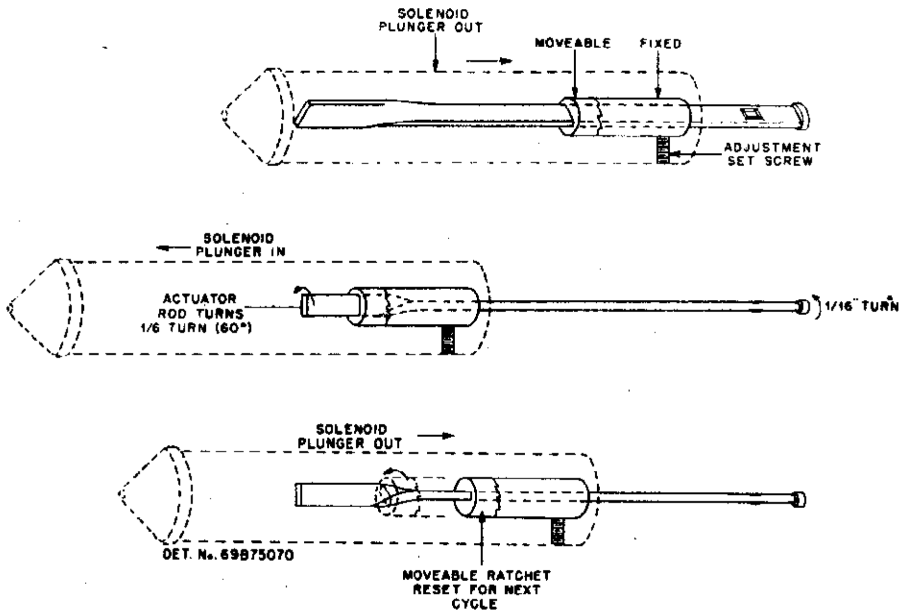


FIGURE 21. PLUNGER RATCHET MECHANISM

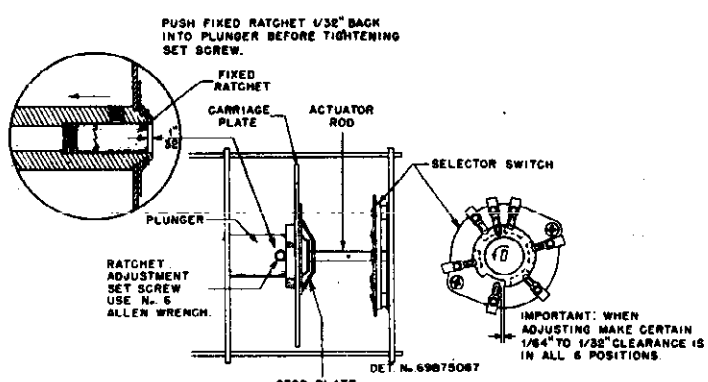


FIGURE 22. PLUNGER RATCHET ADJUSTMENT

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ADJUSTMENT OF GEAR LEVER LATCH

The gear lever latch holds the station set-up gear train in position while setting up stations. Failure of latch to engage properly when set-up button is pushed in would result in inability to set up pre-set station positions. Failure of latch to disengage after station is set up, would result in faulty automatic tuning because the lead screws might not seat themselves properly against the tuner end plate. Figure 24 shows the latch detail and adjustment.

SOLENOID SWITCH TRIP ADJUSTMENT

The solenoid switch tripping mechanism should be adjusted as shown in Figure 23.

If the solenoid switch is tripped too early, the ratchet mechanism may fail to operate; if it trips too late, the plunger may hammer violently or should the solenoid switch fail to trip, the plunger would be held within the solenoid.

AIR RELEASE ADJUSTMENT

The speed at which the tuner operates is governed by dash-pot action of the solenoid plunger within the closed solenoid coil form. The rate at which air is allowed to enter or escape determines the speed of the plunger.

An adjustable air release is provided on all late production tuners. See Figure 20. To adjust loosen the screw and move the eccentric washer which covers the air release hole to expose or cover more of the air release hole as required. Early production tuners did not have a solenoid end plate with an adjustable air release. If such a tuner is slow or sluggish because of too much "dash-pot" action, replace the solenoid end plate with a new end plate having an adjustable air release. Order part Number 1X76556.

1. If tuner operates too slowly, open the air release hole. Open it only far enough to secure reliable operation. Too little "dash-pot" action (air release open too much) may cause the plunger to hammer and sometimes even to make the tuner operate continuously due to the selector switch rotor being turned so rapidly as to overshoot its contacts.

2. If the tuner operates too rapidly, increase dash-pot action by closing the air release hole slightly. Close it only enough to eliminate hammering.

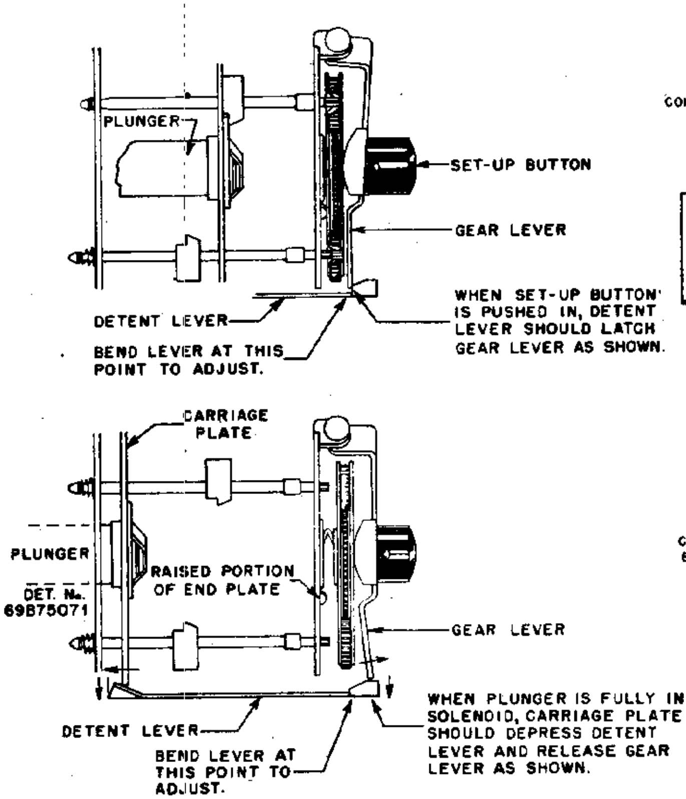

FIGURE 24. GEAR LEVER LATCH ADJUSTMENT

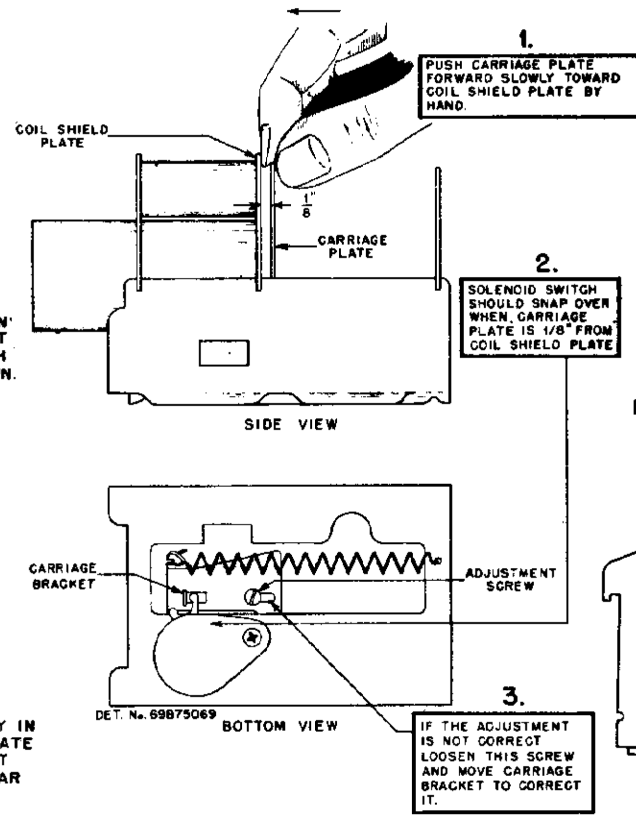

FIGURE 23. SOLENOID SWITCH ADJUSTMENT

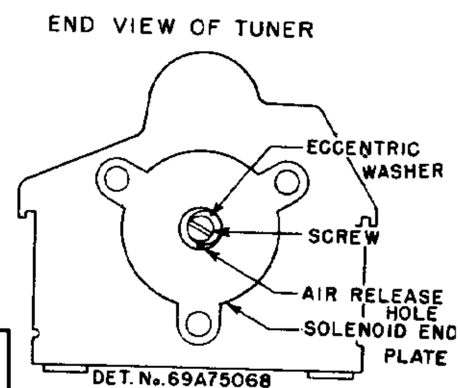

FIGURE 20. AIR RELEASE ADJUSTMENT

MODEL ST-54 Tuner

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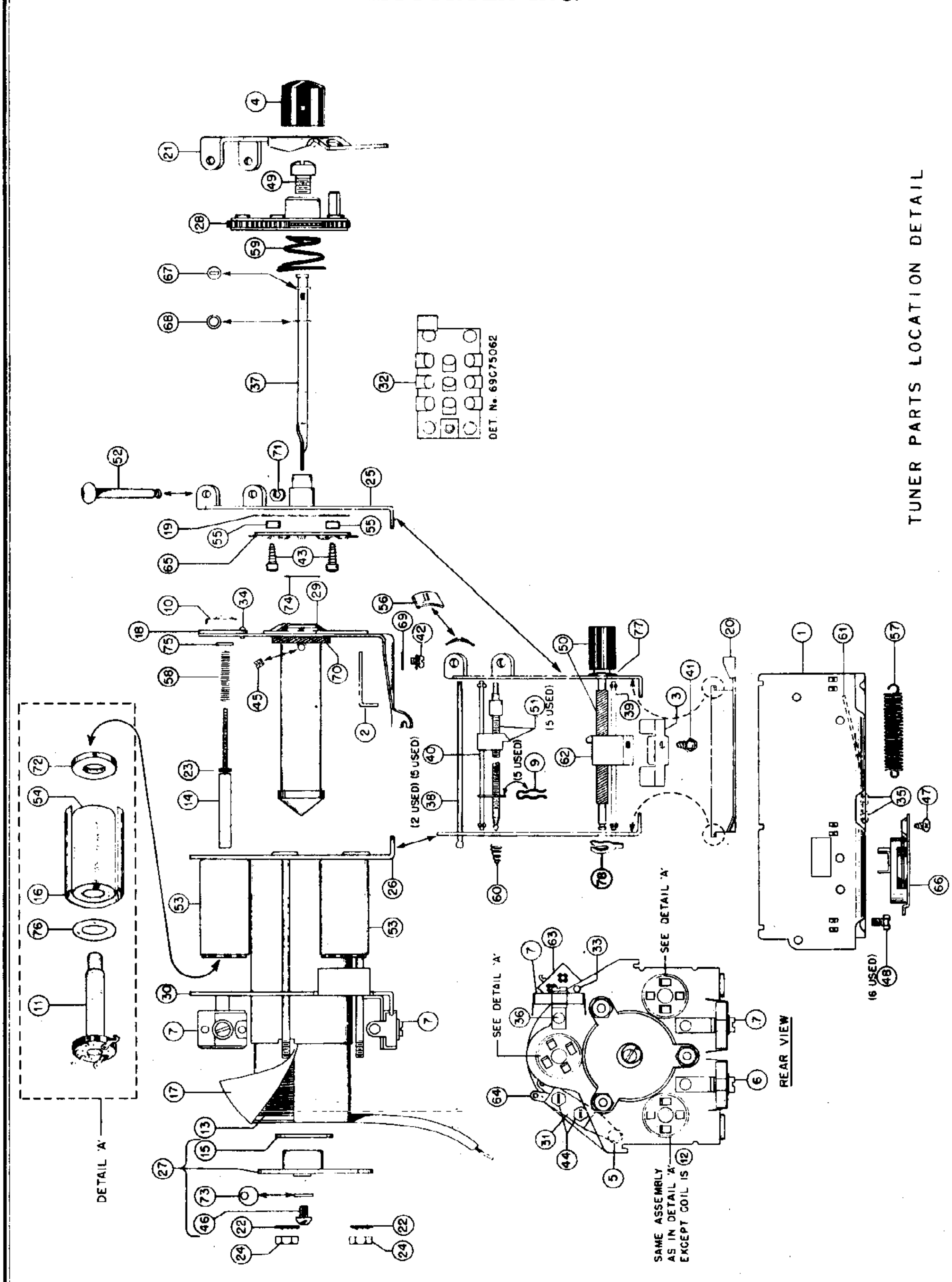

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REF. NO.	PART NO.	DESCRIPTION
	1X71460	Model ST-54 Solenoid Tuner (complete) Exchange
1	1X71358	Base & Spring Assembly
2	7A70928	Bracket, carriage
3	7A70966	Bracket, lead screw stop
4	38A70946	Button, lever and gear (set-up button)
5	38A70954	Button, mute switch; fibre
6	20A70214	Capacitor, variable: mica; 30-60 mmf; with mounting bracket
7	20A70601	Capacitor, variable: mica; 50-180 mmf. with mounting bracket
8	8A19133	Capacitor, fixed: paper; .5 mf. 100 vdc
9	42A70983	Clip, lead screw per/c
10	42A70181	Clip, core adjustment doz.
11	1A71861	Coil, antenna or R.F. (specify color of paint dots on old coil when ordering)
12	1A71879	Coil, oscillator (specify color of paint dots on old coil when ordering)
13	59B70689	Coil, solenoid (RETURN entire tuner to factory for exchange when this part requires replacement)
14	46A70680	Core, powdered iron: with molded-in adj. screw (specify color of paint dot on old core when ordering)
15	32A70972	Gasket, solenoid
16	14A70874	Insulator, coil sleeve: armite
17	14A74196	Insulator, magnet winding: armite
18	14A70979	Insulator, slug: bakelite
19	14A70972	Insulator, switch: armite
20	45B70926	Lever, detent
21	45B70930	Lever, gear
22	4S7651	Lockwasher, steel: #8 internal; Cad. Pl.
23	2A76658	Nut, knurled (takes spring pressure off of iron core)
24	2S7005	Nut, Steel: 6-32 x 5/16 Hex; Cad. Pl.
25	1X73012	Plate, Bushing and Stud Assembly; stop end plate with actuator rod bushing and gear locating stud
26	1X73007	Plate & Coil Shields Assembly: consists of tuner plate, solenoid shield, 3 coil shields and 3 solenoid mtg. bolts
27	1X76558	Plate, end: solenoid end plate assembly; with gasket and adjustable air release
28	1X71359	Plate & Gears Assembly (station set-up gear train)
29	1X73008	Plate & Plunger Assembly: consists of carriage plate with 3 bakelite core screw insulators and solenoid plunger rod with ratchet&stop plate (RETURN entire tuner to factory for exchange when this part requires replacement)
30	1X71357	Plate & Trimmers Assembly: consists of coil end plate, 3 trimmers and terminal strip
31	64A11647	Plate, switch mounting
32	9A13298	Receptacle, plug: 9 prong
33	5S6497	Rivet, steel: .088 x 1/8; Nkl. Pl.
34	5S7770	Rivet, steel: .088 x 5/32; Nkl. Pl. (slug insulator mtg.)
35	5S7706	Rivet, steel; .122 x 1/8; Nkl. Pl. (lockup spring mtg.)
36	5S7707	Rivet, steel: .122 x 5/32 Nkl. Pl. (trimmer mtg.)
37	47A70978	Rod, actuator
38	47A70992	Rod, carriage guide
39	47A73787	Rod, manual stop guide
40	47A70921	Rod, stop guide
41	3S6175	Screw, steel: #4 x 3/16 PRZ Sl. HH. Cad. Pl. (Holds lead screw stop brkt. to manual lead stop)
42	3S2950	Screw, steel: 4-40 x 1/4 Sl. Lk. BHMS; Cad. Pl. (carriage brkt. mtg.)
43	3S2691	Screw, steel: #4 x 3/8 Ph Fil. Hd; Cad. Pl. (selector switch mtg.)
44	3S7327	Screw, steel: 5-40 x 3/8 Sl RH MS; Cad. Pl. (mute sw. mtg.)
45	3S7148	Setscrew; steel; 6-32 x 1/8 Allen Hd; Nkl. Pl. (ratchet setscrew in plunger)
46	3S7200	Screw, steel: 6-32 x 3/16 Sl. Fil. Hd. MS; Cad. Pl. (air release adj. screw)
47	3S2684	Screw, steel: #6 x 1/4 Ph. Flt. Hd; Cad. Pl. (solenoid switch mtg.)
48	3S7205	Screw (lockscrew); 6-32 x 1/4 Sl. RH; Cad. Pl. (base mtg.)
49	3A74590	Screw, special (gear plate mtg.)
50	58A70902	Screw & Coupling Assembly; manual lead screw with bakelite coupling
51	1X73015	Screw & Stop Assembly; lead screw with carriage stop
52	47A70934	Shaft, lever
53	26A70678	Shield, Coil (Ant. R.F. & Osc. Coil Shield)
54	43A70881	Sleeve, Coil; powdered iron
55	43A70953	Spacer, selector switch; fibre
56	2S7966	Speednut, steel: for .095 dia. rod
57	41A70941	Spring, carriage
58	41A70958	Spring, coil iron core
59	41A70968	Spring, gear plate
60	41A70949	Spring, lead screw
61	41A70971	Spring, lockup
62	46A70983	Stop, manual lead
63	31A70948	Strip, Terminal Lug
64	40A70951	Switch, mute
65	40B70952	Switch, selector
66	1B70944	Switch, solenoid: with mtg. plate
67	4A70961	Washer, actuator rod: rectangular hole
68	4A70962	Washer, bearing (actuator rod)
69	4A75683	Washer, brass: special
70	4A73578	Washer, bumper
71	4A70015	Washer, "C" (lever shaft retainer)
72	47A70873	Washer, coil spacer: fibre
73	4A76542	Washer, eccentric (air release hole adjustable cover)
74	4A70974	Washer, insulator (actuator rod)
75	4A70956	Washer, iron core insulator: bakelite
76	4A74571	Washer, paper
77	4A73621	Washer, spring (manual lead screw)
78	4A70952	Washer, "C" spring (manual lead screw retainer)

TO REMOVE THE TUNER FROM CHASSIS

Should it become necessary to remove the solenoid tuner from the receiver chassis, proceed as follows:

1. Remove the top and bottom housings from the set, completely exposing the chassis.
2. Mark all leads connecting tuner to receiver.
3. Disconnect all leads connecting tuner to receiver. The control head connecting receptacle is to be removed by unscrewing the two self-tapping screws; do not unsolder leads from the tuner selector switch. The .5 mf paper capacitor need not be removed.
4. The tuner is held to the chassis by 4 self-tapping screws driven into the sides of the tuner. Do not remove any other screws.

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ALIGNMENT AND SENSITIVITY CHART

Connect output meter across voice coil (.38V = .05 watt). Set volume control at maximum for all operations. The adjusting screwdriver or alignment tool should be of the insulated type, such as Motorola Part No. 66A71008. Refer to Figure 3 for location of trimmers and padder.

OPERATIONS IN ORDER - ADJUST FOR MAX.	GANG CAPACITOR SET AT	DUMMY ANTENNA	GENERATOR CONNECTED TO	ADJUST TRIMMER NO.	GENERATOR SET AT (400~ 30% MODULATED)	AVERAGE MICROVOLT INPUT FOR 38V OUTPUT
1. Align I.F. and Diode	Minimum	.1 mf.	Osc.-Mod. Grid (antenna stator section of gang)	1-2-3	455 Kc.	120
2. Adjust Oscillator to dial scale	1600 Kc.	.1 mf.	Osc.-Mod. Grid (antenna stator section of gang)	4	1600 Kc	
3. Peak loop antenna trimmer	1400 Kc.	None	*	5	1400 Kc.	
4. Adjust Oscillator Padder	600 Kc. **	None	*	6	600 Kc.	

5. Repeat the above steps for maximum accuracy.

6. Assemble set into housing, tune in weak station around 1400 Kc. and repeak loop antenna trimmer (trimmer #5) for maximum. A hole is provided in the housing for this purpose.

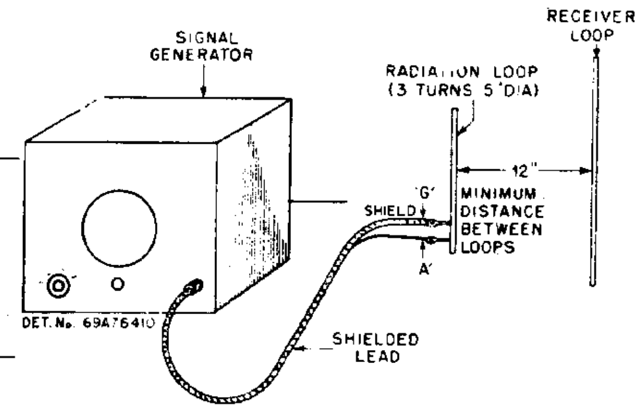

FIGURE 2. METHOD OF RADIATING SIGNAL INTO RECEIVER

* Connect output of signal generator to a 5" diameter, 3 turn loop. See Figure 2. With the volume on full and the output meter connected across voice coil, bring loop close enough to receiver loop until an output of 50 milliwatts is obtained, (.38 V on output meter). Vary distance between generator and receiver loops to maintain the output during alignment.

** Rock gang capacitor until greatest output is obtained.

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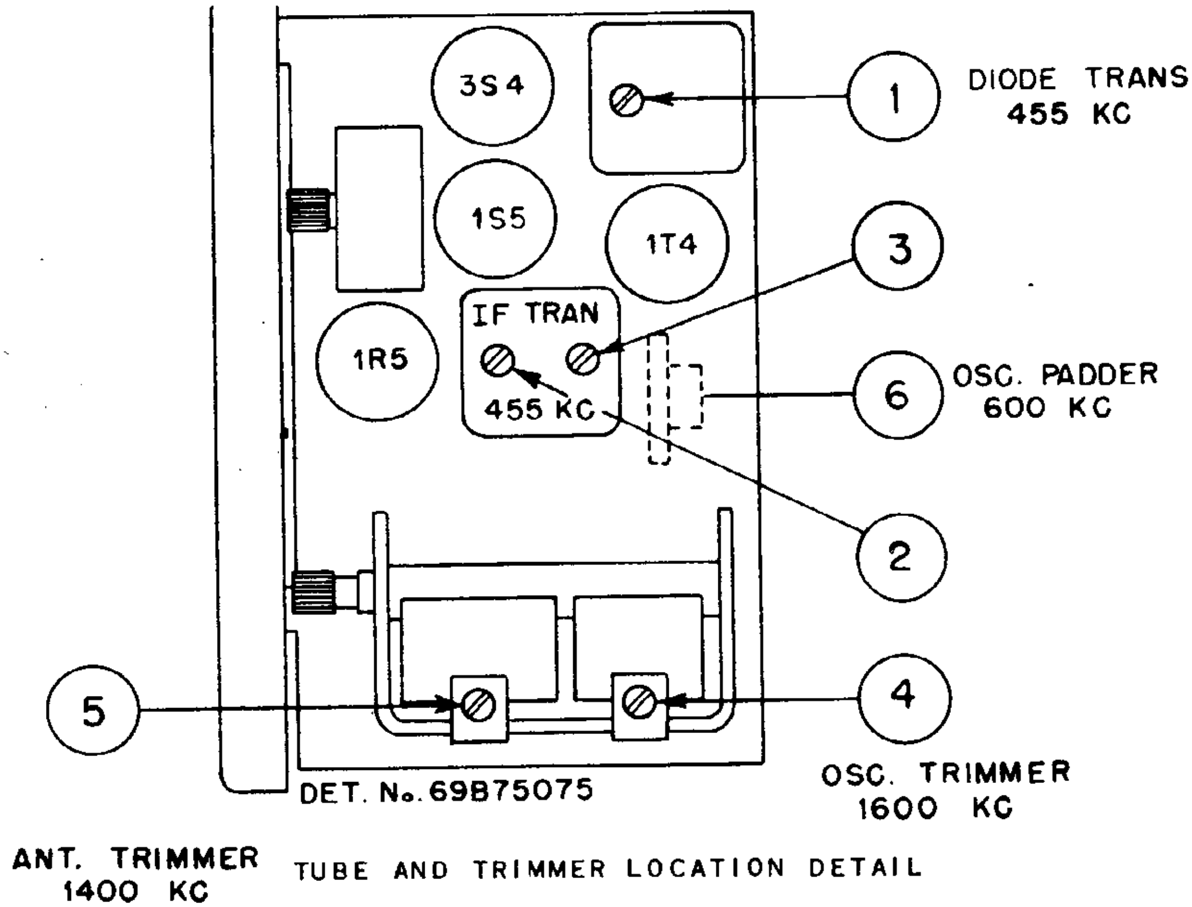
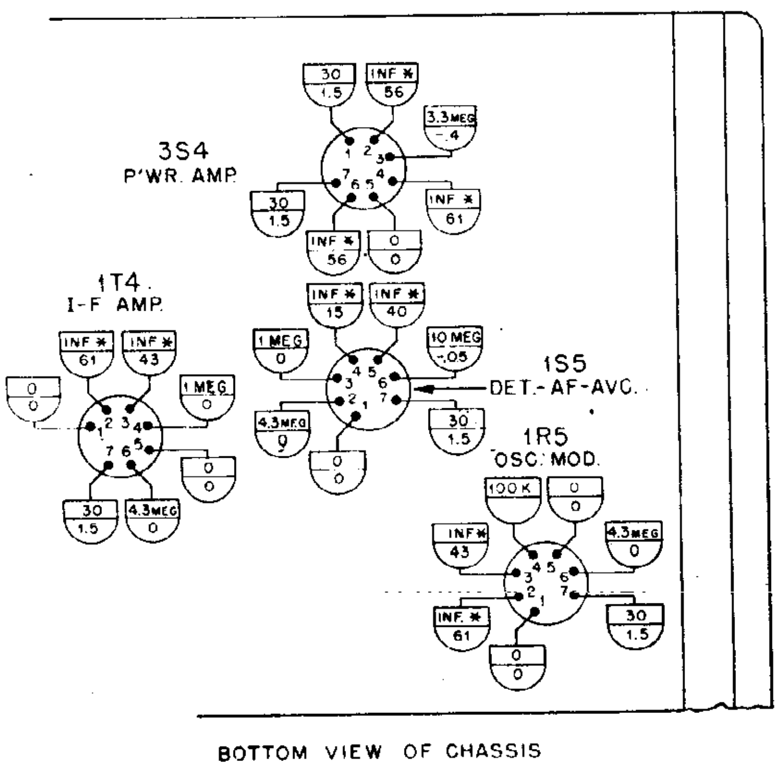


TUBE AND TRIMMER LOCATION DETAIL



▭ — RESISTANCE MEASUREMENTS.

◡ — VOLTAGE MEASUREMENTS.

* — MAY VARY DUE TO ELECTROLYTIC CAPACITOR IN CIRCUIT.

BATTERIES DISCONNECTED FOR RESISTANCE MEASUREMENTS.

A 20,000 OHM PER VOLT VOLTMETER WAS USED.

MEASUREMENTS MADE BETWEEN CHASSIS AND SOCKET PIN INDICATED.

ON-OFF SWITCH IN 'ON' POSITION.

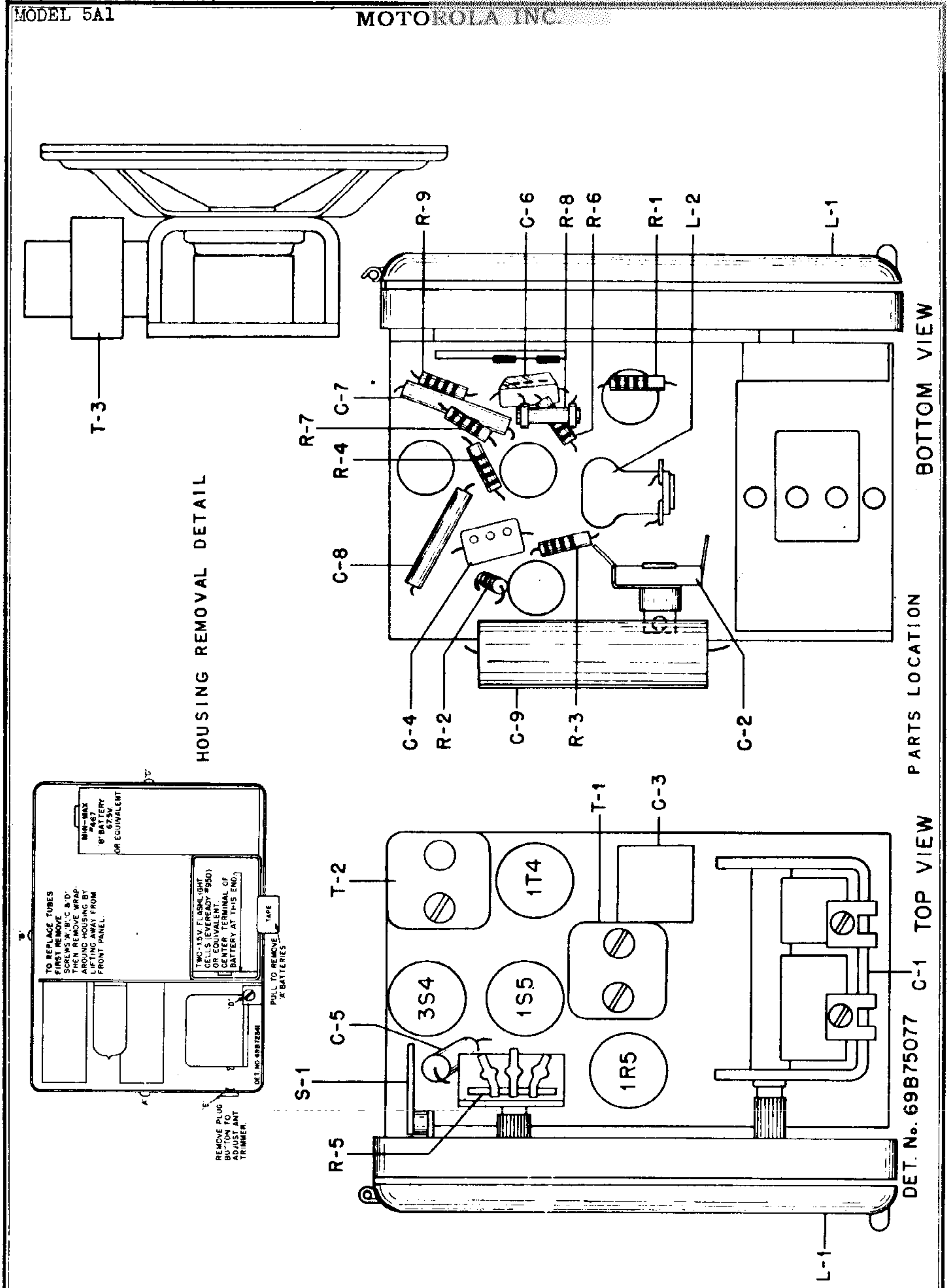
DUE TO COMPONENT TOLERANCES, RESISTANCE VARIATIONS OF 10 TO 20% AND VOLTAGE VARIATIONS OF 20% MAY BE EXPECTED.

CAUTION: BE CAREFUL WHEN MEASURING FILAMENT CIRCUIT WITH TUBES IN SET. SOME OHMMETERS MAY BURN OUT TUBES

BOTTOM VIEW OF CHASSIS

VOLTAGE AND RESISTANCE DIAGRAM

For schematic, see Vol. XV, page 1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HOUSING REMOVAL DETAIL
T-3
TO REPLACE TUBES FIRST REMOVE SCREWS 'A' 'B' 'C' & 'D' THEN REMOVE WRAP-AROUND HOUSING BY LIFTING AWAY FROM FRONT PANEL.
MIN-MAX #467 'B' BATTERY 67.5V. OR EQUIVALENT
TWO-1.5V. FLASHLIGHT CELLS (EVEREADY #950) OR EQUIVALENT.
TAPE
PULL TO REMOVE 'A' BATTERIES
REMOVE PLUG BUTTON TO ADJUST ANT TRIMMER.
R-9
C-6
R-8
R-6
R-1
L-2
L-1
C-7
R-7
R-4
C-8
C-4
R-2
C-9
R-3
C-2
BOTTOM VIEW
PARTS LOCATION
T-2
T-1
C-3
1T4
3S4
1S5
1R5
C-5
S-1
R-5
C-1
TOP VIEW
DET. No. 69B75077
L-1

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REF. NO.	PART NO.	DESCRIPTION
C-1	19B24917	Capacitor, variable; 2 gang
C-2	20A71206	Capacitor, trimmer; 270 mmf. nominal; with "L" mounting bracket (osc. pad).
C-3	8X25549	Capacitor, fixed: paper; block-3X .02 & .05 mf. 100 V
C-4	21R6631	Capacitor, fixed; mica: 100 mmf. 500V
C-5	8A24966	Capacitor, fixed: paper; .005 mf. 100V
C-6	21R6631	Capacitor, fixed: mica; 100 mmf. 500V
C-7	8A24966	Capacitor, fixed: paper; .005 mf. 100V
C-8	8A24966	Capacitor, fixed: paper; .005 mf. 100V
C-9	23A14727	Capacitor, fixed: electrolytic; 10 mf. 150V
L-1	24B24975	Antenna, loop: loop coil mounted on maroon painted bakelite plate
L-2	24A25548	Coil, oscillator
R-1	6R6031	Resistor, fixed: carbon; 100,000 10% 1/2W Ins.
R-2	6R6428	Resistor, fixed: carbon; 6,800 10% 1/2W Ins.
R-3	6R2118	Resistor, fixed: carbon; 3.3 meg 1/2W Ins.
R-4	6R2122	Resistor, fixed: carbon; 4.7 meg 1/2W Ins.
R-5	18A24918	Resistor, variable: 1 Meg
R-6	6R2109	Resistor, fixed: carbon; 10 meg 1/2W Ins.
R-7	6R6004	Resistor, fixed: carbon; 1 meg 1/2W Ins.
R-8	6R6059	Resistor, fixed: carbon; 820 1/3W.I.
R-9	6R2118	Resistor, fixed: carbon; 3.3 meg 1/2W Ins.
S-1	40A24973	Switch, battery
	7A24881	Bracket, capacitor mounting (gang mtg.)
	7A24872	Bracket, volume control mounting
	38A19911	Button, plug (antenna trimmer adjustment cover)
	35A26185	Cloth, grille: maroon
	1X71193	Cover Assembly, back: maroon wrinkle finish; includes sliding latch
	55A27113	Foot, felt
	55K30915	Handle, carrying (complete)
	51B70499	Hinge Assembly (hinges loop to front plate)
	1X71190	Housing Assembly: maroon wrinkle painted; with carrying handle
	87C24974	Housing, loop: moulded plastic
	14A73703	Insulator, contact strip; plastic (for "A" battery positive contact)
	14A29933	Insulator, hinge: bakelite, maroon finish; 1-1/2 x 9/32 x 1/32 thick
	1X24879	Insulator, Strip & Wiper Assembly ("A" battery negative contact mounted on plastic insulator)
	36B24986	Knob, control: maroon plastic
	36A24965	Latch, bar: maroon plastic
	4S7666	Lockwasher, steel: #6 external; Cad. Pl. (osc. coil mounting)
	29R6368	Lug, soldering: #2 (loop terminals on loop plate)
	29R6399	Lug, soldering: #3 (loop terminals on front plate)
	29R5207	Lug, soldering: #6; H.T.
	2S7007	Nut, steel: 8-32 x 1/4 hex; cadmium plated (speaker & front plate mounting.)
	2S7018	Nut, steel: 3/8-32 x 9/16 hex. cadmium plated (volume control mtg.)
	1X74569	Plate (front) & Housing Assembly: includes front plate with hinged loop, latch & battery switch
	64K71167	Plate, front: includes 3 threaded studs; less all other parts
	55K71191	Retainer, handle
	5S7725	Rivet, brass: .063 x 3/32; bright brass (latch bar spring mounting)
	5S8497	Rivet, steel: .068 x 1/8; white nickel (tube socket mounting)
	5S7771	Rivet, steel: .088 x 1/8; polished nickel (hinge mounting)
	5S7770	Rivet, steel: .088 x 5/32; polished nickel (switch mounting)
	5S2815	Rivet, steel: .088 x 7/32; polished nickel (mounting hinge support to front plate)
	5S7708	Rivet, steel: .122 x 1/8; polished nickel ("A" battery positive contact mounting)
T-1	1X24889	Transformer, I.F.: 455 kc; complete with shield can and trimmers
T-2	1X24886	Transformer, diode: 455 kc; complete with shield can and trimmer
T-3	25K71182	Transformer, output (Purchase with speaker)
	32A26019	Baffle, speaker: cardboard
	26A24869	Base, tube shield (for 3S4)
	48X24962	Battery, "A": 1-1/2 volt (Eveready #950)
	48X24965	Battery, "B": 67-1/2 volt (Eveready #467)
	1X24876	Battery Bracket Assembly ("A" battery holder; with negative contact)
	1X30220	Bracket & Button Assembly (back cover sliding latch)
	4S8223	Washer, steel: 3/16 x .101 x .016 thick (spacer between hinge support & front plate)
	4S7567	Washer, steel: 3/8 x .171 .058 thick, cadmium plated (front plate mounting studs)
	41A24954	Spring, latch bar
	31A15555	Strip, terminal: 2 insulated lugs, #3 mounting
	31A24673	Strip, terminal: 1 insulated lug, vertical mounting
	39A24874	Strip, battery contact ("A" battery, positive contact)
	31A24927	Strip, "B" battery terminal ("B" battery connector)
	14A29932	Support, hinge: brown bakelite; 1-1/2 x 9/32 x 3/32 thick
	1X72395	Tube Retainer Strip Assembly: Fibre strip with 3 sponge rubber cushions (for holding tubes in sockets)
	5S7713	Rivet, brass: .122 x 1/8; bright brass (carrying handle retainer mounting)
	5S7707	Rivet, steel: .122 x 5/32; polished nickel (battery bracket mounting; terminal strip mounting)
	5S7701	Rivet, steel: .122 x 3/16; polished nickel (gang bracket mounting)
	5S7772	Rivet, brass: .122 x 3/16; bright brass (back cover sliding latch mounting)
	5S7700	Rivet, steel: .122 x 1/4; polished nickel ("A" battery positive contact mounting
	3S8144	Screw, steel: #2 x 3/16 PKZ Phillips flat head; antique copper (holds loop assembly together)
	3S2880	Screw, steel: #4 x 1/4 PKA Phillips stove head (front plate to housing mounting)
	3S7247	Screw, steel: 6-32 x 5/16 slotted hex head lockscrew, cadmium plated (gang mounting)
	3S7506	Screw, steel; #6 x 1/4 PKZ plain hex head, cadmium plated (by-pass block and oscillator pad & coil mounting)
	3S7454	Screw, steel: #8 x 1/4 PKZ plain hex head; cadmium plated (holds back of chassis to housing)
	26A24970	Shield, tube: midget (for 3S4)
	9A70455	Socket, tube: miniature 7 prong (for 1T4, 1S5 and 3S4)
	9A70489	Socket, tube: miniature 7 prong: cushioned type (for 1R5)
	14A74531	Spacer, hinge & loop back: bakelite; 1/4 x 3/4 x 1/32 thick
	50B71061	Speaker & Output transformer: 3-1/2" permanent magnet
	4S7676	Washer, brass: 5/16 x .130 x .025 thick (part of back cover latch assembly)
	14K76715	Washer, extruded: ("A" battery positive contact ins.)
	4A16556	Washer, spring (part of back cover latch assembly)

MODEL 5A5
Chassis HS-15

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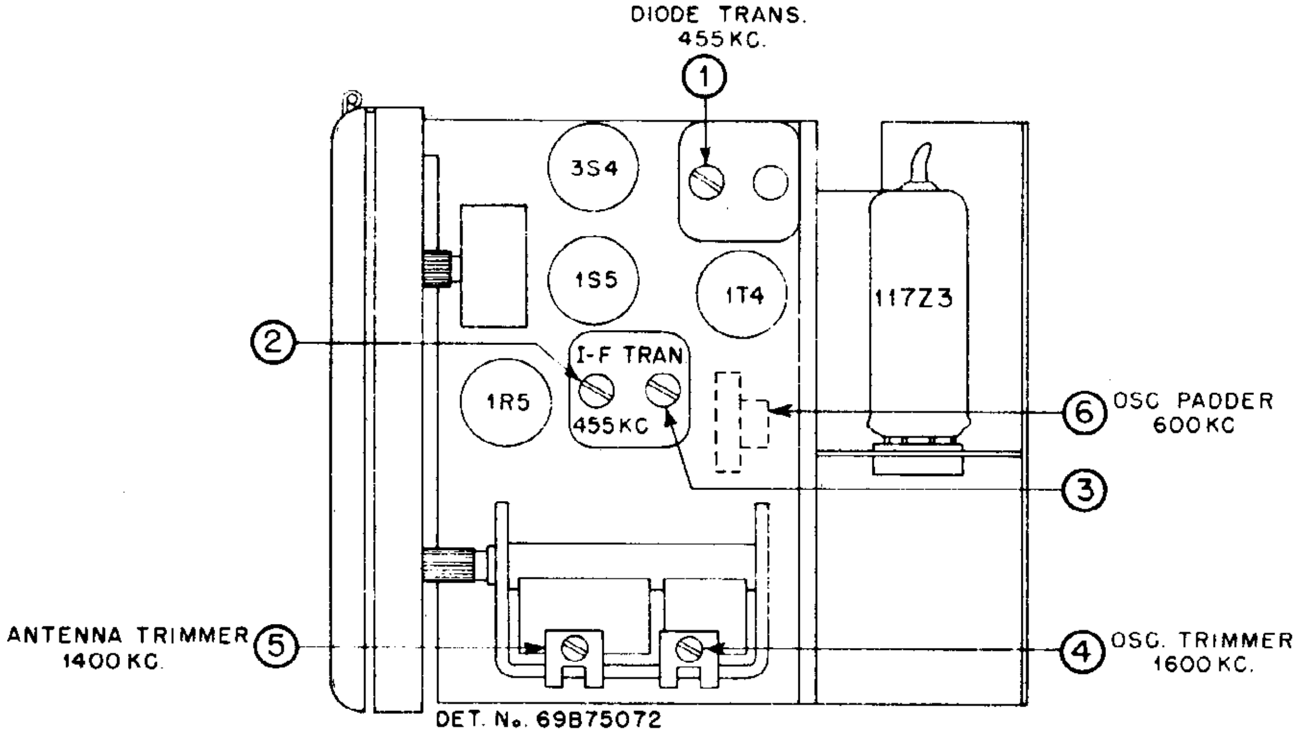
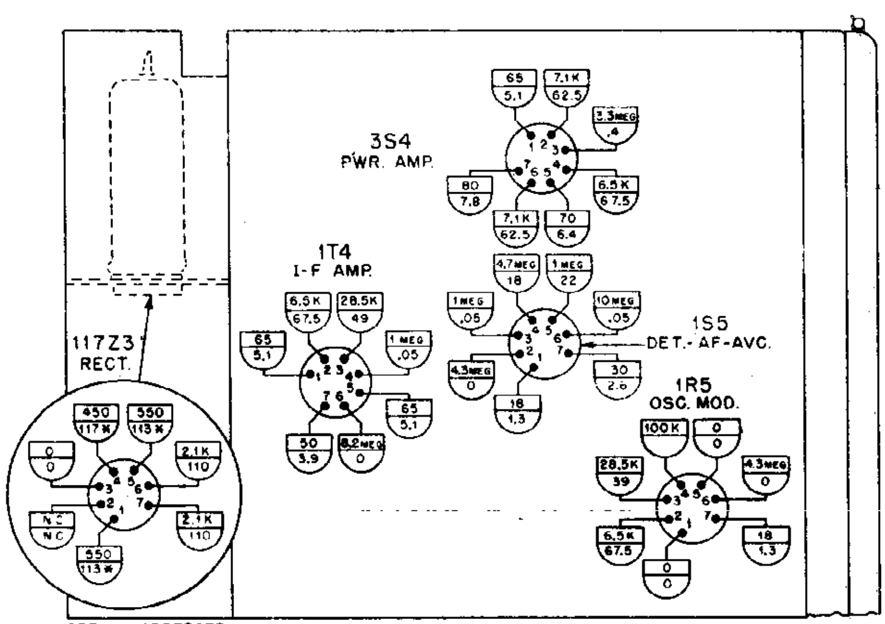


TUBE AND TRIMMER LOCATION DETAIL



BOTTOM VIEW OF CHASSIS

▭ – RESISTANCE MEASUREMENTS.

◡ – VOLTAGE MEASUREMENTS.

* – A-C VOLTAGES.

A 20,000 OHM PER VOLT VOLTMETER WAS USED

MEASUREMENTS MADE BETWEEN CHASSIS AND SOCKET PIN INDICATED.

117 V. LINE CORD REMOVED, BATTERIES DISCONNECTED, ON-OFF SWITCH IN ON POSITION AND A-C D-C BATTERY SWITCH IN A-C D-C POSITION FOR RESISTANCE MEASUREMENTS.

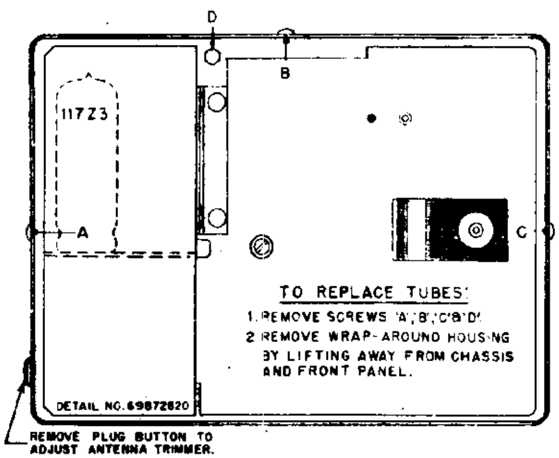
DUE TO COMPONENT TOLERANCES, RESISTANCE VARIATIONS OF 10 TO 20% AND VOLTAGE VARIATIONS OF 20% MAY BE EXPECTED.

CAUTION: BE CAREFUL WHEN MEASURING FILAMENT CIRCUIT WITH TUBES IN SET. SOME OHMMETERS MAY BURN OUT TUBES

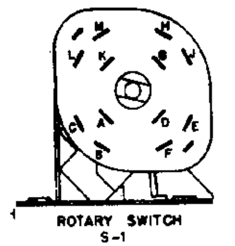
VOLTAGE AND RESISTANCE DIAGRAM

For schematic see Vol. XV, page 15-2

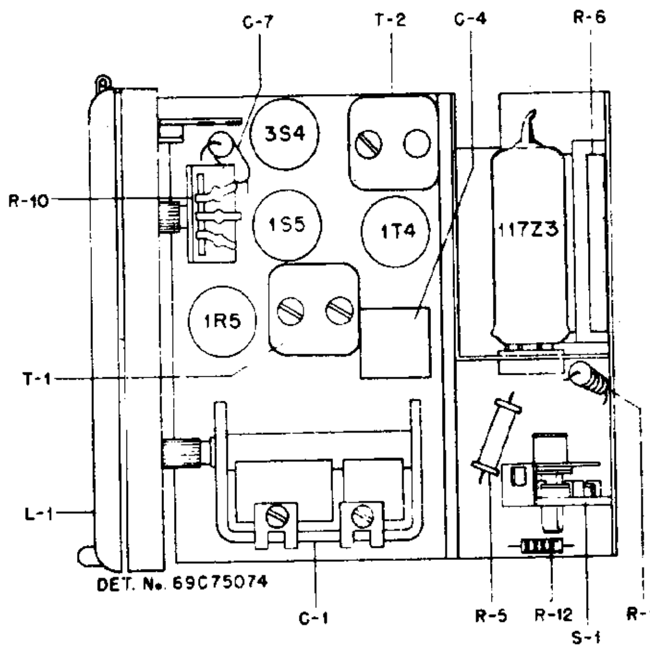
MOTOROLA INC.



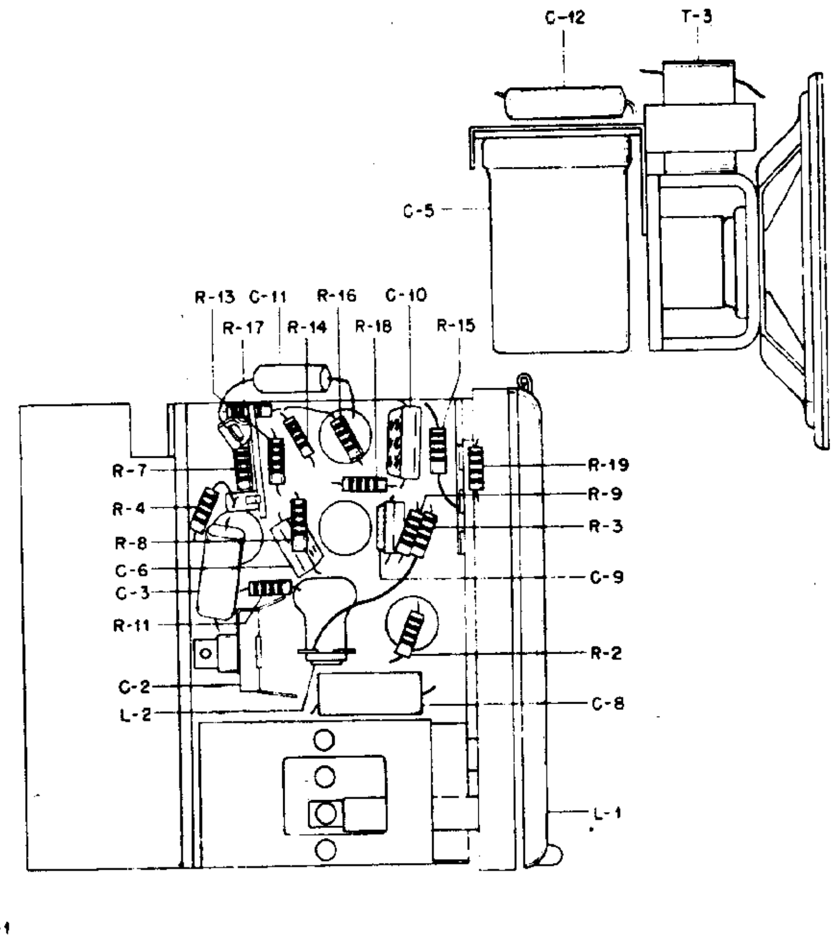
HOUSING REMOVAL DETAIL



PARTS LOCATION



TOP VIEW



BOTTOM VIEW

REF. NO.	PART NO.	DESCRIPTION
C-1	19B24917	Capacitor, variable: 2 gang
C-2	20A71206	Capacitor, trimmer: 270 mmf. nominal; with "L" mounting bracket (oscillator pad.)
C-3	8A25558	Capacitor, fixed: paper; .02 mf. 100V
C-4	8A27077	Capacitor, fixed: paper; block -.5 x .02 mf. 100V; .05 mf. 100V & .05 mf. 400V
C-5	23A71212	Capacitor, electrolytic: 40-20-20 mf. 150V, 80 mf. 25V
C-6	21R6651	Capacitor, fixed: mica; 100 mmf. 300V
C-7	8A24966	Capacitor, fixed: paper; .005 mf. 100V
C-8	8A71213	Capacitor, fixed: paper; .05 mf. 100V
C-9	21R6651	Capacitor, fixed: mica; 100 mmf. 500V
C-10	21R6659	Capacitor, fixed: mica; 500 mmf. 500V
C-11	8A24966	Capacitor, fixed: paper; .005 mf. 100V
C-12	8S9684	Capacitor, fixed: paper; .002 mf. 400V
L-1	24B24975	Antenna, loop: loop coil mounted on maroon painted bakelite plate
L-2	24A25548	Coil, oscillator
R-1		See Schematic Diagram for Correct Usage
	6R6241 or	Resistor, fixed: carbon; 27 10% 1/2 W N.I.
	6R3963	Resistor, fixed: carbon; 100 10% 2 W Ins.
R-2	6R6031	Resistor, fixed: carbon; 100,000 10% 1/2 W Ins.
R-3	6R6397	Resistor, fixed: carbon; 22,000 10% 1/2 W Ins.
R-4	6R3958	Resistor, fixed: carbon; 8.2 meg 1/2W Ins.
R-5	6R3960	Resistor, fixed: carbon; 2,700 1/2 W N.I. (late models)
	6R6278	Resistor, fixed: carbon; 3,900 1/2 W N.I. (early models)
R-6		See Schematic Diagram for Correct Usage
	17A25677 or	Resistor, fixed: wire wound; 2550 5% 5W
	17K75249	Resistor, fixed: wire wound; 2060 5% 5W
R-7	6R6397	Resistor, fixed: carbon; 22,000 10% 1/2 W Ins.
R-8	6R2118	Resistor, fixed: carbon; 3.3 meg. 1/2 W Ins.
R-9	6R2109	Resistor, fixed: carbon; 10 meg. 1/2 W Ins.
R-10	18A24918	Resistor, variable: 1 meg.
R-11	6R5685	Resistor, fixed: carbon; 27 10% 1/2 W Ins.
R-12	6R6289	Resistor, fixed: carbon; 820 10% 1/2 W Ins.

REF. NO.	PART NO.	DESCRIPTION
T-1	1K71265	Transformer, I.F.: 455 kc. complete with shield can and trimmers
T-2	1K24886	Transformer, diode; 455 kc; complete with shield can and trimmer
T-3	25K71182	Transformer, output (purchase with speaker)
	32A26019	Baffle, speaker; cardboard
	28A24869	Base, tube shield (for 3S4)
	1K71263	Battery Bracket Assembly: "A" battery retainer bracket with negative contacts and battery remover tape.
	1K71197	Battery Cover Assembly: masonite cover with hinge, sponge rubber battery pad, pull tab and catch
	1K30220	Bracket & Button Assembly (back cover sliding latch)
	7A24881	Bracket, capacitor mtg. (gang capacitor mounting)
	1K71270	Bracket & Insulator Assembly (electrolytic cap mounting)
	7A27143	Bracket, rectifier unit mounting
	7A24872	Bracket, volume control mounting
	38A19911	Button, plug (antenna trimmer adjustment cover)
	43A27109	Bushing, spacer: brass 7/32 diameter x 9/64 long (part of on-off switch assembly)
	35A26185	Cloth, grille: maroon
	30B20329	Cord, line: with plug; 6 feet long
	1K91273	Cover Assembly: back cover with hinges and sliding latch
	55A27113	Foot, felt
	5A74868	Grommet, plastic (insulates chassis from front panel and speaker)
	55K30915	Handle, carrying (complete)
	51B70499	Hinge Assembly (hinges loop to front plate)
R-13	6R2122	Resistor, fixed: carbon; 4.7 meg. 1/2 W Ins.
R-14	6R6256	Resistor, fixed: carbon; 1 meg. 1/2 W Ins.
R-15	6R2118	Resistor, fixed: carbon; 3.3 meg. 1/2 W Ins.
R-16	6R6432	Resistor, fixed: carbon; 270 10% 1/2 W Ins.
R-17	6R6289	Resistor, fixed: carbon; 820 10% 1/2 W Ins.
R-18	6R6001	Resistor, fixed: carbon; 68000 1/2 W. Ins.
R-19	6R6289	Resistor, fixed: carbon; 820 10% 1/2 W. Ins.
S-1	40A72111 or 40B76519	Switch, changeover: 4P. D.T.
	55K30198	Hinge, back cover: brass
	1K71272	Housing and Back Cover Assembly: complete housing with back cover and handle.
	57C24974	Housing, loop: molded plastic
	14A76705	Insulator, contact strip: plastic (for "A" battery positive contact)

REF. NO.	PART NO.	DESCRIPTION
	1K74575	Plate (front) & Housing Assembly: includes front plate with hinged loop, latch and power switch.
	55K71191	Retainer, handle
	5S7725	Rivet, brass: .083 x 3/32; bright brass (back cover hinge mounting and latch bar spring mounting)
	5S8497	Rivet, steel: .088 x 1/8; nickel plated (socket mounting)
	5S7770	Rivet, steel: .088 x 5/32; polished nickel (mounts switch body to front plate)
	5S7771	Rivet, steel: .088 x 3/16; polished nickel (loop hinge mounting)
	5S8815	Rivet, steel: .088 x 7/32; polished nickel (mounts hinge support to front plate)
	5S7775	Rivet, steel: .088 x 9/32; polished dickel (holds on-off switch together)
	5S7713	Rivet, brass: .122 x 1/8 (handle mounting)
	5S7707	Rivet, steel: .122 x 5/32; nickel plated (terminal strip mounting)
	5S7706	Rivet, steel: .122 x 1/8; nickel plated ("A" battery negative contact insulating strip mounting)
	5S7772	Rivet, brass: .122 x 3/16 (back cover sliding latch mounting)
	5S7701	Rivet, steel: .122 x 3/16 nickel plated (gang capacitor bracket mounting)
	5S7700	Rivet, steel: .122 x 1/4; nickel plated (battery contact strip mounting)
	5S7708	Rivet, steel: .122 x 9/32; nickel plated (battery contact strip mounting; terminal strip mounting)
	14A29933	Insulator, hinge: bakelite; maroon finish, 1-1/2 x 9/32 x 1/32 thick
	31A71195	Strip, terminal: 2 insulated lugs, #2 mounting
	31A71196	Strip, terminal: 3 insulated lugs, #4 mounting
	14A29932	Support, hinge: brown bakelite: 1-1/2 x 9/32 x 3/32 thick
	40A27111	Switch, body: switch actuating lever and mounting bracket (part of on-off switch)
	40A27112	Switch plate and contacts: bakelite plate with D.P.S.T. contacts; less actuating lever and mounting bracket (on-off switch)
	1K72396	Tube Retainer Strip Assembly: fibre strip with 3 sponge rubber cushions. (for holding tubes in sockets)
	9A22058	Wafer, electrolytic mounting: bakelite

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MODEL 5A5

PART	DESCRIPTION
3S7162	Screw, steel: 8-32 x 5/16 slotted binderhead machine screw; cadmium plated (electrolytic bracket mounting)
26A24970	Shield, tube (for 3S4)
9S70455	Socket, tube: miniature 7 prong; plain
9A70489	Socket, tube: miniature 7 prong; cushioned type
14A74531	Spacer, hinge and loop back: bakelite, 1/4 x 3/4 x 1/32 thick
50B71061	Speaker and Output Transformer: 3-1/2" permanent magnet
41A24954	Spring, latch bar
31K27076	Strip, "B" battery terminal ("B" battery connector)
39A71210	Strip, battery contact: brass ("A" battery positive contact)
31K15026	Strip, terminal: 2 insulated lugs, #2 mounting (line cord tie point)
1X71264	Insulating Strip & Wipers Assembly: "A" battery negative contacts mounted on plastic insulating strip; includes brass battery connector strap.
36B24988	Knob, control: maroon plastic
38A24965	Latch, bar: maroon plastic
4S7666	Lockwasher, steel: #6 external, cadmium plated (oscillator coil mounting)
4S7650	Lockwasher, steel: #6 internal; cadmium plated (battery contact strip mounting)
4S7657	Lockwasher, steel: #8 external; cadmium plated (electrolytic bracket mounting)
29R5368	Lug, soldering: #2 (loop terminals on loop plate)
29R5399	Lug, soldering: #3 (loop terminals on front plate)
29R5207	Lug, solder: #6; H.T.
2S7007	Nut, steel: 8-32 x 1/4 hex. cadmium plated (speaker and chassis ...
2S7018	Nut, steel: 3/8-32 x 9/16 hex; cadmium plated (volume control mounting)
64K71187	Plate, front: includes 5 threaded studs; less all other parts
4S7578	Washer, brass: 5/16 x .130 x .025 thick (part of back cover latch assembly)
14K76715	Washer, extruded: ("A" battery positive contact insulator)
14A454	Washer, fibre: ("A" battery positive terminal lug spacer)
14A22929	Washer, fibre: 9/16 x .190 x .010 thick (insulator on front plate studs)
4A16556	Washer, spring (part of back cover latch assembly)
3S8144	Screw, steel: #2 x 3/16 PKZP Phillips flat head antique copper (holds loop assembly together)
3S8175	Screw, steel: #4 x 3/16 PKZ slotted hex head; cadmium plated (mounts battery cover hinge to rectifier unit)
3S2880	Screw, steel: #4 x 1/4 PKA Phillips stove head; bronze plated (front plate to housing mounting)
3S7247	Screw, steel: 6-32 x 3/16 slotted locking hex head machine screw; cadmium plated (gang mounting)
3S8137	Screw, steel: #6 x 3/16 PKZ plain hex head; cadmium plated (holds back of chassis to housing & changeover switch mounting)
3S7506	Screw, steel: #6 x 1/4 PKZ plain hex head; cadmium plated; (oscillator padder, oscillator coil, by-pass capacitor block and rectifier unit mounting.)
4S8223	Washer, steel: 3/16 x .101 x .016 thick (spacer between hinge support and front plate)
4S7557	Washer, steel: 3/8 x .171 x .033 thick: cadmium plated (front plate mounting studs)

MODEL 55F11

PART NO.	DESCRIPTION
5S7701	Rivet, steel: .122 x 3/16; nickel plated (electrolytic wafer mounting; tuning shaft bracket mounting; pilot light socket mounting)
5S7700	Rivet, steel: .122 x 1/4, nickel plated (loop receptacle mounting)
5S7708	Rivet, steel: .122 x 9/32, nickel plated (line cord lock mounting)
5A71246	Rivet, shoulder: .187 long (pointer cord guide pulley mounting)
5A13896	Rivet, shoulder: .312 long (pointer cord guide pulley mounting)
47K71725	Rod, dial cord guide: steel; 10-1/16 long x 3/32 diameter
34B71097	Scale, dial: glass
3S1317	Screw, steel: #2 x 3/8 Phillips oval head wood screw: bronze finish (dial escutcheon mounting)
3S7506	Screw, steel: #6 x 1/4 PKZ plain hex head; cadmium plated (oscillator coil mounting)
3S7536	Screw, steel: #6 x 3/8 PKA slotted acorn head; antique copper finish (loop mounting)
3S2294	Screw, steel: 6-32 x 1/2, plain hex head, locking type machine screw; cadmium plated (gang capacitor mounting)
3S2911	Screw, steel: 6-32 x 3/4 Phillips flat head machine screw; cadmium plated (speaker baffle mounting)
9A12705	Wafer, electrolytic capacitor mounting: bakelite
4A70015	Washer, "C"
4S1719	Washer, steel: 3/8 x .140 x .030 thick cadmium plated ...

MODEL 5A7, Chassis HS-62
MODEL 5A7A, Chassis HS-62A

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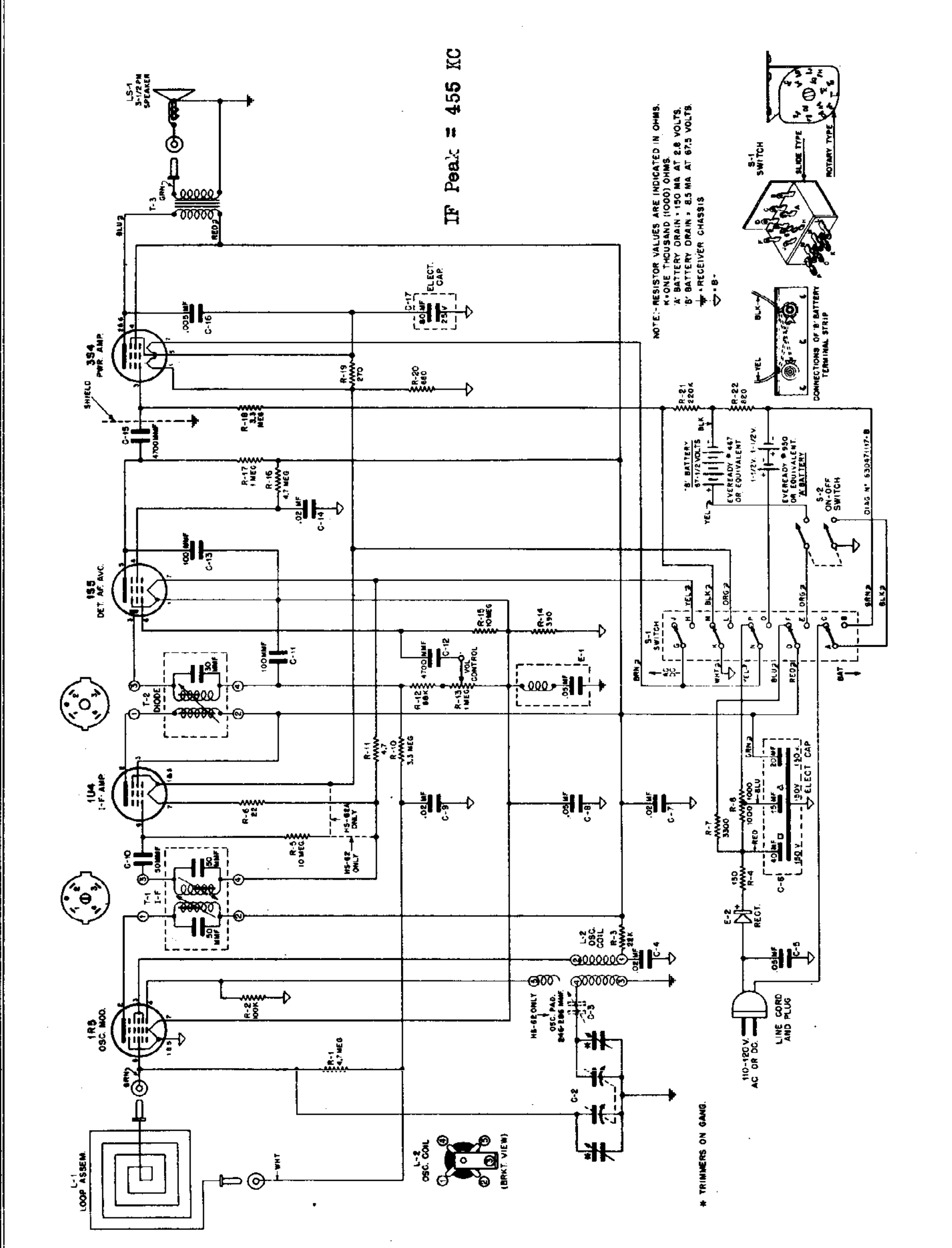

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SERVICE NOTES

Placement of the four tubes (1R5, 1U4, 1S5 and 3S4) is such that they may be easily removed for servicing by opening the back cover of the set. To reduce microphonic howl, rubber shock mounting is provided for the small chassis holding the tubes and coils. A thin piece of braid serves to bond the two chassis. This braid, as well as all leads connecting the small chassis wiring to the large chassis, should be carefully dressed and free in movement to insure a good floating action of the small chassis.

Insulation between the cabinet (front, back and wrap-around) and chassis is provided for by the bakelite bushing mountings on the sides and by a wrap of armite riveted to the inside of the cabinet.

The chassis itself is isolated from the line and power circuit by a capacitor-choke assembly which eliminates shock hazard. To further guarantee any annoyance from a minor shock the chassis is insulated from the cabinet.

To remove the chassis from the cabinet, remove the two 4-40 screws (one on each side of the cabinet), pull off the tuning knobs, remove the front panel, disconnect the two loop leads from the pin receptacles, and slide the chassis out of the cabinet.

To remove the chassis cover plate, remove the two slotted screws holding the plate to the edge of the large chassis and with the set lying with the speaker cone down, lift the plate up from the chassis.

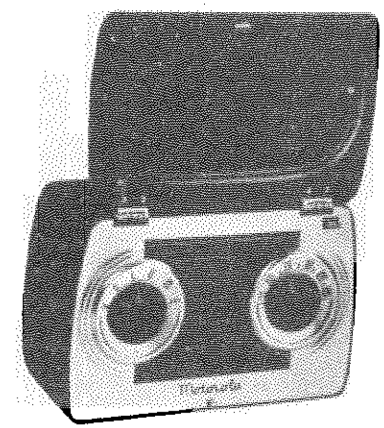
To remove the gang condenser, the screws holding the small chassis to the large chassis should be removed. This makes it possible to pull the small chassis strip out of the way so that access can be had to the screws holding the gang.

For access to some of the wiring, the "A" battery boxes may have to be removed. To do this, remove the two hex-headed screws over the slide switch leaving the center screw in. The two boxes and the connecting bracket may now be separated from the chassis. The bottom plates of the battery boxes are wired to the set, but the plates may be removed by bending the ears on the boxes outward.

The speaker is held in place by one screw located in the back of the 1S5 tube and a locating ear under the diode coil can. To replace the speaker remove the 8-32 hex-headed screw, disconnect the voice coil lead from the pin receptacle on the speaker and pull the speaker out from the front of the set.

Turning the set on or off is accomplished by opening or closing the front cover which actuates a push rod connected to a switch. Overthrow has been provided in the switch so that the switch is open circuited before the cover is completely closed. This prevents tolerance between the cover and front panel from causing switch failure. Inserting the line cord plug into the two slots between the battery boxes operates a slide switch which changes the circuit wiring to battery operation.

The oscillator coil and tuning capacitor leads should be dressed close to the chassis. This will minimize shifting of oscillator frequency when chassis is installed in its cabinet.



GENERAL INFORMATION

TYPE - Models 5A7 and 5A7A are three power (AC/DC-Battery) portable radio receivers of the personal type. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

Chassis HS-62 is used in Model 5A7; Chassis HS-62A is used in Model 5A7A.

Models 5A7 (Chassis HS-62) and 5A7A (Chassis HS-62A) differ as follows:

Model 5A7 uses a tuning capacitor having same shaped plates in both sections and an oscillator padding capacitor. Model 5A7A uses a tuning capacitor having a cut plate oscillator tuning section and, therefore, an oscillator padder is not required. The tuning capacitors, oscillator coils, loop antennas, and front panels are, therefore, unique for each model. The front panels differ because of differences in calibration curves between the cut plate and full plate tuning capacitors.

TUNING - 5A7 - 535 to 1600 Kc
5A7A - 535 to 1620 Kc

IF FREQUENCY - 455 Kc

TUBE COMPLEMENT - 1R5 - Oscillator-Modulator
1U4 - IF Amplifier
1S5 - Detector, AVC & 1st AF Amplifier
3S4 - Power Amplifier
Rect.- Selenium type - for AC/DC operation

POWER SUPPLY - Operates from 110-120V AC/DC (15 watts) or from the following batteries:
2 - 1-1/2V flashlight cells (Eveready #950 or equivalent)

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BOTTOM VIEW OF CHASSIS

= VOLTAGE MEASUREMENTS.
= RESISTANCE MEASUREMENTS.
T.L. = TIE LUG.
* = MEASUREMENTS MAY VARY DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITORS.

CONDITIONS OF MEASUREMENTS.

A VTVM WAS USED TO MAKE ALL VOLTAGE MEASUREMENTS.
LOOP IS DISCONNECTED AND NO STATION IS TUNED IN.
MEASUREMENTS ARE MADE FROM TUBE BASE PIN TO B-(⏚)
SET IS OPERATED FROM FRESH BATTERIES DURING VOLTAGE MEASUREMENTS.
SET IS IN BATTERY' POSITION AND BATTERIES ARE REMOVED DURING RESISTANCE MEASUREMENTS.
VOLTAGE TOLERANCE ±10%. RESISTANCE TOLERANCE ±20%.

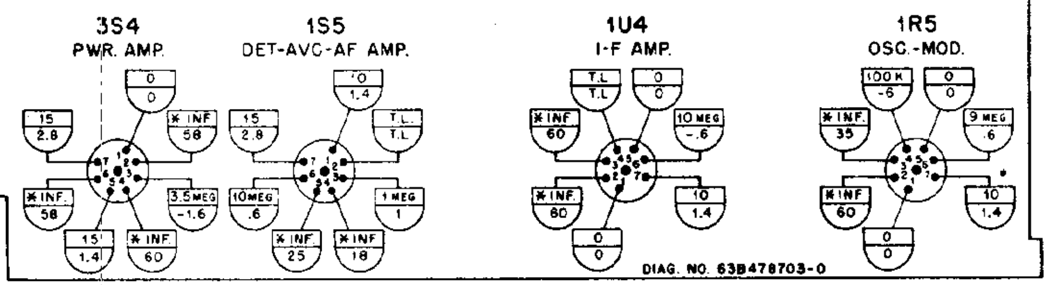

FIGURE 9. VOLTAGE & RESISTANCE DIAGRAM-CHASSIS HS-62 & HS-62A-BATTERY OPERATED

BOTTOM VIEW OF CHASSIS

= VOLTAGE MEASUREMENTS.
= RESISTANCE MEASUREMENTS.
T.L. = TIE LUG.

CONDITIONS OF MEASUREMENTS

A VTVM WAS USED TO MAKE ALL VOLTAGE MEASUREMENTS.
LOOP IS DISCONNECTED AND NO STATION TUNED IN.
MEASUREMENTS ARE MADE FROM TUBE BASE PINS TO B-(⏚)
SET IS OPERATED FROM 117 V. AC DURING VOLTAGE MEASUREMENTS.
SET IS IN AC/DC POSITION AND BATTERIES ARE REMOVED DURING RESISTANCE MEASUREMENTS.
VOLTAGE TOLERANCE ±10%. RESISTANCE TOLERANCE ±20%.

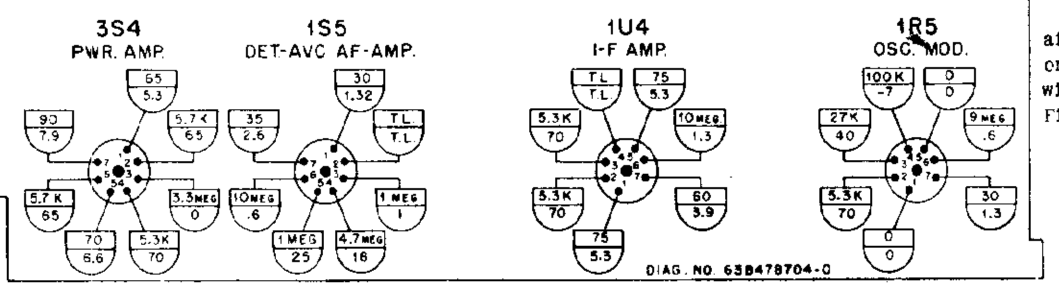

FIGURE 10. VOLTAGE & RESISTANCE DIAGRAM-CHASSIS HS-62 & 62A-AC OPERATED

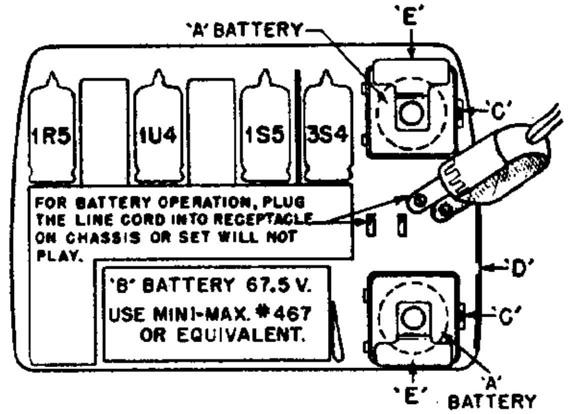

FIGURE 1. BATTERY INSTALLATION DETAIL

'A' Batteries: 1½ V. flashlight cells. Use Eveready No. 950 or equiv. Install with Center Terminal facing back of set. 2 used.

To open 'A' Battery Compartments push Catches 'C' to the right.

When playing from house current, pass Line Cord through Slot 'D' in cabinet.

When line cord is not in use, wind it around Cord Clamps 'E'.

BATTERY REPLACEMENT. When low volume or fuzzy tone is noticed, replace the flashlight cells. Normally, the 67-1/2 "B" battery will last for 3 or 4 changes of the flashlight cells.

NOTE: The condition of the batteries will not affect operation of receiver from 110-120 volts AC or DC. Complete battery replacement instructions will be found inside the receiver back cover (or see Figure 1).

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CHART I. MODEL 5A7 (CHASSIS HS-62) ALIGNMENT PROCEDURE

(Refer to Figure 2 for location of all alignment trimmers and cores)

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Osc-Mod grid & B- *	455 Kc	1,2 & 3	Adjust for maximum
RF ALIGNMENT						
2.	Gang fully opened	.1 mf	Osc-Mod grid & B- *	1600 Kc	4	This sets oscillator to dial scale
3.	-	-	-	-	-	Install chassis in cabinet, leaving output meter connected to speaker.
4.	1400 Kc	None	Radiation loop**	1400 Kc	5	Tune signal in on receiver, then adjust loop trimmer (5) for maximum. Loop trimmer is reached through hole under plug button on side of cabinet.
5.	600 Kc	None	Radiation loop**	600 Kc	6	Tune signal in on receiver. Adjust osc pad (6) through hole in back of shield plate inside back cover (while rocking gang capacitor) for maximum output.

NOTE: If oscillator padder (6) has been indiscriminately tampered with, it may be necessary to repeat Steps 2, 3, 4 & 5 several times to secure correct tuning range and proper tracking.

* A convenient point for these connections is the stator of the loop section of the tuning capacitor and the rear left hand lug on the power switch. See Figure 2.

** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of 50 milliwatts (.40 V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

If the receiver is operated from an AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line.

A low range output meter should be connected to the speaker voice coil terminal and receiver chassis. Set receiver volume control to maximum. For greatest accuracy, keep output of receiver at approximately .05 watt (.05 watt = .40 volt on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

The IF & diode transformer tuning cores are slotted for a small size fibre screwdriver. Do not press hard on the fibre screwdriver during alignment as damage to the coil forms or tuning cores may result.

Chart I gives complete alignment procedure for Model 5A7 (Chassis HS-62). Chart II gives complete alignment procedure for Model 5A7A (Chassis HS-62A).

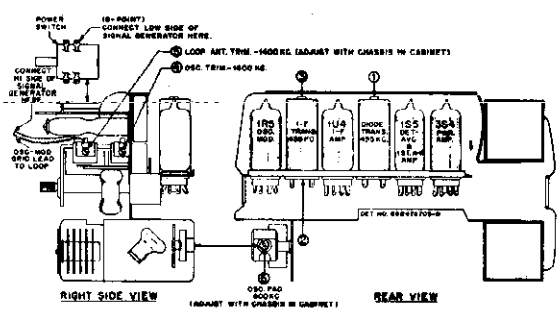

FIGURE 2. CHASSIS HS-62 TUBE & TRIMMER LOCATIONS

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CHART II. MODEL 5A7A (CHASSIS HS-62A) ALIGNMENT PROCEDURE

(Refer to Figure 3 for location of all alignment trimmers and cores).

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Osc-Mod grid & B- *	455 Kc	1,2 & 3	Adjust for maximum.
RF ALIGNMENT						
2.	Gang fully opened	.1 mf	Osc-Mod grid & B- *	1620 Kc	4	This sets oscillator to dial scale.
3.	-	-	-	-	-	Install chassis in cabinet, leaving output meter connected to speaker.
4.	1400 Kc	None	Radiation loop **	1400 Kc	5	Tune signal in on receiver, then adjust loop trimmer (5) for maximum. Loop trimmer is reached through hole under plug button on side of cabinet.

* A convenient point for these connections is the stator of the loop section of the tuning capacitor and the rear left hand lug on the power switch. See Figure 3.

** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of 50 milliwatts (.40 V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

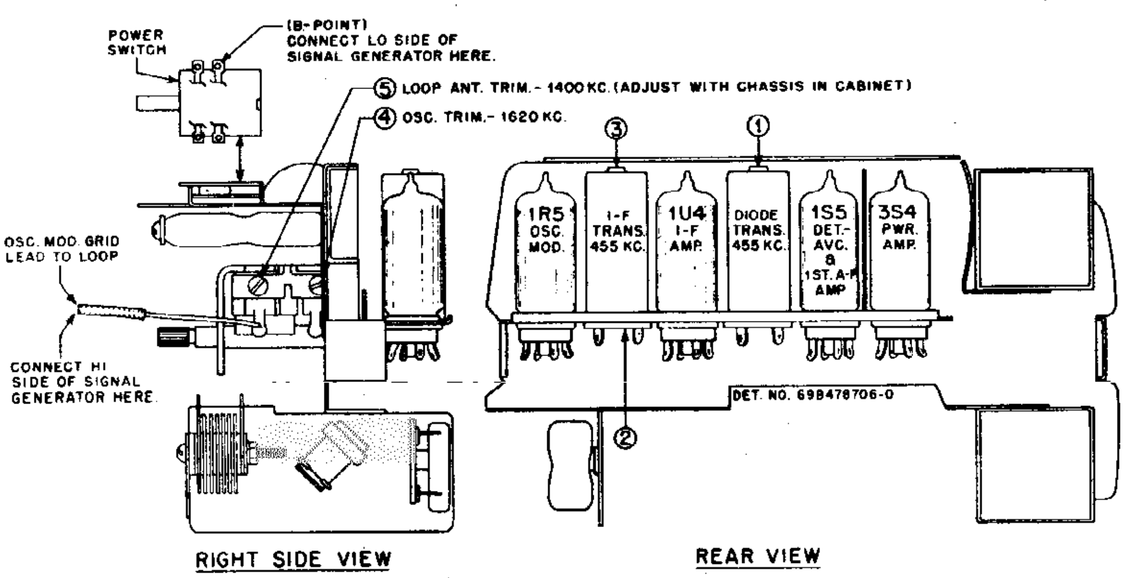

FIGURE 3. CHASSIS HS-62A TUBE & TRIMMER LOCATIONS

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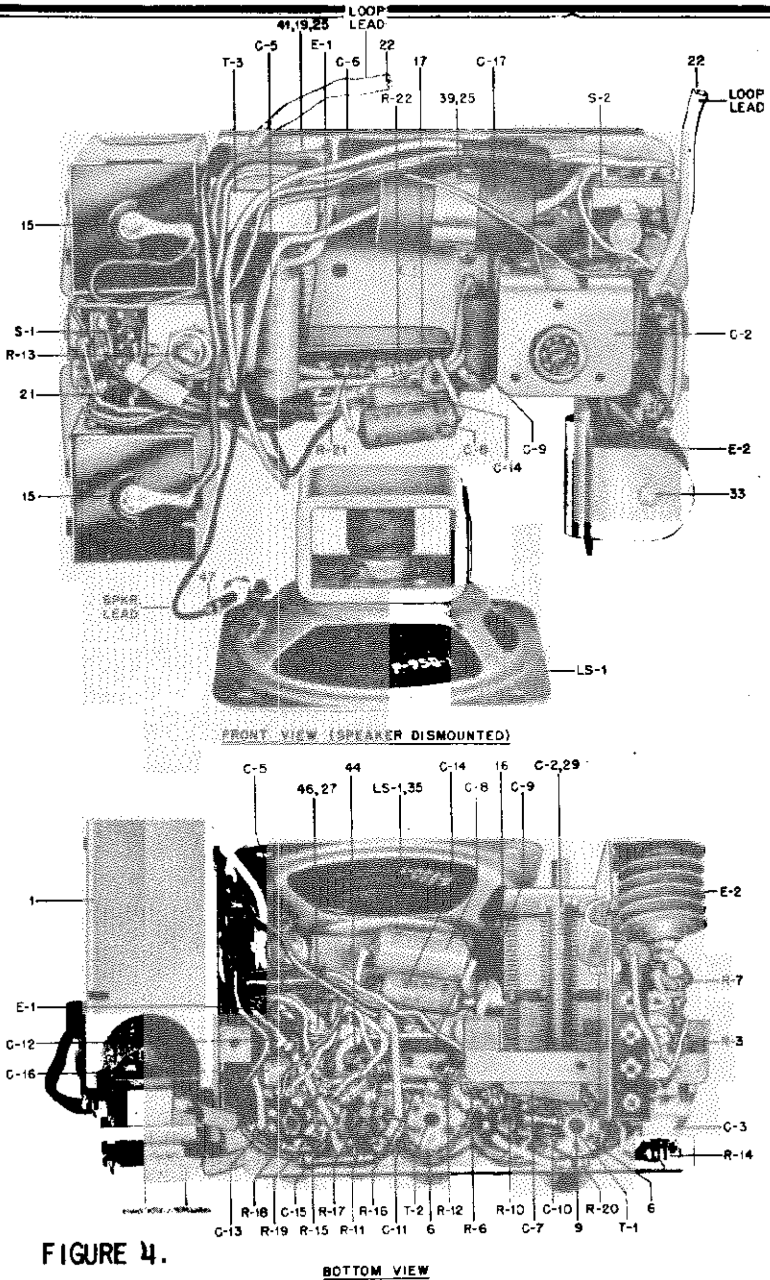

FIGURE 4.

CHASSIS HS-62 PARTS LOCATIONS — FRONT & BOTTOM VIEWS

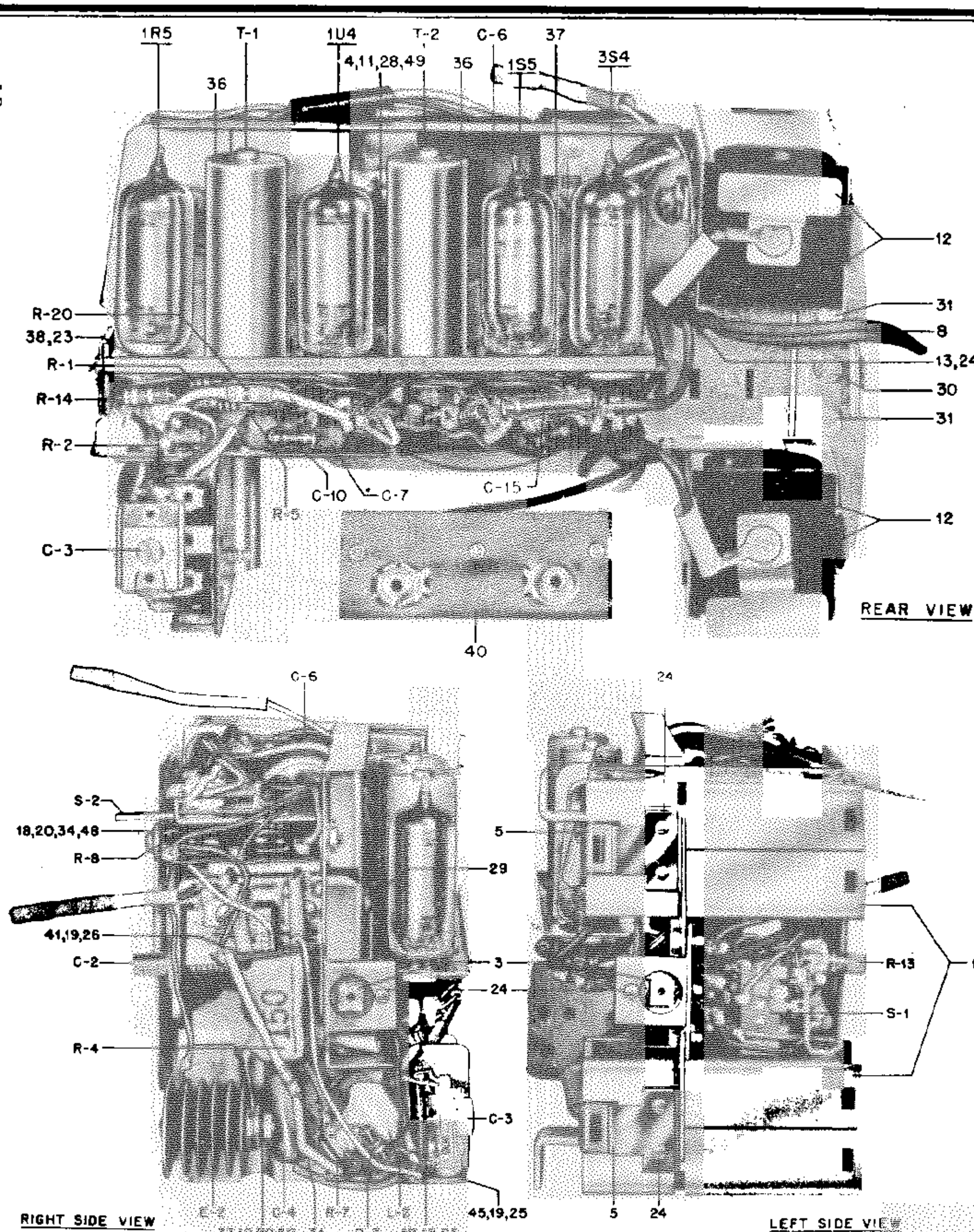

FIGURE 5. CHASSIS HS-62 PARTS LOCATIONS — REAR & END VIEWS

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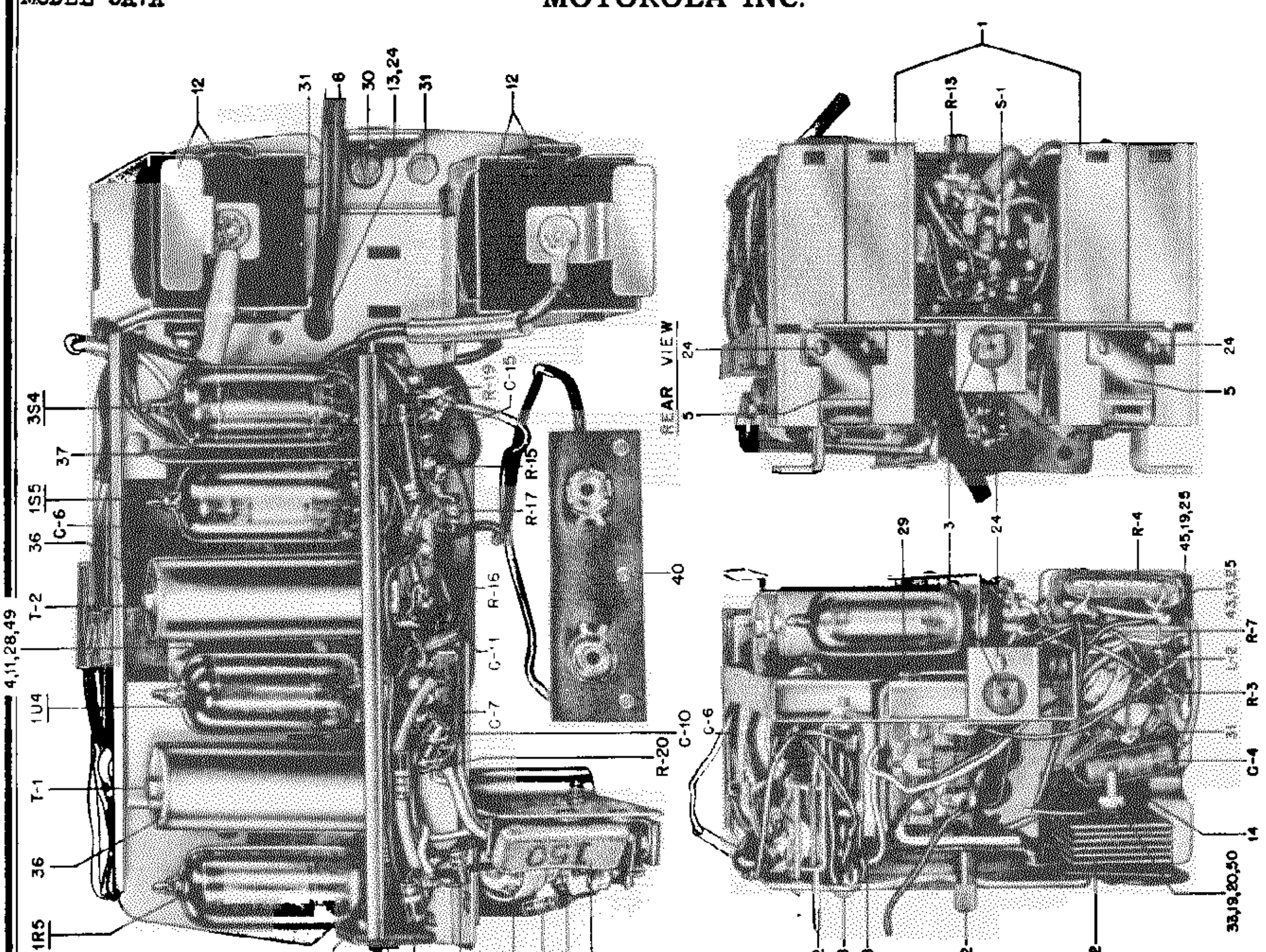

FIGURE 7. CHASSIS HS-62A PARTS LOCATIONS - REAR & END VIEWS

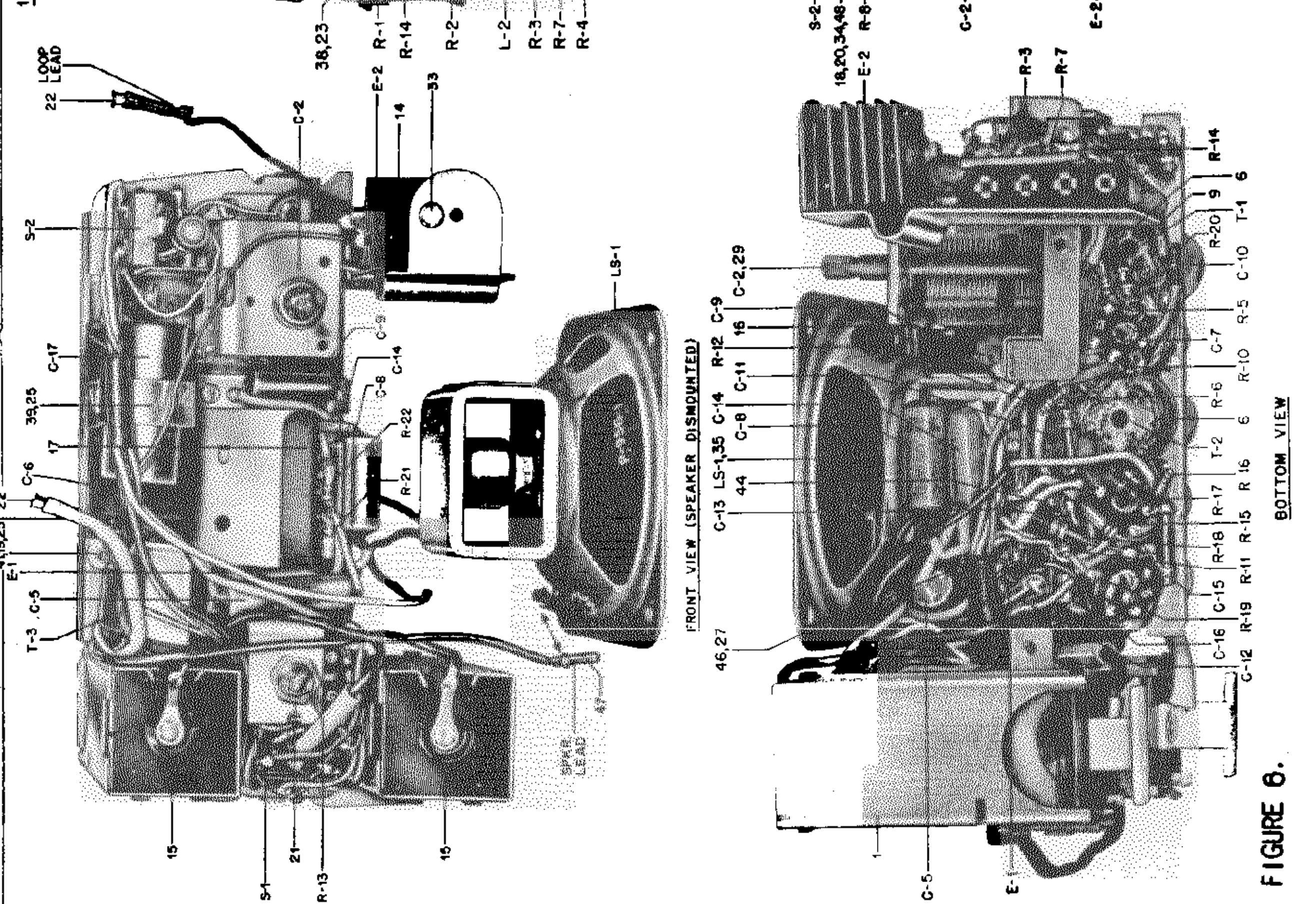

FIGURE 6. CHASSIS HS-62A PARTS LOCATIONS - FRONT & BOTTOM VIEWS

MODEL 5A

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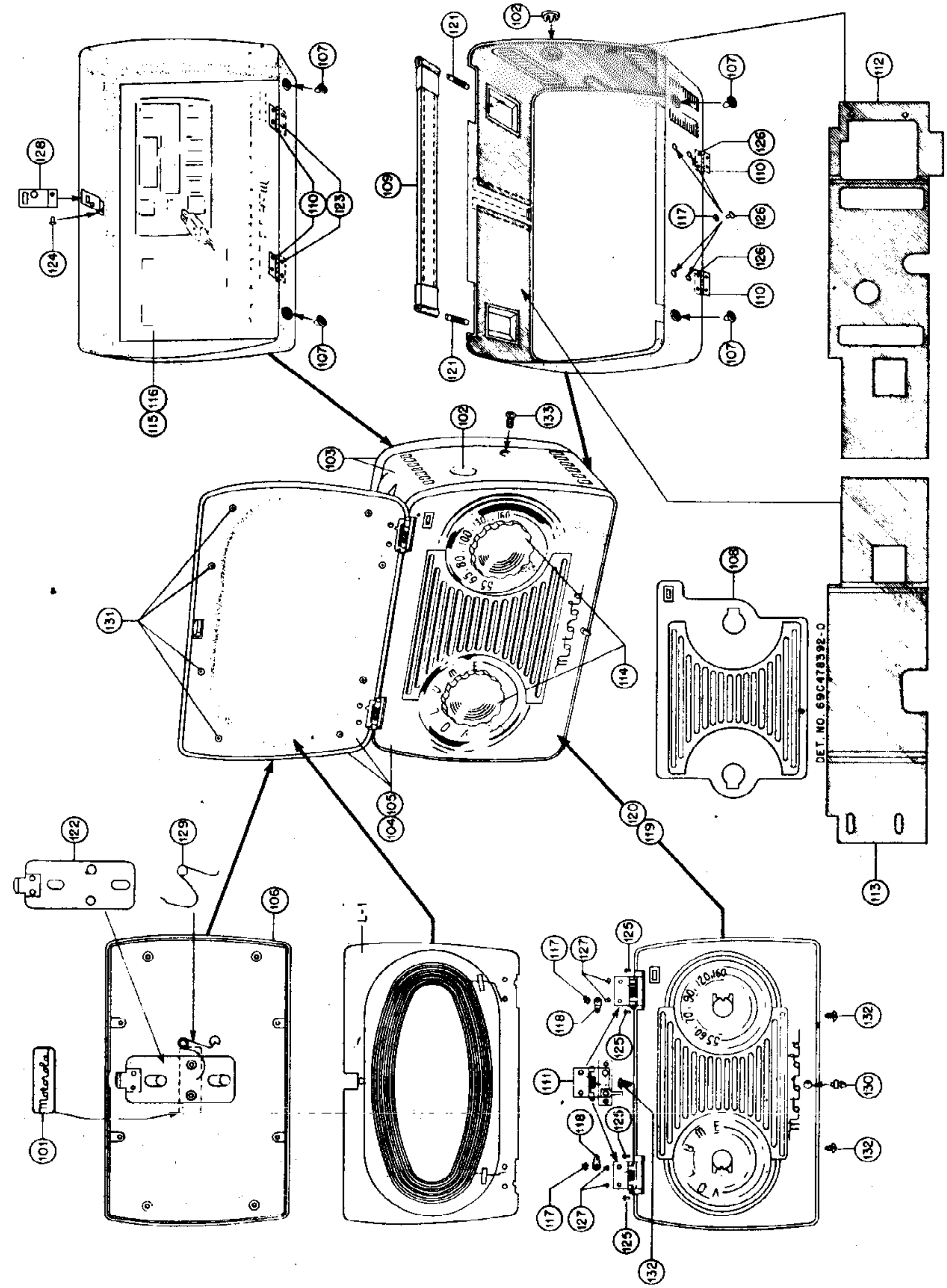

FIGURE 8. MODELS 5A7 & 5A7A CABINET PARTS LOCATIONS

MODEL 5A7
MODEL 5A7A

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REPLACEMENT PARTS LIST

CHASSIS PARTS-HS-62 & HS-62A

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-2	19B470623	Variable, 2 gang: full plates (HS-62 only)
	19B478016	Variable, 2 gang: cut oscillator plates (HS-62A only)
C-3	20A71206 or 20K478061	Trimmer, mica: 246 to 286 mmf range (Osc. pad - HS-62 only)
C-4	8K471628	Paper: .02 mf 100V
C-5	8A470606	Paper: .05 mf 400V
C-6	23B470692	Electrolytic: 40-20-15 mf/150V
C-7	8K471628	Paper: .02 mf 100V
C-8	8A71213	Paper: .05 mf 100V
C-9	8K471628	Paper: .02 mf 100V
C-10	21K77373	Ceramic: 30 mmf 500V
C-11	21B77286	Ceramic: 100 mmf 500V
C-12	21B470567	Ceramic: 4700 mmf 500V
C-13	21B77286	Ceramic: 100 mmf 500V
C-14	8K71628	Paper: .02 mf 100V
C-15	21B470567	Ceramic: 4700 mmf 500V
C-16	8A24986	Paper: .005 mf 100V
C-17	23B470693	Electrolytic: 50 mf 25V
CHOKE & CAPACITOR		
Z-1	24A470628	Choke & Tubular Capacitor (.05 mf 200V capacitor)
RECTIFIER		
E-2	46B478111	Selenium Rectifier: half-wave
COILS		
L-1	24B470993	Loop Antenna & Panel Assembly (HS-62 only)
	24K478006	Loop Antenna & Panel Assembly (HS-62A only)
L-2	24A25546	Oscillator (HS-62 only)
	24A478022	Oscillator (HS-62A only)
SPEAKER		
LS-1	50B470620	Speaker: 3-1/2" PM; 3.2 ohm VC (HS-62 & HS-62A)
	50B478023	Speaker: 3-1/2" PM; 3.2 ohm VC (HS-62A only)
RESISTORS		
Note: All resistors are insulated carbon type, 1/2W, 20% unless otherwise specified.		
R-1	6R2122	4.7 meg
R-2	6R6031	100,000
R-3	6R5597	22,000 10%
R-4	17A76986	Wirewound: 150 10% 2-1/2W
R-5	6R2109	10 meg
R-6	6R5406	22 10%
R-7	6R6036	3,300
R-8	17A470618	Wirewound: 2,000 10% 5W centertapped
R-10	6R2118	3.3 meg
R-11	17K77629	Wirewound: 4.7 10% 1/2W
R-12	6R6001	68,000
R-13	18A471706	Volume Control: 1 megohm
R-14	6R5554	390 10%
R-15	6R2109	10 meg
R-16	6R2122	4.7 meg
R-17	6R6004	1 meg
R-18	6R2118	3.3 meg
R-19	6R6432	270 10%
R-20	6R6040	680 10%
R-21	6R6015	220,000
R-22	6R6269	820 10%
SWITCHES		
S-1	40A470619 or 40B471927	Slide switch: SPDT (AC-DC/Battery selector-interchangeable with 40B471927)
	40B471927	Rotary Change-over Switch: SPDT (AC-DC Battery Selector-interchangeable with 40A470619)
S-2	40A470937	Slide switch (on-off)
TRANSFORMERS		
T-1	24B470694	IF, 455 Kc: complete with padding capacitors and tuning cores; less shield NOTE: WHEN USING REPLACEMENT IF TRANSFORMER, IT MAY BE NECESSARY TO ENLARGE HOLE IN SHIELD SLIGHTLY
T-2	24B470696	Diode, 455 Kc: complete with padding capacitor and tuning core; less shield NOTE: WHEN USING REPLACEMENT DIODE TRANSFORMER, IT MAY BE NECESSARY TO ENLARGE HOLE IN SHIELD SLIGHTLY
T-3	25B470622	Output
1	1X470935	Battery Box & Bracket Assembly: two complete "A" battery boxes assembled together; includes negative contacts and positive contact insulator catches only
2	7A478012	Bracket, speaker mounting (used only with 50B478023 speaker only)
3	1X470635	Bushing & Insulator Assembly (chassis insulated mtg)
4	43K13456	Bushing, plain: brass (used inside sub-chassis shock mtg grommets)
5	55A470913	Catch, battery insulator: phosphor bronze
6	42A470887	Clip, transformer mounting (IF & diode trans. mtg)
7	42A470861	Clip, tuning core (IF & diode trans. tuning core retainer)
8	30B470621	Cord, line & plug: 2 conductor; 6 ft lg.
9	46A470865	Core, iron: threaded (IF & diode trans. tuning)
10	15C470942	Cover, chassis (bottom chassis cover)
11	5K470916	Grommet, insulating: rubber (sub-chassis shock mounting)
12	1X470933	Insulator, Lead & Lug Assembly: includes cord clamp ("A" battery box positive contact)
13	14A470614	Insulator, line cord lock: fibre
14	14A478112	Insulator, rectifier: armite
15	1X470936	Insulator, Spring, Lead & Lug Assembly ("A" battery box negative contact)
16	14A470617	Insulator, terminal strip: armite; small
17	14A470615	Insulator, terminal strip: armite; large
18	4S7666	Lockwasher: #6 external (resistor mtg)
19	4S7650	Lockwasher: #6 internal (term. strip & rectifier mtg)
20	2S7005	Nut: 6-32 x 1/4 hex; cadmium plated (resistor & rectifier mtg)
21	2S7018	Nut: 3/8-32 x 1/2 hex; cadmium plated (vol. cont. mtg)
22	9A470980	Receptacle, loop lead
23	5S7769	Rivet: .088 x 3/32 steel; nickel plated (socket mtg, etc.)
24	5S7770	Rivet: .088 x 5/32 steel; nickel plated (line cord lock, battery insulator catch and chassis insulator mtg)
25	5S7706	Rivet: .122 x 1/8 steel; nickel plated (electrolytic strap mtg, etc)
26	5S7707	Rivet: .122 x 5/32 steel; nickel plated (term. strip mtg)
27	5S7701	Rivet: .122 x 3/16 steel; nickel plated (term. strip mtg)
28	3S2631	Screw: #4 x 3/8 Phillips fillister head thread cutting screw; cadmium plated (sub-chassis mtg)
29	3S7247	Screw: 6-32 x 3/16 slotted hex head locking type machine screw; cadmium plated (gang mtg)
30	3S7469	Screw: #6 x 3/16 slotted hex head thread cutting screw; cadmium plated (AC-DC/Battery sw. mtg-center)
31	3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (osc. coil & battery box mtg)
32	3S7460	Screw: #6 x 1/4 slotted binderhead thread-cutting screw; cadmium plated (chassis cover mtg)
33	3S9663	Screw: 6-32 x 1-1/8 slotted round head machine screw; cadmium plated (rectifier mounting)
34	3S1451	Screw: 6-32 x 2" slotted round head machine screw; cadmium plated (resistor mounting)
35	3S7205	Screw: 6-32 x 1/4 slotted hex head locking type machine screw; cadmium plated (speaker mtg)
36	1A470691	Shield & Sleeve Assembly (for T-1 & T-2)
37	26A470906	Shield, tube
38	9A470506	Socket, tube: miniature 7 prong
39	42A470607	Strap, electrolytic: retainer
40	31K470660	Strip, "B" battery terminal
41	31A64794	Strip, terminal: 1 insulated lug, end mtg
42	31A478040	Strip, terminal: 2 insulated lugs, #2 mtg (3/8 spacing)
43	31K66126	Strip, terminal: 2 insulated lugs, #2 mtg (3/8 spacing) HS-62A
44	31A36311	Strip, terminal: 2 insulated lugs, #2 mtg (1/4" spacing)
45	31A71196	Strip, terminal: 3 insulated lugs, #1 mtg
46	31A470612	Strip, terminal: 3 insulated lugs, hole "
47	29K5414	Terminal, plain pin: .125 dia. (speaker plug)
48	4K470959	Washer, insulating: 3/8 x .136 x .062 thick; armite (resistor mounting)
49	4S7564	Washer: 3/8 x 1/8 x .033 thick, steel; cadmium plated (sub-chassis mtg)
50	4S7552	Washer: 7/16 x 9/64 x .042 thick; cadmium plated (rectifier mtg)

CABINET PARTS - MODELS 5A7 & 5A7A

REF. NO.	PART NO.	DESCRIPTION
101	38A470978	Button, loop cover: plastic
102	38K470999	Button, plug: wrinkle maroon finish (cover for loop ant. trim. hole)
103	1X478032	Cabinet: complete; includes: die cast housing, rear cover with catch, felt feet and armite housing insulators; does not include carrying handle, handle retaining pins or front cover and loop assembly
104	1X478027	Cover, Loop & Front Panel Assembly: includes: satin-finished chrome front panel, latch retainer stud, two insulated hinges, molded speaker grille, loop antenna and loop cover with latch (for 5A7 only-use only with Chassis HS-62)
105	1X478034	Cover, Loop & Front Panel Assembly: same as above except for 5A7A only-use only with Chassis HS-62A
106	1X470992	Cover & Latch Assembly: loop antenna cover with complete latch assembly
107	55A27113	Foot, felt
108	13C470673	Grille, speaker: maroon plastic
109	55A470994	Handle, carrying: complete
110	55K30198	Hinge, back cover
111	1X478029	Hinge & Insulator Assembly (front cover hinge)
112	14D478014	Insulator, inner housing: right hand; armite
113	14K478079	Insulator, inner housing: left hand; armite
114	36B470967	Knob, control: maroon plastic
115	54B471078	Label, composite: operating instructions & cover insulator (for 5A7)
116	54K471873	Label, composite: operating instructions & cover insulator (for 5A7A)
117	4S8406	Lockwasher: #2 internal; cadmium plated (housing insulator mtg & loop lug mtg.)
118	29R5399	Lug, soldering: #3
119	15K478017	Panel, front: metal; satin chrome finish (5A7 only)
120	15K478020	Panel, front: metal; satin chrome finish (5A7A only)
121	46A470997	Pin, handle retainer
122	1X470989	Plate & Latch Assembly
123	5S8487	Rivet: .088 x 3/32 steel; black nickel finish (mounts rear cover to hinge)
124	5S2831	Rivet: .088 x 3/32 steel; statuary bronze finish (rear cover catch mtg)
125	5S2829	Rivet: .088 x 1/4 steel; statuary bronze finish (mounts hinge to front panel)
126	5S8490	Rivet: .088 x 5/32 steel; black nickel finish (mounts hinge to die cast housing & housing insulator mtg)
127	5S2827	Rivet: .088 x 5/32 steel; statuary bronze finish (mounts hinge to loop panel)
128	1X470963	Spring & Button Assembly (rear cover catch)
129	41A470909	Spring, loop door catch
130	46A470961	Stud, latch retainer
131	3S3389	Screw: #2 x 1/4 PKZ Phillips flat head sheet metal screw; statuary bronze finish (mount loop to loop cover)
132	3S3390	Screw: #4 x 3/16 PKA Phillips stove head sheet metal screw; statuary bronze finish (mount front panel to housing)
133	3S478036	Screw: 4-40 x 1/4 Phillips binderhead machine screw; statuary bronze finish (chassis to cabinet mtg)

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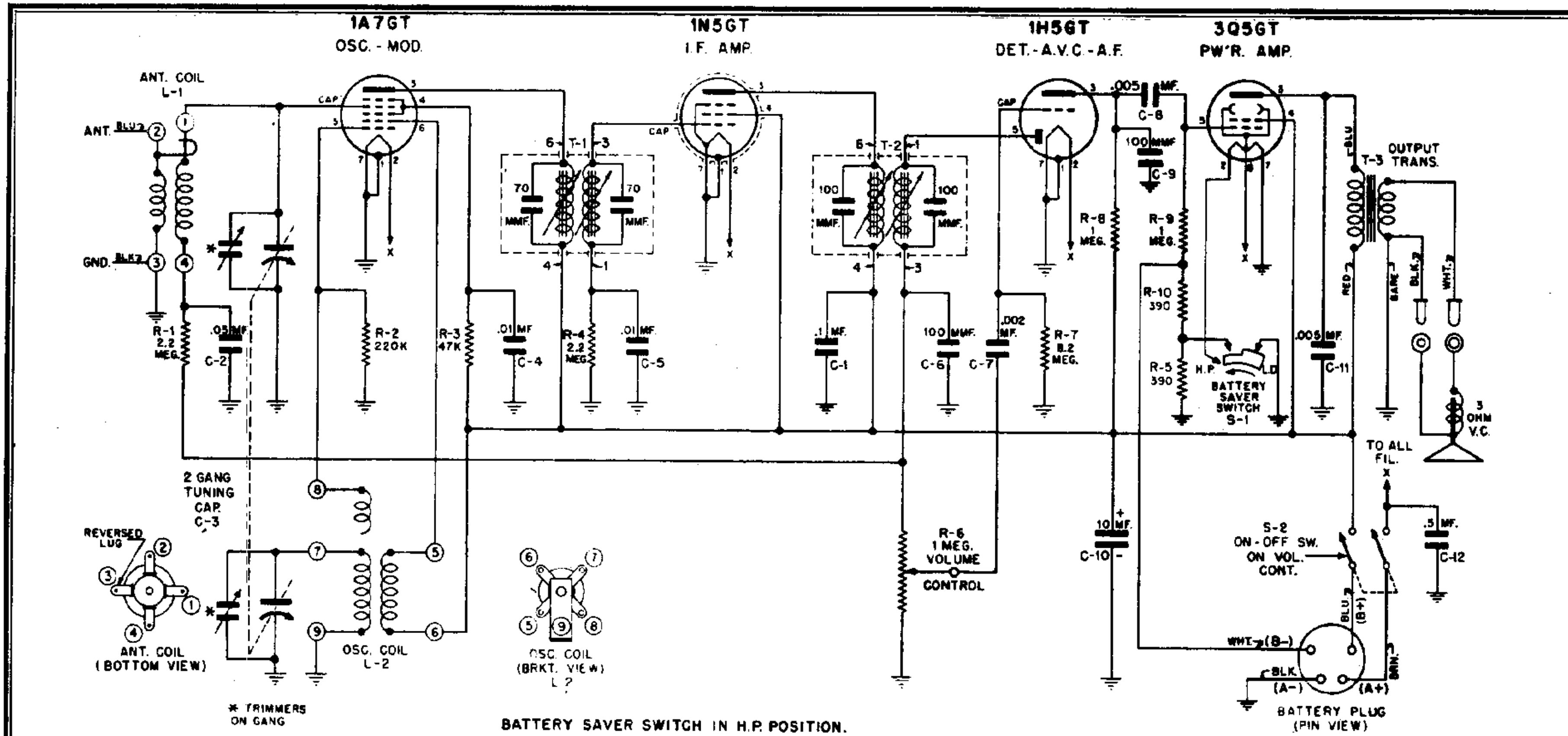


BATTERY SAVER SWITCH IN H.P. POSITION.

'A' DRAIN - .25 AMP.
'B' DRAIN IN 'L.D.' POSITION - 8 MA.
'B' DRAIN IN 'H.P.' POSITION - 12 MA.
MAX. PW'R. OUTPUT - 250 MILLIWATTS.

BATTERY PACK
1-1/2 V. 'A' & 90 V. 'B'

▭ = RESISTANCE MEASUREMENTS.
◡ = VOLTAGE MEASUREMENTS.

ALL VOLTAGE MEASUREMENTS ARE MADE WITH A VTVM FROM TUBE BASE PIN TERMINALS TO CHASSIS.

*= MAY VARY, DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITOR C-10.

A TOLERANCE OF ±10% IS PERMITTED ON VOLTAGE MEASUREMENTS; ±20% ON RESISTANCES.

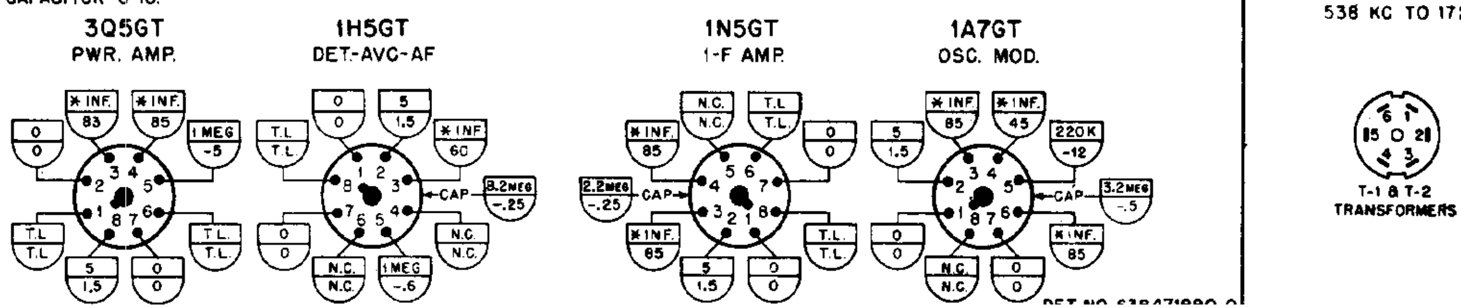
T.L=TIE LUG.

K=1000 (ONE THOUSAND) OHMS.

BATTERY VOLTAGE INPUT; A=1-1/2 VOLTS.
B=90 VOLTS.

I.F. = 455 KC

FREQUENCY RANGE
538 KC TO 1720 KC



MODEL 47B11

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Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

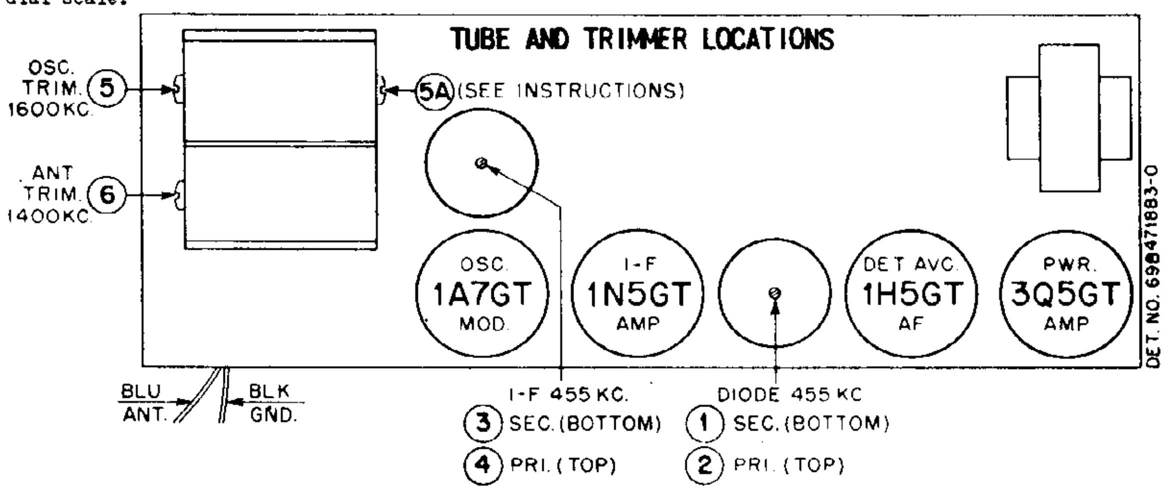
A low range output meter should be connected across the speaker voice coil Set LO DRAIN-HI POWER switch to HI POWER. Set receiver volume control to maximum; for greatest accuracy keep output of receiver at approximately .05 watt throughout alignment by reducing signal generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter.) The alignment tool should be of an insulated type, such as Motorola Part No. 66A71008.

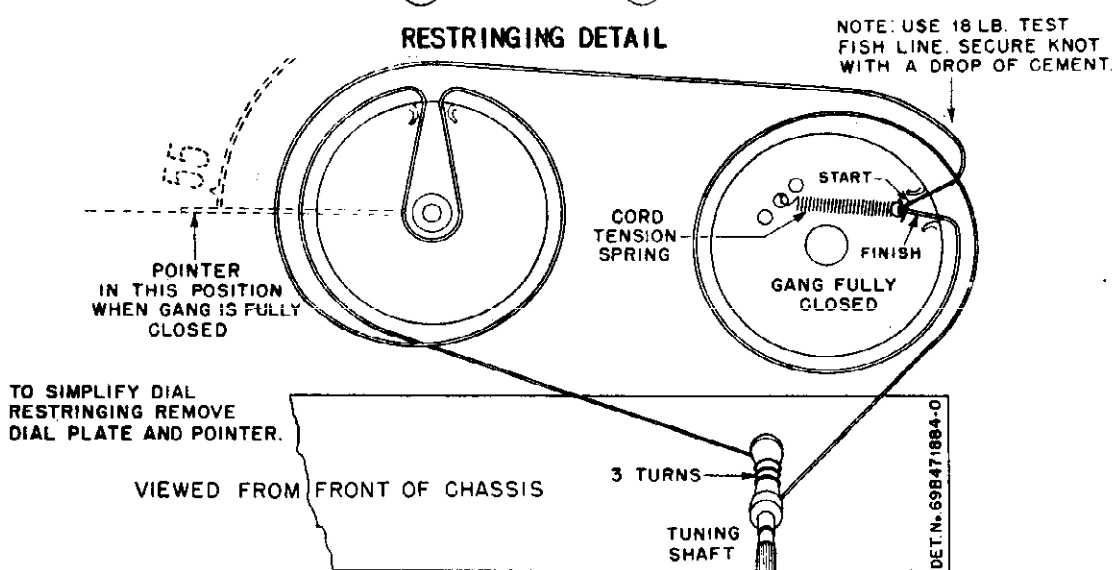
Refer to Figure 1 for location of all adjustments.

Normally, oscillator can be set with trimmer 5. However, if setting of trimmer 5A has been tampered with, it may be necessary to increase or decrease setting of 5A before trimmer 5 will peak correctly.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
ALIGNMENT						
IF ALIGNMENT						
1.	Gang fully opened.	.1 mf.	High side to Osc-Mod grid (cap). Lo side to chassis.	455 Kc.	1,2,3 & 4	Peak for maximum output.
RF ALIGNMENT						
2.	1600 Kc *	200 mmf.	High side to Ant. lead. Lo side to ground lead.	1600 Kc.	5	This sets oscillator to dial scale.
3.	1400 Kc	200 mmf.	"	1400 Kc.	6	Peak for maximum output.

* First check setting of pointer. With gang fully closed, pointer should be parallel with horizontal line on dial scale.





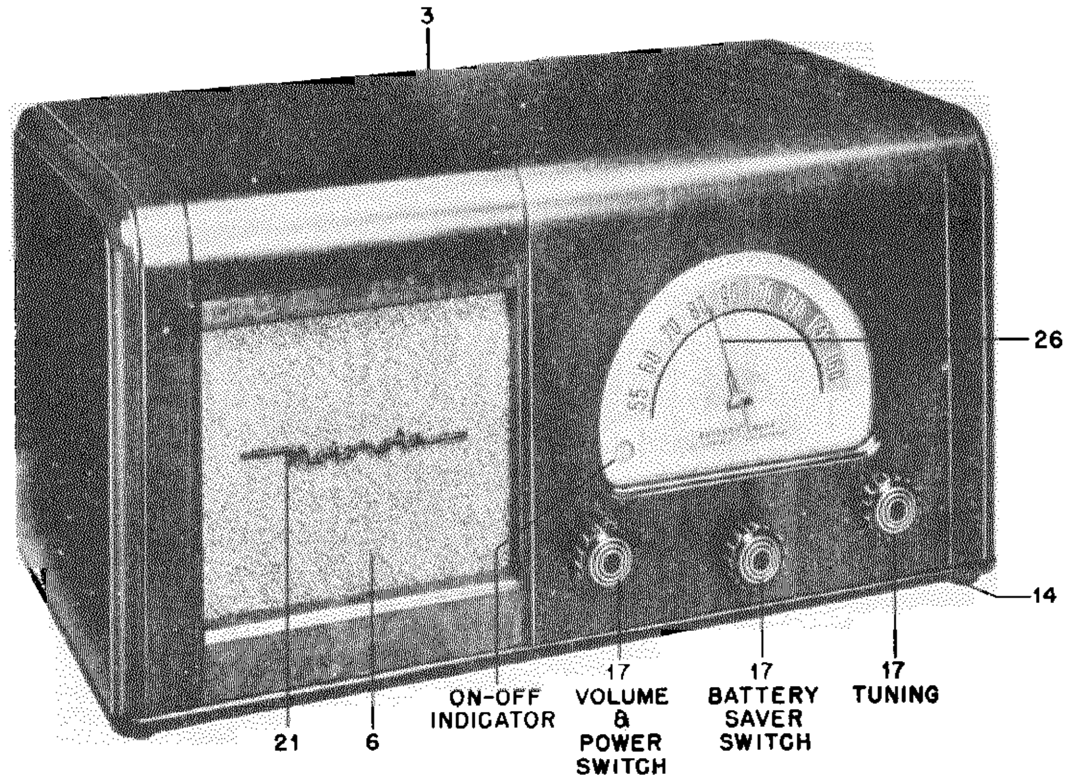


FIGURE 3. PARTS LOCATION - CABINET FRONT

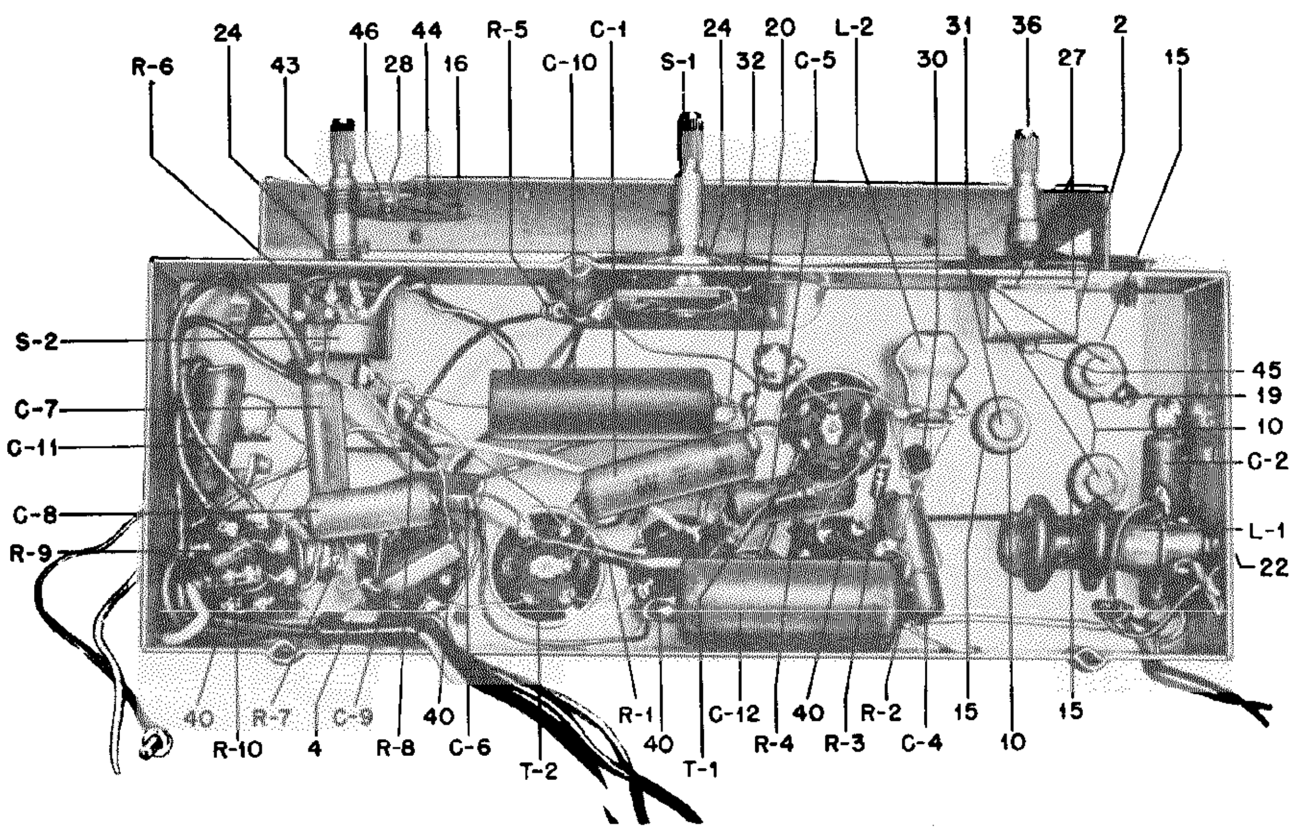


FIGURE 6. PARTS LOCATION - CHASSIS BOTTOM

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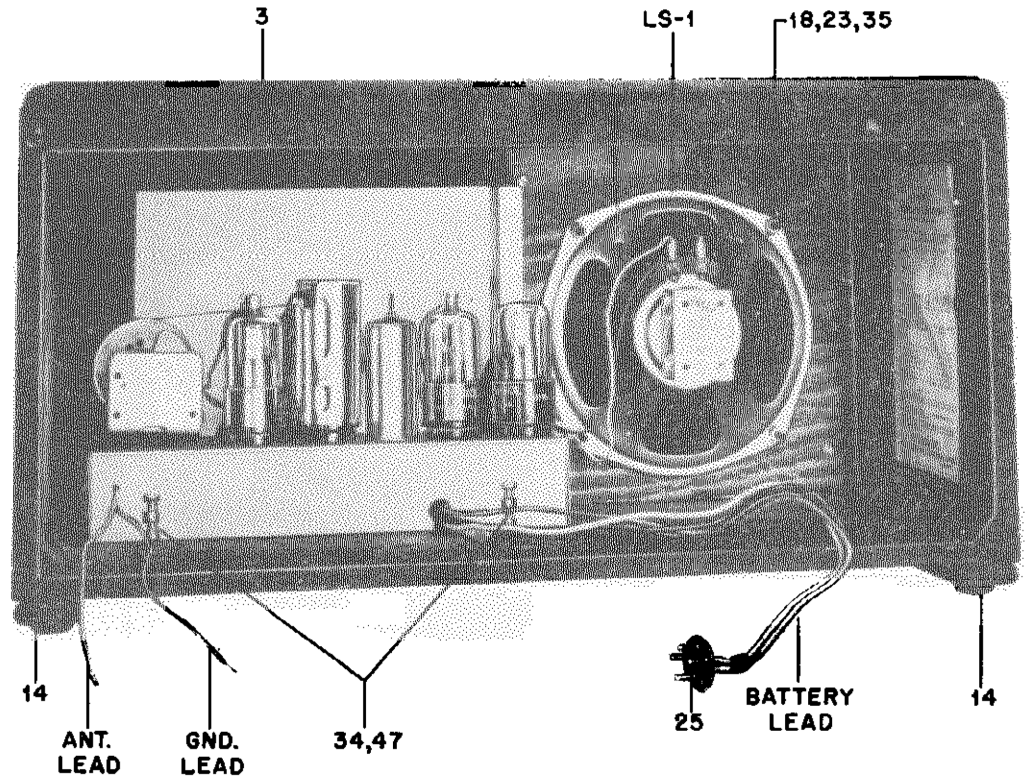
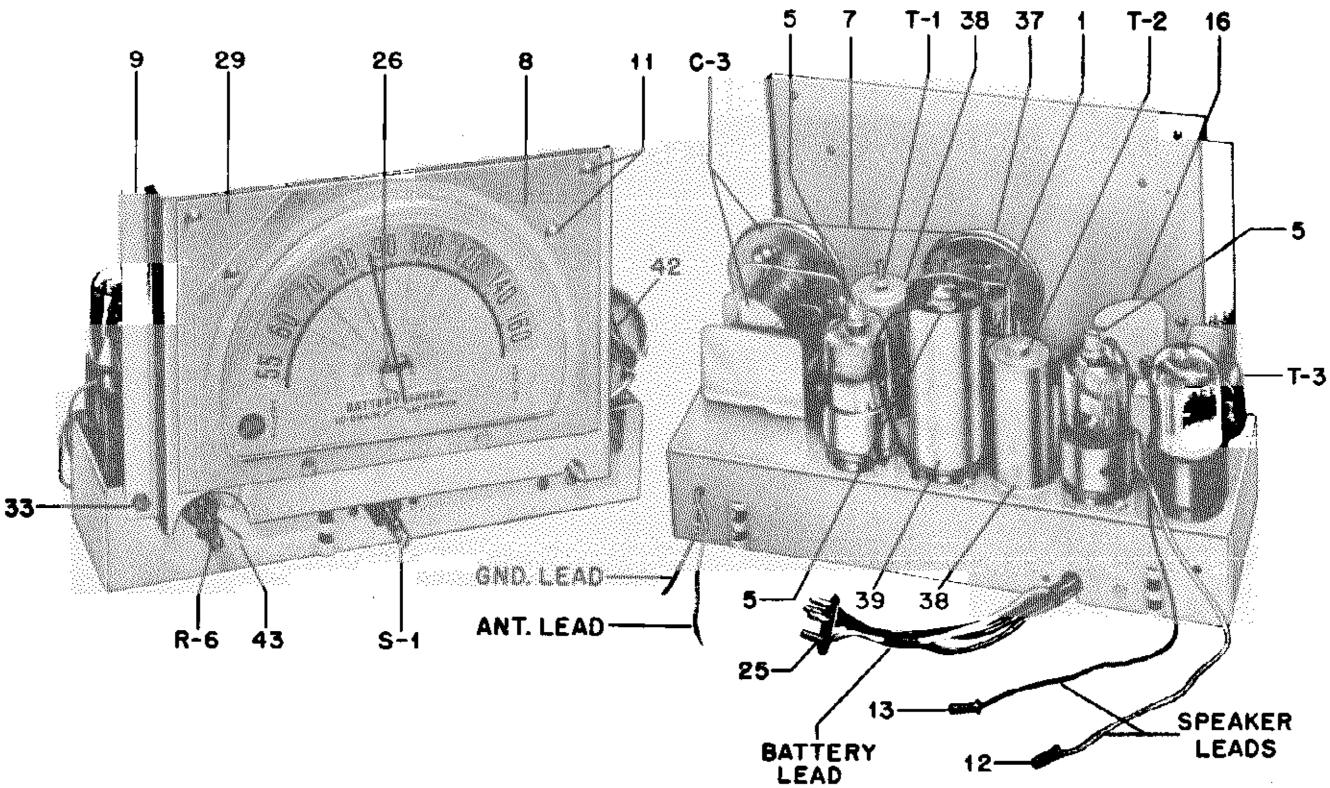


FIGURE 4. PARTS LOCATION - CABINET REAR



PARTS LOCATION - CHASSIS TOP

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
MISCELLANEOUS		
1	71X47007	Bracket Assembly, pointer shaft ....
2	7A77337	Bracket, tuning shaft mounting ....
3	16E77626	Cabinet: wood; walnut finish.............
4	42K13135	Clamp, cable ....
5	42A5480	Clip, grid: small ....
6	13K77699	Cloth, grille ....
7	11M8944	Cord, dial: 18 lb; black ....
8	61B77625	Crystal, dial ....
9	1X77696	Dial Scale Mtg. Plate & Indicator Assembly (less dial scale & dial crystal) ....
10	5A19658	Eyelet (gang mtg) ....
11	5S7605	Eyelet, snap-in (dial scale & crystal mtg)
12	5S7855	Eyelet: .484 long x .156 diameter ....
13	5S7820	Eyelet: .450 long x .125 diameter ....
14	37K15841	Foot, rubber (cabinet foot) ....
15	5A70404	Grommet, rubber (gang cushions) ....
16	52A77612	Indicator, ON-OFF ....
17	36B77659	Knob, control ....
18	4S7660	Lockwasher: #8 external; phosphor bronze (speaker mtg) ....
19	29K3010	Lug, soldering ....
20	29R5348	Lug, soldering: #8 ....
21	62K76926	Nameplate, Motorola ....
22	2S7070	Nut: 6-32 x 1/4 palnut; cadmium plated (ant. coil mtg) ....
23	2S7003	Nut: 8-32 x 5/16; hex; brass (speaker mtg)
24	2S7051	Nut: 3/8-32 x 9/16; hex palnut; cadmium plated (volume cont. mtg) ....
25	28X11368	Plug, 4 prong ....
26	52A77632	Pointer ....
27	5S7701	Rivet: .122 x 3/16 steel; polished nickel finish (tuning shaft bracket mtg)....
28	5A27675	Rivet, shoulder (ON-OFF indicator mtg).....
29	34B77621	Scale, dial ....
30	3S2683	Screw: #6 x 3/16 plain hex head; sheet metal type; black parkerized finish (osc. coil mtg) ....
31	3S2294	Screw: 6-32 x 1/2 plain hex head locking type machine screw; cadmium plated (gang mtg) ....
32	3S7205	Screw: 8-32 x 1/4 slotted hex head locking type machine screw (pointer shaft bracket mtg) ....
33	3S7454	Screw: #8 x 1/4 plain hex head sheet metal screw; cadmium plated (dial plate mounting) ....
34	3S7526	Screw: #8 x 1-1/8 slotted hex head sheet metal screw; cadmium plated (chassis mtg) ....
35	3K653	Screw: speaker mounting ....
36	1X77694	Shaft, tuning ....
37	1X77695	Shaft & Drive Pulley Assembly (pointer shaft)
38	1A71049	Shield & Iron Core Sleeve Assembly (for T-1 and T-2) ....
39	26A14760	Shield, tube: bantam ....
40	9A6790 or	Socket, tube: molded octal ....
41	9A6788	Socket, tube: (replacement) molded octal (to be used in place of 9A6790 when socket mounting lugs on chassis break off) ....

REF. NO.	PART NO.	DESCRIPTION
42	41A14244	Spring, tension coil ....
43	41A77611	Spring, indicator ....
44	41A72506	Spring, tension (ON-OFF indicator) ....
45	4A70015	Washer, C ....
46	4S7554	Washer: 3/8 x 1/8 x .033 thick; cadmium plated (ON-OFF indicator assem)
47	4S8204	Washer: 1" x .203 x .067 thick (chassis mtg) ....
CAPACITORS		
C-1	8S9806	Paper: .1 mf 200V.....................
C-2	8S9816	Paper: .05 mf 400V....................
C-3	1X77683	Variable, 2 gang: includes 2" pulley.....
C-4	8S9809	Paper: .01 mf 400V....................
C-5	8S9809	Paper: .01 mf 400V....................
C-6	21R6641	Mica: 100 mmf 500V....................
C-7	8S9824	Paper: .002 mf 400V...................
C-8	8S9813	Paper: .005 mf 600V...................
C-9	21R6641	Mica: 100 mmf 500V....................
C-10	23A14727	Electrolytic: 10 mfd 150V..............
C-11	8S9813	Paper: .005 mf 600V...................
C-12	8S9822	Paper: .5 mf 200V.....................
COILS		
L-1	24A30442	Antenna: iron core type; incl. mtg. screw
L-2	24A27349	Oscillator............................
SPEAKER		
LS-1	50B71087	PM: 6"; 3.2 ohm voice coil......
RESISTORS		
Note:		All resistors are carbon, 20%, insulated type unless otherwise specified.
R-1	6R3927	2.2 meg 1/2W..........................
R-2	6R6015	220,000 1/2W..........................
R-3	6R6056	47,000 1/2W...........................
R-4	6R3927	2.2 meg 1/2W..........................
R-5	6R5554	390 10% 1/2W..........................
R-6	18K77615	Volume control: 1 meg; with DPST switch
R-7	6K5585	8.2 meg 10% 1/2W......................
R-8	6R6004	1 meg 1/2W............................
R-9	6R6004	1 meg 1/2W............................
R-10	6R5554	390 10% 1/2W..........................
SWITCHES		
S-1	40K77620	Battery Saver.........................
S-2	-	DPDT (part of volume control R-6)
TRANSFORMERS		
T-1	24B77677	IF: 455 Kc; complete with iron cores and padding capacitor, but less shield..
T-2	24B70531	Diode: 455 Kc; complete with iron cores and padding capacitors, but less shield............
T-3	25B76952 or 25B76987	Output................................

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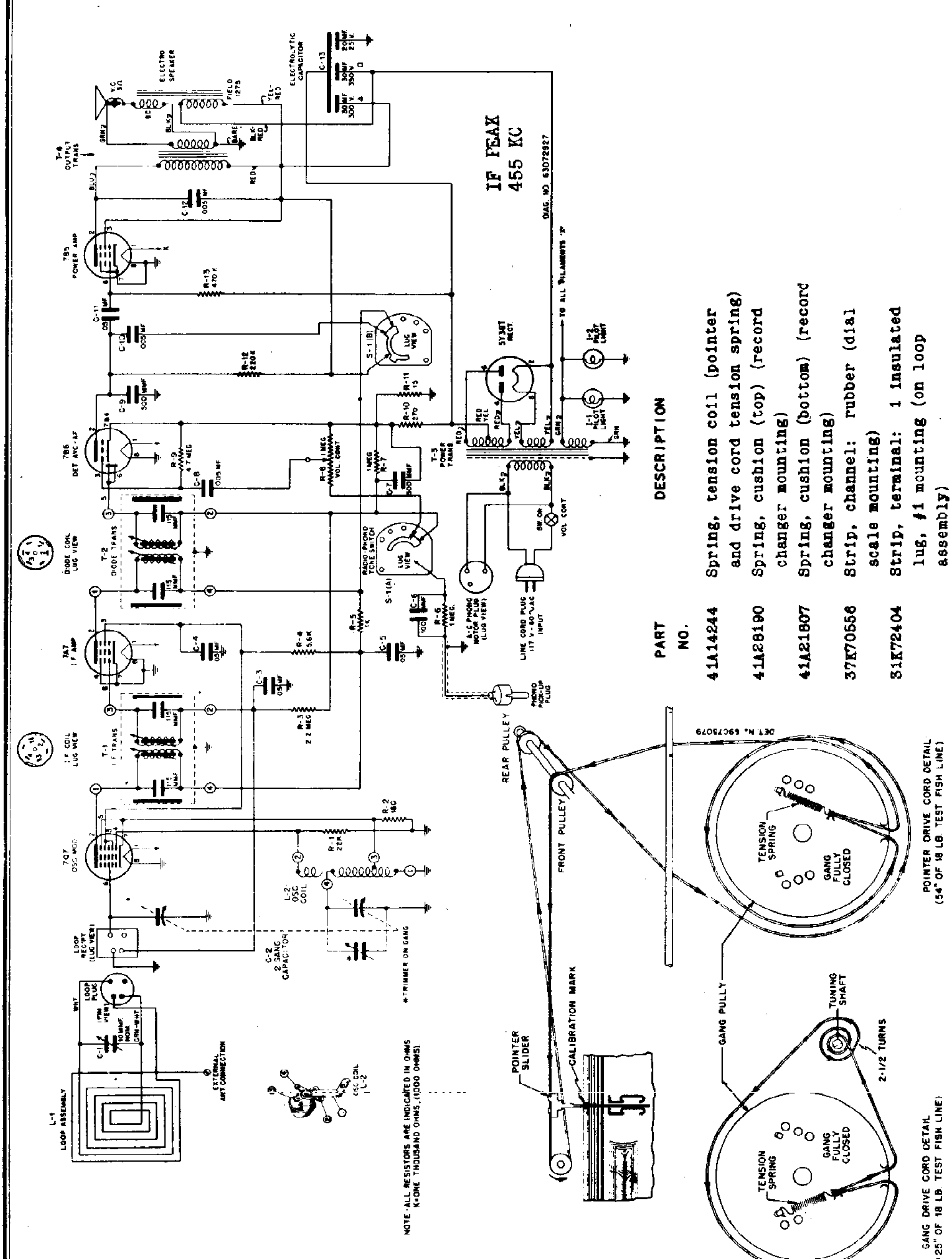

PART NO.	DESCRIPTION
41A14244	Spring, tension coil (pointer and drive cord tension spring)
41A28190	Spring, cushion (top) (record changer mounting)
41A21807	Spring, cushion (bottom) (record changer mounting)
37K70556	Strip, channel: rubber (dial scale mounting)
31K72404	Strip, terminal: 1 insulated lug, #1 mounting (on loop assembly)

For additional parts list see page 17-17

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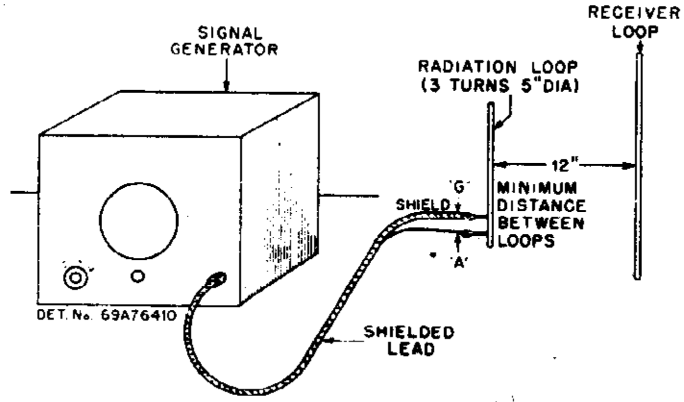
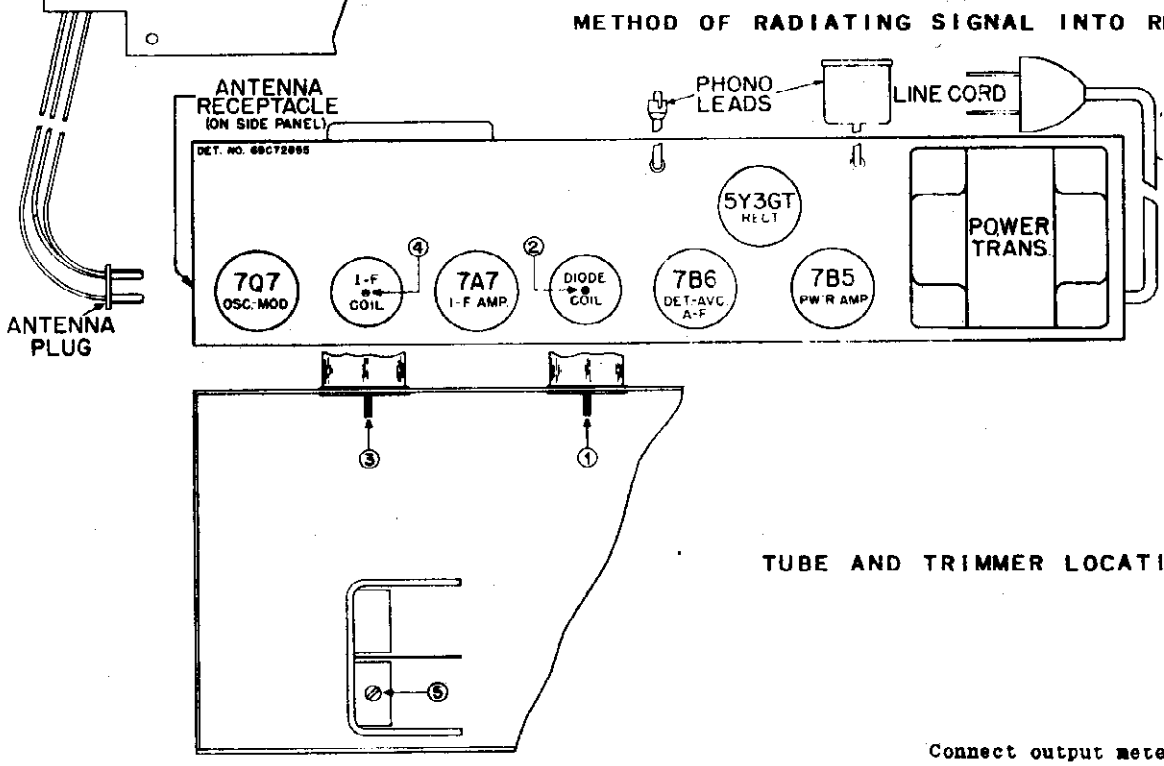


METHOD OF RADIATING SIGNAL INTO RECEIVER



TUBE AND TRIMMER LOCATION DETAIL

Connect output meter across the speaker voice coil. (.38V = .05 watt). Volume control set at maximum for all operations. The PHONO-RADIO TONE switch should be set to RADIO treble position. The adjusting screwdriver or alignment tool should be of the insulated type, such as Motorola Part No. 66A71008.

Operations In Order	Gang Capacitor Set At	Dummy Antenna	Generator Connected to	Generator Set At (400~30% modulated)	Adjust Trimmer or Core No.	Average Microvolt Input for .38V output
1. Align I.F. & diode for maximum	Minimum	.1 mf.	OSC-MOD grid (pin 6)	455 Kc.	1,2,3 & 4	12 microvolt
2. Set Oscillator trimmer	Minimum	.1 mf.	OSC-MOD grid (pin 6)	1620 Kc.	5	
3. Peak loop antenna	1400 Kc.	None	Radiation loop *	1400 Kc.	6 (should be repeaked after loop & set are installed in cabinet.)	

* Connect output of signal generator to a 5" diameter 3 turn loop. See Figure 2. With volume control on full, bring loop close enough to receiver loop until an output of 50 milliwatts is obtained (.38V on output meter). The distance between loops should never be less than 12". Vary distance between generator and receiver loops or adjust generator output to maintain .38V during alignment.

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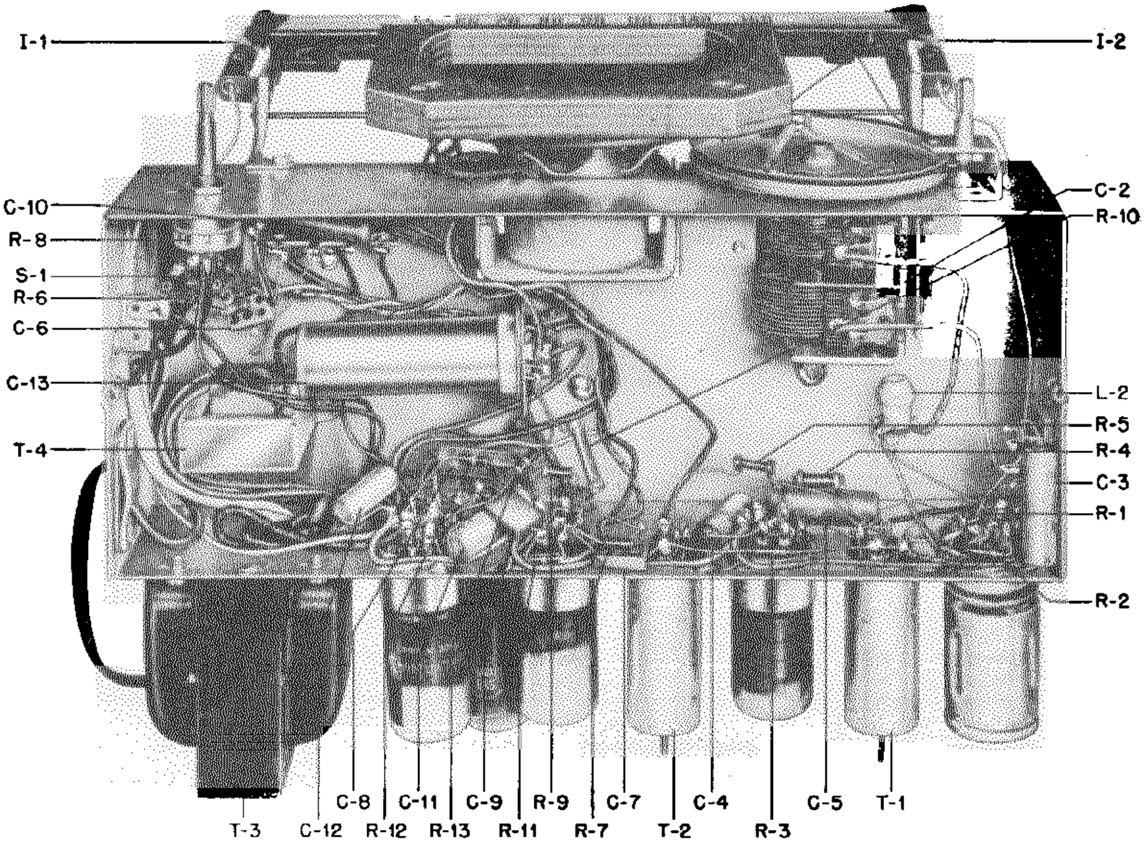
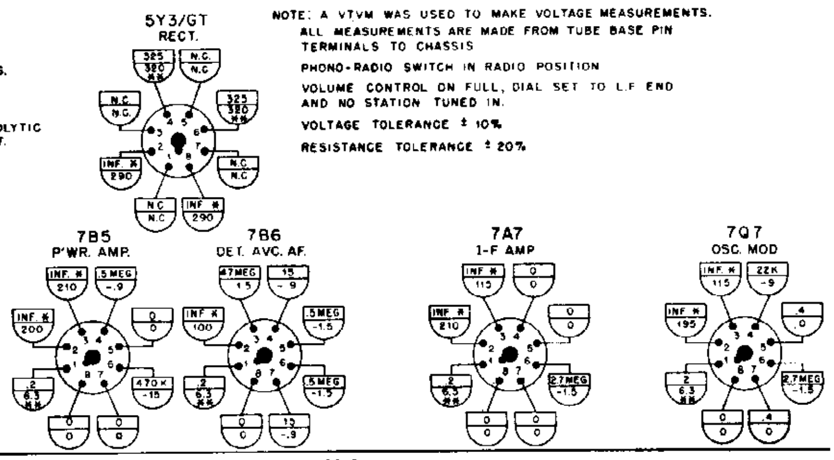


▭ = RESISTANCE MEASUREMENTS.
◡ = VOLTAGE MEASUREMENTS.
* = MAY VARY DUE TO ELECTROLYTIC CAPACITOR C-13 IN CIRCUIT.
** = A.C. VOLTAGES.

NOTE: A VTVM WAS USED TO MAKE VOLTAGE MEASUREMENTS.
ALL MEASUREMENTS ARE MADE FROM TUBE BASE PIN TERMINALS TO CHASSIS
PHONO-RADIO SWITCH IN RADIO POSITION
VOLUME CONTROL ON FULL, DIAL SET TO L.F. END AND NO STATION TUNED IN.
VOLTAGE TOLERANCE ± 10%
RESISTANCE TOLERANCE ± 20%



BOTTOM VIEW OF CHASSIS

1X71048	Core & Clip Assembly (I.F. & diode transformer bottom tuning iron core and clip)
1X72526	Dial Assembly: complete with mounting brackets, 3 pointer cord idler pulleys, dial plate (painted brown), 2 dial light sockets, pointer slider rail and glass dial scale. Pointer is not included
31A15453	Strip, terminal: 1 large insulated lug, #2 mounting
31A71126	Strip, terminal: 3 insulated lugs, #2 ground
13B72476	Escutcheon, dial: brown plastic
5A19658	Eyelet, steel: 19/64-.212 I.D. x 1/2, cadmium plated (gang mounting)

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REF. NO.	PART NO.	DESCRIPTION
C-1	20A18740	Capacitor, trimmer: 1.5-15 mmf; includes "U" mounting bracket
C-2	1X72553	Capacitor, variable: 2 gang; cut oscillator plates; includes pulley.
C-3	8S9816	Capacitor, fixed: paper; .05 mf. 400V
C-4	8S9816	Capacitor, fixed: paper; .05 mf. 400V
C-5	8S9816	Capacitor, fixed: paper; .05 mf. 400V
C-6	21R6641	Capacitor, fixed: mica; 100 mmf. 500V
C-7	21R6659	Capacitor, fixed: mica; 500 mmf. 500V
C-8	8S9815	Capacitor, fixed: paper; .005 mf. 600V
C-9	21R6659	Capacitor, fixed: mica; 500 mmf. 500V
C-10	8S9815	Capacitor, fixed: paper; .005 mf. 600V
C-11	8S9816	Capacitor, fixed: paper; .05 mf. 400V
C-12	8S9815	Capacitor, fixed: paper; .005 mf. 600V
C-13	23A27716 or 23A74627	Capacitor, fixed: electrolytic; 30 mf.350V, 30 mf. 300V, 20 mf. 25V
I-1 & I-2	65X10667	Bulb: 6.3V. .25A tubular bayonet; #44
L-1	24C72605	Loop Assembly: complete with trimmer, connecting leads and plug
L-2	24A72464	Coil, B. C. oscillator
T-3	25B51246	Transformer, power
T-4	25B21175	Transformer, output
	35A72567	Baffle, speaker: cardboard, 1/2" thick
	1X72551	Bracket & Mounting Plate Assembly: "L" shaped steel bracket and bakelite electrolytic mounting plate
	7B71727	Bracket, gang capacitor mounting
	7A14664	Bracket, tuning shaft
	43A76441	Bushing, felt (used on control shafts, between knobs and cabinet)
	16F72556	Cabinet: complete
	35X72557	Cloth, grille
	11M8944	Cord, dial: 16 lb; black
	30K75570	Cord, line: 6 ft. long; with plug
	1X72528	Cord, phono pick-up: complete with one pin plug
	1X71047	Core & Palnut Assembly (I.F.& diode transformer top tuning iron core and nut)

REF. NO.	PART NO.	DESCRIPTION
R-1	6R6028	Resistor, fixed: carbon; 22,000 1/2W Ins.
R-2	6R5660	Resistor, fixed: carbon; 180 10% 1/2 W Ins.
R-3	6R5927	Resistor, fixed: carbon; 2.2 meg 1/2W Ins.
R-4	6R6522	Resistor, fixed: carbon; 5600 10% 1/2W N.I.
R-5	6R6055	Resistor, fixed: carbon; 1000 1/3W N.I.
R-6	6R6004	Resistor, fixed: carbon; 1 meg 1/2W Ins.
R-7	6R6004	Resistor, fixed: carbon; 1 meg 1/2W Ins.
R-8	18A70052	Resistor, variable: carbon; 1 meg; with S.P.S.T. switch
R-9	6R2122	Resistor, fixed: carbon; 4.7 meg 1/2W Ins.
R-10	6R6035	Resistor, fixed: carbon; 270 10% 1 W N.I.
R-11	6R2034	Resistor, fixed: carbon; 15 10% 1/2W Ins.
R-12	6R6015	Resistor, fixed: carbon; 220,000 1/2W Ins.
R-13	6R6032	Resistor, fixed: carbon; 470,000 1/2W Ins.
S-1	40A71721	Switch, phono, radio & tone
T-1	24B70545	Transformer, I.F.: 455 kc: complete but less shield and iron core sleeve
T-2	24B70537	Transformer, diode: 455 kc; complete but less shield and iron core sleeve
	3S7454	Screw, steel: #8 x 1/4 PKZ plain hex head; cadmium plated (gang bracket and dial assembly mounting)
	3S7475	Screw, steel: #8 x 1/4 PKZ slotted acorn head; cadmium plated (power transformer mounting)
	3S7512	Screw, steel: #8 x 1/2 PKZ plain hex head; cadmium plated (speaker mounting)
	3S7526	Screw, steel: #8 x 1-1/8 PKA slotted hex head; cadmium plated (chassis mounting)
	3S7396	Screw, steel: 10-32 x 2" slotted hex head machine screw; copper plated (record changer mounting)
	2S7982	Speednut: for 6-32 screw; blued (speaker baffle mounting)
	2S7087	Speednut. for .093 dia. rod (dial cord guide rod fastener)
	47A71722	Shaft, tuning

PART NO.	DESCRIPTION
9A12705	Wafer, electrolytic capacitor mounting: bakelite
4A70015	Washer, "C"
4S1719	Washer, steel: 3/8 x .140 x .030 thick, cadmium plated (line cord lock mounting)
4S8214	Washer, steel: 7/8 x .203 x .067 thick; cadmium plated (chassis mounting)
4S8204	Washer, steel: 1" x .203 x .067 thick; copper plated (record changer mounting)
5A70096	Eyelet, steel: 23/64-7/32 I.D. x 1/2, cadmium plated (speaker mounting)
37X15841	Foot, rubber (cabinet foot)
5A70404	Grommet, rubber (gang & speaker cushions)
55X72558	Hinge, cabinet
55X72559	Hinge, & Lid Support
36X74682	Knob, control: bakelite; with white dot (radio-phono-tone knob)
1X76790 or 1X76789	Knob, control: clear plastic with gold inset / Knob, control: brown (tuning and volume knobs)
32A24815	Lock, line cord (holds line cord to chassis)
4S7650	Lockwasher, steel: #8 internal; cadmium plated (pilot light socket mounting)
2S7051	Nut, steel: 3/8-32 x 9/16; Palnut; cadmium plated (volume and phono-radio switch mounting)
9A12705	Plate, electrolytic mounting: bakelite
28X71775	Plug, one pin (phono pick-up connector)
28X19871	Plug: 4 pin (loop plug)
52B71729	Pointer, dial
49A21741	Pulley, cord: 3/8 groove
9A30680	Receptacle, 3 prong; less shell (phono motor power connector)
9X28049	Receptacle, 4 prong; (loop receptacle)
3S7707	Rivet, steel: .122 x 5/32, nickel plated (tube socket mounting; terminal strip mounting)
15X74445	Shell, receptacle & plug (used with phono motor power cord plug and receptacle)
1A71049	Shield, & Iron Core Sleeve Assembly (I.F. & diode coil shield; with iron core sleeve)
26A72635	Shield, tube: for loctal type tubes

MODEL 56X11
Chassis HS-94

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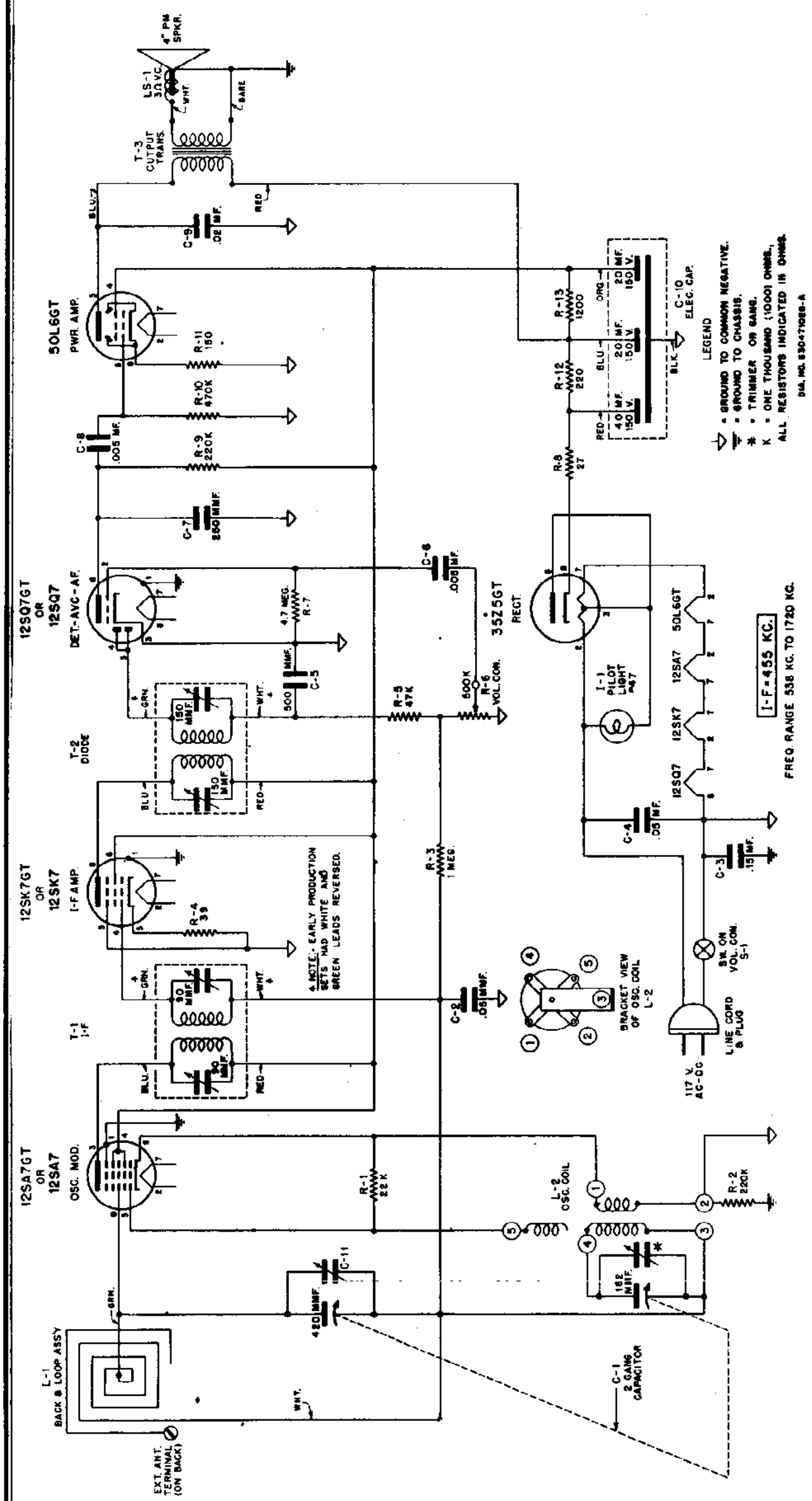


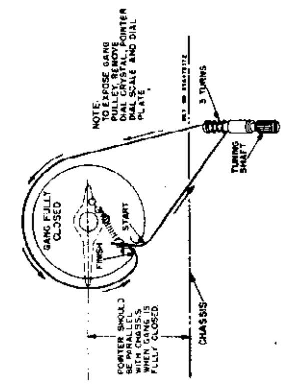
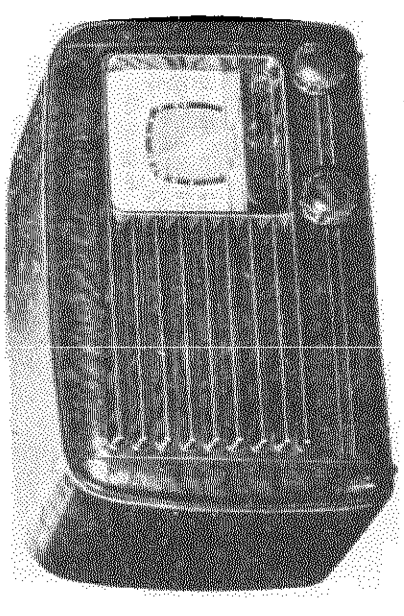


FIGURE 2. STRING DRIVE



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ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum; for greatest accuracy, keep output of receiver at approximately .05 watt thruout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter). The alignment tool should be of an insulated type such as Motorola Part Number 66A71008.

If receiver is operated from AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator to B- instead of the receiver chassis.

Refer to Figure 1 for location of all adjustments.

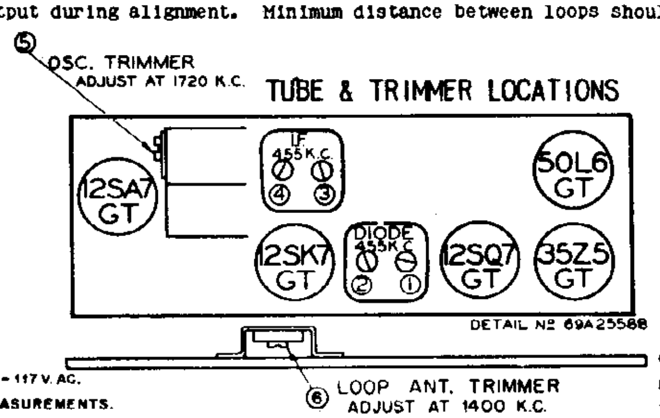
STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Osc-Mod grid*	455 Kc	1,2,3 & 4	Adjust for maximum
RF ALIGNMENT						
2.	Gang fully opened	-	Radiation loop***	1720 Kc	5	This sets osc. to dial scale **
3.	1400 Kc	-	Radiation loop***	1400 Kc	6	Tune signal for max. with receiver tuning knob, then peak trimmer 6. (Repeat this operation after installing chassis & loop in cabinet.

* A convenient point is the stator of the antenna section of the tuning capacitor.

** With gang fully closed, pointer should be parallel with chassis; reset if necessary.

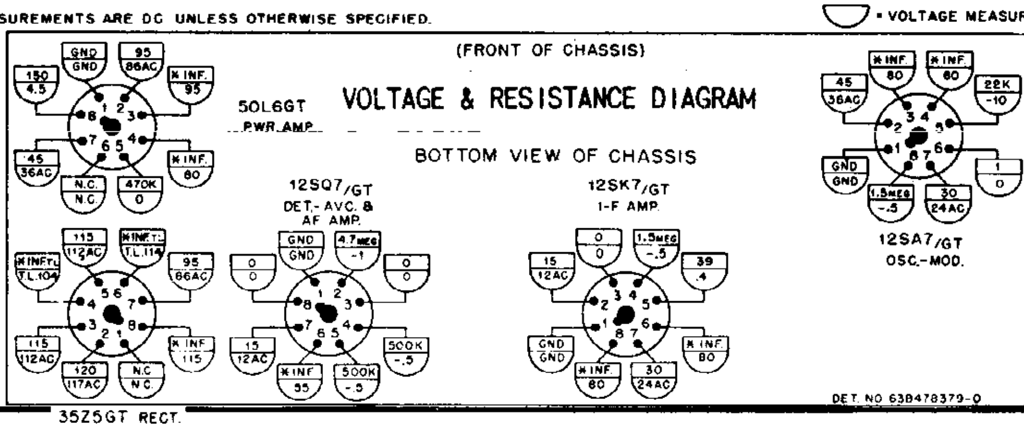
*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of 50 milliwatts (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

TUBE & TRIMMER LOCATIONS



INPUT TO SET DURING MEASUREMENTS - 117 V. AC.
A VTVM WAS USED TO MAKE ALL MEASUREMENTS.
MEASUREMENTS ARE MADE FROM TUBE BASE PIN TERMINALS TO B-
VOLUME CONTROL IS SET TO MINIMUM AND NO STATION TUNED IN.
VOLTAGE TOLERANCE - ±10%; RESISTANCE TOLERANCE - ±20%.
ALL VOLTAGE MEASUREMENTS ARE DC UNLESS OTHERWISE SPECIFIED.

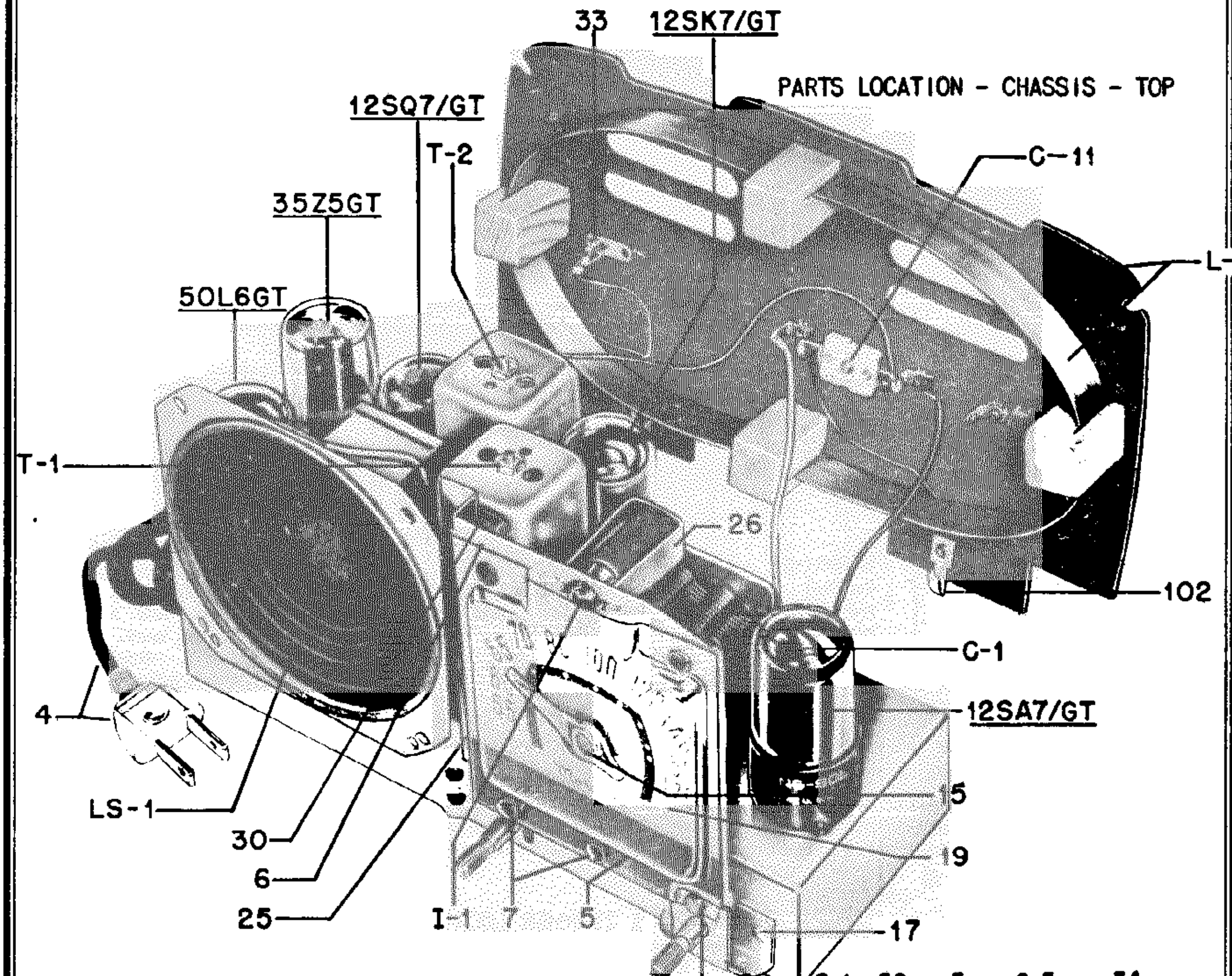
GND = GROUND TO CHASSIS.
N.C. = NO CONNECTION.
T.L. = LUG USED AS TIE LUG.
* = MAY VARY DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITORS.
▭ = RESISTANCE MEASUREMENTS.
▽ = VOLTAGE MEASUREMENTS



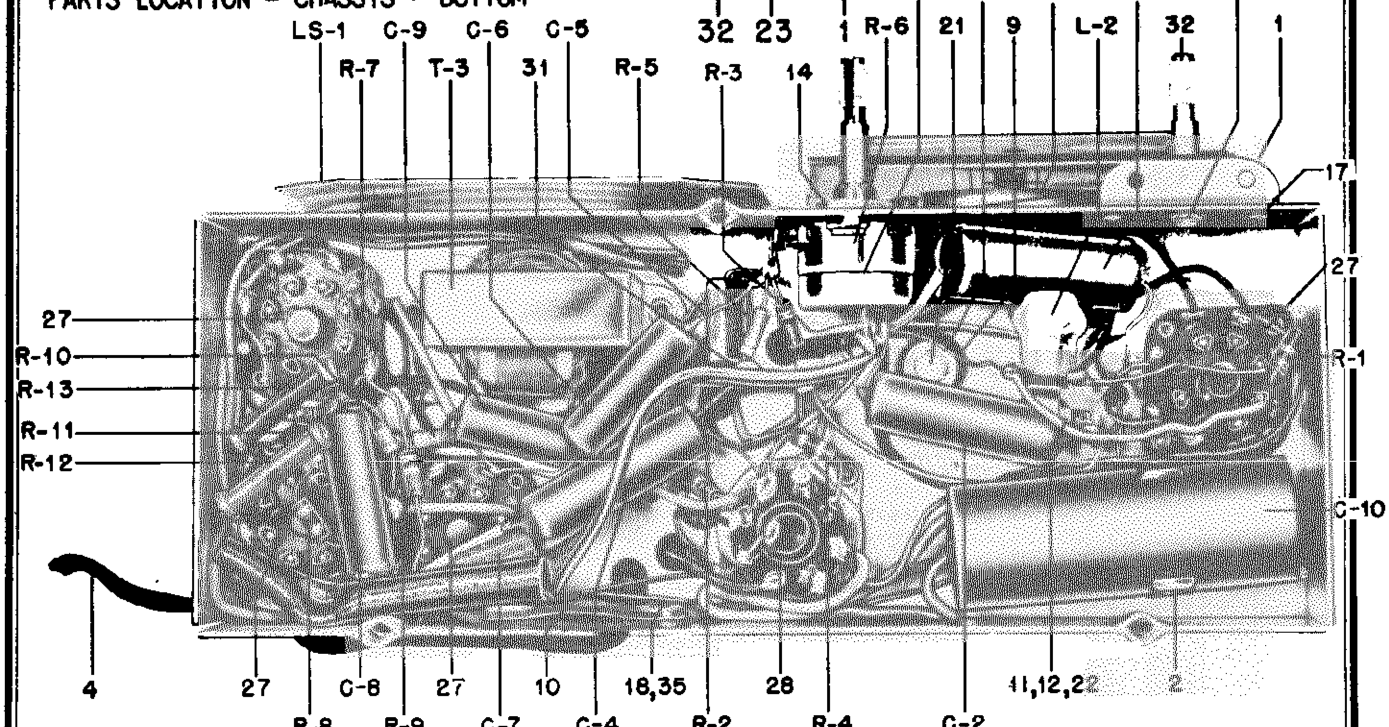
MODEL 56X11

MOTOROLA INC.

PARTS LOCATION - CHASSIS - TOP



PARTS LOCATION - CHASSIS - BOTTOM



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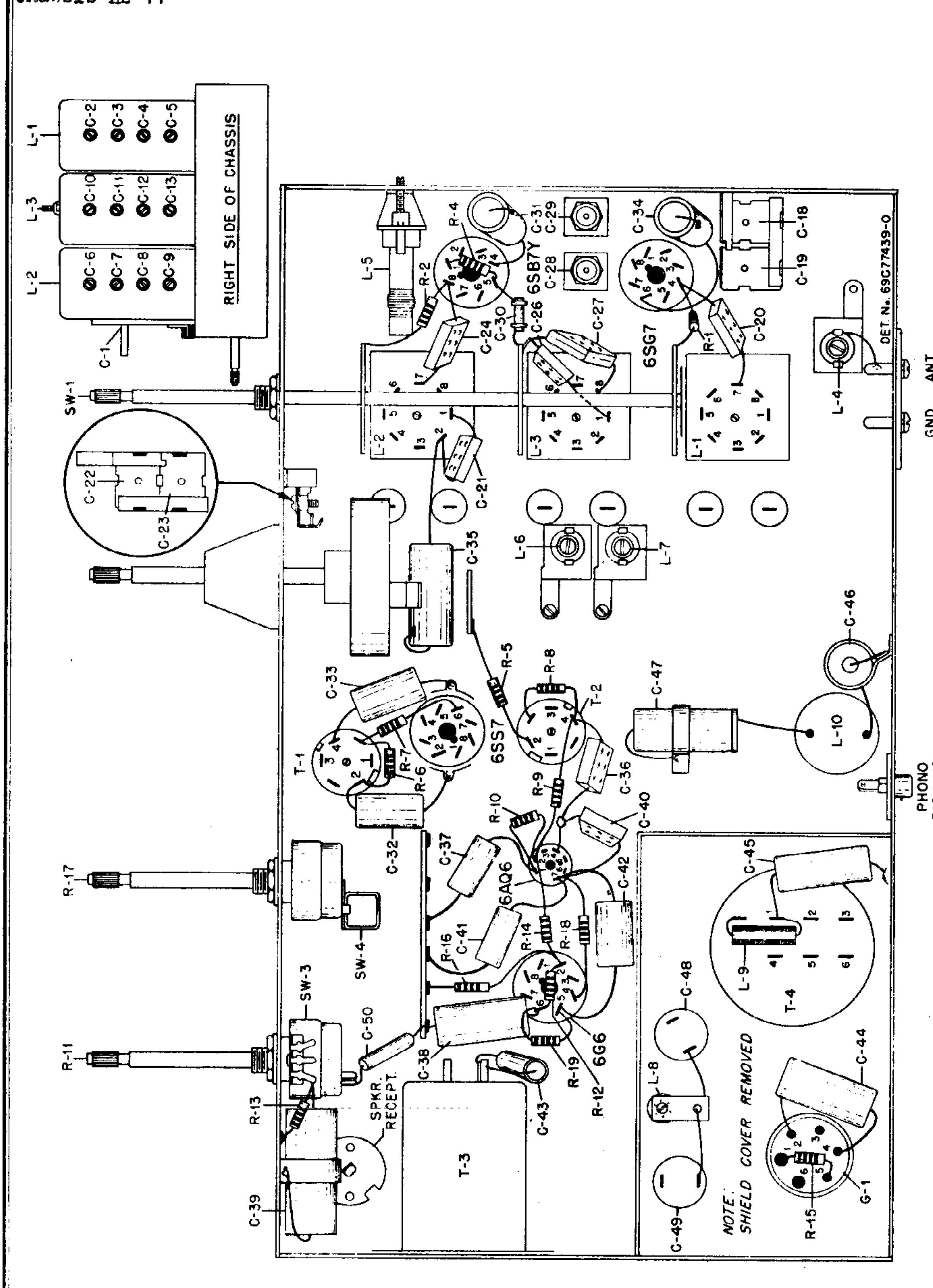
REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1	1X20506	Gang Capacitor & Pulley Assembly. 2 gang; cut oscillator plates; with trimmer on oscillator section; drive pulley included ....
C-2	8S9816	Paper: .05 mf 400V ....
C-3	8A72686	Paper: .15 mf 200V ....
C-4	8S9816	Paper: .05 mf 400V ....
C-5	21R6639	Mica: 500 mmf 500V ....
C-6	8S9813	Paper: .005 mf 600V ....
C-7	21R6646	Mica: 250 mmf 500V ....
C-8	8S9813	Paper: .005 mf 600V ....
C-9	8S9802	Paper: .02 mf 400V ....
C-10	23B75806	Electrolytic: 40-20-20 mf 150V ....
C-11	29K28424	Trimmer: 1.5 mmf to 12 mmf (on cabinet back) ....
DIAL LIGHT		
I-1	65X11854	Bulb: 6-8V, .15 Amp; tubular bayonet base; #47 ....
COILS		
L-1	24B470444	Cabinet Back & Loop Assembly: complete with trimmer ....
L-2	24A26942	Oscillator ....
SPEAKER		
LS-1	50B470442	4" PM; 3.2 ohm voice coil ....
RESISTORS		
Note:		All resistors are insulated carbon type, 1/2 watt, 20% less otherwise specified.
R-1	6R6028	22,000 ....
R-2	6R6015	220,000 ....
R-3	6R6004	1 meg ....
R-4	6R2085	39 10% ....
R-5	6R6056	47,000 ....
R-6	18A14629 or 18A72838	Volume Control: .5 meg; with SPST switch
R-7	6R2122	4.7 meg ....
R-8	6R5683	27 10% ....
R-9	6R6015	220,000 ....
R-10	6R6032	470,000 ....
R-11	6R6373	150 10% ....
R-12	6R6152	220 1 watt, not insulated ....
R-13	6R3972	1,200 10% 1 watt, not insulated ....
SWITCH		
S-1	-	Part of volume control R-6 ....
TRANSFORMERS		
T-1	1X470471	IF, 455 Kc: complete with dual trimmer and shield can .... 20A14619 Trimmer: double; 90 mmf nominal (IF trans. tuning) ....
T-2	1X470469	Diode, 455 Kc: complete with dual trimmer and shield can .... 20K20649 Trimmer: double; 155 mmf nominal (diode trans. tuning) ....
T-3	25A20503	Output ....
MISCELLANEOUS CHASSIS PARTS		
1	7A14610	Bracket, tuning shaft ....
2	42K75826	Clip, electrolytic mounting ....
3	11M8944	Cord, dial: 18 lb; black ....
4	30A470651	Cord, line & plug: 2 conductor; 6 ft long
5	61B25515	Crystal, dial: clear plastic ....

REF. NO.	PART NO.	DESCRIPTION
6	1X25530	Dial Plate & Bracket Assembly ....
7	5S7805	Eyelet, snap-in (dial scale and crysta mounting) ....
8	5A19658	Eyelet, spacer: .296 x .212; copper pla ted (gang mtg) ....
9	37A12691	Grommet, rubber (gang cushion) ....
10	32A24815	Lock, line cord: fibre ....
11	4S7650	Lockwasher: #6 internal; cadmium platec (Osc. coil mtg) ....
12	29R5248	Lug, soldering: 6L; hot tinned ....
13	2S7005	Nut: 6-32 x 1/4 hex; cadmium plated (IF & diode trans. mtg) ....
14	2S7051	Nut: 3/8-32 x 9/16 hex Palnut; cadmium plated (volume control mtg) ....
15	52B20520	Pointer: red plastic ....
16	5S7707	Rivet: .122 x 5/32 steel; nickel platec (term. strip, tube socket mtg) ....
17	5S7701	Rivet: .122 x 3/16 steel; nickel platec (tuning shaft bracket mtg) ....
18	5S7708	Rivet: .122 x 9/32 steel; nickel platec (line cord lock mtg) ....
19	34B25514	Scale, dial ....
20	3S7506	Screw: #6 x 1/4 PKZ plain hex head shee metal screw; cadmium plated (diode trans. mtg) ....
21	3S2294	Screw: 6-32 x 1/2 plain hex head lockin type machine screw; cadmium plated (g mounting) ....
22	3S7339	Screw: 6-32 x 5/8 plain hex head machin screw; cadmium plated (Osc. coil mtg).
23	3S7248	Screw: 8-32 x 1/8 plain hex head machin screw; cadmium plated (dial plate mtg
24	3S7205	Screw: 8-32 x 1/4 slotted hex head loc type machine screw; cadmium plated (speaker mtg) ....
25	3S7454	Screw: #8 x 1/4 PKZ plain hex head she metal screw; cadmium plated (dial pla mtg) ....
26	60A25505	Socket, dial light, clip & leads .....
27	9A6788	Socket, tube: molded octal; plain type
28	9A70165	Socket, tube: molded octal; shielded t (for IF Amp) ....
29	41A14244	Spring, tension coil (drive cord sprin
30	37K20865	Strip, channel: rubber ....
31	31A15555	Strip, terminal: 2 insulated lugs, #3
32	47A14635	Shaft, tuning ....
33	29A70422	Terminal, screw (on cabinet back -Ext. Ant. term.) ....
34	4A70015	Washer, "C" (tuning shaft retainer) ..
35	4S1719	Washer: 3/8 x .140 x .030 thick, steel cadmium plated (line cord lock mtg) .
36	4S7597	Washer: 7/16 x .171 x .032 thick; cadm plated (gang mtg) ....
CABINET PARTS		
101	68D25502	Cabinet, table model: walnut plastic ..
102	42A18764	Clip, mounting (on cabinet back) ......
103	36A470443	Knob, control: walnut plastic ....
104	38A25507	Plug, split (holds cabinet back to cabinet)................................
105	3S8117	Screw: #8 x 1 PKZP slotted hex washer head sheet metal screw; antique copper finish (chassis mtg) ....
106	32A20575	Washer, paper: 3/8 x .171 x .062 thick (used under chassis mtg screws to prev cracking cabinet) ....

MODEL 57B61V
Chassis HS-77

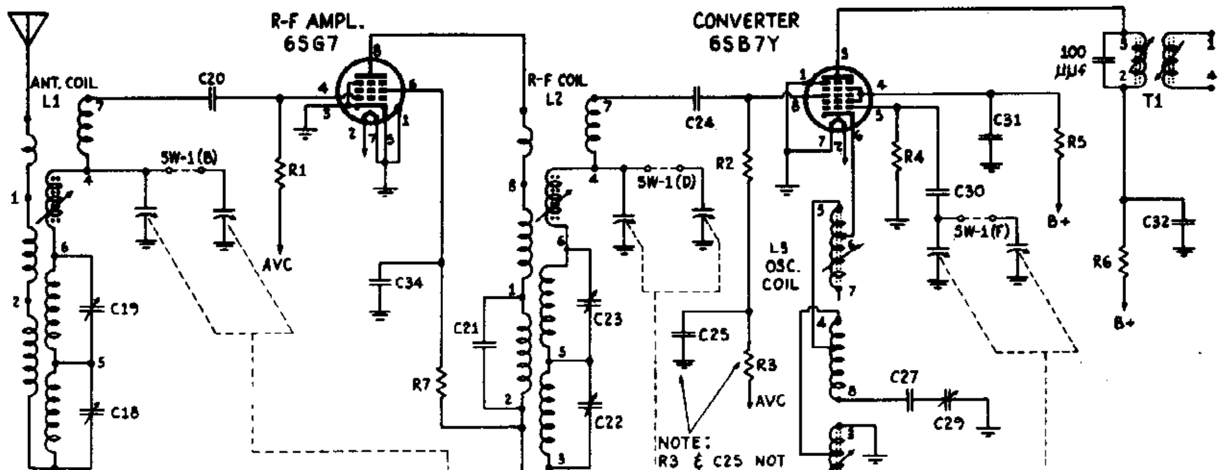
MOTOROLA INC.



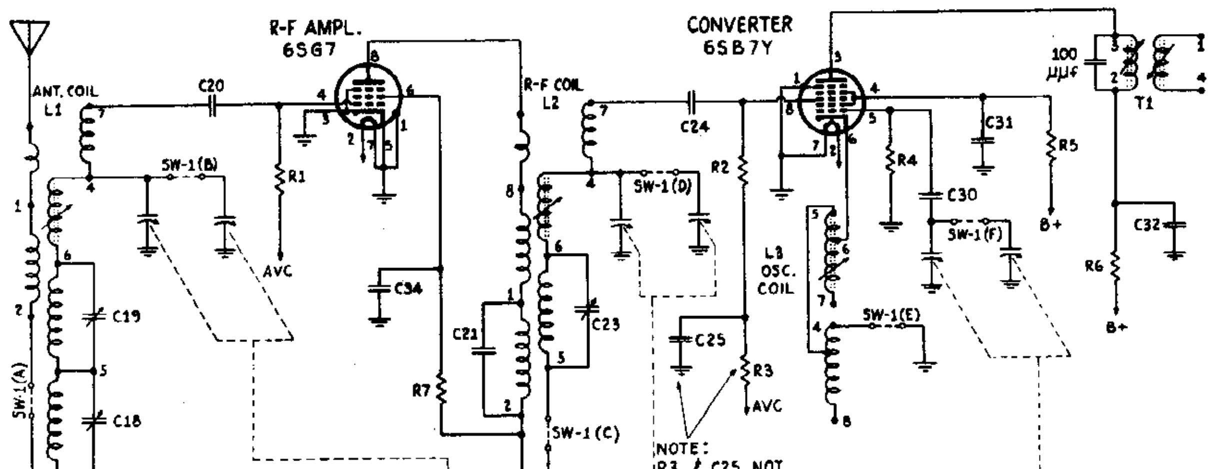
PARTS LOCATION DETAIL

MOTOROLA INC.

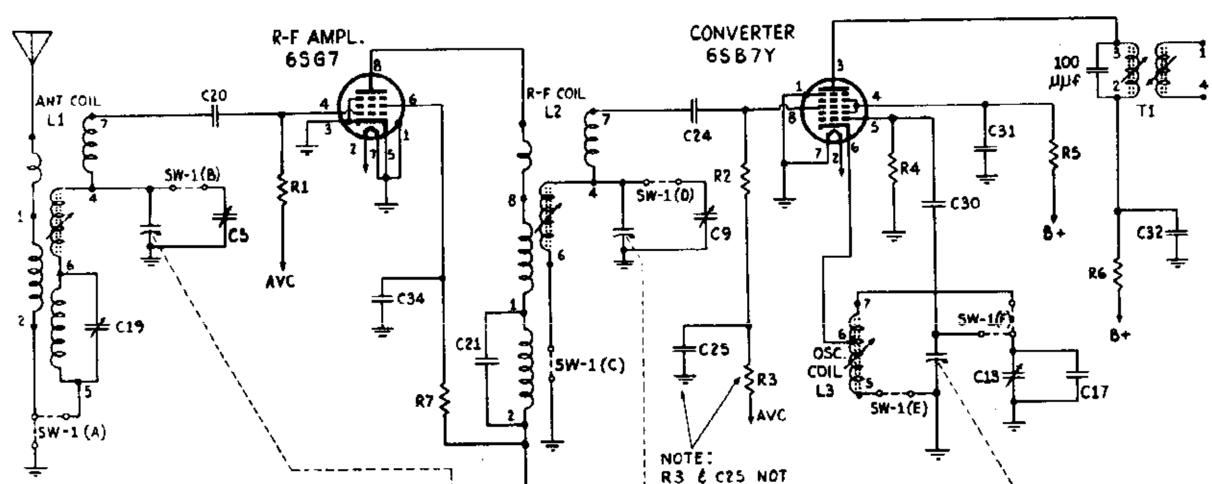
MODEL 57B61V
MODELS 67F61BN, 67T61BN
MODEL 87T61BN



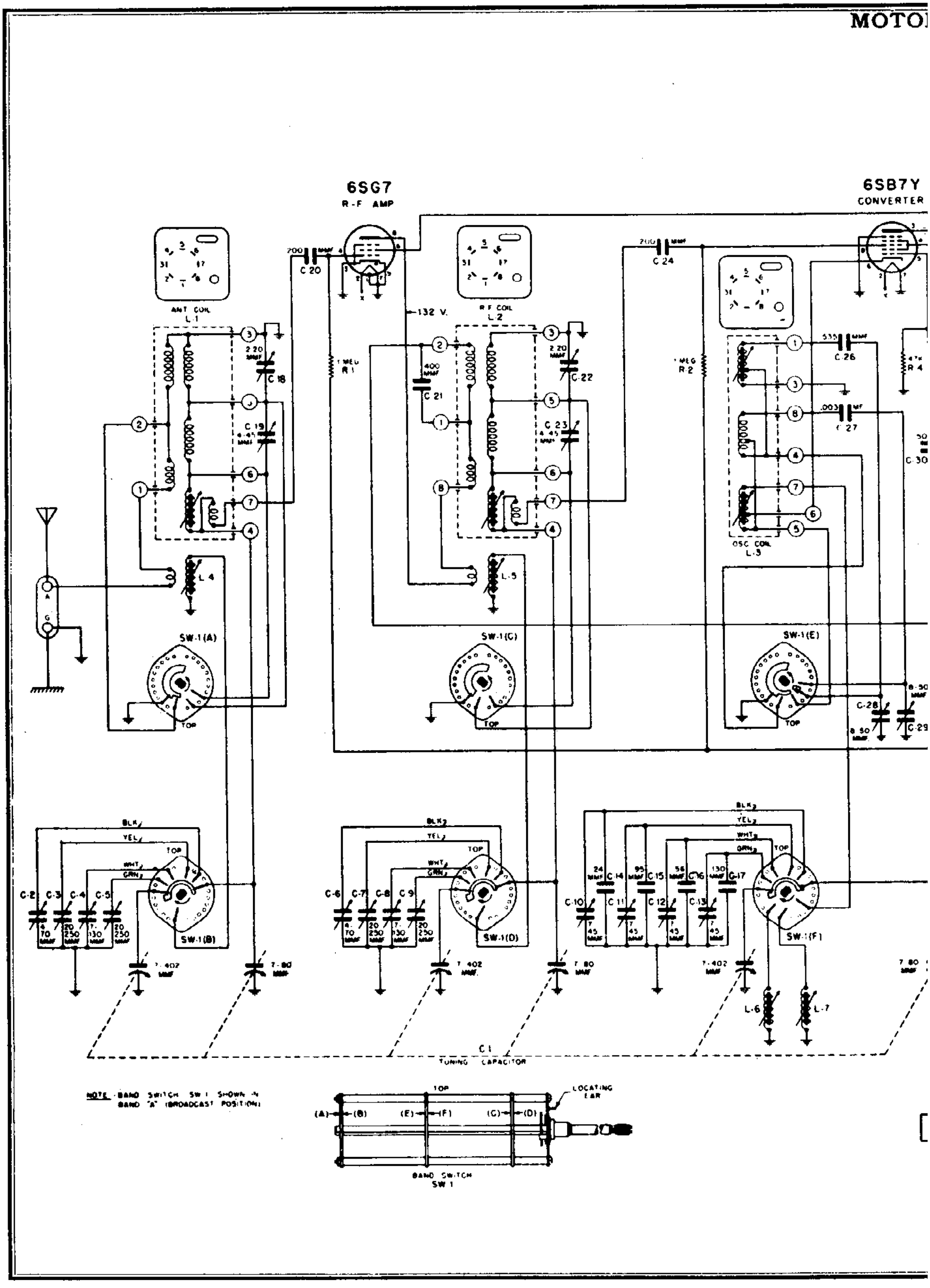
BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND "A" 532 - 1620 KC

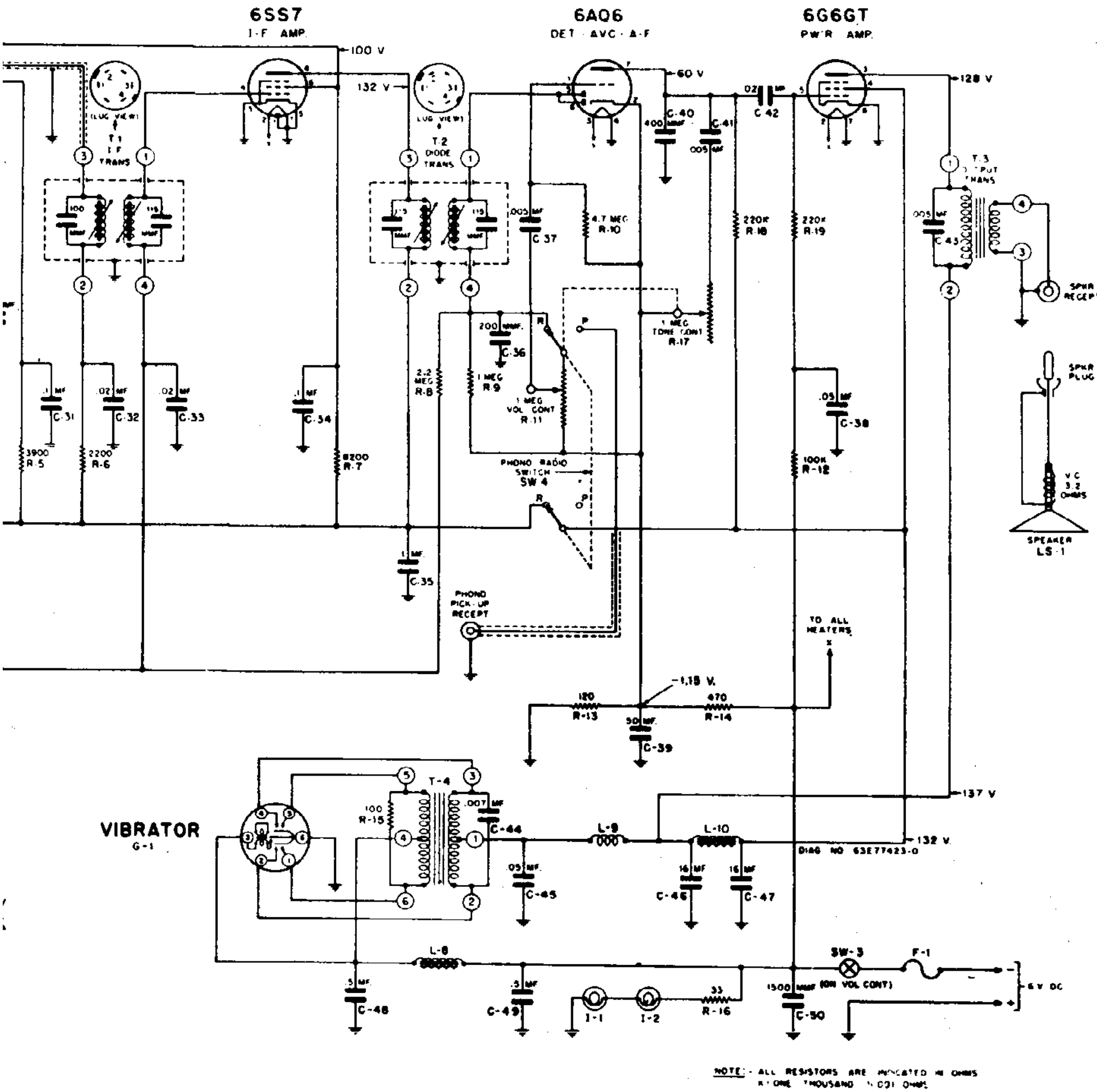


BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. 1ST SHORT WAVE BAND "B" 3 - 9.1 MC



BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE. 2ND SHORT WAVE BAND "C" 8.8 - 10.6 MC

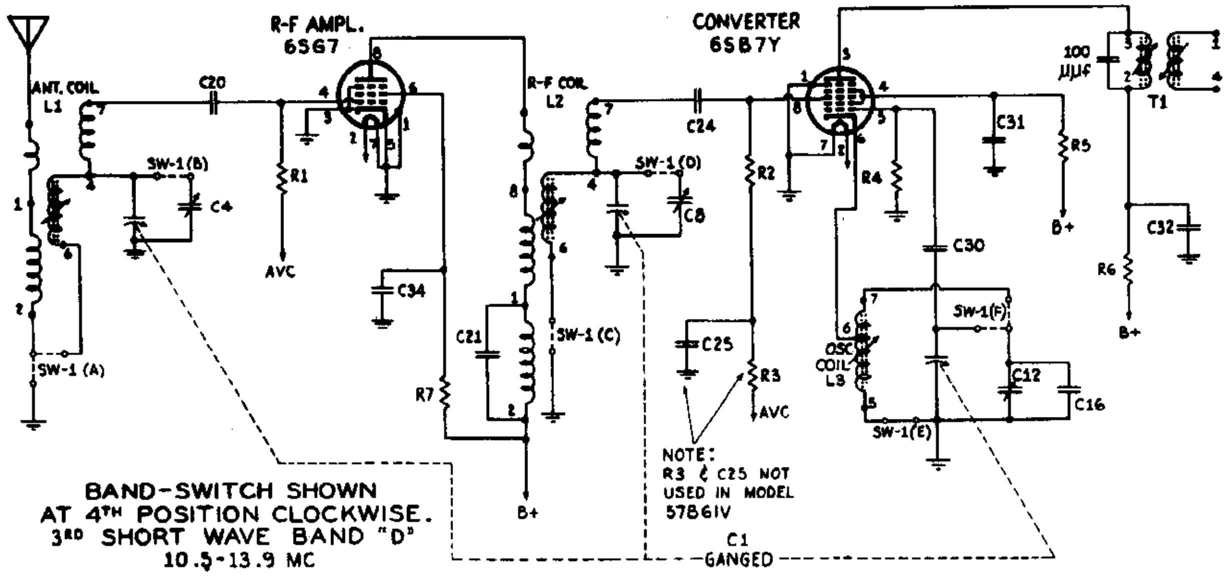

MOTO
6SG7
R-F AMP
6SB7Y
CONVERTER
ANT COIL L-1
R F COIL L-2
OSC COIL L-3
C 20
C 21
C 22
C 23
C 24
C 26
C 27
C-28
C 18
C 19
R 1
R 2
R 4
L-4
L-5
L-6
L-7
132 V.
SW-1(A)
SW-1(B)
SW-1(C)
SW-1(D)
SW-1(E)
SW-1(F)
TOP
BLK
YEL
WHT
GRN
C1
TUNING CAPACITOR
NOTE - BAND SWITCH SW 1 SHOWN IN BAND "A" (BROADCAST POSITION)
LOCATING EAR
BAND SWITCH SW 1



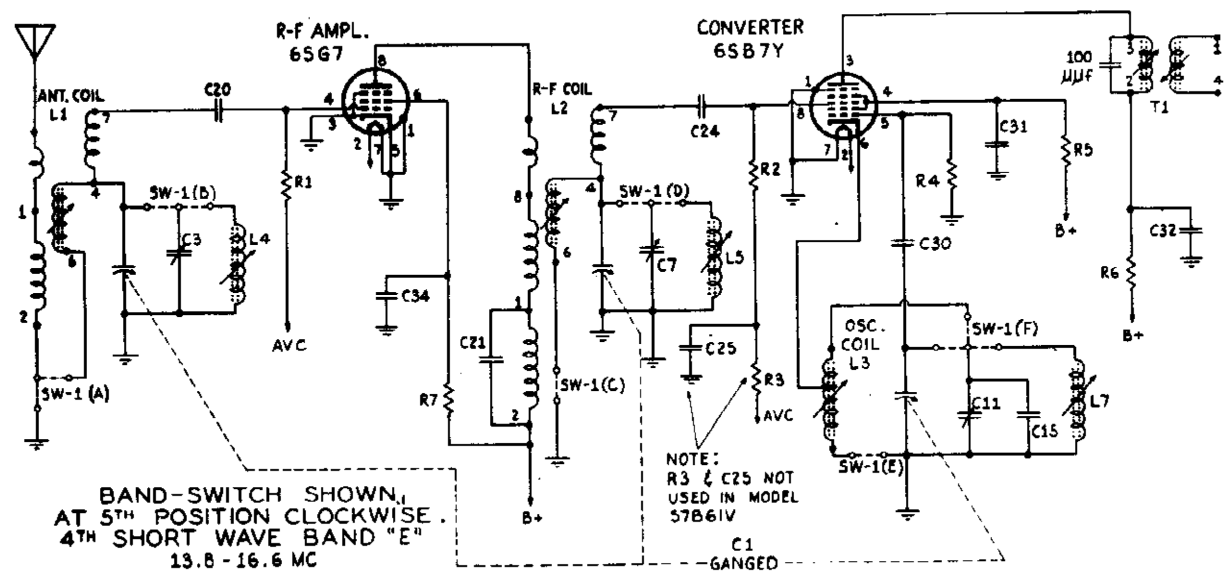
IF PEAK
455 KC

MODEL 57B61V
MODELS 67F61BN, 67T61BN
MODEL 87T61BN

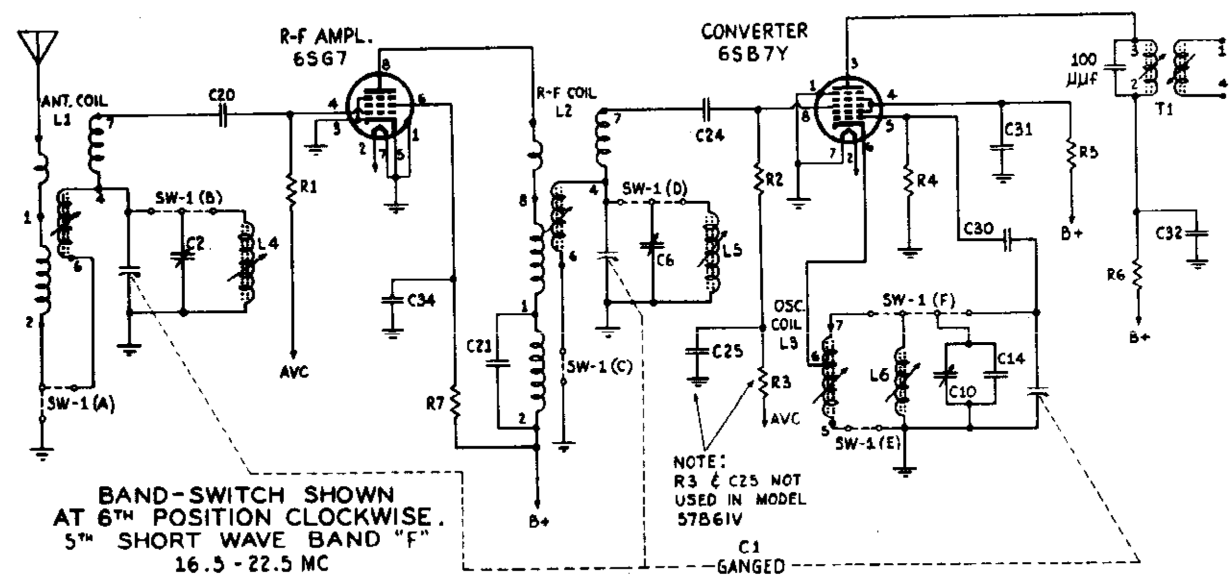
MOTOROLA INC.



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
3RD SHORT WAVE BAND "D"
10.5-13.9 MC



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE.
4TH SHORT WAVE BAND "E"
13.8-16.6 MC



BAND-SWITCH SHOWN
AT 6TH POSITION CLOCKWISE.
5TH SHORT WAVE BAND "F"
16.5-22.5 MC

MOTOROLA INC.

MODEL 57B61V
MODELS 67F61BN, 67T61B
MODEL 87T61BN

ALIGNMENT PROCEDURE

Refer to Figure 6 for location of adjustment trimmers and cores. Connect a low range output meter across speaker voice coil. Volume control should be set at maximum for all operations. The PHONO-RADIO-TONE switch should be set at RADIO position.

The signal generator used, should possess good frequency stability and should be of the modulated type. Its frequency range should be adequate to cover all frequencies indicated in the alignment chart (455 Kc. to 21.5 Mc.) For greatest accuracy, keep the receiver output at approximately 50 milliwatts (.38 V on output meter) during alignment. Vary signal generator output (not receiver volume control) to maintain this output during alignment.

The adjustment screwdriver must be an insulated type.

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
I. F. CHANNEL ALIGNMENT							
1.	Gang open	Band "A"	.1 mf	6SB7Y Conv. grid (#5 pin)	455 Kc	1,2,3 & 4 (I.F. & Diode trans.cores)	Adjust for maximum
R. F. ALIGNMENT							

Note 1: The bands shall be aligned in the following sequence:

Note 2: Pointer setting: With the gang capacitor fully closed the pointer shall coincide with the low frequency end point of the frequency scales. Pointer must be straight.

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
BAND D (10.5-13.9 Mc)							
2.	13.8 Mc	Band "D"	400 ohm	Antenna and ground terminals	13.8 Mc	5, 6 & 7	Adjust for maximum in order shown. Make sure oscillator is lower in frequency than the signal by checking image response which should occur with the input signal
3.	10.5 Mc	Band "D"	400 ohm	Antenna and ground terminals.	10.5 Mc	8, 9 & 10	Adjust for maximum in order shown.
4.							Repeat steps 2 and 3 several times until further adjustment does not increase the output. Make step 2 the final adjustment.
BAND C: (8.8-10.6 Mc)							
5.	10.5 Mc	Band "C"	400 ohm	Antenna and ground terminals	10.5 Mc	11, 12 & 13	Adjust for maximum in order shown. Make sure oscillator is lower in frequency than the signal by checking image response which should occur with the input signal at 9.59 Mc. Check calibration at 9.0 Mc.
BAND F: (16.5-22.5 Mc)							
6.	21.5 Mc	Band "F"	400 ohm	Antenna and ground terminals	21.5 Mc	14, 15 & 16	Adjust for maximum in order shown. Make sure oscillator is lower in frequency than the signal by checking image response which should occur with the input signal at 20.59 Mc.
7.	16.5 Mc	Band "F"	400 ohm	Antenna and ground terminals	16.5 Mc	17, 18 & 19	Adjust for maximum in order shown. Use bakelite screwdriver.

MODEL 57B61V
MODELS 67F61BN, 67T61BN
MODEL 87T61BN

MOTOROLA INC.

STEP	DIAL SET TO	BAND SW. SET TO	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET AT	ADJUST TRIMMER OR CORE	REMARKS
8.							Repeat steps 6 and 7 several times until further adjustment does not increase the output. Make step 6 the final adjustment.
BAND E: (13.8-16.6 Mc)							
9.	16.5 Mc	Band "E"	400 ohm	Antenna and ground terminals	16.5 Mc	20, 21 & 22	Adjust for maximum in order shown. Make sure oscillator is lower in frequency than the signal by checking image response which should occur with the input signal at 15.59 Mc.
10.	13.8 Mc	Band "E"	400 ohm	Antenna and ground terminals	13.8 Mc	23	Adjust for maximum. Use bakelite screwdriver.
11.							Repeat steps 9 and 10 several times until further adjustment does not increase the output. Make step 9 the final adjustment.
BAND B: (3.0-9.1 Mc)							
12.	9.0 Mc	Band "B"	400 ohm	Antenna and ground terminals	9.0 Mc	24	Adjust for maximum. Make sure oscillator is higher in frequency than the signal by checking image response which should occur with the input signal at 9.91 Mc
13.	Tune in signal generator at 6.0 Mc	Band "B"	400 ohm	Antenna and ground terminals	6.0 Mc	25 & 26	Adjust for maximum. Check dial calibration at 3.0 Mc.
BAND A: (538-1620 Kc)							
14.	Fully open	Band "A"	200 mmf	Antenna and ground terminals	1620 Kc	27	Adjust for maximum
15.	1400 Kc	Band "A"	200 mmf	Antenna and ground terminals	1400 Kc	28 & 29	Adjust for maximum.
16.	600 Kc	Band "A"	200 mmf	Antenna and ground terminals	600 Kc	30	Adjust for maximum while rocking gang capacitor slightly.
17.	1620 Kc	Band "A"	200 mmf	Antenna and ground terminals	1620 Kc	27	Recheck 1620 osc setting.

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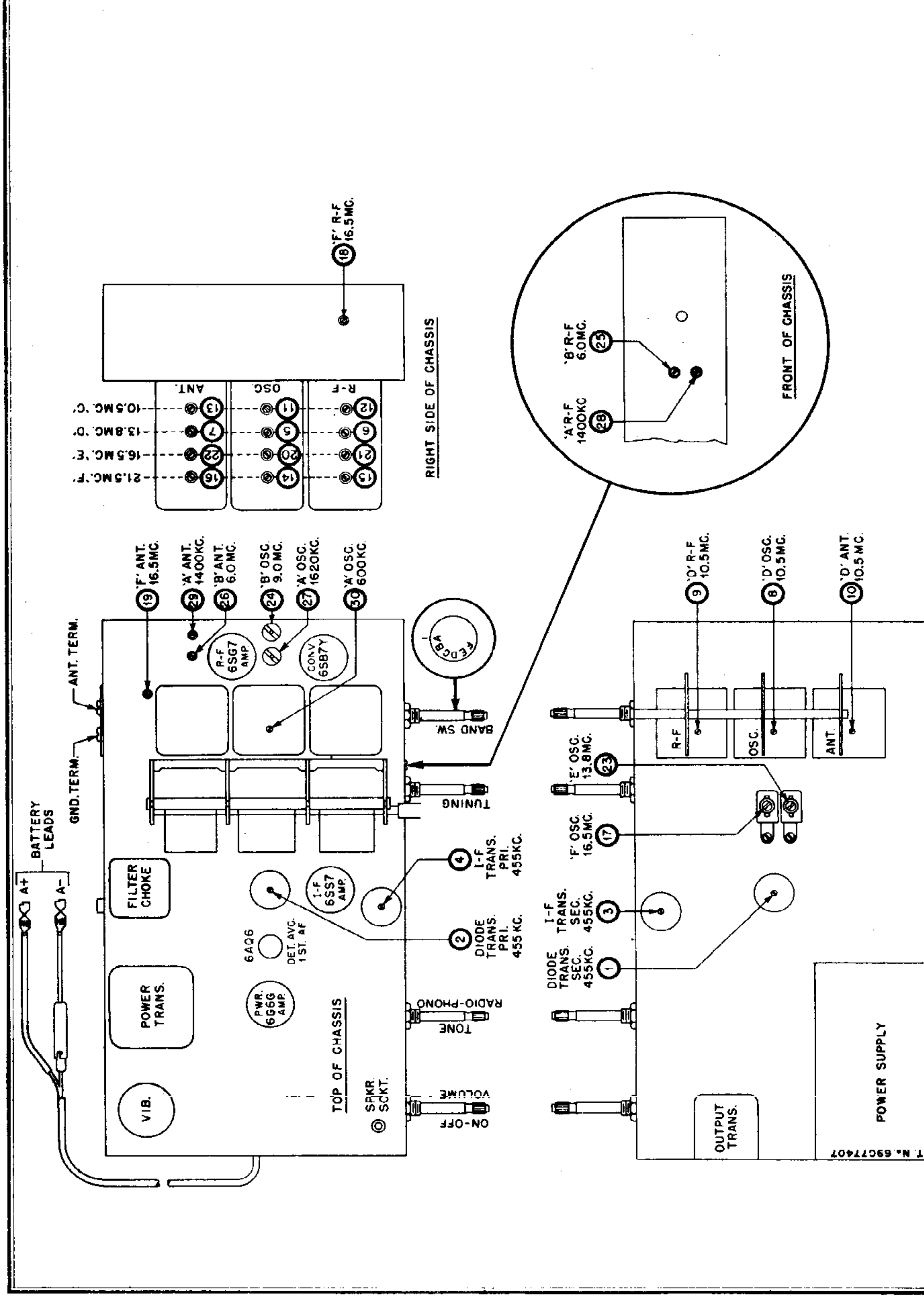


FIGURE 6 TUBE AND TRIMMER LOCATIONS

MODEL 57B61V
MODELS 67F61BN, 67T61BN
MODEL 87T61BN

MOTOROLA INC.

REGULADORES

Los reguladores son como sigue, de izquierda a derecha: (Véase la Figura 3)

CONTROLS

From left to right the controls are as follows: (Refer to Figure 3.)

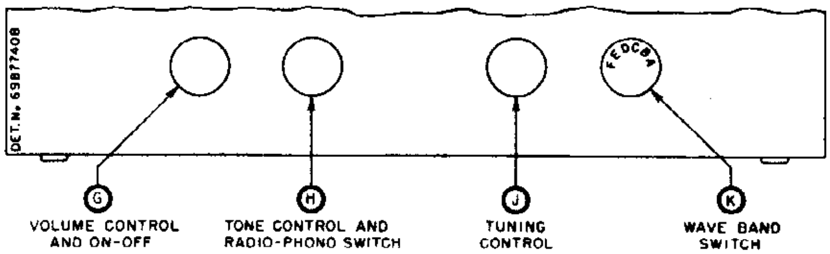


FIGURE 3. CONTROLS

MODEL 67F61BN,87T61BN,57B61V

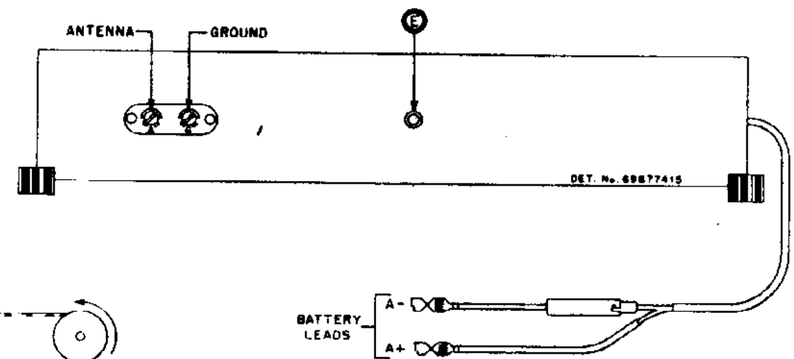
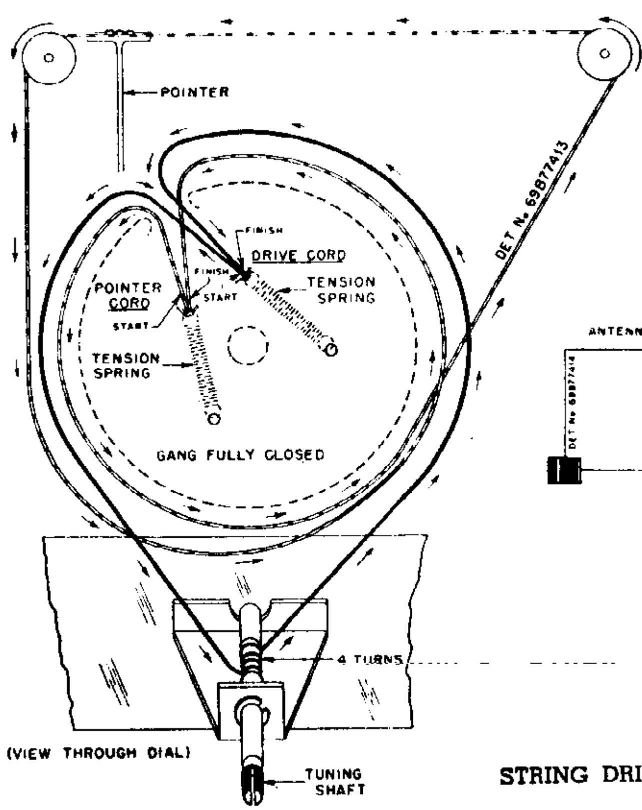


FIGURE 2. CHASSIS REAR VIEW

MODEL 57B61V



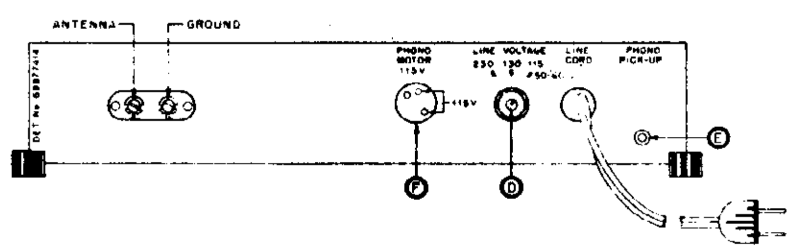


FIGURE 2. CHASSIS REAR VIEW

MODEL 67F61BN,67T61BN,87T61BN

STRING DRIVE DETAIL

MODEL 67F61BN,67T61BN,57B61V

INSTALACION

Desempaquese el receptor y límpiese el compartimiento del fonógrafo, chasis y gabinete de todo material de empaque, cartones, etc, Asegúrese de que todas las válvulas y el enchufe de la bocina estén firmemente asentados en sus receptáculos.

Las dos tiras de madera que se encuentran debajo del chasis deben quitarse antes de hacer funcionar al receptor. Procedase como sigue: (Véase la Figura 1.)

1. Quítense y botense los dos tornillos y abrazaderas de emgarque (A).
2. Aflójense los cuatro tornillos de retención del chasis. (B)
3. Sáquense y botense las dos tiras de madera. (C)
4. Apriétense los cuatro tornillo de retención del chasis (B) lo suficiente para evitar que las arandelas vibren o hasta que los amortiguadores de caucho estén a punto de ser comprimidos. No los apriete demasiado.

INSTALLATION

Unpack the receiver and remove all packing material, cardboard, etc., from the chassi phonograph compartment and cabinet. Make sure all tubes an speaker plug are firmly seated i their sockets.

The two wooden shippin strips found under the chassi should be removed before placin receiver in operation. Procee as follows: (refer to Figure 1.)

1. Remove and discard the tw shipping screws and bracket (A).
2. Loosen the four chassis re taining screws (B).
3. Pull out and discard the tw wooden shipping strips (C).
4. Tighten the four chassis re taining screws (B) just enoug to prevent washers from rattl ing, or until the rubbe cushions are just at the poin of being compressed. Do no tighten too tight.

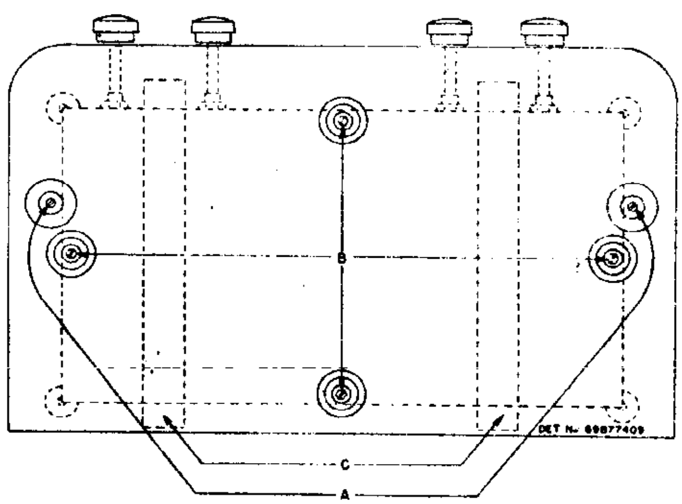


FIGURE 1. SHIPPING STRIP REMOVAL DETAIL

MOTOROLA INC.

ANTENA

Con este receptor debe usarse unabuena antena, especialmente para la recepción de onda corta. Consulte al distribuidor de radio más próximo sobre el tipo de antena que mejor se adapte a su localidad En la mayoría de los casos un sólo alambre de unos 60 pies de large debe dar buenos resultados. Conecte la antena al terminal marcado "A", en el respaldo del receptor. En el punto en que la antena entra a la casa debe instalarse un pararrayos aprobado.

Manténganse bien separados el cable del acumulador y el alambre de entrada de la antena

CONEXION A TIERRA

Una buena tierra, conectada al terminal "G", en el respaldo del receptor, ayudará a reducir ruidos y mejorará la recepción. Se puede hacer una tierra satisfactoria haciendo conexión a un radiador o tubería de agua,. En caso de no haber radiador o tubería de agua, se puede utilizer una varilla o tubo metálico de 5 pies de large clavándola en tierra húmeda.

CORRIENTE ELECTRICA

Conéctense las dos pinzas de batería a un acumulador de 6 voltios. Fíjese en la polaridad al hacer las conexiones: la pinza marcada "+" debe conectarse al terminal "+" (positivo) del acumulador; y la pinza marcada "-" debe ir al terminal "-" (negativo) del acumulador. En caso de que el receptor no funcione después de 20 segundos, ciérrese el interruptor y verifíquese la polaridad de las conexiones del acumulador. Puede dañarse el receptor si se le conecta al acumulador incorrectamente y se le deja así conectado por más de unos pocos minutos.

Colocando un fusible en el alambre del negative del acumulador se protegé al recéptor y al acumulador contra sobrecargas. Nunca utilice un fusible de mayor capacidad que de 5 amperios.

ANTENNA

A good outdoor antenna should be used with this receiver, especially for short wave reception. Consult the radio dealer who serves your territory on the type of antenna best suited for your location. In most cases a single wire about 60 ft long should give good results. Connect the antenna to the terminal marked "A" on the back of the set. An approved lightning arrester should be installed at the point where the antenna enters the house.

NOTE: Keep battery cable and antenna lead well separated.

GROUND

A good ground, connected to the terminal 'G' on the back of the set will aid in reducing noise and improve reception. A satisfactory ground can be made by connecting to a radiator or water pipe. In the absence of a radiator or water pipe, a 5 foot metal stake or pipe driven into moist earth may be used.

POWER SUPPLY

Connect the two battery clips to a 6 volt storage battery. Observe polarity when connecting; the clip marked "+" goes to the "+" (positive) terminal of the battery and the clip marked "-" goes to the "-" (negative) terminal of the battery. See Figure 2. Should the receiver fail to play after being turned on for about 20 seconds, turn receiver off and recheck polarity of battery connections. The receiver may be damaged if it is incorrectly connected to battery and left turned on for more than a few minutes.

A fuse in the negative battery lead protects the receiver and battery against overloads. Never use a fuse with a higher rating than 5 amperes.

From a fully charged battery, the receiver will draw about 2.6 amperes.

Usando un acumulador plenamente cargado, el receptor consimirá unos 2.6 amperios.

COMMUTADOR DE BANDAS (K)

Posición "A" - 532 a 1620 Kc. (Onda corriente)

Posición "B" - 3.0 a 9.1 Mc. (Onda corta)

Posición "C" - 8.8 a 10.6 Mc. (Onda corta)

Posición "D" - 10.5 a 13.9 Mc. (Onda corta)

Posición "E" - 13.8 a 16.6 Mc. (Onda corta)

Posición "F" - 16.5 a 22.5 Mc. (Onda corta)

CLAVIJA PARA REPRODUCTOR DE FONOGRAFO

Al conectarse un tocadiscos a la clavija para reproductor de fonógrafo (E) al respaldo del receptor, pueden tocarse discos utilizando el amplificador de este radio. Véase la figura 2 para localizar la clavija para reproductor de fonógrafo (E).

Se puede usar cualquier tocadiscos que tenga un buen reproductor de cristal. Para reducir zumbidos y ruidos del reproductor, el alambre que conecta al tocadiscos y el receptáculo para el fonógrafo debe ser blindado.

Additional Parts

	9A6736	Socket, tube: 6 prong; saddle type
	9A77241	Socket, pilot light: with lead
	2A76635	Speednut, trimmer lock-in (C-28 & C-29 mounting)
	31A751	Strip, antenna & ground
	4A23164	Washer, "C" (tuning shaft retainer)
T-3	25B76792	Transformer, output
T-4	25C76712	Transformer, power
	7A76622	Bracket, tuning shaft
	16E77372	Cabinet, table model
	5A71092	Grommet, rubber: 5/8 x 3/4 dia. (chassis mounting)

WAVEBAND SWITCH (K)

"A" position - 532 to 1620 Kc. (standard broadcast)

"B" position - 3.0 to 9.1 Mc. (short wave)

"C" position - 8.8 to 10.6 Mc. (short wave)

"D" position - 10.5 to 13.9 Mc. (short wave)

"E" position - 13.8 to 16.6 Mc. (short wave)

"F" position - 16.5 to 22.5 Mc. (short wave)

PHONO PICK-UP JACK

By connecting a record player to the phono pick-up jack (E) on the back of the receiver, you can play records through the amplifier of this radio. See Figure 2 for location of phono pick-up jack (E).

Any record player having a good crystal pickup can be used. To reduce hum and noise pickup, the connecting lead between the record player and radio phone socket should be shielded.

Additional Parts

	5A71130	Grommet, rubber: 1/4 x 1/2 dia. body: 3/4 dia. head (chassis retainer)
	5A76629	Grommet: rubber (dial scale cushion)
	37K16125	Grommet, rubber (gang cushions)
	5A76960	Grommet, rubber (speaker mounting)
	36K76795	Knob, control: branded (band switch)
	36B76794	Knob, control: plain
	52K76676	Pointer, dial
	9A22182	Receptacle, plug: 1 prong
	9A27674	Receptacle, plug: 3 prong
	54D76705	Scale, dial
	47A76624	Shaft, tuning
	1A71049	Shield,& Iron core Sleeve assembly (for I.F. or diode transformer)
	9A70166	Socket, tube: octal; plain
	9A77378	Socket, tube: octal; shielded type
T-1	24B76695	Transformer, I.F.: 455 Kc; complete with iron cores and padding capacitors, but less shield
T-2	24B70537	Transformer, diode: 455 Kc; complete with iron cores and padding capacitors, but less shield

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REF. NO.	PART NO.	DESCRIPTION
C-1	19C76476	Capacitor, variable: 3 gang; each gang section consists of 5 plate (7-80) mmf.) and 21 plate (7-402) mmf) sections
C-2	20A76734	Capacitor, trimmer: mica; 4-70 mmf; (20A76669) on same bracket as C-3, C-4 & C-5; not replaceable separately
C-3	20A76734	Capacitor, trimmer: mica; 20-250 mmf: (20K76671) on same bracket as C-2, C-4 and C-5: not replaceable separately
C-4	20A76734	Capacitor, trimmer: mica 7-130 mmf: (20K76670) on same bracket as C-2, C-3 & C-5; not replaceable separately
C-5	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-2, C-3 & C-4; not replaceable separately
C-6	20A76734	Capacitor, trimmer: mica; 4-70 mmf; (20A76669) on same bracket as C-7, C-8 & C-9; not replaceable separately
C-7	20A76734	Capacitor, trimmer: mica; 20-250 mmf: (20K76671) on same bracket as C-6, C-8 & C-9; not replaceable separately
C-8	20A76734	Capacitor, trimmer: mica; 7-130 mmf; (20K76670) on same bracket as C-6, C-7 & C-9; not replaceable separately
C-9	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-6, C-7 & C-8; not replaceable separately
C-10	20K74940	Capacitor, trimmer: ceramic: 7-45 mmf
C-11	20K74940	Capacitor, trimmer: ceramic: 7-45 mmf
C-12	20K74940	Capacitor, trimmer: ceramic: 7-45 mmf
C-13	20K74940	Capacitor, trimmer: ceramic: 7-45 mmf
C-14	21A76687	Capacitor, fixed: ceramic: 24 mmf 500V
C-15	21A76689	Capacitor, fixed: ceramic: 95mmf 500V
C-16	21A76688	Capacitor, fixed: ceramic: 56 mmf 500V
C-17	21A76690	Capacitor, fixed: ceramic: 130 mmf 500V
C-18	20A76613	Capacitor, trimmer: mica; 2-20 mmf; on same bracket as C-19, not replaceable separately
C-19	20A76613	Capacitor, trimmer: mica; 4-45 mmf; on same bracket as C-18; not replaceable separately.
C-20	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-21	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-22	20A76614	Capacitor, trimmer: mica; 2-20 mmf; on same bracket as C-23; not replaceable separately
C-23	20A76614	Capacitor, trimmer: mica; 4-45 mmf; on same bracket as C-22; not replaceable separately
C-24	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-26	21R2751	Capacitor, fixed: mica; 535 mmf 1% 500V
C-27	21R2732	Capacitor, fixed: mica; .003 mf 2% 300V
C-28	20B76642	Capacitor, trimmer: 6-50 mmf
C-29	20B76642	Capacitor, trimmer: 6-50 mmf
C-30	21K63196	Capacitor, fixed: ceramic; 50 mmf 500V
C-31	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-32	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-33	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-34	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-35	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-36	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-37	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-38	8A76497	Capacitor, fixed: paper; .05 mf 400V; shielded
C-39	8A76496	Capacitor, electrolytic; 50 mf 25V
C-40	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-41	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-42	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-43	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-44	8K15166	Capacitor, fixed: paper; .007 mf 1600V; shielded
C-45	8A76497	Capacitor, fixed: paper; .05 mf 400V; shielded
C-46	23B77245	Capacitor, electrolytic: 16 mf 200V
C-47	23B77245	Capacitor, electrolytic: 16 mf 200V
C-48	8A76710	Capacitor, fixed: paper; .5 mf 120V
C-49	8A76710	Capacitor, fixed: paper; .5 mf 120V
C-50	21A77633	Capacitor, fixed: ceramic; 1500 mmf
F-1	65K52293	Fuse: 5 Amp.
G-1	48B76714	Vibrator, synchronous: 6 volt
I-1	65X77646	Bulb: 2V; bayonet base; type #49
I-2	65X77646	Bulb: 2V; bayonet base; type #49
L-1	24C76730	Coil, antenna; complete with shield, 4 trimmers (C-2, C-3, C-4 & C-5) and tuning core
L-2	24K76731	Coil, R.F.: complete with shield, 4 trimmers (C-6, C-7, C-8 & C-9) and tuning core
L-3	24C76732	Coil, oscillator: complete with shield, 4 ceramic trimmers (C-10, C-11, C-12 & C-13), 4 fixed ceramic capacitors (C-14, C-15, C-16 & C-17) and 2 tuning cores
L-4	1X76728	Coil, shunt: bands "E & F" antenna shunt; white dot coding; complete with core and mounting bracket
L-5	1X76727	Coil, shunt: bands "E & F" R.F. shunt; yellow dot coding; complete with tuning core and mounting bracket
L-6	1X76725	Coil, shunt: band "F" oscillator shunt: red dot coding: complete with tuning core and mounting bracket
L-7	1X76726	Coil, shunt: band "E" oscillator shunt: green dot coding; complete with tuning core and mounting bracket
L-8	24A77239	Choke, "A"
L-9	24A77240	Choke, RF
L-10	25B76711	Choke, filter
LS-1	50B77250	Speaker: 6" PM, 3.2 ohm voice coil (at 400 cycles)
R-1	6R6004	Resistor, fixed: carbon; 1 megohm 1/2 W Ins.
R-2	6R6004	Resistor, fixed: carbon; 1 megohm 1/2W Ins.
R-4	6R6056	Resistor, fixed: carbon; 47,000 ohms 1/2W Ins.
R-5	6R5659	Resistor, fixed: carbon; 3900 ohms 1/2W Ins.
R-6	6R6290	Resistor, fixed: carbon; 2200 ohms 1/2W Ins.
R-7	6R2004	Resistor, fixed: carbon; 8200 ohms 10% 1/2 W Ins.
R-8	6R3927	Resistor, fixed: carbon; 2.2 megohms 1/2W Ins.
R-9	6R6004	Resistor, fixed: carbon; 1 megohm 1/2W Ins.
R-10	6R2122	Resistor, fixed: carbon; 4.7 megohms 1/2W Ins.
R-11	18K76685	Resistor, variable : 1 megohm includes on-off switch SW-3
R-12	6R6075	Resistor, fixed: carbon; 100,000 ohms 1/2W Ins.
R-13	6R5551	Resistor, fixed: carbon; 120 ohms 10% 1/2W Ins.
R-14	6R6090	Resistor, fixed: carbon; 470 ohms 10% 1/2W Ins.
R-15	6R6105	Resistor, fixed: carbon; 100 ohms 10% 1/2 W N.I.
R-16	6R3989	Resistor, fixed: carbon.33 ohms 1/2W Ins.
R-17	18K76686	Resistor, variable; 1 megohm includes phono-radio switch SW-4
R-18	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2W Ins.
R-19	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2W Ins.
SW-1	40B76483	Switch, band: 6 position
SW-3		Switch, S.P.S.T.: part of volume control R-11 (power on-off switch)
SW-4		Switch, D.P.D.T.: part of tone control R-17 (radio-phono switch)

MODELS 57X11, 57X12
Chassis ES-60

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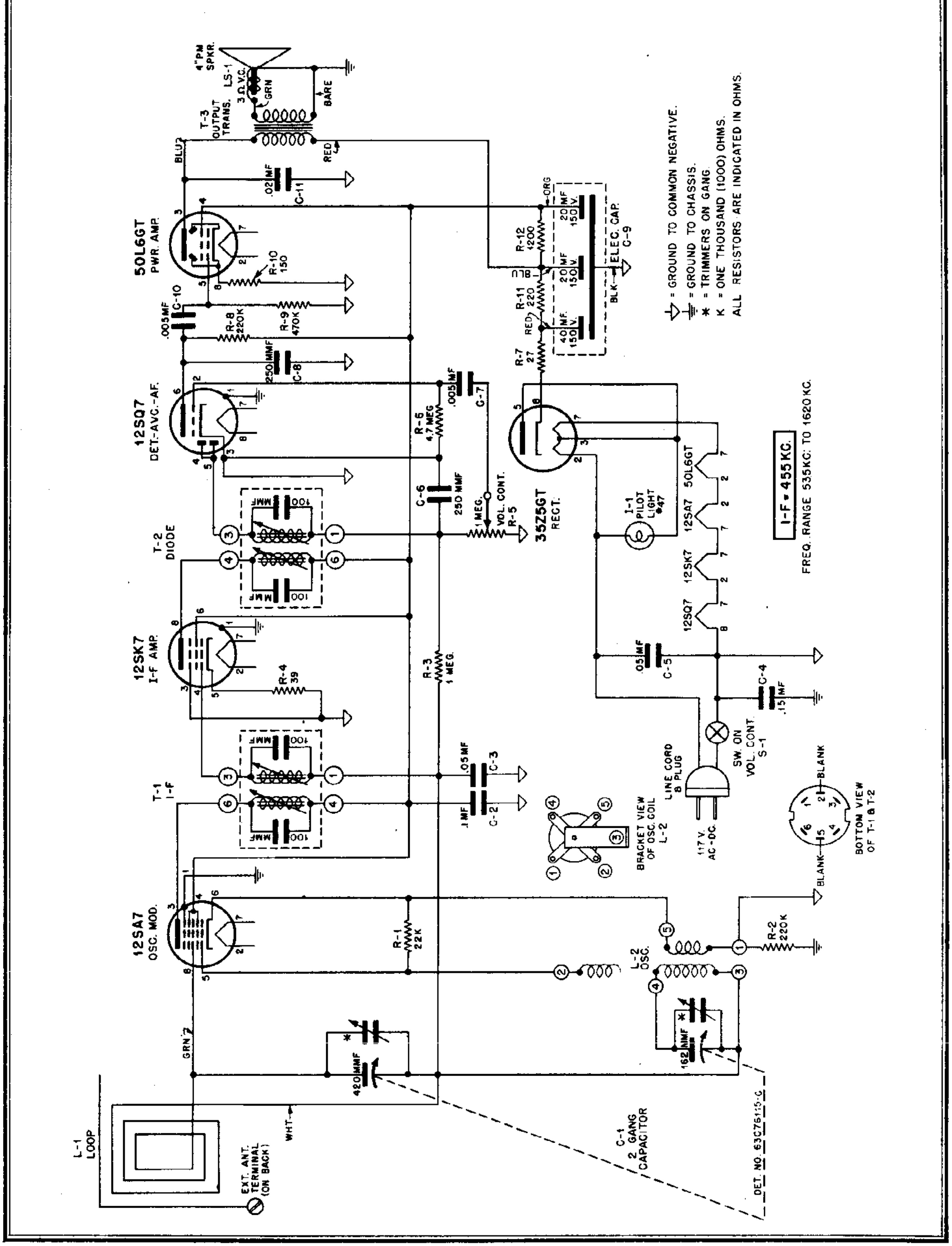

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ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum; for greatest accuracy keep output of receiver at approximately .05 watt throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter). The alignment tool should be of an insulated type such as Motorola Part Number 66A71008.

If receiver is operated from AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator to B- instead of the receiver chassis.

Refer to Figure 1 for location of all adjustments.

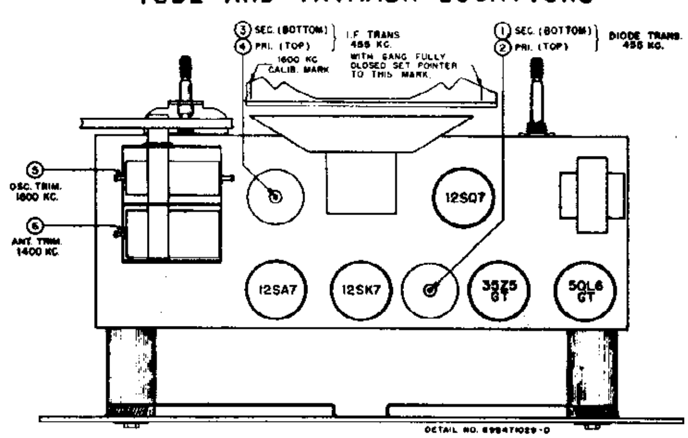
STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf.	Osc-Mod grid *	455 Kc	1,2,3 & 4	Adjust for maximum
RF ALIGNMENT						
2.	1600 Kc **	-	Radiation loop ***	1600 Kc	5	This sets osc. to dial scale
3.	1400 Kc	-	Radiation loop ***	1400 Kc	6	Tune signal for max. with receiver tuning knob, then peak trimmer 6.

* A convenient point is the stator of the antenna section of the tuning capacitor.

** Close gang fully and set pointer to calibration mark at left hand side of dial background; then set pointer to 1600 Kc by turning tuning knob till pointer lines up with right hand calibration mark.

*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of 50 milliwatts (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

TUBE AND TRIMMER LOCATIONS



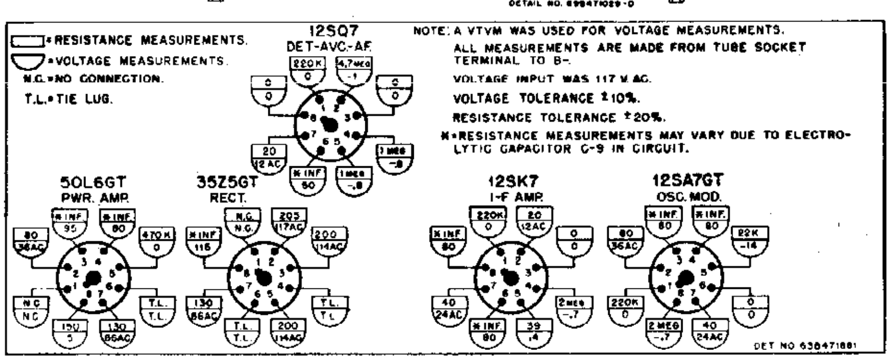


FIGURE 6. VOLTAGE & RESISTANCE DIAGRAM

MODELS 57X11, 57X12

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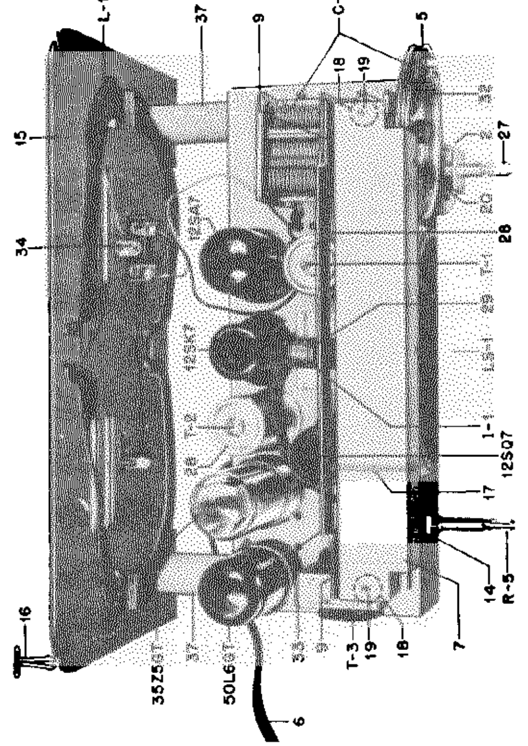
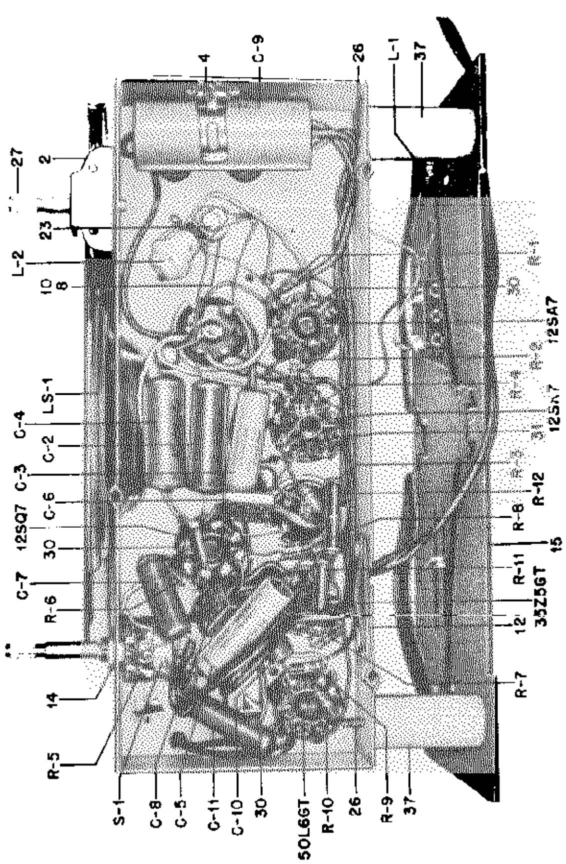
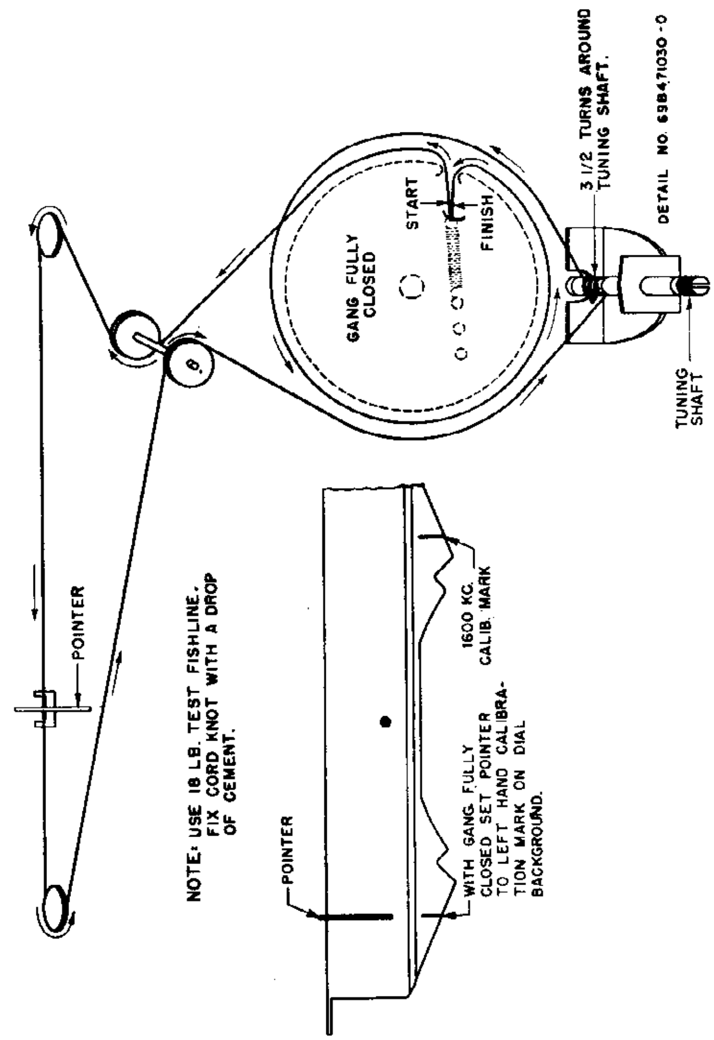
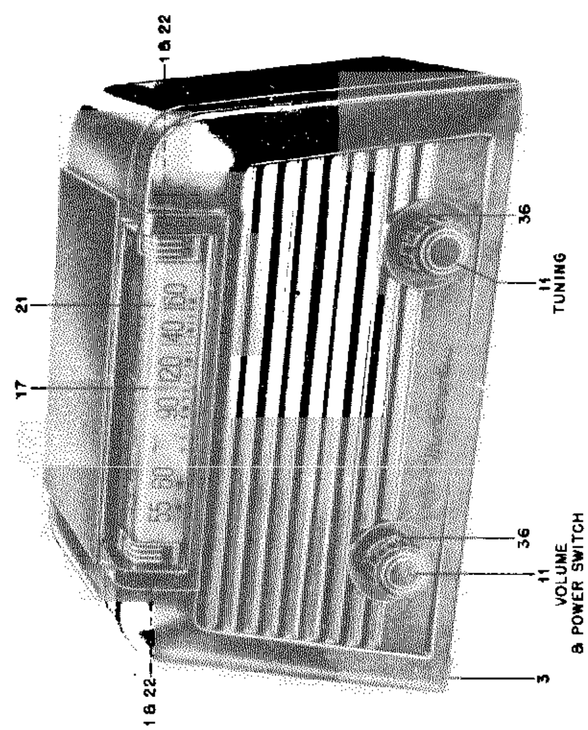
PARTS LOCATION - CHASSIS TOP



PARTS LOCATION - CHASSIS BOTTOM







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MODELS 57X11
57X12

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1	1X77204	Variable: 2 gang; cut oscillator plates; includes pulley........
C-2	8S9806	Paper: .1 mf 200V ....
C-3	8S9816	Paper: .05 mf 400V ....
C-4	8A72686	Paper: .15 mf 200V ....
C-5	8S9816	Paper: .05 mf 400V ....
C-6	21R6640	Mica: 250 mmf 500V ....
C-7	8S9813	Paper: .005 mf 600V ....
C-8	21R6648	Mica: 250 mmf 500V ....
C-9	23B75808	Electrolytic: 40-20-20 mf 150V ....
C-10	8S9813	Paper: .005 mf 600V ....
C-11	8S9802	Paper: .02 mf 400V ....
DIAL LIGHT		
I-1	65X11854	Bulb, pilot: 6.3V, .15A; tubular, bayonet base; #47 ....
COILS		
L-1	24K77096	Loop Winding only - less cabinet back ...
L-2	24A74616	Oscillator ....
RESISTORS		
NOTE:		All resistors are insulated carbon type, ± 20% unless otherwise specified.
R-1	6R6028	22,000 1/2 W ....
R-2	6R6015	220,000 1/2 W ....
R-3	6R6004	1 meg 1/2 W ....
R-4	6R2085	39 10% 1/2 W ....
R-5	18A70032	Volume control: 1 meg; includes switch S-1
R-6	6R2122	4.7 meg 1/2 W ....
R-7	6R5683	27 10% 1/2 W ....
R-8	6R6015	220,000 1/2 W ....
R-9	6R6032	470,000 1/2 W ....
R-10	6R6373	150 10% 1/2 W ....
R-11	6R6152	220 1W N.I. ....
R-12	6R3972	1,200 10% 1W N.I. ....
SPEAKER		
LS-1	50B76109	Speaker: 4" PM; 3.2 ohms V.C. ....
SWITCH		
S-1		Switch (part of volume control R-5)
TRANSFORMERS		
T-1	24B70531	IF: 455 Kc; complete with iron cores and padding capacitors, but less shield ....
T-2	24B70533	Diode: 455 Kc; complete with iron cores and padding capacitors, but less shield ....
T-3	25B76117	Output ....
1	7A77382	Bracket, dial scale mounting ....
2	7A14684	Bracket, tuning shaft ....
3	16E77220	Cabinet, table model: plastic; walnut finish (57X11)..................
	16K77221	Cabinet, table model: plastic; ivory finish (57X12) ....
4	42K75826	Clip, electrolytic mounting ....
5	11M8944	Cord, dial: 18 lb. black ....
6	30A151	Cord, line: 6 ft. long; with plug ....
7	1X77209	Dial Background Bracket & Pulleys Assembly: background bracket with 4 cord pulleys ....

REF. NO.	PART NO.	DESCRIPTION
8	5A19658	Eyelet, spacer: 19/64 x .212 I.D. x 1/2 (gang mtg) ....
9	5S7805	Eyelet, snap-in; steel (dial background strip mtg) ....
10	5A70404	Grommet, rubber (gang cushions) ....
11	36B77213	Knob, control; plastic; walnut finish (
	36K77214	Knob, control: plastic; ivory finish (5
12	32A24815	Lock, line cord: fibre ....
13	2A70075	Nut, speed: Tinnerman #520 (dial backgr bracket mtg) ....
14	2S7051	Nut, steel: 3/8 x 9/16 hex; cadmium pla ted (volume control mtg) ....
15	1X77210	Panel Assembly, cabinet back: less loop winding ....
16	38A25507	Plug, split: 5/8" long (loop panel to c net mtg) ....
17	52A77089	Pointer, dial ....
18	49A21552	Pulley, cord: 1/2" groove ....
19	5A15045	Rivet, shoulder: 7/16" long; nickel pla (cord pulley mtg) ....
20	5A71735	Rivet, shoulder: 1/2" long; nickel plat (cord pulley mtg) ....
21	34B77212	Scale, dial: plastic ....
22	3S7155	Screw, steel: 6-32 x 3/16 slotted hex h machine screw; cadmium plated (hold di scale mtg bracket to cabinet) ....
23	3S2294	Screw, steel: 6-32 x 1/2 plain hex head locking type machine screw; cadmium pl ted (gang mtg) ....
24	3S7205	Screw, steel: 8-32 x 1/4 slotted hex he locking type machine screw; cadmium pl ted (speaker mtg) ....
25	3S8117	Screw, steel: #8 x 1" PKZ slotted hex washer head sheet metal screw; antique copper finish (chassis mtg) ....
26	3S3383	Screw, steel: #8 x 2" PKZ slotted hex h sheet metal screw, cadmium plated (loo mtg) ....
27	47A77087	Shaft, tuning ....
28	1A71049	Shield and Iron Core Sleeve Assembly (for T-1 & T-2) ....
29	9A77086	Socket, pilot light: with bracket and leads.............
30	9A6790	Socket, tube: molded octal; plain type
	9A6788	Socket, tube (replacement) molded octal plain type (to be used in place of 9A6790 when mounting lugs on chassis break off)............................
31	9A6792	Socket, tube: molded octal; with center shield (for I.F. amp) ....
	9A70165	Socket, tube: (replacement)molded octal; with center shield (to be used in plac of 9A6792 when mounting lugs on chassi break off) ....
32	41A14244	Spring, tension coil (drive cord tensio
33	35B77092	Strip, background ....
34	31K15026	Strip, terminal: 2 insulated lugs, #2 m (on loop antenna panel) ....
35	32A20575	Washer, paper: 3/8 x .171 x .062 thick (used between chassis mtg screws and plastic cabinet to prevent cracking cabinet) ....
36	4K19943	Washer, paper: 11/16 x 17/64 x 1/32 thi (used under control knobs) ....
37	57A77084	Dowel, back mounting: wood ....

MODEL 65T21, Chassis HS-32
MODEL 65T21B, Chassis HS-67

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ALIGNMENT AND SENSITIVITY CHART

Connect output meter across speaker voice coil (.38V = .05 watts)
Volume control set at maximum for all operations.
The adjusting screwdriver or alignment tool should be of the insulated type, such as Motorola Part No. 66A71008.
Refer to Figure 2 for location of all adjustment trimmers & cores

OPERATION IN ORDER	GANG CAPACITOR SET AT	BAND SWITCH SET AT	DUMMY ANTENNA	GENERATOR CONNECTED TO	ADJUST TRIMMER OR IRON CORE	GENERATOR SET AT (400∿ 30% MODULATED)	AVERAGE INPUT FOR .38V OUTPUT
Adjust I.F's for maximum	Minimum	B.C.	.1 mf	Osc. - Mod. grid	1-2-3-4	455 Kc	900 microvolts to I.F. grid 4.5 microvolts to Osc.-Mod. grid (455 Kc)
Set B.C. Oscillator trimmer	1620 Kc	B.C.	None	Radiation loop*	5 B.C. Osc. trimmer C-1	1620 Kc	————
Adjust B.C. loop trimmer for maximum	1400 Kc	B.C.	None	Radiation loop*	6 B.C. loop trimmer C-4 (on loop) should be adjusted with set in cabinet	1400 Kc	6.5 microvolts to Osc.-Mod. grid through .1 mf dummy
Set S.W. Oscillator trimmer	12.2 Mc	S.W.	50 mmf.	Antenna terminal	7 S.W. Osc. trimmer C-2	12.2 Mc	————
Adjust S.W.	11.5 Mc	S.W.	50 mmf.	Antenna terminal	8 S.W. Antenna trimmer C-6	11.5 Mc	5 microvolts to Antenna terminal
Repeat above steps for maximum accuracy							.045 volt to 1st A.F. grid (400∿ cycle audio)

Connect output of signal generator to a 5" dia. 3 turn loop. See Fig. 3. With volume control on full, bring loop close enough to receiver loop until an output of 50 milliwatts is obtained. (.38V on output meter). The distance between loops should never be less than 12 inches. Vary distance between generator and receiver loops or adjust generator output to maintain .38V output during alignment.

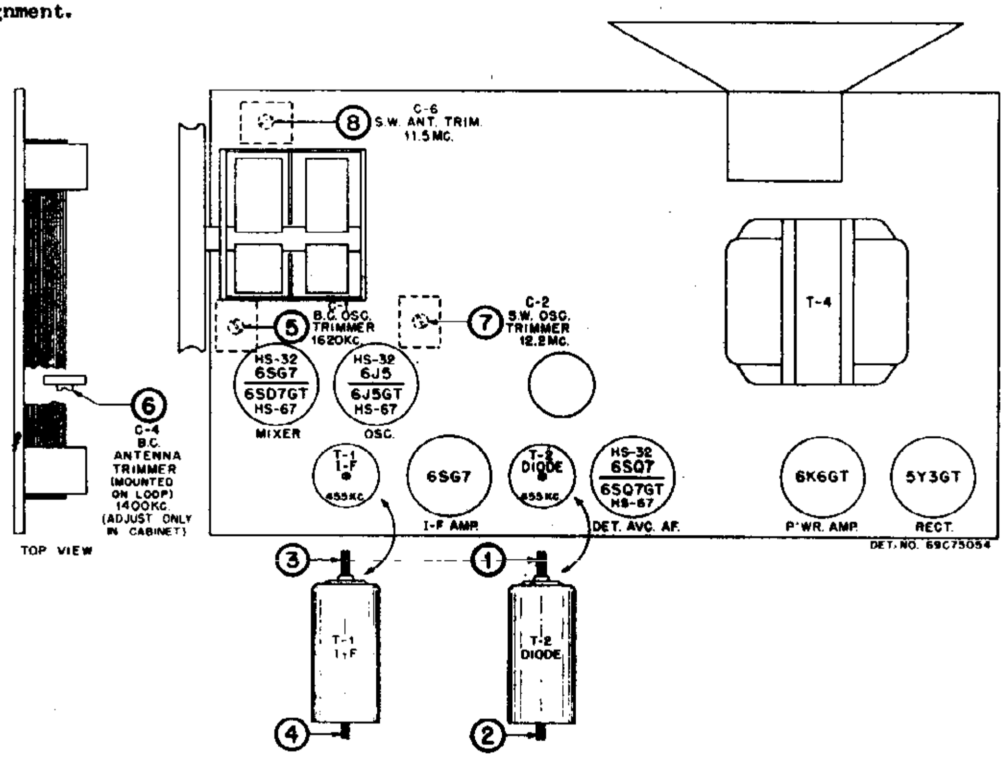
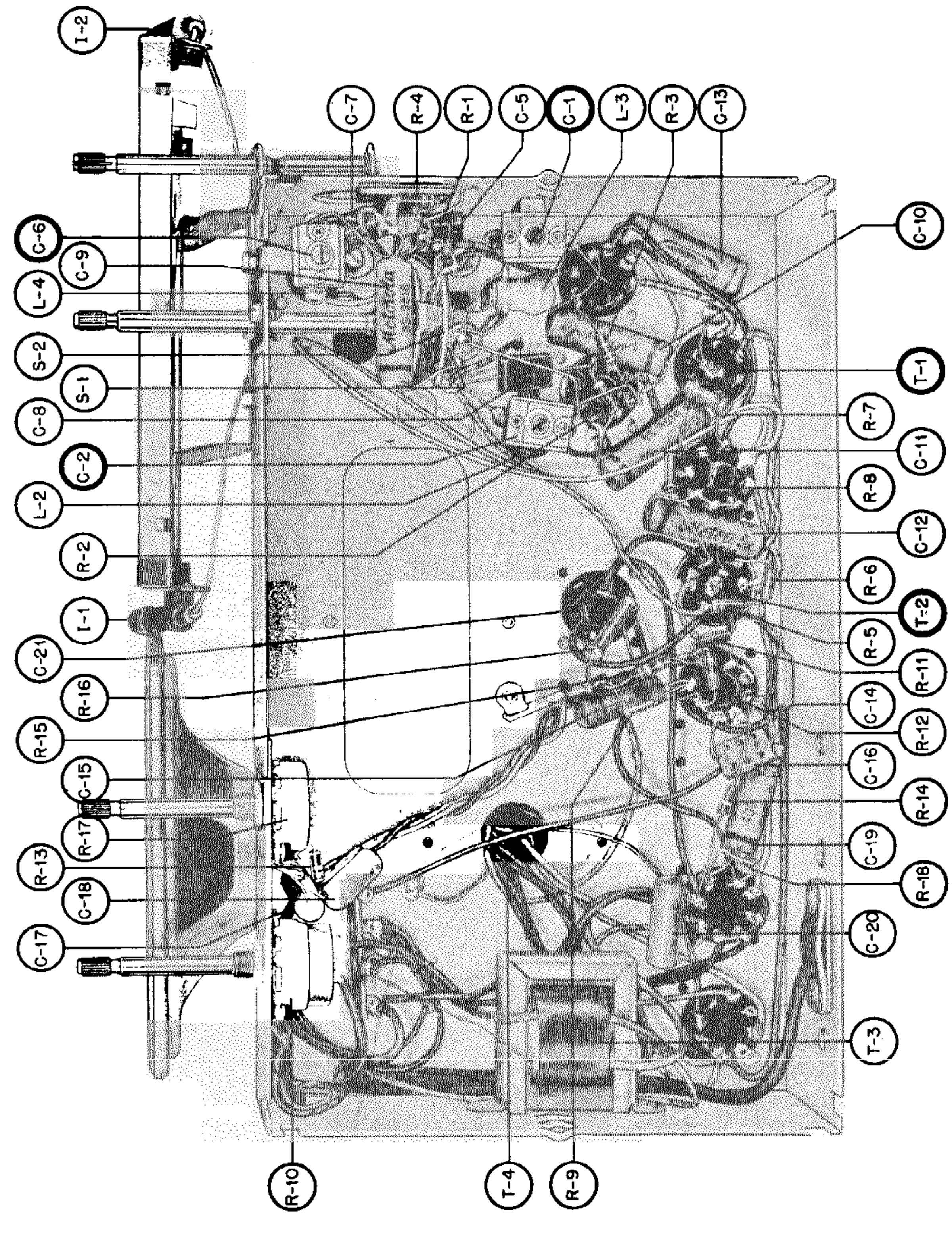


FIGURE 2. TUBE & TRIMMER LOCATION DETAIL

For schematic see Vol. XV, page 15-62

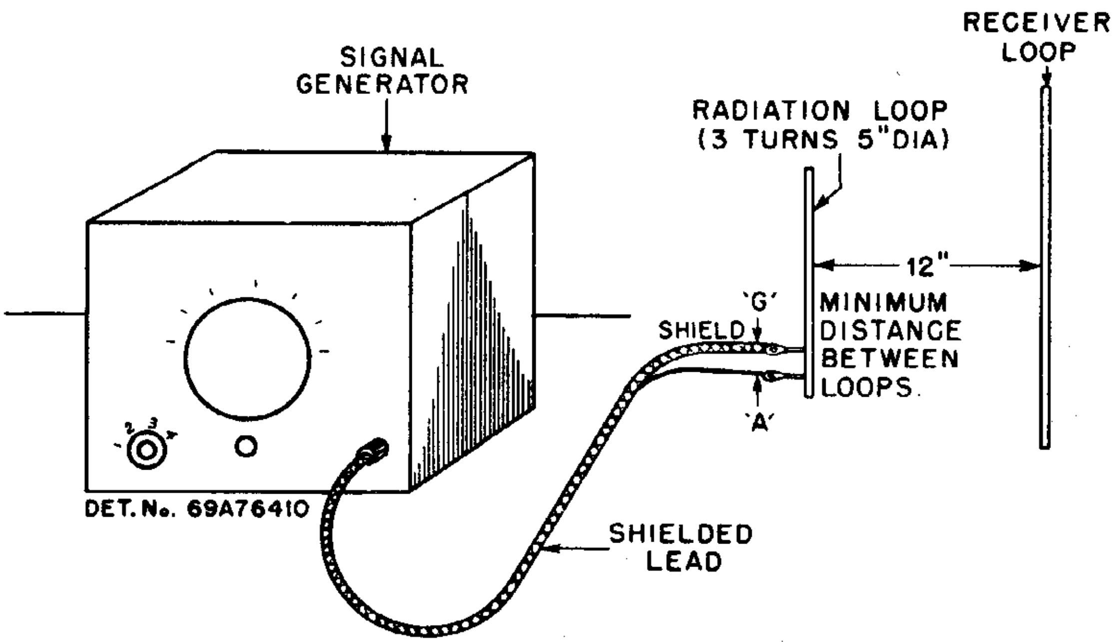
MODEL 65T21

MOTOROLA INC.

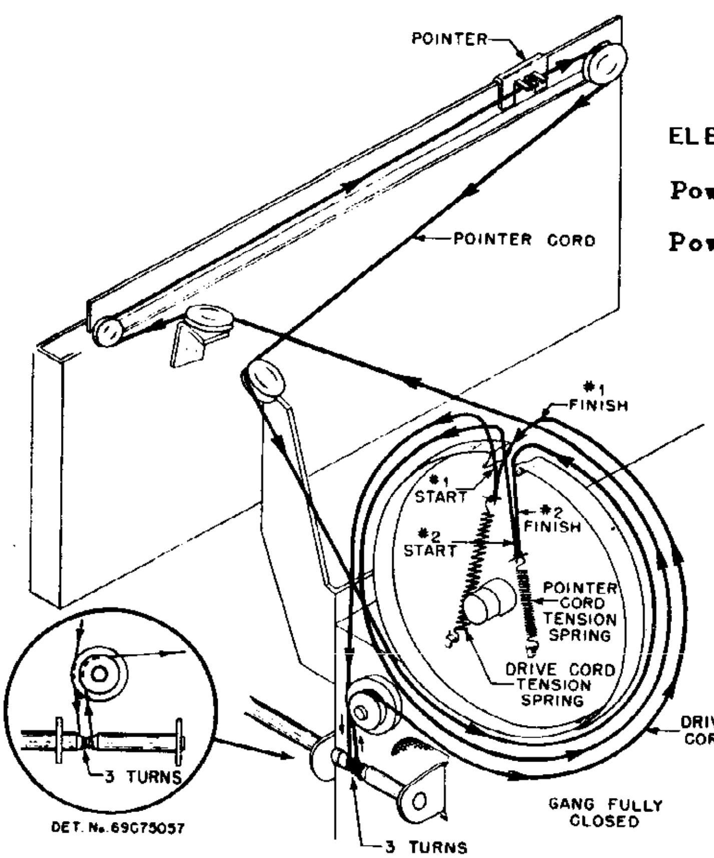


CHASSIS HS-32 & HS-67 - BOTTOM VIEW

MOTOROLA INC.



METHOD OF RADIATING SIGNAL INTO RECEIVER



STRING DRIVE DETAIL

ELECTRICAL CHARACTERISTICS

Power input: 117V-60 cycles, 65 watts

Power output: 3 watts minimum

TUNING RANGE

B.C.	535 to 1620 Kc.	
S.W.	5.6 to 12.2 Mc.	

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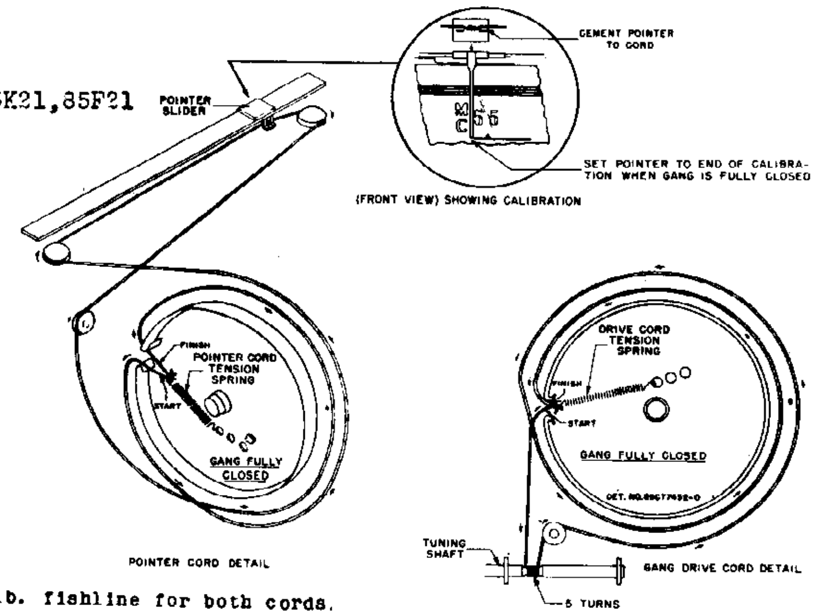
MODEL 85K21, 85F21



Use 18 lb. fishline for both cords.

FIGURE 1. POINTER AND DRIVE CORD RESTRINGING DETAIL

MODEL 65T21, 65T21B

PART NO.	DESCRIPTION
4S1719	Washer, steel: 3/8 x .140 x .030 thick; cadmium plated (line cord lock mounting)
4S7589	Washer, steel: 7/8 x 9/32 x .027 thick; cadmium plated (used on chassis retainer screws)
4S7650	Lockwasher, steel: #6 internal; cadmium plated (output trans. mtg.)
4S7655	Lockwasher, steel: 3/8 internal; cadmium plated (band switch)
2S1376	Nut, steel: 3/8-32 x 1/2 hex; cadmium plated (band switch mtg.)
3S7475	Screw, steel: #8 x 1/4 PKZ slotted acorn head; cadmium plated (power trans. & band switch shaft bearing strip mounting)
3S8011	Screw, steel: 8-32 x 1/2 slotted hex head locking type machine screw; cadmium plated (gang mtg.)
3S7512	Screw, steel: #8 x 1/2 PKZ plain hex head; (cadmium plated)
3S7534	Screw, steel: #8 x 1-3/8 PKZ slotted hex head; cadmium plated (chassis retainer screws)
1A71049	Shield & Iron Core Sleeve Assembly (I.F. & diode coil shield, and sleeve type iron core)
6A15094	Shield, dial light
47A71129	Shaft, tuning
9A6790	Socket, tube: molded octal; regular type (for all but I.F. amp.)
9A6788	Socket; tube: replacement (to be used only when mounting lugs on chassis break off)
9A6792	Socket, tube: molded octal; with center shield (for I.F. amp.)
9A70165	Socket, tube: replacement; with center shield (to be used only when mounting lugs on chassis break off)
9K72592	Socket, pilot light: with mounting bracket
50B71147	Speaker and bracket: 6" electro
41A14244	Spring, tension coil (drive cord)
41A22596	Spring, tension coil (pointer drive)
37K70556	Strip, channel: rubber; 1/2" long (dial scale mounting)
37K21114	Strip, channel: rubber; 1" long (dial scale mounting)
32A27676	Strip, shaft bearing: fibre (supports band switch shaft)
31A51251	Strip, terminal: 1 insulated lug, #1 ground (on loop)
5A71130	Grommet, chassis retainer: rubber; 1/4 x 1/2 diameter body; 3/4 diameter head (cushions under chassis retainer screws)
5A71092	Grommet, chassis mounting: rubber; 5/8 x 3/4 diameter (used on each corner of chassis)
5A70404	Grommet, rubber (gang and speaker cushions)
36K70514	Knob, control: plain; (65T21)
36K70516	Knob, control: branded (65T21)
36K72889	Knob, control: plain (65T21B)
36K72890	Knob, control: branded (65T21B)
32A24815	Lock, line cord: fibre (Holds line cord to chassis)

MODEL 65T21
MODEL 65T21B

MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
C-1	20A71140	Capacitor, trimmer: 10-80 mmf, with "L" mounting bracket
C-2	20A71141	Capacitor, trimmer; 10-80 mmf
C-3	1B71757	Capacitor, variable: 2 gang; cut oscillator plates: includes pulley
C-4	20A71051	Capacitor, trimmer: 4-20 mmf; with "L" mounting bracket (on loop)
C-5	21R6642	Capacitor, fixed: mica; 50 mmf 500V
C-6	20A71125	Capacitor, trimmer: 10-80; with "L" mounting bracket
C-7	21R2724	Capacitor, fixed: mica; 1000 mmf 5% 300V
C-8	21R6642	Capacitor, fixed: mica; 50 mmf 500V
C-9	8S9816	Capacitor, fixed: paper; .05 mf 400V
C-10	8S9816	Capacitor, fixed: paper; .05 mf 400V
C-11	8S9816	Capacitor, fixed: paper; .05 mf 400V
C-12	8S9816	Capacitor, fixed: paper; .05 mf 400V
C-13	8S9816	Capacitor, fixed: paper; .05 mf 400V
C-14	21R6639	Capacitor, fixed: mica; 500 mmf 500V
C-15	8S9813	Capacitor, fixed: paper; .005 mf 600V
C-16	21R6639	Capacitor, fixed: mica; 500 mmf 500V
C-17	8S9813	Capacitor, fixed: paper; .005 mf 600V
C-18	8S9813	Capacitor, fixed: paper; .005 mf 600V
C-19	8S9816	Capacitor, fixed: paper; .05 mf 400V
C-20	8S9813	Capacitor, fixed: paper; .005 mf 600V
C-21	23A27718 or 23B74827	Capacitor, electrolytic: 30-30-20 mf/350-300-25V
	5A71735	Rivet, shoulder: 1/2 long; nickel plated (mounts 2 idler pulleys to chassis)
	5S7707	Rivet, steel: .122 x 5/32 nickel plated (terminal strip, trimmer, socket & output trans. mounting)
	5S7701	Rivet, steel: .122 x 3/16; nickel plated (band switch bracket and electrolytic wafer mounting)
	5S7700	Rivet, steel: .122 x 1/4; nickel plated (loop receptacle mounting)
	5S7706	Rivet, steel: .122 x 9/32; nickel plated (line cord lock mounting)
	34B70566	Scale, dial: glass
	3S2663	Screw, steel: #6 x 5/16 PKZ plain hex head; black parkerized finish (B.C. oscillator coil mounting)
	3S7454	Screw, steel: #8 x 1/4 PKZ plain hex head; cadmium plated (dial mtg.)
	4A21577	Washer "C" (Holds tuning shaft in place)
I-1 & I-2	65X10667	Bulb: 6.3V, .25A; tubular bayonet #44
L-1	24C72483	Loop Antenna and Panel (Complete)
L-2	24A70549	Coil, S.W. Oscillator
L-3	24A70546	Coil, B.C. oscillator
L-4	24A70548	Coil, S.W. antenna
R-1	6R6032	Resistor, fixed: carbon; 470,000 1/2W Ins.
R-2	6R6056	Resistor, fixed: carbon; 47,000 1/2W Ins.
R-3	6R6090	Resistor, fixed: carbon; 470 10% 1/2W Ins. (HS-32)
	6R6229	Resistor, fixed: carbon; 1000 10% 1/2W Ins. (HS-67)
R-4	6R2122	Resistor, fixed: carbon; 4.7 meg 1/2W Ins.
R-5	6R2122	Resistor, fixed: carbon; 4.7 meg 1/2W Ins.
R-6	6R3927	Resistor, fixed: carbon; 2.2 meg 1/2W Ins.
R-7	6R6068	Resistor, fixed: carbon; 22,000 1/2W N.I.
R-8	6R6053	Resistor, fixed: carbon; 1000 1/4W N.I.
R-9	6R2115	Resistor, fixed: carbon; 3.3 meg 1/2W Ins.
R-10	18A70068	Resistor, variable: carbon; 1 meg; with SPST switch; tapped at 300 K
R-11	6R6004	Resistor, fixed: carbon; 1 meg 1/2W Ins.
R-12	6R6406	Resistor, fixed: carbon; 22 10% 1/2W Ins. (HS-32)
	6R2058	Resistor, fixed: carbon; 39 10% 1/2W Ins. (HS-67)
R-13	6R6012	Resistor, fixed: carbon; 33,000 1/2W Ins.
R-14	6R6015	Resistor, fixed: carbon; 220,000 1/2W Ins.
	2S7051	Nut, steel: 3/8-32 x 9/16; cadmium plated (volume and tone control mounting)
	9A12706	Plate, electrolytic capacitor mounting: bakelite
	28K19871	Plug, 4-prong (loop plug)
	52B70519	Pointer, dial
	49A23960	Pulley, cord: 1/4" groove (dial cord idler pulley)
	49A21741	Pulley, cord: 3/8" groove (dial cprd idler pulley)
	49A21552	Pulley, cord: 1/2" groove (dial cord idler pulley)
	9K28049	Receptacle, 4-prong (loop socket)
	5A71246	Rivet, shoulder: .187 long; nickel plated (idler pulley shaft)
	5A12814	Rivet, shoulder: .156 long; nickel plated (idler pulley shaft)
	31K74935	Strip, terminal: 2 insulated lugs, #3 mounting
	31A71128	Strip, terminal: 3 insulated lugs, #2 ground
R-15	6R2058	Resistor, fixed: carbon; 39 10% 1/2W Ins.
R-16	6R6035	Resistor, fixed: carbon 270 10% 1W N.I.
R-17	18B70057	Resistor, variable: carbon; 1 meg
R-18	6R6015	Resistor, fixed: carbon 220,000 1/2W Ins.
S1 & S-2	40A71258	Switch, band: 2 position
T-1	24B70545	Transformer, I.F.: 455 Kc; complete less shield and iron core sleeve (HS-32)
	24B70551	Transformer, I.F.: 455 Kc; complete; less shield and iron core sleeve (HS-67)
T-2	24B70537	Transformer, diode: 455 kc; complete; less shield and iron core sleeve (HS-32)
	24B70533	Transformer, diode: 455 Kc; complete; less shield and iron core sleeve (HS-67)
T-3	25B21175	Transformer, output
T-4	25B21248	Transformer, power
	34B70515	Background, dial; cardboard
	7A70418	Bracket, band switch
	15B70565	Cabinet, table model: walnut veneer (65T21)
	15B71053	Cabinet, table model: blonde mahogany veneer (65T21B)
	4B8528	Clip, fahnestock: #18; double
	36B71090	Cloth, grille (65T21)
	36B71099	Cloth, grille (65T21B)
	11M8944	Cord, dial: 18 lb. black
	2S4151	Cord, line: 6 ft. long; with plug
	1B71046	Core & Clip Assembly (I.F. & diode coil bottom tuning iron core and clip)
	1B71047	Core & Palnut Assembly (I.F. & diode coil top tuning iron core and nut)
	1B71756	Dial, Bracket & Plate Assembly: includes dial plate, pointer slider rail, 4 cord idler pulleys, 2 pilot light sockets, dial plate mounting bracket, dial background and glass dial scale. Pointer not included.
	13B70577	Escutcheon, dial
	6S1611	Eyelet, snap in: .140 x 141; copper oxide (dial background mounting)
	5A71061	Eyelet, chassis mounting: 1/4 x 1/4 diameter body; 1/2 diameter head (used on each corner of chassis)
	5A70098	Eyelet: 23/64 x 7/32 diameter body; 1/2 diameter head (used under chassis retainer screws and gang and speaker mounting)
	37K15841	Foot, rubber: 3/4 diameter (cabinet foot)
	4A71135	Washer, spring (used on tuning shaft)

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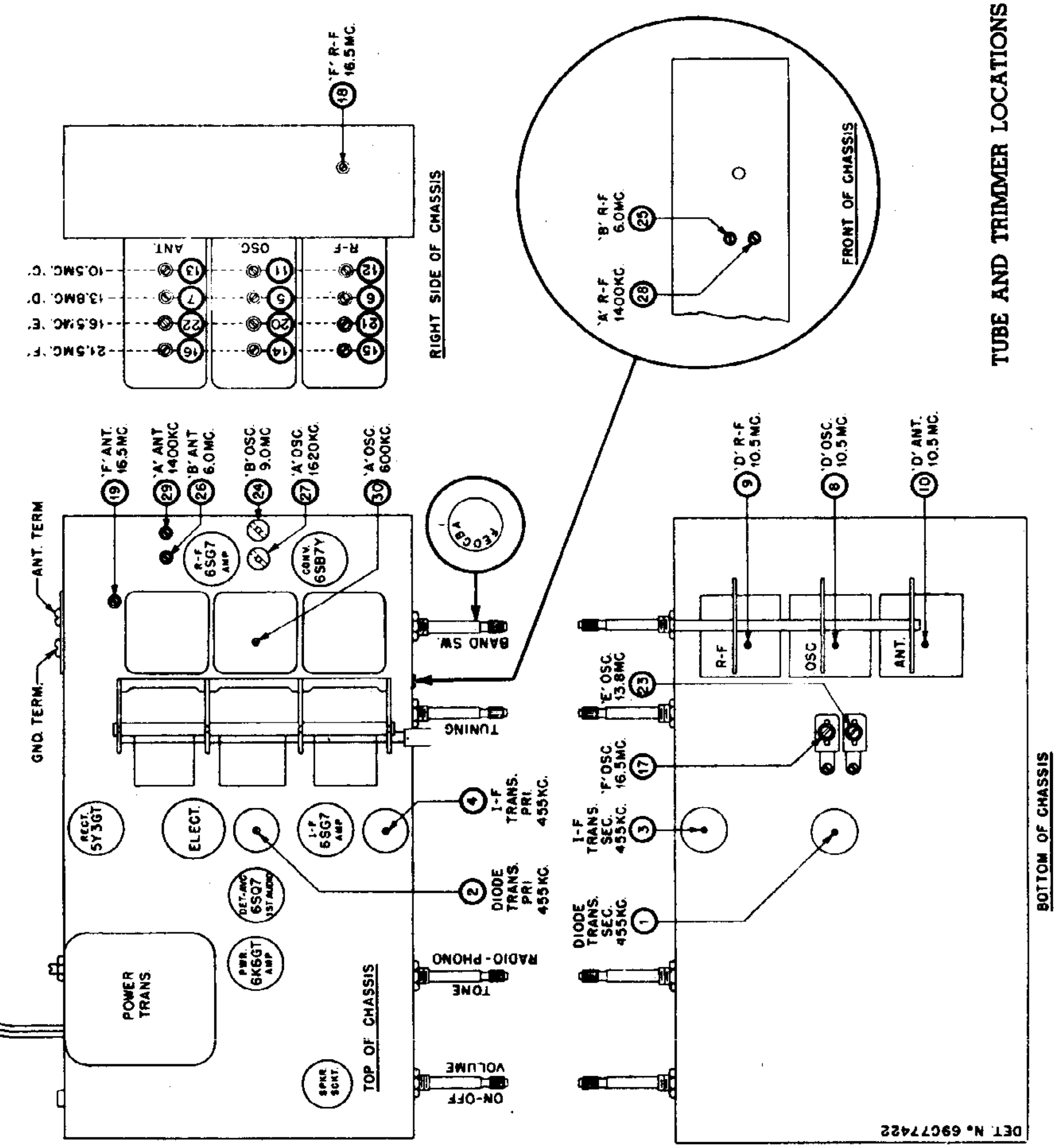
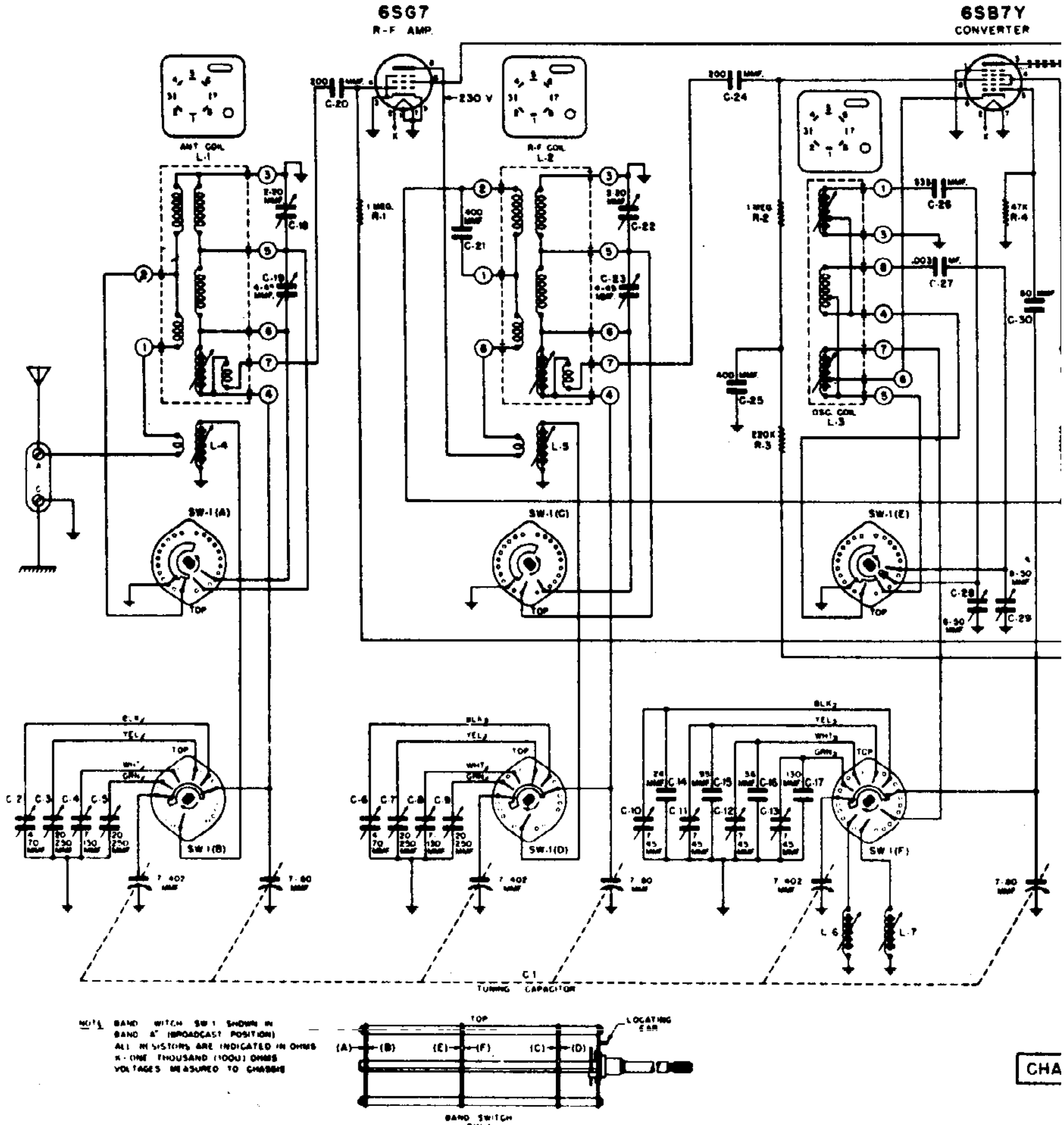
MODELS 67F61BN
67T61BN



TUBE AND TRIMMER LOCATIONS

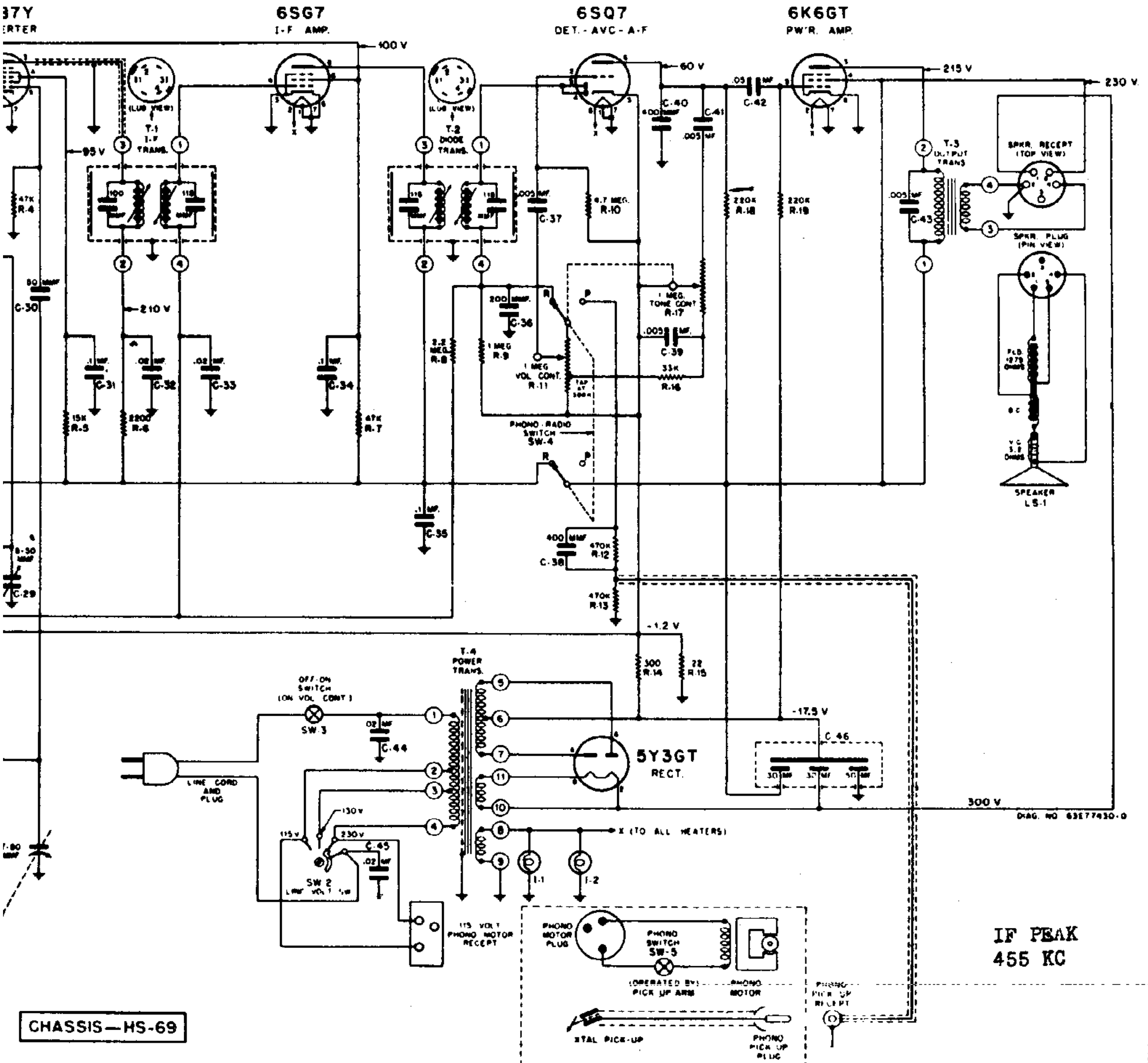


NOTE: BAND SWITCH SW-1 SHOWN IN BAND "A" (BROADCAST POSITION)
ALL RESISTORS ARE INDICATED IN OHMS
K - ONE THOUSAND (1000) OHMS
VOLTAGES MEASURED TO CHASSIS

CHA

MOTOROLA INC.

MODELS 67F61BN, 67T61BN
Chassis HS-69



IF PEAK
455 KC

MOTOROLA INC.

AGUJA FONOGRAFICA

El brazo reproductor del fonógrafo está equipado con una aguja de punta de zafiro de duración permanente que tocará varios millares de discos antes que tenga que reemplazarse, a menos de que se dane dejándola caer o por maltrato. Para mejores resultados reemplacela con agujas fonográficas Motorola; ordenando Agujas Fonográficas, Pieza Numero 47X72643.

Para reponer la aguja, es necesario aflojar el pequeño tornillo de ajuste que la mantiene en posición. El tornillo de ajuste es accessible por dentro del pequeño agujero al frente del brazo del reproductor. Utilice un destornillador pequeno para evitar daño al cartucho de cristal o al brazo reproductor.

PHONOGRAPH NEEDLE

The phono pick-up arm is equipped with a long-life permanent point sapphire tipped needle that will play several thousand records before requiring replacement, unless damaged by dropping or other mishandling. For best results replace with Motorola phonograph needles: order Phonograph Needle Part Number 47X72643.

To replace phonograph needle, it is necessary to loosen the small set screw that holds the needle in place. The set screw is accessible through a small hole in the front of the pick-up arm. Use a small screw driver to avoid damaging the crystal cartridge or pick-up arm.

La mesa giratoria del fonógrafo girará a la velocidad correcta solamente si la corriente para el motor fonográfico es de la frecuencia correcta. El motor fonográfico viene de la fábrica con un buje de 60 ciclos instalado en el eje del motor. Si el motor se utiliza con corriente de 50 ciclos, funcionará más despacio y será necesario aumentar el diámetro del buje del eje del motor para compensar la menor velocidad del motor. Se suministra con este receptor un buje adicional de 50 ciclos para reemplazar al buje de 60 ciclos en el eje del motor, cuando se vaya a funcionar el receptor con corriente de 50 ciclos. El buje de 50 ciclos se encontrará dentro de un sobre colocado en el interior del gabinete. Para poder llegar al eje del motor fonográfico, sólo hay que levatar la mesa giratoria. El buje está ajustado al eje del motor con un solo tonillo de ajuste. Una llave No. 6 de cabeza "Allen" se adaptará al tornillo de ajuste.

The phono-turntable will turn at the correct speed only if the power supply to the phono-motor is of the correct frequency. The phono-motor comes from the factory with a 60 cycle bushing installed on the phono motor shaft. If the phono-motor is used on a 50 cycle power supply it will run slower and it will be necessary to increase the diameter of the phono-motor shaft bushing to compensate for the slower motor speed. A separate 50 cycle bushing is supplied with this receiver and it replaces the 60 cycle bushing on the phono-motor shaft when receiver is to be operated from 50 cycle power lines. The 50 cycle bushing will be found in an envelope, attached to the inside of the cabinet. To expose phono-motor shaft, just lift up turntable. The bushing is secured to the motor shaft with a single set screw. A #6 Allen head driver wrench will fit the setscrew.

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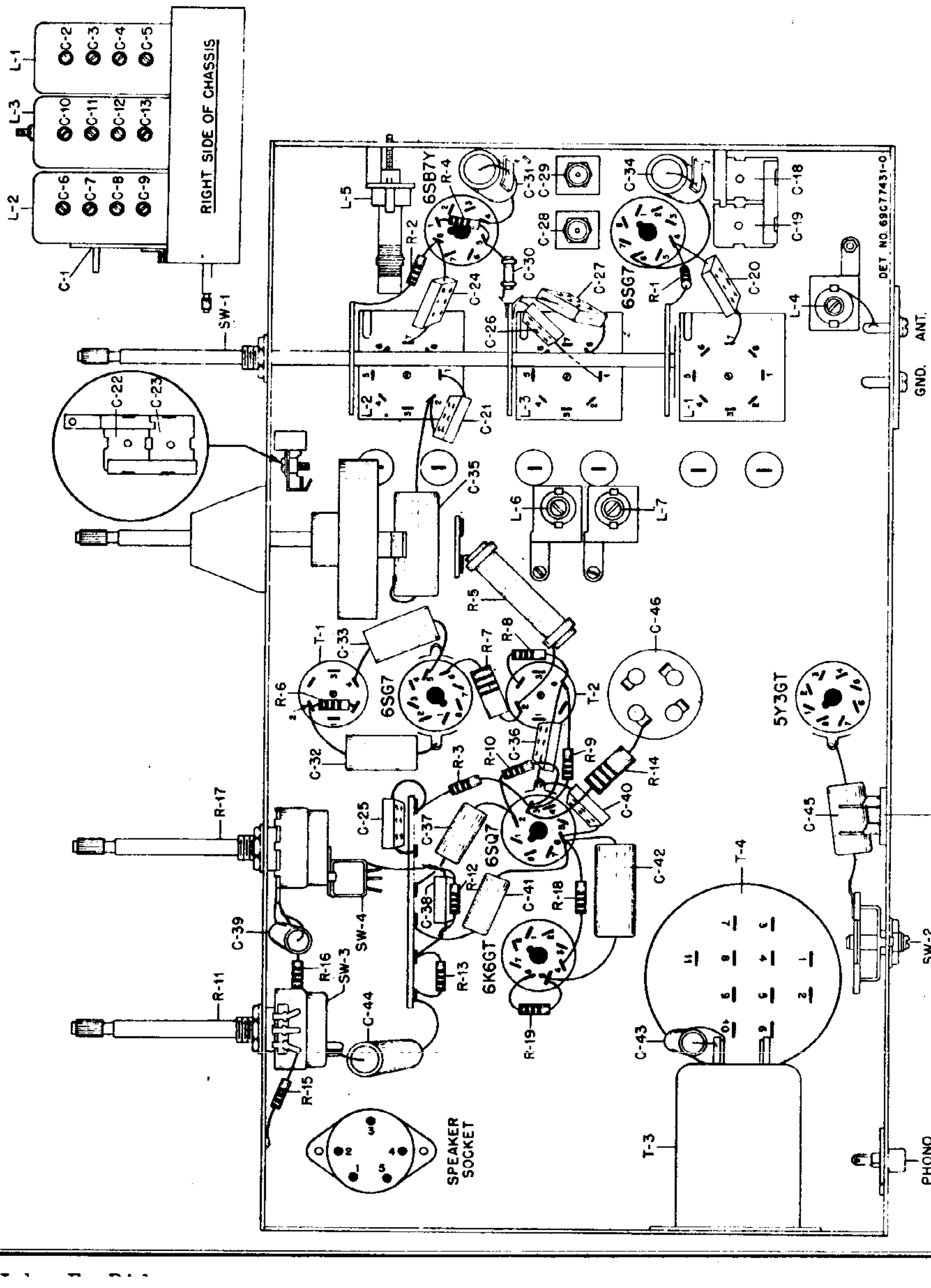


PARTS LOCATION DETAIL

MOTOROLA INC.

MODEL 67T61BN, 87T61BN

CLAVIJA PARA REPRODUCTOR DE FONÓGRAFO Y TOMACORRIENTE PARA MOTOR FONOGRÁFICO

Pueden tocarse discos por medio del amplificador de este radio, conectando un tocadiscos a la clavija para reproductor de fonógrafo (E) situada en el respaldo del receptor. Energía para el motor fonográfico es también obtenible del receptáculo (F) al respaldo del receptor. Véase la Figura 2 para localizar la clavija (E) y el receptáculo (F). El voltaje en el receptáculo fonomotor es siempre de 115 voltios sin tener en cuenta el voltaje de la línea a que esté conectado el receptor; la frecuencia de la corriente en el receptáculo fonomotor será la misma que la frecuencia de la corriente de entrada al receptor. Como la velocidad del motor del fonógrafo es determinada por la frecuencia del voltaje de la línea, asegúrese de que el tocadiscos que utilice se haya diseñado para funcionar correctamente en la frecuencia que proporciona su compañía eléctrica.

PHONO PICK-UP JACK & PHONO MOTOR SOCKET

By connecting a record player to the phono-pick-up jack (E) located on the back of the receiver, you can play records through the amplifier of this radio. Power for the phono-motor is also available at the phono-motor socket (F) on the back of the set. See Figure 2 for location of jack (E) and socket (F). The voltage at the phono-motor socket is always 115 volts, regardless of the input voltage to the set; the frequency of the phono motor supply will be the same as the input power frequency. Since phono-motor speed is determined by the line voltage frequency, make sure the record player you use is designed to run correctly at the frequency your power company supplies.

MODEL 67F61BN, 67T61BN, 87T61BN

ANTENA

Con este receptor debe usarse una buena antena, especialmente para la recepción de onda corta. Consulte al distribuidor de radio más próximo sobre el tipo de antena que mejor se adapte a su localidad. En la mayoría de los casos un sólo alambre de unos 60 pies de largo debe dar buenos resultados. Conecte la antena al terminal marcado 'A' en el respaldo del receptor. En el punto en que la antena entra a la casa, debe instalarse un pararrayos aprobado.

ANTENNA

A good outdoor antenna should be used with this receiver, especially for short wave reception. Consult the radio dealer who serves your territory on the type of antenna best suited for your location. In most cases a single wire about 60 ft. long should give good results. Connect the antenna to the terminal marked 'A' on the back of the set. An approved lightning arrester should be installed at the point where the antenna enters the house.

MODEL 67F61BN, 67T61BN, 87T61BN

CONEXION A TIERRA

Una buena tierra, conectada al terminal 'G', en el respaldo del receptor, ayudará a reducir ruidos y mejorará la recepción. Se puede hacer una tierra satisfactoria haciendo conexión a un radiador o tubería de agua. En caso de no haber radiador o tubería de agua, se puede utilizar una varilla o tubo metálico de 5 pies de largo clavándola en tierra húmeda.

CORRIENTE ELECTRICA

Antes de conectar el enchufe del cordón al tomacorriente, asegúrese de que el regulador del voltaje de línea (D) del receptor, esté ajustado para corresponder con la línea de voltaje en la cual el receptor ha de funcionar. Véase la figura 2 para localizar el regulador del voltaje de línea. Consulte la compañía eléctrica local, si tiene dudas sobre el voltaje y frecuencia de su barriada.

Este receptor puede ajustarse para funcionar con corriente alterna (CA) de 115, 130 o de 230 voltios, de 50 ó de 60 ciclos. Al salir de la fábrica, este receptor está ajustado para trabajar con 230 voltios. Caso de que el voltaje promedio de que se disponga sea de 115 ó 130 voltios (el que más se aproxime), sencillamente gire el regulador del voltaje de línea (D), colocándolo en el voltaje a que vaya a trabajar el receptor.

PRECAUCIÓN: Cuídese de no enchufar el cordón a un tomacorriente de 230 voltios si el regulador de voltaje está ajustado para 115 ó 130 voltios, ya que resultaría en daños para el receptor y para el fonógrafo. El cordón nunca debe ser enchufado a un receptáculo de corriente continua (CC).

GROUND

A good ground, connected to the terminal 'G' on the back of the set will aid in reducing noise and improve reception. A satisfactory ground can be made by connecting to a radiator or water pipe. In the absence of a radiator or water pipe, a 5 foot metal stake or pipe driven into moist earth may be used.

POWER SUPPLY

Make sure that the receiver line voltage control "D" is adjusted to correspond with the line voltage on which set will be operated before connecting line cord to a power receptacle. Refer to Figure 2 for location of line voltage control. Consult your local power company if you have any doubt as to the voltage and frequency in your locality.

This receiver can be adjusted to operate on 115, 130 or 230 volts alternating current (A.C.) 50 or 60 cycles. When the receiver leaves the factory it is adjusted to operate from 230 volts. In the event your average line voltage is 115 or 130 volts (whichever is closer), simply turn the line voltage control (D) to the voltage on which receiver will be used.

CAUTION: Be careful not to plug the line cord into a 230 volt receptacle with the voltage control set for 115 or 130 volts as damage to the receiver and phonograph will result. The line cord must never be plugged into a direct current (D.C.) receptacle.

MOTOROLA INC.

MODEL 67T61BN, 67F61BN

REF. NO.	PART NO.	DESCRIPTION
C-1	19C76476	Capacitor, variable: 3 gang; each gang section consists of 5 plate (7-80 mmf.) and 21 plate (7-402 mmf) sections
C-2	20A76734	Capacitor, trimmer: mica; 4-70 mmf; (20A76669) on same bracket as C-3, C-4 & C5; not replaceable separately
C-3	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-2, C-4 and C-5; not replaceable separately
C-4	20A76734	Capacitor, trimmer: mica; 7-130 mmf; (20K76670) on same bracket as C-2, C-3 & C-5; not replaceable separately
C-5	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-2, C-3 & C-4; not replaceable separately
C-6	20A76734	Capacitor, trimmer: mica; 4-70 mmf; (20A76669) on same bracket as C-7, C-8 & C-9; not replaceable separately
C-7	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-6, C-8 & C-9; not replaceable separately
C-8	20A76734	Capacitor, trimmer: mica; 7-130 mmf; (20K76670) on same bracket as C-6, C-7 & C-9; not replaceable separately
C-9	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-6, C-7 & C-8; not replaceable separately
C-10	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf
C-11	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf
C-12	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf
C-13	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf
C-14	21A76687	Capacitor, fixed: ceramic; 24 mmf 500V
C-15	21A76689	Capacitor, fixed: ceramic; 96 mmf 500V
C-16	21A76688	Capacitor, fixed: ceramic; 56 mmf 500V
C-17	21A76690	Capacitor, fixed: ceramic; 150 mmf 500V
C-18	20A76613	Capacitor, trimmer: mica; 8-20 mmf; on same bracket as C-19; not replaceable separately
C-19	20A76613	Capacitor, trimmer: mica; 4-45 mmf; on same bracket as C-18; not replaceable separately
C-20	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-21	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-22	20A76614	Capacitor, trimmer: mica; 8-20 mmf; on same bracket as C-23; not replaceable separately
C-23	20A76614	Capacitor, trimmer: mica; 4-45 mmf; on same bracket as C-22; not replaceable separately
C-24	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-25	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-26	21R2731	Capacitor, fixed: mica; 585 mmf 1% 500V
C-27	21R2732	Capacitor, fixed: mica; .005 mf 2% 300V
C-28	20B76642	Capacitor, trimmer: 8-50 mmf
C-29	20B76642	Capacitor, trimmer: 8-50 mmf
C-30	21K63198	Capacitor, fixed: ceramic; 50 mmf 600V
C-31	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-32	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-33	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-34	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-35	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-36	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-37	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-38	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-39	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-40	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-41	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-42	8A76497	Capacitor, fixed: paper; .05 mf 400V; shielded
C-43	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-44	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-45	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-46	23A76473	Capacitor, electrolytic: 30-30 mf 400V, 50 mf 25V
I-1	65X4151	Bulb: 6-8V; bayonet base; type #51
I-2	65X4151	Bulb: 6-8V; bayonet base; type #51
L-1	24C76750	Coil, antenna: complete with shield, 4 trimmers (C-2, C-3, C-4 & C-5) and tuning core
L-2	24K76751	Coil, R.F.: complete with shield, 4 trimmers (C-6, C-7, C-8 & C-9) and tuning core
L-3	24C76752	Coil, oscillator: complete with shield, 4 ceramic trimmers (C-10, C-11, C-12 & C-13), 4 fixed ceramic capacitors (C-14, C-15, C-16 & C-17) and 2 tuning cores
L-4	1X76728	Coil, shunt: bands "E & F" antenna shunt; white dot coding; complete with core and mounting bracket
L-5	1X76727	Coil, shunt: bands "E & F" R.F. shunt; yellow dot coding; complete with tuning core and mounting bracket
L-6	1X76725	Coil, shunt: band "F" oscillator shunt; red dot coding; complete with tuning core and mounting bracket
L-7	1X76726	Coil, shunt: band "E" oscillator shunt; green dot coding; complete with tuning core and mounting bracket
LS-1	50B76957	Speaker: 6" electrodynamic; 1275 ohm field; 3.2 ohm voice coil (at 400 cycles)
R-1	6R6004	Resistor, fixed: carbon; 1 megohm 1/2W Ins.
R-2	6R6004	Resistor, fixed: carbon; 1 megohm 1/2W Ins.
R-3	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2W Ins.
R-4	6R6056	Resistor, fixed: carbon; 47,000 ohms 1/2W Ins.
R-5	6R6306	Resistor, fixed: carbon; 15,000 ohms 10% 3W N.I.
R-6	6R6290	Resistor, fixed: carbon; 2200 ohms 1/2W Ins.
R-7	6R5736	Resistor, fixed: carbon; 47,000 ohms 10% 2W Ins.
R-8	6R5927	Resistor, fixed: carbon; 2.2 megohms 1/2W Ins.
R-9	6R6004	Resistor, fixed: carbon; 1 megohm 1/2W Ins.
R-10	6R2122	Resistor, fixed: carbon; 4.7 megohms 1/2W Ins.
R-11	18K76686	Resistor, variable: 1 megohm; tapped at 300,000 ohms; includes on-off switch SW-3
R-12	6R6032	Resistor, fixed: carbon; 470,000 ohms 1/2W Ins.
R-13	6R6032	Resistor, fixed: carbon; 470,000 ohms 1/2W Ins.
R-14	6R3985	Resistor, fixed: carbon; 300 ohms 10% 2W Ins.
R-15	6R6406	Resistor, fixed: carbon; 22 ohms 10% 1/2W Ins.
R-16	6R6012	Resistor, fixed: carbon; 33,000 ohms 1/2W Ins.
R-17	18K76686	Resistor, variable: 1 megohm; includes phono-radio switch SW-4
R-18	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2W Ins.
R-19	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2W Ins.
SW-1	40B76483	Switch, band: 6 position
SW-2	40A76621 or 40A76657	Switch, line voltage: single pole, 3 position
SW-3		Switch, S.P.S.T.: part of volume control R-11 (power on-off switch)
SW-4		Switch, D.P.D.T.: part of tone control R-17 (radio-phono switch)
T-1	24B76696	Transformer, I.F.: 455 Kc; complete with iron cores and padding capacitors, but less shield
T-2	24B70587	Transformer, diode: 455 Kc; complete with iron cores and padding capacitors, but less shield
T-3	25B76474	Transformer, output
T-4	25C76482	Transformer, power
	59C77045	Arm, pick-up: complete
	7A76622	Bracket, tuning shaft
	15P77255	Cabinet, table model
	30K21859	Cord, line: 9 ft. long; with plug
	5A71092	Grommet, rubber: 5/8 x 3/4 dia. (chassis mounting)

MODEL 67T61BN

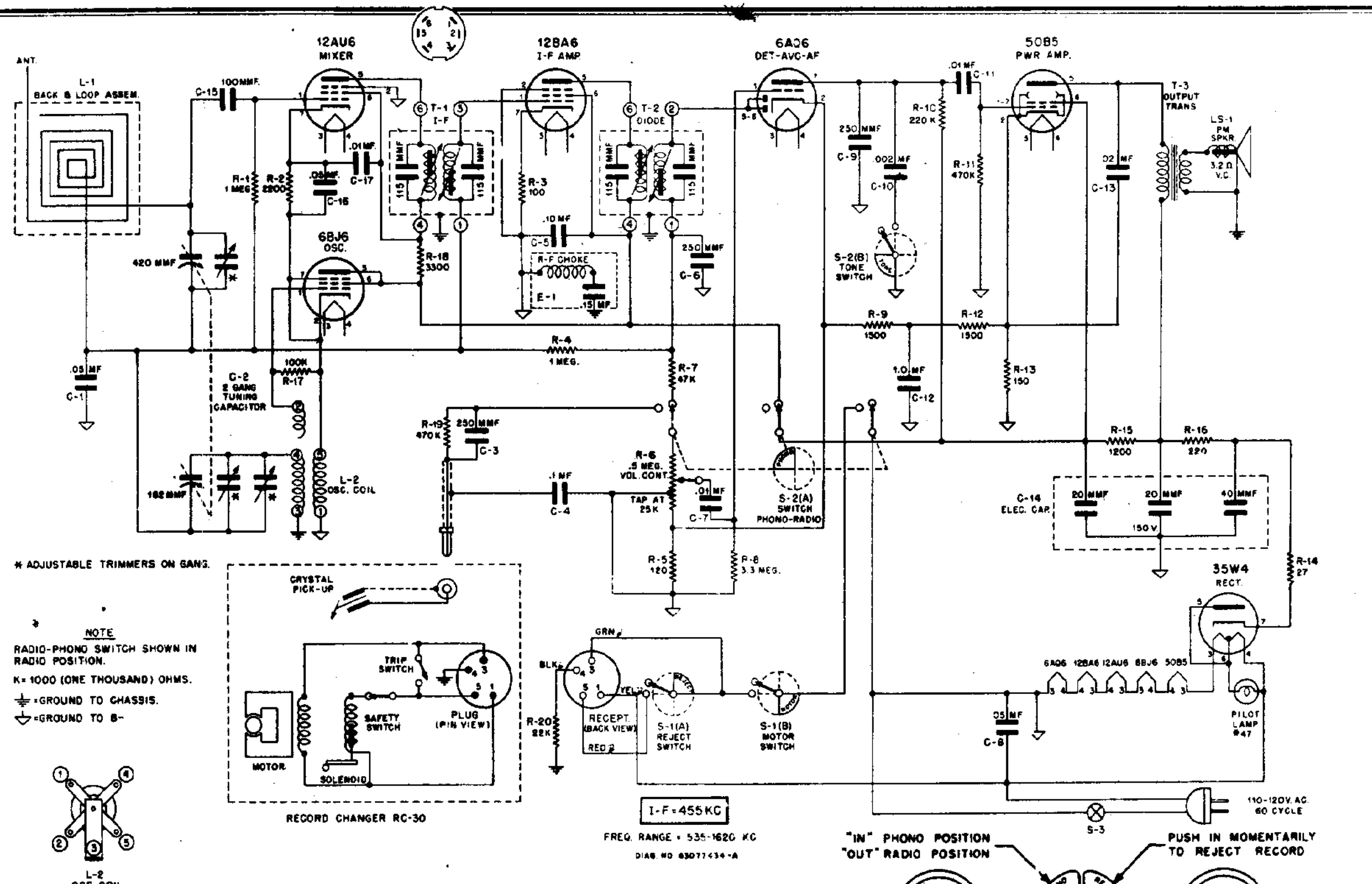
REF. NO.	PART NO.	DESCRIPTION
	7A76622	Bracket, tuning shaft
	15K76962	Cabinet, table model
	30K21859	Cord, line: 9 ft. long; with plug
	5A71092	Grommet, rubber: 5/8 x 3/4 dia. (chassis mounting)
	5A71130	Grommet, rubber: 1/4 x 1/2 dia. body; 3/4 dia. head (chassis retainer)
	5A76629	Grommet: rubber (dial scale cushion)
	37K15125	Grommet, rubber (gang cushions)
	5A76960	Grommet, rubber (speaker mounting)
	14A76696	Insulator, electrolytic capacitor
	36K76795	Knob, control: branded (band switch)
	36B76794	Knob, control: plain
	52K76676	Pointer, dial
	9A22162	Receptacle, plug: 1 prong
	9A27674	Receptacle, plug: 3 prong
	34D76705	Scale, dial
	47A76624	Shaft, tuning
	1A71049	Shield & Iron Core Sleeve Assembly (for I.F. or diode transformer)
	9A70166	Socket, tube: octal; plain
	9A77378	Socket, tube: octal; shielded type
	9A6729	Socket, tube: 5 prong; saddle type
	9A76708	Socket, pilot light; with lead
	2A76635	Speednut, trimmer lock-in (C-28 & C-29 mounting)
	31A781	Strip, antenna & ground
	4A25164	Washer, "C" (tuning shaft retainer)

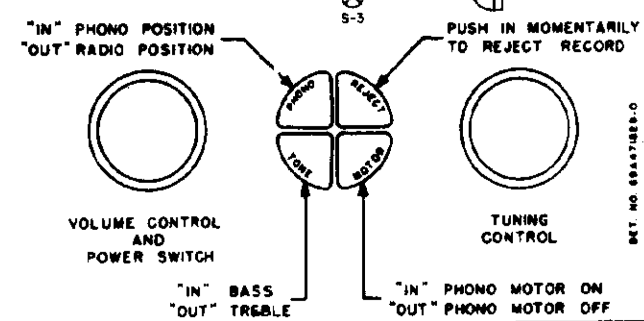
MODEL 67F61BN

REF. NO.	PART NO.	DESCRIPTION
	5A71130	Grommet, rubber: 1/4 x 1/2 dia. body; 3/4 dia. head (chassis retainer)
	5A76629	Grommet: rubber (dial scale cushion)
	37K15125	Grommet, rubber (gang cushions)
	5A76960	Grommet, rubber (speaker mounting)
	55K76466	Hinge
	14A76696	Insulator, electrolytic capacitor
	36K77260	Knob, control: branded (band switch)
	36K77259	Knob, control: plain
	59C77047	Motor, phono
	47K72843	Needle, phonograph: sapphire tipped
	52K76676	Pointer, dial
	28A27573	Plug, 3 pin (phono motor)
	9A22162	Receptacle, plug: 1 prong
	9A27674	Receptacle, plug: 3 prong
	34D76705	Scale, dial
	47A76624	Shaft, tuning
	1A71049	Shield & Iron Core Sleeve Assembly (for I.F. or diode transformer)
	9A70166	Socket, tube: octal; plain
	9A77378	Socket, tube: octal; shielded type
	9A6729	Socket, tube: 5 prong; saddle type
	9A76708	Socket, pilot light; with lead
	2A76635	Speednut, trimmer lock-in (C-28 & C-29 mounting)
	31A781	Strip, antenna & ground
	55B71779	Support, lid
SW-5	40A77040	Switch, control (phono motor)
	49C77046	Turntable, phono
	4A25164	Washer, "C" (tuning shaft retainer)

MODELS 67F11, 67F12, 67F12B MOTOROLA INC.

Chassis HS-63





PHONO SWITCH. The radio will not play unless the PHONO button is out (flush with REJECT button). Alternate pushes will lock the button "in" for phono operation and "out" for radio reception.

TONE SWITCH. Alternate pushes on TONE button will change the tone to bass or treble. Bass position is with button "in".

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ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

It is suggested that an isolating transformer be used between receiver and power line during alignment.

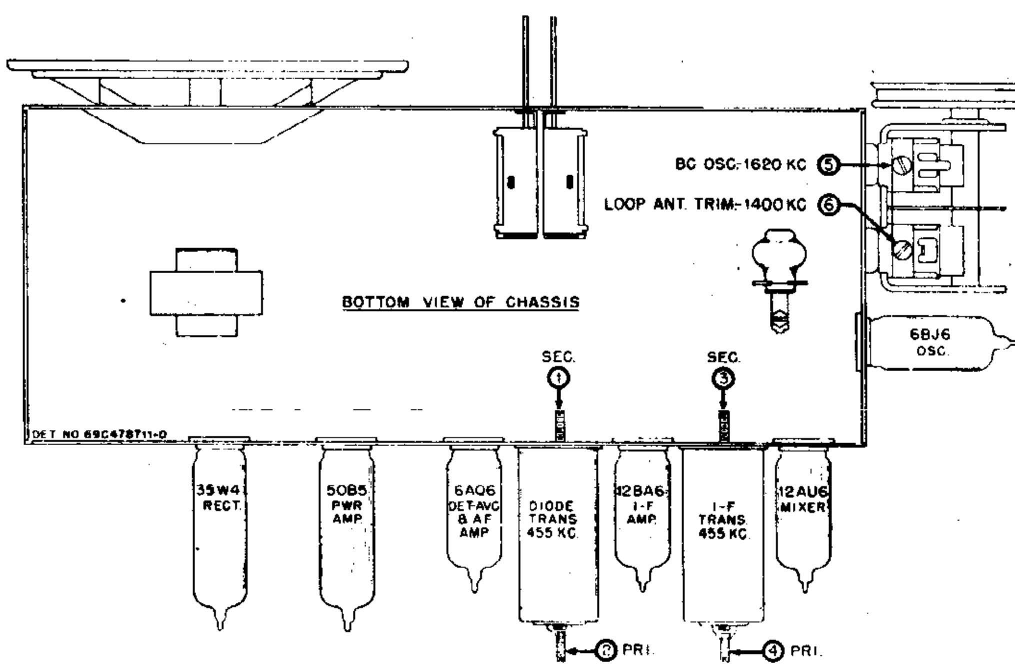
A low range output meter should be connec across the speaker voice coil. Set receiver vo control to maximum. For greatest accuracy, output of receiver at approximately .05 watt watt = .40 volt on output meter) throughout al ment by reducing signal generator output (not ceiver volume control) as stages are brought alignment.

ALIGNMENT CHART

Refer to Figure 3 for location of all alignment trimmers and cores.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	Mixer Grid (pin #1) & B-	455 Kc	1,2,3 & 4	Adjust for maximum
RF ALIGNMENT						
2.	Gang fully opened	.1 mf	Mixer Grid (pin #1) & B-	1620 Kc	5	This sets oscillator to d scale. (Check pointer ca bration by referring to F ure 4).
3.	1400 Kc	None	Radiation Loop *	1400 Kc	6	Tune signal in on receive then adjust trimmer (6) f maximum. After set is ass bled in cabinet, repeak t trimmer.

* Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiv loop to obtain output of 50 milliwatts (.40V) on output meter. Vary distance between loops to maintai this output during alignment. Minimum distance between loops should never be less than 12".



MODELS 67F11,
67F12, 67F12B

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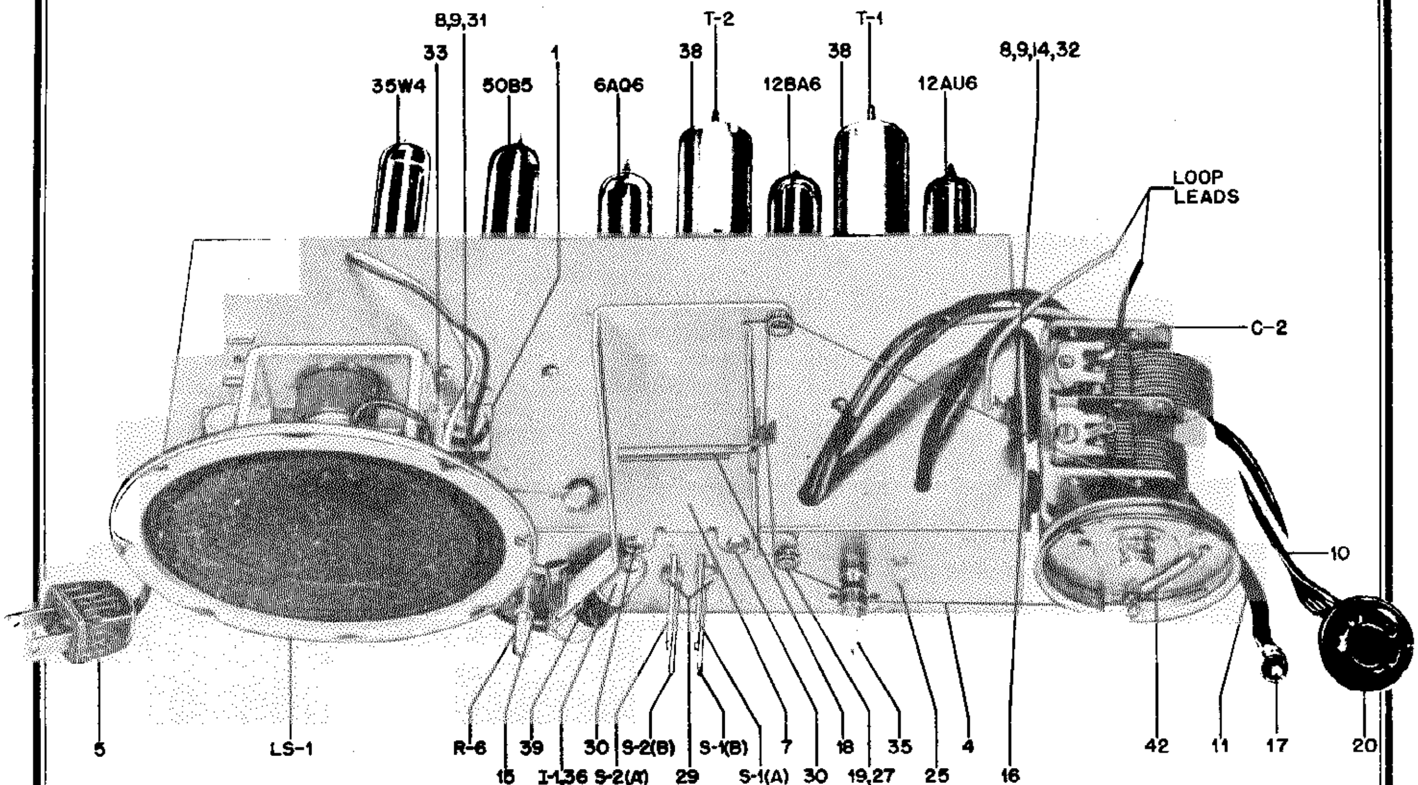

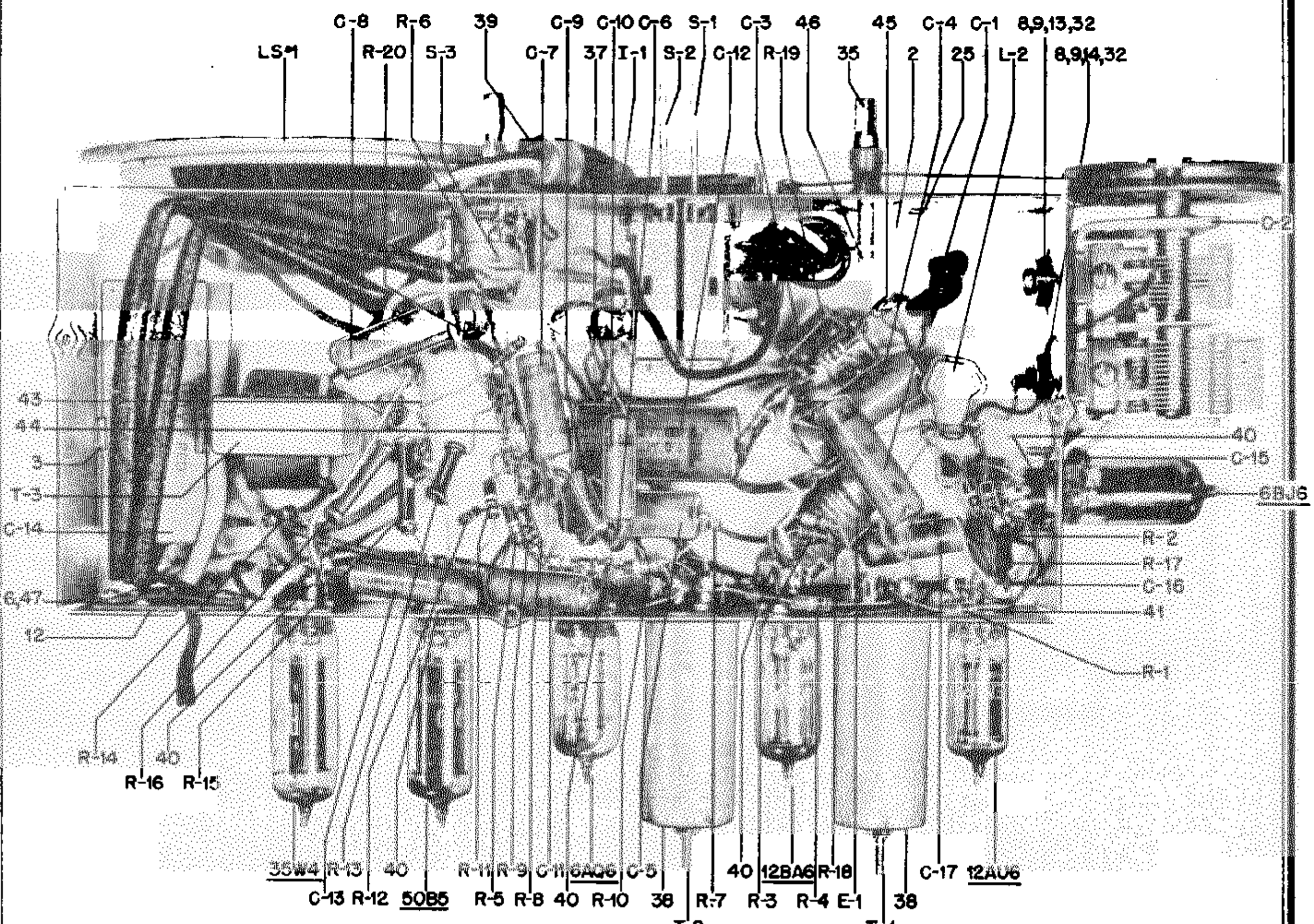

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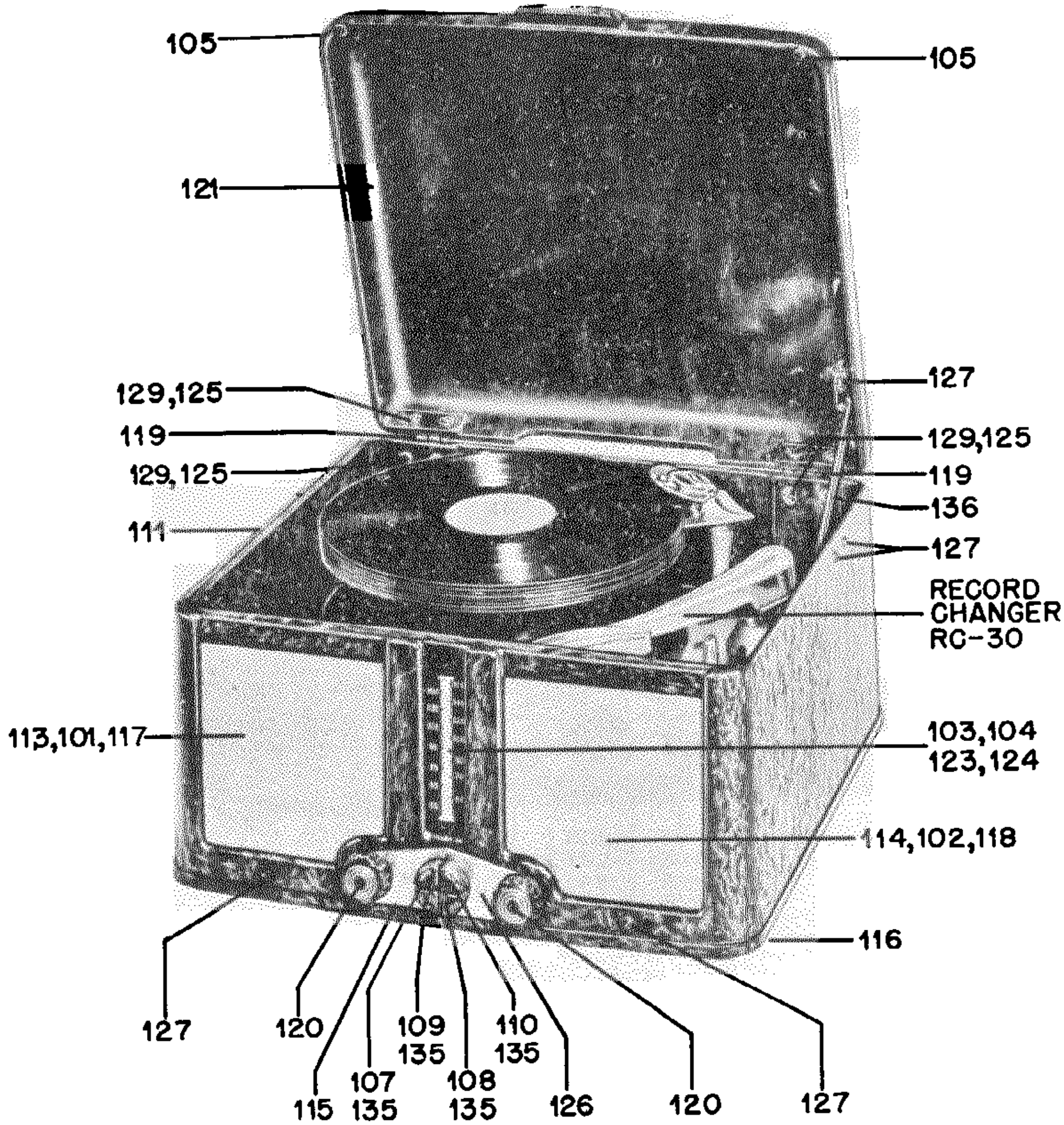
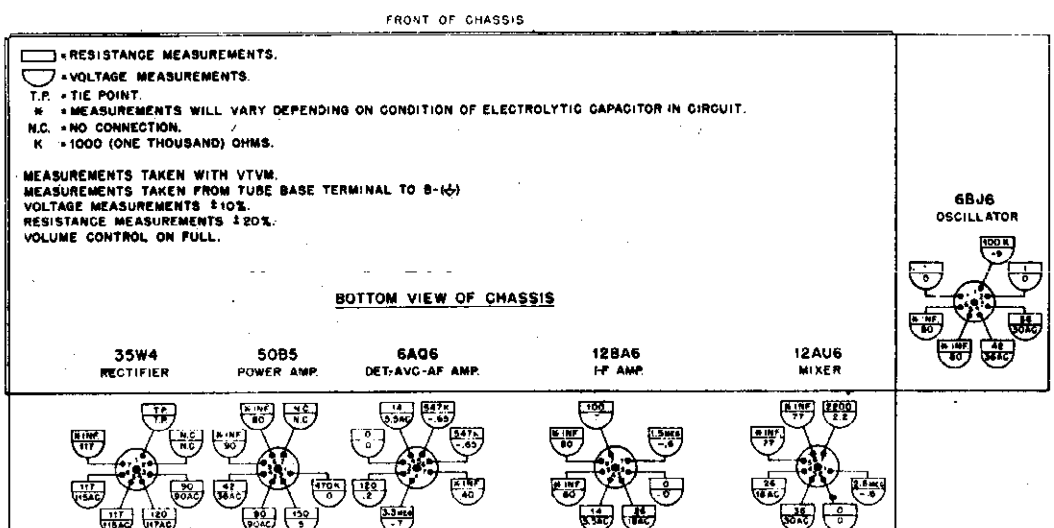


PARTS LOCATION -CABINET- MODEL 67F11



MODELS 67F11, 67F12, 67F12B

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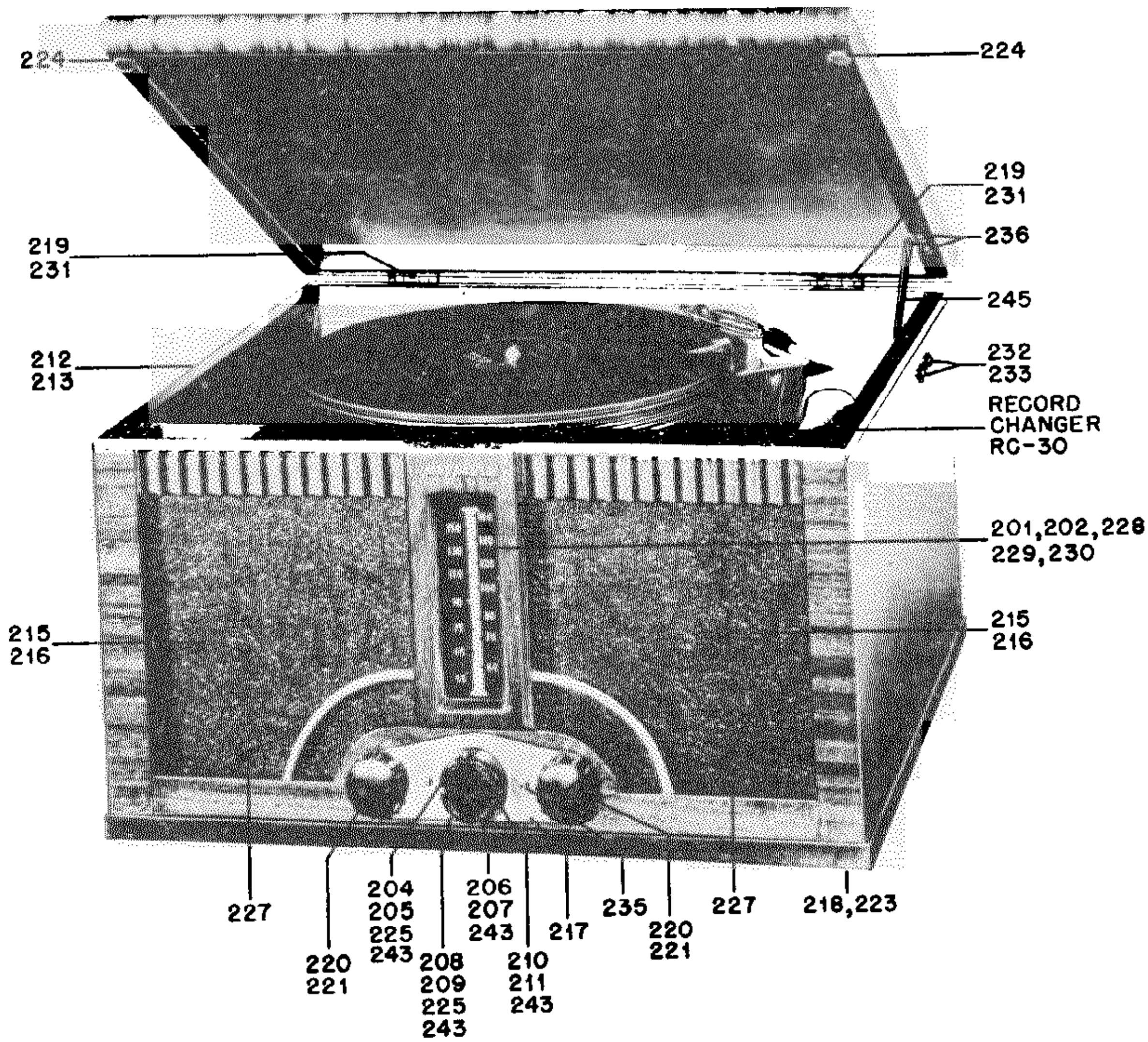
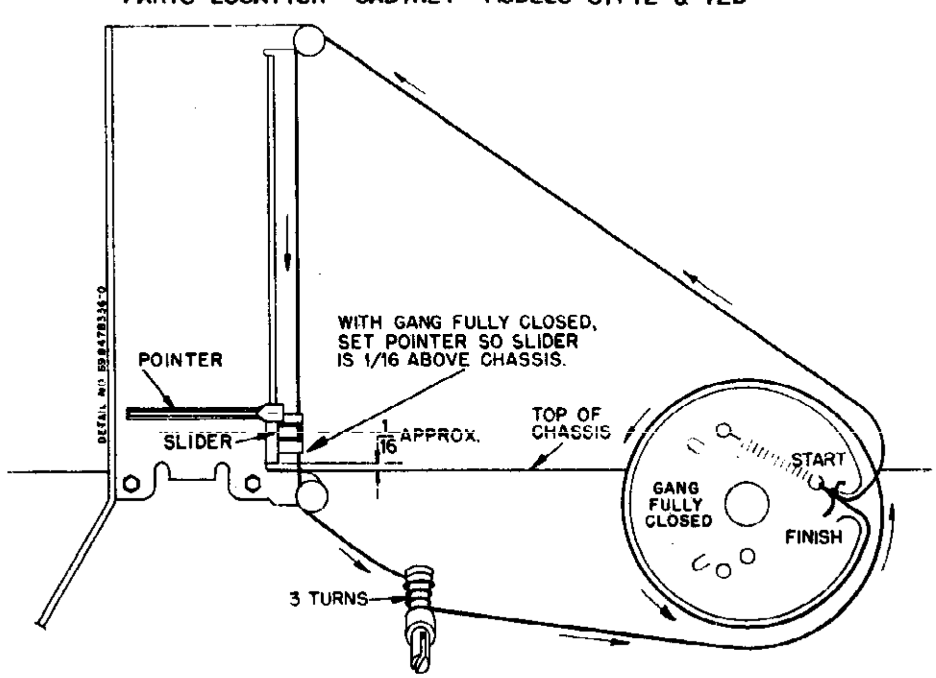


PARTS LOCATION -CABINET- MODELS 67F12 & 12B



MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
110	38K470205	Button, push: REJECT; walnut plastic; with insert spring
111	1K470201	Cabinet Assembly: walnut plastic; complete with all hardware, dial scale, escutcheon and grille
	15E77697	Cabinet: walnut plastic; less all hardware, dial scale, escutcheon, grille and lid
112	42A471546	Clip "C" (loop lead retainer)
113	13K471556	Cloth, grille (left side)
114	13B471555	Cloth, grille (right side)
115	13K470513	Escutcheon, knob and push button: brushed brass finish
116	37A12748	Foot, cabinet: rubber; includes steel washer
117	15C470516	Grille, cabinet: metal (left side)
118	15K470517	Grille, cabinet: metal (right side)
119	55A470195	Hinge, lid: statuary bronze finish
120	36K77661	Knob, control: walnut plastic
121	16E77698	Lid, cabinet: walnut plastic
122	29A470186	Lug, soldering: bent (on loop panel)
123	34B470208	Scale, dial: glass
124	3S2992	Screw: 4-40 x 5/16 slotted flat head machine screw cadmium plated (dial scale mounting)
125	3S2994	Screw: 6-32 x 3/16 slotted binderhead machine screw; statuary bronze finish (hinge mtg)
126	38476039	Screw: 6-32 x 3/8 Phillips binderhead machine screw; brass (escutcheon mtg)
127	3S2993	Screw: 6-32 x 3/8 Phillips binderhead machine screw; black nickel plated (baffle board mtg and lid support mtg)
128	3S3365	Screw: #6 x 3/8 PKZ plain hex head sheet metal screw; statuary bronze finish (loop panel mtg)
129	3A470198	Screw, special: 6-32 internal thread; statuary bronze finish (hinge mtg)
130	3S2968	Screw: 6-32 x 7/16 slotted hex head machine screw; cadmium plated (chassis, tube heat shield & cabinet foot mtg)
131	3S7398	Screw: 10-32 x 2" slotted hex head machine screw; copper plated (record changer mtg)
132	26C470067	Shield, tube heat (Note: Some receivers had tube retainer springs on this shield; these are no longer used or required)
133	41A21807	Spring, cushion: bottom (record changer mtg)
134	41A28190	Spring, cushion: top (record changer mtg)
135	41A12993	Spring, push button insert
136	55B470209	Support, lid: statuary bronze finish
137	4S7562	Washer: 7/16 x .187 x .033 thick; cadmium plated (chassis mtg)
138	4S7611	Washer: 1/2 x 7/32 x .048 thick; antique copper finish (record changer mtg)

CABINET PARTS - MODELS 67F12 & 67F12B

REF. NO.	PART NO.	DESCRIPTION
201	37K70069	Band, rubber: 1" (on dial scale)
202	7A470642	Bracket, dial scale retainer
203	38K470630	Button, plug: 1/4", green (for concealing shipping screw holes in record changer base)
204	38B470202	Button, push: PHONO; walnut plastic; with insert spring (67F12)
205	38K471644	Button, push: PHONO; mottled tan plastic; with insert spring (67F12B)
206	38K470203	Button, push: MOTOR; walnut plastic; with insert spring (67F12)
207	38K471645	Button, push: MOTOR; mottled tan plastic; with insert spring (67F12B)
208	38K470204	Button, push: TONE; walnut plastic; with insert spring (67F12)
209	38K471646	Button, push: TONE; mottled tan plastic; with insert spring (67F12B)
210	38K470205	Button, push: REJECT; walnut plastic; with insert spring (67F12)
211	38K471647	Button, push: REJECT; mottled tan plastic; with insert spring (67F12B)
212	16E470647	Cabinet, table model: wood, walnut finish (67F12)
213	16K471651	Cabinet, table model: wood, blonde finish (67F12B)
214	42A470632	Clamp, cable
215	13K470648	Cloth, grille: 7 x 6-1/2 (67F12)
216	13K471652	Cloth, grille: 7 x 6-1/2 (67F12B)
217	13K470513	Escutcheon, knob and push button: brushed brass finish
218	37K15841	Foot, cabinet: rubber
219	55K470656	Hinge, lid: statuary bronze finish
220	36K470646	Knob, control: walnut plastic (67F12)
221	36K471643	Knob, control: mottled tan plastic (67F12B)
222	29A470186	Lug, soldering: bent (on loop panel)
223	2257965	Nail: .080 x 5/8 (cabinet foot mtg)
224	35K470657	Pad, felt: 1/2 x 1/16 thick (lid cushion)
225	35K76759	Pad, felt (used inside hollow space of PHONO & TONE button on 67F12B) to prevent light from showing through)
226	64K478098	Plate, perforated: painted
227	47A470640	Rod, ornamental: brass
228	34B470208	Scale, dial: glass (67F12)
229	34K471642	Scale, dial: glass (67F12B)
230	3S7431	Screw: #2 x 1/4 Phillips round head wood screw; antique copper finish (dial scale mtg)
231	3S1536	Screw: #4 x 1/2 slotted flat head wood screw; statuary bronze finish (hinge mounting)
232	3S2995	Screw: 6-32 x 3/8 Phillips oval head machine screw; copper oxide finish (mounts lid support to cabinet (67F12)
233	38476039	Screw: 6-32 x 3/8 Phillips; binderhead machine screw; brass (mounts lid support to cabinet (67F12B)
234	3S1346	Screw: #6 x 3/8 Phillips round head wood screw; antique copper finish (perforated plate mounting)
235	3S1341	Screw: #6 x 3/8 Phillips oven head wood screw; brass (escutcheon mtg)
236	3S7436	Screw: #6 x 1/2 slotted round head wood screw; antique copper finish (mounts lid support to lid)
237	3S3387	Screw: #6 x 1/2 PKA slotted hex head; statuary bronze finish (loop panel mtg)
238	48476007	Screw: 6-32 x 7/8 slotted hex head machine screw; cadmium plated (chassis and tube heat shield mtg)
239	3S7398	Screw: 10-32 x 2 slotted hex head machine screw; copper plated (record changer mounting)
240	26C470067	Shield, tube heat
241	41A28190	Spring, cushion: top (record changer mounting)
242	41A21807	Spring, cushion: bottom (record changer mounting)
243	41A12993	Spring, push button insert
244	2257904	Staple, insulated: 1/4" (loop lead anchor)
245	55K470636	Support, lid: statuary bronze finish
246	2A470641	Teenut, pronged: 6-32; slabbed type
247	4A470645	Washer, paper spacer (loop panel spacer.
248	4S7562	Washer: 7/16 x .187 x .033 thick; cadmium plated (chassis mtg)
249	4S7611	Washer: 1/2 x 7/32 x .048 thick; antique copper finish (record changer mtg)

MOTOROLA INC.

CHASSIS PARTS - HS-63

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1	8S9816	Paper: .05 mf 400V
C-2	1X470161	Variable, 2 gang: includes pulley
C-3	21R6648	Mica: 250 mmf 500V
C-4	8S9807	Paper: .1 mf 400V
C-5	8S9806	Paper: .1 mf 200V
C-6	21R6648	Mica: 250 mmf 500V
C-7	8S9809	Paper: .01 mf 400V
C-8	8S9816	Paper: .05 mf 400V
C-9	21R6648	Mica: 250 mmf 500V
C-10	8S9824	Paper: .002 mf 400V
C-11	8S9809	Paper: .01 mf 400V
C-12	8S9839	Paper: 1.0 mf 100V
C-13	8S9802	Paper: .02 mf 400V
C-14	23B75806	Electrolytic: 40-20-20/150V
C-15	21R6641	Mica: 100 mmf 500V
C-16	8S9821	Paper: .05 mf 200V
C-17	8S9809	Paper: .01 mf 400V
CHOKE		
E-1	1A77283	Capacitor and Choke Assembly (includes .15 mf 200V paper capacitor and coil)
DIAL LIGHT		
I-1	65X11864	Bulb: 6.3V .15A; tubular; bayonet base; clear; #47
COILS		
L-1	24C470214	Loop & Panel Assembly
L-2	24A74616	Oscillator
SPEAKER		
LS-1	50B470084	PM: 5"; 3.2 ohm VC
RESISTORS		
Note:		All resistors are insulated carbon type 20% 1/2 watt unless otherwise specified.
R-1	6R6004	1 meg
R-2	6R6146	2200
R-3	6R6018	100
R-4	6R6004	1 meg
R-5	6R5551	120 10%
R-6	18K470033	Volume Control: .5 Meg, tapped at 25,000 ohms; includes power switch
R-7	6R6056	47,000
R-8	6R2118	3.3 meg
R-9	6R6038	1500 10%
R-10	6R6015	220,000
R-11	6R6032	470,000
R-12	6R6038	1500 10%
R-13	6R6392	150 10% not insulated
R-14	6R5663	27 10%
R-15	6R3972	1200 10% 1W not insulated
R-16	6R6060	220 10% 1W not insulated
R-17	6R6075	100,000
R-18	6R6036	3,300
R-19	6R6032	470,000
R-20	6R6028	22,000
SWITCHES		
S-1	40A470510	Dual Push Switch: reject and motor
S-2	40A470511	Dual Push Switch: phono and tone
S-3		Power switch: part of volume control
TRANSFORMERS		
T-1	24B470038	IF, 455 Kc: includes padding capacitors and tuning cores but less shield
T-2	24B75487	Diode, 455 Kc: includes padding capacitors and tuning cores but less shield
T-3	25B76117	Output
MISCELLANEOUS CHASSIS PARTS		
1	7K470005	Bracket, speaker mtg
2	7A77337	Bracket, tuning shaft mtg
3	42K75826	Clip, electrolytic mtg
4	11M8944	Cord, dial; 16# black
5	30K21659	Cord, line: 9 ft long; with plug
6	1X470184	Cover, chassis bottom: includes grounding wiper
7	1X470183	Dial Bracket and Pulley Assembly
8	5A70098	Eyelet, spacer (tuning gang and speaker mounting)
9	5A70404	Grommet, rubber (tuning gang and speaker mounting)
10	1X470177	Lead Assembly, phono motor & control: four conductors, includes four prong receptacle
11	1X470178	Lead Assembly, phono pick-up: single conductor; includes single pin plug
12	32A24815	Lock, line cord: fibre
13	4S7686	Lockwasher: #6 external; cadmium plated (tuning gang mtg)
14	29R5227	Lug, soldering: 6L hot-tinned
15	2S7061	Nut: 3/8-32 x 9/16; Palnut; cadmium plated (volume control mtg)
16	64A470009	Plate, tuning gang mtg
17	28K71775	Plug, single pin (on phono pick-up lead)
18	52A470005	Pointer, dial
19	49A12646	Pulley, cord guide
20	9K470402	Receptacle, 4 prong
21	5S8497	Rivet: .088 x 1/8; steel, nickel plated (molded tube socket mtg)
22	5S2815	Rivet: .088 x 7/32; steel, nickel plated (wafer tube socket mtg)
23	5S7706	Rivet: .122 x 1/8; nickel plated (grounding wiper mtg)
24	5S7707	Rivet: .122 x 5/32; steel, nickel plated (terminal strip mtg)
25	5S7701	Rivet: .122 x 3/16; steel, nickel plated (tuning shaft bracket mtg)
26	5S7708	Rivet: .122 x 9/32; steel, nickel plated (line cord lock mtg)
27	5A71246	Rivet, shoulder (cord pulley mtg)
28	3S2683	Screw: #6 x 3/16 PKZ plain hex head sheet metal screw; cadmium plated (oscillator coil mtg)
29	3S7247	Screw: 6-32 x 3/16 slotted hex head locking type machine screw; cadmium plated (switch mtg)
30	3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (tuning gang plate mtg and dial bracket assembly mounting)
31	3S3560	Screw: #6 x 1/2 PKZ plain hex head sheet metal screw; cadmium plated (speaker mounting)
32	3S7539	Screw: 6-32 x 5/8 slotted hex head machine screw; cadmium plated (tuning gang mounting)
33	3S7205	Screw: 8-32 x 1/4 slotted hex head locking type machine screw; cadmium plated (speaker bracket mtg)
34	3S8153	Screw: #8 x 3/8 PKA plain hex head sheet metal screw; cadmium plated (mounts chassis bottom cover to chassis)
35	1X470172	Shaft and Pulley Assembly, tuning
36	26A470013	Shield, dial light
37	30K14144	Shield, spiral: 3-1/4" long
38	1A71049	Shield and Sleeve Assembly (for IF and Diode transformer)
39	9A470015	Socket, pilot light and leads: with mounting clip
40	9A470506	Socket, tube: miniature; 7 prong; molded
41	9A6778	Socket, tube: miniature; 7 prong; wafer
42	41A14244	Spring, tension coil
43	31K90044	Strip, terminal: 2 insulated lugs #2 ground
44	31A27184	Strip, terminal: 3 insulated lugs #3 mtg
45	31A470012	Strip, terminal: 4 insulated lugs #5 ground
46	4A70015	Washer "C" (tuning shaft retainer)
47	4S1719	Washer: 3/8 x .140 x .030; steel, cadmium plated (line cord lock mtg)
48	39K470052	Wiper, grounding: two section (used on chassis bottom cover)

CABINET PARTS - MODEL 67F11

REF. NO.	PART NO.	DESCRIPTION
101	1X470286	Baffle Board and Nut Assembly: left side; with speaker hole
102	1X470287	Baffle Board and Nut Assembly: right side
103	37K470185	Band, rubber: 4" (used on dial scale)
104	7A470196	Bracket, dial scale retainer
105	35A470192	Bumper, rubber (lid cushion)
106	38K470630	Button, plug: 1/4"; green (for concealing shipping screw holes in record changer base)
107	38B470202	Button, push: PHONO; walnut plastic; with insert spring
108	38K470203	Button, push: MOTOR; walnut plastic; with insert spring
109	38K470204	Button, push: TONE; walnut plastic; with insert spring

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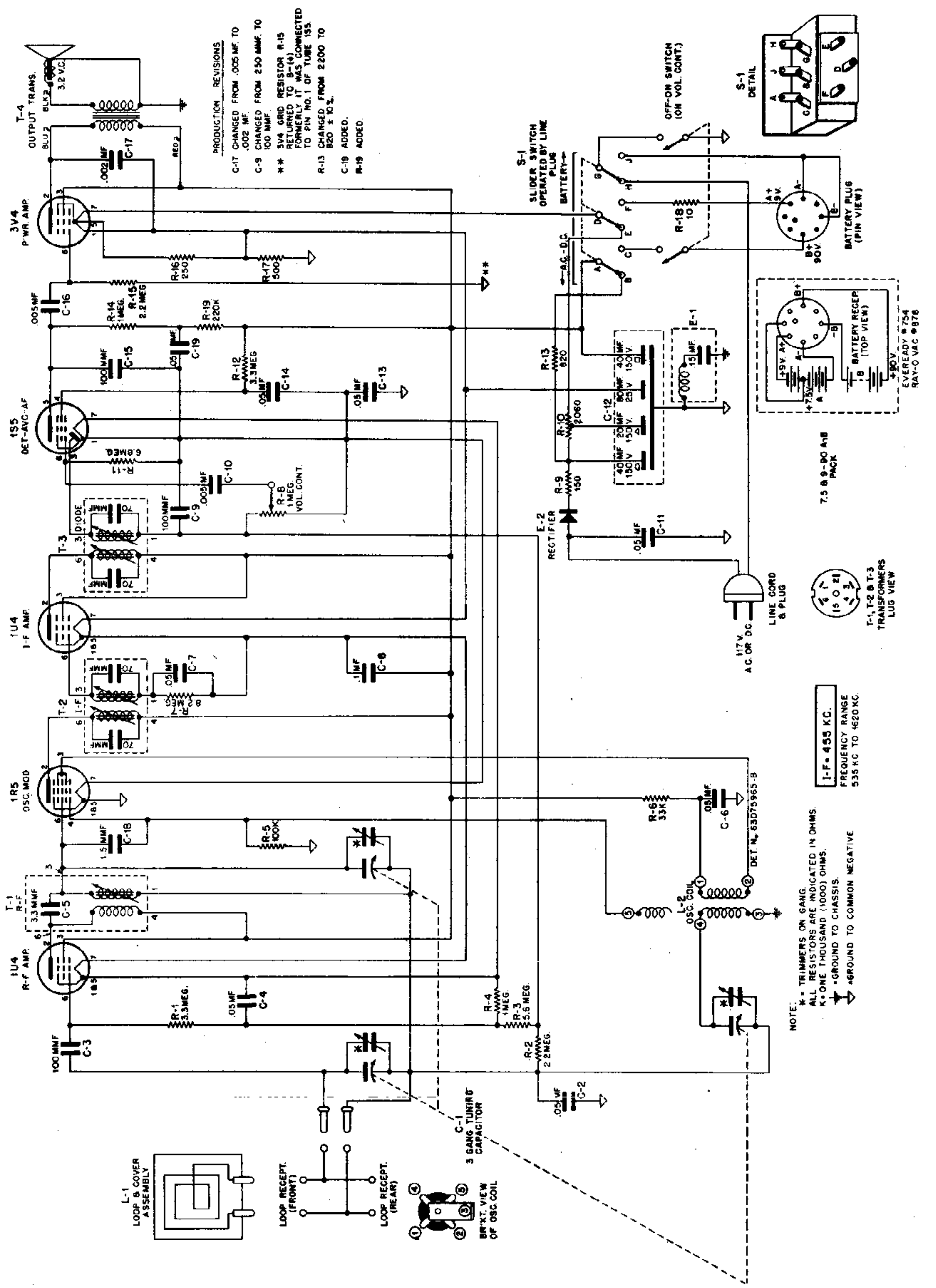


MODEL 67L11

MOTOROLA INC.

ALIGNMENT

Maximum performance can only be obtained if extreme care is exercised during alignment. Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum; for greatest accuracy keep output of receiver at approximately .05 watt throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter.) The alignment tool should be of an insulated type such as Motorola part number 66A71006.

If receiver is operated from AC line during alignment, it is suggested that an isolating transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator to B- instead of the receiver chassis.

Refer to Figure 1 for location of all adjustments.

Normally, alignment can be made with trimmers 5, 6 and 7. However, if range of these trimmers is insufficient to obtain peak, adjustment can be made with trimmers 5A, 6A and 7A.

R.F. COIL. The inductance of this coil is set at time of manufacture by adjusting the iron core. No resetting of this core should be made unless it has been tampered with. If so, readjustment can be made by proceeding as follows:

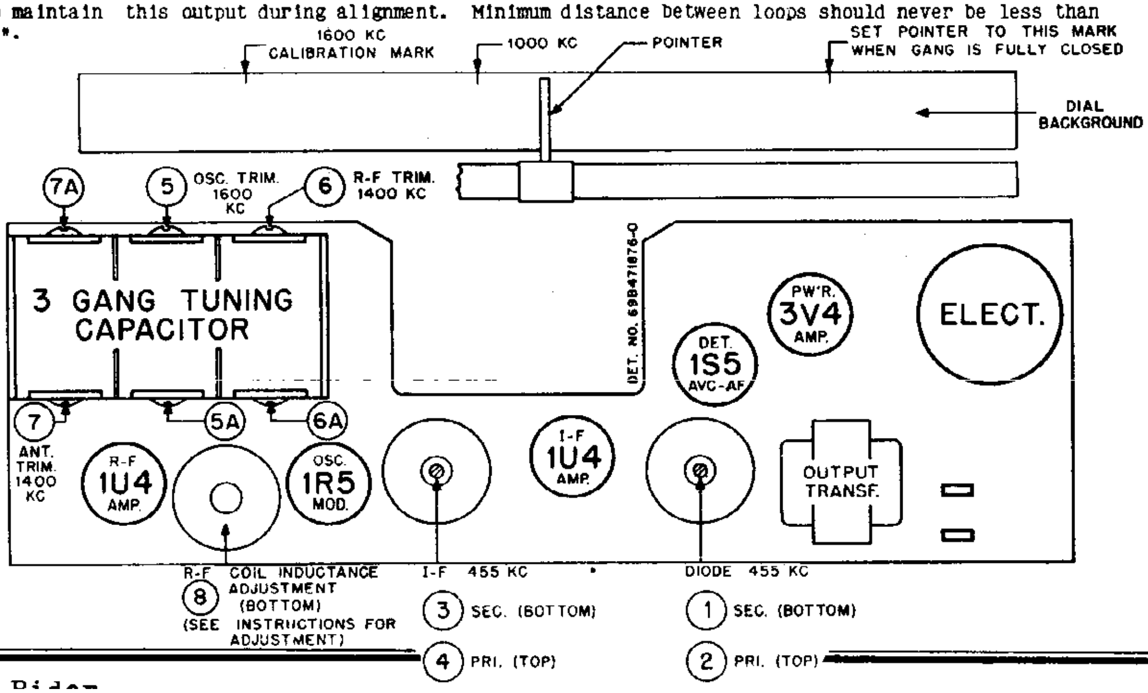
Tune in 600 Kc signal and peak Padder Adj. (8). Next tune in 1400 Kc signal and peak trimmer (6). Repeat both adjustments until maximum response is obtained at both ends; the last adjustment should be trimmer (6).

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened.	.1 mf	OSC-MOD grid*	455 Kc	1,2,3 & 4	Adjust for maximum output
RF ALIGNMENT						
2.	1600 Kc**	-	Radiation loop***	1600 Kc	5	This sets osc. to dial scale.
3.	1400 Kc	-	Radiation loop***	1400 Kc	6 & 7	Tune signal for max. with receiver tuning knob, then peak trimmers 6 & 7.
4.	1400 Kc	-	Radiation loop***	1400 Kc	7	With chassis assembled into cabinet, repeak antenna trimmer. Loop should be in upright position.

* A convenient point is the stator of the tuning capacitor.

** Close gang fully and set pointer to calibration mark at left hand side of dial background, then set to 1600 Kc by setting pointer at right hand calibration mark.

*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring loop close enough to receiver loop to obtain output of 50 milliwatts (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".



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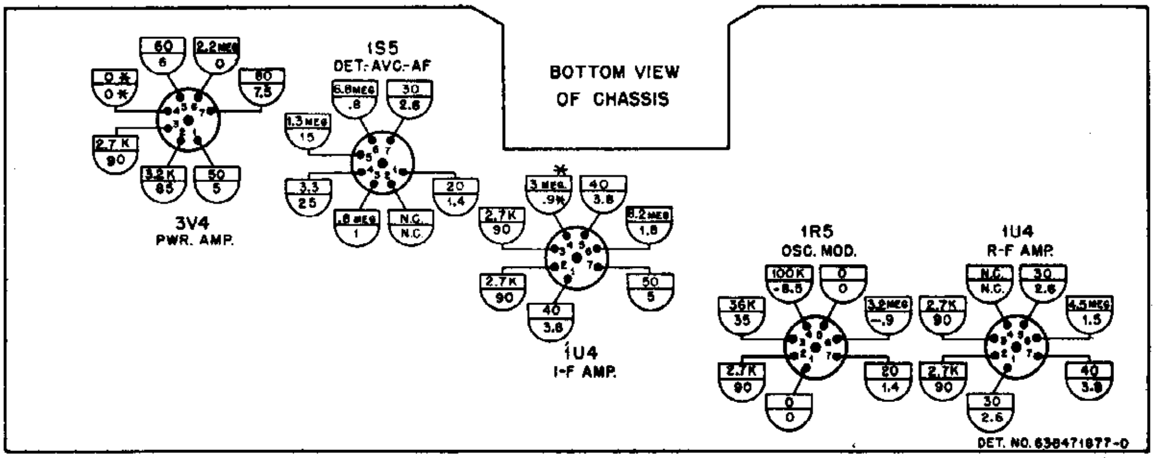
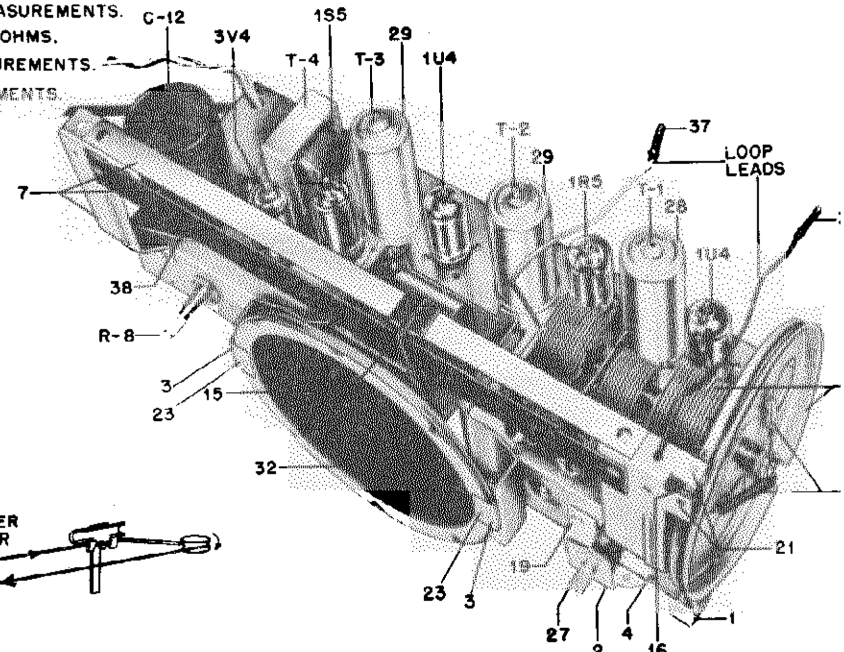
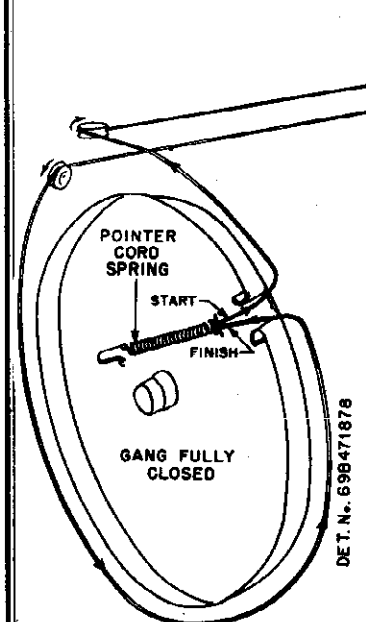


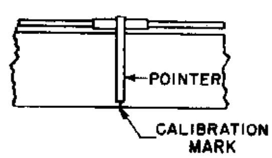
NOTE: A VTVM WAS USED TO MAKE MEASUREMENTS.
MEASUREMENTS ARE MADE FROM TUBE BASE PIN TO B- (⏚)
SET WAS OPERATED FROM 117 V. AC LINE FOR VOLTAGE MEASUREMENTS.
SET WAS IN AC POSITION AND POWER SWITCH WAS 'ON' FOR RESISTANCE MEASUREMENTS.
K = 1000 (ONE THOUSAND) OHMS.
▭ = RESISTANCE MEASUREMENTS.
◡ = VOLTAGE MEASUREMENTS.

VOLTAGE TOLERANCE = ±10%.
RESISTANCE TOLERANCE = ±20%.
✱ = TIE LUG.



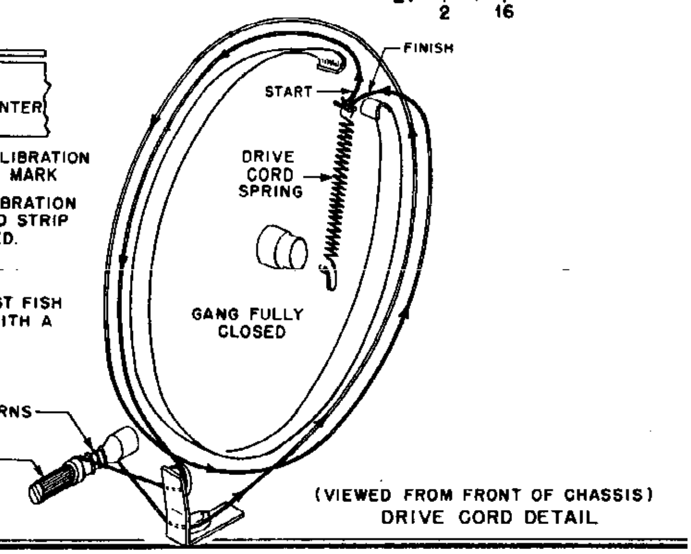


(VIEWED FROM REAR OF CHASSIS)
POINTER CORD DETAIL



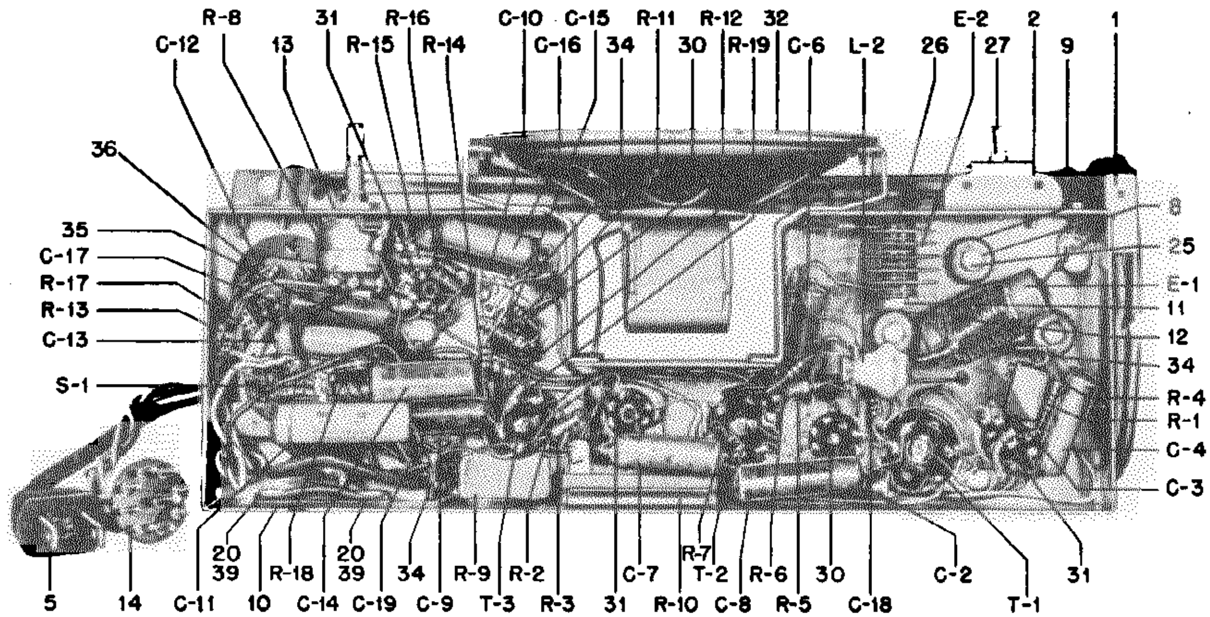
SET POINTER TO CALIBRATION MARK ON BACKGROUND STRIP WHEN GANG IS CLOSED.

NOTE: USE 18 LB TEST FISH LINE. SECURE KNOT WITH A DROP OF CEMENT.



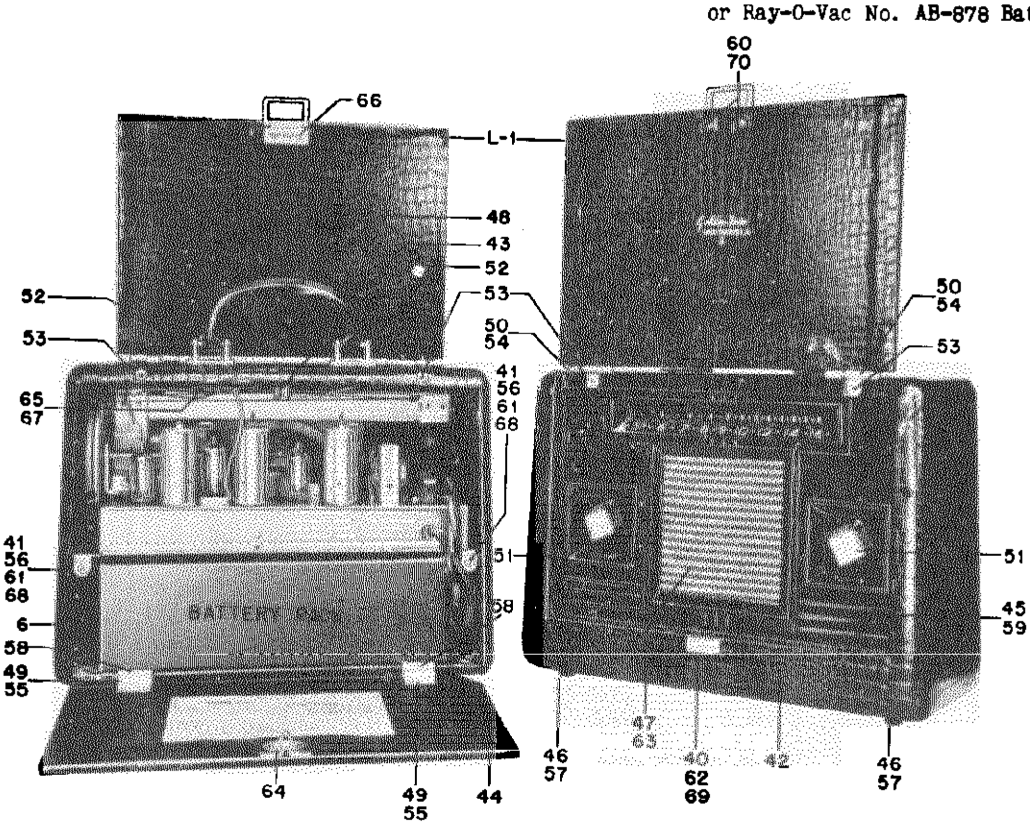
(VIEWED FROM FRONT OF CHASSIS)
DRIVE CORD DETAIL

MOTOROLA INC.



TYPE- 5 tube; three power portable, with a selenium rectifier for house current operation. Loop antenna is housed in detachable front cover.

POWER SUPPLY - Operates from 117V AC or DC (15 watts), or self-contained battery pack. Use Eveready No. 754 or Ray-O-Vac No. AB-878 Battery Pack.



MOTOROLA INC.

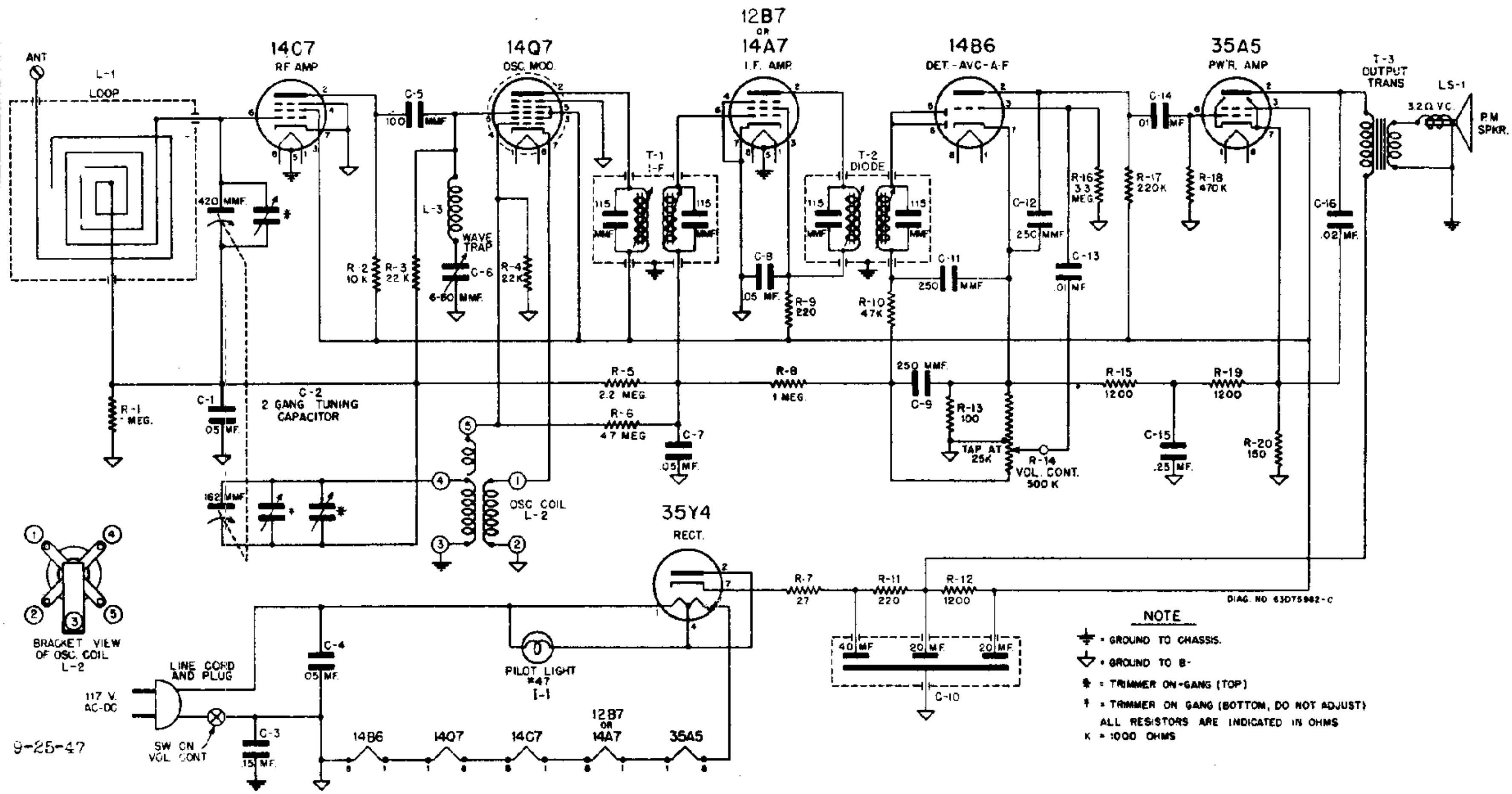
REF. NO.	PART NO.	DESCRIPTION
CHASSIS PARTS		
CAPACITORS		
C-1	1K77263	Variable, 3 gang: includes pulley ..
C-2	8S9605	Paper: .05 mf 100V ....
C-3	21R6648	Mica: 250 mmf 500V ....
C-4	8S9605	Paper: .05 mf 100V ....
C-5	21K77268	Molded 3.3 mmf ....
C-6	8S9605	Paper: .05 mf 100V ....
C-7	8S9605	Paper: .05 mf 100V ....
C-8	8S9606	Paper: .1 mf 200V ....
C-9	6R6641	Mica: 100 mmf 500V ....
C-10	8S9613	Paper: .005 mf 600V ....
C-11	8S9616	Paper: .05 mf 400V ....
C-12	23K76985	Electrolytic: 40-40-20-80 mfd. (includes black fibre cover) .....
C-13	8S9605	Paper: .05 mf 100V ....
C-14	8S9605	Paper: .05 mf 100V ....
C-15	21B77286	Ceramic: 100 mmf 500V ....
C-16	8S9613	Paper: .005 600V ....
C-17	8S9824	Paper: .002 mf 400V ....
C-18	21B77267	Molded: 1.5 mmf ....
C-19	8S9605	Paper: .05 100V ....
CAPACITOR & CHOKE ASSEMBLY		
E-1	1A72283	Capacitor and Choke Assembly (includes .15 mf 200V paper capacitor and coil)
RECTIFIER		
E-2	48B70938	Rectifier, selenium ....
COILS		
L-1	15C77034	Loop & Cover Assembly: includes front cover, loop, catch & hinges ....
L-2	24A76945	Oscillator ....
RESISTORS		
Note: All resistors 20% insulated carbon type unless specified otherwise.		
R-1	6R2118	3.3 meg 1/2W ....
R-2	6R3927	2.2 meg 1/2W ....
R-3	6R3998	5.6 meg 10% 1/2W ....
R-4	6R6004	1 meg 1/2W ....
R-5	6R6075	100,000 1/2W ....
R-6	6R6012	33,000 1/2W ....
R-7	6R5585	8.2 meg 10% 1/2W ....
R-8	18A76948	Volume control: 1 meg; with DPST switch.
R-9	17A76986	Wirewound: 150 10% 2-1/2W ....
R-10	17K75249	Wirewound: 2080 5% 5W ....
R-11	6R3987	6.8 meg 1/2W ....
R-12	6R2118	3.3 meg 1/2W ....
R-13	6R6269	820 10% 1/2W ....
R-14	6R6004	1 meg 1/2W ....
R-15	6R3927	2.2 meg 1/2W ....
R-16	6R2088	250 10% 1/2W ....
R-17	6R5632	500 10% 1/2W ....
R-18	6R5621	10 10% 1/2W ....
R-19	6R6015	220,000 1/2W ....
SWITCHES		
S-1	40A27114	Switch, changeover: triple pole, double throw
TRANSFORMERS		
T-1	24B76988	RF: broadcast band; complete with iron tuning core and C-5 (3.3 mmf) coupling capacitor; less shield can..

REF. NO.	PART NO.	DESCRIPTION
T-2	24B76990	IF: 455 Kc; complete with iron tuning cores and padding capacitors, but less shield ....
T-3	24B77264	Diode: 455 Kc; complete with iron tuning cores and padding capacitors but less shield can ....
T-4	25B76952	Output ....
1	71K477010	Bracket & Pulley Assembly (cord guide)...
2	7A14684	Bracket, tuning shaft mtg ....
3	7A76939	Bracket, speaker mtg. plate ....
4	11M8944	Cord, dial: 18# black ....
5	30B20329	Cord: 6 ft. line cord with plug .....
6	15C76954	Cover, chassis bottom ....
7	1K77281	Dial Background, Rail and Bracket Assembly: includes pointer, slider & pulleys
8	5A19656	Eyelet, spacer (gang mtg) ....
9	5A70404	Grommet, rubber (gang mtg) ....
10	32A24815	Lock, line cord; fibre ....
11	4S7650	Lockwasher, steel; #6 internal; cadmium plated (rectifier mtg) ....
12	2S7002	Nut, steel; 6-32 x 5/16 hex; cadmium plated (rectifier mtg) ....
13	2S7051	Nut, steel; 3/8-32 x 9/16 hex; Palnut; cadmium plated (volume control mtg) ....
14	28K77272	Plug, 9 pin (on battery cable) ......
15	1K76949	Pointer and Slider Assembly ....
16	49A12846	Pulley, drive cord guide ....
17	5S8497	Rivet: .088 x 1/2; nickel plated (tube socket mtg) ....
18	5S7707	Rivet: .122 x 5/32; nickel plated (terminal strip mtg) ....
19	5S7701	Rivet: .122 x 3/16; nickel plated (electrolytic mtg & tuning shaft mtg) ....
20	5S7706	Rivet: .122 x 9/32; nickel plated (line cord lock mtg) ....
21	5A71246	Rivet, shoulder: .187" lg (pulley mtg)...
22	5A15896	Rivet, shoulder: .312" lg (pulley mtg)...
23	3S8974	Screw: 4-40 x 5/16 flat Phillips head; cadmium plated (speaker mtg) ....
24	3S7506	Screw: #6 x 1/4 PKZ plain hex head; cadmium plated (slider switch mtg and dial background mtg) ....
25	3S8294	Screw: 6-32 x 1/2 plain hex head, locking type machine screw; cadmium plated (gang mtg) ....
26	3S9663	Screw: 6-32 x 1-1/8 slotted round head machine screw; cadmium plated (rectifier mtg) ....
27	47A76937	Shaft, tuning control ....
28	26B70107	Shield, (RF coil) ....
29	1A71049	Shield and Sleeve Assembly (IF and Diode shield can) ....
30	9A77066	Socket, tube: miniature; 7 prong; cushioned
31	9A70456	Socket, tube: miniature; 7 prong plain...
32	50C76963	Speaker, PM 5"; 3.2 ohms V.C. ....
33	41A14244	Spring, tension coil ....
34	31A64795	Strip, terminal: 2 insulated lugs, 1 mtg.
35	31A76936	Strip, terminal: 3 insulated lugs, 1 mtg.
36	29A5400	Terminal, plain pin: .125 diam........
37	29K5401	Terminal, plain pin: .156 diam........
38	9A22056	Wafer, bakelite (electrolytic mtg) .....

REF. NO.	PART NO.	DESCRIPTION
39	4S1719	Washer, steel: 3/8 x .140 x .030; nickel plated (line cord lock mtg) ....
CABINET PARTS		
40	46B77059	Block, brass (front cover bottom catch).
41	7A76932	Bracket, chassis mtg....................
42	1K77364	Cabinet (67L11): complete, but less plastic escutcheon, grille and loop antenna....
43	55A77005	Catch, strike (rear panel) ....
44	16K478046	Cover & Hinge Assembly: rear cover .....
45	13D470217	Escutcheon, front panel: plastic; includes dial crystal ....
46	37A16614	Foot, rubber ....
47	36B471002	Grille Cloth and Speaker Baffle Assembly
48	56B71080	Handle, carrying: molded ....
49	55A77005	Hinge, brass (rear panel) ....
50	55A77049	Hinge and Pin, brass (front cover) .....
51	36A470823	Knob, control: volume and tuning ....
52	55K77291	Post and Bottom Plate; brass (carrying handle mtg) ....
53	1A71295	Receptacle and Eyelet Assembly (loop receptacle) ....
54	5S7701	Rivet, steel: .122 x 3/16; nickel plated (front panel hinge mtg) ....
55	5S8479	Rivet: .122 x 9/32; nickel plated (rear panel hinge mtg) ....
56	5S6612	Rivet: .122 x 7/16; nickel plated (chassis mtg. bracket mtg) ....
57	5S7757	Rivet: .122 x 1/2 split; nickel plated (rubber foot mtg) ....
58	5S2805	Rivet: .122 x 1/2; nickel plated (rear panel hinge mtg) ....
59	3S3569	Screw: #6 x 3/8 PKA slotted hex head wood screw; antique copper finish (escutcheon mtg) ....
60	3S2978	Screw: 6-32 x 1/2 slotted oval head; black nickel plated (front panel top catch mtg) ....
61	3S2979	Screw: 6-32 x 3/8 slotted hex head machine screw; cadmium plated (mounts chassis to cabinet)............
62	3S7239	Screw: 8-32 x 1 plain hex head machine screw; cadmium plated (front cover bottom catch mtg) ....
63	3S7999	Speednut, baffle mtg
64	55A76999	Strike, rear panel: cadmium plated.......
65	31K77361	Strip, terminal: 2 receptacle ....
66	1K77293	Top Catch Assembly, brass: front cover....
67	4A13240	Washer, fibre (terminal strip mtg) ......
68	4S7569	Washer: 5/16 x .045 x .007; cadmium plated (chassis mtg. bracket mtg) ....
69	4S7566	Washer: 3/8 x 5/32 x .033; cadmium plated (front cover bottom catch mtg) ....
70	4S1762	Washer: 3/8 x .140 x .030; nickel plated (front cover top catch mtg) ....

MODELS 67X11, 67X12, 67X13
Chassis HS-58

MOTOROLA INC.



I-F=455KC

FREQUENCY RANGE = 535 KC - 1620 KC

CAUTION: Never connect antenna or chassis to water pipe, radiator or other ground.

SPEAKER

LS-1	50B76196	P.M. 5"; 3.2 ohm V.C. .... Exchange

TRANSFORMERS

T-1	24B470038	IF: 455 Kc; includes cores and padding capacitors but less shield ..
T-2	24B75487	Diode: 455 Kc; includes cores and padding capacitors but less shield
T-3	25B76117 or 25B76118	Output ....

COILS

L-1	24K77323	Loop: winding only ....
L-2	24A76192	Oscillator ....
L-3	24A77336	Wave Trap ....

DIAL LIGHT

I-1	65X11854	Bulb: 6.3V .15A; tubular; bayonet base

MOTOROLA INC.

Maximum performance can only be obtained if extreme care is exercised during alignment: Follow the procedure carefully.

A low range output meter should be connected across the speaker voice coil. Set receiver volume control to maximum; for greatest accuracy keep output of receiver at approximately .05 watt throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. (.05 watt = .40 volt on output meter) The alignment tool should be of an insulated type such as Motorola part number 66A71008.

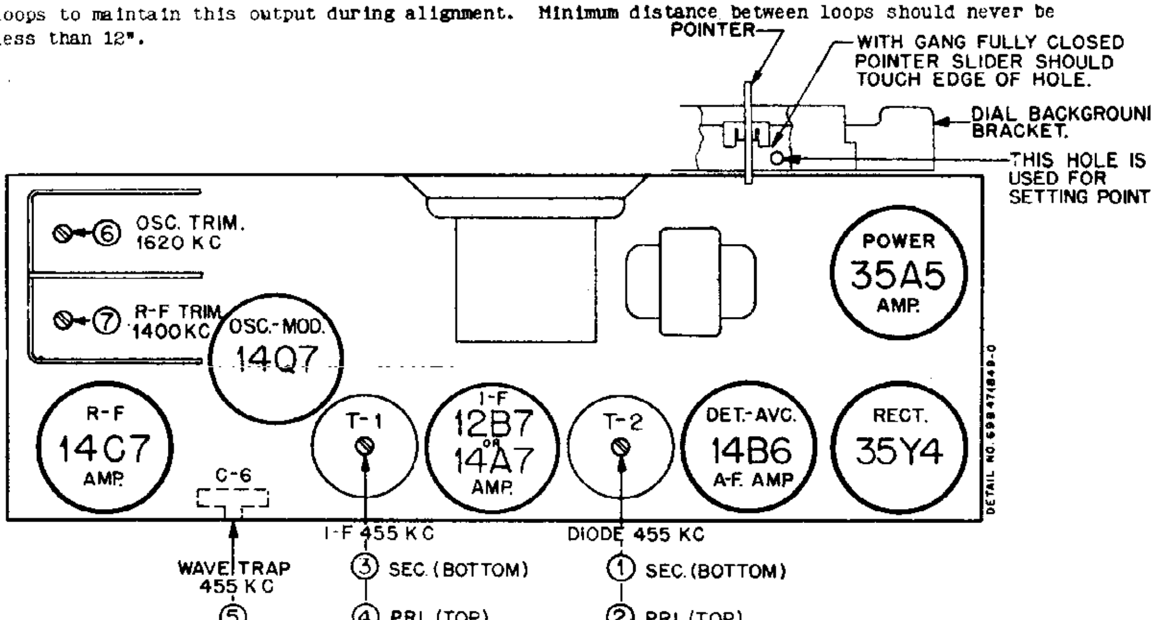
If receiver is operated from AC line during alignment, it is suggested that an isolation transformer be used between receiver and power line. If no isolation transformer is used and hum is encountered during alignment, connect the ground side of the signal generator output to receiver B- instead of the receiver chassis.

STEP	DIAL SET TO	DUMMY	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR SET TO	ADJUST TRIMMER OR CORE	REMARKS
IF ALIGNMENT						
1.	Gang fully opened	.1 mf	RF Amp. grid*	455 Kc	1,2,3 & 4	Adjust for maximum output.
WAVE TRAP ADJUSTMENT						
2.	Gang fully opened	.1 mf	RF Amp. grid*	455 Kc	5	Adjust for minimum response.
3.**	Gang fully opened	.1 mf	RF Amp. grid*	1620 Kc	6	Adjust for maximum output; this sets osc. to dial scale
4.	1400 Kc		Radiation loop***	1400 Kc	7	Tune signal for max. with receiver tuning knob, then peak trimmer 7.

* A convenient point for this connection is the stator of the RF section of the tuning capacitor.

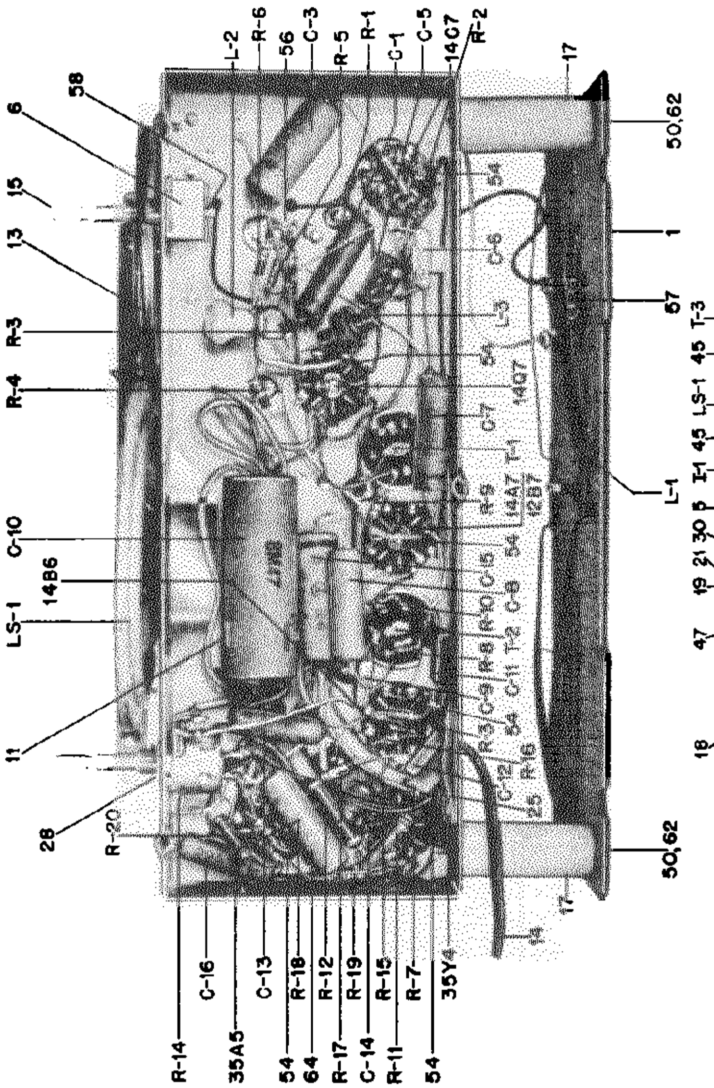
** First close gang fully and set pointer to calibration mark as shown in Figure 1, then proceed with Step 3.

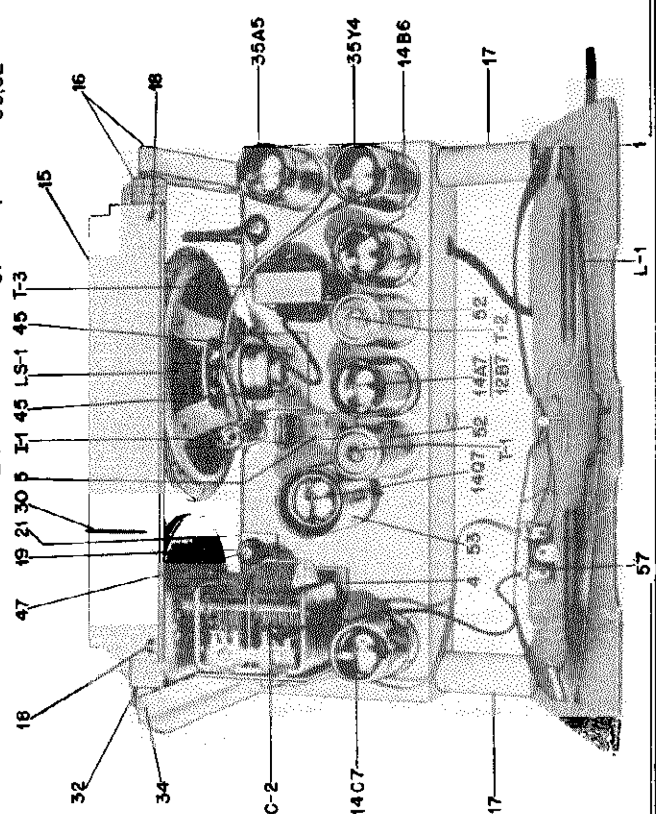
*** Connect output of signal generator to a 5" diameter, 3 turn loop and bring close enough to receiver loop to obtain output of.50 milliwatts (.40V) on output meter. Vary distance between loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".



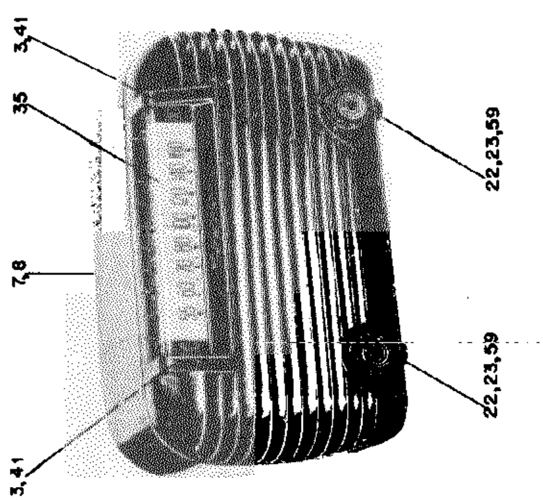
MODELS 67X11,
67X12, 67X13

MOTOROLA INC.

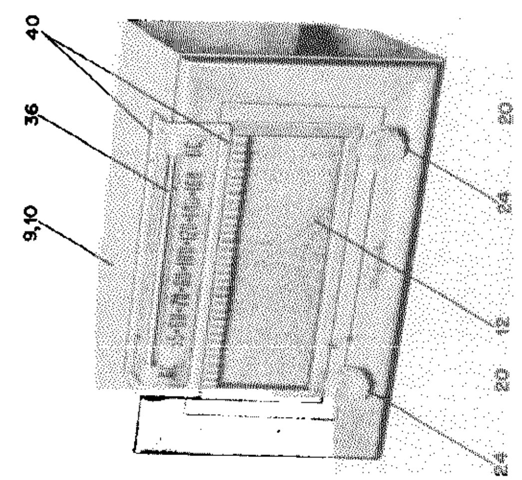


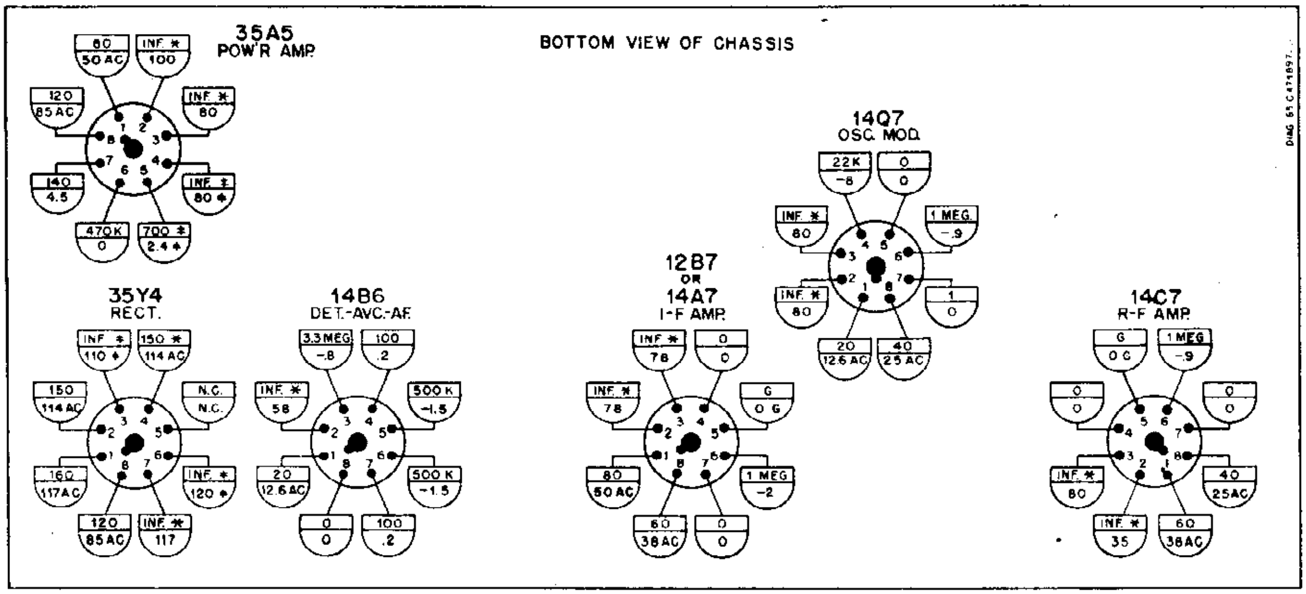


67X11 Walnut, 67X12 Ivory



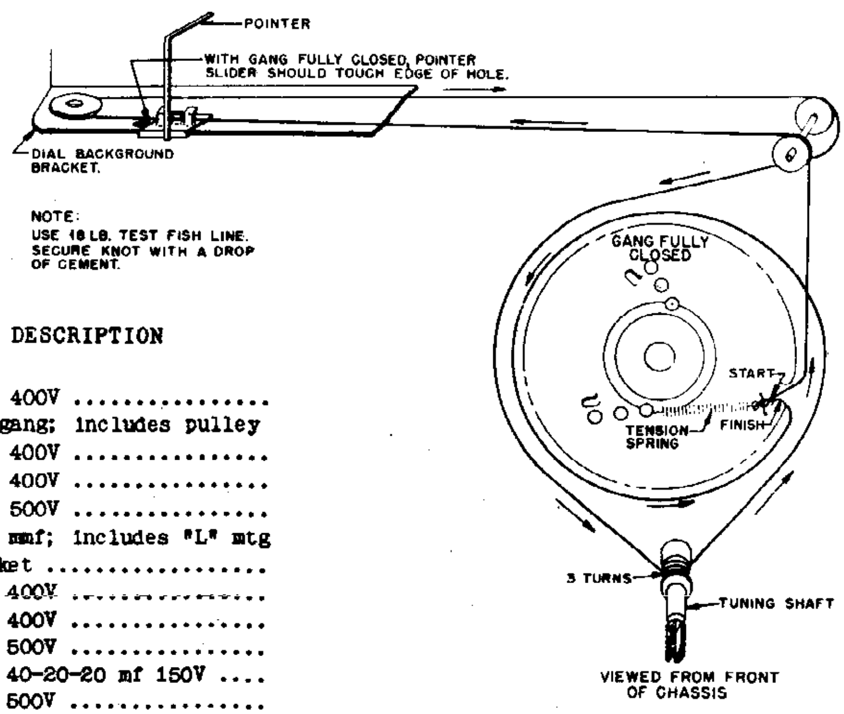
67X13 Blonde or Toast





▭ = RESISTANCE READINGS.
◡ = VOLTAGE READINGS.
G = GROUND TO CHASSIS.
N.C. = NO CONNECTION.
✱ = MAY VARY, DEPENDING ON CONDITION OF ELECTROLYTIC CAPACITORS.
✦ = TIE POINT.

NOTE: A VTVM WAS USED TO MAKE VOLTAGE MEASUREMENTS.
VOLUME CONTROL SET AT MINIMUM AND NO SIGNAL TUNED IN.
MEASUREMENTS TAKEN FROM TUBE SOCKET TERMINALS INDICATED TO B-(▽).
ALL VOLTAGE MEASUREMENTS TAKEN WITH 117V. AC INPUT TO SET.
ALL VOLTAGE MEASUREMENTS DC UNLESS OTHERWISE SPECIFIED.
ALL MEASUREMENTS ±10%.



REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1	8S9816	Paper: .05 mf 400V ....
C-2	1X77339	Variable: 2 gang; includes pulley
C-3	8A75566	Paper: .15 mf 400V ....
C-4	8S9816	Paper: .05 mf 400V ....
C-5	21R6641	Mica: 100 mmf 500V ....
C-6	20A26941	Trimmer: 6-60 mmf; includes "L" mtg bracket ....
C-7	8S9816	Paper: .05 mf 400V ....
C-8	8S9816	Paper: .05 mf 400V ....
C-9	21R6646	Mica: 250 mmf 500V ....
C-10	23B75808	Electrolytic: 40-20-20 mf 150V ....
C-11	21R6648	Mica: 250 mmf 500V ....
C-12	21R6648	Mica: 250 mmf 500V ....
C-13	8S9809	Paper: .01 mf 400V ....
C-14	8S9809	Paper: .01 mf 400V ....
C-15	8S9810	Paper: .25 mf 100V ....
C-16	8S9802	Paper: .02 mf 400V ....

MODELS 67X11, 67X12, 67X13

MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
RESISTORS		
		All resistors carbon -20%-insulated unless specified otherwise
R-1	6R6004	1 meg 1/2 W ....
R-2	6R6054	10,000 1/2 W ....
R-3	6R6028	22,000 1/2 W ....
R-4	6R6026	22,000 1/2 W ....
R-5	6R3927	2.2 meg 1/2 W ....
R-6	6R2122	4.7 meg 1/2 W ....
R-7	6R5683	27 10% 1/2 W ....
R-8	6R6004	1 meg 1/2 W ....
R-9	6R3933	220 1/2 W ....
R-10	6R6056	47,000 1/2 W ....
R-11	6R6152	220 1W NI ....
R-12	6R3972	1200 1W NI ....
R-13	6R6326	100 10% 1/2 W ....
R-14	18A76191	Volume Control: 500,000 ohms; includes on-off switch ....
R-15	6R6393	1200 10% 1/2 W ....doz
R-16	6R2118	3.3 meg 1/2 W ....doz
R-17	6R6015	220,000 1/2 W ....doz
R-18	6R6032	470,000 1/2 W ....doz
R-19	6R6393	1200 10% 1/2 W ....doz
R-20	6R6392	150 10% 1/2 W NI ....doz
1	1X77347	Back Assembly: cabinet back with antenna terminal and terminal strip; less loop ....
2	32A471517	Baffle, speaker (67X13 only) ....
3	7A77382	Bracket, dial mounting (67X11 & 67X12) ..
4	7B18746	Bracket, gang mounting ....
5	7A77303	Bracket, pilot light mounting............doz
6	7A77337	Bracket, tuning shaft mounting ....
7	16E77648	Cabinet, table model: plastic walnut (67X11 only) ....
8	16K77649	Cabinet, table model: plastic ivory ......
9	16D470664	Cabinet, table model: wood; blonde finish (67X13 only) ....
	or	
10	16K478003	Cabinet, table model: wood; toast finish (67X13 only) ....
11	42K75826	Clip, electrolytic mounting ....doz
12	13K470665	Cloth, grille (67X13 only) ....
13	1M8944	Cord, dial: 18#; black ....yd
14	3A470651	Cord, line: 6 ft. long; with plug ..
15	35B77311	Dial Background ....
16	1X77344	Dial Background Bracket and Support Assembly: includes shoulder rivets and pulleys ....
17	37K77085	Dowel, wood (loop antenna mounting) ..
18	5S7805	Eyelet, snap-in (dial background mounting)
19	5A19658	Eyelet, spacer (gang mounting) ....
20	37K15841	Foot, rubber: ⅜ diameter (cabinet foot) (67X13 only) ....
21	37A12691	Grommet, rubber (gang mounting) ....
22	36B77659	Knob, control: Walnut (67X11 only) ....
23	36K77660	Knob, control: Ivory (67X12 only) .....
24	36K478004	Knob, control: Tan (67X13 only) ....
25	32A24815	Lock, line cord: fibre ....
26	4S7666	Lockwasher: #6 external; cadmium plated (oscillator coil mounting)
27	29R5227	Lug, soldering #6 ....
28	2S7051	Nut: 3/8-32x9/16; Palnut; cadmium plated (volume control mounting) ....
29	38A25507	Plug, split (cabinet back mounting) ....
30	52A77307	Pointer and Slider Assembly ....
31	49A12646	Pulley, cord: idler (cord guide) ....
32	49A71078	Pulley, cord: 1/2" groove (cord guide) .
33	5A71246	Rivet, shoulder: .187" long ....
34	5A75045	Rivet, shoulder: .437" long ....
35	34D77647	Scale, dial (67X11 and 67X12 only) .....
36	34D470662	Scale, dial and escutcheon (tan color) (67X13 only) ....
	or	
	34K478005	Scale, dial and escutcheon (toast color) (67X13 only) ....
37	5S7707	Rivet: .122 x 5/32; nickel plated (pilot light mounting bracket mounting, trimmer mounting and terminal strip mounting) ....
38	5S7701	Rivet: .122 x 3/16; nickel plated (tuning shaft mounting bracket mounting)
39	5S7708	Rivet: .122 x 9/32; nickel plated (line cord lock mounting) ....
40	3S1328	Screw: #2 x 3/8 Phillips ovalhead wood screw; brass plated (67X13 dial scale and escutcheon mounting)...
41	3S7155	Screw: 6-32 x 3/16 slotted hex head; cadmium plated (dial mounting) (67X11 and 67X12 only) ....
42	3S7506	Screw: #6 x 1/4 PKZ plain hex head sheet metal screw; cadmium plated (oscillator coil mounting)
43	3S7350	Screw: 6-32 x 1/4 slotted hex head locking type machine screw; cadmium plated (lug mtg) .....
44	3S1339	Screw: #6 x 5/8 flat head wood screw; (baffle mtg) (67X13 only) ....
45	3S7205	Screw: 8-32 x 1/4 slotted hex head locking type machine screw; cadmium plated (speaker mtg) ..
46	3S7454	Screw: #8 x 1/4 PKZ plain hex head cadmium plated (dial background bracket assembly mtg) ....
47	3S7507	Screw: #8 x 5/8 PKZ plain hex head sheet metal screw; cadmium plated (gang mtg)........................
48	3S8117	Screw: #8 x 1" PKZ slotted Hex head sheet metal screw; antique copper finish (chassis mtg) (67X11 and 67X12 only) ....
49	3S7526	Screw: #8 x 1-1/8 PKA slotted hex head; cadmium plated (chassis mtg) (67X13 only) ....
50	3S3384	Screw: #8 x 2-1/4 PKZ slotted hex head sheet metal screw cadmium plated (back mtg) ....
51	1X77363	Shaft Assembly, tuning ....
52	1X71049	Shield and Iron Core Sleeve Assembly (IF and Diode shield can)...........
53	26A72635	Shield, tube ....
54	9A76185	Socket, tube: loctal ....
	or	
	9A72549	Socket, tube: loctal; mounts with rivets (Use this socket to replace 9A76185 socket when mounting ears on chassis break off) ....
55	41A14244	Spring, tension coil ....
56	31A76184	Strip, terminal: #1 ground 2 insulated.
57	31K15026	Strip, terminal: 2 insulated lugs, center mtg (on cabinet back) ....
58	4A70015	Washer "C" (tuning shaft mtg) ....
59	4K19943	Washer, paper (used between control knobs and cabinet 67X11 & 12 only) ...
60	32A20575	Washer: 3/8 x .171 x .062 (chassis mtg) 67X11 & 12 only ....
61	4S1719	Washer: 3/8 x .140 x .030; nickel plated (line cord lock mtg) ......
62	4S7563	Washer: 5/8 x .203 x .033; cadmium plated (cabinet back mtg) ....
63	4S8204	Washer: 1" x .203 x .067; copper plated (chassis mtg) 67X13 only .....

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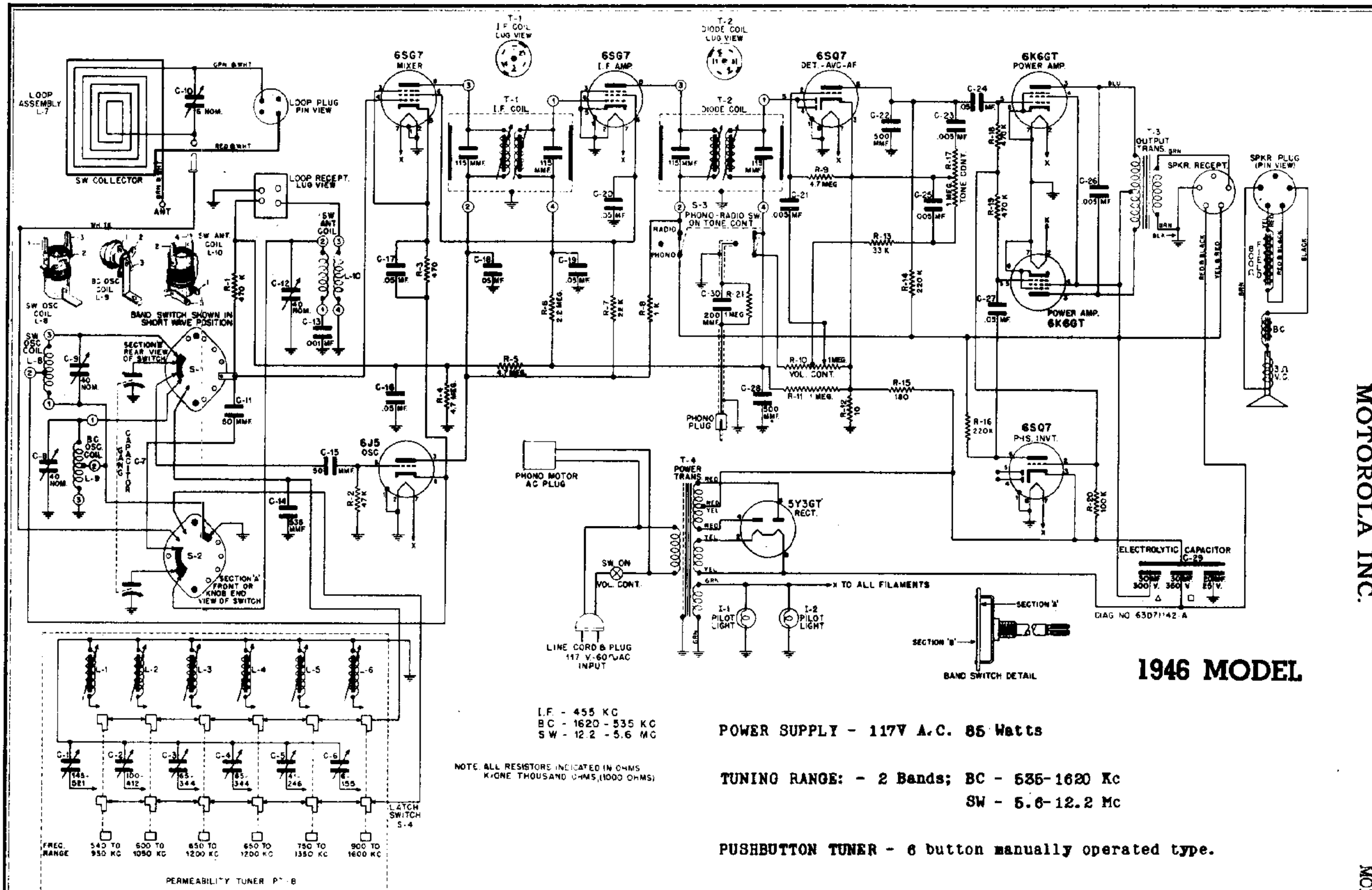


1946 MODEL

I.F. - 455 KC
BC - 1620 - 535 KC
SW - 12.2 - 5.6 MC

NOTE: ALL RESISTORS INDICATED IN OHMS
K=ONE THOUSAND OHMS (1000 OHMS)

POWER SUPPLY - 117V A.C. 85 Watts

TUNING RANGE: - 2 Bands; BC - 535-1620 Kc
SW - 5.6-12.2 Mc

PUSHBUTTON TUNER - 6 button manually operated type.

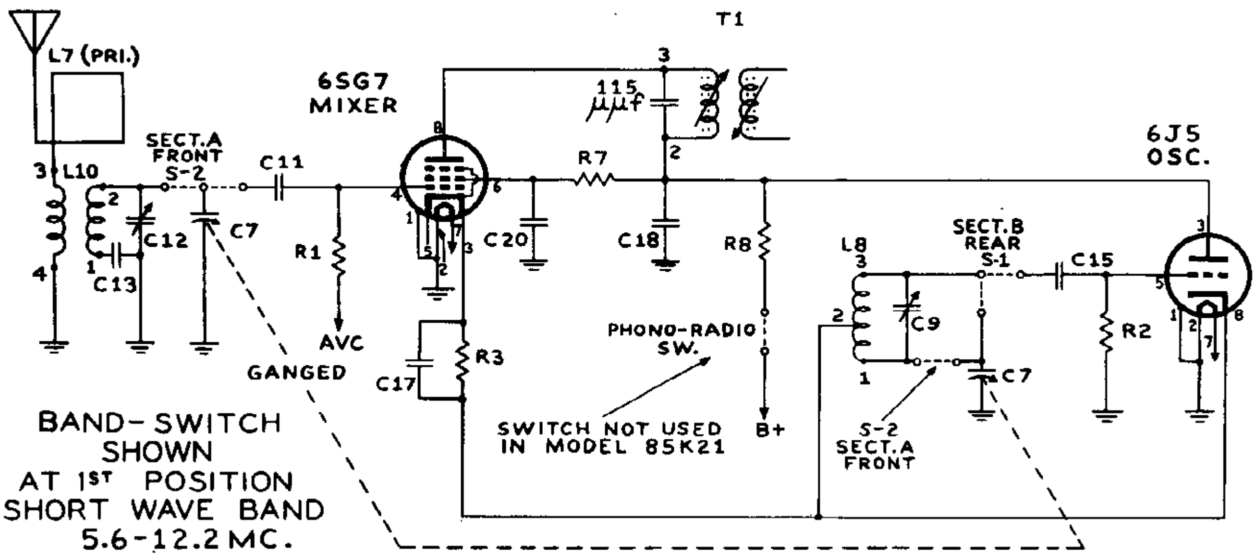
TYPE - 8 tube phonograph-radio with loop antenna in upright console type cabinet.

TUBE COMPLEMENT - 6SG7 Mixer, 6J5 Oscillator, 6SG7 I.F. Amplifier, 6SQ7 Detector, AVC and 1st

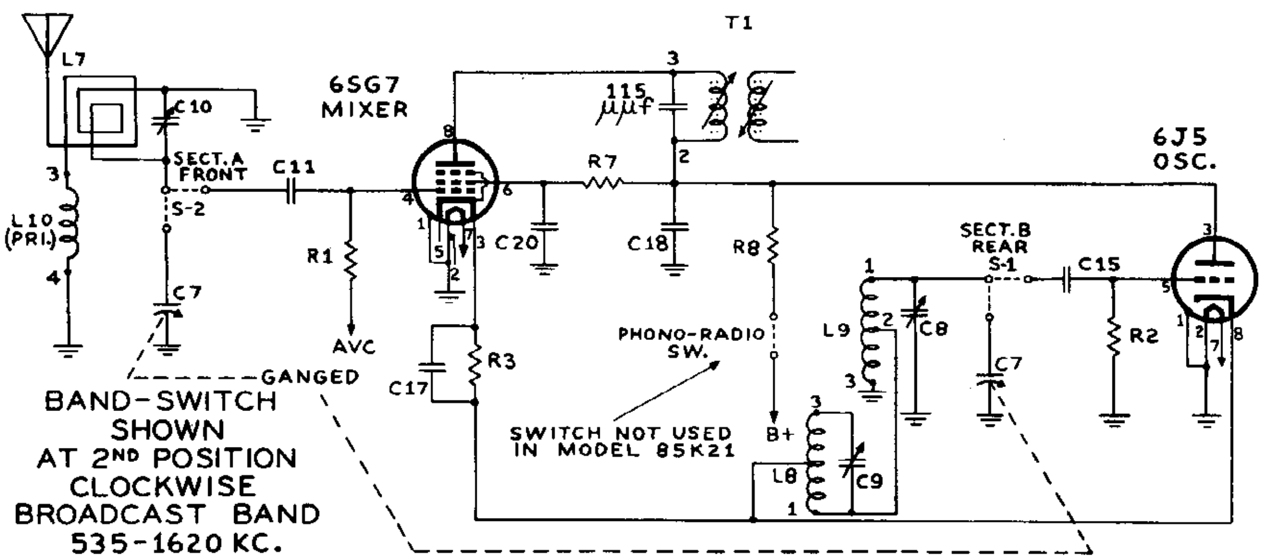
"clarified schematics"

MODEL 85F21
MODEL 85K21

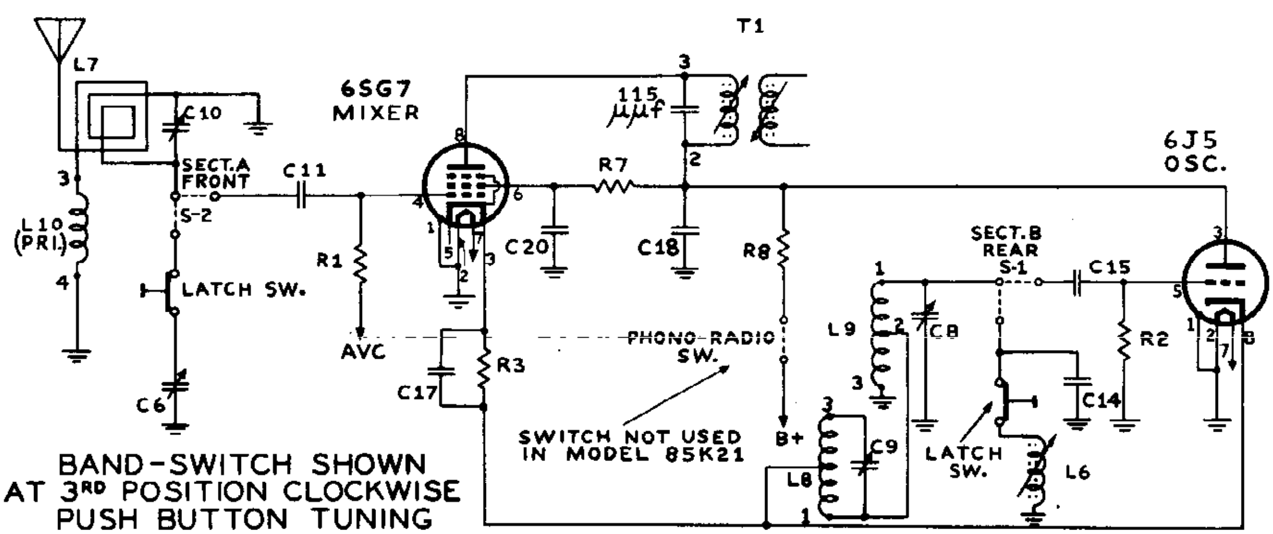
MOTOROLA INC.



BAND-SWITCH SHOWN AT 1ST POSITION SHORT WAVE BAND 5.6-12.2 MC.



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE BROADCAST BAND 535-1620 KC.



BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE PUSH BUTTON TUNING 900-1600KC.

ALIGNMENT

Refer to Figure 2 for location of adjustment trimmers and cores. Connect a low range output meter across speaker voice coil. Volume control should be set at maximum for all operations.

The signal generator used, should possess good frequency stability and should be of the modulated type. For greatest accuracy, keep the receiver output at approximately 50 milliwatts (.38V on output meter) during aligment. Vary signal generator output (not receiver volume control) to maintain this output during alignment.

Step	Gang Setting	Band	Dummy	Generator Connected to	Generator Frequency	Trimmer or Core	Remarks
1	Fully opened	B.C	.1mf	Mixer grid & chassis	455 kc	1,2,3,&4	Adjust I.F. & Diode trans. for maximum
2	Fully opened	B.C	-	Radiation loop*	1620 kc	5	Set oscillator to dial scale
3	1400 KC	B.C	-	Radiation loop*	1400 kc	6 ‡	Tune signal generator for max. on output meter, then peak trimmer.
4	12.2 MC	SW	50mmf	Short wave antenna terminal	12.2 Mc	7	Set osc. to dial scale.
5	11.5 MC	SW	50mmf	Short wave antenna terminal	11.5 Mc	8	Tune signal generator for max. on output meter, then peak trimmer.

‡ Repeak after chassis and loop are installed in cabinet.

* Connect output of signal generator to a 5" diameter, 3 turn loop. With volume on full, bring loop close enough to receiver until output of 50 milliwatts is obtained. (.38V on output meter). Vary distance between generator and receiver loops to maintain this output during alignment. Minimum distance between loops should never be less than 12".

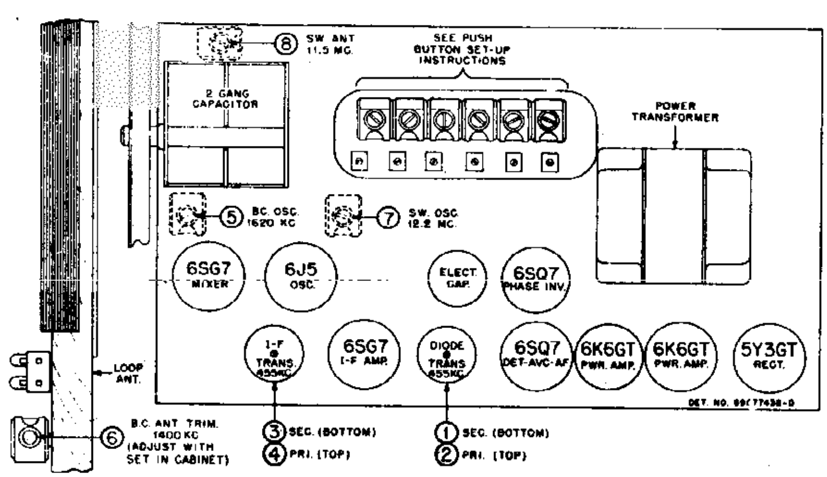


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODEL 85F21
MODEL 85K21

MOTOROLA INC.

INSTRUCTIONS FOR SETTING PUSH BUTTONS

1. Turn the radio "on" and allow it to warm up for a period of at least fifteen minutes.

2. Make a list of the frequencies of the nearby stations you wish to tune in automatically. It is recommended that you select the most powerful stations.

3. Turn the band switch to "BC" position and carefully tune in the first station to be set up.

4. Adjust a signal generator to zero beat with this station. NOTE: While it is advisable to use a signal generator for accuracy, it is not an absolute necessity.

5. Turn the band switch to "PB" position.

6. Push the button to be set up, making sure to select a button having the proper frequency range to include the station you are setting. See Figure 3.

7. The tuner adjustment screws are accessible from the back of the radio. (See Figure 2).

8. Adjust the oscillator screw until the signal from the generator, or station is heard. Carefully adjust the screw to maximum volume.

9. Now adjust the antenna trimmer screw for maximum volume.

10. Follow the same procedure for the remaining buttons.

11. It is advisable, after all buttons are set up, to repeat steps 6, 8 and 9 for maximum performance

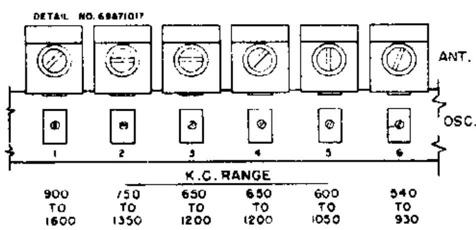


FIGURE 3. PUSH BUTTON SET-UP DETAIL

NOTE:- A V.T.V.M. WAS USED TO MAKE MEASUREMENTS. IF A 20,000 OHM PER VOLT METER IS USED ALL GRID & AVC VOLTAGES WILL READ LOWER.

MEASUREMENTS ARE MADE FROM TUBE BASE PIN TERMINALS TO CHASSIS.

VOLUME CONTROL ON FULL.

VOLTAGE TOLERANCE ±10%

RESISTANCE TOLERANCE ± 20%

BAND SWITCH IN BC. POSITION.

PHONO RADIO SWITCH IN RADIO POSITION

* MEASUREMENTS MAY VARY DUE TO ELECTROLYTIC CAPACITOR C-29 IN CIRCUIT.

▭ = RESISTANCE MEASUREMENTS.

◡ = VOLTAGE MEASUREMENTS

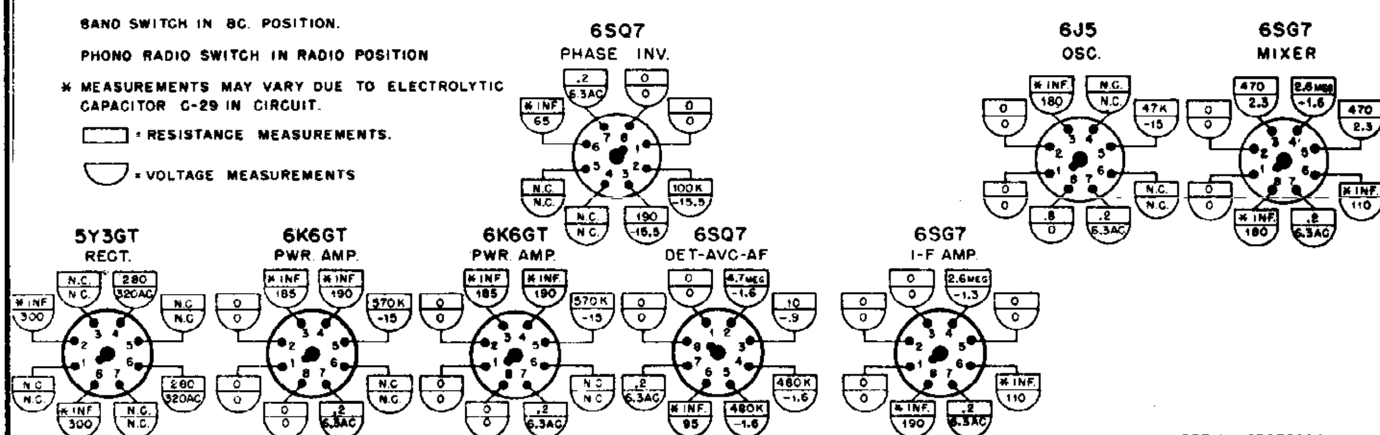


FIGURE 4. VOLTAGE & RESISTANCE DIAGRAM

For dial data see Model 65T21, page 17-59

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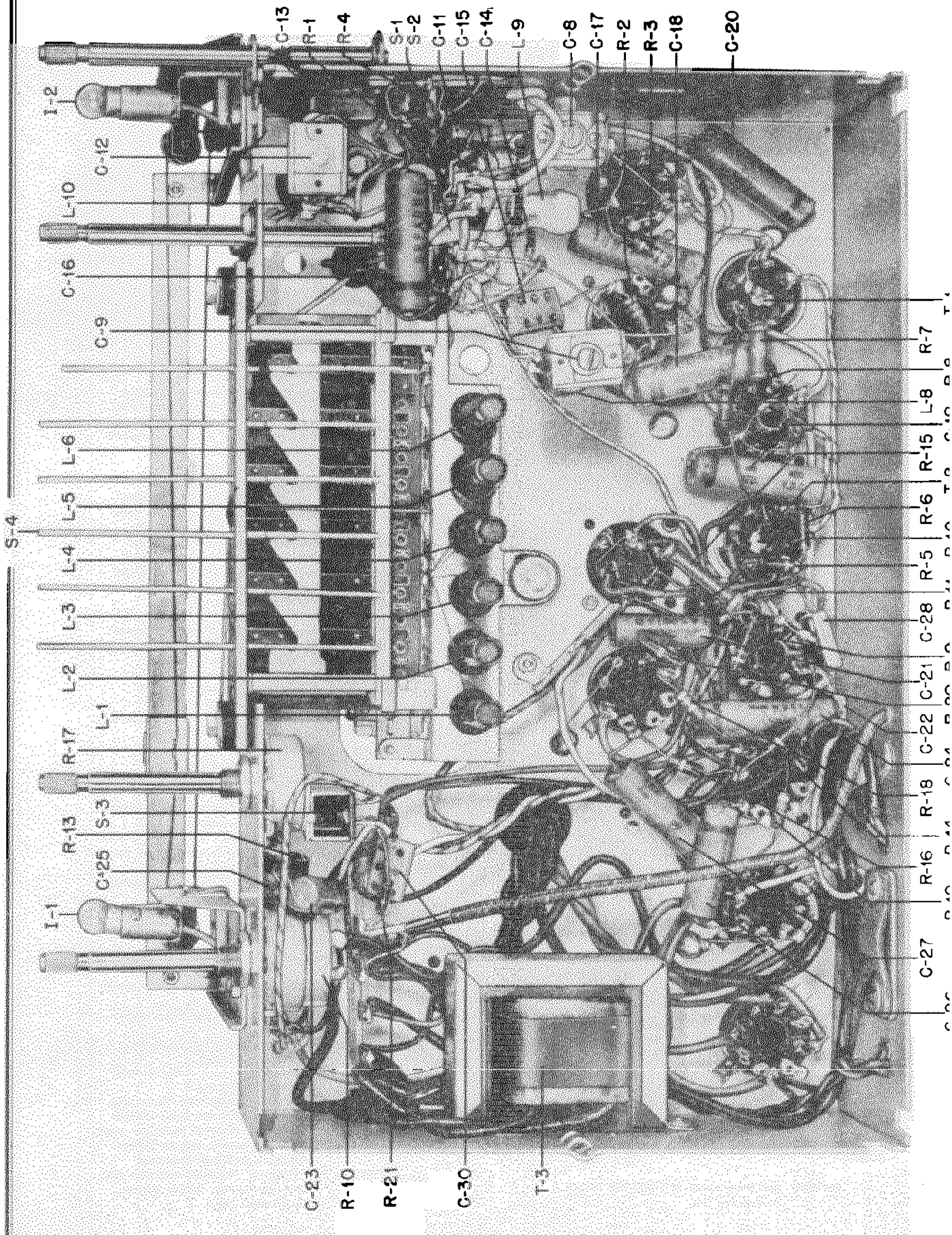

FIGURE 5. PARTS LOCATION, BOTTOM VIEW

MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1 to C-6		Capacitor and Mounting Strip Assembly, push button tuning: See Permeability Tuner Parts List
C-7	1X72363	Variable: 2 gang: with pulley
C-8	20A71140	Mica trimmer: 10-80 mmf; includes "L" mtg. bracket
C-9	20A71141	Mica trimmer: 10-80 mmf
C-10	20A71226	Mica trimmer: 2-12 mmf; includes mtg bracket
C-11	21R6642	Mica: 50 mmf 500V
C-12	20A71125	Mica trimmer: 10-80 mmf; includes "L" mtg bracket
C-13	21R2724	Mica: .001 mf 5% 500V
C-14	21A26020	Silver mica: 535 mmf 3%
C-15	21R6642	Mica: 50 mmf 500V
C-16	8S9816	Paper: .05 mf 400V
C-17	8S9816	Paper: .05 mf 400V
C-18	8S9816	Paper: .05 mf 400V
C-19	8S9816	Paper: .05 mf 400V
C-20	8S9816	Paper: .05 mf 400V
C-21	8S9813	Paper: .005 mf 600V
C-22	21R6639	Mica: 500 mmf 500V
C-23	8S9813	Paper: .005 mf 400V
C-24	8S9816	Paper: .05 mf 400V
C-25	8S9813	Paper: .005 mf 600V
C-26	8S9813	Paper: .005 mf 600V
C-27	8S9816	Paper: .05 mf 400V
C-28	21R6639	Mica: 500 mmf 500V
C-29	23A27718	Electrolytic: 30-30-20 mf/350-300-25V
C-30	21R6640	Mica: 200 mmf 500V
DIAL LIGHTS		
I-1 & I-2	65X4151	6-8V; bayonet base; type #51
COILS		
L-1 to L-6		Coil Assembly, P.B. Oscillator: See Permeability Tuner Parts List
L-7	24K72495	Loop Assembly, antenna: complete; includes loop, trimmer and lead assembly
L-8	24A70549	S.W. oscillator
L-9	24A70546	B.C. oscillator
L-10	24A70548	S.W. antenna
RESISTORS		
Note:		All resistors are 1/2w insulated type unless otherwise specified.
R-1	6R6032	470,000 1/2w
R-2	6R6056	47,000 1/2w
R-3	6R6090	470 1/2w
R-4	6R2122	4.7 meg 1/2w
R-5	6R2122	4.7 meg 1/2w
R-6	6R3927	2.2 meg 1/2w
R-7	6R6068	22,000 1/2w N.I.
R-8	6R6053	1000 1/3w N.I.
R-9	6R2122	4.7 meg 1/2w
R-10	18A70066	Volume control: carbon; 1 meg with SPST switch; tapped at 500,000 ohms
R-11	6R6004	1 meg 1/2w
R-12	6R5621	10 1/2w
R-13	6R6012	33,000 1/2w
R-14	6R6015	220,000 1/2w
R-15	6R6115	180 1w N.I.
R-16	6R6015	220,000 1/2w
R-17	18A70086	Tone control: carbon; 1 meg; with DPDT switch
R-18	6R6032	470,000 1/2w
R-19	6R6032	470,000 1/2w
R-20	6R6075	100,000 1/2w
R-21	6R6004	1 meg 1/2w
SPEAKER		
	50B72379	Electrodynamic; 10"; 800 ohm field; 3.2 ohm V.C.

REF. NO.	PART NO.	DESCRIPTION
SWITCHES		
S-1 & S-2	40A71127	Band selector: three position
S-3		Phono-Radio: (on tone control R-17)
S-4		Switch Assembly, push button: See Permeability Tuner Parts List
TRANSFORMERS		
T-1	24B70545	I.F.: 455 kc; complete with iron cores and padding capacitor, but less shield
T-2	24B70537	Diode: 455 KC; complete with iron cores and padding capacitor, but less shield
T-3	25B27661	Output
T-4	25B26035	Power
MISCELLANEOUS		
	38B71139	Button, push: plastic (includes insert spring 41A12993)
	1X72423	Cabinet Assembly: console type
	35K72310	Cloth grille
	11M8944	Cord, dial: 18 lb. black
	30K21669	Cord, line: 9 ft. long; with plug
	1X72349	Dial Bracket & Slider Assembly: complete; includes dial brackets, pullies, pulley mounting brackets, slider rail and pointer slider (does not include dial scale and pointer)
	13C71752	Escutcheon, dial (lower) wood
	13B71753	Escutcheon, dial (upper) wood
	13B70494	Escutheon, push button: plastic
	5A71081	Eyelet, chassis mounting: 1/4" x 1/4" diameter body; 1/4" diameter head
	5A72771	Grommet, rubber: 1-1/8" O.D. x 3/4" I.D. x 3/8" thick (light shield)
	5A71092	Grommet, rubber, 5/8" x 3/4" diameter (chassis mounting)
	5A70404	Grommet, rubber: gang cushion
	5A71130	Grommet, rubber: 1/4" x 1/2" diameter body: 3/4" diameter head (chassis retainer)
	36K70511	Knob, control: plain
	36K70513	Knob, control: branded
	1X76402	Lead Assembly, phono-pick-up; includes plug: 42" long
	1X72506	Lead Assembly, speaker: four conductor; with receptacle
	32A24615	Lock, line cord: fibre
	4S7655	Lockwasher, steel: 3/8 internal; cadmium plated (band switch mounting)
	4S1376	Nut, steel: 3/8-32 x 1/2" hex; cadmium plated (band switch mounting)
	2S7051	Nut, steel: 3/8-32 x 9/16" hex; palnut; cadmium plated (volume & tone control mounting)
	9A12705	Plate, electrolytic capacitor mounting: bakelite
	28K71776	Plug, 1 pin (on phono pick-up lead)
	28K19871	Plug, 4 pin (antenna loop)
	52A71280	Pointer, dial
	49A23960	Pulley, cord: 1/4" groove (cord guide)
	49A21741	Pulley, cord: 3/8" groove (cord guide)
	9A30680	Receptacle, 3 prong (on phono motor leads)
	9K28049	Receptacle, 4 prong: bakelite (loop antenna receptacle)
	5A71246	Rivet, shoulder: 3/8" long; nickel plated (pulley mtg.)
	1X72769	Scale, dial: glass; with dial light housing covers and light shields
	3S6301	Screw, steel: #2 x 1/2" Phillips' oval head wood screw; antique bronze finish (escutcheon mounting)
	3S1312	Screw, steel: #4 x 1-1/8-Phillips oval head wood screw; bronze finish, (escutcheon mtg.)

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REF. NO.	PART NO.	DESCRIPTION
MISCELLANEOUS (continued)		
	3S7554	Screw, steel: #8 x 1-3/8" PKA slotted sheet metal screw; cadmium plated (chassis mounting)
	3S7396	Screw, steel: 10-32 x 2" slotted hex head machine screw; copper plated (record changer mounting)
	47A71129	Shaft, tuning
	1A71049	Shield & Iron Core Sleeve Assembly (for I.F. or diode transformer)
	9A71290	Socket, pilot light: with bracket
	9A6790	Socket, tube: molded octal; plain type (for all but I.F. amp)
	9A6768	Socket, tube: (replacement) molded octal; plain type (to be used in place of 9A6790 when mounting lugs on chassis break off.
	9A6792	Socket, tube: molded octal; with center shield (for I.F. amp)
	9A70165	Socket, tube: (replacement) molded octal; with center shield (to be used in place of 9A6792 when mounting lugs on chassis break off.)
	41A28190	Spring, cushion: top (record changer mounting)
	41A21607	Spring, cushion: bottom (record changer mounting)
	41A14244	Spring, tension coil (pointer cord
	41A14111	Spring, tension coil (drive cord)
	31A12847	Strip, terminal: 2 insulated lugs: #3 mounting
	31A22190	Strip, terminal: 4 insulated lugs: #3 ground
	32A27678	Strip, shaft bearing: fibre (for band switch shaft)
	38C70588	Tabs, call letter
	4A21577	Washer, "C" (used on tuning shaft)
	4A71133	Washer, spring (used on tuning shaft)
PERMEABILITY TUNER		
	1X71110	Permeability Tuner PT-8: complete: with 1-7/8" push button shaft (for plastic escutcheon)
	1X72460	Permeability Tuner PT-9: complete; with 2-1/8" push button shaft (for wood escutcheon)

REF. NO.	PART NO.	DESCRIPTION
C-1 to C-6	20A72336	Capacitor and Mounting Strip Assembly: capacitors not replaceable separately; consist of - C-1, 145-521 mmf; C-2, 100-412 mmf; C-3, 65-344 mmf; C-4, 65-344 mmf; C-5, 41-246 mmf; C-6, 6-155 mmf.
COILS		
L-1	1X72416	Coil Assembly, P.B. Oscillator: 540-930 kc; includes core and clip (brown)
L-2	1X72417	Coil Assembly, P.B. Oscillator: 600-1050 kc; includes core and clip (red)
L-3	1X72418	Coil Assembly, P.B. Oscillator: 650-1200 kc. includes core and clip (orange)
L-4	1X72418	Coil Assembly, P.B. Oscillator: 650-1200 kc. includes core and clip (orange)
L-5	1X72419	Coil Assembly, P.B. Oscillator: 730-1350 kc; includes core and clip (yellow)
L-6	1X72420	Coil Assembly, P.B. Oscillator: 900-1600 kc; includes core and clip (green)
SWITCH		
S-3	40X72342	Switch Assembly, push button: with 2-1/8" push button shaft (for wood escutcheon)
S-3	40B71105	Switch Assembly, push button: with 1-7/8" push button shaft (for plastic escutcheon)
MISCELLANEOUS		
	5A70098	Eyelet, steel: 23/64" thick x 7/32" I.D. x 1/2" diameter head (tuner mounting)
	5A70404	Grommet, rubber (tuner mounting)
	3S8175	Screw, steel: #4 x 3/16" PKZ slotted hex head sheet metal screw; cadmium plated (trimmer mounting)

85K21

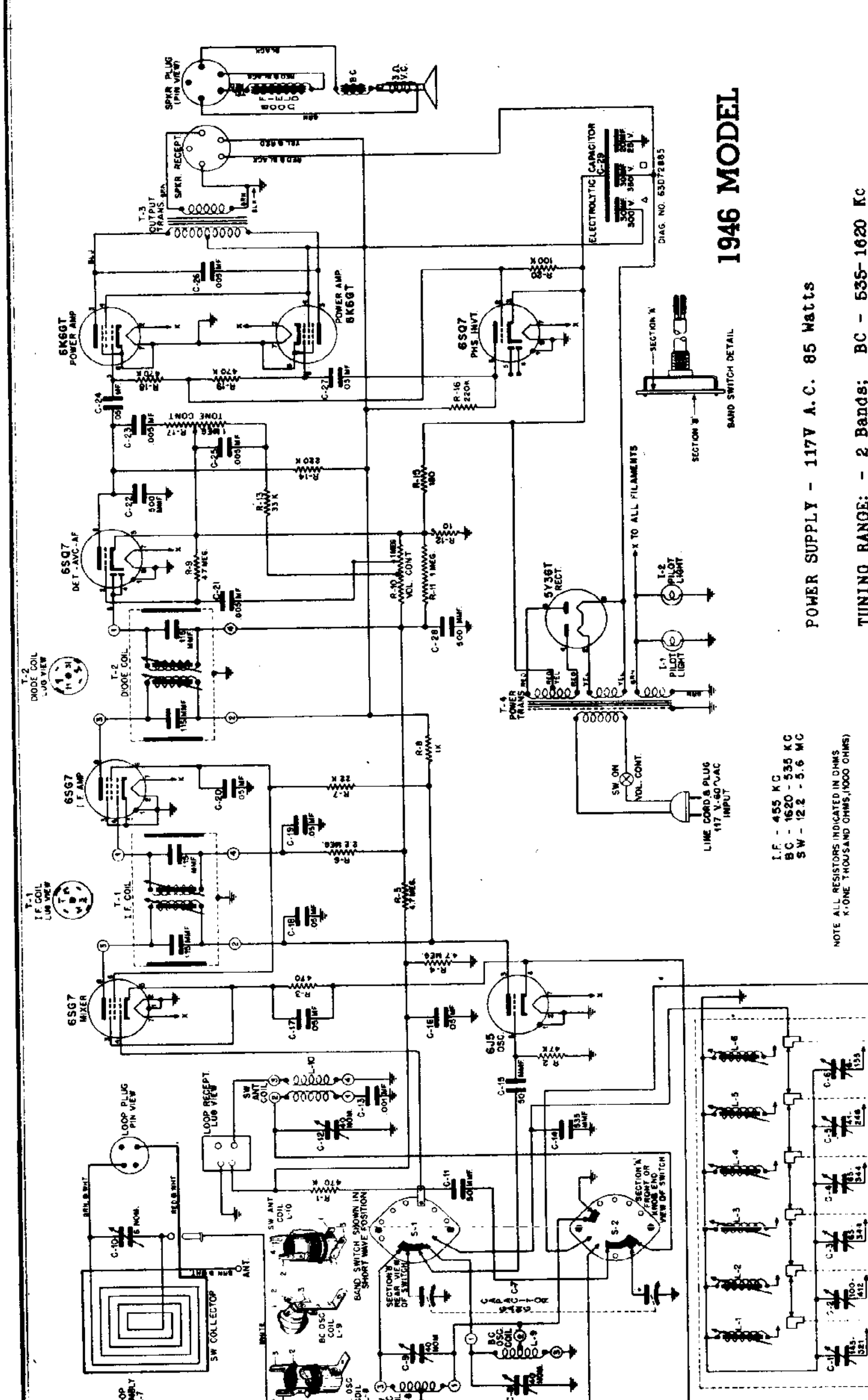
REF. NO.	PART NO.	DESCRIPTION
	9A70165	Socket, tube: (replacement) molded octal; with center shield (to be used in place of 9A6792 when mounting lugs on chassis break off)
	41A14244	Spring, tension coil (pointer cord)
	41A14111	Spring, tension coil (drive cord)
	31X74933	Strip, terminal: 2 insulated lugs; #3 mounting
	31A71126	Strip, terminal: 3 insulated lugs; #2 ground
	32A27678	Strip, shaft bearing: fibre (for band switch shaft)
	38C70588	Tabs, call letter
	4A21577	Washer, "C" (used on tuning shaft)
	4A71133	Washer, spring (used on tuning shaft)
PERMEABILITY TUNER		
	1X71110	Permeability Tuner PT-8; complete: with 1-7/8" push button shaft
CAPACITORS		
C-1 to C-6	20A72336	Capacitor and Mounting Strip Assembly: capacitors not replaceable separately; consist of - C-1, 145-521 mmf; C-2, 100-412 mmf; C-3, 65-344 mmf; C-4, 65-344 mmf; C-5, 41-246 mmf; C-6, 6-155 mmf.

REF. NO.	PART NO.	DESCRIPTION
SWITCH		
S-3	40B71105	Switch Assembly, push button: with 1-7/8" push button shaft
COILS		
L-1	1X72416	Coil Assembly, P.B. Oscillator; 540-930 kc; includes core and clip (brown)
L-2	1X72417	Coil Assembly, P.B. Oscillator: 600-1050 kc; includes core and clip (red)
L-3	1X72418	Coil Assembly, P.B. Oscillator: 650-1200 kc, includes core and clip (orange)
L-4	1X72418	Coil Assembly, P.B. Oscillator: 650-1200 kc, includes core and clip (orange)
L-5	1X72419	Coil Assembly, P.B. Oscillator: 730-1350 kc; includes core and clip (yellow)
L-6	1X72420	Coil Assembly, P.B. Oscillator: 900-1600 kc; includes core and clip (green)
MISCELLANEOUS		
	5A70098	Eyelet, steel: 23/64 thick x 7/32" I.D. x 1/2" diameter head (tuner mounting)
	5A70404	Grommet, rubber (tuner mounting)
	3S8175	Screw, steel: #4 x 3/16" PKZ slotted hex head; sheet metal screw; cadmium plated (trimmer mounting)

Prices Subject to Change Without Notice

MODEL 85K21

MOTOROLA INC.



1946 MODEL

POWER SUPPLY - 117V A.C. 85 Watts

TUNING RANGE: - 2 Bands; BC - 535-1620 Kc
SW - 5.6-12.2 Mc

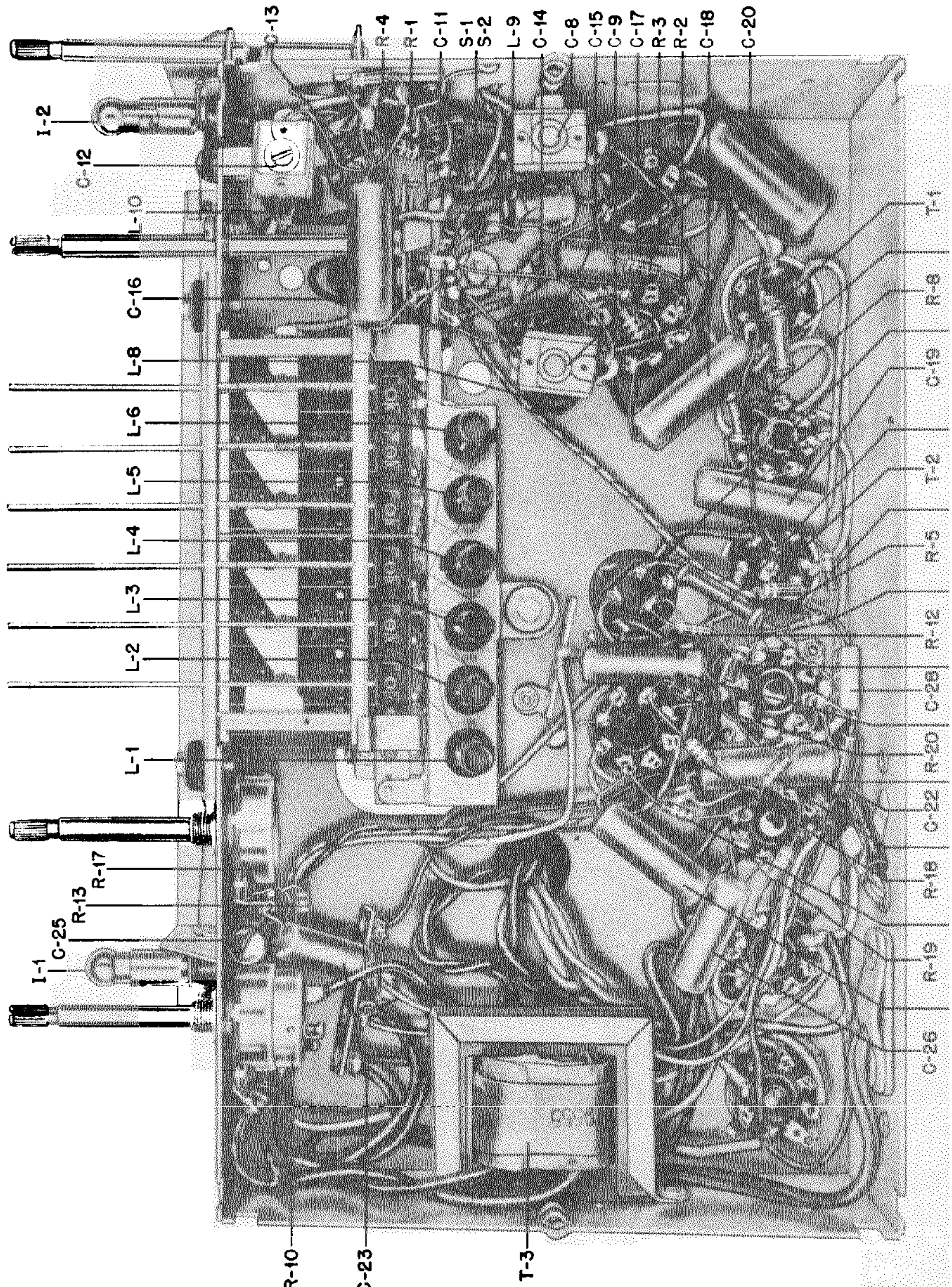
PUSHBUTTON TUNER - 8 button manually operated type.

TYPE - 8 tube phonograph-radio with loop antenna in upright console type cabinet.

TUBE COMPLEMENT - 6SG7 Mixer, 6J5 Oscillator, 6SG7 I.F. Amplifier, 6SQ7 Detector, AVC and 1st A.F. Amplifier, 6SQ7 Phase Inverter, 2- 6K6GT Power Amplifier and 5Y3GT Rectifier.

For clerified schematics and additional data see Model 85F21, pages 17-86 through 17-88 and page 17-91

MOTOROLA INC.



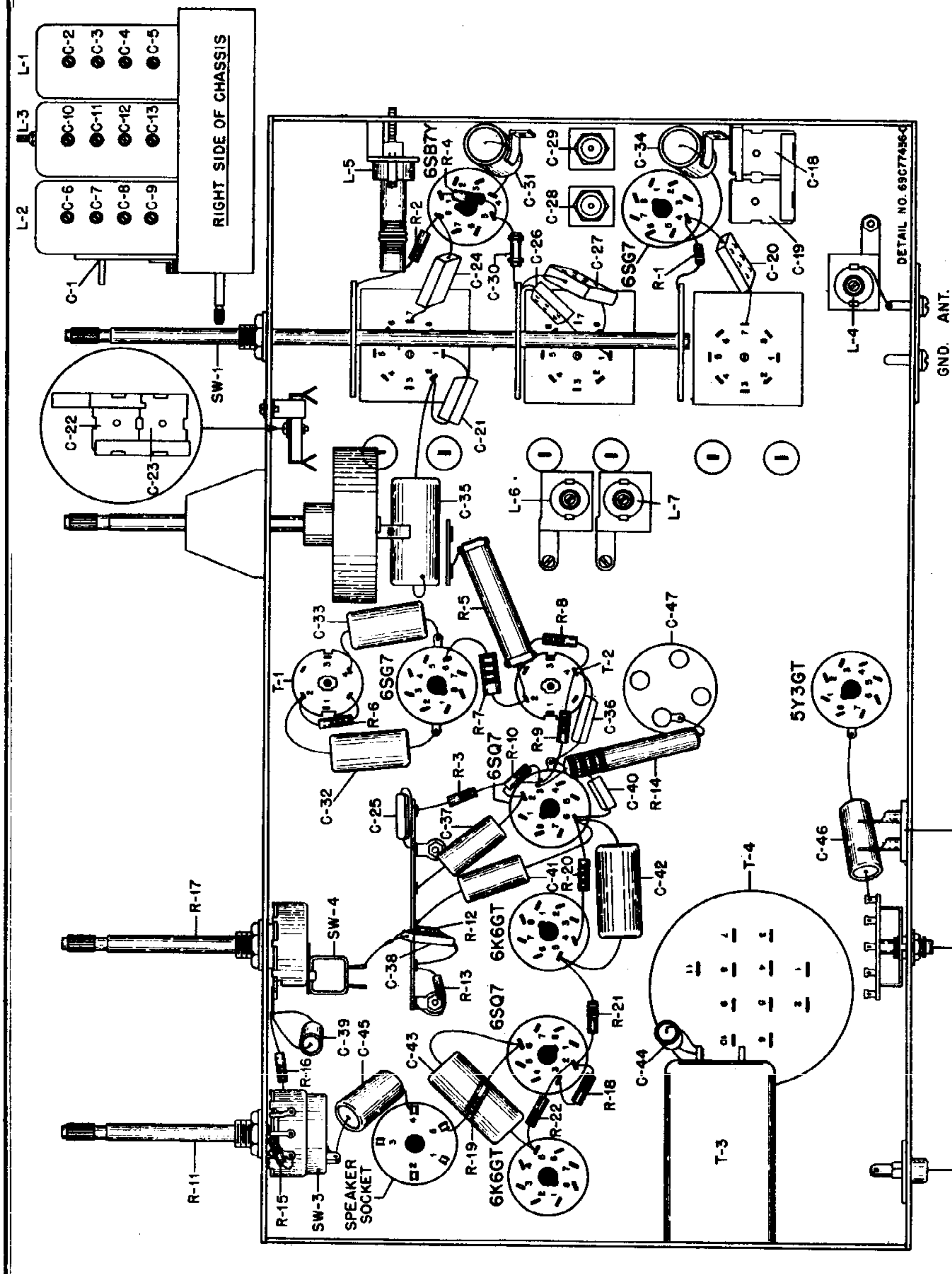
For dial data see Model 65T21, page 17-

MODEL 85K21

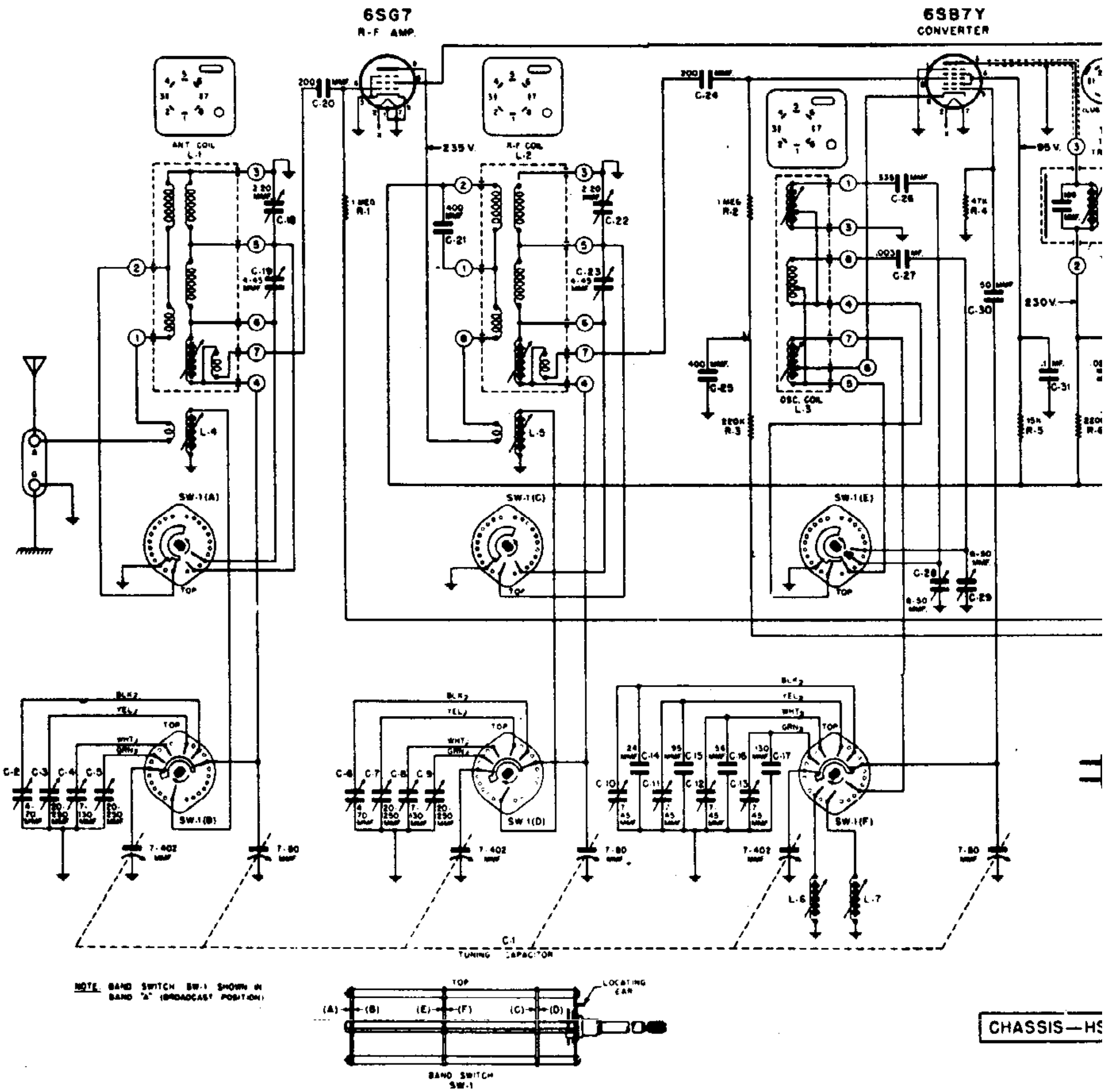
MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
CAPACITORS		
C-1 to C-6		Capacitor and Mounting Strip Assembly, push button tuning: See Permeability Tuner PT-8 Parts List
C-7	1X72363	Variable: 2 gang; with pulley
C-8	20A71140	Mica trimmer: 10-80 mmf
C-9	20A71141	Mica trimmer: 10-80 mmf; includes "L" mtg. bracket
C-10	20A71226	Mica trimmer: 2-12 mmf; includes mtg. bracket
C-11	21R6642	Mica: 50 mmf 500V
C-12	20A71125	Mica trimmer: 10-80 mmf; includes "L" mtg. bracket
C-13	21R2724	Mica: .001 mmf 5% 500V
C-14	21A28020	Silver mica: 535 mmf 3%
C-15	21R6642	Mica: 50 mmf 500V
C-16	8S9816	Paper: .05 mf 400V
C-17	8S9816	Paper: .05 mf 400V
C-18	8S9816	Paper: .05 mf 400V
C-19	8S9816	Paper: .05 mf 400V
C-20	8S9816	Paper: .05 mf 400V
C-21	8S9813	Paper: .005 mf 600V
C-22	21R6639	Mica: 500 mmf 500V
C-23	8S9813	Paper: .005 mf 600V
C-24	8S9816	Paper: .05 mf 400V
C-25	8S9813	Paper: .005 mf 600V
C-26	8S9813	Paper: .005 mf 600V
C-27	8S9816	Paper: .05 mf 400V
C-28	8S6639	Mica: 500 mmf 500V
C-29	23A27718	Electrolytic: 30-30-20 mf/350-300-25V
DIAL LIGHTS		
I-1 & I-2	65X4151	6-8V; bayonet base; type #51
COILS		
L-1 to L-6		Coil Assembly, P.B. oscillator: See Permeability Tuner PT-8 Parts List
L-7	24K71287	Loop Assembly, antenna: complete: includes loop, trimmer and lead assembly
L-8	24A70549	S.W. oscillator
L-9	24A70546	B.C. oscillator
L-10	24A70548	S.W. antenna
RESISTORS		
Note:		All resistors are 1/2w 20% insulated type unless otherwise specified
R-1	6R6032	470,000 1/2w
R-2	6R6056	47,000 1/2w
R-3	6R6090	470 1/2w
R-4	6R2122	4.7 meg 1/2w
R-5	6R2122	4.7 meg 1/2w
R-6	6R3927	2.2 meg 1/2w
R-7	6R6068	22,000 1/2w N.I.
R-8	6R6055	1000 1/3w N.I.
R-9	6R2122	4.7 meg 1/2w
R-10	18A70066	Volume control: carbon; 1 meg; with SPST switch; tapped at 300,000 ohms
R-11	6R6004	1 meg 1/2w
R-12	6R5621	10 1/2w
R-13	6R6012	33,000 1/2w
R-14	6R6015	220,000 1/2w
R-15	6R6116	180 1w N.I.
R-16	6R6015	220,000 1/2w
R-17	18A70067	Tone control: carbon; 1 meg.
R-18	6R6032	470,000 1/2w
R-19	6R6032	470,000 1/2w
R-20	6R6075	100,000 1/2w
SPEAKER		
	50B72379	Electrodynamic; 10"; 600 ohm field; 3.2 ohm V.C.
SWITCHES		
S-1 & S-2	40A71127	Band selector: three position
S-3	--	Switch Assembly, push button: See Permeability Tuner PT-8 Parts List
TRANSFORMERS		
T-1	24B70545	I.F.: 455 kc; complete with iron cores and padding capacitors, but less shield
T-2	24B70537	Diode: 455 kc; complete with iron cores and padding capacitors, but less shield
T-3	25B27661	Output
T-4	25B26055	Power
MISCELLANEOUS		
	36B71189	Button, push: plastic (includes insert spring 41A18993)
	16E72317	Cabinet Assembly: console type
	35K71228	Cloth grille
	11M8944	Cord, dial: 18 lb. black
	30K21659	Cord, line: 9 ft. long; with plug
	1X72349	Dial Bracket & Slider Assembly: complete; includes dial brackets, pulleys, pulley mounting brackets, slider rail and pointer slider (does not include dial scale and pointer.
	13C72362	Escutcheon, dial (lower) plastic
	13B72361	Escutcheon, dial (upper) plastic
	5A71061	Eyelet, chassis mounting: 1/4" x 1/4" diameter body; 1/4 diameter head doz.
	5A72771	Grommet, rubber: 1-1/8" O.D. x 3/4" I.D. x 3/8" thick (light shield)
	5A71092	Grommet, rubber: 5/8" x 3/4" diameter (chassis mounting)
	5A70404	Grommet, rubber: gang cushion
	5A71130	Grommet, rubber: 1/4" x 1/2" diameter body; 3/4" diameter head (chassis retainer)
	36K72889	Knob, control: plain
	36K72890	Knob, control: branded
	1X72364	Lead Assembly, speaker: four conductor; with receptacle
	32A24818	Lock, line cord: fibre
	4S7655	Lockwasher, steel: 3/8 internal; cadmium plated (band switch mounting)
	4S1376	Nut, steel: 3/8-32 x 1/2" hex; cadmium plated (band switch mounting)
	2S7051	Nut, steel: 3/8-32 x 9/16" hex; palnut; cadmium plated (volume & tone control mounting)
	9A12705	Plate, electrolytic capacitor mounting: bakelite
	28K19871	Plug, 4 pin (antenna loop)
	62A71280	Pointer, dial
	49A21741	Pulley, cord: 3/8" groove (cord guide)
	9K28049	Receptacle, 4 prong: bakelite (loop antenna receptacle)
	5A71246	Rivet, shoulder: 3/8" long; nickel plated (pulley mtg.)
	1X72769	Scale, dial: glass; with dial light housing covers and light shields
	3S1312	Screw, steel: #4 x 1-1/8 Phillips oval head wood screw; bronze finish (escutcheon mtg.)
	3S7634	Screw, steel: #8 x 1-3/8" PKA slotted sheet metal screw; cadmium plated (chassis mounting)
	47A71129	Shaft, tuning
	1A71049	Shield & Iron Core Sleeve Assembly (for I.F. or diode transformer)
	9A71290	Socket, pilot light: with bracket
	9A6790	Socket, tube: molded octal; plain type (for all but I. F. amp)
	9A6788	Socket, tube: (replacement) molded octal; plain type (to be used in place of 9A6790 when mounting lugs on chassis break off)
	9A6792	Socket, tube: molded octal; with center shield (for (I.F. amp)

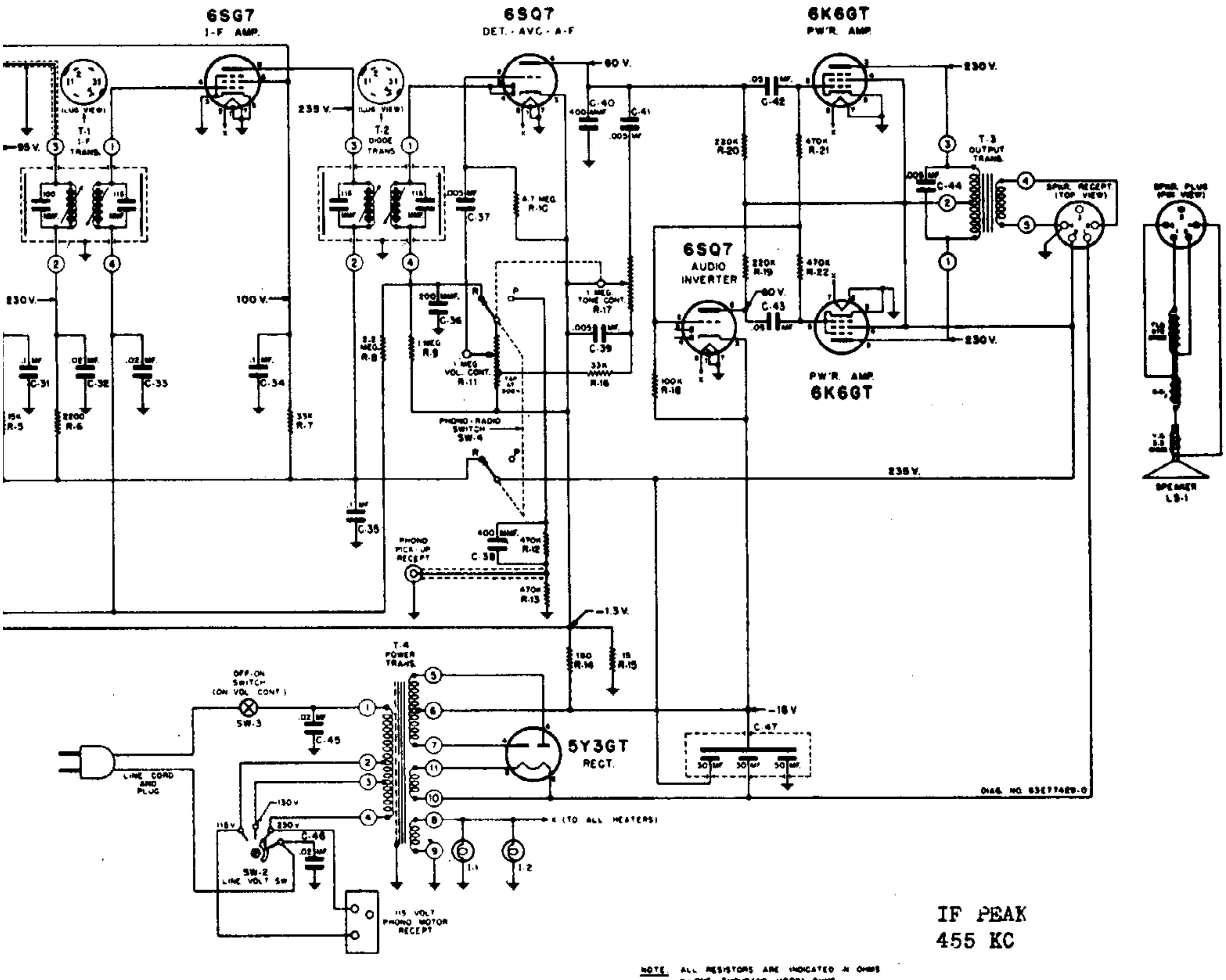
MOTOROLA INC. MODEL 87T61BN



PARTS LOCATION DETAIL


6SG7
R-F AMP.
6SB7Y
CONVERTER
ANT COIL L-1
R-F COIL L-2
OSC. COIL L-3
C-20
C-21
C-22
C-23
C-24
C-25
C-26
C-27
C-28
C-29
C-30
C-31
R-1
R-2
R-3
R-4
R-5
L-4
L-5
L-6
L-7
235 V.
95 V.
230V.
SW-1(A)
SW-1(B)
SW-1(C)
SW-1(D)
SW-1(E)
SW-1(F)
TOP
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10
C-11
C-12
C-13
C-14
C-15
C-16
C-17
C-1
TUNING CAPACITOR
NOTE: BAND SWITCH SW-1 SHOWN IN BAND "A" (BROADCAST POSITION)
LOCATING EAR
(A)
(B)
(E)
(F)
(C)
(D)
BAND SWITCH SW-1

CHASSIS—HS



IF PEAK
455 KC

NOTE. ALL RESISTORS ARE INDICATED IN OHMS
K=ONE THOUSAND (1000) OHMS.
VOLTAGES MEASURED TO CHASSIS

CHASSIS—HS-70

For clarified schematics and other data see Model 57B61V, pages 17-43

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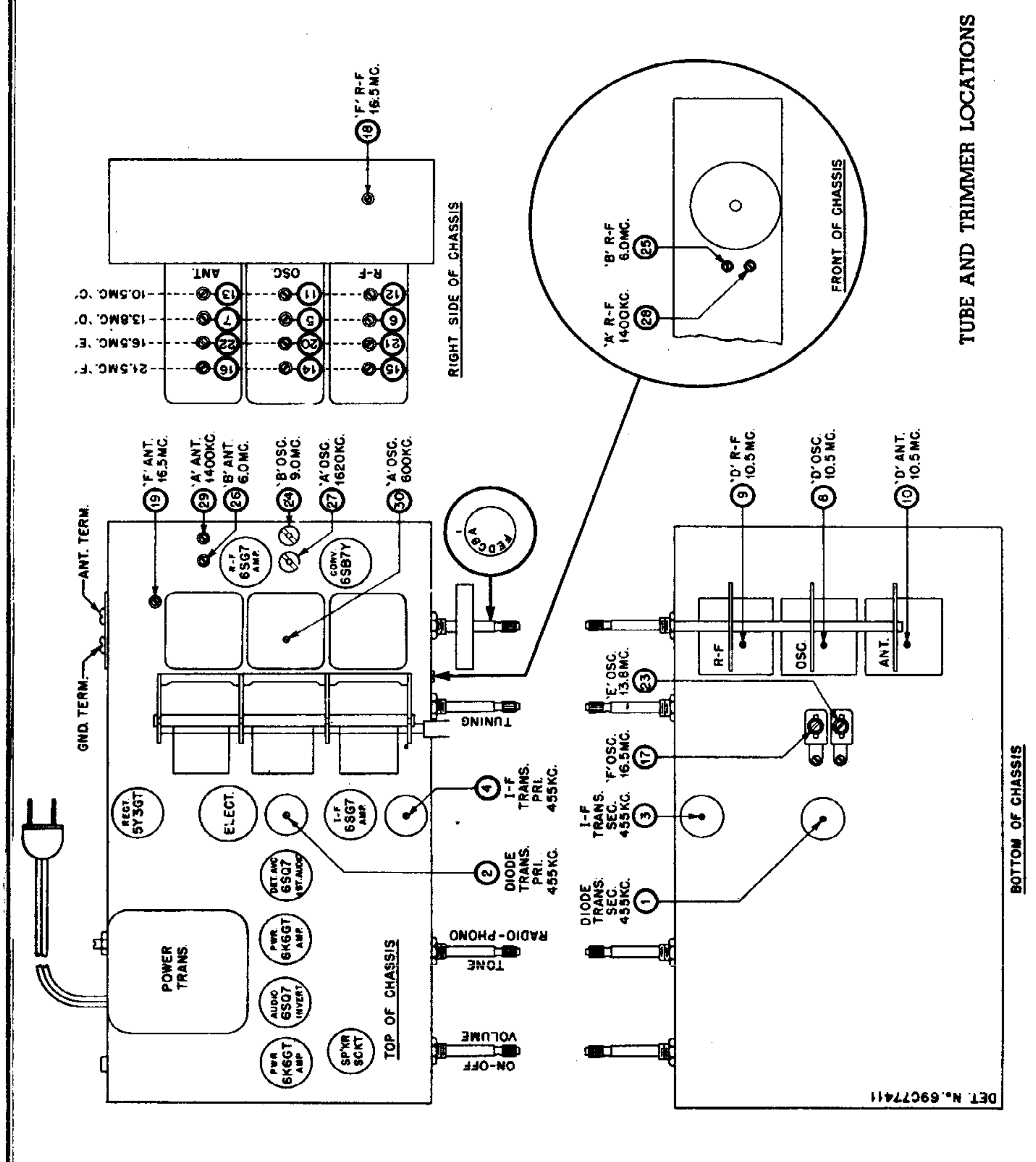

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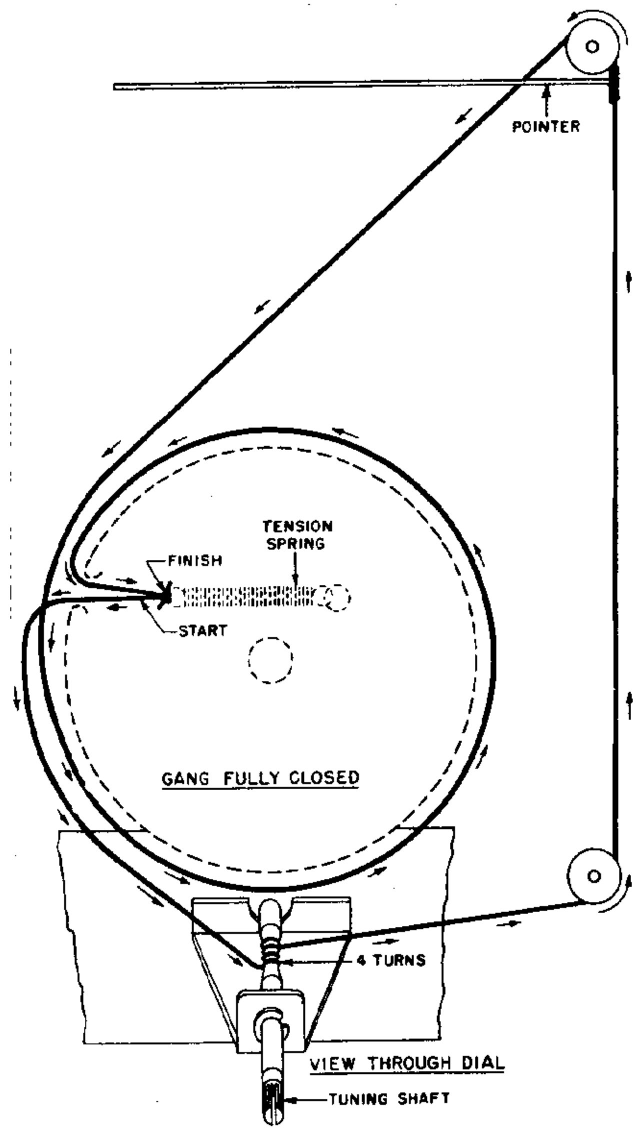
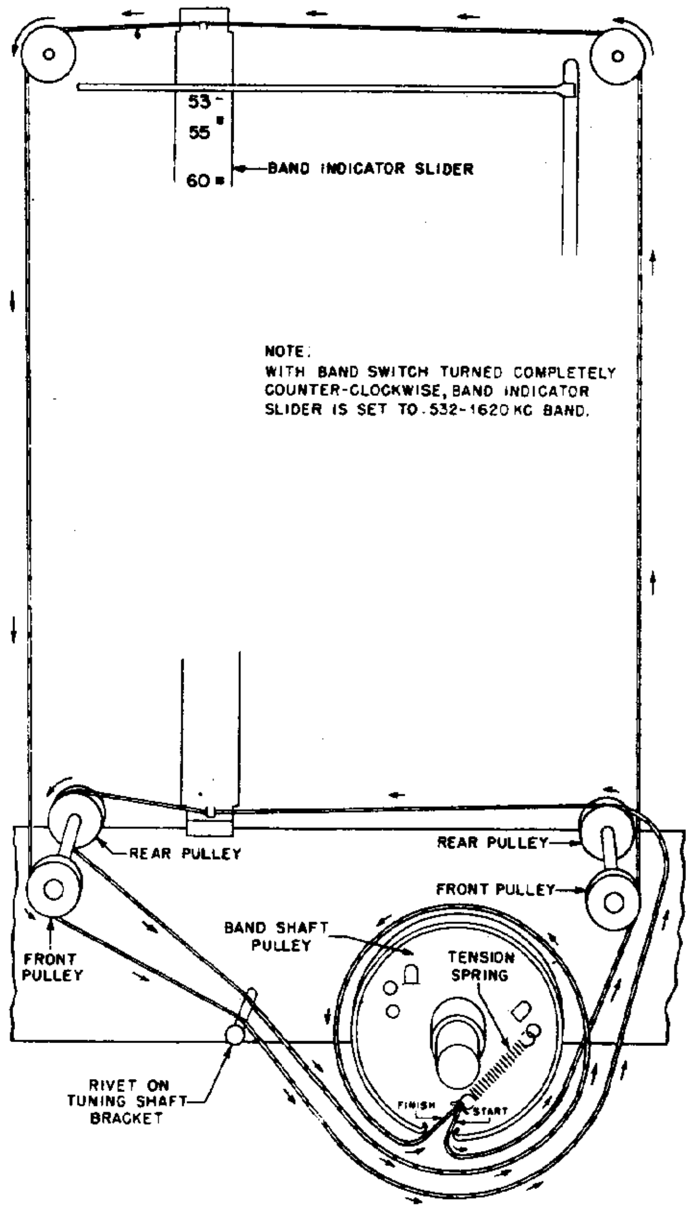


POINTER AND DRIVE CORD DETAIL



BAND INDICATOR SLIDER CORD DETAIL

STRING DRIVE DETAIL

MOTOROLA INC.

REF. NO.	PART NO.	DESCRIPTION
C-1	19C76478	Capacitor, variable: 3 gang; each gang section consists of a 6 plate (7-80 mmf.) and 21 plate (7-402 mmf) sections
C-2	20A76734	Capacitor, trimmer: mica; 4-70 mmf; (20A76669) on same bracket as C-3, C-4 & C-5; not replaceable separately
C-3	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-2, C-4 and C-5; not replaceable separately
C-4	20A76734	Capacitor, trimmer: mica; 7-130 mmf; (20K76670) on same bracket as C-2, C-3 & C-5; not replaceable separately
C-5	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-2, C-3 & C-4; not replaceable separately
C-6	20A76734	Capacitor, trimmer: mica; 4-70 mmf; (20A76669) on same bracket as C-7, C-8 & C-9; not replaceable separately
C-7	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-6, C-8 & C-9; not replaceable separately
C-8	20A76734	Capacitor, trimmer: mica; 7-130 mmf; (20K76670) on same bracket as C-6, C-7 & C-9; not replaceable separately
C-9	20A76734	Capacitor, trimmer: mica; 20-250 mmf; (20K76671) on same bracket as C-6, C-7 & C-8; not replaceable separately
C-10	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf.
C-11	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf.
C-12	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf.
C-13	20K74940	Capacitor, trimmer: ceramic; 7-45 mmf.
C-14	21A76687	Capacitor, fixed: ceramic, 24 mmf 500V
C-15	21A76688	Capacitor, fixed: ceramic, 95 mmf 500V
C-16	21A76686	Capacitor, fixed: ceramic, 56 mmf 500V
C-17	21A76690	Capacitor, fixed; ceramic, 130 mmf 500V
C-18	20A76613	Capacitor, trimmer: mica; 8-20 mmf; on same bracket as C-19; not replaceable separately
C-19	20A76613	Capacitor, trimmer: mica, 4-45 mmf; on same bracket as C-18; not replaceable separately
C-20	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-21	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-22	20A76614	Capacitor, trimmer: mica, 8-20 mmf; on same bracket as C-23; not replaceable separately
C-23	20A7[illegible]	Capacitor, trimmer: mica; 4-45 mmf; on same bracket as C-22; not replaceable separately
C-24	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-25	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-26	21R2751	Capacitor, fixed: mica; 535 mmf 1% 500V
C-27	21R2758	Capacitor, fixed: mica; .005 mf 2% 300V
C-28	20B76542	Capacitor, trimmer; 8-50 mmf
C-29	20B76542	Capacitor, trimmer: 8-50 mmf
C-30	21K53198	Capacitor, fixed: ceramic; 50 mmf 500V
C-31	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-32	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-33	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-34	8A76494	Capacitor, fixed: paper; .01 mf 400V; shielded
C-35	8A76494	Capacitor, fixed: paper; .1 mf 400V; shielded
C-36	21R6697	Capacitor, fixed: mica; 200 mmf 10% 500V
C-37	8A76498	Capacitor, fixed: paper; .005 mf 600V; shielded
C-38	21R6664	Capacitor, fixed; mica; 400 mmf 10% 500V
C-39	8A86494	Capacitor, fixed: paper; .005 mf 600V; shielded
C-40	21R6664	Capacitor, fixed: mica; 400 mmf 10% 500V
C-41	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-42	8A76497	Capacitor, fixed: paper; .05 mf 400V; shielded
C-43	8A76497	Capacitor, fixed: paper; .05 mf 400V; shielded
C-44	8A76496	Capacitor, fixed: paper; .005 mf 600V; shielded
C-45	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-46	8A76495	Capacitor, fixed: paper; .02 mf 400V; shielded
C-47	23A76475	Capacitor, electrolytic: 30-30 mf 400V, 50 mf 25V
I-1	65K4151	Bulb: 6-8V; bayonet base; type #51
I-2	65K4151	Bulb: 6-8V; bayonet base; type #51
L-1	24C76720	Coil, antenna; complete with shield, 4 trimmers (C-2, C-3, C-4 & C-5) and tuning core
L-2	24K76721	Coil, R.F.; complete with shield, 4 trimmers (C-6, C-7, C-8 & C-9) and tuning core
L-3	24K76722	Coil, oscillator; complete with shield, 4 ceramic trimmers (C-10, C-11, C-12 & C-13), 4 fixed ceramic capacitors (C-14, C-15, C-16 & C-17) and 2 tuning cores
L-4	1X76728	Coil, shunt: bands "E & F" antenna shunt; white dot coding; complete with core and mounting bracket
L-5	1X76727	Coil, shunt: bands "E & F" R.F. shunt; yellow dot coding; complete with tuning core and mounting bracket
L-6	1X76725	Coil, shunt: band "F" oscillator shunt; red dot coding; complete with tuning core and mounting bracket
L-7	1X76726	Coil, shunt: band "E" oscillator shunt; green dot coding; complete with tuning core and mounting bracket
LS-1	50C77254	Speaker 8" electrodynamic; 675 ohm field; 3.2 ohm voice coil (at 400 cycles)
R-1	6R6004	Resistor, fixed: carbon; 1 megohm 1/2w Ins.
R-2	6R6004	Resistor, fixed: carbon; 1 megohm 1/2w Ins.
R-3	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2w Ins.
R-4	6R6056	Resistor, fixed: carbon; 47,000 ohms 1/2w Ins.
R-5	6R5306	Resistor, fixed: carbon; 15,000 ohms 10% 3W N.I.
R-6	6R5290	Resistor, fixed: carbon; 2200 ohms 1/2w Ins.
R-7	6R5766	Resistor, fixed: carbon; 33,000 ohms 10% 2W Ins.
R-8	6R5927	Resistor, fixed: carbon; 2.2 megohms 1/2w Ins.
R-9	6R6004	Resistor, fixed: carbon; 1 megohm 1/2w Ins.
R-10	6R2122	Resistor, fixed: carbon; 4.7 megohms 1/2w Ins.
R-11	18K76685	Resistor, variable: 1 megohm; tapped at 300,000 ohms; includes on-off switch SW-3
R-12	6R6377	Resistor, fixed: carbon; 470,000 ohms 10% 1/2w Ins.
R-13	6R6377	Resistor, fixed: carbon; 470,000 ohms 10% 1/2w Ins.
R-14	6R2986	Resistor, fixed: carbon; 160 ohms 10% 2W Ins.
R-15	6R2084	Resistor, fixed: carbon; 15 ohms 10% 1/2w Ins.
R-16	6R6012	Resistor, fixed: carbon; 33,000 ohms 1/2W Ins.
R-17	18K76686	Resistor, variable: 1 megohm; includes phono-radio switch SW-4
R-18	6R6031	Resistor, fixed: carbon; 100,000 ohms 10% 1/2w Ins.
R-19	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2w Ins.
R-20	6R6015	Resistor, fixed: carbon; 220,000 ohms 1/2w Ins.
R-21	6R6377	Resistor, fixed: carbon; 470,000 ohms 10% 1/2w Ins.
R-22	6R6377	Resistor, fixed: carbon; 470,000 ohms 10% 1/2w Ins.
SW-1	40B76483	Switch, band: 6 position
SW-2	40A76621 or 40A76657	Switch, line voltage; single pole, 3 position
SW-3		Switch, S.P.S.T.; part of volume control R-11 (power on-off switch)
SW-4		Switch, D.P.D.T.; part of tone control R-17 (radio-phono switch)
T-1	24B76696	Transformer, I.F.: 455 Kc; complete with iron cores and padding capacitors, but less shield
T-2	24B70637	Transformer, diode; 455 Kc; complete with iron cores and padding capacitors, but less shield
T-3	25B76765	Transformer, output
T-4	25C76655	Transformer, power
	7A76963	Bracket, tuning shaft: with cord guiding shoulder rivet
	15A77257	Cabinet, table model
	30K21859	Cord, line: 9 ft. long; with plug
	5A71092	Grommet, rubber; 5/8 x 3/4 dia. (chassis mounting)
	5A71130	Grommet, rubber: 1/4 x 1/2 dia. body; 3/4 dia. head (chassis retainer)
	5A76629	Grommet; rubber (dial scale cushion)
	37K15125	Grommet, rubber (gang cushions)
	5A76960	Grommet, rubber (speaker mounting)
	1A76979	Indicator, band: with slider at each end
	14A76698	Insulator, electrolytic capacitor
	36K76795	Knob, control; plain
	52A76916	Pointer, dial
	9A22182	Receptacle, plug: 1 prong
	9A27674	Receptacle, plug: 3 prong
	34D76915	Scale, dial: glass
	47A76684	Shaft, tuning
	1A71049	Shield & Iron Core Sleeve Assembly (for I.F. or diode transformer)
	9A70166	Socket, tube: octal; plain
	9A77378	Socket, tube: octal; shielded type
	9A6729	Socket, tube: 5 prong; saddle type
	9K76964	Socket, pilot light with lead
	2A76635	Speednut, trimmer lock-in (C-28 & C-29 mounting)
	31A751	Strip, antenna & ground
	4A23164	Washer, "C" (tuning shaft retainer)

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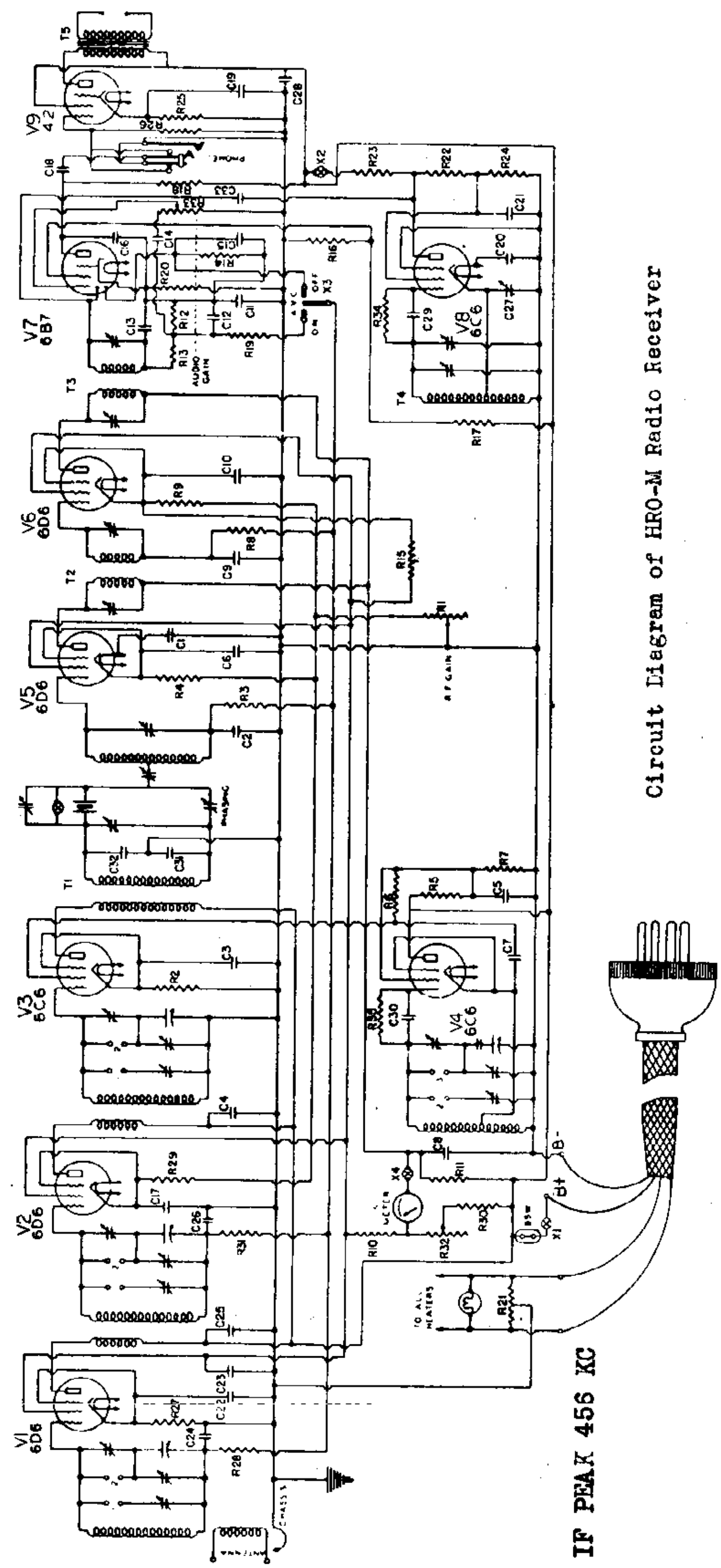

Circuit Diagram of HRO-M Radio Receiver

IF PEAK 456 KC

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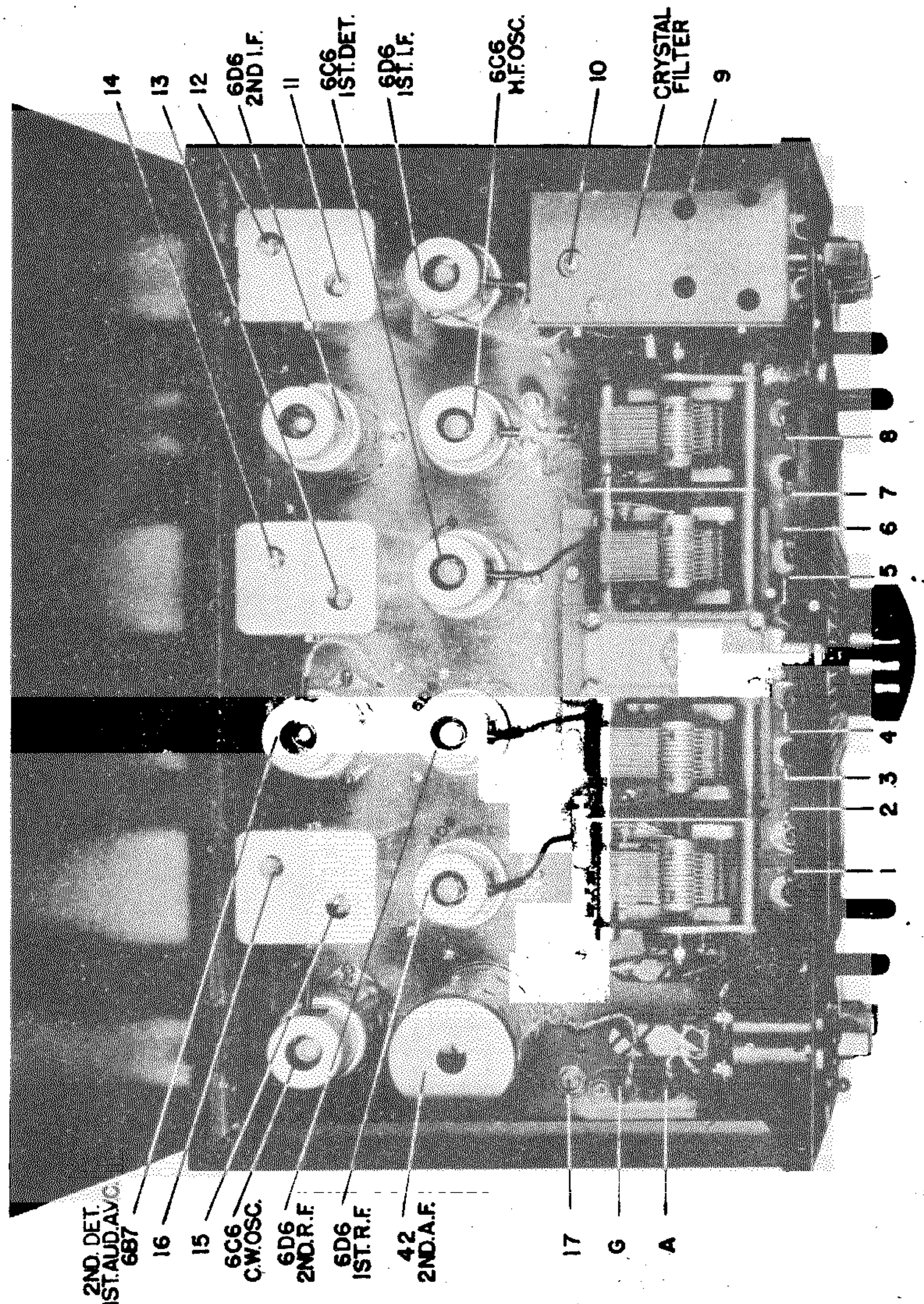
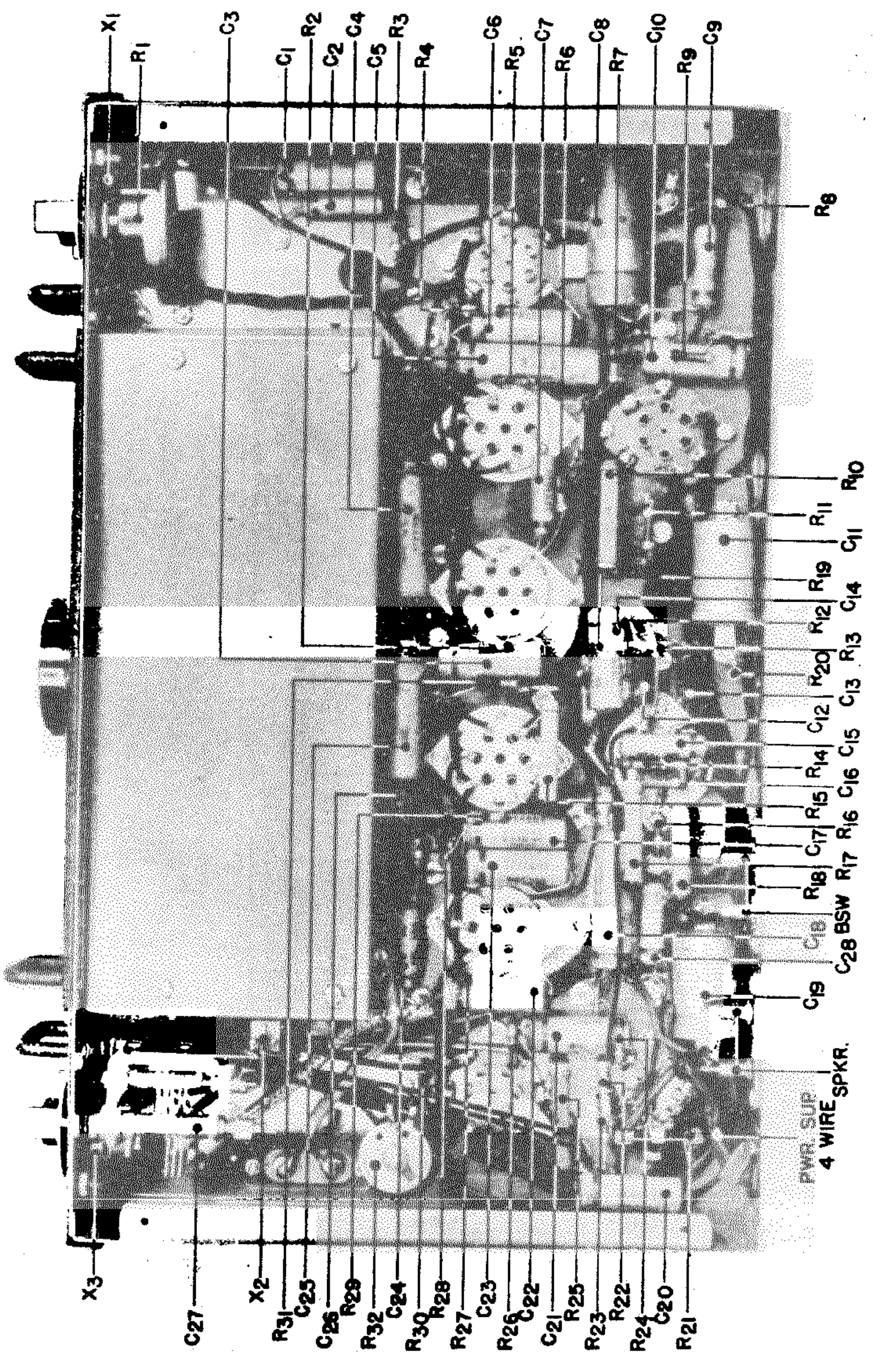


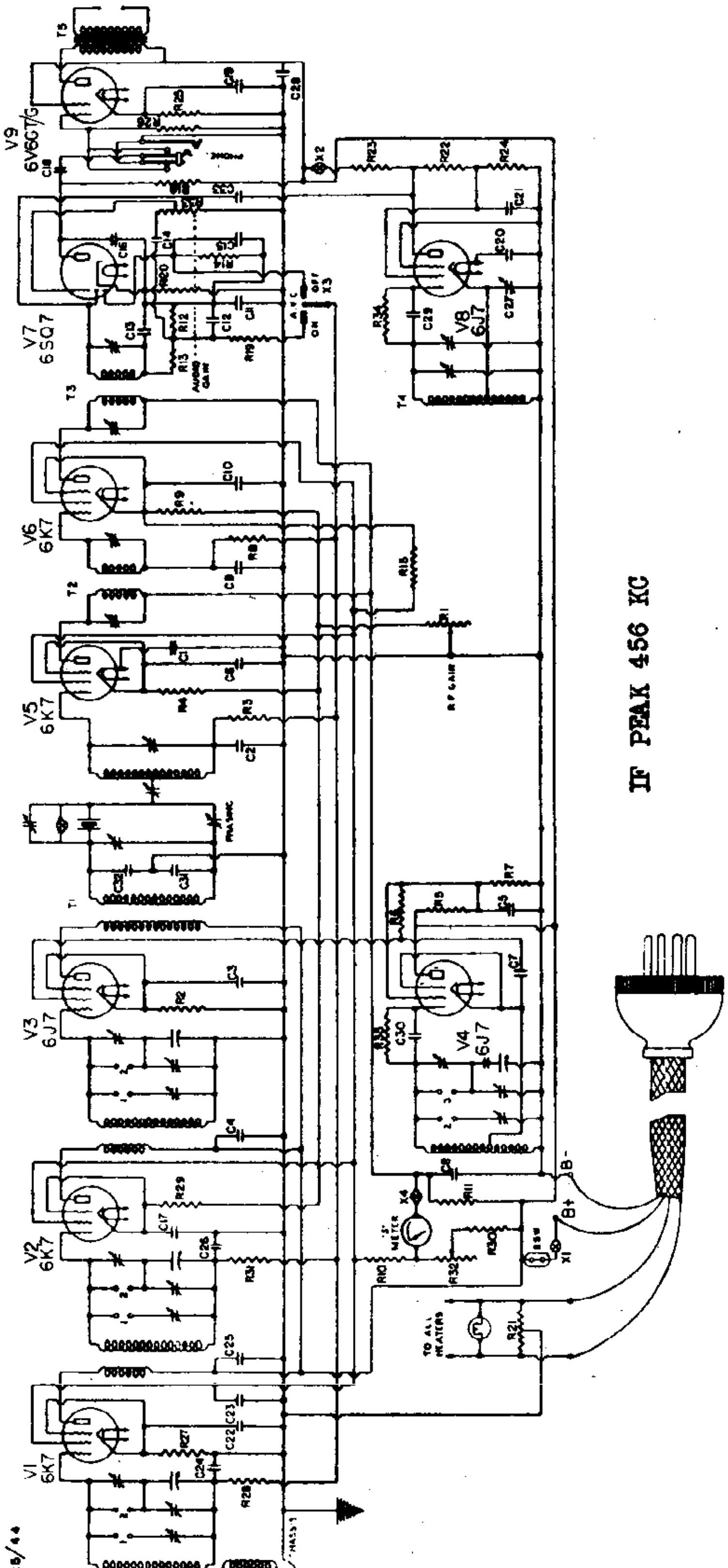
Top View of HRO-M Radio Receiver



Bottom View of HRO-M Radio Receiver

NATIONAL COMPANY, INC.

SCHEMATIC DIAGRAM FOR HRO-5 RADIO RECEIVER



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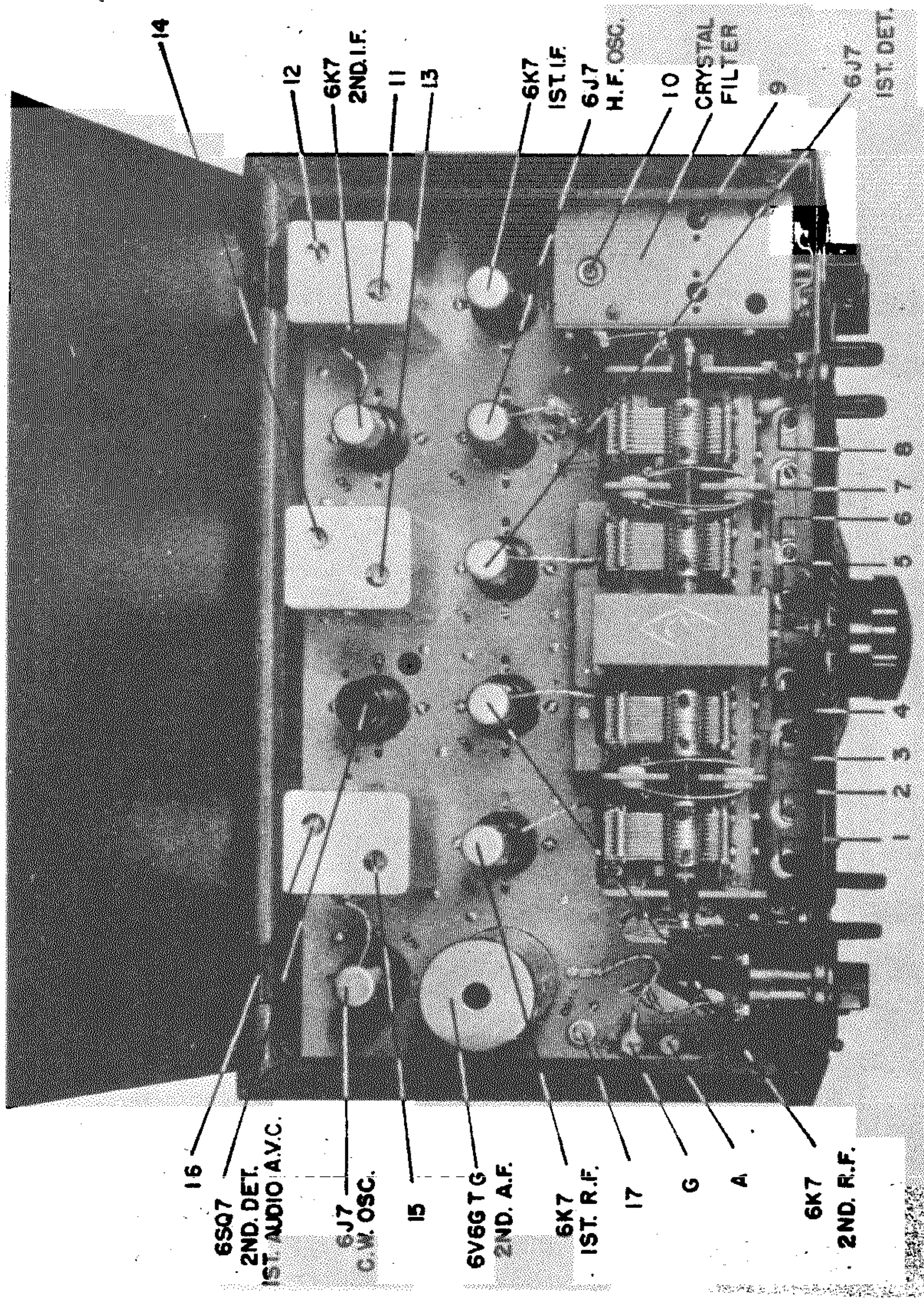
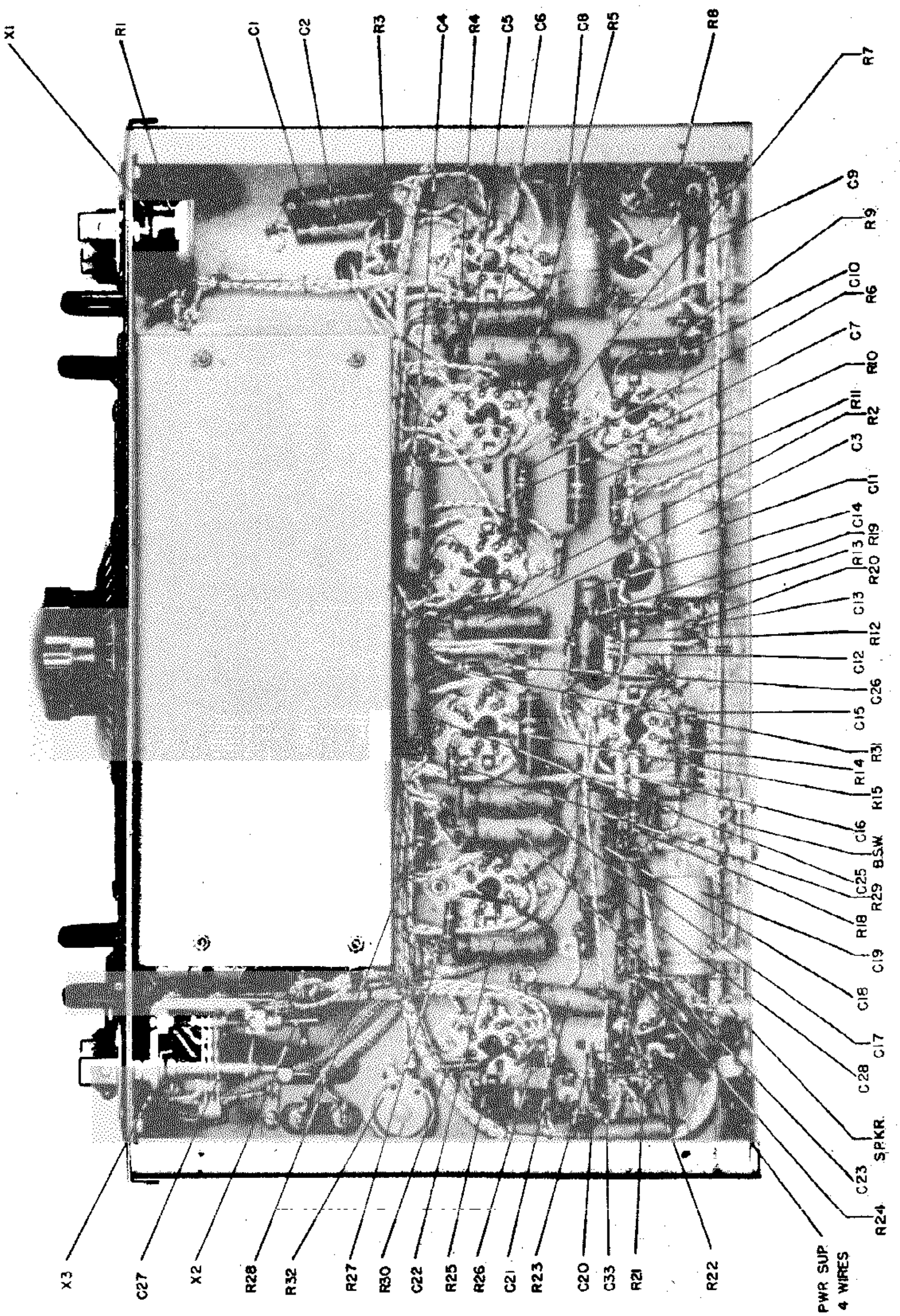


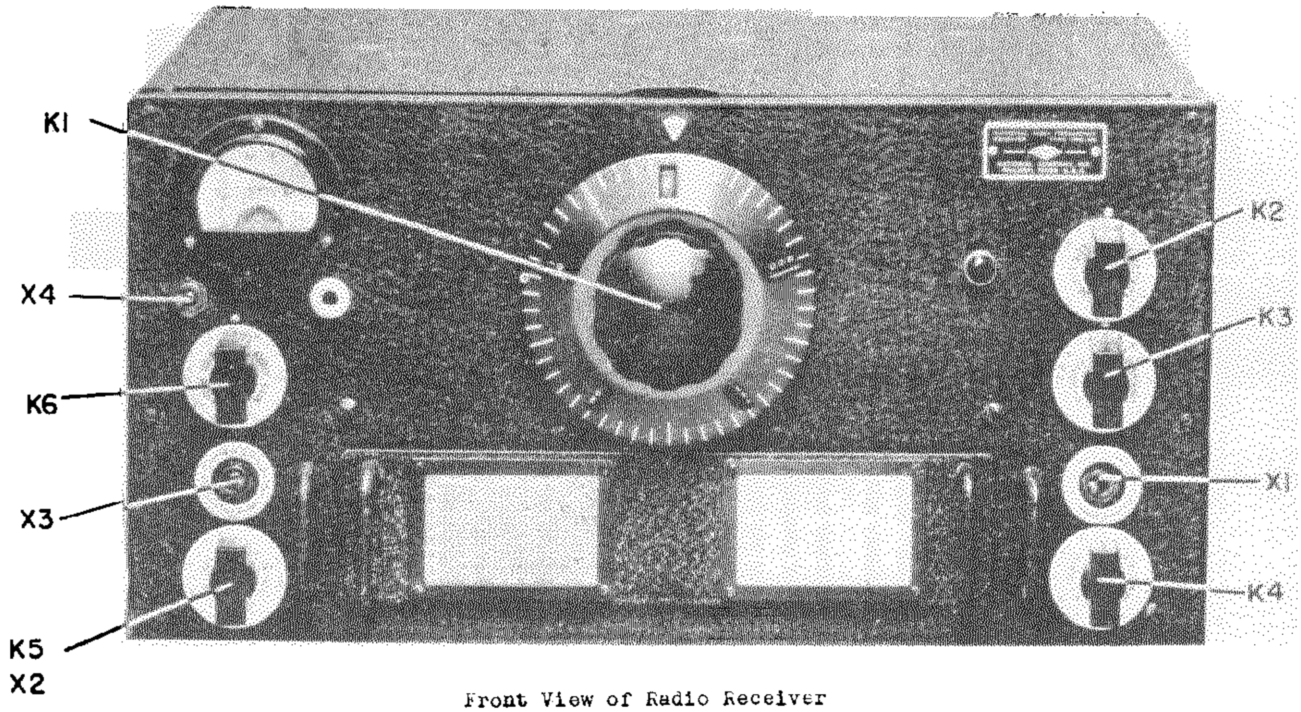
Top View of HRO-5 Radio Receiver

NATIONAL COMPANY, INC.

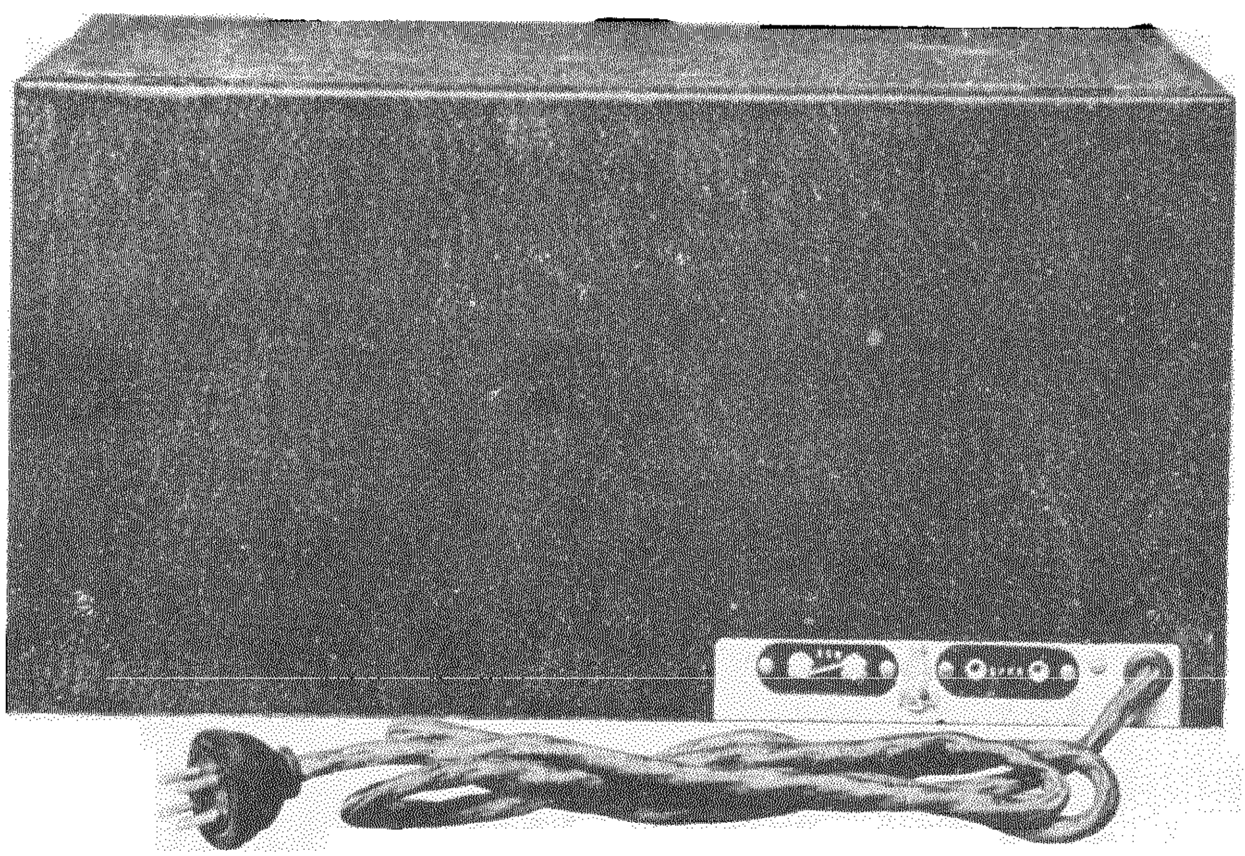


Bottom View of HRO-5 Radio Receiver

NATIONAL COMPANY, INC.



Front View of Radio Receiver



Rear View of Radio Receiver

RECEIVER

The HRO-5 Radio Receiver is a high-frequency superheterodyne suitable for C.W. and M.C.W. reception throughout the frequency range of 50 to 430 Kcs., and 480 to 30,000 Kcs. This range of frequencies is covered in nine bands as follows:

50 - 100 KC. Band.	Type J Coil Set
100 - 200 KC. Band.	Type H Coil Set
180 - 430 KC. Band.	Type G Coil Set
480 - 960 KC. Band.	Type F Coil Set
900 - 2050 KC. Band.	Type E Coil Set
1.7 - 4.0 MC. Band.	Type JD Coil Set
3.5 - 7.3 MC. Band.	Type JC Coil Set
7.0 - 14.4 MC. Band.	Type JB Coil Set
14.0 - 30.0 MC. Band.	Type JA Coil Set

The receiver may be obtained in either table or rack mounting models. Plug-in coil set Types JA, JB, JC, and JD are normally supplied with the receiver, and coil set Types E, F, G, H, and J may be obtained in addition, as desired. The receiver is designed for use with an external power unit capable of supplying 240 volts D. C. at 70 milliamperes and 6.2 volts A. C. at 3.4 amperes, although lower plate supply voltages down to 135 volts may be used with some sacrifice in performance.

The circuit employed on all bands comprises two tuned stages of radio frequency amplification, a tuned first detector stage, a high frequency oscillator employing a tube separate from the first detector tube, a first intermediate frequency amplifier stage employing a crystal filter, a conventional second intermediate frequency amplifier stage operating at 456 kilocycles, a combined second detector - automatic volume control - first audio stage, an audio output stage, and a beat frequency oscillator coupled to the second detector to provide for C.W. reception.

The antenna input circuit is suitable for use with a transmission line, a doublet antenna, or a single wire antenna. The antenna input impedance averages approximately 500 ohms at frequencies higher than 1700 Kc.

Two audio output circuits are provided:

(1) Loud speaker terminals, in the form of tip jacks, are located at the rear left-hand side of the receiver. Normally, the plate circuit of the output tube is brought directly to these tip jacks and a separate permanent magnet type loud speaker having a 5000 to 7000 ohm input impedance is required. The output transformer, in this case, is associated with the loud speaker and carries the plate current of the output tube. An output transformer can be included within the receiver to provide any specified output impedance from a few ohms to 20,000 ohms.

(2) A phone jack is mounted on the front panel. This jack is wired into the output of the first audio stage. When the phones are plugged in, the signal input to the last tube is completely disconnected.

The crystal filter located in the first intermediate amplifier stage provides a convenient means of obtaining adjustable selectivity when receiving any frequency in the tuning range of the receiver. The PHASING control associated with the crystal filter enables the operator to easily suppress interfering signals which may produce objectionable heterodynes. The crystal filter may be used advantageously in either C.W. or M.C.W. reception.

Automatic volume control and an associated signal strength meter are provided for use in M.C.W. reception.

The tubes employed in the HRO- Radio Receiver are located in the circuit as follows:

	HRO-M	HRO-5
First R.F.	6D6	6K7
Second R.F.	6D6	6K7
First Detector	6C6	6J7
High Frequency Oscillator	6C6	6J7
First I.F.	6D6	6K7
Second I.F.	6D6	6K7
Diode Detector, AVC, First Audio	6B7	6SQ7
Second Audio	42	6V6GT/G
Beat Frequency Oscillator	6C6	6J7

B. POWER UNIT.

Power units for operation from 230 A.C., 115 volts A.C., 6 volts D.C., or 12 volts D.C. are available for use with the HRO-5 Receiver.

These power units may be obtained in either rack or table mounting styles.

Special connections in the vacuum tube heater circuits located within the receiver are required for operation from a 12 volt D.C. source.

In all cases the circuit of the power unit consists of a transformer (with vibrator for D.C. models), a rectifier, and filter circuits.

C. LOUD SPEAKER

Loud Speakers in rack or table mounting styles can be supplied for use with the HRO-5 Radio Receiver. Normally the speaker is of the permanent magnet type and the transformer should have an input impedance of 5000 to 7000 ohms. The speaker transformer carries the plate current of the Receiver output tube. In installations where an output transformer is included within the Receiver, the speaker transformer must of course match the Receiver output impedance. A dynamic speaker may be used, although a means for the speaker field excitation must be provided.

INSTALLATION.

The receiver, power unit, and loud speaker may be arranged in any desired positions although it is not recommended that the loud speaker be placed on top of the receiver as in some cases undesirable microphonic noises may result.

The audio power output terminals are located at the rear left-hand side of the receiver. Phone tips on the loudspeaker cable and tip jacks mounted on the receiver chassis provide a convenient means for connecting the loud speaker to the receiver. Connect the loud speaker to these terminals, or if no speaker is to be used, insert a jumper in the tip jacks to connect them together. If this precaution is neglected, the output tube may be damaged due to excessive screen current.

Insert the receiver power plug in the power socket of the power unit. Connect the power unit to the proper supply source.

The radio frequency input circuit of the HRO-5 Receiver is arranged for operation with either single-wire or doublet type of antenna. There are two R.F. input binding posts located at the left-hand end of the receiver. When using a single-wire antenna, connect the lead-in to the binding post nearest the front panel and clamp the short flexible lead, which is connected to the chassis, under the remaining binding post. An external ground connection may or may not be necessary, depending upon the particular installation. When a doublet antenna is used, connect the antenna feeders or a balanced transmission line directly to the input terminals and do not use the flexible ground connection mentioned above.

The radio frequency upon which reception is desired will determine the coil set to employ, in accordance with the individual charts on each coil set panel. Select the proper coil set and plug it into the opening in the front of the receiver.

The receiver is now ready for use. Turn the receiver on by means of the toggle switch located on the power unit. Complete the receiver B+ circuits by means of the toggle switch located on the receiver front panel directly above the R.F. GAIN control. A pair of terminals at the rear of the receiver chassis is wired to the B+ switch on the front panel. These terminals provide a convenient means of connecting a relay or switch for remote control of the B+ circuits.

For further instructions refer to the section of this book entitled Operating Instructions.

CIRCUIT DESCRIPTION.

A. SPECIAL FEATURES.

Several special features have been included in the HRO-5 Radio Receiver which result in high quality performance. These special features provide receiver characteristics which enable the operator to adjust the receiver for optimum reception under a variety of receiving conditions.

The radio frequency amplifier stages are so designed that the receiver gain is essentially uniform throughout the tuning range of the receiver. The impedance of a typical R.F. tuned secondary circuit decreases as the L/C ratio decreases, thus tending to reduce stage gain as the low frequency end of the tuning band is approached. Compensation for this effect is obtained by the use of high inductance primary coils in the interstage R.F. transformers. The high inductance primary is designed so that the primary circuit, as a whole, resonates broadly at a frequency outside the low frequency limit of the coil set tuning range. The primary circuit will, therefore, show increasing impedance as the tuning of the receiver approaches the low frequency end of the band. This resonant characteristic of the primary increases gain at low frequencies, over-compensating for the decreasing impedance of the secondary. In order to obtain the proper amount of compensation, a small coupling capacity is placed between the plate of the preceding tube and the grid of the following tube. This capacity is most effective at the higher frequency end of the band and combined with the resonant characteristic of the primary provides uniform gain throughout the band.

A slightly different arrangement for gain compensation is employed in the 14-30 Mc. band. The interstage R.F. coupling transformers have three windings all closely coupled together. The primary winding connected in the plate circuit of the first R.F. tube is interwound with the tuned secondary winding and both have approximately the same number of turns. A third winding which feeds the control grid of the following R.F. amplifier tube is so designed that its natural period (or resonant frequency) falls just outside the low frequency end of the frequency band covered by the coil set. The impedance of this resonant secondary increases as the low frequency end of the tuning band is approached, thus tending to compensate for the unfavorable L/C ratio of the tuned secondary in much the same manner as the resonant primary system used in other coil sets. The self resonant secondary arrangement is preferable, in the 14-30 Mc. band, as the resonant primary system is inadequate in its levelling action. It is not practical to include any gain compensation system in the coil sets for the 50 to 100 Kc. band.

The plug-in coil sets regularly supplied with the HRO-5 Radio Receiver do not have any provision for band spread. Coil sets can be supplied which include the band spread feature, if desired. Band spread is accomplished by switching small capacitors in series with each section of the main tuning capacitor thus reducing its effective range of capacity change. This system provides band spread of the frequencies received at the high frequency end of each coil set tuning range. The frequency bands chosen for band spread are those of the 10, 20, 40, and 80 meter amateur bands. Coil sets which contain the band spread feature are designated as Type A, B, C and D rather than JA, JB, JC and JD.

The receiver is compensated for frequency drift due to temperature changes occurring in circuits which may detune the receiver from the desired signal. While variations in room temperature are usually so gradual that drift resulting from this source is not objectionable, it is minimized through the use of air dielectric trimmer and tuning condensers, and the use of coil form material which has a small temperature coefficient. The cause of most objectionable frequency drift is the change of inductance of the high frequency oscillator coil as the interior of the receiver is heated by the tubes. To minimize heating the R.F. coils, the receiver is designed so that the coil sets are plugged into the very bottom of the receiver, underneath the chassis in a separate shielded compartment. The heat from the tubes will of course rise toward the top of the receiver and the R.F. coils will remain nearly at room temperature.

A Crystal Filter is included in the HRO-5 Radio Receiver as a means of providing adjustable selectivity. The use of the Crystal Filter also enables the operator to easily suppress an interfering signal by means of the PHASING control. With the Crystal Filter switch in the off position the receiver band width is approximately 3 Kc., at two times down. Switching the Crystal Filter into the circuit gives a band width of approximately 2.5 Kc. in the broad position and about 200 cycles in the sharp position of the SELECTIVITY control. The PHASING control can be adjusted to suppress interfering signal frequencies differing from the desired signal frequency by 300 cycles or more. The Crystal Filter employs a bridge type circuit which makes use of the high rate of reactance change with changes in frequency provided by a crystal to give the desired sharpness of selectivity. The reactance vs. frequency characteristic of the crystal is modified by damping, or loading the crystal by means of the tuned input circuit. When the input circuit is detuned, its effective resistance decreases and damping is greatly reduced, producing maximum selectivity. Detuning the input circuit does not materially affect the amplification of the receiver at the resonant frequency of the crystal since the series impedance of the circuit becomes very low when damping is reduced.

Automatic volume control is provided for use only with M.C.W. reception. When the beat oscillator is turned on for C.W. reception it provides sufficient signal to operate the A.V.C. system and renders the receiver extremely insensitive.

A beat oscillator, which operates at or near the intermediate frequency is coupled to the second detector. The signal from this oscillator and the desired C.W. signal heterodyne at the second detector and produce an audio beat note thus providing a means for C.W. reception.

The main tuning dial located at the center of the front panel permits swift, accurate tuning and precise logging. This type of dial has an effective scale length of twelve feet and is direct reading to one part in 500. The dial drives the four-gang main tuning capacitor through a worm drive having a reduction ratio of 20 to 1.

Backlash is eliminated by the use of a spring loaded split worm wheel which assures positive drive in either direction at all times.

OPERATING INSTRUCTIONS

A. CONTROLS.

The main tuning dial is located at the center of the front panel. The dial is so arranged that the frequency to which the receiver tunes increases as the dial reading increases. Each coil set is fitted with a calibration chart showing the relationship between dial reading and frequency. An additional chart for band spread calibration is provided on coil sets which include the band spread feature. Observation of each coil set tuning chart will show that the calibration is very nearly linear which characteristic eliminates considerable reference to the coil charts.

The R.F. GAIN control is located at the lower right-hand corner of the front panel and serves to adjust the amplification of the second R.F., first I.F. and second I.F. amplifier stages. Maximum sensitivity is obtained by rotating the control knob to the extreme clockwise position, or 10, on its circular scale. In this position all tubes are operating at maximum gain with minimum bias. As the control is turned counter-clockwise, increasing bias is applied to the second R.F., the first I.F., and the second I.F. tubes, thus reducing their amplification.

Directly above the R.F. GAIN control is a two position toggle switch. This switch is connected in the positive lead of the power supply circuit and its purpose is to shut off the receiver during periods of transmission OR WHEN CHANGING COIL SETS. This last function is important. The B+ circuits are complete when this switch is pushed to the right. Series connected with the B+ switch and mounted at the rear of the chassis is a pair of contacts, marked B.S.W., intended for use with relay control of the receiver.

Immediately above the B+ switch is the PHASING control and the Crystal Filter switch. When this control is rotated to 0, the Crystal Filter is disconnected. When the control is at any other setting between 1 and 10, it acts as a PHASING control with the Crystal Filter connected in the circuit. The PHASING control is used to balance the crystal bridge circuit in eliminating interfering signals.

The SELECTIVITY control is located above the PHASING control. With the Crystal Filter in use, minimum selectivity will be found with the pointer nearly vertical where receiver background noise is a maximum. Rotating the knob in either direction from this point will progressively increase selectivity. When the filter is not in use, this knob acts as an ordinary I.F. trimmer and should be set at the point giving maximum volume and sensitivity.

The C.W. OSC. switch and vernier tuning control is located at the lower left-hand side of the front panel. The C.W. oscillator is used to obtain an audible beat note when receiving C.W. signals or to locate the carrier of a weak M.C.W. station. Rotating the C.W. OSC. knob in a clockwise direction switches B+ voltage to the plate and screen of the C.W. oscillator tube. Further rotation of the knob from 0 on the scale to 10 varies the frequency over a range of approximately 3 kc. The C.W. oscillator tunes to the intermediate frequency at 9 on the scale.

The automatic volume control switch is located above the C.W., OSC. control. The automatic volume control circuits are in operation when the toggle switch is pushed to the left.

The AUDIO GAIN control is located directly above the AVC-MVC switch. Clockwise rotation of this control increases the signal applied to the triode section of the first audio tube. This control adjusts the volume level of the signal at both phone jack and loudspeaker terminals.

The S-meter for indicating carrier intensity or signal strength is in the upper left-hand corner. Just below it, and to the left, is a switch which connects the S-meter in the circuit.

The phone jack is located just below and slightly to the right of the S-meter. When a phone plug is inserted into the phone jack, the loud speaker is automatically silenced.

Inspection of the coil set terminal panels which include the band spread feature will show several small rectangular metal pieces. There are two of these pieces or terminal blocks on each coil which will accommodate a small flat-head machine screw. With the screws in the left-hand positions, the coil range will be that shown in the left-hand, or general coverage chart. If it is desired to change the calibration to band spread, as shown on the right-hand chart, it is only necessary to move each of the four screws to the right-hand terminal block of each coil.

B. C.W.RECEPTION.

After the HRO-5 Receiver is properly installed it is put in operation by turning both the Power Unit switch and the Receiver B+ switch to the on position. The C.W. OSC. control should be turned on and the A.V.C. switch must be pushed to the right to render the A.V.C. circuits inoperative. If the A.V.C. switch is turned on with the C.W. oscillator in operation, the receiver will block and become extremely insensitive. The Receiver is now adjusted for C.W. reception and will tune in accordance with the frequency calibration of the coil set in use.

Although the settings of the R.F. GAIN and A.F. GAIN controls will depend to some extent upon operating conditions, it is recommended that the A.F. GAIN control be set about 5 and the R.F. GAIN control advanced as may be required to provide a satisfactory audio signal. Advancing the R.F. GAIN control too much may cause I.F. or second detector overload. Such overload is indicated by a change in pitch of the C.W. beat note over the duration of a code character, or by excessive "thumping".

The best setting of the C.W. OSC. control will also depend upon operating conditions. When the received signal is free from interference and is sufficiently strong to override static and circuit noise, it is recommended that the C.W. OSC. control be set at the position which tunes the C.W. oscillator to the intermediate frequency of the receiver. This setting will normally be between 8 and 10 on the C.W. OSC. dial. As the control is turned toward 0, the C.W. oscillator is progressively detuned from the intermediate frequency of the receiver.

The operator can determine the extent of this deviation by listening to the characteristic pitch of background and circuit noises. When this pitch is 2000 or 3000 cycles per second, it will be found that the receiver has definite "single signal" properties such that on one side of the carrier, the audio beat note of a received signal will be considerably louder than that of the other side. This characteristic is helpful in receiving weak signals through interference and utilizes the maximum available sensitivity of the receiver.

C. M.C.W. RECEPTION

The initial adjustment of the HRO-5 Receiver for M.C.W. reception is the same as for C.W. reception except that the C.W. oscillator control should be turned off. In M.C.W. reception the C.W. oscillator may be useful in locating the carrier of a weak phone or broadcast station. After the phone carrier has been found the C.W. oscillator is, of course, turned off.

With A.V.C. off the settings of the A.F. GAIN and R.F. GAIN controls will depend to some extent upon operating conditions. It is recommended that the A.F. GAIN control be set at about 5 and the R.F. GAIN control advanced as may be required to provide a satisfactory audio signal. When receiving weak signals, best signal-to-noise ratio will be obtained by retarding the A.F. GAIN control and advancing the R.F. GAIN control to a point as near maximum as receiving conditions permit. The operator must be careful to avoid overloading the I.F. or second detector stages under these conditions. Overload will be indicated by excessive audio distortion.

To receive M.C.W. signals with automatic volume control, the A.V.C. switch must be pushed to the left, i.e., the on position. The R.F. GAIN control should be advanced to a point as near maximum as receiving conditions permit. Audio output should be controlled entirely by means of the A.F. GAIN control. When the noise level is high, the R.F. GAIN control may be retarded to limit the overall sensitivity to a definite maximum. The operator should remember, however, that the full range of A.V.C. action cannot be obtained unless the R.F.GAIN control is fully advanced.

D. RECEPTION WITH THE CRYSTAL FILTER.

The crystal filter may be used advantageously in both C.W. and M.C.W. reception to adjust the selectivity of the receiver and also to suppress interfering signals.

For M.C.W. reception the crystal filter is switched into the circuit by turning the PHASING control knob from 0 to 1 as indicated by its dial. The insertion of the crystal filter reduces the receiver gain slightly and as a result it will be necessary to advance both A.F. and R.F. GAIN controls to compensate for this loss in gain. The PHASING control should then be turned to the center of its range which effectively removes its action from the band of frequencies being received. The SELECTIVITY control may be adjusted for minimum selectivity by turning it to a position (near the center of its range) where background noise is the loudest. The receiver may now be tuned to M.C.W. signals in the usual manner, but it will be found that the selectivity is very high, with the result that all audio frequency tones above a few hundred cycles are comparatively weak when the receiver is tuned exactly to the M.C.W. carrier. Normally this loss of high frequency audio tones would result in low intelligibility of received signal, but since the background noise, static, etc., have been reduced much more, the net result is usually an improvement. Selectivity may be increased for use in extreme cases of interference by turning the SELECTIVITY control in either direction from the minimum selectivity position. Under these conditions, tuning is very critical and care must be exercised to assure proper tuning.

An interfering signal which produces undesirable heterodynes may be greatly suppressed by means of the crystal filter PHASING control. It will be found that the point of maximum attenuation for signals with a frequency near the desired frequency will occur near one extreme or the other of the PHASING control rotation depending on whether the frequency of the undesired signal is above or below the frequency of the desired signal. Undesired signals with frequencies further removed from the desired signal frequency can be suppressed with settings of the PHASING control which occur nearer the center of its range.

Crystal Filter operation for C.W. reception is similar to that for M.C.W. with the exception that maximum selectivity may be employed without the loss of intelligibility experienced in M.C.W. reception. When maximum selectivity is employed, tuning is very critical and care must be exercised to assure proper tuning. When the receiver is slowly tuned across the carrier of a received signal, the beat note produced will be very sharply peaked in output at a particular audio pitch. This peak in response indicates the correct receiver dial setting. The setting of the C.W. OSC. must provide a beat note peak well within the audible range so that receiver peak response may be readily observed. A C.W. OSC. dial setting near 7 is recommended. After the receiver has been correctly tuned, the pitch of the beat note peak may be adjusted by means of the C.W. OSC. control to provide an audio tone which is pleasing to copy, or coincides with any response peaks in the speaker or headphones. Under these conditions the receiver will exhibit pronounced single signal properties which may be demonstrated by tuning the receiver dial to the other side of "zero beat" so that the pitch is the same as before and observing the marked reduction in output. This dial setting is not recommended for use other than to demonstrate the single signal properties of the receiver. The operation of the PHASING control in suppressing an undesired signal is the same for either C.W. or M.C.W. reception.

E. <u>MEASUREMENT OF SIGNAL STRENGTH</u>.

The S-meter can be used to measure the strength of received signals when the receiver is adjusted for M.C.W. reception employing automatic volume control. With no signal input the S-meter should read zero with the R.F. GAIN control set at about 9.5. The setting of the AUDIO GAIN control is unimportant when measuring signal strength. The Crystal Filter should be disconnected from the circuit and the SELECTIVITY control set for maximum S-meter reading. The S-meter may be used to measure the strength of either C.W. or M.C.W. signals provided that the beat oscillator is not used.

ALIGNMENT

Should realignment of the HRO-5 Radio Receiver become necessary the following alignment data should be carefully studied before making any circuit adjustments. It is important that the operator understands the function of each circuit element so that correct alignment may be obtained quickly and accurately. Adjustments referred to by number are shown in the various receiver photographs.

The complete alignment of the Receiver may be divided into five steps:

(A) Intermediate Frequency Amplifier alignment including Crystal Filter adjustments.

(B) High Frequency Oscillator alignment.

(C) Radio Frequency Amplifier alignment.

(D) Tracking of High Frequency Oscillator and Radio Frequency Amplifier circuits.

(E) Band Spread adjustments.

A. <u>INTERMEDIATE FREQUENCY AMPLIFIER ALIGNMENT</u>.

A-1 The operator is cautioned against making any adjustments indiscriminately, and he should not realign any circuit unless tests definitely indicate that realignment is necessary.

A-2. The alignment of the Intermediate Frequency Amplifier may be easily checked in the following manner. The receiver should be adjusted for normal operation with no antenna, AVC off, R.F.GAIN at 9, Crystal Filter on, PHASING control at 5, SELECTIVITY maximum, and the C.W. OSC. turned on. The setting of the A.F. GAIN control does not affect the measurement and may be adjusted to provide sufficient output to make the required observations. The C.W. OSC. control should then be turned until a point is found where the predominant pitch of the background noise is lowest and a crystal ring is heard. This setting of the C.W. OSC. control should occur near 9 on the C.W. OSC. scale and the exact setting should be noted. The Crystal Filter should then be disconnected from the circuit by turning the PHASING control to 0 on its scale and the SELECTIVITY control adjusted for maximum background noise. The C.W. OSC. control should again be adjusted for the lowest predominant pitch of background noise and this new setting noted. If the I.F. Amplifier is properly aligned, the setting of the C. W. OSC. control should be the same for both tests outlined above. The I.F. Amplifier should not be realigned, however, unless the test shows appreciable maladjustment of the I.F. Amplifier.

A-3. When it is found necessary to realign the I.F. Amplifier, the following procedure should be used:

(a) Adjust the receiver as explained in paragraph A-2, with the Crystal Filter connected into the circuit and set for maximum selectivity.

(b) Connect an antenna to the receiver and tune in a steady C.W. signal so that it is tuned exactly on the crystal peak response frequency.

(c) Adjust the C.W. OSC. to provide a beat note well within the audio range.

(d) Adjust I.F. Amplifier trimmers, numbers 10, 11, 12, 13, and 14, for maximum response. Avoid second detector or audio overload by reducing the signal input to the receiver as required. Such overload makes various I.F. Amplifier adjustments appear considerably less critical than they actually are. Do not reduce signal level by retarding the R.F.GAIN control but rather by reducing the input to the antenna terminals.

(e) Check the alignment of the I.F.Amplifier as explained in paragraph A-2 to assure that it has been properly aligned to the crystal frequency.

A-4. After the I.F. Amplifier has been properly aligned, the tuning of the C.W. OSC. should be checked. This may be readily accomplished by repeating the test of paragraph A-2 with the Crystal Filter disconnected from the circuit and the SELECTIVITY control adjusted for maximum background noise. If the setting of the C.W. OSC. control does not occur at or near 9, with this test, turn the C.W. OSC. control to 9 and adjust trimmer number 15 or 16, or both, for the lowest pitch of background noise.

B. HIGH FREQUENCY OSCILLATOR ALIGNMENT.

B-1. The need for realignment of the High Frequency Oscillator of any band is indicated when the frequency calibration of the receiver dial is in error by more than 3% (plus or minus) at the high frequency end of the band in question. If there is doubt concerning the necessity for High Frequency Oscillator realignment, this portion of the circuit should not be adjusted as correction can be made by R.F. Amplifier trimmer adjustments.

B-2. If the frequency calibration of a coil set is in error by more than 3%, it should be corrected in the following manner:

(a) Adjust the receiver for normal operation as follows: R.F. GAIN at 9, C.W. OSC. off, A.V.C. off, Crystal Filter off, (PHASING control at 0), SELECTIVITY control at the position of maximum background noise, and the A.F. GAIN set to provide a suitable signal level for the required observations.

(b) Adjust an accurately calibrated test oscillator, frequency meter, or signal generator to provide a signal which should be tuned in near 490 on the receiver dial according to the general coverage calibration chart for the coil set in use.

(c) Tune the Receiver to the test signal and compare the dial reading with the calibration chart.

(d) When the Receiver dial reading is too low, more circuit capacity is required and is supplied by adjustment of trimmer, number 8; When the Receiver dial reading is too high, less circuit capacity is required and is removed by adjustment of trimmer, number 8.

B-3. It is particularly important that the High Frequency Oscillator circuits operate at a higher frequency than that of the R.F. Amplifier circuits. This can be checked by tuning in the test signal, as an image which is normally 912 kilocycles lower on the Receiver dial. The image signal should be considerably weaker if the R.F. Amplifier is correctly aligned and a stronger test signal may be required before the image can be found. If the image signal appears at a higher dial setting rather than a lower setting, the H.F. oscillator circuit is incorrectly adjusted and the capacity of trimmer, number 8, must be decreased until the real signal and image signal appear at the proper points on the dial.

C. R.F. AMPLIFIER ALIGNMENT.

C-1. The term R.F. Amplifier alignment, as used in this section, includes alignment of both R.F. Amplifier and First Detector circuits.

C-2. The R.F. Amplifier may be aligned in the following manner:

(a) Adjust the receiver as explained in (a) of paragraph B-2. No antenna is needed.

(b) Turn the Receiver dial to 490.

(c) Adjust trimmers, numbers 2, 4 and 6, for maximum background noise, which is the setting for maximum gain.

D. TRACKING OF THE H. F. OSCILLATOR AND R. F. AMPLIFIER CIRCUITS.

D-1. Tracking of the H. F. Oscillator and R. F. Amplifier circuits may be readily checked by observing the background noise while tuning throughout the range of the coil set in use. The background noise should not vary greatly as the dial is turned toward the low frequency limit of the coil set tuning range. The actual tracking of each stage near the low frequency limit of the tuning range may be checked by pressing the outside rotor plates of the main tuning condenser section toward or away from the stator, but not far enough to short the condenser or permanently bend the rotor plates. Any change in capacity should decrease the background noise indicating decreased sensitivity, if the stage is tracking properly. Coil sets which may require precise adjustment of circuit elements are provided with adjustable series padders in the High Frequency Oscillator portion of the coil set, which can be adjusted to track with the average adjustment of the R. F. Amplifier coils. This series padder is mounted inside the coil and is adjustable from the rear by means of a screw driver. It should be remembered that the series padders found in the coils of coil set Types A, B, C and D are Band Spread series padders and should not be adjusted except during Band Spread alignment.

D-2. After calibration and alignment at the high frequency end of the coil set have been adjusted as explained in paragraphs B-2 and C-2, the tracking may be adjusted as follows:

(a) With the Receiver adjusted as in part (c) of paragraph C-2, turn the Receiver dial to 20.

(b) Test the tracking of each stage in turn by bending the outside rotor plate of each section of the main tuning capacitor and note any maladjustment. DO NOT bend the rotor plate of any section to such an extent that it will not spring back to its original position.

(c) Adjust the High Frequency Oscillator series padder to its optimum tracking position when step b (above) gives indication of poor tracking.

(d) Turn the Receiver dial to 490 and adjust trimmer number 8 to give the proper calibration with the new value of series padder.

(e) Repeat a, b, c, and d until best tracking is obtained.

(f) Note any slight tracking errors occuring in the R.F. Amplifier stages so that if the same error occurs in a majority of the coil sets, the outside rotor plate may be permanently bent to provide the best tracking for the stage involved.

E. BAND SPREAD ALIGNMENT.

E-1. The Band Spread feature may or may not be included in the particular coil sets supplied depending on the type of coil set purchased for the receiver. The following alignment data applies only to coil sets which include the Band Spread feature.

E-2. Adjustments made for general coverage will affect the Band Spread adjustments, but the separate Band Spread adjustments may be made without changing the general coverage alignment.

E-3. The four screws used to switch from general coverage to Band Spread, as explained under Operating Instructions, must be shifted to the right-hand terminal blocks before any Band Spread alignment adjustments are made.

E-4. The need for realignment of the High Frequency Oscillator section of any coil set is indicated when the frequency calibration of the Receiver dial is in error by more than 30 divisions (plus or minus) at the high frequency end of the band in question.

E-5. If the frequency calibration of a coil set is in error it should be corrected in the following manner.

(a) Repeat the procedure of Paragraph B-2 with the exceptions that a test oscillator frequency is chosen which should be tuned in at 450 on the Receiver dial as indicated by the Band Spread tuning chart and correction for calibration error is made by adjustment of trimmer number 7.

E-6. The alignment of the R.F. Amplifier for Band Spread operation is similar to that for general coverage so the procedure of Paragraph C-2 should be repeated with the exception that the Receiver dial should be turned to 450 and trimmers, numbers 1, 3, and 5 should be adjusted for maximum background noise.

E-7. The adjustment of and method of checking Band Spread tracking is not similar to that for general coverage. The following procedure should be used for Band Spread tracking adjustments.

(a) With the receiver adjusted as in Paragraph E-6, turn the Receiver dial to 50.

(b) Check the receiver calibration at 50 against an accurate test oscillator.

(c) Adjust the High Frequency Oscillator series padder located inside the High Frequency Oscillator coil shield to provide the correct dial calibration.

(d) Turn the dial to 450 and adjust trimmer number 7 to give the proper calibration.

(e) Turn the dial to 50 and check the calibration. Repeat c and d if necessary.

(f) With the Receiver dial at 50 check the settings of trimmers, numbers 1, 3 and 5, for the position of maximum background noise.

(g) If it is found that increasing or decreasing the capacity of trimmer 1, 3 or 5 increases the background noise, adjust the associated series padder located inside the coil shields to provide the desired capacity.

(h) Turn the Receiver dial to 450 and adjust trimmers 1, 3 and 5 for maximum background noise.

(i) Repeat f and h, also g, if necessary.

HRO-5-1 SERIES SUPPLEMENT

Addition of Noise Limiter

To further improve the performance standards of the HRO Receiver, a noise limiter has been added to the circuit. The design and operation of this new noise limiter has been thoroughly tested in the National Laboratories and has proven its worth in minimizing the effects of undesirable noise pulses of high intensity and short duration. A Limiter control, front panel mounted to the left of the main tuning dial, is provided to adjust the threshold level at which limiting action starts. With the Limiter control set at 0, the limiter circuits will pass all but the strongest audio peak voltages; when the control is set at 10 limiting action is at its maximum, i.e. threshold level at its lowest point. When receiving voice or music, care should be taken not to advance the control too far as distortion will result due to suppression of the positive and negative peaks. The limiter control may be advanced farther during radiotelegraph reception as distortion is then less important.

The new components used in the noise limiter assembly, with their respective symbol numbers are as follows:

C45	0.1 mfd., 400 VDCW	R39	50,000 ohms, 1/2 watt
C46	8 mfd., 250 VDCW	R40	10,000 ohms, Variable
C47	0.01 mfd., 300 VDCW	R41	50,000 ohms, 2 watt
R36	1 megohm, 1/2 watt	R42	250,000 ohms, 1/2 watt
R37	5,000 ohms, 1/2 watt	V10	6J5
R38	50,000 ohms, 1/2 watt	V11	6H6

C21 - Changed from 0.1 mfd. to 0.01 mfd.

Drawn on the following page is the schematic diagram illustrating the noise limiter section of the circuit and a pictorial view showing the locations of the two new tubes and Limiter control.

SUPPLEMENT FOR THE HRO-5TA & HRO-5RA

The HRO-5A Series of Receivers are equipped with bandspread coil sets, namely the A, B, C and D coil sets. The frequency and dial coverage of these coil sets are as follows:

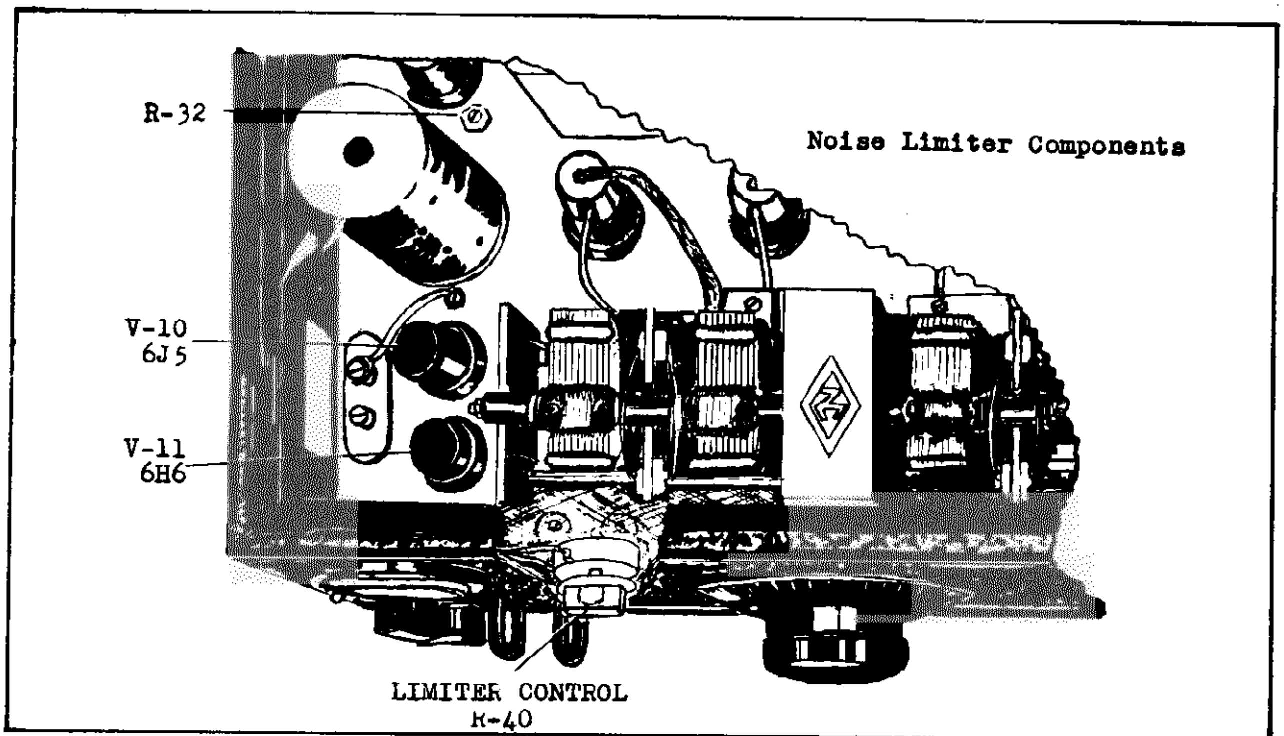
COIL SET	GENERAL COVERAGE	BANDSPREAD Frequency	BANDSPREAD Dial
A	14.0 - 30.0	28 - 29.7 MC;	50 - 450
B	7.0 - 14.4	14 - 14.4 MC;	50 - 450
C	3.5 - 7.3	7.0 - 7.3 MC;	50 - 450
D	1.7 - 4.0	3.5 - 4.0 MC;	50 - 450

These coil sets are aligned in the Receiver at the National Laboratories using crystal controlled test oscillators assuring precision calibration. The frequency tolerance for the calibration of the amateur bands adhered to at the National Laboratories is ± 0.03%.

The National Company wishes to caution those owners of HRO Receivers who intend to purchase the now available bandspread coil sets. These coil sets can be properly aligned in the individual receivers only by using crystal controlled test signals. If the purchaser does not have available suitable test equipment, the National Company is prepared to align these coil sets providing the receiver is shipped to the factory. In the past, the National Company has manufactured models of the HRO employing both glass and metal type tubes. The bandspread coil sets are different for these two models of the HRO Receiver and when ordering it should be stated which model is to be used with the bandspread coil sets.

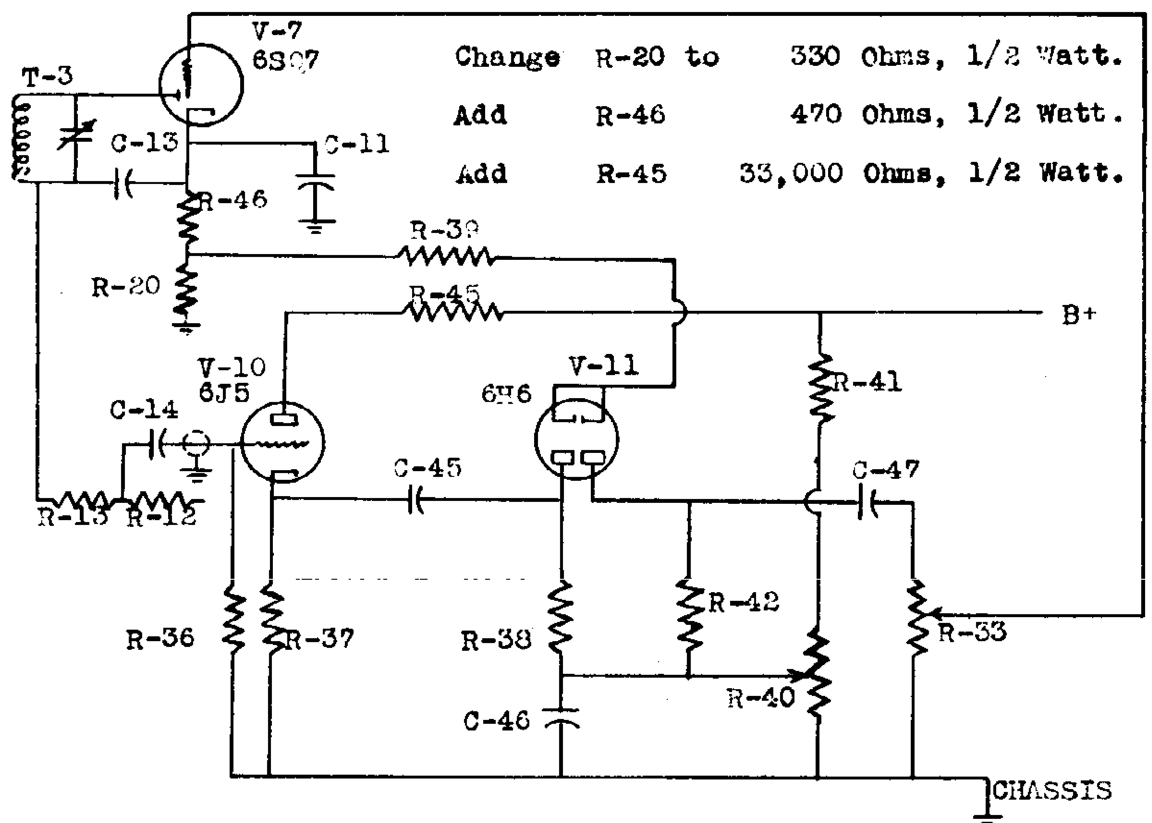
NATIONAL COMPANY, INC.

HRO-5-1 SERIES SUPPLEMENT



Cut-away top view of HRO Receiver

SCHEMATIC DETAIL
(Noise Limiter Components)
FOR HRO-5-1



NATIONAL COMPANY, INC.

TABULATION OF PARTS

Part Symbol Number	Function	Description	Mfr. Type Number	Mfr.
		CONDENSERS		
C1	V5 Heater Bypass	.1 Mfd., 400 VDC W	G	Sprague
C2	V5 Grid Filter	.01 Mfd., 600 VDC W	G	Sprague
C3	V3 Cathode Bypass	.1 Mfd., 400 VDC W	G	Sprague
C4	V2 B+ Bypass	.1 Mfd., 600 VDC W	G	Sprague
C5	V4 Screen Bypass	.1 Mfd., 600 VDC W	G	Sprague
C6	V5 Cathode Bypass	.1 Mfd., 400 VDC W	G	Sprague
C7	V4 Cathode to V2 Screen	.01 Mfd., 600 VDC W	G	Sprague
C8	V5 and V6 Plate Filter	.25 Mfd., 600 VDC W	G	Sprague
C9	V6 Grid Filter	.01 Mfd., 600 VDC W	G	Sprague
C10	V6 Cathode Bypass	.1 Mfd., 400 VDC W	G	Sprague
C11	V7 Cathode Bypass	10. Mfd., 50 VDC W	D 9765	Sprague
C12	V7 Diode Filter	.0001 Mfd., 500 VDC W	Class C	Centralab
C13	V7 Diode Filter	.00025 Mfd., 500 VDC W	Class C	Centralab
C14	V7 Diode to Pentode Coupling	.1 Mfd., 400 VDC W	G	Sprague
C15	V7 Diode Bypass	.01 Mfd., 600 VDC W	G	Sprague
C16	V7 Plate Bypass	.0005 Mfd., 500 VDC W	Dual C	Centralab
C17	V2 Cathode Bypass	.1 Mfd., 400 VDC W	G	Sprague
C18	V7 to V9 Coupling	.1 Mfd., 600 VDC W	G	Sprague
C19	V9 Cathode Bypass	10. Mfd., 50 VDC W	D 9765	Sprague
C20	V8 Heater Bypass	.1 Mfd., 400 VDC W	G	Sprague
C21	V8 Screen Bypass	.1 Mfd., 400 VDC W	G	Sprague
C22	V1 Cathode Bypass	.1 Mfd., 400 VDC W	G	Sprague
C23	V1,V2,V5 and V6 Screen By-pass	.1 Mfd., 400 VDC W	G	Sprague
C24	V1 Grid Filter	.01 Mfd., 600 VDC W	G	Sprague
C25	V1 B+ Bypass	.1 Mfd., 600 VDC W	G	Sprague
C26	V2 Grid Filter	.01 Mfd., 600 VDC W	G	Sprague
C27	C.W. OSC. Tuning	30 Mmf.,	SA-13	NationalCo
C28	V7 B+ Bypass	.01 Mfd., 600 VDC W	G	Sprague
C29	V8 Grid Coupling	.001 Mfd., 500 VDC W	1467	Aerovox
C30	V4 Grid Coupling	.0001 Mfd., 500 VDC W	Class C	Centralab
C31	Crystal Filter Bridge	.0001 Mfd., 500 VDC W	Class C	Centralab

Part Symbol Number	Function	Description	Mfr. Type Number	Mfr.
		CONDENSERS		
C32	Crystal Filter Bridge	.0001 Mfd., 500 VDC W	ClassC	Centralab
C33	V8 to V7 Coupling	2. Mmf., 400 VDC W	B-22	NationalCo
C34	Coil JA-1 or A-1 Antenna Coupling	.00004 Mfd., 500 VDC W	ClassD	Centralab
C35	Coil JA-1 or A-1 Series Padder	.0012 Mfd., 500 VDC W	1467	Aerovox
C36	Coil JA-4 or A-4 Series Padder	.00085 Mfd., 500 VDC W	1467	Aerovox
C37	Coil JB-4 or B-4 Series Padder	.0026 Mfd., 500 VDC W	1467	Aerovox
C38	Coil JC-4 or C-4 Series Padder	.0016 Mfd., 500 VDC W	1467	Aerovox
C39	Coil JD-4 or D-4 Series Padder	.00068 Mfd., 500 VDC W	1467	Aerovox
C40	Coil E-4 Series Padder	.00045 Mfd., 500 VDC W	Dual C	Centralab
C41	Coil F-4 Series Padder	.00035 Mfd., 500 VDC W	Dual C	Centralab
C42	Coil G-4 Series Padder	.0001 Mfd., 500 VDC W	ClassC	Centralab
C43	Coil J-4 Fixed Trimmer	.00005 Mfd., 500 VDC W	ClassD	Centralab
C44	H.F. Osc. Temperature Compensator	10. Mmfd., 500 VDC W	ClassD	Centralab
		KNOBS AND DIALS		
K1	Main Tuning Dial	5/16" Bushing	SA-645	NationalCo
K2	Selectivity Knob	1/4" Bushing	SA-1273	NationalCo
K3	Phasing Knob	1/4" Bushing	SA-7	NationalCo
K4	R.F.Gain Knob	1/4" Bushing	SA-5	NationalCo
K5	C.W.OSC. Knob	1/4" Bushing	SA-6	NationalCo
K6	Audio Gain Knob	1/4" Bushing	SA-4	NationalCo
		RESISTORS		
R1	R.F.Gain Control	10,000 OHM, 1.5 Watt, Var.	G-60	Clarostat
R2	V-3 Cathode	5,000 OHM, 1/2 Watt	SCI-1/2	Speer
R3	V5 Grid Filter	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R4	V5 Cathode	300 OHM, 1/2 Watt	SCI-1/2	Speer
R5	V4 Screen Filter	50,000 OHM, 1/2 Watt	SCI-1/2	Speer
R6	V2 Screen Filter	100,000 OHM, 1/2 Watt	SCI-1/2	Speer

NATIONAL COMPANY, INC.

Part Symbol Number	Function	Description	Mfr. Type Number	Mfr.
		RESISTORS		
R7	V4 Screen Bleeder	100,000 OHM, 1/2 Watt	SCI-1/2	Speer
R8	V6 Grid Filter	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R9	V6 Cathode	1000/5000 OHM, 1/2 Watt	SCI-1/2	Speer
R10	V1,V2,V5 & V6 Screen Filter	15,000 OHM, 2 Watt	SCI-2	Speer
R11	S Meter Bridge	2500 OHM, 1/2 Watt	SCI-1/2	Speer
R12	V7 Diode Load	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R13	V7 Diode Filter	50,000 OHM, 1/2 Watt	SCI-1/2	Speer
R14	V7 Diode Equalizing	250,000 OHM, 1/2 Watt	SCI-1/2	Speer
R15	V1,V2,V5 & V6 Screen Bleeder	30,000 OHM, 2 Watt	SCI-2	Speer
°R16	V7 Screen Bleeder	20,000 OHM, 1/2 Watt	SCI-1/2	Speer
°R17	V7 Screen	100,000 OHM, 2 Watt	SCI-2	Speer
#R18	V7 Plate	50,000 OHM, 1 Watt	SCI-1	Speer
°R18	V7 Plate	100,000 OHM, 2 Watt	SCI-2	Speer
R19	AVC Filter	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R20	V7 Cathode	800 OHM, 1/2 Watt	SCI-1/2	Speer
R21	Heater Center Tap	64 OHM, 3 Watt	864C	Mallory
R22	V8 Screen Filter	100,000 OHM, 1/2 Watt	SCI-1/2	Speer
R23	V8 Plate	250,000 OHM, 1/2 Watt	SCI-1/2	Speer
R24	V8 Screen Bleeder	100,000 OHM, 1/2 Watt	SCI-1/2	Speer
#R25	V9 Cathode	300 OHM, 2 Watt	SCI-2	Speer
°R25	V9 Cathode	500 OHM, 2 Watt	SCI-2	Speer
R26	V9 Grid	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R27	V1 Cathode	300 OHM, 1/2 Watt	SCI-1/2	Speer
R28	V1 Grid Filter	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R29	V2 Cathode	300 OHM, 1/2 Watt	SCI-1/2	Speer
R30	S Meter Bridge	2000 OHM, 1/2 Watt	SCI-1/2	Speer
R31	V2 Grid Filter	500,000 OHM, 1/2 Watt	SCI-1/2	Speer
R32	S Meter Zero Adjusting	1000 OHM, 1 Watt, Var.	E-9029A	Clarostat
R33	Audio Gain Control	500,000 OHM, 1 Watt, Var.	10101635	Centralab
R34	V8 Grid	50,000 OHM, 1/2 Watt	SCI-1/2	Speer
R35	V4 Grid	20,000 OHM, 1/2 Watt	SCI-1/2	Speer

Used only on HRO-5 Series

o Used only on HRO-M Series

Part Symbol Number	Function	Description	HRO-5	Mfr. Type Number	Mfr.
		TRANSFORMERS	HRO-5	HRO-M	
T1	Crystal Filter	456. Kc.	SA-2491	SA-81	NationalCo
T2	Second I.F. Transformer	456. Kc.	SA-2492	SA-41F	NationalCo
T3	Second Detector Trans.	456. Kc.		SA-41G	NationalCo
T4	C.W.Oscillator Trans.	456. Kc.	SA-2493	SA-41H	NationalCo
*T5	Output Trans.	Specify			NationalCo
**T6	First I.F. Trans.	456. Kc.		SA-1320	NationalCo
		VACUUM TUBES	HRO-5	HRO-M	
V1	First R.F.	R.F.Pentode	6K7	6D6	RCA
V2	Second R.F.	R.F.Pentode	6K7	6D6	RCA
V3	First Detector	R.F.Pentode	6J7	6C6	RCA
V4	H.F.Oscillator	R.F.Pentode	6J7	6C6	RCA
V5	First I.F.	R.F.Pentode	6K7	6D6	RCA
V6	Second I.F.	R.F.Pentode	6K7	6D6	RCA
V7	Second Detector	Diode-Pentode	6SQ7	6B7	RCA
V8	C.W.Oscillator	R.F.Pentode	6J7	6C6	RCA
V9	Audio Output	A.F.Pentode	6V6GT/G	42	RCA
		CABLES AND PLUGS			
W1	Power Cable and Plug	Four-wire,four prong plug.		C-627	NationalCo
		SWITCHES			
X1	B+ Switch	S.P.S.T.Toggle, 3A.,250 V.		80994	A.H.+H.
X2	C.W.Oscillator Switch	S.P.S.T.Toggle, 3A.,250 V.		20994L	A.H.+H.
X3	A.V.C. Switch	S.P.D.T.Toggle, 3A.,250 V.		21350E	A.H.+H.
X4	S Meter Switch	S.P.S.T.Toggle, 3A.,250 V.		80994	A.H.+H.

This Parts List indicates suitable types, but equivalent alternate types may be employed.

* Specify Output Impedance When An Output Transformer is Desired.

** May be used in place of T-1.

NATIONAL COMPANY, INC.

FIXED CAPACITORS, CERAMIC-DIELECTRIC

C12	100 Mmfd., 500 V DC W	CC35SL101K
C13	270 Mmfd., 500 V DC W	CC35SL271K
C16	540 Mmfd., 500 V DC W	Dual CC35SL271K
C30	100 Mmfd., 500 V DC W	CC35SL101K
C31	100 Mmfd., 500 V DC W	CC35SL101K
C32	100 Mmfd., 500 V DC W	CC35SL101K
C34	43 Mmfd., 500 V DC W	CC21SL430K
C40	450 Mmfd., 500 V DC W	Dual CC35SL331J and CC35SL121J
C41	350 Mmfd., 500 V DC W	CC35SL351J
C42	100 Mmfd., 500 V DC W	CC35SL101J
C43	51 Mmfd., 500 V DC W	CC21SL510K
C44	10 Mmfd., 500 V DC W	CC21UJ100F

FIXED MICA-DIELECTRIC CAPACITORS

C35	1,200 Mmfd., 500 V DC W	CM35C122J
C36	850 Mmfd., 500 V DC W	CM35C851J
C37	2,600 Mmfd., 500 V DC W	CM35C262J
C38	1,600 Mmfd., 500 V DC W	CM35C162J
C39	880 Mmfd., 500 V DC W	CM35C881J

FIXED COMPOSITION RESISTORS

R2	4,700 Ohm, 1/2 Watt	RC21BF472K
R3	0.47 Megohm, 1/2 Watt	RC21BF474K
R4	330 Ohm, 1/2 Watt	RC21BF331K
R5	47,000 Ohm, 1/2 Watt	RC21BF473K
R6	0.10 Megohm, 1/2 Watt	RC21BF104K
R7	0.10 Megohm, 1/2 Watt	RC21BF104K
R8	0.47 Megohm, 1/2 Watt	RC21BF474K
##R9	1,000 Ohm, 1/2 Watt	RC21BF102K
##R9	1,500 Ohm, 1/2 Watt	RC21BF152K
##R9	2,200 Ohm, 1/2 Watt	RC21BF222K
##R9	3,300 Ohm, 1/2 Watt	RC21BF332K
##R9	4,700 Ohm, 1/2 Watt	RC21BF472K
R10	15,000 Ohm, 2 Watt	RC41BF153K
R11	2,200 Ohm, 1/2 Watt	RC21BF222K
R12	0.47 Megohm, 1/2 Watt	RC21BF474K
R13	47,000 Ohm, 1/2 Watt	RC21BF473K
R14	0.22 Megohm, 1/2 Watt	RC21BF224K
R15	33,000 Ohm, 2 Watt	RC41BF333K
°R16	22,000 Ohm, 1/2 Watt	RC21BF223K

##Varies with individual Receivers

FIXED COMPOSITION RESISTORS (CONTINUED)

°R17	0.10 Megohm, 2 Watt	RC41BF104K
#R18	47,000 Ohm, 1 Watt	RC31BF473K
°R18	0.10 Megohm, 2 Watt	RC41BF104K
R19	0.47 Megohm, 1/2 Watt	RC21BF474K
R20	820 Ohm, 1/2 Watt	RC21BF821K
R22	0.10 Megohm, 1/2 Watt	RC21BF124K
R23	0.22 Megohm, 1/2 Watt	RC21BF224K
R24	0.10 Megohm, 1/2 Watt	RC21BF104K
#R25	330 Ohm, 2 Watt	RC41BF331K
°R25	470 Ohm, 2 Watt	RC41BF471K
R26	0.47 Megohm, 1/2 Watt	RC21BF474K
R27	330 Ohm, 1/2 Watt	RC21BF331K
R28	0.47 Megohm, 1/2 Watt	RC21BF474K
R29	330 Ohm, 1/2 Watt	RC21BF331K
R30	2,200 Ohm, 1/2 Watt	RC21BF222K
R31	0.47 Megohm, 1/2 Watt	RC21BF474K
R34	47,000 Ohm, 1/2 Watt	RC21BF473K
R35	22,000 Ohm, 1/2 Watt	RC21BF223K

VARIABLE WIRE-WOUND RESISTORS

(LOW OPERATING TEMPERATURE)

R1	10,000 Ohm 3 Watt	RA25A1R103FK
R32	1,000 Ohm, 2 Watt	RA15A1SA102AK

Used only on HRO-5 Series
° Used only on HRO-M Series

Power Unit And Loud Speaker Types

POWER UNITS

Table Model	6 Volt DC Vibrapack	Type 686-S
Table Model	AC Power Unit 50/60 Cycle (Specify 115V or 230V)	Type 697
Rack Mounting	6 Volt DC Vibrapack	Type SPU-686-S
Rack Mounting	AC Power Unit 50/60 Cycle (Specify 115V or 230V)	Type SPU-697

LOUD SPEAKERS

Table Mounting	Loud Speaker	Type MCS
Rack Mounting	Loud Speaker	Type RFSH

MISCELLANEOUS

Rack Mounting	Combined Power Unit, Loud Speaker, and Five Compartment Coil Storage Container (Panel Height 15 3/4")	Type SPC
Rack Mounting	Five Compartment Coil Storage Container	Type HCRP

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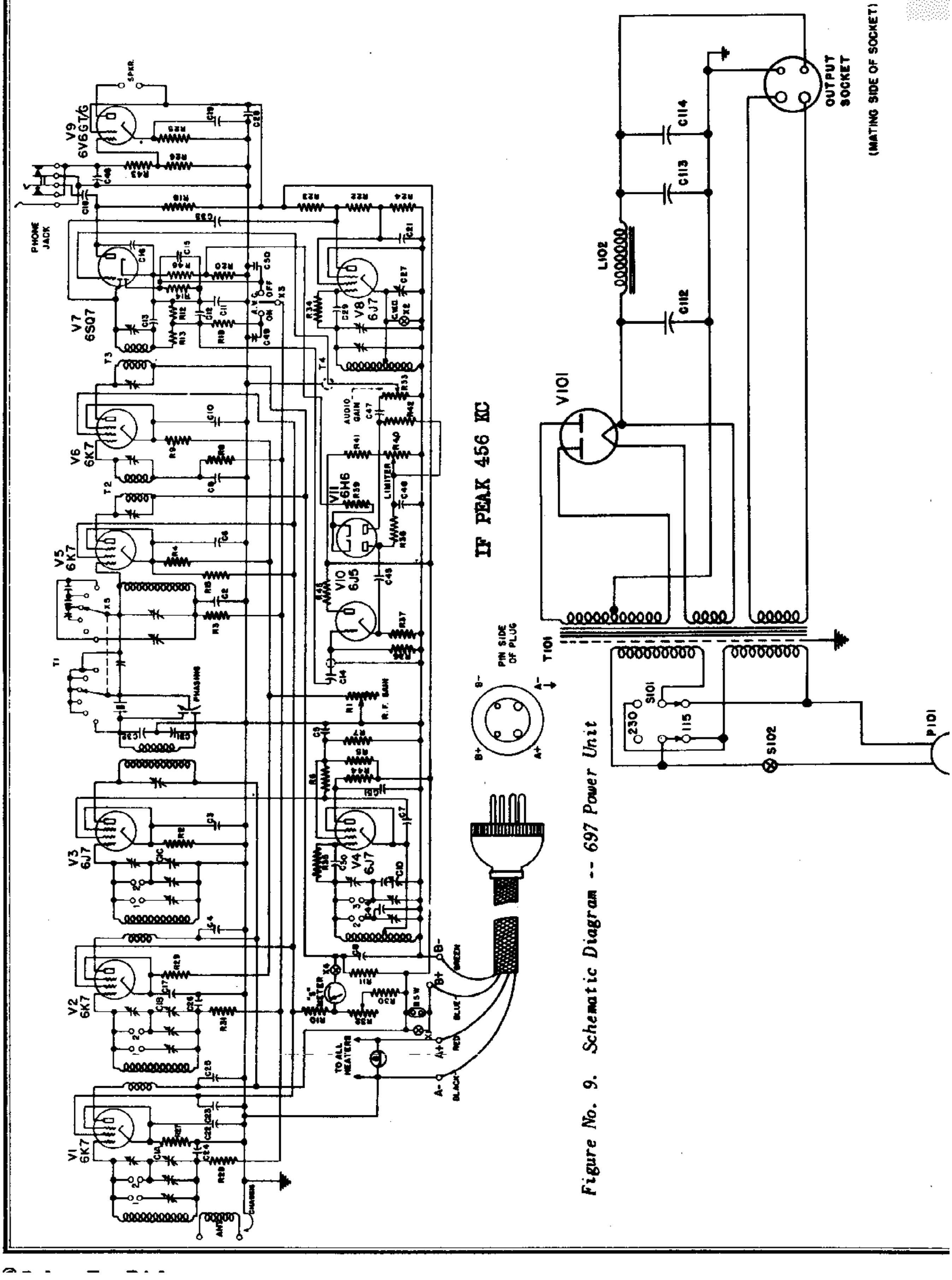

Figure No. 9. Schematic Diagram -- 697 Power Unit

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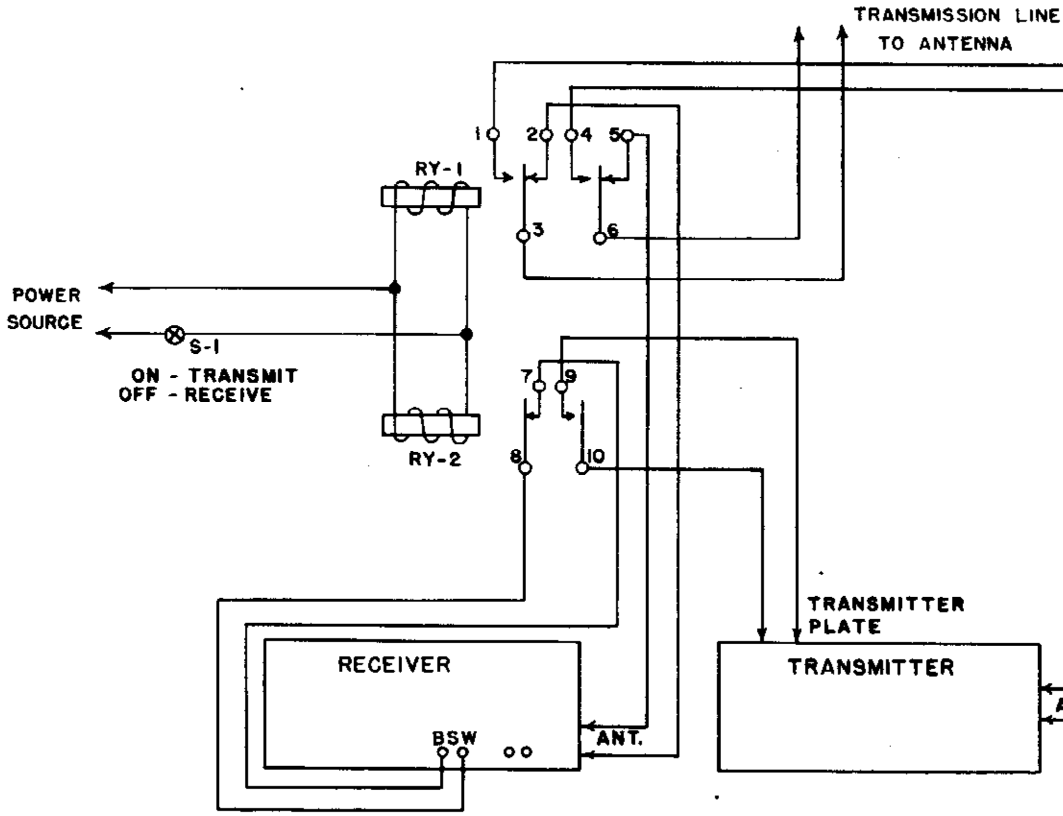

Figure No. 3. Typical Antenna Switching System

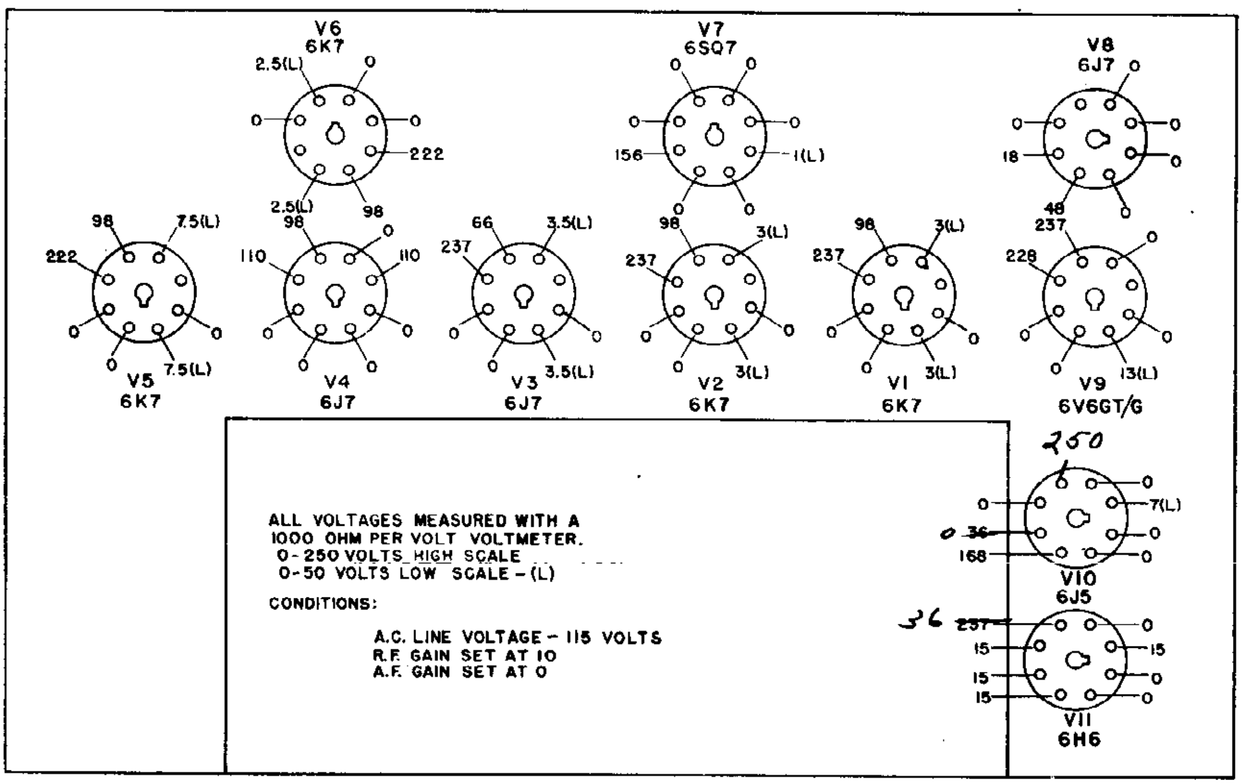

Figure No. 6. Tube Socket Voltages

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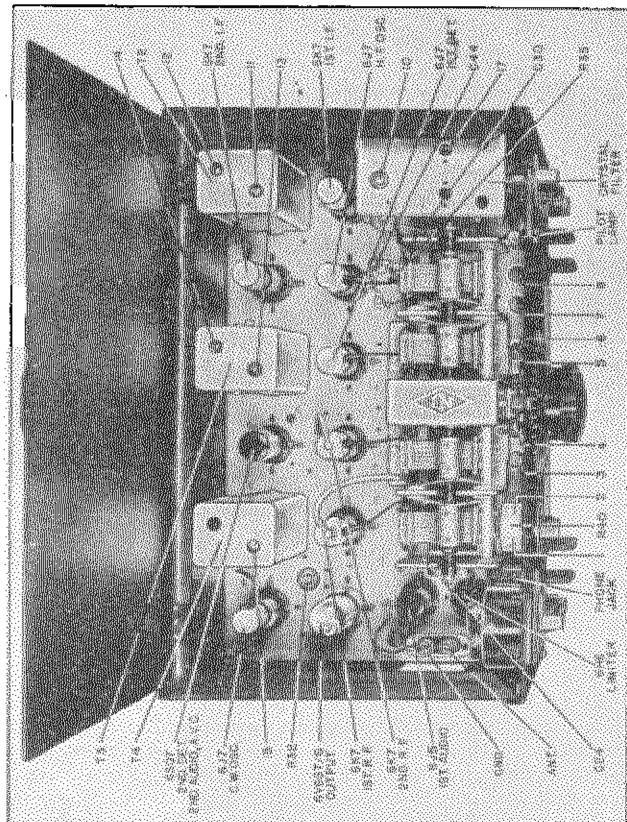

Figure No. 5. Top View of Receiver

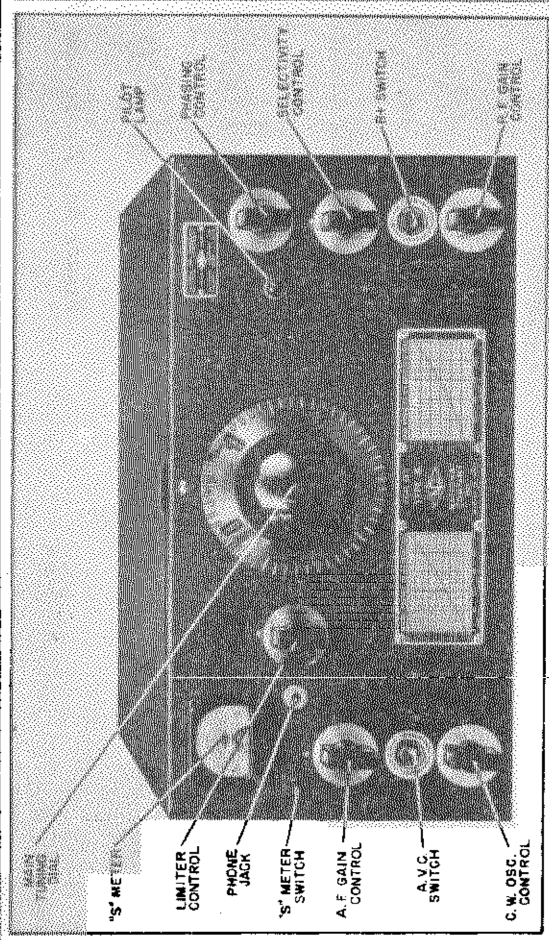

Figure No. 4. Front View of Receiver

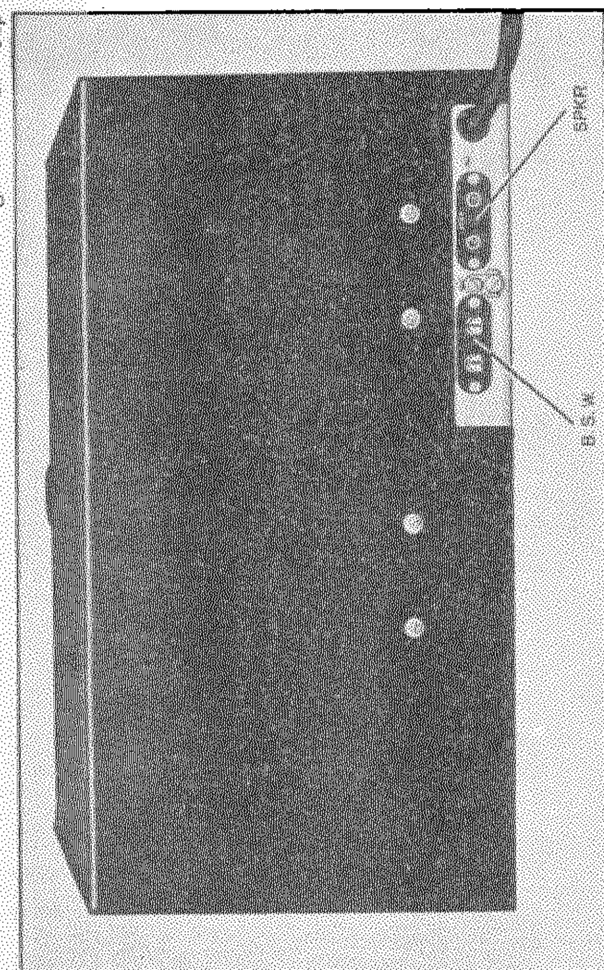

Figure No. 3. Rear View of Receiver

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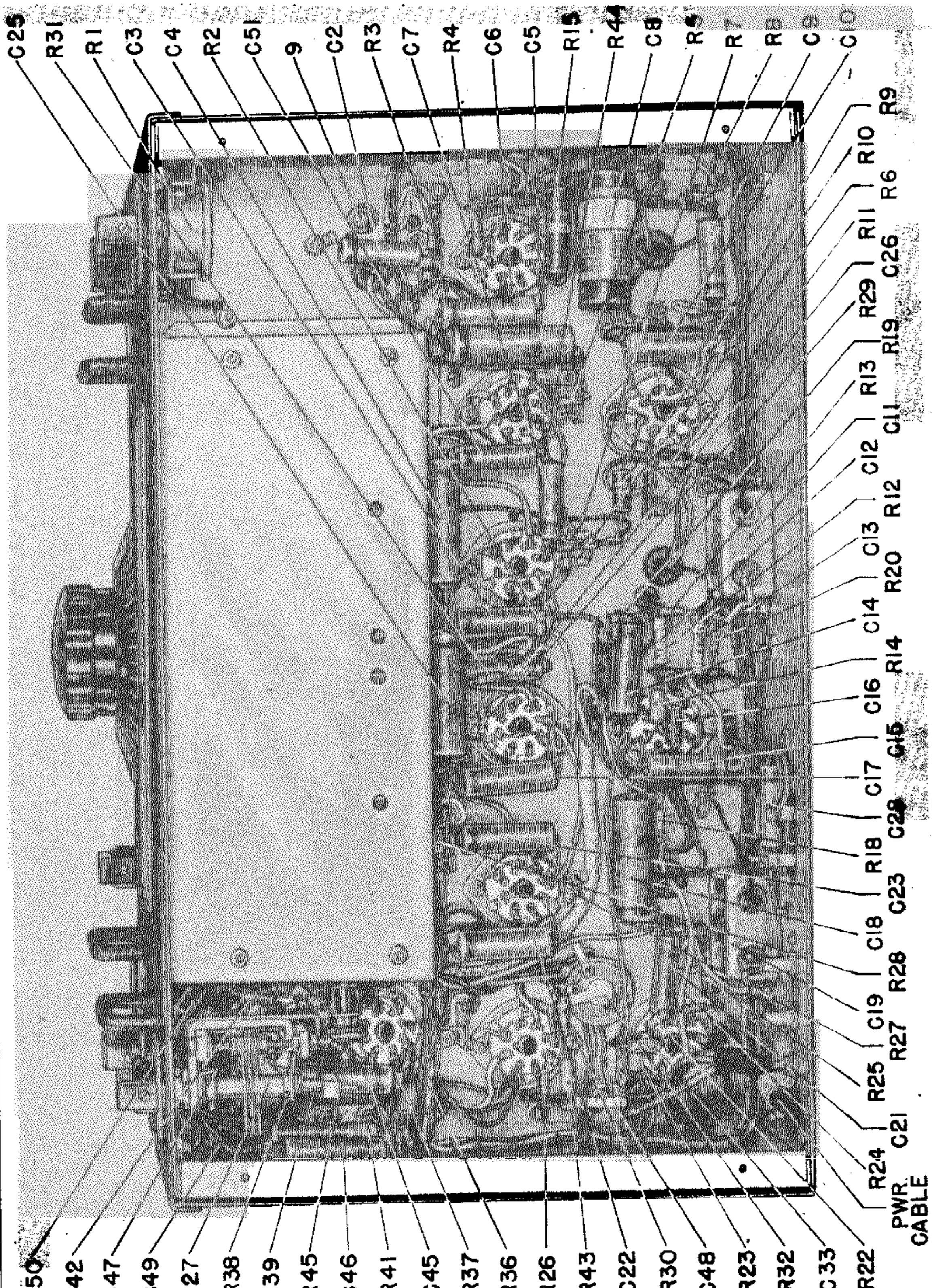

Figure No. 7. Bottom View of Receiver

DESCRIPTION

General

The HRO-5A1 Radio Receiver is an eleven tube high-frequency superheterodyne suitable for C.W. and M.C.W. reception throughout the frequency range of 50 to 430 Kcs., and 480 Kcs. to 30,000 Kcs. This range is covered in nine bands as follows:

COIL SET	GENERAL COVERAGE	BANDSPREAD
A	14.0 - 30 Mc.	27.0-30.0Mc.
B	7.0 -14.4 Mc.	14.0-14.4Mc.
C	3.5 - 7.3 Mc.	7.0- 7.3Mc.
D	1.7 - 4.0 Mc.	3.5- 4.0Mc.
E	900 -2050 Kc.	
F	480 - 960 Kc.	
G	180 - 430 Kc.	
H	100 - 200 Kc.	
J	50 - 100 Kc.	

The Receiver may be obtained in either table or rack mounting models. Plug-in coil set Types A,B,C and D are normally supplied with the receiver, and coil set Types E,F,G,H and J may be obtained in addition, as desired. Coil set types A,B,C and D provide bandspread for the 10-11, 20, 40 and 80 meter amateur bands and each of these bands is spread over approximately 400 dial divisions on the main 500 division tuning dial. Coil set Types JA, JB, JC, and JD, which do not provide the bandspread feature, are available as may be desired.

Circuit

The circuit employed on all bands comprises two tuned stages of radio frequency amplification, a tuned first detector, a high-frequency oscillator employing a tube separate from the first detector tube, a first intermediate frequency amplifier stage employing a variable-selectivity crystal filter, a conventional second intermediate frequency amplifier stage operating at 456 kilocycles, a combined second detector-automatic volume control - second audio stage, a first audio amplifier stage, an adjustable threshold series valve noise limiter, an audio output stage and a beat frequency oscillator coupled to the second detector to provide for C.W. reception.

Antenna Input

The Receiver is designed for operation with a single wire antenna or antennae employing transmission lines having impedances of 70 ohms or more. The actual antenna input impedance is between 300 and 600 ohms depending on the received frequency.

Tube Complement

The HRO-5A1 Receiver is supplied complete with tubes which are tested in the receiver at the time of alignment.

The tubes employed are as follows:

First R.F. Amplifier....................6K7
Second R.F. Amplifier...................6K7
First Detector..........................6J7
High Frequency Oscillator...............6J7
First I.F. Amplifier....................6K7
Second I.F. Amplifier...................6K7
First A.F. Amplifier....................6J5
Diode Detector, AVC, Second Audio......6SQ7
Audio Output.........................6V6GT/G
Beat Frequency Oscillator...............6J7
Noise Limiter...........................6H6

Noise Limiter

The addition of a new, highly effective series valve noise limiter to the HRO-5A1 greatly improves the Receiver's capabilities under adverse receiving conditions. Its usefulness is most appreciated on the higher frequency bands of the receiver where automobile ignition noise and other high frequency disturbances are effectively suppressed. A front panel threshold control permits adjustment of the level at which limiting action starts. Since distortion effects are relatively unimportant in C.W. reception, the noise limiter may be advanced to a greater degree than would normally be employed on M.C.W. signals. In this operating condition there is provided a simulation of A.V.C. action for the reception of C.W. signals, a highly desirable feature. The noise limiter is of the double-acting type - limiting noise on both positive and negative peaks.

Crystal Filter

The crystal filter, located in the first intermediate frequency amplifier stage, is extremely flexible and of most efficient design. A six-position selectivity control and a crystal phasing control are front-panel mounted for adjustment of the crystal filter. Figure No. 1 shows the selectivity characteristics of the Receiver for each of the six positions of the selectivity control. The crystal filter may be used for either C.W. or M.C.W. reception; any degree of selectivity from true single-signal to broadcast reception being available. Operation of the phasing control provides for easy suppression of interfering signals which may produce objectionable heterodynes.

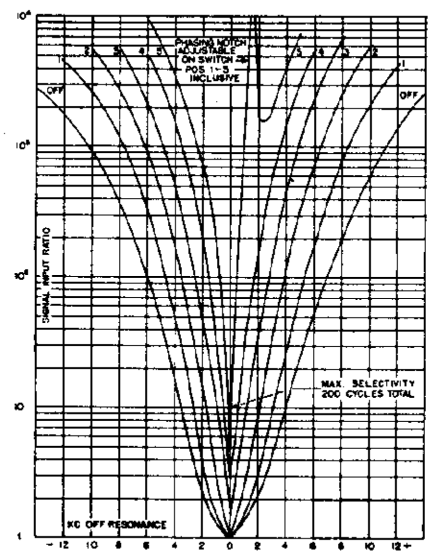

Figure No. 1. Crystal Filter Selectivity Curves.

Signal Strength Meter

Signal input readings are indicated in "S" units from 1 to 9 in 5 db. steps and in db. above S-9 from 0 db. to 40 db. on the panel mounted signal strength meter. A reading of S-9 is obtained with an antenna input of approximately 50 microvolts. Accurate signal input readings from 0.5 microvolts to 5000 microvolts are possible. The meter employs a 0-1 milliampere movement and is connected in a bridge circuit.

Audio Output

Two audio output circuits are provided. Loud-speaker terminals in the form of tip jacks, are located at the rear left-hand side of the receiver and a phone jack is mounted on the front panel. Normally, the plate circuit of the output tube is brought directly to the tip jacks and a separate permanent-magnet loud-speaker is connected to the tip jacks. The loud-speaker must have an impedance of from 5000 to 7000 ohms to properly load the output tube. The output transformer in this case is mounted on the loud-speaker and its primary carries the plate current of the output tube.

Power Supply

The Receiver can be used with the 697 Power Unit for 115 or 230 volt, 50 to 60 cycle A.C. operation or the 686S Power Unit for 6 volt D.C. operation. The Power Units are conservatively rated for use with the Receiver and will give long, trouble-free life.

Loud Speaker

RFSH or MCS Loud-speakers in rack or table mounting styles respectively can be used with the Receiver. These are permanent magnet type loud-speakers and have an output transformer which provides a proper impedance match for the output tube to the loud-speaker voice coil. This matching transformer has a primary impedance of 5000 ohms. In special models of the Receiver, an output transformer is mounted within the Receiver itself. In this case, the loud-speaker matching transformer must have a primary impedance which matches the Receiver output transformer secondary impedance. External means for supplying field excitation will be necessary if a dynamic speaker is to be used with the Receiver.

INSTALLATION

Antenna Recommendations

The radio frequency input of the Receiver is arranged for operation from either a single-wire antenna, a doublet antenna, or other types employing transmission lines having impedances of 70 ohms or more. There are two R.F. input binding posts at the left-hand end of the Receiver. A short, flexible, grounded lead is provided for grounding one input binding post in installations where a ground is required at the point of antenna input to the Receiver.

For best impedance matching to the Receiver input circuit an antenna with a 300 to 600 ohm transmission line is recommended. The antenna should be cut to the proper length for the most used frequency. The antenna transmission line feeders should be connected to the antenna binding posts; the flexible grounding lead is not used. It must be remembered, however, that an antenna installation of this type will have maximum efficiency over a band of frequencies near that frequency for which it is designed and will be most useful in installations where the Receiver is tuned to one frequency or band of frequencies. For other frequencies, it would be desirable to connect the two transmission line leads together at the antenna post nearest the front panel of the Receiver, grounding the other binding post by means of the flexible lead. The antenna is thus utilized as a single wire type.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of from 50 to 100 feet is recommended. The antenna lead-in should be connected to the antenna binding post nearest the front panel of the receiver; the other binding post should be grounded by means of the flexible lead.

In an installation where the Receiver is to be used as the receiving unit in a transmitting station the most efficient operation will result from use of the transmitting antenna as receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type since the same antenna gain is available for both receiving and transmitting - a very desirable condition. Any transmission line of 70 ohms impedance or more may be used. For switching the antenna from receiver to transmitter, an antenna change-over relay should be used. A double pole, double throw relay possessing good high-frequency insulation is suitable. A second relay for controlling the transmitter plate supply and the Receiver B+ circuit may be used to achieve single-switch control of the station. This second relay should be a double pole, single throw type having one normally open pair of contacts and one normally closed pair of contacts. The schematic diagram of this type of control circuit is shown in Figure 3. The relay contacts are shown in the normal or non-energized position. With S-1 OPEN (receive position) the antenna transmission line is connected to the Receiver by contacts 2 and 3 and contacts 5 and 6 on relay RY-1; contacts 7 and 8 on relay RY-2 are closed and complete the B+ circuit of the Receiver. With the switch S-1 closed (transmit position) RY-1 contacts 1 and 3 and 4 and 6 are closed transferring the antenna transmission line to the transmitter; contacts 9 and 10 of relay RY-2 close to complete the plate supply circuit to the transmitter. Contacts 9 and 10 of relay RY-2 should be in series with the primary of the transmitter plate supply transformer. Thus, the station is in the receiving condition with switch S-1 OPEN and in the transmitting condition with switch S-1 CLOSED. The power source for the relays RY-1 and RY-2 will be either 6 volts or 115 volts A.C. or D.C. depending on the power source available and the types of relays used.

When a doublet antenna is used, the antenna feeders or balanced transmission line are connected to the antenna binding posts. The flexible lead is not used.

The inner conductor of a concentric transmission line should be connected to the antenna binding post nearest the front panel of the Receiver. The outer conductor and the flexible grounding lead should be connected to the other binding post.

In some cases where a doublet antenna is used with a low impedance concentric or other type transmission line it may be necessary to re-trim the first R.F. amplifier at the high end of each band to provide a better impedance match between antenna and receiver input circuit. Paragraph 5-7 describes this procedure.

Installation Procedure

After unpacking the Receiver and associated equipment, proceed as follows:

(1) Make sure all tubes are seated firmly in their sockets.
(2) Insert the Receiver power plug into the Power Unit output socket.
(3) Connect Power Unit cord to proper source of voltage.
(4) Connect antenna as recommended in Section 2-2.
(5) Connect the loud-speaker to the tip jacks marked 'SPKR" at the rear of the Receiver. If a loud-speaker is NOT going to be used a jumper MUST be connected between the "SPKR" tip jacks. If this precaution is neglected the output tube may be damaged due to excessive screen current.

The frequency at which reception is desired will determine the coil set used, in accordance with the calibration charts on the front panel of each coil set. If Bandspread coverage of one of the amateur bands is desired, as indicated by the calibration chart at the right-hand side of the front panel of coil sets A, B, C and D, the screws in each coil terminal panel should be in the right-hand position. If General coverage is desired, the terminal panel screws should be in the left-hand position and calibration will be in accordance with the chart on the left-hand side of the coil set front panel. (See Section 4 concerning bandspread switching.) After selecting the proper coil set and adjusting for either Bandspread or General coverage, plug the coil set into the opening at the front of the Receiver. To avoid damage to the contacts it is important that the Receiver B+ switch be in the OFF position whenever coil sets are changed.

The Receiver is now ready for operation, and is turned on by means of the toggle switch mounted on the panel of the Power Unit. After allowing the tubes to reach operating temperature, the B+ circuit is completed by means of the toggle switch on the front panel of the Receiver, located directly above the R.F. GAIN control. This is a convenient stand-by switch.

A pair of terminals (BSW) at the rear of the Receiver provide a convenient means for connecting a relay or switch for remote control of the Receiver B+ circuits.

NOTE

Where the Receiver is located in the R.F. field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the Receiver R.F. coil. If a separate receiving antenna is used a means of disconnecting or grounding it during transmission periods should be provided.

Battery Operation

The Receiver is readily adaptable to emergency or portable operation, or operation in locations where 115 or 230 volt A.C. power is not available. It may be operated directly from batteries or a National Type 686S Power Unit may be used for operation from a 6 volt storage battery. The Type 686S Power Unit draws 7.5 amperes at 6 volts when furnishing power to the Receiver. Battery drain may be decreased for headphone operation by removing the 6V6GT/G output tube from its socket. In this case, the Type 686S Power Unit draws 6 amperes at 6 volts.

The Schematic Diagram, Figure 8, shows a pin view of the Receiver power plug, thus providing the information necessary for wiring batteries to an auxiliary four-prong socket. The regular Receiver power plug may be inserted into this auxiliary socket to complete the power circuit. The normal B voltage required for operation of the Receiver is 240 volts at which voltage the receiver draws 70 milliamperes. Satisfactory headphone operation will result with a B voltage as low as 180 volts. The B battery life may be increased in this instance by removing the 6V6GT/G output tube from its socket as it is not used for headphone operation. With the output tube removed from its socket, the Receiver will draw 36 milliamperes at 180 volts. With the output tube in operation the B battery drain is 65 milliamperes at 180 volts. To conserve battery power the Receiver power plug should be removed from the auxiliary battery socket when the Receiver is not being used. If greater convenience is desired, a single pole, single throw switch may be wired in series with the A+ lead to the battery to turn off the heater supply. If an A battery switch is used it is important that both the external A+ switch and Receiver B+ switch be turned OFF to conserve battery power when the Receiver is not being operated. The Receiver B+ switch will serve as a stand-by switch during transmission periods the same as for A.C. operation.

CIRCUIT FEATURES

R.F. Amplifier Stages

The radio frequency amplifier stages are so designed that the receiver gain is essentially uniform throughout the entire tuning range of the Receiver. The impedance of a typical R.F. tuned secondary circuit decreases as the L/C ratio decreases, thus tending to reduce stage gain as the low frequency end of the tuning band is approached. Compensation for this effect is obtained by the use of high inductance primary coils in the interstage R.F. transformers. The high inductance primary is designed so that the primary circuit, as a whole, resonates broadly at a frequency outside the low frequency limit of the coil set tuning range. The primary circuit will, therefore, show increasing impedance as the tuning of the receiver approaches the low frequency end of the band. This resonant characteristic of the primary increases gain at low frequencies, over-compensating for the decreasing impedance of the secondary. In order to obtain the proper amount of compensation, a small coupling capacity is placed between the plate of the preceding tube, and the grid of the following tube. This capacity is most effective at the high frequency end of the band and combined with the resonant characteristic of the primary provides uniform gain throughout the band.

A slightly different arrangement is employed for gain compensation in the 14 to 30 megacycle band. The interstage R.F. coupling transformers have three windings all closely coupled together. The primary winding connected in the plate circuit of the first R.F. tube is interwound with the tuned secondary winding and both have approximately the same number of turns. A third winding which feeds the control grid of the following R.F. amplifier tube is so designed that its natural period (or resonant frequency) falls just outside the low frequency end of the frequency band covered by the coil set. The impedance of this resonant secondary increases as the low frequency end of the tuning range is approached, thus tending to compensate for the unfavorable L/C ratio of the tuned secondary in much the same manner as the resonant primary system used in other coil sets. The self-resonant secondary arrangement is preferable, in the 14 to 30 Mc. band, as the resonant primary system is inadequate in its levelling action. It is not practical to include any gain compensation system in the coil sets for the 50 to 100 Kc. band.

Band-Spread

The plug-in coil sets regularly supplied with the receiver provide for band-spread of the 10-11, 20, 40 and 80 meter bands using coil sets A, B, C and D respectively. Each band is spread out so as to cover 400 dial divisions on the 500 division main tuning dial. This is accomplished by placing small capacitors in series with each section of the main tuning capacitor, thus reducing its effective capacity range. These coil sets are aligned in the receiver at the National Laboratories using crystal controlled test oscillators assuring precise calibration. The frequency tolerance for the calibration of the amateur bands adhered to at the National Laboratories is + 0.03%.

Temperature Compensation

The receiver is compensated for frequency drift due to temperature changes occuring in circuits which may detune the receiver from the desired signal. While variations in room temperature are usually so gradual that drift resulting from this source is not objectionable, it is minimized through the use of air dielectric trimmer condensers, and the use of coil form material which has a small temperature coefficient. The cause of most objectionable frequency drift is the change of inductance of the high-frequency oscillator coil as heat from the tubes causes the interior of the receiver to increase in temperature. To minimize heating of the R.F. coils, the receiver is designed so that the coil sets are plugged into the very bottom of the receiver, underneath the chassis in a separate shielded compartment. The heat from the tubes will of course rise toward the top of the receiver and the R.F. coils will remain nearly at room temperature.

Crystal Filter

A Crystal Filter affords six positions of selectivity in the HRO Receiver, ranging from broad-band selectivity for reception of broadcast signals to single signal selectivity for C.W. reception. The use of the Crystal Filter enables the operator to easily suppress an interfering signal by means of the PHASING control. With the SELECTIVITY switch in the OFF position, the PHASING control has little effect on receiver performance. In this position, the nominal bandwidth is 8.0 Kc. at ten times down. Switching the Crystal Filter SELECTIVITY switch to position 1 gives a bandwidth of approximately 3.6 Kc., while with the SELECTIVITY switch in position 5 the bandwidth is about 1700 cycles. The PHASING control can be adjusted to suppress interfering signal frequencies differing from the desired signal by 300 cycles or more. The Crystal Filter employs a bridge type circuit which makes use of the high rate of reactance change with changes in frequency provided by a crystal to give the desired sharpness of selectivity. The reactance vs. frequency characteristic of the crystal is modified by damping, or loading the crystal by means of the tuned input circuit. When the input circuit is detuned, its effective resistance decreases and damping is greatly reduced, producing maximum selectivity. Detuning the input circuit does not materially affect the amplification of the receiver at the resonant frequency of the crystal since the series impedance of the circuit becomes very low when damping is reduced.

Beat Frequency Oscillator

A beat frequency oscillator, which operates at or near the intermediate frequency is coupled to the second detector. The signal from this oscillator and the desired C.W. signal heterodyne at the second detector and produce an audio beat note thus providing a means for C.W. reception.

Automatic Volume Control

Automatic Volume Control is provided for use only for M.C.W. reception. When the Beat Frequency Oscillator is turned on for C.W. reception it provides sufficient signal to operate the A.V.C. system and thus render the receiver extremely insensitive. For C.W. reception, therefore, the A.V.C. switch should be in the OFF position. However, the noise limiter, due to its peak limiting action, will provide A.V.C. action for the reception of C.W. signals. The limiter control may be advanced as desired to produce this A.V.C. action and may even be fully advanced to good advantage since the distortion is not detrimental to the reception of C.W. signals.

NATIONAL COMPANY, INC.

Noise Limiter

An adjustable threshold, series valve noise limiter provides very useful suppression of static peaks, automobile ignition noise and other high-frequency electrical noise fed to the receiver via the antenna. The degree of suppression and level at which noise limiter action occurs is adjustable by means of the limiter control on the front panel. When receiving M.C.W. signals, care in setting this control must be exercised since too much limiting action will cause audio distortion. However, when receiving C.W. signals the operator may take full advantage of the limiting action and provide AVC action as well as noise suppression, since distortion is not serious in this case. The 6H6 in the noise limiter stage is a duo-diode providing suppression of both the positive and negative peaks of noise.

Main Tuning Dial

The main tuning dial at the center of the front panel permits swift, accurate tuning and precise logging. This type of dial has an effective scale length of approximately twelve feet and is direct reading to one part in five-hundred. The dial drives the four-gang main tuning capacitor through a worm drive having a reduction ratio of 20 to 1. Back-lash is eliminated by the use of a spring-loaded split worm wheel which assures positive drive in either direction at all times.

OPERATION

Controls

The MAIN TUNING dial is located at the center of the front panel. The dial is so arranged that the frequency to which the receiver tunes increases as the dial reading increases. Each coil set is provided with a calibration chart showing the relationship between dial reading and frequency. An additional chart for bandspread calibration is provided on coil sets which include the band-spread feature. Observation of each coil set tuning chart will show that the calibration is very nearly linear which eliminates considerable reference to the coil charts.

The R.F. GAIN control is located at the lower right-hand corner of the front panel and serves to adjust the amplification of the second R.F., first I.F. and second I.F. amplifier stages. Maximum sensitivity is obtained by rotating the control knob to the extreme clockwise position, or 10, on its circular scale. In this position all tubes are operating at maximum gain with minimum bias. As the control is turned counter-clockwise, increasing bias is applied to the second R.F., the first I.F. and the second I.F. tubes, thus reducing their amplification.

The B+ ON-OFF switch is located directly above the R.F. GAIN control. This switch is connected in the positive lead of the power supply circuit and its purpose is to shut off the receiver during periods of transmission or WHEN CHANGING COIL SETS. This last function is important. The B+ circuits are completed when this switch is pushed to the right. Connected in parallel with the B+ switch and mounted at the rear of the chassis is a pair of contacts, marked B.S.W., intended for use with relay control of the receiver.

The PHASING and SELECTIVITY controls, located immediately above the B+ SWITCH, are a part of the crystal filter. When the SELECTIVITY control is set at OFF, the crystal is switched out of the circuit. With the crystal switched out, the phasing control has little influence on the receiver performance. With the SELECTIVITY control knob set at any point between 1 and 5, inclusive, the crystal filter is in operation, selectivity increasing as the knob is progressively advanced to position 5. The PHASING control is then used to balance the crystal bridge circuit and eliminate interfering signals or heterodynes.

The C.W. OSC. switch and vernier tuning control is located at the lower left-hand side of the front panel. The C.W. oscillator is used to produce an audible beat note when receiving C.W. signals or to locate the carrier of a weak M.C.W. station. Rotating the C.W. OSC. knob in a clockwise direction from OFF removes the ground from the cathode of the C.W. Oscillator, thus permitting it to oscillate. Further rotation of the knob from 0 on the scale to 10 varies the frequency of oscillation over a range of approximately 3 kilocycles. The C.W. Oscillator tunes to the receiver intermediate frequency at 9 on the graduated scale.

The A.V.C. switch is located directly above the C.W. OSC. control. The automatic volume control circuits are operative when the toggle switch is pushed to the left.

The AUDIO GAIN control is located directly above the A.V.C. switch. Clockwise rotation of this control increases the signal applied to the triode section of the second audio tube. This control adjusts the volume level of the signal at both phone jack and loud-speaker terminals.

The LIMITER control, located just to the left of the MAIN TUNING dial, serves to adjust the D.C. potential applied to the elements of the series valve noise limiter tube. The limiter circuit is thus provided with an adjustable threshold at which limiting starts. Any audio voltages or noise peaks in excess of this threshold are prevented from reaching the audio amplifier. With the LIMITER control set at zero, the limiter circuits will pass all but the strongest audio peak voltages; when the control is set at ten, the threshold is lowered to a point where the audio signal will be distorted due to the suppression of the positive and negative peaks.

The S-METER for indicating carrier intensity or signal strength is on the upper left-hand corner of the front panel. Just below it and to the left, is a switch which connects the S-METER in the circuit.

The PHONE JACK is located just below and slightly to the right of the S-METER. When a phone plug is inserted into the PHONE JACK, the loud-speaker is automatically silenced.

The BANDSPREAD switch for each of the four bandspread coil sets is located on each coil set. Inspection of the coil set terminal panels will show several small rectangular metal pieces. There are two of these metal pieces or terminal blocks on each coil which are tapped and countersunk for a flat-head machine screw. With the screws in the left-hand position, the coil range will be that shown in the left-hand or general coverage chart. It is only necessary to move each of the four screws to the right-hand terminal block of each coil to change the calibration from general coverage to BANDSPREAD as shown on the right-hand chart.

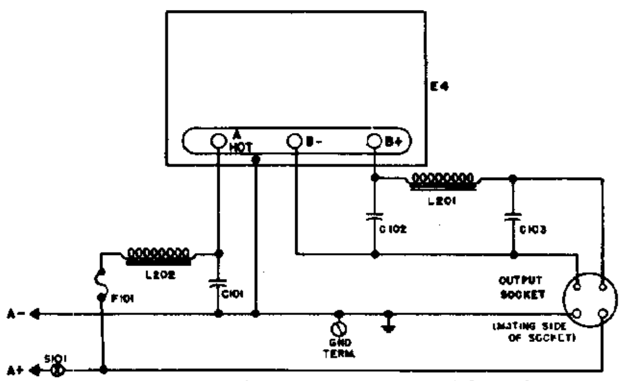

Figure No. 10. Schematic Diagram -- 686S Power Unit

TYPE 686S AND TYPE 1286S POWER UNITS

C.W. Reception

After the HRO-5A1 is properly installed it is put in operation by turning both the Power Unit switch and the Receiver B+ switch to the ON position. The LIMITER control should be set at 0. The C.W. OSC. control should be turned on and the A.V.C. switch must be pushed to the right to render the A.V.C. circuits inoperative. If the A.V.C. switch is turned on with the C.W. oscillator in operation, the Receiver will block and become extremely insensitive. The Receiver is now adjusted for C.W. reception and will tune in accordance with the frequency calibration of the coil set in use.

Although the settings of the R.F. GAIN and A.F. GAIN controls will depend to some extent upon operating conditions, it is recommended that the A.F. GAIN control be set at 5 and the R.F. GAIN control advanced as may be required to provide a satisfactory audio signal. Advancing the R.F. GAIN control too much may cause I.F. or second detector overload. Such overload is indicated by a change in pitch of the C.W. beat note over the duration of a code character, or by excessive " thumping ".

The best setting of the C.W. OSC. control will also depend upon operating conditions. When the received signal is free from interference and is sufficiently strong to override static and circuit noise, it is recommended that the C.W. OSC. control be set at the position which tunes the C.W. oscillator to the intermediate frequency of the receiver. This setting will normally be between 8 and 10 on the C.W. OSC. dial. As the control is turned toward 0, the C.W. oscillator is progressively detuned from the intermediate frequency of the receiver.

The operator can tell the extent of this deviation by listening to the characteristic pitch of background and circuit noises. When this pitch is 2000 or 3000 cycles per second, it will be found that the receiver has definite single-signal properties such that on one side of the carrier, the audio beat note of a received signal will be considerably louder than that of the other side. This characteristic is helpful in receiving weak signals through interference and utilizes the maximum available sensitivity of the receiver.

If receiving conditions are such that static peaks or noise pulses of high intensity and short duration are present, the best signal-to-noise ratio is obtained by advancing the LIMITER CONTROL toward 10. Maximum limiter action is possible for reception of C.W. signals since audio distortion is not important. At the same time using strong limiter action has the further advantage of providing A.V.C. action for C.W. reception.

Phone Reception

The initial adjustment of the HRO-5A1 Receiver for reception of M.C.W. signals is the same as for C.W. reception except that the C.W. OSC. control should be turned off. For M.C.W. reception, the C.W. oscillator may be useful in locating the carrier of a weak phone or broadcast station. After the phone carrier has been located, the C.W. oscillator is turned off. With the A.V.C. OFF the setting of the A.F. GAIN and R.F. GAIN controls will depend to some extent upon operation conditions. It is recommended that the A.F. GAIN control be set at about 5 and the R.F. GAIN control advanced as may be required to provide a satisfactory audio signal. When receiving weak signals, best signal-to-noise ratio will be obtained by retarding the A.F. GAIN control and advancing the R.F. GAIN control to a point as near maximum as receiving conditions will permit. Care must be exercised to prevent overloading the I.F. or second detector stages under these conditions. Overload will be indicated by excessive audio distortion.

To receive M.C.W. signals with automatic volume control, the A.V.C. switch must be placed in the ON position. The R.F. GAIN control should be advanced to a point as near maximum as receiving conditions will permit. Audio output should be controlled entirely by means of the A.F. GAIN control. When the noise level is high, the R.F. GAIN control may be retarded to limit the overall sensitivity of the receiver to a definite maximum. It should be remembered, however, that the full range of A.V.C. action cannot be obtained unless the R.F. GAIN control is fully advanced.

The action of the LIMITER control is similar to that described under Section 4-2. The best setting of the LIMITER control will be determined by trial since too much limiting action will cause distortion of the audio output. If the noise pulses and static peaks are of large amplitude or of long duration the best signal-to-noise ratio will be obtained with the A.V.C. switch in the OFF position. In this operating condition, the optimum signal-to-noise ratio must be obtained by careful adjustment of both the R.F. GAIN and LIMITER controls.

Reception with Crystal Filter

The crystal filter may be used advantageously in the reception of both C.W. and M.C.W. signals to adjust the selectivity of the receiver and also to suppress interfering signals or heterodynes.

For M.C.W. reception the normal setting of the SELECTIVITY control is at one of the positions affording broad selectivity. Positions 1 and 2 are recommended. Selectivity may be progressively increased by turning the SELECTIVITY control to positions 3,4 and 5 although too sharp selectivity for M.C.W. reception will render phone signals unintelligible due to excessive side-band cutting. The PHASING control is used to attenuate, or eliminate, if possible, interfering signals. The PHASING control is normally set at 0 on the scale for reception of M.C.W. signals. If, after tuning in a signal, an interfering signal causes a heterodyne or whistle, the PHASING control should be adjusted until the interfering signal is reduced to a minimum. The setting of the PHASING control which gives maximum attenuation of the heterodyne will depend on the pitch of the heterodyne whistle. If the beat-note is above 1,000 cycles, the optimum PHASING control setting will be zero; if the beat-note is 300 or 400 cycles, the optimum PHASING control setting will be near one end of the scale or the other, depending upon whether the interfering signal is higher or lower in frequency than the desired signal.

For the reception of C.W. signals the action of the crystal filter is similar to that for M.C.W. reception except that full use of the sharp selectivity position may be used without the loss of intelligibility experienced in M.C.W. reception. When maximum selectivity is used, (SELECTIVITY control at position 5), care must be exercised since the tuning is very critical. When the receiver is slowly tuned across the carrier of a received signal, the beat-note produced will be very sharply peaked in output at a particular audio pitch. This peak in response indicates the correct receiver dial setting. The setting of the C.W. OSC. control must be such that the beat-note peak is well within the audible range so that the receiver peak response may be readily observed. A C.W. OSC. dial setting near 7 is recommended. After the receiver has been correctly tuned, the pitch of the beat-note peak may be adjusted by means of the C.W. OSC. control to provide an audio tone which is pleasing to copy, or coincides with any response peaks in the speaker or headphones. Under these conditions, the receiver will exhibit pronounced single-signal properties which may be demonstrated by tuning the receiver to the other side of "zero-beat" so that the pitch is the same as before and observe the marked reduction in output. This dial setting is not recommended for use other than to demonstrate the single-signal properties of the receiver. With the receiver tuned to "crystal peak", an interfering signal may be attenuated by proper setting of the PHASING control since this control has little effect on the desired signal.

Measurement of Signal Strength

To measure the strength or intensity of a signal, the R.F. GAIN control must be advanced to 9.5 and the A.V.C. switch turned to the ON position. The crystal filter should be turned OFF by means of the SELECTIVITY control, and the PHASING control set at 0. The LIMITER and A.F. GAIN controls do not affect the S-METER reading.

Tuning the receiver to a signal will cause the meter to read, indicating the signal input in S-units or in decibels above the S-9 level.

With no R.F. input to the receiver, or with the antenna disconnected, the S-meter should read 0, plus or minus 1 S-unit. If it does not, the S-meter circuit requires adjustment. See Section 6.

Measurement of the signal strength of C.W. signals cannot be made with the C.W. oscillator in operation.

ALIGNMENT DATA

General

Should realignment of the HRO-5A1 Radio Receiver become necessary the following alignment data should be carefully studied before making any circuit adjustments. It is important that the function of each circuit element is understood so that correct alignment may be obtained quickly and accurately. Adjustments referred to by number are shown in Figures 5 and 7.

The complete alignment of the receiver may be divided into five steps:

(a) Intermediate Frequency Amplifier alignment including crystal filter adjustments.

(b) High Frequency Oscillator alignment.

(c) Radio Frequency Amplifier alignment.

(d) Tracking of High Frequency Oscillator and Radio Frequency Amplifier circuits.

(e) Bandspread Adjustments.

I.F. Amplifier Alignment

The making of any adjustment indescriminately is cautioned against and no circuit should be realigned unless tests definitely indicate that realignment is necessary.

The Alignment of the Intermediate Frequency Amplifier may be easily checked in the following manner. The receiver should be adjusted for normal operation with no antenna, AVC OFF, R.F. GAIN at 9, crystal Filter SELECTIVITY switch at 5, PHASING control at 0, and C.W. OSC. turned ON. The setting of the A.F. GAIN control does not affect the measurement and may be adjusted to provide sufficient output to make the required observations. The C.W. OSC. control should then be turned until a point is found where the predominant pitch of the background noise is lowest and a crystal ring is heard. This setting of the C.W. OSC. control should occur near 9 on the C.W. OSC. scale and the exact setting should be noted. The crystal filter should then be disconnected from the circuit by turning the SELECTIVITY control to the OFF position. The C.W. OSC. control should again be adjusted for the lowest predominant pitch of background noise and this new setting noted. If the I.F. Amplifier alignment is correct, the setting of the C.W. OSC. control should be the same for both tests outlined above. The I.F. Amplifier should not be realigned, however, unless the test shows appreciable misalignment.

The intermediate frequency of the HRO-5A1 is 456 kilocycles, plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator in the crystal filter.

Trimmer capacitors are provided on the crystal filter and on each I.F. transformer. These capacitors are numbered 9, 10, 11, 12, 13, 14, 17 on Figure No. 5.

The high output lead of an accurately calibrated signal generator should be connected to the grid terminal of the first detector tube and the ground lead to any convenient point on the chassis. The flexible lead need not be disconnected from the grid of the tube. A dummy antenna is not used. The C.W. OSC. should be turned on and the modulation of the signal generator turned off to provide a steady C.W. test signal. Set the PHASING control at 0, the SELECTIVITY control at 5, and the A.F. GAIN control at maximum or fully advanced. An output meter should be connected to the output terminals of the receiver.

The signal generator should be tuned to approximately 456 kilocycles and its output adjusted to give a convenient reading on the output meter. Tune the signal generator to the frequency producing maximum reading on the output meter; a definite sharply peaked response will be noted. The signal generator output should be reduced now in order to avoid I.F. or audio overload and the C.W. OSC. should be adjusted to give an audio beat-note at some frequency between 400 and 1000 cycles per second.

The I.F. amplifier trimmer capacitors, numbers 9, 11, 12, 13 and 14, should be carefully tuned to produce a maximum reading on the output meter. The order of adjustment is not important. While tuning the I.F. amplifier trimmer capacitors it will be necessary to reduce the signal generator output if the I.F. amplifier gain increases to the overload point.

The crystal filter SELECTIVITY control should be set at 1 and the signal generator detuned between 3 and 4 kilocycles to one side of the crystal frequency, crystal filter trimmer capacitor Number 10 should be tuned for maximum output meter indication. After making this adjustment, the SELECTIVITY control should be set at off and the signal generator retuned to exact crystal frequency. Compensator trimmer capacitor Number 17 should then be tuned for maximum reading on the output meter.

After the I.F. amplifier has been aligned, the tuning of the C.W. OSC. should be checked. This may be readily accomplished by repeating the test previously described with the crystal filter off. If the setting of the C.W. OSC. control does not occur at or near 9, with this test, turn the C.W. OSC. control to 9 and carefully adjust trimmer Number 15 by ear for the lowest pitch of background noise.

High Frequency Oscillator Alignment

The need for realignment of the high frequency oscillator of any band is indicated when the frequency calibration of the receiver dial is in error by more than 3% at the high frequency end of the band in question. If there is doubt concerning the necessity for high frequency oscillator realignment, this portion of the circuit should not be adjusted as correction can be made by R.F. amplifier trimmer adjustments.

If the frequency calibration of a coil set is in error by more than 3%, it should be corrected in the following manner:

(a) Adjust the receiver for normal operation as follows: R.F. GAIN at 9, C.W. OSC. off, A.V.C. off, Crystal Filter off, A.F. GAIN set to provide a suitable signal level.

(b) Adjust an accurately calibrated signal generator to provide a signal which should be tuned in near 490 on the receiver dial according to the general coverage calibration chart for the coil set in use.

(c) Tune the receiver to the test signal and compare the dial reading with the calibration chart.

(d) When the receiver dial reading is too low, more circuit capacity is required and is supplied by adjustment of trimmer Number 8. When the receiver dial reading is too high, less circuit capacity is required and is removed by adjustment of trimmer Number 8.

It is particularly important that the high frequency oscillator operates above the R.F. amplifier frequency and not below. This can be checked by tuning in the test signal as an image which is normally 912 kilocycles lower on the receiver dial. The image signal should be much weaker if the R.F. amplifier is correctly aligned and a stronger test signal may be required in order to hear the image. If the image signal appears at a higher dial setting rather than a lower dial setting, the high frequency oscillator is incorrectly adjusted and the capacity of trimmer, Number 8, must be decreased until the real signal and image signal each appear at the proper points on the dial.

R.F. Amplifier Alignment

The term R.F. amplifier alignment, as used in this section, includes alignment of both R.F. Amplifier and First Detector circuits.

The receiver should be adjusted as in paragraph (a) 5-3. No Antenna is required. Turn the receiver dial to 490 and adjust trimmers, Numbers 2, 4, and 6, for maximum background noise, which is the setting for maximum gain.

Tracking of the H.F. Oscillator and R.F. Amplifier Circuits

Tracking of the H.F. Oscillator and R.F. Amplifier circuits may be readily checked by observing the background noise while tuning over the range of the coil-set in use. The background noise should not vary greatly as the dial is turned toward the low frequency limit of the coil set tuning range. The actual tracking of each stage near the low frequency limit of the tuning range may be checked by pressing the outside rotor plates of the main tuning condenser section toward or away from the stator, but not far enough to short the condenser or permanently bend the rotor plates. Any change in capacity should decrease the background noise indicating decreased sensitivity, if the stage is tracking properly. Coil sets which may require precise adjustment of circuit elements are provided with adjustable series padders in the high frequency oscillator position of the coil set, which can be adjusted to track with the average adjustment of the R.F. amplifier coils. This series padder is mounted inside the coil and is adjustable from the rear by means of a screwdriver. It should be remembered that the series padders found in the coils of coil-set types A,B,C and D are bandspread series padders and should not be adjusted except during bandspread alignment.

After calibration and alignment at the high-frequency end of the coil set have been accomplished, as explained in Section 5-3, the tracking may be adjusted as follows:

(a) With the receiver adjusted as in Section 5-4, turn the receiver dial to 20.

(b) Test the tracking of each stage in turn by bending the outside rotor plate of each section of the main tuning capacitor. DO NOT BEND the rotor plate of any section to such an extent that it will not spring back to its original position.

(c) Adjust the H.F. oscillator series padder to its optimum tracking position when step (b) above gives indication of poor tracking.

(d) Turn the receiver dial to 490 and adjust trimmer Number 8 to give the proper calibration with the new series padder adjustment.

(e) Repeat (a), (b), (c) and (d) until best tracking is obtained.

(f) Note any slight tracking errors occuring in the R.F. Amplifier stages so that if the same error occurs in a majority of the coil sets, the outside rotor plate may be permanently bent to provide the best tracking for the stage involved.

Band-Spread Alignment

The following data applies only to coil sets which include the bandspread feature; coil-set Types A,B,C and D. Adjustments made for general coverage will affect the bandspread adjustments, but the separate bandspread adjustments may be made without changing the general coverage alignment. The four screws used to switch from general coverage to bandspread must be shifted to the right-hand terminal blocks before any bandspread alignment adjustments are made.

The need for realignment of the H.F. oscillator section of any coil set is indicated when the frequency calibration of the main tuning dial is in error by more than 30 divisions at the high frequency end of the band in question.

(a) If the frequency calibration of a coil set is in error, realignment may be accomplished in the following manner:

(1) Repeat the procedure of Section 5-3 with the exceptions that the test oscillator frequency is chosen so as to be tuned in at 450 on the receiver dial as indicated by the bandspread tuning chart and correction for calibration error is made by adjustment of trimmer number 7.

(b) The alignment of the R.F. amplifier for bandspread operation is similar to that for general coverage so the procedure of Section 5-4 should be repeated with the exception that the receiver dial should be turned to 450 and trimmer Numbers 1,3 and 5 should be adjusted for maximum background noise.

(c) The adjustment and method of checking bandspread tracking is not similar to that for general coverage. The following procedure should be used for bandspread tracking adjustments.

(1) With the receiver adjusted as in paragraph (a) above turn the receiver dial to 50.

(2) Check the receiver calibration at dial reading 50 against an accurate test oscillator.

(3) Adjust the H.F. oscillator series padder located inside the H.F.O. coil shield to provide the correct dial calibration.

(4) Turn the dial to 450 and adjust trimmer Number 7 to give the proper calibration.

(5) Turn the dial to 50 and check the calibration. Repeat (3) and (4) if necessary.

(6) With the receiver dial at 50 check the settings of trimmers, Numbers 1, 3 and 5 for the position of maximum background noise.

(7) If it is found that increasing or decreasing the capacity of trimmer 1,3 or 5 increases the background noise, adjust the associated series padder located inside the coil shields to provide the required capacity.

(8) Turn the receiver dial to 450 and adjust trimmers 1,3 and 5 for maximum background noise.

(9) Repeat (6) and (8), also (7) if necessary.

First R.F. Stage Alignment with Low Impedance Transmission Line

If a low impedance transmission line is to be used with the Receiver, it may be necessary to realign the first R.F. amplifier at the high end of each band. The general coverage adjustments affect the bandspread adjustments and should be performed first. The following procedure should be adhered to:

(a) General Coverage:

(1) With the four screws used for switching from general coverage to bandspread in the left-hand (general coverage) position, adjust the receiver for normal operation as follows: R.F. GAIN at 9, C.W. OSC. off, A.V.C. off, CRYSTAL FILTER off, A.F. GAIN set to provide a suitable signal.

(2) Connect the antenna feeders to the Receiver antenna binding posts and tune the receiver to a Signal at approximately 490 on the Receiver dial. Adjust trimmer Number 2 for maximum signal output. If no signal can be received, the trimmer should be adjusted for maximum background noise.

(b) Bandspread:

(1) With the receiver adjusted the same as for general coverage, shift the four screws on the coil terminal panels to the right-hand position (bandspread position).

(2) Connect the antenna feeders to the Receiver antenna binding posts and tune the receiver to a signal at approximately 450 on the Receiver dial. Adjust trimmer Number 1 for maximum signal output. If no signal can be received the trimmer should be adjusted for maximum background noise.

S-Meter Adjustment

The S-meter balancing resistor R-32, is used to obtain zero meter reading in the absence of signal input to the receiver. The adjustment is as follows: Set the R.F. GAIN control at 9.5, AVC ON, and disconnect the antenna. R-32 should now be adjusted until the S-meter reads zero.

Main Tuning Dial

The main tuning dial should normally give no trouble. If, however, the dial should become removed from the receiver it should NOT be operated until mounted on the condenser shaft WITH SET-SCREWS TIGHT. This is because the dial is only designed to rotate for ten revolutions (0 to 500) and if turned farther than this the mechanism will be damaged. When mounted on the condenser, limit stops protect the dial provided the assembly is properly done. The procedure for re-mounting the dial is as follows:

(a) Place dial on condenser shaft, tighten set-screws and turn dial counter-clockwise to fully mesh condenser rotor plates so that the tips of the rotor plates are flush with the edge of the stator plates.

(b) Loosen set-screws and rotate dial slowly until dial reading has decreased to zero.

(c) Tighten the set-screws.

(d) Check position of rotor plates at zero. The tips of the rotor plates should be flush with the edge of the stator plates at zero. A slight adjustment may be necessary and this is done by loosening the set-screws, adjusting the position of the dial and tightening the set-screws again.

If it is necessary to remove the dial at any future time, turn to 250 before removing the dial, and do not disturb the setting of either the dial or condenser until reassembled. If in doubt about the correct position, inspect the springs on the back of the dial. When the dial reads 250 these springs should be straight-up-and-down, they must not be tipped to one side.

It is important that the backplate and dial do not become separated.

The backplate is held in place by two springs so that its gear teeth mesh with the dial gear teeth in correct relationship for proper dial operation. If this backplate should be sprung out of place, it may return to an incorrect position and the proper dial numbers will not appear in the windows when the dial is used. To ascertain that the two parts are in correct position, proceed as follows:

(a) Locate small window near outer periphery of dial backplate and also locate dial number window on face of dial which is 180° removed from the small backplate window.

(b) Hold dial so backplate lies flat in palm of left hand and with right hand rotate dial knob until 250 appears in previously located dial window.

(c) If dial is properly adjusted it will be noted that the pointer at the outer edge of the small window lines up with a marked tooth on the dial itself. It will be found that the dial and backplate can be moved so that the backplate pointer will mesh between teeth at points equi-distant from marked tooth in either direction.

(d) If by checking as in paragraph (c), the dial is found not properly adjusted, it will be necessary to separate the backplate from the dial far enough to bring the two gears out of mesh and then re-mesh the two parts until the proper setting is found. A number of trials may be required before the correct mesh is found.

POWER UNITS

Type 697 Table Model Power Unit

The National Type 697 Table Model Power Unit operates from 115 or 230 volts A.C., 50 or 60 cycles, to provide 240 volts at 70 milliamperes D.C. and 6.2 volts at 3.2 amperes A.C. The circuit diagram of this unit is shown in Figure 9. Output voltages for both A and B supply are available at a four prong socket for convenient connection of the receiver power plug. Section 7-3 shows typical operating voltages and currents when used with the HRO-5A1 Radio Receiver. The Type 697 Power Unit consists of a power transformer, glass Type 5Y3GT/G rectifier tube, and a single section condenser-input filter. B- is connected to the Power Unit Chassis. The Power Unit for rack mounting is designated as SPU-697.

Type 686S Table Model Power Unit

The National Type 686S Table Model Power Unit operates from a 6 volt D.C. supply to provide approximately 165 volts at 45 milliamperes D.C. Battery clips are provided for convenient connection to a 6 volt storage battery or similar source of power. Output voltages for both A and B supply are available at a four prong socket for convenient connection of the receiver power plug. Figure 10 shows the schematic wiring diagram. Section 7-3 shows typical operating voltages and currents when used with the HRO-5A1 Radio Receiver. The 686S Power Unit consists of a vibrapack and a single section condenser-input filter. The vibrapack uses a 6X5 (or OZ4) type rectifier tube and a vibrator. It should be noted that B- is not connected to the Power Unit chassis; A- is connected to the chassis. The National Type SPU-686S Power Unit is the rack-mounted model.

Typical Operating Conditions for Power Units

The following table shows typical operating currents and voltages of the 697, 686S Power Units when used with HRO Series Receivers:

VARIABLE	697	686S
Primary Voltage	115 or 230 VAC	6V DC
Frequency	50/60 cps	0
Heater Voltage	6.2 VAC	6V DC
Heater Current	3.4 Amp. AC	3 Amp.
B Voltage	240 VDC	165V DC
B Milliamperes	70 DC	45 DC
Line Current	.65 Amp.	6.3 Amp.
Power Consumption	70 Watts	38 Watts

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PARTS LIST

Symbol	*Function*	*Type*	*Rating*
	CAPACITORS		
C-1A	First R.F. Amplifier Tuning	Air	225 mmf. max.
C-1B	Second R.F. Amplifier Tuning	Air	225 mmf. max.
C-1C	First Detector Tuning	Air	225 mmf. max.
C-1D	H.F. Oscillator Tuning	Air	225 mmf. max.
C-2	First I.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-3	First Detector Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-4	Second R.F. Plate Bypass	Paper	.1 mfd., 600 VDCW
C-5	H.F.Oscillator Screen Bypass	Paper	.1 mfd., 600 VDCW
C-6	First I.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-7	H.F. Oscillator Coupling	Paper	.01 mfd., 600 VDCW
C-8	First & Second I.F. Plate Bypass	Paper	.25 mfd., 600 VDCW
C-9	Second I.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-10	Second I.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-11	Second Detector Cathode Bypass	Elec.	10 mfd., 50 VDCW
C-12	Second Detector Filter	Ceramic	100 mmf., 500 VDCW
C-13	Second Detector Filter	Ceramic	270 mmf., 500 VDCW
C-14	V-7 to V-10 Coupling	Paper	.1 mfd., 400 VDCW
C-15	Second Detector Bypass	Paper	.01 mfd., 600 VDCW
C-16	Second Audio Plate Bypass	Mica	470 mmf., 500 VDCW
C-17	Second R.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-18	V-7 to V-9 Coupling	Paper	.1 mfd., 600 VDCW
C-19	Audio Output Cathode Bypass	Elec.	10 mfd., 50 VDCW
C-20	Not Used		
C-21	C.W. Oscillator Screen Bypass	Paper	.01 mfd., 600 VDCW
C-22	First R.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-23	V-1, V-2, V-5 and V-6 Screen Bypass	Paper	.1 mfd., 400 VDCW
C-24	First R.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-25	First R.F. Plate Bypass	Paper	.1 mfd., 600 VDCW
C-26	Second R.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-27	C.W. Oscillator Tuning	Air	30 mmf.
C-28	Audio Output Screen Bypass	Paper	.01 mfd., 600 VDCW
C-29	C.W. Oscillator Grid Coupling	Mica	.001 mfd., 500 VDCW
C-30	H.F. Oscillator Grid Coupling	Ceramic	100 mmf., 500 VDCW
C-31	Crystal Filter Bridge	Ceramic	100 mmf., 500 VDCW
C-32	Crystal Filter Bridge	Ceramic	100 mmf., 500 VDCW
C-33	V-8 to V-7 Coupling	Ceramic	2 mmf., 500 VDCW
C-34	Coil A-1 Antenna Coupling	Ceramic	39 mmf., 500 VDCW
C-35	Coil A-1 Series Padder	Mica	.0012 mfd., 500 VDCW
C-36	Coil A-4 Series Padder	Mica	.001 mfd., 500 VDCW
C-37	Coil B-4 Series Padder	Mica	.0026 mfd., 500 VDCW
C-38	Coil C-4 Series Padder	Mica	.0016 mfd., 500 VDCW
C-39	Coil D-4 Series Padder	Mica	900 mmf., 500 VDCW
C-40	Coil E-4 Series Padder	Ceramic	500 mmf., 500 VDCW
C-41	Coil F-4 Series Padder	Ceramic	350 mmf., 500 VDCW
C-42	Coil G-4 Series Padder	Ceramic	100 mmf., 500 VDCW
C-43	Coil J-4 Series Padder	Ceramic	50 mmf., 500 VDCW
C-44	H.F. Oscillator Temp. Compensating (Minus .00077 mmf./mmf./°C)	Ceramic	10 mmf., 500 VDCW
C-45	V-10 to V-11 Coupling	Paper	.1 mfd., 400 VDCW
C-46	Limiter Filter	Elec.	8 mfd., 250 VDCW
C-47	Limiter Output Coupling	Paper	.01 mfd., 600 VDCW
C-48	Audio Output Grid Filter	Ceramic	160 mmf., 500 VDCW
C-49	A.V.C. Filter	Mica	.001 mfd., 500 VDCW
C-50	A.V.C. Filter	Mica	.001 mfd., 500 VDCW
C-51	H.F. Oscillator Plate Bypass	Paper	.01 mfd., 600 VDCW

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Symbol	Function	Type	Rating
	RESISTORS		
R-1	R.F. Gain Control	W.W. Var.	10,000 Ohms, 1.5 W.
R-2	First Detector Cathode	Fixed	4,700 Ohms, 1/2 W.
R-3	First I.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-4	First I.F. Cathode	Fixed	330/1000 Ohms, 1/2 W.
R-5	H.F. Oscillator Screen Filter	Fixed	47,000 Ohms, 1/2 W.
R-6	H.F. Oscillator Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-7	H.F. Oscillator Screen Bleeder	Fixed	100,000 Ohms, 1/2 W.
R-8	Second I.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-9	Second I.F. Cathode	Fixed	330 Ohms, 1/2 W.
R-10	V-1, V-2, V-5, and V-6 Screen Filter	Fixed	15,000 Ohms, 2 W.
R-11	S-Meter Bridge	Fixed	2,200 Ohms, 1/2 W.
R-12	Second Detector Load	Fixed	470,000 Ohms, 1/2 W.
R-13	Second Detector Filter	Fixed	47,000 Ohms, 1/2 W.
R-14	Second Detector Equalizing	Fixed	220,000 Ohms, 1/2 W.
R-15	V-1, V-2, V-5, and V-6 Screen Bleeder	Fixed	27,000 Ohms, 2 W.
R-16	Not Used		
R-17	Not Used		
R-18	Second Audio Plate Load	Fixed	47,000 Ohms, 1/2 W.
R-19	A.V.C. Filter	Fixed	470,000 Ohms, 1/2 W.
R-20	Second Detector Cathode	Fixed	330 Ohms, 1/2 W.
R-21	Not Used		
R-22	C.W. Oscillator Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-23	C.W. Oscillator Plate	Fixed	220,000 Ohms, 1/2 W.
R-24	C.W. Oscillator Screen Bleeder	Fixed	100,000 Ohms, 1/2 W.
R-25	Audio Output Cathode	Fixed	330 Ohms, 2 W.
R-26	Audio Output Grid	Fixed	470,000 Ohms, 1/2 W.
R-27	First R.F. Cathode	Fixed	330 Ohms, 1/2 W.
R-28	First R.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-29	Second R.F. Cathode	Fixed	330 Ohms, 1/2 W.
R-30	S-Meter Bridge	Fixed	1,800 Ohms, 1/2 W.
R-31	Second R.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-32	S-Meter Zero Adjusting	W.W. Var.	1,000 Ohms, 1 W.
R-33	Audio Gain Control	Comp. Var.	500,000 Ohms, 1 W.
R-34	C.W. Oscillator Grid	Fixed	47,000 Ohms, 1/2 W.
R-35	H.F. Oscillator Grid	Fixed	22,000 Ohms, 1/2 W.
R-36	First Audio Grid	Fixed	1,000,000 Ohms, 1/2 W.
R-37	First Audio Cathode	Fixed	4,700 Ohms, 1/2 W.
R-38	Limiter Plate	Fixed	47,000 Ohms, 1/2 W.
R-39	Limiter Cathode	Fixed	47,000 Ohms, 1/2 W.
R-40	Limiter Threshold Control	W.W. Var.	10,000 Ohms, 1 W.
R-41	First Audio Plate	Fixed	47,000 Ohms, 2 W.
R-42	Limiter Plate	Fixed	220,000 Ohms, 1/2 W.
R-43	Audio Output Grid	Fixed	220,000 Ohms, 1/2 W.
R-44	H.F. Oscillator Plate	Fixed	22,000 Ohms, 1 W.
R-45	First Audio Plate Dropping	Fixed	33,000 Ohms, 1/2 W.
R-46	Second Detector Cathode	Fixed	470 Ohms, 1/2 W.

Symbol	Function	Type	Rating
	TRANSFORMERS		
T-1	Crystal Filter		456 K.C.
T-2	Second I.F. Transformer	Air Tuned	456 K.C.
T-3	Second Detector Transformer	Air Tuned	456 K.C.
T-4	C.W. Oscillator Transformer	Air Tuned	456 K.C.
	VACUUM TUBES		
V-1	First R.F. Amplifier	6K7	
V-2	Second R.F. Amplifier	6K7	
V-3	First Detector	6J7	
V-4	High Frequency Oscillator	6J7	
V-5	First I.F. Amplifier	6K7	
V-6	Second I.F. Amplifier	6K7	
V-7	Second Detector, A.V.C., Second Audio	6SQ7	
V-8	C.W. Oscillator	6J7	
V-9	Audio Output	6V6GT/G	
V-10	First Audio Amplifier	6J5	
V-11	Noise Limiter	6H6	
	SWITCHES		
X-1	B+ Switch	Toggle	S.P.S.T.
X-2	C.W. Oscillator Switch	Toggle	S.P.S.T.
X-3	A.V.C. Switch	Toggle	S.P.D.T.
X-4	S-Meter Switch	Toggle	S.P.S.T.
X-5	Crystal Selectivity Switch	Rotary	Two Gang 6 Position
	TYPE 697 POWER UNIT		
C-112, C-113, C-114	Filter Capacitor	Elec.	8+8+8 Mfd., 475 VDCW
L-102	Filter Choke	Potted	17 Henry
P-101	Power Cord and Plug		
S-101	115-230 Volt Switch	Toggle	D.P.D.T.
S-102	Power Switch	Toggle	S.P.S.T.
T-101	Power Transformer	Potted	
V-101	Rectifier Tube	5Y3GT/G	
	TYPE 686S POWER UNIT		
C-101	Filter Capacitor	Mica	500 Mfd., 15 VDCW
C-102, C-103	Filter Capacitor	Elec.	8+8 Mfd., 475 VDCW
E-101	Vibrapack		6.3 VDC Input
F-101	Fuse	3AG	10 Amperes
L-201	Filter Choke	Potted	17 Henry
L-202	Hash Choke	Potted	
S-101	Power Switch	Toggle	S.P.S.T.
V-101	Rectifier Tube	6X5	

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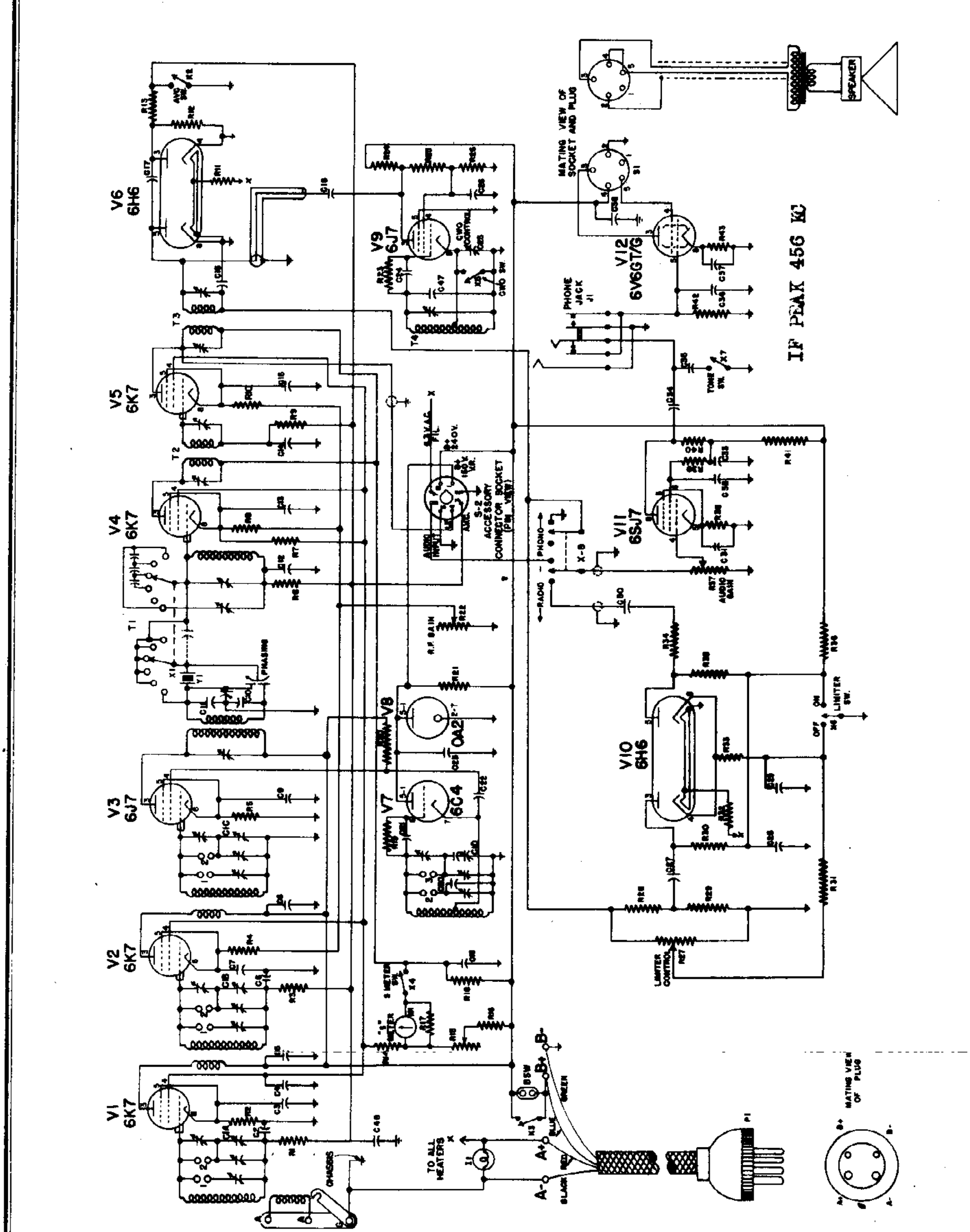

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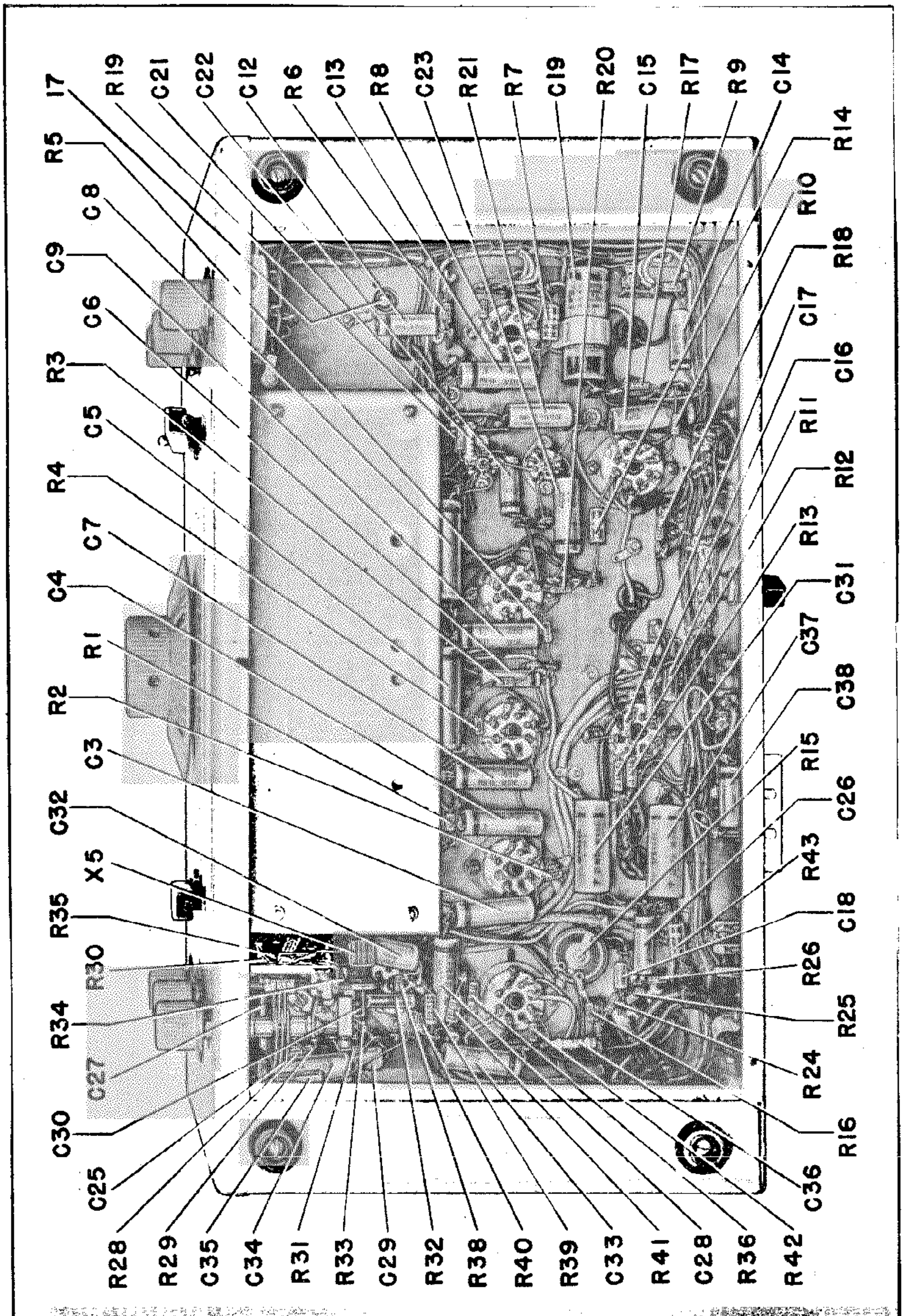

Figure No. 8. Bottom View of Receiver

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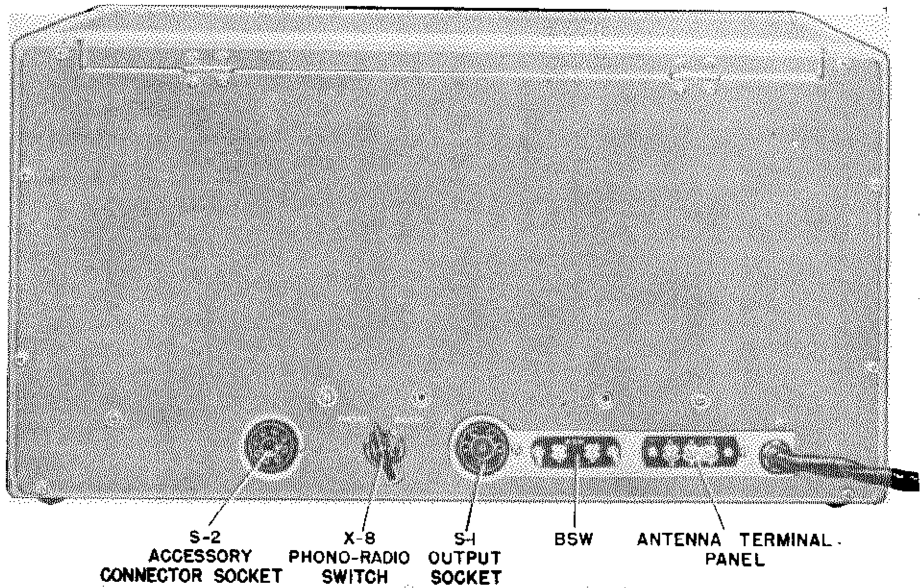
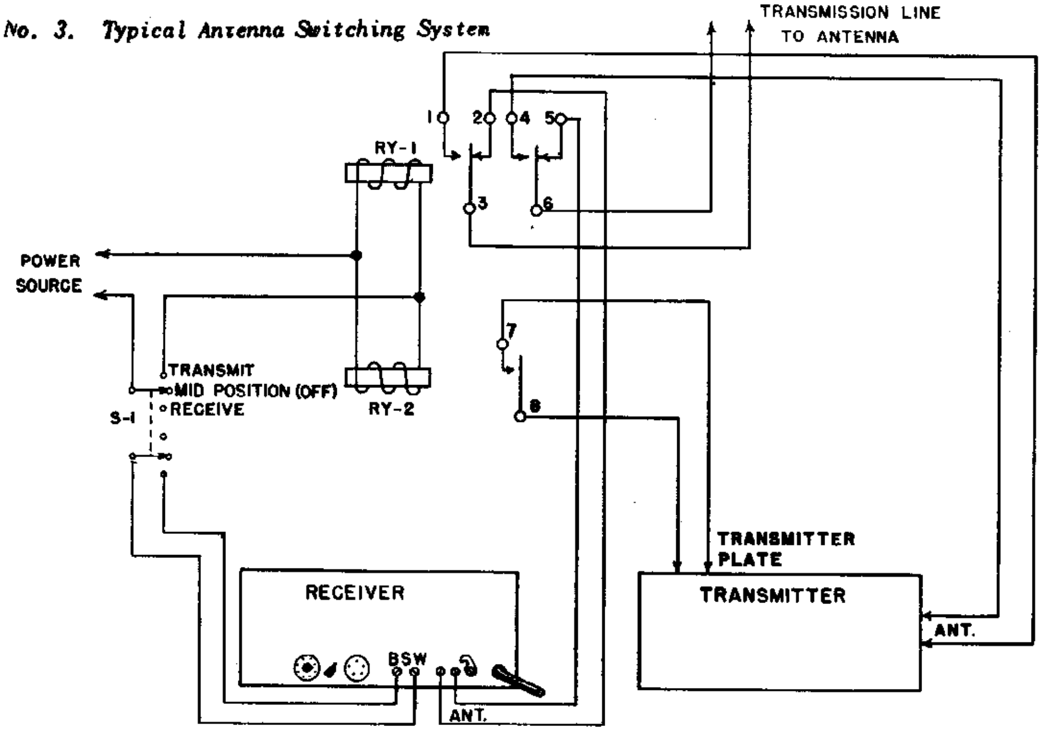


Figure No. 2. Rear View of Receiver (BSW Shield Removed)

Figure No. 3. Typical Antenna Switching System



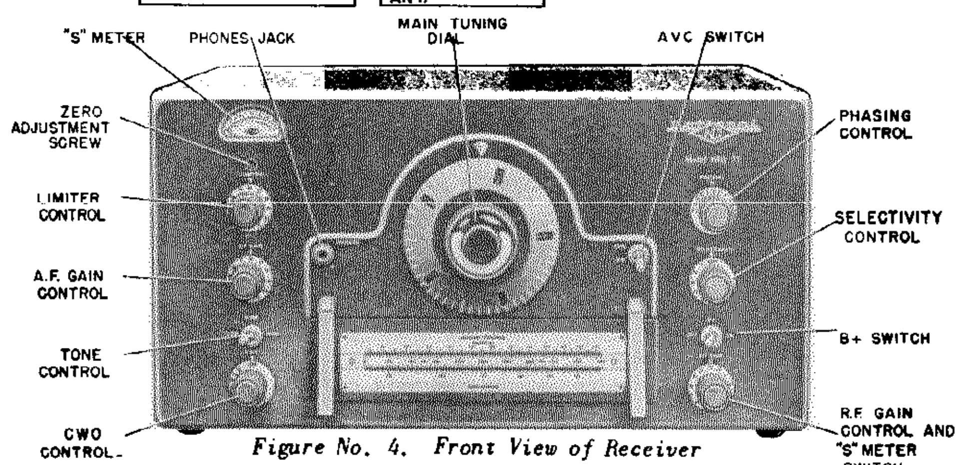


Figure No. 4. Front View of Receiver

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General

The HRO-7 Radio Receiver is a twelve tube high-frequency superhetrodyne for the reception of code and phone signals throughout its frequency range of 50 to 430 Kcs., and 480 to 30,000 Kcs. Long an outstanding and proven performer in Communication and Amateur services, this new series of HRO-7 Receivers features many new refinements emanating from the latest advances in receiver circuitry and design. A new automatic, adjustable threshold, double action noise limiter effectively reduces interference caused by external noise pulses. Two new miniature type tubes, a 6C4 high-frequency oscillator and an OA2 voltage regulator, are employed to give a high order of oscillator stability. The addition of an Accessory Connector Socket, Tone Control, plus other electrical and mechanical revisions give this new HRO greater flexibility and adaptability. A 6 position crystal filter, maximum bandspreading of the Amateur bands, and an excellent signal-to-noise ratio continue to make the HRO a dependable Receiver, capable of maintaining communications despite the most adverse conditions. The HRO-7 is housed in a new cabinet styled in a modern manner with an attractive gray finish.

A complete equipment consists of a receiver, power supply, loud-speaker and plug-in coil set types A, B, C and D. Coil set types E, F, G, H and J may be obtained in addition, as desired.

Circuit

The circuit employed on all bands comprises two tuned stages of radio frequency amplification, a tuned first detector, a high-frequency oscillator employing a tube separate from the first detector tube, a first intermediate frequency amplifier stage employing a variable-selectivity crystal filter and a conventional second intermediate frequency amplifier stage both operating at 455 kilocycles, a combined second detector - automatic volume control stage, an automatic adjustable-threshold series valve noise limiter, a first audio amplifier stage, an audio output stage and a beat frequency oscillator coupled to the second detector to provide for C.W. reception. A voltage regulator tube is used to regulate the plate supply to the high frequency oscillator tube.

Tube Complement

The HRO-7 Receiver is supplied complete with tubes which are tested in the Receiver at the time of alignment.

The tubes employed are as follows:

First R.F. Amplifier	6K7
Second R.F. Amplifier	6K7
First Detector	6J7
High Frequency Oscillator	6C4
First I.F. Amplifier	6K7
Second I.F. Amplifier	6K7
Diode Detector, A.V.C.	6H6
Noise Limiter	6H6
First A.F. Amplifier	6SJ7
Audio Output	6V6GT/G
Beat Frequency Oscillator	6J7
Voltage Regulator	OA2

Tuning System

The frequency coverage of the HRO-7 is covered in nine bands as follows:

COIL SET	GENERAL COVERAGE	BANDSPREAD
A	14.0 - 30 Mc.	27.0-30.0 Mc.
B	7.0 -14.4 Mc.	14.0-14.4 Mc.
C	3.5 - 7.3 Mc.	7.0- 7.3 Mc.
D	1.7 - 4.0 Mc.	3.5- 4.0 Mc.
E	900 -2050 Kc.	
F	480 - 960 Kc.	
G	180 - 430 Kc.	
H	100 - 200 Kc.	
J	50 - 100 Kc.	

As shown above plug-in coil set types A, B, C and D provide bandspread coverage of the 10-11, 20, 40 and 80 meter amateur bands. The B, C and D bands are spread out so as to cover 400 dial divisions, while the A band is spread 430 divisions on the 500-division main tuning dial. This is accomplished by switching small capacitors in series with each section of the main tuning capacitor, thus reducing its effective capacity range. All coil sets are aligned in the Receiver using crystal controlled test oscillators assuring precise calibration.

The micrometer type MAIN TUNING dial drives the four gang main tuning capacitor through a worm drive having a reduction ratio of approximately 20 to 1. Backlash is eliminated by the use of a spring-loaded split worm wheel which assures positive drive in either direction at all times. This dial has an effective scale length of approximately twelve feet and is calibrated from zero to 500. The chart appearing on the front of each plug-in coil set is fitted with a linear scale corresponding to the dial markings and a parallel frequency scale which enables the operator to readily determine the frequency of any particular dial setting. Lever type handles are mounted on the front panel at each end of the plug-in coil set enclosure to facilitate the changing of coil sets. These handles make coil set changing effortless and sure; when the handles are depressed to their maximum vertical position positive contact is made between the coil set and the Receiver brushboard.

Noise Limiter

The new noise limiter in the HRO-7 is the automatic, adjustable-threshold, series valve type. This limiter is double acting -- limiting noise on both positive and negative peaks and is equally effective on both C.W. and phone reception. Its usefulness is most appreciated on the higher frequency bands of the Receiver where automobile ignition noise and other high frequency disturbances are effectively suppressed.

Crystal Filter

The crystal filter, located in the first intermediate frequency amplifier stage, is extremely flexible and of most efficient design. A six-position selectivity control and a crystal phasing control are front-panel mounted for adjustment of the crystal filter. Figure No. 1 shows the selectivity characteristics of the Receiver for each of the six positions of the selectivity control. The crystal filter may be used for either C.W. or M.C.W. reception; any degree of selectivity from true single-signal to broadcast reception being available. Operation of the phasing control provides for easy suppression of interfering signals which may produce objectionable heterodynes.

Tone Control

A two position TONE control (High-Low) is provided to select the desired frequency characteristic of the audio output. The "Low" setting of this control will aid the operator in receiving weak signals through interference.

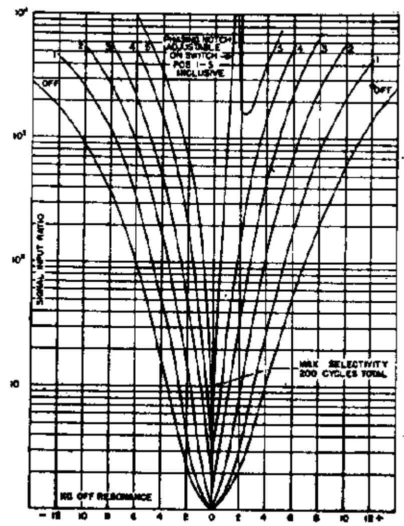

Figure No. 1. Crystal Filter Selectivity Curves.

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Accessory Connector Socket

A socket, S-2, of the standard octal type is mounted at the rear of the Receiver to permit external connection of various accessories such as a narrow-band F.M. adaptor, crystal calibrator, phonograph, microphone or high-frequency converter. A two-position switch, X-8, is mounted adjacent to this socket marked PHONO-RADIO. In the RADIO position all Receiver circuits function normally and connection to the Accessory Connector Socket of equipment such as a crystal calibrator or high-frequency converter may be made. In the PHONO position the second detector portion of the Receiver circuit is rendered inoperative. The PHONO position can be used for the connection of an F.M. adaptor, or phonograph. The input circuit for connection of a phonograph is high-impedance and feeds into the high gain 6SJ7 first audio amplifier stage. The AUDIO GAIN and TONE controls are operative with this connection.

The drawing of the Accessory Connector Socket on the Schematic Diagram shows the various connections made to the pins of this socket and the voltages available. An octal plug termination on the accessory, wired to mate with the proper pins on the Accessory Connector Socket, makes an ideal arrangement for quick and sure connection to the Receiver.

Audio Output

Two audio output circuits are provided. Loud-speaker terminals in the form of a five prong socket are located at the rear of the Receiver and a phone jack is mounted on the front panel. Normally, the plate circuit of the output tube is brought directly to the output socket for connection to a separate permanent-magnet loud-speaker. The loud-speaker must have an impedance of from 5000 to 7000 ohms to properly load the output tube. The output transformer in this case is mounted on the loud-speaker and its primary carries the plate current of the output tube. The phone jack is wired so as to silence the loud-speaker when the phone plug is inserted. The headphone output load impedance is not critical and varying types of headphones may be used including crystal types, as no direct current flows through the phones.

Temperature Compensation

The HRO-7 is compensated for frequency drift due to temperature changes occuring in circuits which may detune the receiver from the desired signal. The cause of most objectionable frequency drift is the change of inductance of the high-frequency oscillator coil as heat from the tubes causes the interior of the Receiver to increase in temperature. This undesirable heating effect of the R.F. coils is minimized by the position of the plug-in coil sets in that they plug in at the bottom of the Receiver underneath the chassis in a separate shielded compartment. A further safeguard against frequency drift is provided for on bandspread operation. The heat dissipated in the high frequency oscillator tube may change the inter-electrode capacity of the tube and thus cause frequency drift. To offset this effect a small negative temperature coefficient capacitor is placed adjacent to the high-frequency oscillator tube to compensate for any change caused by the internal heating of the tube.

Loud-speaker

RFSH or MCR Loud-speakers in rack or table mounting styles respectively can be used with the Receiver. These are permanent magnet type loud-speakers and have an output transformer which provides a proper impedance match for the output tube to the loud-speaker voice coil. This matching transformer has a primary impedance of 5000 ohms. In special models of the Receiver, an output transformer is mounted within the Receiver itself. In this case, the loud-speaker matching transformer must have a primary impedance which matches the Receiver output transformer secondary impedance. External means for supplying field excitation will be necessary if a dynamic speaker is to be used with the Receiver.

INSTALLATION

Arrangement

The Receiver, Power Unit and Loud speaker may be arranged in any desired position although it is not recommended that the loud-speaker be placed on top of the Receiver as undesirable microphonics may result. Neither Power Unit nor Loud-speaker should be placed near the antenna terminals.

Antenna Recommendations

The radio frequency input of the Receiver is arranged for operation from either a single-wire antenna, a doublet antenna, or other types employing transmission lines having impedances of 70 ohms or more. There is a antenna terminal panel at the rear of the Receiver with three screw-type terminals marked A, A and G respectively. A link is provided on the antenna terminal panel to allow connection of two-wire or single-wire type antennae to the Receiver.

For best impedance matching to the Receiver input circuit an antenna with a 300 to 600 ohm transmission line is recommended. The antenna should be cut to the proper length for the most used frequency. The antenna transmission line feeders should be connected to the two antenna terminals marked A; the grounding link is not used. It must be remembered, however, that an antenna installation of this type will have maximum efficiency over a band of frequencies near that frequency for which it is designed and will be most useful in installations where the Receiver is tuned to one frequency or band of frequencies. For other frequencies, it would be desirable to connect the two transmission line leads together at the antenna terminal at the left of the antenna terminal panel, grounding the other terminal by means of the link. The antenna is thus utilized as a single wire type.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of from 50 to 100 feet is recommended. The antenna lead-in should be connected to the antenna terminal marked A at the left of the antenna terminal panel; the other terminal marked A should be grounded by means of the link.

In an installation where the Receiver is to be used as the receiving unit in a transmitting station the most efficient operation will result from use of the transmitting antenna as receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type since the same antenna gain is available for both receiving and transmitting - a very desirable condition. Any transmission line of 70 ohms impedance or more may be used. For switching the antenna from Receiver to transmitter, an antenna change-over relay should be used. A double pole, double throw relay possessing good high-frequency insulation is suitable. A second relay and a three position switch may be used to control the transmitter plate supply and the Receiver B+ circuits. This second relay should be a single pole, single throw type having one normally open pair of contacts. The schematic diagram of this type of control circuit is shown in Figure 3. With S-1 in the receive position the antenna transmission line is connected to the Receiver by contacts 2, 3, 5 and 6 on relay RY-1; the B+ circuit of the Receiver is completed by the switch. (The B+ switch on the Receiver should be at B+ OFF). With the switch in the transmit position RY-1 contacts 1, 3, 4 and 6 are closed transferring the antenna transmission line to the transmitter; contacts 7 and 8 of relay RY-2 close to complete the plate supply circuit to the transmitter. Contacts 7 and 8 of relay RY-2 should be in series with the primary of the transmitter plate supply transformer. Thus, the station is in the receiving condition with switch S-1 in the receive position and in the transmitting condition with S-1 in the transmit position. With S-1 in the mid-position the Receiver B+ circuit and transmitter plate supply circuit are both open thus permitting coil set changing in the Receiver and transmitter. In the mid-position the Receiver B+ circuit is controllable by the B+ switch on the front panel of the Receiver.

When a doublet antenna is used, the antenna feeders or balanced transmission line are connected to the two terminals marked A. The grounding link is not used.

The inner conductor of a concentric transmission line should be connected to the terminal marked A at the left of the antenna terminal panel. The outer conductor should be connected to the other terminal marked A and grounded by means of the link to G.

In some cases where a doublet antenna is used with a low impedance concentric or other type transmission line it may be necessary to re-trim the first R.F. amplifier at the high end of each band to provide a better impedance match between antenna and receiver input circuit. Paragraph 4-5 describes this procedure.

AC Operation

After unpacking the HRO-7 Receiver and associated equipment, proceed as follows:

(1) Make sure all tubes are firmly seated in their sockets and that all grid grips are securely in position.

(2) Make sure the plug-in coil set in the Receiver is firmly in position by pressing down the lever-type handles on the front panel to their maximum vertical position.

(3) Make sure the RADIO-PHONO switch at the rear of the Receiver is set at the RADIO position (right-hand).

(4) Connect antenna as recommended in Section 2-2.

(5) Insert the Receiver power plug into the output socket on the Power Unit.

(6) Insert the five prong loudspeaker plug into the audio output socket at the rear of the Receiver.

(7) Connect Power Unit line cord to proper source of voltage. The Primary. Selection switch, S101, (normally set at 115 volts) must be at the position corresponding to the line voltage to be used i.e. 115 or 230.

(8) Set controls as recommended in Section 3 for the reception of signals.

NOTE

Where the Receiver is located in the R.F. field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the Receiver R.F. coil. If a separate receiving antenna is used a means of disconnecting or grounding it during transmission periods should be provided.

Battery Operation

The Receiver is readily adaptable to emergency or portable operation, or operation in locations where 115 or 230 volt A.C. power is not available. It may be operated directly from batteries or a National Type 686S Power Unit may be used for operation from a 6 volt storage battery. The Type 686S Power Unit draws 6.5 amperes at 6 volts when furnishing power to the Receiver. Battery drain may be decreased for headphone operation by removing the 6V6GT/G output tube from its socket. In this case, the Type 686S Power Unit draws 5.5 amperes at 6 volts.

The Schematic Diagram, Figure 8, shows a pin view of the Receiver power plug, thus providing the information necessary for wiring batteries to an auxiliary four-prong socket. The regular Receiver power plug may be inserted into this auxiliary socket to complete the power circuit. The normal B voltage required for operation of the Receiver is 240 volts at which voltage the Receiver draws 85 milliamperes. Satisfactory headphone operation will result with a B voltage as low as 180 volts. The B battery life may be increased in this instance by removing the 6V6GT/G output tube from its socket as it is not used for headphone operation. With the output tube removed from its socket, the Receiver will draw 32 milliamperes at 180 volts. With the output tube in operation the B battery drain is 60 milliamperes at 180 volts. To conserve battery power the Receiver power plug should be removed from the auxiliary battery socket when the Receiver is not being used. If greater convenience is desired, a single pole, single throw switch may be wired in series with the A+ lead to the battery to turn off the heater supply. If an A battery switch is used it is important that both the external A+ switch and Receiver B+ switch be turned OFF to conserve battery power when the Receiver is not being operated. The Receiver B+ switch will serve as a stand-by switch during transmission periods the same as for A.C. operation.

OPERATION

Controls

The MAIN TUNING dial is arranged so that the frequency to which the Receiver tunes increases as the dial reading increases. Each coil set is provided with a calibration chart showing the relationship between dial reading and frequency. An additional scale for bandspread calibration is provided on the calibration chart of coil sets which include the bandspread feature. Observation of each coil set tuning chart will show that the calibration is very nearly linear which eliminates considerable reference to the coil charts.

The R.F. GAIN control serves to adjust the amplification of the second R.F. first I.F. and second I.F. amplifier stages. Maximum sensitivity is obtained by rotating the control knob to the extreme clockwise position, or 10, on its circular scale. At this setting the S-Meter switch is closed connecting the S-Meter into the circuit. At this position (10) all tubes are operating at maximum gain with minimum bias. As the control is turned counter-clockwise, increasing bias is applied to the second R.F., the first I.F. and the second I.F. tubes, thus reducing their amplification.

The B+ ON-OFF switch is connected in the positive lead of the power supply circuit and its purpose is to shut off the Receiver during periods of transmission or WHEN CHANGING COIL SETS. This last function is important. The B+ circuits are completed when this switch is pushed to the right. Connected in parallel with the B+ switch and mounted at the rear of the chassis is a pair of contacts, marked B.S.W., intended for use with relay control of the Receiver. The B.S.W. panel is covered by a metal shield to prevent accidental contact with the terminals by the operator. Two slots are provided in this shield to bring out wires to connect to an external switch or relay. Care should be taken that these wires for external connection do not short to the B.S.W. shield.

The PHASING and SELECTIVITY controls are a part of the crystal filter. When the SELECTIVITY control is set at OFF, the crystal is switched out of the circuit. With the crystal switched out, the PHASING control has little influence on the Receiver performance. With the SELECTIVITY control knob set at any point between 1 and 5, inclusive, the crystal filter is in operation, selectivity increasing as the knob is progressively advanced to position 5. The PHASING control is then used to balance the crystal bridge circuit and eliminate interfering signals or heterodynes.

The C.W.O. switch and vernier tuning adjustments control the action of the C.W. Oscillator transformer. The C.W. Oscillator is used to produce an audible beat note when receiving C.W. signals or to locate the carrier of a weak M.C.W. station. Rotating the C.W.O. knob in a clockwise direction from OFF removes the ground from the cathode of the C.W. Oscillator, thus permitting it to oscillate. Further rotation of the knob from 0 on the scale to 10 varies the frequency of oscillation over a range of approximately 3 kilocycles. The C.W. Oscillator tunes to the Receiver intermediate frequency at 9 on the graduated scale.

The A.V.C. switch is a two-position toggle marked A.V.C.-OFF. The automatic volume control circuits are operative with the toggle switch in the A.V.C. or upper position.

The A.F. GAIN control adjusts the volume level of the signal at both phone jack and loud-speaker terminals. Clockwise rotation of this control increases the signal applied to the grid of the first audio amplifier tube.

The LIMITER control serves to switch on the limiter, and following this, to adjust the threshold at which limiting action starts. With the LIMITER control turned on (at position 0 on the dial scale) limiting action automatically takes place at a relatively high percentage modulation. Rotating the control clockwise progressively lowers the threshold, or percentage modulation, at which limiting action starts until maximum clipping is achieved at 10. This limiter is double-action in that limiting is accomplished by suppression of both positive and negative peaks.

The S-METER for indicating carrier intensity or signal strength is turned on by rotating the R.F. GAIN control to 10. At this setting the S-Meter switch on back of the control is closed connecting the S-Meter into the circuit.

The TONE control is a two-position switch serving to select the desired audio output frequency characteristic. The "Low" position attenuates the higher audio frequencies while the "High" position provides an audio output response equivalent to normal Receiver reproduction.

The BANDSPREAD switch for each of the four bandspread coil sets is located on each coil set. Inspection of the coil set terminal panels will show several small rectangular metal pieces. There are two of these metal pieces or terminal blocks on each coil which are tapped and countersunk for a flat-head machine screw. With the screws in the left-hand position, the coil range will be that shown on the top scale of the calibration chart. It is only necessary to move each of the four screws to the right-hand terminal block of each coil to change the calibration from General Coverage to bandspread as shown on the bottom scale of the calibration chart See Figure No. 6.

Phone Reception

After the HRO-7 is properly installed as outlined in Section 2, it is placed in operation by the following adjustments:

1. Set the Power Unit switch at ON.
2. Set the Receiver B+ switch at ON.

It is recommended that the operator allow approximately one minute warm-up time before the B+ switch is turned ON. This delay is necessary to permit the Voltage Regulator tube to function efficiently directly after the B+ switch is turned ON.

3. Turn the R.F. GAIN control to 10.
4. Set the A.V.C. switch at A.V.C.
5. Turn the C.W.O. control to the OFF position.
6. Turn the SELECTIVITY control to OFF.
7. Turn the PHASING control to 0.
8. Turn the LIMITER control to OFF.
9. Set the TONE control at the position giving the desired audio output tone.
10. Turn the A.F. GAIN control to the position giving the desired audio volume.

The Receiver is now adjusted for the reception of phone signals and will tune to the frequency corresponding to the plug-in coil set in use and the setting of the MAIN TUNING dial. The position of the four screws on the coil set in use, as previously mentioned in paragraph 1 of this section, will determine the frequency coverage, i.e., General Coverage or Bandspread.

The settings given above are of necessity for reception of signals of average strength. Exceptionally strong or weak signals may require modification of the above settings. Very strong signals may cause overload or distortion in the Receiver with the R.F. GAIN control at 10. In this case retarding this control slightly until the overload or distortion disappears is recommended. Audio output should be controlled entirely by means of the A.F. GAIN control. Very weak signals are best received with the R.F. GAIN control fully advanced. If the level of background noise in the Receiver proves objectionable, such as might be the case when receiving local broadcast stations, the R.F. GAIN control may be retarded to reduce the high level of noise as desired. However, when operating with the R.F. GAIN control well retarded, the full range of A.V.C. action will not be realized.

Operating the Receiver with A.V.C. off will result in an increase in sensitivity in some cases, depending on the incoming signal. With A.V.C. off, however, greater care should be taken in the setting of the A.F. and R.F. GAIN controls. Generally, the A.F. GAIN control can be advanced to some point near 10 and the R.F. GAIN control used to adjust the audio output volume. Overload, as indicated by excessive distortion, will result if the R.F. GAIN control is advanced too far.

Various types of interference which may be encountered due to adverse receiving conditions can be minimized by utilization of the following controls in the manner described:

NOISE LIMITER -- When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, the best signal-to-noise ratio will be obtained by turning ON the LIMITER control. In general, it will be found that turning the LIMITER control ON, to 0 on the dial scale, will effectively minimize interference caused by external noise pulses. In cases where the noise pulses are extremely pronounced a higher degree of noise suppression will be realized by advancing the LIMITER control to a higher dial setting.

TONE CONTROL -- An improvement in signal-to-noise ratio can be realized, when receiving weak signals through interference, by setting the TONE control at LOW.

SELECTIVITY and PHASING -- For M.C.W. reception the normal setting of the SELECTIVITY control is at one of the positions affording broad selectivity. Positions 1 and 2 are recommended. Selectivity may be progressively increased by turning the SELECTIVITY control to positions 3, 4 and 5 although too sharp selectivity for M.C.W. reception will render phone signals unintelligible due to excessive side-band cutting. The PHASING control is used to attenuate, or eliminate, if possible, interfering signals. The PHASING control is normally set at 0 on the scale for reception of M.C.W. signals. If, after tuning in a signal, an interfering signal causes a heterodyne or whistle, the PHASING control should be adjusted until the interfering signal is reduced to a minimum. The setting of the PHASING control which gives maximum attenuation of the heterodyne will depend on the pitch of the heterodyne whistle. If the beat-note is above 1,000 cycles, the optimum PHASING control setting will be zero; if the beat-note is 300 or 400 cycles, the optimum PHASING control setting will be near one end of the scale or the other, depending upon whether the interfering signal is higher or lower in frequency than the desired signal.

C.W. Reception

The initial adjustment of the Receiver controls for C.W. reception is the same as given in Section 3-2 except for the following:

1. Turn the C.W.O. control to ON.
2. Set the A.V.C. switch at OFF.

It is important that the A.V.C. switch is turned OFF for C.W. operation since the Receiver will block and become extremely insensitive if this is not done.

For the reception of C.W. signals the action of the crystal filter is similar to that for M.C.W. reception except that full use of the sharp selectivity position may be used without the loss of intelligibility experienced in M.C.W. reception. When maximum selectivity is used, (SELECTIVITY control at position 5), care must be exercised since the tuning is very critical. When the Receiver is slowly tuned across the carrier of a received signal, the beat-note produced will be very sharply peaked in output at a particular audio pitch.

This peak in response indicates the correct Receiver dial setting. The setting of the C.W.O. control must be such that the beat-note peak is well within the audible range so that the receiver peak response may be readily observed. A C.W.O. dial setting near 7 is recommended. After the Receiver has been correctly tuned, the pitch of the beat-note peak may be adjusted by means of the C.W.O. control to provide an audio tone which is pleasing to copy, or coincides with any response peaks in the speaker or headphones. Under these conditions, the Receiver will exhibit pronounced single-signal properties which may be demonstrated by tuning the Receiver to the other side of "zero-beat" so that the pitch is the same as before and observe the marked reduction in output. This dial setting is not recommended for use other than to demonstrate the single-signal properties of the Receiver. With the Receiver tuned to "crystal peak", an interfering signal may be attenuated by proper setting of the PHASING control since this control has little effect on the desired signal.

Similar to phone reception the LIMITER control can be used to great advantage in C.W. reception for the reduction of interference due to external noise pulses. For C.W. reception, however, the LIMITER control may be set at a well advanced position on the dial scale as excessive clipping of the modulation peaks will not be experienced as might be the case in phone reception.

Measurement of Signal Strength

To measure the strength or intensity of a signal, the R.F. GAIN control must be advanced to 10, the A.V.C. switch set at ON and the C.W.O. control turned OFF. The crystal filter should be turned OFF by means of the SELECTIVITY control, and the PHASING control set at 0. The LIMITER, TONE and A.F. GAIN controls do not affect the S-Meter reading.

Tuning the Receiver to a signal will cause the meter to read, indicating the signal input in S-units or in decibels above the S-9 level.

With no R.F. input to the Receiver, or with the antenna disconnected, the S-Meter should read 0, plus or minus 1 S-unit. If it does not, the S-Meter circuit requires adjustment. See Section 5.

Measurement of the signal strength of C.W. signals cannot be made with the C.W. oscillator in operation.

ALIGNMENT DATA

General

Should realignment of the HRO-7 Radio Receiver become necessary the following alignment data should be carefully studied before making any circuit adjustments. It is important that the function of each circuit element is understood so that correct alignment may be obtained quickly and accurately. Adjustments referred to by number are shown in Figures 5, 6 and 8.

The complete alignment of the Receiver may be divided into three steps:

(a) Intermediate Frequency Amplifier alignment including crystal filter adjustments.

(b) General Coverage Alignment.

(c) Bandspread Alignment.

I.F. Amplifier Alignment

The making of any adjustment indiscriminately is cautioned against and no circuit should be realigned unless tests definitely indicate that rralignment is necessary.

The Alignment of the Intermediate Frequency Amplifier may be easily checked in the following manner. The Receiver should be adjusted for normal operation with no antenna, A.V.C. OFF, R.F. GAIN at 9, Crystal Filter SELECTIVITY switch at 5, PHASING control at 0, and C.W.O. turned ON. The setting of the A.F. GAIN control does not affect the measurement and may be adjusted to provide sufficient output to make the required observations. The C.W.O. control should then be turned until a point is found where the predominant pitch of the background noise is lowest and a crystal ring is heard. This setting of the C.W.O. control should occur near 9 on the C.W.O. scale and the exact setting should be noted. The crystal filter should then be disconnected from the circuit by turning the SELECTIVITY control to the OFF position. The C.W.O. control should again be adjusted for the lowest predominant pitch of background noise and this new setting noted. If the I.F. Amplifier alignment is correct, the setting of the C.W.O. control should be the same for both tests outlined above. The I.F. Amplifier should not be realigned, however, unless the test shows appreciable misalignment.

The intermediate frequency of the HRO-7 is 456 kilocycles, plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator in the crystal filter.

Trimmer capacitors are provided on the crystal filter and on each I.F. transformer. These capacitors are numbered 17, 18 19, 20, 21, 22, 23 on Figure Nos. 5 and 6.

The high output lead of an accurately calibrated signal generator should be connected to the grid terminal of the first detector tube and the ground lead to any convenient point on the chassis. The flexible lead need not be disconnected from the grid of the tube. A dummy antenna is not used. The C.W.O. should be turned on and the modulation of the signal generator turned off to provide a steady C.W. test signal. Set the PHASING control at 0, the SELECTIVITY control at 5, and the A.F. GAIN control at maximum or fully advanced. An output meter with a 5000 ohm resistive load should be connected to the output of the Receiver. Output terminals are available at two convenient locations: the two input terminals on the output transformer mounted on the MCR and RFSH Loudspeakers or the five prong output socket, X-1, at the rear of the Receiver. If the output socket on the Receiver is used for connection of an output meter a five prong plug, wired in the same manner as the loudspeaker plug shown on the Schematic Diagram, may be used for convenience in connecting the output meter to the Receiver.

The signal generator should be tuned to approximately 456 kilocycles and its output adjusted to give a convenient reading on the output meter. Tune the signal generator to the frequency producing maximum reading on the output meter; a definite sharply peaked response will be noted. The signal generator output should be reduced now in order to avoid I.F. or audio overload and the C.W.O. should be adjusted to give an audio beat-note at some frequency between 400 and 1000 cycles per second.

The I.F. amplifier trimmer capacitors, numbers 17, 19, 20, 21 and 22, should be carefully tuned to produce a maximum reading on the output meter. The order of adjustment is not important. While tuning the I.F. amplifier trimmer capacitors it will be necessary to reduce the signal generator output if the I.F. amplifier gain increases to the overload point.

The crystal filter SELECTIVITY control should be set at 1 and the signal generator detuned between 3 and 4 kilocycles to one side of the crystal frequency, crystal filter trimmer capacitor Number 18 should be tuned for maximum output meter indication. After making this adjustment, the SELECTIVITY control should be set at off and the signal generator retuned to exact crystal frequency. Compensator trimmer capacitor Number 23 should then be tuned for maximum reading on the output meter.

After the I.F. amplifier has been aligned, the tuning of the C.W.O. should be checked. This may be readily accomplished by repeating the test previously described with the crystal filter off. If the setting of the C.W.O. control does not occur at or near 9, with this test, turn the C.W.O. control to 9 and carefully adjust trimmer Number 24 by ear for the lowest pitch of background noise.

General Coverage Alignment

The data given in this section applies to the General Coverage alignment of the H.F. oscillator and R.F. amplifier stages of coil sets A, B, C, D, E and F. The original alignment at National Laboratories is accomplished by the use of precision, crystal-controlled test oscillators. No realignment should be attempted unless a reliable test signal source is available. In the case of General Coverage H.F. oscillator alignment, a test signal source with an accuracy of 1% or better is required. For Bandspread alignment the cali-

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bration accuracy demands that the test signal source have the accuracy of precision-calibrated crystals. The entire range of test frequencies required may be obtained by the use of nine crystals operating at their fundamental and harmonic frequencies. The frequency of these crystals is as follows: 0.1, 1.0, 2.0, 3.5, 6.8, 7.0, 7.3, 14.4 and 15 megacycles.

The need for realignment of the H.F. oscillator of any band is indicated when the frequency calibration of the Receiver dial is in error by more than 2% at the high frequency end of the band in question. If it is determined that realignment is necessary, adjust the Receiver controls as follows: R.F. GAIN at 9, C.W.O. off, A.V.C. off, Selectivity off, Bandswitching screws in the General Coverage position and the A.F. GAIN set to provide a suitable audio output level.

The following Alignment Chart gives the step-by-step procedure to follow in effecting the General Coverage alignment of each coil set. It is important that the chart of adjustments is adhered to in the order shown. It should be noted that General Coverage alignment affects Bandspread alignment, but that adjustment of Bandspread alignment does not affect General Coverage.

Particular care should be taken when adjusting trimmers shown at position Number 8, the H.F. oscillator trimmers. It is imperative that the high frequency oscillator is set to operate at a frequency above the R.F. amplifier frequency and not below. This can be checked by tuning in the image of the test signal, which should appear 912 kilocycles lower on the Receiver dial. If it is found that the image does not appear at this dial setting the H.F. oscillator is incorrectly adjusted and the trimmer capacity at position Number 8 must be decreased until the image and fundamental signals appear at the proper points on the dial. After the H.F. oscillator is correctly calibrated the R.F. amplifier trimmers at position Numbers 2, 4 and 6 should be adjusted for maximum receiver gain. It may be desirable to align the R.F. amplifier trimmers at position Numbers 2, 4 and 6 using Receiver background noise as an indication of maximum gain, rather than the signal source. If this alternate method of alignment is used the point of maximum gain is that setting of the trimmers, which provides the loudest Receiver background noise. However, it is possible to align the R.F. amplifier stages to the image frequency using background noise as an indicator. A check of this possibility is to tune in the image signal -- if the image is weaker than the fundamental signal the R.F. amplifier stages are correctly aligned.

Correction of tracking errors of the R.F. amplifier stages at the low frequency limit of each coil set is accomplished by the adjustments listed on the Alignment Chart. The actual tracking of these stages may be checked by pressing the outside rotor plates of the main tuning capacitor section toward or away from the stator in a manner assuring that the rotor plates will spring back to their original position. Any change in capacity should decrease the Receiver gain if the stage is tracking properly.

The locations of the adjustments referred to in this section and on the Alignment Chart are shown on Figure Number 6.

Band-Spread Alignment

The data given in this section applies to the Bandspread Alignment of the H.F. oscillator and R.F. amplifier stages of coil sets A, B, C and D. It is important that no Bandspread adjustments are made until after completion of General Coverage alignment, as General Coverage adjustments affect Bandspread alignment.

The need for realignment of the H.F. oscillator of any band is indicated when the frequency calibration of the Receiver dial is in error by more than +20 divisions. To effect alignment the Receiver controls are adjusted the same as outlined in Section 4-3, except that the four Bandswitching screws must be in the right-hand positions.

The procedure in effecting Bandspread alignment is accomplished by adhering to the instructions given in the Bandspread Alignment Chart. The procedure is similar to that for General Coverage except for the method followed in checking tracking errors of the R.F. amplifier stages at the low frequency limit of each coil set. To secure an indication of proper tracking check the settings of trimmers at position Numbers 1, 3 and 5 for the position of maximum Receiver gain. Any change in capacity should decrease the Receiver gain indicating proper tracking. The use of trimmers 1, 3 and 5 for a tracking check may destroy their proper setting and this should be carefully checked at the high frequency limit of the coil set.

The locations of the adjustments referred to in this section and on the Alignment Chart are shown on Figure Number 6.

First R.F. Stage Alignment with Low Impedance Transmission Line

If a low impedance transmission line is to be used with the Receiver, it may be necessary to realign the first R.F. amplifier at the high end of each band. The general coverage adjustments affect the bandspread adjustments and should be performed first. The following procedure should be adhered to:

(a) General Coverage:

(1) With the four screws used for switching from General Coverage to Bandspread in the left-hand (General Coverage) position, adjust the Receiver for normal operation as follows: R.F. GAIN at 9, C.W.O. off; A.V.C. off, CRYSTAL FILTER off, A.F. GAIN set to provide a suitable signal.

(2) Connect the antenna feeders to the Receiver antenna terminals and tune the Receiver to the signal shown in step 1 on the General Coverage Alignment Chart for the coil set being aligned. Adjust trimmer at position Number 2 on Figure Number 6 for maximum signal output. If no signal can be received, the trimmer should be adjusted for maximum background noise.

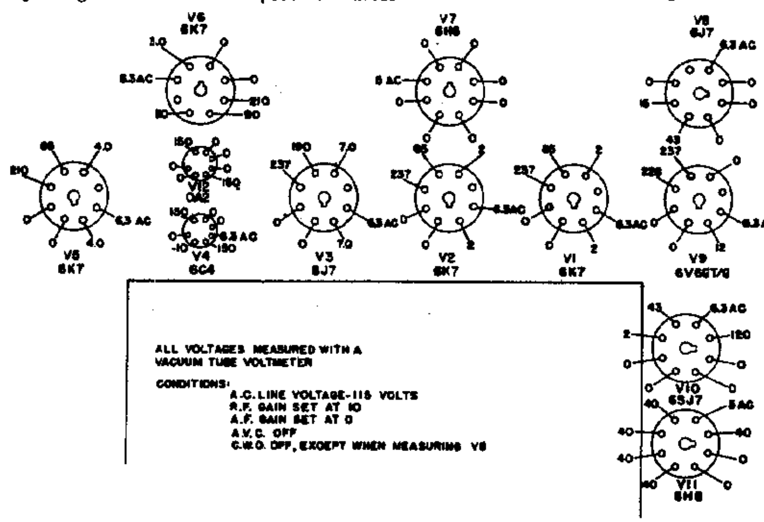
(b) Bandspread:

(1) With the Receiver adjusted the same as for general coverage, shift the four screws on the coil terminal panels to the right-hand position (bandspread position).

(2) Connect the antenna feeders to the Receiver antenna terminals and tune the Receiver to the signal shown in step 1 on the Bandspread Alignment Chart for the coil set being aligned. Adjust trimmer at position Number 1 on Figure Number 6 for maximum signal output. If no signal can be received the trimmer should be adjusted for maximum background noise.

S-Meter Adjustment

The S-Meter balancing resistor R-15, is used to obtain zero meter reading in the absence of signal input to the Receiver. The adjustment is as follows: Set the R.F. GAIN control at 10, A.V.C. ON, and disconnect the antenna. R-15 should now be adjusted until the S-Meter reads zero.



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General Coverage Alignment Chart

Step	Coil Set	Adjust Signal Source To:	Set Dial At	Adjust To Receive Test Signal	Adjust For Maximum Output
1	A	30.0 Mc.	485	Trimmer at Pos. No. 8	Trimmer at Pos. Nos. 2,4,6.
2	A	14.4 Mc.	54	Inductance at Pos. No. 16	Inductance at Pos. Nos. 9,11,13.
3	A	30.0 Mc.	485		Check step 1. Repeat steps 1 and 2 if necessary.
1	B	14.4 Mc.	485	Trimmer at Pos. No. 8	Trimmer at Pos. Nos. 2,4,6.
2	B	7.0 Mc.	28	Inductance at Pos. No. 16	Inductance at Pos. Nos. 9,11,13.
3	B	14.4 Mc.	485		Check step 1. Repeat steps 1 and 2 if necessary.
1	C	7.3 Mc.	490	Trimmer at Pos. No. 8	Trimmer at Pos. Nos. 2,4,6.
2	C	3.5 Mc.	23	Inductance at Pos. No. 16	Inductance at Pos. Nos. 9,11,13
3	C	7.3 Mc.	490		Check step 1. Repeat Steps 1 and 2 if necessary.
1	D	4.0 Mc.	490	Trimmer at Pos. No. 8	Trimmer at Pos. Nos. 2,4,6.
2	D	1.8 Mc.	36	Inductance at Pos. No. 16	Inductance at Pos. Nos. 9,11,13.
3	D	4.0 Mc.	490		Check step 1. Repeat Steps 1 and 2 if necessary.
1	E	2.0 Mc.	470	Trimmer at Pos. No. 8	Trimmer at Pos. Nos. 2,4,6.
2	E	1.0 Mc.	68	Padder at Pos. No. 7	
3	E	1.4 Mc.	245	Inductance at Pos. No. 16	
4	E	2.0 Mc.	470		Check Step 1. Repeat steps 1,2 and 3 if necessary.
1	F	0.9 Mc.	430	Trimmer at Pos. No. 8	Trimmer at Pos. Nos. 2,4,6.
2	F	0.5 Mc.	30	Padder at Pos. No. 7	
3	F	0.7 Mc.	230	Inductance at Pos. No. 16	
4	F	0.9 Mc.	430		Check Step 1. Repeat Steps 1,2 and 3 if necessary.

Bandspread Alignment Chart

NOTE: Do not effect Bandspread Alignment until after completion of General Coverage

Step	Coil Set	Adjust Signal Source To:	Set Dial At	Adjust To Receive Test Signal	Adjust For Maximum Output
1	A	30.0 Mc.	450	Trimmer at Pos. No. 7	Trimmer at Pos. Nos. 1,3,5.
2	A	27.2 Mc.	61	Padder at Pos. No. 15	Padder at Pos. Nos. 10,12,14.
3	A	30.0 Mc.	450		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.
1	B	14.4 Mc.	450	Trimmer at Pos. No. 7	Trimmer at Pos. Nos. 1,3,5.
2	B	14.0 Mc.	50	Padder at Pos. No. 15	Padder at Pos. Nos. 10,12,14.
3	B	14.4 Mc.	450		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.
1	C	7.3 Mc.	450	Trimmer at Pos. No. 7	Trimmer at Pos. Nos. 1,3,5.
2	C	7.0 Mc.	50	Padder at Pos. No. 15	Padder at Pos. Nos. 10,12,14.
3	C	7.3 Mc.	450		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.
1	D	4.0 Mc.	450	Trimmer at Pos. No. 7	Trimmer at Pos. Nos. 1,3,5.
2	D	3.5 Mc.	50	Padder at Pos. No. 15	Padder at Pos. Nos. 10,12,14.
3	D	4.0 Mc.	450		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.

Typical Operating Conditions for Power Units

The following table shows typical operating currents and voltages of the 697, 686S Power Units when used with HRO-7 Receivers:

VARIABLE	697	686S
Primary Voltage	115 or 230 VAC	6V DC
Frequency	50/60 cps	0
Heater Voltage	6.2 VAC	6V DC
Heater Current	3.3 Amp. AC	3 Amp.
B Voltage	240 VDC	165V DC
B Milliamperes	85 DC	55 DC
Line Current	.65 or .32 Amp.	6.5 Amp.
Power Consumption	74 Watts	39 Watts

Main Tuning Dial

The main tuning dial should normally give no trouble. If, however, the dial should become removed from the Receiver it should NOT be operated until mounted on the condenser shaft WITH SET-SCREWS TIGHT. This is because the dial is only designed to rotate for ten revolutions (0 to 500) and if turned farther than this the mechanism will de damaged. When mounted on the condenser, limit stops protect the dial provided the assembly is properly done. The procedure for re-mounting the dial is as follows:

(a) Place dial on condenser shaft, tighten set-screws and turn dial counter-clockwise to fully mesh condenser rotor plates so that the tips of the rotor plates are flush with the edge of the stator plates.

(b) Loosen set-screws and rotate dial slowly until dial reading has decreased to zero.

(c) Tighten the set-screws.

(d) Check position of rotor plates at zero. The tips of the rotor plates should be flush with the edge of the stator plates at zero. A slight adjustment may be necessary and this is done by loosening the set-screws, adjusting the position of the dial and tightening the set-screws again.

If it is necessary to remove the dial at any future time, turn to 250 before removing the dial, and do not disturb the setting of either the dial or condenser until reassembled. If in doubt about the correct position, inspect the springs on the back of the dial. When the dial reads 250 these springs should be straight-up-and-down, they must not be tipped to one side.

It is important that the backplate and dial do not become separated.

The backplate is held in place by two springs so that its gear teeth mesh with the dial gear teeth in correct relationship for proper dial operation. If this backplate should be sprung out of place, it may return to an incorrect position and the proper dial numbers will not appear in the windows when the dial is used. To ascertain that the two parts are in correct position, proceed as follows:

(a) Locate small window near outer periphery of dial backplate and also locate dial number window on face of dial which is 180° removed from the small backplate window.

(b) Hold dial so backplate lies flat in palm of left-hand and with right hand rotate dial knob until 250 appears in previously located dial window.

(c) If dial is properly adjusted it will be noted that the pointer at the outer edge of the small window lines up with a marked tooth on the dial itself. It will be found that the dial and backplate can be moved so that the backplate pointer will mesh between teeth at points equi-distant from marked tooth in either direction.

(d) If by checking as in paragraph (c), the dial is found not properly adjusted, it will be necessary to separate the backplate from the dial far enough to bring the two gears out of mesh and then re-mesh the two parts until the proper setting is found. A number of trials may be required before the correct mesh is found.

POWER UNITS

Type 697 Power Unit

The National Type 697 Table Model Power Unit operates from 115 or 230 volts A.C., 50 or 60 cycles, to provide 240 volts at 85 milliamperes D.C. and 6.2 volts at 3.3 amperes A.C. The circuit diagram of this unit is shown in Figure 9. Output voltages for both A and B supply are available at a four prong socket for convenient connection of the Receiver power plug. Section 6-3 shows typical operating voltages and currents when used with the HRO-7 Radio Receiver. The Type 697 Power Unit consists of a power transformer, glass Type 5Y3GT/G rectifier tube, and a single section condenser-input filter. B- is connected to the Power Unit Chassis. The Power Unit for rack mounting is designated as SPU-697.

Type 686S Power Unit

The National Type 686S Table Model Power Unit operates from a 6 volt D.C. supply to provide approximately 165 volts at 55 milliamperes D.C. Battery clips are provided for convenient connection to a 6 volt storage battery or similar source of power. Output voltages for both A and B supply are available at a four prong socket for convenient connection of the Receiver power plug. Figure 10 shows the schematic wiring diagram. Section 6-3 shows typical operating voltages and currents when used with the HRO-7 Radio Receiver. The 686S Power Unit consists of a vibrapack and a single section condenser-input filter. The vibrapack uses a 6X5 (or OZ4) type rectifier tube and a vibrator. It should be noted that B- is not connected to the Power Unit chassis; A- is connected to the chassis. The National Type SPU-686S Power Unit is the rack-mounted model.

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PARTS LIST

Sym.	Function	Type	Rating
	CAPACITORS		
C-1	Main Tuning	Air	4-section variable
C-1A	First R.F. Tuning	Air	225 mmf., max.
C-1B	Second R.F. Tuning	Air	225 mmf., max.
C-1C	First Det. Tuning	Air	225 mmf., max.
C-1D	H.F. Oscillator Tuning	Air	225 mmf., max.
C-2	First R.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-3	First R.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-4	V-1, V-2, V-4 & V-5 Screen Bypass	Paper	.1 mfd., 400 VDCW
C-5	First R.F. Plate Filter	Paper	.1 mfd., 600 VDCW
C-6	Second R.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-7	Second R.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-8	Second R.F. Plate Bypass	Paper	.1 mfd., 600 VDCW
C-9	First Detector Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-10	Crystal Filter Bridge	Ceramic	47 mmf., 500 VDCW
C-11	Crystal Filter Bridge	Ceramic	62 mmf., 500 VDCW
C-12	First I.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-13	First I.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-14	Second I.F. Grid Filter	Paper	.01 mfd., 600 VDCW
C-15	Second I.F. Cathode Bypass	Paper	.1 mfd., 400 VDCW
C-16	Second Detector Load	Ceramic	270 mmf., 500 VDCW
C-17	T-3 to A.V.C. Rectifier Coupling	Ceramic	100 mmf., 500 VDCW
C-18	V-9 to V-6 Coupling	Ceramic	3 mmf., 500 VDCW
C-19	First and Second I.F. Plate Filter	Paper	.25 mfd., 600 VDCW
C-20	H.F. Oscillator Temp. Compensating (minus .00077 mmf./mmf./°C)	Ceramic	10 mmf., 500 VDCW
C-21	H.F. Oscillator Grid Coupling	Ceramic	100 mmf., 500 VDCW
C-22	V-7 to V-3 Coupling	Paper	.01 mfd., 600 VDCW
C-23	H.F. Oscillator Plate Bypass	Paper	.1 mfd., 400 VDCW
C-24	C.W. Oscillator Grid Coupling	Mica	.001 mfd., 500 VDCW
C-25	C.W. Oscillator Tuning	Air	30 mmf.
C-26	C.W. Oscillator Screen Bypass	Paper	.01 mfd., 600 VDCW
C-27	V-6 to V-10 Coupling	Paper	.1 mfd., 400 VDCW
C-28	Limiter Plate Filter	Paper	.1 mfd., 400 VDCW
C-29	Limiter Threshold Filter	Paper	.1 mfd., 400 VDCW
C-30	V-10 to V-11 Coupling	Paper	.01 mfd., 600 VDCW
C-31	First Audio Cathode Bypass	Elec.	25 mfd., 50 VDCW
C-32	First Audio Screen Bypass	Paper	.1 mfd., 400 VDCW
C-33	First Audio Plate Filter	Paper	.1 mfd., 400 VDCW
C-34	V-11 to V-12 Coupling	Paper	.1 mfd., 400 VDCW
C-35	Tone	Mica	.003 mfd., 600 VDCW
C-36	Audio Output Grid Bypass	Ceramic	160 mmf., 500 VDCW
C-37	Audio Output Cathode Bypass	Elec.	10 mfd., 50 VDCW
C-38	Audio Output Screen Bypass	Paper	.01 mfd., 600 VDCW
C-39	First R.F. Gen. Cov. Padder A Band	Mica	1200 mmf., 500 VDCW
C-40	A Band, First R.F. Bandspread Padder	Ceramic	12 mmf., 500 VDCW
	B Band, First R.F. Bandspread Padder	Ceramic	5 mmf., 500 VDCW
	C Band, First R.F. Bandspread Padder	Ceramic	12 mmf., 500 VDCW
	D Band, First R.F. Bandspread Padder	Ceramic	25.7 mmf., 500 VDCW
C-41	A Band, Antenna Coupling	Ceramic	40 mmf., 500 VDCW
C-42	A Band, Second R.F. Bandspread Padder	Ceramic	21 mmf., 500 VDCW
	B Band, Second R.F. Bandspread Padder	Ceramic	5 mmf., 500 VDCW
	C Band, Second R.F. Bandspread Padder	Ceramic	12 mmf., 500 VDCW
	D Band, Second R.F. Bandspread Padder	Ceramic	25.7 mmf., 500 VDCW

Symbol	Function	Type	Rating
C-43	A Band, First Detector Bandspread Padder	Ceramic	21 mmf., 500 VDCW
	B Band, First Detector Bandspread Padder	Ceramic	5 mmf., 500 VDCW
	C Band, First Detector Bandspread Padder	Ceramic	12 mmf., 500 VDCW
	D Band, First Detector Bandspread Padder	Ceramic	25.7 mmf., 500 VDCW
C-44	A Band, H.F. Osc. Gen. Cov. Padder	Mica	.001 mfd., 500 VDCW
	B Band, H.F. Osc. Gen. Cov. Padder	Mica	2600 mmf., 500 VDCW
	C Band, H.F. Osc. Gen. Cov. Padder	Mica	1600 mmf., 500 VDCW
	D Band, H.F. Osc. Gen. Cov. Padder	Mica	900 mmf., 500 VDCW
	E Band, H.F. Osc. Gen. Cov. Padder	Mica	510 mmf., 500 VDCW
	F Band, H.F. Osc. Gen. Cov. Padder	Ceramic	350 mmf., 500 VDCW
C-45	A Band, H.F. Osc. Bandspread Trimmer	Ceramic	10 mmf., 500 VDCW
	B Band, H.F. Osc. Bandspread Trimmer	Ceramic	10 mmf., 500 VDCW
	C Band, H.F. Osc. Bandspread Trimmer	Ceramic	10 mmf., 500 VDCW
C-46	B Band, H.F. Osc. Gen. Cov. Trimmer	Ceramic	10 mmf., 500 VDCW
	C Band, H.F. Osc. Gen. Cov. Trimmer	Ceramic	10 mmf., 500 VDCW
C-47	C.W. Oscillator Trimmer	Ceramic	100 mmf., 500 VDCW
C-48	AVC Filter	Mica	0.01 mfd., 500 VDCW

MISCELLANEOUS

I-1	S-Meter Lamp		6-8 V., 0.15 Amp.
J-1	Phones Jack	Multi-Ckt.	
M-1	S-Meter	S Scale	0-1 M.A. D.C.
P-1	Power Cable and Plug		
S-1	Output Socket	Five-Prong	
S-2	Accessory Connector Socket	Octal	
T-1	First I.F. Transformer	Crys. Fil.	456 Kc.
T-2	Second I.F. Transformer	Air Tuned	456 Kc.
T-3	Second Detector Transformer	Air Tuned	456 Kc.
T-4	C.W. Oscillator Transformer	Air Tuned	456 Kc.
V-1	First R.F. Amplifier	6K7	
V-2	Second R.F. Amplifier	6K7	
V-3	First Detector	6J7	
V-4	First I.F. Amplifier	6K7	
V-5	Second I.F. Amplifier	6K7	
V-6	Second Detector, A.V.C.	6H6	
V-7	High Frequency Oscillator	6C4	
V-8	Voltage Regulator	OA2	
V-9	C.W. Oscillator	6J7	
V-10	Noise Limiter	6H6	
V-11	First Audio Amplifier	6SJ7	
V-12	Audio Output	6V6GT/G	
X-1	Crystal Selectivity Switch	Rotary	Two gang, 6 Position
X-2	A.V.C. Switch	Toggle	S.P.S.T.
X-3	B+Swith	Toggle	S.P.S.T.
X-4	S-Meter Switch	Part of R-22	S.P.S.T.
X-5	C.W. Oscillator Switch	Part of C-25	S.P.S.T.
X-6	Limiter Switch	Part of R-27	S.P.D.T.
X-7	Tone Switch	Toggle	S.P.S.T.
X-8	Radio-Phono Switch	Rotary	D.P.D.T.
Y-1	Crystal Resonator	Quartz	456 Kc.

MODEL HRO-7

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PARTS LIST (*Continued*)

Symbol	Function	Type	Rating
	RESISTORS		
R-1	First R.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-2	First R.F. Cathode	Fixed	330 Ohms, 1/2 W.
R-3	Second R.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-4	Second R.F. Cathode	Fixed	330 Ohms, 1/2 W.
R-5	First Detector Cathode	Fixed	4,700 Ohms, 1/2 W.
R-6	First R.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-7	V-1, V-2, V-4 & V-5 Screen Bleeder	Fixed	27,000 Ohms, 2 W.
R-8	First I.F. Cathode	Fixed	330/1,000 Ohms, 1/2 W.
R-9	Second I.F. Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-10	Second I.F. Cathode	Fixed	330 Ohms, 1/2 W.
R-11	V-6, Filament Dropping	Fixed	4.3 Ohms, 1 W.
R-12	A.V.C. Plate Load	Fixed	1,500,000 Ohms, 1/2 W.
R-13	A.V.C. Filter	Fixed	1,500,000 Ohms, 1/2 W.
R-14	V-1, V-2, V-4 & V-5 Screen Filter	Fixed	15,000 Ohms, 2 W.
R-15	S-Meter, zero adjusting	W.W. Var.	1,000 Ohms, 1 W.
R-16	S-Meter Bridge	Fixed	1,800 Ohms, 1/2 W.
R-17	S-Meter Shunt	Fixed	270 Ohms, 1/2 W.
R-18	S-Meter Bridge	Fixed	2,200 Ohms, 1/2 W.
R-19	H.F. Oscillator Grid	Fixed	22,000 Ohms, 1/2 W.
R-20	First Detector Screen	Fixed	100,000 Ohms, 1/2 W.
R-21	V-8 Dropping	Fixed	5,000 Ohms, 5 W.
R-22	R.F. Gain Control	W.W. Var.	10,000 Ohms, 1.5 W.
R-23	C.W. Oscillator Grid	Fixed	47,000 Ohms, 1/2 W.
R-24	C.W. Oscillator Plate	Fixed	220,000 Ohms, 1/2 W.
R-25	C.W. Oscillator Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-26	C.W. Oscillator Screen Bleeder	Fixed	100,000 Ohms, 1/2 W.
R-27	Limiter Threshold Control	Comp. Var.	500,000 Ohms, 1 W.
R-28	Second Detector Load	Fixed	22,000 Ohms, 1/2 W.
R-29	Second Detector Load	Fixed	470,000 Ohms, 1/2 W.
R-30	Limiter Plate	Fixed	220,000 Ohms, 1/2 W.
R-31	Limiter Threshold Filter	Fixed	220,000 Ohms, 1/2 W.
R-32	Limiter Filament Dropping	Fixed	4.3 Ohms, 1 W.
R-33	Limiter Cathode	Fixed	220,000 Ohms, 1/2 W.
R-34	Limiter Output Divider	Fixed	220,000 Ohms, 1/2 W.
R-35	Limiter Plate Load	Fixed	470,000 Ohms, 1/2 W.
R-36	Limiter Plate Filter	Fixed	820,000 Ohms, 1/2 W.
R-37	Audio Gain Control	Comp. Var.	500,000 Ohms, 1 W.
R-38	First Audio Cathode	Fixed	2,200 Ohms, 1/2 W.
R-39	First Audio Screen	Fixed	820,000 Ohms, 1/2 W.
R-40	First Audio Plate	Fixed	100,000 Ohms, 1/2 W.
R-41	First Audio Plate Filter	Fixed	47,000 Ohms, 1/2 W.
R-42	Audio Output Grid	Fixed	470,000 Ohms, 1/2 W.
R-43	Audio Output Cathode	Fixed	330 Ohms, 2 W.

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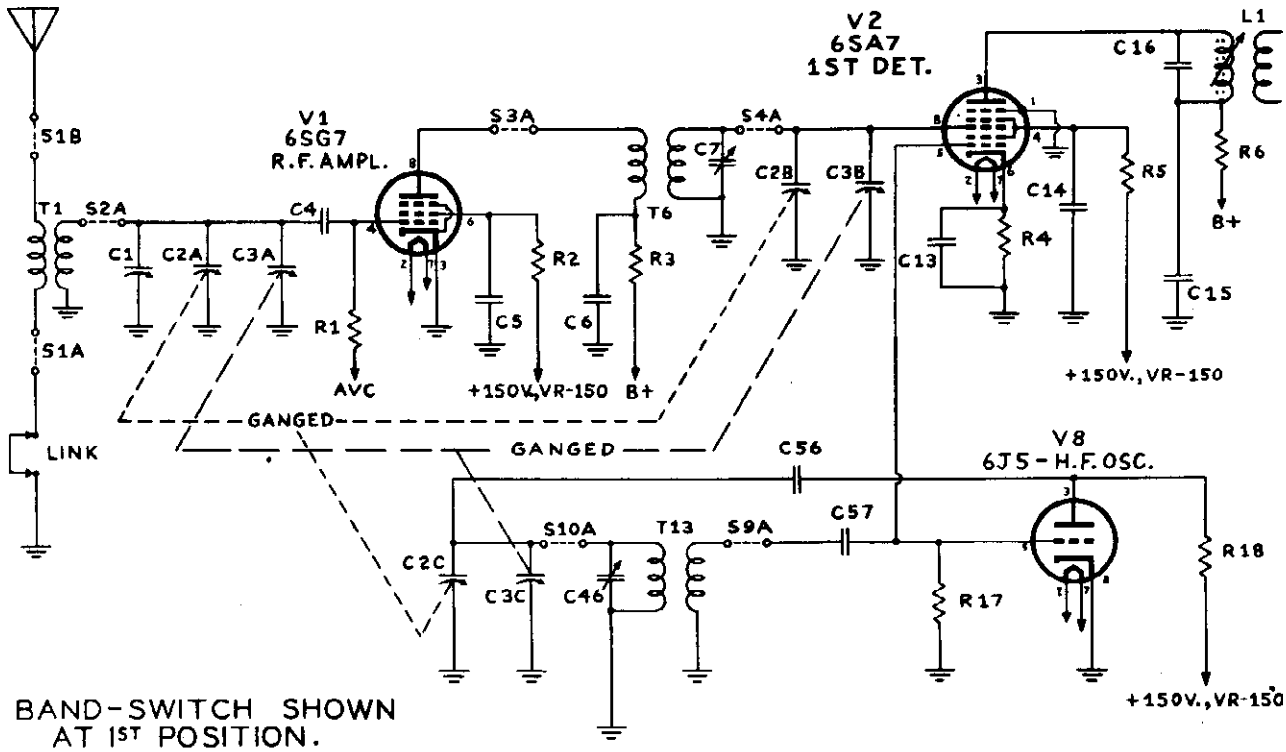
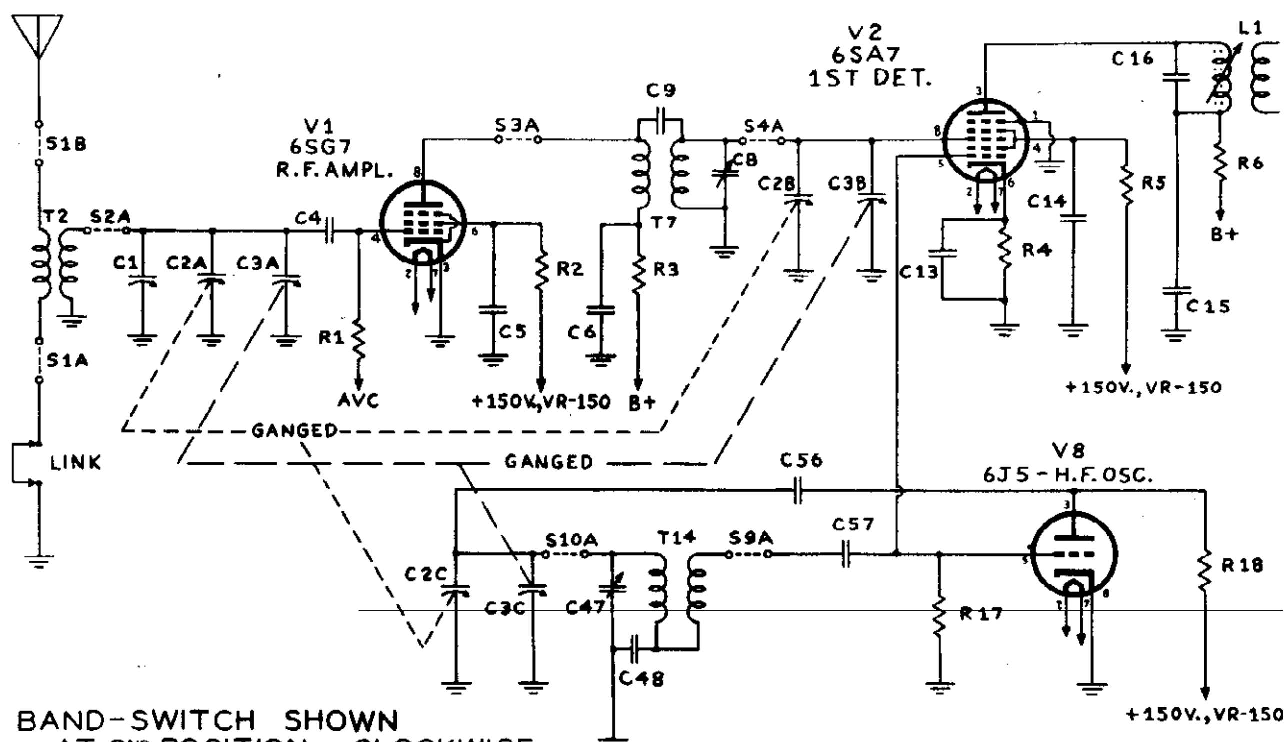
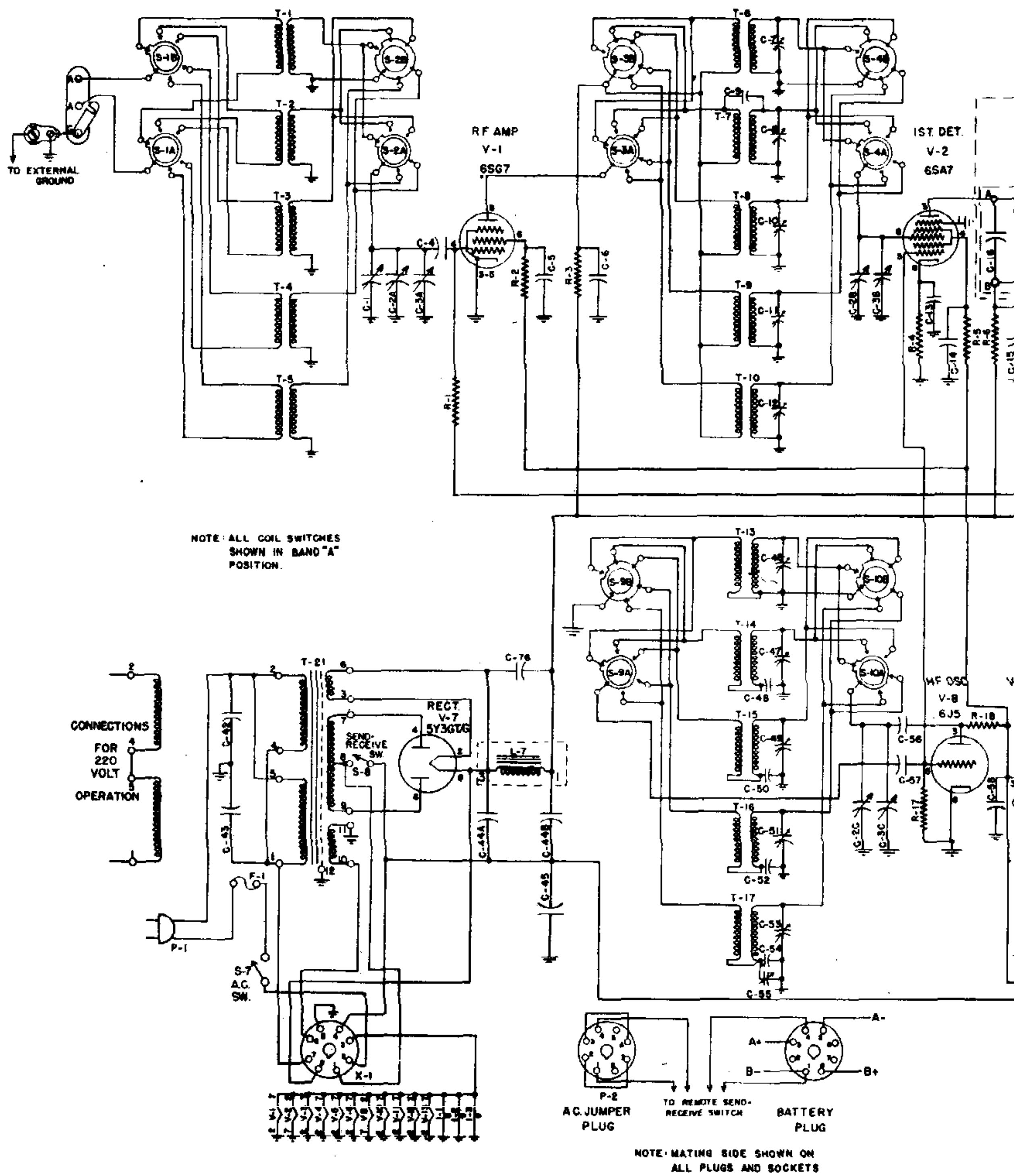


BAND-SWITCH SHOWN
AT 1ST POSITION.
BAND A
48-56 MC.

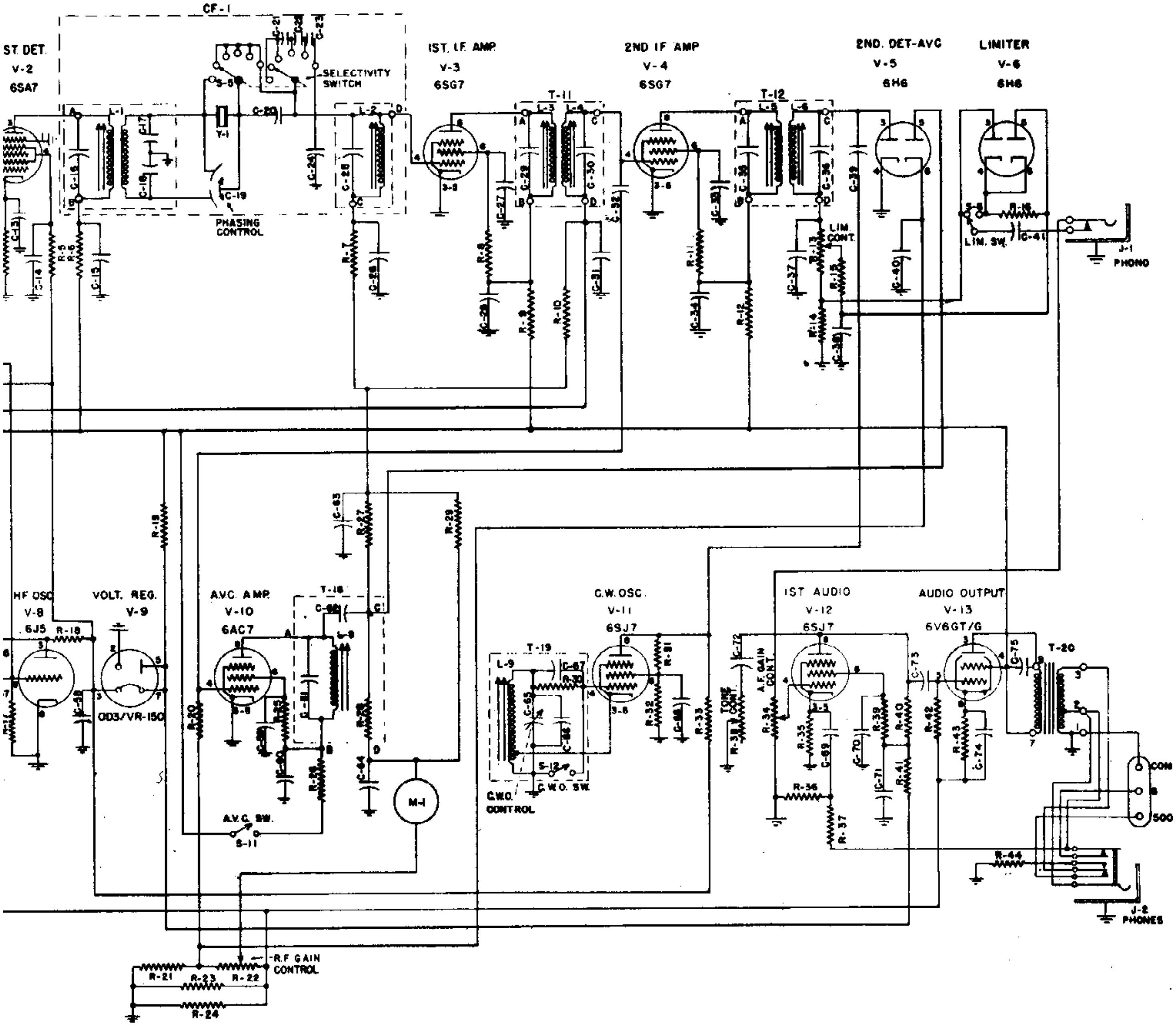


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
BAND B
12-31 MC

NATIONAL

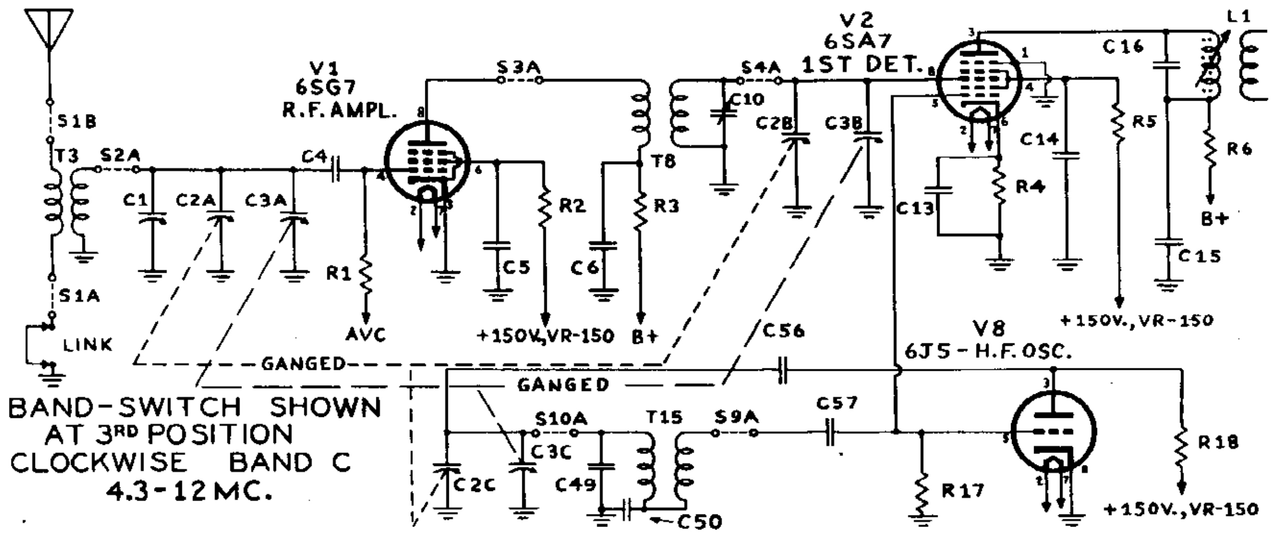


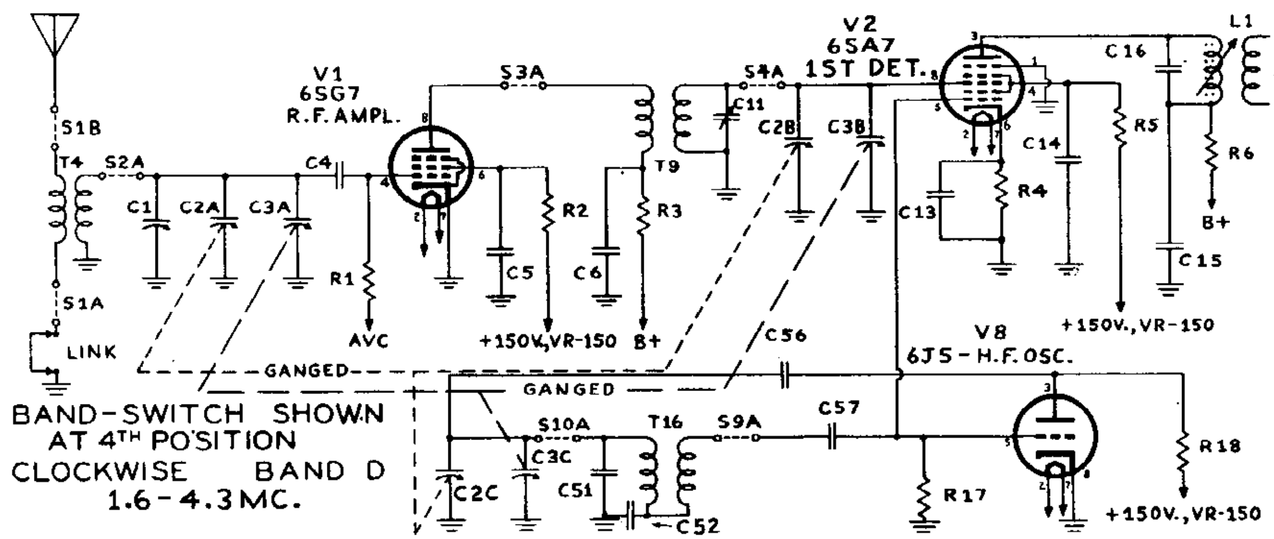
RF AMP
V-1
6SG7
IST. DET.
V-2
6SA7
TO EXTERNAL GROUND
NOTE: ALL COIL SWITCHES SHOWN IN BAND "A" POSITION.
CONNECTIONS FOR 220 VOLT OPERATION
RECT. V-7 5Y3GT/G
SEND-RECEIVE SW.
S-7 A.C. SW.
HF OSC V-8 6J5
A.C. JUMPER PLUG
TO REMOTE SEND-RECEIVE SWITCH
BATTERY PLUG
NOTE: MATING SIDE SHOWN ON ALL PLUGS AND SOCKETS

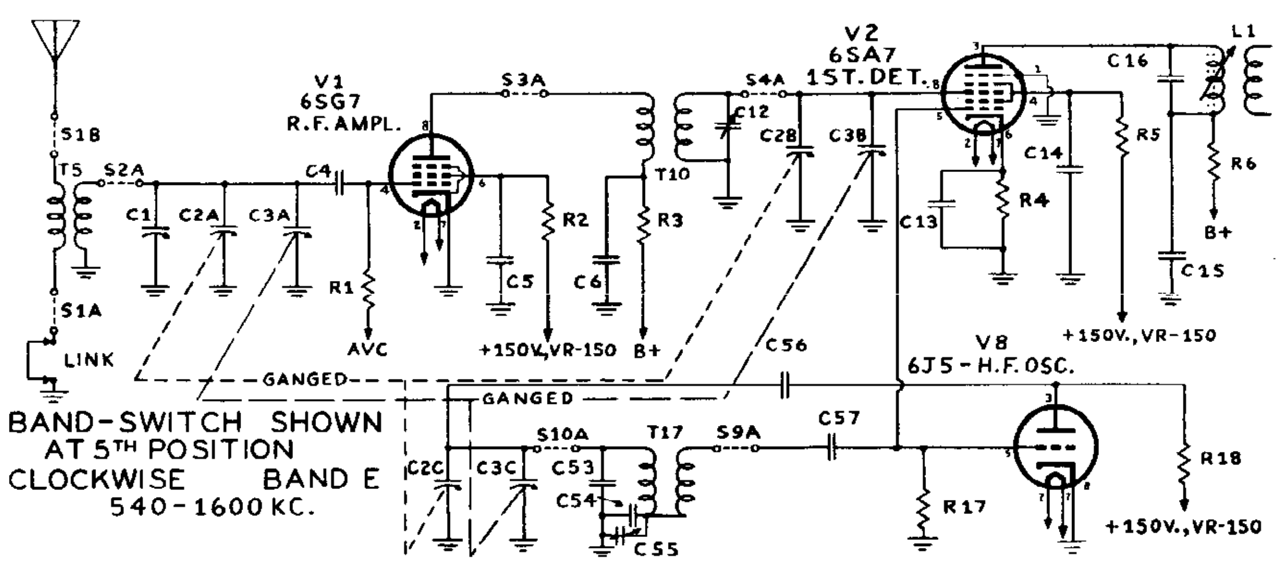


IF PEAK 455 KC

NATIONAL COMPANY, INC.







NATIONAL COMPANY, INC.

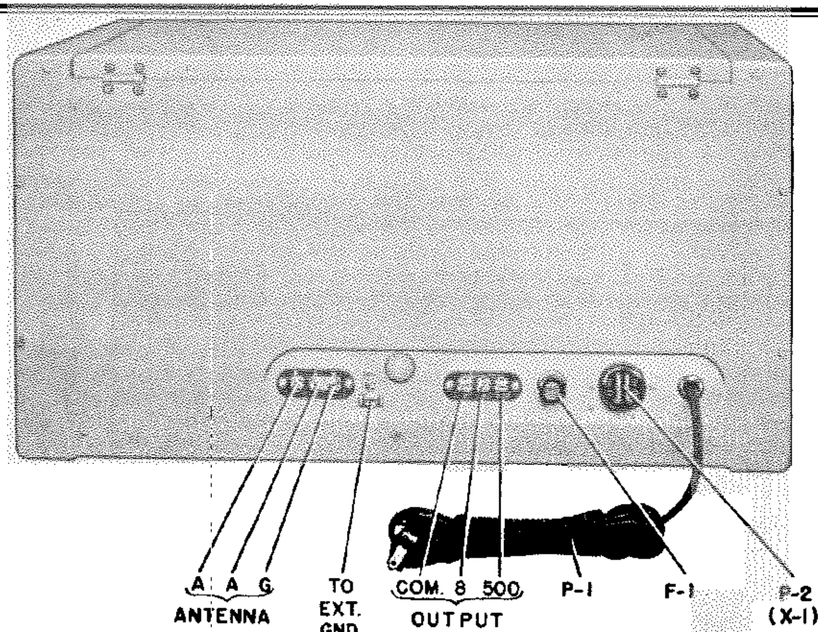


Figure No. 1. Rear View of Receiver

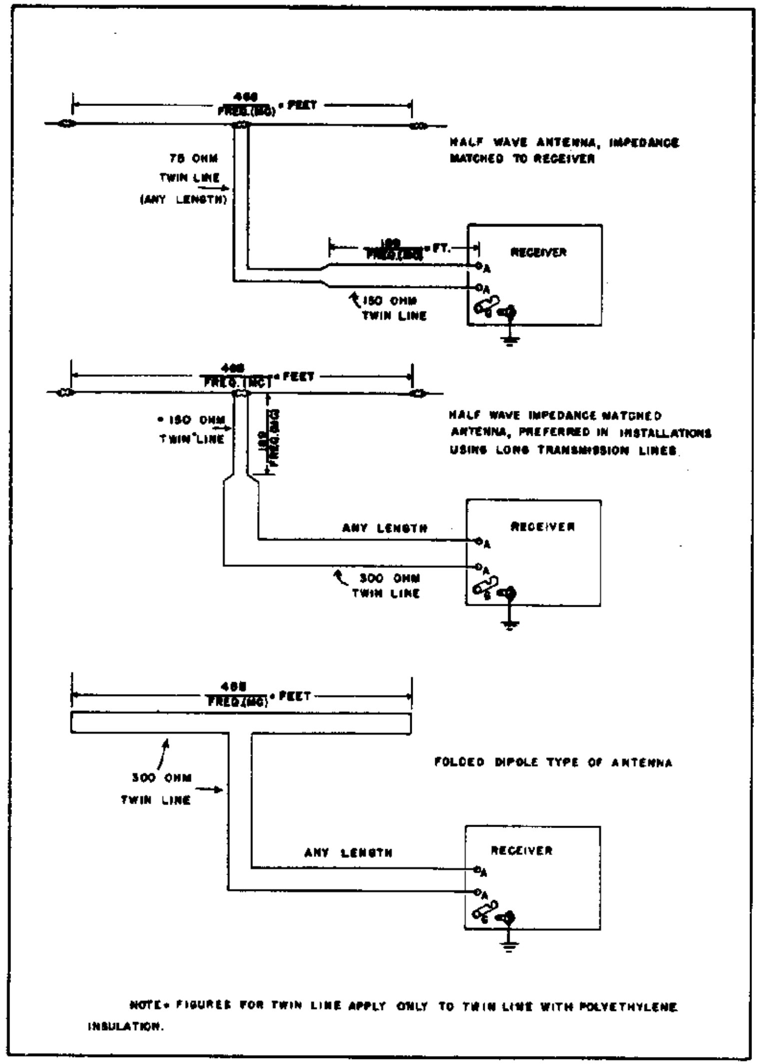
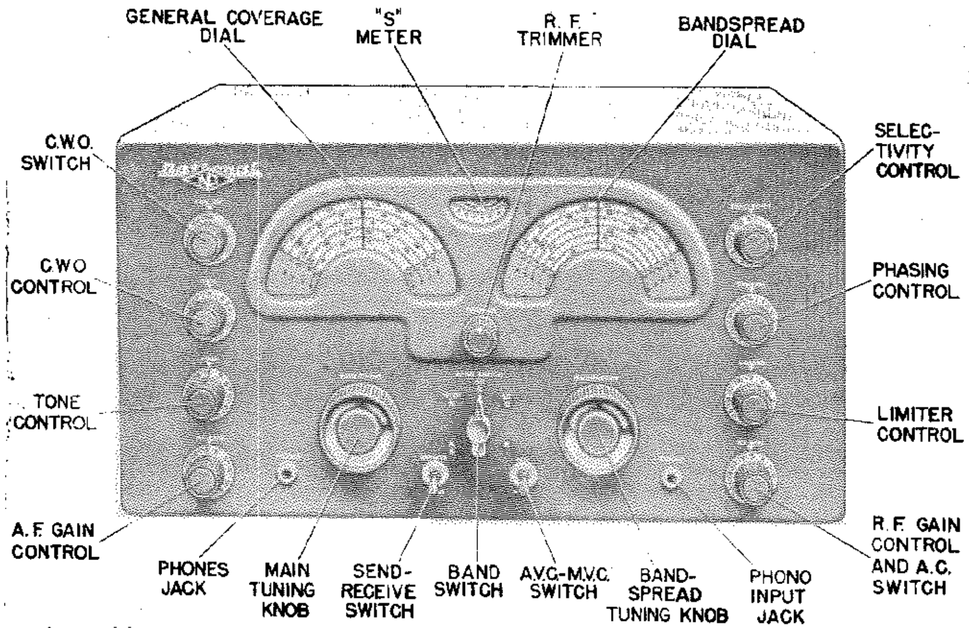


Figure No. 2. Typical Antenna Installations



NATIONAL COMPANY, INC.

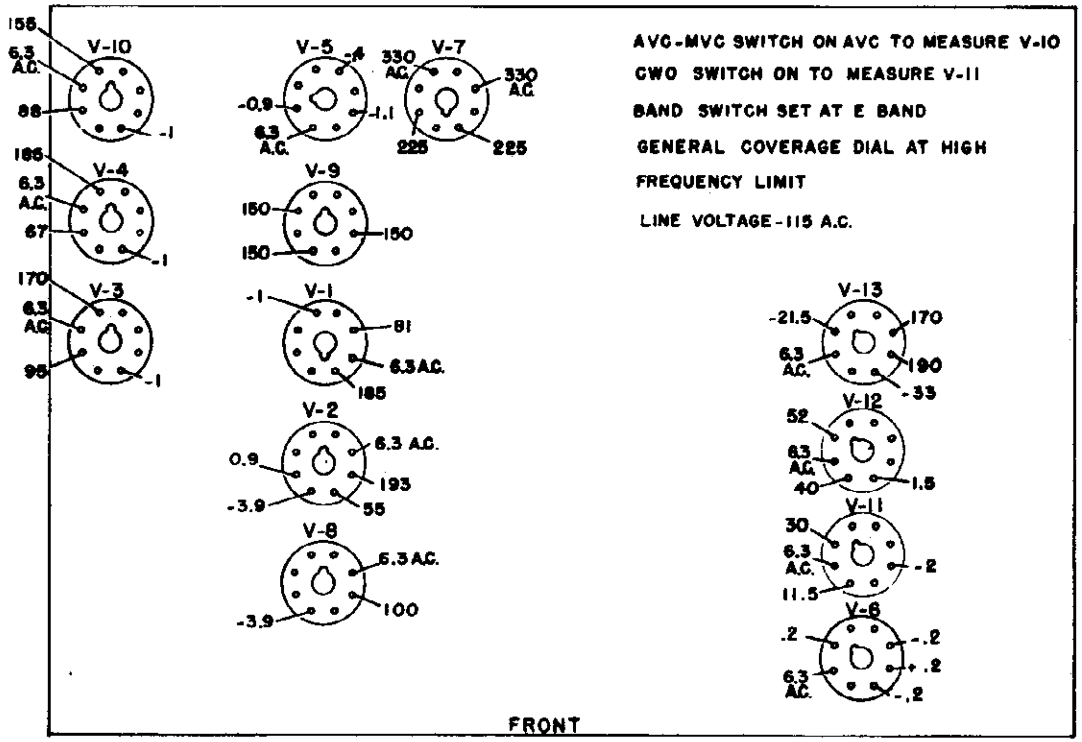


Figure No. 4. Tube Socket Voltages

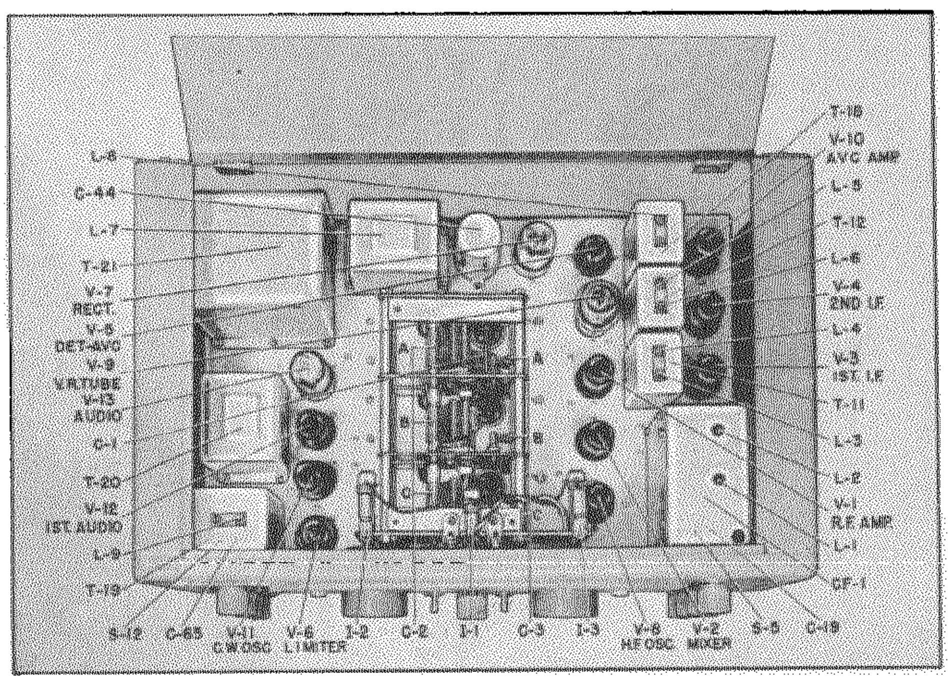


Figure No. 5. Top View of Receiver (Tuning Capacitor Cover Removed)

NATIONAL COMPANY, INC.

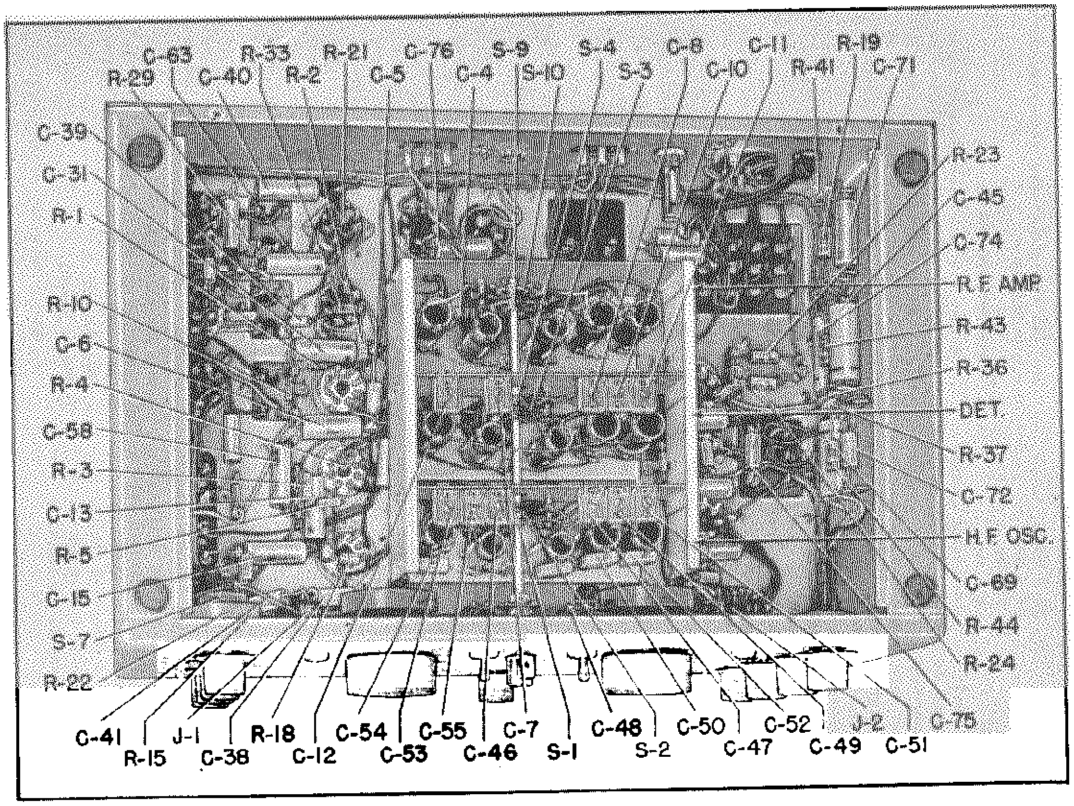


Figure No. 6. Bottom View of Receiver

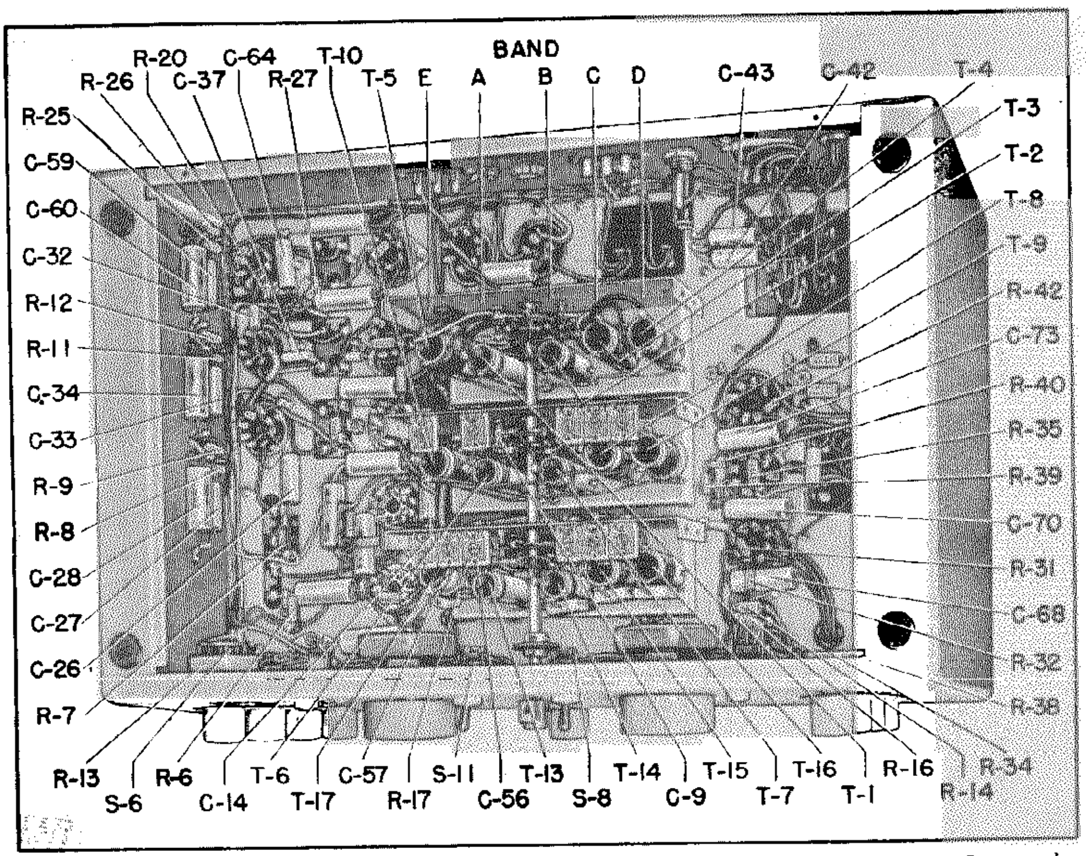


Figure No. 7. Bottom View of Receiver, Coil Compartment Side Plates Removed.

NATIONAL COMPANY, INC.

General

The new NC-173 Receiver features a wide frequency coverage which includes the conventional 540 to 31 mc. range and in addition encompasses the Amateur six meter band in its 48 to 56 mc. range. The tuning system employs separate directly-calibrated dial scales for general coverage and bandspread tuning. Calibrated bandspread tuning is provided for the main amateur bands i.e.; 6, 10-11, 20, 40 and 80. The NC-173 selectivity characteristic is adjustable over a wide range from broad band broadcast requirements to sharp amateur single signal CW reception. The adjustable selectivity plus high sensitivity assures the operator of optimum Receiver performance at all times.

The NC-173 also employs a voltage regulator tube to minimize frequency drift in the high frequency oscillator and also in the beat frequency oscillator. This assures a minimum of frequency drift for both phone and code reception.

These stabilized circuits plus a very effective new noise limiter enables the operator to cope with the most adverse receiving conditions.

Circuit

The NC-173 utilizes 13 tubes in a superheterodyne circuit, featuring such circuit refinements as an RF amplifier stage, a separate AVC amplifier, a voltage regulator for circuit stabilization and a double diode noise limiter.

The circuit employed on all bands consists of one stage of radio frequency amplification, a first detector and separate stabilized high frequency oscillator, two intermediate frequency amplifier stages, a diode type second detector, an audio limiter, a high gain audio stage and an audio output stage. The remainder of the Receiver includes automatic volume control, beat frequency oscillator, voltage regulator and rectifier circuits. The crystal filter is connected between the first detector and first IF stages.

Tube Complement

The NC-173 is supplied complete with tubes which are tested in the receiver at the time of alignment.

The tubes employed are as follows:

R.F. Amplifier	6SG7
First Detector	6SA7
H.F. Oscillator	6J5
First I.F. Amplifier	6SG7
Second I.F. Amplifier	6SG7
Second Det. - AVC Det	6H6
AVC Amplifier	6AC7
Beat Frequency Oscillator	6SJ7
Limiter	6H6
1st. Audio	6SJ7
Audio Output	6V6GT/G
Voltage Regulator	OD3/VR-150
Rectifier	5Y3GT/G

Tuning System

The main tuning capacitor C-2 and the bandspread tuning capacitor C-3 are connected in parallel on all bands. Separate knobs with associated dial scales are used to operate these two capacitors to tune the frequency range of the Receiver in five bands as follows:

BAND	GENERAL COVERAGE	BANDSPREAD
A		48 - 56 Mc.
B	12 - 31 Mc.	27 - 30 Mc.
		14.0 - 14.4Mc.
C	4.3 - 12 Mc.	7.0 - 7.3Mc.
D	1.6 - 4.3 Mc.	3.5 - 4.0Mc.
E	0.54 - 1.6 Mc.	

This tuning system requires that the bandspread dial be set at the proper point when using the general coverage dial and vice versa. The accuracy of the dial calibration will not be maintained unless these settings are properly observed. The correct setting of the *Bandspread* dial for general coverage tuning is at 180 on the linear scale. The following table lists the dial settings for bandspread tuning of the various amateur bands.

AMATEUR BAND	GEN. COV. DIAL SETTING
6	198 on Linear Scale
10-11	30.0 Mc.
20	14.4 Mc.
40	7.3 Mc.
80	4.0 Mc.

The flexibility of this tuning system should be noted. If bandspread coverage is desired on any band in the 540 kc. to 31 mc. range, the main tuning dial can be set at the high frequency end of the band to be spread and the *Bandspread* dial used for tuning. Stations may be logged and bandspread tuning calibrated by means of the 0 to 200 numerical scale on the *Bandspread* dial. In the 48 to 56 mc. range the *Bandspread* tuning dial only is used for tuning.

Band changing is accomplished by means of a highly efficient band switch.

Tuning of the first RF stage on all bands can be readily adjusted to compensate for a wide range of antenna loading conditions by means of the panel mounted antenna compensating capacitor.

Crystal Filter

Adjustable selectivity is obtained in the NC-173 by means of a crystal filter. This crystal filter is newly designed and incorporates features which make it highly flexible in its adjustments and superior in performance. The crystal filter provides uniform selectivity variation from the broad *Off* position to the sharp No. 5 position as well as phasing action for the attenuation of interfering signals. The broader selectivity positions are used during phone reception; the sharper selectivity positions are used during code reception.

Noise Limiter

A new concept in noise limiter design is introduced in the NC-173 Receiver. This new limiter could be termed "double action plus" and the noise limiting action is equally effective whether receiving phone or code signals (that is with the CW Oscillator *On* or *Off*). A threshold control on the front panel permits adjustment of the level at which limiting action starts.

Tone Control

The *Tone* control is a variable potentiometer functioning to adjust the tonal output of the audio amplifier. The control is helpful when receiving weak signals through interference.

Signal Strength Meter

A signal strength meter is associated with the AVC circuit. The S-Meter scale is calibrated in S units from 1 to 9 with approximately 4 db per S unit and in db above S-9 from 0 to 40 db. The "no signal" S-Meter reading does not require adjustment. If it is necessary to compare strong signals which cause the S-Meter to read off scale, the S-Meter sensitivity may be reduced by retarding the *RF Gain* control.

Antenna Input

Antenna input terminals are located at the rear of the receiver chassis near the center. The input circuit is suitable for use with a single wire antenna, a balanced feed line or a low impedance (70 ohm) concentric transmission line. The average input impedance is roughly 500 ohms.

Audio Output

Two audio output circuits are provided:

(1) A headphone jack is front-panel mounted and is wired so as to silence the loud-speaker on the insertion of the phone plug. The headphone load impedance is not critical allowing a wide range of headphone types to be used. Greater audio output at the headphone jack may be obtained, if desired. This is accomplished by unsoldering the headphone jack connection at terminal No. 2, the 8 ohm tap, on the audio output transformer and resoldering it to terminal No. 3, the 500 ohm tap.

(2) An output terminal strip is mounted at the rear of the Receiver having both 8 and 500 ohm terminals and a common ground terminal. The 8 ohm terminal is suitable for connection to the loud-speaker supplied with the NC-173 Receiver and the 500 ohm terminal may be used for connection to a 500 ohm line.

Power Supply

The NC-173 Receiver is designed for operation from a 110/120 volt or 220/240 volt 50/60 cycle power source. The Receiver is shipped from the factory with the power transformer wired for 110/120 volt operation only. A few simple wiring changes in the dual primary of the power transformer are necessary to adapt the NC-173 Receiver for 220/240 volt operation. These changes are made directly on the power transformer terminal panel and are as follows:

(a) Remove the jumper between terminals 1 and 4 and between 2 and 5.

(b) Connect a jumper between terminals 4 and 5.

A drawing of both possible primary circuits is shown on the Schematic Diagram.

Normal power consumption is approximately 83 volt-amps. The built-in power unit supplies all voltages required by the heater and B supply circuits - 4.1 amperes at 6.3 volts and 92 milliamperes at 225 volts, respectively. A 2 ampere fuse is connected in one side of the AC input line to protect the receiver circuits against any voltage surges in the power line or short circuits in the Receiver. This fuse is mounted in an extractor post at the rear of the receiver and is easily removed for examination or replacement.

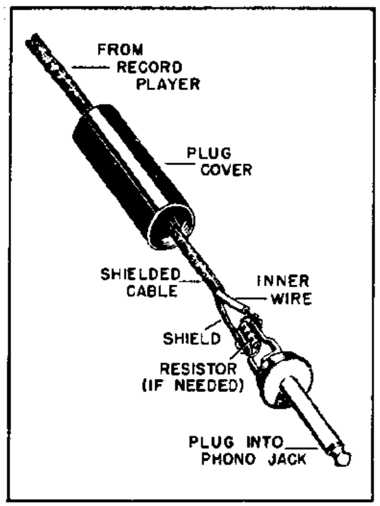
Loud Speaker

The loud-speaker supplied with the table model NC-173 is of the permanent magnet field type and is mounted in a cabinet finished to match the Receiver. The loud-speaker impedance is 8 ohms and connects to the 8 ohm Receiver output circuit.

Pick-up Jack

A pick-up jack is mounted on the front panel and can be used to connect auxiliary apparatus, such as a phonograph pick-up, to the audio system of the Receiver. This input circuit is high impedance and feeds into the high gain 6SJ7 first audio amplifier stage. The *Audio Gain* and *Tone* controls are operative with this connection.

Most record players are terminated in a single shielded wire. As the Phono input jack on the NC-173 is designed to accomodate a phone plug, it is necessary that this single shielded wire be attached to a phone plug. If the output circuit of the record player is low impedance (less than 100,000 ohms) better results will be obtained if a suitable resistor, with a value as specified for the particular record player, is connected across the phone plug to properly load the record player output circuit. The accompanying illustration shows how these connections can be made.



INSTALLATION

Arrangement

The Receiver and loud-speaker may be arranged in any desired position although it is not recommended that the loud-speaker be placed on top of the Receiver as undesirable microphonics may result.

Antenna Recommendations

The antenna input circuit of the Receiver is arranged for operation from either a single-wire antenna, a doublet antenna or other types having impedances of 70 ohms or more. The antenna terminal strip, at the rear of the Receiver, has three terminals, two are for antenna connections and the other for a ground. The ground terminal has connected to it a metal link which is used to ground one antenna lead as necessary. With balanced antenna systems, such as the doublet type, the metal link is not used. With an unbalanced system, such as the single-wire antenna, it is desirable to ground the unused antenna terminal by means of the metal link. For an unbalanced system of the concentric transmission line type, it is recommended that the outside of the concentric line be grounded directly to the ground lug below the antenna terminal strip. The external ground connection to the ground lug below the antenna terminal strip should be maintained at all times.

For best impedance matching to the antenna input circuit, an antenna with a 300 to 600 ohm transmission line is recommended. If a doublet type with a 300 to 600 ohm balanced transmission line is used the metal grounding link should not be used. For optimum results the antenna should be cut to the proper length corresponding to the desired operating frequency. See Fig. No. 1. It must be remembered that an antenna installation of this type will have maximum efficiency over a narrow band of frequencies near the frequency for which the antenna was designed and will be most useful in installations where the Receiver is tuned to one frequency or narrow band of frequencies. For other frequencies it would be desirable to connect the two transmission line leads together at one antenna post and the metal link used to ground the other post. The antenna is thus utilized as a single wire type.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single wire type. An antenna length of from 50 to 100 feet is recommended. The antenna lead-in should be connected to one antenna post and the metal link used to ground the other post.

In an installation where the Receiver is to be used as the receiving unit in a transmitting station, the most efficient operation will usually result from use of the transmitting antenna as a receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type as the same antenna gain is available for both receiving and transmitting--a very desirable condition. For switching the antenna from transmitter to receiver, an antenna change-over relay with good high-frequency insulation is recommended. A second relay for controlling the transmitter plate supply and the Receiver B+ circuit may be used to achieve single-switch control of the station. This second relay should be a double pole, single throw type having one normally open pair of contacts and one normally closed pair of contacts.

Installation Procedure

After unpacking the Receiver and Speaker procede as follows:

(1) Seat A.C. jumper plug and all tubes firmly in their sockets.

(2) Connect the loud-speaker to the 8 ohm output terminals at the rear of the Receiver.

(3) Connect a good external ground to the screw-type lug located at the rear of the Receiver below the antenna terminal strip.

(4) Connect the antenna as recommended in paragraph 2-2.

(5) Connect the power cord to a 115 volt, 50/60 cycle AC source of supply.

(6) Set controls as recommended in Section 3 for reception of signals.

NOTE

Where the Receiver is located in the field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the Receiver antenna coil. If a separate receiving antenna is used, a means for disconnecting or grounding the antenna during transmission periods should be provided.

Battery Operation

The NC-173 may be operated in portable or emergency service by connecting batteries to the terminals of the power socket located at the rear of the receiver. The AC jumper plug may be rewired for battery connection or if changeover operation is desired any octal plug or octal tube base may be used. In any of the above circumstances the battery plug used should be wired according to the drawing shown on the schematic diagram. A 6 volt heater supply (storage battery) should be connected to terminals 3 and 5 and 135 to 250 volt "B" supply connected to terminals 1 and 8. The recommended "B" voltage supply for battery economy is between 135 and 180 volts. The voltage regulator tube will not ignite with this recommended "B" supply but regulation is not required for battery operation. A suggested refinement is to include a switch in the A+ lead so that the tube heaters may be turned off when the receiver is not in use without the necessity of removing the battery plug from the battery socket. The Receiver's "B" switch may be used to silence the receiver with battery operation the same as for AC operation.

The recommendations of Section 3, Operation apply to the battery powered NC-173 Receiver.

Loud Speaker

If the installation is such that the loud-speaker will be placed close to the receiver, the most desirable position is at the side.

OPERATION

Controls

All controls are identified by front panel markings for ease of identification. The controls are located in a symmetrical manner and are arranged for ease of operation.

The five positions of the *Band Switch* are marked with identifying band letters plus the Amateur bands covered in each band corresponding to the band designations on the dial escutcheons. The *Band Switch* does not have any limit stops so that band changing may be accomplished with a minimum of *Band Switch* turning.

The *General Coverage* dial knob operates the main tuning capacitor and turns the main dial scale through a combination pinch drive and anti-backlash gear train. The main dial scale is calibrated directly in frequency for each band covered and also carries a 0-200 linear scale for auxiliary logging purposes. The main dial escutcheon is marked with the frequency band limits in megacycles and also with band letter designations which correspond to the *Band Switch* markings.

The *Bandspread* tuning dial knob operates the bandspread tuning capacitor and bandspread dial scale through a combination pinch drive and anti-backlash gear train which is similar to that used for general coverage tuning. The bandspread dial scale is marked directly in frequency for the amateur 6, 10-11, 20, 40 and 80 meter bands and also has a 0-200 linear scale for bandspread logging on other than the frequency calibrated bandspread frequencies.

The *RF Trimmer* control operates a tuning capacitor trimmer which is connected across the first RF Amplifier main tuning capacitor section. The *RF Trimmer* can be used to tune the first RF Amplifier stage properly under a wide variety of antenna loading conditions.

The *RF Gain* control adjusts the amplification of the RF and IF Amplifier stages. Clockwise rotation of the control increases Receiver gain. The *AC Power* switch is associated with the *RF Gain* control and AC power is turned *On* as the *RF Gain* control is advanced from *AC Off* to *0* on the scale.

The *AF Gain* control adjusts the amount of audio voltage applied to the first audio tube. Clockwise rotation of the control increases the Receiver audio power output. The *AF Gain* control is operative when an audio signal is applied to the *Phono* input jack.

The *Limiter* control is used both to switch the limiter into the circuit and also to adjust the threshold at which limiting action starts. The limiter is turned on as the *Limiter* control is advanced from *Off* to *0* and the threshold is lowered as the control is advanced toward 10. Any noise peak voltages in excess of this adjustable threshold are prevented from reaching the audio amplifier. The limiter circuit is of the double diode type and is equally effective for either phone or CW reception.

The *Tone* control is used to vary the frequency characteristic of the audio portion of the Receiver. Turning this control toward 10 on its scale increasingly attenuates the lower frequencies.

The *CWO Switch* and *CWO* control are used for radiotelegraph code reception. The *CWO Switch* is used to turn the CW Oscillator *On* and the *CWO* control is used to adjust the pitch of the CW note. At zero on the CWO scale, the CW Oscillator is tuned to the Receiver's intermediate frequency.

The *Phasing* and *Selectivity* controls adjust the operation of the crystal filter. Receiver selectivity is made progressively sharper as the Selectivity control is turned from *Off* toward 5 on its scale. The *Phasing* control is inoperative with the *Selectivity* control in the *Off* position. The *Phasing* control is used to attenuate interfering signals and is connected in a bridge circuit so that the bridge can be balanced to reject the undesired signal frequency.

The *Send-Receive* switch is used to quiet the Receiver during transmission periods or other times when it is desirable to be able to turn on the Receiver immediately after a period of silence (i.e. not having to wait for the tubes to warm up). The *Send-Receive* switch is connected in the B- circuit and functions when the Receiver operates from batteries as well as during normal AC operation. The *Send-Receive* switch should not be used to silence the Receiver after the completion of an operating period. The Receiver should be turned *Off* by turning the *RF Gain* control to the *AC Off* position.

External (remote) stand-by control of the Receiver may be accomplished by connecting a switch or relay to terminals 1 and 4 of the AC jumper plug as shown on the Schematic Diagram. This is a parallel arrangement thus permitting the *Send-Receive* switch to remain operative with the external switch or relay in the circuit.

The *AVC-MVC* switch is used to adjust the Receiver for either Automatic Volume Control or for Manual Volume Control operation. Automatic Volume Control can be used for either phone or code reception. The AVC time constants have been adjusted so that Receiver gain does not change appreciably during average code speed reception.

Phone Reception

After the equipment is properly installed, as outlined in Section 2, it is placed in operation by adjusting the receiver controls as follows:

1. Advance the *RF Gain* to a point between 8 and 10.
2. Set the *Send-Receive* switch at Receive.
3. Set the *AVC-MVC* switch at *AVC*.
4. Turn the *CWO* switch to *Off*.
5. Set the *Selectivity* Control at *Off*.
6. Set the *Phasing* control at *0*.
7. Set the *Limiter* control at *Off*.
8. Set the *AF Gain* control to the point providing the audio volume desired by the operator.
9. Adjust the *Tone* control to give the desired audio characteristic.

The Receiver is now adjusted for the reception of phone signals and will tune to the frequency indicated by the tuning dial and band switch settings. Set the *RF Trimmer* control for maximum S-Meter reading after the desired station has been selected, or alternately in the absence of a signal the *RF Trimmer* may be set for maximum Receiver background noise.

The tuning system in the NC-173 is arranged for ease of operation and accuracy of calibration. However, it is necessary that the proper settings of the *General Coverage* and *Bandspread* dials be observed for tuning of signals. For general coverage tuning the *Bandspread* dial must be set at 180 on its linear scale; for bandspread tuning the *General Coverage* dial must be set at the proper point corresponding to the Amateur band being tuned. The *General Coverage* dial settings for bandspread tuning of the various amateur bands are listed in Section 1. The various "set points" are marked directly on the *General Coverage* dial scale at the upper frequency limit of the amateur band being tuned and are easily located by the identifying circular markers. As stated in Section 1, tuning of the 6 meter band is accomplished by use of the *Bandspread* dial entirely. The correct setting of the *General Coverage* dial for 6 meter band operation is at the scale marker position located at approximately 198 on the linear scale.

The *Band Switch* setting determines the band of frequencies which the Receiver will tune at any one time. The dial scale in use is indicated by the identifying markers on the dial escutcheons which correspond to the markings on the *Band Switch* control.

With the *AVC-MVC* switch set in the *AVC* position, the *RF Gain* control should be advanced as far as receiving conditions permit, or until background noise becomes objectionably loud. Audio output should be adjusted entirely by means of the *AF Gain* control. The operator must remember that automatic volume control action will be restricted unless the *RF Gain* control is fully advanced.

The *AVC-MVC* switch may be set at the manual volume control position, in which case the operator must be careful not to advance the *RF Gain* control to a point where IF or audio amplifier overload occurs. Such overload is indicated by distortion. In general, the *AF Gain* control may be set at a fixed position and the *RF Gain* control used to adjust the volume of the audio output.

If a signal is weak and partially obscured by background noise and static, best signal-to-noise ratio will be obtained by turning the *Tone* control towards 0 on its scale. The most effective setting must be determined by trial as too much attenuation of the higher audio frequencies will impair the intelligibility of speech.

When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, the best signal-to-noise ratio will be obtained by advancing the *Limiter* control clockwise from the *Off* position. The best setting must be determined by trial as too much limiter action will impair the audio quality.

The selectivity of the receiver is adjusted by means of the crystal filter *Selectivity* control. The normal setting of the *Selectivity* control in phone reception is at one of the positions affording broad selectivity. Positions marked *Off*, *1* or *2* are recommended. Selectivity may be progressively increased by turning the *Selectivity* control to positions *3*, *4* or *5*. The evidences of increasing selectivity will be the attenuation of the higher frequency audio tones of the signal as well as sharper tuning. Increasing selectivity too much will attenuate these higher tones to such an extent that phone signals will become unintelligible.

The *Phasing* control is used to eliminate or attenuate interfering heterodynes. The normal setting of the *Phasing* control with the crystal filter *On* for phone reception is at *0* on the scale. If, after a signal has been tuned in, an interfering signal causes a heterodyne or whistle the *Phasing* control should be adjusted until interference is reduced to a minimum. The setting of the *Phasing* control which provides maximum attenuation of the heterodyne will depend on the pitch of the heterodyne whistle. If the beat note is above 1000 cycles, the optimum *Phasing* control setting will be near one end of the scale or the other, depending upon whether the interfering signal has a higher or lower frequency than the desired signal. The *Phasing* control is inoperative with the *Selectivity* control in the *Off* position, but the *Phasing* control is operative at all other *Selectivity* control settings.

C.W. Reception

The Receiver is placed in operation for the reception of CW signals in the same manner as that outlined for phone reception, (Section 3-2), except that the *CWO* switch should be set at *On* and the *CWO* control set at mid-scale. The CW code characters are made audible by the heterodyning action of the CW Oscillator with the incoming signal. The frequency of the CW Oscillator can be varied by rotation of the *CWO* control.

The sensitivity of the receiver should be adjusted by means of the *RF Gain* control and the audio volume by means of the *AF Gain* control. When receiving CW characters with slow keying or long pauses during keying it may be desirable to set the *AVC-MVC* switch at *MVC* so that the receiver gain does not change during keying pauses. In this case, the *AF Gain* control should be set at a fixed position and the audio volume adjusted by means of the *RF Gain* control. In either of the above cases, care should be taken not to advance the *RF Gain* to a point where IF or audio amplifier overload will occur.

The action of the *Tone* and *Limiter* controls will be similar to that described under Section 3-2. However, in CW reception it will be possible to advance these controls considerably further than is desirable in phone reception since audio distortion is relatively unimportant.

Turning the *CWO* control to either side of zero will change the characteristic pitch of the receiver background noise thus providing a means of adjusting the audio beat note to the operator's preference. The pitch will become higher as the CWO oscillator is detuned from the IF Amplifier.

A distinct advantage in the reception of weak signals through interference can be realized by the use of the "single-signal" properties of the NC-173 Receiver. The CW oscillator should be detuned until the pitch of the receiver background noise is roughly 2000 cycles. Under this condition the audio beat note of any CW code signal will show a broad peak in output at approximately 2000 cycles. This peak is easily found by rotating the tuning dial slowly through the carrier of a received signal. This peak will appear on one side of "zero beat" only and on the other side of "zero beat" the 2000 cycle note will be considerably weaker. It should be noted that depending on the frequency of the interfering signal better receiving conditions will be obtained by detuning the CWO on one side of zero than on the other. The beat setting of the CWO can only be determined by trial settings on either side of zero until optimum results are obtained.

Crystal filter operation for CW reception is similar to that described in Section 3-2 with the exception that it is possible to utilize maximum selectivity without the loss of intelligibility experienced in phone reception. When maximum selectivity is employed, i.e. *Selectivity* control at 5, tuning is very critical and care must be taken to assure proper tuning. At this setting the "single-signal" effect, previously described, is very pronounced. When tuning across the carrier of a received signal the audio beat note is very sharply peaked at a definite audio frequency. The maximum response indicates the proper dial setting. The pitch of the beat note peak may be adjusted by use of the CWO control to provide an audio tone pleasing to the operator. With the Receiver tuned to "crystal peak" an interfering signal may be attenuated by proper setting of the *Phasing* control since this control does not appreciably affect the desired signal.

Measurement of Signal Strength

The S-Meter in the NC-173 Receiver furnishes a means for the measurement of signal strength of incoming signals. To utilize the S-Meter the following control settings must be observed: *RF Gain* at 10, *AVC-MVC* at *AVC*, *Selectivity* at *Off*, and *Phasing* at 0. The *RF Trimmer* should be adjusted for maximum S-Meter reading of a particular incoming signal. The *CWO Tone*, *Limiter* and *AF Gain* control settings do not affect meter readings.

Tuning the Receiver to a signal will cause a meter deflection indicating the signal strength in S-units or in decibels above the S-9 level.

In instances where a strong signal causes the S-Meter to read off scale the S-Meter sensitivity may be reduced by retarding the *RF Gain* control until an on scale reading is obtained. Without disturbing the setting of the *RF Gain* control the comparative strength of this strong signal may be compared with other signals.

SERVICE AND TEST DATA

Tube Failures

The partial or complete failure of a vacuum tube in the Receiver may reduce the sensitivity, produce intermittent operation, or cause the equipment to be completely inoperative. If tube failure is suspected all tubes should be checked in suitable tube testing equipment, or by replacement with tubes of proven quality. Care should be taken that any tubes removed for checking purposes be returned to their original sockets thereby reducing the necessity for realignment.

Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind when replacements become necessary. The high frequency oscillator and I.F. tubes should be chosen with care to select a replacement which most nearly approaches the characteristics of the original tube. A replacement high frequency oscillator tube can be readily checked by noting any change in dial calibration, particularly in the amateur bandspread bands. Substitution of new I.F. amplifier tubes may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in detail in Section 5-2.

Circuit Failures

All components parts in the NC-173 Receiver have been carefully selected to assure an ample factor of safety yet failure may occur in individual cases. The most common failure, excluding tubes, will probably be due to a defective capacitor or resistor. Measurement of voltage in accordance with Section 4-4 will most likely indicate where failure has occurred. A bypass capacitor which has failed may cause overload of associated resistors. These resistors should be checked for any change in resistance value. An overloaded or shorted resistor will sometimes be evidenced by scorching or discoloration on the surface of the resistor. An open capacitor, often the cause of oscillation or loss of sensitivity, may be checked by temporarily connecting a good capacitor across it. Intermittently poor connections can usually be located by lightly tapping each part with a piece of insulating material.

Stage Gain Measurements

The sensitivity measurements listed below are made with the equipment set up as specified in Section 3-2 except that the *AVC-MVC* switch should be set at *MVC* and the *AF Gain* control at *10*. The signal generator should be adjusted to deliver a test signal of 455 kc. plus or minus 2 kc. either modulated or unmodulated. The high output lead should be connected through a 0.001 capacitor to the pin of the tube as specified in the following table and the ground lead connected to the receiver chassis.

With 1 watt output at the audio output terminals the test signal should be within the limits specified below. It is important that the proper output impedance matching be observed, i.e., 8 or 500 ohms depending upon which terminal is used, when making these tests.

The *Band Switch* must be set at the mid-position between the A and E bands.

TERMINAL	TEST SIGNAL
Mixer Grid	13 ± 3 Microvolts
First IF Grid	170 ± 30 Microvolts
Sec. Det. Grid	33,000 ± 6,000 Microvolts

Voltage Tabulation

All voltage measurements are made with the Receiver controls adjusted for normal operation as outlined in Section 3-2 except that the *AVC-MVC* switch should be set at *MVC* and the *AF Gain* control at *10*, except as noted on Figure No. 4. A high-impedance vacuum tube voltmeter should be used to make these measurements. Readings taken with any other type of instrument will differ greatly from those shown on Figure No. 4. All voltages are measured between specified terminal and chassis.

ALIGNMENT DATA

General

All circuits in the NC-173 Receiver are carefully aligned, before shipment, using precision crystal controlled oscillators which insure close conformability to the dial calibration. No realignment of the various adjustments will be required, therefore, unless the receiver is tampered with or damaged in transit.

The necessity for any realignment can be determined by checking the performance of the Receiver against its normal operation as outlined in Section 3. In no case should realignment be attempted unless tests indicate that such realignment is necessary. Even then, it must be remembered that the NC-173 is a communications receiver and should not be serviced or realigned by any individual who does not have a complete understanding of the functioning of the equipment and who has not had previous experience adjusting a similar type of receiver.

The RF coil groups are mounted in an aluminum compartment which is directly below the main tuning capacitor. The HF oscillator coils are nearest the front panel, the first detector coils are in the center of the compartment and the RF coil group is nearest the rear of the Receiver.

All HF oscillator and first detector coils have individual general coverage trimmer capacitors. The E band has also a general coverage variable series padding capacitor. These capacitors are identified in Figure No. 6.

The IF transformers, crystal filter, AVC amplifier and CW oscillator transformers all have individual permeability-tuned iron core inductors with screw-adjustments for alignment purposes. These adjustments are identified on Figure No. 5.

Before proceding with the alignment of any circuit of the Receiver, the equipment must be set up as specified in Section 2-3, except that the antenna lead-in must be disconnected. An output meter having an 8 or 500 ohm resistive load should be connected to the matching terminal on the Receiver's output terminal strip. If it is so desired a high impedance AC voltmeter having a resistive load of over 8 ohms may be connected to the phone output jack and used in place of the output meter. The *RF Gain* control should be set at *10* and the *Tone* control at *0*.

Alignment of the equipment may be divided into two major steps:

(1) IF and AVC Amplifier Alignment.
(2) General Coverage Alignment.
  (a) HF Oscillator.
  (b) First Detector.

The circuits *must* be tuned in the above order when complete alignment is necessary.

5-2 IF and AVC Amplifier Alignment

The intermediate frequency of the NC-173 Receiver is 455 kilocycles, plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator Y-1.

The preliminary alignment procedure is as follows:

(1) Connect the high output lead of an accurately calibrated signal generator to the stator portion of the detector section of the main tuning capacitor, C-25, and the grounded lead to any convenient grounded

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point on the chassis. This is a direct connection no dummy antenna being required.

(2) Set the *CWO* switch at *On*.

(3) Set the *AVC-MVC* switch at *MVC*.

(4) Set the *Phasing* control at *0*.

(5) Set the *Selectivity* control at 5.

(6) Set the *AF Gain* control at *10*.

(7) Turn the modulation of the signal generator off to provide a steady CW test signal.

Adjust the output attenuator of the signal generator to provide a signal of approximately 100 microvolts and vary the tuning control of the signal generator slowly between the frequencies of 453 and 457 kilocycles. At some frequency between these limits the IF amplifier of the receiver will show a very sharply peaked response, as indicated on the output meter. The absence of such a sharply peaked response will serve to indicate that the crystal resonator, Y-1, is defective. The *CWO* control must be set to provide an audible beat note at all times.

While making IF amplifier adjustments, it will be necessary to retard the attenuator of the signal generator if the readjustment increases IF amplifier gain to a point where overload occurs. Without altering the frequency setting of the signal generator set the *Selectivity* and CWO switches at *Off*, and turn the modulation of the signal generator *On*. The IF tuned inductors L-1 through L-6 should each be carefully adjusted to give a maximum reading on the output meter. The order in which these adjustments are made is not important.

To align the AVC amplifier turn the *AVC-MVC* switch to *AVC*. Adjust L-8 of transformer T-18 until a well-defined dip is observed in the output meter readings. The setting of L-8 where this dip occurs will provide maximum AVC action.

Turn the modulation of the signal generator *Off* and turn the *CWO* switch *On* and set the *CWO* control at *0* at which setting the CW oscillator should be at zero beat with the test signal. If zero beat does not occur at *0*, readjust the tuneable inductor L-9 of transformer T-19 for the correct setting.

General Coverage Alignment

The control settings used for alignment are as outlined in Section 3-2 except that the *AVC-MVC* switch should be at *MVC*. Throughout the alignment procedure outlined below it is important that the *Bandspread* dial is set at 180 on the linear scale.

(a) HF Oscillator

Alignment is effected as follows: Set the *Band Switch* at the position indicating the band to be aligned. Set the *General Coverage* tuning dial near the high frequency end of the band. Connect a signal generator to the antenna input terminals through a standard dummy antenna and accurately tune the signal generator to deliver a signal of the same frequency as that indicated by the receiver dial setting. If, when this signal is tuned in, the dial reading is too high, decrease the capacity of the HF oscillator circuit trimmer until the signal appears at the proper point on the dial. Conversely low dial readings are corrected by increasing the capacity of this trimmer to make correction. Care should be taken to insure that the HF oscillator is tuned to the fundamental frequency and not the image. This can be checked by tuning to the image frequency which should appear 910 kilocycles below the fundamental frequency and be considerably weaker. If the image does not appear at the lower dial setting the HF Oscillator trimmer capacity must be decreased until the fundamental and image frequencies appear at the proper points on the dial.

(b) First Detector

Adjust the signal generator to deliver a modulated signal near the high frequency limit of the band to be checked, tune the receiver to give maximum output, as indicated on the output meter. Adjust the first detector trimmer capacitor until the output reading shows maximum. If these trimmers require considerable realignment, it may be necessary to readjust the high frequency oscillator trimmer in order to maintain correct calibration.

An alternate method of aligning the first detector stage in the event a signal generator is not available is to set the first detector trimmer capacitors for maximum background noise. It will be found that trimmer settings under this method are sufficiently sharp to provide good alignment, although the adjustment must be made with care to avoid alignment to the image.

PARTS LIST

Symbol	*Function*	*Type*	*Rating*
	CAPACITORS		
C-1	RF Trimmer	Air	Variable
C-2	Main Tuning	Air	Variable
C-2A	RF Amp. Tuning	Air	Part of C-2
C-2B	1st Det. Tuning	Air	Part of C-2
C-2C	HF Osc. Tuning	Air	Part of C-2
C-3	Bandspread Tuning	Air	Variable
C-3A	RF Amp. Bandspread Tuning	Air	Part of C-3
C-3B	1st Det. Bandspread Tuning	Air	Part of C-3
C-3C	HF Osc. Bandspread Tuning	Air	Part of C-3
C-4	RF Amp. Grid Coupling	Mica	0.001 mfd., 300 VDCW
C-5	RF Amp. Screen Bypass	Paper	0.01 mfd., 600 VDCW
C-6	RF Amp. Plate Filter	Paper	0.05 mfd., 600 VDCW
C-7	A Band 1st Det. Trimmer	Mica	Variable
C-8	B Band 1st Det. Trimmer	Mica	Variable
C-9	B Band 1st Det. Pri. to Sec. Coupling	Ceramic	10 mmf., 500 VDCW
C-10	C Band 1st Det. Trimmer	Mica	Variable
C-11	D Band 1st Det. Trimmer	Mica	Variable
C-12	E Band 1st Det. Trimmer	Mica	Variable
C-13	Mixer Cathode Bypass	Paper	0.1 mfd., 400 VDCW
C-14	Mixer Screen Bypass	Paper	0.01 mfd., 600 VDCW
C-15	Mixer Plate Filter	Paper	0.05 mfd., 600 VDCW
C-16	Crystal Filter Input Tuning	Mica	510 mmf., 500 VDCW
C-17	Crystal Filter Bridge	Ceramic	85 mmf., 500 VDCW
C-18	Crystal Filter Bridge	Ceramic	50 mmf., 500 VDCW
C-19	Crystal Filter Phasing	Air	Variable
C-20	Crystal Filter Coupling	Ceramic	10 mmf., 500 VDCW
C-21	Selectivity Adjusting	Ceramic	25 mmf., 500 VDCW
C-22	Selectivity Adjusting	Ceramic	100 mmf., 500 VDCW
C-23	Selectivity Adjusting	Ceramic	100 mmf., 500 VDCW
C-24	Selectivity Adjusting	Ceramic	50 mmf., 500 VDCW
C-25	Crystal Filter Output Tuning	Mica	510 mmf., 500 VDCW
C-26	1st IF Grid Filter	Paper	0.01 mfd., 600 VDCW
C-27	1st IF Screen Bypass	Paper	0.01 mfd., 600 VDCW
C-28	1st IF Plate Filter	Paper	0.05 mfd., 600 VDCW
C-29	T-11 Primary Tuning	Mica	510 mmf., 500 VDCW
C-30	T-11 Secondary Tuning	Mica	510 mmf., 500 VDCW
C-31	2nd IF Grid Filter	Paper	0.1 mfd., 400 VDCW
C-32	2nd IF Grid to AVC Grid Coupling	Ceramic	47 mmf., 500 VDCW
C-33	2nd IF Screen Bypass	Paper	0.01 mfd., 600 VDCW
C-34	2nd IF Plate Filter	Paper	0.05 mfd., 600 VDCW
C-35	T-12 Primary Tuning	Mica	510 mmf., 500 VDCW
C-36	T-12 Secondary Tuning	Mica	510 mmf., 500 VDCW

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Symbol	Function	Type	Rating
	CAPACITORS (Continued)		
C-37	2nd Det. Load	Mica	270 mmf., 500 VDCW
C-38	Limiter Plate Filter	Paper	0.1 mfd., 400 VDCW
C-39	Det. Plate to BFO Plate Coupling	Ceramic	10 mmf., 500 VDCW
C-40	AVC Cathode Bypass	Paper	0.1 mfd., 400 VDCW
C-41	1st Audio Coupling	Paper	0.01 mfd., 600 VDCW
C-42	AC Line Bypass	Paper	0.01 mfd., 600 VDCW
C-43	AC Line Bypass	Paper	0.01 mfd., 600 VDCW
C-44	Power Supply Filter	Elec.	8+8 mfd., 475 VDCW
C-44A	Power Supply Filter	Elec.	Part of C-44
C-44B	Power Supply Filter	Elec.	Part of C-44
C-45	B Minus Bypass	Elec.	25 mfd., 50 VDCW
C-46	A Band HF Osc. Trimmer	Mica	Variable
C-47	B Band HF Osc. Trimmer	Mica	Variable
C-48	B Band HF Osc. Padder	Mica	0.0085 mfd., 300 VDCW
C-49	C Band HF Osc. Trimmer	Mica	Variable
C-50	C Band HF Osc. Padder	Mica	0.0042 mfd., 300 VDCW
C-51	D Band HF Osc. Trimmer	Mica	Variable
C-52	D Band HF Osc. Padder	Mica	1250 mmf., 500 VDCW
C-53	E Band HF Osc. Trimmer	Mica	Variable
C-54	E Band HF Osc. Padder	Mica	420 mmf., 500 VDCW
C-55	E Band HF Osc. Padder	Mica	Variable
C-56	HF Osc. Plate Coupling	Mica	0.001 mfd., 300 VDCW
C-57	HF Osc. Grid Coupling	Ceramic	100 mmf., 500 VDCW
C-58	B Supply Filter	Paper	0.1 mfd., 400 VDCW
C-59	AVC Amp. Screen Bypass	Paper	0.01 mfd., 600 VDCW
C-60	AVC Amp. Plate Filter	Paper	0.05 mfd., 600 VDCW
C-61	T-18 Tuning	Mica	510 mmf., 500 VDCW
C-62	AVC Amp. to AVC Coupling	Mica	0.001 mfd., 300 VDCW
C-63	AVC Bus Filter	Paper	0.1 mfd., 400 VDCW
C-64	S-Meter Bypass	Paper	0.01 mfd., 600 VDCW
C-65	T-19 Tuning	Air	Variable
C-66	CWO Tuning	Mica	270 mmf., 500 VDCW
C-67	CWO Grid Coupling	Mica	270 mmf., 500 VDCW
C-68	CWO Osc. Screen Bypass	Paper	0.1 mfd., 400 VDCW
C-69	1st Audio Cathode Bypass	Elec.	25 mfd., 50 VDCW
C-70	1st Audio Screen Bypass	Paper	0.1 mfd., 400 VDCW
C-71	1st Audio Plate Filter	Paper	0.1 mfd., 400 VDCW
C-72	Tone Adjusting	Paper	0.005 mfd., 500 VDCW
C-73	2nd Audio Grid Coupling	Paper	0.1 mfd., 400 VDCW
C-74	2nd Audio Cathode Bypass	Elec.	25 mfd., 50 VDCW
C-75	2nd Audio Tone	Paper	0.005 mfd., 500 VDCW
C-76	Power Supply Filter	Paper	0.1 mfd., 400 VDCW
	RESISTORS		
R-1	RF Amp. Grid	Fixed	100,000 Ohms, 1/2 W.
R-2	RF Amp. Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-3	RF Amp. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-4	Mixer Cathode	Fixed	220 Ohms, 1/2 W.
R-5	Mixer Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-6	Mixer Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-7	1st IF Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-8	1st IF Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-9	1st IF Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-10	2nd IF Grid Filter	Fixed	470,000 Ohms, 1/2 W.
R-11	2nd IF Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-12	2nd IF Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-13	Limiter Control	Variable	100,000 Ohms, 1 W.
R-14	Limiter Plate	Fixed	68,000 Ohms, 1/2 W.
R-15	Limiter Plate Filter	Fixed	270,000 Ohms, 1/2 W.
R-16	Limiter Load	Fixed	270,000 Ohms, 1/2 W.
R-17	HF Osc. Grid	Fixed	22,000 Ohms, 1/2 W.
R-18	HF Osc. Plate	Fixed	47,000 Ohms, 1/2 W.
R-19	VR Dropping	Fixed	2,200 Ohms, 2 W.
R-20	AVC Amp. Grid	Fixed	470,000 Ohms, 1/2 W.
R-21	Voltage Divider	Fixed	330 Ohms, 1/2 W.
R-22	RF Gain Control	Variable	10,000 Ohms, 1.5 W.
R-23	Voltage Divider	Fixed	1,800 Ohms, 2 W.
R-24	Voltage Divider	Fixed	1,800 Ohms, 2 W.
R-25	AVC Amp. Screen Filter	Fixed	33,000 Ohms, 1/2 W.
R-26	AVC Amp. Plate Filter	Fixed	2,200 Ohms, 1/2 W.
R-27	AVC Filter	Fixed	470,000 Ohms, 1/2 W.
R-28	AVC Load	Fixed	33,000 Ohms, 1/2 W.
R-29	AVC Filter	Fixed	100,000 Ohms, 1/2 W.
R-30	CW Osc. Grid Bias	Fixed	47,000 Ohms, 1/2 W.
R-31	CW Osc. Screen Filter	Fixed	100,000 Ohms, 1/2 W.
R-32	CW Osc. Screen Bleeder	Fixed	100,000 Ohms, 1/2 W.
R-33	CW Osc. Plate	Fixed	220,000 Ohms, 1/2 W.
R-34	AF Gain Control	~~Variable~~	~~500,000 Ohms, 1 W.~~
R-35	1st Audio Cathode	Fixed	2,200 Ohms, 1/2 W.
R-36	Inverse Feedback Voltage Divider	Fixed	100 Ohms, 1/2 W.
R-37	Inverse Feedback Voltage Divider	Fixed	10,000 Ohms, 1/2 W.
R-38	Tone Control	Variable	500,000 Ohms, 1 W.
R-39	1st Audio Screen Filter	Fixed	470,000 Ohms, 1/2 W.
R-40	1st Audio Plate	Fixed	100,000 Ohms, 1/2 W.

Symbol	Function	Type	Rating
	RESISTORS (Continued)		
R-41	1st Audio Plate Filter	Fixed	47,000 Ohms, 1/2 W.
R-42	2nd Audio Grid	Fixed	470,000 Ohms, 1/2 W.
R-43	2nd Audio Cathode	Fixed	270 Ohms, 2 W.
R-44	Headphone Load	Fixed	470 Ohms, 2 W.
	MISCELLANEOUS		
CF-1	Crystal Filter		455 Kc.
F-1	AC Line Fuse	Cart.	2 Amp., 250 V.
I-1	S-Meter Lamp	No. 47	0.15 Amp., 6-8 V.
I-2	Dial Lamp	No. 47	0.15 Amp., 6-8 V.
I-3	Dial Lamp	No. 47	0.15 Amp., 6-8 V.
J-1	Phono Jack		Multi-Circuit
J-2	Phones Jack		Multi-Circuit
L-1	CF-1 Input Tuning	Variable	Iron-Core Inductor
L-2	CF-1 Output Tuning	Variable	Iron-Core Inductor
L-3	T-11 Input Tuning	Variable	Iron-Core Inductor
L-4	T-11 Output Tuning	Variable	Iron-Core Inductor
L-5	T-12 Input Tuning	Variable	Iron-Core Inductor
L-6	T-12 Output Tuning	Variable	Iron-Core Inductor
L-7	Filter Choke	No. 80	17 Henries
L-8	T-18 Tuning	Variable	Iron-Core Inductor
L-9	T-19 Tuning	Variable	Iron-Core Inductor
M-1	Signal Strength Meter	S-Meter	
P-1	AC Line Plug and Cord		2 Contact
P-2	AC Jumper Plug	Octal	
S-1	RF Trans. Switch	Rotary	DP 5 Position
S-1A			Part of S-1
S-1B			Part of S-1
S-2	RF Trans. Band Switch	Rotary	DP 5 Position
S-2A			Part of S-2
S-2B			Part of S-2
S-3	1st Det. Trans. Band Switch	Rotary	DP 5 Position
S-3A			Part of S-3
S-3B			Part of S-3
S-4	1st Det. Trans. Band Switch	Rotary	DP 5 Position
S-4A			Part of S-4
S-4B			Part of S-4
S-5	Selectivity Control Switch	Rotary	DP 6 Position
S-6	Limiter Switch		S.P.D.T.
S-7	AC Line Switch		S.P.S.T.
S-8	Send - Receive Switch	Toggle	S.P.S.T.
S-9	HF Osc. Band Switch	Rotary	DP 5 Position
S-9A			Part of S-9
S-9B			Part of S-9
S-10	HF Osc. Band Switch	Rotary	DP 5 Position
S-10A			Part of S-10
S-10B			Part of S-10
S-11	AVC Switch	Toggle	S.P.S.T.
S-12	CW Osc. Switch	Rotary	S.P.D.T.
T-1	RF Amp. Trans.	A Band	
T-2	RF Amp. Trans.	B Band	
T-3	RF Amp. Trans.	C Band	
T-4	RF Amp. Trans.	D Band	
T-5	RF Amp. Trans.	E Band	
T-6	1st Det. Trans.	A Band	
T-7	1st Det. Trans.	B Band	
T-8	1st Det. Trans.	C Band	
T-9	1st Det. Trans.	D Band	
T-10	1st Det. Trans.	E Band	
T-11	2nd IF Trans.		455 Kc.
T-12	Det. Input Trans.		455 Kc.
T-13	HF Osc. Trans.	A Band	
T-14	HF Osc. Trans.	B Band	
T-15	HF Osc. Trans.	C Band	
T-16	HF Osc. Trans.	D Band	
T-17	HF Osc. Trans.	E Band	
T-18	AVC Amp. Trans.		
T-19	CW Osc. Trans.		455 Kc.
T-20	Audio Output Trans.		
T-21	Power Transformer		
V-1	RF Amplifier	6SG7	
V-2	Mixer	6SA7	
V-3	1st IF Amp.	6SG7	
V-4	2nd IF Amp.	6SG7	
V-5	2nd Det.-AVC	6H6	
V-6	Limiter	6H6	
V-7	Rectifier	5Y3GT/G	
V-8	HF Osc.	6J5	
V-9	Voltage Regulator	OD3/VR-150	
V-10	AVC Amp.	6AC7	
V-11	CW Osc.	6SJ7	
V-12	1st Audio	6SJ7	
V-13	Audio Output	6V6GT/G	
X-1	Battery Socket	Octal	
Y-1	Crystal Resonator		455 Kc.

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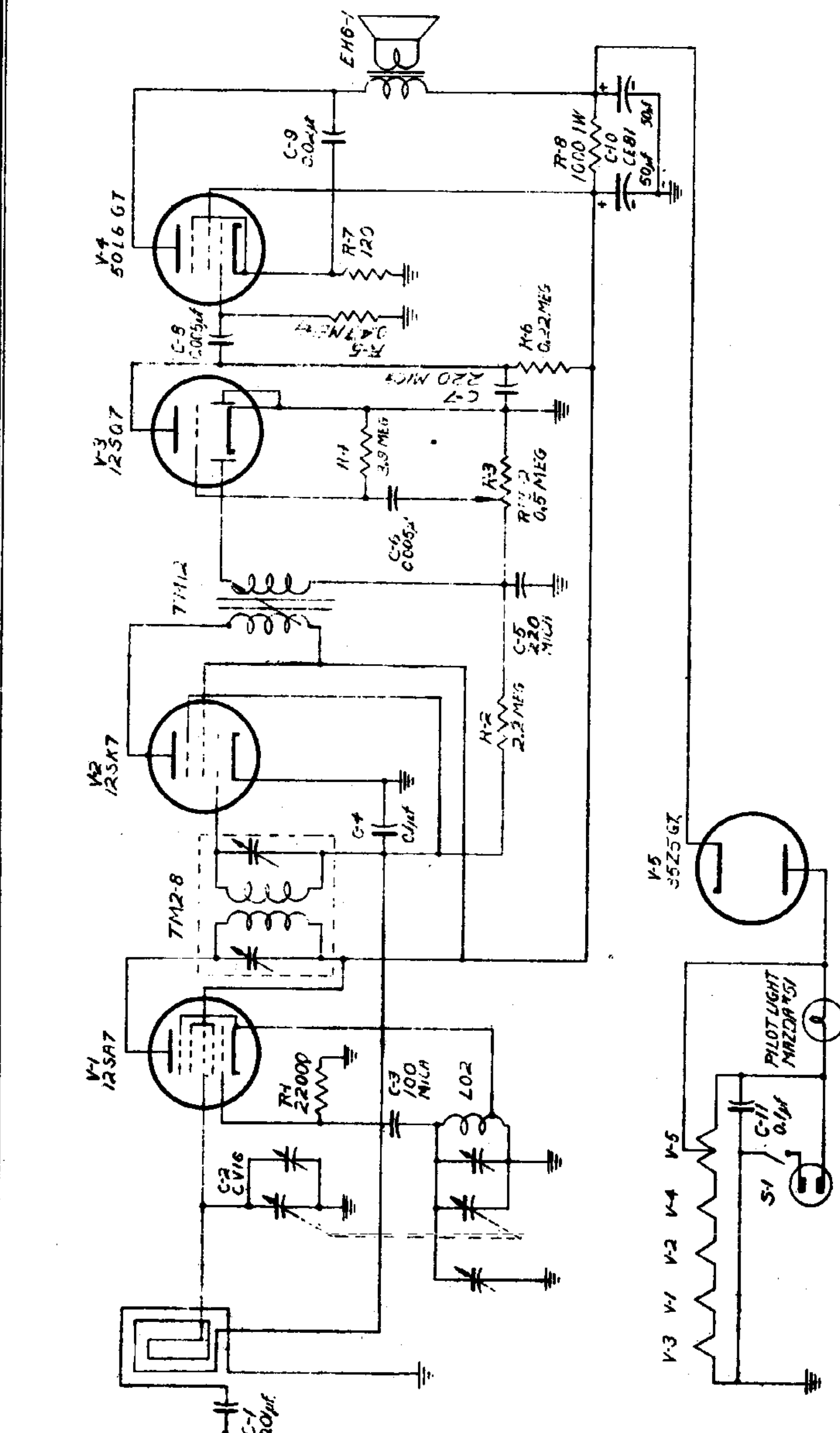
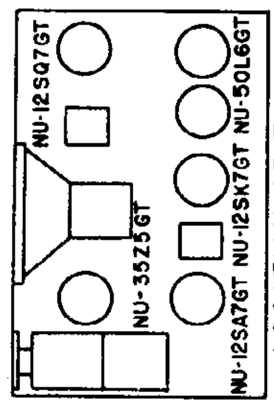


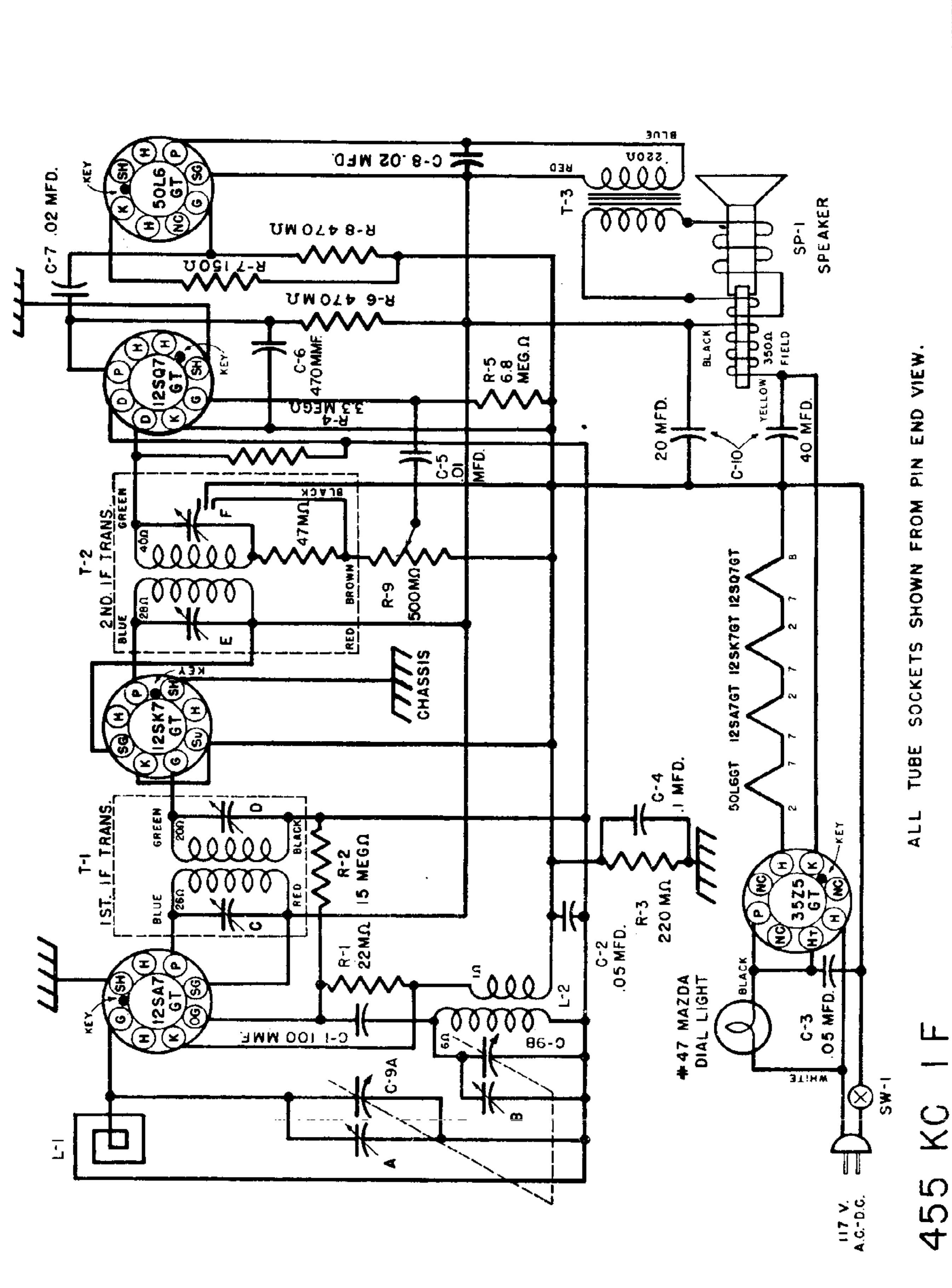
NOTES
1. RESISTORS ARE IN OHMS AND ARE 1/2 WATT CAPACITORS 400 VOLT μμf UNLESS OTHERWISE SPECIFIED
2. SWITCH S-1 MOUNTED ON REAR OF VOLUME CONTROL



LOCATION OF TUBES

MODEL 571

NATIONAL UNION RADIO CORP.



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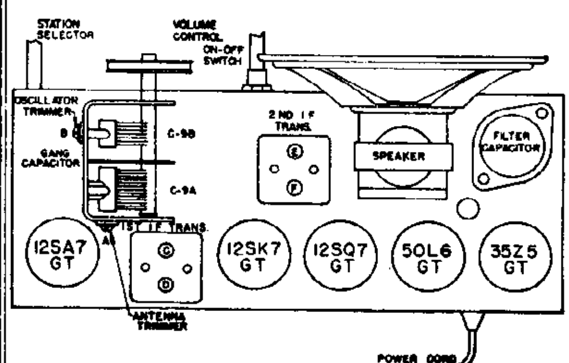
ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

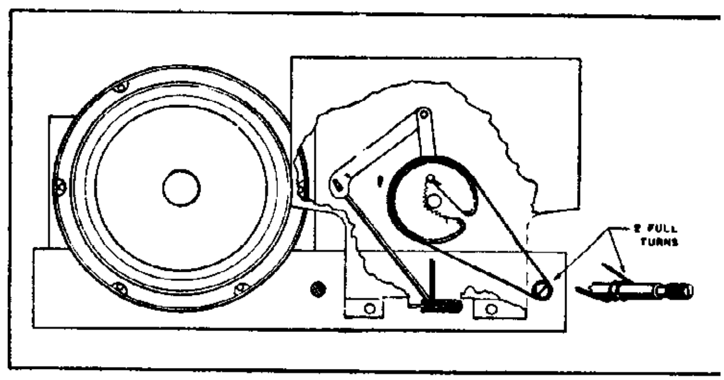
1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd., — RMA loop.

NOTE: Intermediate Frequency and Oscillator adjustment may be made with the loop disconnected provided resistor of 10,000 to 50,000 ohms is substituted t close the 12SA7GT grid circuit. The loop alignmer must be done with the loop and chassis mounted i operating position in the cabinet. A single turn loosel coupled to loop may be substituted for RMA loop

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARI
IF 455 kc.	12SA7GT grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to m
1620 kc.	Through loop	RMA loop	HF end	Osc. trimmer B	Set limit band
1400 kc.	Through loop	RMA loop	1400 kc.	Ant. trimmer A	Tune to m



Tube Layout



Dial Mechanism

TUBE COMPLEMENT

1—12SA7GT Oscillator and Mixer tube
1—12SK7GT IF Amplifier tube
1—50L6GT Power Output tube
1—35Z5GT Rectifier tube
1—12SQ7GT Second Detector and First Audio tube

NOTE: The above glass tubes are interchangeable with their metal equivalent.

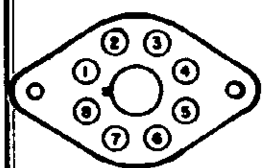
Electrical and Mechanical Specifications

Frequency Range .... 540-1600 kc.
Intermediate Frequency .... 455 kc.
Power Supply .... 105-125 volts AC-DC
Loudspeaker .... Dynamic
V.C. Impedence .... 3.5 ohms at 400 cycles
Power Output (Undistorted) ... .75 watts
Power Output (Maximum) .... 1.5 watts
Tuning Drive Ratio .... 3 to 1

MODEL 571 NATIONAL UNION RADIO CORP.

SOCKET VOLTAGES

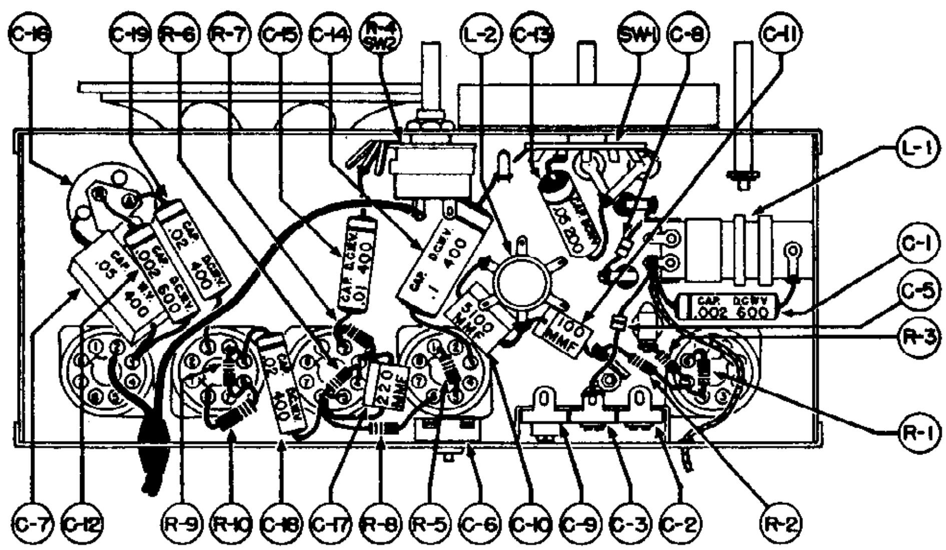
TUBE	POSITION	1	2	3	4	5	6	7	8
12SA7GT	Oscillator and Mixer	0	37.5 AC	99	99	-4.2	0	24.5 AC	0
12SK7GT	IF Amplifier	0	24.5 AC	0	0	0	99	12.5 AC	99
12SQ7GT	2nd Det.—1st Audio	0	0	0	0	0	16	12.5 AC	0
50L6GT	Power Output	0	85 AC	91.5	99	0	0	37.5 AC	5.9
35Z5GT	Rectifier	0	117 AC	112 AC	0	112 AC	0	85 AC	112



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All voltages are positive DC unless otherwise marked.

Volume control full on. No signal.

Line Voltage 117 volts AC.



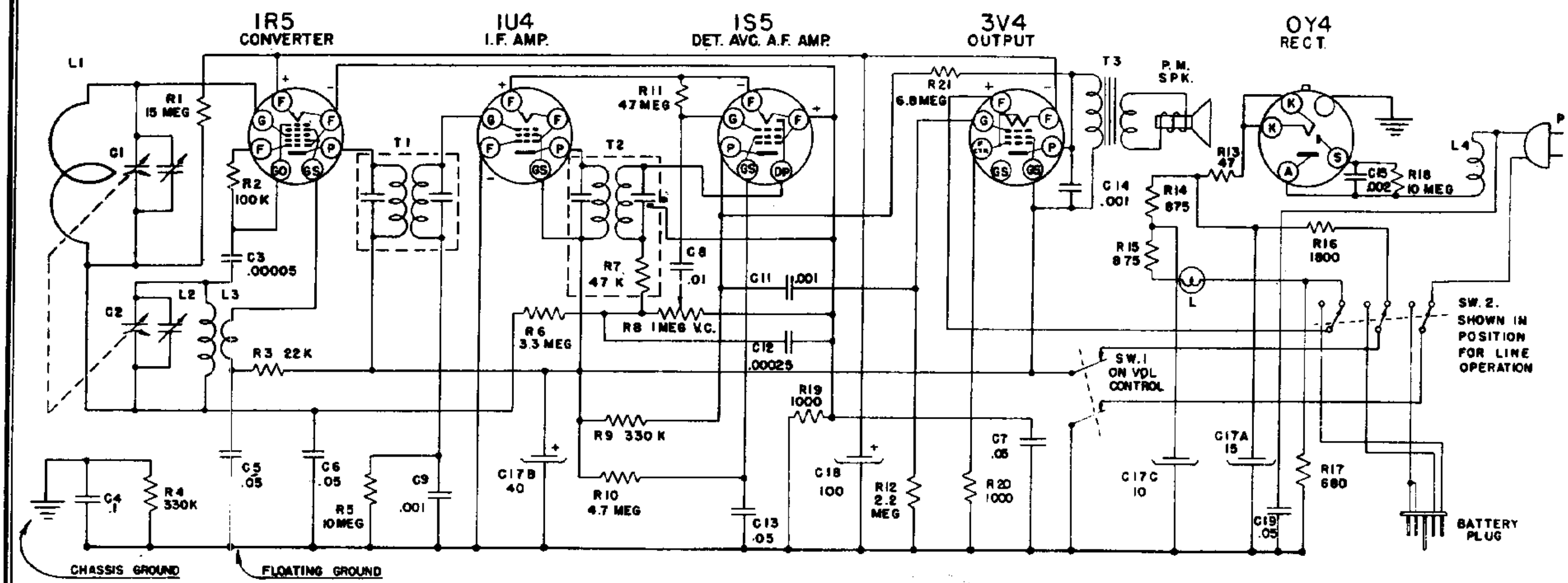
Parts Layout
Chassis Model 568

SERVICE PARTS LIST

Symbol	Part No.	Description
C-7	BC31B503	Cap., Molded Paper, .05 mfd.
C-13	BD210503	Cap., Paper, .05 mfd., 200 v.
C-15	BD410103	Cap., Paper, .01 mfd., 400 v.
C-14	BD410104	Cap., Paper, .1 mfd., 400 v.
C-18, 19	BD410203	Cap., Paper, .02 mfd., 400 v.
C-1, 12	BD610202	Cap., Paper, .002 mfd., 600 v.
C-10	BM58D512	Cap., Mica, 5100 mmf.
C-11	BM78A101	Cap., Mica, 100 mmf.
C-17	BM78A221	Cap., Mica, 220 mmf.
R-10	BR16C151	Resistor, 150 ohm, ½ w.
R-2	BR17B151	Resistor, 150 ohm, ⅓ w.
R-3	BR17B156	Resistor, 15 meg., ⅓ w.
R-1	BR17B223	Resistor, 22,000 ohm, ⅓ w.
R-5	BR17B224	Resistor, 220,000 ohm, ⅓ w.
R-6	BR17B335	Resistor, 3.3 meg., ⅓ w.
R-8, 9	BR17B474	Resistor, 470,000 ohm, ⅓ w.
R-7	BR17B685	Resistor, 6.8 meg., ⅓ w..
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot, No. 47, Mazda, 6.3 v.
C-16	A-8948	Cap., Electrolytic, 40-20 mfd.
R-4	B-9051-5	Control, Vol & Sw. 500,000 ohm
T-1	B-51010-1	Transformer Assembly, 1st IF
T-2	B-51011-1	Transformer Assembly, 2nd IF
	C-51014	Speaker, 5-inch Dynamic
	A-51160-1	Cord, Power, 6 ft.
	A-51163	Clip, Spring
C-6	B-51428-5	Capacitor, Padder
	B-51591	Spring, Dial Bracket
SW-1	B-51764-1	Switch, Band
	A-51787	Spring, Cable, Music Wire
L-1	B-51828	Coil Assembly, BC & SW Ant.
C-2, 3, 9	A-51834	Capacitor, Trimmer, 3-section
L-2	B-51836	Coil Assembly, Osc.
C-4	C-51837-1	Capacitor, Variable
C-8	B-51839-2	Capacitor, 1 mmf.
C-5	B-51839-4	Capacitor, 2.2 mmf.
	A-51869	Antenna Reel Assembly

Order parts not listed by specifying (1) Part Name and (2) Model Number (include number following dash)

NOBLITT-SPARKS INDUSTRIES, INC.



FREQUENCY RANGE
- Broadcast .... 540-1600 kc
- IF .... 455 kc

TUBES & FUNCTIONS
- 1R5 .... Mixer-oscillator
- 1U4 .... IF Amp.
- 1S5 .... DET-AVC-AF. AMP
- 3V4 .... Output
- OY4 .... Rectifier

POWER SUPPLY
- 105-125 Volts, AC-DC, 16 Watts (or)
- *90V.B, 7.5V. A, Battery Pack

POWER OUTPUT
- Undistorted .... .18 Watts
- Maximum .... .27 Watts
- Plate load .... 10,000 Ohms

LOUD SPEAKER
- Type: Permanent magnet
- Size: 5 inch
- Voice coil impedance .... 3.2 ohms

CHASSIS FEATURES
- Automatic Volume Control
- Built-in Loop
- Underwriters Listed

OPERATING CONTROLS
1. Left knob .... ON-OFF Sw. & Volume
2. Right knob .... Tuning

PHYSICAL DIMENSIONS
- Length .... 12¼ inches
- Height .... 10½ inches
- Depth .... 5½ inches

NOBLITT-SPARKS INDUSTRIES, INC.

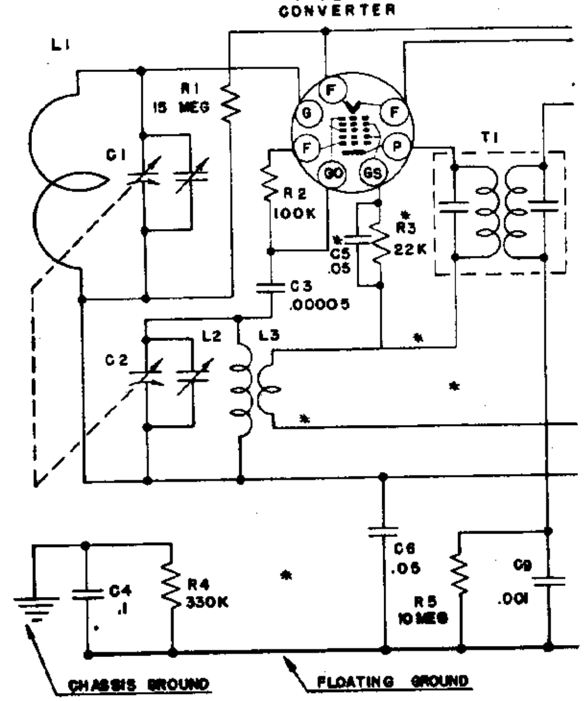
PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
R1	C20060-156	Resistor, 15 megohm ¼ W
R2	C20060-104	Resistor, 100,000 ohms ¼ W
R3	C20060-223	Resistor, 22,000 ohm ¼W
R4, R9	C20060-334	Resistor, 330,000 ohms ¼ W
R5, R18	C20060-106	Resistor, 10 megohm ¼ W
R6	C20060-335	Resistor, 3.3 megohm ¼ W
R7	C20060-473	Resistor, 47,000 ohms ¼ W
R8	C21050	Volume Control and Switch 1 M
R10, R11	C20060-475	Resistor, 4.7 megohm ¼ W
R12	C20060-225	Resistor, 2.2 megohm ¼ W
R13	C20070-470	Resistor, 47 ohm 1 W
R14, R15,	A21348	Resistor, 1750 ohm 10W, tpd 875
R16	C20070-182	Resistor, 1800 ohm 1 W
R17	C20060-681	Resistor, 680 ohm ¼ W
R19, R20	C20060-102	Resistor, 1000 ohm ¼ W
R21	C20060-685	Resistor, 6.8 megohm ¼ W
C1, C2	C19822	Variable Cond.-2 gang. Include 1 A20077-3 grommet and 1 spacer eyelet.
	or	
	C21153	Variable Cond.-2 gang. Include 2-A 19328-2 grommet.
C3	C20065-500	Cond., .00005 uf 500V Mica
C4	C20068-104	Cond., .1 uf 400 VPT.
C5,6,7,13	C20068-503	Cond., .05 uf 400 VPT.
C8	C20068-103	Cond., .01 uf 400 VPT.
C9,11,14	C20065-102	Cond., .001 uf 500V Mica
C12	C20065-251	Cond., .00025 uf 500V Mica
C15	C20069-202	Cond., .002 uf 600 VPT.
C17A	A21163	Electrolytic condenser, 15, 40,
C17B, C17C		10 uf, 150V
C18	A21164	Electrolytic cond. 100uf 10V.
C19	C20068-503	Cond., .05 uf 400 VPT.
L1	AC21054-1	Antenna loop assembly
L2, L3,	AC21055-1	Oscillator coil assy.
L4	AC21152-1	Hash filter
T1	AC21052-1	1st I. F. coil
T2	AC21053-1	2nd I. F. coil
T3	AC21057-1	Output transformer
C	AC21056-1	Battery plug and cable assy.
L	A21172	Dial light bulb - Mazda No. 49
P	B20169-1	Line cord and plug assy.
Spk	C21113	Speaker
	A21032-1	Socket, tube, miniature, wafer
	A21032-2	Socket, tube, miniature, wafer, center pin shielded
	A18254-1	Socket, tube, plain wafer
	A21346-1	Socket, dial light with leads

REF. NO.	PART NO.	DESCRIPTION
	E21155	Cabinet top cover assy.
	AD21338-1	Cabinet bottom cover assy.
	AC21460-1	Cabinet front cover and grille assy. (includes 3 mtg. eyelets, grille cloth, 1 spkr baffle).
	AC21459-1	Rear door assy (includes rear door, rear door mtg. brkt., rear door shaft, torque spring, grille cloth, 2 lugs, 6 eyelets.
	D21207	Battery cradle
	D21143	Chassis bottom cover
	AD21456-1	Cabinet wrap-around assy (includes wrap-around, top insert, cabinet front cover, grille assy, & rear door assy.
	E21131	Cabinet wrap-around
	C21159	Handle
	A21190	Control knob
	C21210	Dial crystal
	A21183	Handle mtg. "U" stud
	A21209	Grille cloth, spkr grille
	A21341	Grille cloth, rear door
	C21364	Speaker baffle
	C21136	Battery pack
	A21211	Carton, complete with fillers
	A21060	Battery plug
	C21146	Dial scale
	D21148	Dial pointer
	A21205-1	Tuning shaft
	A19361	Hairpin clip
	A19132	Dial drive cord
	A19295	Spring, dial drive cord
	A21343	Tube, shield
	A21344	Tube shield base
	A21345	Tube shield spring
	B21123-2	Tube retainer spring
	A19344-1	Idler pulley
	A19205-4	Clip, electrolytic mtg.
	A16695	Idler pulley stud
	A21358	Cam
	A21347	Spring, ON-OFF indicator
	A19139	Terminal strip, single
	A19138-1	Spacer eyelet (mtg. either variable condenser)
	A20077-3	Grommet (mtg. either variable cond)
	A19328-2	Grommet (for mtg. variable condenser C21153).

OSCILLATOR CIRCUIT CHANGE

USED ON SETS BUILT AFTER JUNE 1947 TO INCREASE SENSETIVITY.



* INDICATES POINTS WHERE CHANGES WERE MADE.

1 C5 AND R3 RELOCATED IN SCREEN GRID CIRCUIT, 2. PLATE CURRENT OF CONVERTER TUBE PASSES THROUGH L3

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection .... Across loudspeaker voice coil
Output meter reading to indicate 50 milliwatts (standard ouput) .... .4 volts
Dummy antenna value to be used in series with generator output .... See chart below
Connection of generator output lead .... See Chart Below
Connection of generator ground lead .... Floating ground
Generator modulation .... 30% 400 cycles
Position of volume control .... Fully clockwise
Position of dial pointer with variable fully closed........ Last mark at left end of dial

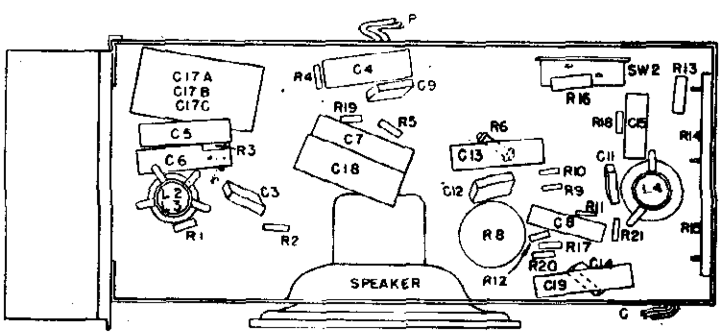
Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455	.05 mfd.	IR5 grid (Stator of C1)	Top of 2nd & 1st IF trans. T2 & T1	IF
1400	1400		*Test Loop	C2; C1, Trimmers on Variable Condenser	Osc. Ant.
600	600		*Test Loop	**Check Point	

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter, placed about one foot from the set loop.

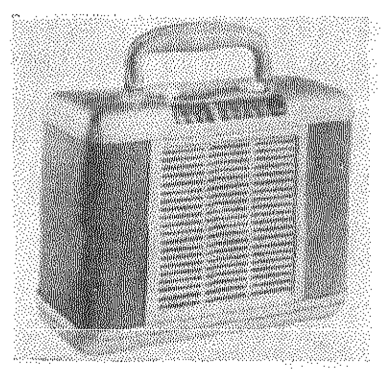
The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.

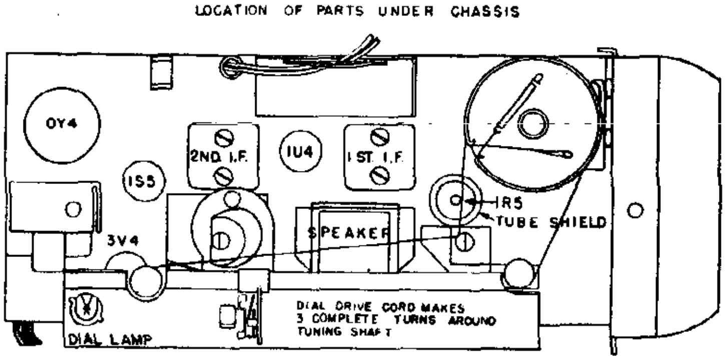
CAUTION: While handling the set out of the cabinet, be careful not to bend the loop because any change in its spacing in respect to the aluminum plate will change the tracking of the antenne circuit with the oscillator.

**If the antenna stage does not track with the oscillator at 600 Kc, check to see if the loop is parallel with the aluminum plate. If it is necessary to straigten the loop to track the set at 600 kc, it will be necessary to retune the set to 1400 kc and repeat the alignment procedure in its original order until the correct spacing has been obtained. In some few cases, due to variations in the parts and wiring of the set, the loop may have to be bent slightly out or in to track the set, but usually the best tracking is obtained with the loop straight.



LOCATION OF PARTS UNDER CHASSIS





TUBE LAYOUT

NOBLITT-SPARKS INDUSTRIES, INC.

VOLTAGE & RESISTANCE MEASUREMENTS FROM SOCKET TERMINALS TO FLOATING GROUND

VOLTAGE — RESISTANCE

WITH SLIDE SWITCH IN ELECTRIC POSITION

TUBE	V 1	V 2	V 3	V 4	V 5	V 6	V 7	V 8	R 1	R 2	R 3	R 4	R 5	R 6	R 7	R 8
1R5	2.8	95	48	**	2.8	*1.8	4.2		39	3.5K	25.5K	100K	39	4.3M	50	
1U4	0	95	95	*1.8	0	0	1.4		0	3.5K	3.5K	4.3M	0	10M	22	
1S5	2.8	0	*2	*20	*50	*1	1.4		39	Inf.	1M+	4.75M	333.5K	4.7M	22	
3V4	4.2	95	95	7	5.6	0	7		50	3.5K	3.5K	65	60	2.2M	65	
OY4	0	0	+DC	117AC	117AC	0	120	120	330K	Inf.	Inf.	Inf.	Inf.	Inf.	1889	1889

WITH SLIDE SWITCH IN BATTERY POSITION

TUBE	V 1	V 2	V 3	V 4	V 5	V 6	V 7	V 8	R 1	R 2	R 3	R 4	R 5	R 6	R 7	R 8
1R5	3.0	90	48	**	3.0	*1.8	4.5		39	*	**	100K	39	4.3M	50	
1U4	0	90	90	*1.8	0	0	1.5		0	*	*	4.3M	0	10M	22	
1S5	3.0	0	*2	*20	*50	*1	1.5		39	Inf.	1M+	4.75M	390K	4.7M	22	
3V4	4.5	90	90	0	6.0	0	7.5		50	*	*	680	60	2.2M	72	
OY4	0	0	0	0	0	0	0	0	330K	Inf.	10.3M	330K	330K	Inf.	2.5K	2.5K

All voltage measurements are made with a line voltage of 117V AC or a battery having 90 VB and 7.5 VA; with no signal using a 1000 ohm per volt voltmeter and are +DC unless otherwise indicated.
* Measured with a vacuum tube voltmeter.
**The oscillator voltage measured with a vacuum tube voltmeter from the oscillator grid to floating ground will vary from approx. —6V with the variable condenser closed to —12V with the condenser open. The true oscillator voltage measured from the grid to the negative filament lug should be from —10 to —20V.

* The resistance reading at this point is the leakage across the electrolytic condenser and will vary with different condensers and different ohmeters. With the negative lead of the ohmeter to floating ground. the reading may vary anywhere from 50K to 1M depending on the type meter used.
** 22K higher than the electrolytic condensers leakage
K equals 100 ohms
M equals 1 megohm

Approximate Resistance of Coils:
L1-.9 ohms
L2-7 ohms
L3-1.5 ohms
L4-9.4 ohms

T1 Primary - 34 ohms
Secondary-22 ohms
Revised
T1 Primary - 25 ohms
Secondary - 25 ohms

T2 Primary - 22 ohms
Secondary - 34 ohms has 47,000 ohm resistor in series inside can
Revised
T2 Primary - 23 ohms
Secondary - 35 ohms has 47,000 ohm resistor in series inside can.

T3 Primary - 250 ohms
Secondary-.4 ohms

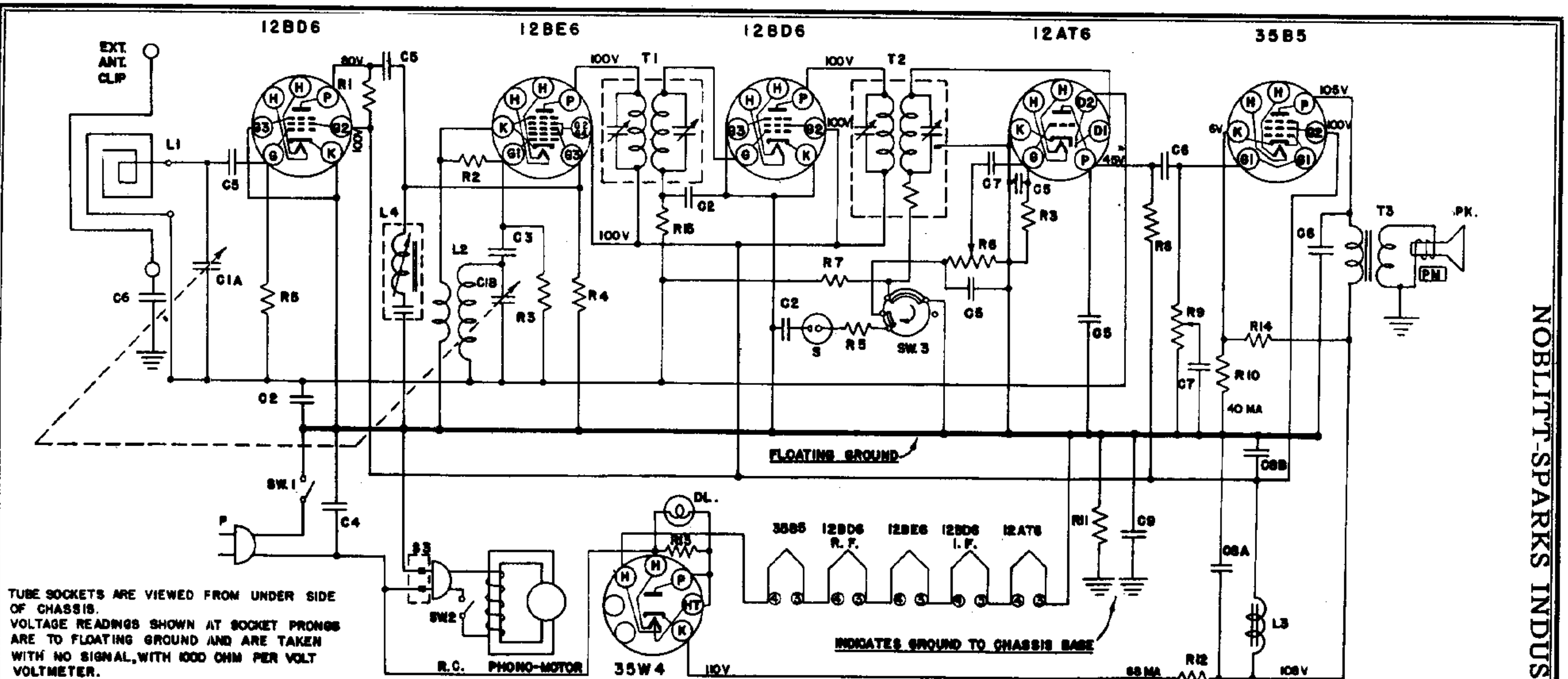
SERVICE HINTS AND CIRCUITS CHANGES:

*Any of the following battery packs can be used: General 60A-6F6-5; Eveready 753; Ray-O-Vac AB994; Burgess F6A60.

NOTE: 1. The dial light operates only when the set is connected to the power line. The set will not operate on the power line if the dial light is burned out. (The tubes will have no filament voltage).

2. Since there have been changes made in the IF Coils in the course of production, all IF Coil replacements should be made in matched pairs to assure satisfactory performance. All coils supplied for replacement will be the revised coils. Replacement of either IF Coil alone may result in oscillation or poor performance.

NOBLITT-SPARKS INDUSTRIES, INC. MODELS 150TC, 151TC, Chassis RE228



TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO FLOATING GROUND AND ARE TAKEN WITH NO SIGNAL, WITH 1000 OHM PER VOLT VOLTMETER.
A.C. LINE VOLTAGE AT 117 VOLTS.
* MEASURED WITH VACUUM TUBE VOLTMETER.

	VOLTAGE							RESISTANCE						
TUBE	1	2	3	4	5	6	7	1	2	3	4	5	6	7
35W4	0	0	85AC	117AC	112AC	112AC	110DC	INF	INF	80	108	105	105	11250
12BD6 RF	0	0	37.5AC	50AC	80DC	100DC	0	✝ 4.2m	0	39	50	14K	12K	0
12BE6	**-8.8DC	0	25AC	37.5AC	100DC	100DC	0	22K	.5	25	39	12K	12K	200K
12BD6 IF	0	0	12.5AC	25AC	100DC	100DC	0	✝ 3.3m	0	14	25	12K	12K	0
12AT6	0	0	0	12.5AC	0	0	* 45DC	10m	0	0	14	✝ 3.2m	✝ 1.05m	482K
35B5	0	6DC	50AC	85AC	105DC	100DC	0	500K	150	80	80	12K	12K	500K

All readings are taken from the socket terminal indicated to floating ground, with AC line voltage at 117V. Voltage measurements made with 1000 ohm per volt voltmeter except where indicated otherwise;
* Measured with a vacuum tube voltmeter.
**Average measured with a vacuum tube voltmeter. -7.7V with variable condenser closed. -9.9V with variable condenser open.)
✝ One meg. lower resistance with Phono-Radio Sw in Phono Position.

RESISTANCE OF COILS

Oscillator		First IF Transformer		Second IF Transformer		Output Transformer	
Cathode winding	.75 ohms	Primary winding	14 ohms	Primary winding	13 ohms	Primary	110 ohms
Grid winding	6. ohms	Secondary winding	14 ohms	Secondary winding	13 ohms	Secondary	.3 ohms
Wave trap	26 ohms	B Choke	200 ohms	47.K Resistor in Series Inside Can			

ALIGNMENT PROCEDURE

Complete alignment can be accomplished with the chassis mounted in the cabinet. It is necessary to: (1) Remove the screws from the compartment shield loop assembly and lay it back to make the trimmers accessable; (2) Remove the bottom plate from the chassis to make the necessary output meter and generator connections.

NOTE: Adjust the antenna trimmer C 1A through hole in the loop assembly with the loop in its normal operating position.
** Connect generator to a standard Hazeltine test loop, placed two (2) feet from set loop (10-3/4" from back of cabinet) or three (3) turns of wire six (6) inches in diameter placed near the back of the cabinet or about one (1) foot in front of the cabinet.

Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 200 milliwatts (standard output)	.8 volts
Dummy antenna value to be used in series with generator output	See chart below
Connection of generator output lead	See chart below
Connection of generator ground lead	Floating ground
Generator modulation	30% 400 cycles
Position of volume control	Fully clockwise
Position of dial pointer with variable fully closed	Last round mark at left edge of dial

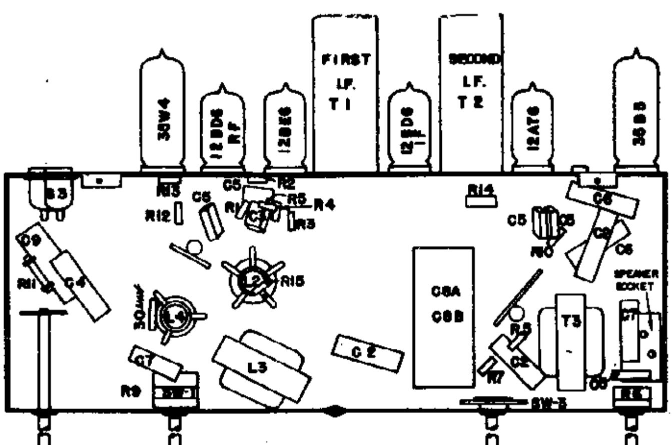
Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers adjusted in Order Shown for Max. Output	Function of Trimmer
Open	455	.05 mfd.	12BE6 Grid	Top of 2nd & 1st IF Trans.	IF
Open	455	.05 mfd.	RF Grid	*Adj. L4 for Min. Output	Wave Trap
1400	1400		** Test Loop	C1B, C1A Trimmers on Variable Condenser	Osc. Ant.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.

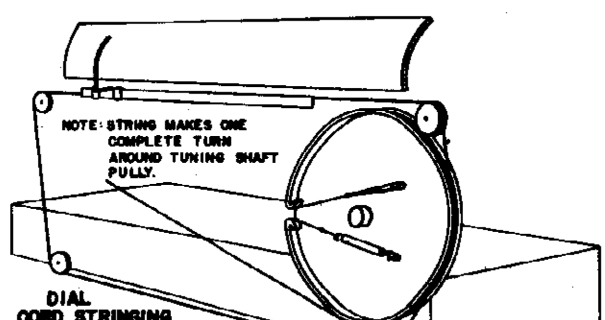
If a standard test loop is used with the signal generator for alignment of the receiver, the approximate sensitivities should be 150 uv/m and 120 uv/m 600 Kc and 1400 Kc, respectively.

Approximate stage by stage sensitivities for 200 Milliwatt Output:

.05 uf. cond. in series with generator lead		50 uuf cond. in series with generator lead	
IF Grid - 455 Kc.	5000 uv	Mixer Grid 1000 Kc	250 uv
Mixer Grid - 455 Kc.	100 uv	RF Grid - 1000 Kc	30 uv
		Antenna - 1000 Kc	15 uv

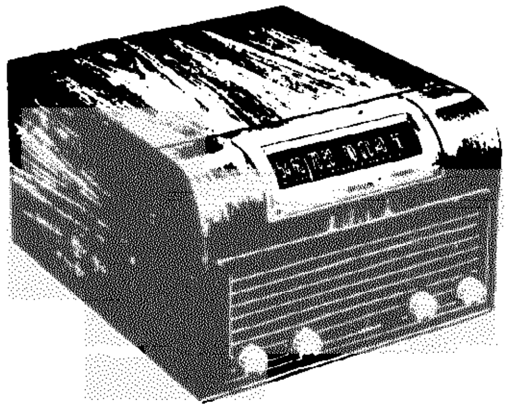


TUBE LAYOUT & LOCATION OF PARTS



DIAL CORD STRINGING ARRANGMENT

NOBLITT-SPARKS INDUSTRIES, INC.



FREQUENCY RANGE
Broadcast .... 540-1600 kc
IF .... 455 kc

TUBES & FUNCTIONS

12BD6	....	RF Amp.
12BE6	....	Mixer-oscillator
12BD6	....	IF Amp.
12AT6	....	DET-AVC-AF
35B5	....	Output
35W4	....	Rectifier

LOUD SPEAKER
Type: Permanent magnet
Size: 5-1/4 inch
Voice coil impedance .... 3.2 ohms

POWER SUPPLY

105-125 Volts AC , 55 Watts

POWER OUTPUT

Undistorted	....	1 Watt
Maximum	....	1.9 Watts
Plate load	....	2000 ohms

150-TC has a mahogany cabinet
151-TC has a walnut cabinet

SERVICE HINTS

On AC, the power cord plug should be tried in both its possible positions in the receptacle, and left in the position that gives least hum. Do not attempt to operate the record changer on DC.

For service information on the record changer see "Automatic Record Changer Service Instructions, Model 205", which should be filed with this bulletin.

Alignment, trouble shooting and many parts changes can be accomplished without removing the chassis from the cabinet. It is necessary in most cases, only to remove the bottom plate and the compartment shield loop assembly.

"TO REMOVE THE CHASSIS FROM THE CABINET"

1. Remove the line cord plug from the electric outlet; turn the tuning knob until the pointer is at 54 on the dial so that the variable condenser is closed, and fasten the pickup to its rest with string or a rubber band.

2. Remove the seven (7) screws which hold the compartment shield and loop assembly in the inside front of the cabinet. Tilt the loop back. Remove the three plug on wires from the terminal strip on the loop and remove the blue lead from the clip inside the bottom of the cabinet on right side. Remove the loop from the cabinet.

3. Remove the two (2) nuts, lock washers and flat washers from the studs on inside front of the cabinet, above the speaker, to release the dial assembly from the cabinet., and remove the speaker plug from its socket on top of the chassis.

4. Pull off the four (4) control knobs.

5. Stand cabinet on end, remove the changer AC plug and Phono pickup plug from back of the chassis; remove the three (3) screws from the bottom plate, and lift off the bottom plate.

6. Remove the three (3) brass screws which hold the chassis base to the under side of the changer platform.

7. Slide the chassis back until the dial mechanism clears the studs.

8. Pull back of chassis away from changer platform to allow the variable condenser to clear the changer platform at the notch provided for it.

9. Pull the chassis back until the control shafts clear the front of the cabinet.

10. Straighten the chassis up and pull it straight out the bottom of the cabinet.

"TO REMOVE RECORD CHANGER"

a. Remove the chassis as above.
b. Remove the two "c" washers from the changer mounting bolts. These are located under the changer platform.
c. Lift changer out of cabinet.

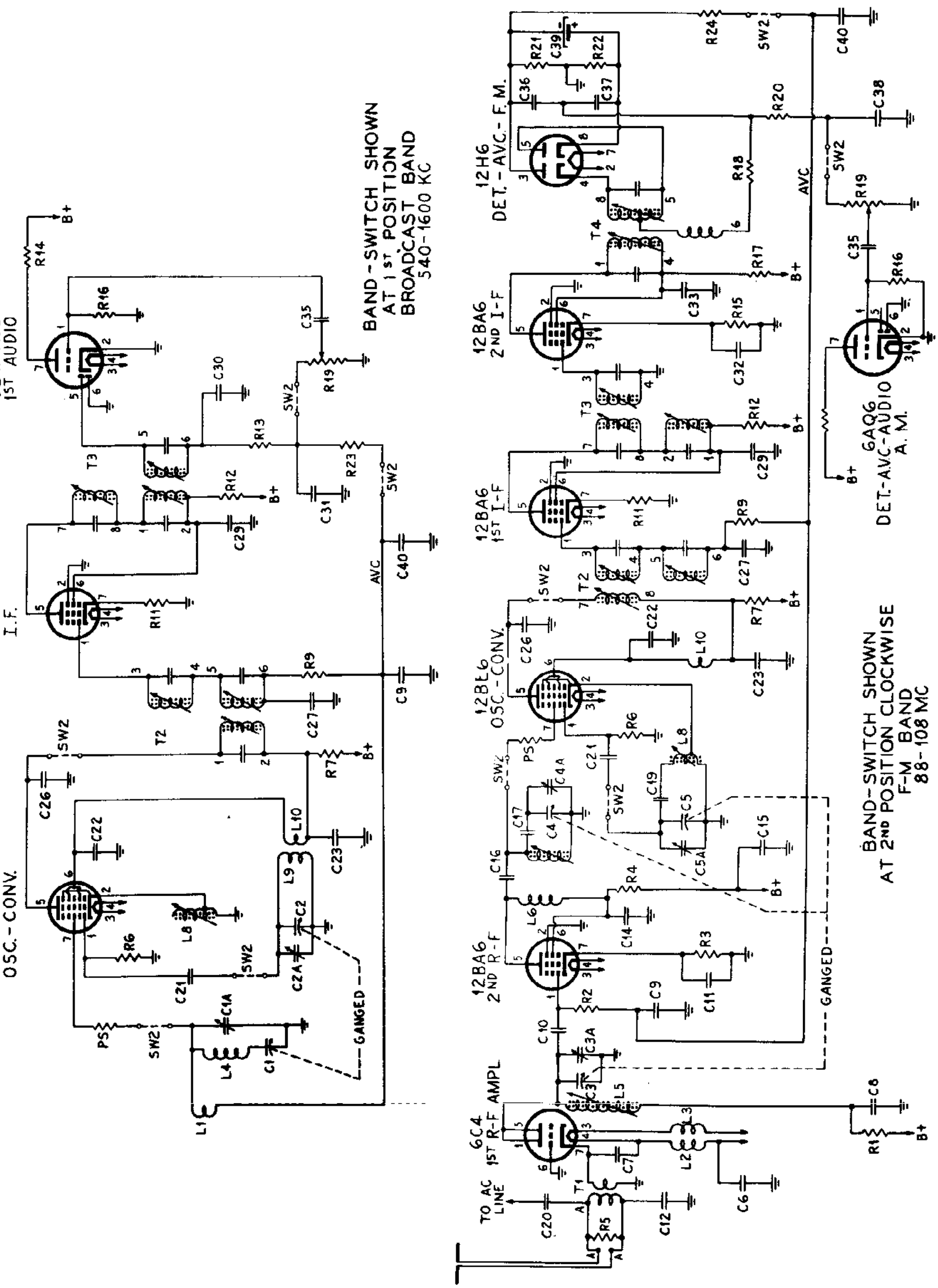
NOTE: When changer is in operation, see that the mounting screws are turned all the way down (clockwise) so that the changer floats on its springs.

NOBLITT-SPARKS INDUSTRIES, INC.

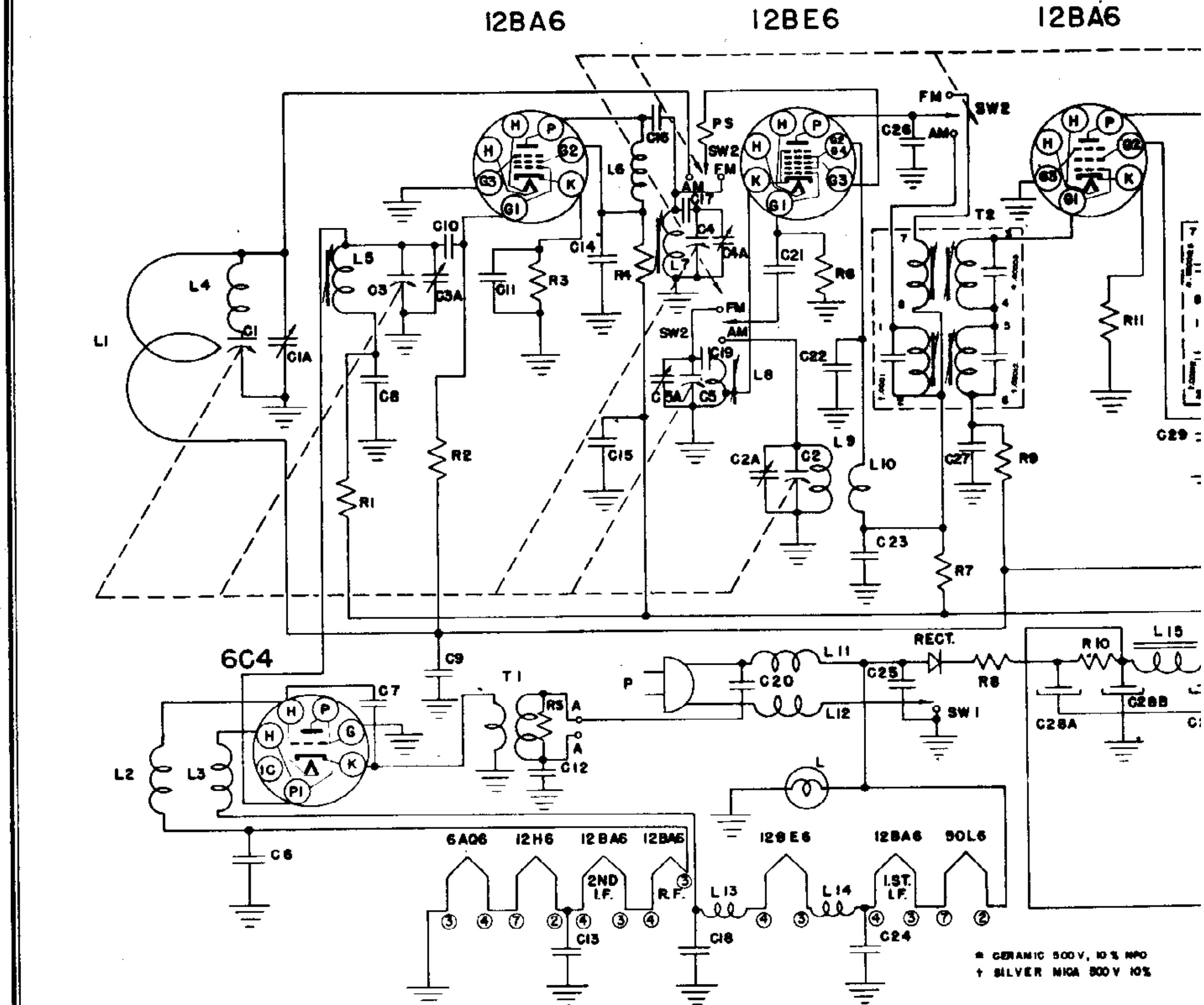
PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
R1	C20060-222	Resistor, 2200 ohm 1/4 W
R2	C20060-223	Resistor, 22,000 ohm 1/4 W
R3	C20060-106	Resistor, 10 megohm 1/4 W
R4	C20060-224	Resistor, .22 megohm 1/4 W
R5	C20060-105	Resistor, 1 megohm 1/4 w
R6	C19927	Volume Control, 1 megohm
R7	C20060-225	Resistor, 2.2 megohm 1/4 W
R8	C20060-474	Resistor, .47 megohm 1/4 W
R9	C19928	Tone Control & Switch, .5 megohm
R10	C20060-151	Resistor, 150 ohm 1/4 W
R11	C20060-334	Resistor, .33 megohm 1/4 W
R12	C20060-220	Resistor, 22 ohm 1/4 W
R13	C20060-331	Resistor, 330 ohm 1/4 W
R14	C20070-123	Resistor, 12,000 ohm 1 W
R15	C20060-104	Resistor, .1 megohm 1/4 W
C1A-C1B	AD21111-1	Variable Condenser & Pulley Assy.
C2	C20067-503	Condenser, .05 us 200 V, Paper
C3	C20065-500	Condenser, .00005 uf 500 V, Mica
C4	C20068-503	Condenser, .05 uf 400 V, Paper
C5	C20065-251	Condenser, .00025 uf 500 V, Mica
C6	C20068-103	Condenser, .01 uf 400 V, Paper
C7	C20068-502	Condenser, .005 uf 400 V, Paper
C8A-C8B	A21349	Electrolytic Condenser, 50-30 uf.,150V
C9	C20068-104	Condenser, .1 uf 400 V, Paper
L1	AD21169-1	Antenna Loop & Compartment Cover Assy.
L2	AC21187-1	Oscillator Coil Assembly
L3	AC21107-1	Filter Choke Assembly
L4	AC21158	I. F. Trap
T1	AC21097-1	1st I. F. Coil
T2	AC21098-1	2nd I. F. Coil
T3	AC21099-1	Output Transformer
DL	A19351	Dial Lamp, Mazda 47
P	B20064-10	Line Cord & Plug Assembly
RC	AE19934	Record Changer (General Instrument Model 205)
S	A19552	Socket, 1-Prong (Phono Pickup)
S3	A19551	Socket, Phono Motor
Spk.	C21064	Speaker Assembly
SW3	C19930	Phono-Radio Switch
	R21071	Cabinet Assembly, Mahogany Veneer (Model 150-TC)
	R21071-1	Cabinet Assembly, Walnut Veneer (Model 151-TC)
	A19850	Needle, Semi-permanent
	E21074	Dial Escutcheon
	E21102	Speaker Grille
	A19933	Grille Cloth
	A19556	Plug, A. C. (On Record Changer)
	E21068	Chassis Bottom Cover

PART NO.	DESCRIPTION
C21075	Knob, Volume
C21076	Knob, Tuning
C21077	Knob, Phono-Radio Switch
C21078	Knob, Tone Control & Switch
A20040-12	Felt Washer (Behind Knobs) (10)
A20185-7	Lockwasher, Countersunk)Mtg.Chgr(10)
A21124	"C" Washer)In Cabt.(25)
A21121	Screw, Changer Mtg.
A21168	Double Fahnestock Connector (For Outside Antenna)
A21307	Carton Complete with Fillers (Model 151-TC)
A21083	Carton Complete with Fillers (Model 150-TC)
B19931	Variable Condenser Mtg. Bracket
D21087	Dial Backing Plate
C21106	Dial Support Bracket
D21089	Dial Plate Mounting Bracket
A19923	Tuning Shaft Bracket
A16695	Idler Pulley Stud
A19344-3	Idler Pulley
A21090	Dial Pointer
D21091	Dial Glass
A21170	Dial Scale Background, Paper
A19361	Hairpin Clip (On Tuning Shaft)
A19132	Cord, Dial Drive
A19205-4	Capacitor Mtg. Clip
A19295	Spring, Dial Drive Cord
A19141	Terminal Strip, Double
A19800	Terminal Strip, Triple, R. H.
A21189	Female Terminal (On Leads to Antenna Loop) (10)
A20077-3	Rubber Grommet (For Mounting Variable Condenser)
A19616-2	Rubber Channel (For Mounting Dial Glass)
A19138-1	Spacer Eyelet (For Mounting Variable Condenser)
B21123-2	Tube Retainer Spring, Medium
B21123-1	Tube Retainer Spring, Long
A20132-1	Tube Socket, Miniature, Molded
A20132-2	Tube Socket, Miniature, Laminated
A19553	Socket, Insulator (For 1-Prong Socket)
A19579	Socket, Speaker
A19828-2	Socket, Dial Lamp, with Leads
A19234	Socket, Antenna Loop
AA21100-1	Tuning Shaft & Pulley Assembly
A19554	Plug, One Prong


BAND-SWITCH SHOWN
AT 1ST POSITION
BROADCAST BAND
540-1600 KC
6AQ6
DET.-AVC
1ST AUDIO
12BA6
I.F.
12BE6
OSC.-CONV.
GANGED
AVC
12H6
DET.-AVC-F.M.
12BA6
2ND I-F
12BA6
1ST I-F
12BE6
OSC.-CONV.
12BA6
2ND R-F
6C4
1ST R-F AMPL
TO AC
LINE
6AQ6
DET.-AVC-AUDIO
A.M.
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
F-M BAND
88-108 MC

NOBLITT-SPARK



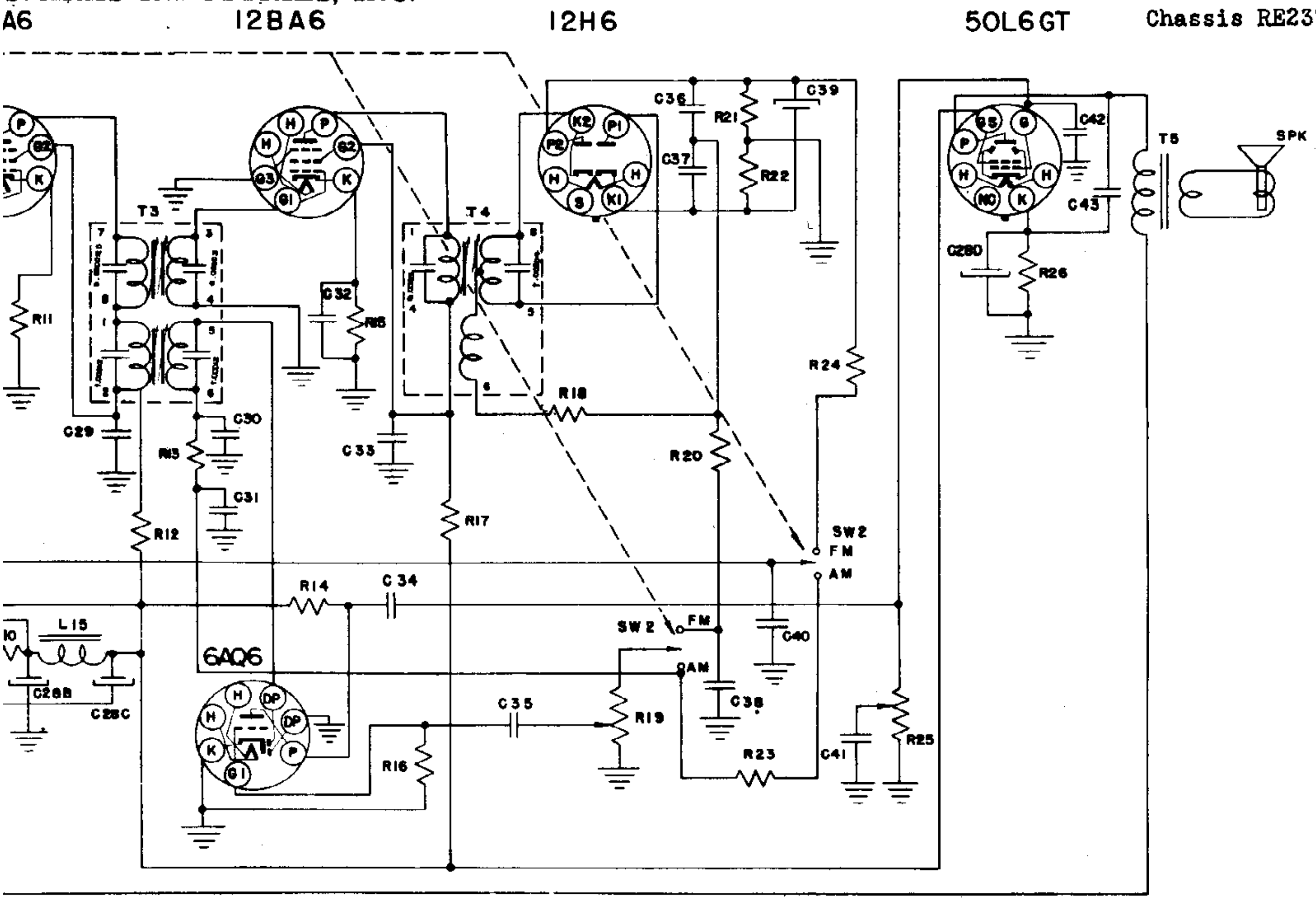
A—IF ALIGNMENT—AM

1. Turn the band switch to AM (To the left).
2. Connect the signal generator output lead to the converter grid, with an .05 uf. dummy and tl generator ground lead to the receiver chassis.
3. Connect output meter across the speaker voice coil.
4. Tune the signal generator to 455 KC and adjust 455 KC IF slugs (1)-(2)-(3)-(4) for maximum outpu

B—IF ALIGNMENT—FM

1. Turn the band switch to FM (To the right).
*2. Connect 10.7 megacycle FM signal generator output lead to 2nd IF grid and the generator groun lead to receiver chassis.
3. Connect a D. C. vacuum tube volt meter to the A. V. C. line and adjust slug no. (5) (primary, bo tom of detector transformer) for maximum A. V. C. Voltage.
4. Connect the D. C. V. T. V. M. to the audio output of detector (high side of volume control) and a just slug no. (6) (secondary, top of detector transformer), for zero voltage.
5. Connect 10.7 megacycle FM signal generator to the converter grid.
6. Connect D. C. V. T. V. M. to the A. V. C. line and adjust the 10.7 IF slugs (7)-(8)-(9)-(10) for max mum A. V. C. voltage.

*If a 10.7 MC.-F. M. generator is not available, an unmodulated signal of 10.7 M. C. from an accurate calibrated conventional AM type generator may be used.



C—RF ALIGNMENT—AM

10% NPO
30V 10%

1. Turn band switch to AM (To the left)..
2. Connect signal generator to a standard Hazeltine test loop, Model 1150, placed 2' from the set loop, or three turns of wire about six inches in diameter placed about one foot from the set loop.
3. Tune the generator to 1620 KC and tune the receiver to the high frequency end of the dial.
4. Connect output meter across the speaker voice coil.
5. Adjust oscillator trimmer (11) on variable condenser for maximum output.
6. Tune signal generator to 1400 KC, and tune receiver to pick up this signal.
7. Adjust antenna trimmer (12) on variable condenser for maximum output.
8. Check tracking at 1000 KC and 600 KC.

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ium output.

D—RF ALIGNMENT—FM

1. Turn band switch to FM (To the right).
2. Connect FM signal generator to FM antenna terminals through a 220 ohm dummy.
3. Set signal generator to 88 megacycles, using 23 KC deviation.
4. Set receiver dial to 88 megacycles.
5. Adjust FM oscillator slug (13) for maximum signal.
6. Set signal generator to 108 M. C.
7. Set receiver dial to 108 M. C.
8. Adjust the FM oscillator trimmer (14) for maximum signal.
9. Repeat 3 to 8; check and recheck until proper coverage is obtained.
10. Set signal generator to 91 M. C., and adjust RF slugs (15) & (16) for maximum signal.
11. Set signal generator to 105 M. C. and adjust RF trimmers (17) & (18) for maximum signal.
12. Repeat 10 & 11 until proper tracking is obtained.

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MODEL 182TFM NOBLITT-SPARKS INDUSTRIES, INC.

APPROXIMATE VOLTAGE AND RESISTANCE MEASUREMENTS
TUBE SOCKET LUGS TO CHASSIS GROUND

			VOLTAGE				RESISTANCE							
Tube	Function	Band Switch	Plate	Screen	Cath-ode	Grid	1	2	3	4	5	6	7	8
6C4	1st RF Amp	FM-AM	95	—	0	0	*	Inf.	51	46	*	0	0	
12BA6	2nd RF Amp	FM	100	100	.9	0	2meg	0	45	35	*	*	68	
		AM	100	100	.9	0	4meg	0	45	35	*	*	68	
12BE6	Oscillator Converter	FM	100	100	0	**	22 K	0	52	62	*	*	0	
		AM	100	100	0	***	22 K	0	52	62	*	*	3meg	
12BA6	1st IF Amp	FM	92	92	.9	0	1meg	0	62	72	*	*	68	
		AM	92	92	.9	0	3.2meg	0	62	72	*	*	68	
12BA6	2nd IF Amp	FM-AM	92	92	.9	0	.9	0	35	24	*	*	68	
6AQ6	AF Amp	FM	42	—	0	-0.6	6.8meg	0	0	10	Inf.	0	*	
	Det, AVC, AF Amp	AM	42	—	0	-0.6	6.8meg	0	0	10	1meg	0	*	
12H6	Det, AVC	FM	—	—	—	—	0	24	6800	1meg	1meg	*	10	6800
		AM	—	—	—	—	0	24	6800	Inf.	Inf.	*	10	6800
50L6	AF Output	FM-AM	115	105	7.5	0	Inf.	72	*	*	500K	1meg	100	220

All voltage readings are positive unless otherwise indicated.

All voltage measurements are made with an electronic voltmeter with a line voltage of 117V, AC.

*No reading given here, due to the wide variations in readings which would be obtained, due to the electrolytic condensers in the B+ circuit.

**G3,0; G1 Varies from approx. -1.5V to -4V, depending on the setting of the variable condenser, variations in tubes, coils, etc.

***G3,0; G1, Voltage varies from approx. -5V with variable condenser closed to approx. -7.5V with variable condenser open.

APPROXIMATE DC RESISTANCE OF COILS AND TRANSFORMERS

L1	Loop Antenna		.6 ohms	T2,3	IF	FM Pri Lugs 7 to 8	.9 ohms
L2,3,4	RF Chokes		.6 ohms		Trans-	AM Pri Lugs 1 to 2	15 ohms
6,13,14					formers	FM Sec. Lugs 3 to 4	.9 ohms
L11,12	RF Chokes		.2 ohms			AM Sec. Lugs 5 to 6	15 ohms
L9,10	AM Osc Coil	L9	5 ohms				
		L10	.5 ohms	T4	Detector	Pri Lugs 1 to 4	1 ohm
L15	B+ Filter Choke		220 ohms		Trans-	Sec Lugs 8 to 5	.1 ohm
					former	Lugs 8 to 6	.3 ohm
T5	Output Transformer	(Pri)	110 ohms			Lugs 5 to 6	.3 ohm
		(Sec.)	.3 ohms				

All resistance measurements of coils were made with the coils wired in the circuit.

All coils and transformers not listed have a resistance too low to be measured with an ohmmeter.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
R1-12-17	C20060-102	Resistor, 1000 ohm, ¼ W
R2-24	C20060-105	Resistor, 1 megohm, ¼ W
R3-11-15	C20060-680	Resistor, 68 ohm, ¼ W
R4-7	C20060-331	Resistor, 330ohm, ¼ W
R5	C20060-100	Resistor, 10 ohm, ¼ W
R6-13-20	C20060-223	Resistor, 22,000 ohm, ¼ W
R8	C20060-220	Resistor, 22 ohm, ¼ W
R9	C20060-104	Resistor, 100,000 ohm, ¼ W
R10	C20103-101	Resistor, 100 ohm, 1 W
R14	C20060-334	Resistor, 300,000 ohm, ¼ W
R16	C20060-685	Resistor, 6.8 megohm, ¼ W
R18	C20060-101	Resistor, 100 ohm, ¼ W
R-19	C21404-1	Volume Control, 1 megohm
R21-22	C20120-682	Resistor, 6800 ohm, ¼ W
R23	C20060-225	Resistor, 2.2 megohm, ¼ W
R25	C21405-1	Tone Control and Switch, 500,000 ohm
R26	C20060-221	Resistor, 220 ohm, ¼ W
C1-C1A) C2-C2A) C3-C3A) C4-C4A) C5-C5A)	AC21401-1	Variable Condenser (With Trimmers)
	D21409	Variable Condenser (Less Trimmers)
C3A-4A	A21440	Trimmer Condenser, 1.6-18 uuf. Compression Type
C5A	A21439	Trimmer Condenser, 1-8 uuf, Glass
C6-11-18-24	C20201-500	Condenser, .00005 uf, 500V, Ceramic
C7-20-30-31	C20204-101	Condenser, .0001 uf, 500V, Ceramic
C8-10	C20226-501	Condenser, .0005 uf, 350V, Ceramic
C9-12-13-14-22	C20226-102	Condenser, .001 uf, 350V, Ceramic
C15-23-27-29-32-33	C20226-502	Condenser, .005 uf, 350V, Ceramic
C16	C20204-100	Condenser, .00001 uf, 500V, Ceramic
C17	C20206-201	Condenser, .0002 uf, 500V, Mica
C19	C20205-2	Condenser, .0001 uf, 500V, Ceramic
C21	C20204-270	Condenser, .000027 uf, 500V, Ceramic
C25-34	C20068-503	Condenser, .05 uf, 400 V, P. T.
C26	C20205-3	Condenser, .00002 uf., 500 V, Ceramic

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REF. NO.	PART NO.	DESCRIPTION
C28,A,B, C,D	A21402	Condenser, Electrolytic, 40-40-80 uf, 150V, 20 uf., 25V
C35	C20068-103	Condenser, .01 uf, 400V, P. T.
C36-37	C20205-5	Condenser, .00005 uf, 500V, Ceramic 10% N750
C38	C20203-202	Condenser, .002 uf, 350V, Ceramic
C39	A21403	Condenser, Electrolytic, 8 uf, 50V
C40	C20067-503	Condenser, .05 uf, 200V, P. T.
C41	C20067-502	Condenser, .005 uf, 200V, P. T.
C42	C20065-251	Condenser, .00025 uf, 500V, Mica
C43	C20069-502	Condenser, .005 uf, 600V, P. T.
L1	AE21395-1	Antenna Loop, Rear Cover, and Line Cord Assy.
L2-3-4 6-13-14	AA21445-1	High Frequency Choke
L5	AC21399-1	1st R. F. Coil (FM)
L7	AC21400-1	2nd R. F. Coil (FM)
L8	AC21397-1	Oscillator Coil (FM)
L9-10	AC21396-1	Oscillator Coil (AM)
L11-12	AA21444-1	High Frequency Choke
L15	AC21394-1	B+ Filter Choke
T1	AA21398-1	Antenna Coupling Transformer
T2	AC21390-1	1st I. F. Coil
T3	AD21391-1	2nd I. F. Coil
T4	AD21392-1	Detector Transformer
T5	AC21393-1	Output Transformer
Sw2	C21406	Band Switch
Spk	C21331	Speaker, 5¼" P. M.
Rect	A20207-3	Rectifier, Selenium, 150 MA
P	B20064-5	Line Cord & Plug Assy
L	A19135	Dial Lamp, Mazda C7
	R21379	Cabinet Assy., Complete
	A21330	Name Plate, Brass
	D21365	Escutcheon, Clear Lucite
	C21428	Knob, Tuning
	C21427	Knob, Volume
	C21430	Knob, Tone
	C21429	Knob, A.M.-F.A. Switch
	A21431	Carton Complete with Fillers
	C21426	Speaker Grille
	C21498	Grille Felt, on Front Cabinet Baffle
	A20217	Socket, Antenna Loop
	D21372	Dial Scale Backing Plate
	A21382	Tuning Shaft Insulator (Rear Phenolic) (Quantity of 5)
	A20196-2	Rivet, Tubular Shoulder (For Mtg. Idler Pulley) (Quantity of 5)
	A20196-4	Rivet, Tubular Shoulder (For Mtg. Idler Pulley) (Quantity of 5)
	A20202-2	Idler Pulley, ⅜" x ⅛" x ½", (Quantity of 5)
	A21422	Tuning Shaft
	D21389	Dial Scale, .050 Clear Acetate
	A19132	Cord, Dial Drive
	A19361	Hairpin Clip (On Tuning Shaft)
	A19295	Spring, Dial Drive Cord
	A21384	Terminal Strip, Double, L. H.
	A19141	Terminal Strip, Double,, Center Mtg.
	A19140	Terminal Strip, Single, L. H.
	A21385	Terminal Strip, Triple with Center Mtg. Lug Grounded
	A19236	Terminal Strip, Triple with Separate Mtg. Lug
	A21457	Insulator (Chassis Fibre, Mtg. Screw)
	A20077-3	Grommet, Rubber (Under Variable Cond.)
	A19138-1	Eyelet, Spacer (Under Variable Cond.)
	A20218	Plug, 2-Prong (Chassis Back Flange-Interlock Plug)
	A21189	Terminal, Female (Quantity of 10)
	A21388	Control Shaft Insulator, Phenolic
	A21443	Tuning Shaft Insulator, Front, Phenolic (Quantity of 5)
	A21225	Antenna Lead Insulator, Phenolic (Quantity of 5)
	A20118-1	Socket, Tube, Miniature, Molded Black)
	A20197-1	Socket, Tube, Miniature, Molded (Low Loss Bakelite)
	A18254-1	Socket, Tube, Plain, Wafer
	A19579	Socket, Speaker
	A19134-4	Socket, Dial Lamp
	A21408	Washer, Insulating, ⅜" I. D. x ¾" O.D., Phenolic (Quantity of 5)
	AC21377-1	Dial Pointer Assy.

Fading

If fading occurs, check the shielded audio leads. One lead should be connected from the center lug of the volume control to the audio coupling condenser on stand-off insulator. The other one should be connected from the right hand terminal of the control to the band change switch. If these two leads are reversed, the A.V.C. will be ineffective.

Antenna

On some of the first sets produced, the primary and secondary windings of the antenna coupling transformer T1, were shorted together. This would cause the antenna terminals on the back of the set to be grounded to the chassis. This should be carefully checked before connecting an external antenna to the set, because one position of the A.C. plug in the electric outlet would place 110 volt A.C. between the antenna and any grounded object. This would be a shock hazard, and if the antenna became grounded, would burn out the R.F. choke in the AC leads in the set.

Oscillation

If oscillation is encountered, ~~try~~ dressing the yellow filament leads, in the IF section of the set, down against the chassis and away from the tube sockets.

Regeneration

Some cases of regeneration in the FM - IF circuit have been encountered. This can be detected by a high discriminator voltage, and also a high A.V.C. voltage, with no input signal. Replacing the .005 mfd. 2nd IF cathode bypass condenser, C32, with a .002 mfd., 350 volt, ceramic condenser will correct this in most cases.

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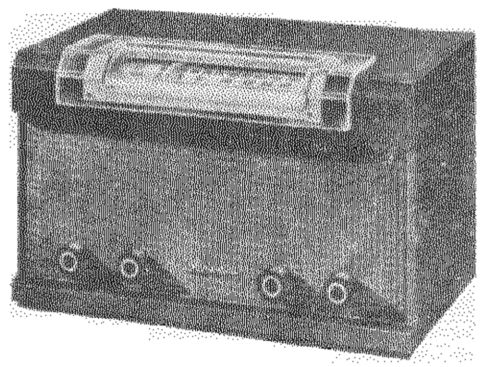


SPECIFICATIONS & SERVICE NOTES

FREQUENCY RANGE

Broadcast Band	540-1600 KC
AM-IF	455 KC
FM Band	88-108 MC
FM-IF	10.7 MC

TUBES & FUNCTIONS

6C4	1st RF Amp FM
12BA6	2nd RF Amp FM
12BE6	Oscillator Converter AM-FM
12BA6	1st IF Amp AM-FM
12BA6	2nd IF Amp FM
6AQ6	Det. AVC. AF Amp AM
	AF Amp FM
12H6	Detector, AVC. FM
50L6	AF Output AM-FM

POWER OUTPUT

Undistorted	1.4 Watts
Maximum	2.5 Watts
Plate Load	2000 Ohms

POWER SUPPLY

105-125 Volts, AC-DC	45 Watts

SPEAKER

Cone Size	5¼"
Cone Resonance in Air-Approx.	197 Cycles
Type	Permanent Magnet
Magnet Size	1.47 oz. Alnico V
Voice Coil Impedance	3.2 Ohms

OPERATING CONTROLS

Extreme Left Knob	Volume
Left Center	On-Off Switch, Tone Control
Right Center	AM-FM Band Switch
Extreme Right	Tuning

PHYSICAL DIMENSIONS

Length	14"
Heighth	8½"
Depth	8 5/16"

APPROX. SENSITIVITIES

FM Converter Grid 10.7 M. C.	300 uv
FM Antenna Terminals 105 MC (23KC Deviation)	40 uv
AM Converter Grid 455 KC	150 uv
AM Loop 1400 KC	240 uv/m

THE ANTENNA

This set has a loop antenna for AM Broadcast reception. For local FM reception, a built-in (line cord) antenna is provided. An external antenna connection is provided for areas where reception is difficult. To connect the external antenna, remove the green wire from the antenna terminal on the back of the set, and connect a dipole antenna to the antenna terminals. When the line cord antenna is used, the green wire must be connected to the outside terminal on the antenna terminal board.

GROUND

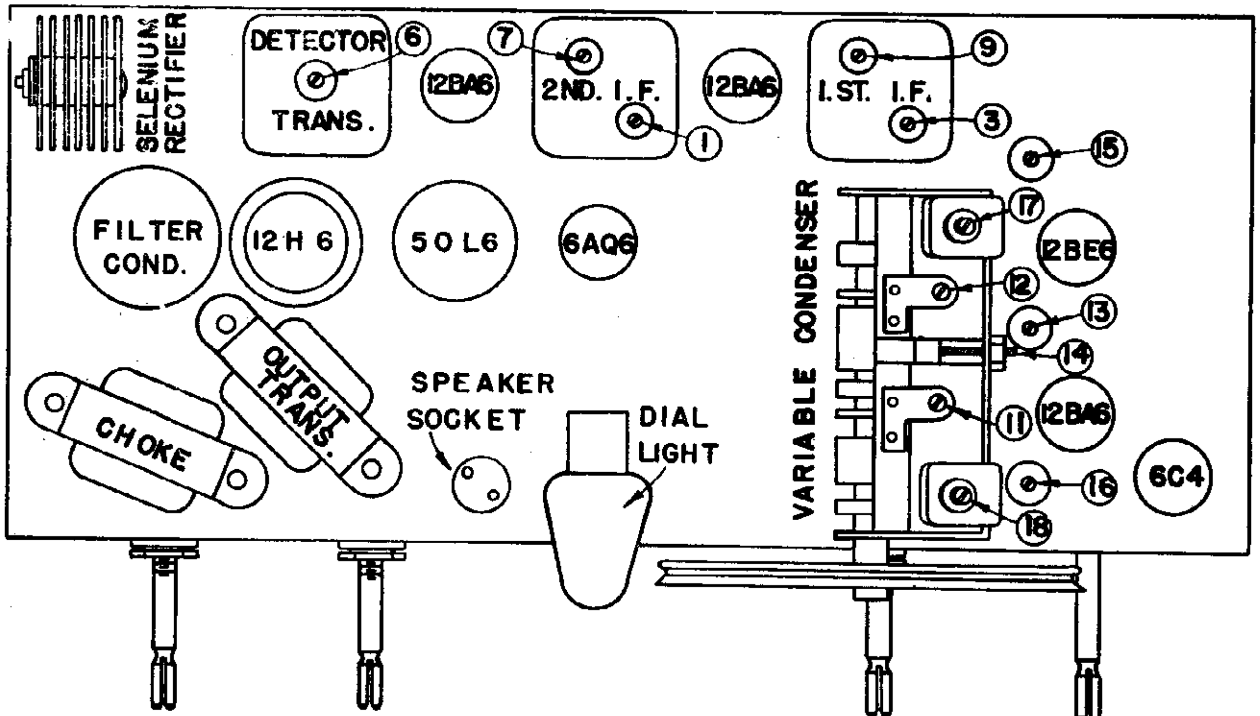
This set is designed to operate without a ground connection and no attempt should be made to use one.

CAUTION

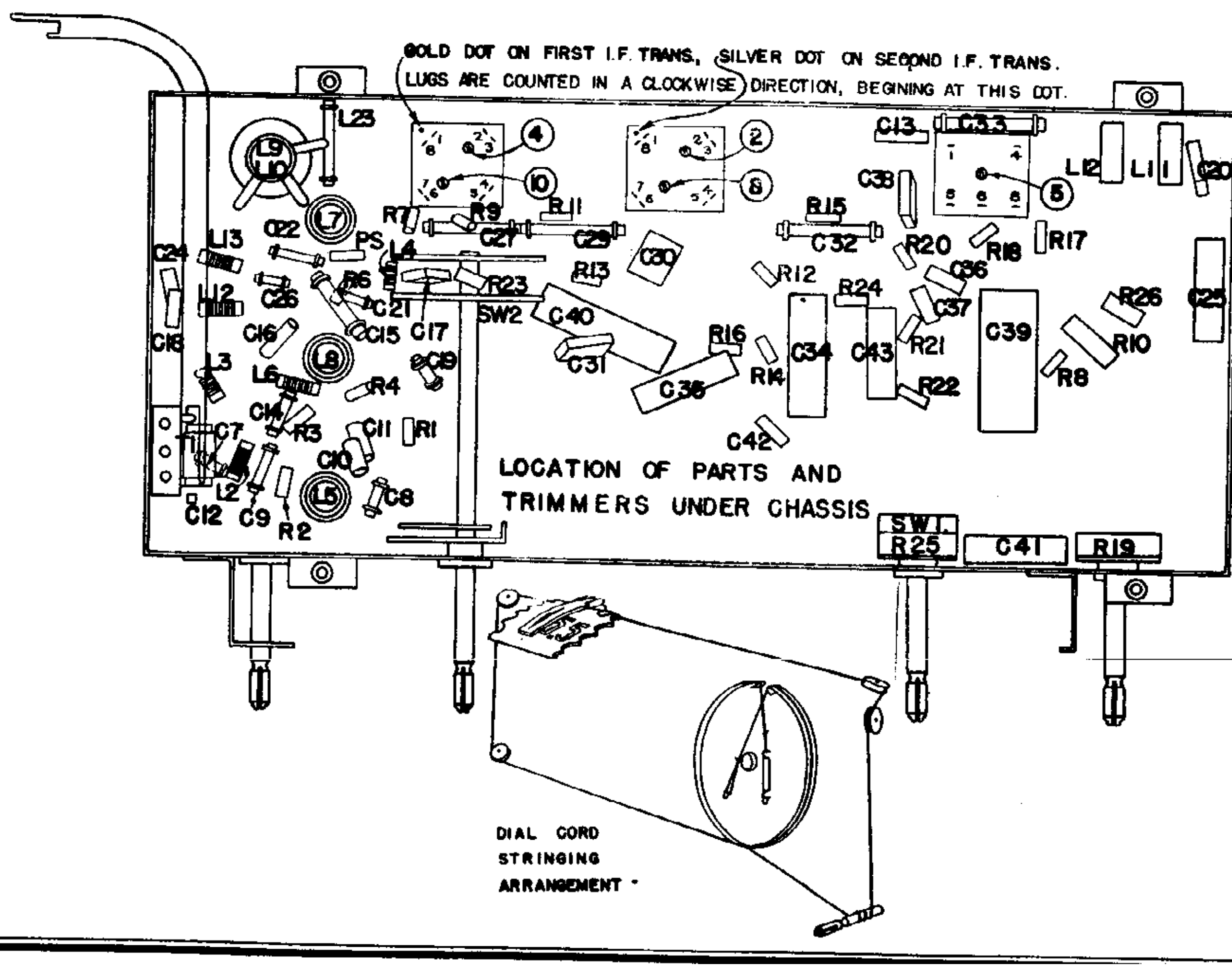
The chassis of this receiver is connected to one side of the power line. Therefore, to prevent a shock hazard, all control shafts, mounting screws and exposed rivets have been insulated from the chassis. When servicing this set and replacing parts, be sure all the necessary insulators are in place to isolate the chassis from all exposed metal parts.

IF & DETECTOR TRANSFORMER REPLACEMENTS

To insure properly matched units for best performance, it is recommended that the IF transformers and FM detector transformer be replaced as complete assemblies, rather than attempt to repair or replace parts of these assemblies.



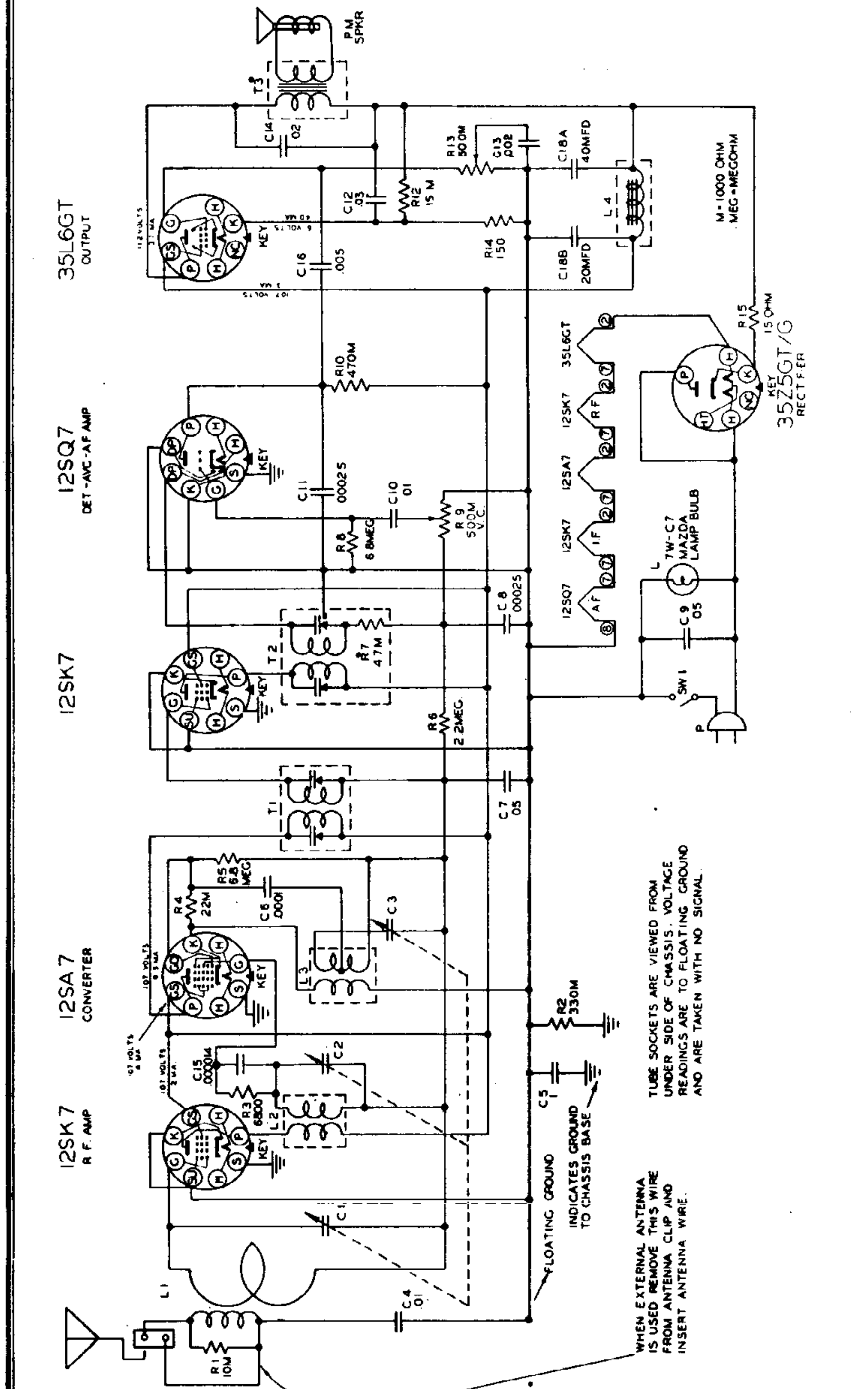
TUBE LAYOUT AND LOCATION OF TRIMMERS ON TOP OF CHASSIS.



LOCATION OF PARTS AND TRIMMERS UNDER CHASSIS

MODEL 6640
Chassis RE-206-2

NOBLITT-SPARKS INDUSTRIES, INC.



NOTE:
The chassis **RE-206-2** is identical with chassis **RE-206-1** used in the Model 664, with exception of the loop assembly.

NOBLITT-SPARKS INDUSTRIES, INC.

ALIGNMENT PROCEDURE

PRELIMINARY.

Output meter connection	Across loudspeaker voice coil
Output meter reading to indicate 200 milliwatts (standard output)	.8 volts
Dummy antenna value to be used in series with generator output	See chart below
Connection of generator output lead	See chart below
Connection of generator ground lead	Floating ground
Generator modulation	30% 400 cycles
Position of Volume Control	Fully clockwise
Position of dial pointer with variable fully closed	Vertical

Place the set loop in the same position with respect to the rear of the chassis, and the same distance from the chassis, as it would be with the set mounted in the cabinet. This distance is 1-11/32" from the back of the chassis to the front of the loop. If the position of the loop is not correct while adjustments are made on the antenna circuit, the antenna circuit will not track and the set will be weak, when placed in the cabinet.

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers adjusted in Order Shown for Max. Output	Function of Trimmer
Open	455	.01 mfd.	12SA7 Grid or (Stator of center section of variable condenser)	Top of 2nd & 1st IF Trans.	IF
1400	1400	.00005 mfd.	Antenna Clip (With black wire removed).	*C3, C2, C1, trimmers on Variable Condenser	Osc. RF Ant.
600	600	.00005 mfd.	Antenna Clip (With black wire removed)	**Adj. plates of variable cond. for Max. output.	Osc. RF Ant.

If a standard test loop is used with the signal generator for alignment of the receiver, the black wire will be left in the antenna clip, and the approximate sensitivities should be 250 uv/m and 150 uv/m or less at 600 Kc and 1400 Kc respectively. Sets using glass 12SA7 tube may have slightly weaker sensitivities.

Approximate stage by stage sensitivities for 200 Milliwatt output.

IF. - 455 Kc.	10,000 uv	Antenna 1000 Kc	15 uv
Mixer 455 Kc.	150 uv	Antenna 1400 Kc	15 uv
Mixer 1000 Kc.	170 uv	Antenna 600 Kc	25 uv

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.
*Trimmer C3 (oscillator) is located either on the top or bottom of the variable condenser, depending on the type variable used on any particular set.

CAUTION:
**AS THE CONDENSERS ARE ALL TRACKED BEFORE LEAVING THE FACTORY IT IS NOT PROBABLE THAT THE PLATES WILL NEED TO BE ADJUSTED UNLESS WIDE VARIATIONS IN TUBES ARE ENCOUNTERED OR THE CONDENSER HAS BEEN DAMAGED. PLATE BENDING SHOULD NOT BE ATTEMPTED WITHOUT THE PROPER EQUIPMENT, OR BY ANYONE NOT EXPERENCED AT TRACKING CONDENSERS.

The outside plates on the antenna & RF sections of the variable condenser are cut, so they can be bent in or out to give more or less capacity at any given position of the rotor, after the trimmers on the variable have been adjusted at 1400 Kc. A disc type tuning wand affords a quick method of determining whether more or less capacity is needed in antenna circuit. If the output increases when the Iron end of the wand is placed near the loop, the plates should be bent in to give more capacity. If the output increases when the brass or aluminum end of the wand is placed near the loop the plates should be spread out. If the wand indicates that the plates should go closer, but cannot go closer without shorting, the oscillator section plates can be spread, or vice versa, but the calibration should be checked after adjusting the oscillator section. Also the band coverage should be checked to see that 540 Kc can be received.

Since the osc. section has much less capacity than the RF & antenna sections, plate bending will be much more effective in the osc. circuit, and a small change in or out in the plates of this section will have the same effect as a large change in the opposite direction in the other sections.

If the receiver is weak at 1000 Kc the same procedure can be followed at 1000 Kc as outlined above for 600 Kc but this will change the tracking at 600 Kc and may affect 1400 Kc so that all points should be rechecked in the original order.

The condenser should be checked for any possible shorting of the plates after the alignment is completed.

MODEL 6640 NOBLITT-SPARKS INDUSTRIES, INC.

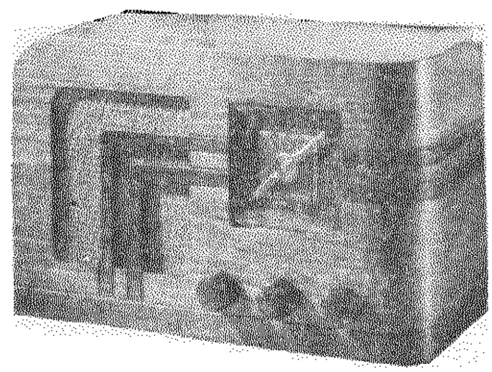
FREQUENCY RANGE
Broadcast .... 540-1600 kc
IF .... 455 kc

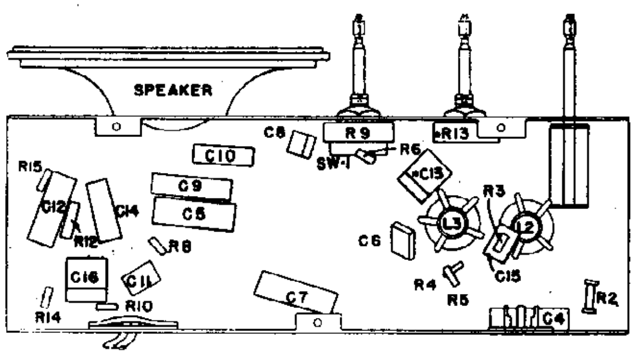
TUBES & FUNCTIONS
12SK7 .... RF Amp.
12SA7 .... Mixer-oscillator
12SK7 .... IF Amp.
12SQ7 .... DET-AVC AF Amp.
35L6 .... Output
35Z5GT .... Rectifier

POWER SUPPLY
105-125 Volts AC-DC, 45 Watts

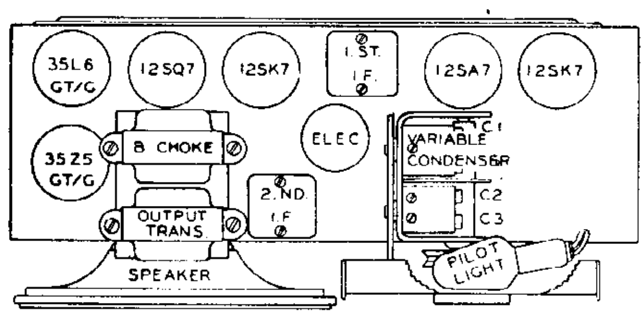
POWER OUTPUT
Undistorted .... .8 Watts
Maximum .... 2.5 Watts
Plate load .... 2000 Ohms

LOUD SPEAKER
Type: Permanent magnet
Size: 5¼ inch
Voice coil impedance .... 3.2 ohms





LOCATION OF PARTS UNDER CHASSIS



TUBE LAYOUT

PARTS LIST

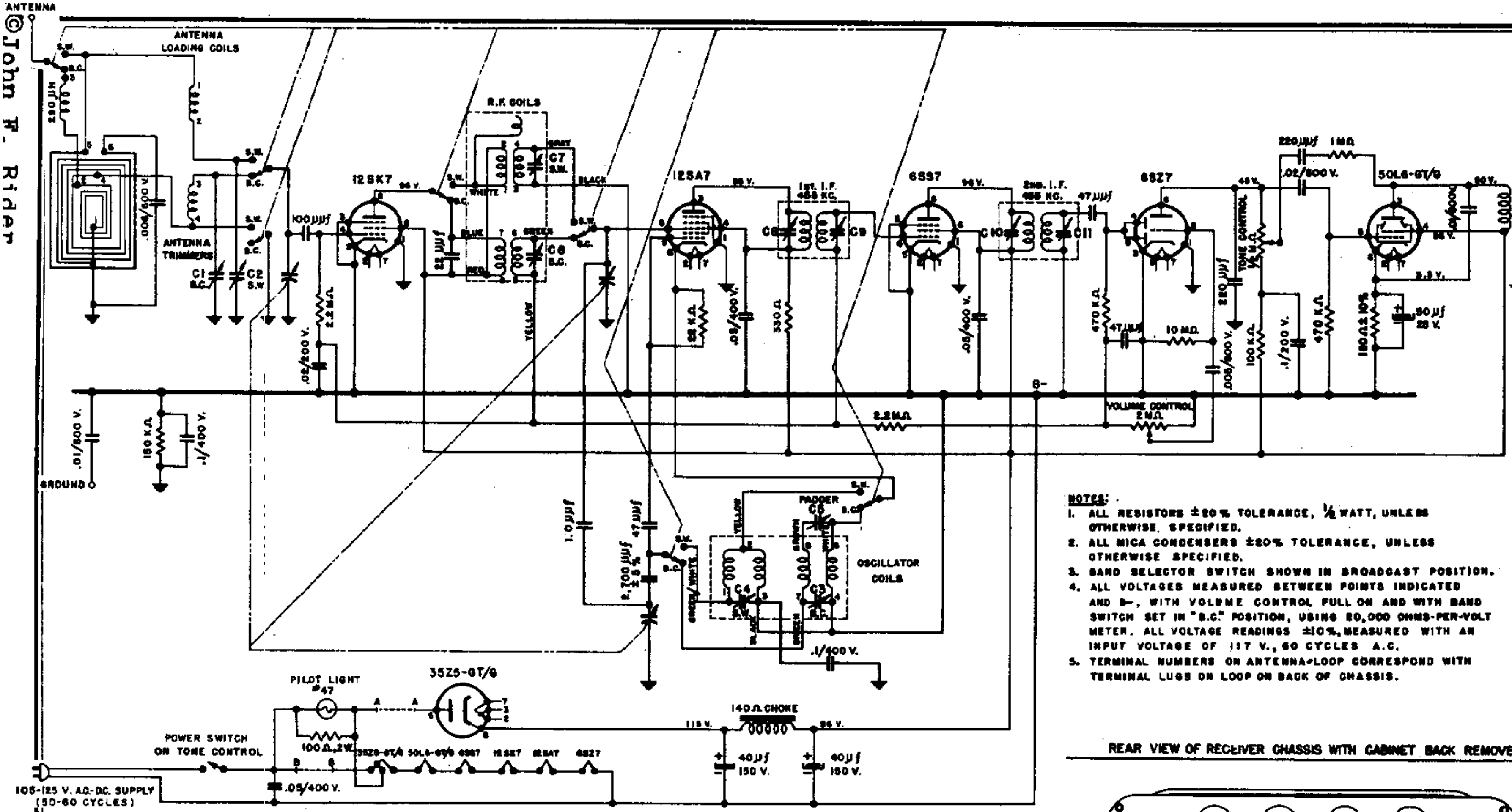
REF. NO.	PART NO.	DESCRIPTION
R1	C20060-103	Resistor, 10,000 ohm ¼W
R2	C20060-334	Resistor, 330,000 ohm ¼W
R3	C20060-332	Resistor, 6800 ohm ¼ W
R4	C20060-223	Resistor, 22,000 ohm ¼ W
R5, R8	C20060-685	Resistor, 6.8 megohm ¼ W
R6	C20060-225	Resistor, 2.2 megohm ¼ W
R7	C20060-473	Resistor, 47,000 ohm ¼ W
R9	C19244	Vol. Cont. & Sw. 500,000 ohms
R10	C20060-474	Resistor, 470,000 ohm ¼ W
R12	C20070-153	Resistor, 15,000 ohms 1 W
R13	C19965	Tone Control, 500,000 ohm
R14	C20060-151	Resistor, 150 ohm ¼ W
R15	C20060-150	Resistor, 15 ohm ¼ W
C1	B18564	**Variable Condenser, 3 gang
C2	or	
C3	C19853	
C4, C10	C20068-103	Cond., .01 uf. 400 VPT
C5	C20068-104	Cond., .1 uf. 400 VPT
C6	C20065-101	Cond., .0001 uf. 500 V Mica
C7, C9	C20068-503	Cond., .05 uf. 400 VPT
C8, C11	C20065-251	Cond., .00025 uf. 500 V Mica
C12	C20068-303	Cond., .03 uf. 400 VPT
C13	C20069-202	Cond., .002 uf. 600 V
C14	C20068-203	Cond., .02 uf. 400 VPT.
C15	A19182	Cond., 14 mmf. 600V Mica
C16	C20069-502	Cond., .005 uf. 600 VPT.
C18A	A19239	Cond., Electrolytic 40-20 uf 150V
C18B	A19674	Terminal Strip
	A19138-1	Spacer Eyelet for Mtg. Var. Cond.
	E21410	Cabinet, Wood, Walnut
	A18272	Dial Crystal
	A19783-1	Knobs, Walnut
L1	AD21423-1	Antenna Loop & Rear Cover Assy.
L2	AC19860-1	R. F. Coil
L3	AC18580-1	Oscillator Coil
L4	AC18583-1	Iron Core Choke
T1	AC21009-1	1st I. F. Coil
T2	AC18578-1	2nd I. F. Coil
T3	AC18582-1	Output Transformer
Spk.	AC19872-1	Speaker Assy. (Spk with Trans. Mtg. Brkt.)
Spk.	C18550	Speaker only
	A19293	Tuning Shaft
	C18432-D	Dial Scale
	A21173	Dial Pointer
	A19132	Dial Drive Cord
	A18254-1	Socket, Tube, Wafer Type
	A16668	Elect. Mtg. Wafer
	A19234	Antenna Socket
	A19134-2	Dial Light Socket
	A19135	Dial Light Bulb, Mazda C7 Night Light, 7W
	B20064-8	Line Cord and Plug Assy.
	A20077-3	Rubber Grommet for Mtg. Var. Cond. B18564 & 19853
	A19328-2	Rubber Grommet for Mtg. Var. Cond. C19583 Only
	A21422	Carton with Fillers

** When ordering a replacement Variable Condenser, be sure to use the part number which is stamped on the back of the original Condenser.

MODELS 6-604V-110, 6-604V-220, early

OLYMPIC RADIO & TELEV. INC.

MODELS 6-604W-110, 6-604W-150, 6-604W-220, early

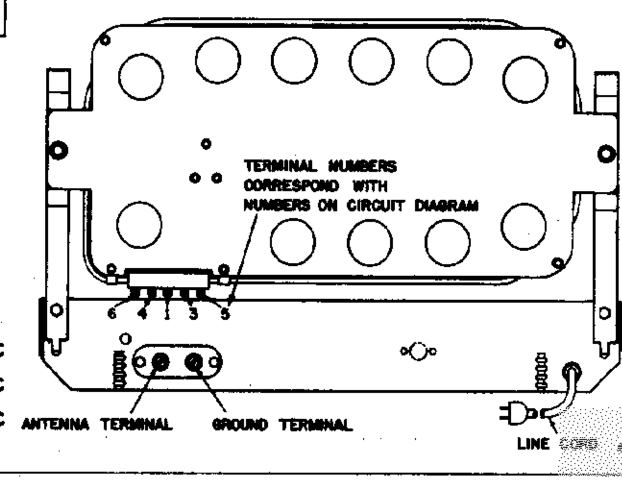


NOTES:
1. ALL RESISTORS ±20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ±20% TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. BAND SELECTOR SWITCH SHOWN IN BROADCAST POSITION.
4. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND B–, WITH VOLUME CONTROL FULL ON AND WITH BAND SWITCH SET IN "B.C." POSITION, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ±10%, MEASURED WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES A.C.
5. TERMINAL NUMBERS ON ANTENNA-LOOP CORRESPOND WITH TERMINAL LUGS ON LOOP ON BACK OF CHASSIS.

FOR MODEL	RESISTOR REQUIRED
6-604-110	NO RESISTORS REQUIRED. CONNECT A TO A AND B TO B.
6-604-150	RESISTOR A-A, 33 Ω ±10%, 1W. RESISTOR B-B, 200 Ω ±5%, 10W.
6-604-220	RESISTOR A-A, 260 Ω; RESISTOR B-B, 820 Ω; 35W FOR ENTIRE RESISTOR UNIT.

LEGEND: CHASSIS GROUND

REAR VIEW OF RECEIVER CHASSIS WITH CABINET BACK REMOVED

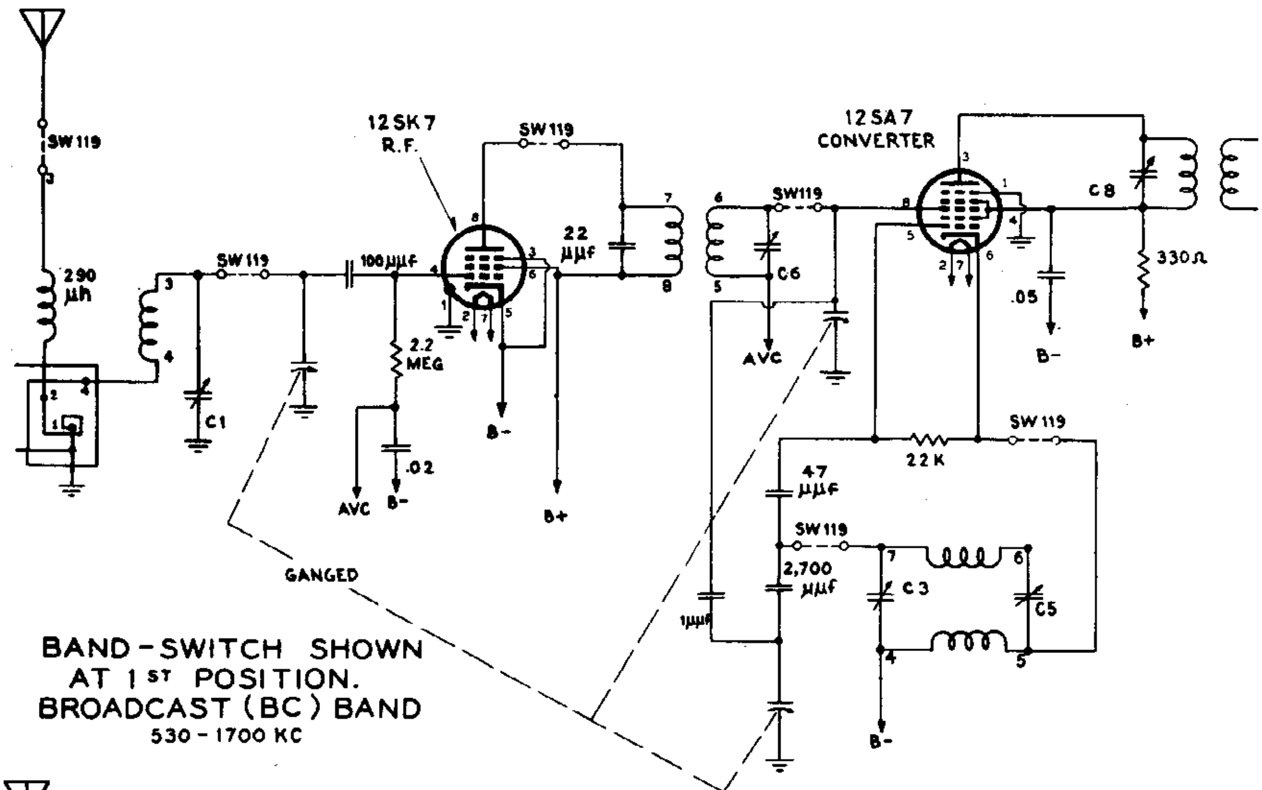


Frequency Range 530-1700 kc and 5.7 - 18.4 mc

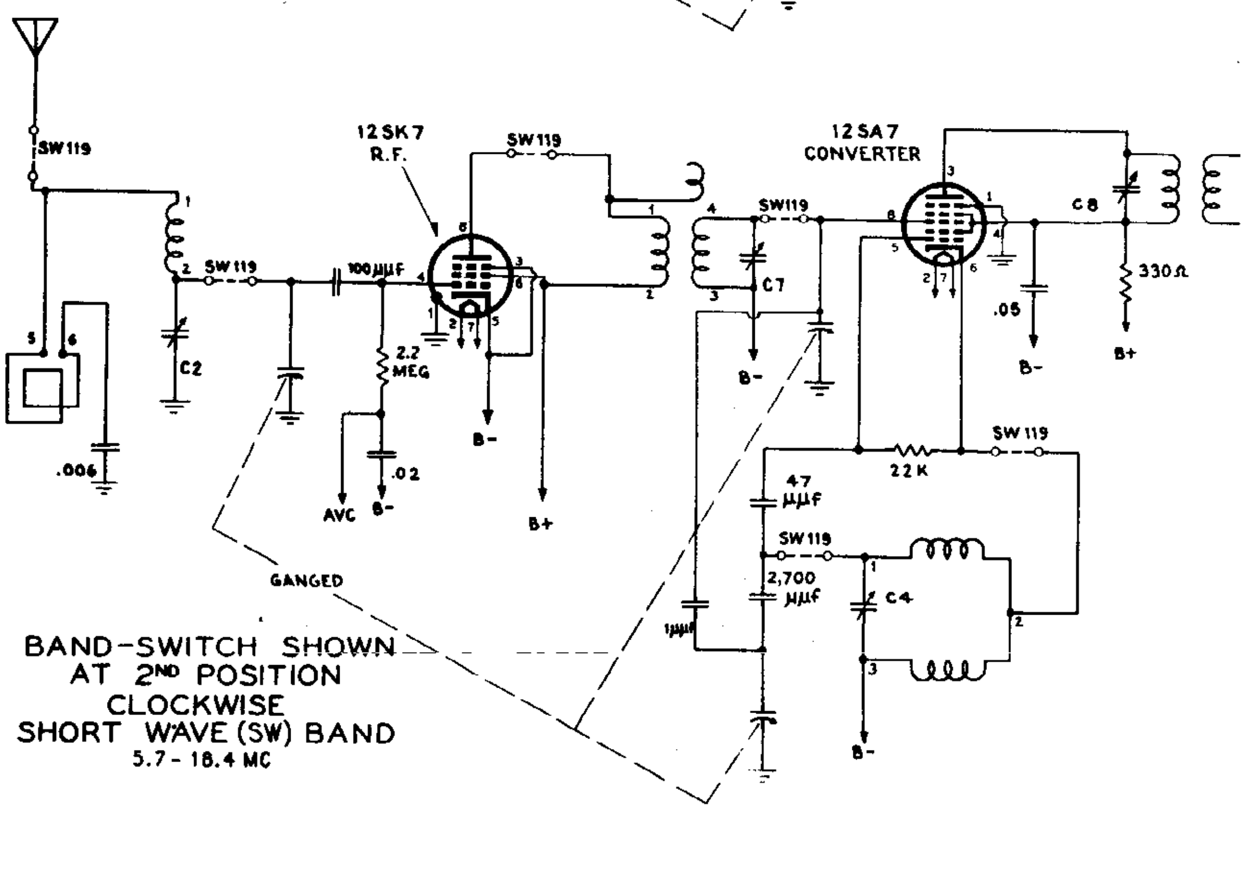
Power Requirement for 6-604-110 105-125 volts a-c 50-60 cycles or 105-125 volts d-c
for 6-604-150 140-160 volts a-c 50-60 cycles or 140-160 volts d-c
for 6-604-220 200-240 volts a-c 50-60 cycles or 200-240 volts d-c

"clarified schematics"

MODELS 6-604W-110, early, OLYMPIC RADIO & TELEV. INC.
6-604W-150, early,
6-604W-220, early
MODELS 6-604V-110, early,
6-604V-220, early



BAND - SWITCH SHOWN
AT 1ST POSITION.
BROADCAST (BC) BAND
530 - 1700 KC



BAND-SWITCH SHOWN
AT 2ND POSITION
CLOCKWISE
SHORT WAVE (SW) BAND
5.7 - 18.4 MC

SERVICE AND ALIGNMENT INSTRUCTIONS

In this receiver the B-voltage is not returned directly to ground but to a common B-return. To avoid hum modulation and to insure proper alignment it is therefore recommended to use a radiated signal for alignment. To radiate the signal connect a loop of about 6" to 8" diameter 1 turn of #14 or #12 wire across the output of the signal generator and place this loop parallel to the loop of the receiver to be aligned at a distance of 8" or 10".

ALIGNMENT:

Equipment required: Modulated r-f signal generator, output meter, insulated screw driver, two .1 mfd 400 volts condensers.

With the receiver removed from the cabinet connect output meter across voice coil. Connect ground side of the signal generator in series with a .1/400 volt condenser to the common B-; turn volume control fully on, and keeping the output of the signal generator as low as possible, proceed in the sequence as shown on the alignment chart.

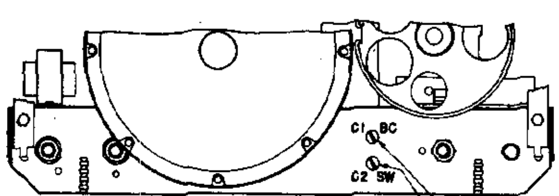
To facilitate alignment of the receiver when removed from cabinet, calibration points are provided on the light diffuser plate, which is mounted to the chassis.

Before aligning, close the variable condenser fully counterclockwise (plates fully closed) and check that pointer coincides with the reference dot (extreme left dot) on the diffuser plate.

NOTE:

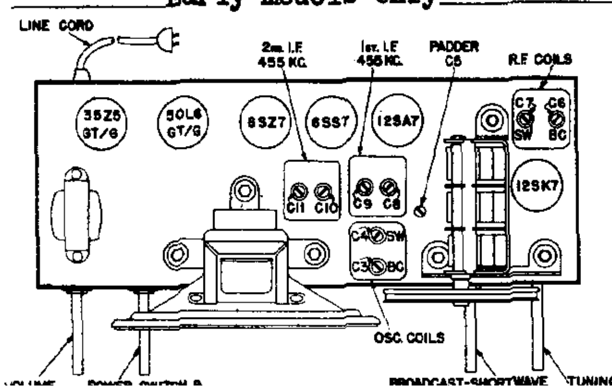
In order to adjust the short wave oscillator trimmer and the short wave r-f trimmer accurately to the fundamental frequency and not to the image signal, turn the trimmers first to the maximum capacity position (fully tight). From this position loosen the trimmer through one peak indication on the output meter until a second peak is obtained. Adjust for maximum output on this second peak.

To check whether this procedure has been accurately performed, ascertain that an image signal can be received (much weaker) by tuning the signal generator to a frequency 910 kilocycles above the alignment frequency.



FRONT VIEW

Early models only



MODELS 6-604W series, **OLYMPIC RADIO & TELEV. INC.**
early and late
MODELS 6-604V series,
early and late

For the 604 series late production, step 2 should read:
R.F. section of variable condenser or pin 7 of the 12BE6 tube in series with a .1mfd, 400 volt condenser.

ALIGNMENT PROCEDURE CHART

STEP	SET BAND SWITCH ON	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE).
1	B.C.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 4 OF THE 6SG7 TUBE IN SERIES WITH A .1 MFD, 400 VOLT CONDENSER.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN).	C 11 AND C 10 (2nd. I.F. TRANSFORMER)
2	B.C.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 8 OF THE 12SA7 TUBE IN SERIES WITH A .1 MFD, 400 VOLT CONDENSER.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN).	C 9 AND C 8 (1st. I.F. TRANSFORMER)
3	B.C.	REPEAT STEPS 1 AND 2			
4	B.C.	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP).	1700 KC.	1700 KC. CALIBRATION POINT ON DIFFUSER PLATE.	C 3 (OSCILLATOR TRIMMER)
5	B.C.	↓	1400 KC.	RESONANCE, APPROXIMATELY 1400 KC. CALIBRATION POINT ON DIFFUSER PLATE.	C 6 AND C 1 (R.F. AND ANTENNA TRIMMERS)
6	B.C.	↓	600 KC.	RESONANCE, APPROXIMATELY 600 KC. CALIBRATION POINT ON DIFFUSER PLATE.	C 5 (PADDER) ROCK VARIABLE FOR MAXIMUM SIGNAL
7	B.C.	↓	REPEAT STEPS 4, 5 AND 6		
8	S.W.	↓	18 MC.	18 MC. CALIBRATION POINT ON DIFFUSER PLATE	C 4 (OSCILLATOR TRIMMER) SECOND PEAK FROM TIGHT POSITION. C 7 (R.F. TRIMMER) C 2 (ANTENNA TRIMMER)
9	S.W.	↓	6 MC.	RESONANCE	CHECK THAT POINTER (AT RESONANCE) COINCIDES WITH 6 MC. CALIBRATION POINT. IF NOT REPEAT STEP 8.
10	S.W.	↓	REPEAT STEPS 8 AND 9		

NOTE: In order to adjust the short wave oscillator trimmer and the short wave r-f trimmer accurately to the fundamental frequency and not to the image signal, turn the trimmers first to the maximum capacity position (fully tight). From this position loosen the trimmer through one peak indication on the outputmeter until a second peak is obtained. Adjust for maximum output on this second peak.
To check whether this procedure has been accurately performed, ascertain that an image signal can be received (much weaker) by tuning the signal generator to a frequency 910 kilocycles above the alignment frequency.

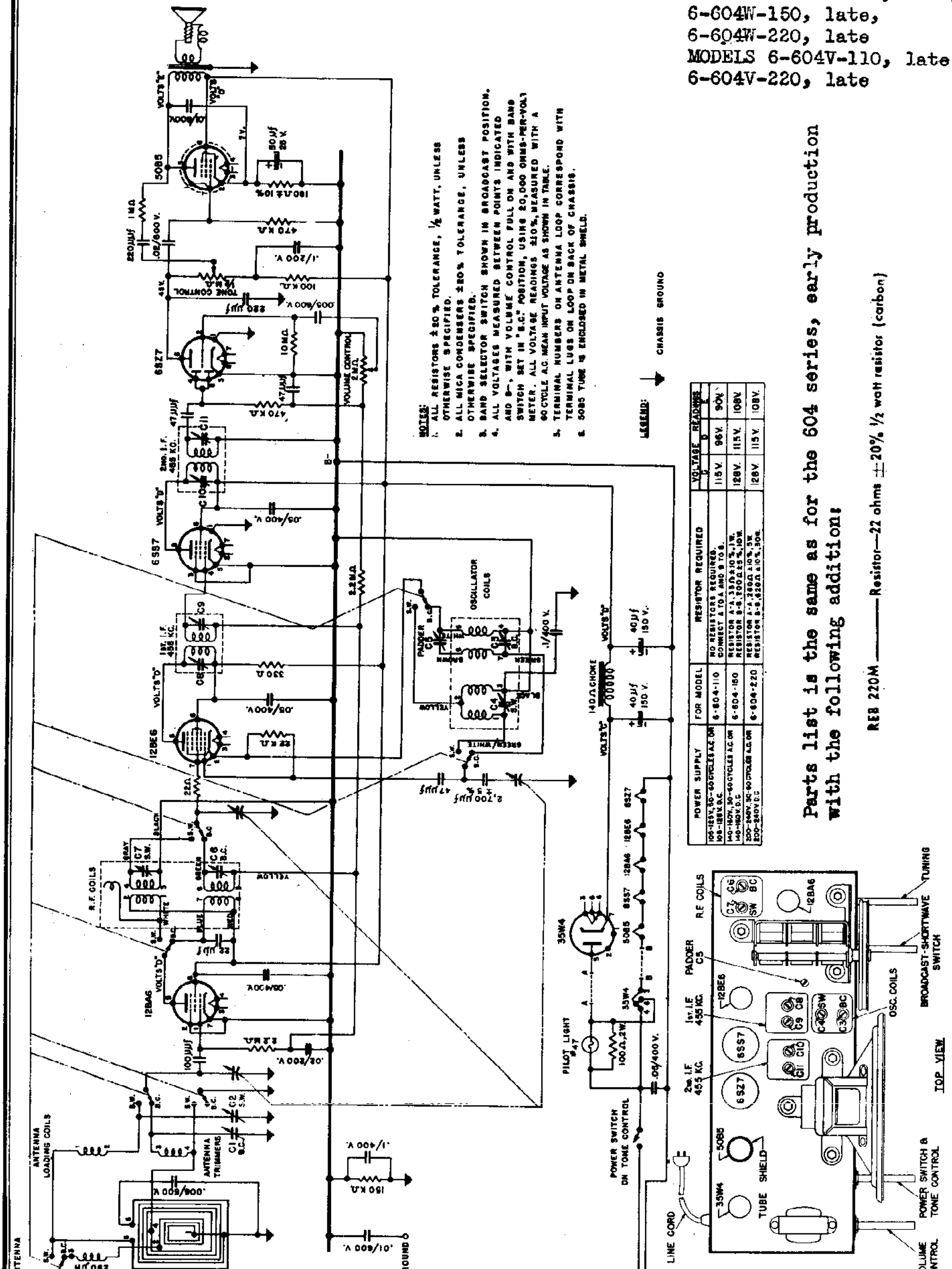
REPLACEMENT PARTS

Part No.	Description
BU 187	Bulb—#47 Mazda 6.3V pilot light bulb
CA 154W	Cabinet—walnut bakelite cabinet
CA 154V	Cabinet—ivory bakelite cabinet
CK 114	Choke—140 ohms 85 mils filter choke
CL 211	Coil—antenna loading coil
CL 212	Coil—shielded oscillator coil
CL 224	Coil—shielded R.F. coil (BC&SW)
CO 111	Condenser—40/40/150W.V.&50/25W.V. electrolytic condenser
CO 311	Condenser—1.0 mmfd ±20% fixed condenser
CT 389	Condenser—dual 3-35 mmfd trimmer condenser
CT 440	Condenser—350-780 mmfd padder condenser
CV 144	Condenser—3 gang variable condenser
DL 454	Dial—glass dial scale
KN 671	Knob—walnut knob marked "VOLUME"
KN 672	Knob—walnut knob marked "OFF-ON TONE"
KN 673	Knob—walnut knob marked "TUNING"
KN 674	Knob—walnut knob marked "BC-SW"
KN 675	Knob—ivory knob marked "VOLUME"
KN 676	Knob—ivory knob marked "OFF-ON TONE"
KN 677	Knob—ivory knob marked "TUNING"
KN 678	Knob—ivory knob marked "BC-SW"
LP 213	Loop—Antenna
PO 334	Pointer
PT 105	Control—2 megohm volume control
PT 106	Control—½ megohm tone control (with S.P.S.T. Switch)
RCM20A101M	Condenser—100 mmfd ±20% mica condenser
RCM20A220M	Condenser—22 mmfd ±20% mica condenser
RCM20A221M	Condenser—220 mmfd ±20% mica condenser
RCM20A470M	Condenser—47 mmfd ±20% mica condenser
RCM30B272J	Condenser—2700 mmfd ±5% mica condenser
RCP10W2104A	Condenser—.1/200 W.V. tubular paper condenser
RCP10W2203A	Condenser—.02/200 W.V. tubular paper condenser
RCP10W4104L	Condenser—.1/400 W.V. tubular paper condenser
RCP10W4503A	Condenser—.05/400 W.V. tubular paper condenser
RCP10W6103A	Condenser—.01/600 W.V. tubular paper condenser
RCP10W6203A	Condenser—.02/600 W.V. tubular paper condenser
RCP10W6502A	Condenser—.005/600 W.V. tubular paper condenser
RCP10W6602K	Condenser—.006/600 W.V. tubular paper condenser
RE 802	Resistor—200 ohms ±5% 10 watt resistor
RE 804	Resistor—880 ohms 35 watt resistor unit tapped at 260 ohms
REB 104M	Resistor—100,000 ohms ±20% ½ watt resistor
REB 105M	Resistor—1 megohm ±20% ½ watt resistor
REB 106M	Resistor—10 megohms ±20% ½ watt resistor
REB 154M	Resistor—150,000 ohms ±20% ½ watt resistor
REB 181K	Resistor—180 ohms ±10% ½ watt resistor
REB 223M	Resistor—22,000 ohms ±20% ½ watt resistor
REB 225M	Resistor—2.2 megohms ±20% ½ watt resistor
REB 331M	Resistor—330 ohms ±20% ½ watt resistor
REB 474M	Resistor—470,000 ohms ±20% ½ watt resistor
REC 330K	Resistor—33 ohms ±10% 1 watt resistor
RED 101M	Resistor—100 ohms ±20% 2 watt resistor
SK 115	Speaker—6½" P.M. speaker with 2000 ohm output transformer
SO 313	Socket—insulated "U" pilot light socket assembly
SP 191	Spring—dial drive lock spring
ST 412	Back—printed cardboard back
ST 459	Light Diffuser
SW 119	Switch—3 wafer 2 position band switch
TR 118	Transformer—1st & 2nd I.F. transformer

455KC

OLYMPIC RADIO & TELEV. INC.

MODELS 6-604W-110, late,
6-604W-150, late,
6-604W-220, late
MODELS 6-604V-110, late
6-604V-220, late



NOTES:
1. ALL RESISTORS ±20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ±20% TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. BAND SELECTOR SWITCH SHOWN IN BROADCAST POSITION.
4. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND B−, WITH VOLUME CONTROL FULL ON AND WITH BAND SWITCH SET IN "B.C." POSITION, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ±10%, MEASURED WITH A 60 CYCLE A.C. MEAN INPUT VOLTAGE AS SHOWN IN TABLE.
5. TERMINAL NUMBERS ON ANTENNA LOOP CORRESPOND WITH TERMINAL LUGS ON LOOP ON BACK OF CHASSIS.
6. 50B5 TUBE IS ENCLOSED IN METAL SHIELD.

LEGEND: CHASSIS GROUND

POWER SUPPLY	FOR MODEL	RESISTOR REQUIRED	VOLTAGE READINGS C	D	E
106-125V, 50-60 CYCLES A.C. OR 106-125V D.C.	6-604-110	NO RESISTORS REQUIRED. CONNECT A TO A AND B TO B.	115V.	96V.	90V.
140-160V, 50-60 CYCLES A.C. OR 140-160V D.C.	6-604-150	RESISTOR A-A, 35Ω ±10%, 1W. RESISTOR B-B, 700Ω ±5%, 10W.	128V.	115V.	108V.
200-240V, 50-60 CYCLES A.C. OR 200-240V D.C.	6-604-220	RESISTOR A-A, 260Ω ±10%, 5W. RESISTOR B-B, 620Ω ±10%, 30W.	128V.	115V.	108V.

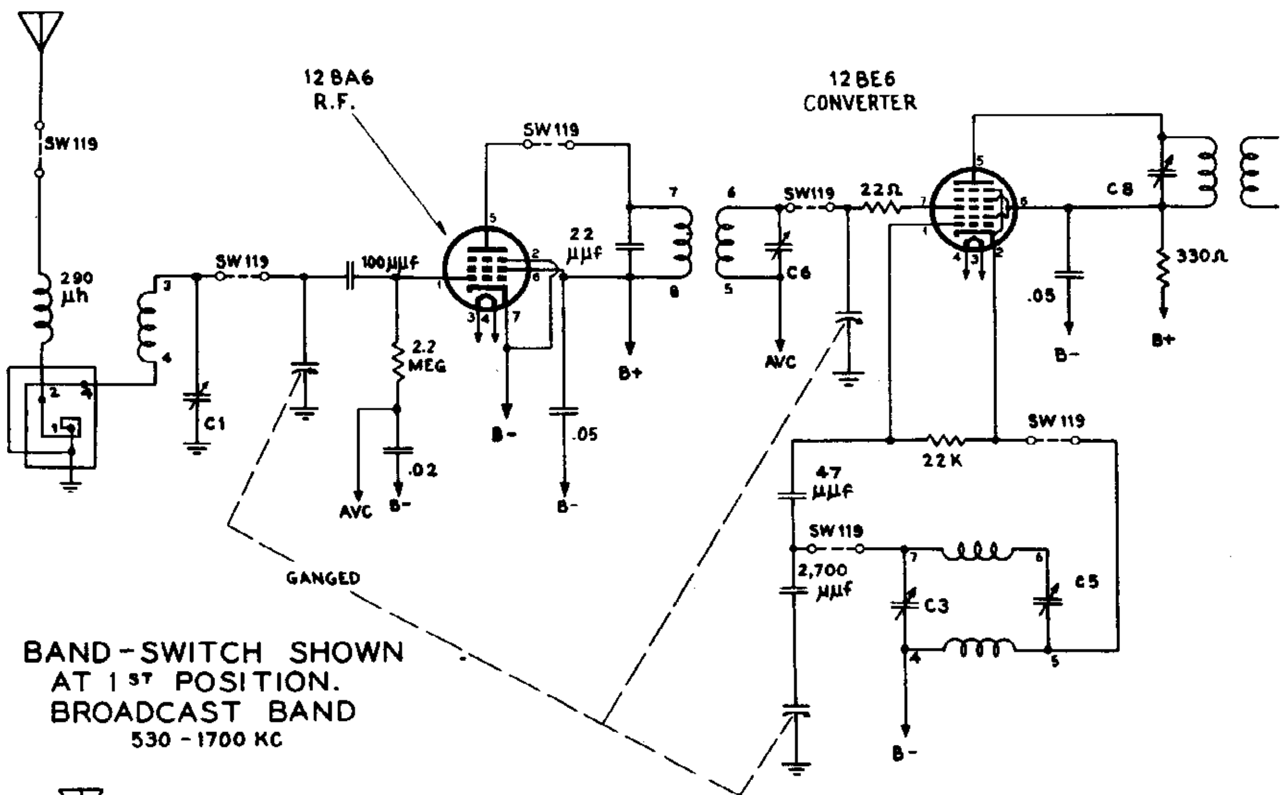
Parts list is the same as for the 604 series, early production with the following addition:

REB 220M ——— Resistor—22 ohms ±20% 1/2 watt resistor (carbon)

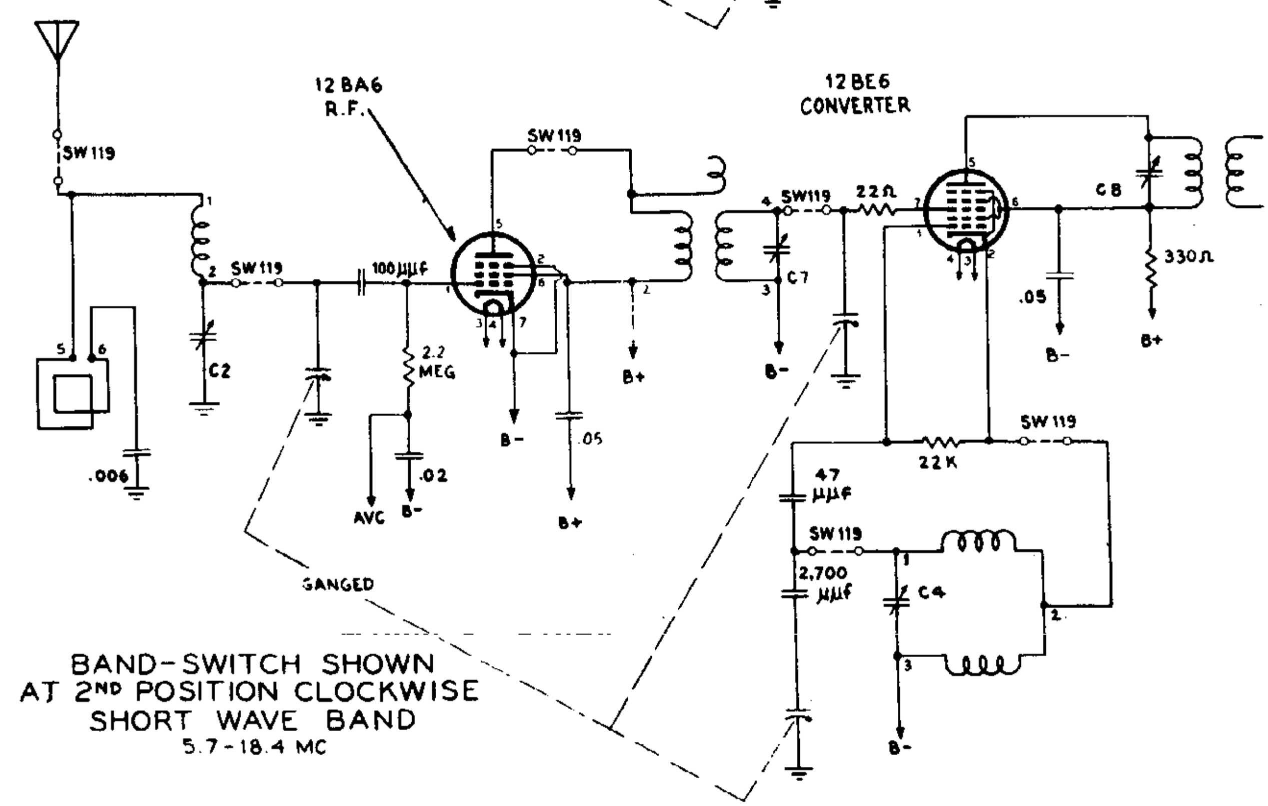
For additional data see pages 17-3 and 17-4

"clarified schematics"

MODELS 6-604W-110, late, OLYMPIC RADIO & TELEV. INC.
6-604W-150, late,
6-604W-220, late
MODELS 6-604V-110, late,
6-604V-220, late

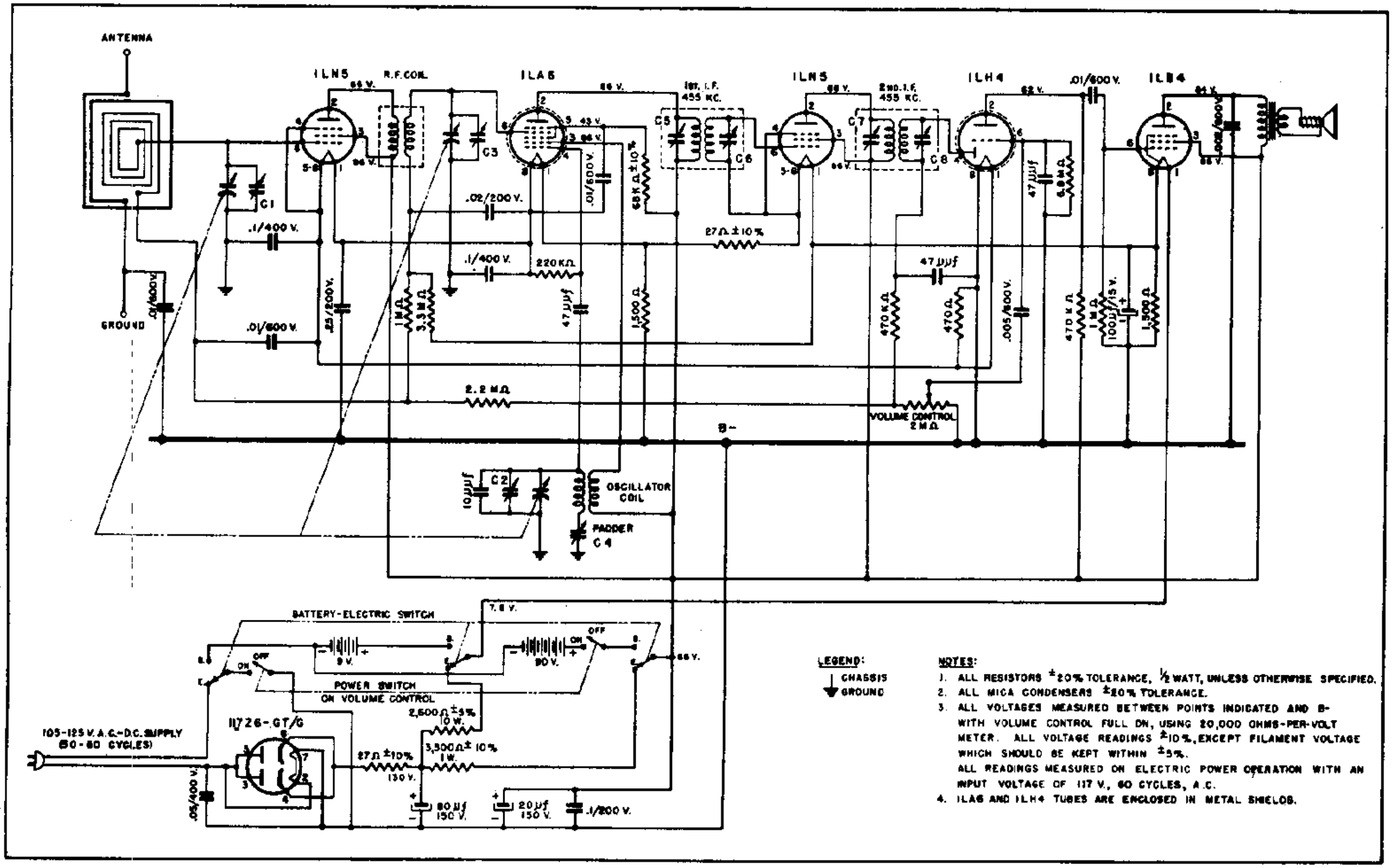


BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND 530 - 1700 KC



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE SHORT WAVE BAND 5.7 - 18.4 MC

OLYMPIC RADIO & TELEV. INC.



NOTES:
1. ALL RESISTORS ±20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ±20% TOLERANCE.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND B- WITH VOLUME CONTROL FULL ON, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ±10%, EXCEPT FILAMENT VOLTAGE WHICH SHOULD BE KEPT WITHIN ±5%. ALL READINGS MEASURED ON ELECTRIC POWER OPERATION WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.
4. 1LA6 AND 1LH4 TUBES ARE ENCLOSED IN METAL SHIELDS.

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	SET POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN)	C8, C7, C6, C5 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL OF ANTENNA LOOP IN SERIES WITH 50 MMFD. COND.	1500 KC.	1500 KC. (150 ON. DIAL)	C2, C3, C1 (OSCILLATOR, R.F. AND ANTENNA TRIMMERS)
3		600 KC.	600 KC. (APPROX. 60 ON DIAL)	C4 (PADDER) ROCK DIAL FOR MAXIMUM SIGNAL
4		REPEAT STEPS 2 AND 3		

MODEL 6-606-U
MODEL 6A-606-U

OLYMPIC RADIO & TELEV. INC.

Frequency Range 530 - 1700 kc.

Power Requirement 105 - 125 volts a-c, 50 to 60 cycles, or 105 - 125 volts d-c, or 9 volts "A" and 90 volts "B' battery supply.

Power Consumption on electric operation — 20 watts

Model 6-606 is a portable six tube superheterodyne receiver designed for operation on a-c and d-c, as well as on self contained batteries. It will operate on 105-125 volts a-c, 50 to 60 cycles; 105-125 volts d-c or on 9 volts "A" and 90 volts "B" batteries.

BATTERIES

The batteries recommended for this receiver are two #746 "Eveready" 4½ volt batteries (National Carbon Co.) and two #482 "Eveready" 45 volt batteries (National Carbon Co.) or replacement types of equal size and voltage. To replace batteries, remove back of cabinet by pulling at top of back. Batteries are accessible without removing chassis or loop. Consult layout drawing for correct placement and connections of batteries.

For tube replacement it is not necessary to remove the chassis from the cabinet. Access to the tubes may be made by removing the center screw on the loop holding same to the bracket, and then lifting loop carefully off the bracket so as to avoid breaking of wires connecting same.

For ALIGNMENT the chassis must be removed from case. Remove first batteries and then the three screws holding chassis to the bottom of the shelf.

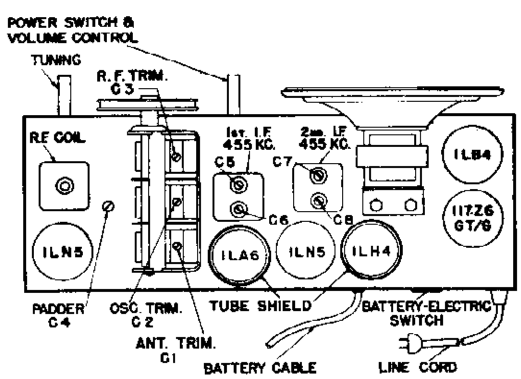
ALIGNMENT

Equipment Required: Modulated r-f signal generator; output meter; insulated screw driver; two .1 mfd 400 volt and one 50 mmfd 400 volt condensers.

Turn variable condenser fully counterclockwise (plates fully closed) and check that pointer coincides with the first thin calibration mark on the dial. Connect the output meter and signal generator as follows:

Output meter: Connect across voice coil and turn volume control to maximum.

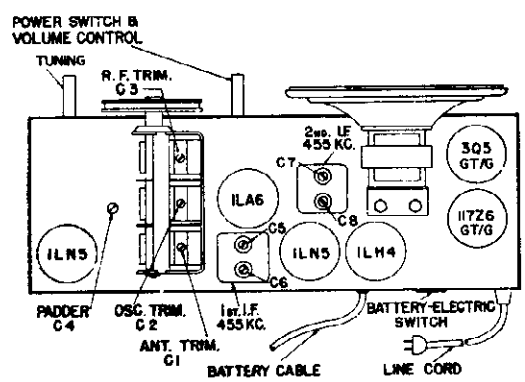
Signal generator: Connect the low side of the signal generator to the receiver chassis thru a .1 mfd condenser and keep output as low as possible, then proceed in the sequence shown on the alignment chart.



TOP VIEW OF CHASSIS

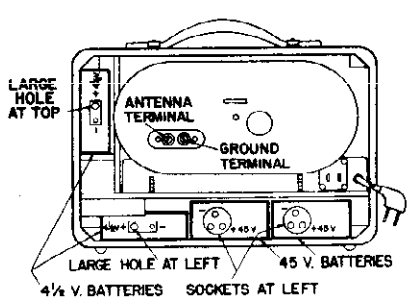
NOTE:
ILA6 AND ILH4 TUBES ARE ENCLOSED IN METAL SHIELDS.

MODEL 6-606-U



TOP VIEW OF CHASSIS

MODEL 6A-606-U



REAR VIEW OF CABINET
SHOWING PLACEMENT OF BATTERIES

OLYMPIC RADIO & TELEV. INC.

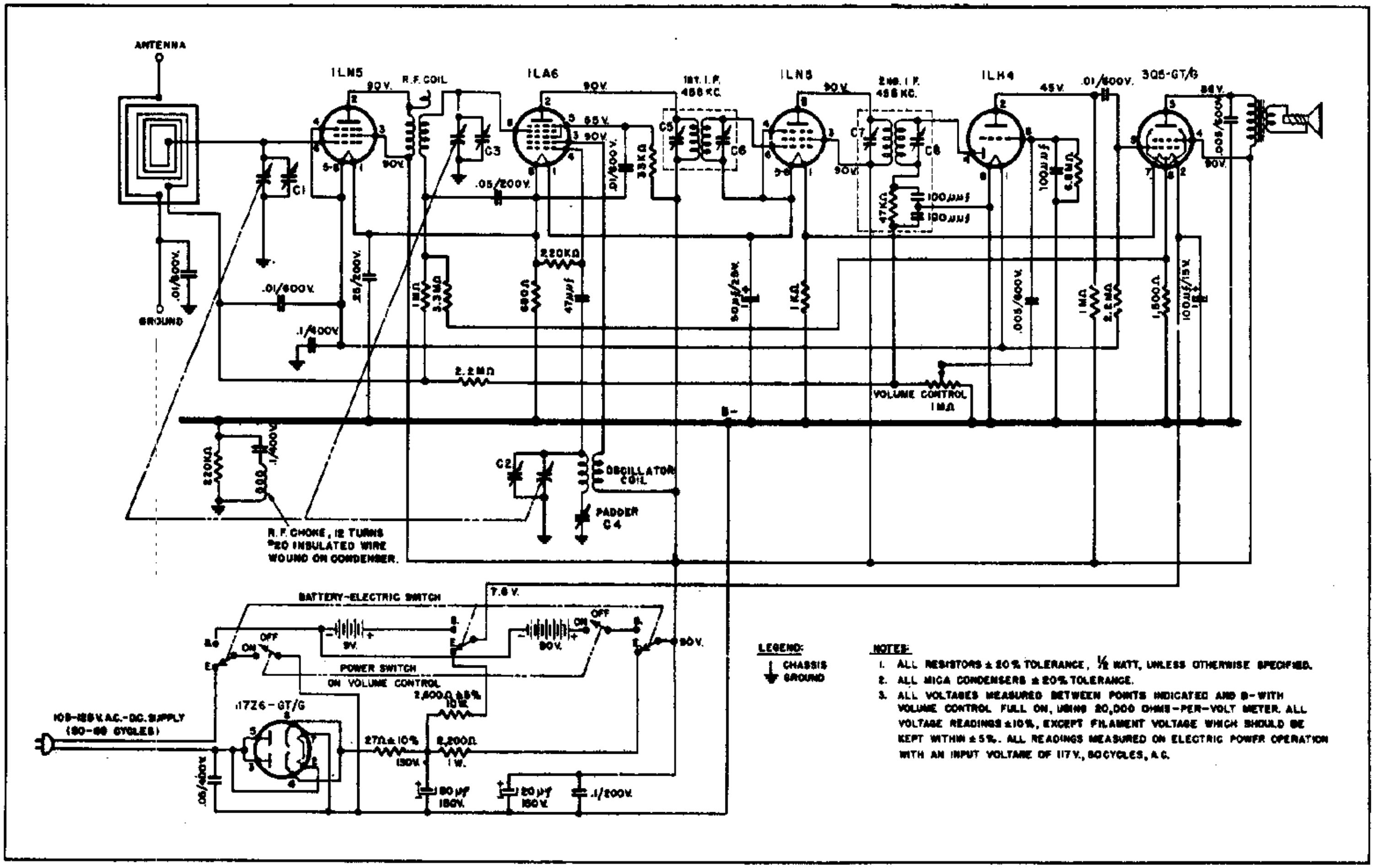
REPLACEMENT PARTS

Part No.	Description
BK-405	Bracket-Resistor mounting bracket
CA-229	Cabinet-portable cabinet
CB-335	Cable-battery cable
CL-176	Coil-R.F. coil, shielded
CL-177	Coil-oscillator coil
CO-182	Condenser-80/20/150W.V. & 100/15W.V. electrolytic condenser
CR-299	Crystal-dial crystal
CT-388	Condenser-220-680 mmfd padder condenser
CV-146	Condenser-3 gang variable condenser (with pulley)
DL-391	Dial-metal dial scale
ES-274-1	Escutcheon-moulded escutcheon
KN-260	Knob-walnut knob
KN-261	Knob-walnut knob with dot
LC-223	Line Cord
LP-178	Loop-Antenna
PO-395	Pointer-dial pointer
PT-383	Control-volume control 2 megohms with D.P.S.T. switch
RCM20A100M	Condenser-10 mmfd ±20% mica condenser
RCM20A470M	Condenser-47 mmfd ±20% mica condenser
RCP10W2104A	Condenser-.1/200W.V. paper tubular condenser
RCP10W2203A	Condenser-.02/200W.V. paper tubular condenser
RCP10W2254A	Condenser-.25/200W.V. paper tubular condenser
RCP10W4104L	Condenser-.1/400W.V. paper tubular condenser
RCP10W4503A	Condenser-.05/400W.V. paper tubular condenser
RCP10W4103A	Condenser-.01/400W.V. paper tub-

Part No.	Description
RCP10W6202M	Condenser-.002/600W.V. paper tubular condenser
RCP10W6502A	Condenser-.005/600W.V. paper tubular condenser
RE-407	Resistor-2600 ohms ±5% 10 watt resistor
REB105M	Resistor-1 megohm ±20% 1/2 watt resistor
REB152M	Resistor-1500 ohms ±20% 1/2 watt resistor
REB224M	Resistor-220,000 ohms ±20% 1/2 watt resistor
REB225M	Resistor-2.2 megohms ±20% 1/2 watt resistor
REB270K	Resistor-27 ohms ±10% 1/2 watt resistor
REB335M	Resistor-3.3 megohms ±20% 1/2 watt resistor
REB471M	Resistor-470 ohms ±20% 1/2 watt resistor
REB474M	Resistor-470,000 ohms ±20% 1/2 watt resistor
REB683K	Resistor-68,000 ohms ±10% 1/2 watt resistor
REB685M	Resistor-6.8 megohms ±20% 1/2 watt resistor
REC332K	Resistor-3300 ohms ±10% 1 watt resistor
SD-607	Shield-Tube Shield
SK-156	Speaker-5" P.M. Speaker with output transformer
SP-191	Spring-Drive shaft retaining spring
SW-193	Switch-battery-electric T.P.D.T. slide switch
TR-186	Transformer-I.F. 455 K.C. Transformer

MODEL 6A-606-U

OLYMPIC RADIO & TELEV. INC.



ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	SET POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	R.F. SECTION OF VARIABLE CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	EXTREME RIGHT HAND POSITION. (CONDENSER PLATES FULLY OPEN)	C8, C7, C6, C5 AND REPEAT IN SAME ORDER (1st. AND 2nd. I.F. TRANSFORMERS)
2	ANTENNA TERMINAL	1500 KC.	1500 KC. (150 ON DIAL)	C2, C3, C1 (OSCILLATOR, R.F. AND ANTENNA TRIMMERS)
3	OF ANTENNA LOOP IN SERIES WITH	600 KC.	600 KC. (APPROX. 60 ON DIAL)	C4 (PADDER) ROCK DIAL FOR MAXIMUM SIGNAL
4	50 MMFD. COND.	REPEAT STEPS 2 AND 3		

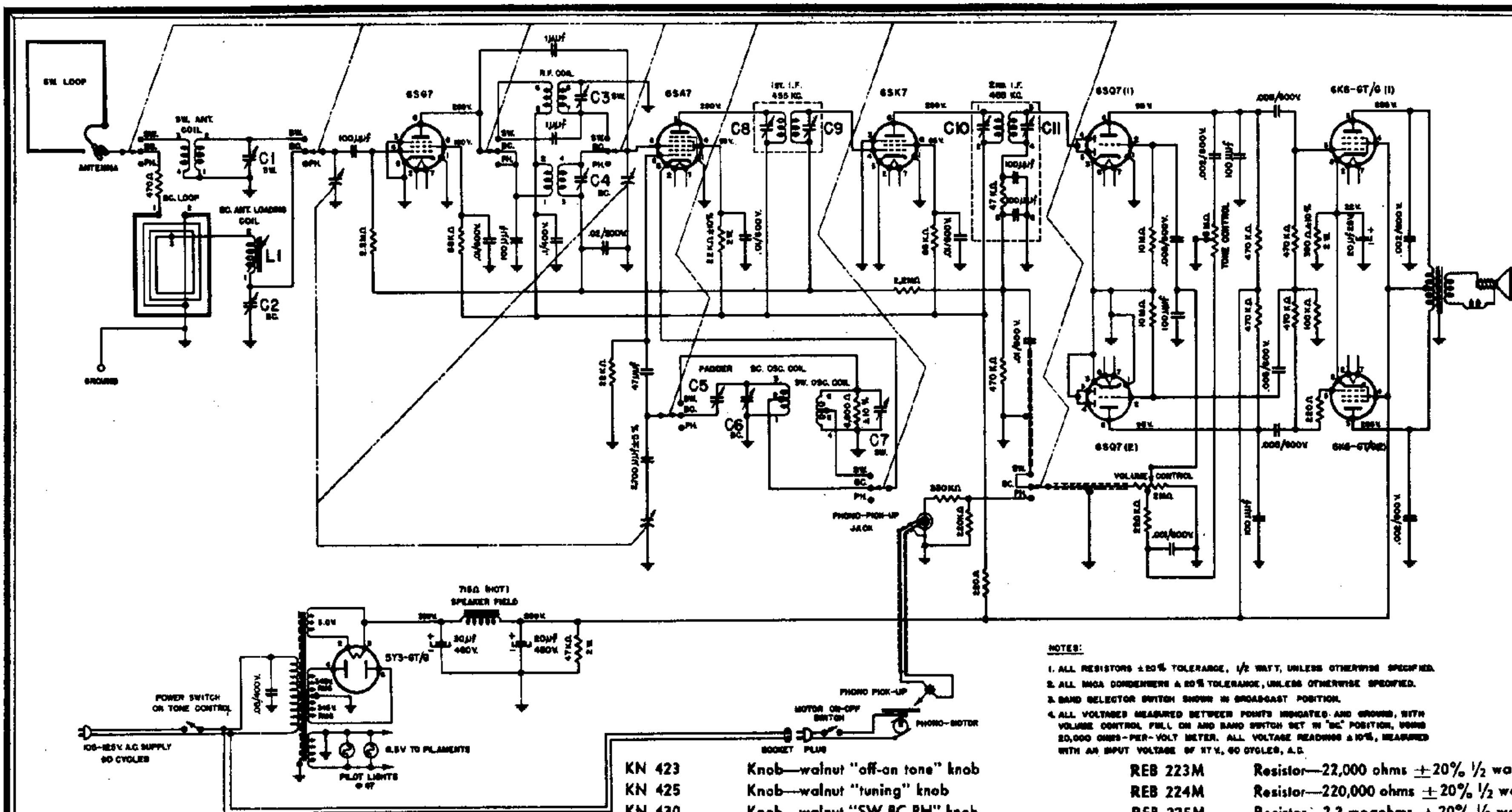
OLYMPIC RADIO & TELEV. INC.

REPLACEMENT PARTS

Part No.	Description	Part No.	Description
BK-405	Bracket-Resistor mounting bracket	RCP10W6502A	Condenser-.005/600WV paper tubular condenser
CA-229	Cabinet-portable cabinet	RE-407	Resistor-2600 ohms ±5% 10 watt resistor
CB-335	Cable-battery cable	REB102M	Resistor-1000 ohms ±20% 1/2 watt resistor
CL-177	Coil-oscillator coil	REB105M	Resistor-1 megohm ±20% 1/2 watt resistor
CL-630	Coil-R.F. coil	REB152M	Resistor-1500 ohms ±20% 1/2 watt resistor
CO-182	Condenser-80/20/150WV & 100/15WV electrolytic condenser	REB224M	Resistor-220,000 ohms ±20% 1/2 watt resistor
CO 808	Condenser-50 mfd /25 W.V. electrolytic condenser	REB225M	Resistor-2.2 megohms ±20% 1/2 watt resistor
CR-299	Crystal-dial crystal	REB270K	Resistor-27 ohms ±10% 1/2 watt resistor
CT-388	Condenser-220-680 mmfd padder condenser	REB333M	Resistor-33,000 ohms ±20% 1/2 watt resistor
CV-146	Condenser-3 gang variable condenser (with pulley)	REB335M	Resistor-3.3 megohms ±20% 1/2 watt resistor
DL-391	Dial-metal dial scale	REB681M	Resistor-680 Ohms ±20% 1/2 watt resistor
ES-274-1	Escutcheon-moulded escutcheon	REB685M	Resistor-6.8 megohms ±20% 1/2 watt resistor
KN-260	Knob-walnut knob	REC 222M	Resistor-2200 ohms ±20% 1 watt resistor
KN-261	Knob-walnut knob with dot	SK-476	Speaker-5" P.M. Speaker with output transformer
LP-178	Loop-Antenna	SP-191	Spring-Drive shaft retaining spring
PO-395	Pointer-dial pointer	SW-193	Switch-battery-electric T.P.D.T. slide switch
PT-576	Control-volume control 1 megohm with D.P.S.T. switch	TR-707	Transformer-I.F. 455 K.C. input-Transformer
RCM20A101M	Condenser-100 mmf ±20% mica condenser	TR-708	Transformer-Output I.F. 455 K.C. Transformer with built-in I.F. filter
RCM20A470M	Condenser-47 mmfd ±20% mica condenser		
RCP10W2254A	Condenser-.25/200W.V. paper tubular condenser		
RCP10W4104L	Condenser-.1/400W.V. paper tubular condenser		
RCP10W4503A	Condenser-.05/400WV paper tubular condenser		
RCP10W6103A	Condenser-.01/600WV paper tubular condenser		

MODEL 7-724

OLYMPIC RADIO & TELEV. INC.



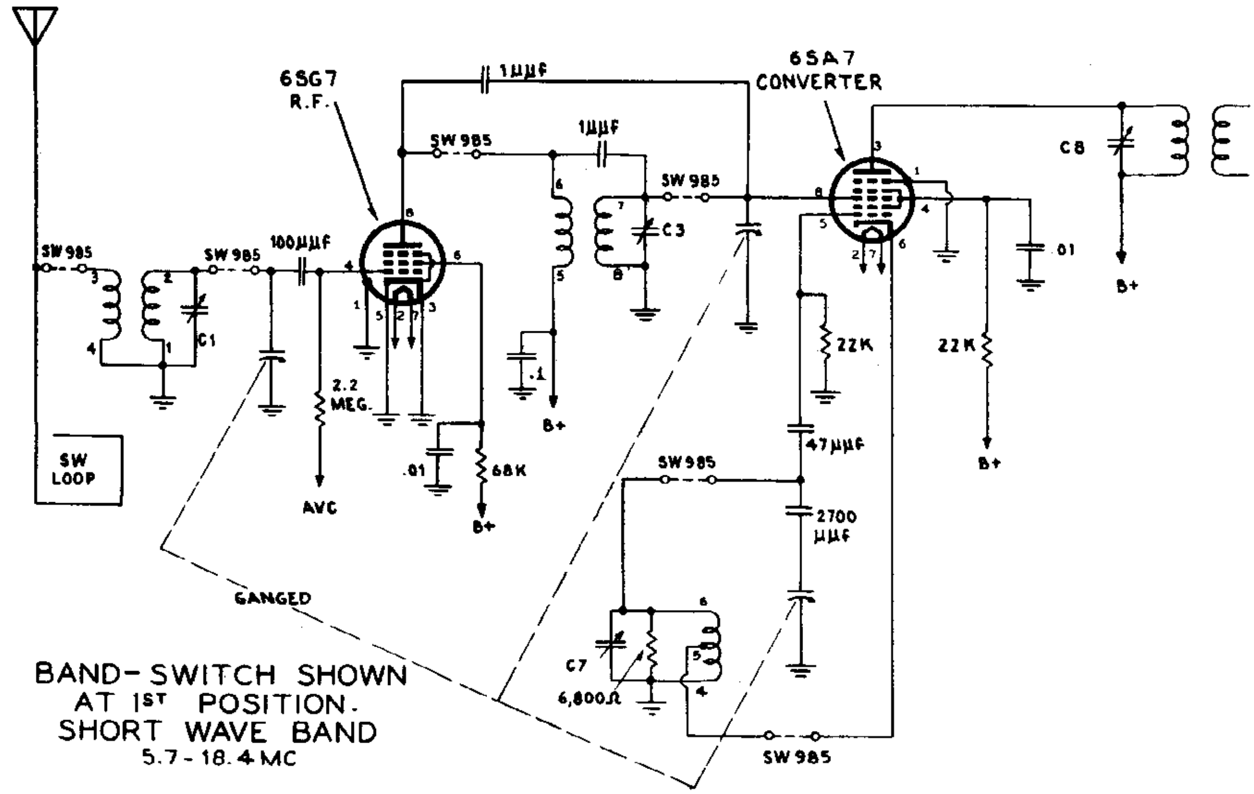
NOTES:

1. ALL RESISTORS ±20% TOLERANCE, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA CONDENSERS ±20% TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. BAND SELECTOR SWITCH SHOWN IN BROADCAST POSITION.
4. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND GROUND, WITH VOLUME CONTROL FULL ON AND BAND SWITCH SET IN "BC" POSITION, USING 20,000 OHMS-PER-VOLT METER. ALL VOLTAGE READINGS ±10%, MEASURED WITH AN INPUT VOLTAGE OF 117 V., 60 CYCLES, A.C.

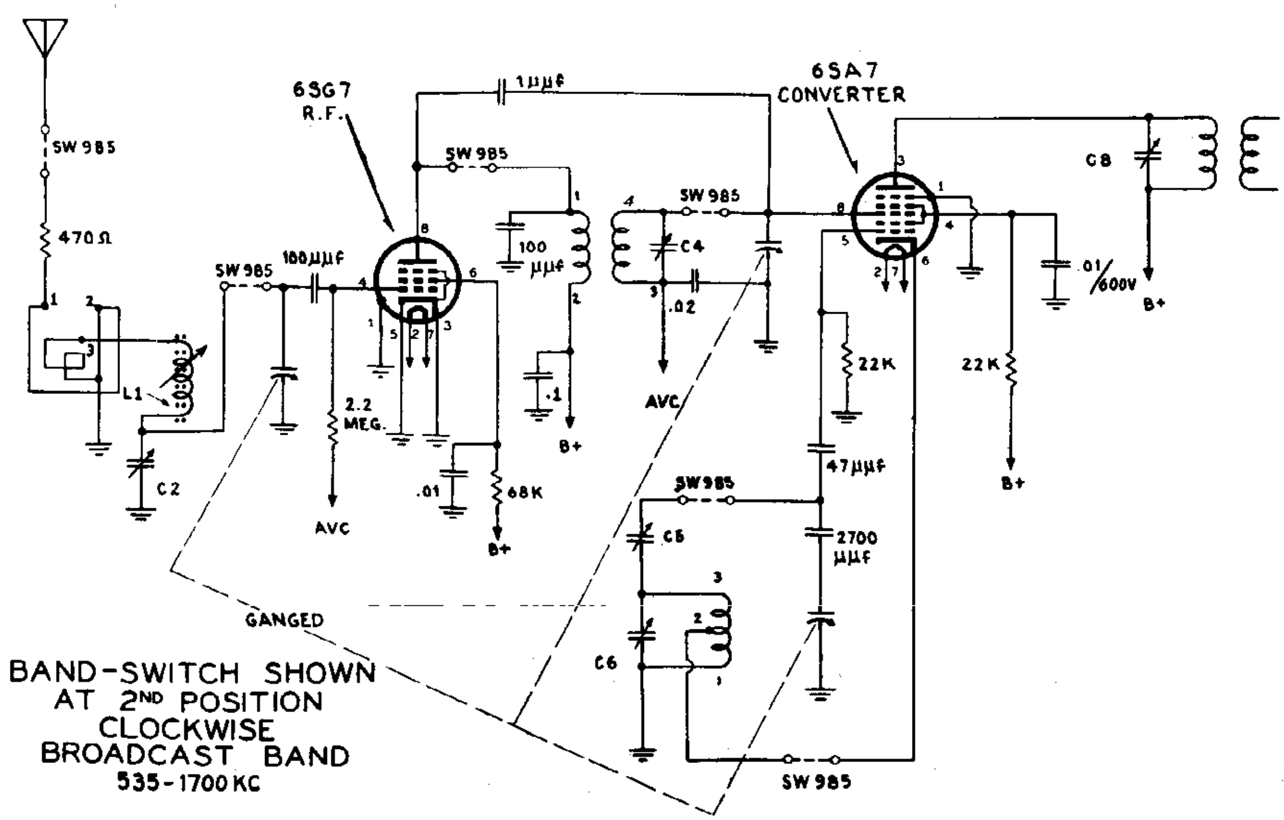
Part No.	Description
BU 187	Bulb—#47 pilot light bulb
CB 1020	Cable—speaker cable assembly
CL 998	Coil—antenna loading coil (BC)
CL 999	Coil—antenna transformer coil (SW)
CL 1000	Coil—R.F. coil (BC & SW)
CL 1001	Coil—oscillator coil (BC & SW)
CO 768	Condenser—30/20/450 W.V. & 20/25 W.V. electrolytic condenser
CO 311	Condenser—1.0 MMFD. 20% fixed condenser
CT 389	Condenser—dual 3-35 MMFD. trimmer condenser
CT 440	Condenser—350-780 MMFD. padder condenser
CT 1002	Condenser—1.6-18 MMFD. trimmer condenser
CV 144	Condenser—3 gang variable condenser
DL 1003	Dial—glass dial scale
IC 1015	Core—iron core
KN 422	Knob—walnut "volume" knob
KN 423	Knob—walnut "off-on tone" knob
KN 425	Knob—walnut "tuning" knob
KN 430	Knob—walnut "SW-BC-PH" knob
LP 1008	Loop—antenna loop
NE 322	Needle—permanent needle
PO 1011	Pointer—dial-pointer
PT 567	Control—2 megohms tapped volume control
PT 568	Control—3 megohms tone control (S.P.S.T.)
RCM20A101M	Condenser—100 MMFD. 20% mica condenser
RCM20A470M	Condenser—47 MMFD. 20% mica condenser
RCM30B272J	Condenser—2700 MMFD. 5% mica condenser
RCP10W2203A	Condenser—.02/200 W.V. paper tubular condenser
RCP10W4104L	Condenser—.1/400 W.V. paper tubular condenser
RCP10W4503A	Condenser—.05/400 W.V. paper tubular condenser
RCP10W6102A	Condenser—.001/600 W.V. paper tubular condenser
RCP10W6103A	Condenser—.01/600 W.V. paper tubular condenser
RCP10W6202M	Condenser—.002/600 W.V. paper tubular condenser
RCP10W6502A	Condenser—.005/600 W.V. paper tubular condenser
REB 104M	Resistor—100,000 ohms ±20% 1/2 watt resistor
REB 106M	Resistor—10 megohms ±20% 1/2 watt resistor
REB 221M	Resistor—220 ohms ±20% 1/2 watt resistor
REB 223M	Resistor—22,000 ohms ±20% 1/2 watt resistor
REB 224M	Resistor—220,000 ohms ±20% 1/2 watt resistor
REB 225M	Resistor—2.2 megohms ±20% 1/2 watt resistor
REB 334M	Resistor—330,000 ohms ±20% 1/2 watt resistor
REB 471M	Resistor—470 ohms ±20% 1/2 watt resistor
REB 474M	Resistor—470,000 ohms ±20% 1/2 watt resistor
REB 682K	Resistor—6,800 ohms ±10% 1/2 watt resistor
REB 683K	Resistor—68,000 ohms ±10% 1/2 watt resistor
RED 223K	Resistor—22,000 ohms ±10% 2 watt resistor
RED 391K	Resistor—390 ohms ±10% 2 watt resistor
RED 473M	Resistor—47,000 ohms ±20% 2 watt resistor
SK 384	Speaker—12" dynamic speaker 715 ohms (12,000 ohms transformer)
SP 191	Spring—lock spring (for dial drive)
SP 218	Spring—pointer drive spring
SW 985	Switch—3 wafer—3 position band switch
TR 781	Transformer—input I.F. transformer-shielded
TR 782	Transformer—output I.F. transformer-shielded
TR 981	Transformer—power transformer

OLYMPIC RADIO & TELEV. INC.

MODEL 7-724

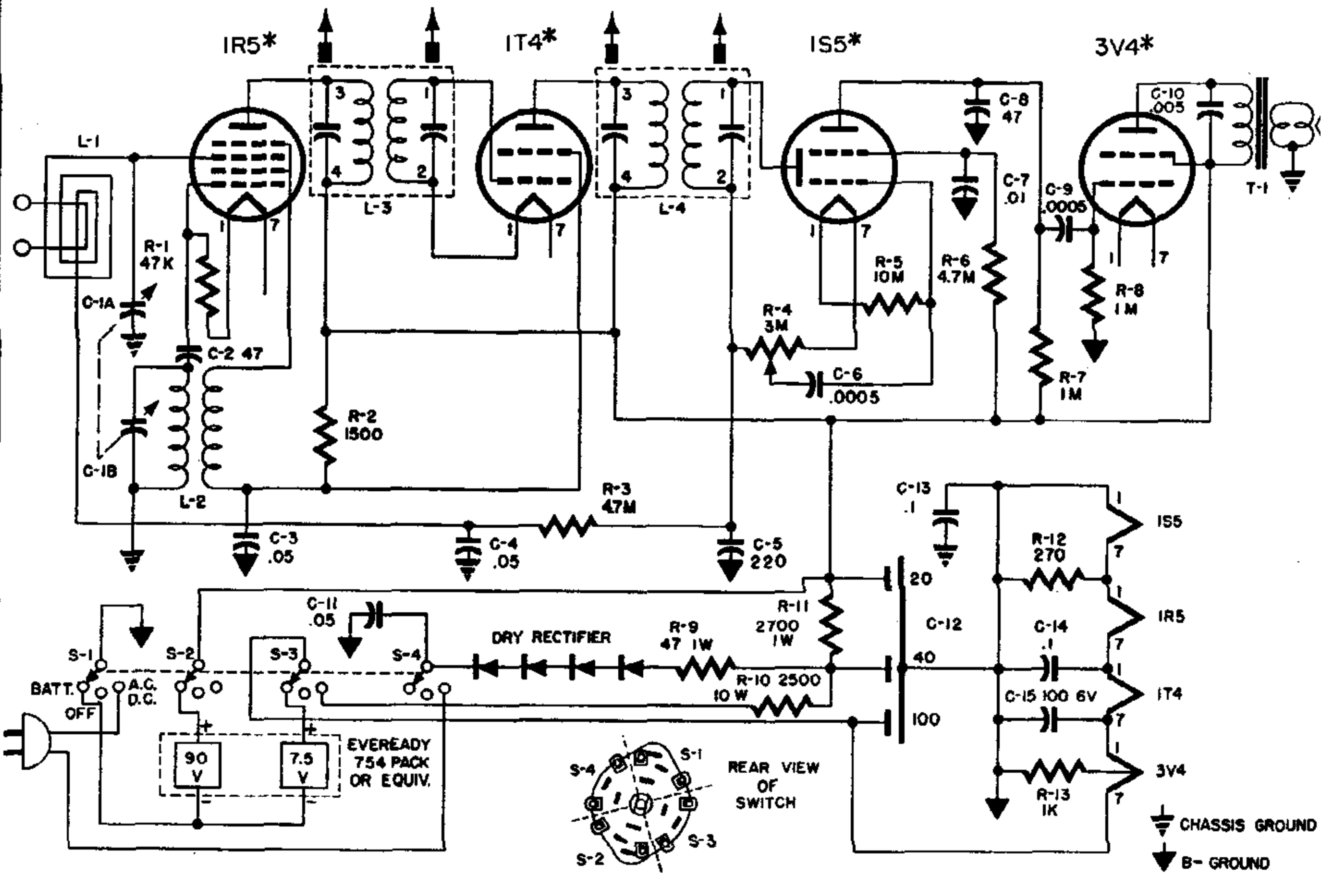


BAND-SWITCH SHOWN AT 1ST POSITION. SHORT WAVE BAND 5.7 - 18.4 MC



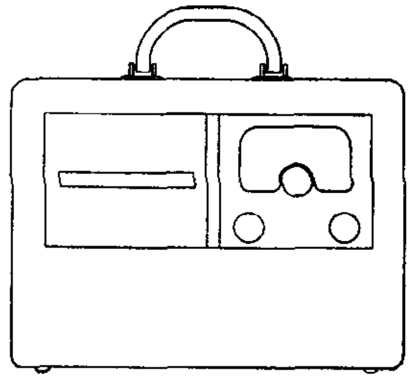
BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE BROADCAST BAND 535 - 1700 KC

PACKARD-BELL COMPANY



*SUPPRESSOR GRIDS TIED INTERNALLY AND NOT SHOWN IN SCHEMATIC

IF PEAK 455 KC



STAGE GAIN MEASUREMENTS

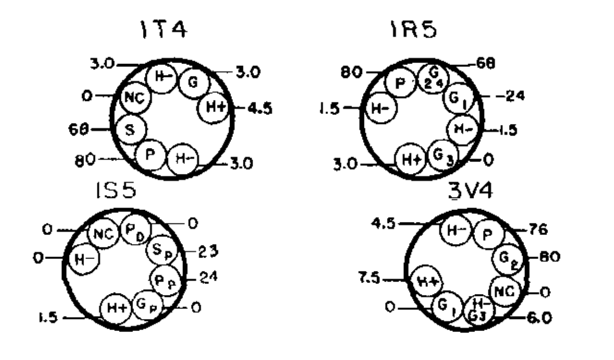
Standard Output . . . 50 mw
Dummy Antenna . . . .01 mfd.
Volume Control . . . Maximum
Converter grid to 1st I.F. grid . . . 51 X at 1000 KC
Converter grid to 1st I.F. grid . . . 65 X at 455 KC
1st I.F. grid to 2nd detector . . . 55 X at 455 KC
Overall audio gain . . . . .014V at 1S5 grid — 100 mw output
400 cycles

D.C. Resistance Measurements

1st I.F. Coil
Primary . . . . . . 20 ohms
Secondary . . . . . 20 ohms

2nd I.F. Coil
Primary . . . . . 15 ohms
Secondary . . . . . 15 ohms

Oscillator Coil
Primary . . . . . . 3 ohms
Secondary . . . . . 7 ohms



TUBE VOLTAGE CHART

NOTE: VOLTAGES TAKEN FROM B— WITH V.T.V.M.—NO SIGNAL

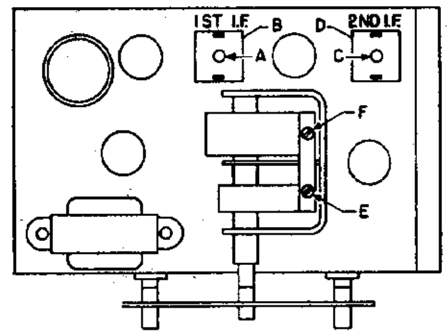
PACKARD-BELL COMPANY

SERVICE DATA — MODEL 471

REPLACEABLE PARTS LIST — MODEL 471

PART NO.	REF. SYMBOL	DESCRIPTION
23502H	C-1A C-2A	Capacitor, variable
23912	C-2	Capacitor, ceramic: 47 mmfd. 20%
23009	C-3	Capacitor, tubular: .05 - 400V
23017	C-4	Capacitor, tubular: .05 - 200V
23915	C-5	Capacitor, ceramic: 220 mmfd. - 20%
23908	C-6	Capacitor, tubular: .0005 - 600V
23022	C-7	Capacitor, tubular: .01 - 400V
23912	C-8	Capacitor, ceramic: 47 mmfd. 20%
23903	C-9	Capacitor, tubular: .0005 - 600V
23004	C-10	Capacitor, tubular: .005 - 600V
23009	C-11	Capacitor, tubular: .05 - 400V
24007A	C-12	Capacitor, electrolytic: 40-20 150 V 100 12V
23019	C-13	Capacitor, tubular: .1 - 200V
23019	C-14	Capacitor, tubular: .1 - 200V
24040	C-15	Capacitor, eelctrolytic, 100 mmfd. 6V
29822	L-1	Coil, loop
29210	L-2	Coil, oscillator
29009	L-3	Coil, 1st I.F.
29009	L-4	Coil, 2nd I.F.
73045	R-1	Resistor, carbon: 47K ½ watt, 10%
73027	R-2	Resistor, carbon: 1500 ohms, ½ watt 10%
73057	R-3	Resistor, carbon: 4.7 megohm ½ watt 20%
25005A	R-4	Control, volume: 3 meghoms
73059	R-5	Resistor, carbon: 10 megohm, ½ watt, 20%
73057	R-6	Resistor, carbon: 4.7 megohm, ½ watt 20%
73058	R-7	Resistor, carbon: 1 megohm, ½ watt, 20%
73058	R-8	Resistor, carbon: 1 megohm, ½ watt, 20%
73086	R-9	Resistor, carbon: 47 ohms, 1 watt, 10%
73917	R-10	Resistor, carbon: 2500 ohms, 10 watts, 5%
73128	R-11	Resistor, carbon: 2700 ohms, 2 watts, 10%
73018	R-12	Resistor, carbon: 270 ohms, ½ watt, 10%
73025	R-13	Resistor, carbon: 1000 ohms, ½ watt, 10%
86015	S-1	Switch, A.C. D.C. Batt. Off.
89414A	T-1	Transformer, output
21085		Cabinet
32011		Cord, A. C.
38067		Dial
41018		Escutcheon, name plate
48005		Grommet, fibre
52001A		Knob
55011B		Crystal
66018		Plug, battery
67028		Pointer
72001		Rectifier, selenium
79018		Socket, A.C.
79024		Socket, tube
88300		Speaker

TRIMMER LOCATIONS



Electrical Rating:
Line Voltage . . . . . 105 to 120 volts, 50-60 cycle, A.C. D.C.
Power Consumption . . . . . 11 watts

Tuning Frequency Range:
540 to 1620 KC

Intermediate Frequency
455 KC

Electrical Power Output:
Maximum . . . . 2 watts

Loudspeaker:
Type . . . Permanent Magnet
Outside Cone Diameter . . . 6"
Voice Coil Impedence . . . 3.2 ohms at 400 cycles
Magnet Rating . . . 2.5 oz. Alnico No. 5

ALIGNMENT PROCEDURE

Alignment procedure consists of the four steps outlined in the Alignment Procedure Chart.

Connect the test oscillator leads to the mixer grid and B— in series with a .01 mfd. capacitor (dummy load) for step No. 1, I.F. alignment.

Upon completion of the I.F. alignment, the variable condenser should be rocked to assure that the I.F.s have not been aligned to the image frequency.

The procedure outlined in steps 2 to 4 utilizes a standard test loop*

Connect the test oscilator leads across this loop and place it in a vertical position about two feet from the receiver loop.

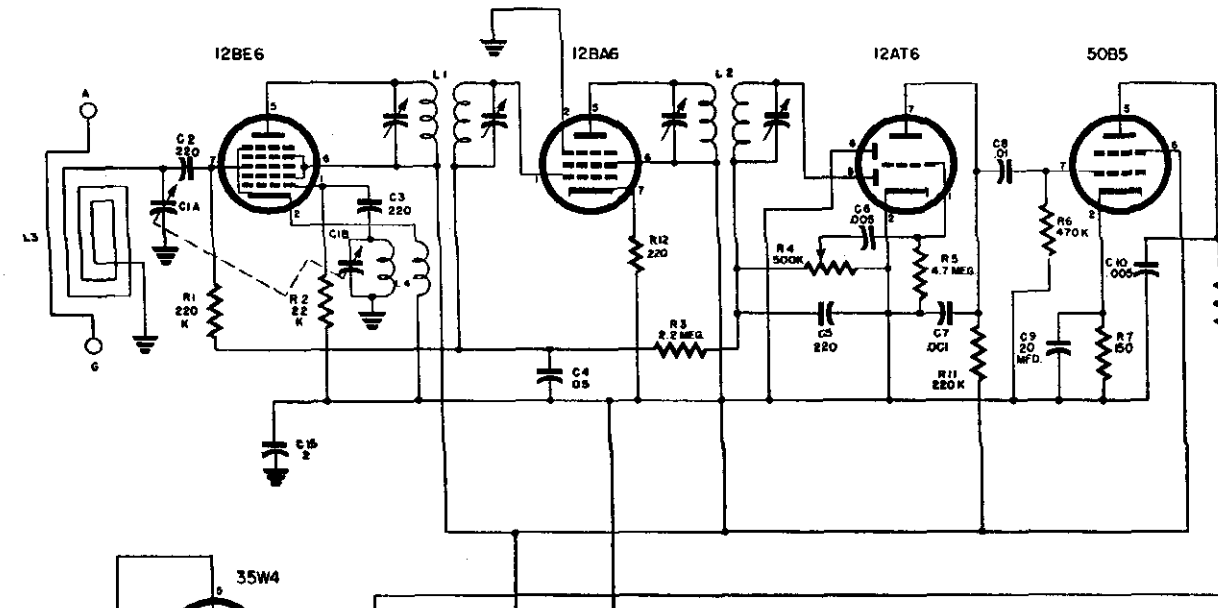
*NOTE: Hazeltine Test Loop No. 1150 or equivalent

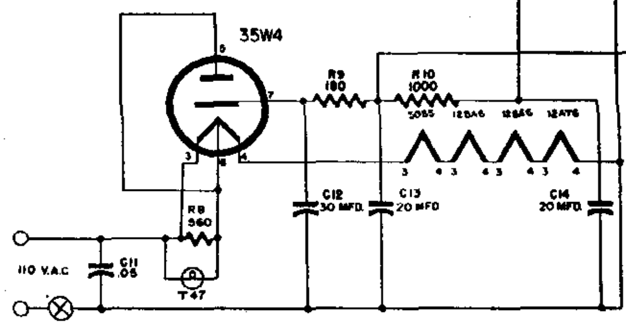
ALIGNMENT CHART

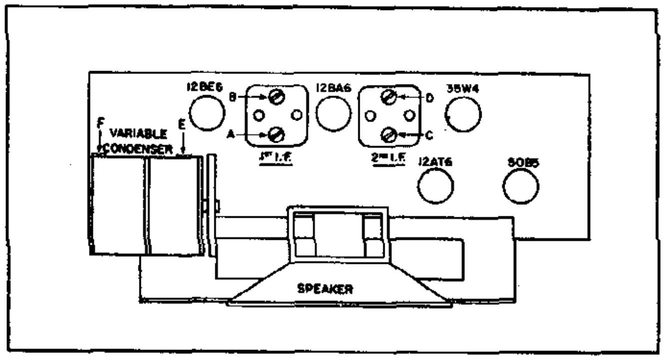
STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Conv. Grid .01 Mfd. Dum. Ant.	455 KC	1620 KC	I.F. Trimmers A, B, C, D
2	Conv. Grid .01 Mfd. Dum. Ant.	1620 KC	1620 KC	Oscillator Trimmer E
3	*Standard Test Loop	1500 KC	1500 KC	Ant. Trimmer F
4	*Standard Test Loop	600 KC	600 KC	Loop
5	Repeat Step No. 3			

NOTE: Hazeltine Test Loop No. 1150 or equivalent.

PACKARD-BELL COMPANY







TRIMMER LOCATIONS

ALIGNMENT PROCEDURE

Alignment procedure consists of four steps outlined in the Alignment Procedure Chart.

For step No. 1, I.F. alignment, connect the leads of a test oscillator to the mixer grid and the common return through an .01 mfd. capacitor (dummy load). Upon completion of this step, "rock" the variable condenser to assure that the I.F.'s have been aligned to the correct frequency. Output should remain constant at any setting of the variable condenser.

Steps 2 to 4 employ a Hazeltine Standard Test Loop No. 1150, or a reasonable substitute. Connect the test oscillator leads across this loop and place it in a vertical position about two feet from the receiver loop.

IMPORTANT NOTICE: Make certain that each step is done with a minimum input signal.

ALIGNMENT CHART

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. .01 Mfd. Cap.	455 KC	540 KC	Trimmers A, B, C & D
2	Standard* Test Loop	1620 KC	1620 KC	Trimmer E to 1620 KC
3	Standard* Test Loop	1500 KC	1500 KC	Trimmer F
4	Standard* Test Loop	600 KC	600 KC	Variable Plates

NOTE: Hazeltine Standard Test Loop No. 1150 or a reasonable substitute.

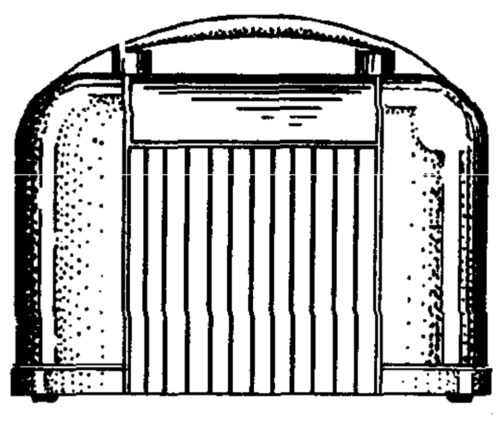
Electrical Rating
Line Voltage . . . . 110-120 volts, 50-60 cycle AC
Power Consumption . . . . . 28 watts

Tuning Frequency Range
Standard Broadcast . . . 540 to 1620 KC

Intermediate Frequency
455 KC

Electrical Power Output
Maximum . . 1.75 watts

Loudspeaker
Type . . . Permanent Magnet
Outside Cone Diameter . . . 5"
Voice Coil Impedance . . . . . . 3.2 ohms at 400 cycles
Magnet Rating . . . 1 oz. Alnico 5



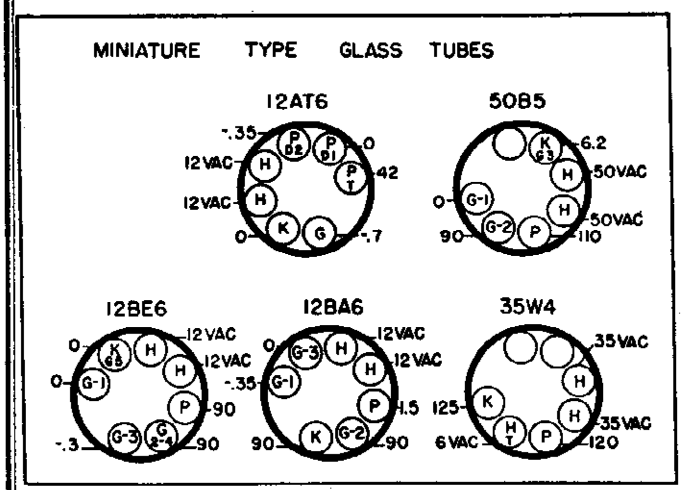
MODELS 571, 572

PACKARD-BELL COMPANY

REPLACEABLE PARTS LIST

PART NO.	SYMBOL	DESCRIPTION
23522	C-1	Capacitor, variable, 2 gang
23228	C-2	Capacitor, 220 mmfd.
	C-3	
	C-5	
	C-11	
23009	C-4	Capacitor, .05 mfd. 400 V
23004	C-6	Capacitor, .005 mfd. 600 V
	C-10	
23001	C-7	Capacitor, .001 mfd. 600 V
23006	C-8	Capacitor, .01 mfd. 600 V
24032	C-9	Capacitor, electrolytic, 30X20X20-150
	C-12	V 20-25V
	C-13	
	C-14	
23018	C-15	Capacitor, 2 mfd. 200 V
29014B	L-1	Coil, 1st I.F.
29015B	L-2	Coil, 2nd I.F.
29317	L-3	Coil, loop
29206	L-4	Coil, oscillator
73041	R-2	Resistor, 22 K ohms, ½ w, 20%
73055	R-3	Resistor, 2.2 megohms, ½ w, 20%
25014	R-4	Control, volume, 500 K
73057	R-5	Resistor, 4.7 megohms, ½ w 20%
73051	R-6	Resistor, 470 K, ½ w, 20%
73081	R-7	Resistor, 150 ohm, 1 w, 10%
73022	R-8	Resistor, 560 ohm, ½ w, 10%

PART NO.	SYMBOL	DESCRIPTION
73077	R-9	Resistor, 180 ohm, 1 w, 10%
73071	R-10	Resistor, 1000 ohm, 1 w, 10%
73049	R-11	Resistor, 220 K, ohms, ½ w, 20%
73017	R-12	Resistor, 220 ohm, ½ w, 10%
54002	T-47	Lamp, dial
89411	T-1	Transformer, output
18098A		Bracket, Dial
21048	571	Cabinet, plastic (specify color)
21049	572	Cabinet, wood (specify finish)
28022		Clip, dial
32011		Cord, A. C. (specify color)
38079	571	Dial, paper
38080	572	Dial, paper
47001	572	Grille
49004G	572	Handle, plastic (10⅝ inch)
4900IF	572	Handle, plastic (9⅞ inch)
49002D	571	Handle, metal
49008N	571	Handle, insert
52015B	572	Knob, ½" shank (specify col.)
52032	571	Knob, ¼" shank (specify col.)
55002	571	Crystal, dial
55013	572	Crystal, dial
67021		Pointer, dial
69013A		Pulley, dial
79033		Socket, dial lamp
83004	571	Speaker
83202	572	Speaker



TUBE VOLTAGE CHART

SPECIAL SERVICE INFORMATION

*Stage Gain Measurements

Dummy Antenna . . . 200 mmf.
Standard Output . . . 50 mw.
Volume Control . . . maximum
Ant. terminal to converter grid . . . 27X at 1000 kc.
Converter grid to 1st I.F. grid . . . 75X at 455 kc.
1st I.F. grid to 2nd detector . 650X at 5 watts 400 cps.

*NOTE: Measurements with A.C. V.T.V.M. AVC shorted out.

Oscillator Cathode Voltages

117 AC line voltage
1620 KC . . . 2.0 volts A.C.*
1200 KC . . . 1.9 volts A.C.*
750 KC . . . 1.7 volts A.C.*
540 KC . . . 1.5 volts A.C.*

*NOTE: Measurements made with A.C. V.T.V.M. Input loading above 10 megohms.

D.C. Resistance Measurements

1st I.F. Coil
primary . . . . 21 ohms   secondary . . . 21 ohms

2nd I.F. Coil
primary . . . . 21 ohms   secondary . . . 21 ohms

Oscillator Coil
secondary . . . 6 ohms   primary . . . . .75 ohms

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to ground buss. A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to ground buss.

Volume control maximum, no signal, 117 volts A.C. line voltage. All voltages shown are positive D.C. unless otherwise noted.

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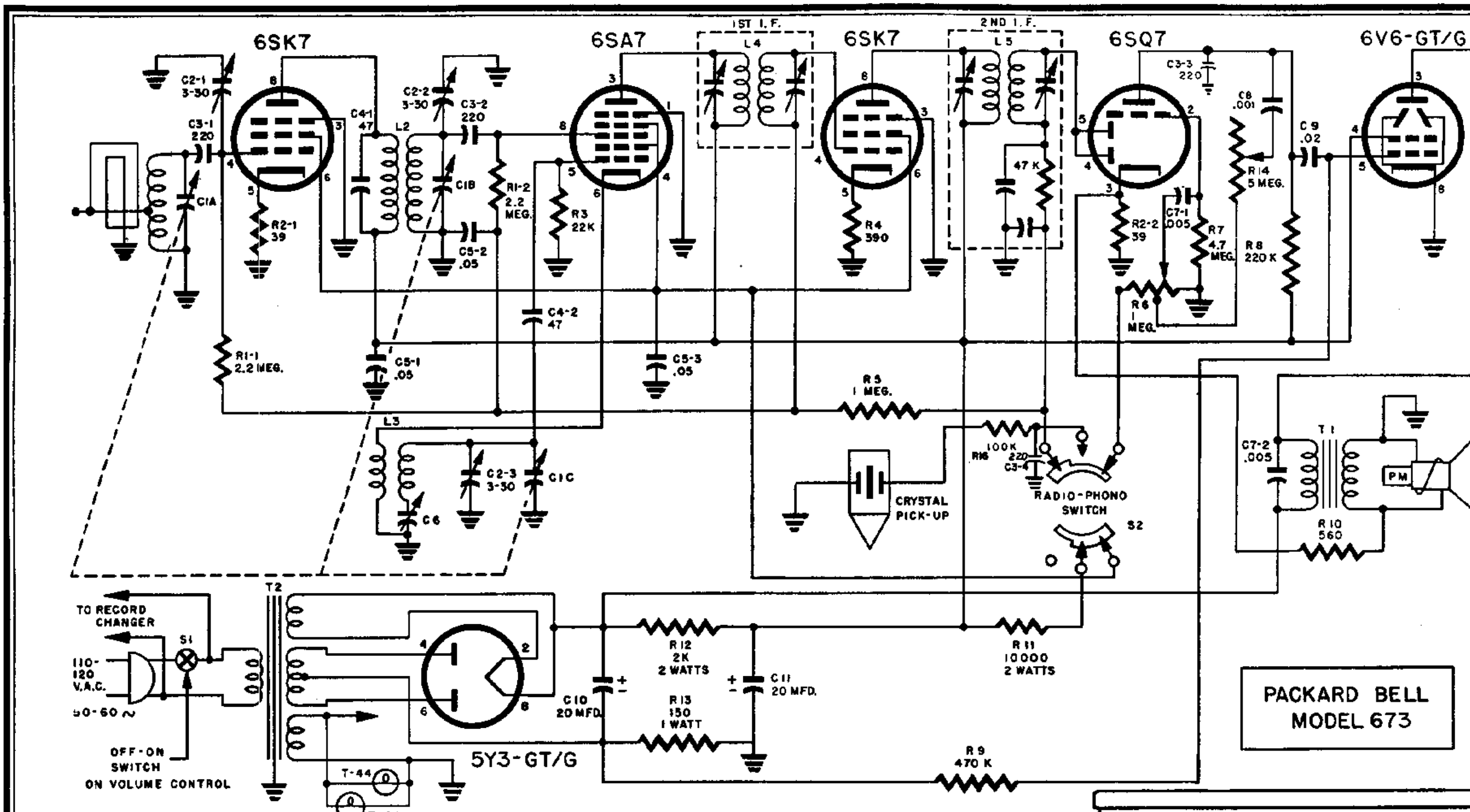
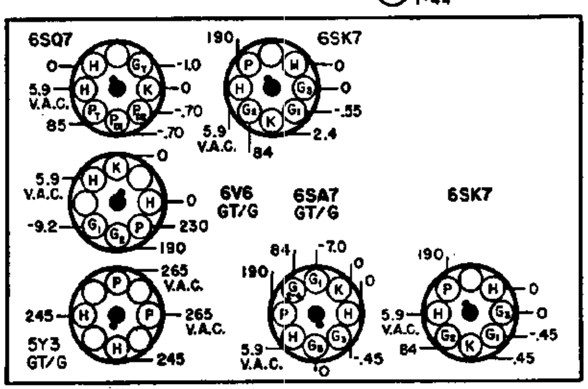


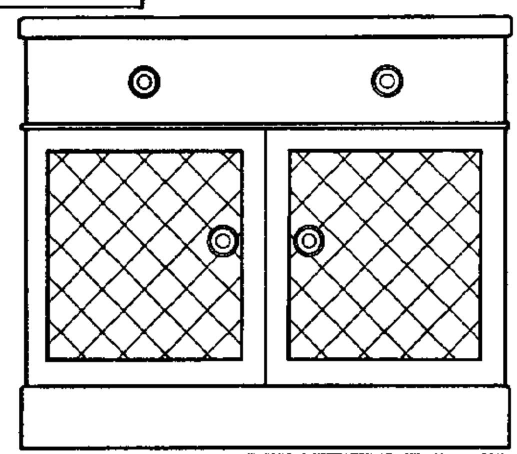


SOCKET VOLTAGES

Intermediate Frequency:
455 KC

Electrical Output:
5 watts maximum

Loudspeaker:
Type . . . Permanent Magnet
Outside Cone Diameter . . . 10"
Voice Coil Impedance . . . 3.2 ohms at 400 cycles
Magnet Rating . . . 4.64 Oz. Alnico V



MODEL 673

PACKARD-BELL COMPANY

SPECIAL SERVICE INFORMATION

D.C. Resistance Measurements:
1st & 2nd I.F. Coils

D.C. Resistance Measurements:
1st & 2nd I.F. Coils
Primary . . . 17 ohms

Oscillator Coil
Primary . . . . . 1 ohm
Secondary . . . 6 ohms

R.F. Coil
Primary . . . 58 ohms
Secondary . . . 4.2 ohms

NOTE: To obtain the true reading of the secondary of the 2nd I.F. Coil, it must be removed from the can. This is so because of the 47K resistor inside the can.

NOTICE: The D.C. Resistance measurements on all coils are subject to a 20% tolerance due to the variation of winding methods.

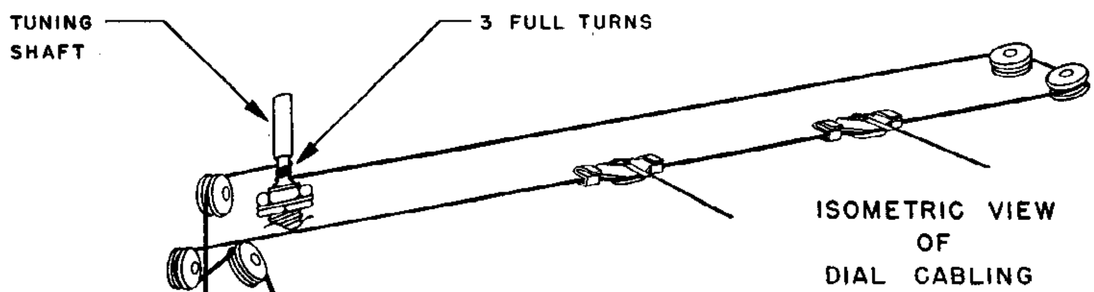
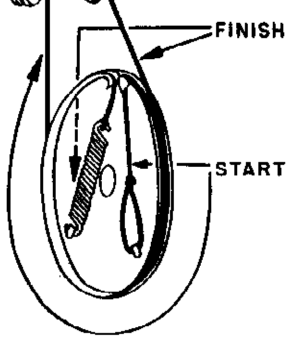
STAGE GAIN MEASUREMENTS:
Measurements taken with volume and tone controls maximum.

Switch in RADIO position.
AVC shorted out.
Standard Output . . . 50 milliwatts
Dummy Antenna . . . 200 Mmf.

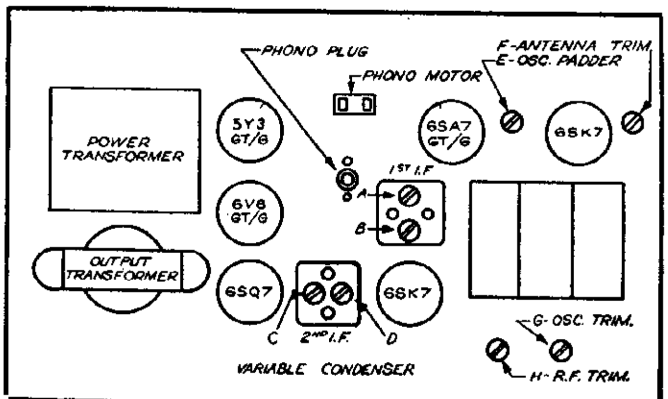
Antenna to R.F. Grid . . . 6X at 1000 KC
R.F. Grid to Converter Grid . . . 7X at 1000 KC
Converter Grid to 1st I.F. Grid . . . 46X at 455 KC
1st I.F. Grid to 2nd Detector . . . 62X at 455 KC
Overall Audio Gain . . . 320X at .5 watts 400 cycles

OSCILLATOR CATHODE VOLTAGES:
Measured at 120 volts AC line voltage with AC vacuum tube voltmeter input loading above 10 megohms.

1500 KC . . . 2.25 volts AC
1000 KC . . . 2.15 volts AC
800 KC . . . 2.3 volts AC
600 KC . . . 2.5 volts AC

ISOMETRIC VIEW OF DIAL CABLING



TRIMMER LOCATION

ALIGNMENT PROCEDURE

Alignment Procedure consists of the 5 steps outlined in the Alignment Procedure Chart.

Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completion of this step "Rock" the variable condenser to assure that the I.F.s have been aligned to the correct frequency. Output should remain constant for any setting of variable capacitor.

Use the Hazeltine Standard Test Loop No. 1150, or a reasonable substitute, for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

It will be noted that all alignment trimmers are accessable without removing the chassis from the cabinet.

IMPORTANT NOTICE: Make certain that each alignment is done with a minimum input signal.

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis. — A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to chassis. — Volume and tone controls maximum. — Switch in Radio position. — No signal. — All voltages shown are positive D.C. unless otherwise noted.

ALIGNMENT CHART

STEP	CONNECT TEST OSC.	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. (.01 Mfd. Cap.)	455KC	540 KC	Trimmers A, B, C & D
2	Standard Test Loop*	1620 KC	1620 KC	Trimmer G to 1620 KC
3	Standard Test Loop*	600 KC	Rock Variable	Padder E
4	Standard Test Loop*	1500 KC	1500 KC	Trimmers F & H
5	Repeat Steps 2, 3, & 4			

NOTE: *Hazeltine Test Loop No. 1150 (or a reasonable substitute)

TABLE OF REPLACEABLE PARTS

PART NO.	REF. SYMBOL	DESCRIPTION
19010		Bushing, drive
21036G		Cabinet
23500C	C1A, B & C	Capacitor, variable: 3 gang
23401	C2-1, C2-2	Capacitor, trimmer: 3-30 Mmfd.
23406	C2-3	Capacitor, trimmer: 3-30 Mfd.
23228	C3-1, C3-2	Capacitor, mica: 220 Mfd. 20%
23225	C4-1, C4-2	Capacitor, mica: 47 Mmfd. 20%
23009	C5-1, C5-2, C5-3	Capacitor, paper: .05 Mfd. 400 V
23402	C6	Capacitor, padder: 300-800 Mmfd.
23004	C7-1, C7-2	Capacitor, paper: .05 Mfd. 600 V
23001	C8	Capacitor, paper: .001 Mfd. 600 V
23007	C9	Capacitor, paper: .02 Mfd. 600 V
24001-3	C10	Capacitor, electrolytic: 20 Mfd. 450 V
24003	C11	Capacitor, electrolytic: 20 Mfd. 350 V
29310A	L1	Loop antenna, high impedance
29102A	L2	Coil, R.F.
29205A	L3	Coil, oscillator
29004D	L4	Coil, 1st I.F.: 455 KC
29007	L5	Coil, 2nd I.F.: 455 KC
32003C		Cord, A.C.: 8'
34002D		Cover, volume control
38034A		Dial scale
40002		Dial drive cord
52001A		Knob, plastic
54001		Dial lamp, bayonet base: 250 MA
58008		Record changer
59001		Needle, phono: permanent
63008A		Crystal, pickup (Shure P-94)
65032		Plate, front
66004		Plug, speaker & phono
66005		Plug, antenna
66008		Plug, A.C.
67004		Pointer slide
67014		Pointer, wire
73055	R1-1, R1-2	Resistor, carbon: 2.2 meg. 20%, ½ watt
73008	R2-1, R2-2	Resistor, carbon, 39 ohms, 10%, ½ watt
73041	R3	Resistor, carbon: 22,000 ohms, 10%, ½ watt
73020	R4	Resistor, carbon: 390 ohms, 10%, ½ watt
73053	R5	Resistor, carbon: 1 meg., 20%, ½ watt
25010B	R6 & S1	Control, volume: 1 meg. tapped at 200,000 ohms; with A.C. switch
73057	R7	Resistor, carbon: 4.7 meg. 20%, ½ watt
73049	R8	Resistor, carbon: 220,000 ohms, 20%, ½ watt
73051	R9	Resistor, carbon: 470,000 ohms, 20%, ½ watt
73022	R10	Resistor, carbon: 560 ohms, 10%, ½ watt
73125	R11	Resistor, carbon: 10,000 ohms, 10%, 2 watt
73214	R12	Resistor, carbon: 2000 ohms, 10%, 2 watt
73081	R13	Resistor, carbon: 150 ohms, 10%, 1 watt
25506B	R14	Control, tone: 5 meg.
73911	R15	Resistor, wire wound: 50 ohms, 10 watt
73047	R16	Resistor, carbon: 100,000 ohms, 20%, ½ watt
77014E		Shaft, dial
78028		Shield, light
79002		Socket, tube: 8 prong octal, wafer type
79004		Socket, antenna
79005		Socket, phono
79007		Socket, A. C.
79010B		Socket, dial lamp: bayonet base
83703		Speaker, permanent magnet: 10"
84001B		Spring, dial cord
84003A4		Spring, knob
84015		Spring, conical: changer mounting
86008	S2	Switch, rotary: wafer type, single section, phono-radio
89409C	T1	Transformer, output
89010A	T2	Transformer, power

MODEL 861 Phonocord

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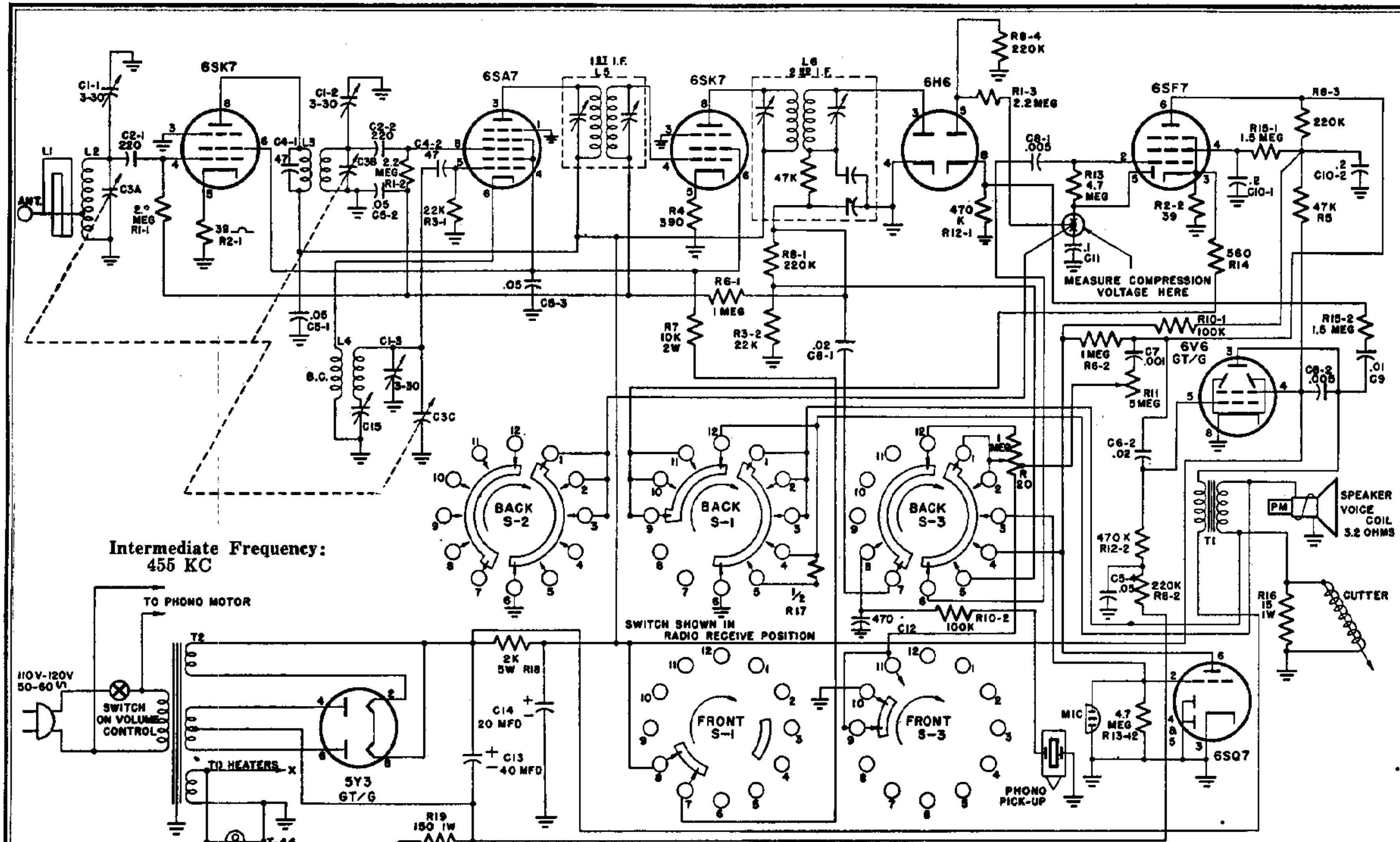

Intermediate Frequency:
455 KC

Electrical Power Output:
Undistorted . . . 3 Watts   Maximum . . . 5 Watts

Loudspeaker:
Type . . . Permanent Magnet
Outside Cone Diameter . . . 10"
Voice Coil Impedance . . . 3.2 ohms at 400 cycles
Magnet Rating . . . 4.6 Oz. Alnico 5

Electrical Rating:
Line Voltage . . . 110-120 volts, 50-60 cycle A.C.
Power Consumption . . . 80 Watts

Tuning Frequency Range:
540 to 1620 KC

Tubes:

Tube	Function
6SK7	R.F. Amplifier
6SA7	Frequency Converter
6SK7	I.F. Amplifier
6SF7	1st Audio Amplifier
6V6-GT/G	Power Amplifier
5Y3-GT/G	Rectifier
6H6	2nd Detector—Compressor Rectifier
6SQ7	Microphone Amplifier

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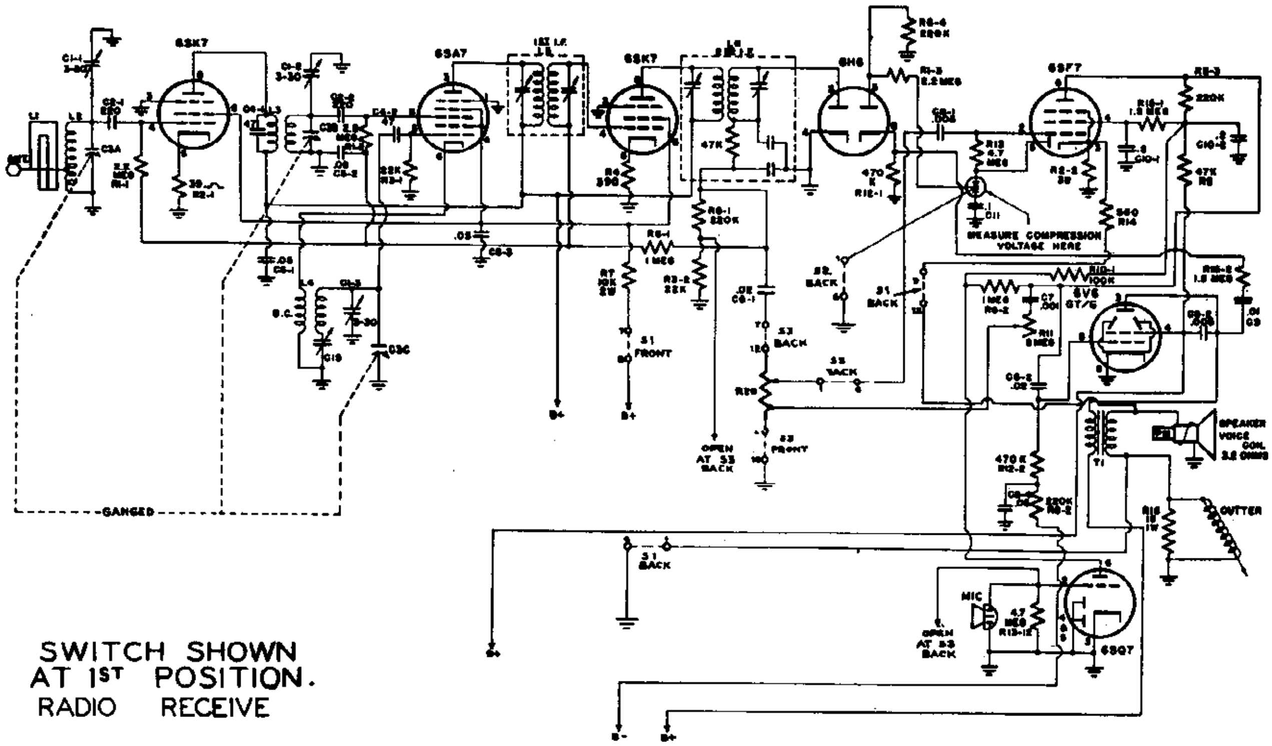
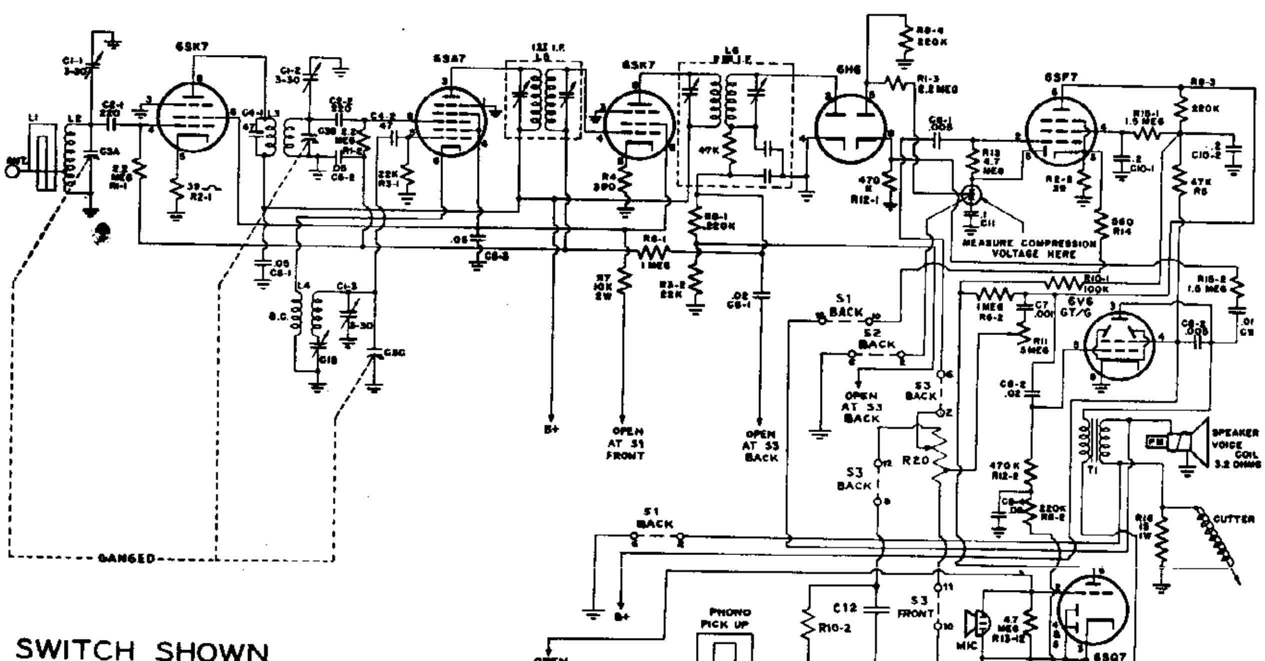
MODEL 861 Phonocord



SWITCH SHOWN AT 1ST POSITION.
RADIO RECEIVE



SWITCH SHOWN AT 2ND POSITION
PHONO

MODEL 861 Phonocord

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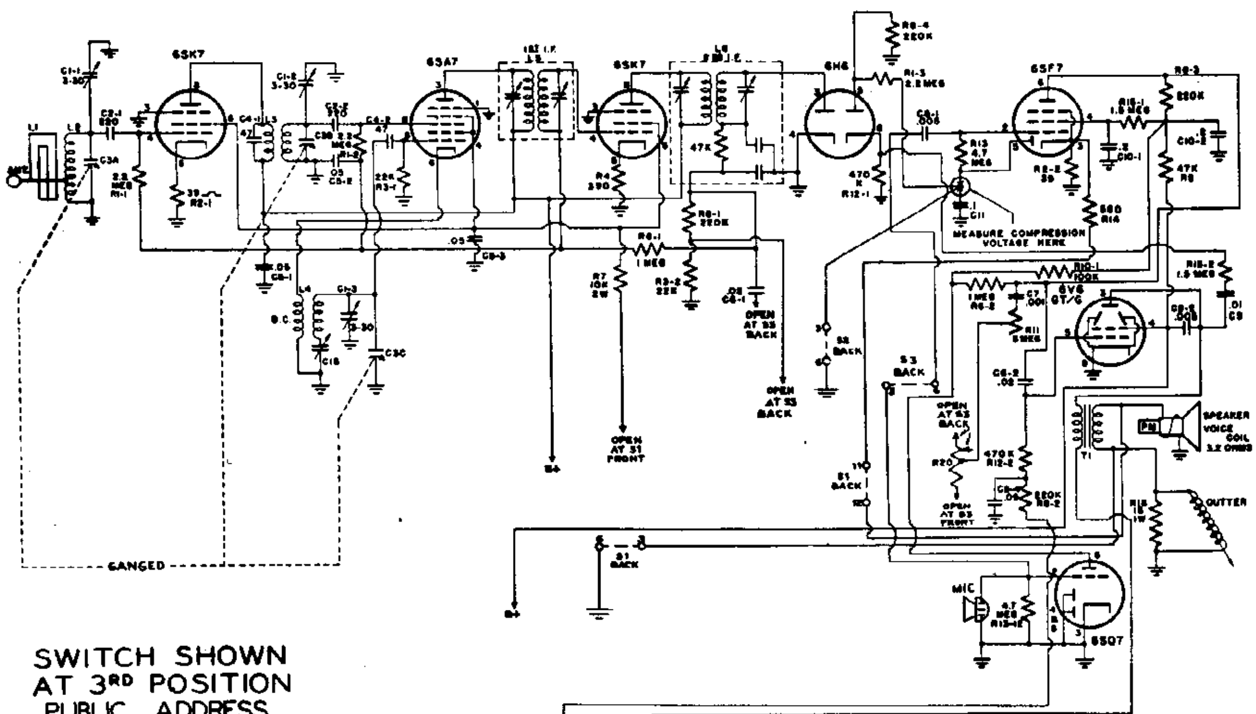
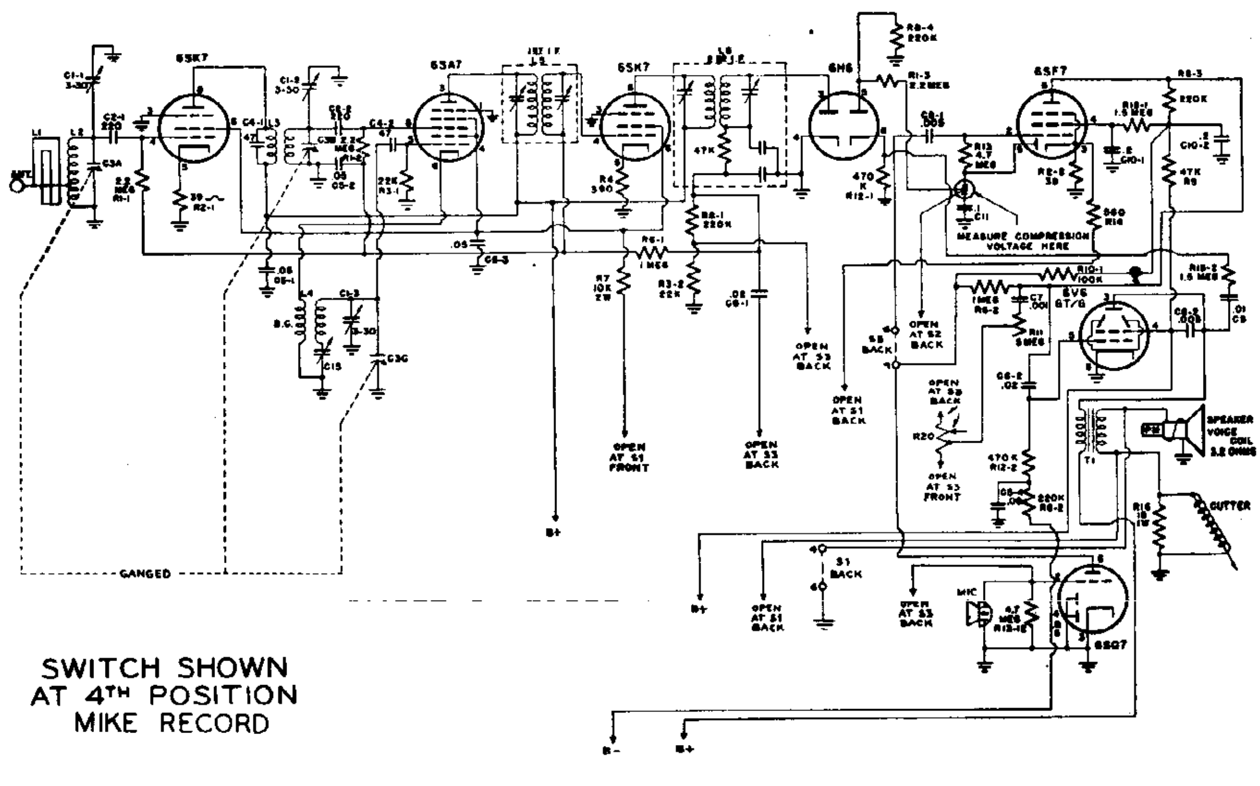
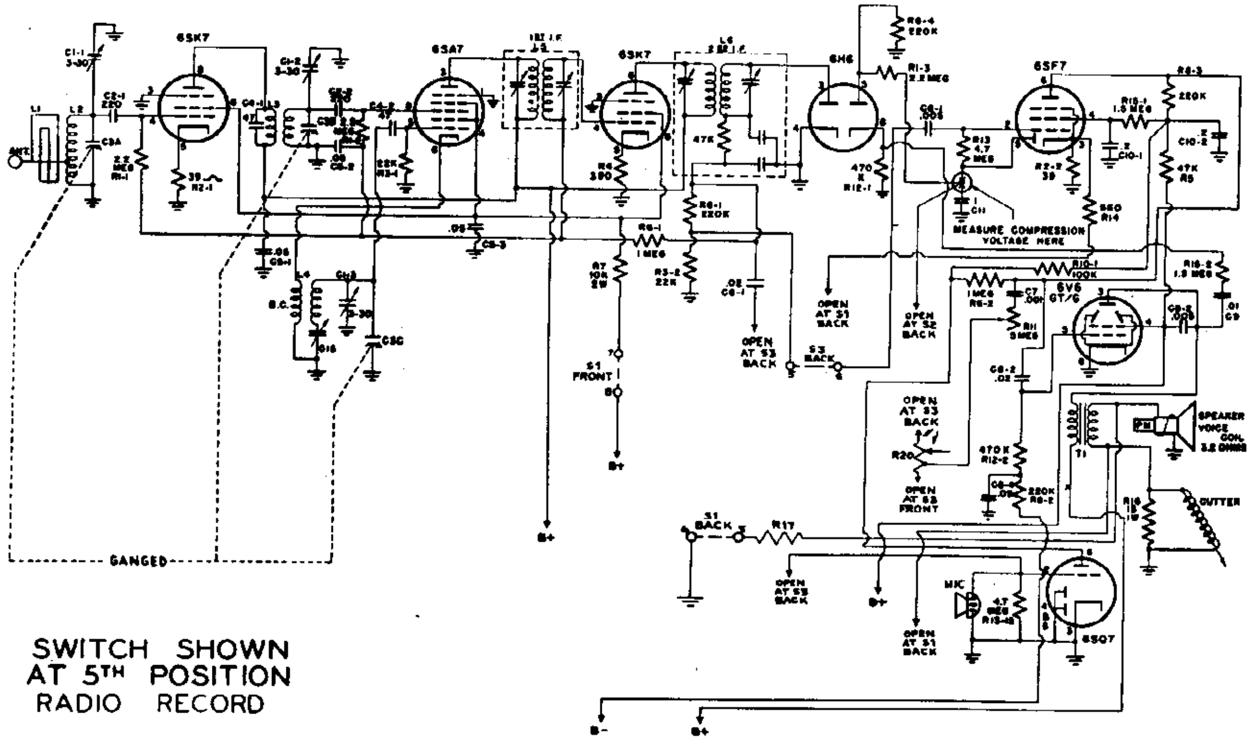
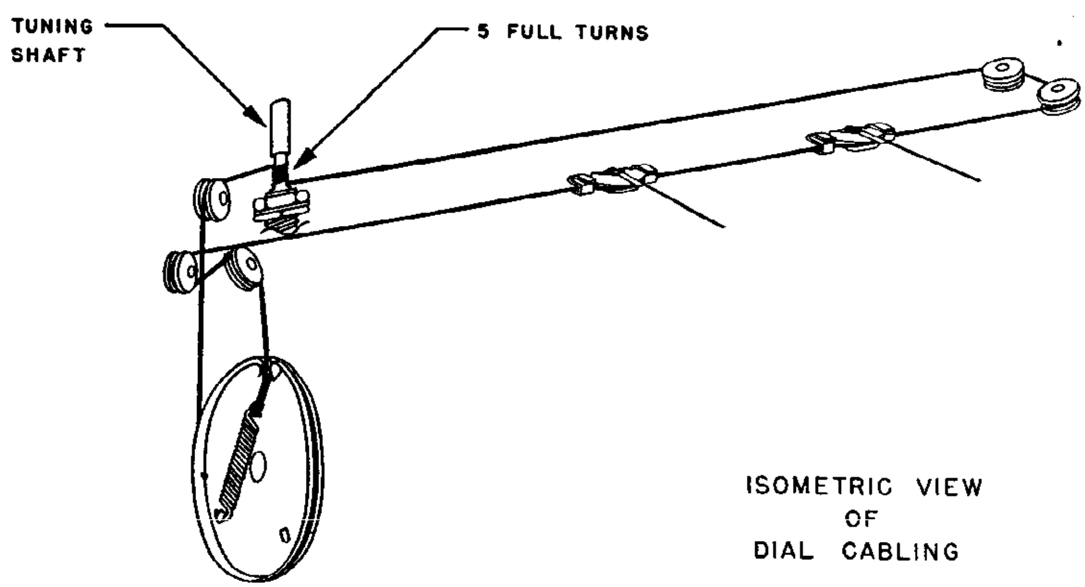


SWITCH SHOWN
AT 3RD POSITION
PUBLIC ADDRESS



SWITCH SHOWN
AT 4TH POSITION
MIKE RECORD





ISOMETRIC VIEW
OF
DIAL CABLING

SPECIAL SERVICE INFORMATION

Stage Gain Measurements:
Measurements taken with volume and time controls maximum. — AVC shorted out.

Standard Output . . . 50 milliwatts
Dummy Antenna . . . 200 Mmf.
Antenna Grid to R.F. Grid . . . 7X at 1000 KC
R.F. Grid Converter Grid . . . 7.5X at 1000 KC
Converter Grid to 1st I.F. Grid . . . 56X at 455 KC
1st I.F. Grid to 2nd Detector . . . 57X at 455 KC
Overall Audio Gain . . . 320X at .5 watts 400 cycles

OSCILLATOR CATHODE VOLTAGES:
Measured at .117 volts AC line voltage wtih AC vacuum tube voltmeter input loading above 10 megohms.

1600 KC . . . 2.15 volts AC
1000 KC . . . 2.0 volts AC
600 KC . . . 2.2 volts AC

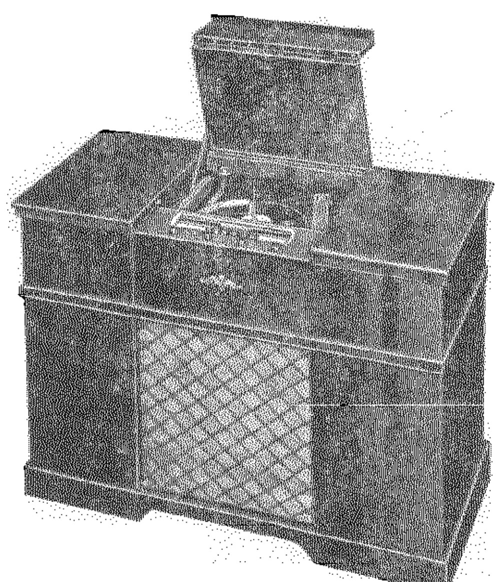
D.C. Resistance Measurements:
1st & 2nd I.F. Coils:
Primary . . . 17 ohms
Secondary . . . 17 ohms*

*NOTE: To obtain the true reading of the secondary of the 2nd I.F. Coil, it must be removed from the can. This is so because of the 47K resistor inside the can.

Oscillator Coil:
Primary . . . 1 ohm
Secondary . . . 6 ohms
Antenna Coil:
Start to finish . . . 12.2 ohms
Start to tap . . . 10.5 ohms
R.F. Coil:
Primary . . . 58 ohms
Secondary . . . 4.2 ohms

NOTICE: The D.C. Resistance measurements on all coils are subject to a 20% tolerance due to the variation of winding methods.

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis.—A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to chassis.—Volume and tone controls maximum.—Switch in Radio Receive position.—No signal. —117V A.C. line. All voltages shown are positive D.C. unless otherwise noted.



ALIGNMENT PROCEDURE

Alignment Procedure consists of the 5 steps outlined in the Alignment Procedure Chart.

Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completion of this step "Rock" the variable condenser to assure that the I.F.s have been aligned to the correct frequency. Output should remain constant for any setting of the variable condenser.

Use the Hazeltine Test Loop No. 1150 or a reasonable substitute for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

It will be noted that all alignment trimmers are accessable without removing the chassis from the cabinet.

IMPORTANT NOTICE: Make certain that each alignment step is done with a minimum input signal.

ALIGNMENT CHART

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. (.01 Mfd. Cap.)	455 KC	540 KC	Trimmers A, B, C & D.
2	Standard Test Loop*	1620 KC	1620 KC	Trimmer E to 1620 KC
3	Standard Test Loop*	600 KC	Rock Variable	Trimmer H to 600 KC
4	Standard Test Loop*	1500 KC	1500 KC	Trimmers F & H
5	Repeat Steps 2, 3 & 4			

*NOTE: Hazeltine Test Loop No. 1150 (or a reasonable substitute).

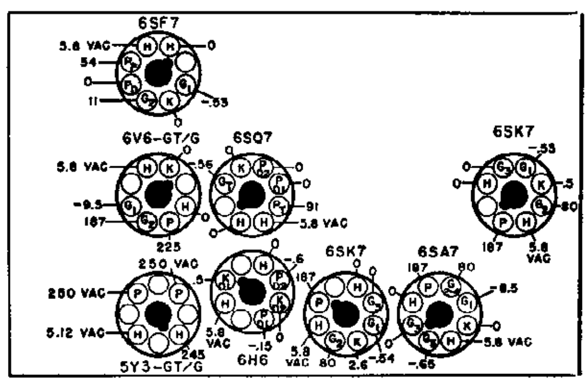


FIGURE 1—SOCKET VOLTAGES

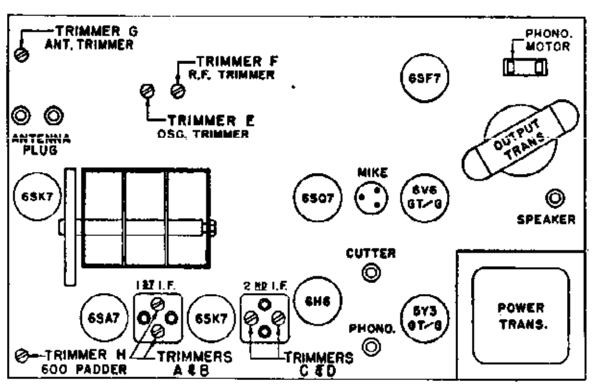


FIGURE 2—TRIMMER LOCATION

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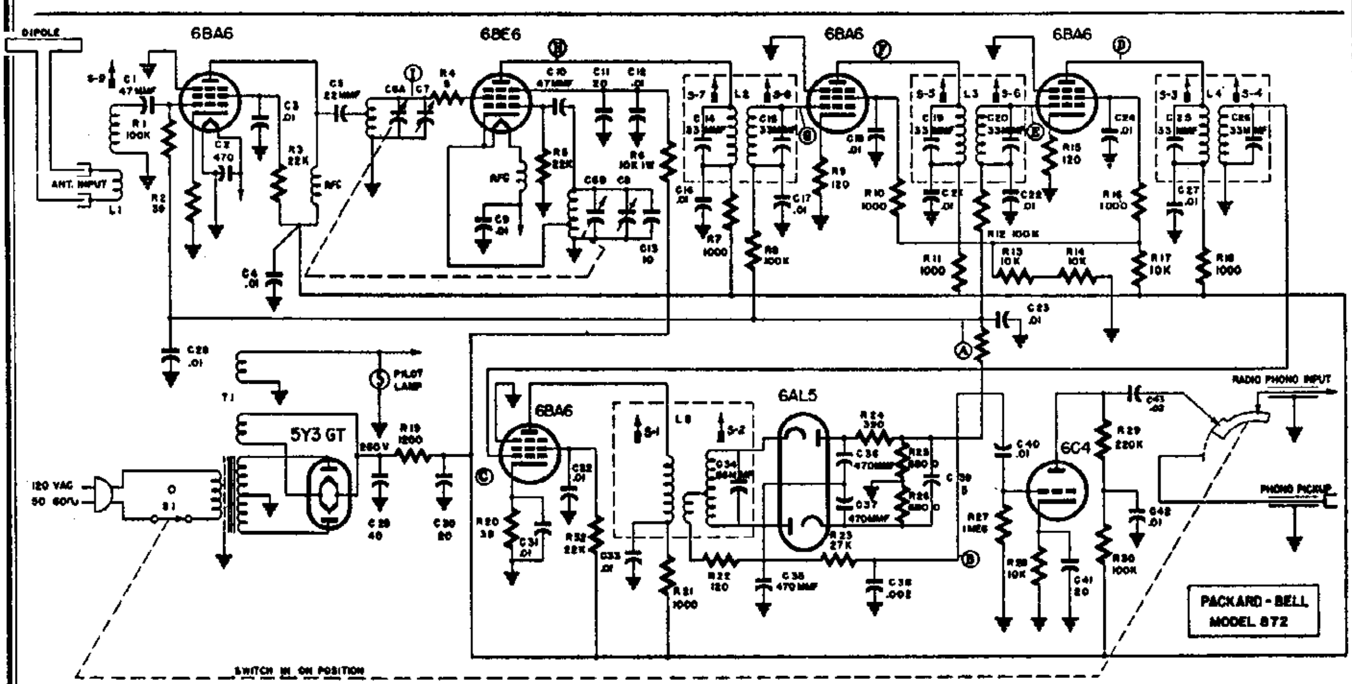
73057	R13-1	Resistor, carbon: 4.7 megohms, 20%, ½ watt
	R13-2	
73022	R14	Resistor, carbon: 560 ohms, 10%, ½ watt
73054	R15-1	Resistor, carbon: 1.5 megohms, 20%, ½ watt
	R15-2	
73903	R16	Resistor, wire wound: 15 ohms, 10%, 1 watt
73910	R17	Resistor, wire wound: ½ ohm, 10%, 1 watt
73902	R18	Resistor, wire wound: 2,000 ohms, 10%, 5 watt
73081	R19	Resistor, carbon: 150 ohms, 10%, ½ watt
25010B	R20	Control, volume: 1 megohm, tapped at 200,000 ohms, with A.C. switch
77016		Shaft, dial
78008		Shield, microphone plug
78028		Shield, dial, light
79002		Socket, tube: 8 prong octal, wafer type
79004		Socket, microphone
79005		Socket, phonograph
79007		Socket, phono motor
79010B		Socket, dial lamp: bayonet base
83703		Speaker, permanent magnet: 10"
84003A		Spring, knob
84028		Spring, dial cord
86009A		Switch, rotary: 3 deck
86802		Switch, micro: used on automatic cutter stop
89409C	T1	Transformer, output
89016	T2	Transformer, power
65038A		Plate, rear
66004		Plug, pin type: Speaker, phono & antenna
67025		Pointer support
67023		Pointer wire
68117		Instruction book
68073		PhonOcord album
69001		Pulley, dial
69003A		Pulley, dial
73055	R1-1	Resistor, carbon: 2.2 Megohm, 20%, ½ watt
	R1-2	
	R1-3	
73008	R2-1	Resistor, carbon: 39 ohms, 10%, ½ watt
	R2-2	
73041	R3-1	Resistor, carbon: 22,000 ohms, 10%, ½ watt
	R3-2	
73020	R4	Resistor, carbon: 390 ohms, 10%, ½ watt
73045	R5	Resistor, carbon: 47,000 ohms, 10%, ½ watt
73053	R6-1	Resistor, carbon: 1 megohm, 20%, ½ watt
	R6-2	
73125	R7	Resistor, carbon: 10,000 ohms, 10%, 2 watt
73049	R8-1	Resistor, carbon: 220,000 ohms, 20%, ½ watt
	R8-2	
	R8-3	
	R8-4	
73047	R10-1	Resistor, carbon: 100,000 ohms, 20%, ½ watt
	R10-2	
25506B	R11	Control, tone: 5 megohms
73051	R12-1	Resistor, carbon: 470,000 ohms, 20%, ½ watt
	R12-2	
66008		Plug, A.C.
66013		Plug, microphone
67026		Pointer slide

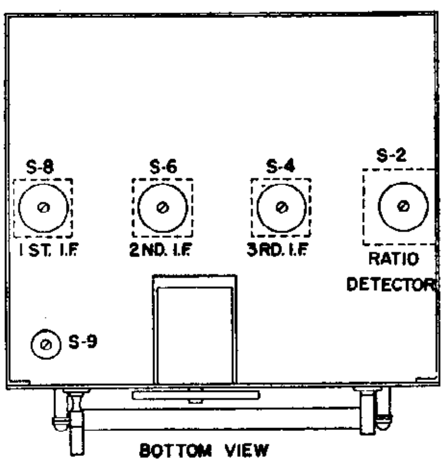
10505		Assembly, switch arm
10506		Assembly, pointer
21040		Cabinet
21040-1		Cabinet back, cardboard: right
21040-2		Cabinet back, cardboard: center
21040-3		Cabinet back, cardboard: left
21040-4		Cabinet back, cardboard: upper center
21040-5		Strip, leatherette: motor board
21051A-1		Cabinet, mic cord holder: side
21051A-2		Cabinet, mic cord holder: bottom
23001	C1-1	Capacitor, trimmer: 3-30 Mmf.
	C1-2	
23406	C1-3	
23915	C2-1	Capacitor, ceramic: 220 Mmf. 20%
	C2-2	
23500C	C3A, B & C	Capacitor, variable
23912	C4-1	Capacitor, ceramic or mica: 47 Mmf., 20%
	C4-2	
23009	C5-1	Capacitor, paper: .05 Mfd., 400 volt
	C5-2	
	C5-3	
	C5-4	
23007	C6-1	Capacitor, paper: .02 Mfd., 600 volt
	C6-2	
23001	C7	Capacitor, paper: .001 Mfd., 600 volt
23004	C8-1	Capacitor, paper: .005 Mfd., 600 volt
	C8-2	
23006	C9	Capacitor, paper: .01 Mfd., 600 volt
23020	C10-1	Capacitor, paper: .2 Mfd., 400 volt
	C10-2	
23019	C11	Capacitor, paper: .1 Mfd. 400 volt
23916	C12	Capacitor, ceramic or mica: 470 Mmf., 20%
24003	C13	Capacitor, electrolytic: 20 Mfd., 350 volt
24030	C14	Capacitor, electrolytic: 40 Mfd., 450 volt
23402	C15	Capacitor, padder: 300-800 Mmf.
28016		Clamp, mic base
92194	L1	Loop, antenna: (19.5 feet of 300 ohm twin lead)
29400A	L2	Coil, antenna
29102B	L3	Coil, R.F.
29205B	L4	Coil, oscillator
29004D	L5	Coil, 1st I.F.: 455 KC
29007	L6	Coil, 2nd I.F.: 455 KC
32003C		Cord, A.C.: 8'
34002D		Cover, volume control
36024		Cutter cartridge
38038		Dial, glass: stationized
38046		Dial, glass: export
40002		Dial drive cord
50079B		Insulator, switch arm
52014BG		Knob, plastic: bar type
52032BG		Knob, plastic: round type
54001		Dial lamp .250 MA
57004		Microphone with cable
57005		Microphone handle
57006		Microphone base
58004D		Automatic Record Changer
59001		Needle, phono
59002		Needle, cutter
65028A		Plate, mounting
65032		Plate, front
65033A		Plate, dial

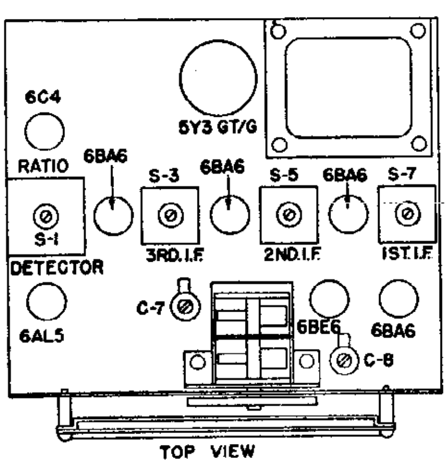
MODEL 872

PACKARD-BELL COMPANY



IF PEAK 10.7 MC





NOTE: * As slug S-2 (Bottom of Ratio Detector Coil) is turned back and forth, a direct-current voltage of positive or negative polarity should be observed if detector is functioning properly. Adjust for zero (center) output.

** A resistive shunt consisting of 1000 ohms in series with 100 mmf should be used. Connect shunt from point "C" (on schematic) to ground and adjust slug S-3. Move shunt from point "C" to point "D" and adjust slug S-4. Same procedure for 1st I.F. and converter.

For steps 6, 7, and 8, the tuner should be set to the required frequency.

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	METER CONNEC. TO	ADJUSTMENT
1	"C" Driver Grid	10.7 Mc	A	Slug S-1 Max. Output
2	"C" Driver Grid	10.7 Mc	B	*Slug S-2 Zero Center Output
3	"E" 2nd I.F. Grid	10.7 Mc	A	**Slugs S-3 S-4 Max. Output
4	"G" 1st I.F. Grid	10.7 Mc	A	Slugs S-5, S-6 Max. Output
5	"I" Conv. Grid	10.7 Mc	A	Slugs S-7, S-8 Max. Output
6	Antenna	108. Mc	A	Trimmer C-8 Max. Output
7	Antenna	105 Mc	A	Trimmer C-7 Max. Output
8	Antenna	96 Mc	A	Slug S-9 Max. Output

Stage Gain Measurements:
Stage gains are measured by connecting the VTVM to AVC (point A) and proceding backwards stage by stage and calculating gain of desired stage.

Audio Gain . . . 10X at 400 cycles
Ratio Detector Sensitivity . . . 100,00 microvolts on driver grid results in approximately 3.0 volts as measured at AVC point.
Second I.F. Gain . . . 20X at 10.7 Mc
First I.F. Gain . . . 20X at 10.7 Mc
Converter Gain . . . This measurement can not be made accurately. The gain is approximately 5X at 100 Mc
R.F. Gain . . . 5X at 100 Mc
Antenna Gain . . . 1.2X at 100 Mc

Oscillator Cathode Voltages:
This measurement should not be made as it is impossible to connect a meter to the cathode without disturbing the proper functioning of the oscillator circuit. Fortunately, oscillators either operate or do not function at all at these frequencies. Make usual overall sensitivity measurements to determine if oscillator is functioning.

D.C. Resistance Measurements.
All three I.F. Coils are identical
Primary . 0.6 ohms Secondary 0.6 ohms

Ratio Detector Coil
Primary . 1.2 ohms Secondary 0.2 ohms

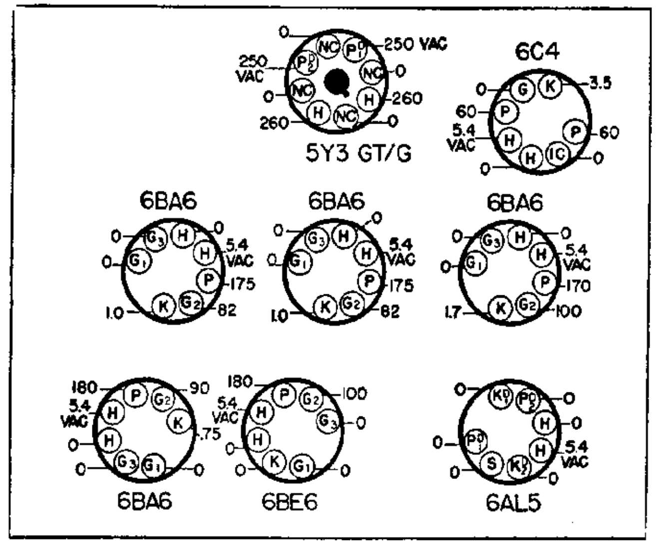
R. F. Coils
These coils are wound with heavy wire and have only a few turns. Their resistances are extremely low and will read zero on any ohmmeter test.

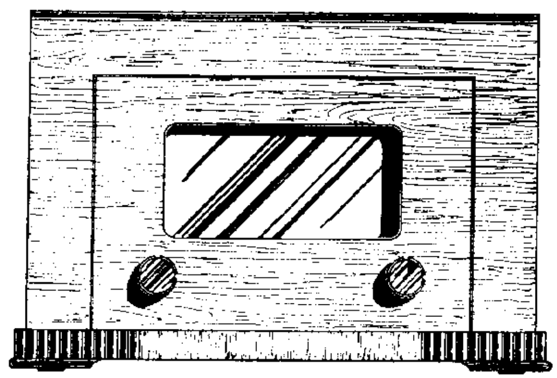
Brief Description of Ratio Detector and I. F. Amplifier
The ratio detector is an improved FM detector in that it is insensitive to amplitude variations and thus requires no limiter stages. It requires much less signal for normal operation and permits lower gain in the I. F. stages which results in improved circuit stability.
The I. F. Amplifier Stages are overcoupled and permit reception of even the weakest stations without impairment of performance.

Electrical Rating:
Line Voltage . . . 110-120 volts 50-60 cycle A.C.
Power Consumption . . 52 watts

Tuning Frequency Range:
Frequency Modulation Band . . 88-108Mc

Intermediate Frequency:
10.7 Mc





MODEL 872

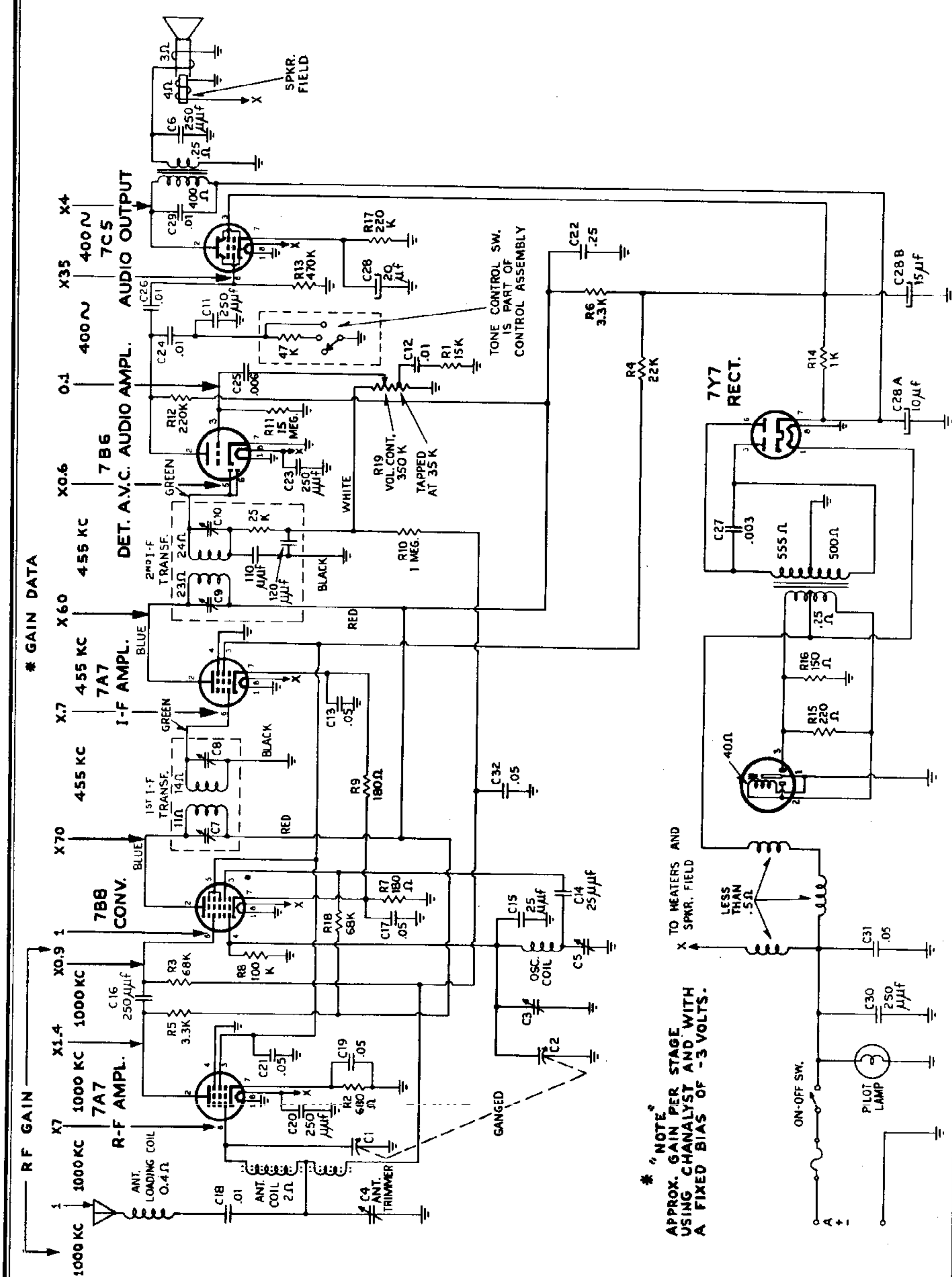
PACKARD-BELL COMPANY

REPLACEABLE PARTS LIST

NO.	SYMBOL	DESCRIPTION
23912	C-1	Capacitor, mica, 47 mmf. NPO to N750
	C-10	
23229	C-2	Capacitor, mica 470 mmf. 20%
	C-35	
	C-36	
	C-37	
23023	C-3	Capacitor, tubular, .01 mf. 500V
	C-4	
	C-9	
	C-12	
	C-16	
	C-17	
	C-18	
	C-21	
	C-22	
	C-23	
	C-24	
	C-27	
	C-28	
	C-31	
	C-32	
	C-33	
	C-40	
	C-42	
23911	C-5	Capacitor, ceramic, 22 mmf. 20% N750
23519	C-6A, B	Capacitor, Variable
23408	C-7	Trimmer, Variable, 3-12 mmf.
	C-8	
24012	C-11	Capacitor, electrolytic, 20 mf. 350V
	C-30	
24006	C-41	Capacitor, Elect. 25 mfd., 25 V
23909	C-13	Capacitor, Ceramic, 10 mmf. 20% NPO to N750
	C-14	Capacitor, enclosed in I.F. cans
	C-15	
	C-19	
	C-20	
	C-25	
	C-26	
24011	C-29	Capacitor, electrolytic, 40 mf. 350 V
	C-34	Capacitor, enclosed in can
23002	C-38	Capacitor, tubular, .002 mf. 600 V
24038	C-39	Capacitor, electrolytic, 5 mf. 50 V
23007	C-43	Capacitor, tubular, .02 mf. 400 V
29321		Antenna, dipole assy.
29405	L-1	Coil, Antenna
29207		Coil Oscillator
29017	L-2	Coil, I.F. 10.7 Mc.
	L-3	
	L-4	
29018	L-5	Coil, ratio Detector

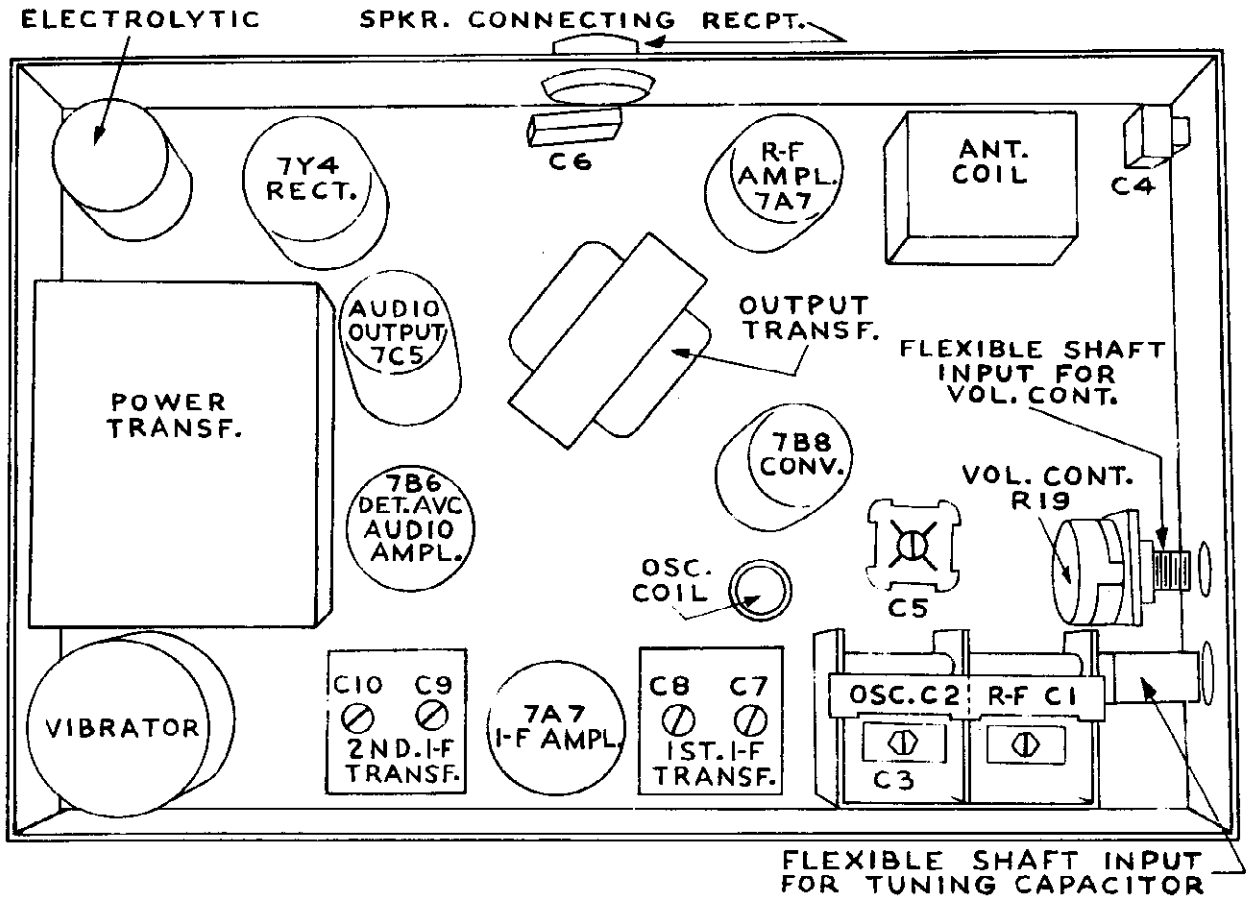
NO.	SYMBOL	DESCRIPTION
73047	R-1	Resistor, 100K ohms, ½ w, 20%
	R-8	
	R-12	
	R-30	
	R-31	
73008	R-2	Resistor, 39 ohm, ½w, 10%
73041	R-3	Resistor, 22K, ohm, ½ w, 10%
	R-5	
	R-20	
	R-32	
73073	R-6	Resistor, 10 K, 1 w, 10%
	R-13	
	R-14	
73025	R-7	Resistor, 1000 ohm, ½ w, 10%
	R-10	
	R-11	
	R-16	
	R-18	
	R-21	
73014	R-9	Resistor, 120 ohm, ½ w, 10%
	R-15	
	R-22	
73125	R-17	Resistor, 10K ohm, 2 w, 10%
73916	R-19	Resistor, 1200 ohm, 5w, 10%
73042	R-23	Resistor, 27K ohms, ½ w, 10%
73020	R-24	Resistor, 390 ohms, ½ w, 10%
73035	R-25	Resistor, 6800 ohms, ½ w, 10%
	R-26	
73053	R-27	Resistor, 1 megohm, ½w, 20%
73037	R-28	Resistor, 10K, ½ w, 10%
73049	R-29	Resistor, 220K, ½ w, 10%
86003B	S-1	Switch, FM, AC, phono
89016B	T-1	Transformer, power
32003C		Cord, A.C. 8'
38065		Dial
40115		Drive
52008G	BG	Knob
52032	BG	Knob
54001	T-47	Lamp, pilot
66001		Plug, pin
66004		Plug, pin
67016A		Pointer, dial
69008B		Pulley, dial
78033		Shield, socket ext.
79009		Socket, dial lamp
79023		Socket, loop
79043		Socket, cable ext.
79044		Socket, coil form

PHILCO CORP.


* GAIN DATA
RF GAIN
1000 KC
7A7 R-F AMPL.
7B8 CONV.
7A7 I-F AMPL.
7B6 DET. A.V.C. AUDIO AMPL.
7C5 AUDIO OUTPUT
7Y7 RECT.
1ST I-F TRANSF.
2ND I-F TRANSF.
455 KC
SPKR. FIELD
TONE CONTROL SW. IS PART OF CONTROL ASSEMBLY
R19 VOL. CONT. 350 K
TAPPED AT 35 K
ANT. LOADING COIL 0.4Ω
ANT. COIL 2Ω
ANT. TRIMMER
OSC. COIL
GANGED
TO HEATERS AND SPKR. FIELD
LESS THAN .5Ω
ON-OFF SW.
PILOT LAMP
* "NOTE" APPROX. GAIN PER STAGE USING CHANALYST AND WITH A FIXED BIAS OF -3 VOLTS.

MODEL UN6-450

PHILCO CORP.



I.F. ALIGNMENT

REMOVE THE TOP COVER OF THE RECEIVER TO GET AT THE ADJUSTMENTS.

CONNECT AN OUTPUT METER ACROSS VOICE COIL OF SPEAKER.

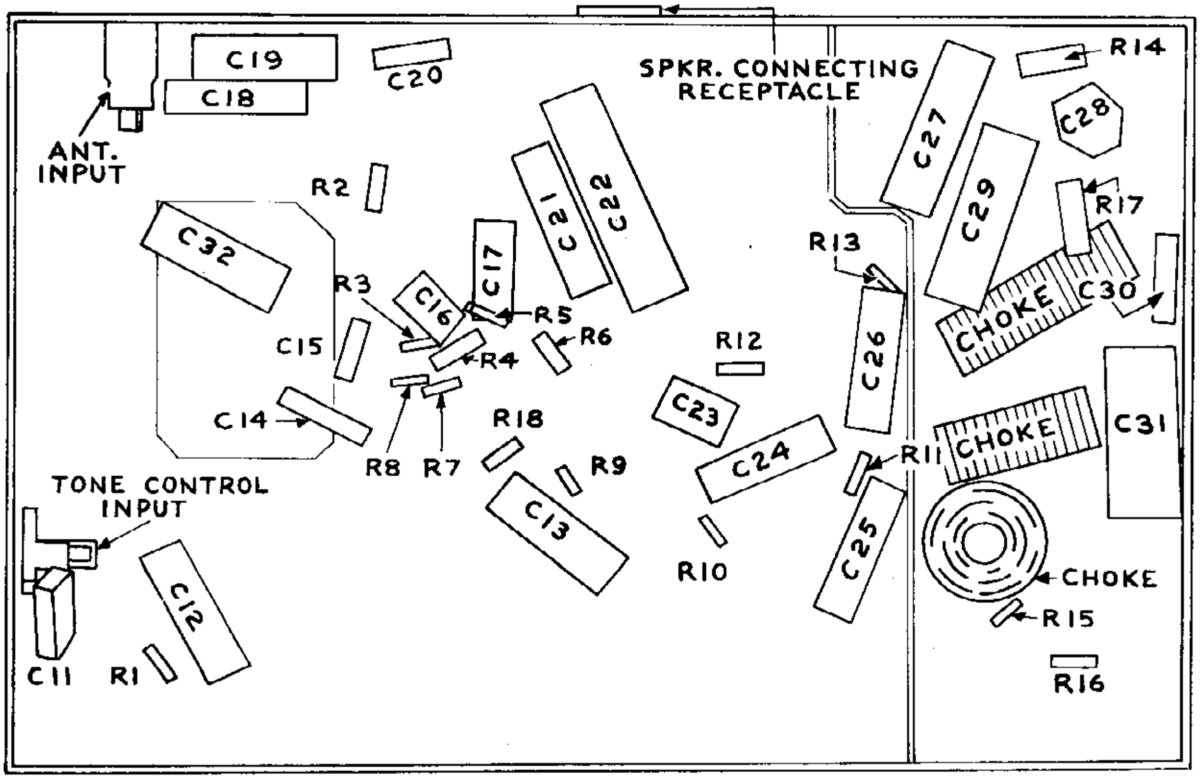
WITH THE TUNING CAPACITOR FULLY MESHED APPLY THROUGH A .05 uf CAPACITOR TO THE ANTENNA TERMINAL A 455 KC SIGNAL STRONG ENOUGH TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER. KEEP THE VOLUME AT MAXIMUM AND ADJUST I.F. TRIMMER C10, C9, C8 AND C7 FOR MAXIMUM OUTPUT.

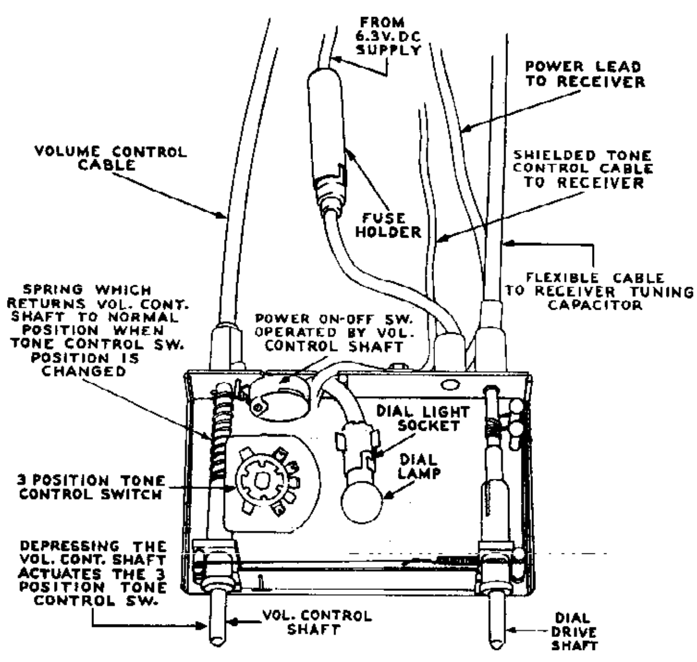
R.F. OSC. ADJUSTMENTS

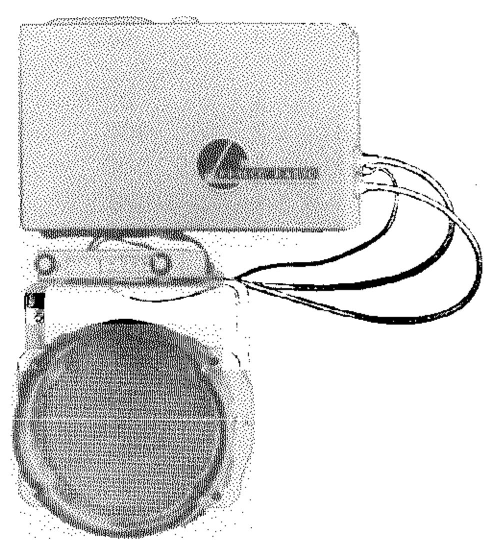
TUNE THE SIGNAL GENERATOR AND RECEIVER TO 1500 KC AND APPLY THE SIGNAL THROUGH A 50 uut CAPACITOR TO THE ANTENNA TERMINAL. ADJUST OSCILLATOR TRIMMER C3 FOR MAXIMUM.

TUNE THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANTENNA TRIMMER C4 FOR MAXIMUM. THIS TRIMMER SHOULD BE READJUSTED AFTER THE RECEIVER HAS BEEN INSTALLED IN THE CAR.

TUNE THE SIGNAL GENERATOR AND RECEIVER TO 600 KC AND ADJUST OSCILLATOR PADDER C5 FOR MAXIMUM WHILE ROCKING THE TUNING CAPACITOR. REPEAT THE OSC. AND R.F. ADJUSTMENTS.


C19
C18
C20
ANT.
INPUT
SPKR. CONNECTING
RECEPTACLE
R14
C27
C28
C29
R17
R2
C21
C22
C32
R13
C17
C30
R3
C16
R5
R6
CHOKE
C15
R4
R12
C26
C14
R8
R7
C23
R18
C31
CHOKE
C24
R11
R9
TONE CONTROL
INPUT
C13
C25
R10
CHOKE
R15
C12
C11
R1
R16

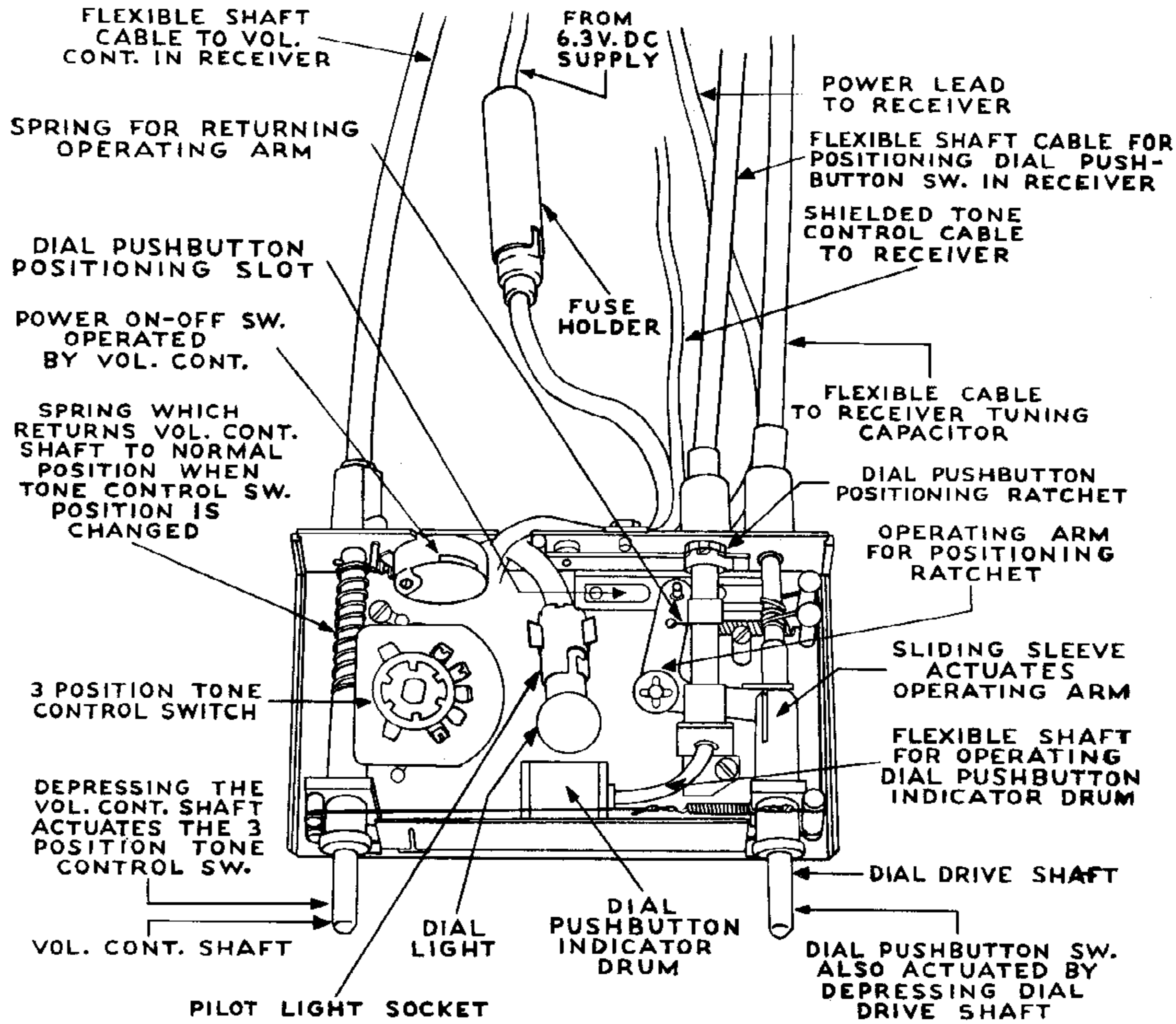

FROM
6.3V. DC
SUPPLY
POWER LEAD
TO RECEIVER
VOLUME CONTROL
CABLE
SHIELDED TONE
CONTROL CABLE
TO RECEIVER
FUSE
HOLDER
FLEXIBLE CABLE
TO RECEIVER TUNING
CAPACITOR
SPRING WHICH
RETURNS VOL. CONT.
SHAFT TO NORMAL
POSITION WHEN
TONE CONTROL SW.
POSITION IS
CHANGED
POWER ON-OFF SW.
OPERATED BY VOL.
CONTROL SHAFT
DIAL LIGHT
SOCKET
DIAL
LAMP
3 POSITION TONE
CONTROL SWITCH
DEPRESSING THE
VOL. CONT. SHAFT
ACTUATES THE 3
POSITION TONE
CONTROL SW.
VOL. CONTROL
SHAFT
DIAL
DRIVE
SHAFT

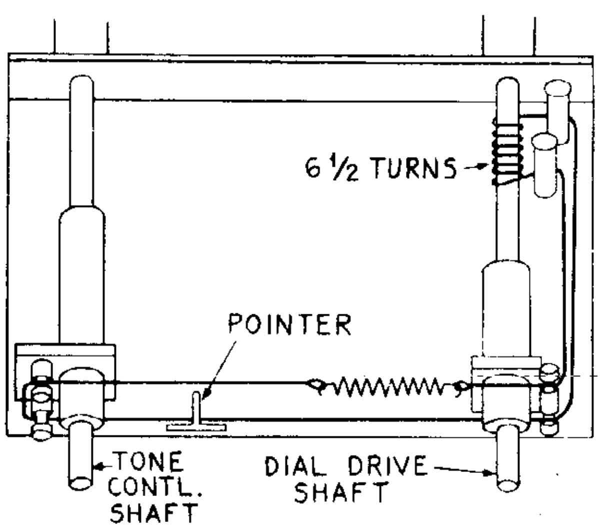


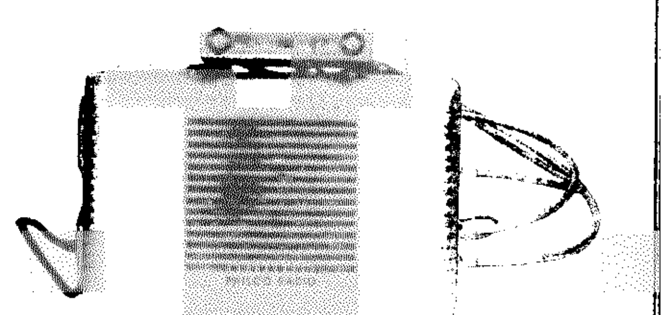
TUBE	PIN	VTVM	20,000 P.V.	1,000 P.V.	RESISTANCE
7A7 RF Ampl	1	0	0	0	0
	2	140	140	140	Over 5 megs
	3	85	85	85	Over 5 megs
	4	0	0	0	0
	5	0	0	0	0
	6	-0.3	0	0	1 meg
	7	3.3	3.3	3.3	750 Ω
	8	6.3	6.3	6.3	0.2 Ω
7B8 Conv	1	0	0	0	0
	2	145	145	145	Over 5 megs
	3	65	65	44	Over 5 megs
	4	-6.5	-5	-0.4	100 K
	5	82	82	82	Over 5 megs
	6	-0.3	-0.1	0	1 meg
	7	2	2	2	180 Ω
	8	6.3	6.3	6.3	0.2 Ω
7A7 IF Ampl	1	0	0	0	0
	2	145	145	145	Over 5 megs
	3	85	85	78	Over 5 megs
	4	0	0	9	0
	5	0	0	0	0
	6	0	0	0	15 Ω
	7	3	3	3	350 Ω
	8	6.3	6.3	6.3	0.2 Ω
7B6 Det.AVC Audio Ampg	1	0	0	0	0
	2	84	84	46	Over 5 megs
	3	-0.5	-0.3	-0.2	15 megs
	4	-	-	-	-
	5	-0.3	-0.3	-0.2	300 K
	6	-0.3	-0.3	-0.2	300 K
	7	0	0	0	0
	8	6.3	6.3	6.3	0.2 Ω
7C5 Audio Output	1	0	0	0	0
	2	205	205	205	Over 5 megs
	3	200	200	200	Over 5 megs
	4	-	-	-	-
	5	-	-	-	-
	6	0	0	0	400 K
	7	7.5	7.5	7.5	220 Ω
	8	6.3	6.3	6.3	0.2 Ω
7Y4 Rect	1	6.3	6.3	6.3	0.2 Ω
	2	-	-	-	-
	3	AC	AC	AC	500 Ω
	4	-	-	-	-
	5	-	-	-	-
	6	AC	AC	AC	555 Ω
	7	225	225	225	Over 5 megs
	8	0	0	0	0

NOTE: All voltage and resistance measurements made with respect to chassis ground, and with a supply voltage of 6.3 V.D.C.

PHILCO CORP.

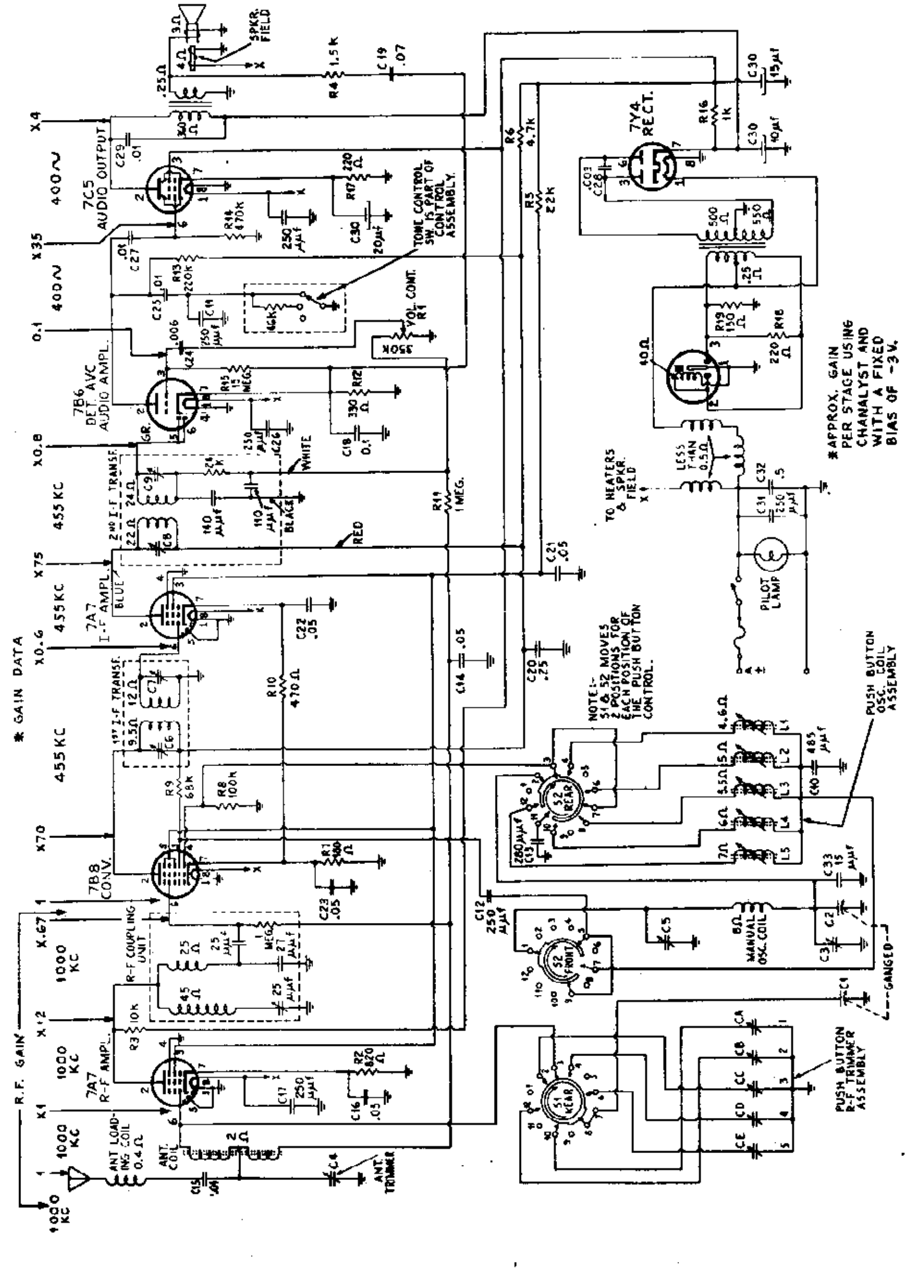

FLEXIBLE SHAFT CABLE TO VOL. CONT. IN RECEIVER
FROM 6.3V. DC SUPPLY
POWER LEAD TO RECEIVER
SPRING FOR RETURNING OPERATING ARM
FLEXIBLE SHAFT CABLE FOR POSITIONING DIAL PUSH-BUTTON SW. IN RECEIVER
SHIELDED TONE CONTROL CABLE TO RECEIVER
DIAL PUSHBUTTON POSITIONING SLOT
FUSE HOLDER
POWER ON-OFF SW. OPERATED BY VOL. CONT.
FLEXIBLE CABLE TO RECEIVER TUNING CAPACITOR
SPRING WHICH RETURNS VOL. CONT. SHAFT TO NORMAL POSITION WHEN TONE CONTROL SW. POSITION IS CHANGED
DIAL PUSHBUTTON POSITIONING RATCHET
OPERATING ARM FOR POSITIONING RATCHET
SLIDING SLEEVE ACTUATES OPERATING ARM
3 POSITION TONE CONTROL SWITCH
FLEXIBLE SHAFT FOR OPERATING DIAL PUSHBUTTON INDICATOR DRUM
DEPRESSING THE VOL. CONT. SHAFT ACTUATES THE 3 POSITION TONE CONTROL SW.
DIAL DRIVE SHAFT
VOL. CONT. SHAFT
DIAL LIGHT
DIAL PUSHBUTTON INDICATOR DRUM
DIAL PUSHBUTTON SW. ALSO ACTUATED BY DEPRESSING DIAL DRIVE SHAFT
PILOT LIGHT SOCKET


6 1/2 TURNS
POINTER
TONE CONTL. SHAFT
DIAL DRIVE SHAFT



MODEL UN6-500

PHILCO CORP.



ALIGNMENT INSTRUCTIONS FOR PHILCO
MODEL UN6-500

MAKE SURE THE DIAL-PUSHBUTTON SWITCH IS IN THE DIAL POSITION BEFORE ATTEMPTING TO ALIGN THIS RECEIVER.

LOOSEN THE DIAL LOCKING SCREW ABOUT HALFWAY. THIS SCREW IS LOCATED BELOW THE OSCILLATOR AND ANTENNA TRIMMER ADJUSTMENT HOLES.

NEXT ROTATE THE PUSHBUTTON SWITCH UNTIL IT LOCKS IN POSITION. THIS WILL BE THE MANUAL TUNING POSITION.

REMOVE SPEAKER FROM TOP OF CASE AND CONNECT AN OUTPUT METER TO THE VOICE COIL.

WITH THE TUNING CONDENSER FULLY MESHED, APPLY THROUGH A .05 MF CONDENSER TO THE ANTENNA TERMINAL, A 455 KC SIGNAL, STRONG ENOUGH TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER. KEEP THE VOLUME CONTROL AT MAXIMUM, AND ADJUST I.F. TRIMMERS C9, C8, C7 and C6 FOR MAXIMUM OUTPUT.

NEXT ADJUST C34 FOR MINIMUM.

RF-OSC. ADJUSTMENTS

TUNE THE SIGNAL GENERATOR AND RECEIVER TO 1500 KC. APPLY THE SIGNAL THROUGH A 50 F CONDENSER TO THE ANTENNA TERMINAL. ADJUST OSCILLATOR TRIMMER C3 FOR MAXIMUM.

TUNE THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANTENNA TRIMMER C400-6 FOR MAXIMUM. THIS TRIMMER SHOULD BE READJUSTED AFTER THE RECEIVER HAS BEEN INSTALLED IN THE CAR.

TUNE THE SIGNAL GENERATOR AND RECEIVER TO 600 KC AND ADJUST OSCILLATOR PADDER C5 FOR MAXIMUM WHILE ROCKING TUNING CONDENSER. REPEAT THE OSC. R.F. ADJUSTMENTS.

PUSH BUTTON ADJUSTMENTS FOR
PHILCO MODEL UN6-500

BEFORE ADJUSTING PUSHBUTTONS MAKE SURE THE DIAL-PUSHBUTTON SWITCH IS SYNCHRONIZED WITH THE DIAL-PUSHBUTTON CONTROL. (SEE PRELIMINARY ALIGNMENT INSTRUCTIONS.) AFTER SYNCHRONIZATION, TIGHTEN DIAL LOCKING SCREW SO THAT DIAL-PUSHBUTTON SWITCH WILL BE ABLE TO MOVE WHEN DIAL-PUSHBUTTON KNOB IS DEPRESSED.

ALLOW THE RECEIVER TO WARM UP FOR AT LEAST 15 MINUTES BEFORE MAKING PUSH BUTTON ADJUSTMENTS

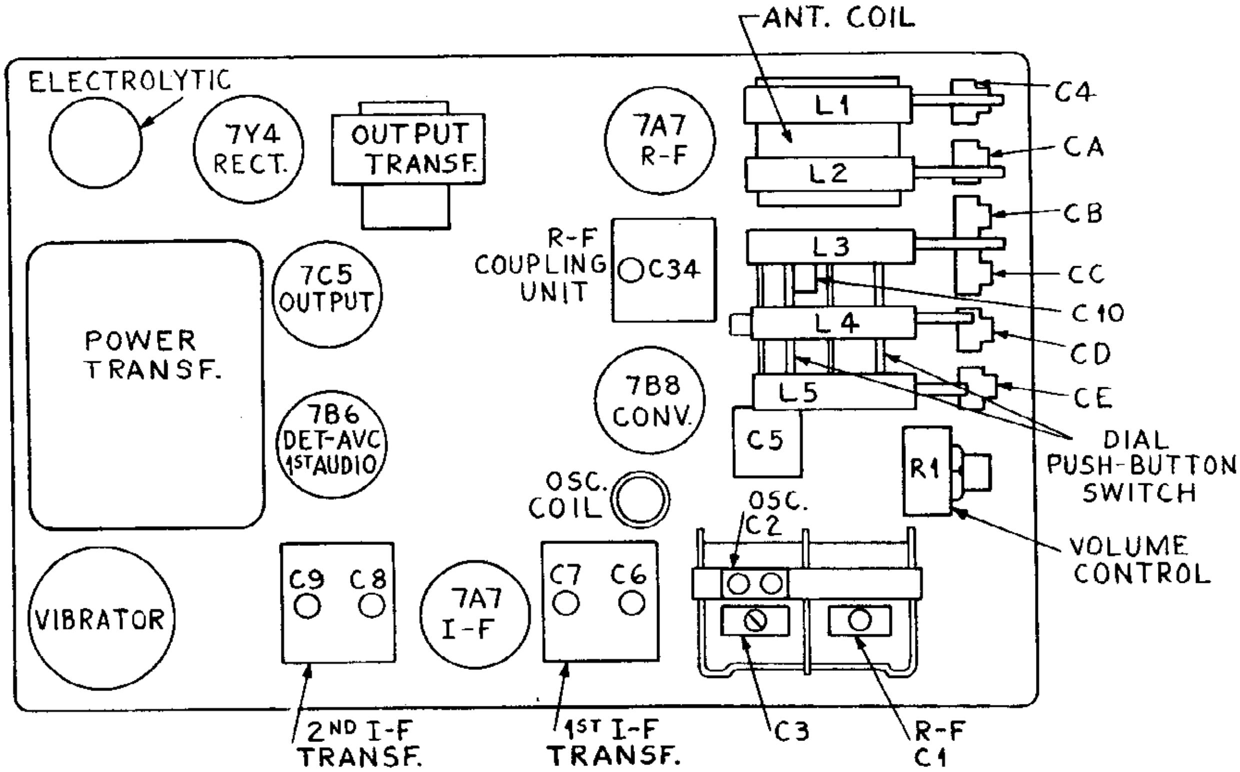
REMOVE THE TWO SCREWS HOLDING THE METAL PLATE ON THE END OF THE RECEIVER.

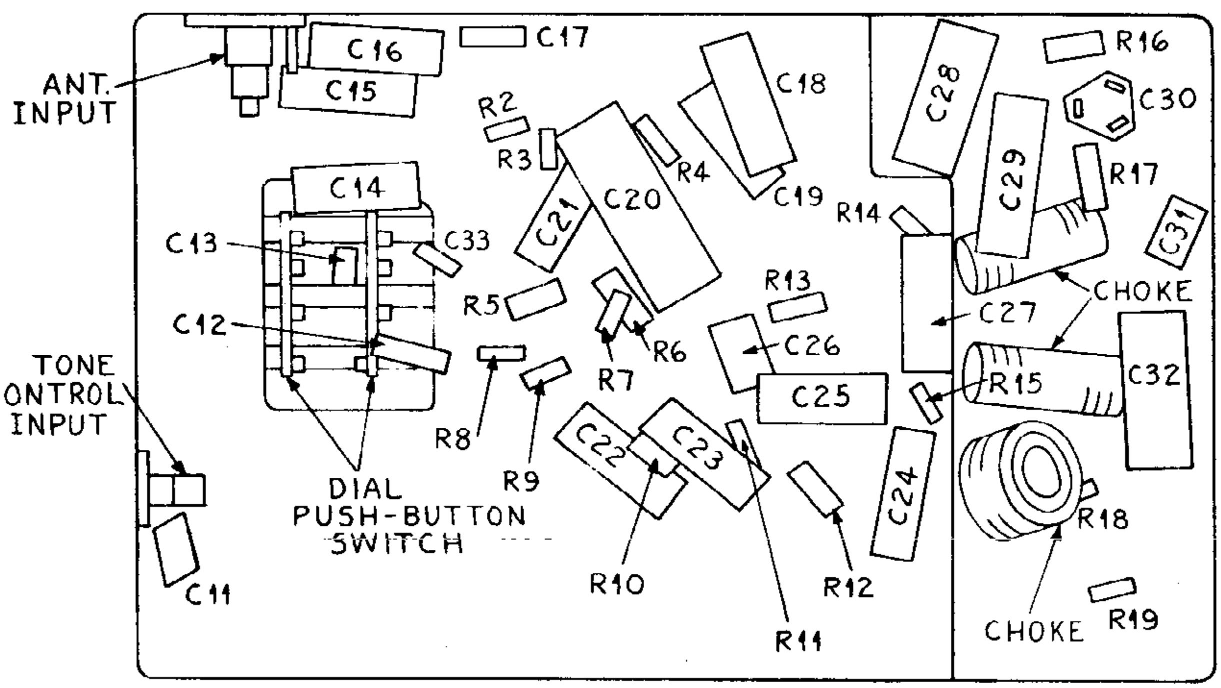
POSITION ONE OF THE PUSHBUTTON SWITCH IN THE HIGHEST FREQUENCY POSITION. SELECT WITH MANUAL TUNING A STATION IN THE RANGE OF POSITION ONE. PLACE THE PUSH BUTTON CONTROL ON POSITION 1 AND ADJUST THE OSCILLZTOR TUNING SLUG L1 UNTIL THE STATION IS TUNED IN. THEN ADJUST THE ANTENNA TRIMMER CA FOR POSITION 1 FOR MAXIMUM.

REPEAT THE ABOVE PROCESS FOR THE OTHER FOUR POSITIONS.

AFTER INSTALLATION IN THE CAR, THE ABOVE ADJUSTMENTS SHOULD BE RECHECKED.

PHILCO CORP.


ANT. COIL
ELECTROLYTIC
7Y4 RECT.
OUTPUT TRANSF.
7A7 R-F
L1
L2
L3
L4
L5
C4
CA
CB
CC
C10
CD
CE
R-F COUPLING UNIT
C34
POWER TRANSF.
7C5 OUTPUT
7B8 CONV.
7B6 DET-AVC 1ST AUDIO
C5
R1
DIAL PUSH-BUTTON SWITCH
OSC. COIL
OSC. C2
VOLUME CONTROL
VIBRATOR
C9
C8
7A7 I-F
C7
C6
2ND I-F TRANSF.
1ST I-F TRANSF.
C3
R-F C1


ANT. INPUT
C16
C15
C17
C18
C19
C28
R16
C30
C29
R17
C31
R2
R3
R4
C20
C21
C14
C13
C33
C12
R14
R5
R6
R7
R13
C27
CHOKE
C26
C25
R8
R9
C32
R15
TONE CONTROL INPUT
DIAL PUSH-BUTTON SWITCH
C22
C23
C24
R18
C11
R10
R11
R12
CHOKE
R19

PHILCO CORP.

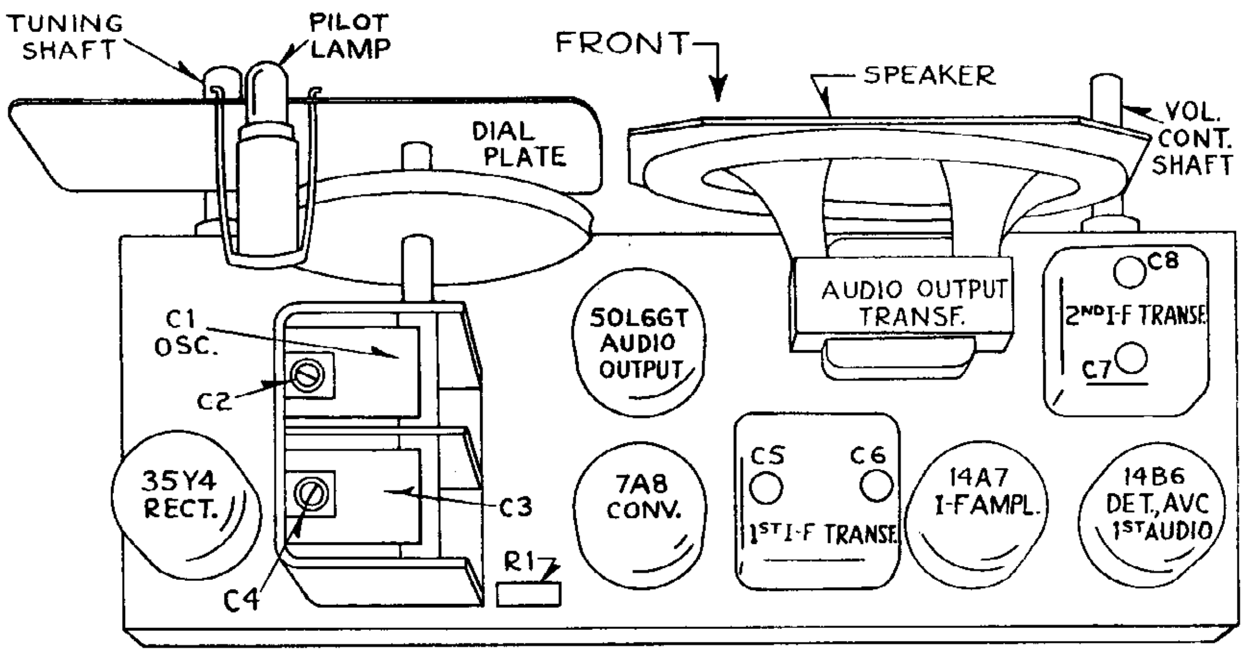
MODEL UN6-500

TUBE	PIN	VTVM	20,000 OHMS PER VOLT	1,000 OHMS PER VOLT	RESISTANCE
7A7	1	0	0	0	0
RF AMPL	2	165	165	165	OVER 5 MEGS
	3	90	90	90	OVER 5 MEGS
	4	0	0	0	0
	5	0	0	0	0
	6	-0.3	0	0	1.2 MEGS
	7	4	4	4	800 OHMS
	8	6	6	6	0.2 OHMS
7B8	1	0	0	0	0
CONV	2	165	165	165	OVER 5 MEGS
	3	72	72	72	OVER 5 MEGS
	4	-4.7	-3.4	0	100 K
	5	88	88	88	OVER 5 MEGS
	6	-0.3	0	0	2 MEGS
	7	2	2	2	180 OHMS
	8	6	6	6	0.2 OHMS
7A7	1	0	0	0	0
IF AMPL	2	165	165	165	OVER 5 MEGS
	3	88	88	88	OVER 5 MEGS
	4	0	0	0	0
	5	0	0	0	0
	6	0	0	0	13 OHMS
	7	4	4	4	650 OHMS
	8	6	6	6	0.2 OHMS
7B6	1	0	0	0	0
DET.AVC	2	94	94	52	OVER 5 MEGS
AUDIO	3	-0.6	-0.2	-0.1	15 MEGS
AMPL	4	0.1	0	0	330 OHMS
	5	-0.4	-0.2	0	350 K
	6	-0.4	-0.2	0	350 K
	7	0.1	0	0	330 OHMS
	8	6	6	6	0.2 OHMS
7C5	1	0	0	0	0
AUDIO	2	200	200	200	OVER 5 MEGS
OUTPUT	3	195	195	195	OVER 5 MEGS
	4	-	-	-	-
	5	-	-	-	-
	6	0.4	0.1	0	500 K
	7	8	8	8	220 OHMS
	8	6	6	6	0.2 OHMS
7V4	1	6	6	6	0.2 OHMS
RECT	2	-	-	-	-
	3	AC	AC	AC	600 OHMS
	4	-	-	-	-
	5	-	-	-	-
	6	AC	AC	AC	550 OHMS
	7	215	215	215	OVER 5 MEGS
	8	0	0	0	0

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A SUPPLY VOLTAGE OF 6.3 V. DC

MODEL 48-214
CODE 125

PHILCO CORP.



TOP VIEW

I.F. ALIGNMENT

CONNECT THE OUTPUT METER TO THE CENTER TERMINAL (LOW) AND THE LEFT TERMINAL (HIGH) OF THE THREE LUG TERMINAL STRIP MOUNTED ON THE REAR OF THE CHASSIS.

CONNECT THE SIGNAL GENERATOR TO THE STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO THE RECEIVER LOOP.

SET THE SIGNAL GENERATOR TO 455 KC AND FULLY MESH THE RECEIVER TUNING CAPACITOR. KEEP THE RECEIVER VOLUME CONTROL AT MAXIMUM AND THE OUTPUT OF THE SIGNAL GENERATOR SUFFICIENT TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER. ADJUST FOR MAXIMUM I.F. TRIMMERS C8, C7, C6 AND C5, IN THAT ORDER.

R.F. OSC. ADJUSTMENT

KEEPING THE SAME SETUP AS USED FOR I.F. ALIGNMENT, SET THE SIGNAL GENERATOR AND RECEIVER TO 1600 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT.

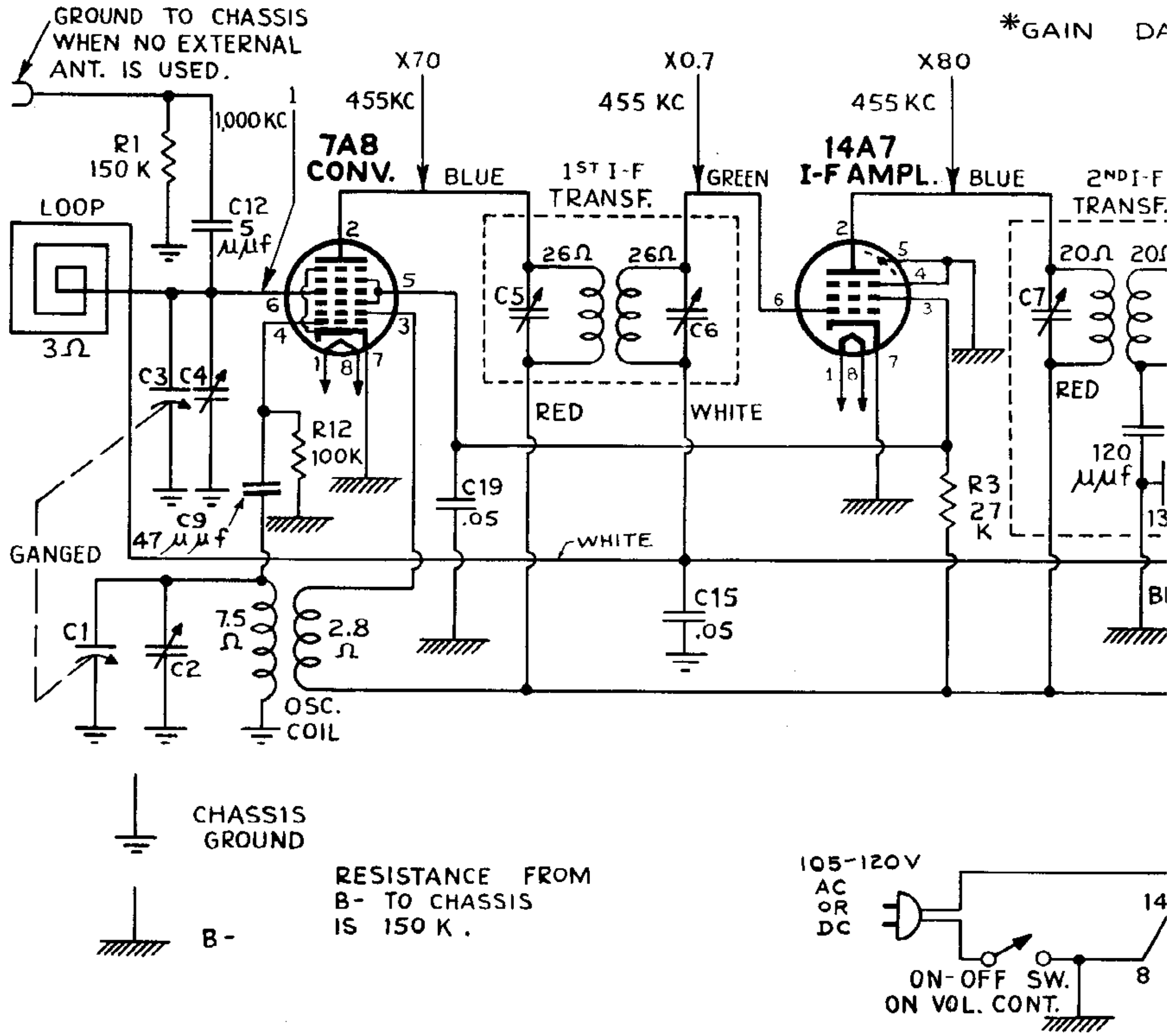
SET THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST R.F. TRIMMER C4 FOR MAXIMUM OUTPUT.

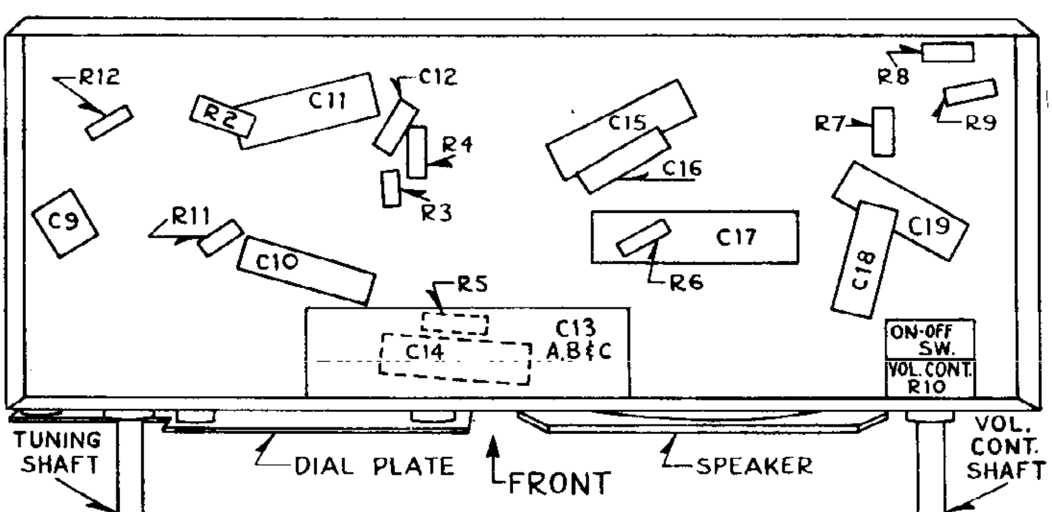
PHILCO CORP.

MODEL 48-214
Code 125

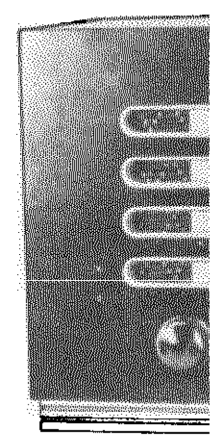
TUBE	PIN	VTVM	20,000 OHM PV	1,000 OHM PV	RESISTANCE
7A8 CONV.	1	AC	AC	AC	45 OHM
	2	+92	+92	+92	OVER 5 MEG
	3	+92	+92	+92	OVER 5 MEG
	4	-14	-12	-6	100 K
	5	+42	+42	+42	OVER 5 MEG
	6	-1	-0.8	-0.4	2.4 MEG
	7	0	0	0	0
	8	AC	AC	AC	35 OHM
14A7 I.F. AMPL.	1	AC	AC	AC	20 OHM
	2	+92	+92	+92	OVER 5 MEG
	3	+42	+42	+42	OVER 5 MEG
	4	0	0	0	0
	5	0	0	0	0
	6	-1	-0.8	-0.4	2.4 MEG
	7	0	0	0	0
	8	AC	AC	AC	35 OHM
14B6 DET. AVC. 1st AUDIO	1	AC	AC	AC	20 OHM
	2	+50	+50	+20	OVER 5 MEG
	3	-1	-0.8	-0.4	3 MEG
	4	0	0	0	0
	5	-1	0.8	0.4	2.4 MEG
	6	-0.8	0.6	0.2	450 K
	7	0	0	0	0
	8	0	0	0	0
50L6GT AUDIO OUTPUT	1	+50	+50	+20	OVER 5 MEG
	2	AC	AC	AC	100 OHM
	3	+100	+100	+100	OVER 5 MEG
	4	+92	+92	+92	OVER 5 MEG
	5	0	0	0	0
	6	-1	-0.8	-0.4	2.4 MEG
	7	AC	AC	AC	35 OHM
	8	+6	+6	+6	130 OHM
35Y4 RECT.	1	AC	AC	AC	130 OHM
	2	AC	AC	AC	125 OHM
	3	-14	-12	-6	100 K
	4	AC	AC	AC	125 OHM
	5	+92	+92	+92	OVER 5 MEG
	6	0	0	0	0
	7	+120	+120	+120	OVER 5 MEG
	8	AC	AC	AC	90 OHM

NOTE: ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO B- AND WITH A LINE VOLTAGE OF 116 V.A.C.

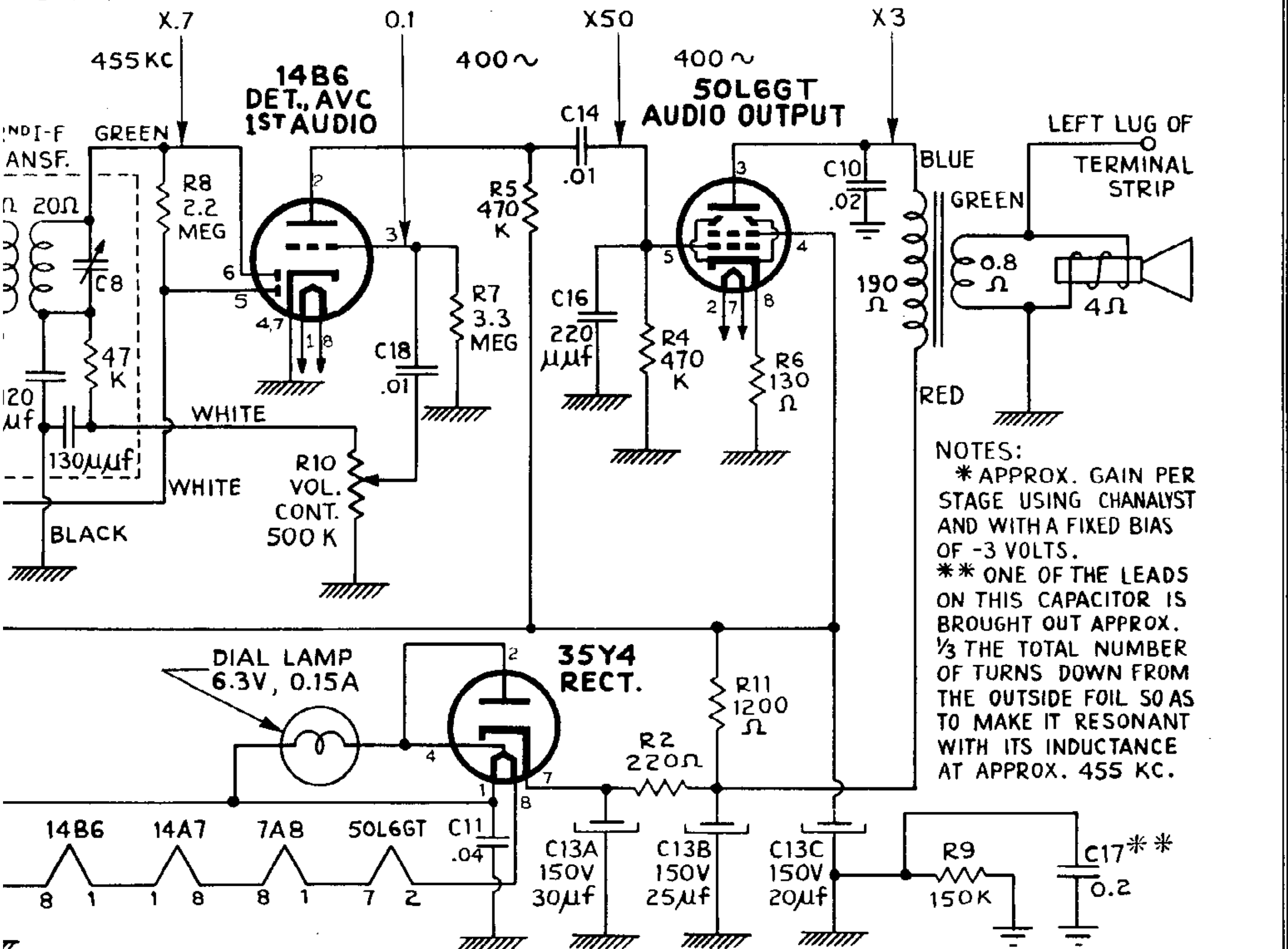

*GAIN DA
GROUND TO CHASSIS WHEN NO EXTERNAL ANT. IS USED.
R1 150 K
1,000 KC
1
C12 5 μμf
LOOP
3Ω
X70
455KC
7A8 CONV.
BLUE
1ST I-F TRANSF.
X0.7
455 KC
GREEN
26Ω
26Ω
C5
C6
RED
WHITE
X80
455 KC
14A7 I-F AMPL.
BLUE
2ND I-F TRANSF.
20Ω
C7
RED
120 μμf
C3
C4
R12 100K
C9 47 μμf
C19 .05
R3 27 K
GANGED
WHITE
C15 .05
C1
C2
7.5 Ω
2.8 Ω
OSC. COIL
CHASSIS GROUND
B -
RESISTANCE FROM B- TO CHASSIS IS 150 K.
105-120V AC OR DC
ON-OFF SW. ON VOL. CONT.
14
8

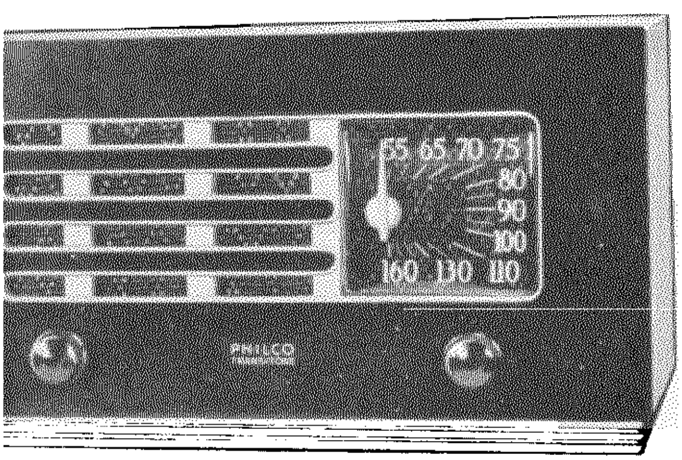

R12
R2
C11
C12
R4
R3
C15
C16
R8
R7
R9
C9
R11
C10
C17
R6
C19
C18
R5
C13 A.B&C
C14
ON-OFF SW.
VOL. CONT. R10
TUNING SHAFT
DIAL PLATE
FRONT
SPEAKER
VOL. CONT. SHAFT

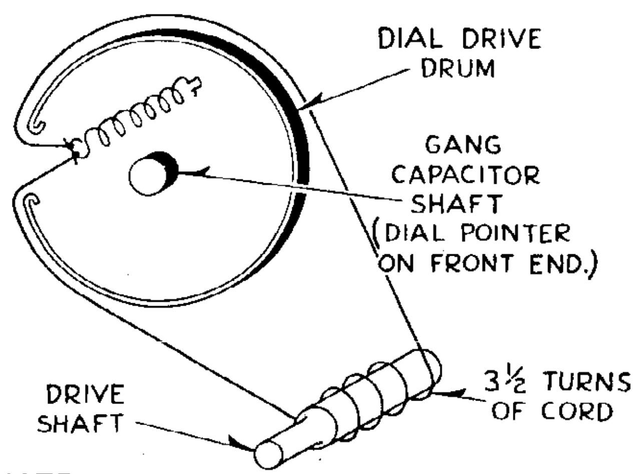
BOTTOM VIEW



DATA



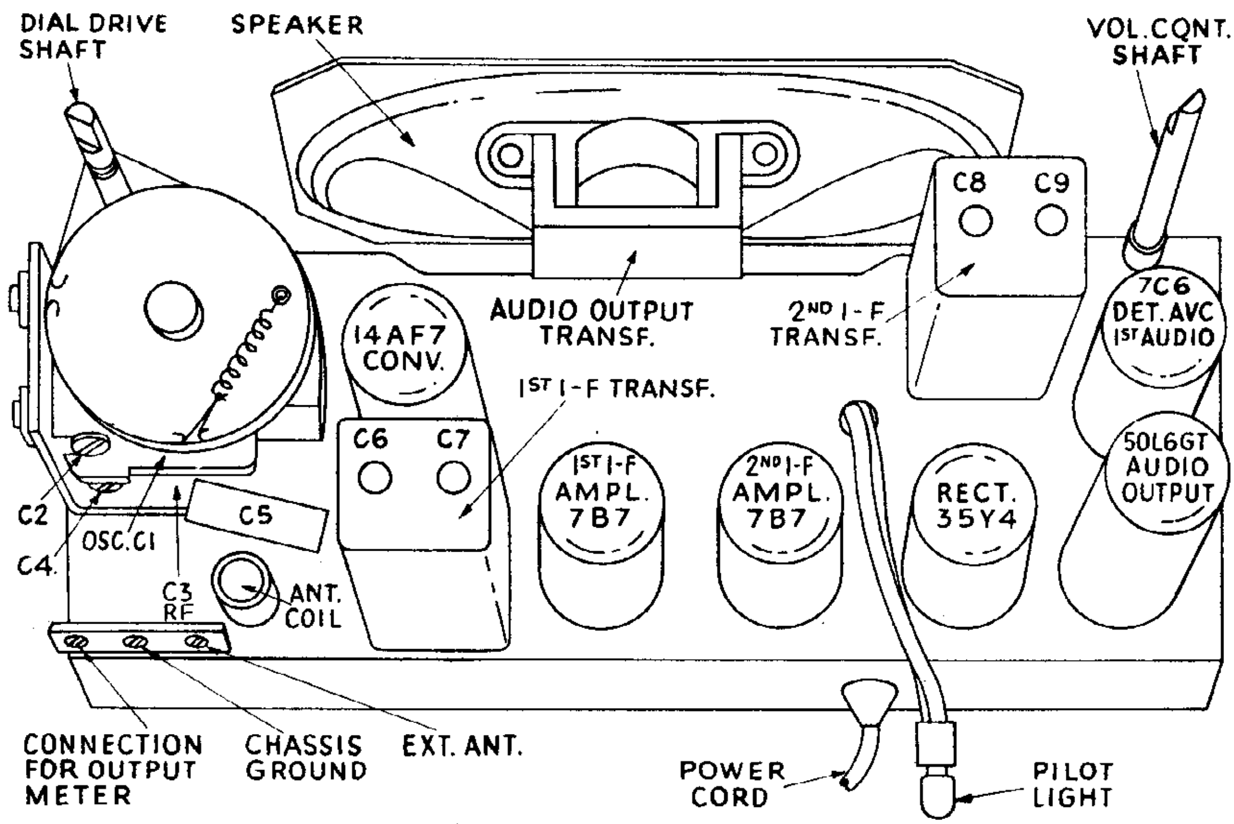




NOTE:
TUNING CAPACITOR IN
MAX. CAPACITY POSITION.

MODEL 48-460
Code 121

PHILCO CORP.



ALIGNMENT INSTRUCTIONS FOR PHILCO MODEL 48-460 CODE 121

IF ALIGNMENT

REMOVE RECEIVER FROM CABINET AND CONNECT THE OUTPUT METER TO THE LEFT TERMINAL (HIGH) AND THE CENTER TERMINAL (LOW) OF THE THREE LUG TERMINAL STRIP MOUNTED ON THE REAR OF THE CHASSIS.

CONNECT THE SIGNAL GENERATOR TO THE STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO THE RECEIVER LOOP.

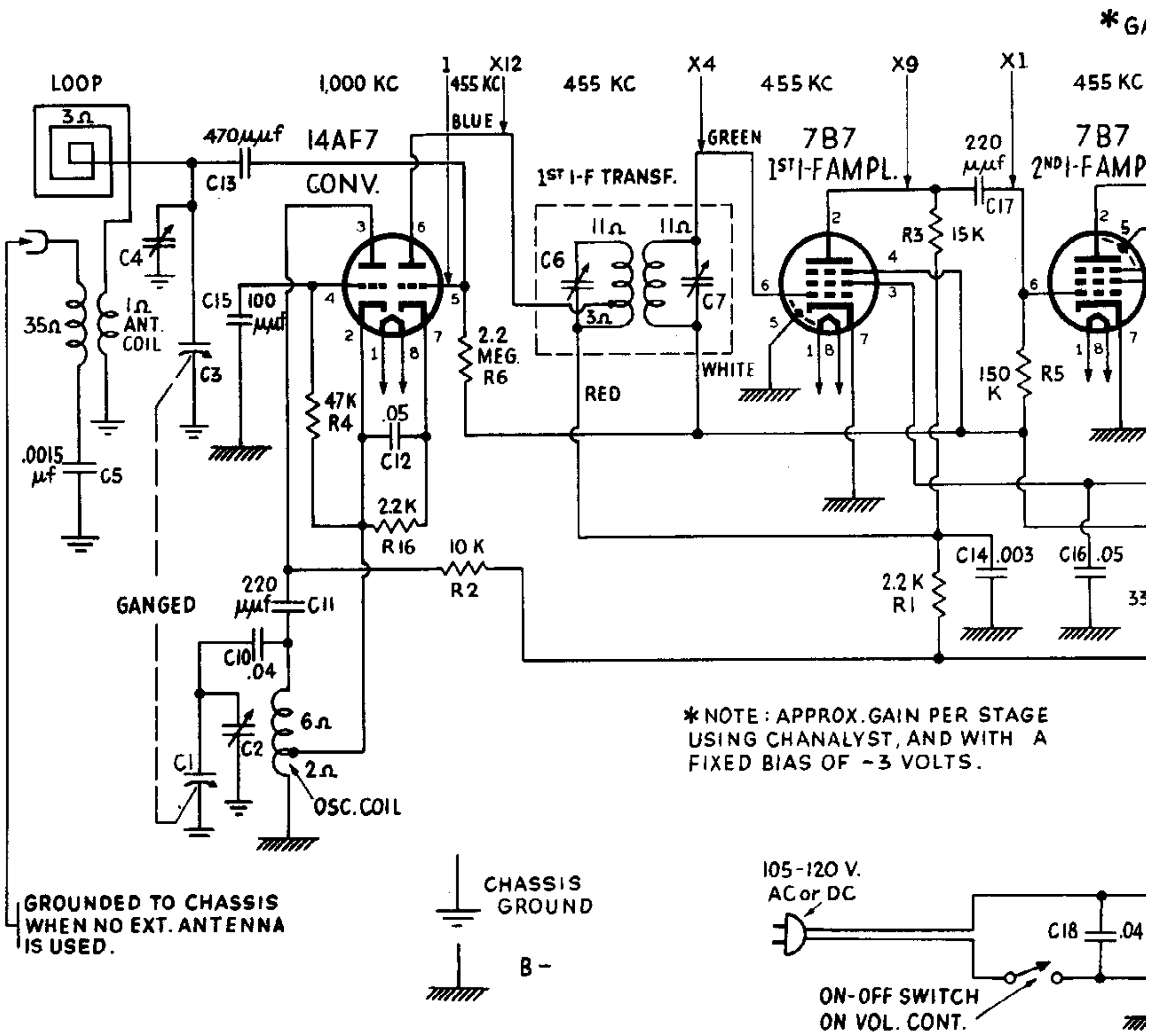
SET THE SIGNAL GENERATOR TO 455 KC AND FULLY MESH THE RECEIVER TUNING CAPACITOR. KEEP THE RECEIVER VOLUME AT MAXIMUM AND THE OUTPUT OF THE SIGNAL GENERATOR SUFFICIENT TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER. ADJUST FOR MAXIMUM I.F. TRIMMERS C9, C8, C7, AND C6.

RF OSC. ADJUSTMENT

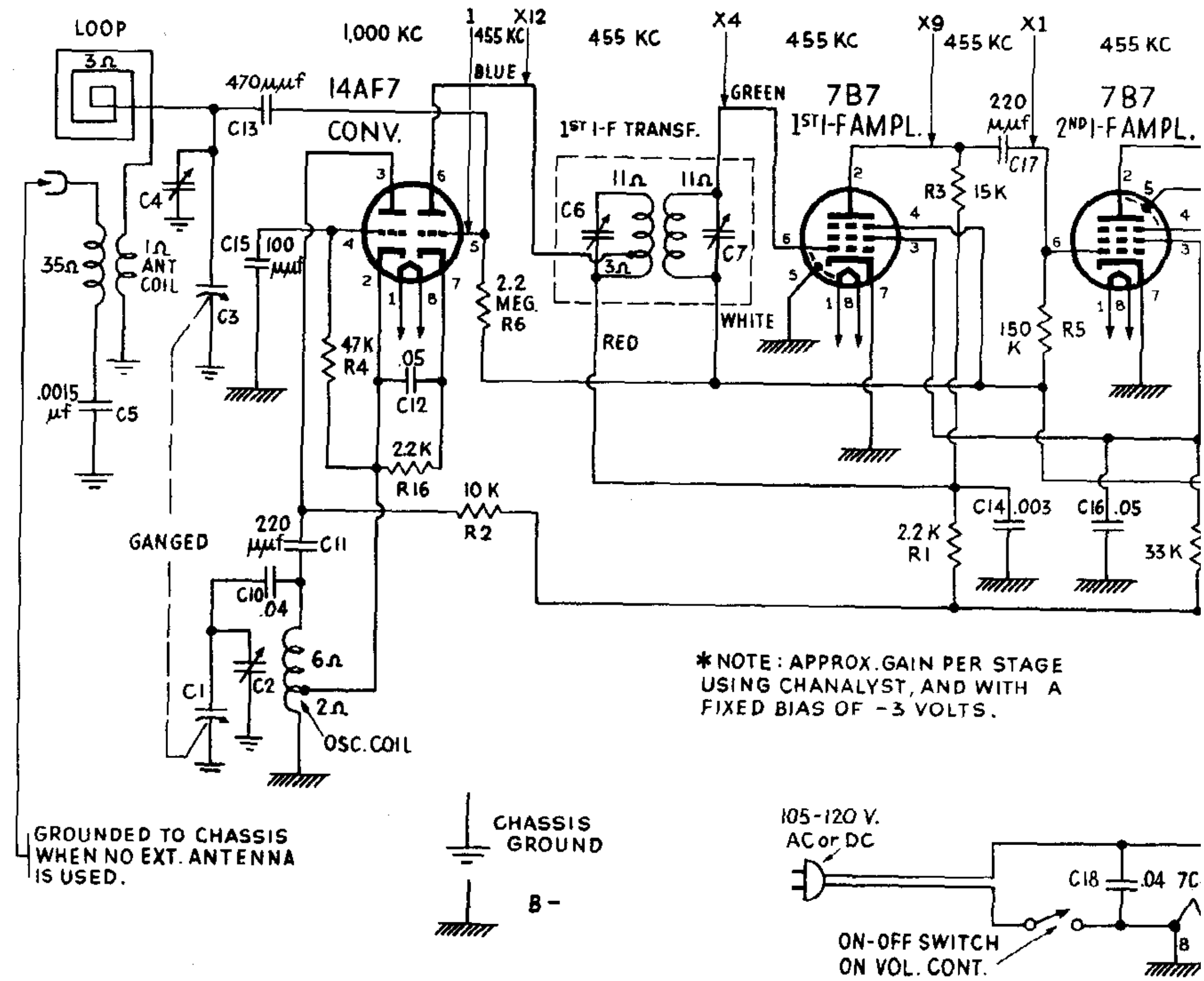
REPLACE THE RECEIVER IN CABINET. KEEPING THE SAME SETUP AS USED FOR IF ALIGNMENT, SET THE SIGNAL GENERATOR AND RECEIVER TO 1600 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT.

SET THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST RF TRIMMER C4 FOR MAXIMUM OUTPUT.

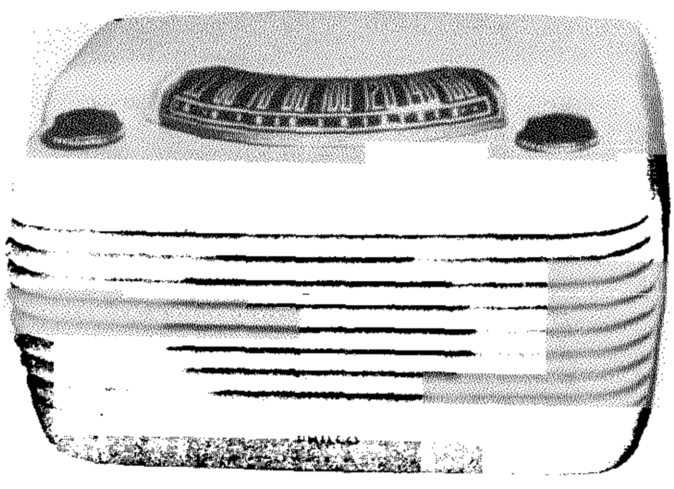
MODEL 48-461
Code 121

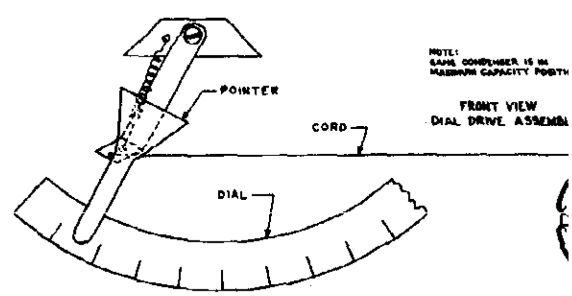


PHIL



*GAI
LOOP
3Ω
1,000 KC
1
X12
455 KC
BLUE
455 KC
X4
GREEN
455 KC
X9
455 KC
X1
455 KC
470μμf
C13
14AF7
CONV.
1ST I-F TRANSF.
7B7
1ST I-F AMPL.
220 μμf
C17
7B7
2ND I-F AMPL.
C4
C6
11Ω
11Ω
C7
3Ω
R3
15K
35Ω
1Ω ANT COIL
C15
100 μμf
C3
2.2 MEG. R6
RED
WHITE
150 K
R5
47K R4
.05
C12
.0015 μf
C5
2.2K
R16
10 K
R2
C14
.003
C16
.05
2.2 K R1
33 K
GANGED
220 μμf
C11
C10
.04
6Ω
C1
C2
2Ω
OSC. COIL
*NOTE: APPROX. GAIN PER STAGE USING CHANALYST, AND WITH A FIXED BIAS OF -3 VOLTS.
GROUNDED TO CHASSIS WHEN NO EXT. ANTENNA IS USED.
CHASSIS GROUND
B-
105-120 V. AC or DC
C18
.04
7C
ON-OFF SWITCH ON VOL. CONT.

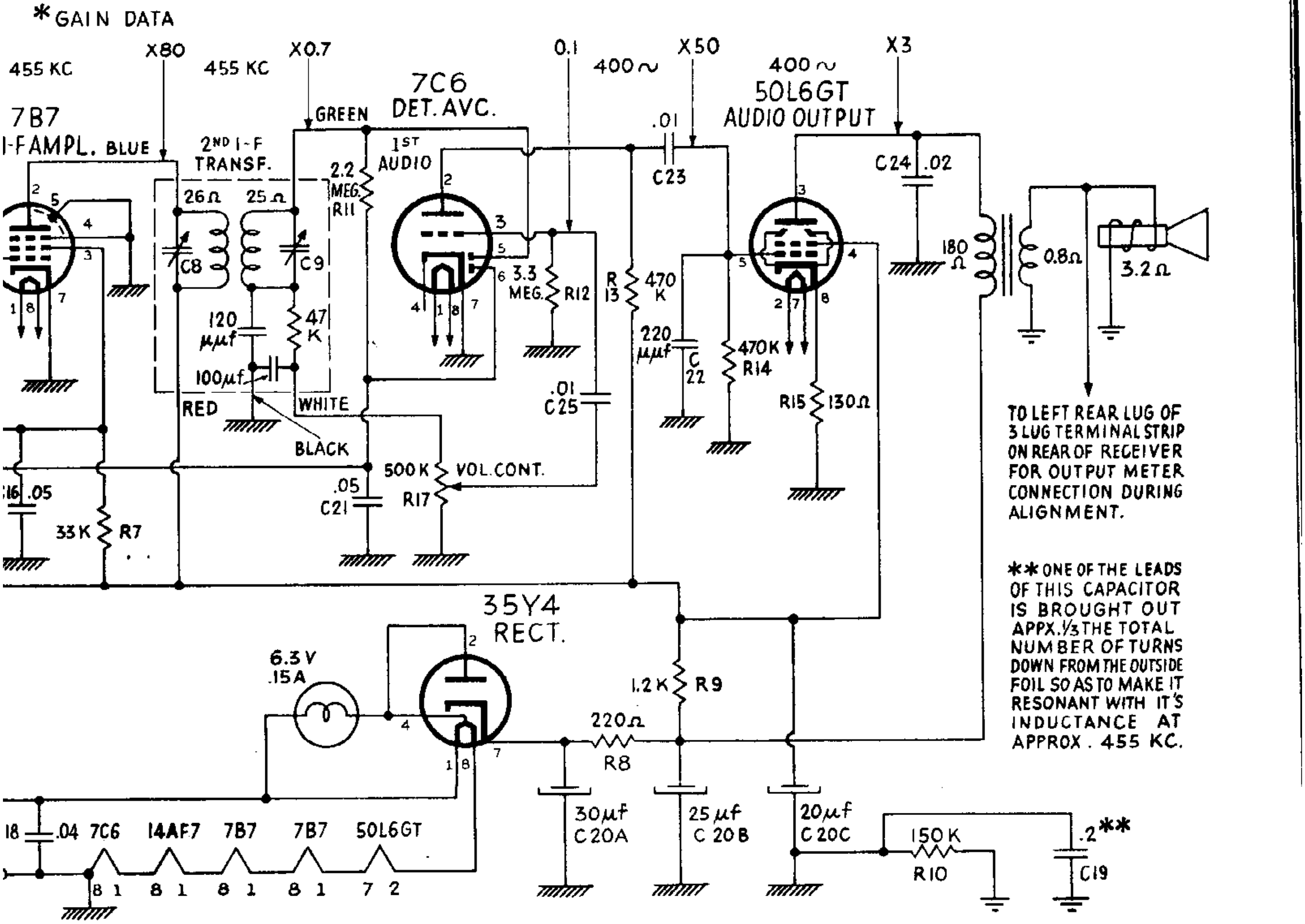


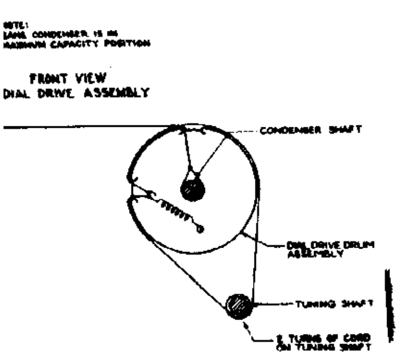


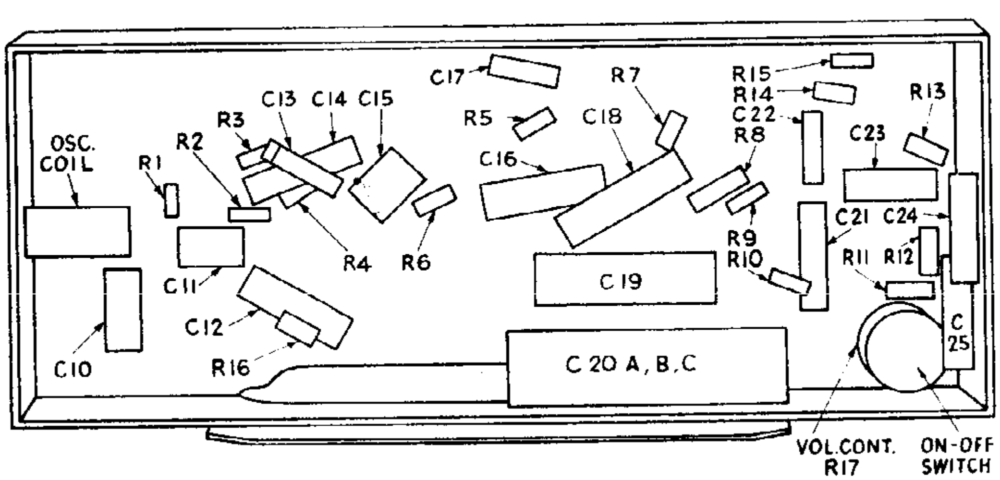
POINTER
CORD
DIAL
FRONT VIEW

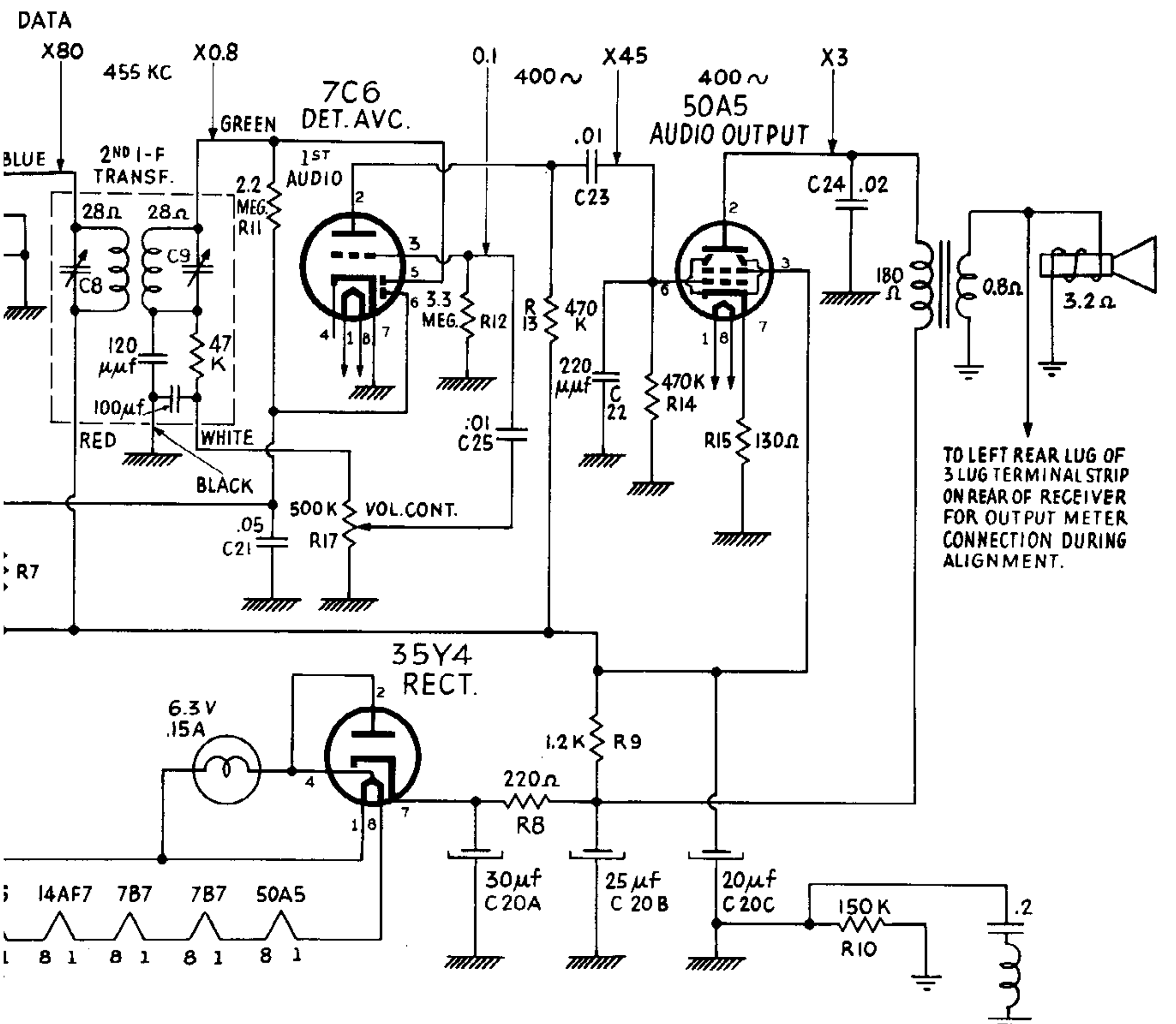
PHILCO CORP.

MODEL 48-460
Code 121








DATA
X80
455 KC
X0.8
GREEN
BLUE
2ND I-F TRANSF.
28Ω
28Ω
C8
C9
120 μμf
47 K
100μμf
RED
WHITE
BLACK
7C6
DET. AVC.
1ST AUDIO
2.2 MEG. R11
3.3 MEG. R12
0.1
400 ∼
X45
.01
C23
R 13
470 K
220 μμf
C 22
470K R14
.01 C25
500K VOL. CONT.
R17
.05 C21
R7
400 ∼
X3
50A5
AUDIO OUTPUT
C24 .02
180 Ω
0.8Ω
3.2Ω
R15 130Ω
TO LEFT REAR LUG OF 3 LUG TERMINAL STRIP ON REAR OF RECEIVER FOR OUTPUT METER CONNECTION DURING ALIGNMENT.
35Y4
RECT.
6.3 V .15A
1.2 K R9
220Ω
R8
30μf C 20A
25μf C 20B
20μf C 20C
150 K
R10
.2
14AF7
7B7
7B7
50A5

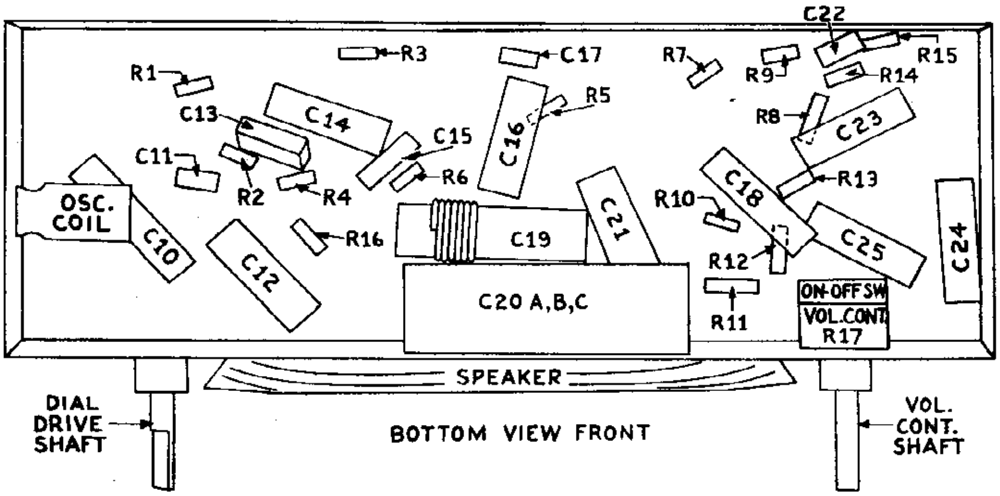
PHILCO CORP.

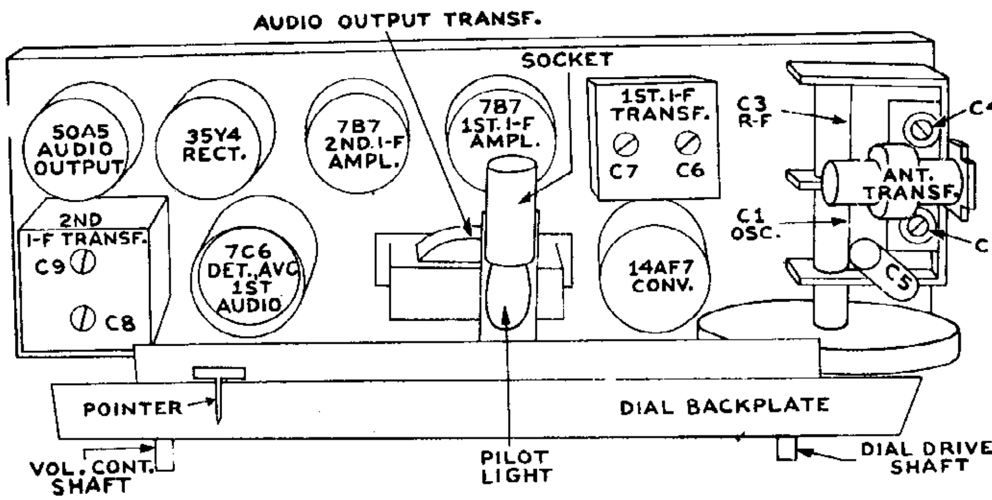
PHILCO MODEL 48-460 CODE 121

TUBE	PIN	VTVM	20,000 OHM PV	1,000 OHM PV	RESISTANCE
14AF7	1	AC	AC	AC	22 OHM
CONV.	2	0	0	0	2 OHM
	3	60	60	56	OVER 500 K
	4	-2.5	-2.5	-2.2	50 K
	5	-0.8	0	0	4.5 MEG
	6	80	80	80	OVER 500 K
	7	3.5	3.4	3.2	2 K
	8	AC	AC	AC	10 OHM
7B7	1	AC	AC	AC	25 OHM
1st IF	2	30	30	28	OVER 500 K
AMPL.	3	40	40	38	OVER 500 K
	4	-0.8	-0.6	-0.3	2.5 MEG
	5	0	0	0	0
	6	-0.8	-0.6	-0.3	2.5 MEG
	7	0	0	0	0
	8	AC	AC	AC	20 OHM
7B7	1	AC	AC	AC	34 OHM
2nd IF	2	84	84	84	OVER 500 K
AMPL.	3	40	40	38	OVER 500 K
	4	0	0	0	0
	5	0	0	0	0
	6	-0.8	-0.6	-0.2	2.8 MEG
	7	0	0	0	0
	8	AC	AC	AC	26 OHM
7C6	1	AC	AC	AC	8 OHM
DET. AVC	2	48	48	16	OVER 500 K
1st AUDIO	3	-0.5	-0.4	-0.2	3 MEG
	4	0	0	0	0
	5	-0.5	-0.4	-0.2	525 K
	6	-0.8	-0.6	-0.3	2.8 MEG
	7	0	0	0	0
	8	0	0	0	0
50L6GT	1	--	--	--	--
AUDIO	2	AC	AC	AC	85 OHM
OUTPUT	3	100	100	100	OVER 500 K
	4	88	88	88	OVER 500 K
	5	0	0	0	500 K
	6	--	--	--	--
	7	AC	AC	AC	34 OHM
	8	6	6	6	130 OHM
35Y4	1	AC	AC	AC	115 OHM
RECT.	2	AC	AC	AC	112 OHM
	3	88	88	88	OVER 500 K
	4	AC	AC	AC	112 OHM
	5	0	0	0	0
	6	88	88	88	OVER 500 K
	7	118	118	118	OVER 500 K
	8	AC	AC	AC	85 OHM

NOTE: ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO B- AND WITH A LINE VOLTAGE OF 116 V.A.C.

PHILCO CORP.





I.F. ALIGNMENT

REMOVE THE RECEIVER FROM CABINET AND CONNECT THE OUTPUT METER TO THE LEFT TERMINAL (HIGH) AND THE CENTER TERMINAL (LOW) OF THE THREE LUG TERMINAL STRIP MOUNTED ON THE REAR OF THE CHASSIS.

CONNECT THE SIGNAL GENERATOR TO THE STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO THE RECEIVER LOOP.

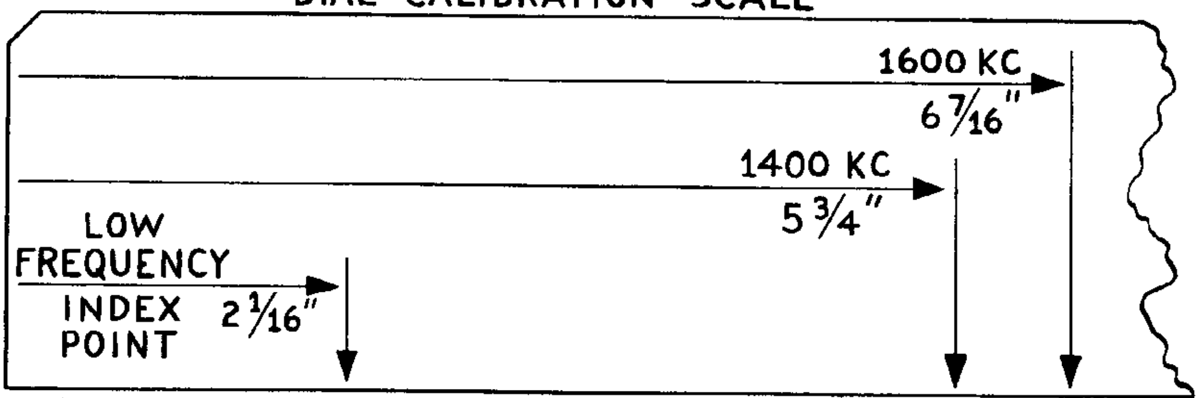
SET THE SIGNAL GENERATOR TO 455 KC AND FULLY MESH THE RECEIVER TUNING CAPACITOR. KEEP THE RECEIVER VOLUME CONTROL AT MAXIMUM AND THE OUTPUT OF THE SIGNAL GENERATOR SUFFICIENT TO GIVE A READABLE DEFLECTION ON THE OUTPUT METER. ADJUST FOR MAXIMUM I.F. TRIMMERS C9, C8, C7 aND C6.

R.F. OSC. ADJUSTMENT

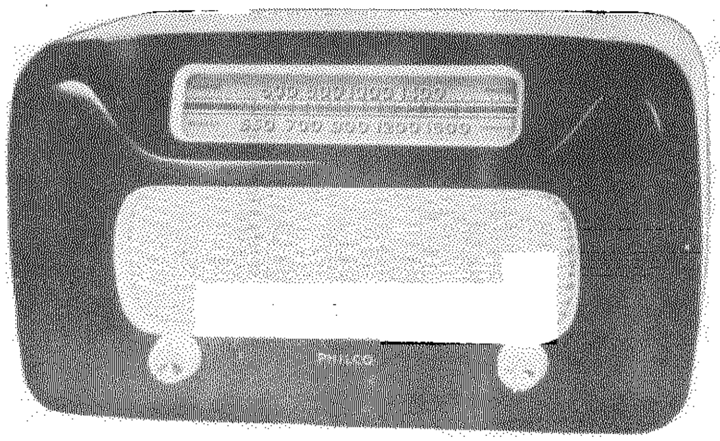
KEEPING THE SAME SETUP AS USED FOR I.F. ALIGNMENT, SET THE SIGNAL GENERATOR AND RECEIVER TO 1600 KC AND ADJUST OSCILLATOR TRIMMER C2 FOR MAXIMUM OUTPUT.

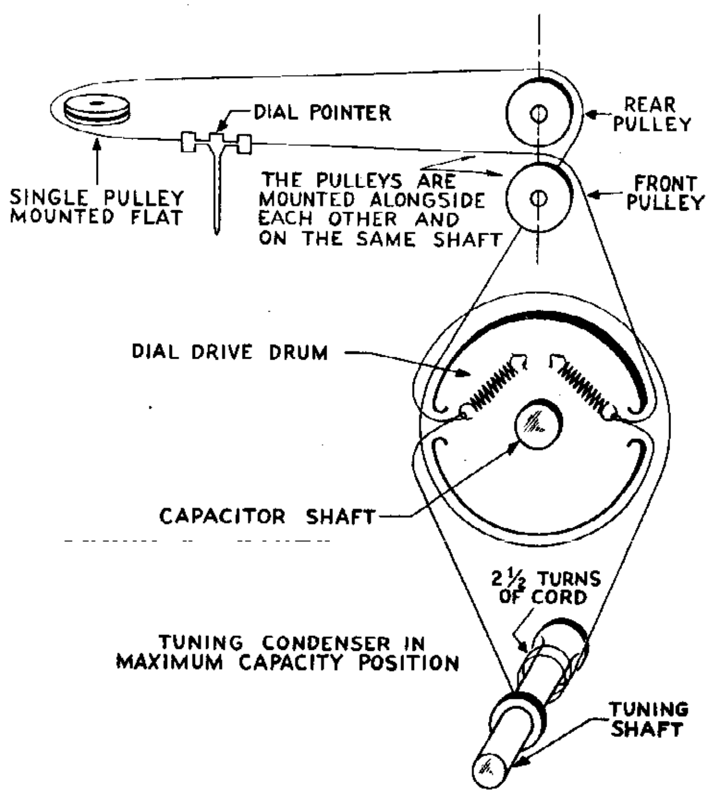
SET THE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST R.F. TRIMMER C4 FOR MAXIMUM OUTPUT.

DIAL CALIBRATION SCALE



MEASURED FROM LEFT FRONT OF DIAL BACKPLATE





MODEL 48-461

PHILCO CORP.

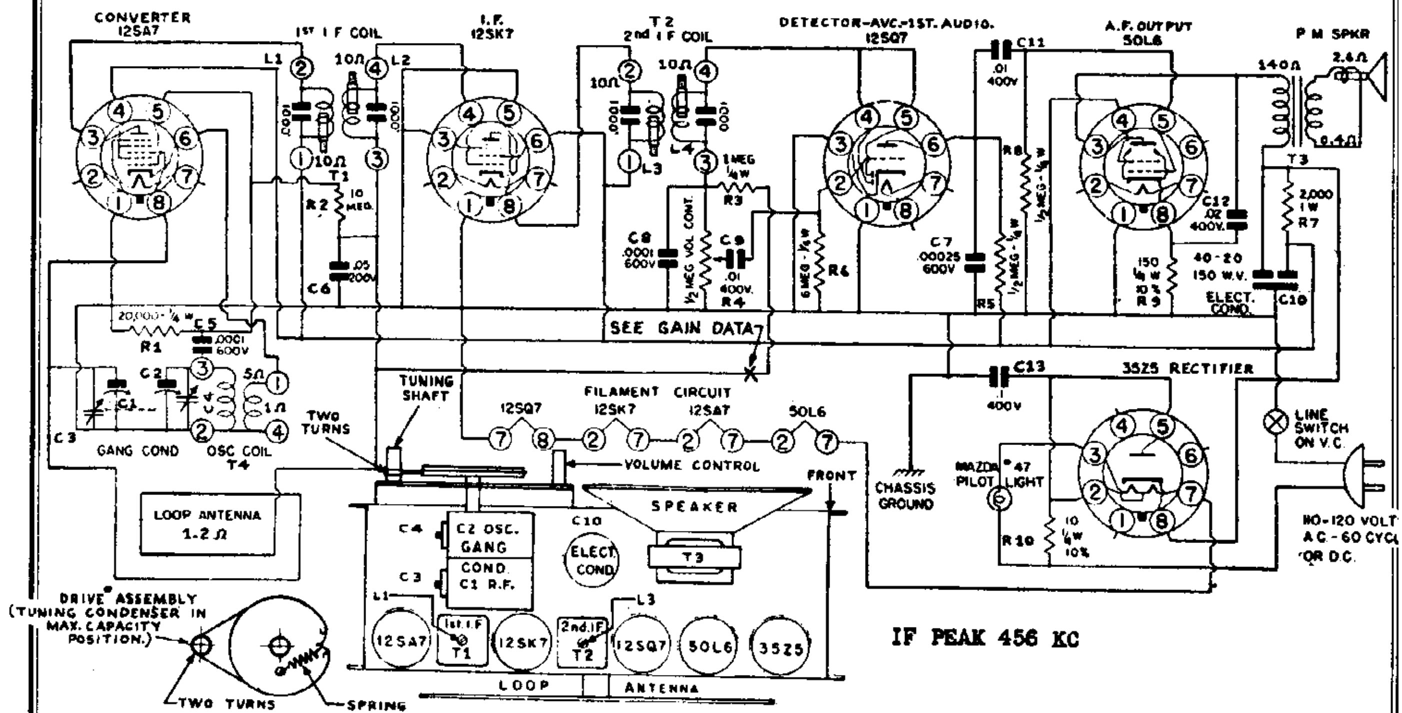
Code 121

TUBE	PIN	VTVM	20,000 OHM PV	1,000 OHM PV	RESISTANCE
14AF7 CONV	1	AC	AC	AC	22 OHM
	2	0	0	0	2 OHM
	3	+60	+60	+56	OVER 500 K
	4	-2.5	-2.5	-2.2	50 K
	5	-0.8	0	0	4.5 MEG
	6	+80	+80	+80	OVER 500 K
	7	+3.5	+3.4	+3.2	2 K
	8	AC	AC	AC	10 OHM
7B7 1st I.F. AMPL.	1	AC	AC	AC	28 OHM
	2	+30	+30	+28	OVER 500 K
	3	+40	+40	+38	OVER 500 K
	4	-0.8	-0.6	-0.3	2.5 MEG
	5	0	0	0	0
	6	-0.8	-0.6	-0.3	2.5 MEG
	7	0	0	0	0
	8	AC	AC	AC	20 OHM
7B7 2nd I.F. AMPL.	1	AC	AC	AC	34 OHM
	2	+84	+84	+84	OVER 500 K
	3	+40	+40	+38	OVER 500 K
	4	0	0	0	0
	5	0	0	0	0
	6	-0.8	-0.6	-0.2	2.8 MEG
	7	0	0	0	0
	8	AC	AC	AC	26 OHM
7C6 Det. AVC 1st AUDIO	1	AC	AC	AC	8 OHM
	2	+48	+48	+16	OVER 500 K
	3	-0.5	-0.4	-0.2	3 MEG
	4	0	0	0	0
	5	-0.5	-0.4	-0.2	525 K
	6	-0.8	-0.6	-0.3	2.8 MEG
	7	0	0	0	0
	8	0	0	0	0
50A5 AUDIO OUTPUT	1	AC	AC	AC	90 OHM
	2	+100	+100	+100	OVER 500 K
	3	+88	+88	+88	OVER 500 K
	4	+105	+105	+105	OVER 500 K
	5	--	--	--	--
	6	0	0	0	500 K
	7	+5.5	+5.5	+5.5	130 OHM
	8	AC	AC	AC	32 OHM
35Y4 RECT.	1	AC	AC	AC	120 OHM
	2	AC	AC	AC	116 OHM
	3	+88	+88	+88	OVER 500 K
	4	AC	AC	AC	116 OHM
	5	0	0	0	0
	6	--	--	--	--
	7	+118	+118	+118	OVER 500 K
	8	AC	AC	AC	90 OHM

NOTE: ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO B- AND WITH A LINE VOLTAGE OF 116 V.A.C.

PHILLIPS PETROLEUM CO.

MODEL 3-5A



IF PEAK 456 KC

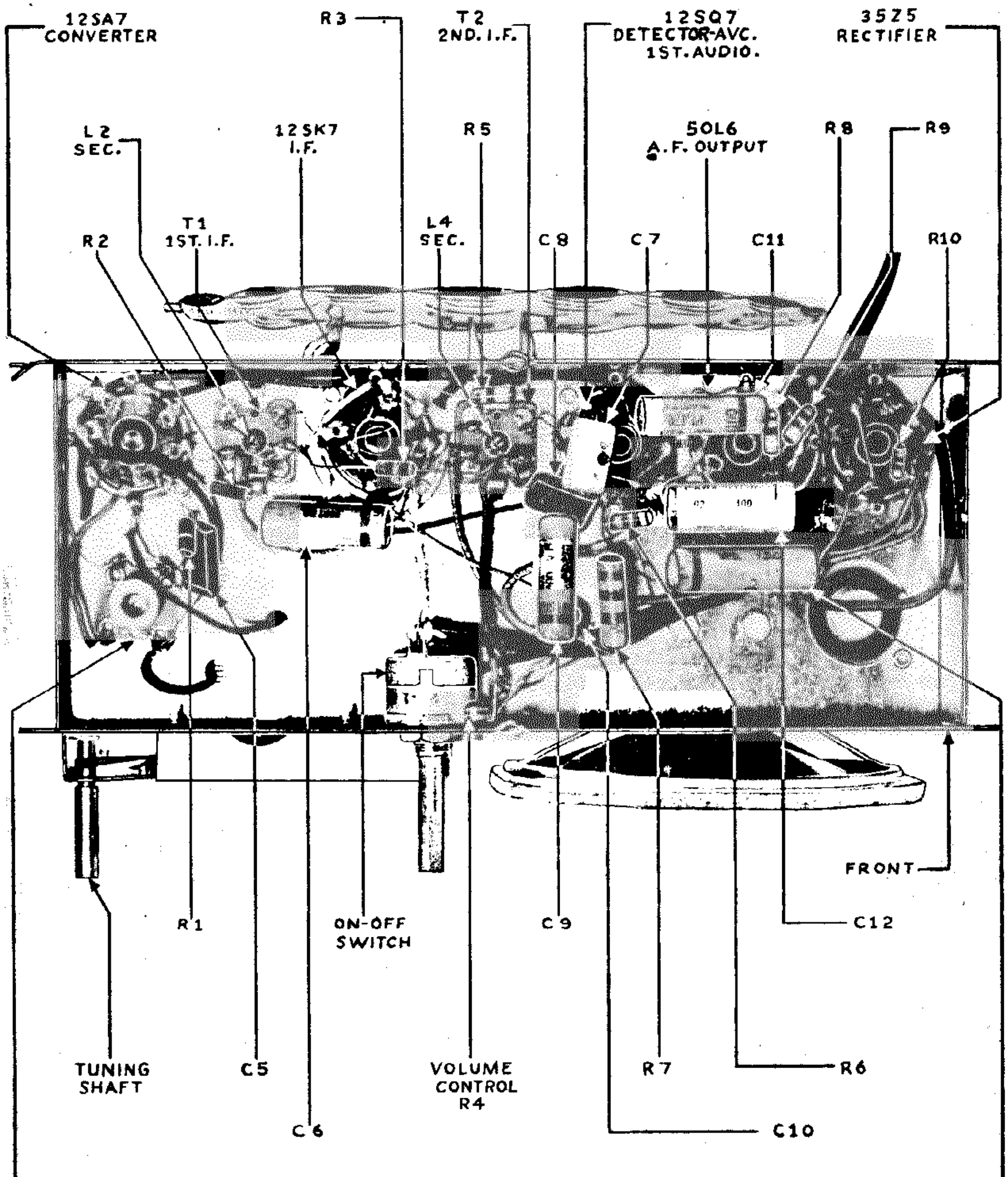
ALIGNMENT

The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine Loop Model 1150, and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc and adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L3, L2, L1. Set the generator and receiver to 1600 Kc and adjust the oscillator trimmer C4 for maximum output. Set the generator and receiver to 1400 Kc and adjust the loop trimmer C3 for maximum output.

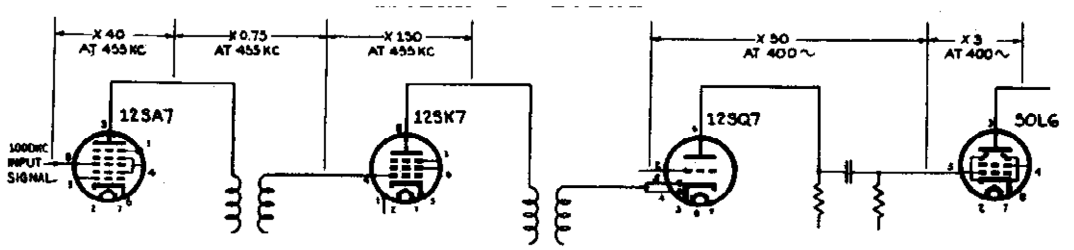
TUBE	PIN	D-C VOLTAGE VTVM	D-C VOLTAGE 20,000 OHMS PER VOLT	D-C VOLTAGE 1000 OHMS PER VOLT	RESISTANCE
12SA7	1	0	0	0	0
	2	0	0	0	24
	3	+80	+80	+78	INFINITE
	4	+80	+80	+78	INFINITE
	5	-9.5	-9.5	-4.8	20,000
	6	0	0	0	1
	7	0	0	0	40
	8	-1.5	-0.8	-0.2	1,200,000
12SK7	1	0	0	0	0
	2	0	0	0	12
	3	0	0	0	0
	4	-1.5	-0.6	-0.2	1,200,000
	5	0	0	0	0
	6	+80	+80	+78	INFINITE
	7	0	0	0	26
	8	+80	+80	+78	INFINITE
12SQ7	1	0	0	0	0
	2	-0.5	-0.4	-0.2	6,000,000
	3	0	0	0	0
	4	-0.5	-0.4	-0.2	400,000
	5	-0.5	-0.4	-0.2	400,000
	6	+46	+42	+40	INFINITE
	7	0	0	0	14
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+120	+120	+120	INFINITE
	4	+80	+80	+78	INFINITE
	5	0	0	0	460,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+4.5	+4.5	+4.5	150
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	8	+120	+120	+120	INFINITE

MODEL 3-5A

PHILLIPS PETROLEUM CO.



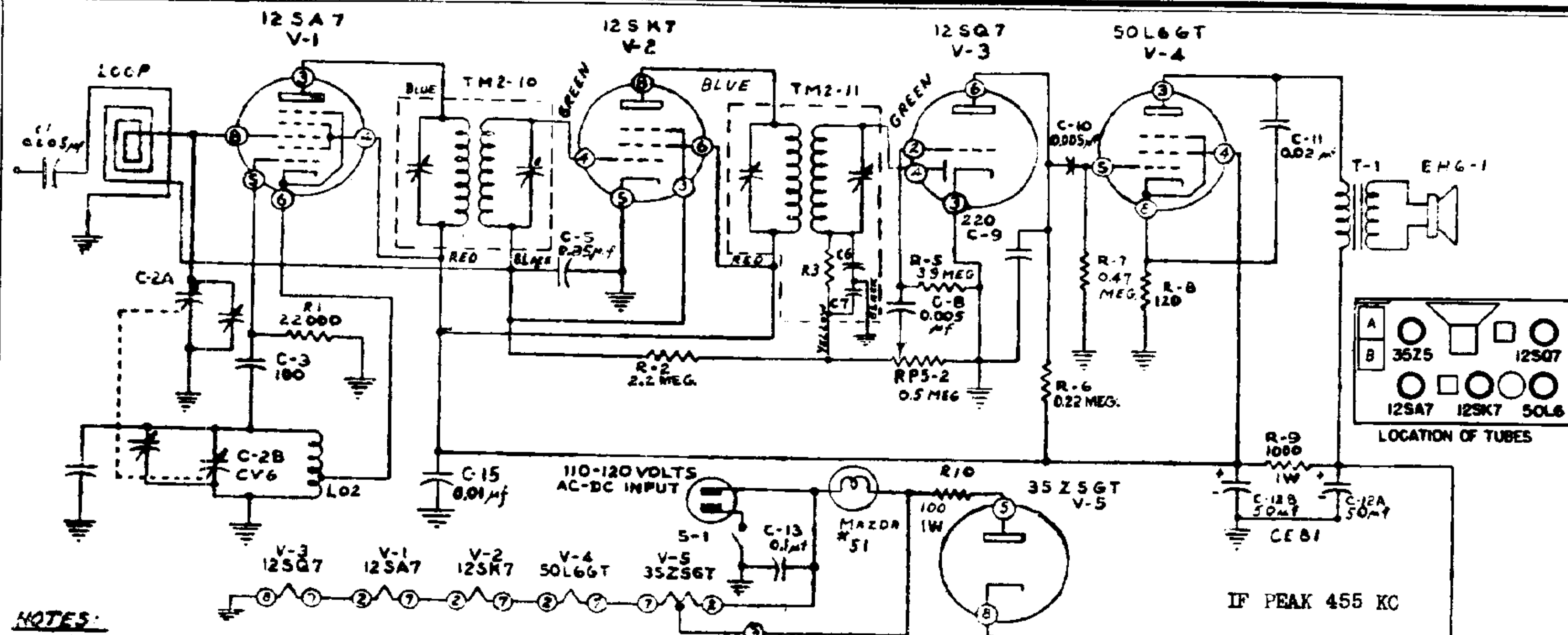
CHASSIS
BOTTOM VIEW



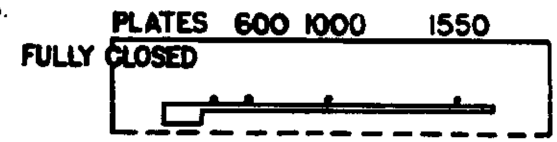
APPROXIMATE
GAIN PER STAGE
DATA

IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND

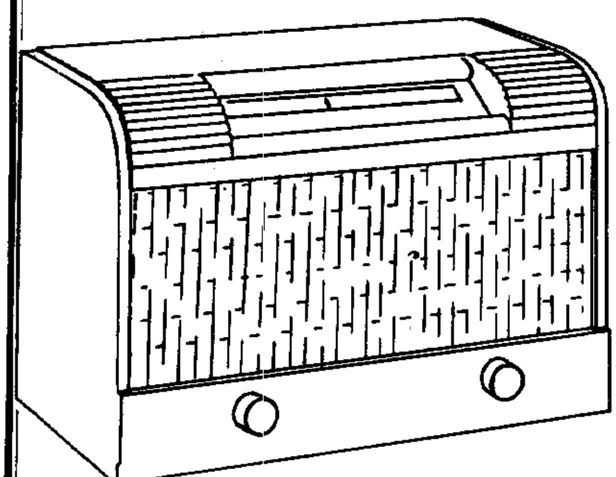
PHILLIPS PETROLEUM CO.



NOTES:
1. RESISTORS ARE IN OHMS. CAPACITORS ARE IN mmf. INDUCTORS ARE IN mH UNLESS OTHERWISE MARKED.
2. SWITCH S-1 MOUNTED ON REAR OF VOLUME CONTROL.
3. R3, C6 & C7 ARE CONTAINED WITHIN TM2-11
4. LOOP FOR MODEL G-513 IS LL14, FOR MODEL G-515 LOOP IS LL16



DIAL PLATE MARKINGS

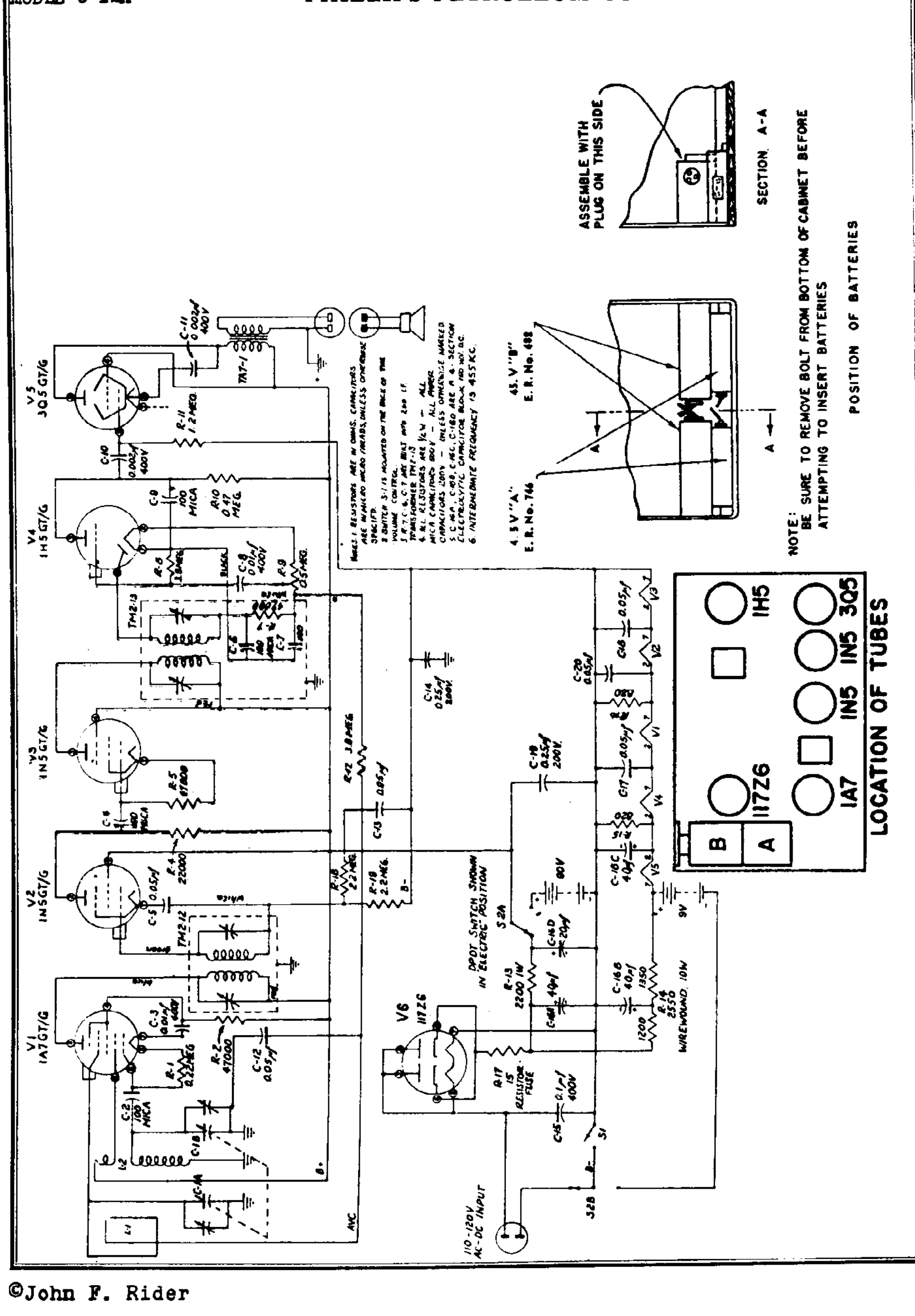


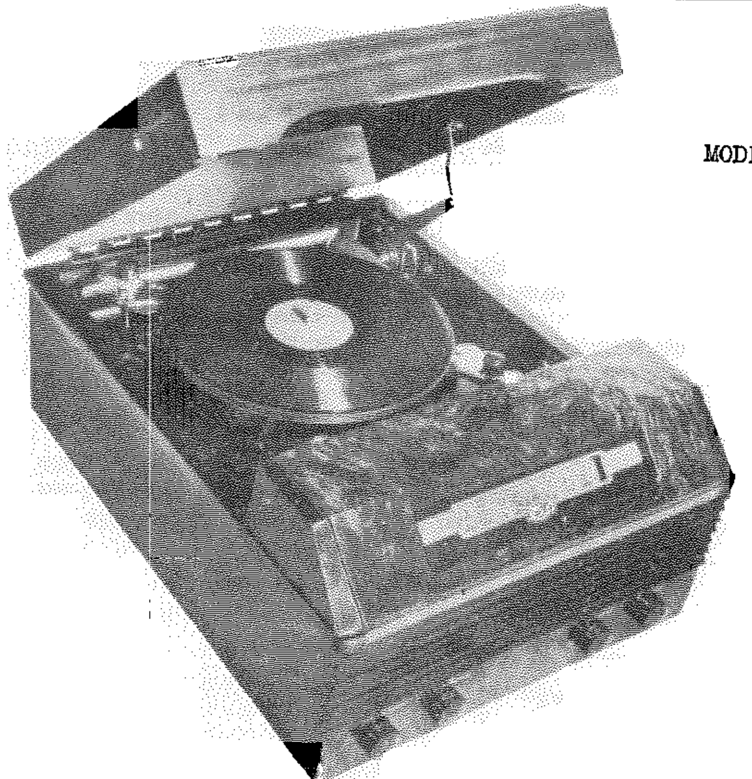
Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception. An output meter may be clipped directly across the voice coil lugs.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug on RF section (B) of tuning capacitor. Connect ground clip of generator directly to chassis. Align the I. F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad.

To align RF trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads or two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter, placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (A) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (B) (on rear section) for maximum response. With tuning capacitor plates fully meshed, the receiver should tune to 532 kc; however, no adjustment is required at this point. For checking purposes, four fine marks are engraved on the dial plate. These represent, in order, the pointer position with capacitor plates fully meshed, and the pointer settings for 600, 1000 and 1550 kc.

PHILLIPS PETROLEUM CO.



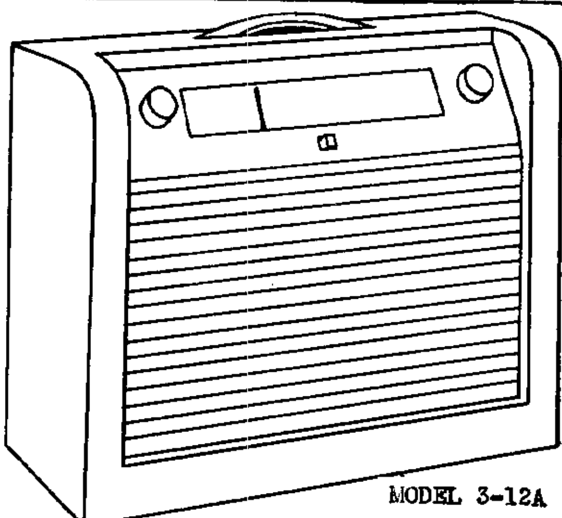


MODEL 3-20A

Alignment: No attempt should be made to re-align this receiver until it has been determined that a poor tube, or some local condition is not responsible for the faulty reception.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug on RF section (B) of tuning capacitor. Connect ground clip of generator directly to chassis. Align the I. F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad. An output meter may be clipped directly across the voice coil lugs.

To align RF trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads to two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter, placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (A) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (B) (on rear section) for maximum response. With tuning capacitor plates fully meshed, the receiver should tune to 532 kc; however, no adjustment is required at this point. For checking purposes, four fine marks are engraved on the dial plate. These represent, in order, the pointer position with capacitor plates fully meshed, and the pointer setting for 600, 1000 and 1550 kc.



MODEL 3-12A

Alignment: No attempt should be made to re-align this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

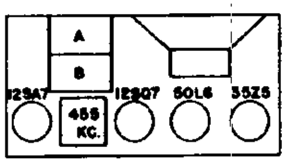
The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug on RF section A of tuning capacitor. Connect ground clip of generator to a convenient B-minus point (such as the case of the electrolytic capacitor, or one of the switch terminals on the back of the volume control). An output meter may be clipped directly across the voice coil lugs. Align the I.F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad.

To align RF trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads to two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter, placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (B) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (A) (on rear section) for maximum response.

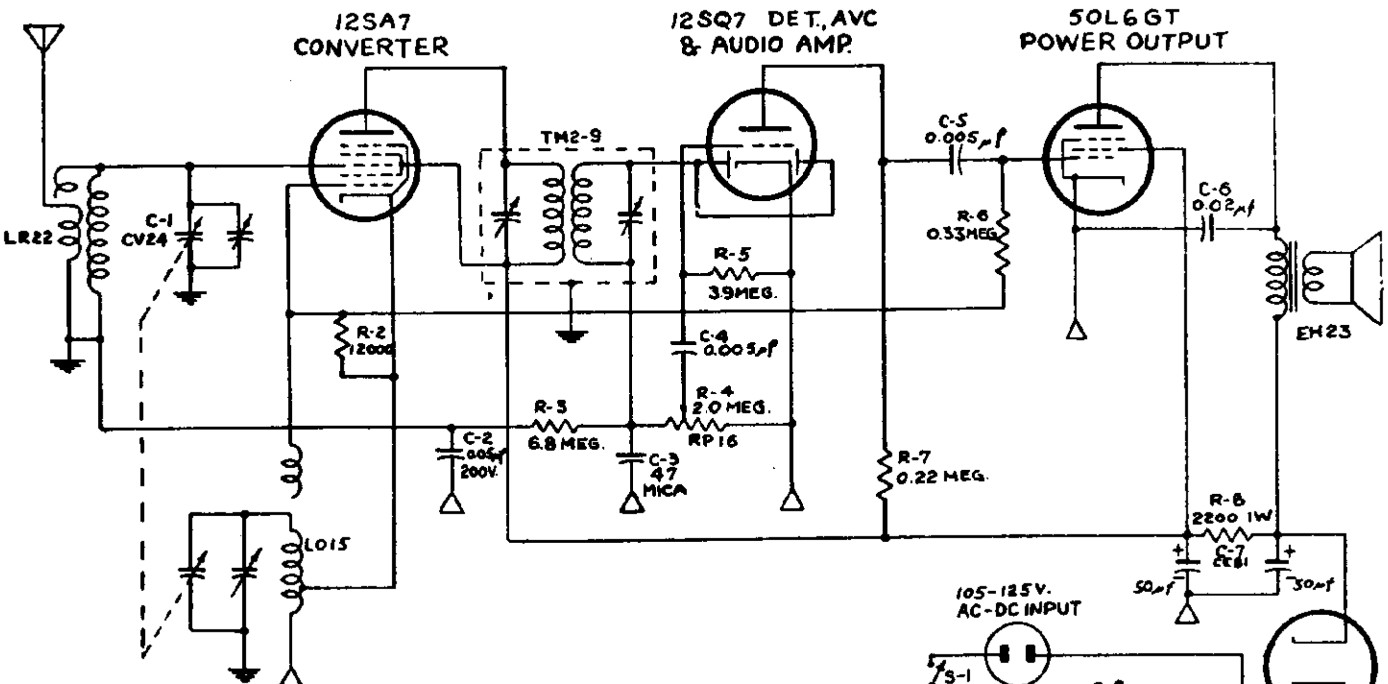
Batteries: The batteries comprise: two 4½ volt "A" units, Eveready type 746 or equivalent, and two 45 volt "B" units, Eveready type 482 or equivalent.

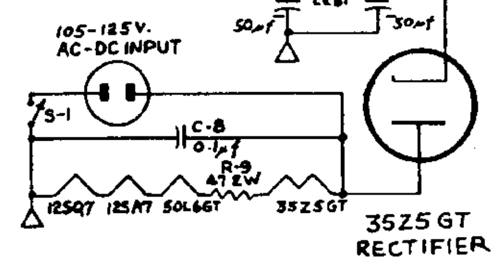
They should be mounted in the compartment provided in the bottom of the cabinet, as shown in sketch. Batteries should be removed when they are dead or if the set is not to be used on battery operation for several months.

PHILLIPS PETROLEUM CO.



LOCATION OF TUBES





NOTES:
1. RESISTORS ARE IN OHMS AND ARE ½ WATT; CAPACITORS ARE 400V AND IN μμf UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON REAR OF VOLUME CONTROL.
3. SYMBOL △ DENOTES B- AND SYMBOL ⏚ DENOTES CHASSIS.
4. I.F. FREQUENCY IS 455Kc.
5. TUNING RANGE IS 532Kc. TO 1700Kc.

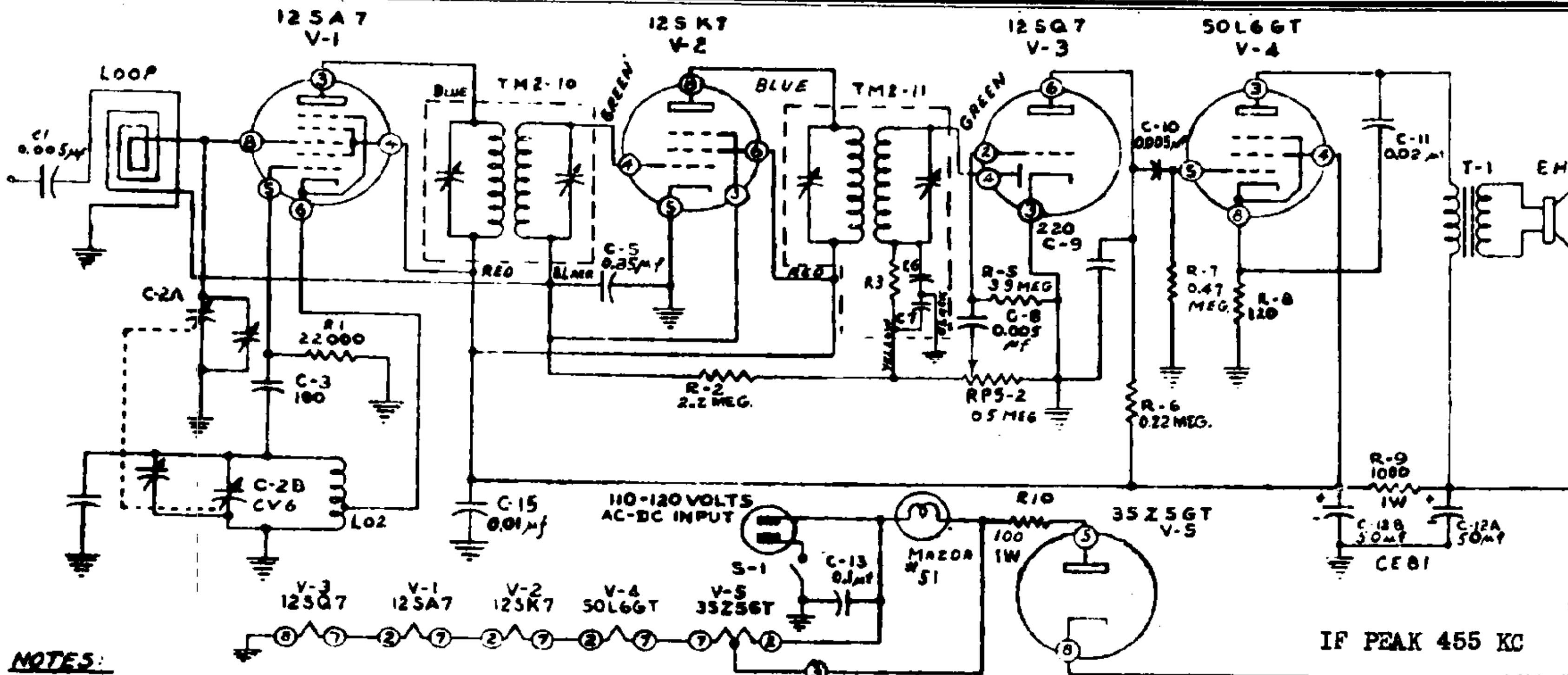
IF PEAK 455 KC

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug of RF section of tuning capacitor. Connect ground clip of generator to a convenient B-minus point such as one of the switch terminals on the back of the volume control. An output meter may be clipped directly across the voice coil lugs. Align the IF trimmers to 455 kc using least possible input from signal generator to avoid developing A. V. C. voltage which would make the tuning adjustments very broad.

To align RF trimmer, remove the 0.01 mf capacitor and connect the signal generator hot lead to a 68 mmf mica condenser. Connect the dummy antenna thus formed to the antenna lug on the antenna coil (lug to which the antenna hank is soldered). Again, use the least possible input from the signal generator. With the tuning capacitor plates completely out of mesh, and pointed at extreme clockwise position, adjust the oscillator trimmer on front section of tuning capacitor to 1700 kc. Readjust both signal generator and tuning capacitor to 1550 kc and adjust the RF trimmer on rear section for maximum response.

PHILLIPS PETROLEUM CO.

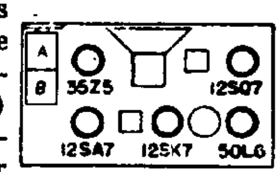


NOTES:
1. RESISTORS ARE IN OHMS. CAPACITORS ARE IN mmf. INDUCTORS ARE IN mH UNLESS OTHERWISE MARKED.
2. SWITCH S-1 MOUNTED ON REAR OF VOLUME CONTROL.
3. R3, C6 & C7 ARE CONTAINED WITHIN TM2-11

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception. An output meter may be clipped directly across the voice coil lugs.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug on RF section (B) of tuning capacitor. Connect ground clip of generator directly to chassis. Align the I. F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which make the tuning adjustments very broad.

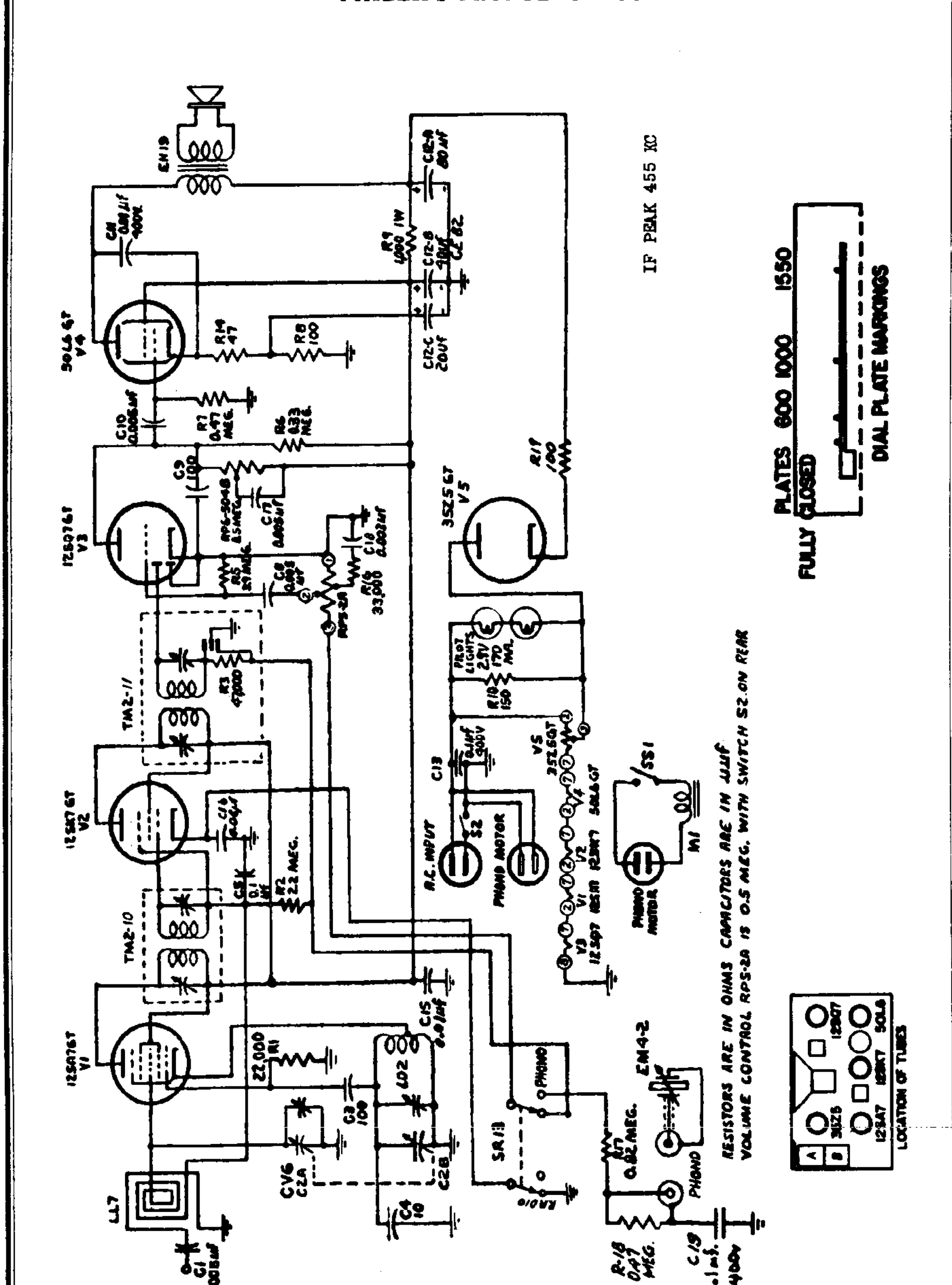
To align RF trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads to two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter, placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (A) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (B) (on rear section) for maximum response. With tuning capacitor plates fully meshed, the receiver should tune to 532 kc; however, no adjustment is required at this point. For checking purposes, four fine marks are engraved on the dial plate. These represent, in order, the pointer position with capacitor plates fully meshed, and the pointer settings for 600, 1000 and 1550 kc.



LOCATION OF TUBES

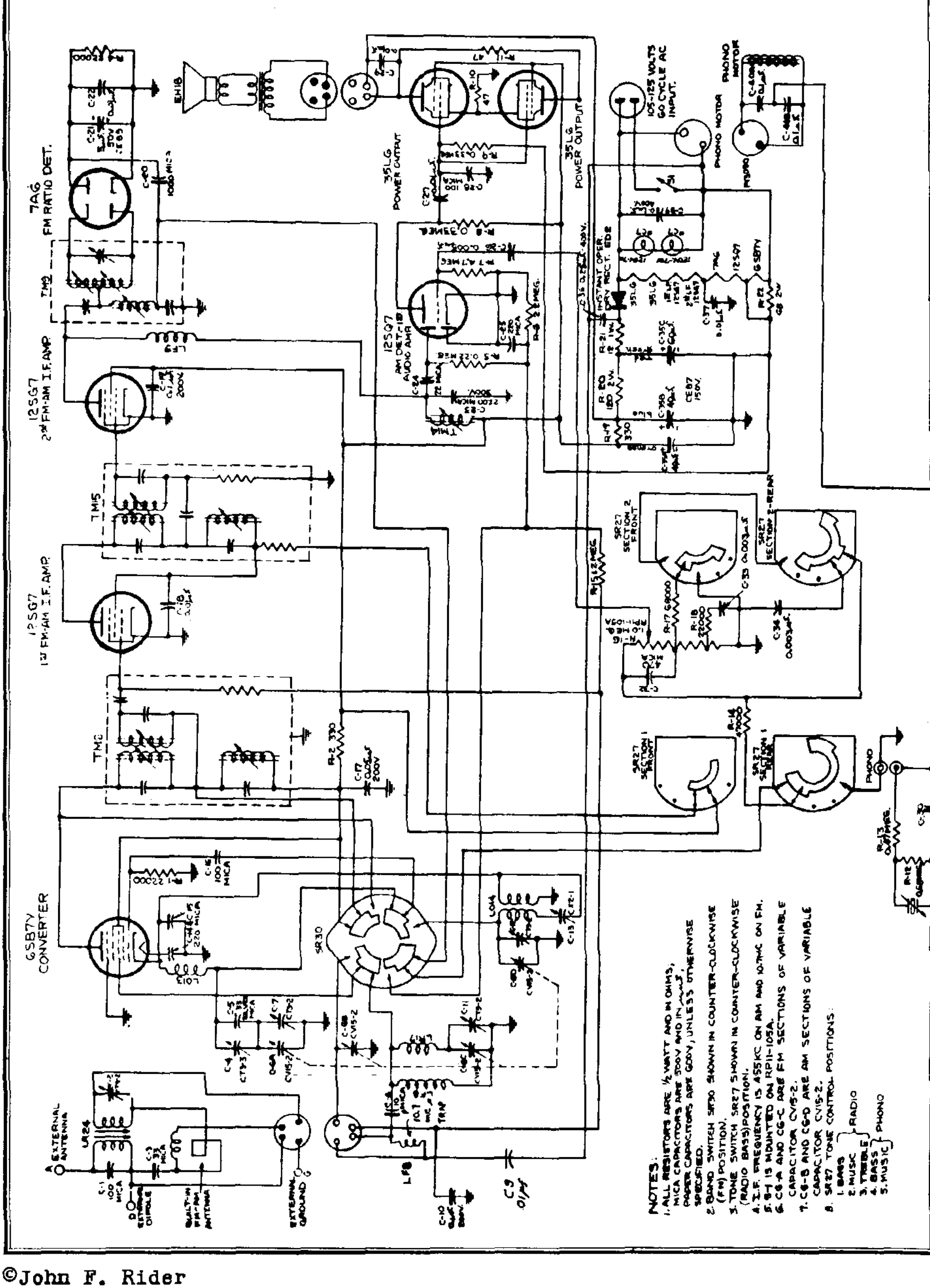
MODEL 3-20A

PHILLIPS PETROLEUM CO.

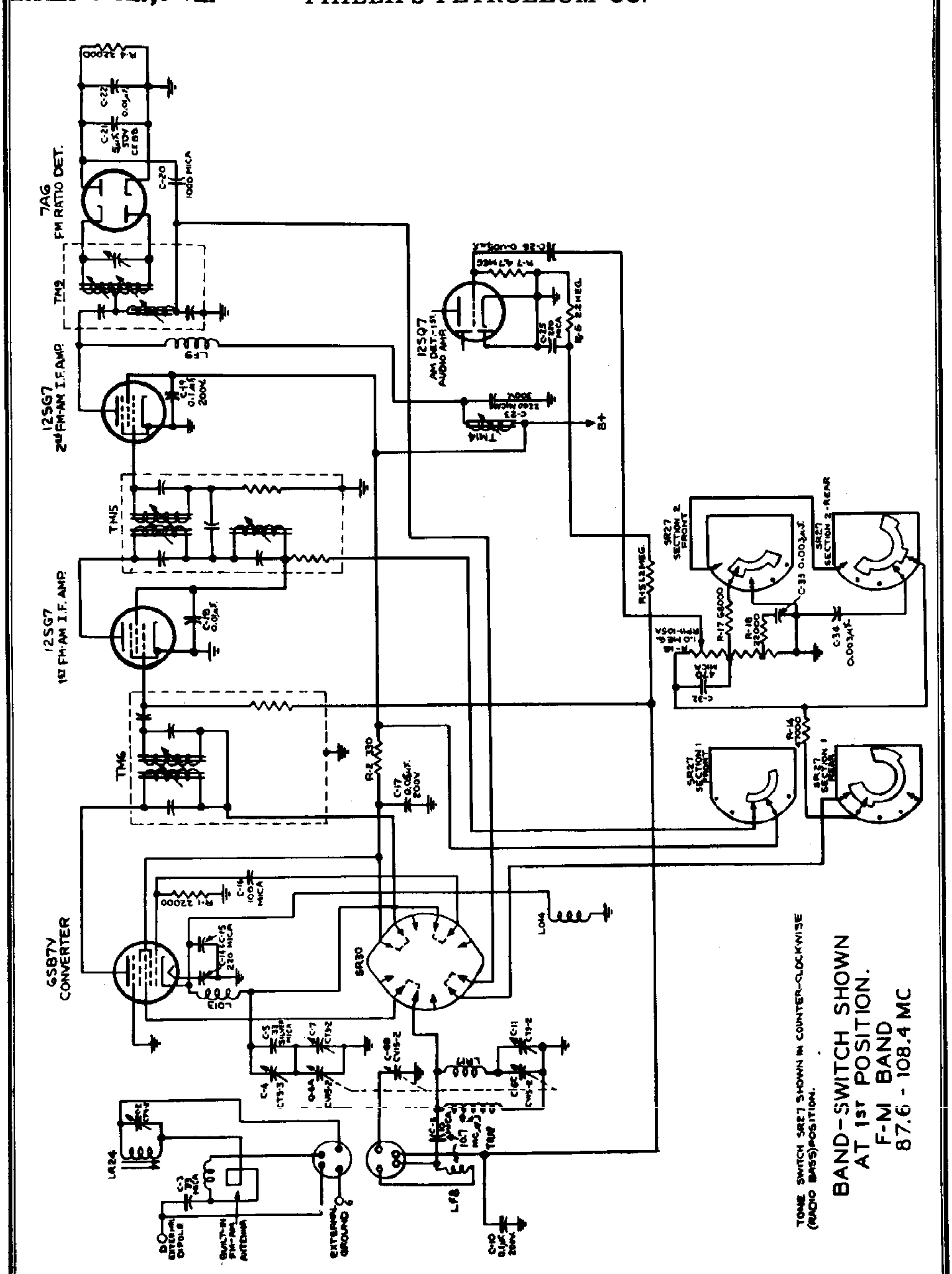


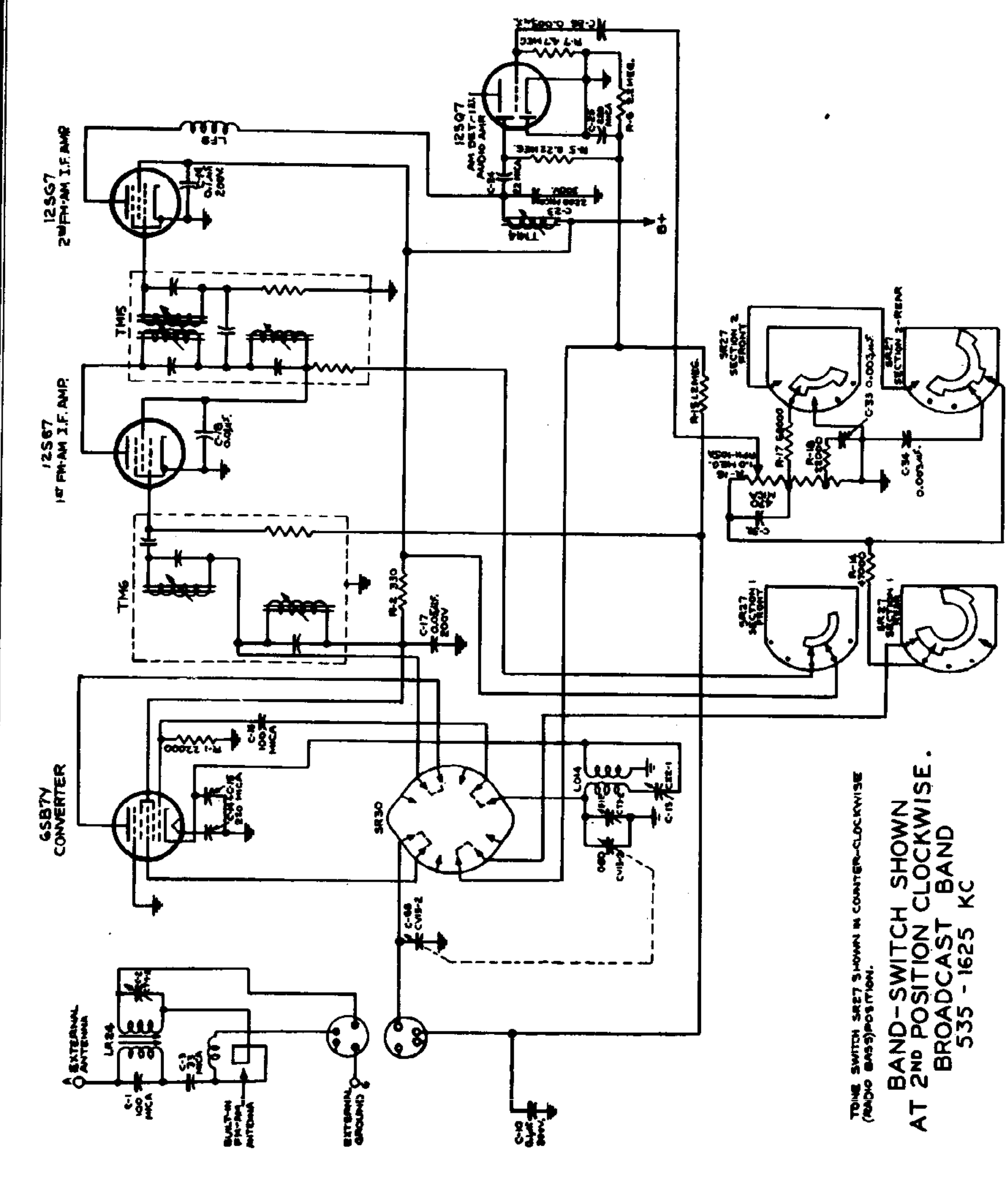
For alignment, see P.17-5
RECORD CHANGER: VM Model 400 RCD.CH.15-1

PHILLIPS PETROLEUM CO.

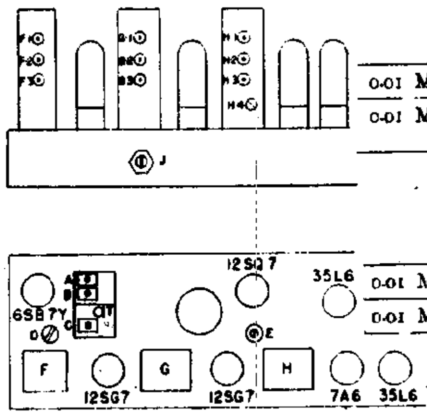


PHILLIPS PETROLEUM CO.




12SQ7 AM DET.-1st AUDIO AMP
12SG7 2nd FM-AM I.F. AMP
12SG7 1st FM-AM I.F. AMP
6SB7Y CONVERTER
TM15
TM6
SR30
B+
EXTERNAL ANTENNA
BUILT-IN FM-AM ANTENNA
EXTERNAL GROUND
TONE SWITCH SR27 SHOWN IN COUNTER-CLOCKWISE (RADIO BASS) POSITION.
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND
535 - 1625 KC

PHILLIPS PETROLEUM CO.



ALIGNMENT PROCEDURE:

Dummy Antenna	Signal Generator Connection	Signal Generator Frequency	Band Switch Position	Radio Dial Setting	Adjust	Remarks
0.01 MFD	Terminal T	455 KC AM	Broadcast	1625 KC	E G-1 F-1	Adjust for maximum output Repeat for fine adjustment
0.01 MFD	Pin 4 of 12SG7 2nd FM-AM IF with FM Signal Gen.	10.7 MC FM	FM	108 MC	H-2	Adjust for maximum output (Broad adjustment)
0.01 MFD	"	10.7 MC FM	FM	108 MC	H-4	Adjust for maximum output
0.01 MFD	"	10.7 MC AM	FM	108 MC	H-1 or H-3	Adjust whichever is required for minimum output
						Repeat last two steps for fine adjustment until settings for maximum FM output coincide with settings for minimum AM output.
0.01 MFD	Pin 8 of 6SB7Y Converter	10.7 MC FM	FM	108 MC	G-3 — G-2	Adjust for maximum output
0.01 MFD		"	FM	108 MC	F-3 — F-2	Adjust for maximum output
						Repeat last two steps for fine adjustment
			Broadcast	535 KC	Pointer	Adjust pointer to reference mark
100 MMFD	"A" Post on Cabinet	600 KC AM	"	600 KC	J and Core on Ant. Coil in Cab.	Adjust for maximum output
"	"	1550 KC AM	"	1550 KC	B and trimmer on Ant. Coil	Adjust for maximum output
300 OHM Resistor	"	92 MC FM	FM	92 MC	D	Adjust for maximum output
"	"	106 MC FM	FM	106 MC	A and C	Adjust for maximum output

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube or some local condition is not responsible for faulty reception. The following is a list of the minimum equipment necessary to realign this receiver.

In the following alignment procedure the high side of the signal generator is connected to the terminal indicated in the "Signal Generator Coupling" column below. The ground side of the signal generator is connected directly to the chassis. The output meter should be connected across the voice coil of the speaker for all measurements.

1—AM signal generator covering 455 KC, 600 KC, 1550 KC and 10.7 MC

2—FM signal generator covering 10.7 MC, 92 MC and 106 MC

3—Output meter, rectifier type, approximately 0 to 2 volts RMS

4—Dummy antennas
0.01 MFD Capacitor
100MMFD Mica Capacitor
300 Ohm Resistor

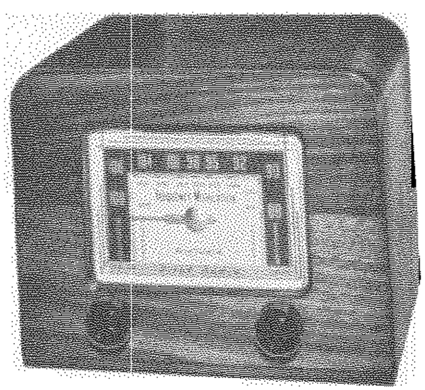
In adjusting the radio frequency trimmers and padders it is advisable to "rock" the variable capacitor gang slightly across the signal being delivered by the signal generator until that particular signal has been accurately peaked.

PILOT RADIO CORP.

ALIGNMENT CHART

(Follow sequence as indicated)

CIRCUIT ALIGNED	STEP	RCVR. DIAL POINTER	SIGNAL GEN. FREQ.	SIGNAL GEN. CONNECTIONS	METER	METER CONNECTIONS	TRIMMER OR SLUG ADJUSTMENT	PROCEDURE
IF	1	88 mc	10.7 mc	Through .01 mfd. cap. to grid of 6BE6	VTVM	Across two 100K resistors —indicated by dotted lines in schematic	S2, S1, S4, S3, S6, S5	Adjust for maximum output
	2		Repeat Step No 1					
Ratio Detector	3	88 mc	10.7 mc	Same as No. 1	VTVM	From: Junction of two 100K resistors TO: Audio output of ratio detector. Connections indicated by dotted lines in schematic	S1	Adjust meter to zero (Check proper zero set) Meter should register reverse polarity when slug is rotated through zero output.
Oscillator	4	90 mc	90 mc	Through carbon 300 ohm resistor to Ant. Terminal	VTVM	Same as Step No. 1	P8	Same as Step No. 1
	5	106 mc	106 mc	Same as No. 4	VTVM	Same as No. 1	T7	Same as No. 1
	6		Repeat Steps No. 4 & 5					
	7	90 mc	90 mc	Same as No. 4	VTVM	Same as No. 1	P10	Same as No. 1
RF	8	106 mc	106 mc	Same as No. 4	VTVM	Same as No. 1	T9	Same as No. 1

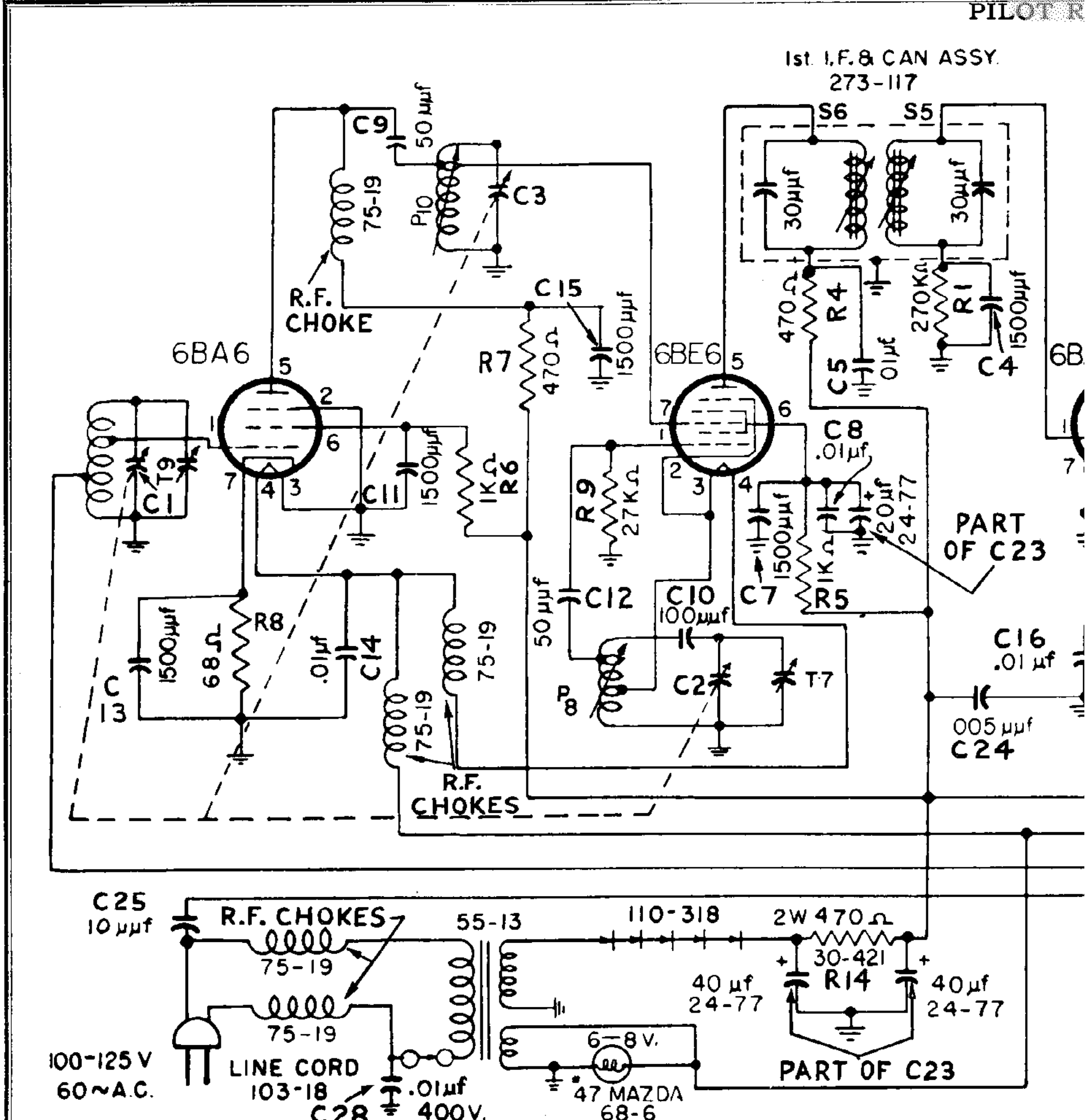


SENSITIVITY

Approximately 25 Microvolts for $\frac{1}{2}$ watt output when coupled to an audio amplifier consisting of a triode and power pentode. Perfect Quieting.

AUDIO RESPONSE

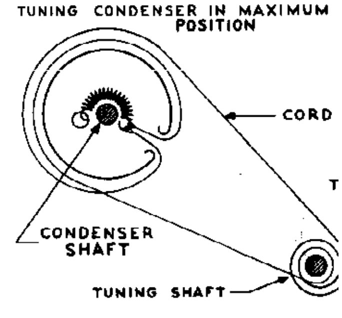
All frequencies up to 12000 cycles. Less de-emphasis than required by transmitter standards, in order to equalize possible deficiencies in the frequency response of audio amplifiers in old AM receivers.



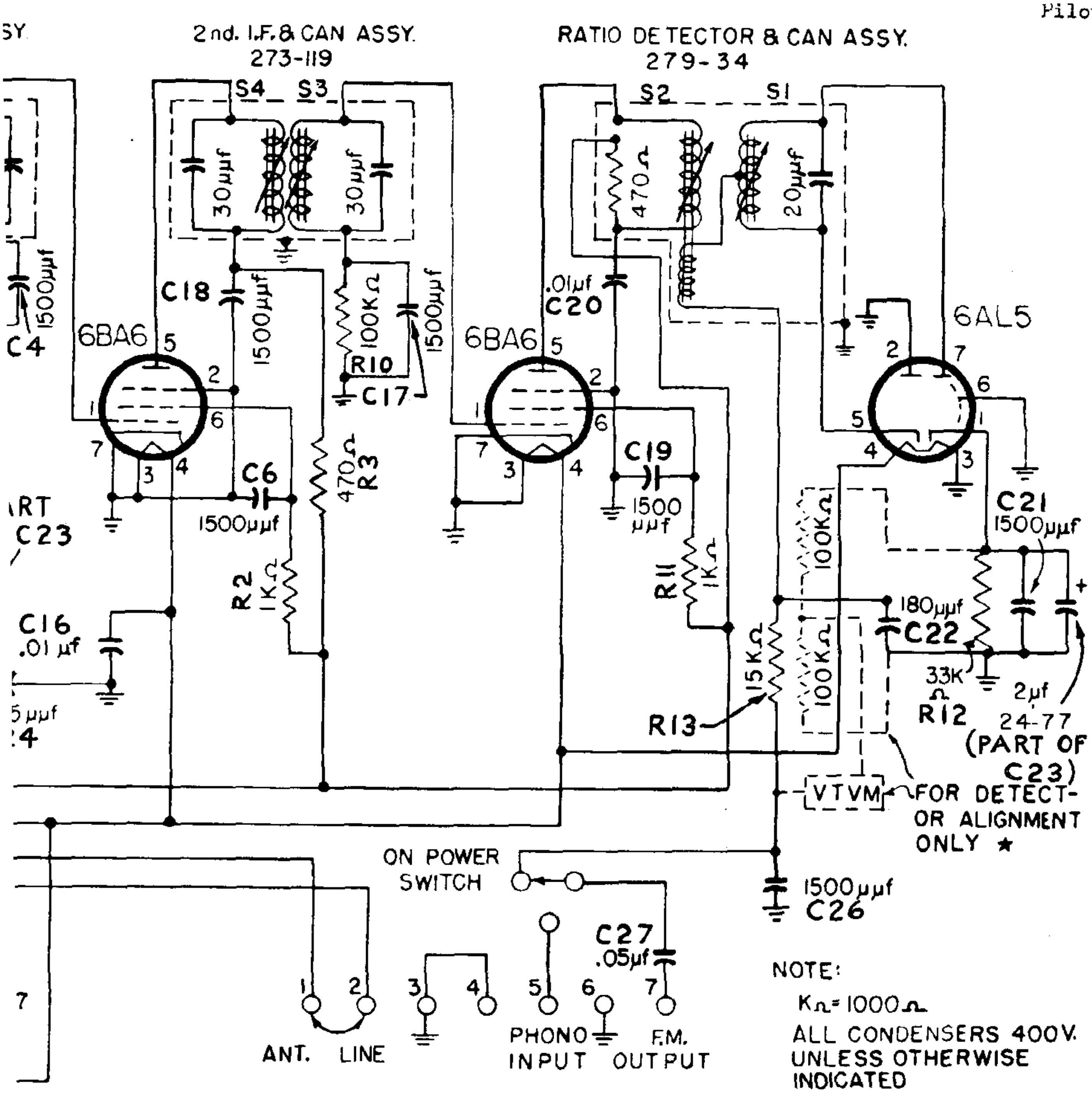
DRAWN BY J.C. CHECKED BY W.R. DATE 6-16-47 PILOT RADIO CORP. LONG ISLAN

S_1	RATIO DETECTOR	SEC.	10.7 MC
S_2	RATIO DETECTOR	PRI.	10.7 MC
S_3	2ND I.F.	SEC.	10.7 MC
S_4	2ND I.F.	PRI.	10.7 MC
S_5	1ST I.F.	SEC.	10.7 MC
S_6	1ST I.F.	PRI.	10.7 MC
T_7	OSC. TRIMMER		106 MC
P_8	OSC. PADDER		90 MC
T_9	ANT. TRIMMER		106 MC
P_{10}	R.F.. PADDER		90 MC

TUNING CONDENSER IN MAXIMUM POSITION



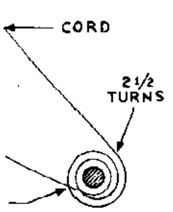
PILOT RADIO CORP.



NOTE:
KΩ = 1000Ω
ALL CONDENSERS 400V. UNLESS OTHERWISE INDICATED

...NG ISLAND CITY, N.Y. U.S.A. DWG. NO. 90-58 MODEL NO. T601

...MAXIMUM CAPACITY ...ION

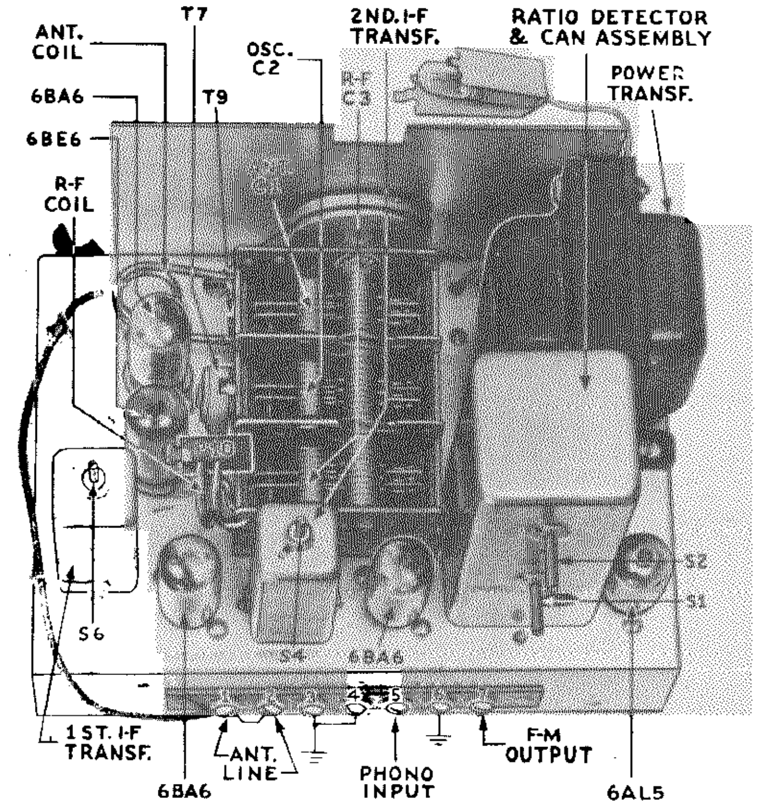


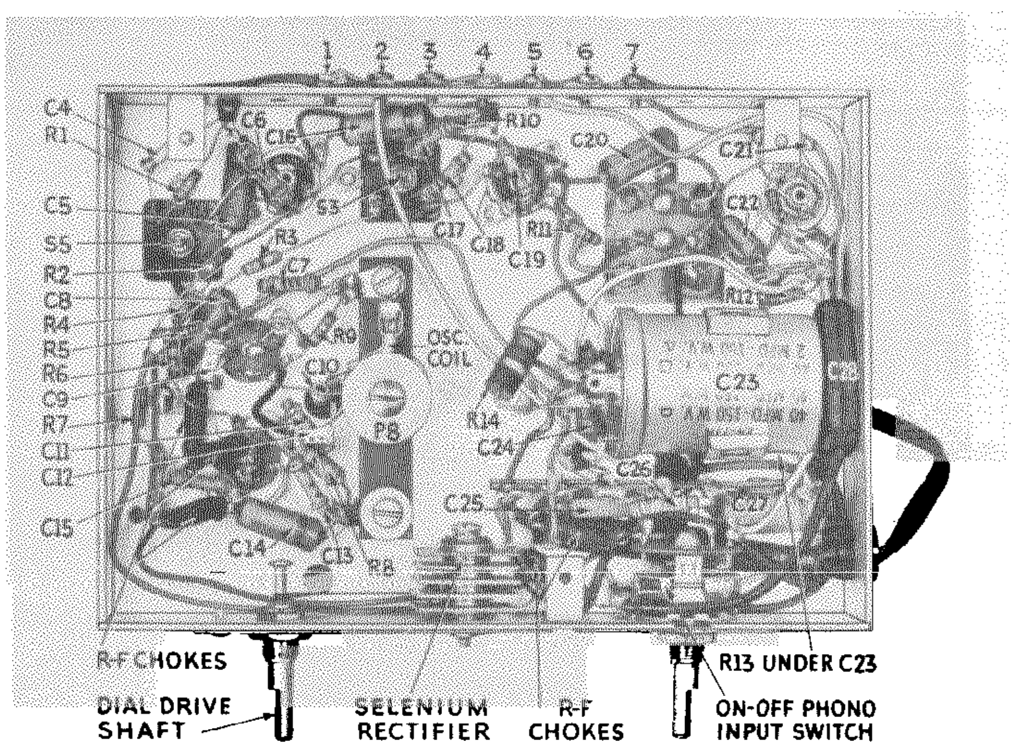
TO ALIGN RECEIVER USE FREQUENCIES AS INDICATED ON LEFT. ADJUST ALL TRIMMERS FOR MAX. D.C. OUTPUT ACROSS 33KΩ RESISTOR IN 6AL5 CIRCUIT.

★TO ALIGN SECONDARY OF RATIO DETECTOR CONNECT METER AS INDICATED IN SCHEMATIC AND ADJUST S_1 FOR ZERO OUTPUT.

MODEL T601
Pilotuner

PILOT RADIO CORP.





PILOTUNER MODEL T-601

TUBE	PIN	VTVM	20,000 P.V.	1.000 P.V.	RESISTANCE
6AB6 RF Ampl	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	0.2 Ω
	5	98	98	98	Over 1 meg
	6	98	98	98	Over 1 meg
	7	0.8	0.8	0.8	70 Ω
6BE6 Conv	1	-1.5	-0.4	-0.2	28 K
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	0.2 Ω
	5	98	98	98	Over 1 meg
	6	92	92	92	Over 1 meg
	7	0	0	0	0
6BA6 IF Ampl	1	0	0	0	270 K
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	0.2 Ω
	5	94	94	94	Over 1 meg
	6	94	94	94	Over 1 meg
	7	0	0	0	0
6BA6 IF Ampl	1	0	0	0	100 K
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	0.2 Ω
	5	94	94	94	Over 1 meg
	6	94	94	94	Over 1 meg
	7	0	0	0	0
6AL5 Ratio Detector	1	1	0.6	0.4	33 K
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	0.2 Ω
	5	0.5	0.3	0.2	Infinite
	6	0	0	0	0
	7	0.5	0.3	0.2	Infinite

NOTE: Selenium rectifier D.C. voltage output in 125 V.

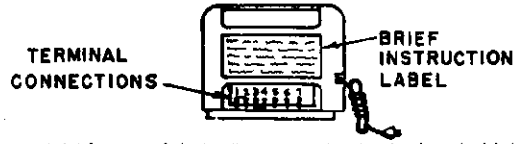
NOTE: All voltage and resistance measurements made with respect to chassis ground and with a line voltage of 116 V.A.C.

NOTE: All values are positive unless indicated otherwise.

PILOT RADIO CORP.

GENERAL

The FM PILOTUNER is a complete, superheterodyne frequency modulation unit, consisting of 5 miniature tubes and a selenium rectifier. It contains its own power supply, designed for AC operation only. However, it does not contain a loudspeaker and audio system. Therefore, the FM PILOTUNER must be connected and operated through your own radio receiver, or separate phonograph, record player or amplifier system. All installation connections from and to the FM PILOTUNER are made to the terminals on the back of the cabinet, numbered from 1 to 7.



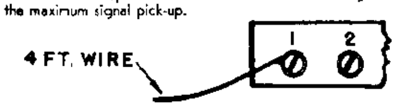
A brief resume of the installation instructions is printed on the label attached to the back of the cabinet. For complete explanation, follow the detailed instructions contained in this booklet.

ANTENNA CONNECTIONS

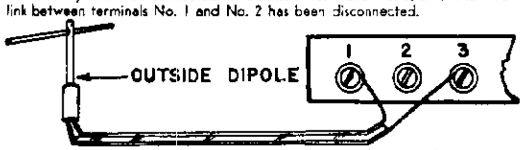
The choice of antenna to be used for the best FM reception depends on many factors: your location, the type of building, power and distance of the FM station. The three main types of antennas are explained below. Test your FM PILOTUNER and choose the one most practical for your use.

A. **For local high-powered FM stations:** The PILOTUNER, when shipped from the factory, is equipped with a permanent **built-in antenna** that will be satisfactory for good reception of most local FM stations. This built-in antenna is connected internally through a wire link between terminals No. 1 and No. 2. For best results when using the built-in antenna, keep the electric line cord extended to its full length and separated from the connector cable of the PILOTUNER.

B. **For local weak-powered FM stations:** Improved reception of weak FM stations may be obtained, in some localities, by disconnecting the wire link between terminals No. 1 and No. 2, and attaching a **4 ft. length of wire** to terminal No. 1. **Keep this wire stretched out at full length in order to** secure the maximum signal pick-up.



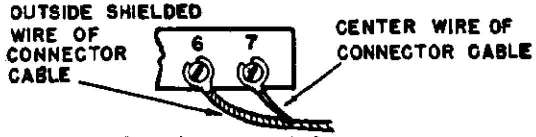
C. **For distant FM stations:** In a few cases, an **outside FM dipole antenna** may be found to be necessary when the FM PILOTUNER is operated at a great distance from the broadcasting station, or under unusual operating conditions. The outside dipole antenna (equipped with a 300 ohm flat lead-in) should be connected to terminals No. 1 and No. 3, after the wire link between terminals No. 1 and No. 2 has been disconnected.



CONNECTIONS FROM PILOTUNER TO RADIO RECEIVER

A 5 ft. shielded cable is furnished with the FM PILOTUNER to facilitate connecting the tuner to your radio receiver, or separate phonograph, record player or amplifying system. One end of this cable is provided with spade lugs for easy connection to the terminals at the back of the PILOTUNER.

Attach the center **wire of one end of the** connector cable to **terminal** No. 7; attach the **outside shielded wire of the same end of the connector** cable to terminal No. 6.



Now, the **FM PILOTUNER** is ready for attachment to your radio **receiver. The method** of connecting the PILOTUNER will depend on whether the radio receiver is a combination set with phonograph, a radio with phonograph outlet only, or a radio without phonograph or phonograph outlet.

A. **Combination Radio Receiver with Phonograph:** Locate the phonograph terminal at the back of your radio receiver chassis. Usually it will be marked PHONO or TELEVISION. There are, in general, three different types of phonograph terminals on standard receivers, as follows:

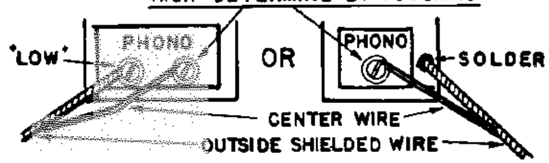
1. **Screw-type Photo Terminal:**

Disconnect any wires attached to this type of phono terminal, and mark them for future **reference.**

SCREW TYPE

Attach center wire of the free end of the PILOTUNER connector cable to the "high" side of the phono terminal. You can determine the "high" side by touching each of the screws of the phono terminal with the radio receiver in operation, and the selector switch on PHONO position; the "high" side will cause speaker hum. Then, attach the outside shielded wire of the same end of the PILOTUNER cable to the "low" or grounded side of the phono terminal. If there is only **one** screw on the phono terminal of your radio receiver, it will be the "high" side.

"HIGH"- DETERMINE BY TOUCHING

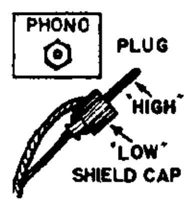


Therefore, connect the outside shielded wire of the PILOTUNER connector cable firmly, preferably by soldering, to the radio receiver chassis.

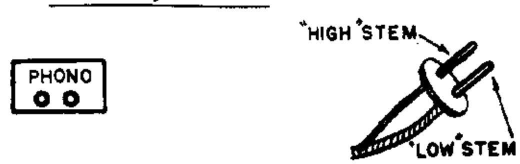
2. **One-hole Plug Phono Terminal:**

Remove plug from phono terminal. Disconnect wires attached to the plug, and mark for future reference.

Connect center wire of PILOTUNER connector cable firmly, preferably by soldering, into center stem of plug ("high" side), and then connect outside shielded wire of connector cable firmly to the outside shield cap of plug ("low" side). Replace plug into single-hole phono terminal.



3. **Two-hole Plug Phono Terminal:**



Remove **plug** from phono terminal. Disconnect wires attached to the **plug** and mark for future reference. Connect center wire of PILOTUNER connector cable firmly, preferably by soldering, into one stem of the plug ("high" side), and outside shielded wire of connector cable into other stem of plug ("low" side). Replace two-hole plug into phono terminal.

B. **Radio receiver with Phono Outlet only (no Phonograph):**

Connection of the PILOTUNER will be made similar to the instructions outlined in paragraph III A above, except that no phonograph leads have to be disconnected.

C. **Receiver without Phonograph or Phono Outlet**

THIS INSTALLATION **MUST BE MADE** BY A COMPETENT RADIO SERVICE TECHNICIAN SINCE IT IS NECESSARY TO WIRE THE PILOTUNER DIRECTLY INTO THE CIRCUIT OF YOUR RADIO RECEIVER.

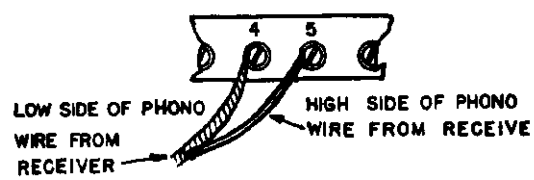
IV. CONNECTIONS FROM PILOTUNER TO SEPARATE PHONOGRAPH, RECORD PLAYER OR AMPLIFIER SYSTEM

Connection of the PILOTUNER is possible in accordance with instructions outlined in paragraphs III A 1, 2 and 3 above, provided there is a phono terminal available. **However, if there is no phono terminal, this type** of installation **must be made** by a radio service technician, following the instructions given in paragraph III C, above.

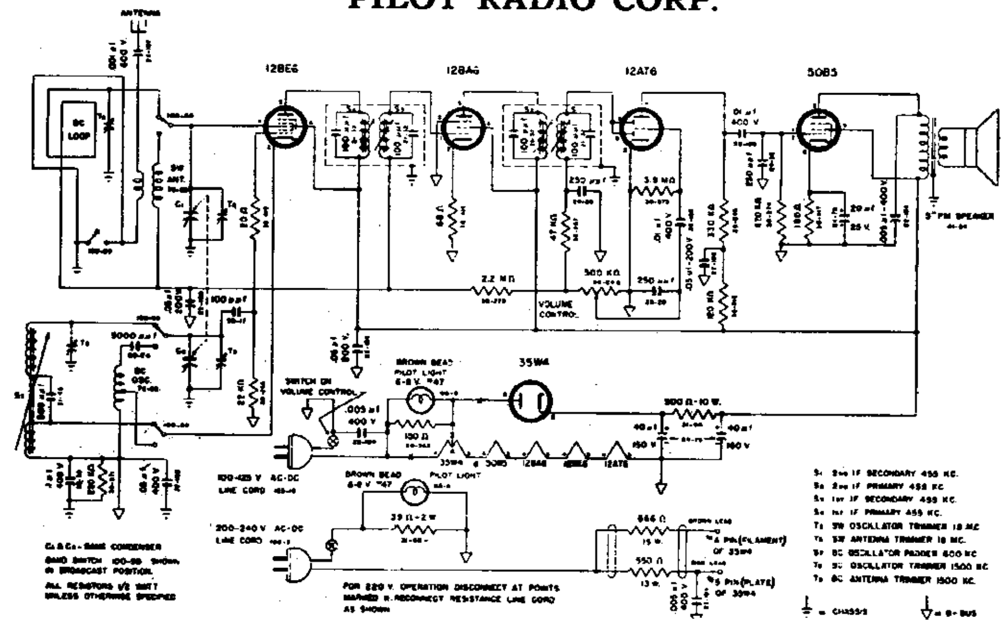
CONNECTIONS FROM RADIO RECEIVER PHONOGRAPH TO PILOTUNER

If you disconnected any wires from the phonograph terminal of your radio receiver in order to connect the FM PILOTUNER (paragraph III A 1, 2 and 3, above), locate **these wires which you marked for future reference.**

Attach the "high" side of the phonograph wire from your radio receiver to terminal No. 5 of the PILOTUNER; and attach the "low" side of the phonograph wire from your radio receiver to terminal No. 4 of the PILOTUNER. The phonograph of your combination radio will operate normally when the ON - OFF switch of the PILOTUNER is in the **OFF** position.



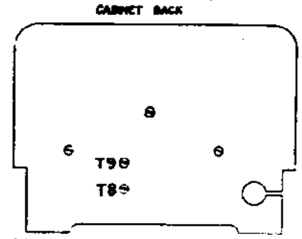
PILOT RADIO CORP.

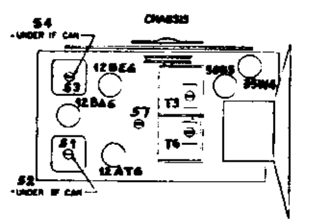


ALIGNMENT CHART

Steps	Circuit Aligned	RECEIVER Band Switch	RECEIVER Dial Pointer	SIGNAL GENERATOR Frequency	SIGNAL GENERATOR Connection	Dummy Antenna	Slug or Trimmer to be adjusted
1	IF	BC	low end of dial	455 kc	grid of 12BE6	0.1 mfd	S1, 2, 3, 4
2	SW	SW	18 mc	18 mc	antenna clip	400 ohm carbon resistor	first: osc. T5; then: ant. T6
3	BC	BC	600 kc	600 kc	antenna clip	200 mmfd mica condenser	Rock in for Max. Reading with S7
4	BC	BC	1500 kc	1500 kc	antenna clip	200 mmfd mica condenser	first: osc. T8; then: loop T9
5	Repeat Steps No. 3 and No. 4						

CABINET BACK





Alignment should be attempted only if a low range A.C. meter, a signal generator, and insulated alignment tools are at your disposal. The A.C. meter is used as an output meter. The signal generator must cover a frequency range from 450 kc to 24 mc.

It is essential that the signal generator be connected to the points indicated in the alignment chart through the proper dummy antenna.

A good ground connection, secured between the groundpost of the signal generator and the chassis, is necessary.

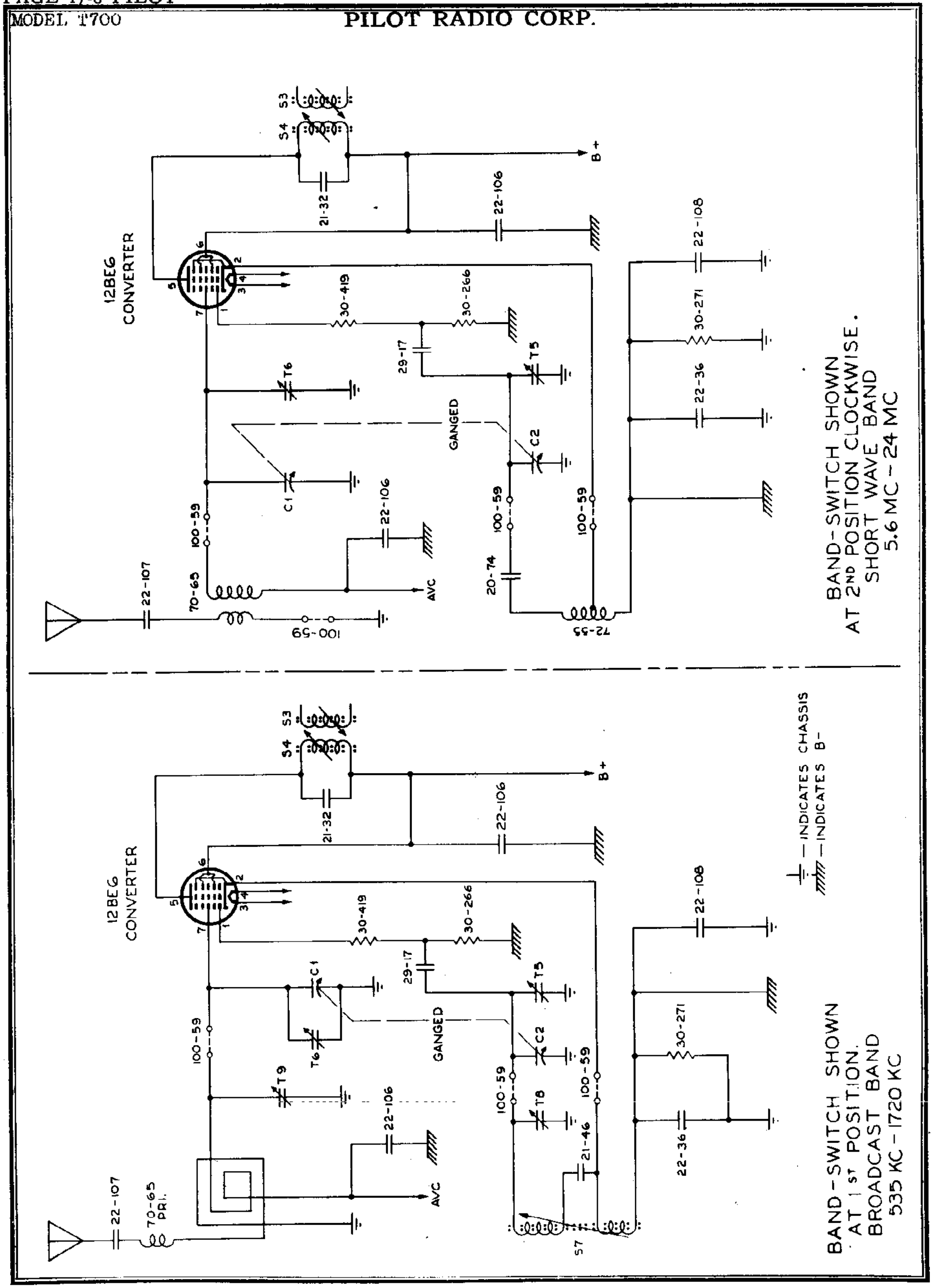
The output of the signal generator must always be kept at its lowest possible value. This is to prevent the automatic volume control of the receiver from interfering with accurate alignment.

During alignment, the line voltage feeding the receiver power supply should be kept at approximately 117 volts or 225 volts depending on the rating of your receiver.

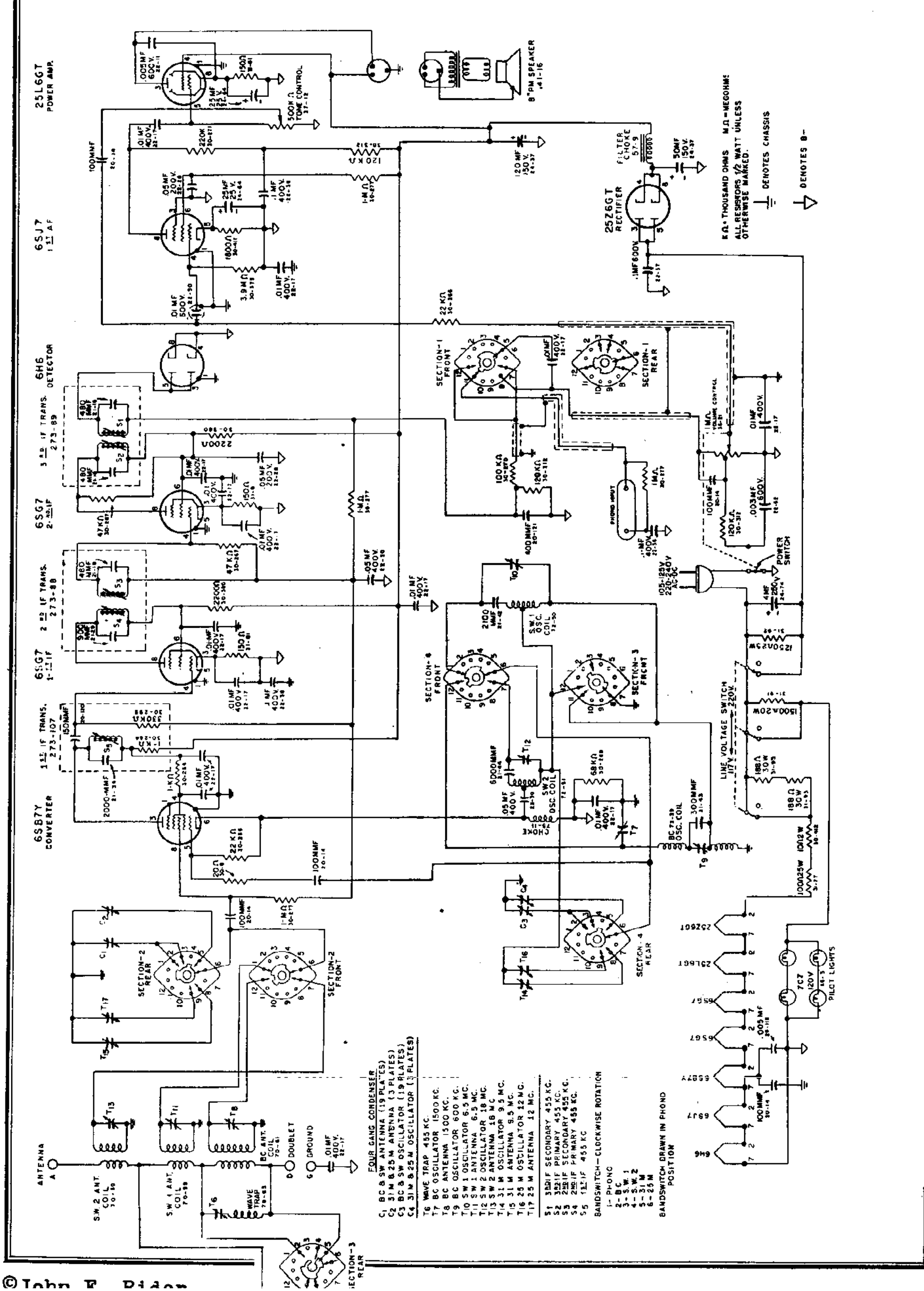
The locations of adjustment screws are indicated clearly on the schematic diagram. Alignment adjustments should be made only in the sequence given in the chart.

For all alignments, connect the output meter across the voice coil. With the volume control turned fully clockwise, tune for a maximum reading.

PILOT RADIO CORP.



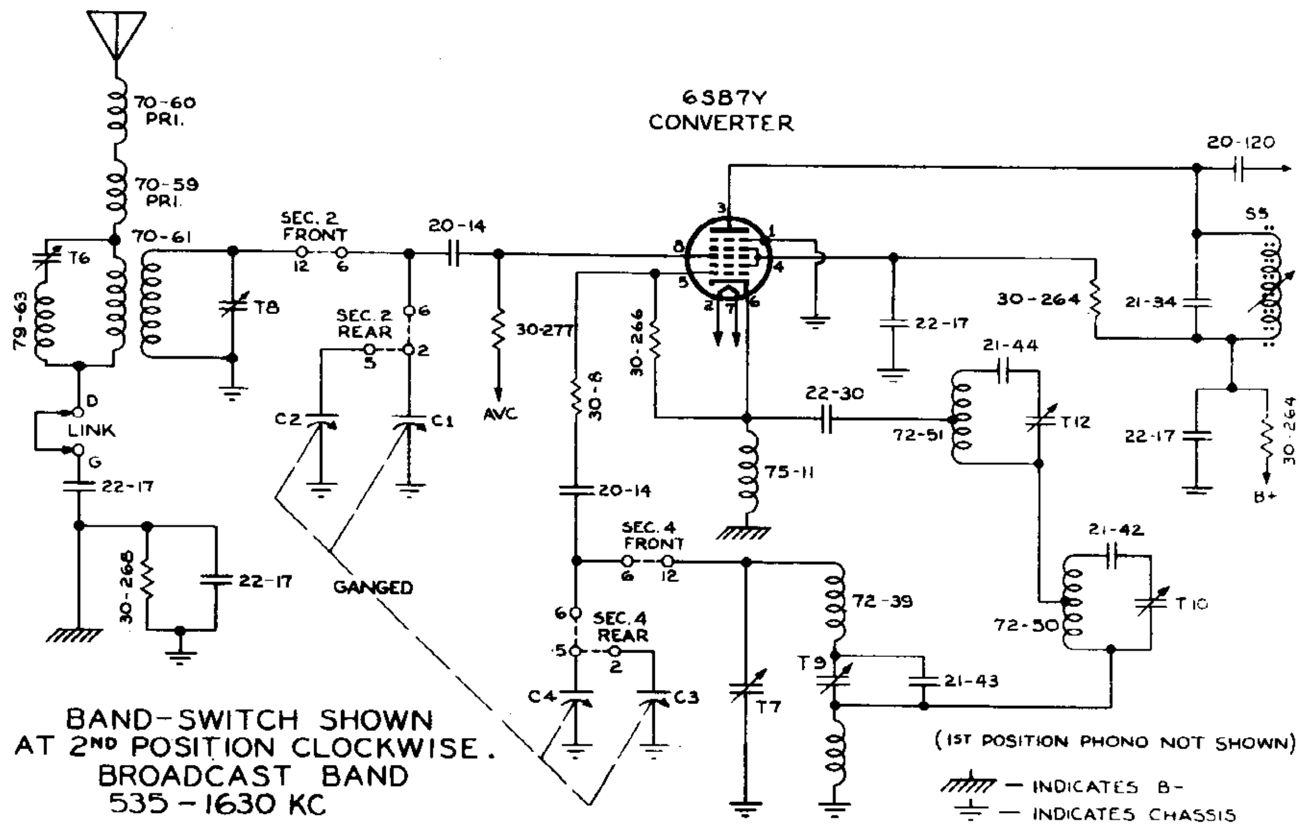
PILOT RADIO CORP.



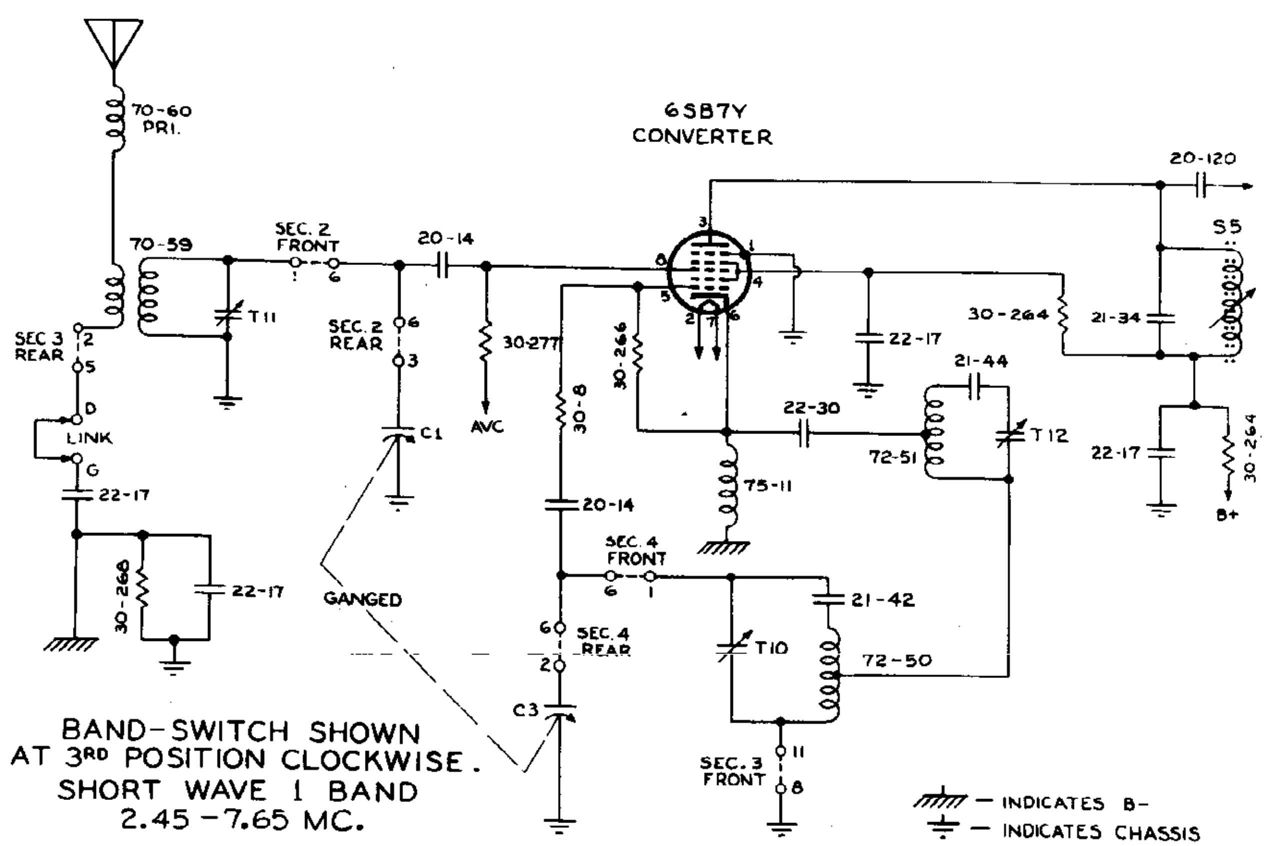
"clarified schematics"

MODEL T741

PILOT RADIO CORP.

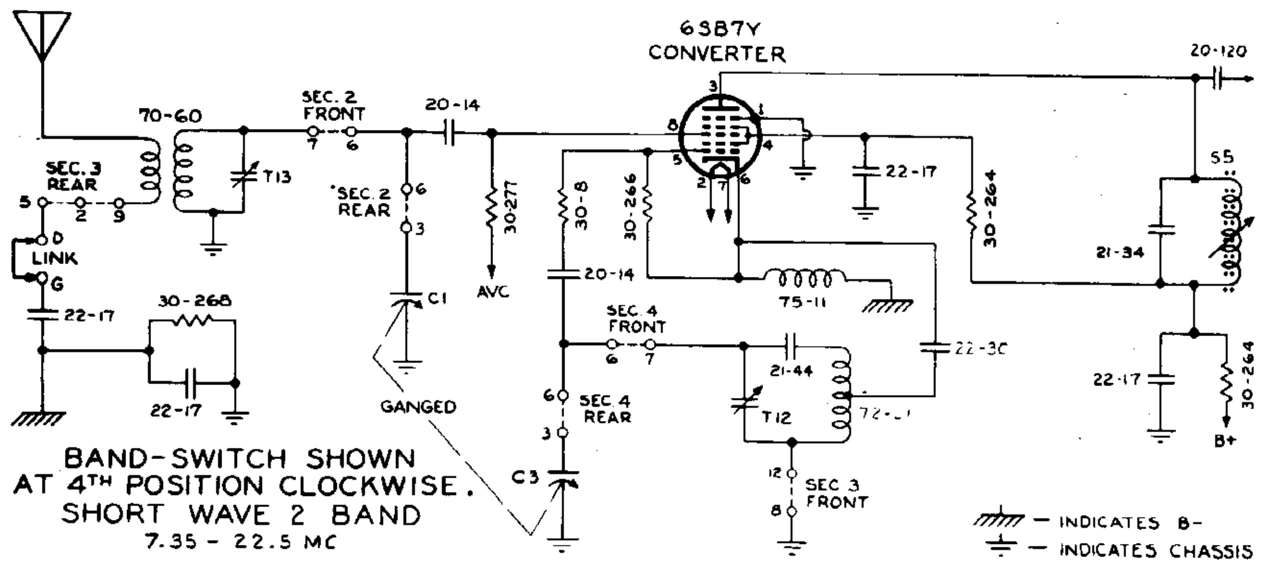


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND
535 - 1630 KC

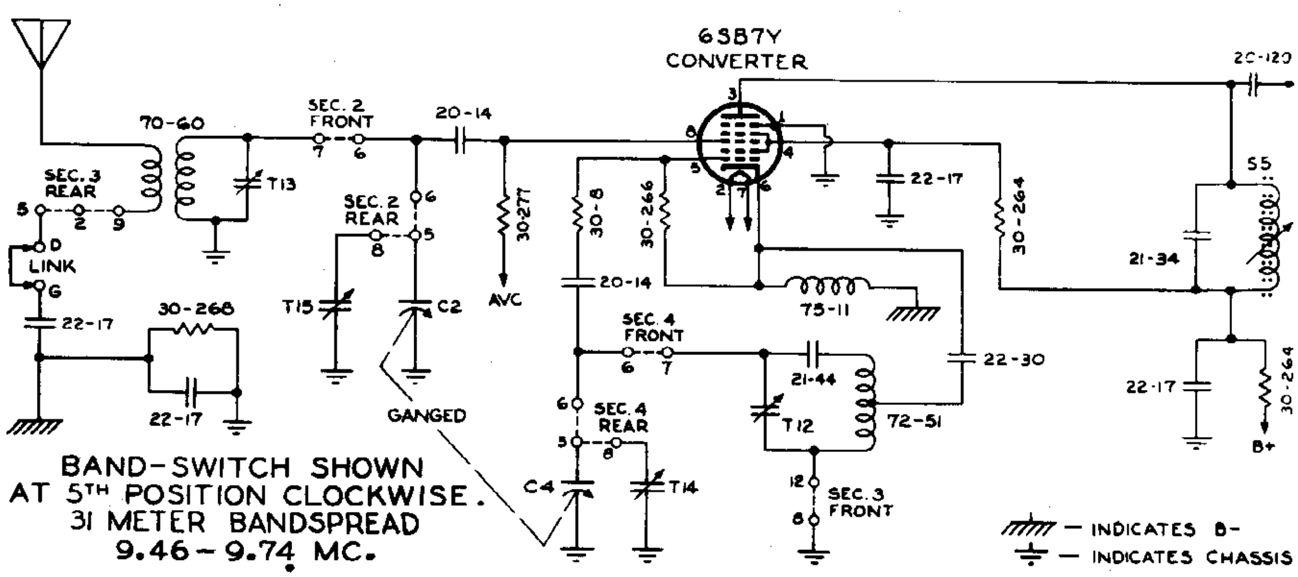


BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
SHORT WAVE 1 BAND
2.45 - 7.65 MC.

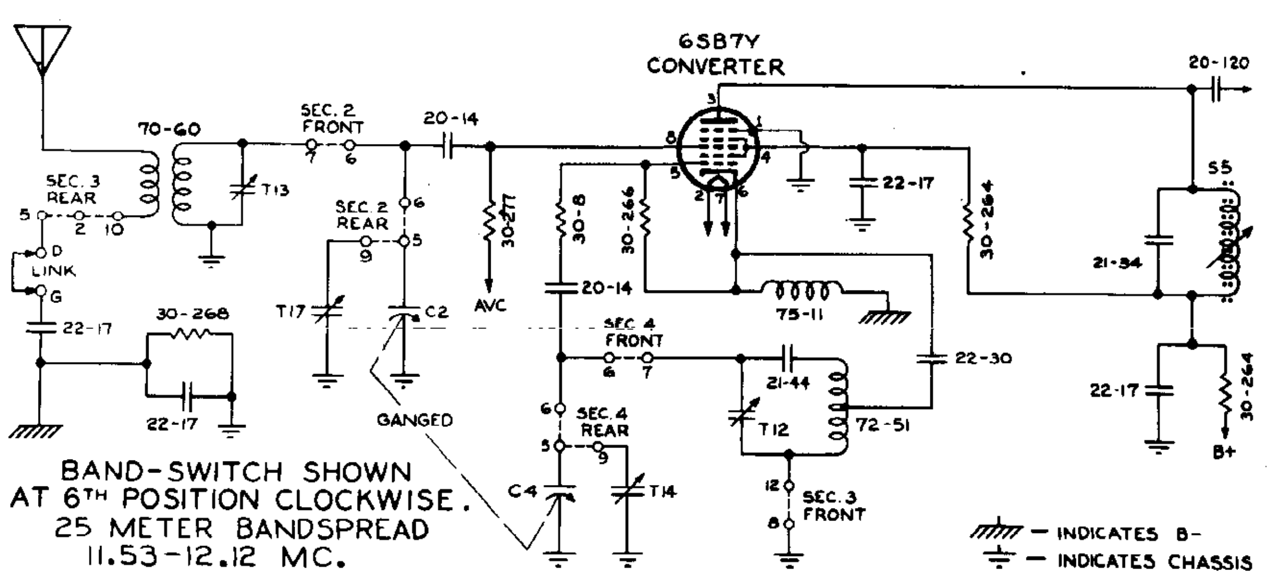
PILOT RADIO CORP.



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
SHORT WAVE 2 BAND
7.35 - 22.5 MC



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE.
31 METER BANDSPREAD
9.46 – 9.74 MC.



BAND-SWITCH SHOWN
AT 6TH POSITION CLOCKWISE.
25 METER BANDSPREAD
11.53 – 12.12 MC.

PILOT RADIO CORP.

ALIGNMENT CHART

(FOLLOW SEQUENCE AS INDICATED)

STEP	CIRCUIT ALIGNED	RECEIVER		SIGNAL GENERATOR		TRIMMER OR SLUG TO BE ADJUSTED	PROCEDURE
		BAND SWITCH	DIAL POINTER	FRE-QUENCY	CONNECTION		
1	IF	BC	At low frequency end of dial	455 KC	Through .1 mfd. condenser to front section of gang	#1, 2, 3, 4 and 5	Adjust for maximum output
2	IF Trap	BC	At low frequency end of dial	455 KC	Through 200 mmf. cond. to antenna post "A" with "D" tied to "G"	#6 (beneath chassis)	Adjust for minimum output
3	Broad-cast RF	BC	150 on dial	1500 KC	"	1. #7 (osc.) 2. #8 (ant.)	Adjust for maximum output
4		BC	60 on dial	600 KC	"	#9 (osc. padder)	Adjust for maximum output while rocking var. cond.
5		BC	REPEAT STEPS 3, 4 and 3				
6	Inter-nat'l SW1	Inter-nat'l SW1	6.5 MC on dial	6.5 MC	Through 400 ohm. resistor to antenna post "A" with "D" tied to "G"	1. #10 (osc.) 2. #11 (ant.)	Adjust for maximum output
7	Inter-nat'l SW2	Inter-nat'l SW2	18.0 MC on dial	18.0 MC	"	1. #12 (osc.) 2. #13 (ant.)	Adjust for maximum output
8	31 Meter Band-spread	31 Meter Band-spread	9.5 MC on dial	9.5 MC	"	1. #14 (osc.) 2. #15 (ant.)	Adjust for maximum output
9	25 Meter Band-spread	25 Meter Band-spread	12.0 MC on dial	12.0 MC	"	1. #16 (osc.) 2. #17 (ant.)	Adjust for maximum output

Alignment should be attempted only if a low range A.C. meter, a signal generator, and insulated alignment tools are at your disposal. The A.C. meter is used as an outputmeter. The signal generator must cover a frequency range from 450 kc to 24 mc.

It is essential that the signal generator be connected to the points indicated in the alignment chart through the proper dummy antenna.

A good ground connection, secured between the groundpost of the signal generator and the chassis, is necessary.

The output of the signal generator must always be kept at its lowest possible value. This is to prevent the automatic volume control of the receiver from interfering with accurate alignment.

During alignment, the line voltage feeding the receiver power supply should be kept at approximately 117 volts or 225 volts, depending on position of line switch.

The locations of adjustment screws are indicated clearly on the schematic diagram. Alignment adjustments should be made only in the sequence given in the chart.

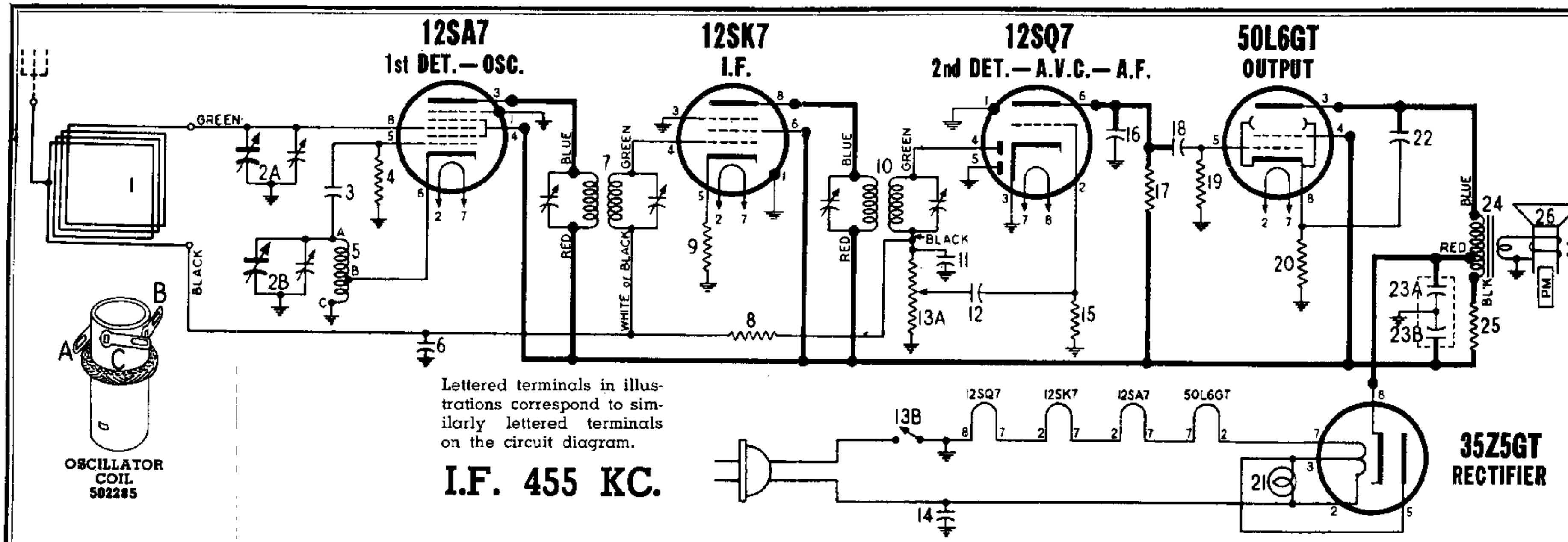
For all alignments, connect the outputmeter across the voice coil. With the volume control turned fully clockwise, tune for a maximum reading.

TUNING RANGE

Band (1) — Phonograph — (Must have record player attached)
Band (2) — Standard Broadcast — (535-1630 kc or 184 to 561 meters)
Band (3) — International Shortwave Band 1 — (2.45 to 7.65 mc or 39.2 to 122.3 meters)
Band (4) — International Shortwave Band 2 — (7.35 to 22.5 mc or 13.3 to 40.8 meters)
Band (5) — 31 Meter Bandspread — (9.46 to 9.74 mc or 30.8 to 31.7 meters)
Band (6) — 25 Meter Bandspread — (11.53 to 12.12 mc or 24.8 to 26 meters)

PORTO-PRODUCTS, INC. MODEL SR-600, Chassis 9040A

Smokerette

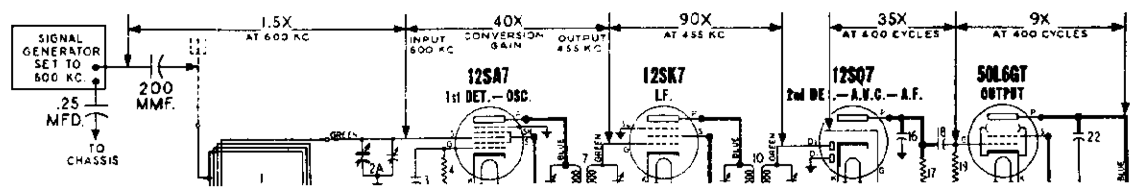


STAGE GAIN MEASUREMENT PROCEDURE

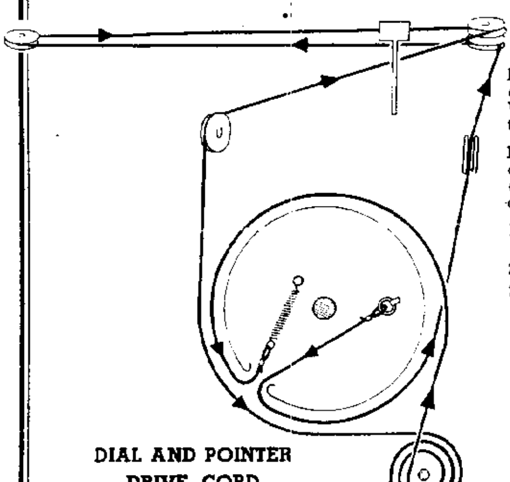
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at black lead to the loop antenna and connect the positive battery lead to receiver chassis.
4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximm output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.



DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, set gang condenser to fully open position and use following parts:

114955	Clip on end of cord
117057	Cord (5 feet)
119087	Ring for dial cord
161384	Tension Spring

PORTO-PRODUCTS, INC.

ALIGNMENT PROCEDURE

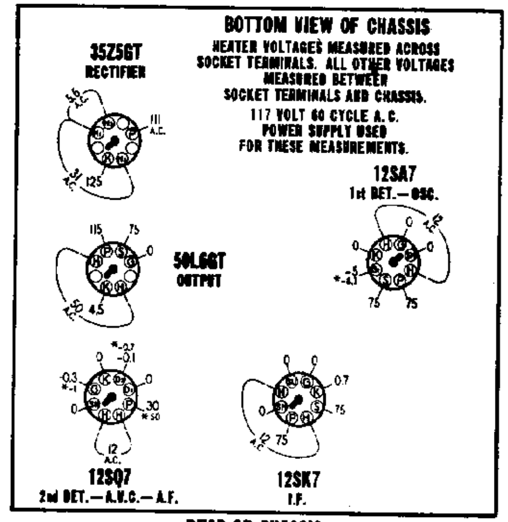
1. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, release pointer clip on dial cord and reposition pointer.
2. Connect an output meter across the speaker voice coil or from the plate of the 50L6GT tube to chassis through a .1 Mfd. condenser.
3. Connect ground lead of signal generator to receiver chassis. **CAUTION:** If your signal generator is designed with an AC-DC power supply, connect ground lead of signal generator to receiver chassis through a .25 mfd. condenser.
4. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
200 MMFD. Mica Condenser	Lug on trimmer No. 6 on rear section of gang (see figure below for location of trimmer.)	455 KC	Any point where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Mica Condenser	External antenna lead on loop.	1400 KC	1400 KC	5	Broadcast Oscillator	Adjust for maximum output.
200 MMFD. Mica Condenser	External antenna lead on loop.	1400 KC	Tune to 1400 KC generator signal	6	Broadcast Antenna	Adjust for maximum output.

SOCKET VOLTAGES

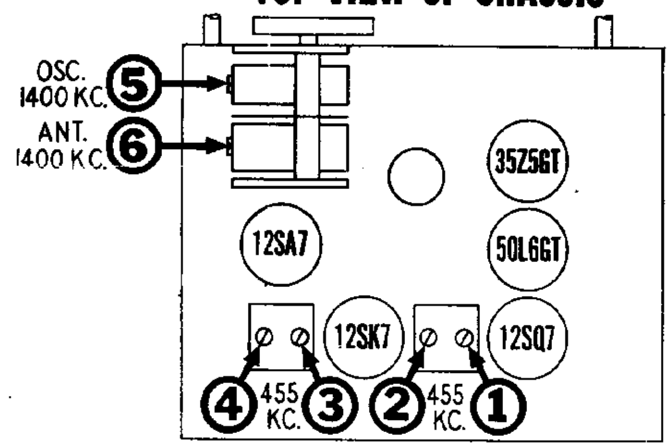
Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

DIAL TUNED TO 540 KC.
VOLUME ON FULL WITH NO SIGNAL



REAR OF CHASSIS

TOP VIEW OF CHASSIS



PARTS LIST

DIA-GRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
2-A, B	505728	Condenser—variable gang (with drum)
3	502159	Condenser—mica 50 Mmfd. 500 volt
6	502157	Condenser—.05 Mfd. 400 volt
11	502271	Condenser—mica 260 Mmfd. 500 volt
12	502260	Condenser—.002 Mfd. 600 volt
14	502157	Condenser—.05 Mfd. 400 volt
16	502271	Condenser—mica 260 Mmfd. 500 volt
18	502261	Condenser—.01 Mfd. 600 volt
22	502261	Condenser—.01 Mfd. 600 volt
23-A, B	500256	Condenser—electrolytic A-40 Mfd. 150 volt; B-20 Mfd. 150 volt
		RESISTORS
4	502130	Resistor—carbon 22,000 ohms ¼ watt
8	502135	Resistor—carbon 2.2 Meg. ¼ watt
9	502794	Resistor—carbon 68 ohms ¼ watt
13-A, B	500223	Volume control 1 Meg. (with switch)
15	502136	Resistor—carbon 10 Meg. ¼ watt
17	502133	Resistor—carbon 220,000 ohms ¼ watt
19	5021[illegible]4	Resistor—carbon 470,000 ohms ¼ watt
20	502270	Resistor—wire wound 150 ohms 1 watt
25	502265	Resistor—carbon 2,000 ohms 1 watt
		COILS AND TRANSFORMERS
1	505729	Loop antenna
5	502285	Coil-oscillator
7	502284	Transformer—1st I.F.
10	502283	Transformer—2nd I.F.
24	500360	Transformer—output for 500257 speaker

DIA-GRAM NO.	PART NO.	DESCRIPTION
		OTHER ELECTRICAL PARTS
21	118921	Lamp—dial (Mazda 47) 6-8V. 150 Ma.
27	500257	Speaker—P.M. dynamic (4 inch) with output transf.
		MISCELLANEOUS PARTS
	160026	Base for mtg. electrolytic condenser
	505741	Cabinet
	112745	Clip-coil mtg.
	114955	Clip-retainer on end of dial cord
	117057	Cord-dial drive (5 feet required)....per ft.
	505738	Dial scale
	505742	Escutcheon
	500224	Foot-felt and mounting screw
	505745	Knob
	505768	Pointer
	81145	Retaining ring for tuning shaft
	119087	Ring for dial cord
	75148	Screw—No. 10-32x⅜; chassis mtg.
	79905	Screw—No. 8x1½ for loop mtg.
	505727	Shaft—tuning
	116690	Socket—octal base
	500499	Socket—dial lamp (with leads)
	161384	Spring—dial cord tension
	111456	Washer—spring washer for tuning shaft

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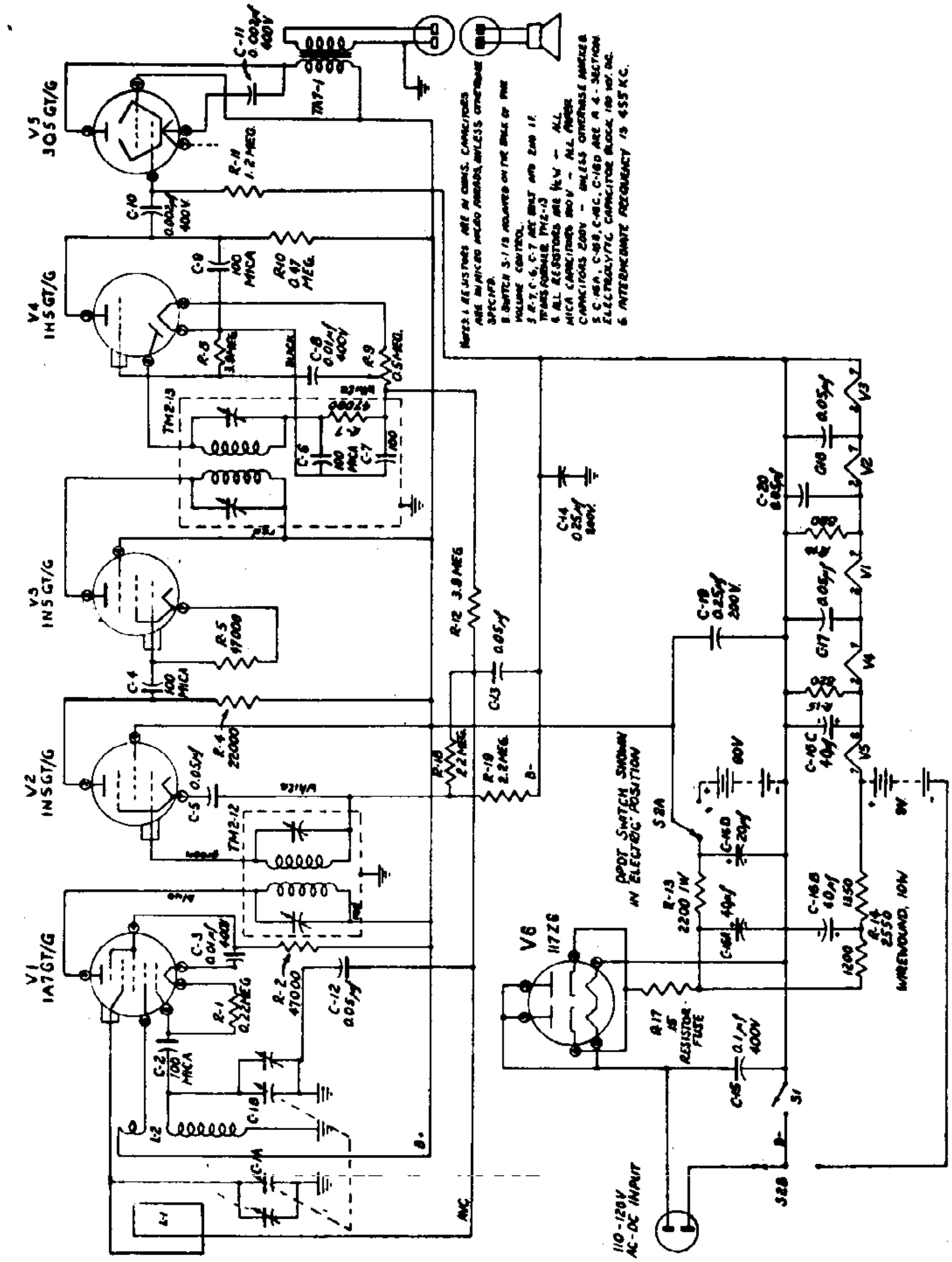
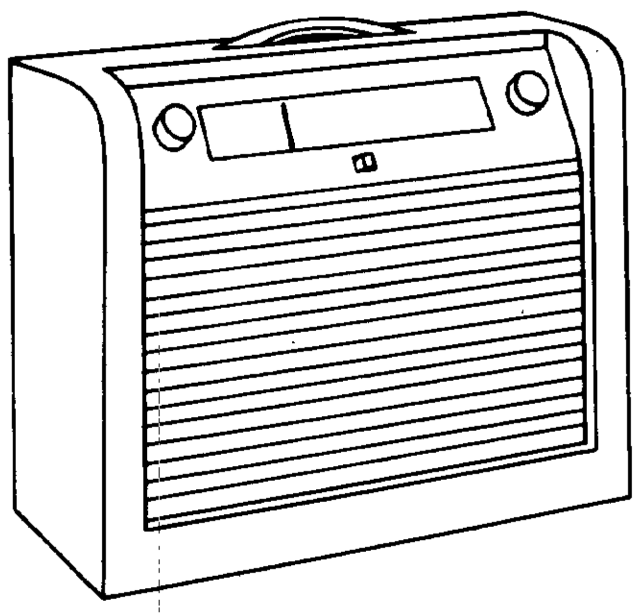


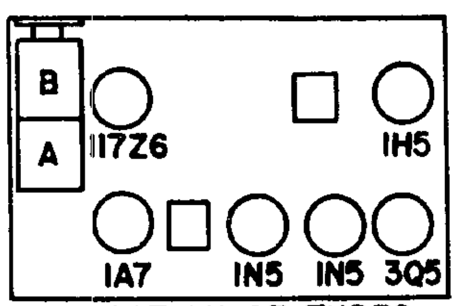
PURE OIL CO., U.S.A.



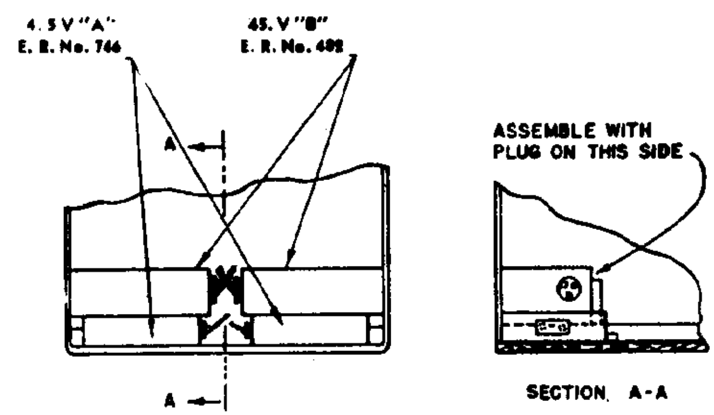
Alignment: No attempt should be made to re-align this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug on RF section A of tuning capacitor. Connect ground clip of generator to a convenient B-minus point (such as the case of the electrolytic capacitor, or one of the switch terminals on the back of the volume control). An output meter may be clipped directly across the voice coil lugs. Align the I.F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad.

To align RF trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads to two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter, placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (B) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (A) (on rear section) for maximum response.



LOCATION OF TUBES



NOTE:
BE SURE TO REMOVE BOLT FROM BOTTOM OF CABINET BEFORE ATTEMPTING TO INSERT BATTERIES

POSITION OF BATTERIES

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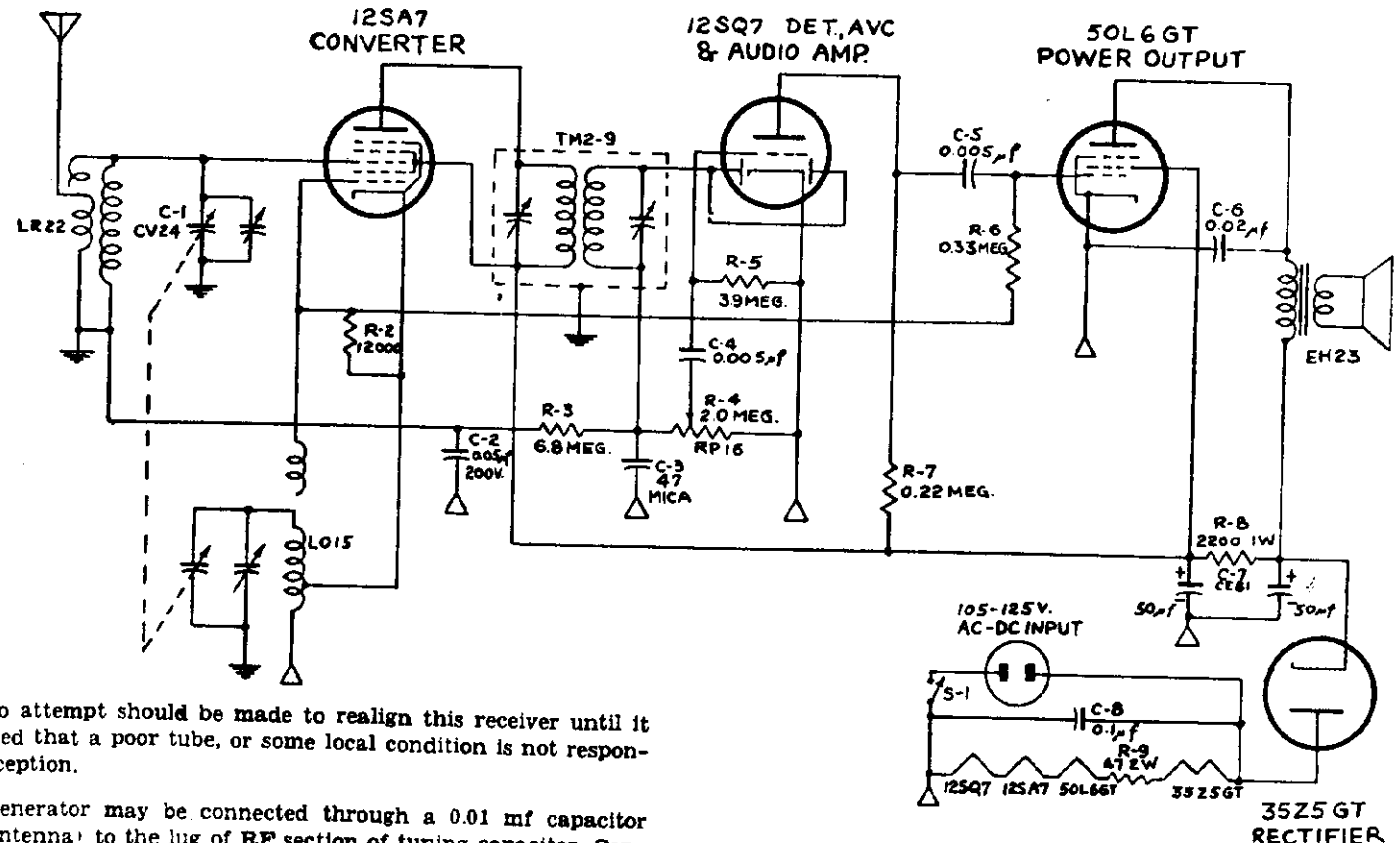
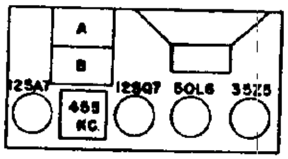




LOCATION OF TUBES

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

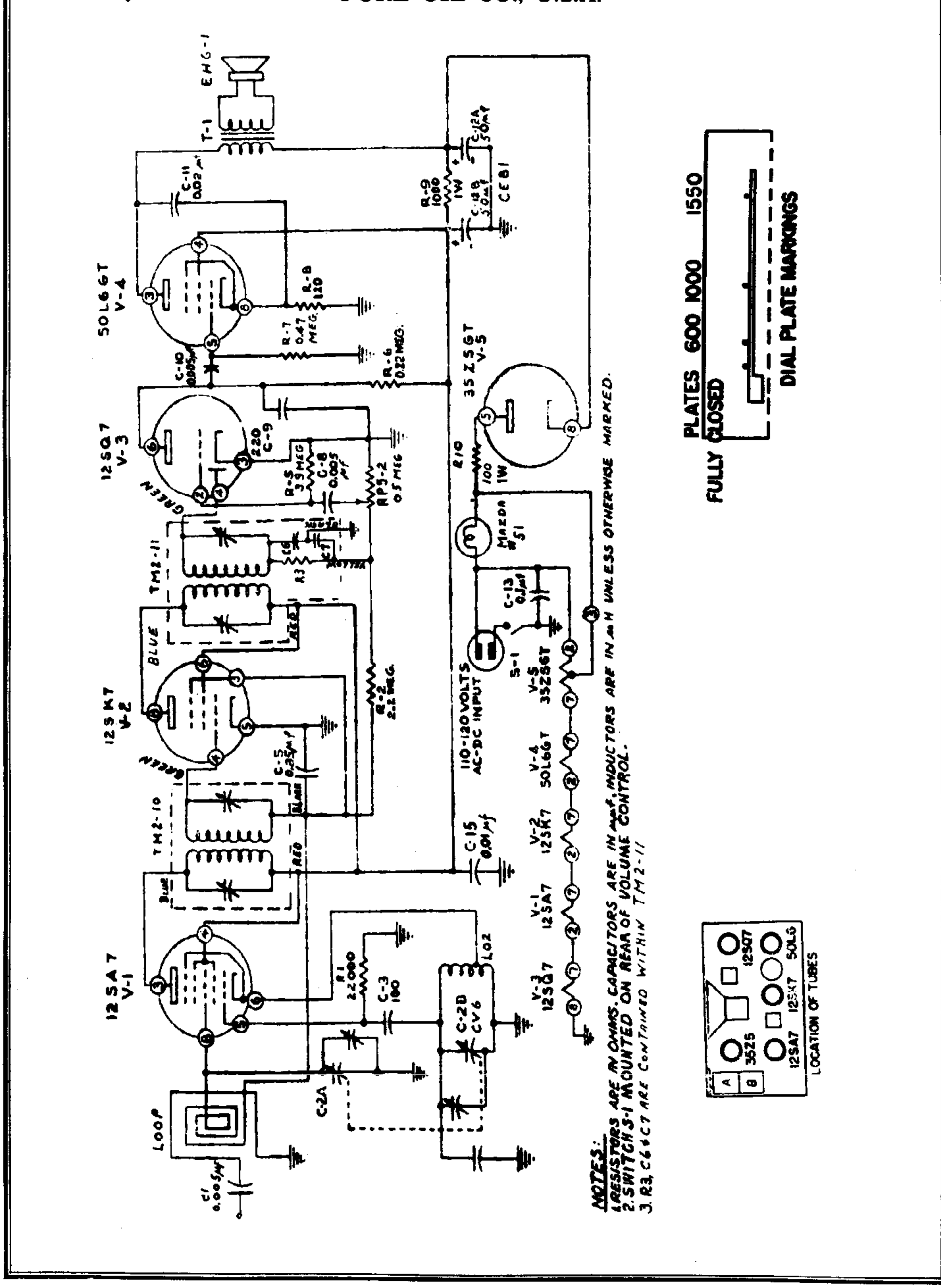
The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug of **RF** section of tuning capacitor. Connect ground clip of generator to a convenient B-minus point such as one of the switch terminals on the back of the volume control. An output meter may be clipped directly across the voice coil lugs. Align the IF trimmers to 455 kc using least possible input from signal generator to avoid developing A. V. C. voltage which would make the tuning adjustments very broad.

To align RF trimmer, remove the 0.01 mf capacitor and connect the signal generator hot lead to a 68 mmf mica condenser. Connect the dummy antenna thus formed to the antenna lug on the antenna coil (lug to which the antenna hank is soldered). Again, use the least possible input from the signal generator. With the tuning capacitor plates completely out of mesh, and pointed at extreme clockwise position, adjust the oscilator trimmer on front section of tuning capacitor to 1700 kc. Readjust both signal generator and tuning capacitor to 1550 kc and adjust the RF trimmer on rear section for maximum response.

NOTES:

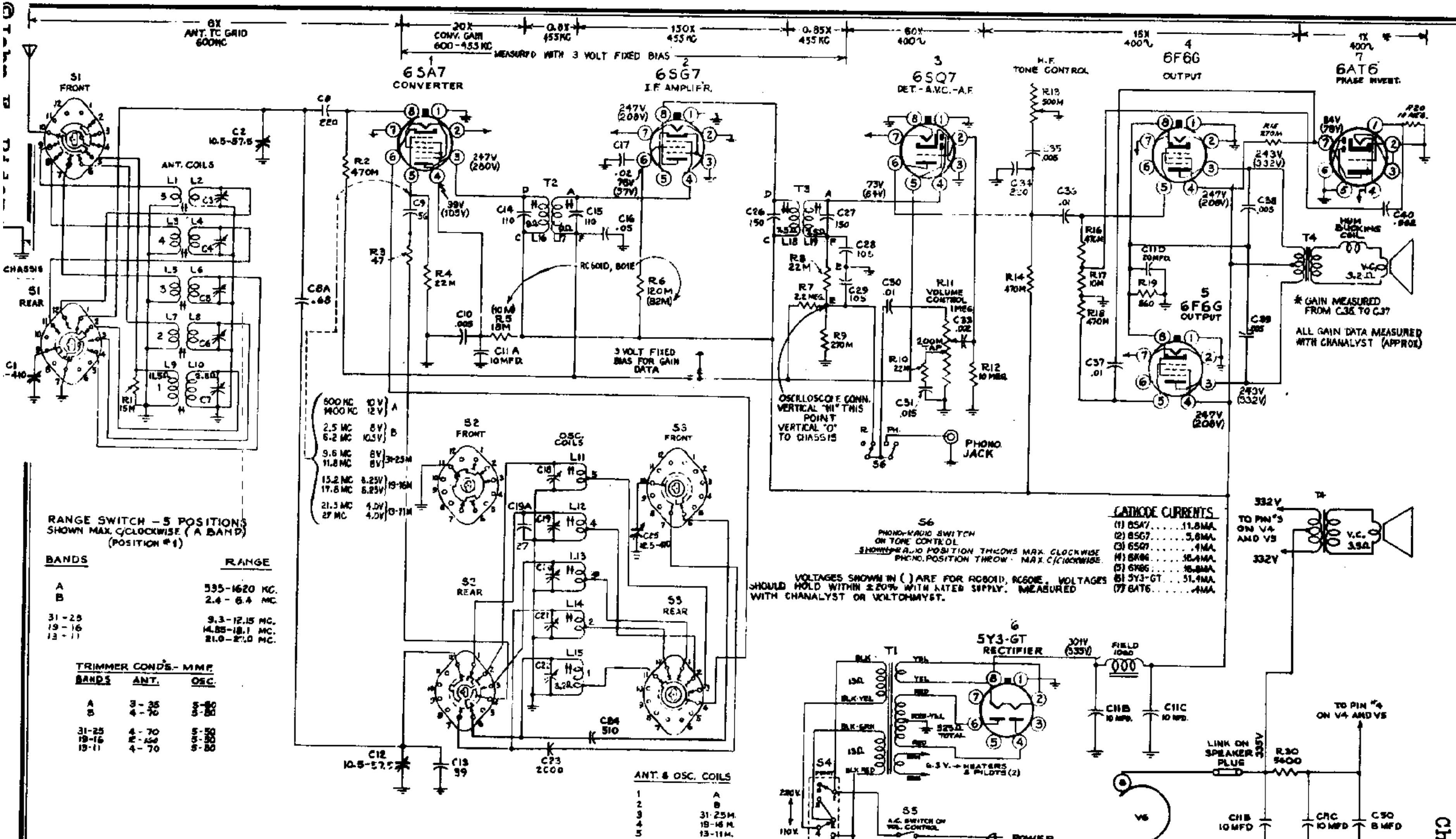
1. RESISTORS ARE IN OHMS AND ARE ½ WATT; CAPACITORS ARE 400V AND IN µf UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON REAR OF VOLUME CONTROL.
3. SYMBOL △ DENOTES B- AND SYMBOL ⏚ DENOTES CHASSIS.
4. I.F. FREQUENCY IS 455Kc.
5. TUNING RANGE IS 532Kc. TO 1700Kc.

PURE OIL CO., U.S.A.



RADIO CORP. OF AMERICA

MODELS Q122, Q122a
Chassis RC601, RC601A



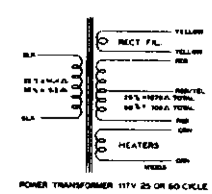
IF PEAK 455 KC

Loudspeaker.—

To center the loudspeaker voice coil, first remove the dust cover. Then loosen the center suspension by thoroughly soaking the outer edge of this suspension with repeated applications of acetone. (Caution: Keep acetone from flowing to other parts of the loudspeaker.)

Keep the outer edge of the suspension soaked, and lift the cone, near the voice coil, up and down until the suspension is pulled away from the cone housing.

Insert 3 feelers, equally spaced, between the voice coil and the pole piece, and allow the center suspension to re-cement itself. Additional cement should be applied if necessary. Remove feelers when cement has hardened completely.



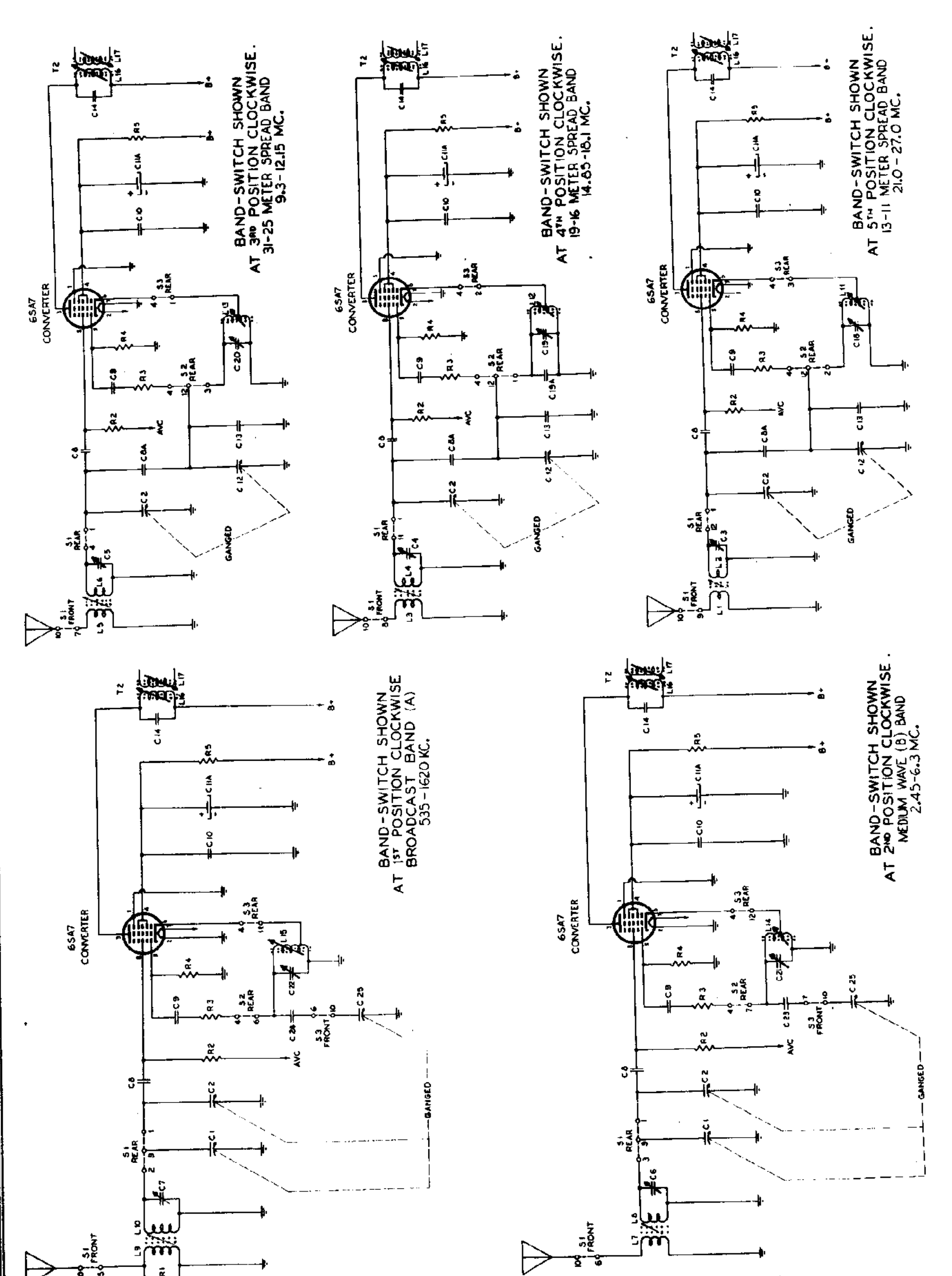
Schematic Diagram, Q122, Q122a

NOTE: In some sets and on some replacement units, the power transformer color code may vary from that shown. On universal transformers (Rating C), the primary No. 1 start may be red; primary No. 1 finish red/black; primary No. 2 start red/yellow; primary No. 2 finish black/red. On the 25 and 60 cycle transformers (Ratings A and B), the primary start and finish may be red. Secondaries of the three transformers would be: rectifier filament, green/red; high-voltage, brown; high-voltage center tap, black/brown; amplifier filament, blue. In case of doubt, identify windings by resistance or voltage measurements.

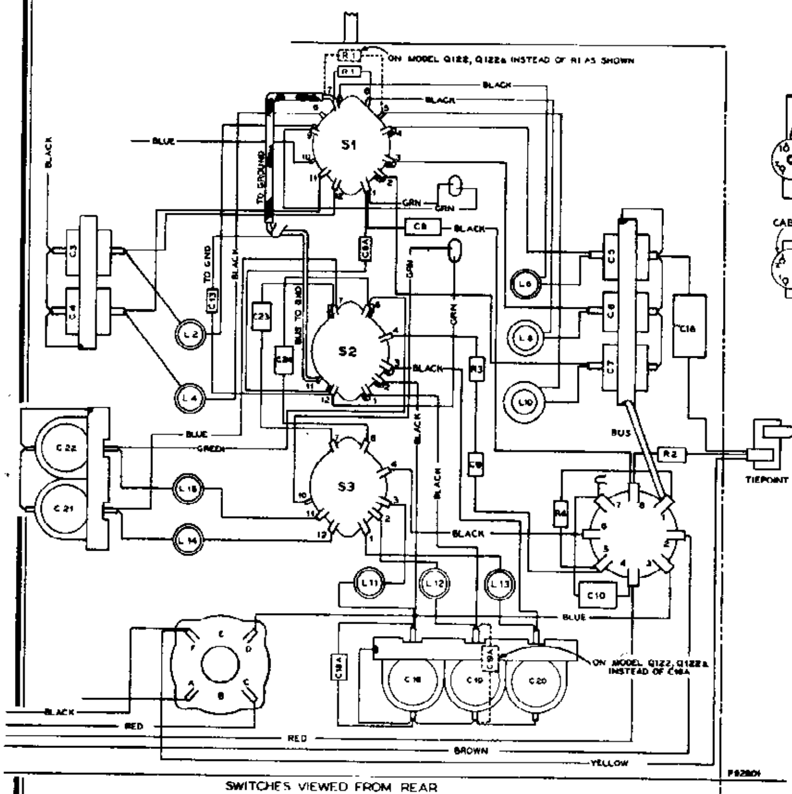
"clarified schematics"

MODELS Q122,Q122a

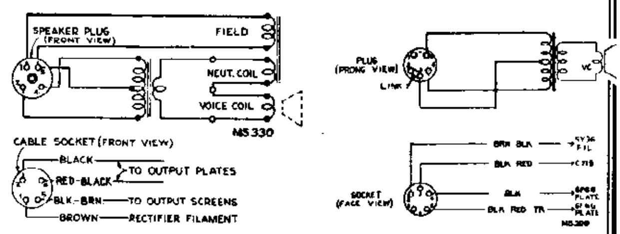
RADIO CORP. OF AMERICA



RADIO CORP. OF AMERICA **MODELS Q122, Q122a, Q122X, Q122Xa**

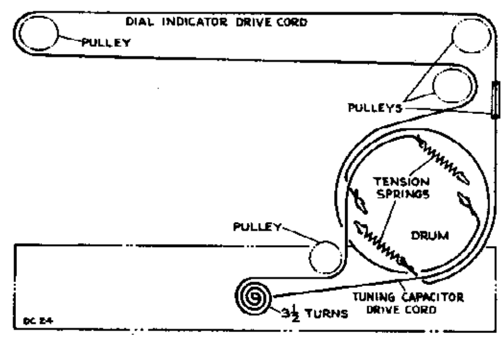


R. F. Wiring Diagram (Bottom View)



RC 601, RC 601A **RC 601D, RC 601E**

Loudspeaker Connections



Dial-Indicator and Drive Mechanism

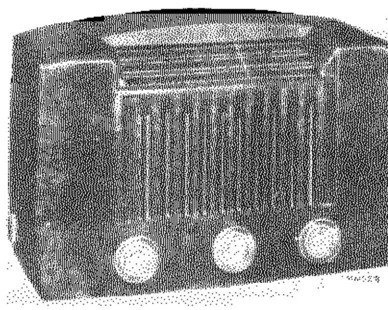
Frequency Ranges, Q-122, Q-122a

Standard Broadcast ("A" Band)	540—1600 kc.	(556—187 m)
Medium Wave ("B" Band)	2.45—6.3 mc.	(122—47.7 m)
"31-25 Meter" Spread Band	9.5 — 12 mc.	(31.6—25 m)
"19-16 Meter" Spread Band	15.1 — 18 mc.	(19.8—16.6 m)
"13-11 Meter" Spread Band	21.4 — 27 mc.	(14 —11.1 m)

Models Q-122X, Q-122Xa, will have in place of the "B" Band, and the "13-11 Meter" Band:

Long Wave ("X" Band)	140—375 kc.	(2,140—800 m)
"49-40 Meter" Spread Band	6.—7.3 mc.	(50—41 m)

Intermediate Frequency .... **455 kc.**



Q122, Q122X

Loudspeaker

Chassis No. RC 601, **RC 601A** **92517-1**
Type (Electrodynamic) .... **6½"**
V-C Impedance (400 c.p.s.) .... **3.4 ohms**

Power Output Rating	**Undistorted**	**Maximum**
Q122, Q122X	**4.2 watts**	**5.0 watts**
Q122a, Q122Xa	**5.2 watts**	**5.4 watts**

Chassis No. RC 601D, RC 601E **92570-1**
Type (PM) .... **6½"**
V-C Impedance (400 c.p.s) .... **3.4 ohms**

Pilot Lamps .... 2 type 44 6.3 volts, 0.25 amp

Power Supply Ratings

Symbol	**Voltages**	**Frequency (cycles)**	**Watts**
Rating A	105-125	50-60	65
Rating B	105-125	25-60	65
Rating C	105-125, 200-250	50-60	65

(Shipped in 225-250 volt position)

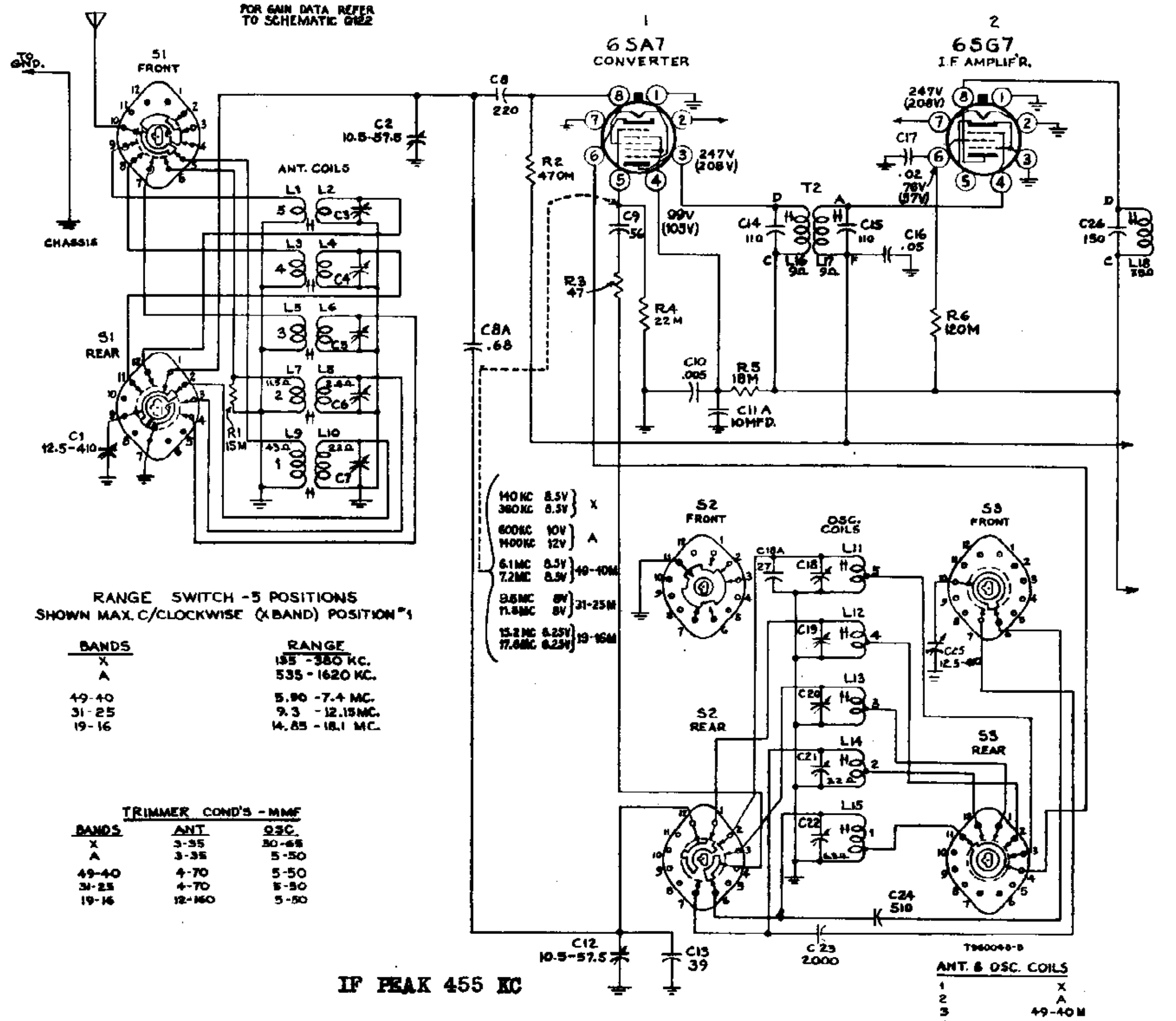
Phonograph Attachment.—A jack is provided on the rear of chassis for connection to a phonograph. The cable from the attachment should be terminated in a Stock No. 31048 plug.

When phonograph is in use the volume control on the radio should be at minimum and, if necessary, tune set off frequency from any very strong station.

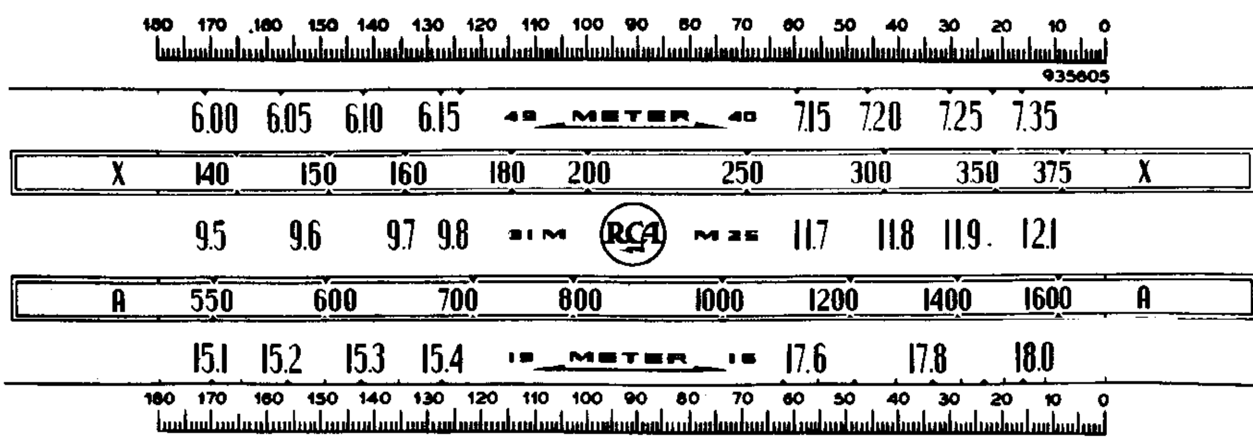
Chassis No. RC 601 and chassis RC 601A differ from RC 601E and RC 601D in that they are equipped with an electrodynamic speaker. Other than the frequency ranges covered, trimmer locations, and power supply filtering, the chassis are identical.

MODELS Q122X, Q122Xa
Chassis RC601D, RC601E

RADIO CORP. OF AMERICA



Schematic Diagram, Q122X, Q122Xa (R. F.)

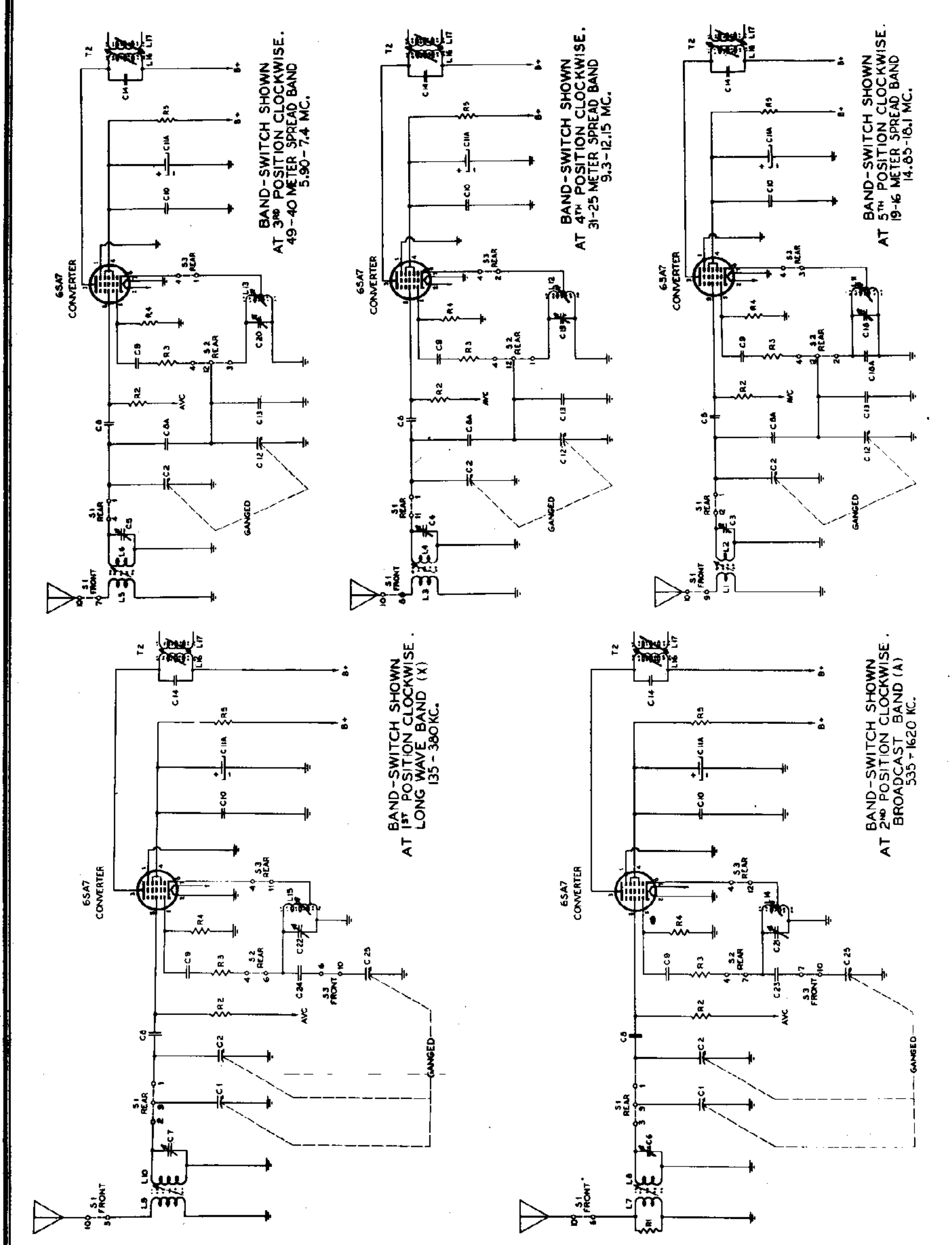


Reduced Reproduction of Receiver Dial, Q122X, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on top calibration scale. For example 150° on the calibration scale corresponds to 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

RADIO CORP. OF AMERICA

MODELS Q122X, Q122Xa



MODELS Q122,Q122a,
Q122X,Q122Xa

RADIO CORP. OF AMERICA

ALIGNMENT CHART Q122

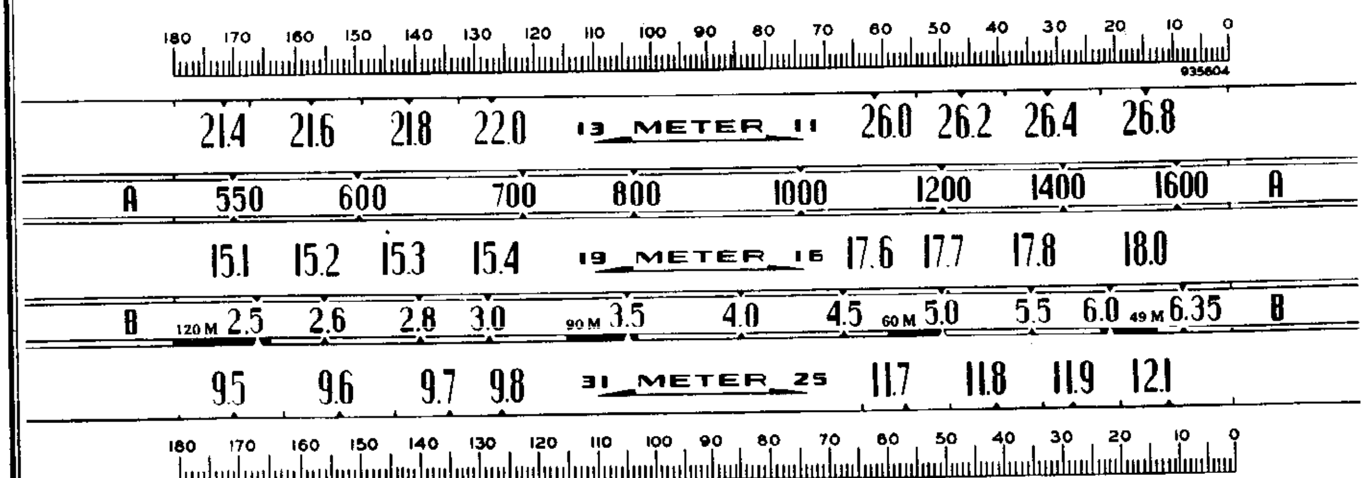
Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn Range Switch to—	Turn Radio dial to—	Adjust the following for max. peak output
1	6SQ7 I-F grid in series with .01 mfd.	455 kc	"A" Band	Quiet point near 600 kc (148°)	L19, L18 2nd I-F trans.
2	6SA7 Det. grid in series with .01 mfd.				L17, L16, 1st I-F trans.
3	Antenna terminal in series with 200 mmfd.	1500 kc	"A" Band	1500 kc (18°)	C22 osc. C7 ant.
4		600 kc		600 kc (148°)	L15 osc. L10 ant.
5	Repeat Steps 3 and 4 until aligned				
6	Antenna terminal in series with 300 ohms	6.2 mc	"B" Band	6.2 mc (14°)	C21 osc. C6 ant.
7		2.6 mc		2.6 mc (152°)	L14 osc. L8 ant.
8	Repeat Steps 6 and 7				
9	Antenna terminal in series with 300 ohms	11.8 mc	"31-25 Meter" Band	11.8 mc (40°)	C20 osc.* C5 ant. Rock in**
10		9.5 mc		9.5 mc (170°)	L13 osc. L6 ant.
11		17.75 mc	"19-16 Meter" Band	17.75 mc (40°)	C19 osc.* C4 ant. Rock in**
12		15.2 mc		15.2 mc (155°)	L12 osc. L4 ant.
13		26.25 mc	"13-11 Meter" Band	26.25 mc (42°)	C18 osc.* C3 ant. Rock in**
14		21.25 mc		21.25 mc (180°)	L11 osc. L2 ant.

Oscillator tracks above signal on all bands.
* Use minimum capacity peak if two peaks can be obtained.
** Use maximum capacity peak if two peaks can be obtained.

Use of Wave Trap.—Should interference from a powerful nearby station require the use of a wave trap, install a Stock No. 32553 trap as indicated in tube layout diagram. Connect coil lug to antenna connection, ground connection is made to chassis through coil mounting foot. Adjust capacitor to resonance with interfering station.

Critical Lead Dress

1. The green and black leads to the Volume Control should be tightly twisted and dressed down towards the chassis away from the 110/220 volt switch and away from the A.C. switch leads.
2. The A.C. switch leads should be twisted and dressed up away from all other leads.
3. The capacitor (C33) from the terminal board to Pin #2 of the 6SQ7 socket should be dressed down against the chassis. The capacitor leads to be cut as short as possible.
4. The capacitor (C30) from the terminal board on the front apron to the high side of the Volume Control should be dressed against the front apron.
5. The capacitor (C31) from the terminal board on the front apron to the low side of the Volume Control should be dressed against the front apron.
6. The capacitor (C8) from Pin #8 of the 6SA7 socket to the range switch should be dressed away from the chassis, range switch and coils.
7. The capacitor and resistor assembly C9 and R3 should be dressed mid-way between the coils L13 and L9 and dressed away from all parts and leads.
8. The capacitor (C16) from the terminal board, on end apron, to the trimmer strip, should be dressed against the end apron.
9. The resistor (R5) should be dressed away from the flywheel.
10. All leads and parts to the 6SA7 socket should have sufficient length to insure flexibility of socket.
11. All resistor and capacitor leads should be as short as possible.
12. All leads from the coils to range switch should be dressed away from each other and other parts.
13. All leads from the trimmer to range switch should be dressed away from coils and other parts.
14. The blue lead from terminal "E" of the 2nd I-F Transformer to S6 phono radio switch should be dressed close to the rear apron and under the clamps.
15. The capacitor (C38) from Pin #3 of the 6F6G socket to Pin #8 should be dressed down against the chassis base.
16. The capacitor (C39) from Pin #3 of the 6F6G socket to Pin #8 should be dressed away from the socket and speaker cable.
17. All excess power transformer leads should be dressed against the chassis and away from the tube sockets.
18. Slack in speaker cable to be as short as possible.
19. The resistor (R12) from Pin #1 to Pin #2 of the 6SQ7 socket should be as short as possible.
20. The capacitor (C35) from R13 tone control to Pin #7 of the 6F6G socket should be dressed away from the phono plug.
21. The resistor (R20) from Pin #1 to Pin #2 of the 6AT6 socket should be as short as possible.
22. All leads from range switch to stator section of gang should be dressed away from each other and should center in the cut-out.
23. Gang straps should be dressed to clear the rotor.
24. The leads to Pin #2, and #4 of the 6SA7 socket should be dressed down against the chassis and behind the trimmer strip.
25. The lead from Pin #3 of the 6SA7 socket to terminal "D" of the 1st I-F Transformer should be dressed down against the chassis and between the oscillator coils and trimmer strip.
26. The lead from terminal "F" of the 1st I-F. Transformer to the terminal board on end apron should be dressed behind the trimmer strip.
27. Brown and black leads to the electrolytic capacitor should be dressed away from green and black Volume Control leads.
28. Pilot lamp lead should be dressed against the chassis under all other leads to 110/220 volt switch.



Reduced Reproduction of Receiver Dial, Q122, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on top calibration scale. For example 150° on the calibration scale corresponds to 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

RADIO CORP. OF AMERICA

MODELS Q122, Q122a, Q122X, Q122Xa

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the Schematic Circuit Diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the indicator-drive-cord drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "180°" mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the calibration scale drawing which shows the dial with 0-180° calibration scales drawn at top and bottom.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 540 kc mark (the first mark on "A" band to the left of "550"), and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Spread-Band Alignment.—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each spread-band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

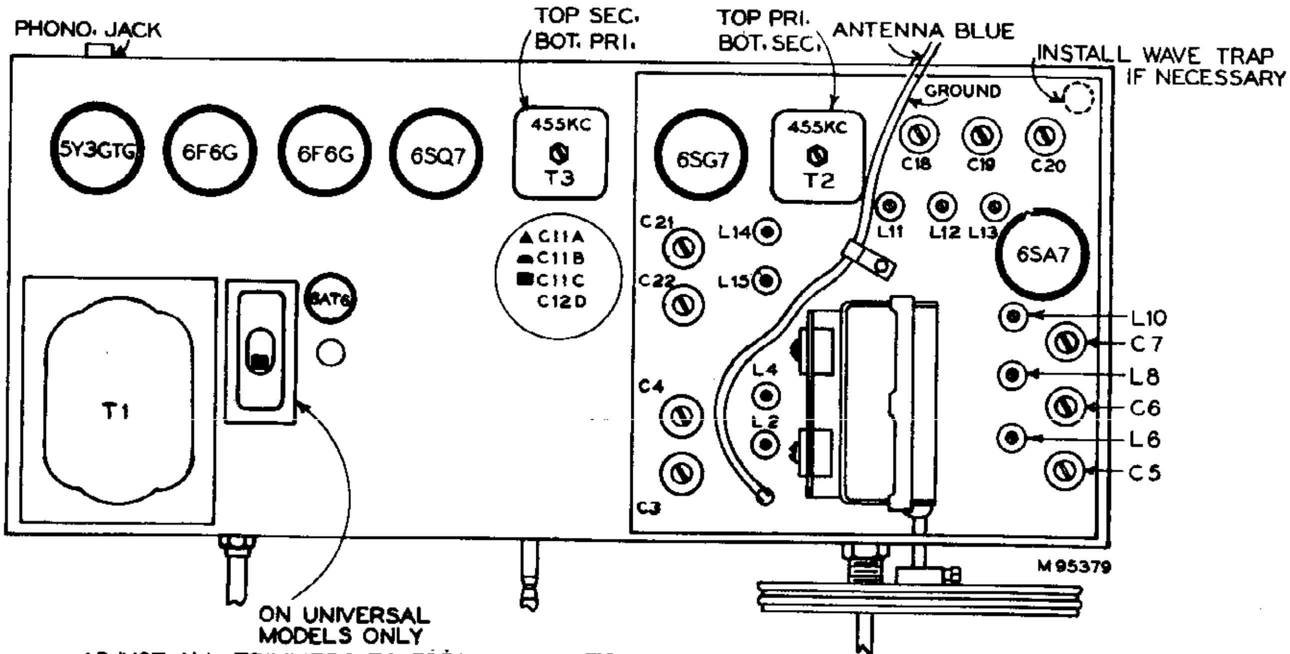
1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal-controlled oscillator, or by zero-beating against standard broadcast stations.

When a test-oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave stations of known frequency, and the magnetite-core oscillator coil for each band should be retouched so that the stations come in at the correct points on the dial.

ALIGNMENT CHART Q122X

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn Range Switch to—	Turn Radio dial to—	Adjust the following fo max. peak output
1	6SG7 I-F grid in series with .01 mfd.	455 kc	"A" Band	Quiet point near 600 kc (148°)	L19, L18 2n I-F trans.
2	6SA7 Det. grid in series with .01 mfd.				L17, L16, 1 I-F trans.
3	Antenna terminal in series with 200 mmfd.	360 kc	"X" Band	360 kc (18°)	C22 osc. C7 ant.
4		160 kc		160 kc (134°)	L15 osc. L10 ant.
5	Repeat Steps 3 and 4				
6	Antenna terminal in series with 200 mmfd.	1500 kc	"A" Band	1500 kc (19°)	C21 osc. C8 ant.
7		600 kc		600 kc (148°)	L14 osc. L8 ant.
8	Repeat Steps 6 and 7				
9	Antenna terminal in series with 300 ohms	7.2 mc	"49-40 Meter" Band	7.2 mc (45°)	C20 osc. C5 ant.
10		6.1 mc		6.1 mc (142°)	L13 osc. L6 ant.
11		11.8 mc	"31-25 Meter" Band	11.8 mc (40°)	C19 osc.* C4 ant. Rock in**
12		9.5 mc		9.5 mc (170°)	L12 osc. L4 ant.
13		17.75 mc	"19-16 Meter" Band	17.75 mc (40°)	C18 osc.* C3 ant. Rock in**
14		15.2 mc		15.2 mc (156°)	L11 osc. L2 ant.

Oscillator tracks above signal on all bands.
* Use minimum capacity peak if two peaks can be obtained.
** Use maximum capacity peak if two peaks can be obtained.



ADJUST ALL TRIMMERS TO FREQUENCIES INDICATED IN ALIGNMENT CHART FOR MODEL DESIRED

MODELS Q122,Q122a, Q122X,Q122Xa RADIO CORP. OF AMERICA

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 601—Q122, RC 601A—Q122X RC 601D—Q122a, RC 601E—Q122Xa
35640	Bracket—Drive cord pulley support bracket complete with one (1) pulley
35639	Bracket—Drive cord pulley support bracket complete with three (3) pulleys
35642	Calibrator—Drive drum calibrator
*71587	Capacitor—Molded paper, .005 mmfd., 600 volts (C10)
*71088	Capacitor—Molded, 0.68 mmfd. (C8a)
*70933	Capacitor—Mica trimmer comprising 2 sections of 3-35 mmfd., and 1 section of 4-70 mmfd. (for Models Q122X, Q122Xa) (C5, C6, C7)
*70932	Capacitor—Mica trimmer comprising 2 sections of 4-70 mmfd. and 1 section of 3-35 mmfd. (for Model Q122, Q122a) (C5, C6, C7)
*70745	Capacitor—Mica trimmer comprising 1 section of 12-180 mmfd. and 1 section of 4-70 mmfd. (for Models Q122, Q122a) (C3, C4)
*70754	Capacitor—Mica trimmer comprising 1 section of 4-70 mmfd. and 1 section of 12-180 mmfd. (for Models Q122X, Q122Xa) (C3, C4)
*70778	Capacitor—Ceramic trimmer, dual 5-50 mmfd. (for Model Q122, Q122a) (C18, C19)
*70798	Capacitor—Ceramic trimmer comprising 1 section of 30-85 mmfd. and 1 section of 5-50 mmfd. (for Models Q122X, Q122Xa) (C21, C22)
*70931	Capacitor—Ceramic trimmer, triple 5-50 mmfd. (C20, C21 C22 for Q122, Q122a; C18, C19, C20 for Q122X, Q122Xa)
*70935	Capacitor—Ceramic, 27 mmfd. (C19A for Q122; C18A for Q122X, Q122Xa)
*70934	Capacitor—Ceramic, 39 mmfd. (C13)
*71924	Capacitor—Ceramic, 56 mmfd. (C9)
*71933	Capacitor—Mica, 180 mmfd. (C24 for Q122X, Q122Xa)
71014	Capacitor—Mica, 220 mmfd. (C8, C34)
*71932	Capacitor—Mica, 510 mmfd. (C24 for Q122, Q122a; C23 for Q122X, Q122Xa)
*53538	Capacitor—Mica, 2000 mmfd. (C23 for Q122, Q122a)
*71136	Capacitor—Molded paper, .002 mfd., 200 volts (C33, C40)
*71593	Capacitor—Molded paper, .005 mfd., 600 volts (C35)
*72220	Capacitor—Molded paper, .005 mfd., 1000 volts (C38, C39)
*71585	Capacitor—Molded paper, .01 mfd., 200 volts (C30)
*71589	Capacitor—Molded paper, .01 mfd., 600 volts (C36, C37)
*71135	Capacitor—Molded paper, .015 mfd., 200 volts (C31)
*71591	Capacitor—Molded paper, .02 mfd., 600 volts (C17)
*71586	Capacitor—Molded paper, .05 mfd., 200 volts (C16)
33014	Capacitor—Electrolytic comprising 3 sections of 10 mfd., 450 volts and 1 section of 20 mfd., 25 volts (C11a, C11b, C11c, C11d)
*70830	Clip—Core and stud retaining clip
*70726	Clip—Spring clip to hold adjustable core and stud
*70923	Coil—Antenna coil—13 meter band (L1, L2 for Q122, Q122a)
*70920	Coil—Oscillator coil—13 meter band (L11 for Q122, Q122a)
*70924	Coil—Antenna coil—19 meter band (L3, L4 for Q122, Q122a; L1, L2 for Q122X, Q122Xa)
*70823	Coil—Oscillator coil—19 meter band (L12 for Q122, Q122a; L11 for Q122X, Q122Xa)
*70925	Coil—Antenna coil—31 meter band (L5, L6 for Q122, Q122a; L3, L4 for Q122X, Q122Xa)
*70825	Coil—Oscillator coil—31 meter band (L13 for Q122, Q122a; L12 for Q122X, Q122Xa)
*70928	Coil—Antenna coil—49 meter band (L5, L6 for Q122X, Q122Xa)
*70921	Coil—Oscillator coil—49 meter band (L13 for Q122X, Q122Xa)
*70927	Coil—Antenna coil—"A" band (L9, L10 for Q122, Q122a; L7, L8 for Q122X, Q122Xa)
*70789	Coil—Oscillator coil—"A" band (L15 for Q122, Q122a; L14 for Q122X, Q122Xa)
*70926	Coil—Antenna coil—"B" band (L7, L8 for Q122, Q122a)
*70829	Coil—Oscillator coil—"B" band (L14 for Q122, Q122a)
*70929	Coil—Antenna coil—"X" band (L9, L10 for Q122X, Q122Xa)
*70922	Coil—Oscillator coil—"X" band (L15 for Q122X, Q122Xa)
*70727	Condenser—Variable tuning condenser (C1, C2, C12, C25)
*70828	Control—Tone control and radio-phono switch (R13, S6)
*70826	Control—Volume control and power switch (R11, S5)
32634	Cord—Drive cord (approx. 29" overall length)
34662	Cord—Indicator drive cord (approx. 54" overall length)
*70831	Core—Adjustable core and stud for I-F transformers
*70940	Core—Adjustable core and stud for Models Q122, Q122a, 13 meter band oscillator coil
*70937	Core—Adjustable core and stud for 19 meter band oscillator coil
*70939	Core—Adjustable core and stud for "A" band oscillator coil
*70943	Coil—Adjustable core and stud for 19 meter band and "A" band antenna coils
*70945	Core—Adjustable core and stud for Models Q122X, Q122Xa, "X" band antenna coil
*70942	Core—Adjustable core and stud for Models Q122X, Q122Xa, "X" and oscillator coil
*70938	Core—Adjustable core and stud for 31 meter band oscillator coil and for Models Q122, Q122a, "B" band oscillator coil
*70944	Core—Adjustable core and stud for 31 meter band antenna coil; for Models Q122, Q122a, "B" band antenna coil and for Models Q122X, Q122Xa, 49 meter band antenna coil
*70941	Core—Adjustable core and stud, for Models Q122X, Q122Xa, 49 meter band and for Models Q122, Q122a, 13 meter band antenna coil
35827	Drum—Drive drum
70429	Grommet—Rubber grommet to mount tube socket (2 req'd)
*70930	Grommet—Rubber grommet to mount tuning condenser (4 req'd)
35638	Flywheel—Tuning shaft flywheel
5040	Plug—4 contact female plug for speaker cable (Q122, Q122X)
12493	Plug—5 contact female plug for speaker cable (Q122a, Q122Xa)
35630	Pulley—Drive cord idler pulley—located between range switch and tuning shaft
35641	Pulley—Drive cord pulley
30732	Resistor—47 ohms, ½ watt (R3)
*90381	Resistor—560 ohms, 1 watt (R19)
72218	Resistor—5600 ohms, 4 watt (R30) (Q122a, Q122Xa)
3078	Resistor—10,000 ohms, ½ watt (R17)
36714	Resistor—15,000 ohms, ½ watt (R1)
39158	Resistor—18,000 ohms, 2 watt (R5)
30492	Resistor—22,000 ohms, ½ watt (R4, R8, R10)
30180	Resistor—120,000 ohms, ½ watt (R6)
30651	Resistor—270,000 ohms, ½ watt (R9, R15)
30648	Resistor—470,000 ohms, ½ watt (R2, R14, R16, R18)
30649	Resistor—2.2 megohms, ½ watt (R7)
30992	Resistor—10 megohms, ½ watt (R12, R20)
14350	Screw—#8-32 square head set screw for drive drum
*70832	Shaft—Tuning knob shaft
31364	Socket—Lamp socket
35787	Socket—Phono input socket
*70827	Socket—Tube socket
36500	Socket—Tube socket, miniature
31319	Socket—Tube socket with mounting plate
31418	Spring—Indicator cord or drive cord spring
35622	Support—Flywheel support bracket
*70732	Switch—Range switch (S1, S2, S3)
32827	Switch—Voltage change switch (S4)
*70917	Transformer—First I-F transformer (T2, L16, L17, C14, C15)
*70918	Transformer—Second I-F transformer (T3, L18, L19, C26, C27, C28, C29)
35588	Transformer—Power transformer, 117 volts, 25 cycles (T1)
32852	Transformer—Power transformer, 117 volts 60 cycles (T1)
32852	Transformer—Power transformer, 117/235 volts, 60 cycles (T1)
33726	Washer—"C" washer for tuning shaft and idler pulley
	SPEAKER ASSEMBLY 92517-1J RC 601, RC 601A
70578	Cone—Cone and voice coil assembly
5118	Plug—4 prong male speaker plug
70583	Speaker—6½" EM speaker complete with cone and voice coil less output transformer and plug
70584	Transformer—Output transformer (T4)
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	SPEAKER ASSEMBLY 92570-1J RC 601D, RC 601E
72520	Cone—Cone and voice coil assembly
71580	Plug—5 prong male speaker plug
72425	Speaker—6½" PM speaker complete with cone and voice coil less output transformer and plug
72426	Transformer—Output transformer (T4)
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
*70834	Back—Cabinet back
*70833	Board—Baffle board and grille cloth
Y1351	Cabinet—Plastic cabinet for Q122, Q122X, Q122a, Q122Xa
*71089	Decal—Trade mark decal for Q122, Q122a
*70981	Dial—Glass dial scale for Q122, Q122a
*70982	Dial—Glass dial scale for Q122X, Q122Xa
35647	Frame—Dial back plate complete less indicator and dial
*70839	Grommet—Rubber grommet for chassis mounting
37396	Grommet—Rubber grommet for speaker mounting
70580	Indicator—Station selector indicator
*70837	Knob—Range switch knob for Q122, Q122a
*70838	Knob—Range switch knob for Q122X, Q122Xa
*70835	Knob—Tone control knob
*70836	Knob—Tuning or volume control knob
11891	Lamp—Dial lamp
14270	Spring—Retaining spring for knobs

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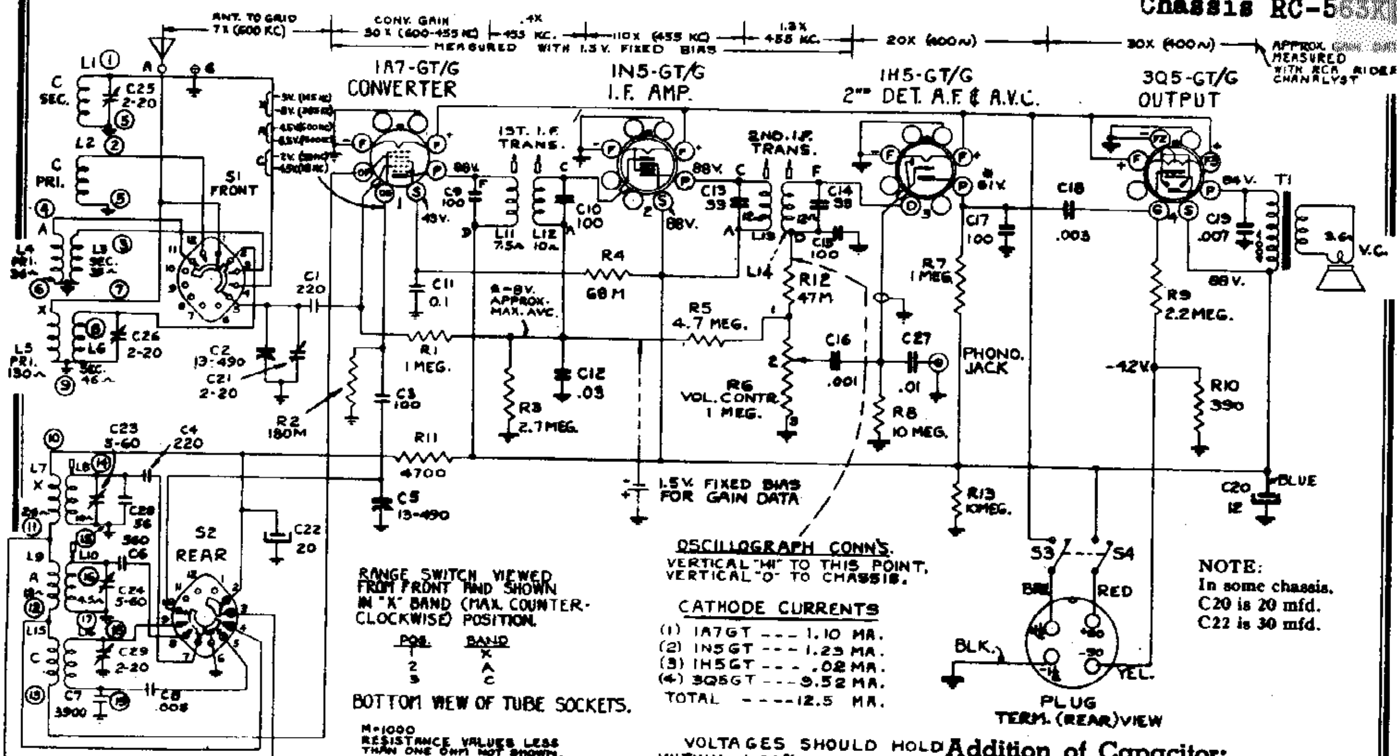
MODEL QB55X, Chassis RC-563K

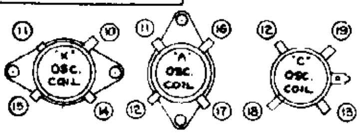


VOLTAGES SHOULD HOLD WITHIN ± 20% WITH RATED BATTERY SUPPLY.

*MEASURED WITH CHANALYST OR VOLTOHMYST

Addition of Capacitor:

A capacitor (.05 mfd. C30) has been added between terminal #6 of S2 rear and chassis. The bus wire which connected terminal #6 of S2 to chassis is omitted. This prevents momentary grounding of +B when the range switch is turned.



Cathode Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid AVC action.

Calibration Scale:

Alignment calibration check points are indicated on the "Dial Cord Assembly and Alignment Check Points" drawing.

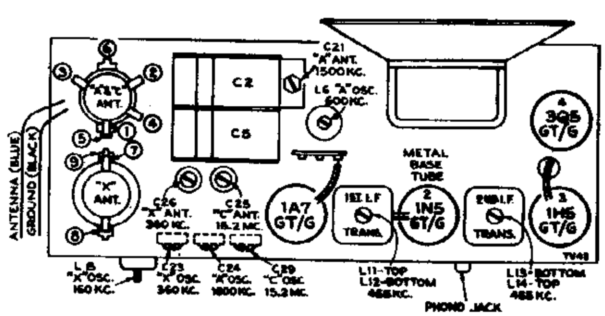
Before alignment, with the tuning condenser at maximum capacity (fully meshed) set the dial pointer 1⅜ in (4.8mm) from the left hand edge of the dial back plate as indicated on the drawing.

Steps	Connect high side of test osc. to.—	Tune test osc. to.—	Turn Radio dial to.—	Adjust following for max. peak output.—
1	1N5GT I.F. grid cap in series with .01 mfd.	455 kc.	"A" Band Quiet point at low freq. end.	L14 and L13 2nd I.F. trans.
2	1A7GT 1st det. grid cap in series with .01 mfd.†	455 kc.	"A" Band Quiet point at low freq. end.	L12 and L11 1st I.F. trans.†
3	Ant. lead in series with 200 mmfd.	1500 kc.	1500 kc. mark	Preset L10 (osc.) screw ⅜ in. out. C24 osc. C21 ant.
4	Ant. lead in series with 200 mmfd.	600 kc.	600 kc. mark	L10**
5	Ant. lead in series with 200 mmfd.	Repeat Steps 3 and 4		
6	Ant. lead in series with 200 mmfd.	360 kc.	360 kc. mark	Preset L8 (osc.) screw ⅜ in. out. C23 osc. C26 ant.
7	Ant. lead in series with 200 mmfd.	160 kc.	160 kc. mark	L8**
8	Ant. lead in series with 200 mmfd.	Repeat Steps 6 and 7		
9	Ant. lead in series with 300 ohms.	15.2 mc.	15.2 mc. mark	C29 osc.* C25 ant.**

*Use minimum capacity peak if two peaks can be obtained.

**Rock gang slightly for peak output.

†Do not readjust L14 or L13 when test oscillator is applied to 1A7-GT/G grid.



Critical Lead Dress:

1. All leads from the antenna coils (on top of chassis) to range switch should be dressed away from the coil windings.
2. The black lead from L1—terminal #1 to S1-#4 should be dressed around rear of range switch away from chassis base.
3. Condenser C1 on top of chassis should be dressed away from chassis base.
4. The green leads connecting the gang to the range switch should be dressed away from all other leads and away from chassis base.
5. The oscillator grid coupling condenser (C3) should be dressed perpendicular to the chassis base.
6. Dress all parts and leads away from terminal "D" of the 2nd. IF transformer.
7. All B+ (red) leads should be dressed close to chassis base.

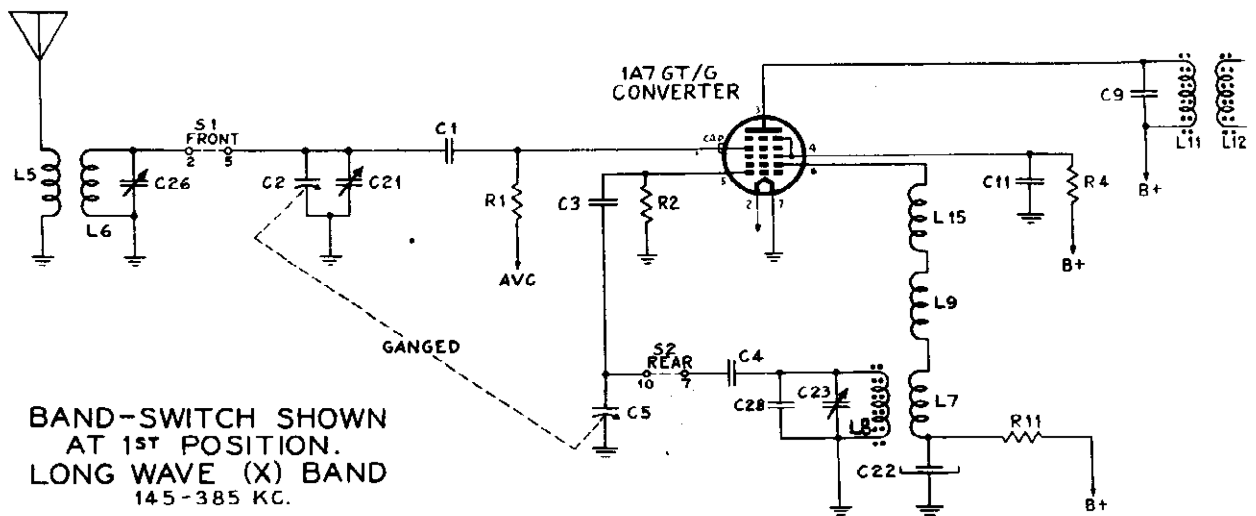
Phonograph Attachment

A jack is provided on the rear of chassis for connecting a Phonograph Attachment to the audio amplifying circuit. The cable from the attachment should be terminated in a Stock No. 31048 plug.

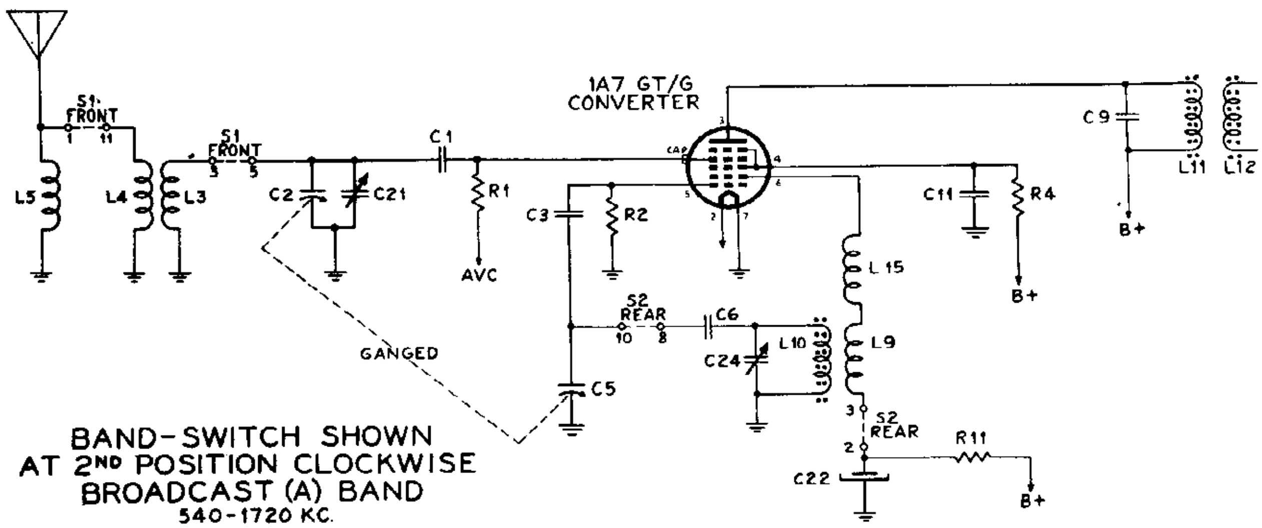
When Phonograph is not in use its plug should be disconnected.

When Phonograph is in use, the volume control on the radio should be at minimum, and, if necessary, tune set off frequency from any very strong station.

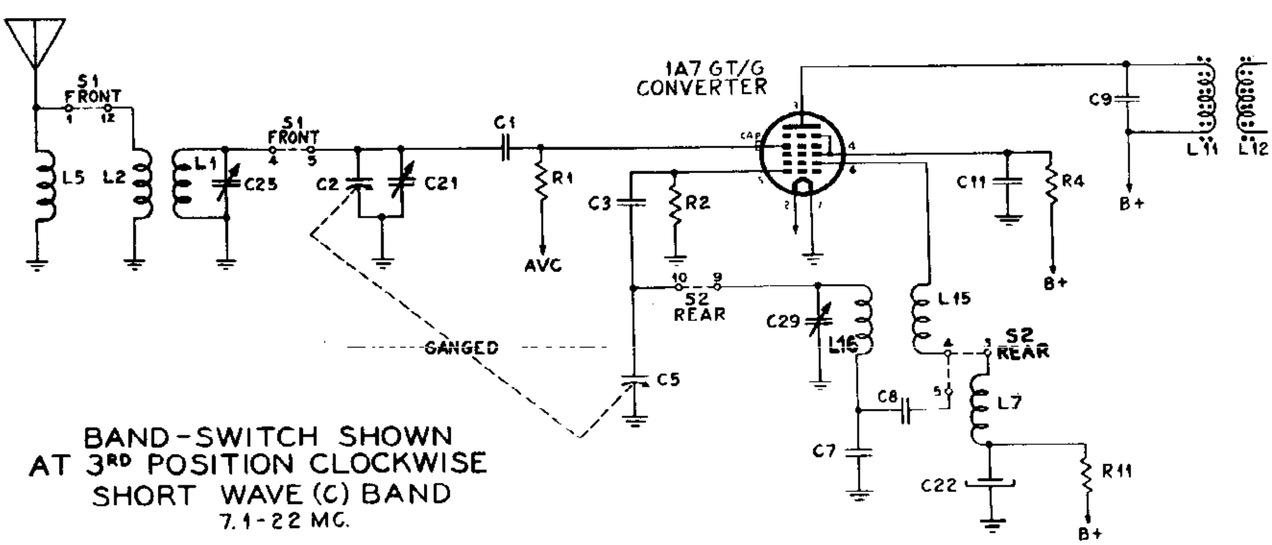
"clarified schematics"



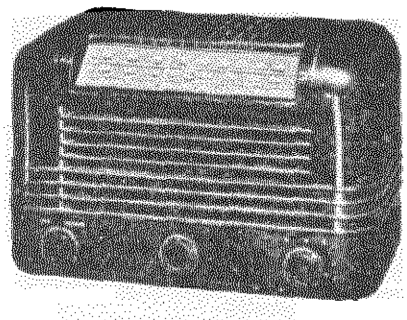
BAND-SWITCH SHOWN
AT 1ST POSITION.
LONG WAVE (X) BAND
145-385 KC.

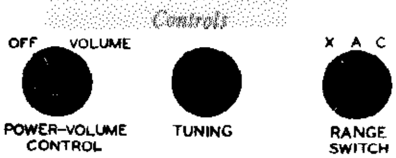


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
BROADCAST (A) BAND
540-1720 KC.



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
SHORT WAVE (C) BAND
7.1-22 MC.





Specifications

Frequency Ranges
Long Wave ("X" Band)........................145-385 kc (2069-779m)
Standard Broadcast ("A" Band)...............540-1,720 kc (555-174m)
Short Wave ("C" Band)............... 5.8-18 mc. (51.7-16.6 meters).

Intermediate Frequency..455 kc

Batteries Required
1—RCA-VSO22 Battery Pack or equivalent
Or: 1—1½ Volt "A" Battery and 2—45 Volt "B" Batteries

A four wire cable with plug is provided for making connection to the RCA-VSO22 battery pack or equivalent. When separate batteries are used, an adapter extension cable is necessary.

Battery Drain
"A"..0.25 amp.
"B"..12.5 ma.

Power Output
Undistorted..0.20 watt
Maximum..0.26 watt

Loudspeaker (92510-1)
Type...............................5-inch permanent-magnet dynamic
Voice-coil impedance..............................4 ohms at 400 cycles

Cabinet Dimensions (inches)
Height...7¾ inches
Width..12⅛ inches
Depth..6¾ inches

QB55X (RC-563K)

Capacitor Substitutions:

In some chassis the electrolytic capacitor differs from that described in the service note: The 12 mfd. section (C20 BLUE) may be 20 mfd. and the 20 mfd. section (C22 RED) may be 30 mfd. The color coding is the same as that of the specified part (Stock No. 32548).

In some chassis C12 (.025 mfd.) is .03 mfd. and C18 (.0025 mfd.) is .003 mfd.

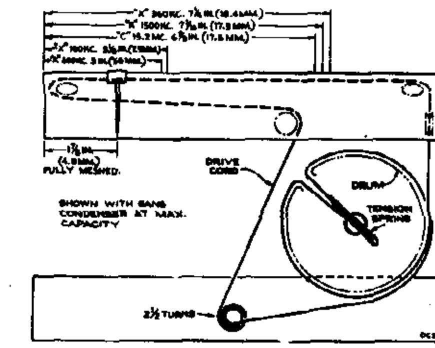
Change in Parts List:

CHASSIS ASSEMBLIES

Delete:

37588 Core—Adjustable core and stud for oscillator coil.

12007 Spring—Oscillator coil core and stud retaining spring.



Dial Cord Assembly and Alignment Check Points

NOTE:

Model CV-112X Electrifier (RS-111A) may be employed to operate this instrument from 117 or 234 volt 50-60 cycle power supply. For this type of operation the receiver power cable plug is inserted in the socket provided on the Electrifier. Refer to RCA Model QB5 or Supplementary Information No. 11 for complete information on CV-112X Electrifier.

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-563K
32830	Capacitor—Mica trimmer, dual 2-20 mmf. (C25, C26)
33788	Capacitor—Mica trimmer, comprising two sections of 5-60 mmf. and 1 section of 2-20 mmf. (C23, C24, C29)
39622	Capacitor—Mica, 56 mmf. (C28)
*72810	Capacitor—Mica, 100 mmf. (C3, C15, C17)
39636	Capacitor—Mica, 220 mmf. (C1)
71014	Capacitor—Mica, 220 mmf. (C4)
*72841	Capacitor—Mica, 560 mmf. (C6)
72637	Capacitor—Mica, 3900 mmf. (C7)
70600	Capacitor—Tubular, .001 mfd., 400 volts (C16)
70603	Capacitor—Tubular, .003 mfd., 400 volts (C18)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C8)
70608	Capacitor—Tubular, .007 mfd., 400 volts (C19)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C27)
70613	Capacitor—Tubular, .03 mfd., 400 volts (C12)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C11)
32548	Capacitor—Electrolytic, comprising 1 section of 12 mfd., 150 volts and 1 section of 20 mfd., 150 volts (C20, C22)
32706	Coil—Antenna coil, "A" and "C" band (L1, L2, L3, L4)
32823	Coil—Antenna coil, "X" band (L5, L6)
33786	Coil—Oscillator coil, "X" band (L7, L8)
32148	Coil—Oscillator coil, "A" band (L9, L10)
33787	Coil—Oscillator coil, "C" band (L15, L16)
38287	Condenser—Variable tuning condenser (C2, C5, C21)
38406	Control—Volume control and power switch (R6, S3, S4)
32634	Cord—Drive cord (approx. 49" overall length)
	NOTE: Before assembling, stretch to full length.
35788	Core—Adjustable core and stud for oscillator coil
36237	Drum—Drive drum
70429	Grommet—Rubber grommet for mounting tube socket
16058	Grommet—Rubber grommet for mounting tuning condenser (4 required)
37068	Indicator—Station selector indicator
*72656	Plate—Dial back plate complete with four (4) pulleys less dial
30568	Plug—4 prong male plug for battery cable
36230	Pulley—Drive cord pulley
30498	Resistor—390 ohms, ¼ watt (R10)
30494	Resistor—4700 ohms, ¼ watt (R11)

STOCK No.	DESCRIPTION
30787	Resistor—47,000 ohms, ¼ watt (R12)
14138	Resistor—68,000 ohms, ½ watt (R4)
11959	Resistor—180,000 ohms, ½ watt (R2)
30652	Resistor—1 megohm, ¼ watt (R1, R7)
30649	Resistor—2.2 megohms, ¼ watt (R9)
72788	Resistor—2.7 megohms, ¼ watt (R3)
30931	Resistor—4.7 megohms, ¼ watt (R5)
30992	Resistor—10 megohms, ¼ watt (R8, R13)
36897	Shaft—Tuning knob shaft
70377	Shield—Shield for 1N5GT tube
33742	Socket—Phono input socket
31251	Socket—Tube socket, wafer
31319	Socket—Tube socket, cushion mounted
31418	Spring—Drive cord tension spring
12007	Spring—Oscillator coil's core and stud retaining spring
*72657	Switch—Range switch (S1, S2)
35636	Transformer—First I.F. transformer (L11, L12, C9, C10)
36122	Transformer—Second I.F. transformer (L13, L14, C13, C14)
38300	Transformer—Output transformer (T1)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES 92510-1
70413	Speaker—5" P.M. speaker complete with cone and voice coil
	NOTE: If stamping on speaker does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS ASSEMBLIES
Y947	Cabinet—Brown plastic cabinet
36890	Clamp—Dial clamp, left hand
36891	Clamp—Dial clamp, right hand
36103	Decal—Power switch decal
*72659	Decal—Range switch decal
*72658	Dial—Glass dial scale
36886	Knob—Range switch or volume control knob
36722	Knob—Tuning knob
30900	Spring—Retaining spring for knobs

MODEL QU62,
Chassis RC602B

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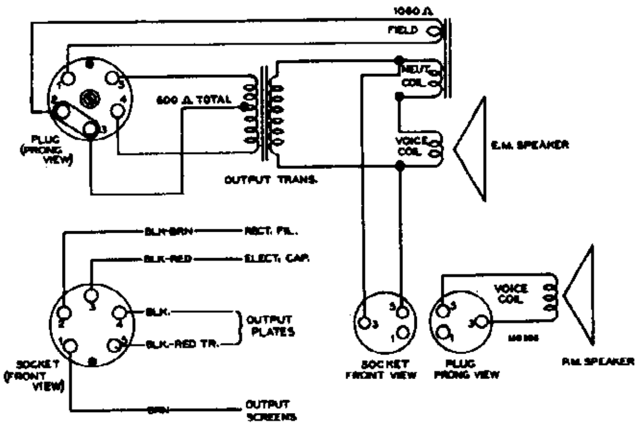
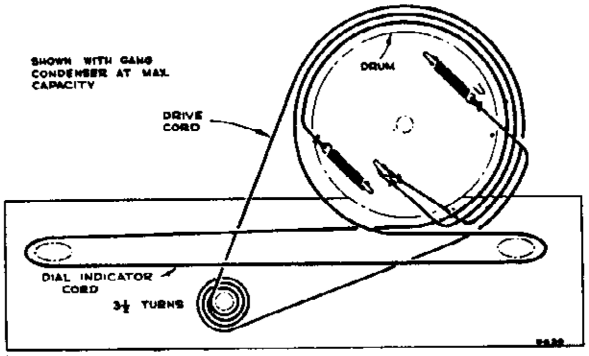


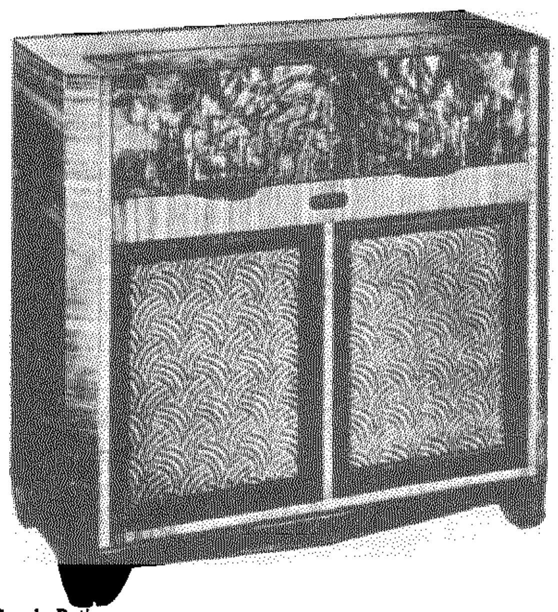
Loudspeaker Connections



Dial-Indicator and Drive Mechanism

Critical Lead Dress

1. Dress C47 and R16 against chassis.
2. Dress R23 against chassis.
3. Dress C48 on power transformer side of terminal board.
4. All resistor and capacitor leads should be as short as practical.
5. Twist electrolytic capacitor leads and dress between chassis and electrolytic capacitor.
6. Twist all A.C. leads and keep close to chassis and away from other component parts and wires.
7. Dress blue treble tone control (R18) lead along intersection of chassis and rear apron and under electrolytic capacitor.
8. Keep tuning indicator and pilot lamp leads away from 6SQ7 tube.
9. Dress C35 against RF plate assembly.
10. Dress C25 and R7 and C24 midway between range switch and RF coil.
11. Keep coil leads to switch and trimmers with minimum slack but not stretched tight.
12. Flexibility of RF plate assembly must be maintained.
13. Dress black lead from phono-radio switch to range switch close to chassis.
14. Dress C13A away from RF shield.
15. Dress C34 against RF plate assembly.
16. Keep all gang leads as short as practical.
17. A loop must be maintained in ground braid connecting RF plate assembly to chassis.
18. Dress blue lead to antenna terminal against RF shield.



Specifications

Frequency Range

Standard Broadcast ("A" Band)................540-1600 kc (556-187 m)
Medium Wave ("B" Band)....................2.45-6.3 mc (122-47.7 m)
"31-25 Meter" Spread Band.....................9.5-12 mc (31.6-25 m)
"19-16 Meter" Spread Band....................15.1-18 mc (19.8-16.6 m)
"13-11 Meter" Spread Band....................21.4-27 mc (14-11.1m)

Intermediate Frequency..455 kc

Loudspeakers (2)

Type 92569-4 (RL103-4)..................................12 in. PM
Type 92566-3 (RL70N1)..................................12 in. EM
V-C Impedance (400 c.p.s.)..............................2.2 ohms

Power Output Rating

Undistorted..10 watts
Maximum..12 watts

Tuning Drive Ratio......................................22:1

	Height	Width	Depth
Cabinet Dimensions (Inches)..........	36	38¼	17
Overall Chassis Dimensions............	7¼	15¾	9⅝

Power Supply Ratings

Symbol	Voltages	Frequency (cycles)	Watts
Rating D	(See below)	60†	150

110 position—100 min.—115 max.
125 position—115 min.—135 max.
150 position—135 min.—165 max.
210 position—190 min.—230 max.
240 position—220 min.—260 max.

Note: Shipped in 240-volt position. To change, remove round cover on top of transformer case and move link to required position.

CAUTION: Remove power cord from line receptacle before changing link position.

†This instrument may be operated from 50 cycle power supply if the record changer is modified—refer to 960001 Service Data.

Record Changer..Type 960001-4
Capacity............................ten 12 in. or twelve 10 in. records

Lamps

Dial lamps..............................2 Type 51, 6.3 volts 0.20 amp.
Vol. Cont. lamp...........................1 Type 47, 6.3 volts 0.15 amp.
Band Indicator lamp......................1 Type 55, 6.3 volts 0.40 amp.
Rec. Changer Comp. lamp..................1 Type 55, 6.3 volts 0.40 amp.

RECORD CHANGER: RCA Model 960001-4. Similar to

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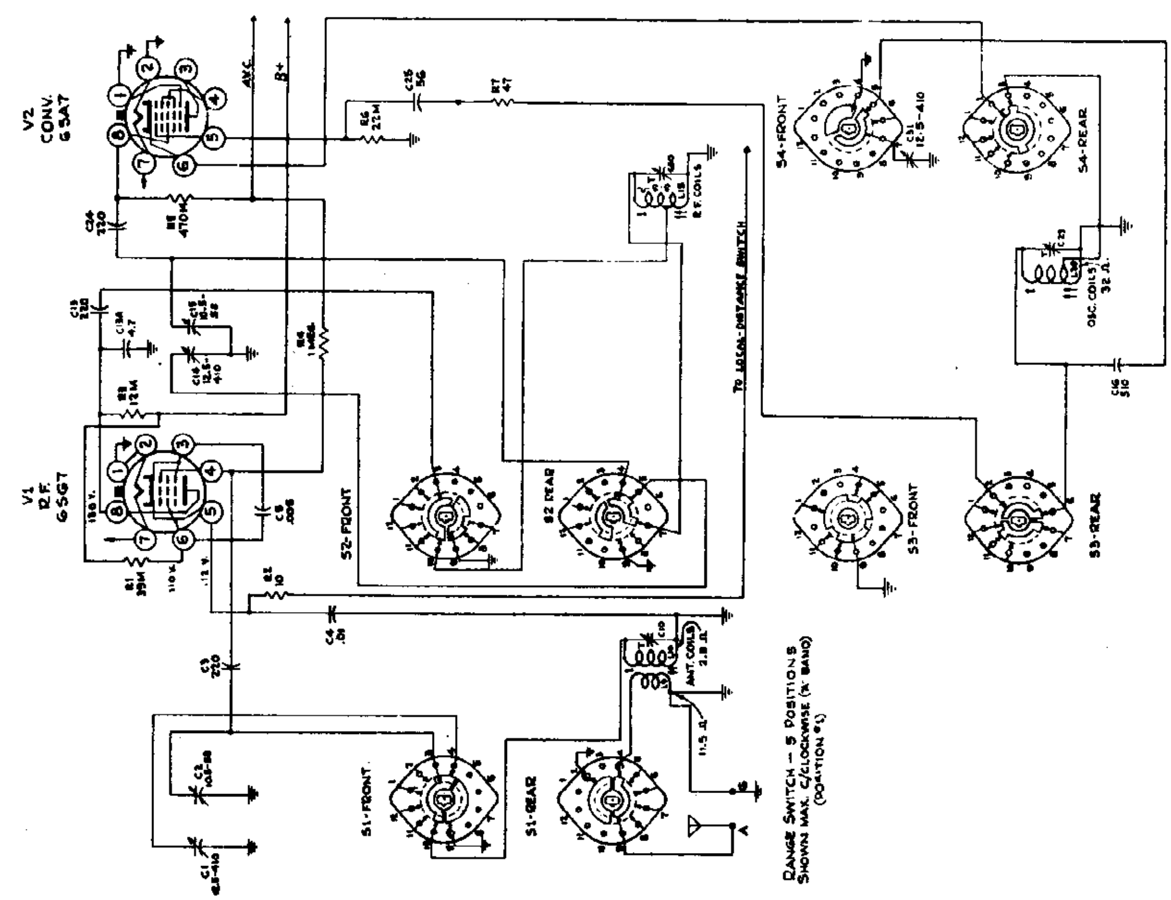
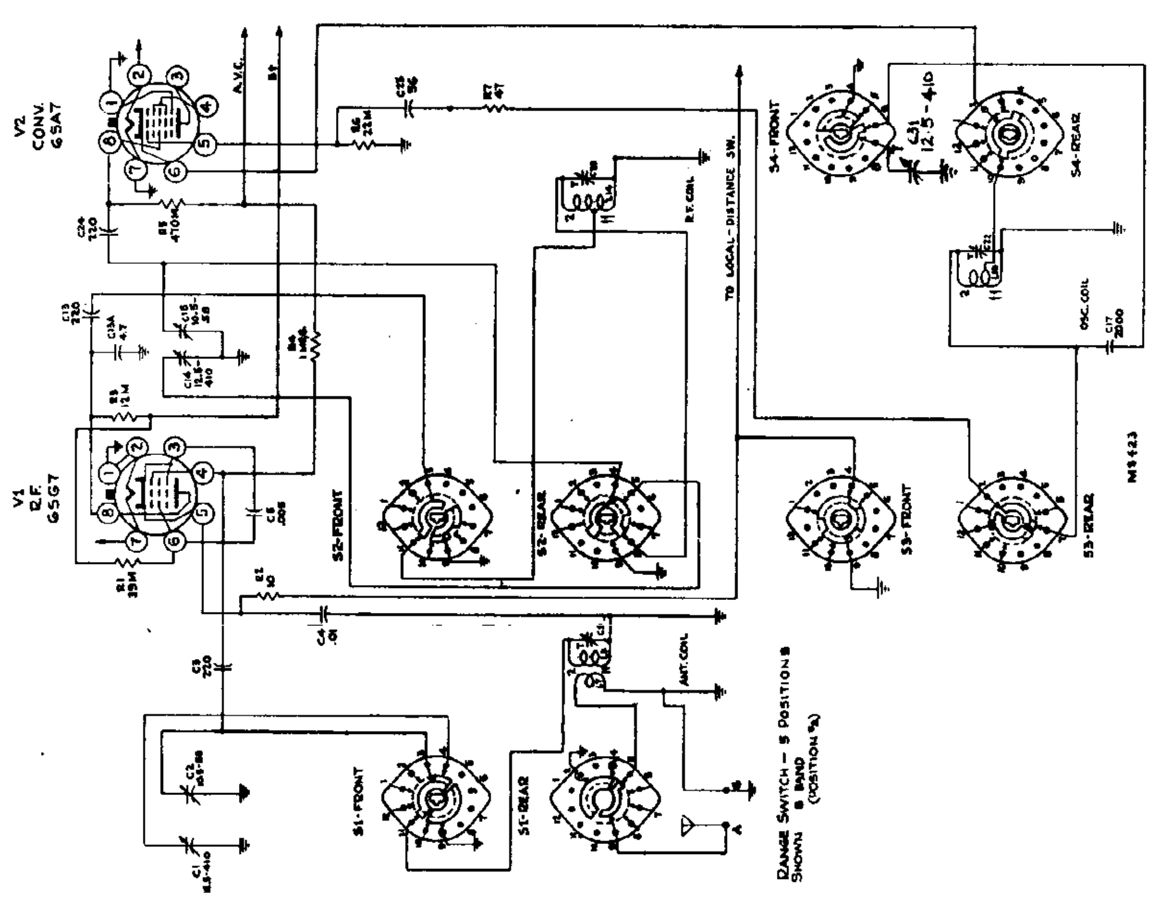
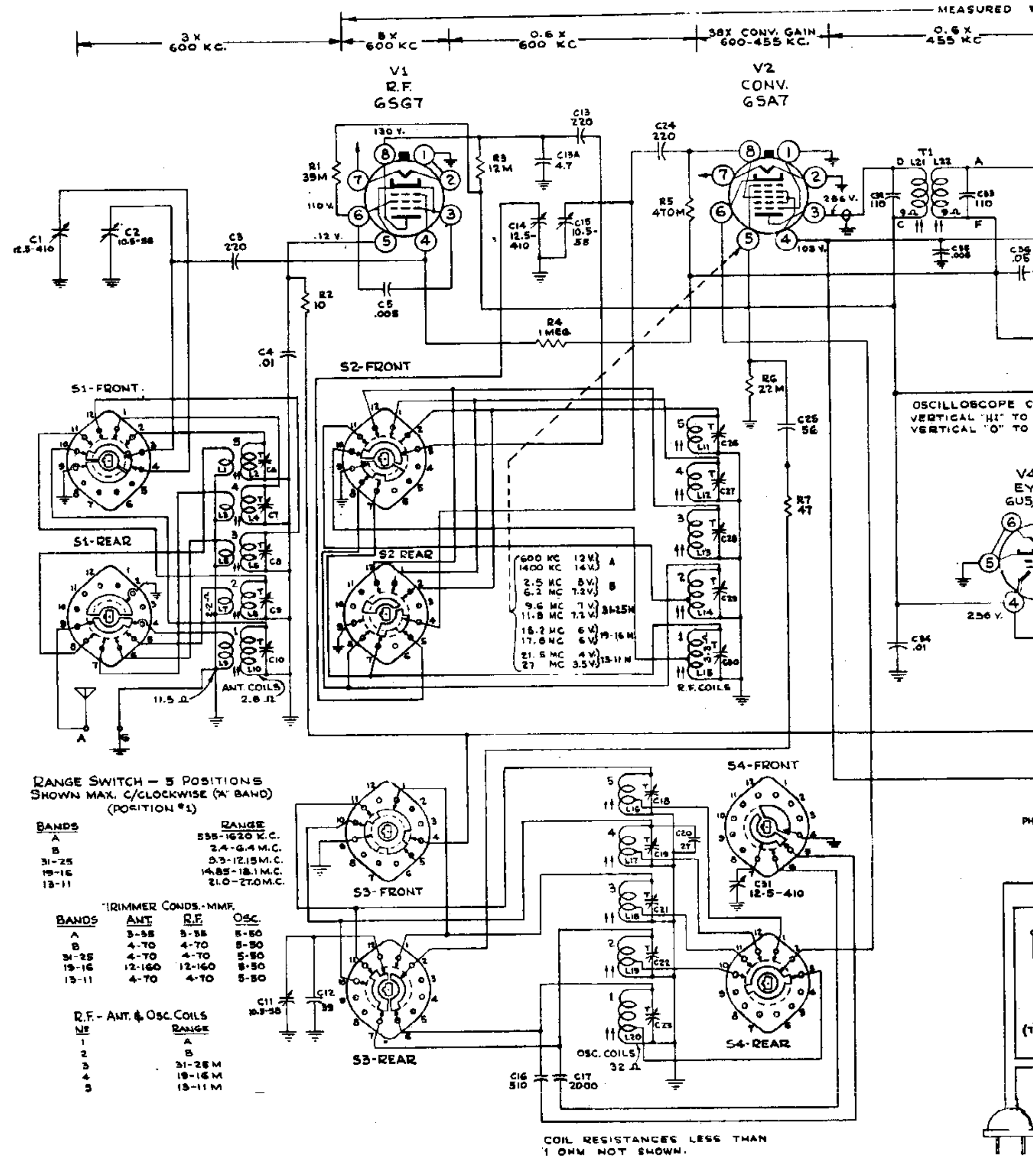


R.F. Section

NOTE: Circuits not in use are either disconnected or grounded thru the range



R. F. Section



RANGE SWITCH — 5 POSITIONS
SHOWN MAX. C/CLOCKWISE ("A" BAND)
(POSITION #1)

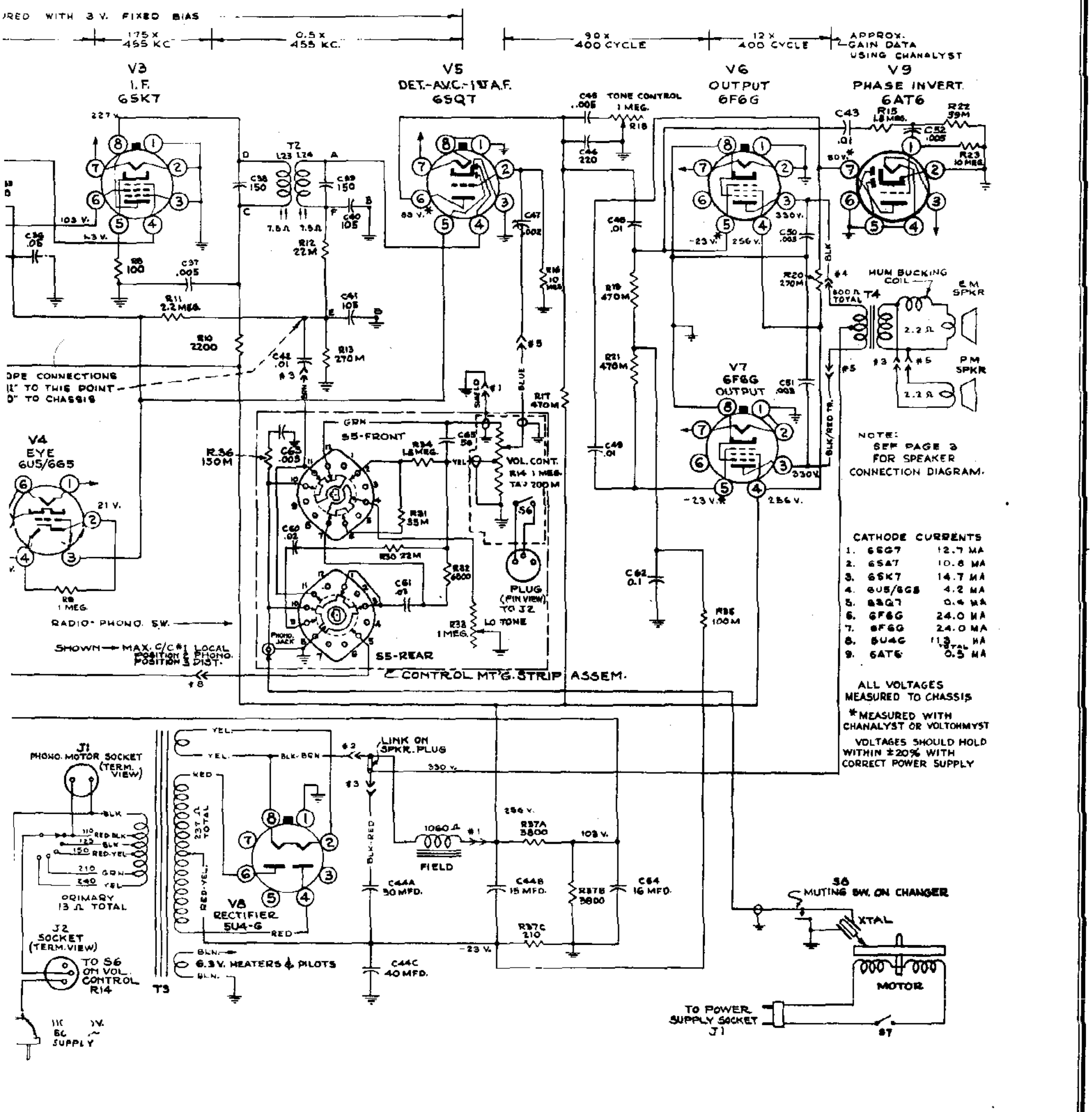
BANDS	RANGE
A	535-1620 K.C.
B	2.4-6.4 M.C.
31-25	9.5-12.15 M.C.
19-16	14.85-18.1 M.C.
13-11	21.0-27.0 M.C.

TRIMMER CONDS.-MMF.

BANDS	ANT.	R.F.	OSC.
A	3-35	3-35	5-50
B	4-70	4-70	5-50
31-25	4-70	4-70	5-50
19-16	12-160	12-160	5-50
13-11	4-70	4-70	5-50

R.F. - ANT. & OSC. COILS

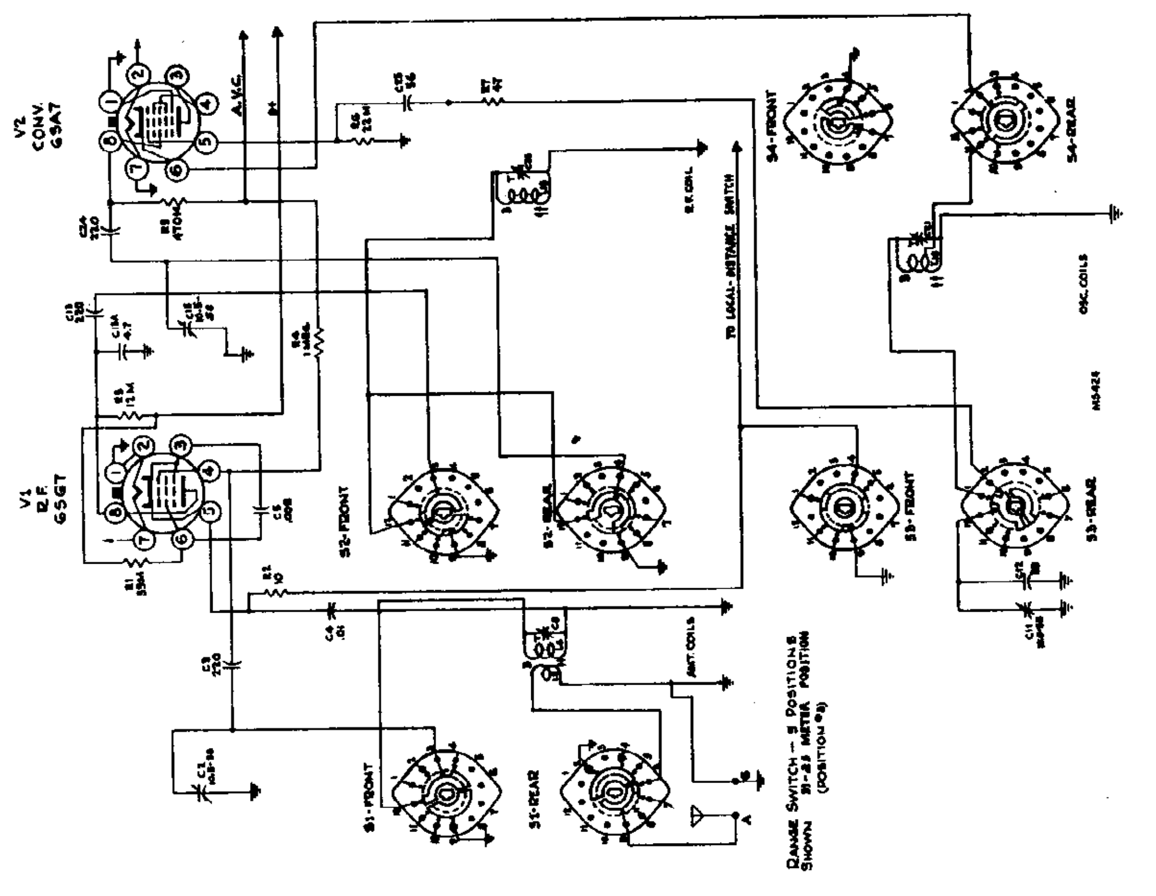
№	RANGE
1	A
2	B
3	31-25 M
4	19-16 M
5	13-11 M



RED WITH 3 V. FIXED BIAS
175 X 455 KC
0.5 X 455 KC.
90 X 400 CYCLE
12 X 400 CYCLE
APPROX. GAIN DATA USING CHANALYST
V3 I.F. 6SK7
V5 DET.-A.V.C.-1ST A.F. 6SQ7
V6 OUTPUT 6F6G
V9 PHASE INVERT. 6AT6
V7 6F6G OUTPUT
V4 EYE 6U5/6G5
V8 RECTIFIER 5U4-G
T2
T3
T4
TONE CONTROL 1 MEG. R18
S5-FRONT
S5-REAR
VOL. CONT. R14 1 MEG. TAP 200 M
PLUG (PIN VIEW) TO J2
LO TONE
CONTROL MT'G. STRIP ASSEM.
RADIO-PHONO. SW.
SHOWN → MAX. C/C #1 LOCAL, POSITION 2 PHONO, POSITION 3 DIST.
HUM BUCKING COIL
E.M. SPKR
P.M. SPKR
NOTE: SEE PAGE 3 FOR SPEAKER CONNECTION DIAGRAM.
CATHODE CURRENTS
1. 6SG7 12.7 MA
2. 6SA7 10.6 MA
3. 6SK7 14.7 MA
4. 6U5/6G5 4.2 MA
5. 6SQ7 0.4 MA
6. 6F6G 24.0 MA
7. 6F6G 24.0 MA
8. 5U4G 113 TOTAL MA
9. 6AT6 0.5 MA
ALL VOLTAGES MEASURED TO CHASSIS
*MEASURED WITH CHANALYST OR VOLTOHMYST
VOLTAGES SHOULD HOLD WITHIN ±20% WITH CORRECT POWER SUPPLY
J1 PHONO. MOTOR SOCKET (TERM. VIEW)
PRIMARY 13 Ω TOTAL
J2 SOCKET (TERM. VIEW)
TO S6 ON VOL. CONTROL R14
LINK ON SPKR. PLUG
FIELD
6.3 V. HEATERS & PILOTS
S8 MUTING SW. ON CHANGER
XTAL
MOTOR
TO POWER SUPPLY SOCKET J1
S7

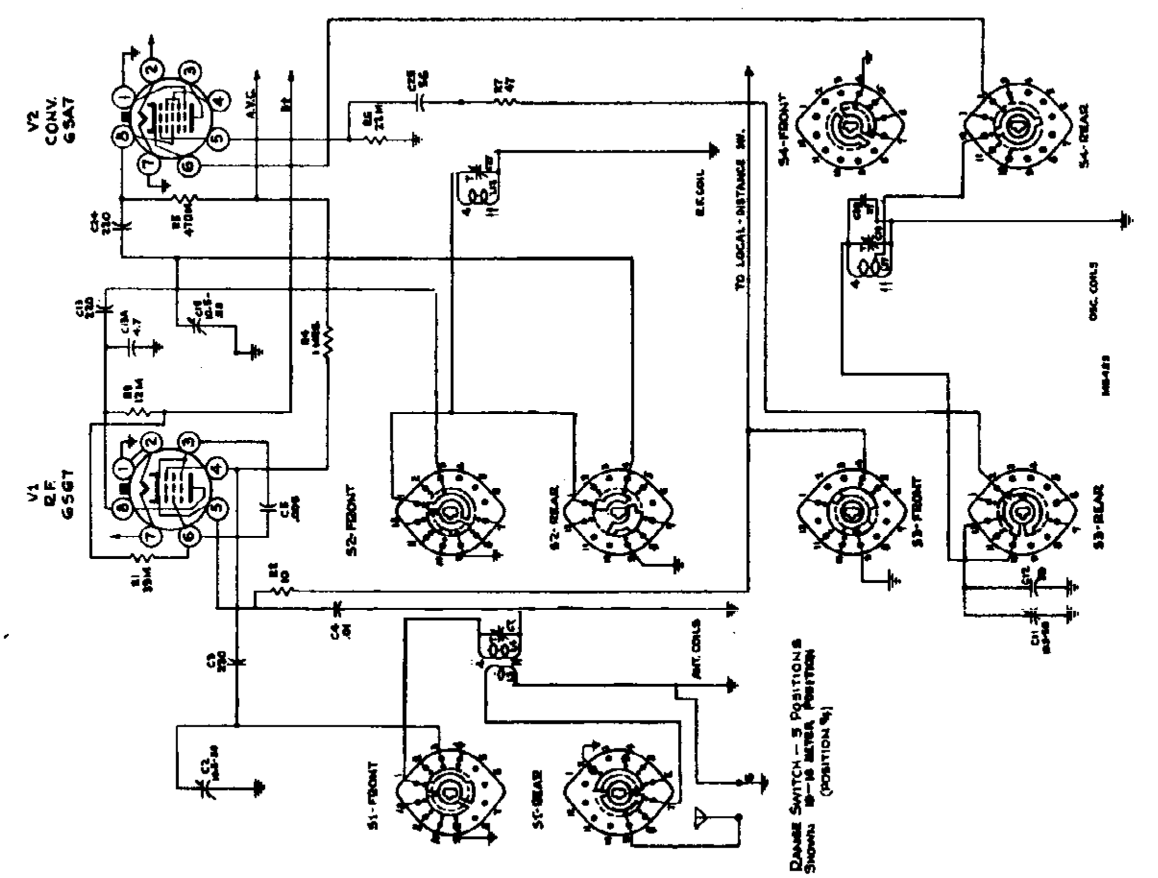
MODEL QU62

RADIO CORP. OF AMERICA



R. F. Section
Simplified Schematic Diagram

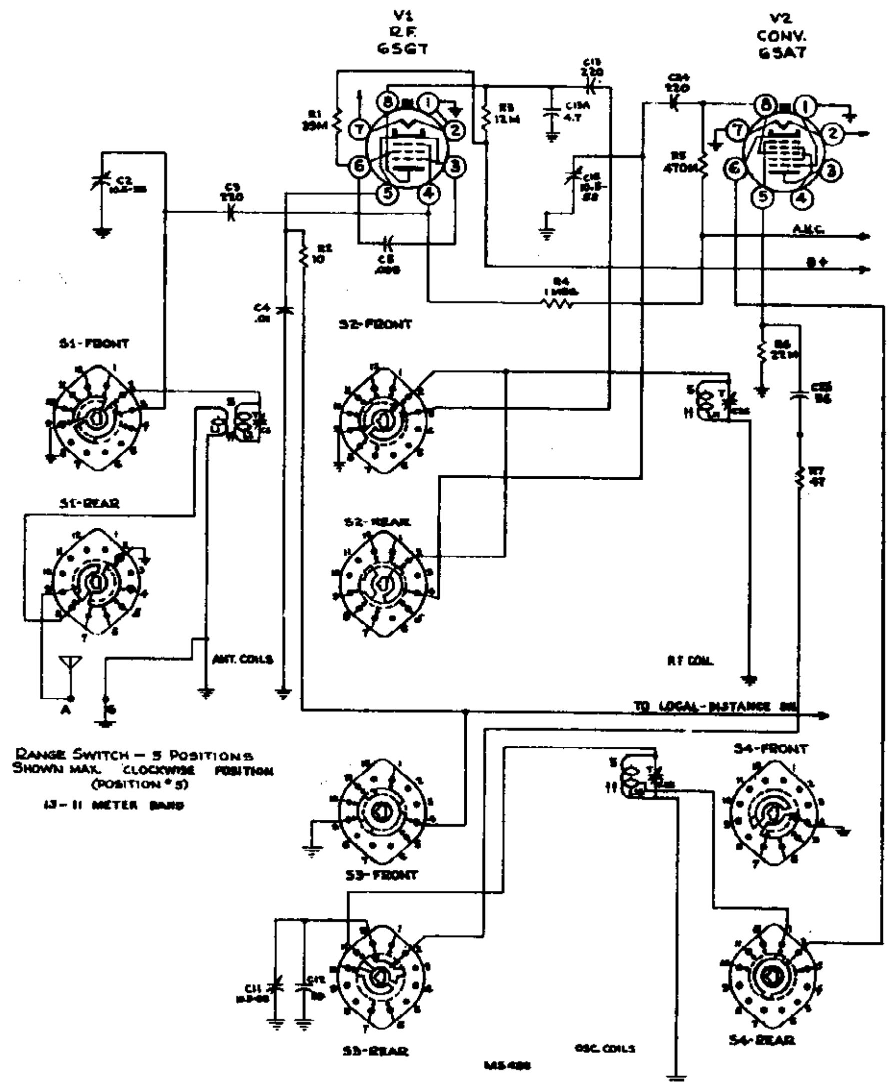
NOTE: Circuits not in use are either disconnected or grounded thru the range switch contacts but are not illustrated.



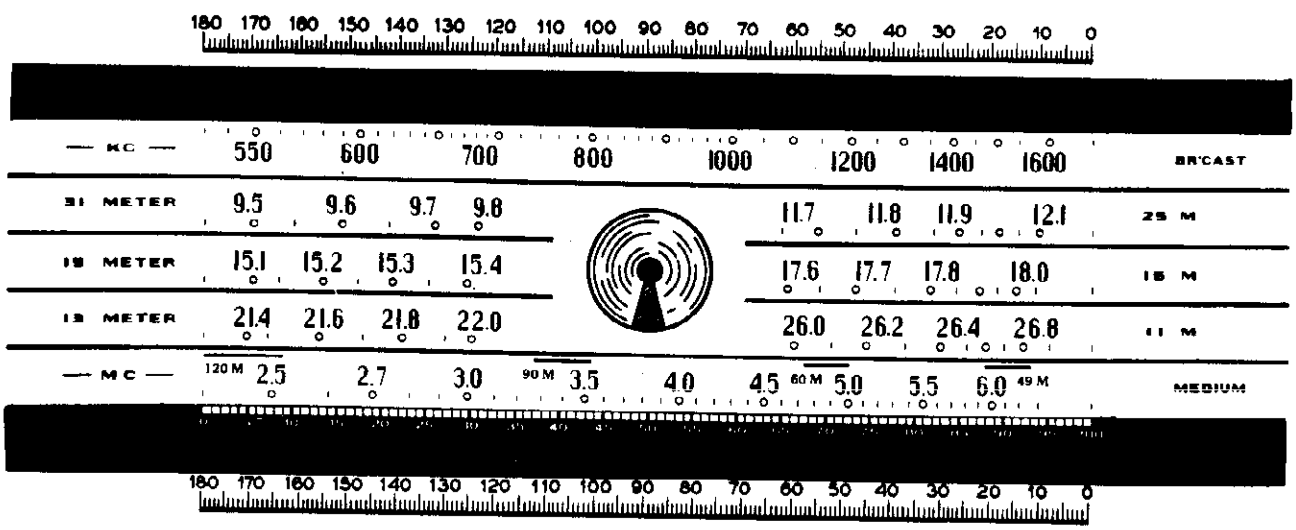
R. F. Section
Simplified Schematic Diagram

RADIO CORP. OF AMERICA

MODEL QU62



R. F. Section
Simplified Schematic Diagram



Reduced Reproduction of Receiver Dial and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on top calibration scale. For example 148° on the calibration scale corresponds to 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

Model QU62

RADIO CORP. OF AMERICA

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the Schematic Circuit Diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the indicator-drive-cord drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "180°" mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the calibration scale drawing which shows the dial with 0-180° calibration scales drawn at top and bottom.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 540 kc mark (the first mark on "A" band to the left of "550"), and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Spread-Band Alignment.—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each spread-band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

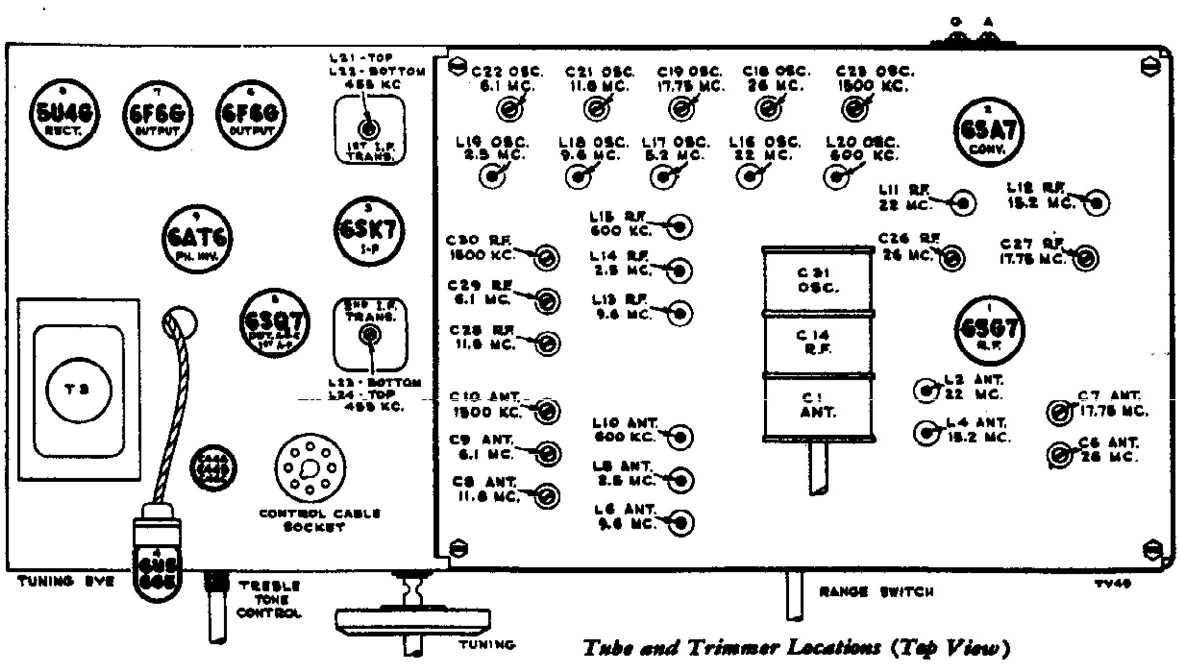
1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings of this range by means of a crystal-controlled oscillator, or by zero-beating against standard broadcast stations.

When a test-oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave stations of known frequency, and the magnetite-core oscillator coil for each band should be retouched so that the stations come in at the correct points on the dial.

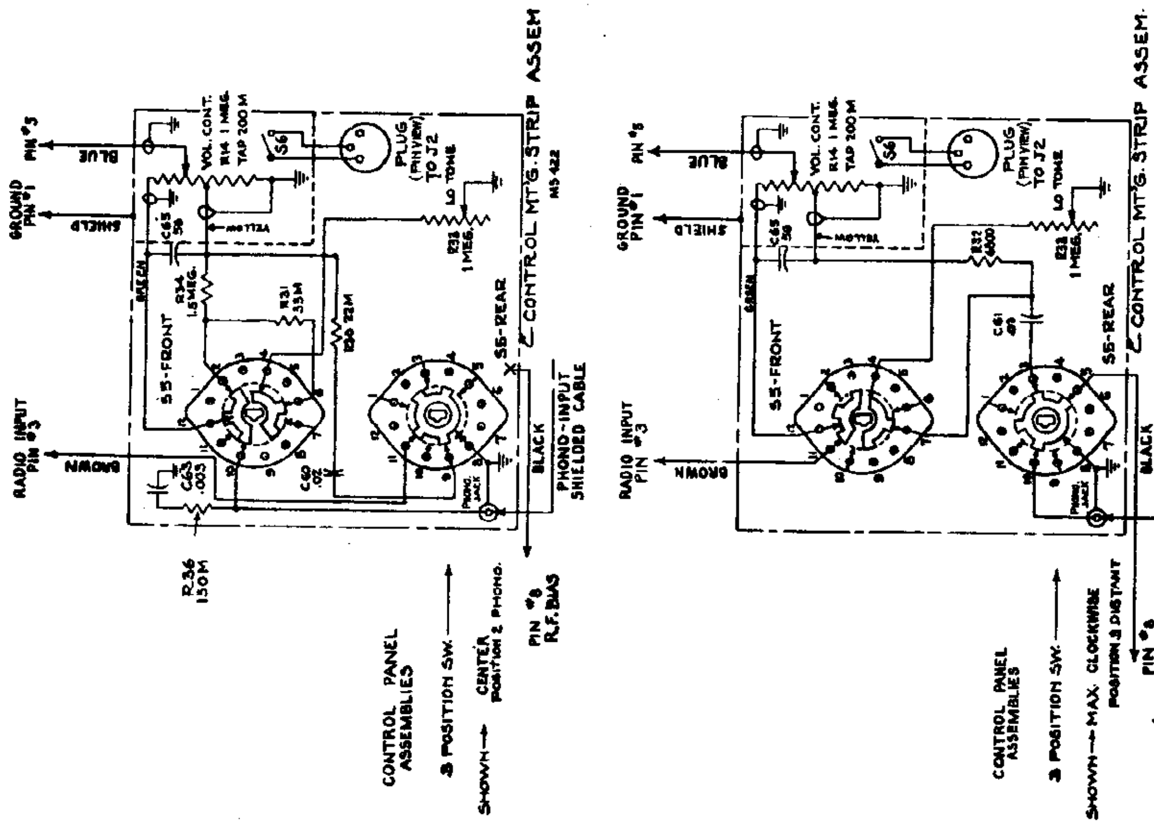
For additional information, refer to booklet "RCA Victor Receiver Alignment."

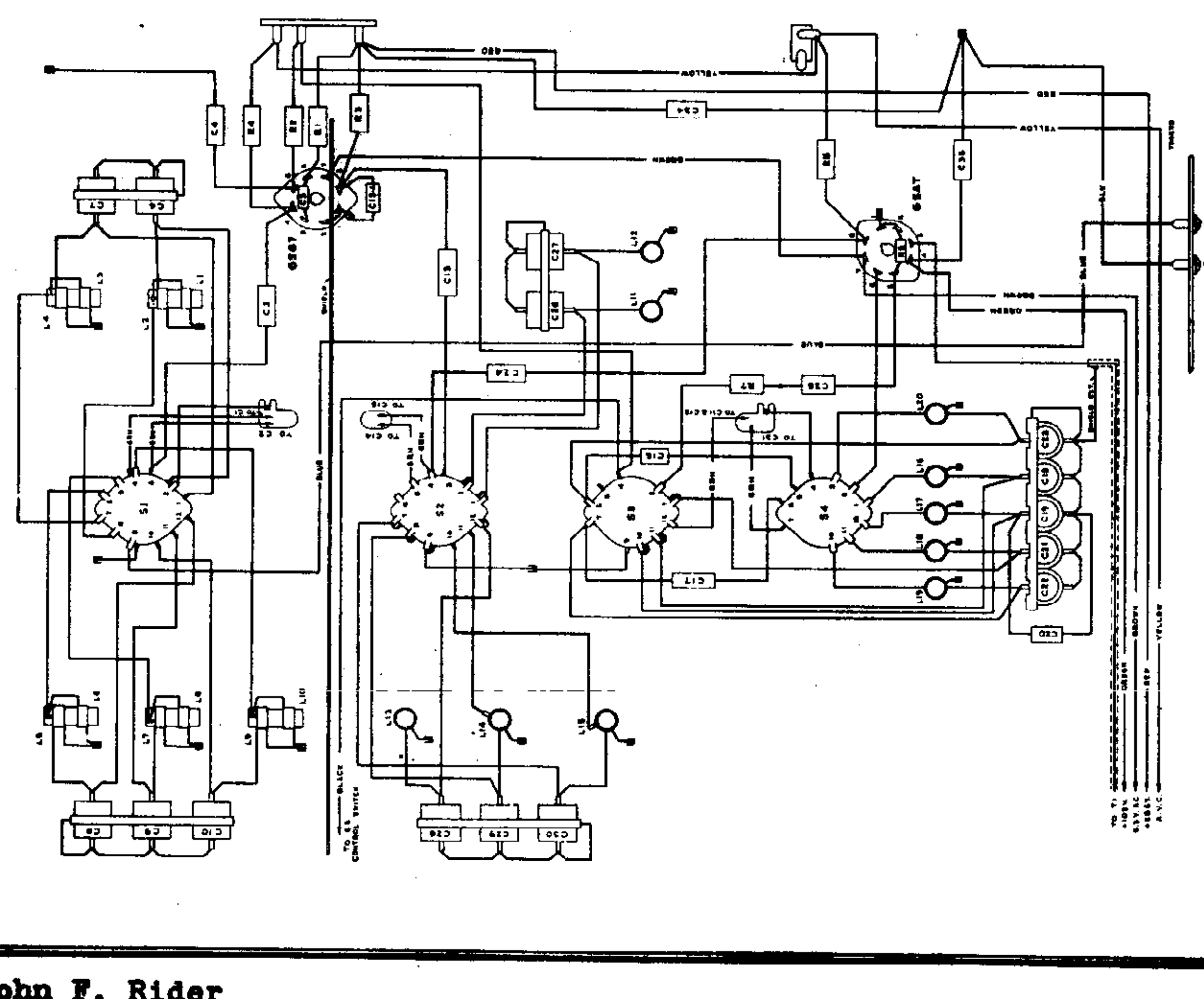
Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn Range Switch to—	Turn radio dial to—	Adjust the following for max. peak output
1	6SG7 I-F grid in series with .01 mfd.	455 kc	"A" Band	Quiet point near 600 kc (148°)	L23, L24 2nd. I-F trans.
2	6SA7 Det. grid in series with .01 mfd.				L21, L22 1st. I-F trans.
3	Antenna terminal in series with 200 mmfd.	1500 kc	"A" Band	1500 kc (19°)	C23 osc. C30 rf. C10 ant.
4		600 kc		600 kc (148°)	L20 osc. L15 rf.† L10 ant.†
5	Repeat Steps 3 and 4				
6	Antenna terminal in series with 300 ohms	6.2 mc	"B" Band	6.2 mc (14°)	C22 osc.* C29 rf. C9 ant.
7		2.6 mc		2.6 mc (152°)	L19 osc.† L14 rf.† L8 ant.†
8	Repeat Steps 6 and 7				
9	Antenna terminal in series with 300 ohms	11.8 mc	"31-25 Meter" Band	11.8 mc (40°)	C21 osc.* C28 rf.** C8 ant.
10		9.5 mc		9.5 mc (170°)	L18 osc.† L13 rf.† L6 ant.†
11		17.75 mc	"19-16 Meter" Band	17.75 mc (40°)	C19 osc.* C27 rf.** C7 ant.
12		15.2 mc		15.2 mc (155°)	L17 osc.† L12 rf.† L4 ant.†
13		26.25 mc	"13-11 Meter" Band	26.25 mc (42°)	C18 osc.* C26 rf.** C6 ant.
14		21.25 mc		21.25 mc (180°)	L16 osc.† L11 rf.† L2 ant.†

Oscillator tracks above signal on all bands.
*Use minimum capacity peak if two peaks can be obtained.
†These adjustments are pre-set and should not require re-adjustment except when components of the tuning section are changed.
**Rock in—use maximum capacity peak if two peaks can be obtained.



Tube and Trimmer Locations (Top View)





R. F. Wiring Diagram (Bottom View)

MODEL QU62

RADIO CORP. OF AMERICA

Replacement Parts

CHASSIS ASSEMBLIES RC-602B

STOCK No.	DESCRIPTION
12930	Board—"Antenna-Ground" terminal board
*72016	Bracket—Bracket (L.H.) complete with one (1) Drive cord pulley
*72015	Bracket—Bracket (R.H.) complete with two (2) Drive cord pulleys
70840	Cable—Bronze cable for band indicator mechanism
71086	Capacitor—Ceramic, 4.7 mmf. (C13A)
70965	Capacitor—Ceramic trimmer, comprising 5 sections of 5-50 mmf. (C18, C19, C21, C22, C23)
70935	Capacitor—Ceramie, 27 mmf. (C20)
70934	Capacitor—Ceramic, 39 mmf. (C12)
71924	Capacitor—Ceramic, 56 mmf. (C25)
39636	Capacitor—Mica, 220 mmf. (C3, C13, C24, C46)
71932	Capacitor—Mica, 510 mmf. (C16)
72526	Capacitor—Mica, 2000 mmf. (C17)
70931	Capacitor—Mica trimmer, comprising 1 section of 3-35 mmf. and 2 sections of 4-70 mmf. (C8, C9, C10, C28, C29, C30)
70745	Capacitor—Mica trimmer, comprising 1 section of 12-160 mmf. and 1 section of 4-70 mmf. (C6, C7)
70754	Capacitor—Mica trimmer, comprising 1 section of 4-70 mmf. and 1 section of 12-160 mmf. (C26, C27)
71592	Capacitor—Moulded, .002 mfd., 200 volts (C47)
71087	Capacitor—Moulded, .003 mfd., 1000 volts (C50, C51)
72221	Capacitor—Moulded, .005 mfd., 200 volts (C52)
71587	Capacitor—Moulded, .005 mfd., 600 volts (C5, C35, C37)
71593	Capacitor—Moulded, .005 mfd., 600 volts (C45)
*72529	Capacitor—Moulded, .01 mfd., 100 volts (C43)
71585	Capacitor—Moulded, .01 mfd., 200 volts (C42)
72219	Capacitor—Moulded, .01 mfd., 600 volts (C4, C34, C48, C49)
*72527	Capacitor—Moulded, .05 mfd., 100 volts (C36)
*72528	Capacitor—Moulded, 0.1 mfd., 100 volts (C62)
*72019	Capacitor—Electrolytic, 16 mfd., 450 volts (C64)
36599	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 450 volts, 1 section of 15 mfd., 350 volts and 1 section of 40 mfd., 25 volts (C44a, C44b, C44c)
70726	Clip—Retaining clip for coils' core and studs
30716	Clip—Tuning tube clip
70923	Coil—Antenna coil, 13-11 meter band (L1, L2)
70924	Coil—Antenna coil, 19-16 meter band (L3, L4)
70925	Coil—Antenna coil, 31-25 meter band (L5, L6)
70926	Coil—Antenna coil, "B" band (L7, L8)
70927	Coil—Antenna coil, "A" band (L9, L10)
70964	Coil—R. F. coil, 13-11 meter band (L11)
70963	Coil—R. F. coil, 19-16 meter band (L12)
70962	Coil—R. F. coil, 31-25 meter band (L13)
70960	Coil—R. F. coil, "B" band (L14)
70959	Coil—R. F. coil, "A" band (L15)
70920	Coil—Oscillator coil, 13-11 meter band (L16)
70823	Coil—Oscillator coil, 19-16 meter band (L17)
70825	Coil—Oscillator coil, 31-25 meter band (L18)
70829	Coil—Oscillator coil, "B" band (L19)
70789	Coil—Oscillator coil, "A" band (L20)
70957	Condenser—Variable tuning condenser (C1, C2, C11, C14, C15, C31)
*72012	Control—H. F. tone control (R18)
*72913	Cord—Drive cord (approx. 30" overall length)
*72913	Cord—Indicator cord (approx. 66" overall length)
70969	Core—Adjustable core and stud for "A" band R.F. coil
70939	Core—Adjustable core and stud for "A" band oscillator coil
70970	Core—Adjustable core and stud for 13-11 meter band R.F. coil
70943	Core—Adjustable core and stud for 19-16 meter band antenna coil
70941	Core—Adjustable core and stud for 13-11 meter band antenna coil
70937	Core—Adjustable core and stud for 19-16 meter band R.F. and oscillator coils, and 13-11 meter band oscillator coil
70944	Core—Adjustable core and stud for 31-25 meter band antenna coils, "B" band antenna coil
70938	Core—Adjustable core and stud for "A" band antenna coils, 31-25 meter band oscillator and R. F. coils and "B" band oscillator coil
70977	Disc—Band indicator actuating disc
*72011	Drum—Band indicator actuating drum
31273	Drum—Condenser drive drum
*72017	Frame—Dial frame and back plate less dial, tube clip, indicator disc, spring, indicator and "C" washer
37396	Grommet—Rubber grommet for mounting R. F. assembly (4 required)
*72018	Indicator—Station selector indicator
5117	Lamp—Band indicator lamp—Mazda #55
11765	Lamp—Dial lamp—Mazda #51
18469	Plate—Bakelite mounting plate for electrolytic #36599
30868	Plug—2 Contact female plug for motor cable (J1)
~~31572~~	~~Plug—3 contact female plug for power switch cable (J2)~~
12493	Plug—5 contact female plug for speaker cable
35630	Pulley—Drive cord pulley (1⅛" dia.)
35641	Pulley—Drive cord pulley (1⅜" dia.)
34761	Resistor—10 ohms, ½ watt (R2)
30732	Resistor—47 ohms, ½ watt (R7)
34765	Resistor—100 ohms, ½ watt (R8)
34767	Resistor—2200 ohms, ½ watt (R10)
71085	Resistor—12,000 ohms, 2 watts (R3)
30492	Resistor—22,000 ohms, ½ watt (R6, R12)
71084	Resistor—39,000 ohms, 1 watt (R1)
30147	Resistor—39,000 ohms, ½ watt (R22)
3252	Resistor—100,000 ohms, ½ watt (R35)
30651	Resistor—270,000 ohms, ½ watt (R13, R20)
30648	Resistor—470,000 ohms, ½ watt (R5, R17, R19, R21)
*72014	Resistor—Voltage divider, comprising 1 section of 3800 ohms, 6 watts, 1 section of 3800 ohms, 3 watts and 1 of 210 ohms, 2.75 watts (R37a, R37b, R37c)
30652	Resistor—1 megohm, ½ watt (R4, R9)
11769	Resistor—1.8 megohm, ½ watt (R15)
30649	Resistor—2.2 megohms, ½ watt (R11)
30992	Resistor—10 megohms, ½ watt (R16, R23)
70976	Screen—Band indicator screen—green
14350	Screw—#8-32 square head set screw
33438	Screw—Thumb screw for tuning tube clip
6647	Shade—Lamp shade
*72013	Shaft—Tuning knob shaft and flywheel
31364	Socket—Lamp socket (clip opening toward lamp)
34909	Socket—Lamp socket (clip opening toward lead)
70827	Socket—Tube socket—octal
9914	Socket—Tube socket for 6AT6
71554	Socket—Tuning tube socket
70978	Spring—Band indicator disc spring
31970	Spring—Tension spring for drive cords
*72020	Switch—Range switch (S1, S2, S3, S4)
70917	Transformer—First I.F. transformer T1 (L21, L22, C32, C33)
70918	Transformer—Second I. F. transformer T2 (L23, L24, C38, C39, C40, C41)
34183	Transformer—Power transformer, 110/125/150/210/240 volts, 60 cycle (T3)
71143	Washer—"C" washer for actuating disc
34373	Washer—"C" washer for tuning shaft

SPEAKER ASSEMBLY 92569-4W (RL 103-4)

STOCK No.	DESCRIPTION
32852	Cap—Dust cap
36145	Cone—Cone complete with voice coil
5118	Plug—3 contact male plug for speaker
*72223	Speaker—12" P.M. speaker complete with cone and voice coil less plug
71145	Suspension—Metal cone suspension

SPEAKER ASSEMBLY 92566-3W (RL 70N1)

STOCK No.	DESCRIPTION
32852	Cap—Dust cap
11469	Coil—Neutralizing coil
12079	Coil—Field coil, 1060 ohms
36145	Cone—Cone complete with voice coil
5119	Plug—3 contact female plug for speaker
71560	Plug—5 prong male plug for speaker
36204	Speaker—12" E.M. speaker complete with cone and voice coil less output transformer and plugs
71145	Suspension—Metal cone suspension
37997	Transformer—Output transformer (T4)

NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.

CONTROL PANEL ASSEMBLIES

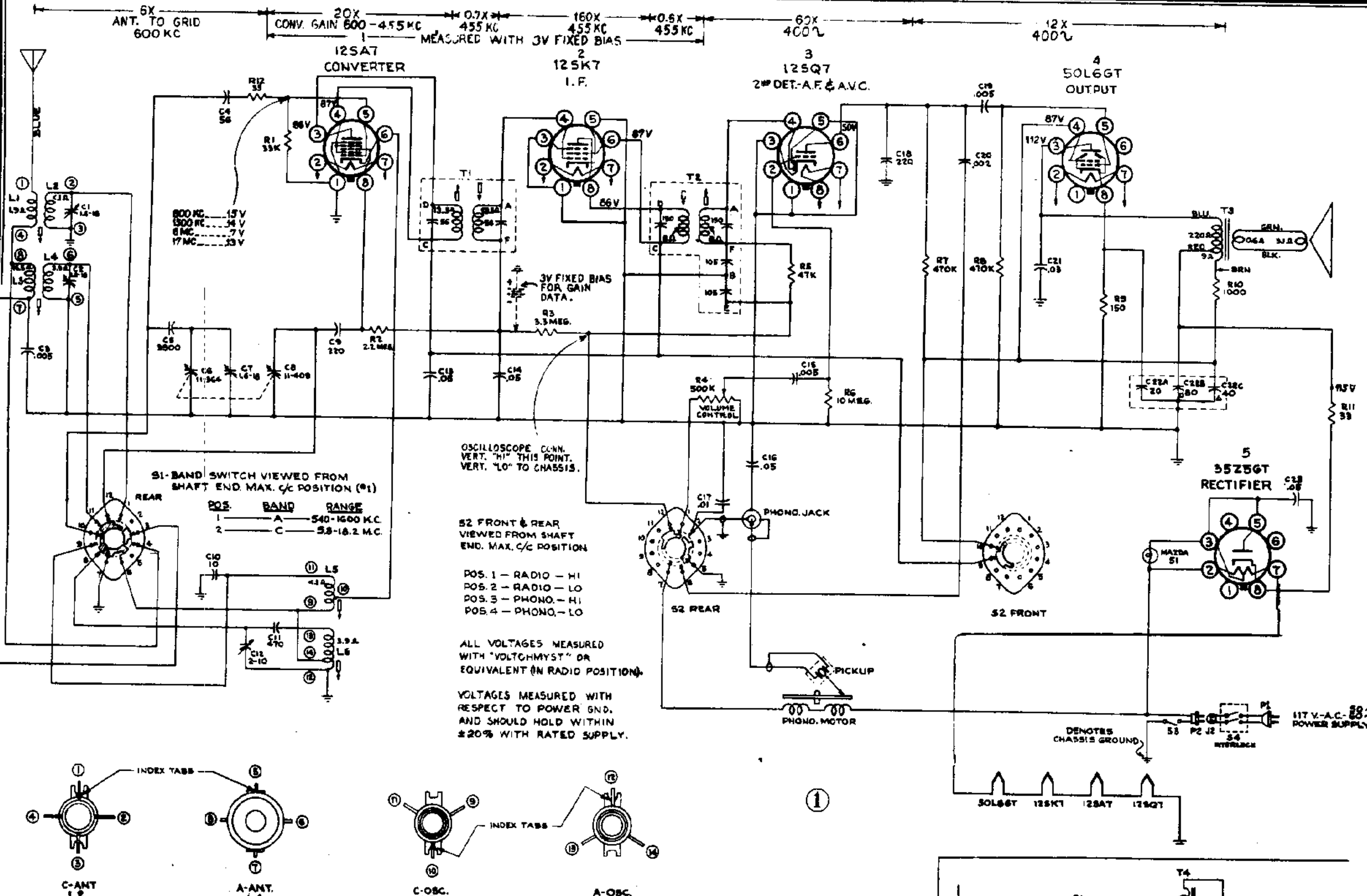
STOCK No.	DESCRIPTION
39622	Capacitor—Mica, 56 mmf. (C65)
*72532	Capacitor—Moulded, .003 mfd., 200 volts (C63)
*72530	Capacitor—Moulded, .02 mfd., 100 volts (C60)
*72531	Capacitor—Moulded, .03 mfd., 100 volts (C61)
*72328	Control—L.F. tone control (R33)
*72330	Control—Volume control and power switch (R14, S6)
31480	Lamp—Volume control lamp—Mazda #47
31567	Plug—3 prong male plug for control cable
35383	Plug—8 prong male plug for control cable
14659	Resistor—6800 ohms, ½ watt (R32)
30492	Resistor—22,000 ohms, ½ watt (R30)
30685	Resistor—33,000 ohms, ½ watt (R31)
30493	Resistor—150,000 ohms, ½ watt (R36)
31449	Resistor—1.5 megohms, ½ watt (R34)
35787	Socket—Phono input socket
72329	Switch—Local-distance-phono switch (S5)

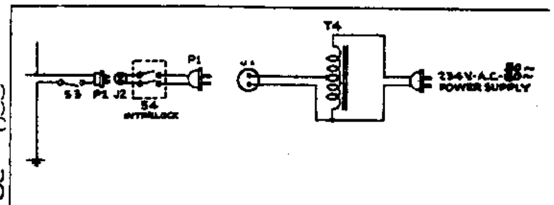
MISCELLANEOUS ASSEMBLIES

STOCK No.	DESCRIPTION
36462	Clamp—Dial clamp
X1624	Cloth—Grille cloth
~~*72902~~	~~Decal—Control panel decal~~
71089	Decal—Trade mark decal
*72326	Dial—Glass dial scale
*72901	Hinge—Lid hinge—invisible type (4 required)
*72900	Hinge—Lid hinge—spring type (4 required)
71905	Knob—Local distance and phono switch knob
70836	Knob—Tone control, range switch or tuning knob
*72331	Knob—Volume control knob
5117	Lamp—Record changer compartment lamp—Mazda #55
70546	Mounting—One set of hardware consisting of four upper springs, four lower springs and four clamp nuts to mount record changer
6647	Shade—Compartment lamp shade
14270	Spring—Retaining spring for knobs

RADIO CORP. OF AMERICA

MODELS QU72, QU72A
Chassis RC1035





Power Output Rating:
Undistorted .75 Watts
Maximum 1.5 Watts

Loudspeaker:
Size 4 x 6 inch
V.C. impedance at 400 cycles 3.4 Ohms

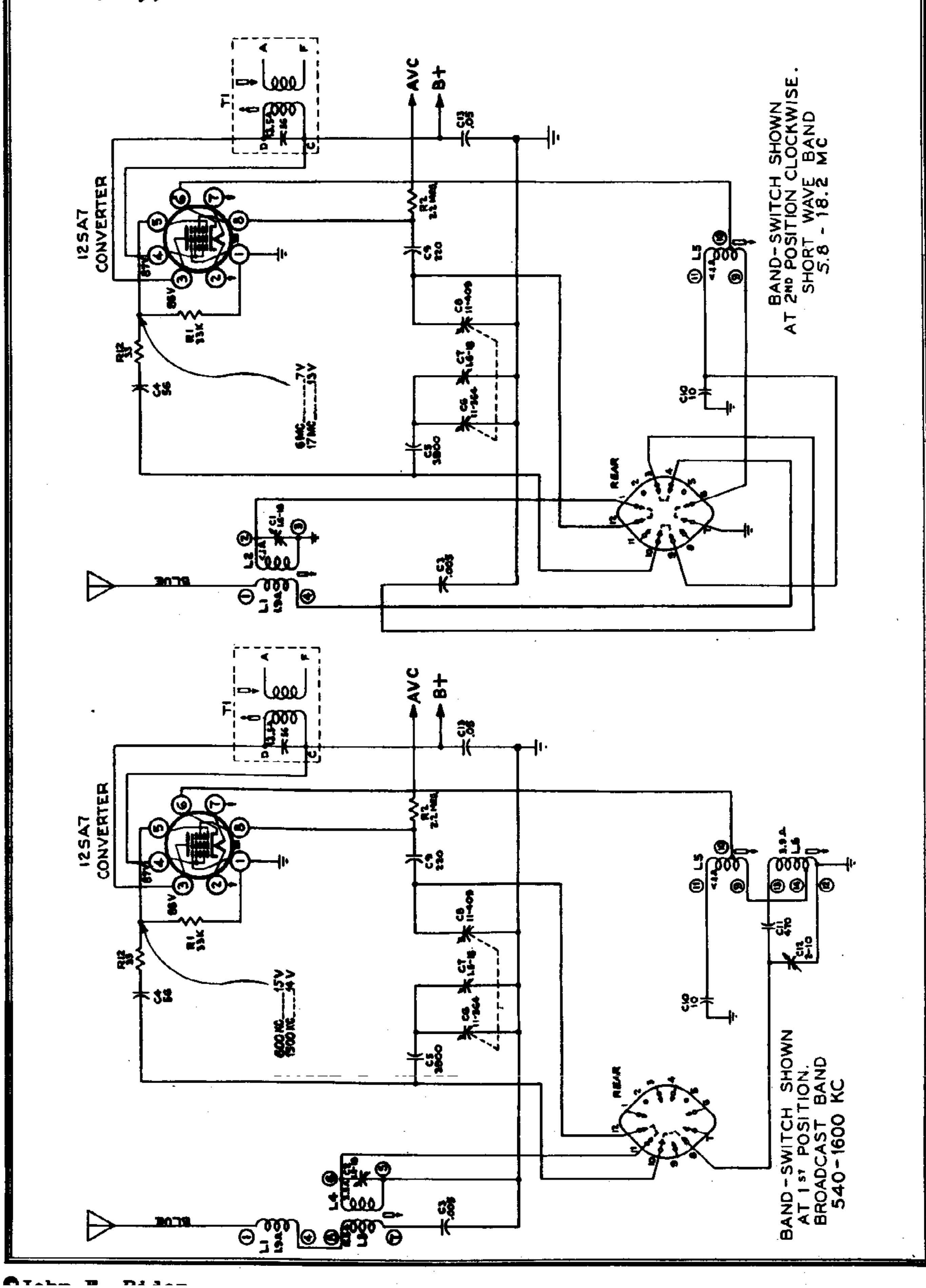
Frequency Range
Standard Broadcast (A Band) 540-1600 kc (556-187 m)
Short Wave (C Band) 5.8-18.2 mc (51.8-16.5 m)
Intermediate Frequency 455 KC

Power Supply Ratings:
QU72 105-125 Volts 50-60 cycles* 42 W (measured at 117V)
QU72A 210-250 Volts 50-60 cycles* 50 W (measured at 234V)
*See note on conversion spring.

"clarified schematics"

MODELS QU72, QU72A

RADIO CORP. OF AMERICA



Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the Schematic Circuit Diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

***Test-Oscillator.**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Alignment.—With the gang condenser in full mesh, the pointer should be set 3½" from the left edge of the dial back plate. This point corresponds to the first mark on the dial scale to the left of "550" kc. on "A" band. To find any calibration point it is necessary to draw a line on the dial scale drawing through the desired freq., so that the line passes through the same reading on the top and bottom rule scales. For instance, 1300 kc. on "A" band will correspond to a dial indicator setting of 7⅞" from the LEFT EDGE of the dial back plate. Move the indicator the desired distance by turning the tuning knob. ONCE THE INDICATOR HAS BEEN SET AT FULL MESH, MOVE THE INDICATOR ONLY BY TURNING THE TUNING KNOB.

Dial Indicator Adjustment.—After the set has been aligned, replace it in the cabinet. Turn the tuning knob until the condenser is in full mesh. The indicator should now be under the first mark on the dial scale face to the left of "550" kc on "A" band. If it is not, the calibration should be rechecked.

Alignment.—The most satisfactory method of aligning or checking the short-wave range is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil, L5, so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce inaccuracy on the band dial. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

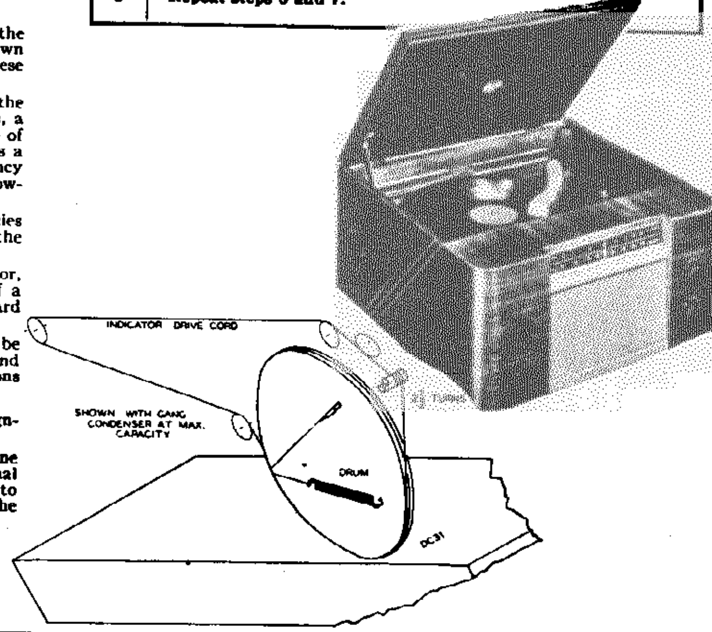
1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal-controlled oscillator, or by zero-beating against standard broadcast stations.

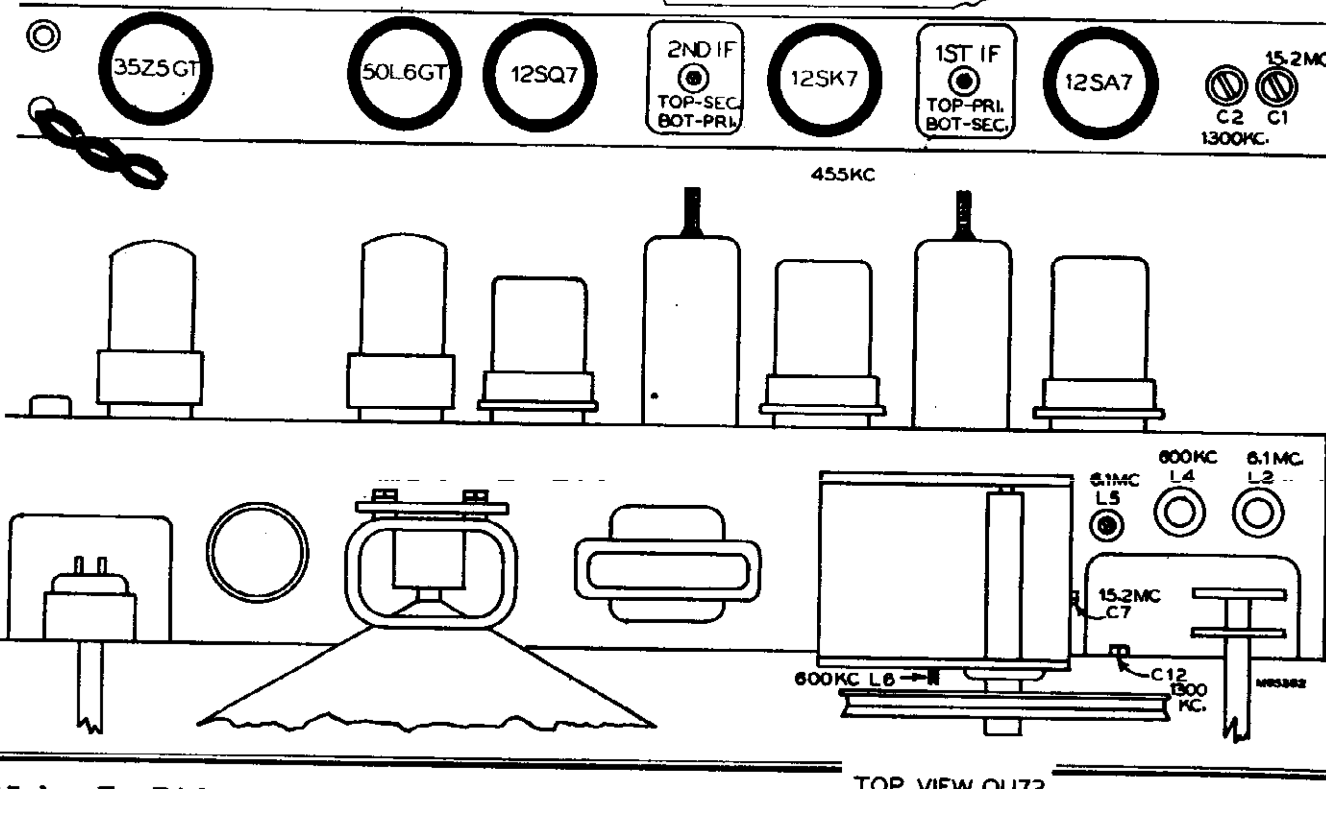
When a test oscillator is employed for alignment, a final check should be made on actual reception of short-wave stations of known frequency, and the magnetite-core oscillator coil should be retouched so that the stations come in at the correct points on the dial.

For additional information, refer to booklet "RCA Victor Receiver Alignment."

***Caution: This is an AC-DC type chassis with one side of the power line connected to the metal base, which is also—B. Connection from the signal generator must have a large (.1 MFD) capacitor in the ground side to prevent damage to the generator attenuator, unless the power source to the receiver is isolated from ground.**

Step	Connect high side of test-osc. to—	Tune test osc. to—	Range Switch	Turn radio dial to	Adjust for max. peak output—
1	12SK7 IF grid in series with .01 mfd.	455 kc	"A"	Quiet point, low end of dial	T2—Top core T2—Bot. core
2	12SA7 IF grid in series with .01 mfd.	455 kc	"A"	Quiet point, low end of dial	T1—Bot. core T1—Top core
3	Ant. lead in series with 300 Ω	15.2 mc	"C"	15.2 mc	C7—Osc. C1—Ant.
4	Ant. lead in series with 300 Ω	6.1 mc	"C"	6.1 mc	L5—Osc. L2—Ant.
5	Repeat steps 3 and 4.				
6	Ant. lead in series with 200 mmfd.	1300 kc	"A"	1300 kc	C12—Osc. C2—Ant.
7	Ant. lead in series with 200 mmfd.	600 kc	"A"	600 kc	L6—Osc. L4—Ant.
8	Repeat steps 6 and 7.				





TOP VIEW QU72

RADIO CORP. OF AMERICA

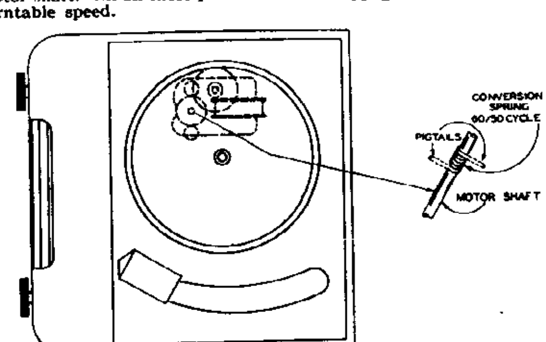
Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1035
*72277	Capacitor—Mica trimmer, dual, 1.6-18 mmf. (C1, C2)
70367	Capacitor—Mica trimmer, 2-10 mmf. (C12)
72615	Capacitor—Mica, 10 mmf. (C10)
39622	Capacitor—Mica, 56 mmf. (C4)
39636	Capacitor—Mica, 220 mmf. (C9, C18)
72814	Capacitor—Ceramic, 470 mmf. (C11)
72637	Capacitor—Mica, 3900 mmf. (C5)
*72839	Capacitor—Molded paper, .002 mfd., 400 volts (C20)
71699	Capacitor—Molded paper, .005 mfd., 400 volts (C3, C15, C19)
*72838	Capacitor—Molded paper, .01 mfd., 400 volts (C17)
72815	Capacitor—Molded paper, .03 mfd., 400 volts (C21)
72837	Capacitor—Molded paper, .05 mfd., 400 volts (C13, C14, C16, C23)
72281	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 150 volts, 1 section of 40 mfd., 150 volts and 1 section of 20 mfd., 25 volts (C22A, C22B, C22C)
72276	Coil—Antenna coil, "C" band (L1, L2)
*72275	Coil—Antenna coil, "A" band (L3, L4)
72274	Coil—Oscillator coil, "C" band (L5)
*72273	Coil—Oscillator coil, "A" band (L6)
*72278	Condenser—Variable tuning condenser (C6, C7, C8)
38410	Control—Volume control and power switch (R4, S3)
32634	Cord—Drive cord (approx. 49" overall length)
	NOTE: Before assembling, stretch to full length
70384	Drum—Drive drum
71851	Grommet—Rubber grommet for mounting tube socket
72283	Grommet—Rubber grommet for mounting tuning condenser or speaker
*72544	Indicator—Station selector indicator
70391	Insulator—Phono input socket insulator
11765	Lamp—Dial lamp, Mazda No. 51
*72272	Plate—Dial back plate complete with drive cord pulleys
30868	Plug—2 contact female plug for motor cable
30870	Plug—2 prong male plug for interlock switch (P2)
30789	Resistor—33 ohms, ½ watt (R12)
71290	Resistor—33 ohms, 1 watt (R11)
30880	Resistor—150 ohms, ½ watt (R9)
71916	Resistor—1000 ohms, 1 watt (R10)
30685	Resistor—33,000 ohms, ½ watt (R1)
30787	Resistor—47,000 ohms, ½ watt (R5)
30648	Resistor—470,000 ohms, ½ watt (R7, R8)
30649	Resistor—2.2 megohms, ½ watt (R2)
31417	Resistor—3.3 megohms, ½ watt (R3)
30992	Resistor—10 megohms, ½ watt (R6)
*72282	Shaft—Tuning knob shaft
34449	Socket—Lamp socket
35787	Socket—Phono input socket
37605	Socket—Tube socket, moulded
31319	Socket—Tube socket, wafer
70390	Spring—Drive cord spring
*72280	Switch—Radio-phono switch (S2)
*72279	Switch—Range switch (S1)
72545	Transformer—First I. F. transformer (T1)
70918	Transformer—Second I. F. transformer (T2)
72296	Transformer—Output transformer (T3)
33726	Washer—"C" washer for tuning knob shaft
	PICKUP AND ARM ASSEMBLIES RMP 124
*72284	Arm—Pickup arm shell only
*72288	Arm—Pivot arm and shaft
*72285	Base—Pickup arm mounting base
*72289	Bracket—Pickup arm mounting bracket
*72592	Cable—Shielded pickup cable complete with pin plug
39851	Crystal—Crystal cartridge
38452	Guard—Needle guard
*72290	Pin—Pivot pin to hold mounting bracket to pivot arm
31048	Plug—Pin plug for pickup cable
70341	Nut—Mounting nut and washer for sapphire
34311	Ring—Mounting base retaining ring
39863	Sapphire—Sapphire and holder
37763	Screw—#2-56 x ⅛" screw to mount guard (2 required)
4388	Screw—#6-32 x 5/16" set screw to hold pivot pin
*72286	Spacer—One set of spacers for pickup arm bracket
*72774	Spring—Pivot arm tension spring
	MOTOR AND TURNTABLE ASSEMBLIES Stamped 970472-1
39533	Clip—Retaining clip for idler wheel
39531	Clip—Retaining clip for turntable spindle
30870	Connector—2 prong male plug for motor cable
*70121	Motor—117 volt 60 cycle motor complete with mounting plate and turntable
39530	Plate—Idler wheel plate
39528	Spindle—Turntable spindle
39534	Spring—Idler wheel tension spring
*72840	Turntable—Finished turntable only
39529	Wheel—Idler wheel
	SPEAKER ASSEMBLIES 922258-2
71058	Speaker—4" x 6" P.M. speaker complete with cone and voice coil
	NOTE: If stamping on speaker does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS ASSEMBLIES
70398	Clamp—Dial clamps (1 set)
*72685	Decal—Control panel decal
*72684	Decal—Trade mark decal
*72683	Dial—Glass dial scale
*72292	Knob—Control knob
*72293	Mounting—One set of hardware to mount pick-up arm
30868	Plug—2 contact female plug for interlock switch (J2)
*72600	Spring—Conversion spring (60 to 50 cycle operation)
14270	Spring—Retaining spring for knob
72745	Switch—Interlock switch, slide type D.P.D.T. (S4)
*72546	Transformer—Step-down transformer, 210-25 volt 50/60 cycle primary, 117 volt 50/60 cycle secondary (T4)

Turntable Spindle:
When lubrication is required, apply one or two drops of Gargoyle 600W to the bearing.

Drive Wheel:
Apply one or two drops of any good grade of S.A.E. No. 10 oil to the bearing felt.

CAUTION:
Exercise extreme care to prevent getting any oil on the rubber tire or on the motor shaft. Oil on these parts will cause slippage with resultant irregular turntable speed.



CONVERSION SPRING 60/50 CYCLE (TOP VIEW)

On instruments having motors stamped 970472-1, it is possible to convert these instruments to 117 volt 50 cycle operation. A conversion spring, stock number 72689, is placed over the motor shaft, as shown in the illustration, increasing the diameter of the shaft, and compensating for the decreased motor speed at 50 cycles. These springs may be supplied with pigtails to aid in installation. After the spring has been placed on the shaft, clip the pigtails so they do not interfere with the drive wheel.

REPLACEMENT OF SAPPHIRE

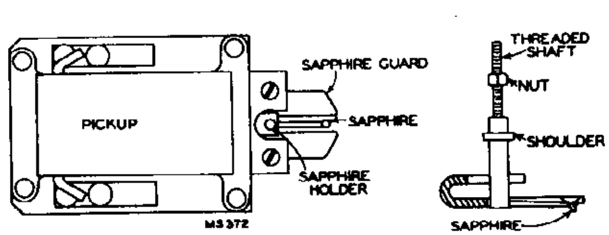
CAUTION: Never bend the sapphire support wire.

The nut on the sapphire holder assembly may be locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and gently push the shaft through the hole in the armature shaft until the sapphire holder assembly comes free.

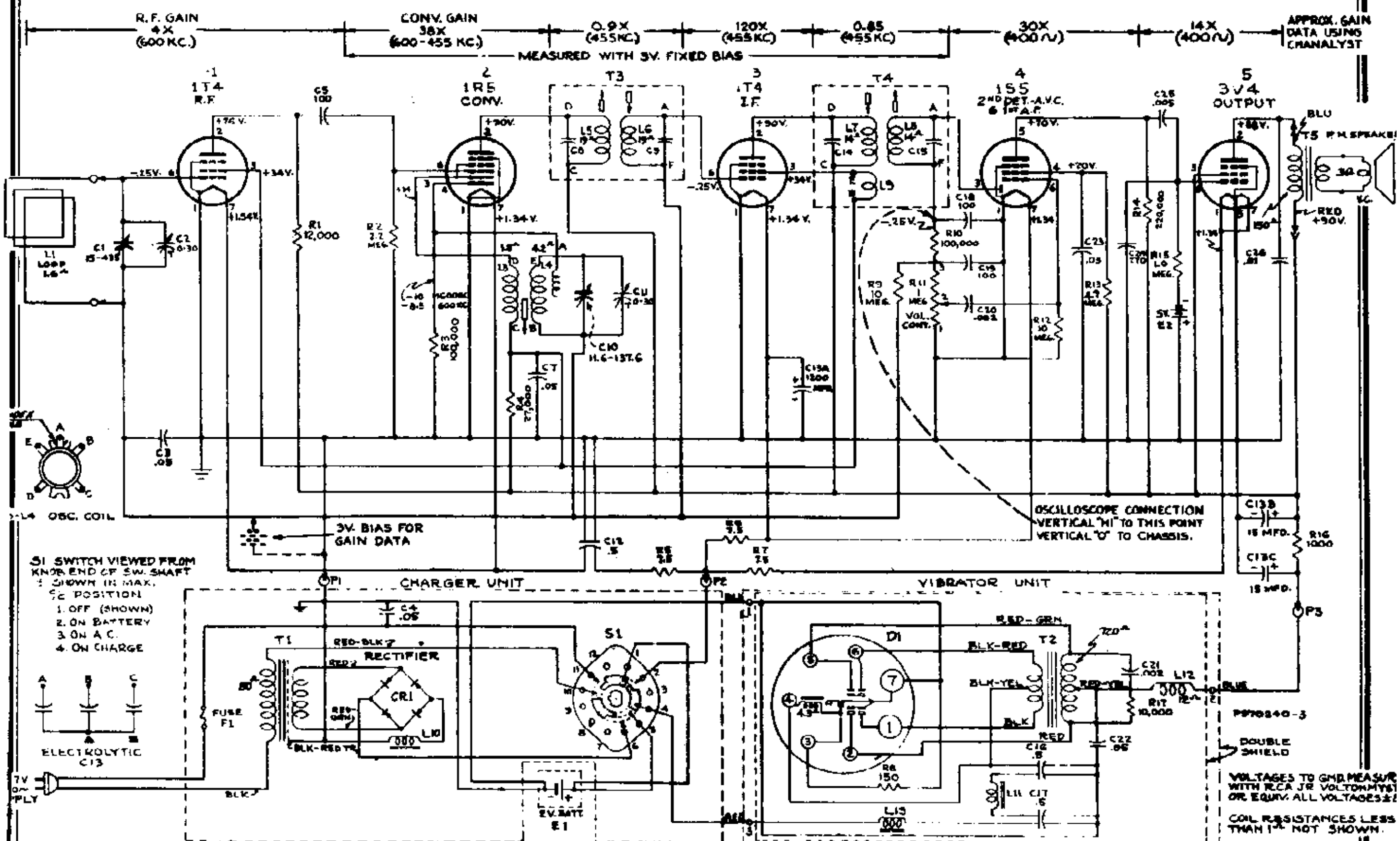
Use of a drop or two of acetone will facilitate the removal of the nut and shaft if cement has been used. Do not use force as the crystal may be broken.

Insert threaded shaft of replacement sapphire holder through armature shaft and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful so as not to strip the threads or break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough (approx. .020") beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little.



RADIO CORP. OF AMERICA

MODEL 65BR9, Chassis RC1045



Alignment Procedure

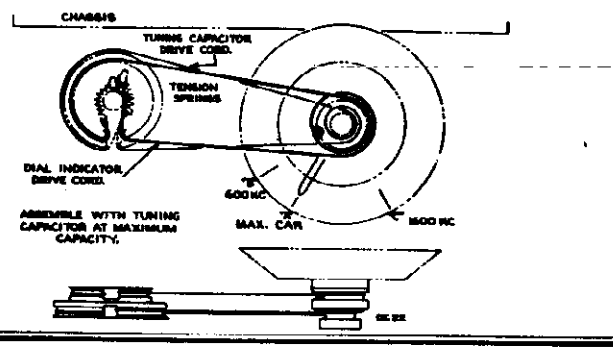
Cathode Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to **maximum.**

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid AVC action.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	High side of loop (Green lead) in series with 0.1 mfd.	455 kc	Gang at max. cap.	L7, L8, 2nd I.F. trans L5, L6, 1st I.F. trans.
2	220 mmf. in series with a single turn loop 4x8 in., approx. 3 in. from receiver loop.	1600 kc	1600 kc "C"	C11 Osc. C2 R.F.
3	(Bottom shield cover in place and chassis in cabinet)	600 kc	600 kc "B"	L4 Osc. Rock in
4		1600 kc	1600 kc "C"	C11 Osc.

Note.—In alignment, if possible, it is advisable to utilize an external source of "B" voltage. This will facilitate accessibility of the various trimmers.



Calibration.—It is not necessary to refer to the dial scale for calibration. Three reference marks on the dial backing are used. With the gang completely meshed, the pointer should be set at "A" as shown in the diagram. For alignment purposes, 600 kc. will then fall at "B", and 1600 kc. will be at "C".

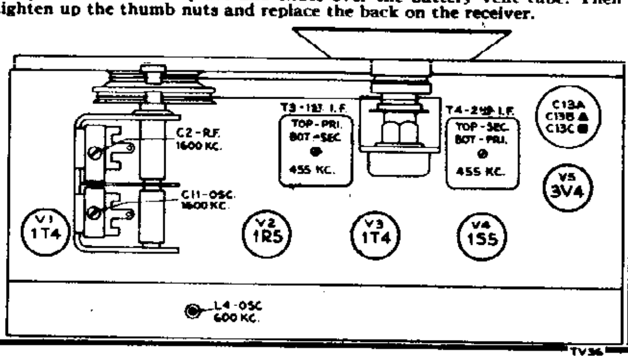
Operation.—This set operates on battery, or 117 Volt, 60 cycle AC (Battery in set, and in good condition). Provision is made so that when the set is operating on "AC" the battery is receiving a slight charge. In the "Charge" position, the rate of charge is much higher. A completely discharged battery will recharge in about 24 hours on "Charge" It is possible to overcharge the battery in the "AC" position, so it is advisable to play the receiver on "Battery" until slightly discharged whenever the battery has become fully charged on "AC"

Battery Charging.—With the cabinet back removed, two balls (1 red and 1 green) may be seen through an opening in the battery compartment cover. Both balls at top—battery full charged—Green ball sinks when battery is 20% discharged. Both balls at bottom—battery 90% discharged. Re-charge by connecting set to 115 volt 60 cycle power supply and set power switch to "CHG". Do not overcharge—check fuse if battery does not charge—do not allow battery to remain in discharged condition.

Water level.—Water Level should be checked frequently and **distilled** water or tap water, if it is used for cooking and drinking, added if required to bring liquid level up to the indicator line visible through the opening in the battery compartment cover. To add water; Remove line cord from power supply, remove cabinet back, remove thumb nuts and battery compartment cover, pull the battery out sufficiently to expose the red fill cap (pull on strap at bottom of battery), do not strain battery leads. Unscrew the red fill cap and add sufficient water to bring liquid level up to the indicator line.

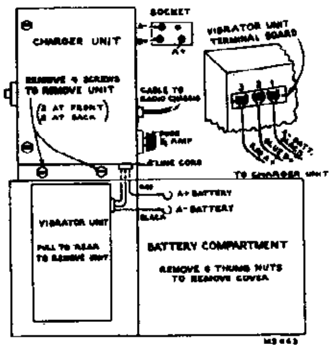
Caution.—The liquid is dilute sulphuric acid, it is destructive to clothing and will burn the hands—do not spill.

Replace the red refill cap, push battery back into place and attach the back to the metal box, making sure during this assembly that the vent compression seal is in place and slides over the battery vent tube. Then tighten up the thumb nuts and replace the back on the receiver.

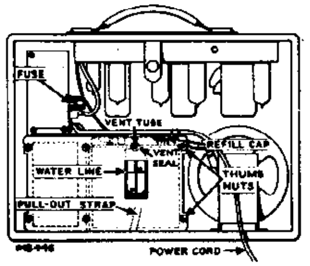


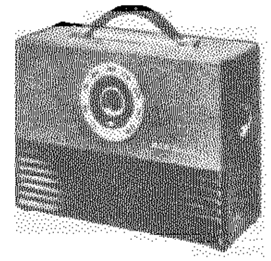
MODEL 65BR9

RADIO CORP. OF AMERICA



65BR9 REAR VIEW (BACK REMOVED)





Specifications

Frequency Range.......................................540-1,600 kc
Intermediate Frequency.......................................455 kc
Batteries Required..................2 Volt Willard ER-34-2 Wet Battery

Tube Complement
(1) RCA—1T4.......................................R.F. Amplifier
(2) RCA—1R5.......................................Converter
(3) RCA—1T4.......................................I.F.-Amplifier
(4) RCA—1S5.........................2nd Det. AVC. & A.F.-Amplifier
(5) RCA—3V4.......................................Power Output

Power Output
Maximum.......................................23 watt

Loudspeaker..........................5" P.M. 3.4 ohms at 400 cycles
Cabinet Dimensions.........Height...10¼", Width...14", Depth...5"

Fuse
Type 3AG.......................................¼ amp.

Current consumption (Chassis) 2.05 V. input to charger.
"A".......................................300 ma.
"B".......................................13 ma.

CRITICAL LEAD DRESS

1. Dress all filament leads next to chassis.
2. Dress loop leads away from tuning drum and battery.
3. Dress output transformer leads away from rear section of gang.
4. Dress r.f. plate lead away from r.f. grid circuit.
5. Dress avc lead away from 2nd IF transformer and associated components.
6. Dress converter plate lead away from chassis and away from output twisted leads.
7. Dress 1st audio plate lead up and away from other wiring.
8. Dress C5 away from chassis.

Caution.—Do not plug this set into a D.C. source as serious damage may result. The ¼ amp. fuse will normally protect the circuit against such damage.

All leads between the battery and the terminals should be free of corrosion, and making good contact. Hum in the set may be caused by high resistance connections.

The receiver will operate on the battery alone with the power cord disconnected and the switch at "AC". **Such operation places an extra load on the battery and should not be used.**

The power unit may be tested without being connected to the radio chassis. Connect an 8,000 ohm, 5 watt resistor between B+ and chassis ground, connect a 7 ohm, 10 watt resistor between A+ and chassis ground. On BATTERY the B+ voltage should be approx. 103 volts, and the A+ voltage should be approx. 2.05 volts. (At end of cable from charger unit) With the unit attached to 117 V. 60 cycle AC and the switch on "AC" the voltage should be slightly higher.

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-1045
45233	Capacitor—Ceramic, 100 mmf. (C5, C18, C19)
71540	Capacitor—Ceramic, 270 mmf. (C24)
72315	Capacitor—Tubular, .002 mfd., 200 volts (C20)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C25)
70613	Capacitor—Tubular, .03 mfd., 200 volts (C23)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C7, C3)
72076	Capacitor—High frequency, 0.5 mfd., 120 volts (C12)
72077	Capacitor—Electrolytic comprising 2 sections of 15 mfd., 150 volts and 1 section of 1200 mfd., 1½ volts (C13A, C13B, C13C)
72827	Capacitor—Tubular, .01 mfd., 400 volts (C26)
72318	Cell—Bias Cell (E2)
72072	Coil—Oscillator Coil (L3, L4)
72073	Condenser—Variable tuning condenser (C1, C2, C10, C11)
38405	Control—Volume control (R11)
32634	Cord—Drive cord (approx. 19" overall length)
32634	Cord—Indicator cord (approx. 20" overall length)
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
72319	Holder—Bias Cell Holder
72075	Indicator—Station selector indicator
72776	Pin—Contact pin for loop leads
72081	Plate—Dial back plate
30868	Plug—2 contact female plug for speaker cable
72317	Plug—3 prong male plug and shell for power input cable
72074	Pulley—Driven pulley
72079	Pulley—Tuning drive pulley
71580	Resistor—7.5 ohms, ½ watt (R5, R6, R7)
34766	Resistor—1000 ohms, ½ watt (R16)
30436	Resistor—12,000 ohms, ½ watt (R1)
30409	Resistor—27,000 ohms, ½ watt (R4)
3252	Resistor—100,000 ohms, ½ watt (R3, R10)
14583	Resistor—220,000 ohms, ½ watt (R14)
30652	Resistor—1 megohm, ½ watt (R15)
30649	Resistor—2.2 megohm, ½ watt (R2)
30931	Resistor—4.7 megohm, ½ watt (R13)
30092	Resistor—10 megohm, ½ watt (R9, R12)
72080	Retainer—Retainer for drive pulley
72078	Sleeve—Volume control sleeve
51955	Socket—Tube socket, miniature
71037	Socket—Tube socket, miniature, floating
72540	Spring—Indicator or drive cord spring
71399	Transformer—First I.F. Transformer (T3, L5, L6, C8, C9)
71400	Transformer—Second I.F. Transformer (T4, L7, L8, L9, C14, C15)
	MISCELLANEOUS
73042	Back—Cabinet back complete (includes back pull Z brackets, air vent grommet and metal grommet).
72216	Battery—Wet battery (E1)

STOCK No.	DESCRIPTION
34027	Board—3 contact terminal board (screw type) for vibrator lead-in
70643	Capacitor—Tubular, .002 mfd., 1000 volts (C21)
72076	Capacitor—High-frequency, 0.5 mfd., 120 volts (C16, C17)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C4, C22)
72321	Clip—Battery leads clip terminal
70392	Cord—Power cord
72083	Escutcheon—Dial and escutcheon
72093	Escutcheon—"Pull-AC Plug" escutcheon
72087	Escutcheon—Switch escutcheon
71595	Foot—Rubber foot for cabinet (4 required)
72104	Fuse—0.25 ampere (F1)
72106	Grommet—Rubber grommet to protect power cord
72320	Handle—Carrying handle
48551	Holder—Fuse holder
72094	Knob—Knob for "Pull-AC" plug
72088	Knob—Switch knob
72084	Knob—Tuning knob
72085	Knob—Volume control knob
72086	Loop—Antenna loop (L1)
72978	Monogram—"RCA Victor" metal monogram
72098	Packing—One set of cushioning for battery
72097	Packing—One set of cushioning for vibrator
72102	Reactor—Iron core reactor (L10, L11, L13)
72322	Reactor—Wound on 1 megohm resistor (L12)
72103	Rectifier—Dry disc (CR1)
72090	Reflector—Reflector for dial escutcheon
30880	Resistor—150 ohms, ½ watt (R8)
3078	Resistor—10,000 ohms, ½ watt (R17)
72082	Socket—3 contact female
72108	Socket—Vibrator socket
4982	Spring—Retaining spring for tuning knob
30900	Spring—Retaining spring for volume control or switch knob
72089	Spring—Switch escutcheon spring
72100	Switch—Power switch (S1)
73041	Strap—Leather strap, including socket and button to secure back
72099	Transformer—Charger transformer (T1)
72109	Transformer—Vibrator transformer (T2)
72107	Vibrator—Plug-in vibrator (D1)
72091	Window—Tuning window
	SPEAKER ASSEMBLIES (92572-2)
30870	Plug—2 prong male plug for speaker
72201	Speaker—5" PM speaker complete with cone and voice coil less transformer and plug
71159	Transformer—Output transformer (T5)
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.

RADIO CORP. OF AMERICA MODELS 65F, Chassis RC1004E, 6V-42, Chassis RS1000

Alignment Procedure

Cathode Ray Alignment is the preferable method. Connections for the oscillograph are shown in the diagram.

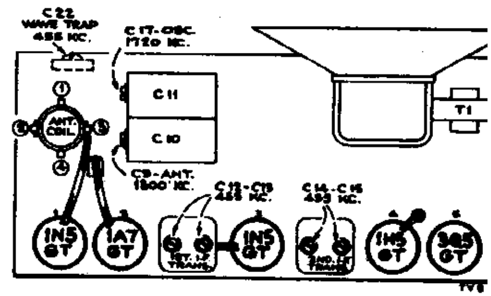
Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

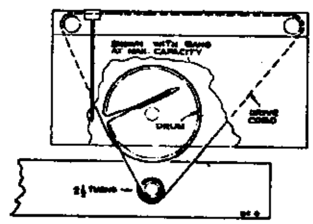
Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the output as low as possible to avoid AVC action.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be set at the left-hand end dial calibration mark.

Step	Connect high side of the test oscillator to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	I-F grid in series with .01 mfd.	455 kc	Quiet point between 550 and 750 kc	C14, C15 (2nd I-F Trans.)
2	1A7GT grid in series with .01 mfd.			C12, C13 (1st I-F Trans.)
3	Antenna terminal in series with 200 mmfd.	1,720 kc	Tuning condenser rotor plates all out	C17 (osc.)
4		1,300 kc	1,300 kc signal	C9 (ant.)
5		455 kc	Quiet point between 550 and 750 kc	Adjust C22 for minimum output on strong 455 kc signal

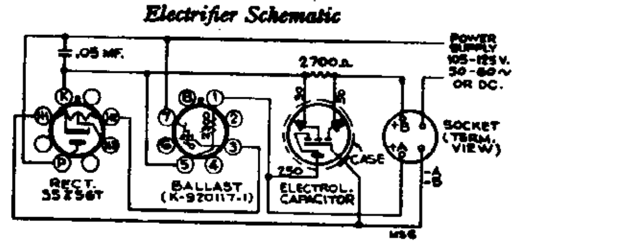
Top-View





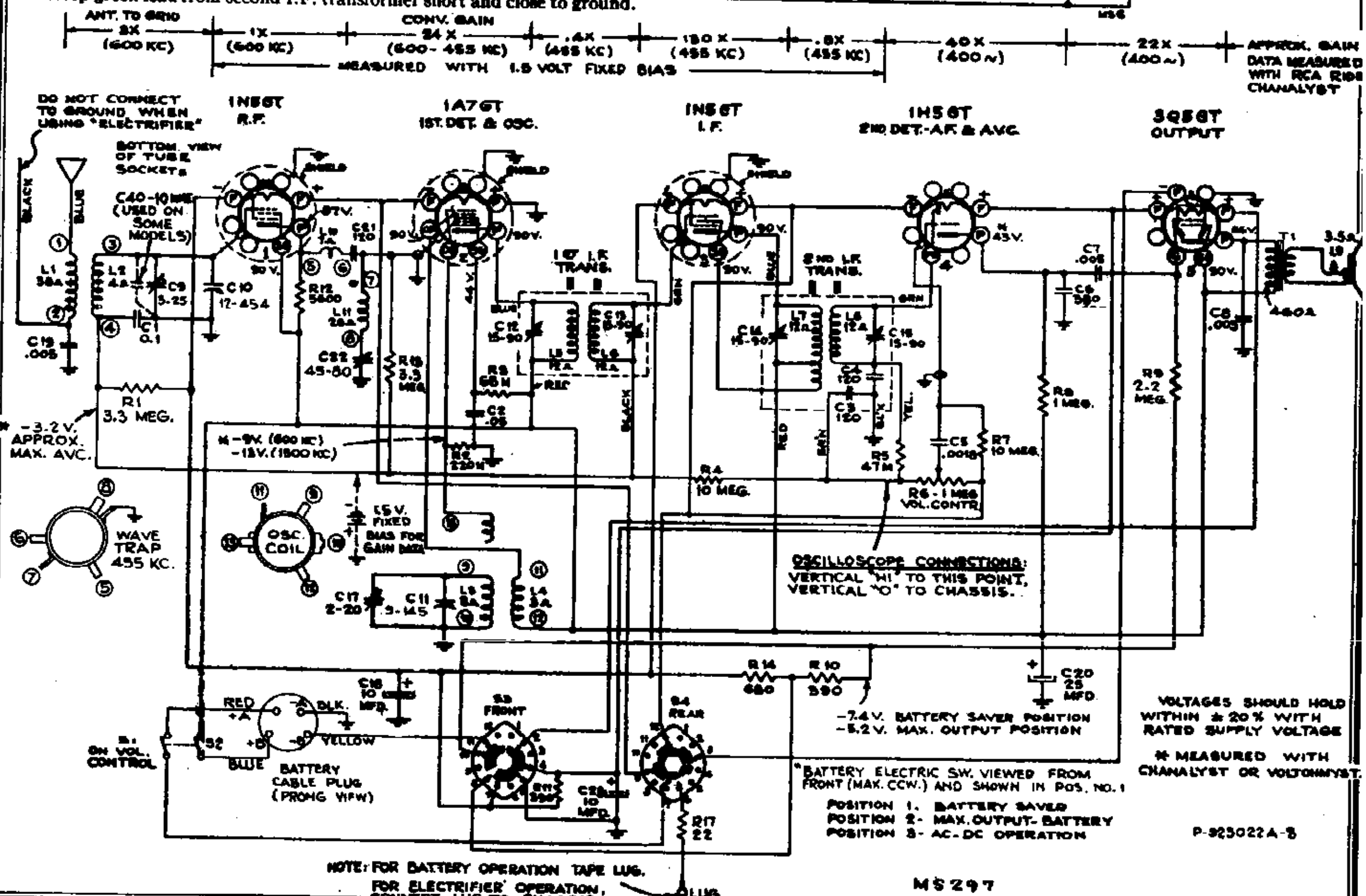
Dial Cord Assembly

Electrifier Schematic



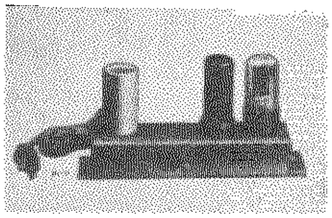
Precautionary Lead Dress.—

1. The lead from the 3Q5 plate to output transformer should be dressed under clip, and away from audio input leads.
2. All filament wires should be dressed close to chassis.
3. Keep AVC lead connecting C1 (0.1 mfd. filter) to antenna coil away from the 1A7GT plate.
4. Keep blue plate leads coming from I.F. transformers short and close to chassis.
5. Keep yellow leads connected to oscillator coil away from trap coil.
6. Keep grid lead of 1N5GT RF tube away from 1A7GT grid.
7. Keep green lead from second I.F. transformer short and close to ground.

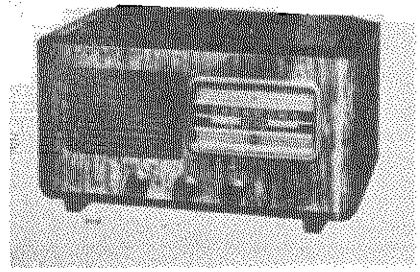


MODELS 65F, CV-42

RADIO CORP. OF AMERICA



CV-42 Electrifier



Model 65F

Specifications

Circuit Description.—Superheterodyne with one stage of radio frequency amplification, automatic volume control and class "A" beam power output. Battery operation, with optional AC-DC socket power attachment available. Model 65F can be operated on 105-125 volts AC, 50-60 cycles, or 105-125 DC, by means of an RCA CV-42 Electrifier.

Frequency Range .... 540-1,720 kc

Intermediate Frequency .... 455 kc

Maximum Power Output .... 0.3 watt

Loudspeaker (5 inch) 92515-1
Voice coil impedance at 400 cycles .... 3.4 ohms

Power Supply
Battery .... RCA VS022 or equivalent
Battery Drain
"A" 1½ volt section .... 0.3 ampere
"B" 90 volt section .... 10 m a. (Switch in "Battery Saver Position")
14 m a. (Maximum Output Position)

Power Consumption
With CV-42 Electrifier Unit (switch in "Electric" position) .... 22.5 watts
Cabinet Dimensions (inches) .... 18 x 9¼ x 10⁷⁄₁₆

IMPORTANT

Remove any external ground connections when using the Electrifier.

CAUTION: Turn power switch off (counter-clockwise) when installing or replacing tubes or batteries.

RECEIVER IS SHIPPED READY FOR BATTERY OPERATION. FOR ELECTRIFIER OPERATION, REMOVE TAPE FROM LUG AT REAR OF CHASSIS AND CONNECT LUG TO 65F RECEIVER CHASSIS.

On a DC power supply, if no reception is obtained, reverse the plug in the outlet and retune. On an AC supply, reversal of the plug may reduce hum. CAUTION! Do not touch Radio Chassis unless power plug is removed from socket.

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-1004E)
38675	Arm—"On-Off" indicator arm
39604	Capacitor—Mica, 10 mmf. (C40)
39640	Capacitor—Mica, 330 mmf. (C6)
38672	Capacitor—Mica trimmer, consisting of 1 section of 120 mmf. and 1 section of 45-80 mmf. (C21, C22)
70712	Capacitor—Tubular, .0018 mfd., 700 volts (C5)
70627	Capacitor—Tubular, .005 mfd., 1200 volts (C7, C8, C19)
70615	Capacitor—Tubular, .05 mfd., 200 volts (C2)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C1)
36718	Capacitor—Electrolytic, 10 mfd., 10 volts (C18, C23)
38705	Capacitor—Electrolytic, 25 mfd., 90 volts (C20)
38344	Coil—Antenna coil (L1, L2)
38345	Coil—Oscillator coil (L3, L4)
70378	Coil—Wave trap (L10, L11)
38599	Condenser—Variable tuning condenser (C9, C10, C11, C17)
36080	Control—Volume control and power switch (R6, S1, S2)
34662	Cord—Drive cord (approx. 59" overall length)
35069	Fastener—Push fastener for dial plate
36090	Indicator—Station selector indicator
38350	Lever—Indicator arm actuating lever
38673	Plate—Dial back plate complete with drive cord pulleys and indicator arm
30550	Plug—4 prong male plug for battery cable
32289	Pulley—Drive cord pulley
39930	Resistor—22 ohms, 1 watt (R17)
30498	Resistor—390 ohms, ¼ watt (R10, R11)
12262	Resistor—680 ohms, ¼ watt (R14)
30734	Resistor—5600 ohms, ¼ watt (R12)
30787	Resistor—47,000 ohms, ¼ watt (R5)
14138	Resistor—68,000 ohms, ¼ watt (R3)
14583	Resistor—220,000 ohms, ¼ watt (R2)
30652	Resistor—1 megohm, ¼ watt (R8)
30649	Resistor—2.2 megohms, ¼ watt (R9)
12928	Resistor—3.3 megohms, ¼ watt (R1, R13)
30992	Resistor—10 megohms, ¼ watt (R4, R7)
36897	Shaft—Tuning knob shaft
70377	Shield—Tube shield for IN5GT and IH5GT tubes
31251	Socket—Tube socket
31418	Spring—Drive cord tension spring
38349	Spring—Indicator arm return spring
38670	Switch—"Battery-Electric" power switch (S3, S4)
70379	Transformer—First I.F. transformer (L5, L6, C12, C13)
70380	Transformer—Second I.F. transformer (L7, L8, C3, C4, C14, C15)
33726	Washer—"C" for tuning knob shaft

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES Stamped 92515-1K
70381	Speaker—5" P.M. speaker less output transformer
70991	Transformer—Output transformer
	Stamped 92515-1P
70381	Speaker—5" P.M. speaker less output transformer
70992	Transformer—Output transformer
	Stamped 92515-1F
70381	Speaker—5" P.M. speaker less output transformer
70993	Transformer—Output transformer
	NOTE: If stamping on speaker in instrument does not agree with above speaker numbers, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS ASSEMBLIES
36462	Clamp—Clamp for glass window
72785	Decal—Control marker decal
72796	Dial—Glass dial scale
36886	Knob—Power switch knob
36722	Knob—Volume control or tuning knob
30900	Spring—Retaining spring for knob
38679	Window—Glass window for dial
	CV-42 ELECTRIFIER
38702	Ballast—Plug-in ballast tube resistor
38701	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts, 1 section of 30 mfd., 150 volts, and 1 section of 250 mfd., 10 volts
30847	Capacitor—.05 mfd., 400 volts
28451	Cover—Insulating cover for electrolytic capacitor
35069	Fastener—Push fastener for bottom cover
28452	Plate—Bakelite mounting plate for electrolytic capacitor
38702	Resistor—Ballast tube resistor
30730	Resistor—2,700 ohms, ½ watt
31027	Socket—Power output socket
31251	Socket—Tube or ballast resistor socket
38702	Tube—Ballast tube resistor

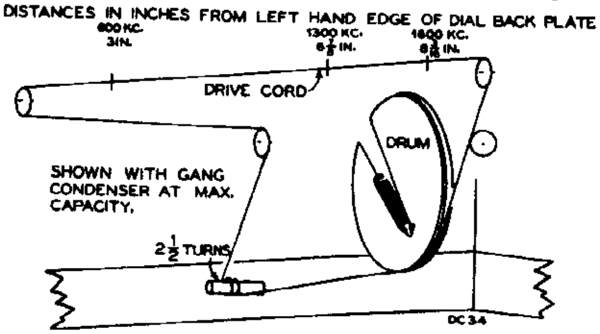
RADIO CORP. OF AMERICA MODELS 66X11,Ch.RC1046A; 66X12,Ch.RC-1046;66X13, 66X14,66X15,Ch.RC1046B

Alignment Procedure

Test Oscillator.—Connect high side of test oscillator as shown in chart. Connect low side through a .01 mf capacitor to common "—B." Keep the output signal as low as possible to avoid AVC action.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	Stator of C-12 in series with .01 mfd.	455 kc	Quiet-point 1,600 kc end of dial	Sec. and pri. 2nd I-F trans.
2				Sec. and pri. 1st I-F trans.
3	Ant. lead in series with 200 mmfd.	1,600 kc	1,600 kc	C14 (osc.)*
4		1,300 kc	1,300 kc	C13 ant.
5		600 kc	600 kc	L4 (osc.) Rock in
6	Repeat steps 3, 4 and 5.			

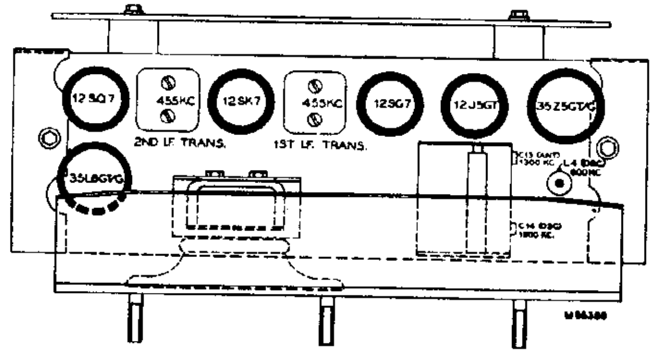
*Left hand osc. trimmer should be pre-set approx. ¼ turn from tight.



DIAL INDICATOR AND DRIVE MECHANISM

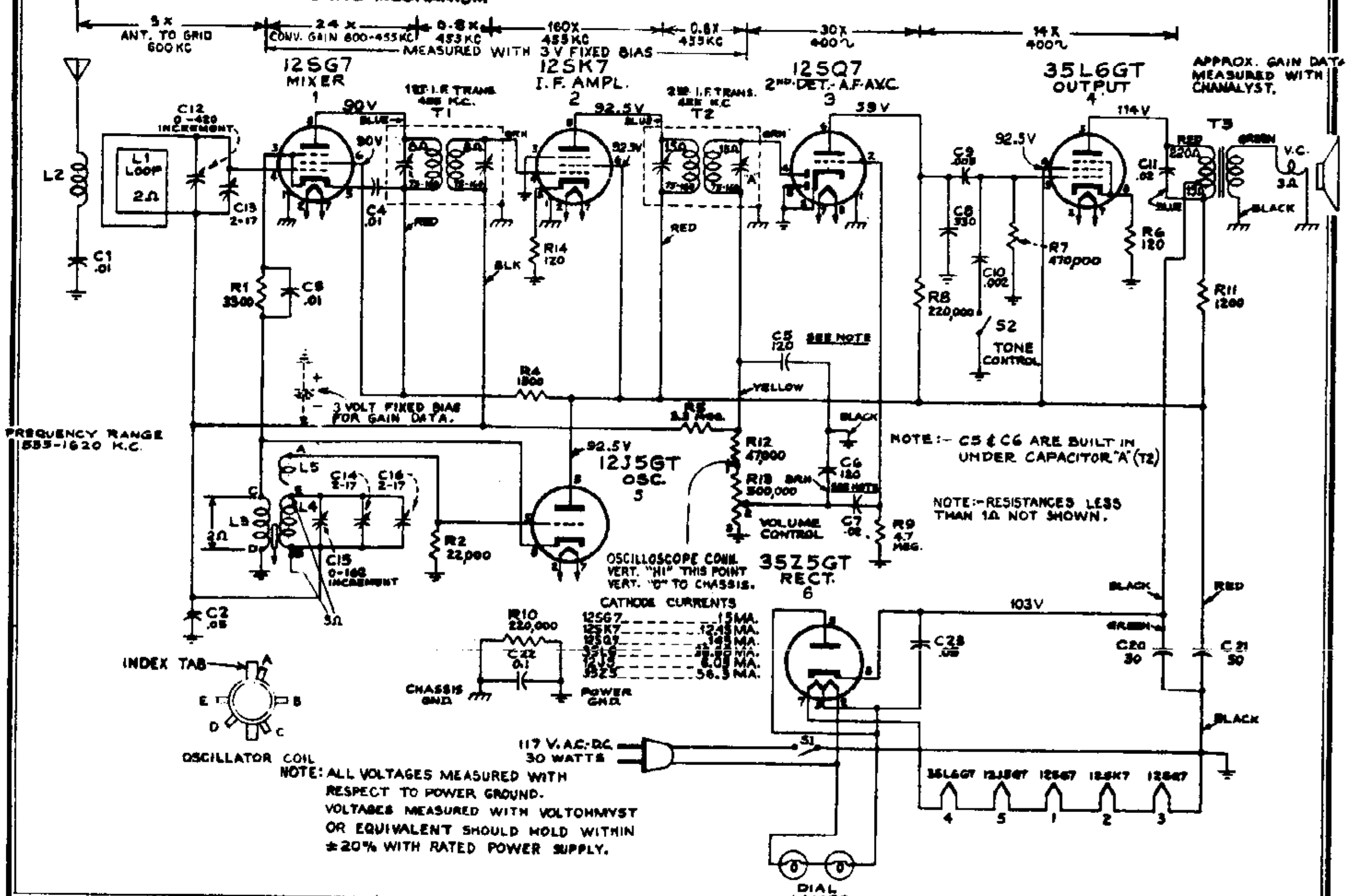
Output Meter.—Connect leads between speaker voice coil and chassis. Turn volume control to maximum clockwise, tone control to maximum highs (clockwise).

Dial Pointer Adjustment.—Rotate tuning condenser fully counterclockwise (plates closed). Adjust indicator pointer to 2¼" from left hand edge of dial back plate.

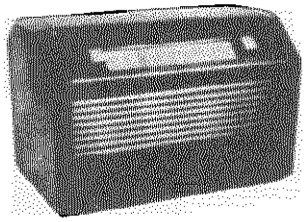


Critical Lead Dress

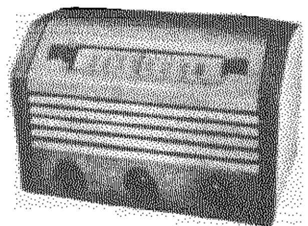
1. Dress output plate bypass capacitor (C-11 .02 mf) against chassis.
2. Dress 35L6GT plate lead (red) against chassis and away from volume control, leads and terminals.
3. Dress audio coupling capacitor (C-7 .02 mf) away from 35L6GT heater leads.
4. Dress tone control lead against front apron.
5. Dress 2nd i-f yellow and brown leads away from output plate bypass capacitor (C-11, .02 mf.) and away from all heater leads.
6. Dress lead to speaker voice coil away from tuning shaft "C" washer.
7. Dress tone control capacitor (C-10, .002 mf.) away from oscillator coil.
8. Dress all uninsulated leads away from each other and away from chassis to prevent short circuits.
9. Dress blue and green leads of both i-f transformers back in shields leaving exposed lengths as short as possible.



Models 66X11, 66X12, 66X13, 66X14, 66X15 RADIO CORP. OF AMERICA



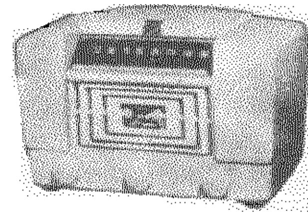
← *66X13—(Wood Walnut)*



66X14—(Wood Blonde) →
66X15—(Wood Mahogany)

Circuit Description

The superhetrodyne circuit is used, incorporating separate mixer, and oscillator stages; one stage of intermediate frequency amplification, a combined second detector-AVC-first audio stage, a beam power output stage, and a half wave rectifier. A loop antenna with provisions for an external antenna is used. A new standard two section variable capacitor of the cut plate type is used. The oscillator coil has a movable powdered iron core for inductance adjustment. Both I.F. transformers are compression tuned and AVC is applied to both the R.F. and I.F. stages. Optimum signal to noise ratio and I.F. stability is obtained by low initial bias on 1st detector and degenerative cathode resistor in the I.F. stage.



66X11—(Brown Plastic)
66X12—(Ivory Plastic) →

Specifications

Frequency Range .... 540-1600 kc

Intermediate Frequency .... 455 kc

Power Output
Undistorted .... 1.0 watt
Maximum .... 1.5 watts

Tube Complement
(1) RCA-12SG7 .... Converter
(2) RCA-12SK7 .... I.F. Amplifier
(3) RCA-12SQ7 .... 2nd Det., A.V.C., and A.F. Amplifier
(4) RCA-35L6GT .... Power Output
(5) RCA-12J5GT .... Oscillator
(6) RCA-35Z5GT .... Rectifier

Loudspeaker (92572-2)
Type .... 5-inch PM
V. C. Impedance .... 3.2 ohms at 400 cycles

Cabinet Dimensions	**Height**	**Width**	**Depth**
66X11 (Brown Plastic)	$8\frac{5}{16}$"	13[illegible]"	7[illegible]"
66X12 (Ivory Plastic)	$8\frac{5}{16}$"	13[illegible]"	7[illegible]"
66X13 (Wood—Walnut)	$9\frac{3}{16}$"	14[illegible]"	7[illegible]"
66X14 (Wood—Blonde)	$9\frac{3}{16}$"	14[illegible]"	7[illegible]"
66X15 (Wood—Mahogany)	$9\frac{3}{16}$"	14[illegible]"	7[illegible]"

Power Supply Rating
105-125 volts, AC, 50 or 60 cycles, or DC .... 30 watts

Pilot Lamp .... 2 type 1490 3.2 volts, 0.16 amp.
Tuning Drive Ratio 20.8:1

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES **RC-1046—66X12** **RC-1046A—66X11** **RC-1046B—66X13, 66X14, 66X15**
72571	Capacitor—Mica, 330 mmf. (C8)
70601	Capacitor—Tubular, .002 mfd., 200 volts (C10)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C9)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C1, C3, C4)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C7, C11)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C2, C23)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C22)
39152	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C20, C21)
*72604	Coil—Oscillator coil (L3, L4, L5, C15)
*72607	Condenser—Variable tuning condenser (C12, C13, C14, C16)
36228	Control—Tone control (S2)
38410	Control—Volume control and power switch (R13, S1)
34662	Cord—Drive cord (approx. 56" overall length) (NOTE: Before assembling, stretch to full length)
*72798	Dial—Dial scale (polystyrene) for 66X13, 66X14, and 66X15
*72603	Drum—Drive drum
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
*72799	Indicator—Station selector indicator for 66X13, 66X14, and 66X15
*72606	Indicator—Station selector indicator for 66X11 and 66X12
71116	Lamp—Dial lamp—Type No. 1490
*72697	Loop—Antenna loop complete (L1, L2)
*72765	Nut—Speed nut to fasten dial logotype for 66X13, 66X14, and 66X15 (2 required)
*72601	Plate—Dial back plate complete with four (4) pulleys less dial for 66X12
*72797	Plate—Dial back plate complete with four (4) pulleys less dial for 66X13, 66X14, 66X15
*72896	Plate—Dial back plate complete with four (4) pulleys less dial for 66X11
72602	Pulley—Drive cord pulley
30189	Resistor—120 ohms, ½ watt (R6, R14)
38896	Resistor—1200 ohms, 1 watt (R11)
30654	Resistor—1500 ohms, ½ watt (R4)
30733	Resistor—3300 ohms, ½ watt (R1)
30492	Resistor—22,000 ohms, ½ watt (R2)
30787	Resistor—47,000 ohms, ½ watt (R12)
14583	Resistor—220,000 ohms, ½ watt (R8, R10)
30648	Resistor—370,000 ohms, ½ watt (R7)
31417	Resistor—3.3 megohms, ½ watt (R5)
30931	Resistor—4.7 megohms, ½ watt (R9)
71798	Screw—No. 8—32 x $\frac{5}{16}$" square head set screw for drive drum
*72608	Shaft—Tuning knob shaft
*72605	Socket—Lamp socket
37605	Socket—Tube socket
31418	Spring—Drive cord spring
70411	Transformer—First I.F. transformer (T1)
70412	Transformer—Second I.F. transformer (T2) (C5, C6)
36800	Transformer—Audio transformer (T3)
33726	Washer—"C" washer for tuning shaft

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES **92572-2**
72201	Speaker—5" P.M. speaker complete with cone and voice coil
	SPEAKER ASSEMBLIES **92510-1D** **92510-1F** **92510-1M** **92510-1R** **92510-1W**
70413	Speaker—5" P.M. speaker complete with cone and voice coil
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS ASSEMBLIES
*72646	Back—Cabinet back for 66X11
*72647	Back—Cabinet back for 66X12
*72829	Back—Cabinet back for 66X13
*72830	Back—Cabinet back for 66X14
*72897	Back—Cabinet back for 66X15
*72648	Baffle—Baffle board for 66X11 and 66X12
Y1400	Cabinet—Brown plastic cabinet for 66X11
Y1401	Cabinet—Ivory plastic cabinet for 66X12
36890	Clamp—Dial clamp—L.H.—for 66X11 and 66X12
36891	Clamp—Dial clamp—R.H.—for 66X11 and 66X12
*72802	Clamp—Dial clamp (1 set) for 66X13, 66X14, and 66X15
*72652	Dial—Glass dial scale for 66X11 and 66X12
37831	Fastener—Push fastener for backs for 66X11 and 66X12
71595	Feet—Rubber feet for 66X13, 66X14 and 66X15 cabinets (4 required)
X1650	Grille—Grille cloth for 66X13, and 66X15
X1651	Grille—Grille cloth for 66X14
*72651	Holder—Jewel holder for 66X11 and 66X12
*72650	Jewel—Decorative polystyrene jewel for cabinet front for 66X11, and 66X12
71821	Knob—Control knob—maroon—for 66X11, 66X13, and 66X15
*72645	Knob—Control knob—ivory—for 66X12
*72800	Knob—Control knob—brown—for 66X14
*72649	Motif—Decorative motif cabinet top for 66X11 and 66X12
*72803	Motif—Decorative motif for cabinet for 66X13, 66X14 and 66X15
71126	Nut—Speed nut for fastening motif for 66X11 and 66X12
72765	Nut—Speed nut for fastening motif for 66X13, 66X14, and 66X15
30900	Spring—Retaining spring for knobs
*72804	Window—Dial window for 66X13, 66X14, and 66X15

"clarified schematics"

MODELS 612V1, 612V3

RADIO CORP. OF AMERICA

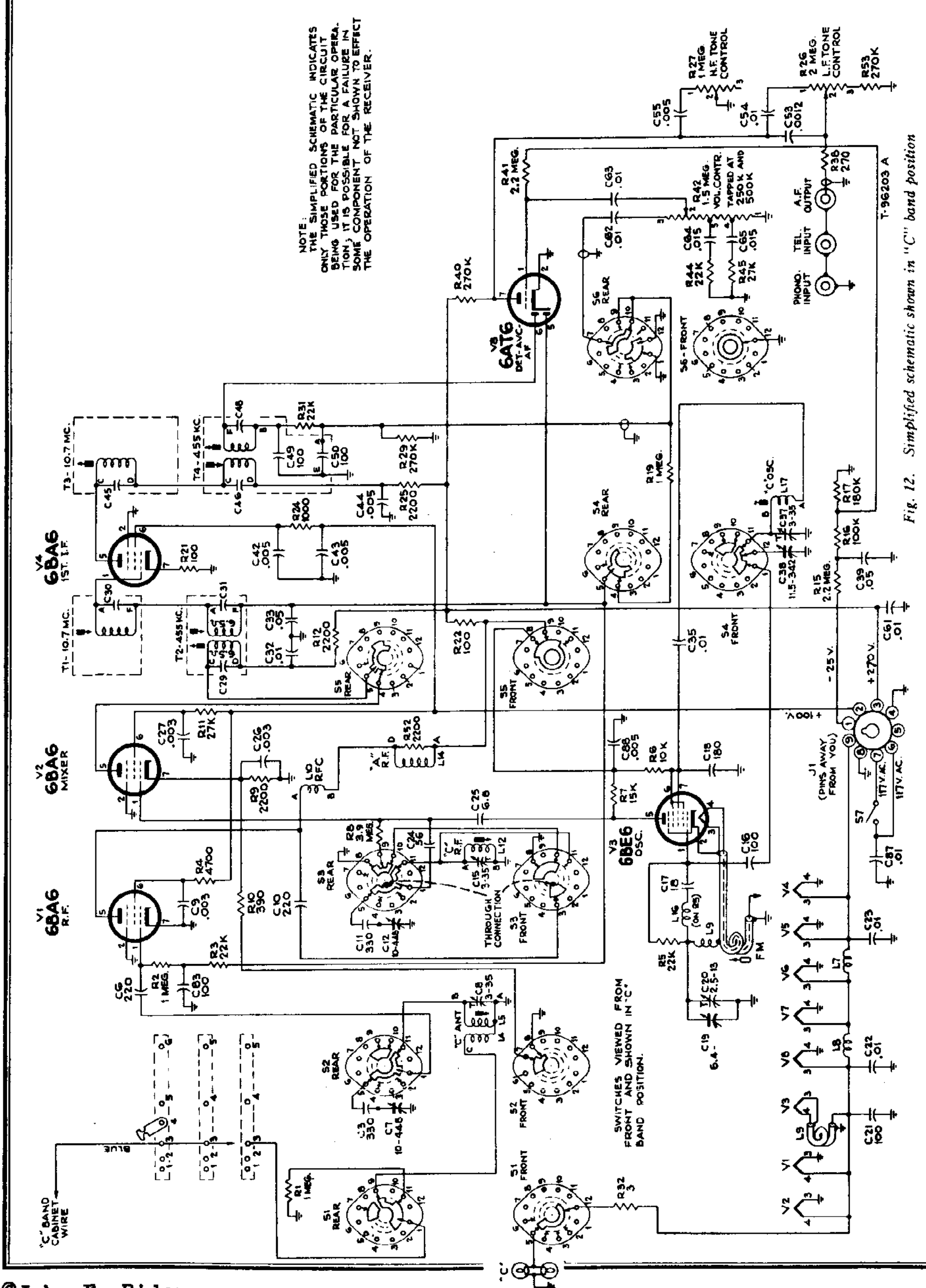


Fig. 12. Simplified schematic shown in "C" band position

RADIO CORP. OF AMERICA

MODELS 612V1, 612V3

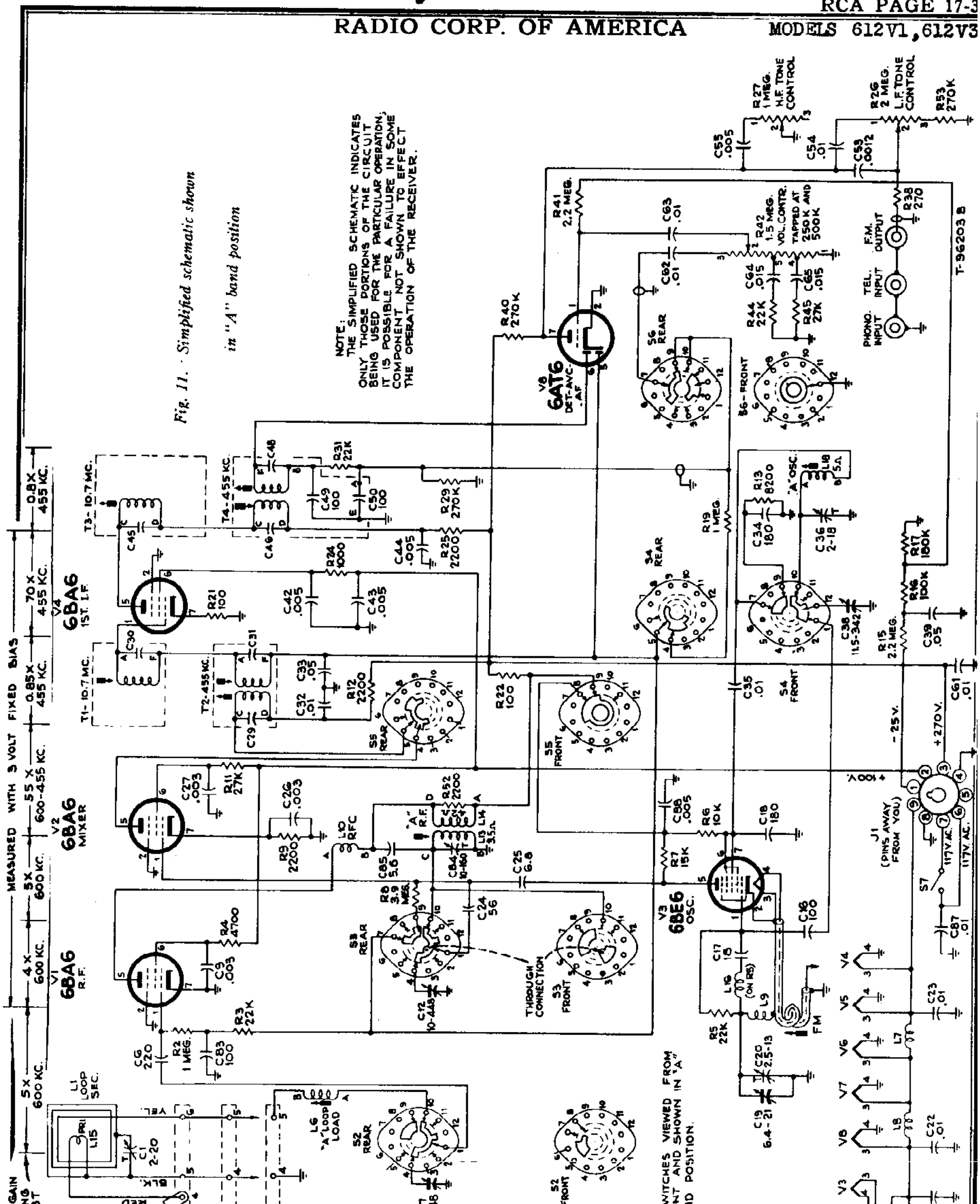


Fig. 11. · Simplified schematic shown in "A" band position

RADIO CORP. OF AMERICA

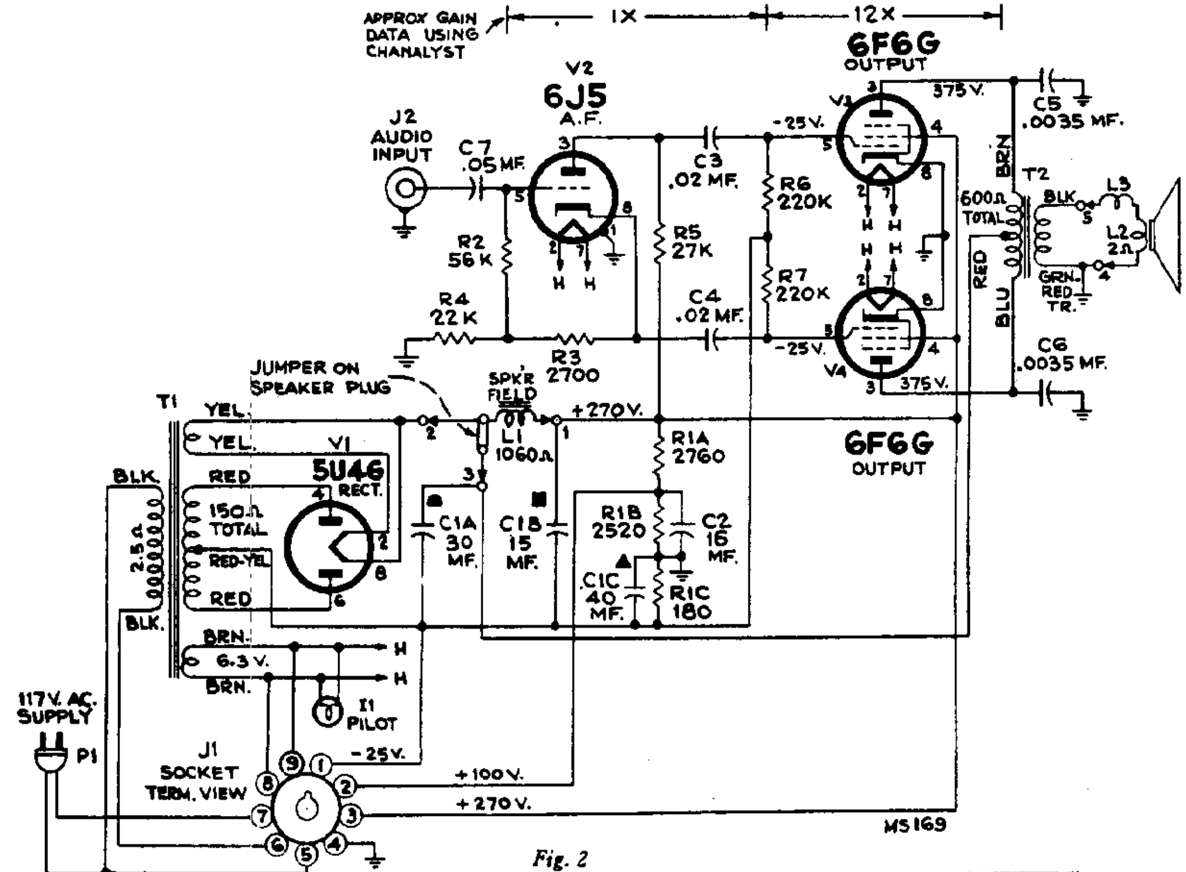


Fig. 2

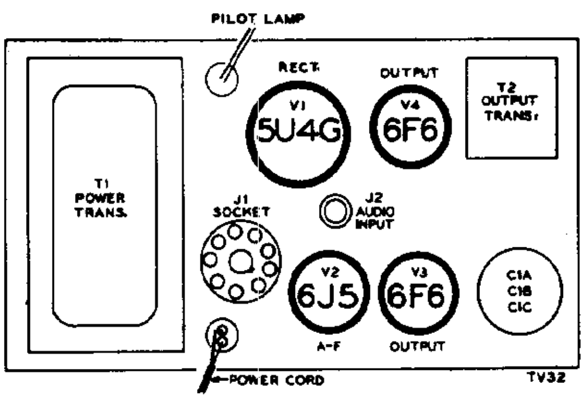


Fig. 3

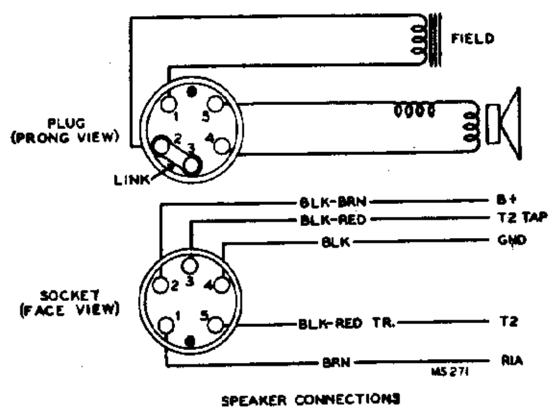


Fig. 4

RADIO CHASSIS UNIT RK121 VOLTAGE CHART

Tube	Type		Pin #	Phono.	B.C.	S.W.	F.M.
V1	6BA6	Plate	5	260	225	220	235
		SCG	6	95	110	90	85
V2	6BA6	Plate	5	260	255	240	230
		SCG	6	90	100	70	70
		Cathode	7	6	6.5	1.8	1.3
V3	6BE6	Plate	5	0	160	155	140
		Grids 2-3-4	6, 7	0	155	160	140
		Grid 1	1		−5.2 (1600 KC)	−10.5 (9.5 MC)	−6.6 (108 MC)
		Grid 1	1	. .	−2.7 (550 KC)	−15.5 (16.2 MC)	−6 (100 MC)
		Grid 1	1	. .	. . .	. . .	−9 (88 MC)
V4	6BA6	Plate	5	245	250	230	220
		SCG	6	110	120	105	95
		Cathode	7	1.4	1.2	1.4	1.5
V5	6AU6	Plate	5	255	245	240	230
		SCG	6	145	140	140	140
V6	6AU6	Plate	5	0	0	0	200
		SCG	6	0	0	0	110
V7	6AL5	. . . .	. . .	. . .	. . .	. . .	. . .
V8	6AT6	Plate	7	150	150	150	150

AMPLIFIER UNIT RS123 VOLTAGE CHART

V2	6J5	Plate	3	230	. . .	. . .	. . .
		Cathode	8	36	. . .	. . .	. . .
V3	6F6G	Plate	3	375	. . .	. . .	. . .
		SCG	4	270	. . .	. . .	. . .
		Grid	5	−25	. . .	. . .	. . .
V4	6F6G	Same as V3			. . .	. . .	. . .

"B" Voltage Measured from Rectifier Fil. (5U4G) to Gnd. 380V.

Voltages were measured with Voltohmyst with the Radio Chassis RK121 connected.
All voltages are measured in respect to ground.

Cathode Currents with Band Switch in FM Position			
V1	RF. Amp.	14 ma.	V7 Ratio Det.
V2	Mixer	4.7 ma.	V8 Det.-Avc.-AF
V3	Osc.	15.9 ma.	Power amp. RS123
V4	First IF.	12.4 ma.	V1 Rectifier Total 140 ma.
V5	2nd IF.-Phono. Amp.	5.6 ma.	V2 Phase Inverter 2.15 ma.
V6	Driver FM	13.7 ma.	V3, V4 Power output 27 ma.

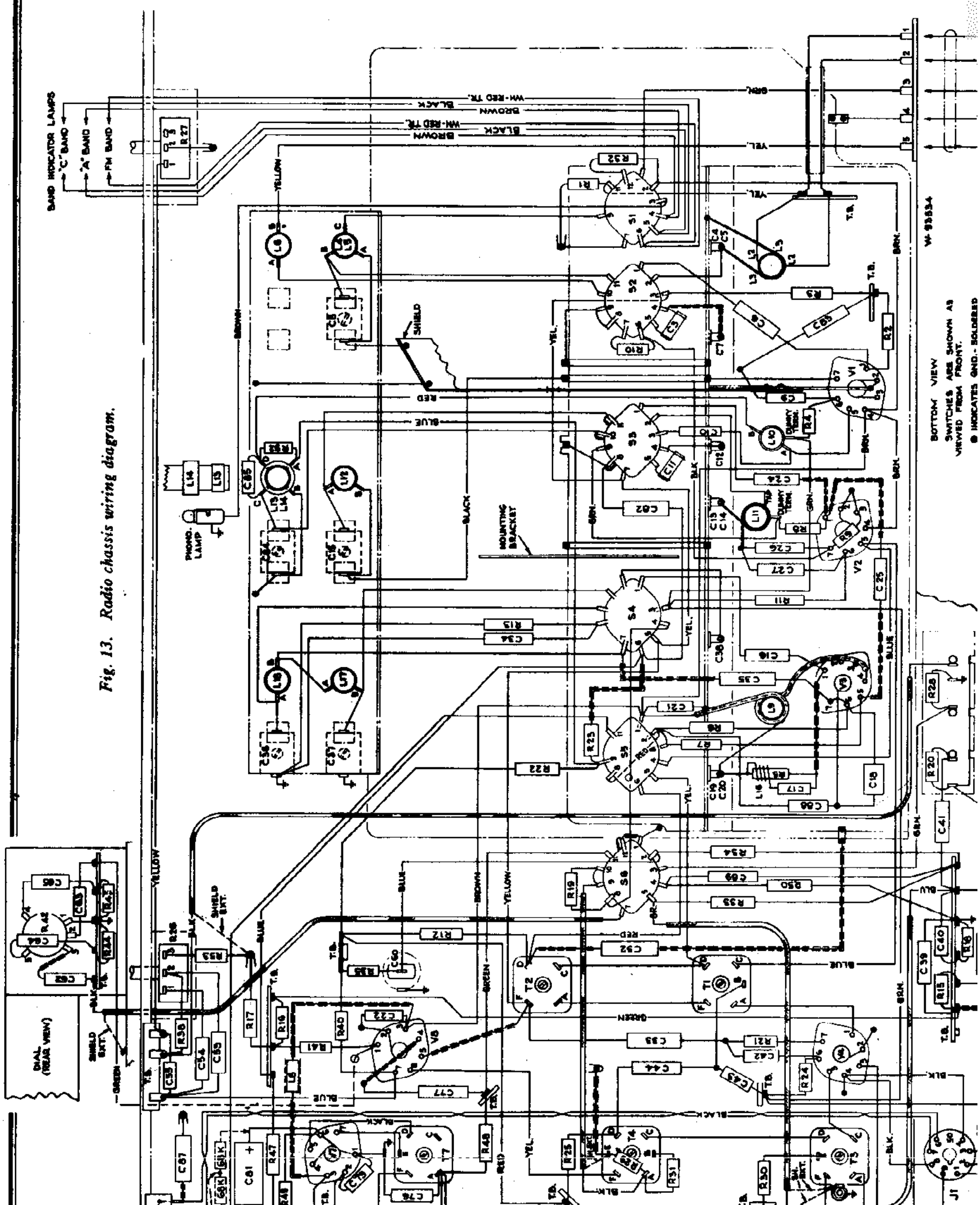


Fig. 13. Radio chassis wiring diagram.

MODELS 612V1, 612V3 RADIO CORP. OF AMERICA

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart. Any adjustments made on the FM 10.7 mc. IF's make it necessary to realign the AM 455 kc. IF's.

For "A" and "C" band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

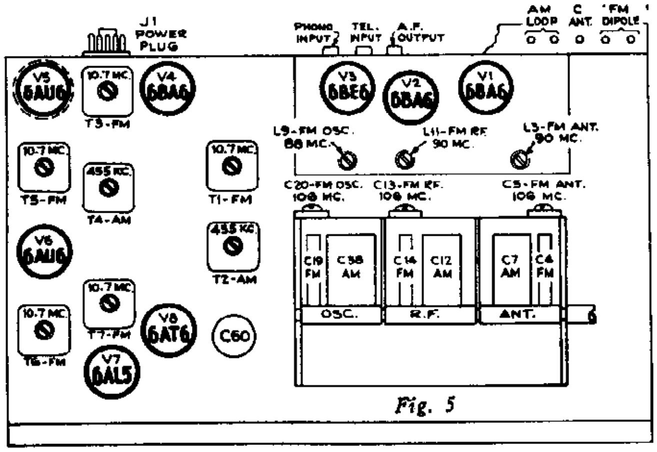


Fig. 5

FM RATIO DETECTOR ALIGNMENT

SET RANGE SWITCH TO FM POSITION

Steps	Connect High Side of Test Osc. To—	Tune the Osc. To—	Turn Vol. Cont. To—	Adjust
1.	Connect a 680 ohm Resistor between lugs D and E of the ratio detector transformer T7. Connect DC probe of a voltohmyst to the negative lead of the 5 mfd. Electrolytic capacitor C81. The common lead of the meter to chassis.			
2.	Driver grid pin 1, of 6AU6 (V6) in series with a .01 MFD capacitor.	10.7 MC 30% Mod. 400 Cycles AM	Maximum Volume	Driver transformer T6 for maximum DC voltage across C-81
3.	Remove Meter Leads and disconnect the 680 ohm resistor from D and E on T7. Connect two 68,000 ohm resistors (within 1% of each other) in series, across C81. Connect the common lead of the Voltohmyst to the center point of the 68,000 ohm resistors and the DC probe to contact No. 7 on rear of Switch wafer S6. Use the 30 volt scale.			
4.	Same as Step 2	Same as Step 2	Volume Control Maximum	†T7 Bottom core for Zero DC Balance on Voltohmyst ††T7 top core for minimum audio output. (Output meter across voice coil)
5.	Reconnect voltohmyst as in step 1, omitting the 680 ohm resistor.			
6.	Repeat step 2 omitting 680 ohms.			
7.	Remove all connections.			

†Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction.

††The zero DC balance and the minimum AF output should occur at the same point: if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the voltohmyst, and an output meter connected across the voice coil for the point at which both zero DC and minimum output occurs.

Note:—Two or more points may be found which will satisfy the condition required in step 4. T7 top core should be correctly adjusted when approximately ½ inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum AF and minimum DC is reached.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Lead from pin 5, tube V2, to terminal "C" on transformer T1 should be dressed close to chassis.
2. Leads to terminals "C" and "D" on transformer T2 should be dressed close together.
3. The following capacitors must be dressed close to the chassis with leads kept as short as possible: C32, C33, C66, C69, C79, and C80.
4. All FM coil connections must be soldered in exact place as the original. (One-sixteenth inch difference in length may be excessive).
5. Lead from pin 7, tube V8, must be dressed away from lead to terminal "D" of transformer T7.
6. ALL wiring in the receiver is critical as to length and placement. It is therefore important when servicing, that extreme care should be taken so as not to disturb more of the wiring than absolutely necessary.

Note: Keep tuning capacitor rotor grounding brushes clean and making good contact.

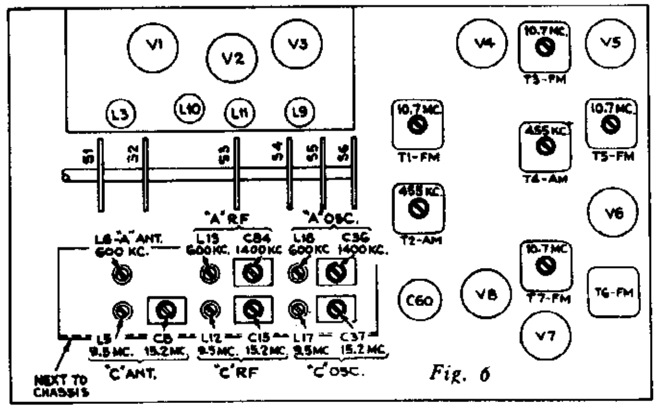


Fig. 6

ANT.—RF.—IF. ALIGNMENT

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
"FM" IF Alignment					
1.	Connect the DC probe of a voltohmyst to the negative lead of the 5 MFD electrolytic capacitor C 81, and the common lead of the meter to chassis ground				
* 2.	Mixer grid pin #1 of 6BA6, (V2) in series with a .01 MFD capacitor (Adjust test osc. output for 6-10 volts developed across C81) (Range switch in FM position) (Use very short lead)	To RF Tube shelf ground near mixer tube (use very short leads)	10.7 MC 30% modulated at 400 cycles AM.	Max. cap. (Fully meshed)	*T5, T3, T1 top and bottom cores alternately loading primary & secondary of each transformer with 680 ohms while the opposite side of the same transformer is being adjusted. Adjust all transformers for maximum voltage across C81.
"AM" IF Alignment					
3.	Mixer grid pin #1 of (V2) in series with a .01 MFD Capacitor. (Turn band switch to "A" or "C" band)	To chassis ground	455KC	High Freq. end of Dial	**Top and bottom Cores of T2 and T4. (For maximum voltage across voice coil)

ANT—RF—IF—ALIGNMENT (Continued)

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
	"C" Band OSC.—RF.—ANT. Alignment				
4.	"C" Band Ant. Terminal #3 Through a dummy Ant. comprising a 150 ohm resistor in series with a 25 to 30 mmf capacitor	To Chassis ground	15.5 MC	15.5 MC	Osc.—C37*** RF.—C15 Ant.—C8 (For maximum voltage across voice coil)
5.			9.5 MC	9.5 MC	Osc.—L17*** RF—L12 Ant.—L5 (For maximum voltage across voice coil)
6.	Repeat steps 4 and 5 for accurate alignment				
	"A" Band OSC.—RF.—ANT.				
7.	High Side (Red Lead) of Loop Primary with link open	To Chassis ground	1400 KC	1400 KC	Osc.—C36 RF.—C84 Ant.—C1 (For maximum voltage across voice coil)
8.	Through a Dummy Ant. comprising a 200 mmf. Capacitor		600 KC	600 KC	Osc.—L18 RF—L13 Ant.—L6 (For maximum voltage across voice coil)
9.	Repeat steps 7 and 8 for Max. output.				
	"FM" Band OSC.—RF.—ANT. Alignment				
10.	FM antenna terminal #1 in series with a 120 ohm resistor	To FM antenna terminal #2 in series with a 120 ohm resistor	106 MC	106 MC	Osc.—C20 for maximum voltage across C81.
11.			88 MC	88 MC	**** Osc.—L9 for maximum voltage across C81.
12.	Repeat steps 3 and 4 for exact calibration.				
13.	Remove or turn test oscillator off.			106 MC No Carrier	***** RF, C13 for maximum voltage across C81 (Noise Voltage)
14.				90 MC No Carrier	**** RF, L11 for maximum voltage across C81. (Noise Voltage)
15.	Repeat steps 13 and 14 for maximum output.				
16.	Same as step 10	Same as step 10	106 MC	106 MC	Ant. C5 for maximum voltage across C81.
17.	Same as step 10	Same as step 10	90 MC	90 MC	Ant. L3 for maximum voltage across C81.
18.	Repeat steps 9 and 10 for maximum output.				
19.	Disconnect dummy antenna and adjust Ant. trimmer C1 on loop when set is installed in cabinet.				

*This method is known as alternate loading which involves the use of a 680 ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 680 ohm resistor while the plate winding is being peaked.

When the windings are loaded, it is necessary to increase the 10.7 MC input since the gain will decrease and the voltage across C81 will be less.

**It is necessary to alternately load the primary and secondary of each 455 KC I. F. transformer with 10,000 ohms while the opposite side of the same transformer is being adjusted.

***To guard against the possibility of alignment of L17 and C37 to image frequencies, tune the test oscillator to 15.5 MC and turn the radio dial to 15.5 MC. Then adjust the test oscillator to 16.41 MC (image frequency). By increasing the test oscillator output, a signal should be heard.

Tune the test oscillator to 9.5 MC and turn the radio dial to 9.5 MC, then adjust the test osciliator to 10.41 MC (image frequency). By increasing the test oscillator output, a signal should be heard.

(If these image frequencies cannot be heard, the set is incorrectly aligned, therefore repeat steps 4 and 5)).

****Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.

*****Two points can be found having the greatest noise voltage developed. Use the one with the greater capacity (tighter adjustment).

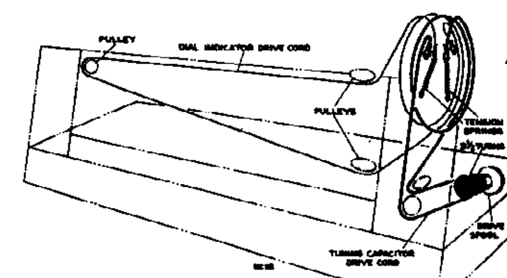


Fig. 7

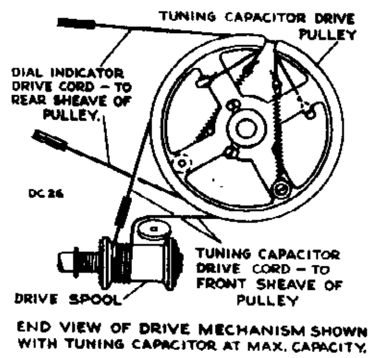


Fig. 8

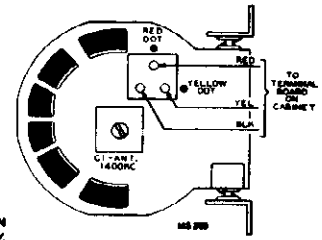


Fig. 9
Loop antenna

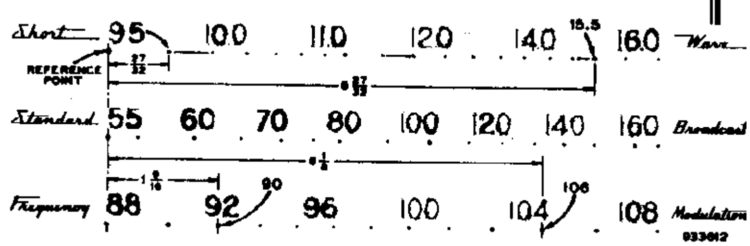


Fig. 10
Dial scale drawing

Circuit diagram breakdown description

In order to have the instrument function in all of the positions of the band switch, a number of extra tubes and parts are required. We have attempted to simplify the circuits by including simplified schematics showing only the parts actually required for the instrument to operate in the position to which the switch is turned.

It can be noted by examining the different simplified schematics, that a few of the circuits deviate from the conventional form.

Tube V8 performs the function of 2nd Det., AVC and AF amp. in "A" and "C" bands only. Diode #5 of V8 functions as a device to prevent the AVC bus from becoming positive.

Tubes V6 and V7 are used only in the FM positions; V6 as a driver and V7 as an FM demodulator as described under the heading of Ratio Detector.

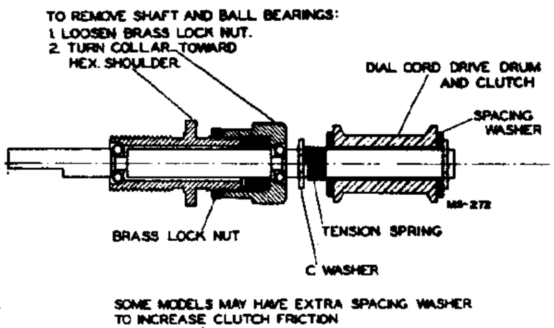


Fig. 17
Tuning Shaft and Clutch Assembly

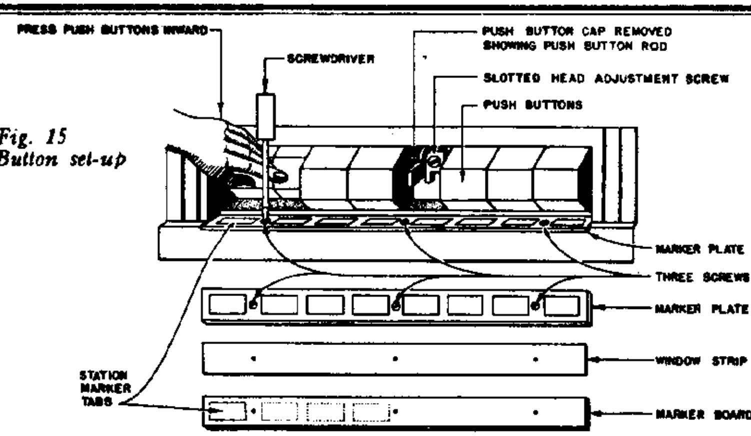


Fig. 15
Push-Button set-up

Push-Button Adjustment

The push-buttons should be adjusted for eight favorite stations after the receiver is operating, and has had a 5 or 10 minute warm-up period.

Any standard broadcast or frequency modulation stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Remove the first PUSH-BUTTON (Just pull) and note the adjustment screw beneath.
2. Loosen the adjustment screw.
3. Manually tune very accurately for the desired station.
4. Push the PUSH-BUTTON rod in till it is against stop.
5. Tighten adjustment screw.
6. Make adjustment for the other buttons, setting up and checking each for the chosen station in a similar manner.
7. Recheck all PUSH-BUTTONS and reset if found necessary.

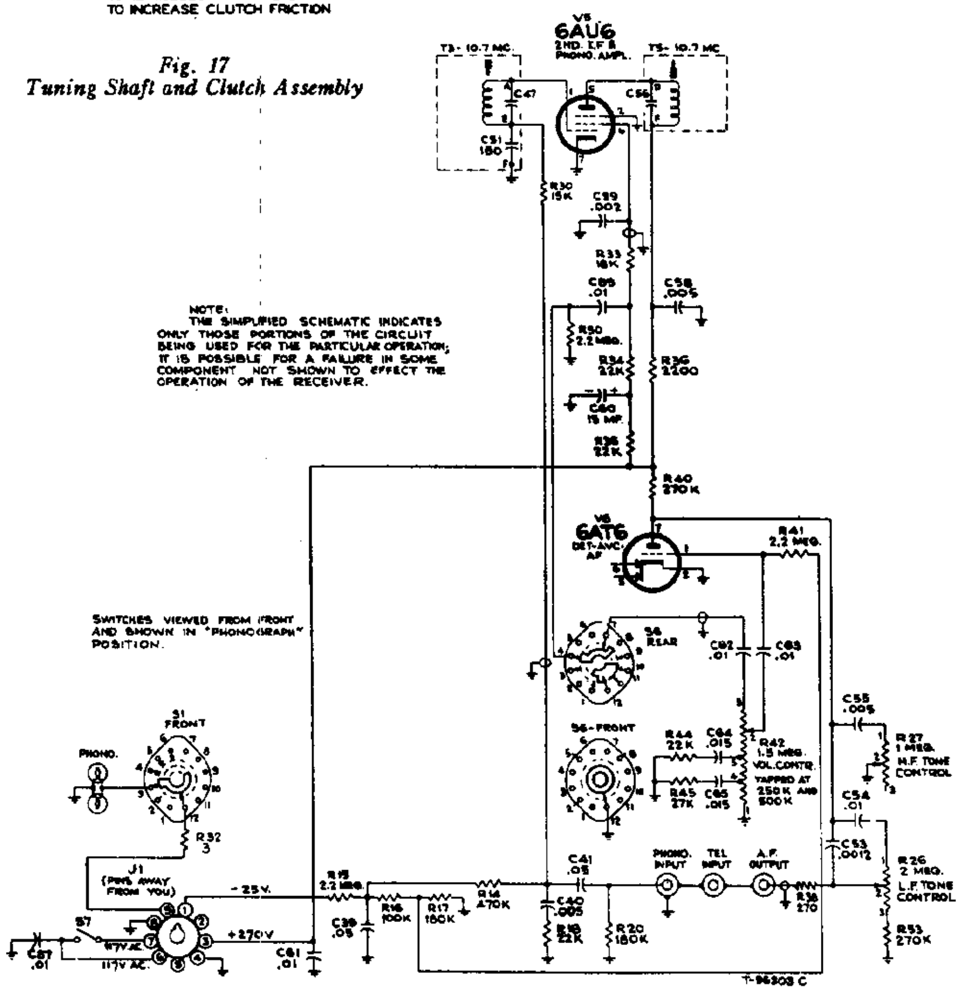


Fig. 14. Schematic shown for phonograph reproduction.

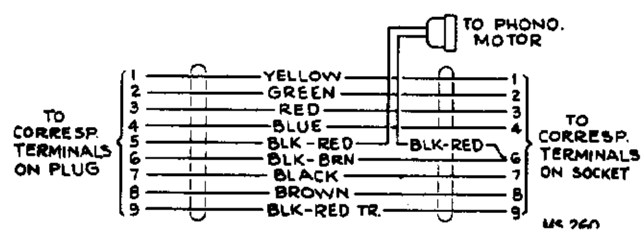


Fig. 15
Power Cable

Some instrument may not have the color code as indicated, therefore use continuity method to check cable assembly.

RADIO CORP. OF AMERICA

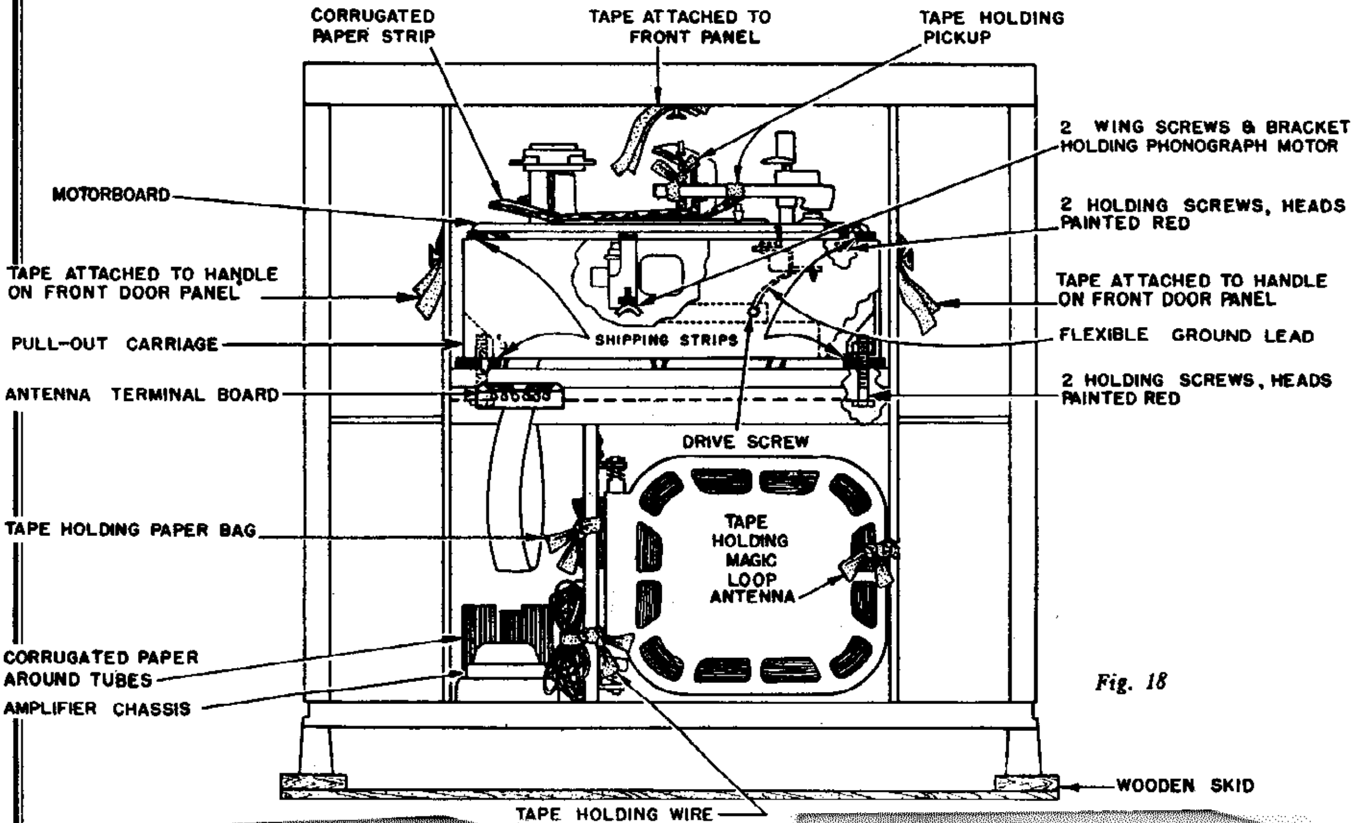
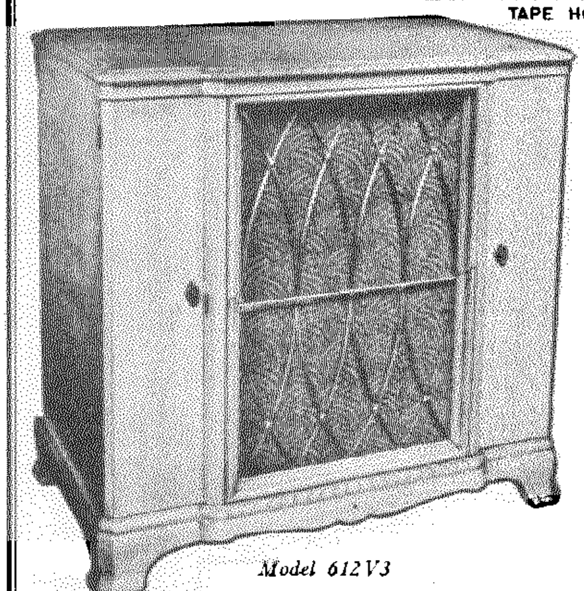
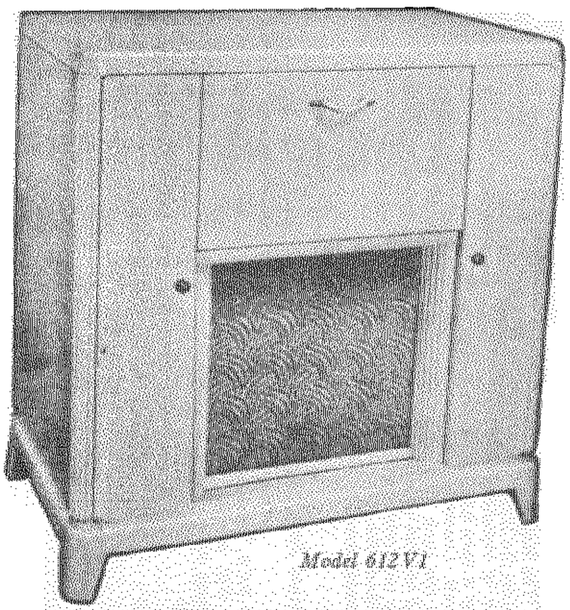


Fig. 18

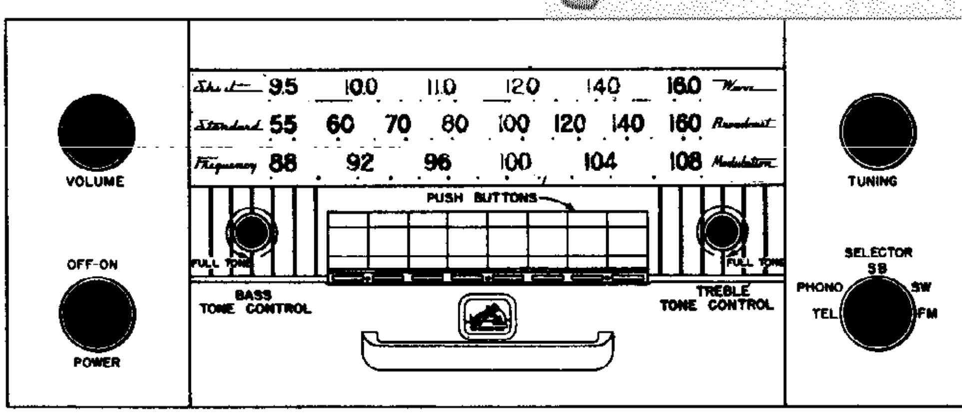


Model 612V3



Model 612V1

Fig. 20
Control Panel



RADIO CORP. OF AMERICA

EXTERNAL ANTENNAS—If reception is not satisfactory on one or more of the three bands, using the built-in cabinet antennas, an external antenna may be used. The Magic Loop Antenna will usually provide sufficient pickup on the Standard Broadcast band, but if an external dipole is installed to improve reception on Frequency Modulation it may be used for Standard Broadcast and Short Wave as well. Connections are made to the antenna terminal board in the back of the cabinet. External antennas may be erected indoors or outdoors and should be oriented in direction for requirements of best reception. RCA Television Antenna, Stock No. 225 or 226, or the equivalent with 300-ohm transmission line is recommended for an external antenna.

Figure 21 (A) shows the *Antenna Terminal Board* with connections for *internal* cabinet *antennas.*

Figure 21 (B) shows connections for the RCA Television Antenna replacing those for the *internal FM antenna* on terminals 1 and 2, and the *internal SW antenna* disconnected at terminal 3. The external dipole antenna is now the antenna for FM and SW bands.

Figure 21 (C) shows the additional change for connecting the Standard Broadcast band to make use of the external RCA Television Antenna. The link across terminals 4 and 5 is changed to terminals 4 and 3. The external antenna is now effective on all bands. Tighten terminals and be sure that the red, black and yellow leads (R.B.Y.) to terminals 4, 5 and 6 are still in place and securely connected.

Figure 21 (D) shows connections for a separate outdoor antenna on SW and SB reception, and the external dipole on FM. This outdoor antenna should consist of a wire 30 to 60 feet or so in length mounted in a convenient location as high as possible. Connect lead-in from the antenna to terminal 3 on the antenna terminal board. This outdoor antenna is effective on SB and SW bands. If this connection makes the SB signal too strong, causing overload and distortion, replace the link across terminals 4 and 5 as in Figure 21 (A) and (B). This outdoor antenna is now effective on SW only

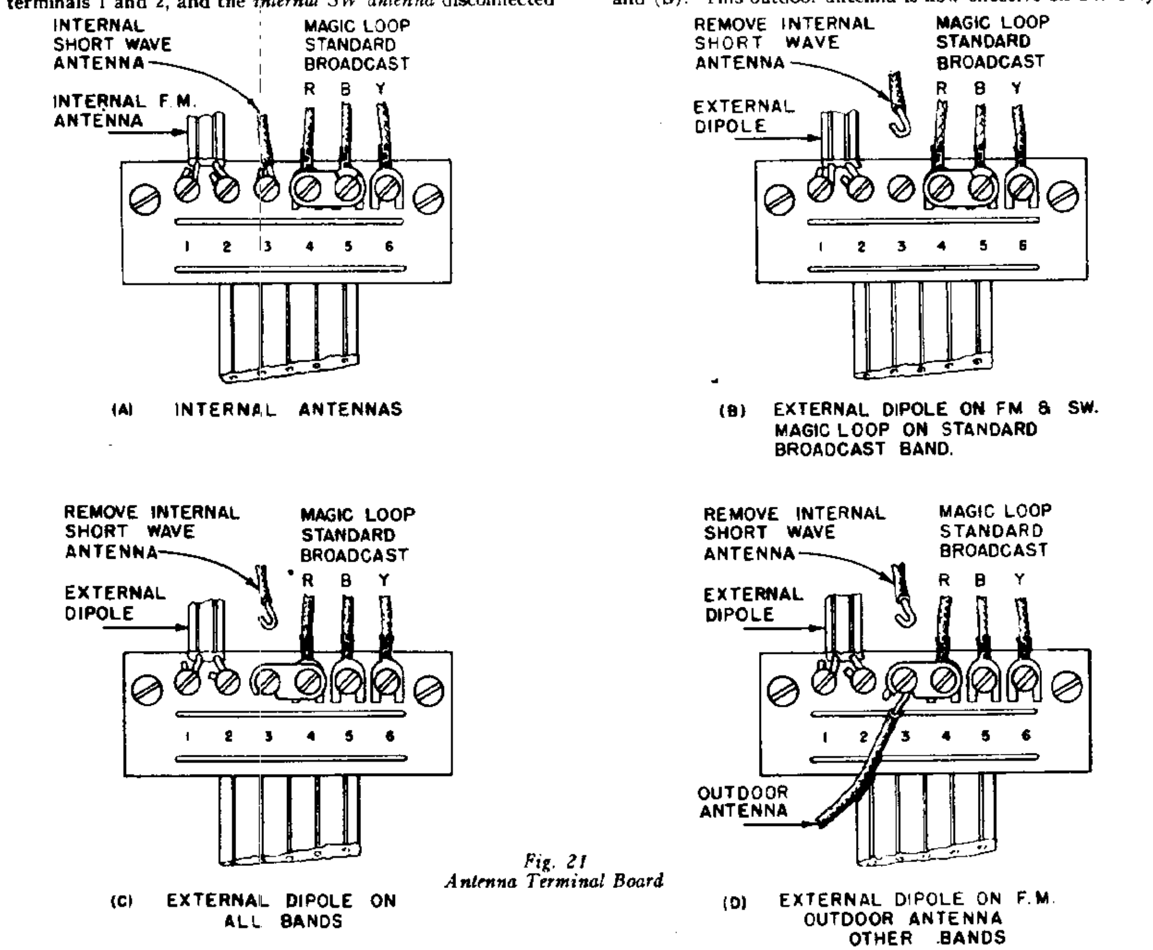


Fig. 21
Antenna Terminal Board

Frequency Range
Broadcast....540-1600 kc
Shortwave "C" Band....9.2-16.0 mc
Frequency Modulation....88-108 mc

Intermediate Frequency AM....455 kc

Intermediate Frequency FM....10.7 mc

Tube Complement of RK-121
1. RCA 6BA6....RF Amplifier
2. RCA 6BA6....Mixer
3. RCA 6BE6....Oscillator
4. RCA 6BA6....1st IF
5. RCA 6AU6....2nd IF and Phono. Amp.
6. RCA 6AU6....Driver
7. RCA 6AL5....Ratio Detector
8. RCA 6AT6....AM-DET-AVC-AF

Tube Complement of RS-123
1. RCA 5U4G....Rectifier
2. RCA 6J5....Phase Inverter
3. RCA 6F6G....Power Output
4. RCA 6F6G....Power Output

Undistorted Power Output....10 watts

Maximum Power Output....11 watts

Loudspeaker
Type....12 inch Electrodynamic
Voice coil impedance....2.2 ohms at 400 cycles

7—Pilot Lamps....No. 51
1—Pilot Lamp....No. 44

Overall Radio Chassis Dimensions
Height....17½"
Width....9"
Depth....6"

Tuning Drive Ratio....10 to 1

Total Power Consumption....Approx. 170 watts

For information on Record Changer refer to Service Data on RP176.

Models—612V1 Mahogany and Walnut....RP176B
—612V1 Blonde....RP176A
—612V3 Mahogany and Walnut....RP176
—612V3 Blonde....RP176A

NOTE:—The difference between the three RP models is color of Motor Board Parts only, mechanical construction is the same.

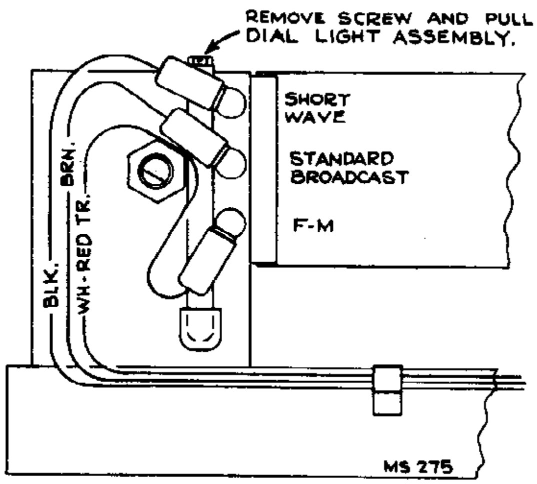


Fig. 22

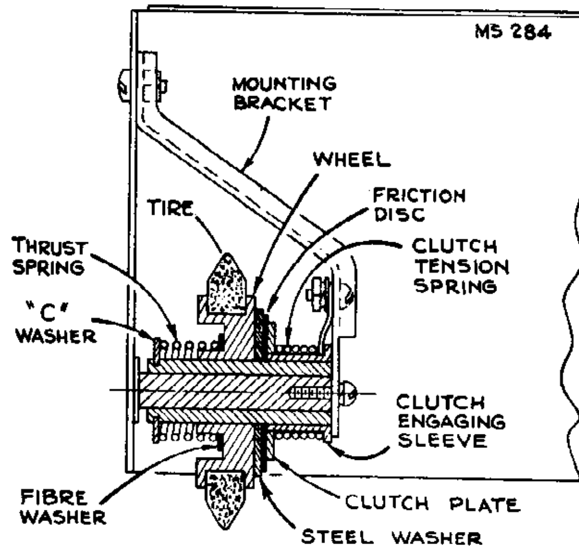


Fig. 23
Friction clutch used on early models only.

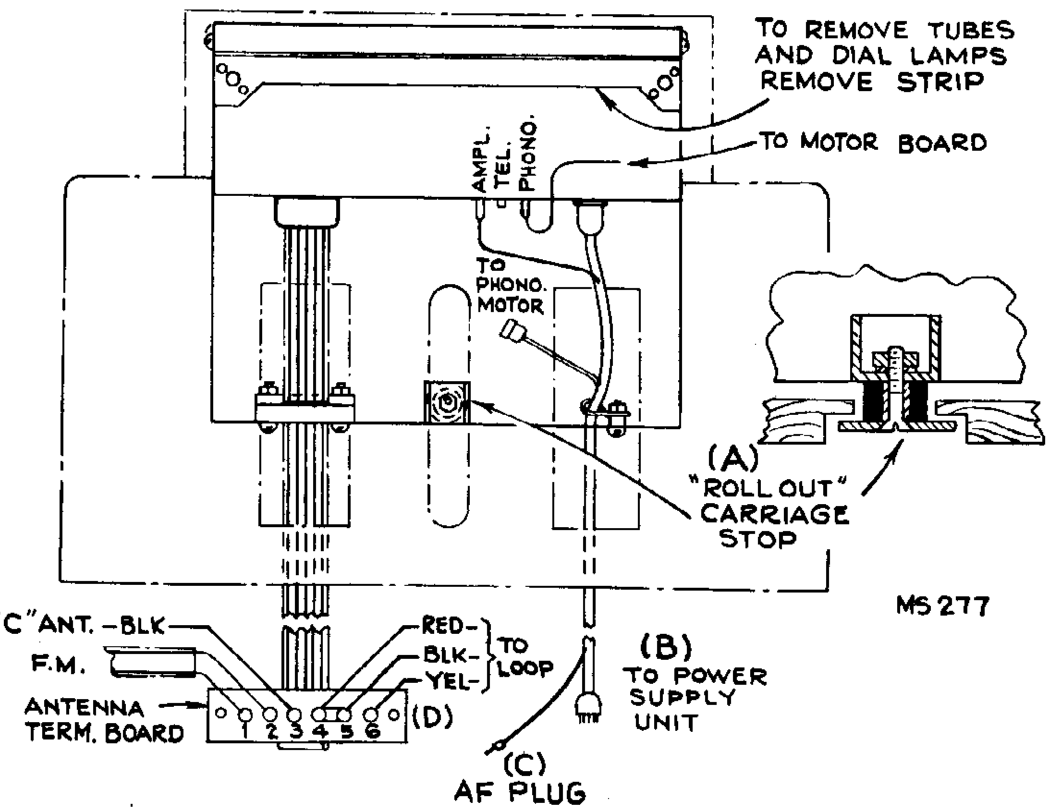


Fig. 24

Removal of dial lamps

1. Remove plug buttons on side of "Roll-out" (Fig. 25).
2. Remove "C" washer on record player (Fig. 25).
3. Raise record player (Fig. 26).
4. Remove tube strip (Fig. 24).
5. Loosen screw and pull dial light strip (Fig. 22).

Removel of Tubes

Use the same procedure as for removal of dial lamps excluding item #5.

Removal of "Roll-out" carriage

1. Remove "Roll-out" stop (A) (Fig. 24).
   (Access to nut can be made up through slot in bottom of carriage platform in rear of cabinet).
2. Pull out power cable plug (B) (Fig. 24) at power supply, also loosen cable clamps.
3. Remove audio plug (C) (Fig. 24).
4. Remove antenna wires and antenna terminal strip (D) (Fig. 24).
5. Pull "Roll-out" carriage out through front of cabinet.

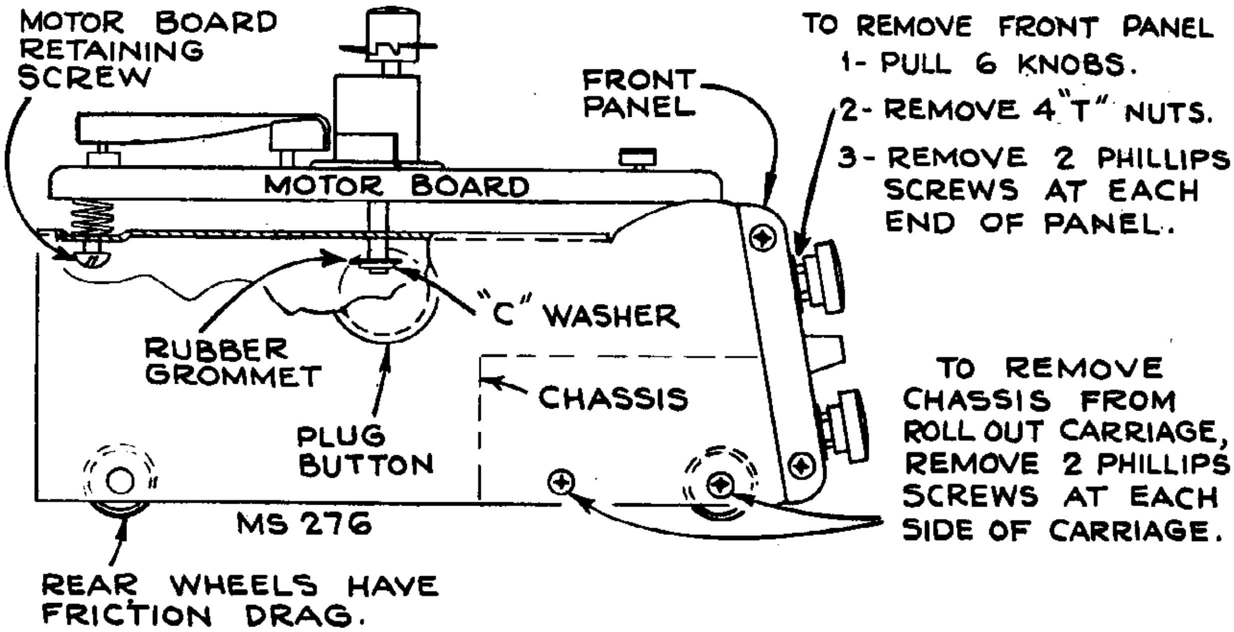


Fig. 25

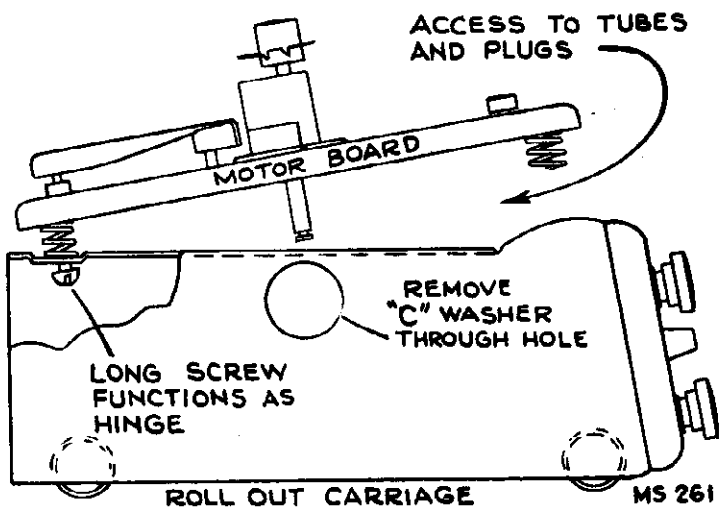


Fig. 26

Caution:—

Do not attempt to remove chassis while the "Roll-out" carriage is in the cabinet. Remove the entire carriage from the cabinet to prevent damaging cabinet finish.

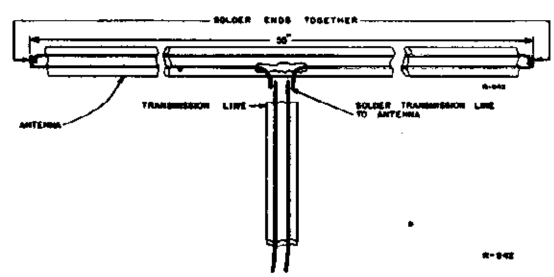


Fig. 27
Sketch showing folded dipole installed in cabinet.

To remove record player

1. Remove plug buttons and "C" washer (Fig. 25).
2. Tilt motor board (Fig. 26).
3. Pull AC and phono plugs (Fig. 24).
4. Remove retaining screws (Fig. 26).
5. Lift motor board out.

To remove front panel and chassis from "Roll-out"

1. Remove entire "Roll-out" carriage from cabinet.
2. Pull six control knobs (Fig. 25).
3. Remove four "T" nuts (Fig. 25) (Do not break fiber washers).
4. Remove two cross-recess head screws at each end of panel (Fig. 25).
5. Remove two cross-recess head screws at each end of carriage (Fig. 25).
6. Lift chassis out through front of carriage.

Friction clutch on rear wheel of "Roll-out" carriage

(used on early models only)

No adjustment has been provided to govern the friction in the clutch on the rear wheels of the "Roll-out" carriage. If the drag becomes too great add a small amount of grease to friction disc (Fig. 23).

STOCK No.	DESCRIPTION
	RADIO CHASSIS ASSEMBLIES RK 121
*71964	Arm—Push arm and cam for tuning condenser
3658	Ball—Steel ball (3/32" dia.) for tuning condenser drive
10705	Ball—Steel ball (5/32" dia.) for tuning condenser drive
*71651	Ball—Steel ball for manual tuning shaft
*71638	Board—5 contact terminal board for antenna lead-in
*71811	Bracket—Idler bracket less pulleys
*71643	Bracket—L.H. dial plate support bracket
*71642	Bracket—R.H. dial plate support bracket
*71791	Cable—Antenna cable (5 conductor molded)
*71809	Capacitor—Adjustable, 1.6-18 mmf. (C84)
*71804	Capacitor—Adjustable, 1.6-18 mmf. (C5, C13)
*71803	Capacitor—Adjustable, 2.5-13 mmf. (C20)
*71808	Capacitor—Adjustable, 3-35 mmf. (C36, C37)
*71930	Capacitor—Ceramic, 5.6 mmf. (C85)
39043	Capacitor—Ceramic, 6.8 mmf. (C25)
*71807	Capacitor—Adjustable, 10-160 mmf. (C8, C15)
71924	Capacitor—Ceramic, 56 mmf. (C24)
45233	Capacitor—Ceramic, 100 mmf. (C16, C21, C83)
39644	Capacitor—Mica, 180 mmf. (C18)
*71922	Capacitor—Ceramic, 180 mmf. (C34)
*71920	Capacitor—Ceramic, 220 mmf. (C6, C10)
*71919	Capacitor—Ceramic, 330 mmf. (C3, C11)
*71929	Capacitor—Ceramic, 1000 mmf. (C80)
*72117	Capacitor—Tubular, .0012 mfd., 400 volts (C53)
*71927	Capacitor—Tubular, .002 mfd., 400 volts (C59)
*71921	Capacitor—Tubular, .003 mfd., 200 volts (C9, C26, C27, C82)
*71926	Capacitor—Tubular, .005 mfd., 200 volts (C40,C42, C43, C66, C76, C77, C78)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C44, C55, C58, C68, — C69, C88)
71588	Capacitor—Moulded paper, .01 mfd (C87)
70631	Capacitor—Tubular, .01 mfd., 600 volts (C61)
*71925	Capacitor—Tubular, .01 mfd., 400 volts (C32, C35, C54, C62, C80)
*71923	Capacitor—Tubular, .01 mfd., 200 volts (C22, C23, C63)
*72120	Capacitor—Tubular, .015 mfd., 200 volts (C64, C65)
*71551	Capacitor—Tubular, .05 mfd., 200 volts (C33, C39, C41, C79)
*72121	Capacitor—Electrolytic, 5 mfd., 50 volts (C67, C81)
33879	Capacitor—Electrolytic, 15 mfd., 300 volts (C60)
*71646	Clamp—Dial clamp (2 required)
*71856	Coil—Antenna coil—"C" band (L4, L5)
*71942	Coil—Filament choke coil (L7, L8)
*71937	Coil—F.M. oscillator coil (L9)
*71938	Coil—F.M. R.F. coil (L11)
*71940	Coil—F.M. antenna coil (L2, L3)
*71855	Coil—Loop loading coil "A" band (L6)
*71852	Coil—Oscillator coil—"A" band (L18)
*71853	Coil—Oscillator coil—"C" band (L17)
*71857	Coil—R.F. coil—"A" band (L13, L14)
*71939	Coil—R.F. choke coil (L10)
*71854	Coil—R.F. coil—"C" band (L12)
38405	Control—H.F. tone control (R27)
38401	Control—L.F. tone control (R26)
*71596	Control—Volume control (R42)
32634	Cord—Indicator drive cord (Approx. 42" overall length) NOTE: Before assembling, stretch to full length
32634	Cord—Manual drive cord (Approx. 30" overall length) NOTE: Before assembling, stretch to full length
*71941	Coupling—F.M. coupling unit (L16, C17, R9)
*71652	Dial—Glass dial scale—Short wave
*71653	Dial—Glass dial scale—standard broadcast
*71654	Dial—Glass dial scale—F.M.
*71805	Drum—Drive drum
35844	Gear—Scissor gear for tuning condenser
*71800	Gear—12 tooth gear fastened to range switch flexible shaft coupling
*71801	Gear—18 tooth gear fastened to range switch shaft
*71647	Guide—Indicator slide guide
*71851	Grommet—Rubber grommet to mount socket (4 req'd)
*71790	Grommet—Rubber grommet to mount cradle (6 req'd)
*71832	Indicator—Station selector indicator
11765	Lamp—Dial lamp—Mazda 51
11801	Lamp—Pilot lamp—Mazda 44
*71962	Pinion—Pinion and shaft for tuning condenser
*71963	Plate—Bearing plate for tuning condenser pinion
*71644	Plate—Dial back plate only less window, dials, support, indicator slide, indicator and pulleys
*71648	Pulley—Indicator cord pulley and idler pulley
*71650	Pulley—Manual tuning shaft cord pulley
*71630	Receptacle—9 prong male plug for power cable (J1)
*71637	Receptacle—Television, audio and phono input jack
*72323	Resistor—3 ohms, ½ watt (R32)
34765	Resistor—100 ohms, ½ watt (R21, R22)
30929	Resistor—270 ohms, ½ watt
30498	Resistor—390 ohms, ½ watt (R10)
34766	Resistor—1000 ohms, ½ watt (R24, R37, R46)
34767	Resistor—2200 ohms, ½ watt (R9, R12, R25, R36, R52)
30494	Resistor—4700 ohms, ½ watt (R4)
14250	Resistor—8200 ohms, ½ watt (R13)
*71914	Resistor—10,000 ohms, 1 watt (R6)
36714	Resistor—15,000 ohms, ½ watt (R30, R48, R51)
*71915	Resistor—15,000 ohms, 1 watt (R7)
3219	Resistor—18,000 ohms, ½ watt (R33)
*71989	Resistor—22,000 ohms, 1 watt (R43)
30492	Resistor—22,000 ohms, ½ watt (R3, R18, R31, R34, R35, R44, R49)
30409	Resistor—27,000 ohms, ½ watt (R11, R45)
3252	Resistor—100,000 ohms, ½ watt (R16, R28)
11959	Resistor—180,000 ohms, ½ watt (R17, R20)
30651	Resistor—270,000 ohms, ½ watt (R29, R40, R53)
30648	Resistor—470,000 ohms, ½ watt (R14)
30652	Resistor—1 megohm, ½ watt (R1, R2, R19)
30649	Resistor—2.2 megohms, ½ watt (R15, R41, R47, R50)
70592	Resistor—3.9 megohms, ½ watt (R8)
*71917	Resistor—22 megohms, ½ watt (R23)
*71798	Screw—#8-32 x 5/16" square head set screw
*71965	Screw—Push arm locking screw
*71806	Shaft—Coupling shaft for range switch flexible shaft
*71641	Shaft—Flexible shaft for range switch knob
*71812	Shaft—Manual tuning shaft less spring and pulley
*71833	Socket—Lamp socket—R.H.
*71834	Socket—Lamp socket—L.H.
*71931	Socket—Pilot lamp socket
*71850	Socket—Tube socket complete with base and shield
72516	Socket—Tube socket—miniature
*71649	Spring—Coil spring for manual tuning shaft
*71936	Spring—Drive cord spring
33622	Spring—Tuning condenser push arm return spring
*71645	Support—Glass support (rubber) (2 required)
*71640	Switch—Power switch (S7)
*71802	Switch—Range switch (S1, S2, S3, S4, S5, S6)
*71934	~~Transformer—Ratio Det. transformer (T7, C72, C74)~~
*71935	Transformer—Driver transformer (T6, C70)
*71845	Transformer—First I.F. transformer (F.M.) (T1, C28, C30)
*71847	Transformer—Second I.F. transformer (F.M.) (T3, C45, C47, C51)
*71849	Transformer—Third I.F. transformer (F.M.) (T5, C56, C57)
*71846	Transformer—First I.F. transformer (A.M.) (T2, C29, C31)
*71848	Transformer—Second I.F. transformer (A.M.) (T4, C46, C48, C49, C50)
37435	Washer—"C" washer to hold gear on coupling shaft
31606	Washer—Idler pulley spring washer and spring washer for drive cord pulley
2917	Washer—Spring washer for manual tuning shaft and for range switch flexible shaft
*71810	Window—Dial window

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS 123
70646	Capacitor—Tubular, .0035 mfd., 1000 volts (C5, C6)
*70632	Capacitor—Tubular, .02 mfd., 600 volts (C3, C4)
72590	Capacitor—Tubular, .05 mfd., 200 volts (C7)
31323	Capacitor—Dry electrolytic, 16 mfd., 150 volts (C2)
30509	Capacitor—Electrolytic comprising 1 section of 30 mfd., 450 volts, 1 section of 15 mfd., 350 volts and 1 section of 40 mfd., 25 volts (C1A, C1B, C1C)
18409	Insulator—Mounting insulator for electrolytic capacitor
11765	Lamp—Pilot lamp—Mazda 51
12493	Plug—Speaker cable plug
*71060	Resistor—Comprising 1 section of 180 ohms, 3.5 watts, 1 section of 2520 ohms, 3.97 watts and 1 section of 2760 ohms, 9.3 watts (R1C, R1B, R1A)
30730	Resistor—2700 ohms, ½ watt (R3)
30492	Resistor—22,000 ohms, ½ watt (R4)
30409	Resistor—27,000 ohms, ½ watt (R5)
30650	Resistor—56,000 ohms, ½ watt (R2)
14583	Resistor—220,000 ohms, ½ watt (R6, R7)
35787	Socket—Audio input socket (J2)
31364	Socket—Pilot lamp socket
71659	Socket—9 prong power socket (J1)
31319	Socket—Tube socket
*71661	Transformer—Output transformer (T2)
37048	Transformer—Power transformer, 117 volt, 50/60 cycles (T1)
	SPEAKER ASSEMBLIES 92567-2W RL 70R1
13867	Cap—Dust cap
71147	Clamp—Clamp to hold metal cone suspension (2 required)
*71146	Coil—Field coil—1060 ohms
11469	Coil—Neutralizing coil
36145	Cone—Cone complete with voice coil
31539	Plug—5 prong male plug for speaker
*71144	Speaker—12" EM speaker complete with cone and voice coil less plug
71145	Suspension—Metal cone suspension
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
*71864	Antenna—Di-pole antenna
*72598	Back—Cabinet back (half-length) for Model 612V1
*72599	Back—Cabinet back (full-length) for Model 612V1
*72579	Back—Cabinet back (half-length) for Model 612V3 (2 required)
*72580	Back—Cabinet back (full-length) for Model 612V3
*71888	Bottom—Bottom cover
36639	Bracket—Pilot lamp bracket
*71874	Bushing—Bushing and washer for large knobs (4 required)
*71884	Button—Push button
*72447	Cable—Shielded audio cable—complete with two pin plugs
*71863	Cable—5 wire moulded antenna lead-in cable
13103	Cap—Pilot lamp cap
38684	Capacitor—Mica trimmer, 2-20 mmf. (C1)
*71892	Catch—Door catch
X1617	Cloth—Grille cloth for 612V1 walnut or mahogany
X1620	Cloth—Grille cloth—upper—for 612V3 mahogany or walnut
X1621	Cloth—Grille cloth—lower—for 612V3 mahogany or walnut
X1624	Cloth—Grille cloth for 612V1 blonde
X1628	Cloth—Grille cloth—upper—for 612V3 blonde
X1629	Cloth—Grille cloth—lower—for 612V3 blonde
*71910	Decal—Trade mark decal
71966	Decal—Trade mark decal "Victrola"
*71866	Disc—Kit containing disc, rubber sleeve and spacer to prevent rollout mechanism from tilting
*72119	Escutcheon—Escutcheon only less screen, window and marker strips for blonde instruments
*71877	Escutcheon—Escutcheon only less screen, window and marker strips for mahogany instruments
*71876	Escutcheon—Escutcheon only less screen, window and marker strips for walnut instruments
*71868	Frame—Mounting frame and bracket
*71943	Grille—Metal grille—upper—for 612V3
*71944	Grille—Metal grille—lower—for 612V3
72763	Handle—Rollout mechanism pullout handle
36610	Hinge—L.H. door hinges (top and bottom) for 612V1
36817	Hinge—R.H. door hinges (top and bottom) for 612V1
*71945	Hinge—Door hinge for 612V3 (4 required)
*71764	Hinge—Drop door hinge (2 required)
*71890	Knob—Door knob (2 required) for 612V1
*71883	Knob—Tone control knob—for walnut or mahogany instruments
72761	Knob—Tone control knob—for blonde instruments
*72118	Knob—Volume control, power switch, selector switch or tuning knob—blonde instruments
71821	Knob—Volume control, power switch, selector switch or tuning knob—walnut or mahogany instruments
11765	Lamp—Pilot lamp—Mazda 51
*71862	Loop—Antenna loop complete
*71969	Marker—Call letter marker
72765	Nut—Speed nut to fasten transparent screen and back plate (2 required)
*71879	Plate—Backing plate for screen
*71881	Plate—Call letter marker plate
72764	Plate—Backing plate for pullout handle (1 set)
30868	Plug—2 contact female plug for power cable
*71967	Plug—9 contact female plug for interconnecting cable
32641	Plug—3 prong male plug for loop cable
*71968	Plug—9 prong male plug for interconnecting cable
31048	Plug—Pin plug for audio cable
*71946	Pull—Door pull for 612V3
*71891	Pull—Drop support door pull for 612V1
*71873	Retainer—Rubber retainer (⅝" O.D. x ⅛" I.D. x ⅜") to mount record changer (2 required)
*71878	Screen—Transparent screen
36422	Socket—3 contact female socket for loop cable
*71869	Spring—Braking spring for right rear wheel
*71870	Spring—Braking spring for left rear wheel
38873	Spring—Conical spring to mount record changer (4 required)
*71867	Spring—Retaining spring for push button
30900	Spring—Retaining spring for knobs
*71865	Spring—Spring to hold flexible cable from mechanism
*71880	Strip—Backing strip for call letter marker plate
*71889	Support—Drop support for door (2 required)
70545	Support—Loop support complete with mounting brackets and spring (2 required)
*71871	Tire—Rubber tire for rear wheels
*71872	Tire—Rubber tire for front wheels
*71875	Washer—Spring washer to fasten front wheels
2017	Washer—Spring washer for rubber retainer (2 required)
*71887	Wheel—Front wheel for rollout frame (2 required)
*71886	Wheel—Left rear wheel complete with braking mechanism
*71885	Wheel—Right rear wheel complete with braking mechanism
*71882	Window—Window for call letter markers

MODEL 711V2, Chassis RK117, RS123

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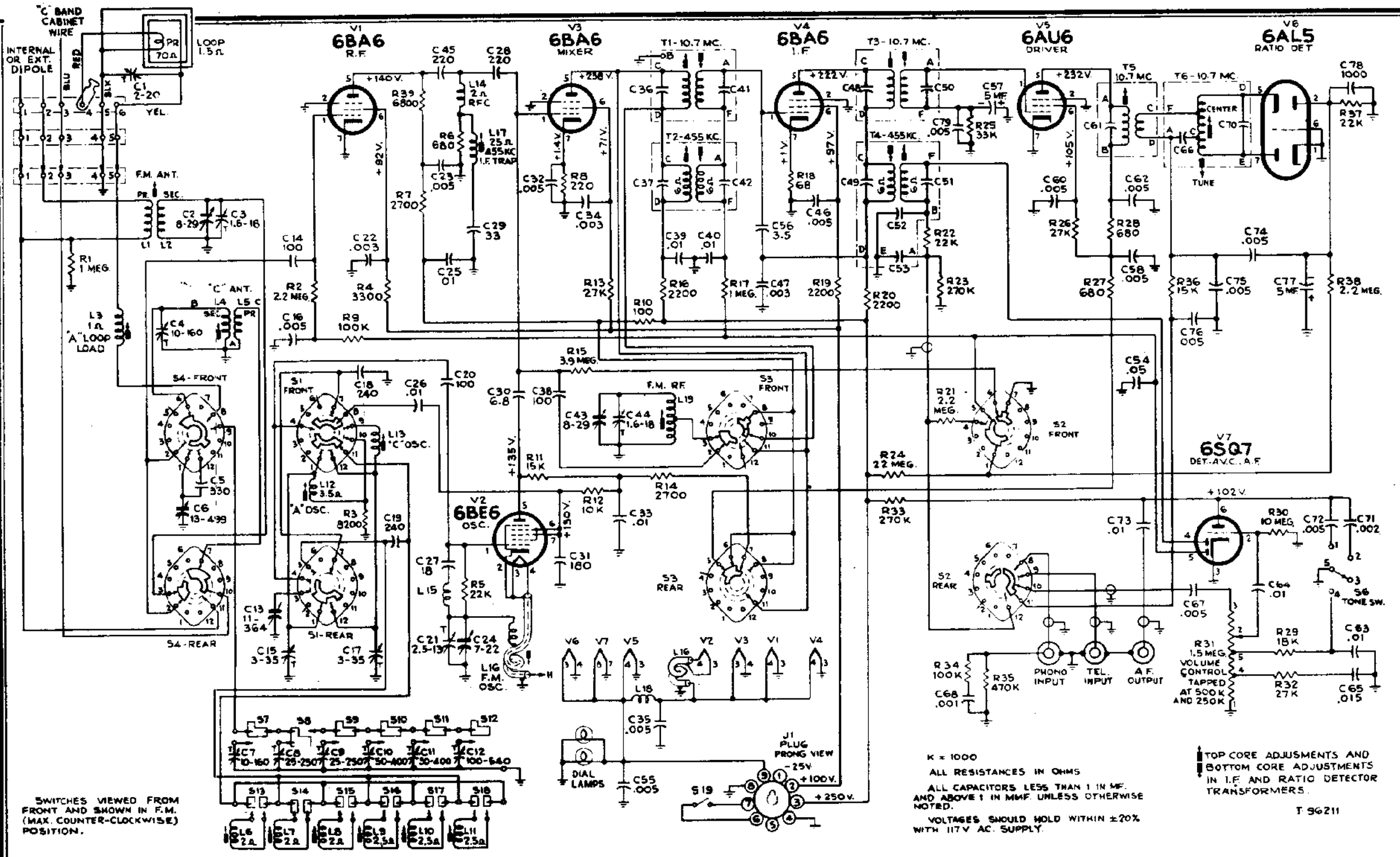

Figure 7—Complete Schematic of Radio Chassis—Range Switch Shown in FM Position.
For separate schematic of range switch positions see figures 11, 12, 13 and 15. See figure 8 for power amplifier.
NOTE: Antenna link closed for loop operation on Broadcast ("A") Band.

Loudspeaker (92567-2)

Type	12-inch Electrodynamic
Voice Coil Impedance	2.2 ohms at 400 cycles
Undistorted Power Output	10 watts
Maximum Power Output	11 watts
Total Maximum Power Consumption at 125 volts, 60 cycles	170 watts

Frequency Range

Broadcast	540-1,600 kc
Short Wave	9.2-16 mc
Frequency Modulation	88-108 mc
Intermediate Frequency—AM	455 kc
Intermediate Frequency—FM	10.7 mc

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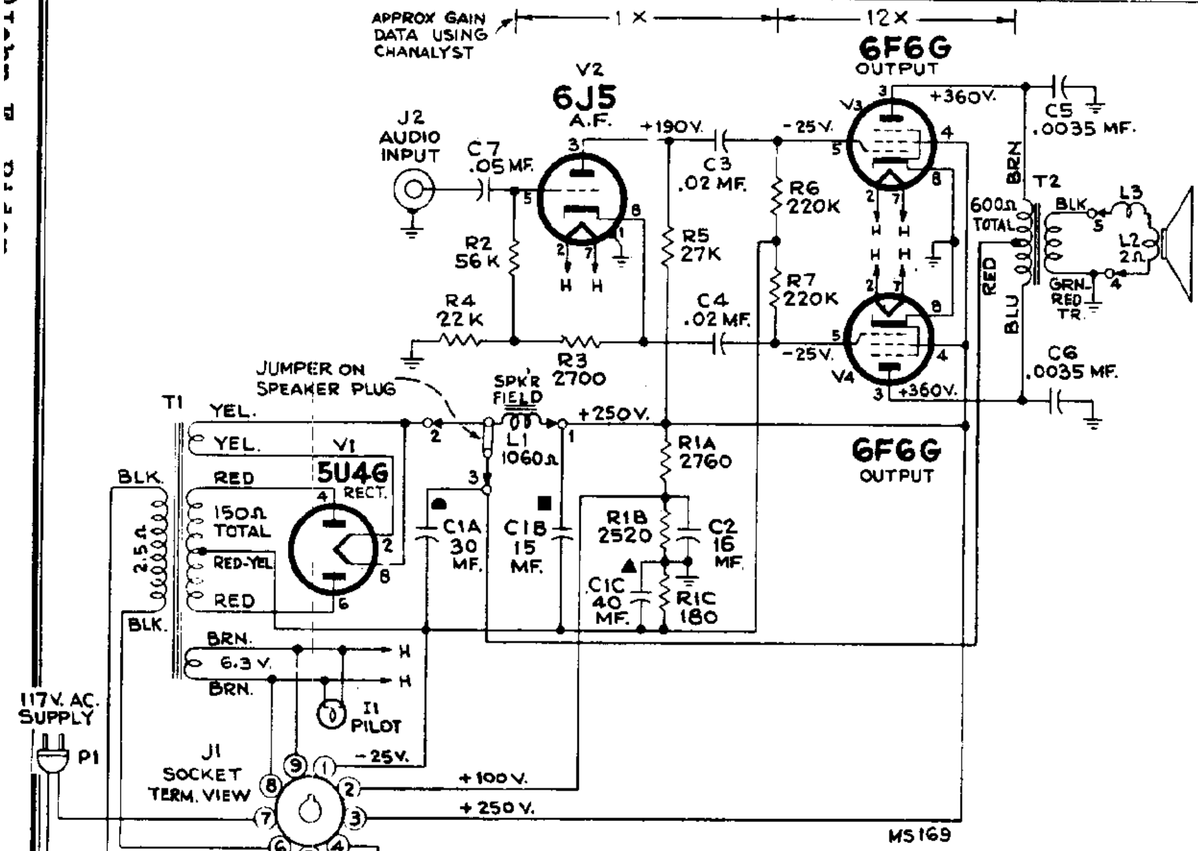

Figure 8—Power Amplifier RS-123

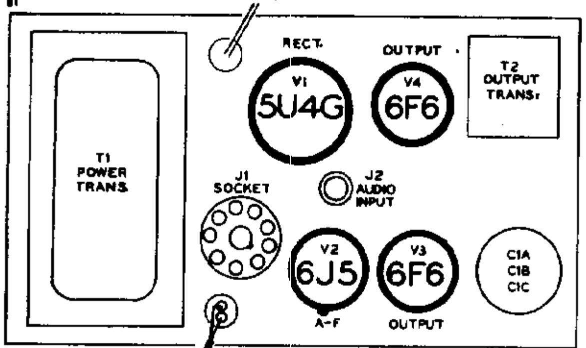

Figure 9—Top View of RS-123

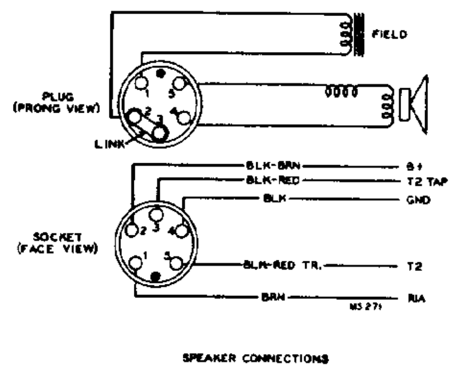

Figure 10

RADIO CHASSIS UNIT RK117 VOLTAGE CHART

Tube	Type	Element	Pin	Phono.	B.C.	S.W.	FM
V1	6BA6	Plate	5	148	148	154	140
		Scg	6	98	96	97	92
V2	6BE6	Plate	5	0	130	130	135
		Grids 2, 3, 4	6-7	0	140	140	130
		Grid 1	1	—	550 kc -24 v	9.5 mc -10 v	88 mc -11 v
		Grid 1	1	—	1600 kc -14 v	15.5 mc -16.2 v	108 mc -12 v
V3	6BA6	Plate	5	250	244	246	238
		Scg	6	67	69	72	71
V4	6BA6	Plate	5	238	236	230	222
		Scg	6	100	98	98	97
V5	6AU6	Plate	5	—	—	—	232
		Scg	6	—	—	—	105
V6	6AL5	—	—	—	—	—	—
V7	6SQ7	Plate	6	106	102	102	102

AMPLIFIER UNIT RS123 VOLTAGE CHART

Tube	Type	Element	Pin				
V1	5U4G	Fil.		380	—	—	—
V2	6J5	Plate	3	205	—	—	—
		Cathode	8	54	—	—	—
V3	6F6G	Plate	4	360	—	—	—
		Scg	5	250	—	—	—
V4	6F6G	Same as V3.					

All voltages were measured in respect to ground, using a VoltOhmyst.

CATHODE CURRENTS WITH BAND SWITCH IN THE FM POSITION

V1 R-F Amplifier	14.1 ma.	V7 Det. Avc. A-F	0.5 ma.
V2 Osc.	12.3 ma.	Power Amp. RS-123	
V3 Mixer	6.5 ma.	V1 Rectifier total	140 ma.
V4 I-F Amplifier	13.5 ma.	V2 Phase inverter	2.15 ma.
V5 Driver FM	15.4 ma.	V3 Power amp.	27 ma.
V6 Ratio Detector	....	V4 Power amp.	27 ma.

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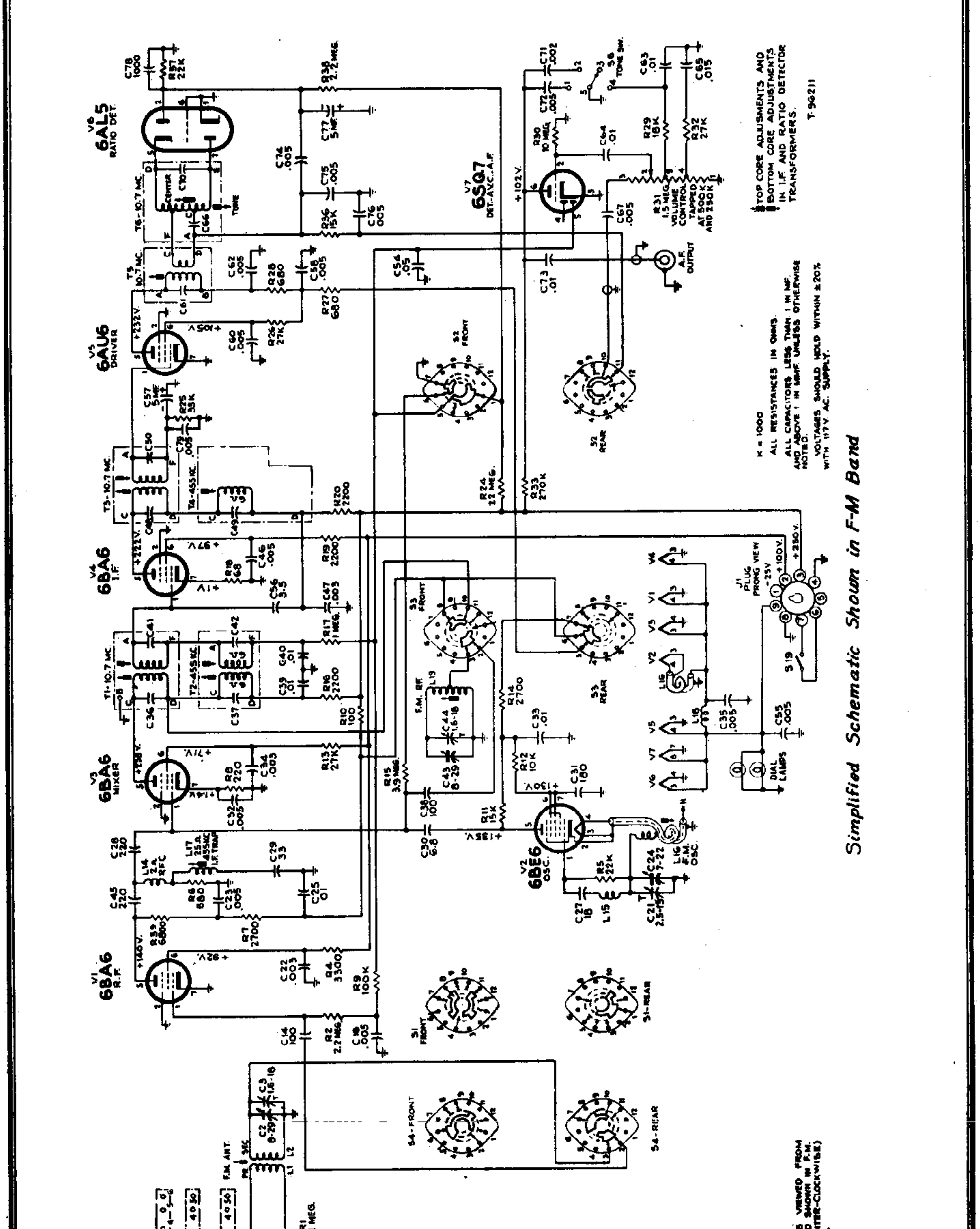

Simplified Schematic Shown in F-M Band

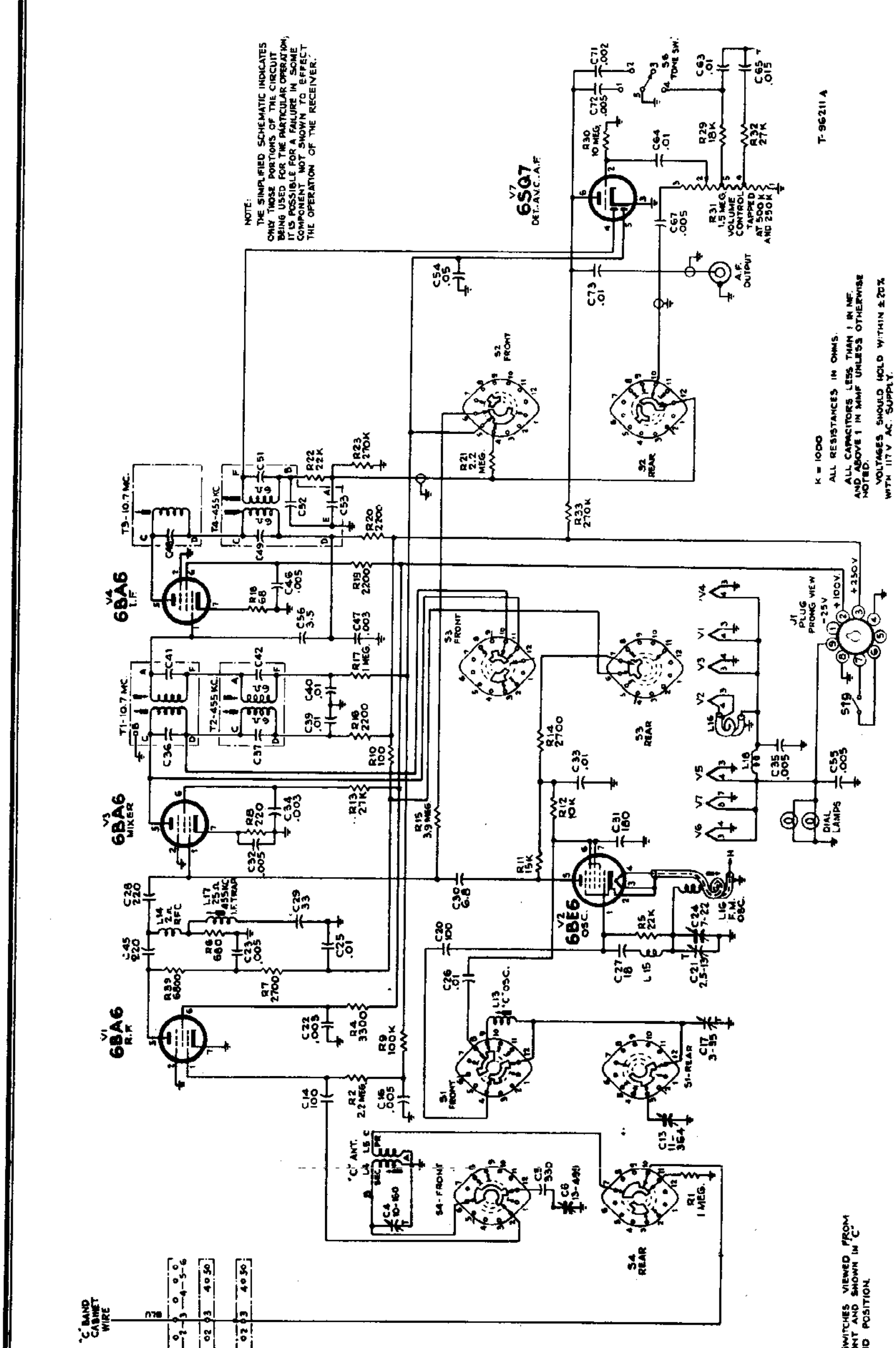

Figure 11—Simplified Schematic Shown in "C" Band Position Only. (See Note above.)

RADIO CORP. OF AMERICA

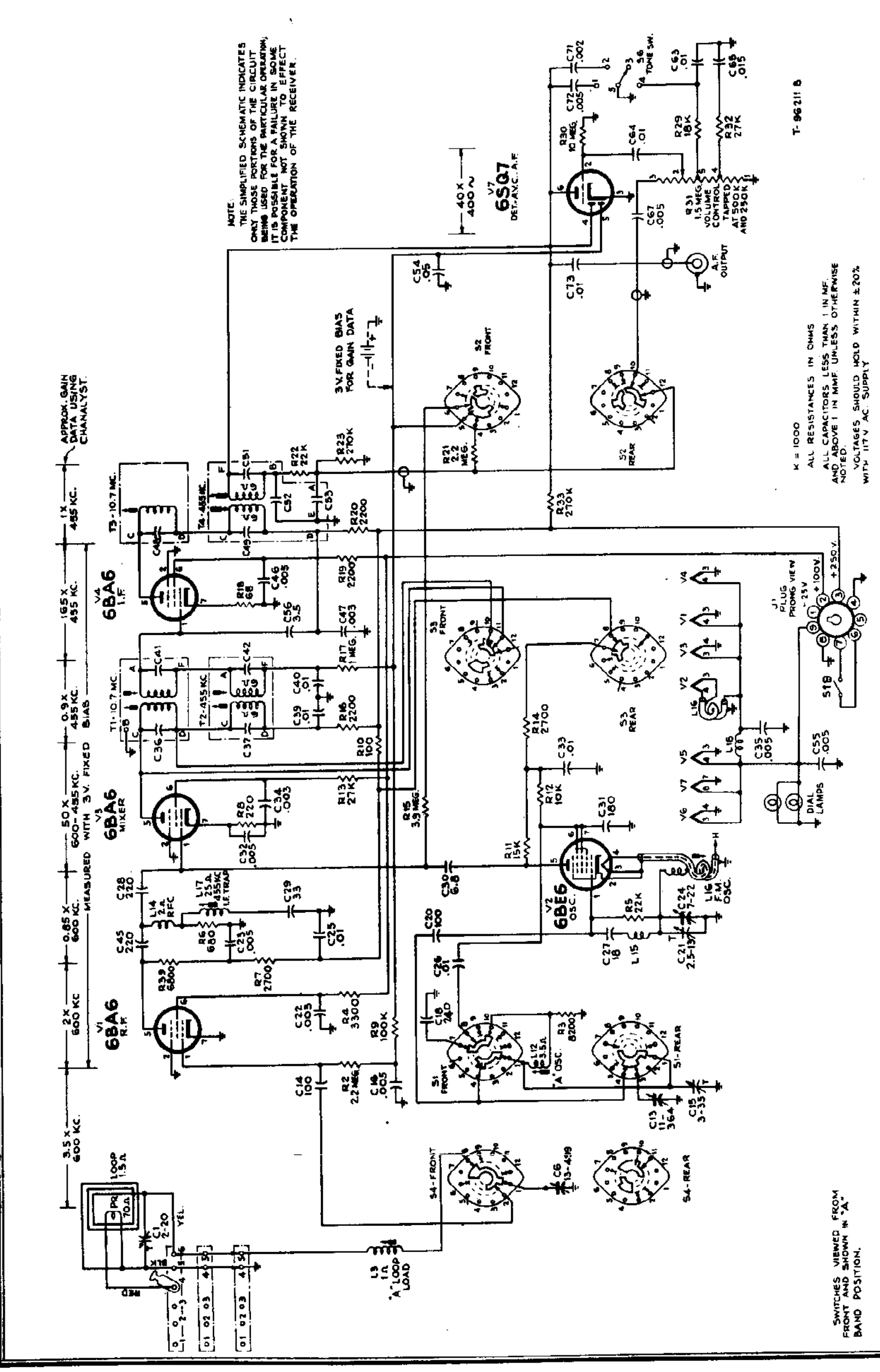

Figure 12—Simplified Schematic Shown in Broadcast ("A") Band Position Only. (See Note above.)

NOTE: Antenna link closed for loop operation (see page 11 for external antenna connections).

RADIO CORP. OF AMERICA

MODEL 711V2

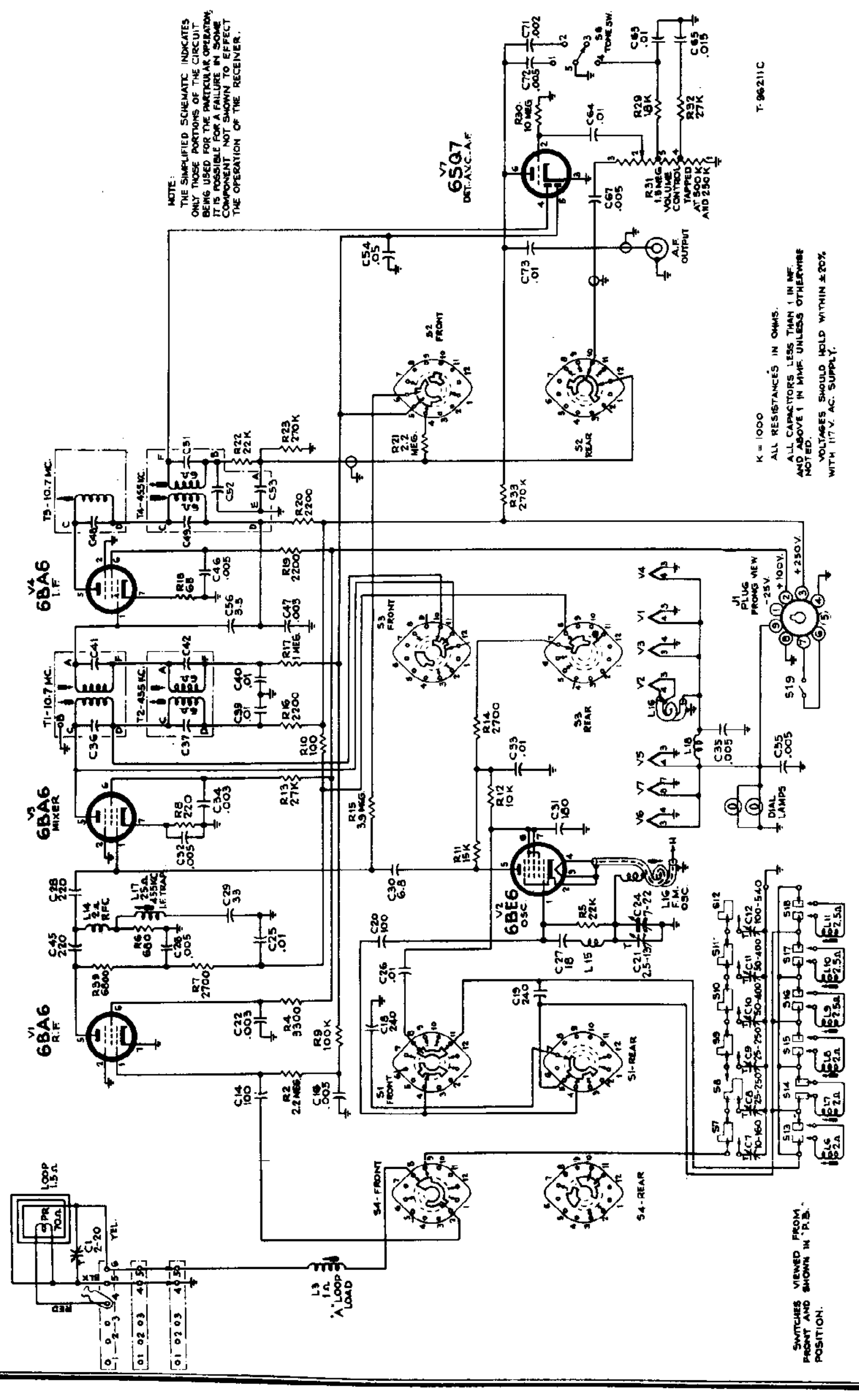

Figure 13—Simplified Schematic Shown in "Push-Button" Position Only. (See Note above.)

NOTE: Antenna link closed for loop operation (see page 11 for external antenna connections).

CRITICAL LEAD DRESS

(Any lead dress should be made before alignment.)

1. The lead from terminal 9, switch S4, front, to terminal on switch S7, must be dressed between the main base and R-F shelf.
2. The leads from terminals 10 and 11, switch S3, front, must be dressed together and away from the chassis.
3. Capacitor C56 must have shortest possible lead on the end connecting to pin 1 of tube V4.
4. The following capacitors must be dressed close to the chassis, with leads kept as short as possible: C40, C47, C54, C62 and C78.
5. All FM coil connections must be soldered in the exact place as the original coil. (One-sixteenth inch difference in length may be excessive.)
6. All wiring in the receiver is critical as to length and placement, any changes tend to impair the operation of the set.

FM Alignment

Before aligning set, completely mesh the gang and set the dial pointer at the mechanical maximum calibration point at the extreme left-hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required and follow with the remaining steps in the chart.

Any adjustments made on the FM 10.7 mc I-F's make it necessary to adjust the AM 455 kc I-F's.

"FM" RATIO DETECTOR ALIGNMENT

SET RANGE SWITCH TO FM POSITION

Steps	Connect High Side of Osc. to—	Tune Osc. to—	Turn Vol. Cont. to—	Adjust
1	Connect a 680-ohm resistor between lugs D and E of the ratio detector transformer T6. Connect d-c probe of a VoltOhmyst to the negative lead of the 5 mfd electrolytic capacitor C77. The common lead of the meter to chassis.			
2	Driver grid pin 1, of 6AU6 (V5) in series with a .01 mfd capacitor	10.7 mc 30% mod. 400 cycles AM	Maximum volume	Driver transformer T5 for maximum d-c voltage across C77
3	Remove meter leads and disconnect the 680-ohm resistor from D and E on T6. Connect two 68,000-ohm resistors (within 1% of each other) in series, across the 22,000-ohm ratio detector load resistor R37. Connect the common lead of the VoltOhmyst to the center point of the 68,000-ohm resistors and the d-c probe to terminal "A" of the ratio detector transformer T6. Use the 30-volt meter range.			
4	Same as step 2	Same as step 2	Maximum volume	*T6 bottom core for zero d-c balance on VoltOhmyst **T6 top core for minimum audio output. (Output meter across voice coil)
5	Reconnect VoltOhmyst as in step 1, omitting the 680-ohm resistor.			
6	Repeat step 2, omitting 680 ohms.			
7	Remove all connections.			

* Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction.

** The zero d-c balance and the minimum A-F output should occur at the same point; if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the VoltOhmyst, and an output meter connected across the voice coil for the point at which both zero d-c and minimum output occurs.

NOTE.—Two or more points may be found which will satisfy the condition required in step 4. T7 top core should be correctly adjusted when approximately 1/8 inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum A-F and minimum d-c is reached.

"FM" R-F—I-F ALIGNMENT

RANGE SWITCH IN FM POSITION

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc. to—	Tune the Osc. to—	Radio Dial Tuned to—	Adjust
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 5 mfd electrolytic capacitor C77, and the common lead of the meter to chassis ground.				
2	Mixer grid pin #1 of 6BA6 (V3) in series with a .01 mfd capacitor (Adjust test osc. output for 8-10 volts developed across C-77) (Range switch in FM Position)	To RF tube shelf ground	10.7 MC 30% modulated at 400 cycles AM	Max. cap. (Fully meshed)	*T3 and T1 top and bottom cores alternately loading primary and secondary of each transformer with 680 ohms while the opposite side of the same transformer is being adjusted. Adjust all transformers for maximum voltage across C77.
3	FM antenna terminals #1 in series with a 120-ohm resistor	To FM antenna terminal #2 in series with a 120-ohm resistor	106 mc	106 mc	OSC, C21 for maximum voltage across C77.
4			90 mc	90 mc	**OSC, L16 for maximum voltage across C77.
5	Repeat steps 3 and 4 for exact calibration.				
6	Same as steps 3 and 4		106 mc	106 mc	R-F, C44 for maximum voltage across C77.
7			90 mc	90 mc	**R-F, L19 for maximum voltage across C77.
8	Repeat steps 6 and 7 for maximum output.				
9	Same as step 3	Same as step 3	106 mc	106 mc	Ant. C3 for maximum voltage across C77.
10	Same as step 3	Same as step 3	90 mc	90 mc	**Ant. L2 for maximum voltage across C77.
11	Repeat steps 9 and 10 for maximum output.				

* This method is known as alternate loading, which involves the use of a 680-ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 680-ohm resistor while the plate winding is being peaked.

When the windings are loaded, it is necessary to increase the 10.7 mc input, since the gain will decrease and the voltage across C77 will be less.

** Two positions of the cores in L2, L19, L16 will satisfy the condition indicated, but for greatest sensitivity, the core position for L2 and L19 chosen, should be the one which results in the adjusting stud projecting the lesser distance.

For oscillator L16 the reverse is true and the coil should be aligned with the stud projecting the greater distance.

AM Alignment

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Output Meter Alignment.—Connect the meter across voice coil, and turn the receiver volume control to maximum.

Steps	Connect the High Side of the Test Osc. To	Tune Test Osc. to—	Range Switch	Turn Radio Dial to—	Adjust the following
1	Mixer grid #1 pin of 6BA6—V3 in series with .01 mfd capacitor	455 kc	"BC" Band	Low Freq. end of Dial	*Top and bottom cores of T2 and T4. (For maximum voltage across voice coil.)
2	High Side of loop Primary in series with a .01 mfd capacitor (Link open)	455 kc	"BC" Band	Low Freq. end of Dial	Adj. I-F Trap L17 for minimum voltage across voice coil.
3	High Side of Loop Primary Through a Dummy Ant. comprising a 200-mmf capacitor (Link open)	1400 kc	"BC" Band	1400 kc	Osc.—C15 Ant.—C1 (For maximum voltage across voice coil.)
4		600 kc	"BC" Band	600 kc	Osc.—L12 Loop Load L3. (For maximum voltage across voice coil.)
5	Repeat steps 3 and 4 for maximum output.				
6	"C" Band Ant. Terminal #3 Through a dummy Ant. comprising a 150-ohm resistor in series with a 25 to 30-mmf capacitor	15.2 mc	"C" Band	15.2 mc	** Osc.—C17 Ant.—C4
7		9.5 mc	"C" Band	9.5 mc	Osc.—L13 Ant.—L4
8	Repeat steps 6 and 7 for accurate alignment.				
9	Install and connect chassis in cabinet, with Antenna link closed. Tune in a radiated oscillator signal at 1,400 kc and peak the "A" band ant. trimmer C1 (on loop).				

* It is necessary to alternately load the primary and secondary of each 455-kc I-F transformer with 10,000 ohms while the opposite side of the same transformer is being adjusted.

** To guard against the possibility of alignment of L13 and C17 to image frequencies, tune the test oscillator to 15.2 mc and turn the radio dial to 15.2 mc. Then adjust the test oscillator to 16.11 mc (image frequency). By increasing the test oscillator output, a signal should be heard.

Tune the test oscillator to 9.5 mc and turn the radio dial to 9.5 mc, then adjust the test oscillator to 10.41 mc (image frequency). By increasing the test oscillator output, a signal should be heard.

(If these image frequencies cannot be heard, the set is incorrectly aligned, therefore repeat steps 6 and 7.)

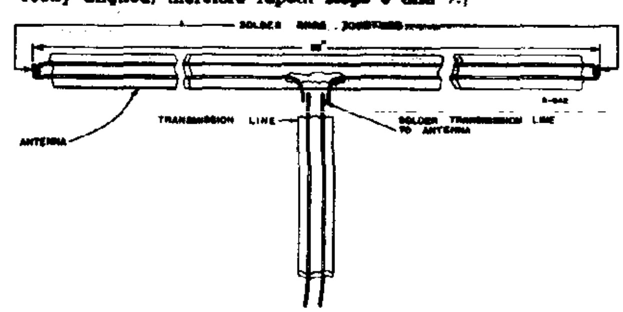

Figure 2—Sketch Showing Folded Dipole Installed in Cabinet

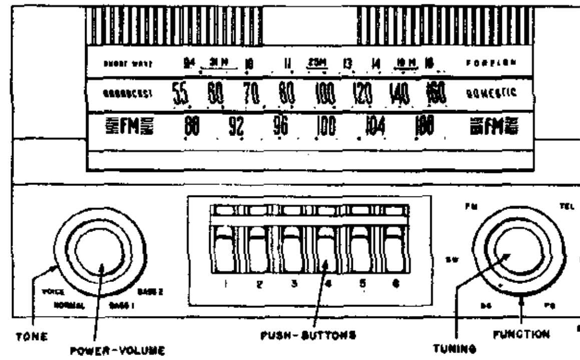

Figure 3—Radio Control Panel

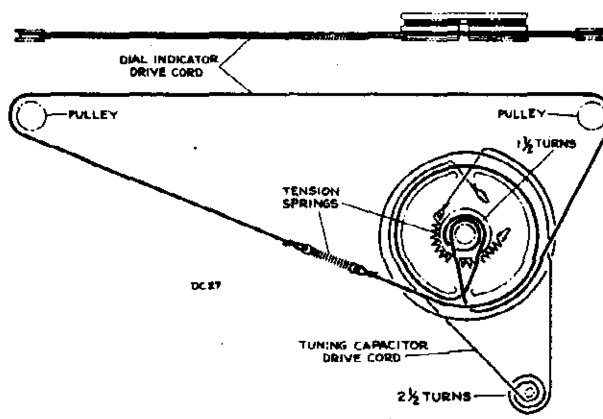

Figure 4—Dial Indicator and Drive Mechanism

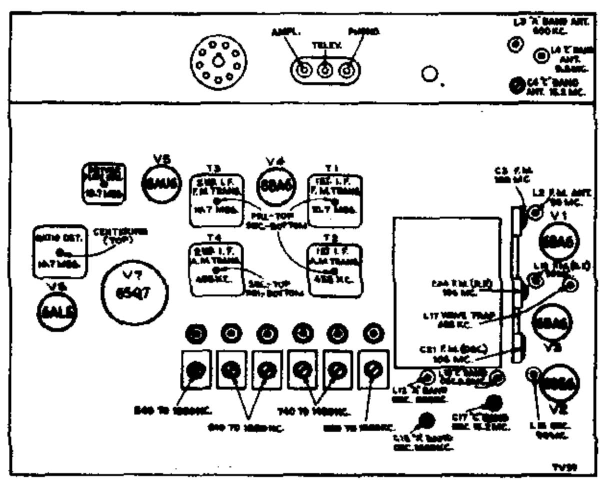

Figure 5—Chassis, Top View, Showing Adjustments

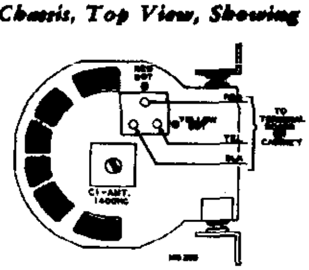

Figure 6—Loop Antenna

Push-Button Adjustment

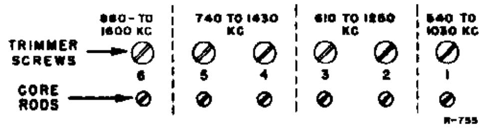

Figure 1—Push-Button Adjustment (Looking from Rear of Chassis)

The push-buttons connect to separate magnetite-core oscillator coils and separate loop circuit trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 70180. Allow about five minutes warm-up period before making adjustments.

The procedure is as follows:

1. Make a list of the desired stations, arranged in order from low to high frequencies.
2. Turn the range switch to the broadcast position and manually tune in the first station on the list.
3. Turn range switch to push-button position and press in the left-hand button.
4. Adjust core rod No. 1 to receive the first station. To secure the best adjustment, rotate the loop for least pickup, and adjust core rod No. 1 for peak output.
5. Adjust trimmer screw No. 1 for peak output on the first station.
6. Proceed in the same manner to adjust for the remaining stations.
7. Repeat adjustments for best results.

On the 880 to 1,600 kc push-button, the higher frequency stations may be received with core rod No. 6 either in or out (oscillator frequency either 455 kc below or 455 kc above the station frequency). The adjustment with this core in its out position (oscillator frequency 455 kc above the station frequency) is the correct one.

NOTE: Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.

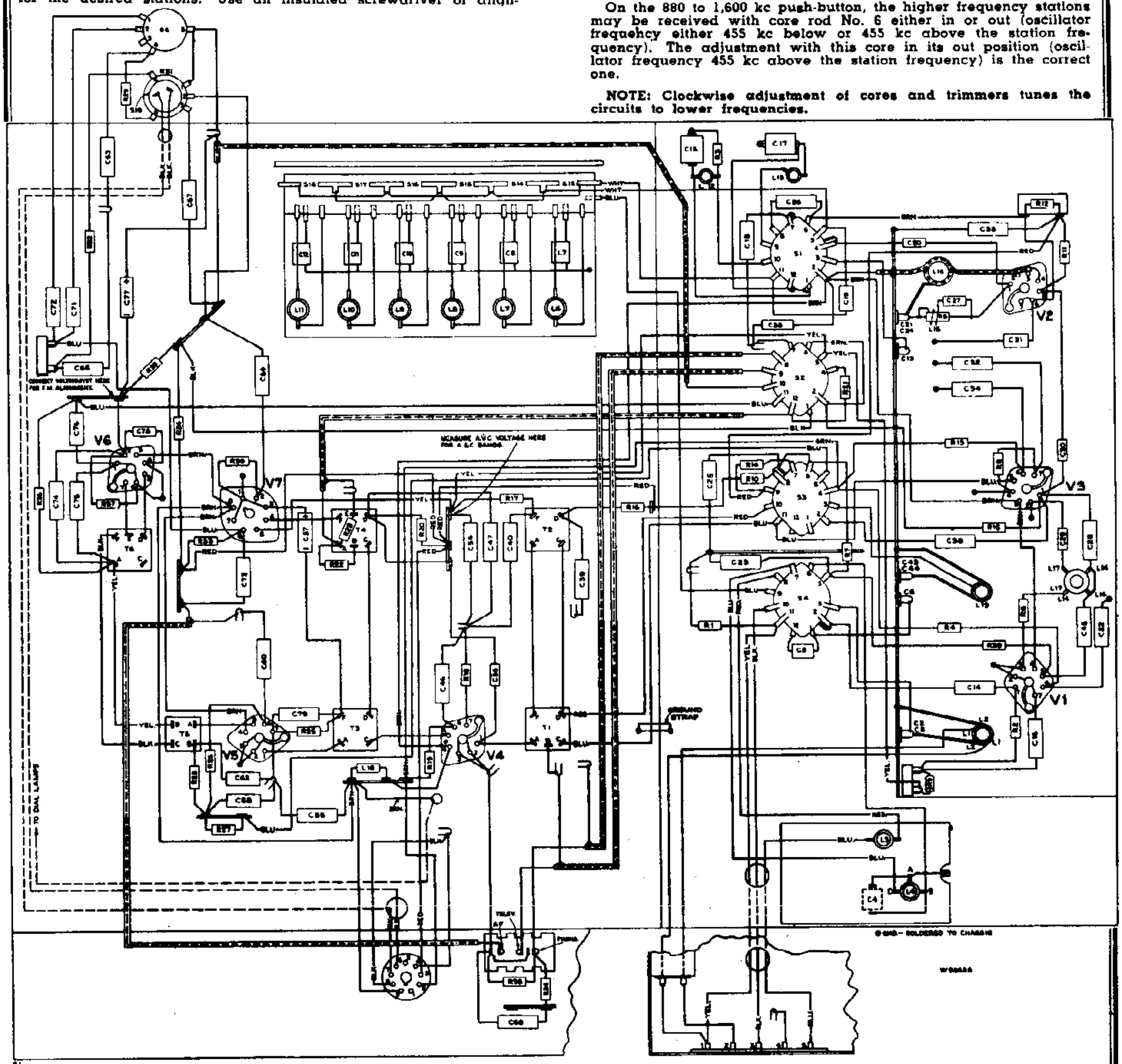

Figure 14—Radio Chassis Wiring Diagram

NOTE: In some instances the color coding of the wiring may be different.

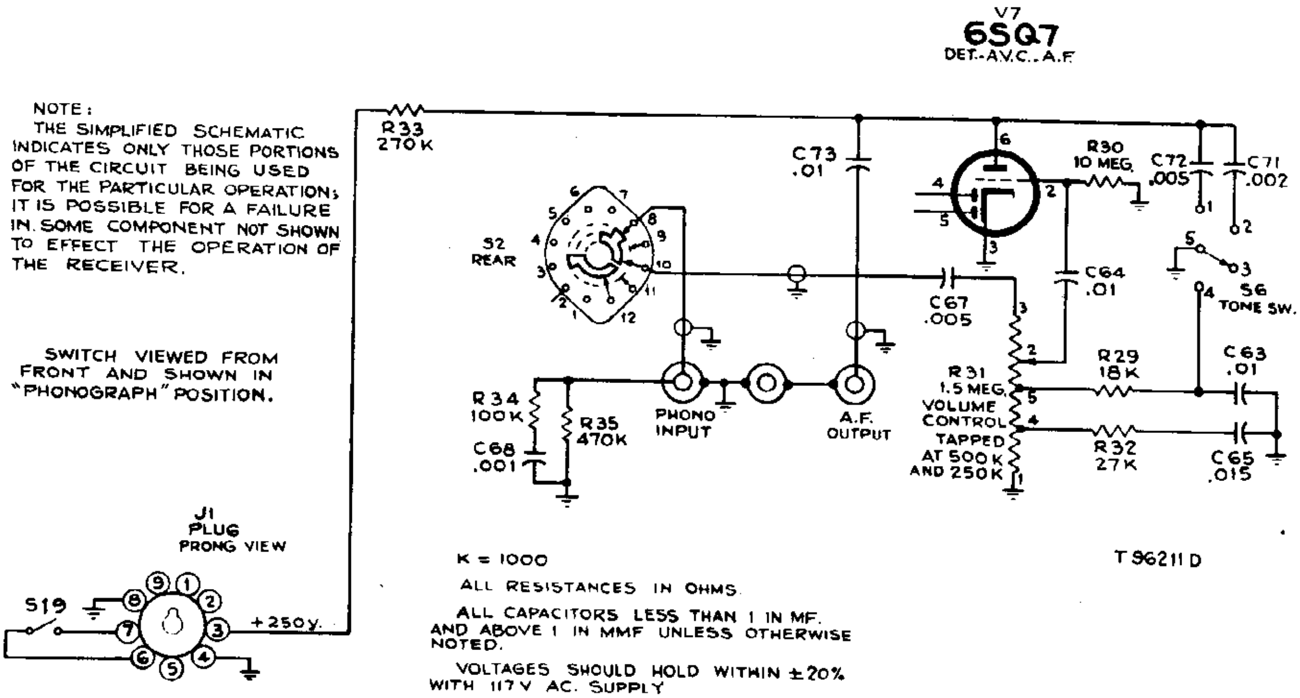

Figure 15—Schematic Shown for Phonograph Reproduction Only.

NOTE: Oscillator plate voltage is removed when the band switch is turned to the phono. or television position.

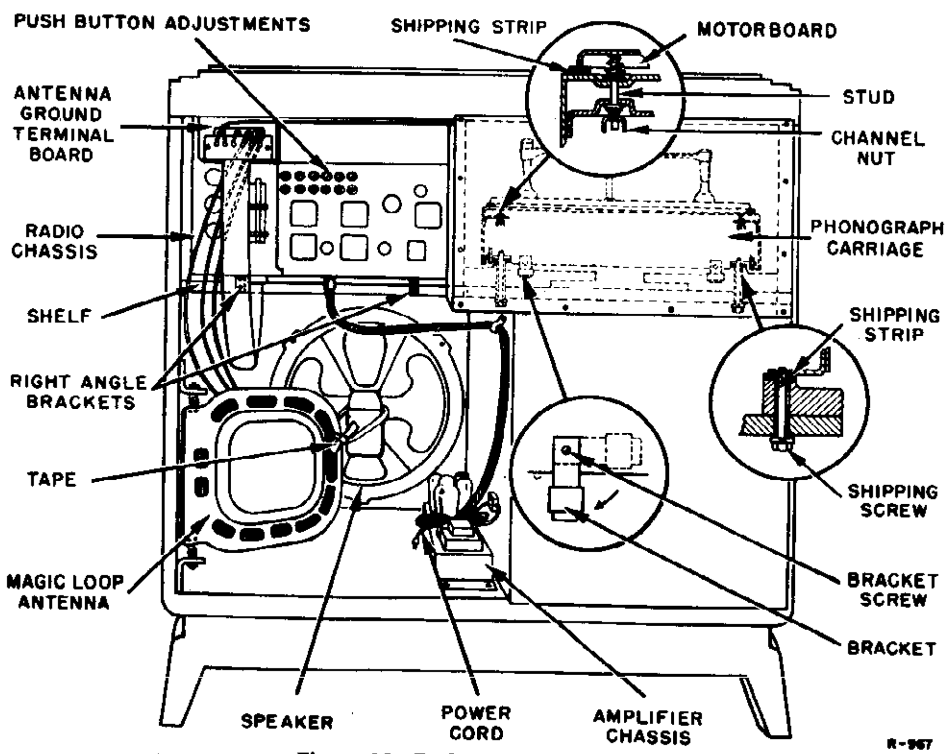

Figure 16—Back View of Cabinet

To remove chassis, remove knobs, loosen all interconnecting cables and remove screws holding right angle mounting brackets to metal mounting strips, then lower chassis.

To remove "Roll-out" loosen all interconnecting cables, turn bracket as indicated in circle in the above drawing, pull out through the front.

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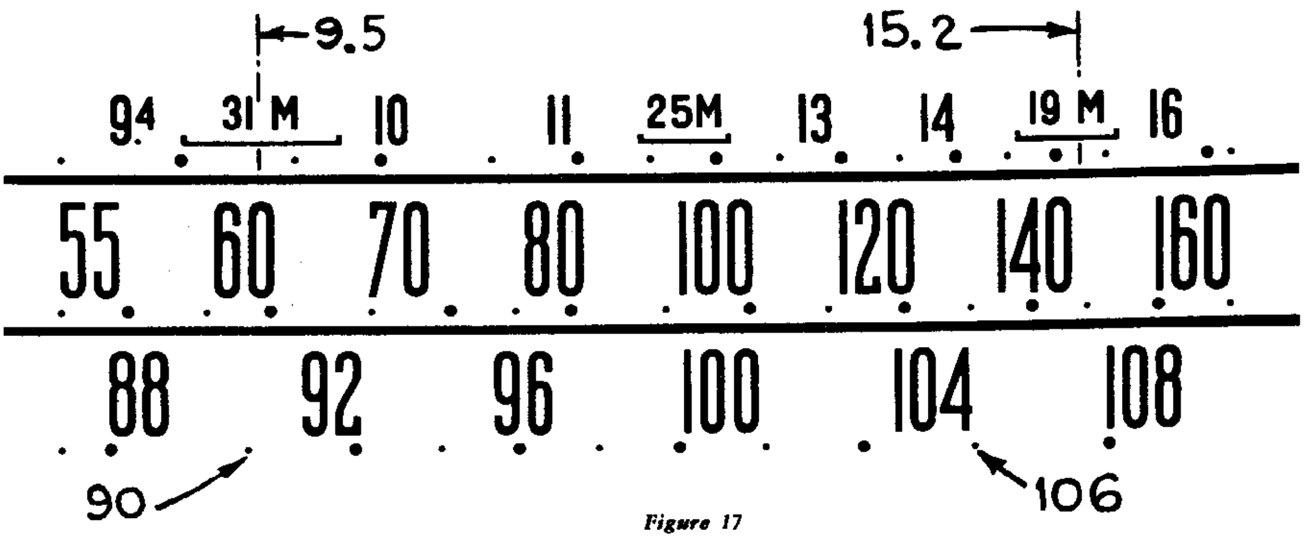


Figure 17

The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

External Antennas.—If reception is not satisfactory on one or more of the three bands, using the built-in cabinet antennas, an external antenna may be used. The Magic Loop Antenna will usually provide sufficient pickup on the Standard Broadcast band, but if an external dipole is installed to improve reception on Frequency Modulation it may be used for Standard Broadcast and Short Wave as well. Connections are made to the antenna terminal board in the back of the cabinet. External antennas may be erected indoors or outdoors and should be oriented in direction for best reception. RCA Television Antenna, Stock No. 225 or 226, or the equivalent with 300-ohm transmission line is recommended for an external antenna.

Figure 18 (A) shows the **Antenna Terminal Board with connections for internal cabinet antennas.**

Figure 18 (B) shows connections for the RCA Television **Antenna** replacing those for the **internal FM antenna** on terminals **1 and 2**, and the **internal SW antenna** disconnected at terminal 3. **The** external dipole antenna is now the antenna for FM and SW **bands.**

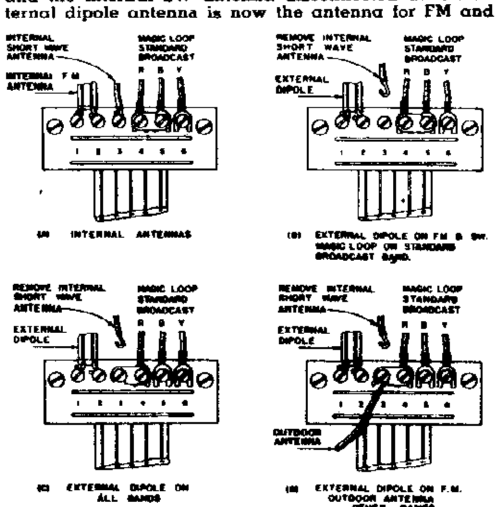
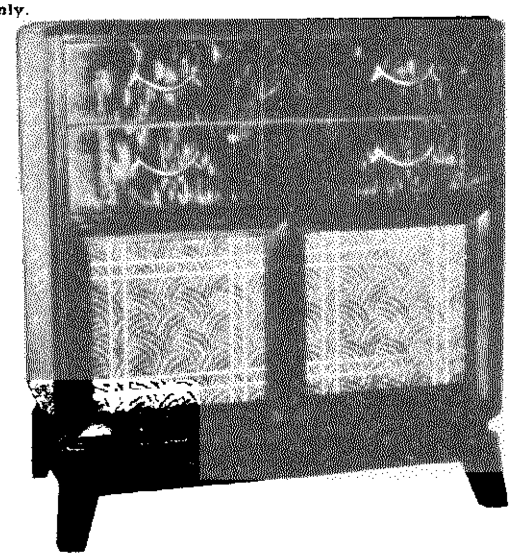


Figure 18—Antenna Terminal Board

Figure 18 (C) shows the additional change for connecting the Standard Broadcast band to make use of the external RCA Television Antenna. The link across terminals 4 and 5 is changed to terminals 4 and 3. The external antenna is now effective on all bands. Tighten terminals and be sure that the red, black and yellow leads (R.B.Y.) to terminals 4, 5 and 6 are still in place and securely connected.

Figure 18 (D) shows connections for a separate outdoor antenna on SW and SB reception, and the external dipole on FM. This outdoor antenna should consist of a wire 30 to 60 feet or so in length mounted in a convenient location as high as possible. Connect lead-in from the antenna to terminal 3 on the antenna terminal board. This outdoor antenna is effective on SB and SW bands. If this connection makes the SB signal too strong, causing overload and distortion, replace the link across terminals 4 and 5 as in Figure 18 (A) and (B). This outdoor antenna is now effective on SW only.



Replacement Parts

STOCK No.	DESCRIPTION
	HEAD END UNIT #2 **RK 117**
71638	Board—5 contact terminal board for antenna lead-in
72047	Capacitor—Mica trimmer, 1.6-18 mmf. (C3, C44)
72046	Capacitor—Adjustable, 2.5-13 mmf. (C21)
72790	Capacitor—Ceramic, 3.5 mmf. (C56)
72037	Capacitor—Mica trimmer, 3-35 mmf. (C15, C17)
39043	Capacitor—Ceramic, 6.8 mmf. (C30)
71807	Capicitor—Adjustable, 10-160 mmf. (C4)
33111	Capacitor—Ceramic, 33 mmf. (C29)
39396	Capacitor—Ceramic, 100 mmf. (C14, C26, C38)
71933	Capacitor—Mica, 180 mmf. (C31)
71920	Capacitor—Ceramic, 220 mmf. (C28, C45)
72789	Capacitor—Mica, 240 mmf. (C18, C19)

STOCK No.	DESCRIPTION
72793	Capacitor—Mica, 330 mmf. (C5)
71929	Capacitor—Ceramic, 1000 mmf. (C78)
72049	Capacitor—Mica trimmer, comprising 1 section of 100-540 mmf., 2 sections of 50-400 mmf., 2 sections of 25-250 mmf. and 1 section of 10-160 mmf. (C7, C8, C9, C10, C11, C12)
72792	Capacitor—Tubular, .001 mfd., 200 volts (C68)
71927	Capacitor—Tubular, .002 mfd., 400 volts (C71)
71921	Capacitor—Tubular, .003 mfd., 200 volts (C22, C34)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C47)
71926	Capacitor—Tubular .005 mfd., 200 volts (C16, C32, C35, C48, C67, C74, C75, C76, C79)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C23, C58, C60, C62)

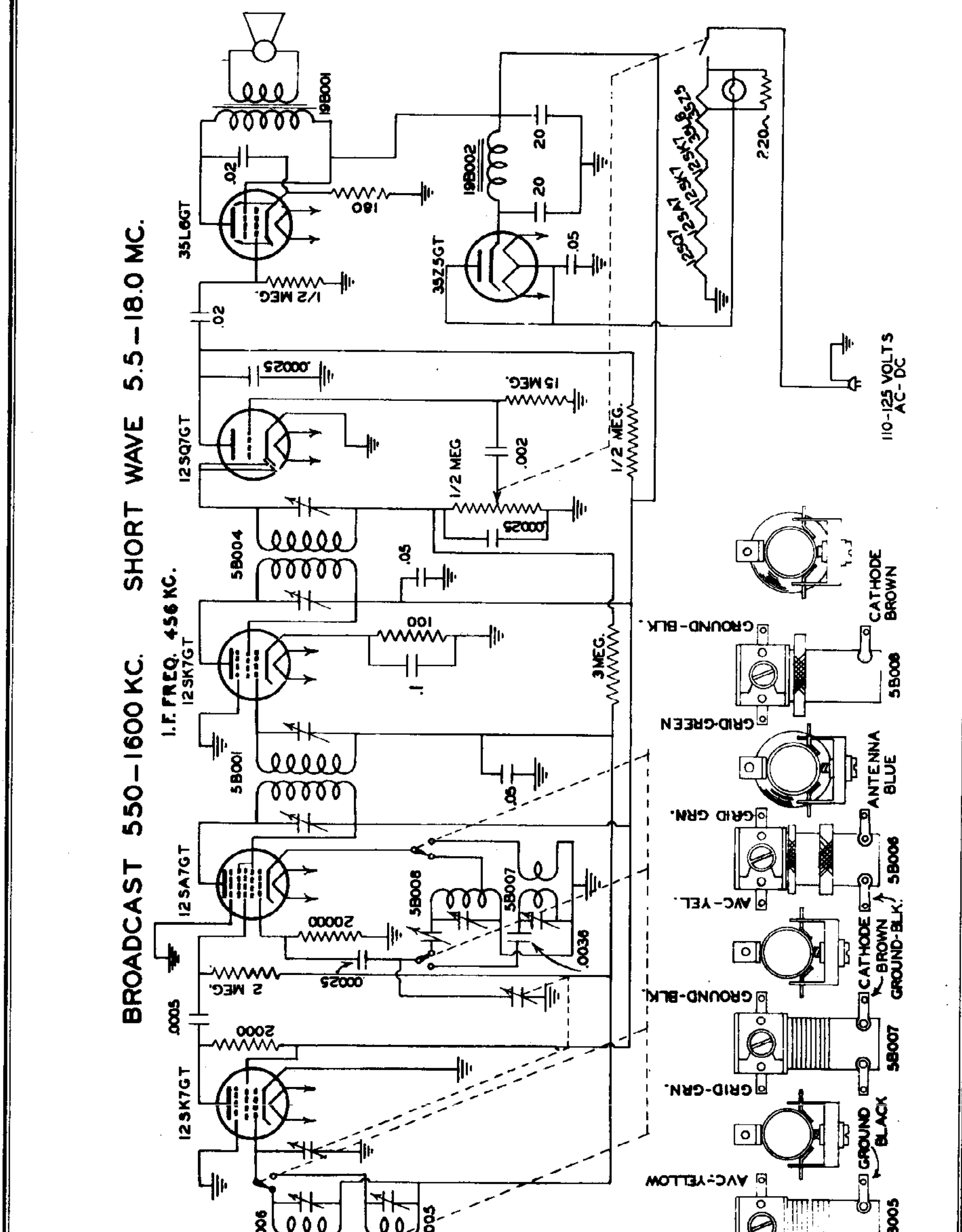
Replacement Parts—Continued

STOCK No.	DESCRIPTION
*72791	Capacitor—Tubular, .005 mfd., 400 volts (C72)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C85)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C40, C63, C84)
71925	Capacitor—Tubular, .01 mfd., 400 volts (C25, C28, C33, C39, C73)
71551	Capacitor—Tubular, .05 mfd., 200 volts (C54)
72121	Capacitor—Electrolytic, 5 mfd., 50 volts (C57, C77)
*72595	Coil—Loop loading coil—"A" band (L9)
71856	Coil—Antenna coil—"C" band (L4, L5)
72044	Coil—Antenna coil—FM (L1, L2)
71852	Coil—Oscillator coil—"A" band (L12)
71853	Coil—Oscillator coil—"C" band (L13)
71937	Coil—Oscillator coil—FM (L16)
71942	Coil—Filament choke coil (L18)
72050	Coil—P.B. coil—high frequency (L6, L7, L8)
72051	Coil—P.B. coil—low frequency (L9, L10, L11)
72045	Coil—R-F coil—FM (L19)
71407	Coil—Wave trap coil (L14, L17)
72038	Condenser—Variable tuning condenser (C2, C6, C13, C24, C43)
*72034	Control—Volume control, tone control and power switch (R31, S6, S19)
32634	Cord—Indicator drive cord (approx. 35" overall length) NOTE: Before assembling, stretch to full length
32634	Cord—Manual drive cord (approx. 19" overall length) NOTE: Before assembling, stretch to full length
71941	Coupling—FM coupling unit (R5, C27, L15)
72043	Drum—Drive drum
72040	Gear—36 teeth gear
72042	Gear—Sleeve gear, 32 teeth
70930	Grommet—Rubber grommet for mounting R-F shelf (4 required)
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
72036	Indicator—Station selector indicator
11765	Lamp—Dial lamp, Mazda #51
72035	Plate—Dial back plate
72602	Pulley—Drive cord pulley
71637	Receptacle—A-F television and phono terminal board
71636	Receptacle—9 prong male receptacle for interconnecting cable (J1)
34763	Resistor—68 ohms, ½ watt (R18)
34765	Resistor—100 ohms, ½ watt (R10)
5201	Resistor—220 ohms, ½ watt (R8)
12282	Resistor—680 ohms, ½ watt (R27, R28)
30731	Resistor—1200 ohms, ½ watt (R6)
34767	Resistor—2200 ohms, ½ watt (R16, R19, R20)
30730	Resistor—2700 ohms, ½ watt (R7, R14)
30733	Resistor—3300 ohms, ½ watt (R4)
38887	Resistor—6800 ohms, 1 watt (R39)
14250	Resistor—8200 ohms, ½ watt (R3)
71914	Resistor—10,000 ohms, 1 watt (R12)
36714	Resistor—15,000 ohms, ½ watt (R36)
71915	Resistor—15,000 ohms, 1 watt (R11)
3218	Resistor—18,000 ohms, ½ watt (R29)
30492	Resistor—22,000 ohms, ½ watt (R22, R37)
30409	Resistor—27,000 ohms, ½ watt (R13, R32)
71900	Resistor—27,000 ohms, 1 watt (R26)
30605	Resistor—33,000 ohms, ½ watt (R25)
3232	Resistor—100,000 ohms, ½ watt (R9, R34)
30651	Resistor—270,000 ohms, ½ watt (R23, R33)
30648	Resistor—470,000 ohms, ½ watt (R35)
30652	Resistor—1 megohm, ½ watt (R1, R17)
30640	Resistor—2.2 megohms, ½ watt (R2, R21, R38)
70840	Resistor—3.9 megohms, ½ watt (R15)
30002	Resistor—10 megohms, ½ watt (R30)
71917	Resistor—22 megohms, ½ watt (R24)
14945	Retainer—Tuning shaft retainer
31611	Screw—#8-32 x ¼" milled head set screw for gear (RCA #72040)
72041	Shaft—Tuning shaft
31364	Socket—Lamp socket
72516	Socket—Tube socket, miniature
31261	Socket—Tube socket, octal
*72821	Spring—Anti-noise spring (hook) for tuning condenser shaft
31418	Spring—Indicator cord tension spring or drive cord tension spring
72031	Support—Dial support and bracket complete with pulley—L.H.
72030	Support—Dial support and bracket complete with pulley—R.H.
72048	Switch—P.B. selector switch only (S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18)
*72039	Switch—Range switch (S1, S2, S3, S4)
72593	Transformer—First I-F transformer, FM (T1, C36, C41)
71846	Transformer—First I-F transformer, AM (T2, C37, C42)
72594	Transformer—Second I-F transformer, FM (T3, C48, C50)
71848	Transformer—Second I-F transformer, AM (T4, C49, C51, C52, C59)
71935	Transformer—Driver transformer (T5, C61)
71934	Transformer—Ratio detector transformer (T6, C68, C70)
	POWER SUPPLY ASSEMBLIES RS 123
70846	Capacitor—Tubular, .0035 mfd, 1000 volts (C5, C6)
70632	Capacitor—Tubular, .02 mfd, 600 volts (C3, C4)
72596	Capacitor—Tubular, .05 mfd, 200 volts (C7)
31323	Capacitor—Electrolytic, 16 mfd, 150 volts (C2)
38399	Capacitor—Electrolytic, comprising 1 section of 30 mfd, 450 volts, 1 section of 15 mfd, 350 volts, and 1 section of 40 mfd, 25 volts (C1A, C1B, C1C)
18469	Insulator—Mounting insulator for electrolytic
11765	Lamp—Pilot lamp, Mazda #51
12493	Plug—Speaker cable plug
30730	Resistor—2700 ohms, ½ watt (R3)

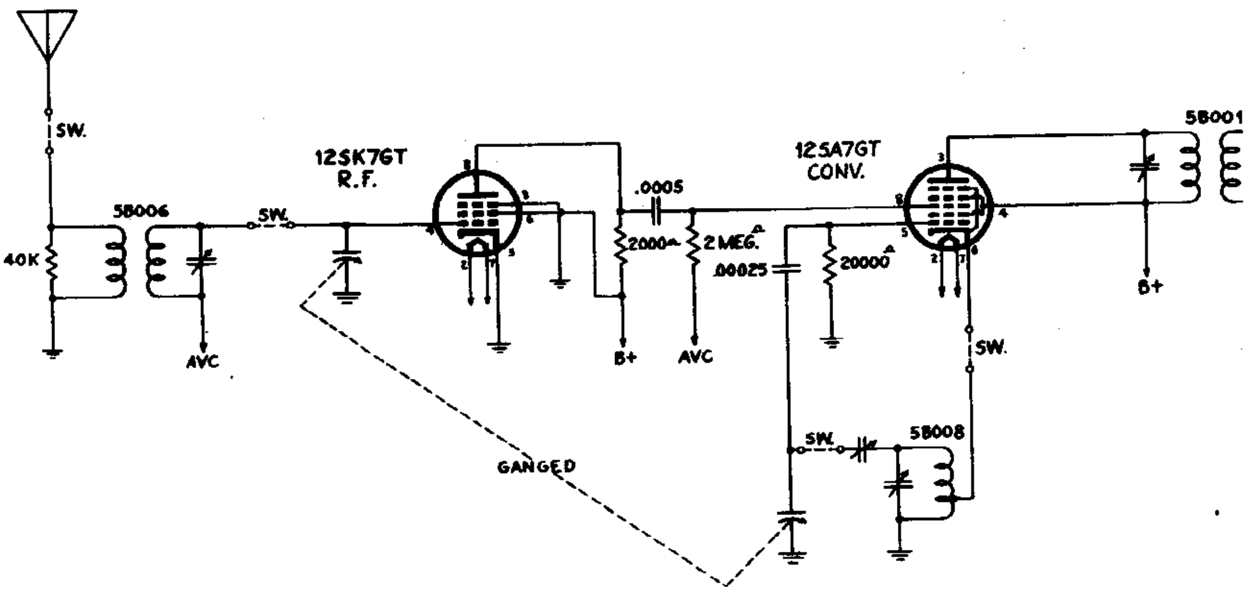
STOCK No.	DESCRIPTION
30492	Resistor—22,000 ohms, ½ watt (R4)
30409	Resistor—27,000 ohms, ½ watt (R5)
30650	Resistor—56,000 ohms, ½ watt (R2)
14503	Resistor—220,000 ohms, ½ watt (R6, R7)
71660	Resistor—Comprising 1 section of 190 ohms, 3.5 watts, 1 section of 2520 ohms, 3.97 watts, and 1 section of 2760 ohms, 8.3 watts (R1A, R1B, R1C)
71659	Socket—9 prong power socket (J1)
35787	Socket—Audio input socket (J2)
31364	Socket—Pilot lamp socket
31319	Socket—Tube socket
37048	Transformer—Power transformer, 117 volts, 50/60 cycle (T1)
71661	Transformer—Output transformer (T2)
	SPEAKER ASSEMBLIES 92567-2W RL 70R1
13867	Cap—Dust cap
71147	Clamp—Clamp to hold metal cone suspension (2 required)
71146	Coil—Field coil, 1050 ohms
11469	Coil—Neutralizing coil
36145	Cone—Cone complete with voice coil
31539	Plug—5 prong male plug for speaker
71144	Speaker—12" E.M. speaker complete with cone and voice coil less plug
71145	Suspension—Metal cone suspension
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
72555	Antenna—Dipole antenna
*72681	Back—Cabinet back for mahogany instruments
*72680	Back—Cabinet back for walnut instruments
72146	Bezel—Push button bezel
71819	Bracket—Door check mounting bracket
71599	Bracket—Pilot lamp bracket
70556	Bumper—Rubber bumper for changer carriage
72151	Button—Push button
72583	Cable—Shielded pickup cable complete with pin plug (56" long)
72445	Cable—Shielded audio cable complete with two pin plugs
71863	Cable—5 wire mould antenna lead-in cable
13103	Cap—Pilot lamp cap
38684	Capacitor—Mica trimmer, 2-20 mmf. (C1)
70553	Carriage—Record changer carriage only, minus rollers
71892	Catch—Door catch and strike (2 required)
72434	Check—Radio compartment door check
72157	Clip—Push button bezel spring clip
71968	Decal—Trade mark decal (Victrola)
71984	Decal—Trade mark decal (RCA-Victor)
72696	Decal—Tuning and range switch function decal
72685	Decal—Volume control and tone control function decal
72707	Dial—Glass dial scale
72158	Escutcheon—Dial escutcheon less dial
*72690	Grille—Metal grille (2 required)
X1635	Grille—Grille cloth for mahogany instruments
X1634	Grille—Grille cloth for walnut instruments
11869	Grommet—Rubber grommet to cushion chassis front apron
72442	Guide—Carriage guide—L.H.
72441	Guide—Carriage guide—R.H.
38610	Hinge—Record storage compartment door hinge, consisting of upper and lower hinges
*72692	Hinge—Record changer compartment or radio compartment hinge (2 required)
72147	Knob—Range switch knob
72148	Knob—Tone control knob
72149	Knob—Tuning knob
72150	Knob—Volume control and power switch knob
71862	Loop—Antenna loop complete
72563	Marker—Call letter markers
70546	Mounting—One set of mounting parts for record changer consisting of four upper springs, four lower springs and four clamp nuts
30868	Plug—2 contact female plug for interconnecting cable
38422	Plug—3 contact female plug for loop leads
71967	Plug—9 contact female plug for interconnecting cable
30870	Plug—2 prong male plug for extension power cable
32641	Plug—3 prong male plug for loop cable
71968	Plug—9 prong male plug for interconnecting cable
31048	Plug—Pin plug for shielded pickup cable or audio cable
*72694	Pull—Record storage compartment door pull
*72693	Pull—Upper doors pull
70551	Retainer—Tray roller retaining strip—L.H.
70552	Retainer—Tray roller retaining strip—R.H.
70554	Roller—Record changer tray roller (6 required)
72581	Spring—Door check spring
72156	Spring—Push button bezel spring
34053	Spring—Retaining spring for push button
72845	Spring—Retaining spring for knob #72147
14278	Spring—Retaining spring for knob #72148
30900	Spring—Retaining spring for knob #72149
30330	Spring—Retaining spring for knob #72150
72582	Stop—Mechanism tray stop
72691	Support—Drop support for record changer compartment door (2 required)
70545	Support—Loop support complete with mounting brackets and spring (2 required)
70555	Tire—Rubber tire for rollers
2917	Washer—"C" washer to mount rollers

THE RADIO CRAFTSMEN INC.

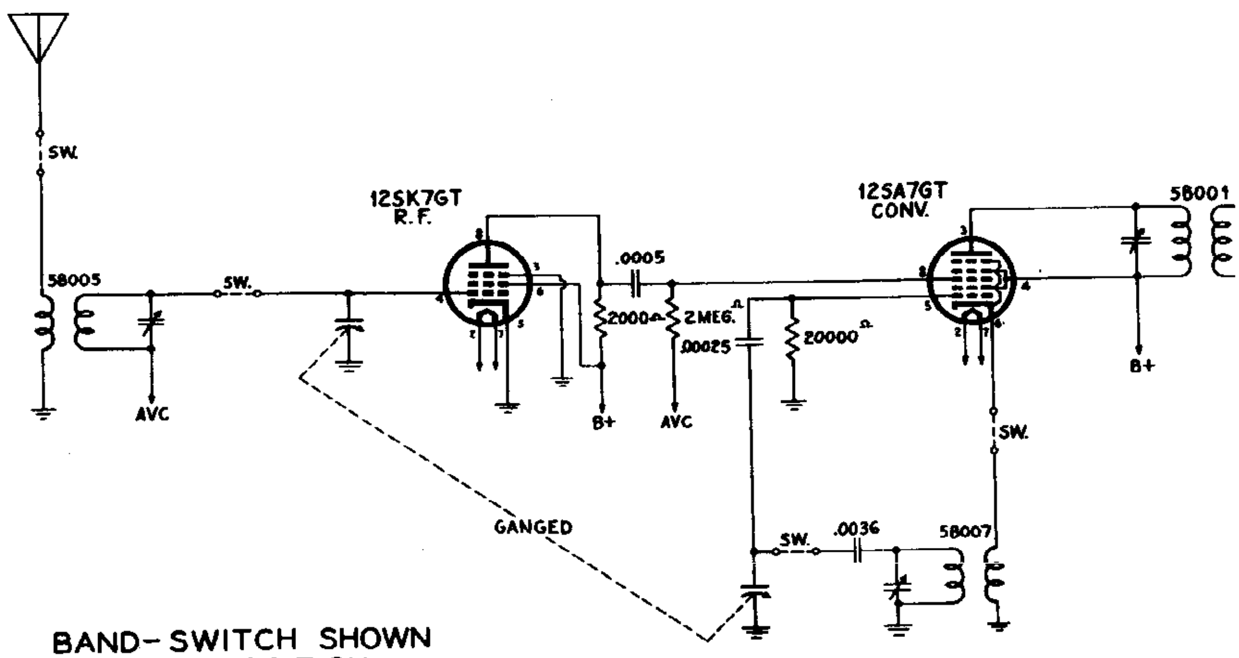
MODEL 6 tube kit



THE RADIO CRAFTSMEN INC.

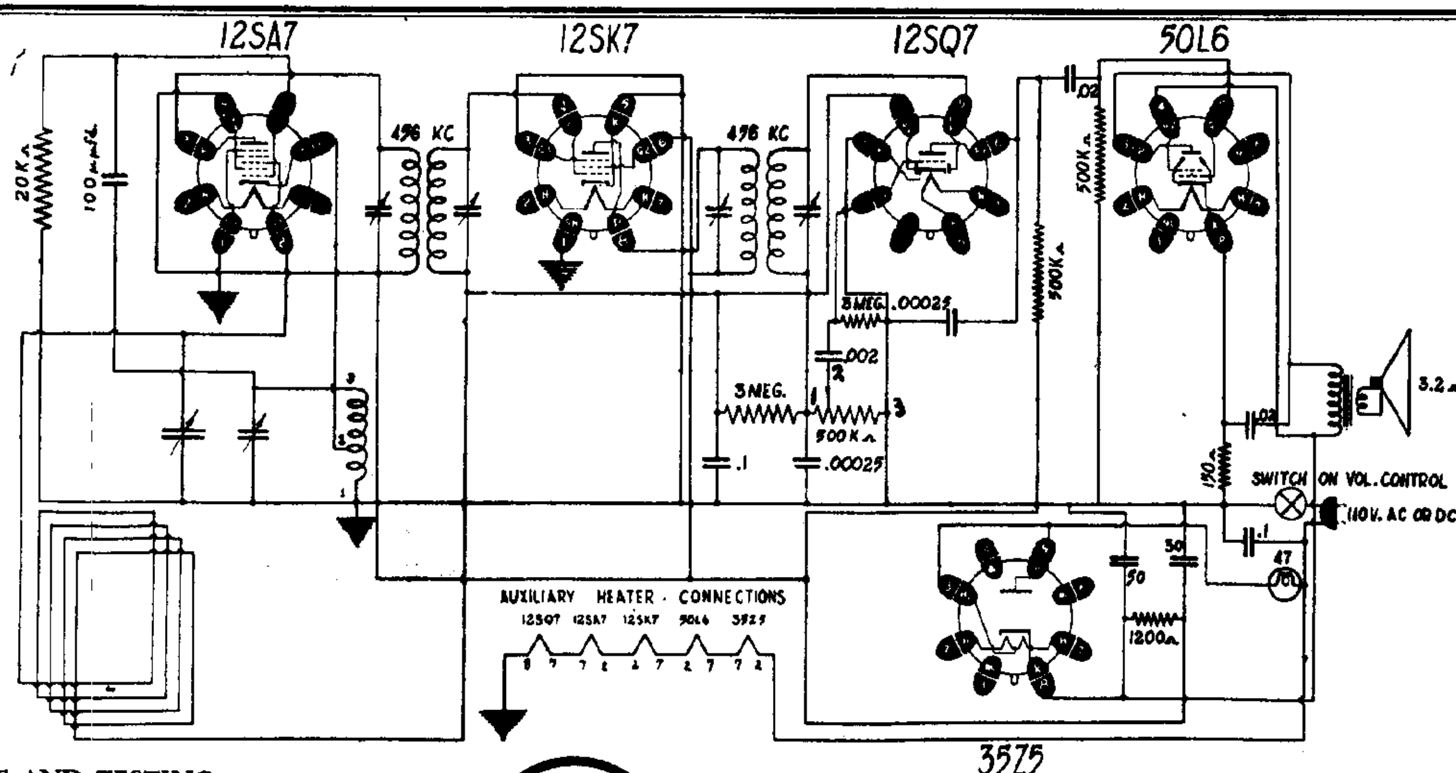


BAND-SWITCH SHOWN
AT 1ST POSITION
BROADCAST BAND
550-1600 KC.



BAND-SWITCH SHOWN
AT 2ND POSITION
SHORT WAVE BAND
5.5-18.0 MC.

RADIO KITS, INC.



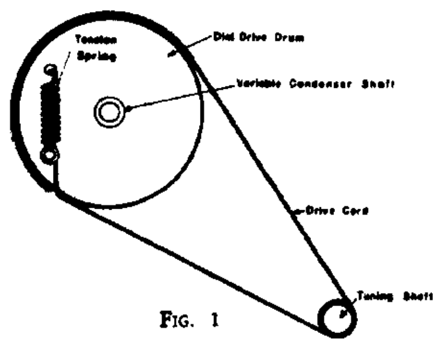


FIG. 1

Wind Drive Cord 2½ times around tuning shaft

ALIGNMENT AND TESTING

A. Check wiring.
  1. It is advisable to check wiring before plugging tubes into receiver. After check-up is complete, plug tubes in their respective sockets.
  2. If an ohm meter is available, the resistance through the line cord should read about 125 ohms.
  3. Now radio is ready to be plugged in.

B. Aligning by Signal Generator.
  1. If a signal genrator is available, it will facilitate adjustment of the receiver and insure maximum sensitivity. The high side of the signal generator ungrounded side) should be connected to the large section of the variable (RF section) Short out the small section of variable by connecting it to ground with a piece of bare wire, and set signal generator to 456Kc. Adjust the I.F. trimmer condenser for maximum response; decreasing the attenuation of signal generator progresively as the signal becomes louder.

     Remove short from oscillator section of variable and connect signal genrator to loop antena. Set signal genrator to 1400 Kc — set radio at 1400 Kc. Adjust trimmer condenser on oscillator section of variable condenser for maximum signal at that frequency. Adjust antenna section of variable condenser trimmer for maximum response.

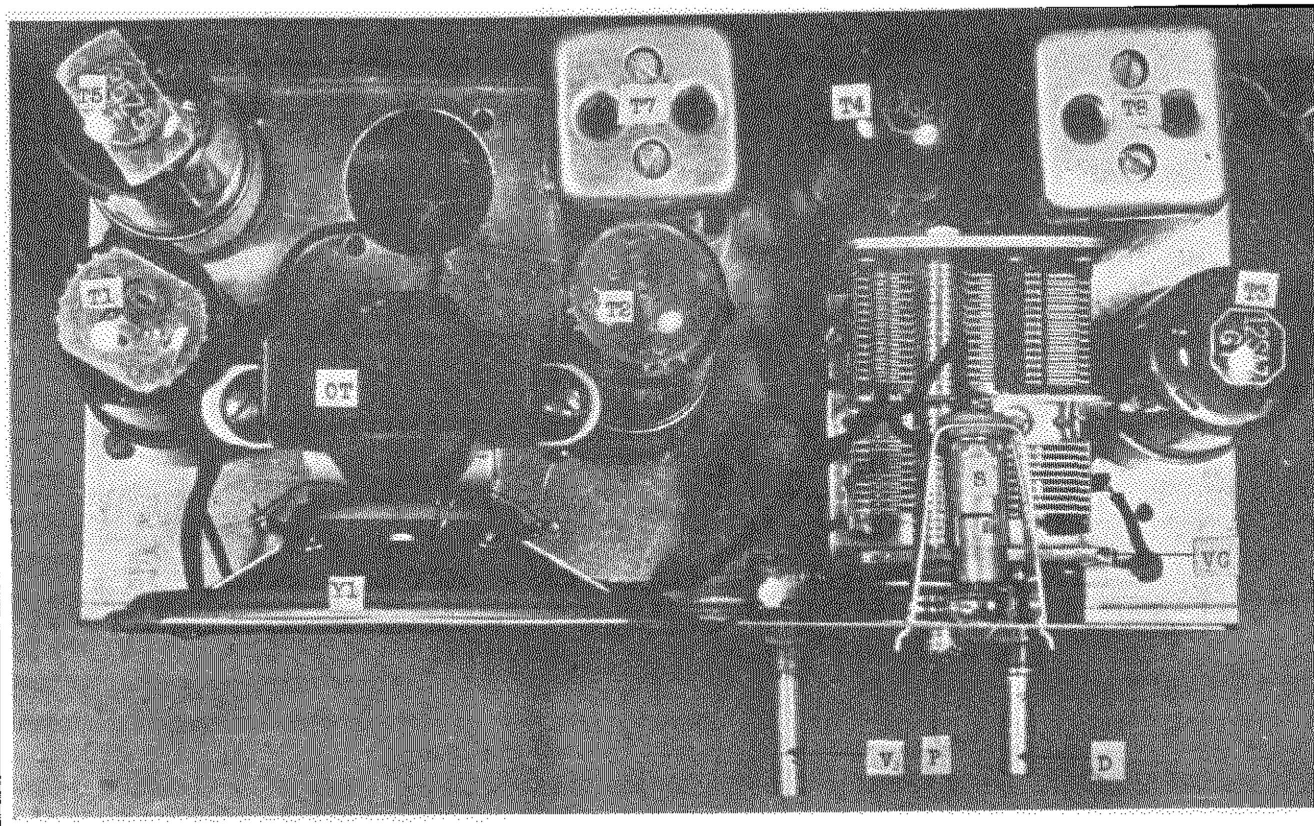
SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
12SA7GT	Osc. and Mixer	0	37.5 AC	99	99	—4.2	0	24.5 AC	0
12SK7GT	IF Amplifier	0	24.5 AC	0	0	0	99	12.5 AC	99
12SQ7GT	2nd Det.—1st Audio	0	0	0	0	0	16	12.5 AC	0
50L6GT	Power Output	0	85 AC	91.5	99	0	0	37.5 AC	5.9
35Z5GT	Rectifier	0	117 AC	112 AC	0	112 AC	0	85 AC	112

NOTE: All DC voltages measured with a 100 ohm per volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated.

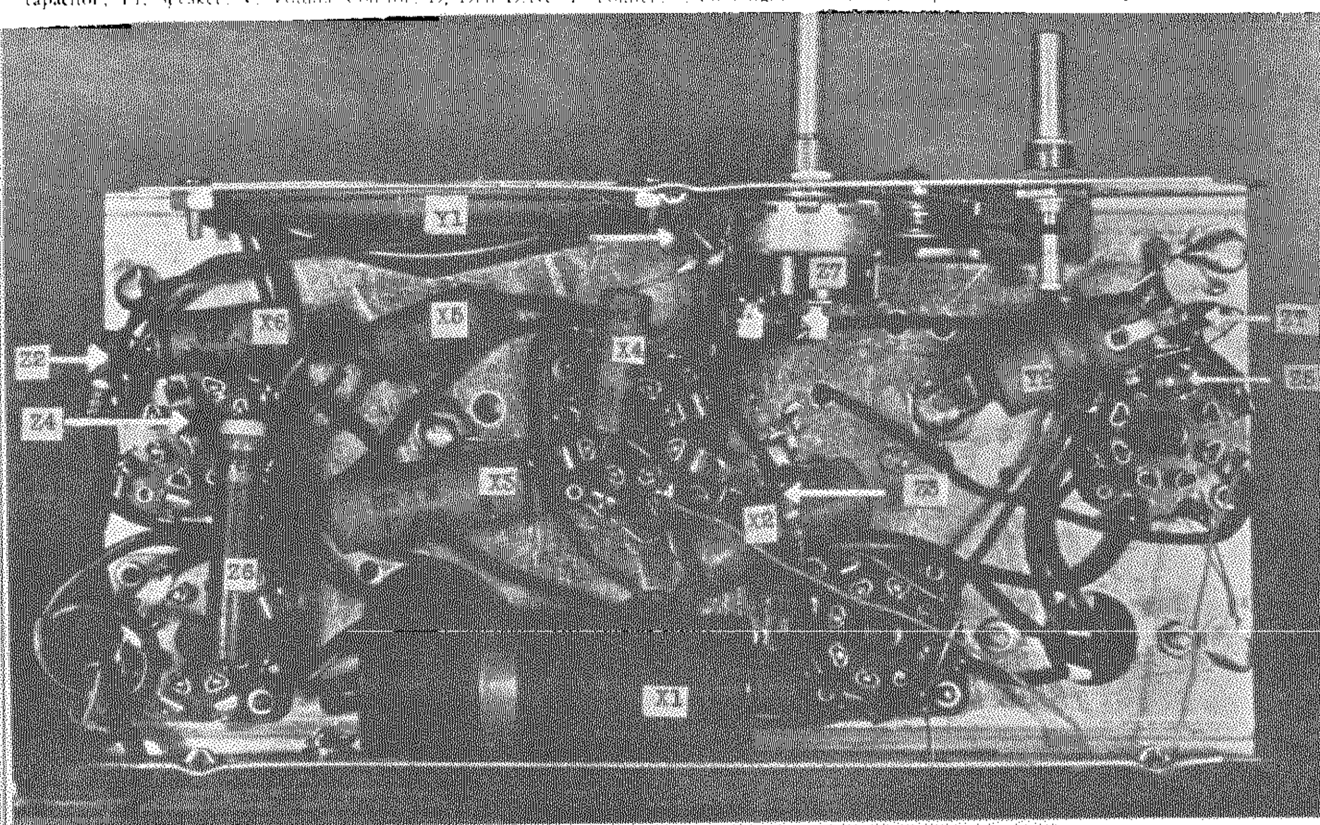
MODEL S5C

RADIO KITS, INC.



PHOTOGRAPH OF TOP VIEW OF RADIO KIT MODEL S-5C

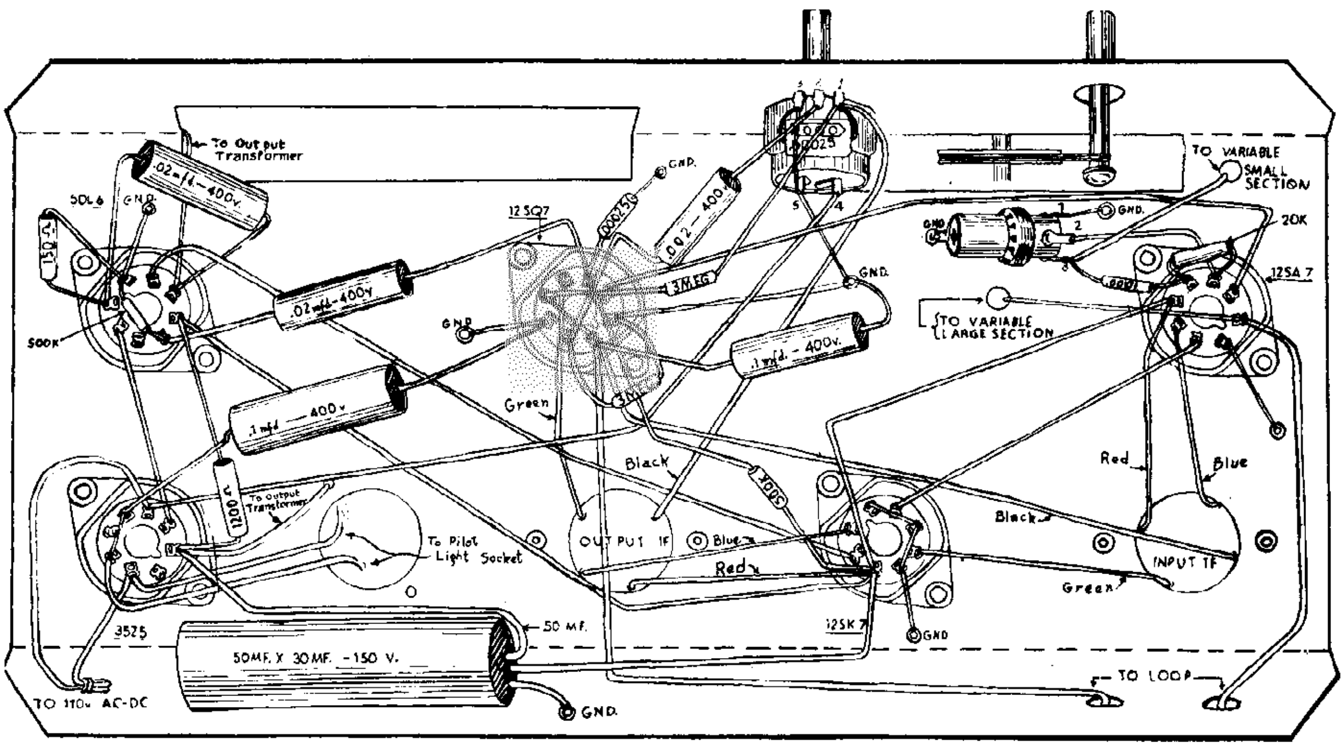
LEGEND: T1, Tube 50L6; T2, Tube 12SQ7; T3, Tube 12SA7; T4, Tube 12SK7; T5, Tube 35Z5; OT, Output Transformer; VC, Variable capacitor; Y1, Speaker; V, Volume Control; D, Dial Drive; P, Pointer; S, Pilot light socket; T7, Output I.F. trans.; T8, Input I.F. trans.



PHOTOGRAPH OF BOTTOM VIEW OF RADIO KIT MODEL S-5C

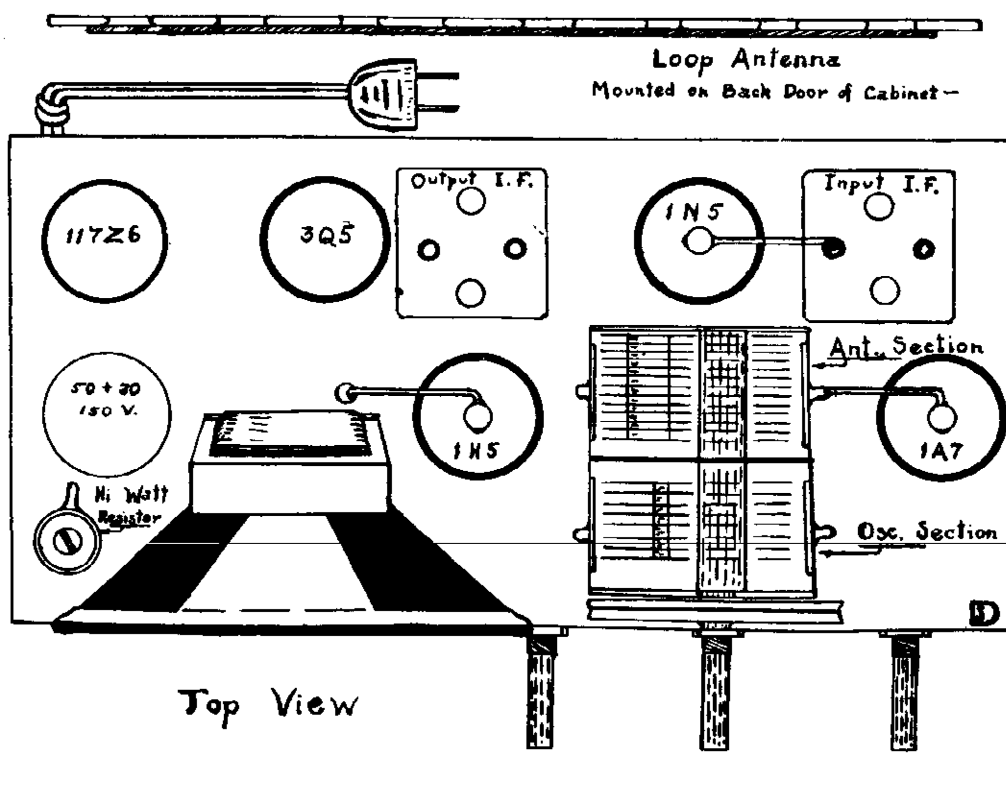
LEGEND X1, 50 mfd X 30 mfd 150 volts; X2, .1 mfd 400 volts; X3, .1 mfd 400 volts; X4, .002 mfd 400 volts; X5, .02 mfd 400 volts; X6, .02 mfd 400 volts; ZT, .0001 mfd 400 volts; Y1, Speaker; Y2, Oscillator; Z2, 150 ohms; Z3, 3 megohms; Z4, .5 megohms; Z5, 20,000 ohms; Z6 1,200 ohms; Z7, Volume control.

RADIO KITS, INC.

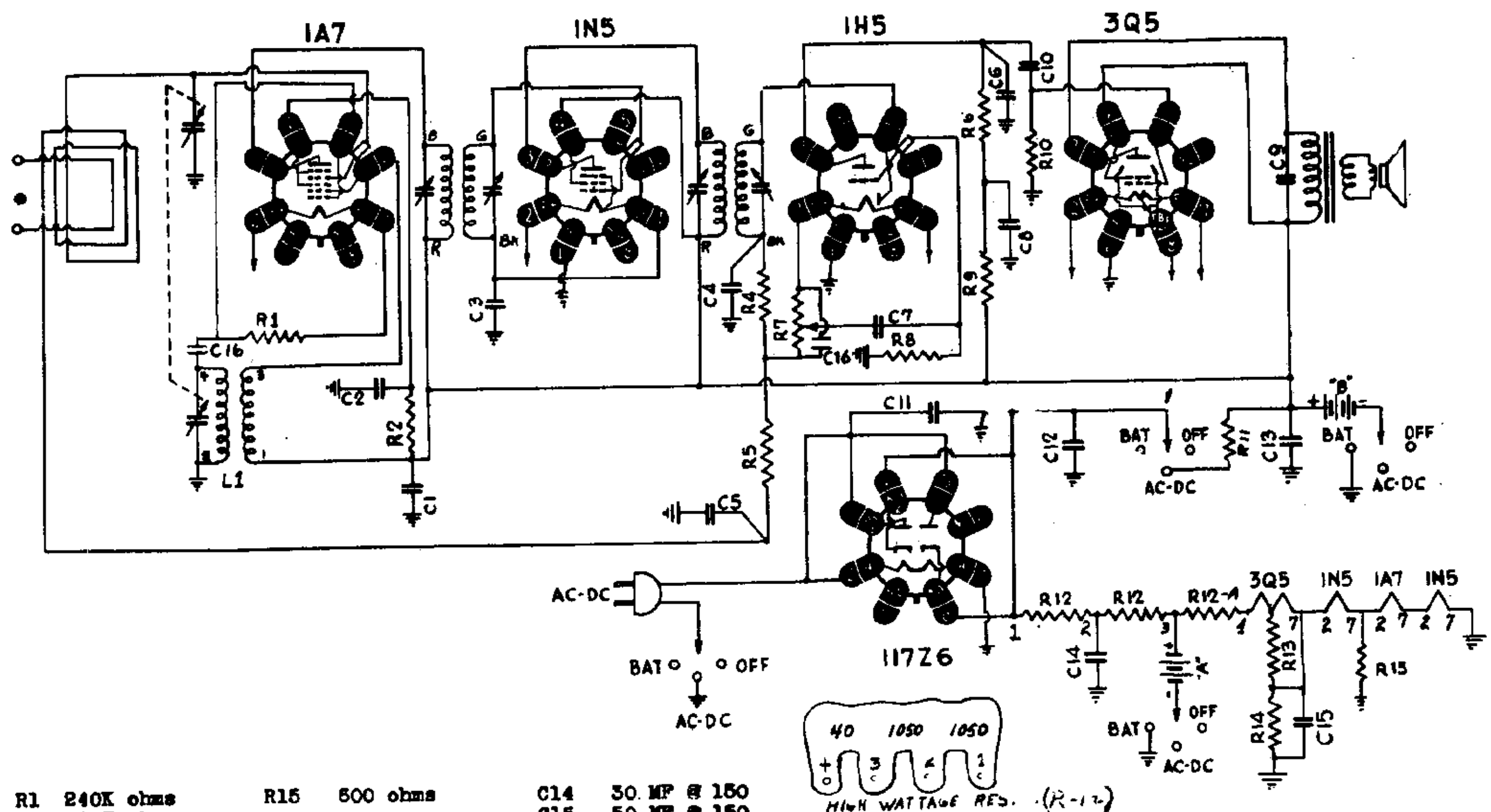


PICTORIAL DIAGRAM OF MODEL S-5C

Model 210

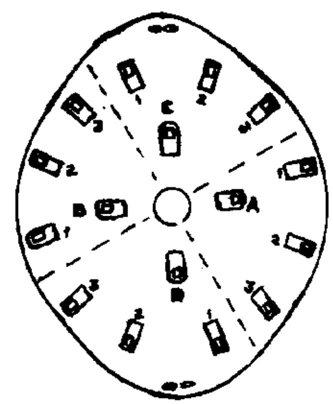


RADIO KITS, INC.



R1	240K ohms
R2	20K ohms
R4	50K ohms
R5	3 megs
R6	1 meg
R7	½ meg cont.
R8	3 meg
R9	500K
R10	2 meg
R11	1200 ohms
R12	1050 1050 40 Ohms
R13	270 ohms
R14	400 Ohms
R15	500 ohms
C1	.02-400
C2	.02-400
C3	.1 400
C4	.0001
C5	.02-400
C6	.0001
C7	.002
C8	.02
C9	.002
C10	.002
C11	.1
C12	50X30 @150
C13	50X30 @150
C14	30 MF @ 150
C15	50 MF @ 150
C16	.0001 (2)

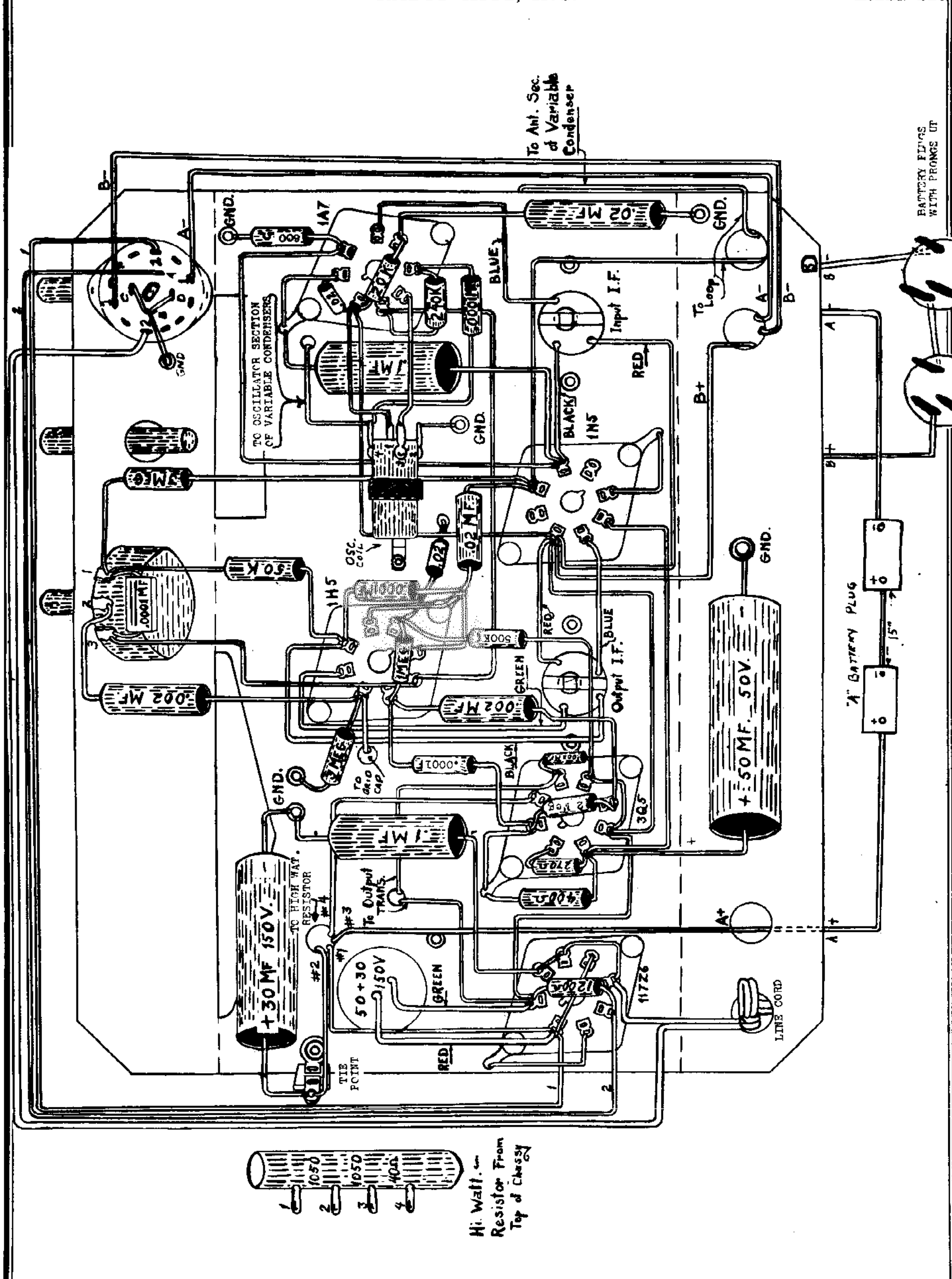
IF PEAK 456 KC



Selector Switch

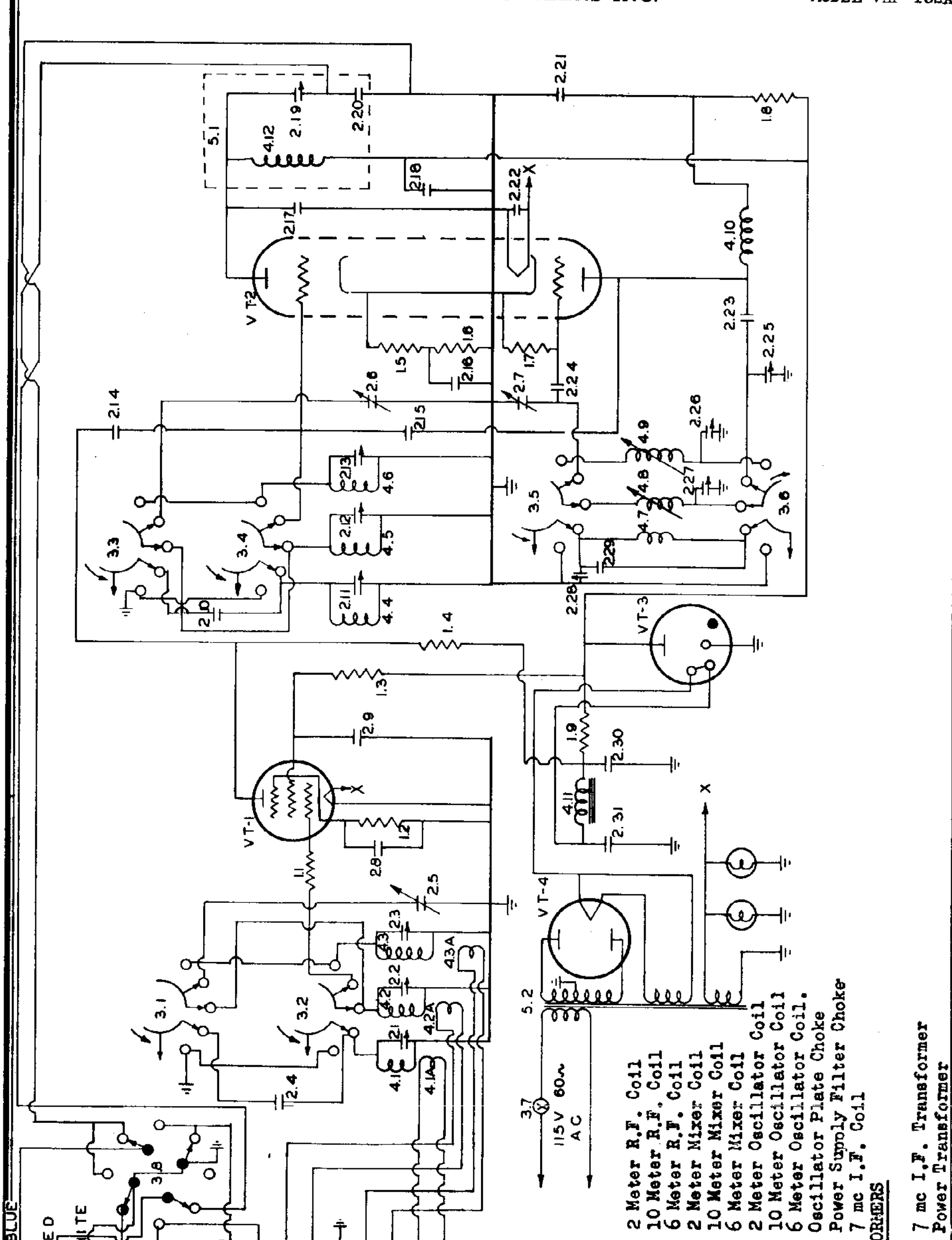
RADIO KITS, INC.

MODEL 210



RADIO MFG. ENGINEERS INC.

MODEL VHF 152A



COILS

4.1 2 Meter R.F. Coil
4.2 10 Meter R.F. Coil
4.3 6 Meter R.F. Coil
4.4 2 Meter Mixer Coil
4.5 10 Meter Mixer Coil
4.6 6 Meter Mixer Coil
4.7 2 Meter Oscillator Coil
4.8 10 Meter Oscillator Coil
4.9 6 Meter Oscillator Coil.
4.10 Oscillator Plate Choke
4.11 Power Supply Filter Choke
4.12 7 mc I.F. Coil

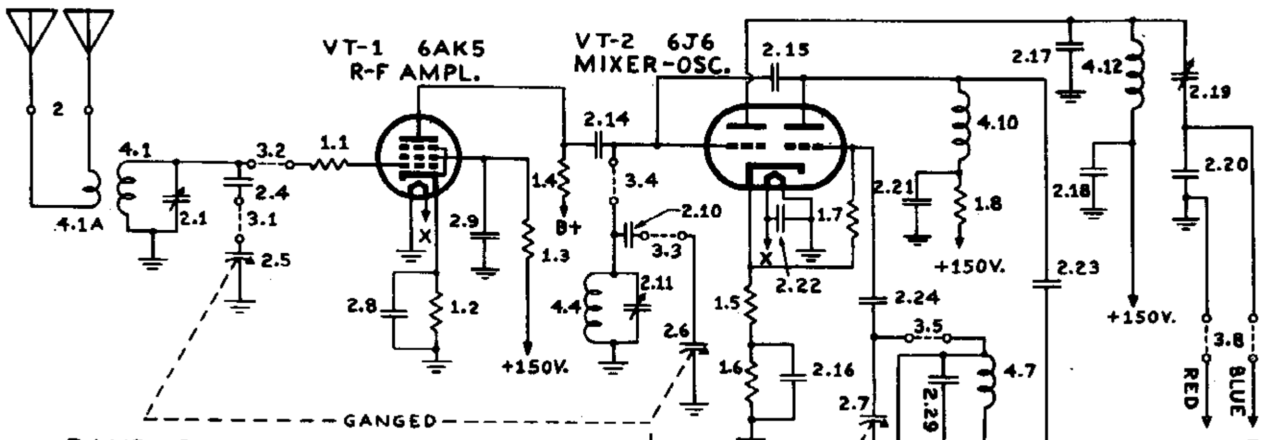
TRANSFORMERS

5.1 7 mc I.F. Transformer
5.2 Power Transformer

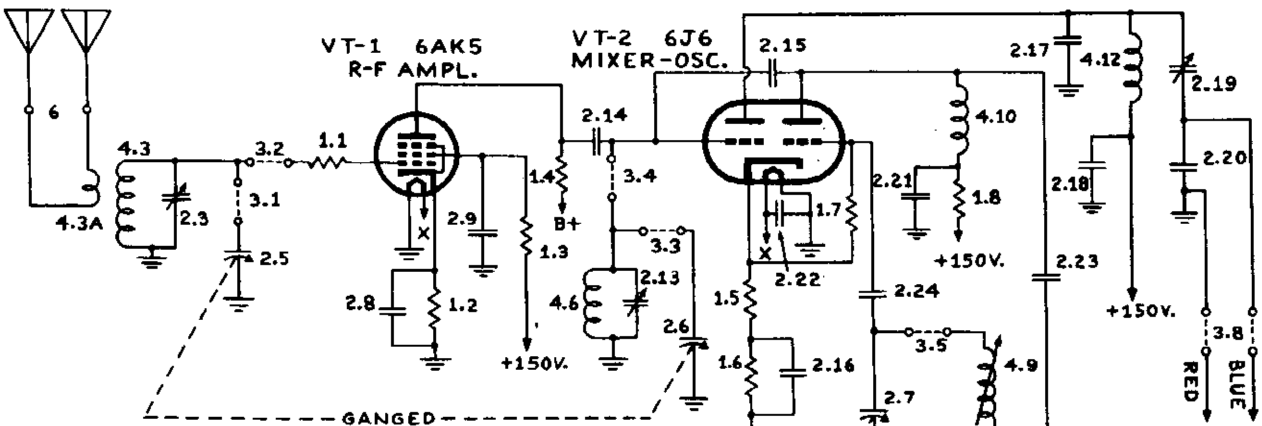
"clarified schematics"

MODEL VHF 152A

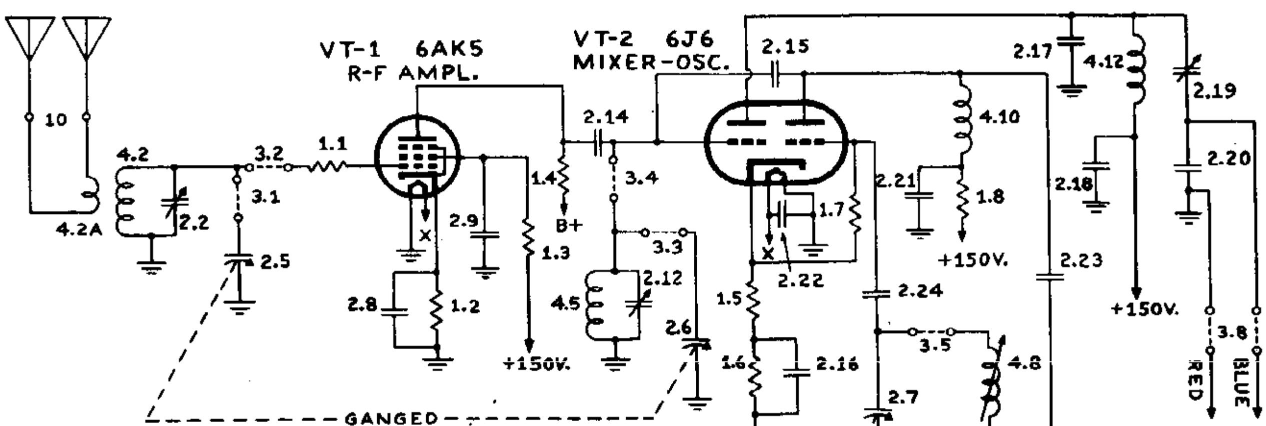
RADIO MFG. ENGINEERS INC



BAND-SWITCH SHOWN
AT 1ST POSITION
2 METER BAND
143.8-148.2 MC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
6 METER BAND
49.5-54.2 MC.



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
10 METER BAND
27.0-29.8 MC.

1.1 Introduction

The VHF-152A Frequency Converter has been designed for use with a conventional communication type receiver to extend its range to cover the 11, 10, 6 and 2 meter amateur bands. The unit consists of an RF amplifier, a mixer, and a high frequency oscillator. The function of the unit is to convert the very high frequencies received by it to a new fixed frequency of 7 megacycles which is fed to the receiver and amplified and detected in the normal manner. This system of receiving may be described as a double heterodyne system. Its advantages are: high image rejection, since the image is 14 megacycles from the signal; and high selectivity which is provided by the selective low frequency intermediate frequency amplifier of the receiver. The auxiliary controls on the receiver, such as the beat frequency oscillator, the noisd limiter, and RF and audio gain controls, function in the normal manner, as does the signal strength meter if the receiver is equipped with one. The RME-45 and RME-84 Receivers are admirably suited for use with the VHF-152A Converter.

1.2 Specifications

Power Supply: 115 volts, 50-60 cycles, single phase*
Power Consumption: 40 watts at 115 volts
Output Frequency: 7 mc (7000 kc) (Nominal)
Overall Cabinet Dimensions: Length 12 inches Width 11 inches Depth 11 inches
Weight: 19.5 pounds
Frequency Range: 27.0 - 29.8 mc
49.5 - 54.2 mc
143.8 -148.2 mc

*NOTE: On special order the VHF-152A may be obtained with a special power transformer suitable for operation on 115-230 volts 25-60 cycles.

1.3 Tube Complement

	Type	Use	Schematic Symbol
1.	6AK5	RF Amplifier	VT-1
2.	6J6	Mixer-Oscillator	VT-2
3.	VR150	Voltage Regulator	VT-3
4.	5Y3G	Rectifier	VT-4

2.1 Inspection

The VHF-152A Converter should be carefully checked on receipt for any mechanical damage that may have resulted in transit. If any such damage is found, a claim should be filed with the carrier. No claim can be filed at the shipping point and Radio Mfg. Engineers, Inc. cannot be responsible for any damage incurred whild in the hands of the carrier.

2.2 External Connections

To place the VHF-152A in operation the line cord should be plugged into a suitable power source. The standard model is designed for operation on 110-120 volt 50-60 cycle AC line only. Use of the VHF-152A on any other voltage or frequency may result in damage.

The output cable (Fig. 2) should be connected to the antenna terminal of the receiver. The cable has two shielded leads and a ground lead each ending in a terminal lug. On receivers which have provision for doublet operation, such as the RME-45 and the RME-84, the blue coded lead must be connected to the antenna terminal farthest from the ground terminal. This is the hot side of the converter output. The red lead, or low side, must be connected to the antenna terminal nearest to the ground terminal. The ground braid should be connected to the receiver ground. On receivers not equipped for doublet operation, the blue lead should be connected to the antenna terminal and the red and ground (shield) leads should be connected to the receiver ground. This lead is coded white. Unless the above instructions are followed, the changeover switch (Par. 3.3) will not operate properly.

If an RME-DB-20 Preselector is used ahead of the receiver, the connections will be made as above except that the converter output cable connects in the same manner to the DB-20 antenna terminals instead of to the receiver.

2.3 Precautions

IMPORTANT - Attempted operation of the VHF-152A on any voltage or frequency other than that for which it is designed will result in damage to the unit. The operator must be sure that the supply is correct before plugging in the converter.

2.4 Antennas

On frequencies of 30 megacycles and above, the use of a resonant antenna is mandatory. For this reason the VHF-152A is provided with separate antenna connection for each frequency band. On the terminal strip on the rear apron (Fig. 2) are four sets of two terminals each. These terminals are marked "2" for the 144-148 mc band: "6" for the 50-54 mc band, and "10" for the 27-29.7 mc band. The input impedance for each band has been designed to be 300 ohms so that the owner may make use of the 300 ohm twin lead line now available. The remaining set of two terminals marked "LF" are for connecting the low frequency antenna used with the receiver. This pair of terminals is connected through to the receiver when the antenna changeover switch (Par. 3.3) is turned to "OUT" For information regarding antenna design and dimensions reference should be made to the ARRL Amateur Handbook, available at all Radio Supply Stores.

SECTION III
Operation and Circuit Details

3.1 Introduction

The VHF-152A operates in conjunction with a communication type receiver tuned to approximately 7 mc. The accuracy of setting the receiver will effect the accuracy of calibration of the VHF-152A by the same amount. That is to say if the low frequency receiver is off 100 kilocycles, the calibration of the VHF-152A will also be off by 100 kilocycles. It should be noted that the operator is not bound to use the output frequency of exactly 7.0 mc. If interference is encountered he may move the receiver tuning slightly to a clear channel, realizing that the VHF-152A calibration will change by the same amount the low frequency receiver was moved. If it is necessary to move the receiver frequency so far that the calibration is affected, he may recalibrate by following instructions in Section IV, It is not recommended that the output frequency be moved more than 50 kc higher or lower than 7.0 mc because of tracking troubles that may be encountered. In the factory the I.F. is left aligned at 6950 kc.

In double heterodyne receiving systems spurious signals may be received which are harmonics of the receiver local oscillator. On the VHF-152 two such signals may be received. One signal will be heard at 29.8 mc, which is outside the 27-29.7 mc band. Another may be heard at 52.2 mc. If it is found that this spurious signal falls on a real signal which is desired, the spurious signal may be moved by changing the receiver tuning slightly.

3.2 Line Switch

The equipment is turned on by means of the line switch on the right hand side of the control panel (Fig. 1).

3.3 Changeover Switch

On the left side of the control panel (Fig. 1) is the changeover switch. When this switch is turned to "IN", the output of the VHF-152A is fed to the receiver input terminals. At the same time the low frequency antenna terminals are grounded to prevent 7 mc signals from feeding through the VHF-152A to the receiver. When the changeover switch is turned to "OUT" the output of the VHF-152A is grounded and the low frequency "LF" (Fig. 2) antenna terminals are connected through to the receiver. Thus by turning the changeover switch to "OUT" the receiver functions normally.

3.4 Band Switch

In the center of the control panel (Fig. 1) is the band change switch. This switch has three positions marked: 144-148, 50-54, and 27-29.7, and is used to switch the VHF-152A to the desired range.

3.5 RF Stage Peaking

When the VHF-152A leaves the factory, the stages are peaked to maximum sensitivity. It may be found that some antennas may reflect a reactance into the RF stage that will detune it slightly. With the antenna for a certain band connected the RF padder for that band may be peaked up by listening to a signal. Figure IV shows the location of the RF padders for each band. To get at the padders it is necessary to remove the bottom cover plate.

3.6 IF Stage Peaking

The IF transformer on the VHF-152A (Fig. 3) is peaked at the factory at 6.95 mc. Different receivers connected to the output may change this tuning slightly. The owner should check the peaking of this transformer with the receiver connected. Peaking is accomplished by turning the screw on the top of the can. The screw should be adjusted for maximum gain as indicated by a received signal or maximum background noise if a signal is not available.

SECTION IV

Maintenance and Service

4.1 Introduction

No maintenance of importance is required on the VHF-152A. It is suggested that dust that may accumulate in the cabinet be blown out periodically

The owner may, if he has an accurate signal source available, recalibrate his converter as discussed in succeeding paragraphs. It should be born in mind that the calibration of the converter is affected by the setting of the companion receiver (Par. 3.1). Therefore, before attempting to recalibrate the converter, the calibration of the receiver should be checked.

The VHF-152A will drift somewhat during the first three minutes after being turned on and to a much less extent during the next ten or twenty minutes. It is recommended that no attempt be made to recalibrate or align the equipment until it has reached a stable temperature.

All calibrating and alignment should be done with the receiver connected and the changeover switch (Par. 3.3) in the "IN" position.

If the receiver has a carrier level meter such as is on the RME-45, this meter is used as a tuning indicator when peaking the circuits. If the receiver is not equipped with a meter, it will be necessary to connect an audio output meter to the receiver for a tuning indicator. When using an audio output meter, it is necessary to remove the AVC from the receiver.

4.2 IF Coil Alignment

As pointed out in Paragraph 3.1, the VHF-152A is calibrated and aligned for an output frequency of 6.95 mc. The output tuning is controlled by the screw on the top of the aluminum can on the top of the chassis (Fig. 3). The transformer may be peaked with a 6.95 mc signal fed into the mixer grid or with a signal tuned in on the converter. Connection to the mixer grid is most easily made on the stator of the center section of the tuning condenser. In either case, the transformer is adjusted to maximum sensitivity as indicated by the meter on the receiver.

4.3 Calibration

Calibration of the VHF-152A should not be attempted unless it is definitely established that the calibration is off.

Calibration is controlled by the oscillator padders (Fig. 4). These padders are made accessible by removal of the cabinet bottom plate. Beneath this plate is a second aluminum plate in which are padder access holes. All calibrating and aligning should be done with this cover on, the proper padder for each band may be determined by referring to Figure IV.

High beat is used on all bands. That is to say, the oscillator is always 7 mc (approximately) above the received signal. As in the case of all super heterodyne receivers, if sufficient input is used each signal may be received at two points differing by twice the IF frequency. With a signal being received, the padder setting that gives the highest oscillator frequency is the proper setting. The two low frequency ranges have iron core oscillator coils. The screws for adjusting the inductance of these coils is accessible on the top of the chassis. Unless the screws have been disturbed, adjustment should never be necessary.

4.4 RF Alignment

When the calibration is correct, the RF circuits should be aligned. Figure 4 shows the location of the RF amplifier and mixer grid padders for each band. Each of these padders should be adjusted for maximum sensitivity as indicated by the meter on the receiver.

When using a signal generator in aligning the VHF-152A a 300 ohm resistor should be inserted between the signal generator and the antenna terminals in order that the low impedance of the signal generator will not swamp the RF circuit and cause a misalignment of this circuit. Best results will be obtained when the RF circuit is aligned with the antenna connected. See paragraph 3.5.

4.5 Voltage Charts

As an aid in trouble shooting on the VHF-152A the following chart of voltages at various points in the circuit is tabulated below. Voltage readings should be made with a voltmeter of at least 2000 ohms per volt resistance. Variation of ±15% may be expected. All voltages are measured from the point indicated to ground unless otherwise indicated.

Circuit	Volts
RF Plate	170
RF Screen	115
RF Cathode	2.0
Mixer Plate	150
Osc. Mixer Cathode	5
Osc. Plate	60 (From cold side of choke)
Osc. Grid*	-3.0 (2 Meters), -4.7 (6 Meters), -5.5 (10 Meters)

* Note: Measured between Osc. grid and cathode with a 2.5 mh choke in series with voltmeter lead to grid.

No.	Component
RESISTORS	
1.1	22 ohm 1/2 watt ±20% carbon
1.2	220 ohm 1/2 watt ±10% carbon
1.3	15K ohm 1/2 watt ±10% carbon
1.4	18K ohm 2 watt ±10% carbon
1.5	55 ohm 1/2 watt ±20% carbon
1.6	1000 ohm 1/2 watt ±10% carbon
1.7	4.7K ohm 1/2 watt ±10% carbon
1.8	18 K ohm 2 watt ±10% carbon
1.9	3.5K ohm 10 watt-wire wound
CAPACITORS	
2.1	30 μμfd. Mica Padder
2.2	10 μμfd. Mica Padder
2.3	10 μμfd. Mica Padder
2.4	15 μμfd. Ceramic ±5%
2.5	Tuning Condenser R.F. Section
2.6	Tuning Condenser Mixer Section
2.7	Tuning Condenser Oscillator
2.8	2000 μμfd. 20% Mica
2.9	1000 μμfd. 20% 500 volt
2.10	15 μμfd. 5% Ceramic
2.11	30 μμfd. Mica Padder
2.12	10 μμfd. Mica Padder
2.13	10 μμfd. Mica Padder
2.14	100 μμfd. ±10% Ceramic
2.15	1.5 μμfd. ±.25 μμfd. Ceramic
2.16	1000 μμfd. ±20% Mica
2.17	25 μμfd. ±10% Ceramic
2.18	.01 μfd. 600 volt paper
2.19	100 μμfd. Mica Padder
2.20	1000 μμfd. 500 V. Mica
2.21	1000 μμfd. 20% 500 volt
2.22	1000 μμfd. 20%
2.23	25 μμfd. 10% Ceramic Neg. Temp. Coeff.
2.24	25 μμfd. 10% Ceramic Neg. Temp. Coeff.
2.25	3-13 μμfd. Ceramic Padder Neg. Temp. Coeff.
2.26	4-25 μμfd. Ceramic Padder Neg. Temp. Coeff.
2.27	4-25 μμfd. Ceramic Padder Neg. Temp. Coeff.
2.28	3-13 μμfd. Ceramic Padder Neg. Temp. Coeff.
2.29	25 μμfd. Ceramic Padder Neg. Temp. Coeff.
2.30	10 μfd. Electrolytic 450 volt
2.31	10 μfd. Electrolytic 450 volt
SWITCHES	
3.1	R.F. Switch Section, Ceramic
3.2	R.F. Switch Section, Ceramic
3.3	Mixer Switch Section, Ceramic
3.4	Mixer Switch Section, Ceramic
3.5	Oscillator Switch Section, Ceramic
3.6	Oscillator Switch Section, Ceramic
3.7	AC Line Switch SPST
3.8	Changeover Switch 4PDT

RADIO MFG. ENGINEERS INC.

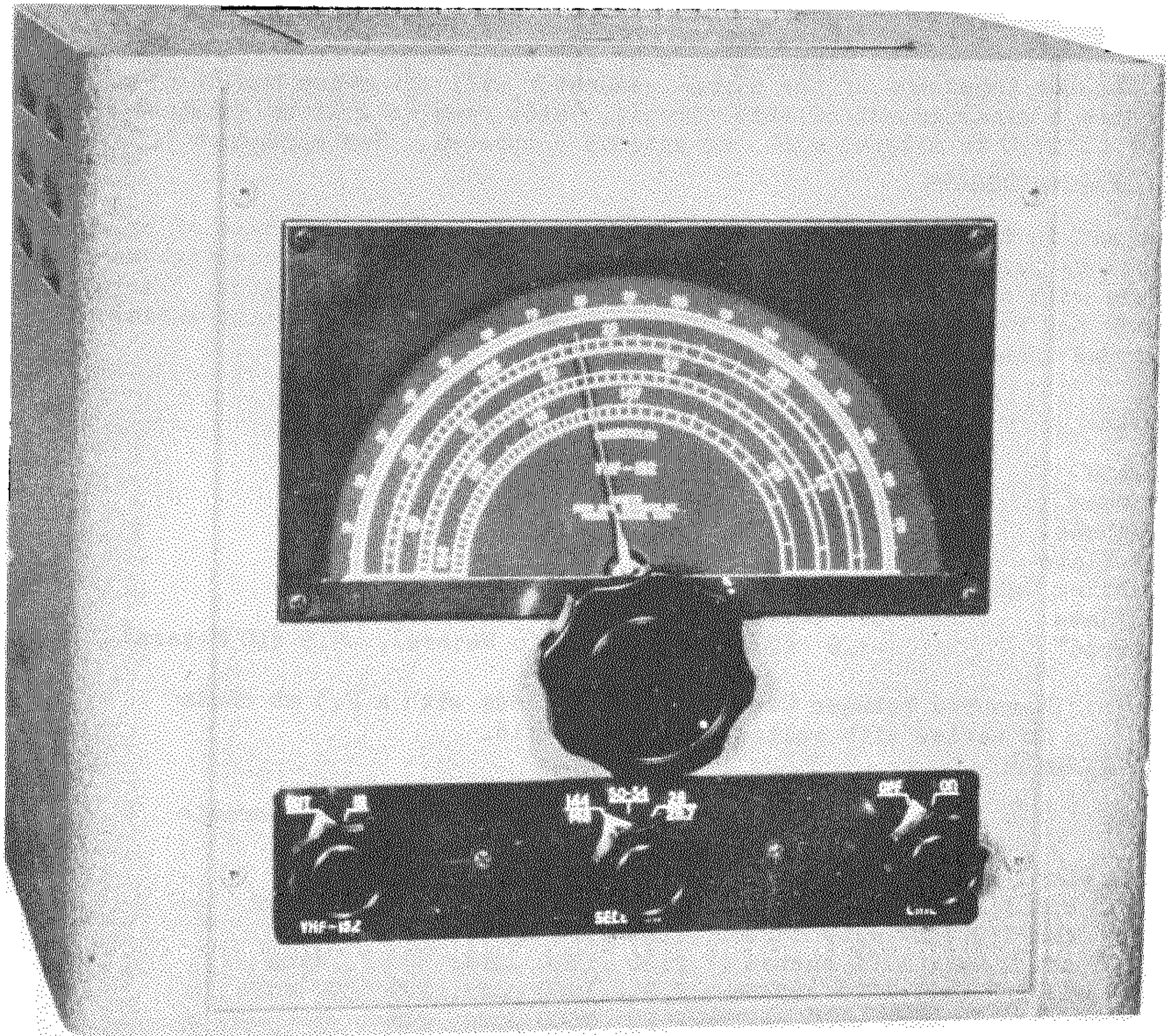
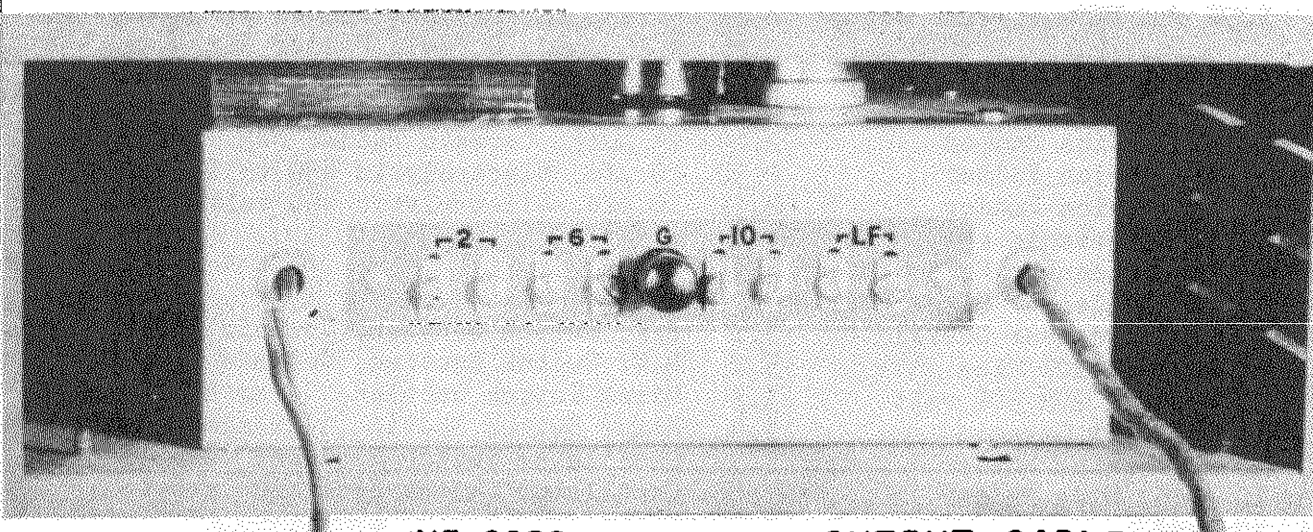


FIG. 1



←LINE CORD FIG.-2 OUTPUT CABLE→

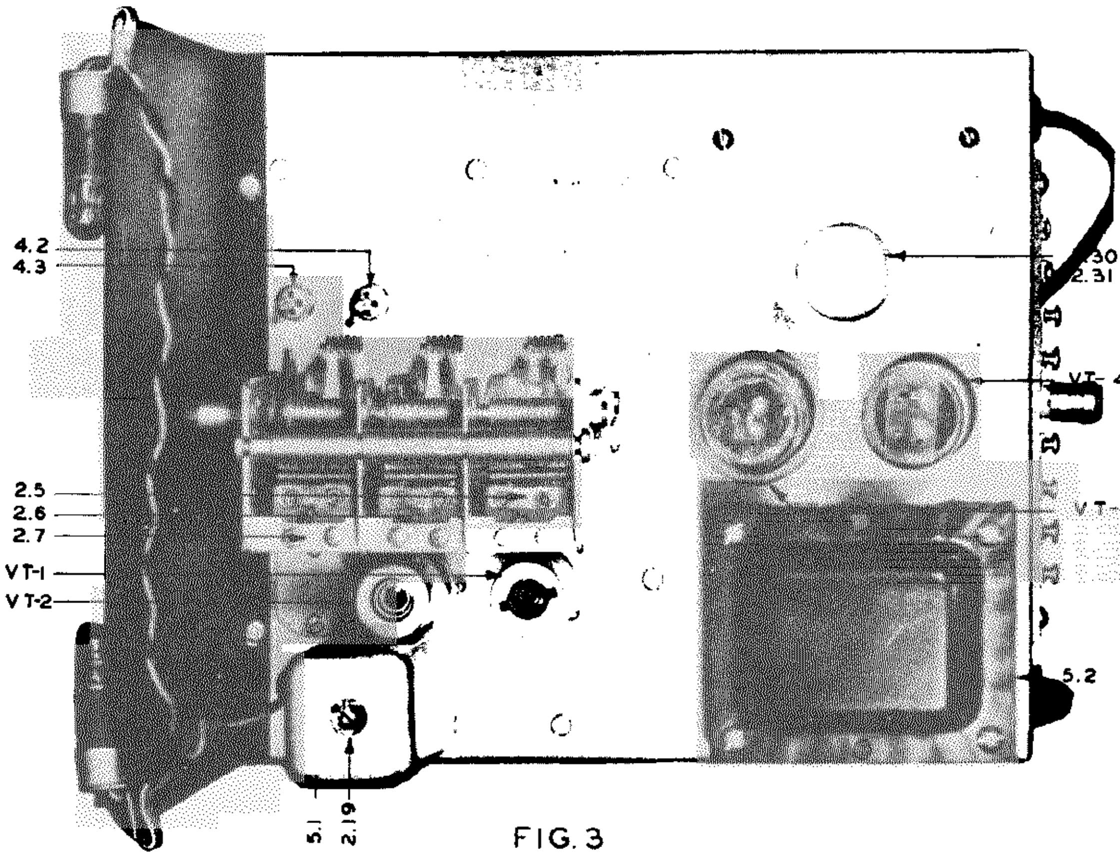

4.2
4.3
2.30
2.31
VT-4
2.5
2.6
2.7
VT-1
VT-2
VT-3
5.2
5.1
2.19

FIG. 3

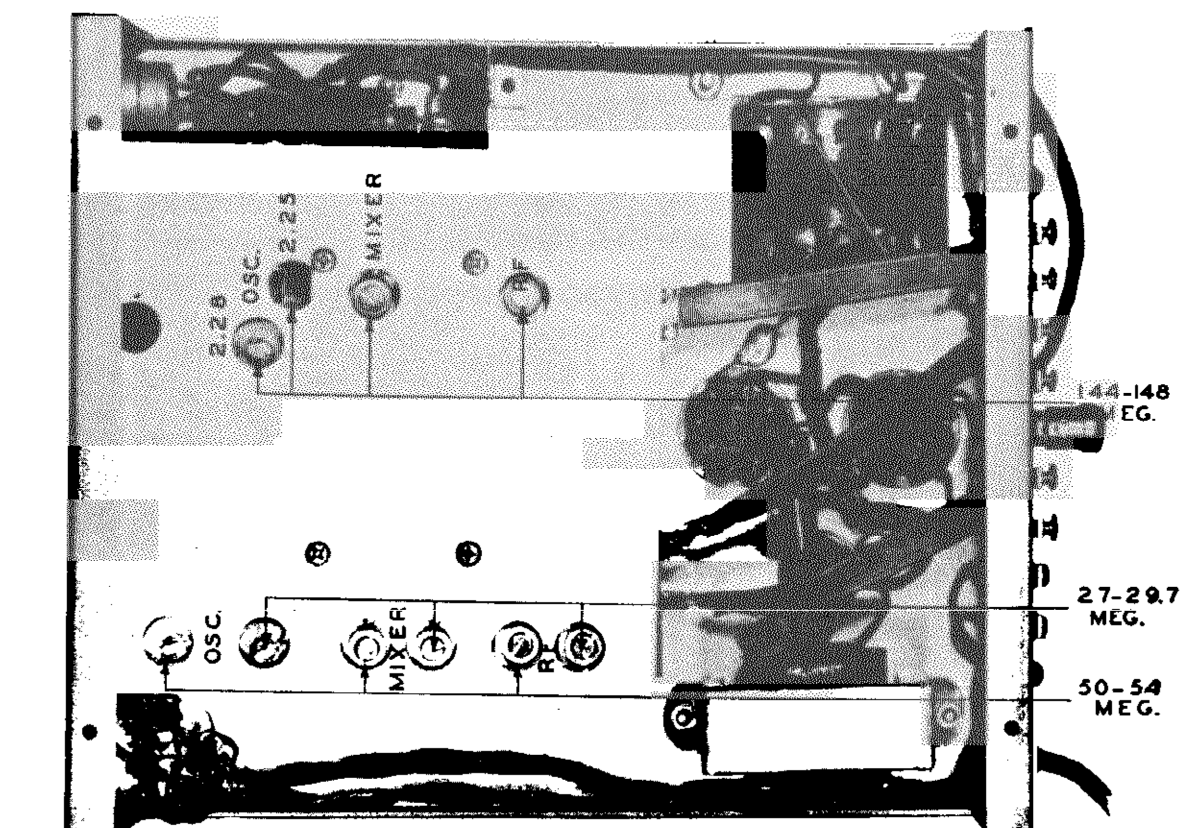

2.28
OSC.
2.25
MIXER
RF
144-148
MEG.
OSC.
MIXER
RF
27-29.7
MEG.
50-54
MEG.

FIG. 4

RADIO MFG. ENGINEERS INC.

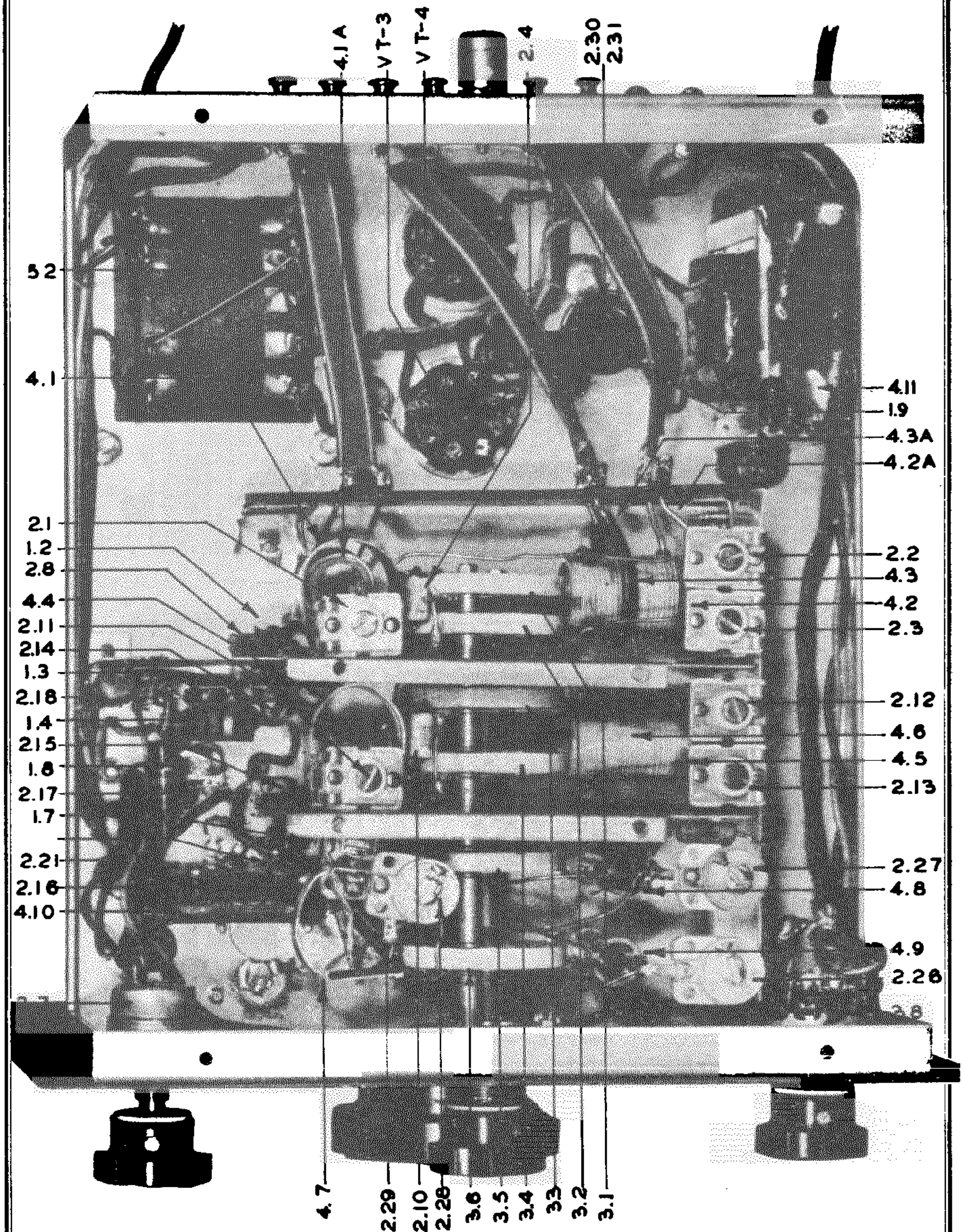
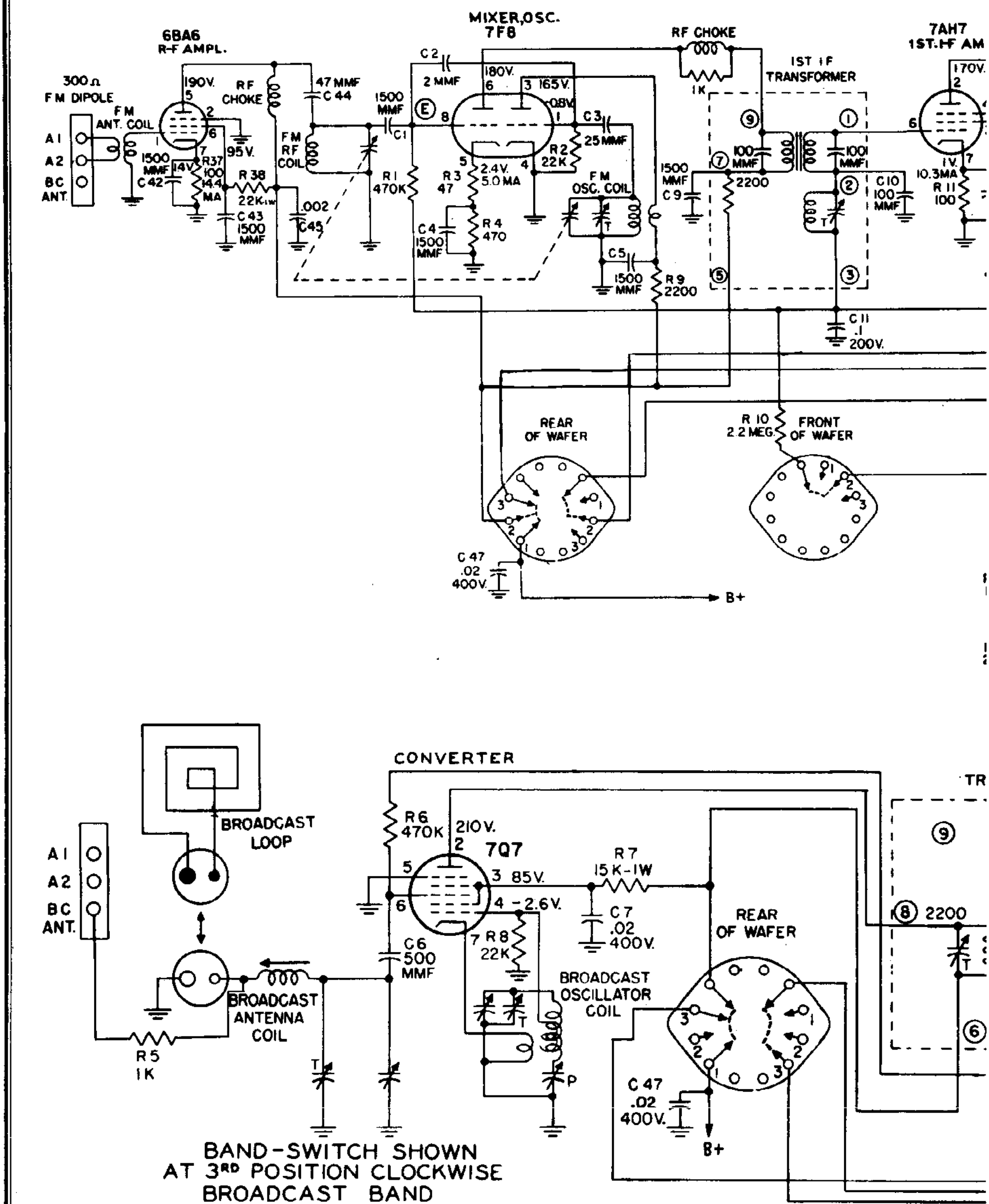
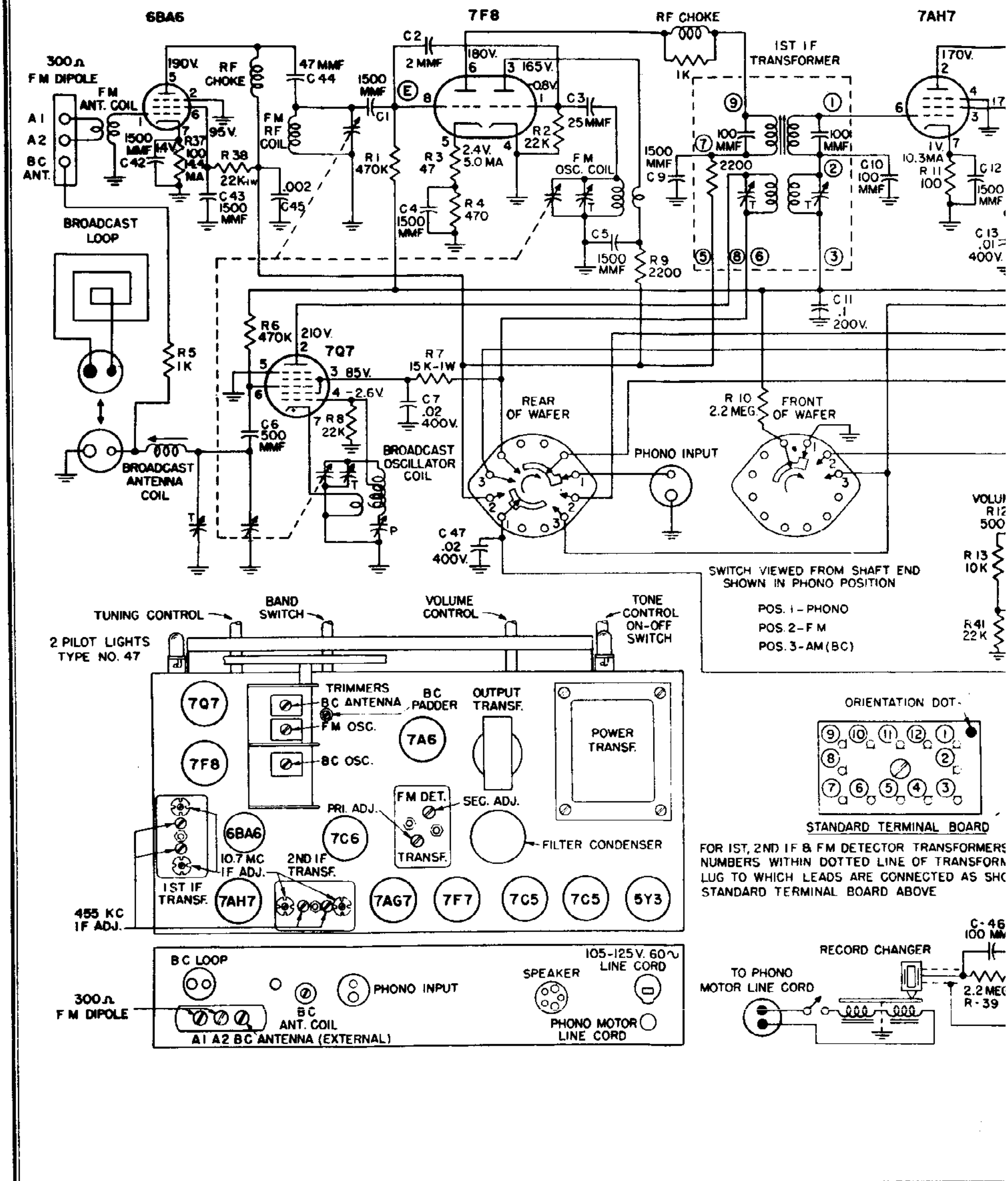
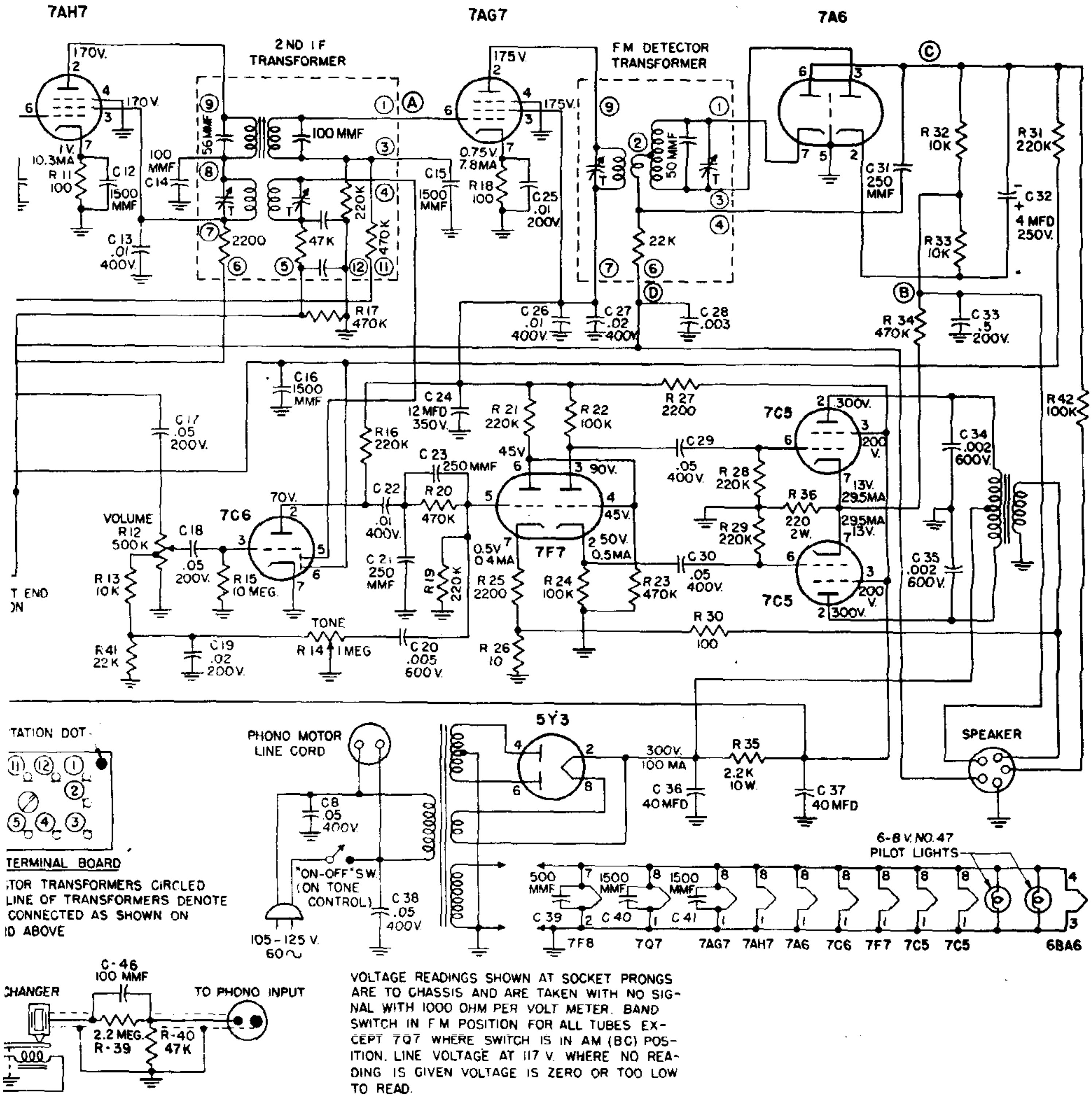


FIG. 5

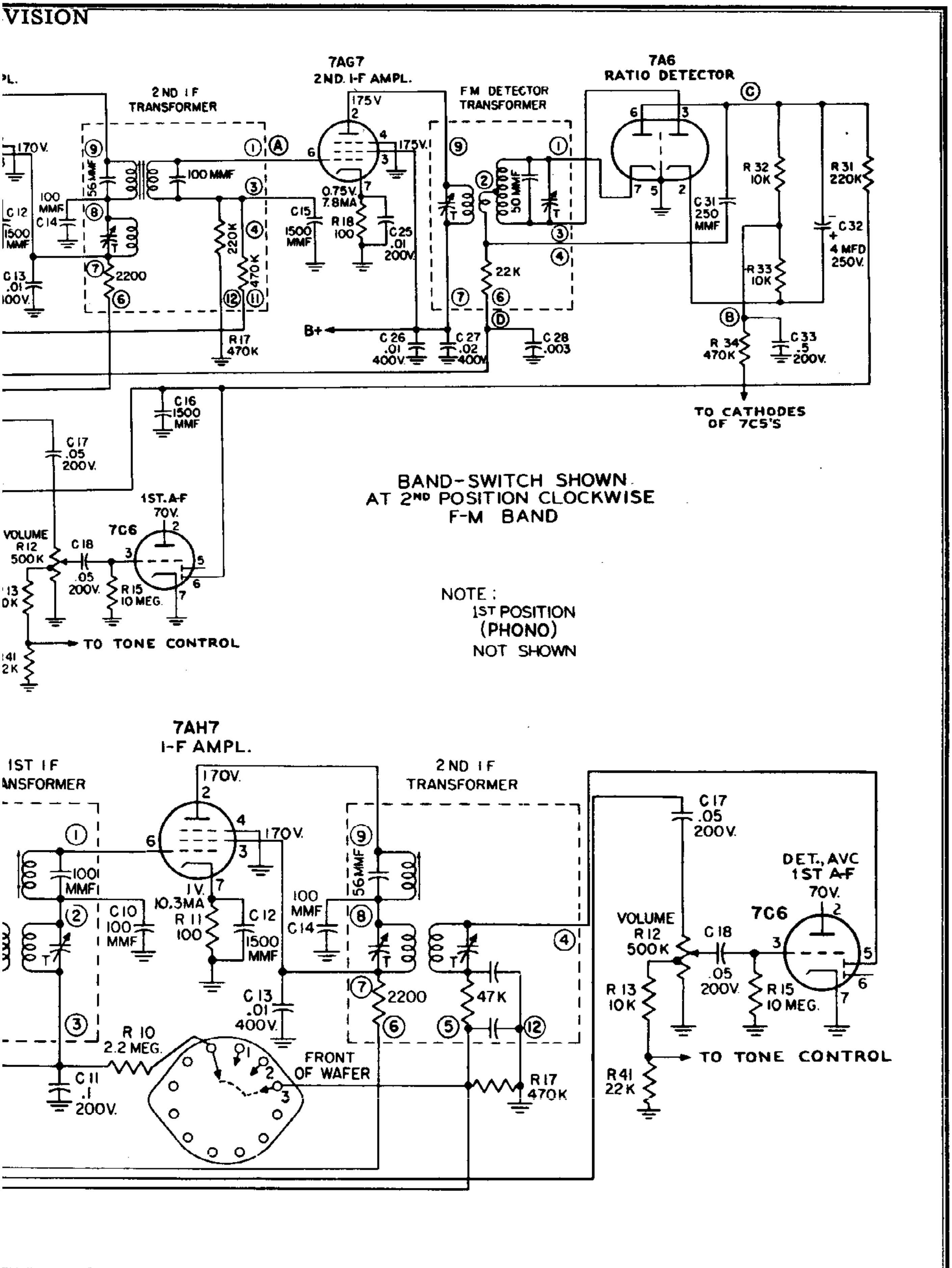
"clarified schem
RADIO WIRE TELE

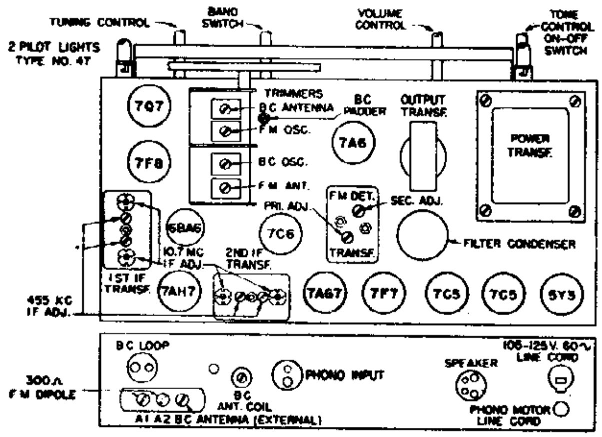



6BA6
7F8
7AH7
7Q7
RF CHOKE
1ST IF TRANSFORMER
300Ω FM DIPOLE
FM ANT. COIL
A1
A2
BC ANT.
RF CHOKE
47 MMF C 44
FM RF COIL
1500 MMF C1
R1 470K
C2 2 MMF
180V.
165V.
.08V.
C3 25 MMF
R2 22K
R3 47
2.4V. 5.0 MA
C4 1500 MMF
R4 470
FM OSC. COIL
C5 1500 MMF
R9 2200
1500 MMF C9
100 MMF
2200
100 MMF
C10 100 MMF
10.3MA
R11 100
C12 1500 MMF
C13 .01 400V.
C11 .1 200V.
170V.
190V.
95V.
1500 MMF C42
14V.
R37 100
1.4 MA
R38 22K 1W
C43 1500 MMF
.002 C45
BROADCAST LOOP
R5 1K
BROADCAST ANTENNA COIL
R6 470K
210V.
85V.
-2.6V.
R7 15K-1W
C7 .02 400V.
C6 500 MMF
R8 22K
BROADCAST OSCILLATOR COIL
REAR OF WAFER
PHONO INPUT
R10 2.2 MEG.
FRONT OF WAFER
C47 .02 400V.
SWITCH VIEWED FROM SHAFT END SHOWN IN PHONO POSITION
POS. 1 - PHONO
POS. 2 - F M
POS. 3 - AM (BC)
VOLUME R12 500
R13 10K
R41 22K
TUNING CONTROL
BAND SWITCH
VOLUME CONTROL
TONE CONTROL ON-OFF SWITCH
2 PILOT LIGHTS TYPE NO. 47
TRIMMERS
BC ANTENNA
FM OSC.
BC OSC.
BC PADDER
OUTPUT TRANSF.
POWER TRANSF.
7A6
FM DET.
PRI. ADJ.
SEC. ADJ.
TRANSF.
7C6
FILTER CONDENSER
10.7 MC IF ADJ.
2ND IF TRANSF.
1ST IF TRANSF.
455 KC IF ADJ.
7AG7
7F7
7C5
7C5
5Y3
BC LOOP
PHONO INPUT
BC ANT. COIL
SPEAKER
105-125V. 60~ LINE CORD
PHONO MOTOR LINE CORD
300Ω FM DIPOLE
A1 A2 BC ANTENNA (EXTERNAL)
ORIENTATION DOT
STANDARD TERMINAL BOARD
FOR 1ST, 2ND IF & FM DETECTOR TRANSFORMERS
NUMBERS WITHIN DOTTED LINE OF TRANSFORM
LUG TO WHICH LEADS ARE CONNECTED AS SHO
STANDARD TERMINAL BOARD ABOVE
RECORD CHANGER
TO PHONO MOTOR LINE CORD
C-46 100 MM
2.2 MEG
R-39



VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS AND ARE TAKEN WITH NO SIGNAL WITH 1000 OHM PER VOLT METER. BAND SWITCH IN FM POSITION FOR ALL TUBES EXCEPT 7Q7 WHERE SWITCH IS IN AM (BC) POSITION. LINE VOLTAGE AT 117 V. WHERE NO READING IS GIVEN VOLTAGE IS ZERO OR TOO LOW TO READ.


7AG7
2ND. I-F AMPL.
2ND IF TRANSFORMER
FM DETECTOR TRANSFORMER
7A6
RATIO DETECTOR
TO CATHODES OF 7C5'S
1ST. A-F
7C6
VOLUME R12 500K
TO TONE CONTROL
BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE F-M BAND
NOTE: 1ST POSITION (PHONO) NOT SHOWN
7AH7
I-F AMPL.
1ST IF TRANSFORMER
2ND IF TRANSFORMER
FRONT OF WAFER
DET., AVC 1ST A-F
7C6
VOLUME R12 500K
TO TONE CONTROL



Tube and Trimmer Locations.

ALIGNMENT PROCEDURE FOR A.M.:

Set band switch to AM. Connect output meter across voice coil. Turn Volume Control on full volume.

1. Connect generator to tuning condenser stator (BC Antenna) in series with .01 mfd.; tune generator to 455 Kc.; tune radio to quiet point on high frequency end of dial, and adjust 1st and 2nd IF transformers (455 Kc.) for maximum peak output.

2. Connect generator to antenna terminal in series with 200 mmf. Turn tuning control to extreme full mesh position of tuning condenser. Set pointer to line located just below 55 calibration on Bcst. Band. Tune receiver to 60 on dial; tune generator to 600 Kc. Adjust BC padder, BC Ant. Coil Inductance (%2 screw on rear of chassis) for maximum output.

3. Tune receiver to 160 on dial; tune generator to 1600 Kc. Adjust BC. Osc. and BC. Ant. trimmers for maximum output. Repeat 2 and 3 for best alignment.

ALIGNMENT PROCEDURE FOR F.M.:

Note: Points A, B, C, D, E, and F, are noted on circuit diagram.

Only a highly skilled technician with the correct equipment can properly align this receiver.

1. Set Band Switch to FM.

2. Connect vacuum tube voltmeter (VTVM) across points B and C.

3. Connect 10.7 Mc. signal generator through .01 mfd. condenser to point A and ground.

4. Adjust primary of FM Detector Transformer for maximum VTVM reading.

5. Connect VTVM across points B and D

6. Adjust secondary of FM Detector Transformer for zero VTVM reading.

7. Connect 10.7 Mc. Signal Generator to point F and ground.

8. Connect VTVM across points B and C.

9. Rotate 10.7 Mc. adjustment screw of 2nd IF Transformer Secondary maximum number of turns counterclockwise.

10. Adjust primary of 2nd IF Transformer for maximum VTVM reading. Decrease signal generator output as IF transformers are adjusted to keep VTVM reading between 2 and 3 volts.

11. Adjust secondary of 2nd IF transformer, keeping reading between 2 and 3 volts.

12. Connect 10.7 Mc generator to point E and ground. Rotate 10.7 Mc adjustment screw of 1st IF Transformer Secondary maximum number of turns counter clockwise. Adjust primary of 1st IF Transformer for maximum VTVM reading, decreasing signal generator output to keep VTVM reading between 2 and 3 volts.

13. Adjust secondary of 1st IF Transformer for maximum VTVM reading, keeping the voltage between 2 and 3.

DO NOT READJUST IF TRANSFORMERS AGAIN.

14. Connect 106 Mc. Signal Generator to FM antenna terminals. If generator impedance is low, put one 150-ohm carbon resistor in series with each of the generator leads. Tune receiver dial to 106 Mc.

15. Adjust FM Oscillator Trimmer for maximum VTVM reading.

16. Adjust FM Antenna Trimmer for maximum VTVM reading.

MODELS M70, M71
MODEL M70A

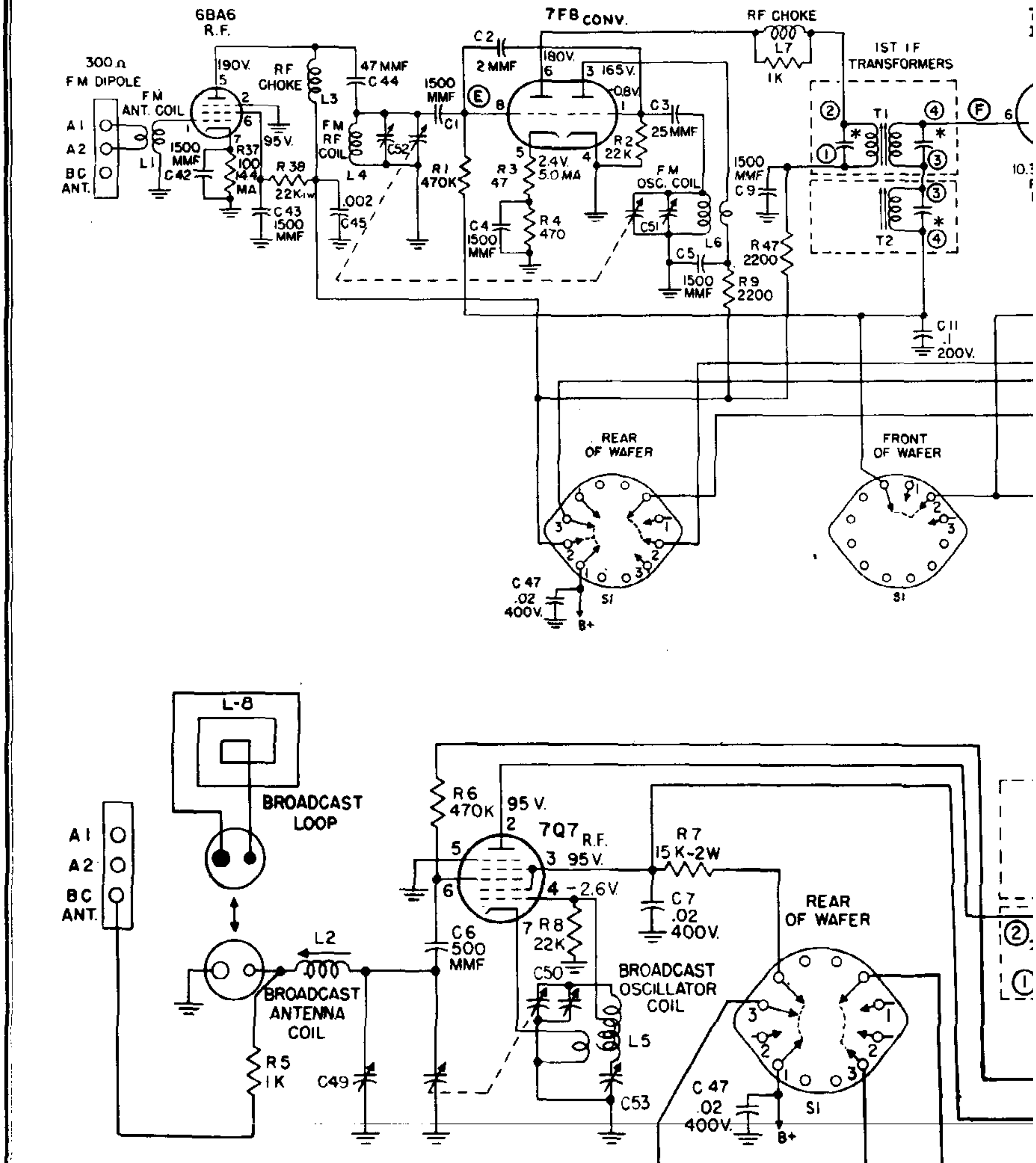
RADIO WIRE TELEVISION

MODELS M70, M71 PARTS LIST:

C 1—1500 mmf., ±300 mmf.
C 2—2 mmf., 20%
C 3—25 mmf., 10%.
C 4—1500 mmf., ±300 mmf.
C 5—1500 mmf., ±300 mmf.
C 6—500 mmf., 20%.
C 7—.02 mfd., 400V.
C 8—1500 mmf., ±300 mmf.
C 9—1500 mmf., ±300 mmf.
C10—100 mmf., 20%
C11—.1 mfd., 200V.
C12—1500 mmf., ±300 mmf.
C13—.01 mfd., 400V.
C14—100 mmf., 20%.
C15—1500 mmf., ±300 mmf.
C16—1500 mmf., ±300 mmf.
C17—.05 mfd., 200V.
C18—.05 mfd., 200V.
C19—.02 mfd., 200V.
C20—.005 mfd., 600V.
C21—250 mmf., 20%.
C22—.01 mfd., 400V.
C23—250 mmf., 20%.
C24—12 mfd., 350V.
C25—.01 mfd., 200V.
C26—.01 mfd., 400V.
C27—.02 mfd., 400V.
C28—.003 mfd., 20%.
C29—.05 mfd., 400V.
C30—.05 mfd., 400V.
C31—250 mmf., 20%.
C32—4 mfd., 250V.
C33—.5 mfd., 200V.
C34—.002 mfd., 600V.
C35—.002 mfd., 600V.
C36—40 mfd., 400V.
C37—40 mfd., 400V.
C38—.05 mfd., 400V.
C39—500 mfd., ±100 mfd.
C40—1500 mmf., ±300 mmf.
C41—1500 mmf., ±300 mmf.
C42—1500 mmf. ±300 mmf.
C43—1500 mmf. ±300 mmf.
C44—47 mmf., 10%.
C45—1500 mfd. ±300 mmf.
C46—100 mmf. 20%.
C47—.02 mfd., 400V.
R 1—470K, ¼W., 20%.
R 2—22K, ¼W., 20%.
R 3—47 ohm, ¼W., 20%.
R 4—470 ohm, ¼W., 20%.
R 5—1K, ¼W., 20%.
R 6—470K, ¼W., 20%.
R 7—15K, 1W., 20%.
R 8—22K, ¼W., 20%.
R 9—2200 ohm, ¼W., 20%.
R10—2.2 meg., ¼W., 20%.
R11—100 ohm, ¼W., 20%.
R12—500K, Variable Volume Control, tapped at 50K.
R13—10K, ¼W., 20%.
R14—1 meg. variable tone control w/s PST.
R15—10 meg., ¼W., 20%.
R16—220K, ¼W., 20%.
R17—470K, ¼W., 20%.
R18—100 ohm, ¼W., 20%.
R19—220K, ¼W., 20%.
R20—470K, ¼W., 20%.
R21—220K, ¼W., 20%.
R22—100K, ¼W., 20%.
R23—470K, ¼W., 20%.
R24—100K, ¼W., 20%.
R25—2200 ohm, ¼W., 20%.
R26—10 ohm, ¼W., 20%.
R27—2200 ohm, ¼W., 20%.
R28—220K, ¼W., 20%.
R29—220K, ¼W., 20%.
R30—100 ohm, ¼W., 20%.
R31—220K, ¼W., 20%.
R32—10K, ¼W., 20%.
R33—10K, ¼W., 20%.
R34—470K.
R35—2200Ω wirewound 10W 10%.
R36—220Ω 2W 20%.
R37—100Ω ¼W 20%.
R38—22K 1W 20%.
R39—2.2 meg. ¼W 20%.
R40—47K ¼W 20%.
AM-FM I.F. Input Transformer (*ZC2.208)
AM-FM I.F. Output Transformer (*ZC2.214)
FM Ratio Det. Transformer (*ZC2.209)
RF Choke (*LA2.210).
FM Antenna Coil—*LA-2.241.
RF Plate choke—*LA-2.242.
FM-RF Coil—*LA-2.243.
FM osc. coil—*LA-2.222.
Bcst. Loop.
Bcst. Antenna coil—*LA-13.997.
Bsct. Osc. coil—*LA-2.221.
FM Dipole.
Power transformer—*TA-18.043.
Audio output transformer—*ZA-15.019.

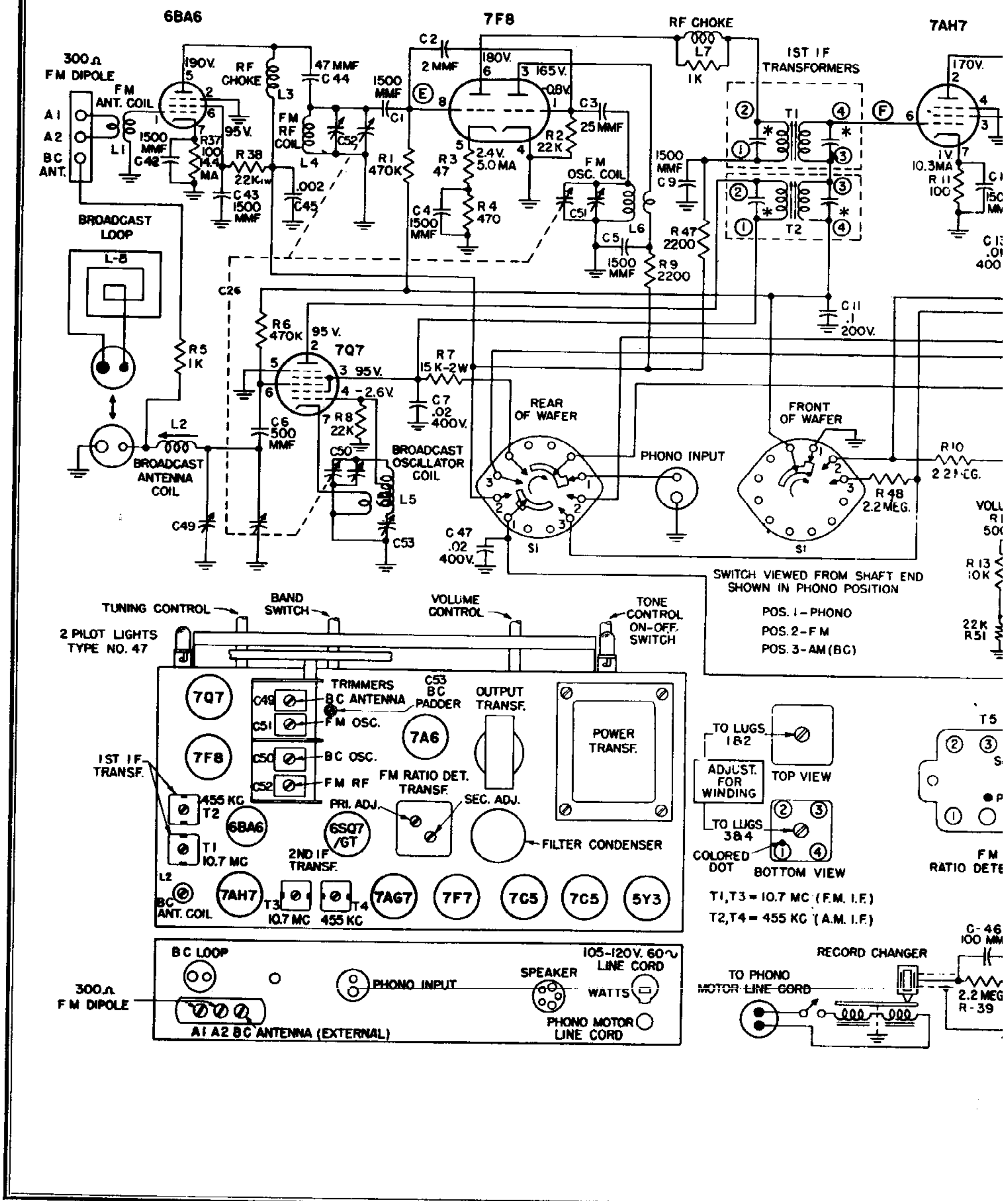
MODEL M70A PARTS LIST:

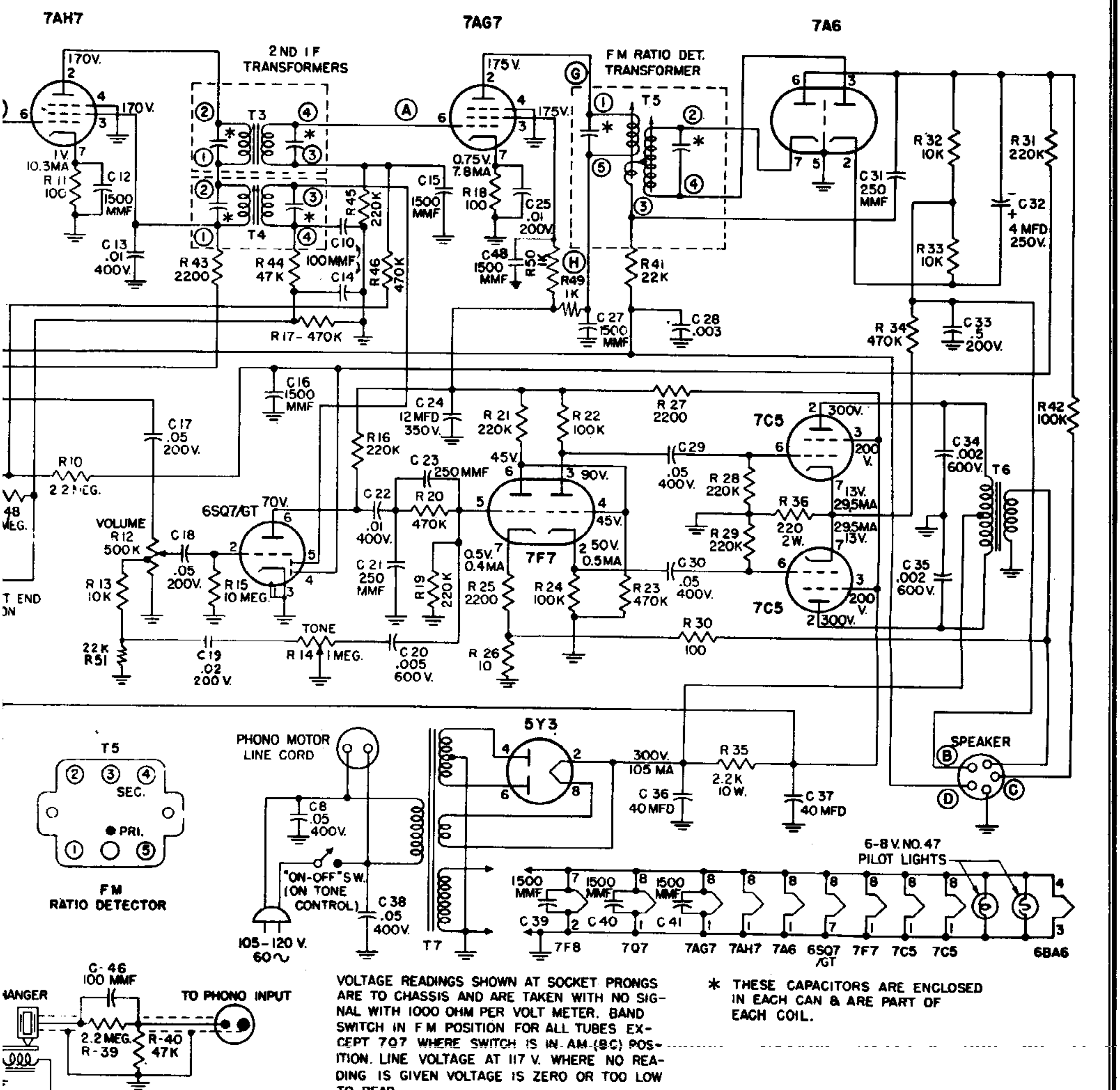
C 1—1,500 mmfd., ± 300 mmfd.
C 2—2 mmfd., 20%
C 3—25 mmfd., 10%
C 4—1,500 mmfd., ±300 mmfd.
C 5—1,500 mmfd., ±300 mmfd.
C 6—500 mmfd., 20%
C 7—.02 mfd., 400 V.
C 8—.05 mfd., 400 V.
C 9—1,500 mmfd., ±300 mmfd.
C10—100 mmfd., 20%
C11—.1 mfd., 200 V.
C12—1,500 mmfd., ±300 mmfd.
C13—.01 mfd., 400 V.
C14—100 mmfd., 20%
C15—1,500 mmfd., ±300 mmfd.
C16—1,500 mmfd., ±300 mmfd.
C17—.05 mfd., 200 V.
C18—.05 mfd., 200 V.
C19—.02 mfd., 200 V.
C20—.005 mfd., 600 V.
C21—250 mmfd., 20%
C22—.01 mfd., 400 V.
C23—250 mmfd., 20%
C24—12 mfd., 350 V.
C25—.01 mfd., 200 V.
C26—Var. cond. (AM-FM) *C-6.012
C27—1,500 mmfd., ±300 mmfd.
C28—.003 mfd., 20%
C29—.05 mfd., 400 V.
C30—.05 mfd., 400 V.
C31—250 mmfd., 20%
C32—4 mfd., 250 V.
C33—.5 mfd., 200 V.
C34—.002 mfd., 600 V.
C35—.002 mfd., 600 V.
C36 & C37—40 mfd. x 40 mfd., electrolytic, 400 V.
C38—.05 mfd., 400 V.
C39—1,500 mmfd., ±300 mmfd.
C40—1,500 mmfd., ±300 mmfd.
C41—1,500 mmfd., ±300 mmfd.
C42—1,500 mmfd., ±300 mmfd.
C43—1,500 mmfd., ±300 mmfd.
C44—47 mmfd., 10%
C45—.002 mfd., 400 V.
C46—100 mmfd., 20%
C47—.02 mfd., 400 V.
C48—1,500 mmfd., ±300 mmfd.
C49—Trimmer, compression, 3-35 mmfd.
C50—Trimmer, compression, 3-35 mmfd.
C51—Trimmer, ceramic, 1.5-7 mmfd.
C52—Trimmer, compression, 1.6-18 mmfd.
C53—Padder condenser, 275-1,000 mmfd.
R 1—470KΩ, ¼W., 20%
R 2—22KΩ, ¼W., 20%
R 3—47Ω, ¼W., 20%
R 4—470Ω, ¼W., 20%
R 5—1KΩ, ¼W., 20%
R 6—470KΩ, ¼W., 20%
R 7—15KΩ, 2W., 20%
R 8—22KΩ, ¼W., 20%
R 9—2,200Ω, ¼W., 20%
R10—2.2 Meg.Ω, ¼W., 20%
R11—100Ω, ¼W., 20%
R12—.5 Meg.Ω Volume Control (Audio Taper) tapped at 50KΩ *RA-9.069
R13—10KΩ, ¼W., 20%
R14—1 Meg.Ω Tone Control, with power switch *RA-9.070
R15—10 Meg.Ω, ¼W., 20%
R16—220KΩ, ¼W., 20%
R17—470KΩ, ¼W., 20%
R18—100Ω, ¼W., 20%
R19—220KΩ, ¼W., 20%
R20—470KΩ, ¼W., 20%
R21—220KΩ, ¼W., 20%
R22—100KΩ, ¼W., 20%
R23—470KΩ, ¼W., 20%
R24—100KΩ, ¼W., 20%
R25—2,200Ω, ¼W., 20%
R26—10Ω, ¼W., 20%
R27—2,200Ω, ¼W., 20%
R28—220KΩ, ¼W., 20%
R29—220KΩ, ¼W., 20%
R30—100Ω, ¼W., 20%
R31—220KΩ, ¼W., 20%
R32—10KΩ, ¼W., 20%
R33—10KΩ, ¼W., 20%
R34—470KΩ, ¼W., 20%
R35—2,200Ω, 10W., wirewound, 10%
R36—220Ω, 2W., 20%
R37—100Ω, ¼W., 20%
R38—22KΩ, 1W., 20%
R39—2.2 Meg.Ω, ¼W., 20%
R40—47KΩ, ¼W., 20%
R41—22KΩ, ¼W., 20%
R42—100KΩ, ¼W., 20%
R43—2,200Ω, ¼W., 20%
R44—47KΩ, ¼W., 20%
R45—220KΩ, ¼W., 20%
R46—470KΩ, ¼W., 20%
R47—2,200Ω, ¼W., 20%
R48—2.2 Meg.Ω, ¼W., 20%
R49—1KΩ, ¼W., 20%
R50—1KΩ, ¼W., 20%
T 1—FM I.F. Trans., 10.7 Mc. *ZB-2.276
T 2—AM I.F. Trans., 455 Kc. *ZB-2.275
T 3—FM I.F. Trans., 10.7 Mc. *ZB-2.276
T 4—AM I.F. Trans., 455 Kc. *ZB-2.275
T 5—FM Ratio Detector Transformer, 10.7 Mc. *ZC-2.278
T 6—Output Trans. *ZB-15.019
T 7—Power Trans. *TA-18.053
S 1—Band Switch *SA-12.060
L 1—FM Antenna Coil *LA-2.241
L 2—Antenna Coil, Broadcast *LA-2.273
L 3—R.F. Plate Choke *LA-2.279
L 4—R.F. Coil, FM *LA-2.243
L 5—Oscillator Coil, Broadcast *LA-2.221
L 6—Oscillator Coil, FM *LA-2.222
L 7—R.F. Choke, Conv. Plate *LA-2.242
L 8—Loop, Broadcast *LC-5.018
Antenna, FM, Folded Dipole (300Ω) *LA-5.010
Pilot Lamp, No. 47, 6-8 V.



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
BROADCAST BAND

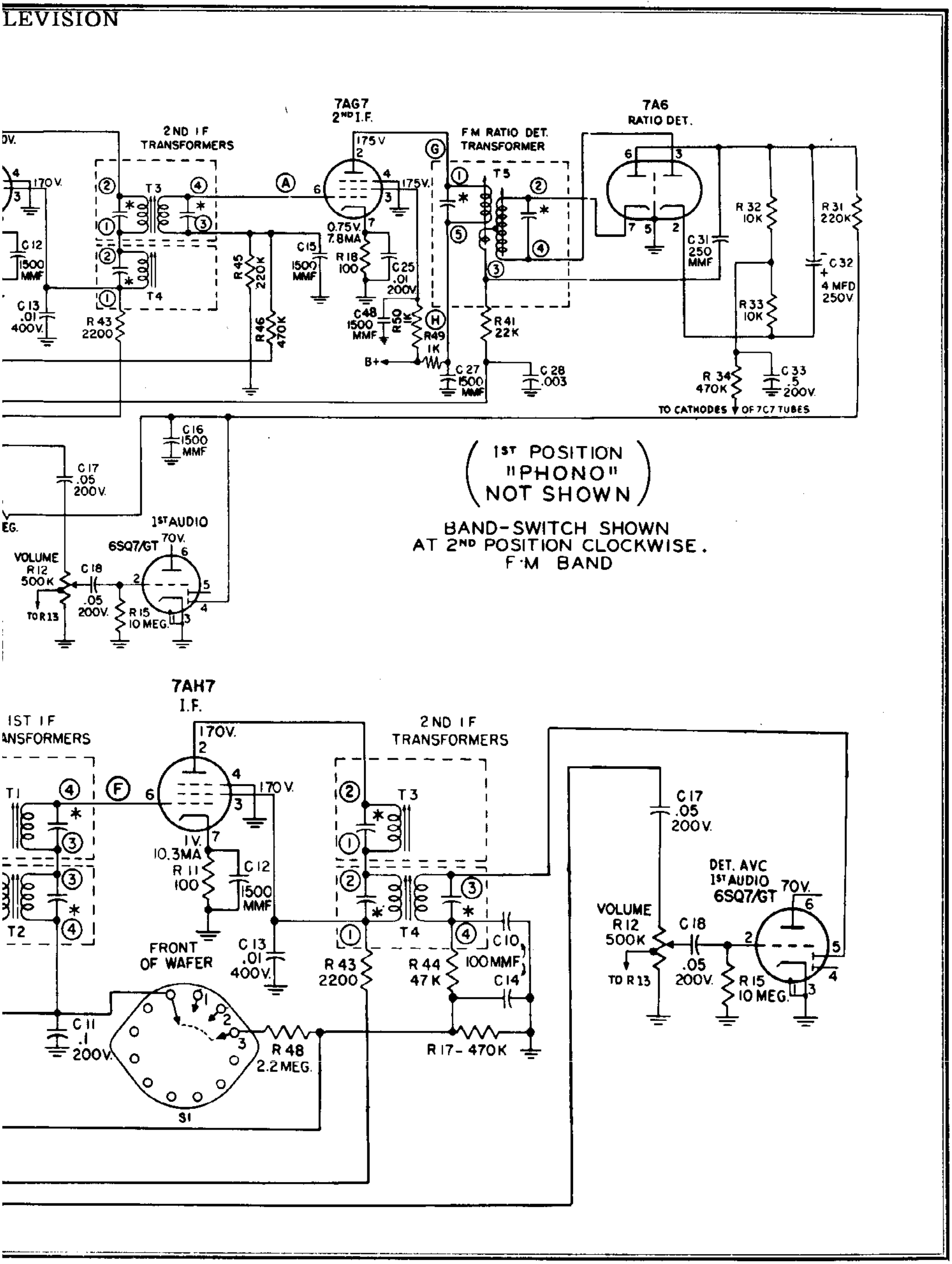
RADIO WI

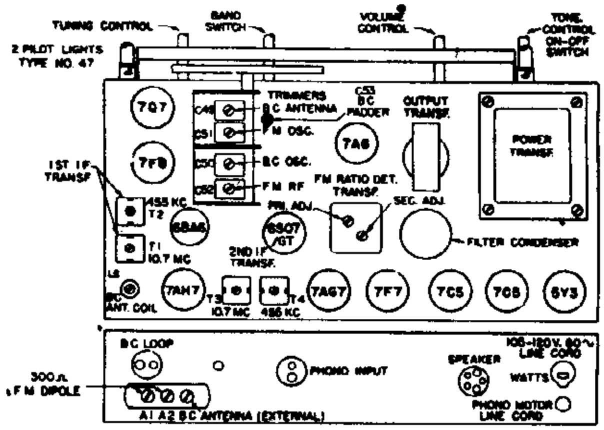

6BA6
7F8
RF CHOKE
7AH7
300 Ω FM DIPOLE
FM ANT. COIL
1ST IF TRANSFORMERS
BROADCAST LOOP
7Q7
REAR OF WAFER
FRONT OF WAFER
PHONO INPUT
BROADCAST ANTENNA COIL
BROADCAST OSCILLATOR COIL
SWITCH VIEWED FROM SHAFT END SHOWN IN PHONO POSITION
POS. 1 - PHONO
POS. 2 - FM
POS. 3 - AM (BC)
TUNING CONTROL
BAND SWITCH
VOLUME CONTROL
TONE CONTROL ON-OFF SWITCH
2 PILOT LIGHTS TYPE NO. 47
TRIMMERS
BC ANTENNA
FM OSC.
BC OSC.
FM RF
C53 BC PADDER
OUTPUT TRANSF.
POWER TRANSF.
1ST IF TRANSF.
455 KC T2
T1 10.7 MC
FM RATIO DET. TRANSF.
PRI. ADJ.
SEC. ADJ.
FILTER CONDENSER
2ND IF TRANSF.
BC ANT. COIL
T3 10.7 MC
T4 455 KC
TO LUGS 1&2
ADJUST FOR WINDING
TO LUGS 3&4
TOP VIEW
COLORED DOT
BOTTOM VIEW
T1, T3 = 10.7 MC (F.M. I.F.)
T2, T4 = 455 KC (A.M. I.F.)
FM RATIO DETE
BC LOOP
PHONO INPUT
105-120V. 60~ LINE CORD
SPEAKER
WATTS
PHONO MOTOR LINE CORD
A1 A2 BC ANTENNA (EXTERNAL)
TO PHONO MOTOR LINE CORD
RECORD CHANGER



VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS AND ARE TAKEN WITH NO SIGNAL WITH 1000 OHM PER VOLT METER. BAND SWITCH IN FM POSITION FOR ALL TUBES EXCEPT 7Q7 WHERE SWITCH IS IN AM (BC) POSITION. LINE VOLTAGE AT 117 V. WHERE NO READING IS GIVEN VOLTAGE IS ZERO OR TOO LOW TO READ.

* THESE CAPACITORS ARE ENCLOSED IN EACH CAN & ARE PART OF EACH COIL.


7AG7
2ND I.F.
2ND I F TRANSFORMERS
F M RATIO DET. TRANSFORMER
7A6
RATIO DET.
R 32 10K
R 31 220K
C 31 250 MMF
C 32 4 MFD 250V.
R 33 10K
R 34 470K
C 33 .5 200V.
TO CATHODES OF 7C7 TUBES
R 45 220K
R 46 470K
C 15 1500 MMF
R 18 100
C 25 .01 200V
C 48 1500 MMF
R 50 1K
R 49 1K
C 27 1500 MMF
R 41 22K
C 28 .003
C 13 .01 400V.
R 43 2200
C 12 1500 MMF
C 16 1500 MMF
C 17 .05 200V.
1ST AUDIO
6SQ7/GT
VOLUME R 12 500K
C 18 .05 200V.
R 15 10 MEG.
TO R 13
1ST POSITION "PHONO" NOT SHOWN
BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. F·M BAND
7AH7
I.F.
IST I F TRANSFORMERS
2ND I F TRANSFORMERS
R 11 100
C 12 1500 MMF
C 13 .01 400V.
R 43 2200
R 44 47 K
C 10 100 MMF
C 14
FRONT OF WAFER
C 11 .1 200V.
R 48 2.2 MEG.
R 17- 470K
S1
DET. AVC 1ST AUDIO 6SQ7/GT
VOLUME R 12 500K
C 17 .05 200V.
C 18 .05 200V.
R 15 10 MEG.
TO R 13



Tube and Trimmer Locations.

ALIGNMENT PROCEDURE FOR A.M.:

Equipment Required:
a) Broadcast Band Signal Generator.
b) Output Meter.

1. Set band switch to AM. Advance volume control to full volume setting.
2. Connect output meter across voice coil.
3. Connect the Signal Generator across the broadcast band antenna section of the variable condenser. The "high" side of the Generator should connect to the stator section and the "ground" side to the frame or chassis. Adjust the Signal Generator to 455 kc and with the receiver switched on, adjust the first and second I.F. transformers for peak output as shown on the output meter. The signal injected into the receiver should be as small in magnitude as possible, consistent with a useful deflection on the output meter.
4. Connect the "high" side of the Generator to the antenna terminal with a 200 mmf condenser inserted in series. Connect the "ground" side of the Generator to the chassis. Tune receiver to 60 on the dial, adjust Signal Generator to 600 kc. Adjust the BC padder and the BC antenna coil for maximum deflection on the output meter. Use a weak signal.
5. Tune receiver to 160 on the dial. Adjust Signal Generator to 1600 kc. Adjust BC oscillator and BC antenna trimmers for maximum output.
6. Repeat operations 4 and 5.

ALIGNMENT PROCEDURE FOR F.M.:

Note: Points A. B. C. D. E. F. G. and H are noted on circuit diagram.

Points B, C, and D have been brought out to the unused contacts of the speaker socket at the rear of the chassis.

Equipment Required:
a) High frequency Signal Generator with 88-108 Mc tuning range.
b) Signal Generator capable of delivering .1 V at 10.7 mc.
c) Audio output meter.
d) D.C. vacuum tube voltmeter with zero center scale.

a. Ratio Detector Alignment:

1. Connect V.T.V.M. across points "B" and "C" (A.V.C. Voltage).
2. Feed 10.7 mc unmodulated R.F. signal into 7AG7 grid (point A) through .01 µfd. condenser. This signal should be .1 volt.
3. Adjust primary of Ratio Detector (T-5) for maximum voltage indication on V.T.V.M.
4. Connect zero centered V.T.V.M. across points "B" and "D".
5. Adjust secondary of Ratio Detector (T-5) for zero indication.
6. Tune 10.7 mc Signal Generator higher in frequency (about 200 kc) until maximum voltage reading is obtained on V.T.V.M.; note this voltage, then tune signal generator lower in frequency until maximum voltage of the opposite polarity is obtained. Note this voltage, then if necessary re-adjust primary of the Det. (T-5) until the detector voltages are about equal on either the high or low side of 10.7 mc.

b. 10.7 I.F. Alignment:

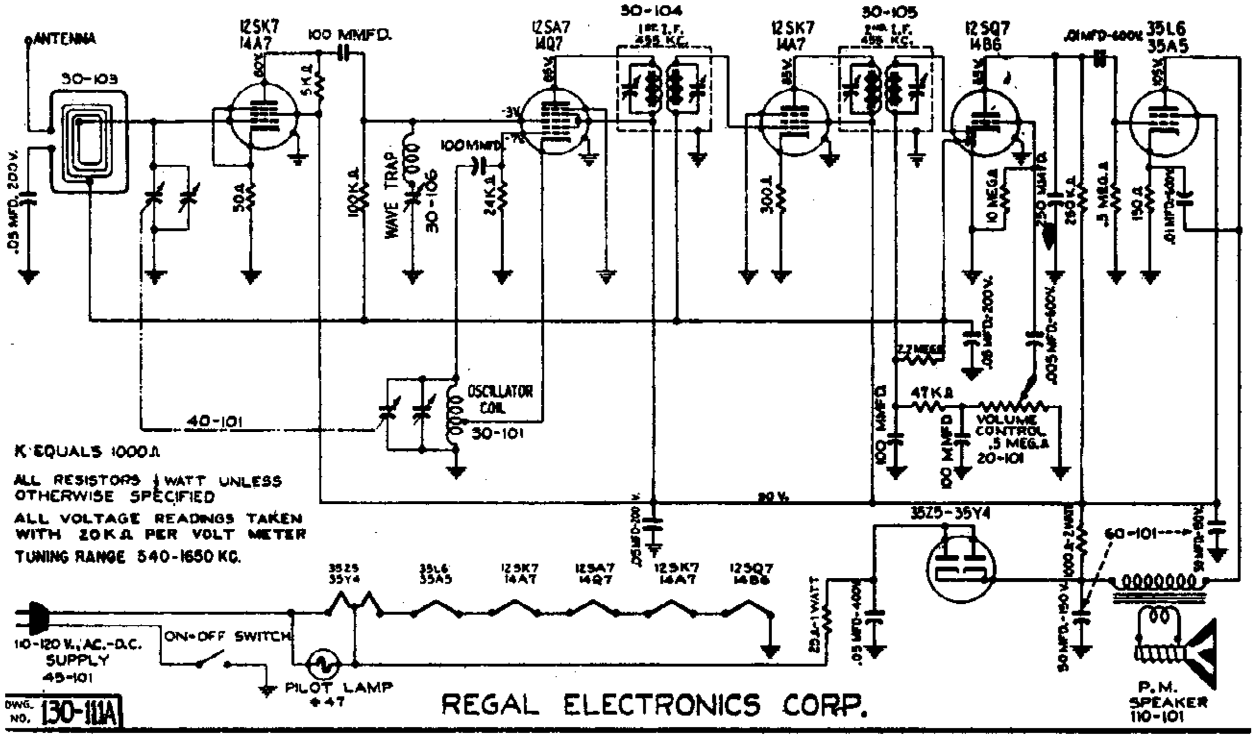
1. Shunt a 1,000-ohm carbon resistor across the primary of the detector (T-5) (Points G and H).
2. Connect output meter across speaker voice coil.
3. Volume and tone controls at maximum clockwise position.
4. Connect 10.7 mc (modulated 30% signal generator through .01 µfd. condenser across point "F" and ground.
5. Adjust secondary, then primary of (T-3) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)
6. Connect 10.7 mc 30% modulated signal generator across point "E" and ground.
7. Adjust secondary, then primary of (T-1) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)
8. Remove 1000-ohm shunting resistor from across primary of (T-5).

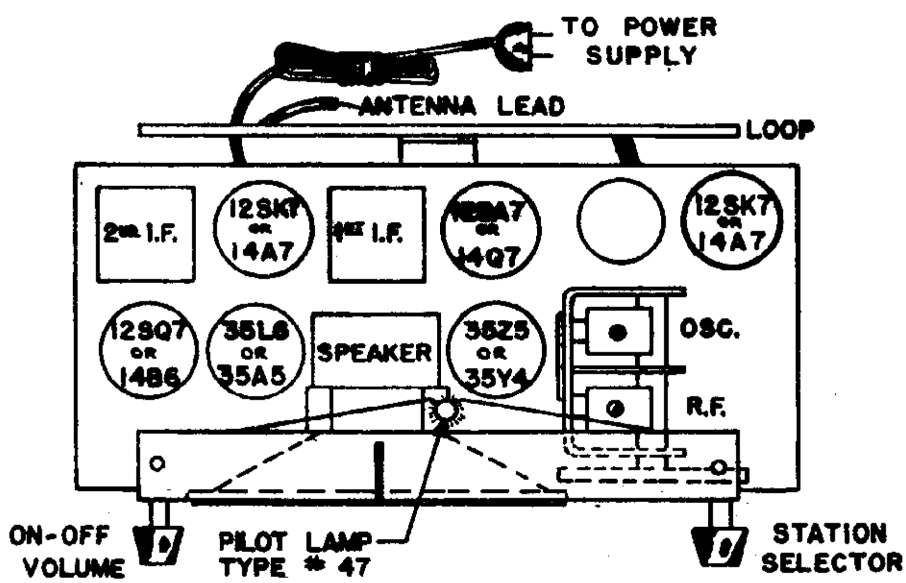
c. Oscillator and R.F. Alignment:

1. Connect V.T.V.M. across "B" and "C" (A.V.C. voltage).
2. Connect 108 mc signal generator to FM antenna terminals. If generator impedance is low, put one 150-ohm carbon resistor in series with each of the generator leads. Tune receiver dial to 108 mc.
3. Adjust FM oscillator trimmer (C-51) for maximum V.T.V.M. reading.
4. Adjust FM R.F. trimmer (C-52) for maximum V.T.V.M. reading. During alignment reduce input signal to maintain A.V.C. voltage at 2 V.
5. Repeat steps 3 and 4.
6. Feed a 90 mc signal into antenna terminals (as in C-2), tune receiver dial to signal.
7. Adjust spacing of FM R.F. coil (L-4) for maximum V.T.V.M. reading at 90 mc. During alignment reduce input signal to maintain A.V.C voltage at 2 V
8. Repeat steps 2 and 4 if necessary.

REGAL ELECTRONICS CORP.

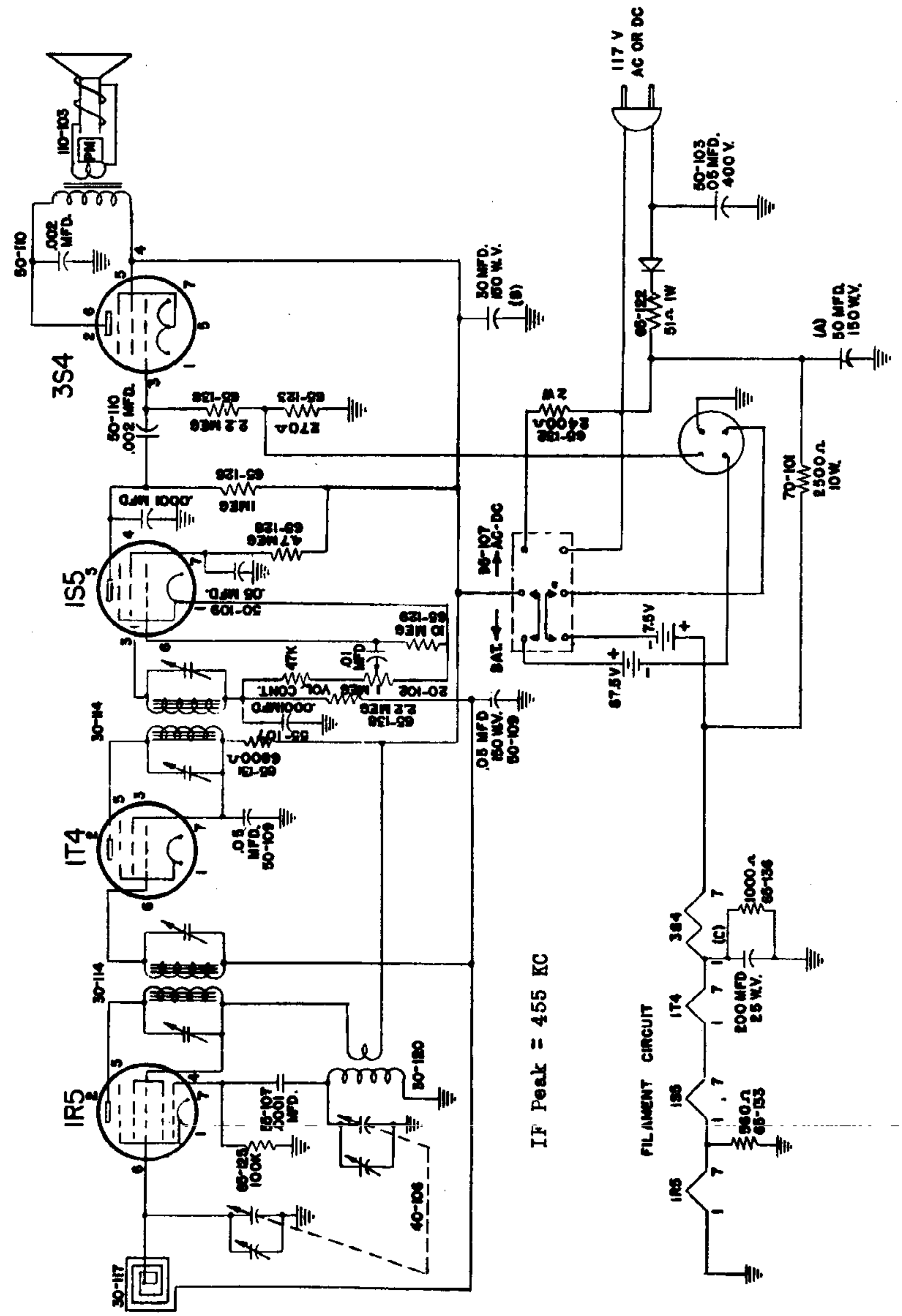
MODEL 700

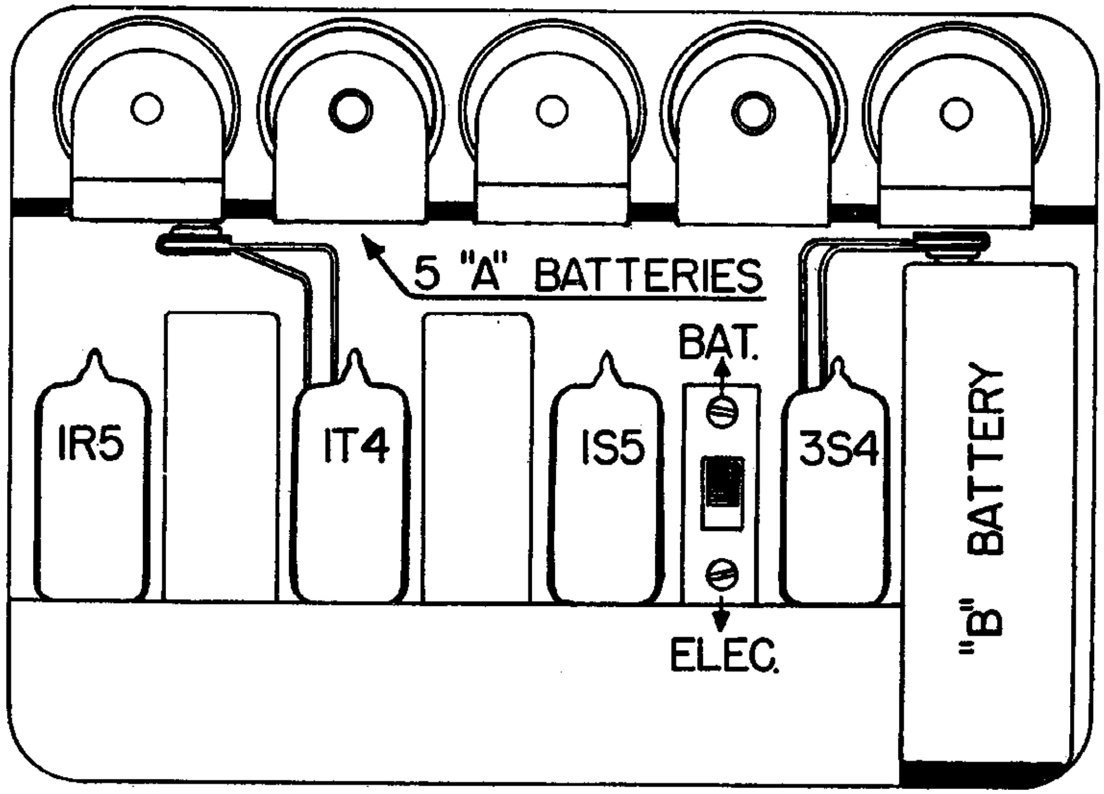




MODEL 747

REGAL ELECTRONICS CORP.





REMOVAL OF SET

First remove chassis from its present case by first removing "B" batteries and also "A" battery tray. Remove 2 screws on baffle inside case. Remove screw from bottom of cabinet. Carefully slide out chassis. Take the new case and with chassis outside the case note that one of the wires from the Regaloop in front cover is color coded. Solder this wire to the lug on top of variable condenser, right hand side looking at it from rear. This is the *oscillator* section. The remaining wire from the Regaloop should be soldered to the lug on the terminal strip mounted on the variable condenser mounting bracket.

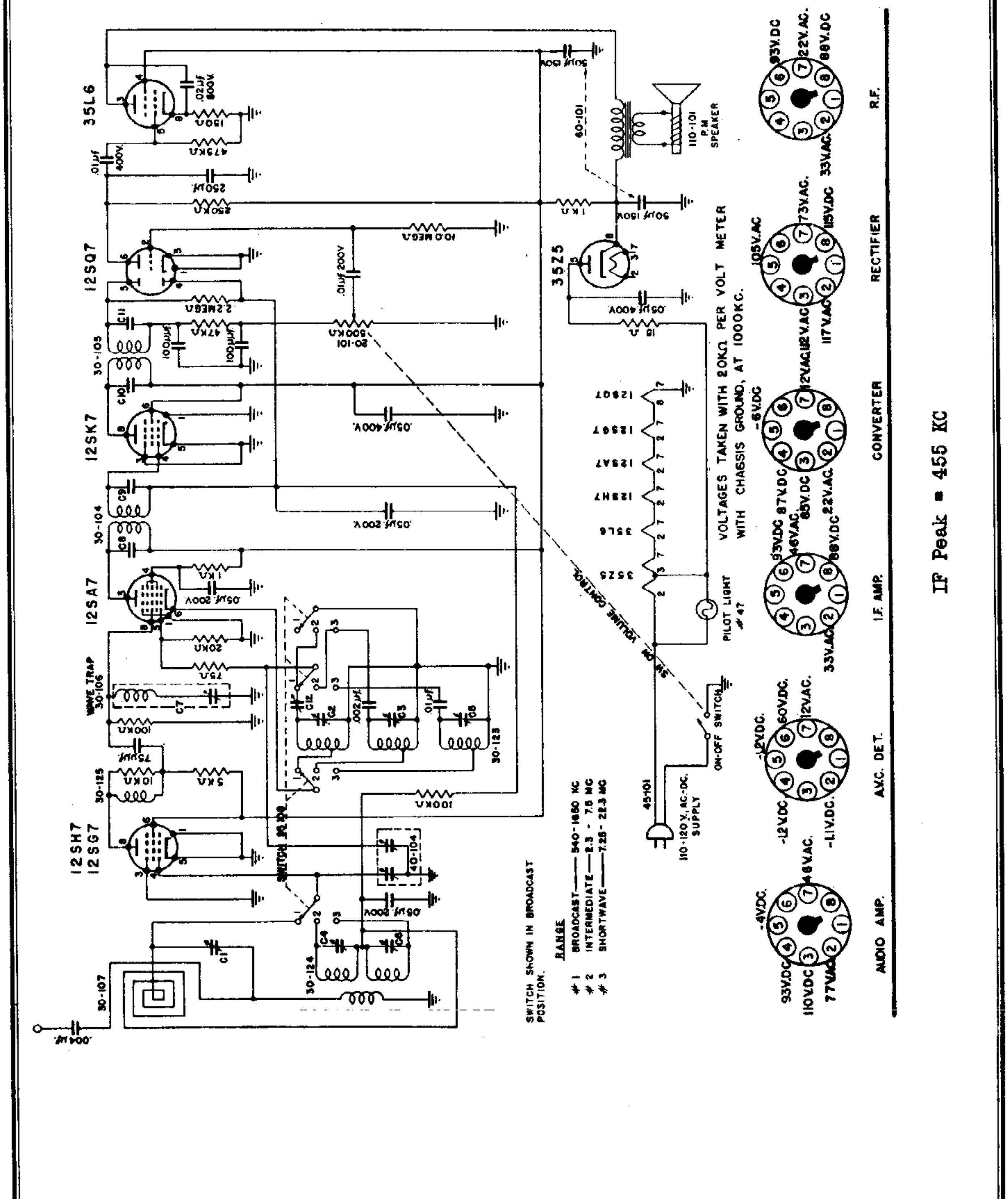
ALIGNMENT OF RECEIVER TO MATCH REGALOOP

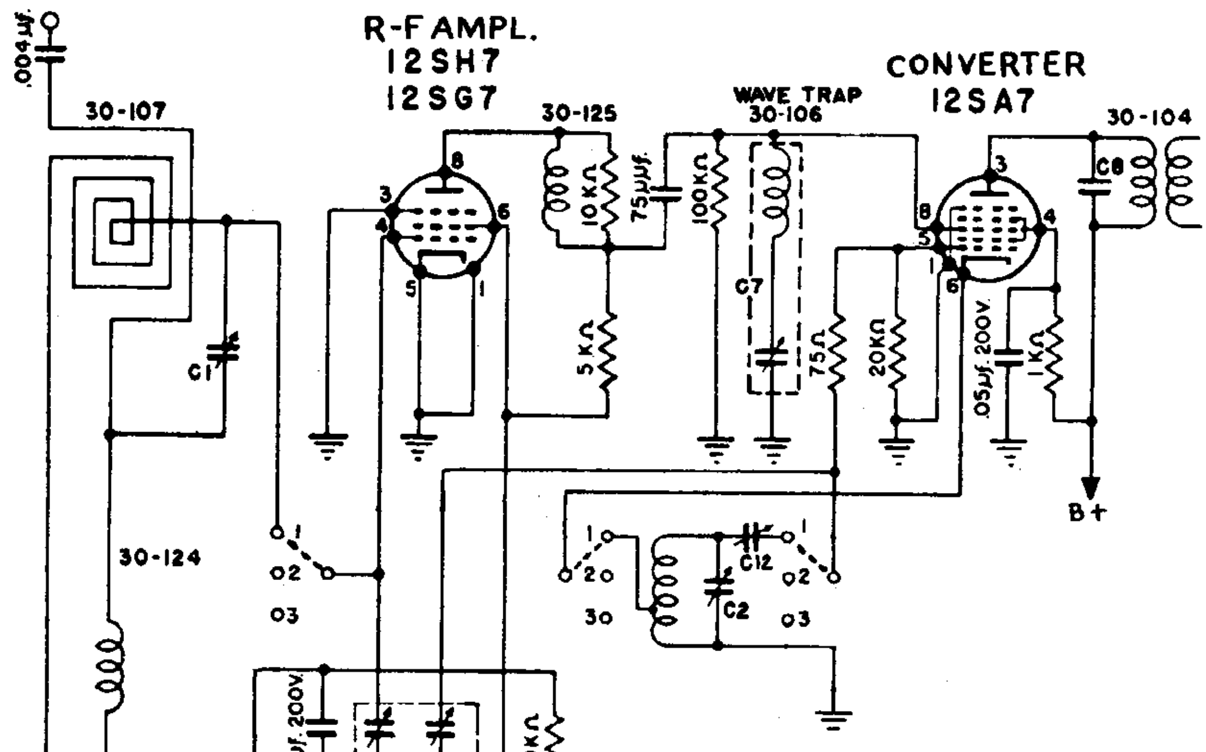
Use a signal generator and output meter. Connect output meter to voice coil leads on speaker. Make a loop consisting on one or two turns of wire and connect ends to signal generator, and place "loop" near enough to the Regaloop (located in front cover) to effect a signal transfer. Set signal generator to 1650 KC. Open variable condenser all the way so that rotor plates are entirely out of stator plate assembly. Use a non-metalic screw driver and adjust oscillator trimmer for maximum output. Now set signal generator to 1500 KC—tune receiver to 1500 KC and adjust the remaining R.F. trimmer for maximum output.

Your chassis is now tuned to the Regaloop in the new case. Place the chassis back in the case and install batteries.

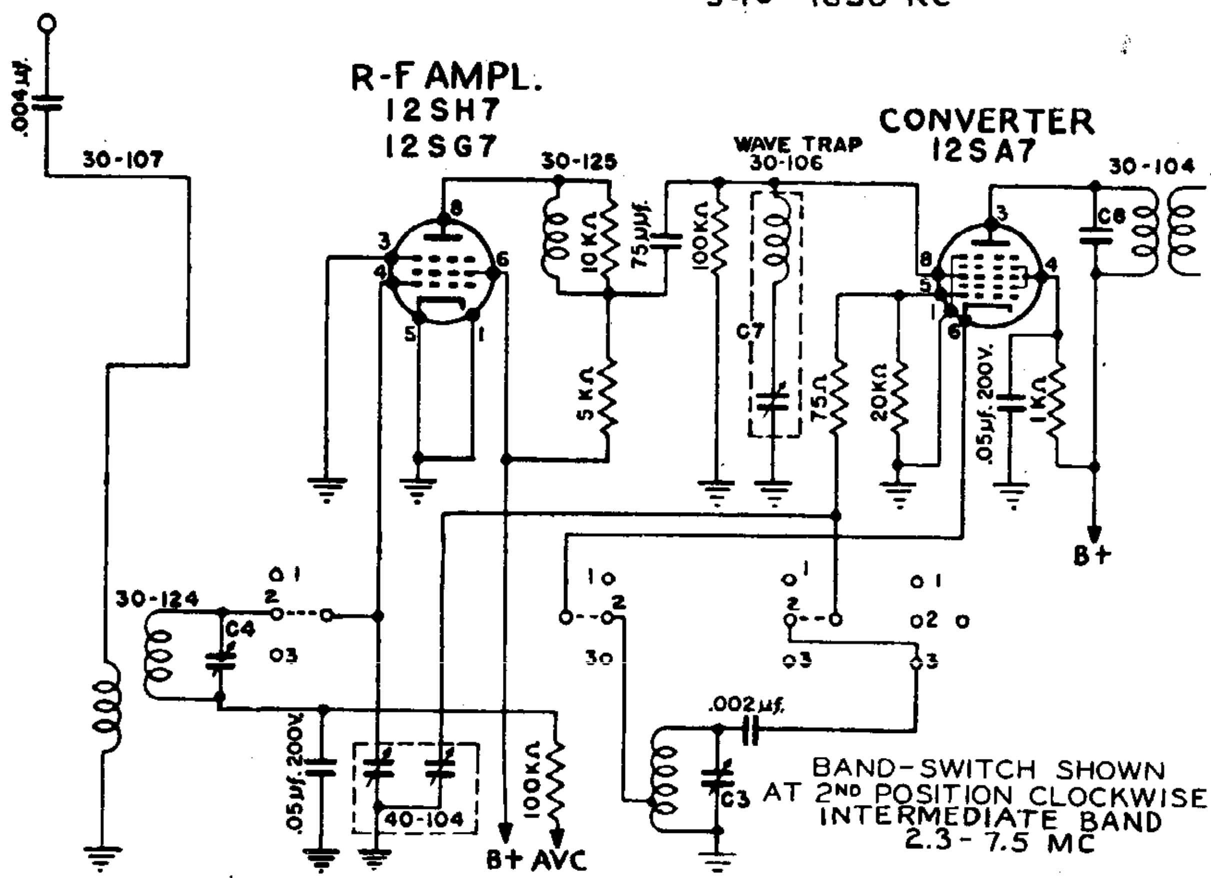
MODEL 1749

REGAL ELECTRONICS CORP.



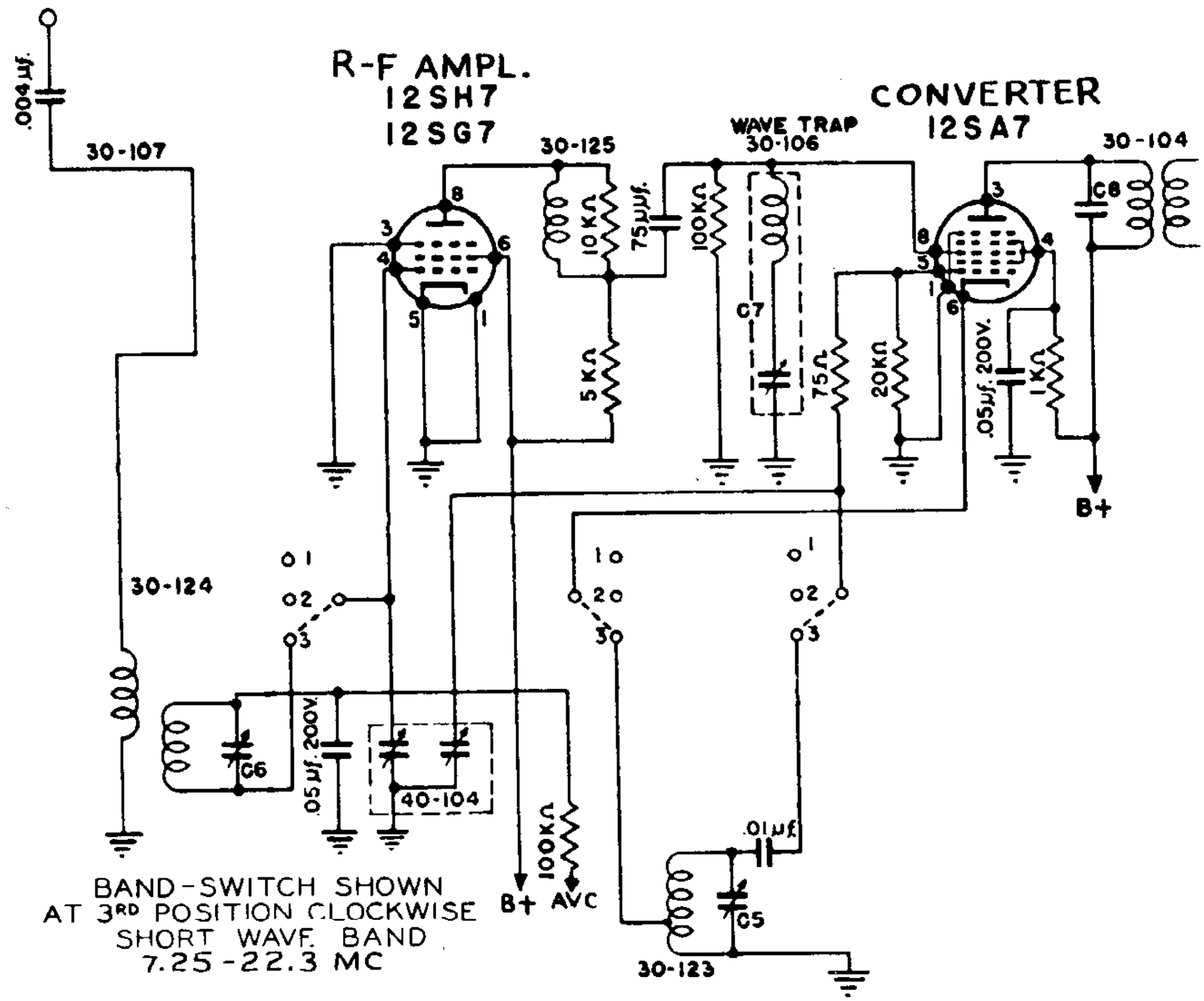


BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND 540-1650 KC



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. INTERMEDIATE BAND 2.3-7.5 MC

REGAL ELECTRONICS CORP.



The Model 1749 is a 6 tube 3 band superheterodyne which will give reception over a wide range, including standard broadcast, intermediate short wave, and foreign short wave. and the foreign short wave frequency is 7.25 to 22.3 megacycles or 41.5 to 13.5 meters. This receiver covers the following meter bands, 13, 16, 19, 25, 31, 39, 49, 60, 90, and 125.

The tuning range of the broadcast frequency is 540 to 1650 kilocycles, or 560 to 182 meters. The intermediate short wave frequency is 2.3 to 7.5 megacycles, or 130.0 to 40.0 meters,

REGAL ELECTRONICS CORP.

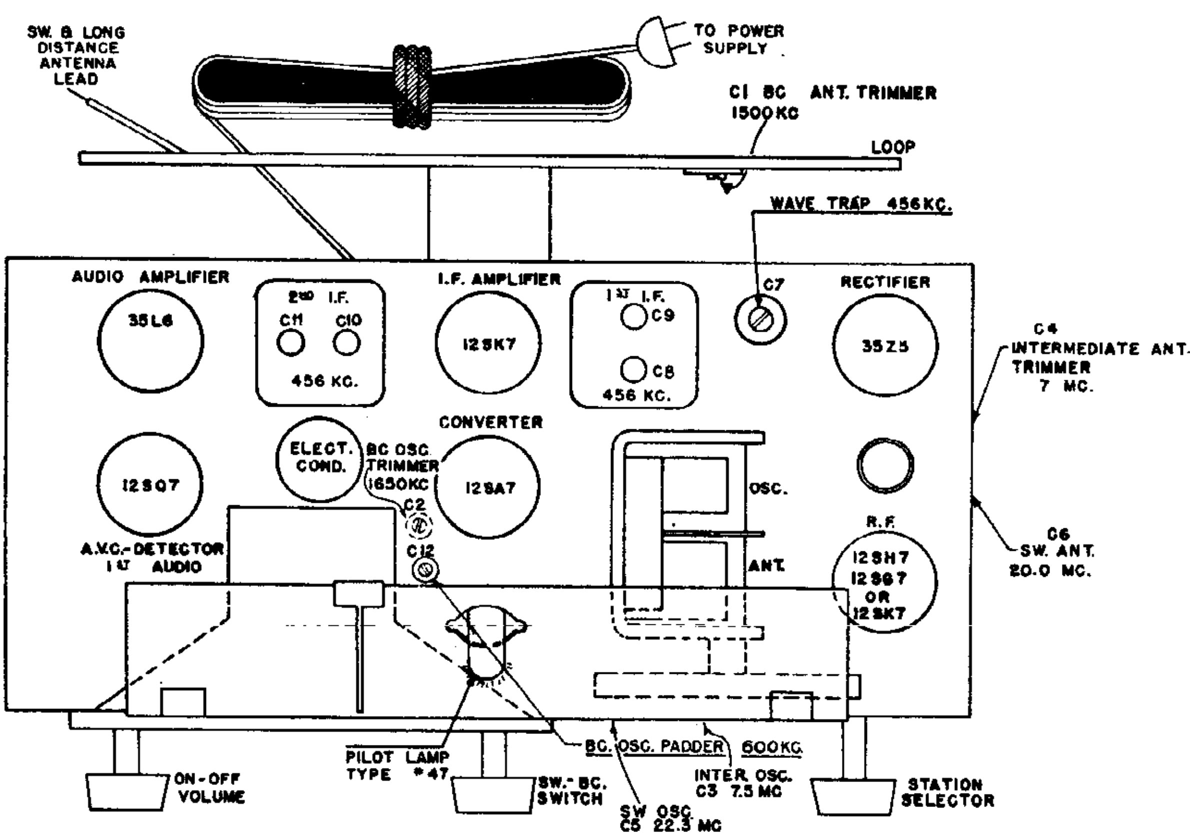
ALIGNMENT INSTRUCTIONS

SET VOLUME CONTROL AT MAXIMUM VOLUME AND OUTPUT FROM SIGNAL GENERATOR NO HIGHER THAN IS NECESSARY TO OBTAIN OUTPUT READING

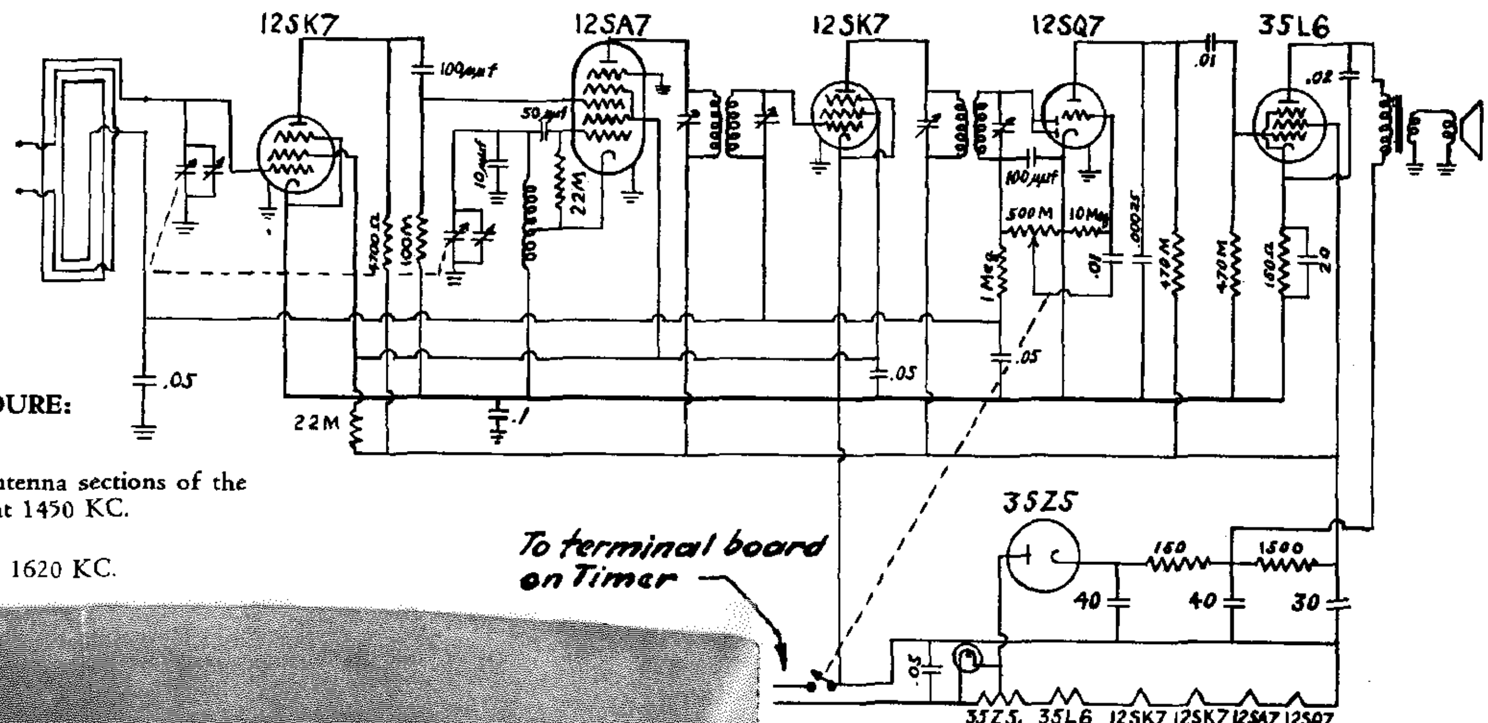
TUNING RANGE BROADCAST 540 - 1650 INTERMEDIATE 2.25 - 7.5 SHORTWAVE 7.25 - 22.3

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	BAND SWITCH POSITION	SIGNAL GEN FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD	RF SECTION OF VARIABLE CONDENSER	BC	455 KC	1650 KC	ACROSS VOICE COIL	C8 , C9 C10 , C11	ADJUST FOR MAXIMUM
.1 MFD	" "	BC	455 KC	600 KC	" "	C7	" " MINIMUM
200 MMFD	ANTENNA LEAD	BC	1650 KC	1650 KC	" "	C2	" " MAXIMUM TRIMMER UNDER CHASSIS
200 MMFD	" "	BC	1500 KC	1500 KC	" "	C1	" " "
200 MMFD	" "	BC	600 KC	600 KC	" "	C12	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT RECHECK C1 & C2 ADJUSTMENTS AS GIVEN
400 Ω	" "	INTERMEDIATE	7.5 MC	7.5 MC	" "	C3	ADJUST FOR MAXIMUM
400 Ω	" "	INTERMEDIATE	7.0 MC	7 MC	" "	C4	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT
400 Ω	" "	SW	22.3 MC	22.3 MC	" "	C5	ADJUST FOR MAXIMUM
400 Ω	" "	SW	20 MC	20 MC	" "	C6	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT

IF TWO PEAKS CAN BE OBTAINED USE ONE WITH TRIMMER SCREW FURTHER OUT



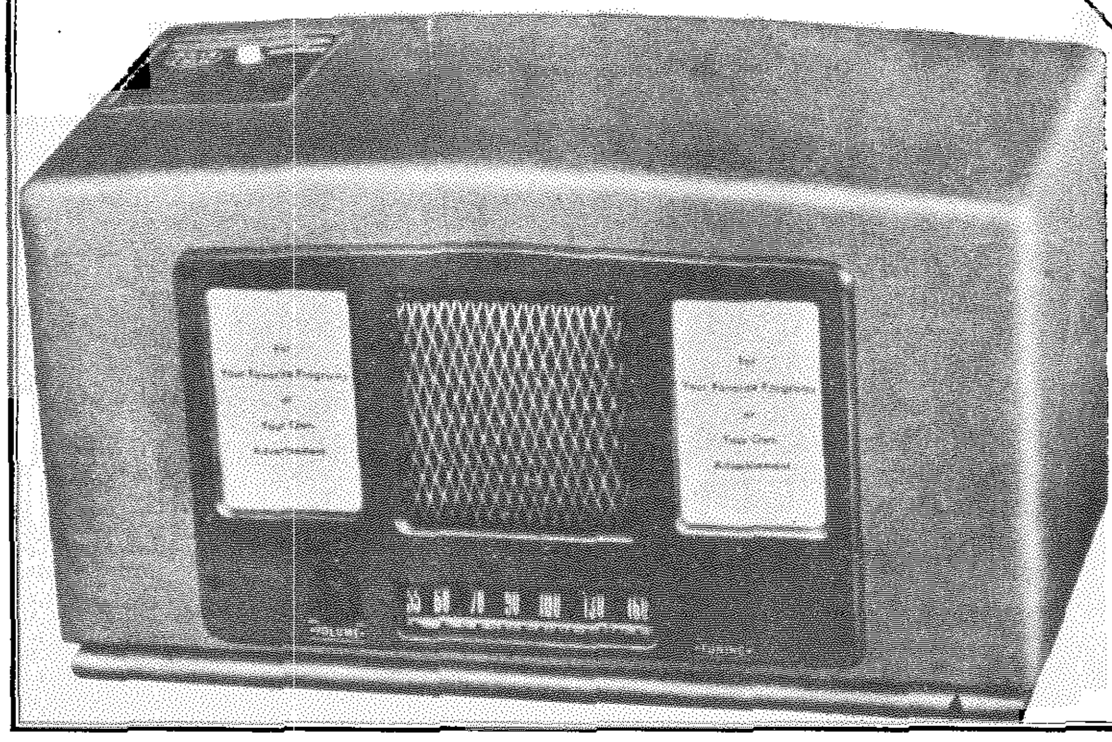
ROBERT-LAWRENCE ELECTRONICS CORP. MODELS 101-6T, 201W-6T

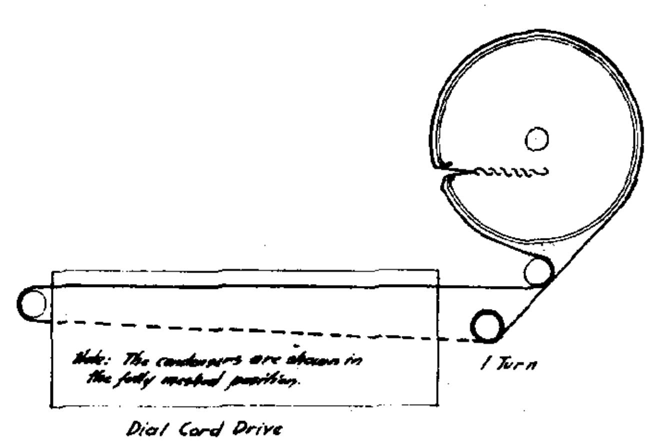


ALIGNMENT PROCEDURE:
Align I.F. at 465 KC.

Trim oscillator and antenna sections of the tuning condenser at 1450 KC.

Frequency Range: 540 to 1620 KC.





MODELS 101-6T,
201W-6T

ROBERT-LAWRENCE ELECTRONICS CORP.

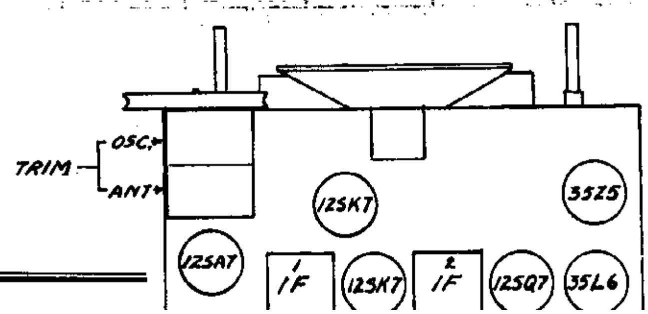
Voltage Readings

No.	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7	0V.	38V.DC	0V.	-.7V.DC	0V.	27V.DC	24V.AC	94V.DC
2	12SA7	0V.	12V.AC	105V.DC	27V.DC	-2.5V.DC	0V.	24V.AC	-.3V.DC
3	12SK7	0V.	38V.DC	0V.	-.7V.DC	0V.	27V.DC	52V.AC	100V.DC
4	12SK7	0V	-.7V.DC	0V.	-2.3V.DC	-2.3V.DC	55V.DC	12V.AC	0V.
5	35L6	0V.	85V.AC	108V.DC	102V.DC	0V.	0V.	52V.AC	5.5V.DC
6	35Z5	0V.	115V.AC	110V.AC	0V.	110V.AC	115V.DC	85V.AC	125V.DC

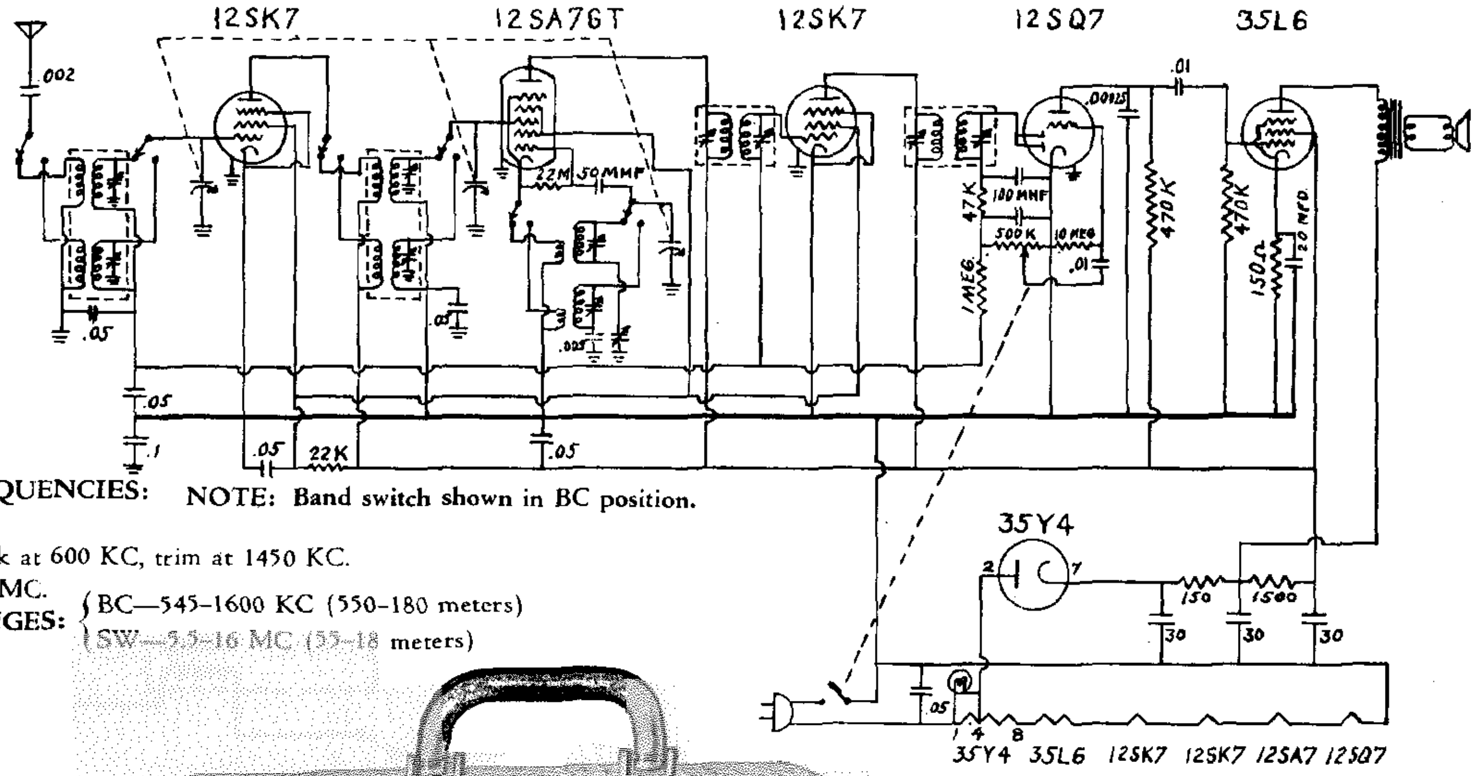
1. DC Voltage measurements are at 20,000 ohms per volt; AC voltages are at 1,000 ohms per volt.
2. Measured values are from socket pin to common negative.
3. Line voltage kept at 115 Volts.
4. Volume Control at maximum. no signal applied.

Resistance Readings

No.	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7	Inf.	40Ω	0Ω	1.5Meg	0Ω	75KΩ	28Ω	55KΩ
2	12SA7	Inf.	14Ω	50KΩ	75KΩ	25KΩ	0.8Ω	26Ω	100KΩ
3	12SK7	Inf.	39Ω	0Ω	1.5KΩ	0Ω	75KΩ	50Ω	50KΩ
4	12SQ7	Inf.	10Meg	0Ω	0.5Meg	0.5Meg	60KΩ	15Ω	0Ω
5	35L6	Inf.	85Ω	50KΩ	50KΩ	0.5Meg	0Ω	50Ω	150Ω
6	35Z5	Inf.	110Ω	110Ω	Inf.	110Ω	50KΩ	85Ω	50KΩ



ROBERT-LAWRENCE ELECTRONICS CORP. MODEL 102-L-6T



ALIGNMENT FREQUENCIES:

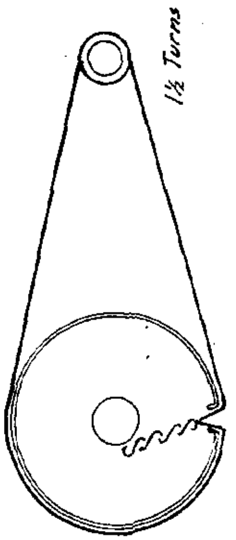
I.F. 465 KC.

BC—Pad and rock at 600 KC, trim at 1450 KC.

SW—Trim at 13 MC.

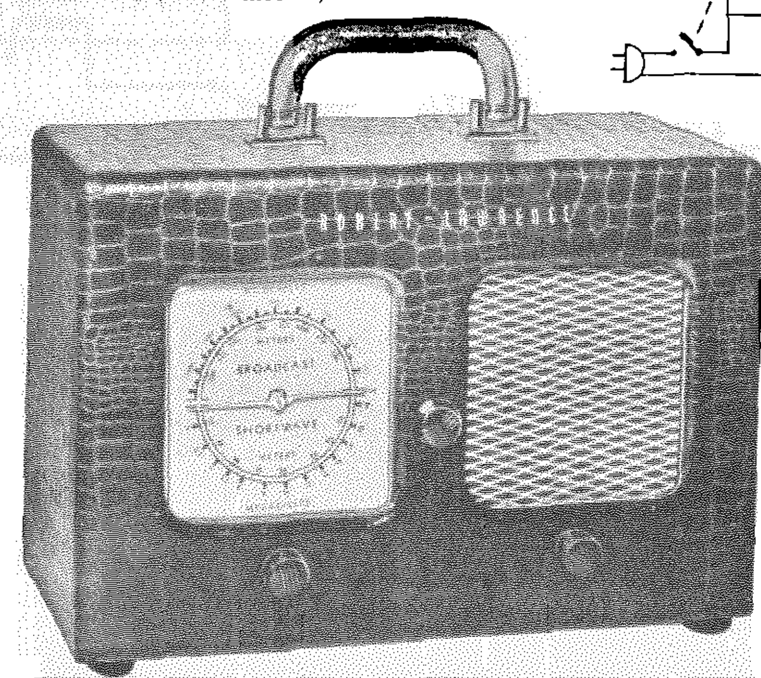
FREQUENCY RANGES: BC—545-1600 KC (550-180 meters)
SW—5.5-16 MC (55-18 meters)

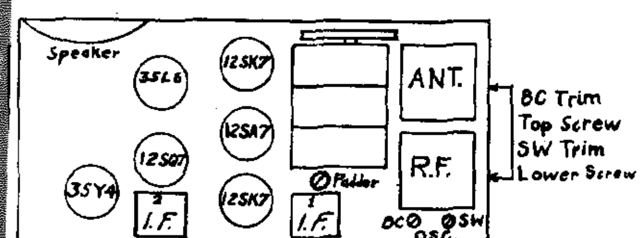
NOTE: Band switch shown in BC position.



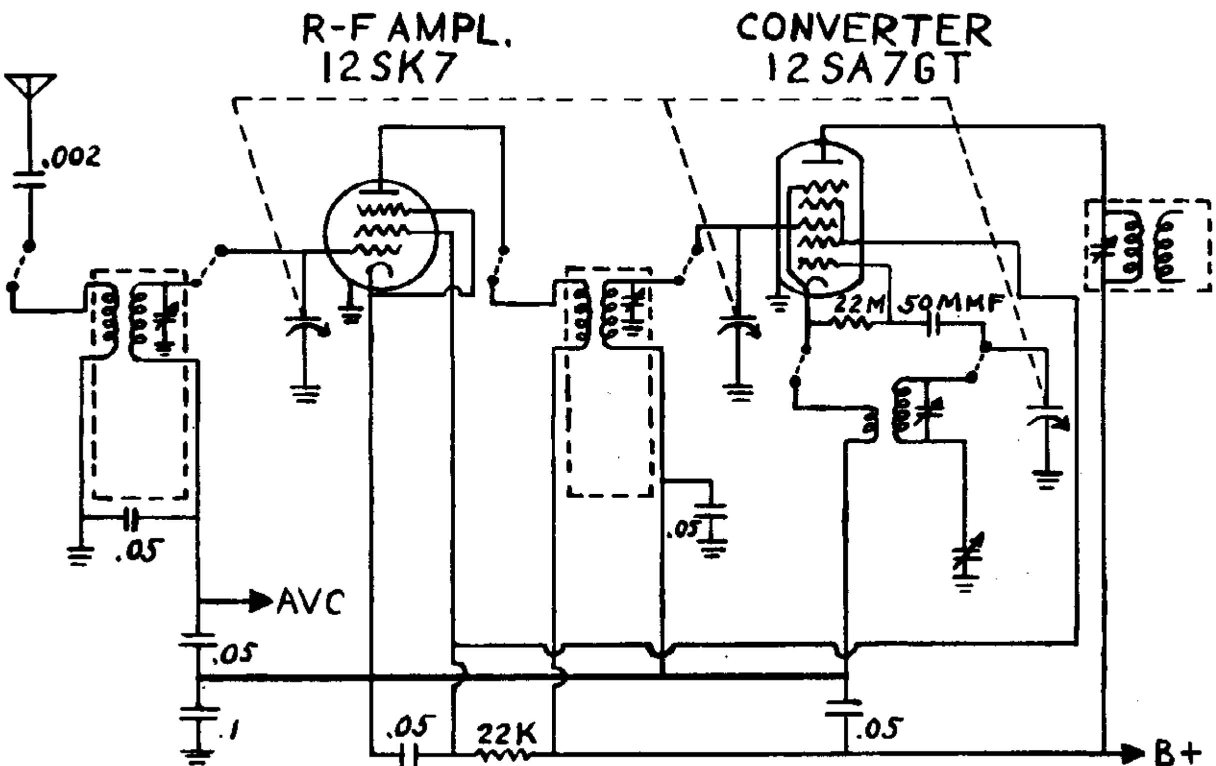
Dial Cord Drive

Chassis Model 102-L-6T

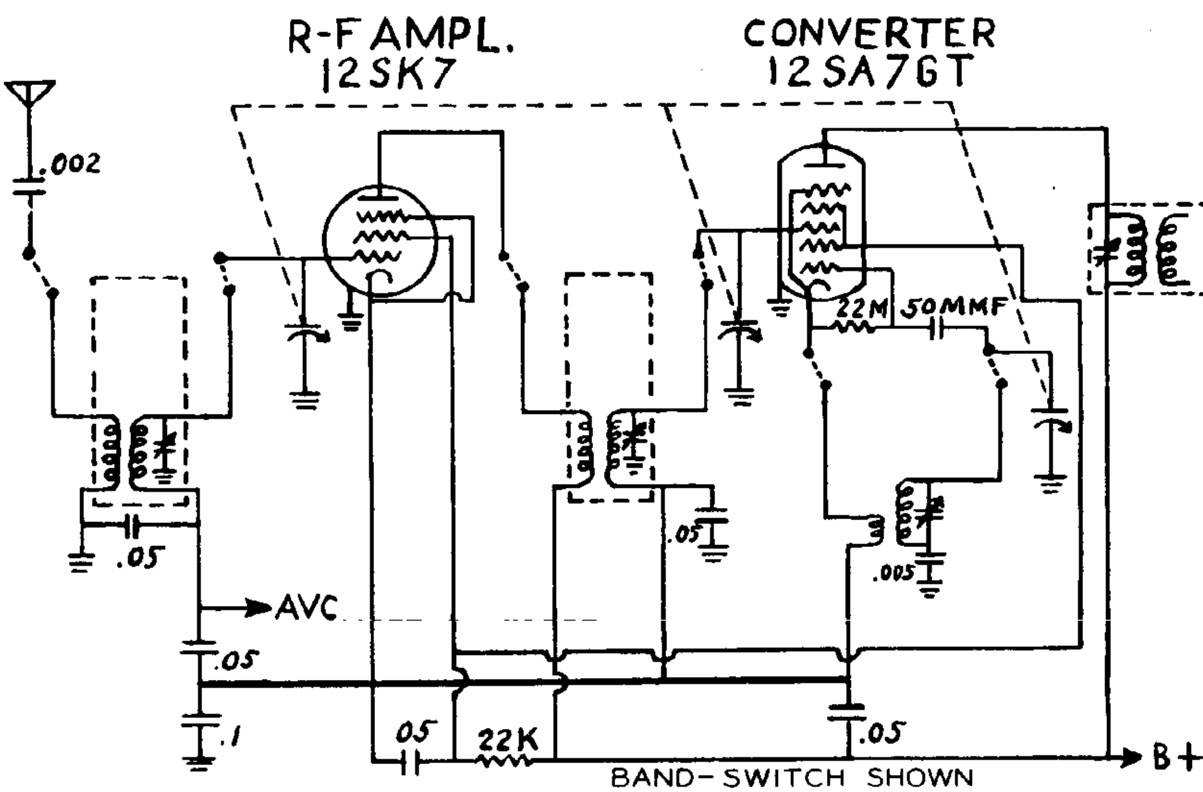




MODEL 102-L-6T ROBERT-LAWRENCE ELECTRONICS CORP.



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
545 - 1600 KC



BAND-SWITCH SHOWN
AT 2ND POSITION.
SHORT WAVE BAND
5.5 - 16 MC

Voltage Readings

No.	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7	0 V.	50 V. AC	0 V.	-.3 V DC	0 V.	30 V. DC	37 V. AC	98 V. DC
2	12SA7	0 V.	24 V. AC	99 V. DC	30 V. DC	-.3 V. DC	0 V.	13 V. AC	0 V.
3	12SK7	0 V.	36 V. AC	0 V.	-.3 V. DC	0 V.	30 V. DC	24 V. AC	98 V. DC
4	12SQ7	0 V.	-.45 V. DC	0 V.	-.45 V. DC	-.45 V. DC	50 V. DC	0 V.	13 V. AC
5	35L6	0 V.	85 V. AC	105 V. AC	100 V. DC	0 V.	0 V.	50 V AC	0 V.
6	35Z5	115 V. AC	110 V. AC	110 V. AC	110 V. AC	115 V. DC	0 V.	122 V. DC	85 V. AC

1. DC Voltage measurements are at 20,000 ohms per volt; AC voltages are at 1000 ohms per volt.
2. Measured values are from socket pin to common negative.
3. Line voltage kept at 115 volts.
4. Volume control at maximum, no signal applied

Resistance Readings

No.	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	
1	12SK7	Inf.	53 Ω	0 Ω	1.5 Meg	0 Ω	70K Ω	40 Ω	44K Ω	
2	12SA7	Inf.	30 Ω	44K Ω	70K Ω	21K Ω	1.4 Ω	15 Ω	*5 Ω	
							*0.4 Ω		*0.1 Ω	*S.W.
3	12SK7	Inf.	40 Ω	0 Ω	1.5 Meg	0 Ω	70K Ω	28 Ω	44K Ω	
4	12SQ7	Inf.	10 Meg	0 Ω	540K Ω	540K Ω	50K Ω	0 Ω	13 Ω	
5	35L6	Inf.	85 Ω	40K Ω	42K Ω	420K Ω	0 Ω	53 Ω	150 Ω	
6	35Z5	Inf.	115 Ω	Inf.	115 Ω	40K Ω	Inf.	40K Ω	88 Ω	

SEARS. ROEBUCK AND CO.

MODEL 6686
Chassis
139.151

"A" SUPPLY

The "A" supply is obtained from a center tap full wave selenium rectifier filtered by a condenser input filter consisting of two condensers and a low resistance choke. Taps on the power transformer provide a voltage change to the rectifier giving two "A" load voltages. Terminal voltages for various loads are indicated on the wiring diagram.

"B" SUPPLY

The "B" supply is also obtained from a selenium rectifier operated in half wave into a condenser input filter of one choke followed by another condenser.

The "A" and "B" circuits are not common to each other. The minus of the "A" circuit is grounded to the chassis.

POWER DRAIN

The power drain is 5 watts when the "A" and "B" circuits are loaded with loads indicated on the wiring diagram. The input watts under no-load should not be more than 2.5 watts and the primary current without load not more than 150 MA at 118 volts, 60 cycles.

"A" SUPPLY FAILS

When the "A" voltage is excessively low the rectifier, condensers or transformer may be defective. To check the transformer remove the Tap-Changer-Plug and test the transformer voltage from F to F and S to S for voltages shown on the schematic. A voltmeter measurement from center tap to either side should be exactly half of these voltages. A high resistance meter must be used for correct readings. If half the rectifier has shorted the D.C. output voltage will drop to approximately 1/2 volt. Another check for the rectifier is to remove the "A" minus lead soldered to the rectifier bracket and measure the D.C. voltage from the bracket to the center tap of the transformer. This should be 2.5 volts with the Tap-Changer-Plug in the 6-tube position. Low capacity or high leakage of the input capacitor will cause a drop in "A" voltage. Replacement of the input capacitor is then necessary and for long life the sealed aluminum tube capacitor shown in the parts list as C_3 should be used for replacement.

"B" SUPPLY FAILS

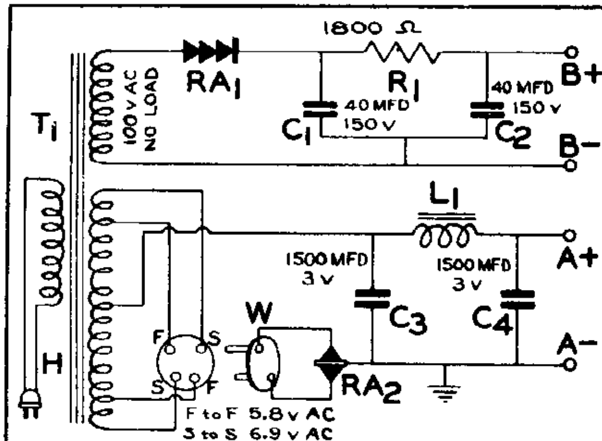
Test the A.C. voltage of the transformer plate winding as shown on the circuit with the rectifier connection removed. When installing a new rectifier note that the transformer lead is connected to the minus side of the "B" rectifier.

EXCESSIVE HUM

When excessive hum is noticed in the radio it may be due to the "A" supply or the "B" supply. The hum will be very loud when the input condenser C_3 opens in service. This open condenser will cause the output voltage to drop to 1 volt D.C. with a 6-tube load with Tap-Changer-Plug on 6-tube position. The hum will be somewhat less in volume if the second section or output condenser has opened and this will not change the output voltage.

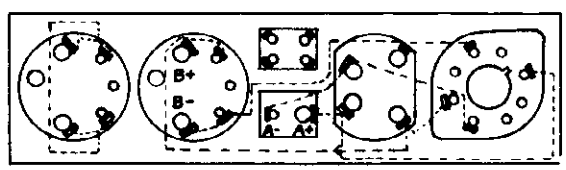
When the hum is caused by the "B" supply, the condensers of the filter circuit have probably opened.

To determine whether the hum is introduced by the "A" supply or the "B" supply, batteries may be substituted for each separate supply while one circuit is tested.



	"A" OUTPUT	"B" OUTPUT
4-5 Tube	1.50 V at 200 Ma. 1.35 V at 250 Ma.	85 V at 13 Ma. 96 V at 8.5 Ma. 128 V at 0 Ma.
6 Tube	1.55 V at 300 Ma. 1.35 V at 350 Ma.	

CIRCUIT DIAGRAM

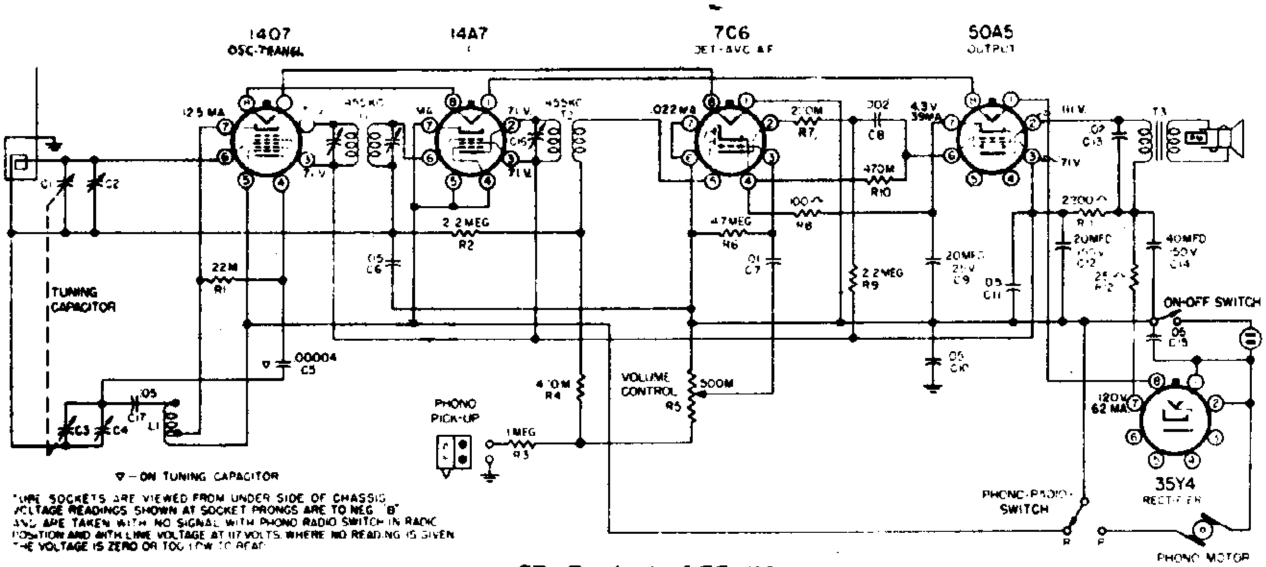


WIRING DIAGRAM OF SOCKET ASSEMBLY (Back)

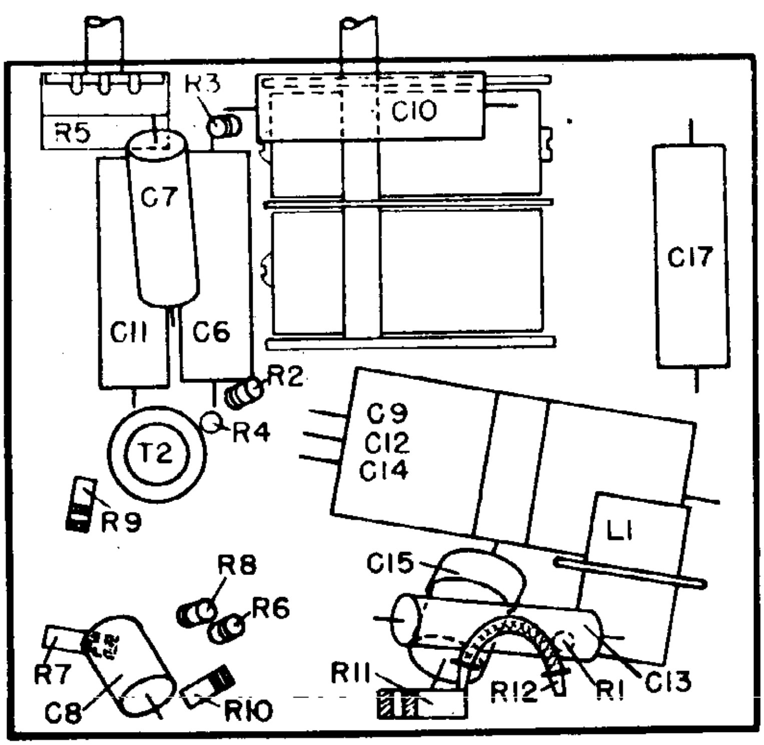
Schematic Location	Part No.	Description
C_1, C_2	J 20690	Capacitor 40x40 MFD. 150 V
C_3	J 20687	"A" Input Capacitor 1500 MFD. 3 Volt Aluminum Tube
C_4	J 20622	"A" Filter Capacitor 1500 MFD. 3 Volt Paper Tube
L_1	J 1065	"A" Filter Choke
R_1	J 1066	Resistor 1800 ohm 1 watt Carbon, insulated
RA_1	J 20691	"B" Rectifier, Selenium
RA_2	J 20693	"A" Rectifier Assembly, Selenium
T_1	J 1067	Power Transformer
H	J 20686	Line Cord with Plug
W	J 2727	Tap Change Plug
-	J 8129	Combination Panel (Socket Assem.)

MODEL 7070
Chassis 101.817

SEARS, ROEBUCK AND CO.



IF Peak = 455 KC



LOCATION OF PARTS UNDER CHASSIS

ALIGNMENT PROCEDURE

PRELIMINARY:

Output Meter Connection..............................Across loud speaker voice coil
Generator ground lead connection...................................Receiver chassis
Dummy Antenna value to be in series with generator output.............See chart below
Connection of generator output lead.................................See chart below
Generator Modulation..30%, 400 cycles
Position of Volume Control...Fully on

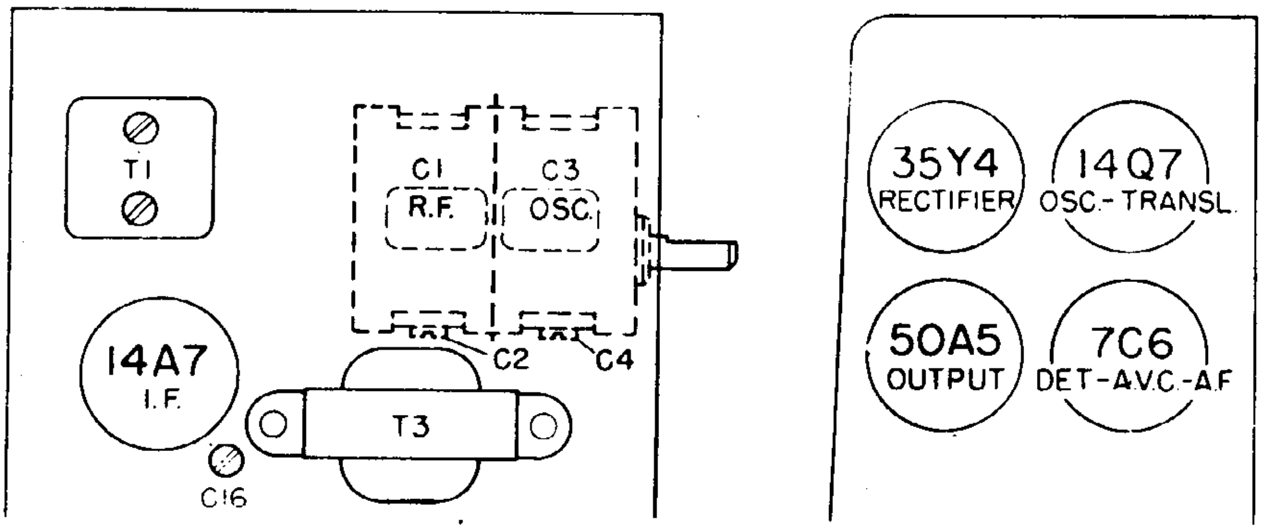
POSITION OF TUNER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER ADJUSTMENTS (IN ORDER) SHOWN	TRIMMER FUNCTION
Closed	455 KC	.1 mfd.	14Q7 Transl. grid	C16, T1	IF
1410 KC	1410 KC	.0002 mfd.	Loop	C4	Oscillator
1410 KC	1410 KC	.0002 mfd.	Loop	C2	Transl.

IMPORTANT ALIGNMENT NOTES

The Alignment must be done in the order given.

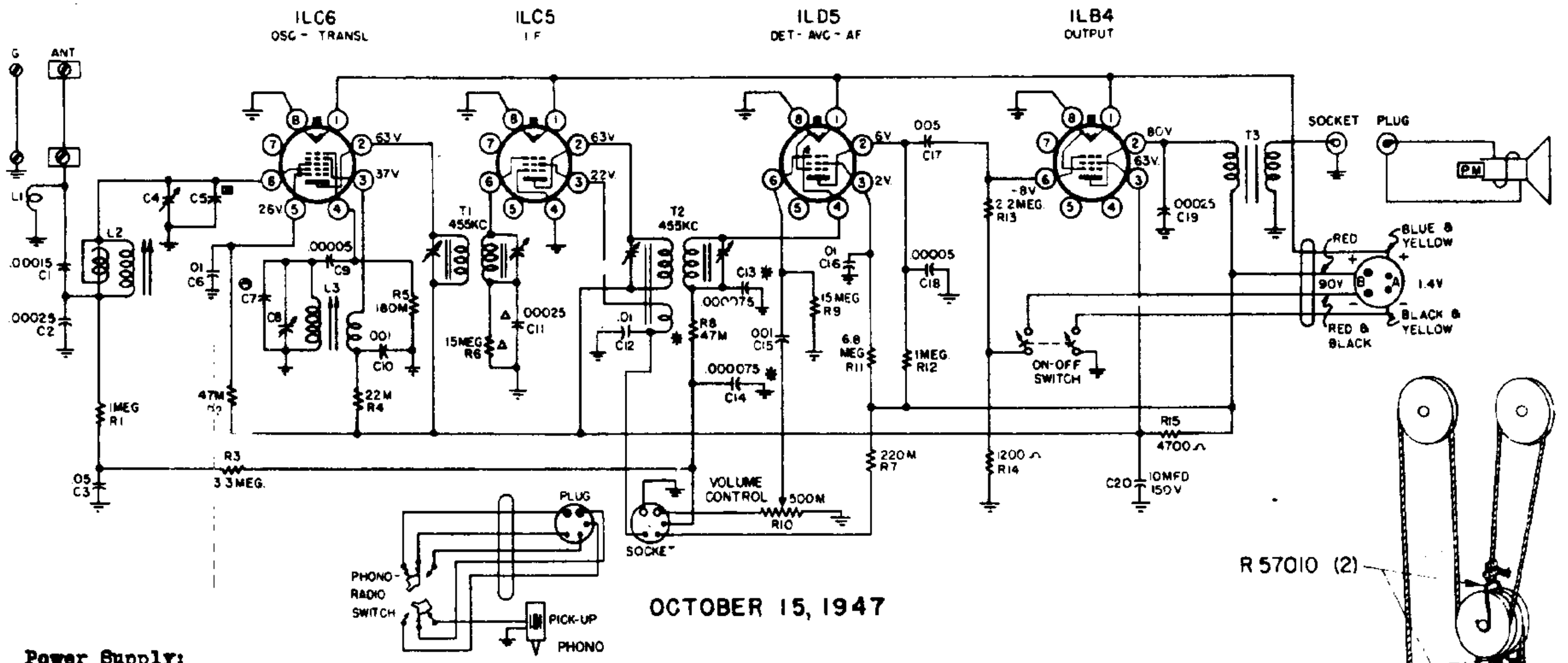
The entire Alignment Procedure should be repeated step by step in the original order for greatest accuracy.

Always keep the output power from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.



MODEL 7210
Chassis 101.820

SEARS, ROEBUCK AND CO.



OCTOBER 15, 1947

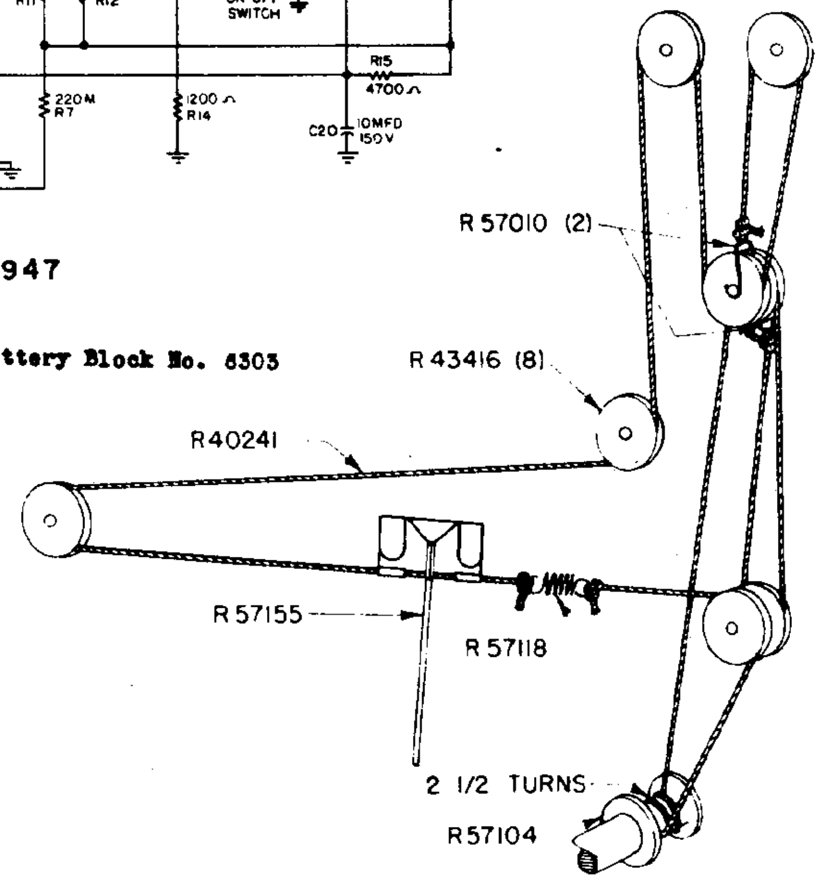
Power Supply:
All models available............................. A & B Battery Block No. 6303

Frequency Range:
Broadcast..............550-1700 KC

Power Output:
Undistorted.............. .08 Watts
Maximum.................. .15 Watts

△ PART OF T1
✱ PART OF T2
▣ PART OF C4
● PART OF C8

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL AND WITH PHONO-RADIO SWITCH IN RADIO POSITION WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ. VOLTAGE READINGS ARE TAKEN WITH A VOLTMETER HAVING A RESISTANCE OF ONE THOUSAND OHMS PER VOLT.



STRING AND POINTER HOOKUP

ALIGNMENT PROCEDURE

PRELIMINARY:

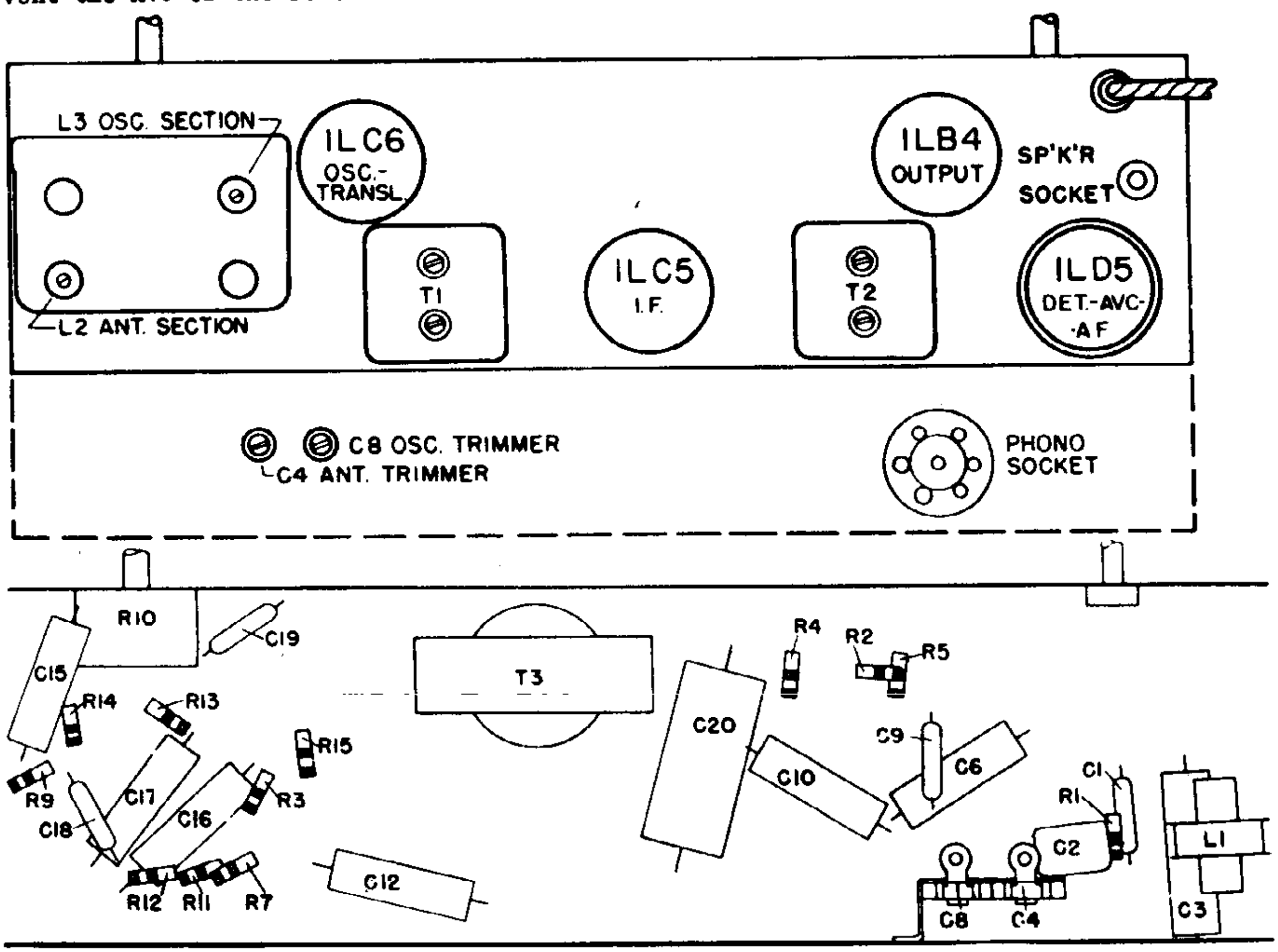
Output Meter Connection..................................Across loud-speaker voice coil
Output Meter Reading to Indicate 50 Milliwatts (Standard Output)............ 0.4 volt
Generator Ground Lead Connection..............................Receiver chassis
Dummy Antenna Value to be in Series with Generator Output............See chart below
Connection of Generator Output Lead.............................See chart below
Generator Modulation..30%, 400 cycles
Position of Volume Control.................................... Fully on
Position of Pointer with Tuner Fully Closed....Line to the left of 540 Kc calibration mark

POSITION OF TUNER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	ADJUSTMENTS (IN ORDER SHOWN)	FUNCTION
Closed	455 Kc.	.1 mfd.	1LC6 Transl. Grid	T2,T1	I.F.
1725	1725 Kc.	.000075 mfd.	Ant. Terminal	C8	Oscillator
1725	1725 Kc.	.000075 mfd.	Ant. Terminal	C4	Antenna
1500	1500 Kc.	.000075 mfd.	Ant. Terminal	L3	Oscillator
1500	1500 Kc.	.000075 mfd.	Ant. Terminal	L2	Antenna
1725	1725 Kc.	.000075 mfd.	Ant. Terminal	C8,C4	Osc. & Ant. Recheck

IMPORTANT ALIGNMENT NOTES

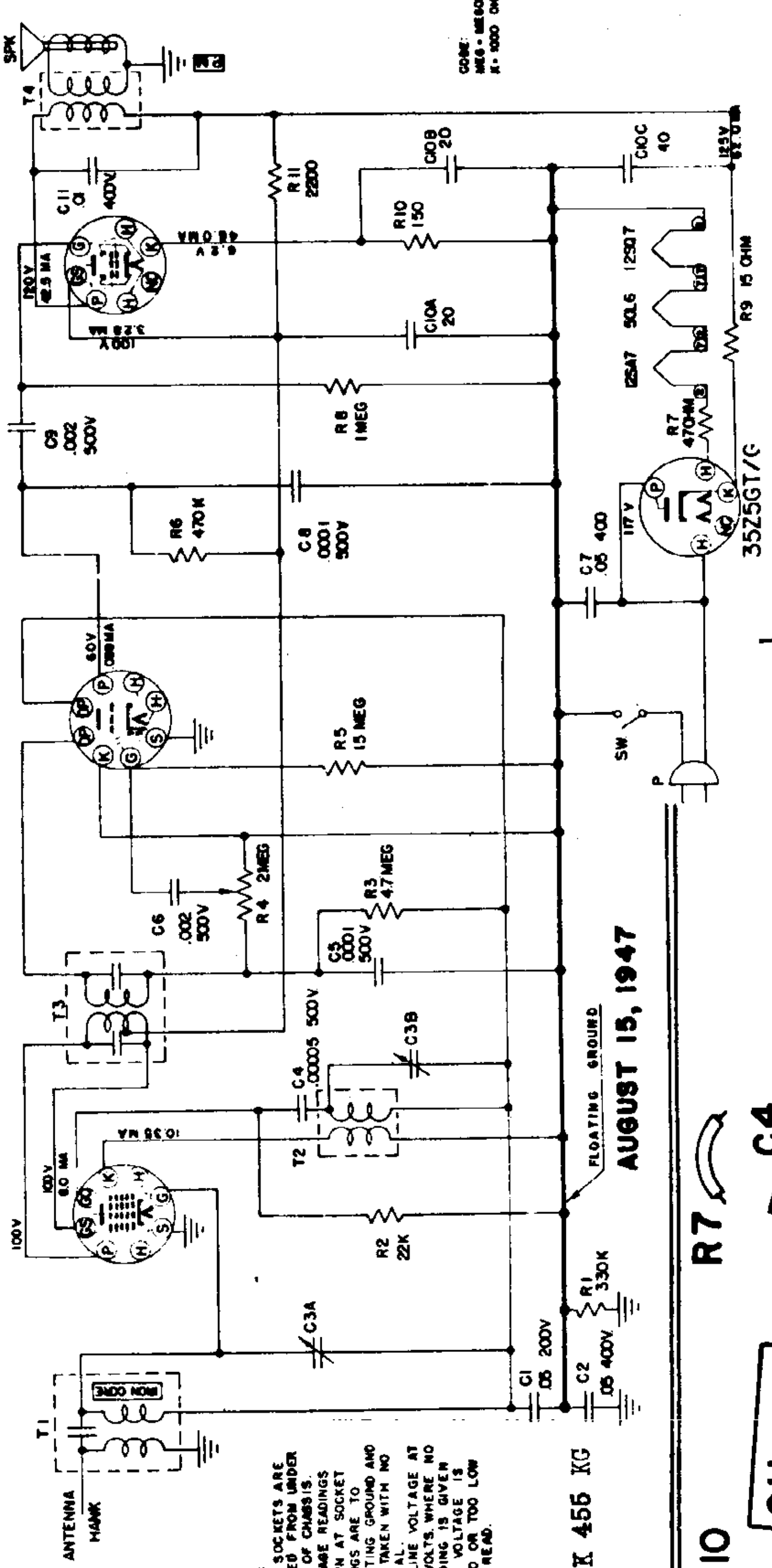
The alignment must be done in the order given.

Always keep the output power from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.



MODEL 8000
Chassis 132.838

SEARS, ROEBUCK AND CO.



Power Supply
105-125 Volts AC-DC 30 Watts

Frequency Range
Broadcast 540-1600 KC

Power Output
Undistorted .3 Watt
Maximum 2.3 Watt

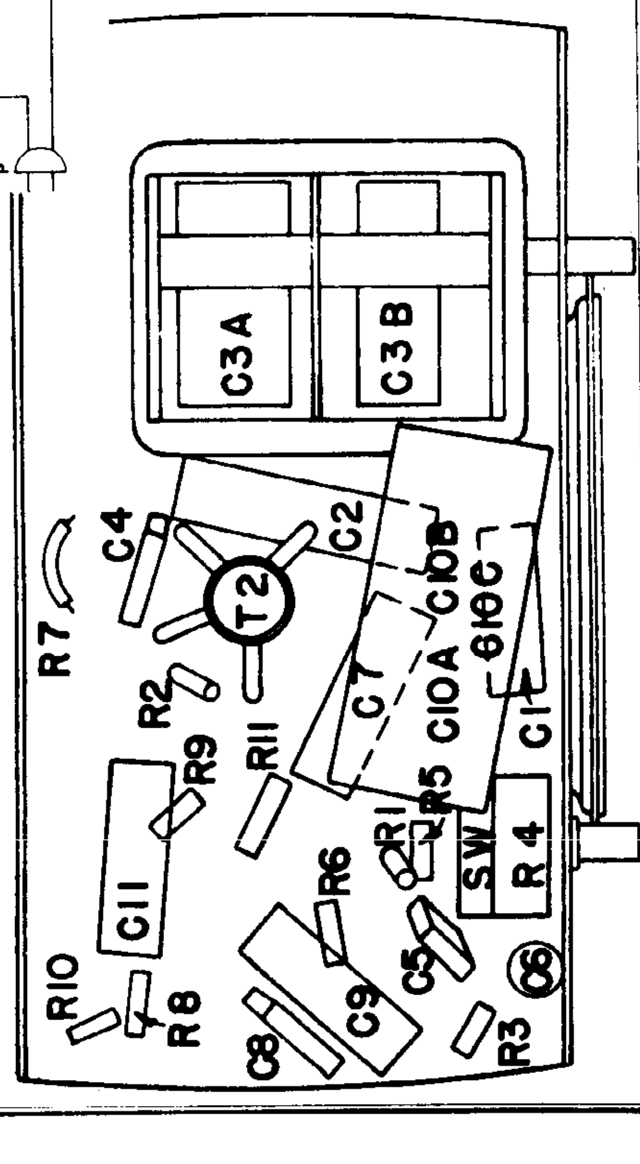
Speaker voice Coil Impedance 3.2 Ohms

AUGUST 15, 1947

NOTE:
TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO FLOATING GROUND AND ARE TAKEN WITH NO SIGNAL.
AC LINE VOLTAGE AT 117 VOLTS. WHERE NO READING IS GIVEN THE VOLTAGE IS ZERO OR TOO LOW TO READ.

IF PEAK 455 KC

LOCATION OF PARTS UNDER CHASSIS



ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection .... Across Speaker Voice Coil
Output meter reading to indicate 200 MW (Standard Output) .... .8 Volt
Generator modulation .... 30% 400 Cycles
Position of volume control .... Fully Clockwise
Position of dial pointer with variable condenser fully closed .... Down

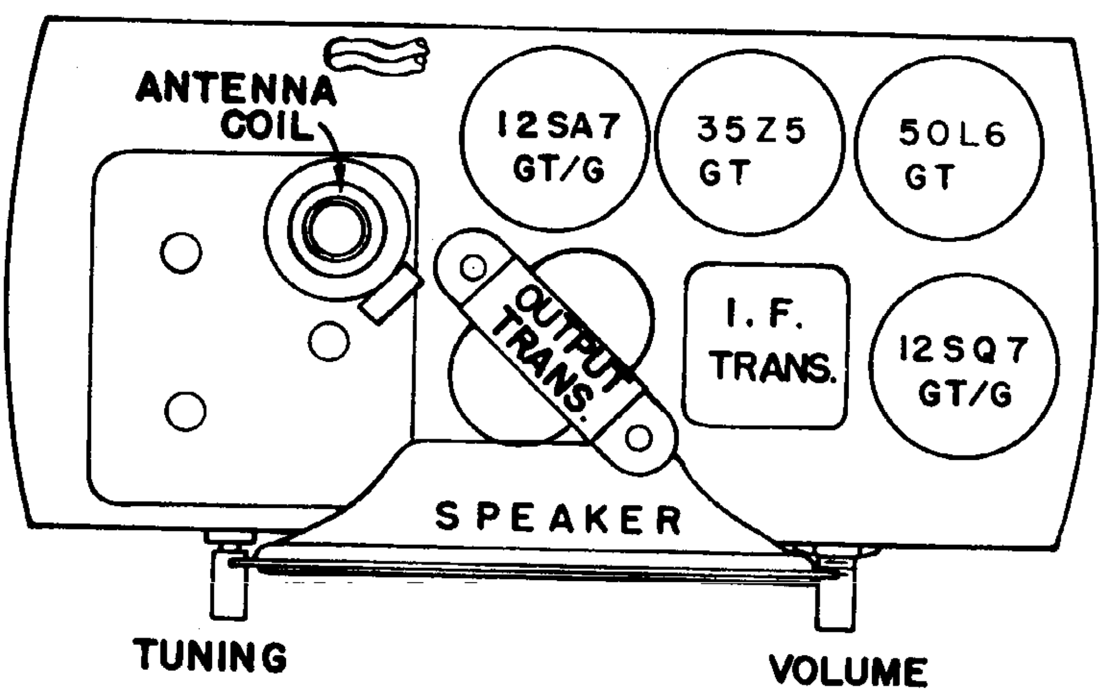
POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION HIGH SIDE	GENERATOR CONNECTION GRD. LEAD	ADJUST TRIMMERS IN ORDER SHOWN	TRIMMER FUNCTION
Open	455 KC	.05 Mfd.	Mixer Grid	Floating Gnd	T3	IF
Open	1620 KC	50 Mmf.	*Ant. Lug	Float. Gnd.	C38	Oscillator
1400 KC	1400 KC	50 Mmf.	*Ant. Lug	Float. Gnd.	C3A	Antenna
600 KC	600 KC	50 Mmf.	*Ant. Lug	Float. Gnd.	**Check Point	Antenna

IMPORTANT ALIGNMENT NOTES

* Antenna hank lug on antenna coil with hank removed.

** Check sensitivity at 600 KC. If low, adjust antenna section plates of variable for maximum output at 600 KC.

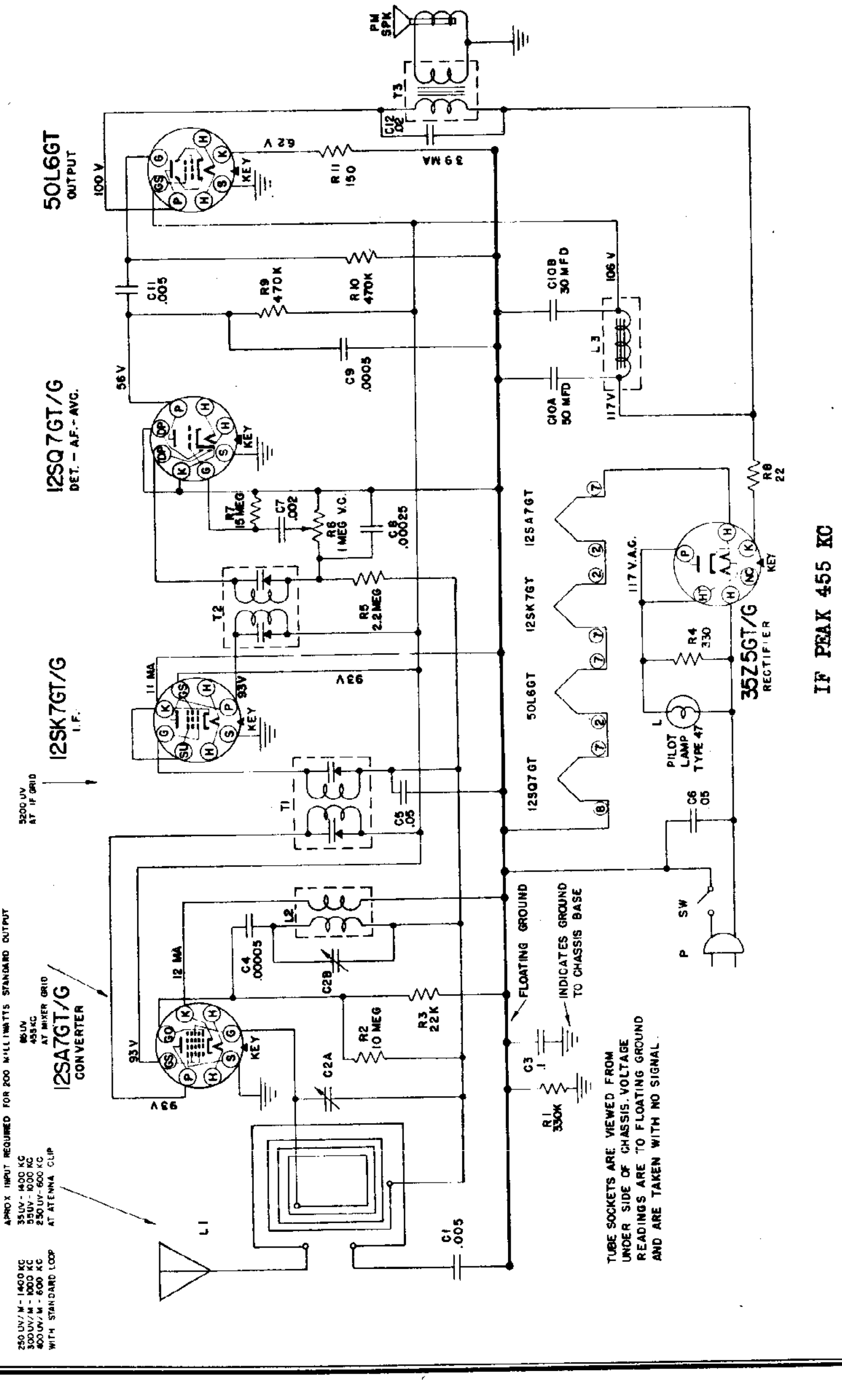
The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.



TUBE LAYOUT

MODEL 8005
Chassis 132.839

SEARS, ROEBUCK AND CO.



ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection .... Across Speaker Voice Coil
Output meter reading to indicate 200 MW (Standard output) .... .8 Volt
Generator modulation .... 30% 400 Cycles
Position of volume control .... Fully clockwise
Dial pointer position with variable condenser closed............... Last mark on dial

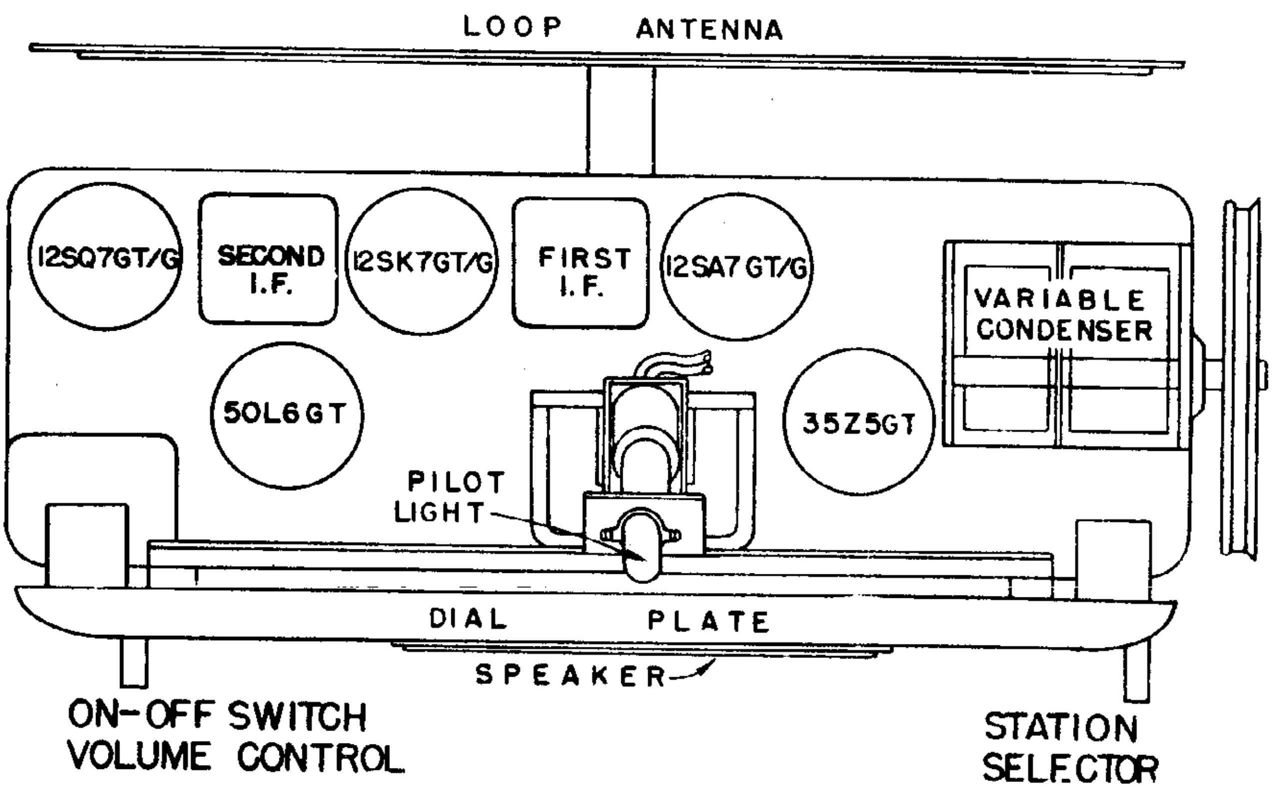
POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION HIGH SIDE	GENERATOR CONNECTION GND. LEAD	ADJUST TRIMMERS ORDER SHOWN	TRIMMER FUNCTION
Open	455 KC	.05 Mfd.	Mixer Grid	Fltg. Gnd.	T2-T1	IF
1400 KC	1400 KC	50 Mmf.	*Ant. Lead	Fltg. Gnd.	C2B	Oscillator
1400 KC	1400 KC	50 Mmf.	*Ant. Lead	Fltg. Gnd.	C2A	Antenna
600 KC	600 KC	50 Mmf.	*Ant. Lead	Fltg. Gnd.	**Check Point	Antenna

IMPORTANT ALIGNMENT NOTES

* Connect generator lead to green wire on loop antenna or a test loop may be used on the generator placed a short distance from the set loop.

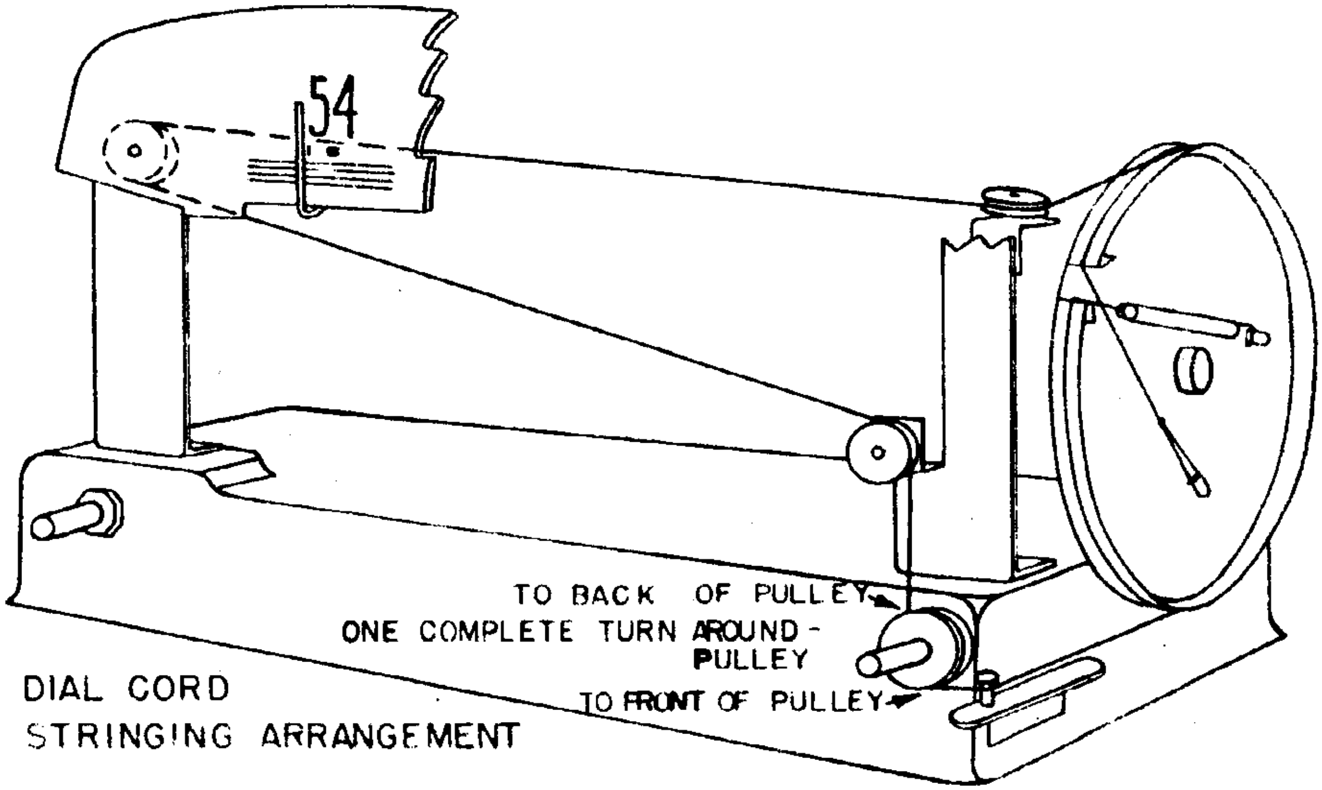
**Check sensitivity at 600 KC. If low, adjust antenna section plates of variable for maximum output at 600 KC.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.

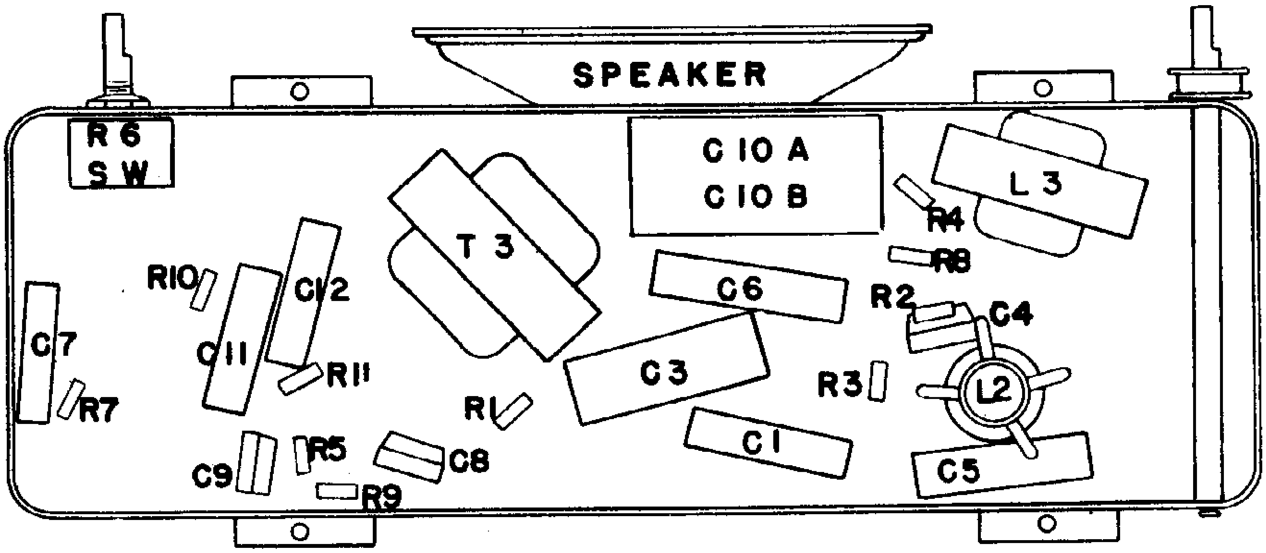


TUBE LAYOUT OUTLINE

SEARS, ROEBUCK AND CO.



DIAL CORD
STRINGING ARRANGEMENT



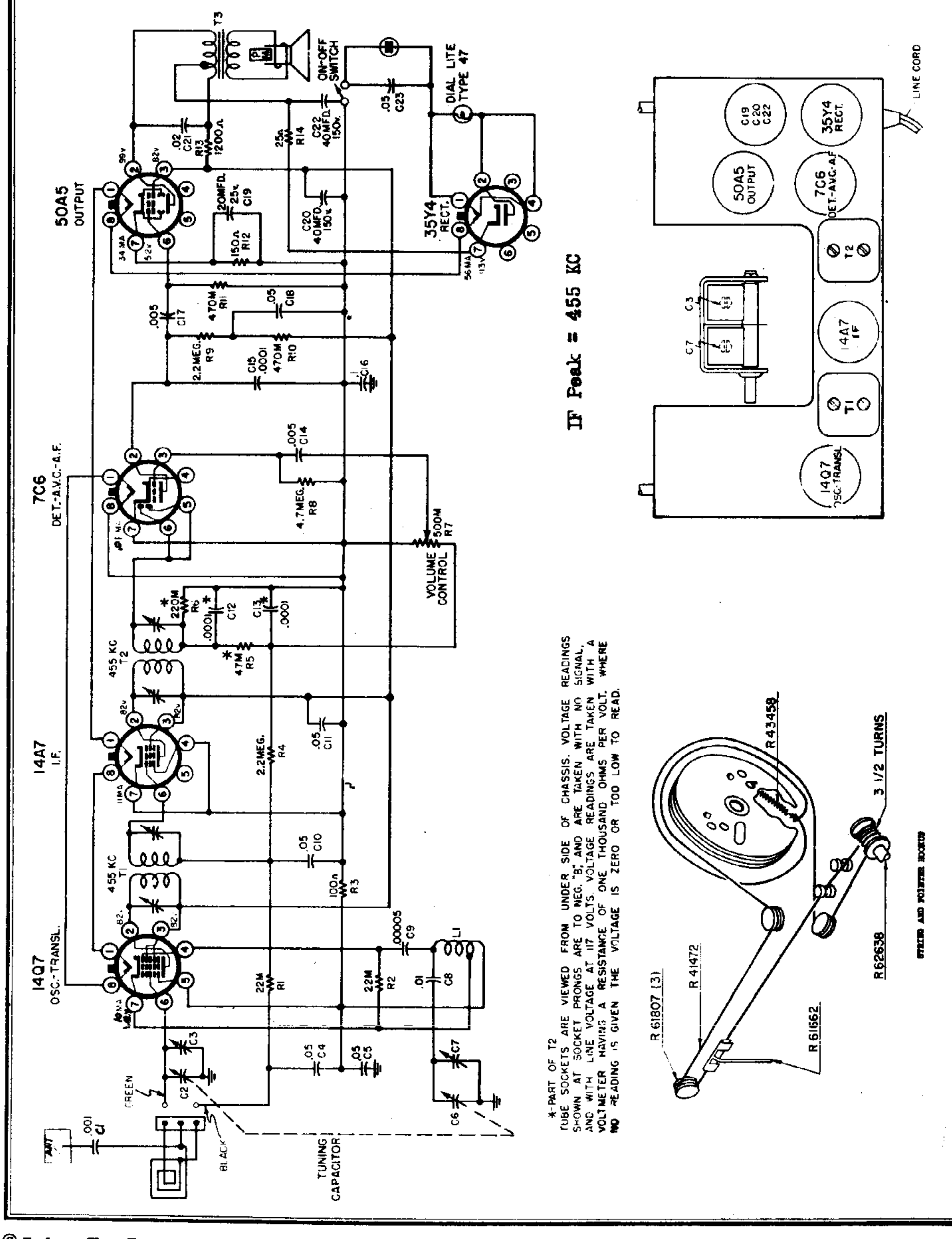
LOCATION OF PARTS UNDER CHASSIS

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	NU CODE
R1		Resistor, 330,000 Ohms, 1/4 W	
R2		Resistor, 10 Meg., ~~1/4~~ W	
R3		Resistor, 22,000 Ohm, 1/4 W	
R4		Resistor, 330 Ohm, 1/4 W	
R5		Resistor, 2.2 Megohm, 1/4 W	
R6	M21251	Control, On-Off Sw & Volume, 1 Megohm	
R7		Resistor, 15 Megohm, 1/4 W	
R8		Resistor, 22 Ohm, 1/4 W	
R9, R10		Resistor, 470,000 Ohm, 1/4 W	
R11		Resistor, 150 Ohm, 1/4 W	
C1, C11		Condenser, .005 Mfd., 400 V	
C2A, C2B		Condenser, Variable	AAO
C3		Condenser, .1 Mfd., 400 V	
C4		Condenser, .00005 Mfd., 500V Mica	
C5		Condenser, .05 Mfd., 400 V	
C6		Condenser, .05 Mfd., 200 V	
C7		Condenser, .002 Mfd., 400 V	
C8		Condenser, .00025 Mfd., 500 V Mica	
C9		Condenser, .0005 Mfd., 500 V Mica	
C10A, 10B		Electrolytic, 50-30 Mfd., 150 V	

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	NU CODE
C12		Condenser, .02 Mfd., 400V	
L1	M21245	Antenna Loop Assembly	
L2	M19354	Coil, Oscillator	
L3	M21246	Choke, Filter	
Spk	M21248	Speaker, 4" P. M.	A5
T1	M21424	Transformer, 1st I. F.	
T2	M21425	Transformer, 2nd I. F.	
T3	M21247	Transformer, Output	
	M21227	Cabinet, Less Metal Grille & Dial Cover	A5
	M19704	Cover, Dial, Clear Plastic	
	M19793	Grille, Metal Cabinet Front	
	M19132	Cord, Dial Drive	
	M21204	Knob, On-Off, Volume or Tuning	
	M21231	Leaflet, Instruction	
	M20138	Line Cord with Plug	
	M21145	Dial Pointer	
	M21200	Scale, Dial with Pointer Rail	
	M21243	Shaft, Tuning	
	M21226	Socket, Dial Light with Leads	
		Lamp, Dial, Mazda No. 47	

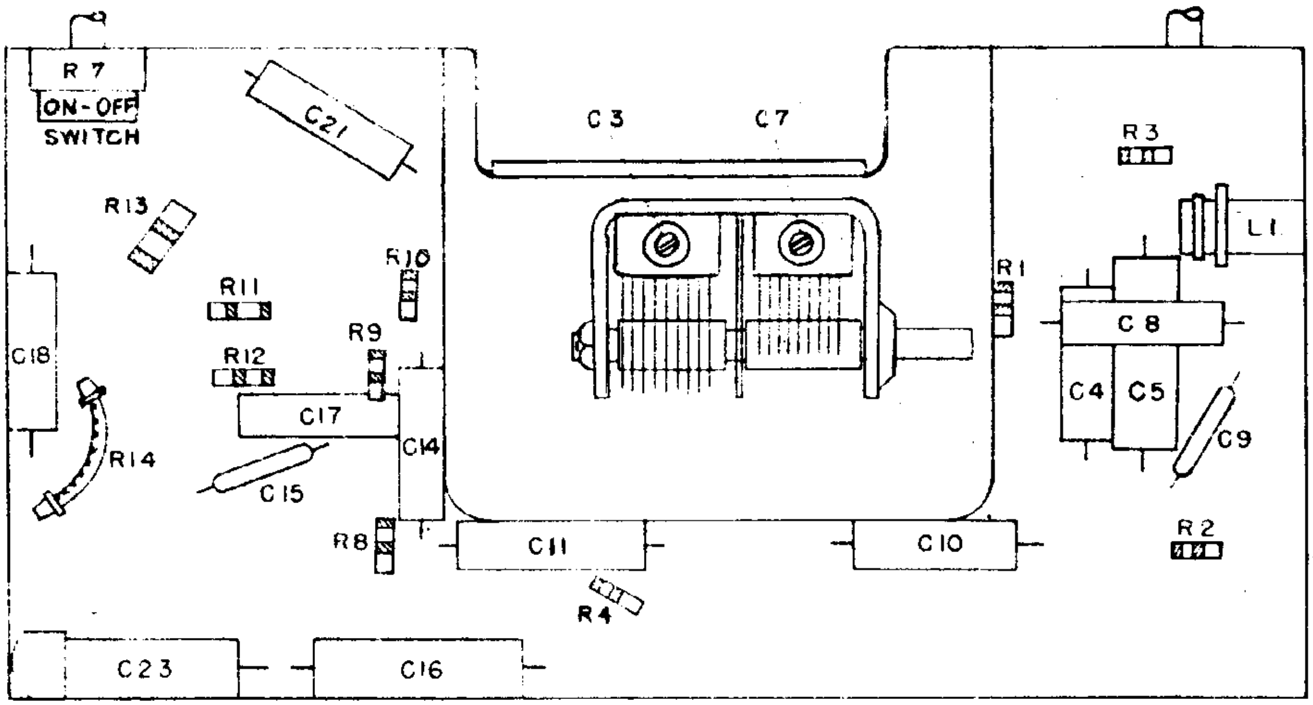
SEARS, ROEBUCK AND CO.

MODEL 8050
Chassis 101.813



IF Peak = 455 KC

*-PART OF T2
TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO NEG. "B" AND ARE TAKEN WITH NO SIGNAL, AND WITH LINE VOLTAGE AT 117 VOLTS. VOLTAGE READINGS ARE TAKEN WITH A VOLTMETER HAVING A RESISTANCE OF ONE THOUSAND OHMS PER VOLT. WHERE NO READING IS GIVEN THE VOLTAGE IS ZERO OR TOO LOW TO READ.



LOCATION OF PARTS UNDER CHASSIS

ALIGNMENT PROCEDURE

PRELIMINARY:

Output Meter reading to indicate 0.05 watt across voice coil.................0.4 Volt
Generator ground lead connection....................I.F. alignment-negative "B" lead
....................R.F. alignment-Receiver chassis
Generator Modulation...30%,400 cycles
Position of Volume Control...Fully on
Position of pointer with tuner fully closed.....Last line to left of 540 calibration mark on escutcheon or light brown mark about 1 inch from the left-hand end on the upper edge of the dial background.

POSITION OF TUNER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER (ADJ. IN ORDER SHOWN)	TRIMMER FUNCTION
Closed	455 Kc.	0.1 mfd.	Transl. Grid	T2,T1	I.F.
Fully Open	1650 Kc.	.0002 mfd.	Antenna	C7	Osc.
See Note Below	1410 Kc.	.0002 mfd.	Antenna	C3	Ant.

IMPORTANT ALIGNMENT NOTES

NOTE: The 1410 Kc. calibration point is a light brown mark about 2 inches from the right hand end on the upper edge of the dial background.

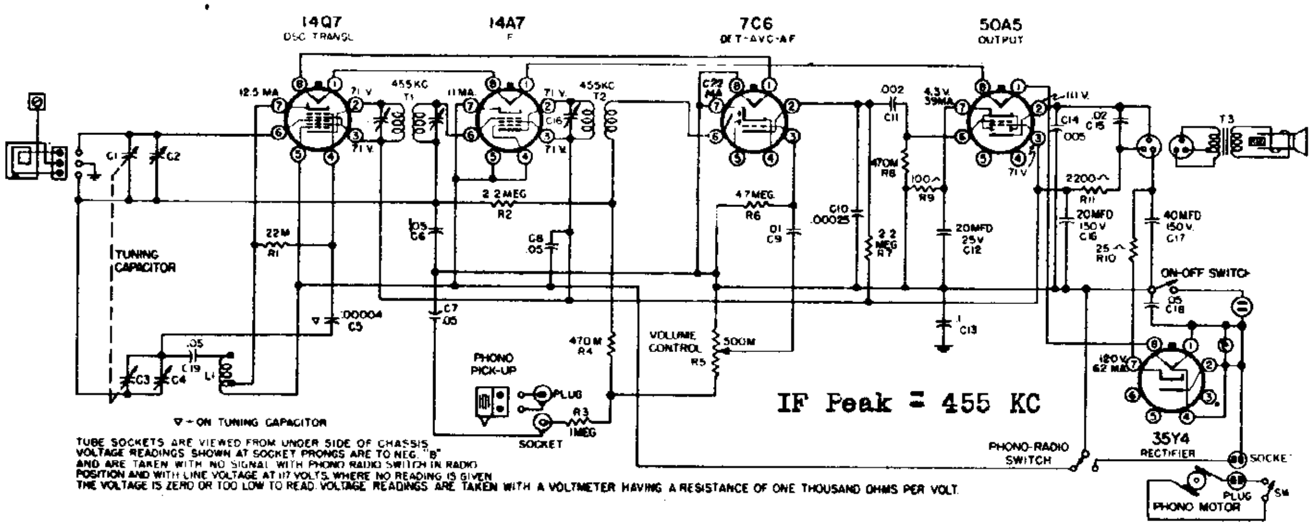
The Alignment must be done in the order given.

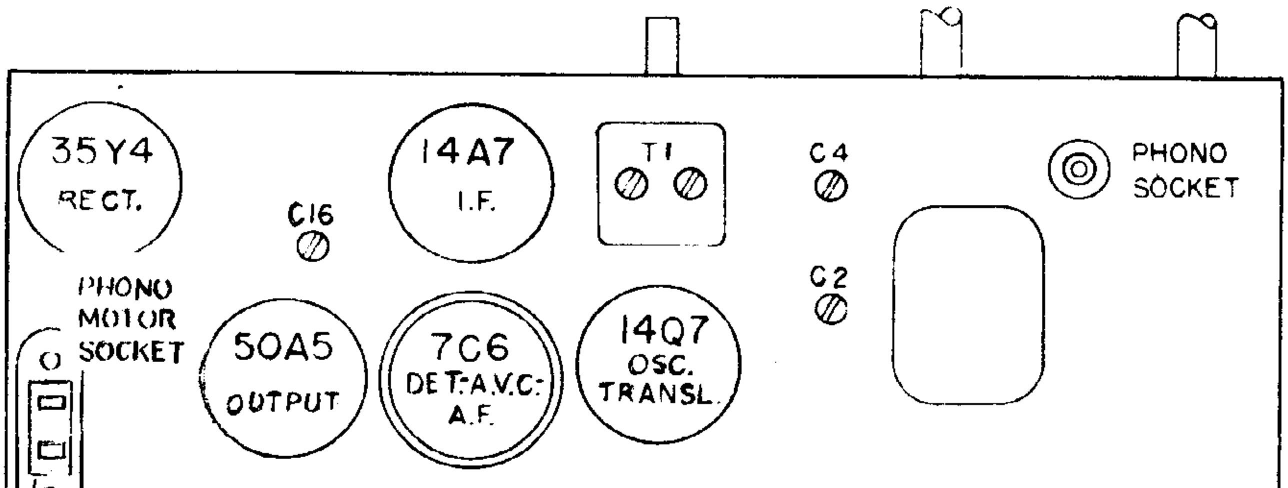
The entire Alignment Procedure should be repeated step by step in the original order for greatest accuracy.

Always keep the output from the generator at its lowest possibly value to prevent the AVC of the receiver from interfering with accurate alignment.

SEARS, ROEBUCK AND CO.

MODEL 8072
Chassis 101.834

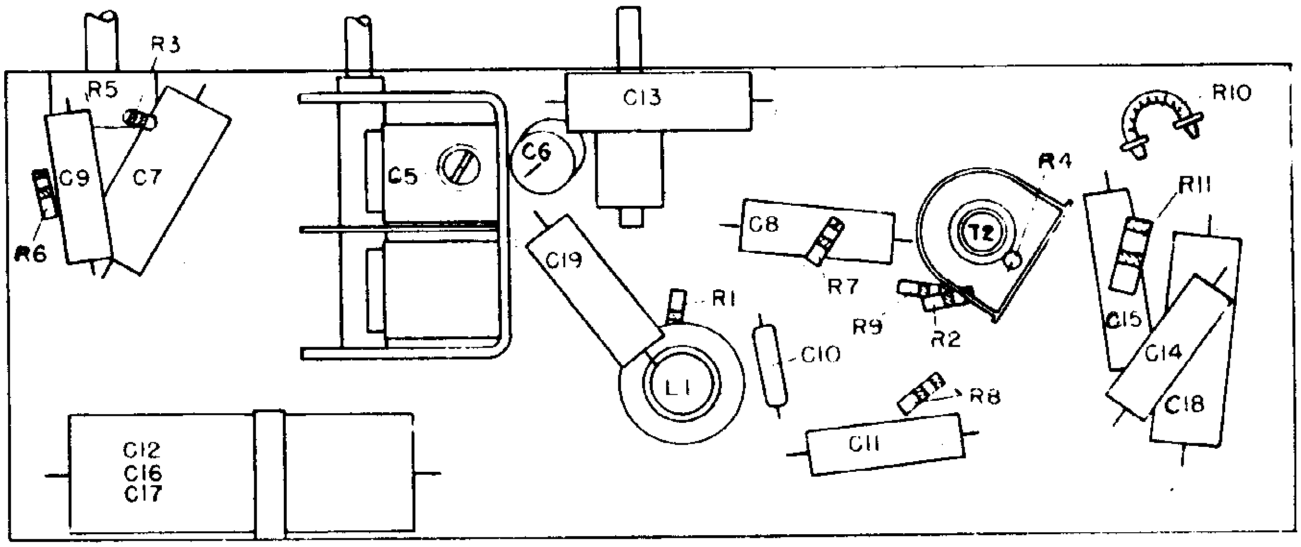




LOCATION OF PARTS ON TOP OF CHASSIS

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	R57433	Arm - Pickup
	R52826	Cartridge - Crystal - Astatic (L-70)
	R57444	Pin - Pickup Arm Hinge
	R62905	Post - Pickup Arm
	R62863	Shaft & Arm Assembly - Pickup Arm
	R57457	Spring - Pickup Arm
	R62864	Bracket & Hub Assembly - Pickup Arm
	R62901	Button - Push (Phono - Radio)
C9		Capacitor - .01 Mfd. 600 Volt
C15		Capacitor - .02 Mfd. 600 Volt
C6,C7,C8, C18,C19		Capacitor - .05 Mfd. 600 Volt
C11		Capacitor - .002 Mfd. 600 Volt
C14		Capacitor - .005 Mfd. 600 Volt
C10		Capacitor - Mica - 250 Mmfd.
C12,C16,C17	R61683	Capacitor - Electrolytic - 40 Mfd. 150 Volt, 20 Mfd. 150 Volt, 20 Mfd. 25 Volt
C1,C3	R61681	Capacitor - Variable - 2 Gang
C16	R62282	Capacitor - Trimmer - Single
L1	R61697	Coil - Oscillator
	R60639	Connector - Loop Terminal
R5	R61684	Control - On-Off & Volume
	R63138	Cord - Line
	R63109	Cord - Pickup Arm
	R62900	Dial - Station
	R49662	Idler Wheel - Phono Motor
	R62524	Knob - Tuning
	R62525	Knob - On-Off - Volume
		Lamp - Mazda Type #47
	R64025	Leaflet - Instruction
	R62904	Loop & Back Cover Assembly

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	R49547	Motor - Phono - 60 Cycle (Less Turntable)
	R57272	Plug - Phono Connector
	R49743	Plug - Speaker
R9		Resistor - 100 Ohm - 1/3 Watt
R1		Resistor - 22,000 Ohm - 1/3 Watt
R4,R8		Resistor - 470,000 Ohm - 1/3 Watt
R3		Resistor - 1 Megohm - 1/3 Watt
R2		Resistor - 2.2 Megohm - 1/3 Watt
R6		Resistor - 4.7 Megohm - 1/3 Watt
R11		Resistor - 2200 Ohm - 1 Watt
R10	R40232	Resistor - Glasohm - 25 Ohm - 1 Watt
	R62906	Rest - Pickup Arm
	R61914	Shield - Switch
	R57193	Shield - Tube
	R44145	Socket - 2 Prong - A. C.
	R57049	Socket - Tube - 8 Prong Lock-In
	R44897	Socket - 1 Prong - Phono Connector
	R60639	Socket - Speaker Cable
	R62173	Socket - Pilot Lamp
		WHEN ORDERING SPEAKER PARTS ALWAYS GIVE THE PART NUMBER ON THE SPEAKER
	R62907	Speaker - 5¼" P. M.
	R62910	Cone & Voice Coil
T3	R62911	Output Transformer
	R62854	Spring - Switch Mounting Plate Assembly
	R61687	Switch - Phono - Radio
	R61915	Switch - Phono Motor - Automatic
T1	R61688	Transformer - I. F. #1
T2	R61689	Transformer - I. F. #2
	R49663	Turntable - 9" (only)
	R62206	Washer - Mica - Variable Capacitor



LOCATION OF PARTS UNDER CHASSIS

ALIGNMENT PROCEDURE

PRELIMINARY:

Output Meter reading to indicate 0.05 watt across voice coil................0.4 Volt
Generator ground lead connection...................................Receiver chassis
Generator Modulation..30%,400 cycles
Position of Volume Control..Fully on
Position of pointer with tuner fully closed......Between the numerals 5 and 4 at the 540 Kc. calibration mark.

POSITION OF TUNER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER (ADJ. IN ORDER SHOWN)	TRIMMER FUNCTION
Closed	455 Kc.	0.1 mfd.	Transl. Grid	C16,T1	I.F.
Open	1650 Kc.	.0002 mfd.	Loop	C4	Oscillator
1410 Kc.	1410 Kc.	.0002 mfd.	Loop	C2	Transl.

IMPORTANT ALIGNMENT NOTES

The Alignment must be done in the order given.

The entire Alignment Procedure should be repeated step by step in the original order for greatest accuracy.

Always keep the output from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.

SEARS, ROEBUCK AND CO.

MODEL 7070 MODEL 8000
MODEL 7210 MODEL 8050

MODEL 7070

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	R62212	Arm - Pickup (Less Crystal)
	R52826	Cartridge - Crystal - Astatic L70
	R61642	Button - Phono - Radio Switch
	R61639	Cabinet - Radio - Molded
C6,C10,C11, C17		Capacitor - .05 Mfd. 200 V.
C15		Capacitor - .05 Mfd. 600 V.
C7		Capacitor - .01 Mfd. 400 V.
C13		Capacitor - .02 Mfd. 200 V.
C8		Capacitor - .002 Mfd. 600 V.
C1,C3,C5	R61682	Capacitor - Variable Assembly
C9,C12,C14	R61683	Capacitor - Elect. 20 Mfd. 150 V., 40 Mfd. 150 V., 20 Mfd. 25 V.
C16	R62282	Capacitor - Trimmer - Single
	R61647	Clip - Spring - Speaker Retaining
L1	R61697	Coil - Oscillator
R5	R61684	Control - On-Off & Volume
	R63143	Cord - Line
	R62228	Cover - Bottom
	R61690	Knob - On-Off & Volume
	R61621	Knob - Station Selector
	R64178	Leaflet - Instruction
	R61415	Loop - Antenna

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	R49547	Motor - Phono - 60 Cycle (Less Turntable)
	R49749	Idler Wheel
	R49548	Turntable - 8"
	R61645	Plate - Chassis Bottom
	R61694	Plate - Chassis Hold Down
R8		Resistor - 100 Ohm - 1/3 Watt
R1		Resistor - 22,000 Ohm - 1/3 Watt
R7		Resistor - 220,000 Ohm - 1/3 Watt
R4,R10		Resistor - 470,000 Ohm - 1/3 Watt
R3		Resistor - 1 Megohm - 1/3 Watt
R2,R9		Resistor - 2.2 Megohm - 1/3 Watt
R6		Resistor - 4.7 Megohm - 1/3 Watt
R11		Resistor - 2200 Ohm - 1 Watt
R12	R40232	Resistor - Glasohm - 25 Ohm - 1 Watt
	R57193	Shield - Tube
	R62230	Shield - I.F. Transformer
	R57049	Socket - Tube - 8 Prong Lock-in
		WHEN ORDERING SPEAKER PARTS ALWAYS GIVE THE PART NUMBER ON THE SPEAKER
	R61693	Speaker - 4" P.M.
	R61687	Switch - Phono - Radio - S.P.D.T.
T1	R61688	Transformer - I.F. #1
T2	R61689	Transformer - I.F. #2
T3	R61699	Transformer - Output

MODEL 8000

SCHEMATIC LOCATION	PART NO.	DESCRIPTION
R1		Resistor, 330,000 Ohms, 1/4 Watt
R2		Resistor, 22,000 Ohms, 1/4 Watt
R3		Resistor, 4.7 Megohm, 1/4 Watt
R4	R21335	Control - Vol and switch, 2 meg.
R5		Resistor, 15 Megohm, 1/4 Watt
R6		Resistor, 470,000 Ohms, 1/4 Watt
R7	R18177	Resistor, 47 Ohms, 1 Watt
R8		Resistor, 1 Megohm, 1/4 Watt
R9		Resistor, 15 Ohms, 1/4 Watt
R10		Resistor, 150 Ohms, 1/4 Watt
R11		Resistor, 2200 Ohms, 1 Watt
C1		Condenser, .05 Mfd., 200 V
C2, C7		Condenser, .05 Mfd., 400 V
C3A, C3B	R21336	Condenser, Variable, 2 Gang
C4		Condenser, .00005 Mfd., 500 V, Mica
C5, C8		Condenser, .0001 Mfd., 500 V., Mica
C6, C9		Condenser, .002 Mfd., 400 V
C10A, C10B, & C10C	R21456	Condenser, Electrolytic, 40-20 Mfd., 150 Volt, 20 Mfd., 25 Volt

SCHEMATIC LOCATION	PART NO.	DESCRIPTION
C11		Condenser, .01 Mfd, 400 V
T1	R21420	Coil, Antenna
T2	R21328	Coil, Oscillator
T3	R21329	Transformer, I. F.
Spk	R21470	Speaker, 4" P.M. with Output Transformer
	R21334	Speaker, 4" P.M.
	R21333	Transformer, Output
	R20138	Line Cord with Plug
	R21126	Cabinet, Ivory
	R19828	Grille, Metal Cabinet Front
	R21175	Sticker, Dial Scale
	R21306	Grille Cloth, Rear Cabinet
	R21314	Felt Feet
	R21101	Knob, Tuning, Ivory
	R21176	Pointer, Dial
	R21177	Knob, Volume, Ivory
	R18136	Wire, Antenna Hank

MODEL 8050

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
		Lamp - Mazda Type #47
	R54677	Leaflet - Instruction
	R61662	Pointer - Dial
R3		Resistor - 100 Ohm - 1/3 Watt
R12		Resistor - 150 Ohm - 1/3 Watt
R1,R2		Resistor - 22,000 Ohm - 1/3 Watt
R10,R11		Resistor - 470,000 Ohm - 1/3 Watt
R4,R9		Resistor - 2.2 Megohm - 1/3 Watt
R8		Resistor - 4.7 Megohm - 1/3 Watt
R13		Resistor - 1200 Ohm - 1 Watt
R14	R40232	Resistor - Glasohm - 25 Ohm - 1 Watt
	R62638	Shaft - Tuning Assembly
	R57049	Socket - Tube - 8 Prong Lock-In
	R62326	Socket - Pilot Lamp
		WHEN ORDERING SPEAKER PARTS ALWAYS GIVE THE PART NUMBER ON THE SPEAKER
	R62544	Speaker - 5¼" P. M.
	R62669	Cone & Voice Coil
T3	R62670	Output Transformer
	R43458	Spring - Dial Drive
T1	R62513	Transformer - I. F. #1
T2	R61142	Transformer - I. F. #2
	R60450	Wafer - Electrolytic Capacitor Mounting

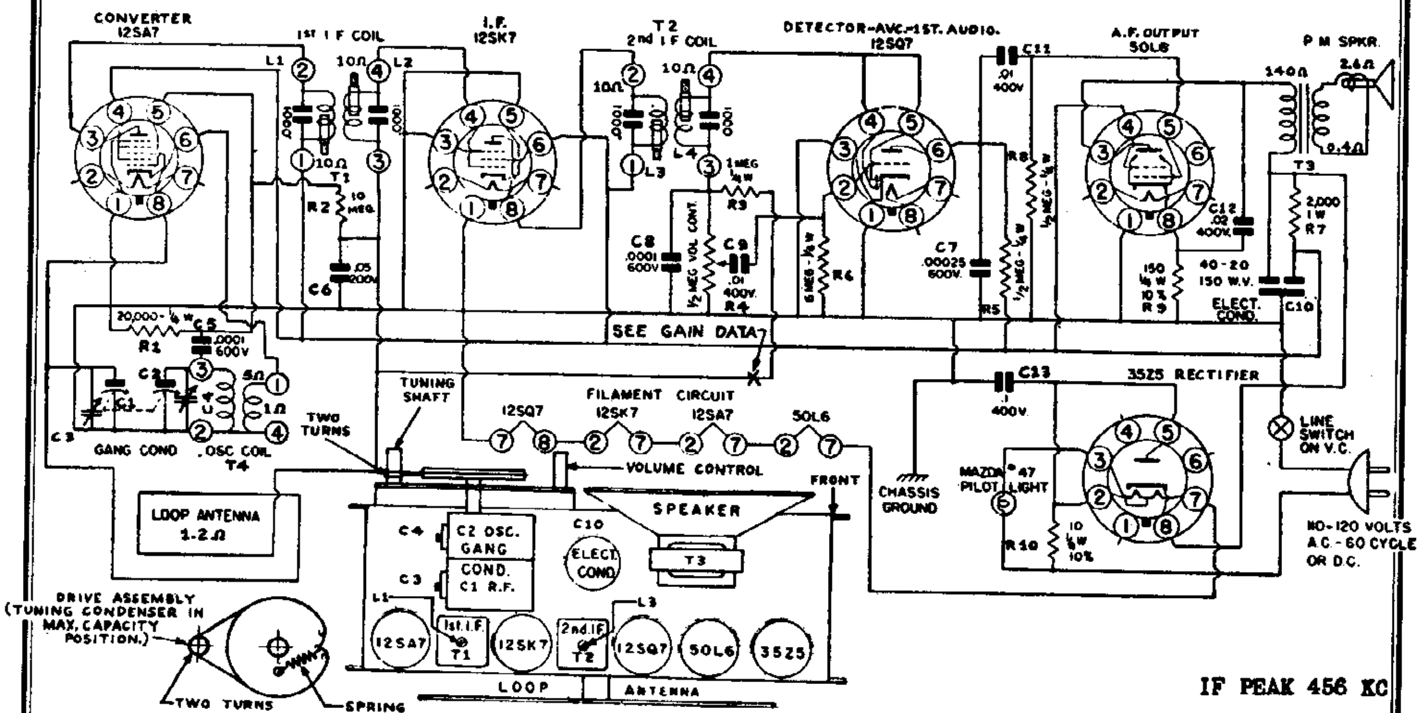
SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	R62328	Background - Dial
	R57037	Board - Antenna
	R60425	Bracket - Variable Capacitor Mtg. - (Rear)
	R13961	Button - Snap
C16		Capacitor - .1 Mfd. 400 Volt
C8		Capacitor - .01 Mfd. 600 Volt
C2		Capacitor - .02 Mfd. 400 Volt
C4,C5,C10, C11,C18,C23		Capacitor - .05 Mfd. 600 Volt
C1		Capacitor - .001 Mfd. 600 Volt
C14,C17		Capacitor - .005 Mfd. 600 Volt
C9		Capacitor - 50 Mmfd. - Mica
C15		Capacitor - 100 Mmfd. - Mica
C19,C20,C22	R60416	Capacitor - Electrolytic - 40 Mfd. 150 Volt, 20 Mfd. 25 Volt, 40 Mfd. 150 Volt
C2,C6	R61100	Capacitor - Variable - 2 Gang
L1	R61107	Coil - Oscillator
	R60639	Connector - Loop Terminal
R7	R61655	Control - On-Off & Volume
	R16706	Cord - Line
	R41472	Cord - Dial Drive
	R62327	Dial - Station
	R62712	Knob - Tuning
	R62713	Knob - On-Off & Volume

MODEL 7210

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
C3		Capacitor - .05 Mfd. 200 Volt
C5,C12,C16		Capacitor - .01 Mfd. 400 Volt
C9,C18		Capacitor - Mica - 50 Mmfd.
C1		Capacitor - Mica - 150 Mmfd.
C19		Capacitor - Mica - 250 Mmfd.
C10,C15		Capacitor - .001 Mfd. 600 Volt
C17		Capacitor - .005 Mfd. 400 Volt
C2		Capacitor - Silver Mica - 250 Mmfd. 500 Volt
C20	R57054	Capacitor - Dry Electrolytic - 10 Mfd. 150 Volt
C4,C8	R57096	Capacitor - Trimmer - 2 Gang
L1	R45265	Coil - Choke - Antenna
R10	R57072	Control - On-Off and Volume
R14		Resistor - 1200 Ohm - 1/3 Watt
R15		Resistor - 4700 Ohm - 1/3 Watt
R4		Resistor - 22,000 Ohm - 1/3 Watt
R2		Resistor - 47,000 Ohm - 1/3 Watt

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
R5		Resistor - 180,000 Ohm - 1/3 Watt
R7		Resistor - 220,000 Ohm - 1/3 Watt
R1,R12		Resistor - 1 Megohm - 1/3 Watt
R13		Resistor - 2.2 Megohm - 1/3 Watt
R3		Resistor - 3.3 Megohm - 1/3 Watt
R11		Resistor - 6.8 Megohm - 1/3 Watt
R9		Resistor - 15 Megohm - 1/3 Watt
		WHEN ORDERING SPEAKER PARTS ALWAYS GIVE THE PART NUMBER ON THE SPEAKER
	R61642	Speaker - 4" x 6" P.M.
	R62255	Cone and Voice Coil
T3	R57076	Transformer - Output
T1	R57094	Transformer - I. F. 1
T2	R57603	Transformer - I. F. 2
	R57087	Tuner - Perm. Unit
L2	R61675	Coil - Antenna
L3	R61676	Coil - Oscillator

THE SEIBERLING RUBBER CO.



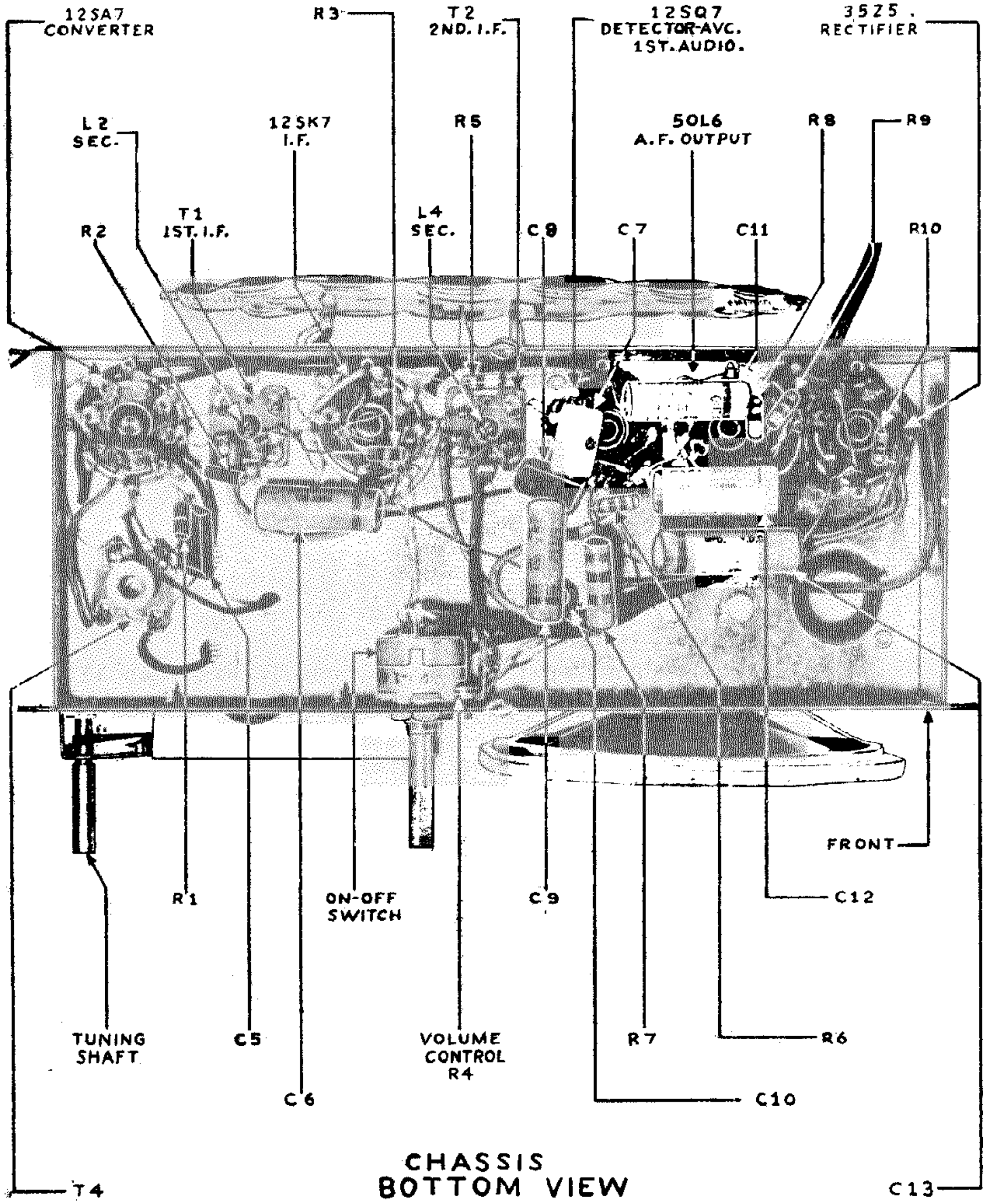
IF PEAK 456 KC

ALIGNMENT

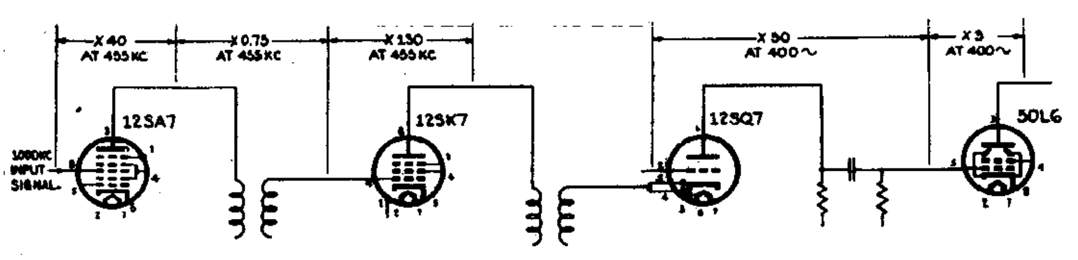
The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine Loop Model 1150, and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc and adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L3, L2, L1. Set the generator and receiver to 1600 Kc and adjust the oscillator trimmer C4 for maximum output. Set the generator and receiver to 1400 Kc and adjust the loop trimmer C3 for maximum output.

TUBE	PIN	VTVM	D-C VOLTAGE 20,000 OHMS PER VOLT	1000 OHMS PER VOLT	RESISTANCE
12SA7	1	0	0	0	0
	2	0	0	0	24
	3	+80	+80	+78	INFINITE
	4	+80	+80	+78	INFINITE
	5	-9.5	-9.5	-4.8	20,000
	6	0	0	0	1
	7	0	0	0	40
	8	-1.5	-0.8	-0.2	1,200,000
12SK7	1	0	0	0	0
	2	0	0	0	12
	3	0	0	0	0
	4	-1.5	-0.6	-0.2	1,200,000
	5	0	0	0	0
	6	+80	+80	+78	INFINITE
	7	0	0	0	26
	8	+80	+80	+78	INFINITE
12SQ7	1	0	0	0	0
	2	-0.5	-0.4	-0.2	6,000,000
	3	0	0	0	0
	4	-0.5	-0.4	-0.2	400,000
	5	-0.5	-0.4	-0.2	400,000
	6	+46	+42	+40	INFINITE
	7	0	0	0	14
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+120	+120	+120	INFINITE
	4	+80	+80	+78	INFINITE
	5	0	0	0	460,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+4.5	+4.5	+4.5	150
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	8	+120	+120	+120	INFINITE

THE SEIBERLING RUBBER CO.



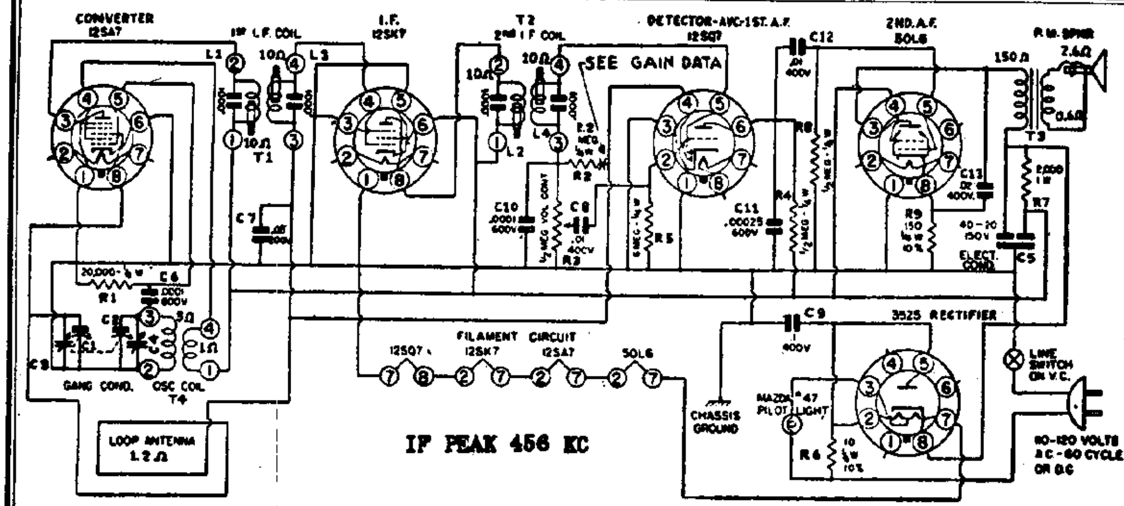
CHASSIS
BOTTOM VIEW



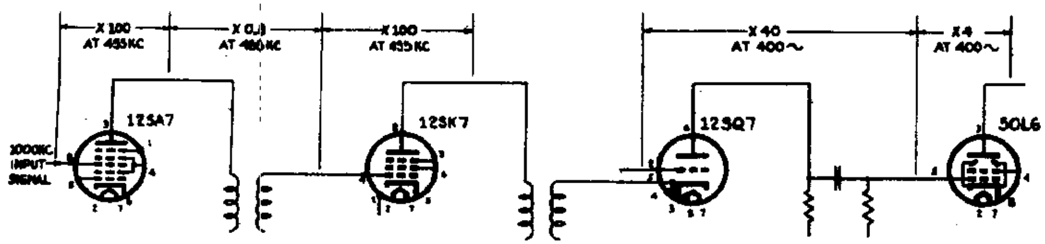
APPROXIMATE GAIN PER STAGE DATA

IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND

THE SEIBERLING RUBBER CO.



IF PEAK 456 KC



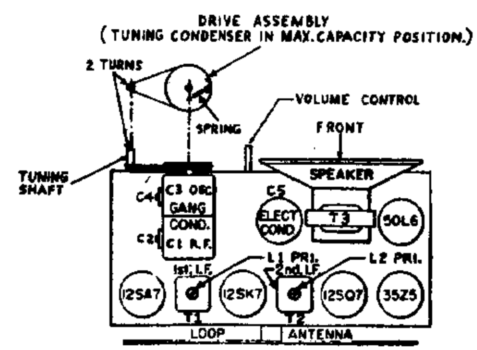
APPROXIMATE GAIN PER STAGE DATA

IN MAKING GAIN PER STAGE MEASUREMENTS, CIRCUIT WAS OPENED AT POINT X TO STOP AVC ACTION, AND A 3-VOLT BATTERY CONNECTED BETWEEN THIS POINT AND GROUND.

TUBE	PIN	VTVM	D-C VOLTAGE 20,000 OHMS PER VOLT	D-C VOLTAGE 1000 OHMS PER VOLT	RESISTANCE
12SA7	1	0	0	0	0
	2	0	0	0	26
	3	+80	+80	+80	5,000,000
	4	+80	+80	+80	5,000,000
	5	-6	-5.6	-2.6	19,000
	6	0	0	0	0
	7	0	0	0	40
	8	-1	-0.4	-0.4	5,000,000
12SK7	1	0	0	0	0
	2	0	0	0	16
	3	0	0	0	0
	4	-1	-0.4	-0.4	5,000,000
	5	0	0	0	0
	6	+80	+80	+78	5,000,000
	7	0	0	0	26
	8	+80	+80	+78	5,000,000
12SQ7	1	0	0	0	0
	2	-1.2	-0.8	-0.5	10,000,000
	3	0	0	0	0
	4	-1	-0.45	-0.4	5,000,000
	5	-0.7	-0.5	-0.2	500,000
	6	+54	+48	+42	5,000,000
	7	0	0	0	15
	8	0	0	0	0
50L6	1	0	0	0	0
	2	0	0	0	40
	3	+125	+120	+120	5,000,000
	4	+80	+80	+80	5,000,000
	5	0	0	0	450,000
	6	0	0	0	INFINITE
	7	0	0	0	90
	8	+5.2	+5	+5	140
35Z5	1	0	0	0	INFINITE
	2	0	0	0	120
	3	0	0	0	120
	4	0	0	0	INFINITE
	5	0	0	0	120
	6	0	0	0	120
	7	0	0	0	90
	3	130	125	125	5,000,000

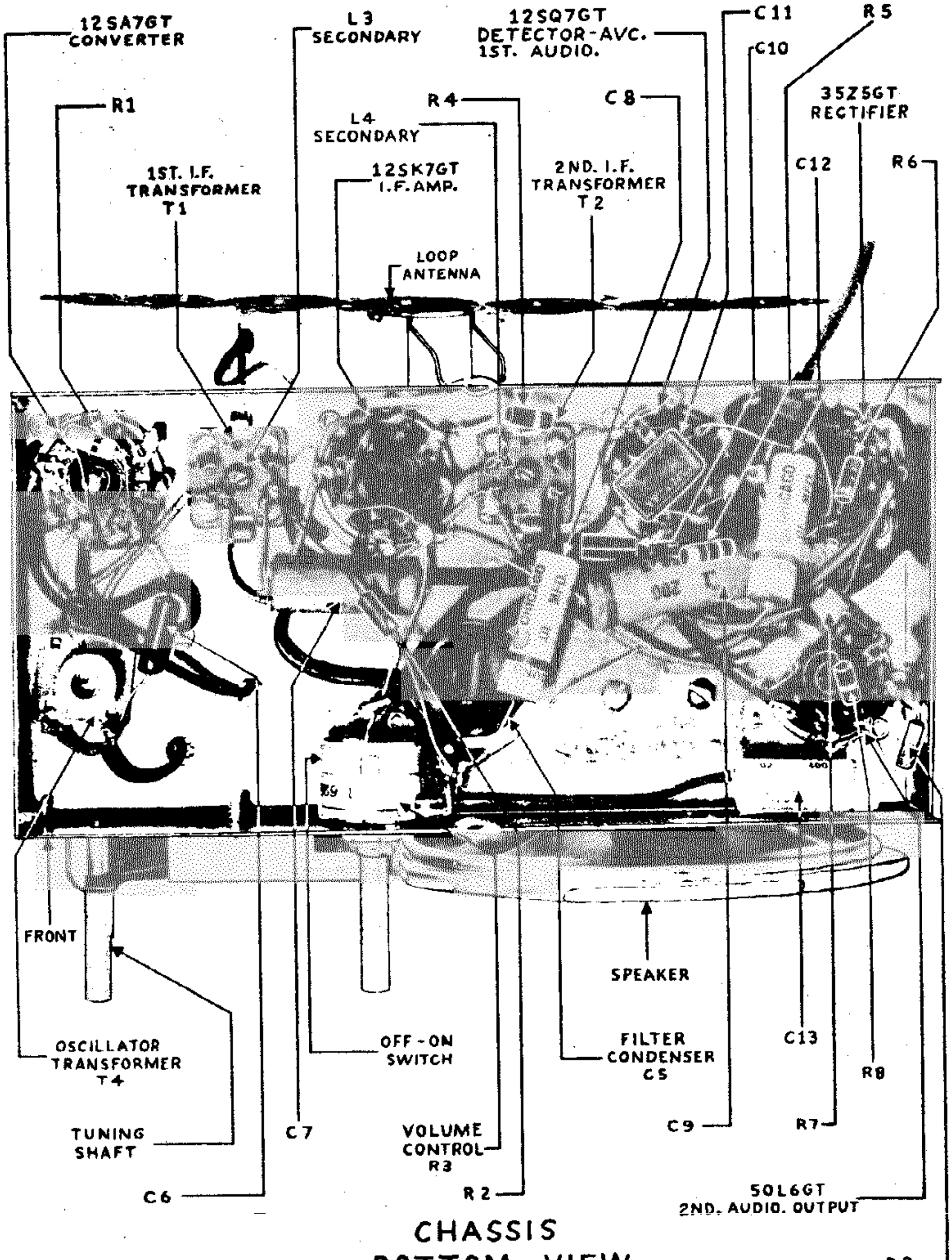
ALIGNMENT

The chassis must be removed from the cabinet in order to align this receiver. Connect the output meter across the voice coil. Connect the signal generator to the Standard Hazeltine Model 1150 loop, and couple loosely to the receiver loop. Set the receiver volume control at maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should at all times be just sufficient to obtain a minimum deflection on the output meter. Set the signal generator to 456 Kc. Adjust the i-f trimmers for maximum meter deflection in the following sequence: L4, L2, L3, L1. Set the generator and receiver to 1600 Kc and adjust oscillator trimmer C4 for maximum output. Set the generator and receiver to 1400 Kc and adjust loop trimmer C3 for maximum output.



TUBE LAYOUT

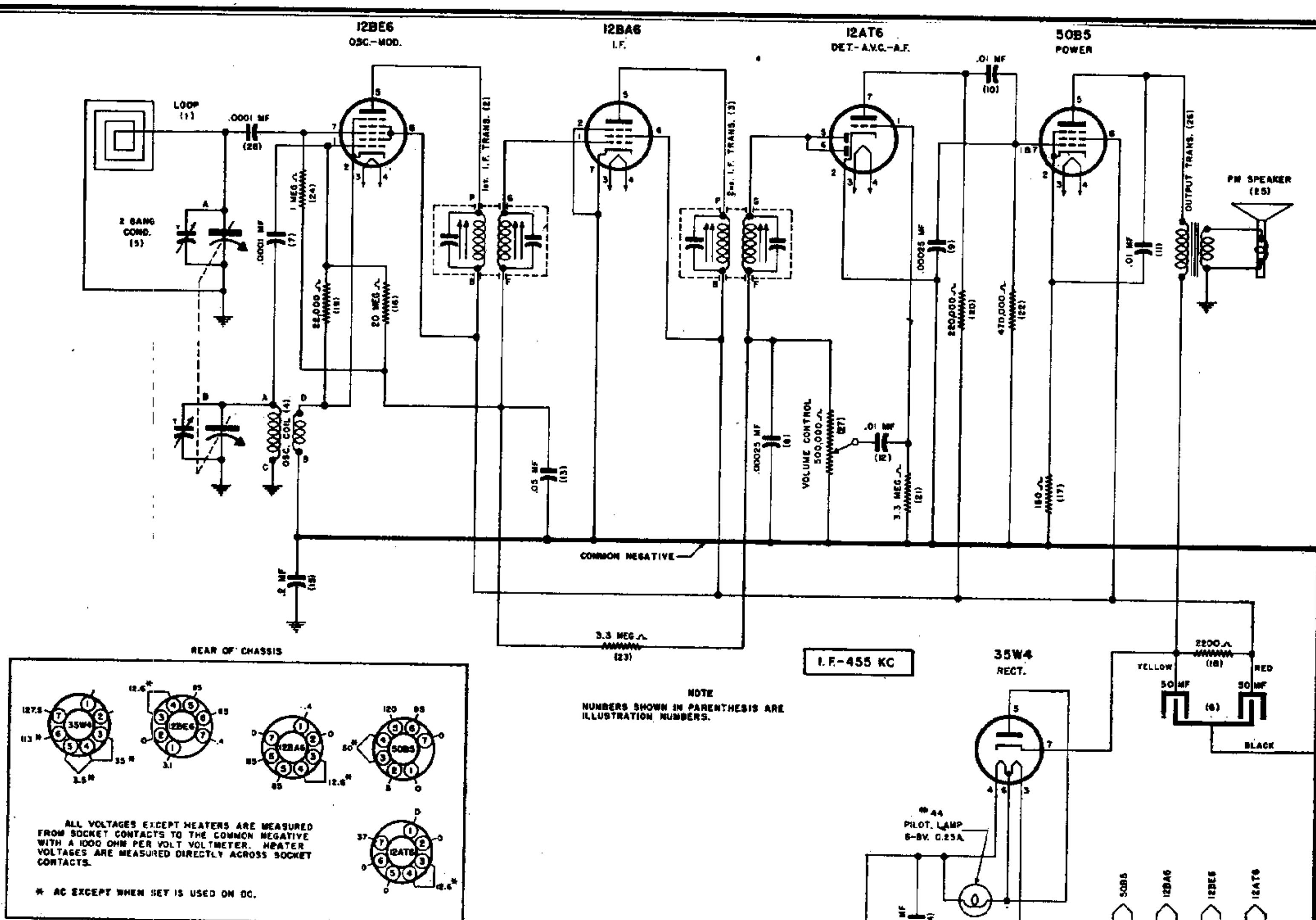
THE SEIBERLING RUBBER CO.



CHASSIS
BOTTOM VIEW

SENTINEL RADIO CORP.

MODELS 1U-309-W, 1U-309-I, 1U-309-R



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

DIAL LIGHT

It is normal for the dial light to be dim for approximately 60 seconds after set is turned "on" and then attain normal brilliance—also, on very loud signals the light may fluctuate.

Always use a 6.3 volt .250 ampere dial light, No. 44 Mazda.

TO REMOVE CHASSIS FROM CABINET:
- (A) Remove cabinet back.
- (B) Pull knobs off of control shafts.
- (C) Unscrew and remove nut and fibre washer on volume control shaft—accessible when knob is removed.
- (D) Slide chassis out of cabinet.

TO REINSTALL, reverse the above procedure. Be sure to place fibre washer on volume control shaft before attaching nut. DO NOT tighten nut too much—otherwise, cabinet may crack.

SENTINEL RADIO CORP.

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

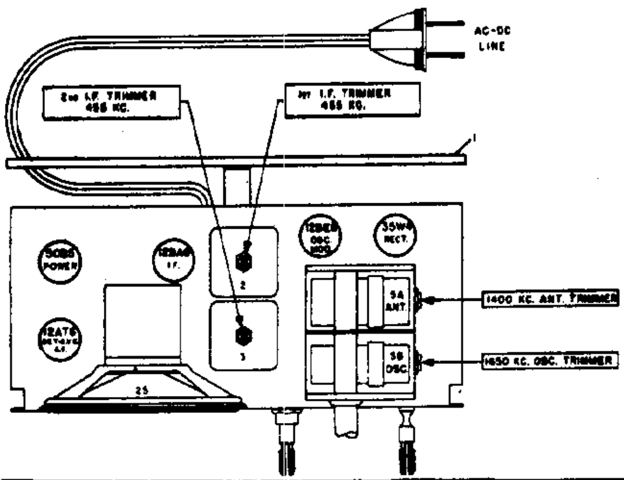
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

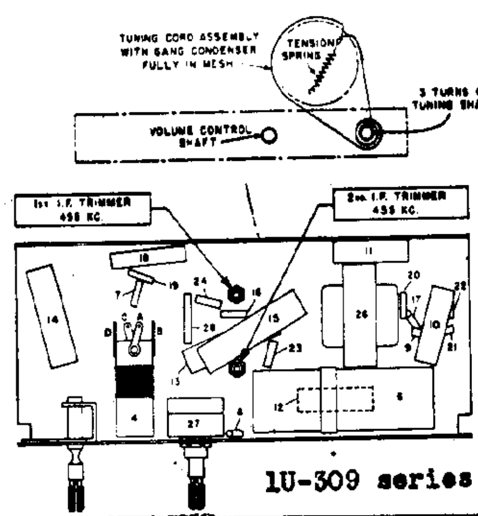
(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET — APPROXIMATELY ⅝" SPACE BETWEEN LOOP AND CHASSIS.

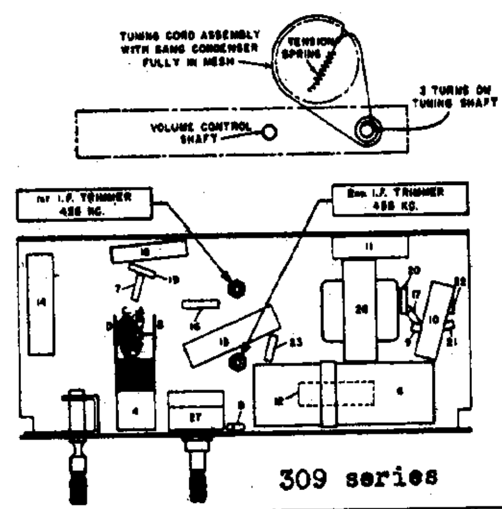
Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to rear stator plates of tuning condenser. Low side to frame of condenser through a .02 Mfd. blocking condenser.	Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.
2	Exactly 1650 K. C.	Exactly 1650 K. C.	.00025 MFD. condenser	High side to green & white antenna lead. Low side to chassis through .02 Mfd. blocking condenser.	Adjust 1650 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	High side to green & white antenna lead. Low side to chassis through .02 Mfd. blocking condenser.	Adjust 1400 K. C. antenna trimmer for maximum output.

1U-309 series, 309 series





1U-309 series



309 series

SENTINEL RADIO CORP.

MODELS 1U-309 series

PARTS LIST

Ill. No.	Part No.	Part Name	Description
1	64E12	Antenna	Loop & Back
2	20E271	Coil	1st I.F. Transformer
	or		
2	20E301	Coil	1st I.F. Transformer
3	20E271	Coil	2nd I.F. Transformer
	or		
3	20E301	Coil	2nd I.F. Transformer
4	20E306	Coil	Oscillator
5	20E273	Condenser	Tuning, 2 Gang
6	25E24	Condenser	Tubular, Dry Elec. 50-50 Mfd. 150 V
7	23E11	Condenser	Fixed Ceramic, .0001 Mfd
8	23E42	Condenser	Fixed Ceramic, .00025 Mfd
9	23E42	Condenser	Fixed Ceramic, .00025 Mfd
10	23E411	Condenser	Fixed Paper, .01 Mfd. 400 Volts
11	23E411	Condenser	Fixed Paper, .01 Mfd. 400 Volts
12	23E411	Condenser	Fixed Paper, .01 Mfd. 400 Volts
13	23E416	Condenser	Fixed Paper, .05 Mfd. 400 Volts
14	23E416	Condenser	Fixed Paper, .05 Mfd. 400 Volts
16	27E206	Resistor	Carbon, Insulated, 20 Megohm 1/3 W.
17	27E151	Resistor	Carbon, Insulated, 150 Ohm 1/3 W.
18	27E222-3	Resistor	Carbon, Insulated, 2,200 Ohm 1 W.
19	27E223	Resistor	Carbon, Insulated, 22,000 Ohm 1/3 W.
20	27E224	Resistor	Carbon, Insulated, 220,000 Ohm 1/3 W.
21	27E335	Resistor	Carbon, Insulated, 3.3 Megohm 1/3 W.
22	27E474	Resistor	Carbon, Insulated, 470,000 Ohm 1/3 W.
23	27E335	Resistor	Carbon, Insulated, 3.3 Megohm 1/3 W.
25	1E27	Speaker	P.M. 3"
26	22E23	Transformer	Output
27	28E27	Vol. Control	500,000 Ohm

MISCELLANEOUS PARTS

Part No.	Part Name	Description
7E129-2	Cabinet	Walnut Plastic
7E129-3	Cabinet	Ivory Plastic
7E129-4	Cabinet	Red Plastic
41E1	Cord	6 ft. Rubber Line Cord
20E274	Dial Cord	Dial Drive Cord
9E9	Dial Crystal	Acetate Dial Crystal
36E32	Dial Scale	Calibrated Scale
20E270	Dial Shaft Assembly	Dial Drive Shaft with bracket.
35E21	Dial Pointer	Dial Indicator
65E2	Dial Spring	Tension Spring for Dial Cord
37E47	Knob	For Walnut Cabinet
37E47-2	Knob	For Ivory and Red Cabinet
17E22	Pilot Lamp Socket	Pilot Lamp Socket with leads
40E2	Pilot Lamp	6.8 Volt .250 Amp. Type #44 Lamp.
10E42	Stud	Trimount Stud for Loop & Back
13E105	Nut	Used to hold chassis in Cabinet
12E123	Washer	Fibre Cushion, Used with 13E105 Nut

MODELS 309 series

PARTS LIST

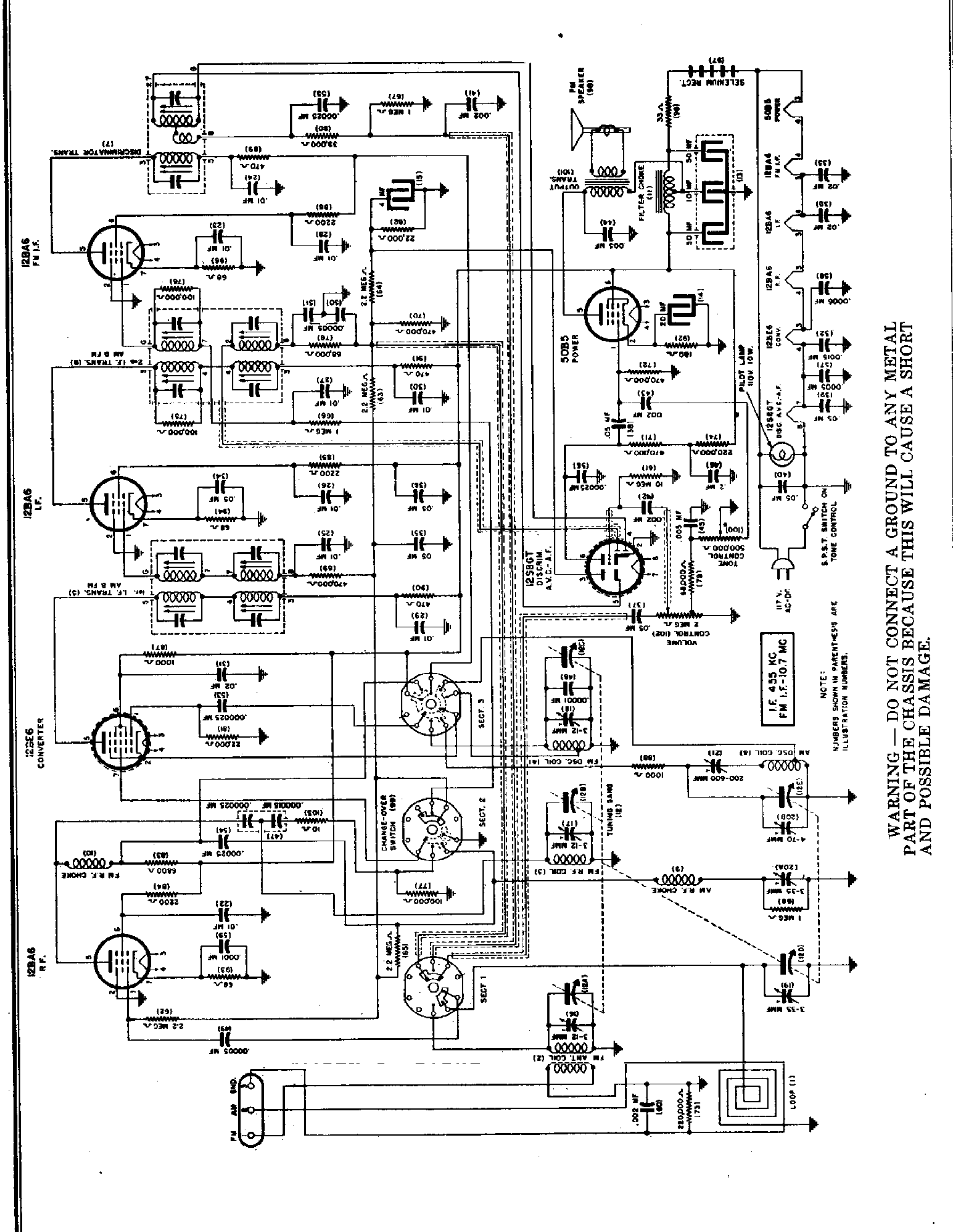
Ill. No.	Part No.	Part Name	Description
1	64E12	Antenna	Loop & Back
2	20E271	Coil	1st I.F. Transformer
	OR		
2	20E301	Coil	1st I.F. Transformer
3	20E271	Coil	2nd I.F. Transformer
	OR		
3	20E301	Coil	2nd I.F. Transformer
4	20E272	Coil	Oscillator
5	20E273	Condenser	Tuning, 2 Gang
6	25E24	Condenser	Dry Electrolytic, 50-50 Mfd. 150 V.
7	23E11	Condenser	Fixed Ceramic, .0001 Mfd
8	23E42	Condenser	Fixed Mica, .00025 Mfd
9	23E42	Condenser	Fixed Mica, .00025 Mfd
10	23E411	Condenser	Fixed Paper, .01 Mfd. 400 V.
11	23E411	Condenser	Fixed Paper, .01 Mfd. 400 V.
12	23E411	Condenser	Fixed Paper, .01 Mfd. 400 V.
13	23E416	Condenser	Fixed Paper, .05 Mfd. 400 V.
14	23E416	Condenser	Fixed Paper, .05 Mfd. 400 V.
15	23E2021	Condenser	Fixed Paper, .2 Mfd. 400 V.
16	27E206	Resistor	Carbon, 20 Megohm, 1/3 W.
17	27E151	Resistor	Carbon, 150 Ohm, 1/3 W.
18	27E222-3	Resistor	Carbon, 2,200 Ohm, 1 W.
19	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.
20	27E224	Resistor	Carbon, 220,000 Ohm, 1/3 W.
21	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 W.
22	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
23	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 W.
24	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
25	1E27	Speaker	3" P.M.
26	22E23	Transformer	Output for speaker
27	28E27	Volume Control	500,000 Ohm, with switch
28	23E11	Condenser	Fixed Ceramic, .0001 Mfd

MISCELLANEOUS PARTS

Part No.	Part Name	Description
7E129-2	Cabinet	Walnut Plastic
7E129-3	Cabinet	Ivory Plastic
7E129-4	Cabinet	Red Plastic
41E8	Cord	6 ft. Rubber Line Cord
20E274	Dial Cord	Dial Drive Cord
9E9	Dial Crystal	Acetate Dial Crystal
36E32	Dial Scale	Calibrated Scale
20E270	Dial Shaft Assembly	Dial Drive Shaft with bracket
35E21	Dial Pointer	Dial Indicator
65E2	Dial Spring	Tension Spring for Dial Cord
37E47	Knob	For Walnut Cabinet
37E47-2	Knob	For Ivory and Red Cabinet
17E29	Pilot Lamp Socket	Pilot Lamp Socket with leads
40E2	Pilot Lamp	6.8 Volt .250 Amp. Type #44 Lamp
10E42	Stud	Trimount Stud for Loop & Back
13E105	Nut	Used to hold chassis in Cabinet
12E123	Washer	Fibre Cushion, Used with 13E105 Nut

MODELS 302-I, 302-T, 302-W

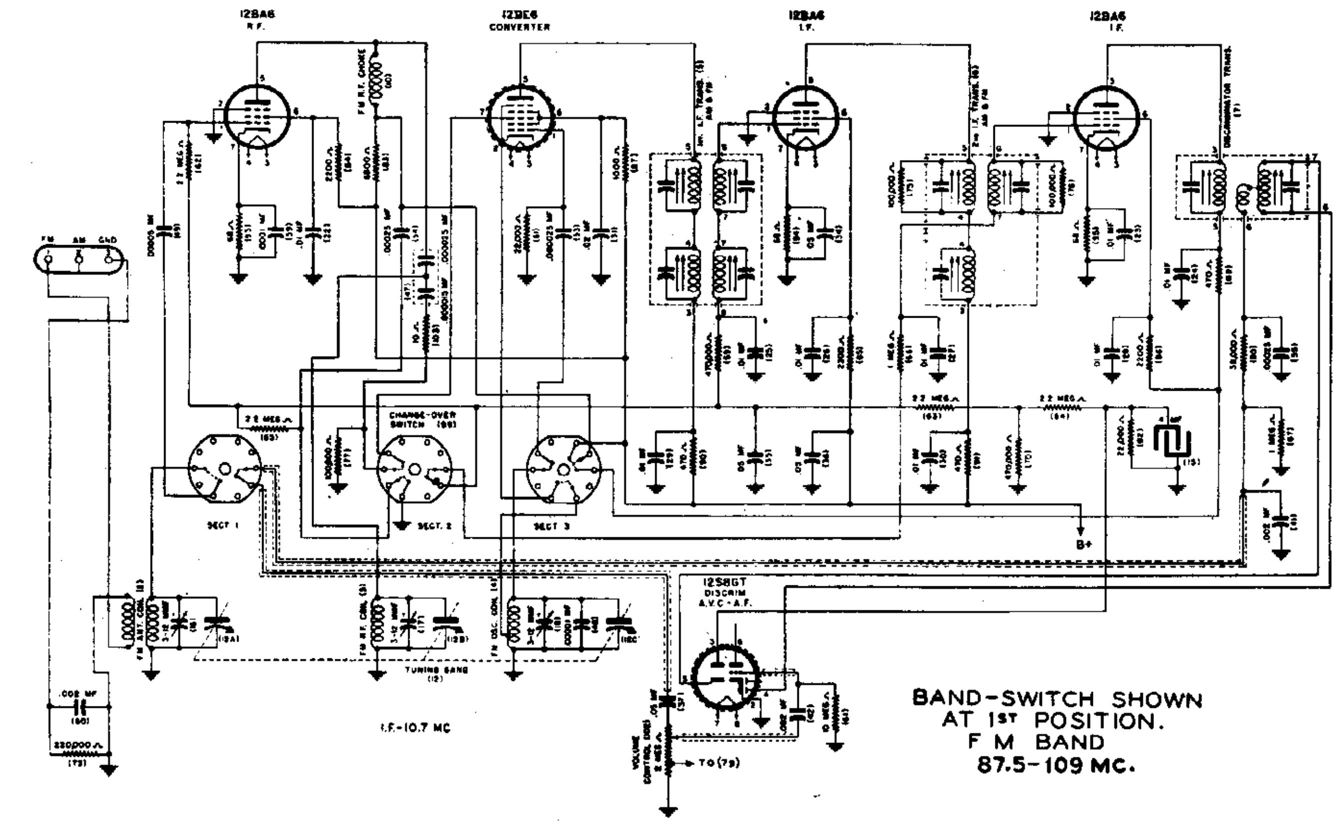
SENTINEL RADIO CORP.



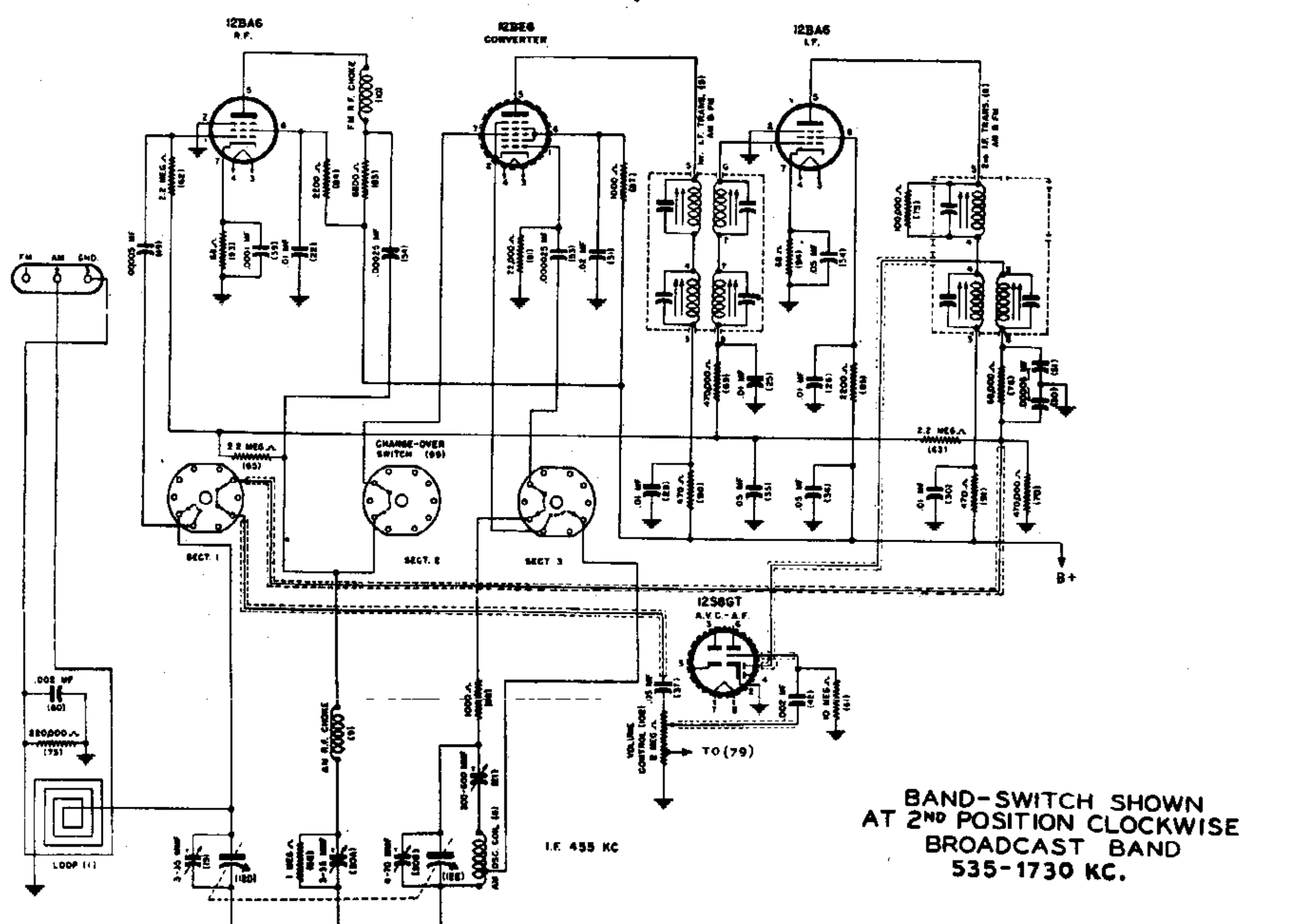
"clarified schematics"

SENTINEL RADIO CORP.

MODELS 302-I, 302-T, 302-W



BAND-SWITCH SHOWN
AT 1ST POSITION.
F M BAND
87.5-109 MC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
BROADCAST BAND
535-1730 KC.

AM ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. Make the adjustment marked (1) first, (2) next.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the AM dial calibration. If dial needle does not point exactly to last line move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) Place loop antenna in the same position it will be in when set is in the cabinet.

Steps	Place band switch for operation on:	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	AM Band position	Any point where no interfering signal is received	Exactly 455 K. C.	0.2 Mfd. Condenser	High side to AM-Osc. stator plates of tuning condenser (12B). Low side to frame of condenser through .01 Mfd. condenser.	Adjust each of the 2nd 455 K. C. AM I. F. transformer trimmers for maximum output, then adjust each of the 1st 455 K. C. I. F. transformer trimmers for maximum output.
2	AM Band position	Rotate gang condenser to maximum capacity	Exactly 455 K. C.	.00025 Condenser	High side to AM "ANT" terminal on loop back. Low side to "GND" terminal on loop back through a .01 Mfd. condenser.	Adjust 455 K. C. trimmer for **MINIMUM** 455 K. C. Signal.
		Exactly 1730 K. C.	Exactly 1730 K. C.			Adjust 1730 K. C. oscillator trimmer for maximum output.
		Approx. 1400 K. C.	Approx. 1400 K. C.			Adjust 1400 K. C. AM Ant. trimmer for maximum output.
		Approx. 600 K. C.	Approx. 600 K. C.			While rocking gang condenser, adjust 600 K. C. oscillator padder for maximum output.

FM ALIGNMENT

Instructions for Alignment of the Frequency Modulation I. F. Transformers, Discriminator, Oscillator, R. F. and Antenna Circuits, with equipment generally available to the service man.

The equipment necessary for this procedure consists of the following:

A sensitive DC Voltmeter having 20,000 Ohms (or better) per volt, or a Vacuum Tube Voltmeter.

An AM Signal Generator that will supply:

(A) A 10.7 M. C. Signal for I. F. alignment.

(B) A 104 M. C. and 108 M. C. Signal—a Signal Generator that only goes up to 30 M. C. but which has sufficient fourth harmonic present in the carrier could be used for this purpose.

THE GENERATOR USED NEED NOT BE FREQUENCY MODULATED.

IT IS ALWAYS DESIRABLE TO ALIGN THE AM I. F. TRANSFORMERS BEFORE MAKING ANY OF THE FM I. F. ADJUSTMENTS, and to RECHECK AM I. F. TRIMMERS AFTER COMPLETING FM I. F. ADJUSTMENTS.

BE SURE TO MAKE THE FM ADJUSTMENTS IN THE ORDER GIVEN BELOW.

(1) PROCEDURE FOR ALIGNMENT OF FM DISCRIMINATOR TRANSFORMER.

(A) Connect the Voltmeter across the 4 Mfd. condenser (Illus. No. 15 in Parts Drawing).

(B) With a .002 Mfd. Isolation Condenser in series with each Signal Generator lead, connect generator from the grid (Pin #1) of the 12BA6 FM-I. F. Amplifier Tube to chassis.

(C) Set Signal Generator to **EXACTLY 10.7 M. C.**

(D) Adjust 10.7 M. C. Discriminator Primary Trimmer, mounted on underside of chassis, for MAXIMUM reading on Voltmeter.

(E) Leave Signal Generator set at 10.7 M. C. and modulate with a 400 cycle note.

(F) Adjust 10.7 M. C. Secondary Discriminator Trimmer, located on top of Discriminator Shield Can, for MINIMUM 400 CYCLE RESPONSE IN THE SPEAKER. IMPORTANT—the reading on the Voltmeter will change only slightly with this adjustment. MINIMUM AUDIO RESPONSE WILL BE RATHER CRITICAL IN ADJUSTMENT and will be correct only if a high audio response is found when tuning on each side of minimum setting.

(2) PROCEDURE FOR ALIGNMENT OF FM I. F. TRANSFORMERS.

(A) Leave the Voltmeter connected across the 4 Mfd. Condenser (Illus. No. 15).

(B) Connect Signal Generator to Input Grid (Pin #7) of 12BE6 Converter tube.

(C) Set Signal Generator to EXACTLY 10.7 M. C.—if possible, mark the position where this occurs right on the Generator's calibrated dial because this becomes a reference point in checking for proper FM I. F. alignment.

(D) Adjust each of the 1st and 2nd FM I. F. Transformers' 10.7 M. C. trimmers for MAXIMUM reading on Voltmeter. KEEP OUTPUT OF SIGNAL GENERATOR SO THAT A READING OF APPROXIMATELY 2 TO 4 VOLTS IS OBTAINED ON THE VOLTMETER.

(E) After all the above FM I. F. Transformer Trimmer adjustments have been correctly completed, MAKE A NOTE OF THE READING ON THE VOLTMETER.

(F) Next, detune the signal generator to a slightly HIGHER frequency (higher than the 10.7 reference frequency), until the Voltmeter reads ONE-HALF of the figure noted in (E) above, and MAKE A NOTE OF THE GENERATOR FREQUENCY AT WHICH THIS OCCURS.

(G) Now, detune the signal generator to a LOWER frequency (lower than the 10.7 reference frequency), until the Voltmeter again reads ONE-HALF the original figure noted in (E), and AGAIN NOTE THE GENERATOR FREQUENCY AT WHICH THIS OCCURS.

The difference between the two above frequencies obtained in (F) and (G), the one lower than 10.7 M. C. reference point and the one higher, is the "Half-amplitude" Band width of the FM-I. F. system. These two frequencies (F) and (G), should be somewhat uniformly spaced on either side of the 10.7 M. C. (C) reference frequency. A SLIGHT DIFFERENCE IS NOT SERIOUS. Only when one is more than twice as far as the other from the 10.7 M. C. reference frequency, or when there is a double peak, is the discrepancy serious. Assuming the FM I. F. Transformers have been properly adjusted, a double peak, or extremely one-sided "half-amplitude" band width, is usually caused by regeneration or a defective FM I. F. Transformer.

(3) PROCEDURE FOR THE ALIGNMENT OF THE FM ANTENNA, R. F. AND OSCILLATOR CIRCUITS.

(A) Leave Voltmeter connected across the 4 Mfd. condenser (Illus. No. 15).

(B) Connect the Signal Generator to the "FM" and "GROUND" posts that are attached to the receiver loop back, through a 5 foot or more length of 300 Ohm transmission line.

(C) Set Signal Generator so that it will deliver an unmodulated 108 M. C. signal. If the generator available is not designed to deliver a 108 M. C. signal, use a generator covering at least to 30 M. C. and set this generator frequency to 27 M. C.—the fourth harmonic of which will be 108 M. C.

(D) Set Receiver Dial Pointer to EXACTLY 108 M. C.

(E) Adjust 108 M. C. Oscillator Trimmer for MAXIMUM reading on Voltmeter.

(F) Next, tune the receiver to 104 M. C.

(G) Set Signal Generator to deliver a 104 M. C. unmodulated signal.

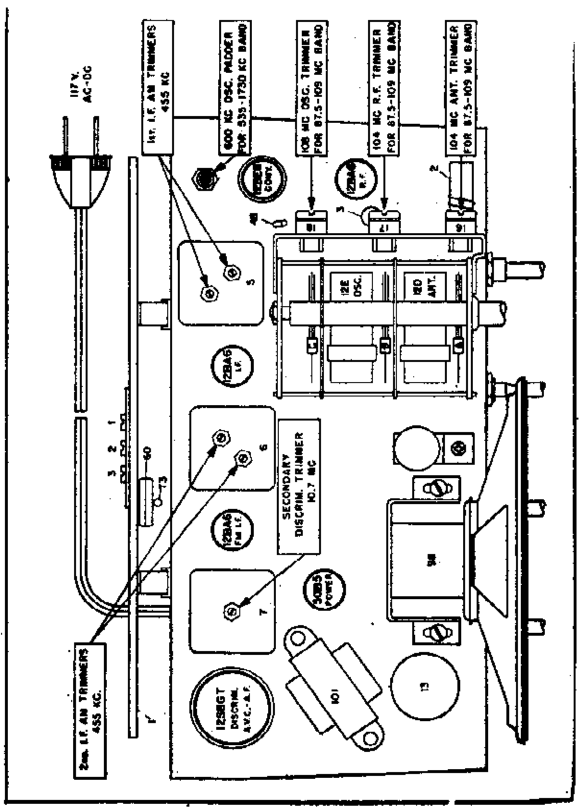
(H) Adjust 104 M. C. Antenna and R. F. Trimmers for MAXIMUM reading on Voltmeter.

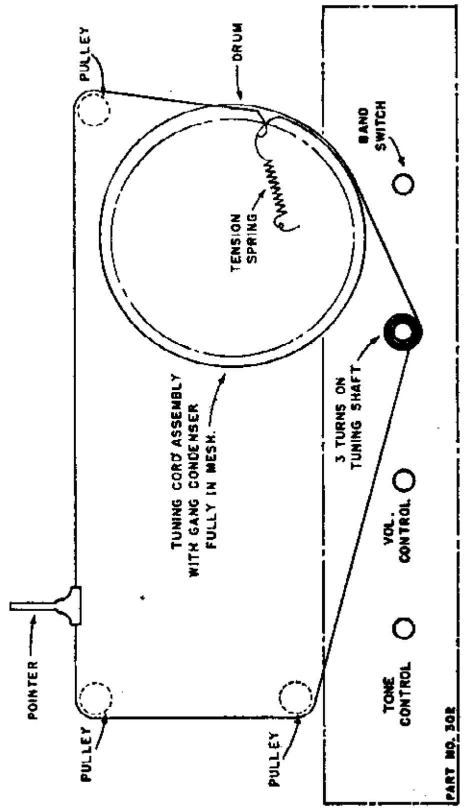
It is somewhat helpful to hear the signal, so, if preferred, an AM modulation on the 108 M. C. and 104 M. C. signal frequencies may be used for alignment of the FM Oscillator, R. F. and Antenna circuits. With modulated or unmodulated signal, ALWAYS ADJUST FOR MAXIMUM READING ON VOLTMETER.

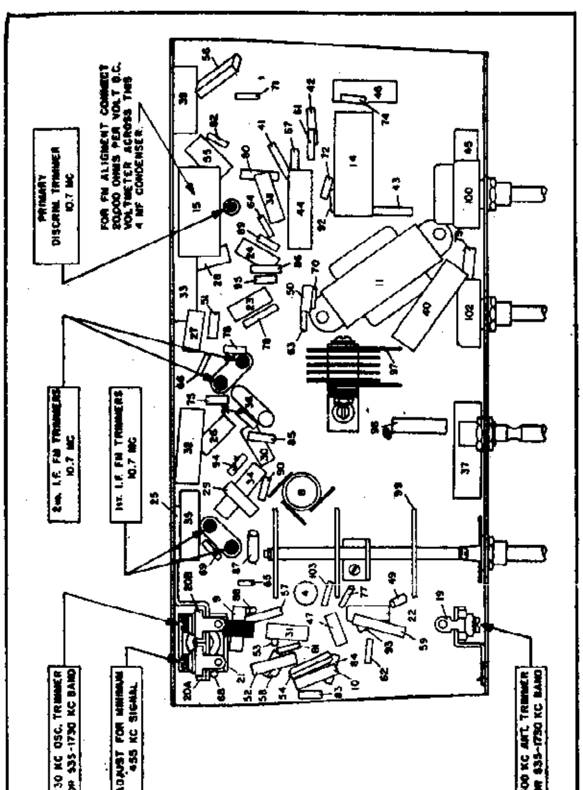
A FREQUENCY MODULATED SIGNAL GENERATOR may be used instead of an AM signal generator. When a Frequency Modulated Signal Generator is used, it is recommended that an unmodulated carrier be used for all of the above adjustments EXCEPT alignment of the Discriminator Secondary Trimmer. Use a frequency modulated signal (22.5 K. C. deviation) and align Discriminator Secondary for MAXIMUM AUDIO RESPONSE heard in speaker.

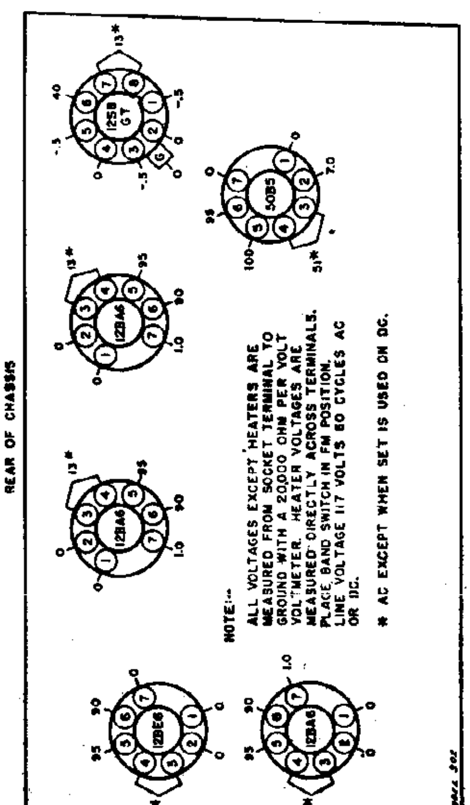
MODELS 302-I, 302-T, 302-W

SENTINEL RADIO CORP.









PARTS LIST

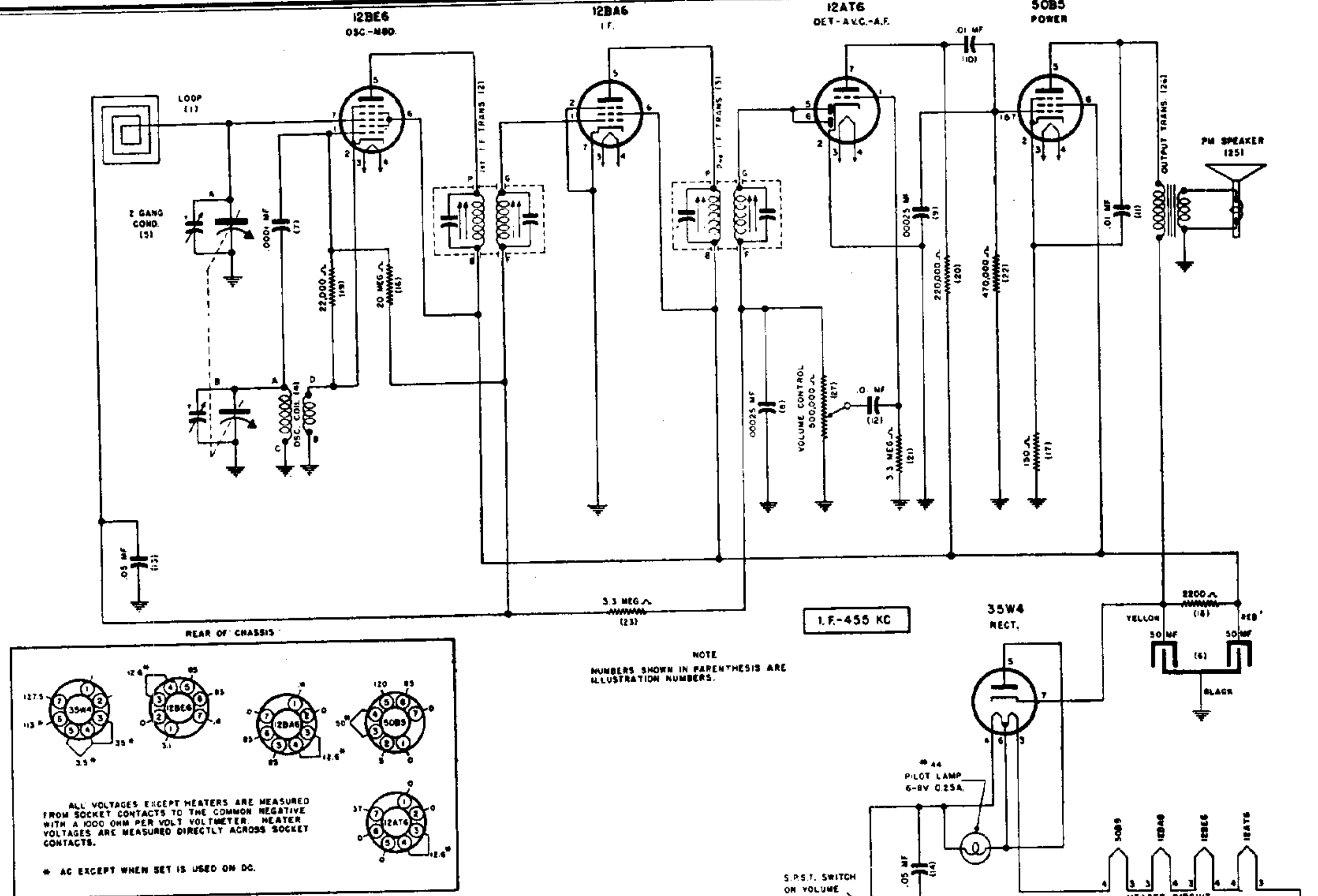
Illus. No.	Part No.	Part Name	Description
1	20E242	Antenna	AM Loop with terminal strip
2	2E53	Coil	FM Antenna
3	2E54	Coil	FM R. F.
4	2E51	Coil	FM Oscillator
5	20E214	Coil	1st AM & FM I. F. Transformer
6	20E215	Coil	2nd AM & FM I. F. Transformer
7	20E213	Coil	Discriminator Transformer
8	20E238	Coil	AM Oscillator
9	2E19	Coil	AM R. F. Choke
10	2E47	Coil	FM R. F. Choke
11	22E21	Condenser	Filter Choke
12	24E30	Condenser	Tuning, 2 Gang
13	25E22	Condenser	Dry Elect. 50-10-50 Mfd. 150 V.
14	25E3	Condenser	Dry Elect. 20 Mfd. 25 V.
15	25E23	Condenser	Dry Elect. 4 Mfd. 50 V.
16	24E28	Condenser	Trimmer, 3-12 MMF
17	24E28	Condenser	Trimmer, 3-12 MMF
18	24E28	Condenser	Trimmer, 3-12 MMF
19	24E3	Condenser	Trimmer, 3-35 MMF
20	24E29	Condenser	Trimmer, 3-35 MMF (A Section), 4-70 MMF (B Section)
21	24E16	Condenser	Padder, 200-600 MMF
22	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
23	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
24	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
25	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
26	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
27	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
28	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
29	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
30	23E2014-6	Condenser	Tubular, .01 Mfd. 200 V.
31	23E2014-7	Condenser	Tubular, .02 Mfd. 200 V.
32	23E213	Condenser	Tubular, .02 Mfd. 200 V.
33	23E213	Condenser	Tubular, .02 Mfd. 200 V.
34	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.
35	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.
36	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.
37	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.
38	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.
39	23E2014-8	Condenser	Tubular, .05 Mfd. 200 V.
40	23E416	Condenser	Tubular, .05 Mfd. 400 V.
41	23E2014-12	Condenser	Tubular, .002 Mfd. 400 V.
42	23E2014-12	Condenser	Tubular, .002 Mfd. 400 V.
43	23E2014-12	Condenser	Tubular, .002 Mfd. 400 V.
44	23E408	Condenser	Tubular, .005 Mfd. 400 V.
45	23E2014-3	Condenser	Tubular, .005 Mfd. 200 V.
46	23E2014-10	Condenser	Tubular, .2 Mfd. 200 V.
47	23E2019	Condenser	Dual Ceramic, .000025 (A), .000015 (B) Mfd. 500 V.
48	23E15	Condenser	Ceramic, .00001 Mfd. 500 V.
49	23E2009-5	Condenser	Ceramic, .00005 Mfd. 500 V.
50	23E2009-5	Condenser	Ceramic, .00005 Mfd. 500 V.
51	23E2009-5	Condenser	Ceramic, .00005 Mfd. 500 V.
52	23E2012-2	Condenser	Ceramic, .0015 Mfd. 500 V.
53	23E16	Condenser	Ceramic, .000025 Mfd. 500 V.
54	23E42	Condenser	Mica, .00025 Mfd. 500 V.
55	23E42	Condenser	Mica, .00025 Mfd. 500 V.
56	23E42	Condenser	Mica, .00025 Mfd. 500 V.
57	23E45	Condenser	Mica, .0005 Mfd. 500 V.
58	23E45	Condenser	Mica, .0005 Mfd. 500 V.
59	23E11	Condenser	Mica, .0001 Mfd. 500 V.
60	23E52	Condenser	Mica, .002 Mfd. 500 V.
61	27E106	Resistor	Carbon, 10 Megohm, 1/3 W.
62	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
63	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
64	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
65	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
66	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
67	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
68	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
69	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
70	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
71	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
72	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
73	27E224	Resistor	Carbon, 220,000 Ohm, 1/3 W.
74	27E224	Resistor	Carbon, 220,000 Ohm, 1/3 W.
75	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
76	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
77	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
78	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.
79	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.
80	27E393	Resistor	Carbon, 39,000 Ohm, 1/3 W.
81	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.
82	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.
83	27E682	Resistor	Carbon, 6,800 Ohm, 1/3 W.
84	27E222	Resistor	Carbon, 2,200 Ohm, 1/3 W.
85	27E222	Resistor	Carbon, 2,200 Ohm, 1/3 W.
86	27E222	Resistor	Carbon, 2,200 Ohm, 1/3 W.
87	27E102	Resistor	Carbon, 1,000 Ohm, 1/3 W.
88	27E102	Resistor	Carbon, 1,000 Ohm, 1/3 W.
89	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.
90	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.
91	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.
92	27E181-2	Resistor	Carbon 180 Ohm, 1/2 W.
93	27E680	Resistor	Carbon, 68 Ohm, 1/3 W.
94	27E680	Resistor	Carbon, 68 Ohm, 1/3 W.
95	27E680	Resistor	Carbon, 68 Ohm, 1/3 W.
96	27E330-3	Resistor	Carbon, 33 Ohm, 1 W.
97	57E1	Rectifier	Selenium
98	1E25	Speaker	P. M. Elliptical
99	29E15	Switch	"AM-FM" Changeover
100	28E22	Tone Control	500,000 Ohm
101	22E20	Transformer	Output
102	28E23	Volume Control	2 Megohm
103	27E100	Resistor	Carbon, 10 Ohm, 1/3 W.

MISCELLANEOUS PARTS

Part No.	Part Name	Description
7E52-1	Cabinet	Walnut Plastic
7E52-2	Cabinet	Ivory Plastic
7E141	Cabinet	Wood, Table Model
7E119	Cabinet Back	Back only, for plastic cabinets
7E143	Cabinet Back	Back only, for wood cabinets
65E2	Dial Cord Spring	Tension Spring for Drive Cord
20E308	Dial Cord	18 lb. Dial Drive Cord
35E8-2	Dial Pointer	Dial Indicator
20E270-2	Dial Shaft	Dial Drive Shaft Assembly with Bracket Bearing
36E30	Dial Scale	Calibrated Scale
15E74	Dial Scale Frame	Metal for holding Dial Scale
20E240	Dial Scale Frame Bracket	Right Hand—for Mounting Dial Frame to Chassis, with Idler Pulley
20E240-2	Dial Scale Frame Bracket	Left Hand—for Mounting Dial Frame to Chassis with Idler Pulley
9E11	Dial Crystal	Crystal for Wood Cabinets
20E243	Dial Crystal	Crystal for Plastic Cabinets
40E5	Dial Light	110 Volt, 10 Watt
17E28	Dial Light Socket	Dial Light Socket Assembly
37E27-4	Knob	Marked "Tuning" for Walnut Plastic Cabinets
37E27-27	Knob	Marked "Volume" for Walnut Plastic Cabinets
37E27-26	Knob	Marked "OFF-ON-TONE" for Walnut Plastic Cabinets
37E27-28	Knob	Marked "FM-AM" for Walnut Plastic Cabinets
37E27-9	Knob	Marked "Tuning" for Ivory Plastic Cabinets
37E27-30	Knob	Marked "Volume" for Ivory Plastic Cabinets
37E27-29	Knob	Marked "OFF-ON-TONE" for Ivory Plastic Cabinets
37E27-31	Knob	Marked "FM-AM" for Ivory Plastic Cabinets
37E52-2	Knob	Marked "OFF-ON-TONE" for Wood Cabinets
37E52-3	Knob	Marked "Volume" for Wood Cabinets
37E52-4	Knob	Marked "Tuning" for Wood Cabinets
37E52-5	Knob	Marked "FM-AM" for Wood Cabinets
10E42	Stud	Trimount Stud for Mounting Plastic Cabinet Back
18E4-4	Terminal Strip	Marked "AM-FM-GROUND"
50E55	Tube Shield	For 12S8GT Tube
50E52	Tube Shield	For 12BE6 Tube
50E50	Tube Shield Base	For 50E52 Tube Shield

MODELS 309-I, 309-N, 309-R, 309-W

SENTINEL RADIO CORP.



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

DIAL LIGHT

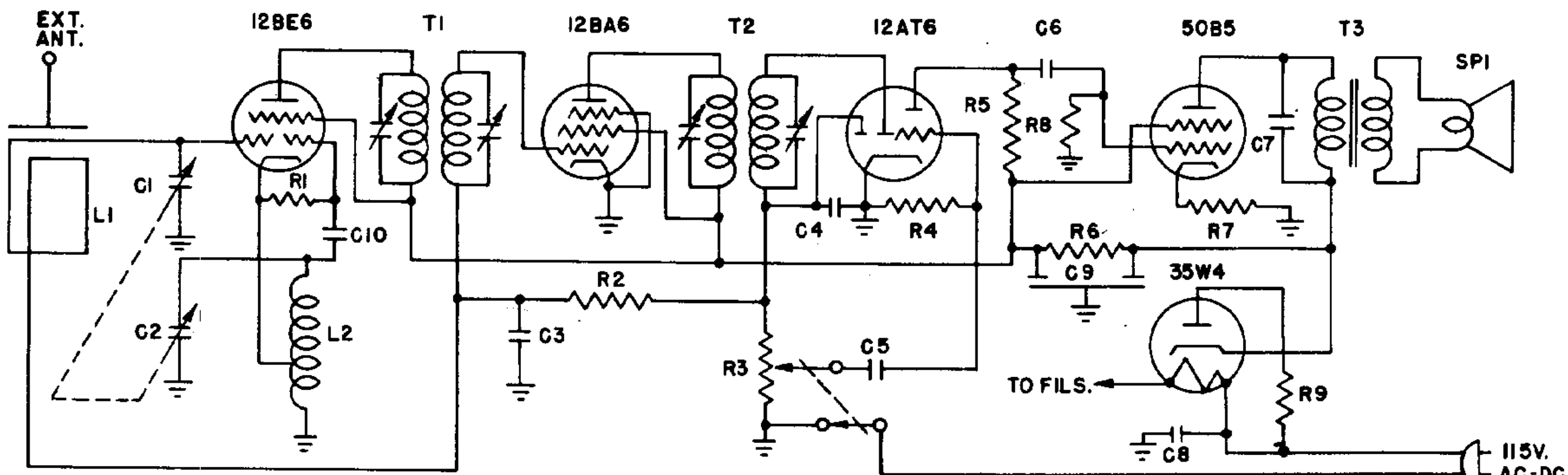
It is normal for the dial light to be dim for **approximately 60 seconds** after set is turned "on" and then attain normal brilliance—**also**, on very loud signals the light may fluctuate.

Always use a 6.3 volt .250 ampere dial light, No. 44 Mazda.

TO REMOVE CHASSIS FROM CABINET:
- (A) Remove cabinet back.
- (B) Pull knobs off of control shafts.
- (C) Unscrew and remove nut and fibre washer on volume control shaft—accessible when knob is removed.
- (D) Slide chassis out of cabinet.

TO REINSTALL, reverse the above procedure. Be sure to place fibre washer on volume control shaft before attaching nut. DO NOT tighten nut too much—otherwise, cabinet may crack.

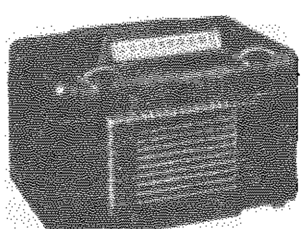
SETCHELL CARLSON, INC.

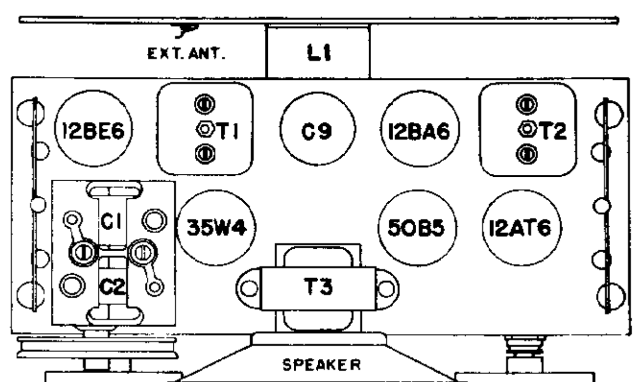


R1 - 25M OHM 1/3 WATT RESISTOR
R2 - 5MEG " " " "
R3 - 500M " POT. WITH SWITCH
R4 - 5MEG " 1/3 WATT RESISTOR
R5 - 200M " " " "
R6 - 1200 " 1/2 " "
R7 - 150 " " " "
R8 - 500M " 1/3 " "
R9 - 22 " 1/2 " "

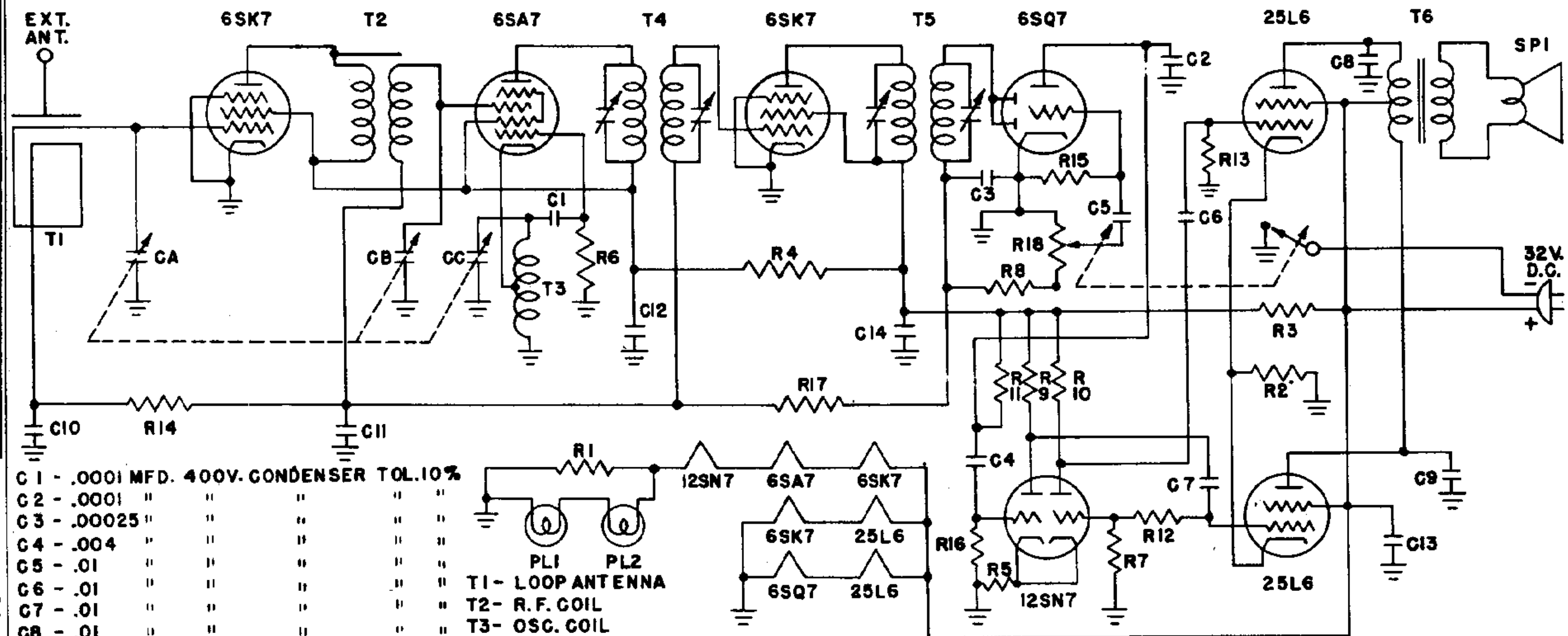
C1 - ANT. SECTION GANG CONDENSER
C2 - OSC. " " "
C3 - .05 MFD. 200 V. CONDENSER
C4 - .00025 MFD. 500V. "
C5 - .006 " " "
C6 - .01 " 400 V. "
C7 - .02 " " "
C8 - .05 " " "
C9 - 50-50 " 150 V. "
C10 - .0001 " 400V. "

L1 - LOOP ANTENNA
L2 - OSC. COIL
T1 - 465KC. I.F. TRANSFORMER
T2 - " " " "
T3 - OUTPUT TRANSFORMER
SP1 - 5" P.M. SPEAKER





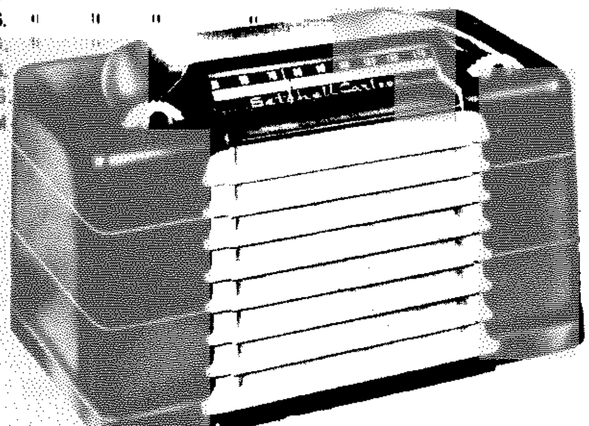
SETCHELL CARLSON, INC.

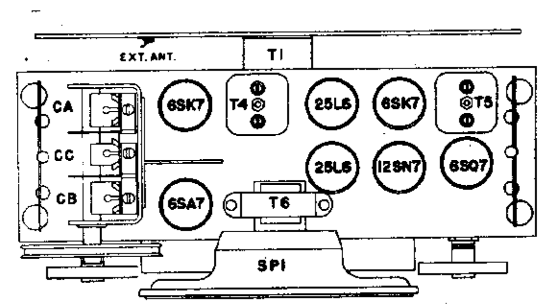


C 1 - .0001 MFD. 400V. CONDENSER TOL. 10%
C 2 - .0001 " " " " "
C 3 - .00025 " " " " "
C 4 - .004 " " " " "
C 5 - .01 " " " " "
C 6 - .01 " " " " "
C 7 - .01 " " " " "
C8 - .01 " " " " "
C9 - .01 " " " " "
C10 - .05 " 200V. " " "
C11 - .05 " " " " "
C12 - .1 " " " " "
C13 - .25 " " " " "
C14 - 50 " 150 V. " " "
CA - ANT. SECTION OF GANG CONDENSER
CB - R.F. " " " "
CC - OSC. " " " "

R 1 - 50 OHM 5 WATT RESISTOR TOL. 10%
R 2 - 150 " 1/2 " " "
R 3 - 500 " 1/3 " " "
R 4 - 500 " " " " "
R 5 - 5000 " " " " "
R 6 - 50M " " " " "
R 7 - 50M " " " " "
R 8 - 100M " " " " "
R 9 - 100M " " " " "
R10 - 100M " " " " "
R11 - 200M " " " " "
R12 - 500M " " " " "

T1 - LOOP ANTENNA
T2 - R.F. COIL
T3 - OSC. COIL
T4 - 455 K.C. I.F. COIL INPUT
T5 - 455 K.C. I.F. COIL OUTPUT
T6 - OUTPUT TRANSFORMER O-437
R13 - 500M " " " "
R14 - 1MEG. " " " "
R15 - 1MEG.
R16 - 1MEG.
R17 - 5MEG.
R18 - 500M





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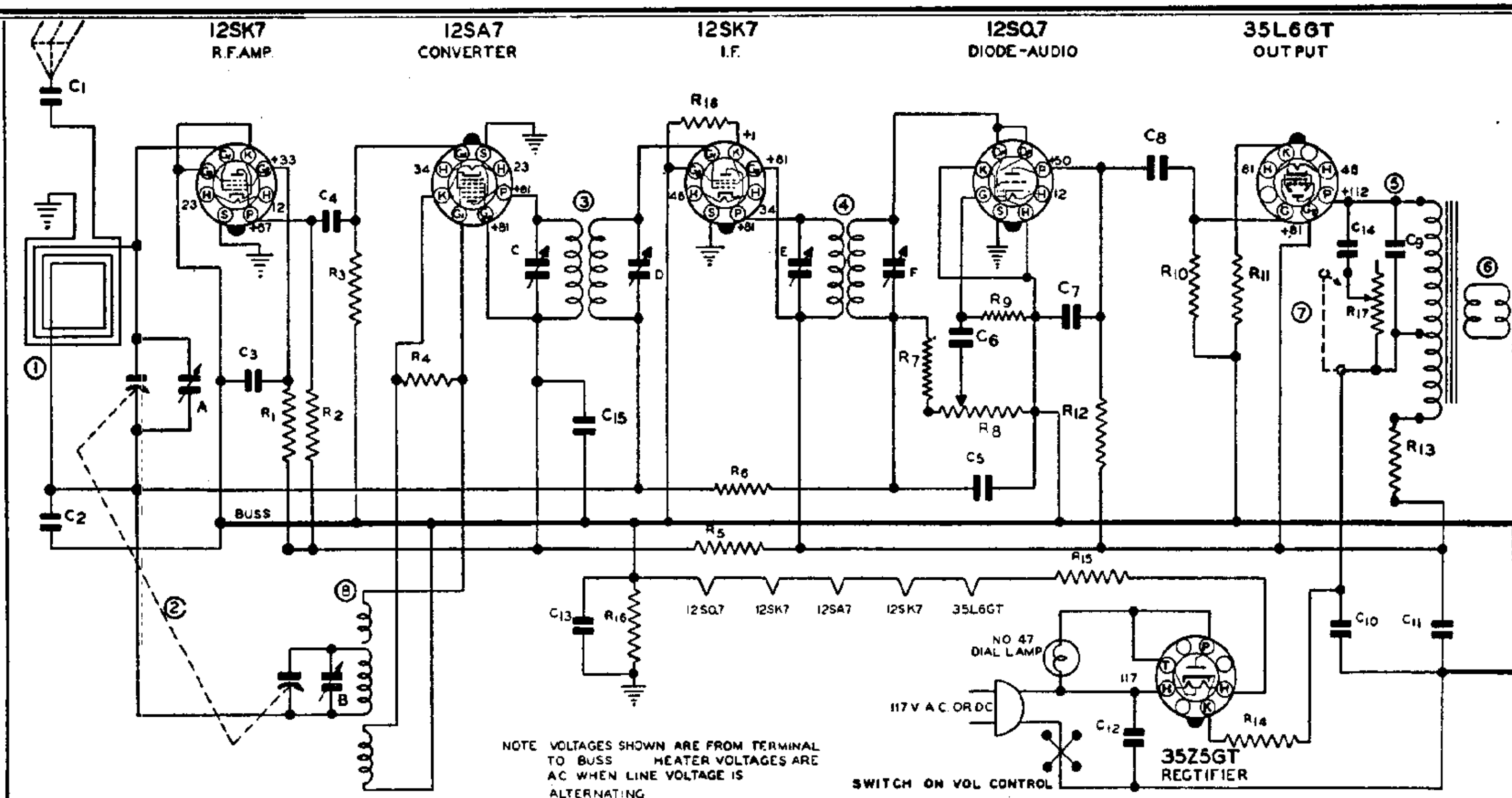
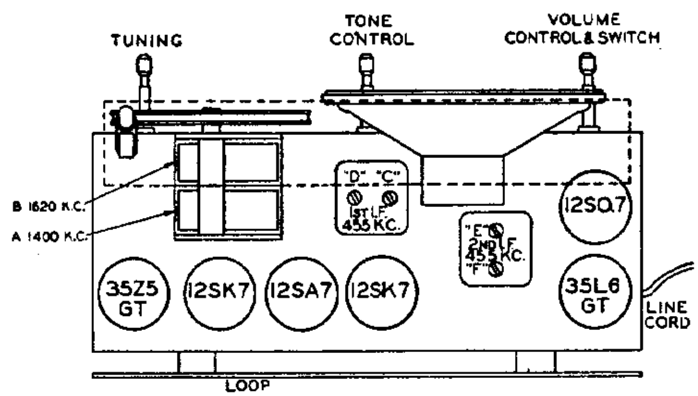


NOTE VOLTAGES SHOWN ARE FROM TERMINAL TO BUSS. HEATER VOLTAGES ARE AC WHEN LINE VOLTAGE IS ALTERNATING

I.F. 455 KC.

DIAG NO.	PART NO.	DESCRIPTION	DIAG NO.	PART NO	DESCRIPTION
C1	N-1344	.01 MFD 400V 20%	R6	N-1262	1 MEGOHM .5W 20%
C2	N-1345	.05 MFD 200V. 20%	R7	N-4063	47,000 OHM .5W. 20%
C3	N-1345	.05 MFD 200V 20%	R8	N-5026	0.5 MEGOHM VOL. CONT.
C4	N-2383	150 MMFD MICA 20%	R9	N-4061	4.7 MEGOHM .5W. 20%
C5	N-1374	100 MMFD MICA 20%	R10	N-4027	470,000 OHM .5W. 20%
C6	N-4894	.005 MFD 600V -15+40%	R11	N-4067	180 OHM .5W. 10%
C7	N-4890	.0005 MFD 600V. -25+60%	R12	N-4988	220,000 OHM .5W INS. 20%
C8	N-1344	.01 MFD 400V. 20%	R13	N-4900	1200 OHM 1.W. 10%
C9	N-1344	.01 MFD 400V. 20%	R14	N-4022	33 OHM .5W. 20%
C10	N-3858	40 MFD 150 W.V. ELECTRO-	R15	N-4628	33 OHM 1.W. 10%
C11	N-3858	40 MFD 150 W.V. LYTIC	R16	N-4028	220,000 OHM .5W 20%
			R17	N-6073	25,000 OHM TONE CONT.
C12	N-1346	.05 MFD 400V. 20%	R18	N-5857	82 OHM .5W. 10%
C13	N-5160	.2 MFD 200V -10+10%	1	N-5937	LOOP COIL
C14	N-1823	.1 MFD 400V. 20% (USED ONLY WITH N-6073)	2	N-5286	2 GANG CONDENSER
				OR	
C14	N-1346	.05 MFD 400V 20% (USED ONLY WITH N-5980)	1	N-	LOOP COIL
			2	N-5936	2 GANG CONDENSER
C15	N-1351	.1 MFD 200V -10+20	3	N-4872	1ST I.F. TRANSFORMER
			4	N-5571	2ND I.F. TRANSFORMER
R1	N-4063	47,000 OHM .5W. 20%	5	N-4875	OUTPUT TRANSFORMER
R2	N-4896	2200 OHM .5W 10%	6	N-4868	5" SPEAKER
R3	N-4087	47,000 OHM .5W. INS. 20%	7	N-5980	TONE SWITCH



TUBE & TRIMMER LOCATIONS

JANUARY, 1947

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters).

DIAL CALIBRATION. The scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcasts frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

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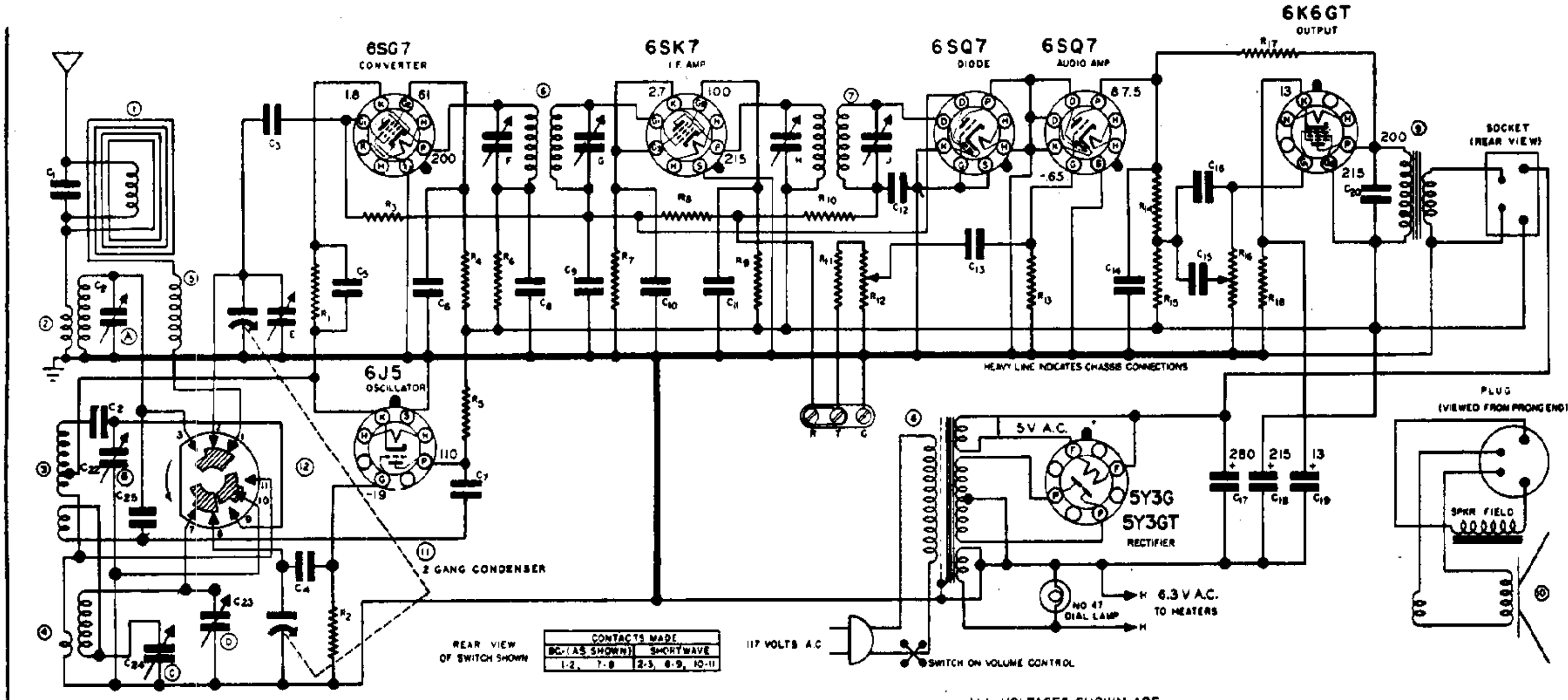
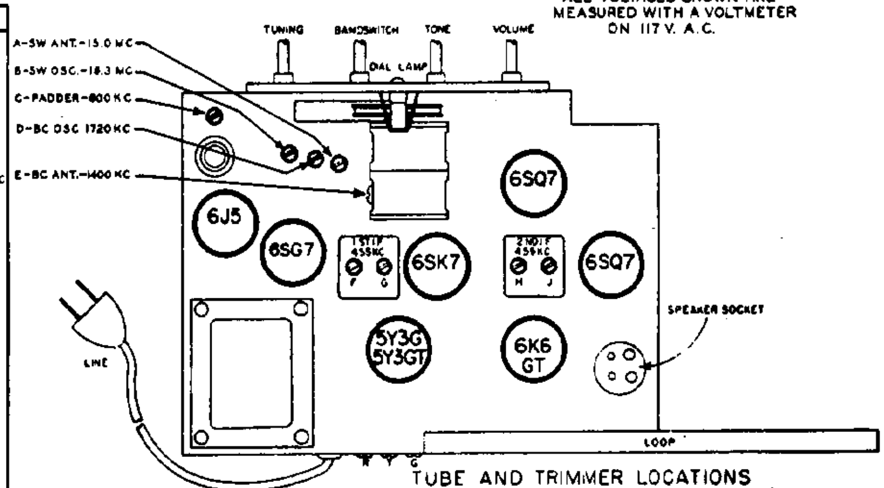


CONTACTS MADE	
BC-(AS SHOWN)	SHORTWAVE
1-2, 7-8	2-3, 8-9, 10-11

ALL VOLTAGES SHOWN ARE MEASURED WITH A VOLTMETER ON 117 V. A.C.

I.F. - 455 KC.



TUBE AND TRIMMER LOCATIONS

DIAG NO	PART NO			
R1	N-3341	1,000 OHM	.5W.	10%
R2	N-4063	47,000 OHM	.5W.	20%
R3	N-4088	3.3 MEGOHM	.5W	20%
R4	N-4423	330,000 OHM	.5W.	20%
R5	N-4451	27,000 OHM	.5W	10%
R6	N-1250	10,000 OHM	.5W.	20%
R7	N-4121	270 OHM	.5W.	10%
R8	N-1262	1 MEGOHM	.5W.	20%
R9	N-4063	47,000 OHM	.5W.	20%
R10		47,000 OHM IN 2ND I.F. COIL	.5W.	20%
R11	N-4063	47,000 OHM	.5W	20%
R12	N-4843	0.5 MEGOHM VOLUME CONTROL		
R13	N-1263	10 MEGOHM	.5W.	20%
R14	N-4064	33,000 OHM	.5W.	20%
R15	N-4423	330,000 OHM	.5W.	20%
R16	N-4398	0.5 MEGOHM TONE CONTROL		
R17	N-4424	2.2 MEGOHM	.5W.	10%
R18	N-4421	470 OHM	1 W	10%
C1	N-1343	.00025 MFD	MICA	20%
C2	N-1690	.004 MFD	MICA	5%
C3	N-1343	.00025 MFD	MICA	20%
C4	N-1342	.00005 MFD.	MICA	20%
C5	N-1345	.05 MFD	200 V.	20%
C6	N-1376	.02 MFD	400 V.	20%
C7	N-1344	.01 MFD	400 V	20%
C8	N-1623	.1 MFD.	400 V	20%
C9	N-1348	.05 MFD.	200 V.	20%

DIAG NO	PART NO	DESCRIPTION
C10	N-1351	.1 MFD 200V 20%
C11	N-1623	.1 MFD 400V. 20%
C12		.0001 MFD MICA 20% IN 2ND I.F. COIL
C13	N-1344	.01 MFD. 400V 20%
C14	N-1374	.0001 MFD. MICA 20%
C15	N-4894	.005 MFD 600V 20%
C16	N-1344	.01 MFD 400V. 20%
C17, C18, C19	N-441	12 MFD 400WV, 10 MFD 400WV, 20MFD 25WV ELECTROLYTIC
C20	N-4894	.005 MFD 600V 20%
C21, C22, C23	N-2158	3 SECTION TRIMMER
C24	N-1254	PADDER
C25	N-5920	4.0 MMFD COPOLENE
1	N-4401	LOOP ANTENNA
2	N-5921	SW ANTENNA COIL
3	N-4404	SW OSCILLATOR COIL
4	N-4403	BC OSCILLATOR COIL
5	N-4407	LOOP SERIES COIL
6	N-4405	1ST I.F. TRANSFORMER
7	N-4406	2ND I.F. TRANSFORMER
8	N-4396	POWER TRANSFORMER
9	N-4395	OUTPUT TRANSFORMER
10	N-4394	6½" DYNAMIC SPEAKER
11	N-4397	2 GANG CONDENSER
12	N-4400	BANDSWITCH

"clarified schematics"

MODEL RET

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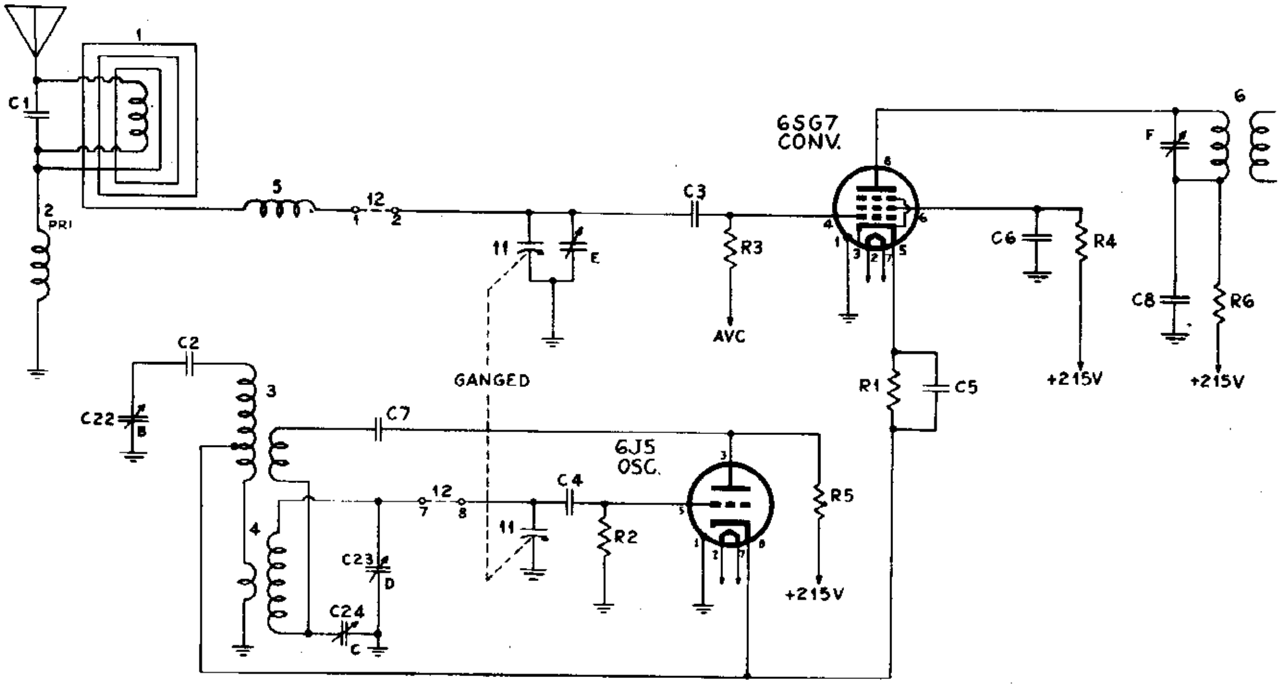
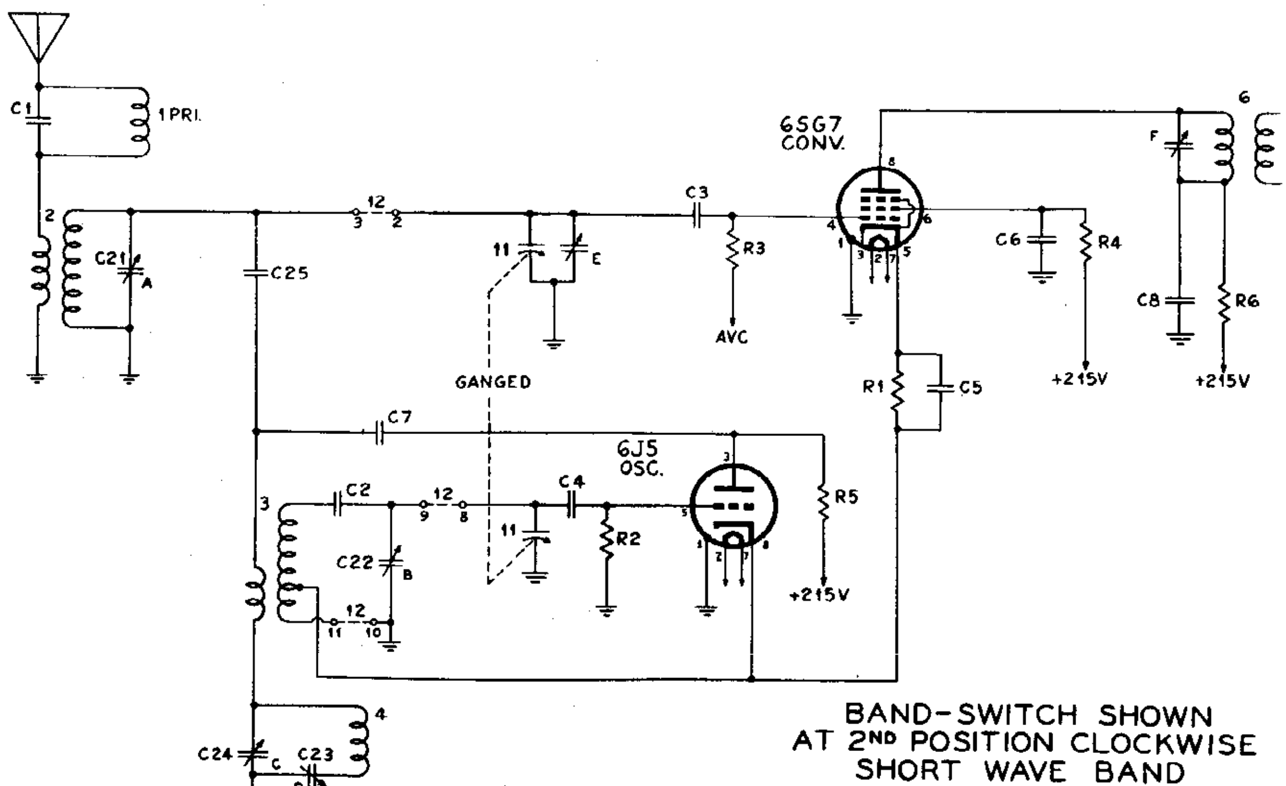


BAND-SWITCH SHOWN
AT 1ST POSITION
BROADCAST BAND
535-1720 KC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND
5.65-18.3 MC.

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400, 1720, 6000, 15000, and 18300 KC, and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast and Short Wave bands should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the Band Switch set to the Broadcast Band and with the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube 6SG7 through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the receiver ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. With the Band Switch turned to the Broadcast Position, connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser, and the ground on the test oscillator to the receiver ground. With the gang condenser set at minimum capacity, set the test oscillator at 1720 KC, and adjust the oscillator (or 1720 KC trimmer). For the antenna adjustment set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in the signal on the condenser. Adjust the 600 KC Pad while rocking the gang to obtain maximum output.

SHORT WAVE BAND ALIGNMENT. With the band switch turned to the S.W. position, connect the test oscillator to the antenna with a 400 ohm dummy and the ground on the test oscillator to the ground connection on the receiver. Adjust the S.W. oscillator to give a maximum output with the dial at 18300 KC (extreme end). Set the test oscillator at 15000 KC and tune in the signal with the dial. Adjust the antenna trimmer for maximum output. With a strong signal input turn the dial to approximately 1 M.C. lower in frequency and pick up the image frequency. If the image is not received, it will be necessary to return the dial to 18300 KC to reduce the capacity in the oscillator trimmer until a second signal is received. Proceed as before with the alignment of the antenna and recheck for image frequency. Check the sensitivity at 6000 KC to determine if the coils and mica pad are not defective.

TUNING RANGE

This receiver is designed to operate over two tuning ranges; the broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters), and the International Short Wave Band which extends from 5.65 to 18.3 Megacycles (MC) (16.4 to 53 Meters).

DIAL CALIBRATION. (STANDARD BROADCAST BAND). The outside scale is calibrated from 55 to 170 (Standard Broadcast). This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba, and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

DIAL CALIBRATION. (SHORT WAVE BAND). The entire inside scale is devoted to short wave American and foreign broadcasts. This scale is calibrated from 6 to 18 megacycles (MC). Consult the Sonora Short-Wave Station list for the proper frequency and time for best short wave reception.

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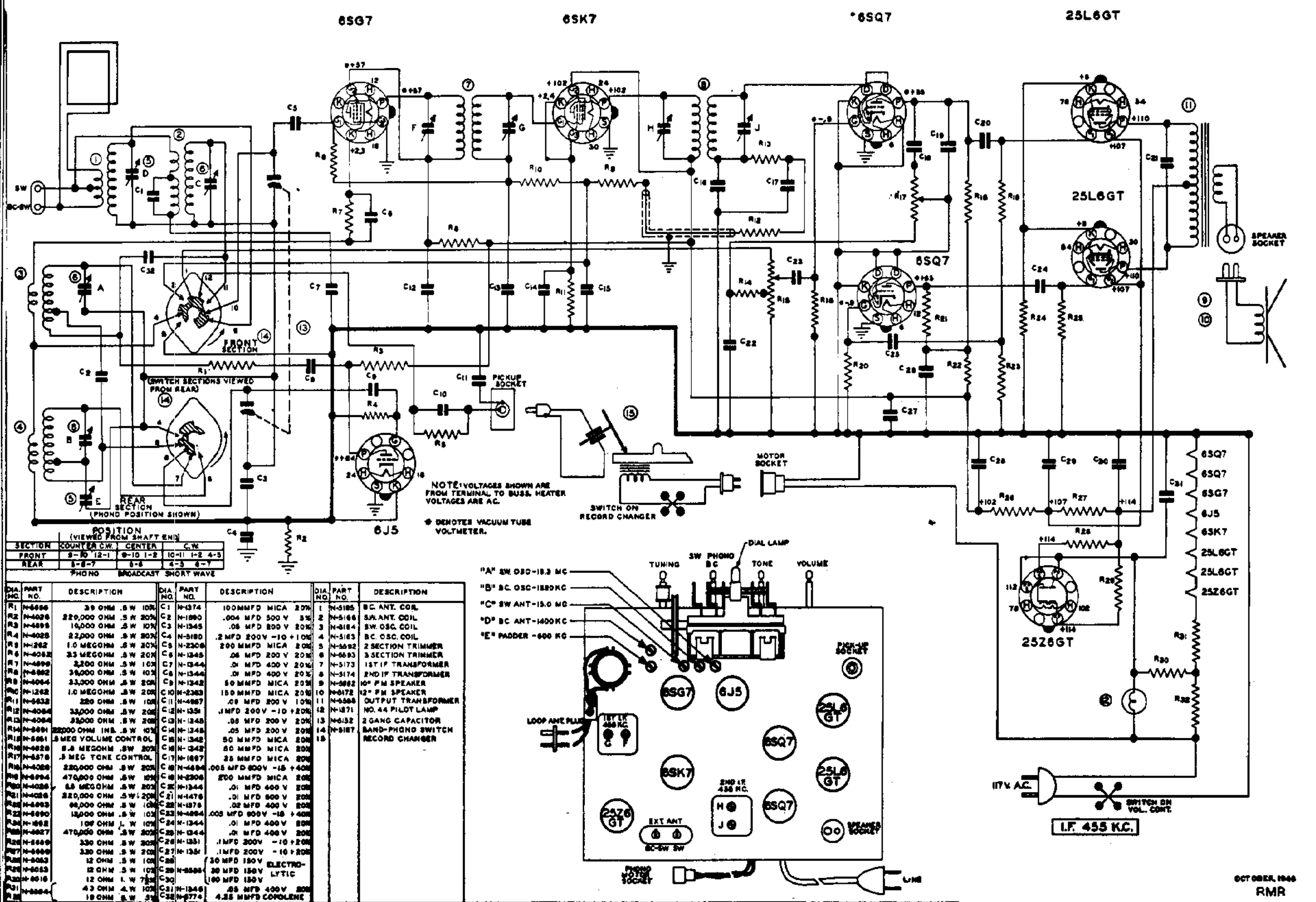

SECTION	COUNTER C.W.	CENTER	C.W.
FRONT	9-10 12-1	9-10 1-2	10-11 1-2 4-5
REAR	5-6-7	5-6	4-5 6-7
	PHONO	BROADCAST	SHORT WAVE

POSITION (VIEWED FROM SHAFT END)

DIA. NO.	PART NO.	DESCRIPTION
R1	N-6686	39 OHM .5 W 10%
R2	N-4026	220,000 OHM .5 W 20%
R3	N-4695	10,000 OHM .5 W 10%
R4	N-4025	22,000 OHM .5 W 20%
R5	N-1262	1.0 MEGOHM .5 W 20%
R6	N-4052	3.3 MEGOHM .5 W 20%
R7	N-4690	2,200 OHM .5 W 10%
R8	N-6592	39,000 OHM .5 W 10%
R9	N-4064	33,000 OHM .5 W 20%
R10	N-1262	1.0 MEGOHM .5 W 20%
R11	N-6632	220 OHM .5 W 10%
R12	N-4064	33,000 OHM .5 W 20%
R13	N-4064	33,000 OHM .5 W 20%
R14	N-6691	22,000 OHM INS. .5 W 10%
R15	N-6661	.5 MEG VOLUME CONTROL
R16	N-4028	5.6 MEGOHM .5 W 20%
R17	N-6576	.5 MEG TONE CONTROL
R18	N-4026	220,000 OHM .5 W 20%
R19	N-6794	470,000 OHM .5 W 10%
R20	N-4026	6.8 MEGOHM .5 W 20%
R21	N-4026	220,000 OHM .5 W 20%
R22	N-6693	68,000 OHM .5 W 10%
R23	N-5690	12,000 OHM .5 W 10%
R24	N-1662	100 OHM 1. W 10%
R25	N-4027	470,000 OHM .5 W 20%
R26	N-5669	330 OHM .5 W 20%
R27	N-5669	330 OHM .5 W 20%
R28	N-5053	12 OHM .5 W 10%
R29	N-5053	12 OHM .5 W 10%
R30	N-5016	12 OHM 1. W 7.5%
R31	N-6664	43 OHM 4. W 10%
R32	N-6664	18 OHM .5 W 5%

DIA. NO.	PART NO.	DESCRIPTION
C1	N-1374	100 MMFD MICA 20%
C2	N-1580	.004 MFD 500 V 5%
C3	N-1345	.05 MFD 200 V 20%
C4	N-5180	.2 MFD 200 V -10 +10%
C5	N-2306	200 MMFD MICA 20%
C6	N-1345	.05 MFD 200 V 20%
C7	N-1344	.01 MFD 400 V 20%
C8	N-1344	.01 MFD 400 V 20%
C9	N-1342	50 MMFD MICA 20%
C10	N-2363	150 MMFD MICA 20%
C11	N-4667	.02 MFD 200 V 10%
C12	N-1351	.1 MFD 200 V -10 +20%
C13	N-1345	.05 MFD 200 V 20%
C14	N-1345	.05 MFD 200 V 20%
C15	N-1342	50 MMFD MICA 20%
C16	N-1342	50 MMFD MICA 20%
C17	N-1667	25 MMFD MICA 20%
C18	N-4694	.005 MFD 600 V -15 +40%
C19	N-2306	200 MMFD MICA 20%
C20	N-1344	.01 MFD 400 V 20%
C21	N-1476	.01 MFD 600 V 20%
C22	N-1378	.02 MFD 400 V 20%
C23	N-4694	.005 MFD 600 V -15 +40%
C24	N-1344	.01 MFD 400 V 20%
C25	N-1344	.01 MFD 400 V 20%
C26	N-1351	.1 MFD 200 V -10 +20%
C27	N-1351	.1 MFD 200 V -10 +20%
C28	N-5585	30 MFD 150 V ELECTROLYTIC
C29	N-5585	30 MFD 150 V ELECTROLYTIC
C30	N-5585	100 MFD 150 V ELECTROLYTIC
C31	N-1346	.05 MFD 400 V 20%
C32	N-6774	4.25 MMFD COPOLENE

DIA. NO.	PART NO.	DESCRIPTION
1	N-5165	B.C. ANT. COIL
2	N-5166	S.W. ANT. COIL
3	N-5164	S.W. OSC. COIL
4	N-5163	B.C. OSC. COIL
5	N-5692	2 SECTION TRIMMER
6	N-5693	3 SECTION TRIMMER
7	N-5173	1ST IF TRANSFORMER
8	N-5174	2ND IF TRANSFORMER
9	N-5962	10" PM SPEAKER
10	N-6172	12" PM SPEAKER
11	N-5586	OUTPUT TRANSFORMER
12	N-1271	NO. 44 PILOT LAMP
13	N-6132	2 GANG CAPACITOR
14	N-5187	BAND-PHONO SWITCH
15		RECORD CHANGER

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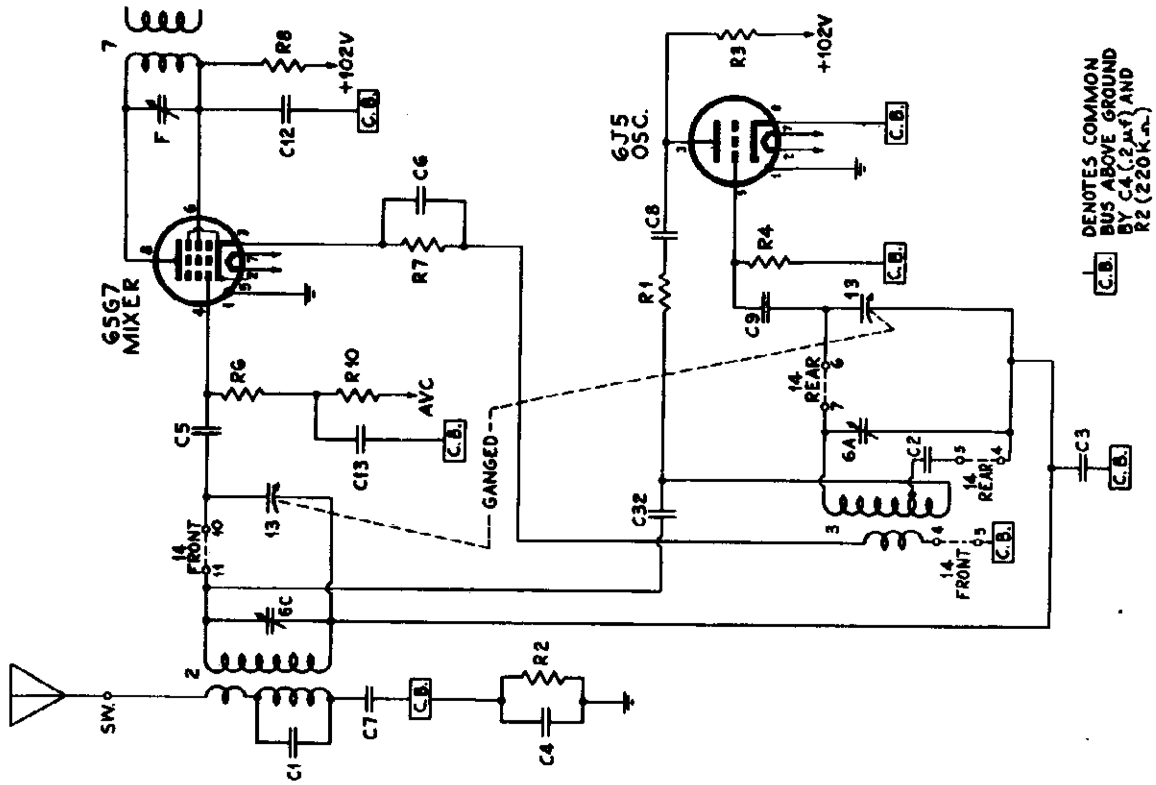
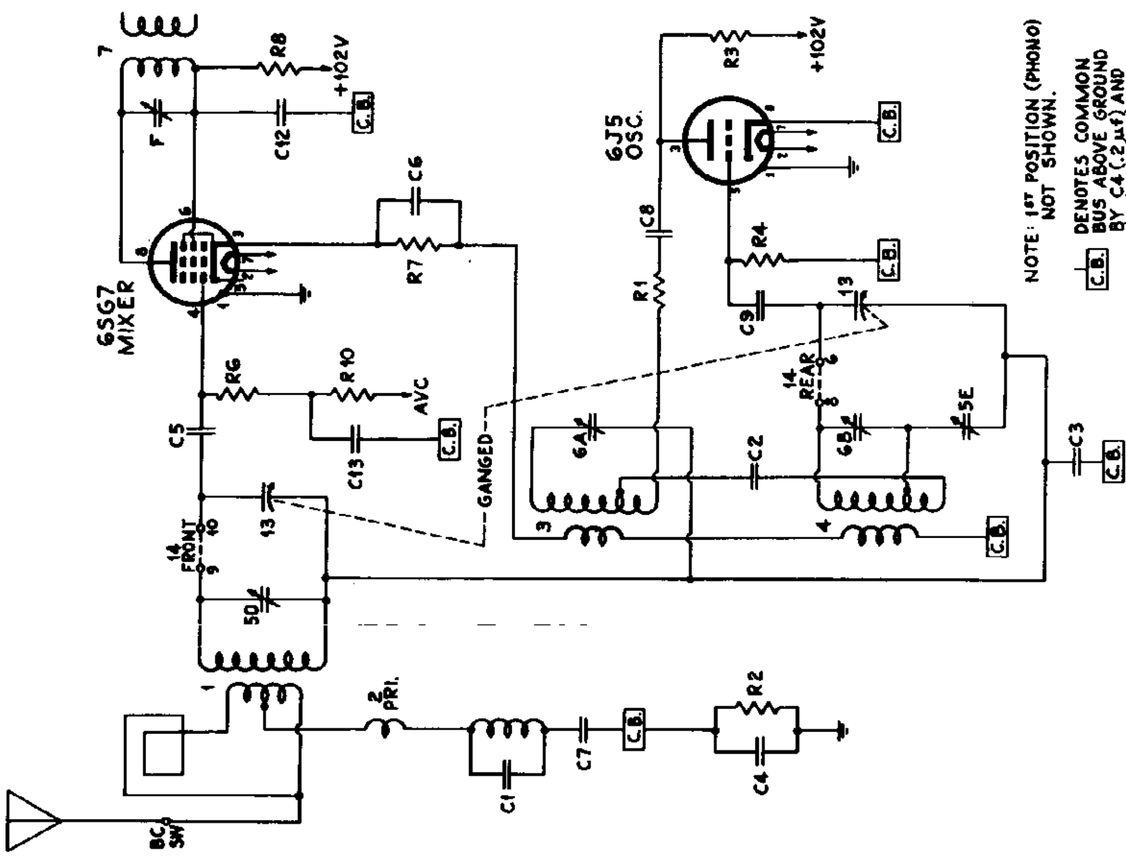


DENOTES COMMON BUS ABOVE GROUND BY C4 (.2 μf) AND R2 (220 K Ω)

BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE
SHORT WAVE BAND
5.65-18.3 MC.



NOTE: 1ST POSITION (PHONO) NOT SHOWN.

DENOTES COMMON BUS ABOVE GROUND BY C4 (.2 μf) AND R2 (220 K Ω)

BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE
BROADCAST BAND
535-1620 KC.

AUTOMATIC TUNING

ADJUSTMENT. All adjustments are simply made from the top of the cabinet using an ordinary screw driver.
To make adjustments remove all six buttons, which pull off readily. The center buttons should be removed first, since by depressing the adjacent buttons with thumb and finger a firm grip may be secured on either center button. The side buttons can then be easily removed.
Loosen the screw of the desired button and with the manual tuning knob tune to any desired station. Hold the manual tuning knob in position and depress the button shaft as far as possible. With the button fully depressed, tighten the screw firmly.
Be sure the push button knob is held down in position while being tightened.
After the stations are adjusted, it is advisable to check each button to assure sufficient tightening.
To assure accurate adjustment, the volume control should be set at a moderate level and the station tuned in slowly to a point of maximum volume and clarity.
It is not necessary to follow any particular sequence of stations since each button is adjustable to any station.
With each button definitely set and securely tightened to the selected station, the tuner is ready for operation.

OPERATION. With the set turned on to a moderate level of volume, the automatic tuner is operated by merely pressing a button set to the desired station.
Station selection may be made automatically or manually at will, since the manual tuning control functions integrally with the automatic unit.
The station call letter tabs enclosed in the Operating Instruction Sheet envelope should be inserted into the slot of the push-buttons, using designations corresponding to the station selected for each button. After inserting call letter tabs, the buttons may be replaced.

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400, 1620, 6000, 15000, and 18300 KC, and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

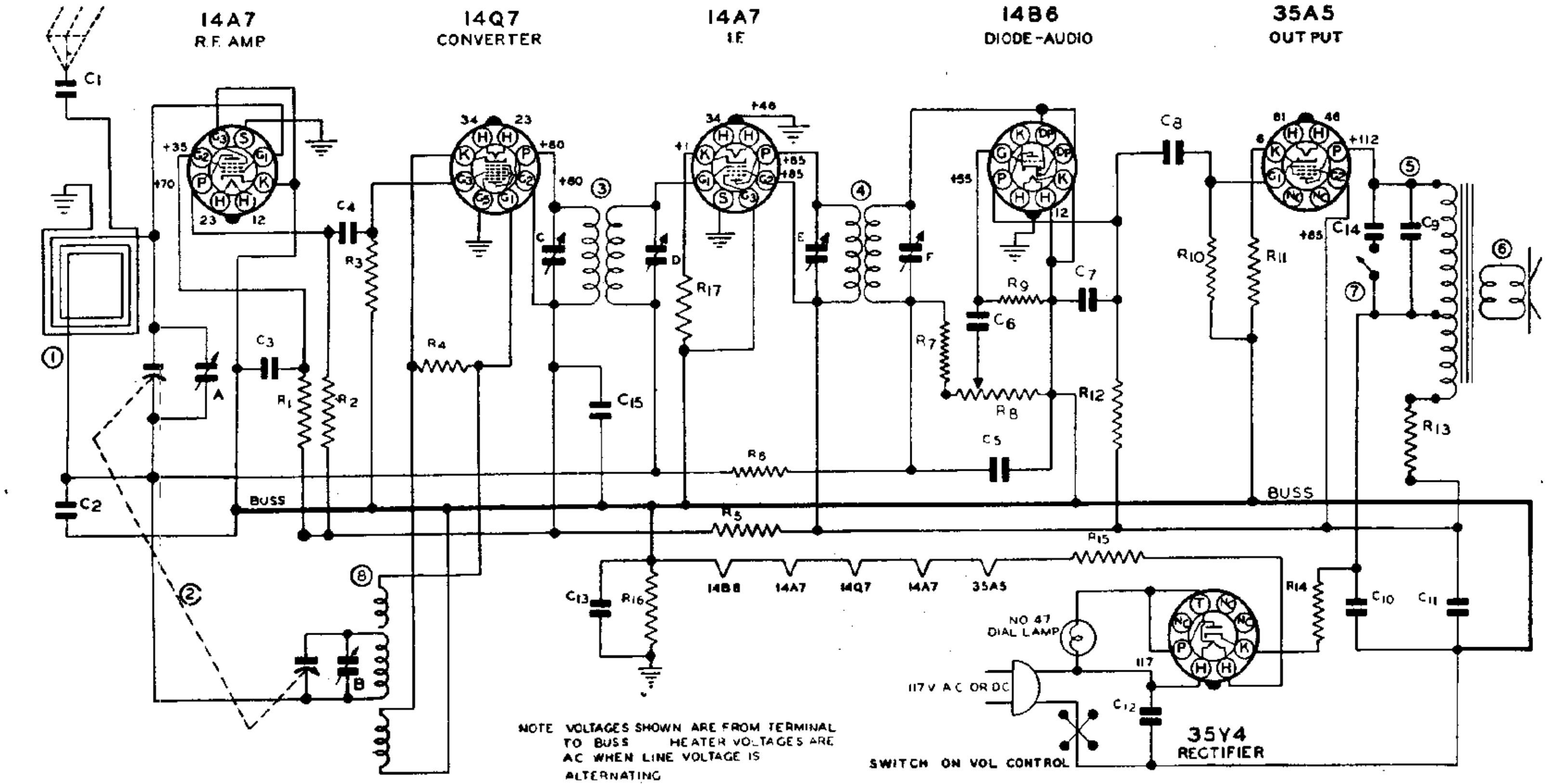
CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast and Short Wave bands should be adjusted.

I. F. ALIGNMENT. Remove the chassis from the cabinet. With the Band Switch set to the Broadcast Band and with the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube 6SG7 through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. With the Band Switch turned to the Broadcast Position, connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser, and the ground on the test oscillator should be connected to the buss, indicated on the circuit diagram. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer). For the antenna adjustment, it is necessary to connect the loop on the cabinet to the chassis or use an equivalent dummy. An equivalent dummy can be constructed by winding two turns of hookup wire on a piece of carton material to form a loop 22x35 inches. Set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on the condenser. Adjust 600 KC pad while rocking the gang to obtain maximum output.

SHORT WAVE BAND ALIGNMENT. With the band switch turned to the S.W. position, connect the test oscillator to the antenna with a 400 ohm dummy and the ground on the test oscillator to the buss, indicated on the circuit diagram. Adjust the S.W. oscillator to give a maximum output with the dial at 18300 KC (extreme end). Set the test oscillator at 15000 KC and tune in the signal with the dial. Adjust the antenna trimmer for maximum output. With a strong signal input turn the dial to approximately 1 M.C. lower in frequency and pick up the image frequency. If the image is not received, it will be necessary to return the dial to 183000 KC to reduce the capacity in the oscillator trimmer until a second signal is received. Proceed as before with the alignment of the antenna and recheck for image frequency. Check the sensitivity at 6000 KC to determine if the coils and mica pad are not defective.

SONORA RADIO & TELEV. CORP.



JANUARY 1947

RZLU

I.F. 455 K.C.

DIAG. NO.	PART NO.	DESCRIPTION	DIAG. NO.	PART NO.	DESCRIPTION
C1	N-1344	.01 MFD 400 V 20%	R6	N-1262	1 MEGOHM .5W 20%
C2	N-1345	.05 MFD 200 V 20%	R7	N-4063	47,000 OHM .5W 20%
C3	N-1345	.05 MFD 200 V 20%	R8	N-5026	0.5 MEGOHM VOL. CONT.
C4	N-2363	150 MMFD MICA 20%	R9	N-4061	4.7 MEGOHM .5W 20%
C5	N-1374	100 MMFD MICA 20%	R10	N-4027	470,000 OHM .5W 20%
C6	N-4894	.005 MFD 600 V. -15+40%	R11	N-4067	180 OHM .5W 10%
C7	N-4890	.0005 MFD 600V -25+60%	R12	N-4988	220,000 OHM .5W INS 20%
C8	N-1344	.01 MFD 400V 20%	R13	N-4900	1200 OHM 1W 10%
C9	N-1344	.01 MFD 400V 20%	R14	N-4022	33 OHM .5W 20%
C10	N-3658	40 MFD 150 W V ELECTRO-	R15	N-4628	33 OHM 1W 10%
C11	N-3658	40 MFD 150 W V LYTIC	R16	N-4026	220,000 OHM .5W 20%
C12	N-1346	.05 MFD 400V 20%	R17	N-5857	62 OHM .5W 10%
C13	N-5160	2 MFD 200V -10+10%	1	N-5937	LOOP COIL
C14	N-1346	.05 MFD 400V. 20%	2	N-5286 OR	2 GANG CONDENSER
C15	N-1351	.1 MFD 200V. -10+20%	1	N-5765	LOOP COIL
			2	N-5936	2 GANG CONDENSER
			3	N-4872	1ST I.F. TRANSFORMER
			4	N-5571	2ND I.F. TRANSFORMER
R1	N-4063	47,000 OHM .5W 20%	5	N-4875	OUTPUT TRANSFORMER
R2	N-4896	2200 OHM .5W 10%	6	N-4868	5" SPEAKER
R3	N-4067	47,000 OHM .5W INS. 20%	7	N-4942	TONE SWITCH
R4	N-5351	22,000 OHM .5W INS. 20%	8	N-4810	OSCILLATOR COIL

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

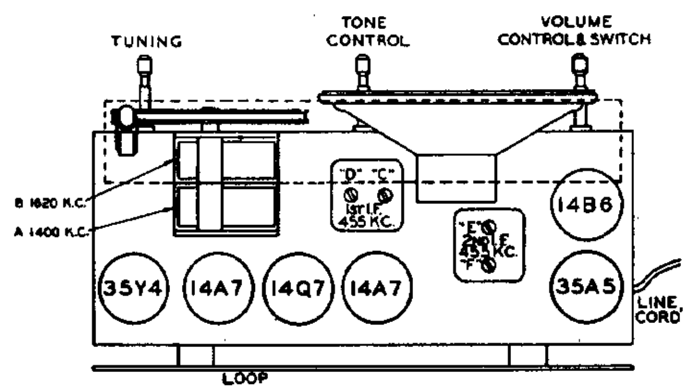
ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

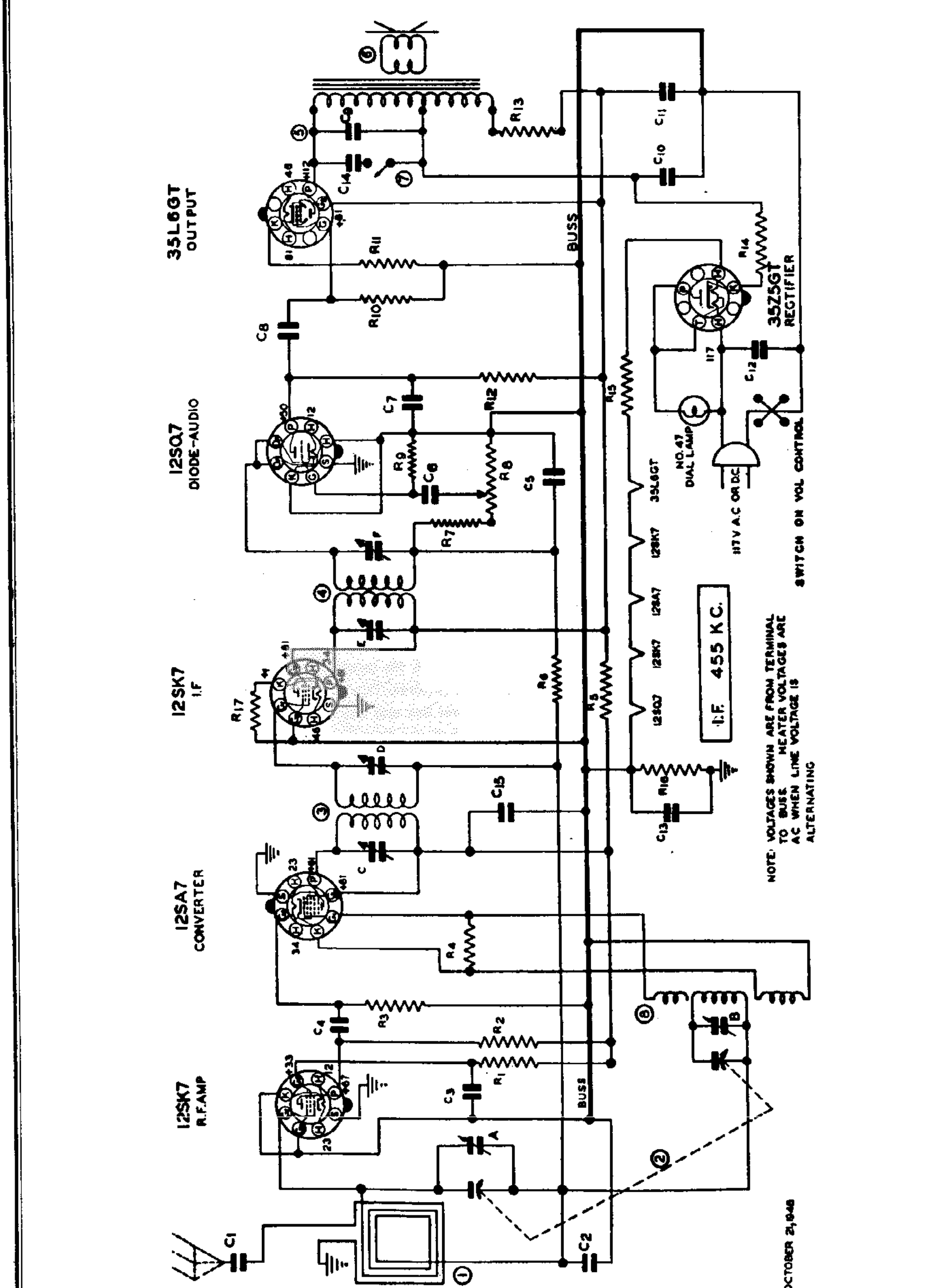
I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (14Q7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.



TUBE & TRIMMER LOCATIONS

SONORA RADIO & TELEV. CORP.



SONORA RADIO & TELEV. CORP.

SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

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ALIGNMENT PROCEDURE

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CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser. With the gang condsenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

TUNING RANGE

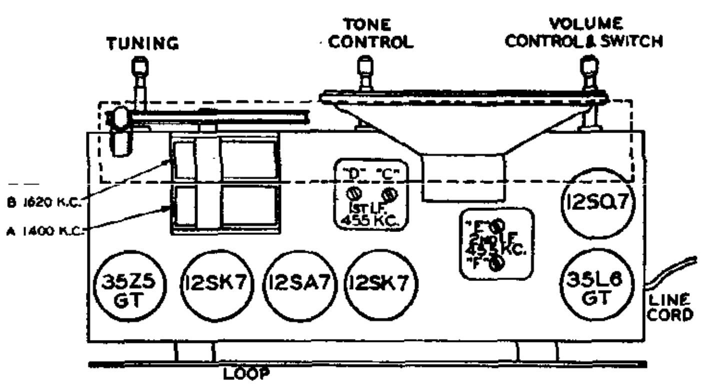
This receiver is designed to operate over the standard broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters).

DIAL CALIBRATION. The scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

GROUND. No ground connection should be used when operaitng this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

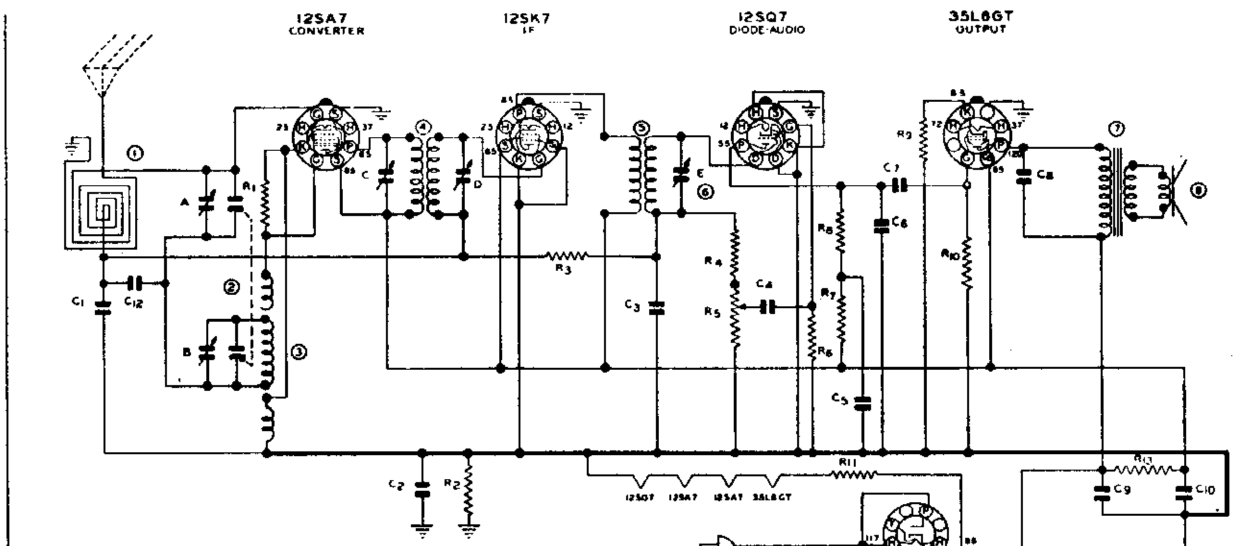
DIAG. NO.	PART NO.	DESCRIPTION	DIAG. NO.	PART NO.	DESCRIPTION
C1	N-1344	.01 MFD 400V. 20%	R6	N-1262	1 MEGOHM .5W. 20%
C2	N-1345	.05 MFD 200V. 20%	R7	N-4063	47,000 OHM .5W. 20%
C3	N-1345	.05 MFD 200V. 20%	R8	N-5026	0.5 MEGOHM VOL. CONT.
C4	N-2363	150 MMFD MICA 20%	R9	N-4061	4.7 MEGOHM .5W 20%
C5	N-1374	100 MMFD MICA 20%	R10	N-4027	470,000 OHM .5W. 20%
C6	N-4694	.005 MFD 600V -15+40%	R11	N-4067	180 OHM .5W. 10%
C7	N-4690	.0005 MFD 600V -25+80%	R12	N-4966	220,000 OHM .5W. INS. 20%
C8	N-1344	.01 MFD 400V. 20%	R13	N-4900	1200 OHM 1W. 10%
C9	N-1344	.01 MFD 400V. 20%	R14	N-4022	33 OHM .5W. 20%
C10	N-3656	40 MFD 150 W.V. ELECTRO	R15	N-4628	33 OHM 1W 10%
C11		40 MFD 150 W.V. LYTIC	R16	N-4026	220,000 OHM .5W. 20%
C12	N-1346	.05 MFD 400V. 20%	R17	N-5857	82 OHM .5W. 10%
C13	N-5160	.2 MFD 200V. -10+10%	1	N-5937	LOOP COIL
C14	N-1346	.05 MFD 400V. 20%	2	N-5286	2 GANG CONDENSER
				OR	
C15	N-1351	.1 MFD 200V. -10+20%	1	N-5765	LOOP COIL
			2	N-5936	2 GANG CONDENSER
			3	N-4672	1ST I.F. TRANSFORMER
			4	N-5571	2ND I.F. TRANSFORMER
R1	N-4063	47,000 OHM .5W. 20%	5	N-4675	OUTPUT TRANSFORMER
R2	N-4696	2200 OHM .5W 10%	6	N-4666	5" SPEAKER
R3	N-4067	47,000 OHM .5W. INS. 20%	7	N-4942	TONE SWITCH
R4	N-5351	22,000 OHM .5W. INS. 20%	8	N-4810	OSCILLATOR COIL
R5	N-4066	470 OHM .5W 10%			



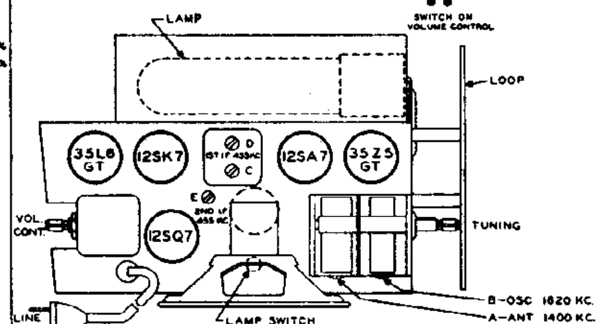
TUBE & TRIMMER LOCATIONS

SONORA RADIO & TELEV. CORP.

MODELS WCU-24
WCU-247



REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
R1	N-4025	22,000 OHM 5W 20%	C6	N-6135	250 MMFD 300V 20%
R2	N-4026	220,000 OHM .5W 20%	C7	N-1344	.01 MFD 400V 20%
R3	N-1292	1 MEGOHM .5W 20%	C8	N-1376	.02 MFD 400V 20%
R4	N-4083	47,000 OHM .5W 20%	C9 / C10	N-6236	50 MFD 150V / 20 MFD 150V ELECTROLYTIC
R5	N-6239	.5 MEGOHM VOL. CONT	C11	N-1346	.05 MFD 400V 20%
R6	N-4080	6.8 MEGOHM .5W 20%	C12	N-1345	.05 MFD 200V 20%
R7	N-4083	47,000 OHM .5W 20%			
R8	N-1779	150,000 OHM .5W 20%			
R9	N-4024 / N-6244	220 OHM .5W 10%	1	N-3838	ANTENNA COIL LOOP
R10	N-4021	470,000 OHM .5W 20%	2	N-6232	2 GANG CONDENSER
R11	[illegible]	68 OHM 2W 10%	3	[illegible]	OSCILLATOR COIL
R12	N-6258	47 OHM 1W 10%	4	N-6130	1ST I.F. TRANSFORMER
R13	N-6900	1200 OHM 1W 10%	5	[illegible]	2ND I.F. TRANSFORMER
			6	[illegible]	TRIMMER
			7	[illegible]	OUTPUT TRANSFORMER
			8	[illegible]	4" P.M. SPEAKER
				[illegible]	LAMP SWITCH
				[illegible]	2.5W. T-10 110V. LAMP
C1	N-1345	.05 MFD 200V 20%			
C2	N-1348	.05 MFD 200V 20%			
C3	N-6015	100 MMFD 300V 20%			
C4	N-4884	.005 MFD 600V -15 +40%			
C5	N-1351	.1 MFD 200V -10 +20%			



IF 455 KC
5 TUBE A.C-

APRIL, 194

SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or spe open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have first thoroughly investigated and definitely proved not to be the cause.

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ALIGNMENT PROCEDURE

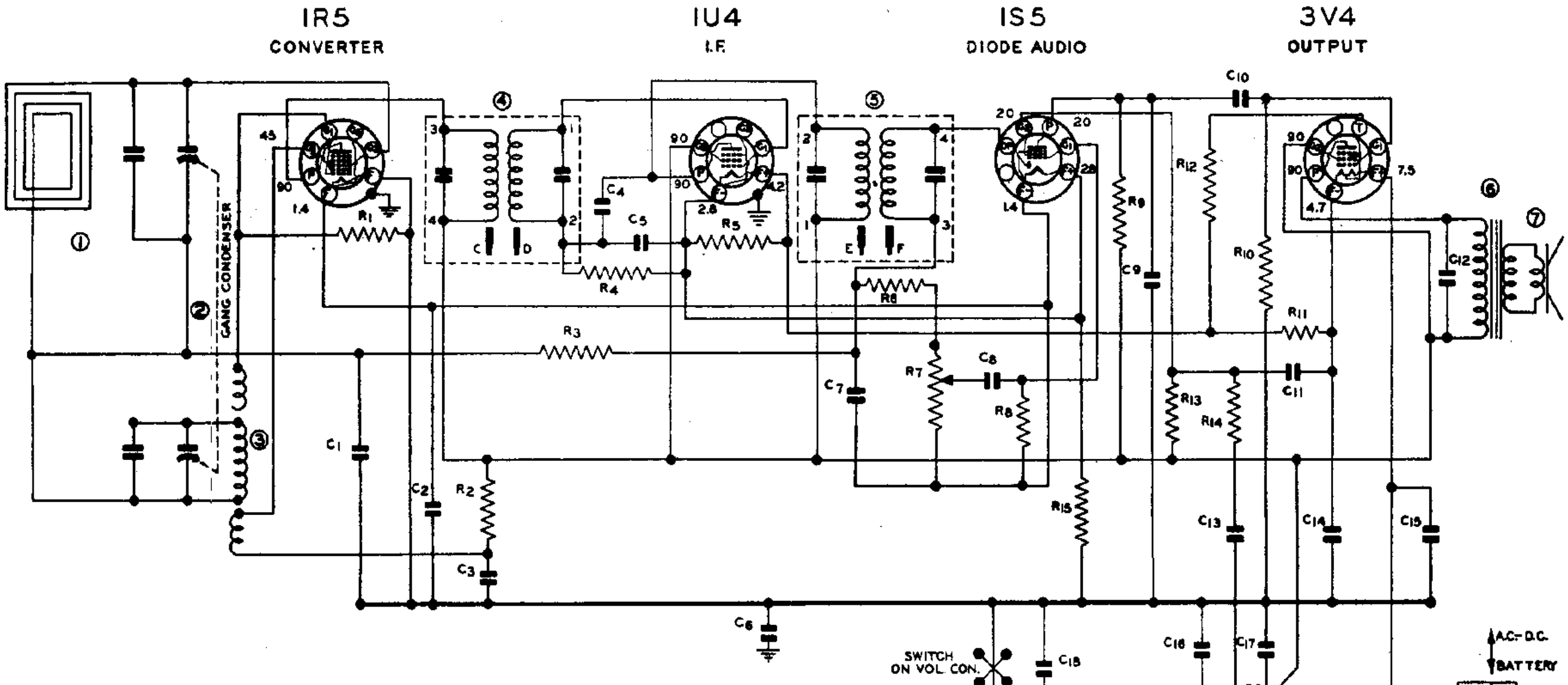
GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

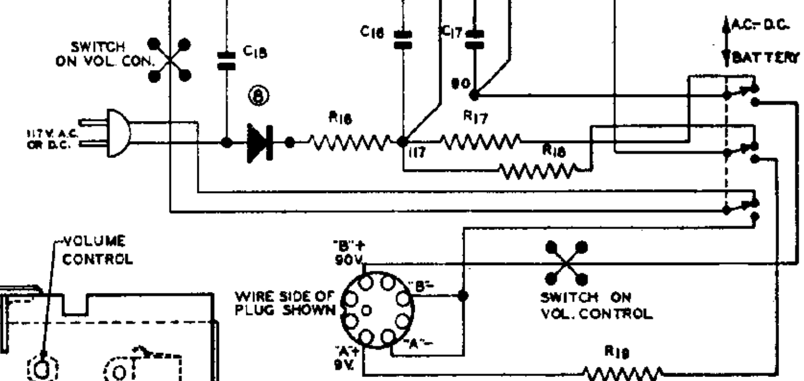
CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With gang condenser set at minimum, adjust the test oscillator tc KC and connect the output to the grid of the converter tube (12 through a .05 or .1 mfd. condenser. The ground on the test oscil should be connected to the ground buss, indicated on the c diagram. Align all three I.F. trimmers to peak or maximum rec on the output meter.

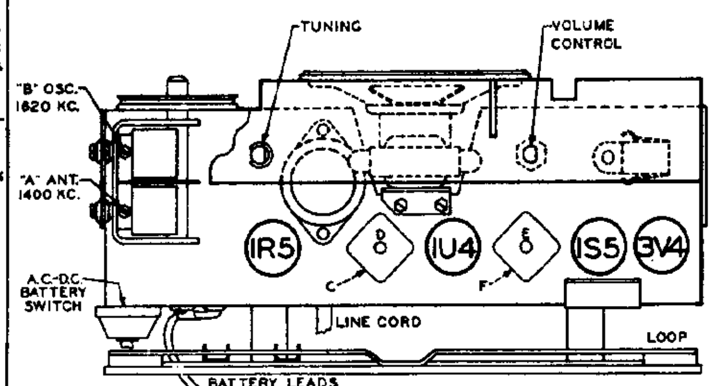
BROADCAST BAND ALIGNMENT. Connect the test oscillat the antenna of the set through a 100 mmfd. (.0001) condenser. the gang condenser set at minimum capacity, set the test oscil at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on c condenser. Next — set the test oscillator at 1400 KC, and tur the signal on the gang condenser. Adjust the antenna trin (or 1400 KC trimmer) for maximum signal. Next set the c lator at 600 KC, and tune in signal on condenser to check a ment of coils.

SONORA RADIO & TELEV. CORP.





ALL VOLTAGES SHOWN ARE MEASURED WITH A VACUUM TUBE VOLTMETER. INPUT VOLTAGE 117 A.C.



I.F. 455 KC.

DIA. NO.	PART NO.	DESCRIPTION	DIA. NO.	PART NO.	DESCRIPTION
R1	N-2973	100,000 OHM .5W 10%	C4	N-6054	7 MMFD 500V 10%
R2	N-6012	22,000 OHM .5W 10%	C5	N-1344	.01 MFD 400V 20%
R3	N-4061	4.7 MEGOHM .5W 20%	C6	N-4957	.05 MFD 200V 10%
R4	N-4029	6.8 MEGOHM .5W 20%	C7	N-6015	100 MMFD 500V
R5	N-4067	180 OHM .5W 10%	C8	N-4894	.005 MFD 600V -15+40%
R6	N-4063	47,000 OHM .5W 20%	C9	N-6015	100 MMFD 500V
R7	N-6007	1 MEG. VOLUME CONTROL	C10	N-4894	.005 MFD 600V -15+40%
R8	N-4028	6.8 MEGOHM .5W 20%	C11	N-1345	.05 MFD 200V 20%
R9	N-2976	1.0 MEGOHM .5W 10%	C12	N-4894	.005 MFD 600V -15+40%
R10	N-4277	2.2 MEGOHM .5W 20%	C13	N-1376	.02 MFD 400V 20%
R11	N-6009	10 OHM .5W 10%	C14	N-6006	100 MFD 25V ELECTROLYTIC
R12	N-6159	390 OHM .5W 10%	C15		100 MFD 25V
R13	N-5473	3.9 MEGOHM .5W 10%	C16		30 MFD 150V
R14	N-6085	12 MEGOHM .5W 10%	C17		30 MFD 150V
R15	N-6082	240 OHM .5W 5%	C18	N-1348	.05 MFD 400V 20%
R16	N-6113	68 OHM 1.5W 10%			
R17	N-4996	2200 OHM .5W 10%			
R18	N-6006	2400 OHM 5.5W 5%			
R19	N-6010	18 OHM .5W 10%	1	N-5972	LOOP COIL
			2	N-5938	2 GANG CAPACITOR
			3	N-6003	OSCILLATOR COIL
			4	N-5973	1ST I.F.
			5	N-5973	2ND I.F.
			6	N-6004	OUTPUT TRANSFORMER
C1	N-1346	.05 MFD 200V 20%	7	N-5986	4" P.M. SPEAKER
C2	N-1381	.1 MFD 200V -10+20%	8	N-5988	SELENIUM RECTIFIER
C3	N-1348	.05 MFD 200V 20%			

JANUARY, 1947

SONORA RADIO & TELEV. CORP.

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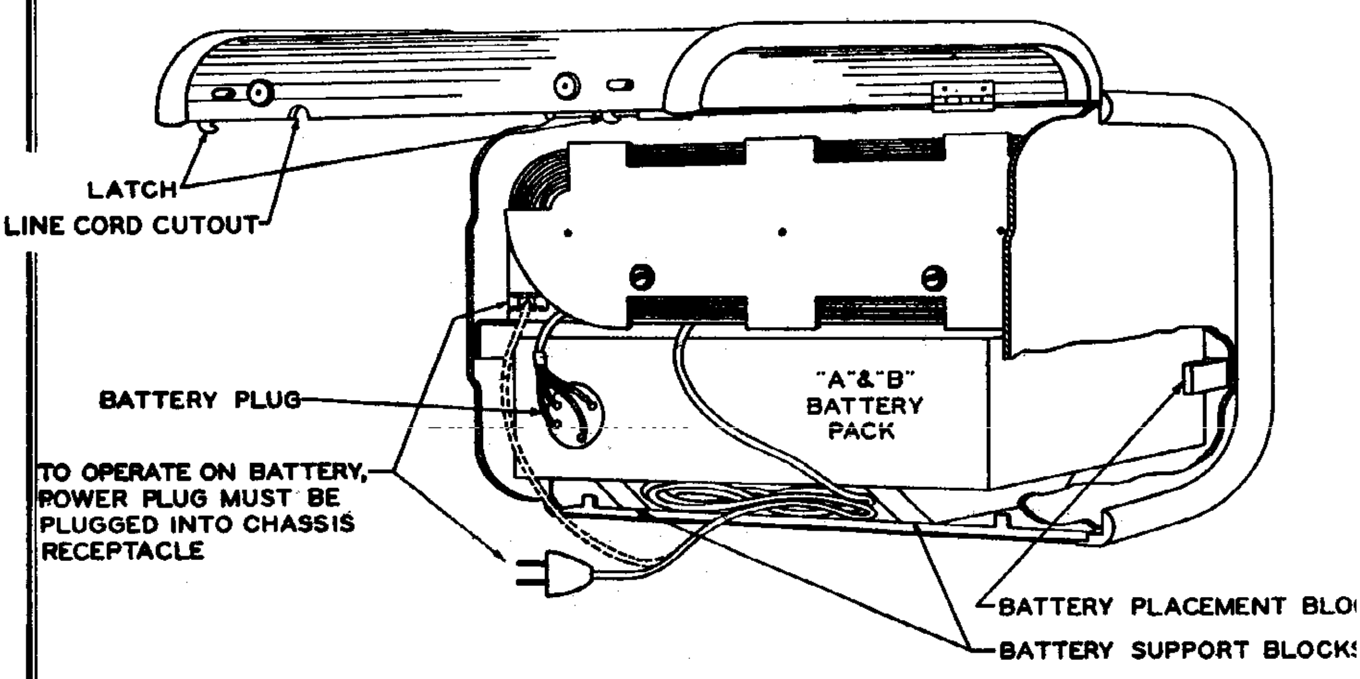
ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F., transformers have been properly adjusted and peaked, the oscillator and loop should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condens set at minimum, adjust the test oscillator to 455 KC and connect th output to the grid of the first detector tube (1R5) through a .05 to mfd condenser. The ground on the test oscillator should be connect to the ground buss, indicated on the circuit diagram. Align all fo I.F. trimmers to peak or maximum reading on the output meter. Ea I.F. has an adjustment at the top and bottom of the can.

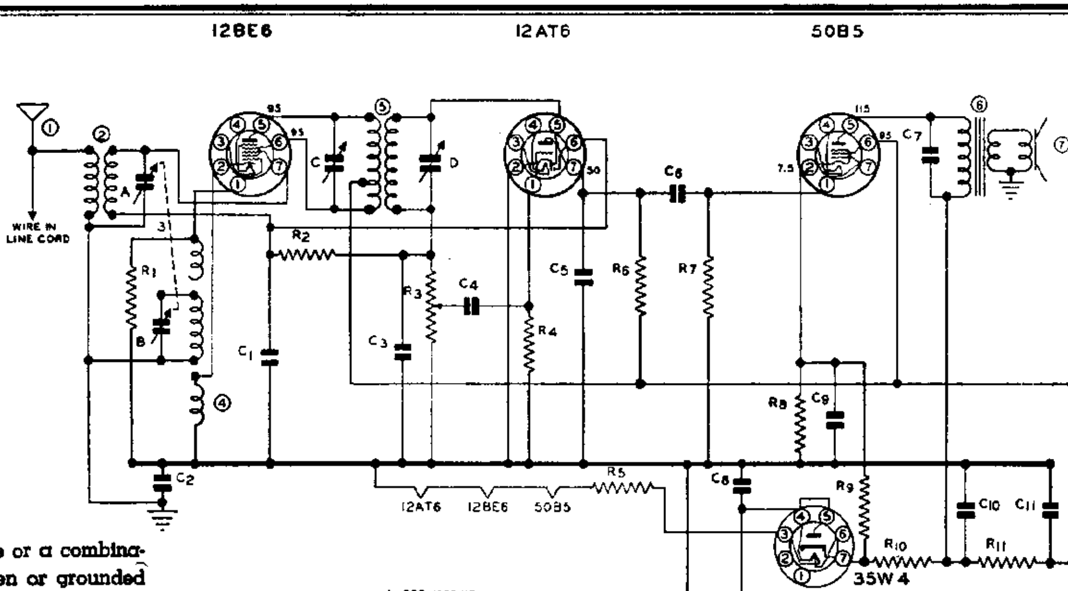
LOOP ALIGNMENT. Connect the test oscillator to a dummy lo which can be made by coiling 2 turns of hookup wire about 6" diameter. Place this dummy loop about a foot from the loop on t receiver and in the same plane as the receiver loop. With the ga condenser set at minimum capacity, set the test oscillator at 16 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condens Next — set the test oscillator at 1400 KC, and tune in the signal on t gang condenser. Adjust the antenna trimmer (or 1400 KC trimm for maximum signal. Next set the test oscillator at 600 KC, and tu in signal on condenser to check alignment of coils.

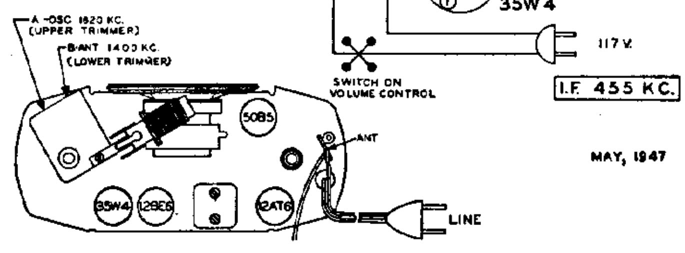


MODELS WJ, WJU

SONORA RADIO & TELEV. CORP.

DIA. NO.	PART NO.	DESCRIPTION	DIA. NO.	PART NO.	DESCRIPTION
R1	N-4012	22,000 OHM .5W 10%	C5	N-6015	100 MMFD 500V
R2	N-4061	4.7 MEGOHM .5W 20%	C6	N-1344	.01 MFD 400V 20%
R3	N-6275	2.0 MEGOHM VOL. CONT.	C7	N-1344	.01 MFD 400V 20%
R4	N-4026	6.8 MEGOHM .5W 20%	C8	N-1346	.05 MFD 400V 20%
R5	N-6258	47 OHM 1W 10% INSUL.	C9	N-6281	20 MFD 25V ELECTROLYTIC
	N-6259	47 OHM 1W 10% WIREW'D	C10		40 MFD 150V
R6	N-4423	330,000 OHM .5W 20%	C11		20 MFD 150V
R7	N-4027	470,000 OHM .5W 20%			
R8	N-4087	180 OHM .5W 10%			
	N-6297	180 OHM 5W 10% WIREW'D			
R9	N-4064	33,000 OHM .5W 20%			
R10	N-4022	33 OHM .5W 20%	1	N-3744	ANTENNA HANK
R11	N-3032	2200 OHM .5W 20%	2	N-6292	ANTENNA COIL
			3	N-6278	2 GANG CAPACITOR
			4	N-6412	OSCILLATOR COIL
C1	N-1345	.05 MFD 200V 20%	5	N-6293	I.F. TRANSFORMER
C2	N-1345	.05 MFD 200V 20%	6	N-3699	OUTPUT TRANSFORMER
C3	N-6015	100 MMFD 500V	6	N-6414	OUTPUT TRANSFORMER
C4	N-2063	.003 MFD 600V -15+40%	7	N-6279	3½" P.M. SPEAKER





Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stage should be aligned properly as the first step. After the I.F. transformer has been properly adjusted and peaked, the broadcast band should be adjusted.

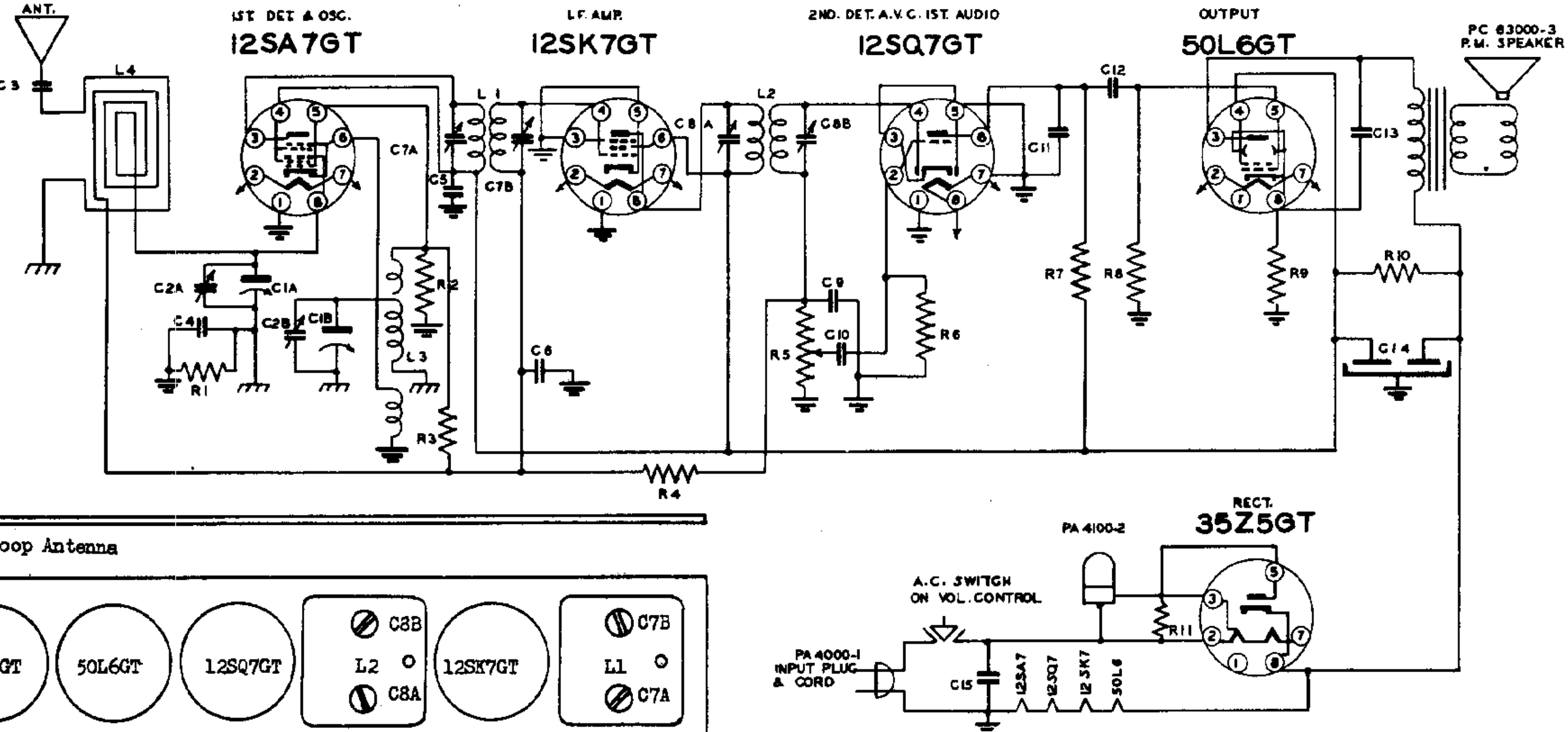
I.F. ALIGNMENT. Remove the Chassis from the cabinet. With the Knob Indicator set at 1620 KC, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (12BE6) through an .05 or .1 MFD condenser. The ground on the test oscillator should be connected to the ground buss indicated on the circuit diagram. Adjust both I.F. trimmers to peak or maximum reading on the output meter.

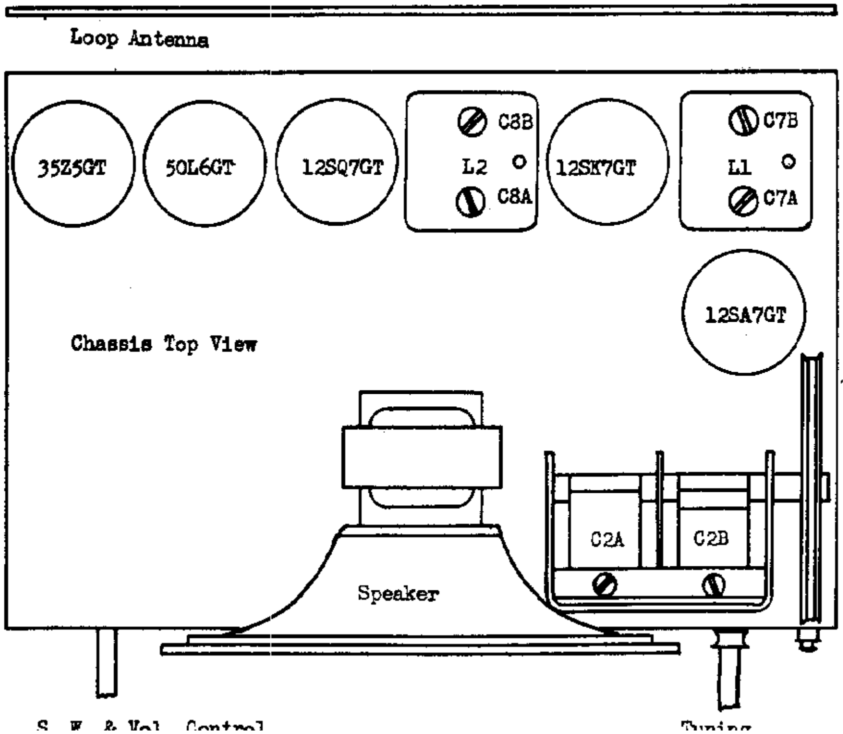
TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters).

BROADCAST BAND ALIGNMENT. Connect the test oscillator to the antenna lead through a 50 mmfd. (.00005) condenser. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condenser. Next set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

INTERMEDIATE FREQUENCY 456 K.C.
BOTTOM VIEWS OF ALL SOCKET CONNECTIONS





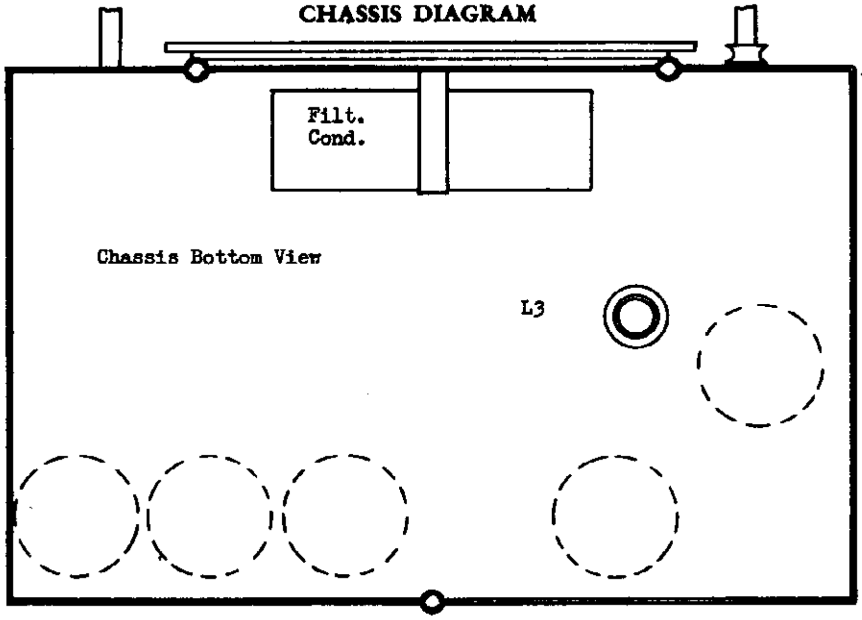
C1A & B	VARIABLE CONDENSER PB 40406			
C2A & B	TRIMMERS ON VARIABLE			
C3	.001 MFD.	400 V.	PC 40GL-102	
C4	.15 MFD.	400 V.	PC 40GL-154	
C5	.05 MFD.	200 V.	PC 40GK-503	
C6	.05 MFD.	200 V.	PC 40GK-503	
C7A & B	NO. 1 I.F. TRIMMERS		AB 43500-44	
C8A & B	NO. 2 I.F. TRIMMERS		AB 43500-55	
C9	270 MMF.	MICA	MC 60G-271	
C10	.01 MFD.	400 V.	PC 40GL-103	
C11	510 MMF.	MICA	MC 60G-511	
C12	.002 MFD.	400 V.	PC 40GL-202	
C13	.01 MFD.	400 V.	PC 40GL-103	
C14	ELECT. CONDENSER		PA 4301-1	
	RED 30 MFD.	YELLOW	40 MFD.	
C15	.05 MFD.	400 V.	PC 40GL-503	

R1	150,000 Ω	.5W	BR12N-154
R2	22,000 Ω	.5W	BR12S-223
R3	15 MEGOHM	.5W	BR12S-156
R4	2.2 "	.5W.	BR12N-225
R5	.5 MEG. VOL. CONT. & SW. PA 4400-3		
R6	5.6 MEGOHM	.5W	BR12S-565
R7	220,000 Ω	.5W	BR12N-224
R8	470,000 Ω	.5W	BR12N-474
R9	150 Ω	.5W	BR12S-151
R10	1200 Ω	1W.	CR12S-122
R11	82 Ω	.5W	BR12S-820

L1 NO. 1 I.F. COIL ASSEMBLY AA 6800-12
L2 NO. 2 I.F. COIL " AA 6800-2
L3 B.C. OSCILLATOR COIL ASSEMBLY AA 6797-1

THE SPARKS-WITHINGTON CO.

CHASSIS DIAGRAM



ALIGNMENT DATA

OPERATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANTENNA	GENERATOR FREQUENCY	TUNING COND. SETTING	TRIMMER	REMARKS
1	Set dial pointer with left hand stop line and with condenser closed.						
2	I.F.	*	* *	456 KC	Open	C8A & B	Peak accurately
						C7A & B	Peak accurately
3	B.C.	* * *	Dummy Loop	1500 KC	1500 KC	C2B Osc.Trim.	Peak accurately
						C2A R.F.Trim.	Peak accurately
4	(Repeat operation 2 and 3).						
5	(Check calibration at 600 KC, 1000 KC, and 1500 KC).						
6	(Check operations 1 to 5 inclusive).						

* Pin No. 6 on 12SA7GT
** Standard Dummy

VOLTAGE CHART

Line Voltage: 117 Volts A.C.

Position of Volume Control: Full with set tunned to quiet channel.

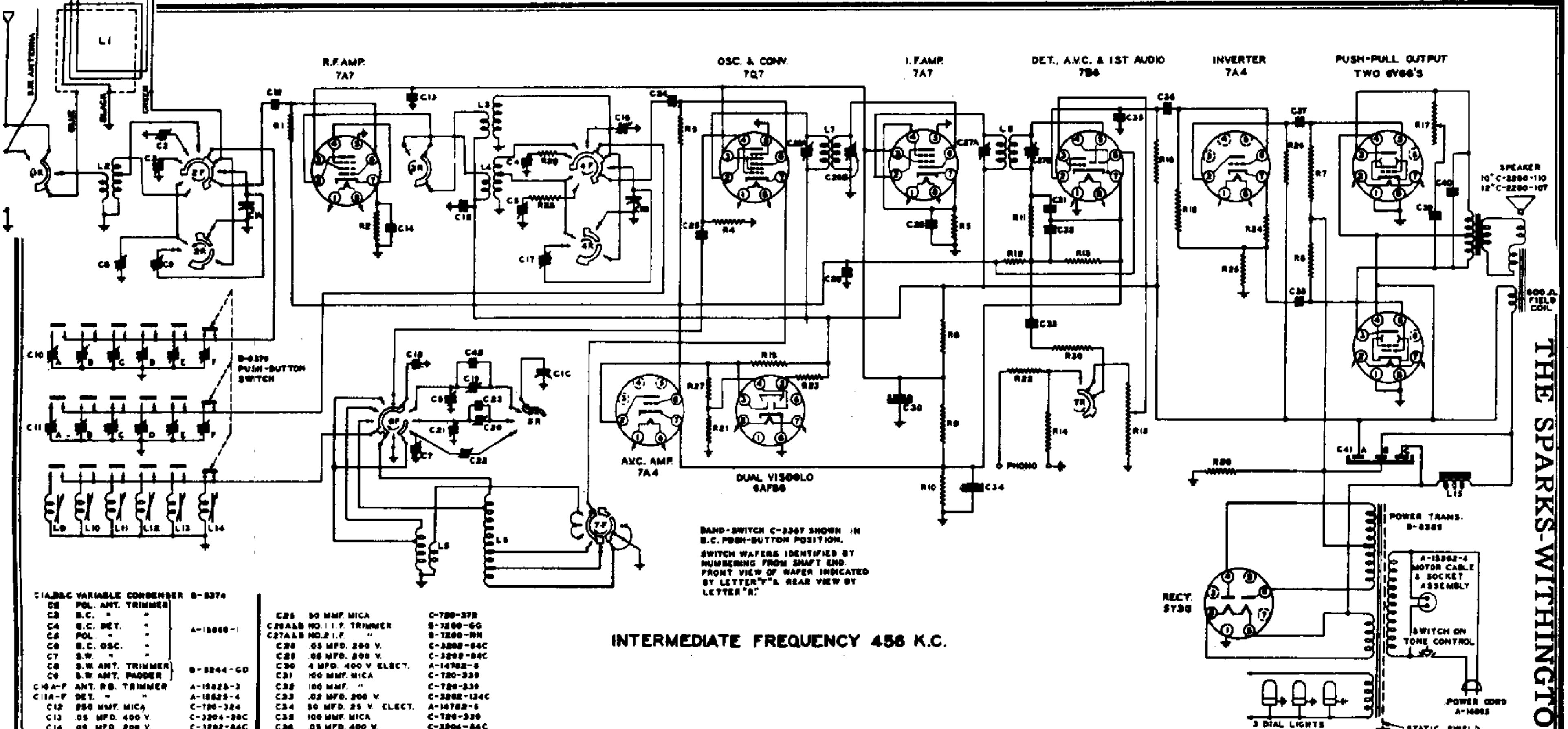
TUBE	FUNCTION	Voltage of Socket Prong to Gnd. (See Prong Nos. on Schematic)							
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
12SA7GT	1st Det. & Osc.	12*	80	80	* *	0	* *	* *	0
12SK7GT	I.F. Amp.	24*	80	80	0	0	* *	0	36*
12SQ7GT	2nd. Det. A.V.C. & 1st Audio	24*	55	-.35	0	0	-.55	0	12*
50L6GT	Power Output	85*	110	85	0	0	* *	5.4	36*
35Z5GT	Rectifier	117*	110*	0	110*	0	0	115	85*

NOTES: Voltage readings are for schematic diagram on back of sheet. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 20,000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages.

* AC volts.
** Cannot be measured with 20,000 ohms per volt voltmeter.

THE SPARKS-WITHINGTON CO.

MODEL 10 series
10-21



INTERMEDIATE FREQUENCY 456 K.C.

C1A,B&C	VARIABLE CONDENSER		B-8374
C2	POL. ANT. TRIMMER		A-18860-1
C3	B.C. " "		
C4	B.C. DET. "		
C5	POL. " "		
C6	B.C. OSC. "		
C7	S.W. " "		
C8	S.W. ANT. TRIMMER		B-8244-GD
C9	S.W. ANT. PADDER		
C10A-F	ANT. P.B. TRIMMER		A-18625-3
C11A-F	DET. " "		A-18625-4
C12	250 MMF. MICA		C-720-324
C13	.05 MFD. 400 V.		C-3204-80C
C14	.05 MFD. 200 V.		C-3202-84C
C15	.05 MFD. 400 V.		C-3204-86C
C16	S.W. DET. TRIMMER		B-7200-EG
C17	S.W. DET. PADDER		
C18	350 MMF. MICA		B-8285-4
C19	B.C. OSC. PADDER		B-7200-YY
C20	PO OSC. PADDER		
C21	" " TRIMMER		B-7200-OG
C22	S.W. OSC. PADDER		
C23	2300 MMF. MICA		C-720-362
C24	250 MMF. MICA		C-720-324
C25	50 MMF. MICA		C-720-372
C26A&B	NO. 1 I.F. TRIMMER		B-7200-GG
C27A&B	NO. 2 I.F. "		B-7200-HH
C28	.05 MFD. 200 V.		C-3202-84C
C29	.05 MFD. 200 V.		C-3202-84C
C30	4 MFD. 400 V. ELECT.		A-14762-5
C31	100 MMF. MICA		C-720-339
C32	100 MMF. "		C-720-339
C33	.02 MFD. 200 V.		C-3202-124C
C34	50 MFD. 25 V. ELECT.		A-14762-5
C35	100 MMF. MICA		C-720-339
C36	.05 MFD. 400 V.		C-3204-84C
C37	.05 MFD. 400 V.		C-3204-140C
C38	.05 MFD. 400 V.		C-3204-140C
C39	.02 MFD. 600 V.		C-3206-124C
C40	.005 MFD. 600 V.		C-3206-115C
C41 A	15 MFD. 450 V.	ELECT.	A-14884-7
C41 B	10 MFD. 450 V.		
C41 C	15 MFD. 450 V.		
C42	250 MMF. MICA		C-720-324

R1	1 MEGOHM	.25 W.	C-2795-98B
R2	1000 Ω	.25 W.	C-2795-52B
R3	1 MEGOHM	.25 W.	C-2795-98B
R4	20,000 Ω	.25 W.	C-2795-100B
R5	820 Ω	.25 W.	C-2795-154B
R6	16,000 Ω	3 W.	C-2799-77A
R7	47,000 Ω	.25 W.	C-2795-82B
R8	47,000 Ω	.25 W.	C-2795-82B
R9	22,000 Ω	1 W.	C-2797-191B
R10	220 Ω	.25 W.	C-2795-142B
R11	16,000 Ω	.25 W.	C-2795-77B
R12	3.3 MEGOHMS	.25 W.	C-2795-104B
R13	100,000 Ω	.25 W.	C-2795-88B
R14	270,000 Ω	.25 W.	C-2795-91B
R15	2 MEG. VOL. CONT.		A-18140-2
R16	270,000 Ω	.25 W.	C-2795-91B
R17	.25 MEG. TONE CONT. & SW.		A-18129-12
R18	150,000 Ω	.25 W.	C-2795-90B
R19	470,000 Ω	.25 W.	C-2795-94B
R20	150 Ω	3 W.	C-2799-141A
R21	1 MEGOHM	.25 W.	C-2795-98B
R22	270,000 Ω	.25 W.	C-2795-91B
R23	56,000 Ω	.25 W.	C-2795-83B
R24	2700 Ω	.25 W.	C-2795-169B
R25	22,000 Ω	.25 W.	C-2795-191B
R26	22,000 Ω	.25 W.	C-2795-191B
R27	1 MEGOHM	.25 W.	C-2795-98B
R28	51 Ω	.25 W.	C-2795-128B
R29	150 Ω	.25 W.	C-2795-139B
R30	330,000 Ω	.25 W.	C-2795-92B

L1	LOOP ANTENNA	D-1806-8
L2	POL. & S.W. ANT. COIL	A-20301
L3	B.C. DET. COIL	A-20353
L4	POL. & S.W. DET. COIL	A-20305
L5	POL. & S.W. OSC. COIL	A-20300
L6	B.C. OSC. COIL	A-20352
L7	NO. 1 I.F. COIL	A-12084-45
L8	NO. 2 I.F. COIL	A-12084-46
L9-L14	P.B.B.C. OSC. COIL	B-8307

Line Voltage: 117 Volts A.C.

Position of Volume Control: Full with Antenna Disconnected
Position of Band Switch: Broadcast

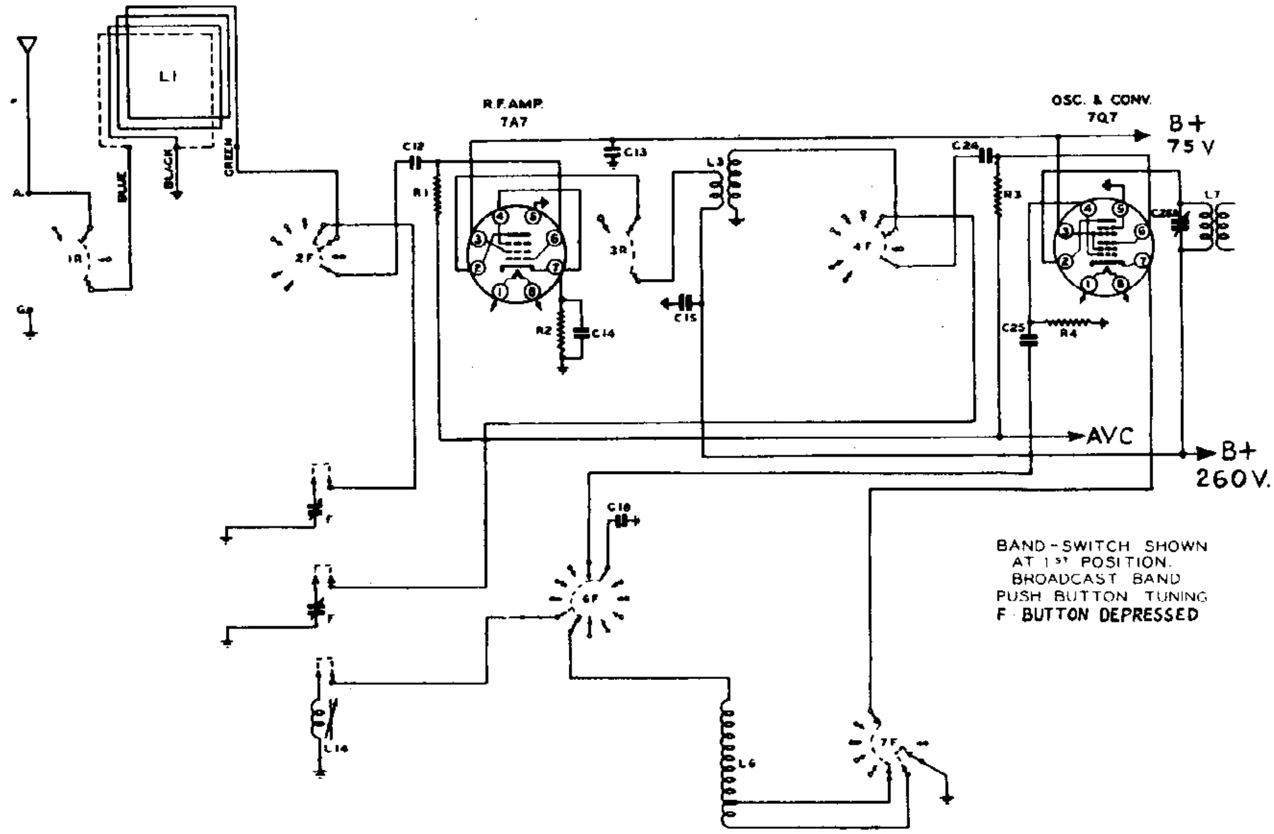
TUBE	FUNCTION	Voltage of Socket Prongs to Gnd. See Prong Nos. on Schematic Dia.								
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
7A7	R-F Amplifier	0	260	75	3.8	0	0	3.8	6.2*	-
7Q7	Osc - Converter	0	260	75	-2.3	0	0	0	6.2*	-
7A7	I.F. Amplifier	0	260	75	3	0	0	3	6.2*	-
7B6	2nd Det - AVC - 1st Audio	0	140	0	1.1	0	.5	.6	6.2*	-
7A4	Inverter	0	223	50	0	0	17	60	6.2*	-
7A4	Viso-Glo Amplifier	0	40	160	0	275	0	1.2	6.2*	-
6V6G	Power Amplifier	0	0	260	265	-17	-17.5	6.3*	0	-
6V6G	Power Amplifier	0	0	260	265	-17	265	6.3*	0	-
5Y3G	Rectifier	0	390	0	355*	0	355*	0	390	-
6AF6G	Viso-Glo	0	0	40	17	260	0	6.2*	0	-

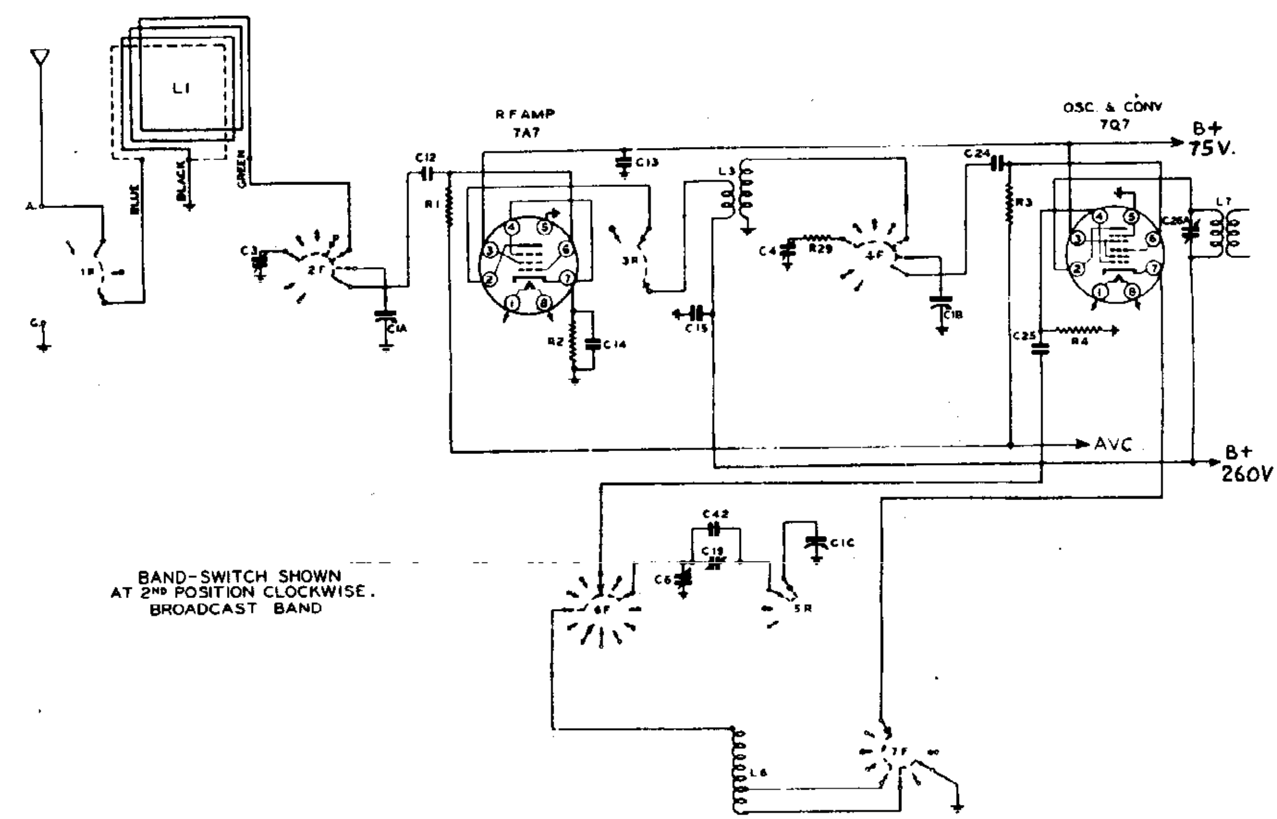
Notes: Voltage readings are for schematic diagram. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 20,000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter.

"clarified schematics"

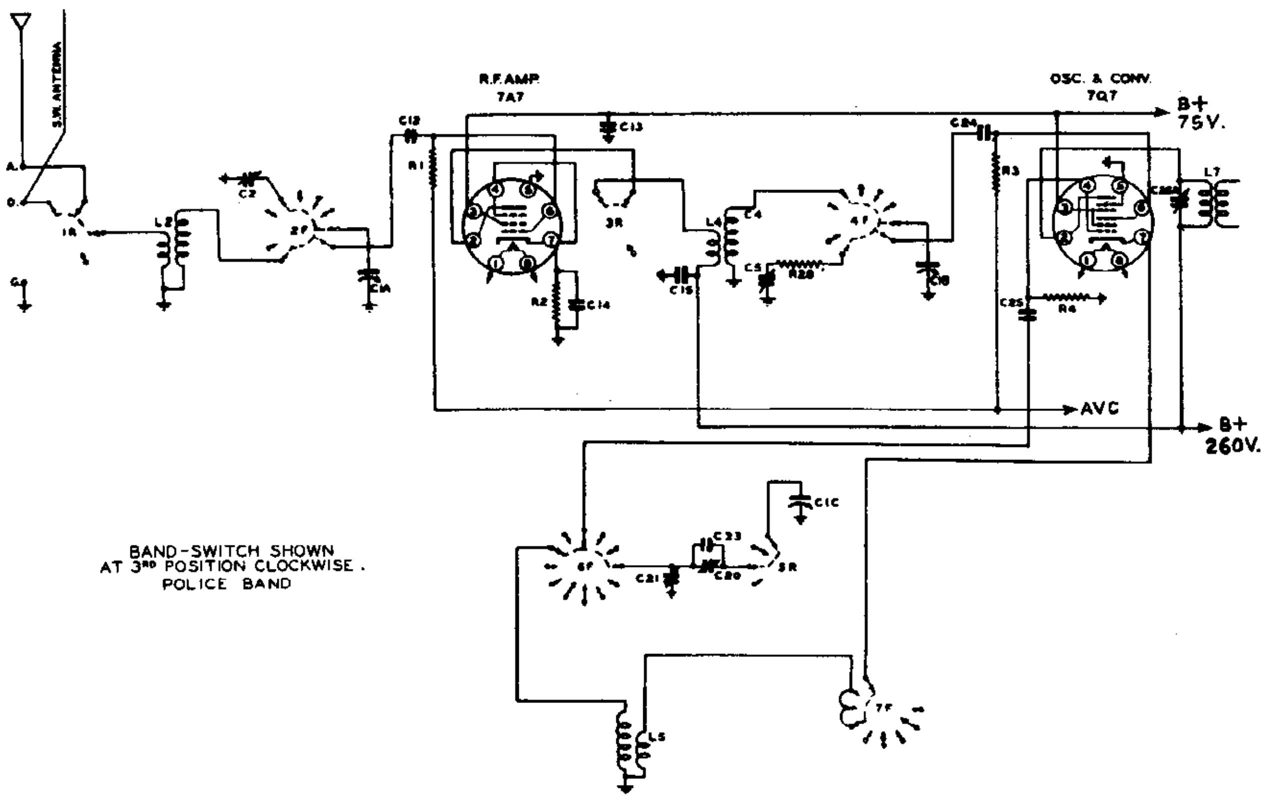
MODEL 10 series,
10-21

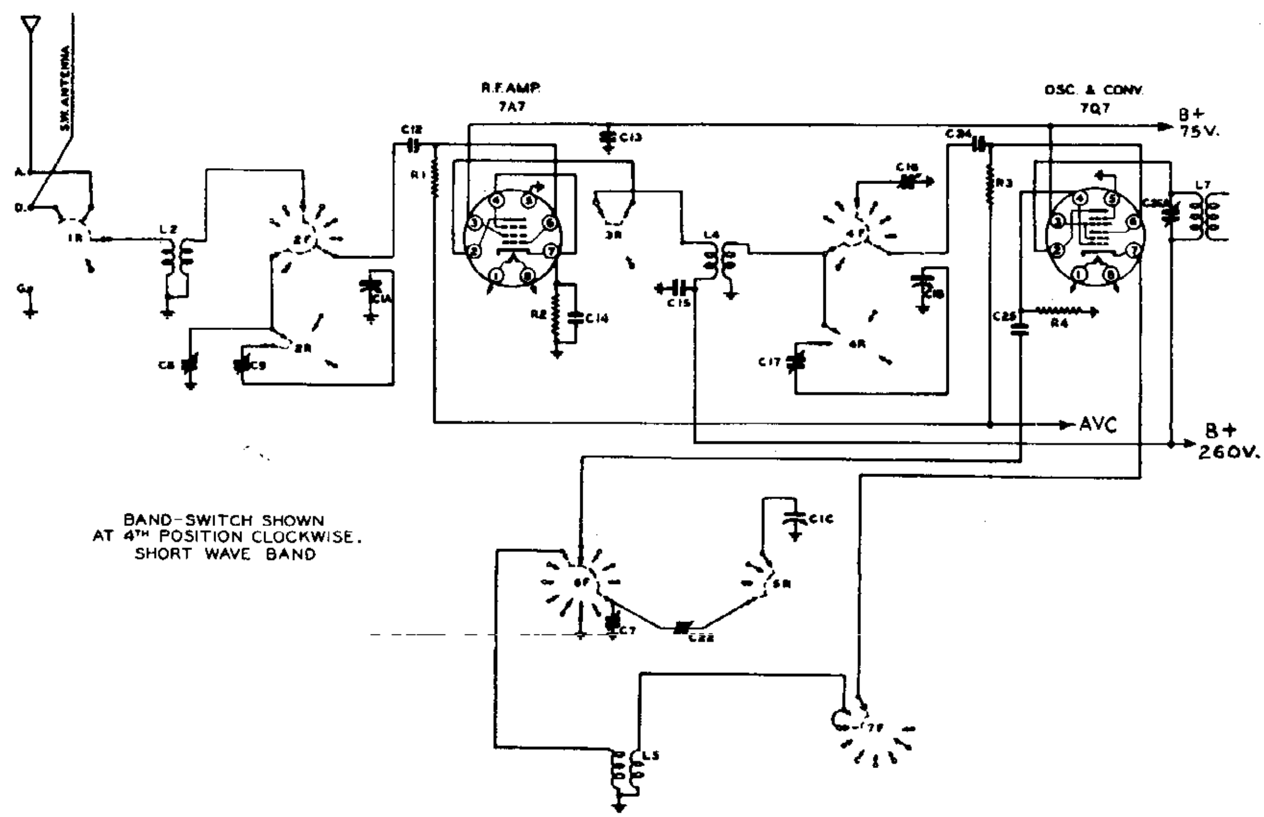
THE SPARKS-WITHINGTON CO.





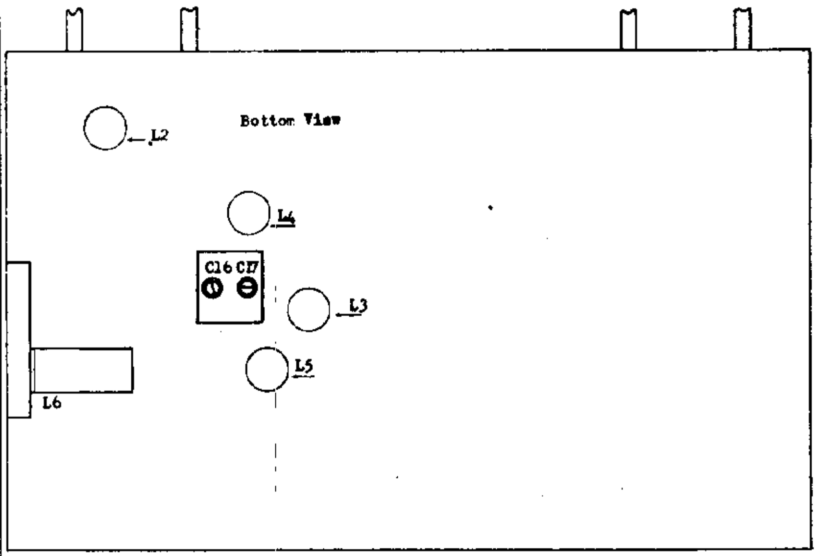
THE SPARKS-WITHINGTON CO.





MODEL 10 series, 10-21

THE SPARKS-WITHINGTON CO.

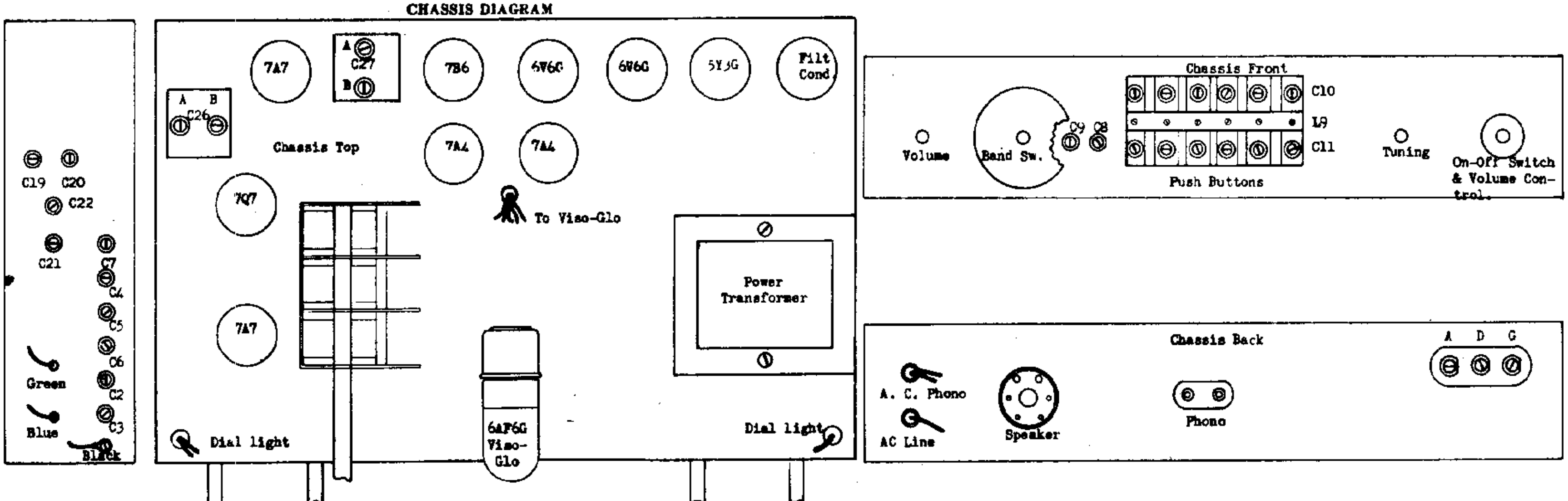


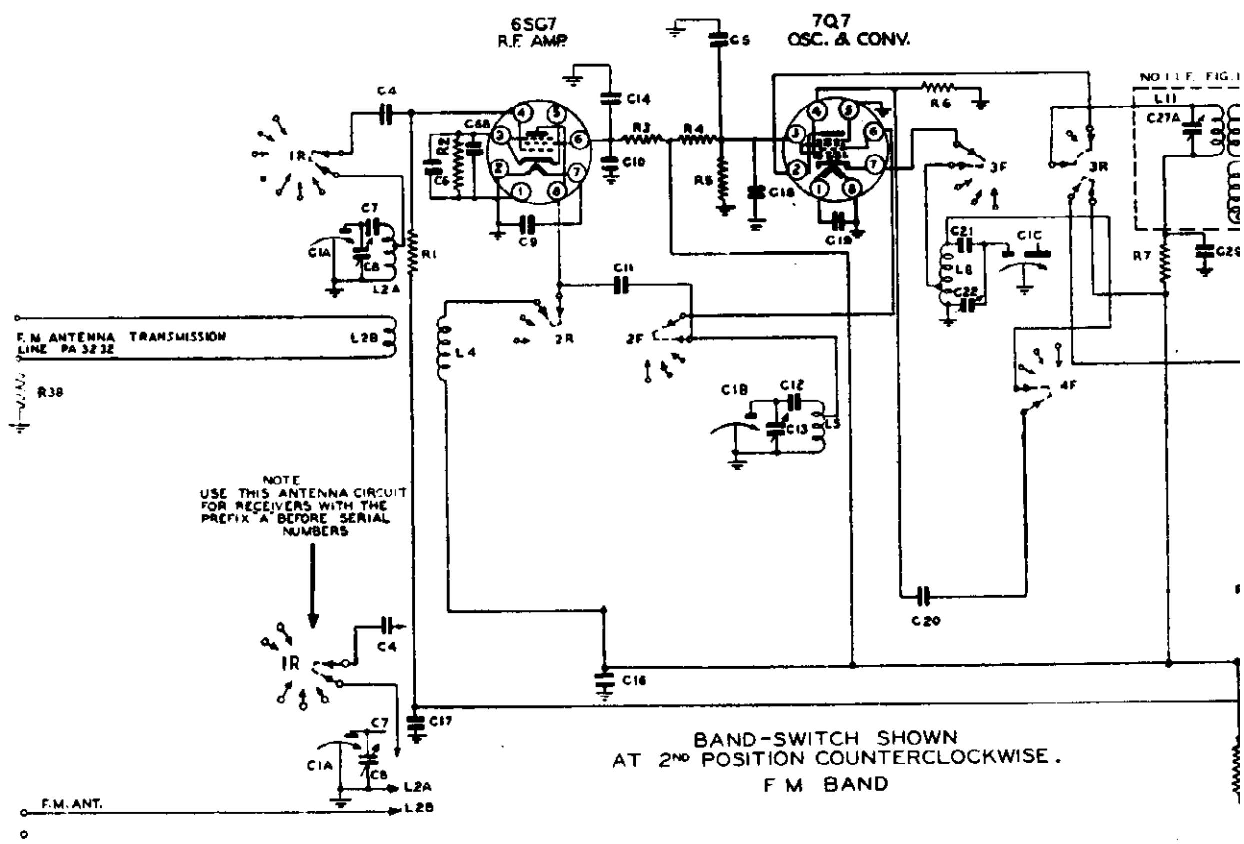
ALIGNMENT CHART

OPER-ATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANTENNA	GENERATOR FREQUENCY	BAND SWITCH SETTING	TUNING COND SETTING	TRIMMERS	REMARKS
1	Set dial pointer even with left hand stop line with condenser gang fully meshed.							
2	I.F.	*	.1 MFD	456 KC	BC	Open	C27 A&B	Peak accurately
3							C26 A&B	Peak accurately
4	Broadcast Band	ANT	See Note	1500 KC	BC	1500 KC	C6 Osc.	Peak accurately
							C4 R.F.	Peak accurately
							C3 Ant.	Peak accurately
5				600 KC	BC	600 KC	C19 Pad.	Rock **
6	Repeat operation 4.							
7	Check calibration and sensitivity at 600 KC, 1000 KC and 1500 KC.							
8	Police Band	ANT	See Note	7 MC	Police	7 MC	C21 Osc.	Peak accurately
							C5 R.F.	Peak accurately
							C2 Ant.	Peak accurately
9				2.5 MC	Police	2.5 MC	C20 Pad.	Rock **
10	Check calibration and sensitivity at 7 MC, 4 MC and 2.5 MC.							
11	Short Wave Band	ANT	See Note	11.7	SW	11.7	C7 Osc. Tr.	Peak accurately
							C16 RF Tr.	Rock **
							C8 Ant. Tr.	Rock **
12				9.3	SW	9.3	C22 Osc. "	Peak accurately
							C17 RF Pad	Rock **
							C9 Ant. "	Rock **
13	Repeat operation 12 as many times as necessary until additional gain cannot be obtained.							
14	Check calibration and sensitivity at 11.7 and 9.3.							
15	Check operations 1 to 14.							

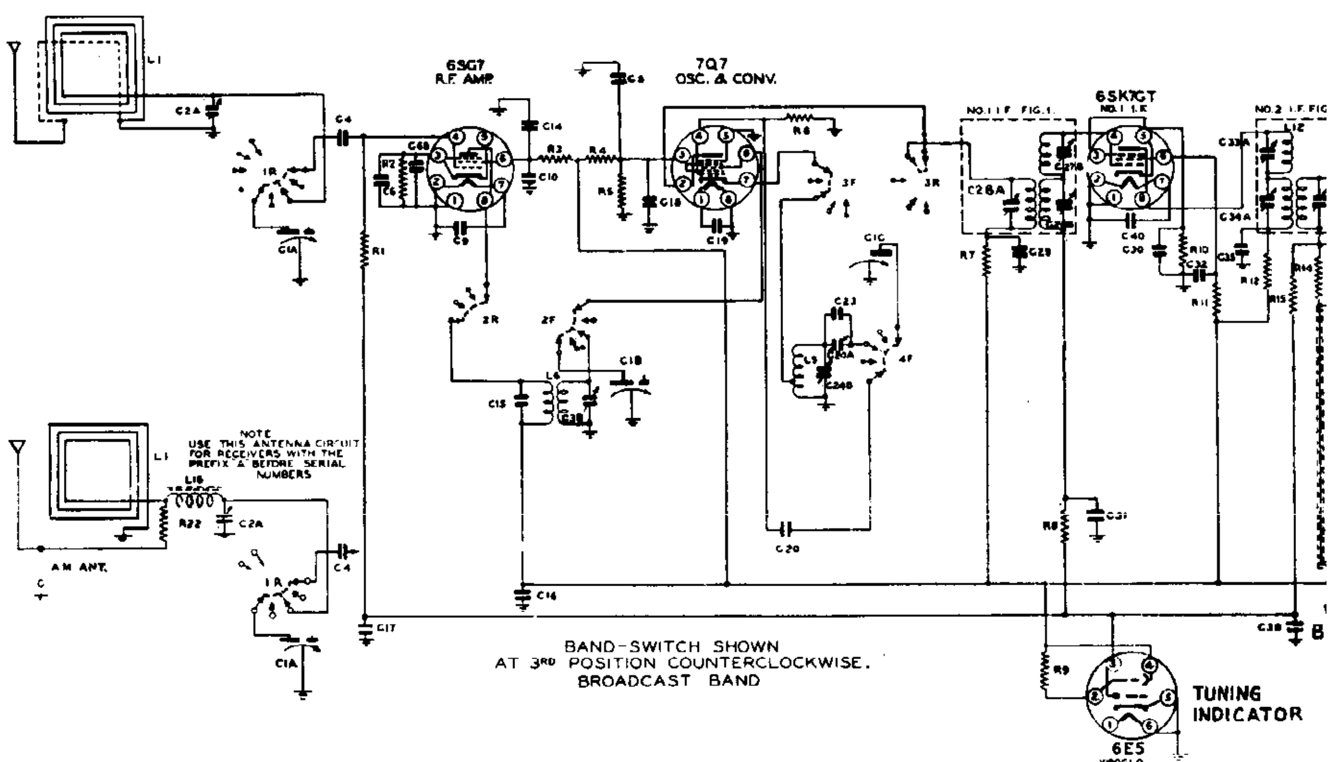
NOTES: Use dummy antenna as described on page 1.
*Connect generator to pin #6 on 7Q7 Oscillator Converter Tube.
**Rock dial while adjusting for maximum output.

CHASSIS DIAGRAM





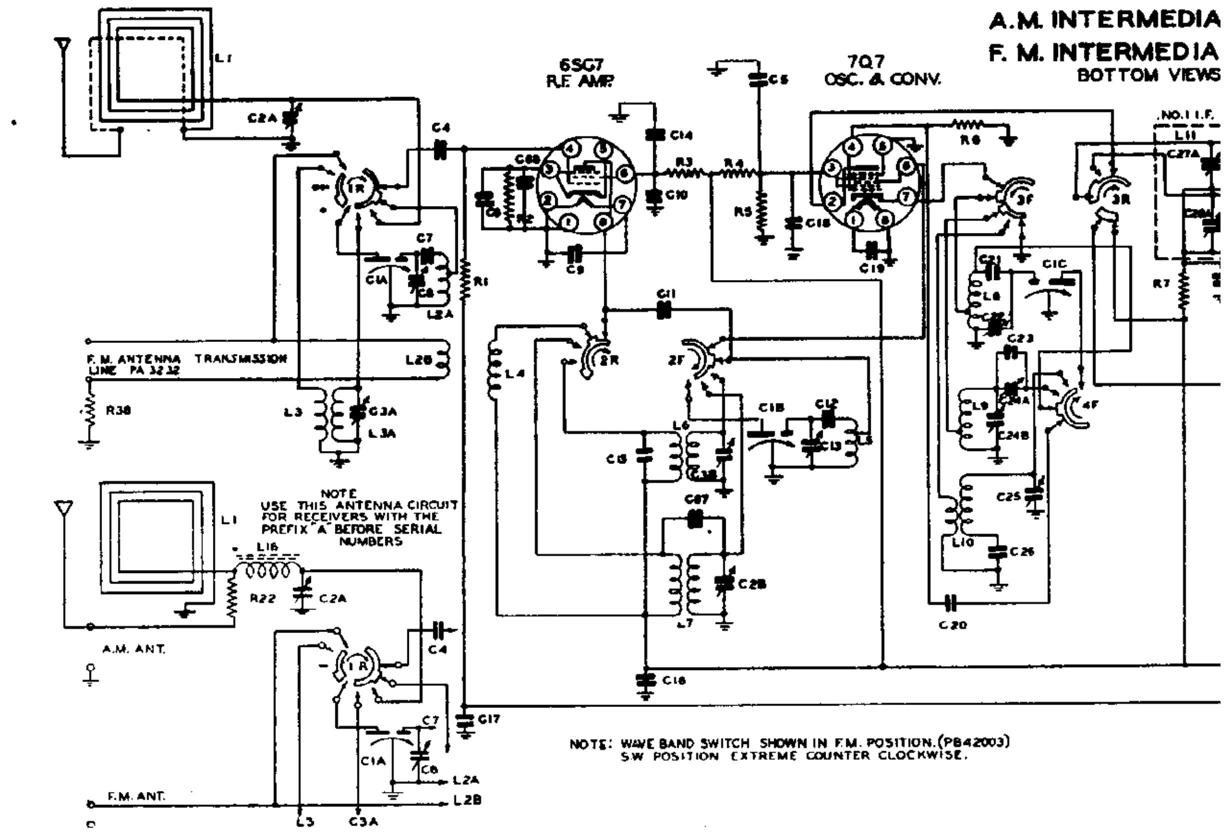
BAND-SWITCH SHOWN
AT 2ND POSITION COUNTERCLOCKWISE.
F M BAND



BAND-SWITCH SHOWN
AT 3RD POSITION COUNTERCLOCKWISE.
BROADCAST BAND

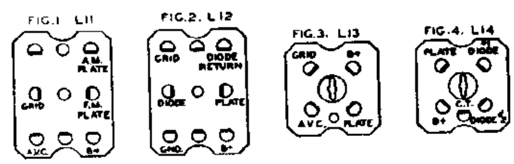
THE SPARKS

A.M. INTERMEDIA
F. M. INTERMEDIA
BOTTOM VIEWS



C1-A,B,C	3 GANG VARIABLE	PB40405
C2A	B.C. ANT. TRIMMER	PA 4377-1
C2B	S.W. R.F. TRIMMER	
C3A	S.W. ANT.	PA 4357-2
C3B	B.C. R.F.	
C4	51 MMF. MOLDED MICA	MC 60G-510
C5	8 MFD. 400 V. ELECTROLYTIC	PA 4303-4
C6	.05 MFD. 200 V. TUBULAR	PC 40GK-503
C7	46 MMF.	PA 4328-2
C8	F.M. ANTENNA TRIMMER	PA 4352-1
C9	.01 MFD. 200 V. MOLD. PAPER	PA 4325-1
C10	.05 " 400 V.	PC 40GL-503
C11	10 MMF. MOLDED MICA	MC 60F-100
C12	46 "	PA 4328-2
C13	F.M. R.F. TRIMMER	PA 4352-1
C14	1000 MMF. MOLDED MICA	MC 60G-102
C15	100 MMF. " "	MC 60F-101
C16	.05 MFD. 400 V. TUBULAR	PC 40GL-503
C17	.05 " 200 V. "	PC 40CR-503
C18	.01 " MICA	MC 61GL-103
C19	.01 " 200 V. MOLDED PAPER	PA 4325-1
C20	51 MMF. SILVER MICA	MC 62F-510
C21	80 MMF. CERAMIC	PA 4328-3
C22	F.M. OSC. TRIMMER	PA 4352-1
C23	100 MMF. MOLDED MICA	MC 60F-101
C24A	B.C. OSC. PADDER	AB 43500-36
C24B	" " TRIMMER	
C25	S.W. OSC. TRIMMER	PA 4352-3
C26	4500 MMF. PADDER	PA 4354-8
C27A, B	NO.1 I.F. TRIMMER (F.M.)	PA 4359-1
C28A, B	NO.1 I.F. TRIMMER (A.M.)	PA 4358-2
C29	.05 MFD. 400 V. TUBULAR	PC 40GL-503
C30	.02 " " "	PC 40GL-203
C31	.05 " 200 V. "	PC 40GK-503
C32	.05 " 400 V. "	PC 40GL-503
C33A,B	NO.2 I.F. TRIMMER (F.M.)	PA 4359-1
C34A,B	NO.2 I.F. TRIMMER (A.M.)	PA 4358-2
C35	.05 MFD. 400 V. TUBULAR	PC 40GL-503
C36	150 MMF. MOLDED MICA	MC 60F-151
C37	51 MMF. " "	MC 60F-510
C38	.005 MFD. 200 V. TUBULAR	PC 40FK-502
C39	.005 " 400 V. "	PC 40FL-502
C40	.01 " 200 V.	PC 40FK-103
C41	.005 MFD. 200 V. TUBULAR	PC 40FK-502
C42 A,B	NO. 3 I.F. TRIMMER	PA 4361
C43	.02 MFD. 400 V. TUBULAR	PC 40GL-203
C44	51 MMF. MOLDED MICA	MC 60F-510
C46 A,B,C	15-15-10 MFD. ELECT.	PA 4300-1
C47	24 MMF. MOLDED MICA	MC 60F-240
C48	51 " " "	MC 60F-510
C49	20 " " "	MC 65F-200
C50	.05 MFD. 400 V. TUBULAR	PC 40GL-503
C51	51 MMF. MOLDED MICA	MC 60F-510
C52	.001 MFD. 200 V. TUBULAR	PC 40GK-102
C53	20 MFD. 25 V. ELECT.	PA 4303-2
C54	.01 " 400 V. TUBULAR	PC 40FL-103
C55	.01 " " V. "	PC 40FL-103
C56	150 MMF. MOLDED MICA	MC 60F-151
C57	.02 MFD. 400 V. TUBULAR	PC 40GL-203
C58	24 MMF. MOLDED MICA	MC 64F-240
C59	20 MMF. " "	MC 65F-200
C60 A,B	DISCRIMINATOR TRIMMER	PA 4359-1
C61	20 MMF. MOLDED MICA	MC 65F-200
C62	.006 MFD. 600 V. TUBULAR	PC 40GM-602
C63	" " " V. "	PC 40GM-602
C64	100 MMF. MOLDED MICA	MC 60F-101
C67	4.7 MMF.	PA 4328-2
C68	.01 MFD.-200 V. MOLDED PAPER	PA 4325-1
C69	2.2 MMF.	PA 4326-1
C70	.002 MFD. 600 V. TUBULAR	PC 40GM-202
C71	.01 MFD. 200 V. TUBULAR	PC 40FK-103

R1	220,000	OHM	1/2 W	BR 12S-224
R2	200	"	"	BR 12G-201
R3	33,000	"	"	BR 12S-333
R4	10,000	"	2 W.	DR 12S-103
R5	18,000	"	1 W.	CR 12S-183
R6	20,000	"	1/2 W.	BR 12G-203
R7	1,000	"	"	BR 12S-102
R8	220,000	"	"	BR 12S-224
R9	1 MEGOHM		"	BR 12S-105
R10	330	OHM	"	BR 12G-331
R11	82,000	"	"	BR 12S-823
R12	1,000	"	"	BR 12S-102
R13	270,000	"	"	BR 12S-274
R14	47,000	"	"	BR 12S-473
R15	56,000	"	"	BR 12S-563
R16	82,000	"	"	BR 12S-823
R17	330	"	"	BR 12G-331
R18	1,000	"	"	BR 12S-102
R19	1 MEGOHM		"	BR 12S-105
R20	100,000	OHM	"	BR 12S-104
R21	.5 MEG. TONE CONTROL			PA 4400-8
R22				
R23	270,000	OHM	1/2 W.	BR 12S-274
R25	100,000	"	"	BR 12S-104
R26	"	"	"	BR 12S-104
R27	"	"	"	BR 12S-104
R28	240	"	2 W.	DR 12G-241
R29	2 MEGOHM VOLUME CONTROL			PA 4401-2
R30	10 MEGOHM		1/2 W.	BR 12S-106
R31	220,000	OHM	"	BR 12S-224
R32	15,000	"	"	BR 12S-153
R33	68,000	"	"	BR 12S-683
R34	"	"	"	BR 12S-683
R35	15,000	"	"	BR 12S-153
R36	27,000	"	"	BR 12S-273
R37	4,700	"	"	BR 12S-472
R38	150,000	"	"	BR 12S-154
R39	47,000	"	"	BR 12S-473



TERMINAL HOOKUP FOR L11, L12, L13 & L14. (BOTTOM VIEW)

FOR RECEIVERS WITHOUT PREFIX "A" BEFORE SERIAL NUMBERS.

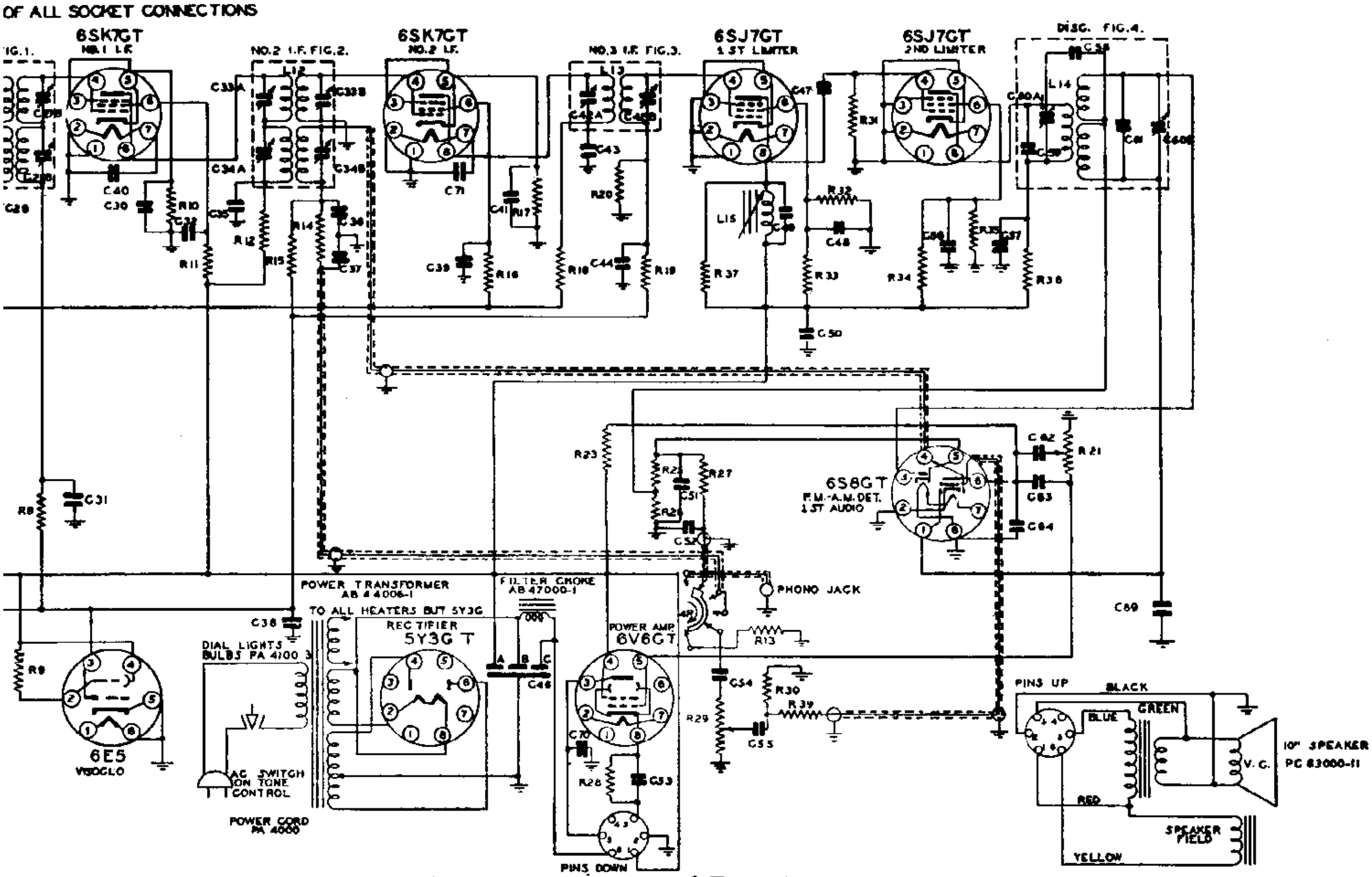
L1	LOOP ANTENNA ASSEMBLY	AB 43011-3
L2A	F.M. ANTENNA COIL (SECONDARY)	AA 6767-3
L2B	F.M. " " PRIMARY	AA 6786-1
L3	S.W. ANTENNA "	AA 6758-5
L4	HIGH FREQUENCY CHOKE COIL	AA 6769-1
L5	F.M. DET. COIL	AA 6787-2
L6	B.C. " "	AA 6758-2
L7	S.W. " "	AA 6760-4
L8	F.M. OSC. COIL	AA 6767-1
L9	B.C. " "	AA 6752-2
L10	S.W. " "	AA 6770-1
L11	NO. 1 I.F. COIL	AA 6803-1
L12	NO. 2 I.F. "	AA 6803-1
L13	NO. 3 I.F. "	AA 6804-1
L14	DISCRIMINATOR COIL	AA 6805-1
L15	LIMITER PLATE REACTOR COIL	AA 6785-1

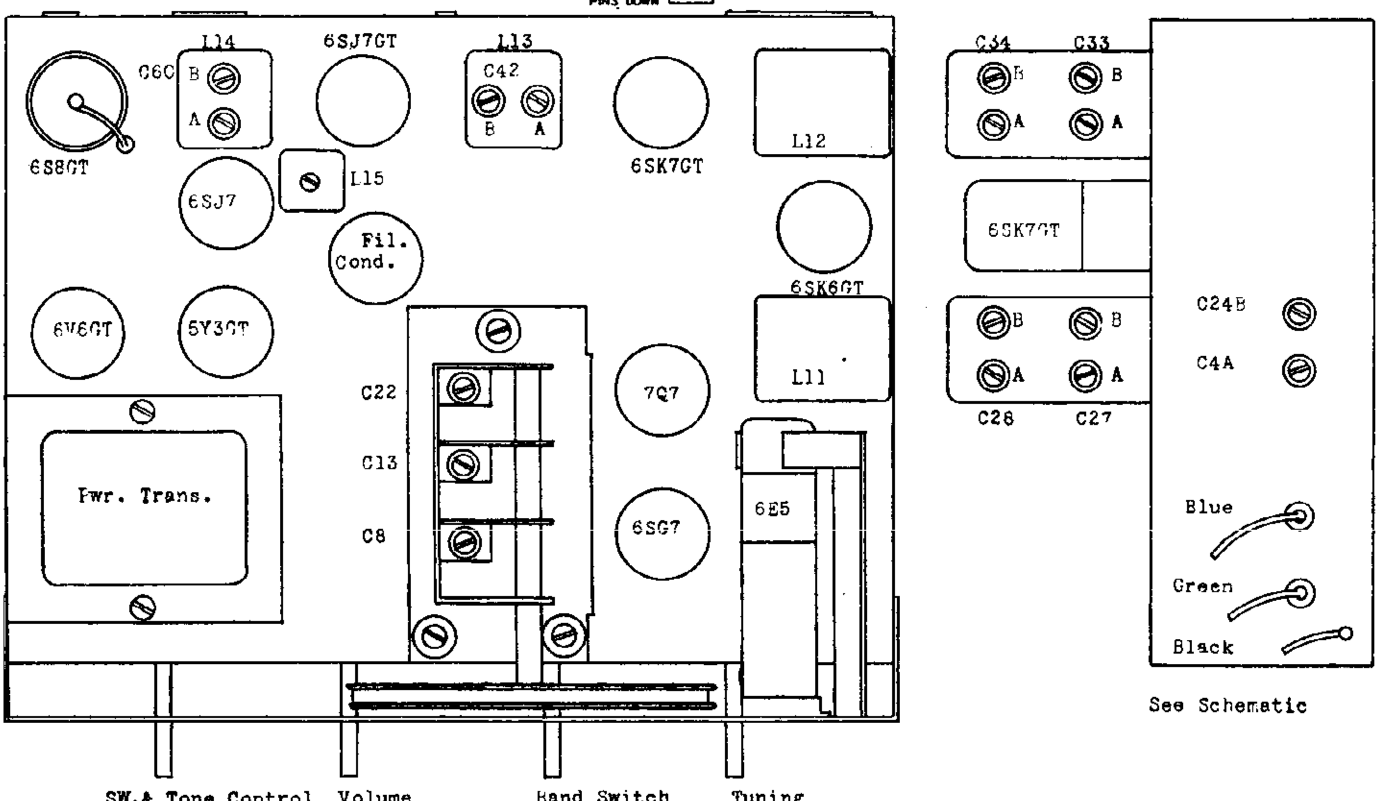
FOR RECEIVERS WITH THE PREFIX "A" BEFORE SERIAL NUMBERS.

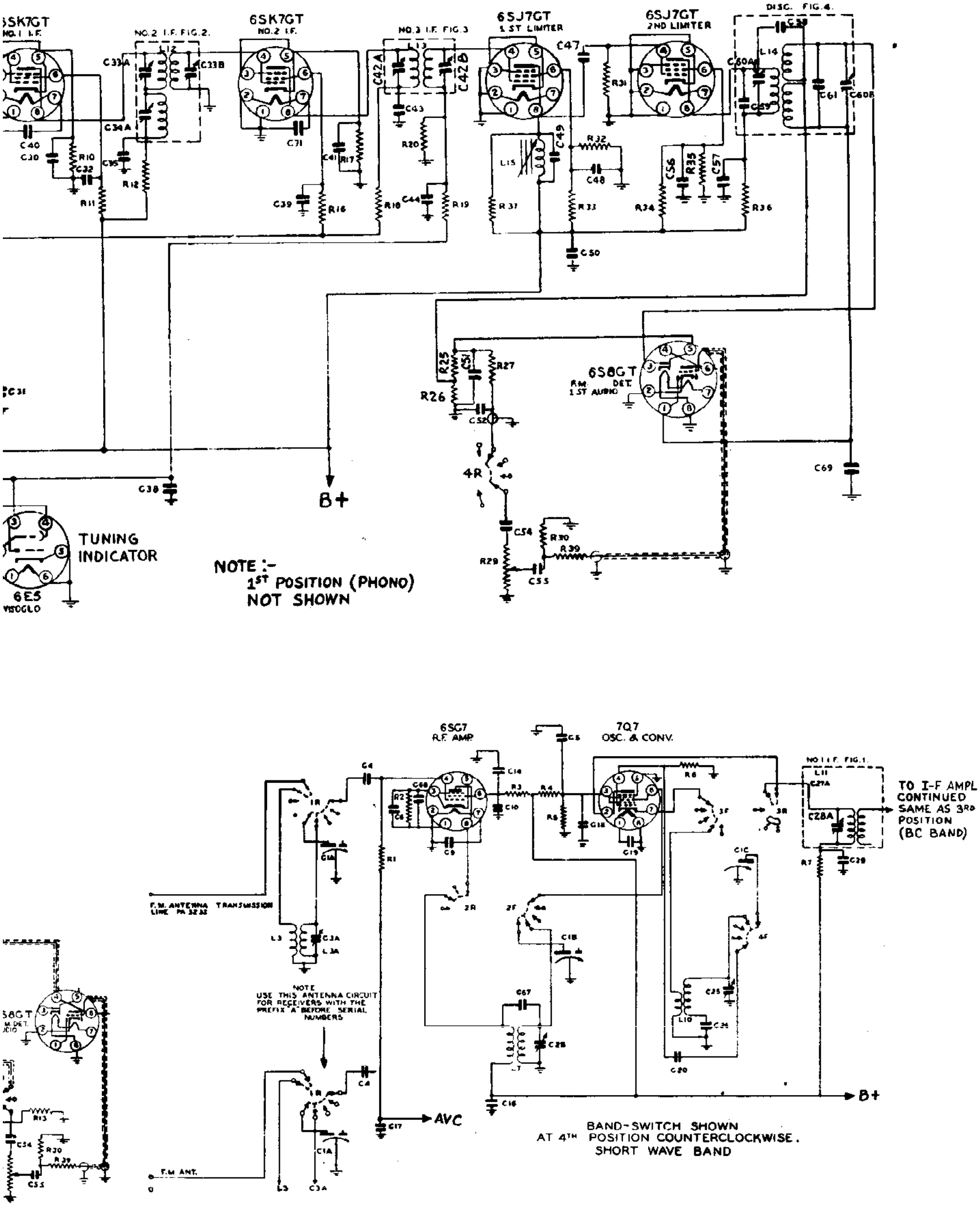
L1	LOOP ANTENNA ASSEM.	AB43011-6, AB43011-7
L3	S.W. ANT COIL ASSEM.	AA6758-6
L6	B.C. DET. COIL ASSEM.	AA6758-3
L7	S.W. DET. COIL ASSEM.	AA6760-5
L9	B.C. OSC. COIL ASSEM.	AA6752-5
L10	S.W. OSC. COIL ASSEM.	AA6770-2
L16	ANT. LOADING COIL ASSEM.	AA6780-1
C26	4290 MMF. CONDENSER	PA4354-9
R22	2200 OHMS 1/2 W.	BR125-222

-WITHINGTON CO.

TE FREQUENCY 456 K.C.
TE FREQUENCY 10.7 M.C.
OF ALL SOCKET CONNECTIONS






6SK7GT
NO. 1 I.F.
NO. 2 I.F. FIG. 2.
6SK7GT
NO. 2 I.F.
NO. 3 I.F. FIG. 3
6SJ7GT
1 ST LIMITER
6SJ7GT
2ND LIMITER
DISC. FIG. 4.
6S8GT
F.M. DET.
1 ST AUDIO
B+
TUNING
INDICATOR
6E5
NOTE :-
1ST POSITION (PHONO)
NOT SHOWN
6SG7
R.F. AMP
7Q7
OSC. & CONV.
NO. 1 I.F. FIG. 1.
TO I-F AMPL
CONTINUED
SAME AS 3RD
POSITION
(BC BAND)
F.M. ANTENNA TRANSMISSION LINE
NOTE
USE THIS ANTENNA CIRCUIT
FOR RECEIVERS WITH THE
PREFIX A BEFORE SERIAL
NUMBERS
AVC
B+
BAND-SWITCH SHOWN
AT 4TH POSITION COUNTERCLOCKWISE.
SHORT WAVE BAND
F.M. ANT.

ALIGNMENT CHART

OPER-ATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANT.	GENERATOR FREQUENCY	BAND SWITCH SETTING	TUNNING COND. SETTING	TRIMMER	REMARKS
1	Set dial pointer even with left-hand stop line with condenser closed.							
2	A.M.-I.F.	Pin #6 of 7Q7 Convt. Tube	.02 MFD Cond.	456 KC.	BC.	Open	C34A & B C28A & B	Peak Accurately " "
3	BC. R.F.	BC. ANT.	*	1600 KC.	BC.	1600 KC.	C24B Osc.T.	" "
4				1500 KC.		1500 KC.	C3B R.F.TR. C2A Ant.TR.	" " " "
5				600 KC.		600 KC.	C24A Osc. P.	**
6	Repeat operations 3, 4, & 5.							
7	Check calibrations at 600 KC., 1000 KC., and 1500 KC.							
8	S.W. BAND	F.M. ANT. to GND.	*	18 MC.	S.W. BAND	18 MC.	C25 Osc.Tr. C2B R.F.Tr. C3A Ant.Tr. C26 Osc. P.	Peak Accurately ** ** See Oper. #9
9	C26 Osc. Padder is precision set at the factory and should not be moved.							
10	Repeat operation #8.							
11	Check calibration at 6 MC. and 18 MC.							
12	SPECIAL NOTE: For complete F.M.-I.F. visual alignment instructions see pages 17-12, 17-13, and 17-14 An alternate F.M.-I.F. alignment using a V.T.V.M. is shown in operations 13, 14, 15, 16, 17, and 18 below.							
13	LIMITER	Pin No. 4 on 1st Lim. Tube.	.02 MFD. Cond.	10.7 MC. Unmod.	F.M.	Optional	L15 Slug	***
14	Disc. Stage Pri.	Pin #4 on 1st limiter to Gnd.	.02 MFD. Cond.	10.7 MC. Unmod.	F.M.	Optional	C60A Disc. Prim.	***
15	Disc. Stage Sec.	Pin #4 on 1st Limiter to Gnd.					C60B Disc. Sec.	See Note 1.
16	F.M.-I.F.	Note "A"	.02 MFD. Cond.	10.7 MC. Unmod.	F.M.	10.7 MC.	C42A & B No. 3. I.F.	See Note 2.
17		Note "B"					C33A & B No. 2 I.F.	" " "
18		Note "C"					C27A & B No. 1 I.F.	" " "
19	F.M.-R.F.	F.M. Ant.	270 OHMS	108 MC. Unmod.	F.M.	108 MC. 300 Channel	C22 Osc.Tr. C13 R.F.TR. C8 Ant.Tr.	" " " " " " " " "
20	Repeat operation 19.							
21	Check calibration at 200, 250, and 300 channels.							

NOTE: The F.M.-I.F. alignment proceedure shown above is made with a measurements vacuum tube voltmeter.
- * Use dummy antenna
- ** Rock dial while adjusting for maximum output.
- *** Connect V.T.V.M. from C.T. of discriminator coil to chassis gnd. using lowest scale on D.C. range. Adjust for maximum reading.

NOTE 1: Connect V.T.V.M. from pin #5 of 6S8GT tube to gnd. adjust for zero reading on V.T.V.M.

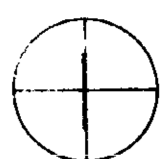
NOTE 2: Connect V.T.V.M. between A.V.C. terminal on #3 I.F. Trans. to gnd. Tune for maximum response on lowest scale D.C. range.
"A" Connect signal generator between pin #4 on No. 2 I.F. tube and gnd.
"B" Connect signal generator between pin #4 on No. 1 I.F. tube and Gnd.
"C" Connect signal generator between pin #6 on 7Q7 converter tube and gnd.

F.M. I.F. ALIGNMENT

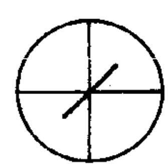
In that the alignment of the I.F. stages of an F.M. receiver is inherently far more critical than is the case in the conventional A.M. receiver the visual method using an oscilloscope and frequency modulated signal generator should be used where such equipment is available. In case this equipment is not available any good signal generator providing a stable signal at 10.7 Mc. may be used providing a vacuum tube voltmeter and zero center voltmeter are used in place of the output meter. Both methods are outlined below.

Visual Alignment of F.M.-I.F. Transformers and Discriminators.

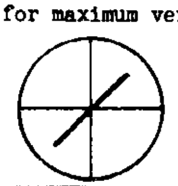
1. Equipment required.
   (a) Cathode ray oscilloscope with both vertical and horizontal amplifiers and preferably with calibrated screen.
   (b) Frequency modulated signal generator providing sweep width up to approximately 400 Kc., preferably variable. The modulation voltage should be available at terminals to syncronize the oscilloscope sweep.
   (c) Insulated alignment tools and shielded leads for the scope and signal generator.
2. Preliminary adjustments.
   (a) Set the signal generator for a center frequency of 10.7 Mc. and allow sufficient warm up time for the generator to stabilize. It is very important that the frequency remain at exactly 10.7 Mc. throughout the entire alignment procedure. A shift in frequency during alignment might result in stagger tuning with consequent impairments of receiver performance.
   (b) Turn the oscilloscope on and after focusing the beam for the smallest spot of desired brilliance, center the spot exactly.
   (c) Connect syncronize or sweep terminals of signal generator to the horizontal input post on the oscilloscope.
3. Alignment of plate reactor and discriminator.
   (a) Connect output from signal generator to pin #4 of 1st limiter tube (6SJ7GT).
   (b) Connect output cable from pin #5 of 6S8GT tube to the vertical input terminals on the scope.
   (c) With the sweep or modulation control off advance the R.F. control on the signal generator to give a trace approximating Fig. 1.



   (d) If the sweep control is now advanced the trace will tilt like Fig. 2.



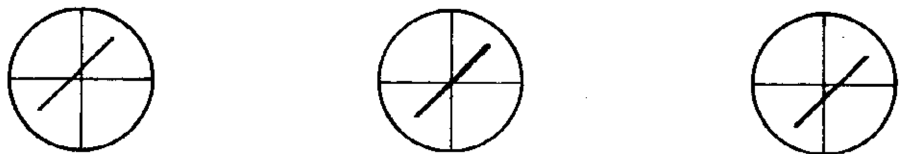
   (e) Adjust core in L15 plate reactor for maximum vertical deflection. Note that the length of trace increases as Fig. 3.



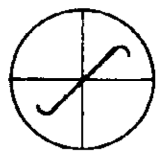
ALIGNMENT DATA

(f) Align discriminator transformer by adjusting primary C60A for maximum vertical deflection, meanwhile keeping the trace in the exact center of the screen by adjusting secondary C60B. See Fig. 4.

Fig. 4



When the discriminator has been properly aligned and the generator sweep increased to about 400 Kc. the conventional shaped discriminator curve will be presented on the screen. See Fig. 5.



This presentation will be helpful for final alignment and balance of the discriminator transformer. Make sure that the straight center position crosses the exact center of the screen and that the distance from the vertical center line to each peak is approximately equal.

4. Alignment of #3 I.F. Transformer

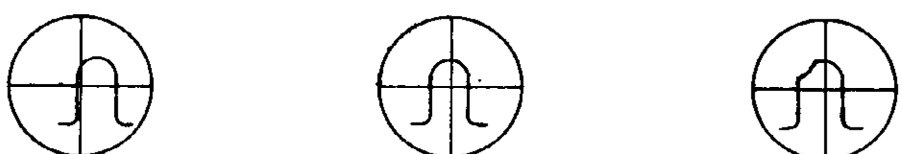
(a) Connect input from signal generator to pin #4 on No. 2 I.F. amplifier tube (6SK7GT).

(b) Connect output cable from AVC terminal on #3 I.F. transformer to the vertical terminals on the scope using a 50 K ohm isolating resistor at the set end of the cable.

(c) With generator sweep width set for approximately 400 Kc. increase R.F. output until a convenient pattern is presented on the screen.

(d) Adjust C42A and C42B for maximum vertical deflection with a symmetrical curve. See Fig. 6.

Fig. 6



5. Alignment of No. 2 I.F. Transformer

(a) Connect input from signal generator to pin #4 of No. 1 I.F. tube (6SK7GT). The output connection remains at the AVC terminal of the 3rd I.F. transformer.

(b) Align C33A and C33B per instructions and diagram in (c) and (d) above.

6. Alignment of No. 1 I.F. Transformer

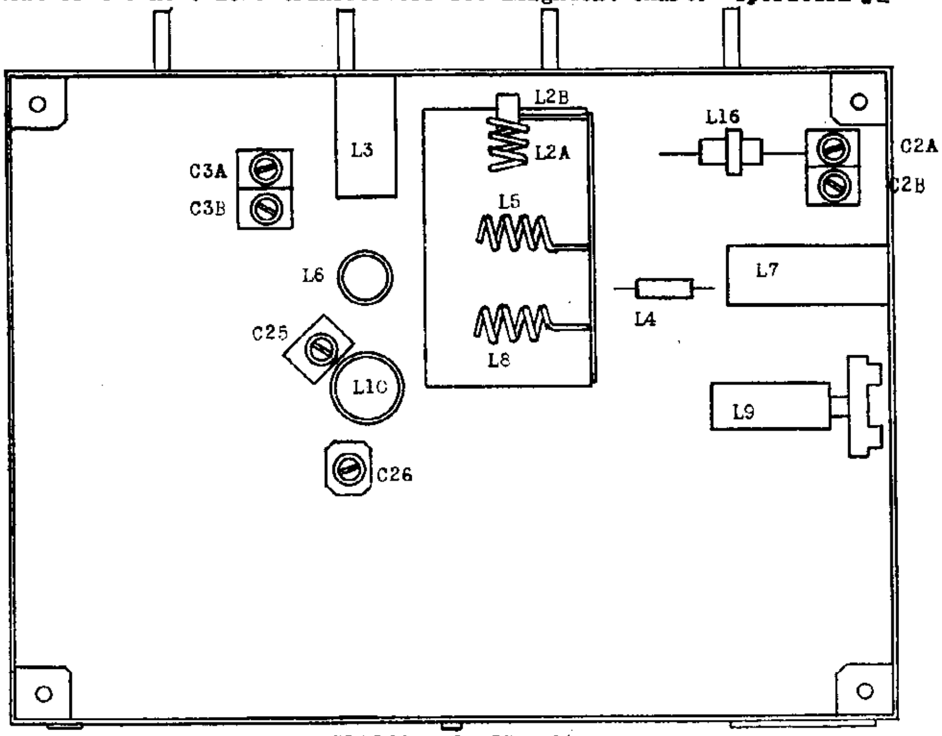
(a) Connect input from signal generator to Pin #6 on the converter tube (7Q7). (Note: There will be an apparent reduction in gain here due to the short circuiting effect of the F.M. detector coil but this may be compensated for by increasing the generator output. If the generator output is still too low the lead from 7Q7 pin #6 to the wave band switch may be unsoldered thus removing the short circuit).

ALIGNMENT DATA

(b) Align C27A and C27B per instructions in (c) and (d) Par. 4. See Fig. 6.

7. Caution: Do not try to "touch up" or worse yet completly align the I.F. channel by applying the signal to the converter grid. To do so will almost certainly result in misalignment of one stage to compensate for the poor alignment of another.

8. For alignment of the A.M.-I.F. transformers see alignment chart. Operation #2



VOLTAGE CHART

Line Voltage: 117 Volts AC

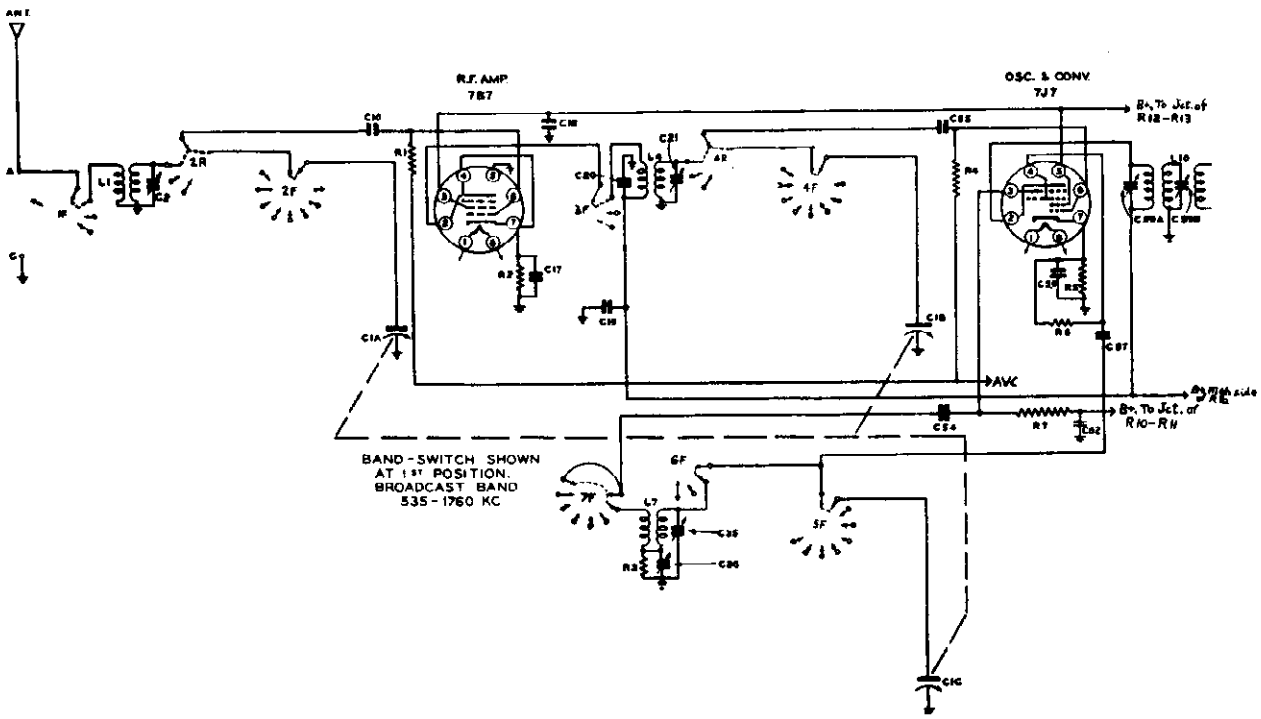
Position of volume control: Full with set tunned to quiet channel.

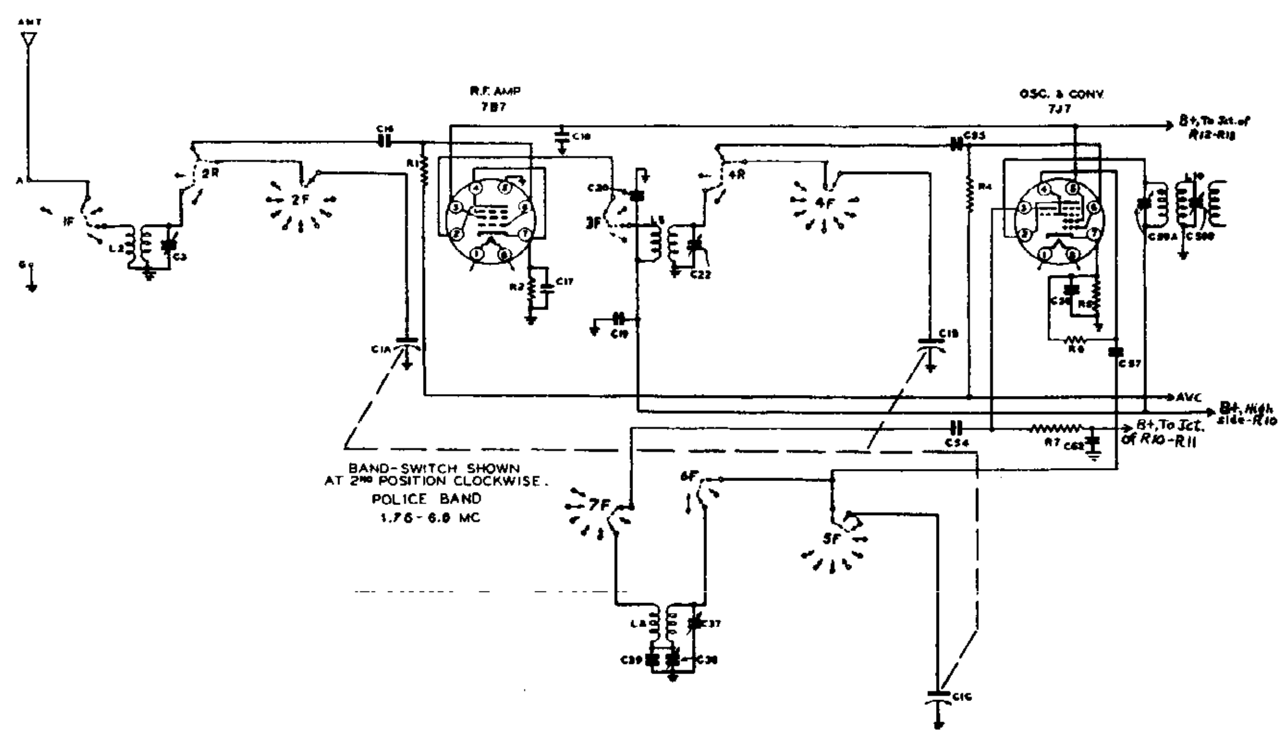
Position of Band Switch: Broadcast with the exception ***.

TUBE	FUNCTION	Voltage of Socket Prongs to Ground See Prong Nos. on schematic.								
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	Grid Cap
6SG7	R. F. Amplifier	0	0	2.20	.10	2.20	155	6.0*	270	
7Q7	Osc. & Convt.	6.05*	270	110	-9.8	0	**	0	0	
6SK7GT	No. 1 I. F. Amp.	0	0	3.0	**	3.0	95	6.05*	270	
6SK7GT	No. 2 I. F. Amp. ***	0	0	3.0	**	3.0	***	6.05*	270	
6SJ7GT	1st Limiter	0	0	0	-.3	0	46	6.05*	270	
6SJ7GT	2nd Limiter	0	0	0	-.42	0	47	6.05*	207	
6S8GT	F.M.-A.M.Det. 1st Audio	-.20	0	-.20	-.30	**	95	6.05	0	-.27
6V6G	Power Amp.	0	0	260	270	**	****	6.05*	12.5	
5Y3GT	Rectifier	0	375	0	360*	0	360*	360	375	
6E5	Viso-Glo	5.95*	23	-4.4	270					

NOTES: Voltage readings are for schematic diagram Allow 15% ≠ or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 20,000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are ≠ DC voltages.

* AC volts.
** Cannot be measured with 20,000 ohms per volt voltmeter.
*** Band switch in F.M. position.
**** Zero volts or 237 volts. (Tie point only on some receivers).

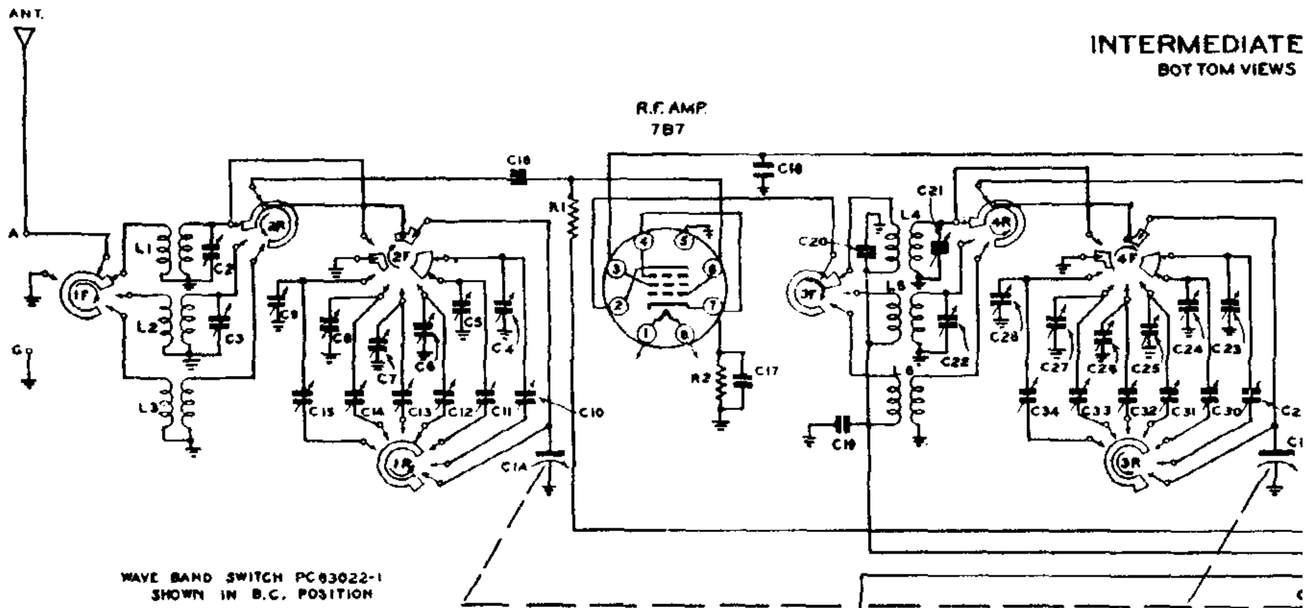

ANT
A
G
R.F. AMP 7B7
OSC. & CONV. 7J7
B+, To Jct. of R12-R13
AVC
B+, To Jct. of R10-R11
BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND 535-1760 KC


ANT
A
G
R.F. AMP 7B7
OSC. & CONV. 7J7
B+, To Jct. of R12-R13
AVC
B+, High side-R10
B+, To Jct. of R10-R11
BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE. POLICE BAND 1.76-6.8 MC

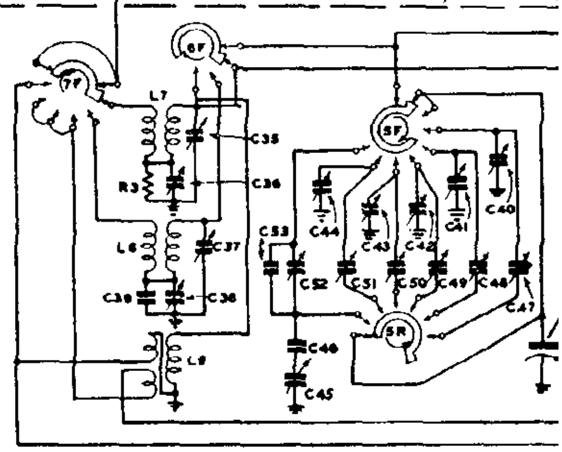
THE SPARKS

INTERMEDIATE

BOT TOM VIEWS



WAVE BAND SWITCH PC63022-1
SHOWN IN B.C. POSITION



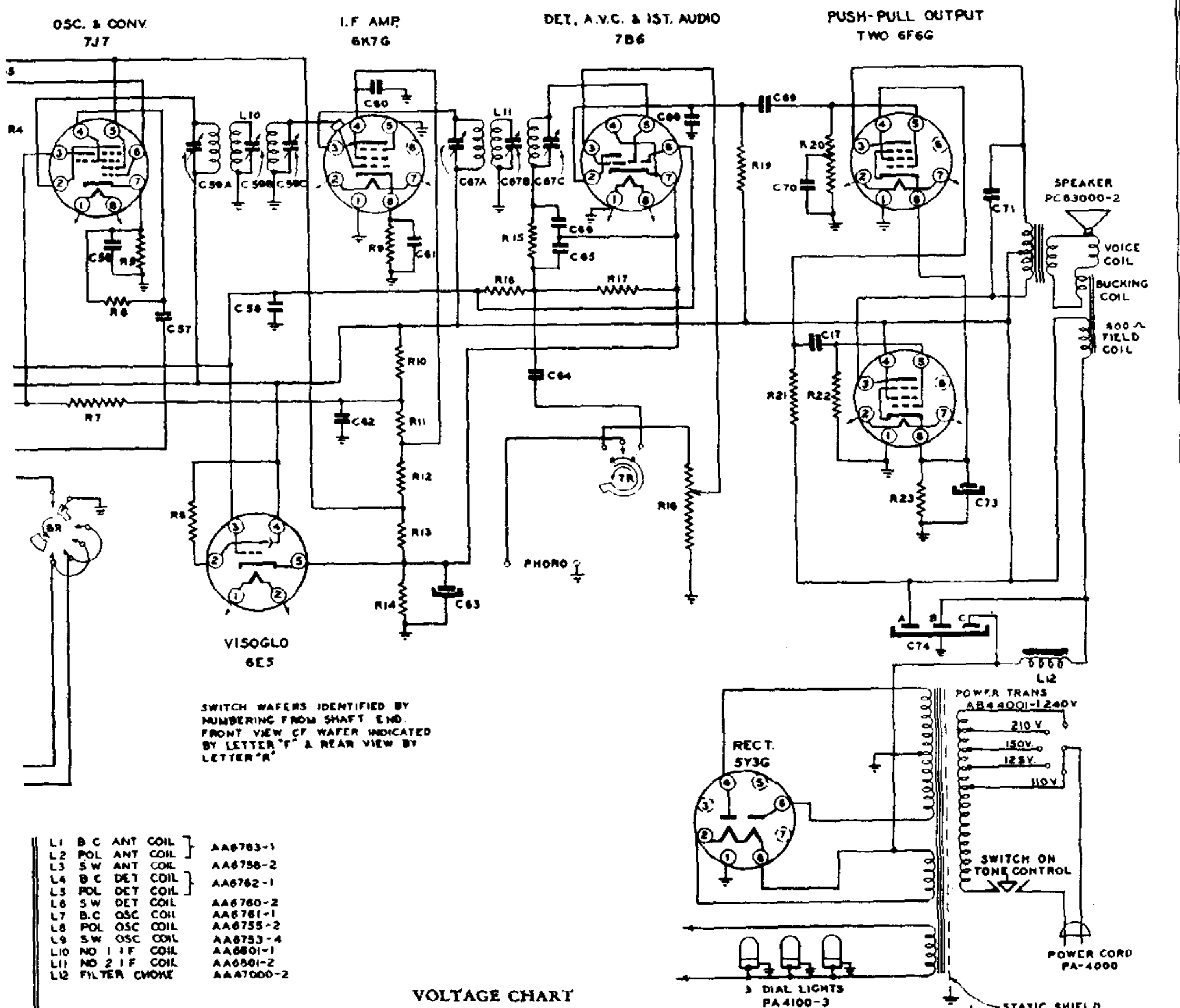
C1A,B & C	VARIABLE CONDENSER	PB-40401
C2	170-560 M BAND ANT TRIMMER	AB43503-1
C3	50-170 M " " "	AB43503-1
C4	49 M. " " "	PA4358-3
C5	30 M. " " "	PA4358-3
C6	25 M. " " "	PA4358-3
C7	20 M. " " "	PA4358-4
C8	16 M. " " "	PA4358-4
C9	13 M. " " "	PA4358-4
C10	49 M. BAND PADDING COND.	PA4358-1
C11	30 M. " " "	PA4358-1
C12	25 M. " " "	PA4358-1
C13	20 M. " " "	PA4358-2
C14	16 M. " " "	PA4358-2
C15	13 M. " " "	PA4358-2
C16	240 MMF. MICA.	MC-60E-241
C17	.05 MFD. 400 V.	PC40GL503
C18	.05 MFD. 600 V.	PC4HM503
C19	.05 MFD. 600 V.	PC40HM503
C20	.05 MFD. 600 V.	PC40HM503
C21	170-560 M. BAND DET. TRIMMER	AB43503-11
C22	50-170 M. " " "	AB43503-11
C23	49 M. " " "	PA4358-3
C24	30 M. " " "	PA4358-3
C25	25 M. " " "	PA4358-3
C26	20 M. " " "	PA4358-4
C27	16 M. " " "	PA4358-4
C28	13 M. " " "	PA4358-4
C29	49 M. " " PADDER	PA4358
C30	30 M. " " "	PA4358
C31	25 M. " " "	PA4358
C32	20 M. " " "	PA4358-2
C33	16 M. " " "	PA4358-2
C34	13 M. " " "	PA4358-2
C35	170-560 M. BAND OSC TRIMMER	AB43503-26
C36	170-560 M. " " PADDER	AB43503-26
C37	50-170 M. " " TRIMMER	AB43503-26
C38	50-170 M. " " PADDER	AB43503-26
C39	1100 MMF. MICA	MC-61F-112
C40	49 M. BAND OSC. TRIMMER	PA4358-3
C41	30 M. " " "	PA4358-3
C42	25 M. " " "	PA4358-3
C43	20 M. " " "	PA4358-4
C44	16 M. " " "	PA4358-4
C45	13 M. " " "	PA4358-4
C46	51 MMF. COMPENSATING COND.	CC30H510C
C47	49 M. BAND OSC PADDER	PA4358-1
C48	30 M. " " "	PA4358-1
C49	25 M. " " "	PA4358-1
C50	20 M. " " "	PA4358-2
C51	16 M. " " "	PA4358-2
C52	13 M. " " "	PA4358-2
C53	20 MMF COMPENSATING COND.	CC30H200F

C54	240 MMF COMPENSATING COND	CC30H241F
C55	240 MMF. MICA	MC-60E-241
C56	.05 MFD 400 V	PC40GL503
C57	100 MMF COMPENSATING COND	CC30H101F
C58	.05 MFD 400 V	PC40GL503
C59ABC	NO. 1 I.F. TRIMMER	PA4375
C60	.05 MFD 600 V	PC40HM503
C61	.05 MFD. 400 V	PC4GL503
C62	.01 MFD. 600 V	PC40HM103
C63	50 MFD 25 V ELECTROLYTIC	PA4303-3
C64	.02 MFD. 400 V.	PC40FL203
C65	100 MMF. MICA	MC60F-101
C66	100 MMF. MICA	MC60F-101
C67ABC	NO. 2 I.F. TRIMMER	PA4375
C68	100 MMF. MICA	MC-60F-101
C69	.05 MFD. 600 V	PC40GM503
C70	.003 MFD. 600 V.	PC40GM302
C71	.003 MFD 600 V.	PC40GM302
C72	.05 MFD. 600 V	PC40GM503
C73	20 MFD. 25 V ELECTROLYTIC	PA4303-2
C74 A	15 MFD 450 V. ELECTROLYTIC	PA4300-1
C74 B	10 MFD 450 V. ELECTROLYTIC	PA4300-1
C74 C	15 MFD. 450 V. ELECTROLYTIC	PA4300-1

R1	2.2 MEGOHM	.5W	BR12S-2
R2	1000 Ω	.5W	BR12S-1
R3	15,000 Ω	.5W	BR12S-1
R4	1 MEGOHM	.5W	BR12S-1
R5	1200 Ω	.5W	BR12S-1
R6	56,000 Ω	.5W	BR12S-
R7	22,000 Ω	.5W	BR12S-
R8	1 MEGOHM	.5W	BR12S-1
R9	620 Ω	.5W	BR12S-
R10	12,000 Ω	2W	DR12S-1
R11	6800 Ω	1W	CR12S-
R12	6800 Ω	1W	CR12S-
R13	16,000 Ω	2W	DR12G-
R14	220 Ω	.5W	BR12G-
R15	56,000 Ω	.5W	BR12S-
R16	1 MEGOHM	.5W.	BR12S-
R17	560,000 Ω	.5W	BR12S-
R18	2 MEGOHM VOL CONT		PA440
R19	270,000 Ω	.5W.	BR12S-2
R20	5 MEG. TONE CONT & S.W.		PA4400
R21	2000 Ω	.5W.	BR12G-2
R22	470,000 Ω	.5W.	BR12S-
R23	240 Ω	2W	BR12G-

VITHINGTON CO.

'REQUENCY 456 K.C.
ALL SOCKET CONNECTIONS



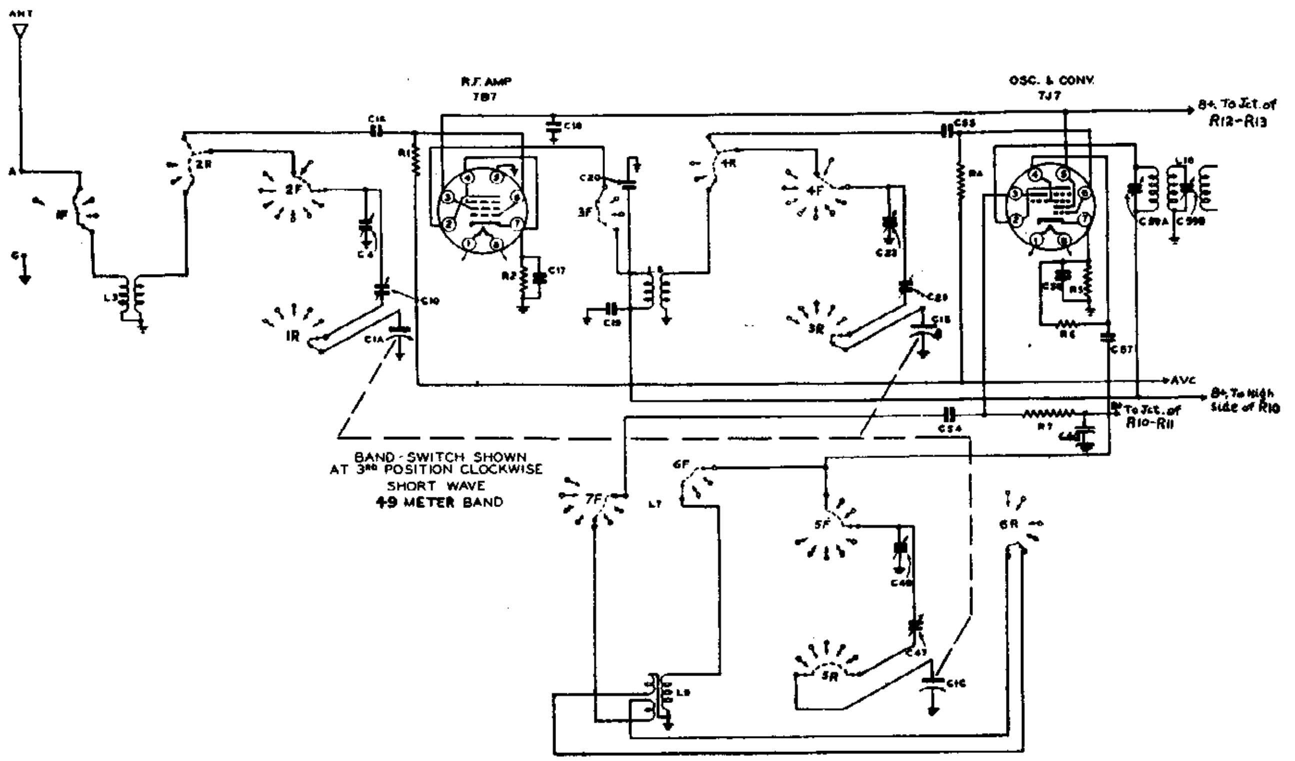
VOLTAGE CHART

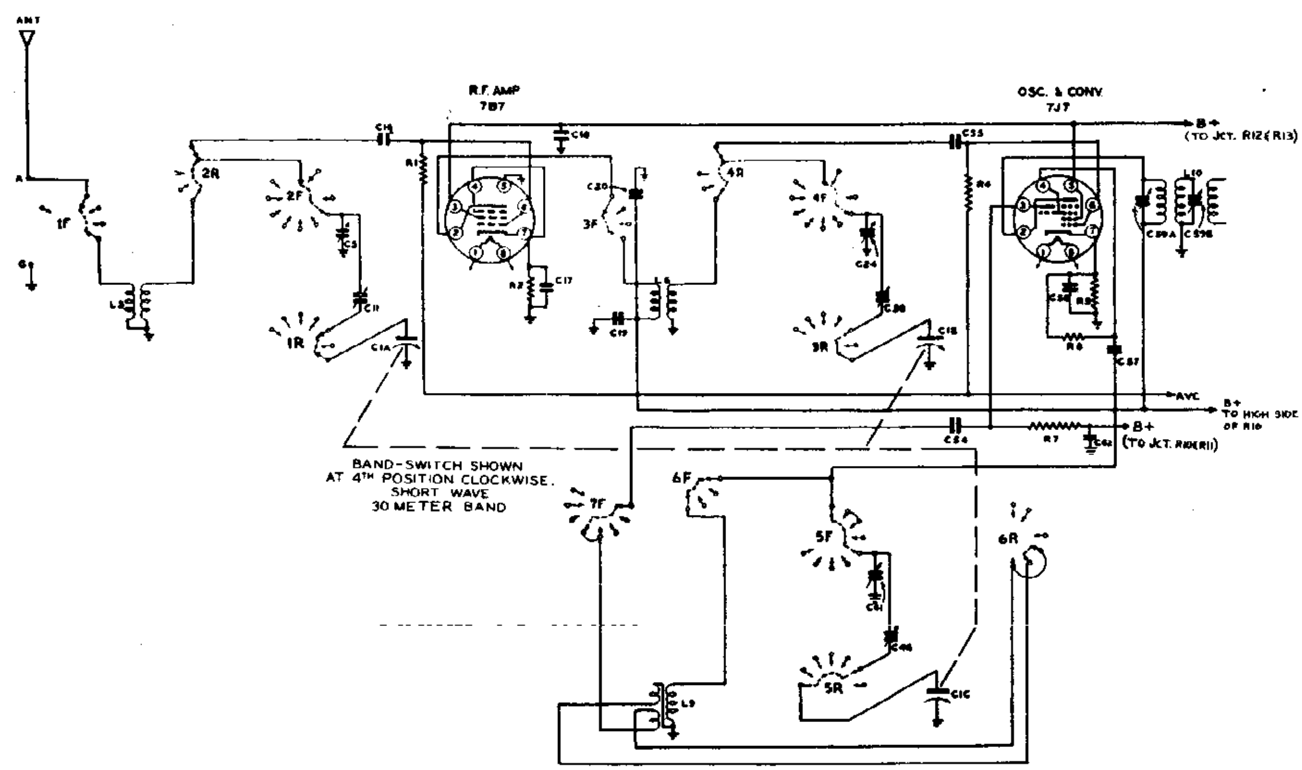
Line Voltage: 115 Volts
Position of Band Switch Broadcast
Position of Volume Control Full with Antenna Disconnected
Position of Tap Plug - 110 Volts

TUBE	FUNCTION	Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Dia.)								
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	Grid Cap.
7B7	R.F. Amplifier	0	290	75	4.2	0	0	4.2	6.1*	-
7J7	Osc - Converter	0	290	100	-1	75	4.1	4.5	6.1*	-
6K7G	I-F Amplifier	0	0	290	120	0	-	6.1*	9	0
7B6	2nd Det - AVC - 1st Audio	0	150	0	1.2	.5	0	1.2	6.1*	-
6F6G	Push-Pull Power Output	0	0	290	285	0	295	6.1*	20	-
6F6G	Push-Pull Power Output	0	0	290	285	0	295	6.1*	20	-
5Y3G	Rectifier	0	375*	0	350*	0	375*	0	350*	-
6E5	Viso-Glo	0	250	0	295	0	6.1*	-	-	-

Notes: Voltage readings are for schematic diagram in this bulletin. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 20,000 ohms per volt voltmeter.
*AC volts.

THE SPARKS-WITHINGTON CO.





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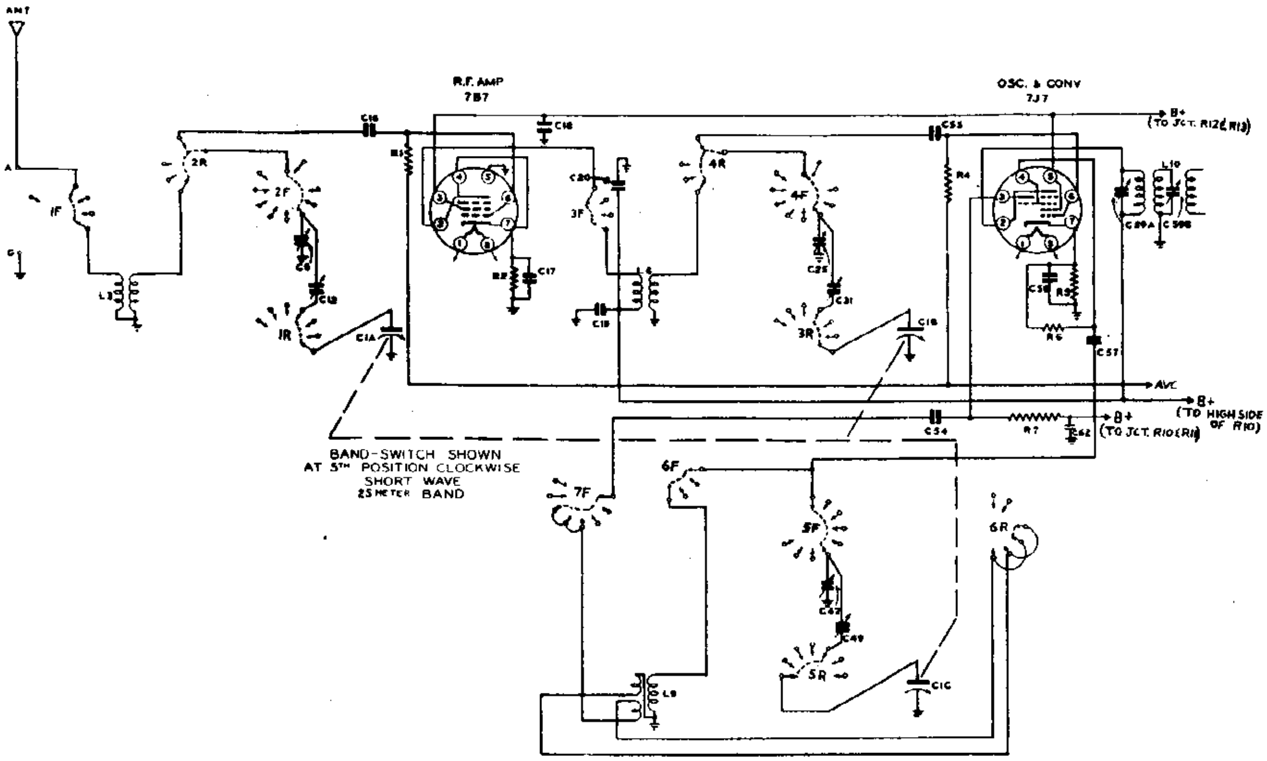
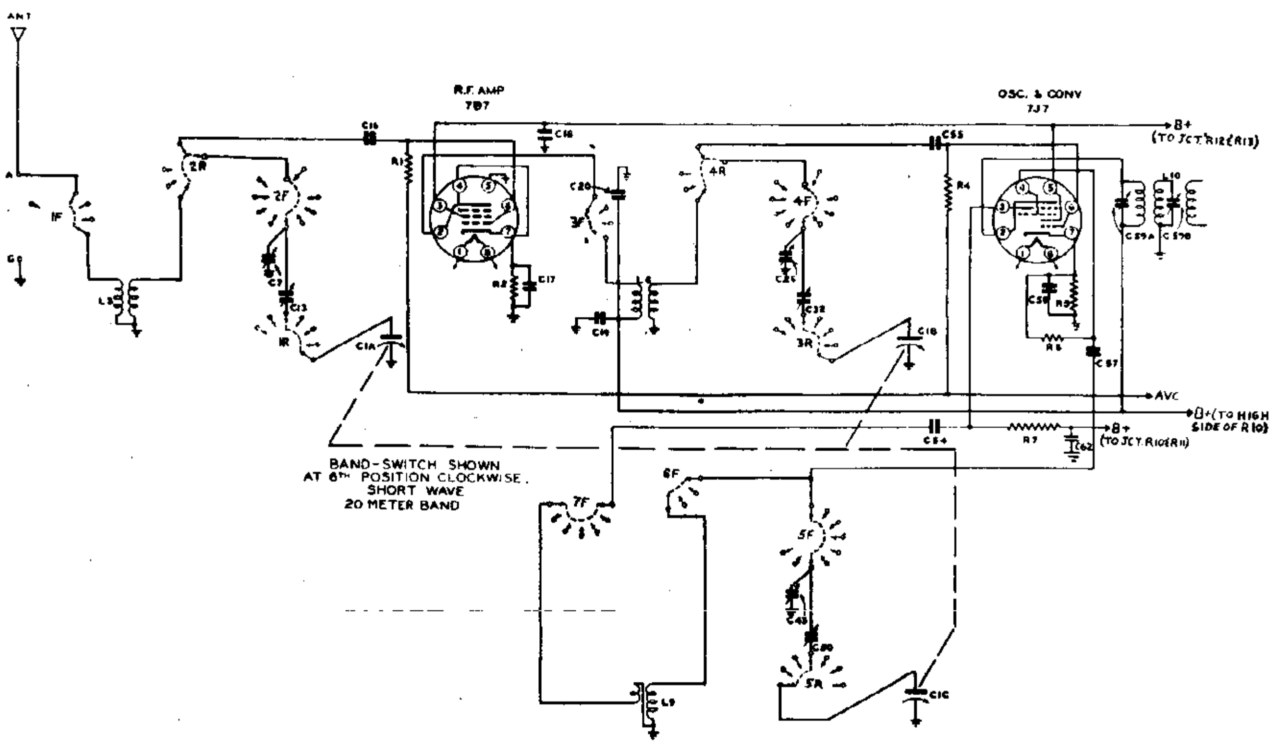
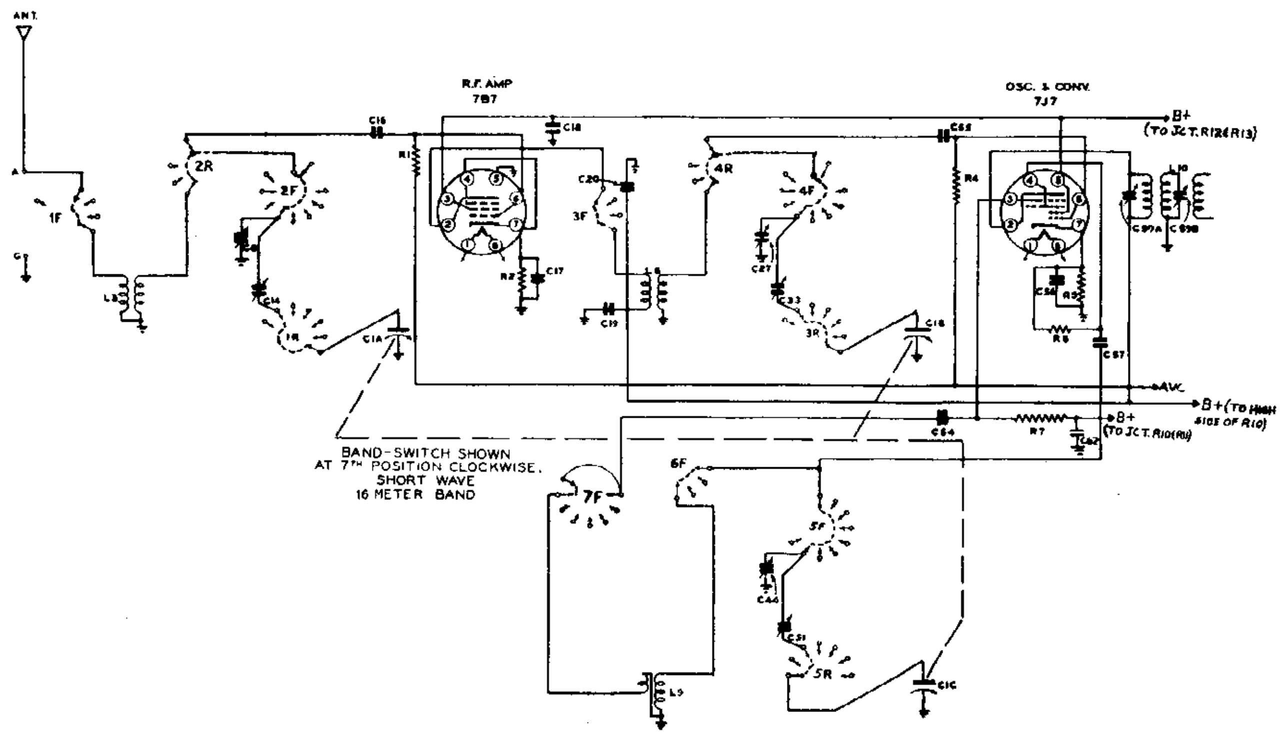
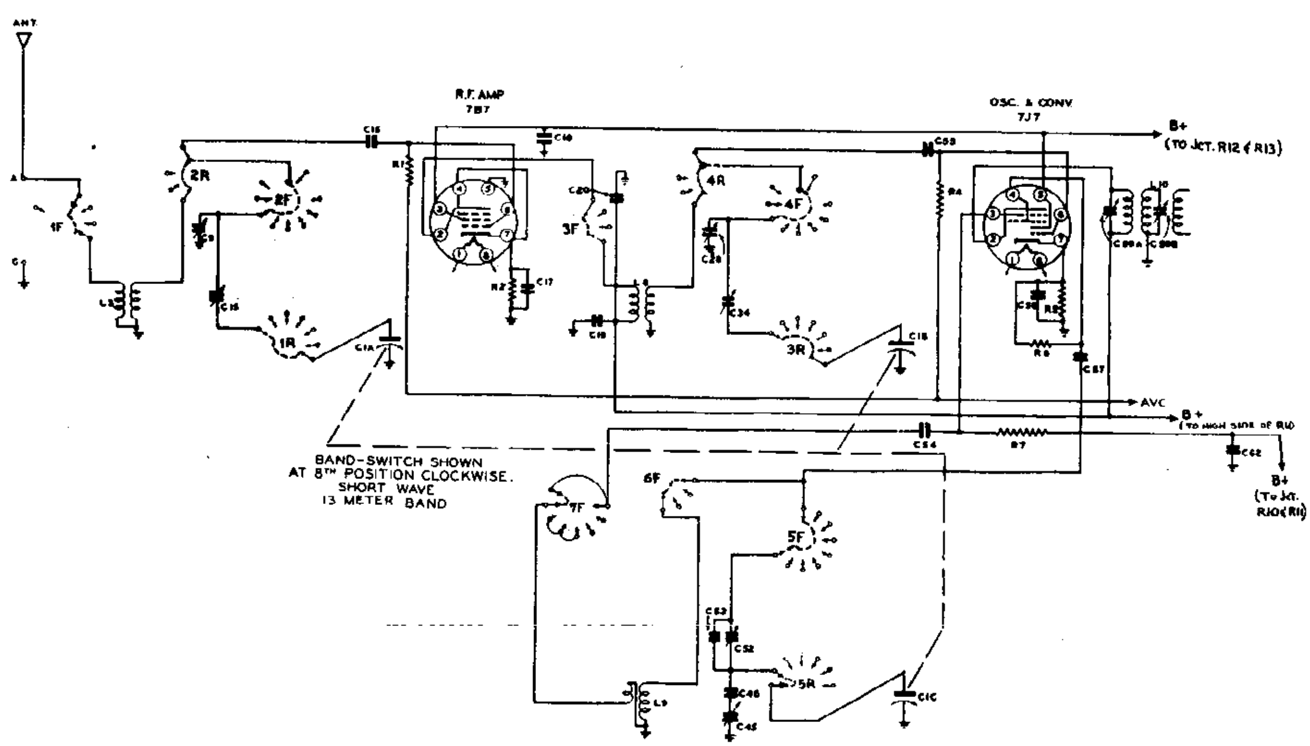





ANT.
A
G
1F
2R
2F
L3
C14
1R
C1A
C15
R1
C18
R.F. AMP
7B7
R2
C17
C20
3F
L6
C19
4R
4F
C27
C33
3R
C1B
C62
OSC. & CONV.
7J7
R4
C56
R5
R8
C57
L10
C59A
C59B
B+ (TO JCT. R12 & R13)
AVC
B+ (TO HIGH SIDE OF R10)
B+ (TO JCT. R10 (R11)
R7
C64
BAND-SWITCH SHOWN AT 7TH POSITION CLOCKWISE. SHORT WAVE 16 METER BAND
6F
7F
5F
C44
C51
5R
L5
C1C


ANT.
A
G
1F
2R
2F
L3
C16
1R
C1A
C15
R1
C18
R.F. AMP
7B7
R2
C17
C20
3F
L6
C19
4R
4F
C28
C34
3R
C1B
C63
OSC. & CONV.
7J7
R4
C56
R5
R8
C57
L10
C59A
C59B
B+ (TO JCT. R12 & R13)
AVC
B+ (TO HIGH SIDE OF R10)
R7
C64
C62
B+ (TO JCT. R10 (R11)
BAND-SWITCH SHOWN AT 8TH POSITION CLOCKWISE. SHORT WAVE 13 METER BAND
6F
7F
5F
C53
C52
5R
L5
C46
C45
C1C

THE SPARKS-WITHINGTON CO.

ALIGNMENT DATA

OPERATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANTENNA	BAND SWITCH SETTING	GENERATOR FREQUENCY	TUNING COND. SETTING	TRIMMER	REMARKS
1	(Set drive wheel so that pointer is at end of calibration scales with condenser gang fully meshed)							
2	I.F.	Connect to Stator of Detector Section of CI (See Chassis Diagram)	.1 mf.	170-560 Meters	(456 KC)	Open	C67B*	**
3							C67A C67C	Peak accurately
4							C67B*	Peak accurately
5							C59B*	**
6							C59A C59C	Peak accurately
7							C59B*	Peak accurately
8	CAUTION: Do not readjust trimmers C67A & C and C59A & C after red spot trimmers C67B & C59B have been peaked)							
9	170-560 Meter Band	ANT	See Note	170-560 Meters	200 M	200 M	C35 Osc.	Trim.
							C21 Det.	Trim.
							C2 ANT.	Trim.
10					500 M	500 M	C36 Osc.	Pad.
11	(Repeat operation 9)							
12	(Check calibration and sensitivity at 200 M, 300 M and 500 M)							
13	50-170 Meter Band	ANT	See Note	50-170 Meters	55 M	55 M	C37 Osc.	Trim.
							C22 Det.	Trim.
							C3 ANT.	Trim.
14					150 M	150 M	C38 Osc.	Pad.
15	(Repeat operation 13)							
16	(Check calibration and sensitivity at 55M, 95M and 150M)							
17	49 Meter Band	ANT	See Note	49 Meters	35 M	35 M	C40 Osc.	Trim.
18					48 M	48 M	C47 Osc.	Pad.
19					35 M	35 M	C23 Det.	Trim.
							C4 ANT.	Trim.
20					48 M	48 M	C29 Det.	Pad.
							C10 ANT.	Pad.
21	(Check carefully all adjustments for 49 meter band. Be sure band limits are covered)							
22	30 Meter Band	ANT	See Note	30 Meters	27 M	27 M	C41 Osc.	Trim.
23					34.5 M	34.5 M	C48 Osc.	Pad.
24					27 M	27 M	C24 Det.	Trim.
							C5 ANT.	Trim.
25					34.5 M	34.5 M	C30 Det.	Pad.
							C11 ANT.	Pad.
26	(Check carefully all adjustments for 30 meter band. Be sure band limits are covered.							
27	25 Meter Band	ANT	See Note	25 Meters	22 M	22 M	C42 Osc.	Trim.
28					26 M	26 M	C49 Osc.	Pad.
29					22 M	22 M	C25 Det.	Trim.
							C6 ANT.	Trim.
30					26 M	26 M	C31 Det.	Pad.
							C12 ANT.	Pad.
31	(Check carefully all adjustments for 25 meter band. Be sure band limits are covered.)							
32	20 Meter Band	ANT	See Note	20 Meters	18.5 M	18.5 M	C43 Osc.	Trim.
33					21.1 M	21.1 M	C50 Osc.	Pad.
34					18.5 M	18.5 M	C26 Det.	Trim.
							C7 Ant.	Trim.
35					21.1 M	21.1 M	C32 Det.	Pad.
							C13 Ant.	Pad.
36	(Check carefully all adjustments for 20 meter band. Be sure band limits are covered.)							
37	16 Meter Band	ANT	See Note	16 Meters	15.7 M	15.7 M	C44 Osc.	Trim.
38					17.7 M	17.7 M	C51 Osc.	Pad.
39					15.7 M	15.7 M	C27 Det.	Trim.
							C8 Ant.	Trim.
40					17.7 M	17.7 M	C33 Det.	Pad.
							C16 Ant.	Pad.

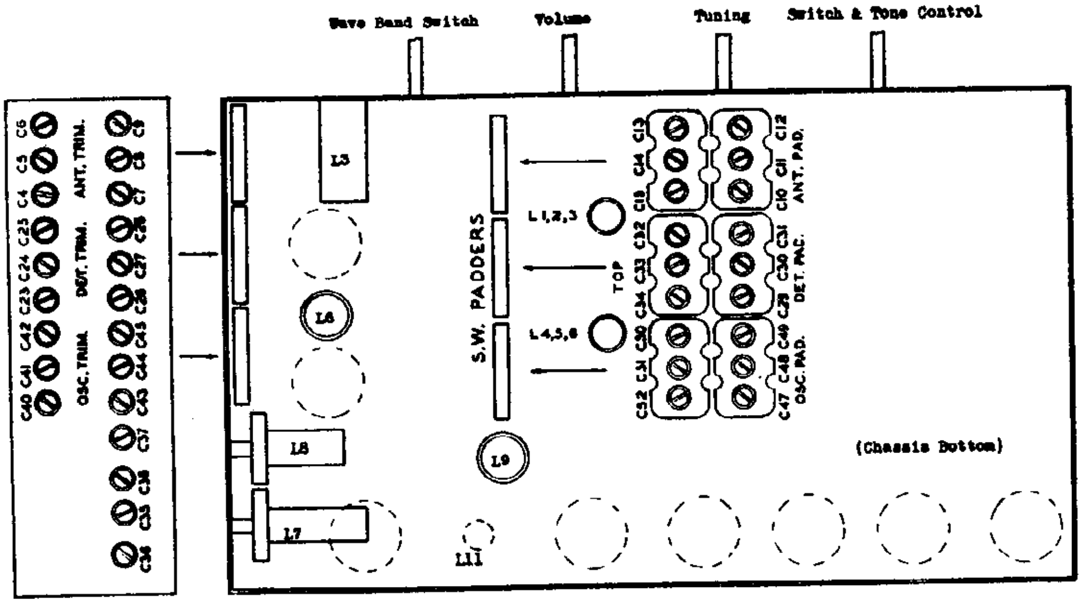
THE SPARKS-WITHINGTON CO.

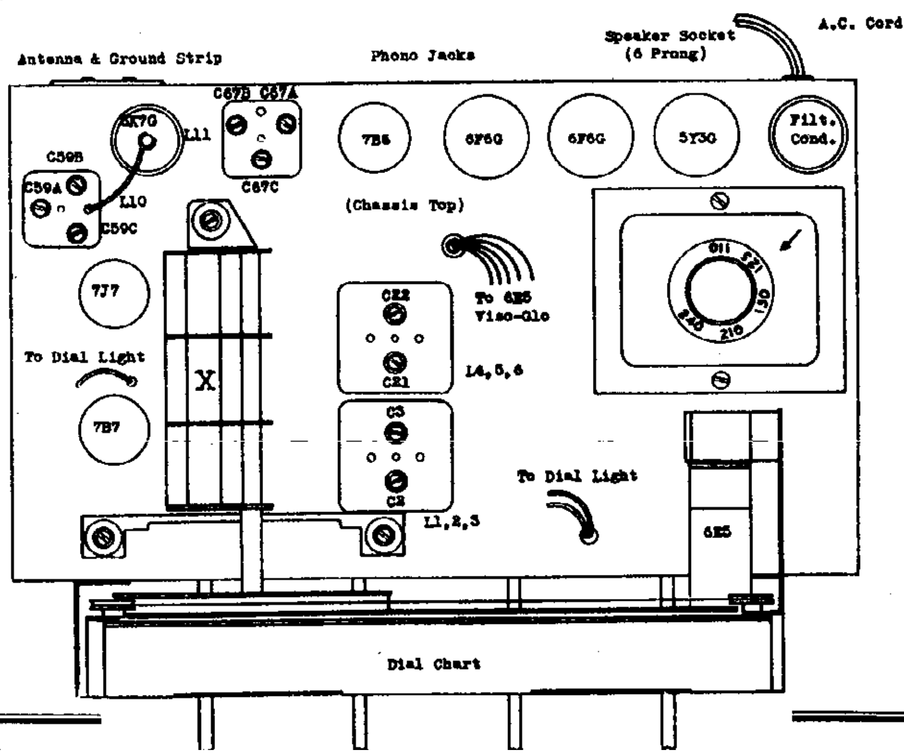
ALIGNMENT DATA

OPER-ATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANTENNA	BAND SWITCH SETTING	GENERATOR FREQUENCY	TUNING COND. SETTING	TRIMMER	REMARKS
41	(Check carefully all adjustments for 16 meter band. Be sure band limits are covered.)							
42	13 Meter Band	ANT	See Note	13 Meters	13.8 M	13.8 M	C45 Osc.	Trim.
43					15.2 M	15.2 M	C52 Osc.	Pad.
44					13.8 M	13.8 M	C28 Det.	Trim.
							C9 Ant.	Trim.
45					15.2 M	15.2 M	C34 Det.	Pad.
							C15 Ant.	Pad.
46	(Check carefully all adjustments for 13 meter band. Be sure band limits are covered.)							

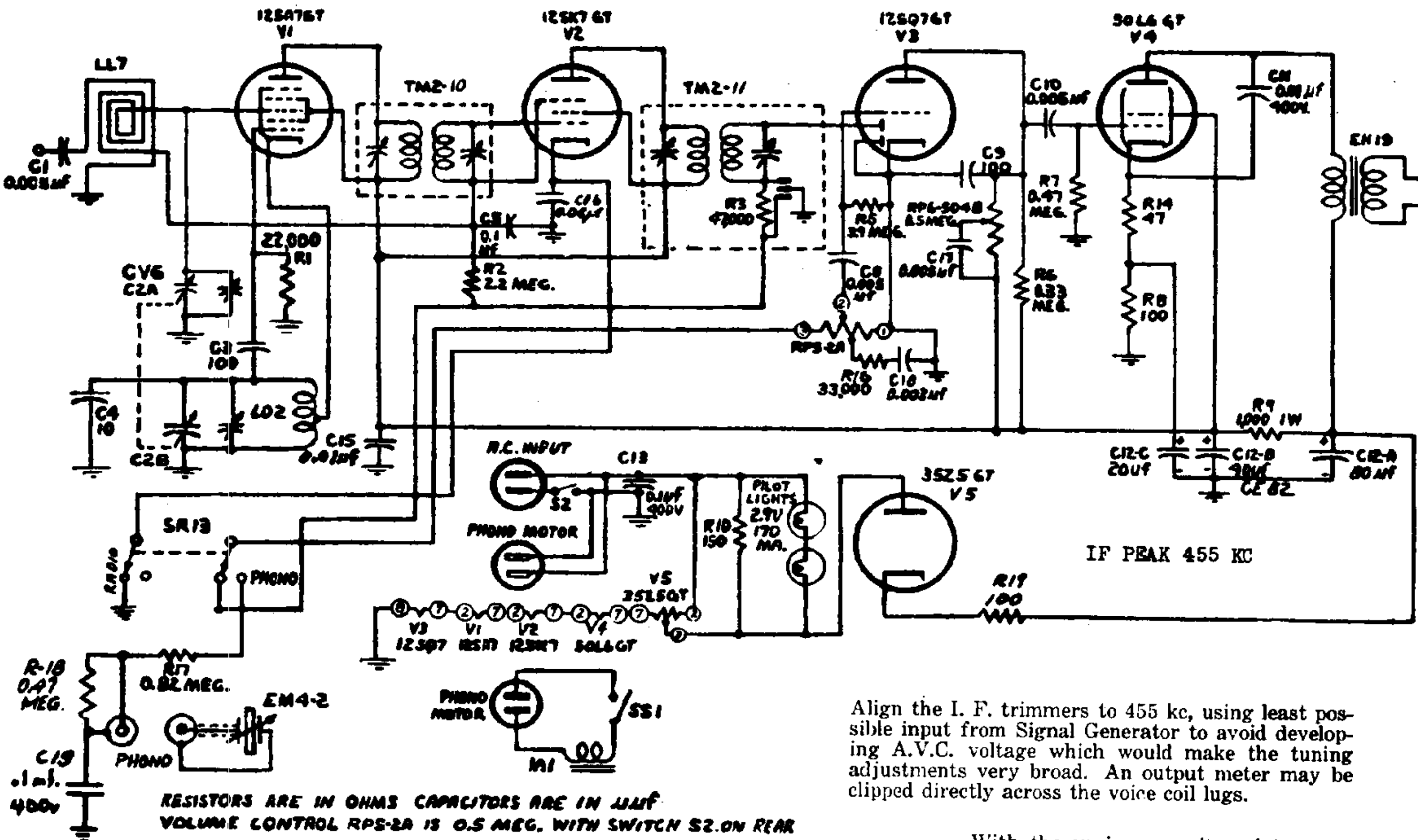
*Bronze color trimmer screw.
**Turn trimmer screw all the way down.
Note - Use dummy antenna described on page (1).

SPECIAL NOTE: All band trimmers should be adjusted to the fundamental of the test signal and not to the image.

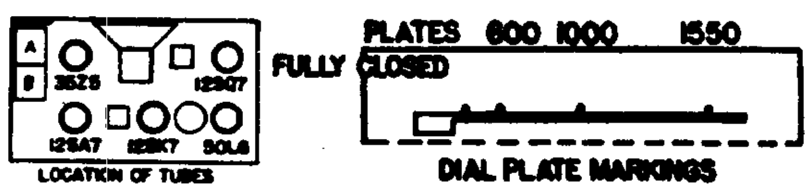




SPIEGEL



RESISTORS ARE IN OHMS CAPACITORS ARE IN uuf
VOLUME CONTROL RPS-2A IS 0.5 MEG. WITH SWITCH S2 ON REAR

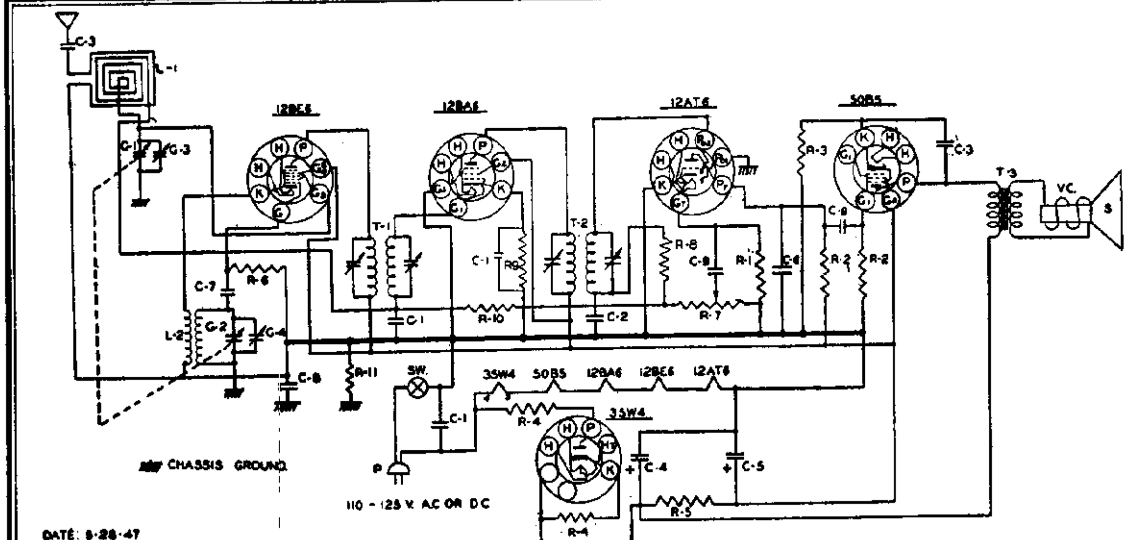


Align the I. F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad. An output meter may be clipped directly across the voice coil lugs.

With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (A) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (B) (on rear section) for maximum response. With tuning capacitor plates fully meshed, the receiver should tune to 532 kc; however, no adjustment is required at this point. For checking purposes, four fine marks are engraved on the dial plate. These represent, in order, the pointer position with capacitor plates fully meshed, and the pointer setting for 600, 1000 and 1550 kc.

MODEL 5052

SPIEGEL



PART NO.		DESCRIPTION
IR-13	R-1	2.2 MEG. RESISTOR 1/2W. 20%
IR-11	R-2	470M Ω RESISTOR 1/2W. 20%
IR-14	R-3	150 Ω RESISTOR 1/2W. 20%
IR-17	R-4	33 Ω RESISTOR 1/2W. 20%
IR-25	R-5	2200 Ω RESISTOR 1 W. 10%
IR-16	R-6	33 M Ω RESISTOR 1/2W 20%
VC-8	R-7	1 MEG. VOLUME CONTROL
GC-7	G-1, G-2	GANG CONDENSER
	G-3	ANT. TRIMMER COND.
IR-19	R-8	100M Ω RESISTOR 1/2W. 20%
IR-36	R-9	100 Ω RESISTOR 1/2W 20
LO-13	L-2	OSC COIL
LI-5	T-1	INPUT TRANSFORMER
LI-7	T-2	OUTPUT TRANSFORMER
SPK-10	T-3	OUTPUT SPK. TRANFORMER
	V.C.	VOICE COIL
	S	P.M. SPEAKER
IR-20	R-11	220M RESISTOR 1/2W. 20%
	SW 1	A.C. SW. ON VOLUME CONTROL
CO-1	P	LINE CORD
TU-18		12BE6 - 12BA6 - 12AT6 50B5 - 35W4
	G-4	OSC. TRIMMER COND
PC-5	C-1	.05 MFD. CONDENSER 400 V
MC-2	C-2	.0001 MFD. MICA CONDENSER 20%
PC-7	C-3	.01 MFD. CONDENSER 400 V
EC-12	C-4	40 MFD. 150 V. ELECTROLYTIC CONDENSER
	C-5	20 MFD. 150 V. ELECTROLYTIC CONDENSER
MC-5	C-6	.0005 MFD. CONDENSER 20%
MC-4	C-7	.000056 MFD. MICA 20%
PC-8	C-8	.1 MFD. CONDENSER 400 V
LL-12	L-1	LOOP ANTENNA
IR-23	R-10	3.3 MEG. RESISTOR 1/2W 20%
PC-6	C-9	.005 MFD. CONDENSER 600 V.

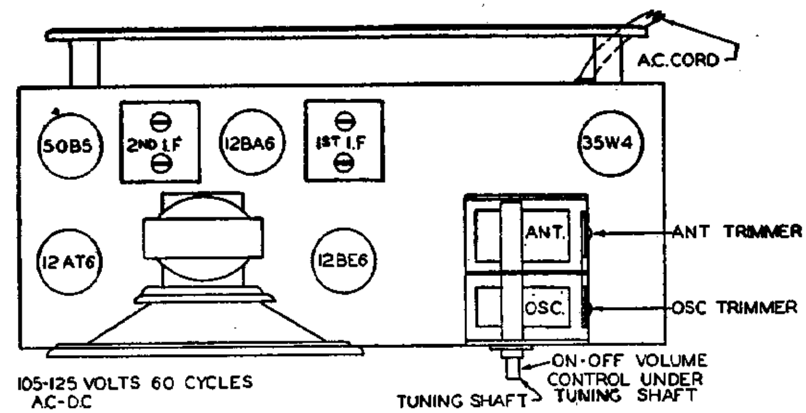
Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

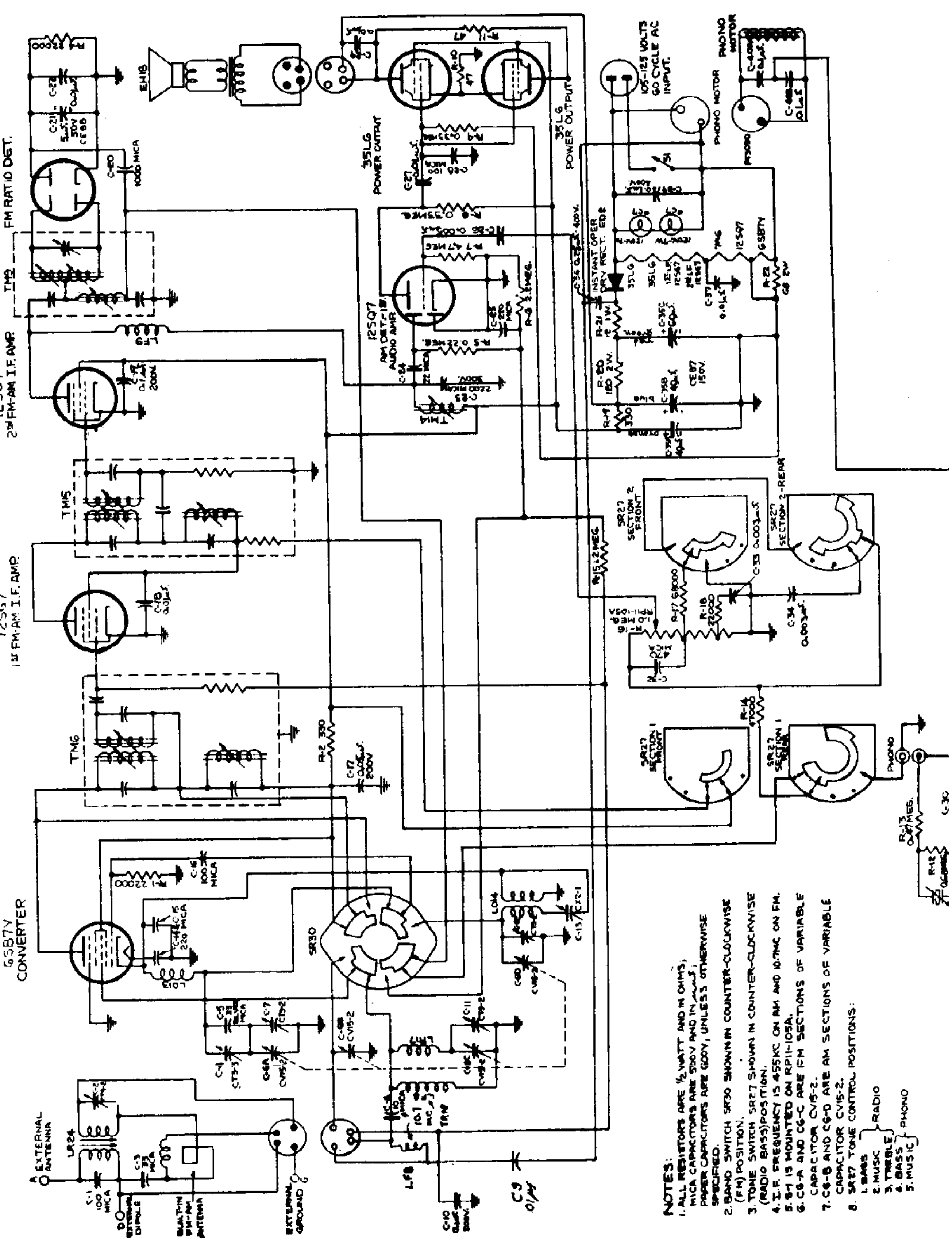
FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through the .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.



THIRD STEP: Remove the generator leads from the gang condenser. Loosely couple the generator to the receiver loop by using a complete turn of wire. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer until a maximum signal is noted on the output meter. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

SPIEGEL

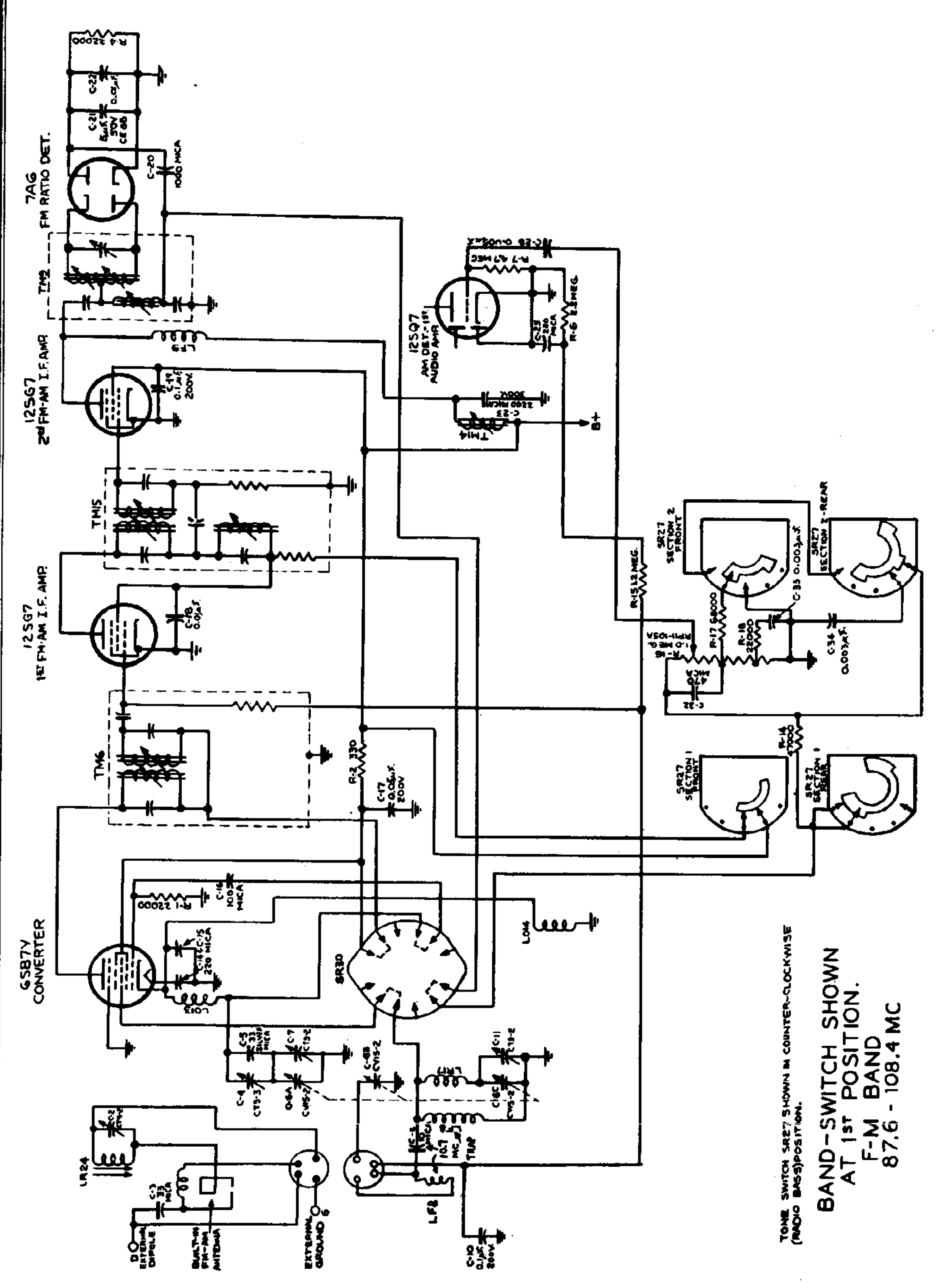


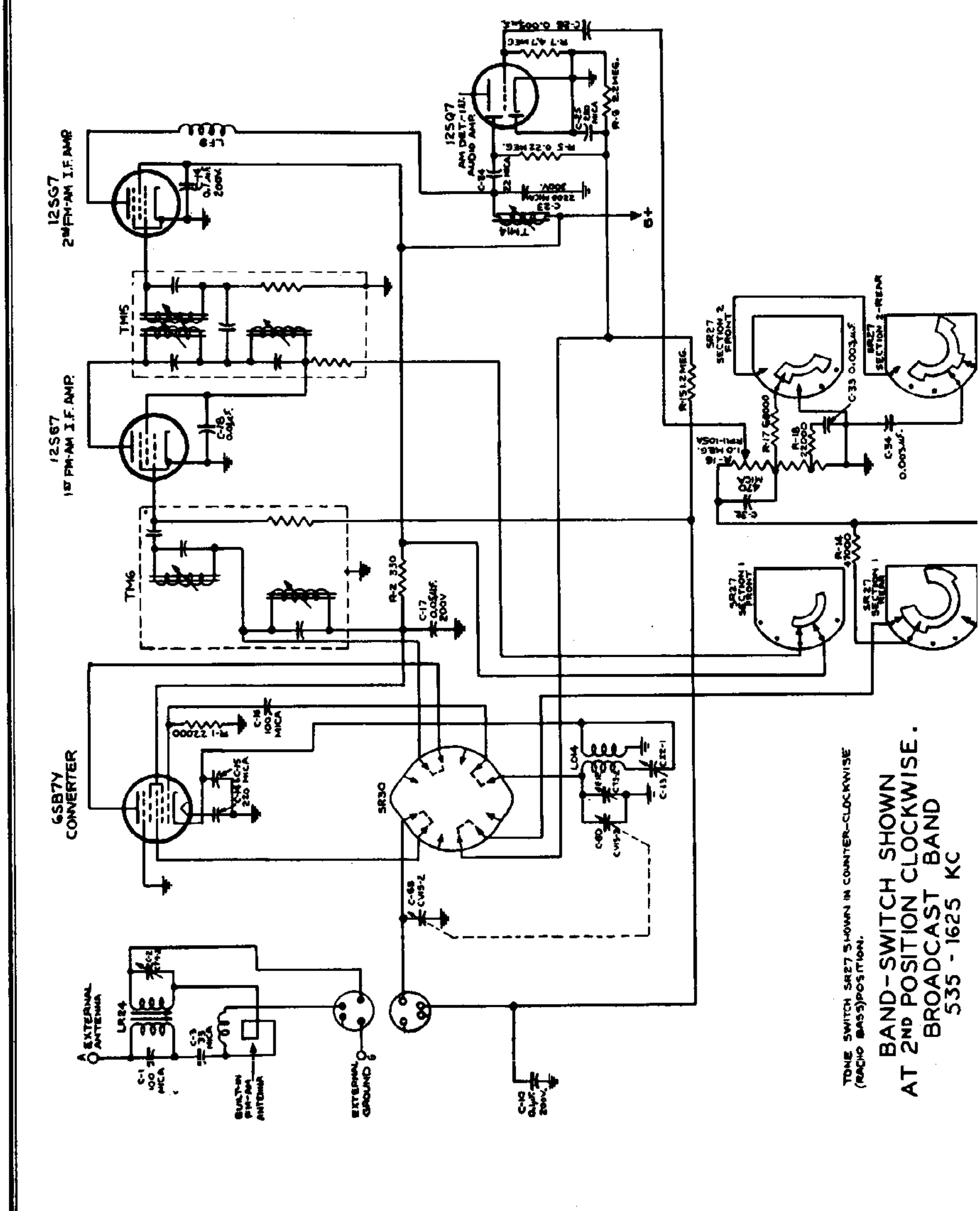
NOTES:
1. ALL RESISTORS ARE ½ WATT AND IN OHMS; MICA CAPACITORS ARE 500V AND IN $\mu\mu f$; PAPER CAPACITORS ARE 600V, UNLESS OTHERWISE SPECIFIED.
2. BAND SWITCH SR30 SHOWN IN COUNTER-CLOCKWISE (FM) POSITION.
3. TONE SWITCH SR27 SHOWN IN COUNTER-CLOCKWISE (RADIO BASS) POSITION.
4. I.F. FREQUENCY IS 455KC ON AM AND 10.7MC ON FM.
5. S-1 IS MOUNTED ON RP11-105A.
6. C6-A AND C6-C ARE FM SECTIONS OF VARIABLE CAPACITOR CV15-2.
7. C6-B AND C6-D ARE AM SECTIONS OF VARIABLE CAPACITOR CV15-2.
8. SR27 TONE CONTROL POSITIONS:
   1. BASS
   2. MUSIC
   3. TREBLE
   4. BASS
   5. MUSIC

(1–3: RADIO; 4–5: PHONO)

MODEL G725

SPIEGEL




12SG7
2ND FM-AM I.F. AMP
12SQ7
AM DET.-1ST AUDIO AMP
12SG7
1ST FM-AM I.F. AMP.
6SB7Y
CONVERTER
TM15
TM16
TM14
SR30
SR27 SECTION 2 FRONT
SR27 SECTION 2 REAR
SR27 SECTION 1 FRONT
SR27 SECTION 1 REAR
LR24
LO14
B+
EXTERNAL ANTENNA
BUILT-IN FM-AM ANTENNA
EXTERNAL GROUND
TONE SWITCH SR27 SHOWN IN COUNTER-CLOCKWISE (RADIO BASS) POSITION.
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
BROADCAST BAND
535 - 1625 KC

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube or some local condition is not responsible for faulty reception. The following is a list of the minimum equipment necessary to realign this receiver.

1—AM signal generator covering 455 KC, 600 KC, 1550 KC and 10.7 MC

2—FM signal generator covering 10.7 MC, 92 MC and 106 MC

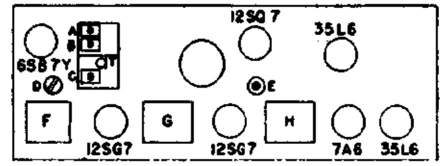
3—Output meter, rectifier type, approximately 0 to 2 volts RMS

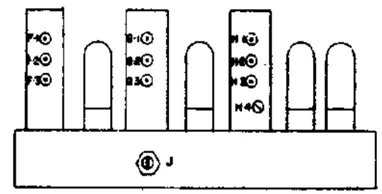
4—Dummy antennas

0.01 MFD Capacitor

300 Ohm Resistor

100MMFD Mica Capacitor



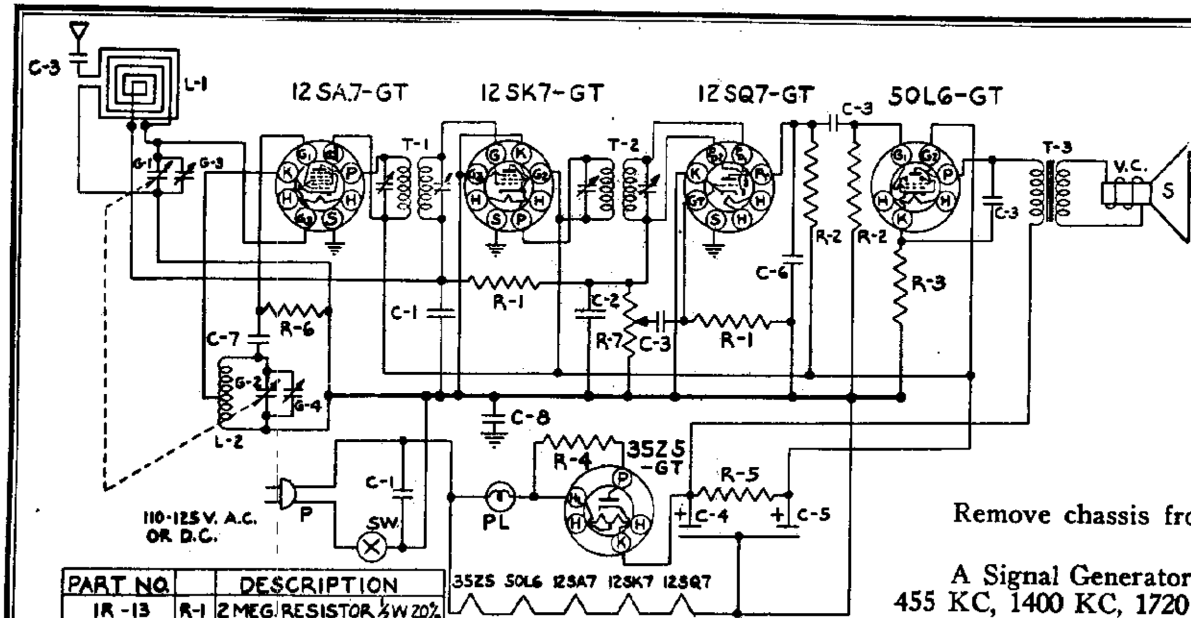


In the following alignment procedure the high side of the signal generator is connected to the terminal indicated in the "Signal Generator Coupling" column below. The ground side of the signal generator is connected directly to the chassis. The output meter should be connected across the voice coil of the speaker for all measurements.

In adjusting the radio frequency trimmers and padders it is advisable to "rock" the variable capacitor gang slightly across the signal being delivered by the signal generator until that particular signal has been accurately peaked.

Dummy Antenna	Signal Generator Connection	Signal Generator Frequency	Band Switch Position	Radio Dial Setting	Adjust	Remarks
0.01 MFD	Terminal T	455 KC AM	Broadcast	1625 KC	E G-1 F-1	Adjust for maximum output Repeat for fine adjustment
0.01 MFD	Pin 4 of 12SG7 2nd FM-AM IF with FM Signal Gen.	10.7 MC FM	FM	108 MC	H-2	Adjust for maximum output (Broad adjustment)
0.01 MFD	"	10.7 MC FM	FM	108 MC	H-4	Adjust for maximum output
0.01 MFD	"	10.7 MC AM	FM	108 MC	H-1 or H-3	Adjust whichever is required for minimum output
						Repeat last two steps for fine adjustment until settings for maximum FM output coincide with settings for minimum AM output.
0.01 MFD	Pin 8 of 6SB7Y Converter	10.7 MC FM	FM	108 MC	G-3 — G-2	Adjust for maximum output
0.01 MFD		"	FM	108 MC	F-3 — F-2	Adjust for maximum output
						Repeat last two steps for fine adjustment
			Broadcast	535 KC	Pointer	Adjust pointer to reference mark
100 MMFD	"A" Post on Cabinet	600 KC AM	"	600 KC	J and Core on Ant. Coil in Cab.	Adjust for maximum output
"	"	1550 KC AM	"	1550 KC	B and trimmer on Ant. Coil	Adjust for maximum output
300 OHM Resistor	"	92 MC FM	FM	92 MC	D	Adjust for maximum output
"	"	106 MC FM	FM	106 MC	A and C	Adjust for maximum output

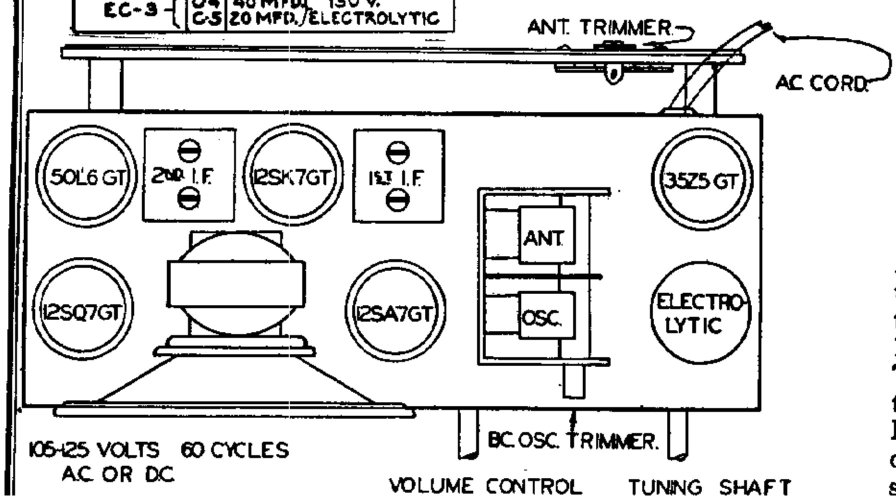
SPIEGEL



PART NO.		DESCRIPTION
IR-13	R-1	2 MEG. RESISTOR ½W 20%
IR-11	R-2	470M-Ω " " "
IR-14	R-3	150 Ω " " "
IR-4	R-4	47 Ω " " "
IR-15	R-5	2200 Ω " " "
IR-16	R-6	33000 Ω " " "
V.C-3	R-7	1 MEG. VOLUME CONTROL
GC-2	G-1, G-2	GANG COND.
TC-7	G-3	ANT. TRIMMER COND.
TC-6	G-4	OSC. TRIMMER COND.
PC-5	C-1	.05 MFD. COND. 400 V.
MC-2	C-2	.0001 MFD. MICA 20%
PC-7	C-3	.01 MFD. COND. 400 V.
EC-3	C-4	40 MFD. 150 V.
	C-5	20 MFD. ELECTROLYTIC

DATE 11-30-45

PART NO		DESCRIPTION
MC-5	C-6	.0005 MFD. COND. 20%
MC-4	C-7	.000056 MFD. MICA 20%
PC-9	C-8	.1 MFD COND. 400V.
LL-1	L-1	LOOP ANTENNA
LO-2	L-2	OSC. COIL
LI-1	T-1	INPUT I.F. TRANSFORMER
LI-2	T-2	OUTPUT I.F. TRANSFORMER
	T-3	OUTPUT SPK. TRANSFORMER
SPK-4	V.C.	VOICE COIL
	S	P.M. SPEAKER
PB-1	PL	#47 PILOT BULB
	SW	A.C. SWITCH ON VOL. CONTROL
CO-1	P	LINE CORD
TU-3		12SA7 GT 12SK7 GT 12SQ7 GT 50L6 GT 35Z5 GT



Remove chassis from cabinet for alignment.

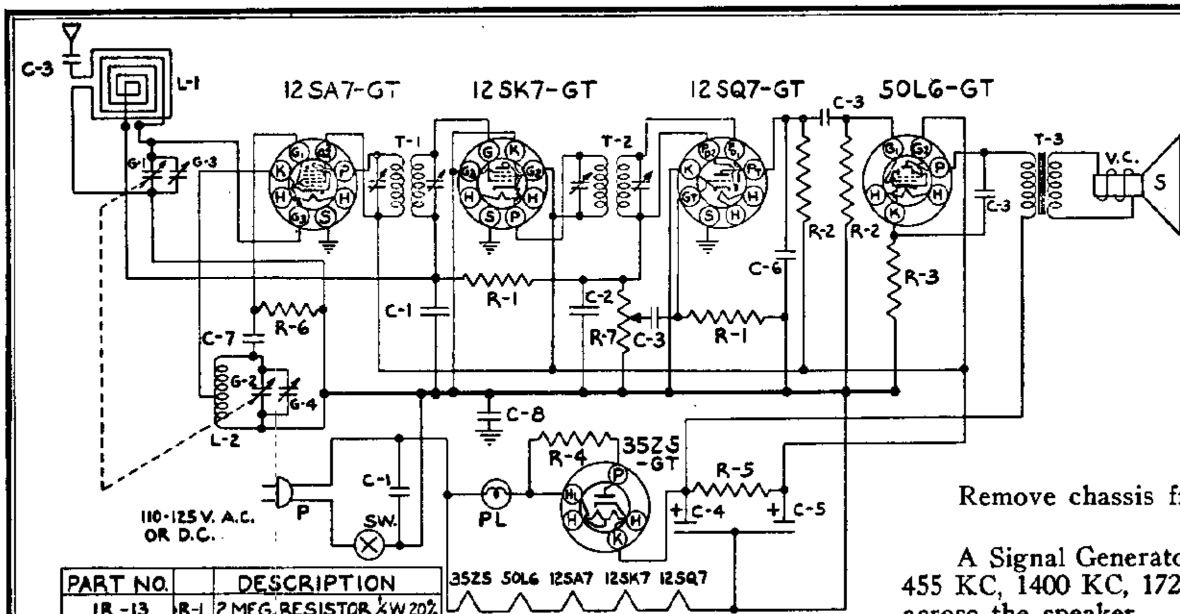
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the metal frame of the gang condenser. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis between the volume and tuning controls. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the antenna lead wire that projects from the back of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the back of the loop antenna. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the

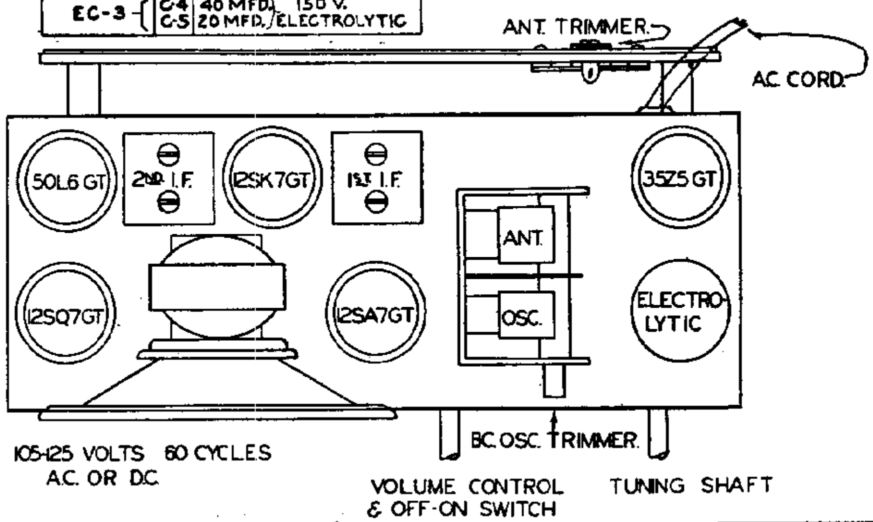
SPIEGEL



PART NO.		DESCRIPTION
IR-13	R-1	2 MEG. RESISTOR ½W 20%
IR-11	R-2	470M-Ω " " "
IR-14	R-3	150-Ω " " "
IR-4	R-4	47-Ω " " "
IR-15	R-5	2200-Ω " " "
IR-16	R-6	33000-Ω " " "
V.C.-3	R-7	1 MEG. VOLUME CONTROL
GC-2	G-1 G-2	GANG COND.
TC-7	G-3	ANT. TRIMMER COND.
TC-6	G-4	OSC. TRIMMER COND.
PC-5	C-1	.05 MFD. COND. 400 V.
MC-2	C-2	.0001 MFD. MICA 20%
PC-7	C-3	.01 MFD. COND. 400 V.
EC-3	C-4	40 MFD. 150 V.
	C-5	20 MFD. ELECTROLYTIC

DATE 11-30-45

PART NO		DESCRIPTION
MC-5	C-6	.0005 MFD. COND. 20%
MC-4	C-7	.000056 MFD. MICA 20%
PC-9	C-8	.1 MFD COND. 400 V.
LL-1	L-1	LOOP ANTENNA
LO-2	L-2	OSC. COIL
LI-1	T-1	INPUT I.F. TRANSFORMER
LI-2	T-2	OUTPUT I.F. TRANSFORMER
	T-3	OUTPUT SPK. TRANSFORMER
SPK-4	V.C.	VOICE COIL
	S	P.M. SPEAKER
PB-1	PL	#47 PILOT BULB
	SW	A.C. SWITCH ON VOL. CONTROL
CO-1	P	LINE CORD
TU-3		12SA7 GT 12SK7 GT 12SQ7 GT 50L6 GT 35Z5 GT



Remove chassis from cabinet for alignment.

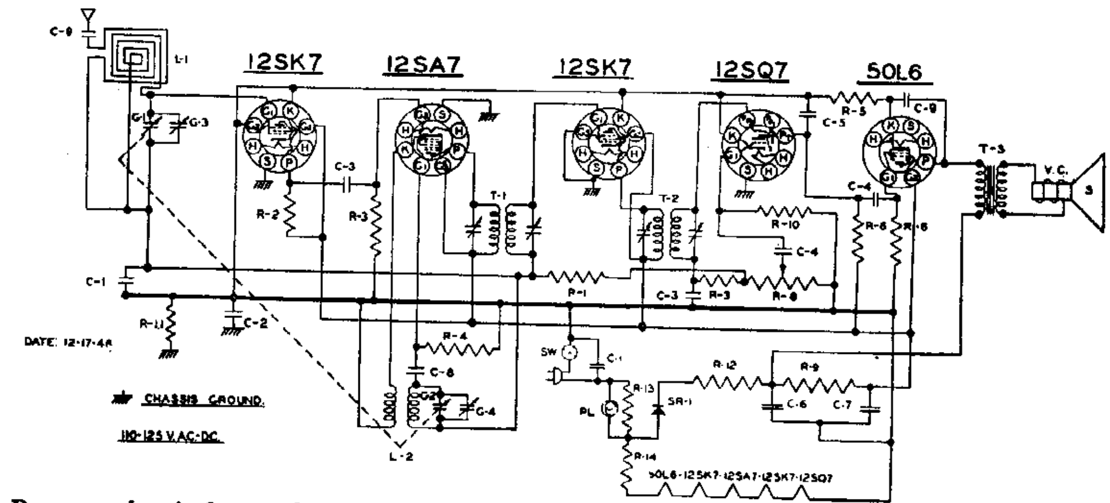
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the metal frame of the gang condenser. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis between the volume and tuning controls. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the antenna lead wire that projects from the back of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the back of the loop antenna. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

SPIEGEL



Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

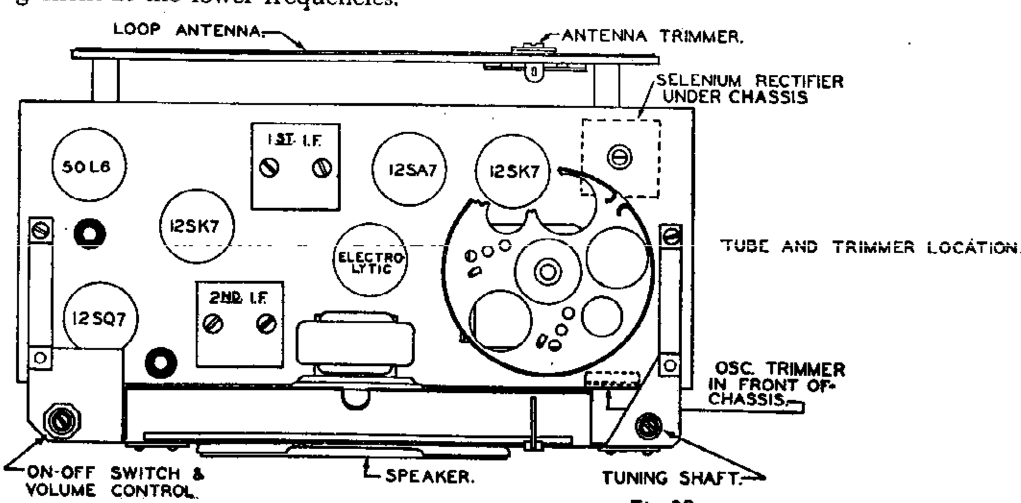
The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent over-loading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the back of the loop antenna. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

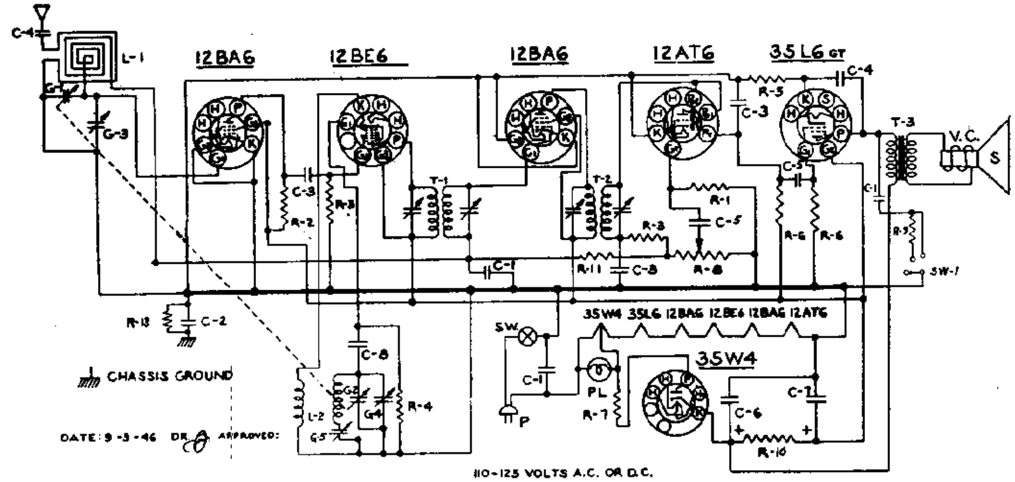
PART NO.		DESCRIPTION.
IR-23	R-1	3.9 MEG RESISTOR 1/2W 20
IR-22	R-2	3900 Ω RESISTOR 1/2 W 10
IR-10	R-3	47M Ω RESISTOR 1/2W 20
IR-9	R-4	22M Ω RESISTOR 1/2 W 20
IR-14	R-5	150 Ω RESISTOR 1/2 W 20
IR-11	R-6	470M Ω RESISTOR 1/2 W 20
VC-4	R-8	1MEG. VOLUME CONTROL
IR-25	R-9	2000 Ω RESISTOR 1 W 10
IR-13	R-10	2 MEG Ω RESISTOR 1/2 W 20
IR-20	R-11	220M Ω RESISTOR 1/2 W 20
IR-35	R-12	75 Ω RESISTOR 2 W 10
PC-5	C-1	.05 MFD CONDENSER 400 V.
PC-8	C-2	.1 MFD. CONDENSER 400 V.
MC-2	C-3	.0001 MFD. MICA CONDENSER
PC-10	C-4	.005 MFD CONDENSER 400 V.
MC-5	C-5	.0005 MFD MICA CONDENSER.
EC-10	C-6	40 MFD 150 V ELECTROLYTIC
	C-7	40 MFD
MC-4	C-8	.00005 MFD MICA CONDENSER
PC-7	C-9	.01 MFD CONDENSER 400V
LO-9	L-2	OSC COIL
CD-1	P	LINE CORD.
PB-1	PL	PILOT LITE #47
LI-1	T1	INPUT IF TRANSFORMER
LI-2	T2	OUTPUT IF TRANSFORMER
LL-1	L1	LOOP ANTENNA
SPK-5	T3	SPK TRANSFORMER
	VC	VOICE COIL
	S	PM SPEAKER
GC-2	G-1 G-2	GANG CONDENSER
TC-7	G-3	ANT TRIMMER CONDENSER.
TC-8	G-4	OSC. TRIMMER CONDENSER.
	SW.	SWITCH ON VOLUME CONTROL
TU-25		2/12SK7-12SA7-12SQ7 50L6
WR-4	R-13	30 Ω 3W 5%
	R-14	90 Ω
SR-1	SR-1	SELENIUM RECTIFIER



TUBE AND TRIMMER LOCATION.

TL-38

SPIEGEL



PART NO.		DESCRIPTION
IR-13	R-1	2.2MEG. RESISTOR 1/2W. 20%
IR-22	R-2	3900Ω RESISTOR 1/2W. 20%
IR-10	R-3	47,000Ω RESISTOR 1/2W. 20%
IR-9	R-4	22,000Ω RESISTOR 1/2W. 20%
IR-5	R-5	220Ω RESISTOR 1/2W. 10%
IR-11	R-6	470MΩ RESISTOR 1/2W. 20%
IR-17	R-7	33Ω RESISTOR 1/2W. 20%
VC-4	R-8	1 MEG. VOLUME CONTROL
IR-15	R-9	2200Ω RESISTOR 1/2W. 20%
IR-25	R-10	2200 Ω RESISTOR 1 W. 10%
IR-23	R-11	3.3 MEG. RESISTOR 1/2W. 20%
PC-5	C-1	.05MFD. COND. 400V.
PC-8	C-2	.1 MFD. COND. 400V.
MC-3	C-3	220MMFD. MICA COND. 20%
PC-7	C-4	.01 MFD. COND. 400V.
PC-6	C-5	.005MFD. COND. 600V. 20%

PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
EC-12	C-6	40 MFD. 150V. ELECTROLYTIC	TC-6	G-4	OSC. TRIMMER COND.
	C-7	20 MFD. 150V. ELECTROLYTIC	CO-1	P	LINE CORD
MC-4	C-8	50 MMFD. MICA COND. 20%	TC-9	G-5	600 K.C. PADDING COND.
SW-2	SW-1	TONE SWITCH	TU-	—	12BA6 12BE6 12BA6 12AT6 35L6 GT 35W4
LL-2	L-1	LOOP ANTENNA			
LO-3	L-2	OSC. COIL			
LI-6	T-1	INPUT I.F. TRANSFORMER			
LI-7	T-2	OUTPUT I.F. TRANSFORMER			
SPK-4	T-3	OUTPUT SPK. TRANS.			
	V.C.	VOICE COIL			
	S	P.M. SPEAKER			
PB-1	PL	#47 PILOT BULB			
GC-1	G-1	GANG CONDENSER			
	G-2				
TC-7	G-3	ANT. TRIMMER COND.			
IR-20	R-13	220,000 Ω RESISTOR 1/2W. 20%			

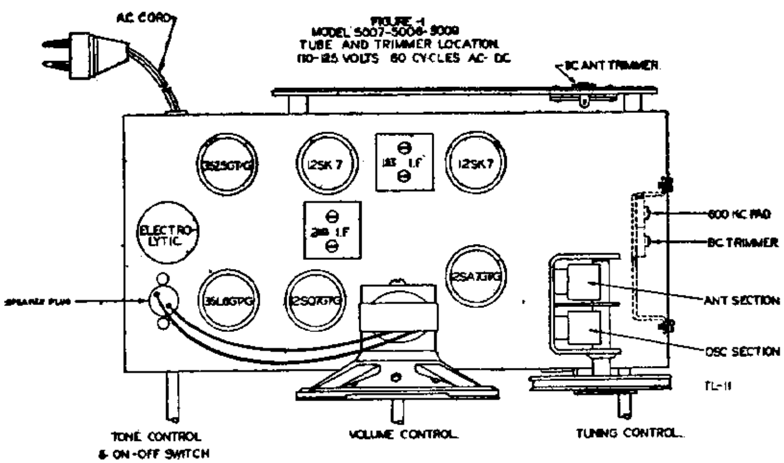


FIGURE-1
MODEL 5007-5008-5009
TUBE AND TRIMMER LOCATION
110-125 VOLTS 60 CYCLES AC-DC

Remove the chassis from the cabinet for alignment.

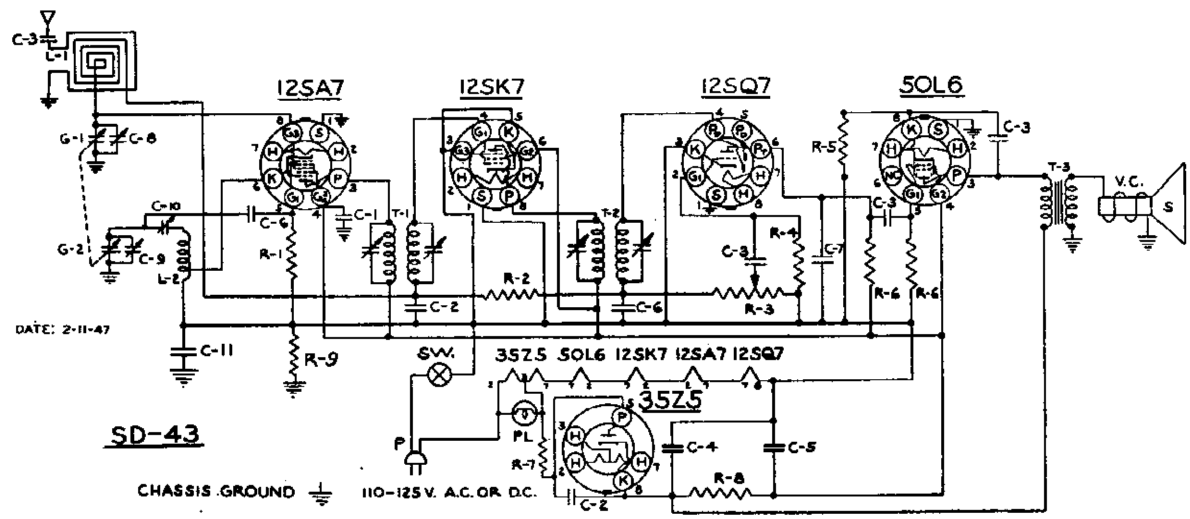
A signal generator is required, having the following frequencies: 455 KC, 1400 KC, 1730 KC. An output meter should be connected across the speaker.

I. F. ALIGNMENT: — Connect the generator lead through a .1 MFD Condenser to the terminal lug on the "Antenna" section of the gang condenser. The ground lead from the generator should be connected to the gang frame. Set the generator at 455 KC. Adjust the trimmer screws in the 1st and 2nd I. F. cans (See Fig. 1) until a maximum reading is noted on the output meter.

The receiver volume control should be turned to maximum during the I. F. and all subsequent alignments, to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

BC. OR BROADCAST ALIGNMENT: — With the generator leads still connected as in I. F. Alignment, rotate the tuning condenser to complete minimum capacity. Set the generator to 1730 KC. Adjust the BC. oscillator trimmer until the signal is tuned in. Next remove the hot lead of the generator from the "Ant" section of the gang condenser. Connect this lead to the antenna lead wire that projects from the back of the loop antenna through a 200 MMFD condenser. Set the generator to 1400 KC and rotate the tuning condenser until the signal is tuned in. Adjust the BC. antenna trimmer until a maximum reading is noted on the output meter. Set the generator to 600 KC and turn the tuning control until the signal is tuned in. Rock the tuning control back and forth slowly and at the same time adjust the 600 KC pad, slowly to the right or left until a maximum reading is noted on the output meter. It is advisable to return to the 1730 KC adjustment and re-check that setting to make sure it has not changed while padding at 600 KC.

SPIEGEL



Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

PART NO.		DESCRIPTION
IR-9	R-1	22,000 Ω RESISTOR ½W.
IR-23	R-2	3.9 MEG. RESISTOR ½W.2
VC-4	R-3	1 MEG. VOL. CONTROL & S
IR-13	R-4	2 MEG. RESISTOR ½W.2
IR-14	R-5	150 Ω RESISTOR ½W.2
IR-11	R-6	470M Ω RESISTOR ½W.2
IR-17	R-7	39 Ω RESISTOR ½W.2C
IR-25	R-8	2000 Ω RESISTOR 1W. IC
PC-8	C-1	.1 MFD. COND.-400V.
PC-5	C-2	.05 MFD. COND.-400
PC-7	C-3	.01 MFD. COND.-400
EC-8	C-4	40 MFD. 150 V. ELECTROLY
	C-5	20 MFD.
MC-2	C-6	100 MMFD. MICA CON
MC-5	C-7	500 MMFD. MICA CON
PC-9	C-11	.25 MFD. COND.-400V
TC-7	C-8	ANTENNA TRIMMER C
TC-6	C-9	OSC. TRIMMER CON
TC-9	C-10	OSC. PADDING COND
IR-20	R-9	220M Ω RESISTOR ½W 2C
GC-1	G-1, G-2	GANG CONDENSE
LL-4	L-1	LOOP ANTENNA
LO-7	L-2	OSC. COIL
LI-1	T-1	INPUT I.F. TRANSFORM
LI-2	T-2	OUTPUT I.F. TRANSFORM
	T-3	OUTPUT SPKR. TRANSFORM
SPK-6	V.C.	VOICE COIL
	S	P.M. SPEAKER
PB-1	PL	No. 47 PILOT BULB
	SW.	A.C. SW. ON VOL. CONT
CO-1	P	LINE CORD
TU-3	—	12SA7 GT 12SK7 GT 12SQ7 GT 50L6 GT 35Z5

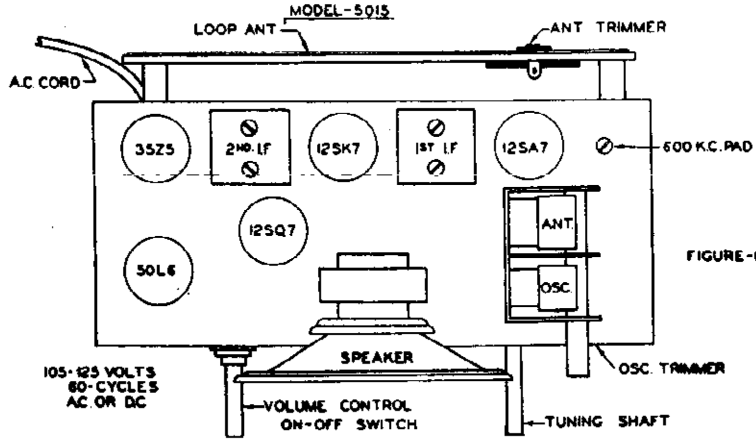
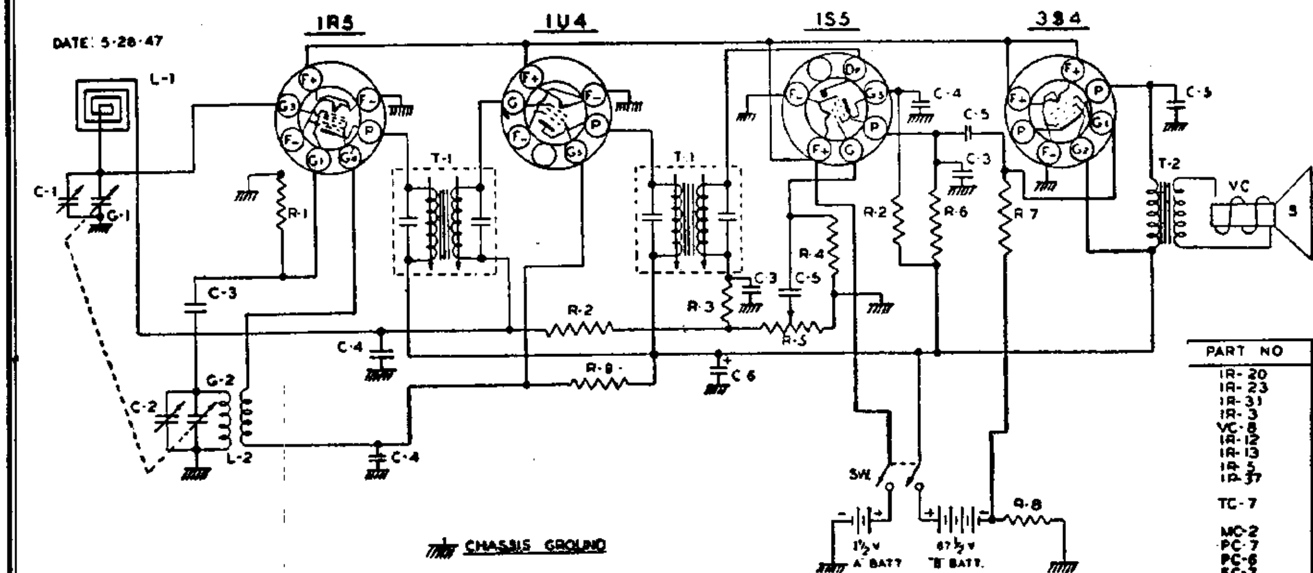


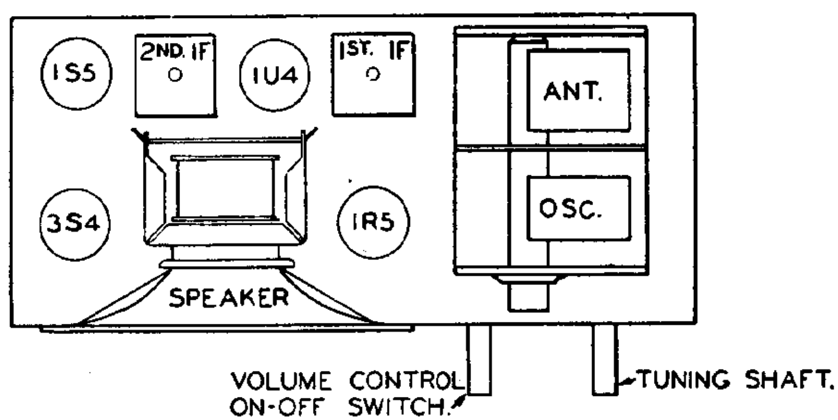
FIGURE-1

SPIEGEL



PART NO		DESCRIPTION
1R-20	R-1	220M Ω RESISTOR 1/2W 20 %
1R-23	R-2	3.3MEG RESISTOR 1/2W 20 %
1R-31	R-3	82M Ω RESISTOR 1/2W 10 %
1R-3	R-4	10MEG RESISTOR 1/2W 20 %
VC-8	R-5	1MEG VOLUME CONTROL
1R-12	R-6	1MEG RESISTOR 1/2W 20 %
1R-13	R-7	2.2MEG RESISTOR 1/2W 20 %
1R-5	R-8	220 Ω RESISTOR 1/2W 10 %
1R-37	R-9	10M Ω RESISTOR 1/2W 20 %
TC-7	C-1	ANT. TRIMMER
	C-2	OSC TRIMMER ON GANG
MC-2	C-3	100MMFD MICA CONDENSER
PC-7	C-4	.01 MFD 400 V.
PC-6	C-5	.005 MFD 600 V.
EC-7	C-6	20MFD. 80WV.
GC-4	G-1, G-2	GANG CONDENSER
LL-8	L-1	LOOP ANTENNA
LO-12	L-2	OSC COIL
LI-5	T-1	IF TRANSFORMER
	SW	DPST. SWITCH ON VOLUME CONTROL
SPK-8	T-2	SPEAKER TRANSFORMER
	VC.	VOICE COIL
	S	PM SPEAKER
TU-29		1R5-1U4-1S5-3S4

TUBE AND TRIMMER LOCATION.



Remove chassis from cabinet for alignment. A signal generator is required having the following frequencies: 455 KC and 1400 KC. An output meter should be connected across the speaker.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD. condenser. The ground lead from the generator may be connected to any spot on the metal chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the movable iron cores in the IF cans. These IF adjustments are made in the top and in the bottom of the can under the chassis. Adjust the cores until a maximum reading is noted on the output meter.

The volume control of the receiver should be turned to maximum during the IF and all subsequent alignment and the generator output as low as possible to prevent the AVC from working and giving false readings.

SECOND STEP: With the leads from the generator still connected as in IF alignment, adjust the generator to 1400 KC. Set the dial pointer to 1400 KC on the dial scale. Adjust the oscillator trimmer until the signal is tuned in.

THIRD STEP: Remove the generator leads from the gang condenser.

Replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn over the outside of the cabinet. With the receiver and the generator still set at 1400 KC increase the generator output. Adjust the Antenna trimmer through the back of the chassis until a maximum signal is noted on the output meter.

No further adjustment should be necessary as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

NOTE: When the antenna trimmer is adjusted at 1400 KC., the chassis as well as the "A" and "B" batteries must be in normal position in the cabinet to reflect the proper loop impedance.

SPIEGEL

BATTERY SERVICING

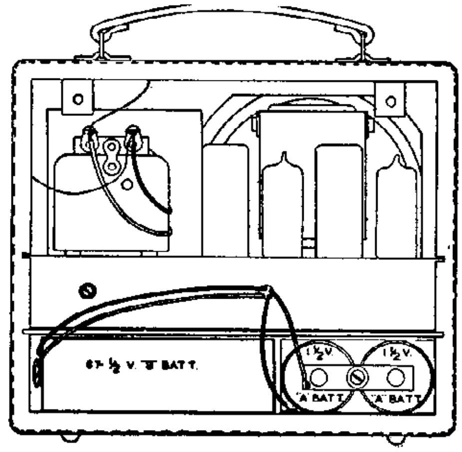
MODEL 5019

Eveready 67½ vlt. #467

Burgess 67½ vlt. #XX45

General 67½ vlt. #W45A

Ray-O-Vac 67½ vlt. #4367



To replace the batteries in this receiver loosen and remove the screw in the back of the cabinet. Remove the back.

To the right looking at the rear of the cabinet is the "A" or flashlight battery assembly. Remove the battery assembly from the cabinet. Loosen the screw in the cross arm assembly until the batteries may be removed. Replace with fresh batteries and retighten the screw making sure that the battery center caps fit into the small recesses in the ends of the cross arm.

To replace the "B" battery, remove it from the cabinet. Disconnect the fasteners from the battery. Replace with a fresh battery and reconnect the fasteners. When replacing the "B" battery in the cabinet, make sure that the terminal end of the battery faces the end of the cabinet.

After the batteries have been installed, replace the back, making sure that the two washers in the bottom of the back fit into the slot near the bottom edge of the cabinet. Replace and tighten the screw.

CAUTION: If the batteries in the receiver wear out from use and the receiver refuses to operate make sure that the volume control is turned all the way to the left in "OFF" position, until the batteries can be replaced. If the switch is left in the "ON" position this will cause the battery cells to burst and they will leak into the receiver which may ruin the component parts.

MODEL 5025

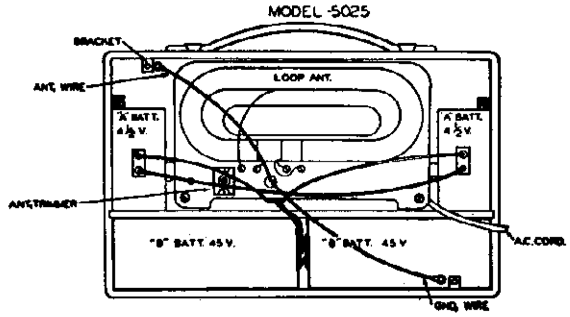
"B" BATTERIES
(2 Required)

Mfgr.	Volts		Type No.
Burgess	45	"B"	M30
General	45	"B"	W30B
Bright Star	45	"B"	3033
Usalite	45	"B"	640
Rayovac	45	"B"	P7830
Eveready	45	"B"	482

"A" BATTERIES
(2 Required)

Burgess	4½	"A"	G3
General	4½	"A"	3H3
Bright Star	4½	"A"	361
Usalite	4½	"A"	683
Rayovac	4½	"A"	P83A
Eveready	4½	"A"	746

MODEL -5025



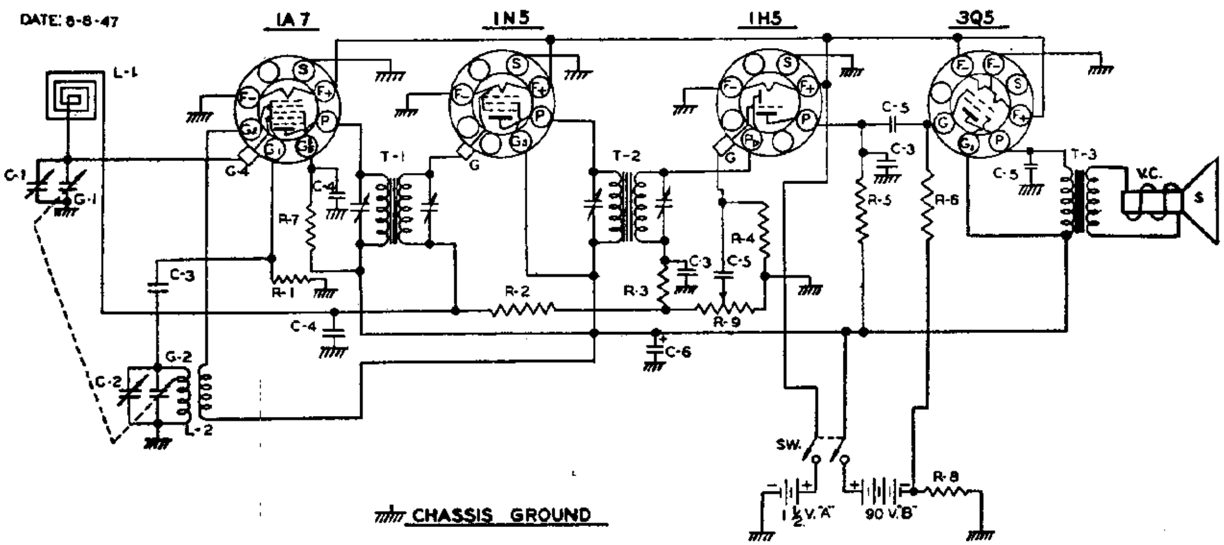
BATTERY LOCATION.

To replace batteries, loosen and remove the two screws at the left and right hand corners of the cabinet back. Remove the back and pull out the plug from each battery. Never pull on the wires connected to the plugs as they may break. Always grasp the plug form between the fingers, or use a flat blade to pry out the plug. Observe with care the position of the batteries and plugs when replacing. Be sure that batteries and plugs are replaced as shown in the "Battery Location" diagram. (Figure No. 1)

After the batteries have been installed, replace the back. Make sure that the two wires from the loop antenna are held in place between the brackets of the cabinet and the back by the two fastening screws.

MODEL 5021

SPIEGEL



Remove chassis from cabinet for alignment. A signal generator is required having the following frequencies: 455 KC and 1400 KC An output meter should be connected across the speaker.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD. condenser. The ground lead from the generator may be connected to any spot on the metal chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the movable trimmers in the IF cans, until a maximum reading is noted on the output meter.

The volume control of the receiver should be turned to maximum during the IF and all subsequent alignment and the generator output as low as possible to prevent the AVC from working and giving false readings.

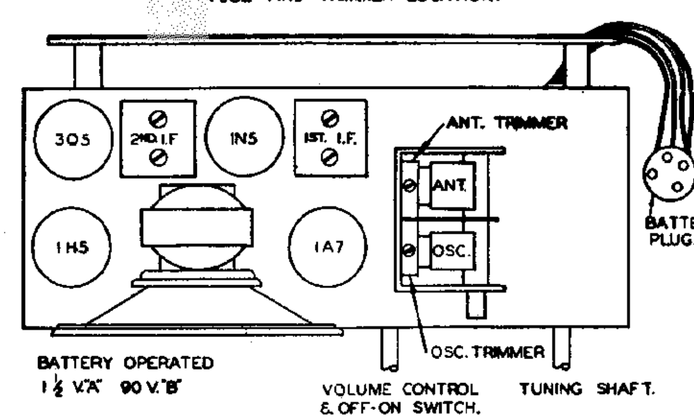
SECOND STEP: With the leads from the generator still connected as in IF alignment, adjust the generator to 400 KC. Set the dial pointer to 1400 KC on the dial scale. Adjust the oscillator trimmer until the signal is tuned in.

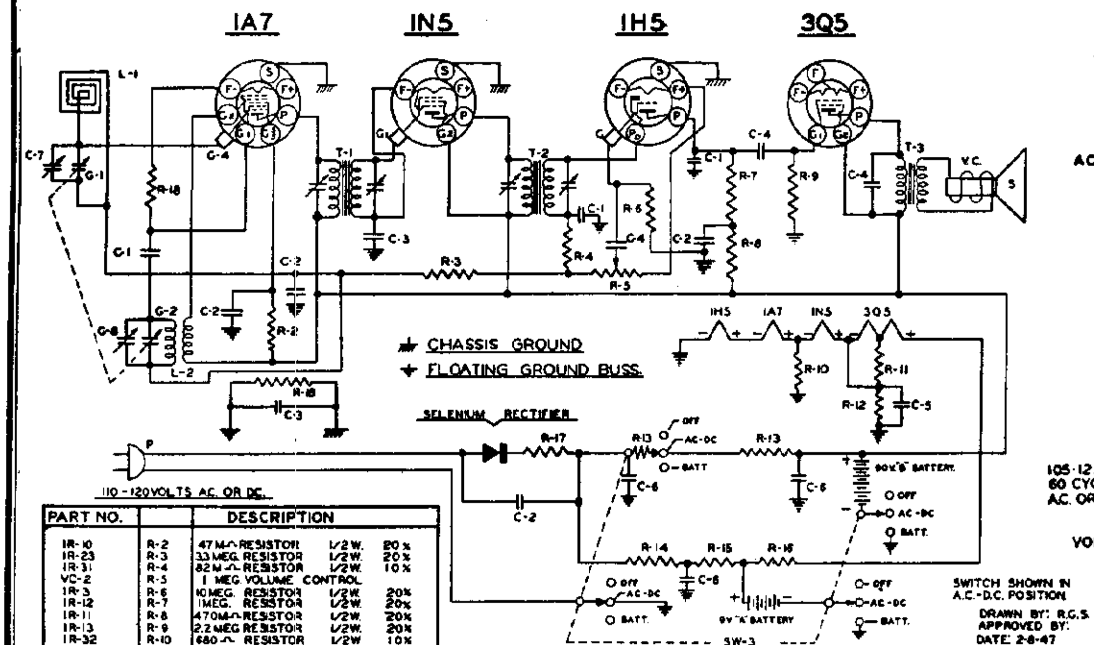
THIRD STEP: Remove the generator leads from the condenser. Connect the hot lead from the generator through a 200 MMFD. condenser to one of the leads which project from the back of the loop antenna. Connect the ground lead of the generator to the remaining lead. With the generator and the receiver still tuned to 1400 KC, adjust the antenna trimmer until a maximum reading is noted on the output meter.

PART NO.		DESCRIPTION.
IR-20	R-1	[illegible] RESISTOR 1/2 W. 20
IR-23	R-2	[illegible] RESISTOR 1/2 W. 20
IR-31	R-3	[illegible] RESISTOR 1/2 W 10
IR-3	R-4	[illegible] RESISTOR 1/2 W. 20
IR-12	R-5	[illegible] RESISTOR 1/2 W. 20
IR-13	R-6	[illegible] RESISTOR 1/2 W. 20
IR-16	R-7	[illegible] RESISTOR 1/2 W. 20
IR-5	R-8	[illegible] RESISTOR 1/2 W. 10
VC-10	R-9	[illegible] VOLUME CONTROL.
	C-1	ANT. TRIMMER
	C-2	OSC. TRIMMER
MC-2	C-3	[illegible] MICA CONDENSER.
PC-5	C-4	[illegible] CONDENSER 400 V.
PC-6	C-5	[illegible] CONDENSER 600 V.
EC-13	C-6	[illegible] 150 V. ELECTROLYTIC CONDENSER

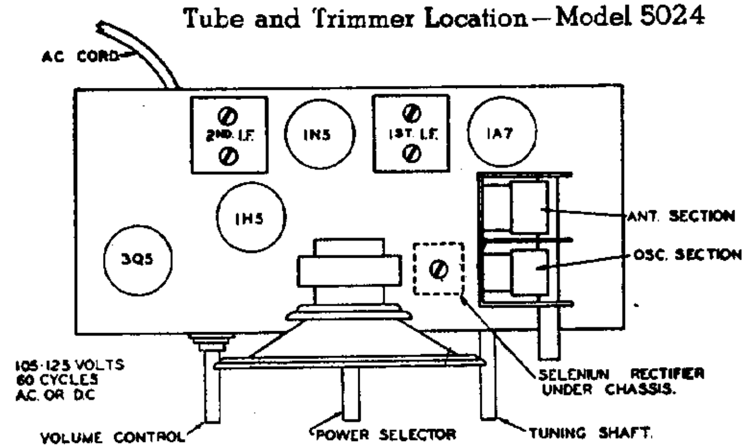
PART NO.		DESCRIPTION.
GC-5	G-1, G-2	GANG CONDENSER.
LL-5	L-1	LOOP ANTENNA
LO-12	L-2	OSC. COIL.
LI-3	T-1	INPUT I.F. TRANSFORMER
LI-4	T-2	OUTPUT I.F. TRANSFORMER
SPK.	T-3	SPEAKER TRANSFORMER
	V.C.	VOICE COIL
	S	P.M. SPEAKER
	SW	D.P.S.T. SWITCH ON VOLUME CONTROL

TUBE AND TRIMMER LOCATION.





Tube and Trimmer Location—Model 5024



PART NO.		DESCRIPTION
1R-10	R-2	47 M-Ω RESISTOR 1/2W. 20%
1R-23	R-3	33 MEG. RESISTOR 1/2W. 20%
1R-31	R-4	82 M-Ω RESISTOR 1/2W. 10%
VC-2	R-5	1 MEG. VOLUME CONTROL
1R-3	R-6	10 MEG. RESISTOR 1/2W. 20%
1R-12	R-7	1 MEG. RESISTOR 1/2W. 20%
1R-11	R-8	470 M-Ω RESISTOR 1/2W. 20%
1R-13	R-9	2.2 MEG RESISTOR 1/2W. 20%
1R-32	R-10	680 Ω RESISTOR 1/2W 10%
1R-33	R-11	270 Ω RESISTOR 1/2W. 10%
1R-21	R-12	330 Ω RESISTOR 1/2W 10%
1R-39	R-13	620 Ω RESISTOR 1/2W 5%
WR-3A	R-14	1050 Ω } CANDOHM RESISTOR
	R-15	1050 Ω
	R-16	40 Ω
1R-35	R-17	82 Ω WIREWOUND RESISTOR. 2W 10%
1R-20	R-18	220 M-Ω RESISTOR 1/2W. 20%
MC-2	C-1	100 MMFD. CONDENSER. (MICA)
PC-5	C-2	.05 MFD. CONDENSER. 400V.
PC-8	C-3	.1 MFD. CONDENSER 400V.
PC-6	C-4	.005 MFD CONDENSER 600V

PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
EC-6	C-5	70 MFD. 10V. ELECTROLYTIC	SPK-5	T-3	OUTPUT SPEAKER TRANSFORMER
EC-4	C-6	40-40-40-150V ELECTROLYTIC		VC	VOICE COIL
TC-7	C-7	ANTENNA TRIMMER		S	P.M. SPEAKER
	G-8	OSC. TRIMMER.	SW-5	SW-3	4 POLE 3 POSITION
GC-4	G-1	GANG CONDENSER	SR-1	——	SELENIUM RECTIFIER
	G-2		TU-11	——	1A7-1N5-1H5-3Q5
LL-10	L-1	LOOP ANNTENNA	"A" BATTERY		9 VOLTS
LO-8	L-2	OSC. COIL	"B" BATTERY		90 VOLTS.
LI-3	T-1	INPUT I.F. TRANSFORMER			
LI-4	T-2	OUTPUT I.F. TRANSFORMER			
CO-1	P	LINE CORD			

ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

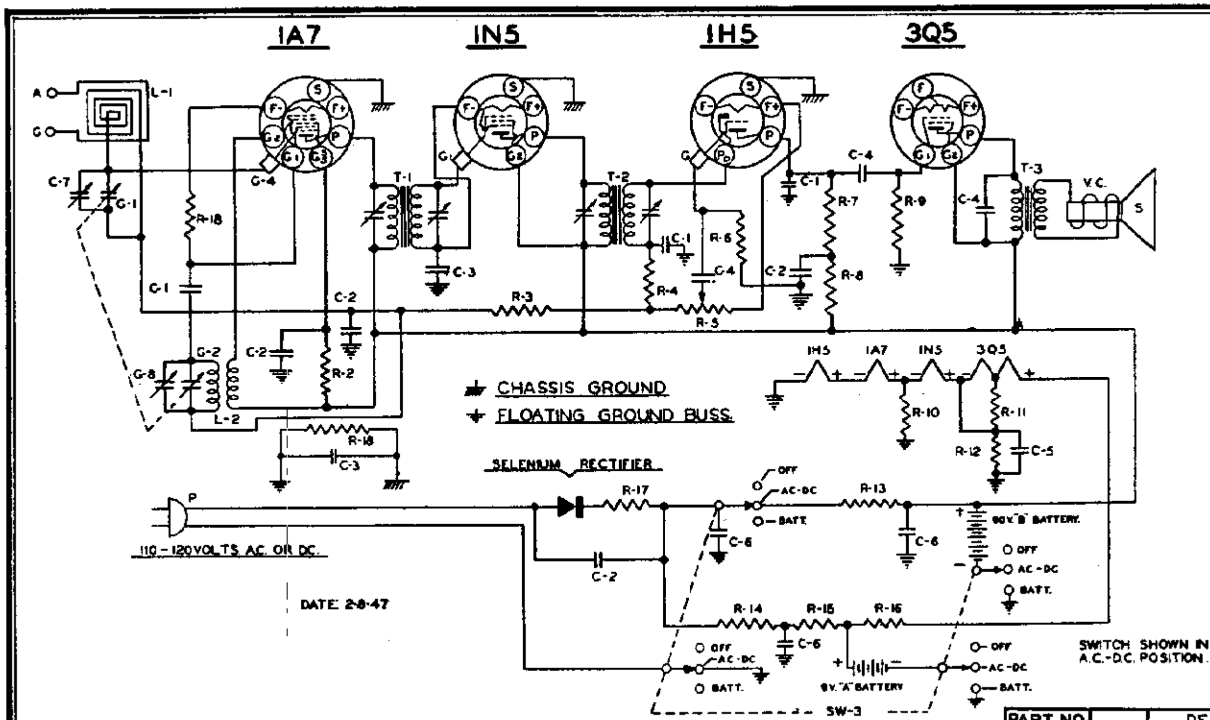
The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through the .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer until a maximum signal is noted on the output meter. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper align-

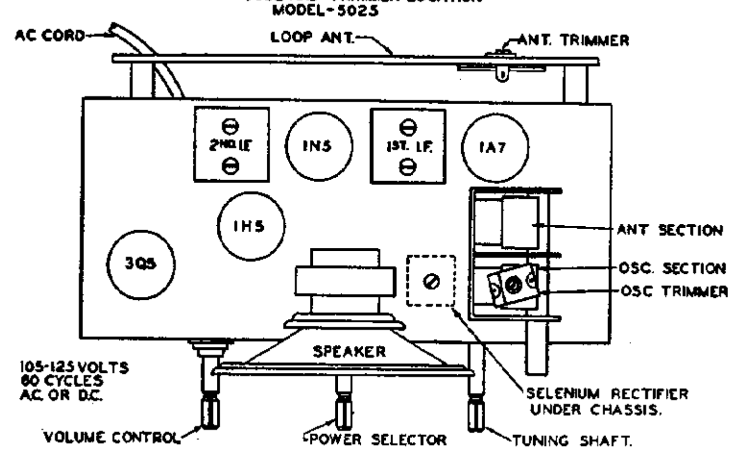
SPIEGEL



PART NO.		DESCRIPTION
IR-10	R-2	47M-Ω RESISTOR 1/2 W. 20%
IR-23	R-3	3.3 MEG. RESISTOR 1/2 W 20%
IR-31	R-4	82 M-Ω RESISTOR 1/2 W. 10%
VC-2	R-5	1 MEG. VOLUME CONTROL
IR-3	R-6	10 MEG. RESISTOR 1/2 W 20%
IR-12	R-7	1 MEG. RESISTOR 1/2 W 20%
IR-11	R-8	470M-Ω RESISTOR 1/2 W 20%
IR-13	R-9	2.2 MEG. RESISTOR 1/2 W. 20%
IR-32	R-10	680 Ω RESISTOR 1/2 W 10%
IR-33	R-11	270 Ω RESISTOR 1/2 W 10%
IR-21	R-12	330 Ω RESISTOR 1/2 W 10%
IR-34	R-13	1200 Ω RESISTOR 1/2 W. 10%
WR-3	R-14	1050 Ω CANDOHM RESISTOR
	R-15	1050 Ω
	R-16	40 Ω
IR-35	R-17	82 Ω WIREWOUND RESISTOR. 2W. 10%
IR-20	R-18	220M-Ω RESISTOR 1/2W. 20%
MC-2	C-1	100 MMFD. CONDENSER. [MICA]
PC-5	C-2	.05 MFD. CONDENSER. 400 V.
PC-8	C-3	.1 MFD. CONDENSER 400 V.
PC-6	C-4	.005 MFD. CONDENSER 600 V.

PART NO.		DESCRIPTION	PART NO		DESCRIPTION
EC-6	C-5	70 MFD. 10V. ELECTROLYTIC	SPK-5	T-3	OUTPUT SPEAKER TRANSFORMER
EC-4	C-6	40-40-40-150V. ELECTROLYTIC		VC	VOICE COIL
TC-7	C-7	ANTENNA TRIMMER		S	P.M. SPEAKER.
TC-6	G-8	OSC TRIMMER	SW-5	SW-3	4 POLE 3 POSITION
GC-2	G-1, G-2	GANG CONDENSER	SR-1	——	SELENIUM RECTIFIER
			TU-11	——	1A7-1N5-1H5-3Q5
LL-5	L-1	LOOP ANNTENNA	"A" BATTERY		9 VOLTS.
LO-8	L-2	OSC COIL	"B" BATTERY		90 VOLTS.
LI-3	T-1	INPUT I.F. TRANSFORMER			
LI-4	T-2	OUTPUT I.F. TRANSFORMER			
CO-1	P	LINE CORD			

TUBE AND TRIMMER LOCATION
MODEL-5025



Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

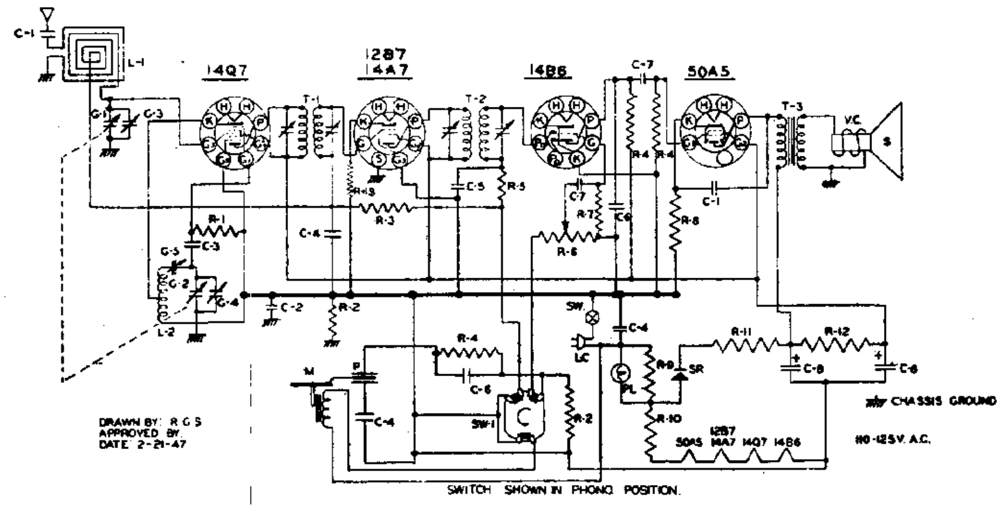
The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: **Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.**

SECOND STEP: **With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.**

THIRD STEP: **Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.**

SPIEGEL



PART NO.		DESCRIPTION.
PC-7	C-1	.01MFD. CONDENSER 400V
PC-6	C-2	.1MFD. CONDENSER 400V
MC-4	C-3	50MMFD. MICA. CONDENSER 500V.
PC-5	C-4	.05MFD. CONDENSER 400V.
MC-2	C-5	100MMFD MICA. CONDENSER. 500V.
MC-5	C-6	500MMFD. MICA. CONDENSER. 500V
PC-10	C-7	.005MFD CONDENSER. 400V.
EC-10	C-8 C-8	40MFD. 40MFD. 150V. ELECTROLYTIC
IR-9	R-1	22000 Ω RESISTOR 1/2W. 20%
IR-20	R-2	220M Ω RESISTOR 1/2W. 20%
IR-23	R-3	3.3MEG. Ω RESISTOR. 1/2W. 20%
IR-11	R-4	470M Ω RESISTOR 1/2W. 20%
IR-10	R-5	47M Ω RESISTOR 1/2W. 20%
VC-4	R-6	1MEG. VOLUME CONTROL
IR-13	R-7	2MEG. Ω RESISTOR 1/2W. 20%
IR-14	R-8	150 Ω RESISTOR 1/2W. 20%
WR-5	R-9 R-10	30 Ω 165 Ω WIREWOUND RESISTOR 5W. 5%
IR-35	R-11	82 Ω RESISTOR. 2W. 10%
IR-25	R-12	2200 Ω RESISTOR. 1W. 10%
IR-6	R-13	470 Ω RESISTOR. 1/2W. 10%
GC-1	G-1 G-2	GANG CONDENSER
TC-7	G-3	ANT. TRIMMER.
TC-6	G-4	OSC. TRIMMER.
TC-9	G-5	600 KC. TRIMMER.
LL-7	L-1	LOOP
LO-7	L-2	OSC. COIL.
LI-1	T-1	INPUT IF TRANSFORMER
LI-2	T-2	OUTPUT IF TRANSFORMER.
SPK-5	T-3	OUTPUT TRANSFORMER.
	VC	VOICE COIL
	S	SPEAKER
SR-1	SR	SELENIUM RECTIFIER.
M-1	M	110V 60CYCLES. A.C. MOTOR
L-75	P	CRYSTAL PICKUP.
SW-1	SW-1	RADIO-PHONO SWITCH.
	SW	A.C. SWITCH ON VOLUME CONTROL.
PB-1	PB	#47 PILOT BLUB
CO-1	LC	LINE CORD.
TU-28		50A5-14Q7-14A7-14B6-SR-1

ALIGNMENT

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

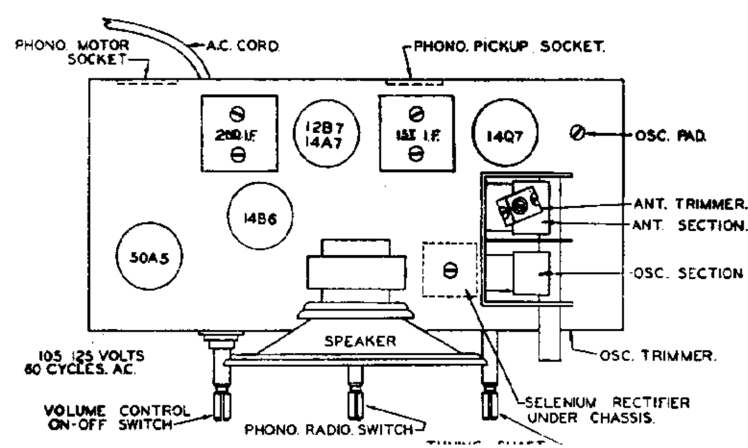
FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

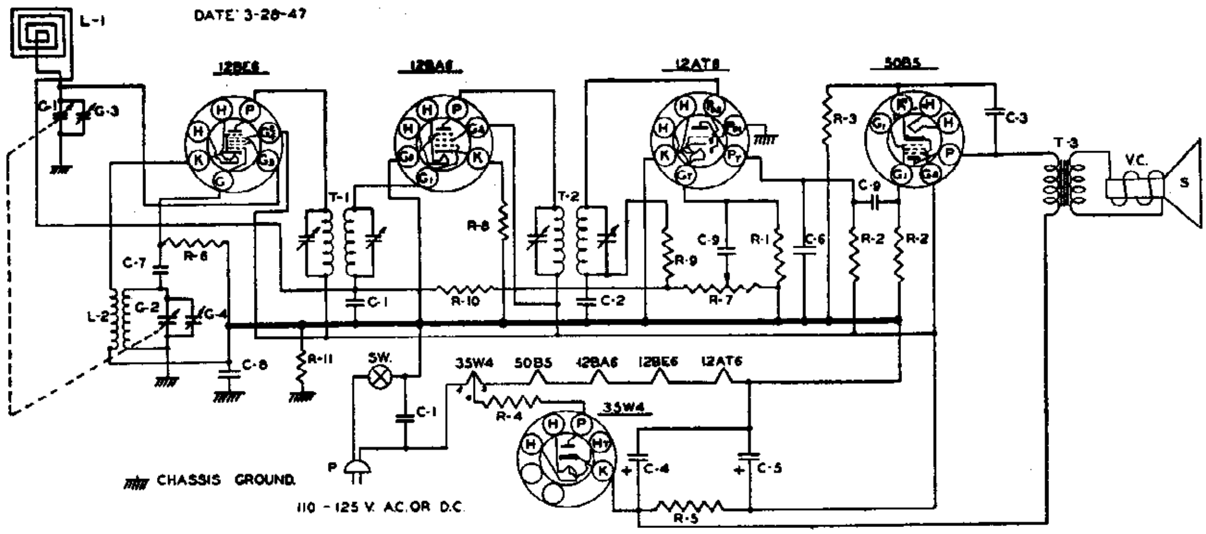
THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

TUBE AND TRIMMER LOCATION

MODEL- 5030-31



SPIEGEL



Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

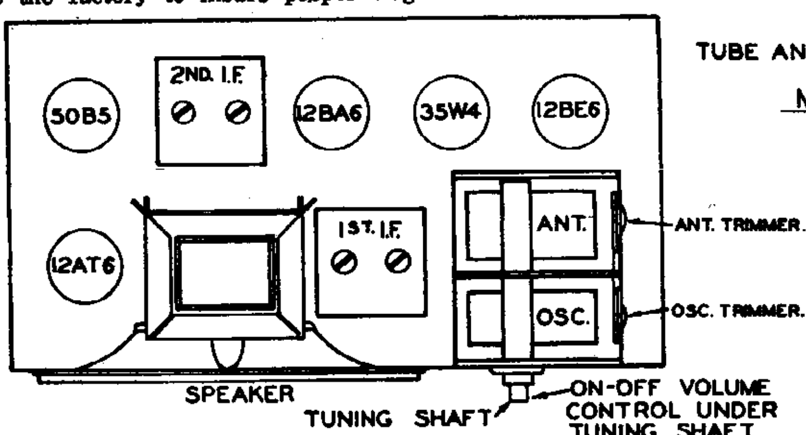
The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the end of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the side of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

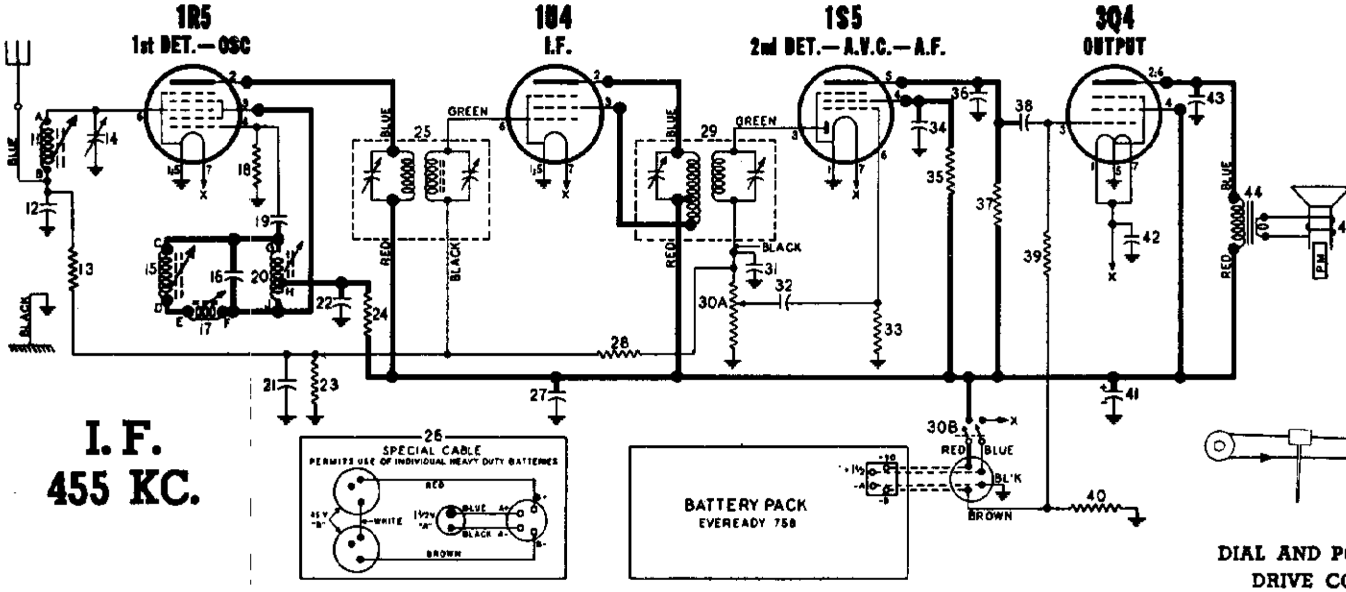
PART NO.		DESCRIPTION
IR-13	R-1	2.2 MEG RESISTOR 1/2 W. 20 %
IR-11	R-2	470M Ω RESISTOR 1/2 W. 20 %
IR-14	R-3	150 Ω RESISTOR 1/2 W. 20 %
IR-17	R-4	33 Ω RESISTOR 1/2 W. 20 %
IR-25	R-5	2200 Ω RESISTOR 1 W. 10 %
IR-16	R-6	33 M Ω RESISTOR 1/2 W 20 %
VC-9	R-7	1 MEG. VOLUME CONTROL
GC-7	G-1, G-2	GANG CONDENSER
	G-3	ANT. TRIMMER COND.
IR-36	R-8	100 Ω RESISTOR 1/2 W 20 %
IR-10	R-9	47 M Ω RESISTOR 1/2 W 20 %
	G-4	OSC. TRIMMER COND.
PC-5	C-1	.05 MFD. CONDENSER 400 V.
MC-2	C-2	.0001 MFD. MICA. CONDENSER 20 %,
PC-7	C-3	.01 MFD. CONDENSER 400 V.
EC-12	C-4	40 MFD. 150 V. ELECTROLYTIC CONDENSER
	C-5	20 MFD.
MC-5	C-6	.0005 MFD. CONDENSER 20 %
MC-4	C-7	.000056 MFD. MICA 20 %
PC-8	C-8	.1 MFD. CONDENSER 400 V.
LL-9	L-1	LOOP ANTENNA
IR-23	R-10	3.3 MEG. RESISTOR 1/2 W. 20 %
PC-6	C-9	.005 MFD. CONDENSER 600 V.
LO-13	L-2	OSC. COIL
LI-6	T-1	INPUT TRANSFORMER
LI-7	T-2	OUTPUT TRANSFORMER
SPK-10	T-3	OUTPUT SPK. TRANFORMER.
	V.C.	VOICE COIL
	S	P.M. SPEAKER
IR-20	R-11	220M RESISTOR 1/2 W. 20 %
	SW	AC. SW. ON VOLUME CONTROL
CO-1	P	LINE CORD
TU-18	—	12BE6 - 12BA6 - 12AT6 50B5 - 35W4



TUBE AND TRIMMER LOCATION

MODEL-5050

STEWART-WARNER CORP.



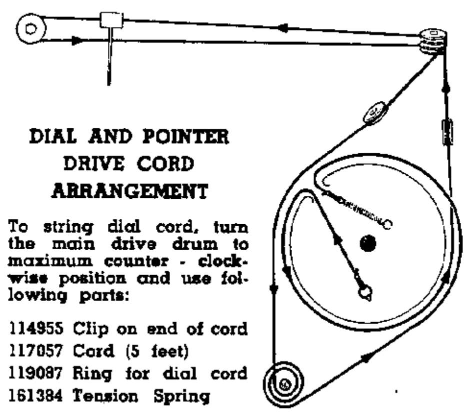
I. F.
455 KC.

POWER LINE OPERATION

The following power pack may be used to operate this set on 110 volt 50-60 cycle A.C. power lines.

Perma-Power Model "A"

This unit is manufactured by the General Transformer Corp., 4321 Knox Ave., Chicago 41, Illinois.



DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, turn the main drive drum to maximum counter - clockwise position and use following parts:

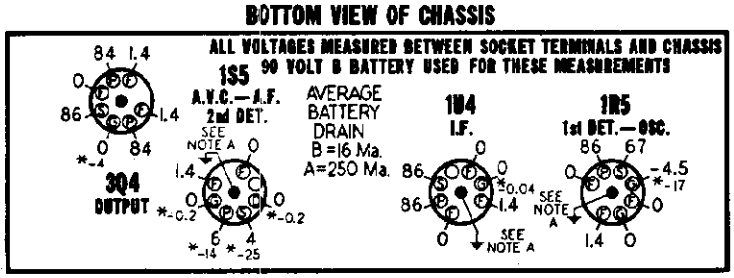
114955 Clip on end of cord
117057 Cord (5 feet)
119087 Ring for dial cord
161384 Tension Spring

SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

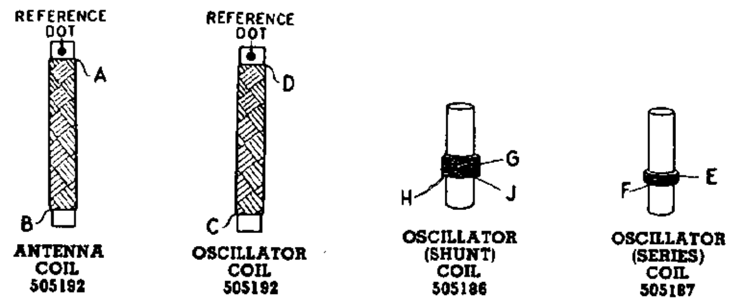
VOLUME ON FULL WITH NO SIGNAL   DIAL TUNED TO 540 KC.

BOTTOM VIEW OF CHASSIS



REAR OF CHASSIS

NOTE A: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.



Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

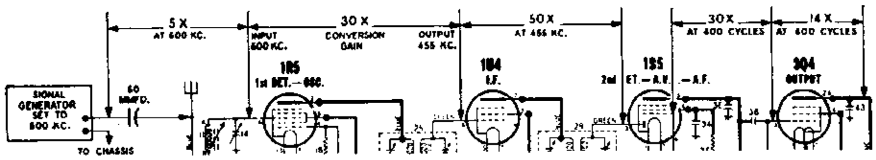
MODEL A41T1 **STEWART-WARNER CORP.**

STAGE GAIN MEASUREMENT PROCEDURE

REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 1½ volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 1½ volt battery to A.V.C. at black lead of 1st I.F. and connect the positive battery lead to receiver chassis.
4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

ALIGNMENT PROCEDURE

1. During the alignment of this receiver it will be necessary to set the dial pointer to the following frequencies: 535 Kc. (first mark on dial scale), 1500 Kc. and 1625 Kc. (last mark on dial scale). In order to avoid replacing the chassis in the cabinet each time a dial setting is required, it will be found more convenient to mark the required frequency points on the white dial background plate before starting the alignment.
2. Rotate the tuning control knob counter-clockwise until tuner mechanism is completely closed. Dial pointer should then point to 535 Kc. or the first mark on the dial. If it is set incorrectly, release pointer clip on dial cord and reposition pointer.
3. Connect ground lead of signal generator to receiver chassis.
4. Connect an output meter across speaker voice coil or from plate of 3Q4 tube to chassis through an 0.1 Mfd. condenser.
5. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.1 MFD. Condenser	Terminal "A" On Slug Tuner (see Fig. 1 below)	455 KC	Any point where it does not affect the signal	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
Set tuner mechanism to maximum open position by turning the tuning control knob clockwise as far as it will go. Then check whether the positions of the tuning slugs correspond to the positions shown in Fig. 1 below. If settings are incorrect, rotate the individual core and threaded stem until desired position is reached. Note that threaded stem is prevented from moving by a dab of cement at top and that this seal must be removed before stem can be rotated.						
50 MMFD. Mica Condenser	External antenna lead (blue)	535 KC	535 KC (First mark on dial)	5	Broadcast Oscillator (Shunt)	Adjust for maximum output.
50 MMFD. Mica Condenser	External antenna lead (blue)	1625 KC	1625 KC (Last mark on dial)	6	Broadcast Oscillator (Series)	Adjust for maximum output.
50 MMFD. Mica Condenser	External antenna lead (blue)	1500 KC	1500 KC	7	Broadcast Antenna	Adjust for maximum output.
Apply a coating of cement at top of each tuning core stem to prevent movement.						

NOTE: After set has been reinstalled in the home and antenna and ground have been properly connected, it will be necessary to readjust trimmer #7 (see Fig. 2). Tune set to receive a weak station in the 1400 Kc. to 1600 Kc. section of the dial and carefully set trimmer #7 so as to receive the station with maximum volume.

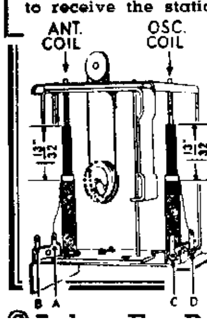


FIG. 1

SLUG TUNER ASSEMBLY
(Drive Parts)
117057 Cord (12")
114955 Clip on cord
504012 Spring

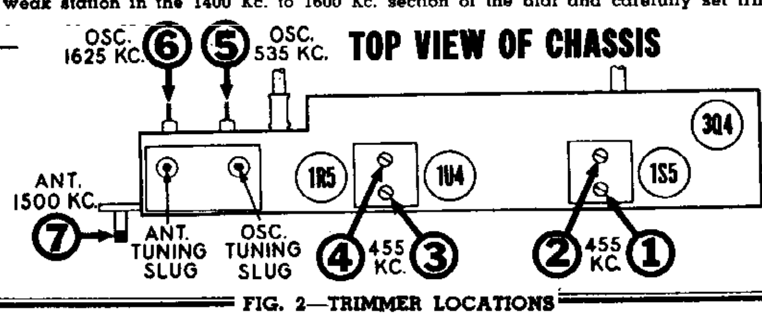


FIG. 2—TRIMMER LOCATIONS

PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

MODEL A41T1

CONDENSERS

DIA-GRAM NO.	PART NO.	DESCRIPTION
12	502790	Condenser—mica 200 Mmfd. 500 volt
14	505179	Condenser—trimmer 30 to 270 Mmfd.
16	505183	Condenser—ceramic 47 Mmfd. ± 2% 500 volt
19	502929	Condenser—mica 47 Mmfd. 500 volt
21 22	502153	Condenser—.05 Mfd. 200 volt
27	502155	Condenser—.1 Mfd. 200 volt
31	502931	Condenser—mica 100 Mmfd. 500 volt
32	502156	Condenser—.004 Mfd. 400 volt
34	502153	Condenser—.05 Mfd. 200 volt
36	502271	Condenser—mica 260 Mmfd. 500 volt
38	504726	Condenser—.01 Mfd. 200 volt
41	505174	Condenser—electrolytic 10 Mfd. 150 volt
42	502263	Condenser—.5 Mfd. 150 volt
43	502453	Condenser—.002 Mfd. 400 volt

RESISTORS

DIA-GRAM NO.	PART NO.	DESCRIPTION
13	502268	Resistor—carbon 1 Meg. 1/4 watt
18	502132	Resistor—carbon 100,000 Ohms 1/4 watt
23	502133	Resistor—carbon 220,000 Ohms 1/4 watt
24	502459	Resistor—carbon 6,800 Ohms 1/4 watt
28	502268	Resistor—carbon 1 Meg. 1/4 watt
30-A, B	505197	Volume control 1 Meg. (with switch)
33	502136	Resistor—carbon 10 Meg. 1/4 watt
35	502269	Resistor—carbon 3.3 Meg. 1/4 watt
37	502268	Resistor—carbon 1 Meg. 1/4 watt
39	502268	Resistor—carbon 1 Meg. 1/4 watt
40	505184	Resistor—carbon 270 Ohms 1/4 watt

COILS & TRANSFORMERS

DIA-GRAM NO.	PART NO.	DESCRIPTION
11	505192	Coil—antenna
15	505192	Coil—oscillator
	505191	Tuning slug for ant. or osc. coils 505192
17	505187	Coil—oscillator series (less slug)
	505189	Slug core for oscillator series coil
20	505186	Coil—oscillator shunt (less slug)
	505188	Slug core for oscillator shunt coil
25	505193	Transformer—1st I.F.
29	505194	Transformer—2nd I.F.
44	505182	Transformer—output for W-505168 speaker

OTHER ELECTRICAL PARTS

DIA-GRAM NO.	PART NO.	DESCRIPTION
26	116566	Battery cable for use with indiv. batt.
45	505168	Speaker—P.M. dynamic (5 inch) includes output transformer

MISCELLANEOUS PARTS

DIA-GRAM NO.	PART NO.	DESCRIPTION
	505176	Cabinet
	505196	Cable—battery with plug
	502506	Clamp—dial scale mtg.
	505165	"C" washer for tuning shaft
	114955	Clip—retainer on end of dial cord
	504653	Clip—coil mounting
	117057	Cord—dial drive (5 ft. required) per ft.
	505350	Dial scale
	502563	Knob tuning
	505329	Knob—volume and "ON-OFF"
	505170	Permeability tuning mechanism (less coils)
	505328	Pointer
	119087	Ring for dial cord
	17063	Screw—#6 x 1/4 holds dial clamp
	18785	Screw—#8 x 7/8" chassis mounting
	504397	Socket—miniature
	161384	Spring—dial cord tension
	504012	Spring for tuning slug drive cord

PARTS LIST

ORDER PARTS FROM YOUR STEWART WARNER DISTRIBUTOR ONLY

MODEL A61CR1

CONDENSERS

DIA-GRAM NO.	PART NO.	DESCRIPTION
13	502151	Condenser—.01 Mfd. 400 volt
14-A, B	505315	Condenser—variable gang (with drum)
16	502931	Condenser—mica 100 Mmfd. 500 volt
19	502153	Condenser—.05 Mfd. 200 volt
20	502157	Condenser—.05 Mfd. 400 volt
22	502152	Condenser—.02 Mfd. 400 volt
25	502153	Condenser—.05 Mfd. 200 volt
33	502931	Condenser—mica 100 Mmfd. 500 volt
36	502156	Condenser—.004 Mfd. 400 volt
39	502152	Condenser—.02 Mfd. 400 volt
41	502157	Condenser—.05 Mfd. 400 volt
45	502405	Condenser—.25 Mfd. 400 volt
48	502150	Condenser—.004 Mfd. 600 volt
49	502271	Condenser—mica 260 Mmfd. 500 volt
51	502410	Condenser—.1 Mfd. 400 volt
53	502152	Condenser—.02 Mfd. 400 volt
55-A, B, C	502207	Condenser—electrolytic A—20 Mfd. 400 volt; B—10 Mfd. 400 volt; C—20 Mfd. 25 volt
57	502156	Condenser—.004 Mfd. 400 volt

RESISTORS

DIA-GRAM NO.	PART NO.	DESCRIPTION
12	502466	Resistor—carbon 33,000 Ohms 1 watt
15	502131	Resistor—carbon 47,000 Ohms 1/4 watt
18	502128	Resistor—carbon 2,200 Ohms 1/4 watt
21	502288	Resistor—carbon 47,000 Ohms 1 watt
23	502459	Resistor—carbon 6,800 Ohms 1/4 watt
26	502269	Resistor—carbon 3.3 Meg. 1/4 watt
27	502264	Resistor—carbon 47 Ohms 1/4 watt
32	502131	Resistor—carbon 47,000 Ohms 1/4 watt
35-A, B	505318	Volume Control 1 Meg. (with switch)
37	502132	Resistor—carbon 100,000 Ohms 1/4 watt
38	502408	Resistor—carbon 68,000 Ohms 1/4 watt
40	502468	Resistor—carbon 4.7 Meg. 1/4 watt
42	502406	Resistor—carbon 1,500 Ohms 1/4 watt
44	502135	Resistor—carbon 2.2 Meg. 1/4 watt
50	502133	Resistor—carbon 220,000 Ohms 1/4 watt
52	502133	Resistor—carbon 220,000 Ohms 1/4 watt
54	502134	Resistor—carbon 470,000 Ohms 1/4 watt
56	504771	Resistor—carbon 3,300 Ohms 2 watt
58	502293	Resistor—wire wound 200 ohms 2 watt

COILS AND TRANFORMERS

DIA-GRAM NO.	PART NO.	DESCRIPTION
11	505306	Loop antenna
17	505326	Coil-oscillator
24	502657	Transformer—1st I. F.
31	502658	Transformer—2nd I. F.
43	502174	Transformer—power
59	505305	Transformer—output

OTHER ELECTRICAL PARTS

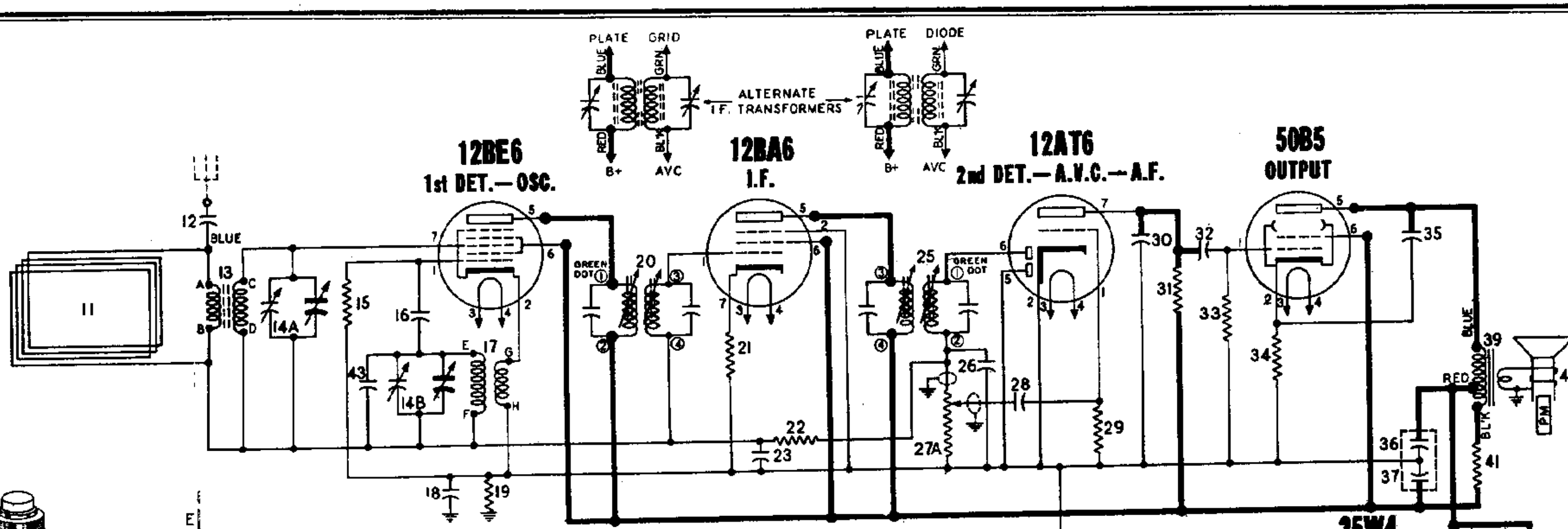
DIA-GRAM NO.	PART NO.	DESCRIPTION
28	505273	Motor—for type "A" 505650 record changer 115 volt 60 cyc.
	505758	Motor—for type "VM" 505339 record changer 115 volt 60 cyc.
29	505100	Crystal cartridge
30	505269	Switch—"ON-OFF" for type "VM"—505339 record changer
	505759	Switch—"ON-OFF" for type "A"—505650 record changer
34	505317	Switch—radio-phono
46, 47	110629	Lamp—dial (Mazda #44) 6.3V 0.25 Amps.
60	505342	Speaker P. M. dynamic (8 inch)

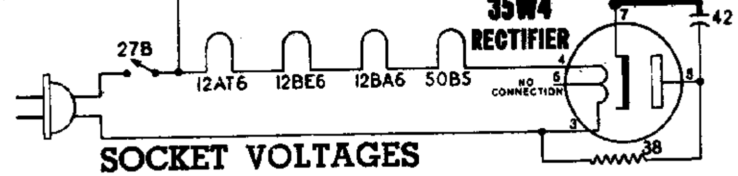
MISCELLANEOUS PARTS

DIA-GRAM NO.	PART NO.	DESCRIPTION
	116467	Base for mtg. electrolytic condenser
	505165	"C" washer
	112745	Clip—coil mounting
	114955	Clip—retainer on end of dial cord
	160326	Clip—retains dial scale
	117057	Cord—dial drive (3 ft. required) per ft.
	505324	Dial scale
	505465	Door (less hardware) for Model A61CR1
	505466	Door Pull for Model A61CR1
	505488	Drawer—record changer for Model A61CR3
	505486	Drawer Pull for Model A61CR3
	505666	Emblem, plastic
	505333	Escutcheon—dial
	505457	Hinge (pair) for lid—Model A61CR2
	505464	Hinge (pair) for lid—Models A61CR1 and A61CR4
	505467	Hinge (pair) for door Model A61CR1
	505344	Knob—tuning
	505345	Knob—"VOLUME"
	505346	Knob—"RADIO-PHONO"
	505455	Lid (less hardware) for Model A61CR2
	505462	Lid (less hardware) for Model A61CR1
	505669	Lid (less hardware) for Model A61CR4
	505456	Lid support for Model A61CR2
	505463	Lid support for Models A61CR1 and A61CR4
	505717	Needle—phonograph
	500966	Plug—Phono. pick-up cable
	501031	Plug—Phono. motor cable
	505686	Pointer
	505487	Rail for drawer (supplied in sets)
	119087	Ring for dial cord
	113463	Rubber pad for mtg. chassis
	79905	Screw—No. 8x1½ for loop mounting
	79993	Screw—No. 8x1¼ for mtg. chassis
	505716	Screw—set for phono needle
	503588	Shaft and drum for dial
	505313	Shaft—tuning
	116690	Socket—octal base
	160039	Socket—phono. plug
	160392	Socket—octal (rectifier)
	505307	Socket and phono. motor cable
	505459	Socket—dial lamp
	505161	Spring—tension
	111456	Washer—spring washer for tuning shaft

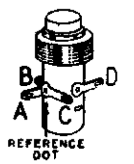
MODELS A51T1, A51T2, A51T3, A51T4

STEWART-WARNER CORP.

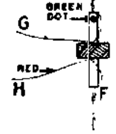




Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.



ANTENNA COUPLING COIL 504451

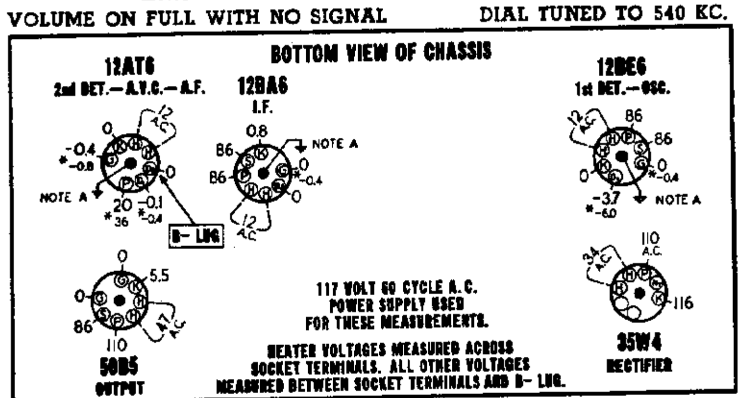


OSCILLATOR COIL 504458

SOCKET VOLTAGES

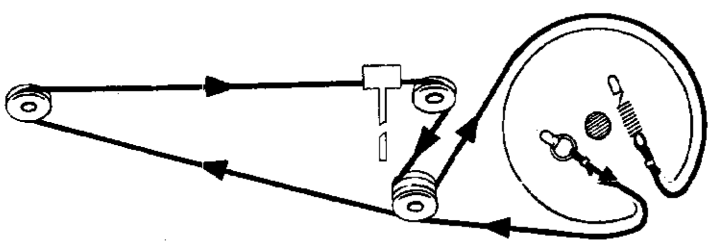
Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

VOLUME ON FULL WITH NO SIGNAL DIAL TUNED TO 540 KC.



REAR OF CHASSIS

NOTE A: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.



DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, turn the drive drum to maximum clockwise position and use the following parts:

114955	Clip on end of cord	119087	Ring for dial cord
117057	Cord (2 feet required)	505161	Tension Spring

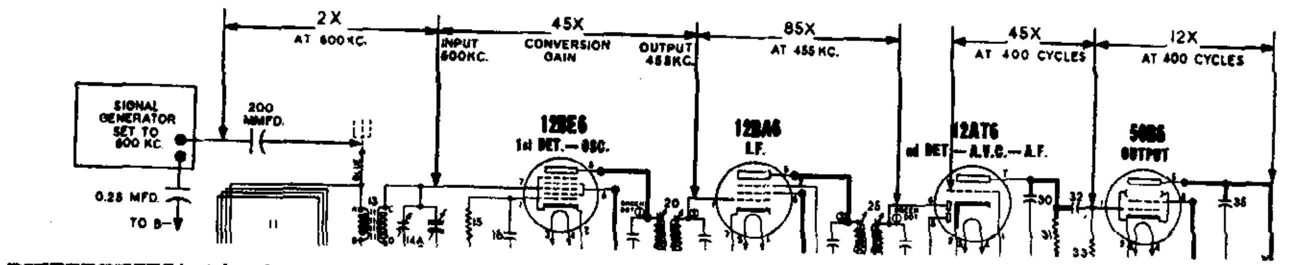
STEWART-WARNER CORP. MODELS A51T1, A51T
A51T3, A51T4

STAGE GAIN MEASUREMENT PROCEDURE

REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at terminal "D" of antenna coupling coil and connect the positive battery lead to B— in receiver chassis.
4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence st gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

ALIGNMENT PROCEDURE

1. With the gang condenser fully meshed, the dial pointer should be 1/8" to the left of the 55 mark on the dial. If it is set incorre release the pointer clip on the dial cord and reposition pointer.

2. To remove chassis from cabinet lift edge of insulating sheet at bottom of cabinet and take out mounting screws at each co Then remove bottom plate by taking out screws at each end holding it to chassis. Solder approximately 8" of insulated wir any B— connection (see voltage chart on opposite side for convenient B— location).

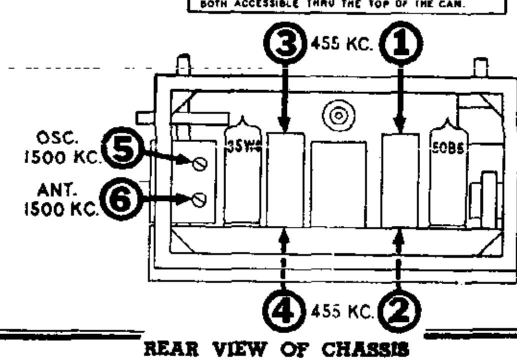
3. Connect ground lead of signal generator to B— through a 0.25 Mfd. condenser.

4. Connect output meter across speaker voice coil (terminals at back of speaker) or from plate of 50B5 tube to B— through a 0.1 condenser.

5. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMEN
200 MMFD. Mica Condenser	Lug on trimmer No. 6 on bottom section of gang (see figure below for location of trimmer).	455 KC	Any point where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum outp Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Mica Condenser	External antenna lead	1500 KC	1500 KC	5	Broadcast Oscillator	Adjust for maximum outp
200 MMFD. Mica Condenser	External antenna lead	1500 KC	Tune to 1500 KC generator signal.	6	Broadcast Antenna	Adjust for maximum outp

AN ALTERNATE TYPE OF I.F. TRANSFORMER WAS USED ON SOME OF THESE CHASSIS AND ITS TRIMMERS ARE BOTH ACCESSIBLE THRU THE TOP OF THE CAN.



REAR VIEW OF CHASSIS

STEWART-WARNER CORP.

PARTS LIST — MODEL A61P1

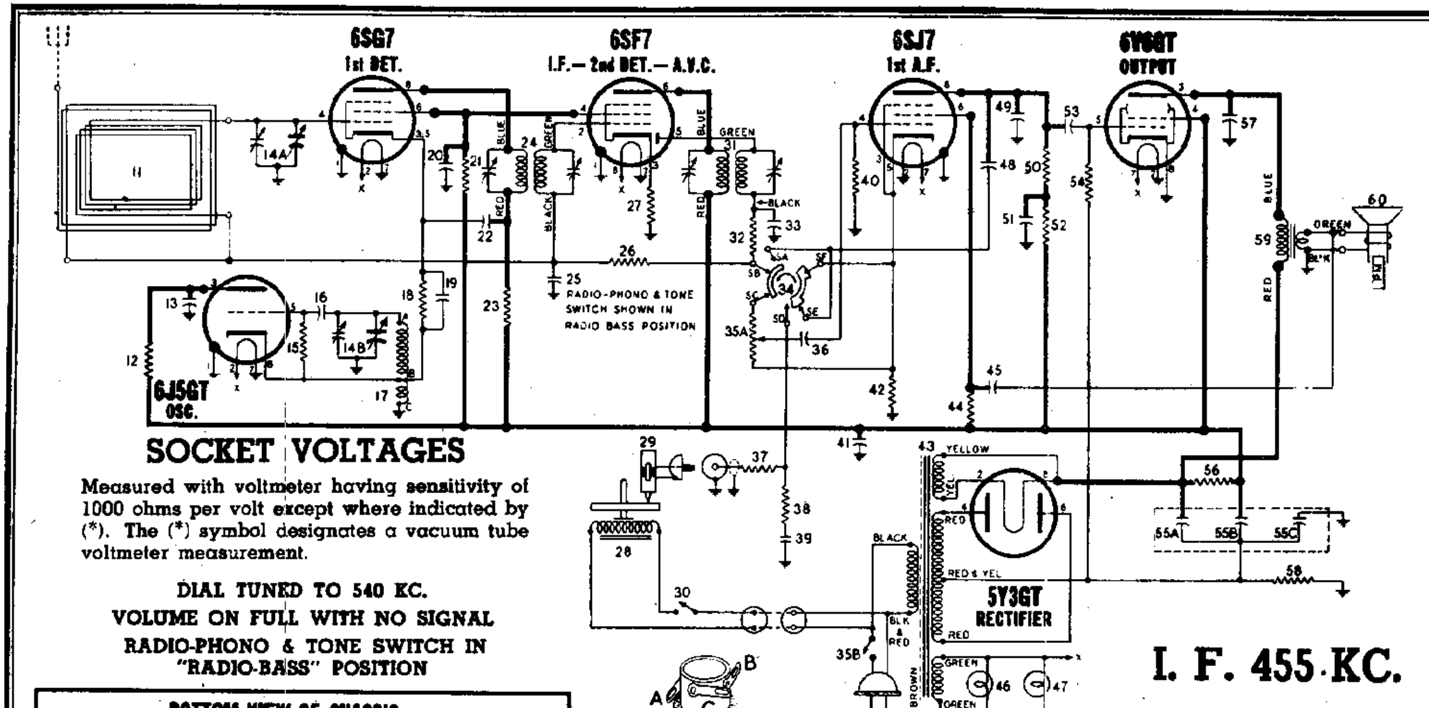
ORDER PARTS FROM YOUR
STEWART-WARNER DISTRIBUTOR ONLY

DIA-GRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
1	502160	Condenser—110 Mmfd. 500 volt
4-A, B	502494	Condenser—variable gang (with drum)
5	119132	Condenser—trimmer 2 to 15 Mmfd.
7	502159	Condenser—mica 50 Mmfd. 500 volt
8	502153	Condenser—.05 Mfd. 200 volt
11	502547	Condenser—electrolytic 4 Mfd. 150 volt
15	502153	Condenser—.05 Mfd. 200 volt
16	502155	Condenser—.1 Mfd. 200 volt
17	502153	Condenser—.05 Mfd. 200 volt
25, 26	502159	Condenser—mica 50 Mmfd. 500 volt
28	502155	Condenser—.1 Mfd. 200 volt
31	502156	Condenser—.004 Mfd. 400 volt
35	502160	Condenser—mica 110 Mmfd. 500 volt
37	502155	Condenser—.1 Mfd. 200 volt
40	502151	Condenser—.01 Mfd. 400 volt
42	502527	Condenser—electrolytic 50 Mfd. 25 volt
48	502155	Condenser—.1 Mfd. 200 volt
50	502453	Condenser—.002 Mfd. 400 volt
56-A, B, C	500714	Condenser—electrolytic A—20 Mfd. 150 volt B—20 Mfd. 200 volt C—20 Mfd. 200 volt
58	502153	Condenser—.05 Mfd. 200 volt
59	502411	Condenser—2 Mmfd. 500 volt
		RESISTORS
6	502133	Resistor—carbon 220,000 ohms 1/4 watt
12	504710	Resistor—carbon 33,000 ohms 1/4 watt
14	502136	Resistor—carbon 10 Meg. 1/4 watt
18	502455	Resistor—carbon 27 ohms 1/4 watt
19	502457	Resistor—carbon 330 ohms 1/4 watt
20	502458	Resistor—carbon 430 ohms 1/4 watt
21	502269	Resistor—carbon 3.3 Meg. 1/4 watt
24	502132	Resistor—carbon 100,000 ohms 1/4 watt
29	502269	Resistor—carbon 3.3 Meg. 1/4 watt
30-A,B,C,D	502525	Volume control 1 Meg. (with switch)
32	502269	Resistor—carbon 3.3 Meg. 1/4 watt
33, 34	502456	Resistor—carbon 220 ohms 1/4 watt
36	502268	Resistor—carbon 1 Meg. 1/4 watt
38	502134	Resistor—carbon 470,000 ohms 1/4 watt
39	500712	Resistor—wire wound 1830 ohms 5 watt
41	502135	Resistor—carbon 2.2 Meg. 1/4 watt
44	502266	Resistor—carbon 15,000 ohms 1/4 watt
45	502459	Resistor—carbon 6800 ohms 1/4 watt
46	502457	Resistor—carbon 330 ohms 1/4 watt
47	502455	Resistor—carbon 27 ohms 1/4 watt
49-A, B, C	500715	Resistor—wire wound A—1460 ohms 10 watt B—155 ohms 1 watt C—310 ohms 10 watt
54	502454	Resistor—wire wound 47 ohms 1 watt
57	502454	Resistor—wire wound 47 ohms 1 watt
		COILS AND TRANSFORMERS
2	505781	Coil—antenna (series)
3	505440	Loop antenna
9	502498	Coil—oscillator
13	502495	Transformer—1st I.F.
23	500749	Transformer—2nd I.F.
51	502902	Trans.—output for A-502491 speaker
	502492	Trans.—output for R-502491 speaker
55	502528	Filter choke
		OTHER ELECTRICAL PARTS
22	502536	Cable—battery pack
27	500713	Neon indicator lamp
43-A,B,C,D	502526	Switch—"CHARGE—BATT.—AC-DC"
53	502491	Speaker—P. M. dynamic (5 inch) includes output transformer
		MISCELLANEOUS PARTS
	160026	Base for mtg. electrolytic condenser
	505444	Cabinet—black
	505451	Catch and latch for rear door
	112745	Clip—coil mtg.
	114955	Clip—retainer on end of dial cord
	117057	Cord—dial drive (3 feet required) per ft.
	505400	Door-front for Model A61P1
	505441	Door-rear for Model A61P1
	505712	Door-front for Model A61P2
	505713	Door-rear for Model A61P2
	505720	Door-front for Model A61P3
	505721	Door-rear for Model A61P3
	505687	Escutcheon plate for Model A61P1
	505692	Escutcheon plate for Models A61P2 & A61P3
	505453	Handle & mtg. clips for Model A61P1
	505714	Handle & mtg. clips for Models A61P2 & A61P3
	505452	Hinge (pair) for rear door
	505711	Hinge for front door
	505682	Knob "OFF-VOLUME" (black)
	505683	Knob—"CHARGE—AC-DC" (black)
	505684	Knob—"TUNE" (black)
	505688	Knob—"OFF-VOLUME" (brown)
	505689	Knob—"CHARGE—AC-DC" (brown)
	505690	Knob—"TUNE" (brown)
	500747	Plug for battery cable (fits chassis)
	502537	Plug for battery cable (fits batt. pack)
	131575	Plug button
	505685	Pointer (black)
	505691	Pointer (brown)
	81145	Retaining ring for tuning shaft
	119087	Ring for dial cord
	79894	Screw—No. 8 X 5/8"; for mtg. chassis
	502524	Shaft—tuning control
	117716	Shield—tube
	116690	Socket—octal base
	500681	Socket—battery cable
	161384	Spring—dial cord tension
	111456	Washer—spring washer for tuning shaft

PARTS LIST — MODEL A51T1

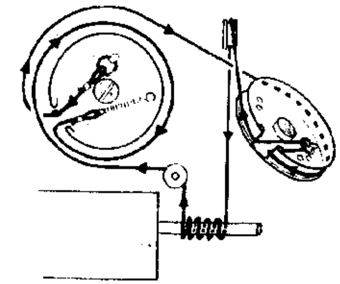
DIA-GRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
12	502156	Condenser—.004 Mfd. 400 volt
14	504390	Condenser—variable gang (with drum)
16	504434	Condenser—ceramic 50 Mmfd. 500 volt
18	504446	Condenser—.1 Mfd. 400 volt
23	504444	Condenser—.05 Mfd. 400 volt
26	502271	Condenser—mica 260 Mmfd. 500 volt
28	504445	Condenser—.004 Mfd. 150 volt
30	502271	Condenser—mica 260 Mmfd. 500 volt
32	504450	Condenser—.01 Mfd. 150 volt
35	504449	Condenser—.01 Mfd. 400 volt
36	504431	Condenser—electrolytic 20 Mfd. 150 volt
37	504431	Condenser—electrolytic 20 Mfd. 150 volt
42	504444	Condenser—.05 Mfd. 400 volt
43	502295	Condenser—10 Mmfd. 500 volt
		RESISTORS
15	504440	Resistor—carbon 22,000 ohms 1/3 watt
19	504435	Resistor—carbon 220,000 ohms 1/3 watt
21	504436	Resistor—carbon 82 ohms 1/2 watt
22	504441	Resistor—carbon 2.2 Meg. 1/3 watt
27A, B	504391	Volume control—with switch; 1 Meg.
29	504439	Resistor—carbon 3.3 Meg. 1/3 watt
31	504438	Resistor—carbon 470,000 ohms 1/3 watt
33	504438	Resistor—carbon 470,000 ohms 1/3 watt
34	504437	Resistor—carbon 150 ohms 1/2 watt
38	502574	Resistor—carbon 33 ohms 1/2 watt
41	504442	Resistor—carbon 1500 ohms 1 watt
		OTHER ELECTRICAL PARTS
11	504453	Loop antenna
13	504451	Coil—antenna coupling
17	504458	Coil—oscillator
20	504392	Transformer—1st I.F.
25	504392	Transformer—2nd I.F.
39	504454	Transformer—output
40	504455	Speaker—P.M. dynamic (3-1/2 inch)
		MISCELLANEOUS PARTS
	504389	Bottom plate
	504537	Cabinet—ivory (Model A51T3)
	504538	Cabinet—black (Model A51T4)
	504539	Cabinet—mahogany (Model A51T2)
	112745	Clip—coil mtg.
	114955	Clip—retainer on end of dial cord
	505101	Clip—for mtg. slug tuned I.F. transformers
	117057	Cord—dial drive (2 ft. required) per ft.
	504545	Dial scale (Models A51T2 & A51T3)
	505099	Dial Scale (Model A51T4)
	504452	Insulator for volume control terminals
	505103	Insulating sheet on bottom of cabinet
	504470	Knob—black (Model A51T4)
	504474	Knob—ivory (Model A51T3)
	504541	Knob—mahogany (Model A51T2)
	504544	Pointer
	119087	Ring for dial cord
	116584	Rubber feet
	12531	Screw—No. 8-32 x 3/8; retains bottom plate to cabinet
	17861	Screw—Set, No. 4-40; shaft extension
	83624	Screw—No. 8 x 1/4; retains chassis to bottom plate
	504721	Shaft extension for tuning gang
	504397	Socket—miniature
	505161	Spring—dial cord tension
	504472	Window for dial

STEWART-WARNER CORP. MODELS A61CR1, A61CR[illegible] A61CR3, A61CR4



DIAL AND POINTER DRIVE CORD ARRANGEMENT

SIDE VIEW
(With dial plate removed)



To string dial cord first slip pointer off its shaft. Then remove dial scale by taking out the six clips around its edges. Dial plate may now be taken off by removing the two screws which are visible and accessible at front of chassis. Now set gang condenser to fully open position and use the following parts:

114955 Clip on end of cord
117057 Cord (3 feet)
119087 Ring for dial cord
505161 Tension spring

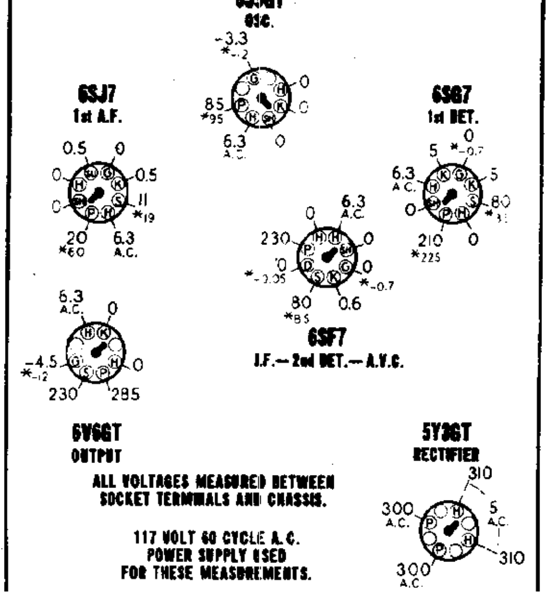
To replace and properly position pointer see step 1 in "Alignment Procedure"

SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

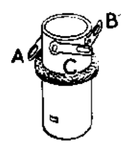
DIAL TUNED TO 540 KC.
VOLUME ON FULL WITH NO SIGNAL
RADIO-PHONO & TONE SWITCH IN "RADIO-BASS" POSITION

BOTTOM VIEW OF CHASSIS



ALL VOLTAGES MEASURED BETWEEN SOCKET TERMINALS AND CHASSIS.

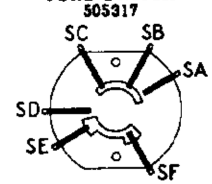
117 VOLT 60 CYCLE A.C. POWER SUPPLY USED FOR THESE MEASUREMENTS.



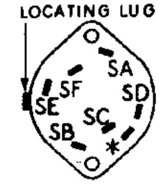
OSCILLATOR COIL
505326

I. F. 455 KC.

ALTERNATE TYPES OF RADIO-PHONO & TONE SWITCH
505317



REAR VIEW



REAR VIEW
*Not used; may serve as wiring junction point.

Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram

AUDIO OSCILLATION

The audio system of this receiver utilizes a two stage type of inverse feed-back arrangement and should it ever be necessary to remove or replace the speaker or output transformer it is important to maintain a definite phase relationship in the feed-back circuit. If the connections to the output transformer are reversed or if the feed-back connection is made to the wrong side of the output transformer secondary, the system will become regenerative instead of degenerative. Under those conditions audio oscillation may result.

STEWART-WARNER CORP.

ALIGNMENT PROCEDURE

1. With the gang condenser fully meshed, the dial pointer should be in a horizontal position at low end of dial, parallel to the bottom edge of dial scale. If it is set incorrectly, merely hold tuning control shaft steady and turn pointer to correct position.
2. Connect an output meter across the speaker voice coil or from the plate of the 6V6GT tube to chassis through a .1 Mfd. condenser.
3. Connect the ground lead of signal generator to the receiver chassis.
4. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF SIG. GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.1 MFD. Condenser	Lug on trimmer. No. 6 on antenna section of gang (see figure below for location of trimmer).	455 KC	Any point where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Mica Condenser	External Antenna Clip	1400 KC	1400 KC	5	Broadcast Oscillator	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip	1400 KC	Tune to 1400 KC generator signal	6	Broadcast Antenna	Adjust for maximum output.

STAGE GAIN MEASUREMENT PROCEDURE

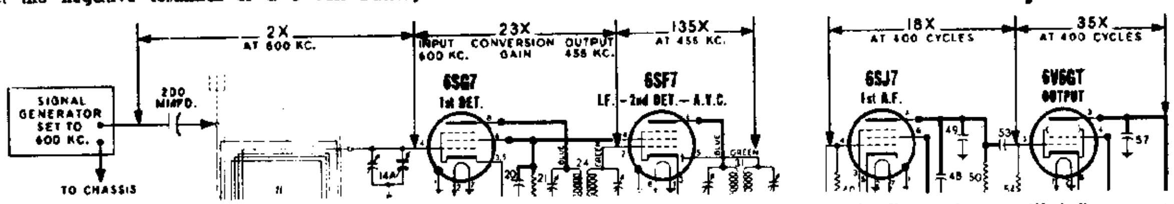
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

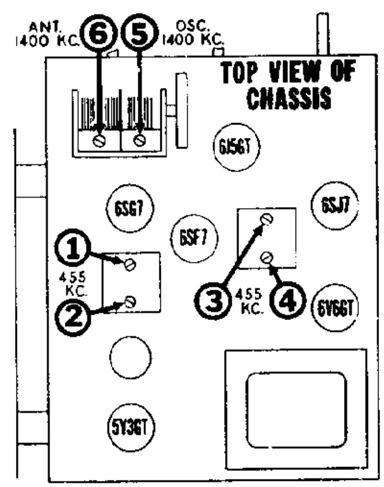
PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at black lead of 1st I.F. and connect the positive battery lead to receiver chassis.

IMPORTANT: Disconnect battery when measuring audio stage gain.

4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.

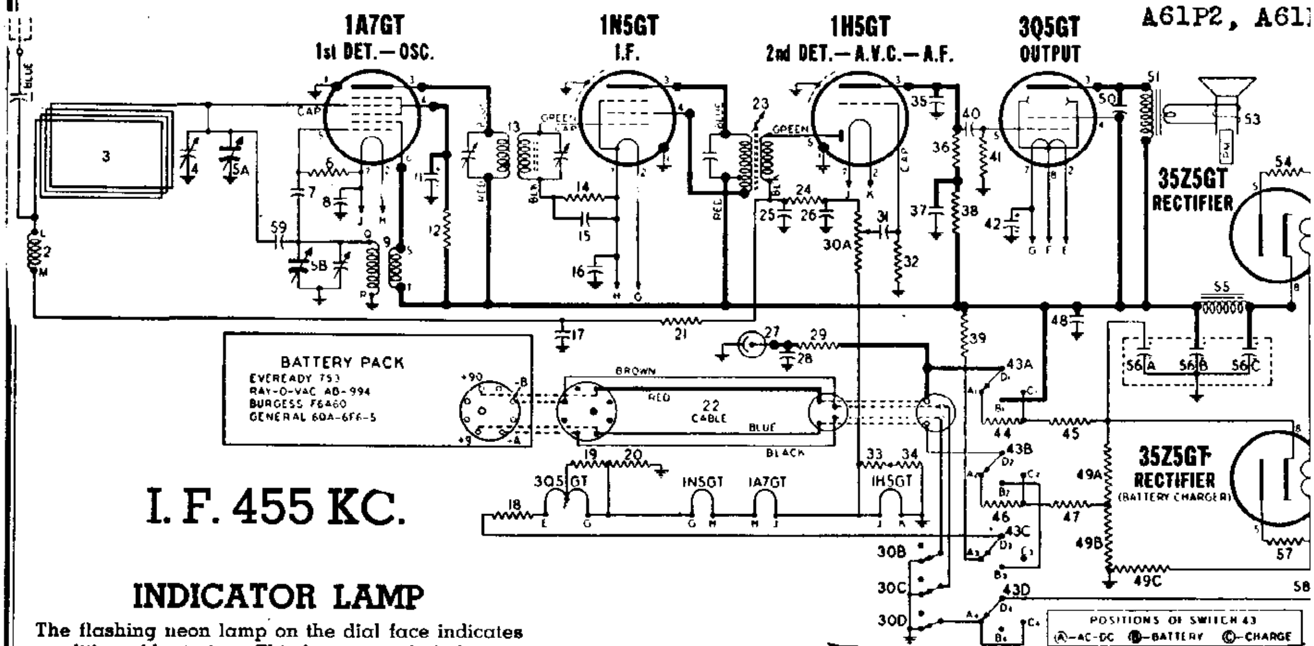




TRIMMER LOCATIONS

DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

STEWART-WARNER CORP.



I. F. 455 KC.

INDICATOR LAMP

The flashing neon lamp on the dial face indicates condition of batteries. This lamp is included in an oscillating (R-C) circuit which is designed to oscillate at approximately 3 pulses per second when batteries are in a fully charged condition. As the battery voltage decreases with use, number of pulses per second decreases.

This lamp will only show the true condition of the batteries when the Selector Switch is in the "Battery" position. Lamp flashes more rapidly during charging or "AC-DC" operation.

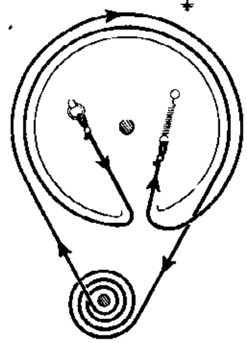
When battery voltage is low (approximately 72 volts) the lamp flashes more slowly (about once per second). The set should not be operated from battery power after this point is reached and batteries should be recharged immediately. Charge for at least twice the time they were used and as soon as possible after they are run down. As batteries age it is necessary to charge for a longer period. For longest battery life, charge immediately after using.

IMPORTANT:

1. Completely dead batteries cannot be recharged.
2. When set is connected to a DC line, check for correct polarity by operating it before attempting to charge the batteries.
3. Batteries will be discharged if "OFF-VOLUME" switch is left ON when power cord is not connected to wall outlet.

CHARGING CIRCUIT

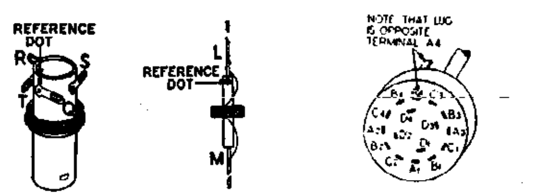
The battery charging circuit consists of a 35Z5GT rectifier and a suitable resistor voltage dividing network. This circuit provides a very low charging current when the receiver is operated on AC-DC and is just enough to maintain the batteries but will not charge them. A separate charging position is provided for the regular charging operation. A charging rate of approximately ⅓ the discharge rate is used to give best results.



DIAL DRIVE CORD ARRANGEMENT

To string dial cord, set gang condenser to fully open position and use following parts:

114955	Clip on end of cord
117057	Cord (3 feet)
119087	Ring for dial cord
161384	Tension Spring



ANTENNA COIL 505781 — OSCILLATOR COIL 502498 — CHARGE—BATT.—AC-DC SWITCH 502526

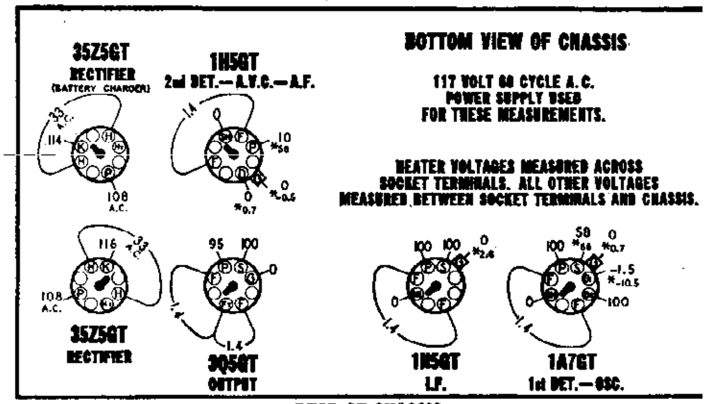
Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt exc where indicated by (*). The (*) symbol designates a vacuum tu voltmeter measurement.

VOLUME ON FULL WITH NO SIGNAL — **DIAL TUNED TO 540**

"CHARGE—BATT.—AC-DC" SWITCH IN "AC-DC" POSITION



MODELS A61P1, A61P2, A61P3

STEWART-WARNER CORP.

STAGE GAIN MEASUREMENT PROCEDURE

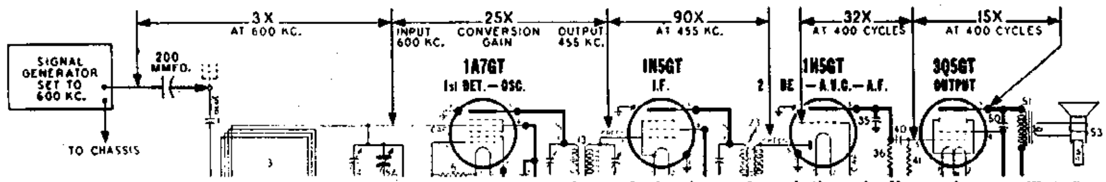
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 1½ volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. **Therefore,** these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for **determining** proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 1½ volt battery to A.V.C. at terminal "M" of Antenna Coil and connect the positive battery lead to receiver chassis.

IMPORTANT: Disconnect battery when measuring audio stage gain.

4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



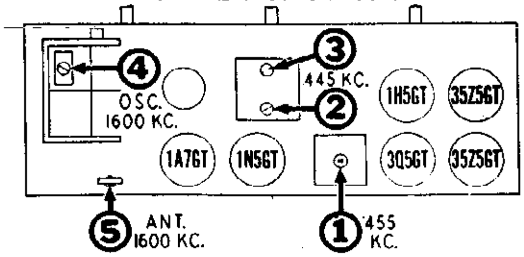
DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

ALIGNMENT PROCEDURE

1. Disconnect and remove battery from cabinet. Then remove the two plug buttons which are located at bottom of cabinet so that a long blade screwdriver may be inserted to remove chassis holddown screws. After removing these screws be sure to replace and reconnect the battery as battery position affects alignment of loop antenna circuit.
2. Partially withdraw the chassis from cabinet so as to obtain access to trimmer adjustments—**do not completely remove the chassis from the cabinet as position of chassis relative to loop antenna is important.**
3. In order to provide a means of coupling the signal generator to the antenna, wind approximately two turns of insulated wire around outside of cabinet so that its position corresponds to that of the built-in loop. Then connect both leads of this coupling to signal generator.
4. Connect an output meter across voice coil of speaker or between plate of 3Q5GT output tube and chassis through a 0.1 mfd. condenser.
5. Set the volume control at maximum volume position and use a weak signal from the signal generator.
6. Set "CHARGE—BATT.—AC-DC" Switch in "AC-DC" position.

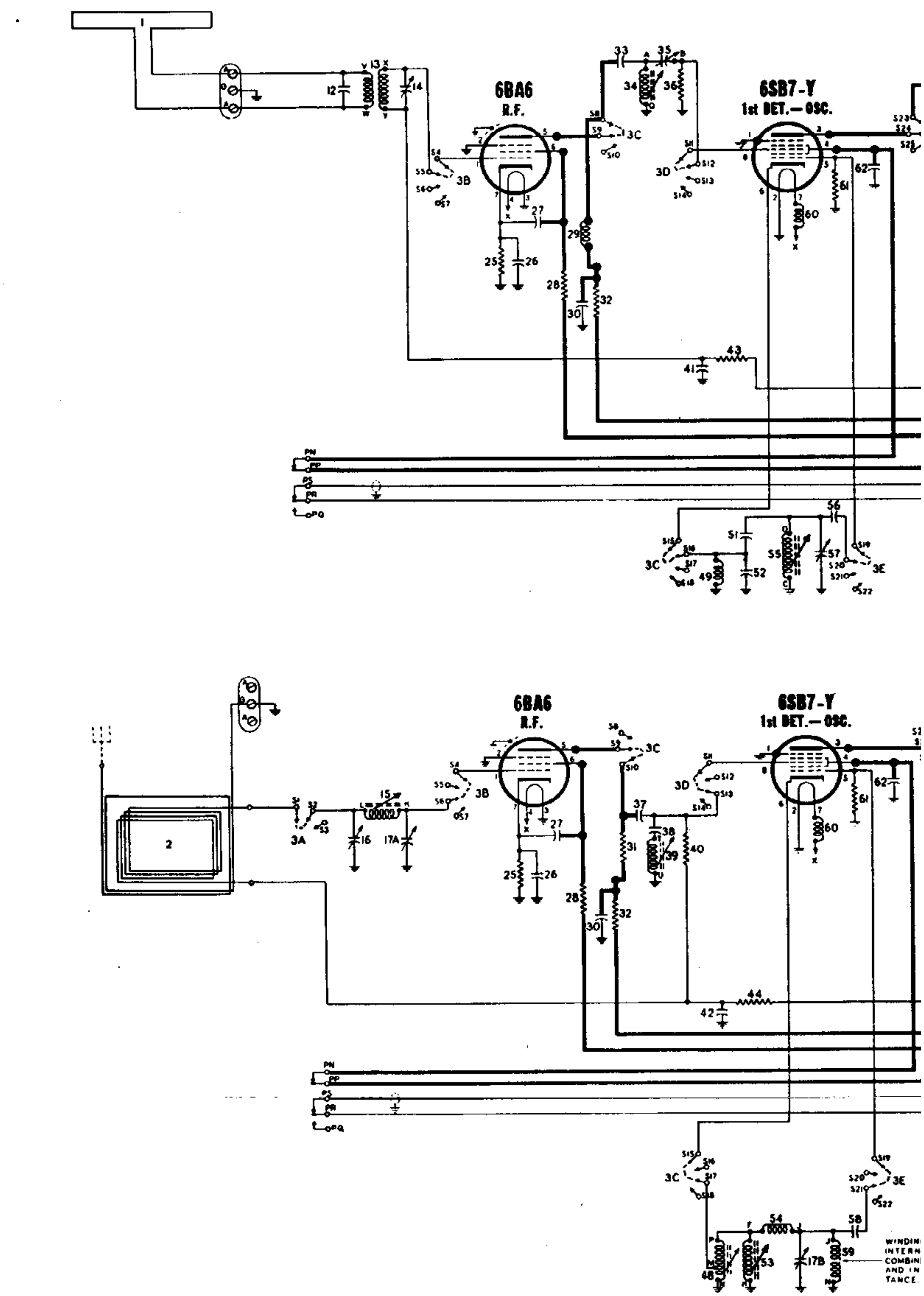
DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
None	Connect directly to coupling turn around cabinet.	455 KC	Any point where it does not affect the signal.	1	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				2—3	1st I.F.	
None	Connect directly to coupling turn around cabinet.	1600 KC	1600 KC	4	Broadcast Oscillator	Adjust for maximum output.
None	Connect directly to coupling turn around cabinet.	1600 KC	Tune to 1600 KC generator signal	5	Broadcast Antenna	Adjust for maximum output. Slide chassis all the way into cabinet when making this adjustment.

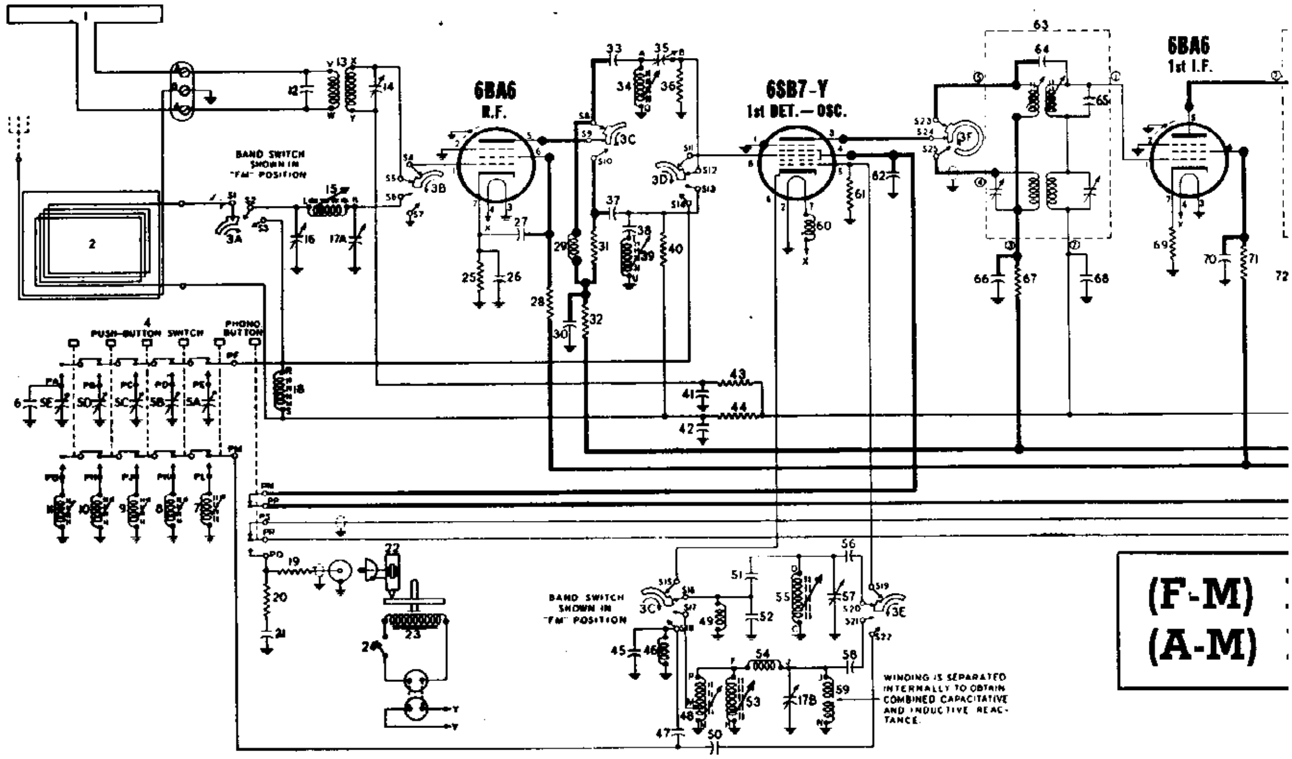
TOP VIEW OF CHASSIS

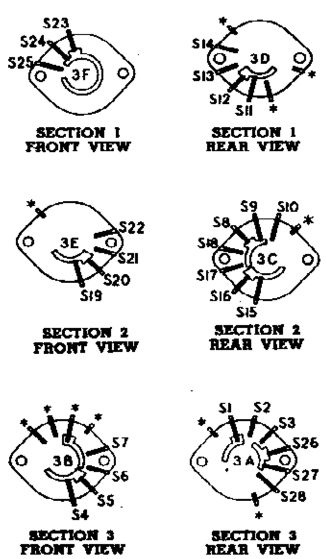


TRIMMER LOCATIONS

MODELS A92CR3,
A92CR6



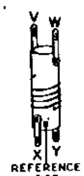




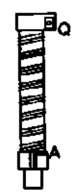
*Not used; may serve as wiring junction point.

BAND SWITCH
504593

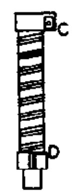
Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.



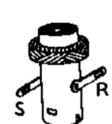
FM ANT. COIL 504692



FM R.F. COIL 505159



FM OSC. COIL 505159



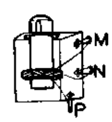
BC. ANT. COUPLING COIL (PUSH-BUTTON) 505041

BC. ANT. COIL 505151

REFERENCE DOT

WAVE TRAP COIL 504670

BC. OSC. COIL 505153

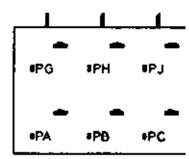


BC. OSC. COIL (SHUNT) 505155

SLUGS FOR MANUAL TUNING COILS

FM R.F. / FM OSC. } 505160

BC. ANT. / BC. OSC. } 505152



PUSH-BUTTON

SOCKET

Measured with voltmeter
per volt except whe
symbol designates a vac

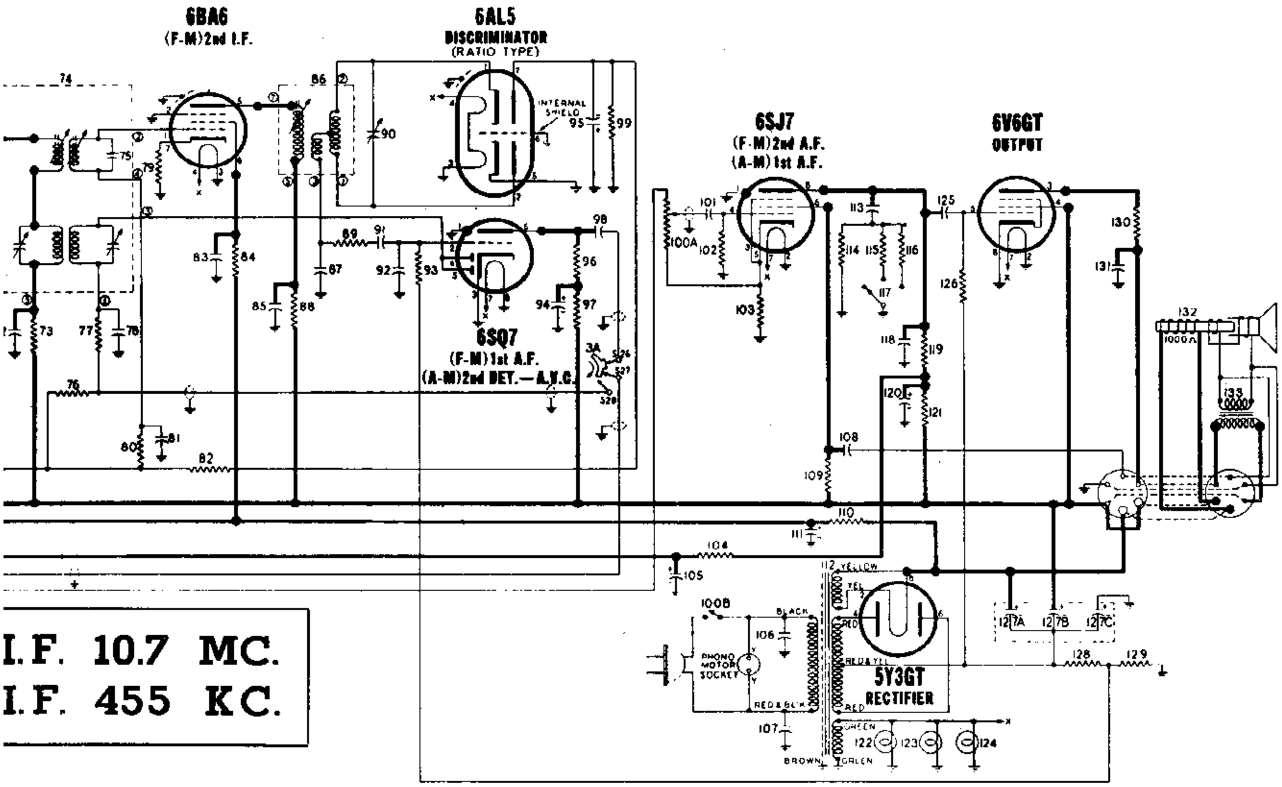
ALL MEASUREMENTS MADE WITH BAND SWIT
DIAL TUNED TO 108M
DIAL TUNED TO 540K
VOLUME CONTROL SET
ALL PUSH BUTT
TONE SWITCH

POWER OUTPUT
Undistorted ....
Maximum ....

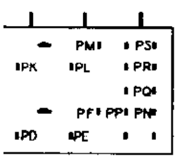
SPEAKER ....

INTERMEDIATE FREQUEN

NOTE A: Grounding of center stud on tube sock
Oscillat



I.F. 10.7 MC.
I.F. 455 KC.

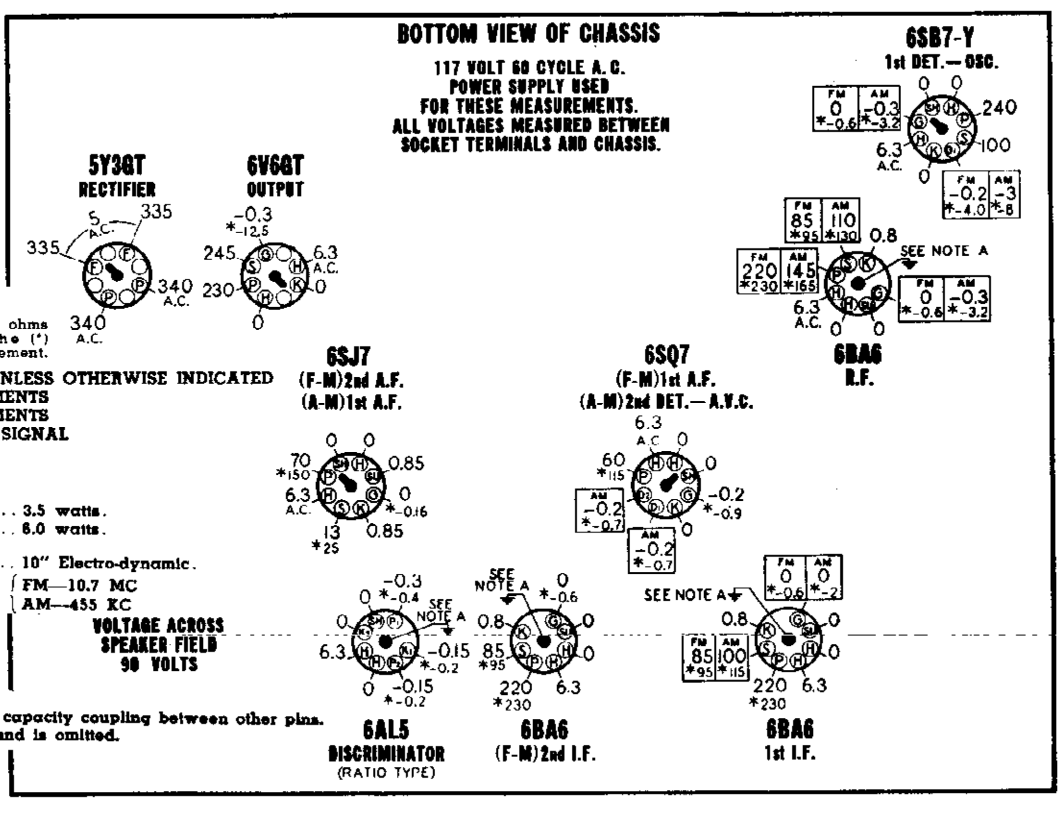


T VOLTAGES

r having sensitivity of 1000 ohms
re indicated by (*). The (*)
uum tube voltmeter measurement.

CH IN "FM" POSITION UNLESS OTHERWISE INDICATED
C. FOR "FM" MEASUREMENTS
C. FOR "AM" MEASUREMENTS
TO MINIMUM WITH NO SIGNAL
ONS IN "OUT" POSITION
IN SPEECH POSITION

.... 3.5 watts.
.... 6.0 watts.
.... 10" Electro-dynamic.
CY........................ FM—10.7 MC
AM—455 KC

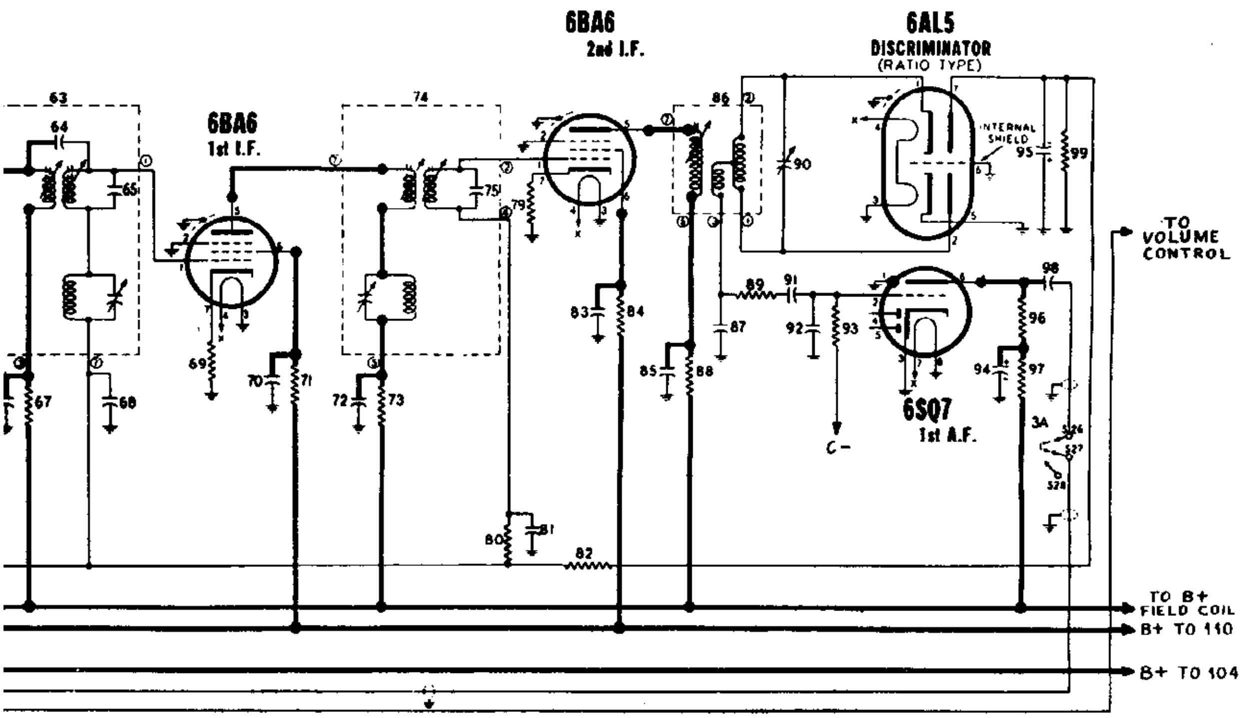


REAR OF CHASSIS

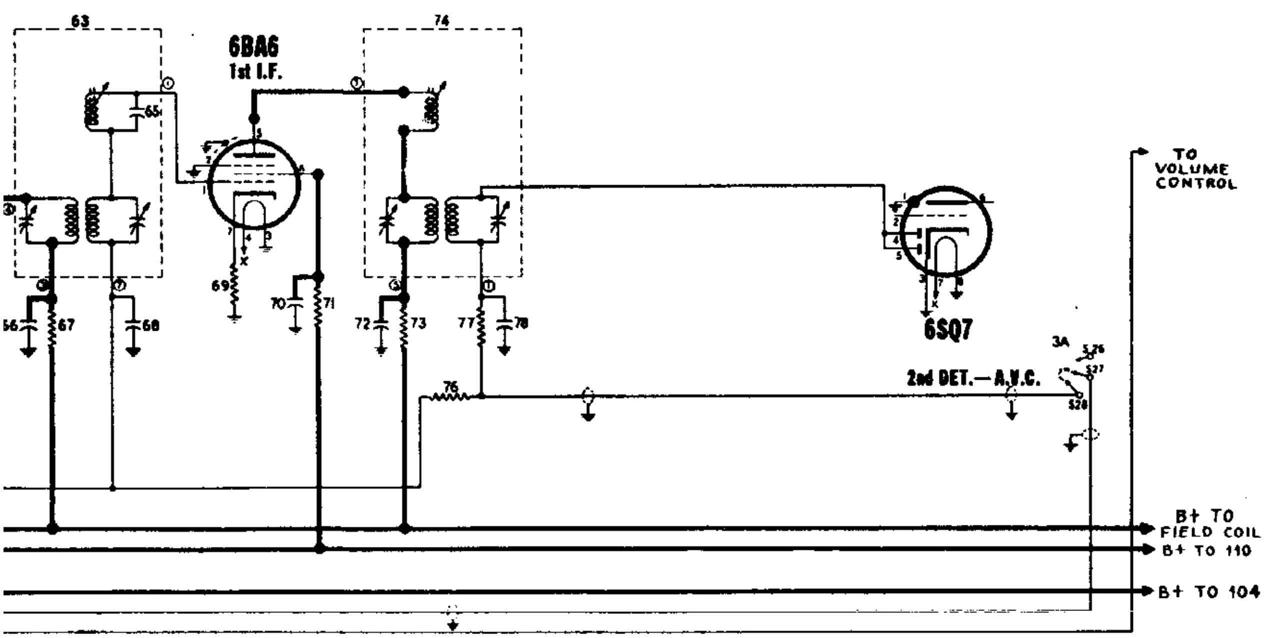
ket is necessary to reduce capacity coupling between other pins.
ion may result if this ground is omitted.

! schematics"

WARNER CORP.

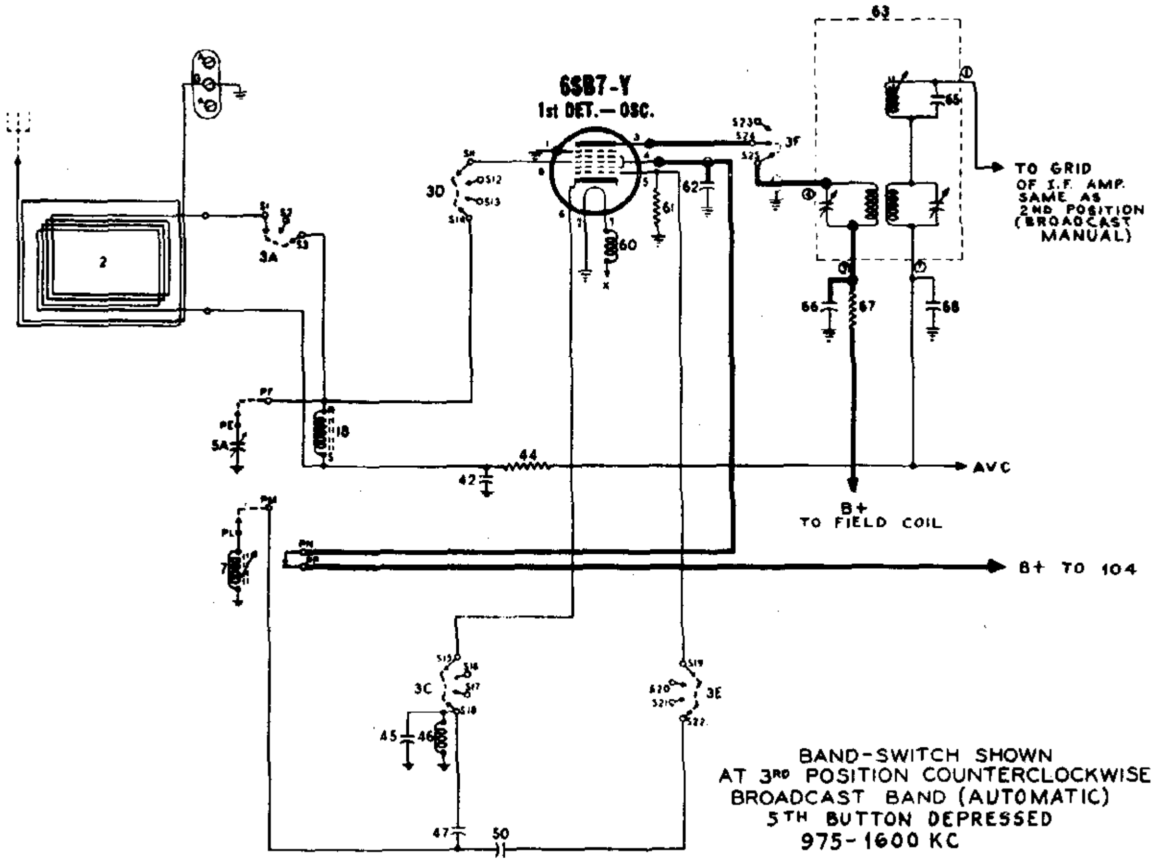


BAND-SWITCH SHOWN
AT 1ST POSITION
F M BAND
88-108 MC



BAND-SWITCH SHOWN
AT 2ND POSITION COUNTERCLOCKWISE
BROADCAST BAND (MANUAL)
540-1600 KC

ATED
BTAIN
TATIVE
REAC-



STAGE GAIN MEASUREMENT PROCEDURE

REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver should be measured with an A. C. Vacuum Tube Voltmeter of the high frequency type (uniform response up to 100 MC). A conventional "AM" type signal generator may be used but it must be capable of producing **fundamental** frequencies of 600 KC. and 98 MC—**avoid using a generator that produces the 98 MC. signal by means of harmonics.**

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F., I.F. and Discriminator stages are carefully and accurately aligned by utilizing the alignment procedure given in this manual.
2. Connect Signal Generator as shown below. Note that generator connections differ for "AM" and "FM" measurements.
3. For "AM" measurements, set signal generator to 600 KC. and then carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
4. For "FM" measurements, set signal generator to 98 MC. and then carefully tune radio receiver to this signal by using a D. C. Vacuum Tube Voltmeter as an output indicator—meter must be connected between pin #7 of 6AL5 tube and chassis. If station interferes, set generator to a nearby frequency and the receiver.
5. The values of stage gain which are given here were m with a fixed bias of 3 volts on the control grids of all R.F. tubes which are connected to the A.V.C. circuit. Therefor values are not intended to indicate the full capability of but they will serve as a convenient basis for determininc operation. In order to duplicate the fixed bias voltage, con negative terminal of a 3 volt battery to A.V.C. at terminal 1st I.F. transformer and connect the positive battery leac receiver chassis.
6. R.F. and I.F. circuits are slightly de-tuned when contact with an instrument probe and this action, which is indicat change in the output meter reading, may seriously affect t measurement. Therefore, it is important to adjust the as circuit trimmer for a maximum output meter reading an the input signal level to a convenient reference point on t measuring instrument while the probe is making contac removing the probe it is again necessary to adjust the tri as to obtain the same output meter reading and thereby that the signal voltage at the specified point has not cha a result of circuit de-tuning.

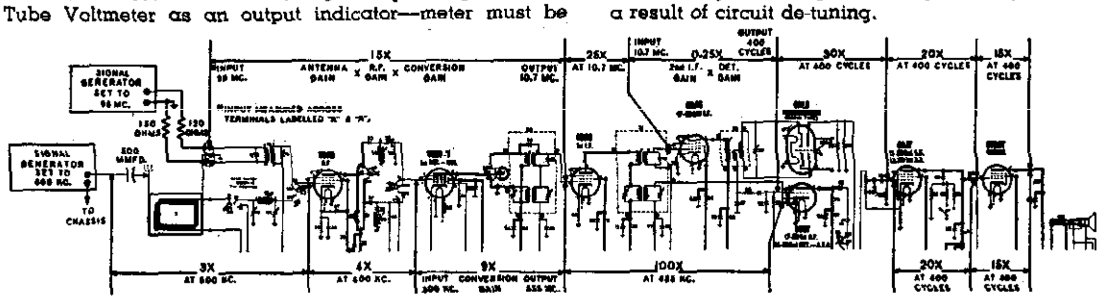


Fig. 11

DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

STEWART-WARNER CORP.

BROADCAST BAND — "AM" — ALIGNMENT PROCEDURE

1. Disconnect leads from FM antenna terminal strip (labelled "A-G-A") at back of chassis; also disconnect speaker plug, AM loop antenna plug and phono plugs. Remove chassis from cabinet.

2. Remove AM loop antenna from cabinet and reconnect it to the plug at back of receiver chassis. Then wind one turn of insulated wire around frame of loop antenna so as to provide a means of coupling it to the signal generator. Connect one end of this coupling turn to receiver chassis and allow the other end to remain open until otherwise instructed in the following chart.

3. Remove Speaker from cabinet and reconnect plug to receiver chassis.

4. Connect an output meter across speaker voice coil or from plate of 6V6GT tube to chassis through a 0.1 Mfd. condenser.

5. Connect ground lead of signal generator to receiver chassis.

6. Set volume control to the maximum volume position and use a weak signal from the signal generator.

7. Space the loop antenna approximately the same distance from receiver chassis as when installed in the cabinet.

8. If alignment of both AM and FM channels is necessary, it is necessary to align the AM channel first; then align FM channel as instructed in preceding section.

9. R.F. leads from slug tuner assembly and push button switch should be dressed away from wave trap coil and close to chassis.

10. After alignment procedure is completed and chassis and loop antenna have been reinstalled in cabinet, arrange leads to loop so that they are separated from each other as much as possible—avoid twisting or taping these leads together.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
0.1 MFD. Condenser	Terminal K on tuner unit (see Fig. 13).	455 KC	"AM" Center Position	Any position where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
					3-4	1st I.F.	
0.1 MFD. Condenser	Terminal K on tuner unit (see Fig. 13).	455 KC	"AM" Center Position	Any position where it does not affect the signal.	5	Wave Trap	Adjust for minimum output.
If positions of movable slugs in the slug tuner assembly have been disturbed (examine cement seal near top of threaded stem on each slug) or if a coil or slug has just been replaced in the tuner assembly, omit the next 5 instructions in this chart and start with the procedure entitled "Slug Tuner Adjustment Procedure—AM Section." Where the tuner assembly has not been disturbed, ignore this instruction and proceed with the next step.							
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	535 KC	"AM" Center Position	Set Slug tuner assembly to fully closed position. Disregard position of dial pointer.	6	Oscillator Trimmer	Adjust for maximum output.
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	1000 KC	"AM" Center Position	Tune to 1000 KC generator signal and check position of dial pointer. If it is set incorrectly, release clip on pointer and reposition to 1000 KC calibration mark. Note that the 1000 KC mark is located under the number "1". Exercise care to set pointer accurately.			
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	1500 KC	"AM" Center Position	Tune to 1500 KC generator signal.	7	Antenna Trimmer	Note the difference between the dial pointer setting and the 1500 KC mark on the scale do not disturb pointer position even if pointer does not coincide with 1500 KC mark. If the difference does not exceed 20 KC, adjust trimmer No. 7 for maximum output and proceed with next two instructions in this chart. Where the calibration error exceeds 20 KC it is advisable to omit the next two instructions in this chart and adjust the slug tuner as described in the following section.
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	600 KC	"AM" Center Position	Tune to 600 KC generator signal.	8	Antenna Padder	Adjust for maximum output. Try to increase output by detuning padder and retuning receiver dial until maximum output is obtained.

Repeat adjustment of trimmers 7 and 8 until one no longer detunes the other. This completes the AM band alignment procedure. The following procedure should only be used where the conditions described under the heading are encountered.

STEWART-WARNER CORP.

SLUG TUNER ADJUSTMENT PROCEDURE — AM SECTION

This procedure is to be used only where the positions of slugs in the slug tuner have been disturbed or in event of a coil or slug replacemer where a serious calibration or tracking error is noted after attempting to align the receiver as described in the preceding section.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTM
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	535 KC	"AM" Center Position	Set Slug tuner assembly to fully closed position. Disregard position of dial pointer.	9	Oscillator Tuning Slug	The object of this adjus is to set slug #9 to a tion where the oscillato reaches maximum in ance at 535 KC. That i complished by first ba off trimmer condense until its plates are spaced (lowest capa then rotate slug #9 note whether a peak c obtained on the o meter. If a peak cann reached, turn trimmer denser #6 to a sli higher capacity setting repeat adjustment of #9 for peak output. adjusting this slug, al approach the peak o setting by rotating the so that it is moving dow to the coil form. The c setting of slug #9 is mined when a definite can be reached with tri #6 at the lowest cap position that permits th and condenser to resonc 535 KC.
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	1500 KC	"AM" Center Position	Set Accurately to 1500 KC mark on scale.	6	Oscillator Trimmer	Adjust for maximum ou
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	535 KC	"AM" Center Position	Set Slug tuner assembly to fully closed position.	10	Oscillator Padder Slug	Adjust to receive 535 KC nal and for maximum ou

Repeat adjustment of oscillator trimmer #6 at 1500 KC and oscillator padder slug at 535 KC until both points are correctly calibrated with the scale.

500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	1500 KC	"AM" Center Position	Tune to 1500 KC generator signal.	7	Antenna Trimmer	Adjust for maximum ou
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	1000 KC	"AM" Center Position	Tune to 1000 KC generator signal.	11	Antenna Tuning Slug	Adjust for maximum ou
500 MMFD. Mica Condenser	Coupling turn on Loop Antenna frame.	600 KC	"AM" Center Position	Tune to 600 KC generator signal.	8	Antenna Padder	Adjust for maximum ou Try to increase output b tuning padder and retu receiver dial until maxi output is obtained.

Repeat the three preceding adjustments until no further improvement can be made in output at 1500 KC, 1000 KC and 600 KC. Apply a coatin speaker cement at top of each tuning slug stem to prevent movement.

DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, turn the main drive drum to maximum **counter-clockwise** position and use following parts:

114955—Clip on end of cord
117057—Cord (7 feet)
119087—Ring for dial cord
113177—Tension Spring

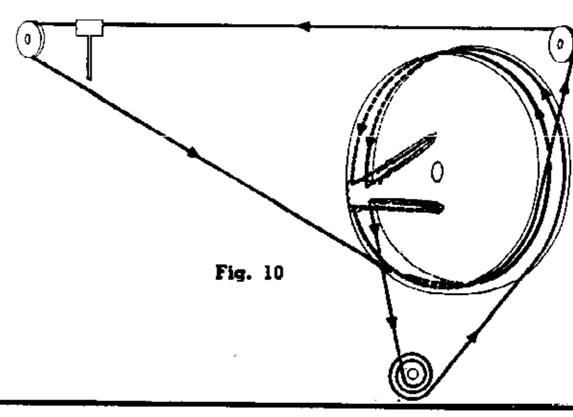


Fig. 10

STEWART-WARNER CORP.

FREQUENCY MODULATION — "FM" — ALIGNMENT PROCEDURE

INSTRUMENTS: Alignment of the FM circuits in this receiver may be accomplished with either a conventional AM type signal generator or an FM signal generator. The output indicator should be an oscilloscope or a vacuum tube voltmeter.

Although it is preferable to use an FM generator and an oscilloscope, reasonably accurate alignment is obtainable when using a conventional AM generator and vacuum tube voltmeter providing proper care is exercised in adjusting the discriminator circuit trimmer condenser.

IMPORTANT: If an AM signal generator is used, it should be capable of producing **fundamental** frequencies of 10.7 MC and 88 to 108 MC—avoid using an AM generator which produces signals in the 88 to 108 MC range by using harmonics higher than the second. Generators which are dependent upon third, fourth or fifth harmonics for output frequencies of 88 to 108 MC will generally produce undesirable spurious beat signals with the local oscillator in the receiver and alignment will be exceedingly difficult.

The following procedure is adaptable for use with either an AM or FM generator and oscilloscope or vacuum tube voltmeter—merely follow the instructions which are applicable to the instruments that are used.

1. If alignment of both AM and FM channels is required it is necessary to align the AM channel first, then align the FM channel as instructed in adjacent chart (AM alignment procedure is given on page 7). Do not attempt to reposition pointer by releasing it from clip on dial cord—this is done only during AM alignment.
2. Disconnect leads from FM antenna terminal strip (labelled "A-G-A") at back of chassis; also disconnect all other plugs on rear of chassis and remove chassis from cabinet. It is not necessary to remove the built in antennas.
3. Remove speaker from cabinet and reconnect plug to receiver chassis.
4. Examine underside of chassis and note whether a metal shield plate is covering components in the vicinity of the IF stages. Some chassis were equipped with this shield and it must be removed during alignment.
5. A specific setting of the receiver volume control is not required, however, it will be found convenient to leave it in the maximum volume position so that alignment signals will be audible even though the output indication is obtained by a V-T voltmeter or 'scope connected to points in the discriminator circuit.
6. Dress FM circuit leads as short and straight as possible, particularly those in the oscillator circuit. I.F. plate and grid leads should also be kept short and straight.
7. Alignment of receiver circuits may now be accomplished by using the procedure in the adjoining chart.

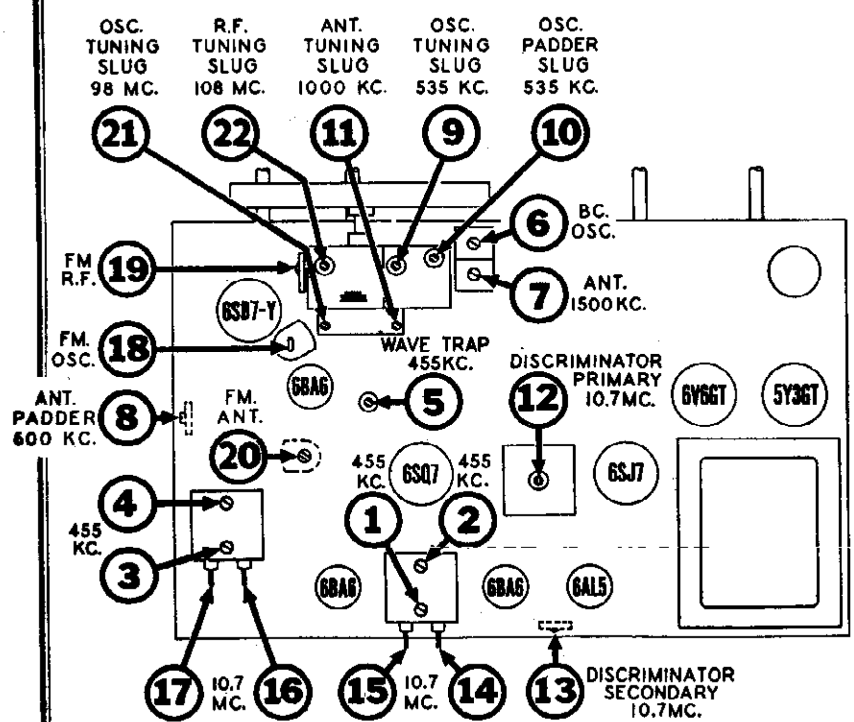


Fig. 12
TRIMMER LOCATION CHART

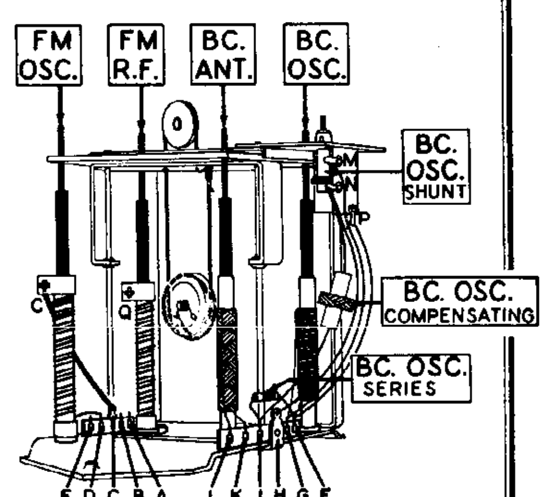


Fig. 13
SLUG TUNER ASSEMBLY

STEWART-WARNER CORP.

PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

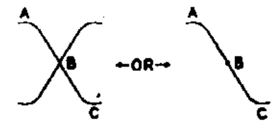
DIA-GRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
5-A to E	502910	Condenser trimmer assembly for P-B tuner
6	504659	Condenser ceramic 39 Mmfd. 500 volt
12	504723	Condenser mica 30 Mmfd. 500 volt
14	504663	Condenser trimmer 5-20 Mmfd.
16	504956	Condenser trimmer 390-550 Mmfd.
17-A, B	504712	Condenser trimmer assembly A—50 to 120 Mmfd. B 220 to 340 Mmfd.
21	502261	Condenser .01 Mfd. 600 volt
26	504447	Condenser .05 Mfd. 150 volt
27	504724	Condenser mica 1000 Mmfd. 500 volt
30	502261	Condenser—.01 Mfd. 600 volt
33	502929	Condenser mica 47 Mmfd. 500 volt
35	502757	Condenser trimmer; 6.5 to 35 Mmfd.
37	502931	Condenser mica 100 Mmfd. 500 volt
38	504659	Condenser—ceramic 39 Mmfd. 500 volt
41	504725	Condenser—.02 Mfd. 200 volt
42	502153	Condenser—.05 Mfd. 200 volt
45	502150	Condenser—.004 Mfd. 600 volt
47	505069	Condenser mica 200 Mmfd. 500 volt
50	505069	Condenser—mica 200 Mmfd. 500 volt
51	504905	Condenser—ceramic 5 Mmfd. 500 volt
52	502929	Condenser mica 47 Mmfd. 500 volt
56	504733	Condenser ceramic 15 Mmfd. 500 volt
57	502757	Condenser trimmer; 6.5 to 35 Mmfd.
58	502929	Condenser mica 47 Mmfd. 500 volt
62	502261	Condenser .01 Mfd. 600 volt
64	504983	Condenser ceramic 1.0 Mmfd. 500 volt
65	504982	Condenser—ceramic 39 Mmfd. 500 volt
66	502261	Condenser .01 Mfd. 600 volt
68	502153	Condenser—.05 Mfd. 200 volt
70	502261	Condenser—.01 Mfd. 600 volt
72	502261	Condenser .01 Mfd. 600 volt
75	504982	Condenser ceramic 39 Mmfd. 500 volt
78	502931	Condenser mica 100 Mmfd. 500 volt
81	504727	Condenser mica 500 Mmfd. 500 volt
83	502261	Condenser .01 Mfd. 600 volt
85	502261	Condenser .01 Mfd. 600 volt
87	502202	Condenser ceramic 150 Mmfd. 500 volt
90	504662	Condenser trimmer 35-55 Mmfd.
91	502261	Condenser—.01 Mfd. 600 volt
92	502157	Condenser—.05 Mfd. 400 volt
94	504719	Condenser—electrolytic 4 Mfd. 450 volt
95	504937	Condenser—electrolytic 5 Mfd. 50 volt
98	502261	Condenser—.01 Mfd. 600 volt
101	502150	Condenser .004 Mfd. 600 volt
105	505150	Condenser—electrolytic 16 Mfd. 400 volt
106, 107	502804	Condenser .01 Mfd. 400 volt
108	502405	Condenser .25 Mfd. 400 volt
111	505150	Condenser—electrolytic 16 Mfd. 400 volt
113	502261	Condenser .01 Mfd. 600 volt
118	502271	Condenser mica 260 Mmfd. 500 volt
120	504719	Condenser—electrolytic 4 Mfd. 450 volt
125	502152	Condenser .02 Mfd. 400 volt
127-A,B,C	161193	Condenser electrolytic A-20 Mfd. 450 volt B-15 Mfd. 450 volt C-10 Mfd. 25 volt
131	502479	Condenser—.006 Mfd. 600 volt
		RESISTORS
19	502132	Resistor—carbon 100,000 Ohms 1/4 watt
20	502408	Resistor—carbon 68,000 Ohms 1/4 watt
25	502794	Resistor—carbon 68 Ohms 1/4 watt
28	502466	Resistor—carbon 33,000 Ohms 1 watt
31	504732	Resistor carbon 10,000 Ohms 1 watt
32	502128	Resistor—carbon 2,200 Ohms 1/4 watt
36	502130	Resistor—carbon 22,000 Ohms 1/4 watt
40	502130	Resistor—carbon 22,000 Ohms 1/4 watt
43	504907	Resistor—carbon 560,000 Ohms 1/4 watt
44	502134	Resistor—carbon 470,000 Ohms 1/4 watt
61	502130	Resistor—carbon 22,000 Ohms 1/4 watt
67	502128	Resistor—carbon 2,200 Ohms 1/4 watt
69	502794	Resistor—carbon 68 Ohms 1/4 watt
71	502466	Resistor—carbon 33,000 Ohms 1 watt
73	502128	Resistor—carbon 2,200 Ohms 1/4 watt
76	502267	Resistor—carbon 680,000 Ohms 1/4 watt
77	502131	Resistor—carbon 47,000 Ohms 1/4 watt
79	502794	Resistor—carbon 68 Ohms 1/4 watt
80	502133	Resistor—carbon 220,000 Ohms 1/4 watt
82	502135	Resistor—carbon 2.2 Meg. 1/4 watt
84	502466	Resistor carbon 33,000 Ohms 1 watt
88	502128	Resistor—carbon 2,200 Ohms 1/4 watt
89	502514	Resistor—carbon 3,300 Ohms 1/4 watt
93	502136	Resistor—carbon 10 Meg. 1/4 watt
96	502132	Resistor—carbon 100,000 Ohms 1/4 watt
97	502892	Resistor—carbon 330,000 Ohms 1/4 watt
99	502130	Resistor—carbon 22,000 Ohms 1/4 watt
100-A, B	502148	Volume control 500,000 Ohms (with switch)
102	502468	Resistor—carbon 4.7 Meg. 1/4 watt
103	502406	Resistor—carbon 1,500 Ohms 1/4 watt
104	504731	Resistor carbon 12,000 Ohms 2 watt
109	502135	Resistor—carbon 2.2 Meg. 1/4 watt
110	504731	Resistor—carbon 12,000 Ohms 2 watt
114	502468	Resistor—carbon 4.7 Meg. 1/4 watt
115	502131	Resistor—carbon 47,000 Ohms 1/4 watt
116	502291	Resistor—carbon 4,700 Ohms 1/4 watt
119	502133	Resistor—carbon 220,000 Ohms 1/4 watt
121	502478	Resistor—carbon 1,000 Ohms 1/4 watt
126	502134	Resistor—carbon 470,000 Ohms 1/4 watt
128	504729	Resistor—carbon 130 Ohms 2 watt
129	504728	Resistor—carbon 11 Ohms 1/2 watt
130	502454	Resistor—wire wound 47 Ohms 1 watt
		COILS & TRANSFORMERS
1	504895	Antenna—FM ("Twin Lead" Assembly)
2	504902	Loop Antenna for AM
7, 8	502909	Coil less slug (975-1600 Kc.)
9, 10	502908	Coil less slug (650-1300 Kc.)
11	502907	Coil less slug (540-1000 Kc.)
	502911	Slug core for coils 502907, 502908, 502909
13	504692	Coil—FM antenna

DIA-GRAM NO.	PART NO.	DESCRIPTION
15	505151	Coil—BC. antenna (less slug)
	505152	Tuning slug for BC. ant. coil (may have end colored yellow, green, blue or violet)
18	505041	Coil—BC. antenna (for push button)
29	504675	Coil—R.F. choke
34	505159	Coil—FM R.F. (less slug)
	505160	Tuning slug for FM R.F. coils (may have end colored black, grey, red or orange)
39	504670	Coil wave trap (455 Kc.)
	504671	Slug core for wave trap
46	504673	R.F. choke (BC.)
48	505155	Coil—BC. oscillator; shunt (less slug)
	505156	Slug core for BC. osc. shunt coil (505155)
49	504675	Coil—R.F. choke (FM)
53	505153	Coil—BC. oscillator (less slug)
	505152	Tuning slug for BC. osc. coil (may have end colored yellow, green, blue or violet)
54	505157	Coil—BC. oscillator; series
55	505159	Coil—FM oscillator (less slug)
	505160	Tuning slug for FM osc. coil (may have end colored black, grey, red or orange)
59	505158	Coil—BC. oscillator; compensating
60	504675	Coil—R.F. choke (FM)
63	504645	Transformer—1st I.F.
74	504646	Transformer—2nd I.F.
86	504690	Transformer—discriminator
112	504643	Transformer—power
133	502994	Transformer—output for M-502302 speaker
	505029	Transformer—output for E-502302 speaker
	505394	Transformer—output for O-502302 speaker
		OTHER ELECTRICAL PARTS
3-A to F	504593	Switch—band
4	504596	Switch—push-button
22	502461	Crystal cartridge (Astatic L-71)
23	504201	Motor—for type "W"-504138 Record Changer 115 volt 60 cycle
	505273	Motor—for type "VM"-504932 Record Changer 115 volt 60 cycle
24	504203	Switch—"ON-OFF" for type "W"-504138 Record Changer
	505269	Switch—"ON-OFF" for type "VM"-504932 Record Changer
117	504592	Switch—tone
122, 123, 124	110629	Lamp—dial (Mazda #44) 6.3V 0.25 Amps.
132	502302	Speaker—electro-dynamic (10 inch)
		MISCELLANEOUS PARTS
	504840	Background for Dial
	116467	Base for mtg. electrolytic condenser
	117131	Bulls Eye for indicator light
	117315	Call Letter Tabs for push-buttons
	119989	Clamp for dial glass
	112745	Clip—for mtg. push-button ant. coil
	114955	Clip—retainer on end of dial cord
	501151	Clip—for mtg. push-button coils
	504691	Clip—coil mtg.; wave trap & B C. oscillator shunt
	505368	Clip—for tube shield
	117057	Cord dial drive (7 ft. required) per ft.
	504839	Dial Scale
	505417	Door—radio compartment; upper right (mahogany)
	505420	Door—record storage compartment; lower right (mahogany)
	505423	Door—record storage compartment; lower left (mahogany)
	505426	Drawer—record changer (Mahogany Model A92CR3 "W" Changer)
	505429	Drawer—record changer (Mahogany Model A92CR6 "VM" Changer)
	504831	Escutcheon for push-button
	505433	Handle—for upper door or drawer
	505432	Hinges—for all doors (supplied in pairs)
	504835	Knob—volume or tuning
	504837	Knob—tone or band
	505431	Knob—for record storage compartment doors
	502460	Needle—phonograph
	504711	Perm. tuning mechanism (less coils)
	500966	Plug—phono. pick-up cable
	501031	Plug—phono. motor cable
	504097	Plug—speaker
	504838	Pointer
	504833	Push-button
	505430	Rail for drawer (supplied in sets)
	119087	Ring for dial cord
	17843	Rubber grommets for mtg. FM coils
	85078	Rubber grommets for mtg. BC. coils
	113463	Rubber pad for mtg. chassis
	116584	Rubber spacer for mtg. dial scale
	112874	Screw—No. 10 x 1 1/8 for mtg. chassis
	114914	Screw—No. 2 x 3/8"; for mtg. escutcheon
	504594	Shaft tuning
	505367	Shield—tube
	114876	Socket—octal base (rectifier)
	118617	Socket for dial lamp
	119791	Socket—octal base
	160039	Socket—phono. plug
	500051	Socket—loop antenna
	501182	Socket—phono. motor cable
	502210	Socket—speaker
	504595	Socket—pilot lamp (at base of cabinet)
	504597	Socket—miniature
	113177	Spring—dial cord tension
	504012	Spring for tuning slug drive cord
	504644	Terminal strip (A-G-A)
	500487	Washer felt for knobs

SIGNAL GENERATOR CONNECTIONS			OSCILLOSCOPE OR V-T VOLTMETER CONNECTIONS		
CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	CONNECT GROUND LEAD OF SIGNAL GENERATOR TO	FREQUENCY & TYPE OF MODULATION	IF AN OSCILLOSCOPE IS USED, CONNECT IT AS FOLLOWS:	IF A V-T VOLTMETER IS USED, CONNECT IT AS FOLLOWS:	BAND SWITCH POSITION
Pin #1 of 6BA6 (FM) 2nd I.F. use a .01 MFD. condenser in series with generator lead.	Receiver chassis in vicinity of 6BA6 (FM) 2nd I.F. tube.	**10.7 MC** AM signal may be 400 cycle modulated or FM signal should preferably be modulated ±300 KC.	Connect vertical amplifier "high" lead in series with an 0.1 MFD. condenser to pin #6 of 6SQ7 tube. Connect scope ground lead to receiver chassis.	Connect common (or ground) terminal of meter to receiver chassis. D.C. probe lead of meter is then connected to pin #7 of the 6AL5 tube.	**FM** Maximum clockwise position
Same as above	Same as above	Same as above	Same as above	Before connecting V-T voltmeter, it is necessary to connect two 68,000 ohm resistors (resistance of both units must compare within 1%) in series from pin #7 of the 6AL5 tube to the chassis. Then connect common (or ground) terminal of V-T voltmeter to the junction of these two resistors. D.C. probe lead of meter is now connected to junction of resistor #89 (3300 ohms) and condenser #91 (.01 MFD.) which are in the discriminator output circuit.	Same as above
Recheck the two preceding adjustments to be sure that both trimmers are set as accurately as possible to obain the specified output indication on vacuum					
Pin #1 of 6BA6 (FM) 1st I.F. tube; use a .01 MFD. condenser in series with generator lead.	Receiver chassis in vicinity of 6BA6 (FM) 1st I.F. tube.	Same as above	Same as above	Connect common (or ground) terminal of meter to receiver chassis. D.C. probe lead of meter is then connected to Pin #7 of the 6AL5 tube.	Same as above
Terminal "B" on slug tuner unit (see Fig. 13); use a .01 MFD. condenser in series with generator lead.	Receiver chassis in vicinity of slug tuner unit.	Same as above	Same as above	Same as above	Same as above
If positions of movable slugs in the slug tuner assembly have been disturbed (examine cement seal near top of threaded stem on each slug) or if a coil or slu FM Section." Where the tuner assembly has not been disturbed, ignore this instruction and proceed with the next step.					
Generator output leads must be connected to the two terminals labelled "A" on the "A-G-A" terminal strip at back of chassis. Connect "high" lead to one "A" terminal in series with a 120 ohm resistor and connect generator ground lead to the other "A" terminal in series with a 150 ohm resistor.		**98 MC** AM signal may be 400 cycle modulated or FM signal should preferably be modulated ±300 KC.	Same as above	Same as above	**FM** Maximum clockwise position
Same as above		Same as above	Same as above	Same as above	Same as above
Same as above		**90 MC** AM signal may be 400 cycle modulated or FM signal should preferably be modulated ±300 KC.	Same as above	Same as above	Same as above
Check calibration and tracking of receiver with input signals of 88 and 108 MC. If difference between dial pointer setting and 88 or 108 MC. calibration ma calibration error is greater than ±0.4 MC. it is advisable to adjust the slug tuner as described in the following section.					
SLUG TUNER ADJUSTME					
This procedure is to be used only where the positions of slugs in slug tuner have been disturbed or in event of a coil or slug replacement, or where a serio					
Same as above		**88 MC** AM signal may be 400 cycle modulated or FM signal should preferably be modulated ±300 KC.	Same as above	Same as above	Same as above
Same as above		**98 MC**	Same as above	Same as above	Same as above
Same as above		**108 MC**	Same as above	Same as above	Same as above
Repeat the three preceding adjustments until satisfactory calibration and tracking is obtained at 88 MC., 98 MC., and 108 MC. Apply a coating of speaker					

RT-WARNER CORP.

MODELS A92CR3, A92CR6

RECEIVER				TYPE OF ADJUSTMENT AND OUTPUT INDICATION	
H N	DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	ADJUSTMENT AND OUTPUT INDICATION WHEN USING A V-T VOLTMETER	ADJUSTMENT AND OUTPUT INDICATION WHEN USING AN OSCILLOSCOPE
m e	Any position where it does not affect the signal.	12	Discriminator Primary	Set meter to a low D.C. voltage range and adjust trimmer #12 for maximum meter reading. (This voltage will be negative.)	Set vertical amplifier of scope for maximum amplification. Where FM signal generator provides an output voltage for synchronization, connect this voltage to "sync" terminals of the scope. Then adjust setting of trimmer #13, before attempting to adjust trimmer #12, until a pattern similar to the following appears on the screen. If pattern does not remain stationary, operate sweep frequency control on scope and also "sync" control until desired result is obtained.  This double "S" curve pattern results when 'scope uses "Sawtooth" horizontal deflection voltage. This single "S" curve pattern results when 'scope uses properly phased "sine wave" horizontal deflection voltage. Adjust trimmer #12 for maximum amplitude and steepness of that portion of the curve between "A" and "C".
bove	Same as above	13	Discriminator Secondary Use an insulated phasing tool to adjust this trimmer.	Set meter for operation on its lowest D.C. voltage range. Note that as trimmer #13 is rotated a point will be found where voltmeter will swing rather sharply from a positive to a negative reading or vice versa. Correct setting of trimmer #13 is obtained when meter reads zero as trimmer is moved through this point. The adjustment is somewhat critical and considerable care must be exercised to set the trimmer for a zero meter indication.	With the 'scope set up as described above, adjust trimmer #13 until the cross-over point "B" is centrally located in both the horizontal and vertical directions; in addition, the portion of the curve between "A" and "C" should be as linear (straight) as possible.
cuum tube voltmeter or oscilloscope. Then disconnect and remove the two 68,000 ohm resistors that were used for the vacuum tube voltmeter connection in the 2nd step.					
bove	Same as above	14 and 15	2nd I.F.	Adjust trimmers #14 and #15 for maximum meter reading.	With 'scope set up as described above, adjust trimmers #14 and #15 for maximum amplitude and steepness of that portion of the pattern between "A" and "C".
bove	Same as above	16 and 17	1st I.F.	Adjust trimmers #16 and #17 for maximum meter reading.	Adjust trimmers #16 and #17 for maximum amplitude and steepness of pattern as described above. If the enlarged pattern now indicates a lack of symmetry, readjust trimmer #13 for correct cross-over point.
or slug has just been replaced in the tuner assembly, omit the next 4 instructions in this chart and start with the procedure entitled "Slug Tuner Adjustment Procedure—					
m e	98 MC	18	Oscillator Trimmer	Set trimmer #18 to receive 98 MC. signal and adjust for maximum meter reading.	Adjust trimmer #18 to obtain the symmetrical pattern shown above. Correct setting of trimmer #18 is obtained when cross-over point in pattern is centrally located.
bove	98 MC	19	R.F. Trimmer	Adjust trimmer #19 for maximum meter reading.	Adjust trimmer #19 for maximum amplitude of pattern.
		16 and 17	1st I.F.	Recheck adjustment of these trimmers for maximum meter reading.	Recheck adjustment of these trimmers for maximum amplitude and symmetry of pattern.
bove	Tune to 90 MC. generator signal.	20	Antenna Trimmer	Adjust trimmer #20 for maximum meter reading.	Adjust trimmer #20 for maximum amplitude of pattern.

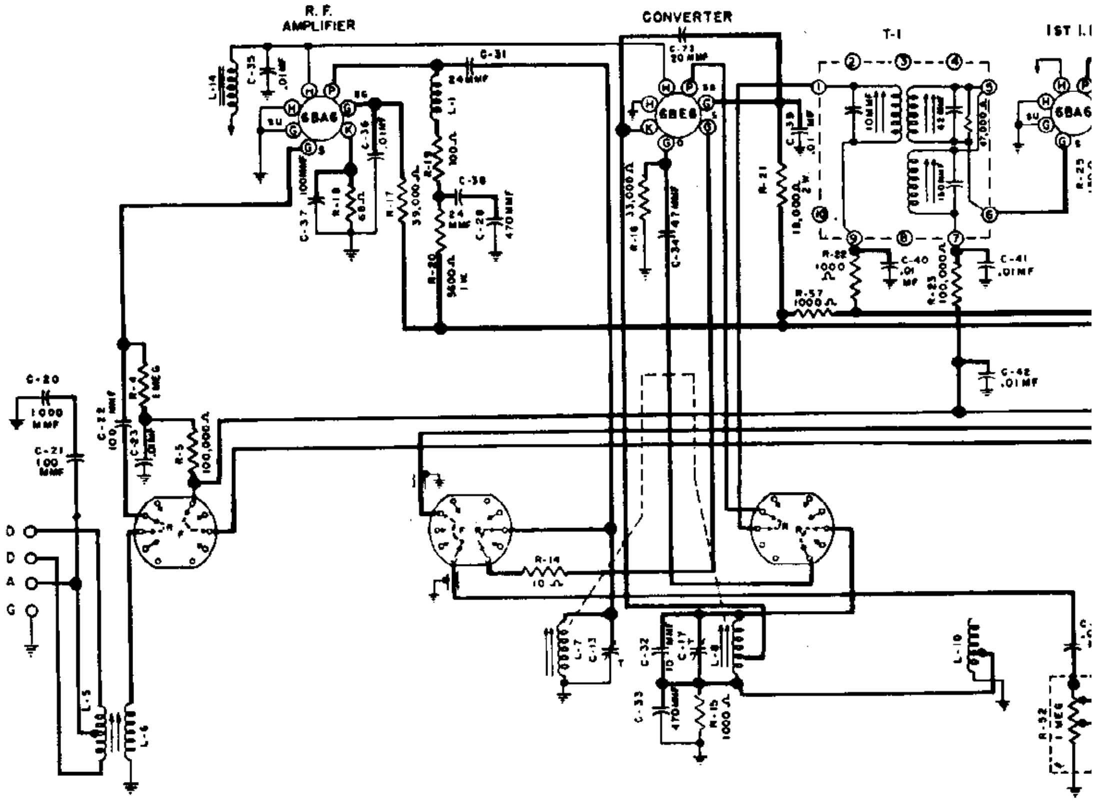
n mark does not exceed ±0.4 MC. and R.F. circuit is tracking properly, then alignment may be considered satisfactory and no further adjustment is necessary. Where

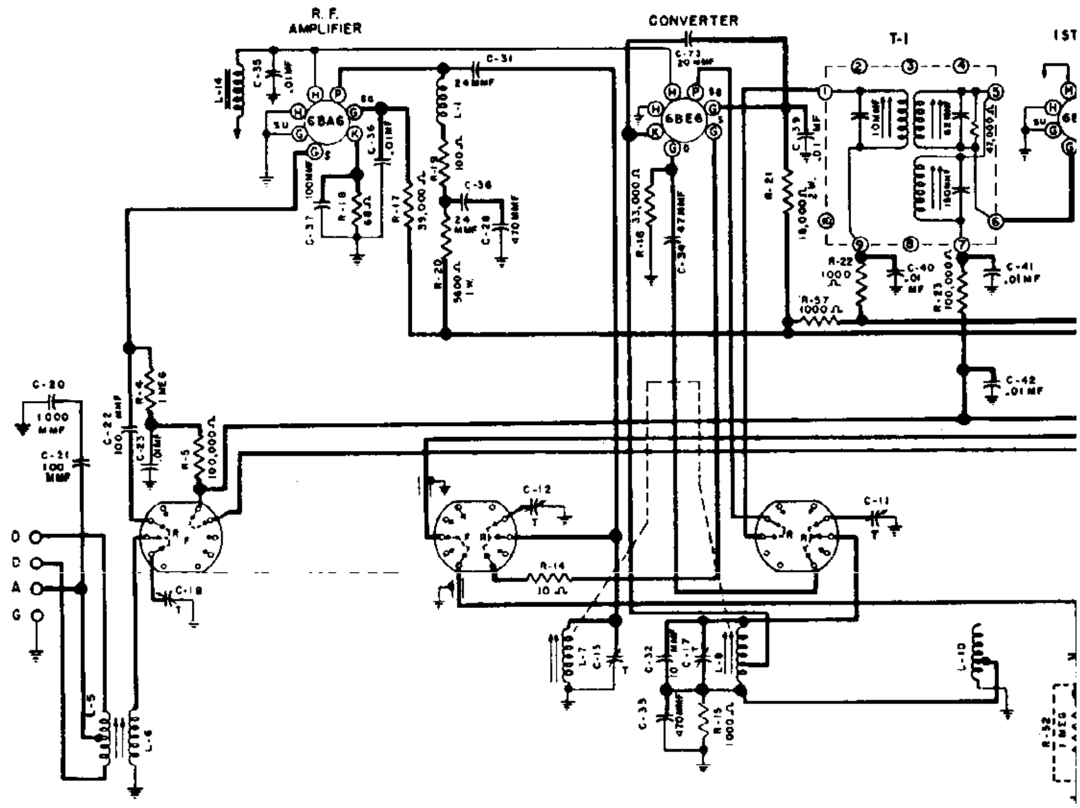
MENT PROCEDURE — FM SECTION

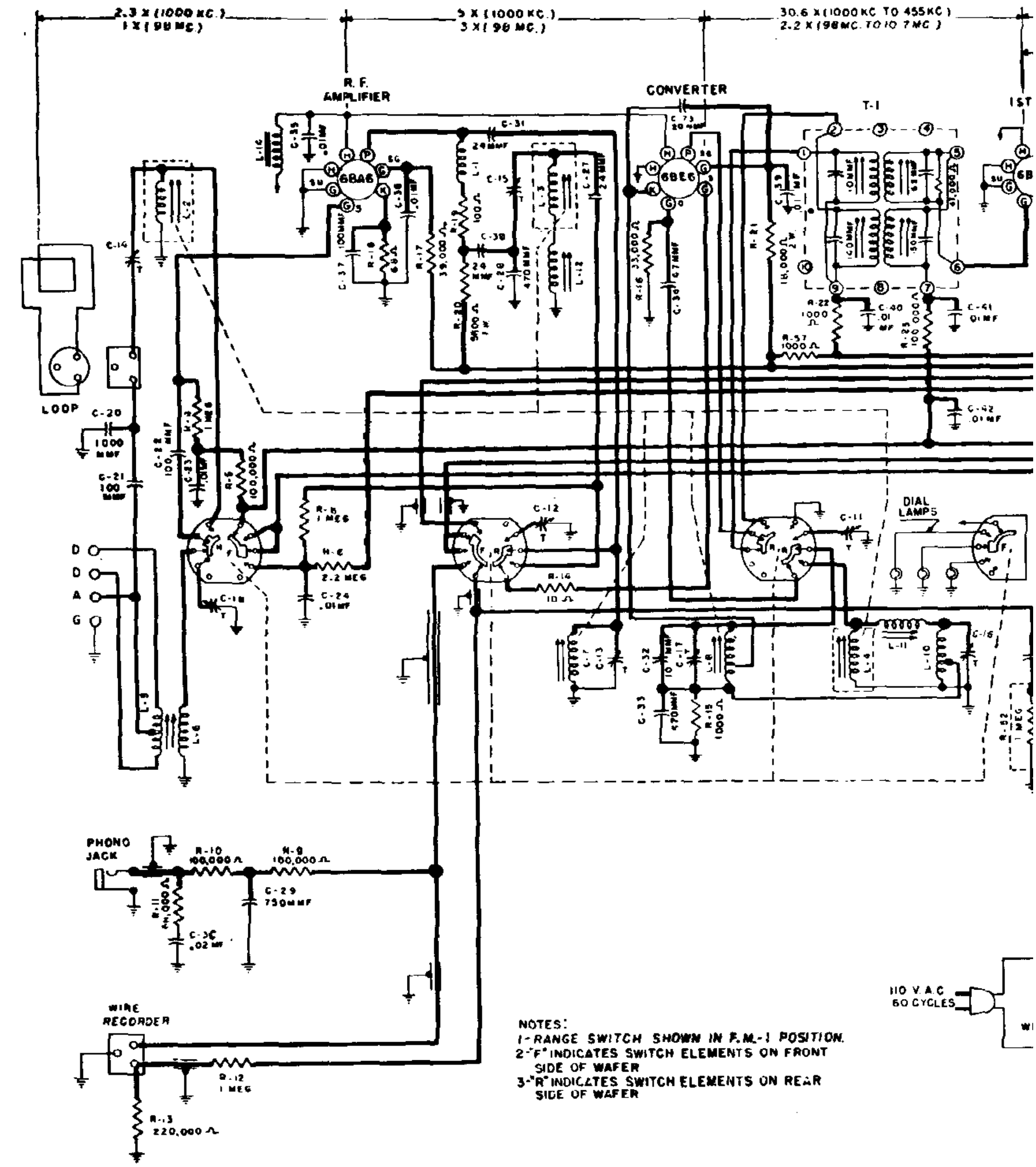
serious calibration or tracking error is noted after attempting to align the receiver as described in the preceding section.

bove	By means of tuning control knob, set dial pointer to 88 MC. mark on dial.	18	Oscillator Trimmer	Set trimmer #18 to receive 88 MC. signal.	Adjust trimmer #18 to obtain the symmetrical pattern shown above.
		19	R.F. Trimmer	Adjust trimmers #19 and #20 for maximum meter reading.	Adjust trimmers #19 and #20 for maximum amplitude of pattern.
		20	Antenna Trimmer		
bove	By means of tuning control knob, set dial pointer to 98 MC. mark on dial.	21	Oscillator tuning slug	Set slug #21 to receive 98 MC. signal and adjust for maximum meter reading.	Adjust slug #21 to obtain the symmetrical pattern shown above.
bove	By means of tuning control knob, set dial pointer to 108 MC. mark on dial.	—	—	Note heavy braided lead connection to osc. coil; adjust position of this braid until 108 MC. signal is received and meter reading is maximum. Coat braid with speaker cement after correct position is located.	Note heavy braided lead connection to osc. coil; adjust position of this braid until symmetrical pattern shown above is obtained. Coat braid with speaker cement after correct position is located.
		22	R.F. tuning slug	Adjust slug #22 for maximum meter reading.	Adjust slug #22 for maximum amplitude of 'scope pattern.

ker cement at top of each tuning slug stem to prevent movement.


R. F. AMPLIFIER
CONVERTER
T-1
1ST I.F.
6BA6
6BE6
C-20 1000 MMF
C-21 100 MMF
C-22 100 MMF
R-4 1 MEG
R-5 100,000 Ω
R-14 10 Ω
R-15 1000 Ω
R-16 33,000 Ω
R-17 39,000 Ω
R-18 68 Ω
R-19 100 Ω
R-20 5600 Ω 1W
R-21 18,000 Ω 2W
R-22 1000 Ω
R-23 100,000 Ω
R-57 1000 Ω
C-31 24 MMF
C-35 .01 MF
C-36 .01 MF
C-37 100 MMF
C-38 24 MMF
C-28 470 MMF
C-73 20 MMF
C-39 .01 MF
C-40 .01 MF
C-41 .01 MF
C-42 .01 MF
C-32 10 MMF
C-33 470 MMF
C-34 47 MMF
L-1
L-5
L-6
L-7
L-8
L-10
L-14
R-32 1 MEG
D
D
A
G


R. F. AMPLIFIER
CONVERTER
T-1
6BA6
6BE6
C-11
C-12
C-18
C-20 1000 MMF
C-21 100 MMF
R-14 10 Ω
R-15 1000 Ω
D
D
A
G



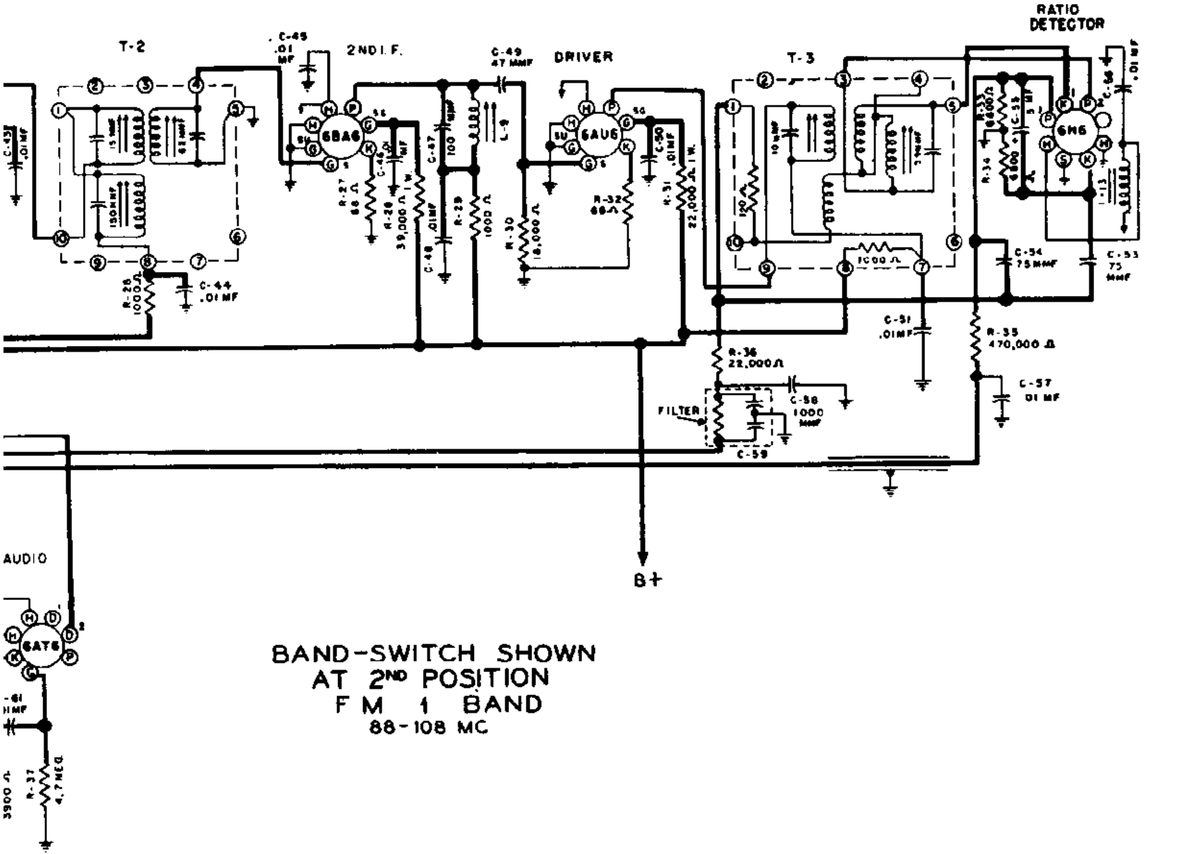
NOTES:
1-RANGE SWITCH SHOWN IN F.M.-1 POSITION.
2-"F" INDICATES SWITCH ELEMENTS ON FRONT SIDE OF WAFER
3-"R" INDICATES SWITCH ELEMENTS ON REAR SIDE OF WAFER

SPECIFICATIONS

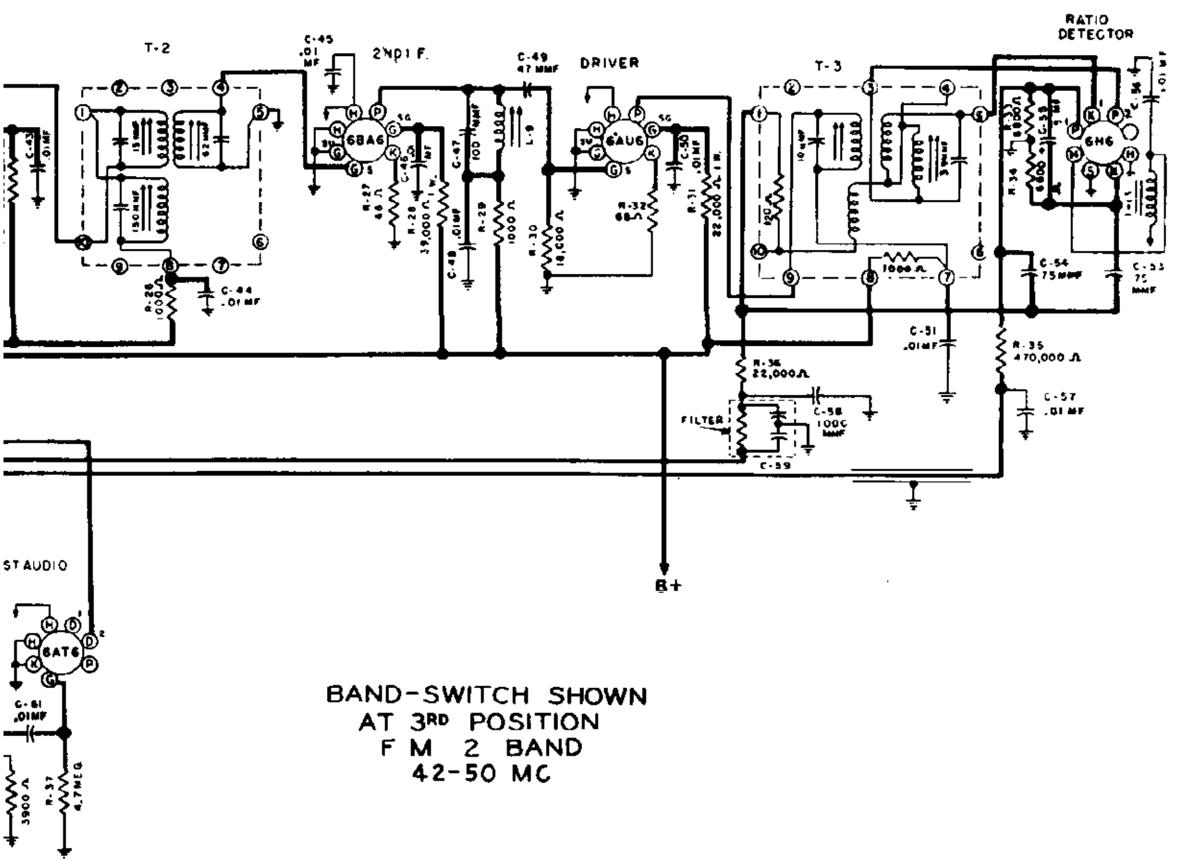
Voltage Rating.........................50-60 Cy. 105-125 V.
Type of Circuit.............................Superheterodyne
Tuning Range....................Broadcast—540 KC.-1700 KC.
FM. 1-88 MC.-108 MC. FM. 2-42 MC.-50 MC.
Input Power Rating..............Radio 86 Watts, Phono 30 Watts
Intermediate Frequency............A.M. 455 KC, F.M. 10.7 MC.
Speaker Voice Coil Impedance at 400 Cycles...........6-8 Ohms
Power Output...10 Watts

Resistors

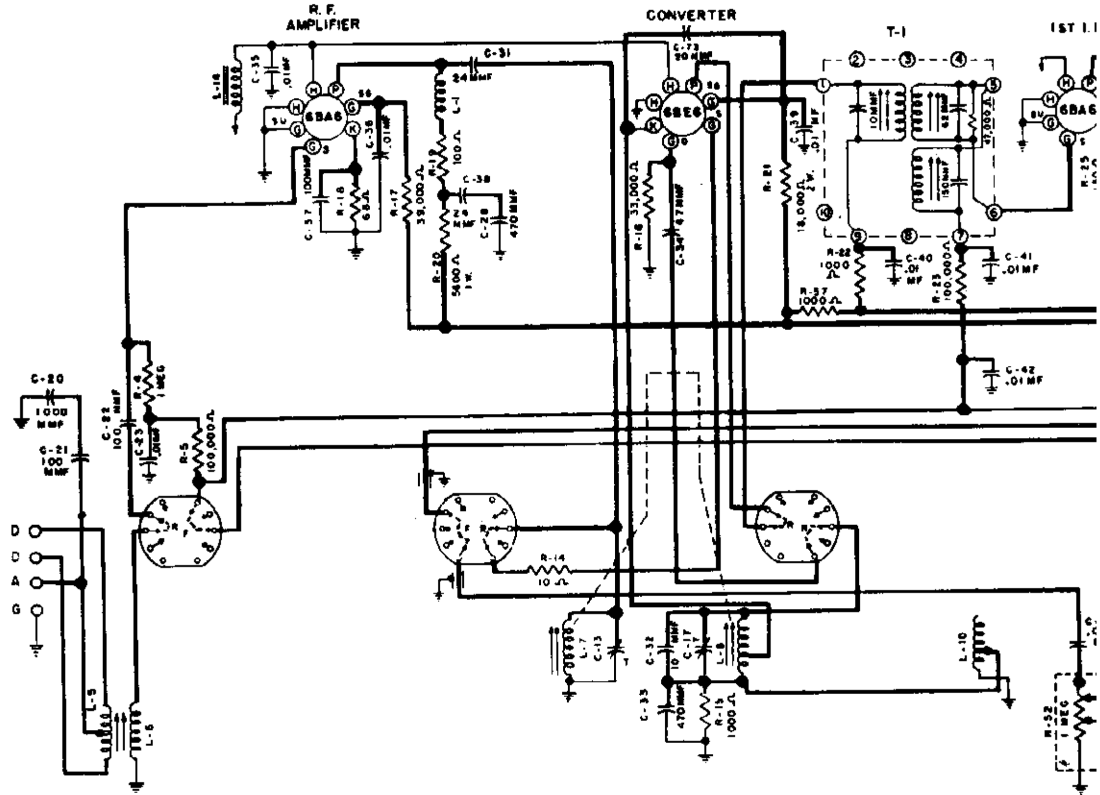
Part No.		Description
28163	R-45	2,700 Ohm, ½ W
28165	R-56	3,900 Ohm, ½ W
28171	R-47	12,000 Ohm, ½ W
28173	R-30	18,000 Ohm, ½ W
28174	R-55	27,000 Ohm, ½ W
28186	R-38-42-44	390,000 Ohm, ½ W
28187	R-46	470,000 Ohm, ½ W
28188	R-54	560,000 Ohm, ½ W
149020	R-51	330 Ohm, 2 W
149057	R-21	18,000 Ohm, 2 W

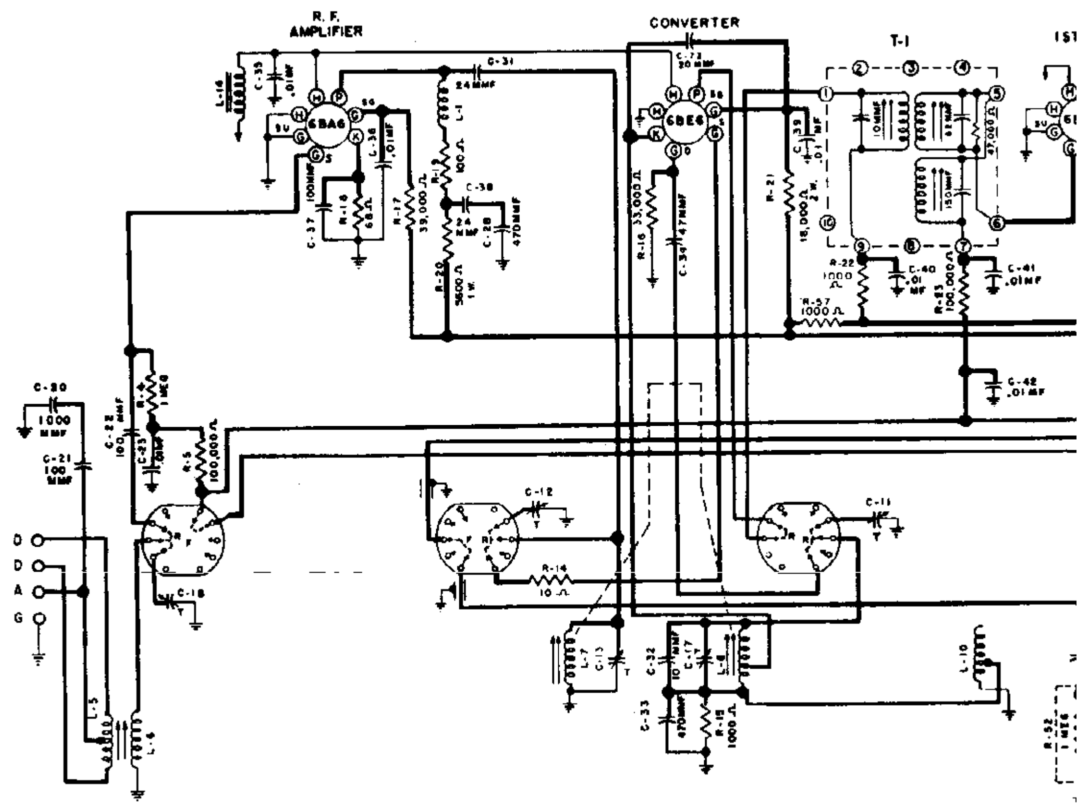


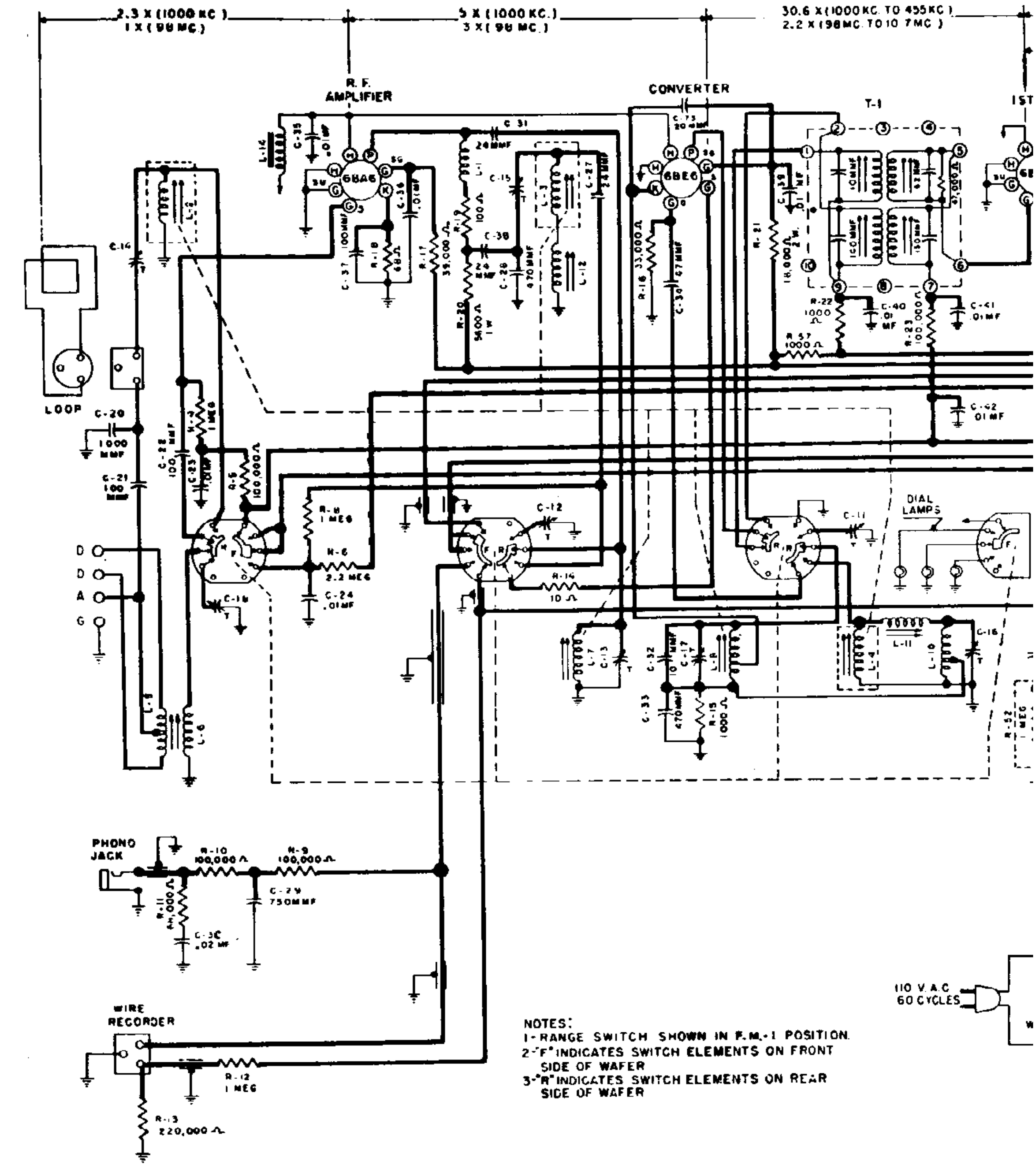
BAND-SWITCH SHOWN
AT 2ND POSITION
F M 1 BAND
88-108 MC



BAND-SWITCH SHOWN
AT 3RD POSITION
F M 2 BAND
42-50 MC


R. F. AMPLIFIER
CONVERTER
T-1
6BA6
6BE6


R. F. AMPLIFIER
CONVERTER
T-1
6BA6
6BE6



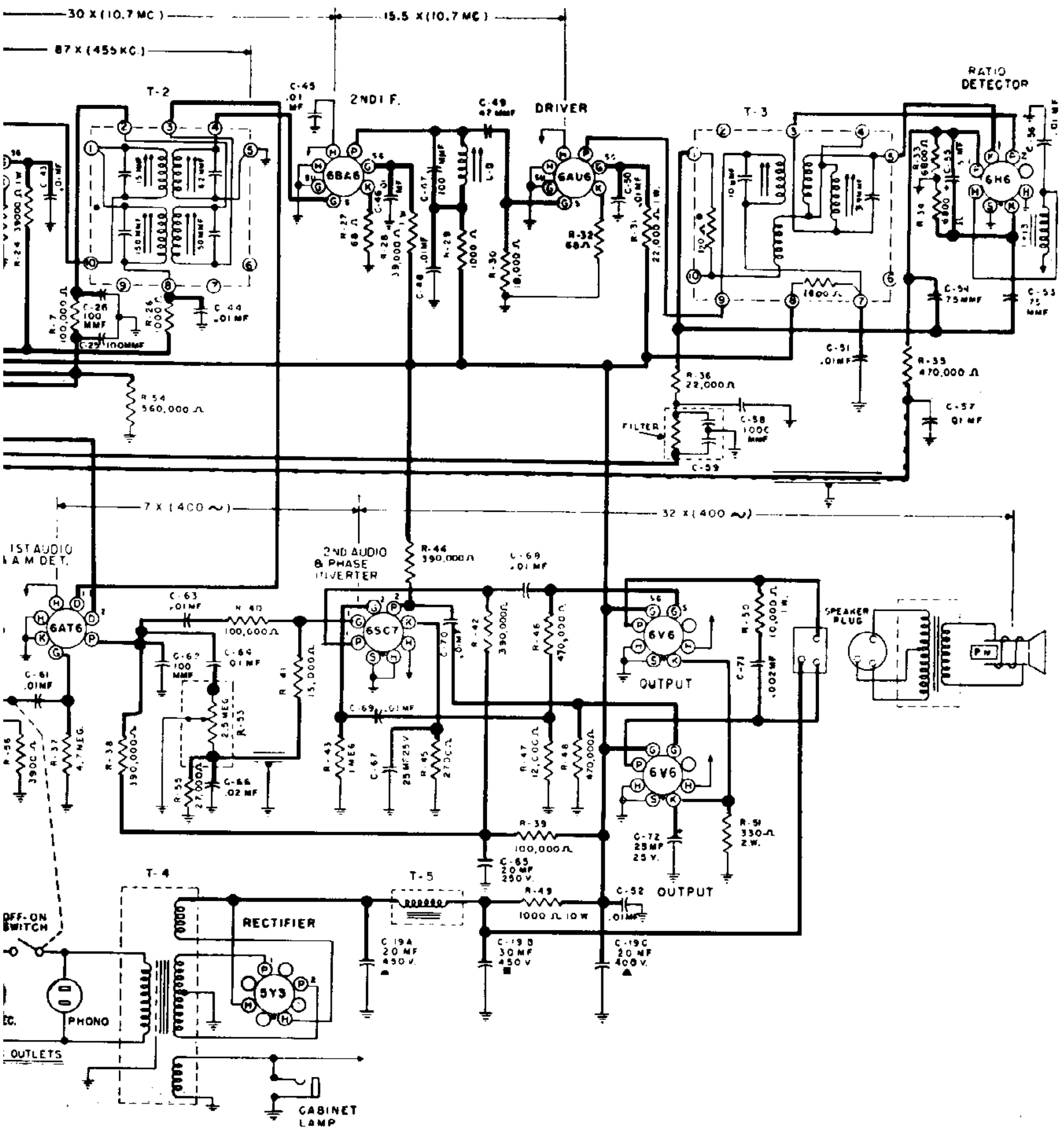
SPECIFICATIONS

Voltage Rating..........................50-60 Cy. 105-125 V.
Type of Circuit..............................Superheterodyne
Tuning Range....................Broadcast—540 KC.-1700 KC.
FM. 1-88 MC.-108 MC. FM. 2-42 MC.-50 MC.
Input Power Rating.............Radio 86 Watts, Phono 30 Watts
Intermediate Frequency.............A.M. 455 KC, F.M. 10.7 MC.
Speaker Voice Coil Impedance at 400 Cycles..........6-8 Ohms
Power Output...10 Watts

Resistors

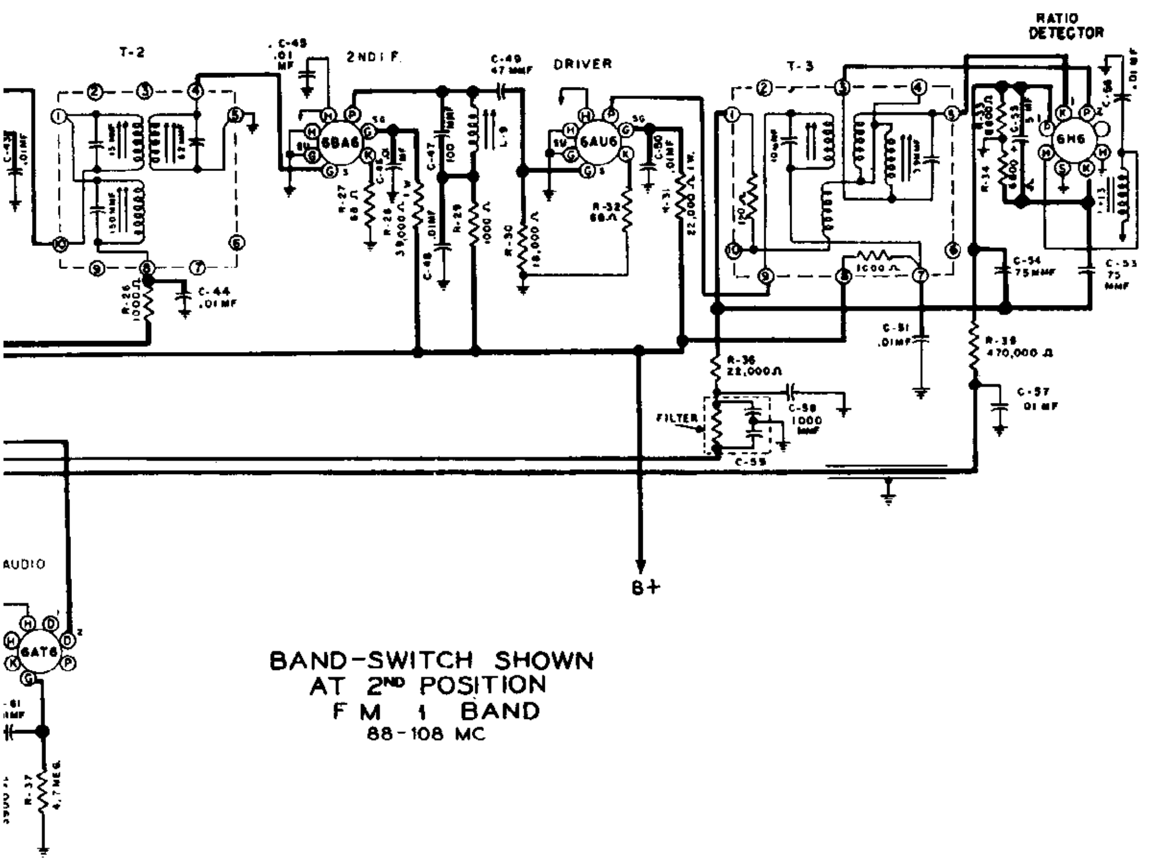
Part No.		Description
28163	R-45	2,700 Ohm, ½ W
28165	R-56	3,900 Ohm, ½ W
28171	R-47	12,000 Ohm, ½ W
28173	R-30	18,000 Ohm, ½ W
28174	R-55	27,000 Ohm, ½ W
28186	R-38-42-44	390,000 Ohm, ½ W
28187	R-46	470,000 Ohm, ½ W
28188	R-54	560,000 Ohm, ½ W
149020	R-51	330 Ohm, 2 W
149057	R-21	18,000 Ohm, 2 W

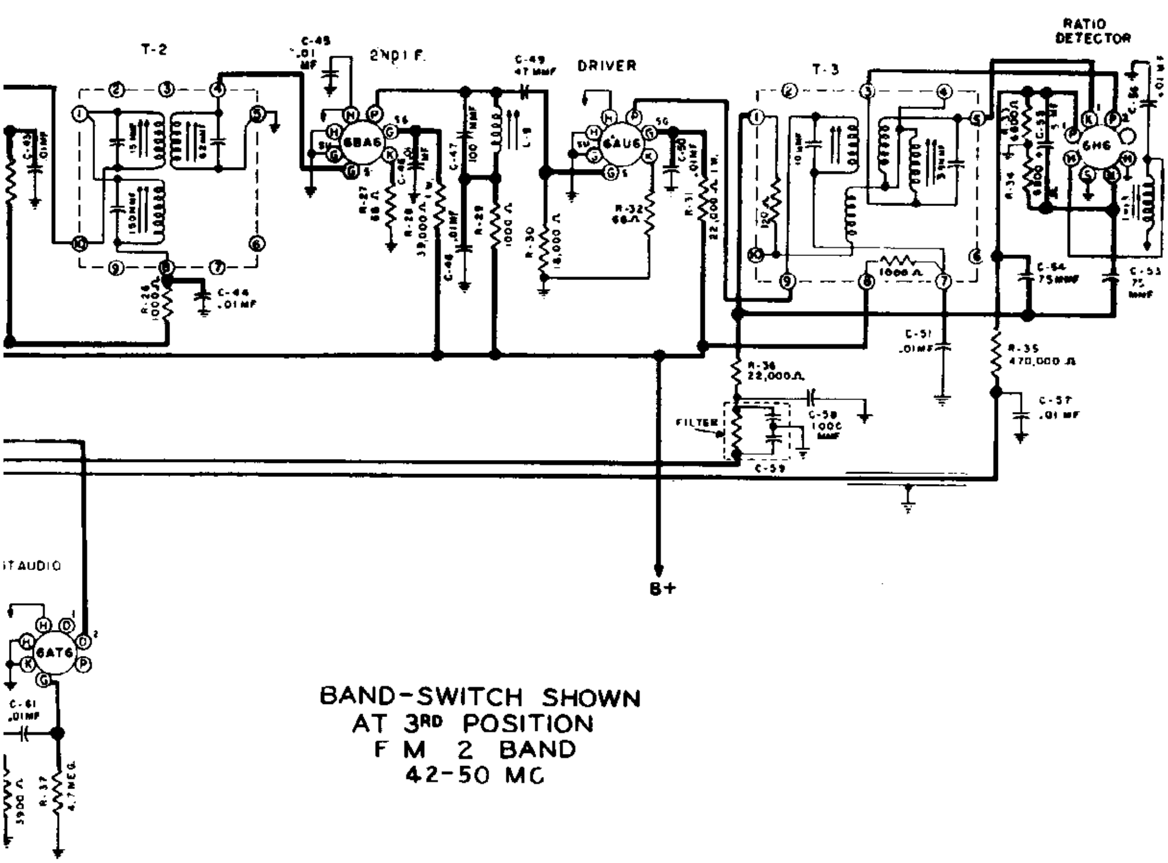
MODELS 1210M2-Y, 1210M2-M, 1210M2-W, 1210PG-M, 1210PG-W, 1210PL-M, series 10-11



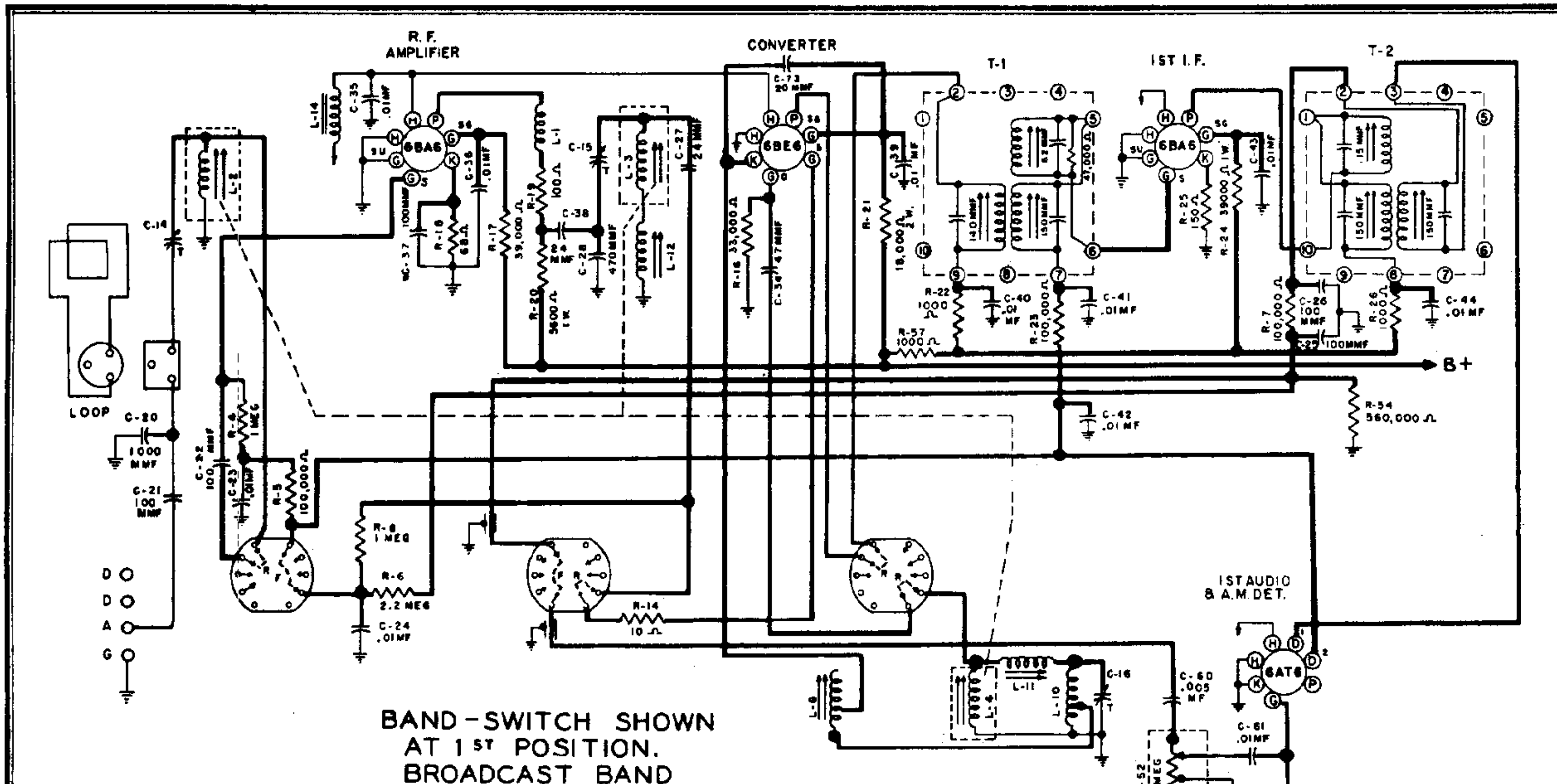
89	R-14	10 Ohm, ½ W			
94	R-18-27-32	68 Ohm, ½ W	149121	R-6	2.2 Meg. ½ W
95	R-19	100 Ohm, ½ W	149123	R-37	4.7 Meg. ½ W
96	R-25	150 Ohm, ½ W	149126	R-49	10,000 Ohm, 10 W B Stick
01	R-15-22-26-29-57	1,000 Ohm, ½ W	149144	R-50	10,000 Ohm, 1 W
08	R-41	15,000 Ohm, ½ W	149146	R-31	22,000 Ohm, 1 W
09	R-36	22,000 Ohm, ½ W	149184	R-20	5,600 Ohm, 1 W
10	R-16	33,000 Ohm, ½ W	149189	R-17-24-28	39,000 Ohm, 1 W
12	R-68	68,000 Ohm, ½ W	149216		Voltage Divider
13	R-5-7-9-10-23-39	100,000 Ohm, ½ W	149239	R-33-34	6,800 Ohm, ½ W ±5%
15	R-13	220,000 Ohm, ½ W			
17	R-35-48	470,000 Ohm, ½ W			
19	R-4-8-12-43	1.0 Meg. ½ W			

RECORD CHANGERS: M2 series uses Seeburg Model L


T-2
2ND I.F.
6BA6
DRIVER
6AU6
T-3
RATIO DETECTOR
6H6
FILTER
B+
AUDIO
6AT6
BAND-SWITCH SHOWN
AT 2ND POSITION
F M 1 BAND
88-108 MC


T-2
2ND I.F.
6BA6
DRIVER
6AU6
T-3
RATIO DETECTOR
6H6
FILTER
B+
1ST AUDIO
6AT6
BAND-SWITCH SHOWN
AT 3RD POSITION
F M 2 BAND
42-50 MC

STROMBERG-CARLSON CO.



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
540-1700 KC

Transformers—Coils

Part No.		Description
114029	L-7	R.F., Coil, F.M.
114035	L-5-6	Ant., Coil, F.M.
114037	L-8	Osc. Coil, F.M.
114038	L-10	Osc. Coil, A.M.
114039	L-11	Osc. Trim. Coil, A.M.
114040	L-12	R.F. Trim. Coil, A.M.
114041	L-2-3-4	Ant., R.F., & Osc. Coils, A.M.
114328	T-2	I.F. 2nd
114329	L-9	I.F. 3rd
114332	T-1	I.F. 1st
114614	L-1	R.F. Choke
114618	L-13-14	R.F. Filament Choke
161006	T-5	Filter Choke
161226		Output Trans.

Miscellaneous

29956	Pilot Lamp
32046	Socket, Loop-Wire Rc.
32076	Pulley, Dial Cord
32164	Plug, Ant. Loop
33218	A.C. Cord
34421	Socket, Phono., Cab. Lamp
40546	Clip, Pulley
48997	Speaker
48984	Speaker Cone
81054	Speaker Plug.
105112	Chassis Mtg. Bracket
118001	Iron Core (I.F.)
122016	Dial Scale, F.M. 1
122017	Dial Scale, F.M. 2
122018	Dial Scale, A.M.
131004	Grommet, A.C. Cord
142029	Dial Plate Assem.
144011	Pointer, Broadcast
144012	Pointer, F.M.
150031	Shaft, Vol. Control
150032	Shaft, Tuning
151028	Tube Shield, Base (Min.)
151036	Tube Shield, (Min.)
152026	Socket, A.C. (2)
152031	Pilot Socket, F.M. 1
152032	Pilot Socket, A.M. 2
152033	Socket, Speaker
152036	Pilot Socket
156033	Coupling Spring, Vol.
159023	Ant. Binding Post

Controls—Switches—Knobs

134038		Knobs
145028	R-52	Tone Control
145029	R-53	Volume Control and Switch
158020		Range Switch

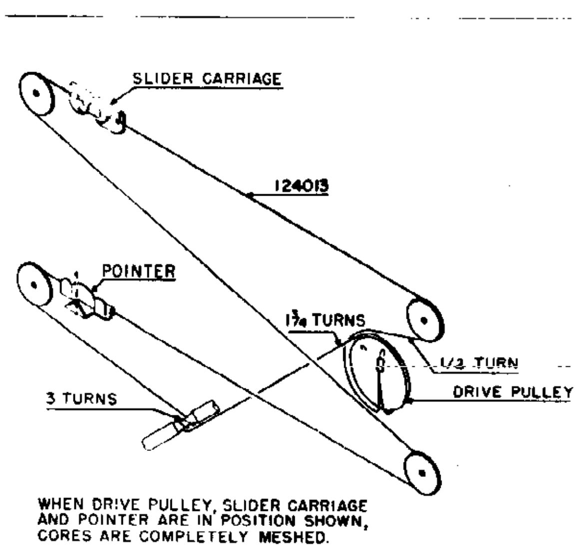
MODELS 1210 series STROMBERG-CARLSON CO.

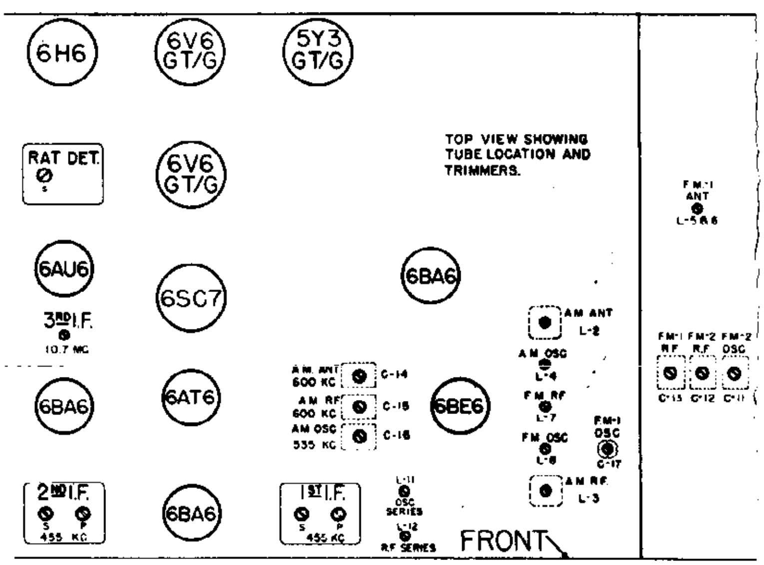
ALIGNMENT PROCEDURE

	Band and Pointer Setting	Input Generator Setting	Input and Dummy	VTM and Scope Input	Trimmer Adj. and Notes
			A.M. I.F. ALIGNMENT		
1	AM Low end of dial	455 kc. 400 cy. mod.	Junction C-17 and L-8. See location chart. 100 mmf. dummy	Junction R-12 and C-60 (See location chart)	Adj. Pri. and Sec. 1st and 2nd I.F. (Top of Chassis) for highest voltage on -3V DC Scale
2	"	455 kc. swept 15 kc.	"	"	Adj. same cores as above for best over-lapping curve on scope.
			F.M. I.F. ALIGNMENT		
FM 1	(1) Low end of dial	10.7 mc. 400 cyc. mod.	Junction C-17 and L-8. See location chart. 100 mmf. dummy	AVC buss (Green and White Wire)	Detune Sec. Ratio Det. (Top of Chassis). Adj. Pri. and Sec. 1st and 2nd I.F. Pri. Ratio Det. (Bottom of Chassis) and 3rd I.F. (L-9 Top of Chassis).on -3 VDC Scale for max. AVC voltage.
2*	"	10.7 mc. swept 150 kc.	"	Pin No. 6 Driver tube (screen) thru .01 capac.	Adj. same cores (as in step 1) for best overlapping curve on scope.
3*	"	"	"	Junction R-12 and C-60	Adj. Sec. of Ratio Det. for zero voltage. (Top of Chassis).
	*Repeat 2 and 3 if necessary				
			A.M. R.F. ALIGNMENT		
1	Broadcast Extreme Low Freq.	535 Kc. 400 cyc. mod.	Ant. term. 200 mmf. dummy	AVC Buss Green and White Wire	Adj. C-16 for max. AVC voltage
2	Extreme Hi Freq.	1700 Kc. 400 cyc. mod.	"	"	Adj. L-11 for max. AVC voltage
3	Repeat 1 and 2				
4	600 Kc	600 Kc. 400 cyc. mod.	"	"	Adj. C-15 for max. AVC voltage
5	1500 Kc	1500 Kc. 400 cyc. mod.	"	"	Adj. L-12 for max. AVC voltage
6	Repeat 4 and 5				
7	600 Kc	600 Kc. 400 cyc. mod	"	"	Adj. C-14 for max. AVC voltage
			F.M. R.F. ALIGNMENT		
1	FM 1 Channel 260	100 Mc	Ant. term. (DD) 150 ohm series with each side of Gen.	AVC Buss Green and White Wire	CAUTION: Align FM-1 1st. 1. C-17 2. C-13 3. L-5 and 6 } Adjust for max. AVC Voltage. (All Trimmers)
2	FM 2 Channel 60	46 Mc.	"	"	1. C-11 2. C-12 3. C-18 } Adjust for max. AVC Voltage (All Trimmers)

CAUTION: Use low signal input especially for steps 2 and 3 of F.M. I.F. Alignment to avoid overloading.
Use dummy loop No. 114048 for A.M. R.F. Alignment
Use insulated aligning tool No. 80777 to prevent damage to iron cores.
Refer to Number 4, Vol. 1 Current Flash for suggested instrument use.
R.F. alignment procedure of iron core tuners is different from condenser tuners in that trimmers are adjusted at low frequency end and coils are adjusted at high frequency end of dial.
Recommended procedure is to align both I.F. channels if either channel requires it.

Dial Stringing Chart





STROMBERG-CARLSON CO.

Capacitors

25484	C-30-66	.02 mf. 600 V.
27646	C-71	.002 mf. 600 V.
110019	C-14-15-16	Aligning
110020	C-11-12-13	Aligning
110022	C-18	Aligning
110023	C-17	Trimmer
110401	C-21-22-25-26-37-62	100 mmf.
110402	C-34-49	47 mmf.
110403	C-27-31-38	24 mmf.
110419	C-60	.005 500 V.
110420	C-23-24-35-36-39-40-41-42-43-44-45-46-48-50-51-52-56-57-61-63-64-68-69-70	.01 mf. 500 V.
110425	C-20-58	1,000 mmf.
110455	C-28-33	470 mmf.
110456	C-29	750 mmf.
110476	C-47	100 mmf.
110478	C-59	Diode Filter
110483	C-53-54	75 mmf.
110495	C-32	10 mmf.
110496	C-73	20 mmf.
111025	C-19	Electrolytic
111026	C-67-72	Electrolytic
111030	C-55	5 mfd.
111031	C-65	20 mf. 250 V.

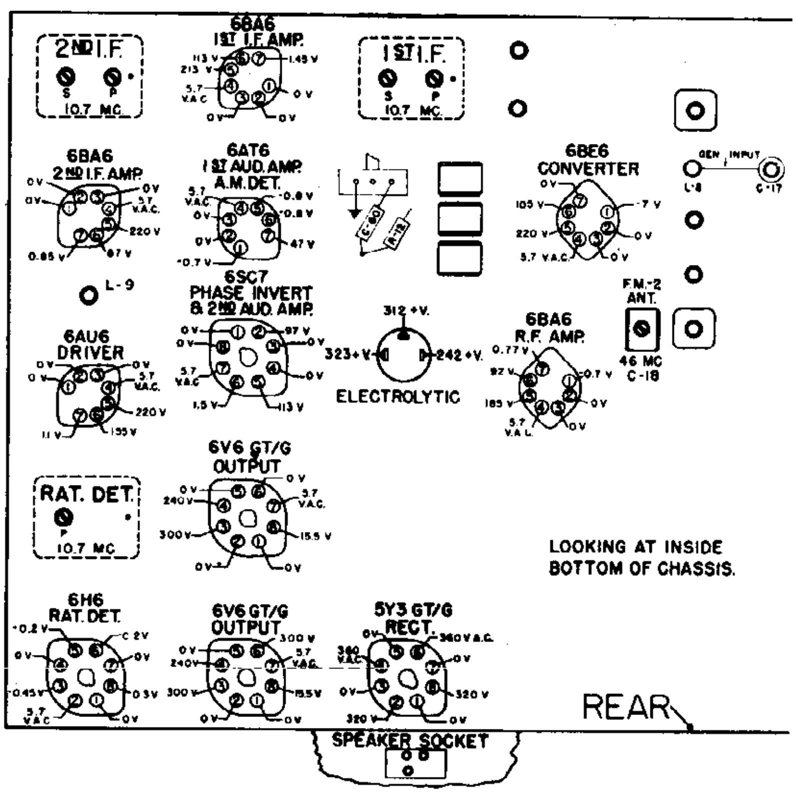
NOTE: Series 11 incorporates changes listed

	Part No.
Remove—R55—27,000 ohms	Not Replaced
Change—R-14 10 ohms—To 100,000 ohms	149113
Add—C74—100 mmf. across R-14	110401
Change—C 31 24 mmf.—To 100 mmf.	110401
Change—C 38 24 mmf.—To 47 mmf.	110402

NOTE—When ordering replacement parts always specify series number as well as model and part number. Series number is stamped on back of chassis.

Cabinet Parts

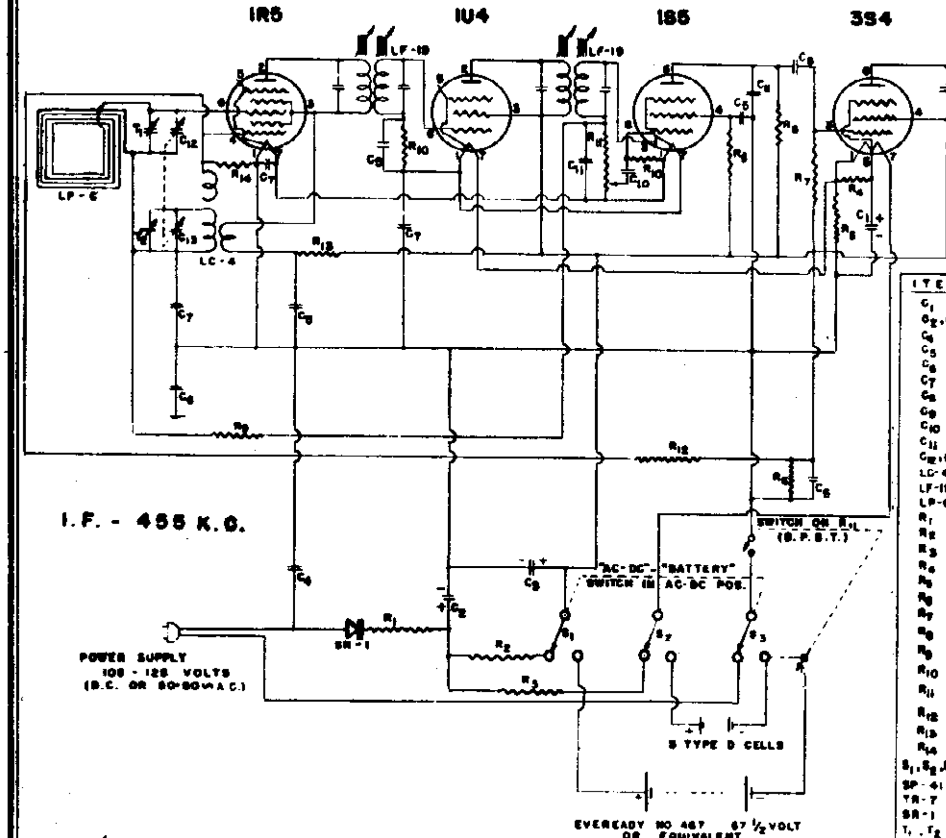
	PGM-W	PLM	M-2-Y,M-W	Description
37148	X			Door
38442	X	X		Bullet C
39350	X			Grille C
80681	X	X		Stophinge Asser
108016			X	Phono Drawer and T
108052	X			Phono Drawer and T
108054		X		Phono Drawer and T
125015			X	Dial Escutch
125016	X	X		Dial Escutch
125018			X	Escutcheon Spec
130030		X		Grille C
130031		X		Metal G
132009			X	Door Pull, concea
132013			X	Bottom Hi
132016			X	Bullet C
132021	X		X	Phono Track,
132022	X		X	Phono Track, r
132053			X	Rt. Upper Hinge, Semi-concea
132054			X	Lt. Lower Hinge, Semi-concea
132059		X		Phono Track, R
132060		X		Phono Track,
132061		X		Door
132062		X		Ros
132063		X		Stophinge, up
132064		X		Stophinge, lo
132065			X	Door Pull
132071		X		Door K
152009		X	X	Socket and
801401	X	X	X	Lamp



Measurements are made at 117V line, using electronic Voltmeter. Except where otherwise indicated, voltages are D.C. and are positive with respect to the reference point which is the chassis.

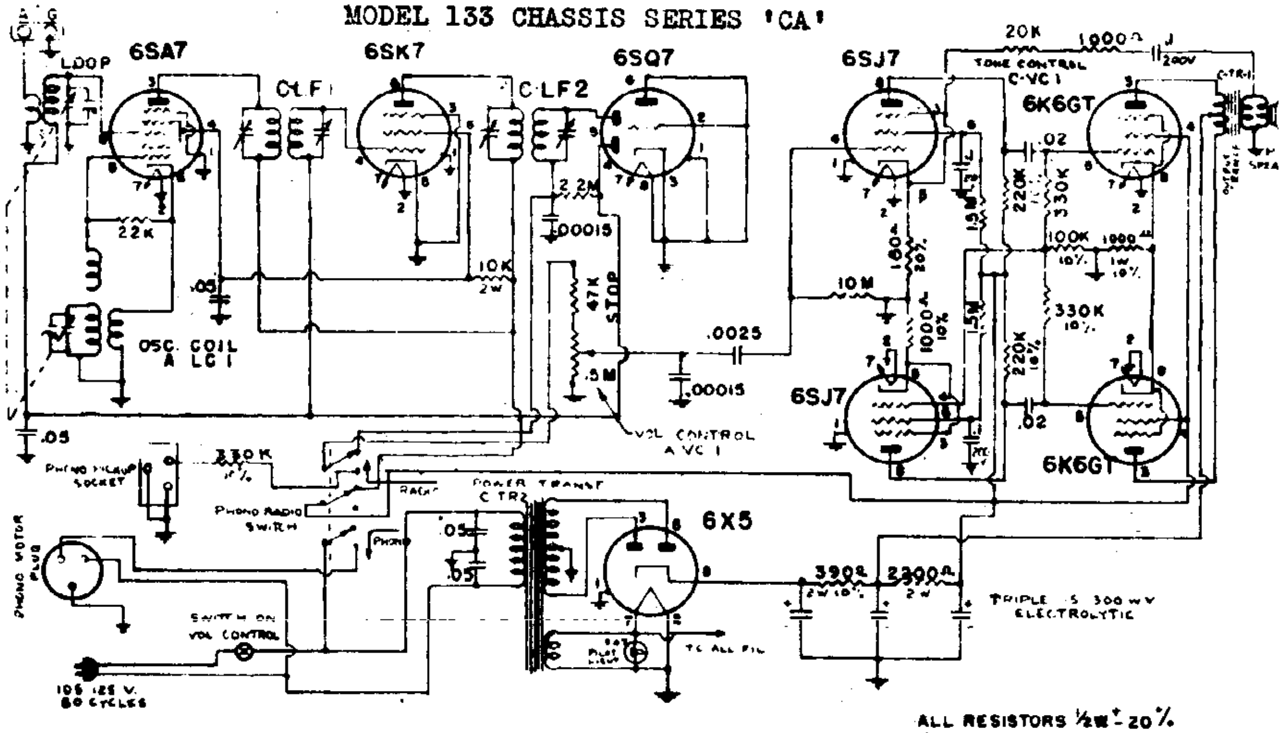
TELE-TONE RADIO CORP. MODEL 133, chassis CA
MODELS 145, 152, chassis

MODELS 145, 152 CHASSIS SERIES 'R'



ITEM	DESCRIPTION	PART NUM
C_1	125 MFD. 10 VOLT } ELECTROLYTIC	CE-12
C_2, C_3	25 MFD. 150 VOLT } CONDENSER	
C_4	.05 MFD. 400 VOLT PAPER CONDENSER	CP 503-
C_5	.01 MFD. 150 VOLT PAPER CONDENSER	CP 103-
C_6	.1 MFD. 200 VOLT PAPER CONDENSER	CP 104-
C_7	.05 MFD. 150 VOLT PAPER CONDENSER	CP 503-
C_8	.002 MFD. 120 VOLT PAPER CONDENSER	CP 202-
C_9	.005 MFD. 400 VOLT PAPER CONDENSER	CP 502-
C_{10}	.001 MFD 120 VOLT PAPER CONDENSER	CP 102-1
C_{11}	.0001 MFD. 500 VOLT MICA CONDENSER	CM 101-1
C_{12}, C_{13}	VARIABLE CONDENSER	CV 10
LC-4	OSCILLATOR COIL	LC-4
LF-19	I. F. TRANSFORMER	LF-19
LP-6	ANTENNA LOOP	LP-6
R_1	56 OHM 2 WATT 10% W.W. RESISTOR	RW 560-
R_2	7500 OHM 1 WATT 10% RESISTOR	RC 752
R_3	2720 OHM 10 WATT 5% RESISTOR	RP-1
R_4	470 OHM 1/2 WATT RESISTOR	RC 471-
R_5	820 OHM 1/2 WATT 10 % RESISTOR	RC 821-
R_6	270,000 OHM 1/2 WATT 10% RESISTOR	RC 274-
R_7	2.2 MEG. 1/2 WATT RESISTOR	RC 225-
R_8	1 MEG. 1/2 WATT RESISTOR	RC 105-
R_9	3.3 MEG. 1/2 WATT RESISTOR	RC 335
R_{10}	10 MEG. 1/2 WATT RESISTOR	RC 106-
R_{11}	1 MEG POTENTIOMETER WITH SWITCH	VC-6
R_{12}	1 MEG 1/2 WATT 10% RESISTOR	RC 105-
R_{13}	15,000 OHM 1/2 WATT RESISTOR	RC 153-
R_{14}	100,000 OHM 1/2 WATT 10% RESISTOR	RC 104-
S_1, S_2, S_3	3 POLE SINGLE THROW SWITCH	SW-3
SP-41	SPEAKER	SP-41
TR-7	OUTPUT TRANSFORMER	TR-7
SR-1	SELENIUM RECTIFIER	SR-1
T_1, T_2	TRIMMERS ON VARIABLE	

MODEL 133 CHASSIS SERIES 'CA'

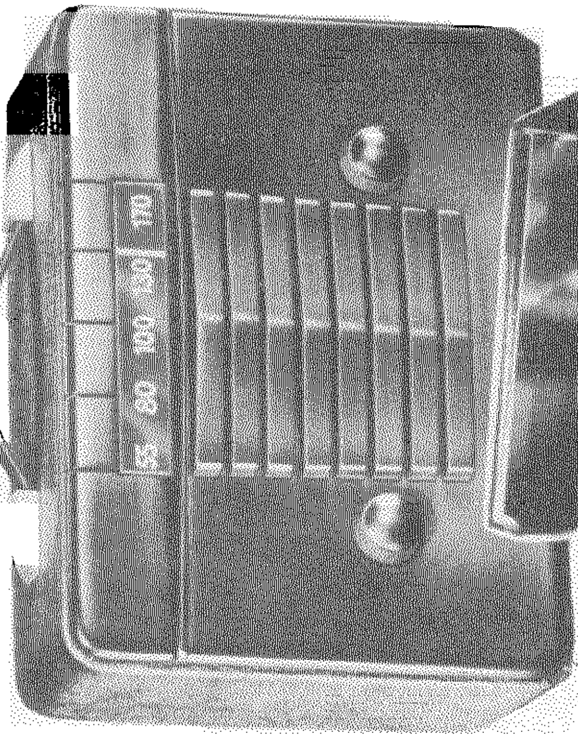


I.F.-455 K.C.
FREQ. RANGE-1700 KC-530 KC
ALIGN AT-1500 KC
TRACK AT-600 & 1000 KC

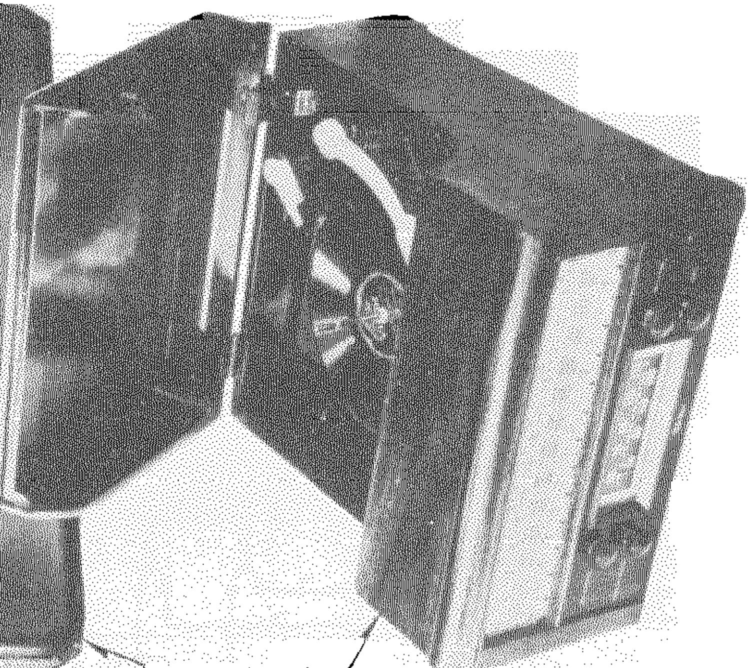
ALL RESISTORS ½W ± 20% UNLESS SPECIFIED
Ω = OHMS
K = THOUSAND Ω
M = MILLION Ω
ALL CONDENSERS IN MICRO FARA[DS] @400 VDC. UNLESS SPECIFIED

MODEL 133
MODEL 145
MODEL 150
MODEL 152

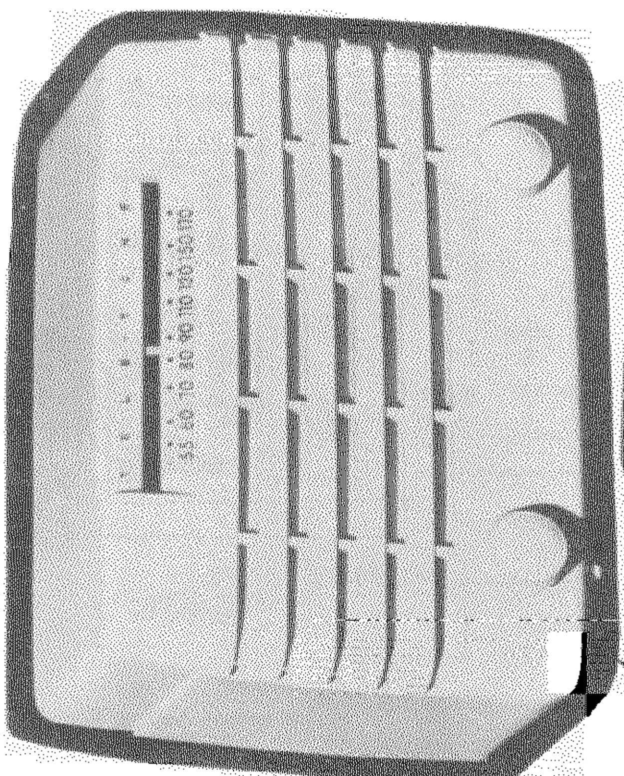
TELE-TONE RADIO CORP.



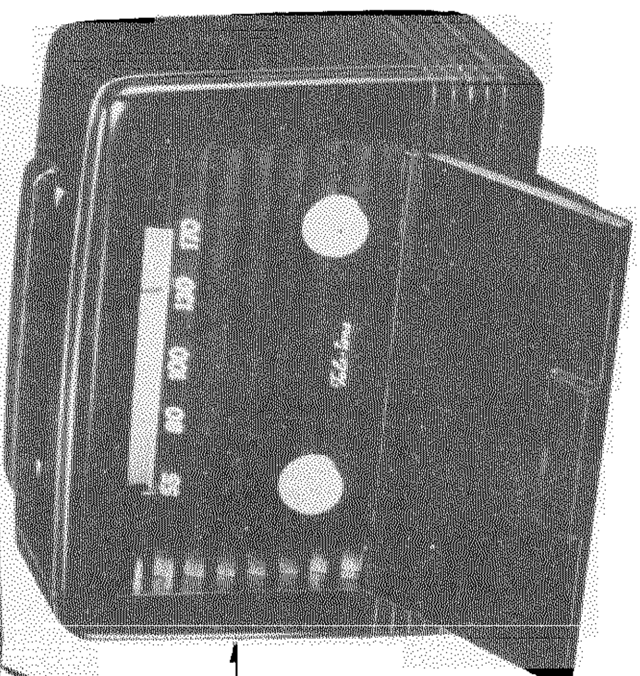
MODEL 145



MODEL 133



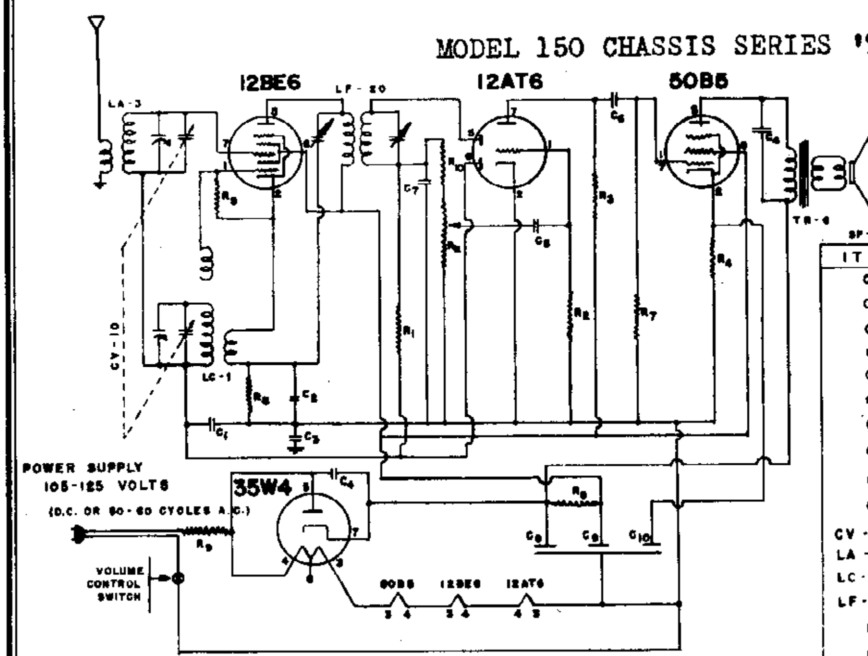
MODEL 150



MODEL 152

TELE-TONE RADIO CORP.

MODEL 150 CHASSIS SERIES 'T'



I.F. - 455 K.C.

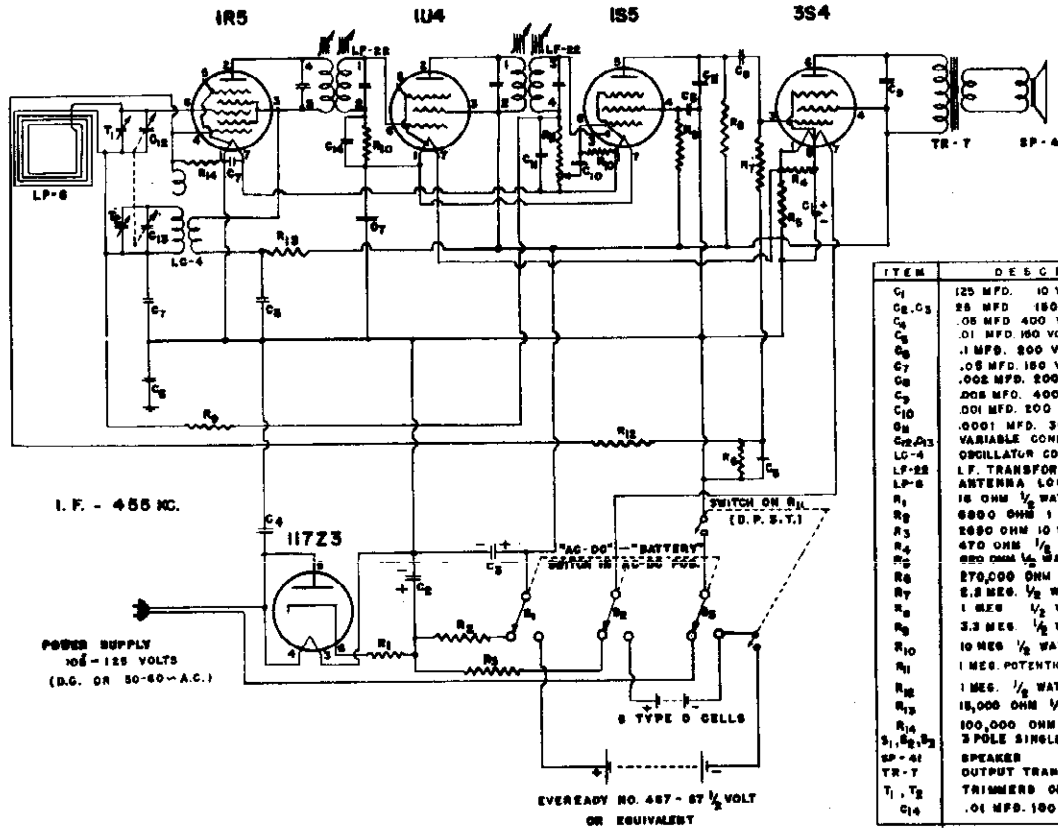
FREQ. RANGE 530-1700 K.C.

ALIGN AT 1500 K.C.

TRACK AT 600 K.C.

ITEM	DESCRIPTION		PART N
C_1	.05 MFD - 200 VOLT PAPER CONDENSER		CP 503-3
C_2	.01 MFD - 150 VOLT PAPER CONDENSER		CP 103-2
C_3	.05 MFD-400 VOLT PAPER CONDENSER		CP 503-3
C_4	.02 MFD-400 VOLT PAPER CONDENSER		CP 203-1
C_5	.002 MFD-400 VOLT PAPER CONDENSER		CP 202-2
C_6	.005 MFD-200 VOLT PAPER CONDENSER		CP 502-3
C_7	150 MMF-500 VOLT MICA CONDENSER		CM 151-1
C_8	40 MFD-150 VOLT	ELECTROLYTIC CONDENSER	CE-13
C_9	20 MFD-150 VOLT		
C_{10}	20 MFD-15 VOLT		
CV-10	VARIABLE CONDENSER		CV-10
LA-3	ANTENNA COIL		LA-3
LC-1	OSCILLATOR COIL		LC-1
LF-20	I. F. TRANSFORMER		LF-20
R_1	2.2 MEG. 1/2 WATT RESISTOR		RC 225-1
R_2	10 MEG. 1/2 WATT RESISTOR		RC 106-1
R_3	330,000 OHMS 1/2 WATT RESISTOR		RC 334-1
R_4	150 OHMS 1/2 WATT RESISTOR		RC 151-1
R_5	22,000 OHMS 1/2 WATT RESISTOR		RC 223-
R_6	.82 OHMS 1/2 WATT RESISTOR 10%		RC 820-2
R_7	470,000 OHMS 1/2 WATT RESISTOR		RC 474-1
R_8	2200 OHMS 1 WATT RESISTOR		RC 222-
R_9	33 OHMS 2 WATT WIRE RESISTOR 10%		RW 330-
R_{10}	100,000 OHMS 1/2 WATT RESISTOR		RC 104-1
R_{11}	1 MEG. VOLUME CONTROL & S.P.S.T. SW.		VC-5
SP-40	SPEAKER		SP-40
TR-6	OUTPUT TRANSFORMER		TR-6

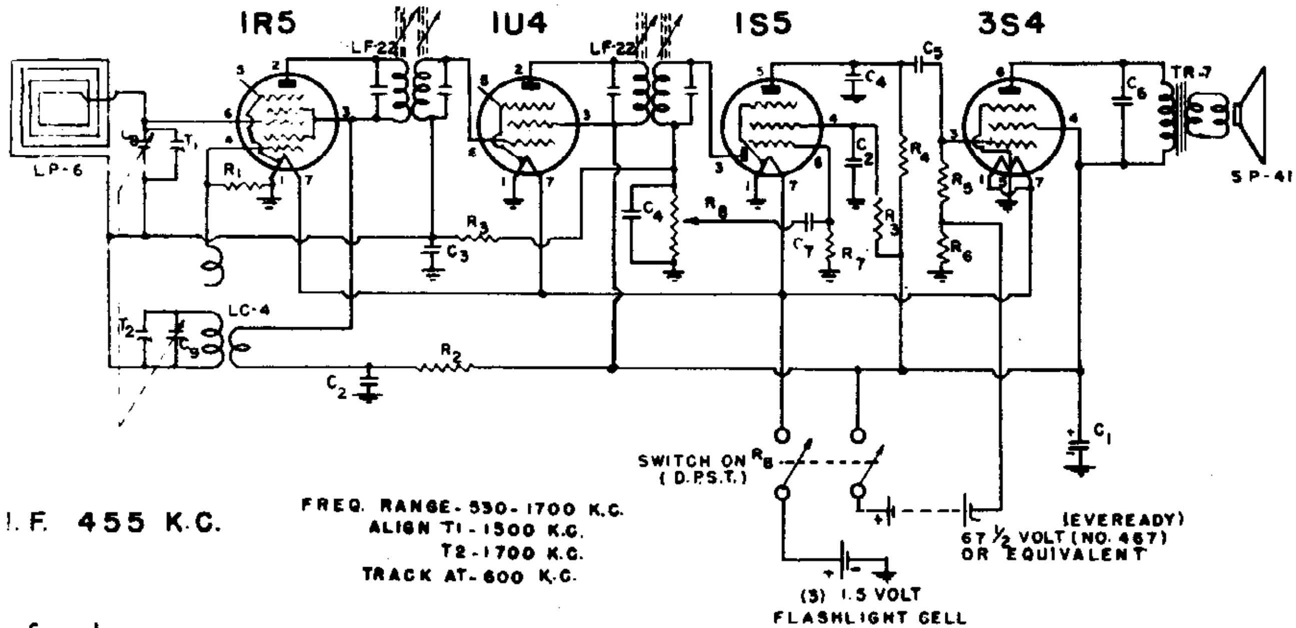
MODEL 152 CHASSIS SERIES 'W'



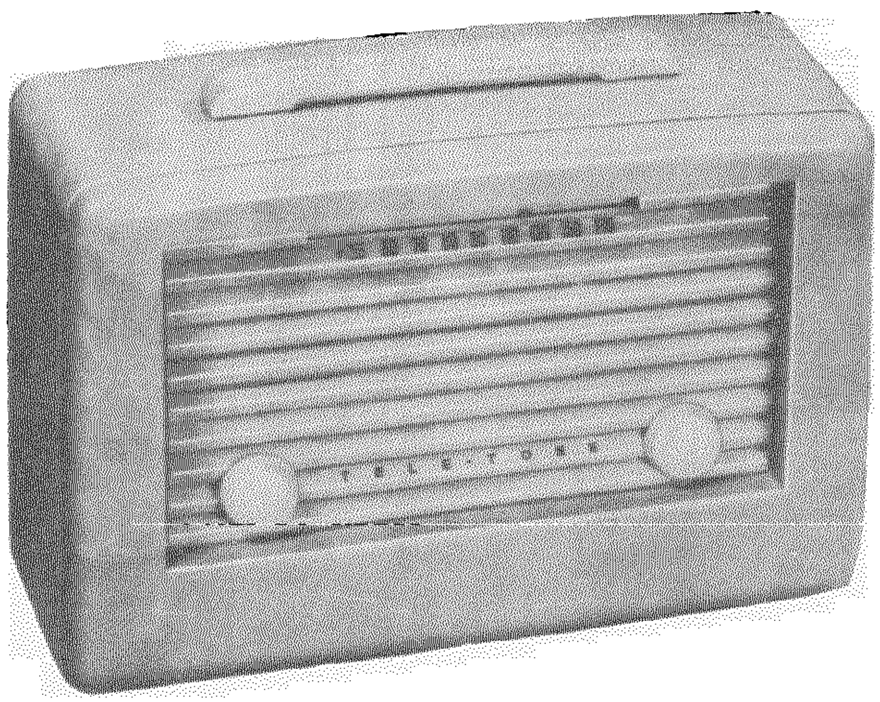
ITEM	DESCRIPTION	PART NUMBER
C_1	125 MFD. 10 VOLT } ELECTROLYTIC	CE-12
C_2, C_3	25 MFD 150 VOLT } CONDENSER	
C_4	.05 MFD 400 VOLT PAPER COND.	CP 503-5
C_5	.01 MFD. 150 VOLT PAPER COND.	CP 103-2
C_6	.1 MFD. 200 VOLT PAPER COND.	CP 104-2
C_7	.05 MFD. 150 VOLT PAPER COND.	CP 503-2
C_8	.002 MFD. 200 VOLT PAPER COND.	CP 202-3
C_9	.005 MFD. 400 VOLT PAPER COND.	CP 502-2
C_{10}	.001 MFD. 200 VOLT PAPER COND.	CP 102-3
C_{11}	.0001 MFD. 300 VOLT MICA COND.	CM 101-1
C_{12}, C_{13}	VARIABLE CONDENSER	CV 10
LC-4	OSCILLATOR COIL	LC-4
LF-22	I.F. TRANSFORMER	LF-22
LP-6	ANTENNA LOOP	LP-6
R_1	18 OHM 1/2 WATT RESISTOR	RC 180-1
R_2	6800 OHM 1 WATT 10% RESISTOR	RC 682-5
R_3	2650 OHM 10 WATT 5% RESISTOR	RP-3
R_4	470 OHM 1/2 WATT RESISTOR	RC 471-1
R_5	820 OHM 1/2 WATT 10% RESISTOR	RC 821-2
R_6	270,000 OHM 1/2 WATT 10% RESISTOR	RC 274-2
R_7	2.2 MEG. 1/2 WATT RESISTOR	RC 225-1
R_8	1 MEG 1/2 WATT RESISTOR	RC 105-1
R_9	3.3 MEG. 1/2 WATT RESISTOR	RC 335-1
R_{10}	10 MEG 1/2 WATT RESISTOR	RC 106-1
R_{11}	1 MEG. POTENTIOMETER WITH SWITCH	VC-6
R_{12}	1 MEG. 1/2 WATT 10% RESISTOR	RC 105-2
R_{13}	15,000 OHM 1/2 WATT RESISTOR	RC 153-1
R_{14}	100,000 OHM 1/2 WATT RESISTOR 10%	RC 104-2
S_1, S_2, S_3	3 POLE SINGLE THROW SWITCH	SW-10
SP-41	SPEAKER	SP-41
TR-7	OUTPUT TRANSFORMER	TR-7
T_1, T_2	TRIMMERS ON VARIABLE	
C_{14}	.01 MFD. 100 VOLT PAPER COND.	CP 103-4

MODEL 156, chassis U

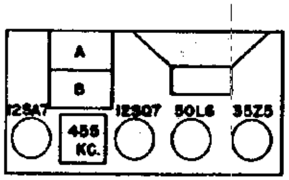
TELE-TONE RADIO CORP.



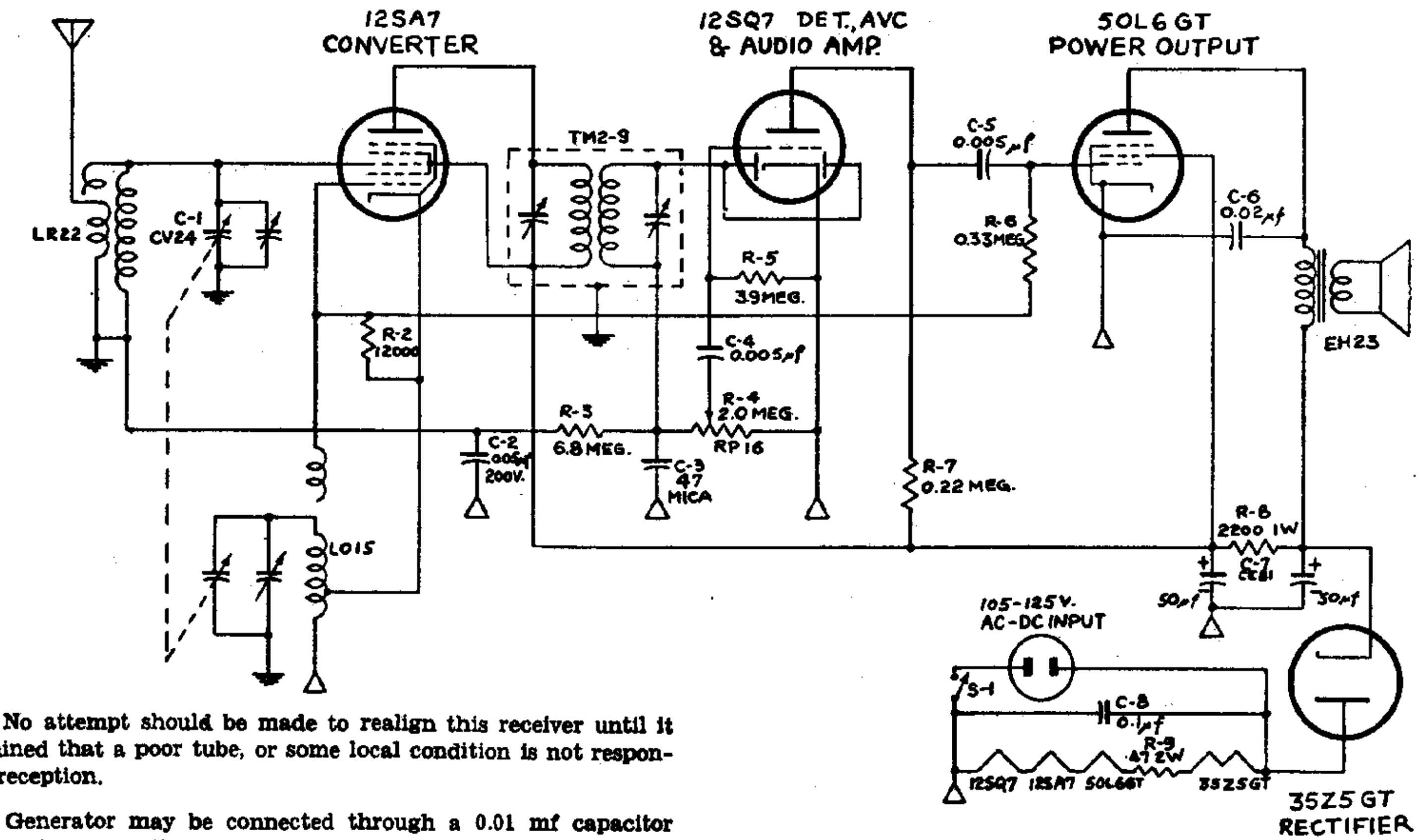
C1	16 MFD. 100 VOLT ELECTROLYTIC	CE-14	R2	15,000 OHM ½ WATT RESISTOR	RC-153-1
C2	.01 MFD. 200 VOLT PAPER COND.	CP-103-3	R3	3.3 MEG. ½ WATT RESISTOR	RC-335-1
C3	.05 MFD. 200 VOLT PAPER COND.	CP-503-4	R4	1 MEG. ½ WATT RESISTOR	RC-105-1
C4	.0001 MFD. 500 VOLT MICA COND.	CM-101-2	R5	2.2 MEG. ½ WATT RESISTOR	RC-225-1
C5	.002 MFD. 200 VOLT PAPER COND.	CP-202-2	R6	820 OHM ½ WATT RESISTOR 10%	RC-821-2
C6	.005 MFD. 400 VOLT PAPER COND.	CP-502-1	R7	10 MEG. ½ WATT RESISTOR	RC-106-1
C7	.001 MFD. 200 VOLT PAPER COND.	CP-102-3	SP-41	SPEAKER	SP-41
LC-4	OSCILLATOR COIL	LC-4	R8	1 MEG. POTENTIOMETER WITH SWITCH	VC-4
LF-22	I.F. TRANSFORMER	LF-22	TR-7	OUTPUT TRANSFORMER	TR-7
LP-6	ANTENNA LOOP	LP-6	C8, C9	VARIABLE CONDENSER	CV-10
R1	100,000 OHM ½ WATT RESISTOR	RC-104-1	T1, T2	TRIMMERS ON VARIABLE	



TEMPLETONE RADIO MFG. CORP.



LOCATION OF TUBES



NOTES:

1. RESISTORS ARE IN OHMS AND ARE ½ WATT; CAPACITORS ARE 400V AND IN μμf UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON REAR OF VOLUME CONTROL.
3. SYMBOL △ DENOTES B- AND SYMBOL ⏚ DENOTES CHASSIS.
4. I.F. FREQUENCY IS 455Kc.
5. TUNING RANGE IS 532Kc. TO 1700Kc.

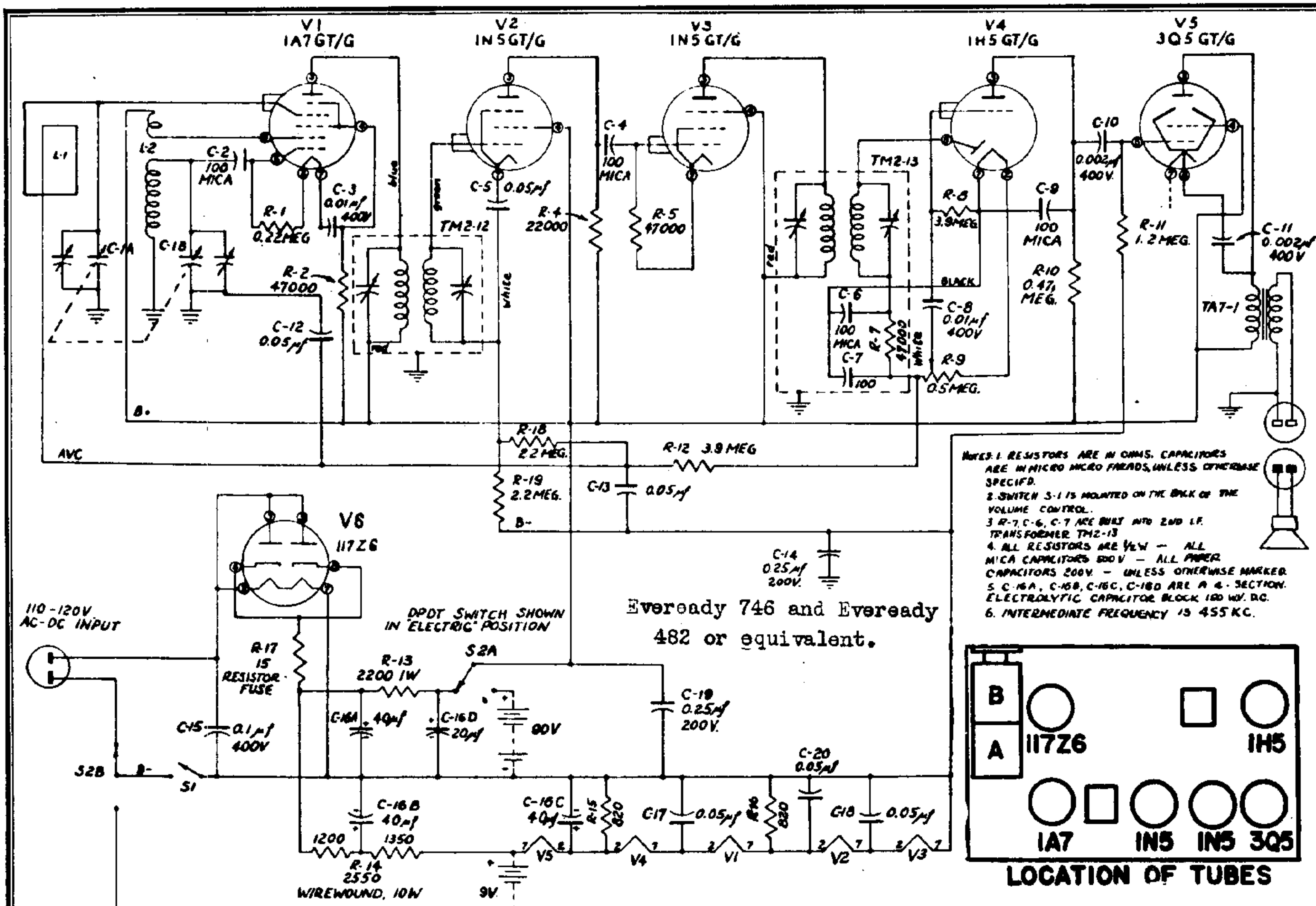
Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug of RF section of tuning capacitor. Connect ground clip of generator to a convenient B-minus point such as one of the switch terminals on the back of the volume control. An output meter may be clipped directly across the voice coil lugs. Align the IF trimmers to 455 kc using least possible input from signal generator to avoid developing A. V. C. voltage which would make the tuning adjustments very broad.

To align RF trimmer, remove the 0.01 mf capacitor and connect the signal generator hot lead to a 68 mmf mica condenser. Connect the dummy antenna thus formed to the antenna lug on the antenna coil (lug to which the antenna hank is soldered). Again, use the least possible input from the signal generator. With the tuning capacitor plates completely out of mesh, and pointed at extreme clockwise position, adjust the oscillator trimmer on front section of tuning capacitor to 1700 kc. Readjust both signal generator and tuning capacitor to 1550 kc and adjust the RF trimmer on rear section for

MODEL G612

TEMPLETONE RADIO MFG. CORP.

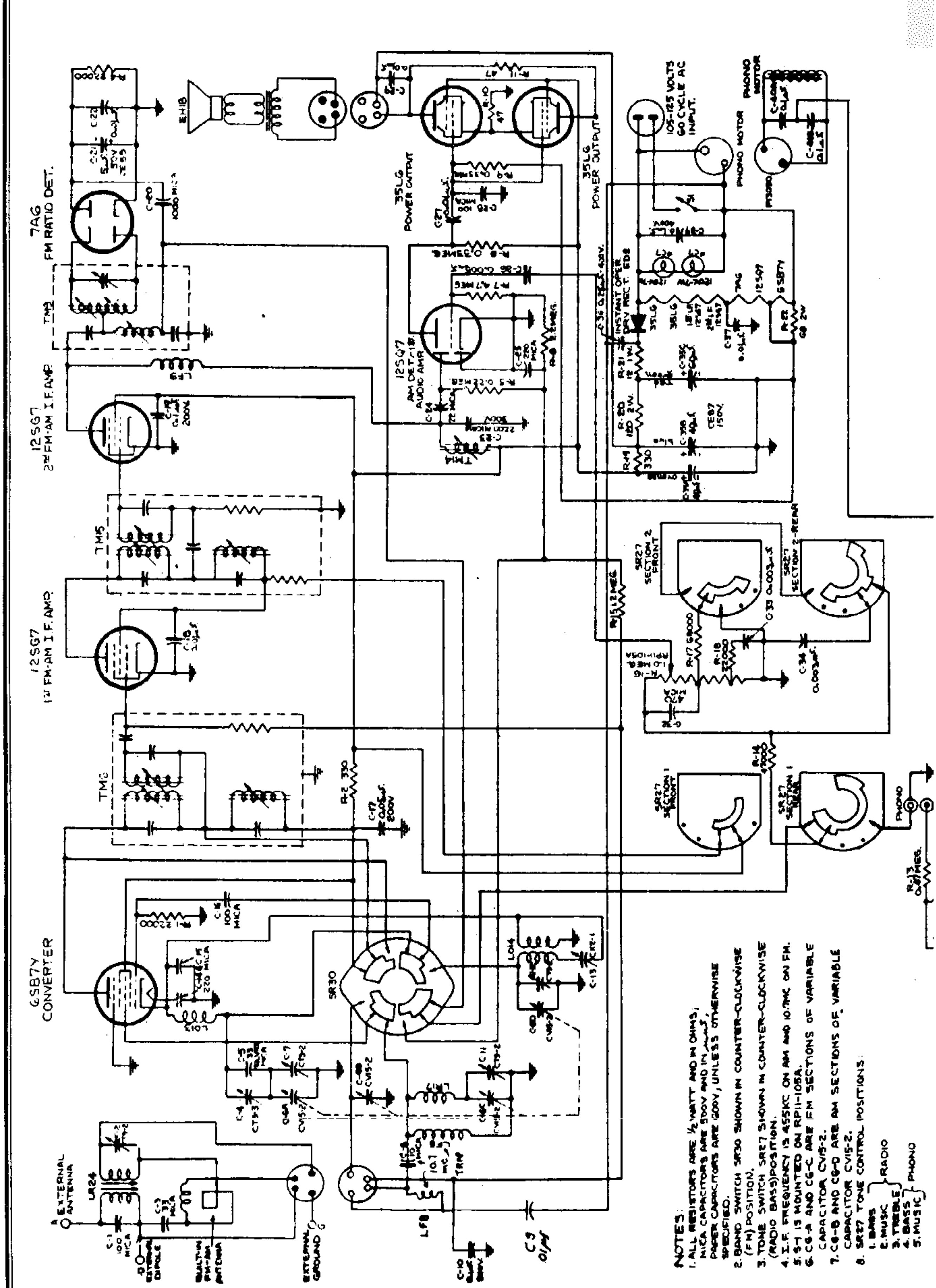


1. Using .01 mfd. capacitor, align i-f trimmers to 455 kc with smallest input.
2. With capacitor plates out of mesh, use 8 inch loop from signal generator to receiver loop and adjust oscillator trimmer B to 1700 kc.
3. Adjust r-f trimmer A to 1550 kc for maximum response.

Range is 532 to 1700 kc.

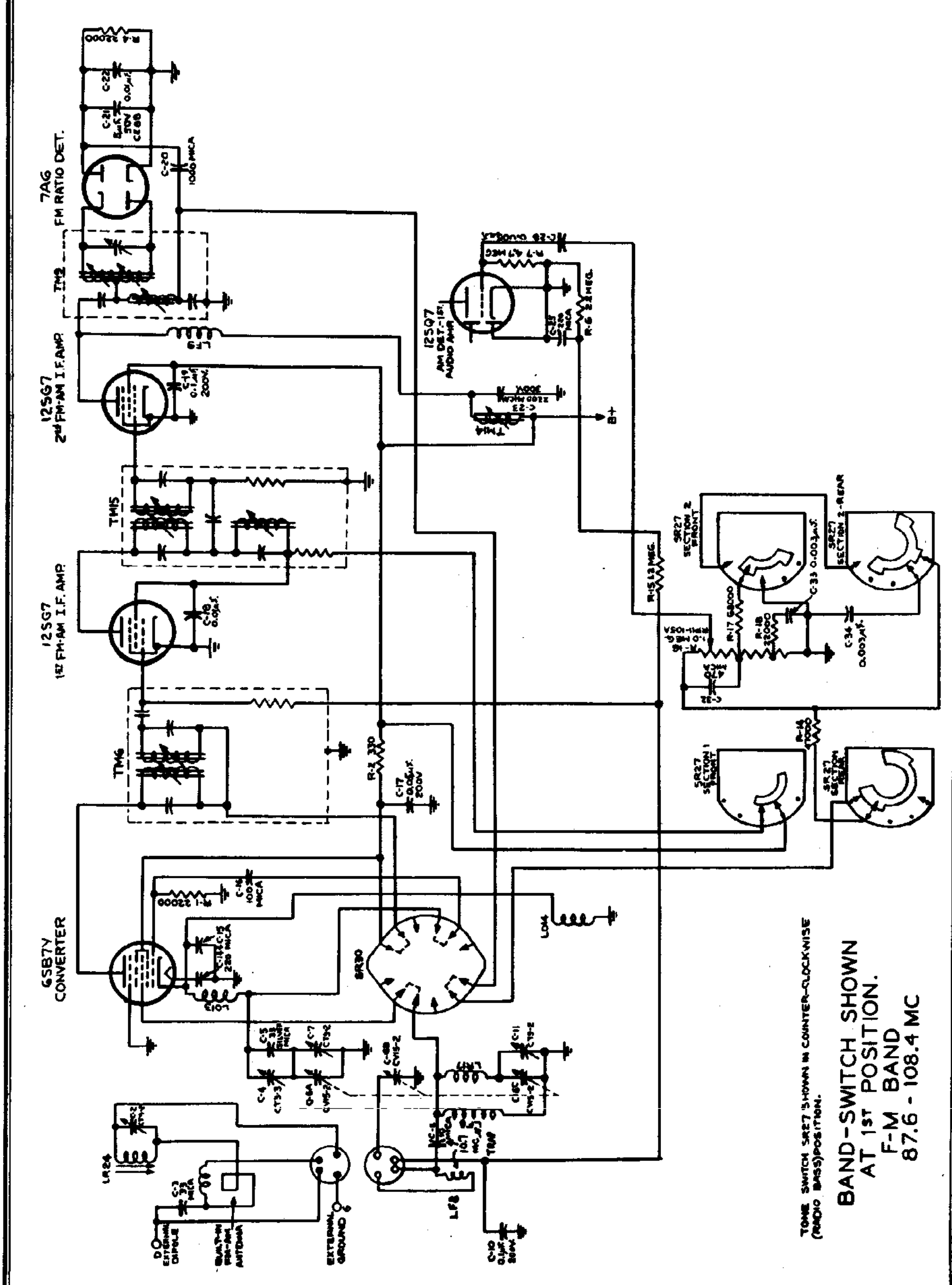
TEMPLETONE RADIO MFG. CORP.

MODEL G7

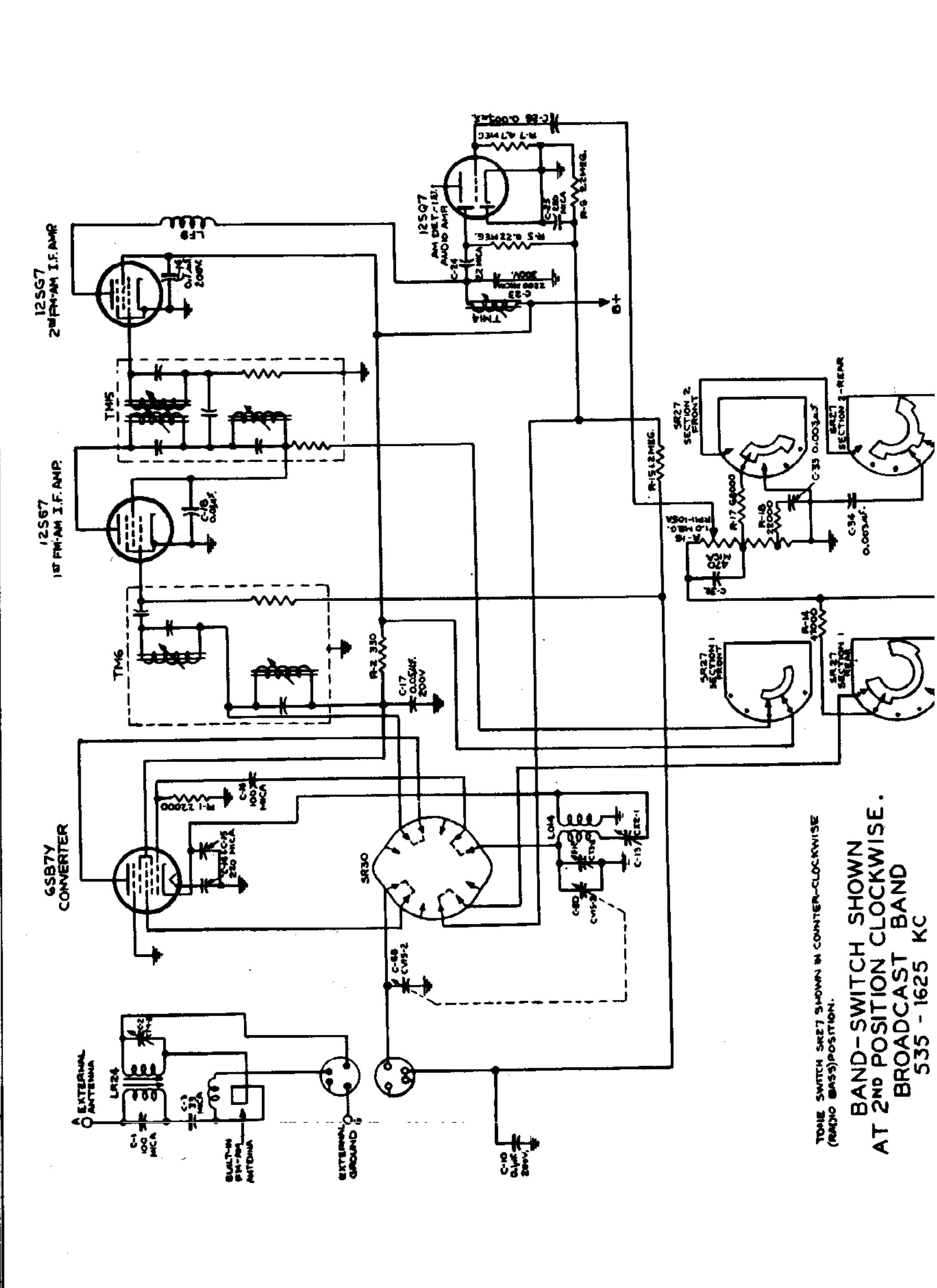


MODEL G725

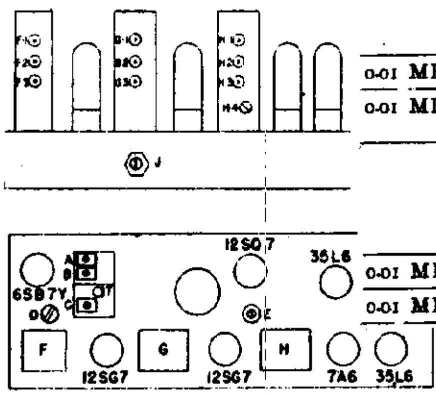
TEMPLETONE RADIO MFG. CORP.



TEMPLETONE RADIO MFG. CORP.



TEMPLETONE RADIO MFG. CORP.



ALIGNMENT PROCEDURE:

Dummy Antenna	Signal Generator Connection	Signal Generator Frequency	Band Switch Position	Radio Dial Setting	Adjust	Remarks
0.01 MFD	Terminal T	455 KC AM	Broadcast	1625 KC	E G-1 F-1	Adjust for maximum output Repeat for fine adjustment
0.01 MFD	Pin 4 of 12SG7 2nd FM-AM IF with FM Signal Gen.	10.7 MC FM	FM	108 MC	H-2	Adjust for maximum output (Broad adjustment)
0.01 MFD	"	10.7 MC FM	FM	108 MC	H-4	Adjust for maximum output
0.01 MFD	"	10.7 MC AM	FM	108 MC	H-1 or H-3	Adjust whichever is required for minimum output
						Repeat last two steps for fine adjustment until settings for maximum FM output coincide with settings for minimum AM output.
0.01 MFD	Pin 8 of 6SB7Y Converter	10.7 MC FM	FM	108 MC	G-3 — G-2	Adjust for maximum output
0.01 MFD		"	FM	108 MC	F-3 — F-2	Adjust for maximum output
						Repeat last two steps for fine adjustment
			Broadcast	535 KC	Pointer	Adjust pointer to reference mark
100 MMFD	"A" Post on Cabinet	600 KC AM	"	600 KC	J and Core on Ant. Coil in Cab.	Adjust for maximum output
"	"	1550 KC AM	"	1550 KC	B and trimmer on Ant. Coil	Adjust for maximum output
300 OHM Resistor	"	92 MC FM	FM	92 MC	D	Adjust for maximum output
"	"	106 MC FM	FM	106 MC	A and C	Adjust for maximum output

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube or some local condition is not responsible for faulty reception. The following is a list of the minimum equipment necessary to realign this receiver.

In the following alignment procedure the high side of the signal generator is connected to the terminal indicated in the "Signal Generator Coupling" column below. The ground side of the signal generator is connected directly to the chassis. The output meter should be connected across the voice coil of the speaker for all measurements.

1—AM signal generator covering 455 KC, 600 KC, 1550 KC and 10.7 MC

2—FM signal generator covering 10.7 MC, 92 MC and 106 MC

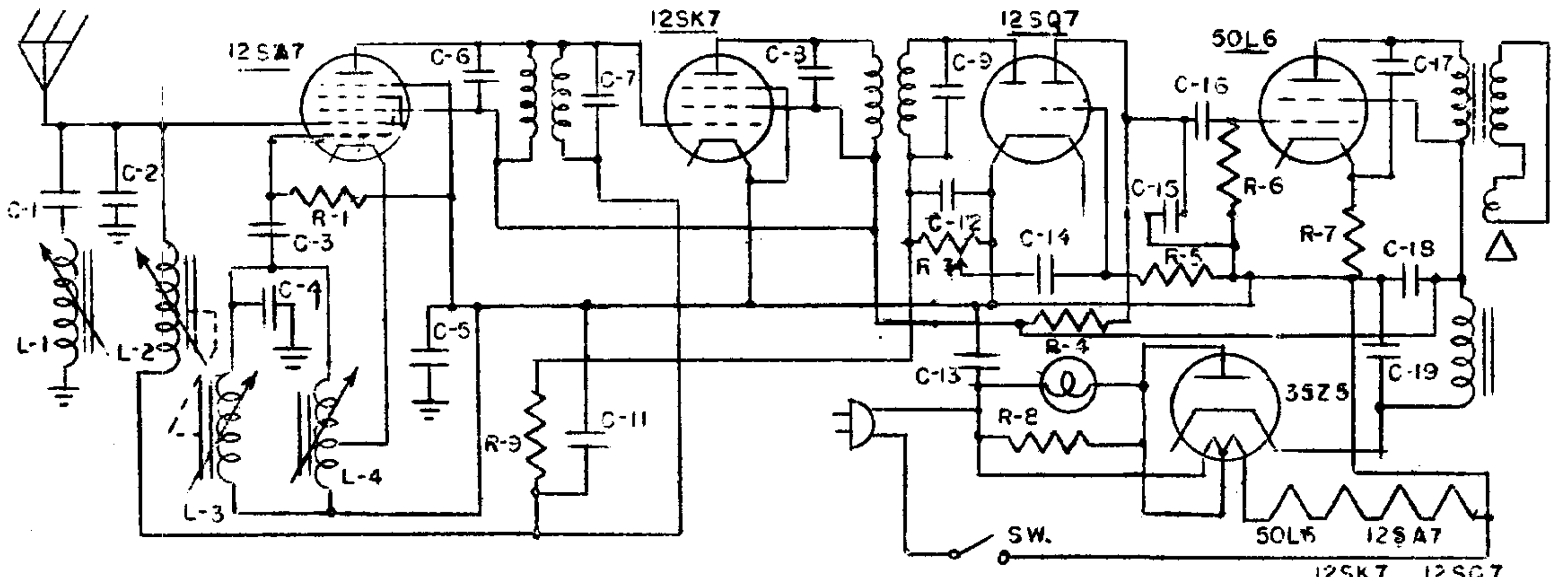
3—Output meter, rectifier type, approximately 0 to 2 volts RMS

4—Dummy antennas
100MMFD Mica Capacitor
300 Ohm Resistor
0.01 MFD Capacitor

In adjusting the radio frequency trimmers and padders it is advisable to "rock" the variable capacitor gang slightly across the signal being delivered by the signal generator until that particular signal has been accurately peaked.

TRADIO

SCHEMATIC DIAGRAM FOR TRADIO
MODEL L5



C-1	25 MMF CERAMIC	C-8	TRIMMER	C-16	0.01 MF PAPER	R-3	500 10% ½W	L-4	OSC COIL
C-2	TRIMMER	C-9	TRIMMER	C-17	0.02 MF PAPER	R-7	180 OHM 10% ½W		
C-3	250 MMF MICA	C-11	0.1 PAPER	C-18	20 MF ELECTROLYTIC	R-8	220 OHM 20% ½W		
C-4	TRIMMER	C-12	250 MMF MICA	C-19	20 MF ELECTROLYTIC	R-9	3.3 MEG 20% ½W		
C-5	0.1 PAPER	C-13	0.1 PAPER	R-1	20 K 10% ½W				
C-6	TRIMMER	C-14	.005 MF PAPER	R-6	500 K 10% ½W	L-1	WAVE TRAP		
C-7	TRIMMER	C-15	500 MMF MICA	R-4	500 10% ½W	L-2	PERMEABILITY TUNER		
				R-5	4.7 MEG 20% ½W	L-3	PERMEABILITY TUNER		

TRADIO

1. I. F. Alignment

    A. Set signal generator at 455 k.c.

    B. Connect output meter across voice coil.

    C. Put a .1 MFD condenser in series with the output side of signal generator.

    D. Connect other end of this condenser to grid of 12SA7 (Pin #8).

    E. Connect ground of signal generator to A.C. switch on volume control.

    F. Turn both volume controls to maximum volume.

    G. Adjust screw on bottom and screw on top of I.F. transformers for maximum output on meter.

2. Wave Trap Alignment

    A. Connect a 200 MMFD condenser in series with the signal generator.

    B. Connect other end of condenser to antenna.

    C. With signal generator set at 455 k.c., tune wave trap for MINIMUM output.

3. R. F. Alignment

    A. Set signal generator at 1600 k.c.

    B. Put 200 MMFD condenser in series with output side of signal generator. Connect other side of 200 MMFD condenser to antenna of receiver. Set dial to 1600 k.c.

    C. Tune ocillator trimmer on tuning unit. (This trimmer is on outside edge of tuning unit furthest away from speaker). Adjust this trimmer for maximum output.

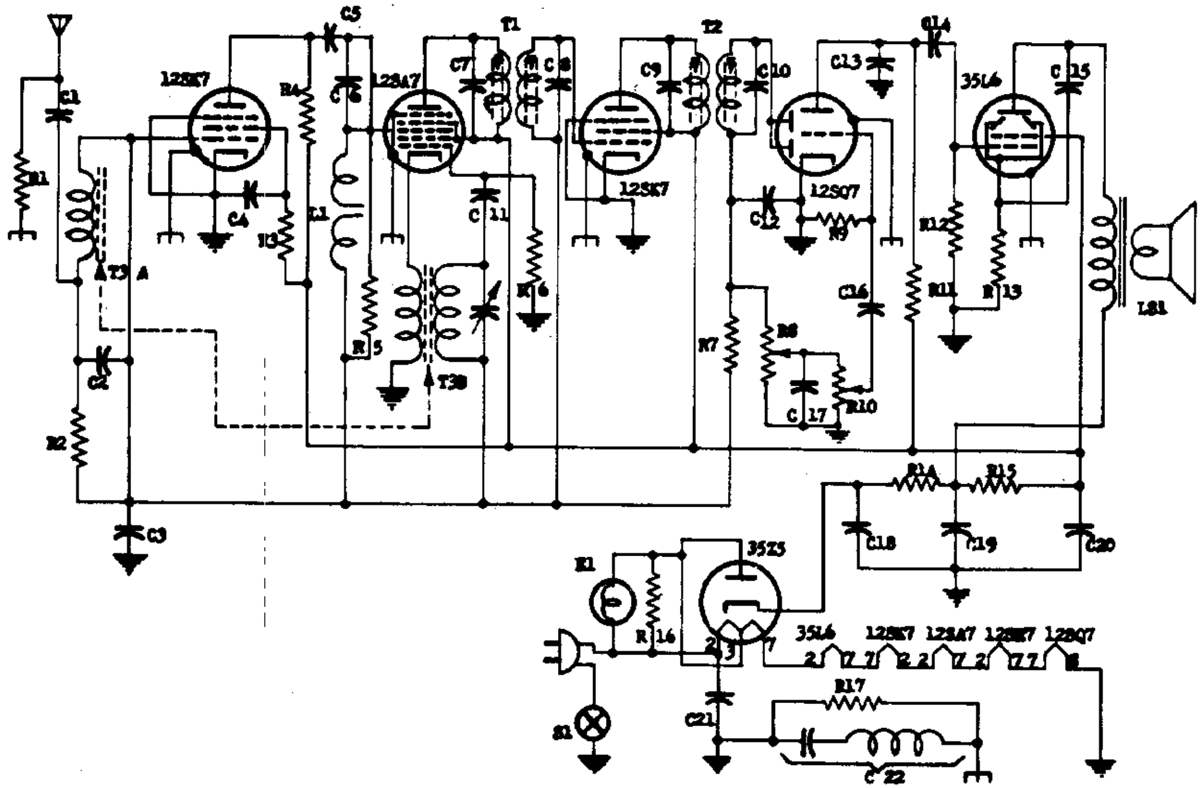
    D. Adjust trimmer nearest speaker for maximum output.

4. Tracking

    A. Set tuning dial of receiver at 600 k.c.

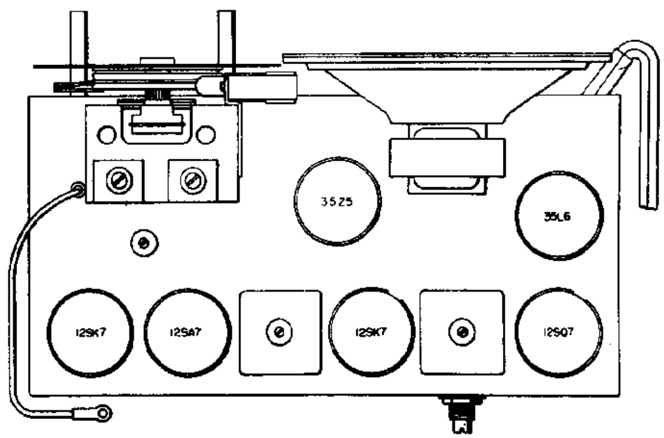
    B. Set signal generator at 600 k.c. and adjust slug in center of tuning unit for maximum output.

TRADIO



Part		Description	Value	Wattage
C1		Condenser	150 mmfd.	
C2,C6		Condenser	25 mmfd.	
C3		Condenser	.05 mfd. 400V.	
C4,C15		Condenser	.02 mfd. 400V.	
C5,C7,C8,C9,C10		Condenser	100 mmfd.	
C11		Condenser	45 to 50 mmfd. Mica	
C12,C17		Condenser	250 to 300 mmfd.	
C13		Condenser	500 mmfd.	
C14		Condenser	.01 mfd. 400V.	
C16		Condenser	.005 mfd. 600V. D.C.	
C18,C19,C20		Condenser	20-20-20 150V. D.C.	
C21		Condenser	.1 mfd. 400V. D.C.	
C22		Condenser	(Modified for line ground)	
R1		Resistor	470K to .5 meg.	1/2 W
R2,R5,R17		Resistor	220K	1/2 W
R3		Resistor	33K	1/2 W
R4		Resistor	4700 ohms.	1/2 W
R6		Resistor	20K	1/2 W
R7		Resistor	.3 to 3.3 meg.	1/2 W
R8		Resistor	500K Pot.	
R9		Resistor	4.7 to 5.1 meg.	1/2 W
R10		Resistor	500K (With switch)	
R11,R12		Resistor	470K to .5 meg.	1/2 W
R13		Resistor	180 ohms.	1/2 W
R14		Resistor	180 to 220 ohms.	1/2 W
R15		Resistor	1000 to 1500 ohms.	1/2 W
R16		Resistor	220 ohms.	1/2 W

Part	Description	Part No.
T1	I. F. Transformer	Lavoie #1268-86
T2	I. F. Transformer	Lavoie #1268-86
T3	Tuner	
L1	Wave trap	Lavoie #1268-98
LS1	5" P. M. Speaker	Lavoie #1268-88 1268-89
S1	Switch	Part of R10
E1	Pilot Lamp	



TUBE LAYOUT

TRADIO

1. I. F. Alignment

   A. Set signal generator at 455 k.c.

   B. Connect output meter across voice coil.

   C. Put a .1 MFD condenser in series with the signal generator.

   D. Connect other end of this condenser to grid of the 12SA7 (Pin #8).

   E. Connect ground of signal generator to A.C. switch on the volume control.

   F. Turn both volume controls to maximum volume.

   G. Adjust screw on bottom and screw on top of I.F. transformers for maximum output on meter.

2. Wave Trap Alignment

   A. On certain LU-6 sets the wave trap is situated directly behind the tuning unit. These traps are tunable. Wave trap alignment on these sets is the same as given for Model L-5. Note: On certain LU-6 chassis, the wave trap is not situated directly behind the tuning unit. These sets are fix-tuned and do not have to be adjusted.

3. R. F. Alignment

   A. Chassis' bottom plate must be on.

   B. Set signal generator at 1630 k.c.

   C. Put 200 MMFD condenser in series with signal generator.

   D. Connect other end of this condenser to antenna of receiver.

   E. Set tuning dial at 1630 k.c.

   F. Tune ocillator trimmer on top of tuning unit nearest speaker (#9-345) for maximum output.

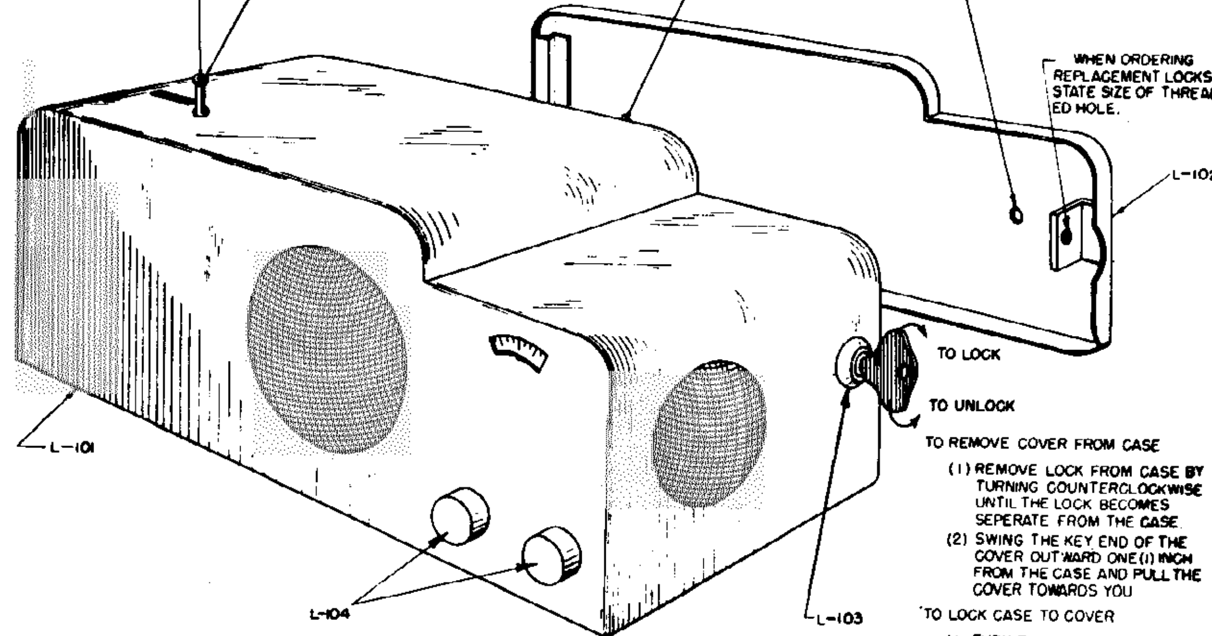
   G. Adjust trimmer furthest away from speaker for maximum output.

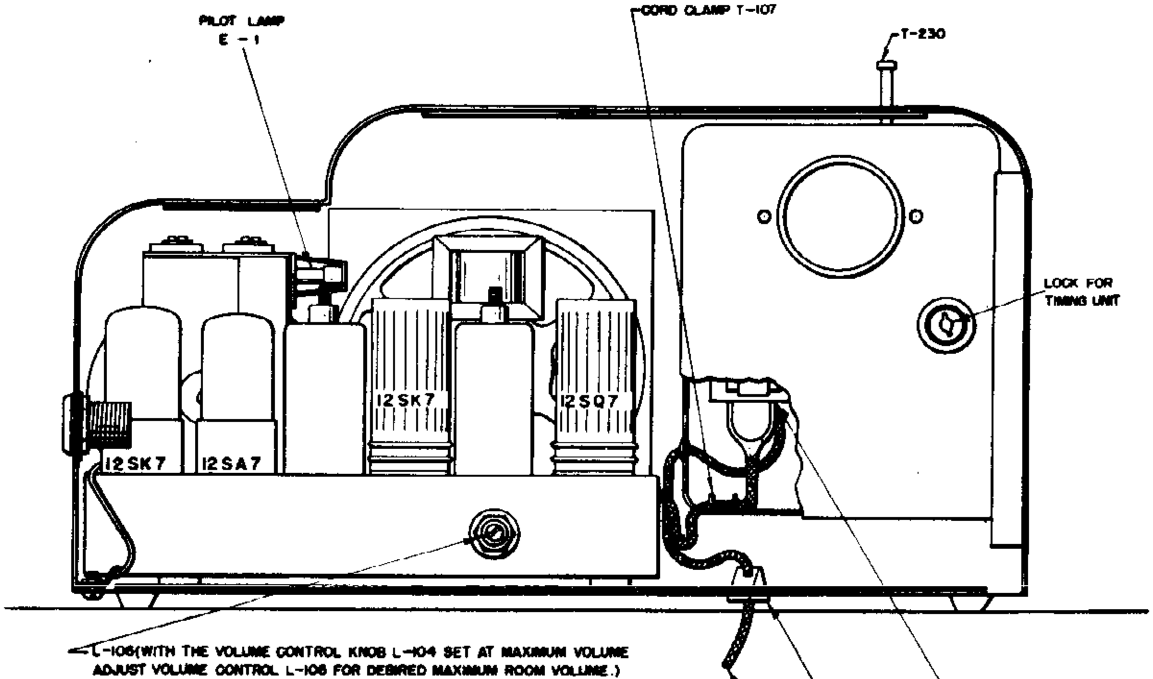
4. Tracking

   A. Set tuning dial of receiver at 600 k.c.

   B. Set signal generator at 600 k.c. and adjust slug in center of tuning unit for maximum output.

TRADIO

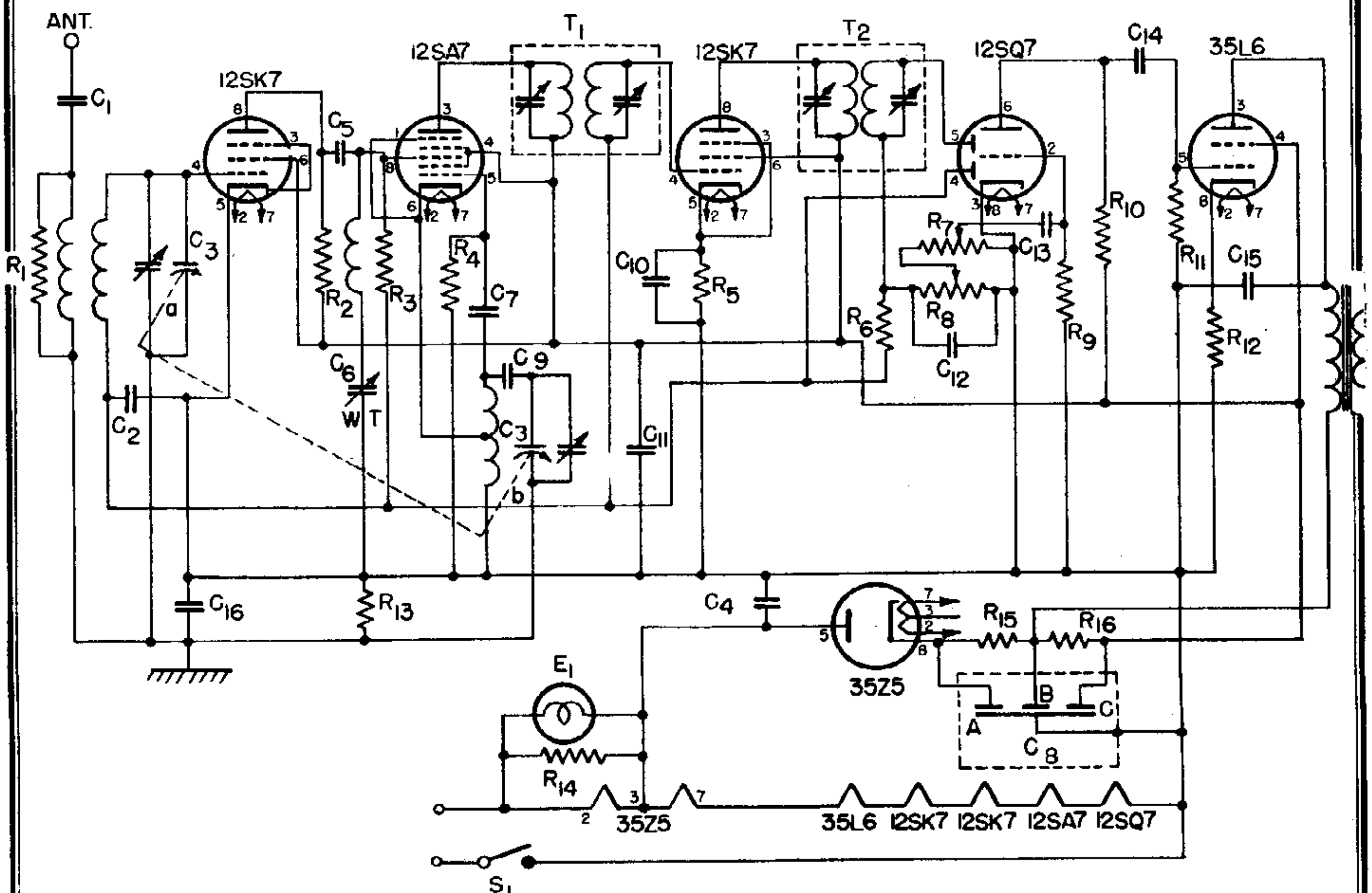




REAR VIEW

MODEL T-U6-1

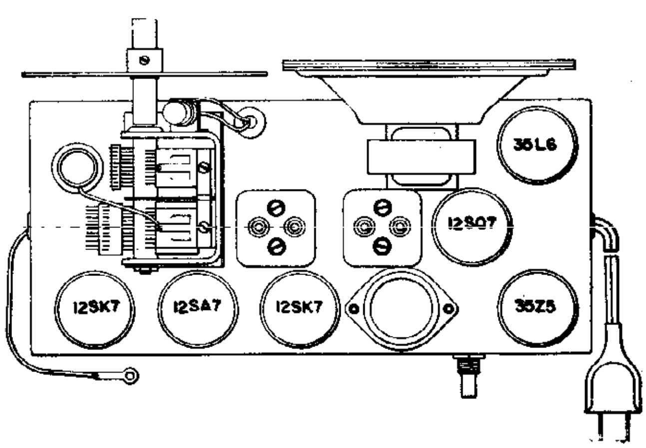
TRADIO



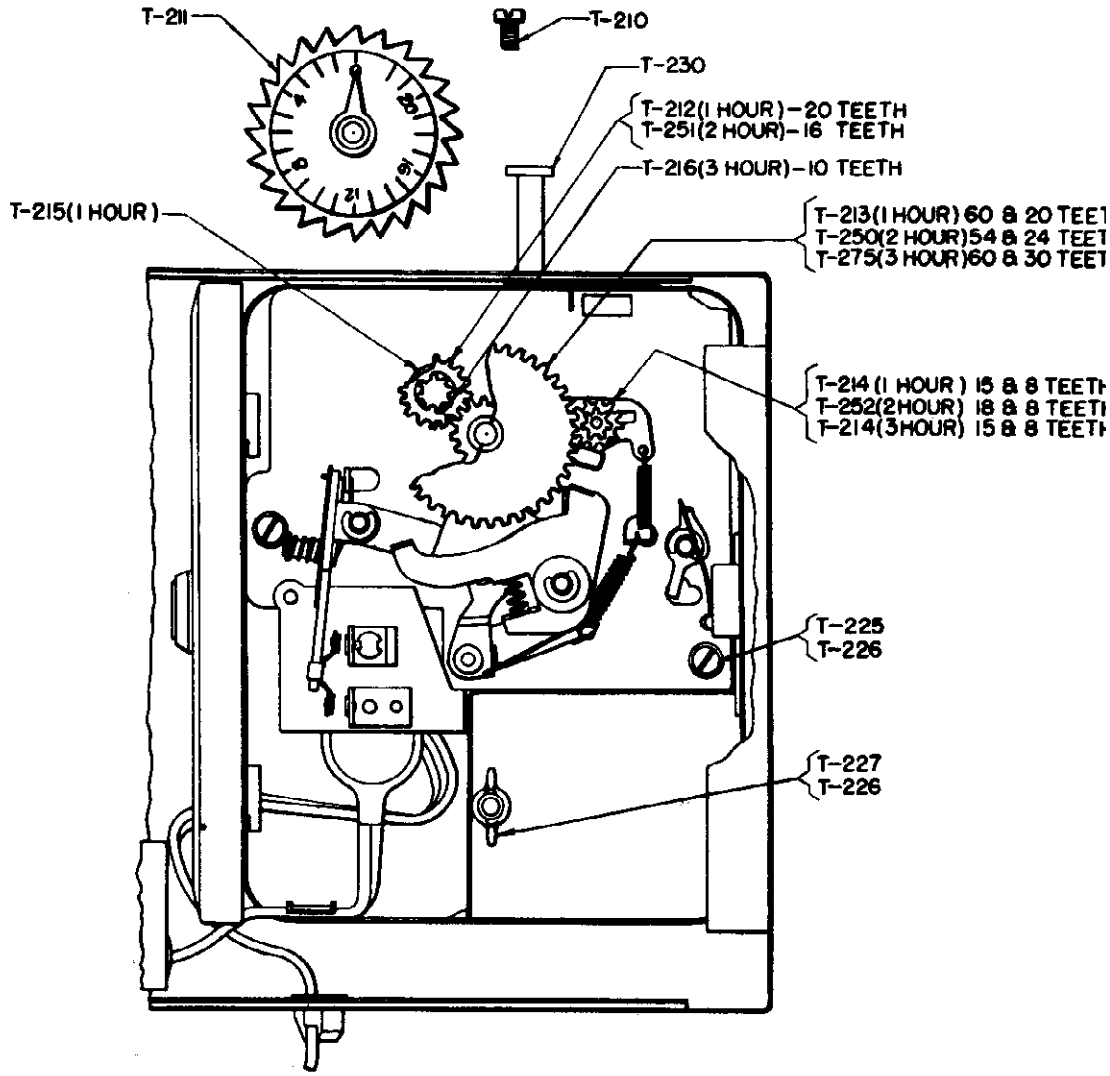
R-1	RESISTOR	15,000	OHMS
R-2		6,800	
R-3		100,000	
R-4		22,000	
R-5		100	
R-6		1 MEG	
R-7		VAR.-.5 MEG.	
R-8		VAR.-.5 MEG.	
R-9		3.9 MEG.	
R-10		220,000	
R-11		470,000	
R-12		130	
R-13		220,000	
R-14		30	
R-15		200	
R-16	RESISTOR	910	OHMS

C-1	CONDENSER	250	MMF.
C-2		.05	MF.
C-3		VAR. AIR, 360	MMF.
C-4		.05	MF.
C-5		100	MMF.
C-6		VAR.	
C-7		100	MMF.
C-8		A 30	MF
		B 40	MF
		C 20	MF
C-9		.01	MF
C-10		.05	MF
C-11		.05	MF
C-12		250	MMF
C-13		.005	MF
C-14		.01	MF
C-15		.03	MF
C-16	CONDENSER	1	MF

E-1	LAMP — 47	
LS-1	SPEAKER	P. M.
T-1	I.F. TRANSFORMER (INPUT) 455 K.C.	
T-2	I.F. TRANSFORMER (OUTPUT) 455 K.C.	
S-1	SWITCH (ON VOL. CONT.)	

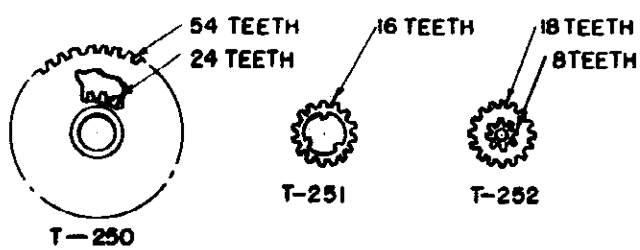


TRADIO



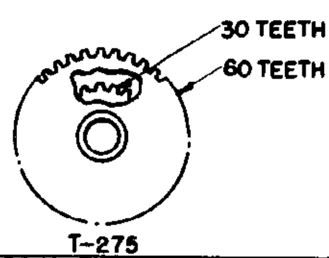
TIMER ASSEMBLY
(T-210 & T-211 REMOVED TO SHOW 1 HOUR GEAR SETUP)

FROM 1 TO 2 HOUR ASSEMBLY



REMOVE	REPLACE
T-210	T-251(COLLAR DOWN)
T-211	T-252(8 TOOTH GEAR UP)
T-213	T-250(LARGE GEAR UP)
T-212	T-211
T-214	T-210
T-215	

FROM 1 TO 3 HOUR ASSEMBLY



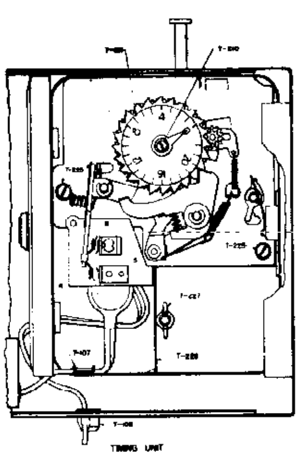
REMOVE	REPLACE
T-210	T-275 LARGE GEAR UP
T-211	T-211
T-213	T-210
T-212	
T-215	

TRADIO

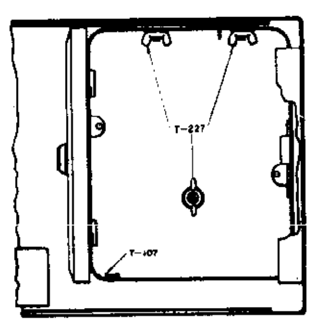
1. The meter contacts R&S may not close properly.
2. Coins may be jammed in the coin chute.
   (A) The easiest way to "free" jammed coins is to open the meter and pry them out of the chute with the blade of a screwdriver or the point of an ice pick. Use caution in prying the coins free so that the chute is not deformed in the prying operation.
3. The dial group parts T-211 may not be functioning properly
   (A) If the various parts of the dial group are not operating smoothly, the meter switch may open, even though the account may be prepaid one or more periods. The remedy for this condition is to replace the dial group, which can be done easily in the field. The defective dial should be returned to the factory for repairs.
4. The Meter Switch Contacts May Be Badly Burned
   (A) If the switch contacts R&S cannot be dressed well enough to insure proper closing the parts should be replaced.
5. The Line Fuses May Be Blown.
6. The Line Switch May Be Open.
   (A) Someone unknown to the party registering the service call may have opened the line switch. Be sure to check to see that the switch is closed.
7. The Timing Gears May Be Jammed.
   (A) See Fig-4 on Timing Gears
8. The Meter May Be Collecting Too Much Money.
   (A) The Meter May Have Incorrect Timing Gears. (See Fig. 4)
   (B) The cycles of the line may be greater than those of the meter motor. For example, if a 25 cycle meter is connected to a 60 cycle line, the meter will run 2.4 times as fast as a 60 cycle meter. Therefore, the payments will be cancelled out too rapidly. The cycles of the meter are shown on the name plate.

HOW TO REMOVE THE TIMING UNIT FROM THE CASE

1. Remove coin partition T-228 from the timing unit case.
2. Remove the screws T-225 (2).
3. Remove Screw T-231 and collar T-230. (Fig. 1).
4. Remove the line clamp T-107 and unplug the cord from the timing unit.
5. Remove the timing unit from the case.
6. Remove the screws connecting the electrical outlet line to the timing unit.
7. The timing unit may be replaced in the case by reversing the above steps.



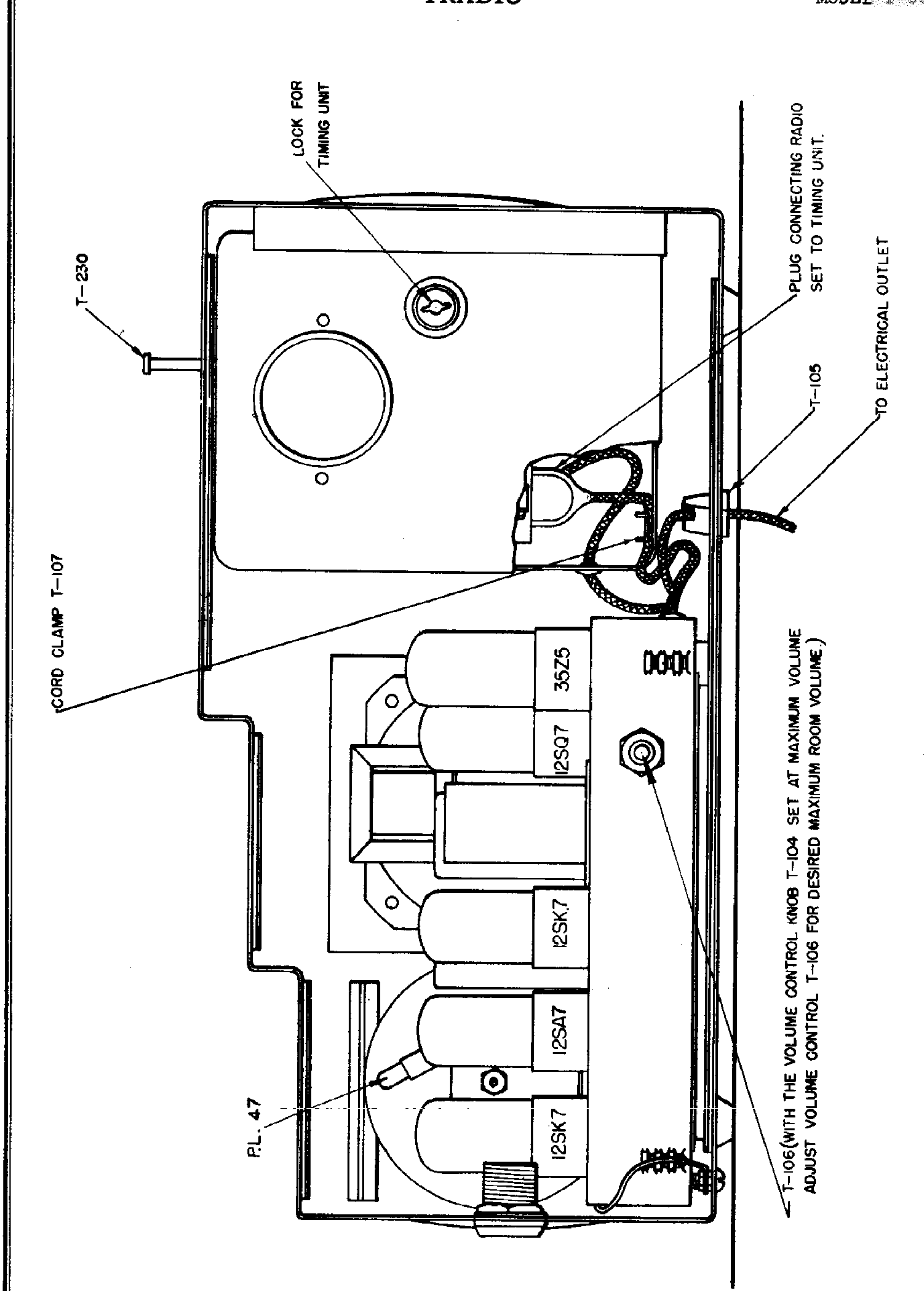
TIMING UNIT



FOR REMOVING THE TIMING UNIT CASE FROM THE CABINET REMOVE T-227(2). NOTE— THIS WING NUT MUST BE IN A VERTICAL POSITION AFTER TIGHTENING SO THAT COIN PARTITION T-228 MAY BE INSERTED.

TIMING CASE MOUNTING & CABINET

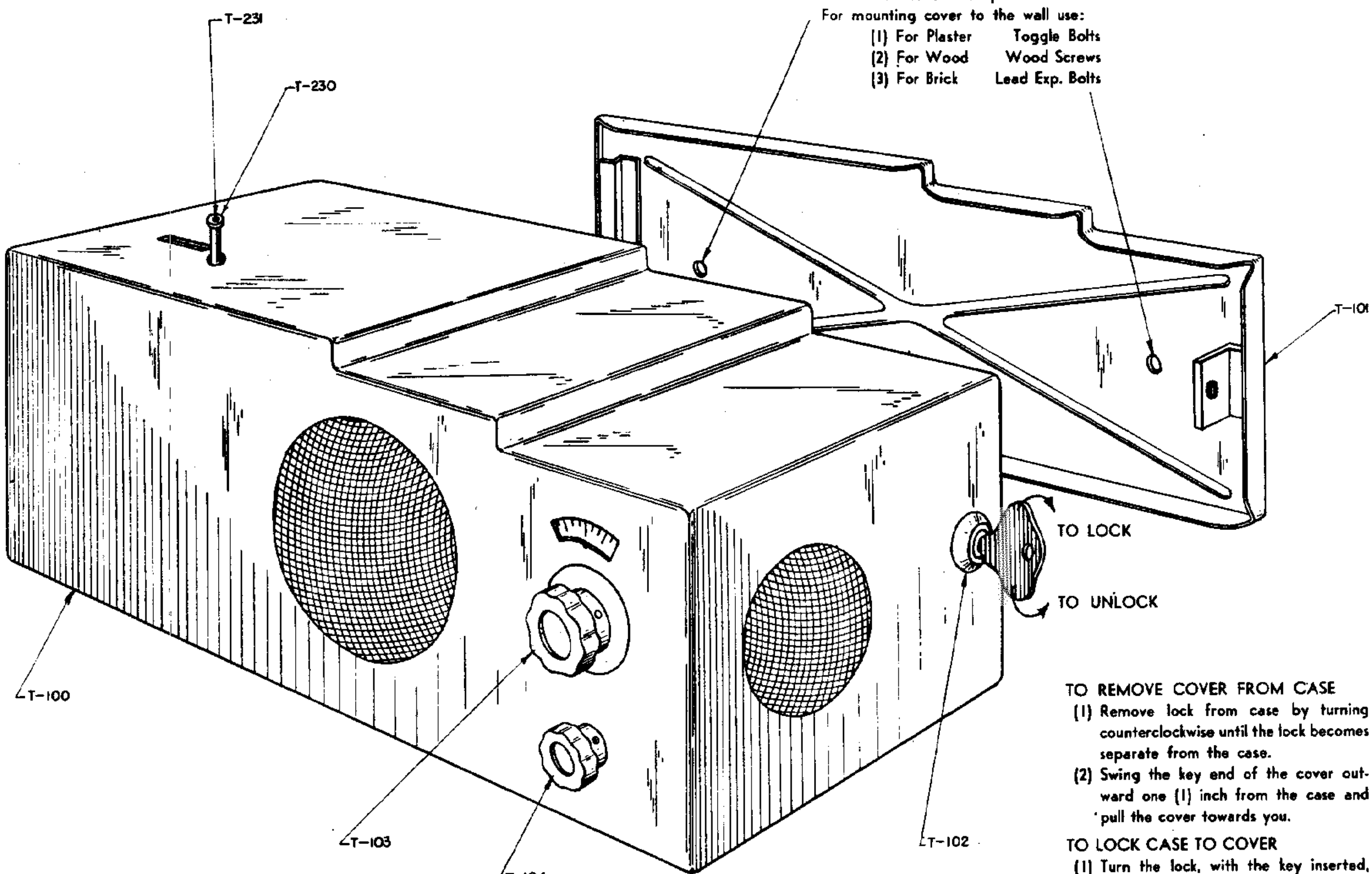
TRADIO


LOCK FOR TIMING UNIT
T-230
PLUG CONNECTING RADIO SET TO TIMING UNIT.
T-105
TO ELECTRICAL OUTLET
CORD CLAMP T-107
35Z5
12SQ7
12SK7
12SA7
12SK7
P.L. 47
T-106 (WITH THE VOLUME CONTROL KNOB T-104 SET AT MAXIMUM VOLUME ADJUST VOLUME CONTROL T-106 FOR DESIRED MAXIMUM ROOM VOLUME.)

TRADIO

Using the cover as a template spot these two (2) holes on the desired wall position.
For mounting cover to the wall use:

(1) For Plaster	Toggle Bolts
(2) For Wood	Wood Screws
(3) For Brick	Lead Exp. Bolts



TO REMOVE COVER FROM CASE

(1) Remove lock from case by turning counterclockwise until the lock becomes separate from the case.

(2) Swing the key end of the cover outward one (1) inch from the case and pull the cover towards you.

TO LOCK CASE TO COVER

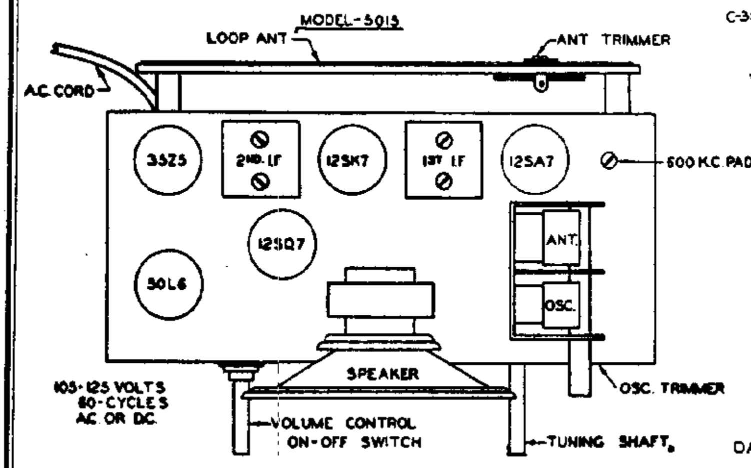
(1) Turn the lock, with the key inserted, into the lock bushing until the lock cylinder is flush with the bushing face and the key is in a vertical position.

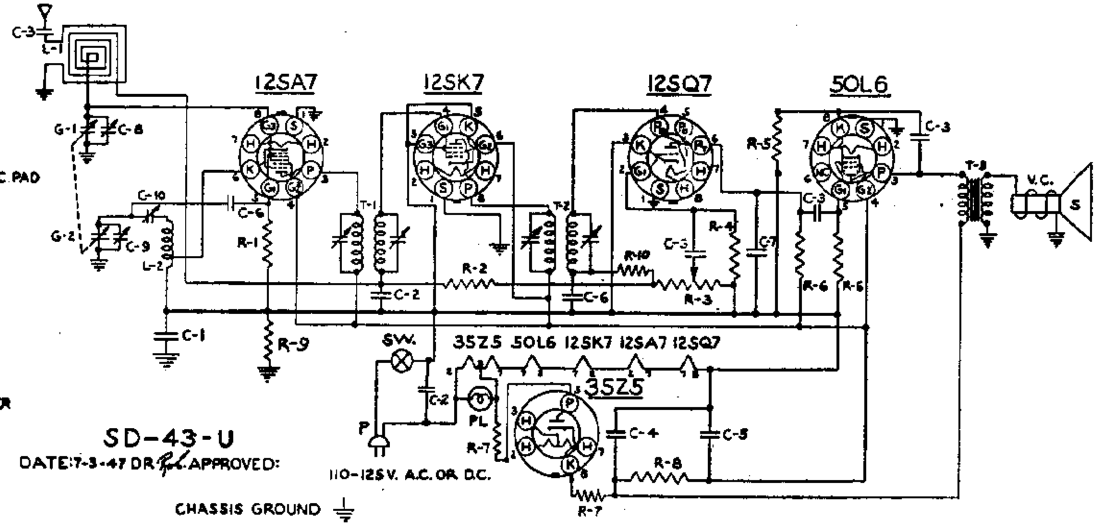
(2) Remove the key while it is in a vertical position.

CAUTION:

After lock cylinder with key still inserted is separated from the lock bushing do not remove key from cylinder.

TRAV-LER RADIO CORP.





SD-43-U
DATE: 7-3-47 DR. APPROVED:

PART NO.		DESCRIPTION
IR-9	R-1	22,000 Ω RESISTOR 1/2 W 20%
IR-23	R-2	3.3 MEG. RESISTOR 1/2 W 20%
VC-4	R-3	1 MEG. VOL. CONTROL & SW.
IR-13	R-4	22 MEG. RESISTOR 1/2 W 20%
IR-14	R-5	150 Ω RESISTOR 1/2 W 20%
IR-11	R-6	470M Ω RESISTOR 1/2 W 20%
IR-17	R-7	33 Ω RESISTOR 1/2 W 20%
IR-25	R-8	2200 Ω RESISTOR 1 W 10%
PC-8	C-1	.1 MFD. COND.-400V.
PC-5	C-2	.05 MFD. COND.-400V.
PC-7	C-3	.01 MFD. COND.-400V.
EC-12	C-4	40 MFD. 150V. ELECTROLYTIC
	C-5	20 MFD.
MC-2	C-6	100 MMFD. MICA COND.
MC-5	C-7	500 MMFD. MICA COND.
IR-10	R-10	47M Ω 1/2 W 20%
TC-7	C-8	ANTENNA TRIMMER COND.
TC-6	C-9	OSC. TRIMMER COND.
TC-9	C-10	OSC. PADDING COND.
IR-20	R-9	220M Ω RESISTOR 1/2 W 20%
GC-1	G-1, G-2	GANG CONDENSER
LL-4	L-1	LOOP ANTENNA
LO-7	L-2	OSC. COIL
LI-1	T-1	INPUT I.F. TRANSFORMER
LI-2	T-2	OUTPUT I.F. TRANSFORMER
	T-3	OUTPUT SPKR. TRANSFORMER
SPK-6	V.C.	VOICECOIL
	S	P.M. SPEAKER
PB-1	PL	No. 47 PILOT BULB
	SW.	A.C. SW. ON VOL. CONTROL
CO-1	P	LINE CORD
TU-3	———	12SA7 GT 12SK7 GT 12SQ7 GT 50L6 GT 35Z5 GT

ALIGNMENT

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

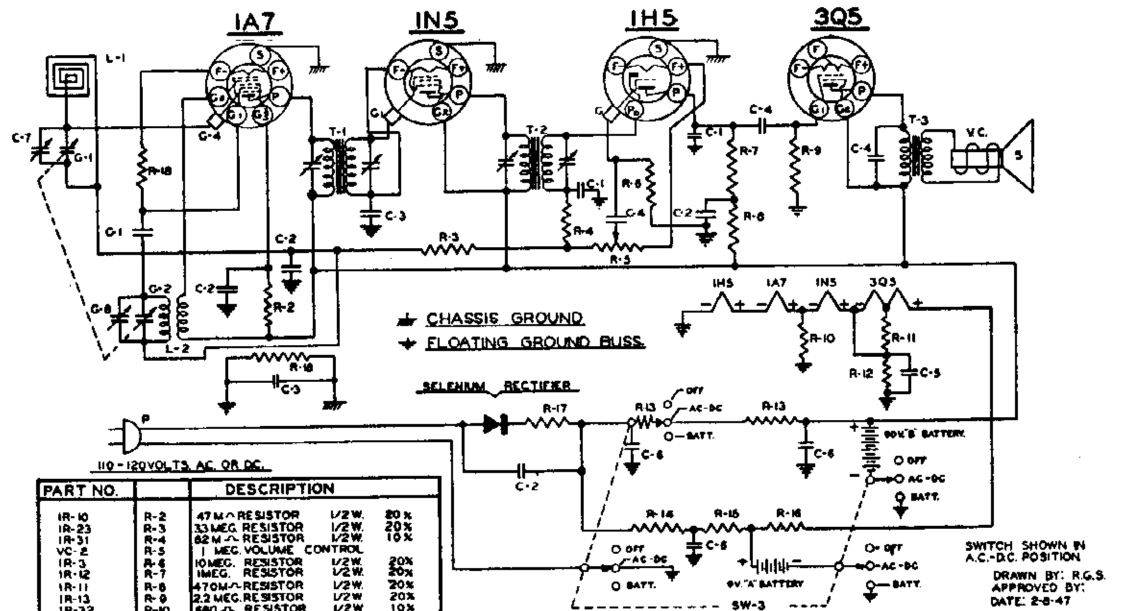
FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory

MODEL 5027

TRAV-LER RADIO CORP.



PART NO.		DESCRIPTION
1R-10	R-2	47 M∧ RESISTOR 1/2W. 20%
1R-23	R-3	3.3 MEG. RESISTOR 1/2W. 20%
1R-31	R-4	82 M∧ RESISTOR 1/2W. 10%
VC-2	R-5	1 MEG. VOLUME CONTROL
1R-3	R-6	10 MEG. RESISTOR 1/2W. 20%
1R-12	R-7	1 MEG. RESISTOR 1/2W. 20%
1R-11	R-8	470M∧ RESISTOR 1/2W. 20%
1R-13	R-9	2.2 MEG. RESISTOR 1/2W 20%
1R-32	R-10	680 ∧ RESISTOR 1/2W. 10%
1R-33	R-11	270 ∧ RESISTOR 1/2W 10%
1R-21	R-12	330 ∧ RESISTOR 1/2W 10%
1R-39	R-13	620 ∧ RESISTOR 1/2W. 5%
WR-3A	R-14	1050 ∧ CANDOHM RESISTOR
	R-15	1050 ∧
	R-16	40 ∧
1R-35	R-17	82∧ WIREWOUND RESISTOR. 2W. 10%
1R-20	R-18	220M∧ RESISTOR 1/2W. 20%
MC-2	C-1	100 MMFD. CONDENSER. (MICA)
PC-5	C-2	.05 MFD. CONDENSER 400V.
PC-8	C-3	.1 MFD. CONDENSER 400V.
PC-6	C-4	.005 MFD. CONDENSER 600V.

PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
EC-6	C-5	70 MFD. 10V. ELECTROLYTIC	SPK-5	T-3	OUTPUT SPEAKER TRANSFORMER
EC-4	C-6	40-40-40-150V. ELECTROLYTIC		VC	VOICE COIL
TC-7	C-7	ANTENNA TRIMMER		S	P.M. SPEAKER.
	C-8	OSC. TRIMMER.	SW-5	SW-3	4 POLE 3 POSITION
GC-4	G-1	GANG CONDENSER	SR-1	——	SELENIUM RECTIFIER
	C-2		TU-11	——	1A7-1N5-1H5-3Q5
LL-10	L-1	LOOP ANNTENNA	"A" BATTERY		9 VOLTS
LO-8	L-2	OSC. COIL	"B" BATTERY		90 VOLTS.
L1-3	T-1	INPUT I.F. TRANSFORMER			
L1-4	T-2	OUTPUT I.F. TRANSFORMER			
CO-1	P	LINE CORD			

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

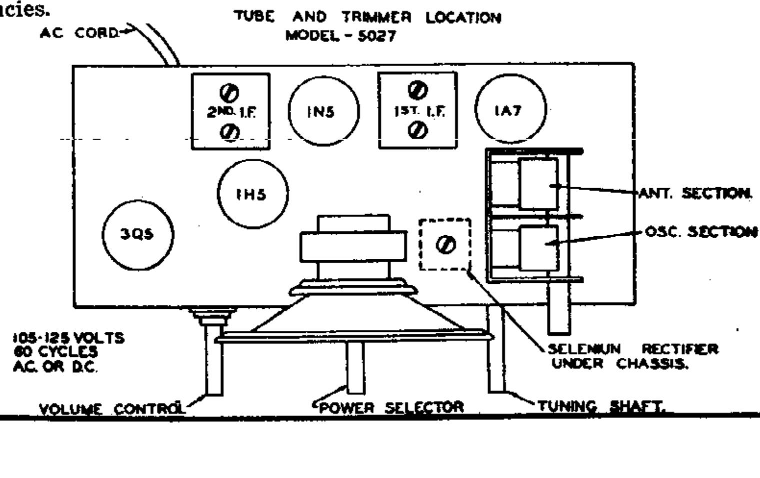
The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the top of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the top of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

TUBE AND TRIMMER LOCATION
MODEL - 5027



TRAV-LER RADIO CORP.

MODEL 5028

BATTERY SUPPLIERS

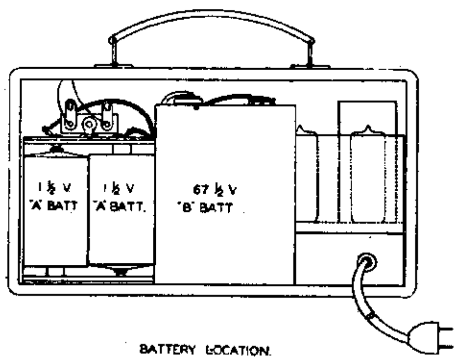
The batteries for this receiver may be purchased from any reliable dealer.

For proper operation this receiver requires two "A" batteries and one "B" battery.

The "A" batteries are size "D" flashlight cells and are made by all battery manufacturers.

The "B" battery is a 67½ volt battery and is made by the following manufacturers:

Eveready	67½ vlt.	#467
Burgess	67½ vlt.	#XX45
General	67½ vlt.	#W45A
Ray-O-Vac	67½ vlt.	#4367



BATTERY LOCATION.

BATTERY SERVICING

To replace the batteries in this receiver:

Remove the back.

To the left, looking into the rear of the cabinet is the "A" or flashlight battery container. To the right is the "B" or 67½ volt battery.

To replace the "A" batteries, pull the old batteries out of the container. Replace with fresh batteries, making sure the batteries are inserted according to the diagram on the inside of the container.

To replace the "B" battery, disconnect the snap fastener connectors. Replace with a fresh battery and snap the connectors into place. Replace the battery in the cabinet as shown in Fig. No. 1, making sure that the connector end faces the top of the cabinet.

After the batteries have been installed, replace the back, making sure that the two washers in the bottom of the back fit into the slot near the bottom edge

MODEL 5027

BATTERY SUPPLIERS

The batteries for this receiver may be purchased from any reliable radio dealer.

For proper operation of this receiver, you must use, two (2) 4½ Volt "A" batteries, and two (2) 45 Volt "B" batteries.

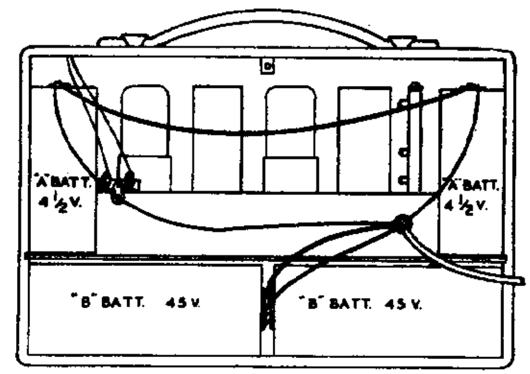
The following is a table of manufacturers and their battery type number.

"B" BATTERIES (2 Required)

Mfgr.	Volts		Type No.
Burgess	45	"B"	M30
General	45	"B"	W30B
Bright Star	45	"B"	3033
Usalite	45	"B"	640
Rayovac	45	"B"	P7830
Eveready	45	"B"	482

"A" BATTERIES (2 Required)

Burgess	4½	"A"	G3
General	4½	"A"	3H3
Bright Star	4½	"A"	361
Usalite	4½	"A"	683
Rayovac	4½	"A"	P83A
Eveready	4½	"A"	746



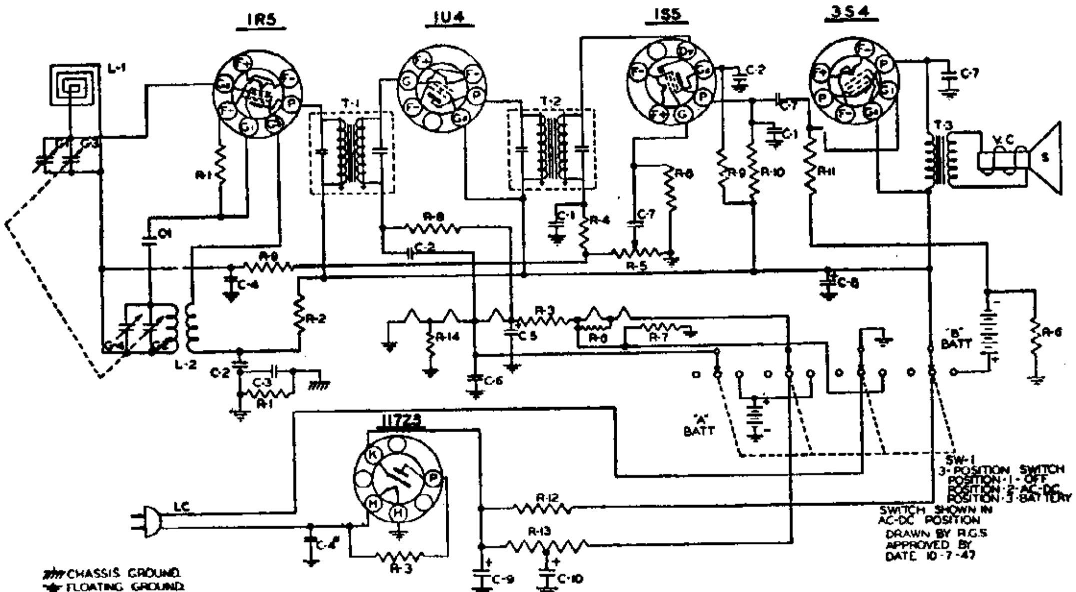
BATTERY LOCATION

BATTERY SERVICING

To replace batteries, loosen and remove the two screws at the left and right hand corners of the cabinet back. Remove the back and pull out the plug from each battery. Never pull on the wires connected to the plugs as they may break. Always grasp the plug form between the fingers, or use a flat blade to pry out the plug. Observe with care the position of the batteries and plugs when replacing. Be sure that batteries and plugs are replaced as shown in the "Battery Location" diagram. (Figure No. 1)

After the batteries have been installed, replace the back. Make sure that the two wires from the loop antenna are held in place between the brackets

TRAV-LER RADIO CORP.



PART NO		DESCRIPTION
IR-20	R-1	220M-^ RESISTOR 1/2W 20 %
IR-37	R-2	10M-^ RESISTOR 1/2W 20 %
IR-17	R-3	33-^ RESISTOR 1/2W 20 %
IR-31	R-4	82M-^ RESISTOR 1/2W 10 %
VC-11	R-5	1MEG. VOLUME CONTROL
IR-33	R-6	270-^ RESISTOR 1/2W 10 %
IR-39	R-7	620-^ RESISTOR 1/2W 5 %
IR-3	R-8	10MEG-^ RESISTOR 1/2W 20 %
IR-23	R-9	3.3MEG-^ RESISTOR 1/2W 20 %
IR-12	R-10	1MEG-^ RESISTOR 1/2W 20 %
IR-13	R-11	2.2MEG-^ RESISTOR 1/2W 20 %
IR-40	R-12	3900-^ RESISTOR 1W 10 %
WR-7	R-13	1050-1050 CANDOHM RESISTOR 5W 5%
IR-1	R-14	470-^ RESISTOR 1/2 20 %
MC-2	C-1	100MMFD. MICA CONDENSER
PC-7	C-2	.01MFD. CONDENSER 400WV
PC-8	C-3	.1MFD. CONDENSER 400W.V
PC-5	C-4	.05MFD. CONDENSER 400WV
EC-6	C-5	20MFD 10WV ELECTROLYTIC

PART NO		DESCRIPTION
PC-3	C-6	.1 MFD. CONDENSER 200 W.V
PC-6	C-7	.005MFD CONDENSER 600 W.V
EC-14	C-8	40 MFD. 150WV ELECTROLYTIC
	C-9	40 MFD.
	C-10	20 MFD.
GC-6X	G-1	ANT TRIMMER
	G-2	GANG CONDENSER
	G-3	
	G-4	OSC TRIMMER
LL-14	L-1	LOOP ANTENNA
LO-8	L-2	OSC COIL
CO-1	LC	LINE CORD
SW-8	SW-1	4 POLE-3 POSITION SWITCH

PART NO		DESCRIPTION
LI-5	T-1	INPUT IF TRANSFORMER
LI-5	T-2	OUTPUT IF TRANSFORMER
SPK-8	T-3	SPEAKER OUTPUT TRANSFORMER
	VC	VOICE COIL
	S	3½ PM SPEAKER
TU-31	—	117Z3-1R5-1U4-1S5-3S4
	A BATT	2 "D" SIZE 1½ VOLT FLASHLITE CELLS
	B BATT	1-67½ VOLT BATTERY

Remove chassis from cabinet for alignment.

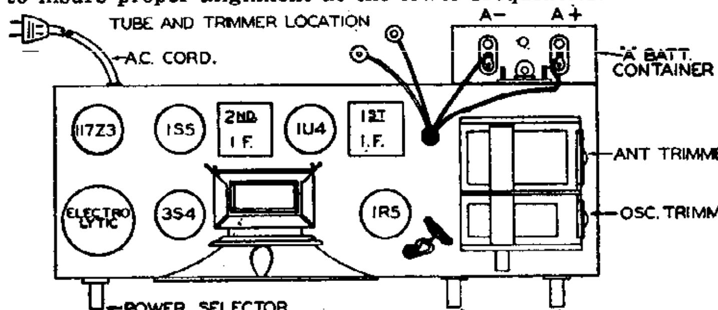
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the movable iron cores in the IF cans. These IF adjustments are made in the top and in the bottom of the can under the chassis. Adjust the cores until a maximum reading is noted on the output meter.

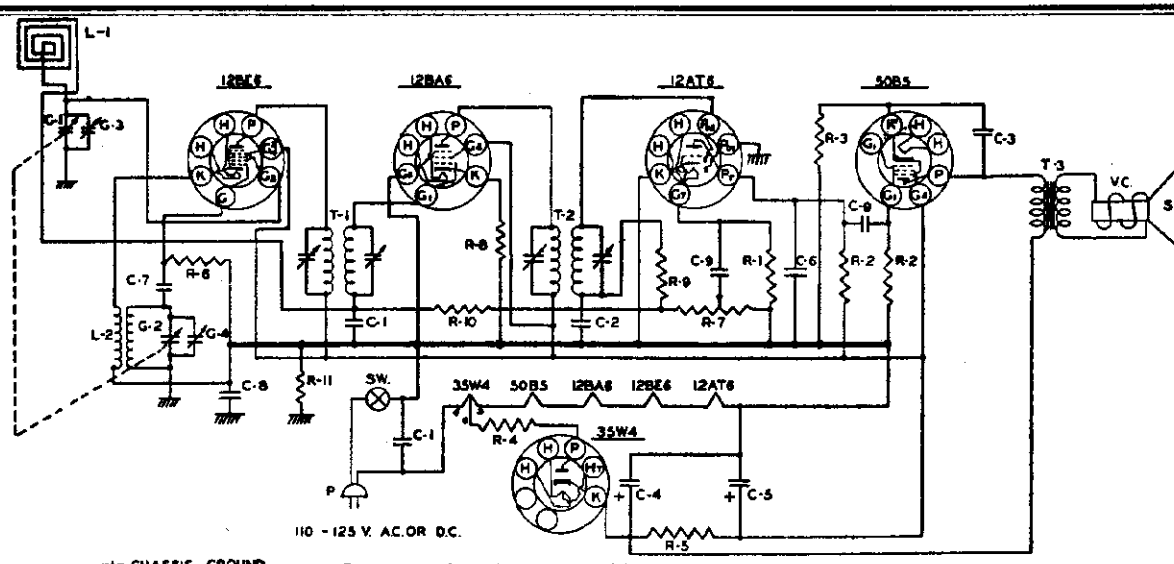
SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the end of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the side of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.



TRAV-LER RADIO CORP.

PART NO.		DESCRIPTION
IR-13	R-1	2.2 MEG RESISTOR 1/2 W. 20 %
IR-11	R-2	470M Ω RESISTOR 1/2 W. 20 %
IR-14	R-3	150 Ω RESISTOR 1/2 W. 20 %
IR-17	R-4	33 Ω RESISTOR 1/2 W. 20 %
IR-25	R-5	2200 Ω RESISTOR 1 W. 10 %
IR-16	R-6	33 M Ω RESISTOR 1/2 W 20 %
VC-9	R-7	1 MEG. VOLUME CONTROL
GC-7	G-1, G-2	GANG CONDENSER
	G-3	ANT. TRIMMER COND.
IR-36	R-8	100 Ω RESISTOR 1/2 W 20 %
IR-10	R-9	47 M Ω RESISTOR 1/2 W 20 %
	G-4	OSC. TRIMMER COND.
PC-5	C-1	.05 MFD. CONDENSER 400 V.
MC-2	C-2	.0001 MFD. MICA. CONDENSER 20 %
PC-7	C-3	.01 MFD. CONDENSER 400 V.
EC-12	C-4, C-5	40 MFD., 20 MFD. 150 V. ELECTROLYTIC CONDENSER
MC-5	C-6	.0005 MFD. CONDENSER 20 %
MC-4	C-7	.000056 MFD. MICA 20 %
PC-8	C-8	.1 MFD. CONDENSER 400 V.
LL-9	L-1	LOOP ANTENNA
IR-23	R-10	3.3 MEG. RESISTOR 1/2 W. 20 %
PC-6	C-9	.005 MFD. CONDENSER 600 V.
LO-13	L-2	OSC. COIL
LI-6	T-1	INPUT TRANSFORMER
LI-7	T-2	OUTPUT TRANSFORMER
	T-3	OUTPUT SPK. TRANFORMER.
SPK-10	V.C.	VOICE COIL
	S	PM. SPEAKER
IR-20	R-11	220M RESISTOR 1/2 W. 20 %
	SW	AC. SW. ON VOLUME CONTROL
CO-1	P	LINE CORD
TU-18	—	12BE6 - 12BA6 - 12AT6 50B5 - 35W4



DATE: 5-28-47
DRAWN BY: R.G.S.
APPROVED:

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

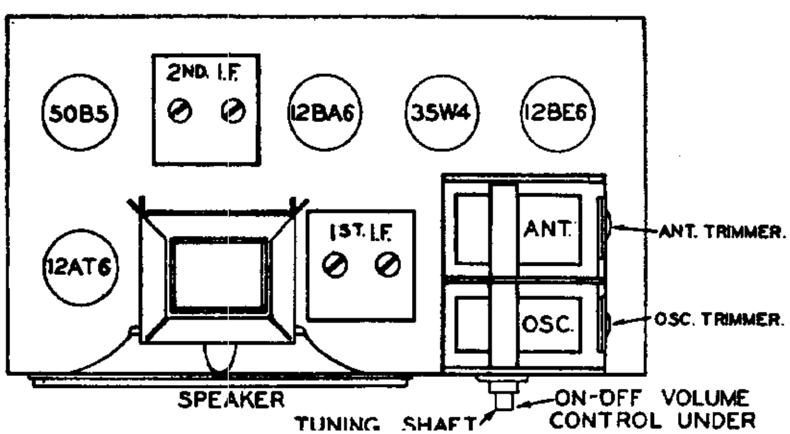
The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

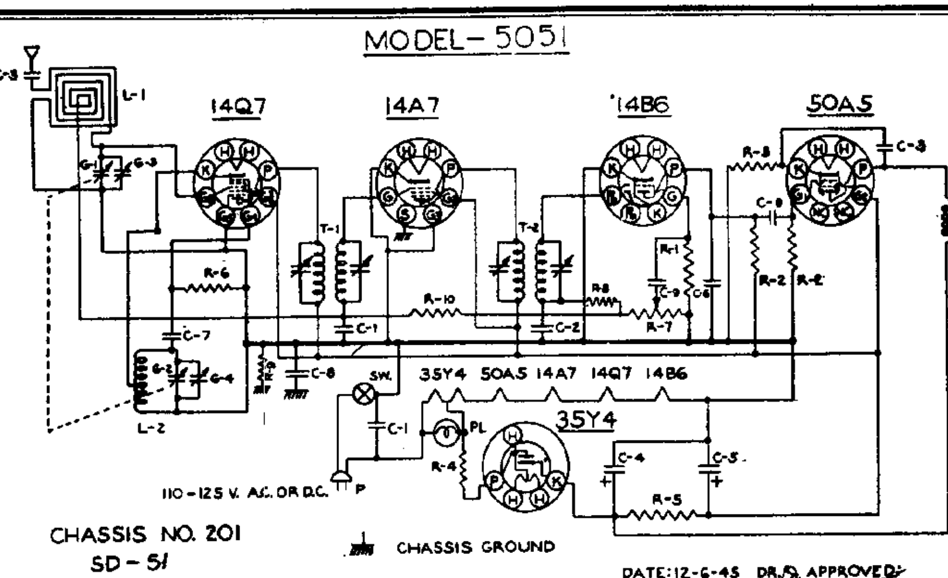
SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the end of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the side of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower

TUBE AND TRIMMER LOCATION



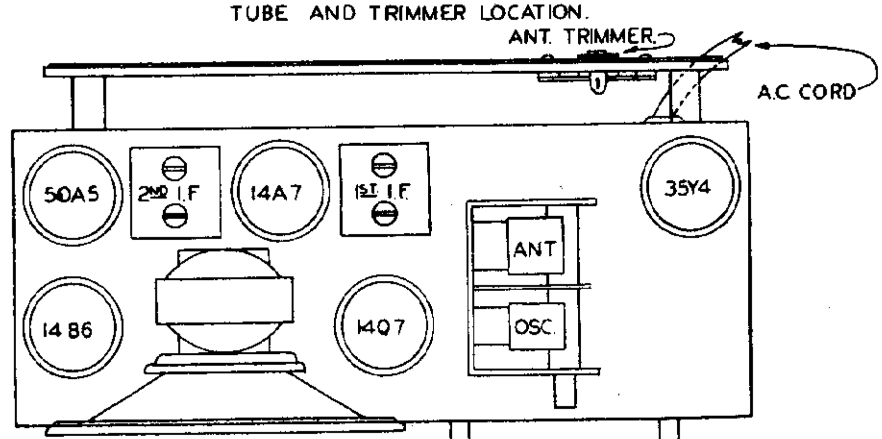
TRAV-LER RADIO CORP.



CHASSIS NO. 201
SD-51

PART NO.		DESCRIPTION
LO-11	L-2	OSC. COIL
LI-1	T-1	INPUT I.F. TRANSFORMER
LI-2	T-2	OUTPUT I.F. TRANSFORMER
SPK.-4	T-3	OUTPUT SPK. TRANSFORMER
	V.C.	VOICE COIL
	S	P.M. SPEAKER
PB-1	PL	#47 PILOT BULB
	SW.	A.C. SW. ON VOL. CONTROL
CO-1	P	LINE CORD
TU-6	—	14Q7 14A7 14B6 50A5 35Y4
IR-23	R-10	3.3MEG. 1/2W. 20%
PC-6	C-9	.005MFD. 600 V.

TUBE AND TRIMMER LOCATION.



105-125 VOLTS 60 CYCLES
AC OR DC

VOLUME CONTROL & OFF-ON SWITCH

TUNING SHAFT

PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
IR-13	R-1	2.2 MEG RESISTOR 1/2 W 20%		G-4	OSC. TRIMMER COND.
IR-11	R-2	470M RESISTOR 1/2 W 20%	PC-5	C-1	.05 MFD. COND. 400V.
IR-14	R-3	150 RESISTOR 1/2W 20%	MC-2	C-2	.0001 MFD. MICA COND. 20%
IR-4	R-4	47 RESISTOR 1/2W 20%	PC-7	C-3	.01 MFD. COND. 400V.
IR-15	R-5	2200 RESISTOR 1/2W 20%	EC-12	C-4	40 MFD. } 150 V. ELECTROLYTIC CONDENSER
IR-16	R-6	33 M RESISTOR 1/2 W 20%		C-5	20 MFD.
VC-3	R-7	1 MEG. VOLUME CONTROL	MC-5	C-6	.0005 MFD. COND. 20%
GC-4	G-1, G-2	GANG CONDENSER	MC-4	C-7	.000056 MFD. MICA 20%
TC-7	G-3	ANT. TRIMMER COND.	PC-9	C-8	.1 MFD. COND. 400 V.
IR-10	R-8	47M 1/2W 20%	LL-6	L-1	LOOP ANTENNA
			IR-20	R-9	220M 1/2W 20%

ALIGNMENT

Remove chassis from cabinet for alignment.

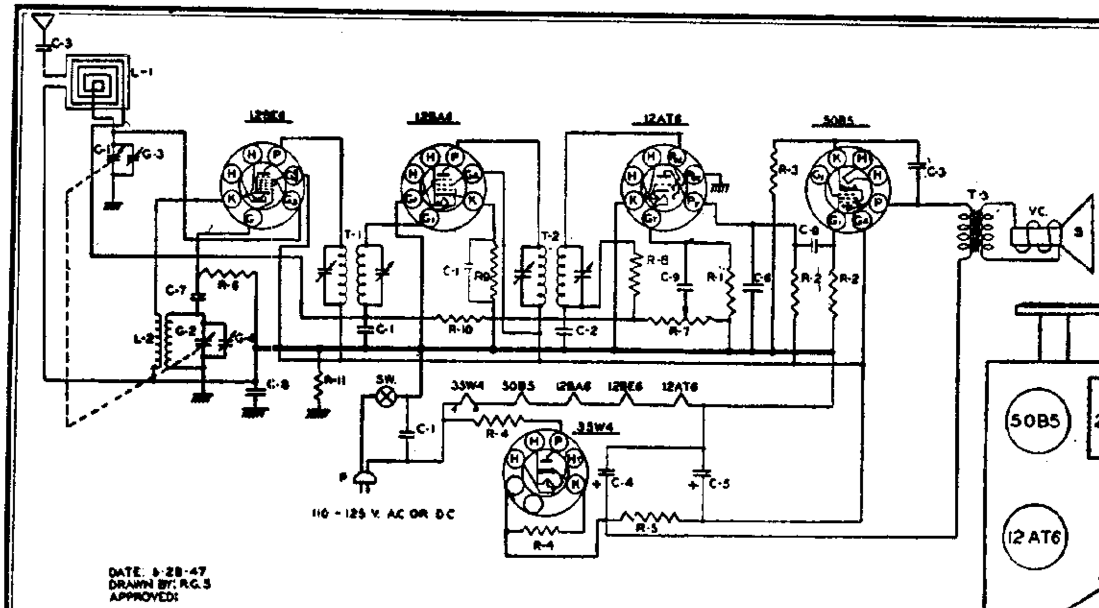
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

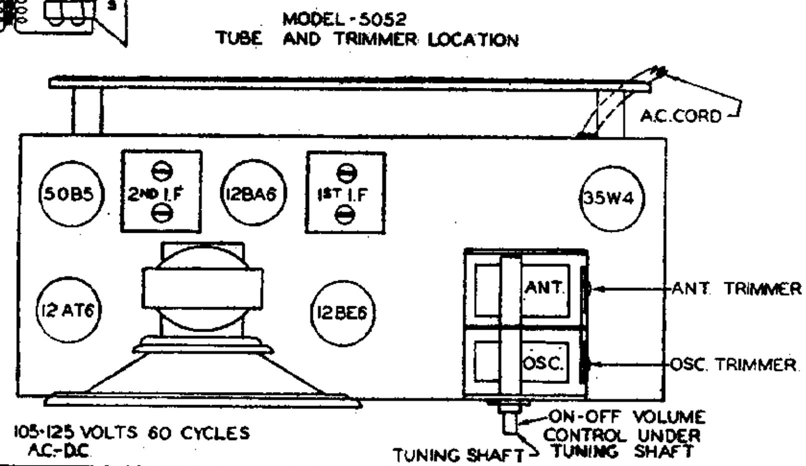
FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the metal frame of the gang condenser. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis between the volume and tuning controls. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the antenna lead wire that projects from the back of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the back of the loop antenna. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

TRAV-LER RADIO CORP.





PART NO.		DESCRIPTION	PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
IR-13	R-1	2.2 MEG RESISTOR 1/2 W. 20 %		G-4	OSC. TRIMMER COND	LO-13	L-2	OSC COIL
IR-11	R-2	470M Ω RESISTOR 1/2 W. 20 %	PC-5	C-1	.05 MFD. CONDENSER 400 V	LI-6	T-1	INPUT TRANSFORMER
IR-14	R-3	150 Ω RESISTOR 1/2 W. 20 %	MC-2	C-2	.0001 MFD. MICA CONDENSER 20 %	LI-7	T-2	OUTPUT TRANSFORMER
IR-17	R-4	33 Ω RESISTOR 1/2 W. 20 %	PC-7	C-3	.01 MFD. CONDENSER 400 V	SPK-10	T-3	OUTPUT SPK. TRANFORMER
IR-25	R-5	2200 Ω RESISTOR 1 W. 10 %	EC-12	C-4	40 MFD. 150 V ELECTROLYTIC CONDENSER		V.C.	VOICE COIL
IR-16	R-6	3.3 M Ω RESISTOR 1/2 W 20 %		C-5	20 MFD.		S	P.M. SPEAKER
VC-8	R-7	1 MEG. VOLUME CONTROL	MC-5	C-6	.0005 MFD. CONDENSER 20 %	IR-20	R-11	220M RESISTOR 1/2 W. 20 %
GC-7	G-1	GANG CONDENSER	MC-4	C-7	.000056 MFD. MICA 20 %	•	SW 1	AC. SW. ON VOLUME CONTROL
	G-2		PC-8	C-8	.1 MFD. CONDENSER 400 V	CO-1	P	LINE CORD
	G-3	ANT. TRIMMER COND.	LL-12	L-1	LOOP ANTENNA	TU-18	—	12BE6 - 12BA6 - 12AT6 50B5 - 35W4
IR-19	R-8	100M Ω RESISTOR 1/2 W. 20 %	IR-23	R-10	3.3 MEG. RESISTOR 1/2 W 20 %			
IR-38	R-9	100 Ω RESISTOR 1/2 W 20	PC-6	C-9	.005 MFD. CONDENSER 600 V			

ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

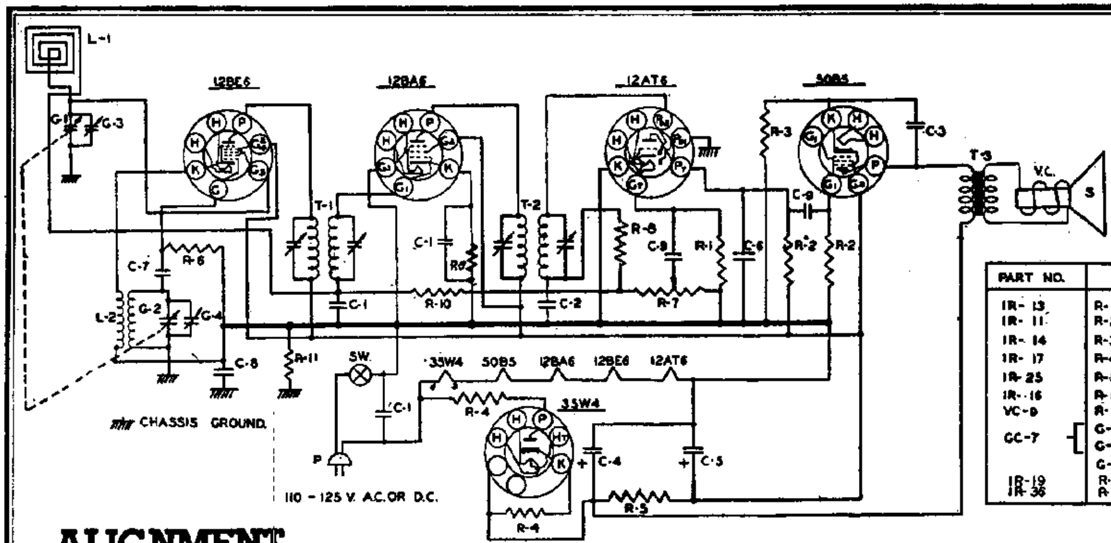
The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through the .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser. Loosely couple the generator to the receiver loop by using a complete turn of wire. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer until a maximum signal is noted on the output meter. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

TRAV-LER RADIO CORP.



PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
IR-13	R-1	2.2 MEG RESISTOR 1/2 W. 20 %		G-4	OSC. TRIMMER COND.
IR-11	R-2	470M Ω RESISTOR 1/2 W. 20 %	PC-5	C-1	.05 MFD. CONDENSER 400 V.
IR-14	R-3	150 Ω RESISTOR 1/2 W. 20 %	MC-2	C-2	.0001 MFD. MICA. CONDENSER 20 %
IR-17	R-4	33 Ω RESISTOR 1/2 W. 20 %	PC-7	C-3	.01 MFD. CONDENSER 400 V.
IR-25	R-5	2200 Ω RESISTOR 1 W. 10 %	EC-12	C-4	40 MFD. 150 V. ELECTROLYTIC CONDENSER
IR-16	R-6	33 M Ω RESISTOR 1/2 W 20 %		C-5	20 MFD.
VC-9	R-7	1 MEG. VOLUME CONTROL	MC-5	C-6	.0005 MFD. CONDENSER 20 %
GC-7	G-1	GANG CONDENSER	MC-4	C-7	.000056 MFD. MICA 20 %
	G-2		PC-8	C-8	.1 MFD. CONDENSER 400 V.
	G-3	ANT. TRIMMER COND.	LL-15	L-1	LOOP ANTENNA
IR-19	R-8	100M Ω RESISTOR 1/2 W. 20 %	IR-23	R-10	3.3 MEG. RESISTOR 1/2 W. 20 %
IR-36	R-9	100 Ω RESISTOR 1/2 W 20	PC-6	C-9	.005 MFD. CONDENSER 600 V.

PART NO.		DESCRIPTION.
LO-13	L-2	OSC. COIL
LI-6	T-1	INPUT TRANSFORMER
LI-7	T-2	OUTPUT TRANSFORMER
SPK-10	T-3	OUTPUT SPK. TRANFORMER
	V.C.	VOICE COIL
	S	P.M. SPEAKER
IR-20	R-11	220M RESISTOR 1/2 W. 20 %
	SW	AC. SW. ON VOLUME CONTROL
CO-1	P	LINE CORD
TU-18	—	12BE6 - 12BA6 - 12AT6 50B5 - 35W4

ALIGNMENT

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

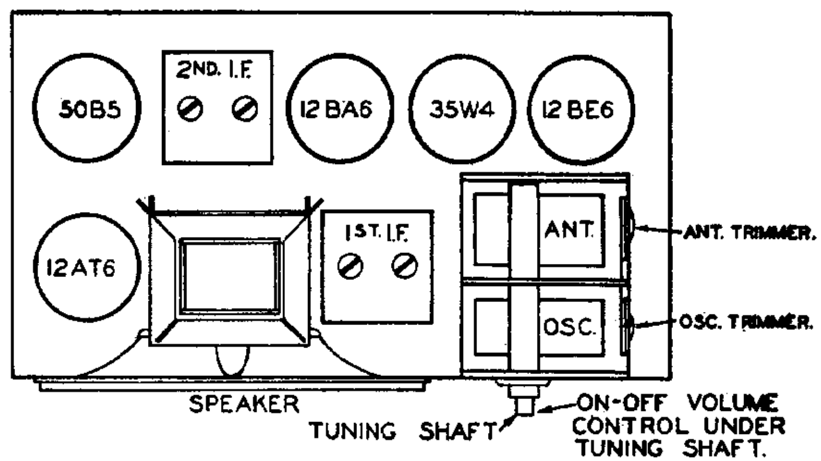
The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the trimmers of the first and second I. F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer until a maximum signal is noted on the output meter. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

TUBE AND TRIMMER LOCATION



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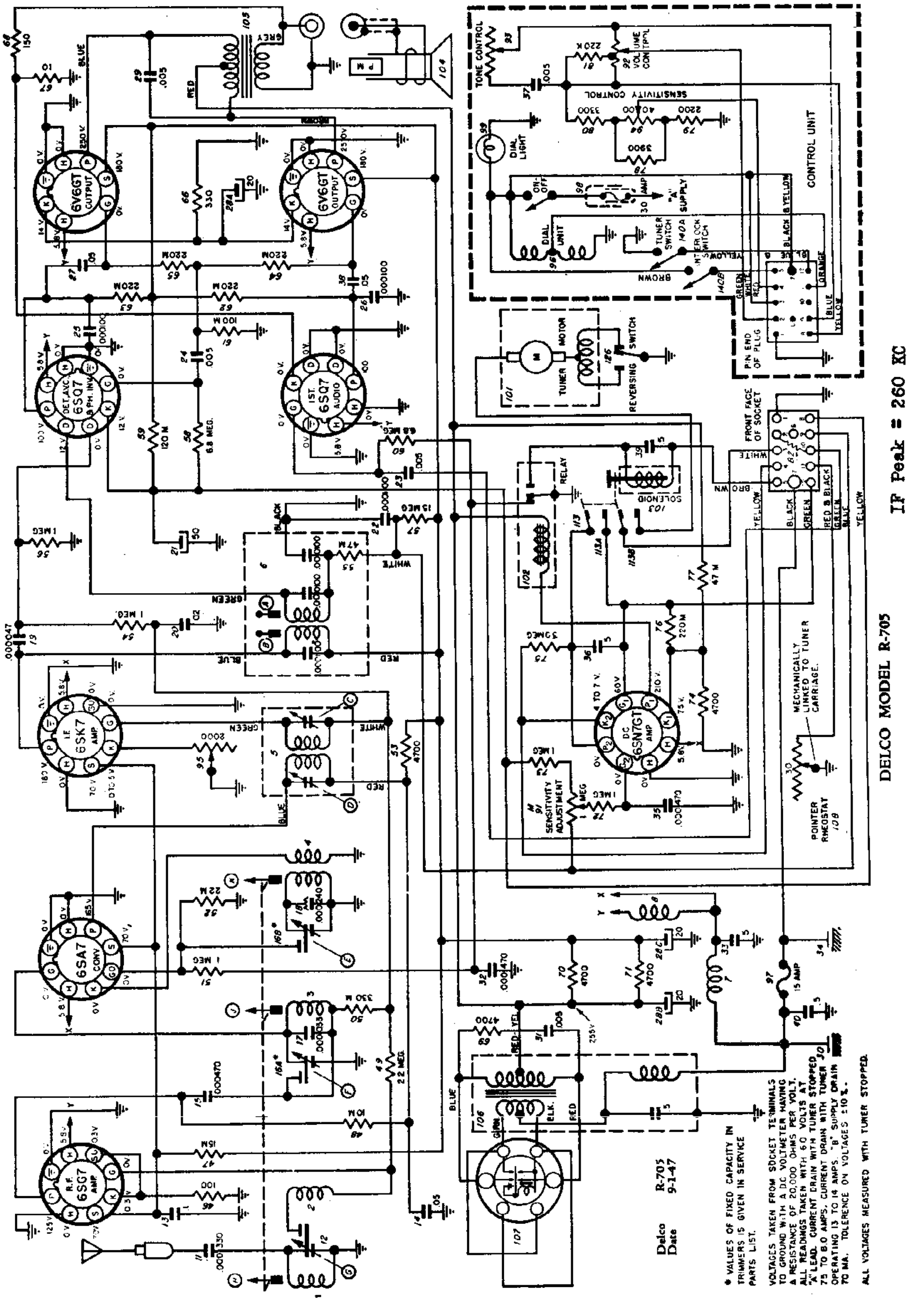

MODEL R-705

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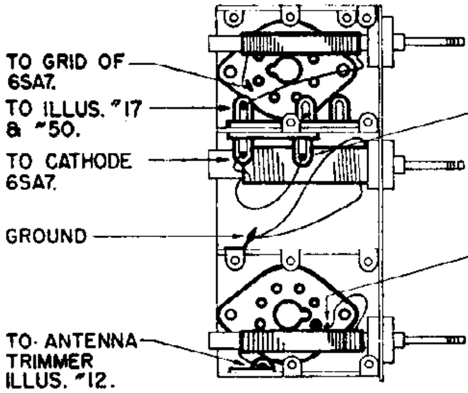
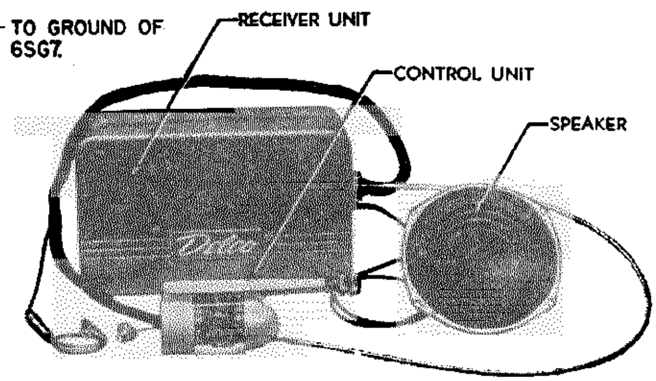


COIL CONNECTIONS



MODEL R-705

MOUNTING—Universal.

TUBES—Eight Plus a Synchronous Vibrator.

SPEAKER—7" Round Permanent Magnet.

TUNING—Manual and Electronic.

ANTENNA TRIMMER COMPENSATION—.000050-.000110 Mfd.

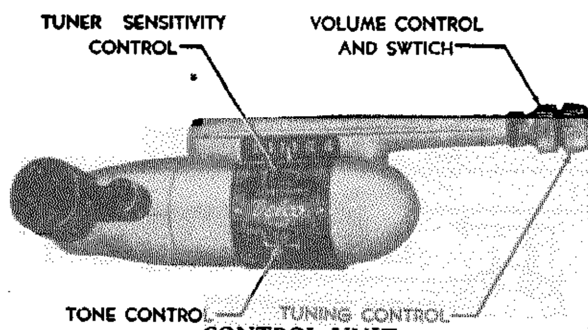
TUNING RANGE—550-1600 KC.

PUSH BUTTON SETUP

No pushbutton setup is required, however a tuner sensitivity adjustment can be made to regulate the minimum number of stations selected by the electronic tuner.

ALIGNMENT PROCEDURE

Output Meter Connections............Across Voice Coil
Generator Ground ....To Chassis
Dummy Antenna............In Series With Generator
Volume Control Position............Maximum
Tone Control Position ....Treble



CONTROL UNIT

Steps	Series Condenser or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver To	Adjust Screws In Order
1	0.1 MFD	6SA7 Grid (Pin #8)	260	High Frequency End of Band	A, B, C, D
2	.000068 MFD	Antenna Connector	1615 KC	Maximum Withdrawal of Cores	*E, F, G
3	.000068 MFD	Antenna Connector	1430 KC	Signal Generator	H, J
4	.000068 MFD	Antenna Connector	1615 KC	Maximum Withdrawal of Cores	F, G
5	.000068 MFD	Antenna Connector	1430 KC	Signal Generator	H, J

*Before making this adjustment, check setting of Oscillator Core "K" with Cores at maximum withdrawal. The stud end of Core "K" should be 1" from end of coil form.

SPECIAL INSTRUCTIONS

The 2nd I. F. Coil Secondary Trimmer "A" should be adjusted so that, with the Sensitivity Control, Illus. #94 with minimum sensitivity, all the way to the left, the signal strength necessary to stop the tuner will be the same when approaching the signal from either end of the band. Adjusting Trimmer "A" counterclockwise will increase the tuner sensitivity when decreasing frequency.

When the radio is installed, adjust the Trimmer "G" to match the car antenna at approximately 1400 KC.

TUNER SENSITIVITY ADJUSTMENT

With a small screw driver adjust the tuner sensitivity adjuster, Illus. #91, so that with the tuner sensitivity control, Illus. #94 turned all the way to the left the tuner will stop only on the strong stations in your locality.

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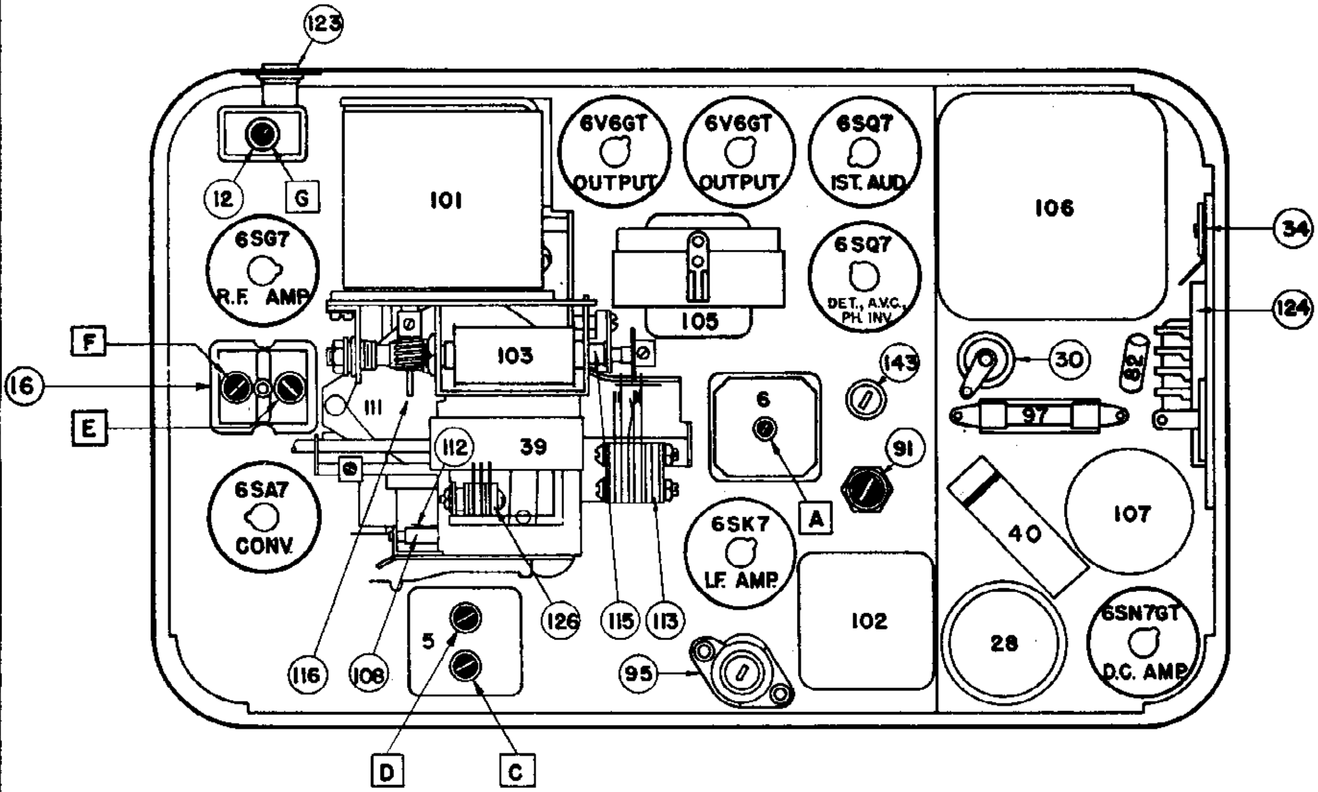
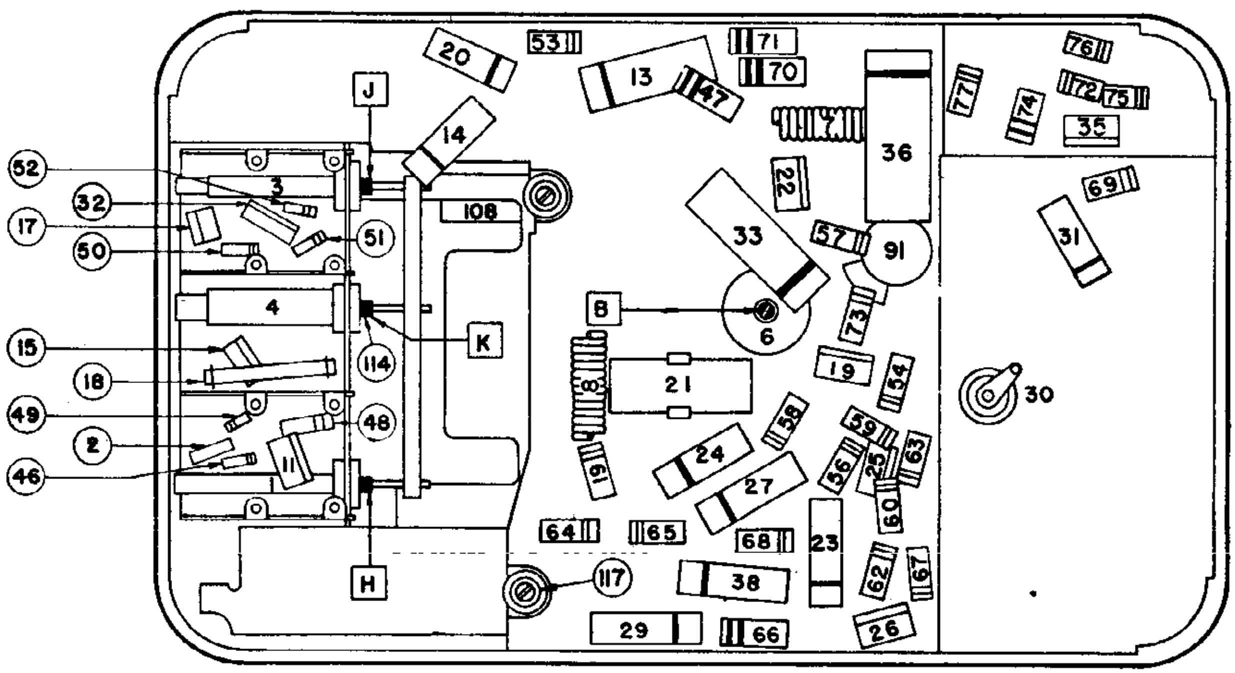


RECEIVER UNIT PARTS LAYOUT — TUBE VIEW



RECEIVER UNIT PARTS LAYOUT — CHASSIS VIEW

MODEL R-705

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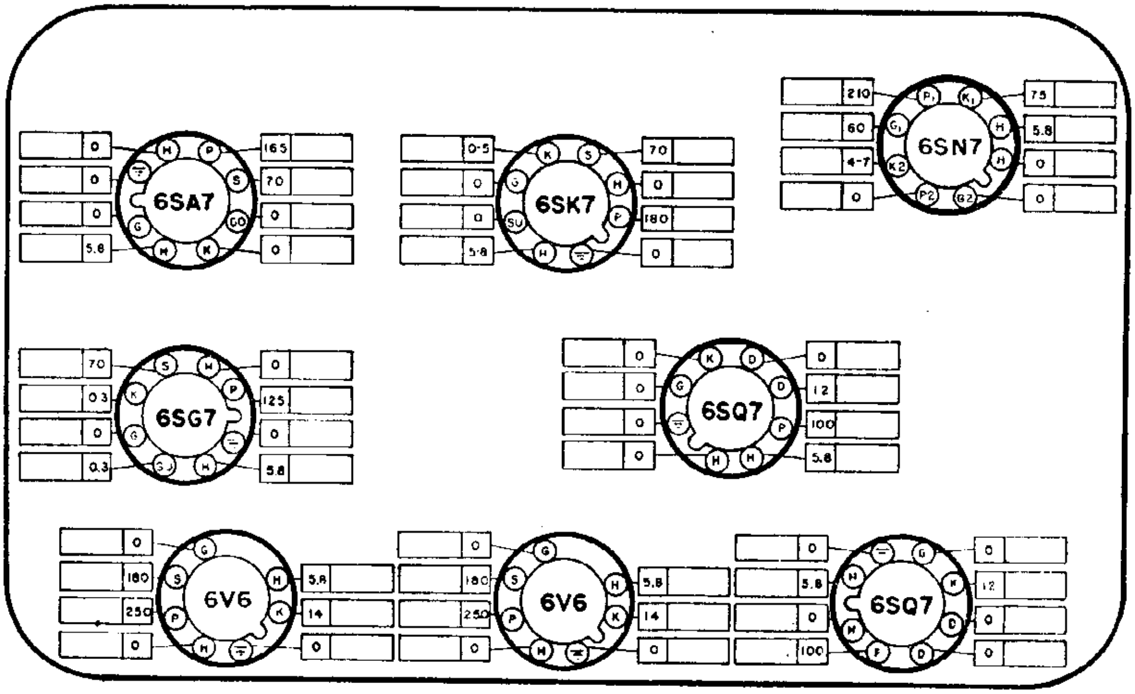
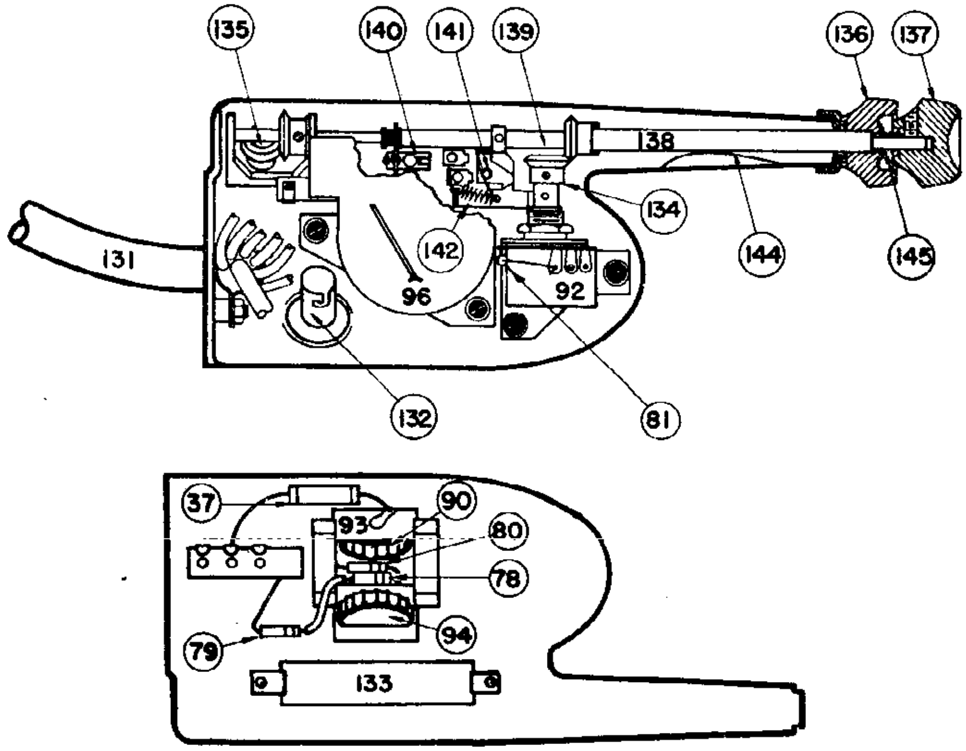
TUBE SOCKET VOLTAGE CHART

The tube socket voltages, as measured at the factory, and under the conditions shown on the schematic diagram on page 3, are shown below. The blank spaces are provided so the serviceman may fill in actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.



Voltages measured from socket terminals to ground. Voltmeter resistance .... ohms per volt. All readings taken with ....volts at "A" lead. "A" current drain tuner stopped 7.5 to 8 amps with 6 volts input. "A" current drain tuner operating 13 to 14 amps with 6 volts input. "B" current drain 70 MA with 6 volts input. Voltage tolerance ±10%.



CONTROL UNIT PARTS LAYOUT

UNITED MOTORS SERVICE
DIV. OF GENERAL MOTORS CORP.

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
			ELECTRICAL PARTS
			COILS
1	7256246	7256246	Antenna
2	7240251	7240251	Antenna Choke
3	7256246	7256246	R. F.
4	7256244	7256244	Oscillator
5	7256218	7256218	1st I. F.
6	7256371	7256371	2nd I. F.
7	7241708	7241708	"A" Spark Choke
8	7241708	7241708	Hash Choke
			CONDENSERS
11	7232957	G 331	.0000330 Mfd Molded
12	7256093	7256093	Antenna Trimmer—Fixed Capacity .000200 Mfd
13	1207908	E 104	.1 Mfd 400 V. Tubular
14	7230892	E 503	.05 Mfd 400 V. Tubular
15	7238879	G 471	.000470 Mfd Molded
16	7242454	7242454	Dual Trimmer
16A			R. F. Section—Fixed Capacity .000300 Mfd
16B			Oscillator Section—Fixed Capacity .000100 Mfd
17	1217735	G 330	.000033 Mfd Molded
18	7256349	7256349	.000240 Mfd Compensating
19	7233313	G 470	.000047 Mfd Molded
20	7236107	E 203	.02 Mfd 200 V. Tubular
21	1217140	J 500	40 Mfd 25 V. Electrolytic
22	1210275	G 101	.000100 Mfd Molded
23	7230767	E 502	.005 Mfd 600 V. Tubular
24	7230767	E 502	.005 Mfd 600 V. Tubular
25	1210275	G 101	.000100 Mfd Molded
26	1210275	G 101	.000100 Mfd Molded
27	7230892	E 503	.05 Mfd 600 V. Tubular
28	7241198	7241198	3 Section Electrolytic
28A			20 Mfd 25 V.
28B			20 Mfd 400 V.
28C			20 Mfd 400 V.
29	7230593	H 502	.005 Mfd 1000 V. Tubular
30	1217946	1217946	Double Chassis Plate Condenser
31	7257451	7257451	.005 Mfd 3000 V. Tubular
32	7238879	G 471	.000470 Mfd Molded
33	7242885	E 504	.5 Mfd 600 V. Tubular (Factory 200 V.)
34	1217848	1217848	Chassis Plate Condenser (Included in Illus. #124)
35	7238879	G 471	.000470 Mfd Molded
36	7236621	E 504	.5 Mfd 600 V. Tubular (Factory 200 V.)
37	7237946	E 502	.005 Mfd 600 V. Tubular (Factory 400 V.)
38	7230892	E 503	.05 Mfd 600 V. Tubular
39	7242885	E 504	.5 Mfd 600 V. Tubular (Factory 100 V.)
40	7242885	E 504	.5 Mfd 600 V. Tubular (Factory 100 V.)
			RESISTORS
46	1213217	A 101	100 Ohms ½ W. Insulated
47	7233653	C 153	15,000 Ohms 2 W. Insulated
48	1211085	B 103	10,000 Ohms 1 W. Insulated
49	1214563	A 225	2.2 Megohms ½ W. Insulated
50	1214557	A 334	330,000 Ohms ½ W. Insulated
51	1213282	A 105	1 Megohm ½ W. Insulated
52	1214550	A 223	22,000 Ohms ½ W. Insulated
53	1214547	A 472	47,000 Ohms ½ W. Insulated
54	1213282	A 105	1 Megohm ½ W. Insulated
55	1214553	A 473	47,000 Ohms ½ W. Insulated
56	1213282	A 105	1 Megohm ½ W. Insulated
57	1213289	A 156	15 Megohms ½ W. Insulated
58	1215563	A 685	6.8 Megohms ½ W. Insulated
59	1213271	A 124	120,000 Ohms ½ W. Insulated
60	1215563	A 685	6.8 Megohms ½ W. Insulated
61	1213270	A 104	100,000 Ohms ½ W. Insulated
62	1214555	A 224	220,000 Ohms ½ W. Insulated
63	1214555	A 224	220,000 Ohms ½ W. Insulated
64	1214555	A 224	220,000 Ohms ½ W. Insulated
65	1214555	A 224	220,000 Ohms ½ W. Insulated
66	1214572	C 331	330 Ohms 2 W. Insulated
67	1215107	A 100	10 Ohms ½ W. Insulated
68	1213220	A 151	150 Ohms ½ W. Insulated
69	1216126	B 472	4,700 Ohms 1 W. Insulated
70	7256311	C 472	4,700 Ohms 2 W. Insulated
71	7256311	C 472	4,700 Ohms 2 W. Insulated
72	1213282	A 105	1 Megohm ½ W. Insulated
73	1213282	A 105	1 Megohm ½ W. Insulated
74	7256311	C 472	4,700 Ohms 2 W. Insulated
75	1214565	A 395	3.9 Megohm ½ W. Insulated
76	1214555	A 224	220,000 Ohms ½ W. Insulated
77	1216157	B 473	47,000 Ohms ½ W. Insulated
78	1214546	A 392	3,900 Ohms ½ W. Insulated
79	1214545	A 222	2,200 Ohms ½ W. Insulated
80	1213481	A 332	3,300 Ohms ½ W. Insulated
81	1214555	A 224	220,000 Ohms ½ W. Insulated
82	7237835	A 221	220 Ohms ½ W. Insulated

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SERVICE PARTS LIST (Continued)

Illus. No.	Production Part No.	Service Part No.	Description
			TUBE COMPLEMENT
	7237752	5222	6SA7
	1216123	5226	6SG7
	1214292	5230	6SK7GT
	1217376	5258	6SN7GT
	1213793	5241	6V6GT
	1214293	5252	6SQ7GT
			MISCELLANEOUS ELECTRICAL PARTS
91	7256287	7256287	Adjuster—Tuner Sensitivity
92	7256085	7256085	Control—Volume and Switch
93	7256425	7256425	Control—Tone
94	7256424	7256424	Control—Tuner Sensitivity
95	7256255	7242204	Control—Radio Sensitivity
96	1517002	1517002	Dial Indicating Unit
97	120151	120151	Fuse—15 Amperes
98	120114	120114	Fuse—30 Amperes
99	187189	187189	Lamp—Dial Light (Mazda #44)
101	7256429	7256429	Motor Assembly
102	7256216	7256216	Relay—SPDT
103	7256021	7256021	Solenoid
104	7255955	7255955	Speaker—7" PM Round
105	7256628	7256628	Transformer—Output
106	7256293	7256293	Transformer—Power
107	7255853	8642	Vibrator
108	7256317	7256317	Rheostat and Bracket—Pointer
			MECHANICAL PARTS
			CHASSIS
111	7256090	7256090	Cam and Gear
112	7255811	7255811	Contact—Sliding
113	1217947	1217947	Contact Assy.—Solenoid
113A			Motor Switch
113B			Disabling Switch
114	7256112	7256112	Core—Iron
115	7255791	7255791	Core—Solenoid
116	7256016	7256016	Gear and Disc
	7256022	7256022	Gear and Clutch Disc—Worm (Located Under Ill. 103)
117	1216462	1216462	Grommet—Tuner Mtg.
	7256089	7256089	Guide Bar Assy.—Core
123	7256256	7256256	Socket—Antenna
124	7256195	7256195	Socket Plate—Cable
	7236279	7236279	Socket—Octal Tube
	7255857	7255857	Socket—Vibrator
	7256281	7256281	Spring—Slide Return (Located Under Illus. #111)
126	7256284	7256284	Switch—Motor Reversing
143	7256155	7256155	Screw—Captive
			CONTROL UNIT
131	7256277	7256277	Cable—Control
132	1217945	1217945	Dial Light Socket—Less Lamp
133	7256054	7256054	Dial Glass
134	1217942	1217942	Gear
135	1217944	1217944	Gear and Bracket Assy.
136	7256126	7256126	Knob—Volume Control and Switch
137	1217941	1217941	Knob—Tuning Control
138	7256198	7256198	Shaft and Gear—Volume Control
139	1217943	1217943	Shaft and Collar—Tuning Control
140	7256086	7256086	Switch Assembly
140A			Tuner Switch
140B			Interlock
141	7256278	7256278	Spring
142	7256280	7256280	Spring
144	7255988	7255988	Spring—Control Shaft
145	7256291	7256291	Spring—Knob
			INSTALLATION PARTS
	7256296	7256296	Cable—Speaker
	1849161	6016	Condenser—"A" Lead
	1866865	6015	Condenser—Generator
	1217969	1217969	Fuse Holder
	7256391	7256391	Flexible Drive Shaft
	1207818	1207818	Suppressor—Distributor

The mechanical mounting parts for the control unit and speaker are listed under the following adapter packages:

Adapter Package 4415
1941-1942-1946-1947 Chevrolet and Pontiac

Adapter Package 4416
1941-1942-1946-1947 Buick and Oldsmobiles
1940 Chevrolet, Pontiac and Oldsmobile

Adapter Package 4417
1940 Chrysler, Dodge and Plymouth
1941 Chrysler, Plymouth and DeSoto
1946 Dodge Custom, DeSoto Custom, Plymouth and Chrysler
1942 DeSoto, Chrysler and Plymouth
1947 Chrysler, DeSoto Deluxe and Custom, Plymouth and Dodge Custom

Adapter Package 4418
1942-1946-1947 Ford and Mercury

Adapter Package 4419
1942-1946-1947 Packard

Adapter Package 4420
1946-1947 Studebaker

Adapter Package 4421
1942-1946-1947 Hudson

Adapter Package 4422
1946 DeSoto Deluxe
1941-1942 Dodge
1947 Dodge Deluxe

Adapter Package 4423
1946-1947 Kaiser and Frazer

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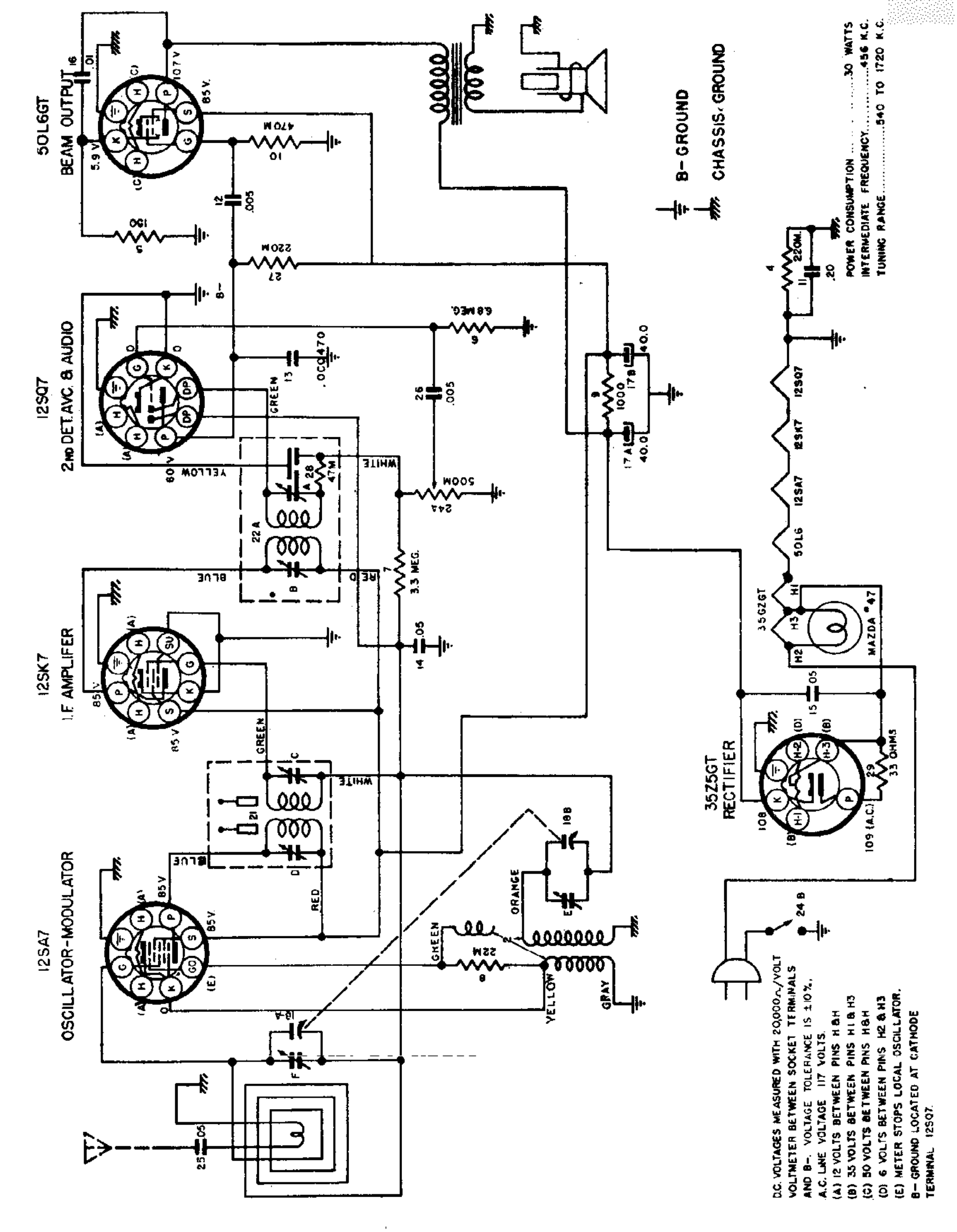
MODELS R1230, R1230
R1231, R1231A, R123



MODELS R1230, R1230A, R1231, R1231A, R1232

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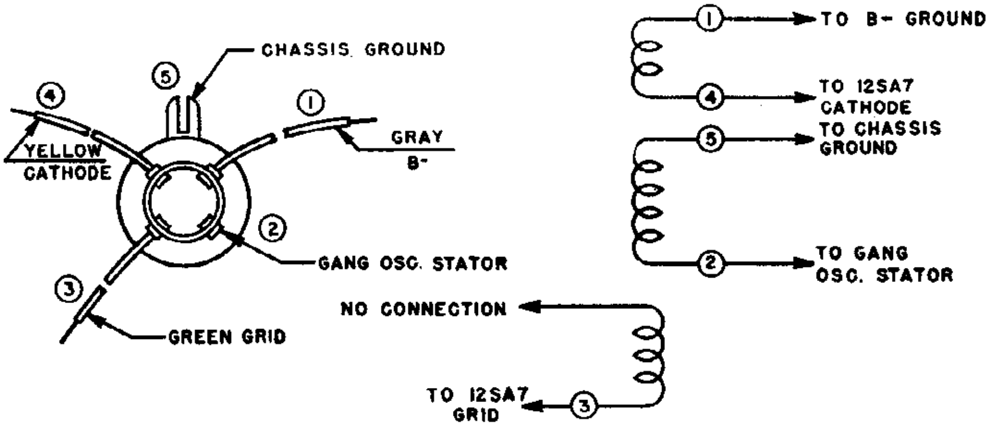
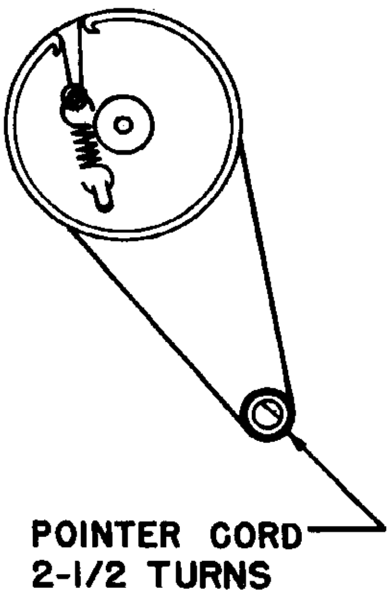
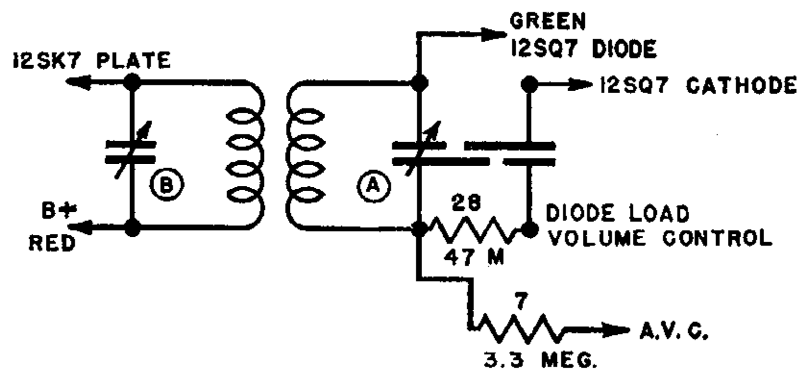


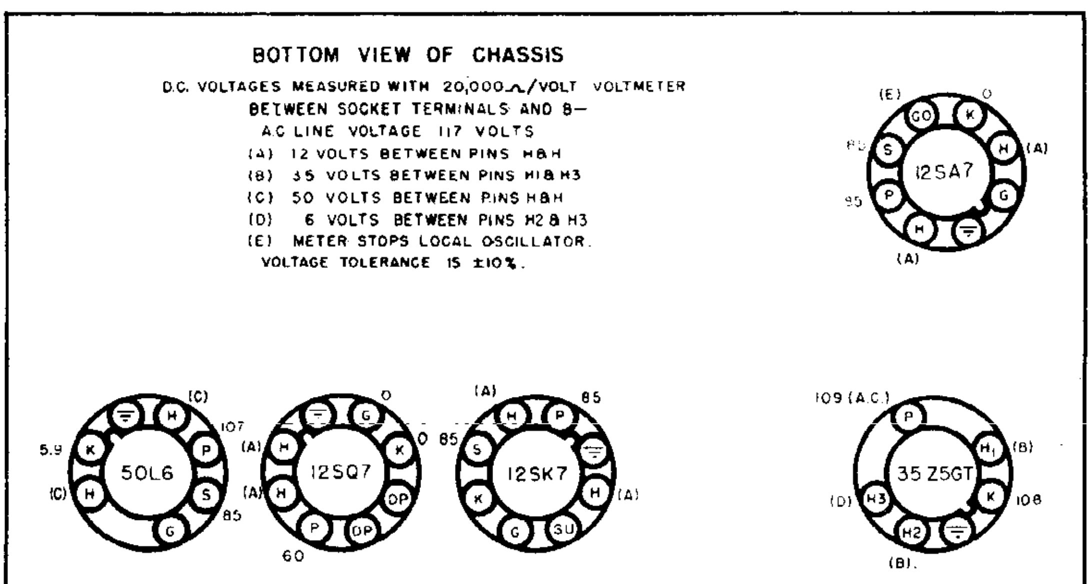
OSCILLATOR COIL



DIAL STRING DRAWING



SECOND I. F. TRANSFORMER
PART #22 UNSHIELDED
MODELS R-1230, R-1231 and R-1232



TUBE SOCKET VOLTAGE CHART

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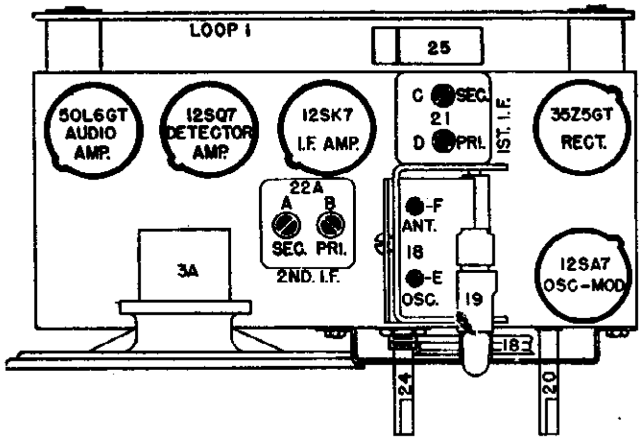
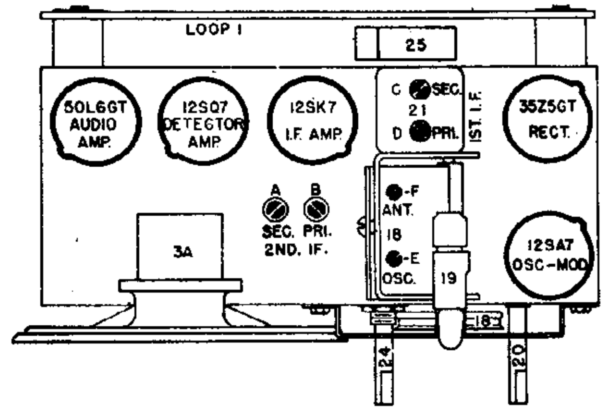
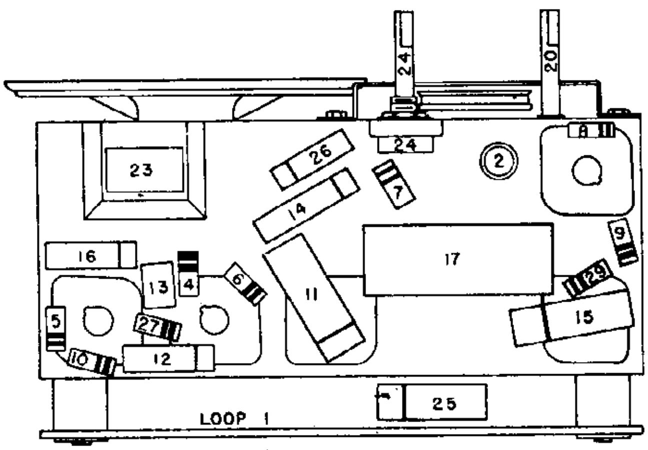


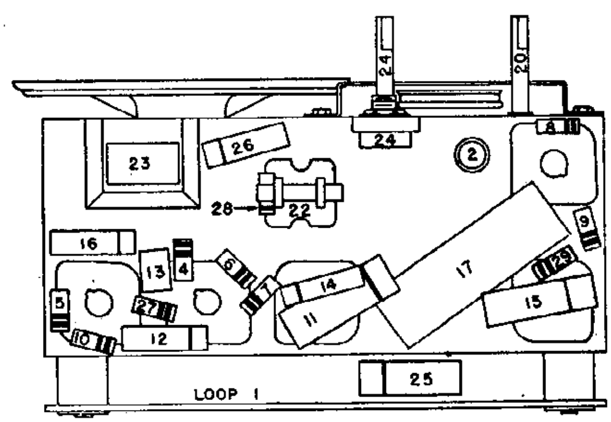
PARTS LAYOUT - TUBE VIEW
MODELS R-1230A, R-1231A
AND R-1232A



PARTS LAYOUT - TUBE VIEW
MODELS R-1230, R-1231
AND R-1232



PARTS LAYOUT - CHASSIS VIEW
MODELS R-1230A, R-1231A
AND R-1232A



PARTS LAYOUT - CHASSIS VIEW
MODELS R-1230, R-1231
AND R-1232

ALIGNMENT PROCEDURE

Output Meter Connections .... Across Voice Coil Windin
Generator Ground .... To Chassis through .01 MF
Dummy Antenna .... In Series with generat
Volume Control Position .... Fully c

Steps	Series Condenser or Dummy Antenna	Connect Signal Generator To	Adjust Signal Generator To	Turn Radio Dial To	Adjust Trimmers
1	0.1 Mfd.	12SA7 Grid (Pin #8) Ground Generator to B− (not chassis)	456 KC	Quiet Point near H. F. end	A-B (2nd IF Trans) C-D (1st IF Trans)
2	.000200 Mfd.	Ant. lead	1720 KC	1720 KC	E (Osc.)
3	.000200 Mfd.	Ant. lead	1400 KC	1400 KC	F (Ant.)

MODELS R1230, R1230A, R1231, R1231A, R1232

UNITED MOTORS SERVICE
DIV. OF GENERAL MOTORS CORP.

SERVICE PARTS LIST

Illus. No.	Service Part No.	Description
		ELECTRICAL PARTS
		COILS
1	1217593	Antenna Assembly - Loop and Back Cover
2	1216518	Oscillator
21	1216504	1st I. F.
22	1216980	2nd I. F. (Includes Illus. No. 7 and 28) Unshielded - Mounted on under side of chassis
22A	1217594	2nd I. F. (Includes Illus. No. 28) Shielded - Mounted on top of chassis
		CONDENSERS
11	E204	.20 Mfd. 400V Tubular
12	E502	.005 Mfd. 600V Tubular
13	G471	.000470 Mfd. Molded
14	E503	.05 Mfd. 600V Tubular
15	E503	.05 Mfd. 600V Tubular
16	E103	.01 Mfd. 600V Tubular
17	J908	2 Section Electrolytic
17A		40 Mfd. 150V
17B		40 Mfd. 150V
18	1217391	Condenser and Pulley Parts Package
		Condenser and Pulley
		Grommet (3)
		Spacer Sleeve (3)
		Screw (3)
25	E503	.05 Mfd. 600V Tubular
26	E502	.005 Mfd. 600V Tubular
		RESISTORS
4	A224	220,000 Ohms ½ W Insulated
5	A151	150 Ohms ½ W Insulated
6	A685	6.8 Megohms ½ W Insulated
7	A335	3.3 Megohms ½ W Insulated
8	A223	22,000 Ohms ½ W Insulated
9	B102	1,000 Ohms 1 W Insulated
10	A474	470,000 Ohms ½ W Insulated
27	A224	220,000 Ohms ½ W Insulated
28	A473	47,000 Ohms ½ W Insulated (Used only on sets utilizing volume controls without a stop.)
29	A330	33 Ohms ½ W Insulated
		TUBE COMPLEMENT
	1213809	12SA7
	1213812	12SK7
	1213813	12SQ7
	1214366	50L6GT
	1213848	35Z5GT - Rectifier
		MISCELLANEOUS ELECTRICAL PARTS
24	1216477	Control - Volume and Switch
24A		Volume Control
24B		Switch
	1216512	Cord - Universal Power
	435433	Lamp - Dial Light (Mazda #47)
3	1216563	Speaker - 5" P. M. (Bracket #1217406 is necessary when replacing original 4" speakers)
23	1216571	Transformer - Output

UNITED MOTORS SERVICE — MODELS R1230, R1230
DIV. OF GENERAL MOTORS CORP. — R1231, R1231A, R123

SERVICE PARTS LIST (Cont.)

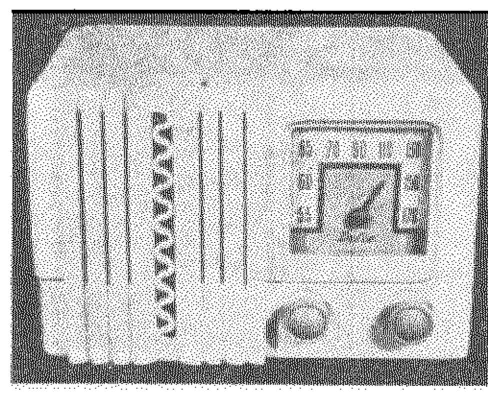
Illus. No.	Service Part No.	Description
		MECHANICAL PARTS
		MISCELLANEOUS CHASSIS PARTS
	1217406	Bracket - Speaker Mounting (For 5" Speakers)
	1216559	Clip - Condenser
	1212233	Cord - Universal Dial Drive
	1217210	Dial and Dial Plate - Dial, Dial Plate and Bracket Assy. (Model R-1232)
	1217213	Dial and Dial Plate - Dial, Dial Plate and Bracket Assy. (Models R-1230, R-1230A)
	1217421	Dial and Dial Plate - Dial, Dial Plate and Bracket Assy. (Models R-1231, R-1231A)
	1216831	Pointer - Dial
20	1216479	Shaft - Tuning
	1217366	Spacer (Use with Tuning Shaft)
	1217323	Spring - Drive Cord Tension
19	1217819	Socket - Dial Light, Less Lamp
	7236279	Socket - Octal Tube
	1216508	Washer - "C" (Use with Tuning Shaft)
		MISCELLANEOUS CABINET PARTS
	1216715	Cabinet - Ivory - Models R-1230, R-1230A (Includes Crystal)
	1216827	Cabinet - Walnut - Model R-1232 (Includes Crystal)
	1216714	Cabinet - Brown - Models R-1231, R-1231A (Includes Crystal)
	1216660	Crystal - Dial (Models R-1230, R-1230A, R-1231, R-1231A)
	1216811	Crystal - Dial (Model R-1232)
	1216825	Knob - Ivory - Volume and Tuning (Models R-1230, R-1230A)
	1216826	Knob - Brown - Volume and Tuning (Models R-1231, R-1231A, R-1232)

GENERAL:

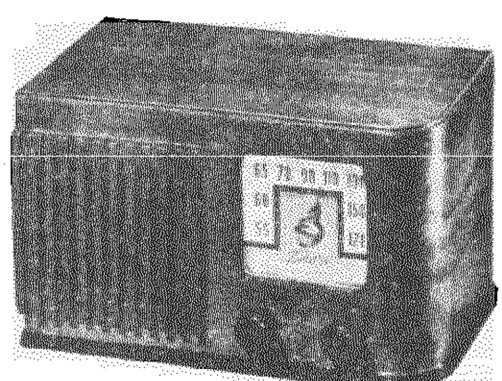
Tubes	5
Speaker	5" PM
Tuning	Manual
Tuning Range	540 to 1720 KC
Intermediate Frequency	456 KC
Power Supply	105/125 volts AC-DC
Power Consumption	30 Watts

Model R-1232—Walnut Wood Cabinet
Models R-1231 and R-1231A—Brown Plastic Cabinet
Models R-1230 and R-1230A—White or Ivory Plastic Cabinet

The same chassis is used in all of the five different models listed in this bulletin. Models R-1230A and R-1231A are equipped with a shielded Second I. F. Transformer which is mounted on the upper side of the chassis whereas Models R-1230, R-1231 and R-1232 are equipped with an unshielded Second I. F. which is mounted on the under side of the chassis.



MODELS R-1230, R-1231, R-1230A and R-1231A



MODEL R-1232

MODELS R1251, R1252
all production runs

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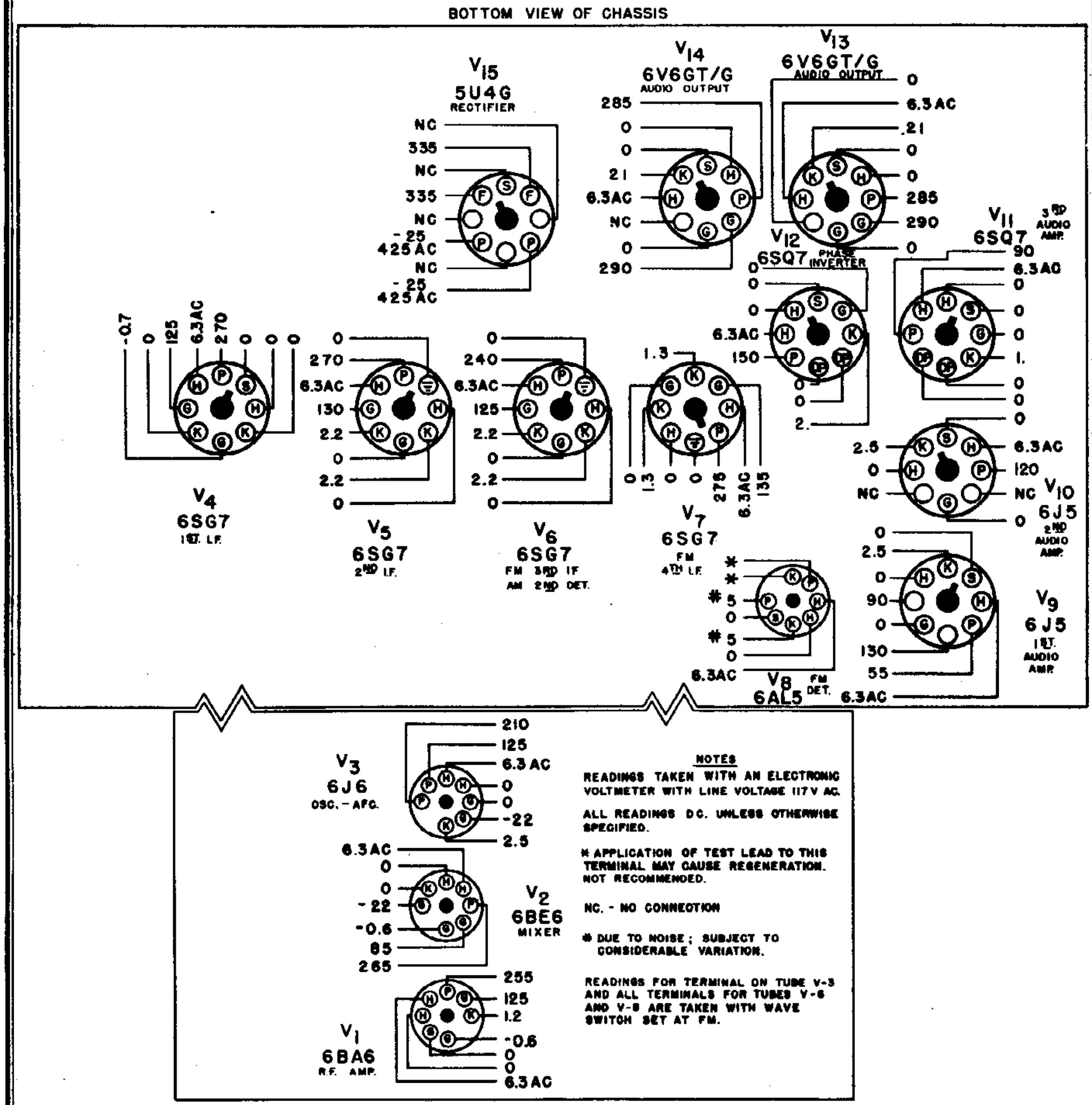
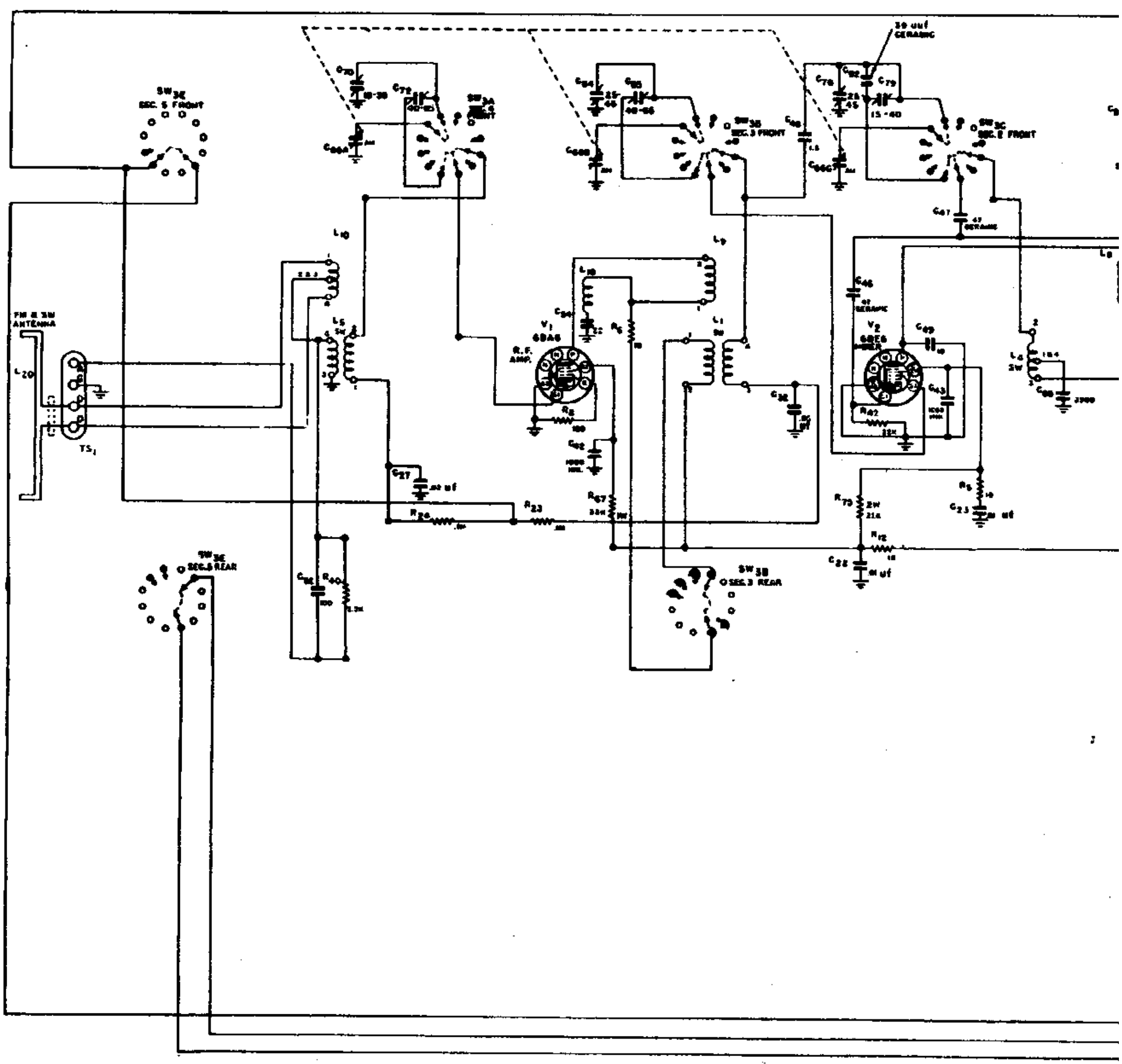
DIV. OF GENERAL MOTORS CORP.



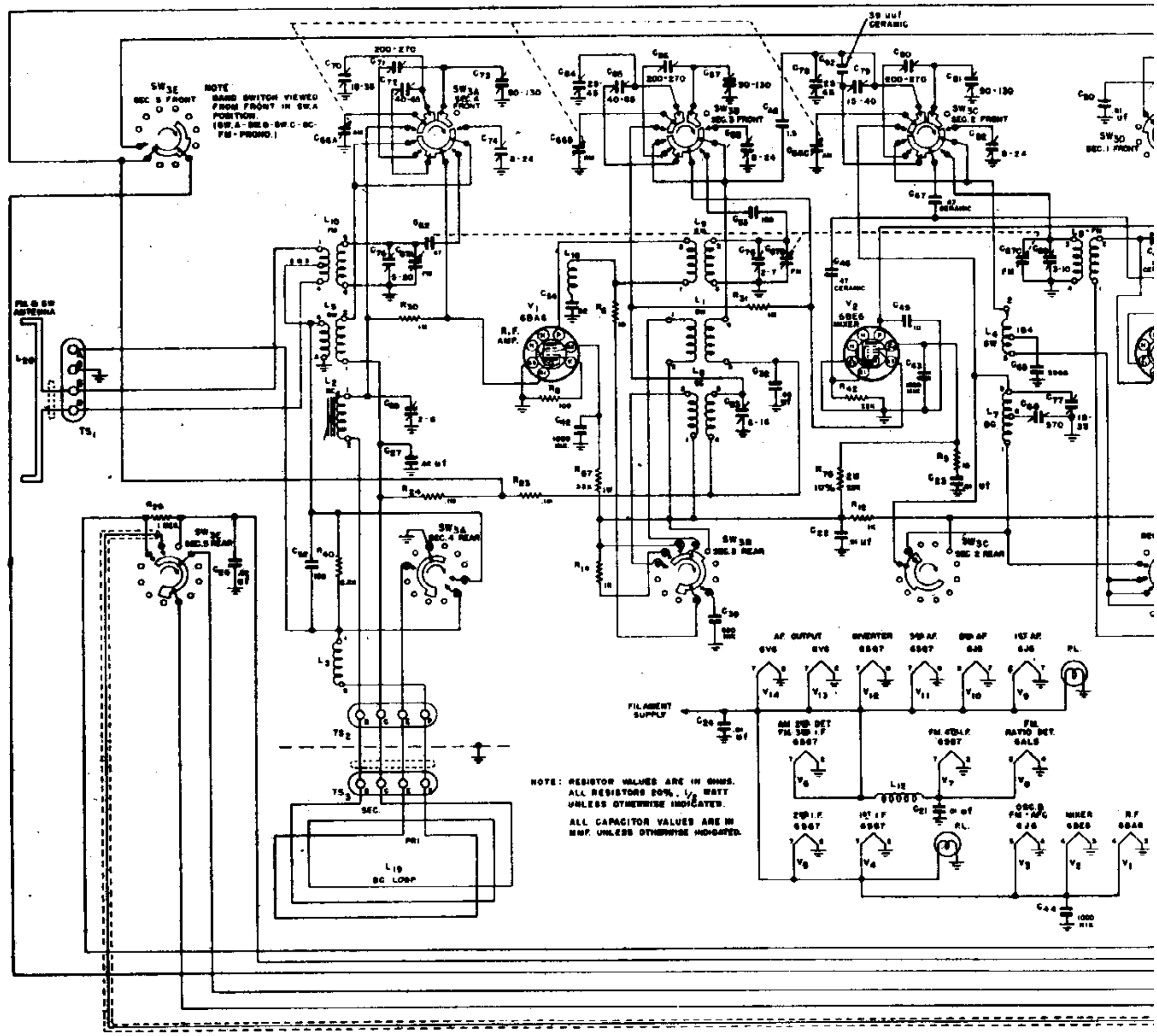
Tube voltage chart.



SERVICE PARTS LIST

Illustration No.	Description	Delco Service Part No.
	RESISTORS	
R9, 10, 11, 12, 13, 14, 77	1000 ohm, ½ W	A102
R15, 16	10,000 ohm ½ W	A103
R17, 18, 19, 20, 21, 22, 23, 24, 25, 78	100,000 ohm ½ W	A104
R26, 27, 28, 29, 30, 31	1 meg. ½ W.	A105
R32	150 ohm ½ W	A151
R33, 34	15,000 ohm ½ W	A153
R35, 36, 37, 38, 39	220 ohm, ½ W	A221
R40	2200 ohm, ½ W	A222
R41, 42	22,000 ohm, ½ W	A223
R43, 44, 45	220,000 ohm, ½ W	A224
R46	33 ohm, ½ W	A330
R47, 48	3300 ohm, ½ W	A332
R49	33,000 ohm, ½ W	A333
R50, 51, 52	330,000 ohm, ½ W	A334
R53	3900 ohm, ½ W (10%)	A392
R54, 55	470 ohm, ½ W	A471
R56	4700 ohm, ½ W	A472
R57	820 ohm, ½ W	A821
R58, 59	47,000 ohm, ½ W	
R60, 61	68,000 ohm, ½ W	
R62, 63, 64, 65	470,000 ohm, ½ W	
R66, 67	33,000 ohm, 1 W	
R68, 69, 70	7,000 ohm, 1 W	
R71	68,000 ohm, 1 W	
R72, 73, 74	10,000 ohm, 2 W	
R75	22,000 ohm, 2 W	
	MISC	
SW1	Bass, on and off, complet	
SW2	Treble, complete	
SW3	Band switch, 5 sec. 6 pos.	
	Phono motor receptacle	
	Phono pick-up jack	
	Speaker socket	
	Octal socket, (tube)	
	Miniature socket	
	Pilot light socket and bra	
	Pilot light socket and bra	
	Pointer carriage	
	Tube shield spring retain	
	Shield base	
	Dial cord	
	Line cord and plug	

UNITED
DIV. OF GEN



GENERAL:

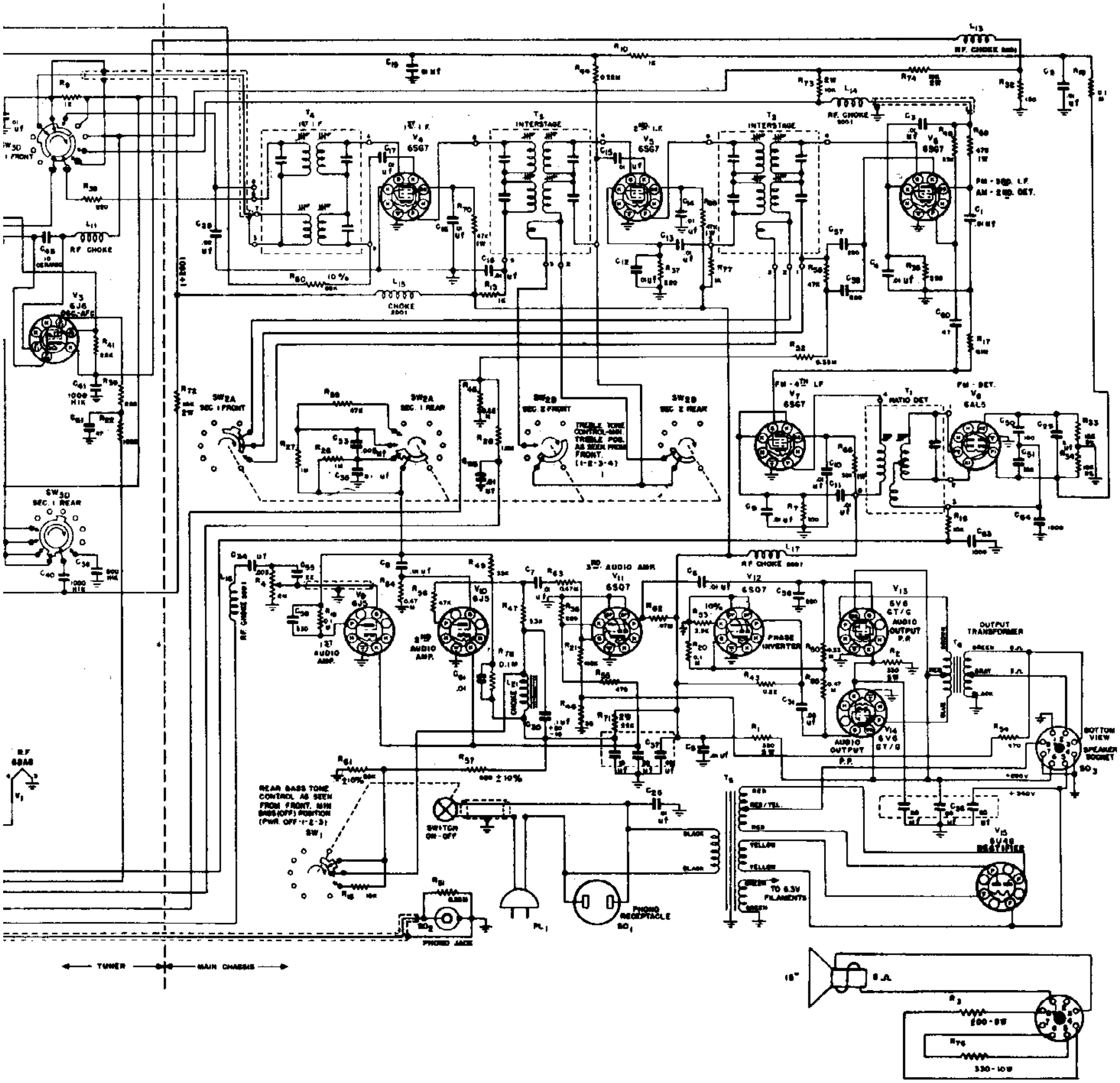
Tubes.....................Fifteen

Speaker....................15" PM

Antennas..................Built-in loop, "AM"
Built-in dipole, "FM"

Provision for external Antennas.

Tuning....................Manual and mechanical pushbuttons. 5 P.B. for "AM" and 5 P.B. for "FM."



BOTTOM VIEW OF SPEAKER PLUGS

Tuning Range	(BC)	540 kc —1700 kc
	(A)	15 mc— 18 mc
	(B)	9 mc— 12 mc
	(C)	5.8 mc— 18 mc
	(FM)	88 mc— 108 mc

Intermediate Frequency.....455 kc "BC" and "SW"

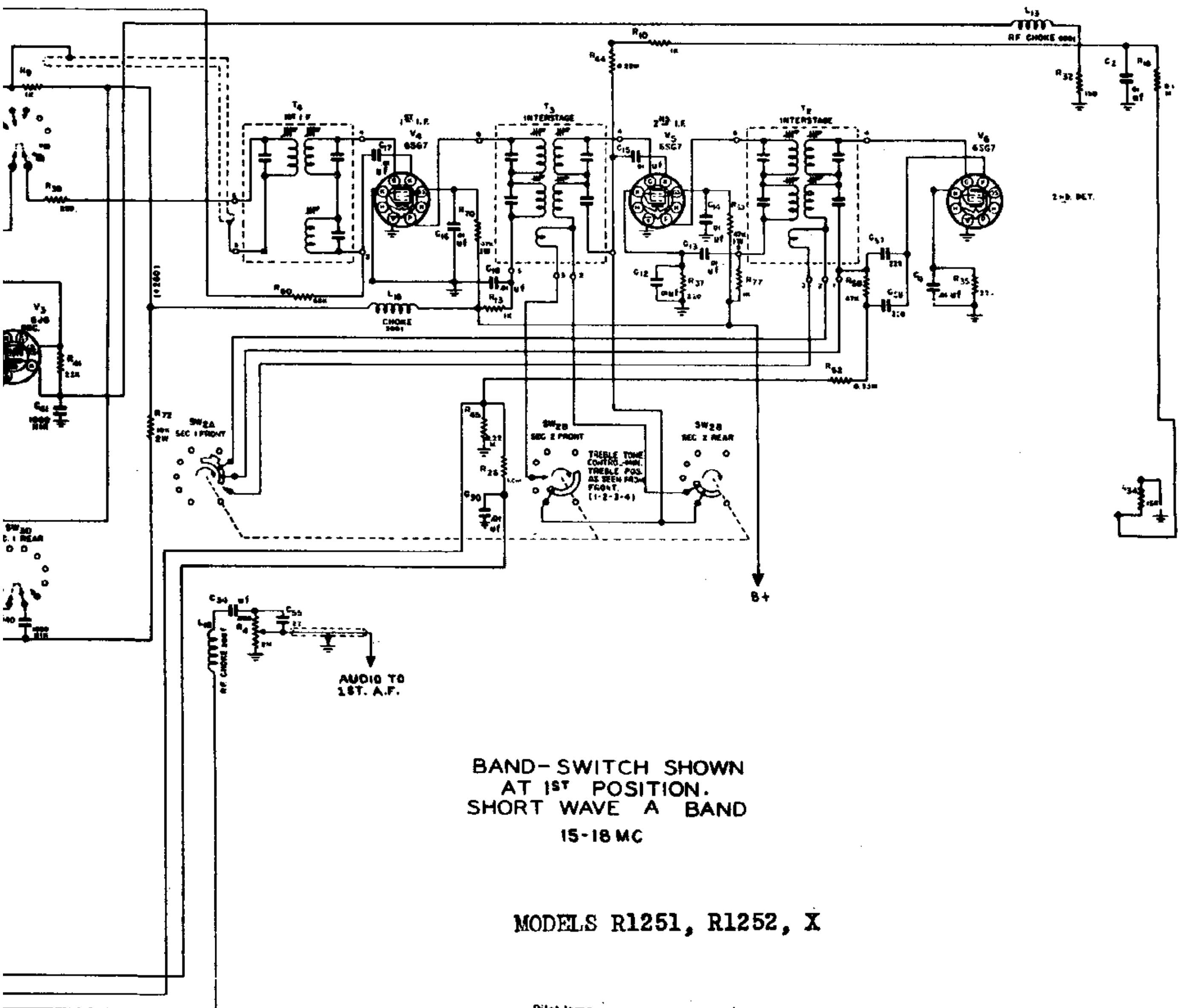
Intermediate Frequency.....10.7 mc "FM"

Power Supply.............105-125 V. 60 cycle AC

Power Consumption........180 watts (Radio only)

Record Changer............See Bulletin 15D-505 'schematics"

TORS SERVICE
AL MOTORS CORP.



BAND-SWITCH SHOWN
AT 1ST POSITION.
SHORT WAVE A BAND
15-18 MC

MODELS R1251, R1252, X

Pilot lamp	435433
Pointer, FM	1217676
Pointer, AM	1217677
Insert, pointer, FM	1217664
Insert, pointer, AM	1217665
Push-button	1217666
Speaker, PM, 15"	1217678
Knob, with index	1217626
Knob	1217627
Push-button insert	1217631
Call letters	1217632
Record changer	See Bulletin 15D505
Dial glass, Control Knob Index	1217829
Dial glass, calibrated	1217828
Escutcheon	1217830

.....	A473
.....	A683
.....	A474
.....	B333
.....	B473
.....	B683
.....	C103
.....	C223

All production runs

EOUS

.....	1217638	
.....	1217637	
.....	1217636	
.....	1217633	
.....	1217634	
.....	1217684	
.....	1217684	V15
.....	1217683	V8
.....	1217629	V1
L.	1217628	V2
.....	1217653	V9, 10
.....	1217685	V3
.....	1217688	V4, 5, 6, 7
		V13, 14
.....	85451	V12, 11
.....	1217618	

TUBES

5U4G Rectifier	5117
6AL5 FM Freq. detector	5251
6BA6 RF amplifier	5252
6BE6 1st detector	5253
6J5 1st and 2nd audio amp.	5187
6J6 H.F. osc. and FM AFC	5254
6SG7 1st and 2nd I.F., AM 2nd det., FM 3rd and 4th I.F.	5226
6V6GT/G push pull audio amp.	5241
6SQ7 Inverter and 3rd audio amp.	5231

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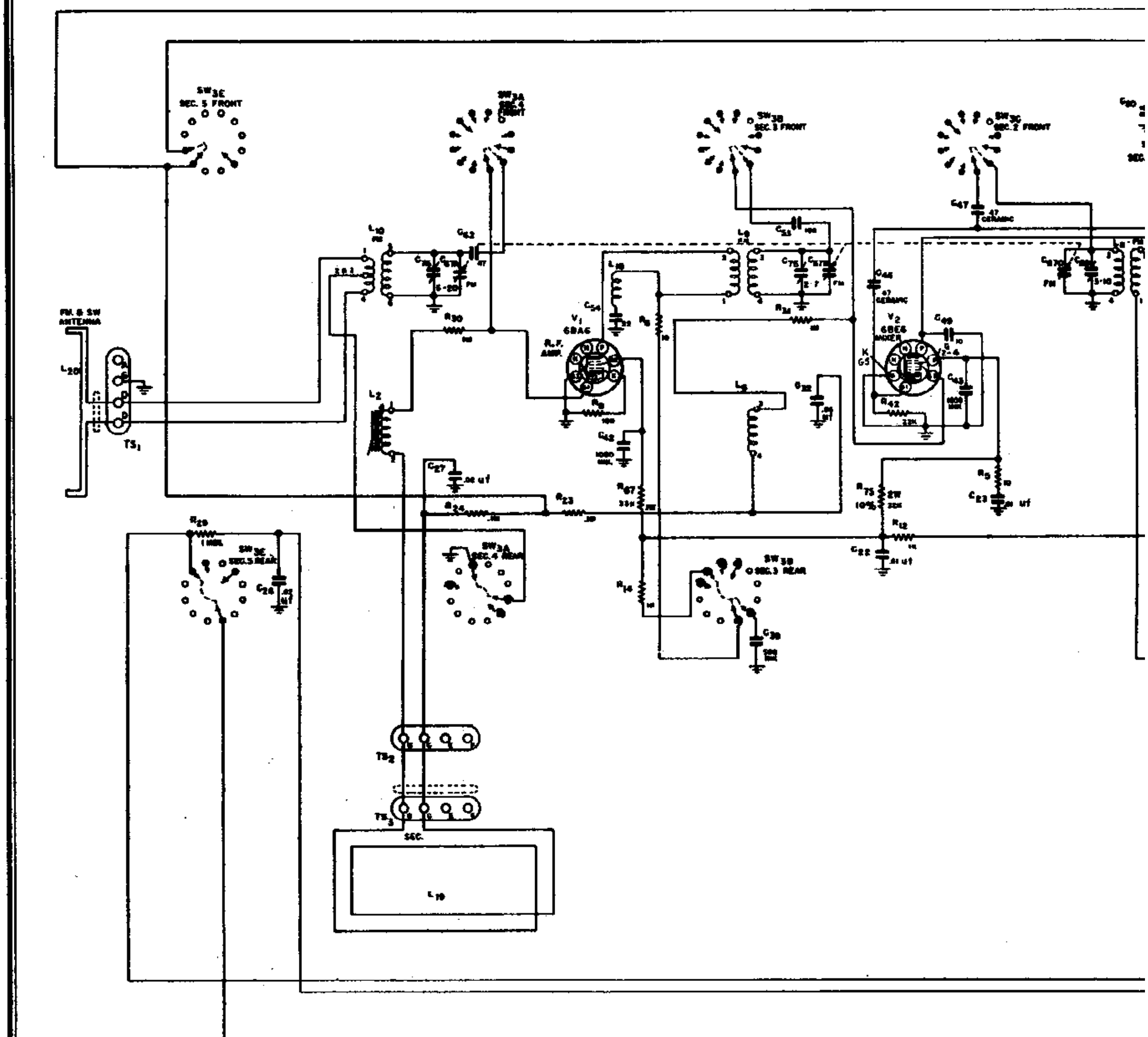

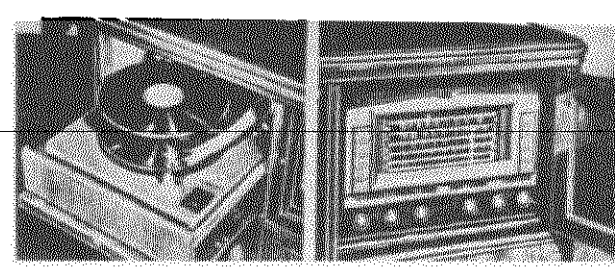

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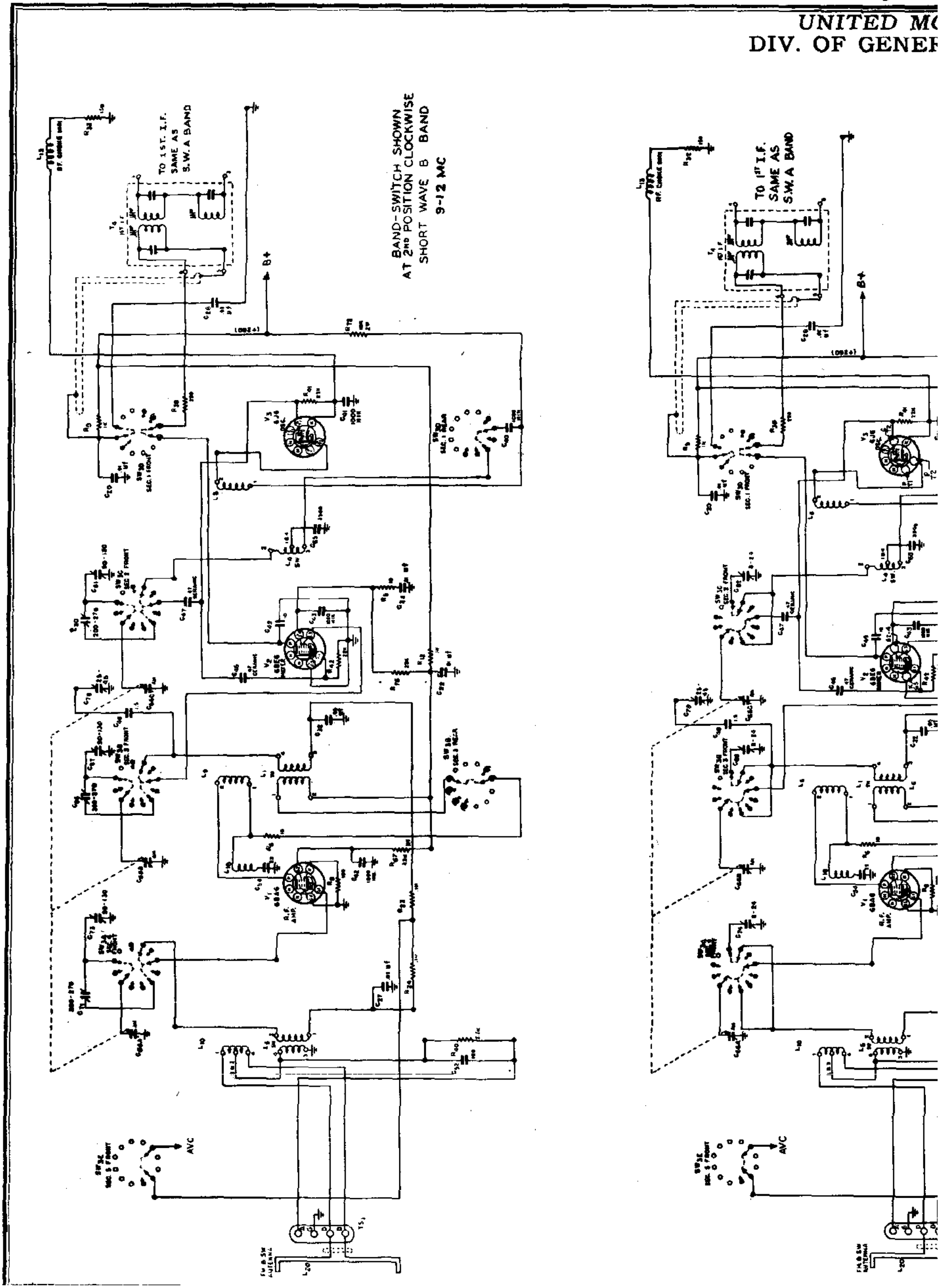

schematics"

OTORS SERVICE
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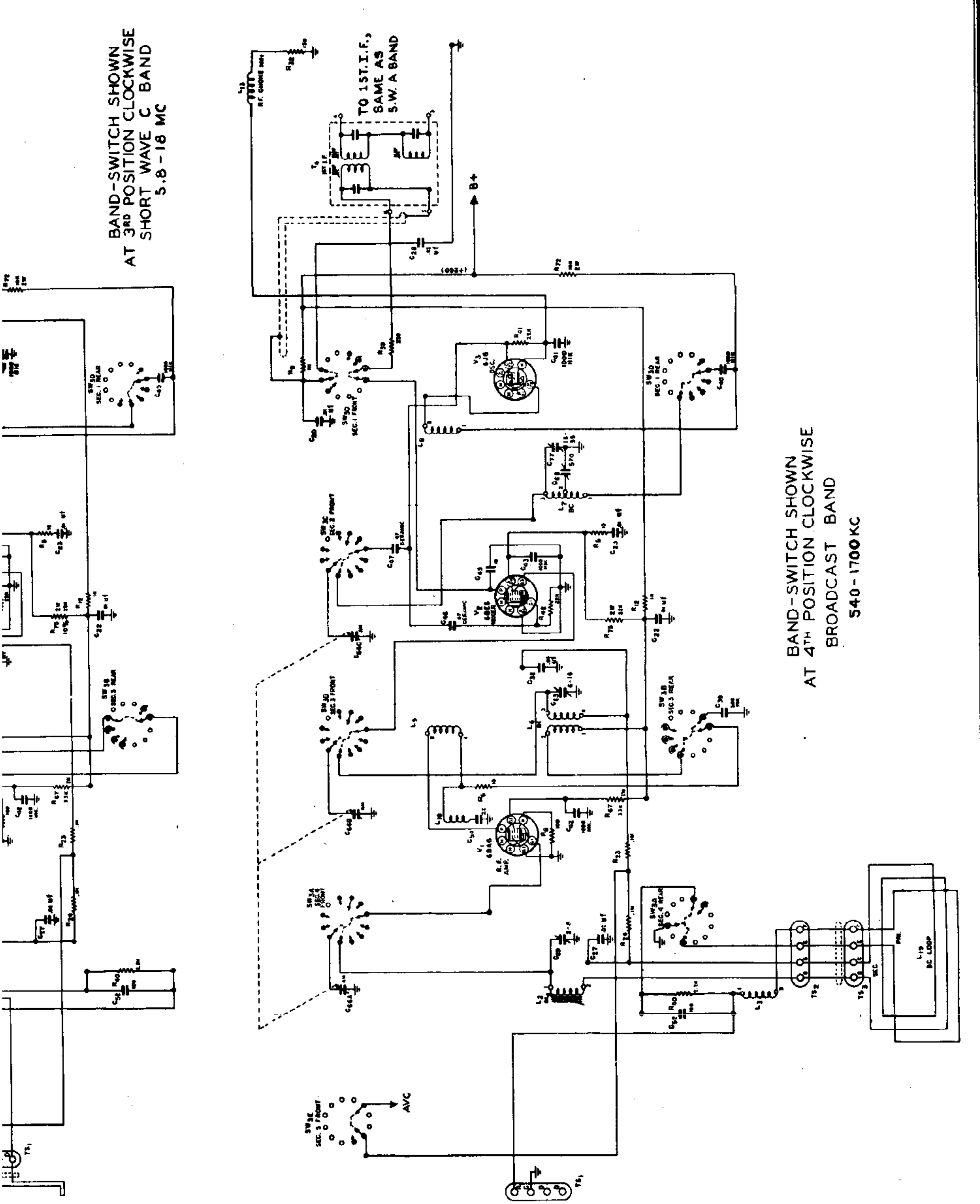

schematics"

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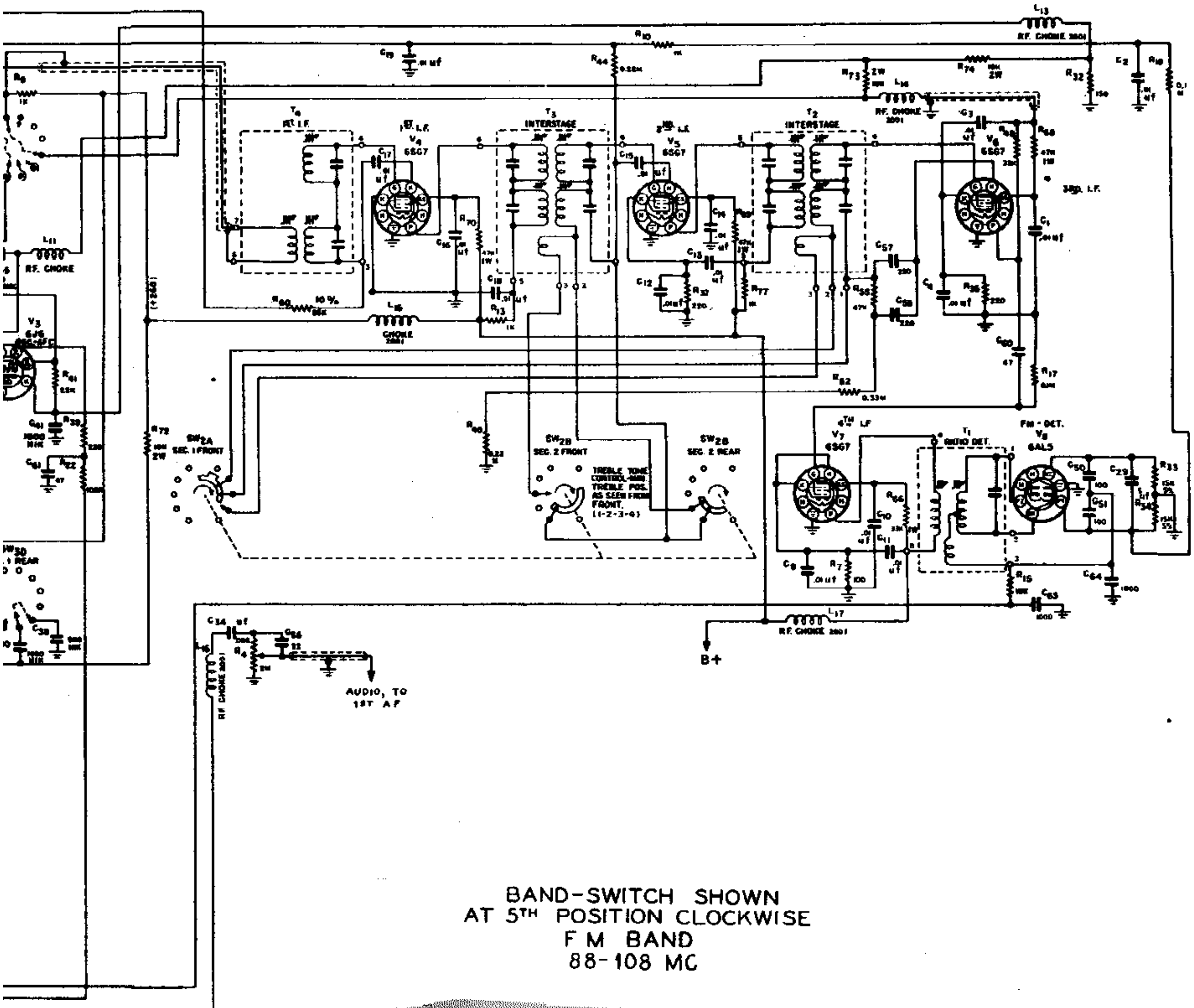
AL MOTORS CORP.



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE
F M BAND
88-108 MC

UNITED MOTORS SERVICE
DIV. OF GENERAL MOTORS CORP.

ALIGNMENT PROCEDURE

Removal of the receiver chassis from the cabinet requires the use of other calibration means than the dial glass. Calibration strips mounted on the pointer rails are provided for alignment purposes.

In order to see these calibration strips, it is necessary that the dial plate (brown metal cover) be removed in the following order:

1. Pull out dial pointers.
2. Remove seven self-tapping screws holding dial plate to chassis.
3. Remove the Right hand and Left hand Dial lamp assemblies fastened by one self-tapping screw each.
4. Remove dial plate.

With the variable condensers fully "closed," the right hand side of the pointer carriage will be indexed to "0" on the calibration strips (see fig. 3).

Proceed with the alignment of the receiver as indicated on the alignment chart.

NOTE: This receiver has AUTOMATIC FREQUENCY CONTROL employed on the "FM" band in order to compensate for discrepancies in P.B. tuning and frequency drift. Its characteristics are such that the "take hold" point is greater than 100 kc plus or minus the frequency of an input signal of .01 volts. The "release" point is approximately 350 kc, plus or minus the frequency of an input signal of .01 volts.

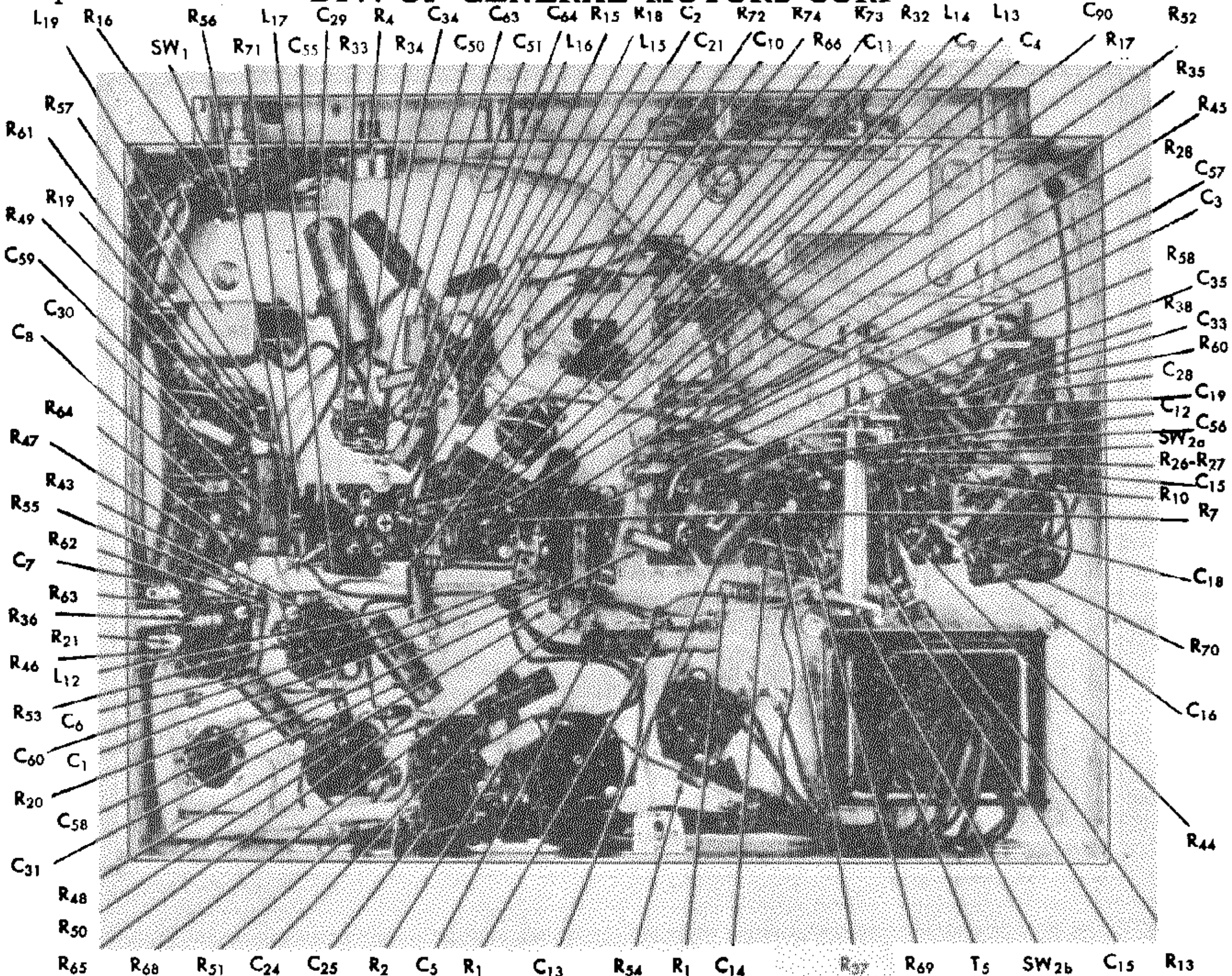
Standard RMA dummy consisting of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

ALIGNMENT PROCEDURE

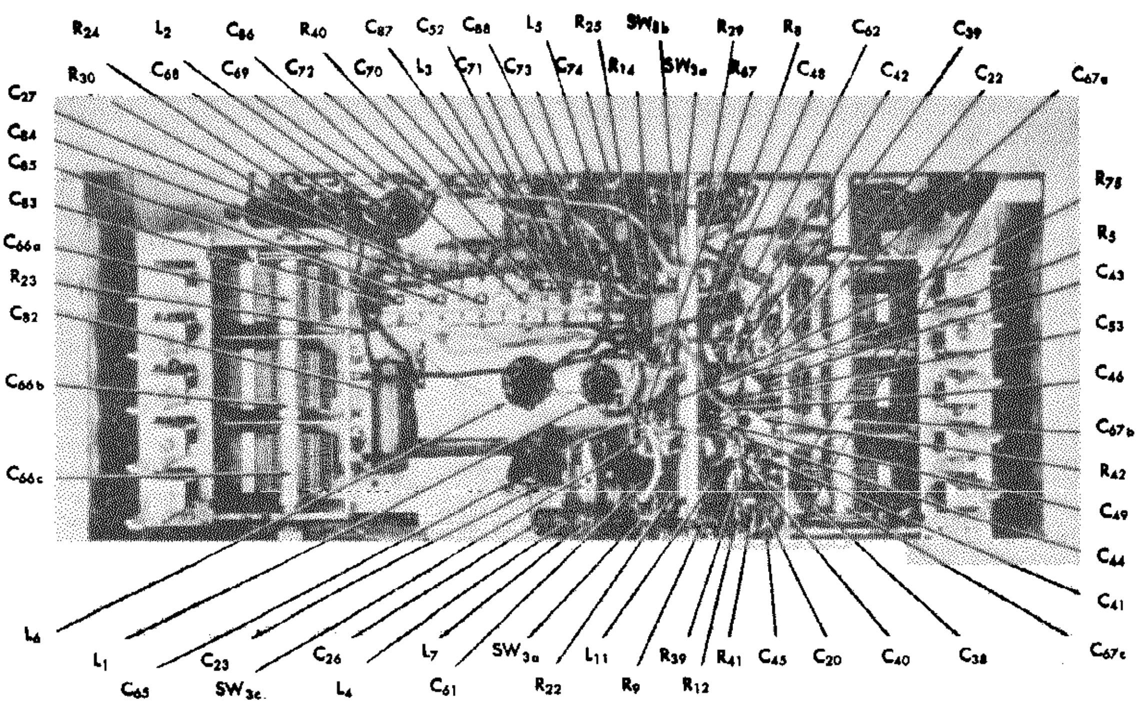
Steps	*Signal Generator Thru .01 Mfd to:*	*Sig. Gen. Tuned to:*	*Calibration Strip No.*	*Adjust the Following Slugs/Trimmers for:*
"AM" i.f. 1.	2nd i.f. control grid	455 kc	55	S3 and S6, Max. output
2.	1st i.f. control grid	455 kc	55	S2 and S5, Max. output
3.	1st Det. control grid	455 kc	55	S1 and S4, Max. output
NOTE: Set "Bass" control at No. 1, and "Treble" control at No. 4, read output for maximum AVC voltage, using a VTVM or 20,000 ohms/volt meter connected to pin No. 7 of the 6AL5 ratio detector tube to ground.				
"FM" i.f. 4.	2nd i.f. control grid	10.7 mc	55	S9, S12, S13 Max. output
5.	1st i.f. control grid	10.7 mc	55	S8 & S11 Max. output
6.	1st Det. control grid	10.7 mc	55	S7, S10 Max. output
NOTE: For ratio detector alignment, clip output meter to C-34 leading to audio control potentiometer and ground.				
7.	1st Det. control grid	10.7 mc	55	S14 for "0" audio voltage
8.	Standard RMA dummy ant. to:	1500 kc	82	"F," Calibration
9.	"A" "G"	1500 kc	82	"H," Max. output
10.	"A" "G"	1500 kc	82	"I," Max. output
11.	"A" "G"	600 kc	15.5	"G," Calibration
12.	"A" "G"	600 kc	15.5	S15, Max. output
13.	"A" "G"	12 mc	91.5	"C," Calibration
14.	"A" "G"	12 mc	91.5	"J," Max. output
15.	"A" "G"	12 mc	91.5	"K," Max. output
16.	"A" "G"	9 mc	6.5	"D," Calibration
17.	"A" "G"	9 mc	6.5	"L," Max. output
18.	"A" "G"	9 mc	6.5	"M," Max. output
19.	"A" "G"	18 mc	94.5	"A," Calibration
20.	"A" "G"	18 mc	94.5	"N," Max. output
21.	"A" "G"	18 mc	94.5	"O," Max. output
22.	"A" "G"	15 mc	7.5	"B," Calibration
23.	"A" "G"	15 mc	7.5	"P," Max. output
24.	"A" "G"	15 mc	7.5	"Q," Max. output
25.	"A" "G"	16 mc	84	"E," Calibration
26.	"A" "G"	16 mc	84	"R," Max. output
27.	"A" "G"	16 mc	84	"S," Max. output
28.	Two 150 ohm resistors to: "D" "D"	108 mc	83.5	"T," Calibration
29.	"D" "D"	108 mc	83.5	"U," Max. output
30.	"D" "D"	108 mc	83.5	"V," Max. output

MODELS R1251, R1252
all production runs

UNITED MOTORS SERVICE
DIV. OF GENERAL MOTORS CORP



Bottom view of receiver showing component location.



Back view of R.F. chassis showing component location.

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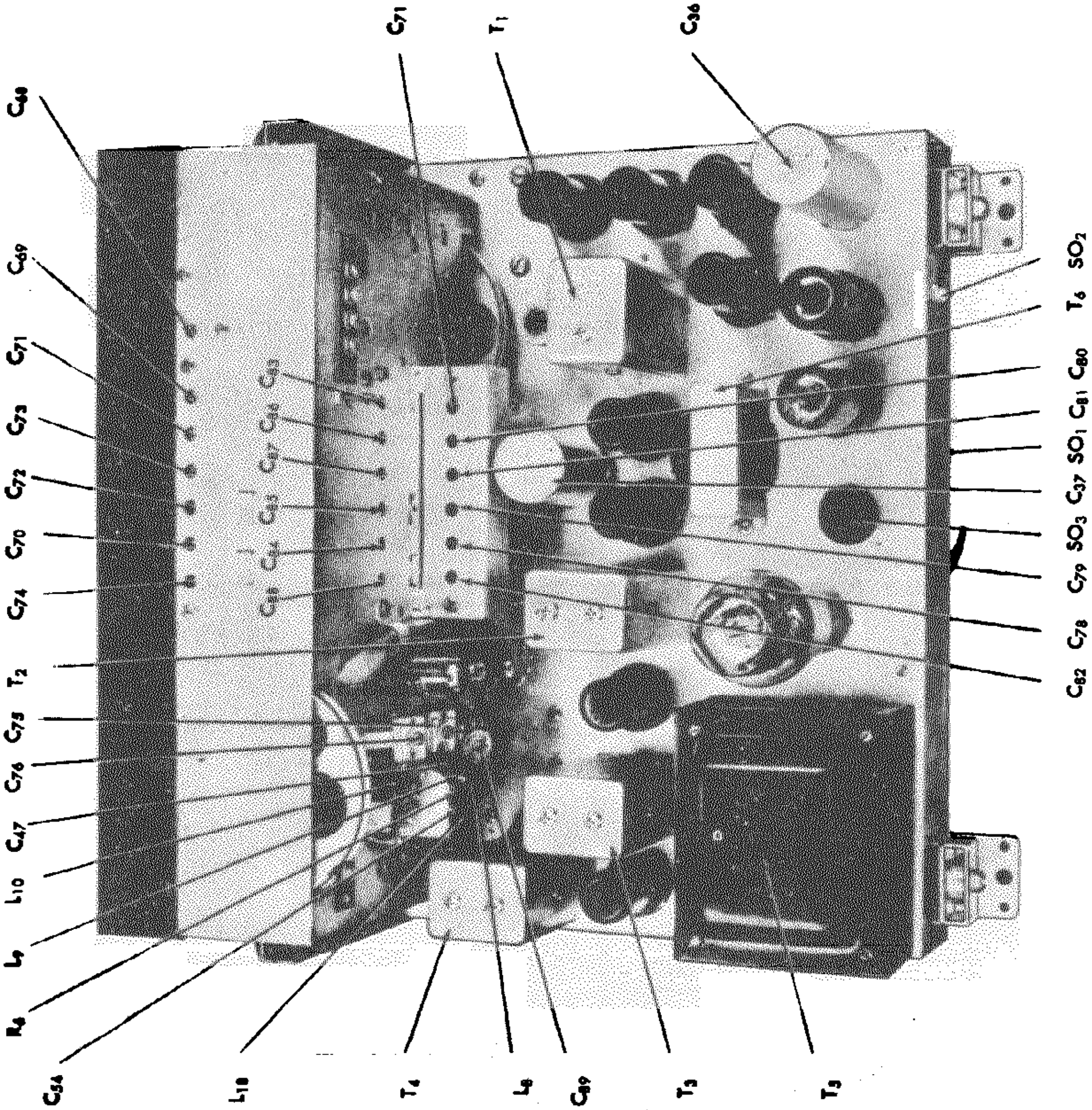
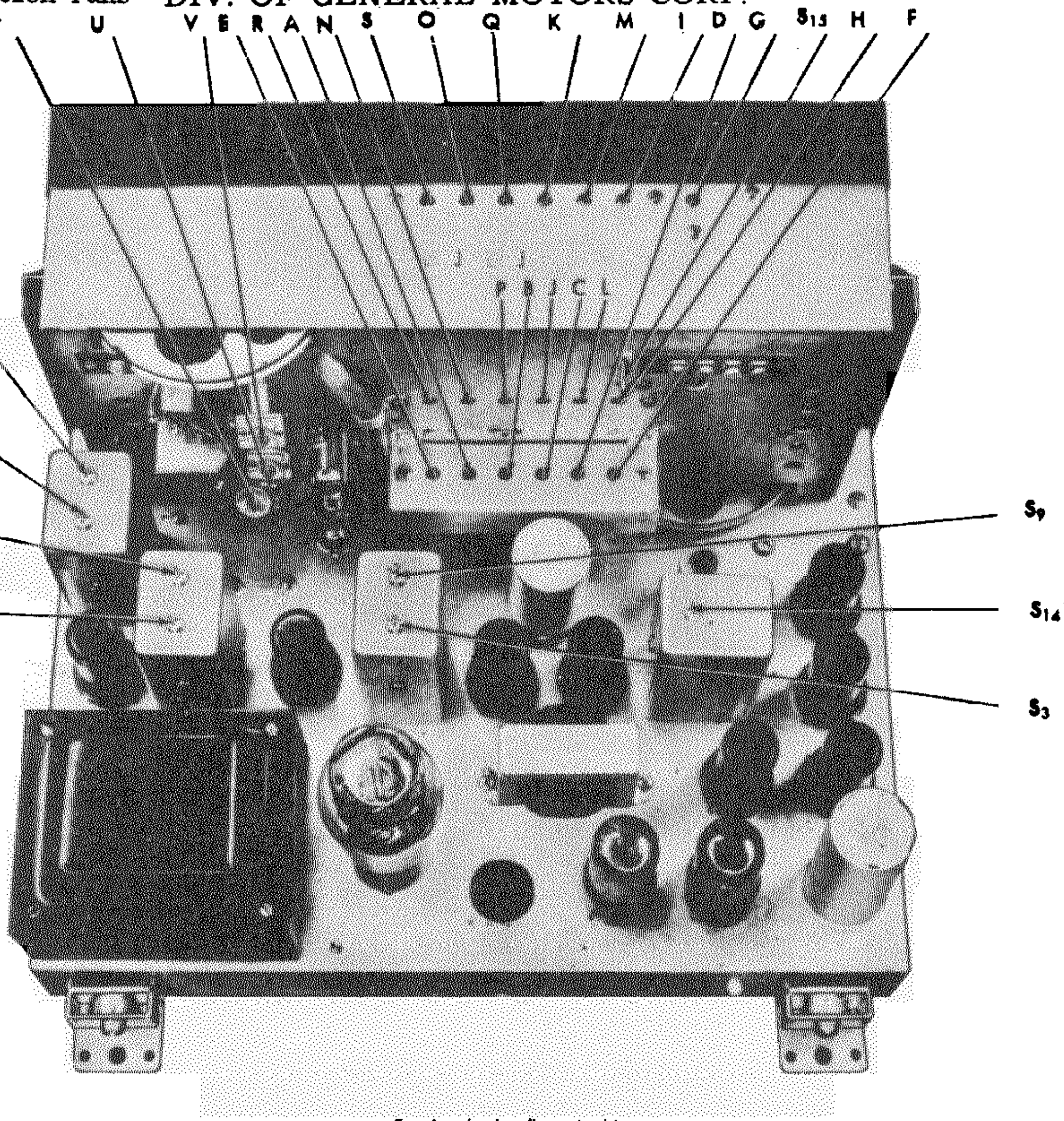


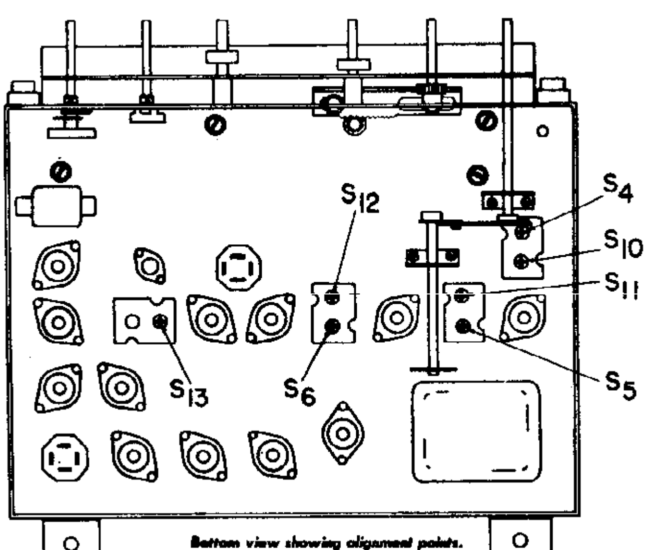
Top view showing component location.

MODELS R1251, R1252
all production runs

UNITED MOTORS SERVICE
DIV. OF GENERAL MOTORS CORP.



Top view showing alignment points.



Bottom view showing alignment points.

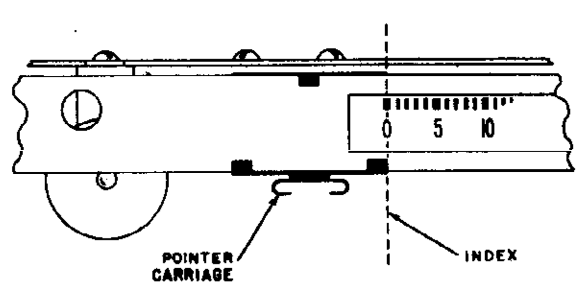
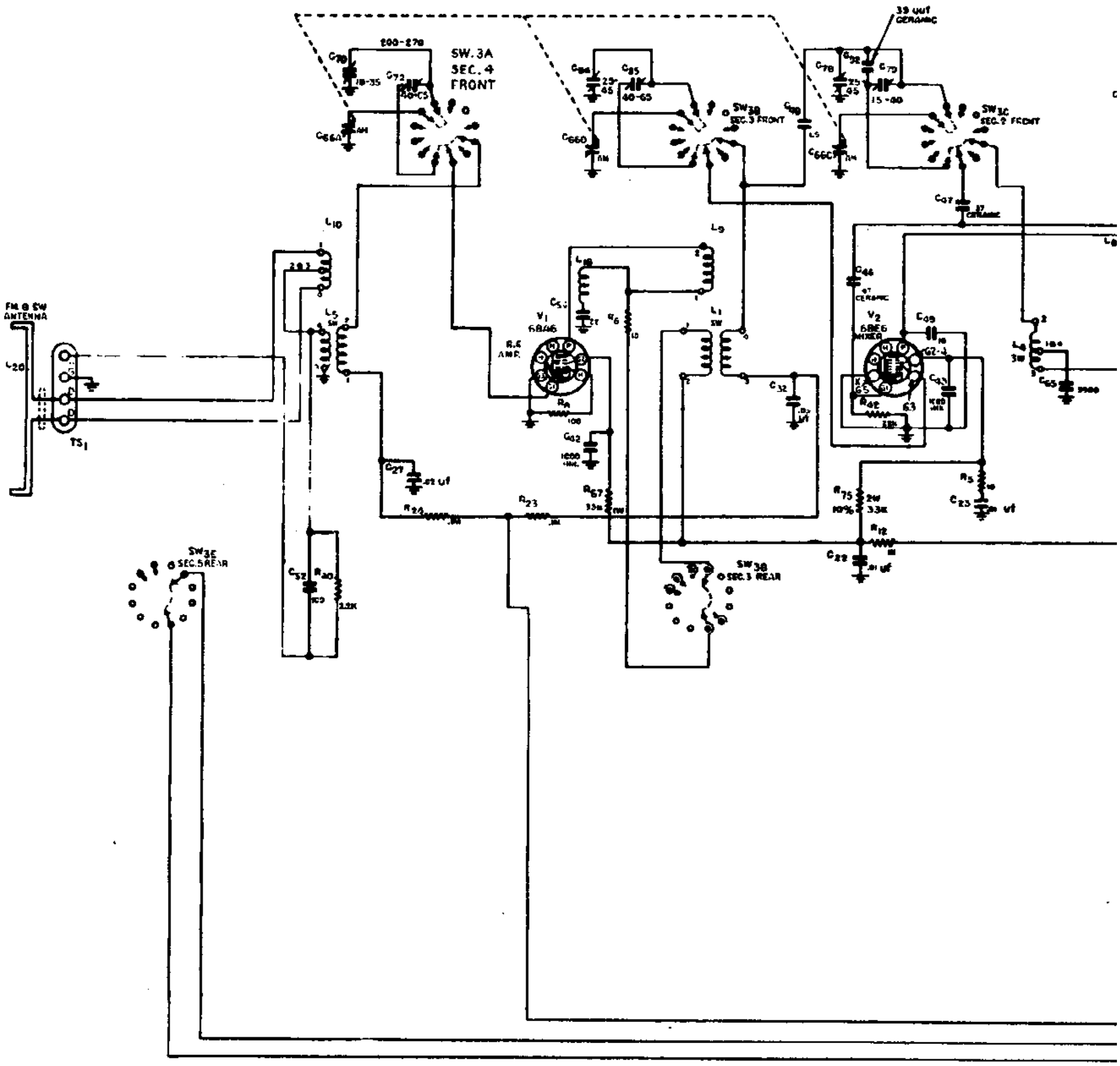


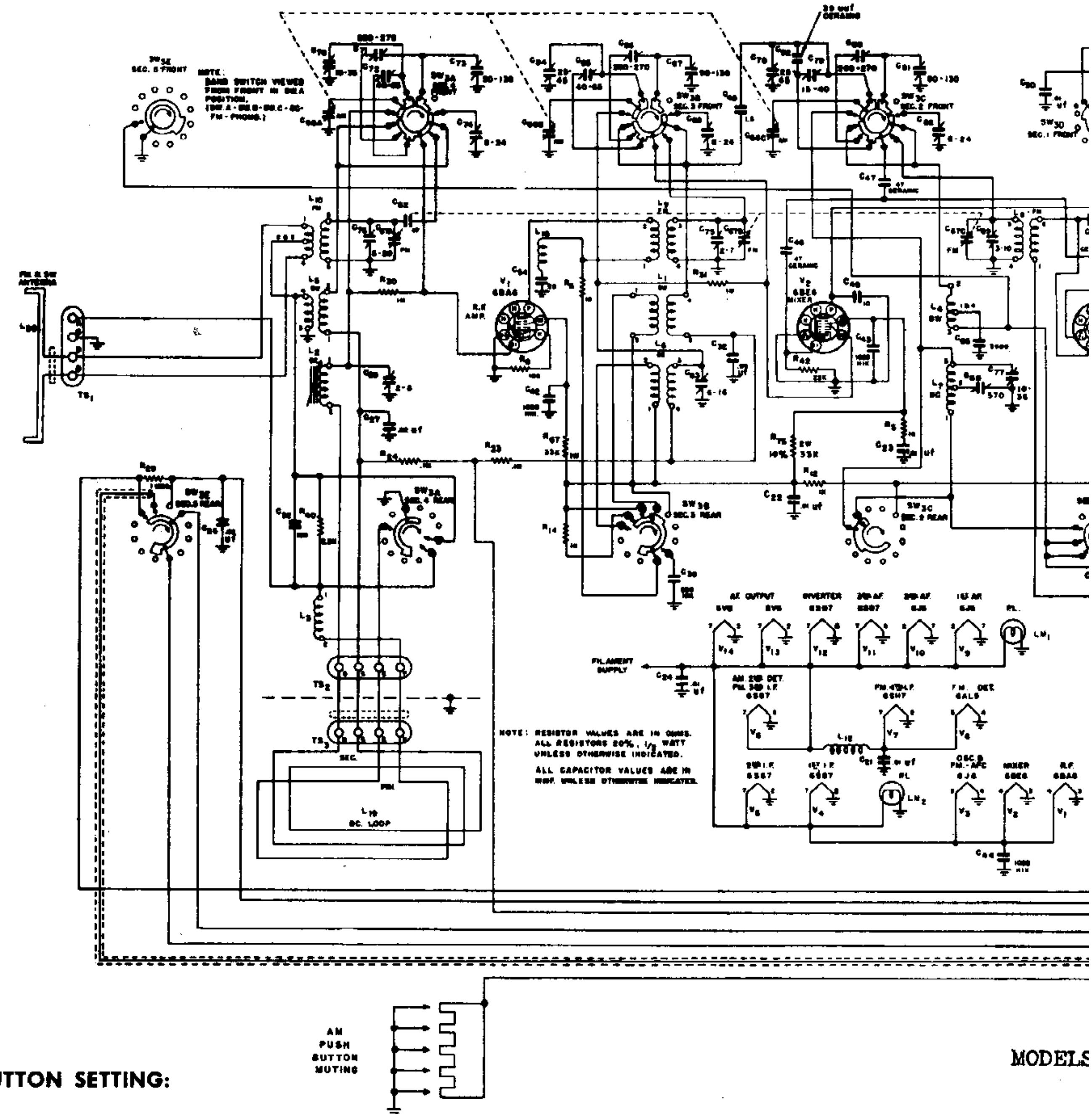
Fig. 3. Calibration strip detail.



DIAL CORD STRINGING INSTRUCTIONS

For restringing the "FM" gang and dial, cut a 5 ft. piece of 9 lb. test dial cord and proceed as indicated in Fig. 7.

For restringing the "AM" gang and dial, cut a 4½ ft. piece of dial cord and proceed as indicated in Fig. 7.



MODELS

BUTTON SETTING:

1. Select any one pushbutton.
2. Pull translucent insert straight out.
3. Insert screw driver blade through large hole of pushbutton into slot of locking screw. (See Fig. 1).
4. Loosen locking screw about one-half turn. (Not more than one full turn.)
5. With pushbutton depressed, carefully tune in desired station with the manual control.
6. With the manual control held firm, tighten the locking screw.

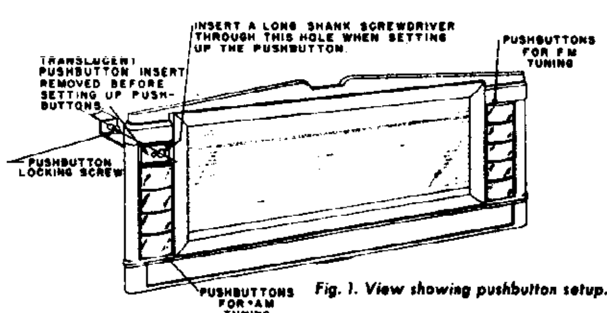


Fig. 1. View showing pushbutton setup.

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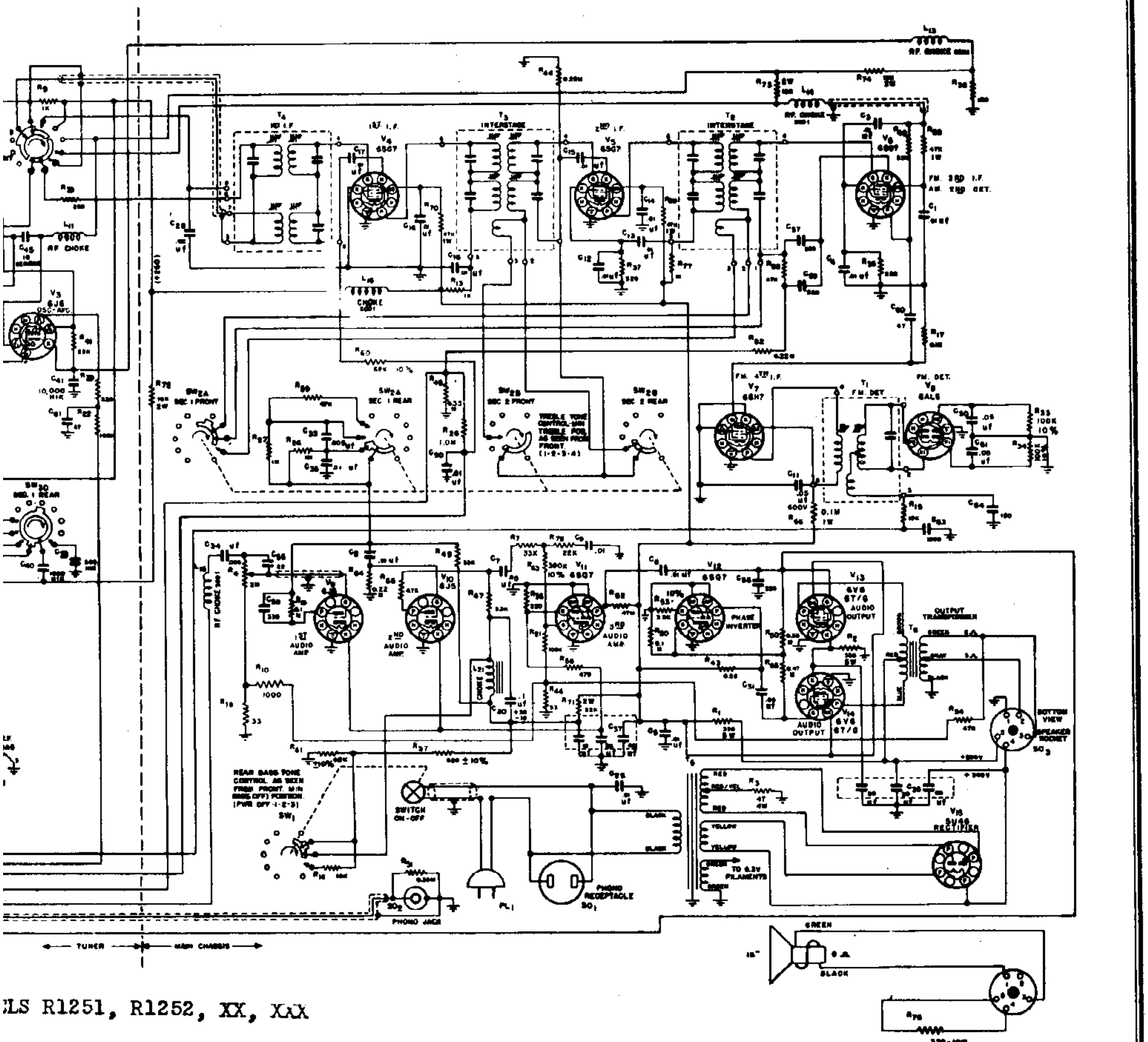


BOTTOM VIEW OF SPEAKER PLUGS

LS R1251, R1252, XX, XXX

INSERTING CALL LETTERS INTO TRANSLUCENT INSERT ASSEMBLY:

1. Slide out metal insert fron translucent insert assembly. (See Fig. 2).
2. Insert Call letter tab.
3. Replace metal insert.
4. Replace translucent insert assembly into pushbutton.

All production runs

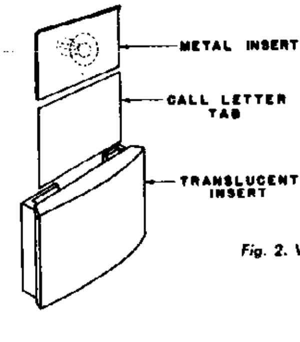
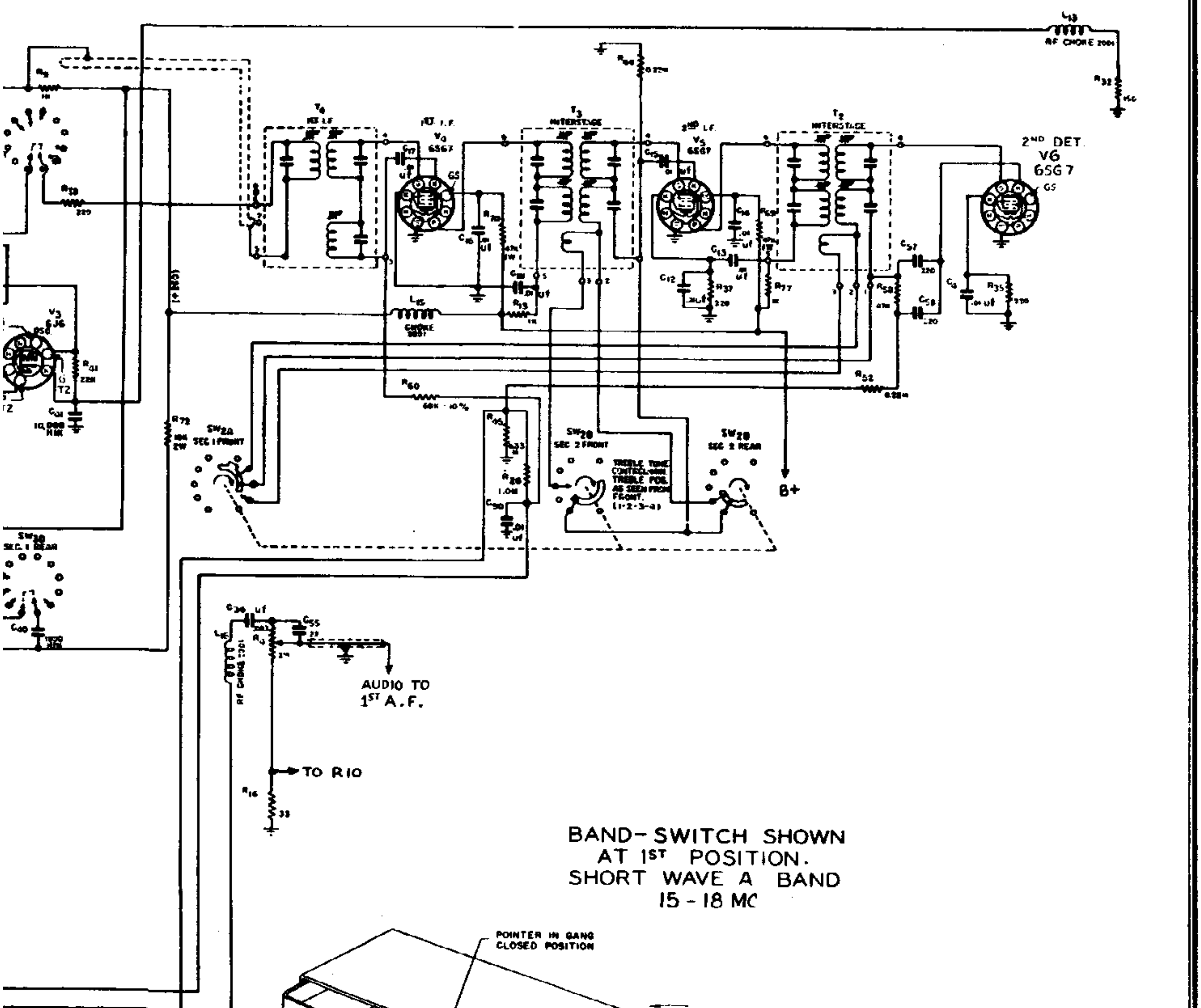


Fig. 2. View showing call letter installation.

TORS SERVICE
AL MOTORS CORP.



BAND-SWITCH SHOWN
AT 1ST POSITION.
SHORT WAVE A BAND
15 - 18 MC

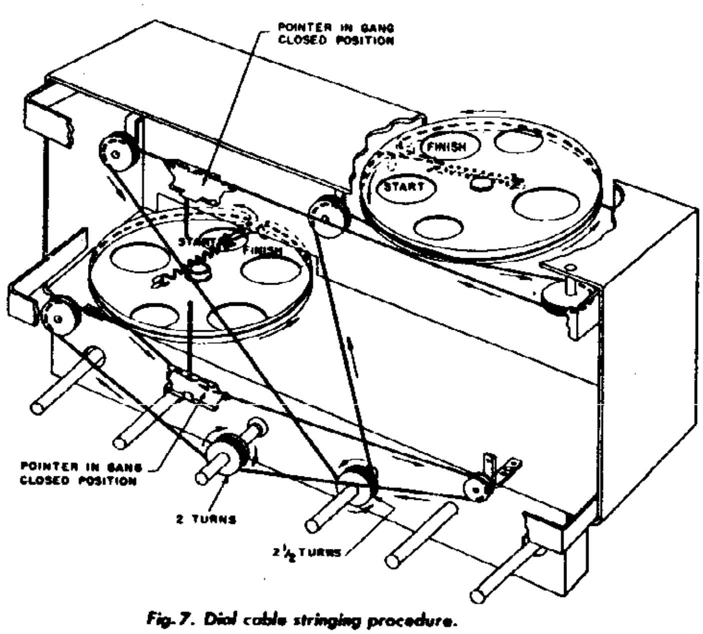


Fig. 7. Dial cable stringing procedure.

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MODELS R1251, R1252, X
MODELS R1251, R1252, XX, XXX

UNITE
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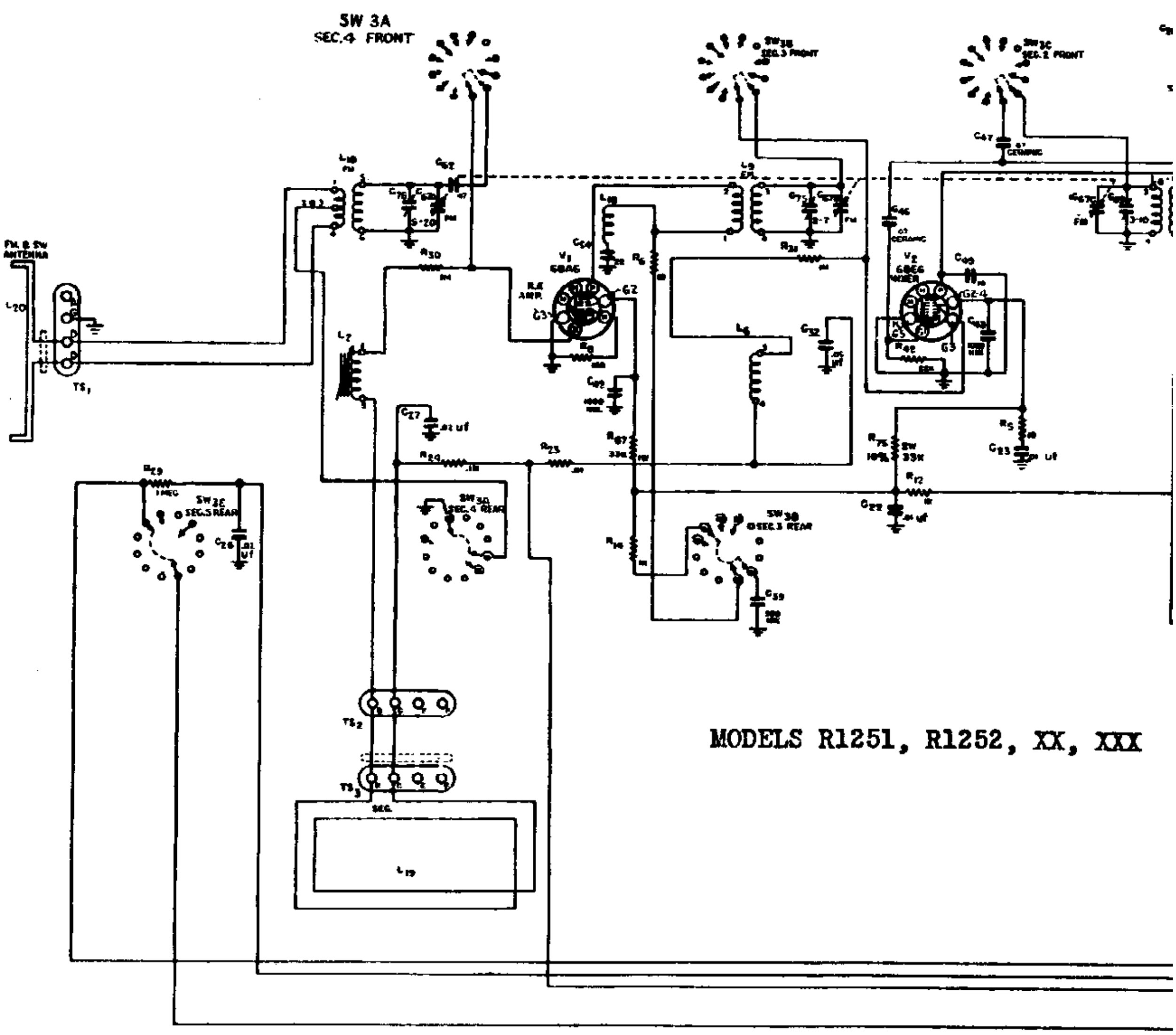


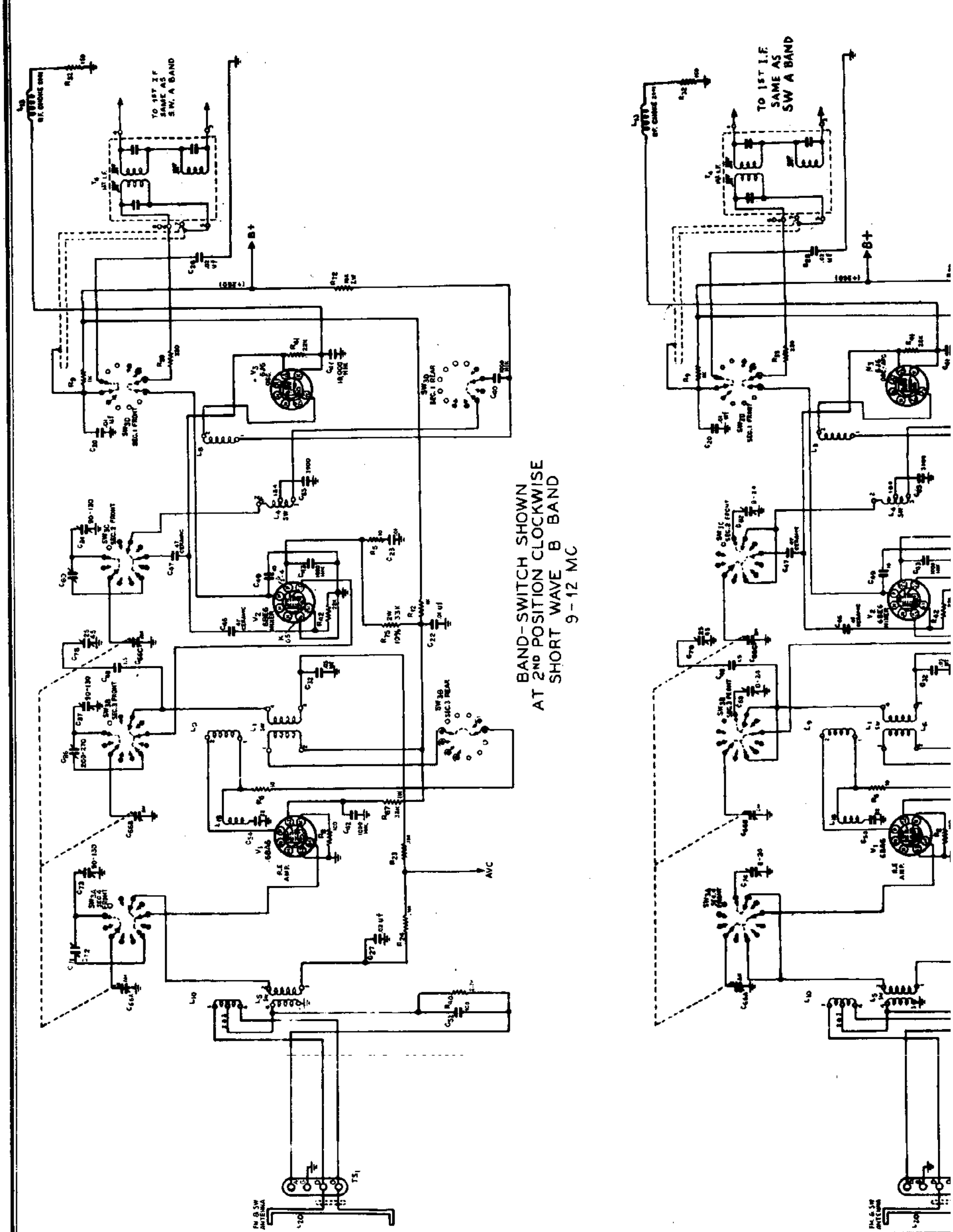
MODELS R1251, R1252, XX, XXX

All production runs

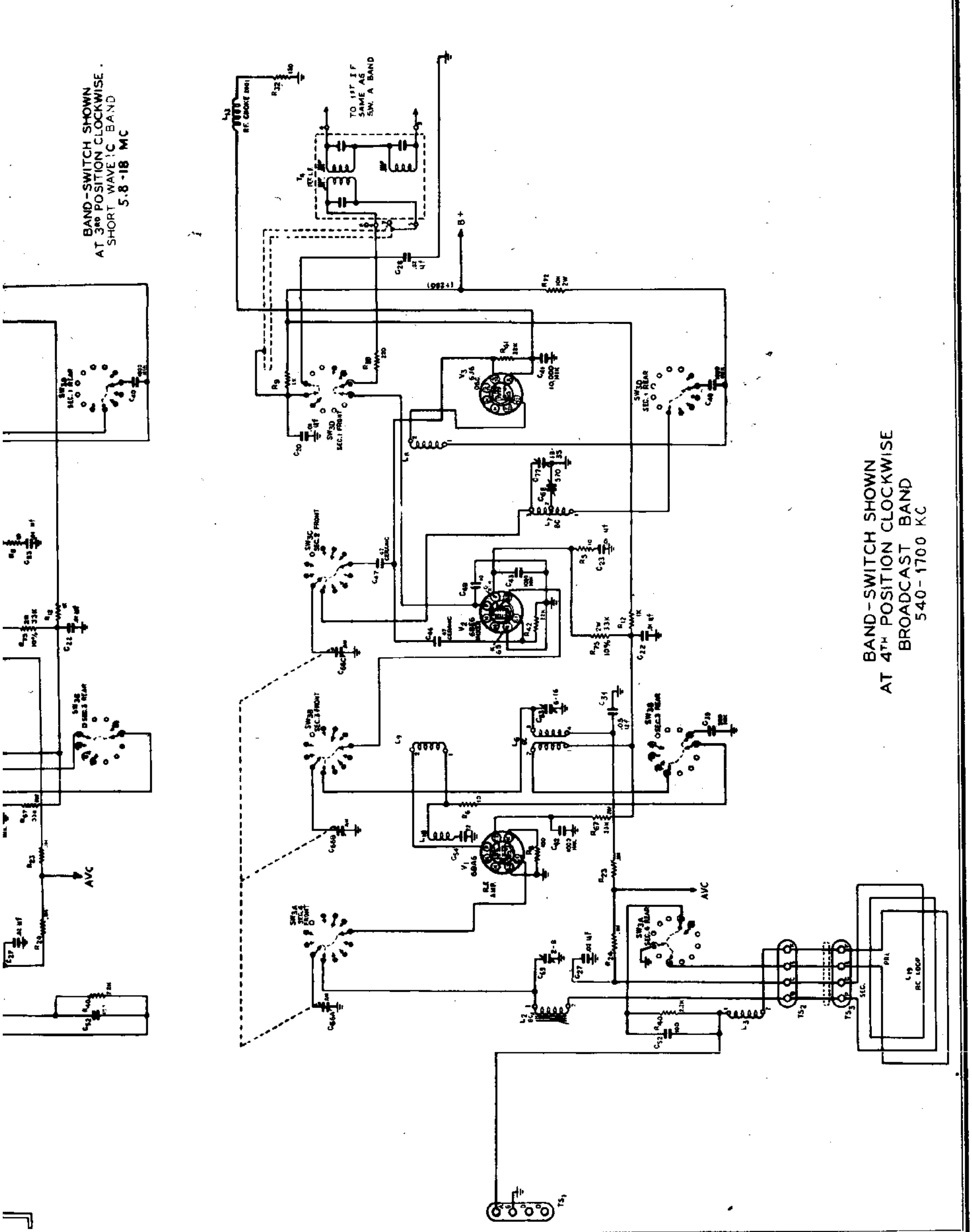
SERVICE PARTS LIST

Illustration No.	Description	Delco Part No.
	CABINET PARTS	
	Mahogany	1217814
	Walnut	1217813
	TRANSFORMERS AND COILS	
T1	Freq. detector trans. FM	1217635
T2, 3	Interstage I.F. trans.	1217639
T4	1st I.F. trans.	1217640
L1	R.F. Coil, short wave	1217641
L2	Loading coil, ant., BC	1217642
L3	Loop loading coil	1217643
L4	Osc. coil, short wave	1217644
L5	Ant. coil, short wave	1217645
L6	R.F. Coil, B.C.	1217646
L7	Osc. coil, B.C.	1217647
L8	Osc. coil, FM	1217648
L9	R.F. coil, FM	1217718
L10	Ant. coil, FM	1217649
L11	Plate choke	1217613
L12	Filament choke	1217615
L13, 14, 15, 16, 17	R.F. choke	1217614
L18	R.F. choke	1217780

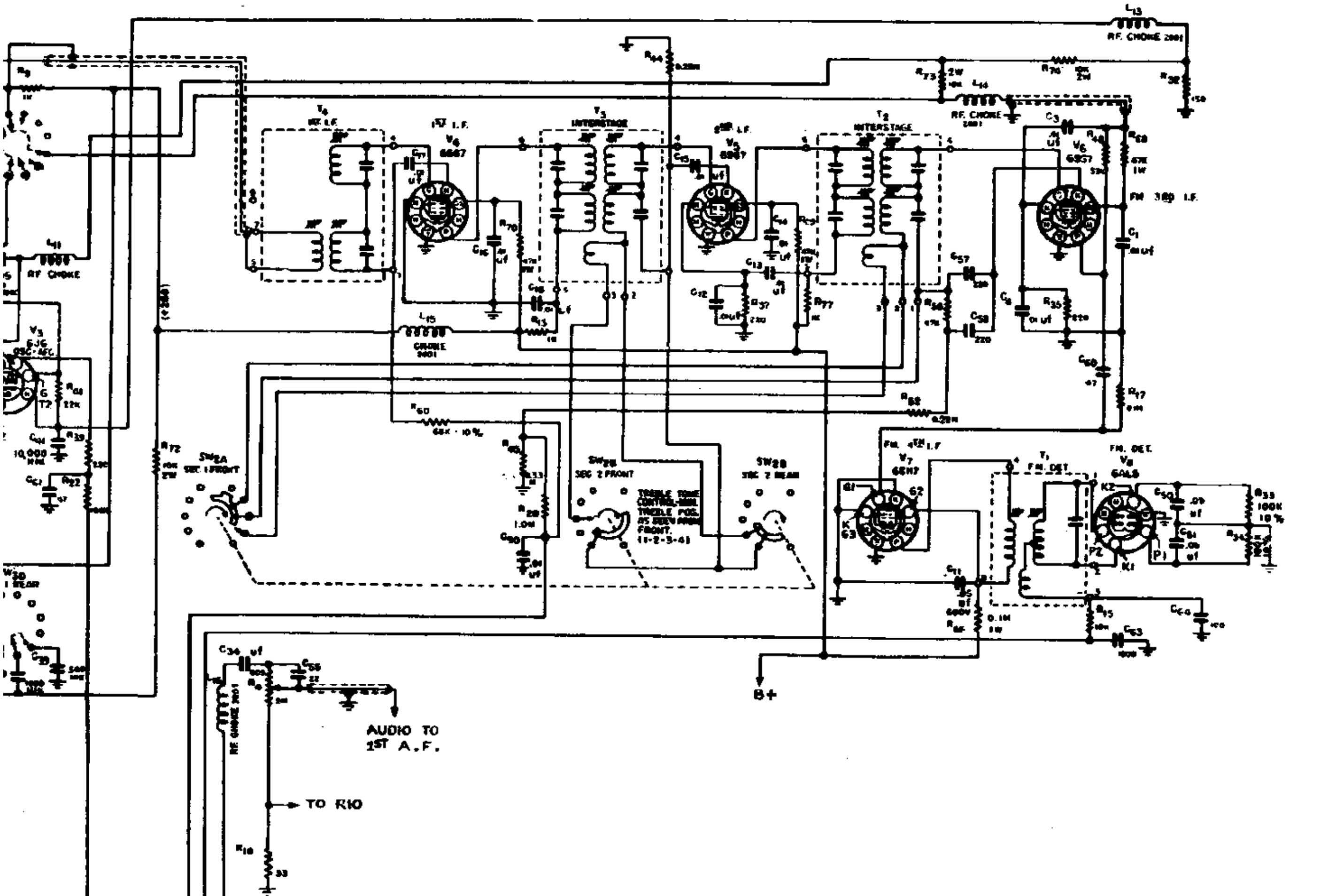
L19	BC-SW loop
L20	FM dipole a
T5	Power trans
T6	Output trans
L21	Audio choke
C1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 90, 91.	.01 mfd. 600
C26, 27, 28	.02 mfd 600
C30	.1 mfd 200 v
C31, 32	.05 mfd 600
C33	.002 mfd 600
C34, 35	.003 mfd 600
C38, 39	500 uuf cera
C40, 41, 42, 43, 44, 16	1000 uuf cera
C45	10 uuf ceram
C46, 47	47 uuf ceram
C48	1.5 uuf "Gim
C49	10 uuf 500 v.
C50, 51, 52, 53	100 uuf 500 v
C54	22 uuf 500 v.
C55	22 uuf 500 v.
C56, 57, 58	220 uuf 500 v
C59	330 uuf 500 v


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE B BAND
9-12 MC
TO 1ST I.F. SAME AS SW A BAND
B+
AVC

ORS SERVICE
L MOTORS CORP.



TORS SERVICE
AL MOTORS CORP.



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE
F-M BAND
88 - 108MC

	1217679
	1217775
	1217600
	1217599
	1217650

CONDENSERS

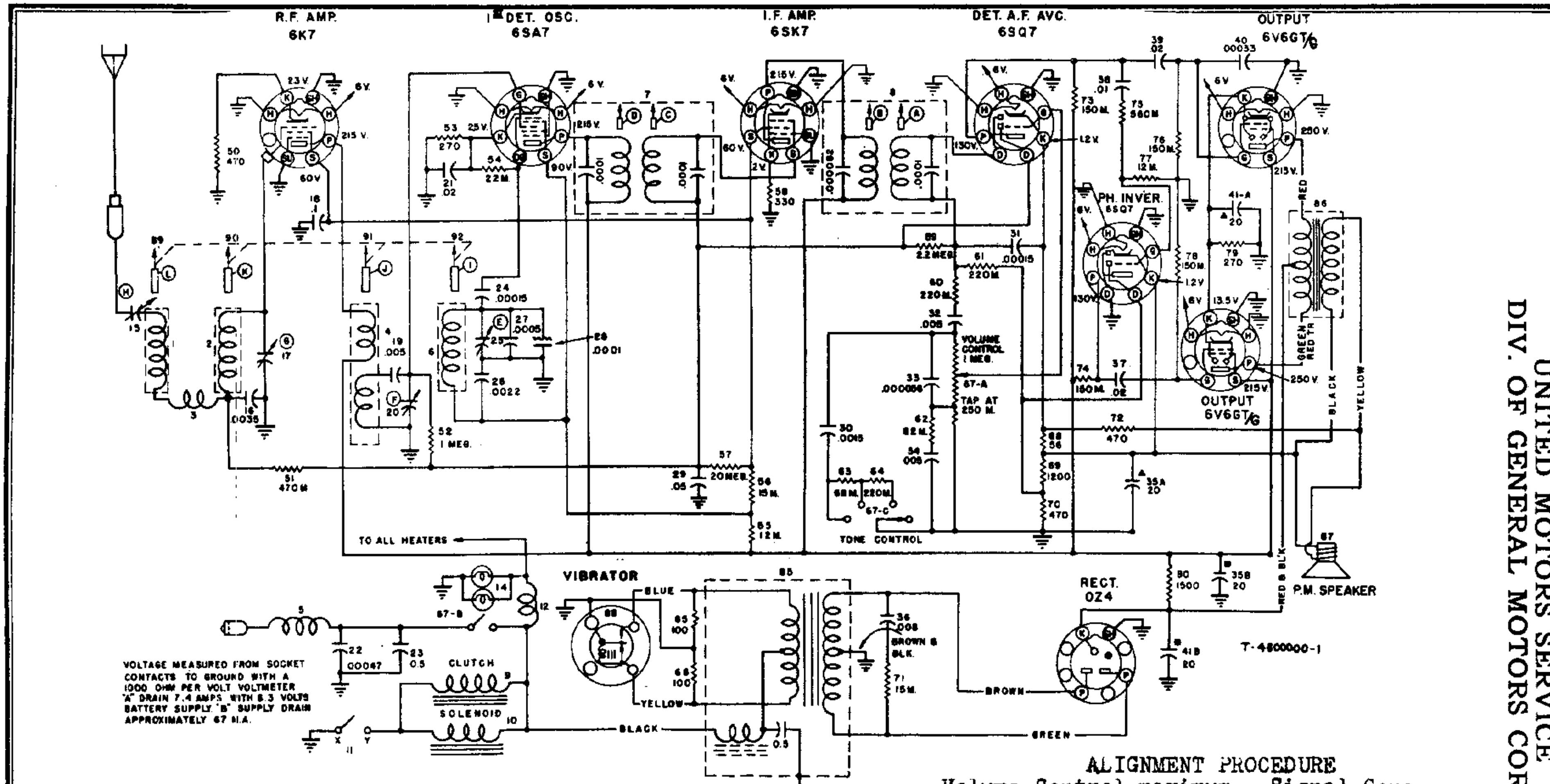
	E103
	E203
	E104
	E503
	E202
	E302
	1217712
	1217713
	1217714
	1217715
	Not Supplied
	G100
	G101
	G220
	G220
	G221
	G331

C60, 61, 62	47 uuf 500 v. mica	G470
C63 64	1000 uuf 500 v. mica	G102
C65	3900 uuf 500 v. mica	G392
C36	60-20 mfd 450 v. electrolytic 20 mfd 30 v. electrolytic	1217710
C37	40-10 mfd 450 v. electrolytic 20 mfd 30 v. electrolytic	1217711
C29	5 mfd. 50 v. electrolytic	J051
C68	570 uuf, trimmer	1217703
C75	Trimmer, FM, RF	1217705
C89	Trimmer, FM, Osc.	1217706
C76	Trimmer, FM, Ant.	1217707
C69, 70, 71, 72, 73, 74	Trimmer assembly, ant.	1217704
C77, 78, 79, 80, 81, 82	Trimmer assembly, Osc.	1217708
C83, 84, 85, 86, 87, 88	Trimmer assembly, RF	1217709
C67a-b-c	Variable condenser, "FM"	1217715
C66a-b-c	Variable Condenser, "AM"	1217717
C92	39 uuf, Ceramic	5255

RESISTORS

R1, 2	330 ohm, 5W WW	1217700
R76	330 ohm 10 W WW	1217831
R3	200 ohm 5W WW	1217701
R4	2 meg. volume control	1217702
R5, 6	10 ohm, ½ W	A100
R7, 8	100 ohm, ½ W	A101

UNITED MOTORS SERVICE
DIV. OF GENERAL MOTORS CORP.



Series Condenser Dummy Antenna	Connect to	Signal Generator Frequency	Tune Receiver To	Adjust Screws in Order
.1 Mfd.	6SK7 Grid	260 K.C.	No Broadcast Signal	A, B
.1 Mfd.	6SA7 Grid	260 K.C.	No Broadcast Signal	C, D
*.000072	Antenna	1,645 K.C.	Extreme High Freq. End	E, F, G, H
.000072	Antenna	1,620 K.C.	Extreme High Freq. End	I, J, K, L
.000072	Antenna	1,200 K.C.	Signal Generator	J, K, L
.000072	Antenna	600 K.C.	Signal Generator	F, G, H

ALIGNMENT PROCEDURE

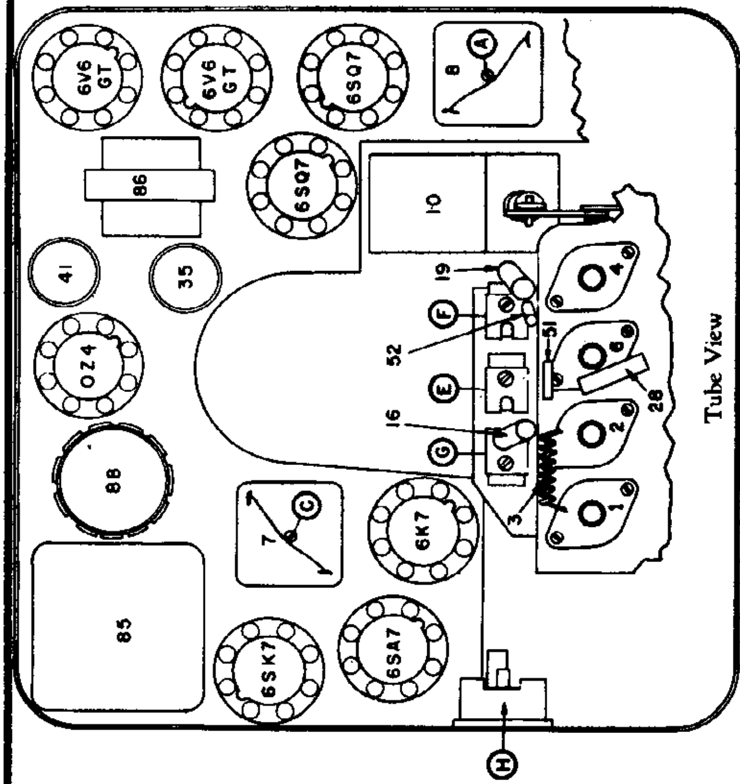
Volume Control maximum. Signal Generator output minimum for satisfactory output indication.

*Before making this adjustment, turn core screws, I, J, K, L several turns in a counter clockwise direction until the threaded stud extends 5/8" through the core bar (Illus.94). The purpose of this adjustment is to completely remove the tuning cores from the coils for the initial trimmer adjustments.

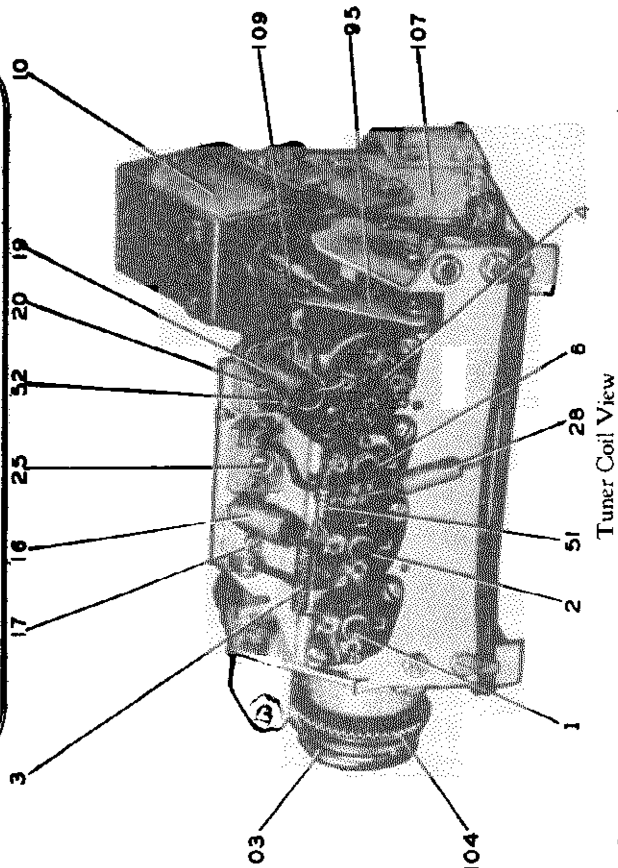
Adjust trimmer (H) to match car antenna (1.200 K.C.) when radio is in-

MODEL 984172, Pontiac

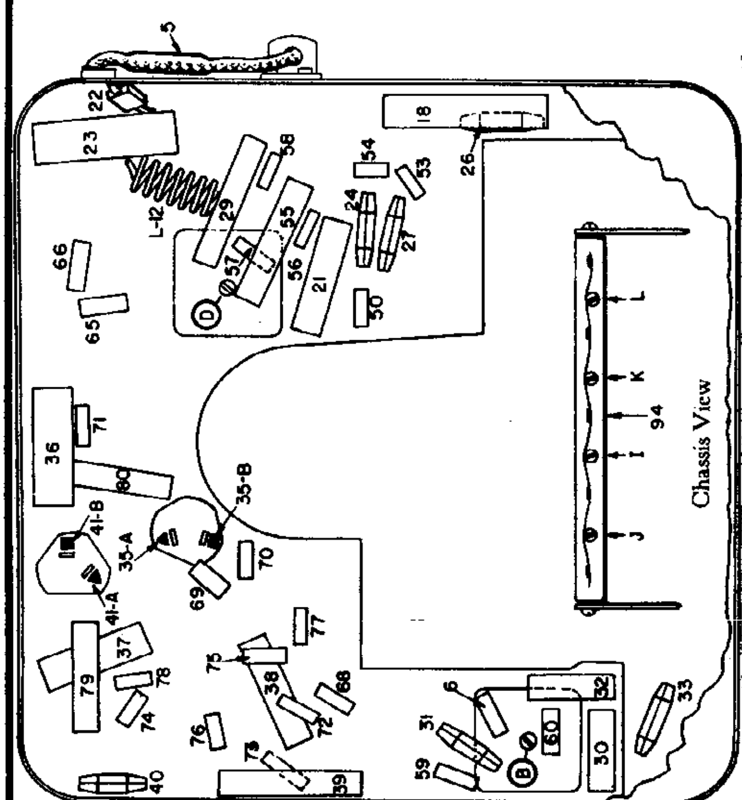
UNITED MOTORS SERVICE
DIV. OF GEN. MOTORS CORP.



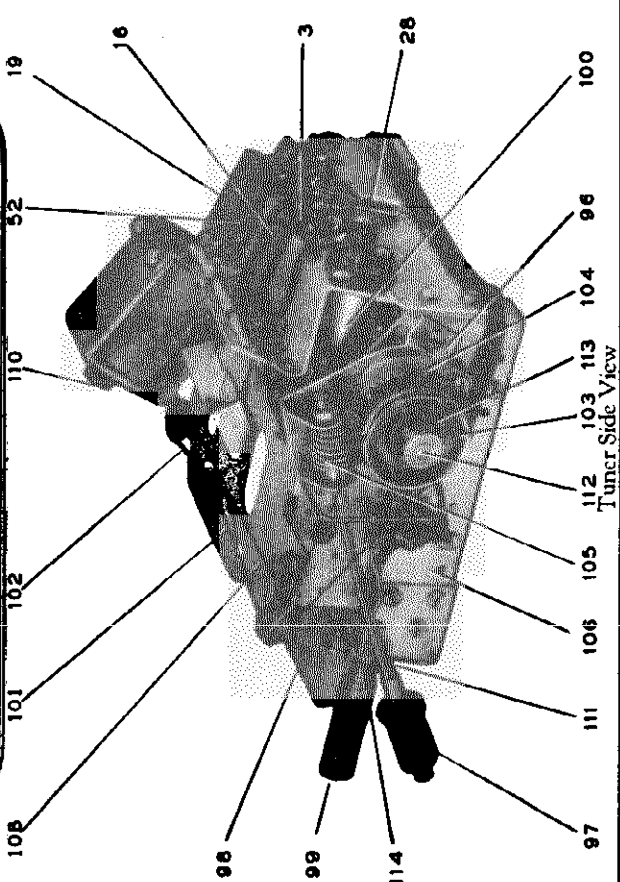
Tube View



Tuner Coil View



Chassis View



Tuner Side View

UNITED MOTORS SERVICE
DIV. OF GEN. MOTORS CORP.

SERVICE PARTS LIST

Coils

Ill. No.	Service Part No.	Description
1	1215800	Antenna (less shield can)
2	1215800	Antenna (less shield can)
3	1215801	Antenna choke
4	1215802	R.F. (less shield can)
5	1215803	"A" lead and choke assembly
6	1215804	Oscillator (less shield can)
7	1214491	First I.F. transformer
7A		I.F. coil assemblies
7B		.0001 mfd. mica
8	1214492	Second I.F. transformer
8A		I.F. coil assemblies
8B		.000082 mfd., mica
8C		.0001 mfd., mica
9	1214463	Clutch
10	1216431	Solenoid

Condensers

Ill. No.	Service Part No.	Description
15	1214494	Antenna trimmer and bracket
16	7232954	.0035 mfd., 700 volts, tubular
17	1214456	8-80 mmfd.—trimmer
18	1207908	0.1 mfd., 400 volts—tubular
19	7230912	.005 mfd., 800 volts—tubular
20	1214456	8-80 mmfd.—trimmer
21	1212099	.02 mfd., 600 volts—tubular
22	1214168	.00047 mfd.—mica
23	7232403	0.5 mfd., 150 volts—tubular
24	7230893	.00015 mfd.—moulded mica
25	1214456	8-80 mmfd.—trimmer
26	7236159	.0022 mfd.—silvered mica, moulded
27	7236160	.00051 mfd.—silvered mica, moulded
28	1216120	.0001 mfd.—ceramic
29	7230592	.05 mfd., 600 volts—tubular
30	1214167	.0015 mfd., 1,500 volts—tubular
31	7230893	.00015 mfd.—moulded mica
32	7230912	.005 mfd., 800 volts—tubular
33	1215077	.000056 mfd.—moulded mica
34	7230912	.005 mfd., 800 volts—tubular
35	1216122	Electrolytic
35A		20 mfd., 25 volts
35B		20 mfd., 350 volts
36	1215191	.008 mfd., 1,500 volts—tubular
37	1212099	.02 mfd., 600 volts—tubular
38	1208600	.01 mfd., 600 volts—tubular
39	1212099	.02 mfd., 600 volts—tubular
40	7232957	.00033 mfd.—moulded mica
41	1216122	Electrolytic
41A		20 mfd., 25 volts
41B		20 mfd., 350 volts

Resistors

Ill. No.	Service Part No.	Description
50	1213486	470 ohms, ½ watt
51	1210470	500,000 ohms, ½ watt
52	1209885	1 meg., ½ watt
53	1211188	270 ohms, ½ watt
54	1210882	20,000 ohms, ½ watt
55	1212491	12,000 ohms, 2 watt
56	1211089	15,000 ohms, ½ watt
57	7242581	20 meg., ½ watt
58	1211220	300 ohms, ½ watt
59	1211164	2 meg., ½ watt
60	1210119	200,000 ohms, ½ watt
61	1210119	200,000 ohms, ½ watt
62	1210832	75,000 ohms, ½ watt
63	1210832	75,000 ohms, ½ watt
64	1210119	200,000 ohms, ½ watt
65	1211002	100 ohms, 1 watt
66	1211002	100 ohms, 1 watt
67	1215806	Volume control, tone control, and power switch
67A		Volume control
67B		Power switch
67C		Tone control
68	1212288	50 ohms, ½ watt
69	1211038	1,200 ohms, ½ watt
70	1213486	470 ohms, ½ watt
71	1211091	15,000 ohms, 1 watt
72	1213486	470 ohms, ½ watt
73	1211163	150,000 ohms, ½ watt
74	1211163	150,000 ohms, ½ watt
75	7232592	600,000 ohms, ½ watt
76	1211163	150,000 ohms, ½ watt
77	7231810	12,000 ohms, ½ watt
78	1211163	150,000 ohms, ½ watt
79	1216117	270 ohms, 2 watt
80	1216125	1,500 ohms, 2 watt

Miscellaneous Electrical Parts

Ill. No.	Service Part No.	Description
85	1215807	Vibrator transformer
85A		Transformer coil and core
85B		0.5 mfd., 100 volts—tubular
85C		Reactor
86	1214488	Output transformer
87	1216432	Dynamic speaker, 6⅜ in. x 9¼ in. Elliptical
87A	1215838	Cone and voice coil
87B	1215839	Dust cap
88	8542	Vibrator
89, 90, 91, 92	1215809	Tuning core—Color code YELLOW
89, 90, 91, 92	1215810	Tuning core—Color code GREEN
89, 90, 91, 92	1215811	Tuning core—Color code RED

Tuner Mechanical Parts

Ill. No.	Service Part No.	Description
	145635	Ball—For worm gear
94	1214461	Bar—Coil core draw
	1214484	Bar—Contact latch
	1214458	Bar—Rocker and gear
95	1216434	Bar—Solenoid draw and link
96	1215812	Bracket—Clutch and bearing assembly
	1214481	Bracket—Push button guide
97	1214476	Bushing—Tuning shaft
98	1215813	Button—Push
99	1215814	Button—Set-up
100	1215815	Can—Coil shield
101	1215816	Cord—Pointer cord and long link
102	1214508	Cord—Pointer cord and short link
	1216435	Dial—Tuning
	7235945	Disc—Rubber disc for clutch
103	1214468	Drum—Drive drum and clutch disc (rubber
	1215818	Escutcheon—Dial
104	1216092	Gear—Drive gear and clutch friction di assembly
105	1214842	Gear—Worm gear—less set screw
	1215819	Grommet—Rubber grommet for antenna R.F. coils
	1215820	Grommet—Rubber grommet for oscillator c
	1214462	Link—Coil draw bar
	1216436	Nut—Locknut for solenoid pole piece
	1214821	Nut—Locknut for worm gear bearing screw
	1309864	Nut—Mounting nut for tuning shaft bushin
	1215821	Pawl—Switch finger
106	1215822	Plate—L.H. end
107	1215823	Plate—R.H. end
108	1215824	Plate—Bottom plate with pulleys
	1216437	Plate—Dial back
	1216438	Plate—Front bearing
	1214444	Plate—Rear bearing
	1214460	Plate—Set-up button stop plate and switch rear contact
109	1216439	Plunger—Solenoid plunger and stud
	1215826	Pointer—Dial pointer and holder
110	1216440	Pole Piece—Solenoid
	1214822	Retainer—Solenoid draw bar retaining clip
	1214503	Retainer—Tuning dial
	1215827	Rod—Push rod and cam assembly
	132688	Screw—Dial back plate mounting
	1214845	Screw—Dial escutcheon
	1215121	Screw—Set screw for drive drum
	127555	Screw—Set screw for worm gear
	7240316	Screw—Set screw for worm gear bearing
	1214483	Shaft—Contact latch bar, and switch finger pawl shaft
111	1214477	Shaft—Flexible tuning shaft—less bushing
	1214469	Shaft—Solenoid draw bar
	1214464	Shell—Clutch coil cover
	1214486	Shield—Light shield
112	1215828	Spindle—Clutch spindle and gear assembly
	1214466	Spring—Clutch
	1214843	Spring—Coil draw bar link
	1214831	Spring—Coil draw bar
	1214825	Spring—Contact latch bar
113	1216208	Spring—Pointer cord
	1214482	Spring—Push button retaining spring strip
	1216441	Spring—Push rod return
	1215235	Spring—Rocker bar gear
114	1216118	Spring—Set-up button
	1216442	Spring—Solenoid draw bar
	1214824	Spring—Switch finger pawl
	7236121	Spring—Tension spring for drive gear
	1216209	Spring—Tension spring for rocker bar
	7236001	Washer—"C" washer for flexible shaft
	1214835	Washer—Felt washer for push rods
	7235892	Washer—Fibre washer for worm gear thrus
	1214837	Washer—Flat washer for solenoid draw bar
	1214823	Washer—Spring washer for worm gear thru

Tubes

Service Part No.	Description
7232770	6K7—R.F.
7237886	6SA7—First Detector—Oscillator
7237887	6SK7—I.F.
7237888	6SQ7—Second Detector—A.F.—A.V.C.
7237888	6SQ7—Phase Inverter
1213637	6V6GT—Output
1213637	6V6GT—Output
7237180	0Z4—Rectifier

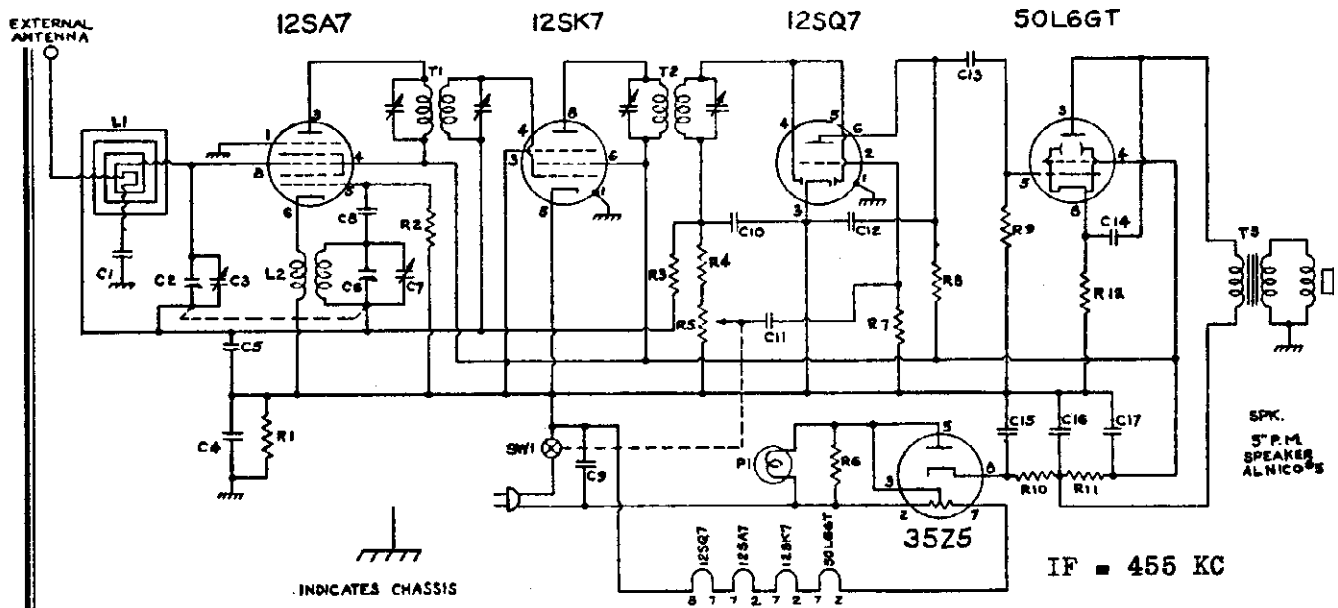
Miscellaneous Mechanical Parts

Service Part No.	Description
1860926	Bushing—Bushing and ferrule for "A" le connector
1215829	Case—Complete receiver case
1214495	Connector—"A" lead connector and bracke
1215830	Cover—Vibrator "hash" cover
1215831	Gasket—Sponge rubber gasket for speak cover
115273	Lamp—Dial lamp—Mazda No. 51
1309864	Nut—½ in. x 28 in. nut for volume cont bushing
1213439	Socket—Tube
1215196	Socket—Vibrator
1214497	Spacer—Spacing collar for volume cont shaft

Installation Parts

Service Part No.	Description
1215832	Package No. 1—Instrument Panel Hardware
505629	Bolt—¼ in. x 20 x ⅝ in. hex head (1)
7235968	Nut—½ in. x 28 in. x ⅛ in. hex (2)
1299232	Washer—¼-in. (plain) (1)
121753	Washer—Shakeproof (1)
1216443	Package No. 2—Panel Parts
508921	Card—Owner's instruction and warranty card (1)
508865	Marker—Station call letter markers (1)
508583	Plate—Control finish plate (1)
1215834	Package No. 3—Knob Kit
507510	Knob—Dummy (1)
507511	Knob—Tone control (1)
507505	Knob—Tuning and volume control (2)
503630	Washer—Felt washer (1)
7238755	Washer—Spring washer (1)
1215835	Package No. 4—"A" Lead and Fuse
106653	Fuse—20 ampere (1)
504842	Lead—"A" lead assembly (1)
1845913	Tube—Fuse insulating (1)
1215836	Package No. 5—Suppressor and Condenser Kit
1853686	Adapter—Suppressor (1)
1882758	Condenser—Ammeter (1)
1879777	Condenser—Generator (1)
509129	Insulator—Distributor Suppressor (1)
144722	Screw—No. 7 x ⅜ S.T. hex head (1)
1207821	Suppressor—Distributor (1)

WALGREEN CO.



Wiring Diagram R-7000

NOTE: Specify Model and Serial Numbers for all Replacement Parts

REPLACEMENT PARTS

CAPACITORS

	Part No.
C1 .001 mf 600 V	12004-001
C2 Ant. Section Gang C3 Ant. Trimmer	R-1055
C4 .1 mf 200 V	12000-1
C5 .05 mf 200 V	12000-05
C6 Osc. Section Gang C7 Osc. Trimmer	R-1055
C8 50 mmf Mica	12010-50
C9 .05 mf 400 V	12002-05
C10 250 mmf Mica	12010-250
C11 .01 mf 400 V	12002-01
C12 250 mmf Mica	12010-250
C13 .01 mf 400 V	12002-01
C14 .03 mf 400 V	12002-03
C15 20 mf 150 V C16 40 mf 150 V	R-1241-1
C17 40 mf 150 V	12101-40

COILS AND TRANSFORMERS

	Part No.
L1 Loop	R-1237
L2 Osc. Trans. Coil	R-1033
T1 1st I. F. Trans.	R-1025-3
T2 2nd I. F. Trans.	R-1025-4
T3 Output Trans. Assem.	R-1040-1

RESISTORS

	Part N
R1 470000 ohm ½ W	11005-4
R2 33000 ohm ½ W	11005-3
R3 2.2 Meg ½ W	11005-2
R4 47000 ohm ½ W	11005-4
R5 SW1—500000 ohm V. C.	R-1043
R6 150 ohm ½ W	11005-1
R7 6.8 Meg ½ W	11005-6
R8 220000 ohm ½ W	11005-2
R9 470000 ohm ½ W	11005-4
R10 330 ohm 1 W	11008-3
R11 1200 ohm 1 W	11008-1
R12 150 ohm ½ W	11005-1

MISCELLANEOUS

	Part N
Spk. Speaker	R-10
Dial Glass	R-13
Dial Pointer	R-1255
Diffusion Screen	R-11
Tuning Shaft	R-11
Cabinet	R-5011
Knob	R-10

WALGREEN CO.

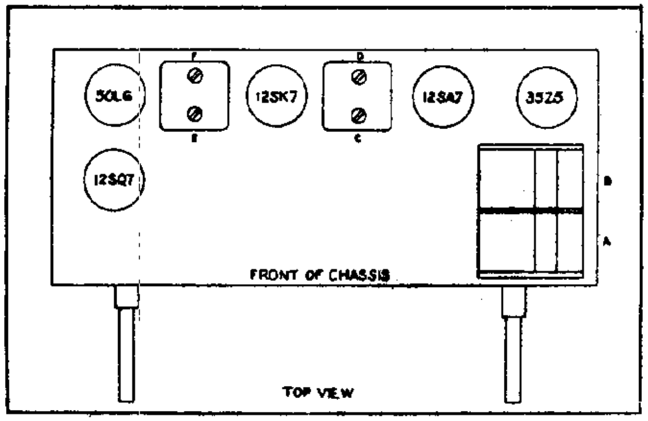
Specification:

Power Supply
105 to 125 Volts AC or DC

Power Consumption
35 Watts

Tuning Range
540 KC to 1720 KC

Circuit
Superheterodyne — Built in Antenna with provision for connecting external antenna. Do not connect ground to receiver.



ALIGNMENT PROCEDURE

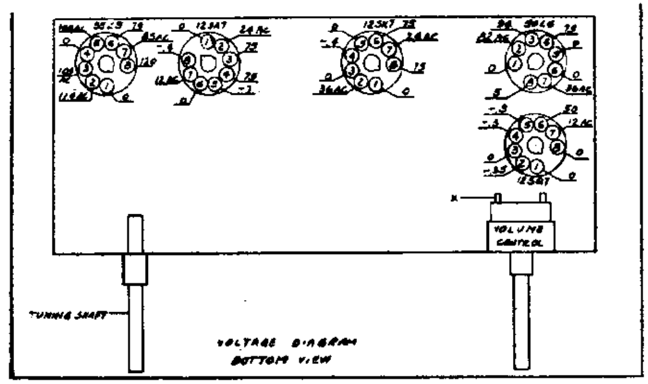
Allow receiver to warm up thoroughly before alignment. Turn volume control to maximum. Connect output meter to voice coil terminals.

455 IF ALIGNMENT

Tune receiver to high end of dial.
Connect signal generator to antenna through .0005 mf condenser,
Set generator to 455 KC, tune trimmers E—F—C—D to maximum output.
Always use lowest input from signal generator that provides good output indication.

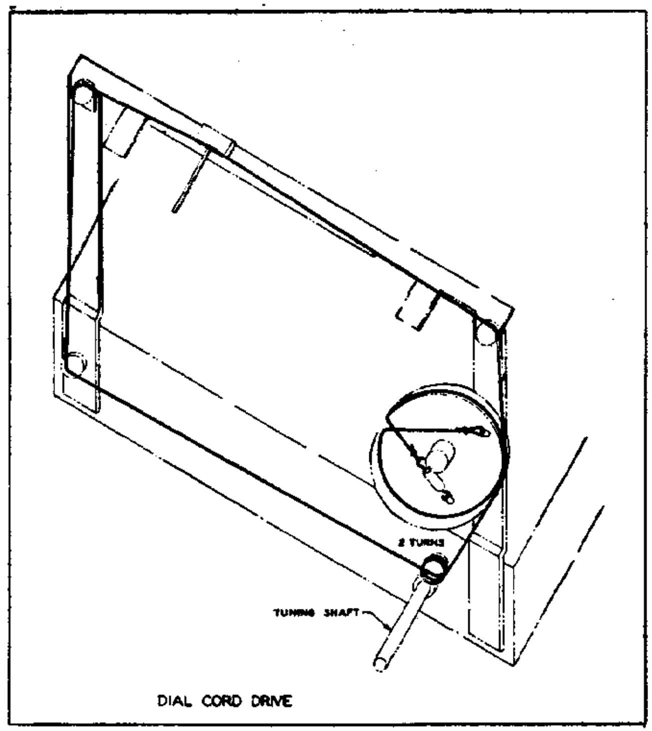
540 KC to 1720 KC ALIGNMENT

Loosely couple the signal generator to receiver by placing S. G. output lead near the pick-up antenna. (Not connected to it.)
Set generator and receiver to 1400 KC.
Adjust trimmer "A" to signal.
Adjust trimmer "B" to maximum output.
Decrease signal generator output as receiver alignment provides more output to meter.

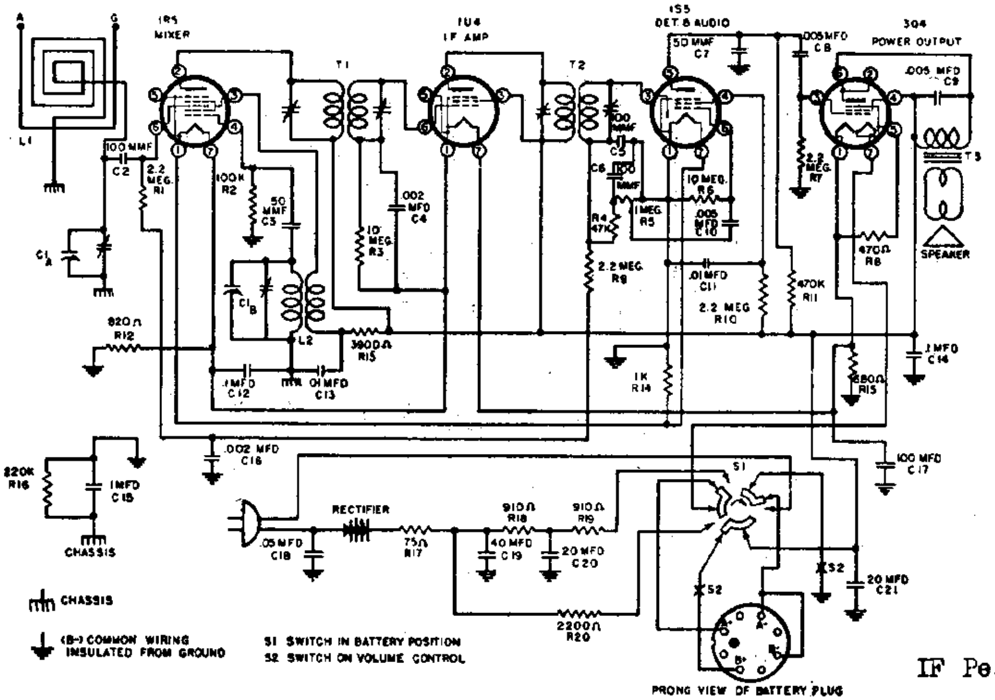


VOLTAGE DATA

Measured at 115 Volt line.
Volume control in maximum position.
Dial tuned to low frequency end — no signal.
Reading taken between tube socket and B—bus—point x on volume control.
Voltages measured with high resistance voltmeter, 20,000 ohm per volt preferable.



WARWICK MFG. CORP.



IF Peak = 155 KC

Code	Part No.	DESCRIPTION	Code	Part No.	DESCRIPTION	Code	Part No.	DESCRIPTION
C1A, C1B	B19-188	Variable Condenser	R4	A60-685	47K Ohm ½ watt 20% Resistor		10-470	Antenna Loading Coil
C2, C5, C6	A15-103	100 MMF Mica Condenser	R8	A60-707	470 Ohm ½ watt 20% Resistor		A52-197	Knob, Tuning
C3, C7	A15-175	50 MMF Mica Condenser	R11	A60-662	470K Ohm ½ watt 20% Resistor		A52-196	Knob, Volume
C4, C16	A16-115	.002 MFD. 600 volt Condenser	R12	A60-709	820 Ohm ½ watt 10% Resistor		A52-198	Knob, Battery—AC-DC
C8, C9, C10	A16-106	.005 MFD. 150 volt Condenser	R13	A60-710	3900 Ohm ½ watt 10% Resistor		B67-486	Dial Scale
C11, C13	A16-105	.01 MFD. 200 volt Condenser	R14	A60-675	1000 Ohm ½ watt 20% Resistor		A58-63	Dial Pointer
C12, C14	A16-100	.1 MFD. 400 volt Condenser	R15	A60-708	680 Ohm ½ watt 10% Resistor		A83-391	Selenium Rectifier
C15	A16-137	.1 MFD. 200 volt Condenser	R16	A60-667	220K Ohm ½ watt 20% Resistor		A78-60	Tuning Shaft
C18	A16-150	.05 MFD. 400 volt Condenser	R17	A60-712	75 Ohm 3 watt 5% Resistor		A88-27	AC Socket
C17		100 MFD. 25 volt Electrolytic Condenser	R18, R19	A60-713	1820 Ohm 10 watt 5% Resistor		A88-28	Socket for AC cord
C19	A16-201	40 MFD. 150 volt Electrolytic Condenser			(each section 910 ohms)	S1	B60-173	Switch, Battery—AC-DC
C20, C21		20 MFD. 150 volt Electrolytic Condenser	R20	A60-714	2200 Ohm ½ watt 10% Resistor	T3	A90-320	Output Transformer
R1, R7, R9, R10	A60-644	2.2 Megohm ½ watt 20% Resistor	L2	B10-460	Oscillator Coil		B78-350	Speaker, 5" P M
R2	A60-671	100K Ohm ½ watt 20% Resistor	T1	C10-462	1st I. F. Transformer		A45-119	Plug, Battery
R3, R6	A60-663	10 Megohm ½ watt 20% Resistor	T2	C10-463	2nd I. F. Transformer		D42-406	Cabinet
			R5	A24-170	Volume Control and Switch		D40-140	Escutcheon and Grille

The radio is shipped from the factory minus the battery. One combination A. B. Battery Pack is required, having 90 volts "B" and 7½ volts "A," such as Ray-o-vac No. AB-994, General No. 60A6F6/5, Burgess No. D5A60 or Eveready No. 753.

DESCRIPTION

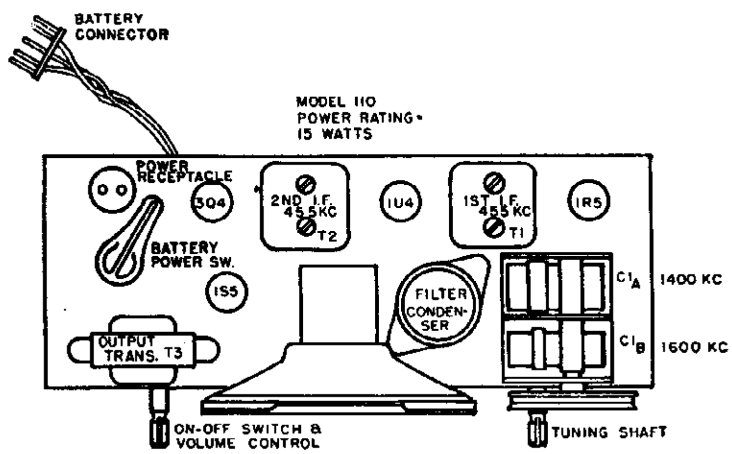
Model 11011 is a 4-tube superheterodyne portable receiver designed for operation on a 117 volt 50-60 cycle, 117 volt DC power supply or from a self-contained battery.

This receiver covers the frequency range from 535 kilocycles to 1600 kilocycles (K.C.).

The tubes used are:—

1R5—Mixer, Oscillator
1U4—I. F. Amplifier
1S5—Detector and first Audio
3Q4—Power Output

No rectifier tube is required as a Selenium rectifier is used when operating on A. C. current.



ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A. V. C. action from interfering with correct alignment.

With the output meter connect across the voice coil of the speaker, the output meter reading for 50 milliwatts is .4 volts using a signal which is modulated 400 c.p.s.

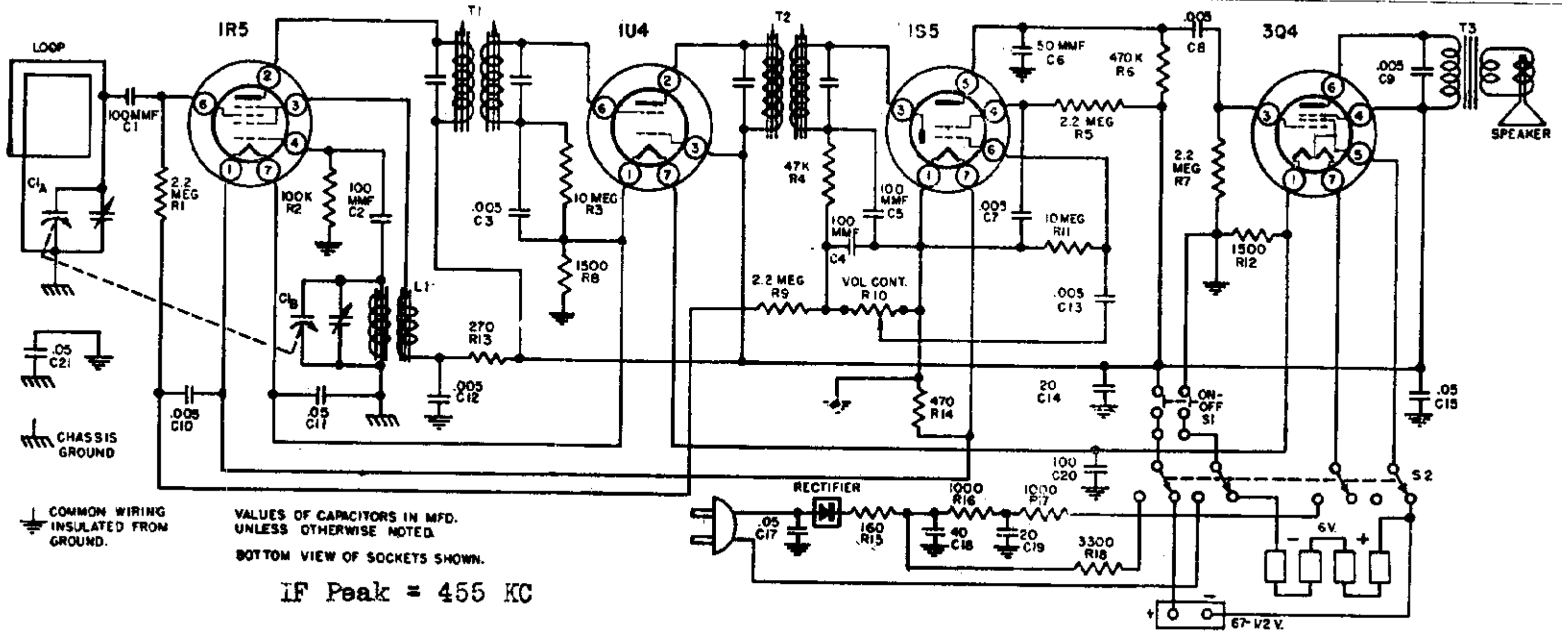
Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D. C. receiver and if alignment is made with the receiver connected to 117 volts A. C. or D. C., it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or place a .2 M. F. D. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*1R5 Grid (Stator of CIA)	T2	Output I. F.
Fully open	455 KC	.1	*1R5 Grid (Stator of CIA)	T1	Input I. F.
Fully open	1600 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1A	Antenna

*Connect ground lead of signal generator to Common "B."
**Connect ground lead of signal generator to ground wire stapled to cabinet.

If it should become necessary to re-adjust the loop antenna loading coil tune in a weak station, between 600 and 650 Kilocycles, and adjust for maximum output.



VALUES OF CAPACITORS IN MFD. UNLESS OTHERWISE NOTED.

BOTTOM VIEW OF SOCKETS SHOWN.

IF Peak = 455 KC

CODE NO.	PART NO.	DESCRIPTION
C1, C2, C4, C5	A15-190	100 MMF Mica Condenser
C1A, C1B	B19-190	Variable Condenser
C12, C13, C3, C7, C8, C9, C10,	A16-166	.005 MFD 150 volt Condenser
C6	A15-191	50 MMF Mica Condenser
C11, C17, C21	A16-179	.05 MFD 400 volt Condenser
C14, C19, C18, C20	A18-282	20 MFD 150 volt electrolytic Condenser 40 MFD 150 volt Electrolytic Condenser 100 MFD 25 volt electrolytic Condenser
C15	A16-170	.05 MFD 200 volt Condenser
R1, R5, R7, R9	A60-726	2.2 Megohm $\frac{1}{2}$ watt Resistor
R2	A60-727	100K Ohm $\frac{1}{2}$ watt Resistor
R3, R11	A60-728	10 Megohm $\frac{1}{2}$ watt Resistor
R4	A60-730	47K Ohm $\frac{1}{2}$ watt Resistor
R6	A60-731	470K Ohm $\frac{1}{2}$ watt Resistor
R8, R12	A60-729	1500 Ohm $\frac{1}{2}$ watt Resistor
R10	A24-172	1 Megohm Volume Control
R13	A60-723	270 Ohm $\frac{1}{2}$ watt Resistor
R14	A60-722	470 Ohm $\frac{1}{2}$ watt Resistor
R15	A60-725	160 Ohm 3 watt Resistor

CODE NO.	PART NO.	DESCRIPTION
R16, R17	A60-713	2000 Ohm 10 watt Resistor (1000 Ohm each section)
R18	A60-724	3300 Ohm 1 watt resistor
T1, T2	C10-475	I. F. Transformer
T3	A80-231	Output Transformer
L1	B10-477	Oscillator Coil
	S84-112	Cover Assembly for "A" Batteries
	B52-218	Knob, On-off Switch
	A83-391	Selenium Rectifier
	B79-353	P.M. Speaker
	A69-174	AC-DC—Battery Switch
	A69-175	On-off Switch
	A76-34	Terminal for "B" Battery
	B23-154	Line Cord
	D21-108	End Cap for Handle
	B83-442	Handle
	C52-216	Knob, Tuning
	B52-217	Knob, Volume Control
	S84-126	Front Cover Assembly for Case, with Loop
	S84-111	Hub and Pointer Assembly
	S84-128	Rear Cover Assembly for Case

DESCRIPTION

Model 11411 is a 4-tube superheterodyne radio receiver designed for use on 117 volt AC-DC current or from self-contained batteries.

This receiver covers the frequency range from 545 kilocycles to 1600 kilocycles (K.C.).

The tubes used are:—

1R5—Mixer, Oscillator
1U4—I.F. Amplifier
1S5—Detector and first Audio
3Q4—Power output

No rectifier tube is required as a Selenium rectifier is used

WARWICK MFG. CORP.

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

With the output meter connected across the voice coil of the speaker; the output meter reading for 50 milliwatts is .4 volts using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

For alignment points refer to Figure No. 2.

CAUTION: This is an A.C.-D.C. receiver and if alignment is made with the receiver connected to 117 volts A.C. or D.C., it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or place a .2 M.F.D. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*1R5 Grid (Stator of C1A)	T2	Output I.F.
Fully open	455 KC	.1	*1R5 Grid (Stator of C1A)	T1	Input I.F.
Fully open	1600 KC	.00025	*1R5 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1400 KC	—	Loosely coupled to loop	C1A	Antenna
**Tune in signal from generator	600 KC	—	Loosely coupled to loop	L1	600 KC Padder

*Connect ground lead of signal generator to chassis.

**When making this adjustment the variable should be rocked back and forth.

INSTALLATION

This receiver is shipped from the factory minus the batteries. To install the batteries, open the back cover of the case and place them in their proper positions. (Figure No. 2 clearly illustrates the correct position for the batteries). The batteries required are one 67-1/2 volt "B" battery such as Eveready No. 467, Burgess No. XX45, Ray-O-Vac No. 4367 or similar battery of the same voltage and size. The "B" battery connections are of the snap-on type and so constructed that they can only be installed in the correct position. Four No. 2 standard flash light dry cells are required for "A" batteries.

CAUTION: Be sure the "A" batteries are placed exactly as shown in Figure No. 2 otherwise the receiver will not operate.

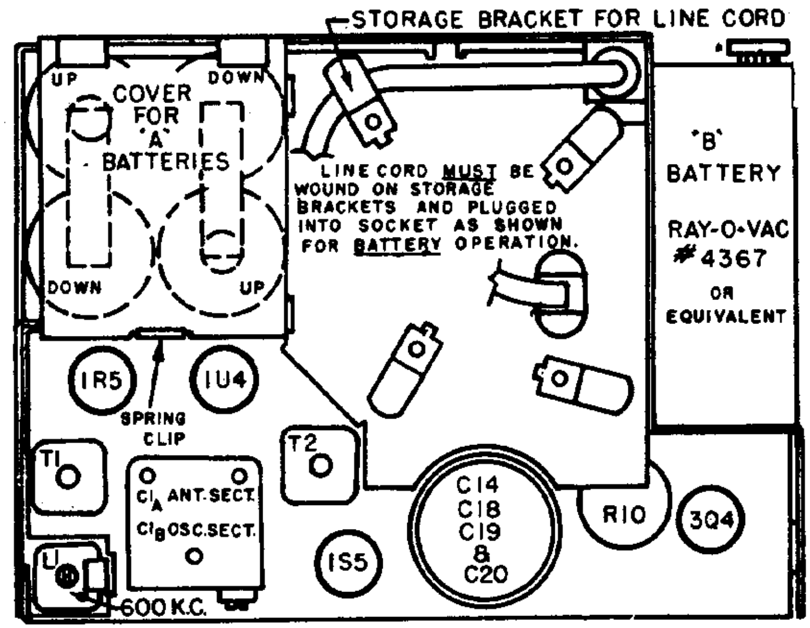
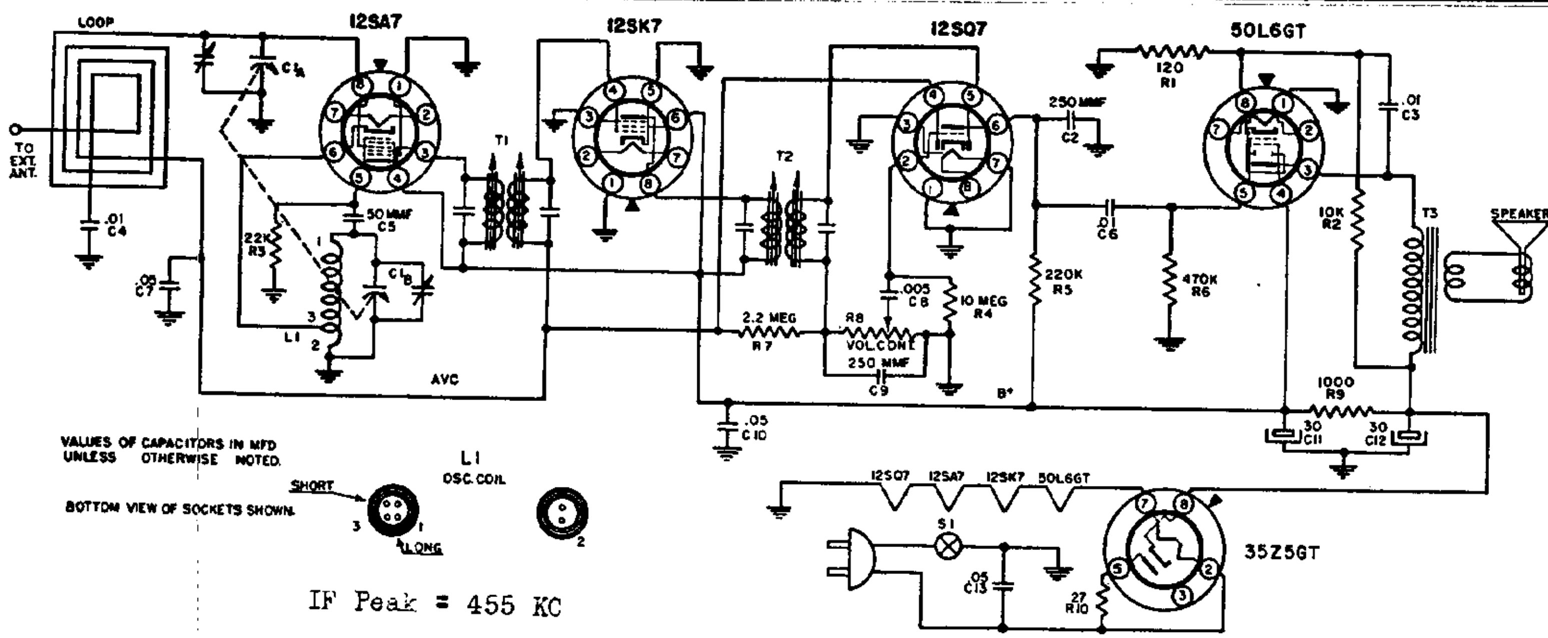


FIG. 2 PICTORIAL DIAGRAM

WARWICK MFG. CORP.



IF Peak = 455 KC

PARTS LIST

CODE	PART NO.	DESCRIPTION
C1A, C1B	19-173	Variable Condenser
C2, C9	A-15-176	250 MMFD. Mica Condenser
C3, C4, C6	A16-156	.01 MFD. 400 volt Condenser
C5	A15-175	50 MMFD. Mica Condenser
C7, C10	A16-152	.05 MFD. 200 volt Condenser
C8	A16-153	.005 MFD. 600 volt Condenser
C11, C12	B18-283	30x30 MFD. 150 volt Dual Electrolytic Condenser
C13	A16-158	.05 MFD. 400 volt Condenser
R1	A60-702	120 Ohm 1/3 watt Resistor
R2	A60-698	10K Ohm 1 watt Resistor
R3	A60-659	22K Ohm 1/2 watt Resistor
R4	A60-663	10 Megohm 1/2 watt Resistor
R5	A60-667	220K Ohm 1/2 watt Resistor
R6	A60-662	470K Ohm 1/2 watt Resistor
R7	A60-684	2.2 Megohm 1/2 watt Resistor
R8	24-157	Volume Control, 1 Megohm
R9	A60-732	1000 Ohm 1 watt Resistor
R10	A60-690	27 Ohm 1/2 watt Resistor
T1	A10-478	1st I. F. Transformer
T2	A10-479	2nd I. F. Transformer
T3	A80-233	Output Transformer
L1	B10-480	Oscillator Coil
	48-34	Dial Crystal
	58-37	Dial Pointer
	79-316	4-inch P.M. Speaker
	C83-448	Cabinet Back
	B82-46	Loop Antenna
	42-320W	Cabinet, Molded Walnut
	A42-420	Cabinet, Molded Ivory
	67-462	Dial Scale
	52-165W	Knob, Walnut
	A52-222	Knob, Ivory

Model 11801 is a 5 tube (including rectifier) superheterodyne radio receiver designed for use on 117 volts 60 cycle AC or 117 volts DC power supply.

The tubes used are:—

1—12SA7 Oscillator Converter
1—12SK7 I.F. Amplifier
1—35Z5GT Power Rectifier
1—12SQ7 AVC Detector and 1st Audio
1—50L6GT Power Output

This receiver covers the frequency range from 540 kilocycles to 1630 kilocycles (KC).

WARWICK MFG. CORP.

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

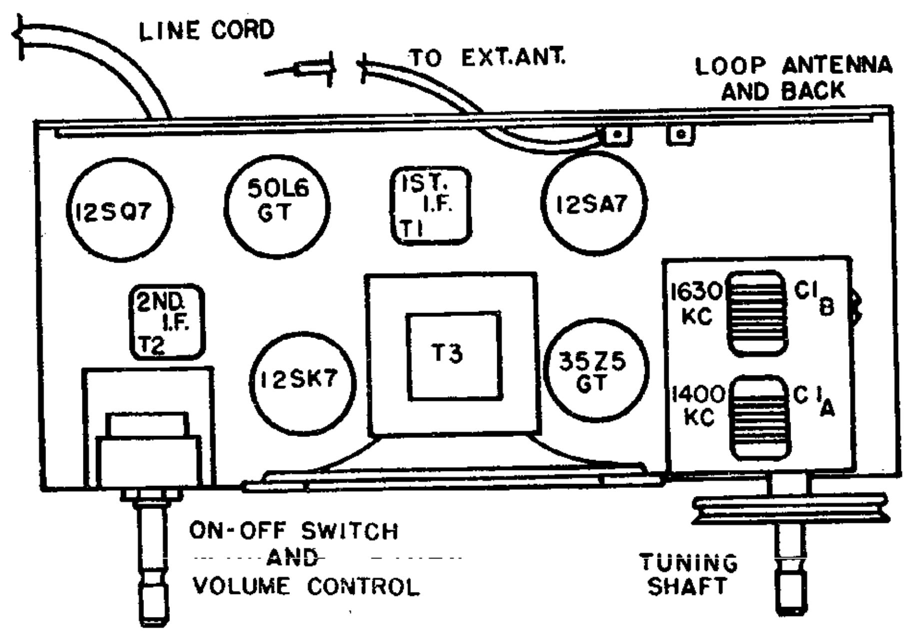
With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milli-watts is .4 volts using a signal which is modulated 400 c.p.s.

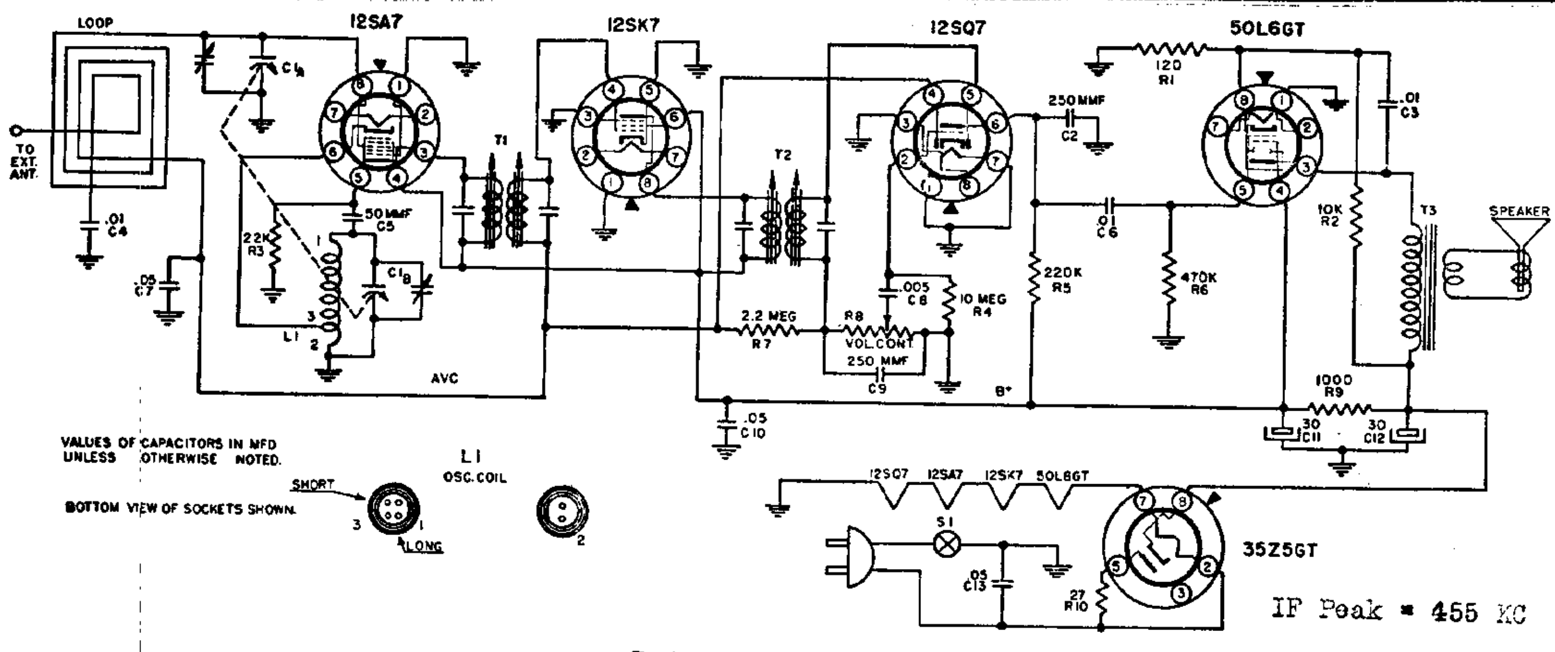
Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T1	Input I.F.
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T2	Output I.F.
Fully open	1630 KC	.00025	*12SA7 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	*Ant. lead from loop	C1A	Antenna

*Connect ground lead of signal generator to chassis.





IF Peak = 455 KC

PARTS LIST

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
C1A, C1B	19-173	Variable Condenser	R9	A60-732	1000 Ohm 1 watt Resistor
C2, C9	A15-176	250 MMFD. Mica Condenser	R10	A60-690	27 Ohm ½ watt Resistor
C3, C4, C6	A16-156	.01 MFD. 400 volt Condenser	T1	A10-475	1st I. F. Transformer
C5	A15-175	50 MMFD. Mica Condenser	T2	A10-479	2nd I. F. Transformer
C7, C10	A16-152	.05 MFD. 200 volt Condenser	T3	A80-233	Output Transformer
C8	A16-153	.005 MFD. 600 volt Condenser	L1	B10-480	Oscillator Coil
C11, C12	B18-283	30 x 30 MFD. 150 volt Dual Electrolytic Condenser		79-316	4" P. M. Speaker
C13	A16-158	.05 MFD. 400 volt Condenser		67-462	Dial Scale
R1	A60-702	120 Ohm ½ watt Resistor		48-34	Dial Crystal
R2	A60-698	10K Ohm 1 watt Resistor		58-37	Dial Pointer
R3	A60-659	22K Ohm ½ watt Resistor		B82-46	Loop Antenna
R4	A60-683	10 Megohm ½ watt Resistor		A42-432	Cabinet, Ivory
R5	A60-667	220K Ohm ½ watt Resistor		C42-430	Cabinet, Walnut
R6	A60-682	470K Ohm ½ watt Resistor		A52-222	Knob, Ivory
R7	A60-684	2.2 Megohm ½ watt Resistor		A52-244	Knob, Maroon
R8	24-157	Volume Control, 1 Megohm		C83-500	Cabinet Back
				A36-123	Grille, Ivory
				C36-122	Grille, Maroon

Model 11802 is a 5 tube (including rectifier) superhetrodyne radio receiver designed for use on 117 volts 60 cycle AC or 117 volts DC power supply.

The tubes used are:—

1—12SA7	Oscillator Converter	1—12SQ7	AVC Detector and 1st Audio
1—12SK7	I.F. Amplifier	1—50L6GT	Power Output
1—35Z5GT	Power Rectifier		

This receiver covers the frequency range from 540 kilocycles to 1630 kilocycles (KC).

WARWICK MFG. CORP.

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

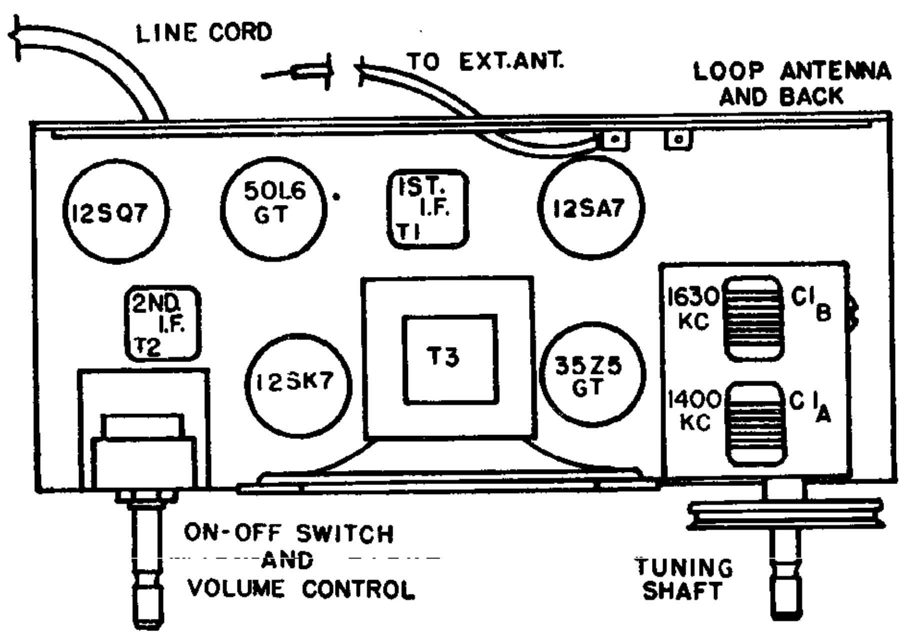
With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milli-watts is .4 volts using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

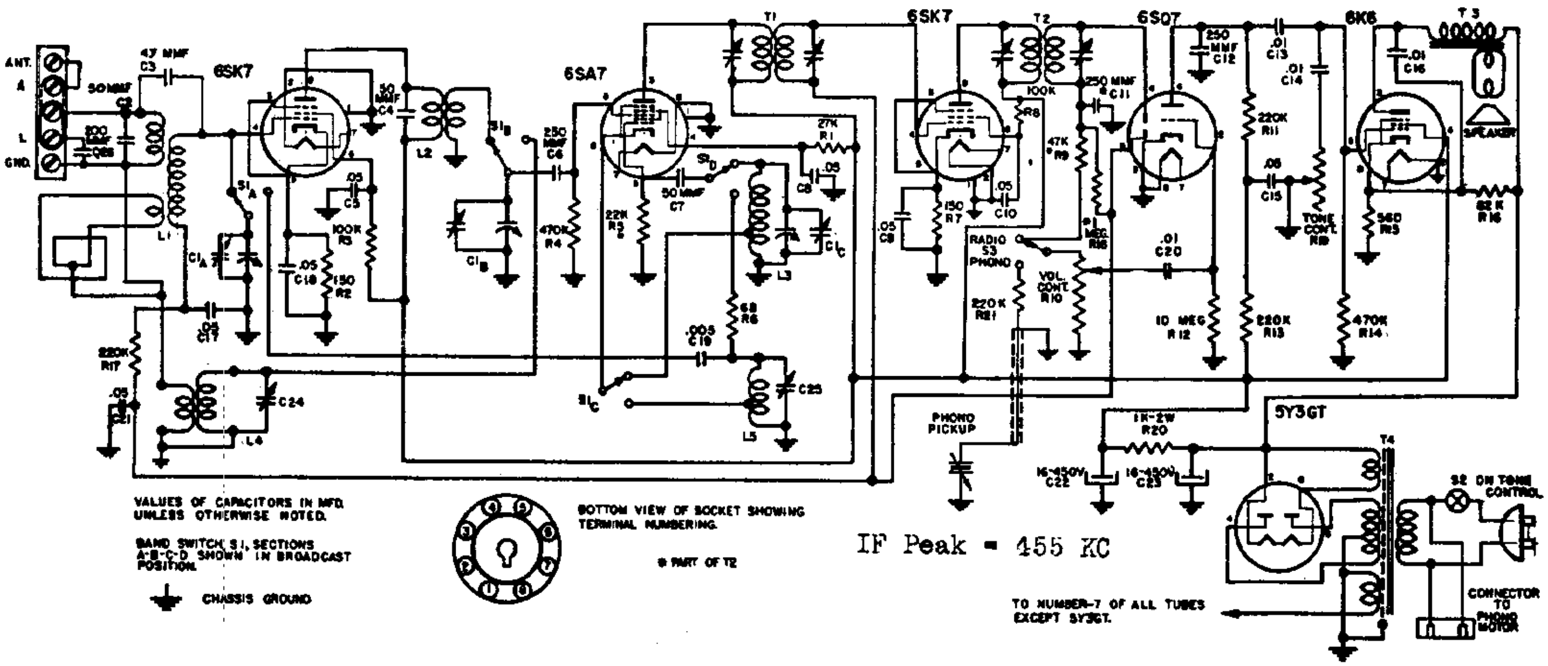
CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T1	Input I.F.
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T2	Output I.F.
Fully open	1630 KC	.00025	*12SA7 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	*Ant. lead from loop	C1A	Antenna

*Connect ground lead of signal generator to chassis.



WARWICK MFG. CORP.

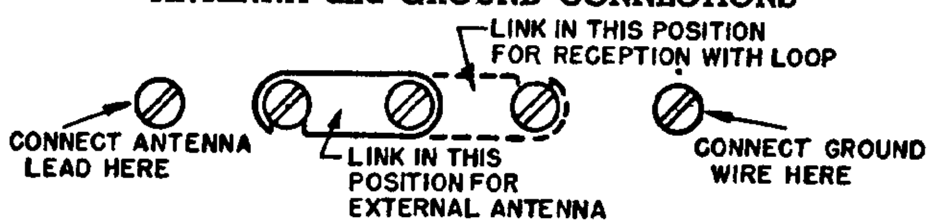


This receiver covers the standard broadcast frequency range, 535 to 1725 Kilocycles (K.C.) and the short wave frequency range from 6 to 18.2 Megacycles (M.C.).

The tubes used are:

6SK7—R. F. Amplifier
6SA7—Mixer—Osc.
6SK7—I. F. Amplifier
6SQ7—Det. AVC—Audio
6K6 GT—Power Output
5Y3 GT—Rectifier

ANTENNA and GROUND CONNECTIONS



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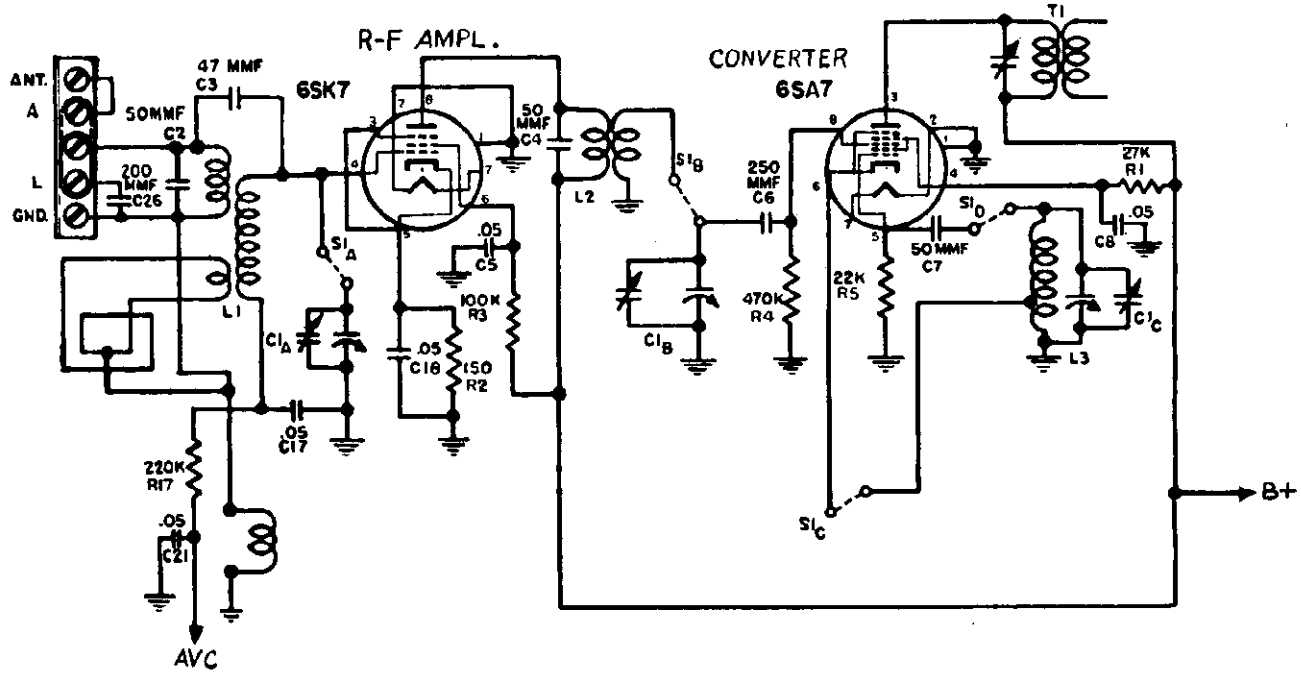
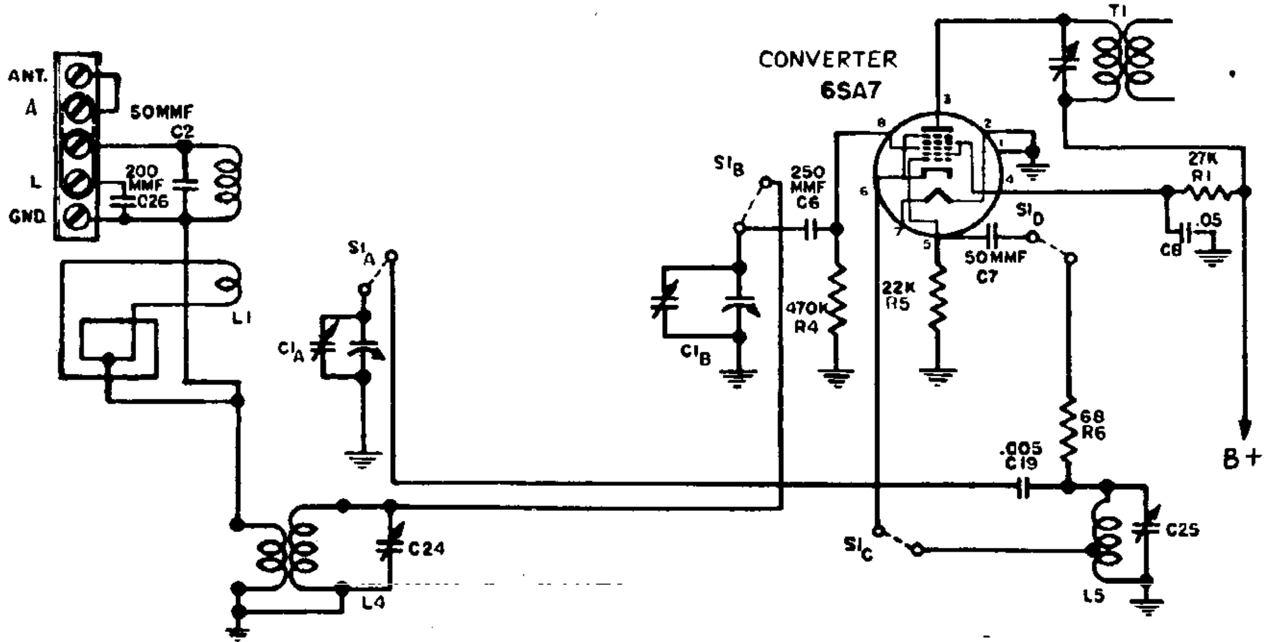


BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
535 - 1725 KC



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
SHORT WAVE BAND
6 - 18.2 MC

WARWICK MFG. CORP.

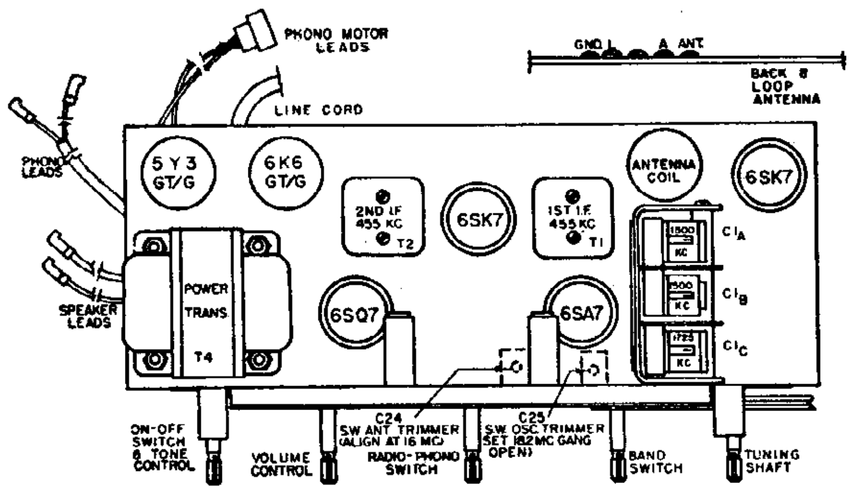


Fig. 2 Tube Positions and Alignment Points

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

With an output meter connected across the voice coil of the speaker, the output meter reading for ½ watt is 1.25 volts using a signal which is modulated 400 c.p.s. Follow through the procedure as outlined below for proper alignment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, for accurate alignment.

Position of Variable	Band Switch Position	Generator Freq.	Dummy Ant.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully Open	BC	455 KC	.1 MFD	6SA7 Grid (Stator of C1B)	T1 T2	I. F.
Fully Open	BC	1725 KC	.00025 MFD	*Ant. Terminal on Loop	C1C	BC Osc.
Tune in signal from Generator	BC	1500 KC	.00025 MFD	*Ant. Terminal on Loop	C1B	R. F.
Tune in signal from Generator	BC	1500 KC	.00025 MFD	*Ant. Terminal on Loop	C1A	BC Ant.
Fully Open	SW	18.2 MC	400 ohms	*Ant. Terminal on Loop	C25	SW Osc.
Tune in signal from Geneartor	SW	16 MC	400 ohms	*Ant. Terminal on Loop	C24	SW Ant.

GROUND lead of generator should be attached to the chassis for all adjustments

C24 and C25 are located under the chassis

For alignment points refer to Figure 2

* Be sure coupling link is in correct position for external antenna operation. See illustration below.

Repeat above alignment procedure as a final check.

MODEL 12310W
MODEL 12312M

WARWICK MFG. CORP.

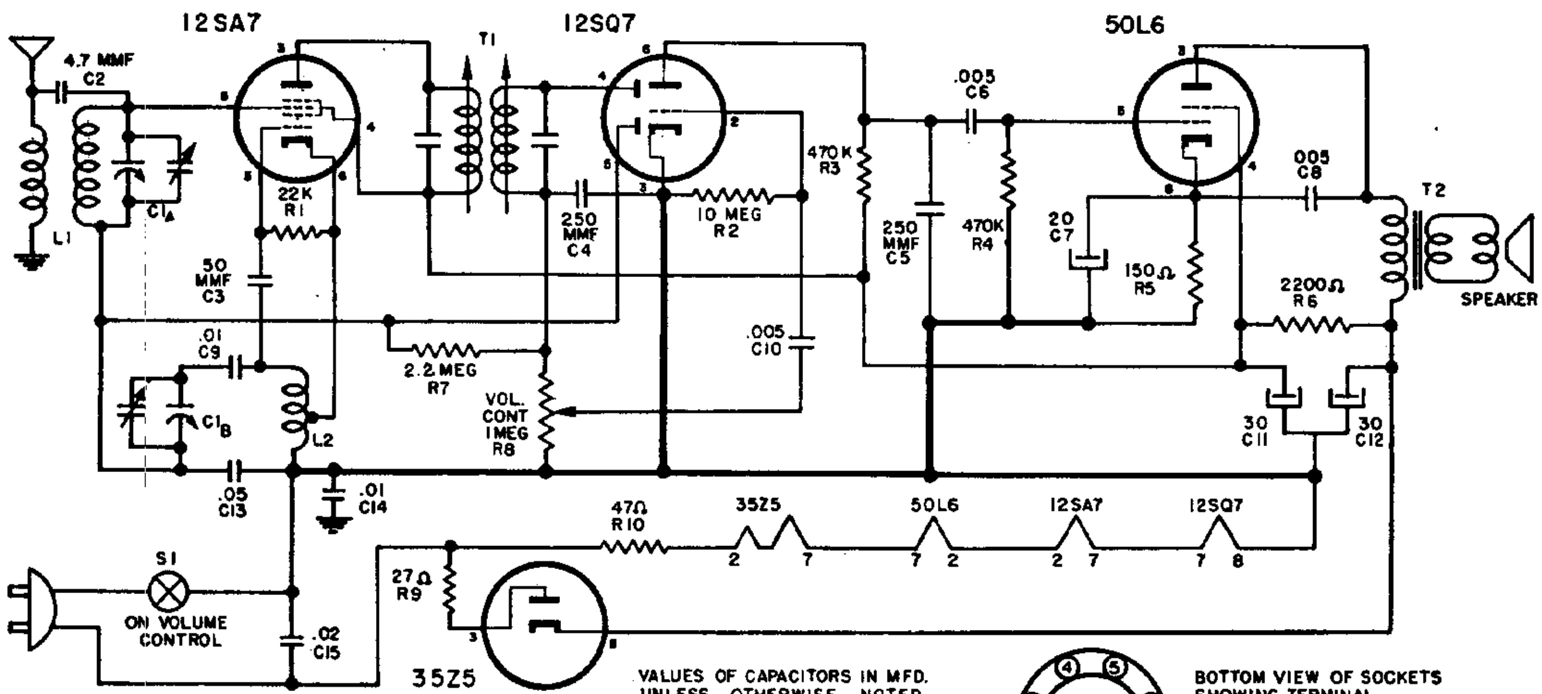
MODEL 12310W — PARTS LIST

CODE	PART NO.	DESCRIPTION
C1A, C1B, C1C	B19-186	Variable Condenser
C2, C4, C7	A15-175	50 MMFD Mica condenser
C3	A83-355	4.7 MMFD condenser
C5, C8, C10, C15	A16-158	.05 MFD 400 volt condenser
C6, C12	A15-176	250 MMFD Mica condenser
C9, C17, C18, C21	A16-152	.05 MFD 200 Volt condenser
C13, C14, C20	A16-156	.01 MFD 400 Volt condenser
C16	A16-168	.01 MFD 1000 Volt condenser
C19	A16-181	.005 MFD Mica condenser
C22	A18-279	16 MFD 450 Volt electrolytic condenser
C23	A18-274	16 MFD 450 Volt electrolytic condenser
C24	A20-143	SW Antenna trimmer
C25	A20-143	SW Oscillator trimmer
C26	A15-189	200 MMFD Mica condenser
R1	A60-692	27K ohm 1 watt resistor
R2, R7	A60-686	150 ohm ½ watt resistor
R3, R8	A60-671	100K ohm ½ watt resistor
R4, R14	A60-662	470K ohm ½ watt resistor
R5	A60-659	22K ohm ½ watt resistor
R6	A60-733	68 ohm ½ watt resistor
R10	A24-169	Volume control, 500,000 ohm
R11, R13, R17, R21	A60-667	220K ohm ½ watt resistor
R12	A60-663	10 megohm ½ watt resistor
R15	A60-701	560 ohm 1 watt resistor
R16	A60-700	82K ohm 1 watt resistor
R19	A26-124	Tone control, 2 megohm, with switch
R20	A60-699	1K ohm 2 watt resistor
L1	C10-459	BC Antenna coil
L2	B10-452	RF Coil
L3	B10-446	BC Oscillator coil
L4	A10-482	SW Antenna coil
L5	A10-481	SW Oscillator coil
T1	B10-412	1st IF Transformer
T2	B10-444	2nd IF Transformer
T3	A80-222	Output Transformer
T4	C80-223	Power Transformer
	A84-41	Dial drive shaft assembly
S1	A69-176	Band Switch
S3	A69-180	Switch, Phono-Radio
	A52-200	Knob, Tuning
	A52-205	Knob, Volume
	A52-233	Knob, On-Off and Tone
	A52-234	Knob, SW-BC
	A52-235	Knob, Radio-Phono
	A58-67	Dial Pointer
	C67-507	Dial scale, glass
	C83-478	Dial scale retainer
	C79-357	Speaker, 8" P.M.
	S84-160	Back and Loop Assembly
	D42-426	Cabinet

MODEL 12312M — PARTS LIST

CODE	PART NO.	DESCRIPTION
C1A, C1B, C1C	B19-186	Variable Condenser
C2, C4, C7	A15-175	50 MMFD Mica condenser
C3	A83-355	4.7 MMFD condenser
C5, C8, C10, C15	A16-158	.05 MFD 400 volt condenser
C6, C12	A15-176	250 MMFD Mica condenser
C9, C17, C18, C21	A16-152	.05 MFD 200 Volt condenser
C13, C14, C20	A16-156	.01 MFD 400 Volt condenser
C16	A16-168	.01 MFD 1000 Volt condenser
C19	A16-181	.005 MFD Mica condenser
C22	A18-279	16 MFD 450 Volt electrolytic condenser
C23	A18-274	16 MFD 450 Volt electrolytic condenser
C24	A20-143	SW Antenna trimmer
C25	A20-143	SW Oscillator trimmer
C26	A15-189	200 MMFD Mica condenser
R1	A60-692	27K ohm 1 watt resistor
R2, R7	A60-686	150 ohm ½ watt resistor
R3, R8	A60-671	100K ohm ½ watt resistor
R4, R14	A60-662	470K ohm ½ watt resistor
R5	A60-659	22K ohm ½ watt resistor
R6	A60-733	68 ohm ½ watt resistor
R10	A24-169	Volume control, 500,000 ohm
R11, R13, R17, R21	A60-667	220K ohm ½ watt resistor
R12	A60-663	10 megohm ½ watt resistor
R15	A60-701	560 ohm 1 watt resistor
R16	A60-700	82K ohm 1 watt resistor
R19	A26-124	Tone control, 2 megohm, with switch
R20	A60-699	1K ohm 2 watt resistor
L1	C10-459	BC Antenna coil
L2	B10-452	RF Coil
L3	B10-446	BC Oscillator coil
L4	A10-482	SW Antenna coil
L5	A10-481	SW Oscillator coil
T1	B10-412	1st IF Transformer
T2	B10-444	2nd IF Transformer
T3	A80-222	Output Transformer
T4	C80-223	Power Transformer
	A84-41	Dial drive shaft assembly
S1	A69-176	Band Switch
S3	A69-180	Switch, Phono-Radio
	A52-203	Knob, Tuning
	A52-208	Knob, Volume
	A52-240	Knob, On-Off and Tone
	A52-241	Knob, SW-BC
	A52-242	Knob, Radio-Phono
	A58-68	Dial Pointer
	C67-509	Dial scale, glass
	B83-471	Dial scale retainer
	B79-359	Speaker, 10" P.M.
	S84-173	Back and Loop Assembly
	C42-429	Cabinet
	B83-482	Plate, Diffusing

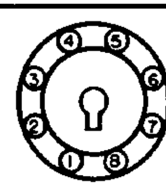
WARWICK MFG. CORP.



IF Peak = 455 KC

VALUES OF CAPACITORS IN MFD.
UNLESS OTHERWISE NOTED.

CHASSIS GROUND.



BOTTOM VIEW OF SOCKETS
SHOWING TERMINAL
NUMBERING.

PARTS LIST

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
C1A, C1B	B19-194	Variable Condenser	R1	A60-659	22K ohm ½ watt Resistor		B79-360	Speaker, 5" P.M.
C2	A83-355	4.7 Mmfd Condenser	R2	A60-663	10 Megohm ½ watt Resistor		A91-57	Antenna Wire, 20 feet
C3	A15-175	50 Mmfd Mica Condenser	R3, R4	A60-682	470K ohm ½ watt Resistor		C21-118	Cabinet Back
C4, C5	A15-176	250 Mmfd Mica Condenser	R5	A60-686	150 ohm ½ watt Resistor		D42-424	Cabinet, Ivory
C6, C8, C10	A16-153	.005 Mfd 600 Volt Condenser	R6	A60-737	2200 ohm 1 watt Resistor		A42-433	Cabinet, Black
C7	A18-278	20 Mfd-25 Volt Electrolytic Condenser	R7	A60-684	2.2 Megohm ½ watt Resistor		A42-434	Cabinet, Red
C9, C14	A16-156	.01 Mfd 400 Volt Condenser	R8	A24-174	Volume Control, 1 Megohm		A42-435	Cabinet, Green
C11, C12	A18-283	30x30 Mfd 150 Volt Electrolytic Condenser	R9	A60-690	27 ohm ½ watt Resistor		A48-42	Dial Crystal
C13	A16-152	.05 Mfd. 200 Volt Condenser	R10	A60-750	47 ohm 1 watt Resistor		B67-510	Dial Scale
C15	A16-151	.02 Mfd 600 Volt Condenser	L1	A10-485	Antenna Coil		A58-69	Dial Pointer
			L2	B10-502	Oscillator Coil		A52-222	Knob, White
			T1	A10-479	I.F. Transformer		A52-243	Knob, Black
			T2	A80-239	Output Transformer			

WARWICK MFG. CORP.

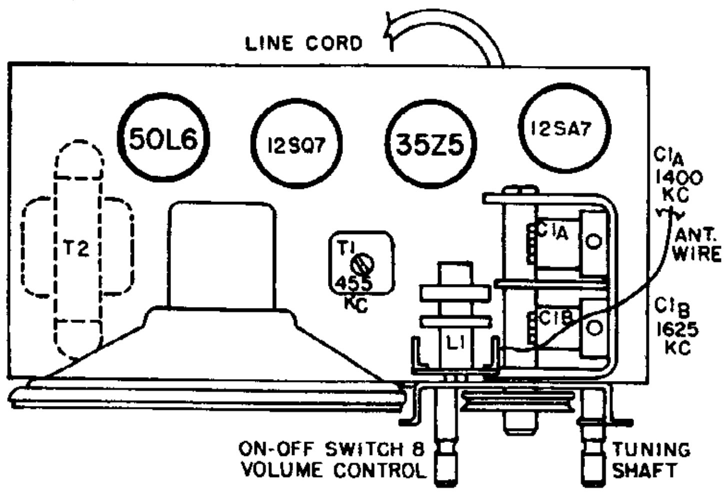
DESCRIPTION

Model 12801 is a superheterodyne receiver, designed for use on 105-125 volt 60 cycle AC or DC current.

The tubes used are:

12SA7—Oscillator-Mixer
12SQ7—Detector and first Audio
50L6—Power Output
35Z5—Rectifier

This receiver covers the frequency range from 540 to 1625 KC. The dial scale is calibrated in kilocycles, minus the final zero.



ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T1	I.F.
Fully open	1625 KC	.00025	*Antenna Wire	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	*Antenna Wire	C1A	Antenna

*Connect ground lead of signal generator to chassis.

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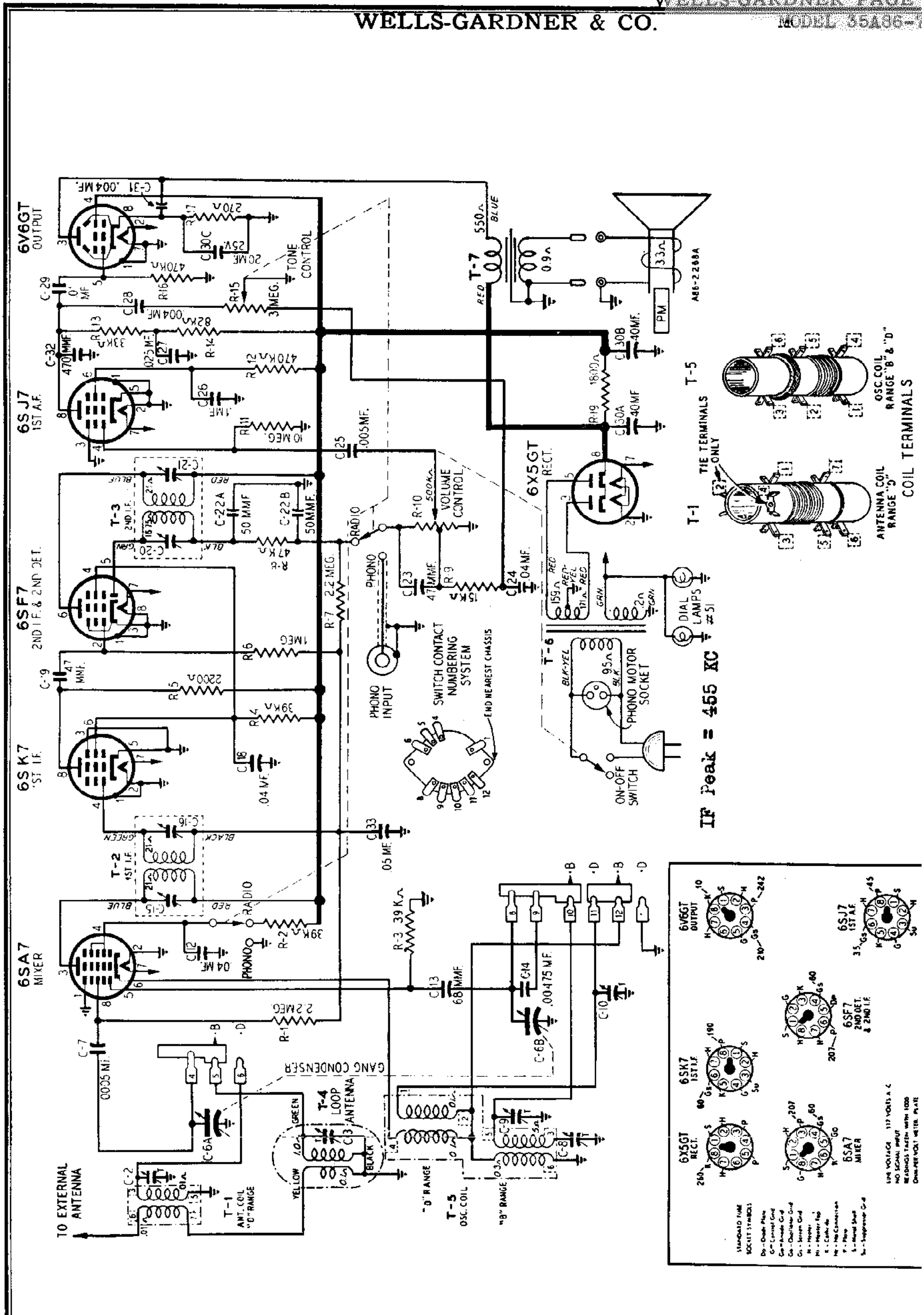
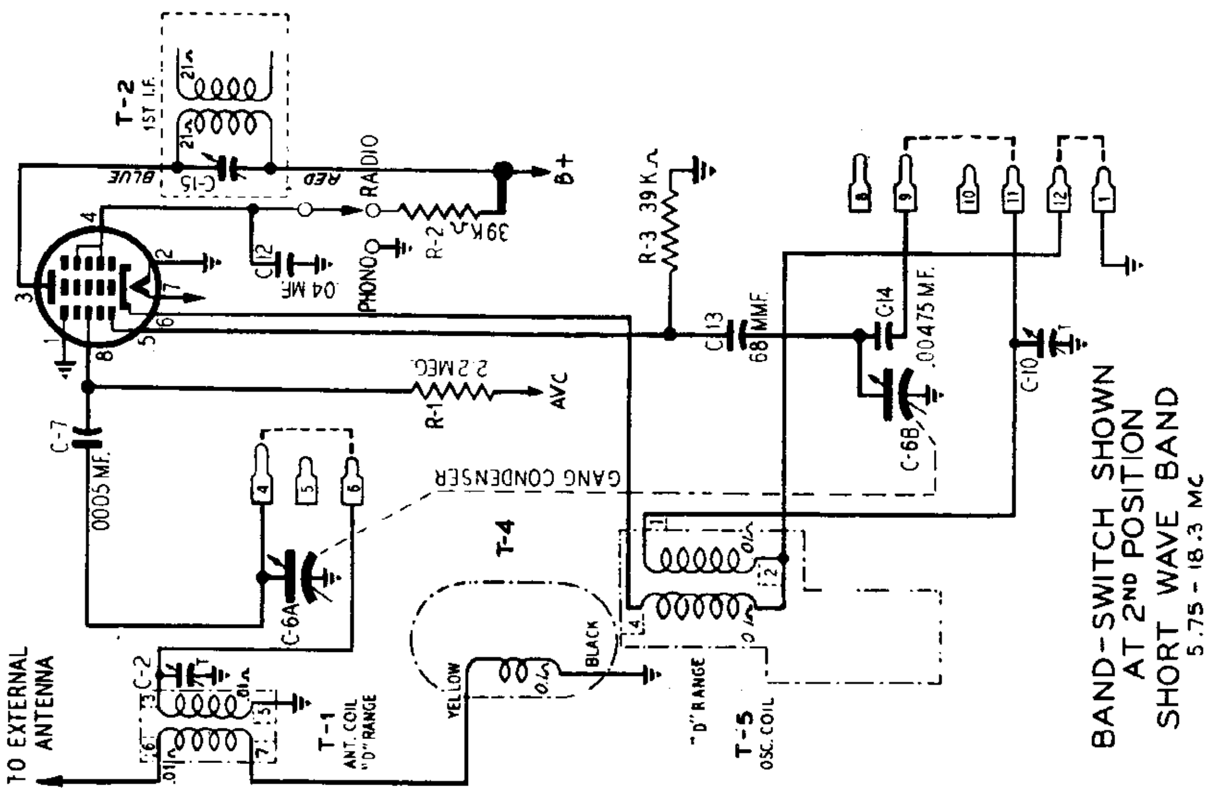
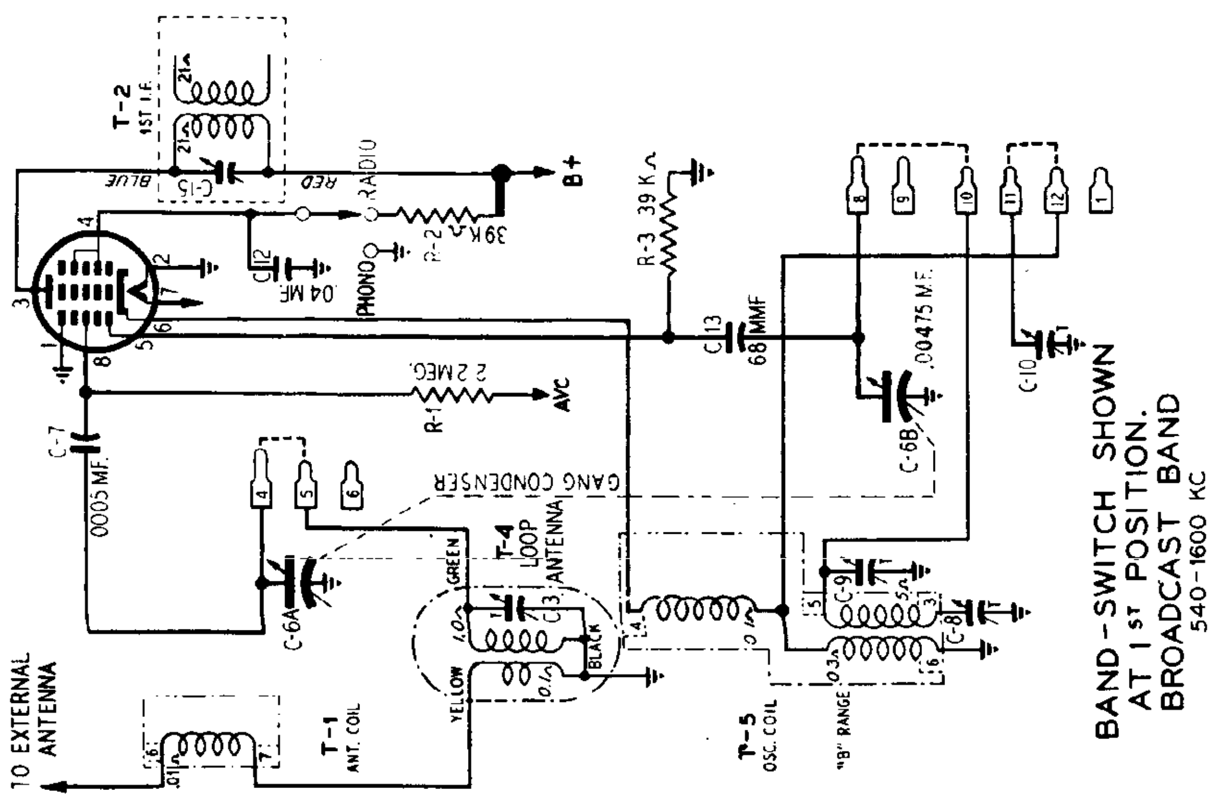


MODEL 35A86-750

WELLS-GARDNER & CO.



BAND-SWITCH SHOWN AT 2ND POSITION SHORT WAVE BAND 5.75 - 18.3 MC



BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND 540-1600 KC

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ALIGNMENT PROCEDURE

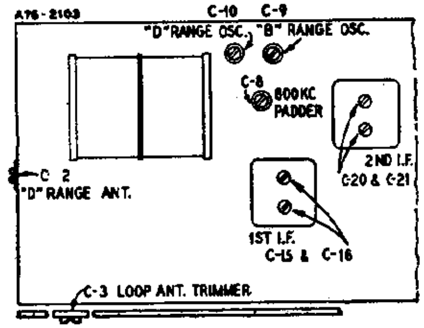
Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning: An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed. Output Indicating Meter—Non-Metallic Screwdriver. Dummy Antennas—.1 mf., 50 mmf., and 400 ohms.

	SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I.F.	455 KC	Grid of 6SA7 Pin 8	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C15) & (C16) 2nd I.F. (C20) & (C21)
RANGE B	1620 KC	Antenna Lead	50 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C9)
	1400 KC	Antenna Lead	50 mmf.	B Range	Tune Rotor to Max. Output	Ant. Range B (C3)
	600 KC	Antenna Lead	50 mmf.	B Range	Tune Rotor to Max. Output	600 KC (C8) See Note B
	Repeat above steps at 1620 and 600 KC until readjusting the oscillator Range B Trimmer (C9) causes no further improvement in output.					
RANGE D	18.3 MC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C10)
	16 MC	Antenna Lead	400 Ohm	D Range	Tune Rotor to Max. Output	Ant. Range D (C2) Rock Rotor—See Note B
LOOP RANGE B	Reassemble chassis in cabinet.					
	1400 KC	Antenna Lead	50 mmf.	B Range	Tune Rotor to Max. Output See Note A	Ant. Range B (C3)



NOTE A—Set pointer at the 1400 KC mark on the dial scale. Attach pointer to drive cord.

NOTE B—Turn rotor back and forth and adjust the trimmer until peak of greatest intensity is obtained.

REMOVAL OF CHASSIS FROM CABINET

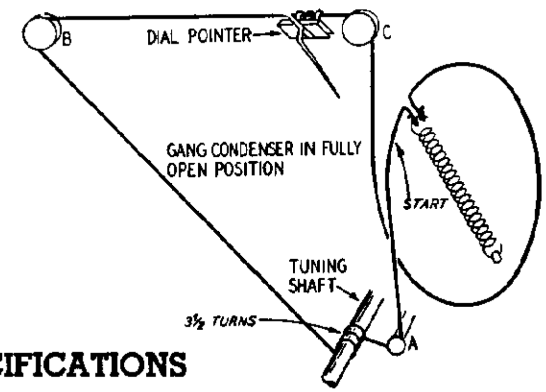
Before removing the chassis from the cabinet it will be necessary to detach the dial pointer from the dial string. To do this, spread the tabs on the pointer and pull the dial string off the pointer.

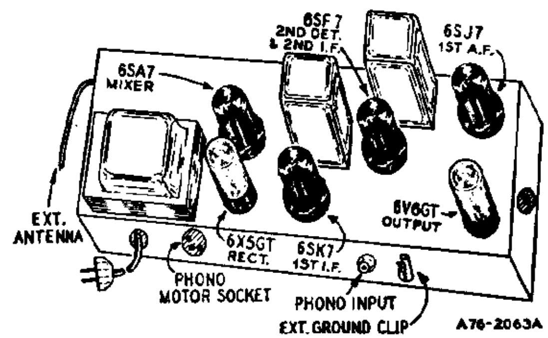
The dial lamp socket assemblies may be disengaged from the cabinet mounting by squeezing together and pulling away from the cabinet mounting, the spring bracket to which the dial lamp socket is mounted. Take care not to bend or damage the large drive pulley on the gang condenser while doing this.

When replacing the chassis in the cabinet it will be necessary to tune in a station of a known frequency and move the dial pointer until that frequency is indicated on the dial and then attach the pointer to the dial string. Take care not to scuff or cut the dial string or bend the pointer during this operation.

DRIVE CORD REPLACEMENT

The drive cord should be replaced as shown on the accompanying illustration using a new 10X56 drive cord assembly for the purpose. After the cord has been installed, stretch the tension spring and fasten the free end of the cord to it.





SPECIFICATIONS

Power Consumption (at 117 Volts AC) .... 45 Watts (normal), 70 Watts (phono operating)

Power Output .... 4 Watts, Maximum, 2.3 Watts, 10% Harmonics

Tuning Frequency Range

B Range .... 540-1600 Kilocycles

D Range .... 5.75-18.3 Megacycles

Speaker .... 8" PM Dynamic

Intermediate Frequency .... 455 KC

Selectivity .... 40 KC Broad at 1000 Times Signal

Sensitivity (For 0.5 Watt Output, with External Antenna)

B Range .... 9 Microvolts Average

D Range .... 20 Microvolts Average

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REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

MISCELLANEOUS

12A477	8" P.M. Speaker
3A303	Tube Socket—Octal (8 prong) Moulded
3A304	Phono Motor Socket
3A305	Phono Socket—Single Pin Tip
10A467	Knob (Tuning)
10A468	Knob (Off-On Volume)
10A634	Knob (SW-BC)
10A529	Knob (Tone—R.P.)
2A372	Band Change Switch
13X328	Line Cord and Plug Assembly
	No. 750 Phono-Console Cabinet

CAPACITORS

C-2	17A164	5-50 mmf		Trimmer
C-3	17A235	2-24 mmf		Trimmer
C-6A, C-6B	14A184	Gang Condenser with Drive Pulley		
C-7	B66501	.0005 mf	200 V	Tubular
C-8	17A155	350-430 mmf		Trimmer
C-9, C-10	17A109	2.5-35 mmf		Dual Trimmer
C-12, C-18	D66403	.04 mf	400 V	Tubular
C-13	47X466	68 mmf		Moulded
C-14	46X289	.00475 mf	180 V	Tubular
C-15, C-16	Part of T-2 (1st I-F Coil Assembly)			
C-19, C-23	47X463	47 mmf		Moulded
C-20, C-21	Part of T-3 (2nd I-F Coil Assembly)			
C-22A, C-22B	47X112	50-50 mmf		Dual Mica
C-24	D64403	.04 mf	400 V	Tubular
C-25	D66502	.005 mf	400 V	Tubular
C-26	D67104	.10 mf	400 V	Tubular
C-27	D64253	.025 mf	400 V	Tubular
C-28	D66402	.004 mf	400 V	Tubular
C-29	D66103	.01 mf	400 V	Tubular
C-30A	45X346	40 mf	450 V	3 Section Electrolytic
C-30B		40 mf	450 V	
C-30C		20 mf	25 V	
C-31	H66402	.004	800 V	Tubular
C-32	47X467	470 mmf		Moulded
C-33	B66503	.05 mf	200 V	Tubular

RESISTORS

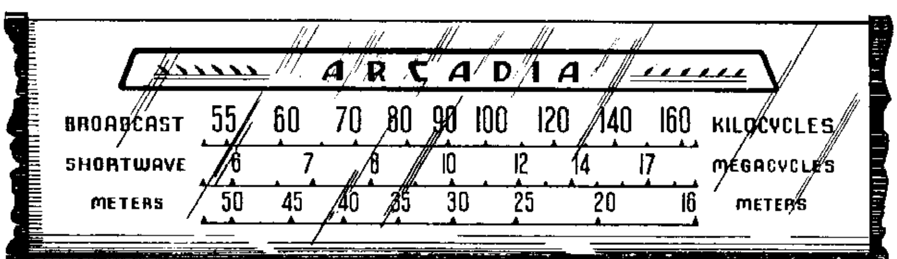
B85225	R-1, R-7	2.2 megohms	0.5 W	Carbon
C84393	R-2, R-4	39 K ohms	1.0 W	Carbon
B84393	R-3	39 K ohms	0.5 W	Carbon
B84222	R-5	2200 ohms	0.5 W	Carbon
B85105	R-6	1 megohm	0.5 W	Carbon
B85473	R-8	47 K ohms	0.5 W	Carbon
B84153	R-9	15 K ohms	0.5 W	Carbon
36X358	R-10	500 K ohms	Volume Control and Line Switch	
B85106	R-11	10 megohms	0.5 W	Carbon
B85474	R-12, R-16	470 K ohms	0.5 W	Carbon
B84333	R-13	33 K ohms	0.5 W	Carbon
B84823	R-14	82 K ohms	0.5 W	Carbon
40X276	R-15	3.0 megohms	Tone Control & Radio Phono Switch	
C84271	R-17	270 ohms	1.0 W	Carbon
D84182	R-19	1800 ohms	2.0 W	Carbon

DIAL AND DRIVE ASSEMBLY

6X21	Rubber Grommet } Mtg. Gang Condenser
20X329	Cond. Cushion Stud } Mtg. Gang Condenser
25X1489	Pulley Bracket (Right)
25X1490	Pulley Bracket (Left)
26X485	Drive Shaft
19X192	"C" Washer
25X1491	Pointer Bracket
15X229	Pointer
10X56	Drive Cord Assembly
28X113	Drive Cord Tension Spring
30X517	Dial Clamp
4X915	Escutcheon, Dial (Right)
4X916	Escutcheon, Dial (Left)
4X931	Escutcheon Insert
58X704	Dial Glass
7A200	Pilot Light Socket Assembly
7A32	Pilot Light Bulb No. 51

TRANSFORMERS AND COILS

T-1	9A1917	"D" Range Antenna Coil Assembly
T-2	9A1814	1st I-F Coil Assembly
T-3	9A1815	2nd I-F Coil Assembly
T-4	26A442	"B" Range Loop Antenna
T-5	9A1918	Oscillator Coil Assembly
T-6	53X282	Power Transformer
T-7	51X134	Output Transformer



A86-2299

2275

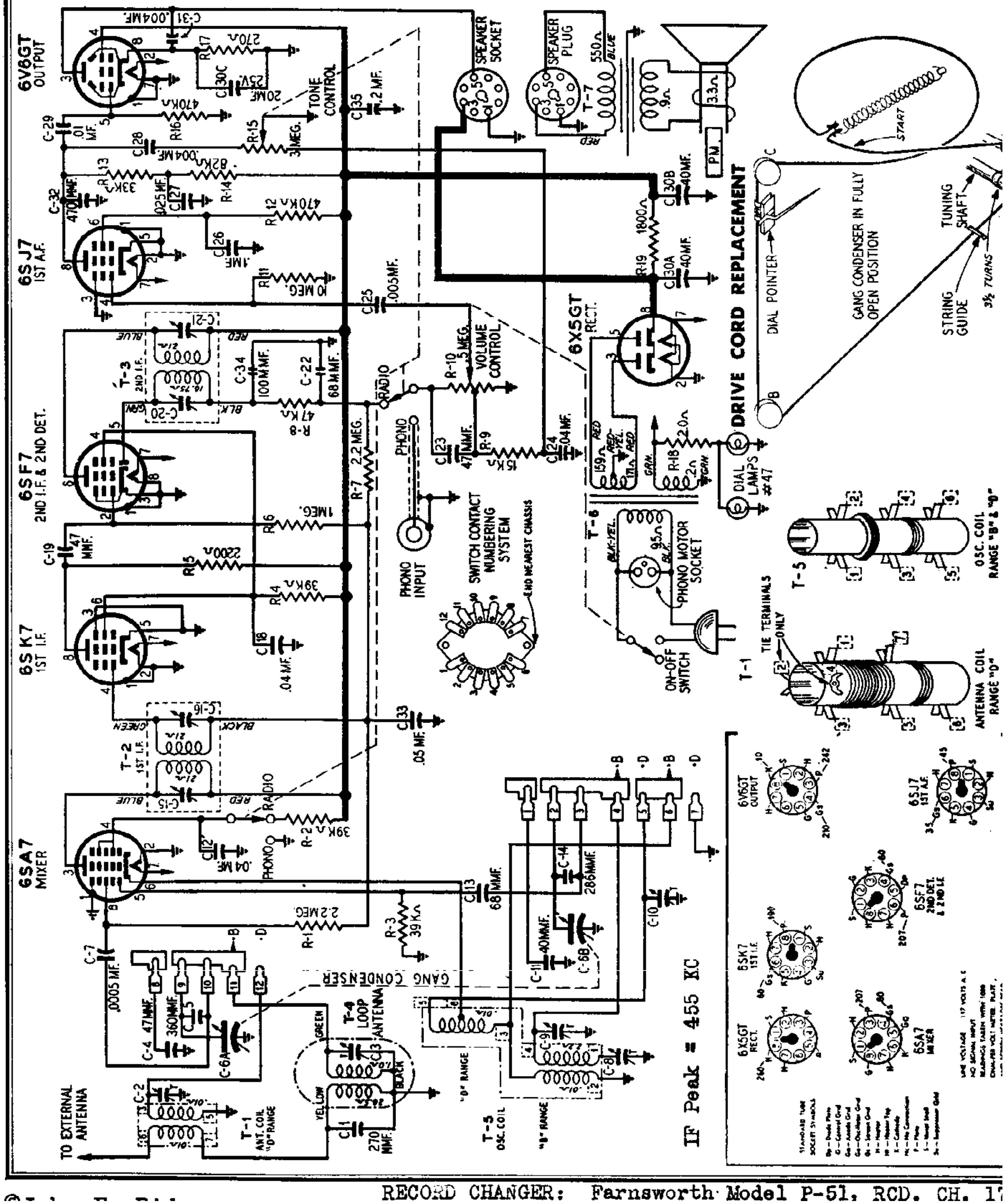
ON-OFF SWITCH AND VOLUME CONTROL

BAND SWITCH

TUNING KNOB

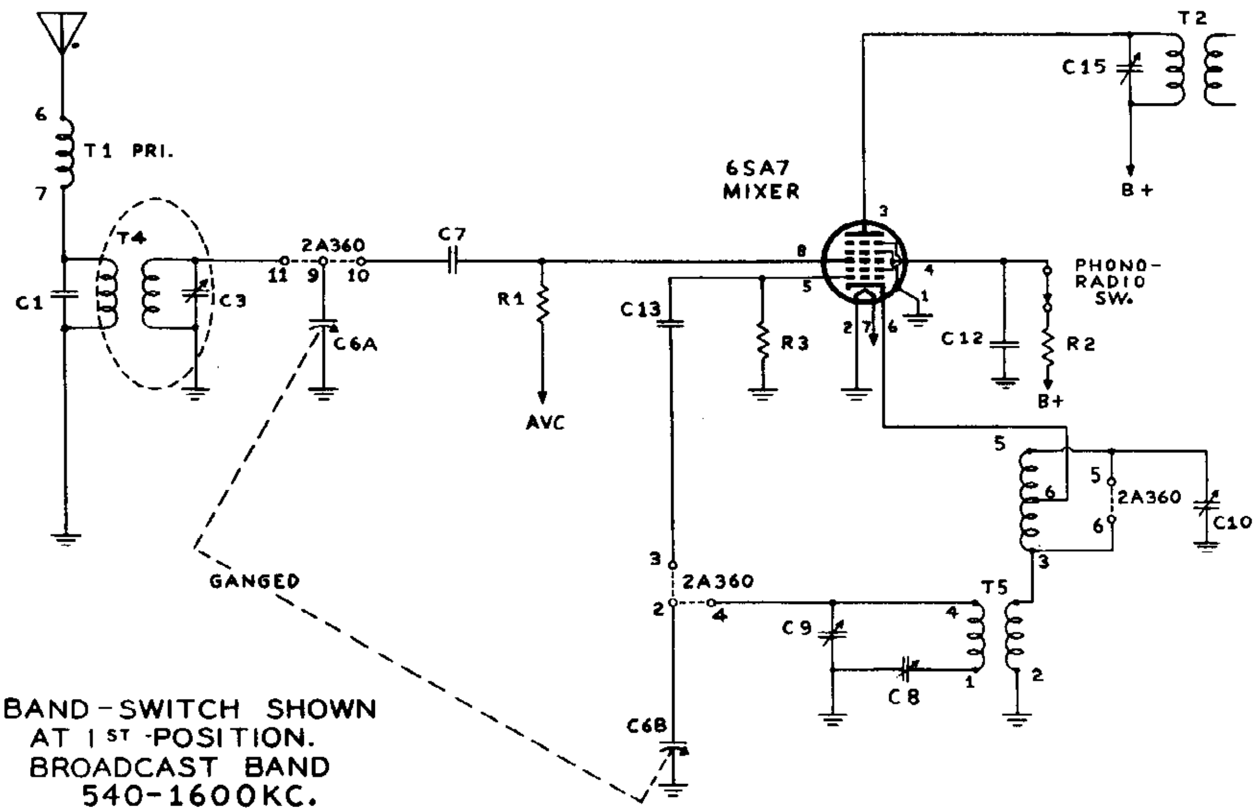
TONE CONTROL AND PHONO-RADIO SWITCH

WELLS-GARDNER & CO.

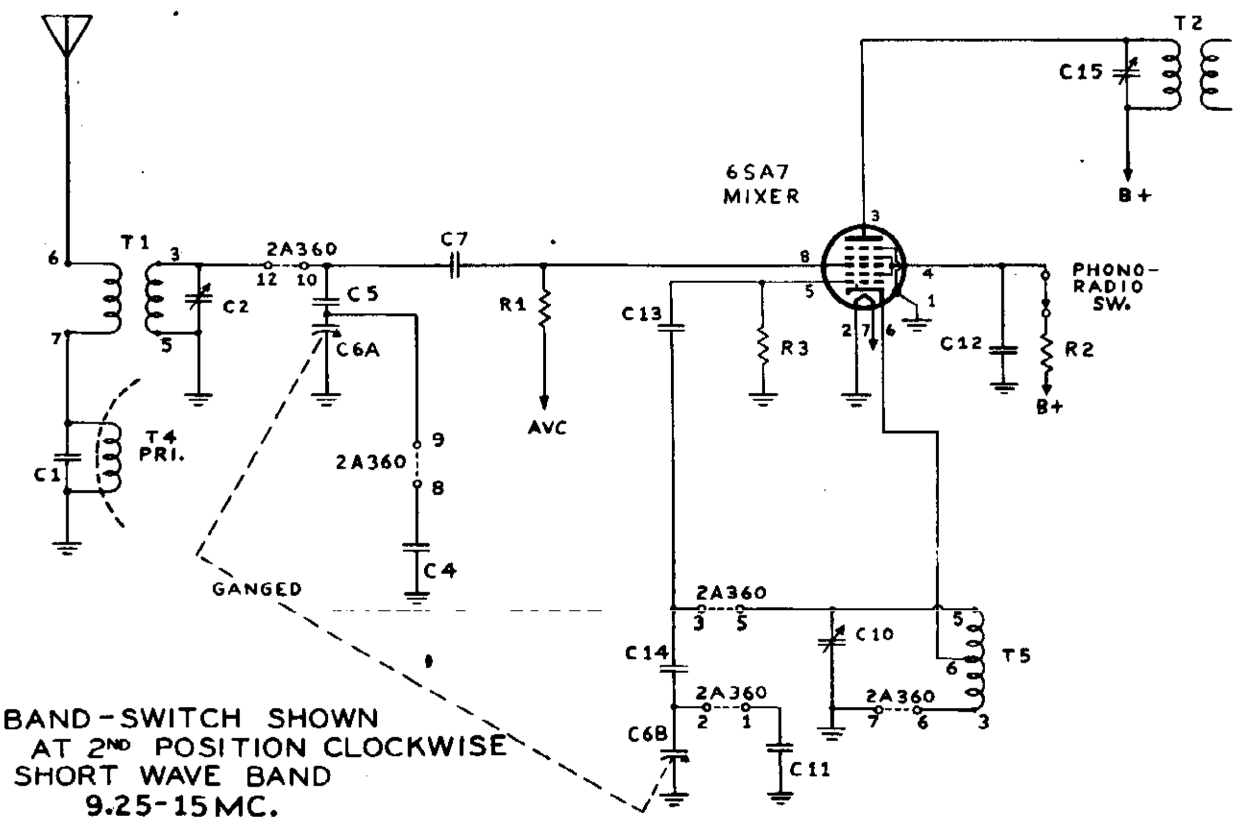


MODEL 436A76-670

WELLS-GARDNER & CO.



BAND-SWITCH SHOWN
AT 1ST -POSITION.
BROADCAST BAND
540-1600KC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND
9.25-15MC.

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REPLACEMENT PARTS LIST

NOTICE: There is a Model Number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

MISCELLANEOUS

PART NO.	DESCRIPTION
12A442	6" P.M. Speaker complete with Output Transformer
12A436	8" P.M. Speaker complete with Output Transformer
	Cone and Voice Coil Assembly (Specify part number and letters stamped on speaker)
	Output Transformer (Specify part number and letters stamped on speaker)
3A303	Tube Socket—Octal (8 prong) Molded
3A304	Phono Motor Socket
3A305	Phono Socket—Single Pin Tip
2A360	Band Change Switch
13X328	Line Cord and Plug Assembly
10A614	Knob (Tuning)
10A615	Knob (Volume)
10A616	Knob (Tone—R.P.)
10A617	Knob (SW-BC)

CAPACITORS

C-1	47X445	270 mmf		Molded
C-2	17A164	5-50 mmf		Trimmer
C-3	17A235	2-12 mmf		Trimmer
C-4	47X473	47 mmf		Silvered Mica
C-5	47X474	360 mmf		Silvered Mica
C-6A, C-6B	14A184	Gang Condenser		
C-7	B66501	.0005 mf	200 V	Tubular
C-8	17A155	350-430 mmf		Trimmer
C-9, C-10	17A109	2.5-35 mmf		Dual Trimmer
C-11	47X472	40 mmf		Silvered Mica
C-12, C-18	D66403	.04 mf	400 V	Tubular
C-13	47X466	68 mmf		Molded
C-14	47X481	286 mmf		Silvered Mica
C-15, C-16	Part of T-2 (1st I-F Coil Assem.)			
C-19, C-23	47X463	47 mmf		Molded
C-20, C-21	Part of T-3 (2nd I-F Coil Assem.)			
C-22	47X471	68 mmf		Molded
C-24	D64403	.04 mf	400 V	Tubular
C-25	D66502	.005 mf	400 V	Tubular
C-26	D67104	.10 mf	400 V	Tubular
C-27	D64253	.025 mf	400 V	Tubular
C-28	D66402	.004 mf	400 V	Tubular
C-29	D66103	.01 mf	400 V	Tubular
C-30A	45X346	40 mf	450 V	Three Section Electrolytic
C-30B		40 mf	450 V	
C-30C		20 mf	25 V	
C-31	F66402	.004 mf	600 V	Tubular
C-32	47X505	470 mmf		Molded
C-33	B66503	.05 mf	200 V	Tubular
C-34	47X476	100 mmf		Molded
C-35	D67204	.2 mf	400 V	Tubular

RESISTORS

		OHMS	WATTS	
R-1, R-7	B85225	2.2 meg.	0.5	Carbon
R-2, R-4	C84393	39 K	1.0	Carbon
R-3	B84393	39 K	0.5	Carbon
R-5	B84222	2200	0.5	Carbon
R-6	B85105	1 meg.	0.5	Carbon
R-8	B85473	47 K	0.5	Carbon
R-9	B84153	15 K	0.5	Carbon
R-10	36X357	.5 meg.		Volume Control & Swi
R-11	B85106	10 meg.	0.5	Carbon
R-12, R-16	B85474	470 K	0.5	Carbon
R-13	B84333	33 K	0.5	Carbon
R-14	B84823	82 K	0.5	Carbon
*R-15	40X277	3 meg.		Tone Control & Radio Phono Swi
R-17	C84271	270	1.0	Carbon
R-18	43X213	2.0	0.5	Wire-wound
R-19	D84182	1800	2.0	Carbon

DIAL AND DRIVE ASSEMBLY

6X21	Rubber Grommet } Mtg. Gang Condenser
20X329	Cond. Cushion Stud } Mtg. Gang Condenser
26A443	Dial Bracket Assembly complete with Spacers, Pulle Diffusers and Dial Background less Dial Glass
58X676	Dial Glass
26A444	Idler Bracket Assembly
26X486	Drive Shaft
19X192	"C" Washer (for drive shaft)
15X163	Pointer
10X38	Drive Cord Assembly or 50" Cord
28X113	Drive Cord Tension Spring
7X199	Pilot Light Socket Assembly
	No. 47 Pilot Light
4X353	Escutcheon

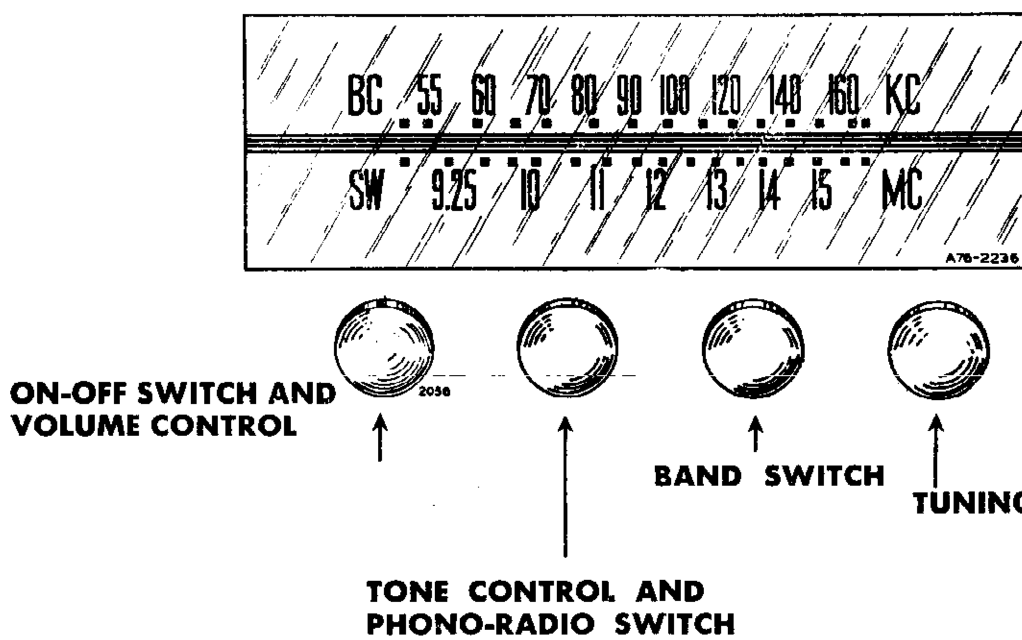
TRANSFORMERS AND COILS

T-1	9A1812	"D" Range Antenna Coil Assembly
T-2	9A1814	1st I-F Coil Assembly
T-3	9A1815	2nd I-F Coil Assembly
T-4	26A449	"B" Range Loop Antenna Assembly
T-5	9A1813	"B" and "D" Range Oscillator Coil Assembly
T-6	53X282	117 Volt, 60 Cycle, Standard Power Transformer
T-7		Output Transformer (See Miscellaneous)

SUBSTITUTE PARTS

The following parts are used in some receivers only. Check part numl on old part before ordering and order part originally used in recei

*40X282	Tone Control (Substitute for 40X277)
*25X1539	Radio Phono Switch Lever (Use with 40X282)
*2A161	D.P.D.T. Switch (Use with 40X282)



WELLS-GARDNER & CO.

ALIGNMENT PROCEDURE

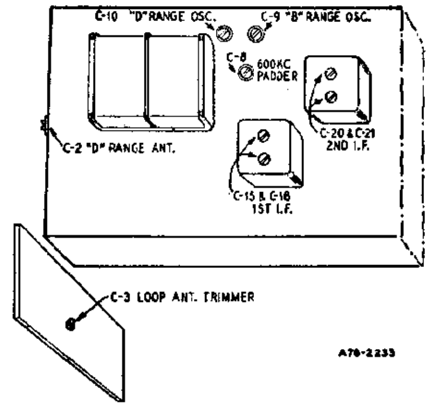
Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning: An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed. Output Indicating Meter—Non-Metallic Screwdriver. Dummy Antennas—.1 mf., 100 mmf., and 400 ohms.

	SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I.F.	455 KC	Grid of 6SA7 Pin 8	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C15) & (C16) 2nd I.F. (C20) & (C21)
RANGE B	1620 KC	Antenna Lead	100 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C9)
	1400 KC	Antenna Lead	100 mmf.	B Range	Tune Rotor to Max. Output See Note A	Ant. Range B (C3)
	600 KC	Antenna Lead	100 mmf.	B Range	Tune Rotor to Max. Output	Oscillator (C8) See Note B
	Repeat above steps at 1620 and 600 KC until readjusting the oscillator Range B Trimmer (C9) causes no further improvement of output.					
RANGE D	15.6 MC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C10)
	14 MC	Antenna Lead	400 Ohm	D Range	Tune Rotor to Max. Output	Ant. Range D (C2)
LOOP RANGE B	Reassemble chassis in cabinet.					
	1400 KC	Antenna Lead	100 mmf.	B Range	Tune Rotor to Max. Output	Ant. Range B (C3)

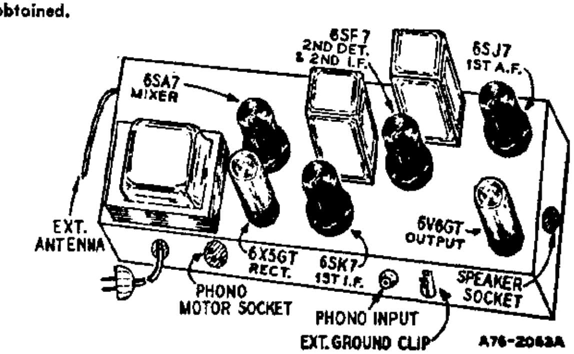


NOTE A—Set pointer at the 1400 KC mark on the dial scale. Attach pointer to drive cord.

NOTE B—Turn rotor back and forth and adjust the trimmer until peak of greatest intensity is obtained.

REMOVAL OF CHASSIS FROM CABINET

Before the chassis may be taken from the cabinet, it is necessary to pull off the 4 control knobs, remove the 4 chassis mounting bolts, disconnect the leads running to the loop antenna, record changer and speaker and loosen the screw and remove the black lead fastened to the lower left corner of the chassis.



SPECIFICATIONS

Power Consumption (at 117 Volts AC) .... 40 Watts (normal)
58 Watts (phono operating)

Power Output .... 4 Watts, Maximum
2.3 Watts, 10% Distortion

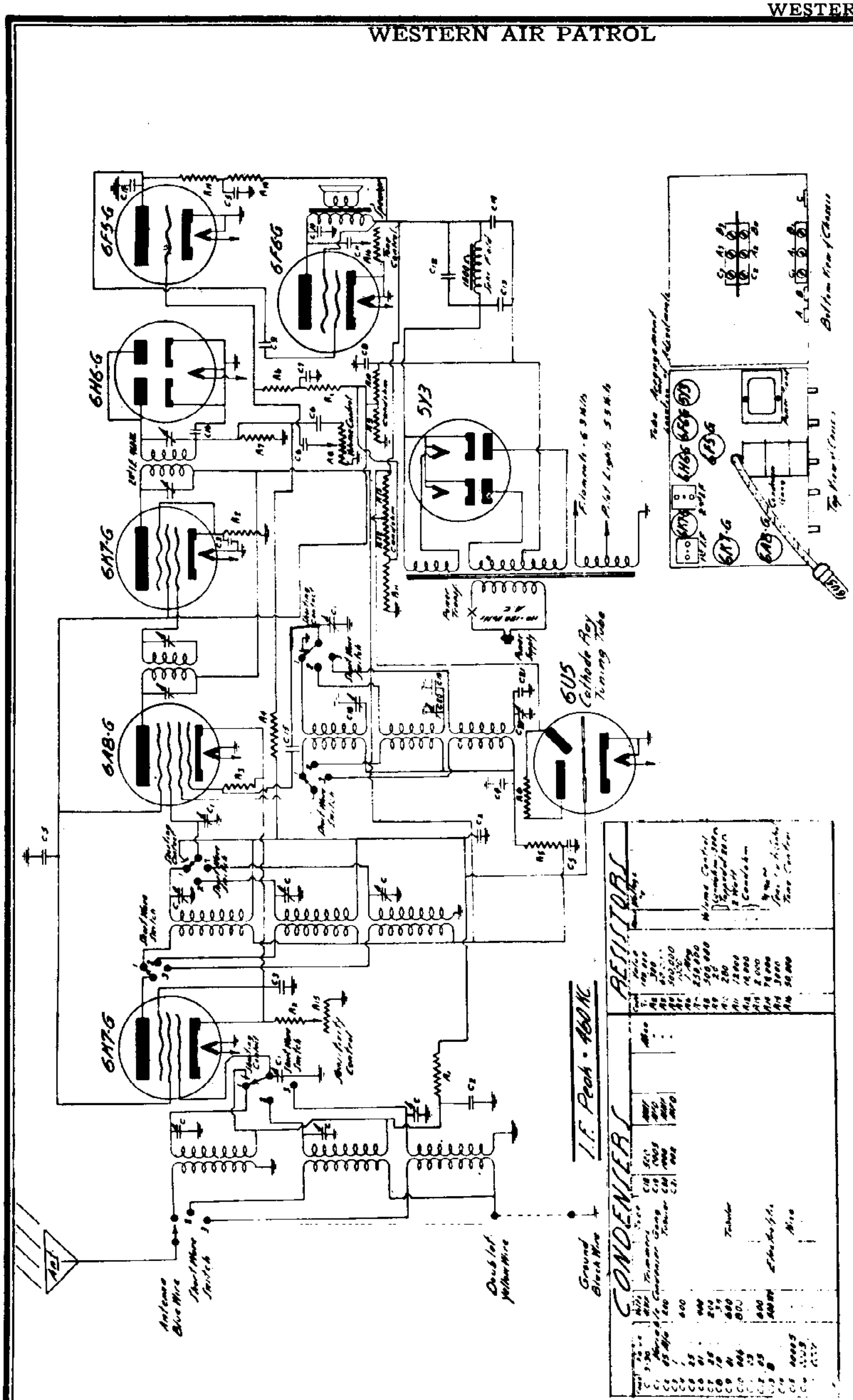
Tuning Frequency Range
B Range .... 540-1600 Kilocycles
D Range .... 9.25-15 Megacycles

Intermediate Frequency .... 455 KC

Selectivity .... 40 KC Broad at 1000 Times Signal

Sensitivity (For 0.5 Watt Output, with External Antenna)
B Range .... 9 Microvolts Average
D Range .... 20 Microvolts Average

WESTERN AIR PATROL



RANGE A-525-1750 KC.
TRIMMER A1-1712KC.
TRIMMER A-600 KC.
TRIMMER A2,A3-1300 KC.

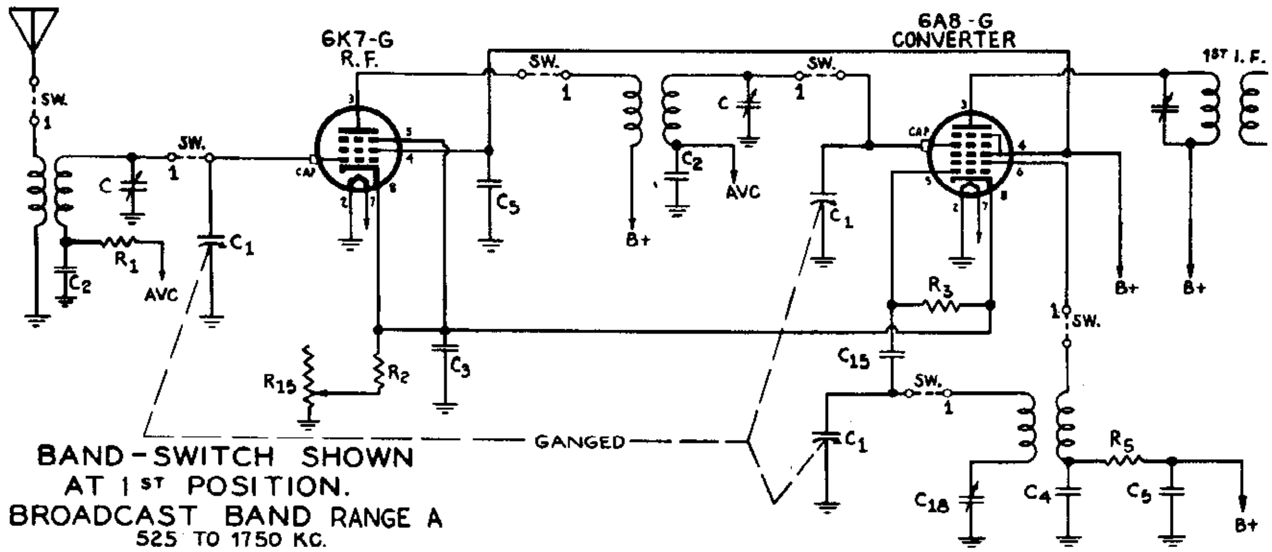
ALIGNMENT FREQUENCIES

RANGE B-1700-5800 KC.
TRIMMER B1-5400 KC.
TRIMMER B-1800 KC.
TRIMMER B2,B3-5400 KC.

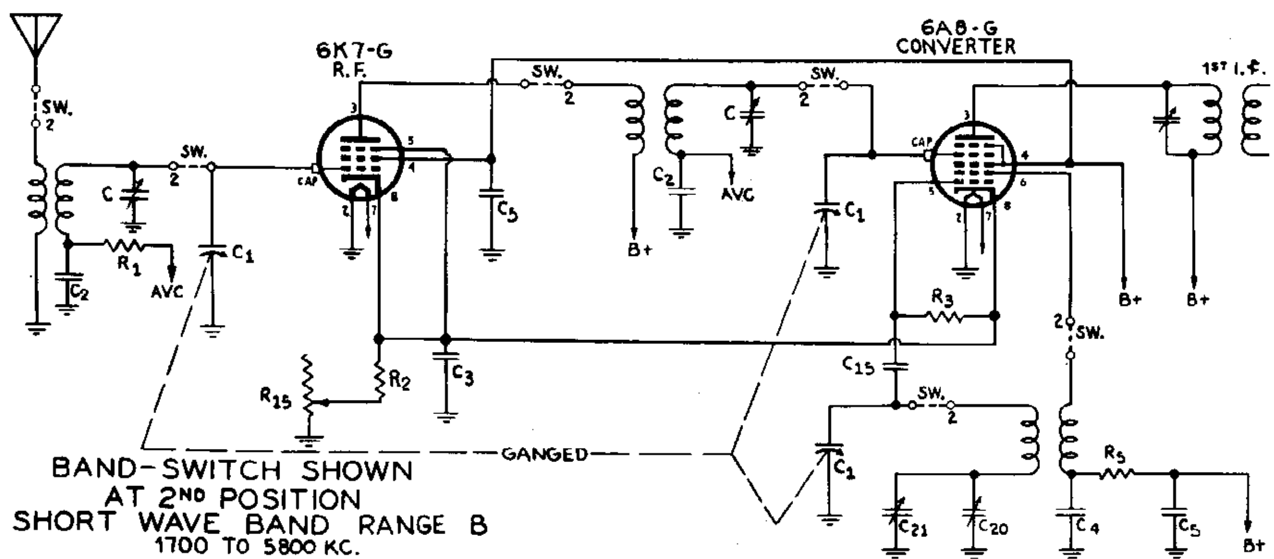
RANGE C-5400-18000 KC.
TRIMMER C1-18 MC.
TRIMMER C-6000 KC.
TRIMMER C2,C3-18 MC.

Model 587

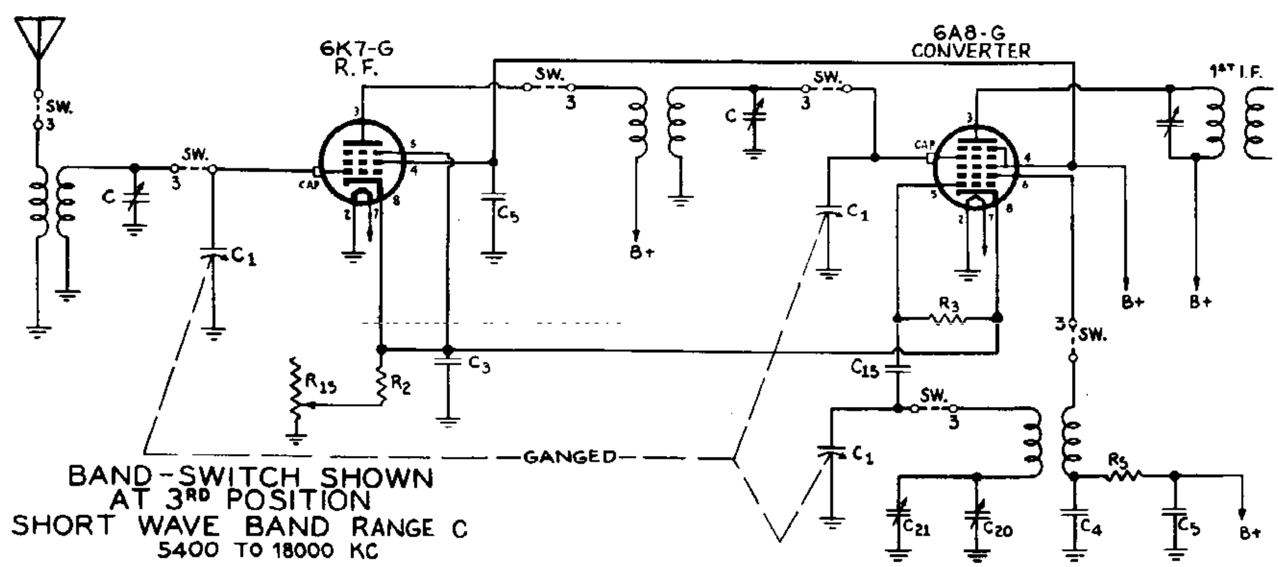
WESTERN AIR PATROL



BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND RANGE A
525 TO 1750 KC.

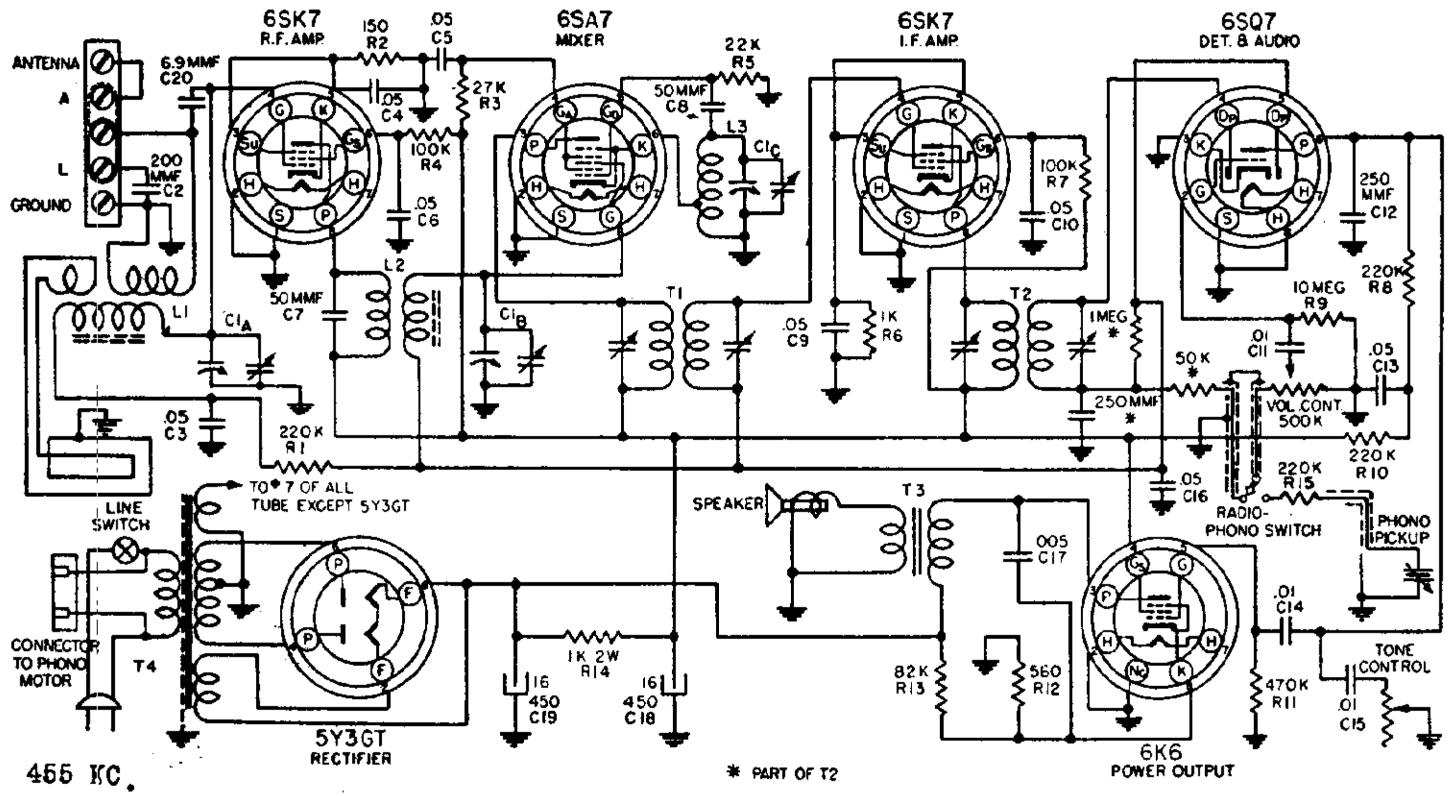


BAND-SWITCH SHOWN
AT 2ND POSITION
SHORT WAVE BAND RANGE B
1700 TO 5800 KC.

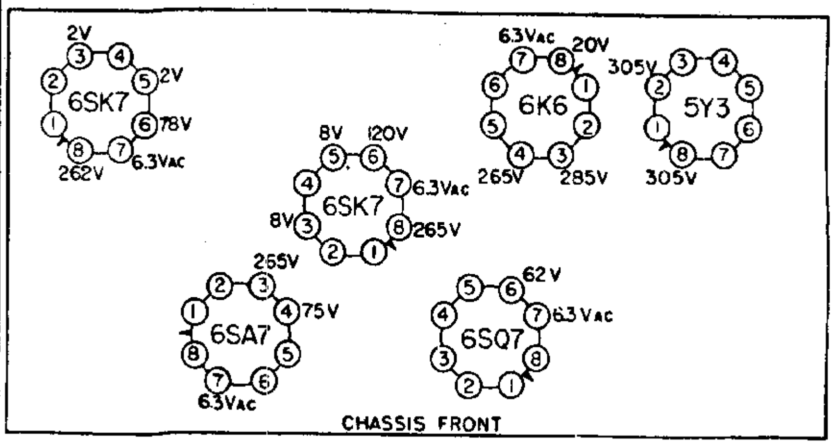


BAND-SWITCH SHOWN
AT 3RD POSITION
SHORT WAVE BAND RANGE C
5400 TO 18000 KC

WESTERN AUTO SUPPLY CO.



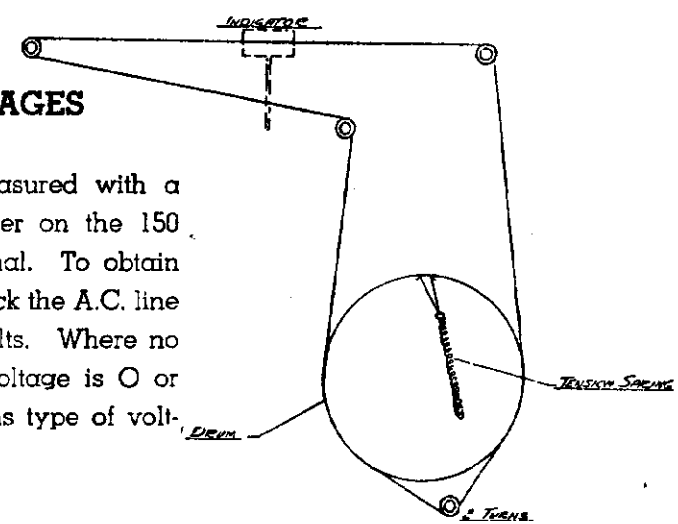
I.F. 455 KC.



Chassis, Bottom View

SOCKET VOLTAGES

All voltages are measured with a 1000 ohm per volt meter on the 150 volt scale, with no signal. To obtain an accurate voltage check the A.C. line voltage must be 117 volts. Where no voltage is shown the voltage is O or cannot be read with this type of voltmeter.



WESTERN AUTO SUPPLY CO.

ALIGNMENT PROCEDURE

Volume control—Maximum: all adjustments.
Tone Control—Treble: Full Clockwise Rotation.
Connect ground lead of signal generator to radio chassis.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for proper alignment

Signal generator that will provide the test frequencies as listed.

Output meter.

Non-metallic screwdriver.

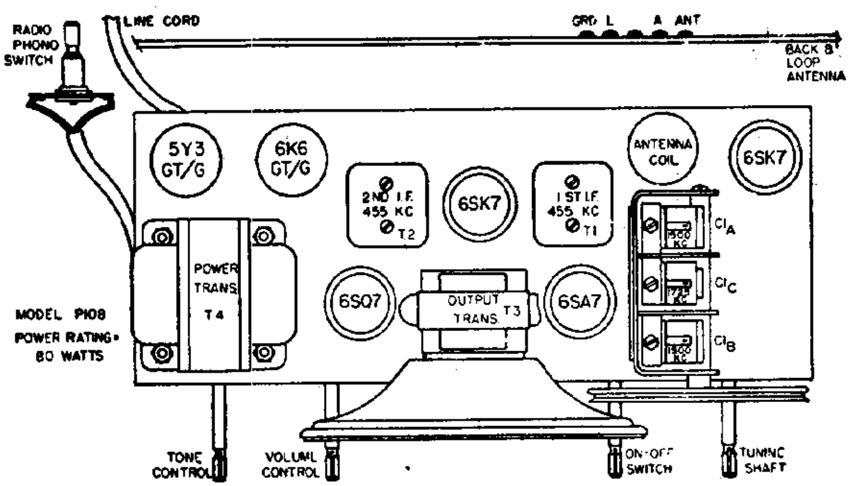
Dummy antennas—.1 mfd., 00025 mfd.

Position of Variable	Generator Frequency	Dummy Ant. mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Minimum Capacity (Fully Opened)	455 K.C.	.1	6SA7 Grid (Stator of C1B)	T1 T2	I. F.
Minimum Capacity (Fully Opened)	1725 K.C.	.00025	*Ant. Terminal on Loop	C1C	Osc.
Tune in signal From Generator	1500 K.C.	.00025	*Ant. Terminal on Loop	C1B	R. F.
Tune in signal From Generator	1500 K.C.	.00025	*Ant. Terminal on Loop	C1A	Ant.

*Be sure coupling link is in correct position for external antenna operation. See illustration below (Fig. 4).

Repeat the above alignment procedure as a final check.

With an output meter connected across the voice coil of the speaker, the output meter reading for ½ watt is 1.25 volts using a signal which is modulated 400 c.p.s.



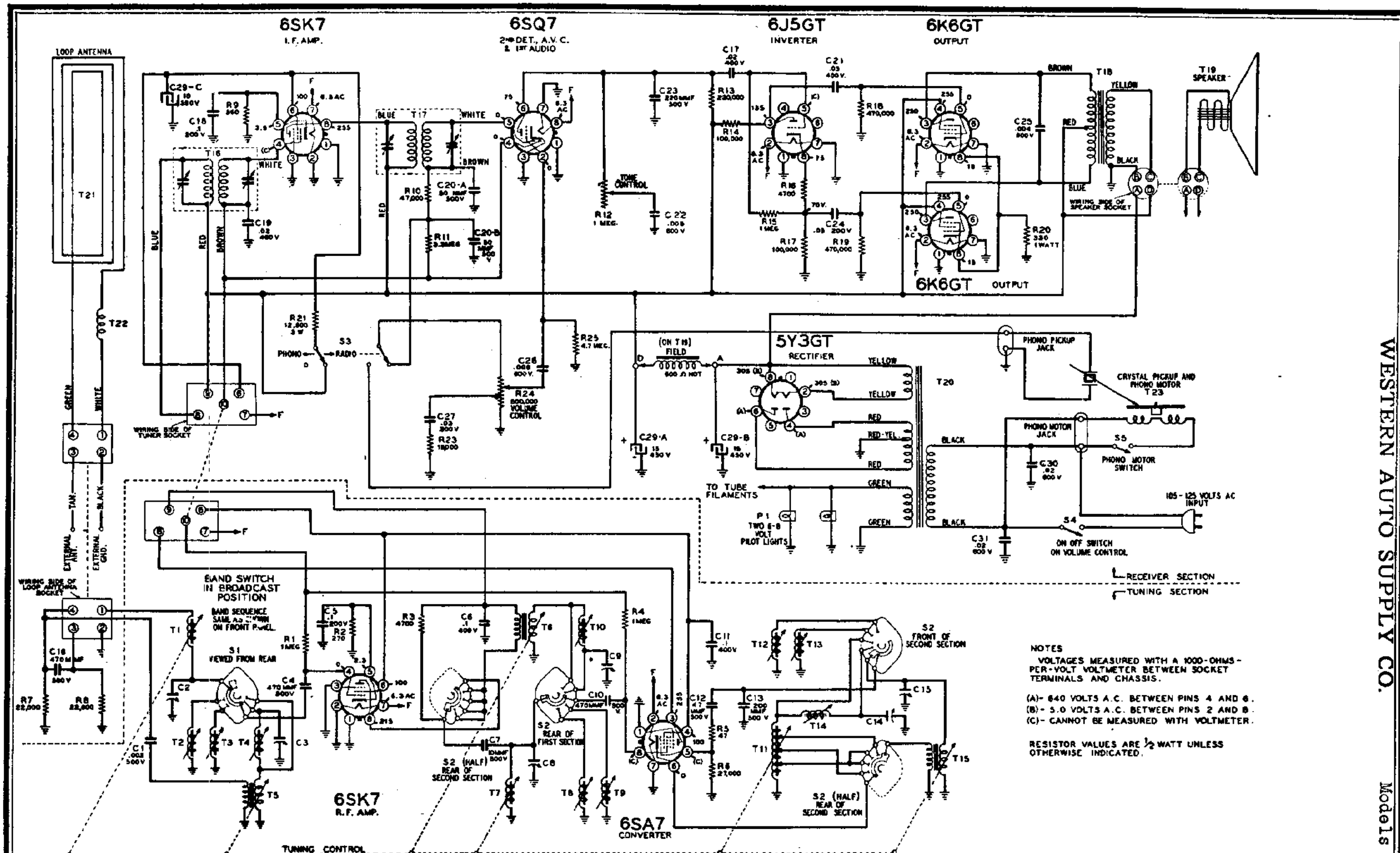
Chassis, Top View

Speaker cones and output transformers are not furnished as seperate items. Defective speakers should be returned to the factory for replacement and repair.

Note: The two speakers shown are interchangeable.

Circuit Reference	Part No.	Description
		CONDENSERS
C1A, C1B, C1C	B19-186	Variable condenser
C2		200 MMF mica condenser (on Loop)
C3 C4, C9, C16	A16-152	.05 MFD. 200 volt tubular condenser
C5, C6, C10, C13	A16-158	.05 MFD. 400 volt tubular condenser
C7, C8	A15-175	50 MMF mica condenser
C11, C14, C15	A16-156	.01 MFD. 400 volt tubular condenser
C12	A15-176	250 MMF. mica condenser
C17	A16-153	.005 MFD. 600 volt tubular condenser
C18	A18-279	16 MFD. 450 volt electrolytic condenser
C19	A18-274	16 MFD. 450 volt electrolytic condenser
C20	A84-71	6.9 MMF. condenser
		RESISTORS
R1, R8, R10 & R15	A60-667	220K ohm ½ watt resistor
R2	A60-686	150 ohm ½ watt resistor
R3	A60-692	27K ohm 1 watt resistor
R4, R7	A60-671	100K ohm ½ watt resistor
R5	A60-659	22K ohm ½ watt resistor
R6	A60-675	1K ohm ½ watt resistor
R9	A60-663	10 megohm ½ watt resistor
R11	A60-662	470K ohm ½ watt resistor
R12	A60-701	560 ohm 1 watt resistor
R13	A60-700	82K ohm 1 watt resistor
R14	A60-699	1000 ohm 2 watt resistor
		COILS
L1	B10-451	Antenna coil
L2	B10-452	R. F. coil
L3	A10-446	Oscillator coil
T1	B10-412	1st I.F. transformer
T2	B10-444	2nd I.F. transformer
		MISCELLANEOUS
T3		Output transformer (part of Speaker)
T4	C80-223	Power Transformer
	A69-169	ON-OFF Switch
	A26-123	Tone Control
	A24-169	Volume Control
	A84-41	Dial Drive Shaft and Pulley Assembly
	B79-341	6¼" P.M. Speaker
	B79-342	6¼" P.M. Speaker, alternate
	S84-56	Antenna Loop Assembly
	C67-494	Dial Scale
	D42-391	Wood Cabinet
	A52-188	Knob (Phono-Radio)
	A52-193	Knob
	A58-61	Dial Pointer
	A83-361	Dial Scale Retainer
	A69-172	Phono-Radio Switch

WESTERN AUTO SUPPLY CO.



Power Output......5.5 watts undistorted.
7.5 watts maximum.

Sensitivity.........4 microvolts average for ½ watt output.

Selectivity.........35 kc. broad at 1000 times signal at

Intermediate Freq....455 kc.

Tuning........................All bands permeability-tuned.

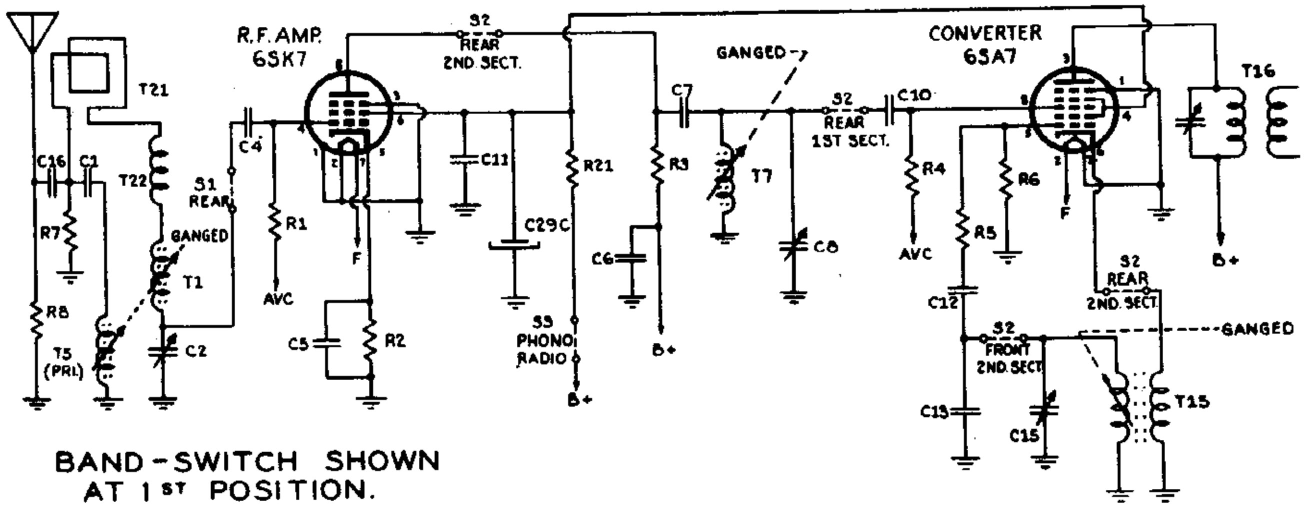
Antenna.......................Built-in; provisions also for external antenna and ground.

Speaker.......................8" electrodynamic. Voice coil im-

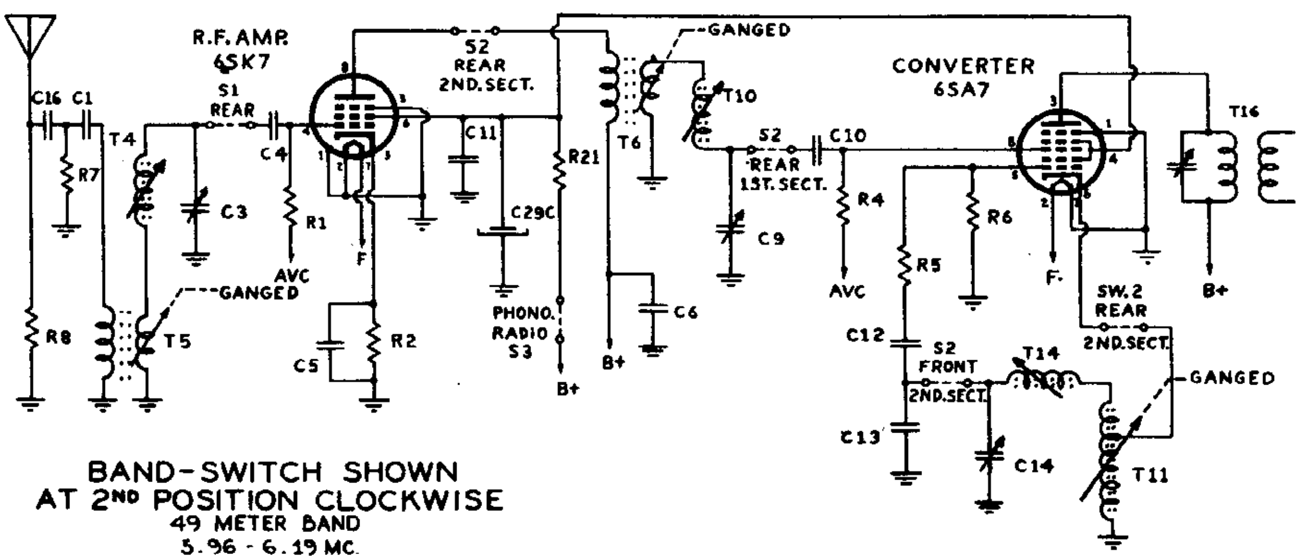
Power Supply...........105 to 125 volts AC, 60 cycles; 95 watts (118 watts with phono motor operating).

Frequency Ranges....Broadcast band—540 to 1600 kc.
49-meter band—5.96 to 6.19 mc.
31-meter band—9.1 to 10 mc.
25-meter band—11.45 to 12.16 mc.

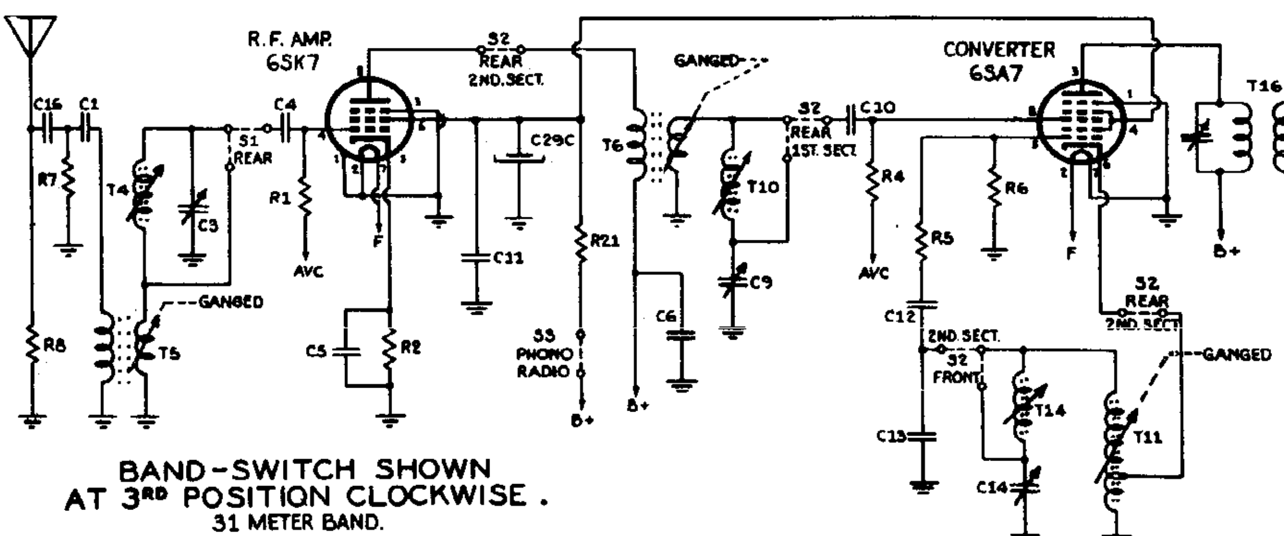
Models D-1747, D-1748 WESTERN AUTO SUPPLY CO.



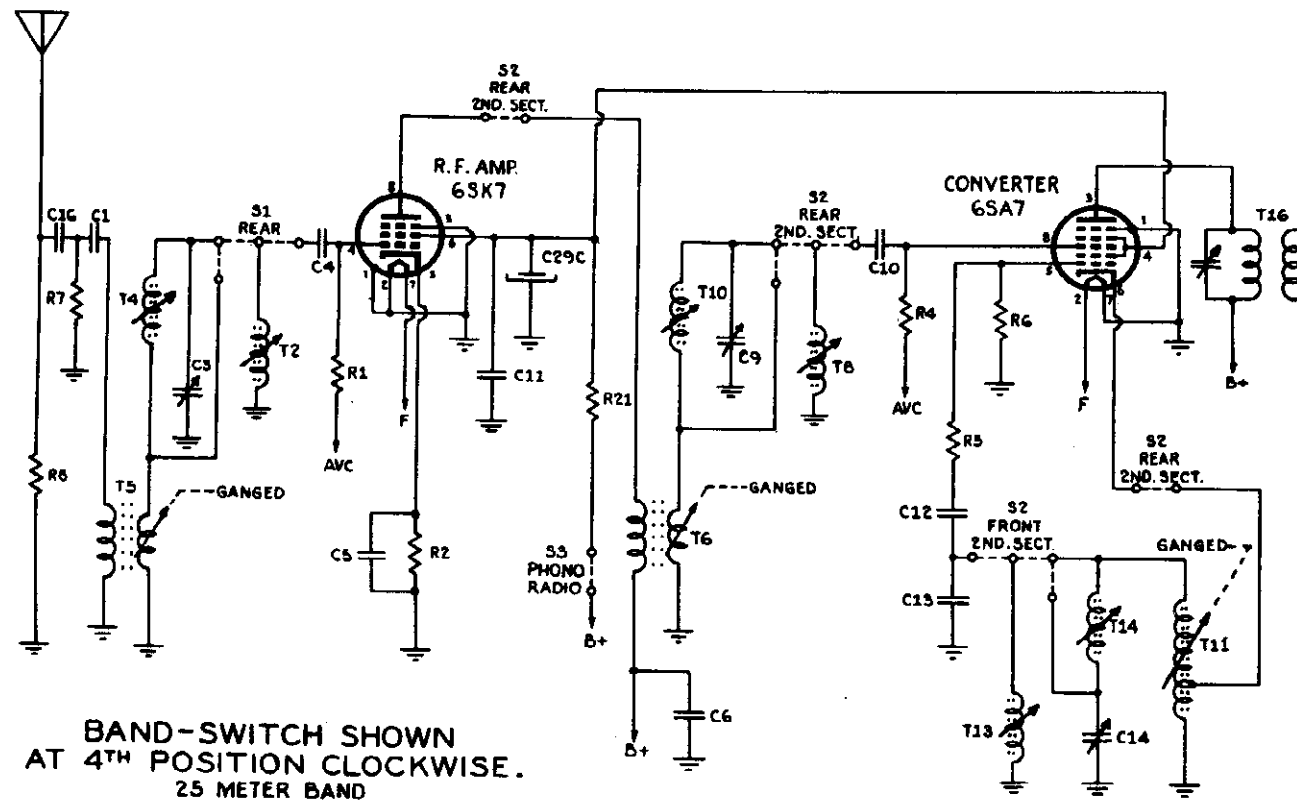
BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
540-1600 KC



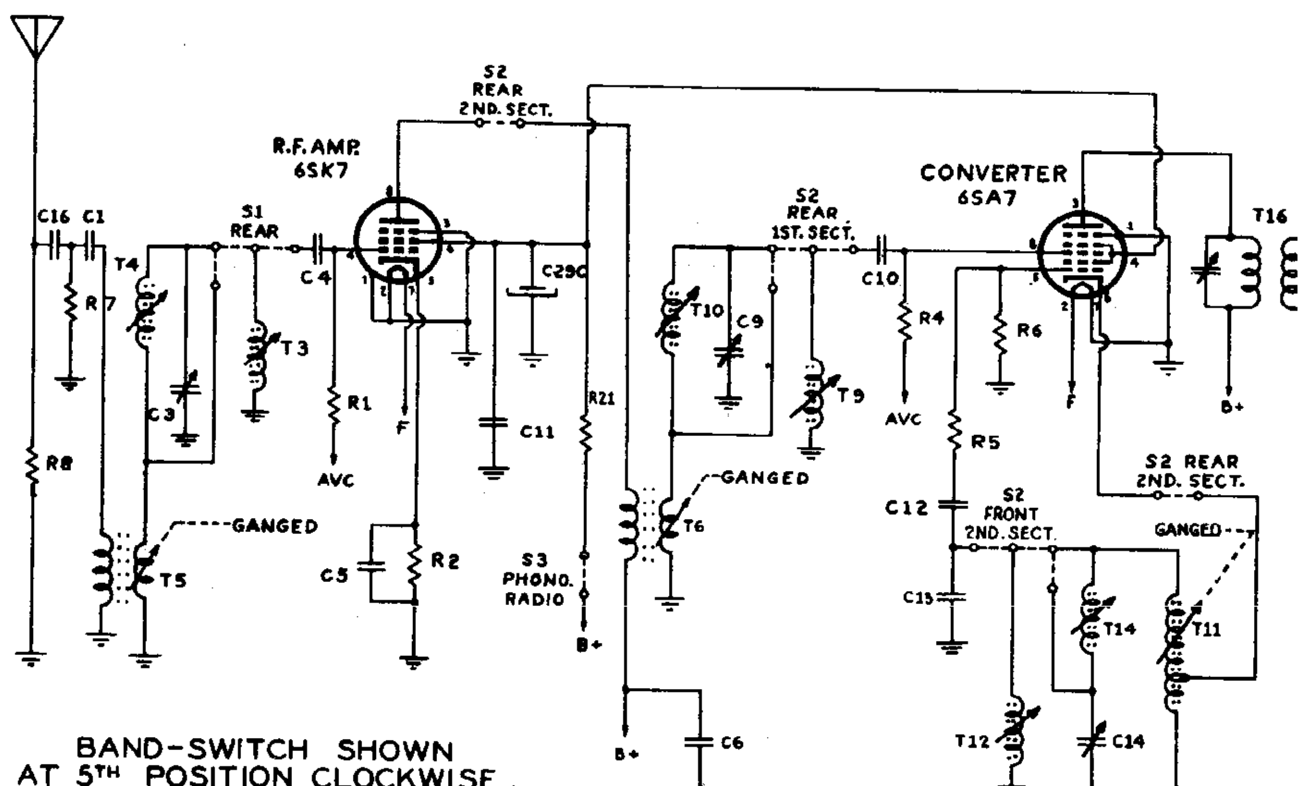
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
49 METER BAND
5.96 - 6.19 MC.



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
31 METER BAND.
9.1 - 10 MC.



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
25 METER BAND
11.45 - 12.16MC.



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE.
19 METER BAND
14.94 - 15.46 MC.

Models D-1747, D-1748 WESTERN AUTO SUPPLY CO.

ALIGNMENT PROCEDURE

MECHANICAL ADJUSTMENT—The core tuning bar (see illustration of iron cores) and dial pointer must be adjusted mechanically before any electrical alignment is attempted. Rotate the manual tuning control until the core bar is farthest from the coils. For proper adjustment the bar should be approximately 1/32 of an inch from the two rod guide angles.

With the core bar in this position, adjust the dial pointer to coincide with 1600 kc on the dial scale.

Rotate the cores of each of the three broadcast coils (see illustration) until the end of the coil is 1-5/32" from the end of the coil form. Rotate the three 9-mc cores until this dimension is 1-1/16" for these coils. After these adjustments have been made, the unit can be aligned electrically.

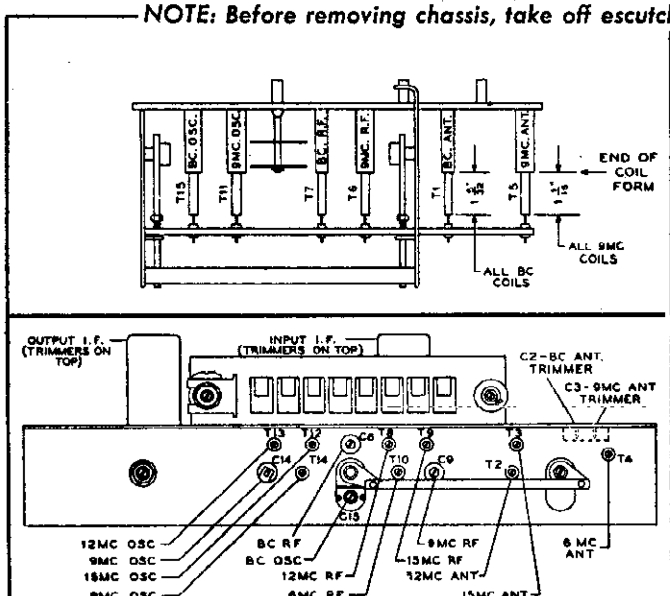
ELECTRICAL ADJUSTMENT—To align the set make the following preliminary adjustments: Set the tone control for treble tone; set the volume control at maximum; connect the ground post of the signal generator to the radio chassis; connect the output meter across a 3.2-ohm output load; and allow the receiver and signal generator to warm up for several minutes.

Align the set according to the sequence given in the chart. The indicated dummy antenna is to be connected in series between the signal generator output lead and the receiver. Adjust the set for maximum output; reduce the input as needed to keep the output near 1.3 volts.

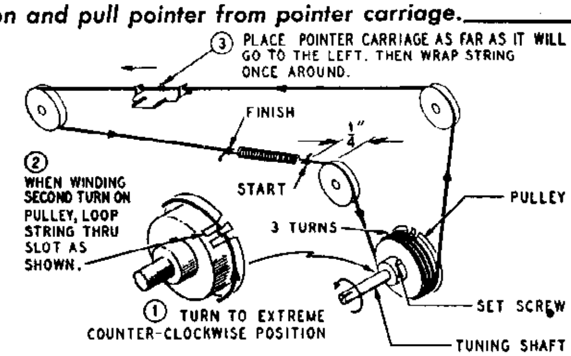
Locations of all trimmers and coils are shown elsewhere in this manual. After adjustment, seal the coil cores with collodion or a similar substance (do not use cement).

BAND SWITCH SETTING	*SIGNAL GENERATOR*			*DIAL POINTER SETTING*	*ADJUST TO MAXIMUM OUTPUT (in order shown)*
	Frequency	*Coupling Capacitor*	*Connection to Radio*		
Broadcast (for I. F.)	455 kc	.1 mf	Grid (pin 8) of converter (6SA7)	1600 kc	Trimmers on output and input I. F. cans
Broadcast	1600 kc	200 mmf	Antenna lead	1600 kc	BC Osc. trimmer C15 BC R. F. trimmer C8 BC Ant. trimmer C2
	1400 kc	200 mmf	Antenna lead	1400 kc	Rotate cores of BC R. F. coil T7 and BC Ant. coil T1
31 Meter	9.6 mc	400 ohms	Antenna lead	9.6 mc	9 mc Osc. trimmer C14 9 mc R. F. trimmer C9 9 mc Ant. trimmer C3
49 Meter	6.1 mc	400 ohms	Antenna lead	6.1 mc	6 mc Osc. coil T14 6 mc R. F. coil T10 6 mc Ant. coil T4
25 Meter	11.8 mc	400 ohms	Antenna lead	11.8 mc	12 mc Osc. coil T13 12 mc. R. F. coil T8 12 mc. Ant. coil T2
19 Meter	15.2 mc	400 ohms	Antenna lead	15.2 mc	15 mc. Osc. coil T12 15 mc R. F. coil T9 15 mc Ant. coil T3

NOTE: Before removing chassis, take off escutcheon and pull pointer from pointer carriage.



Coils and Trimmers



WHEN FINISHED WITH STRINGING, SPRING MUST BE 1/4" FROM IDLER AS SHOWN. TO DO THIS:

④ LOOSEN SET SCREW ON PULLEY.

⑤ HOLD TUNING SHAFT FIRM IN POSITION INDICATED AND TURN PULLEY BY HAND UNTIL SPRING IS 1/4" AWAY FROM IDLER.

⑥ TIGHTEN SET SCREW. NOW SPRING SHOULD TRAVEL BACK AND FORTH WITHOUT TOUCHING THE IDLERS.

⑦ REPLACE CHASSIS IN CABINET. REPLACE POINTER ON CARRIAGE. TUNE IN STATION OF KNOWN FREQUENCY. HOLD TUNING SHAFT FIRM AND SLIDE POINTER TO CORRECT POSITION ALONG DIAL.

⑧ GLUE POINTER TO STRING.

Replacement of Drive Cord

WESTERN AUTO SUPPLY CO.

REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number, and series

REMOVABLE TUNER ASSEMBLY

CAPACITORS*

Ref. No.	*Part No.*	*Description*
C1	B-8F-10767	.002 mf, 500 volts, 10%, mica
C2, C3	124143	Dual, broadcast (67-123 mmf) and 9 mc (95-175 mmf) ant. trimmers
C4, C10	B-8F3-121	470 mmf, 500 volts, 10%, mica
C5	C-8D-10771	.1 mf, 200 volts, +20% −10%
C6, C11	C-8D-10760	.1 mf, 400 volts, +20% −10%
C7	B-8F5-101	10 mmf, 500 volts, 10% silver mica
C8	A-8G-7205	Broadcast RF trimmer (120-220 mmf)
C9	A-8G-7206	9 mc RF trimmer (60-110 mmf)
C12	B-8F3-109	47 mmf, 500 volts, 10%, mica
C13	B-8F-10763	200 mmf, 500 volts, 3%, silver mica
C14	124145	9 mc oscillator trimmer (7-35 mmf)
C15	124144	Broadcast oscillator trimmer (15-27 mmf)

RESISTORS*

Ref. No.	*Part No.*	*Description*
R1, R4	C-9B1-31	1 megohm, ½ watt, 20%
R2	C-9B1-55	270 ohms, ½ watt, 10%
R3	C-9B1-70	4700 ohms, ½ watt, 10%
R5	C-9B1-46	47 ohms, ½ watt, 10%
R6	C-9B1-79	27,000 ohms, ½ watt, 10%
R7, R8	C-9B1-21	22,000 ohms, ½ watt, 20%
R9	C-9B1-59	560 ohms, ½ watt, 10%
R10	C-9B1-23	47,000 ohms, ½ watt, 20%
R11	C-9B1-34	3.3 megohms, ½ watt, 20%
R12, S3	125180	Tone control (1 megohm) and radio-phone switch
R13	C-9B1-87	120,000 ohms, ½ watt, 20%
R14, R17	C-9B1-86	100,000 ohms, ½ watt, 10%
R15	C-9B1-31	1 megohm, ½ watt, 20%
R16	C-9B1-70	4700 ohms, ½ watt, 10%
R18, R19	C-9B1-29	470,000 ohms, ½ watt, 20%
R20	C-9B2-56	330 ohms, 1 watt, 10%
R21	10662	12,500 ohms, 3 watts, 10%
R23	C-9B1-20	15,000 ohms, ½ watt, 20%
R24, S4	A-10A-10586	Volume control (500,000 ohms) and on-off switch
R25	C-9B1-35	4.7 megohms, ½ watt, 20%

COILS (complete with cores)

Ref. No.	*Part No.*	*Description*
T1	111195	Broadcast antenna coil
T2	111191	12-mc antenna coil
T3	111192	15-mc antenna coil
T4	111189	6-mc antenna coil
T5	111190	9-mc antenna coil
T6	10959	9-mc RF coil
T7	10962	Broadcast RF coil
T8	10960	12-mc RF coil
T9	10961	15-mc RF coil
T10	10958	6-mc RF coil
T11	110157	9-mc oscillator coil
T12	110159	15-mc oscillator coil
T13	110158	12-mc oscillator coil
T14	110156	6-mc oscillator coil
T15	110161	Broadcast oscillator coil
T16	108177	Input IF coil complete in can (Range of trimmers: 110-210 mmf)
T17	108176	Output IF coil complete in can (Range of trimmers: 80-140 mmf)
T18	B-12C-10234	Output transformer
T20	104202B	Power transformer

MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
S1	B-20A-10964	Band switch, antenna
S2	B-20A-10965	Band switch, oscillator and RF
	121210	Socket, molded, for 6SA7
	121171	Socket, laminated, for 6SK7GT
	117907	Tuning shaft
	117798	Pinion gear on tuning shaft
	120393	Spring, intermediate link, under ends of treadle bar
	131251	Washer, "C," on slug tuning bar
	B-2C-7245	Gear segment
	A-2J-7439	Spring clip, for coils

SOCKETS

Ref. No.	*Part No.*	*Description*
	121200	Socket, 4-terminal, for loop antenna
	121279	Socket, 5-terminal, for tuner
	A-15B-11538	Socket, 4-terminal, for speaker
	121280	Socket, 1-terminal, for phono pick-up
	121199	Socket, 2-terminal, for phono motor
	121210	Socket, octal, molded (all tubes except 6SK7, IF amp.)
	121273	Socket, octal, laminated (for 6SK7, IF amplifier)

MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
T19	C-18B-13181	Speaker, 8-inch, electrodynamic
	A-19A-11539	Plug on speaker leads
T21	A-14MA-11066-3	Loop antenna (ribbon only)
T22	A-16A-11113	Choke on loop terminal board
	A-19A-11322	Plug on loop antenna leads
	107401	Phono motor cable assembly
	10724	Connector, for phono pickup leads
	B-6D-10949	Dial scale
	10794	Dial light, 6-8 volts, type T-44 (2 used)
	107-259	Dial light shield
	B-2G-10588	Dial pointer
	A-2J-11041	Pointer spring
	1121035	Pointer carriage
	B-53A-10989	String for dial pointer
	120377	Spring for dial pointer string
	107266	Line cord and plug (9 feet)
	1121040-14	Side escutcheon, walnut
	1121040-41	Side escutcheon, mahogany
	1121033-14	Bottom escutcheon, walnut
	1121033-41	Bottom escutcheon, mahogany
	128-787-14	Knob, walnut, for all controls
	128-787-41	Knob, mahogany, for all controls
	B-47A-10842	Socket assembly for pilot lite
	A-2L-11293	Bandswitch link
	112808	Station call letters
	131316B	Washer "C", for 9-mc coils
	134134	Grommet for core mounting (all broadcast and 9-mc coils)
	134126	Grommet for coil mounting (broadcast RF and antenna coils)
	134125	Grommet for coil mounting (broadcast oscillator coil)
	A-25A-7619	Grommet for all 9-mc coils
	B-202-10475	Pushrod assembly
	A-2J-7176	Cam locking spring
	A-2J-7627-1	Retainer spring
	120366	Spring, pushrod return
	121281	Plug, 5-prong
	128-505-14	Pushbutton sleeve section, walnut
	128-505-41	Pushbutton sleeve section, mahogany
	128-504-29	Pushbutton, clear end piece
	131210	Washer "C", on end plate

MAIN CHASSIS

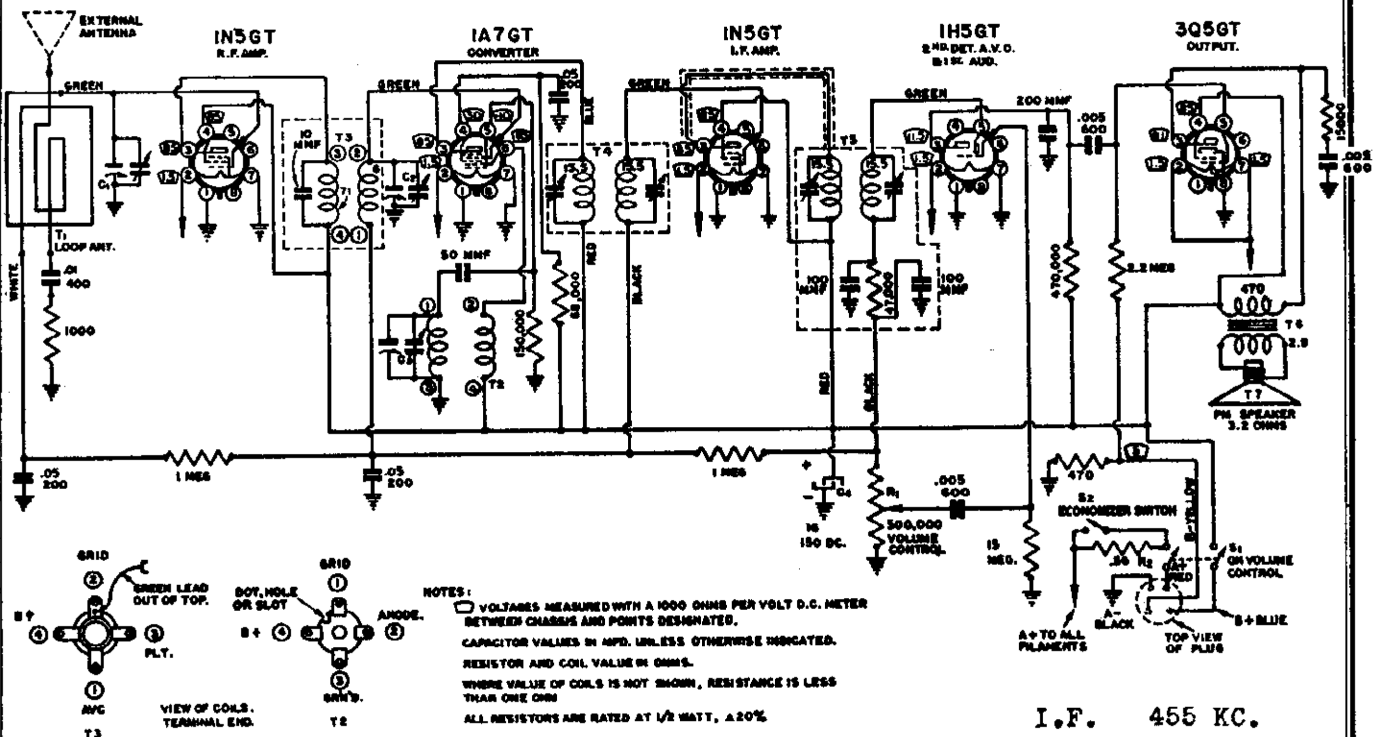
CAPACITORS*

Ref. No.	*Part No.*	*Description*
C16	C-8F3-12	470 mmf, 20%, mica
C17, C19	C-8D-10774	.02 mf, 400 volts, 20%
C18	C-8D-10771	.1 mf, 200 volts, +20% −10%
C-20-A C20-B	129165B	Dual, 50 mmf each section, mica, 20%
C21	C-8D-10813	.05 mf, 400 volts, 20%
C22	C-8D-10935	.005 mf, 600 volts, +40% −15%
C23	C-8F3-10	220 mmf, 20%, mica
C24	C-8D-10770	.05 mf, 200 volts, 20%
C25	C-8D-10788	.004 mf, 600 volts, 20%
C27	C-8D-10992	.03 mf, 200 volts, 20%
C28	C-8D-10785	.006 mf, 600 volts, 20%
C29-A, -B, -C	119109	Electrolytic, 15 mf x 450 volts, 15 mf x 450 volts, 10 mf x 350 volts
C30, C31	C-8J-11321	.02 mf, 600 volts, 20%

*The values of the resistors and mica capacitors listed above (except C13) are based on RMA standards. Due to conditions beyond our control some receivers have been shipped with components of pre-standardized values. This receiver will operate equally well with components of either group.

Model D2621

WESTERN AUTO SUPPLY CO.



SERVICE PARTS LIST MODEL D2621

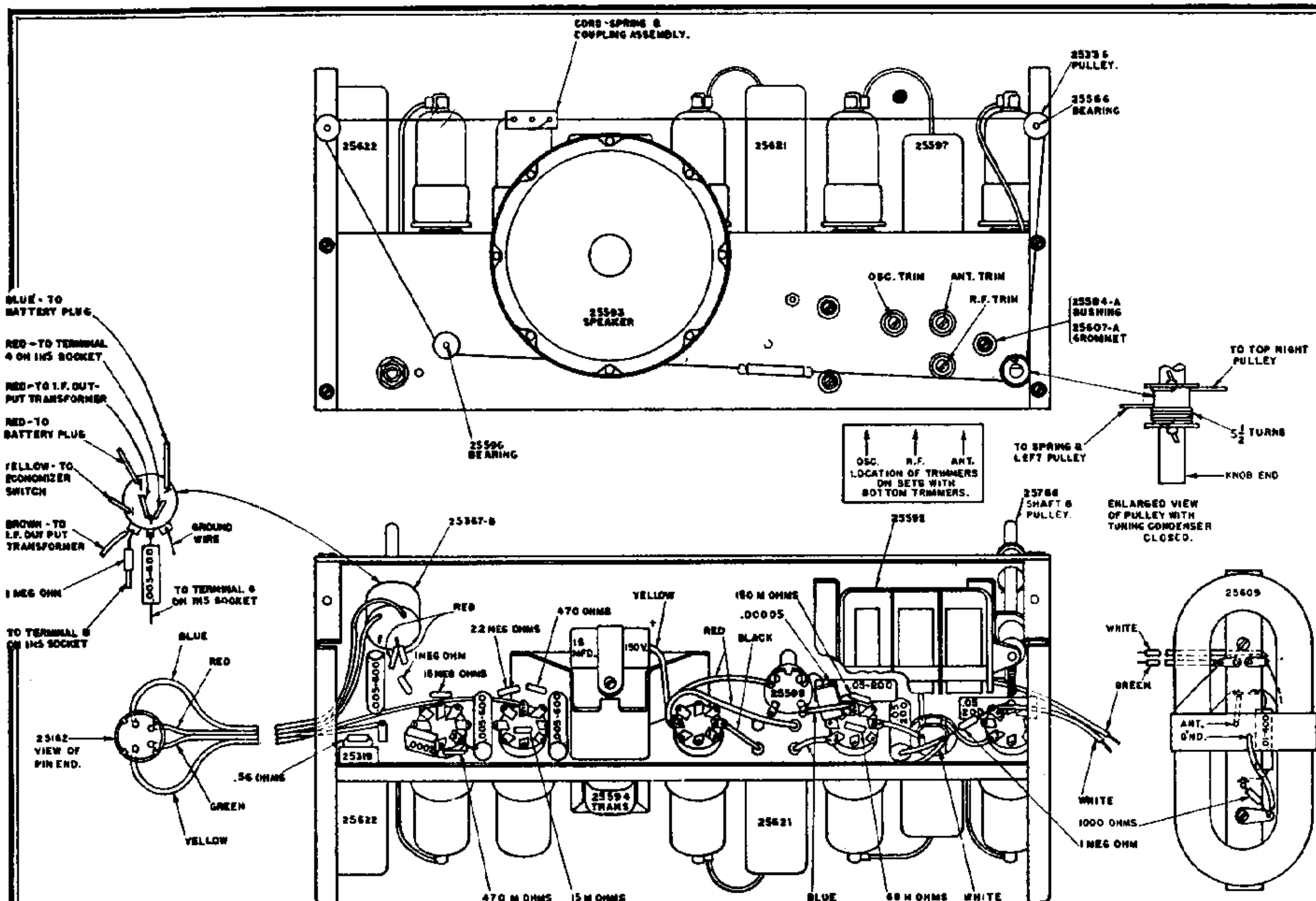
Order Parts by Model No., Part No., Series and Issue

Part No.	Name
25566	Bearing (for wood pulleys)
25597	Coil, R. F. (T3)
25598	Coil, Oscillator (T2)
25600	Condenser, Electrolytic 16 Mfd, 150 V. (C4)
25592	Condenser—Tuning, 3 Gang, less Tuning Shaft (C1, C2, C3)
25367	Control, Volume, with On-Off Switch (R1)
25767	Cord, Dial, complete with Spring and Pointer Coupling
25696	Knob, Tuning or Volume
25609	Loop (T1)
25612	Plug, Battery Cable 4 Prong
	Pointer, Dial — See "Track-Pointer"
25336	Pulley—Wood
25615	Scale, Dial
25766	Shaft—Tuning with "spool" pulley
25620	Socket—Tube
25593	Speaker 5" P. M. Dynamic (T7) (less Transformer)
25319	Switch, Economizer (S2)
25788	Track, Pointer, complete with Brackets and Pointer
25621	Transformer I. F. Input (T4)
25622	Transformer I. F. Output (T5)
25594	Transformer—Speaker Output (T6)

Reference Numbers such as (C4) are shown on circuit diagram.

Parts not listed above, may be ordered by part number as shown in the picture and by complete description, send a sketch if possible. Order parts from your local Western Auto Store.

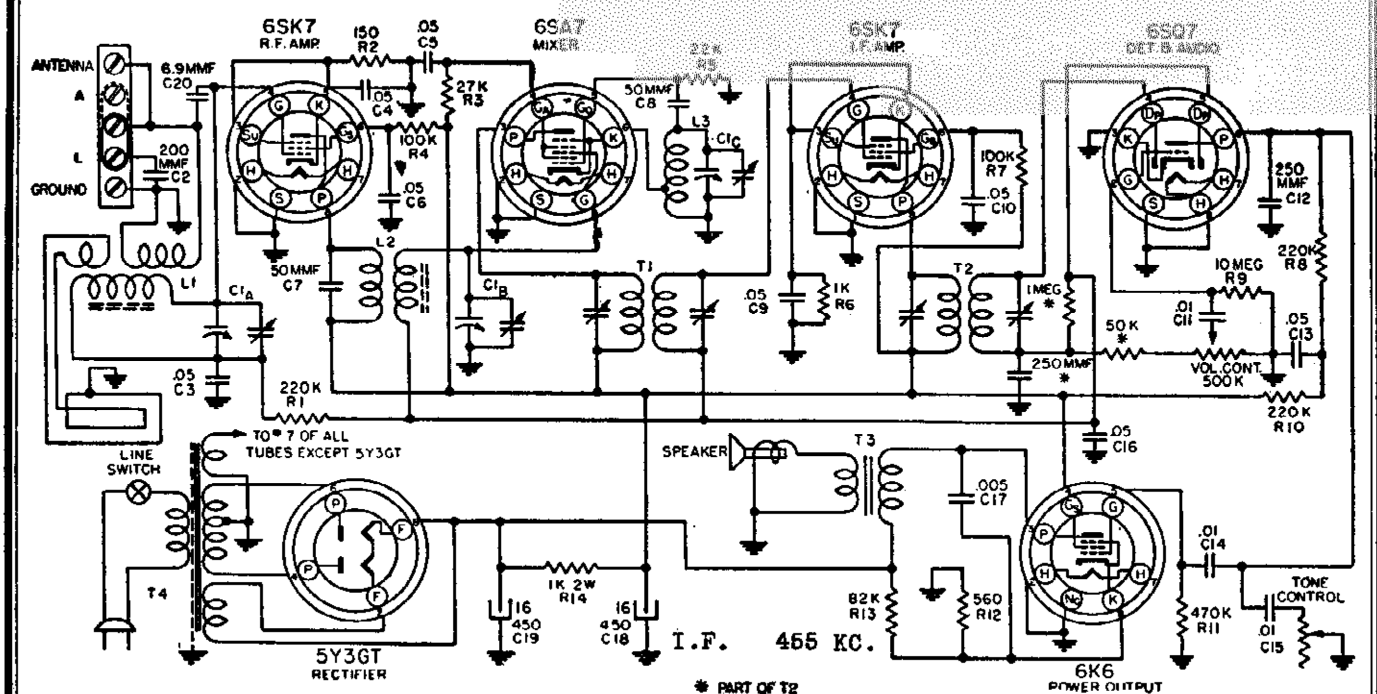
We cannot supply speaker cones. We can replace or repair a damaged speaker for a nominal price if it is returned to our factory, transportation charges prepaid.



Installation — This Receiver is designed with a loop antenna which is matched to the receiver to give maximum performance. However, under certain conditions, an outside antenna and ground may give improved reception. Connections are provided for an antenna and ground. At the right rear of chassis will be found two wires, a green for antenna, and a black for ground connection. This receiver operates from a single unit Wizard B6430, Ray-O-Vac #AB-82, Burgess 17G-D60, Eveready 748, Bond. 0528, or General 60 DL-11L Battery. NO OTHER BATTERIES ARE REQUIRED, as this type of battery is a combination 90 Volt "B" battery and 1.5 Volt "A" battery. A compartment is provided in the cabinet to accommodate the battery. THIS RECEIVER HAS THE TRUE-TONE BATTERY ECONOMIZER SWITCH located at the top left rear of receiver chassis, when battery unit is NEW the ECONOMIZER switch should be in the "New" position. When the volume of local stations becomes noticeably weaker, the ECONOMIZER switch should be set to the "Used" position. ALWAYS HAVE THE ECONOMIZER SWITCH AT THE "NEW" POSITION when first putting new receiver in operation or when INSTALLING A NEW BATTERY UNIT. Battery unit is connected to receiver by means of a four wire cable and 4 prong plug. (Note: The volume at which the receiver is operated has no bearing on the life of the bat-

Alignment--Remove chassis from cabinet, and align I.F. Transformers in the conventional manner with a test oscillator adjusted to 455 KC, connected to the grid of the 1A7GT through a .1 Mfd condenser, with the tuning condenser set at minimum capacity. To align tuning condenser, connect test oscillator to antenna wire (green) through a .0001 Mfd. condenser. Adjust oscillator trimmer condenser (located on left top) to 1620 KC with tuning condenser at minimum capacity (completely out of mesh). The antenna and R.F. sections are trimmed at 1400 KC. Ant. trimmer is top right; R.F. trimmer is below at right. Dial pointer may be adjusted to scale by slipping bakelite pointer coupling on dial cord.

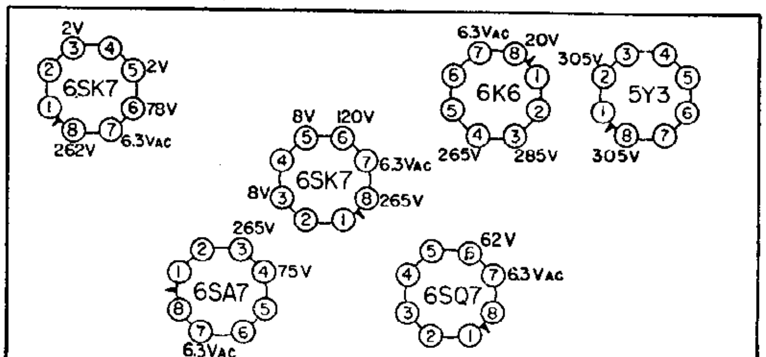
Model D2623 WESTERN AUTO SUPPLY CO.



SOCKET VOLTAGES

Chassis, Bottom View

All voltages are measured with a 1000 ohm per volt meter on the 150 volt scale, with no signal. To obtain an accurate voltage check the A.C. line voltage must be 117 volts. Where no voltage is shown the voltage is O or cannot be read with this type of voltmeter.



Circuit Reference	Part No.	Description
		CONDENSERS
C1A, C1B, C1C	B19-186	Variable condenser
C2		200 MMF mica condenser (on Loop)
C3, C4, C9, C16	A16-152	.05 MFD. 200 volt tubular condenser
C5, C6, C10, C13	A16-158	.05 MFD. 400 volt tubular condenser
C7, C8	A15-175	50 MMF mica condenser
C11, C14, C15	A16-156	.01 MFD. 400 volt tubular condenser
C12	A15-176	250 MMF. mica condenser
C17	A16-153	.005 MFD. 600 volt tubular condenser
C18	A18-279	16 MFD. 450 volt electrolytic condenser
C19	A18-274	16 MFD. 450 volt electrolytic condenser
C20	A84-71	6.9 MMF. condenser
		RESISTORS
R1, R8 & R10	A60-667	220K ohm 1/3 watt resistor
R2	A60-686	150 ohm. 1/3 watt resistor
R3	A60-692	27K ohm 1 watt resistor
R4, R7	A60-671	100K ohm ½ watt resistor
R5	A60-659	22K ohm 1/3 watt resistor
R6	A60-675	1K ohm 1/3 watt resistor
R9	A60-663	10 megohm 1/3 watt resistor
R11	A60-662	470K ohm 1/3 watt resistor
R12	A60-701	560 ohm 1 watt resistor
R13	A60-700	82K ohm 1 watt resistor
R14	A60-699	1000 ohm 2 watt resistor
		COILS
L1	B10-451	Antenna coil
L2	B10-452	R. F. coil
L3	A10-446	Oscillator coil
T1	B10-412	1st I.F. transformer
T2	B10-444	2nd I.F. transformer
		MISCELLANEOUS
T3		Output transformer (Part of Speaker)
T4	C80-223	Power Transformer
	A69-169	ON-Off Switch
	A26-123	Tone Control
	A24-169	Volume Control
	A84-41	Dial drive shaft and pulley Assembly
	B79-341	6¼" P.M. Speaker
	S84-54	Loop Antenna Assembly

Volume control—Maximum: all adjustments.
Tone Control—Treble: Full Clockwise Rotation.
Connect ground lead of signal generator to radio chassis.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for pro[per] alignment:

Signal generator that will provide the te[st] frequencies as listed.

Output meter.

Non-metallic screwdriver.

Dummy antennas—.1 mfd., 00025 mfd.

Position of Variable	Generator Frequency	Dummy Ant. mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Minimum Capacity (Fully Opened)	455 K.C.	.1	6SA7 Grid (Stator of C1B	T1 T2	I. F.
Minimum Capacity (Fully Opened)	1725 K.C.	.00025	*Ant. Terminal on Loop	C1C	Osc.
Tune in signal From Generator	1500 K.C.	.00025	*Ant. Terminal on Loop	C1B	R. F.
Tune in signal From Generator	1500 K.C.	.00025	*Ant. Terminal on Loop	C1A	Ant.

*Be sure coupling link is in correct position for external antenna operation. See illustration below (Fig. 4).

Repeat the above alignment procedure as a final check.

With an output meter connected across the voice coil of the speaker, the output meter reading for ½ watt is 1.25 volts using a signal which is modulated 400 c.p.s.

The tube complement of this receiver consists of the following:

1—6SK7—R.F. Amplifier

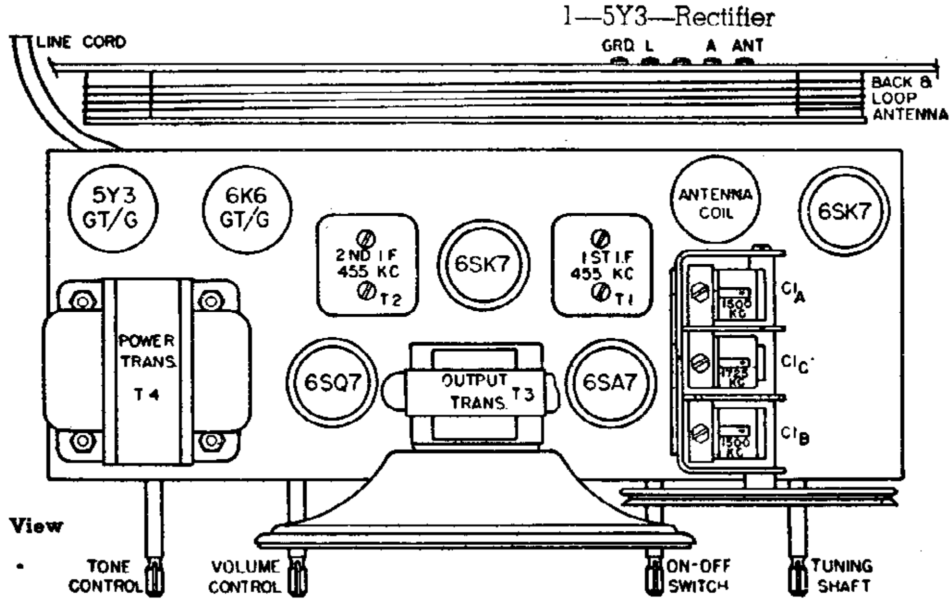
1—6SA7—Mixer—OSC.

1—6SK7—I.F. Amplifier

1—6SQ7—Det. AVC—Audio

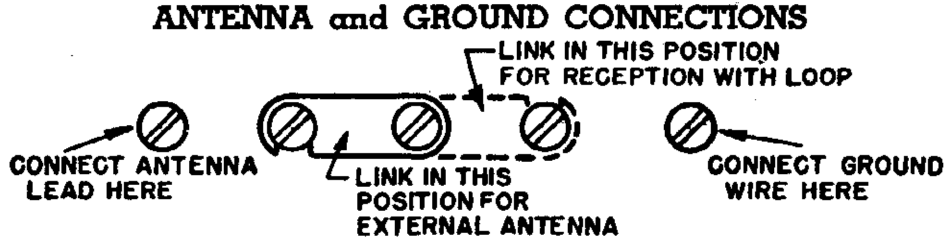
1—6K6—Power Output

1—5Y3—Rectifier



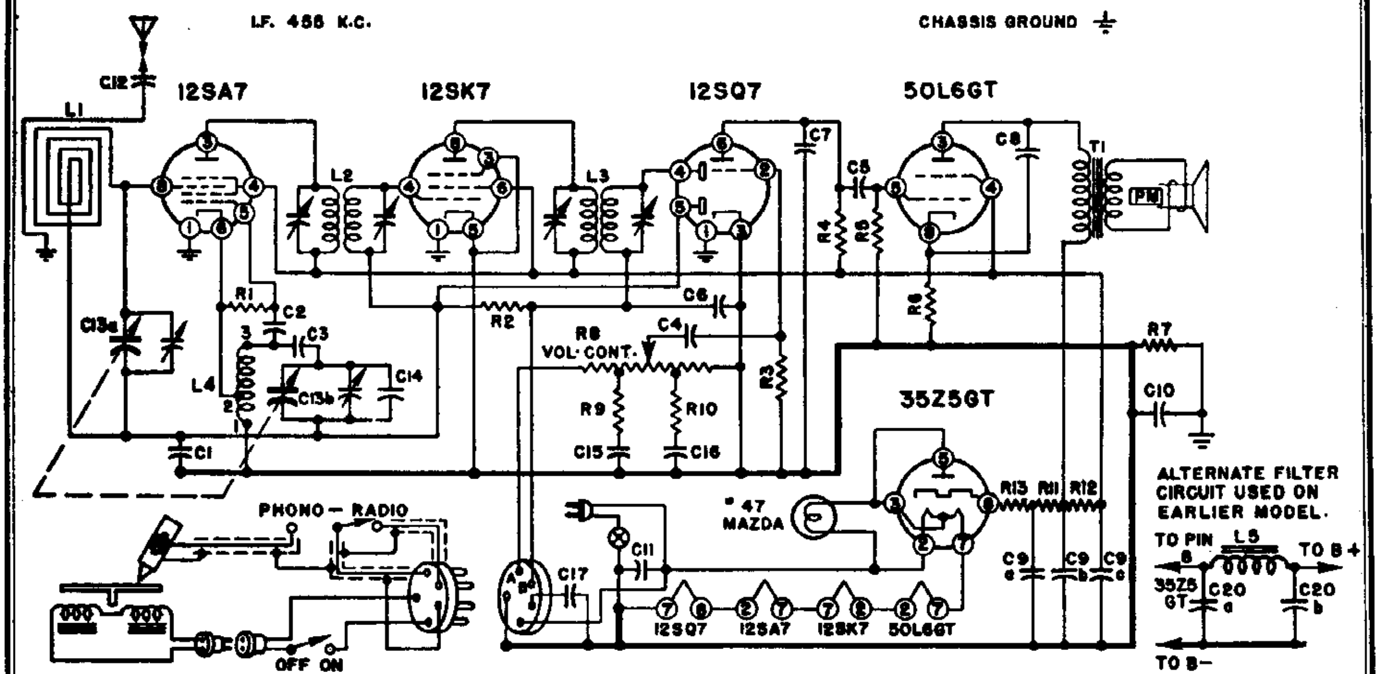
Chassis, Top View

ANTENNA and GROUND CONNECTIONS



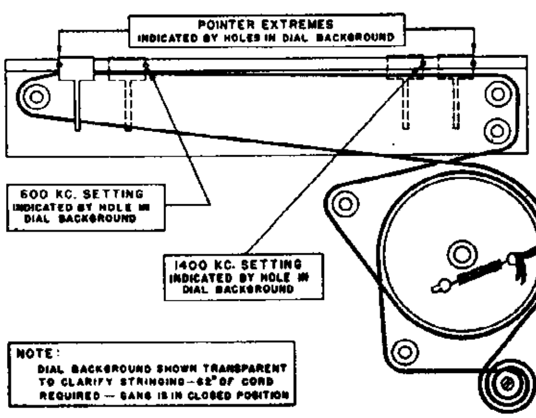
Model D2642

WESTERN AUTO SUPPLY CO.



NOTE: Connect points "A" and "B" with jumper when testing chassis with phono plug removed.

DIAL STRINGING AND POINTER SETTINGS



TRUETONE TUBES USED

12SA7—1st Det. Osc.
12SK7—I. F. Amplifier
50L6GT—Beam Power Output
35Z5GT—Rectifier
12SQ7—2nd Det.—A. V. C.—1st Audio

RADIO RECEPTION DURING PHONO

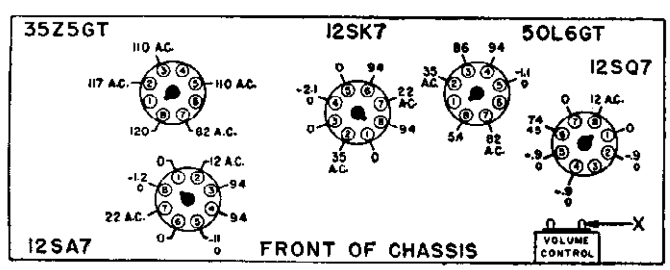
It is normal for strong radio stations to be heard faintly when switched to PHONO, unless the radio dial is tuned between stations. This interference can sometimes be reduced by moving condenser C4 as far from the 12SQ7 socket and as close to the chassis as possible. Also move the I.F. transformer wire, connected to pin 4 or 5 of 12SQ7, as far from condenser C4 and as close to the chassis as possible.

POWER SUPPLY

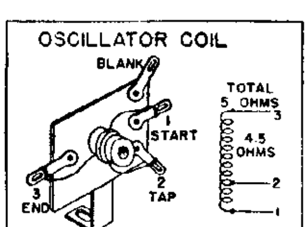
This receiver is designed to operate ONLY from an AC (Alternating Current) power supply line of 110-120 volts, 60 cycles.

The line plug should be tried both ways and left in the position that gives minimum hum.

VOLTAGE DATA



Bottom View of Chassis, Showing Voltages



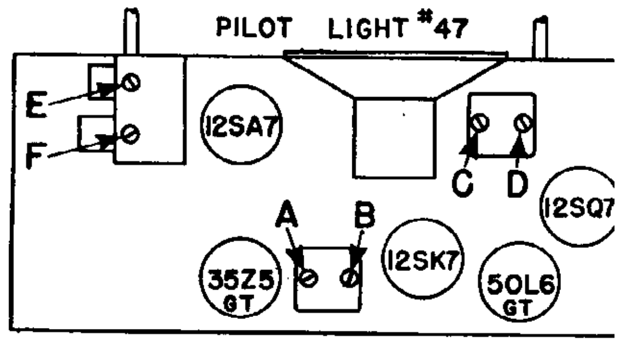
All readings made between Tube Socket Terminals and Switch Lug on volume control (Point "X" on drawing).
Measured on a 117 Volt A.C. line.
Volume control full on.
Dial tuned to low frequency end, no signal.
Voltages obtained on Vacuum Tube voltmeter.
A second voltage reading is shown made with a 1000 ohm-per-volt meter when use of this instrument would result in appreciably lower readings.

WESTERN AUTO SUPPLY CO.

Step	Dummy Antenna between Radio and Signal Generator	Connect Signal Generator to	Signal Generator Frequency	Gang Condenser Setting	Trimmers Adjust for Maximum Outp
1	250 mmfd. Condenser	Gang Condenser Antenna Stator	455 KC.	Rotor full open (Plates out of mesh)	C and D—2nd. I
2	250 mmfd. Condenser	Gang Condenser Antenna Stator	455 KC.	Rotor full open (Plates out of mesh)	A and B—1st I.
3	250 mmfd. Condenser	Gang Condenser Antenna Stator	1630 KC.	Rotor full open (Plates out of mesh)	E—Oscillator
4	No actual connection between set and generator.	Loop radiator (or place pickup lead from generator close to loop of set to obtain adequate signal).	1400 KC.	Set Gang to tune in Generator Signal	F—Antenna (See Note)

NOTE: Antenna trimmer "F" must be aligned after chassis and loop are mounted in the cabinet. This adjustme can be made by lifting up the top cover and removing the plug button which is directly above trimmer "F

- IMPORTANT—Check to see the dial pointer reaches each end of dial scale when Station Selector Control is turned from one end to the other.
- Volume control—Maximum for all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect output meter across voice coil of speaker.
- Allow chassis and signal generator to warm up for several minutes.
- Use lowest Output setting of Signal Generator capable of producing adequate Output Meter indication and then proceed in the following sequence.



BACK OF CHASSIS

REPLACEMENT PARTS

CONDENSERS

Symbol	Description	Part No.
C1	Paper, .1 mfd., 200 V.	64B1-30
C2	Mica, 50 mmf. ±20%	65B7-11
C3	Paper, .02 mfd. 400 V.	64B1-24
C4	Paper, .01 mfd. 400 V.	64B1-25
C5	Paper, .01 mfd. 400 V.	64B1-25
C6	Mica, 250 mmf. ±20%	65B7-22
C7	Mica, 500 mmf. ±20%	65B7-27
C8	Paper, .02 mfd. 400 V.	64B1-24
C9a C9b C9c	Elect., 30 mfd. 150 V. Elect., 30 mfd. 150 V. Elect., 20 mfd. 150 V.	67A8
C10	Paper, .2 mfd. 400 V.	64A2-1
C11	Paper, .05 mfd. 400 V.	64B1-22
C12	Paper, .005 mfd. 600 V.	64B1-12
C13a C13b	Gang Condenser (2 Section)	68A2
C14	Mica, 20 mmf. ±10%	65B5-5
C15	Paper, .01 mfd. 400 V.	64B1-25
C16	Paper, .01 mfd. 400 V.	64B1-25
C17	Paper, .2 mfd. 400 V.	64A2-1
C20a C20b	Elect., 30 mfd. 150 V. Elect., 50 mfd. 150 V.	67A3

RESISTORS

Symbol	Description	Part No.
R1	22,000 ohm ±10%, ½ W.	60B8-223
R2	1 megohm ±10%, ½ W.	60B8-105
R3	10 megohm ±10%, ½ W.	60B8-106
R4	220,000 ohm ±10%, ½ W.	60B8-224
R5	470,000 ohm ±10%, ½ W.	60B8-474
R6	150 ohm ±10%, ½ W.	60B8-151
R7	150,000 ohm ±10%, ½ W.	60B8-154

RESISTORS (Cont'd)

Symbol	Description	Part No.
R8	½ megohm Volume Control and Switch	75B3-2
R9	47,000 ohm ±10%, ½ W.	60B8-473
R10	27,000 ohm ±10%, ½ W.	60B8-273
R11	150 ohm ±10%, 1 W.	60B28-1
R12	1,000 ohm ±10%, 1 W.	60B28-2
R13	33 ohm ±10%, 1 W.	60B28-3

TRANSFORMERS AND COILS

Symbol	Description	Part No.
L1	Antenna, Loop	69B6
L2	Transformer, 1st I. F.	72B3
L3	Transformer, 2nd I. F.	72B4
L4	Oscillator Coil	69A5
L5	Choke Coil (Filter)	74A1
T1	Transformer, Output	*

*When ordering, specify all numbers on speaker and transformer.

PHONOGRAPH PARTS

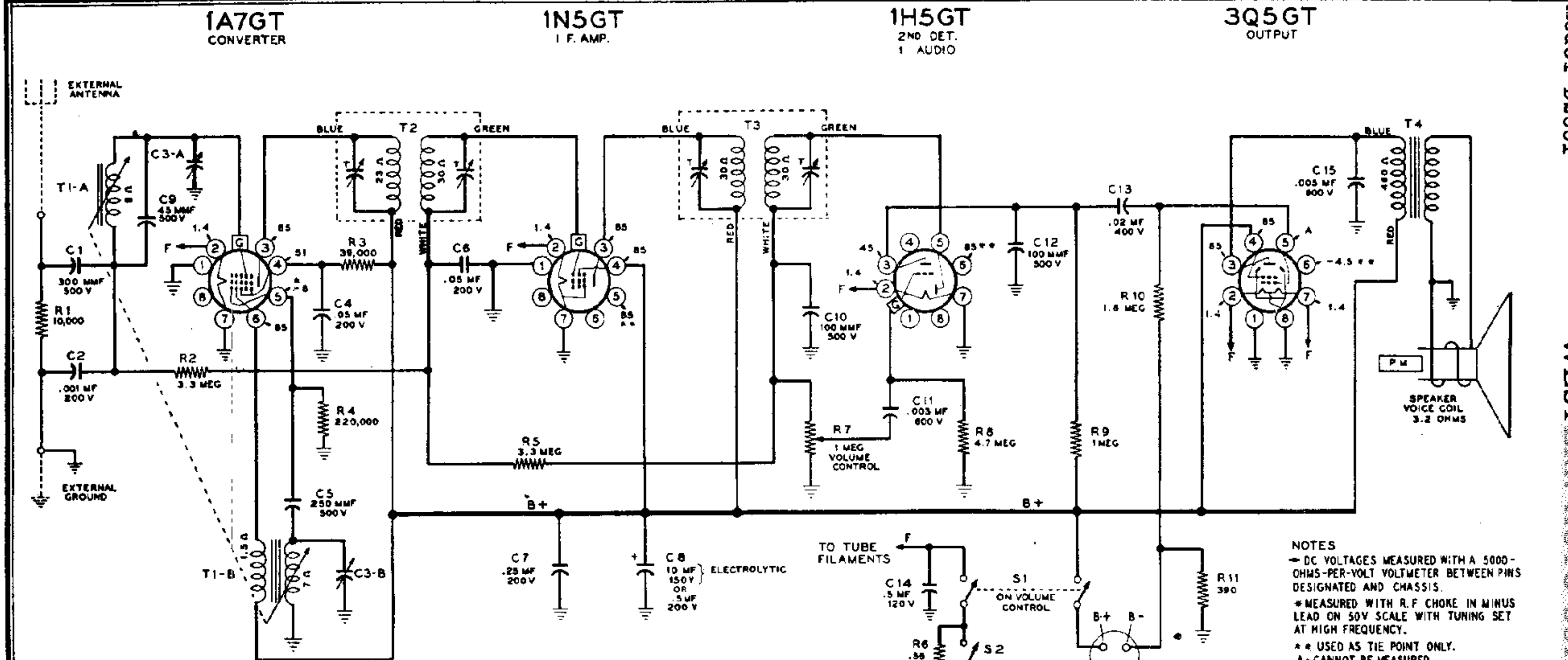
Description	Part No.
Centerpost	G400A12
Crystal Cartridge	409A1
Idler Wheel (407B3 Motor)	G400A23
Idler Wheel (407B1 Motor)	G400A57
Idler Wheel (407B2 Motor)	G400A59
Motor, 60 cycle 115 volt, A.C. (Types 407B1 and 407B2 also used)	407B3

MISCELLANEOUS

Description	Part N
Background, Dial	X22C
Buttons, Snap	13A1-
Cord, Dial (62")	50A1-
Drum and Hub Assembly	A101
Escutcheon, On-Off	26A6-
Escutcheon, Radio-Phono	26A6-
Grommet, Rubber (Gang Mtg.)	12A1-
Knob	33A1
Pilot Light #47	81A1-
Pilot Light Socket and Leads	82A2-
Plug (Phono Leads)	88A3-
Plug, Button	13A2-
Plug, Alden (Motor Leads)	88A8-
Plug Shell (Phono Leads)	88A3-
Pointer	25A13
Pulley, Fibre Dial	17A1-
Scale, Glass Dial	21B27
Shaft, Tuning	28A1-
Socket and Leads (Alden)	89A6-
Socket, Octal Tube	87A10
Speaker, 5" PM and Output Transformer	78B13
Spring, Dial Cord Tension	19A1-
Switch, SPDT (Radio-Phono)	77B1-1
Switch, SPST (On-Off)	77B1-
Washer, Flat Insulating	5A1-6
Washer, Offset Insulating	5A2-5
Washer, C	4A4-1
Washer, Spring	4A6-3

Model D2661

WESTERN AUTO SUPPLY CO.



NOTES
- DC VOLTAGES MEASURED WITH A 5000-OHMS-PER-VOLT VOLTMETER BETWEEN PINS DESIGNATED AND CHASSIS.
* MEASURED WITH R.F CHOKE IN MINUS LEAD ON 50V SCALE WITH TUNING SET AT HIGH FREQUENCY.
** USED AS TIE POINT ONLY.
A- CANNOT BE MEASURED.
RESISTORS ARE ½ WATT UNLESS OTHERWISE INDICATED.

Speaker........................4½-inch; P.M., 1.4-ounce magnet; voice coil impedance 3.2 ohms.

Power Output...............150 milliwatts undistorted
270 milliwatts maximum.

Sensitivity.....................50 microvolts average for 50-milliwatt output.

Selectivity.....................52 kc broad at 1000 times signal at 1000 kc.

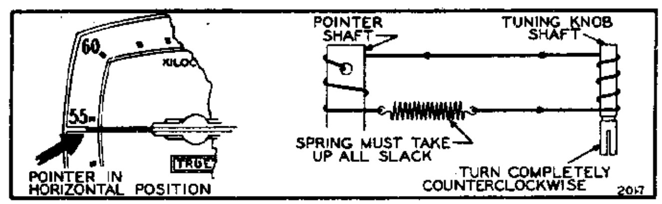
Power Supply...............A Battery—1.5 volts, 250 ma.
B Battery—90 volts, 11 ma.

Frequency Range...........540 to 1700 kc.

Intermediate Freq.........455 kc.

Tuning...........................Two permeability-tuned circuits.

Antenna.........................External only. Also external ground.



REPLACEMENT OF DIAL POINTER DRIVE CORD

When the installation is complete, and when the capacitor rotors are closed, the spring should be close to the pointer shaft.

After installing the cord, remove the crystal covering the face of the dial. Turn the tuning shaft completely counterclockwise. Then rotate the pointer, against the friction of the shaft, until it is in a horizontal position, as indicated.

WESTERN AUTO SUPPLY CO.

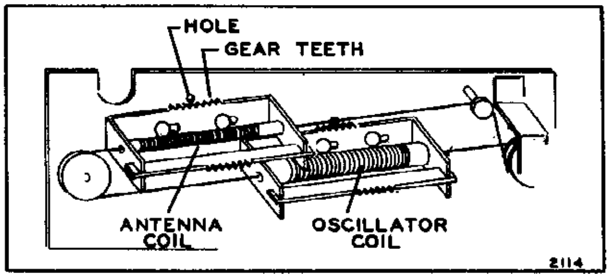
ALIGNMENT PROCEDURE

(Refer to Chassis and Coil Views)

- Output meter across 3.2-ohm output load.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Volume control at maximum for all adjustments.
- Connect ground post of signal generator to radio chassis.

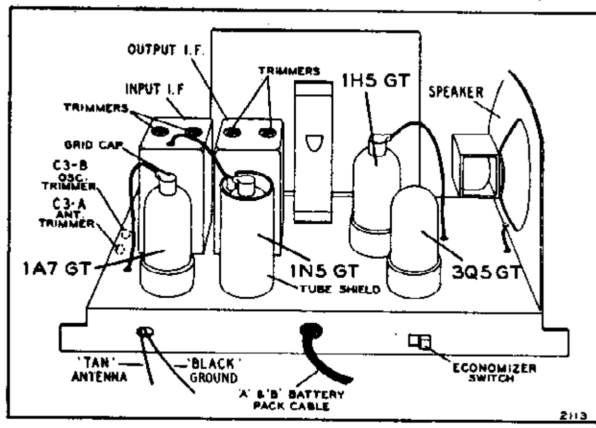
SIGNAL GENERATOR			*TUNER SETTING*	*ADJUST FOR MAXIMUM OUTPUT (in order shown)*
Frequency	*Dummy Antenna*	*Connection to Radio*		
455 kc	.1 mf	Grid (top cap) of 1A7GT	Iron cores all the way out	Trimmers on output and input I.F. cans
1700 kc	.1 mf	Grid (top cap) of 1A7GT	Iron cores all the way out	Oscillator trimmer C3-B
1700 kc	200 mmf	Antenna lead	Iron cores all the way out	Antenna trimmer C3-A
1400 kc	200 mmf	Antenna lead	Turn dial to 1400 kc	Adjust position of antenna coil (see coil view)*

*This adjustment and the previous adjustment are interlocking; therefore repeat the two adjustments alternately for best results.



VIEW OF COIL ASSEMBLY

The antenna coil assembly is movable left or right. When making the adjustment as required in the alignment procedure, move the coil assembly very slowly, either by hand or by pivoting one end of a screwdriver blade in the hole and engaging the blade in the gear teeth of the coil form.



CHASSIS VIEW

Ref. No.	*Part No.*	*Description*
		CAPACITORS
C1	129114	300 mmf, 20%, mica
C2	100112	.001 mf, 200 volts, 10%
C3-A, -B	124165	Dual trimmer, antenna and oscillator. Range: 84-156 mmf ea.
C4, C6	10022	.05 mf, 200 volts, 25%
C5	12912	250 mmf, 20%, mica
C7	1006	.25 mf, 200 volts, 25%
C8	C-8D-11270	.5 mf, 200 volts, +20%—10%
	or	
	119117	10 mf, 150 volts, electrolytic
C9	129177	45 mmf, 5%, ceramicon
C10, C12	12940	100 mmf, 10%, mica
C11	10012	.003 mf, 600 volts, 25%
C13	10026	.02 mf, 400 volts, 25%
C14	10017	.5 mf, 120 volts, +50%—10%
C15	1007	.005 mf, 600 volts, 25%
		RESISTORS*
R1	C-9B1-74	10,000 ohms, ½ watt, 10%
R2, R5	C-9B1-34	3.3 megohms, ½ watt, 20%
R3	C-9B1-81	39,000 ohms, ½ watt, 10%
R4	C-9B1-27	220,000 ohms, ½ watt, 20%
R6	130346	.56 ohm, ⅓ watt, 10%, wire-wound
R7, S1	101210	Volume control (1 megohm) and on-off switch
R8	C-9B1-35	4.7 megohms, ½ watt, 20%
R9	C-9B1-98	1 megohm, ½ watt, 10%
R10	C-9B1-101	1.8 megohms, ½ watt, 10%
R11	C-9B1-57	390 ohms, ½ watt, 10%

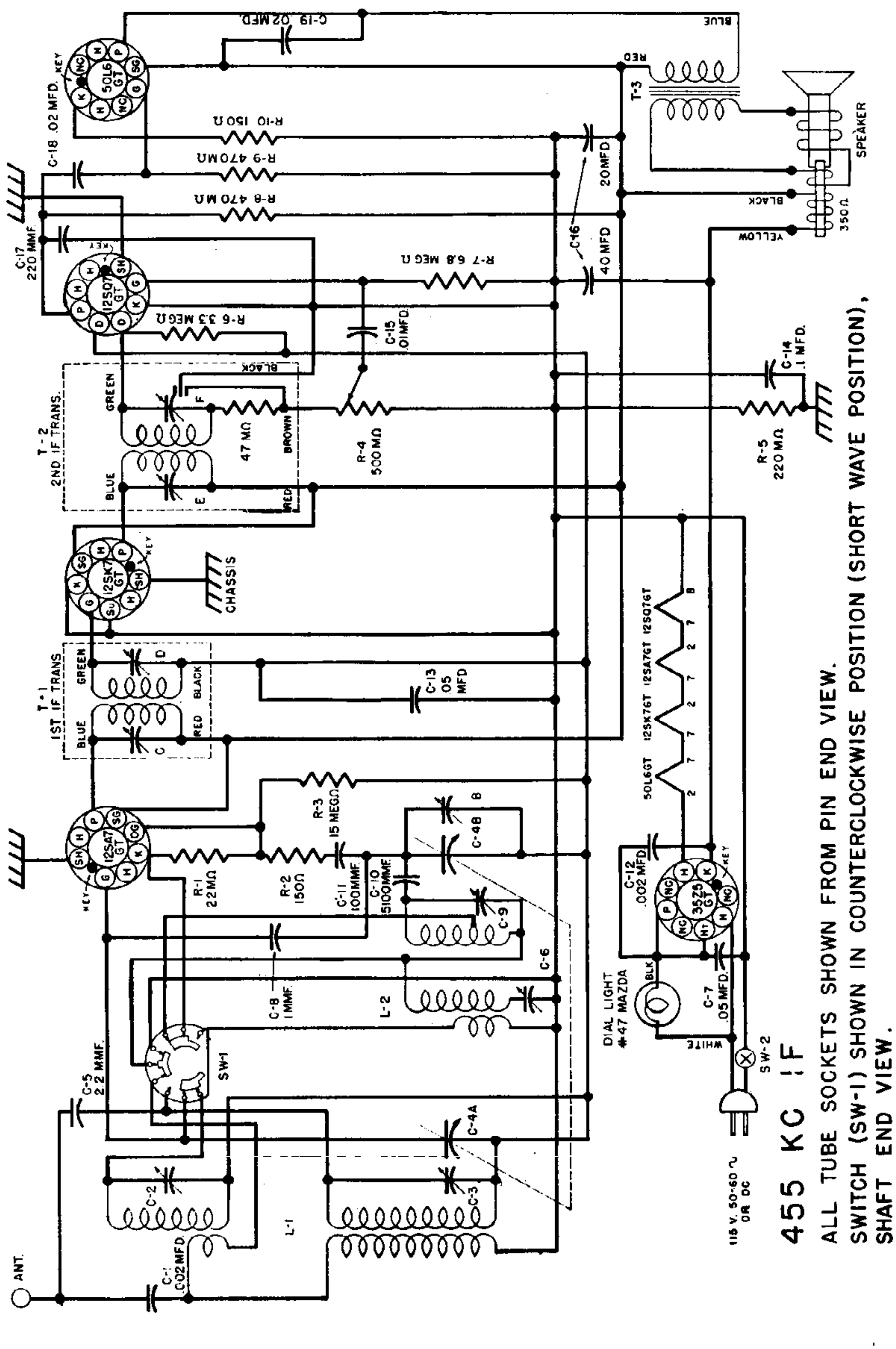
Ref. No.	*Part No.*	*Description*
		TRANSFORMERS AND COILS
T1-A, -B	13613	Tuning assembly complete, including antenna and oscillator coils
T2	108202B	Input I.F. coil, complete in can. Range of trimmers: 60-110 mmf (pri.), 40-70 mmf (sec.)
T3	108153C	Output I.F. coil, complete in can. Range of trimmers: 40-70 mmf each
T4	10591C	Output transformer
		MISCELLANEOUS
	114213	Speaker, 4-inch, P.M.
	121210	Tube socket
	107364	Battery cable assembly
S2	12588B	Battery economizer switch
	115396	Tube shield (for 1N5GT)
	112825	Pointer, for dial
	112924	Dial scale
	112824	Crystal for dial scale
	B-2M-10383	Snap-in rivets for dial scale
	A-53A-10989	Cord for dial pointer drive (1 ft)
	120184	Spring for drive cord
	128501-36	Cabinet
	128499-36	Knob, tuning
	128499B-36	Knob, volume
	128638	Back for cabinet
	131193	Snap-in rivets for mounting back

*The values of the resistors listed above are based on RMA standards. Due to conditions beyond our control some receivers have been shipped with resistors of pre-standardized values. This receiver will operate equally well with resistors of either group. An illustration of the difference follows:

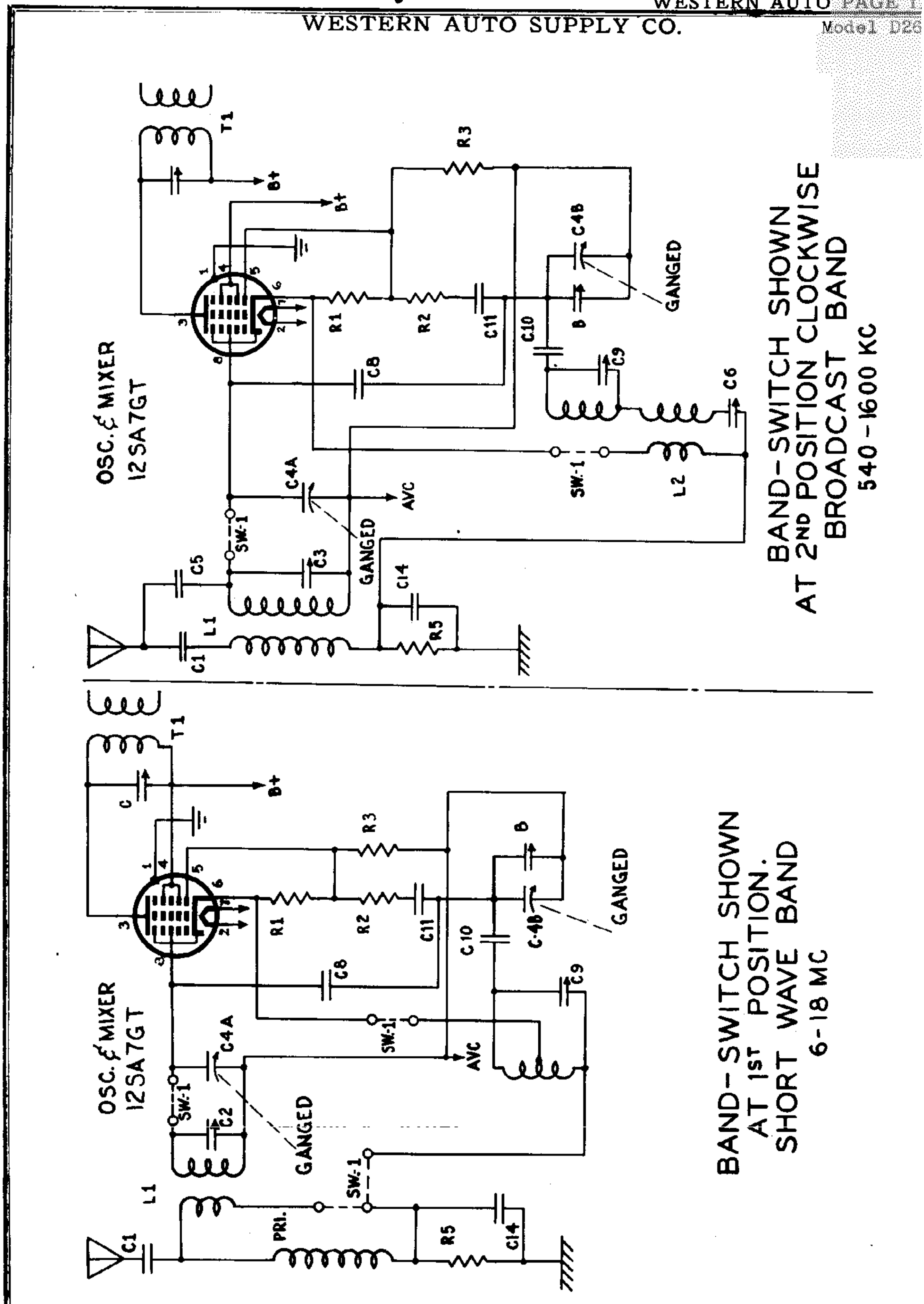
Pre-standardized value — 200,000 ohms, ⅓ watt, 20%
RMA value — 220,000 ohms, ½ watt, 20%

Model D2691

WESTERN AUTO SUPPLY CO.



WESTERN AUTO SUPPLY CO.



WESTERN AUTO SUPPLY CO.

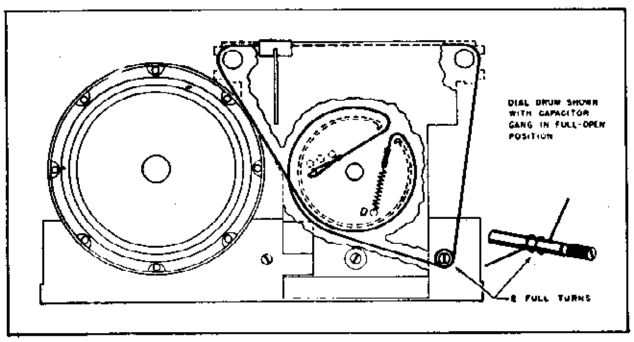
ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

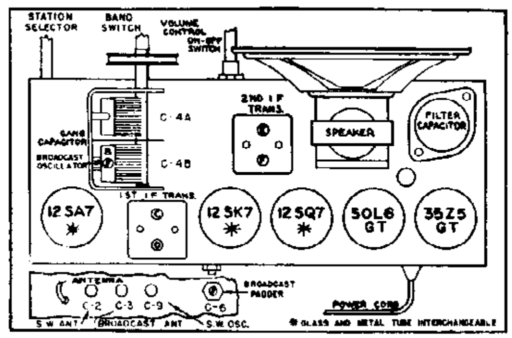
1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — 200 mmf. — 400 ohms

CONNECT TEST OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL AT	TRIMMERS	PURPOSE
12SA7GT grid	.1 mfd.	455 kc.	Broadcast	HF end	C D E F	Align IF
12SA7GT grid	.1 mfd.	1620 kc.	Broadcast	HF end	B	Set limit of band
Ant. terminal	400 ohms	18.3 mc.	Short Wave	HF end	C-9	Set limit of band
Ant. terminal	400 ohms	18.0 mc.	Short Wave	18 mc.	C-2	Align antenna
Ant. terminal	200 mmf.	1400 kc.	Broadcast	1400 kc.	C-3	Align antenna
Ant. terminal	200 mmf.	600 kc.	Broadcast	600 kc.	C-6	Rock gang and adjust to max.

NOTE: Recheck alignment of trimmers B and C-3 after adjusting C-6.



Dial Mechanism



Tube Layout

Electrical and Mechanical Specifications

Frequency Range .... 540-1600 kc., 6-18 mc.
Intermediate Frequency .... 455 kc.
Power Supply....105-125 volts, 50-60 cycle AC or DC
Loudspeaker .... Dynamic
V.C. Impedance .... 3.5 ohms at 400 cycles
Power Output (Undistorted) .... .75 watt
Power Output (Maximum) .... 1.5 watts
Tuning Drive Ratio 5-1

TUBE COMPLEMENT

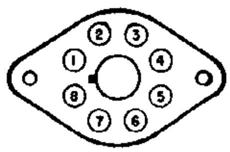
1—12SA7GT Oscillator and Mixer tube
1—12SK7GT IF Amplifier tube
1—12SQ7GT Second Detector and First Audio tube
1—50L6GT Power Output tube
1—35Z5GT Rectifier tube

NOTE: The above glass tubes are interchangeable with their metal equivalent.

WESTERN AUTO SUPPLY CO.

SOCKET VOLTAGES

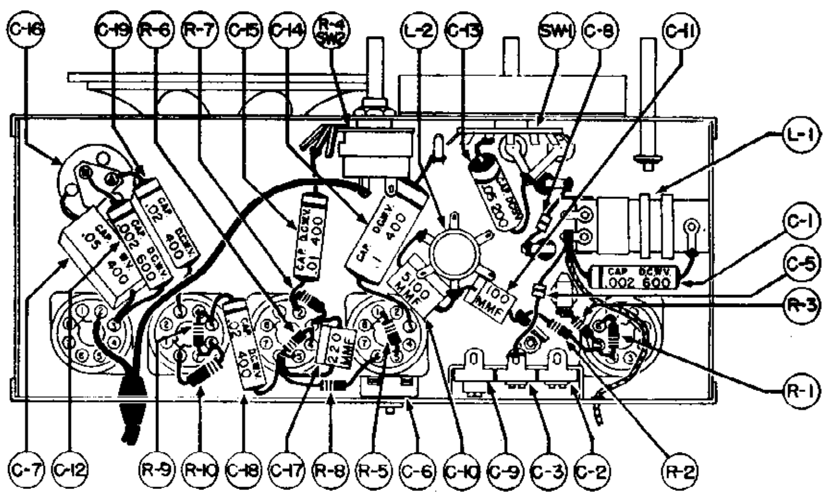
TUBE	POSITION	1	2	3	4	5	6	7	8
12SA7GT	Oscillator and Mixer	0	37.5 AC	99	99	−4.2	0	24.5 AC	0
12SK7GT	IF Amplifier	0	24.5 AC	0	0	0	99	12.5 AC	99
12SQ7GT	2nd Det.—1st Audio	0	0	0	0	0	16	12.5 AC	0
50L6GT	Power Output	0	85 AC	91.5	99	0	0	37.5 AC	5.9
35Z5GT	Rectifier	0	117 AC	112 AC	0	112 AC	0	85 AC	112



NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All voltages are positive DC unless otherwise marked.

Volume control full on. No signal.

Line Voltage 117 volts AC.

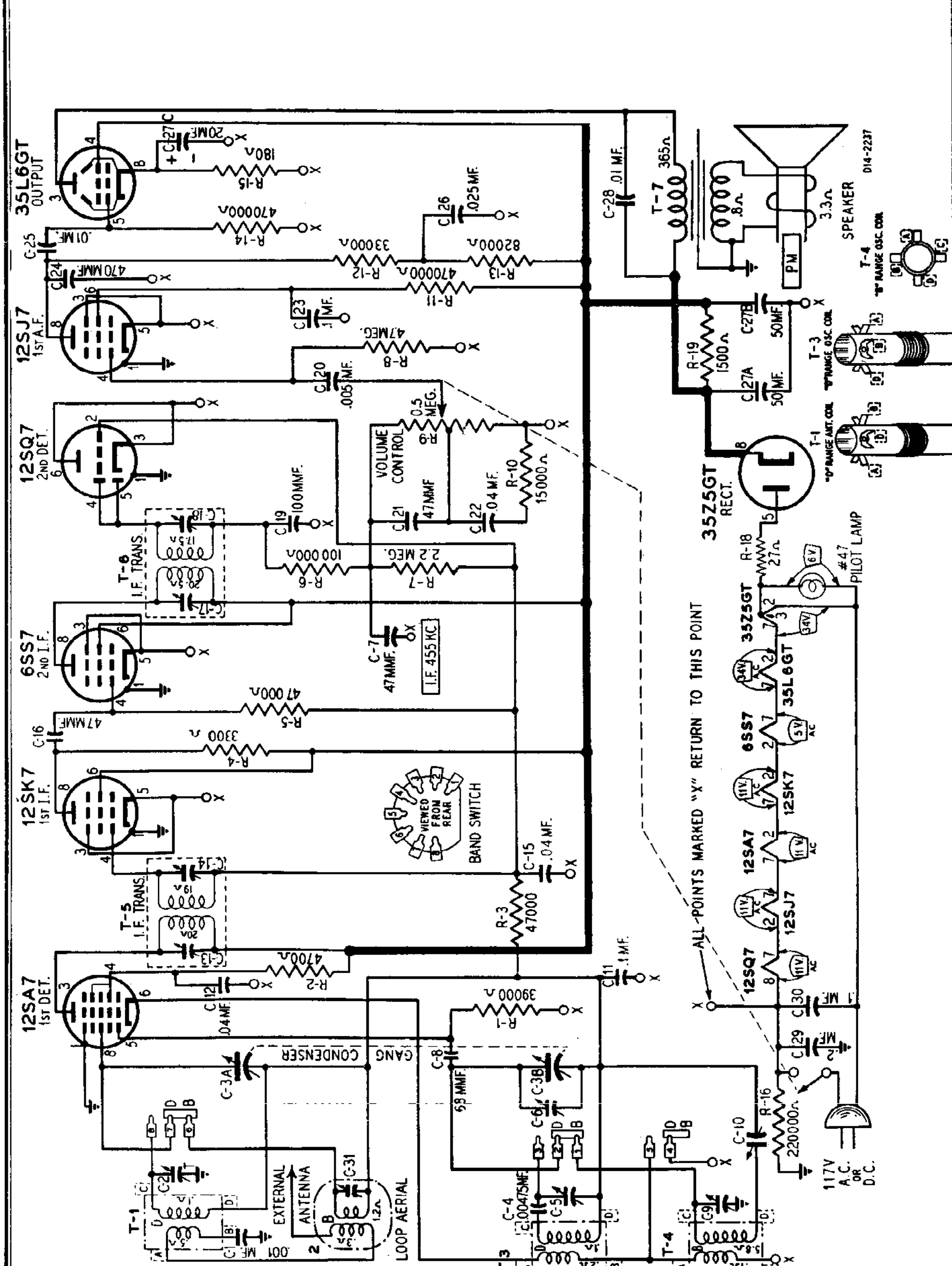


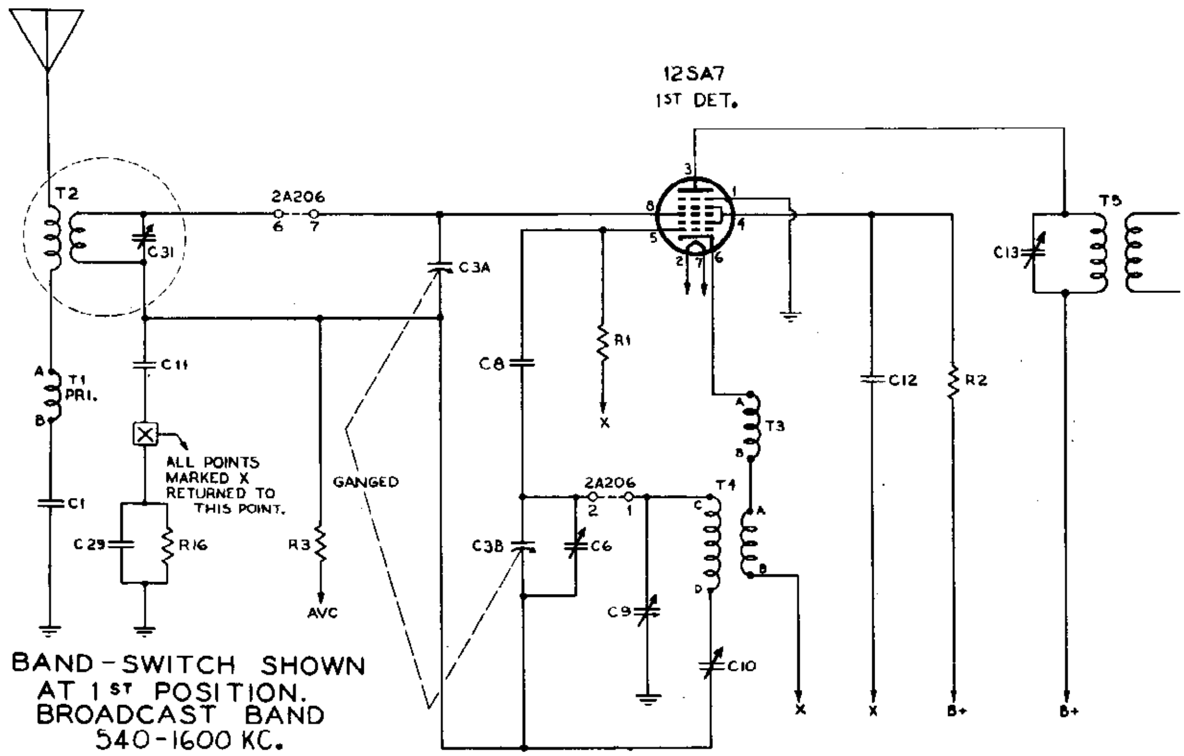
SERVICE PARTS LIST

Symbol	Part No.	Description
C-7	BC31B503	Cap., Molded Paper, .05 mfd.
C-13	BD210503	Cap., Paper, .05 mfd., 200 v.
C-15	BD410103	Cap., Paper, .01 mfd., 400 v.
C-14	BD410104	Cap., Paper, .1 mfd., 400 v.
C-18, 19	BD410203	Cap., Paper, .02 mfd., 400 v.
C-1, 12	BD610202	Cap., Paper, .002 mfd., 600 v.
C-10	BM58D512	Cap., Mica, 5100 mmf.
C-11	BM78A101	Cap., Mica, 100 mmf.
C-17	BM78A221	Cap., Mica, 220 mmf.
R-10	BR16C151	Resistor, 150 ohm, ½ w.
R-2	BR17B151	Resistor, 150 ohm, ⅓ w.
R-3	BR17B156	Resistor, 15 meg., ⅓ w.
R-1	BR17B223	Resistor, 22,000 ohm, ⅓ w.
R-5	BR17B224	Resistor, 220,000 ohm, ⅓ w.
R-6	BR17B335	Resistor, 3.3 meg., ⅓ w.
R-8, 9	BR17B474	Resistor, 470,000 ohm, ⅓ w.
R-7	BR17B685	Resistor, 6.8 meg., ⅓ w.
	A-2163	Cable, Drive
	A-6158	Lamp, Pilot, No. 47, Mazda, 6.3 v.
C-16	A-8948	Cap., Electrolytic, 40-20 mfd.
R-4	B-9051-5	Control, Vol & Sw. 500,000 ohm
T-1	B-51010-1	Transformer Assembly, 1st IF
T-2	B-51011-1	Transformer Assembly, 2nd IF
	C-51014	Speaker, 5-inch Dynamic
	A-51160-1	Cord, Power, 6 ft.
	A-51163	Clip, Spring
C-6	B-51428-5	Capacitor, Padder
	B-51591	Spring, Dial Bracket
SW-1	B-51764-1	Switch, Band
	A-51787	Spring, Cable, Music Wire
L-1	B-51828	Coil Assembly, BC & SW Ant.
C-2, 3, 9	A-51834	Capacitor, Trimmer, 3-section
L-2	B-51836	Coil Assembly, Osc.
C-4	C-51837-1	Capacitor, Variable
C-8	B-51839-2	Capacitor, 1 mmf.
C-5	B-51839-4	Capacitor, 2.2 mmf.
	A-51869	Antenna Reel Assembly

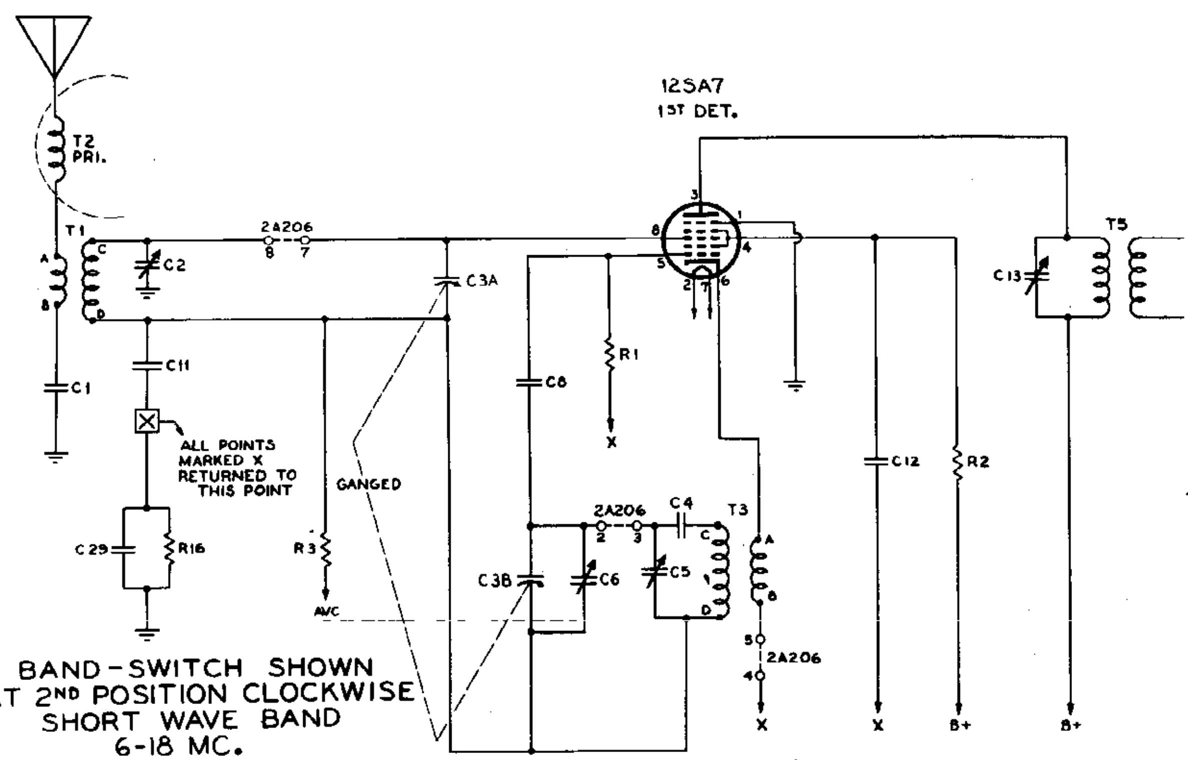
Order parts not listed by specifying (1) Part Name and (2) Model Number (include number following dash)

Models D2718, D2718A WESTERN AUTO SUPPLY CO.





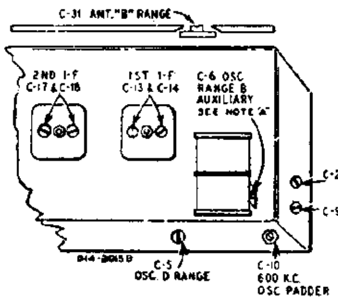
BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND
540-1600 KC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND
6-18 MC.

Models D2718, D2718A

WESTERN AUTO SUPPLY CO.



ALIGNMENT NOTES

NOTE A—Adjust Oscillator Range B (C9) trimmer on side of chassis. Oscillator Range B (C6) auxiliary trimmer on gang condenser is adjusted at factory and ordinarily need not be readjusted in the field.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—Attach pointer to drive cord and position at 1400 KC mark on dial scale.

NOTE D—Some receivers have a "gimmick" capacity formed by twisting two wires together on the loop antenna in place of the Antenna Range B Trimmer, C-31. When aligning receivers having the "gimmick" capacity, proceed as instructed in the Alignment Procedure Table but omit the steps at 1400 KC involving C-31.

The "gimmick" capacity is set at the factory and normally will not require adjustments when realigning the receiver. Adjustment is obtained by twisting or untwisting the wires.

On receivers having the "gimmick", the dial pointer should be set at 1600 KC rather than as instructed in Note C.

On receivers having neither a trimmer or a "gimmick", the dial pointer should also be set at 1600 KC.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

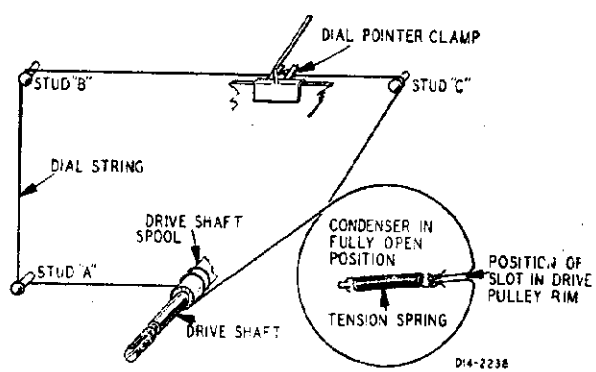
The equipment in column at right is required for Aligning:

Signal Generator which will provide an accurately calibrated signal at test frequencies as listed.

Output indicating Meter; Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 50 mmf., and 400 ohm.

FREQUENCY SETTING	SIGNAL GENERATOR ANTENNA CONNECTION	SIGNAL GENERATOR GROUND CONNECTION	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration)
I.F. 455 KC	Signal Grid of 1st Det. Connect at Stator of Large Gang Section.	Point "X" 12SK7—1st I-F Prong No. 3	.1 mf.	B Range	Turn Rotor to Fully Open Position	1st I.F. (C13) & (C14) 2nd I.F. (C17) & (C18)
RANGE B 1600 KC	External Antenna Clip	Point "X"	50 mmf.	B Range	Turn Rotor to Fully Open Position	Oscillator Range B (C9) See Note A
1400 KC Note D	External Antenna Clip	Point "X"	50 mmf.	B Range	Turn Rotor to Max. Output. Set pointer to 1400 KC See Note C	Antenna Range B (C-31)
600 KC	External Antenna Clip	Point "X"	50 mmf.	B Range	Turn Rotor to Max. Output and Rock	600 KC Padder (C10) Rock Rotor See Note B
Repeat above oscillator adjustments at 1600 and 600 KC until readjusting the oscillator Range B Trimmer (C9) causes no further improvement of output.						
RANGE D 18.3 MC	External Antenna Clip	Point "X"	400 Ohm	D Range	Turn Rotor to Fully Open Position	Oscillator Range D (C5)
17 MC	External Antenna Clip	Point "X"	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C2)
Loop Range B 1400 KC Note D	Reassemble chassis in cabinet External Antenna Clip	Chassis	50 mmf.	B Range	Turn Rotor to Max. Output	Ant. Range B (C-31)



SPECIFICATIONS

Power Consumption..............................42 Watts (At 117 volts AC)

Power Output......................1.5 Watts Maximum .9 Watt 10% Harmonics

Selectivity......49KC Broad at 1000 times Signal

Intermediate Frequency..........................455 KC

Speaker....................4"x6" oval PM Dynamic

Tuning Frequency Range

B Range..............................540 to 1600 KC

D Range........................6000 to 18,000 KC

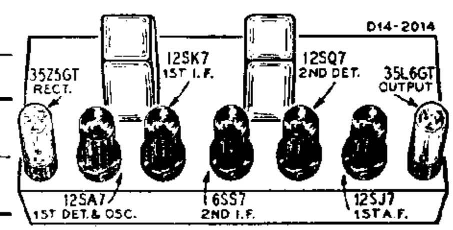
Sensitivity (For .05 watt output—External Antenna).

B range......................9 Microvolts Average

D Range..................30 Microvolts Average

CAUTION—If a dial lamp burns out, it should be replaced at once.

Use ONLY No. 47 dial lamps.



DRIVE CORD REPLACEMENT

Use a new 10X51 drive cord assembly or a piece of new cord 45" long for this installation. Turn the large drive pulley counterclockwise until the gang condenser is in the fully open position, then fasten one end of the new drive cord to one end of the tension spring. Hook the other end of the tension spring over the tab on the drive pulley, pass the drive cord through the slot in the drive pulley rim and wind it ½ turn counterclockwise around the top of the drive pulley. Wind 2 turns around the drive shaft spool with the turns progressing towards the chassis. Continue with the cord around idler studs A, B and C as shown in the illustration. Wind the cord ¾ turn counterclockwise around the large drive pulley, pass it through the slot in the pulley rim and fasten the end to the tension spring. Rotate the tuning shaft several turns to take up any slack in the drive cord, then attach the dial pointer to the cord.

WESTERN AUTO SUPPLY CO. Models D2718, D2718

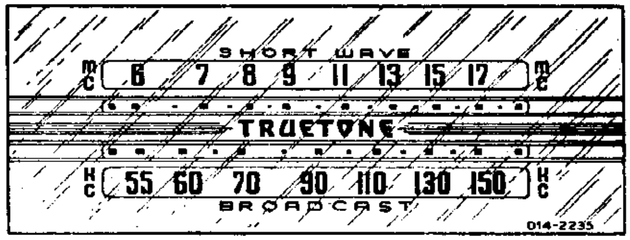
SHORT WAVE BAND

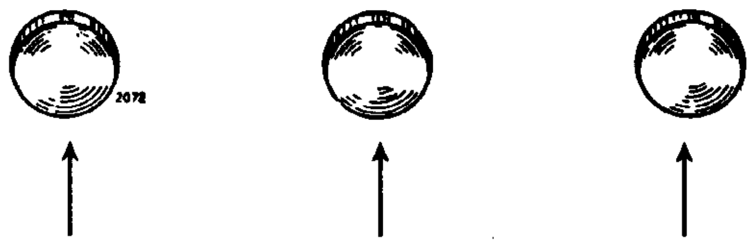
6 to 18 Megacycles

This band is calibrated in megacycles. The 16, 19, 25, 31 and 49 meter bands, in which the principal international short wave broadcasts will be heard, are located in this band.

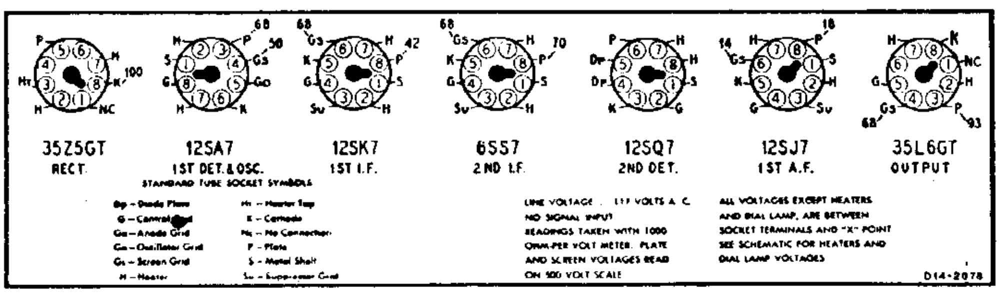
These bands will be found on the dial as follows:

16 Meter Band	17.7—17.9 MC
19 Meter Band	15.1—15.3 MC
25 Meter Band	11.7—11.9 MC
31 Meter Band	9.5— 9.7 MC
49 Meter Band	6— 6.2 MC





ON-OFF SWITCH AND VOLUME CONTROL — **TUNING KNOB** — **BAND SWITCH**



REPLACEMENT PARTS LIST

NOTICE: There is a Model Number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

MISCELLANEOUS

12A464	4" x 6" P.M. Speaker complete with Mounting Bracket
	Cone and Voice Coil Assembly (Specify Part Number and Letter Stamped on Speaker)
3A303	Tube Socket—Octal (8 prong) Molded
2A206	Band Change Switch
10A601	Knob, Tuning — For Ivory Cabinet
10A602	Knob, Volume — For Ivory Cabinet
10A603	Knob, Band — For Ivory Cabinet
10A604	Knob, Tuning — For Brown Cabinet
10A605	Knob, Volume — For Brown Cabinet
10A606	Knob, Band — For Brown Cabinet
13X546	Line Cord and Plug Assembly
55X292	Cabinet, Ivory Plastic
55X296	Cabinet, Brown Plastic
28X292	Snap Button (Mtg. Antenna to Cabinet)
	No. 6 x ⅜" P-K Type "Z" Screws (Mtg. Antenna to Chassis)
6X53	Rubber Bumpers (Mtd. to Bottom of Cabinet)

TRANSFORMERS AND COILS

T-1	9A1443	"D" Range Antenna Coil Assembly
T-2	26A451	"B" Band Loop Antenna Assembly (For Ivory Cabinet)
T-2	26A452	"B" Band Loop Antenna Assembly (For Brown Cabinet)
T-3	9A1444	"D" Range Oscillator Coil Assembly
T-4	9A1442	"B" Band Oscillator Coil Assembly
T-5	9A1793	1st I-F Coil Assembly
T-6	9A1794	2nd I-F Coil Assembly
T-7	51X118	Output Transformer

CAPACITORS

C-1	B67102	.001 mf	200 V	Tubular
C-2, C-9	17A152	2-25 mmf		Trimmer Strip
C-3A, C-3B	14A148	Gang Condenser Assembly		
C-4	46X289	.00475 mf	180 V	Tubular
C-5	17A174	2-25 mmf		Trimmer
C-6	Part of C-3	(Gang Condenser Assembly)		
C-7	47X463	47 mmf		Molded
C-8	47X466	68 mmf		Molded
C-10	17A234	300-450 mmf		Trimmer
C-11, C-23	B66104	.1 mf	200 V	Tubular
C-12, C-15, C-22	B66403	.04 mf	200 V	Tubular
C-13, C-14	Part of T-5	(1st I-F Coil Assembly)		
C-16, C-21	47X446	47 mmf		Molded
C-17, C-18	Part of T-6	(2nd I-F Coil Assembly)		
C-19	47X476	100 mmf		Molded
C-20	B66502	.005 mf	200 V	Tubular
C-24	47X467	470 mmf		Molded
C-25, C-28	B66103	.01 mf	200 V	Tubular
C-26	B67253	.025 mf	200 V	Tubular
C-27A	45X342	50 mf	150 V	Dry Electrolytic
C-27B	45X342	50 mf	150 V	Dry Electrolytic
C-27C	45X342	20 mf	25 V	Dry Electrolytic
C-29	D67204	.2 mf	400 V	Tubular
C-30	D67104	.1 mf	400 V	Tubular
C-31	17A123	1.5-12 mmf		Trimmer

RESISTORS

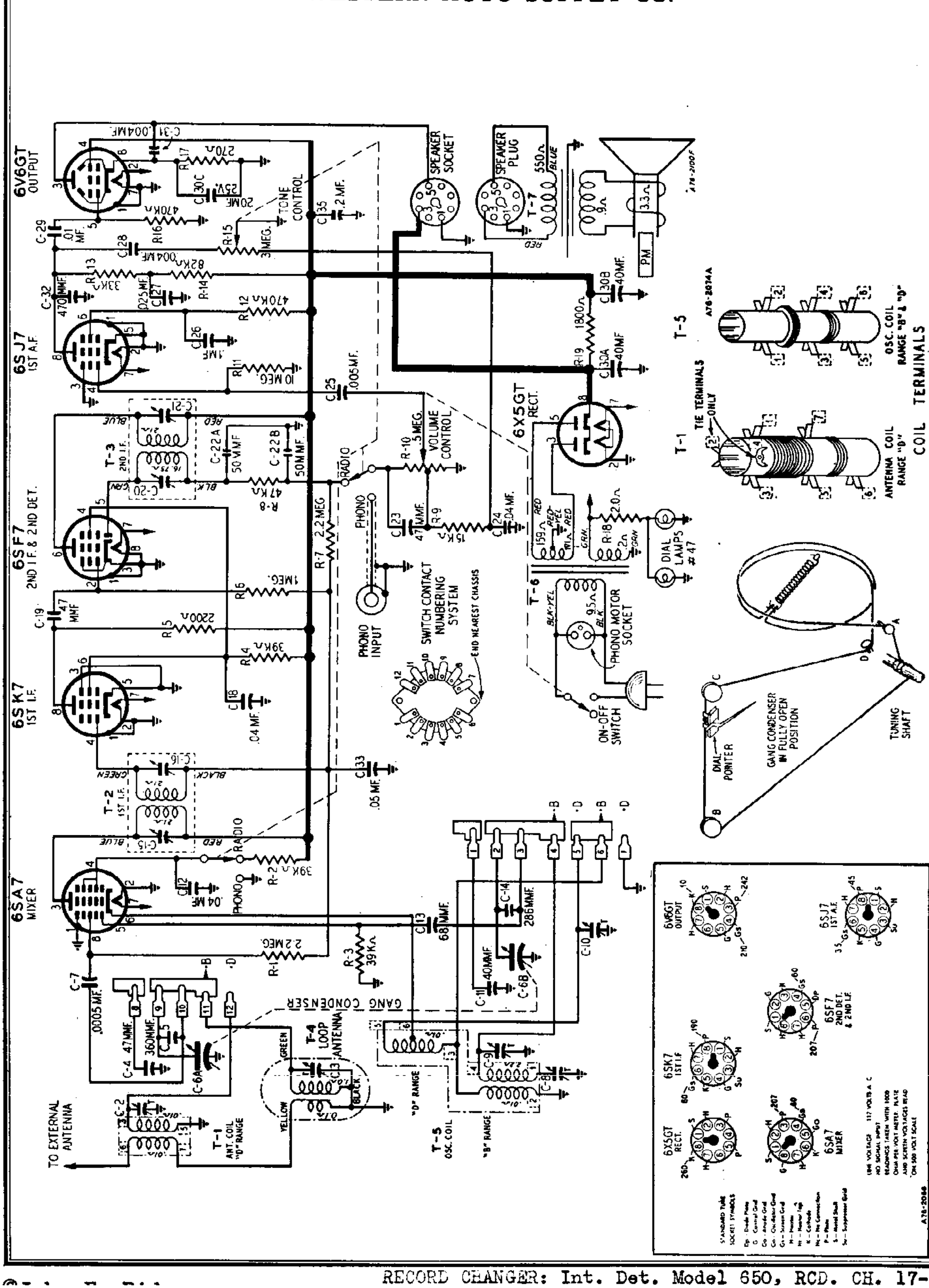
		OHMS	WATTS	
R-1	B84393	39 K	0.5	Carbon
R-2	B84472	4700	0.5	Carbon
R-3, R-5	B85473	47 K	0.5	Carbon
R-4	B84332	3300	0.5	Carbon
R-6	B85104	100 K	0.5	Carbon
R-7	B85225	2.2 meg	0.5	Carbon
R-8	B85475	4.7 meg	0.5	Carbon
R-9	36X309	.5 meg		Volume Control Switch
R-10	B84153	15 K	0.5	Carbon
R-11, R-14	B85474	470 K	0.5	Carbon
R-12	B84333	33 K	0.5	Carbon
R-13	B84823	82 K	0.5	Carbon
R-15	B84181	180	0.5	Carbon
R-16	B85224	220 K	0.5	Carbon
R-18	B84270	27	0.5	Carbon
R-19	C85152	1500	1.0	Carbon

DIAL AND DRIVE ASSEMBLY

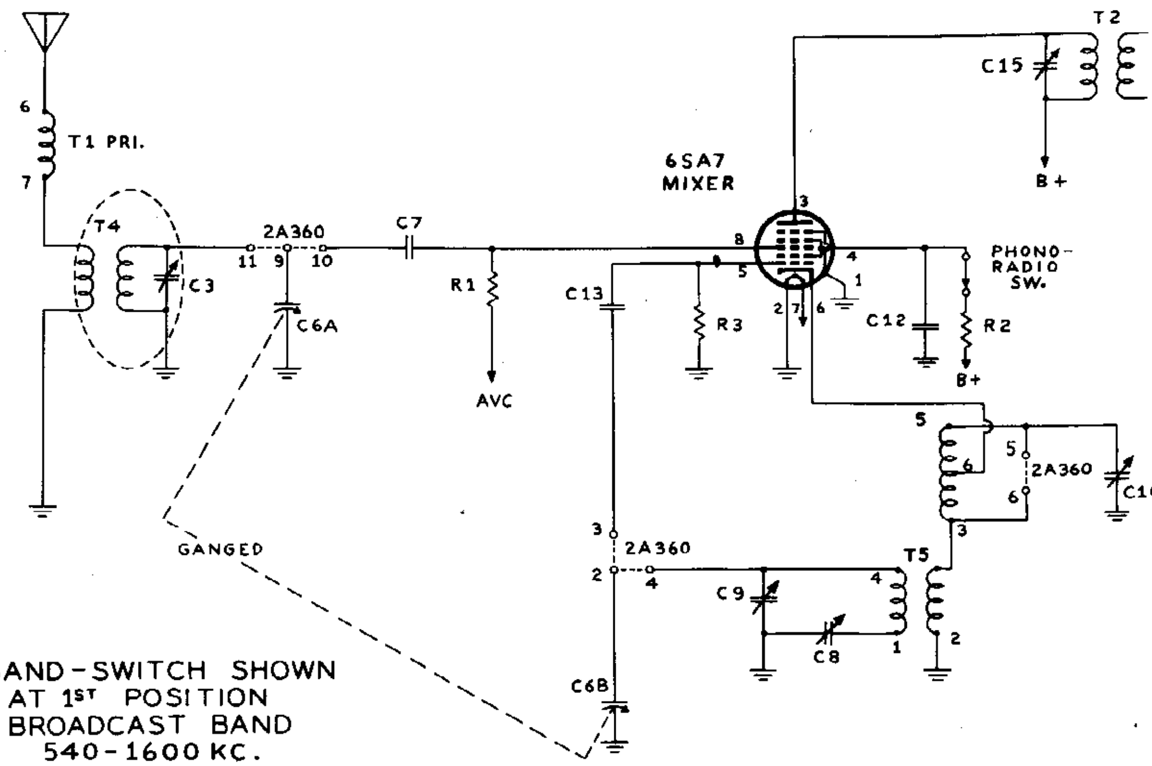
20X329	Cond. Cushion Stud — Mtg. Gang Conden
6X21	Rubber Grommet — Mtg. Gang Conden
26A450	Dial Bracket Assembly
25A1044	Diffuser and Clamp Assembly
58X671	Dial (for Ivory Cabinet)
30X532	Dial Clamps
15X236	Pointer
25X580	Drive Shaft Bracket
26X465	Drive Shaft
19X192	"C" Washer (For Drive Shaft)
24X564	Drive Shaft Spool
10X51	Drive Cord Assembly
28X113	Drive Cord Tension Spring
7A185	Pilot Light Socket Assembly
	No. 47 Pilot Light Bulb

Model D2745

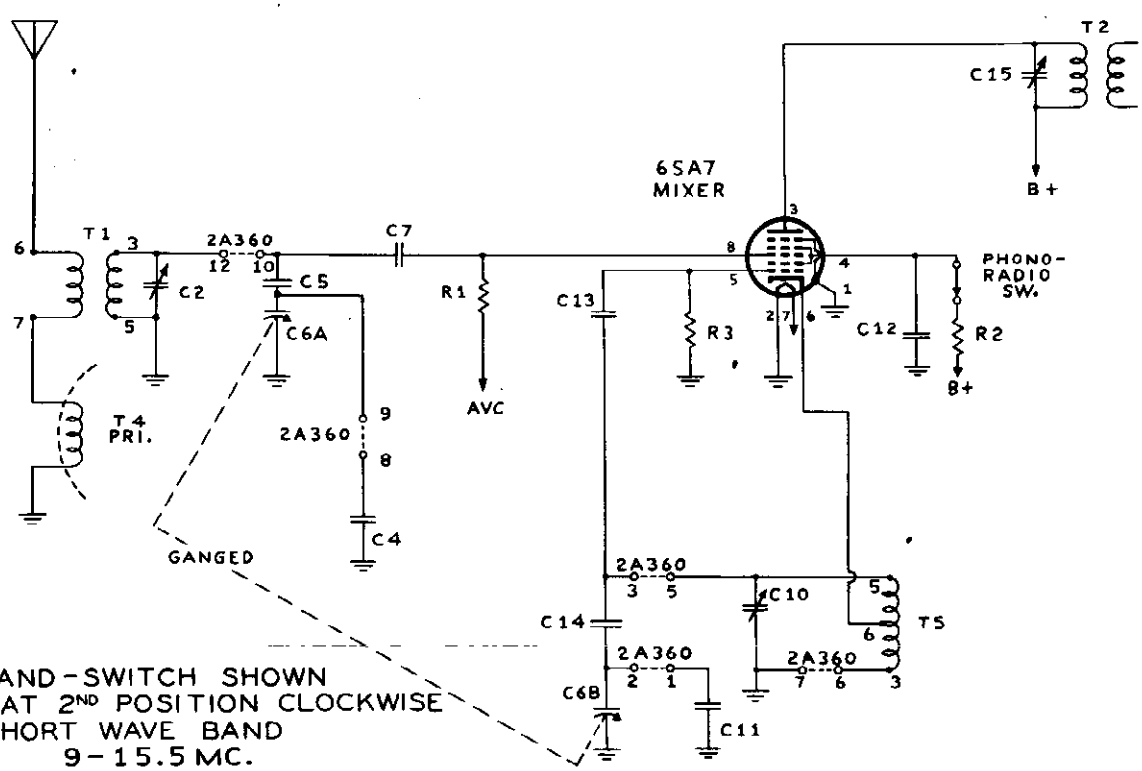
WESTERN AUTO SUPPLY CO.



WESTERN AUTO SUPPLY CO.



BAND-SWITCH SHOWN
AT 1ST POSITION
BROADCAST BAND
540-1600 KC.



BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
SHORT WAVE BAND
9-15.5 MC.

Model D2745

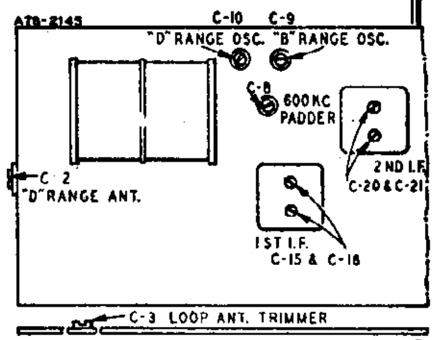
WESTERN AUTO SUPPLY CO.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 100 mmf., and 400 ohms.

	SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I.F.	455 KC	Grid of 6BA7 Pin 8	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C20) & (C21) 1st I.F. (C15) & (C16)
RANGE B	1620 KC	Antenna Lead	100 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C9)
	1400 KC	Antenna Lead	100 mmf.	B Range	Tune Rotor to Max. Output Set Pointer to 1400 KC (See Note A)	Ant. Range B (C3)
	600 KC	Antenna Lead	100 mmf.	B Range	Tune Rotor to Max. Output	Oscillator (C8) Rock Rotor—See Note B
	Repeat above steps at 1620 and 600 KC until readjusting the oscillator Range B Trimmer (C9) causes no further improvement of output.					
RANGE D	15,600 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C10)
	14,000 KC	Antenna Lead	400 Ohm	D Range	Tune Rotor to Max. Output	Ant. Range D (C2) Rock Rotor—See Note B
LOOP RANGE	Reassemble chassis in cabinet.					
B	1400 KC	Antenna Lead	100 mmf.	B Range	Tune Rotor to Max. Output	Ant. Range B (C3)



NOTE A—Set pointer at the 1400 KC mark on the dial scale. Attach pointer to drive cord.

NOTE B—Turn Rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

MISCELLANEOUS

12A442	6" P.M. Speaker Complete with Output Transformer
	Cone and Voice Coil Assembly (Specify part number and letters stamped on speaker)
	Output Transformer (Specify part number and letters stamped on speaker)
3A303	Tube socket-octal (8 prong) moulded
3A304	Phono motor socket
3A305	Phono socket—single pin tip
10A578	Knob (Tuning)
10A579	Knob (Off-On, Volume)
10A581	Knob (Tone, Radio-Phono)
10A580	Knob (SW-BC)
2A359	Band Change Switch
13X328	Line cord and plug assembly

TRANSFORMERS AND COILS

T-1	9A1812	"D" Range Antenna Coil Assembly
T-2	9A1814	1st I.F. Coil Assembly
T-3	9A1815	2nd I.F. Coil Assembly
T-4	26A475	"B" Range Loop Antenna
T-5	9A1813	"B" Range and "D" Range Oscillator Coil Assembly
T-6	53X282	117 Volt 60 Cycle Standard Power Transformer
T-7		Output Transformer (See Miscellaneous)

CAPACITORS

C-2	17A164	5-50 mmf		Trimmer
C-3	17A251	1.5-12 mmf		Trimmer
C-4	47X473	47 mmf		Silvered mica
C-5	47X474	360 mmf		Silvered mica
C-6A, C-6B	14A178	Gang Capacitor with drive pulley		
C-7	B66501	.0005 mf	200 V	Tubular
C-8	17A155	350-430 mmf		Trimmer
C-9, C-10	17A109	2.5-35 mmf		Dual Trimmer
C-11	47X472	40 mmf		Silvered mica
C-12, C-18	D66403	.04 mf	400 V	Tubular
C-13	47X466	68 mmf		Moulded
C-14	47X481	286 mmf		Silvered mica
C-15, C-16	Part of T-2 (1st I.F. Coil Assem.)			
C-19, C-23	47X463	47 mmf		Moulded
C-20, C-21	Part of T-3 (2nd I.F. Coil Assem.)			
C-22A & B	47X112	50-50mmf		Dual Mica
C-24	D64403	.04 mf	400 V	Tubular
C-25	D66502	.005 mf	400 V	Tubular
C-26	D67104	.10 mf	400 V	Tubular
C-27	D64253	.025 mf	400 V	Tubular
C-28	D66402	.004 mf	400 V	Tubular
C-29	D66103	.01 mf	400 V	Tubular
C-30A	45X346	40 mf	450 V	3 Section Electrolytic
C-30B		40 mf	450 V	
C-30C		20 mf	25 V	
C-31	F66402	.004 mf	600 V	Tubular
C-32	47X467	470 mmf		Moulded
C-33	B66503	.05 mf	200 V	Tubular
C-35	D67204	.2 mf	400 V	Tubular

Sensitivity (For 0.5 Watt Output, with External Antenna)
B Range........................ 9 Microvolts Average
D Range........................ 20 Microvolts Average

RESISTORS

B85225	R-1, R-7	2.2 megohms	0.5 W	Carbon
C84393	R-2, R-4	39 K ohms	1.0 W	Carbon
B84393	R-3	39 K ohms	0.5 W	Carbon
B84222	R-5	2200 ohms	0.5 W	Carbon
B85105	R-6	1 megohm	0.5 W	Carbon
B85473	R-8	47 K ohms	0.5 W	Carbon
B84153	R-9	15 K ohms	0.5 W	Carbon
36X358	R-10	.5 megohm	Volume control and line switch	
B85106	R-11	10 megohms	0.5 W	Carbon
B85474	R-12, R-16	470 K ohms	0.5 W	Carbon
B84333	R-13	33 K ohms	0.5 W	Carbon
B84823	R-14	82 K ohms	0.5 W	Carbon
40X276	R-15	3.0 megohms	Tone control & Radio-Phono switch	
C84271	R-17	270 ohms	1.0 W	Carbon
43X213	R-18	2.0 ohms	0.5 W	Wire wound
D84182	R-19	1800 ohms	2.0 W	Carbon

DIAL AND DRIVE ASSEMBLY

26A400	Dial bracket assembly complete with dial glass, background, diffusers, etc.
7A202	Pilot light socket assembly
	No. 47 Pilot light
28X113	Drive cord tension spring
10X58	Drive cord assembly
15X150	Pointer
26X485	Drive Shaft
19X192	"C" Washer (for drive shaft)
6X21	Rubber Grommet } Mtg. Gang Capacitor
20X329	Cond. Cushion Stud } Mtg. Gang Capacitor

Power Output........................4 Watts Maximum
2.3 Watts, 10% Harmonics

Power Consumption (at 117 Volts AC)..............40 Watts (normal)
60 Watts (phono operating)

Frequency Ranges
B Range..............................540-1600 Kilocycles
D Range..............................9-15.5 Megacycles

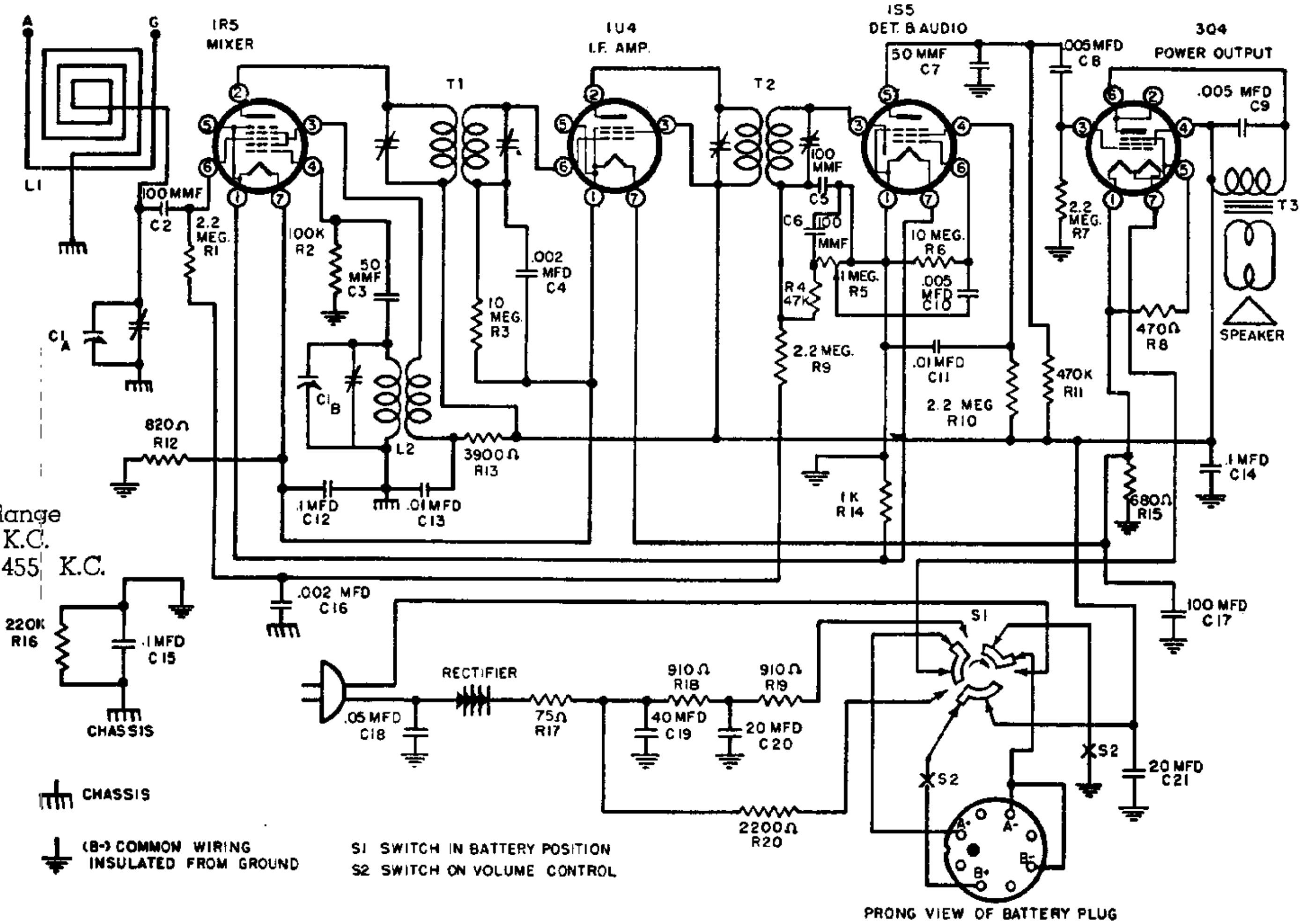
Intermediate Frequency..........455 KC

Selectivity ....40 KC Broad at 1000 Times Signal

Speaker ....6" PM Dynamic

NOTICE: There is a Model Number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

WESTERN AUTO SUPPLY CO.



Frequency Range
535 to 1600 K.C.
I.F. Frequency 455 K.C.

VOLTAGE CHART

All voltages are measured from minus "B" with a 1000 ohm per volt meter on the 150 volt scale. For the following voltages the AC line voltage is 117 volts. Where no voltages are shown the voltage is 0 or is too low to be read with this type of voltmeter.

TUBE — Pin Numbers	1	2	3	4	5	6	7
1R5	1.5	85	69	—5	1.5	0	3.0
1U4	3.0	85	85	0	3.0	0	4.5
1S5	0	0	0	4	8	0	1.5
3Q4	4.5	82	0	85	6.0	82	7.5

ALIGNMENT PROCEDURE

Volume control—Maximum: all adjustments.

Connect ground lead of signal generator to common "B."

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, 30% modulated, 400 c.p.s.

Output meter.

Non-metallic screwdriver.

Dummy antennas— .1 mfd., .00025 mfd.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*1R5 Grid (Stator of CIA)	T2	Output I. F.
Fully open	455 KC	.1	*1R5 Grid (Stator of CIA)	T1	Input I. F.
Fully open	1600 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1A	Antenna

*Connect ground lead of signal generator to Common "B."

**Connect ground lead of signal generator to ground wire stapled to cabinet.

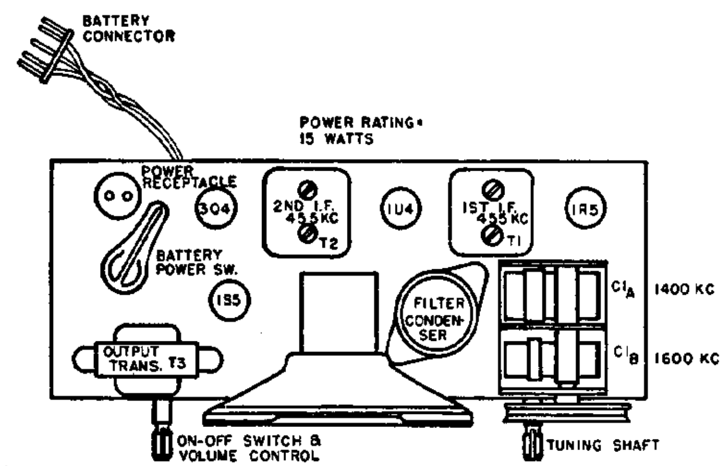
If it should become necessary to re-adjust the loop antenna loading coil tune in a weak station, between 600 and 650 Kilocycles, and adjust for maximum output.

With an output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is .4 volts using a signal which is modulated 30% at 400 c.p.s.

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given below in the order listed. After realignment has been completed repeat the procedure as a final check.



Chassis, Top View.

CONDENSERS

Circuit Diagram Reference	Part No.	Description
C1A, C1B	B19-188	Variable Condenser.
C2, C5, C6	A15-188	100 MMF Mica Condenser.
C3, C7	A15-175	50 MMF Mica Condenser.
C4, C16	A16-155	.002 MFD 600 volt Condenser.
C8, C9, C10	A16-166	.005 MFD 150 volt Condenser.
C11, C13	A16-165	.01 MFD 200 volt Condenser.
C12, C15	A16-160	.1 MFD 400 volt Condenser.
C14	A16-157	.1 MFD 200 volt Condenser.
C18	A16-158	.05 MFD 400 volt Condenser.
C17	A18-281	100 MFD 25 volt Electrolytic Condenser.
C19	A18-281	40 MFD 150 volt Electrolytic Condenser
C20, C21	A18-281	20 MFD 150 volt Electrolytic Condenser.

RESISTORS

Circuit Diagram Reference	Part No.	Description
R1, R7, R9, R10	A60-684	2.2 Megohm ½ watt 20% Resistor.
R2	A60-671	100K Ohm ½ watt 20% Resistor.
R3, R6	A60-663	10 Megohm ½ watt 20% Resistor.
R4	A60-685	47K Ohm ½ watt 20% Resistor.
R8	A60-707	470 Ohm ½ watt 20% Resistor.
R11	A60-662	470K Ohm ½ watt 20% Resistor.
R12	A60-709	820 Ohm ½ watt 10% Resistor.
R13	A60-710	3900 Ohm ½ watt 10% Resistor.
R14	A60-675	1000 Ohm ½ watt 20% Resistor.
R15	A60-708	680 Ohm ½ watt 10% Resistor.
R16	A60-667	220K Ohm ½ watt 20% Resistor.
R17	A60-712	75 Ohm 3 watt 5% Resistor.
R18, R19	A60-713	1820 Ohm 10 watt 5% Resistor. (each section 910 ohms).
R20	A60-714	2200 Ohm ½ watt 10% Resistor.

COILS

Circuit Diagram Reference	Part No.	Description
L2	B10-460	Oscillator Coil.
T1	C10-462	1st I.F. Transformer.
T2	C10-463	2nd I.F. Transformer.
	or	
	C10-473	1st I.F. Transformer.
	C10-474	2nd I.F. Transformer.
	or	
	C10-471	1st I.F. Transformer.
	C10-472	2nd I.F. Transformer.
	or	
	C10-475	1st I.F. Transformer.
	C10-475	2nd I.F. Transformer.
	A10-476	Antenna Loading Coil

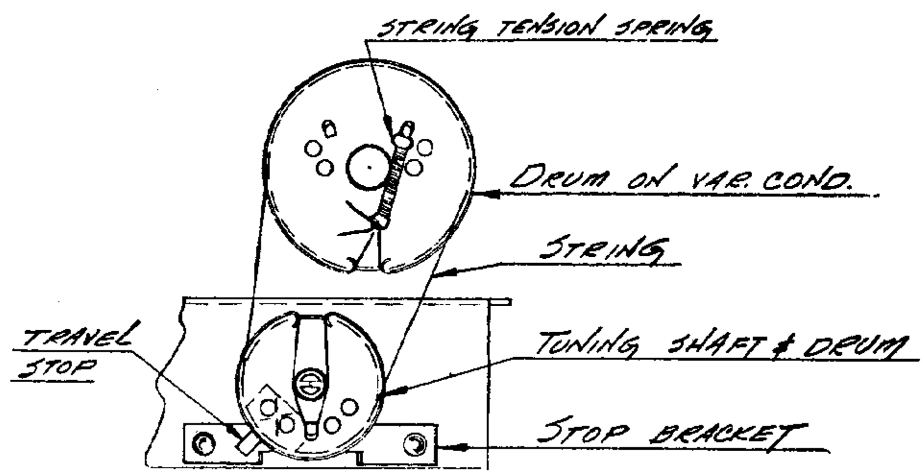
NOTE:

I. F. Transformers shown are interchangeable.

Part No. C10-475 may be used as 1st or 2nd I. F. Transformer.

MISCELLANEOUS

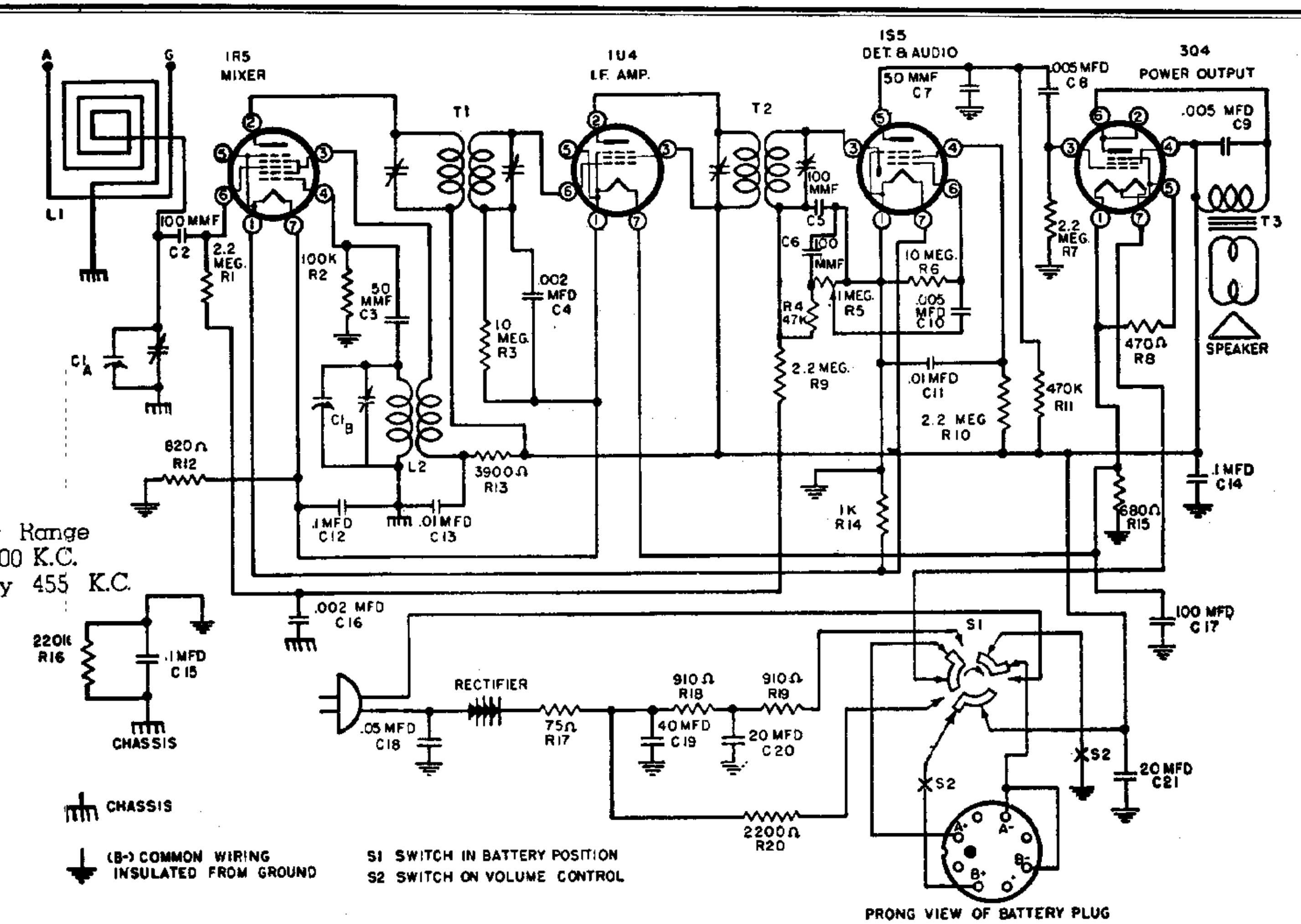
Circuit Diagram Reference	Part No.	Description
T3	A80-228	Output Transformer.
R5	A24-170	Volume Control and Switch.
S1	B69-173	Switch, Battery—AC-DC.
	D42-409	Cabinet, Leatherette cover.
	A52-213	Knob, Tuning.
	C52-212	Knob, Dial Scale Calibrated.
	C36-120	Grille.
	B83-402	Handle for Cabinet.
	S84-77	Line cord assembly.
	A83-412	Iron Core for loop loading coil.
	A52-196	Knob, Battery—AC-DC.
	A83-391	Selenium Rectifier.
	S84-101	Dial drive drum and shaft assembly.
	A45-121	AC Socket.
	A68-28	Plug for AC cord.
	B79-350	Speaker, 5" PM.
	A45-119	Plug, Battery.



DIAL STRING ARRANGEMENT

Dial Drive.

WESTERN AUTO SUPPLY CO.



Frequency Range
535 to 1600 K.C.
I.F. Frequency 455 K.C.

VOLTAGE CHART

All voltages are measured from minus "B" with a 1000 ohm per volt meter on the 150 volt scale. For the following voltages the AC line voltage is 117 volts. Where no voltages are shown the voltage is 0 or is too low to be read with this type of voltmeter.

TUBE — Pin Numbers	1	2	3	4	5	6	7
1R5	1.5	85	69	—5	1.5	0	3.0
1U4	3.0	85	85	0	3.0	0	4.5
1S5	0	0	0	4	8	0	1.5
3Q4	4.5	82	0	85	6.0	82	7.5

ALIGNMENT PROCEDURE

Volume control—Maximum: all adjustments.

Connect ground lead of signal generator to common "B."

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, 30% modulated, 400 c.p.s.

Output meter.

Non-metallic screwdriver.

Dummy antennas— .1 mfd., .00025 mfd.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	* 1R5 Grid (Stator of CIA)	T2	Output I. F.
Fully open	455 KC	.1	* 1R5 Grid (Stator of CIA)	T1	Input I. F.
Fully open	1600 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1A	Antenna

*Connect ground lead of signal generator to Common "B."

**Connect ground lead of signal generator to ground wire stapled to cabinet.

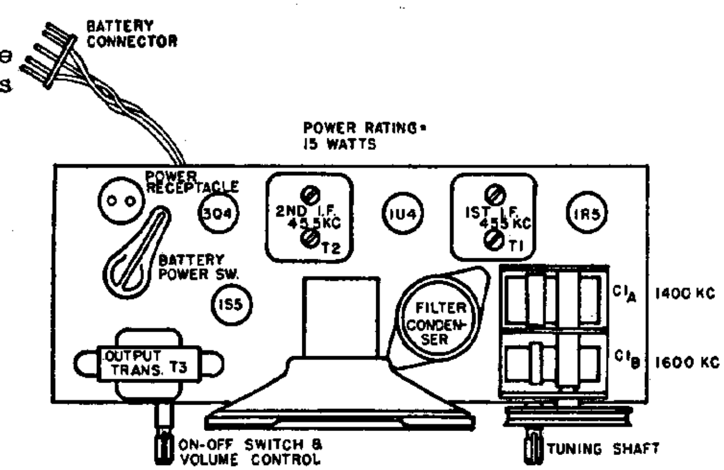
If it should become necessary to re-adjust the loop antenna loading coil tune in a weak station, between 600 and 650 Kilocycles, and adjust for maximum output.

With an output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is .4 volts using a signal which is modulated 30% at 400 c.p.s.

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given below in the order listed. After realignment has been completed repeat the procedure as a final check.



Chassis, Top View.

WESTERN AUTO SUPPLY CO.

CONDENSERS

Circuit Diagram Reference	Part No.	Description
C1A, C1B	B-19-188	Variable condenser
C2, C5, C6	A15-188	100 MMF Mica condenser
C3, C7	A15-175	50 MMF Mica condenser
C4, C16	A16-155	.002 MFD 600 volt condenser
C8, C9, C10	A16-166	.005 MFD 150 volt condenser
C11, C13	A16-165	.01 MFD 200 volt condenser
C12, C15	A16-160	.1 MFD 400 volt condenser
C14	A16-157	.1 MFD 200 volt condenser
C18	A16-158	.05 MFD 400 volt condenser
C17	A18-281	100 MFD 25 volt electrolytic condenser
C19		40 MFD 150 volt electrolytic condenser
C20, C21		20 MFD 150 volt electrolytic condenser

RESISTORS

Circuit Diagram Reference	Part No.	Description
R1, R7, R9, R10	A60-684	2.2 Megohm ½ watt 20% resistor
R2	A60-671	100K ohm ½ watt 20% resistor
R3, R6	A60-663	10 Megohm ½ watt 20% resistor
R4	A60-685	47K ohm ½ watt 20% resistor
R8	A60-707	470 ohm ½ watt 20% resistor
R11	A60-662	470K ohm ½ watt 20% resistor
R12	A60-709	820 ohm ½ watt 10% resistor
R13	A60-710	3900 ohm ½ watt 10% resistor
R14	A60-675	1000 ohm ½ watt 20% resistor
R15	A60-708	680 ohm ½ watt 10% resistor
R16	A60-667	220K ohm ½ watt 20% resistor
R17	A60-712	75 ohm 3 watt 5% resistor
R18, R19	A60-713	1820 ohm 10 watt 5% resistor (each section 910 ohms)
R20	A60-714	2200 ohm ½ watt 10% resistor

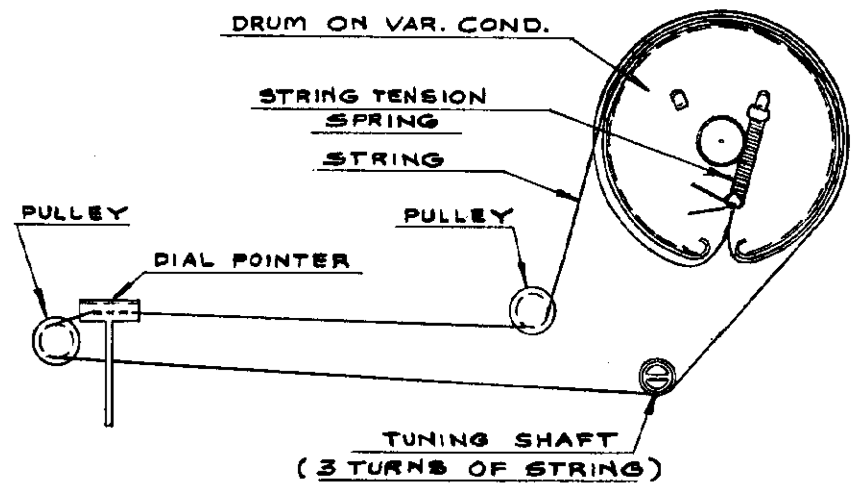
COILS

Circuit Diagram Reference	Part No.	Description
L2	B10-460	Oscillator coil
T1	*C10-475	1st I.F. transformer
T2	C10-475	2nd I.F. transformer
	A10-470	Antenna loading coil

MISCELLANEOUS

Circuit Diagram Reference	Part No.	Description
T3	A80-228	Output transformer
R5	A24-170	Volume control and switch
S1	B69-173	Switch, Battery—AC-DC
	B42-427	Cabinet, Leatherette cover
	A52-197	Knob, tuning
	A52-198	Knob, volume
	D40-140	Grille
	S84-77	Line cord assembly
	A52-196	Knob, battery—AC-DC
	A83-391	Selenium rectifier
	A45-121	AC socket
	A68-28	Plug for AC cord
	B79-350	Speaker, 5" PM
	A45-119	Plug, battery
	B67-496	Dial scale
	A58-63	Dial pointer
	A75-60	Tuning shaft

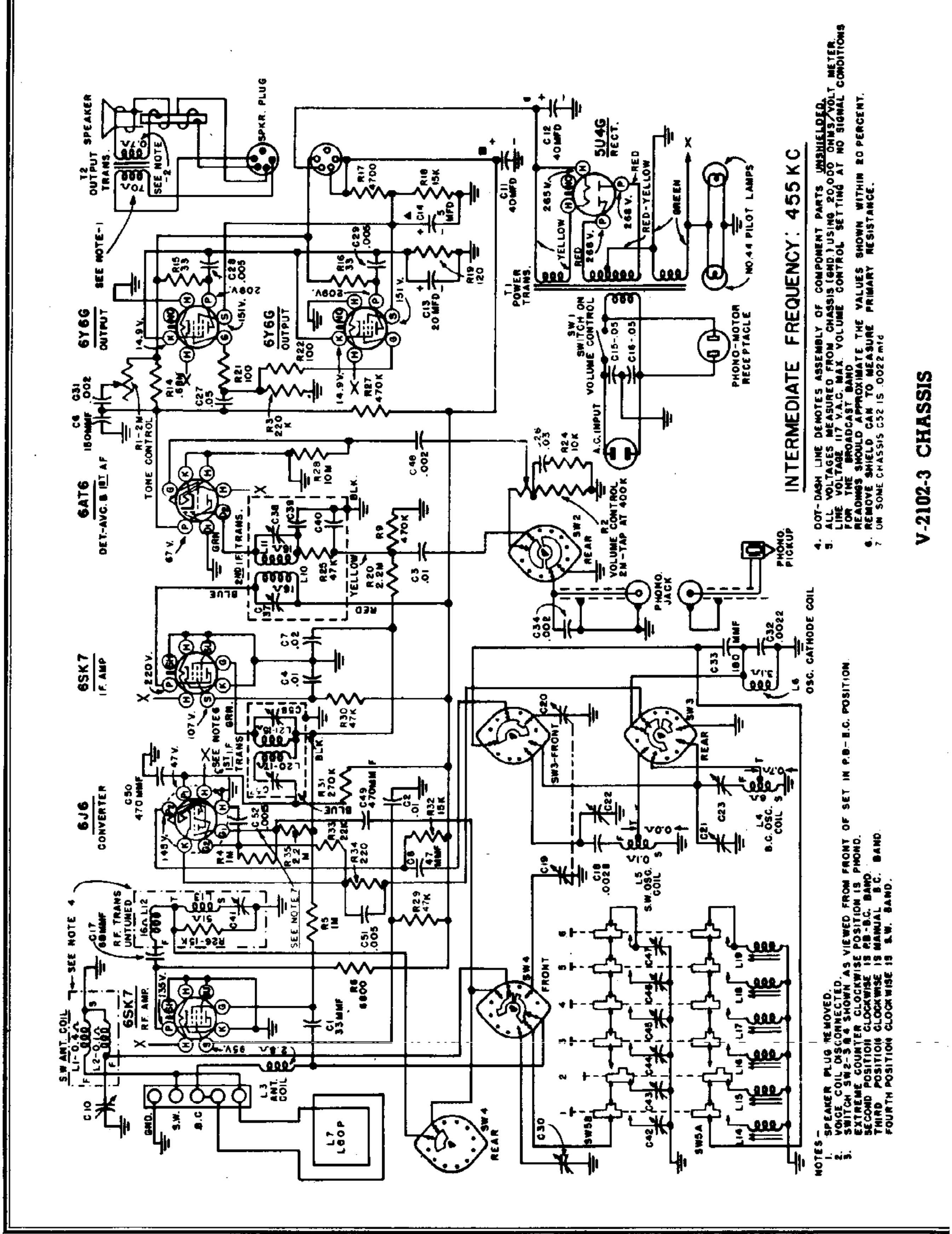
*Part No. C10-475 may be used as 1st or 2nd I.F. Transformer.



DIAL STRING ARRANGEMENT

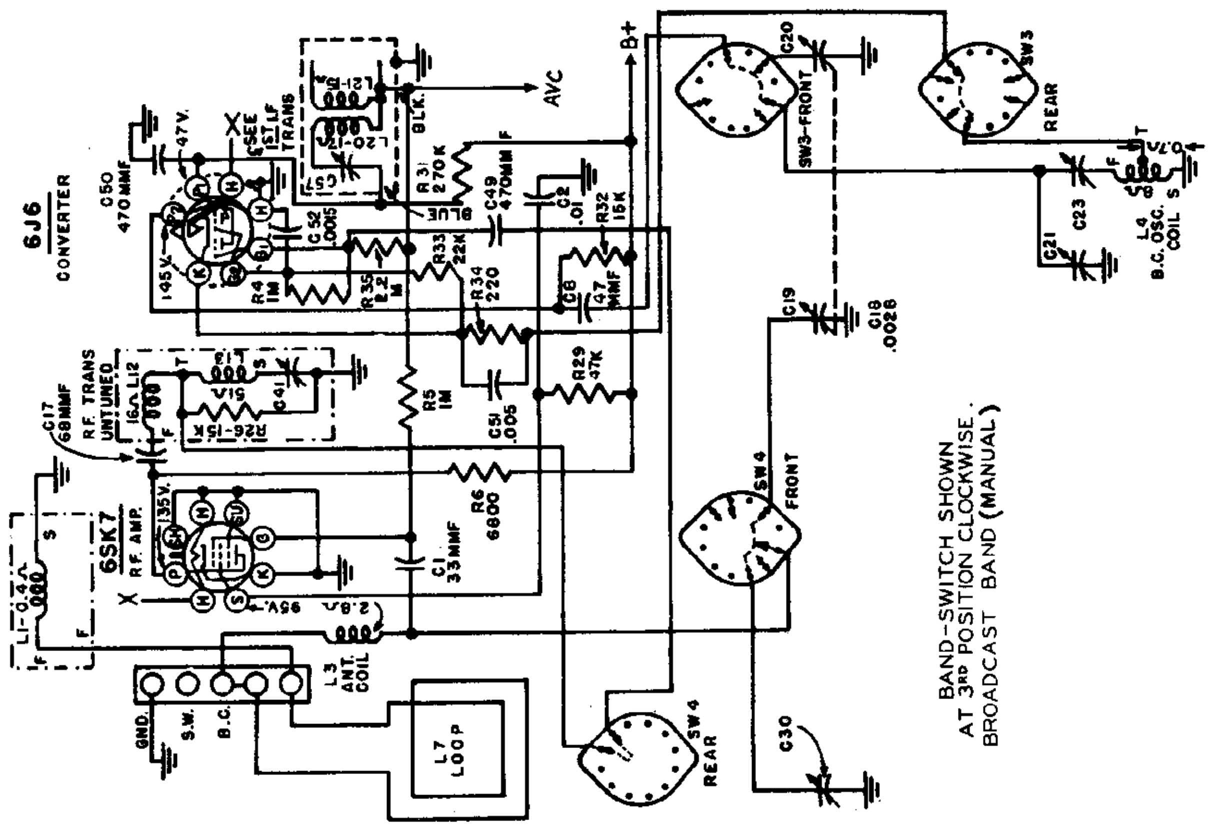
Dial Drive.

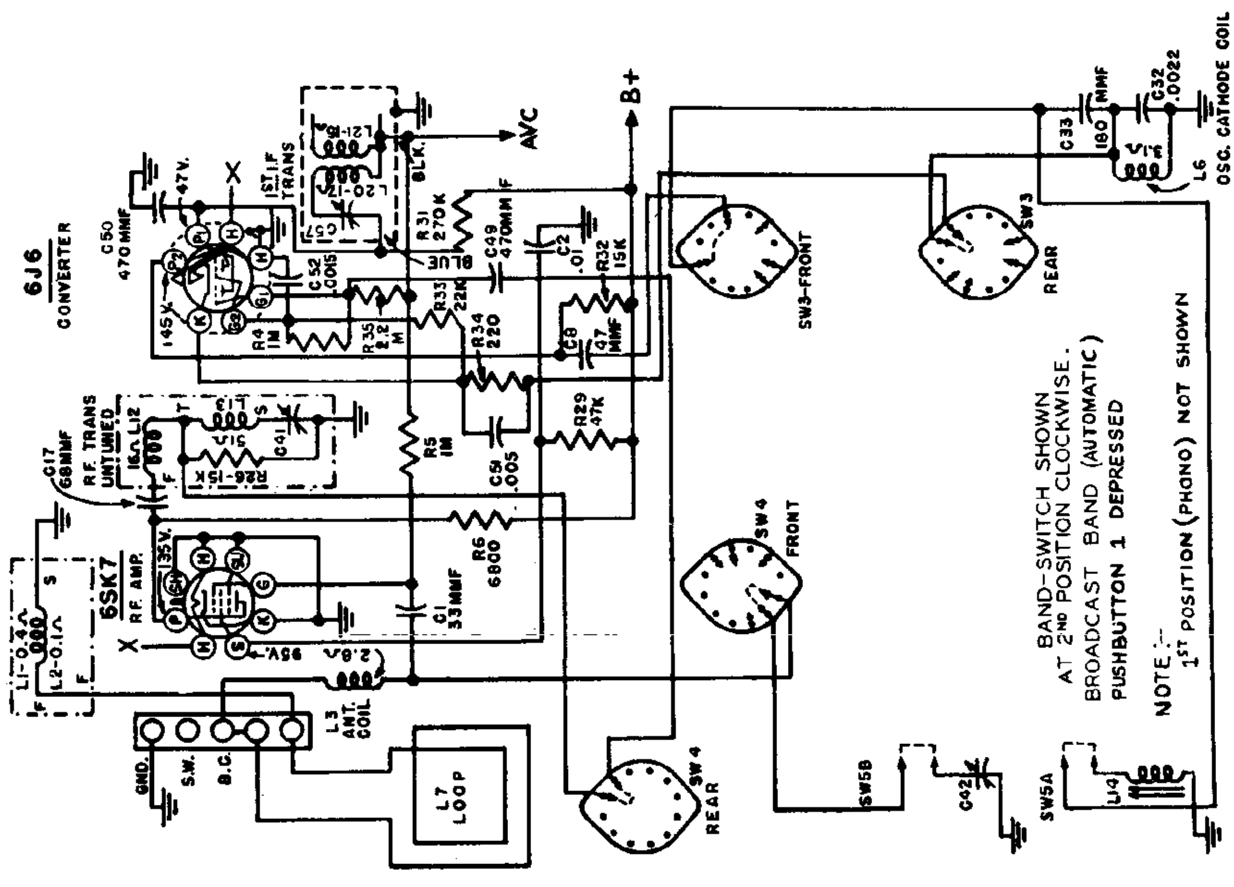
WESTINGHOUSE ELECTRIC CORP. MODELS H-104B, H-105B, H-107B, H-108B, H-110B, H-111B, H-137B, H-138B Chassis V-2102-3



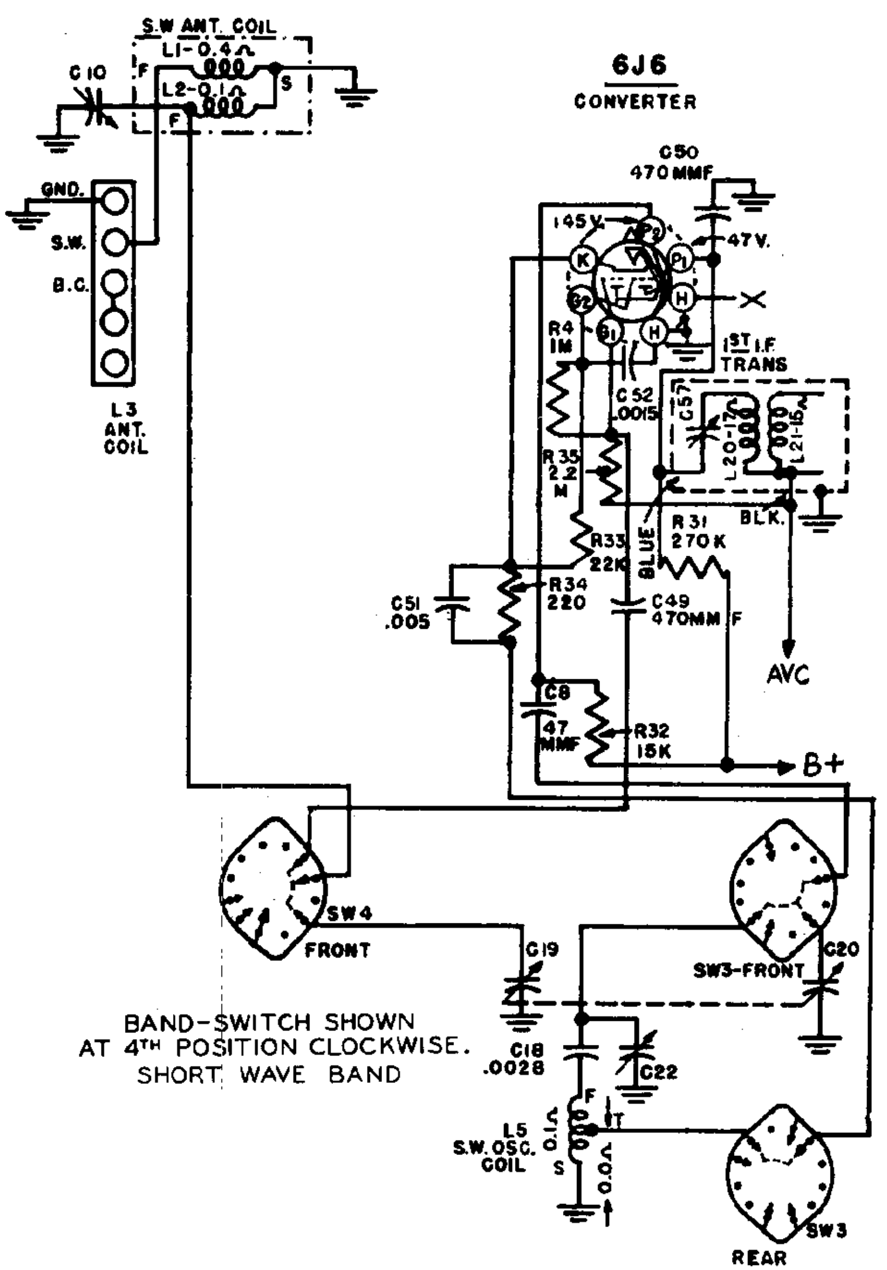
For alignment and additional material see Model H-10

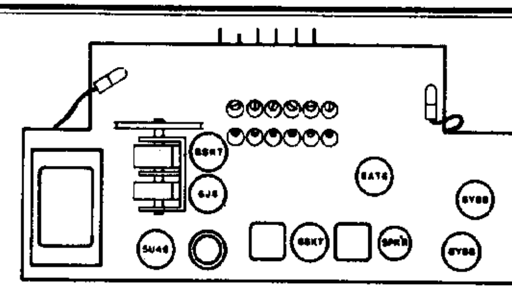
MODELS H-104B, H-105B, WESTINGHOUSE ELECTRIC CORP.
H-107B, H-108B, H-110B,
H-111B, H-137B, H-138B
Chassis V-2102-3





WESTINGHOUSE ELECTRIC CORP. MODELS H-104B, H-105B, H-107B, H-108B, H-110B, H-111B, H-137B, H-138B
Chassis V-2102-3





TUBE LAYOUT. V-2102-3 AND V-2102-5 CHASSIS

PARTS LIST ADDITIONS FOR MODELS H-104B, H-105B, H-107B AND H-108B H-110B, H-111B, H-137B AND H-138B

PART NO.	DESCRIPTION
RCP10W6202A	Capacitor, .002 mfd 600 v. (C48)
RCM20A471M	Capacitor, 470 mmf mica (C49, C50)
RCP10W6502A	Capacitor, .005 mfd 600 v. (C51)
RCM30B222M	Capacitor, .0022 mfd mica (C52)
RCM20A221M	Capacitor, 220 mmf mica (C53)
RCM30B102M	Capacitor, .001 mfd mica (C54)
RCM20C201J	Capacitor, 200 mmf mica (C55)
RCP10W4503A	Capacitor, .05 mfd 400 v. (C56)
RCP10W4203A	Capacitor, .02 mfd 400 v. (C61)
V-4317	Coil, B.C. and S.W. osc. (L24, L25)—V-2102-5 Chassis only
V-4316	Coil, osc. cathode (L26)—V-2102-5 Chassis only
RC10AE474K	Resistor, 470K ¼ w. (R27)
RC10AE106M	Resistor, 10M ¼ w. (R28)
RC20AE473K	Resistor, 47K ½ w. (R29, R30)
RC20AE274K	Resistor, 270K ½ w. (R31)
RC41AE153K	Resistor, 15K 2 w. (R32)
RC10AE223K	Resistor, 22K ¼ w. (R33)
RC10AE221K	Resistor, 220 ohms ¼ w. (R34, R40)
RC10AE225M	Resistor, 2.2M ¼ w. (R35)
RC10AE105M	Resistor, 1M ¼ w. (R36)
RC30AE183K	Resistor, 18K 1 w. (R37)
RC10AE394K	Resistor, 390K ¼ w. (R38)
RC30AE333K	Resistor, 33K 1 w. (R39)
RC10AE683K	Resistor, 68K ¼ w. (R41)
RC10AE680M	Resistor, 68 ohms ¼ w. (R42)
V-4169-2	Shield, 6J6 tube
V-4162-1	Socket Assy., 6AT6 tube (including adapter plate)
V-4162-3	Socket Assy., 6J6 tube (including adapter plate and shield base)
V-4180	Transformer, 1st I-F (L20, L21, C57, C58)—V-2102-3 Chassis only
V-4345	Transformer, 1st I-F (L22, L23, C59, C60)—V-2102-5 Chassis only

ADDITION TO V-3269-1 RECORD CHANGER PARTS LIST

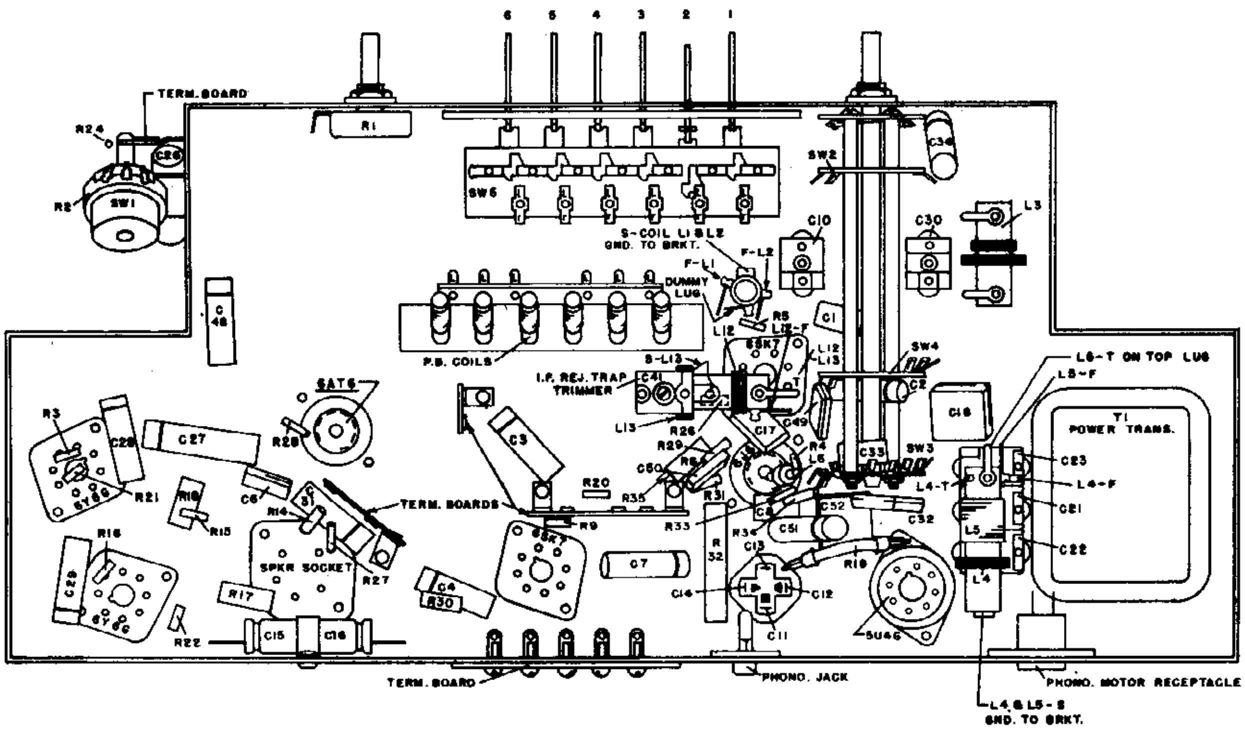
This item should be added to the V-3269-1 Record Changer parts list given in the "Models H-104, H-105, H-107 and H-108 Service Notes."

PART NO.	DESCRIPTION
V-4152	Cord, pickup (shielded)

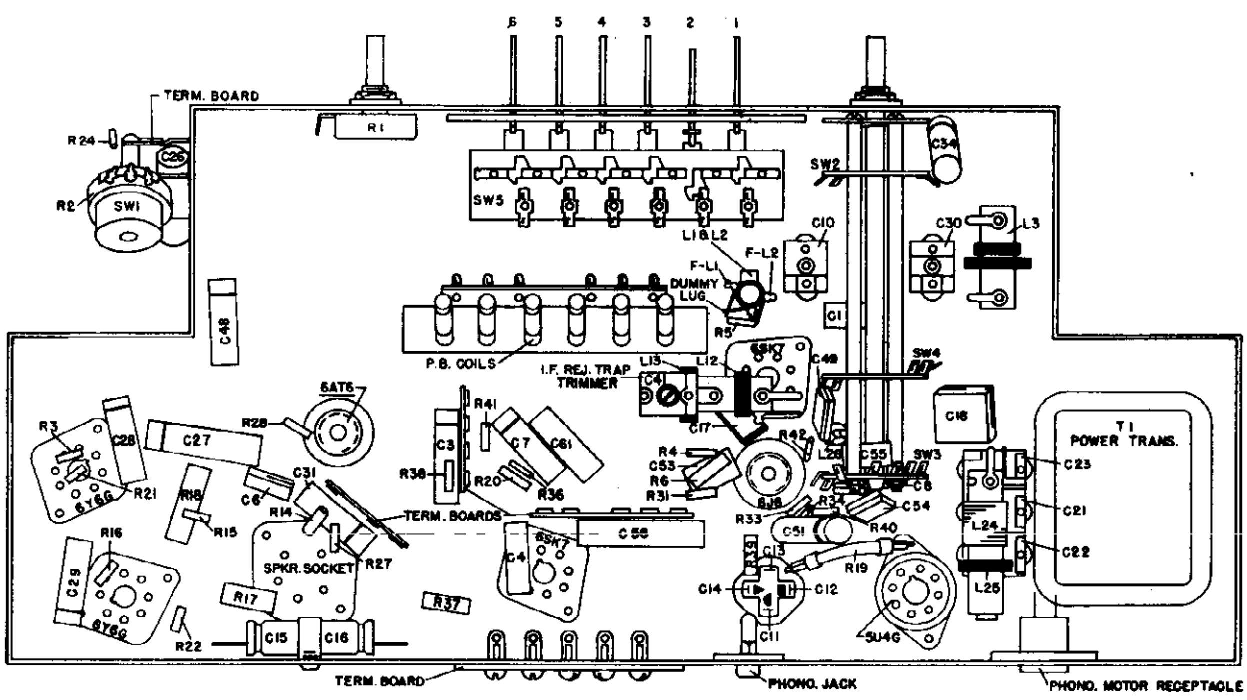
For additional parts list see Model H-104, page 15-4 of Rider's Volume XV

MODELS H-104B, H-105B, H-107B, H-108B, H-110B, H-111B, H-137B, H-138B
Chassis V-2102-3, V-2102-5

WESTINGHOUSE ELECTRIC CORP.

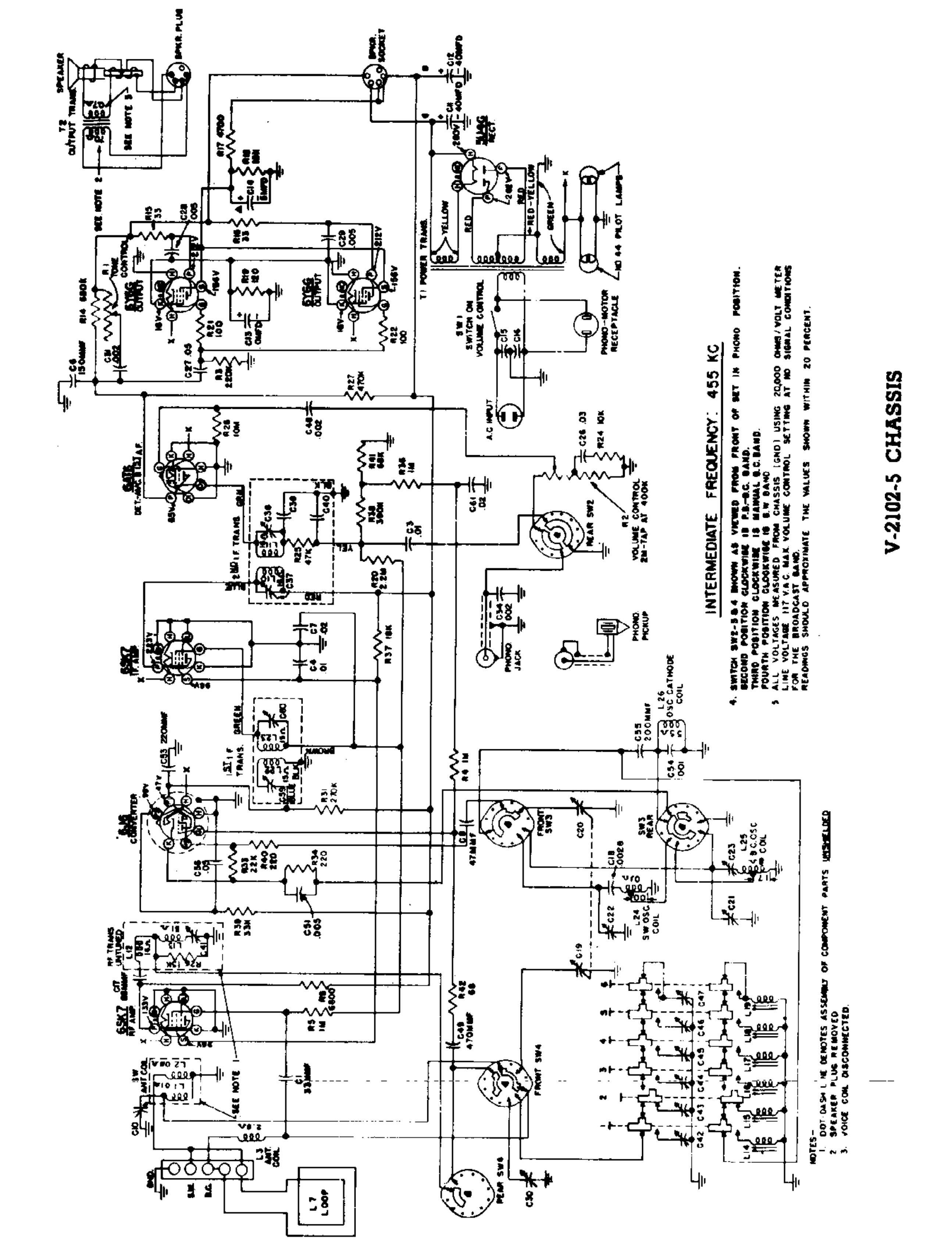


BOTTOM VIEW OF V-2102-3 CHASSIS



BOTTOM VIEW OF V-2102-5 CHASSIS

WESTINGHOUSE ELECTRIC CORP. MODELS H-104B, H-105
H-107B, H-108B, H-110
H-111B, H-137B, H-13
Chassis V-2102-5

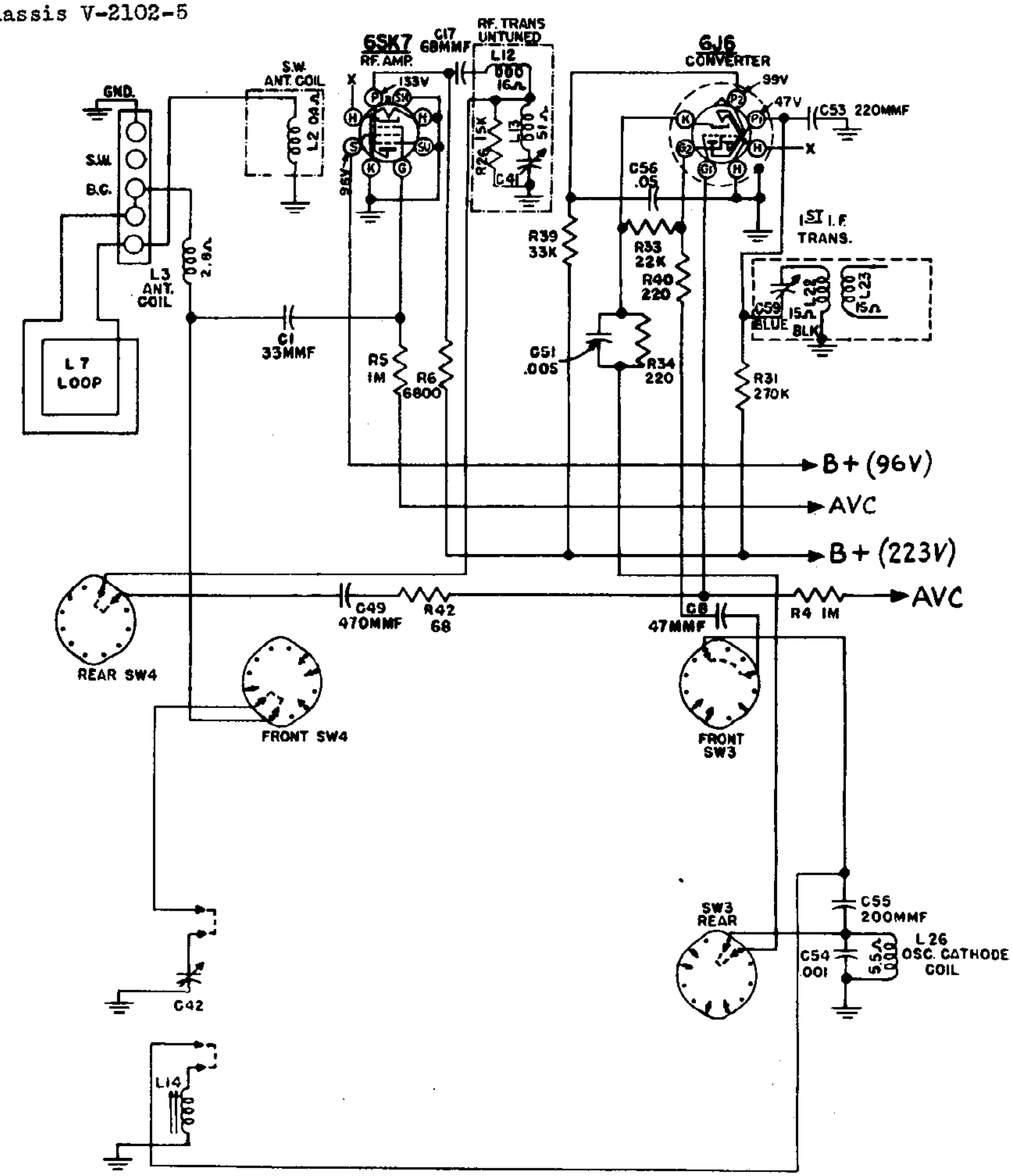


 For alignment and additional material see Model H-104, pp. 15

"clarified schematics"

MODELS H-104B, H-105B, H-107B, H-108B, H-110B, H-111B, H-137B, H-138B
Chassis V-2102-5

WESTINGHOUSE ELECTRIC CORP.

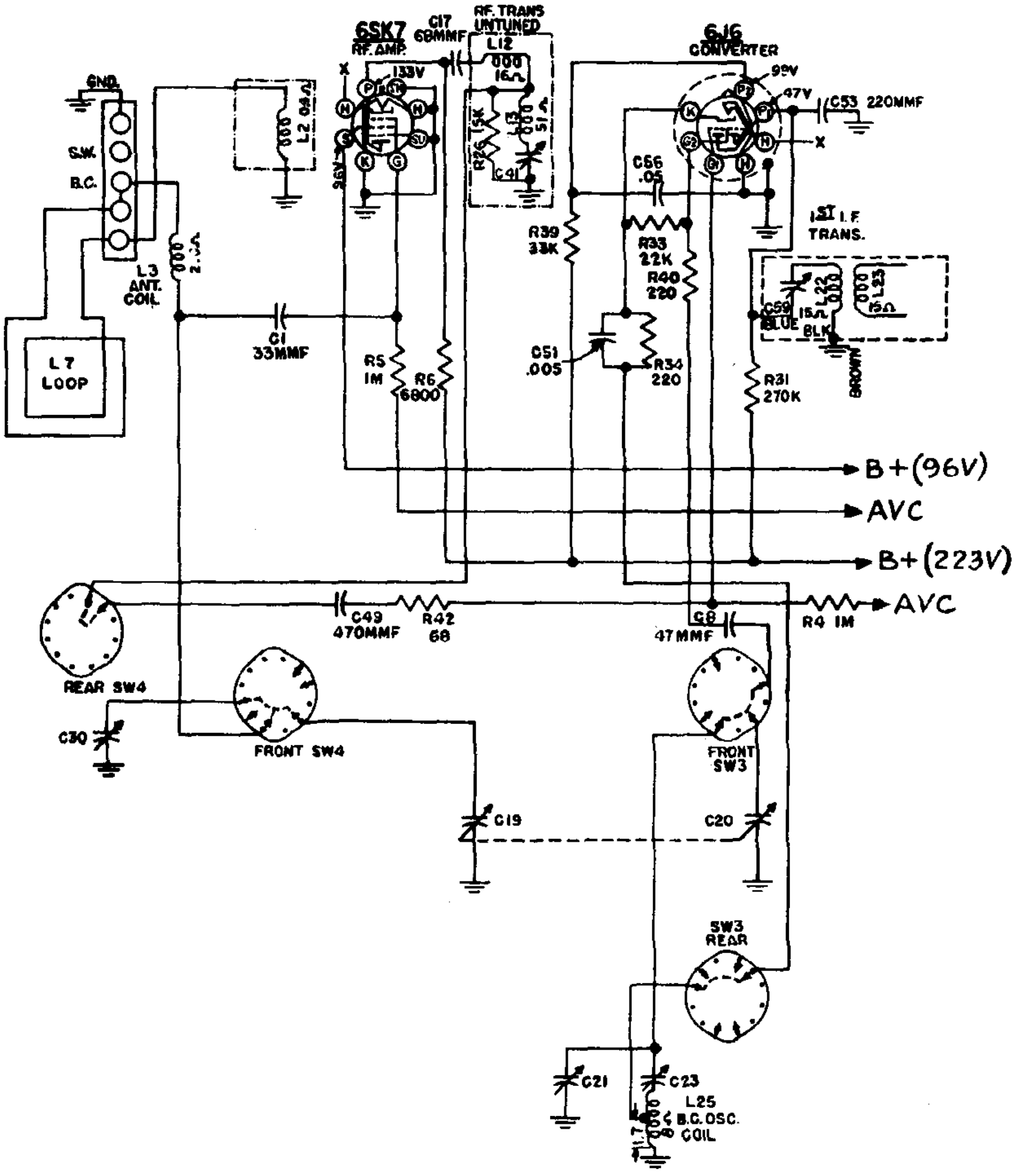


NOTE :
1ST POSITION (PHONO) NOT SHOWN.

BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE.
BROADCAST BAND (AUTOMATIC)
PUSHBUTTON 1 DEPRESSED

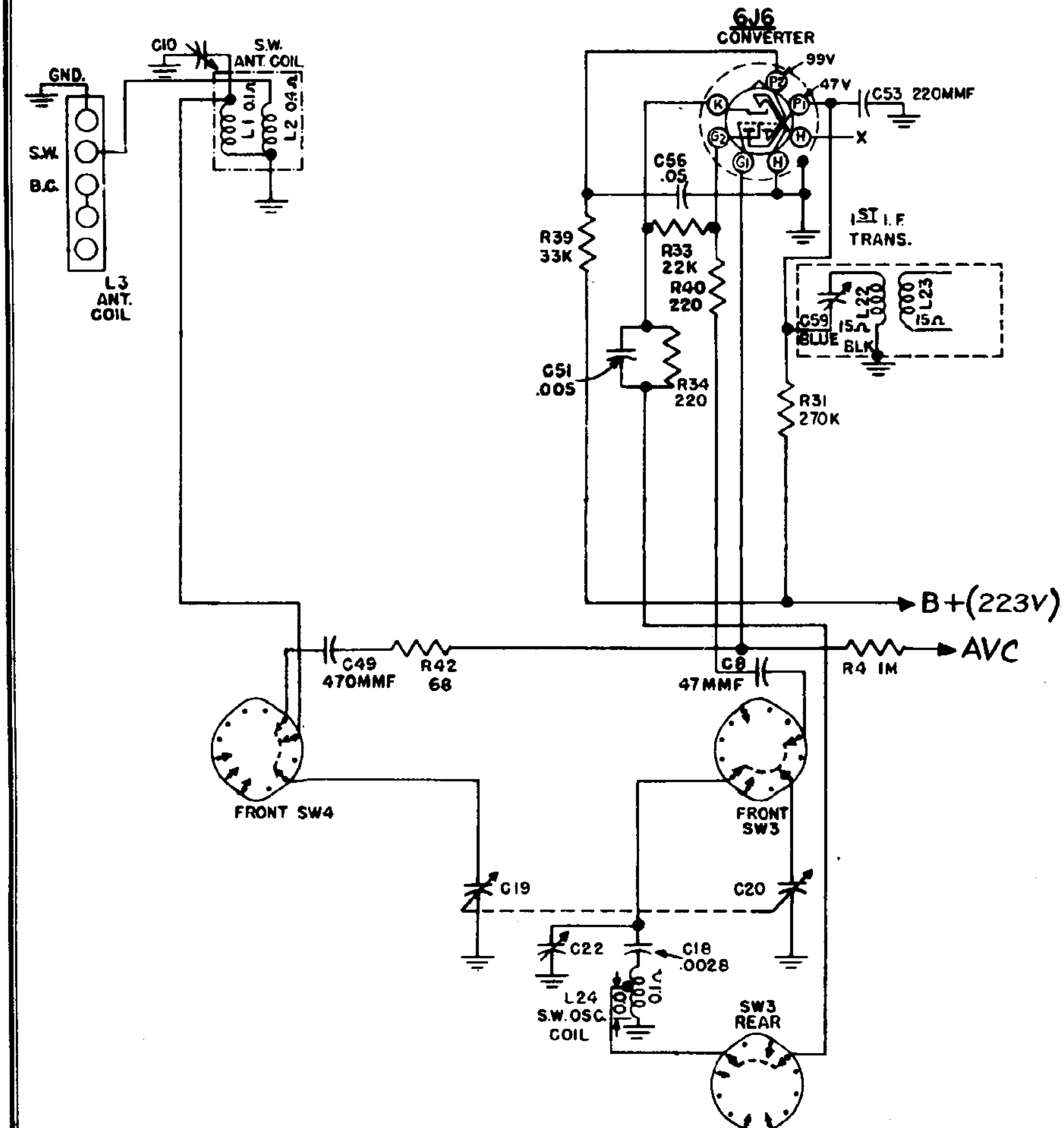
WESTINGHOUSE ELECTRIC CORP.

MODELS H-104B, H-105B
H-107B, H-108B, H-110
H-111B, H-137B, H-138
Chassis V-2102-5



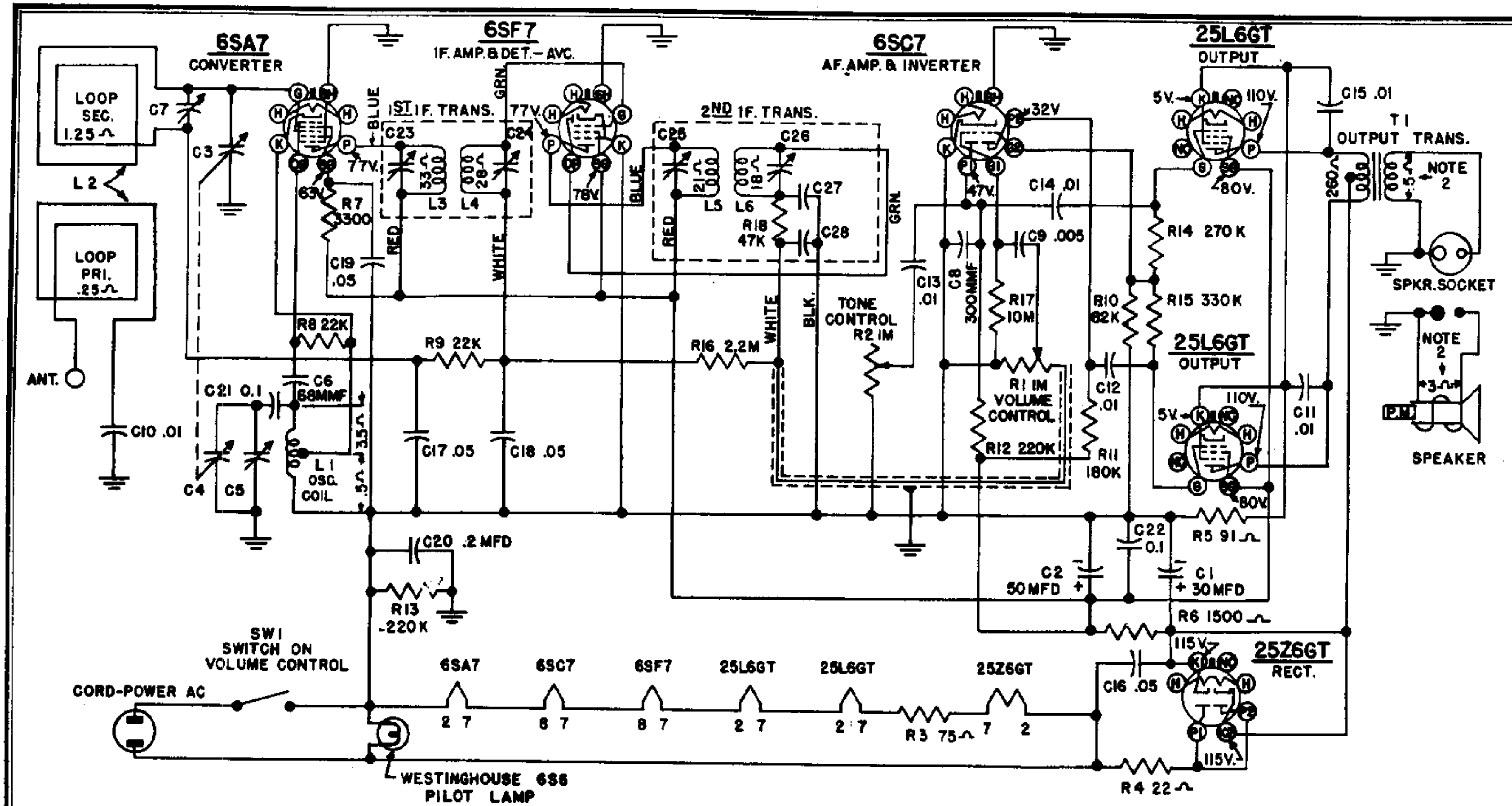
BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE. BROADCAST BAND (MANUAL)

MODELS H-104B, H-105B, WESTINGHOUSE ELECTRIC CORP.
H-107B, H-108B, H-110B,
H-111B, H-137B, H-138B
Chassis V-2102-5

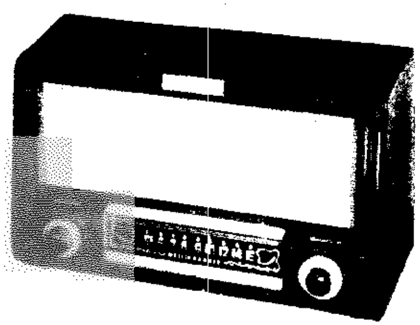


BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
SHORT WAVE BAND

WESTINGHOUSE ELECTRIC CORP. MODEL H-1



NOTE: 1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHMS PER VOLT METER - LINE VOLTAGE 117 VOLTS A-C. VOLTAGES SHOULD BE AS SHOWN ± 20 %.
2. SPEAKER PLUG REMOVED.



SPECIFICATIONS

FREQUENCY RANGE:
Standard Broadcast .... 540 to 1600 kc

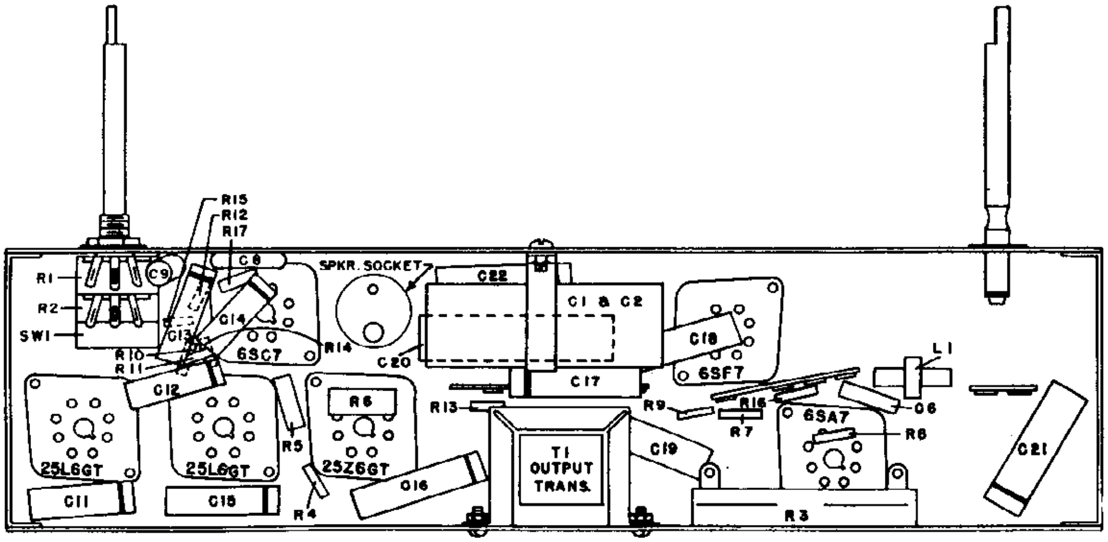
INTERMEDIATE FREQUENCY: .... 455 kc

POWER OUTPUT:
Undistorted .... 2.75 watts
Maximum .... 5 watts

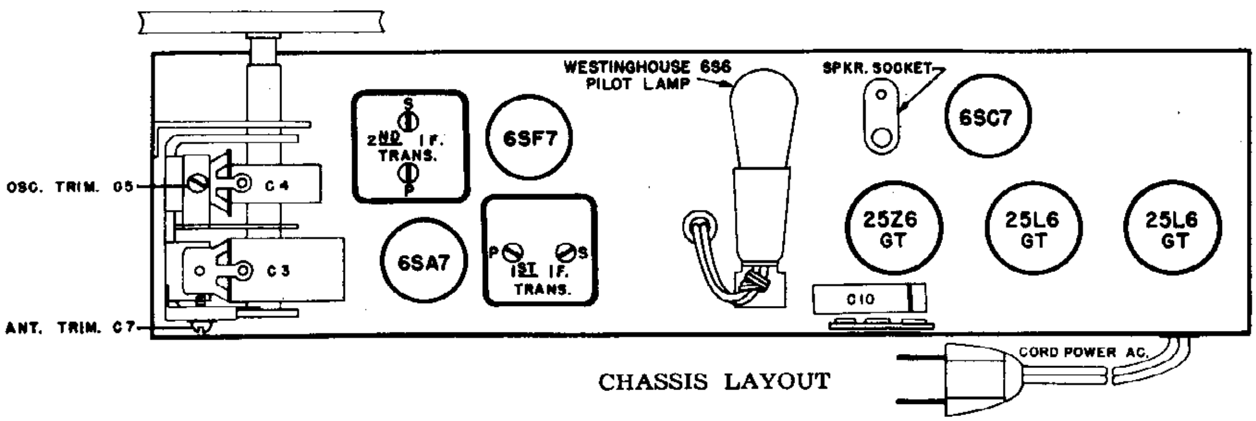
LOUDSPEAKER:
Size and Type .... 5"x 7" oval P. M.
Voice Coil Impedance .... 3.2 ohms

OPERATING VOLTAGE: .... 105 to 120 volts 50-60 cycles A-C or 105 to 120 volts D-C

POWER CONSUMPTION: .... [illegible]



BOTTOM VIEW OF CHASSIS



CHASSIS LAYOUT

ALIGNMENT

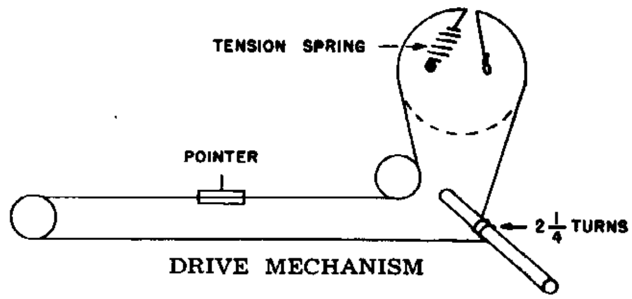
Before beginning alignment, make certain that the dial pointer is correctly positioned.

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	6SF7 control grid through 0.1 mfd capacitor	455 kc	1600 kc	Primary and secondary trimmers of 2nd I-F trans. for max. output
2	6SA7 control grid through 0.1 mfd capacitor	455 kc	1600 kc	Primary and secondary trimmers of 1st I-F trans. for max. output
3	Antenna terminal through 200 mmf capacitor	455 kc	1600 kc	"Peak" all I-F trimmers for max. output
4	Antenna terminal through 200 mmf capacitor	1615 kc	gang at minimum	Oscillator trimmer for max. output
5	Radiated signal (no actual connection)	1400 kc	1400 kc	Antenna trimmer for max. output

WESTINGHOUSE ELECTRIC CORP.

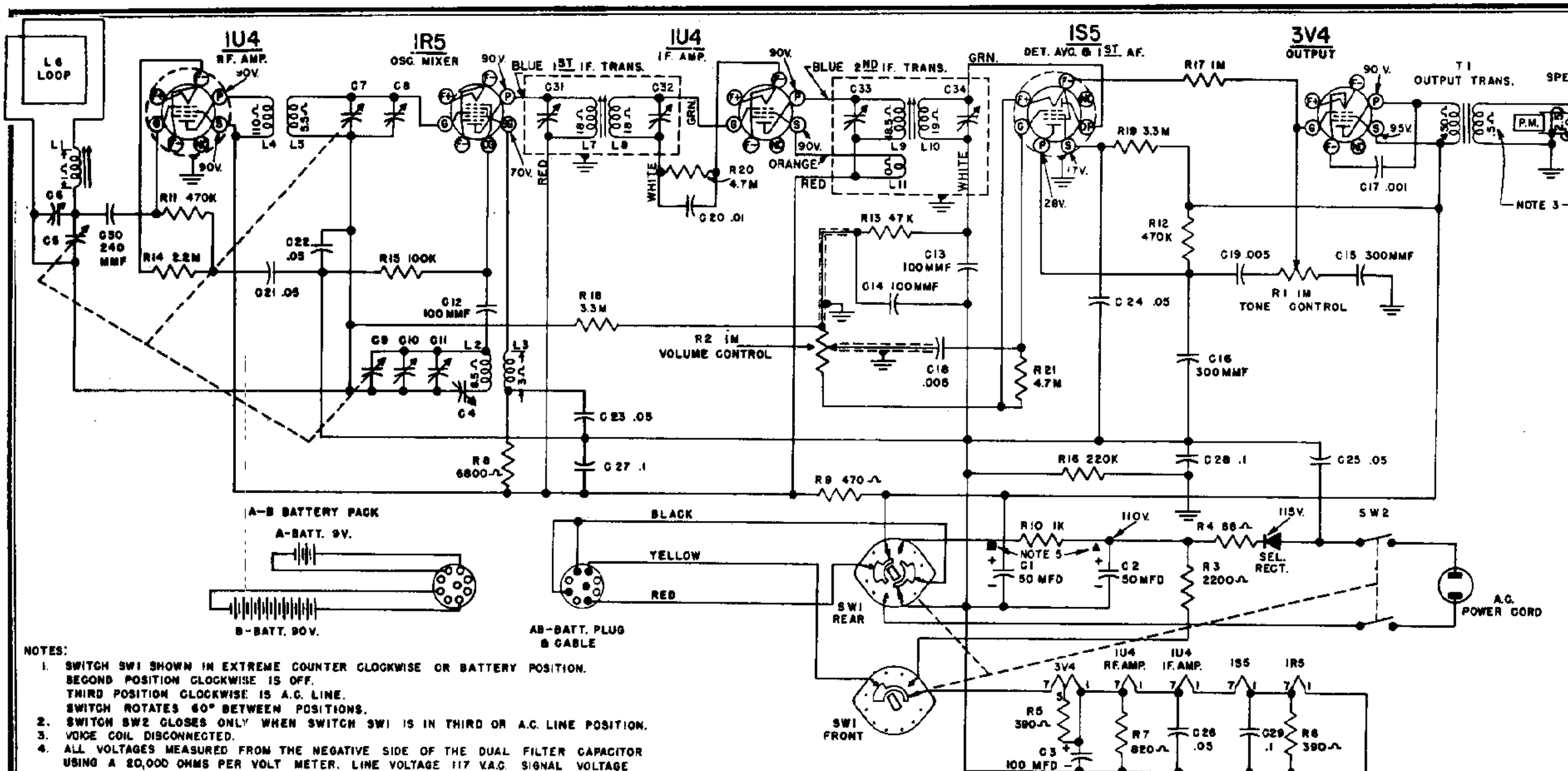


DRIVE MECHANISM

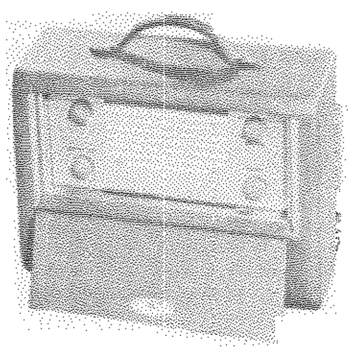
PARTS LIST

Part No.	Description
V-5019	Asbestos Sheet
V-5268	Background, dial
V-5021	Baffle and Grille Cloth Assy.
V-4997	Bracket, dial background
V-4991	Bracket, var. capacitor mtg.
V-5352	Bracket, volume control
V-1139-1	Cabinet, mahogany
V-3304	Capacitor, electrolytic 30 mfd 150 v. (C1) 50 mfd 150 v. (C2)
V-4993	Capacitor, var. 2-gang (C3, C4, C5)
RCM20A680M	Capacitor, 68 mmf mica (C6)
V-4992	Capacitor, trimmer (C7)
RCM20A301M	Capacitor, 300 mmf mica (C8)
RCP10W6502A	Capacitor, .005 mfd 400 v. (C9)
RCP10W4103A	Capacitor, .01 mfd 400 v. (C10, C11, C12, C13, C14, C15)
RCP10W4503A	Capacitor, .05 mfd 400 v. (C16, C17, C18, C19)
RCP10W4204K	Capacitor, .2 mfd 400 v. (C20)
RCP10W4104A	Capacitor, .1 mfd 400 v. (C21, C22)
V-4763	Clamp, dial
V-3382	Coil, oscillator (L1)
V-4982	Control, volume (R1), tone (R2) and switch (SW1)
V-4349-1	Cord, A-C power
V-4304S-10	Cord, dial drive (incl. clip)
V-5024	Cover, back
V-4983	Dial Scale
V-4072-1	Fastener, back cover clip
V-4893	Foot, rubber
V-3345S-5	Grommet, var. capacitor mtg.
V-4362-3	Knob, ON-OFF and tone
V-5039-1	Knob, tuning
V-5028-1	Knob, volume
No. 6S6	Lamp, pilot
V-5031	Loop, antenna (L2)
V-5043	Nameplate, Westinghouse
V-5022	Nameplate, Stations
V-5023	Nameplate, Volume
V-5033	Plate, front glass
V-4986	Pointer, dial
V-3166S	Pulley, 7/16" dia.
V-4987	Rail, pointer (incl. pulley studs)
V-4994	Resistor, ballast, 75 ohms (R3)
RC20AE220M	Resistor, 22 ohms ½ w. (R4)
RC30AE910J	Resistor, 91 ohms 1 w. (R5)
RC40AE152M	Resistor, 1500 ohms 2 w. (R6)
RC10AE332M	Resistor, 3300 ohms ¼ w. (R7)
RC10AE223M	Resistor, 22K ¼ w. (R8, R9)
RC10AE823K	Resistor, 82K ¼ w. (R10)
RC20AE184K	Resistor, 180K ½ w. (R11)
RC20AE224K	Resistor, 220K ½ w. (R12)
RC10AE224M	Resistor, 220K ¼ w. (R13)
RC10AE274K	Resistor, 270K ¼ w. (R14)
RC10AE334K	Resistor, 330K ¼ w. (R15)
RC10AE225M	Resistor, 2.2M ¼ w. (R16)
RC10AE106M	Resistor, 10M ¼ w. (R17)
V-4988	Shaft, tuning
V-3344S-1	Sleeve, spacer, var. Capacitor mtg.
V-3246S	Socket, octal
V-3163S	Socket, octal (pin No. 1 GND)
V-4989	Socket, pilot lamp
V-3299S	Socket, speaker
V-5034	Speaker, 5"x 7" P. M.
V-3248S	Spring, dial drive
V-3909	Strip, plastic, loop mtg.
V-3228S-1	Terminal Board, 2 lugs
V-4776	Terminal Board, 3 lugs
V-5041	Terminal Board, 4 lugs
V-3375S	Terminal Board, 5 lugs
V-3328	Transformer, 1st I-F (L3, L4, C23, C24)
V-3329	Transformer, 2nd I-F (L5, L6, C25, C26, C27, C28, R18)
V-3297	Transformer, output (T1)
V-3752S	Washer, felt (for knobs)
V-3267S-4	Washer, flat (chassis mtg.)

WESTINGHOUSE ELECTRIC CORP.



NOTES:
1. SWITCH SW1 SHOWN IN EXTREME COUNTER CLOCKWISE OR BATTERY POSITION. SECOND POSITION CLOCKWISE IS OFF. THIRD POSITION CLOCKWISE IS A.C. LINE. SWITCH ROTATES 60° BETWEEN POSITIONS.
2. SWITCH SW2 CLOSES ONLY WHEN SWITCH SW1 IS IN THIRD OR A.C. LINE POSITION.
3. VOICE COIL DISCONNECTED.
4. ALL VOLTAGES MEASURED FROM THE NEGATIVE SIDE OF THE DUAL FILTER CAPACITOR USING A 20,000 OHMS PER VOLT METER. LINE VOLTAGE 117 V.A.C. SIGNAL VOLTAGE ZERO. READINGS SHOULD APPROXIMATE THE VALUES SHOWN ± 20 PERCENT.
5. IN LATER PRODUCTION, THE POSITIONS OF C1 & C2 IN THE CIRCUIT WERE REVERSED.



SPECIFICATIONS

FREQUENCY RANGE:
Standard Broadcast ....550 to 1600 kc

INTERMEDIATE FREQUENCY ....455 kc

TUBE COMPLEMENT:
2 1U4 ....R-F Amp. and I-F Amp.
1 1R5 ....Oscillator-mixer
1 1S5 ....Det., AVC and 1st A-F Amp.
1 3V4 ....Output Amp.

POWER OUTPUT:
Undistorted ....200 milliwatts
Maximum ....350 milliwatts

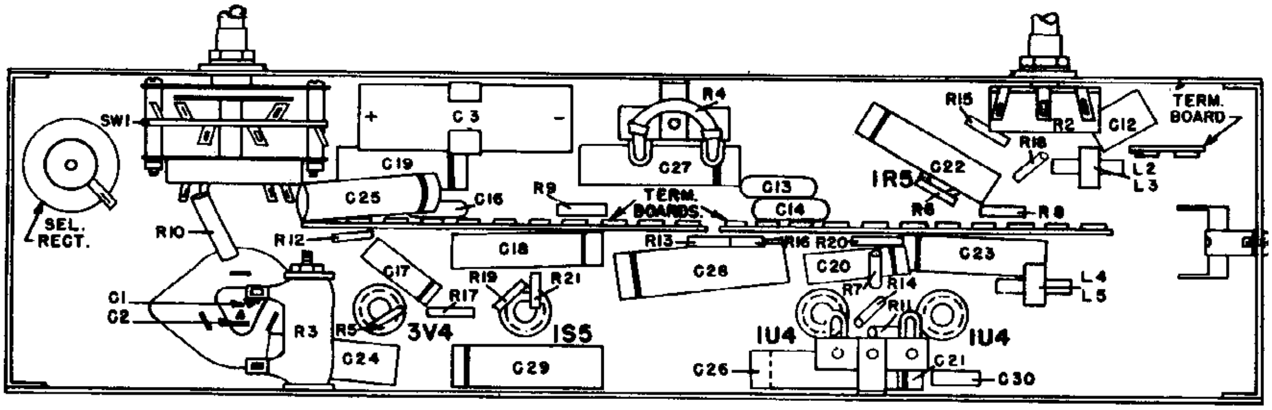
LOUDSPEAKER:
Size and Type ....4"x 6" P. M.
Voice Coil Impedance ....3.2 ohms

POWER SUPPLY:
Battery Operation ....1 Westinghouse V-3920 "AB" Battery (9 v. "A" and 90 v. "B").
Line Operation ....105 to 120 volts, 50-60 cycles A-C, or D-C.

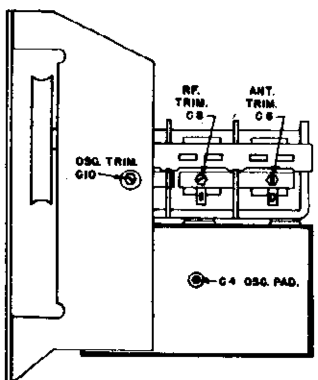
CURRENT CONSUMPTION (Battery Operation):
"A" Section of "AB" Battery ....05 amp.
"B" Section of "AB" Battery ....012 amp.

POWER CONSUMPTION:
(Line Operation) ....12 watts

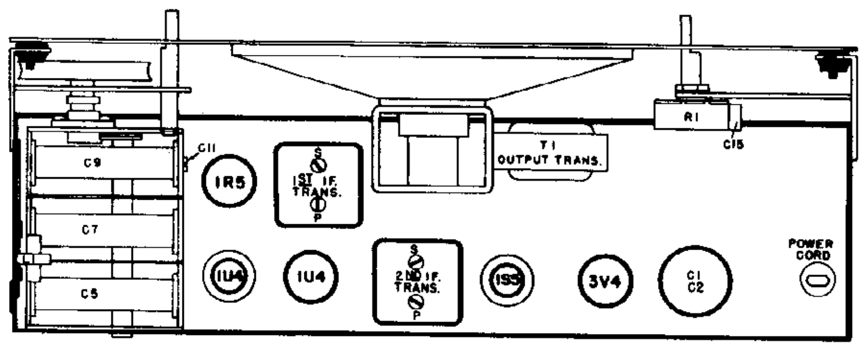
WESTINGHOUSE ELECTRIC CORP.



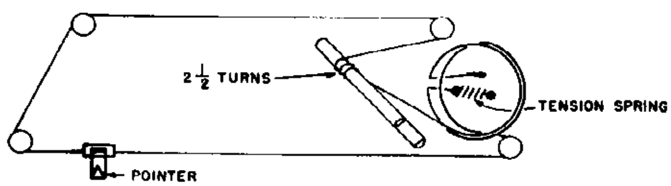
BOTTOM VIEW OF CHASSIS



SIDE VIEW



CHASSIS LAYOUT



DIAL DRIVE

ALIGNMENT

Before beginning alignment, make certain that the dial pointer is properly orientated with respect to the dial scale.

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid A. V. C. action.

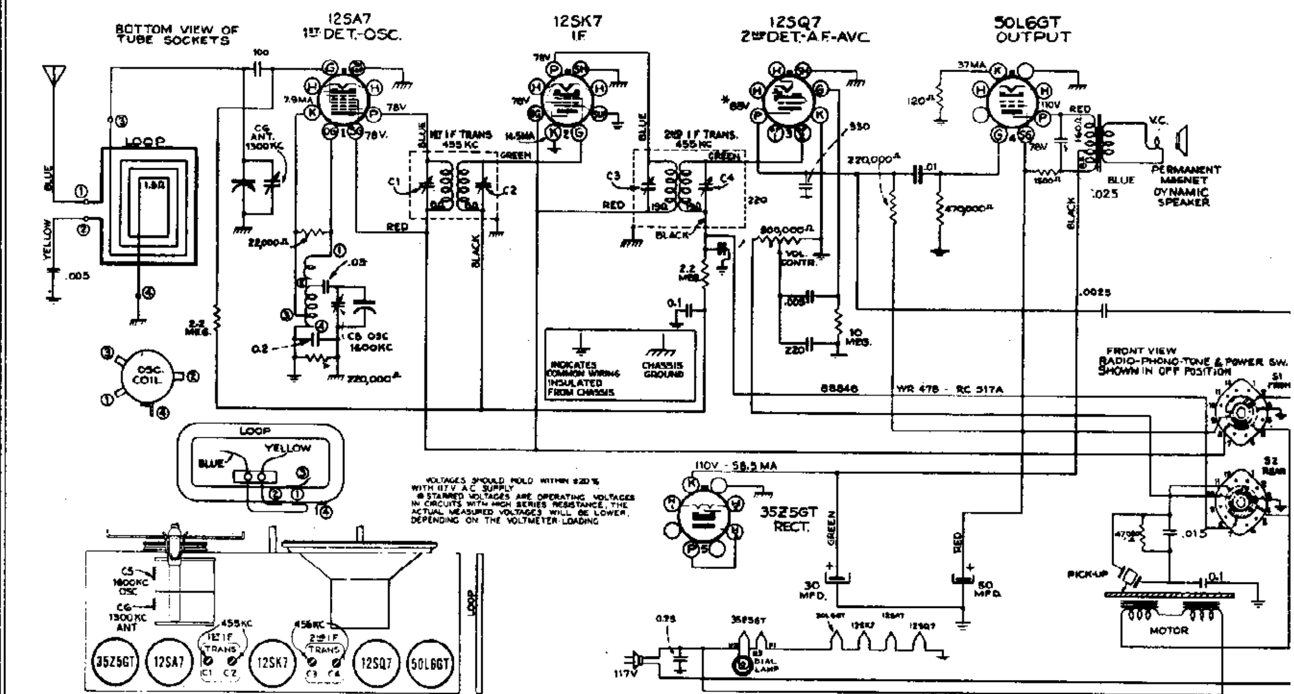
Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust for Maximum Output
1	1U4, I-F Amp., control grid through a 0.1 mfd capacitor	455 kc	550 kc	Primary and secondary trimmers of 2nd I-F trans.
2	1R5, Converter, control grid through a 0.1 mfd capacitor	455 kc	550 kc	Primary and secondary trimmers of 1st I-F trans.
3	Stator of R-F section (C7) of tuning capacitor through a 0.1 mfd capacitor	455 kc	550 kc	"Peak" all I-F trimmers
4	Same as above	600 kc	600 kc	Oscillator padder (C4)
5	Same as above	1600 kc	1600 kc	Oscillator trimmer (C10)
6	Repeat steps 4 and 5			
7	Radiated signal (no actual connection)	1400 kc	1400 kc	R-F trimmer (C8) and ant. trimmer (C6)

WESTINGHOUSE ELECTRIC CORP.

PARTS LIST

Part No.	Description
V-4865	Background, pointer
V-4869	Baffle and Grille Cloth Assembly
V-4169-1	Base, shield, miniature tube
V-3920	Battery Pack, "A-B"
V-4790-1	Bracket Assy., R.H. (control)
V-4790-2	Bracket Assy., L.H. (control)
V-4818	Bracket, chassis mounting
V-4789	Bracket, rail pointer
V-4835	Bracket, shield mounting
V-4893	Bumper, door
V-4836-2	Button, hole plug
V-4242	Button, back cover
V-1134	Cabinet
V-3874	Cable, battery
V-4791	Capacitor, dry electrolytic, dual 50 mfd 150 v. (C1, C2)
V-3866	Capacitor, electrolytic cartridge, 100 mfd 25 v. (C3)
V-4792	Capacitor, oscillator padder (C4)
V-4793	Capacitor, variable 3 gang (C5, C6, C7, C8, C9, C10, C11)
RCM20A101M	Capacitor, 100 mmfd mica (C12)
RCM20A101K	Capacitor, 100 mmfd mica (C13, C14)
RCM20A301M	Capacitor, 300 mmfd mica (C15, C16)
RCP10W6102A	Capacitor, .001 mfd 600 v. (C17)
RCP10W6502A	Capacitor, .005 mfd 600 v. (C18, C19)
RCP10W4103A	Capacitor, .01 mfd 400 v. (C20)
RCP10W4503A	Capacitor, .05 mfd 400 v. (C21, C22, C23, C24, C25, C26)
RCP10W4104A	Capacitor, 0.1 mfd 400 v. (C27, C28, C29)
RCM20A241K	Capacitor, 240 mmfd mica (C30)
V-4849	Catch, door, front cover
V-4202S	Clamp, power cord
V-4874	Clamp, spring (electrolytic capacitor mounting)
V-4794	Coil, antenna loading (L1)
V-4795	Coil, oscillator (L2, L3)
V-4813	Coil, R-F (L4, L5)
V-4796	Control, tone, 1.0 megohms (R1)
V-4797	Control, volume, 1.0 megohms (R2)
V-4304S-6	Cord, dial drive
V-4349-1	Cord, power A-C
V-4825	Cover Assembly, back
V-4826	Cover Assembly, front, with knob and catch
V-3371	Foot, rubber
V-4798	Grille, front
V-3766	Grommet, fibre
V-3345-5	Grommet, rubber
V-4828	Handle
V-4833	Hinge, back
V-3437	Insulator, electrolytic capacitor
V-4840	Knob, battery-off-line
V-4848	Knob, door catch, front
V-4839	Knob, volume, tuning, tone
V-4856	Latch, back cover
V-4831	Loop, antenna (L6)
V-4846	Molding, front cover
V-3894	Nameplate
V-3891	Nut, speed, back cover, 3/16"
V-4800S-1	Nut, speed, grille mounting
V-4876S-1	Nut, speed, speaker mounting
V-5045	Paper, fish, switch insulating
V-3873	Plug, battery cable
V-4801	Pointer
V-3166S	Pulley, 7/16 dia.
V-4115	Rectifier, selenium
V-4872	Resistor, ballast, 2200 ohms (R3)
V-4807	Resistor, 68 ohms fusible (R4)
RC10AE391K	Resistor, 390 ohms 1/4 w. (R5, R6)
RC20AE821K	Resistor, 820 ohms 1/2 w. (R7)
RC20AE682K	Resistor, 6800 ohms 1/2 w. (R8)
RC20AE471M	Resistor, 470 ohms 1/2 w. (R9)
RC30AE102M	Resistor, 1000 ohms 1 w. (R10)
RC10AE474M	Resistor, 470,000 ohms 1/4 w. (R11, R12)
RC10AE473M	Resistor, 47,000 ohms 1/4 w. (R13)
RC10AE225M	Resistor, 2.2 megohms 1/4 w. (R14)
RC10AE104K	Resistor, 100,000 ohms 1/4 w. (R15)
RC10AE224M	Resistor, 220,000 ohms 1/4 w. (R16)
RC20AE105K	Resistor, 1 megohm 1/2 w. (R17)
RC10AE335M	Resistor, 3.3 megohms 1/4 w. (R18, R19)
RC20AE475M	Resistor, 4.7 megohms 1/2 w. (R20, R21)
V-4802-4	Screw, speaker mounting
V-4805	Shaft, tuning
V-4169-2	Shield, miniature tube
V-4806	Shield, mounting plate (under chassis)
V-5521	Shield, selenium rectifier
V-3344-1	Sleeve, spacer, grille mounting and variable capacitor mounting
V-4292S-1	Socket, miniature tube
V-4809**	Speaker, 4x6" P.M.
V-4057	Spring, dial drive
V-3258S	Spring, knob
V-3909	Strip, plastic, loop mounting
V-3892-2	Stud, back cover
V-4829	Stud, handle mounting
V-4803	Switch, battery-off-line (SW1, SW2)
V-3351	Terminal Board, 2 lugs
V-3228S-2	Terminal Board, 2 lugs, 1 lug grounded
V-3487	Terminal Board, 11 lugs
V-4810	Terminal Strip, 2 lugs, R.H. control bracket assembly
V-4811	Transformer, 1st I-F (L7, L8, C31, C32)
V-4812	Transformer, 2nd I-F (L9, L10, L11, C33, C34)
V-3752S	Washer, felt, knob mounting
V-4853	Washer, felt, upper front cover
V-3267S-4	Washer, flat, back cover latch mtg.
V-4896	Washer, flat, foot mounting
V-3867	Washer, phenolic, ballast mounting

WESTINGHOUSE ELECTRIC CORP. MODEL WR-4



Alignment Procedure

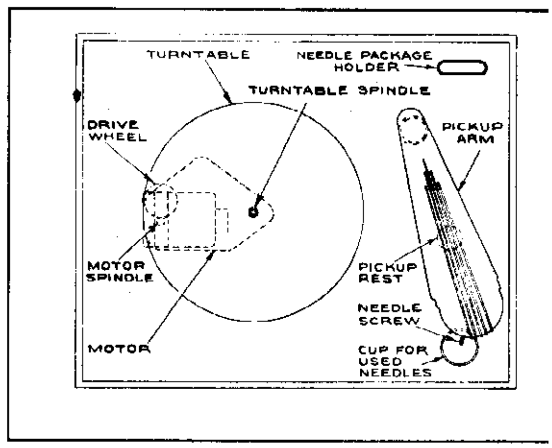
Power Supply.—Although this model employs an ac-dc chassis, it is not suitable for use on d.c., as this would damage the motor.

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

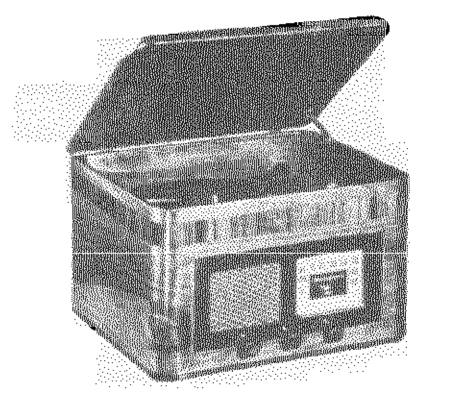
Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it should be connected to the blue antenna lead on the rear of the chassis.

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 I-F grid in series with 0.1 mfd.	455 kc	Quiet Point 1,500 kc end of dial	C3, C4 2nd I-F transformer
2	12SA7—1st. det. grid in series with 0.1 mfd.	455 kc	Quiet Point 1,500 kc end of dial	C1, C2 1st I-F transformer
3	Antenna Lead (blue) in series with 100 mmfd.	1,560 kc	signal frequency	C5 (osc.)
4	Antenna Lead (blue) in series with 100 mmfd.	1,300 kc	signal frequency	C6 (ant.)
5	Repeat steps 3 and 4.			



Phonograph

Controls



The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the top and bottom motor spindle bearings, to the turntable spindle and to the turntable drive wheel bearing.

CAUTION: Keep oil away from drive bushing on top of motor spindle and from rubber driving tire on turntable drive wheel.

Pre-setting Dial.—With gang condenser in full me the pointer should be horizontal.

MODEL WR-478 WESTINGHOUSE ELECTRIC CORP.

Electrical and Mechanical Specifications

Frequency Range .... 540-1,650 kc

Intermediate Frequency .... 455 kc

Tube Complement

(1) RCA-12SA7 .... 1st Detector-Oscillator
(2) RCA-12SK7 .... I-F Amplifier
(3) RCA-12SQ7 .... 2nd Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT .... Power Output
(5) RCA-35Z5GT .... Half-Wave Rectifier
Dial Lamp (1) .... Mazda 51, 7.5 volts, 0.2 amp.

Power Output (125 volt, 60 cycle supply)	Radio	Phonograph
Undistorted	0.9 watts	1.5 watts
Maximum	1.2 watts	2.2 watts

Power Supply Ratings

A-C Rating .... 105-125 volts, 60 cycles, 55 watts

Loudspeaker (RL-81-A4)

Type .... 5-inch Permanent Magnet Dynamic
Voice-Coil Impedance .... 4 ohms at 400 cycles

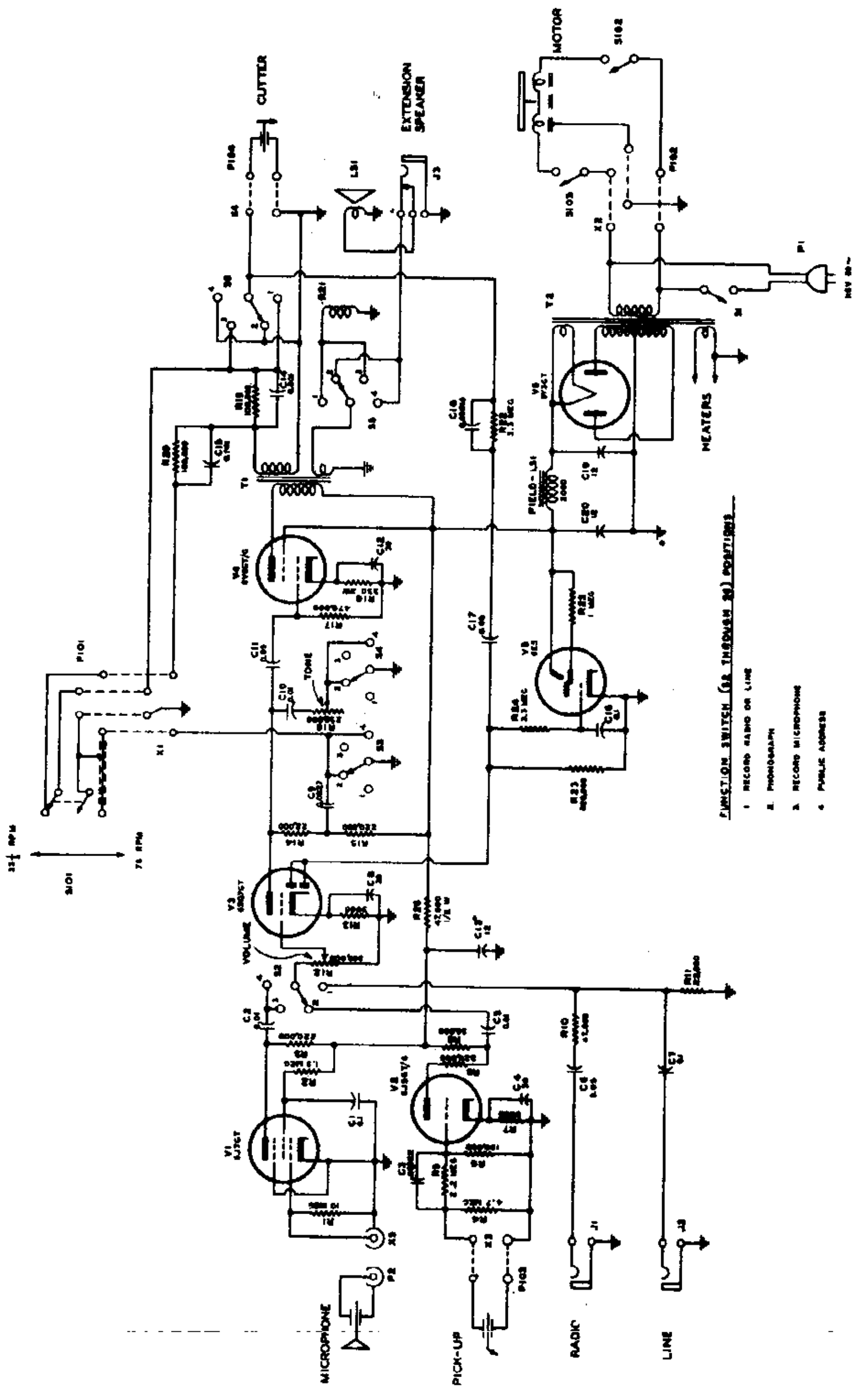
Phonograph .... Synchronous (self-starting)
Records .... 10-inch and 12-inch, 78 r.p.m.
Pickup .... Crystal, 100,000 ohms at 1,000 c.p.s.
Average Output of Pickup .... 1½ volts at 1,000 c.p.s. across ¼ meg. load
Cabinet Dimensions (inches) .... Height 10¾, Width 16¾, Depth 13¾
Weight (net) .... 18 pounds
Tuning Drive Ratio .... 9—1

REPLACEMENT PARTS

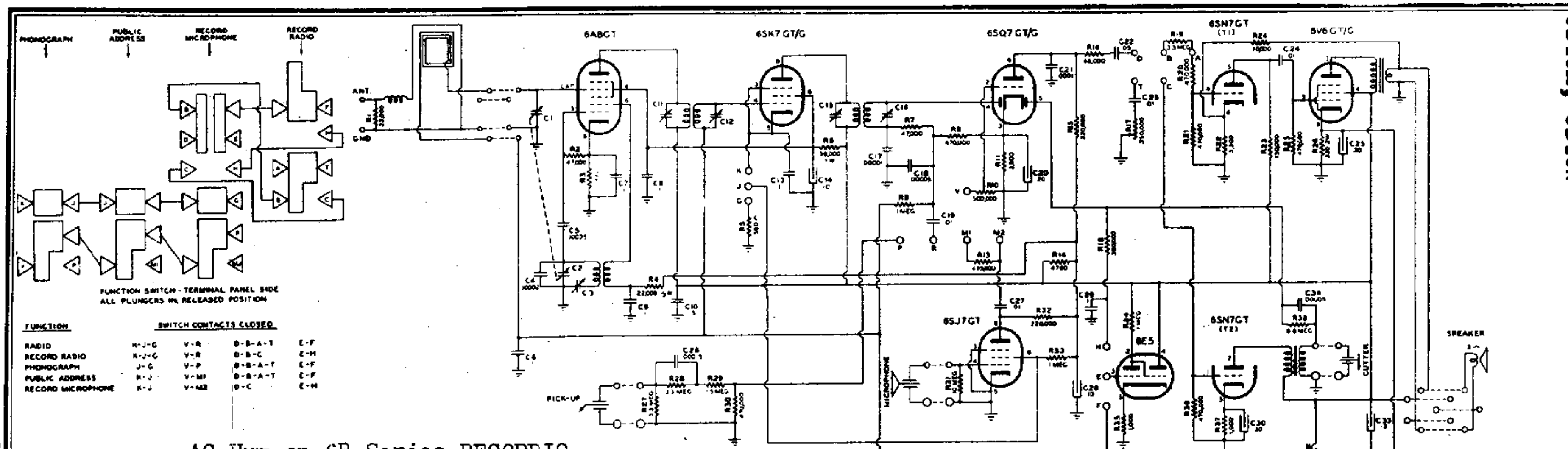
PART No.	DESCRIPTION
	PICKUP AND ARM ASSEMBLIES
33591	Arm—Pickup arm only—less cartridge, base and cable
34481	Arm—Pickup pivot arm and shaft
34482	Base—Pickup mounting base
34758	Bushing—Rubber bushing and metal bushing for pickup pivot arm shaft
33122	Crystal—Pickup crystal cartridge and needle screw
34311	Ring—Retaining ring for pivot shaft
33529	Screw—Needle screw
	MOTOR ASSEMBLIES
36402	Arm—Idler arm and stud
20134	Ball—Steel ball
37215	Motor—105-125 volts, 50 cycle
36404	Motor—105-125 volts, 60 cycle motor
36403	Mounting—One set of motor mounting grommets, spacers, and washers
36406	Plate—Idler arm guide plate
36401	Plate—Motor plate complete with bearing and ball
30340	Retainer—Motor fan retainer
30585	Spring—Idler arm tension spring
36399	Turntable—Turntable and bushing complete with spindle
33726	Washer—"C" washer for idler wheel
36405	Washer—Flat washer for idler wheel
36274	Wheel—Idler wheel and bearing
	SPEAKER ASSEMBLIES (RL-81-A-4)
32907	Cap—Dust cap
36295	Cone—Cone complete with voice coil
	MISCELLANEOUS ASSEMBLIES
36438	Crystal—Dial scale crystal
4109	Cup—Used needle cup
36612	Decalcomania—Control panel decal
35447	Decalcomania—Trade mark decal
36809	Hinge—Cabinet lid hinge
36246	Holder—Needle book holder
34340	Knob—Radio-Phono-Power switch knob
36202	Knob—Tuning or volume control knob
11765	Lamp—Dial lamp, Mazda 51
36305	Mounting—One set of mounting hardware for motor
36303	Mounting—One set of mounting hardware for pickup arm
30870	Plug—2-prong male plug for motor
32610	Rest—Rubber pickup rest
14270	Spring—Retaining spring for knobs
36810	Support—Cabinet lid support

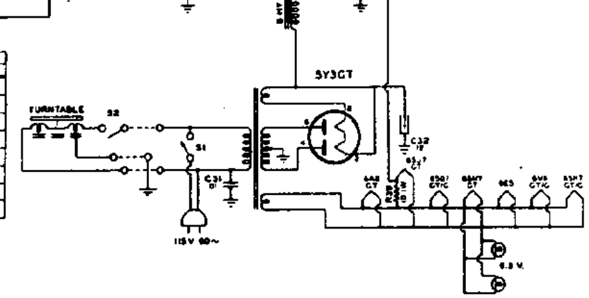
PART No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-517-A)
35332	Can—Shield can for I-F transformer, Part No. 36432
35097	Can—Shield can for I-F transformer, Part No. 35088
12720	Capacitor—100 mmfd., moulded mica
12694	Capacitor—220 mmfd., moulded
12952	Capacitor—330 mmfd., moulded mica
34459	Capacitor—.0025 mfd., 1,400 volts—tubular
33584	Capacitor—.005 mfd., 1,200 volts—tubular
4937	Capacitor—.01 mfd., 1,000 volts—tubular
11315	Capacitor—.015 mfd., 400 volts—tubular
30938	Capacitor—.025 mfd., 400 volts—tubular
32787	Capacitor—.05 mfd., 400 volts—tubular
4839	Capacitor—0.1 mfd., 400 volts—tubular
34505	Capacitor—0.2 mfd., 300 volts—tubular
12484	Capacitor—0.25 mfd., 350 volts—tubular
35673	Capacitor—Electrolytic comprising 1 section of 30 mfd., 150 volts, and 1 section of 50 mfd., 150 volts
35571	Coil—Oscillator coil
36285	Condenser—Variable tuning condenser
36435	Control—Volume control
32634	Cord—Drive cord
36439	Dial—Dial scale
36440	Indicator—Station selector indicator
36289	Loop—Antenna loop
36286	Plate—Dial plate and support—less dial
30868	Plug—2-contact female plug for motor cable
30189	Resistor—120 ohms, ½ watt
3153	Resistor—1,500 ohms, 1 watt
13998	Resistor—22,000 ohms, ¼ watt
12412	Resistor—47,000 ohms, ¼ watt
12264	Resistor—220,000 ohms, ¼ watt
12285	Resistor—470,000 ohms, ¼ watt
12679	Resistor—2.2 meg., ¼ watt
13601	Resistor—10 meg., ¼ watt
~~36437~~	~~Shaft—Tuning shaft~~
36292	Socket—Dial lamp socket
31251	Socket—Tube socket
31319	Socket—Tube socket—moulded for 12SA7 tube
30585	Spring—Drive cord spring
35098	Spring—Used to hold I-F transformers in shield cans
36436	Switch—Radio, phono., and power switch
35088	Transformer—First I-F transformer—less shield can
36432	Transformer—Second I-F transformer—less shield can
35666	Transformer—Output transformer
33726	Washer—"C" washer for tuning shaft

WILCOX-GAY CORP.



WILCOX-GAY CORP.





TYPICAL VOLTAGE CHART

TUBE	VOLTAGE TO GROUND PIN NO. 1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	7.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	80	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	33	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	0	0	240		13		

MEASURED WITH 1000 OHMS PER VOLT METER.
SCALES USED - 3-30-150-300

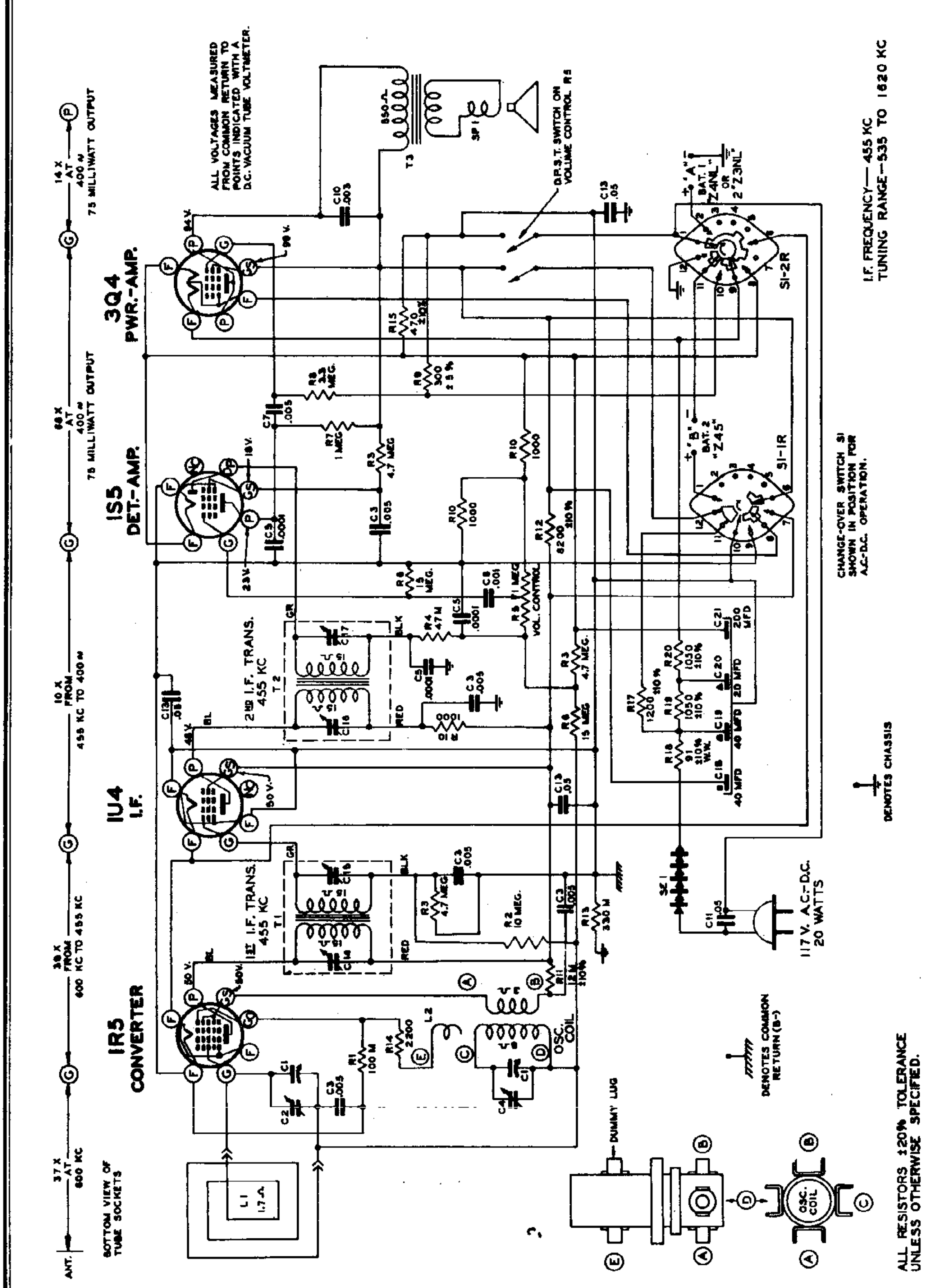
ALL PLUNGERS IN RELEASED POSITION.

AC Hum on 6B Series RECORDIO

Difficulty with 60 cycle AC hum on the 6B series RECORDIO with the function switch in any position has been traced to the following:

1. <u>DEFECTIVE GROUND CONNECTION OF THE COMMON TERMINAL OF THE FILTER BANK TO THE CAN OF THE FILTER CONDENSER</u>. This can be detected by turning the filter can by hand -- if the hum stops at a certain point then the connection is defective. Peening the can base at the connection point will sometimes help, if not, replace with a new filter condenser.
2. <u>GROUNDED DIAL LIGHT OR HEATER CIRCUIT ON THE CHASSIS USING THE 6SJ7 MICROPHONE AMPLIFIER TUBE</u>. This can be detected by checking the resistance between one side of the heater circuit to ground (chassis) with an ohmmeter. This value should be approximately 340 ohms. If a direct short is shown the short should be cleared. Check dial light sockets by removing them from the supporting brackets.

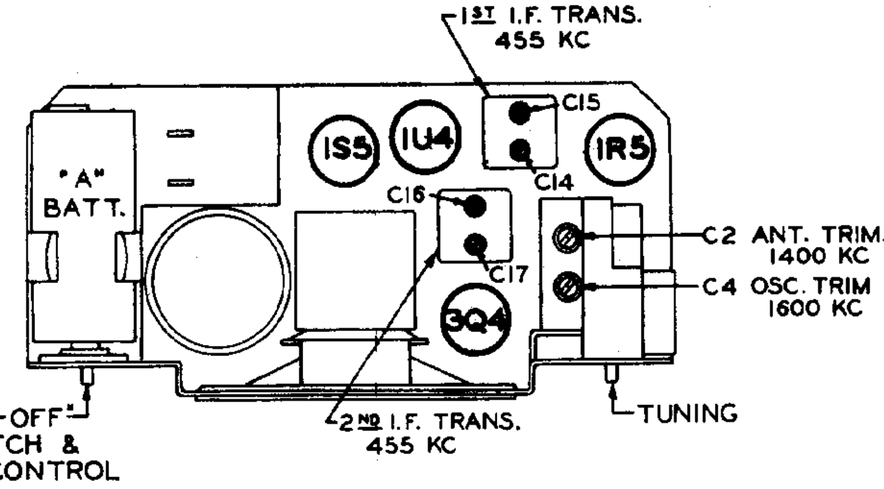
ZENITH RADIO CORP.



ZENITH RADIO CORP.

PARTS LIST

REFERENCE NO.	DIAGRAM NO.	DESCRIPTION
		CABINET ASSEMBLY
S-13786		Handle Strip Assembly
S-13793		Bottom Cover Assembly
S-13847		Wavemagnet & Cover Assembly
12-1379		Handle Support Bracket (R.H.)
12-1380		Handle Support Bracket (L.H.)
43-149		Handle End Piece
46-683		Front Cover Latch
46-684		Tuning Control Knob
46-685		Volume Control Knob
57-1314		Cabinet Front Plate
57-1315		Chassis Bottom Plate
59-290		Dial Pointer
80-567		Latch Spring
83-1416		Decorative Strip
83-1417		Handle Strip - Rubber
93-870		Fibre Shoulder Washer
110-127		Grille Cloth
199-79		Flexible Handle Sleeve
		CONDENSERS
22-1457	C1	2 Gang Variable
22-1706	C3	.005 MFD . . . 450 V
22-1669	C5	.0001 MFD . . . 500 V
22-1676 OR 22-1343	C6	.001 MFD . . . 500 V OR .001 MFD . . . 300 V
22-1175	C7	.005 MFD . . . 600 V
22-326	C10	.003 MFD . . . 400 V
22-1660	C11	.05 MFD . . . 400 V
22-1655	C13	.05 MFD . . . 200 V
ON T1	C14	1st I. F. Trans. Pri. Trim
ON T1	C15	1st I. F. Trans. Sec. Trim
ON T2	C16	2nd I. F. Trans. Pri. Trim
ON T2	C17	2nd I. F. Trans. Sec. Trim
22-1443	C18	40 MFD. Electro. . . . 150 V
	C19	40 MFD. Electro. . . . 150 V
	C20	20 MFD. Electro. . . . 150 V
	C21	200 MFD. Electro . . . 10 V
		RESISTORS
63-1870	R1	100 M Ohm . . . 1/2 W
63-1954	R2	10 Megohm . . . 1/2 W
63-1940	R3	4.7 Megohm . . . 1/2 W
63-1856	R4	47 M Ohm . . . 1/2 W
63-1553	R5	1 Meg. Vol. Control
63-1961	R6	15 Megohm . . . 1/2 W
63-1912	R7	1 Megohm . . . 1/2 W
63-1933	R8	3.3 Megohm . . . 1/2 W
63-1762	R9	300 Ohm . . . 1/2 W
63-1786	R10	1000 Ohm . . . 1/2 W
63-1831	R11	12 M Ohm . . . 1/2 W
63-1824	R12	8200 Ohm . . . 1/2 W
63-1891	R13	330 M Ohm . . . 1/2 W
63-1800	R14	2200 Ohm . . . 1/2 W
63-1771	R15	470 Ohm . . . 1/2 W
63-1789	R17	1200 Ohm . . . 1/2 W
63-1564	R18	91 Ohm . . . 2 W
63-1647	R19	1050 Ohm . . . 2-1/2 W
	R20	1050 Ohm . . . 2-1/2 W
		COILS AND CHOKES
S-13786	L1	Wavemagnet Assembly
S-13774	L2	Oscillator Coil Assembly
95-1015	T1	1st I. F. Transformer
95-1016	T2	2nd I. F. Transformer
		MISCELLANEOUS
85-400	S1	Change over Switch
49-587	SP1	3½" P. M. Speaker
95-1014	T3	Speaker Transformer
212-2	SE1	Selenium Rectifier
OR		
212-4	SE1	Selenium Rectifier



TUBE AND TRIMMER LOCATION

Final alignment of the 4E41 chassis should be made with the chassis installed in the cabinet. Tune in a weak station in the vicinity of 1400 KC and adjust the antenna trimmer for maximum.

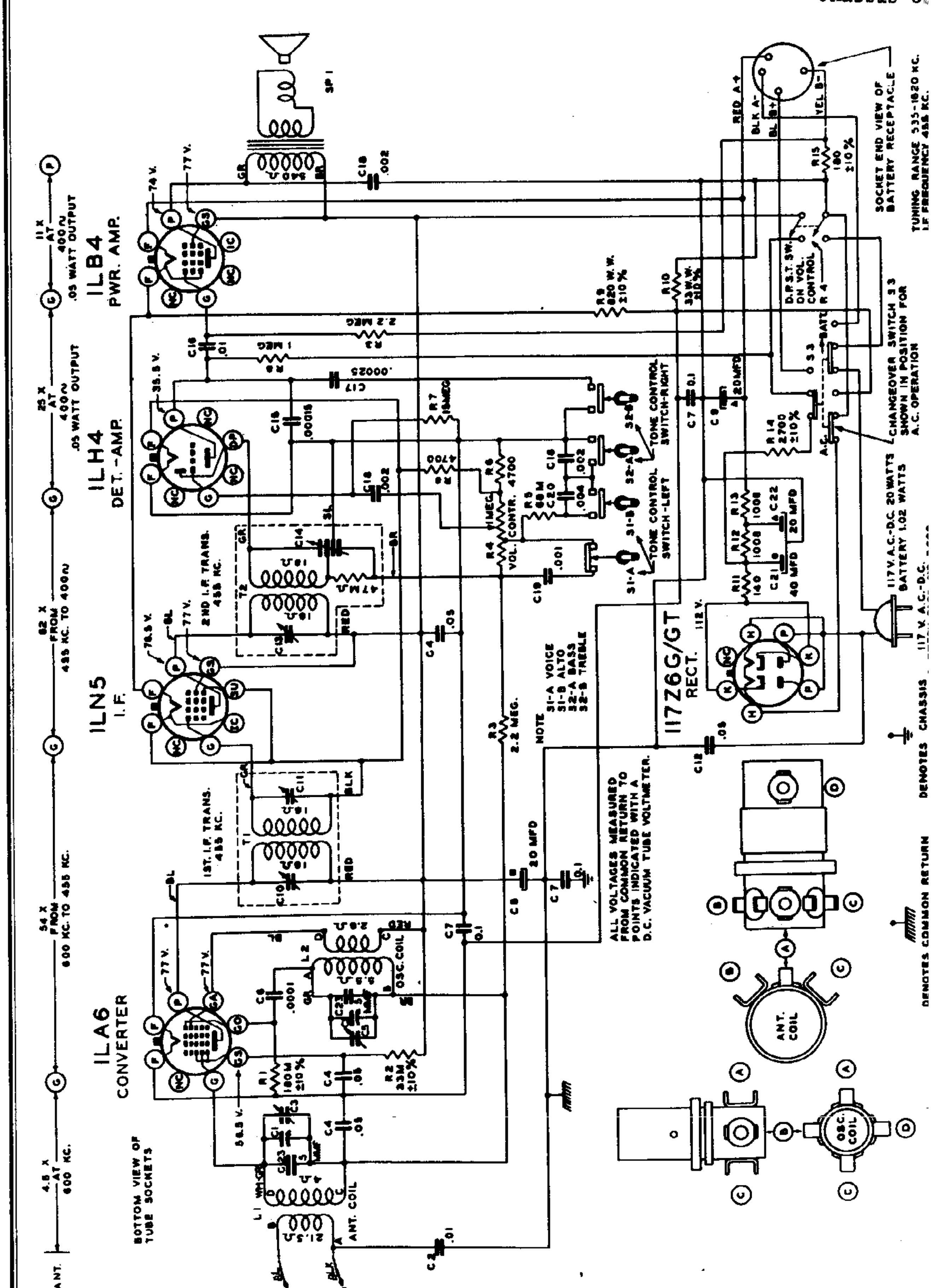
ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid.	.1 MFD	455 Kc.	600 Kc.	C14, C15, C16, C17	Align I.F.
2	One Turn Loosely Coupled to Wavemagnet.		1600 Kc.	1600 Kc.	C4	Set Oscillator to Scale --
3			1400 Kc.	1400 Kc.	C2	Adjust for Maximum.

ZENITH RADIO CORP.

MODEL 5G0

Chassis 5

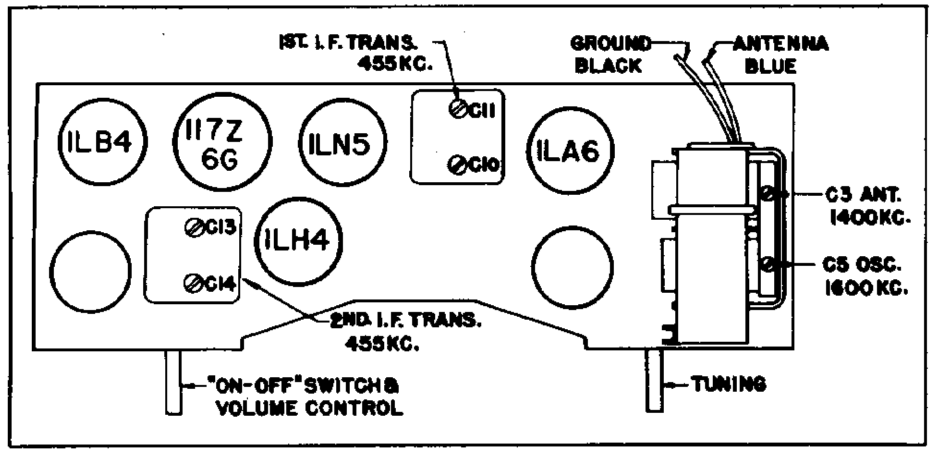


ZENITH RADIO CORP.

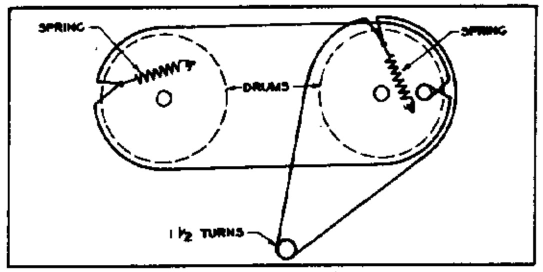
PARTS LIST

PART NO.	REF. NO.	
		RESISTORS
63-271	R8	1 Megohm .... 1/4 Watt
63-439	R14	2700 Ohm .... 1/4 Watt
63-567	R6	4700 Ohm .... 1/4 Watt
63-594	R5	68M Ohm .... 1/4 Watt
63-600	R3	2.2 Megohm .... 1/4 Watt
63-627	R15	180 Ohm .... 1/4 Watt
63-646	R2	33M Ohm .... 1/4 Watt
63-654	R1	100M Ohm .... 1/4 Watt
63-876	R7	15 Megohm .... 1/4 Watt
63-1099	R10	35 Ohm W.W. Insul. 1/2 Watt
63-1236	R4	Volume Control & Switch...
63-1239	R12	Candohm (or 63-1465)......
63-1366	R11	140 Ohm W.W. (Used only when using 63-1465) 2 Watt
63-1550	R9	820 Ohm W.W. Insul... 1 Watt
		MISCELLANEOUS
11-86		Line Cord & Plug..........
15-87		Battery Cable Plug Cap....
49-523	SP1	6 1/2" P.M. Speaker.......
		206-523 Output Transformer
		206-523 Cone & Voice Coil.
52-190		Speaker Cable & Plug......
54-34		#6-32 x 1/4" x 5/32" Hex Nut - Steel N.P.
57-11A		Antenna Lead Marker.......
57-116		Ground Lead Marker........
57-1159		Radiorgan Escutcheon......
70-124		#2 x 3/8" Phillips Hd. Wood Screw-Brass Plated (57-1159)..............
78-228		Electrolytic Condenser Socket..................
78-340		Battery Cable Socket......
78-401		Loktal Base Tube Socket (or 78-506-729)..........
78-456		Loktal Base Tube Socket (7 contact).............
78-611		Octal Base Tube Socket (8 contact).............
85-254	S3	Power Change Over Switch..
85-284	S1	Radiorgan Switch (Voice & Alto) (Left)............
85-285	S2	Radiorgan Switch (Treble & Bass) (Right)..........
93-125		#6 Internal Shakeproof Lockwasher...............
93-256		Brown Felt Washers (Knobs)
94-295		Radiorgan Switch Mounting Bushing (4 used).........
112-58		#6 x 1/4" Hex Hd. Self Tapping Screw............
114-87		#6-32 x 7/16" Hex Acorn Hd. Mach. Screw-Steel N.P.
114-192		#8 x 7/8" Hex Acorn Washer Self Tapping Screw (Chassis Mtg.)...........
125-17		Rubber Grommets...........
202-385		Instruction Book..........

PART NO.	REF. NO.	
		DIAL ASSEMBLY
26-330		Dial Scale................
46-443		Radiorgan Knob - Voice....
46-444		Radiorgan Knob - Treble...
46-445		Radiorgan Knob - Alto.....
46-446		Radiorgan Knob - Bass.....
46-820		Volume & Tuning Control Knob (Use S-11558).......
59-122		On-Off Indicator..........
59-160		Dial Pointer..............
76-335		Tuning Control Shaft......
80-183		Indicator Spring..........
80-209		Dial Cord Tension Spring..
80-471		Tuning Shaft Spring.......
93-690		Brown Felt Washer.........
159-50		Cinch Plug Button #49361 - Black Oxidize............
188-32		Retaining Ring (76-335)...
188-34		Retaining Ring (S-11362)..
192-90		Dial Crystal..............
196-84		Dial Crystal Gasket.......
S-9588		Indicator Cam Assembly....
S-9610		Dial Cord & Eyelet Assembly (Pointer)............
S-9733		Dial Cord & Eyelet Assembly (Gang Condenser)......
S-9751		Pulley & Rivet Assembly...
S-11362		Pulley & Bushing Assembly (Pointer)................
S-11558		Decorative Ring & Control Knob Assembly (2 used)...
S-11560		Dial Plate & Indicator Assembly.................
		COILS & CHOKES
95-616	T1	1st I.F. Transformer......
95-617	T2	2nd I.F. Transformer......
S-11960	L1	Antenna Coil Assembly.....
S-12505	L2	Oscillator Coil Assembly..
		CONDENSERS
22-162	C6	.0001 Mfd. ....600 V.
22-182	C17	.00025 Mfd. ....600 V.
22-195	C16	.01 Mfd. ....600 V.
22-303	C23	5 Mmfd. ....600 V.
22-448	C20	.004 Mfd. ....600 V.
22-470	C15	.00015 Mfd. ....600 V.
22-492	C18	.002 Mfd. ....600 V.
22-827	C7	.1 Mfd. ....200 V.
22-829	C4	.05 Mfd. ....200 V.
22-897	C19	.001 Mfd. ....600 V.
22-1017	C12	.05 Mfd. ....400 V.
22-1026	C21-C22	20 Mfd. X 40 Mfd. Dry Electrolytic.......150 V.
22-1027	C8-C9	20 Mfd. 25 V. X 20 Mfd. 150 V. Dry Electrolytic..
22-1183	C2	.01 Mfd. ....400 V.
22-1216	C1	Two Section Variable......



TUBE TRIMMER LOCATION



DIAL CABLE DRAWING

The alignment of chassis 5C51 is conventional. None of the adjustment interlock, however, the most accurate alignment will be accomplished if the procedure is followed exactly. The IF frequency is 455 KC and all measurements, voltage, and resistance have been taken with an electronic voltohm meter.

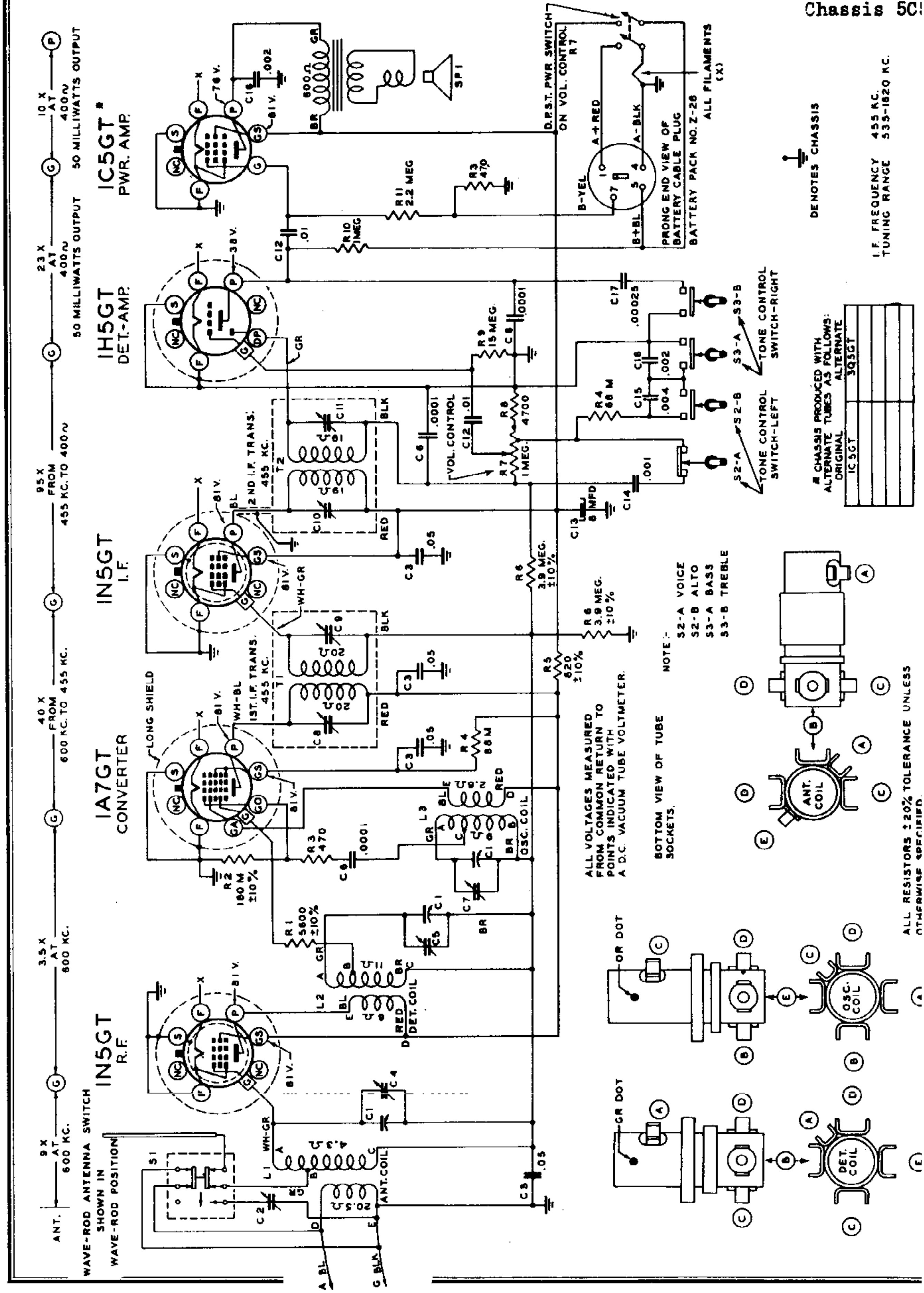
Stage by stage measurements are for reference purposes only. Gain measurements can seldom be duplicated, and are used only for comparison purposes.

ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	C10, C11 C13 and C14	Align I.F.
2	Antenna and Ground	200 Mmfd.	1600 Kc.	1600 Kc.	C5	Set Oscillator to scale
3	Antenna and Ground	200 Mmfd.	1400 Kc.	1400 Kc.	C3	Align Antenna

ZENITH RADIO CORP.

MODEL 5K03
Chassis 5C



ZENITH RADIO CORP.

PARTS LIST

DIAL ASSEMBLY

26-344	Dial Scale
46-443	Radiorgan Knob (Voice)
46-444	Radiorgan Knob (Treble)
46-445	Radiorgan Knob (Alto)
46-446	Radiorgan Knob (Bass)
59-122	Off & On Indicator
59-160	Dial Pointer
76-335	Tuning Control Shaft
80-183	Indicator Spring
80-209	Dial Cord Tension Spring
80-471	Tuning Shaft Spring
93-690	Brown Felt Washer (S-11362)
188-32	Retainer Ring (76-335)
188-34	Retainer Ring (S-11362)
192.90	Dial Crystal
196-64	Dial Crystal Gasket
S-9588	Indicator Cam & Bushing Assembly)
S-9610	Dial Cord & Eyelet Assem (Pointer)
S-9733	Dial Cord & Eyelet Assem (Gang)
S-9751	Pulley & Rivet Assem. (Gang)
S-11362	Pulley & Bushing Assem.
S-11558	Vol. & Tuning Knob Assem (2 used)(46-520)

CHOKES & COILS

95-814	1st I.F. Transformer (T1)
95-839	2nd I.F. Transformer (T2)
S-9570	Detector Coil Assem. (L2)
S-9746	Oscillator Coil Assem(L3)
S-11731	Antenna Coil Assem. (L1)

CONDENSERS

22-162	.0001 Mfd. (C6) 600 V.
22-182	.00025 Mfd. (C17) 600V.
22-196	.01 Mfd. (C12) 600V.
22-448	.004 Mfd. (C15) 600V.
22-492	.002 Mfd. (C16) 600V.
22-684	Dry Electroclytic 8Mfd. (C13) 150 V.
22-829	.05 Mfd (C3) 200 V.
22-887	.001 Mfd. (C14). 600V.
22-1358	Three Section Gang (C1)
22-1421	Antenna Trimmer (C2)

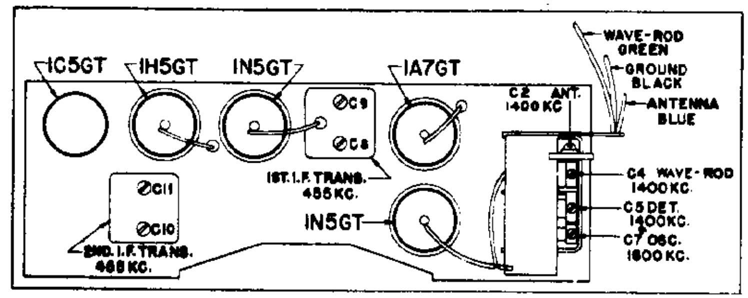
RESISTORS

63-271	1 Megohm (R10) ½ Watt
63-581	470 Ohm (R3) ½ Watt
63-587	4700 Ohm (R8) ½ Watt
63-594	68M Ohm (R4) ½ Watt
63-600	2.2 Megohm (R11) ½ Watt
63-634	820 Ohm (R5) ½ Watt
63-638	5600 Ohm (R1) ½ Watt
63-669	3.9 Megohm (R6) ½ Watt
63-976	15 Megohm (R9) ½ Watt
63-1236	Volume Control & Switch (R7)

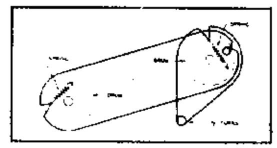
MISCELLANEOUS

12-1082	Ant. Rod Mtg. Brkt.
46-572	Telescopic Ant. Knob
49-522	6½" P.M. Speaker
	206-522 Output Trans.
	208-522 Cone & Voice Coil
49-523	6½" P.M. Speaker (Alt. for 49-522) (SP1)
	206-523 Output Trans.
	208-523 Cone & Voice Coil
52-190	Speaker Cable
57-11A	Antenna Marker
57-11G	Ground Marker
57-900	Dial Plate
57-1103	Antenna Knob Escutcheon
57-1139	Radiorgan Escutcheon
58-74	Battery Cable Plug
70-124	#2 x 3/8 Phillips Hd. Wood Screw (Esc. Mtg)
78-611	Octal Base Tube Socket 5 used
85-228	Wave-Rod Antenna Sw. (cr 85-303)(S1)
85-284	Radiorgan Switch (Voice & Alto L.H) (S2)
85-288	Radiorgan Switch (Treble & Bass R.H. (S3)
93-125	#6 Internal Shakeproof Lockwasher
93-258	Brown Felt Washer (Knobs)
94-295	Steel Bushing (Radiorgan 4 used)
112-56	#6 - ¼ Hex Hd. Self Tapping Screw
114-67	#6-32 x 7/16 Hex Acorn Head Screw
114-162	#8 x 7/8 Hex Acorn Washer Hd S.T. Screw (Chassis Mtg)
125-17	Rubber Grommets
126-379	Tube Shield (3used) short
126-382	Tube Shield (1A7GT) long.
159-50	Plug Button (Blk Oxidize)
202-386	Instruction Book
S-11251	Telescopic Antenna Assem. (Complete)
S-11586	Release Assem. (Telescopic Assembly)
S-11729	Waverod Switch & Plate Assembly
Z-28	Battery Pack (BP)

15M2-15-47



TUBE TRIMMER LOCATION



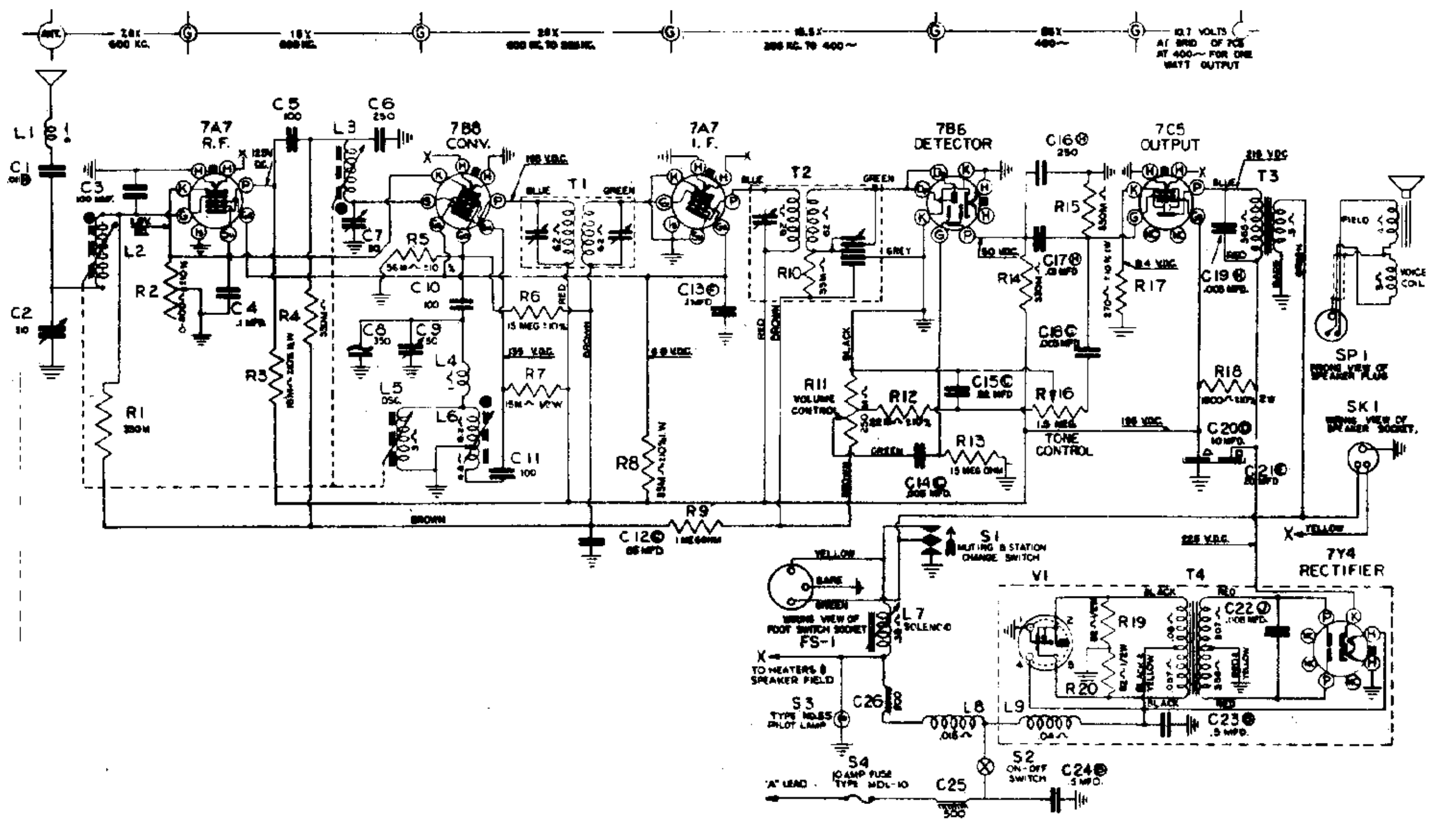
DIAL CABLE DRAWING

The alignment of chassis 5C50 is conventional. None of the adjustment interlock, however, the most accurate alignment will be accomplished if the procedure is followed exactly. The IF frequency is 455 KC and all measurements, voltage, and resistance have been taken with an electronic voltohm meter.

Stage by stage gain measurements are for reference purposes only. Gain measurements can seldom be duplicated, and are used only for comparison purposes.

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	C8, C9, C10, and C11	Align I.F
2	Ant. and Ground	200Mmfd Antenna Switch in Ant. position	1600 Kc.	1600 Kc.	C7	Set Oscillator to Dial Scale.
3	"	"	1400 Kc.	1400 Kc.	C5	Align Detector
4	"	"	"	"	C2	Align Antenna
5	Two Turns Loosely Coupled To Waverod	Wave Rod Fully extended Switch in Waverod Position	1400 Kc.	1400 Kc.	C4	Align Waverod Antenna

ZENITH RADIO CORP.



I. F. 265 KC.
TUNING RANGE 540 KC. TO 1600 KC.

ALL CONDENSERS ARE MMFD.
UNLESS OTHERWISE SPECIFIED

ON ALL CONDENSERS

Ⓐ = 25 VOLTS	Ⓑ = 120 VOLTS	Ⓒ = 200 VOLTS
Ⓓ = 300 VOLTS	Ⓔ = 350 VOLTS	Ⓕ = 400 VOLTS
Ⓖ = 500 VOLTS	Ⓗ = 600 VOLTS	Ⓙ = 1000 VOLTS

FOR RESISTORS: M = 1000 Ω E.G., 10 M = 10 000 Ω
ALL RESISTORS ARE ½ WATT & ± 20 %
UNLESS OTHERWISE SPECIFIED

⏚ DESIGNATES CHASSIS GROUND

ALL TUBE SOCKETS ARE BOTTOM VIEWS

STAGE GAINS

TAKEN AT ANT. SOCKET & AT R. F. GRID AT 600 KC & TAKEN AT CONV. GRID AT 265 KC.

DUMMY ANTENNA

30 MMFD. SERIES & 30 MMFD. SHUNT AT ANTENNA SOCKET & 0.1 MFD SERIES TO CONVERTER GRID

BATTERY CONDITIONS

6.3 VOLTS AT STORAGE BATTERY TERMINALS WITH POSITIVE GROUNDED

TEST CONDITIONS

VOLUME CONTROL SET AT MAXIMUM TONE CONTROL SET ON "HIGH" WITH NO INCOMING SIGNAL.

VOLTAGES TO READ FROM POINT SHOWN TO CHASSIS WITH 1000 OHM PER VOLT METER

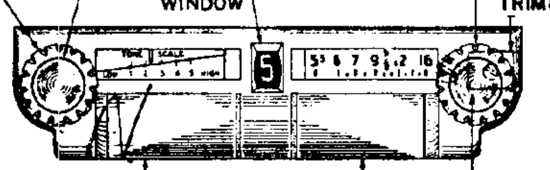


Fig. 1. Panel View

Receiver Installation

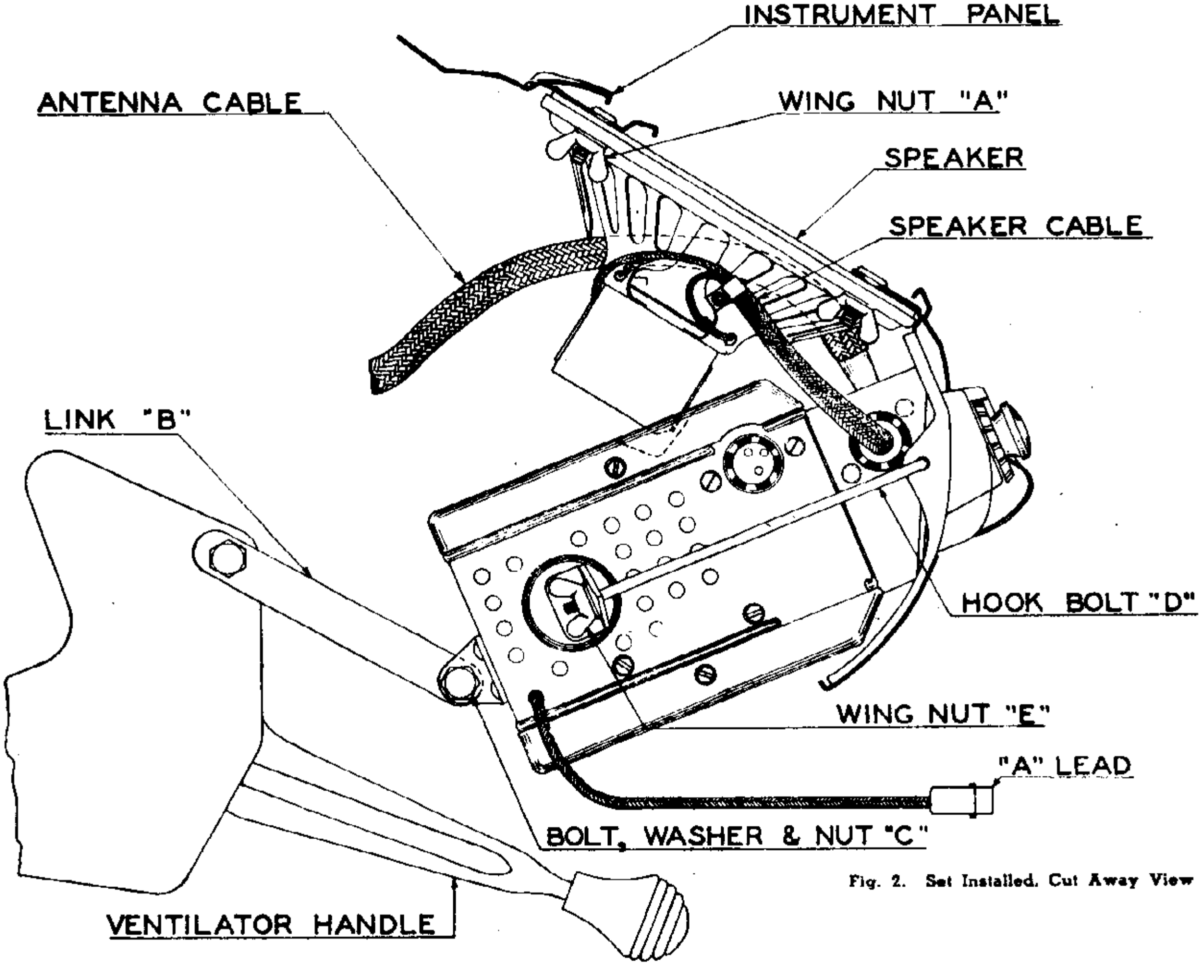


Fig. 2. Set Installed, Cut Away View

1—Install the antenna and antenna cable. Complete installation instructions are packed with each antenna kit.

2—Remove the radio opening cover plate from the instrument panel.

3—Place the speaker over the studs on the rear of the instrument panel, with the cable to the left. Fasten securely with the four wing nuts No. 54-189, furnished in the installation kit.

4—Start the No. 12-24 wing nuts "E" on the hook bolts "D" (Fig. 2). Place the receiver in position. Slip the end of the hook bolts through the receiver brackets with the hooks turned toward the center. Hook the bolts in the holes provided on the instrument panel. Tighten the wing nuts sufficiently to hold the receiver in place while the supporting link "B" is connected between the rear hanger bracket of the receiver and the ventilator bracket of the car, with bolts, lock-washers and nuts ("C," Fig. 2.)

5—Tighten all nuts and bolts to hold the receiver firmly in place.

6—Connect "A" lead to circuit breaker. (Fig. 3.)

7—Connect the speaker cable and antenna lead to the receiver.

8—IMPORTANT: Turn the receiver on and allow it to operate for approximately fifteen minutes in order for each part to reach normal operating temperature. Tune in a weak station near 1200 Kc. With a small screwdriver adjust the antenna trimmer (Fig. 1.), for maximum volume.

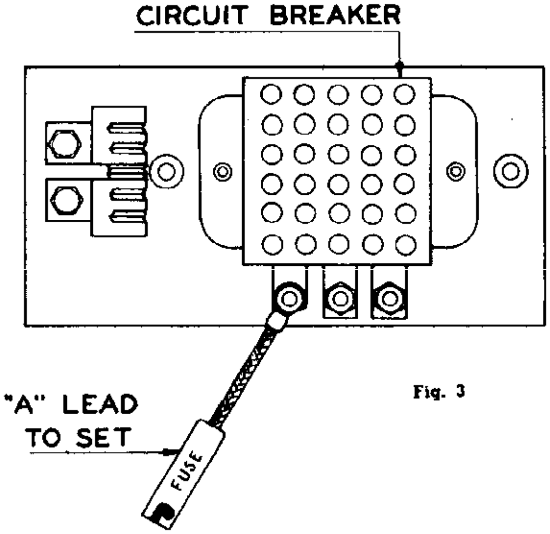


Fig. 3

Setting The Adjust-O-Matic Tuning

Pressing the station selector touch-bar six times will cause the tuning mechanism to change through a cycle of six positions. Five of these Adjust-O-Matic positions, at which numbers appear in the station indicator window, may be set for five favorite local stations while the sixth position, at which the letter M appears in the station indicator window, may be used for selecting stations manually.

The five positions, at which numbers appear in the station indicator window, may be adjusted in succession to any desired dial settings. However, in order to simplify the identification of the stations, it is advisable to set the Adjust-O-Matic mechanism in sequence according to frequencies of the stations, beginning with the station broadcasting on the lowest frequency, and progressing to the station broadcasting on the highest frequency.

Turn the receiver on and allow it to operate for at least fifteen minutes in order for each part to reach normal operating temperature before making the following Adjust-O-Matic settings:

1—Press the station selector touch bar repeatedly until No. 1 appears in the station indicator window.

2—Pull the manual tuning knob outward engaging the Adjust-O-Matic mechanism with the dial. (Fig. 1.)

3—Select the station desired and tune it in by turning the tuning knob in the same manner as when tuning the radio manually. Tune very carefully for clearest reception.

CAUTION: Do not attempt to force the tuning knob in. The knob will return to the "in" position when the station selector touch bar is again depressed.

4—Press the station selector touch bar, pull the manual tuning knob outward, and tune in the station desired for No. 2 position. Use the same procedure for adjusting positions Nos. 3, 4, and 5.

When the five positions have been adjusted to the five desired stations, it is only necessary to press the station selector touch bar to return to manual tuning or to any one of the stations on the Adjust-O-Matic.

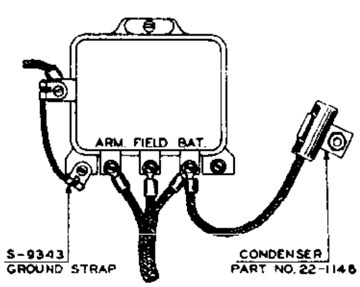
NOTE: When the letter M appears in the station indicator window, the manual tuning knob must be pulled outward and turned in order to select stations manually.

Interference Elimination

Important

Use the utmost care in the following operations to insure freedom from interference. Clean away paint and dirt to make good contacts between condensers and the car. Tighten all bolts and nuts securely.

1—Install a condenser, Part No. 22-1148, and a ground strap, Part No. S-9343, on the voltage regulator (Fig. 4.)



CONDENSER ON VOLT. REGULATOR

Fig. 4

2—Mount a condenser, Part No. 22-1326, on the ignition coil and connect the lead to the battery terminal (Fig. 5.)

3—Cut the high tension wire, that runs from the ignition coil to the distributor, three quarters of an inch from the point where it enters the soft rubber high tension wire housing. Shorten the wire one inch. Remove the wire from the coil, and screw the suppressor into the wire ends (Fig. 6). Replace the wire in the coil.

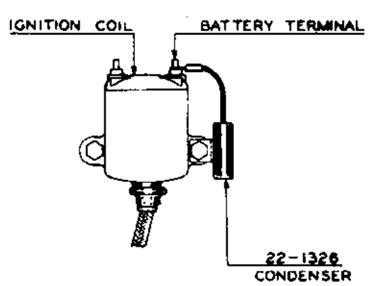


Fig. 5

If ignition interference is still present, check to make sure that the inside center windshield trim strip is grounded to the car body, and does not touch the antenna roof tube nut. Be certain the antenna wing nut and all the instrument panel bolts are tight.

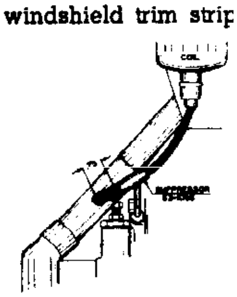
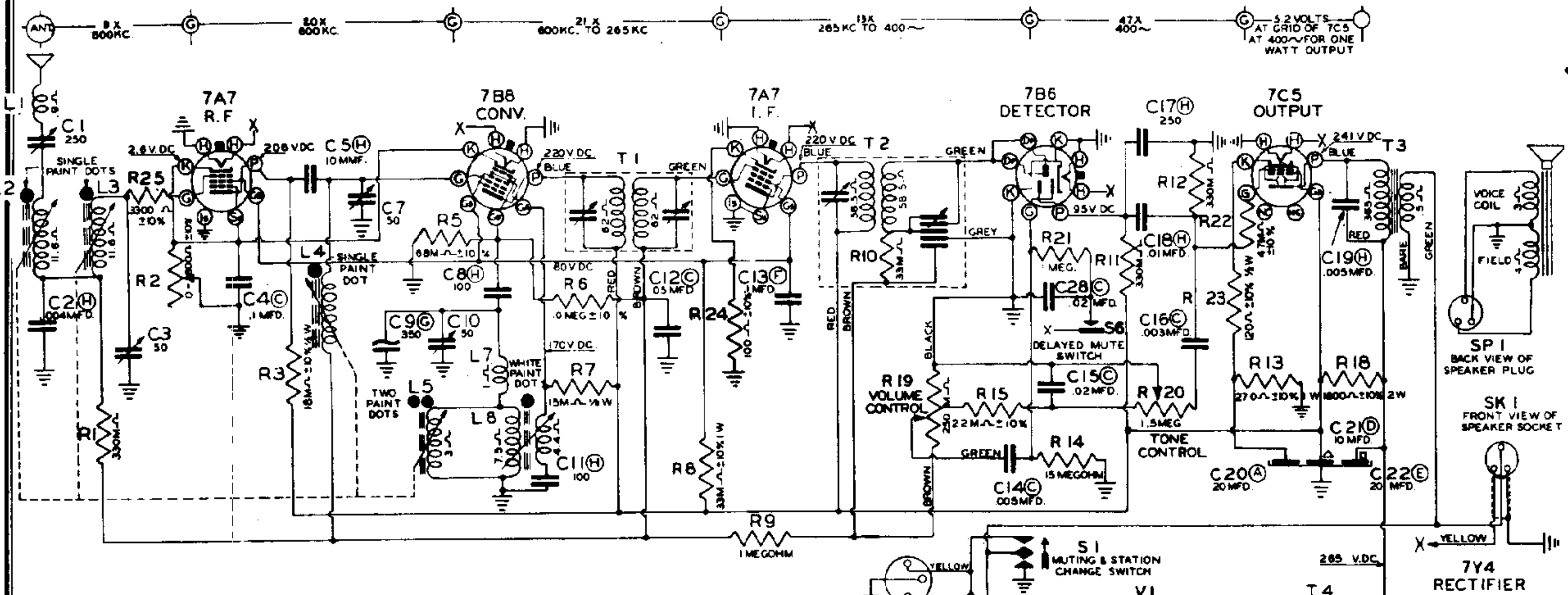
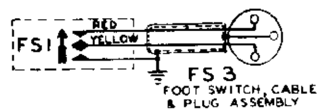


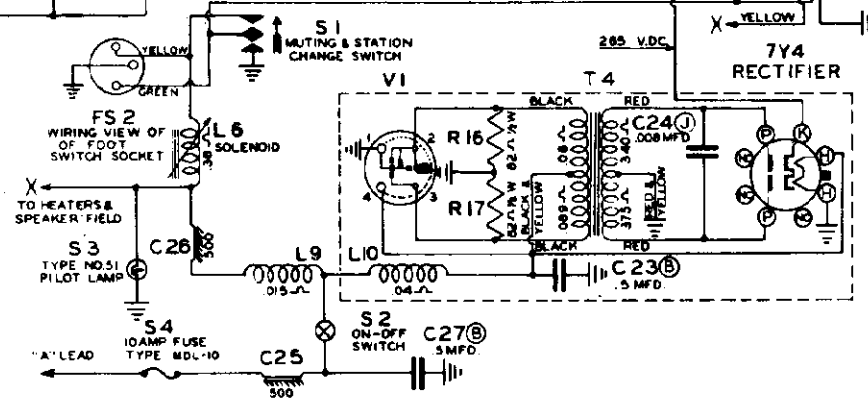
Fig. 6

MODELS 6MN088, 6MN788, Nash

ZENITH RADIO CORP.







DIAG	PART #	DESCRIPTION
[illegible]	[illegible]	[illegible] ANTENNA TRIMMER
[illegible]	[illegible]	[illegible] % 600V. MICA
[illegible]	[illegible]	[illegible] PL. R.F. TRIMMER
[illegible]	[illegible]	[illegible] -10% 200V.
[illegible]	[illegible]	[illegible] % 600V. MICA
[illegible]	[illegible]	[illegible] PL. CONV TRIMMER
[illegible]	[illegible]	[illegible] -20% 600V MICA
[illegible]	[illegible]	[illegible] % COMPENSATOR
[illegible]	[illegible]	[illegible] PL. OSC TRIMMER
[illegible]	[illegible]	[illegible] -20% 600V. MICA
[illegible]	[illegible]	[illegible] -10% 200V.
[illegible]	[illegible]	[illegible] -10% 400V.
[illegible]	[illegible]	[illegible] -10% 200V.
[illegible]	[illegible]	[illegible] -10% 200V.
[illegible]	[illegible]	[illegible] +20% -10% 200V.
[illegible]	[illegible]	[illegible] ±20% 600V MICA
[illegible]	[illegible]	[illegible] ±20% 600V
[illegible]	[illegible]	[illegible] +50% -10% 600V.
[illegible]	[illegible]	[illegible] 25 W.V. ELECTROLYTIC
[illegible]	[illegible]	[illegible] 300 W.V. ELECTROLYTIC △
[illegible]	[illegible]	[illegible] 350 W.V. ELECTROLYTIC □
[illegible]	[illegible]	[illegible] +50% -10% 120V
[illegible]	[illegible]	[illegible] +20% -10% 1600V
[illegible]	[illegible]	SPARK PLATE
[illegible]	[illegible]	SPARK PLATE
[illegible]	[illegible]	[illegible] +50% -10% 120V
[illegible]	[illegible]	[illegible] +20% -10% 200V
[illegible]	[illegible]	ANTENNA MOTOR NOISE CHOKE
[illegible]	[illegible]	ANT. TUNING COIL (TUNING UNIT)
[illegible]	[illegible]	R.F. TUNING COIL (TUNING UNIT)
[illegible]	[illegible]	CONV. TUNING COIL (TUNING UNIT)
[illegible]	[illegible]	OSC TUNING COIL
[illegible]	[illegible]	SOLENOID (PART OF TUNING UNIT)
[illegible]	[illegible]	OSC SERIES COIL
[illegible]	[illegible]	OSC SHUNT COIL
[illegible]	[illegible]	MOTOR NOISE CHOKE
[illegible]	[illegible]	HASH CHOKE
[illegible]	[illegible]	SPEAKER & PLUG (8" ROUND)
[illegible]	[illegible]	SPEAKER CABLE & SOCKET

DIAG	PART #	DESCRIPTION
[illegible]	[illegible]	[illegible] 20% ½W
[illegible]	[illegible]	[illegible] SENS. CONTROL
[illegible]	[illegible]	[illegible] 10% ½W
[illegible]	[illegible]	[illegible] 10% ½W
[illegible]	[illegible]	[illegible] 10% ½W
[illegible]	[illegible]	[illegible] ±20% ½W
[illegible]	[illegible]	[illegible] ±10% 1W
[illegible]	[illegible]	[illegible] ±20% ¼W
[illegible]	[illegible]	[illegible] 10% (IN 2ND I.F.) ¼W
[illegible]	[illegible]	[illegible] ±20% ¼W
[illegible]	[illegible]	[illegible] ±20% ¼W
[illegible]	[illegible]	[illegible] ±10% (W.W.) 1W
[illegible]	[illegible]	[illegible] ±20% ½W
[illegible]	[illegible]	[illegible] ±10% ½W
[illegible]	[illegible]	[illegible] 20% ½W
[illegible]	[illegible]	92 [illegible] 20% ½W
[illegible]	[illegible]	1800 [illegible] 10% (W.W.) 2W
[illegible]	[illegible]	250M- [illegible] CONT (TAP AT 75M-Ω)
[illegible]	[illegible]	1.5 MEG [illegible] CONTROL
[illegible]	[illegible]	1 MEG [illegible] 20% ½W
[illegible]	[illegible]417	47000 OHMS ±10% ½W
[illegible]	[illegible]410	120 OHMS ±10% ½W
[illegible]	[illegible]414	100 OHMS ±10% ½W
[illegible]	[illegible]410	3300 OHMS ±10% ½W
T1	95-[illegible]	I.F. TRANSFORMER
T2	95-[illegible]	I.F. TRANSFORMER
T3	95-[illegible]	[illegible]UT TRANSFORMER
T4	95-1015	VIBRATOR POWER TRANSFORMER
	95-914	VIBRATOR POWER TRANS (ALTERNATE)
FS1	S-11140	FOOT SWITCH & PLATE ASSEMBLY
FS2	78-640	FOOT SWITCH SOCKET
FS3	S-[illegible]	FT SWITCH CABLE & PLUG ASSY
S1	S-11270	HAND SELECTOR & MUTING SWITCH
S2	[illegible]-353	ON-OFF SWITCH
S3	100-32	TYPE NO.51 PILOT LAMP
S4	[illegible]-14	10AMP. FUSE, TYPE MDL-10
S5		DELAYED MUTE SWITCH (ON TUNER)
V1	190-20	VIBRATOR (NONSYNCHRONOUS)

ALL CONDENSERS ARE MMFD. UNLESS OTHERWISE SPECIFIED

ON ALL CONDENSERS —

Ⓐ = 25 VOLTS Ⓑ = 120 VOLTS Ⓒ = 200 VOLTS
Ⓓ = 300 VOLTS Ⓔ = 350 VOLTS Ⓕ = 400 VOLTS
Ⓖ = 500 VOLTS Ⓗ = 600 VOLTS Ⓙ = 1600 VOLTS

FOR RESISTORS M = 1000 Ω. E.G. 10M = 10,000 Ω.
ALL RESISTORS ARE ¼ WATT & ± 20% UNLESS OTHERWISE SPECIFIED

⏚ = DESIGNATES CHASSIS GROUND

ALL TUBE SOCKETS ARE BOTTOM VIEWS

STAGE GAINS

TAKEN AT ANT. SOCKET, AT R.F. GRID AT 600KC & TAKEN AT CONV GRID AT 265KC.

DUMMY ANTENNA

30 MMFD SERIES & 30 MMFD SHUNT AT ANT SOCKET & 0.1MFD SERIES TO CONVERTER GRID

BATTERY CONDITIONS

6.5 VOLTS AT STORAGE BATTERY TERMINALS WITH POSITIVE GROUNDED

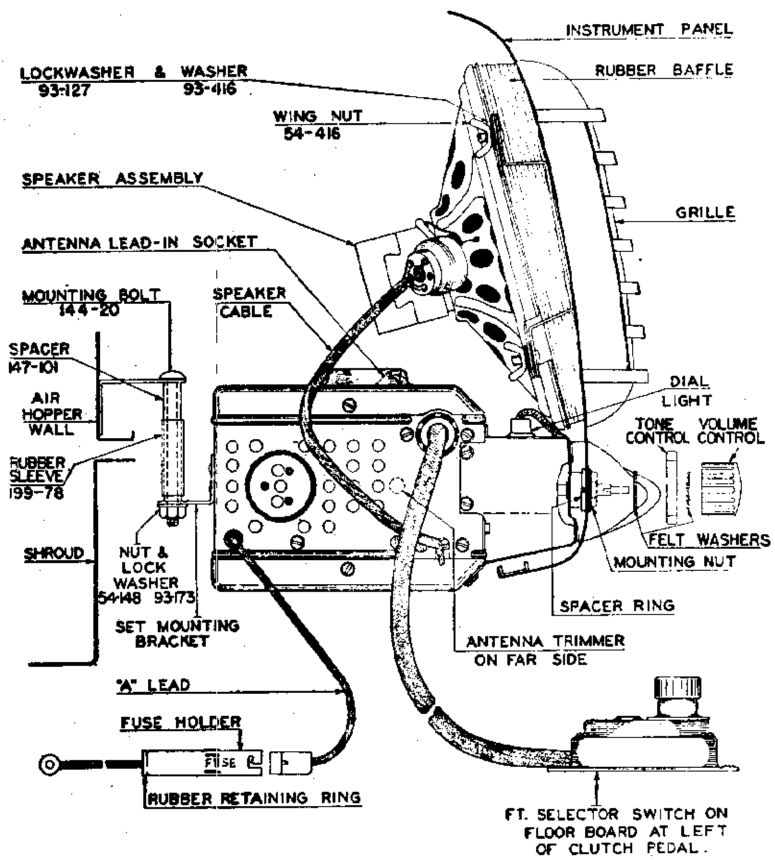
TEST CONDITIONS

VOL CONTROL SET AT "MAX." TONE CONTROL SET ON "HIGH", WITH NO INCOMING SIGNAL

VOLTAGES READ FROM POINT SHOWN TO CHASSIS WITH 1000 OHM PER VOLT METER

SCHEMATIC DIAGRAM FOR 6 TUBE
NASH 6MN088 and 6MN788
WITH FOOT CONTROL
I.F. 265 KC.
TUNING RANGE 540KC. TO 1600 KC.

ZENITH RADIO CORP.



SETTING THE AUTOMATIC TUNER

Pressing the Push-Bar at the right below the dial repeatedly will cause the tuning mechanism to change through a cycle of six positions. Five of the automatic positions may be set for favorite local stations while the sixth position, at which "M" appears on the indicator drum, is used for selecting stations manually.

Allow the receiver to operate for at least fifteen minutes to bring the operating temperature up to normal before making the following automatic tuning settings.

Using "M" position as a reference point, the remaining five positions may be adjusted in succession to any desired dial setting. Setting these stations in sequence according to their frequencies beginning at the lowest frequency for number 1, and progressing through to the high frequency end of the dial for number 5 is the recommended practice to simplify the identification of each automatic tuned station.

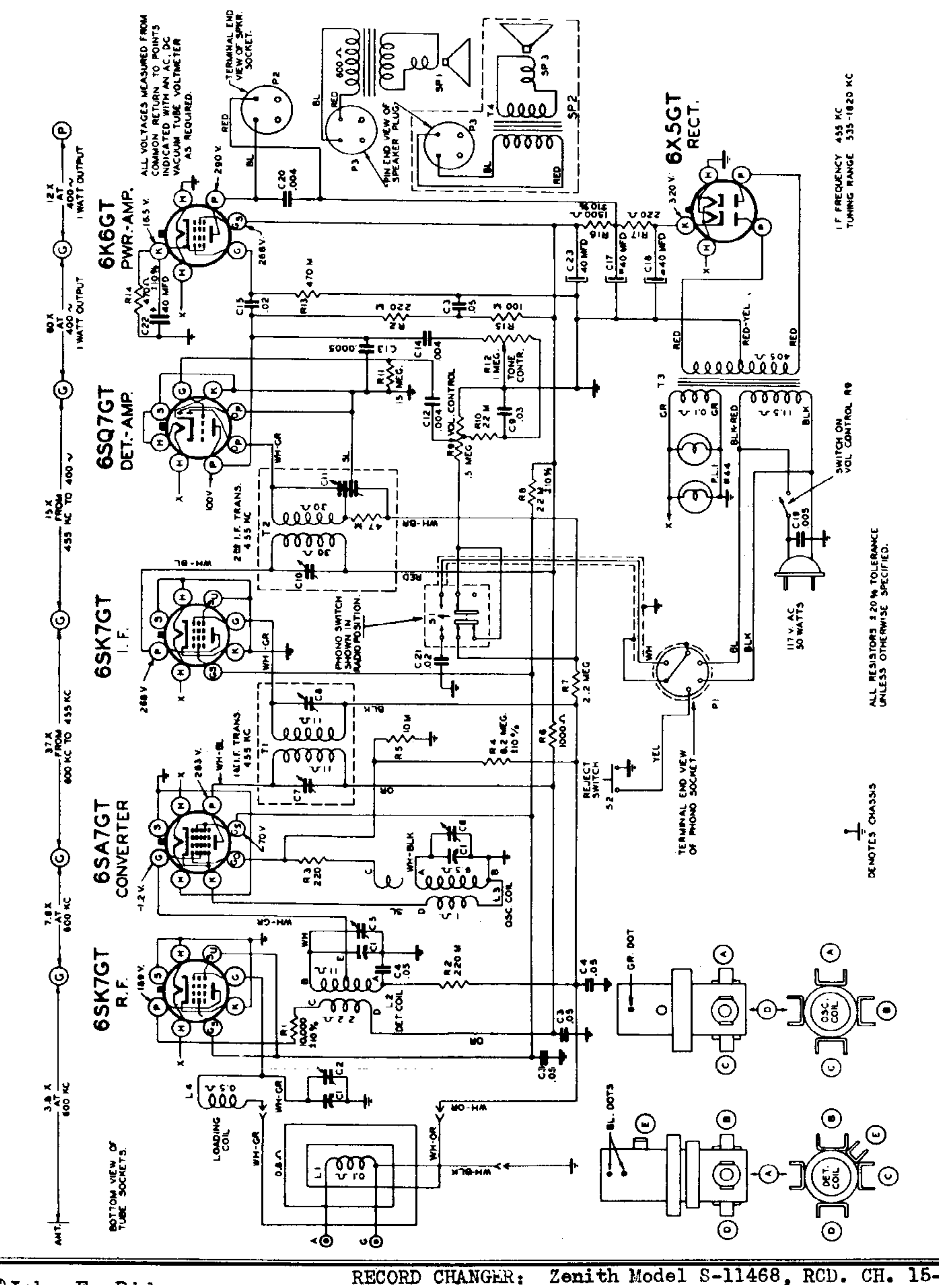
1. Press station selector bar until number 1 appears in station indicator window.
2. Pull manual tuning knob outward to engage the automatic mechanism.
3. Select the station desired and tune to its frequency by turning tuning knob. Tune very carefully for clearest reception.
4. Press station selector bar, pull manual tuning knob outward, and tune in station desired for No. 2 position. Use same procedure for positions No. 3, 4 and 5.

NOTE: When "M" appears in the station indicator window, the manual tuning knob must be pulled outward and rotated to select the stations manually.

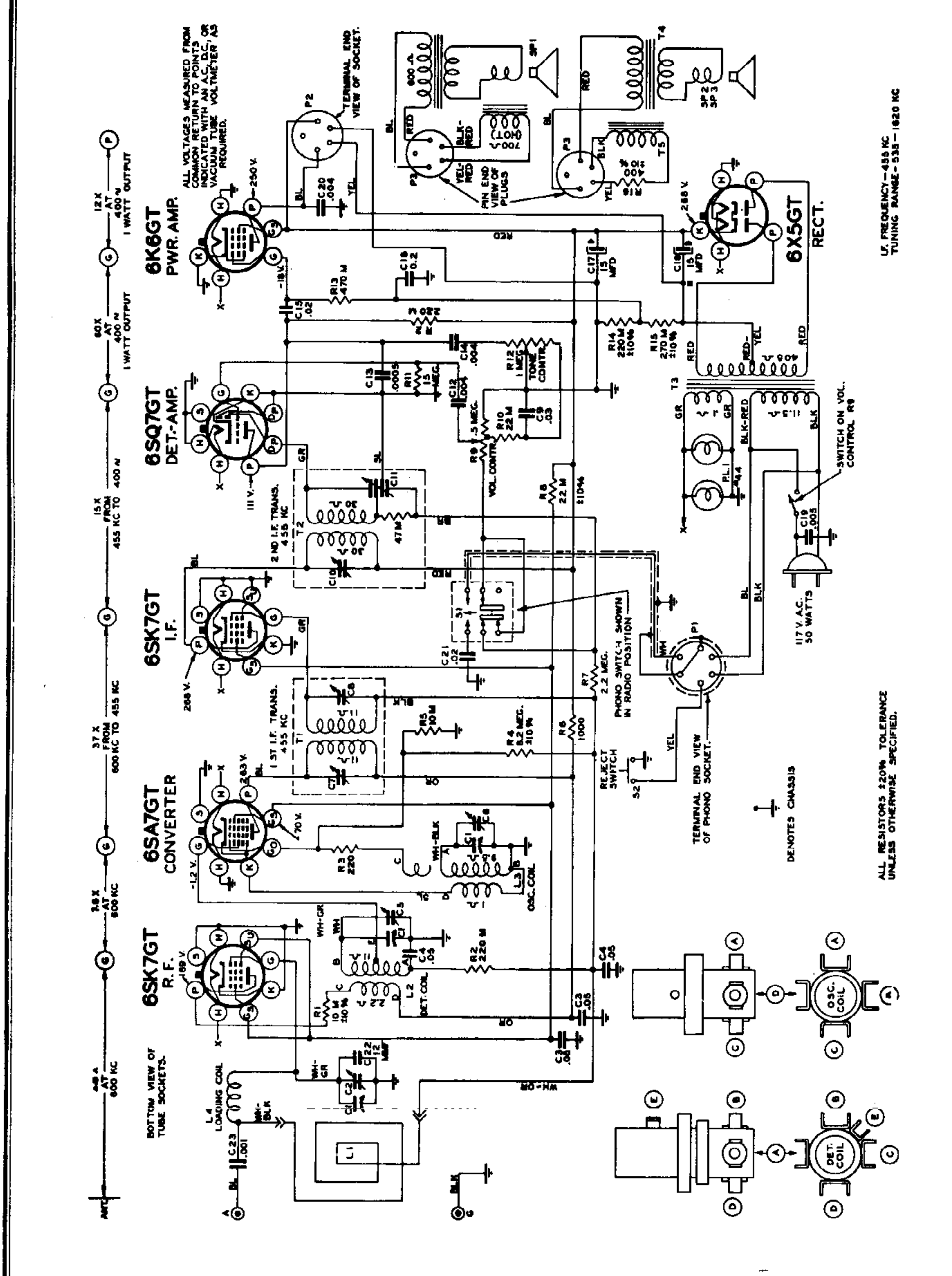
IMPORTANT: Turn the receiver on and allow it to operate for approximately 15 minutes. Tune in a weak station at approximately 1200 kc. Adjust the antenna trimmer condenser (see Fig. 2) with a small screw driver for maximum signal.

MODEL 6R087Z,
Chassis 6C22Z

ZENITH RADIO CORP.



ZENITH RADIO CORP.



ZENITH RADIO CORP.

A feature of chassis 6C22Z and 6C22ZZ is a high gain tuned R.F. stage ahead of the conventional superheterodyne circuit.

When making repairs or adjustments on the chassis be sure to have the Phono-Radio switch in Radio position (button out).

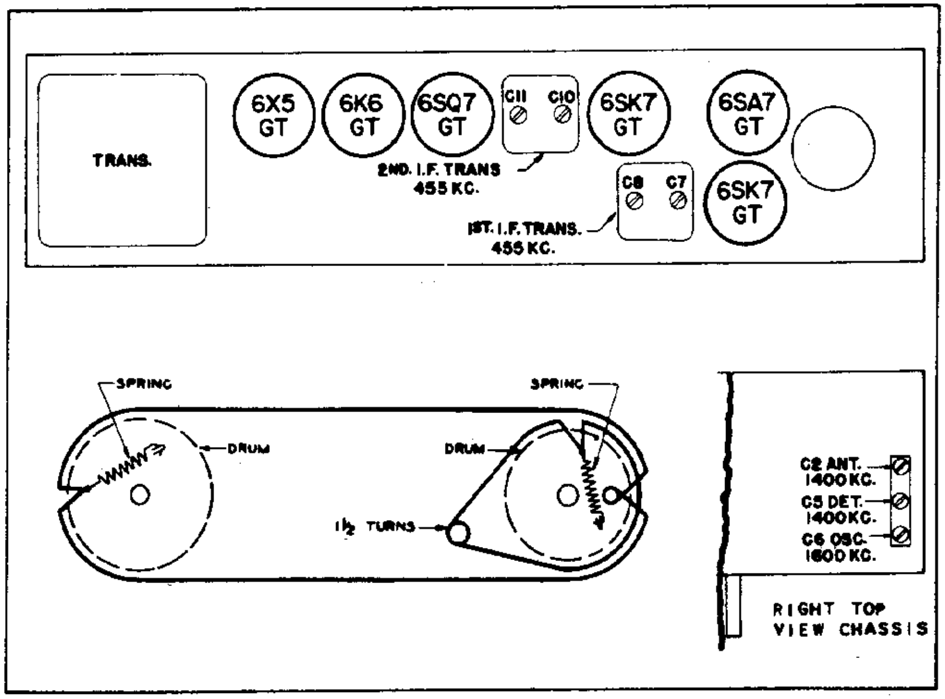
The Tone Control circuit used in this chassis is unusual. Attenuation or control occurs in both the grid and plate circuit of the triode section of the 6SQ7 tube. To increase the bass response Resistor R10 and Capacitor C9 boost the bass in the grid circuit.

Capacitor C14 and the Variable Tone Control R12 attenuate the highs in the plate circuit.

When the tone control R12 is in the treble position attenuation to highs are greatly reduced in the plate circuit and minimum bass boost takes place in the grid circuit.

When the tone control is in bass position, attenuation to the highs takes place in the plate circuit with maximum bass boost in the grid circuit.

The result of this arrangement allows a smooth tone control over the audio frequency range.



TUBE TRIMMER LOCATION AND DIAL CABLE DRAWING

ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	C-7, C-8, C-10, C-11	Align I. F.
2	One turn loop coupled loosely to Wave Magnet	--	1600 Kc.	1600 Kc.	C-6	Set Oscillator to Dial Scale
3		--	1400 Kc.	1400 Kc	C-5	Align Det.
4		--	1400 Kc.	1400 Kc.	C-2	Align Ant.

MODEL 6R087

ZENITH RADIO CORP.

PARTS LIST

DIAL ASSEMBLY

26-334	Dial Scale
46-522	Control Knob (Dummy)
46-538	Tuning Knob
46-548	Radio-Phono Reject Knob
57-1071	Escutcheon Plate
59-161	Dial Pointer
76-413	Tuning Control Shaft
78-504	Dial Light Socket & Wire
80-365	Tuning Shaft Tension Spring
80-402	Dial Cord Tension Spring
100-36	Dial Light Bulb 6.3 Volts
159-50	Plug Button (Dial Scale Mtg.)
188-30	Retaining Ring (Tuning Shaft)
188-32	Retaining Ring (Dial Pulley)
188-34	Retainer Ring
188-54	Knob Clamping Ring
192-94	Dial Crystal
S11161	Dial Pulley Cord & Eyelet Assem
S11162	Pointer Pulley Cord & Eyelet Assem.
S11168	Condenser Pulley & Bushing Assem.
S11292	Dial Pulley & Bushing Assem
S11558	Tone & Volume Control Knob & Ring Assem.

CHOKES & COILS

95-909	1st I.F. Transformer
95-910	2nd I.F. Transformer
S11163	Detector Coil Assem
S11164	Oscillator Coil Assem
S13478	Antenna Loading Coil Assem. 6C22ZZ.
S11896	Antenna Loading Coil Assem. 6C22Z

CONDENSERS

22-138	.2 Mfd. (C16)	200 V.
22-171	.05 Mfd. (C3)	600 V.
22-448	.004 Mfd. (C14 & C20)	600 V.
22-530	12 Mmfd. 6C22ZZ	600 V.
22-1444	.001. 6C22ZZ	200 V.
22-829	.05 Mfd. (C4)	200 V.
22-830	.02 Mfd. (C15)	600 V.
22-854	.0005 Mfd. (C13)	600 V.
22-1041	.005 Mfd. (C19)	400 V.
22-1157	.03 Mfd. (C9)	200 V.
22-1362	.004 Mfd. (C12)	600 V.
22-1369	3 Section Gang Cond. (C1)	
22-1372	Dry Electrolytic 15 Mfd.-450V.X 15 Mfd.-350V.X (C17 & C18) 6C22ZZ	
22-1382	Dry Electrolytic 40 x 40 Mfd. 450V. x 40 Mfd.-25 V. 6C22Z (C17, 18, 22)	
22-1386	.02 Mfd. (C21)	600 V.
22-1611	Dry Electrolytic 40 Mfd-450V (C23-6C22Z)	

RESISTORS

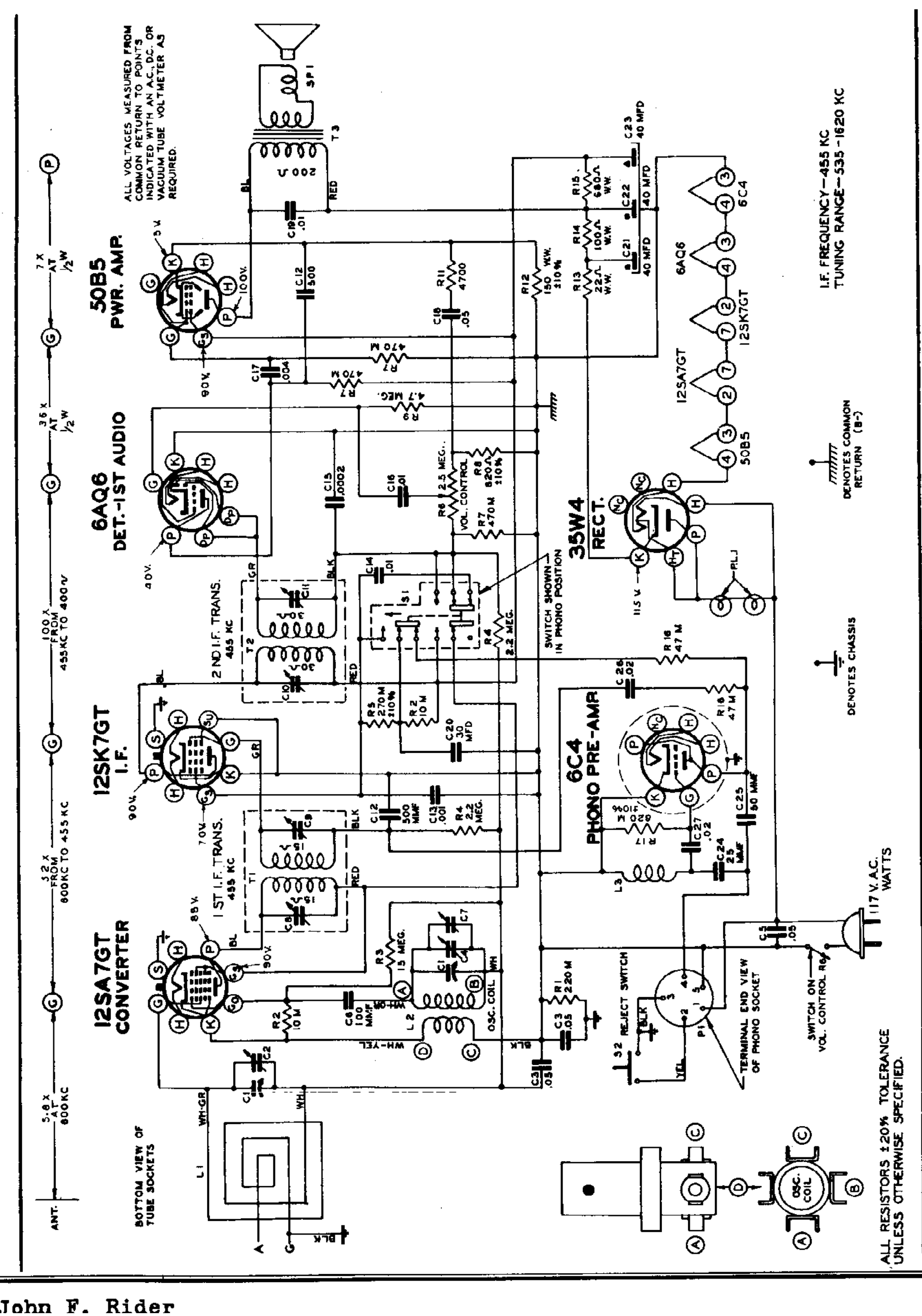
63-156	10M Ohm (R1)	1 Watt
63-296	220M Ohm (R2)	1/4 Watt
63-579	220 Ohm (R3)	1/4 Watt
63-589	10M Ohm (R5)	1/4 Watt
63-591	22M Ohm (R10)	1/4 Watt
63-595	100M Ohm (R15-6C22Z)	1/4 Watt
63-597	470M Ohm (R13)	1/4 Watt
63-600	2.2 Megohm (R7)	1/4 Watt
63-605	1M Ohm (R6)	1/2 Watt
63-655	220M Ohm (R14-6C22ZZ)	1/4 Watt
63-656	~~270M Ohm (R15-6C22ZZ)~~	~~1/4 Watt~~
63-673	8.2 Megohm (R4)	1/4 Watt
63-976	15 Megohm (R11)	1/4 Watt
63-1170	1800 Ohm W.W. (R16-6C22Z)	2 Watt
63-1222	470 Ohm W.W. (R14-6C22Z)	1 Watt
63-1227	220 Ohm W.W. (R17-6C22Z)	1 Watt
63-1340	Volume Control & Switch (R9)	
63-1341	Tone Control (1 Megohm) (R12)	
63-1545	400 Ohm 10W (R16-6C22)	

MISCELLANOUS

2-121	Cabinet Back
11-85	Line Cord & Plug
11-87	Line Cord & Plug (Z Models)
12-1138	Wavemagnet Mtg. Brkt.
15-23	Plug Cap & Insulator (Used on S11456)
15-62	Plug Cap & Insulator (Used on S11456)
19-123	Phono Unit Mtg. Clip
27-81	Mounting Flange (Shaft Bearing Disc)
36-31	Record Changer Pull-out Handle
45-526	10" Dynamic Speaker
	206-526 Output Transformer
	207-526 Field Coil (Not Replaceable)
	208-526 Cone & Voice Coil
49-563	10" Dynamic Speaker (Alt. for 49-526)
	206-563 Output Transformer
	207-563 Field Coil (Not Replaceable)
	208-563 Cone & Voice Coil
49-581	10" P.M. Speaker (Also see S-132571). 6C22Z
	Output Transformer (See 95-1011)
	208-581 Cone & Voice Coil
49-585	10" P.M. Speaker 6C22Z
	296-585 Output Transformer
	208-585 Cone & Voice Coil
52-377	Speaker Cable (49-563)
58-88	Wavemagnet Plug (3 Prong)
58-132	Six Prong Plug (Used on S11456)
58-152	Speaker Plug. ~~6C22ZZ~~
58-156	Speaker Plug (49-585) 6C22Z
70-83	#6 x 1/2 Washer Hd. Wood Screw (Cabinet Back)
72-55	#6 x 3/8 Flat Phillips Hd. Wood Screw
72-59	#2 x 2-1/2 Phillips Flat Hd. Wood. Screw (Esc. Mtg.)
78-128	Speaker Plug Socket
78-349	Wavemagnet Plug Socket
78-373	Octal Base Tube Socket (5 Contact)
78-374	Octal Base Tube Socket (6 Contact)
78-376	Octal Base Tube Socket (8 Contact)
78-555	Six Prong Socket (Used on S11456)
78-611	Octal Base Tube Socket (Z Model) (8 Contact)
78-623	Phono Socket (6 Prong)
78-732	Speaker Plug Socket (Z Model)
89-463	Phono Mtg. Spring
83-1218	Insulating Strip (Gang Cond.)
83-1240	Black Vinylite Trim Strip (Record Changer)
85-337	Phono-Radio Switch
85-349	Record Reject Switch
94-295	Bushing-Switch Mtg. (Z Model)
94-334	Bushing-Switch Mtg.
95-911	Power Transformer, 117V. 50-60.
95-1007	Output Transformer. 6C22ZZ
95-1011	Spkr. Output Transformer (49-581) 6C22Z
95-1019	Filter Choke. 6C22ZZ
112-420	Phono Mtg. Screw
112-489	Handle Mtg. Screw (36-31)
114-58	6-32 x 3/8 Hex Accrn Hd.M.S. Screw
114-128	Chassis Mtg. Self Tapping Screw
114-193	#8 x 3/16 Hex Accrn Hd.S.T. Screw.
114-202	#8-32 x 1-1/8 Slotted Hex.Washer Hd S.T. Screw (Used on 12-1138)
125-17	Switch Mtg. Grommets
125-45	Condenser Mtg. Grommets
196-80	Dust Gasket
202-381	Phono Instruction Sheet
202-388	Instruction Book
237-1	Cable Clamp
S13479	Loop Antenna. 6C22ZZ
S13391	12" PM Speaker Assembly 6C22ZZ
S13406	10" PM Speaker Assembly 6C22ZZ
S11450	Wavemagnet Assem. (30A). 6C22Z
S11456	Inter Connecting Cable Assem.
S11468	Record Changer Assem.
S11920	Record Changer Mtg. Frame Assem.
S12864	Drive Wheel & Pin Assem. (Rec. Chang.)
S13257	10" P.M. Spkr. & Transformer Assem. (Alt. for 49-585) (Z Model). 6C22Z

MODEL 6R886,
Chassis 6E02

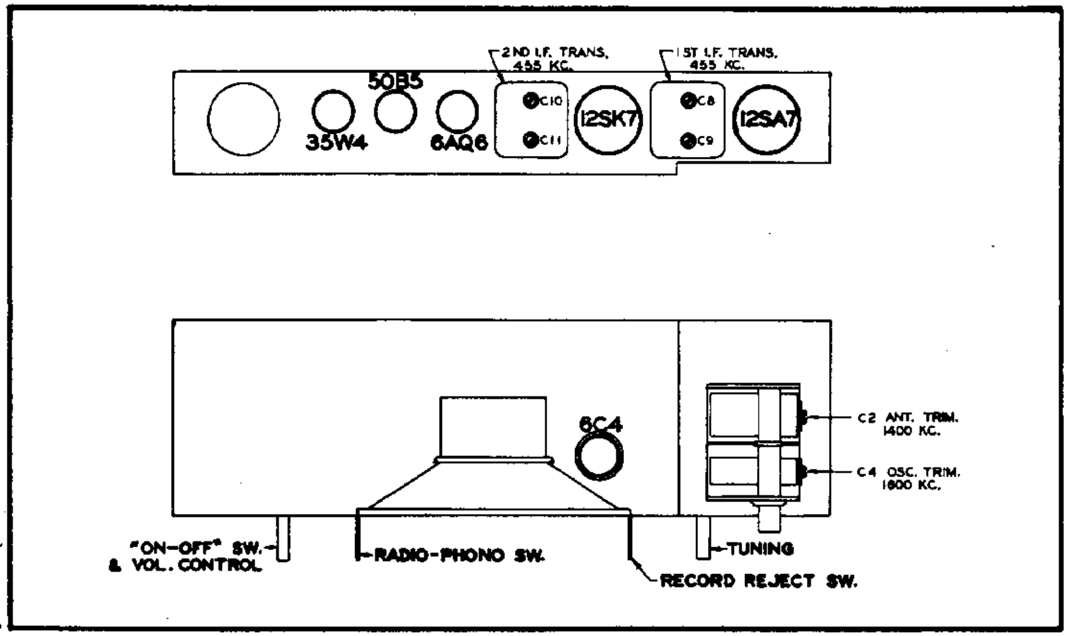
ZENITH RADIO CORP.



ZENITH RADIO CORP.

PARTS LIST

REFERENCE NUMBER	DIAGRAM NUMBER	DESCRIPTION
		CONDENSERS
22-1657	C1	2-Gang Variable
ON C1	C2	Bc. Ant. Trim
22-629	C3	.05 Mfd . . . 200 V.
ON C1	C4	Bc. Osc. Trimmer.
22-1017	C5	.05 Mfd . . . 400 V.
22-162	C6	100 Mmfd. . . . 500 V.
ON C1	C7	Bc. Osc. Trim
ON T1	C8	1st. I.F. Trans. Pri. Trim.
ON T1	C9	1st. I.F. Trans. Sec. Trim.
ON T2	C10	2nd. I.F. Trans. Pri. Trim.
ON T2	C11	2nd. I.F. Trans. Sec. Trim.
22-716	C12	.0005 Mfd . . . 500 V.
22-1444	C13	.001 Mfd. . . . 200 V.
22-243	C14	.01 Mfd . . . 400 V.
22-853	C15	.0002 Mfd . . . 500 V.
22-196	C16	.01 Mfd . . . 600 V.
22-445	C17	.004 Mfd. . . . 600 V.
22-176	C18	.05 Mfd . . . 200 V.
22-1162	C19	.01 Mfd . . . 400 V.
	C20	30 Mfd. Electro . . . 150 V.
	C21	40 Mfd. Electro . . . 150 V.
22-1707	C22	40 Mfd. Electro . . . 150 V.
	C23	40 Mfd. Electro . . . 150 V.
22-127	C24	25 Mmfd . . . 500 V.
22-1532	C25	50 Mmfd . . . 500 V.
22-186	C26	.02 Mfd . . . 400 V.
22-327	C27	.02 Mfd . . . 200 V.
		RESISTORS
63-1884	R1	220 M Ohm . . . 1/2 W.
63-1828	R2	10 M Ohm. . . . 1/2 W.
63-1861	R3	15 Megohm . . . 1/2 W.
63-1836	R4	2.2 Megohm. . . . 1/2 W.
63-1867	R5	270 M Ohm . . . 1/2 W.
63-1565	R6	2.5 Meg. Vol. Control
63-1898	R7	470 M Ohm . . . 1/2 W.
63-1762	R8	820 Ohm . . . 1/2 W.
63-1840	R9	4.7 Megohm. . . . 1/2 W.
63-1814	R11	4700 Ohm. . . . 1/2 W.
63-586	R12	150 Ohm W. W. . . . 1/2 W.
63-1219	R13	22 Ohm W. W . . . 1/2 W.
63-1220	R14	100 Ohm W. W. . . . 1 W.
63-1221	R15	560 Ohm W. W. . . . 1 W.
63-1856	R16	47 M Ohm. . . . 1/2 W.
63-1908	R17	820 M Ohm . . . 1/2 W.
		COILS
S13817	L1	Wavemagnet Assem.
S13799	L2	Osc. Coil Assem
S12503	L3	Osc. Coil Assem
95-919	T1	1st. I.F. Trans
95-906	T2	2nd. I.F. Trans
95-1025	T3	Output Trans.
		MISCELLANEOUS
100-90	P.L.1	Pilot Light 3.2 V
78-592	P1	5 Prong Phono Socket.
85-421	S1	Phono-Radio Switch.
85-422	S2	Reject Switch
49-502	SP1	5-1/4" P.M. Speaker
S13815		Hinge Assembly.
S13829		Dial Pointer and Pulley Assembly.
S14196		Escutcheon and Grille Cloth Assembly.
2-122		Cabinet Back.
13-1362		Hinge Support Bracket
14-1066		Table Cabinet
26-387		Dial Scale.
27-99		Felt Disc
46-567		Tuning Control Knob
46-589		Phono Switch Knob
57-1105		Wavemagnet Lead Spacer Strip.
57-1320		Chassis Cover Plate
80-407		Record Changer Mounting Spring.
80-569		Dial Scale Retaining Spring
110-129		Grille Cloth.
112-544		Record Changer Mounting Screw
139-71		Speaker Baffle.
166-13		Rubber Bumper



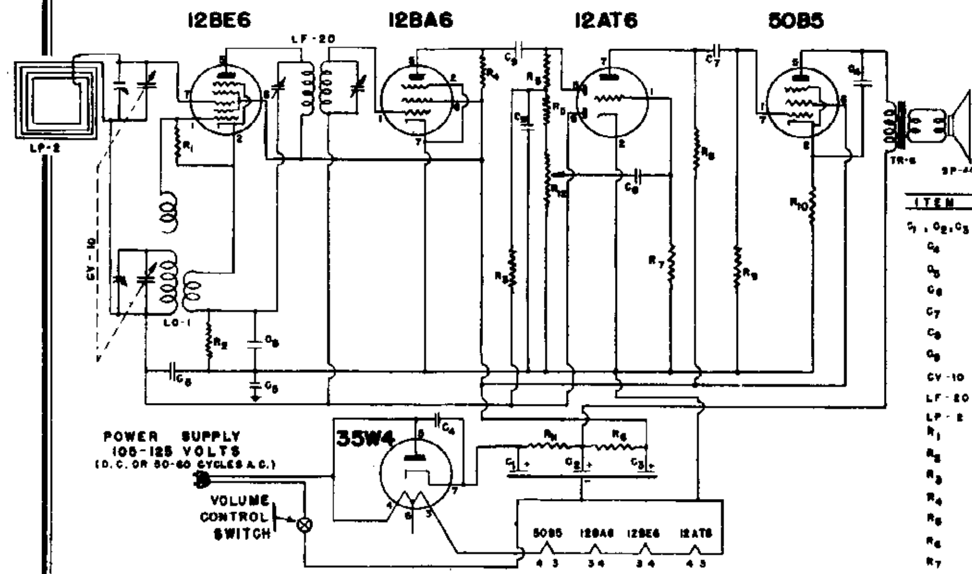
TUBE AND TRIMMER LOCATION

Chassis 6E02 has a Record Reject push button switch on the receiver control panel to reject records.
The socket P1 is used to connect the automatic record changer to the receiver.
The record player is connected to the receiver by a shielded cable and socket arrangement.
The Phono-Radio switch is a two position double acting push-button switch and when in the "in" position connects the changer for playing records.

ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 MFD	455 Kc.	1600 Kc.	C8, C9, C10, C11	Align I.F.
2	Single Turn Loop Loosely Coupled to Wavemagnet	------	1600 Kc.	1600 Kc.	C4	Set Oscillator to Dial Scale.
3		------	1400 Kc.	1400 Kc.	C2	Align Antenna.

AMBASSADOR DISTRIBUTING CORP.

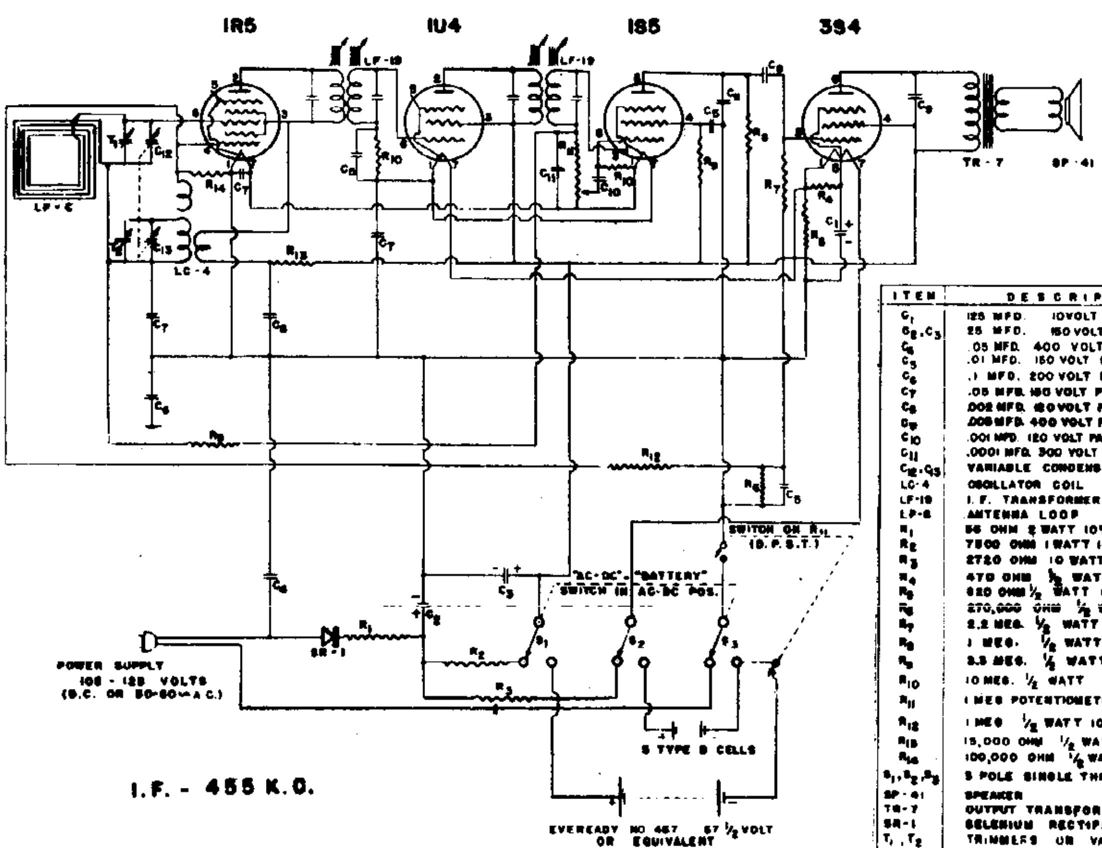


I.F. - 455 K.C.

ITEM	DESCRIPTION	PART NO.
C_1, C_2, C_3	3 X 20 MFD - 150 VOLT ELECTROLYTIC	CE - 11
C_4	.02 MFD - 400 VOLT PAPER CONDENSER	CP-203-1
C_5	.05 MFD - 200 VOLT PAPER CONDENSER	CP-503-4
C_6	.01 MFD - 400 VOLT PAPER CONDENSER	CP-103-1
C_7	.01 MFD - 150 VOLT PAPER CONDENSER	CP-103-2
C_8	.002 MFD - 400 VOLT PAPER CONDENSER	CP-202-2
C_9	.00015 MFD - 500 VOLT MICA CONDENSER	CM-151-1
CV-10	VARIABLE CONDENSER	CV-10
LF-20	I. F. TRANSFORMER	LF-20
LP-2	LOOP	LP-2
R_1	22,000 OHMS 1/2 WATT RESISTOR	RC-223-1
R_2	82 OHMS 1/2 WATT 10% RESISTOR	RC-820-1
R_3	2.2 MEG. 1/2 WATT RESISTOR	RC-225-1
R_4	6800 OHMS 1/2 WATT RESISTOR	RC-682-1
R_5	100,000 OHMS 1/2 WATT RESISTOR	RC-104-1
R_6	1500 OHMS 1 WATT RESISTOR	RC-152-4
R_7	10 MEG. 1/2 WATT RESISTOR	RC-106-1
R_8	220,000 OHMS 1/2 WATT RESISTOR	RC-224-1
R_9	470,000 OHMS 1/2 WATT RESISTOR	RC-474-1
R_{10}	150 OHMS 1/2 WATT RESISTOR	RC-151-1
R_{11}	150 OHMS 1 WATT RESISTOR	RC-151-4
R_{12}	VOLUME CONTROL 1 MEG. WITH S.P.S.T SW	VC-5
SP-40	SPEAKER	SP-40
LC-1	OSCILLATOR COIL	LC-1
TR-6	OUTPUT TRANSFORMER	TR-6

FREQ. RANGE - 530-1700 KC.
ALIGN AT - 1500 KC.
TRACE AT - 600 KC.

MODEL 144

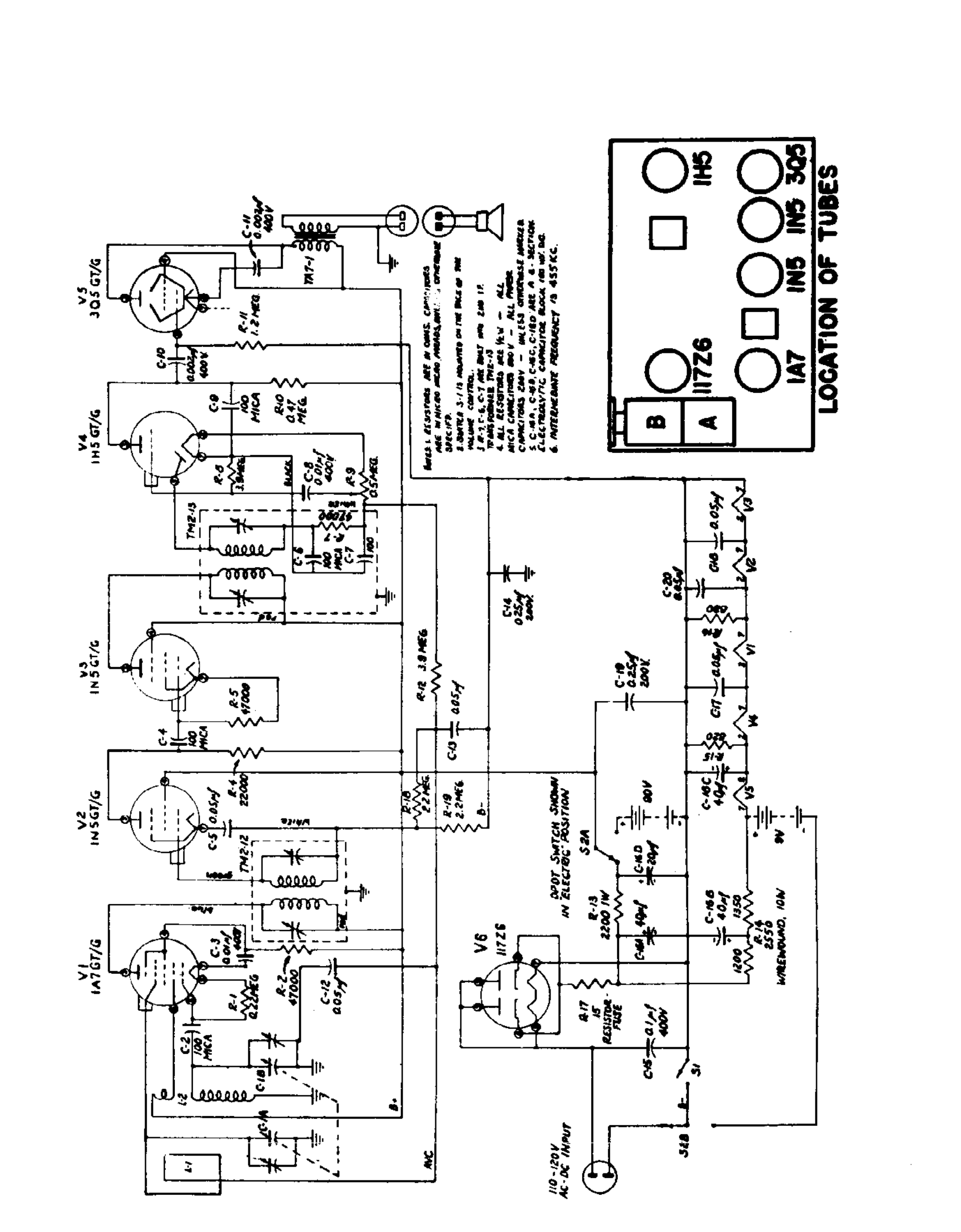


I.F. - 455 K.C.

ITEM	DESCRIPTION	PART NUMBER
C_1	125 MFD. 10 VOLT } ELECTROLYTIC	CE-12
C_2, C_3	25 MFD. 150 VOLT } CONDENSER	
C_4	.05 MFD. 400 VOLT PAPER CONDENSER	CP 503-1
C_5	.01 MFD. 150 VOLT PAPER CONDENSER	CP 103-2
C_6	.1 MFD. 200 VOLT PAPER CONDENSER	CP 104-2
C_7	.05 MFD. 150 VOLT PAPER CONDENSER	CP 503-2
C_8	.002 MFD. 120 VOLT PAPER CONDENSER	CP 202-1
C_9	.005 MFD. 400 VOLT PAPER CONDENSER	CP 502-2
C_{10}	.001 MFD. 120 VOLT PAPER CONDENSER	CP 102-1
C_{11}	.0001 MFD. 300 VOLT MICA CONDENSER	CM 101-1
C_{12}, C_{13}	VARIABLE CONDENSER	CV 10
LC-4	OSCILLATOR COIL	LC - 4
LF-19	I. F. TRANSFORMER	LF - 19
LP-6	ANTENNA LOOP	LP - 6
R_1	56 OHM 2 WATT 10% W.W. RESISTOR	RW 560-6
R_2	7500 OHM 1 WATT 10% RESISTOR	RC 752-5
R_3	2720 OHM 10 WATT 5% RESISTOR	RP - 1
R_4	470 OHM 1/2 WATT RESISTOR	RC 471-1
R_5	820 OHM 1/2 WATT 10 % RESISTOR	RC 821-2
R_6	270,000 OHM 1/2 WATT 10% RESISTOR	RC 274-2
R_7	2.2 MEG. 1/2 WATT RESISTOR	RC 225-1
R_8	1 MEG. 1/2 WATT RESISTOR	RC 105-1
R_9	3.3 MEG. 1/2 WATT RESISTOR	RC 335-1
R_{10}	10 MEG. 1/2 WATT RESISTOR	RC 106-1
R_{11}	1 MEG POTENTIOMETER WITH SWITCH	VC - 6
R_{12}	1 MEG 1/2 WATT 10% RESISTOR	RC 105-2
R_{13}	15,000 OHM 1/2 WATT RESISTOR	RC 153-1
R_{14}	100,000 OHM 1/2 WATT 10% RESISTOR	RC 104-2
S_1, S_2, S_3	3 POLE SINGLE THROW SWITCH	SW - 3
SP - 41	SPEAKER	SP - 41
TR - 7	OUTPUT TRANSFORMER	TR - 7
SR - 1	SELENIUM RECTIFIER	SR - 1
T_1, T_2	TRIMMERS ON VARIABLE	

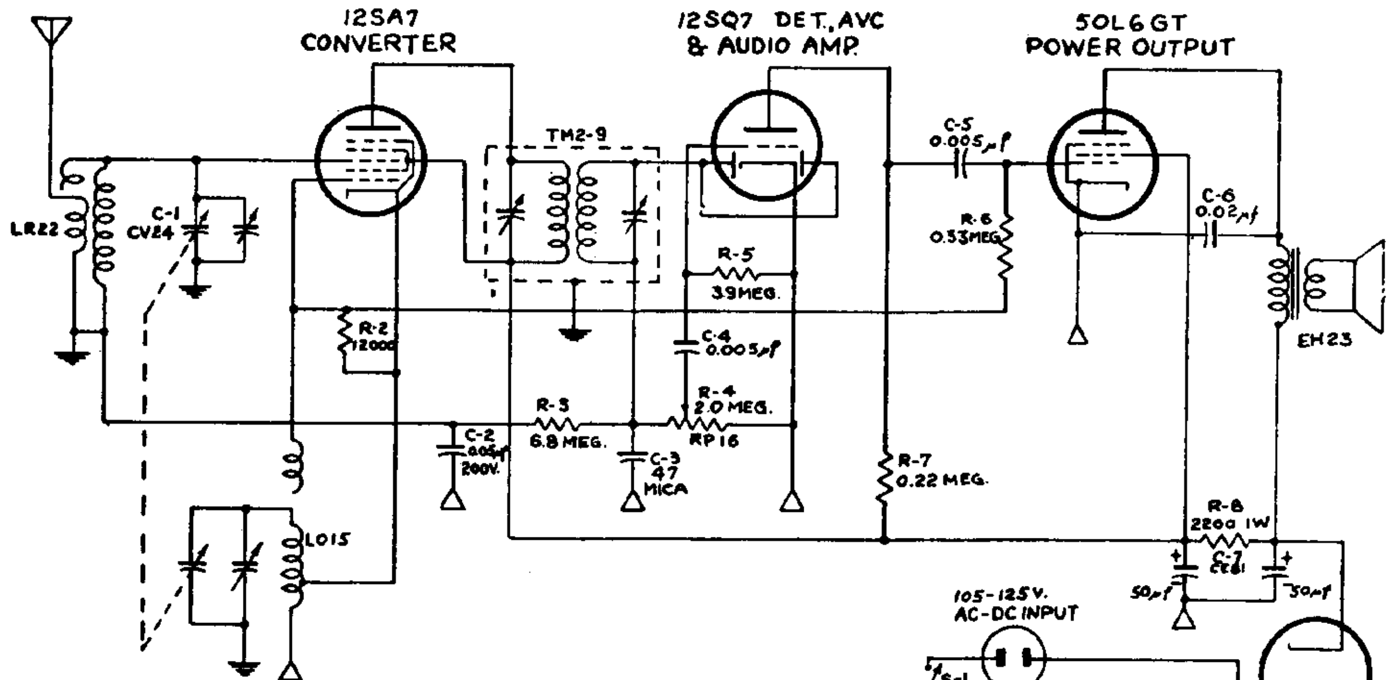
MODELS NUP, NU6

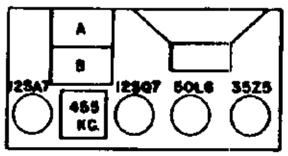
ATLAS SUPPLY CO.



COAST TO COAST STORES

MODELS MD28, MD





LOCATION OF TUBES

Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

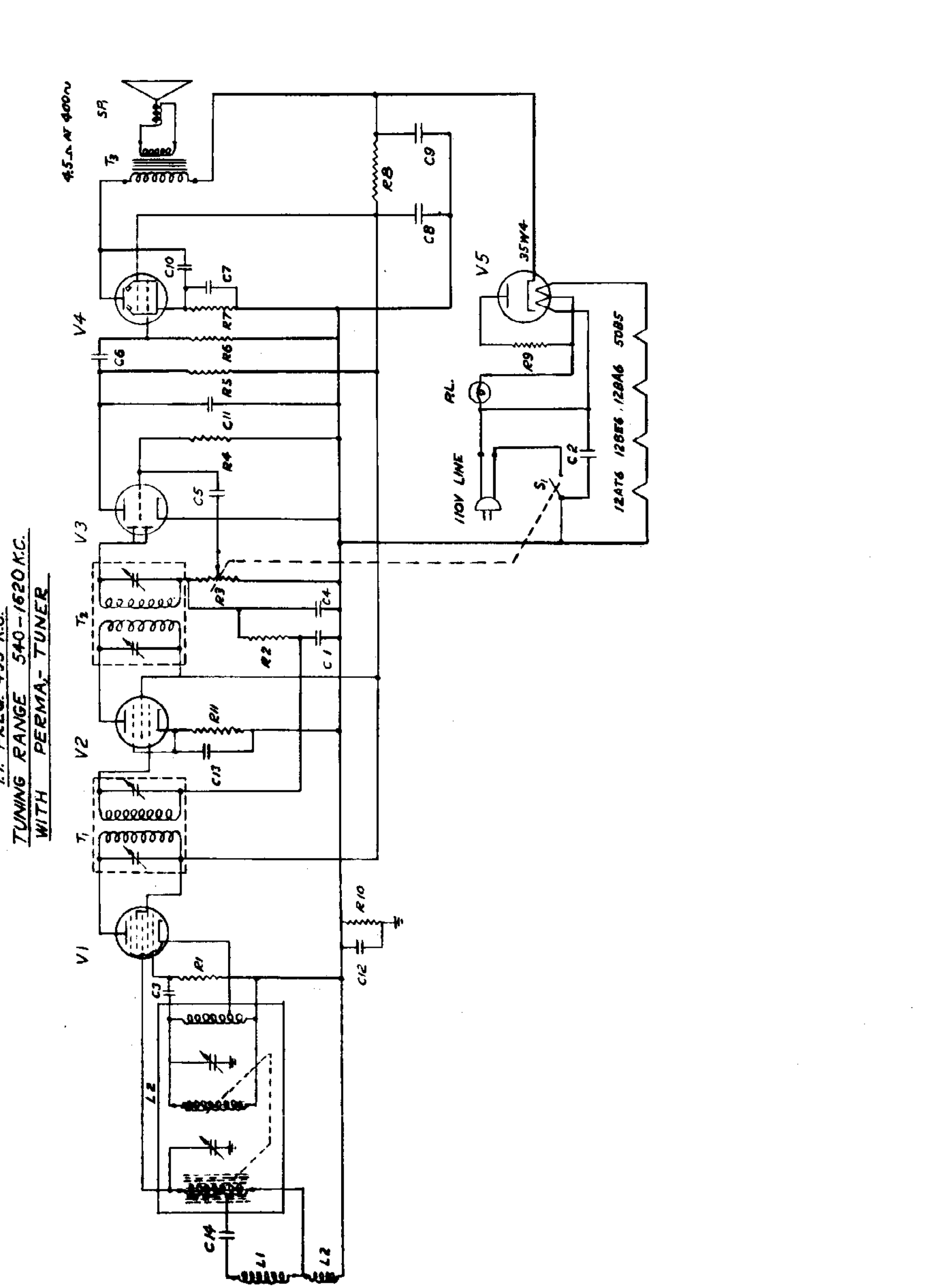
The **Signal Generator** may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug of RF section of tuning capacitor. Connect ground clip of generator to a convenient B-minus point such as one of the switch terminals on the back of the volume control. An output meter may be clipped directly across the voice coil lugs. Align the IF trimmers to 455 kc using least possible input from signal generator to avoid developing A. V. C. voltage which would make the tuning adjustments very broad.

To align RF trimmer, remove the 0.01 mf capacitor and connect the signal generator hot lead to a 68 mmf mica condenser. Connect the dummy antenna thus formed to the antenna lug on the antenna coil (lug to which the antenna hank is soldered). Again, use the least possible input from the signal generator. With the tuning capacitor plates completely out of mesh, and pointed at extreme clockwise position, adjust the oscilator trimmer on front section of tuning capacitor to 1700 kc. Readjust both signal generator and tuning capacitor to 1550 kc and adjust the RF trimmer on rear section for maximum response.

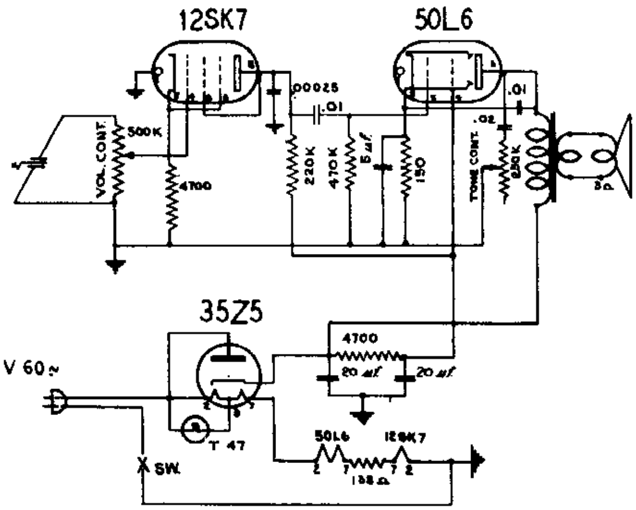
NOTES:

1. RESISTORS ARE IN OHMS AND ARE ½ WATT; CAPACITORS ARE 400V AND IN μf UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON REAR OF VOLUME CONTROL.
3. SYMBOL △ DENOTES B- AND SYMBOL ⏚ DENOTES CHASSIS.
4. I.F. FREQUENCY IS 455Kc.
5. TUNING RANGE IS 532Kc. TO 1700Kc.

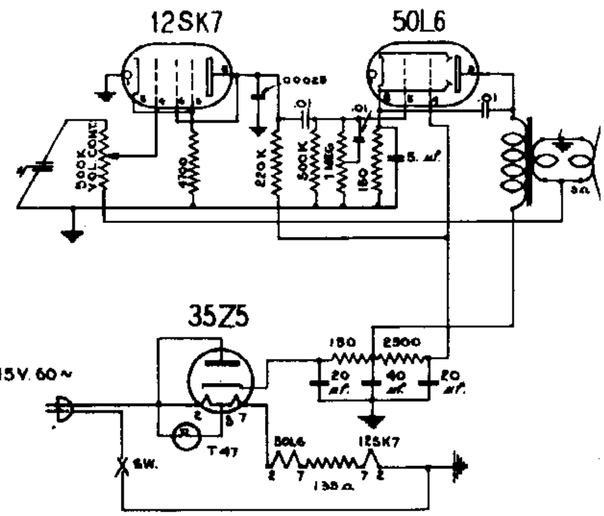
MODEL A6-C5389 DUAL ENGINEERING CORP.



ELECTROMATIC MFG. CORP.

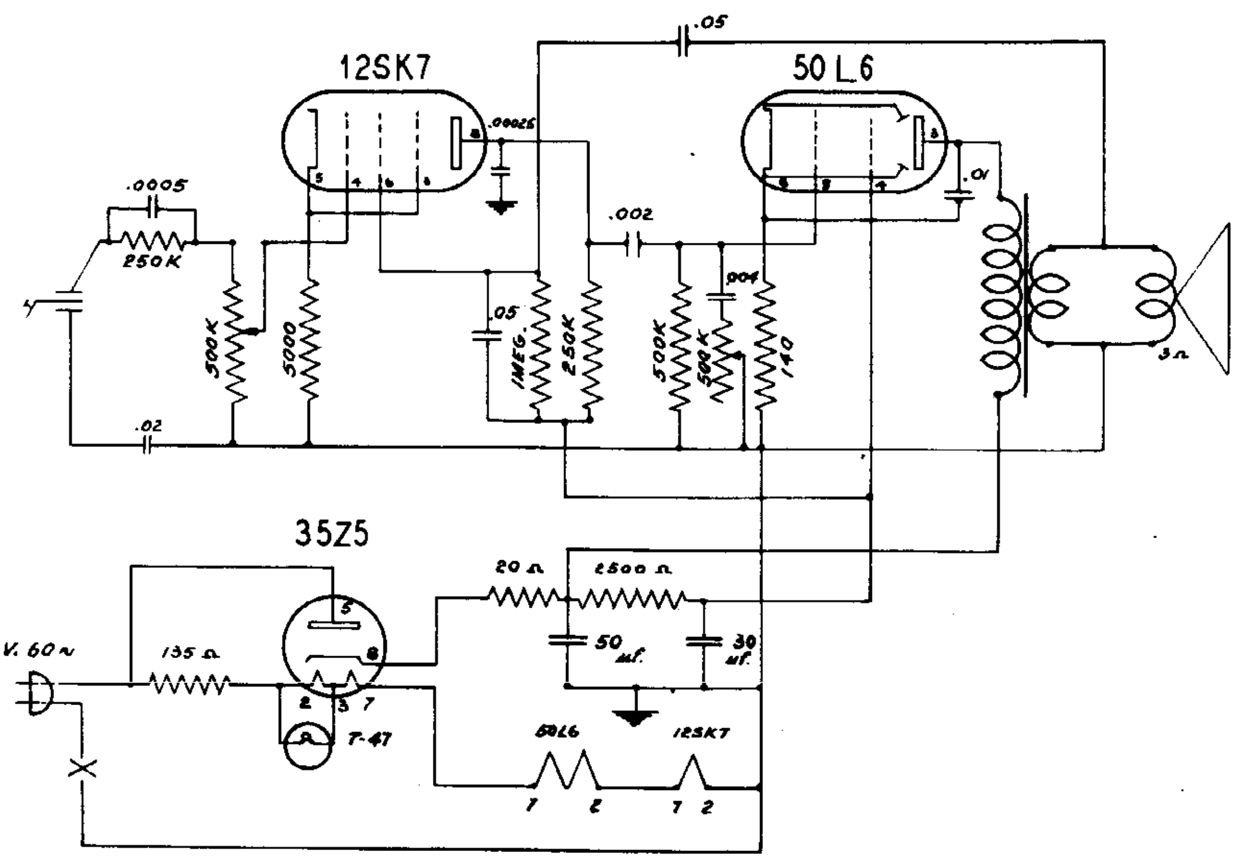


MODEL A.P.H. 301-A



5-8-46

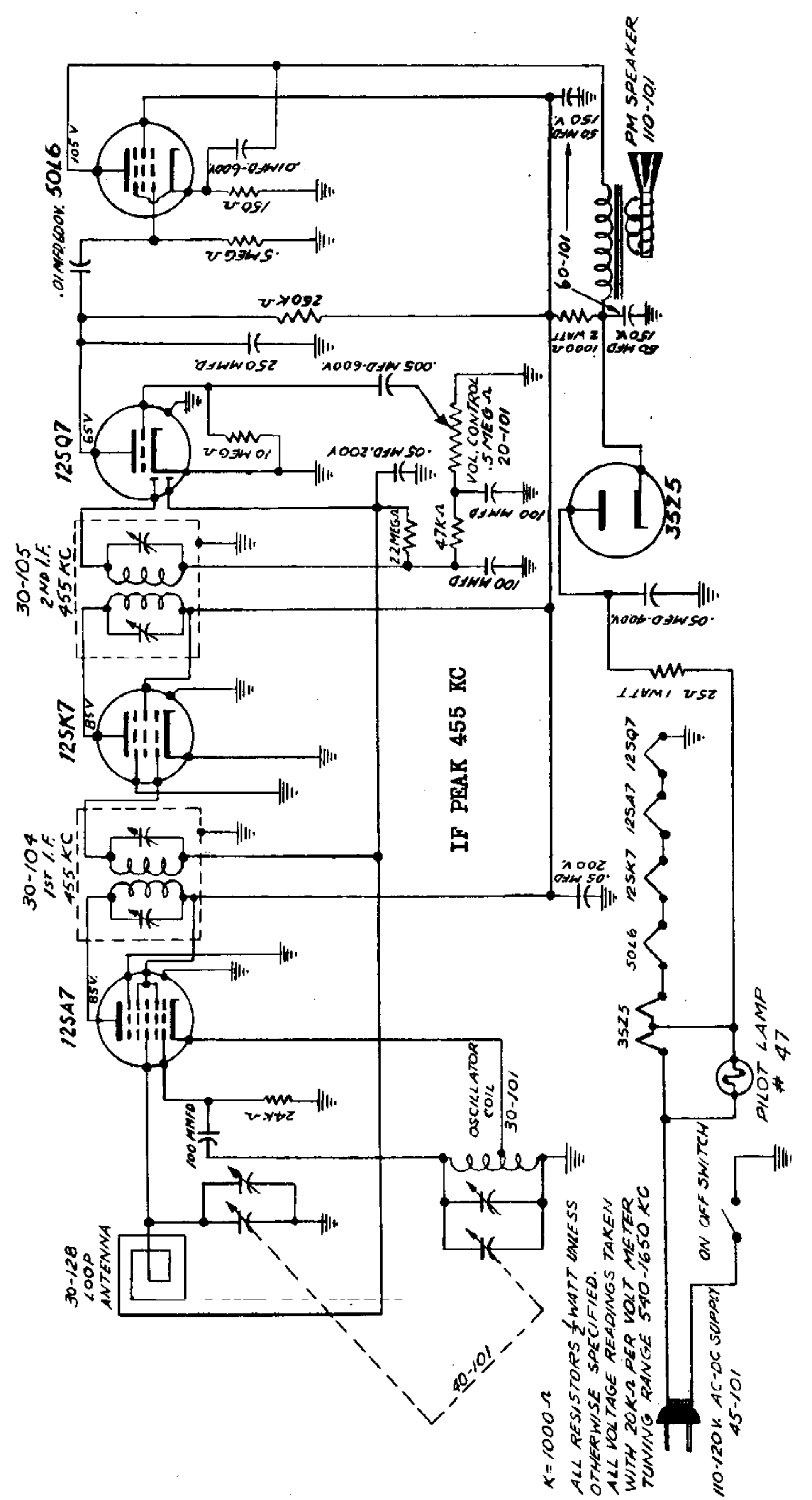
MODEL A.P.H 301-B



MODEL APH 301-C

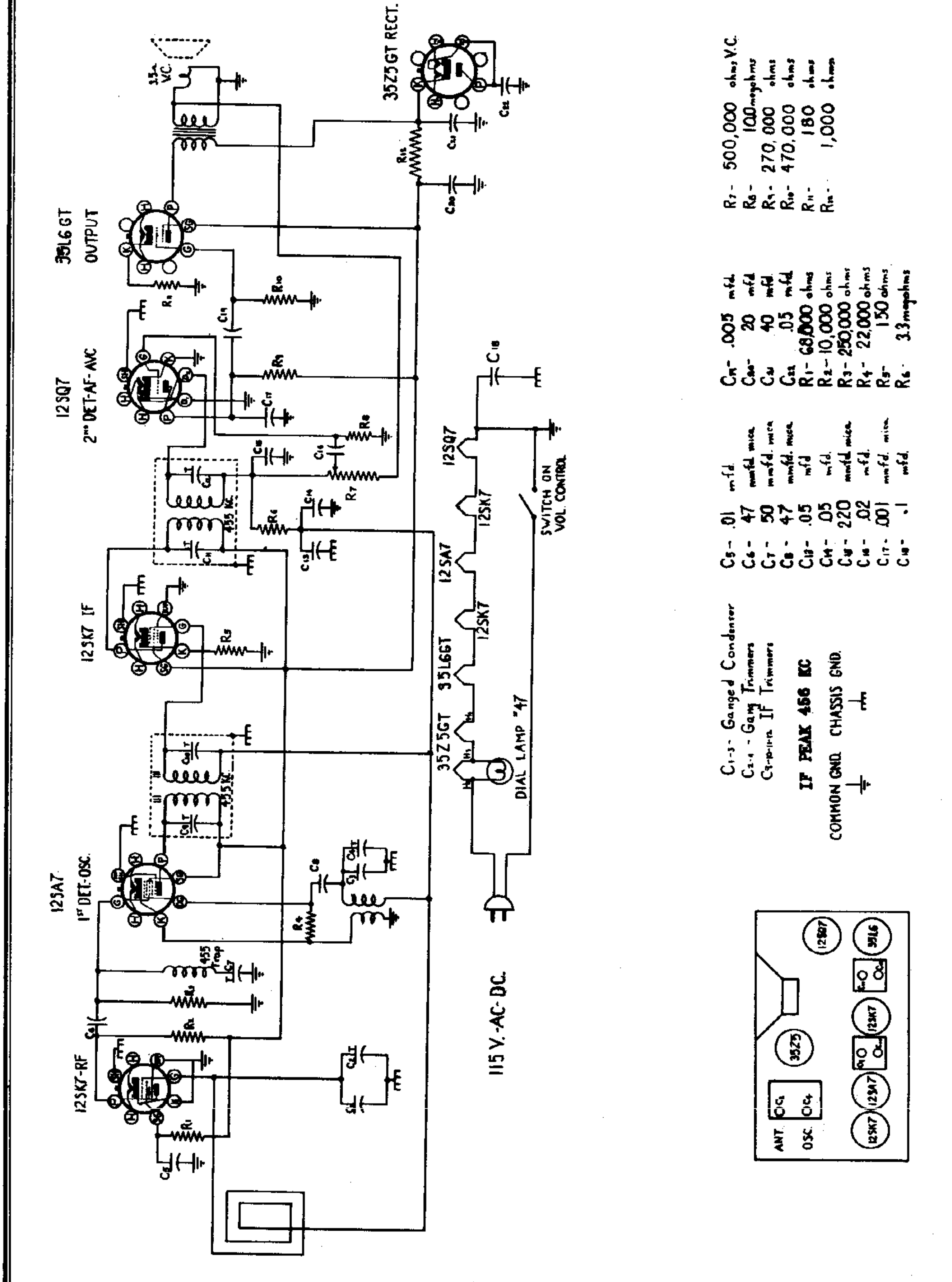
MODEL 205

W. T. KNOTT CO.



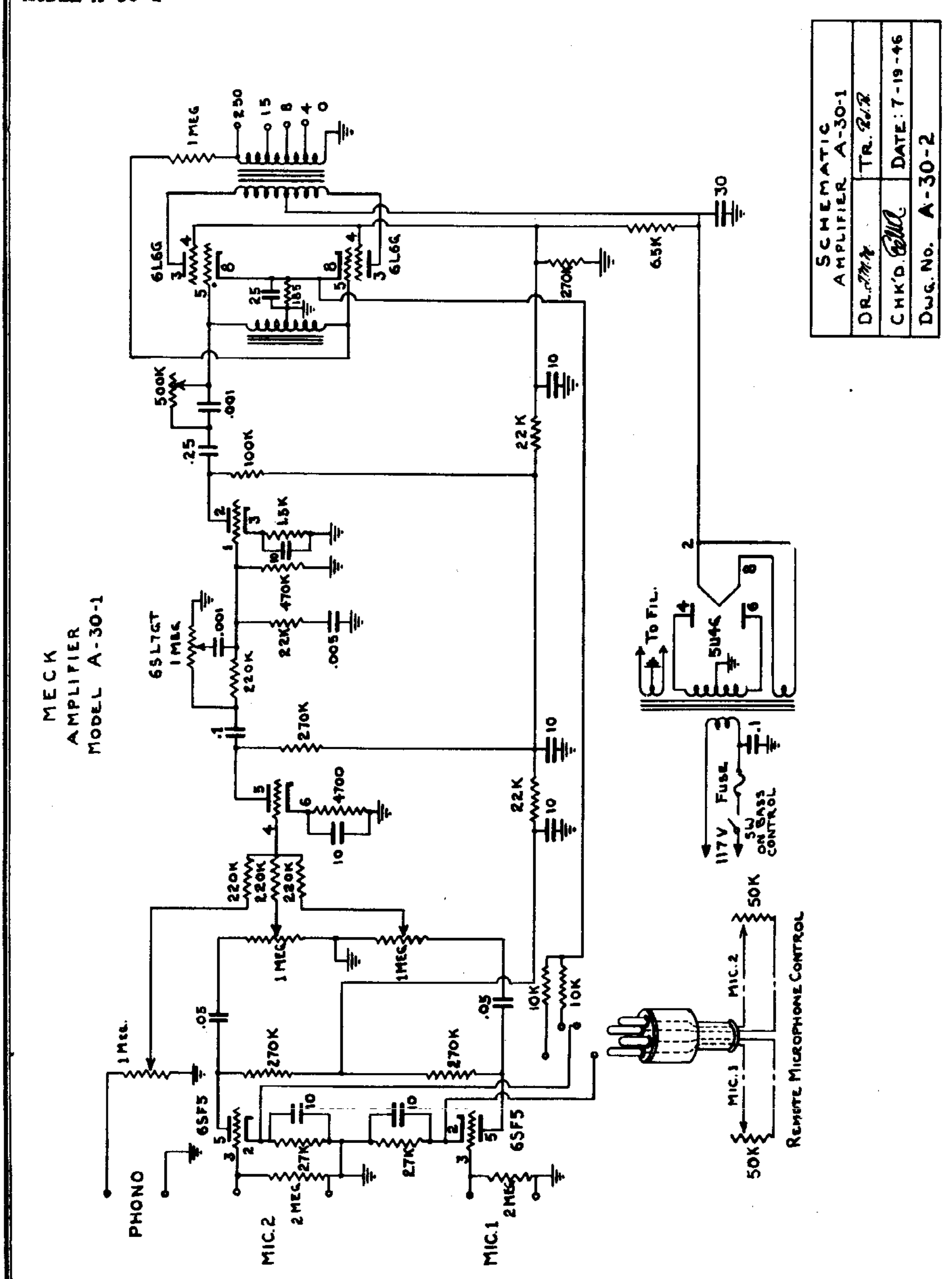
MAGNA ELECTRONIC CORP.

MODELS M300-6
M400-6

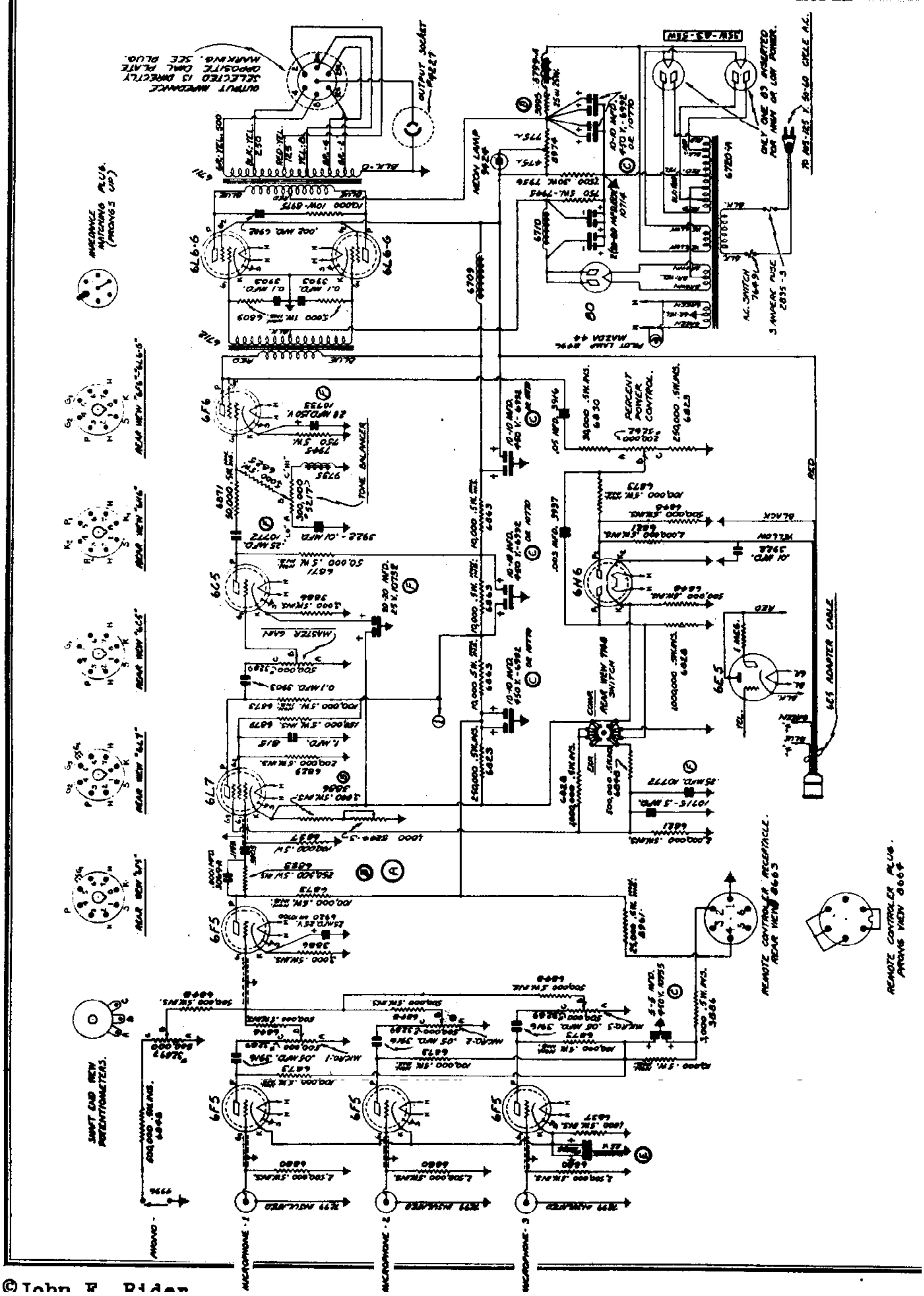


MODEL A-30-1

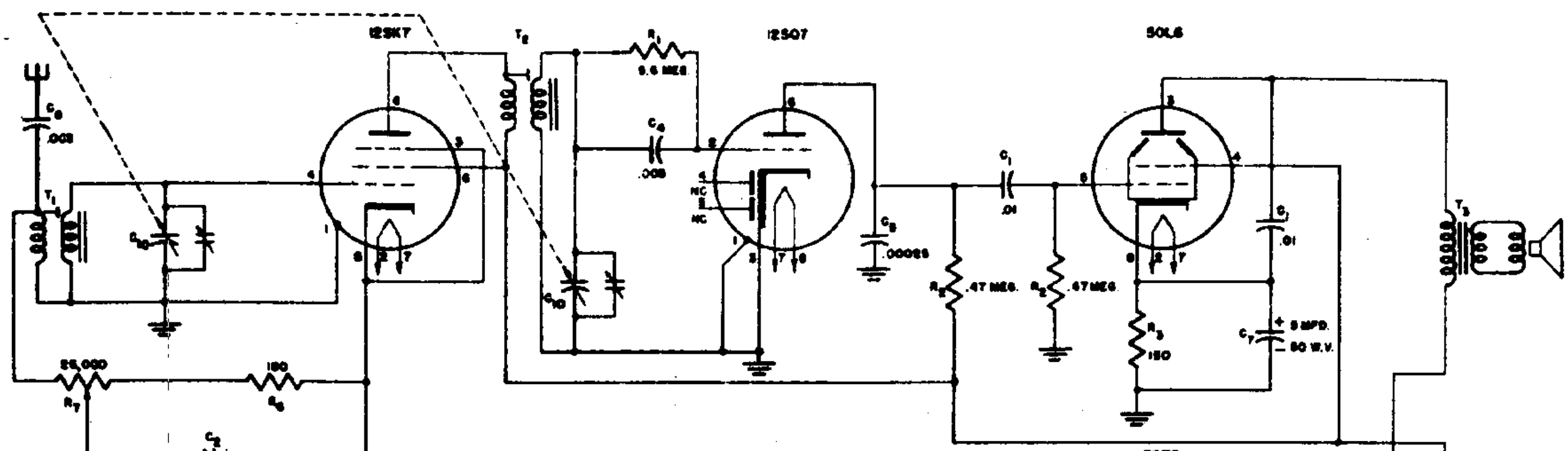
JOHN MECK IND., INC.

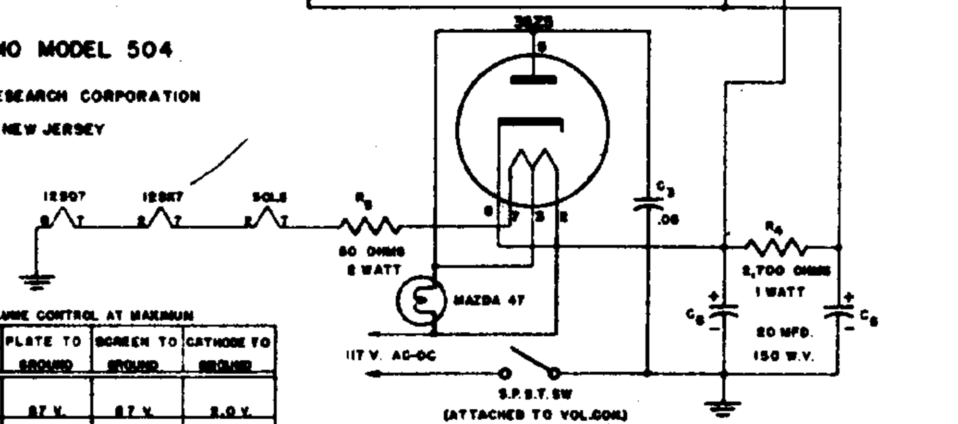


OPERADIO MFG. CO.



MODEL 504 RADIO DEVELOPMENT & RESEARCH CORP.

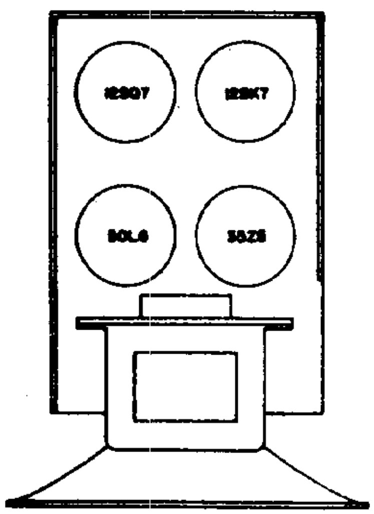




MAGIC-TONE RADIO MODEL 504

RADIO DEVELOPMENT & RESEARCH CORPORATION

JERSEY CITY, NEW JERSEY



LINE VOLTAGE 117 VOLTS A.C. VOLUME CONTROL AT MAXIMUM

TUBE			PLATE TO	SCREEN TO	CATHODE TO
OCTAL	———	TYPE	GROUND	GROUND	GROUND
12SK7	———	R.F. AMPLIFIER	87 V.	87 V.	2.0 V.
12SQ7	———	DETECTOR AMPLIFIER	50 V.	———	———
50L6	———	POWER AMPLIFIER	127 V.	87 V.	8.4 V.
35Z5	———	RECTIFIER	112 V.A.C.	———	127 V.D.C.

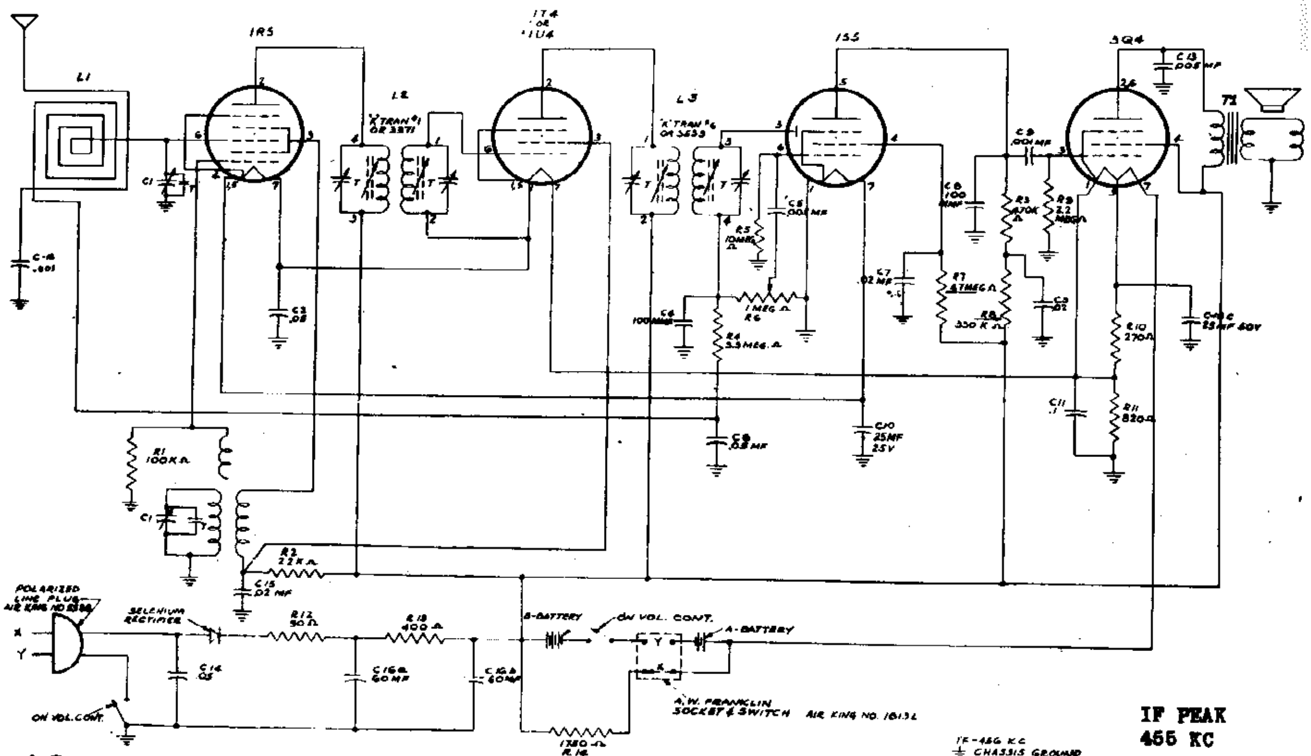
VOLTAGE READINGS TAKEN WITH 20,000 OHMS PER VOLT METER

ALIGNMENT INSTRUCTIONS CONNECT TEST OSCILLATOR IN SERIES WITH 0.0001 MFD. CONDENSER TO ANTENNA LUG. SET VOLUME CONTROL AT MAXIMUM AND TEST OSCILLATOR OUTPUT NO HIGHER THAN IS NECESSARY. WITH TUNING GANG CONDENSER AT MINIMUM CAPACITY SETTING ADJUST TRIMMERS FOR 1600 K.C. TUNE IN 1500 K.C. SIGNAL AND READJUST TRIMMERS IF NECESSARY FOR MAXIMUM OUTPUT.

LICENSE NOTICE

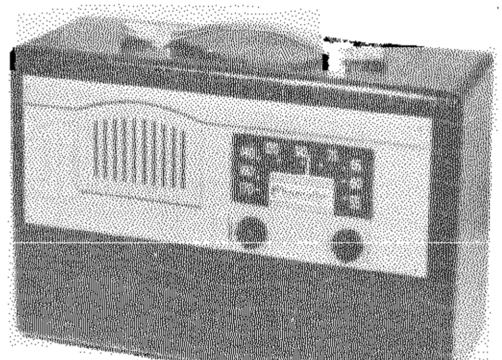
THIS APPARATUS USES INVENTIONS OF U.S. PATENTS LICENSED BY RADIO CORPORATION OF AMERICA.
PATENT NUMBERS SUPPLIED UPON REQUEST.
THIS DEVICE LICENSED UNDER PATENTS OF HAZELTINE CORPORATION.

RADIONIC EQUIPMENT CO.

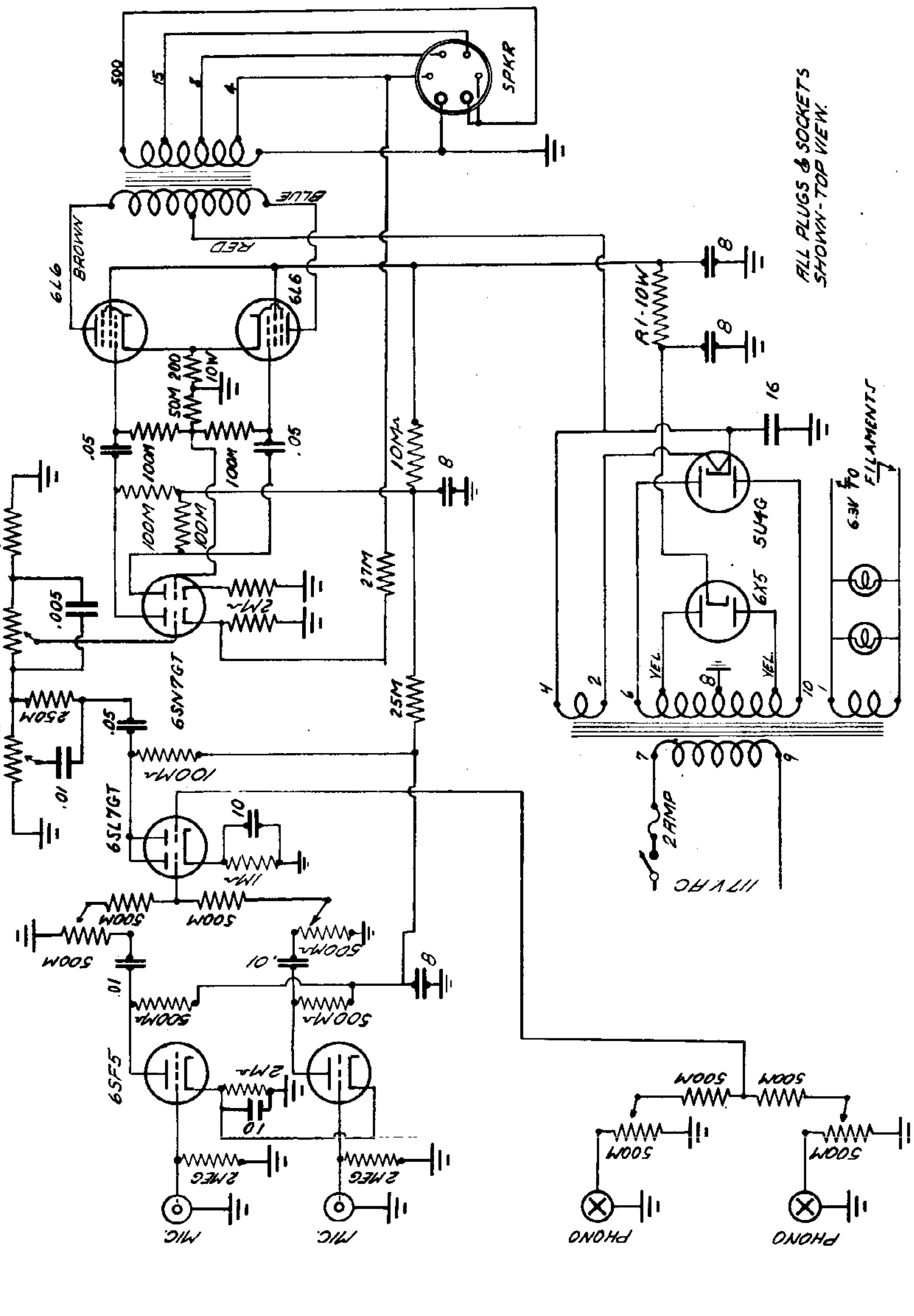


IF PEAK
455 KC

2481	Volume Control 1 meg w. switch (DPST)
	Resistors 270, 820, 8200, 100K, 330K, 470K, 2.2 meg
	" 3.3 meg, 4.7 meg, 10 meg, ¼ watt each
	33 ohms 1 watt
2177	Filter & filament dropping resistor
6011	Cabinet complete with carton and fittings
5899	Loud speaker 4" without transformer
5340	Backcover (without loop)
6246	Grille
4098	Dial crystal (mounted on grill)
39164	Knobs (brown)
	Instruction leaflet
1694	Variable condenser
2075	Electrolytic condenser unit (60, 60, 25)
20105	" " single 25mf 25 v.
28197	Oscillator coil
3371	I. F. transformer (input)
3535	I. F. transformer (output)
1337	Output transformer
28199	Loop
54309	Dial pan
54308	Tuning control bracket
4679	Drive shaft dial
5588	Line cord (polarized)
54325	Flag on-off
41106	Pointer
18131	Miniature tube socket
18130	" " "
18129	Battery cable plug
18132	Wafer switch

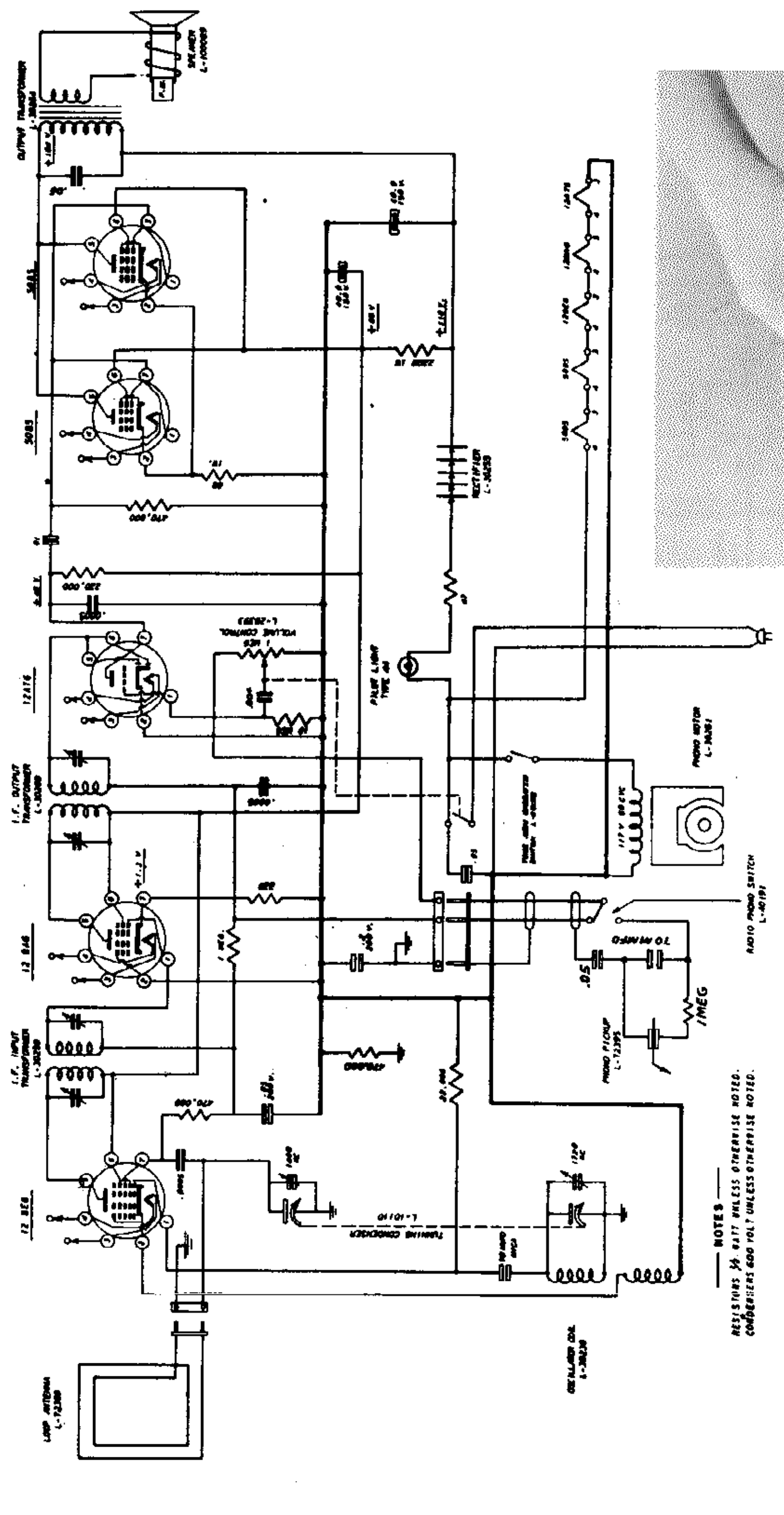


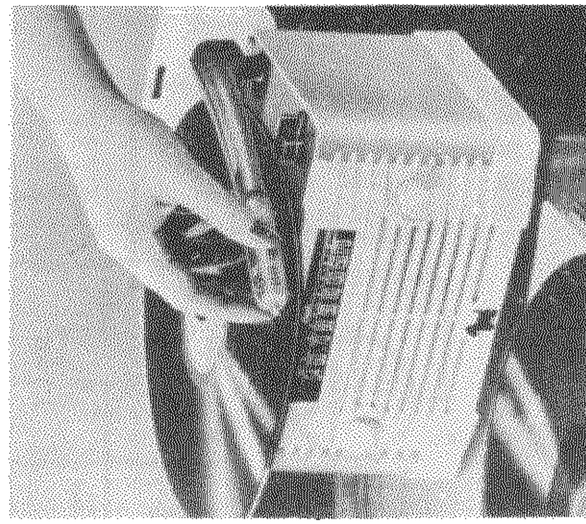
MODEL 35 RADOLEK CO.



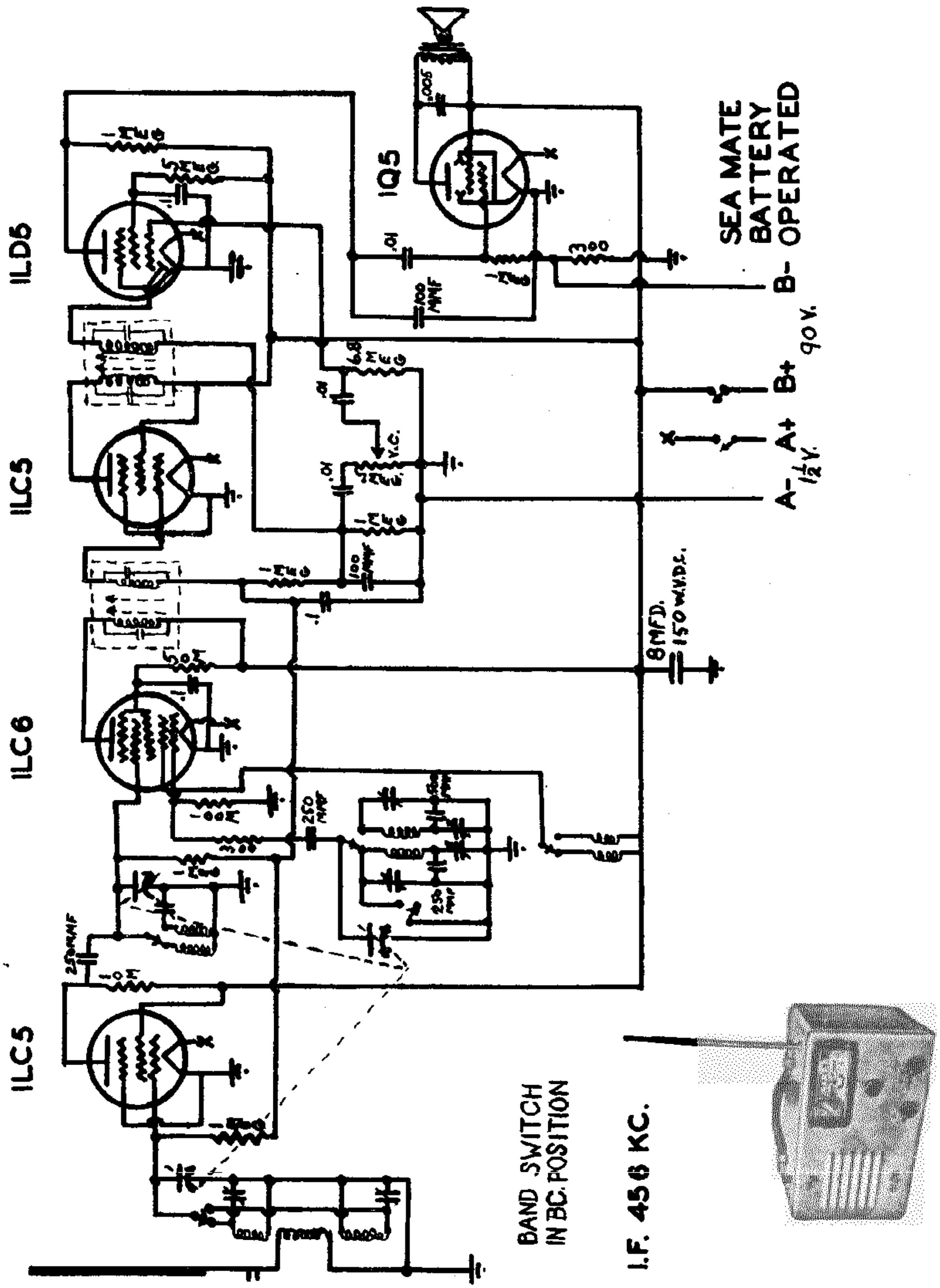
REMLER COMPANY LTD.

MODELS 5300B
5300BI, 5300



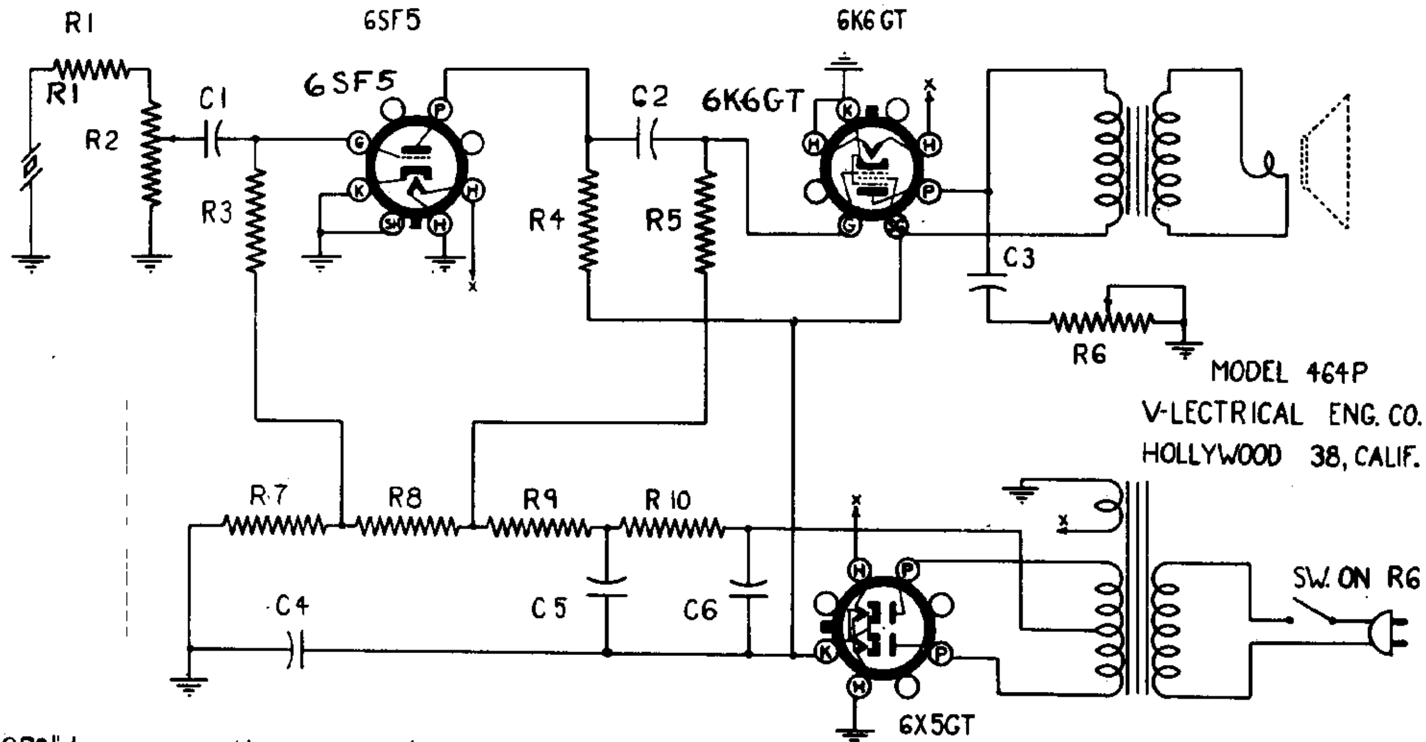


MODEL Sea Mate SOUNDVIEW MARINE CO.



V-LECTRICAL ENGINEERING CO.
WATTERSON RADIO MFG. CORP.

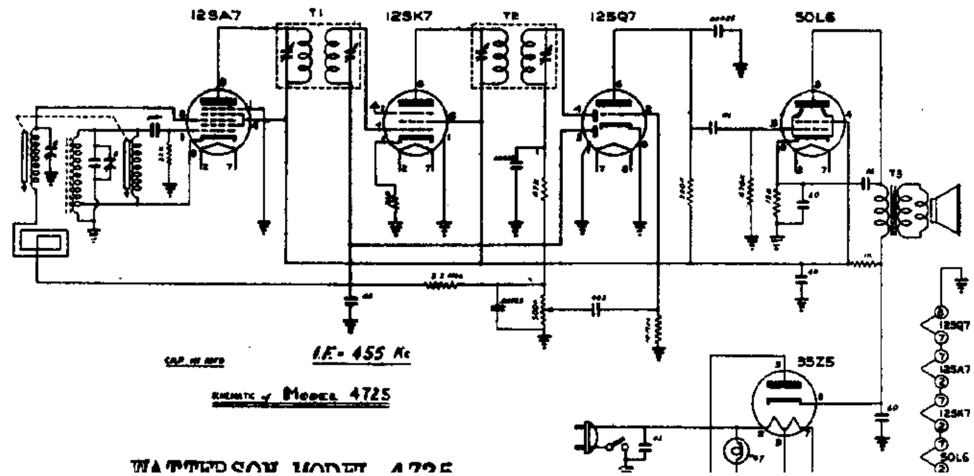
MODELS Z463, Z464
Model 4725



MODEL 464P
V-LECTRICAL ENG. CO.
HOLLYWOOD 38, CALIF.

RESISTORS				
R1 .5 MEG.	R5 1.0 "	R10 1000 "		
R2 .5 "	R6 50 K.OHM	CONDENSERS	C3 .05 "
R3 20 "	R7 50-OHMS	C1 .01 MFD.	C4 8.0 "
R4 .25 "	R8 330 "	C2 .01 "	C5 8.0 "
	R9 1000 "		C6 20. "

RECORD CHANGER: Webster Model 56,
RCD. CH. 15-10



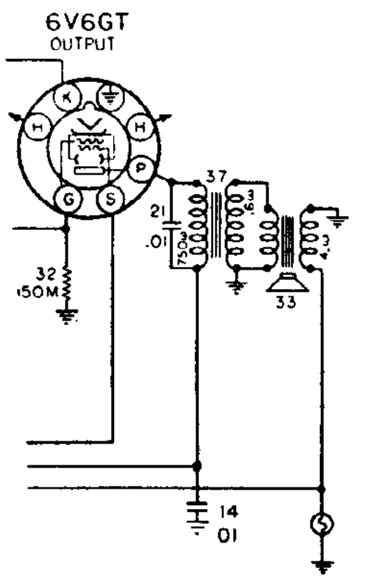
Ansley 32A

The model 32A is the same as the model 32, shown on *page 15-1, 2 of Rider's Volume XV*, with the following exceptions: the 240-ohm resistor connected to prong 5 of the plug is deleted as is also the 12-ohm resistor connected to the one just mentioned. The 10,000-ohm resistor that was in series with the deleted 12-ohm resistor is now connected to ground.

A permanent-magnet loudspeaker has replaced the dynamic speaker and the following changes have been made in this circuit: as there is now no field or bucking coils, the leads to these coils from terminals 1, 5, and 8 have been removed. Instead of the bucking coil (B.C. in the schematic), the voice coil is connected directly across the secondary of the output transformer.

Chevrolet 985792

In the production of this model between serial numbers B46-130000 and B46-136522 the following changes have been made: the 22,000-ohm resistor, 24, has been changed to 33,000 ohms; and the 0.01 μf capacitor, 14, has been moved



Partial schematic of Chevrolet 985792 showing changes.

from between the 33,000-ohm resistor, 25, and ground to the primary of the output transformer, 37, which is connected through the capacitor to ground, as shown in the accompanying illustration.

In the production of this model starting upward with serial number B46-136523, the 6SA7GT oscillator-translator tube has been changed to a type 7Q7. The voltages shown in the bottom view of the sockets on *page 13-2 of Rider's Volume XIII* are the same for the 7Q7 as for the 6SA7GT, except that the socket prong designations have been shifted.

Starting upward with serial number B47-1001, the tube complement is changed with the exception of the 7Q7 and the 0Z4G tubes. The i-f tube is changed from a 6SK7GT to a 7A7; the 6SQ7GT detector is changed to a 7B6, and the output tube is changed from a 6V6GT to a 7C5. The voltage readings on these tubes are the same as those noted above with the exception of the reading on the cathode of 7C5 which is 4.5 instead of 9.5 volts.

The early production schematic appears on *page 13-1 of Rider's Volume XIII.*

Crosley 56PA, 56PB

Recently it has been discovered that some of the models 56PA and 56PB radios, shown on *page 15-29 of Rider's Volume XV*, are more efficient on power line operation than they are on battery operation. This condition may exist in certain areas, even though the batteries are in good condition.

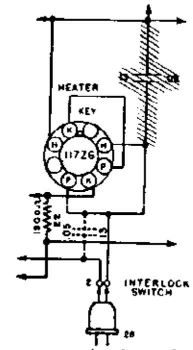
If a condition of this nature is encountered in your area, it is suggested that one lead wire of the 0.05-μf capacitor, which is item 13 in the schematic, should be disconnected from the terminal strip. This lead wire should be extended, covered with sleeving, and attached to the red wire in the interlock switch, as shown in Fig. 1.

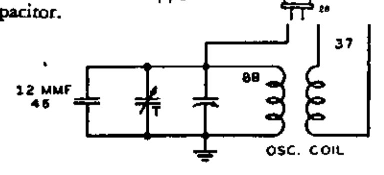
In a later production of these models, a 1U5 tube has been substituted for the 1S5 Det.-AVC, 1st A.F. Amp. tube. All components connecting to the tube remain the same; the only difference occurs in the wiring to the tube socket.

Capacitor (15) which was formerly connected across the output transformer (5), is now connected from the plate pin 2 to F+ pin 7 of the 3S4 output tube.

A 12-$\mu\mu$f capacitor (46) part No. C-137727-13 has been added across the oscillator tank circuit as shown in Fig. 2. The ground from this tank circuit was inadvertently omitted from the schematic diagram shown in Volume XV.

Fig. 1, right. The changing of a lead of item 13 in the Crosley 56PA, 56PB in some cases gives more efficient operation from power lines than from batteries. Fig. 2, below. The ground symbol in the oscillator tank circuit was omitted from the original schematic and should be inserted on Crosley *page 15-29* and also the added 12-$\mu\mu$f capacitor.





Emerson 512, 515, 516, 550, Chassis 120006, 120056

These models incorporating tl 120006 chassis are the same as mod 512 shown on *page 15-11 of Ride Volume XV*. These models using tl 120056 chassis are the same as tho mentioned above, except for the repla ing of the octal tubes with the followi loctal tubes:—7B7, 14B6, 14Q7, 50A and a 35Y4. The circuit diagram a the voltage readings remain the san except for the base pin numbers.

Emerson 550, Chassis 120,006

This model is the same as models 51 515, and 516, chassis 120,006, shown *pages 15-11 and 15-12 of Rider's Volun XV.*

Electronic Laboratories 2701, ISSUE

This model from serial number 211 001 and up, is similar to the 2701 receiv shown on *pages 15-1 and 15-2 of Rider Volume XV*, except for the followir changes:

A 27-ohm 10-watt wire-wound resi tor, part W-284C has been added to tl filament line, between pin 7 of tl 35Z5GT/G rectifier and pin 2 of tl 50L6GT/G output tubes.

In the alignment procedure for a fr quency setting of 700 kc, the followir note has been added in the last columr If more than one turn is required, tl trimming 1400 kc should be repeated an the 700 kc padding of the tuning co also repeated until correct alignment h been reached.

Farnsworth ET-061

The following information is of us to those who have experienced findin turned-up edges in the cabinet of th Farnsworth model ET-061:

The Dynox or simulated wood wra around has a tendency to curl at the edg on early shipments of some table model This can usually be firmly recemented b applying a heated dull knife blade b tween the Dynox and the cabinet. Th heated blade should then be applied the outside surface of the Dynox pressin it firmly against the cabinet. It will hel to stroke the blade toward the edge the Dynox while applying firm pressur Care must be used to see that the knif blade is not hot enough to burn or di color the finish of the Dynox.

FARNSWORTH ET-069

The Farnsworth Model ET-069 is tl same as the Farnsworth Model ET-06 except that Model ET-069 uses cabin No. H-247 and knob No. 59423. Tl schematic for the ET-066 is found o *page 15-5 of Rider's Volume XV.*

Farnsworth P-51 Record Changer

The following procedure is required if it is desired to convert a 60-cycle-operated record player to 50-cycle operation:

50-cycle wire drive pulley #64401 replaces the 60-cycle metal pulley #55274 on the General Industries motor.

50-cycle wire drive pulley #64402 replaces 60-cycle wire pulley #64415 on General Industries motor.

50-cycle wire pulley #64399 is placed over 60-cycle nonremovable metal pulley on the Alliance motor.

50-cycle wire pulley #64410 replaces 60-wire pulley 64414 on Russell motor.

There have been many questions asked in reference to some suggestions pertaining to the satisfactory operation of this record changer. Below is a compiled list of service hints that may help you to understand and to correct certain faults in the operation of this changer:

Oversize Record Problems

An oversize record may bind between record plunger and spindle during changer cycle. To correct this condition to enable playing oversize records, loosen the three screws which hold the record support post to base plate and insert a 0.042 shim, #37269 underneath the front edge of the record support post (the edge toward turntable). The mounting screws may then be tightened.

If, after making sure the 10- and 12-inch needle landing adjustments are set correctly, the needle when moving in strikes the edge of the stack (especially when there are 6 or 8 records on the turntable), the tone arm lift rod adjustment is set too low to clear the record stack. Setting this adjustment to clear 12 records will eliminate this trouble.

On the early production run of P-51 changers, the plastic record support post was molded with a decorative ridge running vertical with the record support post. It was found that an oversize 12-inch record would rub this ridge. Two methods are suggested to correct this condition.

1. A small portion of the ridge may be removed with a file.
2. A part #36118 washer may be placed under the turntable. This positions the turntable slightly higher, thus clearing the ridge. The later production changer has a portion of this ridge removed.

Some complaints have been received of more than one record dropping at a time. Two causes can be attributed to this condition.

1. Failure of customer to lift the record stack clear of spindle, thus not allowing latch to drop down before setting records back over spindle.
2. When the record stack is removed, the spindle latch may remain in the up position due to a burr on the latch, insufficient lubrication of latch, latch pin fitting too snug, or latch itself being bent. To function correctly the latch must always point down when records are placed over the spindle.

"Wows" may be caused by (1) worn idler pulley, (2) C-washer under turntable slipped to one side, (3) insufficient lubrication between turntable spindle and turntable drive shaft, (4) bent spindle or bent turntable drive shaft.

The correct spacing for the friction trip assembly is 0.012 inch. The spacing between #50204 and the underside of the base plate should be 0.008 inch. Although in actual operation this spacing is between the under side of the base plate and the upper cork washer, it is important that the adjustment be made by inserting an 0.008 feeler gauge on top of the tone arm support post and under the tone arm support bracket.

Excessive click may usually be stopped by using an extra part #60438 spacer on the starting lever assembly. This should be installed on the under side of the starting lever assembly making a total of two washers on the under side and one on the upper side of the starting lever assembly. A part #62086 starting lever bumper that is worn down to the metal, will also cause click. This may be corrected by replacing with #07329 starting lever assembly.

If changer fails to trip or reject a record, when record selector switch is placed in reject position, the following parts should be checked:

1. Check trip lever for position in relation to trip finger spring. The trip lever should be on the left side of the spring as viewed from underneath changer and with record support post nearest you.
2. If insufficient tension is applied to friction trip assembly, the trip finger may assume a position low enough to strike the ejector pin. This pin is located on the edge of main cam and is the pin with the largest diameter. Adjustment of tension on friction trip assembly should correct this condition. If, however, the trip finger has become bent, it will require reforming before satisfactory operation is obtained. When set correctly, the trip finger will clear the ejector pin but will strike the starting lever bumper.

All necessary notes and pictures pertaining to this Farnsworth record changer are found in *Rider's Volume XV*, beginning with *RCD. CH. page 15-1.*

FARNSWORTH P-51 RECORD CHANGER

In the Farnsworth P-51 record changer a number of changes have been made in the parts numbers which are listed below:

561321	Shelf Post part number changed to 04050.
59166	Escutcheon part number changed to 04051.
37067	Flat Washer is obsolete in later production changer.
36845	#10 Flat Washer is obsolete.
561312	Spring is obsolete.
2017-005	Flat Washer is obsolete.

The following is a list of parts that were not originally identified:

36347	Drive screw fastens escutcheon to baseplate.
36847	Drive-lock pin is used in record shelf crank assembly.
36849	Hairpin cotter is used at bottom of stationary spindle.
36934	H. P. Cotter is used on A-C switch shaft.
561348	Spacer is used under stud mounting tone arm return lever No. 561355 and mounting nut.
561349	Spacer used with rejector lever.
64324	Small tension coil spring used to keep the tone arm from moving back over the record after last record has finished playing.

The original parts list for this record changer is found on *RCD. CH. page 15-12* of *Rider's Volume XV*.

Farnsworth P-52, P-57 Record Changers

Model P-52 is the same as P-51 except that the tone arm and P.C. escutcheon are different and that the Astatic L71 crystal pickup is used. The P-57 is the same as the P-52 except for the positive trip.

Firestone 7423-6

This model is the same as model S7398-1 shown on *page 13-14 of Rider's Volume XIII.*

Fada 602

This model, shown on *page 15-1 of Rider's Volume XV*, also uses the Milwaukee-Erwood 10700 Series Record Changer, which is shown on *page RCD.CH. 15-1 of Rider's Volume XV.*

GE 417A

This model appears on *pages 16-17 to 16-20 of Rider's Volume XVI.* The i-f transformers T-8 and T-9 are indicated as having terminals. They actually have leads coming out. For T-8: blue goes to the plate of V4, red goes to B+, green goes to grid of V5, and black goes to ground. For T-9: blue goes to plate of V4, red goes to B+, green goes to grid of V6, orange goes to junction of R16 and R27, and black goes to ground.

Farnsworth Models

The parts shortage has resulted in the substitution of various types of tuning capacitors without change in part numbers stamped on them. In ordering replacement tuning capacitors for ET-060, 061, 063, 064, 065, 066, 069; EK-263, 264, and 265 the following suggestions should be observed:

Gang Capacitor with 21 plate oscillator section requires the removal of trimmer from r-f section of gang if the loop antenna has a r-f trimmer located on it. This capacitor used B.C. oscillator coil #38483 and, if an S.W. oscillator coil is used requires S.W. oscillator coil #38549. Both of these coils have a white dot to indicate finish lug.

A #26239 gang capacitor with 19 plate oscillator section (identified by red dot on rear) may require the removal of r-f trimmer as explained above. This capacitor requires B.C. oscillator coil #38706 and S.W. oscillator coil (if used) #38709. These oscillator coils are marked with a yellow dot at the finish lug.

The following is an alignment hint for the Farnsworth models with respect to the use of the antenna:

The antenna should be held in a vertical position, ⅛ inch from the back side of the radio chassis in order to maintain the maximum output of the antenna after being installed in the cabinet. Therefore, we suggest some type of a jig to be made out of scrap material found around the service department to hold said antenna in the proper position while the serviceman is realigning the radio out of the cabinet. This suggestion is very helpful in getting the best operation out of the radio and, in addition, saving expense and time.

GALVIN DIAL CORD SLIPPAGE

Dial slippage encountered in 1946 home sets using slide rule type dials can easily be remedied by restringing using two dial cords.

Formerly, a single cord and tension spring was used for both driving the tuning capacitor and moving the pointer. It is recommended that two cords and tension springs be used; one for driving the tuning capacitor and one for moving the pointer.

Before removing the old cord, make a sketch showing the old cord layout. This will assist greatly in restringing.

First install the drive cord between the tuning shaft and tuning capacitor pulley. It is to be routed in exactly the same manner as the old cord was, except run it only between the tuning shaft and tuning capacitor pulley. Be sure to wind 3 turns around the tuning shaft. The old tension spring is used to provide tension on the cord by hooking in exactly as before. Use the cord originally on the set for this purpose, except cut it down to the required length.

Install the pointer cord supplied by routing it in the same fashion as before except that it does not go to the tuning shaft. Simply run it to the tuning capacitor pulley and apply light tension to it with the attached tension coil spring. There are several holes in the tuning capacitor pulley through which the tension spring may be hooked and/or adjusted.

To calibrate pointer, simply turn the tuning capacitor to the fully meshed position and set pointer to "V" notch or calibration mark provided.

Use a drop of household cement to fix pointer to cord. A drop of cement on all knots will secure them.

Gamble-Skogmo 43-7601, 43-7601A, 43-7601B

These models, shown on *pages 16-1 to 16-5 of Rider's Volume XVI*, use the General Instrument Record Changer model 205, which can be found on *pages RCD.CH. 15-5 to 15-8 of Rider's Volume XV*.

General Electric 250

To reduce the hum in this model, which is found on *pages 15-32 to 15-36 of Rider's Volume XV*, it is suggested that the following change be made.

Resistor R16 (2200 ohms) should be removed from the negative battery terminal lug, lengthen pigtail, insulate with a spaghetti covering, and solder to the ground lug of the terminal board located at socket saddle of the 1LH4 tube.

An appreciable increase in duration of operation from a fully charged battery in this model can be effected in the following manner, realizing, however, that some degree of performance is sacrificed in regard to sensitivity and power output. Replace power-supply filter resistor, R17 (1500 ohms) with one of 4700 ohms, 1 watt, carbon. This change should be made only when the customer demands a longer duration of operation to one battery charge.

Hallicrafters S-38

In the event that an a-c hum develops in this receiver, the schematic of which appears on *page 15-59 of Rider's Volume XV*, it has been found that the 35Z5GT is the cause of the trouble, even though the tube passes a normal test. Also, other tubes in this set have been known to cause hum. Try replacement tubes.

Another cause is a high resistance ground between the chassis and the case. This usually develops through the rubbe[r] mounting grommets or through the switc[h] mounting rivets. Occasionally it may b[e] a defective 25-μf capacitor (C36), whic[h] should be replaced if defective. It is pos[-]sible that C36 is not of the correct valu[e]. Check this point.

If this set loses sensitivity after bein[g] in use for approximately a half hour replace the 12SA7GT/G tube, as an in[-]vestigation has revealed that this condi[-]tion is due to a certain percentage o[f] Hytron tubes of this type, of a particula[r] production run marked 1/6, 2/6, 1A6, o[r] 2A6. The replacement should have an[y] other marking than those listed previ[-]ously.

Hallicrafters S-40

In the event that band 4 (15.7 to 4[?] mc) fails to operate at all times, bu[t] reception on other bands is normal trouble is indicated in the oscillator cir[-]cuit of this band, which in most cases ca[n] be traced to a weak 6SA7 oscillator tub[e] or low line voltage. In those few case[s] where trouble persists, even though al[l] voltages are normal and the tube has bee[n] replaced, this trouble can be remedie[d] by replacement of the oscillator coil T[9] and capacitor C18, as follows:

Replace T9 oscillator coil, par[t] #51B791 containing 7 primary turns with part #51B791B, having 10 primar[y] turns. Change capacitor C8 (100 $\mu\mu f$) to part #CC25UK680K, 68 $\mu\mu f$. Con[-]nect the cathode lead from terminal 6 o[f] the 6SA7 (V2) to T9 direct to the sec[-]ondary winding where it leaves the coi[l] form rather than to terminal lug "A" o[n] the top of the coil form. (See sketch o[f] coil form on *page 15-67, 68 in Rider'[s] Volume XV*.) Replacement coils are fur[-]nished without the iron cores, as they ar[e] interchangeable. If new cores are needed due to loss or breakage, they can b[e] ordered under part #77A068.

If the receiver cannot be placed i[n] "break-in" operation, apply the followin[g] remedy: Notice on the schematic of th[e] receiver on *page 15-67, 68 in Rider'[s] Volume XV* that the grid of V6 the outpu[t] 6F6G tube is connected to the powe[r] switch S7, so that when the switch is i[n] the "send" position the grid of this tube i[s] grounded. Many operators wish to leav[e] this switch in the "send" position an[d] connect from terminal 5 on the plug PL2 through the transmitter relay to ground In order to do this, the lead between S[7] and V6 should be removed. On late[r] production runs, this lead has been elimi[-]nated. See notes on "Power Require[-]ments" and "Preparation for Use" on *pag[e] 15-71 of Rider's Volume XV*.

HOWARD 901-A

The following is a list of changes made in Howard Model 901-A above serial number 40575:

1. The 0.05-μf capacitor in the avc filter network, instead of going to ground, goes to B minus.
2. The 300-$\mu\mu$f capacitor that has one end connected to the variable arm of the volume control, has the other end connected to B minus instead of ground.
3. The 0.01-μf capacitor that has one end connected to the plate of the 50L6GT tube has the other end connected to the cathode of the same tube instead of to the low side of the output transformer.
4. There is inserted in series with the cathode of the 35Z5GT rectifier tube a 50-ohm 1-watt wire-wound resistor.

The schematic diagram for the original production runs is found on *page 15-2* of *Rider's Volume XV.*

MAGNAVOX CR 190

Points of information relative to the differences between the CR 190 chassis carrying various suffix letters are as follows:

The CR 190 A and B, which are found in *Rider's Volume XV on pages 15-43 to 15-50,* and CR 190 D are alike electrically.

The CR 190 C and CR 190 E differ from the models previously mentioned, in that item 22, 0.01-μf 600-volt paper capacitor, and item 47, 15,000-ohm 1-watt resistor, which are connected in series from the plate to ground on the first audio, are omitted.

The CR 190 F is the same as CR 190 A, B, and D except that a 220,000-ohm resistor is connected from grid to ground on the first audio tube.

The CR 190 A, B, and D were used in the Magnavox Georgian, Model 15' series, the Contemporary 148 series, and the Magnavox Provincial Model 152 series.

The CR 190 C and E were used in the Magnavox Duette Model 138 series.

The CR 190 F is used in only the Magnavox Duette Model 138 series.

This information should be added to *pages 15-43 to 15-50* in *Rider's Volume XV.*

Majestic 8S473

In the late production of this chassis 4810, above serial number A235000, the two capacitors, C30 and C32 (each 0.001 μf), have been removed from the cathode circuits of the two 6K6GT output tubes. The schematic for the early production of this set is on *page 15-28 of Rider's Volume XV.*

Meissner 6D

This model number is Meissner's new designation for models 9-1084 and 9-1086 which are shown on *pages 15-1 and 15-2 of Rider's Volume XV.*

MONTGOMERY WARD 64BR-1051A

The trimmer diagram in this model on *page 15-62 of Rider's Volume XV* has an error. The capacitor numbers on the input and output i-f transformers are wrong. The input i-f capacitors should be C8 and C9 and the output i-f capacitors should be C12 and C13.

Montgomery Ward 64BR-1051B

This model is similar to 64BR-1051A shown on *pages 15-61 to 15-63 of Rider's Volume XV,* except for the following changes:

Ref. No.	*Part No.*	*Description*
R1	BEC-9B1-27	220,000 ohms, 20%, ½ watt
R2	BEC-9B1-16	3,300 ohms, 20%, ½ watt
R3	BEC-9B1-84	68,000 ohms, 10%, ½ watt
R4, R7	BEC-9B1-37	10 megohms, 20%, ½ watt
R5, R9	BEC-9B1-34	3.3 megohms, 20%, ½ watt
R8	BEC-9B1-31	1 megohm, 20%, ½ watt
R10	BEC-9B1-60	680 ohms, 10%, ½ watt
R11, R14	BEC-9B1-42	22 ohms, 10%, ½ watt
R12	BEC-9B1-66	2,200 ohms, 10%, ½ watt
	BE 120-145	Coiled tension spring for dial string

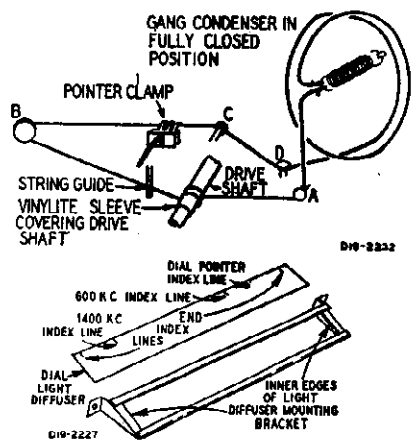
MONTGOMERY WARD 64WG-1804C, 74WG-1804C

These two models are similar to the 64WG-1804A receiver, shown on *pages 15-88 to 15-90 of Rider's Volume XV,* except for the following changes:

The frequency range has been slightly contracted to 540-1600 kc. A 470-ohm dropping resistor (R-20) has been inserted in the circuit between B+ and the following points: primary winding of the first i-f transformer (T-3), the screen-grids of the 12SA7 mixer, the screen-grid of the 12SK7 r-f amplifier, and resistor R-1. A 0.05-μf bypass capacitor (C-28) is connected from the junction of these points to the point marked "X" in the filament line of the schematic on *page 15-88 of Rider's Volume XV.*

The drive cord length has been increased for these models and the following drive cord replacement instructions should be followed.

Turn the gang condenser to the fully closed position. Use a new drive cord 42 inches long and tie one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley, pass the cord through the slot on the drive pulley rim, under stud A and wind two turns clockwise (from front of chassis) around the tuning shaft as shown in the accompanying illustration. Turns must progress away from chassis. Pass cord over pulley B and stud C and under stud D. Pass cord under drive pulley and wind 1¾ turns counterclockwise around drive pulley. Stretch tension spring and tie free end of cord to spring. Cut off any excess cord.



Revised dial stringing diagram and diffuser strip for Montgomery-Ward Models 64WG-1804C, 74WG-1804C.

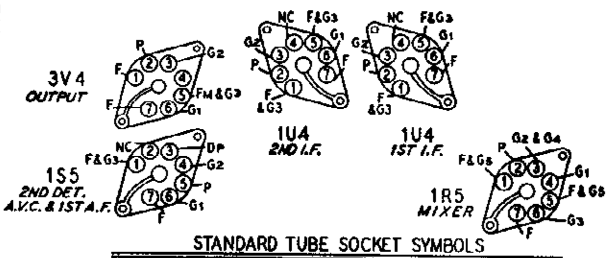
Attach the dial pointer to the cord and position as instructed on *page 15-89 of Rider's Volume XV.*

The low end of the dial on these models is opposite to that used on the 64WG-1804A model so that the diffuser strip appears as shown in the accompanying illustration.

The components used in the 64WG-1804C and 74WG-1804C models are the same as those used in 64WG-1804A enumerated on *page 15-90 of Rider's Volume XV* except for the following:

Ref. No.	*Part No.*	*Description*
C-1	D67102	.001 mf 400 V Tubular
C-3A, C-3B	26A402	Gang condenser and pulley assembly
C-14	B67403	.04 mf 200 V Tubular
C-15	B67602	.006 mf 200 V Tubular
C-22	B67204	0.2 mf 200 V Tubular
C-23	D67104	.1 mf 400 V Tubular
C-24	17A123	1.5-12 mmf Trimmer
C-28	B67503	.05 mf 200 V Tubular
R-20	B85471	470 ohms 0.5 watts Carbon
T-1	26A445	"B" Range loop antenna assembly
	58X667	Dial
	26A446	Pointer bracket assembly 42" drive cord
	28X95	Drive cord tension spring
	41X81	Dial light diffuser

Revised tube layout for the Montgomery Ward Model 74WG-1054A in which a 3V4 output tube has been substituted for a type 3Q4 tube.



MONTGOMERY WARD 74WG-1054A

This receiver is the same as the 64WG-1054A, shown on *pages 15-82 to 15-84 of Rider's Volume XV* except for the following changes: A 3V4 is used for the output tube so that in the final step of the receiver stage sensitivity measurements the signal generator should be connected through the 0.05-μf coupling capacitor to pin 6 of this tube. A 2.2-volt input will be required for a 50-milliwatt output for this stage. The schematic shown on page 15-82 holds true for this model without any changes since the 3V4 tube has the same wiring as the 3Q4. The changed socket layout is shown in the accompanying sketch. The C-1 trimmer capacitor in this model has a value of 1.5-12 $\mu\mu$f, and its part number is 17T123.

MONTGOMERY WARD 54WG-2700A 64WG-2700A,—B, 74WG-2700A,—

These models are similar to the 54WG-2500A, shown on *pages 15-31 to 15-35 of to 15-96 of Rider's Volume XV* except for the following changes:

Ref. No.	*Part No.*	*Description*
C-7	D67501	.0005 mf 400 V Tubular
	12A455	10" Electro dynamic speaker
	28X113	Drive cord tension spring

The frequency range has been very slightly compressed to 540 kc-1600 kc. The issue "B" receivers incorporate a 10-inch electrodynamic speaker, part number 12A455.

MONTGOMERY WARD 64WG-2009B, 74WG-2009B

These models are similar to the 64WG-2009A, shown on *pages 15-95 and 15-96 of Rider's Volume XV* except for the following changes:

A 470-ohm dropping resistor (R-20) has been inserted in the circuit between B+ and the following points: the primary winding of the first i-f transformer (T-3), the screen grids of the 12SA7 mixer tube, and resistor R-2. A .05-mf bypass capacitor (C-28) is connected between the junction of these points and the point marked "X" in the filament line of the schematic on page 15-95.

The components used in these models are the same as those used in 64WG-2009A enumerated on *page 15-94 of Rider's Volume XV* except for the following changes and additions:

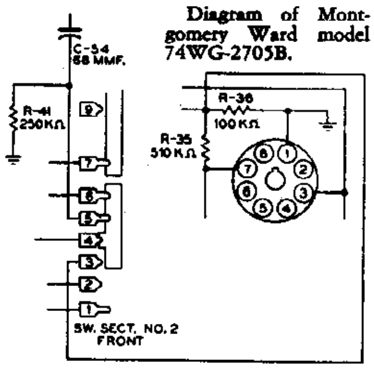
Ref. No.	*Part No.*	*Description*
C-1	D67102	.001 mf 400 V Tubular
C-3, C-4, C-5	B67102	.001 mf 200 V Tubular
C-14	B67403	.04 mf 200 V Tubular
C-15	B67602	.006 mf 200 V Tubular
C-19	B67253	.025 mf 200 V Tubular
C-23	D67104	0.1 mf 400 V Tubular
C-28	B67503	.05 mf 200 V Tubular
R-20	B85471	470 ohms 0.5 watts Carbon
	26A426	Tube socket and shield assembly

Montgomery Ward 74WG-2705B

This model is similar to the 74-WG2705A, shown on *pages 16-16 and 16-22 to 16-26 of Rider's Volume XVI* except for the following changes:

R-3 in the screen-grid circuit of the 6BA6 f-m r-f tube has been changed from 15,000 ohms to 27,000 ohms. The part number is B85273, and it is a 0.5-watt carbon resistor.

Diagram of Montgomery Ward model 74WG-2705B.



R-41, a 250,000-ohm, 0.5-watt carbon resistor, part B83254 has been added to the oscillator grid circuit of the 6BE6 a-m r-f converter, and wiring has been added from contact 3 of switch section 2 front to the junction of *R-35* and *R-36* as shown in the accompanying diagram.

Arvin 544R, 544AR

These models are the same as models 544 and 544A appearing on *pages 15-3 to 15-5 of Rider's Volume XV*, except for the changes following.

The variable capacitor has been changed. The antenna section of this variable capacitor now has a capacitance of 420-$\mu\mu$f. The loop inductance has been made less to match this larger capacity.

The parts list for the Arvin 544R ai 544AR is the same as that enumerated (*page 15-5 of Rider's Volume XV* exce for the following changes:

Part No.	*Description*
A18640-2	Dial scale
A19473	Dial pointer
AC19867-1	Antenna loop assemb
AC19866	Var. capacitor and pu ley assy.

PHILCO 80

In the Philco Model 80 the corre voltage on the screen grid of the 36 osci lator-detector tube is about 80 volts ar not 165 volts as shown on *page 3-25* (*Rider's Volume III* and *page 113* (*Rider's Abridged Volumes I—V*.

RCA Receiver Drive Cords

A small amount of beeswax rubbe lightly over a *rayon* drive cord will pr long the life of the cord. Nylon cord do not require this treatment.

RCA Record Changers

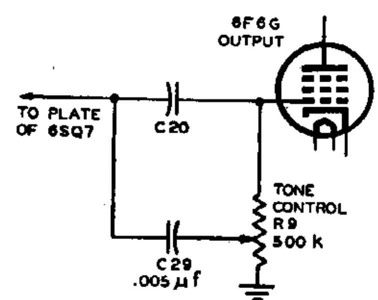
The motors of the RCA record chang ers Nos. 960001-1, 960001-2, 960001-3 and 960015 will not operate properl from a 50-cycle source. Information abou these record changers will be found i the record changer section of *Rider's Vo ume XV.*

RCA QB12

This is the same chassis as used i model QB11, which will be found on *pa 15-8 of Rider's Volume XV.*

RCA 5Q5, Q18

In the second production of the RC Models 5Q5 and Q18 a tone control wa



Tone control in second production of RC 5Q5, Q18.

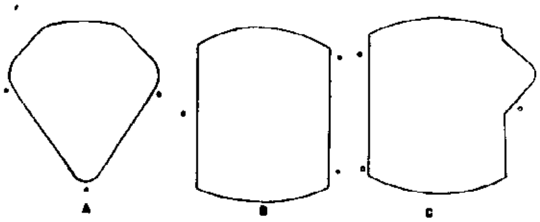
inserted in the control-grid circuit of th 6F6G output tube. The revision for thi change is shown in the accompanyin diagram; the original schematic is show on *page 11-15* of *Rider's Volume XI.*

Noblitt-Sparks 558, Chassis RE-204

This model, which is on *pages 15-7 to 15-9 of Rider's Volume XV*, uses two different cutouts in the motor board of the cabinets; it is therefore necessary to use the correct part numbers when ordering replacement cabinet, motor, and turntable assembly or any part thereof.

Part E21004 Ballentine phono-motor and turntable assembly is used with part 19573-1 cabinet which has a cutout A, the outline being shown in the accompanying sketch. Part E19475 Alliance phono-motor and turntable assembly is used with part R19573 cabinet with cutout B or C.

C motor cutout is the result of reworking R19573-1 cabinets to be used as R19573 cabinets with E19475 motor and turntable assembly.

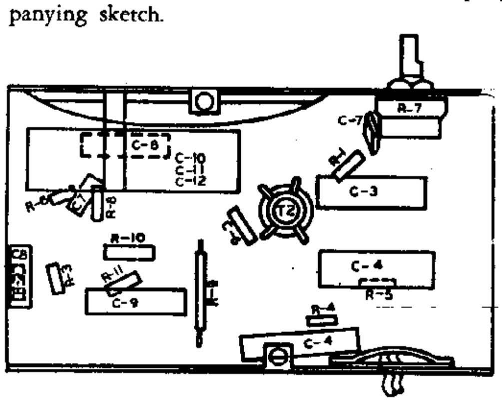


Sketch of different cutouts used in the motor board of the cabinet of model 558, chassis RE-204.

Noblitt-Sparks 444M, 444AM, Chassis RE-200M

The schematic for this model is the same as the 444,444A, chassis RE-200 shown on *page 15-1 of Rider's Volume XV* except for the substitution of miniature tubes for the regular metal and GT tubes. This set uses the 12BE6, 12AT6, 50B5, and 35W4 in place of the 12SA7, 12SQ7, 50L6GT, and 35Z5GT.

The location of parts under chassis has been reoriented as shown in the accompanying sketch.



Location of reoriented parts under chassis for Noblitt-Sparks model 444M, 444AM, chassis RE-200.

RCA 55F, 66-1

Service Hint: Failure of the 1A7GT converter to operate may be due to a short circuit in C21, the grid coupling capacitor. This will make itself evident as a high positive voltage on the signal grid of the 1A7GT tube.

RCA 5Q12

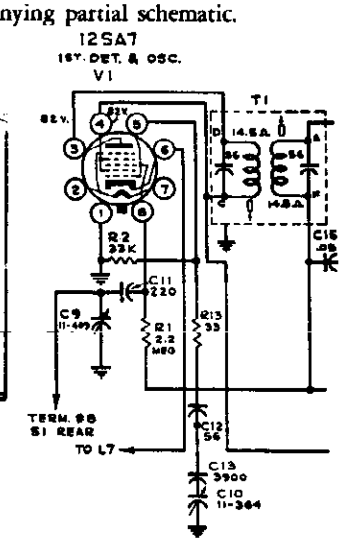
The RCA Model 5Q12 is the same as the Model 6Q8 except that in the 5Q12 the 6U5/6G5 tuning indicator tube and its associated resistance R11 are omitted. The schematic for Model 6Q8 is found on *page 11-33* of *Rider's Volume XI.*

RCA QU51C, QU51M, QU55

The value for capacitor C15 shown as 2-8 μμf, in the schematic found on *page 14-37* of *Rider's Volume XIV*, should be 2-12 μμf.

RCA Q103 Series, Chassis Nos. RC-1044, RC-1044 B

The following changes pertain to the Q103 series, chassis Nos. RC-1044 and RC-1044B appearing on *pages 16-8 to 16-13 of Rider's Volume XVI.* The capacitors in the 2d i-f transformer (T2) connected from A to F and D to C have been changed to 150 μμf. The capacitors connected from F-B and B to E have been changed to 105 μμf. A 33-ohm resistor (*R-13*) has been added to the oscillator circuit between the first grid of the 12SA7 pentagrid converter and *C12*. This is illustrated in the accompanying partial schematic.



Changes in the 1st Detector-Oscillator circuit of the RCA Q103 Series.

A felt pad is cemented to the side of the 1st i-f transformer next to the 12SA7 1st Det-Osc. tube. A rubber band around the tube and transformer holds the tube against the felt and reduces the tendency to howl on high volume.

Additional precautionary lead dress for these models is as follows:

5. Maintain flexible loop in ground straps of tuning capacitor. Allow slack in leads to tuning capacitor stators.
6. All leads to 12SA7 socket must be dressed to insure flexibility of the socket.
7. Oscillator grid coupling capacitor *C12* should be cemented to chassis with wax or glyptal cement.
8. Dress tracking capacitor *C13* outside of the range switch assembly and cement it to the range switch spacer bar with wax or glyptal cement.

RCA 56 SERIES, 61 — SERIES

On some models of these series, which appear in *Rider's Volume XV*, the 500,000-ohm volume control is not furnished with a stop 50,000 ohms from the high end of the control. Volume controls having no stop can be identified by a dot of red lacquer on the left side of the control, viewing the shaft end with terminals up. In models using this control, a 56,000-ohm ½-watt resistor, completely covered with spaghetti tubing, is connected between the high end of the control and the yellow lead on the second i-f transformer.

Replacement controls equipped with a stop do not need this external 56,000-ohm resistor, so when replacing a volume control, check the resistance between the arm and the high end of the replacement control with the arm turned fully clockwise. A reading of 50,000 ohms will indicate that the control is equipped with a stop, and that the 56,000-ohm resistor in the set should be removed before installing the new control.

RCA 56X5, 56X10, 61-5, 61-10

Changes in the schematic should be made on RCA Model 56X5, *page 15-32;* Models 56X10, *page 15-35;* and Models 61-5 and 61-10, *page 15-51, all in Rider's Volume XV.*

Change the location of C9 from the grid of the 12SQ7 to ground, so that it is connected from the plate of the 12SQ7 to ground.

Earlier models may still have C9 connected from grid to ground; in these sets an increase in sensitivity will be obtained by reconnecting C9 in accordance with the above change in the schematic.

R6 has been changed from 3.3 to 2.2 megohms.

RCA 55U

This change refers to RCA Model 55U, which appears on *page 15-16 of Rider's Volume XV*. Models having serial numbers B62201 will use transformer part number 922246-7 (Stock No. 70386). In this transformer, C21 is 100 $\mu\mu$f, rather than 110 $\mu\mu$f, as in previous transformers.

RCA 55U, 56X, 56X5, 65X

On these models, the data for which appear in *Rider's Volume XV*, the lead coloring on the output transformer may not correspond with the coloring given on the schematic in the service notes. It is therefore necessary to rely on resistance measurements to determine lead connections, rather than the color coding given in the schematic.

RCA 56X5, 56X10

In some of these models the 15-megohm resistor R5 has been omitted. This does not affect the basic operation of the set, the primary effect being to make the set more sensitive. The schematics for the RCA Models 56X5 and 56X10 appear on *pages 15-32* and *15-34* respectively of *Rider's Volume XV*. Resistor R5 appears in both of these schematics.

RCA 59VI

A speaker substitution has been made in some of the RCA Models 59VI, the circuit diagram of which appears on *page 15-54* of *Rider's Volume XV*. Speaker 92567-1 has been substituted for speaker 92513-1K. For replacement of speakers stamped 92567-1, order Stock No. 36330.

RCA 59V1

In RCA Model 59V1, found on *page 15-44 of Rider's Volume XV*, field coils stamped 94136-501A will have a minimum resistance of 1300 ohms at 25° C.

RCA 61-6, 61-7

A change has been made in the dial drive cord of these models, the dial drive mechanism of which appears on *page 15-53* of *Rider's Volume XV*. Stock No. 32634 cord-drive cord (about 37 inches long) should be approximately 34¾ inches long.

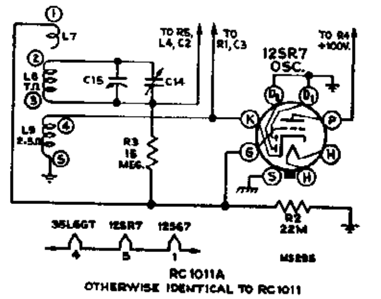
RCA 66BX

The following changes pertain to RCA Model 66BX which appears on *page 15-87 of Rider's Volume XV:*

1. Change Stock No. 71229—Transformer—First i-f transformer (L6, L7, C13, C14), to Stock No. 71399.
2. Add Stock No. 72541—Socket—Tube socket — miniature — bottom mounted.

RCA 61-1, 61-2, 61-3

The schematic shown on *page 15-49 of Rider's Volume XV* shows a 12J5GT oscillator tube in chassis RC-1011. In the second production the 12J5GT tube was replaced with a 12SR7 tube (as shown in Fig. 1) and the chassis changed to RC-1011A. In the third production, the 12SR7 tube was replaced with a 12-



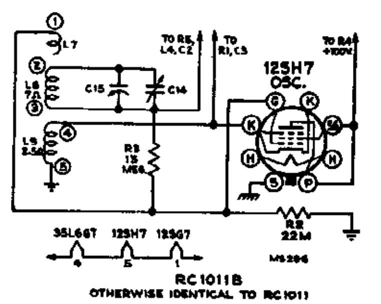
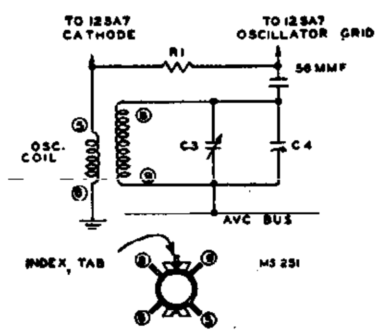


Fig. 1, above. Revised circuit with 12SR7 oscillator. Fig. 2, below, Second revision with 12SH7 oscillator.

SH7 tube (as shown in Fig. 2) and the chassis number is now RC-1011B.

RCA 65X Series

Some models may use a No. 71406 oscillator coil in place of the one shown in the schematic which appears on page *15-62* of *Rider's Volume XV*. When No. 71406 oscillator coil is used, there will be a No. 39622 mica capacitor (56 $\mu\mu$f) used in place of the "gimmick" capacitance winding shown in the schematic. The accompanying drawing illustrates the necessary circuit changes.



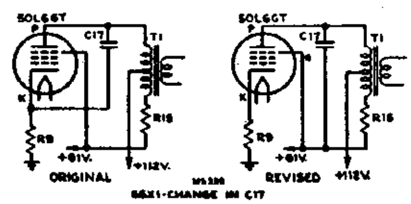
Alternate oscillator coil in RCA 65X.

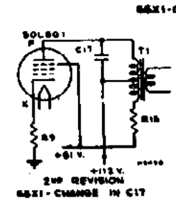
RCA 65X1, 65X2, 65X8 and 65X9, Chassis RC-1034

Models 65X8 and 65X9 are the same except for the cabinets, as models 65X1 and 65X2, chassis RC-1034, shown on *pages 15-61 and 15-62 of Rider's Volume XV*. The following changes are applicable to all models. Capacitor C17 which was originally connected between plate and cathode of the 50L6GT output tube and later connected between plate and screen grid of the 50L6GT output tube, is now connected between plate of the 50L6GT output tube and center tap of the output transformer. These changes are shown in the accompanying schematic.

Some chassis use a part No. 71406 oscillator coil instead of the one indicated on the schematic. When this oscillator coil is used, a part No. 39622 mica capacitor (56 $\mu\mu$f) is used in place of the capacitance winding L4 (gimmick) shown in the schematic. This capacitor is connected between 7 and 8 of the oscillator coil.

The lead coloring of the output transformer may not correspond with the coloring given on the schematic. It is therefore, necessary to rely on resistance measurements rather than the color coding given on the schematic to determine lead connections.

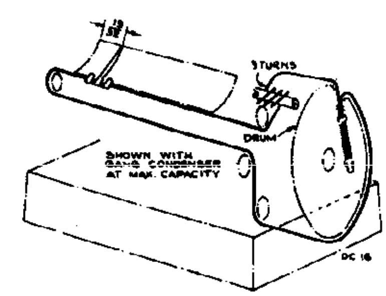




Partial schematics of the original, and first and second revisions in the output circuit of the RCA Chassis RC-1034.

RCA 66BX

The dial cord drawing for this model is shown on *page 15-87* of *Rider's Volume XV;* this is slightly in error and the correct drawing is shown in the accompanying figure.



The dial cord drawing for RCA 66BX.

RCA 85T2

The RCA Model 85T2 is the same as the Model 85T except that in the former model either of two loudspeakers may be employed with the numbers stamped as follows: 84128-1 or 84128-2.

RCA 112A

The RCA Model 112A is the same as the Model 112 except that resistor R15 in Model 112A is rated at 205 ohms. This resistor is located in the filament circuit of the RCA-12Z3 rectifier tube. The circuit diagram for Model 112 is found on *page 4-58* of *Rider's Volume IV*.

REMLER MP5-5-3

In the schematic of this model, which appears on *page 15-1 of Rider's Volume XV*, the cathode of the 6V6GT output tube, pin 8, should be connected to ground.

SCOTT 800-B

The instructions below are for installing an antenna coupling transformer for this receiver, data for which are shown on *pages 15-30 to 15-90 in Rider's Volume XV*.

For better reception of weak signals on the standard broadcast band in remotely located areas or in locations where the noise level is extremely high, an antenna coupling transformer is furnished which provides maximum signal input to the receiver for reception of stations on the standard broadcast band.

The coupling transformer should be installed as follows:

1. Loosen the large screw in the lower left hand corner of the pushbutton tuning backplate at the rear of the receiver. This screw is located on the square backplate just above and to the left of the antenna terminals.
2. Slide the coupling transformer mounting bracket under the screw head and tighten down. The transformer should face toward the center of the backplate and will cover up the license plate.
3. Fasten the white wire from the transformer to the outside AM antenna terminal on the receiver.
4. Connect a short piece of wire between the center AM antenna terminal and the GND terminal and connect the black wire from the coupling transformer to the GND terminal of this strip.
5. Connect the antenna lead-in to the two terminals provided on the coupling transformer, clamping the wires between the two flat washers provided.

Stewart-Warner 9017-A, B

These models are a later production of the 9017-A shown on *pages 15-49 to 15-52 of Rider's Volume XV*.

A 0.05-μf capacitor (61) part No. 502806, has been added from the avc bus (low side of secondary of 1st i-f transformer 33) to B— (cathode of the 12J5GT Osc. tube).

In some chassis of this model the short-wave oscillator trimmer 28 was ommitted in order to permit the use of gang capacitors with higher than normal capacity in the oscillator section. In these instances exact calibration is obtained without the use of the trimmer—merely tune receiver to 20-mc generator signal and adjust antenna trimmer 11.

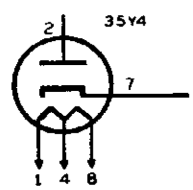
Sonora RDU-209

The service data appearing on *page 15-2 of Rider's Volume XV* also applies to this model.

TELETONE 117, 117A, 118, 119

In the Teletone Models 117, 117A, 118, 119 (chassis series D) found on *page 15-4* of *Rider's Volume XV*, the pin numbers for the 35Y4 rectifier are shown incorrectly. The correct pin numbers for this tube are illustrated in the accompanying figure.

Correct pin numbers for the 35Y4 tube in the Teletone Model 117 schematic.



Truetone D1645, Issue C

The following changes appear in receivers of this issue, the original issue being on *page 15-1 of Rider's Volume XV*:

The 68-$\mu\mu$f capacitor C22 is now connected from the junction of R7 and R8 to ground and a 100-$\mu\mu$f capacitor, C34, is connected from the other end of R8 to ground. The value of C32 is now 470 $\mu\mu$f instead of 330 $\mu\mu$f. C31, 0.004 μf is now connected from the plate of the 6V6GT output tube to terminal 8, the cathode of this same tube, instead of between the plate and terminal 3 of the speaker socket. A 0.2-μf tubular capacitor, C35, part #D67204 has been added from the screen-grid of the 6V6GT output tube to ground.

The following parts are used in some receivers only. Check part number on old part before ordering and order part originally used in the set. 40X281 tone control (substitute for 40X276); 25X1539 radio-phono switch lever, when 40X281 is issued; 2A161 d.p.d.t. switch when 40X281 is used.

TRUETONE D1180 B

This model is similar to model D1180A, shown on *pages 13-69 and 13-79 of Rider's Volume XV* except for the following changes: The antenna trimmer (C2), part number 17A123, mounted on the loop aerial assembly in the Issue "A" model, has been replaced by a "Gimmick" fixed capacitance, consisting of two wires, one wrapped around the other. The 1400-kc adjustment as given in the alignment procedure is omitted; this adjustment is made at the factory and need not be made in the field.

Watterson 4582

The alignment instructions for this receiver, the schematic of which appears on *page 15-2 of Rider's Volume XV*, were unavailable when the Manual went to press. They are as follows:

I-F Alignment: Set signal generator to 455 kc; connect its high side with a 0.1 μf capacitor in series to the grid of the 1A7 tube and the grounded side to the chassis. Tune the iron cores of the perm tuner so they are completely out of the coils. Use a small generator output. First, adjust the second i-f transformer for maximum output and then the first i-f transformer. Check to see that both transformers are adjusted for maximum output.

R-F Alignment: Connect the high side of the signal generator (with the capacitor removed) to the antenna lead (blue) and the ground lead of the generator to the chassis (black) lead. Set volume control to maximum and see that the iron cores on perm tuner are all the way out of the coils. Set generator to 1650 kc and peak oscillator trimmer. *See page 15-2* for trimmer locations. Then peak antenna trimmer for maximum output.

Turn dial drive shaft until iron cores are completely inside coils; set generator to 540 kc and adjust tracking core for maximum output.

Recheck alignment at 1650 kc, making sure of maximum output.

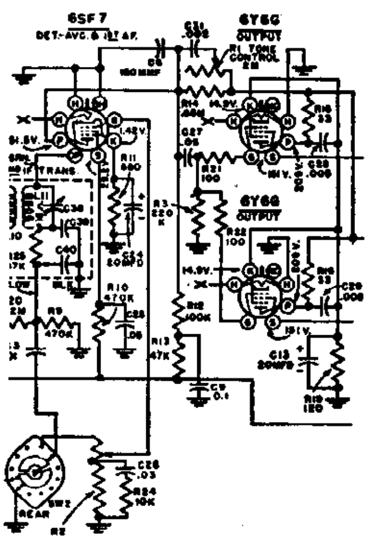
Zenith Chassis 6C40

The On-Off switch of this set must be in the "Off" position whenever the line plug is inserted into the changeover switch on the rear of the chassis. Failure to do this may cause flashing and possible burn-out of the output tubes. In the event the set cuts out, the loop snap connectors may be sprung causing a poor contact; also there may be poor contact through the cabinet hinge. The letter "X" after the model number (6G001YX) indicates that an aluminum cabinet is used. The schematic diagram of this receiver will be found on *page 15-30 of Rider's Volume XV*.

WESTINGHOUSE H-104, H-105, H-107, H-108

In later productions of Westinghouse Models H-104, H-105, H-107, H-108 the tone-control circuit was modified to provide greater tonal range. In chassis incorporating this change, the chassis number was changed from V-2102 to V-2102-1. This change is shown in the accompanying diagram. The same two components that comprised the tone-control circuit in the early production models, C31 (0.002-μf) and tone control R1 (2 megohms), are also used in the later revised models. The former tone-control circuit was removed from the connection it had to the volume control, R2, and wired to the plate circuit of the 6SF7 first audio tube as follows:

One end of capacitor C31 is connected to the plate of the 6SF7 tube and the other end to the variable arm of the tone control, R1. One end of the tone control is connected between resistors R14 and R15, or between resistors R14 and R16, (since R14 is tied to one end of either of the other resistors), and the other end of the tone control left open. The schematic with the original tone control circuit is found on *page 15-1* of *Rider's Volume XV*.



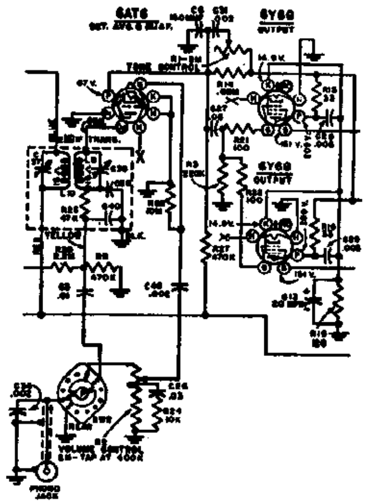
Courtesy Westinghouse Elec. Corp.

Tone-control circuit in Westinghouse chassis V-2102-1 showing changes.

Westinghouse H-104A, H-105A, H-107A, H-108A

These models are modified versions of the same model numbers without the suffix A, the service data for which appears on *page 15-1 of Rider's Volume XV* and changes in the June, 1947 issue of SUCCESSFUL SERVICING. The chassis number of the models carrying the suffix A is V-2102-2.

The major difference in this latest chassis is the substitution of a 6AT6 tube for the 6SF7 detector, avc, and first a-f amplifier. This necessitates the introduction of C48, (0.002 μf, 600 volts) between the control-grid of the 6AT6 and the movable arm of the volume control. The cathode and one end of the heater are connected to ground and to a 10,000-ohm resistor, R28, the other side of which goes to C48. R27, a 470,000-ohm, 0.25-watt resistor has been substituted for R12 and R13, thus eliminating C9 (0.1 μf). These changes are shown in the accompanying partial schematic, in which it should also be noted that now there is 67 volts on the plate of the 6AT6 instead of 51.5 as in the case of the 6SF7.

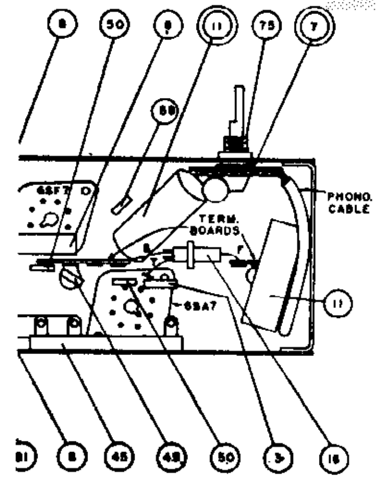


Modified Westinghouse chassis V-2102-2, showing changes due to use of 6AT6.

WESTINGHOUSE H-122, H-130

The following changes have been made in Westinghouse Models H-122 and H-130 that bear serial numbers higher than 1500:

1. The capacitor, item No. 7, was changed in value from 0.002-μf to 0.01-μf and its item number was also changed from 7 to 10. This capacitor connects across the phono-input cable at the radio-phono switch.
2. The 0.1-μf capacitor, item No. 11, which was previously connected between the shield of the phono-input cable and ground, now connects between the phono-input cable and the common negative line. Its physical location, looking at the bottom view of the chassis, was moved from the right side of the radio-phono switch to the left side. The diagram for this physical change is shown in the accompanying diagram.



Courtesy Westinghouse Elec. Cor

Bottom view of the chassis of Westinghous Models H-122 and H-130 showing new loc tion of capacitor No. 11.

The original schematic for these model is illustrated on *page 15-5* of *Rider's Vo ume XV* and the chassis layout is show on *page 15-7*.

Automatic 640, Series B

The schematic of this model is th same as the 640 shown on *page 15-7 o Rider's Volume XV* except for the chang from octal type to loctal type tubes.

This model uses the 14Q7, 14A7, 14B6 50A5, and 35Y4 in place of th 12SA7GT, 12SK7GT, 12SQ7GT, 50L 6GT, and 35Z5GT tubes.

Automatic 650

This model is similar to the 650 show on *pages 15-4 and 15-7 of Rider's Vol ume XV* except for the following change The 20,000 resistor in the oscillator gri circuit of the 12SA7GT now is connecte directly to ground instead of to the cath ode of that tube.

Belmont 8A510

This model is the same as the 8A5 shown on *pages 15-8 to 15-12 of Rider Volume XV*, except for the addition o four parts.

The two miscellaneous parts of the re movable tuner assembly are:

1. Part No. A-2J-7176—cam locking spring.
2. Part No. A-2J-7627-1—retainer spring

The miscellaneous part added to th main chassis is part A-19A-11539 whicl is a plug on the speaker leads.

The final addition is an alternate recor changer which can be used with thi model. Part C-201-12545-1 is a Detroi Changer model 550, which is shown o *pages RCD.CH.15-1 to 15-10 of Rider Volume XV*.

Zenith 6D0 Series

Variations in the tube line-up of this chassis 6C05 will be found; a single chassis may contain octal, lock-in, and miniature button tubes. If an original tube is replaced with an alternate, the socket must also be replaced. Alternates that may be found are as follows:

Original	*Alternate*
12SA7GT	12BE6 or 14Q7
12SQ7GT	12AT6
35Z5GT	35W4

In case the oscillator shifts, replace the 220-ohm resistor (R3) with a 1000-ohm resistor, and if the oscillator drops out at the low end of the band, disconnect R1 (10,000 ohms) from the negative return and connect it to the cathode of the converter. See the schematic on *page 15-28 of Rider's Volume XV.*

If audio oscillation occurs, disconnect the 0.0005-μf capacitor (C14) from the negative return and connect it to the cathode of the 35L6GT output tube. Take out C21 from the plate to the cathode of the 35L6GT. If oscillation occurs at 910 kc, change the capacitor C5 in the negative return to the chassis from 0.05 μf to 0.1 μf. In the event that there is hum, oscillation, or poor sensitivity, check for grounded tuning capacitor frame. This can be corrected by inserting cork or rubber pad between rear capacitor frame and chassis; this pad should be cemented in place.

The letter "V" (6C05V) indicates that an aluminum chassis is used.

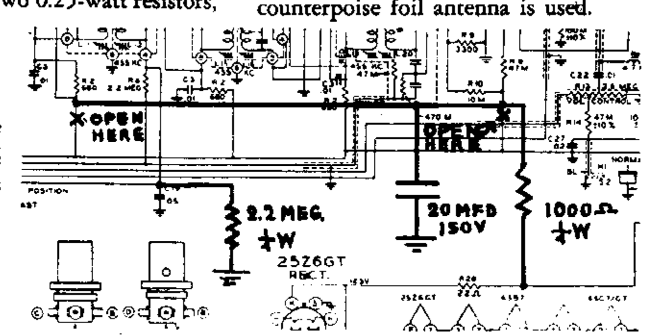
If hum and microphonics are found in this chassis, check for a grounded tuning capacitor frame to the cabinet ventilator plate. Distortion and poor sensitivity are usually caused by a short circuit between turns on the loop. Sometimes poor sensitivity and failure to operate on the low-frequency end of the dial is due to the oscillator coil, which should be replaced. If uncontrolled oscillations occur, solder a 470,000-ohm resistor across the secondary of the first i-f transformer.

Zenith Chassis 8C01

If flutter is experienced when the set is on f.m., it can be eliminated by installing a 20-μf 150-volt capacitor (Part No. 22-1635) and two 0.25-watt resistors, one 2.2 megohms (Part No. 63-600) and the other 1000 ohms (Part No. 63-583), as shown in the accompanying partial schematic. The complete schematic of this receiver will be found on *page 15-71, 72 of Rider's Volume XV.*

A rushing noise when the volume control is turned to minimum is caused by a poor connection from the grid element to the grid cap of the 6S8GT discriminator tube. A hot iron and a little flux on the grid cap will remove the high-resistance solder joint.

If the f-m oscillator drifts, check for a red dot on the oscillator tuning slug wire. If the wire is unmarked, replace with one which has a red dot.



F.m. flutter may be eliminated in the Zenith Chassis 8C01 if the indicated changes are made.

Zenith Chassis 5C01

A single chassis may contain octal, lock-in, and miniature button tubes. The following alternates may be found:

Original	*Alternate*
12SA7GT	12BE6 or 14Q7
35Z5GT	35W4
12SK7	12BA6
12SQ7	12AT6
50L6GT	50B5

In the event that the oscillator shifts, replace the 220-ohm resistor, R8, with one of 1000 ohms. If the oscillator drops out at the low end of the band, remove resistor R1 (10,000 ohms) from common return and connect it to the cathode of the converter. The schematic of this chassis will be found on *page 15-8 of Rider's Volume XV.*

Montgomery Ward 64WG-1807B, 74WG-1807B

These models are the same as model 64WG-1807A, shown on *pages 15-91 to 15-94 in Rider's Volume XV,* except for the following changes. A 0.2-μf bypass capacitor (C-35) has been connected between ground and the screen grid of the 6V6GT output tube, resistor R-14, resistor R-12, the red lead of the 2d i-f transformer (T-3), resistor R-5, resistor R-4, the red lead of the 1st i-f transformer (T-2), and resistor R-2. The 0.004-μf capacitor (C-31) is now connected from the plate lead of the 6V6GT output tube to the cathode of this tube. No counterpoise foil antenna is used.

Arvin 544 and 544R (Noblitt-Sparks)

The following changes have been made in the circuit appearing on *pages 15-3 to 15-5 of Rider's Volume XV* to reduce low level hum and hum modulation.

1. The capacity of the electrolytic capacitor A19136 (C7) is changed from 40-20$\mu\mu$f, 150v, 20$\mu\mu$f, 25v, to 50-20$\mu\mu$f, 150C, 20$\mu\mu$f, 25c.
2. The rotor of the variable capacitor is now connected to AVC instead of to chassis. (This is the same circuit that was used in sets built previous to March 1946.)
3. C11 0.1μf, 400v, capacitor from AVC to chassis is deleted.
4. The bypass capacitor from B+ to chassis is changed from C9, 0.05μf, 400v, to C11, 0.1μf, 400v, to prevent oscillation.
5. A fiber washer part 20198 ¼ inch ID, ½ inch OD, ⅛ inch thick, is added under the pointer to prevent the pointer from touching the dial and shorting AVC to the chassis.
6. The floating ground wiring is changed; the jumper from the oscillator coil to the #3 lug on the 12SK7 socket is removed and replaced by a jumper from the ground side of the volume control to the a-c switch lug.
7. The top of the dial scale backing plate has been cut off even with the top of the dial, to allow the dial to set in a more vertical position. The part number remains the same, and the old and new plates are interchangeable.

The parts list for these models remains the same as that enumerated on *page 15-5 of Rider's Volume XV* except for the changes noted.

Part No.	*Description*
A19136	Capacitor, electrolytic 50-30$\mu\mu$f, 150v. 20$\mu\mu$f, 25v.
A20198	Washer, fiber

General Electric 202

This receiver is the same electrically as the model 200 as shown on *pages 15-54 to 15-56 in Rider's Volume XV,* except that it has a different cabinet.

General Electric 219, 220, 221

A few cases of hum which cannot be reduced in the normal manner from these models shown on *pages 15-28 to 15-31 of Rider's Volume XV,* may be corrected by cathode degeneration in the output tube, 35L6GT/G, cathode circuit. Remove R17 and C29-C from the circuit. This can be done by disconnecting one end of R17.

General Electric A51, A56

These models are the same as model A54 shown on *pages 7-4 to 7-6 of Rider's Volume VII.*

ADMIRAL CORPORATION

RC161 RECORD CHANGER

IMPORTANT

The RC161 Record Changer is similar in appearance to other model changers. To be certain which model changer you are servicing, look for the changer model number which appears on the small label attached to the underside of the changer mechanism. The changer can be further identified by comparing Figures 3 and 5 with the actual changer.

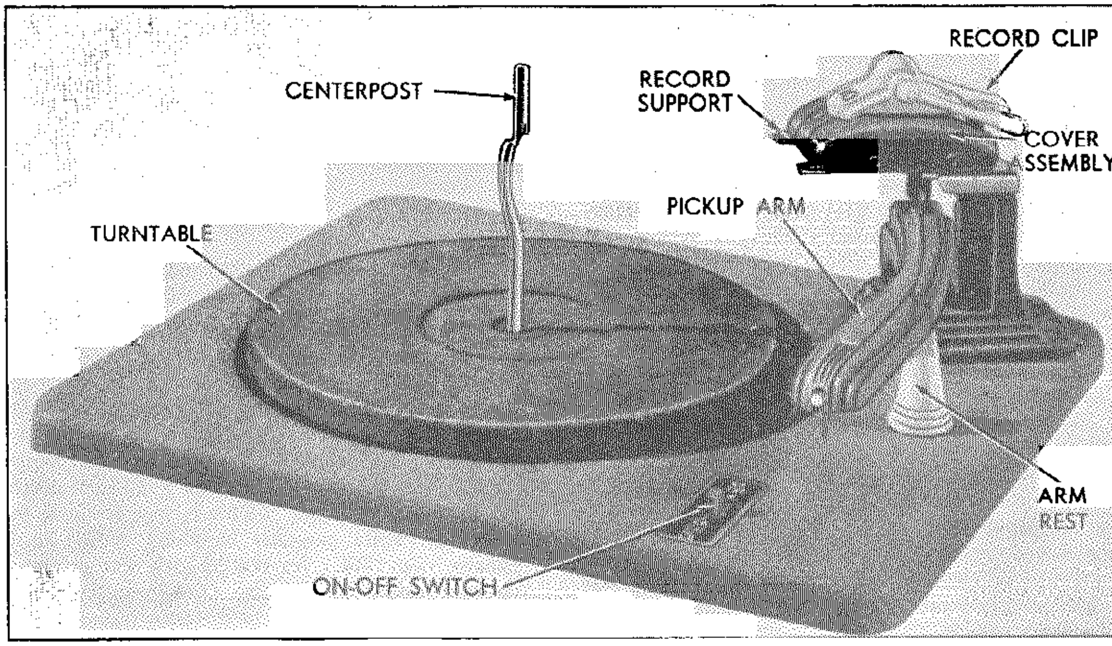


FIGURE 1. RECORD PLAYER, TOP VIEW

OPERATING INSTRUCTIONS

1. SETTING FOR SIZE OF RECORD.

The size of record for which the record changer is set to play is indicated by the number (on the top of the cover assembly) nearest the turntable. See Figure 1.

To change the setting, grasp the record support and cover assembly and rotate it a half turn until it snaps into place with the correct record size toward the turntable. **In changing the setting from 10-inch to 12-inch, rotate the assembly counterclockwise only; in changing from the 12-inch to the 10-inch setting, rotate the assembly clockwise only.**

2. STARTING THE RECORD CHANGER.

Load the record changer and set the record clip so that it rests on the top record. Before turning on the ON-OFF switch, firmly grasp the pickup arm, move it slightly to the right of the arm rest and then return the pickup arm to a point near the edge of the turntable before releasing it. While moving the arm, it should be held firmly enough to prevent it from snapping back and causing possible damage to the needle.

Now turn on the ON-OFF switch. The entire stack of records will then be played automatically.

3. REJECTING A RECORD.

To reject a record at any time and start playing next one, firmly grasp the pickup arm, move it a and slightly to the right of the arm rest and return pickup arm to a point near the edge of the record b releasing it. While moving the arm, it should be firmly enough to prevent it from snapping back.

4. UNLOADING RECORDS.

To remove the records, it is advisable to have changer mechanism out of cycle. However, it is p ble to unload the changer while it is in cycle so lo the pickup arm is clear of the records.

When removing records, hold them lightly an straight up.

CAUTIONS

When turning the record support, be sure to the entire record support and cover assembly not just the plastic record clip.

Never use force to stop the motor or turntabl

THE CHANGE CYCLE

5. DESCRIPTION OF CHANGE CYCLE.
(See Figures 2, 5, and 6.)

While a record is playing and as the pickup arm moves toward the center of the record, the arm control pin (31A) on the arm control assembly (31) moves along the portion of the arm control track (36B) as indicated at "P", figure 2. As the record reaches the pickup or trip point, the pin reaches point "T" on the track. As it moves into the recessed position in which it it shown in the illustration, it permits the trip spring (35) to pull the arm control plate (36) forward towards the centerpost (27). As the arm control plate is drawn forward, the stop tab (36A) on the arm control plate (36) is withdrawn from behind the stop bracket (43A) on the eccentric cam (43). The cam, which no longer is held in place by the stop tab (36A), is pulled over by the eccentric cam spring (44) until the rubber tire makes contact with the knurled roller (53) on the turntable shaft (28A). This knurled roller, which rotates with the turntable shaft, rotates the eccentric cam. In turn, this forces the riser plate assembly (37) back along its guide rods (51A) away from the centerpost (27). As soon as the riser plate begins to move, the push-off cam and shaft assembly (42) rides along the inclined track (37C) of the riser plate (37). This action causes the push-off cam and shaft assembly (42) to be drawn downward; as a result the pickup arm lift (19) presses down on the arm lift bearing pin (14) causing the pickup arm to be raised clear of the record. Then the riser plate tab (37B) contacts and moves the arm control assembly (31) which, since it is coupled to the pickup arm support assembly (22), carries the pickup arm away from the centerpost and clear of the edge of the turntable. As the riser plate (37) continues to travel further along the guide rods (51A), the riser plate motion bracket (37A) contacts and rotates the push-off cam and shaft assembly (42); as a result, the push-off arm (5), [which is coupled to the push-off cam and shaft assembly (42)] causes the push plate (7C) to drop a record to the turntable.

During the second half of the change cycle, the pressure of the push plate spring starts to return the push plate (7C) and push-off arm (5) back to their normal position. At the same time, the motion of the eccentric cam (43) and the guide rod recoil spring (38) propel the riser plate (37) toward the centerpost. The arm control assembly (31), and hence the pickup arm, are drawn back by the tension in the set-down spring (30). After the arm reaches this point directly above the set-down point, the riser plate (37) has moved far enough back towards the centerpost (27) to allow the push-off cam and shaft assembly (42) to ride down the inclined track (37C) of the riser plate (37). This lowers the pickup arm onto the record. (The following paragraph describes how the set-down point is determined for the 10-inch and 12-inch settings.) As the eccentric cam (43), aided by the eccentric cam spring (44) completes its revolution, the rubber tire of the cam moves away from the knurled roller (53) on the turntable shaft and the stop bracket (43A) comes to rest against the stop tab (36A) of the arm control plate (36). The change cycle is completed.

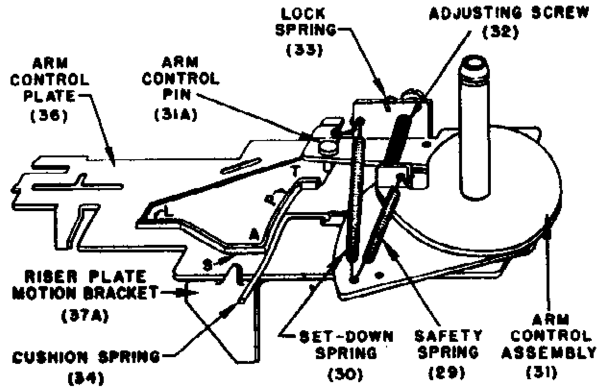


FIGURE 2.

6. DESCRIPTION OF DETERMINATION OF 10-INCH AND 12-INCH SET-DOWN POINTS.

During the early part of the change cycle, the arm control plate (36) has traveled (in a direction away from the centerpost) until the size change stop (36C) reaches the cam (42B) of the push-off cam and shaft assembly. The distance traveled by the arm control plate (36) will depend on the size of the record being played; the distance is less for a 12-inch setting than for a 10-inch setting. (This is true because the push-off cam (42B) presents its short radius to the size change stop (36C) for the 10-inch setting and presents its long radius to the size change stop for a 12-inch setting.) This variation in distance traveled means that the arm control track (36B) will be in a position closer to the centerpost for the 12-inch setting than for the 10-inch setting. This in turn means that during the change cycle the arm control pin (31A) [whose path is determined by the motion of the arm control assembly (31)] will leave its recessed position, and will ride along the "S" portion of the arm control track for the 12-inch setting and along the "L" portion for the 10-inch setting. (See Figure 2.)

As the pickup arm moves back towards the record during the second half of the change cycle, it will be stopped when the bracket (31C) reaches the adjusting screw (32). How far the arm returns before being stopped depends on whether the arm control pin (31A) has been riding in the "S" or "L" portion of the arm control track. If the pin has been riding in the "S" or 12-inch portion of the track, the arm will be stopped at a point directly above the 12-inch set-down point; if the pin has been riding in the "L" or 10-inch portion, the arm will be stopped at a point directly above the 10-inch set-down point.

7. REJECTING A RECORD.

When rejecting a record, the motion of the pickup arm moves the arm control assembly (31) so that the trip spring (35) tension is now permitted to move the arm control plate (36) slightly forward. This movement releases the stop bracket (43A) on the eccentric cam which was engaged by the stop tab (36A) on the arm control plate. The eccentric cam (43) then falls against the knurled roller (53) and the change cycle begins as if a record had just finished playing.

ADJUSTMENTS

CAUTIONS

See that the drive pulley (60A), and the rubber tires on both the idler wheel (57) and the eccentric cam (43) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

If replacement of any parts requires the removal of the lift adjusting collar (10), pickup arm support assembly (22) or the push-off arm (5), be sure to re-position or replace these parts as directed in paragraphs 9, 10, and 11 respectively.

TOOLS REQUIRED

#6 Bristol Set Screw Wrench. (Part No. P-5805. List Price $0.05.)
#8 Bristol Set Screw Wrench. (Part No. P-5806. List Price $0.05.)

8. SET-DOWN POINTS AND PICKUP OR TRIP POINT.

(If the pickup arm support assembly (22) has been removed or if its set screws are loose, it must be re-positioned as described in paragraph 10 before adjusting the set-down points and pickup or trip point.)

This changer is designed so that the 10-inch set-down point, the 12-inch set-down point, and the pickup or trip point are simultaneously adjusted in a single operation. It is recommended that you make the adjustment at either of the set-down points. This adjustment is made by means of the adjusting screw (32) shown in figure 3. Turning this screw counter-clockwise will cause the arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost. One complete turn on the screw will move the arm about 1/4 inch.

If the adjusting screw (32) will not change the setting sufficiently, the pickup arm support assembly (22) may be out of position. (See paragraph 10.)

The set-down points when using a straight-shank needle will differ slightly than when using an offset-shank needle. Unless you know the type to be used by the customer, we suggest the following settings *when tested with a straight needle:* measuring from the side of the centerpost, 4-5/8" for the 10-inch set-down point, 5-5/8" for the 12-inch set-down point, and 1-19/32" for the pickup or trip point.

If you know which type of needle will be used by the customer, and test with that type of needle, the following settings are recommended: measuring from the side of the centerpost, 4-21/32" for the 10-inch set-down point, 5-21/32" for the 12-inch set-down point, and 1-5/8" for the pickup or trip point.

When using an offset-shank needle, slight variations in set-down point can often be corrected by loosening the needle screw and rotating the needle slightly.

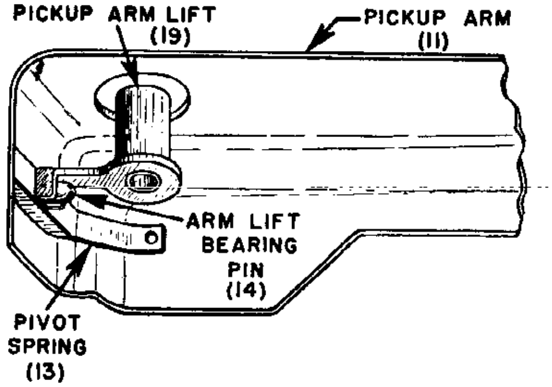


FIGURE 4.

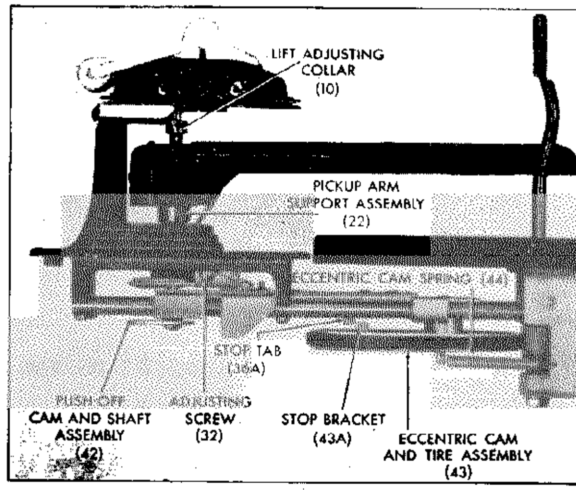


FIGURE 3.

9. PICKUP ARM HEIGHT.

When properly adjusted, the pickup arm height should be such that, without a needle and with a single record on the turntable, the arm should be about 1/32" above the record. The arm height depends on the location of the lift adjusting collar (10). As the collar is moved down, the arm is raised, and vice versa. When necessary, the pickup arm height may be adjusted by re-positioning the lift adjusting collar (10) as follows:

(a) The changer should be out of cycle.
(b) Lift the pickup arm and check to see that the pickup arm lift (19) is positioned properly over arm lift bearing pin (14). (See Fig. 4.)
(c) Remove needle and place pickup arm on turntable close to its edge.
(d) Loosen set screw in lift adjusting collar (10).
(e) Remove slack by pushing up on push-off cam and shaft assembly (42). Do not compress the arm lift shaft spring (41).
(f) Using a #6-32 Bristol wrench, place it in the set screw and slide the lift adjusting collar (10) down until it is snug against the pickup arm lift (19).
(g) Tighten set screw in the lift adjusting collar.
(h) Check height.

If height is still incorrect, it may be necessary to repeat the adjustment. Before doing so, it may be advisable to examine the shaft (42A) of the push-off cam and shaft assembly for nicks and burrs caused by the set-screws. Smooth shaft with file if necessary. The upper portion of the shaft is accessible if the push-off arm (5), head assembly (7) and lift adjusting collar (10) are removed. To prevent shaft from falling out through bottom, keep in place with masking tape. When replacing the lift adjusting collar (10) and push-off arm (5), see paragraphs 9 and 11 respectively.

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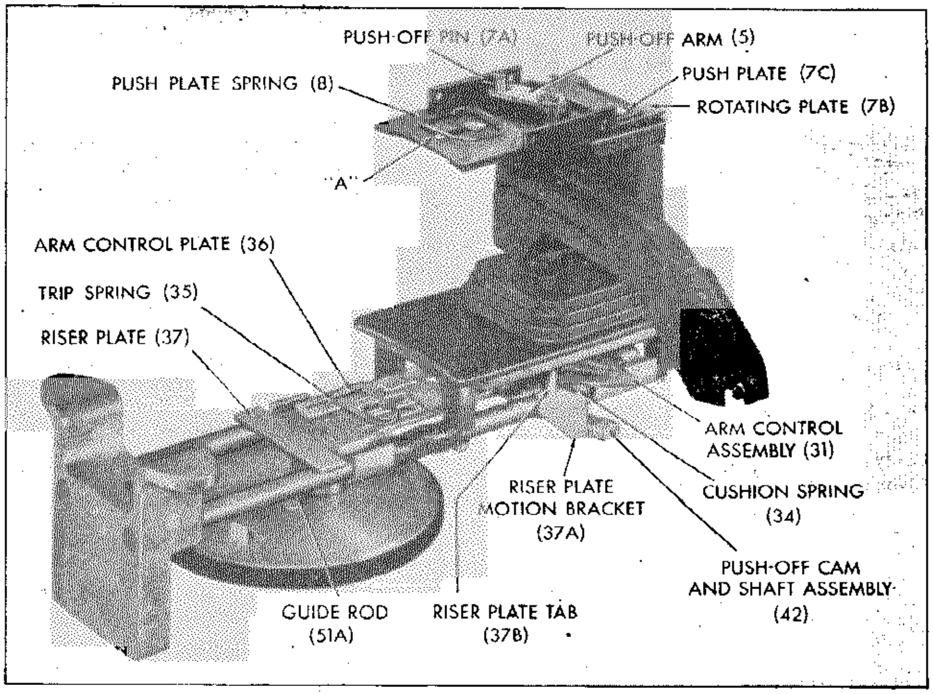

FIGURE 5.

10. RE-POSITIONING PICKUP ARM SUPPORT ASSEMBLY (22).

To assure proper set-down adjustment, this must be done carefully as follows if set screws are loose or if pickup arm support assembly (22) has been removed.

(a) Turn adjusting screw (32) (see paragraph 8) clockwise as far as it will go, then turn back counterclockwise for 2 full turns.

(b) Place a 12" record on the turntable.

(c) With the changer out of cycle, manually move the arm control assembly (31) outwards as far as it moves freely. In this position, the arm control pin (31A) will be located as indicated at "A" in figure 2.

(d) Place pickup arm so that needle rests in first playing groove on the 12" record.

(e) Tighten the two set screws in pickup arm support assembly (22).

(f) Make the final set-down adjustment as described in paragraph 8.

11. RE-POSITIONING PUSH-OFF ARM (5).

This must be carefully done if set screws are loose or push-off arm (5) has been removed.

(a) Rotate the record support to the 10-inch position. Remove push-off arm (5).

(b) Manually slide the push plate (7C) over the rotating plate (7B) until a piece of metal 3/32 inch in diameter or a #8-32 Bristol wrench can be inserted into the opening at the front of the center slot in the push plate (see "A", figure 5). If the 12-inch push-off is faulty with this setting, try using a 1/16" piece of metal or a #6-32 Bristol wrench.

(c) Put the changer into cycle and manually rotate the turntable until the riser plate (37) has traveled along the guide rods (51A) to a position furthest away from the turntable.

(d) Now position push-off cam and shaft assembly (42) so that it is held tightly against riser plate motion bracket (37A).

(e) Put push-off arm in position, leaving about 1/16" clearance between the top of the push plate and the push-off arm.

(f) Tighten set screws in push-off arm.

12. CHANGER REPEATEDLY GOES THROUGH CHANGE CYCLE WITHOUT PLAYING RECORD.

(a) Mounting screw on eccentric cam (43) may be loose. Tighten.

(b) Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See figure 5.)

(c) In normal operation, the trip spring (35) holds the arm control plate (36) against the riser plate (37). If the trip spring is faulty, it permits the arm control plate to rise too high above the riser plate. This causes the stop bracket (43A) to pass underneath the stop tab (36A). To correct, bend the legs of the trip spring closer together. If necessary, replace trip spring.

(d) Eccentric cam (43) is bent so that stop bracket (43A) passes underneath stop tab (36A) on the arm control plate (36). To correct, straighten cam by putting changer out of cycle and pressing upward on cam near stop bracket.

(e) The stop bracket (43A) on the eccentric cam (43) is not properly bent and is failing to engage stop tap (36A) on arm control plate (36). To correct, bend stop bracket (43A) until it is at right angles to disc of eccentric cam.

13. NEEDLE SLIDES ACROSS PORTION OF RECORD AFTER SET-DOWN ON 12-INCH RECORD.

Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See figure 5.)

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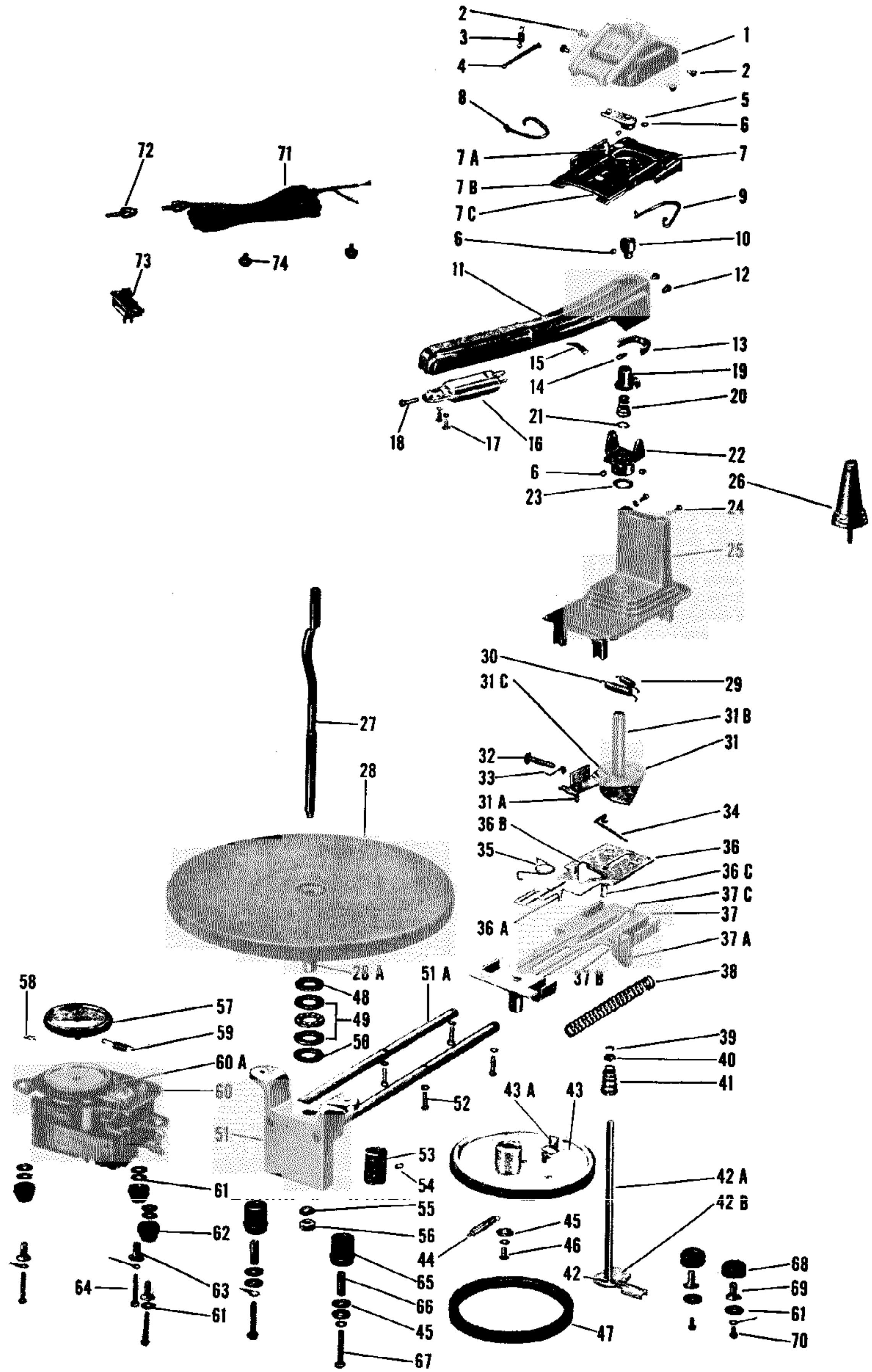

FIGURE 6. RECORD CHANGER, EXPLODED VIEW

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SERVICE PARTS LIST

RC161 RECORD CHANGER

See Exploded View, Figure 6, for Identification of Parts.

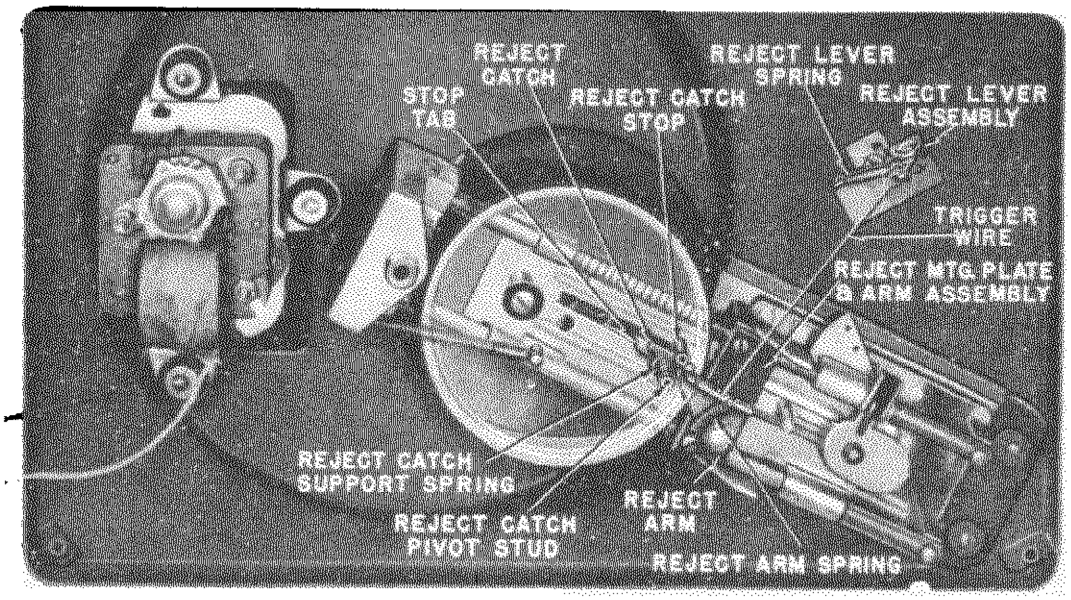
Ref. No.	Part Number	Description
1	G400A110	Cover assembly (Includes 3 and 4)
2	13A1-3-57	Snap buttons (cover)
3	405A4	Spring, record clip
4	414A4	Spring rod (record clip)
5	G400A66	Push-off arm assembly (When replacing, refer to paragraph 11)
6	1A44-38	Set screw (Bristol Head #6-32x3/16")
7	G400B68	Head assembly (Includes 7A, 7B, 7C, 7D, 8 and 9)
7A		Push plate pin (Part of 7)
7B		Rotating plate (Part of 7)
7C		Push plate (Part of 7)
7D		Head mounting plate (Part of 7)
8	405A38	Spring, push plate (Located on top of push plate)
9	405B18	Spring, head mounting plate (Located on bottom of head mounting plate assembly)
10	402A57	Lift adjusting collar (When replacing, refer to paragraph 9)
11	G400A92	Pickup arm, pivot spring and arm lift bearing pin assembly (Does not include 15 or 16)
12		Rivet (pickup arm pivot spring) } Supplied as a group only; order part number 98A1-P
13		Pivot spring (pickup arm)
14		Arm lift bearing pin
15	405A13	Spring clip (pickup arm)
16	409A3 409A2 409A1	Pickup cartridge Pickup cartridge } Interchangeable Pickup cartridge
17	42-250-C2-47	Screw (Fil.H.M.S. #4-40x¼"; for mtg. cartridge)
18	402A43	Needle screw for cartridge
19	G400A86	Pickup arm lift assembly
20	405A46	Brake spring (5 turns)
21	405A37	Retaining ring (Used on arm support tube 31B)
22	G400A73	Pickup arm support assembly (When replacing, refer to paragraph 10)
23	405A27	Washer, spring
24	65-312-C2-47	Screw (B.H.M.S. #6-32x5/16"; for mtg. assembly 7)
25	G400B80	Base (die cast)
26	G400A46-3	Arm rest
27	G400A12	Centerpost
28	G400B49	Turntable
28A		Turntable shaft (Part of 28)
29	405A41	Safety spring
30	405A42	Set-down spring
31	G400A84	Arm control assembly
31A		Arm control pin (Part of 31)
31B		Arm support tube (Part of 31)
31C		Bracket (Part of 31)
32	402A60	Adjusting screw
33	405A44	Lock spring (set-down adjustment)
34	405A45	Cushion spring
35	405A43	Trip spring
36	G400A112	Arm control plate
36A		Stop tab (Part of 36)
36B		Track (Part of 36)
36C		Size change stop (Part of 36)
37	G400A88	Riser plate assembly
37A		Riser plate motion bracket (Part of 37)
37B		Riser plate tab (Part of 37)
37C		Inclined track (Part of 37)
38	405A9	Spring, recoil
39		Retaining ring (arm lift shaft) } Furnished as an assembly only; order part number G400A98
40		Safety collar (arm lift shaft)
41		Spring (arm lift shaft)
42		Push-off cam and shaft assembly
42A		Arm lift shaft (Part of 42)
42B		Push-off cam (Part of 42)
43	G400A78	Eccentric cam and tire assembly
43A		Stop bracket (Part of 43)
44	405A47	Spring, eccentric cam
45	4B1-57-47	Flat washer (eccentric cam)
46	84-250-C2-21	Screw (R.H.M. #8-32x¼"; for mtg. eccentric cam)
47	406A1	Rubber tire, eccentric cam
48	412A1	Cork washer (3/32" thick)
49	415A2	Thrust bearing assembly (Replace as a unit)
50	412A9	Cork washer (3/64" thick)
51	G400B56	Turntable mounting and guide rod assembly
51A		Guide rods (Part of 51)
52	62-500-C2-21	Screw (Fil.H.M.S. #6-32x¼"; for mtg. guide rod)
53	402A5	Knurled roller, turntable shaft
54	1A44-13	Set screw (Bristol #8-32x⅛"; for knurled roller)
55	3A2-9-47	Lockwasher, split (¼" diameter)
56	402A41	Hex nut (¼"-20; used on centerpost)
57	G400A23 G400A57 G400A59	Idler wheel assembly (Used with motor 407B3 only) Idler wheel assembly (Used with motor 407B1 only) Idler wheel assembly (Used with motor 407B2 only)
58	405A15	Spring, hairpin
59	405A14 405A35 405A36	Spring, idler wheel (Used with motor 407B3 only) Spring, idler wheel (Used with motor 407B1 only) Spring, idler wheel (Used with motor 407B2 only)
60	407B3	Motor, complete with idler wheel; 105-125 volts, 60 cycle (Motors 407B1 and 407B2 are interchangeable with 407B3)
60A	401A48	Drive pulley (Part of 60. For motor 407B3 only.)
61	4B1-36-47	Flat washer
62	406A4 406A9 406A10	Rubber grommet (motor mounting; for motor 407B3) Rubber grommet (motor mounting; for motor 407B1) Rubber grommet (motor mounting; for motor 407B2)
63	401A53 402A44 402A45	Spacer, grommet (Used with motor 407B3) Spacer, grommet (Used with motor 407B1) Spacer, grommet (Used with motor 407B2)
64	60-875-C2-2 60-1125-C2-21	Screw (R.H.M.S. #6-32x⅞"; used for mounting motor on metal base) Screw (R.H.M.S. #6-32x1⅛"; used for mounting motor on wood or plastic base)
65	406A5 406A2	Rubber grommet (Large; used with metal base) Rubber grommet (Used with wood or plastic base)
66	402A36 29A2-4-21	Spacer, mounting (Used with metal base) Spacer, mounting (Used with wood or plastic base)
67	80-1000-C2-47 280-875-C2-2	Screw (R.H.M.S. #8-32x1"; used for mounting record changer on metal base) Screw (R.M.H.S. Sems #8-32x⅞"; used for mounting record changer on wood or plastic base)
68	406A6 406A2	Rubber grommet (Small; used with metal base) Rubber grommet (Used with wood or plastic base)
69	29A2-6-21	Spacer, mounting (Used with wood or plastic base)
70	60-250-C2-47 260-687-C2-2	Screw (R.H.M.S. #6-32x¼"; used for mounting record changer on metal base) Screw (R.H.M.S. Sems #6-32x11/16"; used for mounting record changer on wood or plastic base)
71	89A5-9	Shielded output cable and plug
72	88A2-1	Plug (output)
73	77A1-15	Switch, On-Off
74	12A3-4	Rubber bumper
	405A30 405A31 405A32	50 cycle conversion spring (For motor 407B1) 50 cycle conversion spring (For motor 407B2) 50 cycle conversion spring (For motor 407B3)

RC161A RECORD CHANGER

When servicing the RC161A, use this supplement with the RC161 Service Manual

IMPORTANT

The RC161A Record Changer is similar in appearance to other model changers. To be certain which model changer you are servicing, look for the changer model number which appears on the small label attached to the underside of the changer mechanism.



ECCENTRIC CAM IN PHANTOM TO SHOW REJECT CATCH

The RC161A is a modification of the RC161 Record Changer. Hence, the Service Manual for the RC161 Record Changer may be used for servicing the RC161A if the following changes are noted:

THE REJECT MECHANISM

A push-button reject mechanism has been provided in the RC161A Record Changer.

The reject button is located on the top of the arm rest. The additional parts used to provide push-button rejection are shown in the illustration above; part numbers are listed below under "Service Parts List".

The illustration above shows the changer out of cycle, that is, when a record is playing. Note that the reject catch engages both the stop tab on the arm control plate, and the reject arm. If the changer is allowed to finish playing the record, the stop tab on the arm control plate is withdrawn from behind the reject catch; the eccentric cam is then pulled against the knurled roller and the change cycle begins. However, when the reject button is pressed, the reject trigger wire pulls the reject arm from behind the catch; the eccentric cam is pulled against the knurled rc and the change cycle begins.

TURNTABLE MOUNTING

The RC161A also features an important turnt shaft bearing arrangement. Self-lubricating por bronze bearings are now pressed into the turnt mount casting. This feature was also added to later RC161 changers.

OPERATING INSTRUCTIONS

To start the RC161A Record Changer, load record changer, set the record clip, and turn on On-Off switch. Now press down on the reject but directly or push down on the pickup arm momenta if it is setting on the arm rest. The entire stack records will be played automatically.

To reject a record, merely press down on the re button.

SERVICE PARTS LIST

(All parts not listed below are the same as in the RC161 and should be ordered from RC161 Service Manual)

Part Number	Description
G400A115	Reject lever assembly
405A25	Spring, reject lever
414A12	Reject trigger wire
G400A116	Reject mounting plate and arm assembly
	Reject arm (part of reject mtg. plate and arm assembly)
405A25	Reject arm spring
401A97	Reject catch
405A15	Hairpin spring (reject catch)
405A50	Reject catch support spring

Part Number	Description
G400A117	*Eccentric cam and tire assembly (Does not include r catch support spring or hairpin spring)
	Reject catch pivot stud (part of cam)
	Reject catch stop (part of cam)
G400A111	*Turntable mounting and guide rod assembly
402A62	*Knurled roller
G400A46-3	Arm rest assembly (Mounted on metal only)
G400A46-4	*Arm rest assembly (Mounted on wood or plastic)

*These parts are not interchangeable with RC161 parts having s description but different part numbers.

ADMIRAL CORPORATION

RC200 RECORD CHANGER

IMPORTANT

To be certain which model changer you are servicing, look for the changer model number which appears on the small label attached to the underside of the changer mechanism.

OPERATING INSTRUCTIONS

1. SETTING FOR SIZE OF RECORD.

The size of record for which the record changer is set to play is indicated by the number (on the top of the cover assembly) nearest the turntable. See Figure 1.

To change the setting, grasp the record support and cover assembly and rotate it a half turn until it snaps into place with the correct record size toward the turntable. **In changing the setting from 10-inch to 12-inch, rotate the assembly counterclockwise only; in changing from the 12-inch to the 10-inch setting, rotate the assembly clockwise only.**

2. STARTING THE RECORD CHANGER.

Load the record changer and set the record clip so that it rests on the top record.

Turn the Phono-Motor switch to the "ON" position. Press the reject button directly or push down on the pickup arm momentarily if it is setting on the arm rest. The bottom record will drop to the turntable and the Record Changer will play the entire stack of records automatically.

Care should be exercised when moving the pickup arm while the changer is out of cycle. If the arm is accidentally dropped while it is being moved from the edge of the turntable to the arm rest, the pickup arm may snap back and cause possible damage to the needle and record.

3. REJECTING A RECORD.

To reject a record at any time and start playing the next one, merely press the reject button on top of the arm rest.

4. UNLOADING RECORDS.

To remove the records, it is advisable to have the changer mechanism out of cycle. However, it is possible to unload the changer while it is in cycle so long as the pickup arm is clear of the records.

When removing records, hold them lightly and lift straight up.

CAUTIONS

When turning the record support, be sure to grip the entire record support and cover assembly and not just the plastic record clip.

Never use force to stop the motor or turntable.

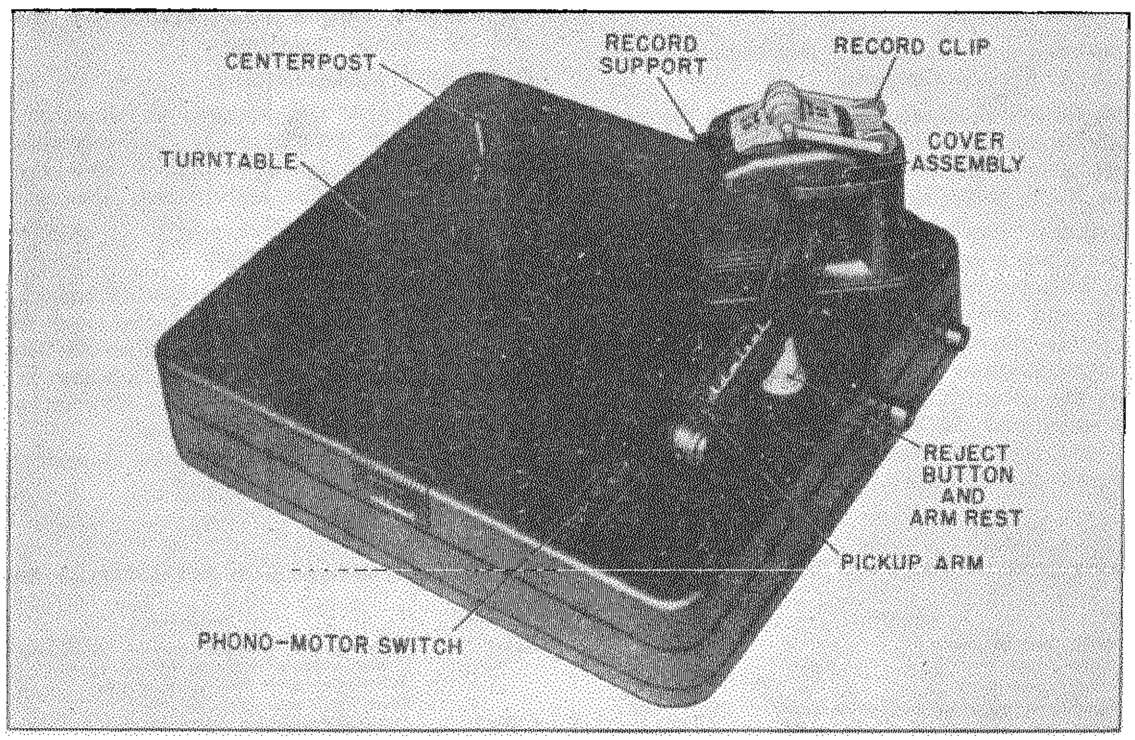


FIGURE 1. RECORD PLAYER, TOP VIEW

THE CHANGE CYCLE

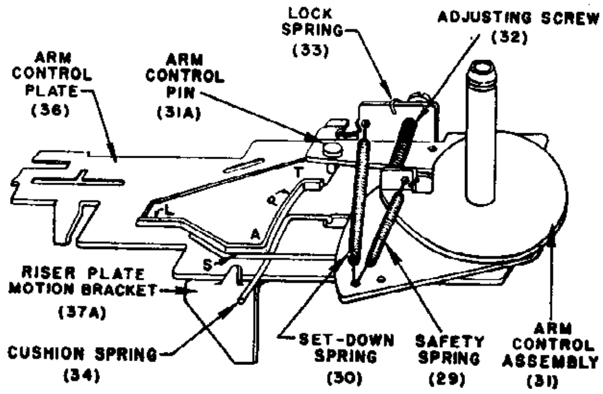


FIGURE 2.

5. DESCRIPTION OF CHANGE CYCLE. (See Figures 2, 5, and 7.)

While a record is playing and as the pickup arm moves toward the center of the record, the arm control pin (31A) on the arm control assembly (31) moves along the portion of the arm control track (36B) as indicated at "P", figure 2. As the record reaches the pickup or trip point, the pin reaches point "T" on the track. As it moves into the recessed position in which it is shown in the illustration, it permits the trip spring (35) to pull the arm control plate (36) forward towards the centerpost (27). As the arm control plate is drawn forward, the stop tab (36A) on the arm control plate (36) is withdrawn from behind the reject catch (85). This allows the eccentric cam (43) to be pulled over by the eccentric cam spring (44) until the rubber tire makes contact with the knurled roller (53) on the turntable shaft (28A). This knurled roller, which rotates with the turntable shaft, rotates the eccentric cam. In turn, this forces the riser plate assembly (37) back along the guide rods (51A) away from the centerpost (27).

As soon as the riser plate begins to move, the push-off cam and shaft assembly (42) rides along the inclined track (37C) of the riser plate (37). This action causes the push-off cam and shaft assembly (42) to be drawn downward; as a result the pickup arm lift (19) presses down on the arm lift bearing pin (14) causing the pickup arm to be raised clear of the record. Then the riser plate tab (37B) contacts and moves the arm control assembly (31) which, since it is coupled to the pickup arm support assembly (22), carries the pickup arm away from the centerpost and clear of the edge of the turntable. As the riser plate (37) continues to travel further along the guide rods (51A), the riser plate motion bracket (37A) contacts and rotates the push-off cam and shaft assembly (42); as a result, the push-off arm (5) [which is coupled to the push-off cam and shaft assembly (42)] causes the push plate (7C) to drop a record to the turntable.

During the second half of the change cycle, the pressure of the push plate spring starts to return the push plate (7C) and push-off arm (5) back to their normal position. At the same time, the motion of the eccentric cam (43) and the guide rod recoil spring (38) propel the riser plate (37) toward the centerpost. The arm control assembly (31), and hence the pickup arm, are drawn back by the tension in the set-down spring (30). After the arm reaches a point directly above the set-down point, the riser plate (37) has moved far enough back towards the centerpost (27) to allow the push-off cam and shaft assembly (42) to ride down the inclined track (37C) of the riser plate (37). This lowers the pickup arm onto the record. (The following paragraph describes how the set-down point is determined for the 10-inch and 12-inch settings.) As the eccentric cam (43) [aided by the eccentric cam spring (44)] completes its revolution, the rubber tire of the cam moves away from the knurled roller (53) on the turntable shaft. The reject catch (85) then comes to rest against both the stop tab (36A) and the reject arm (87A). The change cycle is completed.

6. DESCRIPTION OF DETERMINATION OF 10-INCH AND 12-INCH SET-DOWN POINTS.

During the early part of the change cycle, the arm control plate (36) has traveled (in a direction away from the centerpost) until the size change stop (36C) reaches the push-off cam (42B) of the push-off cam and shaft assembly. The distance traveled by the arm control plate (36) will depend on the size of the record being played; the distance is less for a 12-inch setting than for a 10-inch setting. (This is true because the push-off cam (42B) presents its short radius to the size change stop (36C) for the 10-inch setting and presents its long radius to the size change stop for a 12-inch setting.) This variation in distance traveled means that the arm control track (36B) will be in a position closer to the centerpost for the 12-inch setting than for the 10-inch setting. This, in turn, means that during the change cycle the arm control pin (31A) [whose path is determined by the motion of the arm control assembly (31)] will leave its recessed position, and will ride along the "S" portion of the arm control track for the 12-inch setting and along the "L" portion for the 10-inch setting. (See Figure 2.)

As the pickup arm moves back towards the record during the second half of the change cycle, it will be stopped when the bracket (31C) reaches the adjusting screw (32). How far the arm returns before being stopped depends on whether the arm control pin (31A) has been riding in the "S" or "L" portion of the arm control track. If the pin has been riding in the "S" or 12-inch portion of the track, the arm will be stopped at a point directly above the 12-inch set-down point; if the pin has been riding in the "L" or 10-inch portion, the arm will be stopped at a point directly above the 10-inch set-down point.

7. REJECTING A RECORD. (See Figure 6.)

When the reject button (26) is pressed, the reject trigger wire (83) pulls the reject arm (87A) from behind the reject catch (85). The eccentric cam (43) then falls against the knurled roller (53) and the change cycle begins as if a record had just finished playing.

ADJUSTMENTS

CAUTIONS

See that the drive pulley (60A), and the rubber tires on both the idler wheel (57) and the eccentric cam (43) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

If replacement of any parts requires the removal of the lift adjusting collar (10), pickup arm support assembly (22) or the push-off arm (5), be sure to reposition or replace these parts as directed in paragraphs 9, 10, and 11 respectively.

TOOLS REQUIRED

#6 Bristol Set Screw Wrench. (Admiral Part No. P-5805. List Price $0.05.)
#8 Bristol Set Screw Wrench. (Admiral Part No. P-5806. List Price $0.05.)

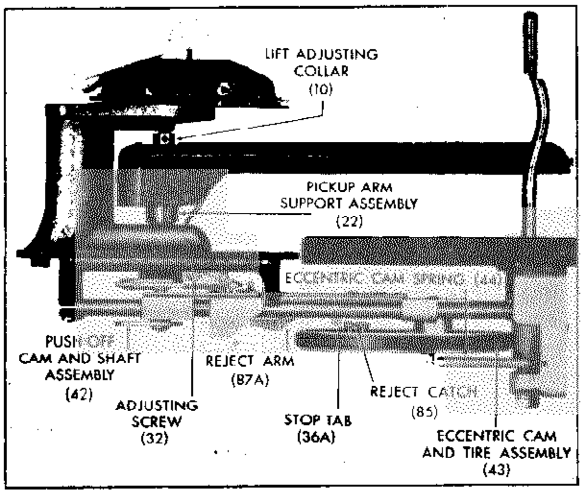


FIGURE 3.

8. SET-DOWN POINTS AND TRIP POINT.

If the pickup arm support assembly (22) has been removed or if its set screws are loose, it must be repositioned as described in paragraph 10 before adjusting the set-down points and pickup or trip point.

This changer is designed so that the 10-inch set-down point, the 12-inch set-down point, and the pickup or trip point are simultaneously adjusted in a single operation. It is recommended that you make the adjustment at either of the set-down points. This adjustment is made by means of the adjusting screw (32) shown in figure 3. Turning this screw counter-clockwise will cause the arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost. One complete turn on the screw will move the arm about 1/4 inch.

If the adjusting screw (32) will not change the setting sufficiently, the pickup arm support assembly (22) may be out of position. (See paragraph 10.)

The set-down points when using a straight-shank needle will differ slightly than when using an offset-shank needle such as the Admiral Lifetime Needle. If you do not know which type of needle is to be used by the customer, we suggest the following settings *when tested with a straight needle:* measuring from the side of the centerpost, 4-5/8" for the 10-inch set-down point, 5-5/8" for the 12-inch set-down point, and 1-19/32" for the pickup or trip point.

If you know which type of needle will be used by the customer, and test with that type of needle, the following settings are recommended: measuring from the side of the centerpost, 4-21/32" for the 10-inch set-down point, 5-21/32" for the 12-inch set-down point, and 1-5/8" for the pickup or trip point.

When using an offset-shank needle, slight variations in set-down point can often be corrected by loosening the needle screw and rotating the needle slightly.

9. PICKUP ARM HEIGHT.

When properly adjusted, the pickup arm height should be such that, without a needle and with a single record on the turntable, the arm should be about 1/32" above the record. The arm height depends on the location of the lift adjusting collar (10). As the collar is moved down, the arm is raised, and vice versa. When necessary, the pickup arm height may be adjusted by repositioning the lift adjusting collar (10) as follows:

(a) Be sure the changer is out of cycle.
(b) Lift the pickup arm and check to see that the pickup arm lift (19) is positioned properly over the arm lift bearing pin (14). (See Fig. 4.)
(c) Remove needle and place pickup arm on turntable close to its edge.
(d) Loosen set screw in lift adjusting collar (10).
(e) Remove slack by pushing up on push-off cam and shaft assembly (42). Do not compress the arm lift shaft spring (42C).
(f) Using a #6-32 Bristol wrench, place it in the set screw and slide the lift adjusting collar (10) down until it is snug against the pickup arm lift (19).
(g) Tighten set screw in the lift adjusting collar.
(h) Check height.

If height is still incorrect, it may be necessary to repeat the adjustment. Before doing so, it may be advisable to examine the shaft (42A) of the push-off cam and shaft assembly for nicks and burrs caused by the set screws. Smooth the shaft with a file if necessary. The upper portion of the shaft is accessible if the push-off arm (5), head assembly (7), head mounting plate (75), base head (76), and lift adjusting collar (10) are removed. To prevent shaft from falling out through bottom, keep in place with masking tape. When replacing the lift adjusting collar (10) and push-off arm (5), see paragraphs 9 and 11 respectively.

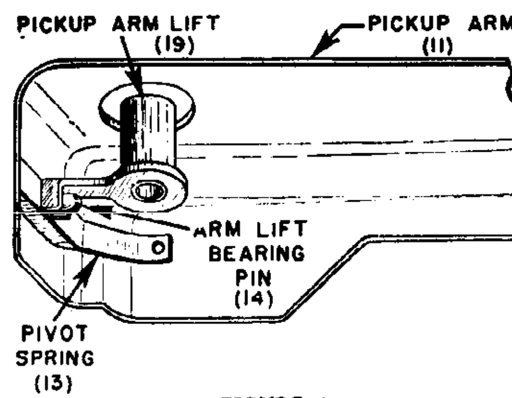


FIGURE 4.

SERVICE AND REPAIR

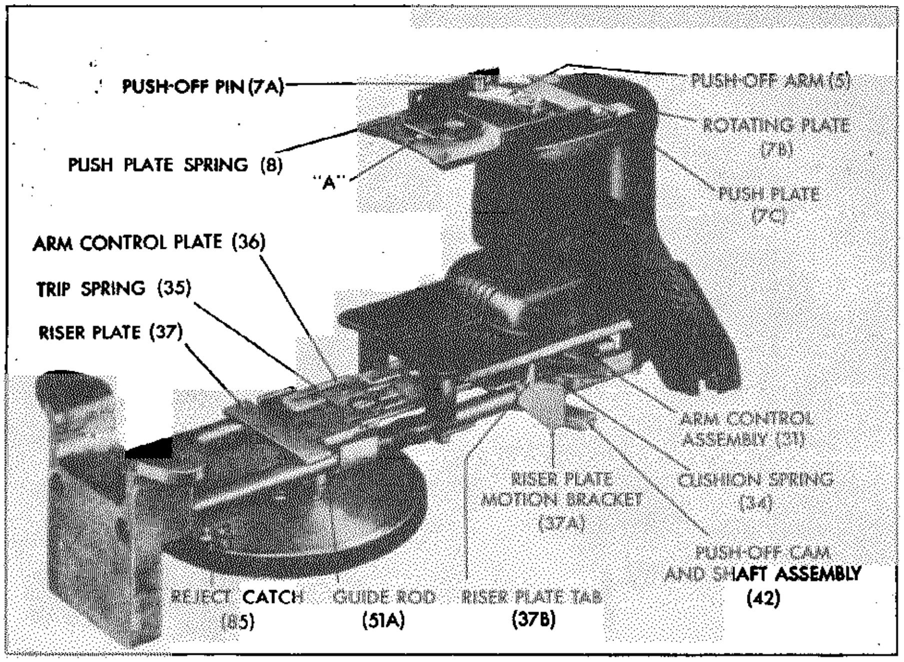


FIGURE 5.

10. RE-POSITIONING PICKUP ARM SUPPORT ASSEMBLY (22).

If the pickup arm support assembly (22) has been removed or if its set screws are loose, re-position as follows to assure proper set-down adjustment:

(a) Turn adjusting screw (32) (see paragraph 8) clockwise as far as it will go, then turn back counter-clockwise for 2 full turns.

(b) Place a 12" record on the turntable.

(c) With the changer out of cycle, manually move the arm control assembly (31) outward as far as it moves freely. In this position, the arm control pin (31A) will be located as indicated at "A" in figure 2.

(d) Place pickup arm so that needle rests in first playing groove on the 12" record.

(e) Tighten the two set screws in pickup arm support assembly (22).

(f) Make the final set-down adjustment as described in paragraph 8.

11. RE-POSITIONING PUSH-OFF ARM (5). (See Figure 5.)

If push-off arm (5) has been removed or if its set screws are loose, carefully re-position as follows:

(a) Rotate the record support to the 10-inch position. Remove push-off arm (5).

(b) Manually slide the push plate (7C) over the rotating place (7B) until a piece of metal 3/32 inch in diameter or a #8-32 Bristol wrench can be inserted into the opening at the front of the center slot in the push plate (see "A", figure 5).

If, after completing the re-positioning of the push-off arm, it is seen that this setting does not give proper push-off for both 10-inch and 12-inch records, vary the spacing at "A" slightly and repeat the procedure.

(c) Put the changer into cycle and manually rotate the turntable until the riser plate (37) has traveled along the guide rods (51A) to a position furthest away from the turntable.

(d) Now position push-off cam and shaft assembly (42) so that it is held tightly against riser plate motion bracket (37A).

(e) Put push-off arm in position, leaving about 1/16" clearance between the top of the push plate and the push-off arm.

(f) Tighten set screws in push-off arm.

12. CHANGER REPEATEDLY GOES THROUGH CHANGE CYCLE WITHOUT PLAYING RECORD.

(a) Mounting screw on eccentric cam (43) may be loose. Tighten it.

(b) Eccentric cam (43) is bent so that the reject catch (85) passes underneath the stop tab (36A) or reject arm (87A). To correct, straighten the cam by putting changer out of cycle and pressing upward on the cam near the reject catch.

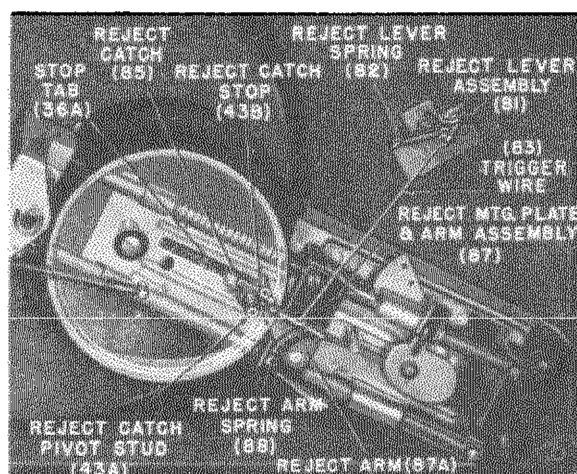


FIGURE 6. ECCENTRIC CAM IN PHANTOM TO SHOW REJECT CATCH

MODEL RC-200

ADMIRAL CORPORATION

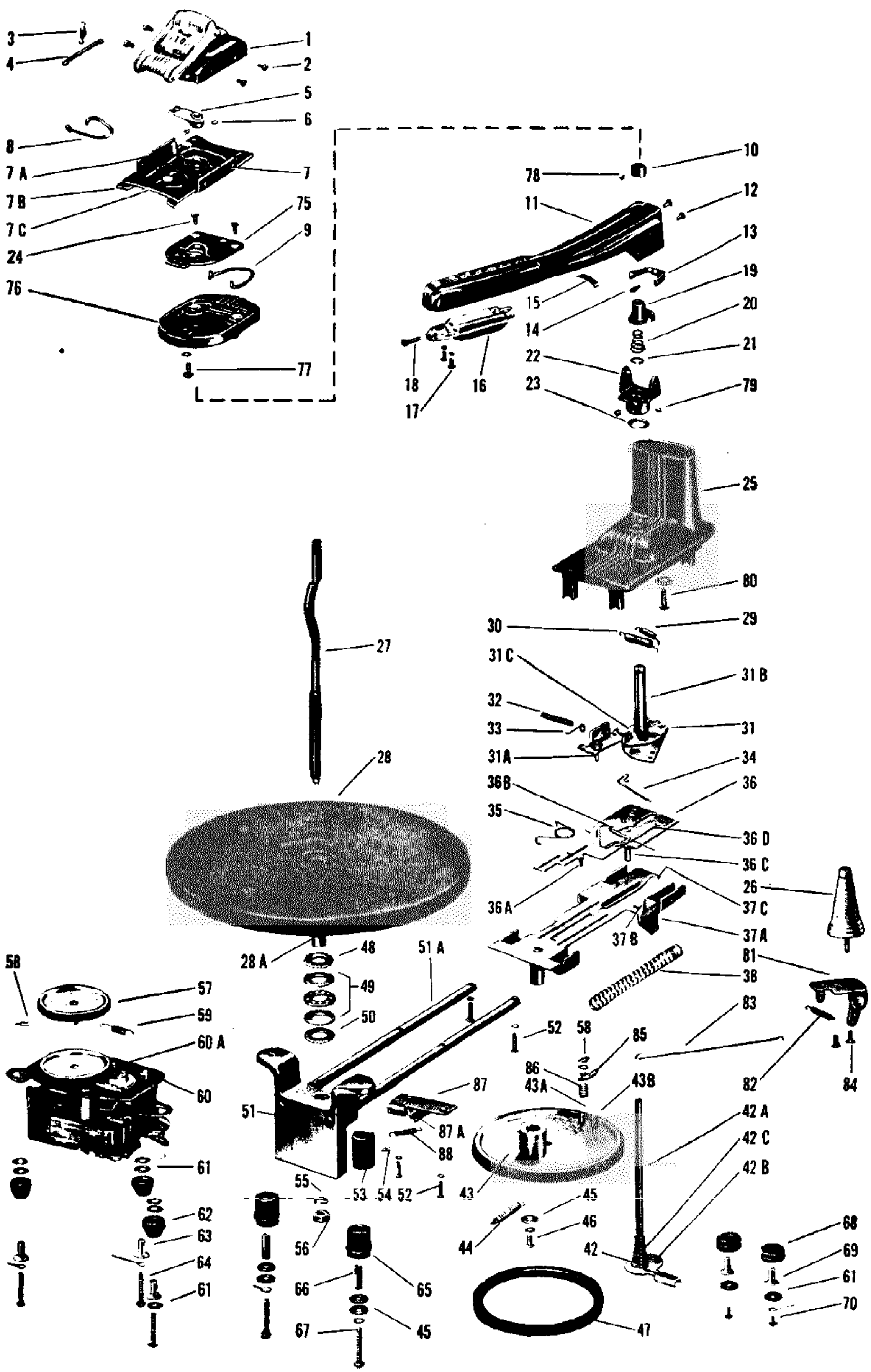


FIGURE 7. RECORD CHANGER, EXPLODED VIEW

SERVICE PARTS LIST
RC200 RECORD CHANGER

See Exploded View, Figure 7, for Identification of Parts.

Ref. No.	Part Number	Description
1	G400A128	Cover assembly (Includes 3 and 4)
2	13A1-3-57	Snap buttons (cover)
3	405A4	Spring, record clip
4	414A4	Spring rod (record clip)
5	G400A66	Push-off arm assembly (When replacing, refer to paragraph 11)
6	1A44-38	Set screw (Bristol Head #6-32x3/16"; cone tip)
7	G400B70	Head assembly (Includes 8)
7A		Push plate pin (Part of 7)
7B		Rotating plate (Part of 7)
7C		Push plate (Part of 7)
8	405A38	Spring, push plate (Located on top of push plate)
9	405B18	Spring, head mounting plate
10	402A66	Lift adjusting collar (When replacing, refer to paragraph 9)
11	G400A130	Pickup arm, pivot spring and arm lift bearing pin assembly (Does not include 15 or 16)
12		Rivet (pickup arm pivot spring) } Supplied as a group only; order part number 98A1
13		Pivot spring (pickup arm) } Supplied as a group only; order part number 98A1
14		Arm lift bearing pin } Supplied as a group only; order part number 98A1
15	405A13	Spring clip (pickup arm)
16	409A3	Pickup cartridge } Interchangeable
	409A2	Pickup cartridge } Interchangeable
	409A1	Pickup cartridge } Interchangeable
17	42-250-C2-47	Screw (Fil.H.M.S. #4-40x¼"; for mtg. cartridge)
18	402A43	Needle screw for cartridge
19	G400A86	Pickup arm lift assembly
20	405A46	Brake spring (5 turns)
21	405A37	Retaining ring (Used on arm support tube 31B)
22	G400A73	Pickup arm support assembly (When replacing, refer to paragraph 10)
23	405A27	Washer, spring
24	61-312-C2-47	Screw (F.H.M.S. #6-32x5/16")
25	404C8	Base (die cast)
26	G400A46-1	Reject button and arm rest (For metal base)
	G400A46-2	Reject button and arm rest (For wood or plastic base)
27	G400A12-2	Centerpost
28	G400B49	Turntable
28A		Turntable shaft (Part of 28)
29	405A41	Safety spring
30	405A49	Set-down spring
31	G400A84	Arm control assembly
31A		Arm control pin (Part of 31)
31B		Arm support tube (Part of 31)
31C		Bracket (Part of 31)
32	402A60	Adjusting screw
33	405A44	Lock spring (set-down adjustment)
34	405A45	Cushion spring (Part of 36)
35	405A43	Trip spring
36	G400A125	Arm control plate (Includes 34)
36A		Stop tab (Part of 36)
36B		Track (Part of 36)
36C		Size change stop (Part of 36)
36D		Clamp spring (Part of 36)
37	G400A88	Riser plate assembly
37A		Riser plate motion bracket (Part of 37)
37B		Riser plate tab (Part of 37)
37C		Inclined track (Part of 37)
38	405A9	Spring, recoil
42	G400A98	Push-off cam and shaft assembly (Includes retaining ring, ~~safety collar and spring~~)
42A		Arm lift shaft (Part of 42)
42B		Push-off cam (Part of 42)
42C		Arm lift shaft spring (Part of 42)
43	G400A117	Eccentric cam and tire assembly
43A		Reject catch pivot stud (Part of 43)
43B		Reject catch stop (Part of 43)
44	405A47	Spring, eccentric cam
45	4B1-57-47	Flat washer (ecentric cam)
46	84-250-C2-21	Screw (R.H.M.S. #8-32x¼"; for mtg. eccentric cam)
47	406A1	Rubber tire, eccentric cam
48	412A1	Cork washer (3/32" thick)
49	415A2	Thrust bearing assembly (Replace as a unit)
50	412A9	Cork washer (3/64" thick)
51	G400A111	Turntable mounting and guide rod assembly
51A		Guide rods (Part of 51)
52	62-500-C2-21	Screw (Fil.H.M.S. #6-32x¼"; for mtg. guide rod)
53	402A62	Knurled roller, turntable shaft
54	1A44-13	Set screw (Bristol #8-32x⅛"; for knurled roller)
55	3A2-9-47	Lockwasher, split (¼" diameter)
56	402A41	Hex nut (¼"-20; used on centerpost)
57	G400A23	Idler wheel assembly (For motor 407B3 or 407B4)
	G400A57	Idler wheel assembly (Used with motor 407B1 only)
	G400A59	Idler wheel assembly (Used with motor 407B2 only)
58	405A15	Spring, hairpin
59	405A14	Spring, idler wheel (For motor 407B3 or 407B4)
	405A35	Spring, idler wheel (Used with motor 407B1 only)
	405A36	Spring, idler wheel (Used with motor 407B2 only)
60	407B3	Motor, complete with idler wheel; 105-125 volts, 60 cycle (Motors 407B1 and 407B2 are interchangeable with 407B3)
	407B4	Motor, complete with idler wheel; 105-125 volts, 50 cycles
60A	401A48	Drive pulley (Part of 60. For motors 407B3, 407B4 only. In addition, motor 407B4 includes a coil spring, part number 405A32)
61	4B1-36-47	Flat washer
62	406A4	Rubber grommet (Used with motor 407B3 or 407B4)
	406A9	Rubber grommet (motor mounting; for motor 407B1)
	406A10	Rubber grommet (motor mounting; for motor 407B2)
63	401A53	Spacer, grommet (Used with motor 407B3 or 407B4)
	402A44	Spacer, grommet (Used with motor 407B1)
	402A45	Spacer, grommet (Used with motor 407B2)
64	60-312-C2-2	Screw (R.H.M.S. #6-32x5/16"; used for mounting motor on metal base)
	60-1125-C2-21	Screw (R.H.M.S. #6-32x1⅛"; used for mounting motor on wood or plastic base)
65	406A5	Rubber grommet (Large; used with metal base)
	406A2	Rubber grommet (Used with wood or plastic base)
66	402A36	Spacer, mounting (Used with metal base)
	29A2-4-21	Spacer, mounting (Used with wood or plastic base)
67	80-875-C2-47	Screw (R.H.M.S. #8-32x⅞"; used for mounting record changer on metal base)
	280-875-C2-2	Screw (R.M.H.S. Sems #8-32x⅞"; used for mounting record changer on wood or plastic base)
68	406A6	Rubber grommet (Small; used with metal base)
	406A2	Rubber grommet (Used with wood or plastic base)
69	29A2-6-21	Spacer, mounting (Used with wood or plastic base)
70	60-250-C2-47	Screw (R.H.M.S. #6-32x¼"; used for mounting record changer on metal base)
	260-687-C2-2	Screw (R.H.M.S. Sems #6-32x11/16"; used for mounting record changer on wood or plastic base)
75	401A64	Head mounting plate
76	404B9	Base head
77	65-375-C2-47	Screw (B.H.M.S. #6-32x⅜")
78	1A44-7	Set Screw (Bristol Head #6-32x⅛"; cup tip)
79	1A44-8	Set Screw (Bristol Head #6-32x3/16"; cup tip)
80	100-437-C2-47	Screw (R.H.M.S. #10-24x7/16")
81	G400A115	Reject lever assembly
82	405A25	Spring, reject lever
83	414A12	Reject trigger wire
84	1A20-14-21	Screw (#6-⅜" drive screw; used for reject lever mounting on metal base)
	1A20-18-21	Screw (#6-⅞" drive screw; used for reject lever mounting on wood or plastic base)
85	401A97	Reject catch
86	405A50	Reject catch support spring
87	G400A116	Reject mounting plate and arm assembly
87A		Reject arm (Part of 87)
88	405A25	Reject arm spring
	405A30	50 cycle conversion spring (For motor 407B1)
	405A31	50 cycle conversion spring (For motor 407B2)
	405A32	50 cycle conversion spring (For Motor 407B3)

CRESCENT INDUSTRIES, INC.

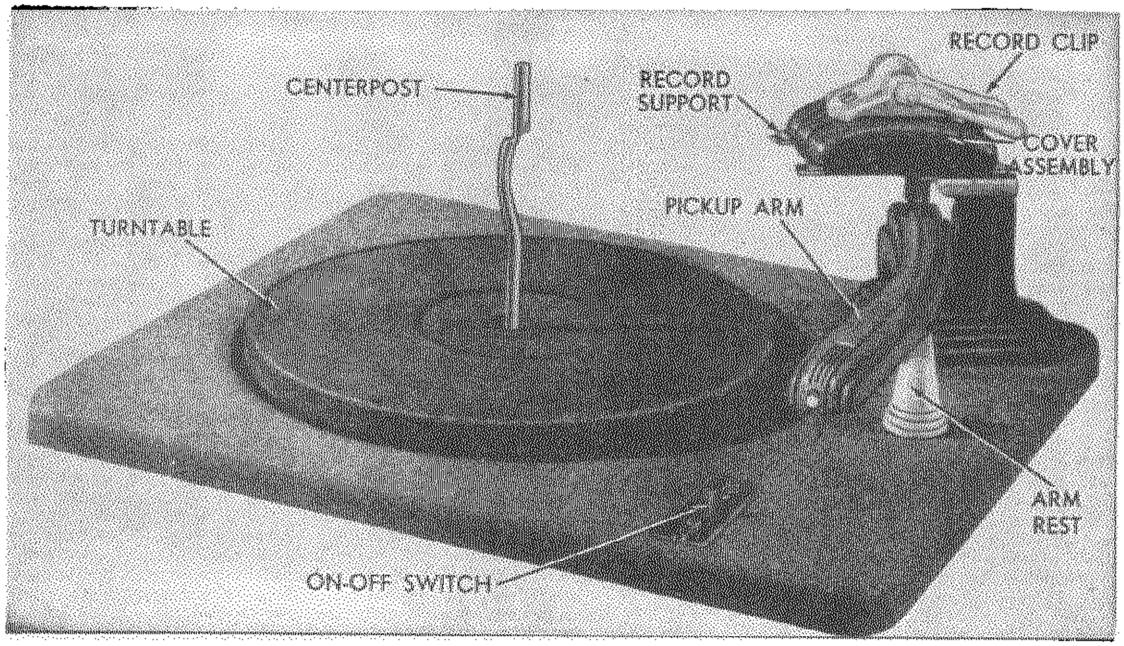


FIGURE 1. RECORD PLAYER, TOP VIEW

OPERATING INSTRUCTIONS

1. SETTING FOR SIZE OF RECORD.

The size of record for which the record changer is set to play is indicated by the number (on the top of the cover assembly) nearest the turntable. See Figure 1.

To change the setting, grasp the record support and cover assembly and rotate it a half turn until it snaps into place with the correct record size toward the turntable. **In changing the setting from 10-inch to 12-inch, rotate the assembly counterclockwise only; in changing from the 12-inch to the 10-inch setting, rotate the assembly clockwise only.**

2. STARTING THE RECORD CHANGER.

Load the record changer and set the record clip so that it rests on the top record. Now start the turntable rotating and press down on the reject button or push down on the pickup arm momentarily if it is setting on the arm rest. The entire stack of records will be played automatically.

On-Off switch is standard on some models.

3. REJECTING A RECORD.

To reject a record at any time and start playing the next one, merely press down on the reject button.

4. UNLOADING RECORDS.

To remove the records, it is advisable to have the chang mechanism out of cycle. However, it is possible to unlo the changer while it is in cycle so long as the pickup a is clear of the records.

Stop the turntable from rotating before lifting pickup a to arm rest and remove records.

When removing records, hold them lightly and l straight up.

CAUTIONS

1. **Never use force to stop the motor or turntable.**
2. **When turning the record support, be sure to grip t entire record support and cover assembly and not ju the plastic record clip.**

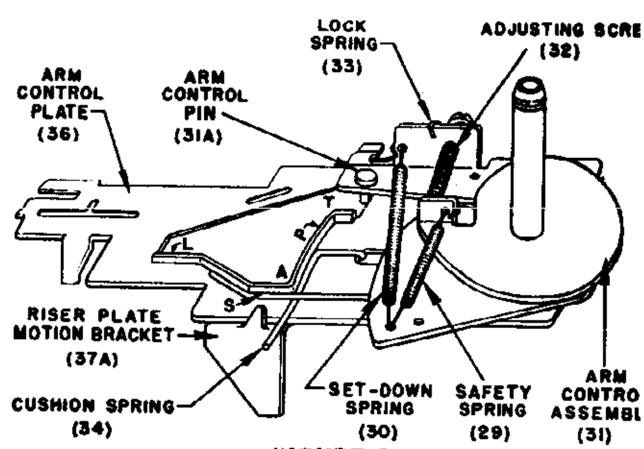


FIGURE 2.

THE CHANGE CYCLE

5. DESCRIPTION OF CHANGE CYCLE.

(See Figures 2, 6, and 7.)

While a record is playing and as the pickup arm moves toward the center of the record, the arm control pin (31A) on the arm control assembly (31) moves along the portion of the arm control track (36B) as indicated at "P", figure 2. As the record reaches the pickup or trip point, the pin reaches point "T" on the track. As it moves into the recessed position in which it is shown in the illustration, it permits the trip spring (35) to pull the arm control plate (36) forward towards the centerpost (27). As the arm control plate is drawn forward, the stop tab (36A) on the arm control plate (36) is withdrawn from behind the reject catch (62) on the eccentric cam (61). The cam, which no longer is held in place by the stop tab (36A), is pulled over by the eccentric cam spring (44) until the rubber tire makes contact with the knurled roller (53) on the turntable shaft (28A). This knurled roller, which rotates with the turntable shaft, rotates the eccentric cam. In turn, this forces the riser plate assembly (37) back along its guide rods (51A) away from the centerpost (27). As soon as the riser plate begins to move, the push-off cam and shaft assembly (42) rides along the inclined track (37C) of the riser plate (37). This action causes the push-off cam and shaft assembly (42) to be drawn downward; as a result the pickup arm lift (19) presses down on the arm lift bearing pin (14) causing the pickup arm to be raised clear of the record. Then the riser plate tab (37B) contacts and moves the arm control assembly (31) which, since it is coupled to the pickup arm support assembly (22), carries the pickup arm away from the centerpost and clear of the edge of the turntable. As the riser plate (37) continues to travel further along the guide rods (51A), the riser plate motion bracket (37A) contacts and rotates the push-off cam and shaft assembly (42); as a result, the push-off arm (5), [which is coupled to the push-off cam and shaft assembly (42)] causes the push plate (7C) to drop a record to the turntable.

During the second half of the change cycle, the pressure of the push plate spring starts to return the push plate (7C) and push-off arm (5) back to their normal position. At the same time, the motion of the eccentric cam (61) and the guide rod recoil spring (38) propel the riser plate (37) toward the centerpost. The arm control assembly (31), and hence the pickup arm, are drawn back by the tension in the set-down spring (30). After the arm reaches this point directly above the set-down point, the riser plate (37) has moved far enough back towards the centerpost (27) to allow the push-off cam and shaft assembly (42) to ride down the inclined track (37C) of the riser plate (37). This lowers the pickup arm onto the record. (The following paragraph describes how the set-down point is determined for the 10-inch and 12-inch settings). As the eccentric cam (61), aided by the eccentric cam spring (44) completes its revolution, the rubber tire of the cam moves away from the knurled roller (53) on the turntable shaft and the reject catch (62) to rest against the stop tab (36A) of the arm control plate (36). The change cycle is completed.

6. DESCRIPTION OF DETERMINATION OF 10-INCH AND 12-INCH SET-DOWN POINTS.

During the early part of the change cycle, the arm control plate (36) has traveled (in a direction away from the centerpost) until the size change stop (36C) reaches the cam (42B) Figure 2).

As the pickup arm moves back towards the record during the second half of the change cycle, it will be stopped when the bracket (31C) reaches the adjusting screw (32). How far the arm returns before being stopped depends on whether the arm control pin (31A) has been riding in the "S" or "L" portion of the arm control track. If the pin has been riding in the "S" or 12-inch portion of the track, the arm will be stopped at a point directly above the 12-inch set-down point: if the pin has been riding in the "L" or 10-inch portion, the arm will be stopped at a point directly above the 10-inch set-down point.

7. REJECTING A RECORD. (See Figure 3.)

The reject button (26A) is located on the top of the arm of the push-off cam and shaft assembly. The distance traveled by the arm control plate (36) will depend on the size of the record being played; the distance is less for a 12-inch setting than for a 10-inch setting. (This is true because the push-off cam (42B) presents its short radius to the size change stop (36C) for the 10-inch setting and presents its long radius to the size change stop for a 12-inch setting). This variation in distance traveled means that the arm control track (36B) will be in a position closer to the centerpost for the 12-inch setting than for the 10-inch setting. This in turn means that during the change cycle the arm control pin (31A) [whose path is determinted by the motion of the arm control assembly (31)] will leave its recessed position, and will ride along the "S" portion of the arm control track for the 12-inch setting and along the "L" portion for the 10-inch setting (See rest (26). The parts used to provide push button rejection are shown in Figure 3.

Figure 3 shows the changer out of cycle, that is, when a record is playing. Note that the reject catch (62) engages both the stop tab on the arm control plate, and the reject arm (70). If the changer is allowed to finish playing the record, the stop tab on the arm control plate is withdrawn from behind the reject catch (62); the eccentric cam (61) is then pulled against the knurled roller (53) and the change cycle begins. However, when the reject button (26A) is pressed the reject trigger wire (86) pulls the reject arm (70) from behind the reject catch (62); the eccentric cam (61) is pulled against the knurled roller (53) and the change cycle begins.

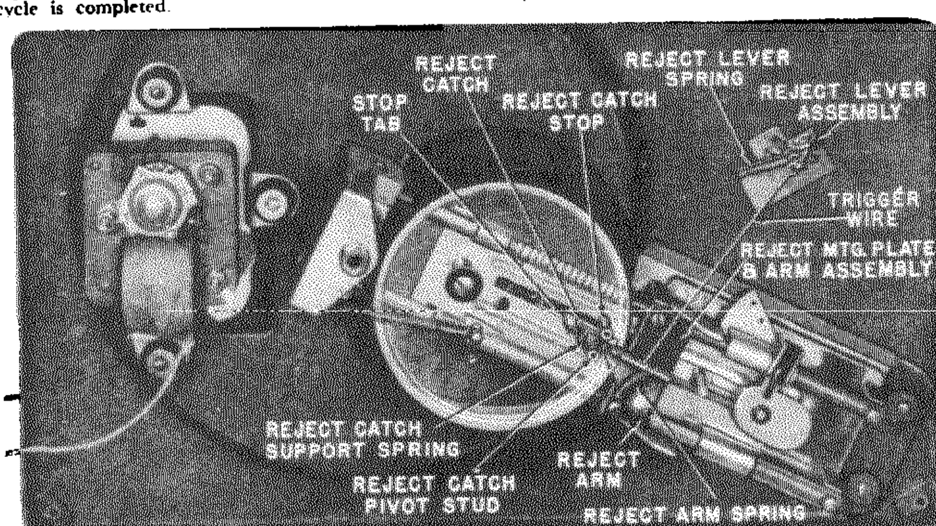


FIGURE 3.

ADJUSTMENTS

CAUTIONS

1. See that the drive pulley and the rubber tire on the motor (60) and the rubber tire on the eccentric cam (61) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

2. If replacement of any parts requires the removal of lift adjusting collar (10), pickup arm support assem (22), or the push-off arm (5), be sure to re-position replace these parts as directed in paragraph 9, 10, 11 respectively.

TOOLS REQUIRED

#6 Bristol Set Screw Wrench.
#8 Bristol Set Screw Wrench.

8. SET-DOWN POINTS AND PICKUP OR TRIP POINT.

(If the pickup arm support assembly (22) has been removed or if its set screws are loose, it must be repositioned as described in paragraph 10 before adjusting the set-down points and pickup or trip point).

This changer is designed so that the 10-inch set-down point, the 12-inch set-down point, and the pickup or trip point are simultaneously adjusted in a single operation. It is recommended that you make the adjustment at either of the set-down points. This adjustment is made by means of the adjusting screw (32) shown in Fig. 4. Turning this screw counter-clockwise will cause the arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost. One turn on the screw will move the arm about ¼ inch.

If the adjusting screw (32) will not change the setting sufficiently, the pickup arm support assembly (22) may be out of position. (See paragraph 10).

The set-down point when using a straight-shank needle will differ slightly than when using an offset shank needle.

If you do not know which type of needle is to be used by the customer, we suggest the following settings *when tested with a straight needle*: measuring from the side of the centerpost, 4⅝" for the 10-inch set-down point, 5⅝" for the 12-inch set-down point, and 1-19/32" for the pickup or trip point.

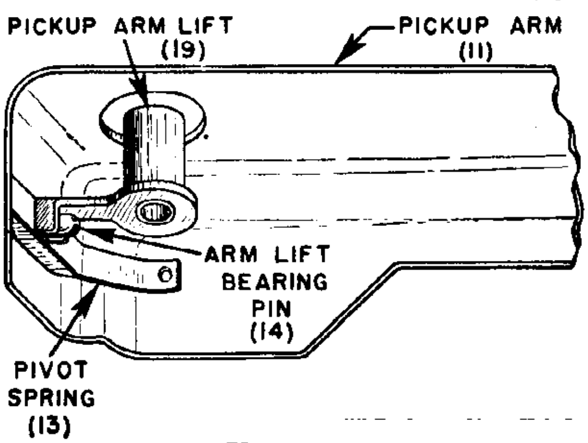


FIGURE 5.

If you know which type of needle will be used by the customer, and test with that type of needle, the following settings are recommended: measuring from the side of the centerpost, 4-21/32" for the 10-inch set-down point, 5-21/32" for the 12-inch set-down point, and 1⅝ for the pickup or trip point.

When using an offset-shank needle, slight variations in set-down point can often be corrected by loosening the needle screw and rotating the needle slightly.

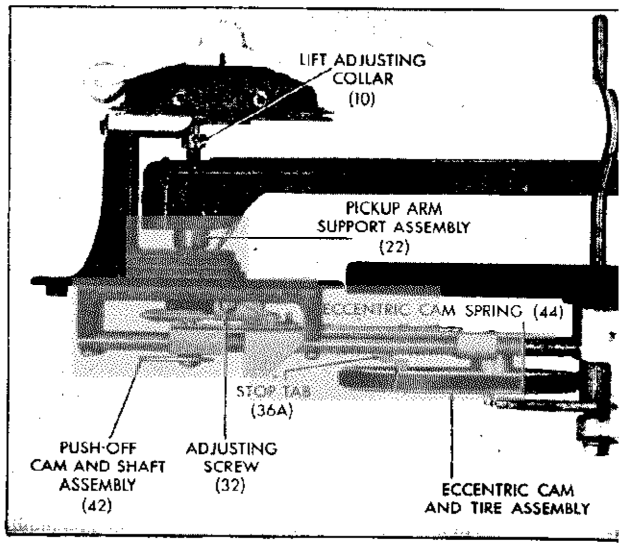


FIGURE 4.

9. PICKUP ARM HEIGHT.

When properly adjusted, the pickup arm height should such that, without a needle and with a single record on turntable, the arm should be about 1/32" above the reco The arm height depends on the location of the lift adjust collar (10). As the collar is moved down, the arm is rais and vice versa. When necessary, the pickup arm height n be adjusted by re-positioning the lift adjusting collar .(1 as follows:

(a) The changer should be out of cycle.

(b) Lift the pickup arm and check to see that the pi up arm lift (19) is positioned properly over arm lift bear pin (14). (See Fig. 5).

(c) Remove needle and place pickup arm on turnta close to its edge.

(d) Loosen set screw in lift adjusting collar (10).

(e) Remove slack by pushing up on push-off cam shaft assembly (42). Do not compress the arm lift sh spring (41).

(f) Using a #6-32 Bristol wrench, place it in the screw and slide the lift adjusting collar (10) down until is snug against the pickup arm lift (19).

(g) Tighten set screw in the lift adjusting collar.

(h) Check height.

If height is still incorrect, it may be necessary to rep the adjustment. Before doing so, it may be advisable examine the shaft (42A) of the push-off cam and sh assembly for nicks and burrs caused by the set-screws. Smo shaft with file if necessary. The upper portion of the sh is accessible if the push-off arm (5), head assembly (7) a lift adjusting collar (10) are removed. To prevent sh from falling out through bottom, keep in place with maski tape. When replacing the lift adjusting collar (10) and pu off arm (5), see paragraphs 9 and 11 respectively.

SERVICING AND REPAIR

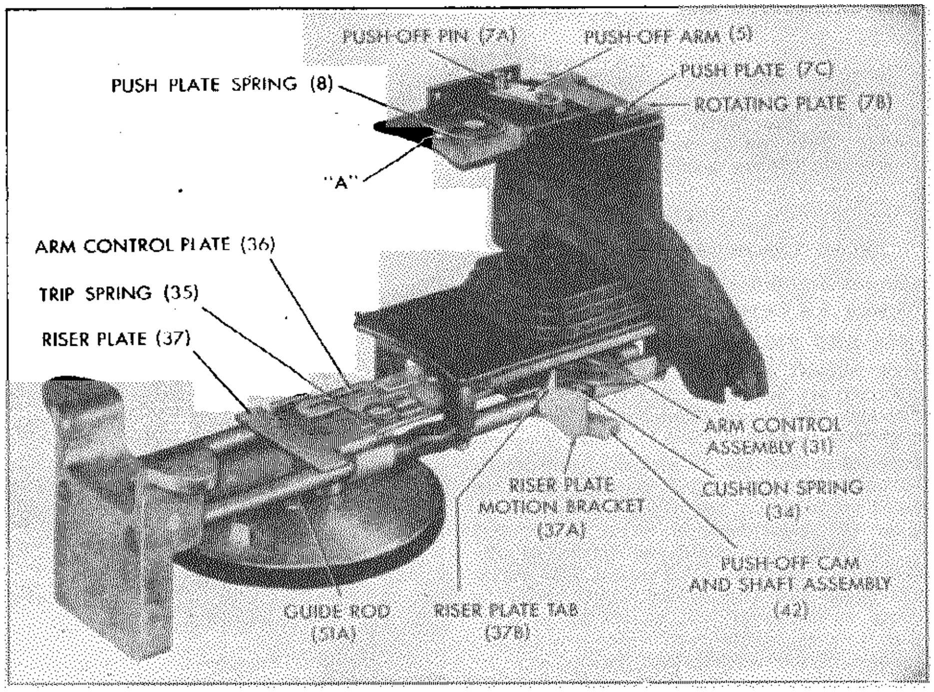


FIGURE 6.

10. RE-POSITIONING PICKUP ARM SUPPORT ASSEMBLY (22).

To assure proper set-down adjustment, this must be done carefully as follows if set screws are loose or if pickup arm support assembly (22) has been removed.

(a) Turn adjusting screw (32) (see paragraph 1) clockwise as far as it will go, then turn back counterclockwise for 2 full turns.

(b) Place a 12" record on the turntable.

(c) With the changer out of cycle, manually move the arm control assembly (31) outwards as far as it moves freely. In this position, the arm control pin (31A) will be located as indicated at "A" in figure 2.

(d) Place pickup arm so that needle rests in first playing groove on the 12" record.

(e) Tighten the two set screws in pickup arm support assembly (22).

(f) Make the final set-down adjustment as described in paragraph 1.

11. RE-POSITIONING PUSH-OFF ARM (5).

This must be carefully done if set-screws are loose or push-off arm (5) has been removed.

(a) Rotate the record support to the 10-inch position. Remove push-off arm (5).

(b) Manually slide the push plate (7C) over the rotating plate (7B) until a piece of metal 3/32 inch in diameter or a #8-32 Bristol wrench can be inserted into the opening at the front of the center slot in the push plate (see "A", Figure 6). If the 12-inch push-off is faulty with this setting, try using a 1/16" piece of metal or a #6-32 Bristol wrench.

(c) Put the changer into cycle and manually rotate the turntable until the riser plate (37) has traveled along the guide rods (51A) to a position furthest away from the turntable.

(d) Now position push-off cam and shaft assembly (42) so that it is held tightly against riser plate motion bracket (37A).

(e) Put push-off arm in position, leaving about 1/16" clearance between the top of the push plate and the push-off arm.

(f) Tighten set screws in push-off arm.

12. CHANGER REPEATEDLY GOES THROUGH CHANGE CYCLE WITHOUT PLAYING RECORD.

(a) Mounting screws on eccentric cam (61) may be loose. Tighten.

(b) Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See Figure 6).

(c) In normal operation, the trip spring (35) holds the arm control plate (36) against the riser plate (37). If the trip spring is faulty, it permits the arm control plate to rise too high above the riser plate. This causes the reject catch (62) to pass underneath the stop tab (36A). To correct, bend the legs of the trip spring closer together. If necessary replace trip spring.

(d) Eccentric cam (61) is bent so that reject catch (62) passes underneath stop tab (36A) on the arm control plate (36). To correct, straighten cam by putting changer out of cycle and pressing upward on cam near reject catch.

13. NEEDLE SLIDES ACROSS PORTION OF RECORD AFTER SET-DOWN ON 12-INCH RECORD.

Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See Figure 6).

SERVICE PARTS LIST

C 200 RECORD CHANGER

See Exploded View Figure 7 for Identification of Parts.

Ref. No.	Part Number	Description
1	G400A13	Cover assembly (Includes 3 and 4)
3	405A4	Spring, record clip
4	414A4	Spring rod (record clip)
5	G400A66	Push-off arm assembly (When replacing, refer to paragraph 11)
6	1A44-38	Set screw (Bristol Head #6-32x3/16")
7	G400B68	Head assembly (Includes 7A, 7B, 7C, 7D, 8 and 9)
7A		Push plate pin (Part of 7)
7B		Rotating plate (Part of 7)
7C		Push plate (Part of 7)
7D		Head mounting plate (Part of 7)
8	405A38	Spring, push plate (Located on top of push plate)
9	405B18	Spring, head mounting plate (Located on bottom of head mounting plate assembly)
10	402A57	Lift adjusting collar (When replacing, refer to paragraph 9)
11	G400B93	Pickup arm, pivot spring and arm lift bearing pin assembly (Does not include 15 or 16)
12		Rivet (pickup arm pivot spring) — Supplied as a group only; order part number 98A1
13		Pivot spring (pickup arm) — Supplied as a group only; order part number 98A1
14		Arm lift bearing pin — Supplied as a group only; order part number 98A1
15	405A13	Spring clip (pickup arm)
16	409A3 409A2 409A1	Pickup cartridge Pickup cartridge } Interchangeable Pickup cartridge
17	42-250-C2-47	Screw (Fil.H.M.S. #4-40x1/4"; for mtg. cartridge)
18	402A43	Needle screw for cartridge
19	G400A86	Pickup arm lift assembly
20	405A46	Brake spring (5 turns)
21	405A37	Retaining ring (Used on arm support tube 31B)
22	G400A73	Pickup arm support assembly (When replacing, refer to paragraph 10)
23	405A27	Washer, spring
24	65-312-C2-47	Screw (B.H.M.S. #6-32x5/16"; for mtg. assembly 7)
25	G400C11	Base (die cast)
26	G400A8	Arm rest assembly
26A	403-B8-4	Reject button
27	G400B21	Centerpost
28	A400B7	Turntable
28A		Turntable shaft (Part of 30)
29	405A41	Safety spring
30	405-A49	Set-down spring
31	G400A84	Arm control assembly
31A		Arm control pin (Part of 31
31B		Arm support tube (Part of 31
31C		Bracket (Part of 31)
32	402-A60	Adjusting screw
33	405A44	Lock spring (set-down adjustment)
34	405A45	Cushion spring
35	405A43	Trip spring
36	G400A112	Arm control plate
36A		Stop tab (Part of 36)
36B		Track (Part of 36)
36C		Size change stop (Part of 36)
37	G400A88	Riser plate assembly
37A		Riser plate motion bracket (Part of 37)
37B		Riser plate tab (Part of 37
37C		Inclined track (Part of 37
38	405A9	Spring, recoil
39		Retaining ring (arm lift shaft) — Furnished as an assembly only; order part number G400A98
40		Safety collar (arm lift shaft) — Furnished as an assembly only; order part number G400A98
41		Spring (arm lift shaft) — Furnished as an assembly only; order part number G400A98
42		Push-off cam and shaft assembly — Furnished as an assembly only; order part number G400A98
42A		Arm lift shaft (Part of 42)
42B		Push-off cam (Part of 42)
44	405A47	Spring, eccentric cam
45	481-57-47	Flat washer (eccentric cam)
46	84-250-C2-21	Screw (R.H.M. #8-32x1/4"; for mtg. eccentric cam)
47	406A1	Rubber tire, eccentric cam
48	412A1	Cork washer (3/32" thick)
49	415A2	Thrust bearing assembly (Replace as a unit)
50	412A9	Cork washer (3/64" thick)
51	G400B7	Turntable mounting and guide rod assembly
51A		Guide rods (Part of 51)
52	62-500-C2-21	Screw (Fil.H.M.S. #6-32x1/4"; for mtg. guide rod)
53	402A5	Knurled roller, turntable shaft
54	1A44-13	Set screw (Bristol #8-32x1/8"; for knurled roller)
55	3B1-29	Lockwasher, split (1/4" diameter)
56	402A41	Hex nut (1/4"-20; used on centerpost)
60	407-B1	Motor, complete, 105-125 volt 60 cycle (Motors 407-B2, 407-B3 and 407-B4 are interchangeable with 407-B1)

The following parts are not identified in exploded view, figure 7.

Ref. No.	Part Number	Description
61	G400A117	Eccentric cam and tire assembly
62	401-A97	Reject catch (Part of 61)
63	402-A64	Reject catch stop (Part of 61)
64	402-A65	Reject catch stud (Part of 61)
65	405-A50	Reject catch support spring (Part of 61)
66	405-A15	Hairpin spring
67	G400A115	Reject lever assembly
68	405-A25	Reject lever spring
69	G400A116	Reject mounting plate and arm assembly
70		Reject arm (Part of 69)
71		Reject mounting plate (Part of 69)
72	405-A25	Reject arm spring
73	401-A200	Flat washer
74	401-A75-2	Flat washer
75	60-875-C2-2	Screw (R.H.M.S. #6-32x7/8"; used for mounting motor to metal base)
76	3B1-25-47	Lockwasher #6
77	406-A2	Rubber grommet
78	62-500-C2-21	Screw (F.H.M.S. #6-32x1/2"; used for mounting record changer to metal base)
79	29A2-4-21	Spacer, mounting
80	406-A3	Rubber washer
81	3B1-26-47	Lockwasher #8
82	80-875-C2-21	Screw (R.H.M.S. #8-32x7/8"; used for mounting record changer to metal base)
83	96A1-12	Spaghetti (.101 I.D.x1" long)
84	96A1-15	Spaghetti (.250 I.D.x3½" long)
85	413-A3-2	Shielded output cable
86	414-A12	Reject trigger wire
87	77B1-44	Switch, on-off (standard on some models)
88	401-A103	Switch escutcheon plate
87	401 A80-C	Mounting strap; used for mounting record changer to metal base

The various models of Emerson phonoradios are equipped with several types of automatic record cha each similar in appearance and function, but with different identifying characteristics. Before attempting to s or adjust a record changer, examine the exterior-view photograph in these notes and compare it with the r changer you are about to service to make sure you are using the proper service instructions.

OPERATING PROCEDURE

AUTOMATIC OPERATION

Loading

1. Turn the set on and the volume up and set the selector knob in the position for phonograph operation.
2. Turn the Spindle Cap (2) until is is as completely OUT OF LINE with the Spindle (3) as possible.
3. If ten-inch records are to be played, rotate the Record Support (4) to the left, and for twelve-inch record operation rotate the Record Support to the extreme right.
4. Insert a maximum of 12 ten-inch records or 10 twelve-inch records on the Spindle shoulder and Record Support.
5. Swing the Hold-Down Finger (5) so that it rests on the top record.

Starting

To start operation, push the Starting Switch (6) to the ON position, then depress the switch button as indicated for reject.

Reject Records

To reject a record, depress the Starting Switch button as indicated on the switch housing.

Shut Off

1. Remove any records remaining on the Record Support.
2. Depress the Starting Switch as indicated for reject and allow the Pickup Arm (1) to reset on the record.
3. Gently lift the Pickup Arm and return it to the Rest Post (8).
4. Push the Starting Switch to the OFF position.

Unloading

1. Rotate the Spindle Cap until it is aligned with the Spindl
2. Turn the Hold-Down Finger aside.
3. Lift the records, tilting them slightly to clear the Recor Support.

MANUAL OPERATION

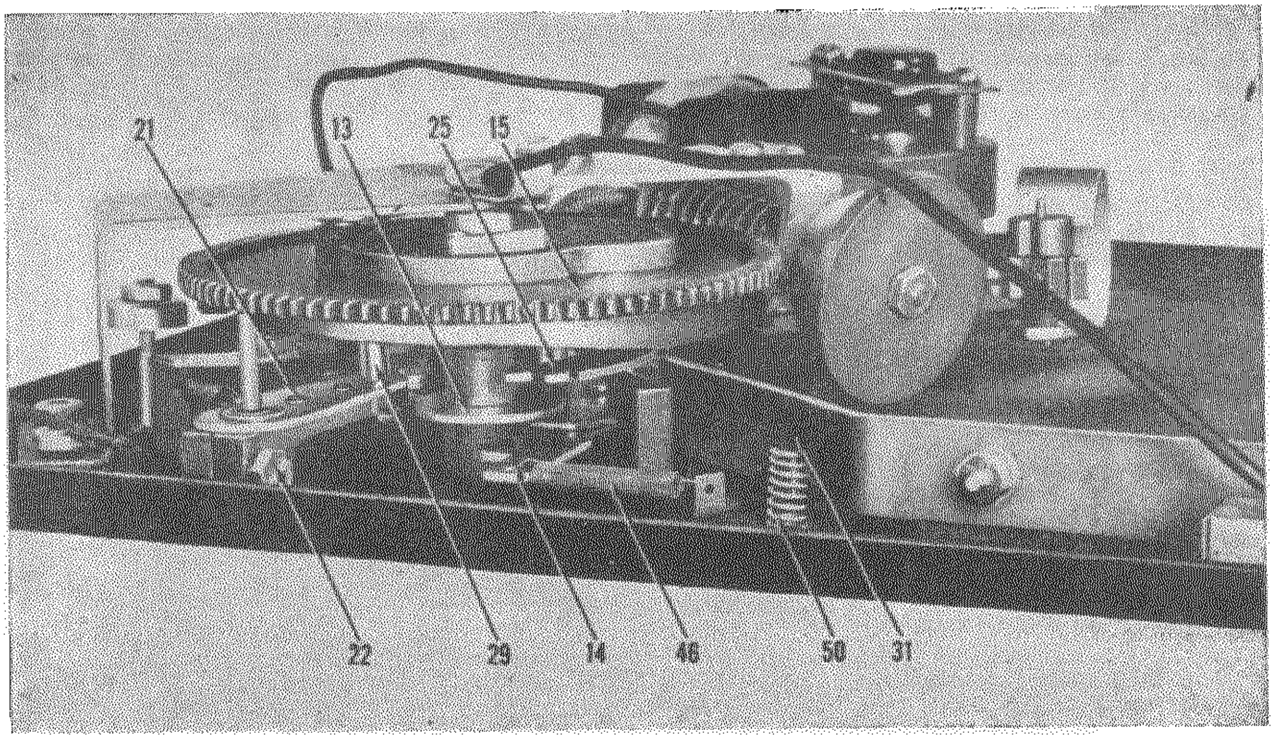
Starting

1. Turn the set on and the volume up and set the selector kno in the position for phonograph operation.
2. Make sure the Spindle Cap is aligned with the Spindle an place the record over the Spindle and on the Turntable.
3. Push the switch to the ON position.
4. Place the Pickup Arm on the outer edge of the record t start operation.

Shut Off

1. Allow Pickup Arm to complete its cycle and reset on th record. Gently lift the Pickup Arm and return it to th Rest Post.
2. Push the Starting Switch to the OFF position.

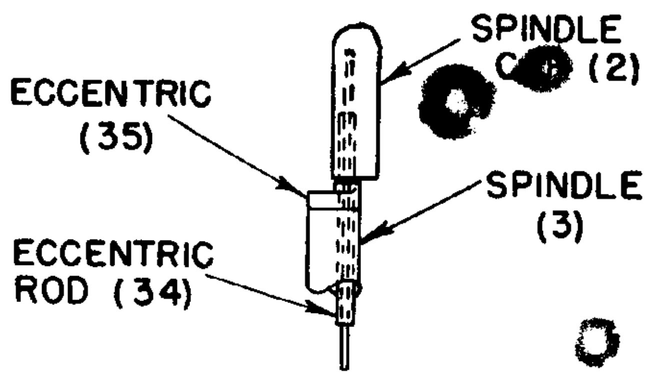
PART 819003 EMERSON RADIO & PHONO. CORP.



OPERATING CAUTIONS

This record changer has been sturdily constructed to give a maximum of service throughout a long life. In order to receive this service the following precautions should be observed:

1. Do not handle the Pickup Arm or mechanism while in cycle. Never use force.
2. Do not bend or strain the Spindle Cap when loading or unloading records.
3. Do not overload the changer. The maximum load is either 12 ten-inch or 10 twelve-inch records. Use modern records in good condition.
4. Keep the Pickup Arm on its rest and remove records when set is not in use.
5. During operation close the cover to reduce mechanical noise If a hum is noticeable, reverse the line plug.



SPINDLE ASSEMBLY

6. The phonoradio is not off when the phonograph is inoperative unless the volume control is in the extreme counter-clockwise position.

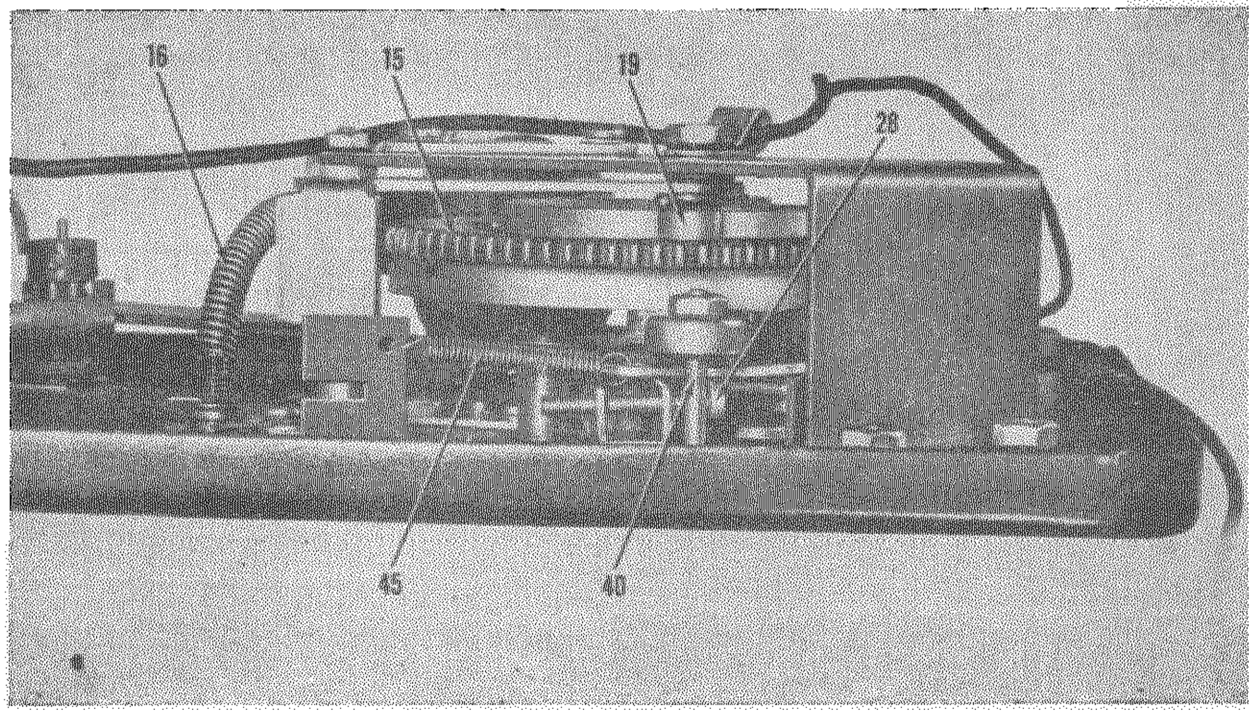
OPERATING DESCRIPTION

This record changer is an automatic cam-type changer, featuring single-button control and eccentric-spindle record selection.

Starting

After the Single Control Button (6) has been turned ON. thus supplying power to rotate the turntable, automatic cycling may be started by depressing the button. This movement pushes the Trip Bar (31) forward, causing engagement with the Carrier Lever (14) and its attached cycling Drive Wheel (10). The latter thus contacts the rim of the turntable and rotates with it. This motion is transmitted through the Flexible Coupling (16) to the Worm Drive (17). which in turn drives the Main Cam (15).

EMERSON RADIO AND PHONO. CORP.



Cycling

A single revolution of the Main Cam results in complete automatic cycling of the changer. This includes selection of a record from the stack, lifting the Pickup Arm from its rest, and setting the needle on the edge of the record. Upon completion of the revolution, the Automatic Trip Cam (13) engages with the block on the Trip Lever and pulls the Carrier Lever (14) back to its original position so that the cycling Drive Wheel (10) is no longer engaged with the turntable rim.

Record Feed

The lower side of the Main Cam (15) controls record selection. Motion of the Feed Cam Roller (19) about the cam results in a backward and forward movement of the Feed Sector Lever (18), thus engaging the Record Feed Pinion (20). This in turn causes the Eccentric (35) to first rotate to the proper position for record selection and to then return, allowing the record to drop over the Spindle.

Pick-Up Arm Movement

The upper side of the Main Cam (15) controls Pick-Up Arm (1) movement. LIFT is imparted by motion of the Lift Pin along the vertical edge of the cam as the latter rotates. DIRI TION is controlled by engagement of the Main Cam with Sweep Lever Pinion (29). The Sweep Lever (21) is attac to the Pick-Up Arm by means of a clamp (22) around Pick-Up Arm Pivot Sleeve (23). A boss projecting from upper side of the Main Cam displaces the Stop Lever (25) the end of the change cycle, thus permitting the Pick-Up A to proceed across the record.

Positive Trip Action

As the Pick-Up Arm approaches the Spindle, the Sw Lever (21) hits the Positive Trip Screw (28) mounted on Trip Lever. This action reengages the drive wheel with turntable rim and starts a new cycle.

Ten-Inch or Twelve-Inch Operation

Adjusting the Record Support (4) to the ten-inch or twel inch position lowers the Selector Rod (40) a definite deg The length of the extension of this rod determines the positi ing of the Stop Lever (25). The latter is the means of reg ting the distance the Sweep Lever (21) and its attached Pick- Arm travel before the arm is lowered to the edge of the reco

ADJUSTMENTS

Positive Trip

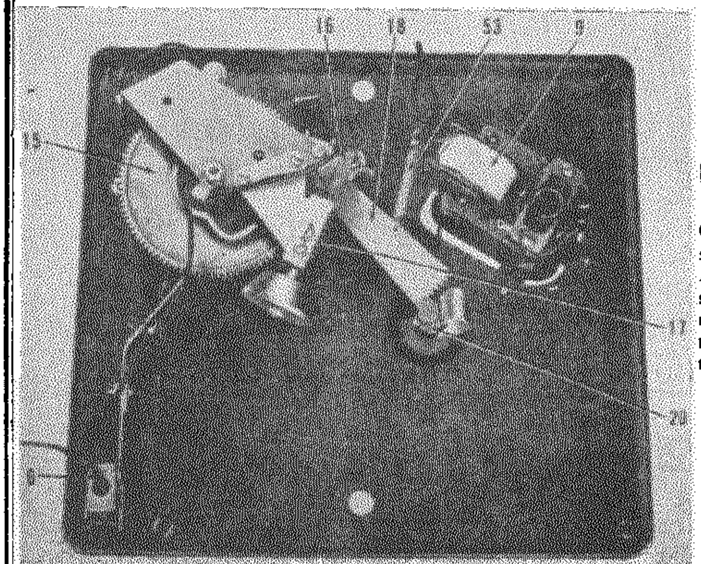
The tripping point of the changer may be readjusted by positioning of the Positive Trip Screw (28). Turn the screw clockwise to delay tripping and counter-clockwise to trip earlier in the playing cycle.

Pick-Up Arm Drop Point

An external strain exerted on the Pick-Up Arm may al the drop point. To adjust, loosen the screw on the Sweep Lev Clamp (22) slightly and reposition the Pick-Up Arm with spect to the Sweep Lever (21).

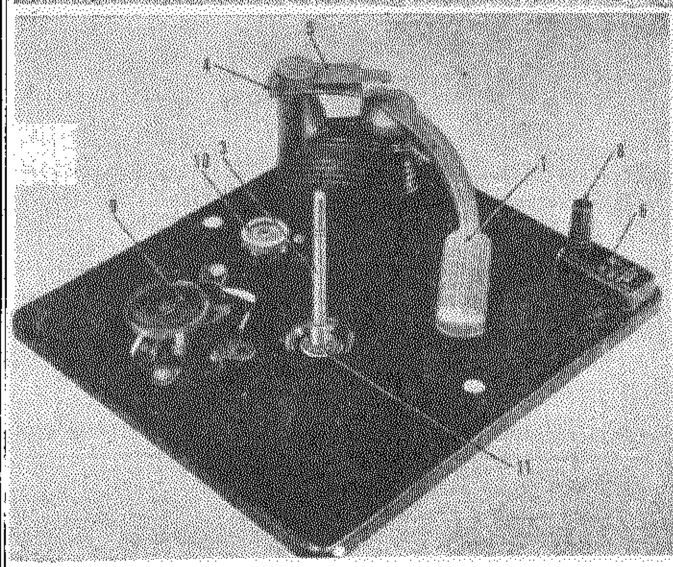
PART 819003

EMERSON RADIO & PHONO. CORP.



Needle Replacement

A special long-life needle is provided with the record changer. On most models the needle can be replaced by inserting a small screwdriver through the opening at the front of the Pick-Up Arm and loosening the set screw on the crystal cartridge. On some pickup arms, however, no opening is provided and needle replacement can be accomplished by removing the crystal cartridge. Simply unscrew the two round-head screws to unfasten the cartridge.



Slipping and Stalling

If the turntable slips {due to slipping of the Motor Wheel (9)} or stalling in cycle is encountered {due to slipping of the Cycling Drive Wheel (10)}, align the Spindle Cap and lift off the turntable. With a clean cloth soaked in carbon tetrachloride or other suitable solvent, remove all traces of grease from the inside rim of the turntable, from the small motor shaft, and from the two rubber-rimmed wheels.

REPLACEMENT PARTS

When ordering, state part numbers. List price each as of January 1, 1946, subject to change without notice.

Reference Symbol	Part Number	
11	280450	Bearing
3	280460	Spindle
5	400090	Record Stabilizer Finger
6	510380	Single-Button Control Switch
10	400080	Cycling Drive Wheel
16	587180	Flexible-Coupling Spring Assembly
19	280480	Feed Cam Roller
—	280490	Lift Pin
—	587190	Counter-Balance Spring
—	587200	Finger Spring
—	587210	Mounting Spring
45	587220	Stop-Lever Spring
46	587230	Trip-Lever Spring
—	587240	Pull-In Spring
50	587250	Trip-Bar Spring
53	587260	Record-Feed Spring
—	587270	Carrier-Lever Spring
—	587280	Index Spring
—	413460	Turntable
9	400100	Motor Wheel
—	820034	Pickup Cartridge, less needle
9	819013	Motor, 110 V., 60 cycles
9	819014	Motor, 110 V., 25 cycles
9	819015	Motor, 220 V., 50 cycles
9	819016	Motor, 220 V., 25 cycles

DESCRIPTION OF P-56, P-56MP and P-51 RECORD CHANGER

TRIP ASSEMBLIES— P-56, P-56MP and P-51 Record Changers are identical with the exception of the trip mechanism. The P-56 and P-56MP trip finger follows the movement of the tone arm inward until the changer is tripped. The tripping of the P-51 changer depends upon the velocity of the tone arm moving the trip finger through spring tension.

THE LATEST CHANGER—Model P-56MP, has a top tone arm adjustment, magnetic pickup, and tone clarifier for optimum tonal reproduction from old, new and high fidelity records. Response to every tone value is achieved by the sensitive magnetic pickup and light weight tubular non-resonant tone arm. Critical needle set-down adjustment is facilitated through the provision of the top tone arm adjustment screw. Gray flock covered turntable and burnished record support shelves enhance the appearance of the changer. Other features of the P-56 MP are the same as the P-56 changer.

RECORD LOADING—These changers are to be loaded with a maximum of 12 ten-inch or 10 twelve-inch records (not intermixed). The record support shelf assembly (Part No. 13413 fig. 2) is turned to present the shortest distance to the spindle for playing 10-inch records. For 12-inch records, the shelf is rotated one half turn. The tone arm set down is automatically adjusted for the size of record by the position of the record shelf.

In the 10-inch position, the tone arm return lever is free to move inward against the main cam. The tone arm return lever through the correct adjustment of the tone arm crank 54108 (fig. 9) and tone arm bracket and support tube 15123 (fig. 6) imparts movement to the tone arm for the set-down on 10-inch records.

When the record support shelf and cover assembly is turned to the 12-inch position, the angular face of lower part of record support shelf post 57158 (fig. 5) forces the interceptor shaft 561317 down to intercept the movement of the tone arm return lever toward the main cam. The tone arm following the movement of the tone arm return lever is stopped in correct position to set-down on a 12-inch record.

RECORD CHANGING—After the changer is loaded with records, the control lever is moved to reject position to start the record change cycle. Rotation of the main cam will actuate the record lift lever which lifts the spindle and the stack of records so that the shelf lever can move the record supports under the records. The bottom record is moved to the record shelf which moves backward in synchronism with the outward movement of the record support, allowing the record to settle to the turntable. Then the tone arm return lever moves the tone arm into position to be lowered to the record by the tone arm lift rocker. The tone arm moves across the record until the selection is finished and the trip mechanism functions. Finally the tone arm is lifted and carried over the record until clear of the record stack and the next record is released completing one change cycle. In this manner all records in the stack are played.

AUTOMATIC STOP—The weight of the records on the spindle forces the record lift lever to follow the contour of the main cam. When the last selection is played, a spring lifts the record lift lever into position to move the automatic stop pawl outward. The main cam carries the stop pawl into engagement with the switch lever, thus, stopping the changer.

SPRING MOUNTING—The entire changer is floated on spring mountings to eliminate rumble or feedback. These springs insulate the changer from any cabinet vibration occasioned by the sound waves emanating from the speaker. This vibration, if transmitted through the tone arm to the pickup, would be amplified in the audio system of the radio and passed into the speaker again.

The spring mountings also cushion the changer from sudden jars or shocks.

After removing the four palnuts, the record changer may be easily removed from the cabinet by lifting the baseplate upward. Stress should not be placed on the record supports ("flags").

CYCLE OF OPERATION

STUDYING THE CYCLE—The record change cycle consists of the sequence of motions required to move the pickup into position on a record, play the record, remove the pickup and place a record into position. Since movements of various parts are being performed simultaneously, it is impossible to follow all of the actions at one time. A suggested method is to select one certain cycle of operation. For example, the raising of the tone arm, moving it over the record and the replacement on the record may be studied while running the changer slowly by hand. After the motions associated with the tone arm are understood, another portion of the changer may be observed.

The change cycle of the P-56, P-56MP and P-51 changers are identical. The construction of the tripping mechanisms differ as explained in the following paragraphs. It should be noted that the adjustments of each type of trip mechanism requires a different method of approach.

TRIP FINGER—The trip finger used on the P-56 and P-56MP is secured to the tone arm support tube and follows the movement of the tone arm. When the tone arm reaches a predetermined point, the trip finger spring touches the starting lever, moving it to contact the starting pawl on the spindle gear.

The trip finger on the P-51 is separated from the collar secured to the tone arm support tube by a spring wave washer. The tension of this spring forces the trip finger against a cork washer. Motion of the tone arm is transmitted through the tone arm crank and cork washer to the trip finger. When the needle enters the trip grooves of a record, the increased velocity of movement impels the trip finger against the starting lever. The starting lever then engages the starting pawl on the spindle.

THE CHANGE CYCLE—The turntable is driven through an idler pulley by the electric motor, the turntable being screwed on the spindle. A gear on the spindle meshes with the main cam gear. Several teeth are left off the main cam to stop it in playing position. After a selection has been played, the trip mechanism moves the starting lever far enough to engage the starting pawl on the turntable spindle. Since the starting lever is part of the main cam assembly, the main cam is moved forward at the right speed and correct distance to permit the gears to mesh properly.

As the main cam rotates, the tone arm lift rocker (561329 fig. 9) lifts the tone arm upward and the tone arm return lever 561354 moves the tone arm over the record. The record lift lever 561328 lifts the spindle and records to permit the shelf lever 561355 to position the record support shelves under the stack of records. Immediately after the support shelves are under the records, the record lift lever lowers the records to the shelves. Record ejector lever 561335 imparts motion to the record plunger arm (56975 fig. 5) which moves plunger 17115 forward to push the bottom record from the spindle offset. The remainder of the stack of records is raised by the record lift lever. The shelf lever snaps the record support shelves from under the bottom record at the same time the record ejector lever withdraws the plunger and shelf assembly, releasing the record which decends to the turntable. At the same time, the tone arm return lever has been returning the tone arm to the record. As the tone arm passes the outer edge of the record, the tone arm lift rocker lowers the pickup needle to the starting groove in the record. The main cam is now in playing position and stops. One change cycle has been completed.

PICTORIAL REPRESENTATION—The following series of photographs, with a corresponding brief explanation of each phase, are inserted to illustrate the movements of pertinent parts of the changer during a change of record cycle.

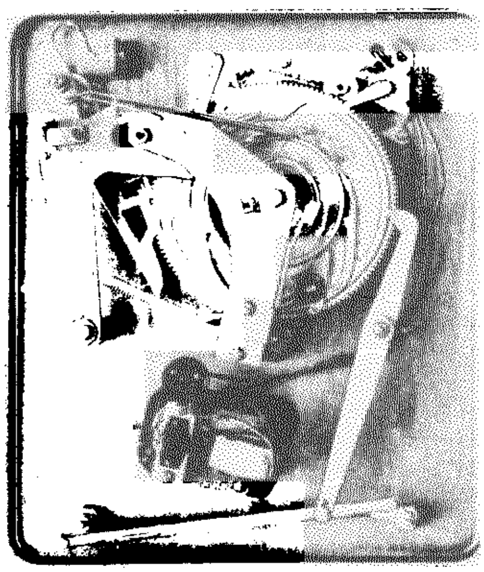


FIGURE A

FIGURE A—The main cam is driven through the spindle gear. When a change cycle is completed, the main cam disengages from the spindle gear because several teeth are left off the main cam gear. The tone arm is in position on the record and free to follow the playing groove. This phase of cycle is called the playing position.

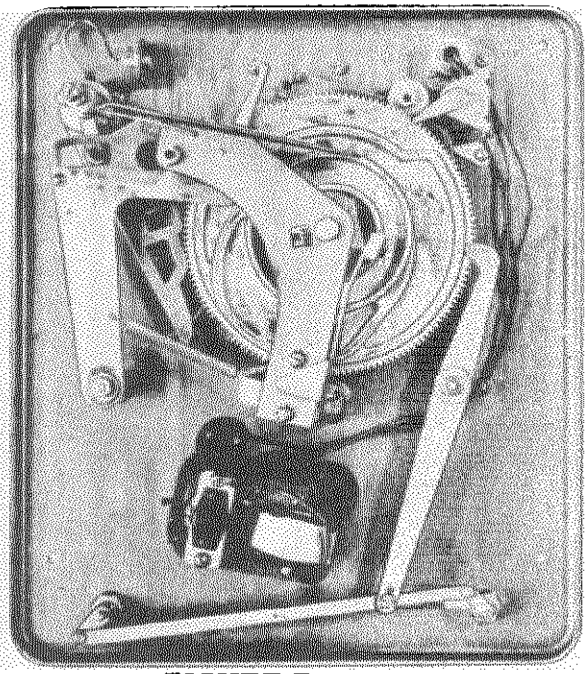


FIGURE B

FIGURE B—The change cycle has just begun. The tone arm lift lever has raised the tone arm from the record and the tone arm return lever has started to move the tone arm away from the turntable. The record lift lever assembly has started to raise the spindle and stack of records resting on it.

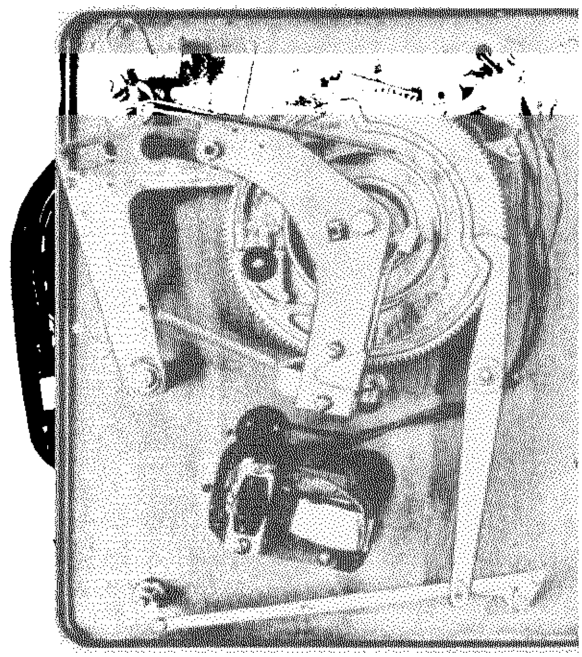


FIGURE C

FIGURE C--The shelf lever has moved i toward the center of the main cam whi moves the support shelves in under th record stack. At the same time, the record lift lever has started to lowe the spindle and stack of records.

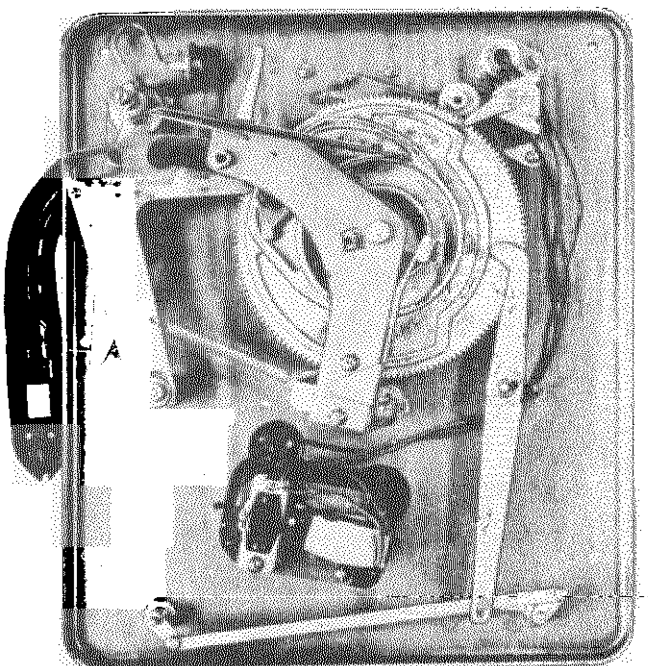


FIGURE D

FIGURE D—The record stack has been lowered to the record support shelves. Simultaneously the bottom record has been pushed off the stationary shelf and rests on the record ejector plunger.

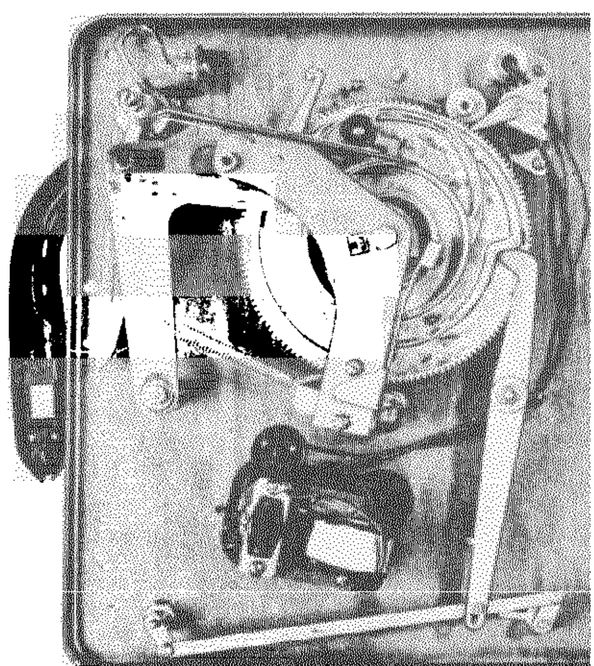


FIGURE E

FIGURE E--The record ejector plunger retr and at the same time both of the record sup shelves move out from under the bottom re which drops to the turntable.

MODEL P51
P56, P65MP

FARNSWORTH TELEV. & RADIO CORP.

CHANGER LUBRICATION

The record changer should be lubricated and cleaned periodically or when a major part or assembly is replaced. Dirt, old oil or grease may be removed with carbon tetrachloride or other similar cleaning fluid.

Use only a good grade of machine oil with a viscosity of SAE 10.

Care should be exercised to prevent an excess of oil being used on any part and that no oil gets on the velocity trip cork, motor pulley, idler pulley or turntable rim.

Once a year a thin coat of light grease of the vaseline type may be applied to all surfaces of the main cam that contact lift levers and record lift lever roller.

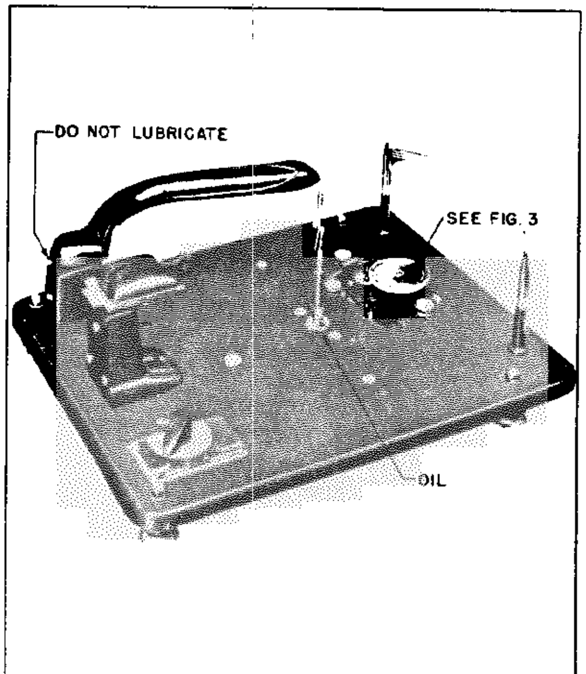


FIGURE G

DO NOT LUBRICATE THE FOLLOWING PARTS:

Tone arm support tube No. 15123.
Tone arm hinge pin No. 561337.
Starting lever assembly No. 58779 or 07329.
Velocity trip assembly.

USE LIGHT MACHINE OIL ON FOLLOWING PARTS:

One drop of oil between turntable drive shaft 13540 and the stationary spindle 15120. (Prevents record latch chatter.)
Idler pulley (see figure 3).
Phono motor (one drop on felt at each end of shaft).
Turntable drive shaft felts No. 92189.
Spindle thrust bearing 56959.
Record lift lever rivet and roller pin.
Tone arm lift lever rivet.
Crank link lever at pivot point.
12" Interceptor shaft at bearing in baseplate.

USE LIGHT GREASE OF VASELINE TYPE AT FOLLOWING POINTS:

Very light film on spindle at turntable drive shaft tube bearing surface.
Main cam tube or stud.
Main cam at gear teeth and cam tracks.
Tone arm return lever No. 561354 at the spacer No. 561350.
At record lift lever and spindle ball.
Indexing spring at point of bearing against pawl on automatic switch shaft.

PRECAUTIONS

Probably the greater part of Record Changer servicing is performed by radio technicians. As a result of his training, little difficulty is presented by invisible electrical troubles. With mechanical devices, much information pertinent to lubrication may be obtained by observation. Obviously, it will be seen that certain parts of rotating or sliding machinery must be lubricated, but it should be realized that other parts depend upon contact surfaces being dry and free from foreign substances, such as grease, so that proper friction exists.

Where lubrication is indicated, it should be applied judiciously, avoiding any excess lubricant that may be transferred or thrown to some part designed for dry operation.

Be sure to use the type of oil or grease recommended for lubricating specified items. Inspect parts not requiring lubrication to make certain they are clean. Cork washers 50204 and 60297 (fig. 16) should be replaced if oil or grease has come in contact with them.

Most owners, as a rule, forget all about lubrication during the time he has the equipment. He thinks of it after something has gone wrong. Consequently, the serviceman should stress the importance of periodic inspections and lubrications.

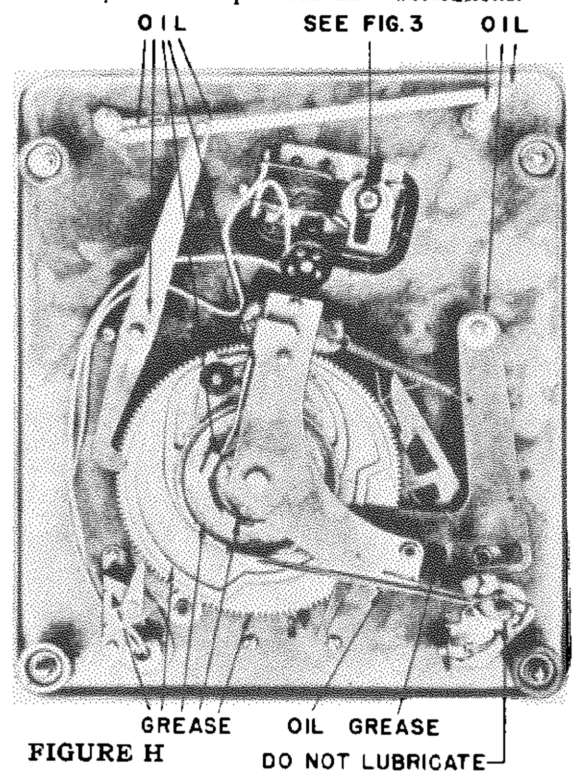


FIGURE H

PARTS IDENTIFICATION (P-56)

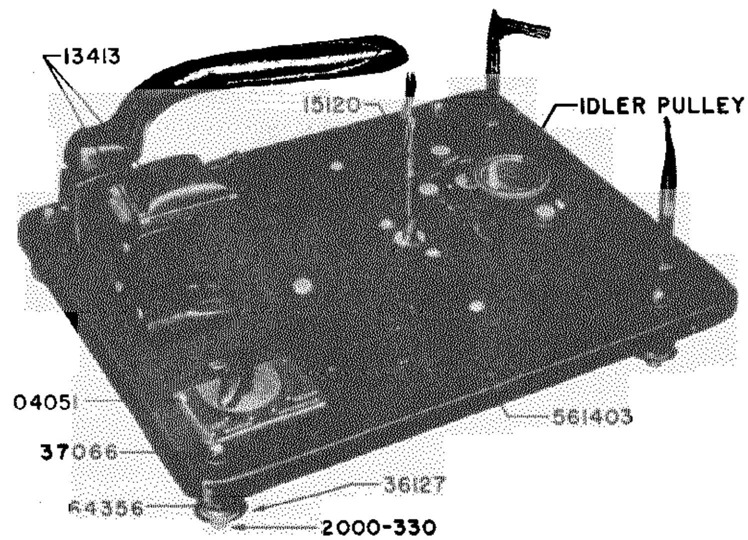


FIGURE 1 Top View

Part No.	Description
04050	Shelf Post
04051	Escutcheon
13435	Turntable
13510	Control Knob Assembly
13540	Turntable Drive Shaft and Gear Assy.
13544	Shelf Cover and Record Hold-Down Rubber Assembly
15120	Spindle Assembly
15127	Record Support and Crank Assembly (R.
15128	Record Support and Crank Assembly (L.
17115	Plunger and Shelf Assembly
59164	Record Support Post
59165	Tone Arm Support
59176	Shelf Cover
2041-135	#6—32x3/8" Allen cup pt. set screw

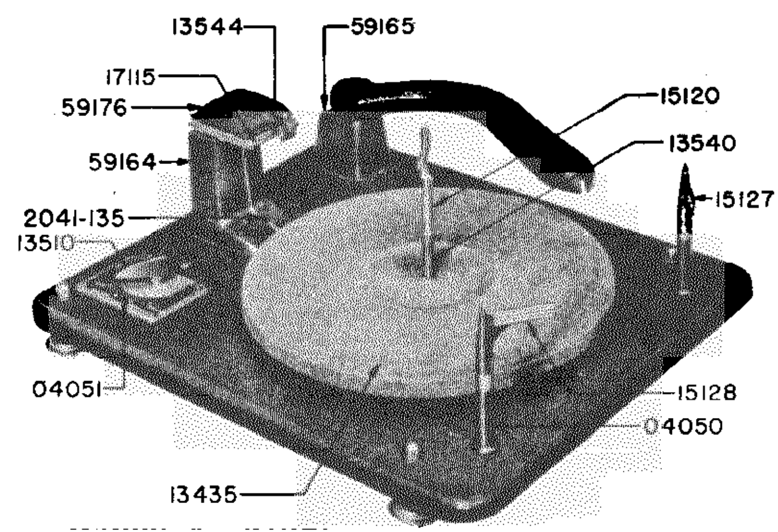


FIGURE 2 Top View with Turntable Removed

Part No.	Description
09217	Mounting Spring Assembly
36127	Cup
36137	Retainer Nut
64014	Upper Spring
64356	Lower Spring
2000-332	#10—32x2⅛" Rd. Hd. M. S.
04051	Escutcheon
13413	Record Support Shelf and Cover Assem
15120	Spindle Assembly
37066	Acorn Palnut
561403	Turntable "C" Stop Washer
2041-135	#6—32x3/8" Allen cup pt. set screw

MODEL P51, P56, P56MP FARNSWORTH TELEV. & RADIO CORP.

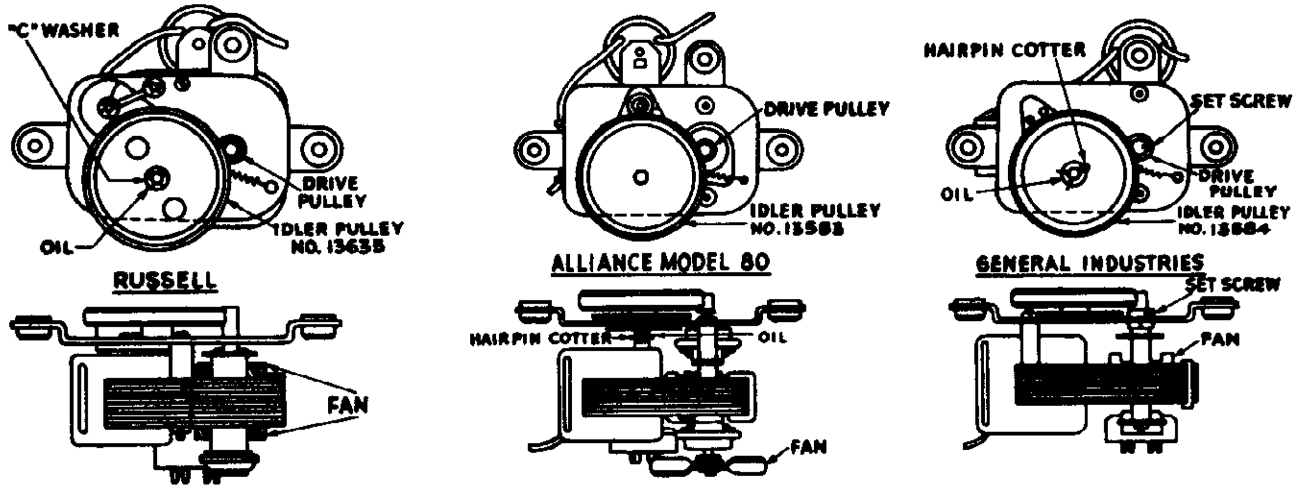


FIGURE 3. P-56 and P-51 Motors

The three makes of motors used on the P-56 and P-51 Record Changers are the Alliance motor the General Industries Motor and the Russell Motor. The complete motors are interchangeable, but it it necessary to identify the make of motor when ordering an idler Pulley or 50 cycle drive pulley Each make may readily be distinguished by noting the location of the fan on the motor and the location of the hair pin cotter or "C" washer holding the Idler pulley as shown in above figure 3.

PARTS LIST FOR FIGURE 4

Part No.	Description
07343	P. U. Socket Assembly
13412	Auto. Stop Switch and Bracket Assembly
15204	Trip Finger and Spring
15127	Record Shelf and Crank Assembly (R.H.)
15128	Record Shelf and Crank Assembly (L.H.)
36849	Hair Pin Cotter
44038	Phono Motor
54108	Tone Arm Crank
57160	Bracket
57247**	Main Cam
64325	Tone Arm Return Lever Spring
64330	Shelf Link Spring
90145	A. C. Switch
561323**	Automatic Stop Pawl
561325*	Shelf Crank Link
561328*	Record Lift Lever
561329*	Tone Arm Lift Rocker
561330*	Tone Arm Stop Lever
561335	Record Ejector Lever
561342	Shelf Crank Rivet
561355*	Shelf Lever
561356*	Tie Plate

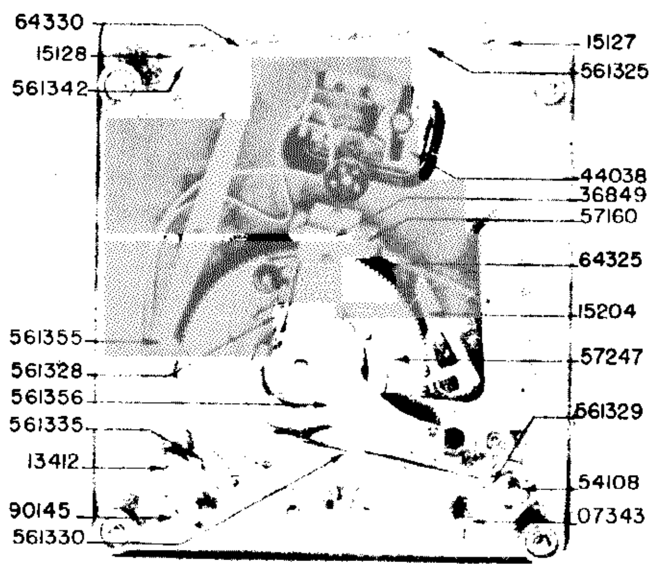


FIGURE 4

BOTTOM VIEW

*Not sold separately. Part numbers 561325, 561355 with R.H. and L.H. cranks sold as assembly #07330. Part numbers 561328, 561329, 561330, 561344 and 561356 sold as assembly #13414.

**Order by assembly No. 07618 which includes 57247, 561323 and 561326.

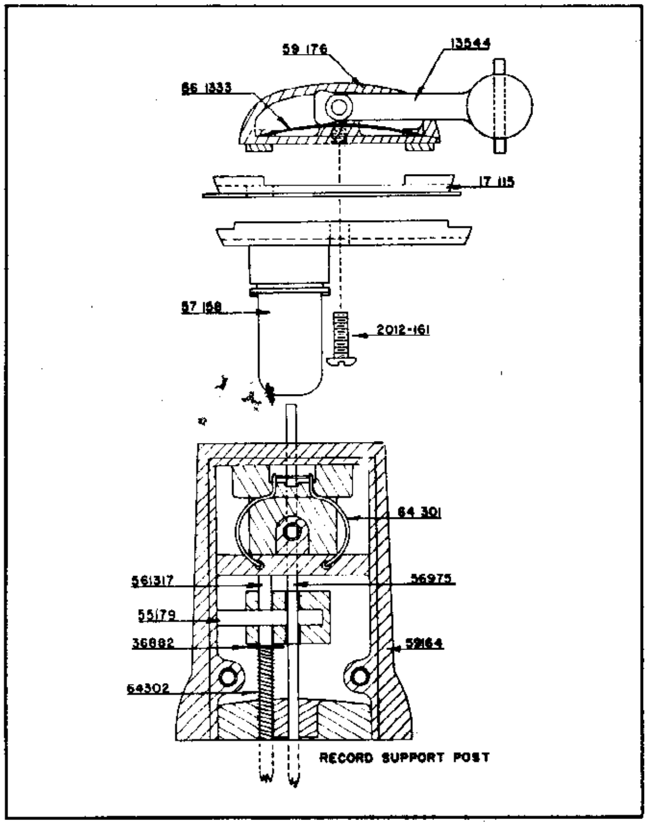


FIGURE 5

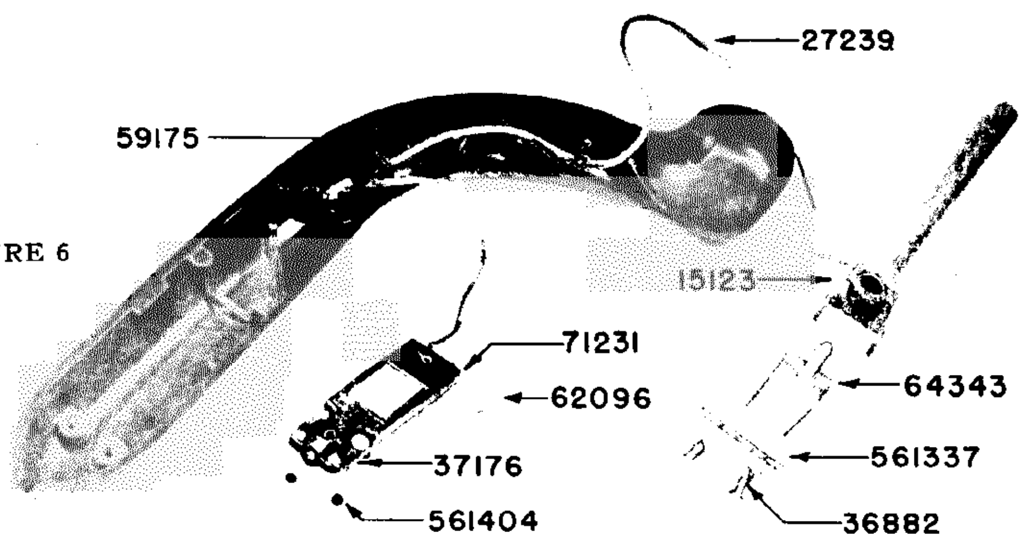
FIGURE 5

RECORD SUPPORT POST AND SHELF

Part No.	Description
13544	Shelf Cover Arm & Record Hold Down Rubber Assembly
17115	Plunger and Shelf Assembly
36882	Hairpin Cotter
55179	Pin
56975	Record Plunger Rocker Arm
57158	Record Support Shelf
59164	Record Support Post
59176	Shelf Cover
64301	Record Support Post Hold Down Sprin
64302	Interceptor Shaft Spring
561317	Interceptor Shaft
561333	Shelf Cover Spring
2012-161	#6-32 x 7/16" Bdg. HMS

NOTE:—Record Plunger Rocker Arm 56975 is i serted in the elongated hole in Ejector Plung No. 17115.

FIGURE 6



TONE ARM ASSEMBLY

Part No.	Description
15123	Tone Arm Bracket and Support Tube Assembly
27239	Shielded P. U. Conductor
36882	Hairpin Cotter Hubbard #111 x .026"
37176	#4-36 x 13/32 RHMS
59175	Tone Arm Housing

Part No.	Description
62096	P. U. Damping Shim
64343	Tone Arm Spring
71231	Crystal Cartridge
561337	Hinge Pin, Tone Arm
561404	P. U. Spacer

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

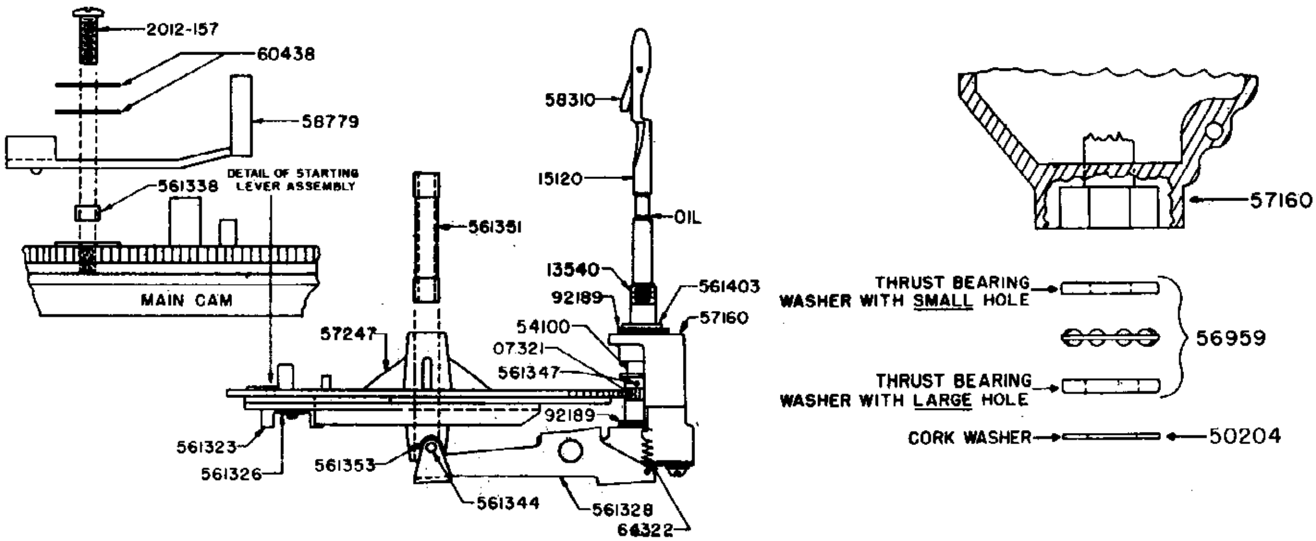


FIGURE 7

MAIN CAM AND SPINDLE SUPPORT BRACKET ASSEMBLY

Part No.	Description
07321	Spindle Gear Assembly
13540	Drive Shaft and Gear Assembly
15120	Turntable Spindle Assembly
50204	Cork Washer 3⁄8″ O.D.
54100	Spacer
56959	Thrust Bearing
57160	Bracket
57247**	Main Cam
58310*	Automatic Record Latch
58779	Starting Lever
60438	Paper Washer
64322	Record Lift Lever Spring
92189	Felt Washer
561323*	Automatic Stop Pawl
561326*	Spring Washer
561328*	Record Lift Lever
561338	Spacer
561344*	Pin
561347	Pin
561351	Main Cam Tube
561353*	Record Lift Lever Roller
561403	Turntable Stop Washer
2012-157	#6—32x5/16″ Bdg. HMS

*Not Sold Separately. See page 9.
**Order Main Cam by Assembly No. 07618.

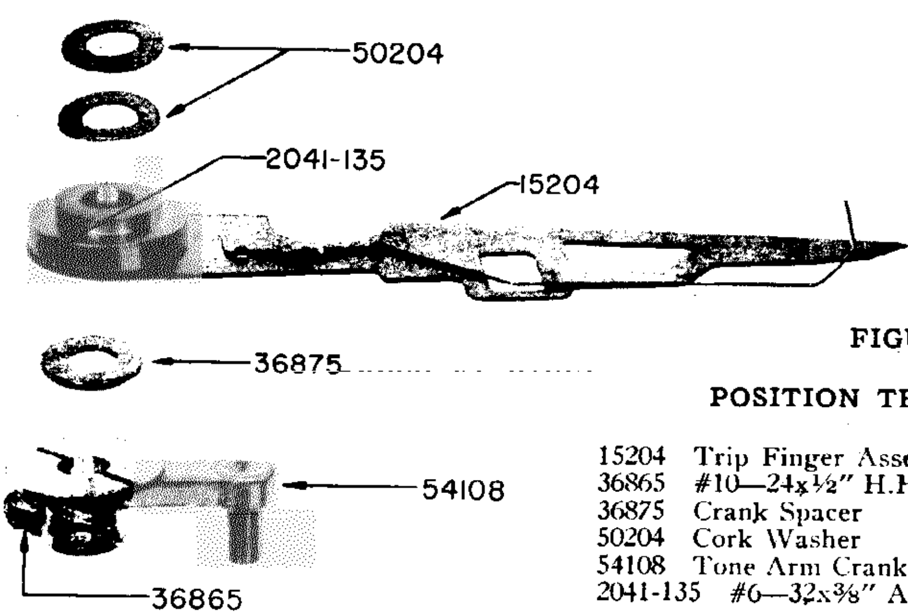


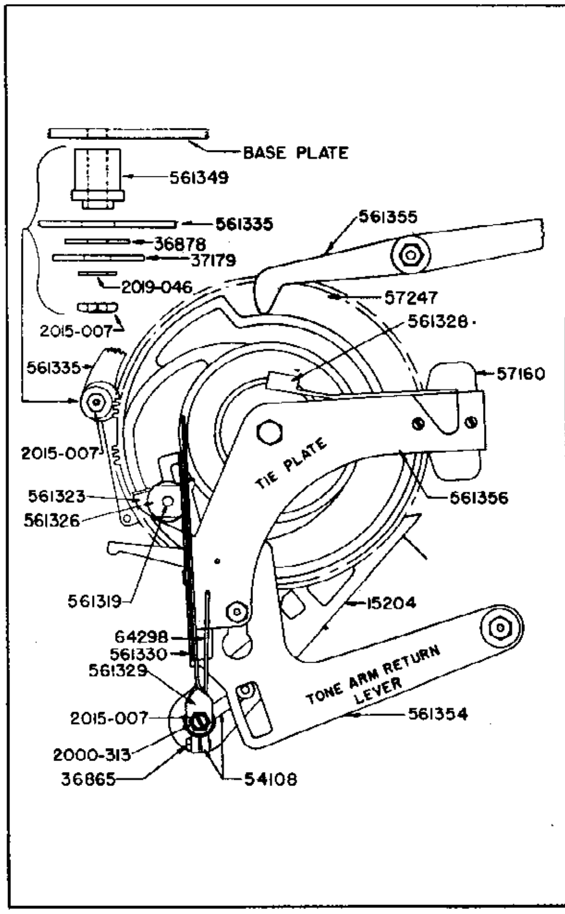
FIGURE 8

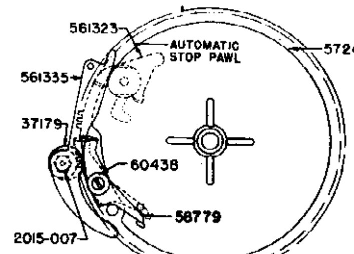
POSITION TRIP ASSEMBLY

15204	Trip Finger Assembly
36865	#10—24x½″ H.H.M.S.
36875	Crank Spacer
50204	Cork Washer
54108	Tone Arm Crank
2041-135	#6—32x3⁄8″ Allen cup. pt. set screw

FARNSWORTH TELEV. & RADIO CORP.

**MODEL P51
P56, P56M**

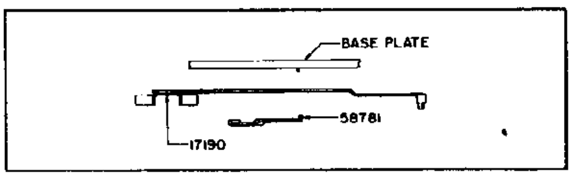




TOP OF MAIN CAM

FIGURE 9

MAIN CAM AND ASSOCIATED ASSEMBLIES



17190	Reject Lever Assembly
58781	Reject Lever Clip

PARTS LIST FOR FIGURE 9

Part No.	Description
15204	Trip Finger Assembly
36865	#10—24x½" HHMS
36878	Flat Washer
37179	Flat Washer
54108	Tone Arm Crank
57160	Spindle Support Bracket
57247**	Main Cam
58779	Starting Lever
60438	Paper Washer
64298	Spring
561319**	Stud
561323**	Automatic Stop Pawl
561326**	Spring, Washer
561328 *	Record Lift Lever
561329*	Tone Arm Lift Rocker
561330*	Tone Arm Stop Lever
561335	Record Ejector Lever
561349	Spacer
561354	Tone Arm Return Lever
561355*	Shelf Lever
561356*	Tie Plate
2000-313	#10—32x½" RHMS
2015-007	#10—32 Std. Hex. Nut
2019-046	#10 SP Ext. Lockwasher

*Not sold separately, see note page 9.
**Order by Assembly No. 07618.

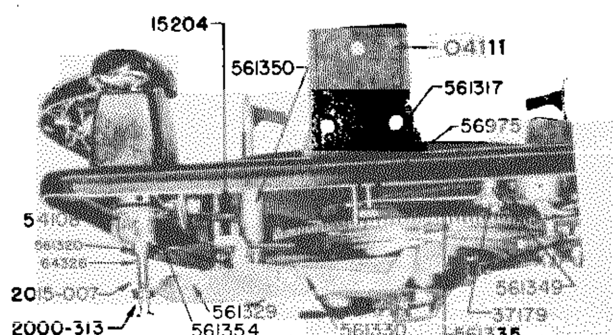


FIGURE 10. Edge View

PARTS LIST FOR FIGURE 10

Part No.	Description
04111	Record Support Post Cover
15204	Trip Finger Assembly
37179	Flat Washer
54108	Tone Arm Crank
56975	Record Plunger Rocker Arm
64326	Tone Arm Brake Spring
561317	Interceptor Shaft
561320	Tone Arm Lift Rod
561329*	Tone Arm Lift Rocker
561330*	Tone Arm Stop Lever
561335	Record Ejector Lever
561349	Spacer
561350	Tie Plate Mounting Spacer
561354	Tone Arm Return Lever
2000-313	#10—32x½" RHMS
2015-007	#10—32 Std. Hex Nut

*Sold only as part of assembly 13414.

**MODEL P51
P56, P56MP**

FARNSWORTH TELEV. & RADIO CORP.

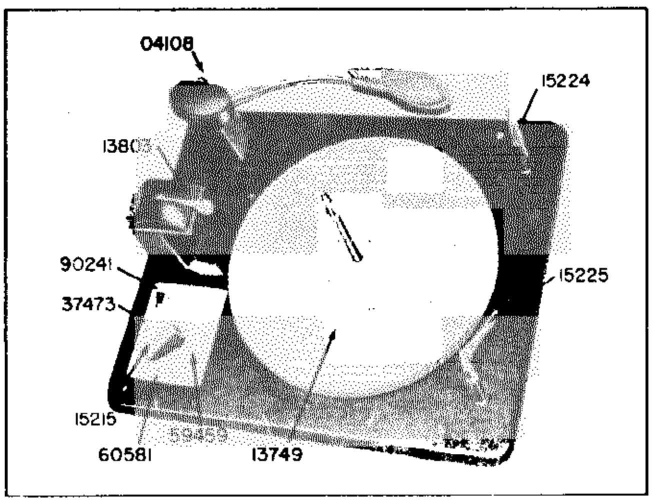
PARTS IDENTIFICATION (P-56MP)

Five features are to be considered in differentiating the P-56MP changer from the P-56 Model. They are: the top tone arm adjustment; the magnetic pickup and tone arm; the tone clarifier; the motor; and the finish of "flags", turntable and operating controls.

In addition to accessibility, the top tone arm adjustment screw, which is located at the hinged end of the tone arm housing, provides for fine adjusting of needle landing, after the coarse adjustment has been made as described for the P-56.

A variable reluctance magnetic pickup, such as used with this changer will not respond to vertical movement, and, as a result, is not affected by common record surface imperfections. This sensitive magnetic pickup, in combination with the light weight tubular non-resonant tone arm, achieve unsurpassing fidelity of musical response.

The tone clarifier consists of a resistance capacity network regulated by a three position switch. Set at the corresponding position for the type of record being played, reproduction at high noise-free tonal definition is effected.



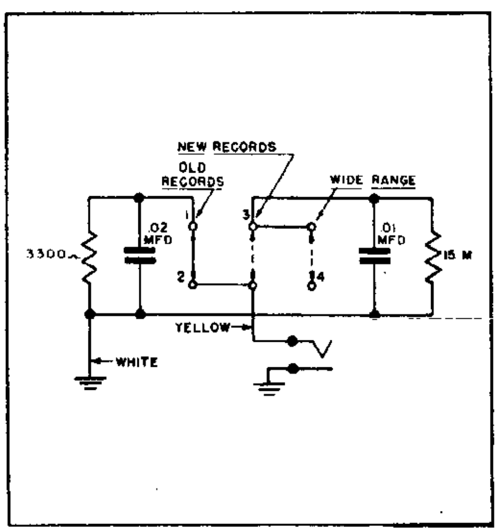
TOP VIEW—FIGURE 11

A two pole induction motor specifically designed for use with the magnetic pickup drives this changer at constant speed.

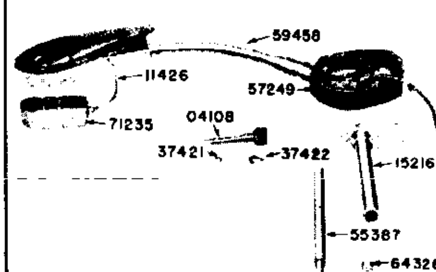
All parts of the P-56MP Record Changer, with the exception of those listed on this page, interchange with the P-56. Servicing data pertinent to the P-56 is applicable to the magnetic pickup equipped model.

P-56MP PARTS LIST

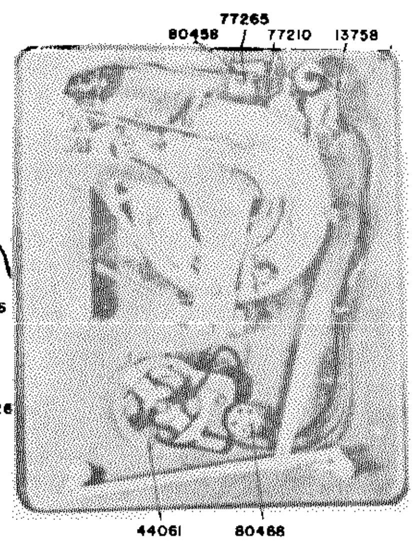
Part No.	Description
04108	Tone Arm Adjustment Screw
11426	Pickup terminal and lead assembly
13749	Turntable
13758	Auto stop switch and Bracket assembly
13759	Record support shelf and cover assembly
13803	Shelf cover arm and record hold down rubber assy.
15215	Control knob and spring
15216	Tone arm support tube and bracket assy.
15224	Record support and crank (R.H.)
15225	Record support and crank (L.H.)
25112	Tubular capacitor .01 mfd. 200V
25276	Tubular capacitor .02 mfd. 200V
37421	"E" Washer (for the tone arm adj. screw)
37422	Spring washer (for the tone arm adj. screw)
37473	#4—36 x 3/16" Phillips oval H.M.S.
44061	Phono motor (less plug)
55386	Tone arm spacer
55387	Tone arm lift rod
57249	Tone arm end
59458	Tone arm tube and plastic head
59459	Escutcheon
60581	Escutcheon background
71235	Magnetic pickup
77210	3300 ohm carbon resistor
77265	15000 ohm carbon resistor
80458	Terminal strip
80468	Phono motor plug
90241	3 position slide switch



CLARIFIER SCHEMATIC



TONE ARM ASSY.—FIGURE 12



BOTTOM VIEW—FIGURE 12

PARTS IDENTIFICATION (P-51)

Parts used exclusively in the P-51 record changer are listed below. Their position in the changer is in cated in the illustrations appearing in this section. Other parts are interchangeable with model P-56 a may be identified by reference to section 6. Procedure to be followed in adjusting trip mechanism will found on page 18, division E of operational adjustments section.

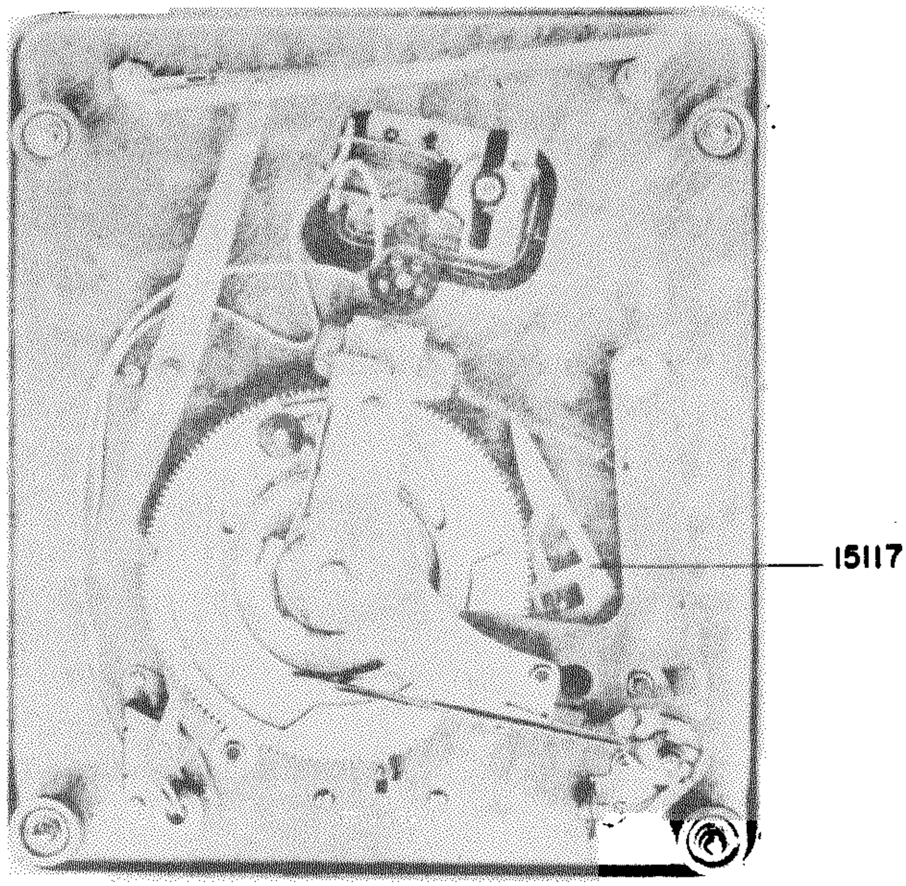


FIGURE 14 Bottom View

P-51 PARTS LIST

Part No.	Description
07329	Starting Lever Assembly
07332	Main Cam Rivet Assembly
15117	Trip Finger and Spring
37157	Tubular Rivet .085 x ¼″
57161*	Main Cam
60297	Cork Washer
62086	Starting Lever Bumper
62094	Starting Lever Sleeve
64327	Reject Rod
561327	Trip Finger Spacer
561340	Wave Washer

*Order by assembly No.07332 which includes cam 57161, stop pawl 561323, spring washer 561326 and stud 561319.

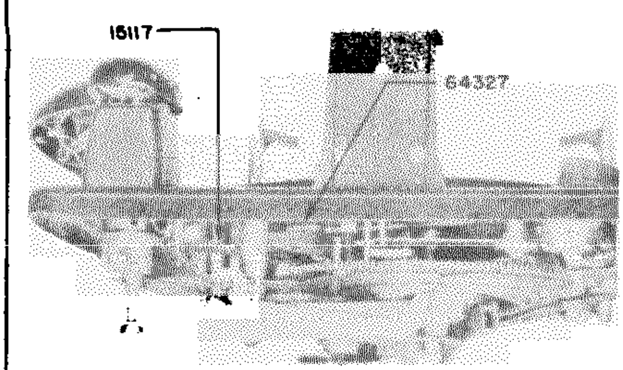


FIGURE 15 Edge View

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

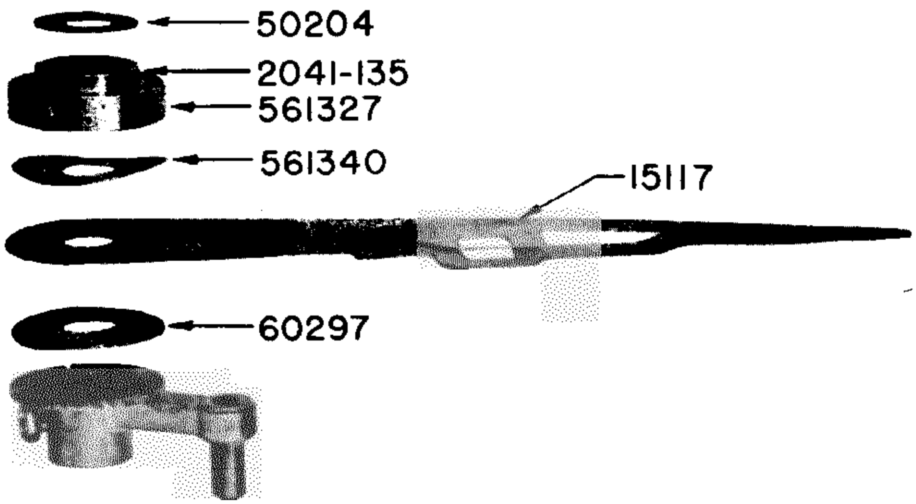


FIGURE 16 Velocity Trip Assembly

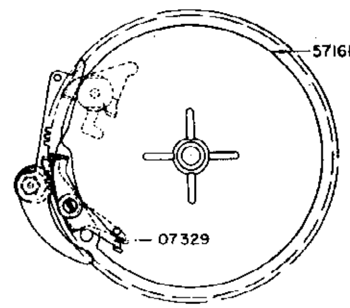


FIGURE 17 Main Cam—Top View

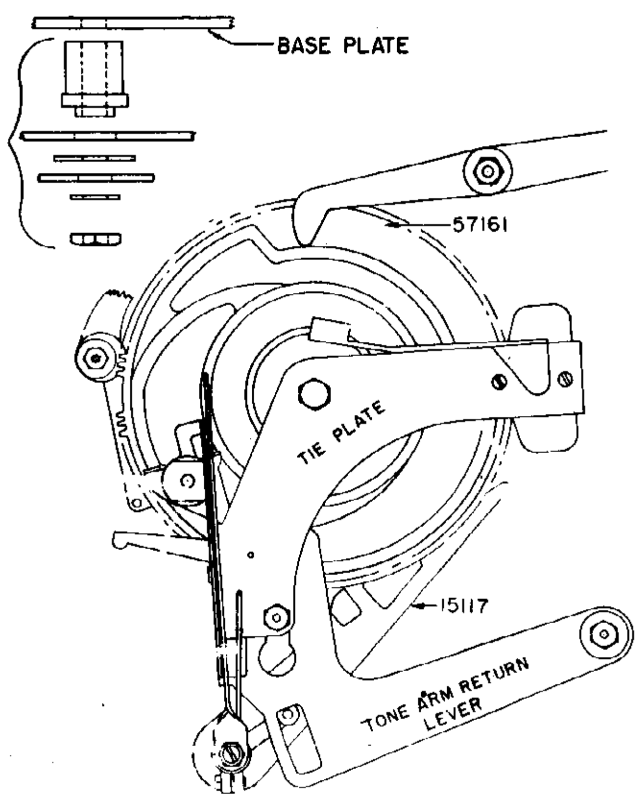


FIGURE 17
Main Cam and Associated Assemblies

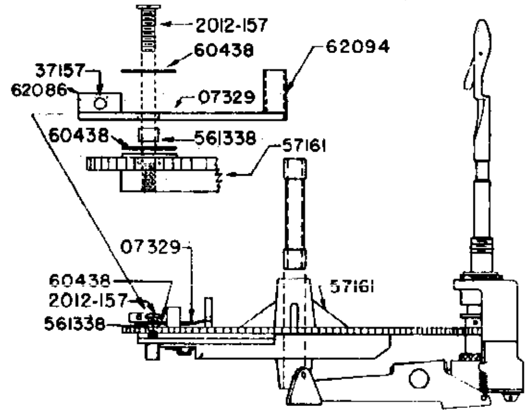


FIGURE 18
Main Cam and Spindle Support Bracket Assembly

REASSEMBLING PARTS

When repairs are being made, a careful check should be made of all moving parts in order to make sure that no binding occurs. Check all moving parts for binding before springs are connected.

All levers which operate on shoulder studs should be assembled with the burred side of the retaining washer away from the lever. This method is necessary to prevent the washer from binding on the lever.

TO REPLACE HOLD DOWN RUBBER ASSEMBLY AND SHELF COVER SPRING

Insert hold-down assembly 13544 into cover as shown in figure 5. Place spring 561333 into position and push other part of shelf cover over spring. Place on shelf and insert screws 2012-161. NOTE: The elongated hole in plunger and shelf assembly 17115 is placed over the round hole in support shelf 57158.

TO REPLACE RECORD SUPPORT POST HOLD DOWN SPRING 64301 (fig. 5)

Insert record shelf 57158 into record support post 59164. Place the open ends of the spring in the holes in support post. With a very small screw driver, lift the spring into the slot in record support post 57158. Hold spring in place with finger, and slip backplate over post WITHOUT RELEASING SPRING from slot.

TO REMOVE AND REPLACE TURNTABLE

The spindle gear may be wedged by a wooden block or a wrapped screw driver between it and the main cam, to prevent it from turning while the turntable is being unscrewed from the spindle (by rotating counter-clockwise). When replacing turntable, see that the "C" washer (No. 561403) remains fully inserted in the turntable shaft and make sure the turntable does not bind on the idler pulley. The turntable may then be properly tightened. The record latch must be entirely in the recess in the spindle to permit the turntable to be replaced. NEVER USE PLIERS TO HOLD SPINDLE.

TO REMOVE IDLER PULLEY (See Figure 3).

After the turntable has been removed, the idler pulley can be removed by slipping off the small hairpin cotter on the end of the idler pulley shaft.

When replacing tne pulley a single drop of oi should be used on the pulley shaft.

CAUTION: Do not allow oil to get on eithe the idler pulley or the turntable rim.

TO REMOVE SPINDLE 15120

Slip out hairpin cotter No. 36849 at the botton of the spindle.

REPLACING THRUST BEARING

When replacing thrust bearing 56959, th thrust bearing washer having the smaller hole mus be placed in the turntable drive shaft bracket 5716 first, so that the shoulder on the turntable driv shaft may rest on the washer. See figure 7.

REPLACING INDEXING SPRING

Move control knob to automatic position an pull off knob. Remove the two screws holdin switch assembly to baseplate. Push the reject ro from hole and remove switch assembly. Remov the hairpin cotter from shaft and pull shaft forwar so that pawl will not interfere with spring. Replac spring, and booster spring, if used, through slot i the bracket. (The curved part of the spring bear against the pawl.) Hold the spring against bracke away from pawl and push shaft into place. Be sur the lip on the pawl enters the slot in the switch Replace hairpin cotter and the assembly is read to be replaced.

SHIPPING CHANGER

A hold down bolt should always be used o each side of the changer to bolt the changer securel to the cabinet while it is in transit. A cardboar spacer 1/8" thick should be placed between the base plate and cabinet approximately one inch from each shipping bolt. These spacers prevent excessiv compression of the mounting springs. The ton arm should also be fastened securely for shipping Always remove the hold down bolts before puttin the changer in operation. After this is done, se that the changer is centered properly in the cabinet and floats freely on the spring mounts; otherwise the changer will not properly feed records, and th tone arm will not position properly on the record

INSERTING PHONO PLUG

The phono input plug must be inserted int the phono socket as far as possible to avoid "gri hum". If hum persists, check ground connection of socket.

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

OPERATIONAL ADJUSTMENTS

A. TONE ARM HEIGHT ADJUSTMENT

1. Disconnect power.
2. Load two 10″ records on spindle. With mechanism in cycle, rotate turntable by hand until tone arm is at highest point.
3. Loosen locknut 2015-007 and raise or lower screw 2000-313 Figure 10 until distance from top of tone arm to bottom record on stack is 3/16 inch. Tighten locknut.

NOTE: Unless the standard needle furnished is used, the tone arm may not raise sufficiently to clear full stack of 10″ records on turntable.

B. RECORD SUPPORT SHELF ADJUSTMENT

1. Loosen the three screws under baseplate which secure the record support post. Turn main cam until space left by missing teeth is over inner screw.)
2. With #6 Allen wrench, adjust set screw (2041-135 fig. 1 at base of shelf post) until spacing between spindle center to edge of record shelf to 4.97 inches, using gauge 58803. If this gauge is not vailable, one may be fashioned from a metal strip with a spindle hole in one end 4.97 inches from hole-center to opposite end. If the changer does not incorporate an Allen screw adjustment, shim the support post under front or rear according to direction desired.
3. Tighten the three below-chassis screws.

C. STARTING LEVER ADJUSTMENT

If washer 37179 Fig. 9 does not move starting lever far enough, the changer will trip as soon as the change cycle is completed. To correct this condition,

1. Loosen locknut 2015-007.
2. Move washer 37179 in toward main cam.
3. Tighten locknut securely after proper adjustment has been made.

Clicking noise from starting lever on P-51 may be stopped by adding another paper washer 60438 to bottom of assembly. Check to see that washers can be turned freely and that the starting lever does not bind.

D. FIXED POSITION TRIP ADJUSTMENT AND NEEDLE LANDING ADJUSTMENT (P-56 and P-56MP)

The trip adjustment and tone arm clearance setting are made concurrently.

1. TONE ARM CLEARANCE
   a. Loosen Allen-set-screw 2041-135 Figure 8, in trip finger collar.
   b. Run turntable by hand through cycle to play position.
   c. Turn record shelf to 10-inch position.
   d. Insert narrow width .008 feeler gauge (Part No. 88316) between tone arm support post and tone arm support bracket.

2. POSITION TRIP ADJUSTMENT
   a. Hold tone arm so that needle is 1¾ inchs away from spindle. (Changer baseplate in horizontal position.)
   b. Move starting lever against low side of cam on spindle gear.
   c. Move the trip finger in until it starts to move the starting lever.
   d. Tighten the Allen set screw in the collar with the collar tight against the cork washer and remove .008″ feeler gauge.
   e. Run the changer through cycle by hand to see that no parts have been displaced which might cause it to jam.

3. NEEDLE LANDING ADJUSTMENT

Before proceeding with adjustment of P-56 MP needle landing, it may be necessary to adjust the top tone arm adjustment screw until the support bracket is centered in the tone arm.

   a. Place 10-inch record on turntable and control lever in automatic position.
   b. Lift up tone arm stop lever 561330 Figure 10, allowing tone arm return lever to go all the way toward main cam.
   c. Place needle in starting groove or 3/32″ from outside edge of record.
   d. Loosen hex screw in tone arm crank and move crank against the outer edge of cutout in tone arm return lever.
   e. Tighten hex screw in tone arm crank while holding crank up against trip finger and collar.

4. 12″ NEEDLE LANDING will usually not require adjustment. If required, it should be made only after 10″ adjustment is correct.
   a. Turn record shelf to 12″ position and place 12″ record on turntable, Changer in playing position.
   b. Place needle in starting groove or 3/32″ from outside edge.
   c. Slightly form tone arm return lever until it touches interceptor shaft.

5. ERRATIC NEEDLE LANDING
   a. Smooth surface of tone arm stop lever where it contacts tone arm return lever.
   b. Check wire leads to see they do not interfere with changer mechanism.

E. VELOCITY TRIP ADJUSTMENT (P-51)

Tone arm clearance must be set before adjusting trip.

FARNSWORTH TELEV. & RADIO CORP. MODEL F51, P56, P56

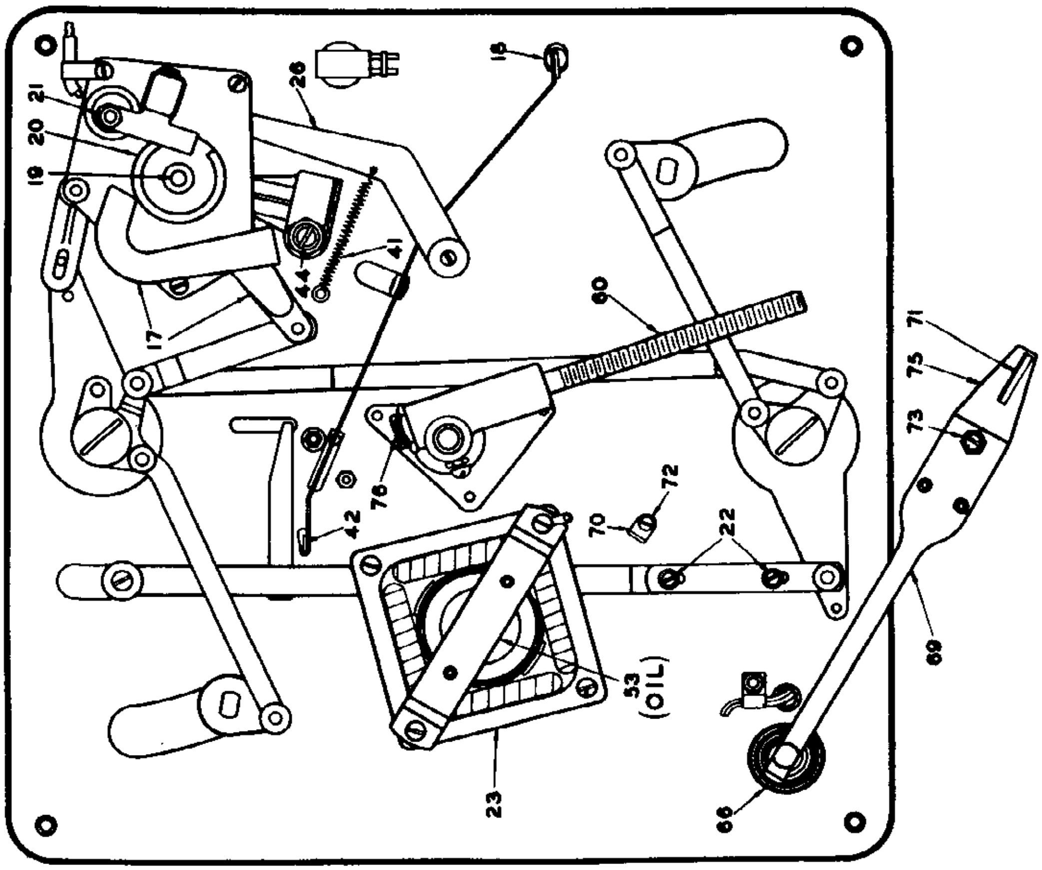
GENERAL PARTS

Part No.	DESCRIPTION	Part No.	DESCRIPTION
04050	Shelf Post	59164	Record support post
04051	Escutcheon	59165	Tone arm support
04108	Tone arm adjustment screw P-56MP	59175	Tone arm housing
04111	Record support post cover	59176	Shelf cover
05087	Shipping shim assembly	59458	Tone arm tube and plastic head P-56MP
07321	Spindle gear assembly	59459	Escutcheon P-56MP
07329	Starting lever assembly, P-51	60297	Cork washer, P-51
07330	Shelf crank and link assembly	60438	Order by kit (see #41117)
07332	Main cam rivet assembly, P-51	60611	Escutcheon background P-56MP
07618	Main cam rivet assembly, P-56 and P-56MP	62086	Starting lever bumper, P-51
07343	P.U. socket assembly	62094	Starting lever sleeve, P-51
09217	Mounting spring assembly	62096	P.U. damping shim, P-56, P-51
09340	Mounting spring assembly P-56MP	64014	Upper mounting spring
11426	Pickup terminal and lead assy., P-56MP	64298	Tone arm lift lever spring
13410	Turntable drive shaft & bracket assy	64301	Hold-down spring, record support post
13412	Auto stop switch & bracket assy., P-56, P-51	64302	Interceptor shaft spring
13414	Tie plate assy.	64322	Record lift lever spring
13435	Turntable, P-56, P-51	64324	Spring, Tone arm stop lever
13510	Control knob assy.	64325	Tone arm return lever spring
13540	Drive shaft and gear assy.	64326	Tone arm brake spring
13544	Shelf cover arm & record hold-down rubber assy.	64327	Reject rod, P-51
13583	Idler pulley used with Alliance motor	64329	Plunger rocker spring
13584	Idler pulley used with General Ind. motor	64330	Shelf link spring
13819	Idler pulley for P-56MP motor	64343	Tone arm spring
13749	Turntable P-56MP	64356	Lower mounting spring
13758	Auto stop switch & bracket assy., P-56MP	64471	Tension spring for P-56MP motor
13803	Shelf cover arm & record hold down rubber assy., P-56MP.	71231	Crystal cartridge
15117	Trip finger and spring, P-51	71235	Magnetic pickup P-56MP
15120	Spindle assy.	77210	3300 ohm carbon resistor P-56MP
15123	Tone arm support tube & bracket assy. P-56, P-51	77265	15000 ohm carbon resistor P-56MP
15127	Record support and crank (R.H.) P-56, P-51	80458	Terminal strip P-56MP
15128	Record support and crank (L.H.) P-56, P-51	80468	Phono motor plug P-56MP
15204	Trip finger assy., P-56, P-56MP	88316	.008 feeler gauge
15215	Control knob & spring P-56MP	88317	.013 feeler gauge
15216	Tone arm support tube & bracket assy., P-56MP	90145	Switch A.C.
15224	Record support and crank (R.H.) P-56MP	90241	3 position slide switch P-56MP
15225	Record support and crank (L.H.) P-56MP	92189	Felt washer
17115	Plunger and shelf assy.	561317	Interceptor shaft
17190	Reject lever assy., P-56, P-56MP	561320	Tone arm lift rod, P-56, P-51
25112	Tubular capacitor .01 mfd. 200 V.	561327	Trip finger spacer P-51
25276	Tubular capacitor .02 mfd. 200 V.	561331	Indexing spring
27239	Shielded P.U. Lead Wire	561332	Long spacer (used with 561355 and 561354)
36127	Mounting spring cup	561333	Shelf cover spring
36137	Mounting spring retainer nut	561335	Record ejector lever
36347	#0 x ¼" Drive Screw (used to fasten Escutcheon)	561337	Tone arm hinge pin, P-56, P-51
36843	¼—28 x 2⅜ HHM bolt	561338	Spacer, starting lever
36844	¼"—28 Hex Half Nut	561340	Wave washer, P-51
36847	Driv-Lok pin type B 5/64" Dia x 7/16" Lg. (for shelf crank)	561342	Shelf crank rivet
36849	H.P. Cotter (used at bottom of stationary spindle)	561347	Pin, spindle gear
36865	#10—24 x ½" HHMS	561348	Washer spacer (used with 561355 and 561354)
36867	#10 Flat washer ⅝ O.D. x .062	561349	Spacer (used with ejector lever)
36875	Crank spacer	561350	Tie plate mtg. spacer
36878	Flat washer	561351	Main cam tube
36882	H.P. Cotter Hubbard #111 x .026"	561354	Tone arm return lever
36888	#10—32 x 1" Bolt	561402	Auto stop switch cover
36914	#10—32 x 2¼ Carriage Bolt	561403	Turntable stop washer
36934	H.P. Cotter (used on A.C. Switch Shaft)	561404	P.U. Spacer, P-56, P-51
36949	⅜—24 Std. Hex Nut	2000-209	#8—32 x ⅜" RHMS
37066	10-32 Acorn Palnut	2000-313	#10—32 x ½" RHMS
37067	Flat Washer	2000-327	#10—32 x 1½" RHMS
37157	Tubular rivet .085 x ¼"	2000-329	#10—32 x 1¾" RHMS
37176	#4—32 x 13/32 RHMS	2000-332	#10—32 x 2⅛" RHMS
37179	Flat washer ⅞ OD x 1/16 thick	2003-321	#10—32 x 1" F.H.M.S. (for record ejector lever) P-56MP
37421	"F" washer for tone arm adj. screw P-56MP	2007-053	#3—48 x 3/16" Fil H.M.S. (for tone arm) P-56MP
37422	Spring washer (for tone arm adj. screw) P-56MP	2012-151	#6—32 x ⅛" Bdg. HMS
37473	#4—36 x 3/16" Phillips oval H.M.S. (for escutcheon) P-56MP	2012-157	#6—32 x 5/16" Bdg. HMS
41107	Record changer mounting & shipping kit	2012-161	#6—32 x 7/16" Bdg. HMS
41117	Kit of 12 paper washers #60438	2012-209	#8—32 x ⅜" Bdg. HMS
44038	Phono motor for 60 cycles P-56, P-51	2013-107	#4—40 x 5/16" Bdg. HMS (used witth #55358) P-56MP
44061	Phono motor (less plug) for P-56MP	2015-007	#10—32 Std. Hex Nut
50204	Cork washer ¾" OD	2017-005	#10—Sdt. Flat Washer
54100	Spacer	2019-003	#4 S.P. Int. Lockwasher
54108	Tone arm crank	2019-045	#8 S.P. Ext. Lockwasher
55179	Pin	2019-007	¼" S.P. Int. Lockwasher
55258	Tone arm lever positioner	2019-046	#10 S.P. Ext. Lockwasher
55386	Tone arm spacer P-56MP	2041-135	#6—32 x ⅜" Allen cup pt. set screw
55387	Tone arm lift rod P-56MP	2085-219	#6—32 x ⅛" oven H.M.S. (motor and plug mtg.) P-56MP
55398	Tone arm spacer (used between 15123 and 59165) P-56	2091-022	⅛" x 3/16" Tubular rivet (slide switch mtg.) P-56MP
56959	Thrust bearing		50 Cycle Drive Pulleys (see fig. 3)
56975	Record plunger rocker arm	64401	50 cycle wire drive pulley for Gen. Ind. motor with
57158	Record support shelf		pulley
57160	Spindle bracket	64402	50 cycle wire drive pulley for Gen. Ind. motor with
57249	Tone arm end P-56MP		pulley
58779	Starting lever P-56, P-56MP	64399	50 cycle wire drive pulley for Alliance motor
58781	Reject lever clip P-56, P-56MP		
58796	Booster spring (used with 561331)		
58803	Shelf adjusting gauge		

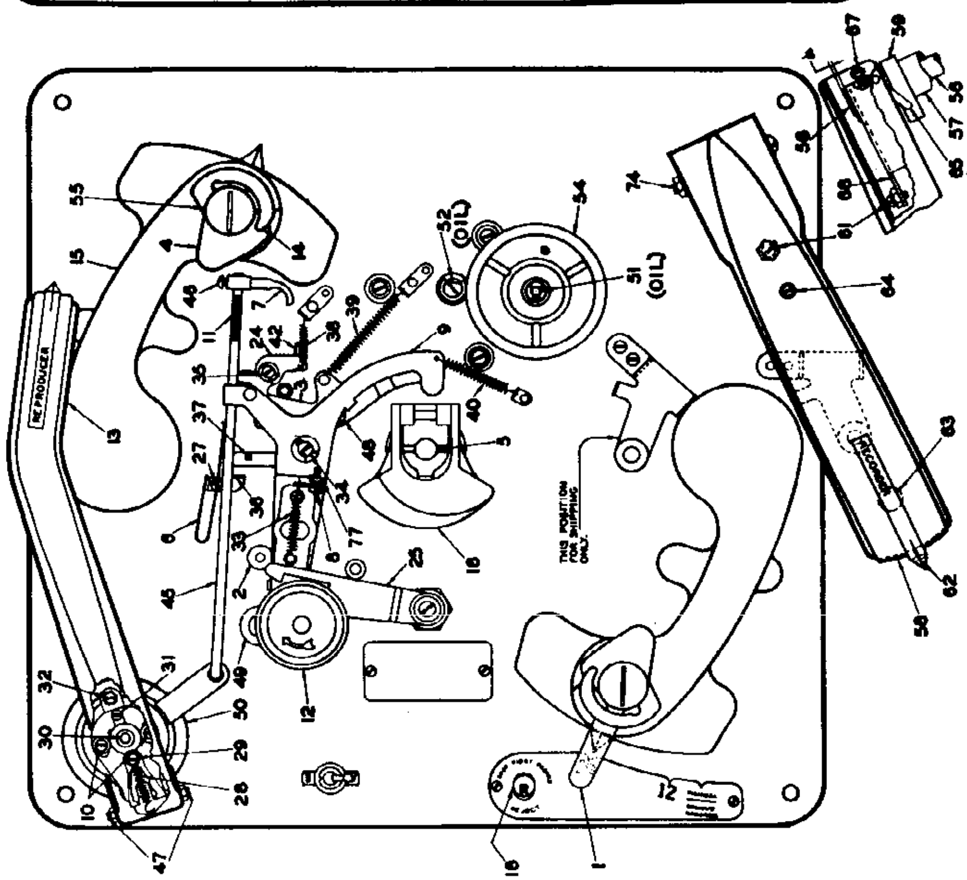
MODELS P51, P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

Bottom View
MODELS GI-RC130 and RC130L



Top View
MODELS GI-RC130 and RC130L



GENERAL

This record changer is designed to operate from a power source of 105–125 volts at 60 cycles. It will automatically play ten 12-inch records or twelve 10-inch records at a single loading. When the last record is played, the tone arm returns to its starting position, shutting off the motor. The turntable speed is 78 rpm.

MANUAL OPERATION

1. Move the record support plate (4) counterclockwise as far as it will go.

2. Place the hold-down finger (5) over the number "10" on the record support plate (4).

3. Twist the top of the turntable-spindle (2) so that it aligns into a smooth spindle with the lower part (3) of this assembly.

4. Place a record over the spindle (3) onto the turntable. Push down on switch button (6). This operation starts the motor. The pickup arm will move over onto the record. After the record has been played, the tone arm will then return to the starting position, shutting off the motor.

AUTOMATIC OPERATION

1. Twist the top of spindle (2) so that the top part is "off center" and a little step appears.

2. For 10-inch records, turn the record support (4) so that its short side is towards the spindle. For 12-inch records, the long, curved side should face the spindle. Keep the hold-down finger (5) turned slantwise across the corner.

3. Place the records to be played on the spindle (3). They will rest on the record support (4) and the step (35) of the spindle. Swing the hold-down finger so that it rests on the top record.

4. Start operation by pressing down on the switch butt The records will play through and after the last record been played, the arm (1) will return to the starting positi shutting off the motor. If you wish to reject a record bef it has finished playing, push down on the switch button.

5. To stop the phonograph before all records are play remove any records remaining on the record support. Pr down on switch button (6) and the tone arm will return to starting position, shutting off the motor.

OPERATION PRECAUTIONS

1. Use only unwarped records for automatic operation. I warped, odd size, or home recorded records, play as manual operation.

2. Never use force to start or stop the motor or any part the record changing mechanism.

3. Do not store the records on the record post or on t turntable as they may warp, especially if the temperature high.

4. Do not allow oil or grease to come into contact with t drive wheels or any rubber part of the record changer.

LUBRICATION

Use light grease (Lubriplate or equivalent) on the followir

1. Worm gear and main cam gear.
2. All cams.
3. Spindle bearing.

Use light machine oil on the following:

1. All shafts before insertion in bearing (replacement Keep oil or grease away from disc pulleys or other rubb parts.

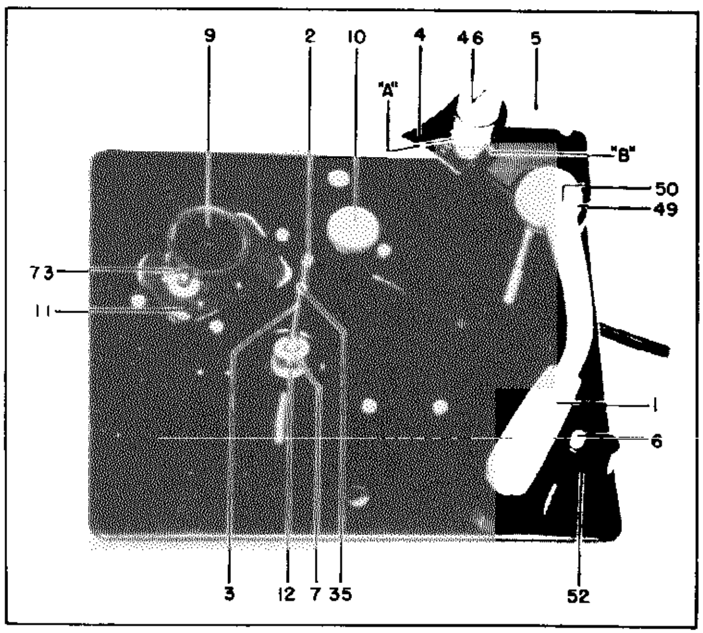
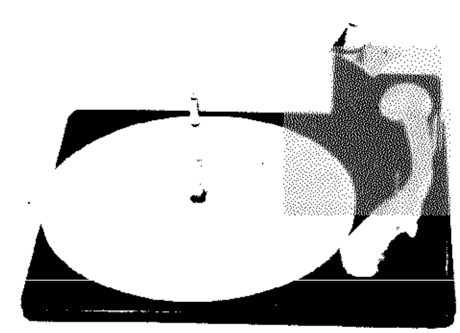


Fig. 1. Top View of Record Changer



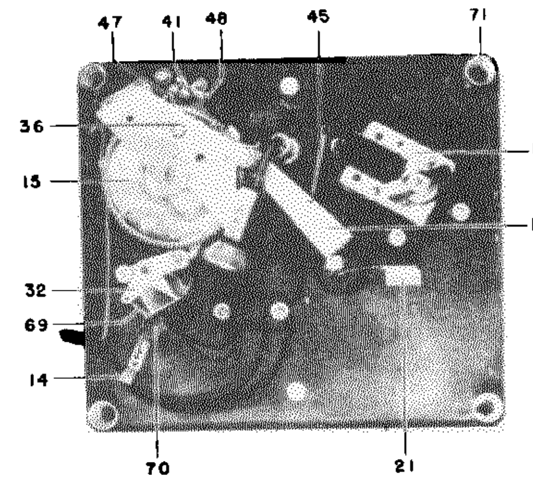


Fig. 2. Bottom View

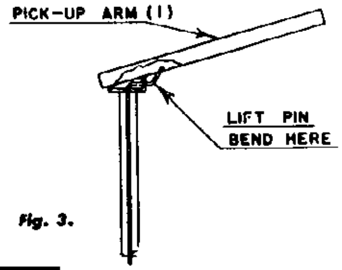


Fig. 3.

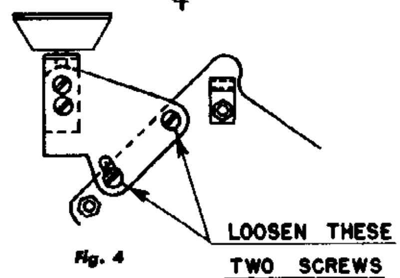


Fig. 4

PICK-UP

A special General Electric pick-up is used in this changer which will give superior results from the standpoint of high fidelity, low surface noise, and negligible record wear. The pick-up is not interchangeable with a crystal pick-up as the ratio of output voltage levels of the two types is at least 70 to 1, the pick-up supplied having an extremely low output.

The pick-up is supplied with a semi-permanent type stylus. Dust and foreign matter should be removed from the stylus assembly at regular intervals with a soft brush. Make sure the stylus arm is centered between the stops. This clearance should be 9 to 11 mils on each side.

When making service adjustments, it is advisable to replace the cover over the stylus which was originally shipped on it. This will prevent possible injury and misalignment.

50-CYCLE OPERATION

This changer may be used on a 50-cycle power supply provided it is equipped with a Type A or Type G motor and a 50-cycle conversion spring and is operated at reduced voltage. This reduced voltage operation is obtainable either from a tap on the primary of the power transformer or by use of a series resistor.

The conversion spring number is Stock No. RMS-036 (Type G motor) or RMS-037 (Type A motor) and is placed over the motor drive bushing that operates the idler wheel (9).

PHONO MOTOR PARTS REPLACEMENT

Two types of phono motors are used during production. These are identified as Type A and Type G motors and can be distinguished by the following: Type A has an external cooling fan blade, Type G has internal cooling fan blade. When ordering idler wheel springs or 50-cycle conversion springs, specify the type of motor used, as motor parts are not interchangeable.

CYCLE OF OPERATION

INITIATING THE CHANGE CYCLE—Pushing down on the control button (6) turns the power ON and starts the turntable rotating. Automatic cycling may be started by depressing the button (6). This movement slides the trip bar (14), causing engagement with the carrier lever (31) and its attached drive wheel (10). This motion of the carrier lever causes the drive wheel (10) to contact the rim of the turntable and rotate with it. The rotation of the drive wheel (10) is transmitted through the flexible coupling (16) to the worm drive (17), which in turn drives the main cam (15).

CYCLING—A single revolution of the main cam (15) results in a complete automatic cycling of the changer. This includes selection of a record from the stack, lifting of the tone arm (1) from its rest position and setting of the needle in the first groove of the record.

Upon the completion of the revolution the automatic trip cam at the bottom of the cam (15) which has the block on the trip lever (57) riding on its outer surface, drops into a depression on the trip cam, on the underside of cam (15), which causes the carrier lever (31) to return to its original position so that the drive wheel (10) will disengage with the turntable rim.

RECORD FEED—The outer and lower surface of the main cam (15) controls the record selection. Motion of the feed cam roller (36) about the cam groove causes the feed sector lever (19) which is engaged with the record feed pinion (20), to turn the eccentric (44) to the proper position for a record selection and to then return, allowing the record to drop over the spindle (3). The feed sector lever and record feed cam should enmesh as shown in Fig. 7.

PICK-UP ARM MOVEMENT—The upper surface of the main cam (15) controls the pick-up arm movement. The tone arm is lifted by the motion of the lift pin (25) as it contacts the outer vertical edge of the cam (15) as the latter rotates. The direction of swing of the tone arm is controlled by the engagement of the main cam (15) with the sweep lever pinion. The sweep lever (62) connects directly to the tone arm (1) by means of a clamp (25) around the pick-up arm pivot sleeve. A boss projecting from the upper side of the main cam (15) displaces the stop lever (59) at the end of the change cycle, thus permitting the tone arm to proceed across the record.

POSITIVE TRIP ACTION—As the tone arm runs-in on the inner groove of the record after the playing of that record, the sweep lever (62) hits the positive trip screw (54) mounted on the trip lever (57). This action re-engages the drive wheel (10) with the rim of the turntable and starts a new cycle.

PAWL TRIP ACTION—Any reversal of the direction of the sweep lever (62) travel before positive trip action takes place at the end of the playing of a record causes the sweep lever (62) to push forward the pawl (56) mounted on the auxiliary trip lever (57). This movement also has the effect of re-engaging the drive wheel (10) to start a new cycle. Pawl trip action is effective only after the pick-up arm (1) reaches a distance of not more than four inches from spindle (3).

10- OR 12-INCH OPERATION—Setting the record support shelf (4) to the 10-inch or 12-inch position lowers the stop selector rod (39) a definite amount. The raising and lowering of this rod determines whether the stop lever (59) positions against the rod (39) or the cap at the top of the rod. This regulation of the distance that the sweep lever (62) will travel determines whether the tone arm which is attached to the sweep lever (62) will lower on the first groove of the 10-inch or 12-inch record.

AUTOMATIC SHUT-OFF—Release of the record stabilizer finger (5) lowers the shut off rod (41) and forces the stop selector lever (40) completely clear of the stop lever (42). The latter is then able to move into a position which completely blocks any forward motion of the sweep lever (62). Consequently, the sweep lever (62) cannot perform its usual function of actuating the switch lever (32). Thus the switch lever roller remains in the path of the stop lever (42). On completion of the cycle, the stop lever (42), in returning to home position, hits the switch lever roller and forces the mercury switch (13) to the OFF position.

SERVICE ADJUSTMENTS

The turntable is driven by means of a friction *idler wheel* (9). The driving power is transferred from the motor *bushing* to the *drive wheel* (9) and then to the rim of the turntable. It is important, therefore, that the *motor bushing* and the *idler wheel* (9) be kept clean of grease, oil, dirt, or any foreign matter. Any quick drying solvent like naphtha is satisfactory for cleaning these parts.

A. TONE ARM DROP-POINT

The point at which the stylus of the tone arm drops on the record is adjusted by loosening slightly the *sweep lever clamp* (75) and repositioning the *tone arm* (1) with respect to the *sweep lever* (62) sufficiently so that the proper landing point is obtained. The stylus should land approximately ⅛-inch in from the edge of the record when properly adjusted. When the landing adjustment has been made for 10-inch records, the landing will be correct for the 12-inch records.

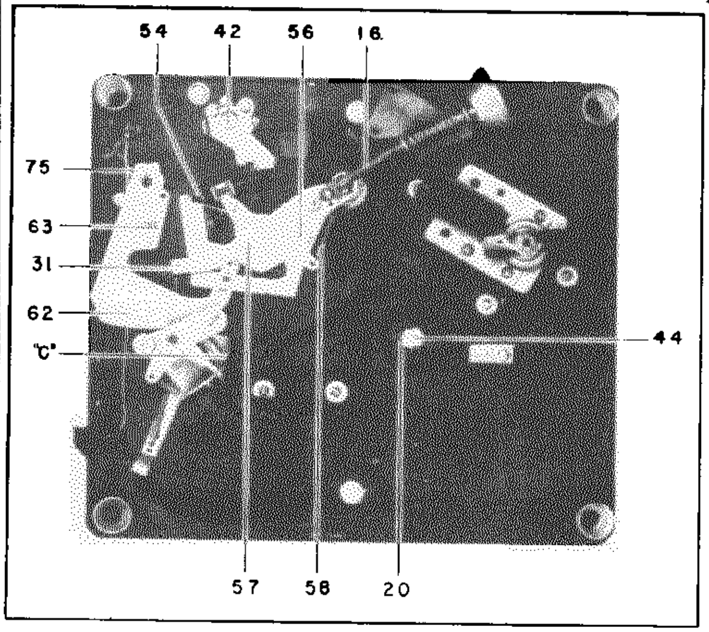


Fig. 5. Bottom View, cam removed

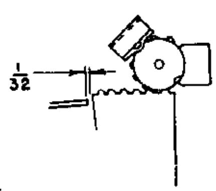


Fig. 7.

B. POSITION OF RECORD SUPPORT (4)

The angle through which the *record support* (4) rotat when changing from its 10-inch to its 12-inch position, ar the position of its edge with respect to the records it suppor when in either of its two positions may be adjusted by mea of the two *positioning screws* "A" and "B," see Figure *Screw* "A" adjusts the 12-inch position; *screw* "B" adjus the 10-inch position.

The position of the *record support* for either 10-inch or 1 inch records is correct when the support is symmetrical wi respect to the records being supported (so that the reco will drop from both corners of the support simultaneously

C. POSITIVE TRIP

The time at which the changer starts to cycle is adjustab by turning the *positive trip screw* (74). Turn the screw cloc wise to delay tripping or cycling of the mechanism an counterclockwise to trip earlier in the playing cycle. Th *screw* should be adjusted so that the changer trips when th needle is 3⅛ inches in from the edge of a 10-inch record. Th adjustment is rather critical and should be made accurately.

D. ALIGNMENT OF ECCENTRIC (35)

The alignment of the *eccentric* (35) is accomplished b

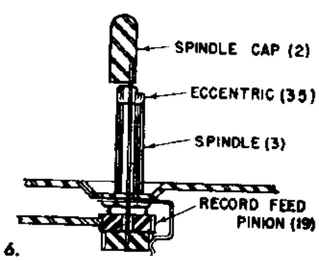


Fig. 6.

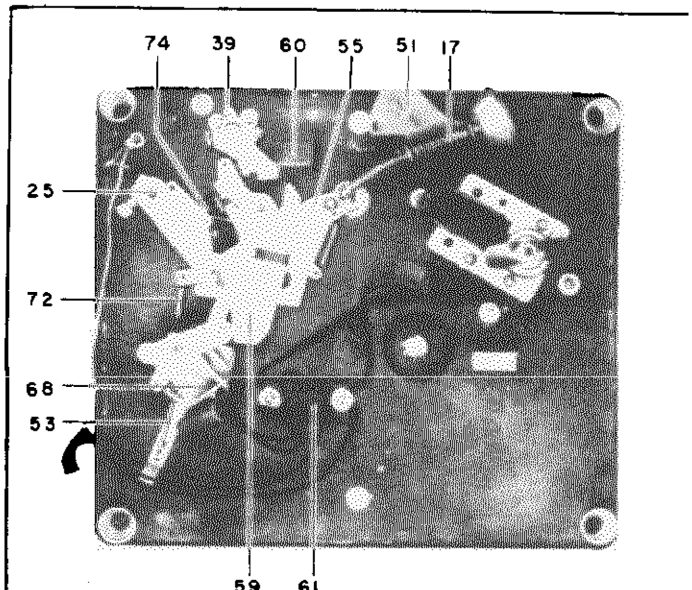


Fig. 8. Bottom View, cam removed

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loosening the clamping screw on the *feed pinion* (20), shifting the position of the *eccentric* so that it is aligned with the *spindle* (3) and retightening the clamping screw. See Fig. 6.

The position of the *eccentric* is correct if it is aligned with the *spindle* when the mechanism is not in a change cycle.

E. ALIGNMENT OF SPINDLE CAP (2)

The alignment of the *spindle cap* (2) is accomplished by loosening the two set screws holding the *cap index cam* (44) in place, rotating the *cap index cam* until the *spindle cap* (2) is aligned with the *spindle* (3). Tighten the two setscrews.

F. POSITIONING OF DRIVE WHEEL (10)

Under normal conditions when the changer is not cycling, the *drive wheel* must not contact the *rim* of the turntable. If it does, adjust the *eccentric bushing* (hex-shaped) so that it just clears. This adjustment should be slight as a large adjustment away from the rim of the turntable will prevent cycling when the changer is supposed to. If it contacts the rim when it is not supposed to, the changer will be in continuous cycling. On some of the later models the hex-shaped bushing is replaced by a smooth bushing. To make this adjustment, it may be necessary to bend the bushing slightly with a tool.

G. ADJUSTMENT OF WORM GEAR (17)

The enmeshing of the *worm gear* (17) with the *cam* (15) is regulated by the two set screws, see Figure 4. If the *worm gear* enmeshes with the *cam* too tightly, it causes binding with the resultant defective cycling.

H. LIFT PIN (25) ADJUSTMENT

Bend *lift pin* (25) so that needle will play the first record. See Figure 3 for correct bending point. When the tone arm is at its starting position, it should clear the *starter button* about 1/8 of an inch. If *lift pin* (25) is bent too far, it will not clear the records located on the shelf plate.

I. AUTOMATIC SHUT-OFF SCREW (42) ADJUSTMENT

Make certain that automatic *shut-off adjusting screw* (42) mounted on *stop selector lever* makes contact with the *shut-off adjusting rod* (41) when the *stabilizer finger* (5) is released. Adjust as required.

TROUBLE-SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
RECORD SELECTION	
1. Records drop unevenly from record support.	1. (a) Check adjustment B.
2. Records do not slip on or off the spindle smoothly.	2. (a) Check adjustment D. (b) Check adjustment E.
3. Records fail to drop.	3. (a) Check adjustment D. (b) Check adjustment B.
4. Records drop more than one at a time.	4. (a) Check adjustment E. (b) Check center hole in records—probably too large.
5. Records fail to stay on spindle cap when loading.	5. (a) Check adjustment E.
TONE ARM MOVEMENT	
1. Needle lands incorrectly.	1. (a) Check adjustment A.
2. Needle fails to feed in after landing.	2. (a) Check *pull-in spring* (58)—probably too weak.
3. Needle lands properly on record but slides in on record.	3. (a) Check for broken stylus in pick-up. (b) Pull-in spring (58) too strong.
TRIPPING—CYCLING	
1. Changer fails to trip.	1. (a) Check adjustment C.
2. Changer trips too soon.	2. (a) Check adjustment C. (b) Check record—may be eccentric.
3. Changer trips continuously.	3. (a) *Trip lever spring* (46) too weak. (b) *Trip block* (65) on trip lever turned out of line or catching edge worn. (c) Disengaging *cam* (13) worn. (d) *Carrier lever spring* (62) too strong.
4. Changer trips but fails to change—turntable continues to turn.	4. (a) *Carrier lever spring* (62) too weak. (b) Grease on drive wheel or turntable rim.
5. Changer continues to cycle after last record has been played.	5. (a) Check adjustment F.
MOTOR	
1. Changer is sluggish or motor overheats.	1. (a) Check lubrication—oil old or gummy. (b) Incorrect line voltage. (c) Defective motor winding. (d) Check binding of worm on main cam.
2. Motor rumble heard in record reproduction.	2. (a) Shipping bolts not removed from motor board.
3. Motor fails to start.	3. (a) Defective switch. (b) Check adjustment F. (c) Check a-c input plug to motor.
4. Motor fails to shut off after last record has been played.	4. (a) Check adjustment I.

REPLACEMENT PARTS LIST

CAT. NO.	REFERENCE	DESCRIPTION
RAD-022	68	BRACKET—Switch bracket subassembly
RAX-015	51	BRACKET—Drive support bracket assembly
RBX-006	11	MOTOR—Phono motor assembly (Type A), 115 v., 60 cycle
RBX-007	11	MOTOR—Phono motor assembly (Type G), 115 v., 60 cycle
RHW-008	7	WASHER—Turntable bearing washer (2 per package)
RJB-015	61	BOARD—Motor terminal board
RMA-002	1	ARM—Tone arm (less pickup cartridge)
RMC-016	44	COLLAR—Indexing collar assembly
RML-012	31	LEVER—Carrier lever assembly
RMM-013	14	LEVER—Trip bar assembly
RMM-030	4	SUPPORT—Record support plate
RMM-031	56	PAWL—Pawl assembly (includes spring)
RMM-034	55	STUD—Carrier lever pivot stud
RMP-003	25	PIN—Tone arm lift pin
RMP-010	49	PIN—Tone arm hinge pin
RMR-001	36	ROLLER—Feed cam roller
RMS-010	47	SPRING—Stop selector lever spring
RMS-011	71	SPRING—Mounting spring (pkg. 4)
RMS-012	60	SPRING—Stop lever spring
RMS-013	58	SPRING—Trip lever spring
RMS-016	52	SPRING—Control button spring
RMS-017	53	SPRING—Trip bar spring
RMS-022	45	SPRING—Feed sector lever spring
RMS-023	72	SPRING—Carrier lever spring
RMS-030	50	SPRING—Tone arm counterbalance spring
RMS-036		SPRING—Conversion for 50 cycle Type G motor
RMS-037		SPRING—Conversion for 50 cycle Type A motor
RMS-050	54	SPRING—Auxiliary trip lever spring
RMS-052	63	SPRING—Pull-in spring
RMS-100	46	SPRING—Stabilizer finger tension spring
RMS-101	69	SPRING—Switch bracket spring
RMS-102	73	SPRING—Drive wheel tension spring for Type A motor
RMS-103	73	SPRING—Drive wheel tension spring for Type G
RMT-005	64	TURNTABLE—Turntable assembly
RMU-027	41	ROD—Shut-off rod
RMU-028	39	ROD—Stop selector rod
RMW-030	9	WHEEL—Drive wheel for Type A motor
RMW-031	9	WHEEL—Drive wheel for Type G motor
RMX-002	16	SPRING—Drive spring assembly
RMX-004	21	SPRING—Indexing spring assembly
RMX-024	35	ECCENTRIC—Spindle eccentric assembly
RMX-025	2	CAP—Spindle cap and rod assembly
RMX-026	12	BEARING—Turntable bearing assembly
RMX-027	20	GEAR—Pinion gear assembly
RMX-031	17	GEAR—Worm gear
RMX-032	10	WHEEL—Drive wheel assembly
RMX-034	70	SWITCH—Motor switch assembly
RMX-035	19	LEVER—Feed section lever assembly
RMX-036	32	LEVER—Switch lever assembly (includes roller)
RMX-037	59	LEVER—Stop lever assembly
RMX-038	40 and 42	LEVER—Stop selector lever assembly
RMX-040	57	LEVER—Auxiliary trip lever assembly
RMX-043	15	GEAR—Main cam and gear assembly
RMX-045	62	LEVER—Sweep lever assembly
RMX-088	3	SPINDLE—Stationary spindle assembly
RMX-089	48	PIN—Pin and C washer kit

GENERAL

This single-post record changer is designed to operate from a power source of 110 volts, 60 cycles. It will play a single record at a time or a series of 10-inch or 12-inch records intermixed. When the series of records have been played through, the arm will return to its rest position, shutting off the record changer power.

The turntable speed is 78 rpm.

MANUAL OPERATION

1. Turn the Selector Switch (23) to the "M" position.

2. With the Record Stabilizer Weight (1) turned back and the spindle in position, place a record on the spindle as in Automatic Operation. The record may then be moved forward slightly to slip over the spindle step and then lowered to the turntable in playing position.

3. Press the "ON" button (24).

4. Place the Stylus gently on the edge of the record. Do not lift the pickup arm too high as this may cause it to catch in the automatic stop lock position.

5. At the end of the recording, or to stop the record at any time, either push down on the "OFF" button (25) (pickup arm rest) or replace the pickup arm on the rest.

AUTOMATIC OPERATION

1. Turn the Selector Switch (23) to "A" position.

2. Turn back the Record Stabilizer Weight (1). Place not more than twelve 10-inch records or ten 12-inch records, or ten records of the two sizes mixed, on the spindle. The bottom record will rest on the step of the spindle and the record

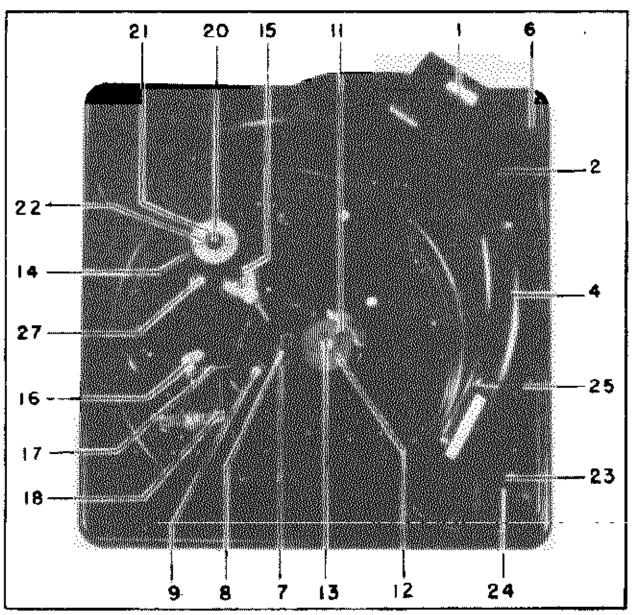

Fig. 1. Top View of Record Changer

selector shelf (62). Now turn the Stabilizer Weight (1) forwar so that it rests on the edge of the top record.

3. Depress the "ON" button (24) in the front right-han corner of the record player. The record player does the res without further attention. When the last record has bee played, the pickup arm automatically returns to its rest posi tion and shuts off the motor.

4. If you wish to reject the record being played, push dow the "ON" button. The changer immediately will shift to th next record.

5. If you want to stop the phonograph before all the record have been played, depress the "OFF" button (25). You ca move the pickup arm by hand at any time without damag to the mechanism. However, after the last record has bee played, the pickup arm automatically is locked in positio until it has come to rest on the "OFF" button.

6. To remove a stack of records from the turntable, pull ou the center spindle, lift off the entire stack of records, an replace the spindle.

OPERATION PRECAUTIONS

1. Use only unwarped records for automatic operation. Fo warped, odd-size, or home-recorded records, play as fo manual operation.

2. Never use force to start or stop the motor, or any par of the record changing mechanism.

3. Do not store the records on the record post or on th turntable as they may warp, especially if the temperature i high.

4. Do not allow oil or grease to come in contact with th drive wheel or any rubber part of the changer.

5. Do not, under any circumstances, connect the motor to source of direct current or to alternating current other tha that specified.

LUBRICATION

Use a light machine oil on the following:

1. Motor bearings, saturate top and bottom felts.

2. Pick-up arm shaft (5), see Fig. 3. Apply one drop each t bottom bearing point, bracket hole, and hole through mai base plate.

3. Ball bearing assembly (8), see Fig. 1.

4. Idler wheel felt (21), see Fig. 1.

Apply lubriplate No. 110 with a small brush to:

1. Idler wheel linkage.

2. Turntable shaft stud.

3. Pickup arm hinge pins.

4. Knife edge of raising lever (38), see Fig. 3.

5. Main cam bearing. It is necessary to remove the sub-plat assembly to lubriplate this bearing.

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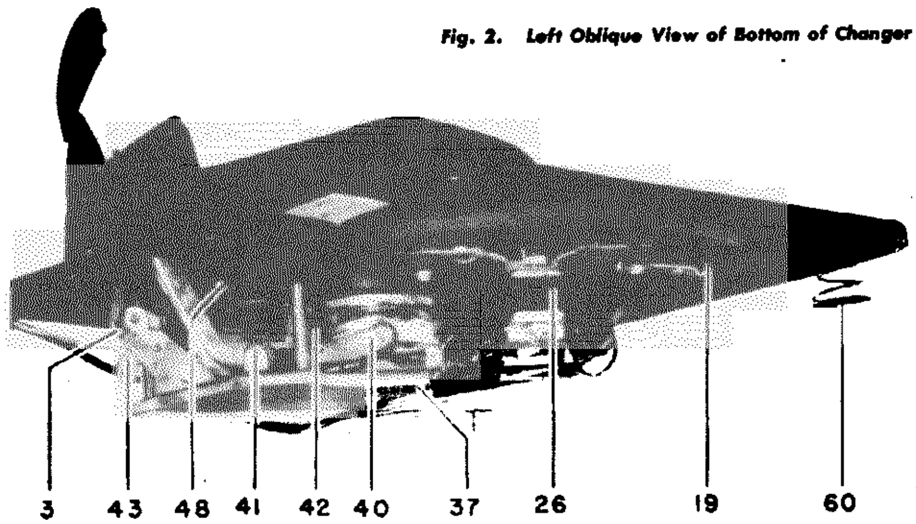


Fig. 2. Left Oblique View of Bottom of Changer

Apply Sta-Put with a small brush to:

1. Teeth of Main Cam Actuating Gear (45), see Fig. 4.
2. Track of Main Cam Gear (46), see Fig. 4.
3. Teeth of large and small Idler Gears (11) (12), see Fig. 1.
4. Raising Lever Bracket bearing surfaces (38), see Fig. 4.

PICKUP

A special General Electric pickup is used in this changer which will give superior results from the standpoint of high fidelity, low surface noise, and negligible record wear. The pickup is not interchangeable with a crystal pickup as the ratio of output voltage levels of the two types is at least 70 to 1, the pickup supplied having an extremely low output.

The pickup is supplied with a semi-permanent type stylus. Dust and foreign matter should be removed from the stylus assembly at regular intervals with a soft brush. Make sure the stylus arm is centered between the pole pieces. This clearance should be 9 to 11 mils on each side.

When making service adjustments, it is advisable to replace the cover over the stylus which was originally shipped on it. This will prevent possible injury and misalignment.

50- OR 60-CYCLE OPERATION

When operating on 60 cycles, use pulley, Stock No. RMW-025, on idler wheel and a-c motor voltage of 105–125 v. a-c.

When operating on 50 cycles, use pulley, Stock No. RMW-034, on idler wheel and a-c motor voltage of 90–109 v. a-c.

When the 50-cycle drive pulley is used, the idler wheel will not be completely retracted from the turntable but will still have some pressure applied to it when the motor is off. This is due to the larger diameter of the 50-cycle pulley.

CYCLE OF OPERATION

INITIATING THE CHANGE OF CYCLE—Depressing the *ON button* (24) turns the power switch ON, also trips the *idler release rod* causing the *idler wheel* (14) to make contact with turntable, starting it to rotate. This causes *gears* (11) and (12) to mesh with *main cam gear* (45), causing the start of cycling.

CYCLING—A single revolution of the *main cam* (45) results in a complete automatic cycling of the changer. This includes selection of a record from the stack, lifting of the *pickup arm* (4) from its rest position, and setting of the stylus in the first groove of the record. Upon the completion of the revolution, the *automatic trip cam* (46) which has the *trip lever* (47) riding on its outer edge, trips and causes *pickup lever* (38) to trip on the edge of *disc hub* (31). This causes the *arm* (4) to depress the *off button* (25), which trips the *idler release rod* (19) causing *idler wheel* (14) to disengage from edge of turntable, thus completing the cycle.

RECORD FEED—The outer and lower surface of the *main cam* (46) controls the record selection. Motion of the *rocker arm lever* (40) controls the *record selector lever* (3), causing *selector arm* (61) on the record shelf to push forward and drop a record.

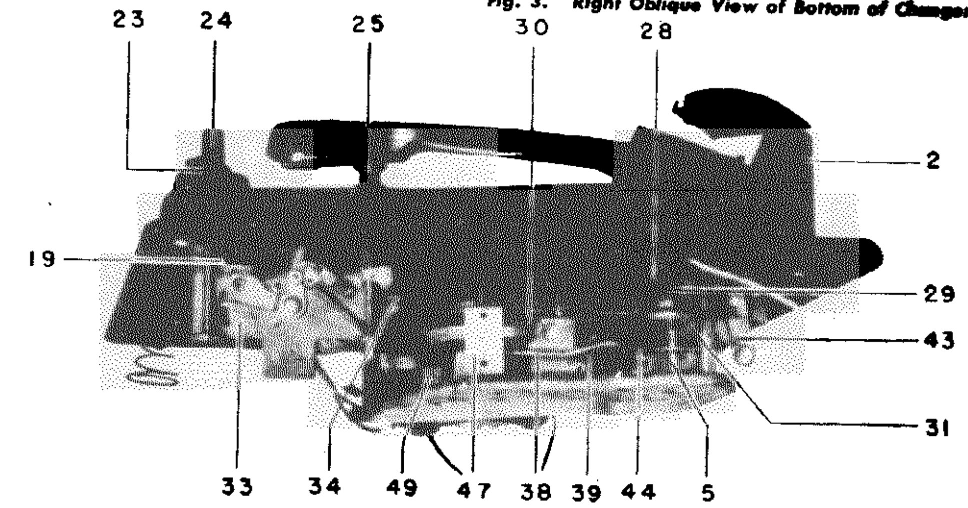
PICKUP ARM MOVEMENT—The lower surface of the *main cam* (46) controls the pickup arm movement. The tone arm is lifted by the motion of the *lever* (38) and *disc hub* (31) by motion of the *cam* (46). Direction of swing of the pickup arm is controlled by the *lever* (38) that lifts and turns the *disc hub* (31). After the pickup arm travels across the record, the *automatic trip* (30) controls the point at which the mechanism trips and the *arm* (4) returns to the starting position, completing the cycle.

POSITIVE TRIP ACTION—As the pickup arm runs in on inner groove of the record after record has been played the *automatic trip lever* (30) trips the *actuating pawl* on main cam assembly, allowing it to engage the main cam *actuating gear* (45) driving the mechanism through the change of cycle.

PAWL TRIP ACTION—Pressing down on the ON button starts motor and also trips the *velocity trip lever* (47). This, in turn, trips the *actuating pawl* on main cam actuating gear, driving the mechanism through the change cycle.

10- OR 12-INCH OPERATION—The selector arm (61) attached to the record's selector lever (3) initiates the selection of either 10- or 12-inch records. When a 10-inch record is resting on the record selector shelf (62) the selector arm (61) is not depressed, resulting that the selector lever assembly is thus in its normal engaged position with the indexing lever (43). This causes the drop mechanism of the pickup arm (4) to be indexed for the 10-inch drop-point during its change cycle. When a 12-inch record is on the record selector shelf, the selector arm (61) is depressed which, in turn, disengages the record selector lever (3) from the indexing lever (43). This results in the pickup arm dropping in the 12-inch drop-point position during the change cycle. In addition to this indexing, the motion of the record arm towards the turntable at the proper instant causes the record which is then resting on the platform to be pushed forward sufficiently past the notch on the turntable spindle to cause it to drop on the turntable.

Fig. 3. Right Oblique View of Bottom of Changer



AUTOMATIC SHUT-OFF—After a record has been played, the *pickup arm* (4) moves over to the "OFF" *button* (25) dropping on same. This trips the *switch* (24) and *idler release rod* (19), automatically shutting off changer.

SERVICE ADJUSTMENTS

The turntable is driven by means of a friction *idler wheel* (14). The driving power is transferred from the *motor bushing* (27) to the *drive wheel* (14) and then to the *rim* of the turntable.

It is important, therefore, that the *motor bushing* (27) and *idler wheel* (14) be kept clean of grease, oil, and dirt or any foreign matter. Any quick drying solvent, like naphtha, is satisfactory for cleaning these parts.

A. AUTOMATIC TRIP—When the movement of the *pickup arm* (4) toward the spindle is greater than 1/8 inch in 1/2 revolution of the turntable, the *automatic trip arm* (30) trips the *velocity trip and roller assembly* (47). This releases the *actuating pawl* on the *main cam assembly* (46), allowing it to engage the main cam *actuating gear* (45) and driving the mechanism through the change cycle.

The *automatic trip arm* follows the movement of the pick-up arm through a *spring compression clutch* (29). This clutch must be kept free of oil or grease.

Should it become necessary to clean the clutch, loosen the *lock* (A), see Fig. 6, to relieve the spring tension, and clean the clutch parts with carbon tetrachloride. Reset the clutch spring tension by setting the lock at least 1/4 inch below the main plate. This tension should be sufficient to operate the trip mechanism without placing undue drag on the movement of the pickup arm.

B. AUTOMATIC LOCK LEVER—This *lever* (48) should move up and down freely with no record on spindle. Hook end of the automatic shut-off lock lever (point B, Fig. 6) should catch *pickup arm raising disc* (31) at the beginning of cycle, to prevent travel of the arm and to cause it to drop on the "OFF" button. With no records on the spindle, this hook should clear the *pickup arm raising disc* by 1/32 inch with the mechanism at rest. Bend lip (point F, Fig. 6) if necessary to make clearance correct.

C. VELOCITY TRIP—At the completion of the change of cycle, the actuating pawl is engaged by the hook end of the *velocity trip and roller assembly* (47) which has been returned to its normal position by the reset points on the *main cam drive gear* (45). This hook should be adjusted for about .005–.015 inch clearance from the bottom of the *main cam drive gear* (45). Greater clearance may permit the pawl to bounce past the hook and re-engage, causing it to go into another cyc

D. INDEXING—The eccentric screw, accessible through the of the *pickup arm* (4) should take care of any normal adj ment. Turn the screw clockwise to index the stylus in tow the spindle and counterclockwise to index the stylus away from the spindle.

Should further adjustment be necessary, proceed as follo Operate the mechanism by revolving the turntable manu until the stylus drops to within 1/8 inch of a 10-inch record the turntable. With a No. 8 Bristol wrench in each of the screws (points D and E, Fig. 6), alternately loosen one tighten the other until the stylus rests above the reco lead-in groove at the desired point.

Be sure both setscrews are tight when this adjustmen completed. The 12-inch position is indexed automatically the pressure of a 12-inch record on the front of the selec arm (61).

E. PICKUP ARM LIFT—The stylus should approach the record of a full stack on the turntable with approximat 1/8-inch clearance. Adjust by bending the *pickup arm rais lever* (38) at point C, see Fig. 6. Do not attempt to m *pickup arm raising disc* up or down.

F. RECORD DROP ADJUSTMENT—The distance between *selector arm* (61) and the *spindle* is critical and should adjusted as accurately as possible. If this distance is too gre records of minimum diameter will not be pushed off spindle step during the change of cycle. If it is too sho records of maximum diameter will either lie over the tips of *selector lever* (61) (resulting in no record drop and impro index) or be pushed against the spindle with undue for causing center hole damage.
CAUTION: *Be certain that a standard size record is used making this adjustment: A standard 10-inch record measu 9 7/8 inches ±1/32 inch diameter. A standard 12-inch reco measures 11 7/8 inches ±1/32 inch diameter.*

With a standard 10-inch record on the *spindle*, check t distance between the edge of the record and the front of t *selector arm fingers* (61). This distance should be appro mately 3/32 inch and should be the same for each side of *selec arm* (61). With a full stack of records on the spindle, t weight of the records will reduce this distance to about inch. Do not attempt to bend the spindle to adjust this d tance. Bending the spindle will destroy the relationship b tween the heel of the spindle off-set and the horizontal pla of the record. This spacing is set to permit only one record a time to slide between the heel of the off-set and the step the spindle. Standard records are 0.70 inch to 0.100 inch thickness and any change in the angle of the spindle w either close the angle of the off-set, which will result in to

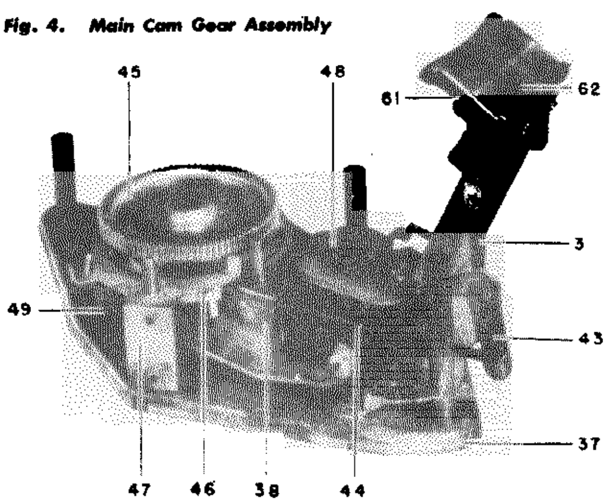


Fig. 4. Main Cam Gear Assembly

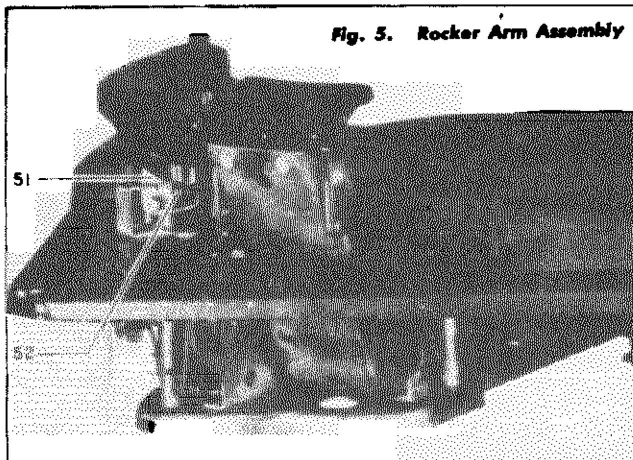


Fig. 5. Rocker Arm Assembly

center labels on thick records, or open the angle, permitting two thin records to drop at one time.

To adjust push-off distance:

1. Remove the four screws under the main plate which hold the center trim section.

2. Remove the center trim section by lifting straight up.

3. For forward adjustments of the *selector arm* (61), wedge a screwdriver between the *rocker arm* and the sub-plate in front of the rocker arm pivot. With the heel of the hand, bend the record selector post toward the spindle.

4. For backward adjustment, wedge the screwdriver between the rocker arm and the sub-plate in back of the rocker arm pivot. Pull back on the selector post.

5. After making adjustment, make sure that both selector arm fingers are equi-distant from the edge of the record.

G. TO REMOVE THE PICKUP ARM OR REPLACE A PICKUP CARTRIDGE.

A pickup cartridge can be easily replaced by first removing the pickup arm.

A spring is inserted between the pins of the hinge bracket to prevent its coming apart in shipment. This spring must be removed before the hinge can be taken apart. Proceed as follows:

1. Hold the pickup arm firmly.

2. Remove the spacing spring by pressing down on its center until it snaps off the hinge pins.

3. With a screwdriver or long-nose pliers, bend in one end of the blue steel pickup arm hinge brackets while lifting up on the arm. This will release the pickup arm hinge pin.

4. Repeat on the other pickup arm bracket.

5. The pickup arm, when released from the hinge brackets, may then be turned over and laid on the turntable for easy access to the cartridge.

6. Unsolder the leads and remove two setscrews that fasten the pickup.

TO REPLACE THE PICKUP ARM.

1. Hook the roller (on the rear of the hinge assembly) under the pickup lift bracket.

2. Use a pair of long-nosed pliers to place the pickup arm hinge brackets over the pins in the shaft bracket.

In performing this operation be sure that the pickup cord lies outside of the hinge and does not become wedged in the bracket. The spacing spring need not be replaced unless the unit is to be reshipped.

H. TO REMOVE THE SUB-PLATE ASSEMBLY.

In the event that it becomes necessary to replace any of the major parts in the sub-plate assembly (Fig. 4), the entire assembly should first be removed from the main plate. Proceed as follows:

1. Remove the turntable spindle and turntable.

2. Remove the pickup arm.

3. Remove the center trim section (2).

4. Unhook the rocker arm return spring (42).

5. Remove the rocker arm pivot pin (41).

6. Remove the four No. 8-32 screws holding the sub-plate studs and holding the center post to the main plate.

To replace the sub-plate assembly reverse the above procedure, making certain that all parts fall into their proper positions.

I. TO REMOVE THE RECORD SELECTOR AND ROCKER ARM ASSEMBLY.

1. Unhook the rocker arm return spring (42), Fig. 2.

2. Remove the rocker arm pivot pin (41), Fig. 2.

3. Lift out the selector and rocker arm assembly as a unit.

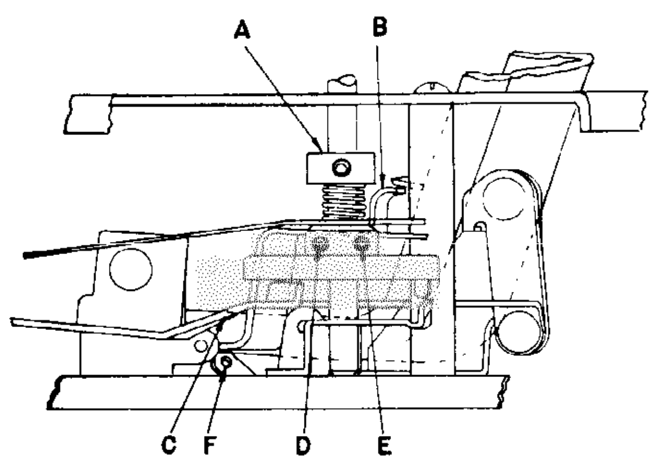


Fig. 6. Adjustment Points

GENERAL ELECTRIC CO.

TROUBLE SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
TRIPPING	
1. Automatic Trip Fails.	1. (a) Check adjustment A. (b) Binding of velocity trip. (c) Actuating pawl stuck; part of main cam assembly. (d) Automatic trip arm bent and not hitting velocity trip and roller (30). (e) Insufficient compression on clutch spring (29). (f) Manual trip lever binding (34). (g) No velocity lead-in groove or eccentric in center of record. (h) Foreign matter in record groove. (i) Bent stylus.
2. Manual Trip Fails.	2. (a) Manual trip lever (34) hair spring bent or broken. (b) Velocity trip and roller assembly (47) binding. (c) Actuating pawl stuck.
3. Velocity Trip Fails.	3. (a) Check adjustment C. (b) Velocity trip and roller assembly (47) rubbing on main cam actuating gear
4. Automatic Lock Lever Fails.	4. Check adjustment B.
INDEXING	
1. Indexing of Arm.	1. Check adjustment D.
PICKUP ARM MOVEMENT	
1. Pickup arm lift too high or too low.	1. Check adjustment E.
RECORD DROP	
1. Adjustment of Record Drop.	1. Check adjustment F.
MOTOR	
1. Motor Does Not Shut Off.	1. (a) OFF button stuck. (b) Defective switch. (c) Defective switch mechanism.

REPLACEMENT PARTS LIST

CAT. NO.	REF.	DESCRIPTION
RAA-008	30	ARM—Automatic trip arm
RAD-024	51	BRACKET—Pickup arm mounting bracket
RAD-025	17	BRACKET—Connecting link bracket
RBX-011	26	MOTOR—50-60 cycle with mounting grommet
RDB-013	24	BUTTON—"ON" button
RDB-014	25	BUTTON—"OFF" button
RDF-007	21	WASHER—Idler wheel (felt)
RDK-091	23	KNOB—Manual control knob and spring washer
RHC-011	22	CLIP—Idler wheel retaining clip
RHS-009	13	SCREW—Idler gear mounting screw
RHW-003	7	WASHER—Bearing race washer
RHW-004	20	WASHER—Idler wheel (fiber)
RMB-008	59	BUSHING—Rubber bushing
RMG-005	45	GEAR—Main cam gear
RMG-007	11	GEAR—Small idler gear (fiber)
RMG-008	12	GEAR—Large idler gear (fiber)
RMK-003	12	COUPLING—Idler gear coupling
RML-006	34	LEVER—Lever and wire assembly manual trip
RML-010	48	LEVER—Automatic "shut-off" lock lever
RML-013	15	LEVER—Idler lever and mounting assembly
RML-014	16	LINK—Connecting link and spring assembly
RML-015	18	LEVER—Idler release lever
RML-016	38	LEVER—Lever assembly, arm raising lever and bracket assembly
RML-017	40	LEVER—Rocker arm and lever assembly.
RML-018	43	LEVER—Index selector lever
RMM-038	57	SWITCH—Switch cover
RMP-008	41	PIN—Rocker arm pivot pin
RMP-009	49	PIN—"Shut-off" pivot pin
RMS-071	39	SPRING—Pickup arm raising lever tension sprin
RMS-074	44	SPRING—Index compression spring
RMS-075	42	SPRING—Rocker arm return spring
RMS-104	52	SPRING—Hinge spacing spring
RMS-105	29	SPRING—Clutch tension spring
RMS-106	58	SPRING—Manual trip spring
RMS-108	60	BUSHING—Spring bushing
RMU-032	19	ROD—Idler release rod
RMW-025	27	PULLEY—Motor drive, 60-cycle pulley
RMW-033	14	WHEEL—Idler wheel assembly
RMW-034	27	PULLEY—Motor drive, 50-cycle pulley
RMX-071	8	BEARING—Ball bearing and retainer assembly
RMX-072	9	STUD—Turntable shaft assembly
RMX-075	31	DISC—Disc and hub assembly, PU raising arm
RMX-077	46	CAM—Main cam assembly
RMX-078	47	TRIP—Velocity trip and roller assembly
RMX-080	28	COLLAR—Clutch spring tension collar
RMX-095	5	SHAFT—Shaft assembly, PU arm pivot
RMX-096	3	SELECTOR—Selector and shelf assembly
RMX-097	53	SHAFT—Shaft assembly record spindle
RMX-098	54	SHAFT—Needle pad shaft assembly
RMX-099	55	SHAFT—Shaft assembly T.T. assembly
RPA-004	4	ARM—Pickup arm (less reproducer)
RPX-010		PICKUP—Magnetic reproducer
RSS-004	56	SWITCH—A-c power switch
RSX-014	33	SWITCH—Switch assembly complete, less buttor

1. TONE ARM CLEARANCE ADJUSTMENT
   a. Loosen Allen set screw in trip finger spacer 561327 (fig. 16)
   b. Move record shelf to 10" position and run changer through cycle to play position.
   c. Insert narrow width .008" feeler gauge (Part Number 88316) between tone arm support post and tone arm support bracket.
   d. Hold spacer tight against small cork washer, and tighten set screw.
   e. Remove .008 feeler gauge.
2. TRIP AND NEEDLE LANDING ADJUSTMENTS
   a. Place 10-inch record on turntable.
   b. Lift up tone arm stop lever (561330 fig. 10) so that tone arm return lever will go all the way in toward main cam.
   c. Place needle in starting groove on record or 3/32" in from outside edge of record.
   d. Loosen hex screw in tone arm crank.
   e. Insert .013" feeler gauge (part number 88317) between large cork washer (60297 Figure 16) and trip finger.
   f. Set tone arm crank against outer edge of cutout in tone arm return lever (No. 561354 Figure 9). Hold tone arm crank in position pressed tightly against large cork washer and retighten hex set screw.
   g. Remove .013 feeler gauge.
   h. Run changer through cycle to see that no parts have been displaced that might cause changer to jam.
3. 12 INCH NEEDLE LANDING—See paragraph 4, Division D.
4. ERRATIC NEEDLE LANDING—See paragraph 5, Division D.
5. REJECTS CONTINUOUSLY
   a. Trip finger passes over stud on main cam and fails to return to normal position due to improper clearance between trip finger and tone arm crank. Set clearance with .013" feeler gauge.
6. DOES NOT REJECT
   a. See that reject rod is on side of trip finger spring farthest from main cam. See Figure 14.
7. FAILS TO TRIP AT END OF RECORD
   a. Check clearance between trip finger and tone arm crank. Should be .013". If correct, see that starting lever #07329 Figure 18 is not binding.
   b. See that trip finger is not bent so as to strike stud on cam, thus preventing actuation of starting lever.

F. RECORD FEED
1. FAILURE TO PUSH RECORDS FROM FLAT PORTION OF SPINDLE
   a. Records undersize or holes too large or eccentric (not centered).
   b. Incorrect distance from spindle center to the edge of record shelf. See Division B.
   c. Stroke is insufficient.

      (1) Plunger arm (part number 56975) does not make contact with the record support post cover plate. Indent plate slightly. Be sure the inside of plate is lubricated with lubriplate.

      (2) Pivot for record plunger rocker arm (part number 55179 may be moved slightly inward to obtain greater stroke.
2. DOES NOT DROP RECORDS
   a. Failure to push records from flat portion of spindle. See paragraph 1, Division F.
   b. Shelf lever #561355 may be off cam track.
3. DROPS MORE THAN ONE RECORD
   a. Check spacing from spindle center to edge of record shelf. See Division B.
   b. Record latch not dropping down.

      (1) Failure to lift record stack clear of spindle.

      (2) Sticking latch due to insufficient lubrication, pin fitting too snug, burr on latch or bent latch.
4. SHUTS OFF BEFORE LAST RECORD IS PLAYED
   a. Tension of spring 64322 (fig. 7) too great.
5. DOES NOT SHUT OFF
   a. Automatic stop pawl 561323 (fig. 9) too tight. Release pressure between wave washer and pawl using a screwdriver.
   b. Tone arm stop lever 561330 not flat against tone arm lift rocker.

G. REPRODUCTION
1. No response.
   a. Audio system. Check with radio reception.
   b. Pickup leads shorted.
   c. Pickup cartridge dead. Try new cartridge.
2. Distorted tone.
   a. Worn needle.
   b. "WOWS" or variance in speed.

      (1) Oil on idler pulley and turntable rim.

      (2) "C" washer 561403 (under turntable) dragging on baseplate.
   c. Warped records.
   d. Defective pickup cartridge.

      (1) Use of badly chipped records or records with breaks.

      (2) Dropping tone arm on record.
3. Thumping noise.
   a. Groove in idler pulley worn by motor drive pulley. Result of idler pulley being held stationary with motor running.

      (1) Sand idler pulley smooth or replace pulley.
4. "Grid Hum".
   a. Insert phono input plug into phono socket as far as possible.
   b. Check electrical ground connection of phono socket.
5. Mechanical Hum

   Check alignment of turntable motor armature.

OPERATING INSTRUCTIONS AND DESCRIPTION

(1) Lever for setting to play 10-inch or 12-inch records. Manual playing or Remove records. Mechanism as shown is set for playing 10-inch records.

(3) Trip mechanism designed to handle automatically records with either spiral run-in or oscillating grooves.

(4) Record Support Fingers.

(5) Turntable Shaft.

(6) Trip Rod Tension Spring.

(7) Adjustment for run-in or spiral grooved records.

(8) Adjusting lock screw for controlling position of power take-off wheel (12).

(10) Adjusting screws for locking tone arm in position so that needle will rest properly on edge of record.

(12) Rubber-tired power take-off wheel. It is through the trip mechanism this wheel contacts the inside flange of the turntable during the change cycle from one record to the next, but does not operate during the playing of a record.

(13) Pickup Arm.

(14) Record Divide Fingers.

(15) Record Support Arm.

(16) Master Trip Cam.

(18) Reject Button. By pressing this button, changing mechanism operates immediately regardless of needle position on the record. Also by pressing this button, the first record will drop on turntable.

(21) Adjusting screw for setting vertical movement for pickup arm. If properly set, no further adjustment will be necessary.

(22) Adjusting Tie Bar used for positioning record support arms. The adjustment of this bar properly made should require no further attention.

(23) Rim Drive Electric Motor. Be sure Voltage and Cycles are correct for your Power Line.

(45) Trip Rod.

(54) Rubber-tired Drive Wheel. By means of a spring this wheel contacts the steel pulley on the motor and the inside flange of the turntable; driving the table in clockwise rotation.

(58) Cutter Arm. At all times except when actually recording, cutter arm is placed on cutter arm support rest.

(60) Lead Screw.

(61) Adjusting Screw and Lock Nut for proper spacing between cutter arm and record.

(62) Cutting Stylus clamp screw.

(64) Adjusting Screw by which the tension on the cutter head equalizing spring may be varied for different types of records.

(69) Follower Arm and Spring Cam. This arm and cam mesh with lead screw (60) to provide lateral motion of cutter arm during recording.

Note: The Cutter Arm Support Rest holds cutter arm out of the way when automatic record changer is in use and also removes all strain on cutter-head equalizing spring. Mounted in inside position for shipping purposes. Before attempting to use mechanism it is necessary to move rest to the outside position shown.

How To Load Records

The record support posts must be set for either 10-inch or 12-inch records. This is accomplished by simply lifting Lever (1) then shift to the desired position. Select any number up to ten 12-inch or twelve 10-inch records, line them up with center holes, slip them onto center post of the turntable.

How To Start And Stop

All that is necessary to start the automatic Record Changer, after loading with records and properly securing needle in pickup, is to turn on the current by throwing switch. After turntable is in motion, press button (18). To stop changer merely throw switch to off position.

How To Reject A Record

Press Reject Button (18).

How To Remove Records

Before removing records move Lever (1) away from turntable to extreme position.

For Manual Playing Of A Record

Move Lever (1) away from turntable to extreme position same as for removing records. This will free the tripping mechanism so that the pickup arm can be moved by hand to and from the record.

NOTE: During recording Lever (1) must be in manual position at all times.

How To Place Record On Turntable

Place blank record disc on turntable in such a manner that the retractable pin protrudes through one of three holes near center of record. This is absolutely necessary to prevent the record from slipping and ruining the recording. When it is desired to play an ordinary record, place record on turntable; weight of record will cause pin to depress into turntable and friction between record and table is sufficient to prevent slippage.

How To Cut Records

Start motor, raise cutter arm from rest position to an angle of approximately 45 degrees and move inward until white mark on front of cutter arm is just inside record periphery. Lower arm gently as far as it will go; if stylus does not contact record, arm must be raised to relocate. The record is now being cut; inside limit of travel of recording arm will be indicated by a "clicking" sound, when this is heard, raise cutter arm immediately and place on rest. During time of cutting fine threads will accumulate about ½ inch inside stylus. These threads are carried to the center spindle by means of the thread collector attached to the cutter stylus clamp screw.

Phonograph Play-Back

With phonograph reproducing needle in pickup arm (13) start motor and place arm on record.

Caution:

Do not use changer mechanism with home recording discs.

GENERAL INFORMATION

LEVELING OF INSTRUMENT

For this mechanism to operate to the best advantage it should be mounted in a cabinet which is solidly supported and has no tendency to rock on its feet. If the floor under the cabinet is not level, shims should be placed under the feet of the cabinet until the base plate of this instrument is level.

Failure to level the instrument may result in improper feed-in of the pickup arm when the automatic record changer is in use and during recording the proper balance of the cutter head would be disturbed.

PLAYBACK NEEDLES

This mechanism will play 10 twelve inch or 12 ten inch commercial records automatically and an ordinary needle would become badly worn and cause serious record wear before the completion of this number of records. Special long playing needles made especially for automatic record changers should always be used. These needles are not as a rule recommended for playback of home recorded discs, however. For home recordings, 100% shadowgraphed needles will give the least surface noise and prolong the life of the recording. These needles in turn are not suitable for use in an automatic record changer for playing a series of commercial records. No needle which has been used to play a commercial record should ever be used to play home recordings except in the case of the so called "permanent point type". Unless needles have a locating flat on the shank for engagement with the needle clamping screw they should never be used after they have once been removed from the needle chuck. Even if needles have a flat on the shank it is not always easy to locate them exactly as they were the previous time and serious damage to records may follow the re-use of such needles. The pickup needles used in this unit should be 5/8 inches long.

LUBRICATION

Frequent lubrication of the record changer is not required, however, certain points should receive attention at least two or three times a year. Lubricate with SAE 20 automobile engine oil (every six months or every 500 hours of operation whichever comes first) the following points: motor bearings (52) and (53), turntable shaft bearing under cam (16) and idler bearing (51). Caution: Make sure that no oil, grease, or solvent of any description gets on the rubber tread of idler (54). Oil other parts of the mechanism whenever advisable. Keep the working surfaces of cam (16) and the various cams on cam shaft (19) covered with a thin film of petroleum jelly (Vaseline).

Whenever the follower arm post (56) shows any tendency to stick or bind in the pivot post bushing (57), apply petroleum jelly to the follower arm post above and below the pivot post bushing and work the lubricant in by alternately raising and lowering the recording arm (58). Never oil the follower arm post. Work petroleum jelly into the bearing surfaces between the straddle plate (59) and the pivot post bushing (57). This can best be done by raising the recording arm (58) until it is free of the feed screw after which it can be swung from side to side until the lubricant is well worked into place.

Because the threads or shavings resulting from the recording process may work into the various parts of the mechanism, care should be exercised to remove this debris from the mechanism at regular intervals. At such times also thoroughly clean the threads of the feed screw (60), removing any dirt particles which may have accumulated. The use of a brush is recommended for cleaning the feed screw. Never use a sharp instrument to remove particles from the feed screw threads as scratches on the threads would be detrimental.

AUTOMATIC RECORD CHANGER MECHANISM

DESCRIPTION OF TRIP MECHANISM

(1) In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the trip grooves at the end of the music grooves in all standard records.

(2) All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

(3) This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.

(4) To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (1) to either the 10 or 12 inch position.

(5) To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (13) swings inwardly, the trip rod (45) moves toward the pickup base until the serrations on the trip rod seen at (11) are in contact with the knife edge of the trip latch (24). If the pickup arm (13) is now moved outwardly, the serrations at (11) will engage with the trip latch (24) permitting the trip cam lever (3) to be released so that it will drop in and engage the trip cam (16).

(6) To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (13) inwardly until the trip dog (7) comes in contact with the trip latch (24) and releases trip cam lift lever (3).

(7) The reject button (18) it will be noted also operates to trip the mechanism by imparting motion to latch (24).

(8) After trip cam lift lever (3) has been released so that it will engage trip cam (16), the forces required to operate the balance of the trip mechanism are derived from the motor (23) which drives cam (16) through the turntable.

(9) As trip cam (16) engages trip cam lift lever (3), cam (16) is hinged upwards so that it engages the pulley control lever (9) and forces pulley (12) into positive frictional engagement with the inside of the turntable rim.

(10) To keep pulley (12) in engagement with the turntable rim after lever (9) walks off of cam (16), lever (9) is engaged by latch (25) and the tripping operation is complete.

DESCRIPTION OF SPEED REDUCER AND CAM SHAFT

(11) Driven by the pulley (12) through a double worm and gear reduction, the cam shaft (19) carries cams which control the pickup arm movements, the dropping of records and at the conclusion of the change cycle, the release of latch (25).

(12) Cam (20) which is mounted on lower end of shaft (19) raises and lowers the pickup arm (13) through a rocker arm and push rod. On the upper side of cam (20) is a dog which engages lever (17) and actuates the record handling fingers (4) (See paragraph 18).

(13) The positioning of the pick up arm (13) for 10 or 12 inch records is controlled by two cams just above the lower cam shaft bearing. The lower of these cams (with short throw) positions the pickup for 12 inch records and the upper cam (with long throw) positions the pickup for 10 inch records.

(14) An examination of the pickup positioning cams will reveal spring fingers at the termination of the cam rise. These spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

(15) When lever (1) is set in the 10 or 12 inch position the pickup positioning cam follower is shifted up or down so as to engage the proper cam. The pickup positioning cam follower can easily be distinguished by the coil spring mounted thereon and linking the cam follower to its extension. This coil spring will extend, preventing damage, if for any reason the pickup arm (13) becomes obstructed while the pickup positioning cam is forcing the pickup arm (13) inwardly.

(16) Just above the pickup positioning cams is the pickup return cam which has the function of swinging the pickup arm (13) outwardly when the mechanism has been tripped.

(17) The last and uppermost cam operates through cam follower (26) to release the pulley latch (25) thus disengaging pulley (12) from the turntable rim at the completion of the cycle.

(18) On the upper side of the latch control cam is mounted a roller which engages the upper extension of lever (17) and through a linkage rotates the record support fingers (4) so as to drop a record to the turntable. After the record is dropped, the lower extension of lever (17) engages with the dog on the upper side of cam (20), rotating support fingers (4) in the opposite direction and back to their original position.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

(19) To adjust the spiral trip to operate farther from the center of the record, loosen the set screw (46) holding dog (7) and move the dog (7) away from the end of the trip rod (45). (Read paragraph 20 before making adjustment).

(20) Dog (7) is set at the factory to trip when the pickup needle is 1-3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. To facilitate the location of dog (7) it is best to hold a scale with the end touching the turntable pin (5) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1-3/4" graduation. Note: If for any reason the position of the pickup arm (13) with relation to the pickup base becomes changed, the trip dog (7) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (7). (This pickup adjustment is covered in paragraph 34).

MECHANISM FAILS TO TRIP

(21) If the mechanism fails to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be badly worn or scratched in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have been damaged.

(22) The trip rod (45) is held in contact with trip latch (24) by the trip rod tension spring (6). If the eccentric trip fails to operate, it may be necessary to increase the pressure of spring (6) against trip rod (45) but before changing the adjustment, first, make sure that the trip rod does not bind in the bearing where it is linked to the pick-up base, second, be sure that the trip rod floats freely, third, examine the serrations at (11) to be certain that the sharp edges have not been damaged, fourth, remove any dirt which may be embedded in the serrations and which would prevent the trip latch (24) from being engaged, fifth, examine the knife edge of trip latch (24) to see if it has become damaged, sixth, inspect the spring (6) to see that its long leg clears that part of supporting bracket (36) on which rests trip rod (45), seventh, make sure that the pick-up needle is not jumping out of the trip grooves in the record, eighth, hold pickup base (50) with one hand, then press gently sideways on head of pickup arm (13) to detect any unusual amount of lost motion or play which might be caused by lock screws (10) not holding firmly or pivot screws (47) not being correctly adjusted, ninth, sight along the length of the trip rod (45) to make sure that it has not become bent as this would seriously interfere with adjustment of spring (6). If trip rod (45) is found to be bent, always disassemble it before trying to straighten it. Note: Do not increase the pressure of spring (6) against trip rod (45) any more than is necessary to insure operation of the eccentric trip as excessive spring pressure will cause the pickup needle to jump the record grooves. To increase the tension of spring (6) against trip rod (45) loosen screw (27) and turn spring bracket (36) in a clockwise direction.

(23) If the pickup needle shows a tendency to jump grooves on all records and fails to trip, make sure that the pickup arm (13) swings freely. Next check the pressure of the pickup needle against the record to make sure that counter balance spring (28) is properly adjusted. (Model GI-RC130 should have a needle pressure of : 2-1/2 oz.; Model GI-RC130L: 1-1/4 oz. minimum). To correct insufficient needle pressure, loosen lock nut on adjusting screw (29) and turn adjusting screw (29) in a clockwise direction until needle pressure is correct. Caution: Before changing adjusting screw (29) make certain that push rod (30) moves up and down freely and is not supporting the pickup arm (13) while the needle apparently is resting on the record. Also make sure that pickup arm (13) is not resting on the head of screw (32). If the pickup needle only jumps grooves when but one record is on the turntable, pickup arm (13) is almost certainly resting on either push rod (30) or screw (32) in which case read paragraph 33. As a final precaution see that pivot screws (47) are not so tight as to interfere with the free vertical motion of pickup arm (13).

(24) If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (24) and the trip cam lift lever (3) to make sure that they work freely and do not bind on studs (35) and (48) respectively. If either of these levers are scraping on the base plate, make sure that the studs have not worked loose.

(25) If the lever (3) moves freely when it clears the trip latch (24) but does not swing into path of the trip cam (16) then spring (39) which connects to lever (3) is either stretched or missing. If lever (3) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place. Note: Never attempt to make the trip mechanism operate from home recorded discs.

CHANGE MECHANISM DRIVE PULLEY FAILS TO ENGAGE

(26) If the trip mechanism functions in a satisfactory manner and pulley (12) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen lock nut (77) and turn adjusting screw (8) counter clockwise so as to move the pulley control lever extension (49) outwardly a distance which will bring pulley (12) into positive frictional engagement with the turntable rim then tighten lock nut (77). Caution: This adjustment is very critical and should be carefully made.. If pulley (12) is forced too tightly against the turntable rim the latch (25) will stick at the completion of the change cycle and prevent the pulley from becoming disengaged from the turntable rim. Before making any adjustment it is also advisable to check the set screw in pulley (12) to make sure that pulley (12) is tight and not turning on the shaft which carries it.

(27) If latch (25) fails to hold pulley (12) in position, check the latch to make sure that the latch fingers have not been bent. Next check spring (41) on lever (26) to make sure that the spring is not defective or missing. If pulley (12) is riding off the lower edge of the turntable rim or so high as to cause it to scrape against the underside of the turntable, the height of pulley (12) may be adjusted by means of thrust screw (44). Before trying to turn screw (44) always locsen the lock nut provided.

MECHANISM REPEATS

(28) If the mechanism repeats (continues to change records without playing them), the pulley (12) may not be disengaging from the turntable rim. This failure to disengage may be due to the following: Faulty action of the latch (25). (See "Caution" in paragraph 26). A defective or missing return spring (40) on pulley control lever (9). A defective or missing spring (41) on lever (26). Lever (26) may be bent so that it is not contacting the pulley release cam. (See paragraph 17).

(29) If pulley (12) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked: Reject lever (42) may be bearing against trip latch (24) or it might be caught under trip latch (24). Pulley control lever (9) may be bent down so that it engages cam (16) even when cam (16) is not elevated by lift lever (3). Cam (16) may be sticking in the raised position. The reset spring (38) on trip latch (24) may be defective or missing. The stud (34) on which pulley control lever (9) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE

(30) If the mechanism trips during the playing of a record and before the pickup arm has swung inwardly to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked: Weak or missing reset spring (38) on latch (24). Defective shoulder on trip latch (24) or rounded corner on cam lift lever (3), permitting lever (3) to slip off of the shoulder on trip latch (24). If the mechanism trips when the pickup arm is moved by hand from the outside edge of the turntable outwardly the trip rod (45) may be bent.

MECHANISM TRIPS OR PICKUP ARM BINDS IN MANUAL POSITION

(31) When lever (1) is moved to the manual position the pickup arm (13) should be capable of free motion between the normal limits of its travel without tripping the mechanism. If the pickup arm binds or trips the mechanism under these conditions check the following: Trip rod (45) may be bent or disengagement finger (37) bent or broken. If rubber bumper (2) becomes pushed up away from the base plate, this will permit lever (9) to overtravel and may jam trip rod (45).

RECORDS FAIL TO DROP PROPERLY FROM RECORD SUPPORTS

(32) If two or more records are dropped at the same time or one edge of a record drops and the other edge does not then the rear record support (15) may not be correctly adjusted or record separating fingers (14) may be bent. Also check the records to make sure that they are of standard diameter and thickness. Should record separating fingers (14) be bent refer to paragraph 35 for corrective measures. An examination of the unit will disclose that the front record support has fixed positions determined by dedents which are located by lever (1). The rear record support (15) however is adjustable. If the record supports are not the correct distance apart, loosen screws (22) and move the rear record support (15) to the proper position.

Caution: Before making this adjustment always make sure the lever (1) is firmly located in the proper dedent.

Note: As home recording discs differ from standard records in thickness and diameter, they cannot be handled by the record supports.

PICKUP ARM LIFT AND REST ADJUSTMENTS

(33) The height to which pickup arm (13) is lifted during the change cycle may be adjusted by the screw (21). In making this adjustment make sure that the pickup arm will not lift high enough to strike the bottom record on the record supports. Also make sure that the pickup needle drops low enough to rest properly on one record on the turntable. (Recommended needle length ⅝"). If the pickup arm (13) is in contact with the push rod (30) or the pickup rest (32) when the pickup needle is resting on one record on the turntable, the needle will not exert sufficient pressure against the record for proper operation. Before adjusting the pickup lift, therefore, the pickup rest (32) should be checked to be sure that it is correctly adjusted. Pickup rest (32) is correctly adjusted when the pickup needle just touches the top of the turntable. As a final check be sure that the pickup will track properly when reproducing the thinnest home recorded disc likely to be used.

ADJUSTMENT OF PICKUP LOWERING POINT

(34) To adjust the pickup arm (13) so that it will be lowered to the correct point on the outside of the record, first shift the lever (1) to the 10" position and then stop the mechanism with the pickup positioning cam follower at the point of maximum rise of the pickup positioning cam. (See paragraphs 13, 14 and 15). Now raise the pickup arm to the vertical position and loosen two screws (10) so that the arm (13) can be moved with relation to the pickup base (50) but not too freely. Next holding the pickup base (50) so that it will not turn, force the pickup arm (13) toward the record centering pin (5). Now place a scale under the pickup needle with the end of the scale touching the record centering pin (5). Next, carefully pull the pickup arm (13) outwardly until the pickup needle is 4-45/64" from the pin (5). Raise the pickup arm (13) and tighten the two locking screws (10), being careful not to move arm (13) outwardly past the correct setting before tightening the screws. This adjustment will automatically take care of 12" records as well as 10" as will be seen by moving lever (1) to the 12" position and running the unit through its cycle. If the pickup arm (13) always lowers in the 12" position, regardless of the position of lever (1), the pickup positioning cam follower is sticking in the down position. Some pickups are equipped with an eccentric (31) for rotating the pickup arm (13) with relation to the pickup base (50). On such units the two locking screws (10) are loosened and eccentric (31) turned a small amount at a time until the pickup needle is lowered to the correct point on the record.

CHIPPING OF RECORDS

(35) The record supports (4) and the record separating fingers (14) are so designed that no chipping of standard records will take place unless through rough handling the fingers (14) become bent. For proper operation the fingers (14) must be perfectly flat. To straighten the fingers (14) it is necessary to remove the large headed screws (55) which hold the fingers in place after which the fingers (14) can be disassembled. Ordinarily straightening can be accomplished by holding the main part of finger (14) through which the clamping screw passes with one hand and then taking hold of the sickle shaped part of (14) with the fingers of the other hand, bending the sickle shaped part until it is lined up with the main body. After bending lay the finger (14) on a flat surface to make sure the straightening has been properly done.

RECORDER MECHANISM

MAGNETIC CUTTER

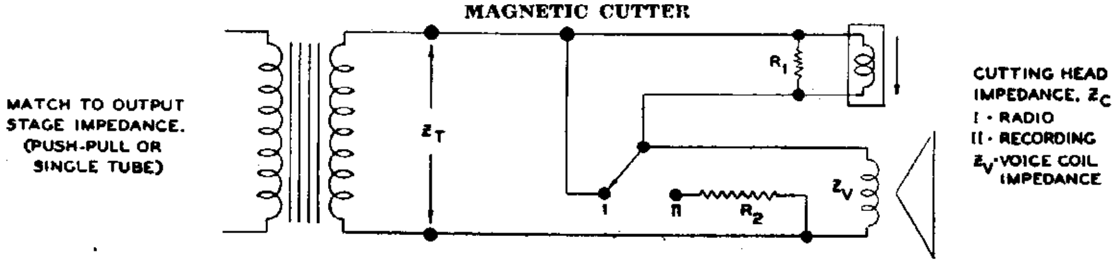


FIG. A

TYPICAL VALUES OF COMPONENTS

Z_C OHMS	R_1 OHMS	Z_V OHMS	R_2 OHMS	Z_T OHMS	MONITORING SPEAKER LEVEL BELOW RECORDING LEVEL
10	10	3.2*	0.4	3.2	17.0
10	10	4.0	0.5	4.0	16.5
10	10	6.0	1.0	6.0	13.0
10	16	8.0	2.25	8.0	10.0
10	18	10.0	5.50	10.0	5.0

*RMA STANDARD VOICE COIL IMPEDANCE OF SMALL SPEAKERS

MAGNETIC CUTTER (Cont'd)

(36) A suggested circuit for inclusion of the magnetic cutter in the voice coil circuit is shown in Figure A.

In this circuit, the speaker is used as a monitor. Resistor R_2 shunts the speaker voice coil and resistor R_1 shunts the cutter. Resistor values are selected which will result in the total series resistance of the two groups approximately matching the output transformer's impedance. The ratio of R_1 in ohms in parallel with Z_c in ohms at 400 cycles to R_2 in ohms in parallel with Z_v in ohms at 400 cycles will represent the voltage ratio between cutting and monitoring levels. This can be converted to decibels when the resistance of each leg of the network is known. The high frequency response of the cutters is partially governed by the ratio of Z_c to R_1. Resistor R_1 should be of the same value as the impedance of Z_c or slightly higher, but R_1 should in no case exceed twice the value of Z_c in ohms. In all calculations, sufficient accuracy will normally be secured if the 400 cycle impedance of both cutter and speaker voice coil be considered as pure resistance. Generally speaking, the 400 cycle impedance in ohms of a magnetic cutter will be approximately 2½ times its D. C. resistance in ohms. The 400 cycle impedance in ohms of the speaker voice coil will be approximately 1¼ times its D. C. resistance. If the 400 cycle impedance in ohms is supplied by the manufacturer of the cutter or speaker, it should be used instead of calculations from the D. C. resistance.

(37) Typical values for R_1 and R_2 with various impedance voice coils are given in the above table when a 4 ohm D. C. - 10 ohm 400 cycle cutter is used. Value of R_1 and R_2 can be found with other impedance cutters by simply applying Ohms Law if, as mentioned before, the 400 cycle impedance in ohms is considered as pure resistance.

When connecting the cutter to an output where the monitor speaker isn't required, only R_1 in parallel with Z_c in ohms will be considered as the load. For example, a 10 ohm cutter at 400 cycles (Z_c) in parallel with a 16 ohm resistor (R_1) would represent a load of 6.15 ohms to the output transformer of the radio receiver or amplifier. It would be satisfactory to connect this to the 6 ohm tap of the output transformer.

(38) A volume level indicator is necessary to prevent cutting too heavily. For this purpose, a high resistance voltmeter (1000 ohms per volt or higher) can be connected across the cutting head in parallel with R_1. Where Z_c has a value of 10 ohms as shown in the table, the voltage peaks should be about 1 volt on speech and 1½ volts on music. A power level of approximately ¼ watt is required by the average magnetic cutter for satisfactory operation. This is a voltage of 1.58 across a 10 ohm impedance cutter.

Other methods of volume level indication such as neon bulbs in series with resistors, tuning eyes, oscillographs, etc., are also satisfactory. Any high impedance device which will indicate low values of A. C. voltage can be used.

In cases where it is necessary to extend the cutter lead wires, insulated #20 wire should be used. When the extension is over a few feet it is usually desirable to use a larger wire size.

CRYSTAL CUTTER

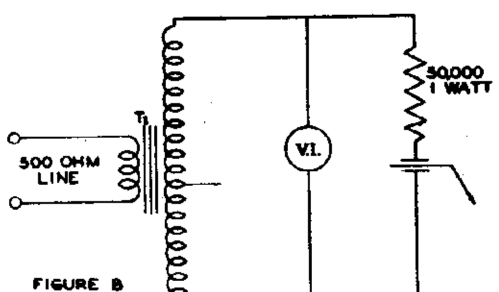


FIGURE B

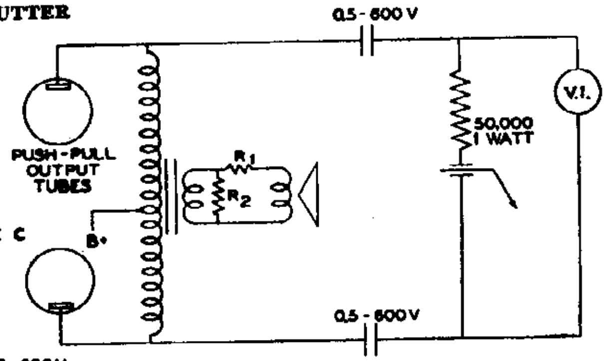


FIGURE C

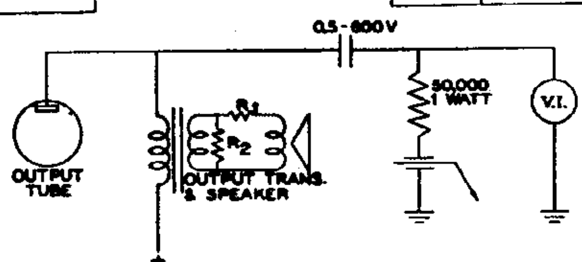


FIGURE D

(39) To record at characteristics similar to standard commercial recordings with a crystal cutter, a 50,000 ohms 1 watt resistor should be placed in series with the cutter. To emphasize high frequencies, this resistor should be shunted with a condenser between .001 to .01 mfd. To emphasize low frequencies, the series resistor should be varied up to 250,000 ohms.

(40) A volume level indicator is necessary to prevent cutting too heavily. The level indicator should be connected as V. I. in figures B, C and D. Any high impedance device which will indicate A. C. voltage can be used. A high resistance A. C. voltmeter (1000 ohms or more per volt) 0-150 volt scale may be used. For normal recordings, the voltage peaks should be about 100 volts. The actual voltage required can be determined after a few trial recordings are made (see section on Making A Trial Recording).

(41) A crystal cutter must be driven from a high impedance source, Figures C and D show means of capacity coupling the cutter to either a single or push-pull output circuit. The 0.5 mfd. 600 volt condenser blocks the direct current from reaching the cutter but will pass the voltages to be recorded. Resistors R_1 and R_2 represent legs of an "L" pad to be used in attenuating the speaker level to permit its being used for monitoring when recording a radio program. These two resistors may be fixed and of such values that the total load to the output transformer will be the same as the speaker impedance. The monitoring level will be a fixed number of decibels below the recording level. See Chart E for typical values of R_1 and R_2. Various degrees of monitoring attenuation can be found by simply applying Ohms Law if the 400 cycle impedance of the speaker voice coil is considered as pure resistance. A simple switching arrangement can be used to remove the resistors from the circuit as well as opening the cutter circuit when not recording.

Figure B indicates a means of inductively coupling the cutter to an amplifier's 500 ohm output. Transformer T_1 should have an impedance ratio of 500 to between 40,000 to 80,000. Several reputable tranformer manufacturers supply tranformers which can be used - some are designed primarily for crystal cutters and others are for driving push-pull grids from a 500 ohm line. If the latter transformer is used, the center tap of the secondary will be left open as shown in Fig. B.

The length of the wire from the radio or amplifier to the crystal cutter should be kept as short as possible and should be well insulated.

GENERAL INDUSTRIES COMPANY

CHART E

TYPICAL VALUES OF "L" PAD RESISTORS R_1 AND R_2 FOR SPEAKER MONITORING

OUTPUT TRANSFORMER AND VOICE COIL IMPEDANCE IN OHMS	R_1 OHMS	R_2 OHMS	DECIBELS ATTENUATION BELOW RECORDING LEVEL
3.2	5.5	5.5	8.5
3.2	10	4.5	12.0
6.0	10	10	8.5
6.0	15	8	11.0
8.0	11	14	7.5
8.0	20	11	11.0

AMPLIFIER

(42) The amplifier should be capable of at least 5 watts output in order to keep harmonic distortion down to a reasonable level and preferably have triode output or beam tubes with inverse feedback. Frequency response should be reasonably flat within the audible range. Hum level should be low enough so that hum is not discernible at the loud speaker with the volume adjusted to recording level. The amplifier should be stable at full volume and "microphonic" tubes avoided. If the amplifier and recorder unit are to b installed in the same cabinet, all conditions of mechanic resonance and feed back must be avoided to preclude th possibility of recorded "rumble". The cabinet should b substantially built of comparatively heavy materials. cabinet resonance is encountered, wooden braces glued t the inside surfaces of the cabinet will sometimes serve t correct this condition.

RECORDING FROM RADIO

(43) For radio recording, it is desirable to leave the speaker connected for monitoring purposes. In Fig. A the circuit components are arranged for reducing the speaker volume during recording as shown in the table.

(44) Referring to Fig C and D. an "L" pad is shown in th voice coil circuit for reducing speaker volume during recor ing. When the radio is being used without recording th "L" pad should of course be disconnected.

RECORDING FROM MICROPHONE

(45) When recording from microphone the speaker must be disconnected to prevent feed back and a resistor of the same value as the speaker voice coil impedance substituted for the voice coil, in order that the proper load impedance be re flected back to the output tubes.

PLAYBACK PICKUP

(46) The crystal pickup leads may be connected directly to the phonograph input terminals provided on most amplifiers and radio receivers, or may be connected between "grid" and "ground" of the radio receiver's second detector tube if no other connection is provided.

The volume control is usually in this circuit and the pickup lead can be connected to the two outside connections of potentiometer type volume controls. One of these connections is grounded, or at very low potential. The shiel or outer conductor of the pickup wire should be connecte to this terminal. The inner wire of the pickup lead shoul be connected to the opposite volume control connection. desired, a single pole double throw switch can be used a this point to switch from radio to phonograph. If thes connections are reversed, an A. C. hum will be heard in th loud speaker when the switch is in record playing positio

MICROPHONE

(47) For making microphone recordings through the audio amplifier of a radio receiver, quite satisfactory results will usually be forthcoming by use of a diaphram type crystal microphone of reputable manufacture, connected to the phonograph input terminals of the radio receiver. Correct polarity of connections to the microphone cable should be observed, the same as for connecting the pickup cable. The shield of the cable should connect to "ground." This arrangement will usually afford sufficent volume for micro phone recording, although the microphone cannot be ex pected to produce the same loud speaker volume as is ob tained in playing records with the pickup connected to th amplifier. The phonograph pickup delivers approximatel from .5 to 2 volts to the input of the amplifier, while th microphone is capable of furnishing only approximatel 1/100th of this voltage or from .01 to .02 volts.

PRE-AMPLIFIER FOR MICROPHONE

(48) If it is within the scope of the constructor's knowledge and ability, the assembly and installation of a microphone pre-amplifier will prove to be a material aid in microphone recording service. The purpose of the pre-amplifier is to amplify the impulses generated by the microphone, before being fed into the audio frequency amplifier, so that the am plifier will produce about the same amount of volume to th recording head, or cutter, whether recordings are mad from microphone or from radio reception.

RECORDING STYLI

(49) This mechanism is designed to utilize short shank styli or cutting needles. Short shank styli have an overall length ranging from $\frac{7}{16}$" to ⅝" whereas long shank styli are approximately ⅛" longer. Any attempt to use long shank styli will result in failure as it will be found impossible to correctly adjust the stylus angle (see "Stylus Angle Adjustment"). It is also essential that the cutting face of the styli be parallel to the axis of the shank. Styli having a hooked cutting face are offered for sale but as in the case of the long shank type, these cannot be used in this mechanism.

(50) Short shank, straight face cutting styli are sold at widely varying prices depending on the material and care used in their manufacture. The most inexpensive type is made from hardened steel and the cutting point is ground to a sharp "V". In contrast the higher priced styli are tipped with special metal cutting edges such as stellite or precious stones such as sapphire and the cutting points on these are ground with a slight radius. The useful life of styli ranges from 30 minutes in the case of steel styli to as much as 10 hours in the case of natural sapphire styli, bu it must be remembered that the abrasive character of th recording blanks used will finally determine the actual lif of any given stylus. Care must also be exercised to preven the sharp cutting edges from coming in contact with har surfaces, such as the turntable, which would render th stylus unfit for further use.

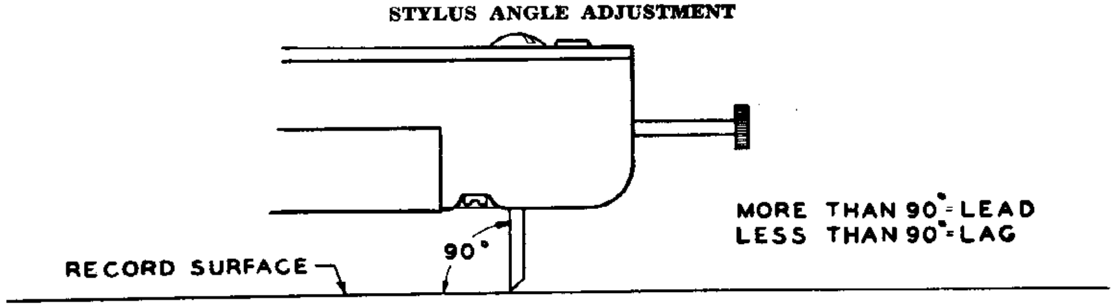
(51) Almost all recording styli, now on the market, have a flat cut on the shank. This flat is of great assistance in properly locating a stylus in the cutting head as the stylu screw bears against this flat and holds the stylus in prope position. When styli are used which do not have the locatin flat, it is usually difficult to properly position them in th cutting head. Even where styli have the locating flat cu on the shank, they do not always position themselves in th stylus chuck so that the thread cut from the record disc wil throw toward the record center. In case the thread tend to throw to the outside, loosen the stylus clamping screw slightly and reseat the stylus in the stylus chuck.

CUTTING HEAD ADJUSTMENTS

(52) Due to the wide range of physical properties found in various recording blanks and the varying cutting qualities of different styli, it is necessary to adjust the cutting head on this unit for the particular type of recording blank and stylus to be used if best results are to be realized. To compensate for these differences in recording materials, two adjustments must be made. First, the proper angle must be maintained between the cutting face of the stylus and the face of the record disc. Second, downward pressure of the stylus against the record must be correct. (See "Stylus Angle Adjustment" and "Depth of Cut Adjustment.")

(53) Owing to the fact that the shanks of cutting styli are of hardened steel, there is a tendency for styli to become loose in the stylus chuck during the recording process. To combat this tendency, the stylus clamping screw should be tightened with the fingers at the completion of each recording. Never tighten the stylus clamping screw with pliers, however, as breakage of the clamping screw is almost certain to occur.

STYLUS ANGLE ADJUSTMENT



(54) The angle between the cutting face of the stylus and the face of the recording blank is said to "lead" when the angle is greater than 90° and is said to "lag" when the angle is less than 90°. Approaching the vertical, a point will be found where the cut becomes cleaner and quieter, however, a point is always reached where the stylus tends to dive into the record face and when this happens, chatter and squealing occur. For this reason the useful limits of adjustment are from the vertical to 5° lagging. Because of the sharp "V" point found on hardened steel styli, this type usually operates best at about 5° lagging angle. Sapphire styli on the other hand can usually be adjusted between the vertical and 5° lagging angle. Stellite and other alloy styli will be found to fall somewhere between steel and sapphire and usually can be operated almost vertically. It should be noted that when a stylus becomes dull from normal wear, surface noise increases and eventually chattering or squealing occur. Chattering or squealing can also be caused by a recording blank which does not cut freely because it has become dried out or else did not have good cutting qualities initially. All of these factors must be considered when adjusting the stylus angle.

(55) The stylus angle is controlled by the length of the stylus and the distance from the top of the recording blank to the recording arm (58). As the stylus should always be inserted in the stylus chuck as far as it will go, it follows that to change the stylus angle the recording arm should be raised or lowered. Raising the recording arm decreases the lag and lowering the recording arm increases the lag. To change the height of the recording arm (58) above the record blank, first raise the recording arm to the vertical position and then adjust stop screw (61) until stylus angle is correct.

(56) To determine the angle between the cutting face of the stylus and the top of the record blank at any time, two methods of inspection are used. (a) With the turntable stationary and the stylus resting on the record blank, a sight taken across the cutting face of the stylus and one side of the spindle in the center of the turntable will show any departure from the vertical and how much. (b) Looking across the cutting face of the stylus, both the stylus and its reflection in the face of the record blank can be seen at one time. When the stylus is vertical with respect to the record blank, the plane of the cutting face of the stylus and its reflection will of course be in a straight line. When the mechanism is mounted down in a well in a cabinet it is not always possible to make these inspections directly and in this case a mirror must be employed.

(57) The most important thing to remember in making this adjustment is that the best stylus angle is that angle which gives the quietest cut and plays back with the least surface noise.

(58) Caution: Because of the wide variation in the thickness of record blanks (.020" to .100"), the variation in the length of styli ($\frac{3}{16}$" to $\frac{5}{8}$") and the possibility of warped or bent recording blanks, be sure that the stylus clamping screw (62) does not strike the bottom of the slot in the end of the recording arm as the stylus follows the surface of the record blank. Also, be sure that the cork bumper (63) on top of the cutting head is not striking in the top of the recording arm. If it is suspected that the cork bumper is striking, this can be easily checked by gently applying upward pressure on the stylus clamping screw (62). It will raise easily if the cork bumper is not striking but do not lift this screw roughly as it might become bent.

(59) Caution: Every care should be exercised to prevent the cork bumper from striking in the top of the recording arm during recording as this would drive the cutting stylus through the coating on the recording blank and ruin the cutting edges of the stylus. The stylus may also be damaged if it is lowered roughly on to the face of the recording blank. Never allow the stylus to rest on a stationary recording blank if energy is being fed to the cutting head, as the stylus will dig through the record coating and damage its cutting edges.

DEPTH OF CUT ADJUSTMENT

(60) The depth of cut is regulated by screw (64) located on top of the recording arm (58). Turning screw (64) clockwise increases the depth of cut. To check the depth of cut, make a trial cut of a few quiet grooves on a record blank of the same type on which recordings are to be made. This is important because of the varying hardness and cutting qualities of different blanks. For an accurate inspection of the grooves, a magnifying glass or low powered microscope should be used to compare the width of the grooves with the land or uncut space between grooves. If a magnifying glass is not available, the examination can be made with the unaided eye provided the light strikes the record at the correct angle. When a magnifying glass is not used, however, the grooves appear to be wider than they actually are and this should be borne in mind. For home recording practice, a groove exactly the same width as the land, is recommended. Too narrow a groove will cause difficulty with the playback needle climbing out of the groove, while at the other extreme a very wide groove will cut across into the adjacent grooves during recording. Too wide a groove may also produce sudden variations in the turntable speed.

(61) Hardened steel styli with a sharp "V" point cut deeper for a given pressure than the higher priced styli which have a very slight radius on the point. As styli become dulled with use more pressure is required to maintain the same depth of cut. Changing the cutting angle (angle between the cutting face of stylus and face of record) will have some effect on the depth of cut and for this reason the stylus angle adjustment should always be made before the depth of cut adjustment, where both adjustments are necessary.

IMPORTANCE OF RECORDING AT THE CORRECT VOLUME LEVEL

(62) If recordings are made at too low a volume level, it will be necessary to increase the gain during playback to where surface noises will be very objectionable. If on the other hand the volume level is too high, the wall of record material between grooves may be cut through, rendering the record useless. Where only a very thin wall is left between grooves, "echo" or "ghost" may be noticeable. "Echo" is the faint reproduction of recorded sound as the playback needle travels in the adjacent groove following the groove in which the sound originally was recorded, while "ghost" is heard in a groove preceding an adjacent groove where the sound actually was recorded.

MAKING A TRIAL RECORDING

(63) After it has been determined that all of the adjustments are in correct order, and the machine is cutting correctly, a trial cut should be made to determine the correct level of volume for recording.

(64) During recording, the tone control should be set to its treble or high pitch position to avoid the possibility of losing high frequencies in the recording.

(65) In making microphone recordings, place the microphone at a distance of about 10 to 18 inches for the speaking voice, and at correspondingly greater distances for recording vocal or instrumental musical renditions. When recording speech, the microphone should not be spoken into at close range, as lip sounds and sounds of breathing will be recorded, and because of shock to the microphone diaphram due to sudden bursts of sound impulses entering the microphone, the voice is caused to be recorded unnaturally.

ADJUSTMENT OF RECORDING ARM MOUNTING

(66) The recording arm assembly is automatically positioned for height at the pivot or back end by the "U" shaped link (65) and the follower arm post (56). If the recording arm assembly does not always come to the same height when the recording arm is lowered to the horizontal position, check spring (66) and also make sure the follower arm post (56) is not binding in the pivot post bushing (57). If link (65) is loose when the recording arm is lowered to the horizontal position, this is an indication that something is wrong. If the follower arm post (56) is binding in the pivot post bushing (57), trouble may also be experienced when trying to raise the recording arm from the horizontal position. To stop any binding between the follower arm post (56) and the pivot post bushing (57) apply grease as outlined in the section on lubrication.

(67) Two hex-head set screws (67) secure the recording arm assembly to follower arm post (56). If the hex-head screws (67) become loosened or the relationship between the recording arm platform (68) and the follower arm (69) become altered in any manner, make sure that both of the following conditions are complied with. (a) The end of the follower arm post (56) should extend through the recording arm platform (68) approximately 1/32". Note that this dimension is taken from the top surface of the platform (68) and not from the staked end of the bushing attached to the platform. (b) With the follower arm (69) swung in to where it is in contact with the stop (70), the recording stylus should be cutting a circle approximately 3 inches in diameter. If the spring blade on the end of the follower arm strikes the casting carrying the feed screw before the follower arm strikes stop (70) or the knife edge (71) can no longer engage the feed screw threads, loosen screw (72) and reset stop (70). When resetting stop (70) make sure that knife edge (71) will still engage with the threads of the feed screw (60) when recording at the outside of a 10 inch diameter record blank.

(68) Caution: Any time that the recording arm mounting is adjusted, it is always necessary to readjust the tension screw (73) (See "Proper Engagement of Feed Screw").

(69) If after hex-head set screws (67) are properly tightened there is any lost motion between the recording arm and the follower arm (69), check the adjustment of the pivot screw (74). When pivot screw (74) is properly adjusted there should be no lost motion between the recording arm (58) and the recording arm platform (68).

PROPER ENGAGEMENT OF FEED SCREW

(70) Engagement between the knife edge (71) and the feed screw (60) usually starts to take place when the nose of the recording arm is around 2 inches above the turntable. When the recording arm (58) is raised to a greater height than this, unhampered horizontal motion of the recording arm is possible between the normal limits of its travel. To permit disengagement of the recording arm from the feed screw at a minimum height above the turntable, stop screw (73) has been provided. Adjustment of screw (73) should be made with the recording arm in the lowered position and with the feed screw engaged. Adjust screw (73) so that it barely touches spring blade (75) when the knife edge (71) is engaged at any point in the length of feed screw (60).

(71) Normally the full pressure of knife edge (71) against feed screw (60) is desirable. If this pressure is sufficient to cause uneven turntable speed, however, the pressure of knife edge (71) against feed screw (60) can be reduced by turning screw (73) in a clockwise direction. Great care should be used however in reducing the blade pressure as uneven groove spacing may result.

UNEVEN SPACING OF RECORD GROOVES

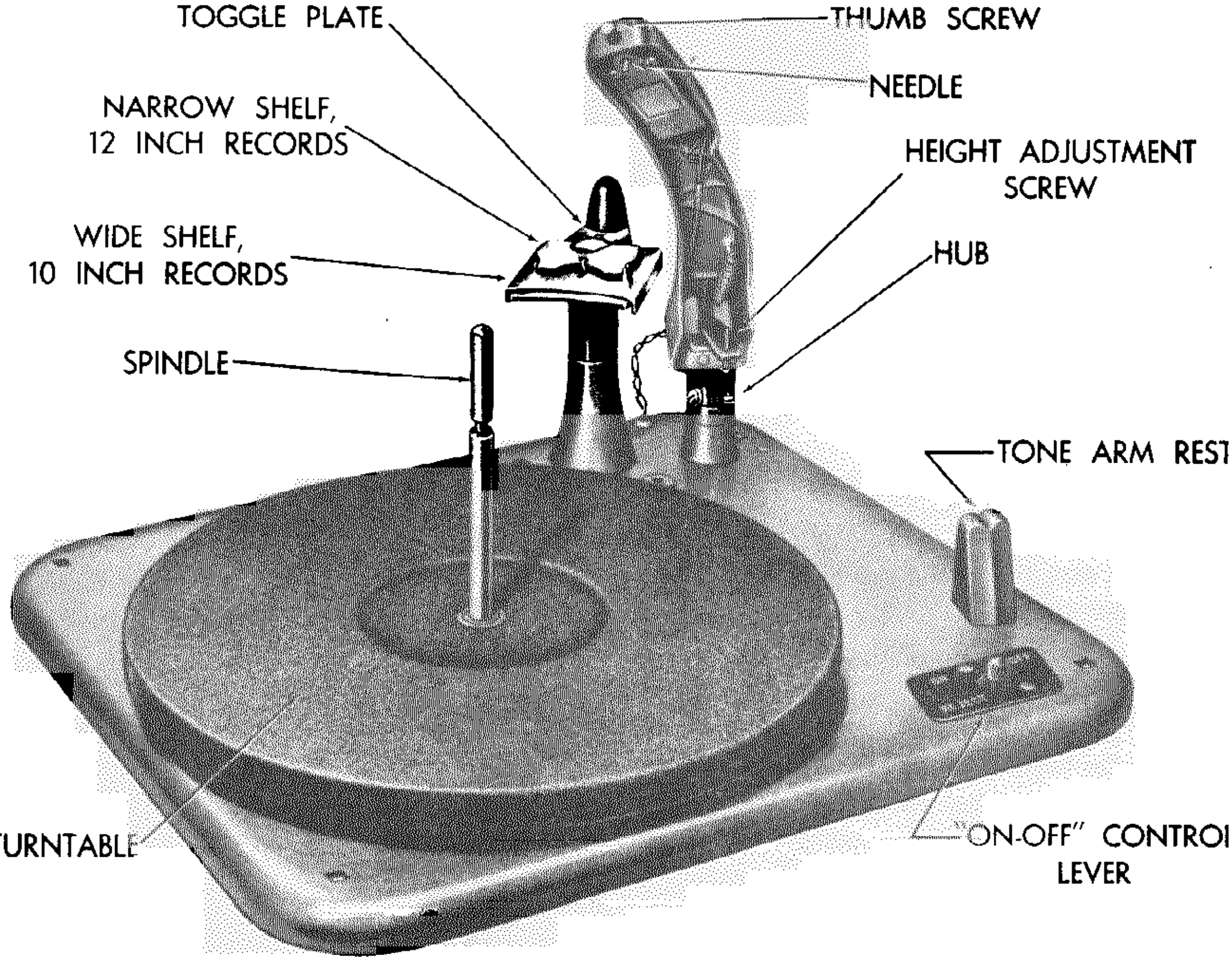
(72) If screw (73) is turned too far, in a clockwise direction, it will reduce the pressure of the knife blade (71) against feed screw (60), to where the knife blade (71) will climb the sides of the threads in the feed screw and cause uneven spacing of the recorded grooves in the record disc. Always be sure that the threads of feed screw (60) are free of dirt or other foreign matter, as these particles may cause uneven spacing of recorded grooves. Excessive end play in the feed screw will also cause uneven groove spacing.

(73) Thrust screw (76) is provided to keep the end play out of feed screw (60). Care must be used in adjusting screw (76) to prevent binding feed screw (60) between the end thrusts as this would put an excessive load on the motor and cause speed variations in the turntable.

(74) Lost motion or play between the follower arm (69) and recording arm (58) in the horizontal direction will prevent the recording arm from accurately following the follower arm, and this play should be eliminated (See "Adjustment of Recording Arm Mounting" paragraphs 67 and 69)

HOW TO REPLACE CUTTER HEAD

1. Remove the stylus screw (62).
2. With the arm (58) in the vertical position, press the balance spring against the top of the arm which will throw the cutter head out where it can be firmly grasped.
3. Pull the cutter head upwards until the knife edge at the back of the cutter clears its seat in the arm.
4. Unhook the balance spring from the cutter head.
5. It will now be noticed that a cork bumper (63) is glued to the top of the cutter head. This bumper is put there to prevent the stylus screw from being bent if the recorder arm is roughly handled. Remove this cork from the old head and glue it to the new head in precisely the same location as before.
6. Hook the balance spring to the new cutter head and extend the spring sufficiently so that the cutter head knife can be placed in its seat in the arm.
7. Replace stylus screw with shaving collector between cutter head and cutter arm with bottom of collector to left of center.
8. Thread the cutter leads through the arm, the arm platform, the base plate and the leads clamp on the underside of the base plate and arrange them exactly as before.



THE CHANGE CYCLE

An understanding of the methods used to accomplish the necessary mechanical motions will aid greatly in the diagnosis of any disorders of the mechanism. A careful study of the following outline should prove extremely valuable.

The mechanical functions of the change cycle, raising, moving and lowering the tone arm and the ejection of records are controlled by a ca This cam is driven during the change cycle by ratchet on the cam which engages one of t bosses on the revolving drive wheel. This whe is driven from the turntable bearing by means a spring belt. The turntable is rim driven fro the motor.

THE CHANGE CYCLE

The change cycle sequence is as follows:

1. As the needle in the tone arm nears the end of a record, a lever with a serrated end moves with the tone arm and engages a trip dog pivoted on a release bracket.

2. The eccentric groove in the record causes the tone arm to oscillate. The backward motion of the tone arm and serrated lever causes the trip dog to push against its pivot point, thus moving the release bracket away from the cam.

3. This allows the drive ratchet on the cam (which has been held by the release bracket) to drop down onto the drive wheel and engage one of the bosses; the cam then rotates with the drive wheel.

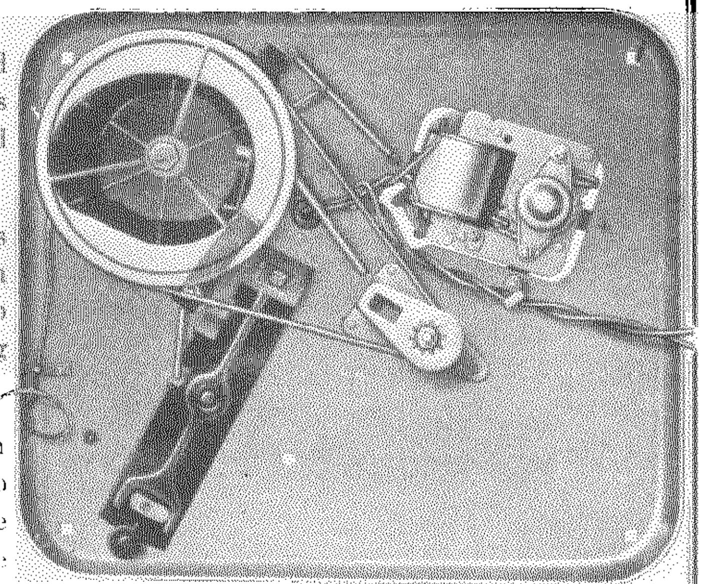
4. The function of the cam is threefold. It causes the:

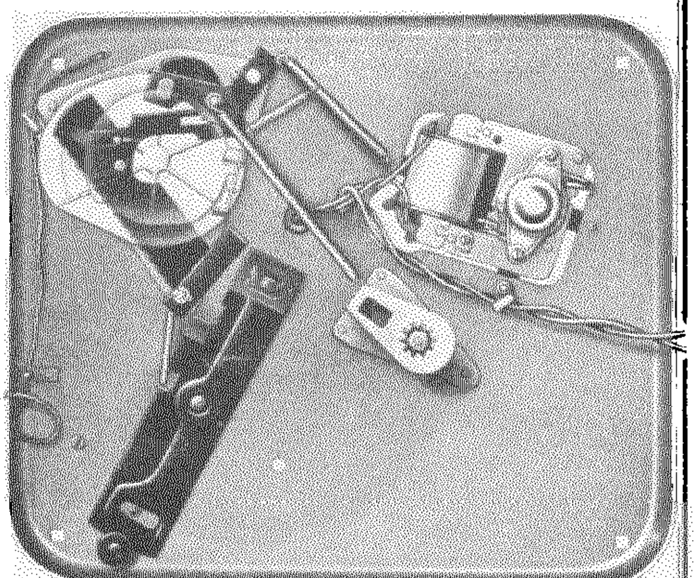
(a) Tone arm to be raised and lowered at the proper times.

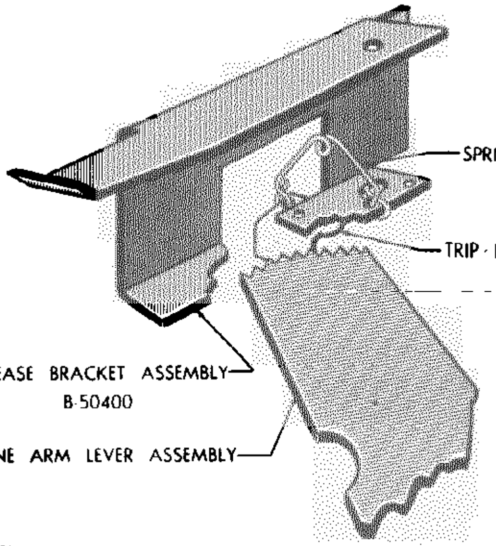
(b) Horizontal motion of the tone arm.

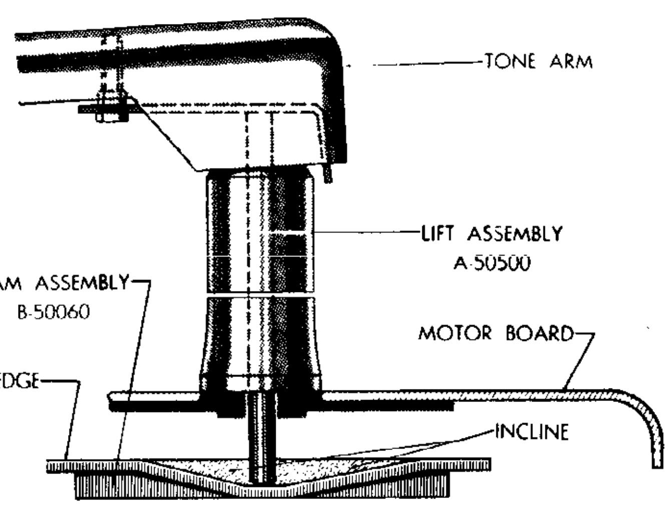
(c) Ejector plate to be moved.

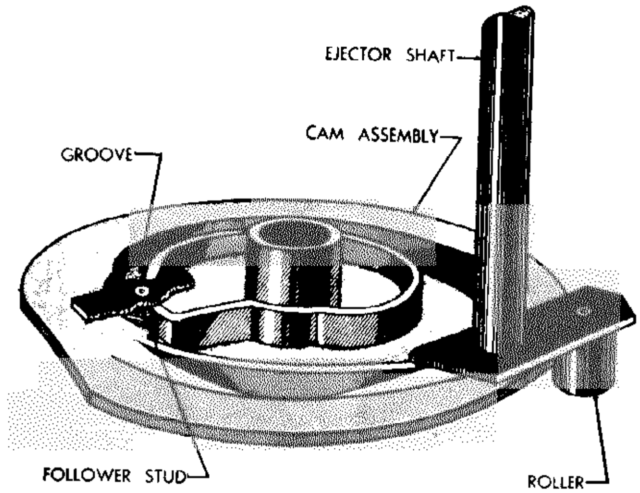
As the cam turns, the tone arm lift shaft rides up an incline to a ledge on the periphery of the cam and thus raises the tone arm off the record. During most of the remainder of the cycle, the lift shaft rides this ledge, keeping the tone arm elevated.

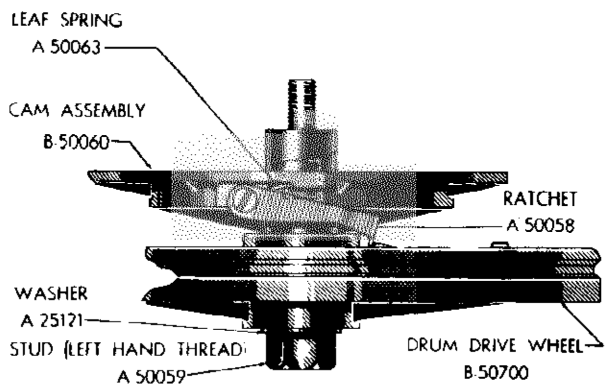


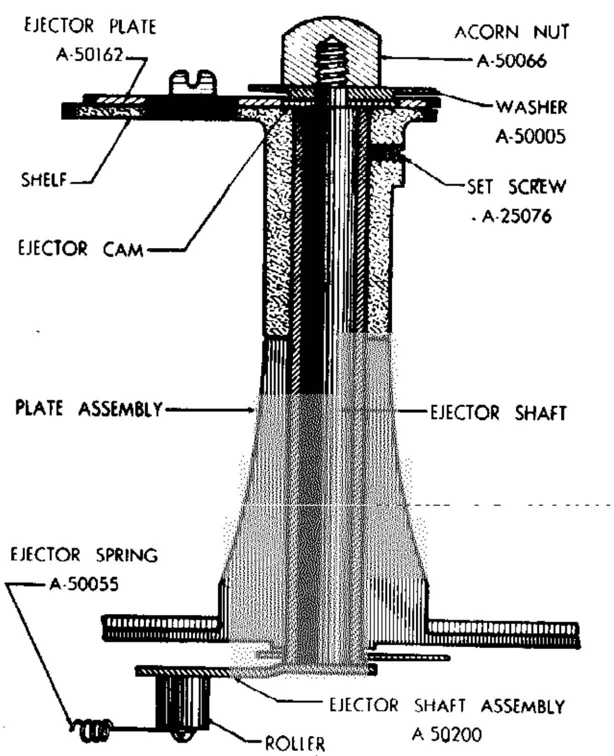












The change cycle sequence (Cont'd)

5. The follower stud on the adjustment leve assembly is pulled into a groove on the cam. A the cam rotates, this stud follows the groove an causes the tone arm to swing out beyond the edg of the record.

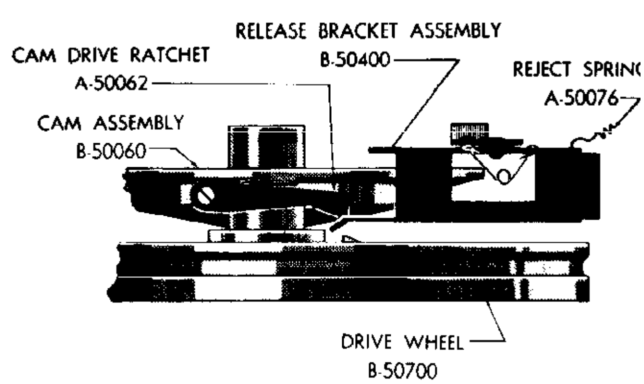
6. The shape of the cam is elliptical at on portion of the outer periphery. A roller attache to an ejector lever and shaft follows the outsid periphery of the cam. As the cam rotates, th elliptical portion pushes against the roller causin the lever to move, thereby turning the ejecto shaft.

7. This shaft extends up through the plate as sembly to the record support shelf. A small ejecto cam turned by this shaft moves the ejector plate pushing a record off of the shelf.

8. The tone arm follower stud still riding i the groove on the cam causes the tone arm to re turn to a position over the outside edge of th record.

9. The tone arm lift shaft now rides down a incline from the ledge to a flat on the main cam thus lowering the tone arm to the record.

10. At this point, the drive ratchet on the car is lifted off the boss on the drive wheel by th release bracket. The cam ceases rotating and th change cycle is completed. The tone arm is nov in position for reproduction of the record.



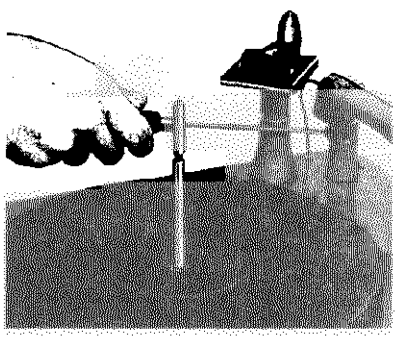
INTERNATIONAL DETROLA CORP.

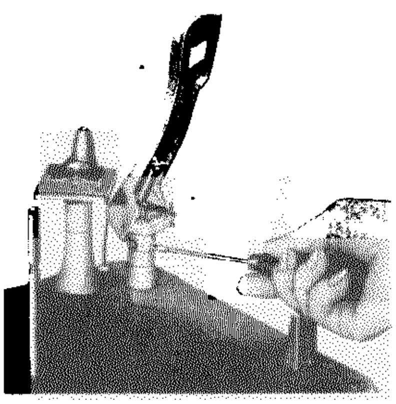
ADJUSTMENTS

A—PICKUP POSITION

A simple adjustment to the changer may be made if the tone arm frequently falls off the edge of a standard record or starts playing a standard record too far in on the music grooves. Adjust as follows:

1. Make certain that the needle is straight in the tone arm and that the thumb screw is tight.





2. Put three to five records on the turntable.

3. Loosen the lock screw on the hub sleeve.

4. With a screwdriver turn the adjustment stud to the right or to the left until the needle in the tone arm is directly above the starting groove of the record on the turntable.

5. Carefully tighten the lock screw.

The following instructions are for use only when the tone arm and hub are being reassembled to the changer. This adjustment is for correct positioning of the tone arm needle in the first groove of a record. The needle should set down at approximately 4¾ inches from the center of the spindle on 10-inch records. (Adjustment for 12-inch records is automatic when the 10-inch adjustment is made.)

A—PICKUP POSITION (Cont'd)

6. Push upwards on the tone arm lever (near the bearing) from beneath the motor board and hold it against the plate.

7. On the top, insert a .005 shim between the tone arm hub and the boss on which it rests to obtain the necessary clearance. If there is less than .005 clearance, it will cause the tone arm to be stiff.

8. Place the tone arm in its correct position above the record. (Be sure to continue holding the lever firmly against the plate.) Tighten one set screw on the hub.

9. Run the changer through a few cycles, using several records to check the adjustment. Make a minor correction if necessary.

10. Tighten the other set screw on the hub and remove the shim.

B—RECORD SHELF POSITION

This shelf must be adjusted for the correct distance from the spindle as well as for correct alignment with the spindle.

I. To Adjust the Distance

(a) Remove the turntable by lifting upward. Loosen slightly the three Phillips head screws that hold the spindle assembly to the motor board. Remove the drive-spring belt from the turntable bearing and the drum drive wheel.

(b) With the record shelf in the 10-inch position (wide ledge toward spindle), carefully place a standard 10-inch record so that it rests on the shelf and on the ledge of the spindle.

ADJUSTMENTS

A—PICKUP POSITION (Cont'd)

6. Push upwards on the tone arm lever (near the bearing) from beneath the motor board and hold it against the plate.

7. On the top, insert a .005 shim between the tone arm hub and the boss on which it rests to obtain the necessary clearance. If there is less than .005 clearance, it will cause the tone arm to be stiff.

8. Place the tone arm in its correct position above the record. (Be sure to continue holding the lever firmly against the plate.) Tighten one set screw on the hub.

9. Run the changer through a few cycles, using several records to check the adjustment. Make a minor correction if necessary.

10. Tighten the other set screw on the hub and remove the shim.

B—RECORD SHELF POSITION

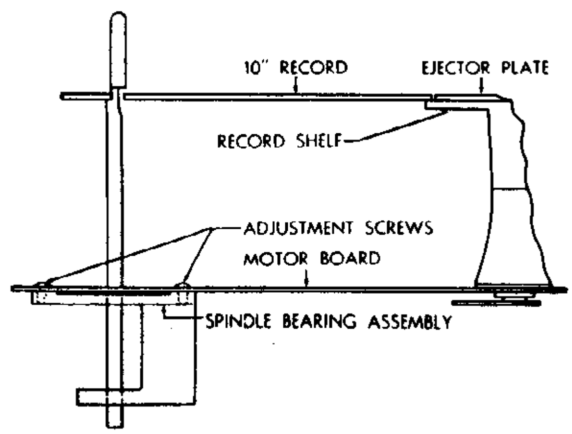
This shelf must be adjusted for the correct distance from the spindle as well as for correct alignment with the spindle.

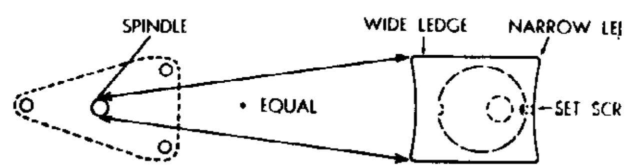
1. To Adjust the Distance

(a) Remove the turntable by lifting upward. Loosen slightly the three Phillips head screws that hold the spindle assembly to the motor board. Remove the drive-spring belt from the turntable bearing and the drum drive wheel.

(b) With the record shelf in the 10-inch position (wide ledge toward spindle), carefully place a standard 10-inch record so that it rests on the shelf and on the ledge of the spindle.

(c) Adjust the distance by sliding the spin assembly toward or away from the shelf. T position should be such that the record will r fall off of either the spindle or the shelf, nor ja when the ejector plate pushes it, and when eject will fall clear of both shelf and spindle ledge. (S the Standards for record sizes listed under GE ERAL INFORMATION on page 6.)





(d) Carefully tighten the screws and check t adjustment again, using several standard recor Replace the turntable, being careful to push t idler wheel of the motor under the edge of t turntable. Replace the belt.

ADJUSTMENTS

B—RECORD SHELF POSITION (Cont'd)

II. To Adjust Alignment

(a) Loosen the set screw beneath the 12-inch shelf (narrow ledge). Have the 10-inch shelf toward the spindle.

(b) Place a standard 10-inch record over the spindle, allowing it to rest on the spindle ledge and record shelf.

NOTE: Be sure the record shelf is in the correct position in relation to the adjustment cam which is under the motor board. When the 10-inch ledge is toward the spindle, the wider section of the adjustment cam should also be toward the spindle.

(c) Rotate the shelf slightly in either direction to line up the record edge and the shelf. Tighten the set screw.

C—HEIGHT OF TONE ARM

If the needle in the tone arm does not come down far enough to contact the first record on the turntable or if the tone arm does not rise high enough to clear the top of a complete stack of records on the turntable, adjust as follows:

1. Raise the tone arm and loosen the lock nut.

(NOTE: Some models do not have this lock nut, therefore adjust only as directed in paragraph 2 below.)

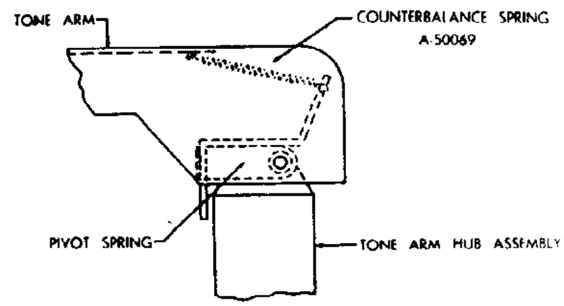
2. Turn the height adjustment screw in either direction until the desired adjustment is obtained.

3. Tighten the lock nut again when the tone arm height has been adjusted.

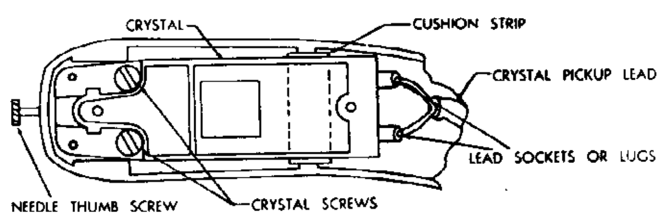
D—THE TONE ARM

The weight of the tone arm at the needle point should be $1\frac{1}{4}$ ounces. The counterbalance spring, which is fastened to the tone arm and to the hub, should be adjusted to the tension required to obtain this weight.

The tone arm may be removed from the changer to facilitate changing the crystal cartridge. Simply squeeze the pivot spring and lift off the tone arm. The counterbalance spring may be unhooked from the hub if the tone arm is to be completely



removed. To change the crystal, remove the needle thumb screw and the two screws which hold the crystal to the tone arm. Slip the lead sockets off the plugs on the crystal or unsolder the leads if there are lugs on the crystal. (*Caution:* Crystals become damaged by excessive heat.) Re-



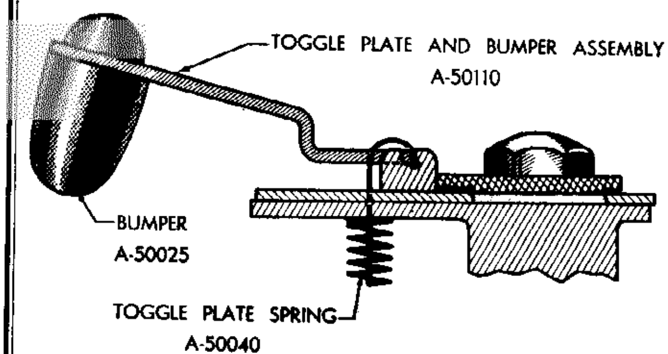
move the crystal and replace with a new one in the same manner. Be sure the rubber or plastic cushion strip is placed under the crystal.

The lead, which emerges from the tone arm at the back, should have some slack at all times or it will bind the tone arm and prevent its free movement across the record.

ADJUSTMENTS

E—TOGGLE PLATE

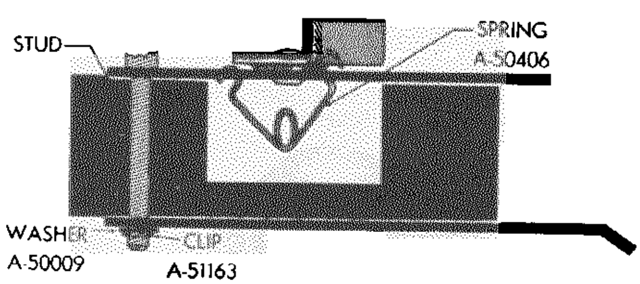
The toggle plate is held to the ejector shelf by a spring; this spring also exerts tension on the toggle plate to keep the records in place on the shelf. If too much tension is exerted, the spring should be distorted slightly.



Put the toggle assembly on the ejector shelf, locating the tabs on the plate in the bosses on the shelf. Push the end of the spring through the slot in the shelf, with the open end of the spring toward the nut. (The spring will have to compress.) Fasten the end of the spring in the small center hole on the plate. The large side of the bumper is to be placed over the 10-inch records.

The rubber bumper should be assembled to the plate with the large side of the bumper on the side of the plate marked with an "X" or an "O."

F—RELEASE BRACKET ASSEMBLY



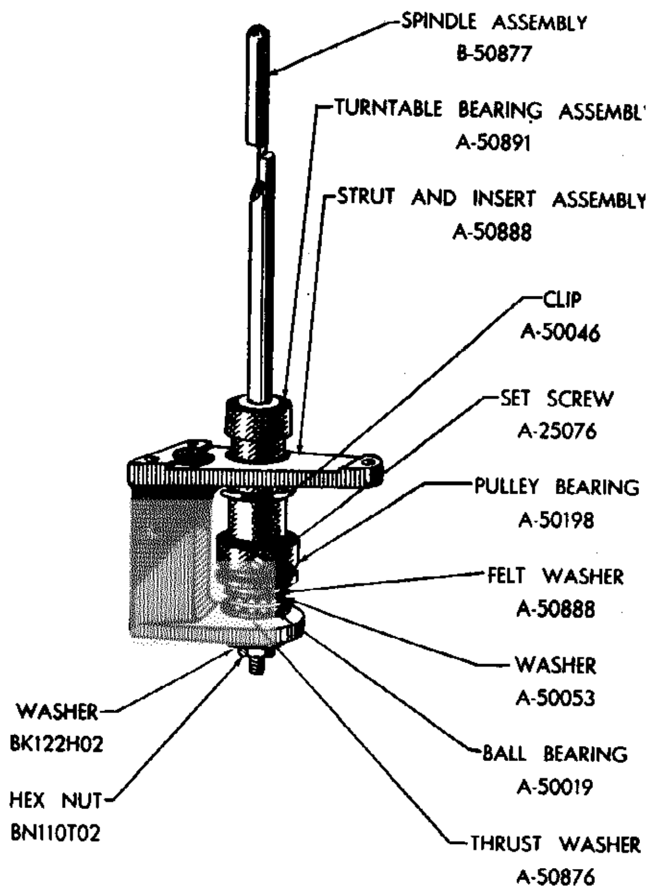
This bracket, with the dog and grasshopper spring assembled to it, is one of the critical items in the unit. It should pivot freely on the stud to which it is assembled. It may be easily removed by slipping the hairpin clip and washer off the stud and carefully turning the bracket so it will clear the main cam and drum drive wheel.

The dog should pivot very freely. If it does no clean and relubricate with fine oil. If it is sti sluggish, replace the entire assembly.

G—SPINDLE AND BEARING ASSEMBLY

To replace the spindle assembly, bearings o washers, proceed as follows:

1. Loosen set screw in pulley bearing.
2. Remove lock clip on turntable bearing.
3. Remove nut on bottom of spindle.
4. Replace defective part and reassemble. (Se illustration below for correct sequence of parts.



5. Tighten nut securely but do not use force. Make sure that the spindle is centered so that the turntable bearing will slide freely into the strut. To accomplish this in the event the spindle is not aligned correctly, raise the turntable bearing above the strut and exert a slight pressure against the spindle to align it.

6. When aligned, fasten pulley to turntable bearing and replace lock clip.

ADJUSTMENTS

H–MOTOR

The speed of the turntable should be within the limits of 76 to 81 R.P.M.

If the changer runs slow, and after careful examination there is no evidence of binding of any mechanical parts, the motor should be checked. (Low line voltage should also be considered.)

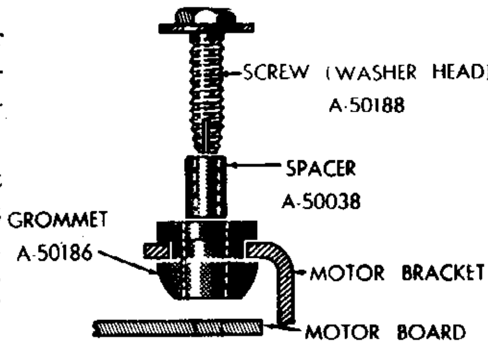
It is better to order a new motor if it should prove defective. Rewinding of coils is never satisfactory.

switch and line cord, be sure to fasten the index spring over one of the mounting screws. Attach the other end of the spring to the index lever.

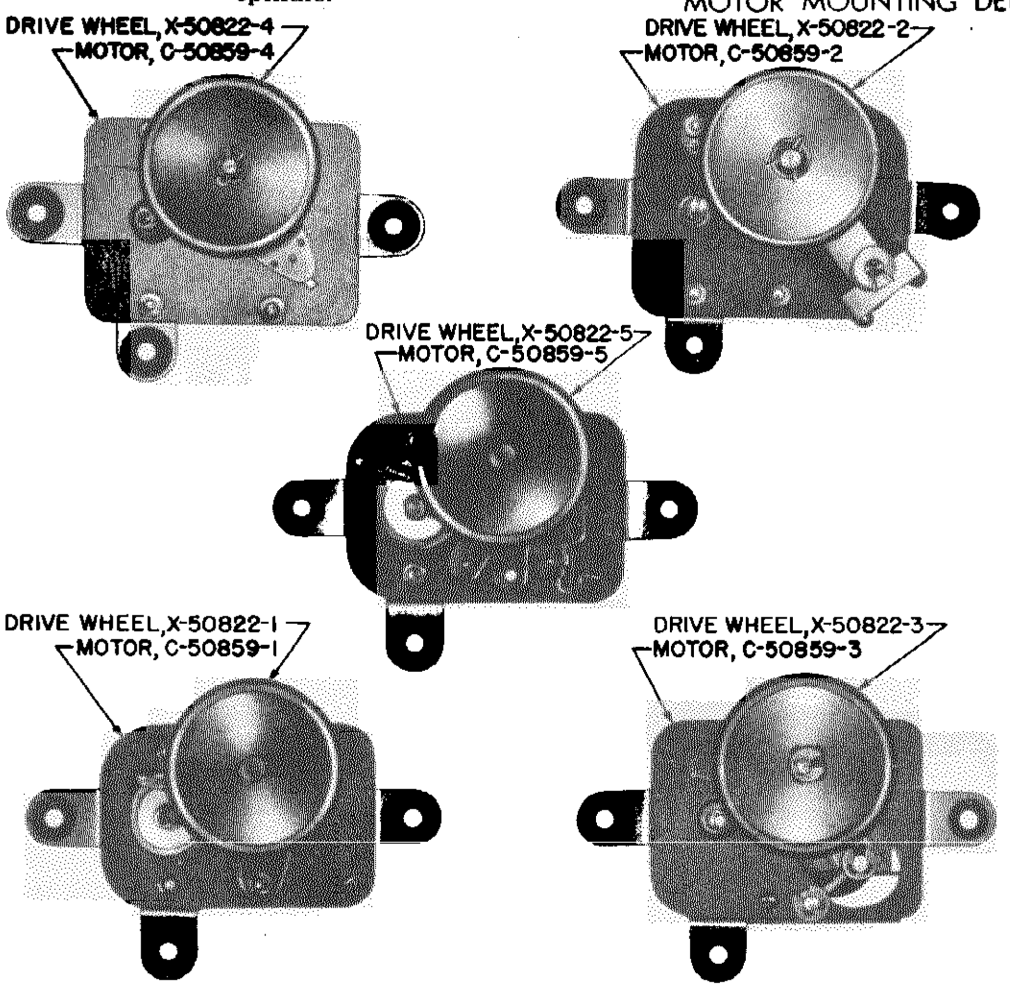
Check drive wheel for oil or flat spot on the rubber drive surface. Replace drive wheel if defective.

Caution: Check for the correct relationship of the adjustment cam and record shelf when fastening the spring. In the 10-inch position, the larger side of this cam should be toward the spindle.

After a new motor has been assembled to the motor board with its screws, washers, spacers and grommets, and wired to the



MOTOR MOUNTING DETAIL



When ordering replacement drive wheels, kindly use correct part number of drive wheel corresponding to the type of motor in your changer. The five types of motors used to date are illustrated above. They are for use on 105 to 125 volts, 60 cycle A. C. only.

ADJUSTMENTS

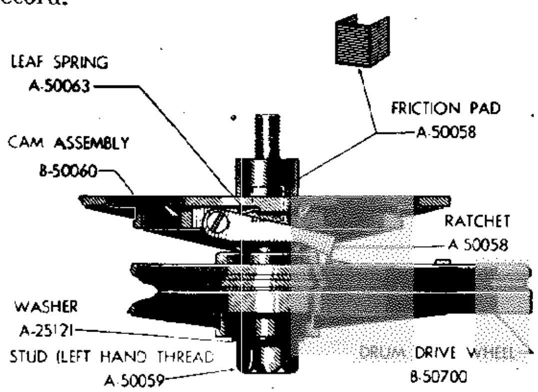
MANUAL CONTROL

J—CAM AND DRIVE WHEEL ASSEMBLY

This assembly consists of a stud (NOTE: THIS STUD HAS A LEFT HAND THREAD) which screws into the main motor board assembly, a washer, a drive wheel, a main cam and a friction pad. The pad is necessary to provide some drag on the cam for smooth action. It must be assembled carefully to prevent deforming. The center holes of the drive wheel and cam are countersunk for easier assembly of the friction pad.

The drive ratchet on the cam should pivot freely. A minimum of pressure should be exerted on this ratchet by the leaf spring.

Inside the groove on the main cam assembly, where the tone arm follower stud rides, is a small spring, fastened to the side of the groove. It causes the follower stud to ride the same side of the groove at each cycle, thus the tone arm will always set down at the same location on the record.



The changer will operate without this spring, but without it, the place at which the tone arm sets down on a record will vary about 1/8 inch. This will sometimes allow the tone arm to fall off

I—OPERATION

Record changers which have a manual control switch should be operated as follows:

1. Move the manual control lever to the "Manual" position.

2. Rotate the record shelf to the 12-inch position.

3. Flip the toggle plate toward the back.

4. Put the selected record over the spindle and down onto the turntable.

5. Move the "On-Off" control lever to the "On" position.

6. Place the tone arm by hand on the starting edge of any size record on the turntable.

When the machine is indexed for manual operation, it either must be turned off by hand after each record, or the tone arm placed on the rest between changes of records. The machine will not function as a changer, but only as a record player in this position.

II—SERVICE

Occasional failure of this switch is usually due to either too tight or too loose an engagement of the manual bracket with the ratchet on the main cam.

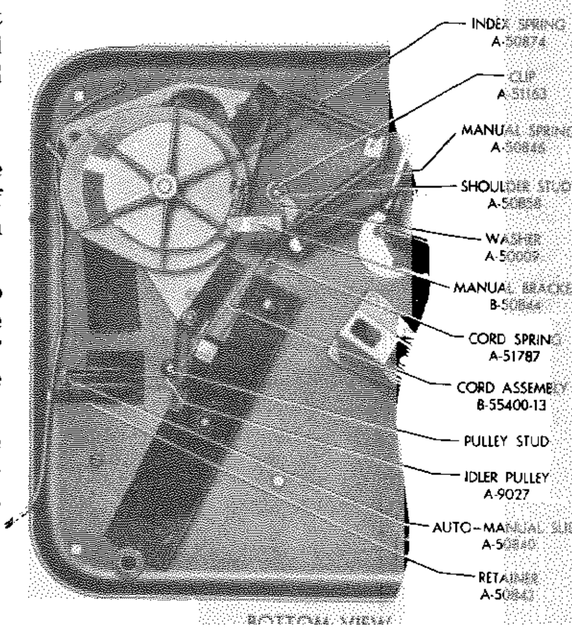
Too tight an engagement causes the bracket to remain in contact with the cam ratchet after the manual switch has been moved to the "Automatic" position. This prevents the operation of the change cycle.

Too loose a fit may cause a clicking noise due to the ratchet, held too low, being struck by the bosses on the drive wheel. At times the looseness of the engagement may be sufficient to allow the ratchet to drop completely, thus causing a jam between the ratchet and the manual bracket. This can usually be released by simply moving the

Very careful bending of the manual bracket, while it is still assembled to the changer, should correct these difficulties. (The cord which moves the bracket may be forced off its pulley by one of the above mentioned situations. This should be replaced before attempting any further correction.)

The tension spring which connects the dial cord to the manual bracket must be fastened in the hole in the bracket that is nearer the motorboard.

Should it be necessary to replace the cord, its length, loop end to loop end should be 5¼ inches, or of such length that when the switch is in the "Automatic" position, the end of the manual bracket clears the cam by approximately 1/8 inch.



SERVICE AND ADJUSTMENTS

1—TONE ARM, ACTION NOT FREE

May be caused by:

(a) Bent trip lever assembly A-50320. Straighten or replace.

(b) Tone arm lead too tight. Pull up to allow some slack.

(c) Lubrication on tone arm bearing gummy. Clean and relubricate with fine oil.

(d) Bent or binding adjustment lever assembly A-50310. Straighten or replace.

(e) Lack of spacing in tone arm hub assembly which must be at least .005. (See adjustment A, page 7.)

2—TONE ARM, FAILURE TO SET DOWN PROPERLY

May be caused by:

(a) Counterbalance spring A-50069 hitting tone arm lift assembly A-50500. Reposition spring. (See adjustment D, page 9.)

(b) Bent tone arm lift lever. Straighten carefully.

3—TONE ARM DROPS TOO FAR IN ON RECORD OR MISSES RECORD

May be caused by:

(a) (See adjustment A, page 7.)

4—CLICKING NOISES

May be caused by:

(a) Bent release bracket assembly B-50400 which rubs on the bosses of the drum drive wheel. Straighten or replace.

5—FAILURE TO TRIP

May be caused by:

(a) Defective release bracket assembly B-50400. This part may be binding or bent out of square. (See adjustment F, page 10.)

(b) Bent or loose ratchet on main cam assembly B-50060. Straighten or replace.

(c) Bent trip lever assembly which fails to engage dog on release bracket assembly B-50400. Straighten or replace.

6—CHANGER CYCLES CONTINUOUSLY (I.E., tone arm lifts immediately from record without playing)

May be caused by:

(a) Reject spring A-50076 from release bracket to the tab on ON-OFF lever missing or loose. Replace.

(b) Drive ratchet A-50062 on cam binding. Straighten and/or relubricate. Check leaf spring A-50063.

7—RECORD JAMS BETWEEN SHELF AND SPINDLE

May be caused by:

(a) Incorrect distance between record shelf and spindle or record shelf not aligned with spindle. (See adjustment B, page 8.)

8—RECORD FAILS TO DROP FROM SHELF

May be caused by:

(a) Toggle plate not flipped onto records. This must be done to provide tension on records. (Also see Item 9 below.)

9—UNIT STALLS WHEN EJECTING A RECORD

May be caused by:

(a) Weak spring drive belt B-50137. Replace.

(b) Low motor torque. Replace motor.

(c) (See adjustment H, page 11.)

10—TURNTABLE SPEED SLOW OR IRREGULAR

May be caused by:

(a) Frozen turntable bearing. Clean and relubricate or replace bearing. (See adjustment G, page 10.)

(b) (See adjustment H, page 11.)

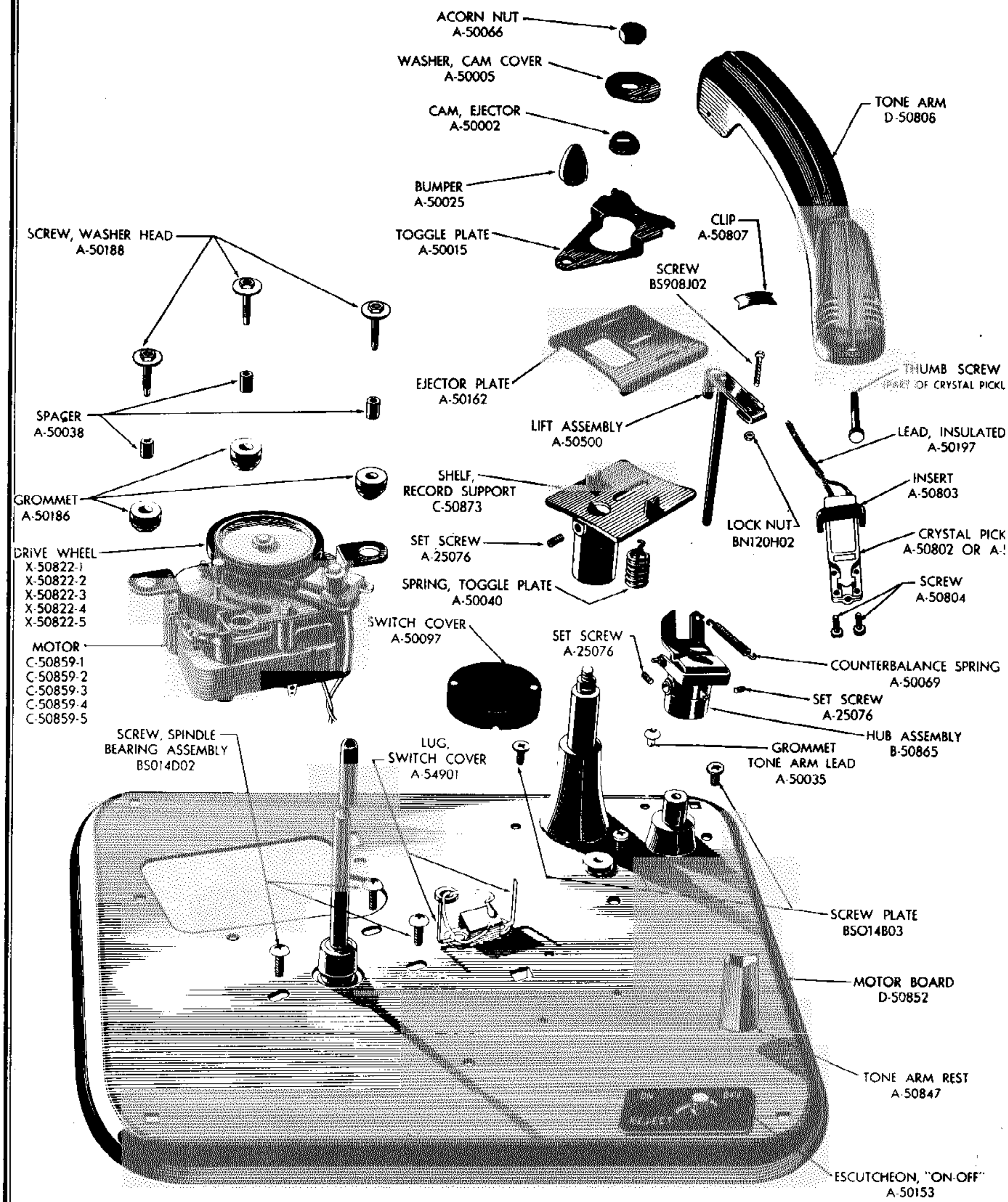
11—JERKY ACTION DURING CYCLE

May be caused by:

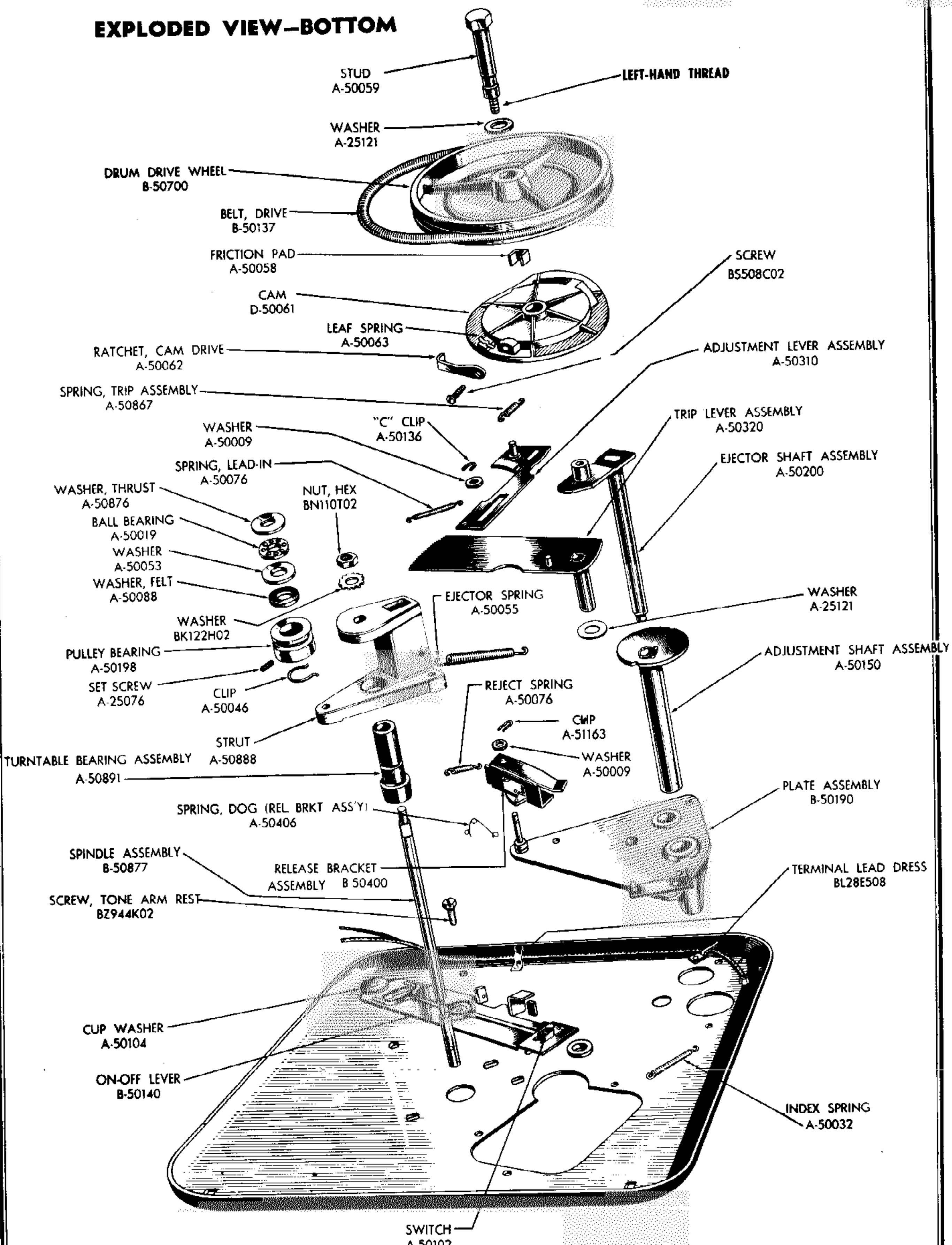
(a) Worn belt damping core. Replace with new belt.

(b) Deformed friction pad A-50058 in cam and drive wheel assembly. Replace.

EXPLODED VIEW—TOP



EXPLODED VIEW—BOTTOM



SERVICE PARTS LIST

Part No.	Description
	Assemblies
C-50859	**Motor (For 60 Cycle, 117 v.)**
A-50186	Grommet
A-50188	Screw, No. 6-32 x ⅝ Thread Cutting, Hex Washer Head
A-50038	Spacer
*X-50822	Wheel, Drive
C-50850	**Motor Board Assembly**
A-50153	Escutcheon, On-Off
B-50140	Lever, On-Off
A-50301	Rivet, Shoulder (On-Off Lever)
BV321E03	Rivet, Tubular ⅛ x 3/16
A-50102	Switch
A-54901	Terminal (Switch Cover)
BL28E508	Term. (Tone Arm Lead Dress)
A-50104	Washer, Cup
B-50190	**Plate Assy., Ejector and Tone Arm**
BS014B03	Screw, No. 8-32 x 3/16
B-50400	**Release Bracket Assembly**
A-50406	Spring, Dog
A-50847	**Rest, Tone Arm**
BZ944K02	Screw, No. 8 x ¾ Thrd. Cutting
C-50879	**Spindle Bearing Assembly**
A-50019	Ball Bearing, Thrust
A-50046	Clip, Spring
BN110T02	Nut, Hex No. 10-32
A-50198	Pulley Bearing
§A-50946	Pulley Bearing (threaded)
A-25076	Screw, Set No. 8-32 x 3/16
BS014D02	Screw, No. 8-32 x 5/16
B-50877	Spindle Assembly
A-50888	Strut and Insert Assembly
A-50891	Turntable Bearing Assembly
§A-50948	Turntable Bearing Assy. (threaded)
A-50053	Washer, Flat
A-50088	Washer, Felt
A-50876	Washer, Spindle Thrust
BK122H02	Washer, Shakeproof No. 10
A-50110	**Toggle Plate and Bumper Assembly**
A-50025	Bumper
A-50015	Plate, Toggle
B-50820	**Tone Arm Assembly**
A-50802 or A-50812	Crystal Pickup and Thumb Screw
A-50807	Clip
A-50803	Insert
A-50197	Lead, Insulated
A-50804	Screw, No. 4-40 x ¼
D-50808	Tone Arm (Shell only)

Part No.	Description
	Miscellaneous Parts
B-50137	Belt, Drive
A-50002	Cam, Record Ejector
B-50060	Cam Assembly
A-51163	Clip (Release Bracket Assembly)
A-50136	Clip "C" (Index Arm)
A-50097	Cover, Switch
B-50700	Drum Drive Wheel
A-50200	Ejector Shaft Assembly
A-50035	Grommet (Tone Arm Lead)
A-50500	Lift Assembly, Tone Arm
A-50066	Nut, Acorn
A-50058	Pad, Friction
A-50162	Plate, Ejector
A-50150	Record Adjustment Shaft Assembly
A-50310	Record Adjustment Lever Assembly
A-50302	Rivet, Shoulder
A-25076	Screw, Set No. 8-32 x 3/16 Cup Point (Ejector Shelf, Tone Arm Hub and Pulley Bearing)
A-50873	Shelf, Record Support
A-50055	Spring, Ejector
A-50032	Spring, Index
A-50069	Spring, Tone Arm Counterbalance
A-50076	Spring, Tone Arm Lead-in and Reject
A-50040	Spring, Toggle Plate
A-50867	Spring, Trip Assembly
A-50059	Stud
A-50320	Tone Arm Trip Lever Assembly
B-50865	Tone Arm Hub Assembly
D-50910	Turntable
A-25121	Washer, .625 O.D. x .375 I.D. x .010 brass (Tone Arm Trip Assy., and Cam and Drum Assembly)
A-50005	Washer, Cam Cover
A-50009	Washer, 5/16 O.D. x .156 I.D. x .025 brass (Release Bracket Assembly and Index Arm)

The following service parts are listed for Model 65 Run No. 1, which was manufactured with an "Automati Manual Control Lever":

Part No.	Description
B-50844	Bracket, Manual
A-50842	Escutcheon, Auto-Manual
A-9027	Pulley, Idler (Cord for Manual Bracket)
A-50843	Retainer, Manual Slide
A-5917	Rivet, Shoulder (Idler Pulley)
BV321F09	Rivet, Tubular, ⅛ x 7/32
A-50840	Slide, Auto-Manual
A-51787	Spring (Cord for Manual Bracket)
A-50846	Spring, Manual Bracket
A-50858	Stud, Shoulder (Manual Bracket)
B-55400-13	Cord, Assembly
A-50009	Washer
A-50874	Clip
A-51163	Index Spring

INTERNATIONAL DETROLA CORP.

Non-Standard or **Imperfect** records are those which have enlarged center holes, or those which may be warped, chipped, cracked or scratched. Others have no starting grooves or eccentric grooves or may have grooves which are not complete nor pressed properly into the record. Edges of some records are rough or sharp and will cause more than one record at a time to drop to the turntable. Imperfect or sub-standard records prevent the record changer from operating automatically, and may cause the needle to slide off the record at the start of the recording.

ADJUSTMENTS

A simple adjustment to the changer may be made if the tone arm frequently falls off the edge of a standard record or starts playing a standard record too far in on the music grooves. Make the adjustment as follows:

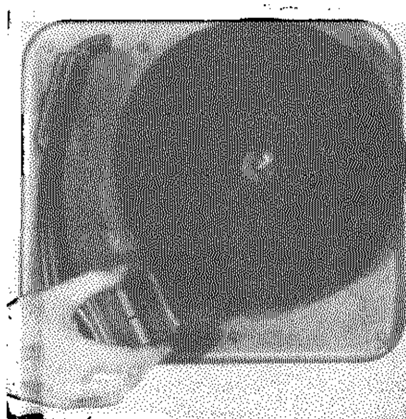
1. Make certain that the needle is **straight** in the tone arm and that the thumb screw is **tight.**
2. Put 3 to 5 records **on the turntable.**
3. Start the changer and then stop it in the position where the tone arm begins to lower itself to the record, or you can turn the turntable by hand until the tone arm begins to lower itself to the record. It is then possible to see how much the tone arm needs adjusting to the right or left.
4. Insert a nail or small screwdriver in one of the holes in the adjustment stud under the tone arm (See Illustration 5) and turn the stud to the right or the left until the needle in the tone arm is directly above the starting groove of the record on the turntable.

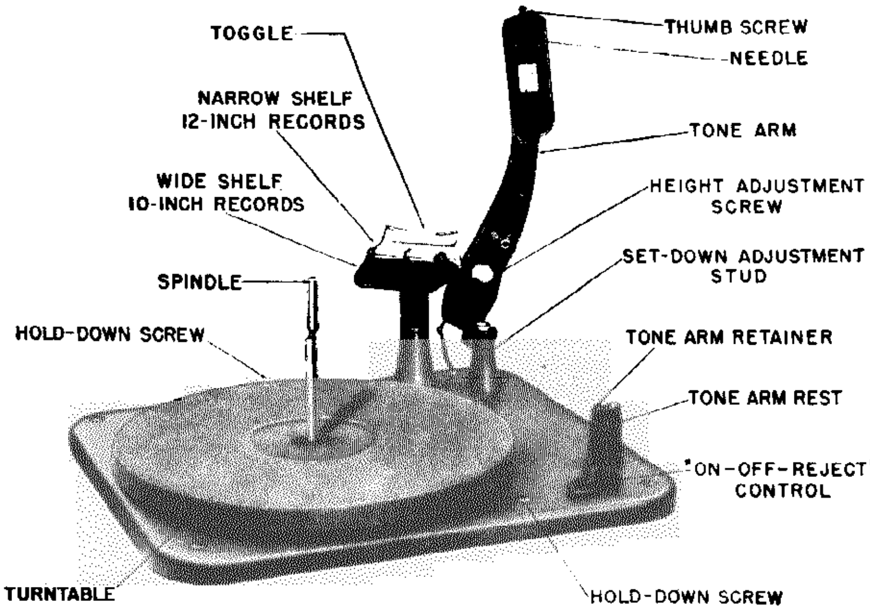
Phonograph needles vary in length and may necessitate another adjustment of the tone arm. If the needle in the tone arm does not come down far enough to contact the first record on the turntable or if the tone arm does not rise high enough to clear the top of a complete stack of records on the turntable, adjust as follows:

(a) Raise the tone arm and turn the height adjustment screw (See Illustration 6) in either direction until the desired adjustment is obtained.

No other adjustments should be necessary. The record changer has been factory-tested for performance.

If the flocking on the turntable becomes flattened down, use a fine wire brush such as used on suede materials. Brush lightly to raise flocking.





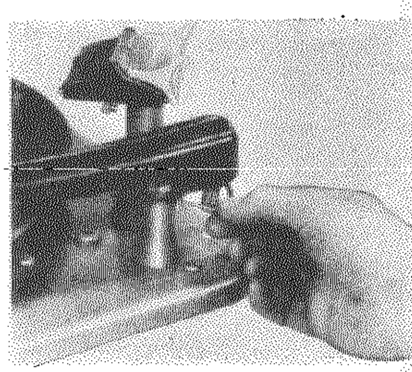


Illustration 5

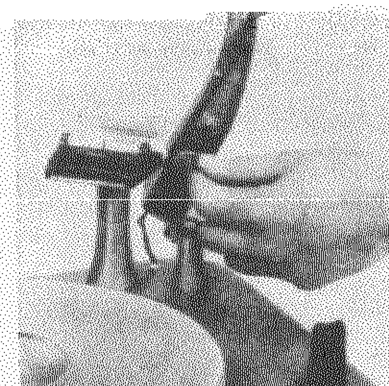
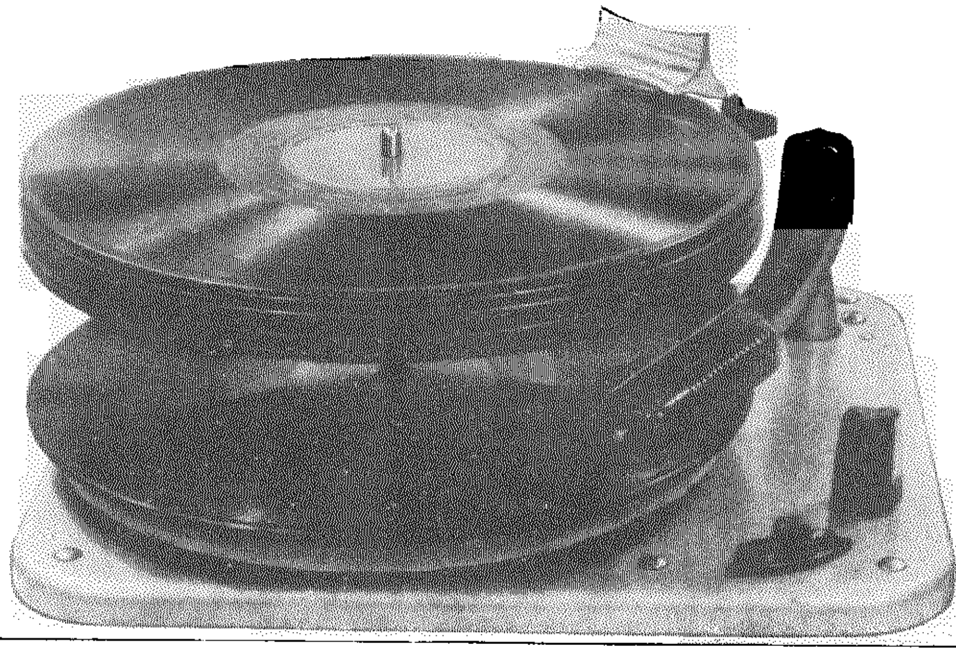


Illustration 6

INTERNATIONAL DETROLA CORP.



SERVICE PARTS LIST

Part No.	Description
	Assemblies
B-50060	Cam Assembly
A-50062	Ratchet, Cam Drive
A-50063	Spring, Leaf
D-50470	Motor (For 60 Cycle, 117 V.)
B-50462	Fastener, Snap
A-50186-1	Grommet
D-50460	Motor Board Assembly
B-50440	Lever, Switch
BL28E508	Lug, Solder
A-50301	Rivet, Shoulder
BV321E03	Rivet, Tubular
BV386J03	Rivet, Tubular
A-50475	Spring, Conical
A-50102	Switch, AC
B-50490	Plate Assembly, Ejector and Tone Arm
BS014B03	Screw, No. 8-32 x 3/16
B-50400	Release Bracket Assembly
A-50406	Spring, Dog
B-50480	Spindle Assy.
C-50429-1	Tone Arm Assembly
A-50802-1	Crystal Pickup and Thumb Screw (For use with Twisted Pickup Lead Assy.)
A-50802-2	Crystal Pickup and Thumb Screw (For use with Shielded Lead Assy.)
BS408C02	Screw, No. 4-40 x ¼
BS508C01	Screw, No. 4-40 x ¼
B-50385-2	Tone Arm (Shell only)
A-50469	Tone Arm Rest
B-55151-1	Fastener, Tubular Clip
B-50468	Retainer, Tone Arm
A-50467	Spring, Retainer
	Miscellaneous Parts
A-50395	Adjustment Lever Assy.
A-50907	Ball Bearing, Thrust
A-50946	Bearing, Pulley
B-50493	Bearing, Strut

Part No.	Description
	Miscellaneous Parts (cont'd)
B-50491	Bearing, Turntable
B-50137	Belt, Drive
B-50390	Bracket Assy., Pivot
A-50433	Cam, Ejector
A-51163	Clip, Release Bracket Assembly
B-55380-1	Clip, Spring
C-50700	Drum, Drive
A-50430	Ejector Lever Assy.
A-50035	Grommet (Tone Arm Lead)
A-50494	Nut, Strut Bearing
A-50058	Pad, Cam Friction
BN771W02	Palnut, ¾-16
B-50452	Plate, Record Ejector
A-50437	Roller
BS914C01	Screw, No. 8-32 x ¼
BA114B01	Screw, No. 8-32 x 3/16 Set
B-50483	Shaft and Cam, Adjustment
A-50431	Shaft, Record Ejector
A-50422	Shaft, Tone Arm Lift
C-50453	Shelf Cover
C-50451-1	Shelf, Record Support
A-50495	Spacer, Turntable Bearing
A-50471	Spring, Ejector Return
A-50499	Spring, Flat Spindle
A-50032	Spring, Index
A-50867	Spring, Trip Assembly
A-50455	Spring, Toggle
A-50076	Spring, Tone Arm Lead-In and Reject
D-50481	Strut, Center Post
A-50486	Stud, Cam
B-50454	Toggle
B-50420	Trip Lever Assembly
C-50496-1	Turntable (Grey)
BF24WYA1	Washer, Felt
BF1D3T13	Washer, Flat ⅝ O.D. x .381 O.D. x .010 (Trip Lever Assy.)
A-50497	Washer, Flat ⅞ O.D.
A-50832	Washer, Flat 5/16 x .167 — .172 x .025 (Release Bracket Assy.)

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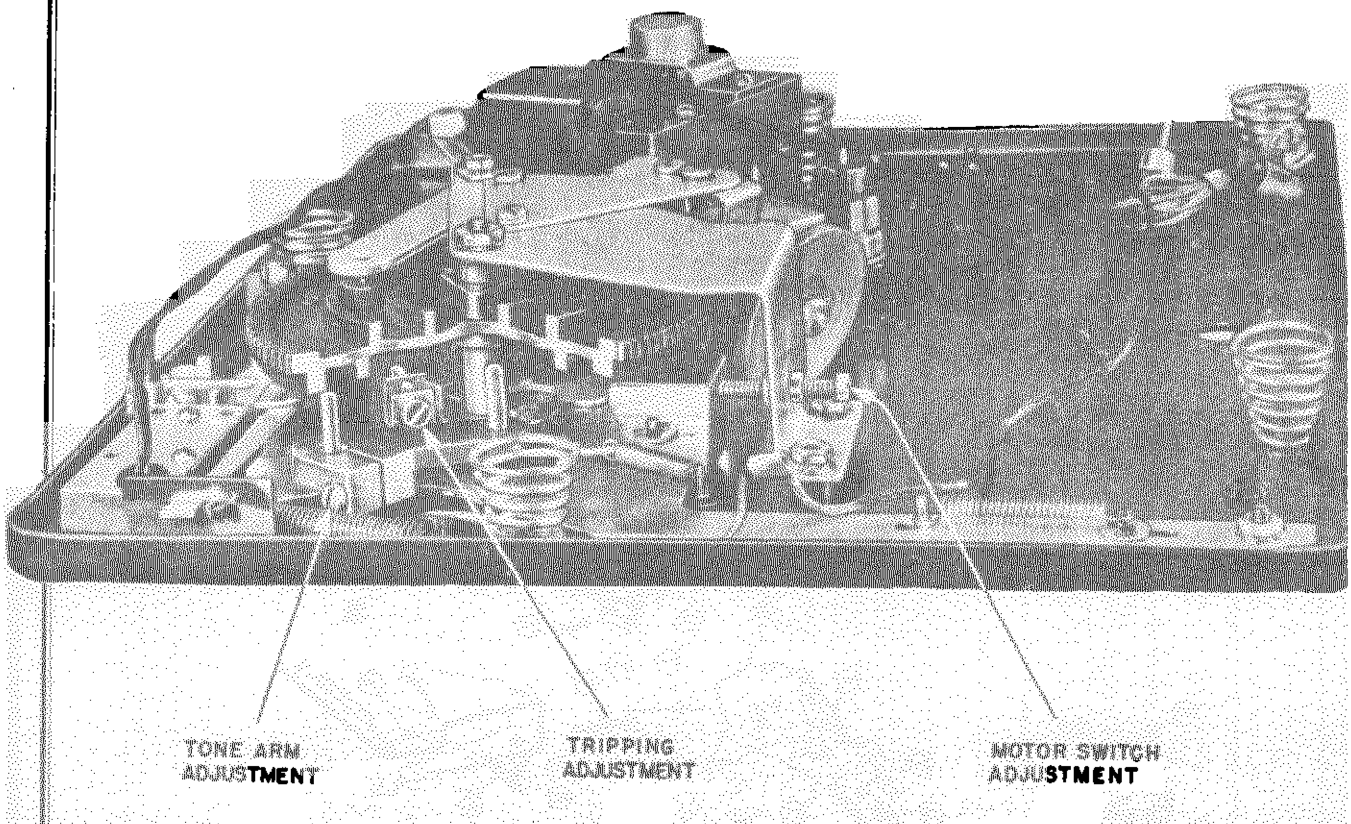
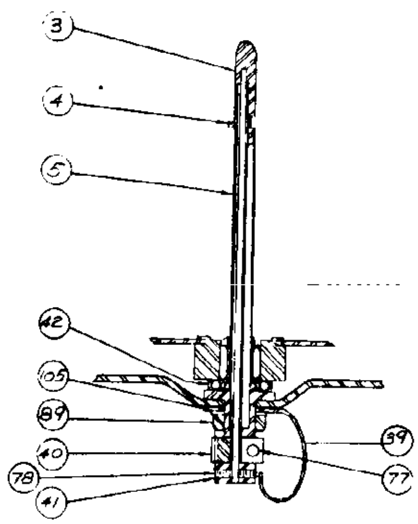


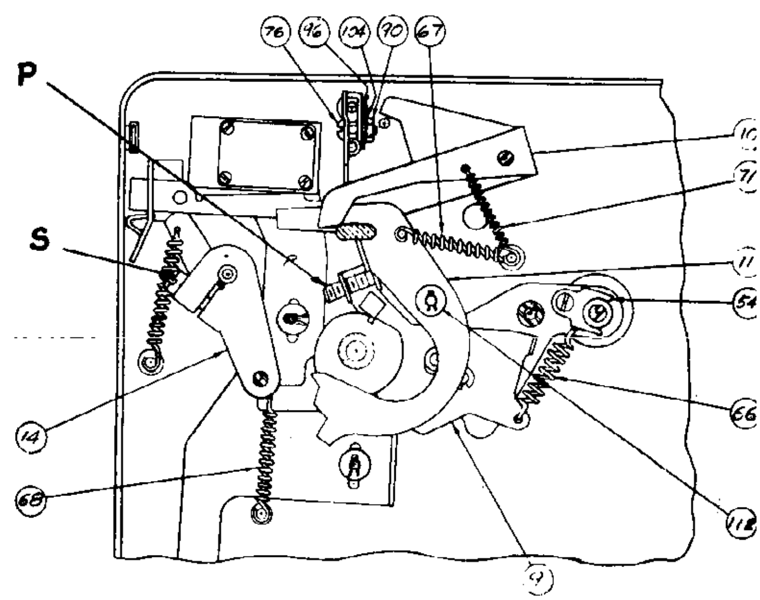
1. RECORDS FALL SHORT OF RECORD SUPPORT

SERVICE HINTS

Check spindle assembly to see it is not bent away from pedestal. Spindl should be vertical and records should just clear support with spindle in dropping position. If necessary to make clearance adjustment, loosen Hex Jam Nut (Ref. No. 89, just enough so that spindle base can be tapped toward (or away from) the pedestal. Caution. Use plastic hammer only.

NOTE: It is not necessary to loosen the Lock (Ref. No. 41) or the Pinio (Ref. No. 40) in making the above adjustment.



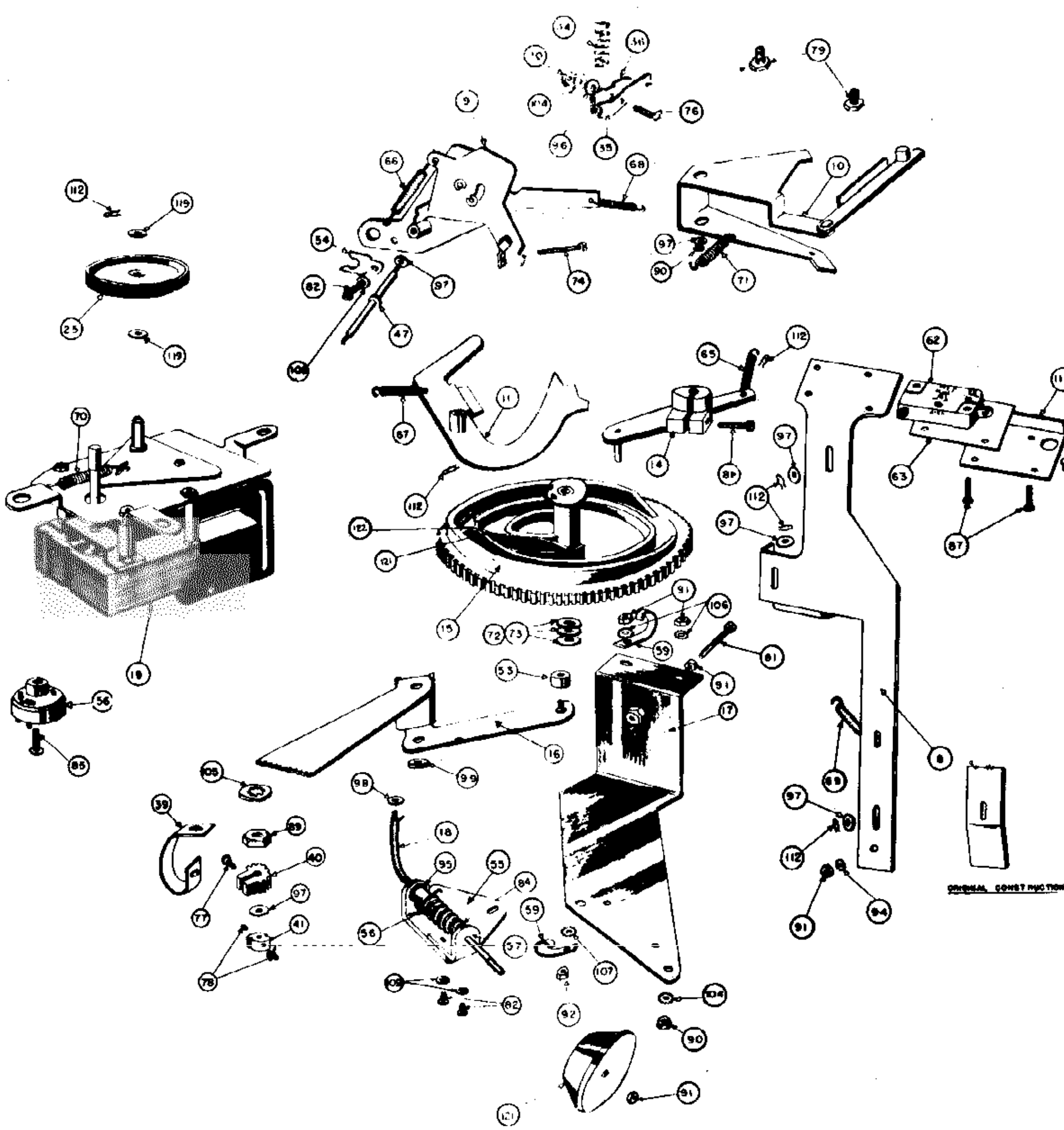


2. RECORDS DO NOT DROP PROPERLY

This may be caused by excessive end play in the spindle tip and eccentric. The spindle tip is clamped by the Lock (Ref. No. 41) and end play may be reduced by loosening the set screws in the lock and tapping the spindle tip down. The end of the spindle tip shaft should be flush with the surface of the lock. Also check the engagement of the Dropping Arm Assembly (Ref. No. 16) with the Pinion (Ref. No. 40) at point indicated by "R"

With the changer "out of cycle," the last tooth of the pinion should mesh between the teeth labeled "R." End of arm may be lifted enough to re-engage in correct position.

EXPLODED VIEW



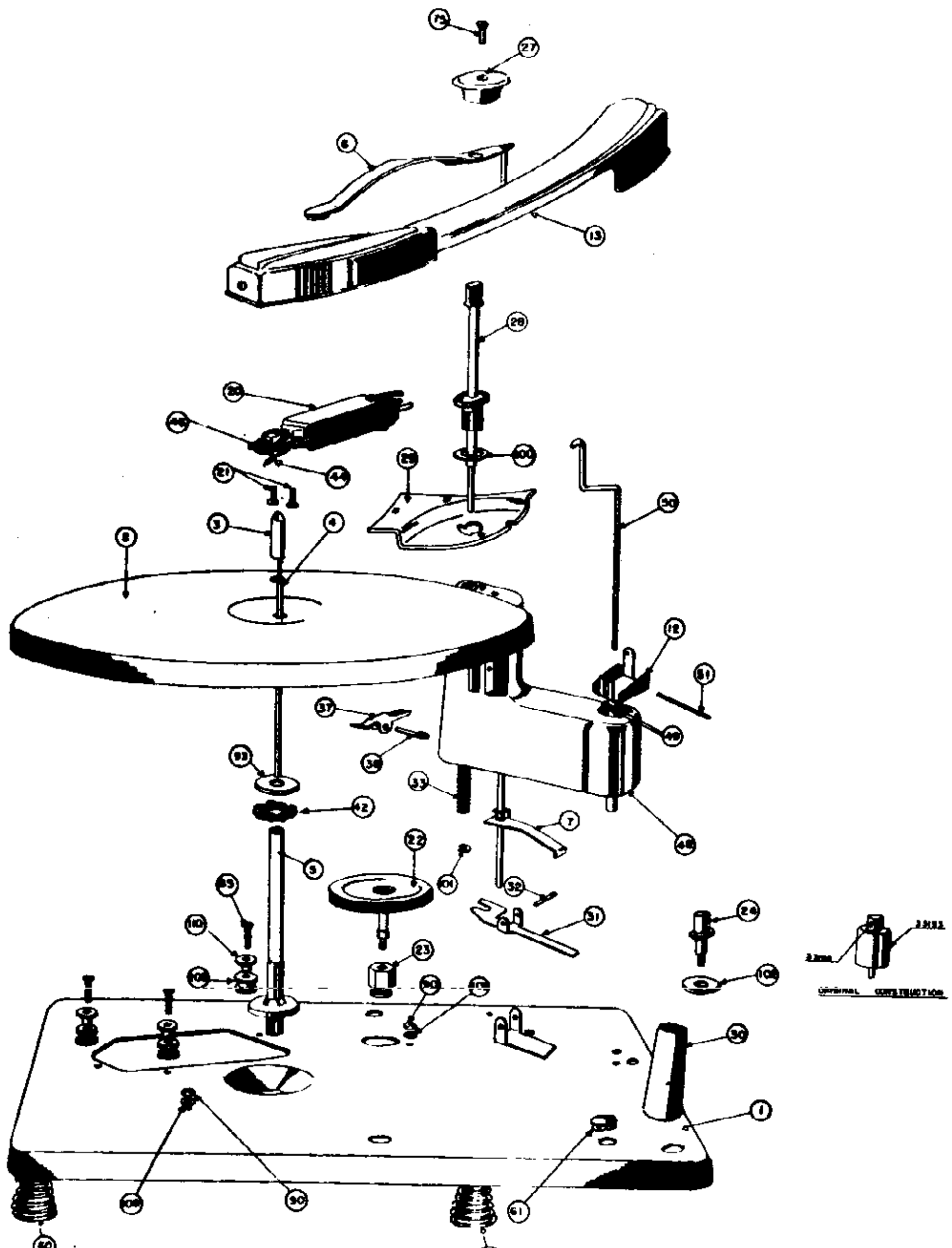
3. MOTOR WILL NOT START OR SHUT OFF

If motor will not start automatically the trouble may be due to incorrect adjustment of Screw (Ref. No. 81). This screw should be turned in just enough so that motor will start. If the motor will not stop automatically when the tone arm has returned to its rest position on the pedestal, this screw should be turned out until the proper adjustment is obtained.

4. TONE ARM WILL NOT LAND IN CORRECT POSITION ON RECORD

If tone arm is either in or out too far when starting to play records, it will be necessary to loosen screw "S" and move Crank Assembly (Ref. No. 14) to correct, after which screw "S" must be tightened.

EXPLODED VIEW



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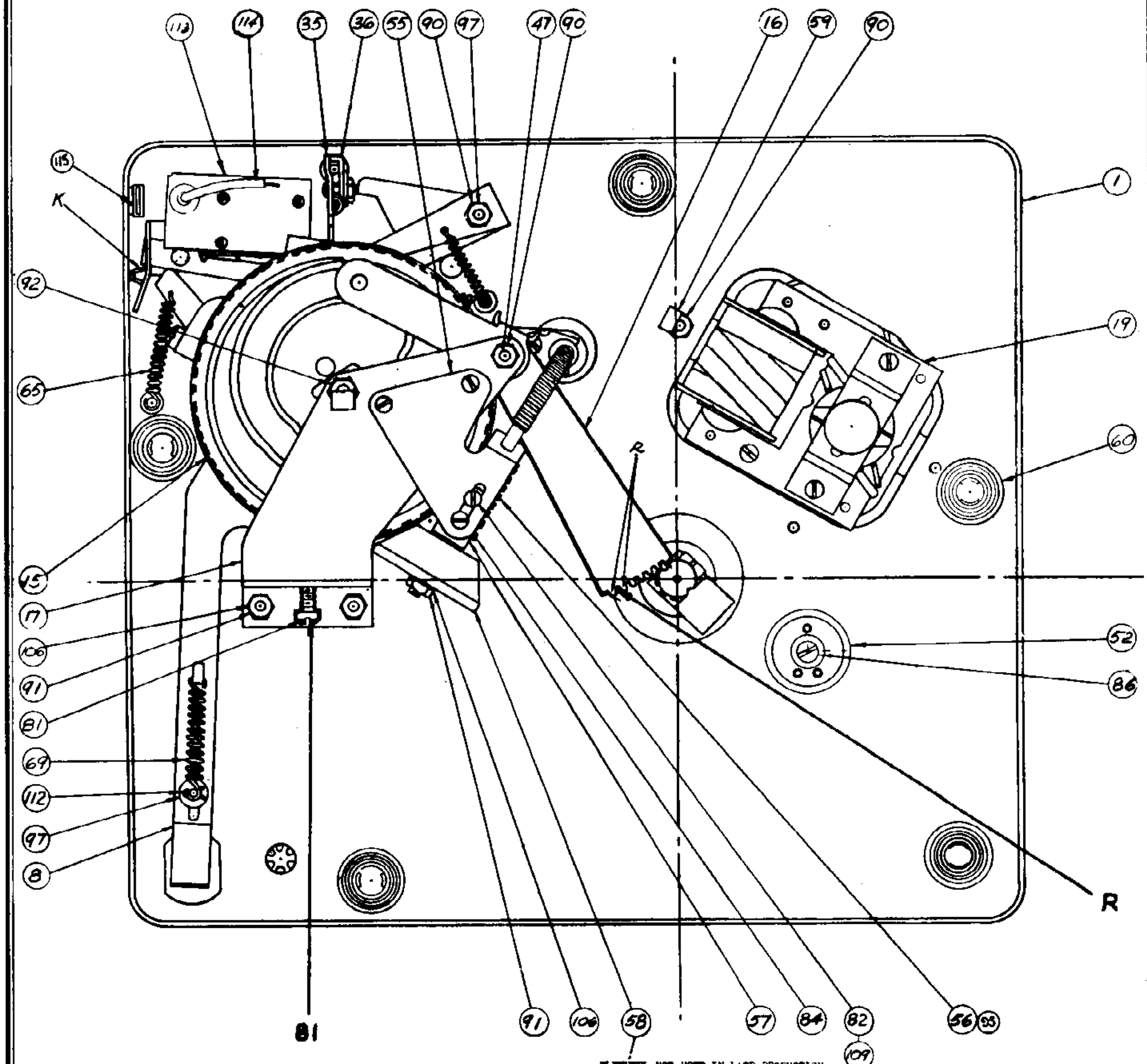


5. EARLY OR LATE TRIPPING

Automatic tripping at end of record is controlled by adjustment screw "P". Factory adjustment calls for tripping to occur when needle is approximately 2" from center of spindle. If this adjustment screw turns too freely, a slight bending of the bracket holding the screw will place more tension on the threads.

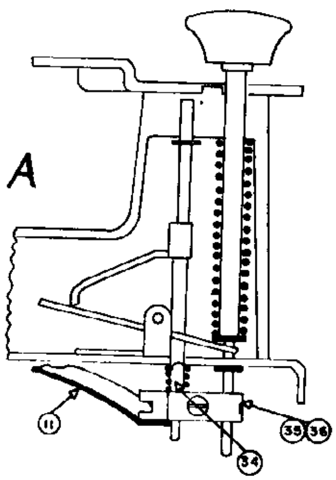
6. <u>TONE ARM WILL NOT LAND IN SHUT-OFF POSITION</u>

Check Compression Spring (Ref. No. 34). See that Record Clamp Shaft (Ref. No. 28) clears hole in base plate. If shaft binds in hole, ream with drill no larger than #8 standard twist drill.

In shut-off position Size Arm (Ref. No. 11) should fall below Positioner (Ref. No. 35) and Positioner Clip (Ref. No. 36.) Reference to Fig. B (shut-off position) will show the size arm in this position. When the mechanism is in the 12 inch position, the size arm should fall into the slot in the Positioner.

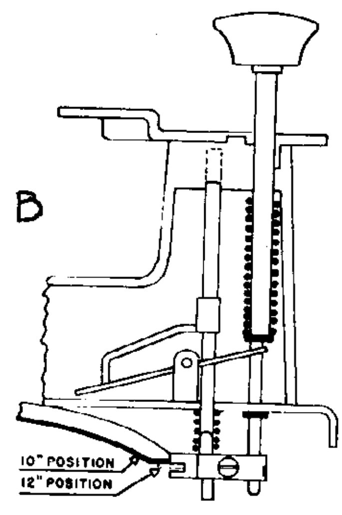
NOTE: In Fig. A, B, the Positioner and Positioner Clip are shown in at right angles to their true position, in order to illustrate the action of the size arm with respect to the mechanism, particularly inside the pedestal.

A



SHUT OFF POSITION

B



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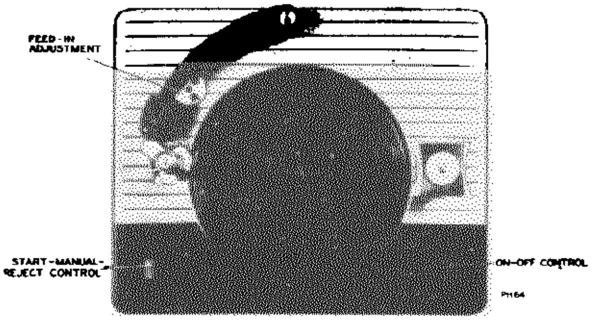
7. TONE ARM WILL NOT REMAIN ON REST POST AFTER AUTOMATIC SHUT-OFF

The metal cup under the pickup cartridge should engage the rim of the rest post to prevent the tone arm from sliding off. If necessary bend the edge of the cup slightly **using extreme care**.

8. TONE ARM DOES NOT SWING FREELY WHEN UNIT IS OUT OF CYCLE

Check clearance of end of Crank (Ref. No. 14) as it passes formed metal piece at point labled "K", If necessary bend metal to allow clearance, but be careful not to disturb the stop position of switch off bar (Ref. No. 10)

ITEM	PART #	DESCRIPTION	Q'TY
1	33289	BASE ASS'Y	1
2	33417	TURNTABLE & BEARING ASS'Y	1
3	33251	SHAFT & TIP ASS'Y	1
4	33245	ECCENTRIC & SHAFT ASS'Y	1
5	33252	SPINDLE ASS'Y	1
6	33394	CLAMP ASS'Y - RECORD	1
7	33393	ARM ASS'Y POSITIONER	1
8	33418	REJECT ARM & SWITCH ASS'Y	1
9	33364	LATCH ASS'Y	1
10	33368	SWITCH OFF ASS'Y	1
11	33238	ARM ASS'Y - SIZE	1
12	33239	POST & HINGE ASS'Y	1
13	33155	ARM TONE	1
14	33287	CRANK ASS'Y	1
15	33835	CAM ASS'Y	1
16	33247	ARM ASS'Y DROPPING	1
17	33309	BRACKET ASS'Y, MOUNTING	1
18	33416	POWER ASS'Y TAKE OFF	1
19	33112	MOTOR & DRIVE ASS'Y	1
20	33295	CARTRIDGE CRYSTAL PICK-UP	
21	10523	SCREW, FIL. HEAD	2
22	33248	PULLEY - POWER TAKE OFF	1
23	33177	HUB ECCENTRIC	1
24	34703	BUTTON REJECT	1
25	33151	WHEEL ASS'Y - MOTOR	1
26			
27	33200	KNOB - RECORD CLAMP	1
28	33202	SHAFT RECORD CLAMP	1
29	33314	SUPPORT RECORD	1
30	33087	PLUG PEDESTAL	1
31	33150	ARM LAST RECORD	1
32	33199	PIN, LAST RECORD ARM	1
33	31656-04	SPRING, COMPRESSION	1
34	31656-07	SPRING, COMPRESSION	1
35	33155	POSITIONER	1
36	33302	CLIP, POSITIONER	1
37	33164	ARM SELECTOR	1
38	33246	AXLE, SELECTOR ARM	1
39	33059	SPRING SPINDLE	1
40	33039	PINION	1
41	33038	LOCK	1
42	33273	BEARING THRUST	1
43			
44	54061	NEEDLE, REPRODUCER	1
45	54060	CARD INSTRUCTION	1
46	33802	SCREW, SET	1
47	33053	SHAFT	1
48	33308	PEDESTAL	1
49	26032-02	BALL BEARINGS	9
50	33167	ROD, LIFT	1
51	33235	PIN HINGE	1
52	54569	CONNECTOR	1
53	33182	ROLLER, DROP ARM	1
54	33171	CLIP, POWER ARM	1
55	33168	SUPPORT WORM	1
56	33086	GEAR WORM	1
57	33159	ANGLE WORM SUPPORT	1
58			
59	33369	CLAMP CABLE	2
60	33391	SPRING MOUNTING	5
61	33414	PLUG, BUTTON	1
62	33382	SWITCH, MICRO LIMITED	1
63	33425	INSULATION	1
64			
65	33205-01	SPRING, COIL TENSION	1
66	33205-02	SPRING, COIL TENSION	1
67	33205-03	SPRING, COIL TENSION	1
68	33205-04	SPRING, COIL TENSION	1
69	33205-05	SPRING, COIL TENSION	1
70	33113	SPRING, COIL TENSION	1
71	33205-07	SPRING, COIL TENSION	1
72	61216	SHIM	AS
73	54003	WASHER	REQ'D
74	11145	SCREW, FIL. HEAD	1
75	12544	SCREW, OVAL HEAD	1
76	11058	SCREW, ROUND HEAD	1
77	11139	SCREW, FIL. HEAD	1
78	12585	SCREW, SET	2
79	33269	SCREW PEDESTAL	2
80			
81	11151	SCREW, FIL. HEAD	2
82	10887	SCREW	1
83			
84	12564	SCREW, SET	2
85	11061	SCREW	4
86			
87	10453	SCREW	2
88			
89	33347	NUT, HEX JAM	1
90	12937	NUT	6
91	12941	NUT	4
92	12944	NUT	
93	6918	WASHER, PLAIN	1
94	56240	WASHER, LOCK	
95	4645	WASHER, BAKELITE	2
96	29567-10	WASHER, PLAIN	1
97	29567-11	WASHER, PLAIN	6
98	29567-12	WASHER, PLAIN	1
99	29567-13	WASHER, PLAIN	1
100	33321	WASHER, TENSION	1
101	33371	WASHER HORSE SHOE	1
102	54002	WASHER	1
103			
104	56239	WASHER LOCK	3
105	56202	WASHER LOCK	1
106	56240	WASHER LOCK	3
107	56241	WASHER LOCK	1
108	52492	GROMMET	3
109	56197	WASHER INTERNAL TOOTH LOCK	5
110	52439	SLEEVE FLANGE	3
111	2824	GROMMET	1
112	29379-01	COTTER, HAIR PIN	6
113	33740	COVER SWITCH	1
114	31549-09	WIRE FLEX. LEAD	16"
115			
116			
117	61479	WASHER TURNTABLE (UPPER)	1
118	61478	WASHER TURNTABLE (LOWER)	1
119	33117	WASHER	2
120	61475	DECAL, PUSH	1
121	33172	FLYWHEEL	1
122	33319	SPRING LEAF	1
123	33316	SPRING RETAINER	1



RCA VICTOR

RP-176

Automatic Record Changer

SERVICE DATA

—1946 No. 12—

RADIO CORPORATION OF AMERICA
RCA VICTOR DIVISION
CAMDEN, N. J., U. S. A.

FEATURES

1. This record changer is a two-support, drop type, non-intermixing mechanism designed to play automatically a series of twelve ten-inch or ten twelve-inch records of the standard 78 RPM type.
2. The mechanism uses a lightweight, low-noise, crystal pickup cartridge, equipped with a long-life sapphire point.
3. The tone arm is automatically returned to rest position and the power removed from the drive motor, after the mechanism has finished playing the last selection of the stack.
4. The changer is equipped with an eccentric tripping device which insures tripping on all standard records.
5. A pickup muting switch is incorporated, which shorts out the pickup while the changer is in cycle. This prevents mechanical noises of moving parts from being amplified.
6. The record support and separator are mechanically linked, requiring only one operation for changing of record size.
7. Moving parts are few in number while playing records. This insures quiet reproduction, free from rumble and wow.
8. The mechanism is provided with a safety clutch which prevents damage to the mechanism in case of a jam due to a defective record.
9. The accessible feed-in adjustment is positive in action.

MANUAL OPERATION

1. Make certain the mechanism is out of cycle with the pickup on the rest.
2. Push "Start-Reject" knob to manual position.
3. Place record on turntable and push the power switch to the "on" position.
4. Lift and place pickup on record.
5. When the selection has finished playing, the pickup will continue to ride in the eccentric groove until the pickup is lifted from the record or the power is removed from the drive motor.

LUBRICATION

A light machine oil (SAE #10) should be used to oil the bearings of the drive motor.

On all bearing surfaces, excepting the motor bearings, Houghton STA-PUT No. 320, or equivalent, should be used. On all other surfaces, STA-PUT No. 512, or equivalent, is recommended. STA-PUT can be purchased from E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

(Do not oil or grease record separator shaft.)

It is important that the drive motor spindle and the rubber tire on the friction disc as well as that on the idler wheel be kept clean and free from oil or grease, dirt, or any foreign material at all times. Carbon tetrachloride or naphtha is satisfactory for cleaning these parts.

AUTOMATIC OPERATION

The pickup "rest" consists of a post incorporating a button and shaft connecting a switch beneath the motor board. This switch, which controls the power to the drive motor, is actuated by the weight of the pickup and tone arm while going in and out of rest position.

1. Turn the record support on the right-hand side of the changer, to position it for 10- or 12-inch records.
2. Load the records on the supports with the desired selections upward, the last record to be played on top. (Make certain the separator shelf is pushed down when stack is placed on the supports.)
3. Push the "On-Off" knob to the "on" position.
4. Push "Manual-Reject" knob to reject position and release. The mechanism will play the selections in the entire stack at which time the tone arm will return to rest position and the power will be removed from drive motor.
5. To reject a record being played, push the "Manual-Reject" knob to "Reject" and release.
6. Lift and turn separator shelf to facilitate the removal of records.
(Note: For automatic operation, each record is required to have the standard eccentric groove.)

Cautions

Before servicing the automatic changer, inspect the assembly to see that all gears, cams, springs, levers, etc., are correctly assembled and in good working order.

1. Never use force to start or stop the motor or any part of the record changing mechanism.
2. Warped or damaged records may cause the mechanism to jam. When jamming occurs, the safety clutch slips, causing a clicking sound.
3. A cracked or chipped record may damage the sapphire.
4. Warped records may slide on one another while playing and result in unsatisfactory reproduction.
5. Do not leave the records on the record posts or on the turntable as they may warp, particularly in warm climates. Warped records may be flattened by placing them on a flat surface with a heavy flat article placed on top of them for a few days.
6. If, for any reason, the mechanism stalls, turn off the "On-Off" switch and remove the records from the posts. Start the turntable by turning the switch on and allow the pickup arm to complete its cycle.
7. Do not tighten copper-plated, cone-pointed screws until final adjustment has been made.

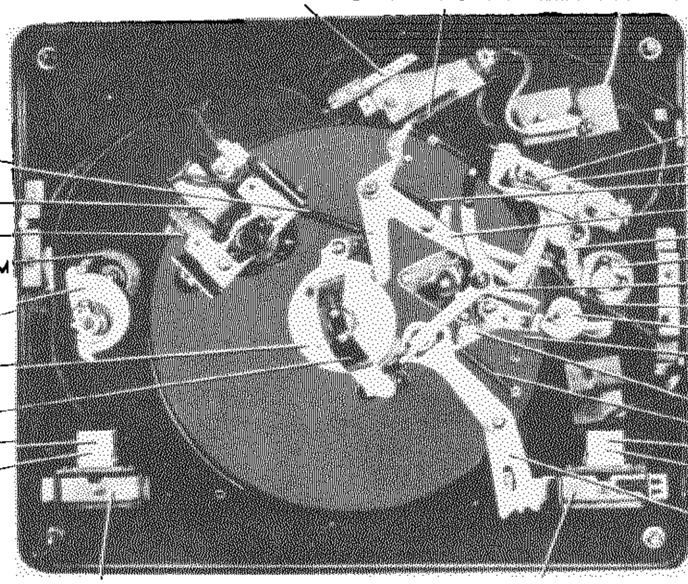


FIG. 1

FUNCTION OF PRINCIPAL PARTS

Trip Lever 85

When the pickup is riding in the eccentric groove, the trip pawl located on the trip lever engages the ratchet lever, starting the cycle.

Ratchet Lever 59

Portion of lever acts as a ratchet and the other portion acts as a stop or catch to hold the drive clutch from engaging.

Ratchet Wheel (fig. 4)

Acts as part of the safety clutch, which is engaged with the cam pawl during cycle.

Drive Cam, Gear and Pawl 41

Transfers motion from turntable through clutch to main gear.

Turntable Spindle Support 35

Forms a bearing for turntable spindle.

Main Cam 67 (fig. 2)

Has a series of tracks controlling cycling action.

Record Separator Lever, Link, Crank 97 (fig. 2)

Transfers motion from the main cam through the stud, lever and link to the separator post during change cycle.

Feed-in Lever Locking Pawl or Latch 130 (fig. 3)

Provides a means of locking feed-in lever until the pickup has landed on the record, then unlatching and allowing feed-in lever to gently push the pickup into starting groove.

Manual-Reject Control Knob and Lever Assembly

In "manual" position, it contacts the stud on clutch portion of drive cam thereby preventing the clutch from engaging and starting cycle.

In "automatic" position, it permits operation of the ratchet lever safety clutch and stop switch.

In "start reject" position, it momentarily closes control switch which is shunted across stop switch. It also moves the ratchet lever away from drive cam pawl, permitting the clutch to engage and start cycle.

Muting Switch Actuating Lever 133 (fig. 3)

Opens pickup muting switch during the playing cycle.

Tone Arm Lever 65

Directs horizontal motion of tone arm. It also incorporates an additional retard lever which stabilizes tone arm while the mechanism is in cycle.

Tone Arm Return Lever 62

Moves the tone arm inward and provides positioning for landing.

Feed-in Lever 88

A small lever under spring tension providing a small amount of force inward on tone arm, after the pickup has landed on record.

Tone Arm Elevating Lever 125 (fig. 2)

Directs vertical motion of tone arm.

Tone Arm Elevating Rod 79

Transfers motion from elevating lever to tone arm.

Record Support Cam 22

Functions as a lock for record support belt drum.

Record Support Belt and Drum 24-99-100

Forms a mechanical linkage between record support and record separator.

Record Support

Provides a support for the record stack and a handle for record size change.

Record Separator Post and Blade

Functions to support the records and, together with the selector blade, to separate the lowest record of the stack and allow it to drop to the turntable during the change cycle.

Shut-off or Segment Cam 118

Locks tone arm return lever preventing it from pushing the tone arm in for landing.

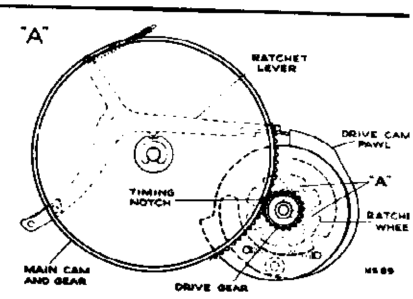
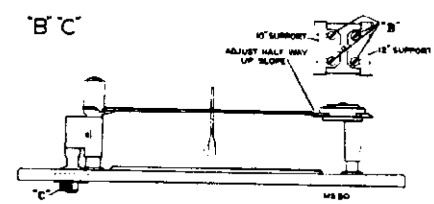
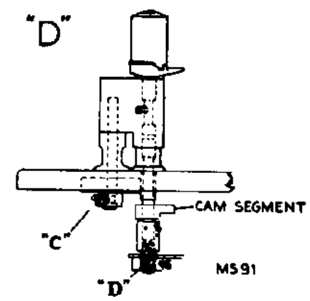
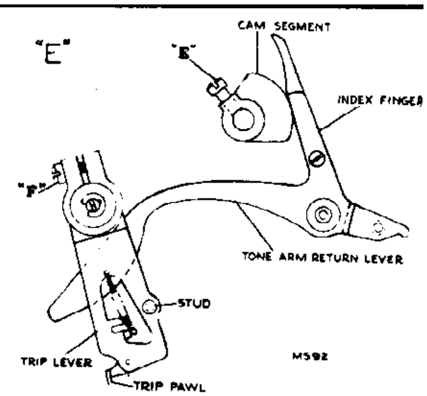
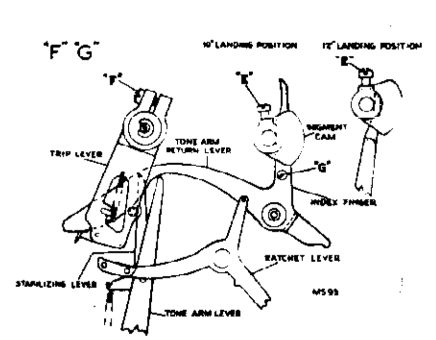
Retainer Spring 132 (fig. 3)

A small piece of phosphor-bronze functioning as a partial lock which stabilizes the tone arm when in the outermost position.

Stop Spring 131

A small piece of spring steel used as a stop, which determines the outermost position of tone arm. (Adjustable.)

RCA MFG. CO.
Quick-Reference Chart for
Automatic Record Changer Adjustments

Trouble	Adjustment	Diagram
Mechanism jams. General irregularity of operation. **(Mechanism Timing)**	With the ratchet lever and the pawl on the drive shaft cam in playing position as shown, remove the bottom support bracket, link and lever assembly. Remove the "C" washer on the main cam shaft and slip the cam down far enough that it can be rotated with respect to the drive gear. Then rotate it until the timing notch is positioned as shown. Put the main gear back in mesh with the drive gear, replace the "C" washer, place the elevating lever on the cam ridge. Make certain the separator link and lever assembly is in its correct position and replace the bottom support bracket.	"A" 
Records strike separator post or fail to stay on record shelf. **(Spacing Between Record Posts)**	Turn the record support post to the ten-inch position. Loosen set screws "C," hold the separator post against the end of its slot in the motorboard and turn the belt drum to take up any slack in the belt. Tighten the zinc-plated, blunt-nosed screw and check to see that a ten-inch record fits the posts as shown. Then tighten the copper-plated, cone-pointed screw. Loosen set screws "B" and adjust support shelf so both 10- and 12-inch records set half-way up the slope when support post is turned to their respective positions.	"B" "C" 
Records do not drop at proper time. **(Record Shelf Timing)**	With the record supports turned to ten-inch position, place a ten-inch record on the supports. Loosen the set screws "D" and turn the record separator shaft until the edge of the record-separating knife is 3/32 inch away from the edge of the record. The teeth on the inner circumference of the knife should be resting in the bottom of their slots at the time the adjustment is made. Tighten the zinc-plated screw first, run through cycle several times as a check, then tighten the copper-plated screw. **Note: It may be found necessary to deviate slightly from 3/32 inch dimension if twelve-inch records do not drop properly.**	"D" 
Tone arm continues to repeat playing of top record or jams when part way in on record. **(Segment-cam height or radial position)**	With record changer in the ten-inch position and the records removed from the posts, loosen the set screw "E." Set the record separator segment-cam so that the index finger of the tone arm return lever rides on the middle of the segment-cam, as shown. Rotate the segment-cam until it is in such a position that the index finger will not ride off either end. Check to see that the index finger rides in over top of the cam when the record shelf is depressed by the weight of one record. Tighten the set screw.	"E" 
Sapphire does not land at correct point on 10-inch record. **(Tone Arm Position With Respect To Trip Lever)** **Correct dimension from outside edge of spindle to sapphire 4 11/16 inches.**	With the record changer in the ten-inch position, place a ten-inch record on the turntable and rotate the changer through cycle by hand, until the sapphire is just ready to land. Make certain that the index finger of the pickup arm return lever is against the record separator shaft and that the tone arm trip lever stud is held firmly against the return lever. Loosen the set screw "F" and move the pickup arm to the correct landing position. Maintain correct alignment between ratchet lever and trip pawl, when tightening set screw "F." (Note—Make certain trip lever stud does not come in contact with motorboard while making this adjustment.) Place a twelve-inch record on the turntable and rotate the changer through cycle until the sapphire is just ready to land. Loosen screw "G" and adjust end of tone arm return lever so it is against separator shaft when pickup is in correct landing position.	"F" "G" 

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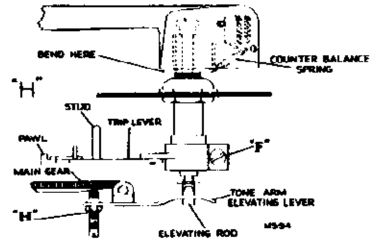
Top of tone arm strikes stack of records or sapphire fails to clear the records on the turntable. **(Tone Arm Height While In Cycle)**	Rotate the changer through cycle until the tone arm has risen to its maximum height above the turntable but has not begun to move out. At this point adjust the screw "H" until the distance between the turntable and the sapphire is one and three-sixteenths inches. Tighten the locknut.
(Tone Arm Height While Out of Cycle)	Bend end of tone arm support bracket or pivot arm so the pickup end of tone arm clears the motorboard by $\frac{3}{32}$ inch.



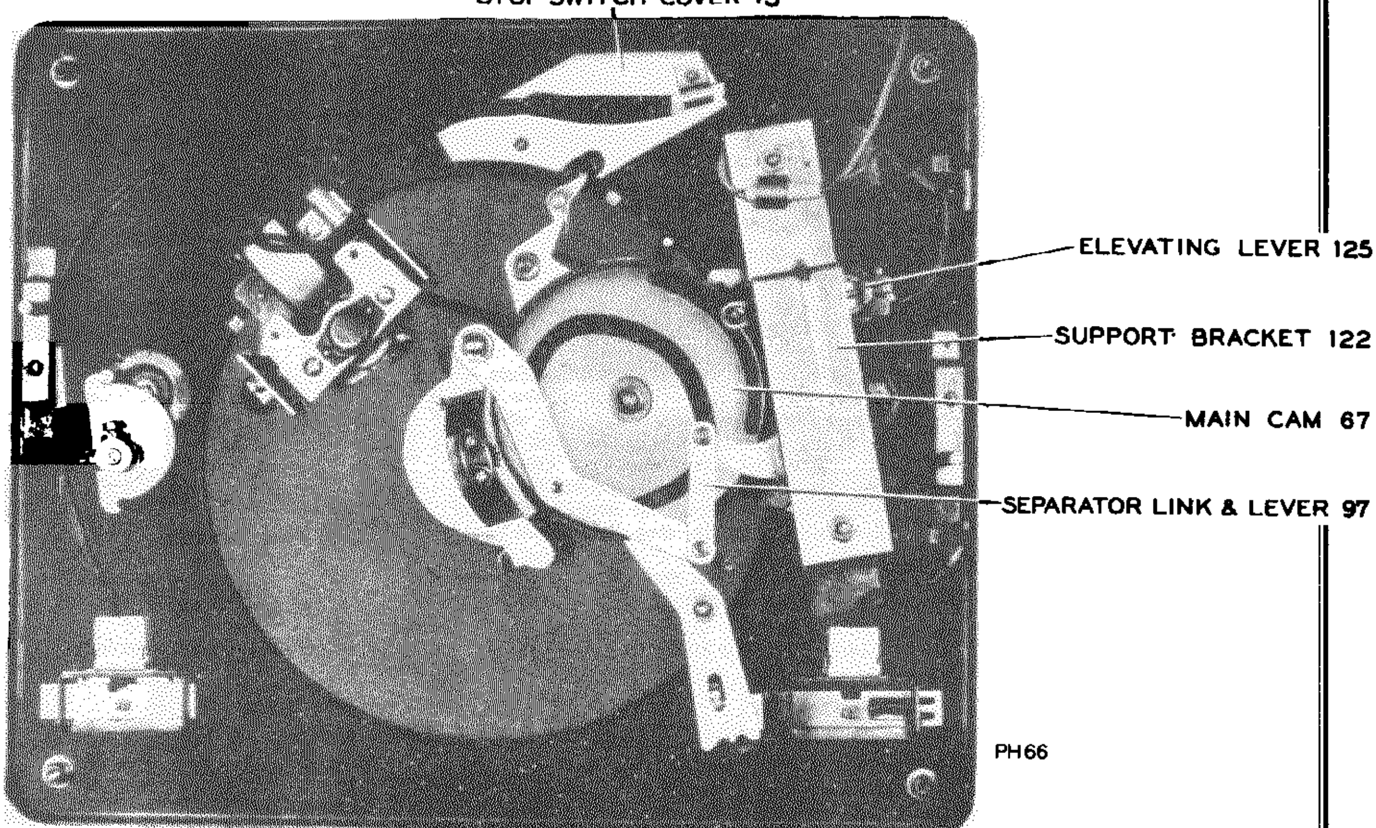
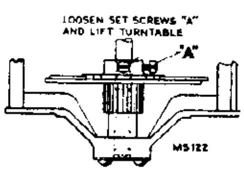
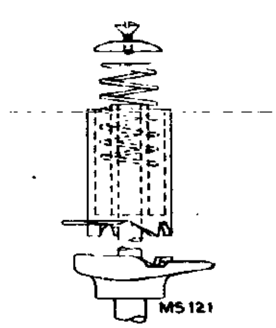


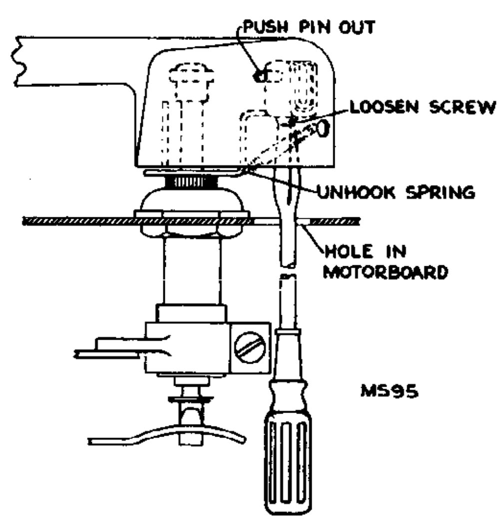
FIG. 2

To remove turntable loosen set screws "A" and lift the turntable.



To remove separator knife, loosen top screw and entire assembly can be dismantled as shown in drawing.





REMOVING TONE ARM

Cycle of Operation

The changer can be conveniently rotated through the change cycle by pushing the reject knob and revolving the turntable by hand. Eight turntable revolutions are required for one change cycle. Block up the motor, so it is disengaged fr the drive disc, to permit easier manual rotation of the tu table.

	Function	Explanation
Operator	Turn Record Support to 10" or 12" Position as Desired	1. Separator post positions itself by means of belt drive.
Operator	Place Records on Posts	1. Separator shaft is pushed down against its spring and carries segment-cam out of path of in finger.
Operator	Push Start Knob	1. Switch connected to start knob momentarily applies power to drive motor until tone arm raised from stop button. 2. Manual-reject lever pushes ratchet lever. 3. Ratchet lever is pushed out of step on main gear shaft and releases drive cam pawl. 4. Drive cam pawl engages cam sprocket and it revolves, carrying drive gear with it.
Automatic Cycle	Tone Arm Rises	1. Main cam and gear revolves with drive gear. 2. Stud on tone arm lever rides in top track on main cam and directs movement of the lever. 3. Tone arm elevating lever rides up on ridge on main cam and pushes tone arm up by me of elevating rod.
Automatic Cycle	Tone Arm Moves Out	1. Tone arm lever pushes on trip lever stud. 2. Trip lever moves out. 3. Stud on trip lever, on its outermost swing, pushes feed-in lever into latch lever (130) (fig. 3 4. Tone arm return lever is carried along by trip lever stud, and by stud on main cam top trc
Automatic Cycle	Record Knife Separates Bottom Record from Stack After Gauging Thickness of Record	1. Stud on separator lever follows main cam bottom track and directs the motion of the lever. 2. Through the separator link and crank, the separator lever turns the separator shaft. 3. Knife turns with shaft and strikes edge of bottom record. 4. Separator shaft continues to revolve and teeth on inner circumference of knife ride up shelf teeth until knife is carried high enough against the action of spring (112) (fig. 4) to m in over top of record.
Automatic Cycle	Record Drops to Turntable	1. Separator shaft continues to turn until knife supports stack of records and shelf moves from under bottom record.
Automatic Cycle	Tone Arm Moves In	1. Separator shaft reverses rotation. 2. Tone arm lever moves away from trip lever stud. 3. While tone arm lever moves away from stud on trip lever, the retard lever, hinged on t arm lever, stabilizes tone arm for accurate landing. 4. Tone arm return lever pushes on trip lever stud. 5. Trip lever moves in.
Automatic Cycle	Tone Arm Lowers Sapphire on to Record	1. Index finger on tone arm return lever moves against separator shaft to insure proper land position. 2. Tone arm elevating lever rides down on main cam ridge thus lowering the elevating rod c the tone arm. 3. Separator shaft returns knife to original position and allows stack of records to rest on sh
Automatic Cycle	Sapphire Moves In to Record Groove Record Begins to Play	1. Ratchet lever rides into eccentric step on main gear shaft and blocks drive cam pawl. 2. Pawl is disengaged from drive cam sprocket. 3. Drive gear and main gear stop. 4. Tone arm lever moves into cam to maintain disengagement. 5. As tone arm lever moves to its innermost position, it contacts feed-in latch (130) (fig. 3), unlat ing feed-in lever. This allows it to gently push pickup into the first groove of the record.
Automatic Cycle	Last Record Drops and the Last Selection Is Finished Playing	1. As the mechanism goes into cycle the separator shaft raises, allowing segment cam to engc index finger and prevent tone arm return lever from pushing tone arm in for landing. 2. Tone arm is lowered into rest position. 3. Power is removed from drive motor by the weight of the tone arm resting on stop button wh opens the stop switch.

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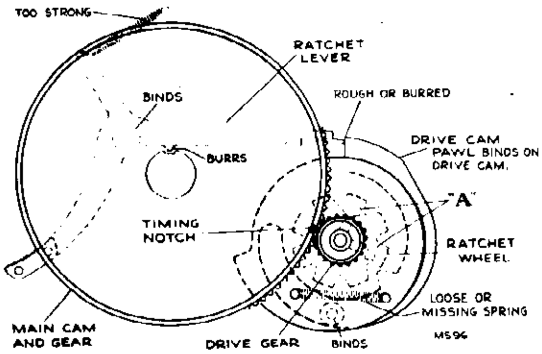
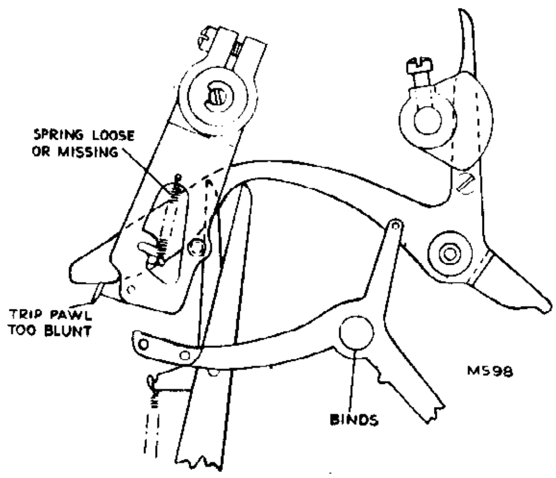
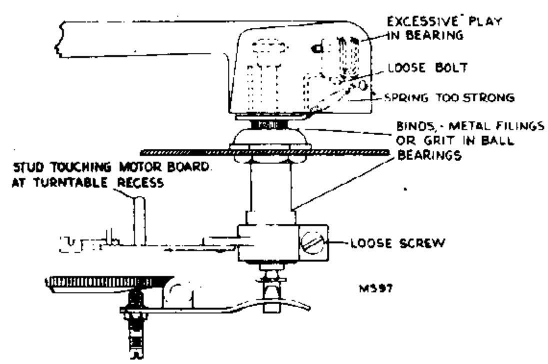
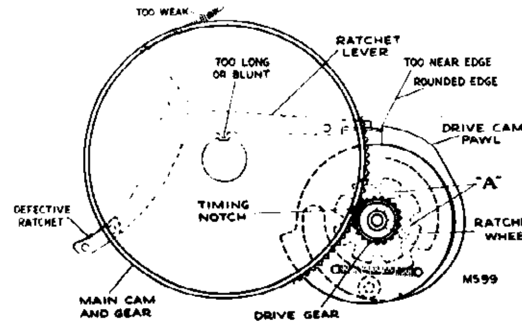
Fails to Trip:

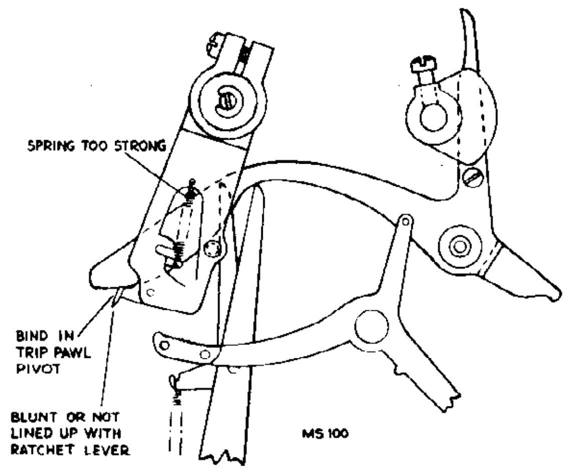




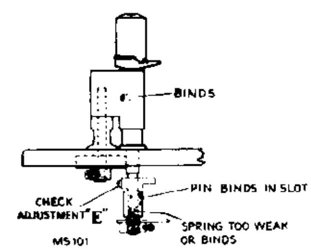


Trips Early:

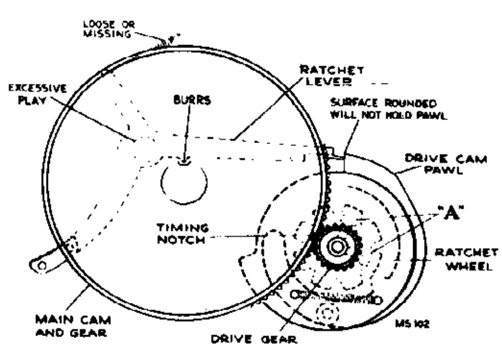


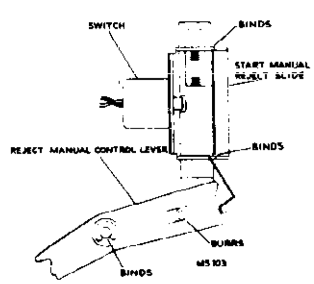


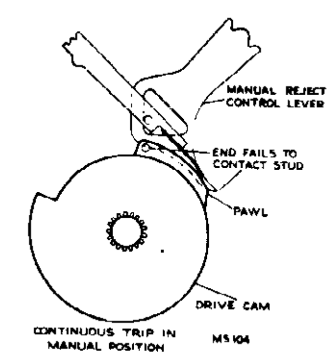
Repeats Playing of Last Record:



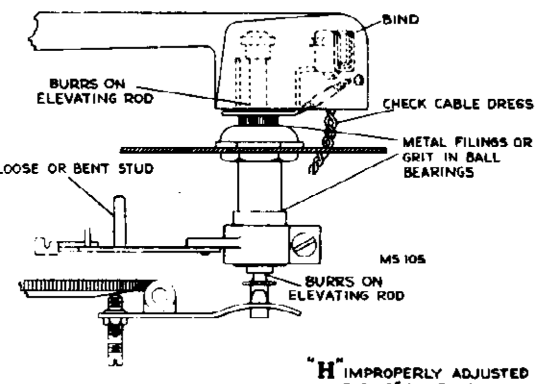
Trips Continuously:

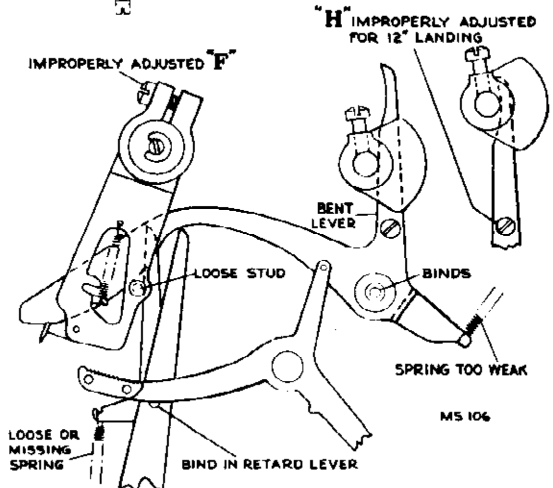


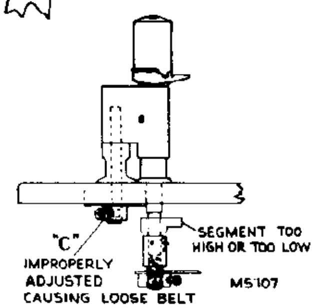




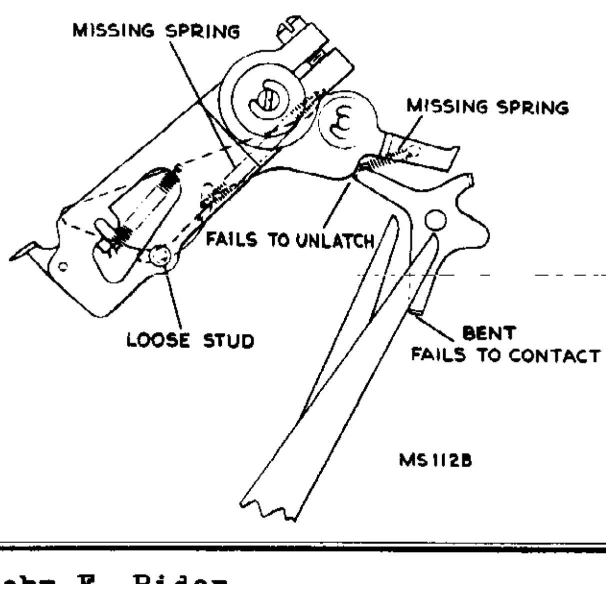
Lands Incorrectly:





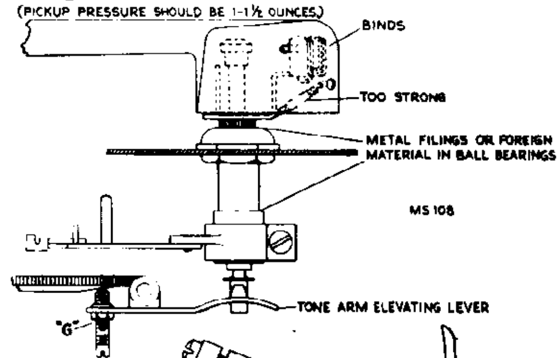


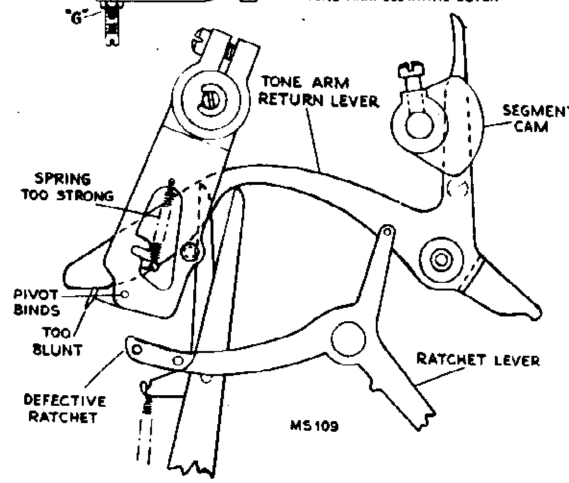
Incorrect Feed-in:



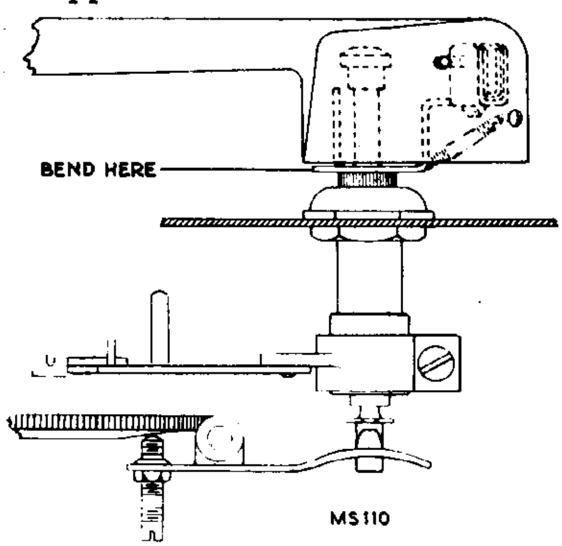
Repeats Grooves:

(PICKUP PRESSURE SHOULD BE 1-1½ OUNCES)

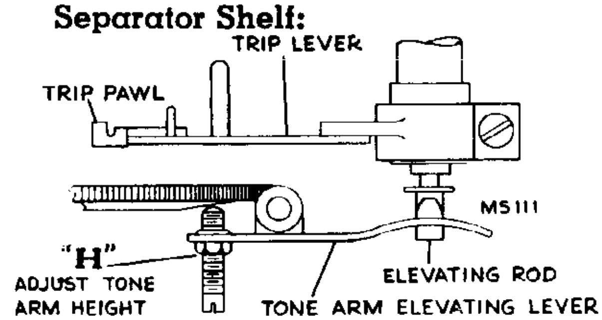




Sapphire Strikes Motorboard:



Tone Arm Touches Record on Separator Shelf:



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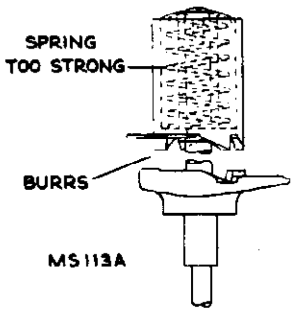
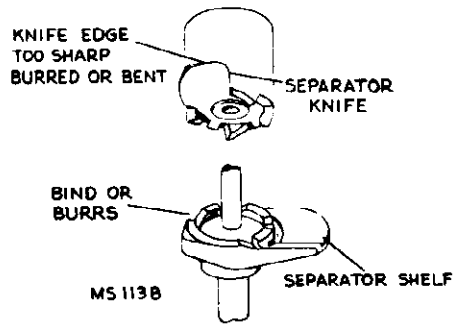
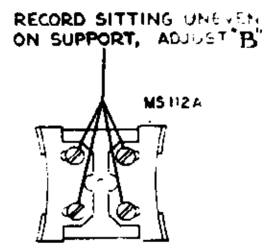
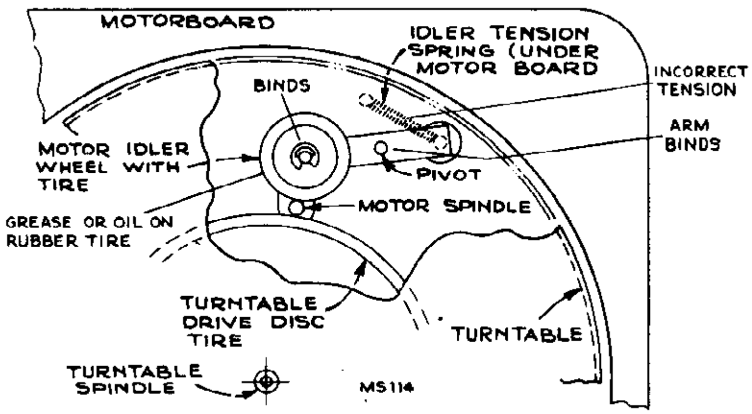
Records Jam or Stack Unsteady:

Record too thick, too thin, warped, or has rough edge.



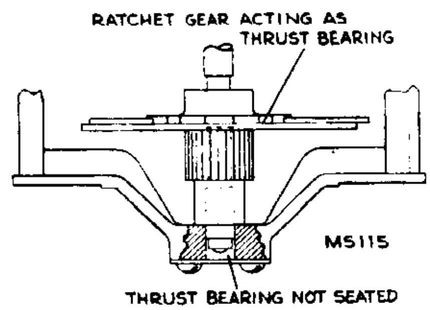




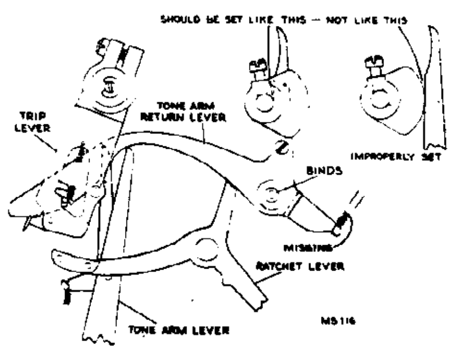


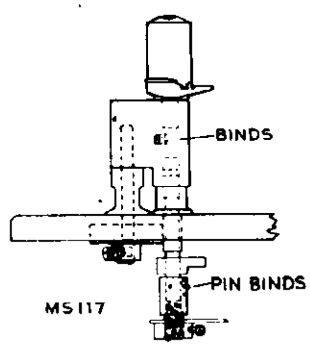
Slow Speed:

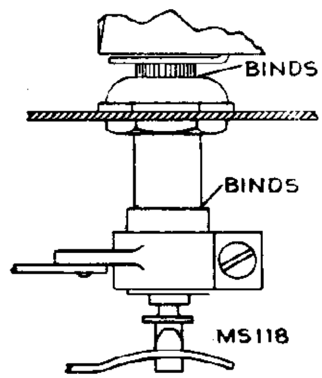
Turntable spindle binds on bottom or top bearing.



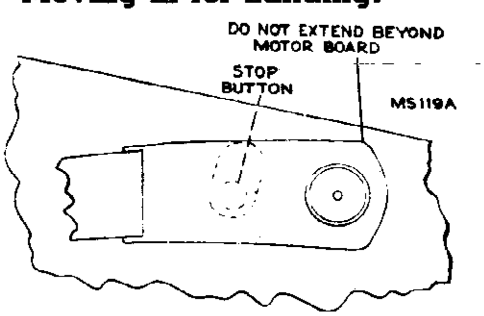
Tone Arm Continues to Come Down in Rest Position:



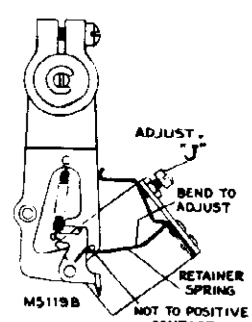




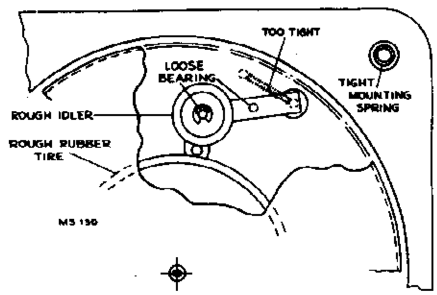
Tone Arm Lands Incorrectly on Rest, Drifts Off of Rest, or Jumps Suddenly When Moving in for Landing:

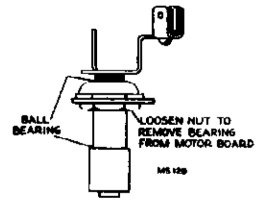


1. Adjust "J" for tone arm limit stop.
2. Bend retainer spring which contacts stud on trip lever, so tone arm is stabilized while on rest or in the outermost position. Do not make too positive contact or motion of tone arm will start motion with a sudden jump.



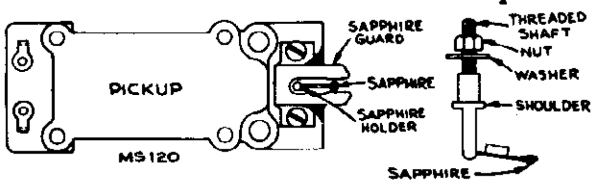
Rumble:





Do not remove ball bearings from tone arm bearing unless absolutely necessary. If cleaning is necessary immerse entire bearing in cleaning solution such as carbon tetrachloride.

Replacement of Sapphire:



Caution: Never bend the sapphire support wire.

The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and push the shaft through the hole in the viscoloid until the sapphire holder assembly comes free.

Use of a drop or two of acetone will facilitate the removal of the nut and shaft. Do not use force as the crystal may be broken.

Insert threaded shaft of replacement sapphire holder through viscoloid and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful so as not to strip the threads or break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough (approx. .020) beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder.

Note: Pickup force should be approximately 1½ oz.

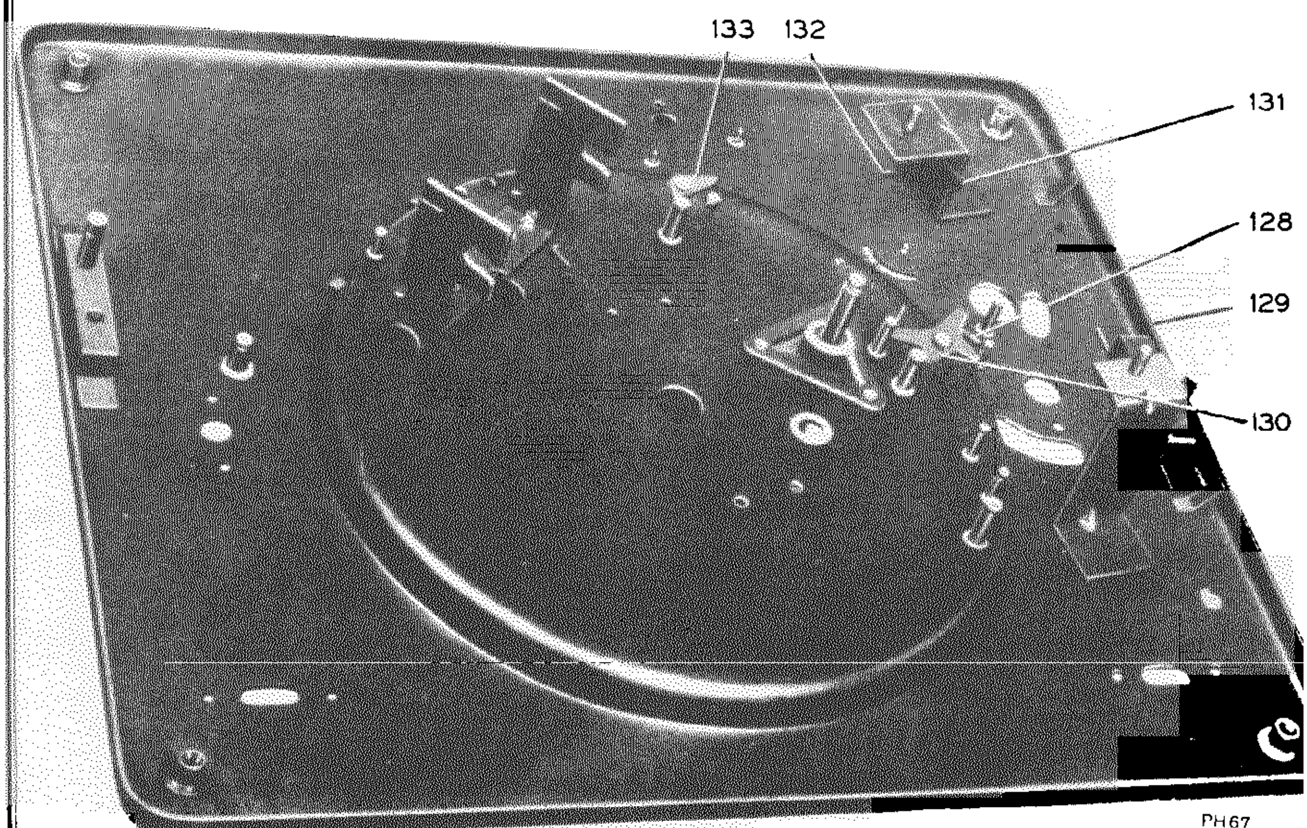


FIG. 3

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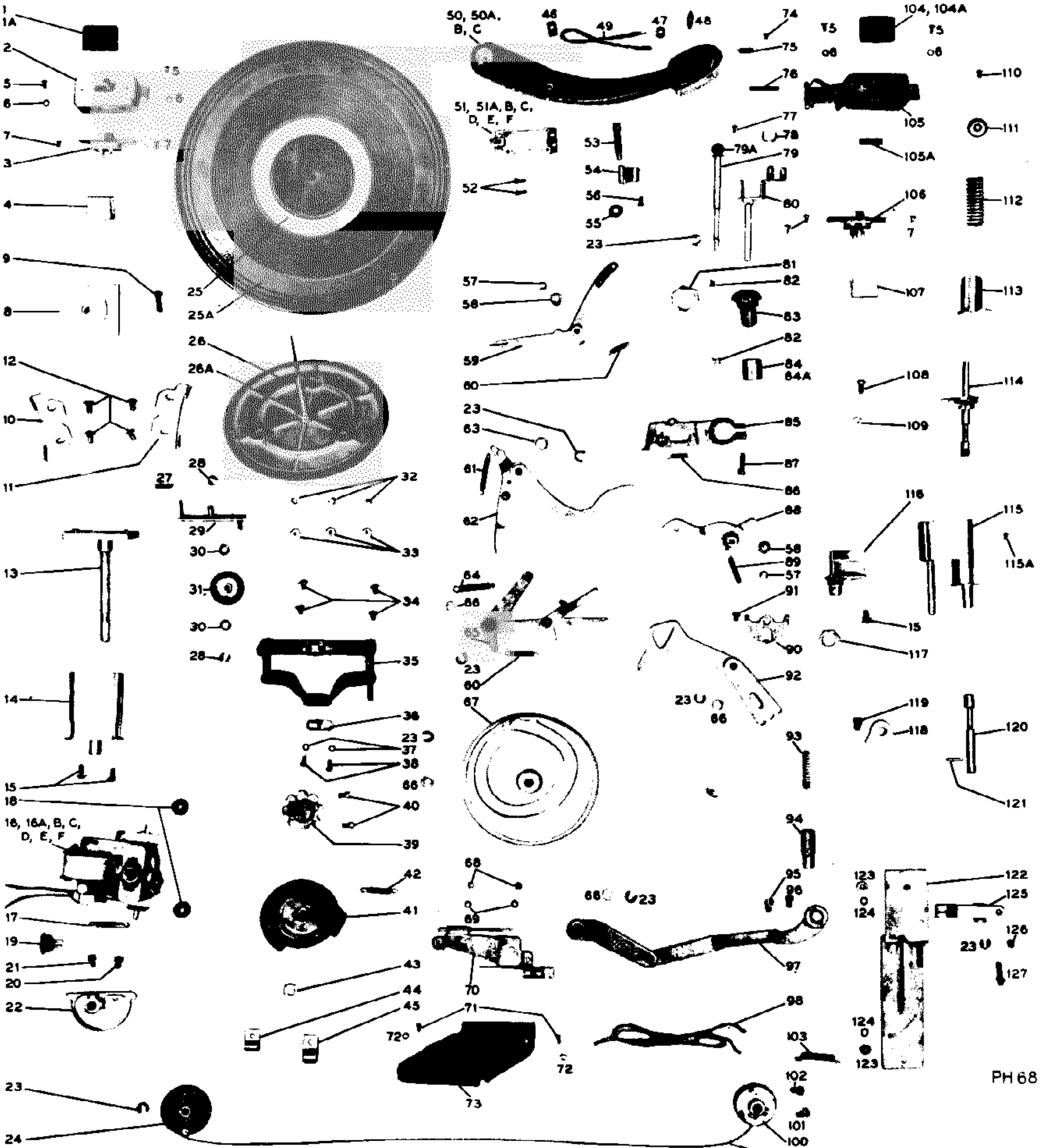

FIG. 4

Replacement Parts

REF. No.	STOCK No.	DESCRIPTION
1*	70946	Knob—"Off-On" knob
1A	14270	Spring—Retaining spring for knobs
2*	70874	Slider—"Off-On" action slider—less switch
3*	70875	Switch—"Off-On" switch
4*	71106	Cover—Metal cover for "Off-On" switch
5*	70881	Screw—#4-40 x ¼" binder head screw for slider controls
6†		Washer—Lockwasher split type #4
7†		Screw—Binding head screw, #4-40 x ¼" brass
8*	70857	Cap—Record support cap
9*	70882	Screw—#10-32 x ¾" oval head screw for record support cap
10*	70862	Support—Record support for 12" records only
11*	70860	Support—Record support for 10" records only
12*	70861	Screw—#10-32 x ⅜" binding head screw for record supports

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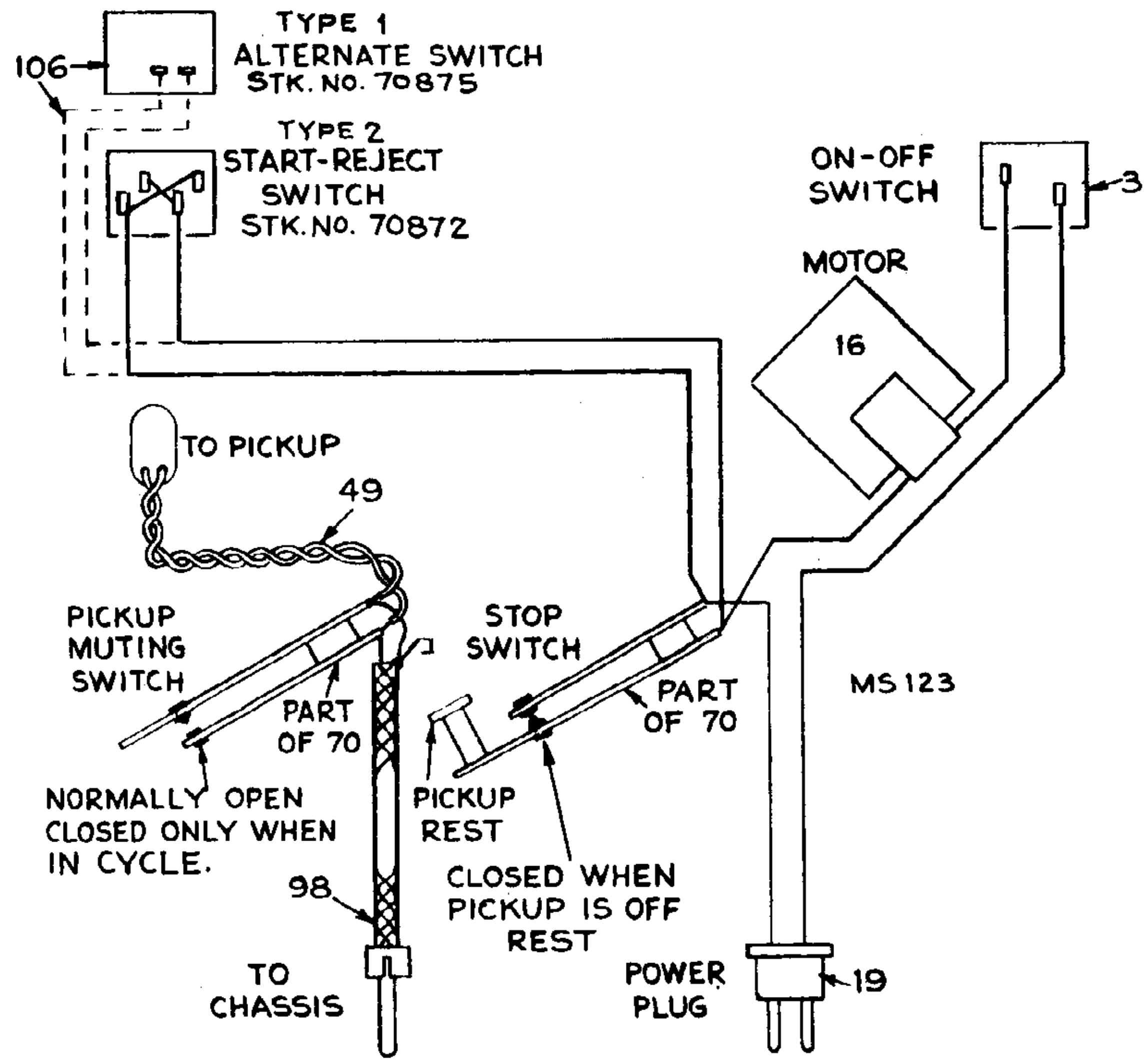

FIG. 5 WIRING DIAGRAM

Note:

This automatic record changer may be equipped with either of two types of "Manual-Reject" switches as indicated in the circuit diagram above.

Type 1 is the usual two position "On" and "Off" switch. This switch should be so installed as to have the "On" position toward the "Reject" position side of the "Start-Manual-Reject" control. Since the switch is shunted across the stop switch, it shorts out the stop switch when the control is placed in the "Reject" position. The switch is automatically returned to "Automatic" position by control slide spring 105-A, (fig. 4).

In the "Manual" position, the turntable will start rotating when the tone arm is lifted from the rest.

Type 2 is a three position "On-Off-On" switch (Ref. No. 106) which operates as type 1 in the "Reject" position, but in addition, it shorts out the stop switch when the control is in the "Manual" position. This allows the turntable to rotate whether the tone arm is on or off the rest if the control is in the "Manual" position.

When replacing switch of type 1 (Photographic Ref. 106) order Stock No. 70875.

The spring (Photographic Ref. 105A) used with type 1 switch is Stock No. 72515.

If, however, it becomes necessary to replace the slide of type 1 (Photographic Ref. 105) order type 2 slider, Stock No. 70871, and also switch, type 2 (Photographic Ref. 106), Stock No. 70872, used in conjunction with type 2 slider.

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REF. No.	STOCK No.	DESCRIPTION
13*	70859	Shelf—Record support shelf and shaft minus supports
14*	70888	Base—Record support base
15†		Screw—Self-tapping screw, #10 x 3/8" long
16	38612	Motor—105-125 volts, 60 cycle (complete with mounting bracket)
16A	37108	Bearing—Bottom bearing and bracket
16B	37107	Bearing—Top bearing and bracket
16C	37109	Bracket—Motor mounting bracket
16D	37111	Coil—Motor field coil assembly
16E	37106	Pad—Rotor thrust pad
16F	37110	Rotor—Motor rotor complete with fan
17*	71545	Spring—Motor tension spring (.192" O.D. x 1½"—58 turns)
18	34368	Grommet—Rubber grommet to mount motor (2 required)
19	30870	Plug—2 prong male plug for power cable
20	39772	Screw—#10-32 x 5/16" fillister head cone point set screw for record support shaft cam
21*	32869	Screw—#10-32 x 5/16" fillister head screw for separator drum and record support shaft cam
22*	70845	Cam—Record support shaft cam—less mounting screws
23	2917	Washer—"C" washer for tone arm lever and for drum and belt assembly, tone arm return lever link and lever assembly, tone arm lever, main cam and manual lever and lift rod.
24*	70899	Drum—Record support belt drum
25*	70865	Turntable—Finished turntable plate (including mat)
25A*	70866	Mat—Rubber mat for turntable
26*	70867	Spindle—Turntable spindle (including disc with rubber tire)
26A	37873	Tire—Rubber drive tire
27*	71546	Spring—Idler arm tension spring (.187" O.D. x 7/8"—31 turns)
28	33726	Washer—"C" washer for idler arm and wheel
29*	70863	Arm—Motor idler arm—less wheel
30	39996	Washer—Fibre washer for idler wheel (2 required)
31	36274	Wheel—Idler wheel
32†		Washer—Lockwasher (split type #6)
33†		Nut—6 x 32 brass
34†		Screw—Machine screw #8-32 x 3/16" long
35*	70891	Support—Turntable spindle support
36*	70860	Plate—Spring thrust plate for turntable spindle
37†		Washer—Lockwasher (split type #6)
38*	70883	Screw—#6-32 x 5/16" round head screw for turntable spring plate
39	38624	Ratchet—Ratchet wheel (drive cam sprocket) for turntable drive—less mounting screws
40	38626	Screw—#8-32 x 1/4" fillister head set screw for ratchet wheel
41*	70853	Cam—Drive shaft cam and pawl—less tension spring
42*	70854	Spring—Drive shaft cam and pawl spring (.195" O.D. x 1-3/16"—42 turns)
43*	70879	Washer—Washer for cam and pawl
44†		Clamp—Metal clamp fastening pickup leads to bracket 122
45†		Clamp—Metal clamp fastening power and motor leads to cover 73
46	38458	Nut—Speed nut to hold cable—located in front of arm
47*	71095	Nut—Speed nut to hold cable—located in rear of arm
48*	71279	Nut—Speed nut to hold cable—located in rear of pivot arm
49*	71278	Cable—Pickup cable (twisted pair)
50*	70901	Arm—Tone arm complete, including reflector cap, crystalite button, and reflector—less pivot arm, crystal and cable
50A*	70903	Button—Crystalite button (part of tone arm)
50B*	70904	Cap—Reflector cap—lucite (part of tone arm)
50C*	70902	Reflector—Reflector (part of tone arm)
51*	70339	Crystal—Pickup crystal (complete)
51A	70019	Damper—Viscoloid damper—top front
51B*	70914	Damper—Viscoloid damper for sapphire
51C	38452	Guard—Sapphire guard
51D	70341	Nut—Mounting washer and nut for sapphire
51E*	70915	Sapphire—Sapphire and holder assembly
51F	37763	Screw—#2-56 x 1/8" screw for sapphire guard
52*	70912	Screw—#4-40 x 3/8" binder head screw to mount crystal (2 required)
53*	71102	Button—Pickup stop switch button
54*	70889	Rest—Pickup arm rest
55	32943	Nut—Pickup stop switch button speed nut
56†		Screw—Self-tapping screw, #10 x 3/8" long
57	20165	Washer—"C" washer for rachet lever and feed-in lever
58†		Washer—Steel washer, O.D. ½", I.D. .193", T-.020"
59*	70851	Lever—Ratchet lever assembly
60*	71549	Spring—Ratchet lever spring (.180" O.D. x 7/8"—54½ turns) and tone arm lever spring
61*	71726	Spring—Tone arm return lever spring (.218" O.D. x 1½"—48½ turns)
62*	70847	Lever—Tone arm return lever
63*	70884	Washer—Bearing washer for tone arm return lever
64*	71547	Spring—Tone arm lever tension spring (.218" O.D. x 1½"—48½ turns)
65*	70858	Lever—Tone arm lever
66*	70877	Washer—.280" I.D. x 7/16" flat washer for tone arm lever, main cam, manual lever and separator link
67*	70864	Cam—Main cam
68†		Nut—Hex. nut 6-32
69†		Washer—Lockwasher (split type #6)
70*	70876	Switch—Pickup muting switch (including stop switch and bracket)
71†		Screw—Round head brass screw, #4-40 x 3/16" long
72†		Washer—Lockwasher (split type #4)
73*	70855	Cover—Stop switch cover
74*	70913	Stud—Pivot arm spring stud
75*	71099	Spring—Pivot arm spring (.187" O.D. x ¾"—24 turns)
76*	70905	Pin—Pivot pin
77*	71097	Screw—#4-¼" long self-tapping screw to lock pivot clamps
78*	71098	Clamp—"U" clamp to lock pivot arm in position
79*	70909	Rod—Pusher rod (including rubber cushion)
79A	38607	Cushion—Rubber cushion for pusher rod
80*	70906	Arm—Pivot arm and shaft
81*	70886	Nut—¾-32 hex nut for pickup arm
82	3658	Ball—Steel ball (3/32" dia.)
83*	70910	Bushing—Pivot arm bushing (upper)
84*	70911	Bushing—Pivot arm bushing (lower)
84A	5042	Screw—#8-32 x 1/8" set screw for lower pivot arm bushing
85*	70856	Lever—Trip lever (including trip pawl and trip pawl spring)
86*	71543	Spring—Trip spring (.135" O.D. x 21/32"—38 turns)
87†		Screw—Fil. head machine screw, #10-32 x 5/8" steel
88*	70873	Lever—Feed-in lever
89*	71550	Spring—Feed-in lever adjusting disc spring (.160" O.D. x 1¼"—75 turns)
90*	70885	Disc—Feed-in adjusting disc
91†		Screw—Binding head, #8-32 x ¼" long
92*	70869	Lever—Manual reject lever
93*	70850	Spring—Record separator shaft bottom spring (.290" O.D. x 1.35"—14¾ turns)
94*	70849	Bushing—Record separator shaft bushing
95*	71100	Screw—#10-32 x ¼" round head screw for link
96	31118	Screw—#10-32 x 5/16" fillister head set screw for link
97*	70852	Link—Record separator shaft link and lever
98*	71105	Cable—Shielded pickup cable complete with plug
99*	70900	Belt—Record separator to support belt—minus drum
100*	70898	Drum—Record separator drum
101	32869	Screw—#10-32 x 5/16" fillister head screw for separator drum and record support shaft cam
102	31118	Screw—#10-32 x 5/16" fillister head set screw for separator drum
103*	71544	Spring—Drum and belt tension spring (.255" O.D. x 1⅜"—27½ turns)
104*	70870	Knob—"Start-Reject-Automatic-Manual" knob
104A		Same as 1A
105*	70871	Slider—Reject action slider—less switch (Type 2) (See Fig. 5 and descriptive note)
105A†		Spring—Included in slider assembly (70871) (Type 2) (See Fig. 5 and descriptive note)
106*	70872	Switch—"Start-Reject-Automatic-Manual" switch (Type 2) (See Fig. 5 and descriptive note)
107*	71107	Cover—Metal cover for "Start-Reject-Manual-Automatic" switch
108†		Screw—Round head mach. screw, #8-32 x 7/16" brass
109†		Nut—Hex nut, #8-32 brass
110*	70893	Screw—#6-32 x ¼" oval head screw for record separator cap
111*	70897	Cap—Record separator cap
112*	70895	Spring—Record separator spring—upper (.622" O.D. x 1-11/16"—13½ turns)
113*	70894	Knife—Record separator knife
114*	70896	Shelf—Record separator shelf and shaft
115*	70846	Swivel—Record separator swivel and shaft
116*	70887	Support—Record separator support
117*	70890	Nut—#9-16/32 hex nut for separator support
118*	70848	Cam—Shut-off or segment cam—fastens on record separator shaft
119*	70878	Screw—#10-32 x 5/16" round head screw for shut-off cam assembly
120*	71280	Shaft—Record separator bottom shaft
121*	71103	Pin—Drive pin for record separator shaft end bushing
122*	70868	Brace—Angle bracket or bottom support for tone arm elevating lever
123†		Nut—Hex nut #10-32
124†		Washer—Lockwasher, #10 split type
125	38631	Lever—Tone arm elevating lever
126*	71104	Nut—#10-32 hex locknut for tone arm lever adjustment
127	39691	Screw—#10-32 x 7/8" headless screw for adjusting tone arm lift lever
128*	71548	Spring—Feed-in control spring (.160" O.D. x 11/16"—52 turns)
129*	70844	Board—Motorboard sub-assembly complete with all welded and riveted parts—less detachable operating parts (Fig. 3)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

* This is the first time this Stock No. has appeared in Service Data.

† These parts are not stocked.

RUSSELL ELECTRIC CO.

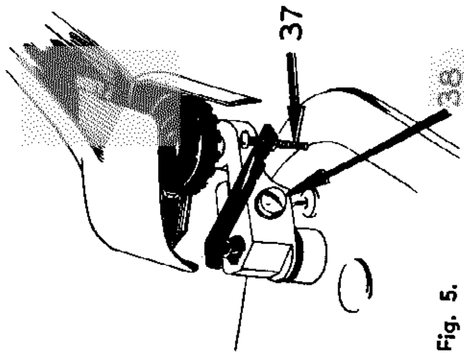


Fig. 5.

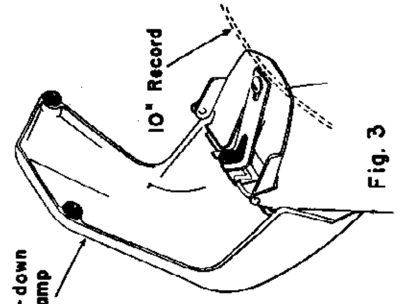


Fig. 3

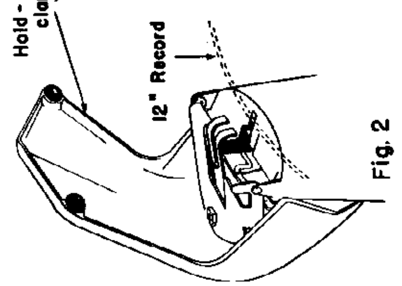
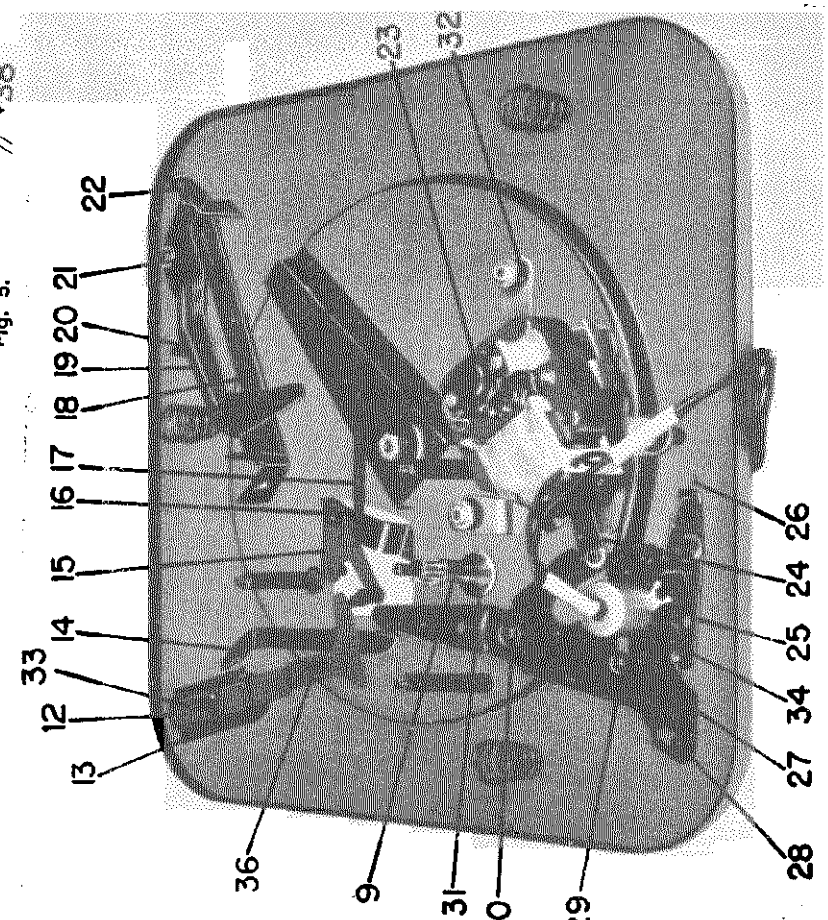


Fig. 2



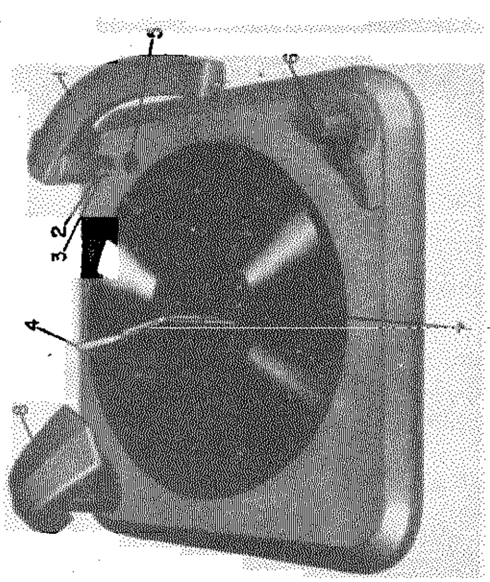
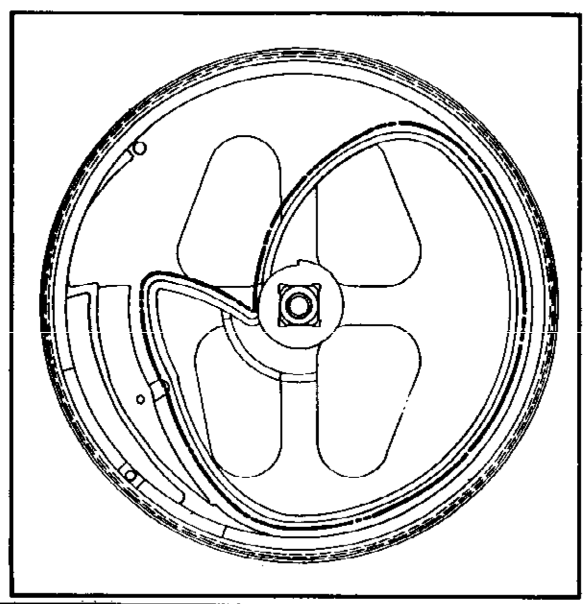


Fig. 1.



MODEL C-9 RUSSELL ELECTRIC CO.

SERVICE AND ADJUSTMENT NOTES

1. TONE ARM, ACTION NOT FREE	(a) Bent detent lever assembly (12). (b) Pin 36 must follow course of heavy dotted line in view of bottom of gear. (See fig. 4). (c) Tone arm lead too tight.
2. TONE ARM, FAILURE TO SET DOWN PROPERLY.	(a) After completing cycle adjust lift pin screw (37) for correct height of tone arm. Bottom of tone arm should be even with top of turntable. (b) Bent tone arm lift lever. (This lever holds screw 37).
3. TONE ARM DROPS TOO FAR IN OR MISSES RECORD.	(a) Minor adjustment—Thru hole in base plate near pickup arm post. Turn screw very slightly to right or left. (b) Major adjustment—Loosen lock screw 38 and slip tone arm bracket to compensate.
4. CLICKING NOISE.	(a) Missing ball retainer assembly (11).
5. FAILURE TO TRIP.	(a(Adjust screw on detent lever assembly (12). (b) Bent or loose positive tripping lever (14), or tripping lever assembly (15). (c) Defective or missing springs (16) or (17).
6. CYCLES TOO SOON OR CONTINUOUSLY.	(a) Weak spring (16).
7. RECORD JAMS BETWEEN SHELF AND SPINDLE.	(a) Bent spindle (4).
8. RECORD FAILS TO DROP FROM SHELF.	(a) Check spring 22.
9. STALLS WHEN REJECTING RECORD.	(a) Adjust idler wheel on changer drive assembly to make better contact with drum.
10. TURNTABLE SPEED SLOW OR IRREGULAR.	(a) Same as No. 9 above.
11. JERKY ACTION DURING CYCLE.	(a) Same as No. 9.

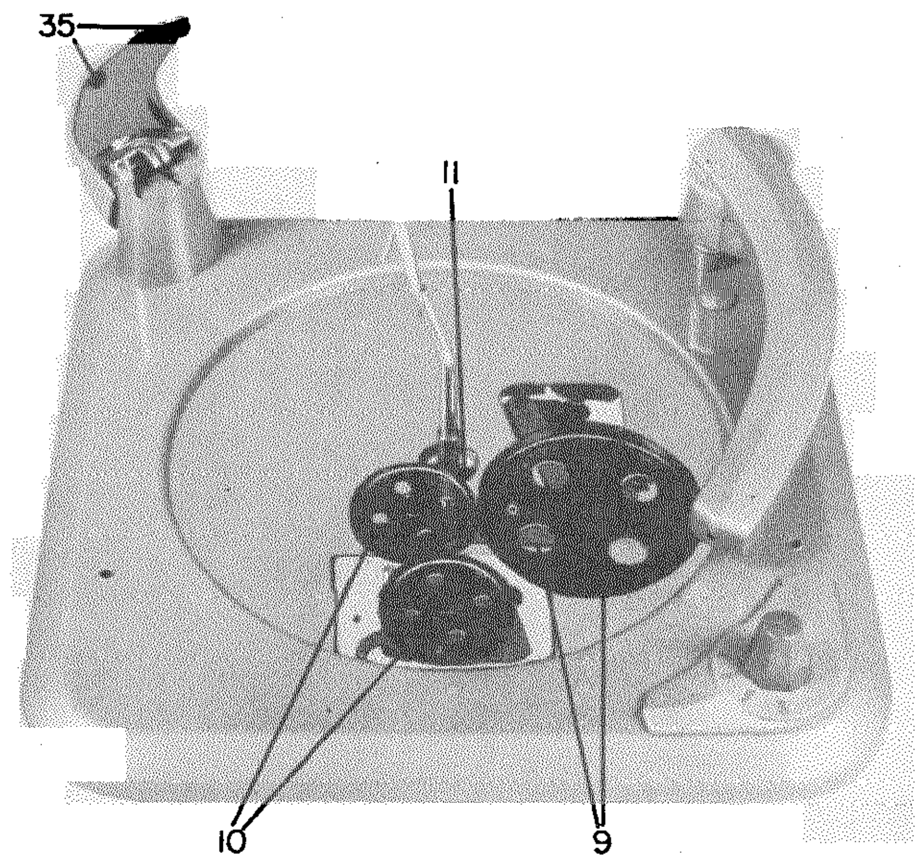


Fig. 7.

TABLE OF REPLACEABLE PARTS

Ref. No.	Part No.	Description
1	20505	Tone Arm Assembly
2	21259	Tone Arm Carrier Assembly
3	21372	Ball Retainer Assembly
4	21016	Center Post Assembly
5	16107	Plug Button
6	20571	Control Knob
7	21258D	Turntable Assembly
8	21252	Push Off Assembly
9	21010	Changer Drive Assembly
10	12757	Idler Wheel Assembly
11	21360	Ball Retainer Assembly
12	21257	Detent Lever Assembly
13	21256	Tone Arm Guide Assembly
14	12354	Positive Tripping Lever
15	21107	Tripping Lever Assembly
16	21287	Spring
17	21113	Spring
18	21254	Selector Bar Assembly
19	20508	Release Arm Assembly
20	20126	Release Arm Spring
21	12761	Spring
22	20127	Spring, Push off Lever
23	21286	Motor
24	20572	Idler Pulley Holder
25	20509	Stop Lever Assembly
26	20570	Spring
27	21255	Tripping Arm Assembly
28	21003	Control Knob Arm Assembly
29	16064	"C" Washer
30	16026	"C" Washer
31	16027	"C" Washer
32	22068	Grommet
33	21260	Tone Arm Lift Post Assembly
34	21377	AC Switch
35	21075	Rubber Bumpers
—	21327	Spring (on top side of 18 selector bar assembly)
	21253	Cam Assembly

MODEL C-10

RUSSELL ELECTRIC CO.

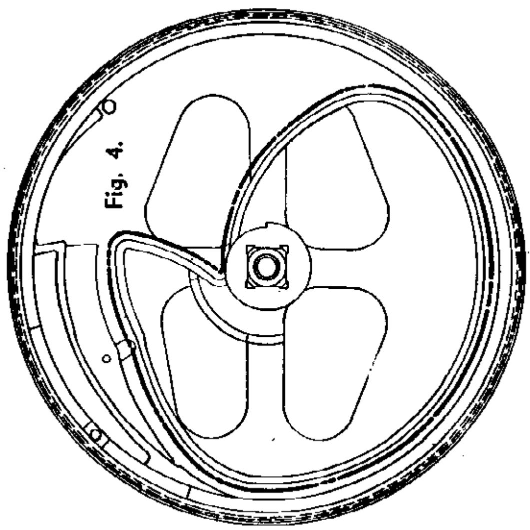


Fig. 4.

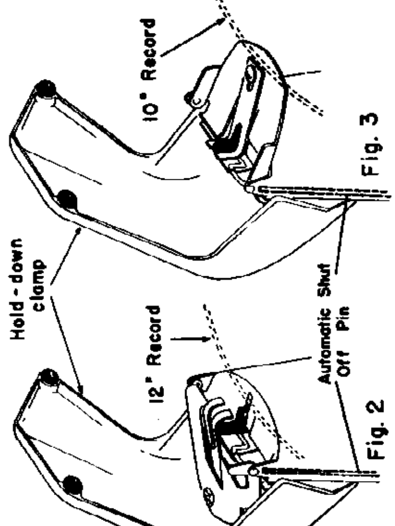


Fig. 2

Fig. 3

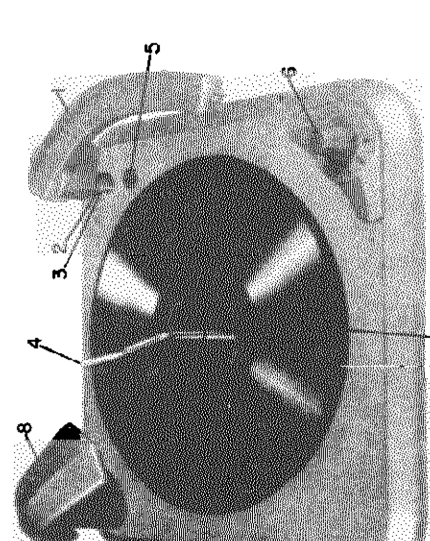


Fig. 1.

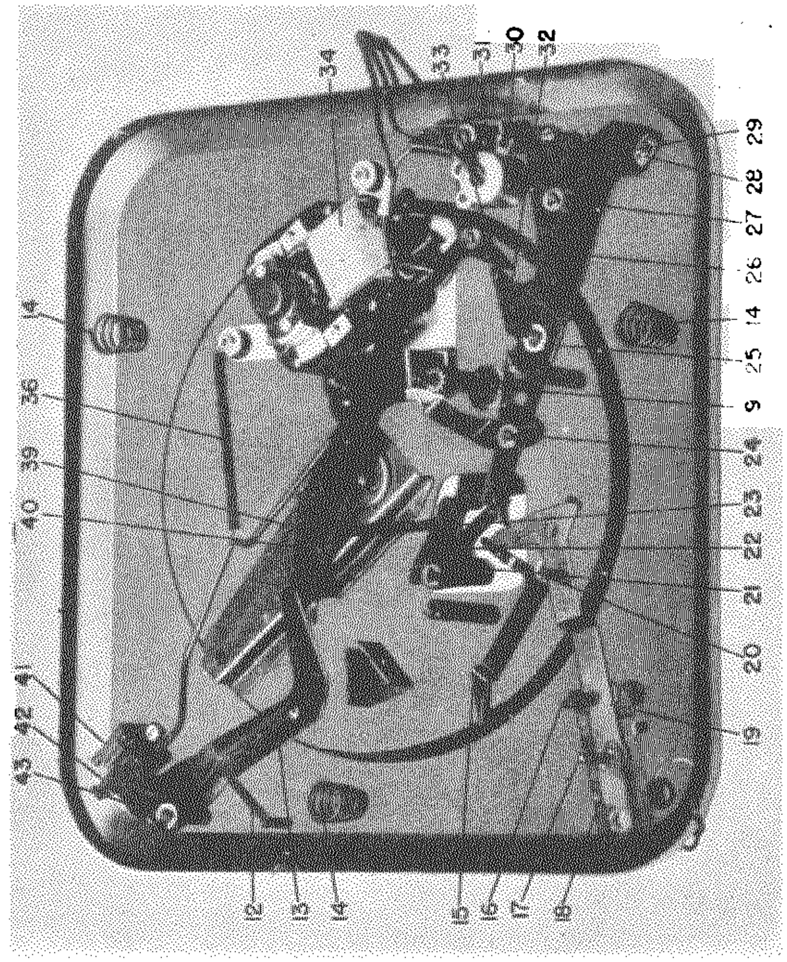


Fig. 6.

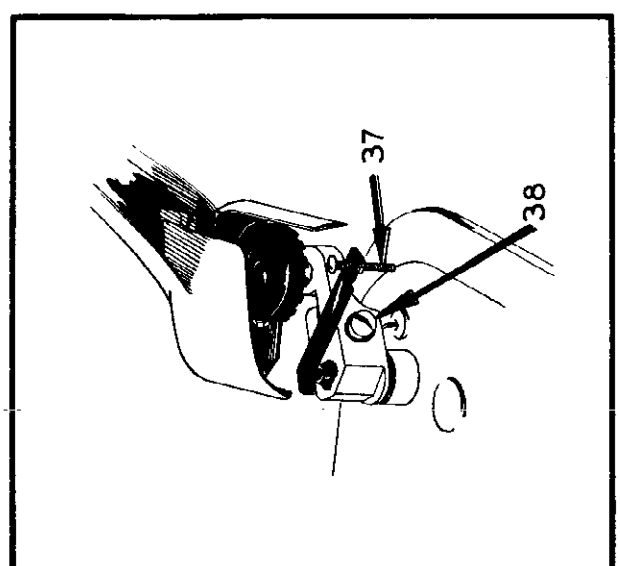


Fig. 5.

SERVICE AND ADJUSTMENT NOTES

1. TONE ARM, ACTION NOT FREE	(a) Bent detent lever assembly (18). (b) Pin 20 must follow course of heavy dotted line in view of bottom of gear. (See fig. 4). (c) Tone arm lead too tight.
2. TONE ARM, FAILURE TO SET DOWN PROPERLY.	(a) After completing cycle adjust lift pin screw (37) for correct height of tone arm. Bottom of tone arm should be even with top of turntable. (b) Bent tone arm lift lever. (This lever holds screw 37).
3. TONE ARM DROPS TOO FAR IN OR MISSES RECORD.	(a) Minor adjustment—Thru hole in base plate near pickup arm post. Turn screw very slightly to right or left. (b) Major adjustment—Loosen lock screw 38 and slip tone arm bracket to compensate.
4. CLICKING NOISE.	(a) Missing ball retainer assembly (11).
5. FAILURE TO TRIP.	(a) Adjust screw on detent lever assembly (18). (b) Bent or loose positive tripping lever (15), or tripping lever assembly (21). (c) Defective or missing springs (22) or (23).
6. CYCLES TOO SOON OR CONTINUOUSLY.	(a) Weak spring (22).
7. RECORD JAMS BETWEEN SHELF AND SPINDLE.	(a) Bent spindle (4).
8. RECORD FAILS TO DROP FROM SHELF.	(a) Check spring 42.
9. STALLS WHEN REJECTING RECORD.	(a) Adjust idler wheel on changer drive assembly to make better contact with drum.
10. TURNTABLE SPEED SLOW OR IRREGULAR.	(a) Same as No. 9 above.
11. JERKY ACTION DURING CYCLE.	(a) Same as No. 9.
12. NO AUTOMATIC SHUT-OFF.	Broken spring No. 36. Bent rod No. 39 sticking automatic shut-off pin or hinge (41).

Adjustment (13) if changer jams after last record is played, bend lever No. (33) about 10/1000 of an inch in direction of switch.

MODEL C-10

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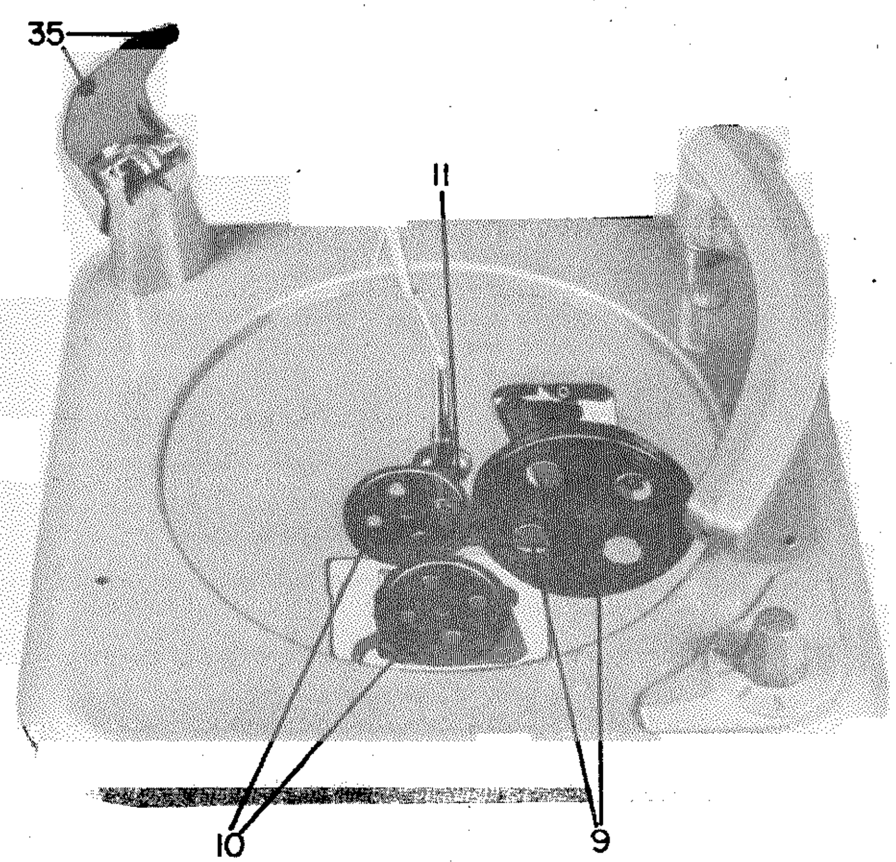

Fig. 7.

TABLE OF REPLACEABLE PARTS

Ref. No.	Part No.	Description
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9	21010	Changer Drive Assembly
10	12757	Idler Wheel Assembly
11	21360	Ball Retainer Assembly
12	20126	Release Arm Spring
13	20508	Release Arm Assembly
14		Mounting Spring
15	12354	Positive Tripping Lever
17	21260	Tone Arm Lift Post Assembly
18	21257	Detent Lever Assembly
21	21107	Tripping Lever Assembly
22	21287	Spring
23	21113	Spring
24	21391	Connecting Lever
25	16026	"C" Washer
26	21396	Tripping Arm Assembly
27	16064	"C" Washer
28	21003	Control Knob Arm Assembly
29	21377	AC Switch
31	20509	Stop Lever Assembly
33	20572	Idler Pulley Holder
34	21286	Motor
35	21075	Rubber Bumpers
36	21393	Spring
37		Height Adjustment Screw
38		Clamp Screw
39	21388	Connecting Rod
40	21395	Automatic Stop Lever Assembly
41	21386	Trunnion Support
41	21387	Hinge
41	21390	Pin
42	20127	Spring, Push off Lever
	21256	Tone Arm Guide Assembly
	21254	Selector Bar Assembly (under 13)
	12761	Spring
	20570	Spring
	16027	"C" Washer
	22068	Grommet
	21327	Spring (on top side of selector bar asembly)
	21253	Cam Assembly
	21394	Stop Rod

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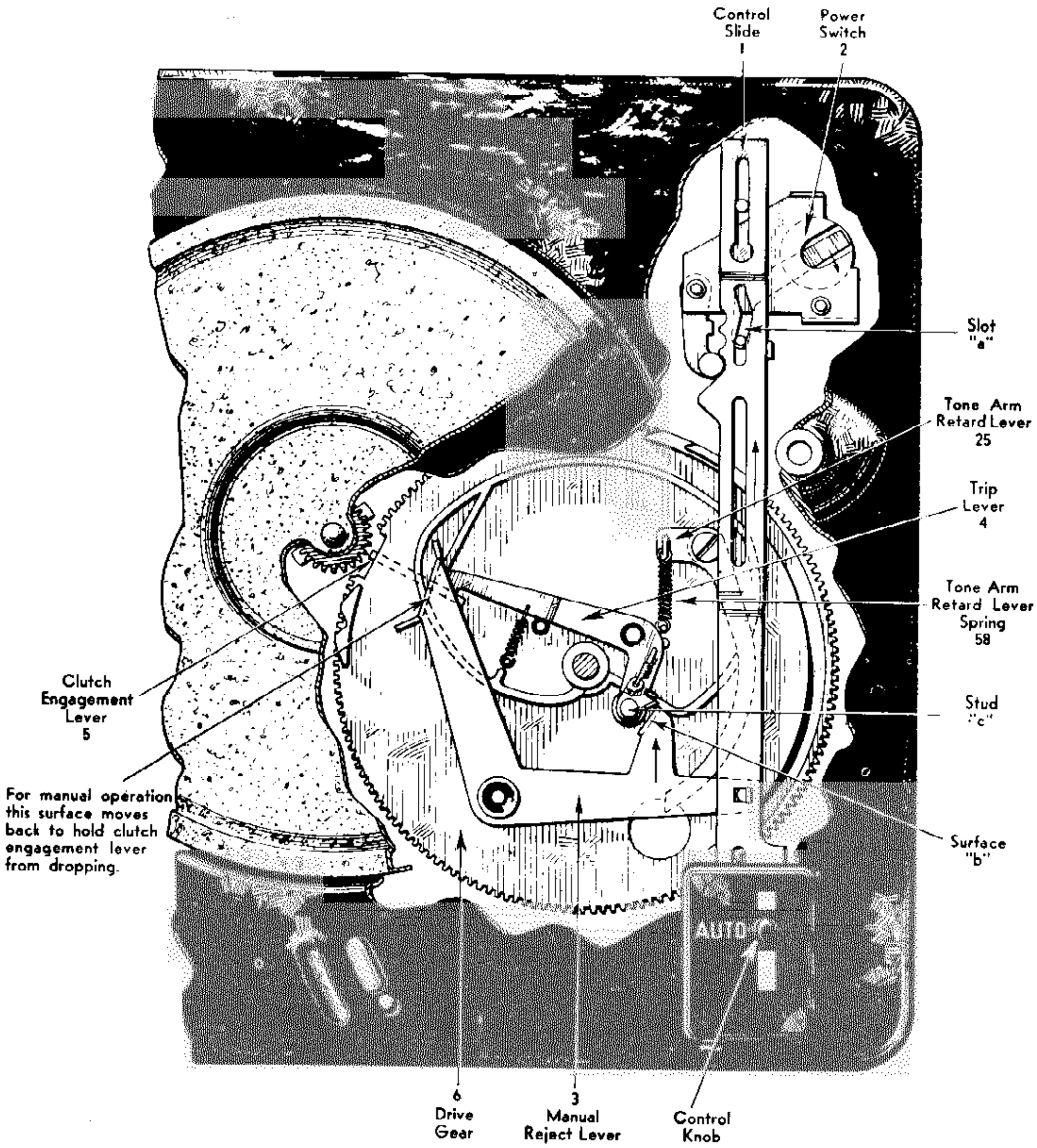

FIG. 2. CUTAWAY—BOTTOM VIEW

I CYCLE OF AUTOMATIC OPERATION—

After placing changer in operating position, with records on the selector arm posts, the control knob governs all subsequent automatic operations.

A. CONTROL SLIDE (1)—Moving the control slide from "OFF" to "REJECT" starts the changer into "AUTOMATIC" operation in three steps:

1. As the control slide moves from "OFF" past "AUTOMATIC", slot "a" in the control slide (1) turns on the power switch (2) starting the motor and turntable.

2. When the control knob reaches "REJECT", the changer is manually "tripped" as follows:

   The control slide pushes the manual reject lever (3) in the direction of the arrow. Surface "b" strikes trip lever stud "c". Trip lever (4) movement releases the clutch engagement lever (5), which drops by gravity. (Levers 4 & 5 are mounted on drive gear (6).)

3. When the control knob is released, it returns from "REJECT" to "AUTOMATIC".

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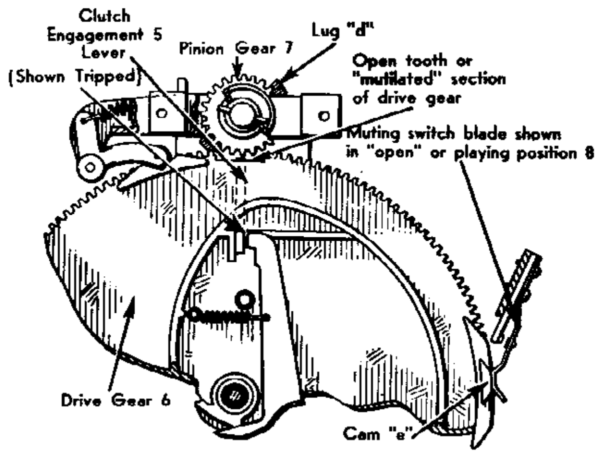

FIG. 3. CUTAWAY—TOP VIEW

B. CLUTCH ENGAGEMENT—

Lug "d" on the rotating pinion gear (7) strikes extended portion of the clutch engagement lever (5), causing drive gear (6) to rotate and mesh with pinion gear (7). (Open tooth or "mutilated" section of drive gear permits pinion gear to rotate freely, EXCEPT during the change cycle.) As the drive gear rotates, the muting switch blade (8) leaves the cam "e" and shorts out the pickup lead during remainder of change cycle.

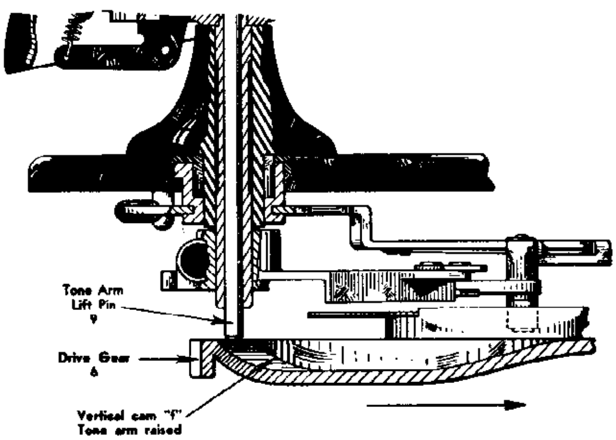

FIG. 4. CUTAWAY—SIDE VIEW

C. ROTATION OF DRIVE GEAR (6)—results in the following cam actions:

1. Vertical cam surface "f" moves the tone arm lift pin (9) and raises the tone arm.

2. Cam "g" (bottom surface of drive gear)

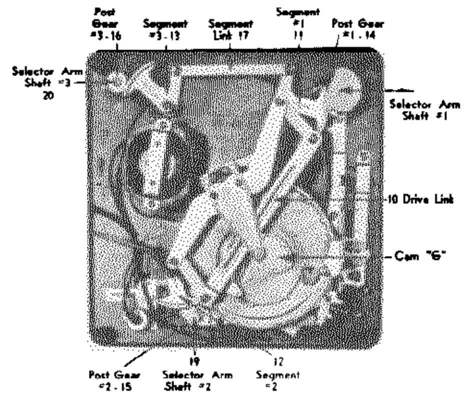

FIG. 5. BOTTOM VIEW

actuates the drive link (10) that induces the quarter turn by which the selector arms release a record.

The motion is transmitted from the gear to the selector arms through the following parts: Drive link (10), Segments #1 (11), #2 (12), #3 (13), Segment link (17), Post gears #1 (14), #2 (15), #3 (16), and Selector arm shafts #1 (18), #2 (19), and #3 (20). All of the parts listed above operate as a unit. The three selector arms are always in synchronism whether operated through the drive link (10) or manually.

See page 21 (Fig. 30), for correct setting of these parts.

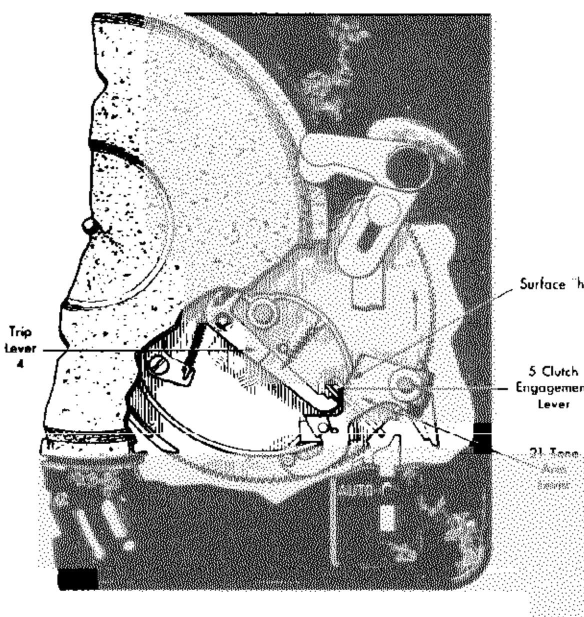

FIG. 6. CUTAWAY—TOP VIEW

3. Surface "h" on the locked tone arm lever (21) resets the trip by latching the clutch engagement lever (5) to the trip lever (4).

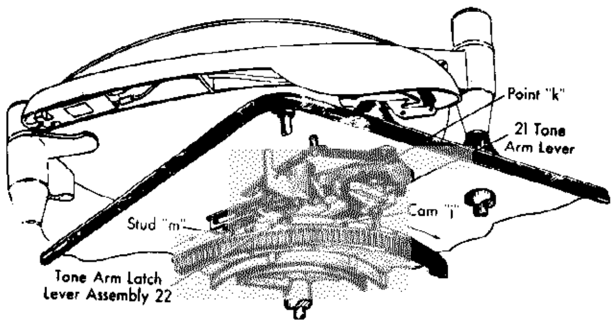

FIG. 7. CUTAWAY—BOTTOM VIEW

4. Cam surface "j" moves the tone arm latch lever assembly (22) so as to unlatch the tone arm lever (21) at point "k". Thereafter, the stud "m" on the tone arm lever follows the receding cam surface "n", which is part of the drive gear; this is shown in Figure 8.

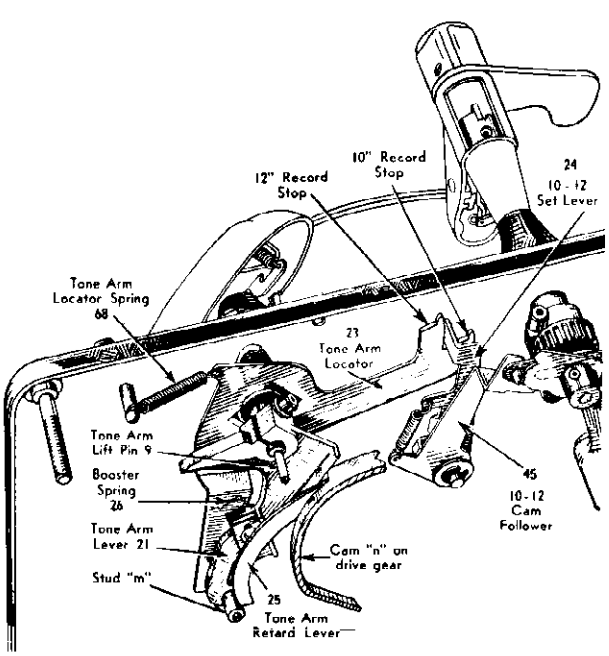

FIG. 8. CUTAWAY—BOTTOM VIEW

5. Spring pressure from tone arm locator (23) moves the tone arm lever (21) and the tone arm in toward the record.

The presence of a 10" or 12" record on the selector arms determines the point at which the tone arm locator (23) stops in contact with the 10-12 set lever (24). Fig. 8 shows 10" and 12" record stops. (See page 10 Fig. 12 for further description.)

6. The tone arm retard lever (25) contacts stud "m" and holds it in position during the time of lowering the needle on the record. (See page 18 on retard lever.)

7. Tone arm lift pin (9) follows vertical cam on drive gear and lowers tone arm to the record. After the needle has touched the record, the booster spring (26) exerts a slight pressure, causing the needle to enter the starting groove. (See page 19 on booster spring action.)

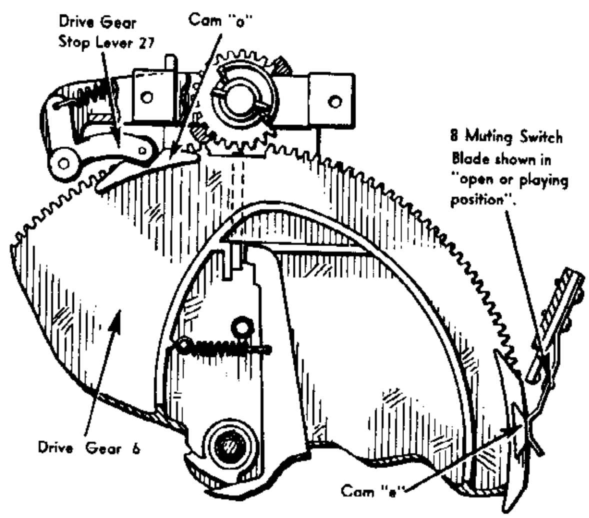

FIG. 9. CUTAWAY—TOP VIEW

8. As the needle starts in the groove, the drive gear (6) completes its rotation and is locked in open-tooth position by the drive gear stop lever (27) in detent in cam "o". Cam "e" engages the muting switch blade (8) and restores pickup lead circuit to normal position. (Both cam "e" and cam "o" are part of the drive gear.)

D. AUTOMATIC TRIPPING—at the end of a record, the needle enters the cutoff groove and a new change cycle is set in motion by either of two actions releasing the clutch engagement lever (5).

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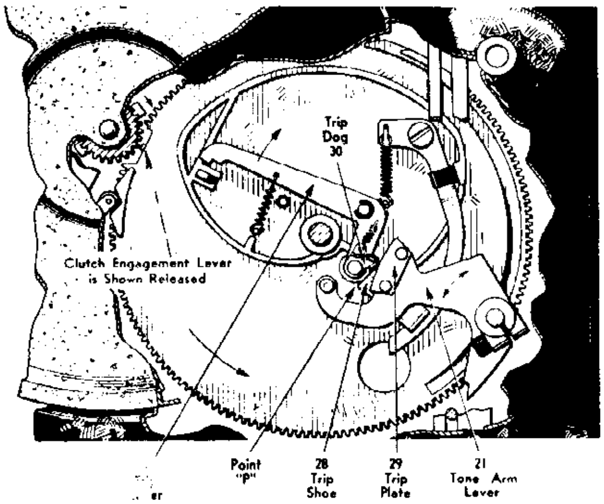

FIG. 10. CUTAWAY—TOP VIEW

1. **MINIMUM DIAMETER CUTOFF** occurs when trip shoe (28) strikes trip lever (4) at point "p". This should take place at approximately 1-7/8" radius on the record.

2. **ECCENTRIC GROOVE CUTOFF** occurs when the tone arm is moved away from the spindle. The sawtooth edge of the trip plate (29) engages and moves the trip dog (30), causing the trip lever (4) to function. This trip operates at all positions of the tone arm, after it has played approximately half of the record.

The changer has now completed one cycle of automatic operation.

II INTERMIXING ACTION—

This changer is of a three-post, automatic intermixing type. Such performance requires three main actions, (A) separation of intermixed records, (B) automatic indexing of the tone arm in accordance with the diameter of the record to be played, and (C) the automatic shutoff is also actuated from the same parts:

Separation of 10" and 12" records, whatever the sequence, is achieved by the selector blades engaging the lowermost record of a stack. If the records are all of one diameter, either 10" or 12", the cam action of the selector blades results in its entering the stack and separating the lowermost record as in a conventional two-post type changer.

In case the stack is entirely 10" records, the post link shoes will contact the edge of each record in succession and will be pushed back.

In case the stack is entirely 12" records, the post link shoes will be depressed flush with the surface of the arm by the weight of the records. These two positions of the post link shoes—i.e., pushed back or depressed—determine the subsequent tone arm indexing and automatic shutoff operation as described below.

When 10" and 12" records are intermixed, there are two separate conditions under which the machine must function:

1. When a 12" record is below a 10"—the selector arms contact the edge of the 12" record, cam upwards to the thickness of the record and swing into the diameter of the 10" record, at which point the leading edges of the blades pass under the 10" record holding it and the remainder of the stack while the 12" record drops into a playing position.

2. If a 10" record is followed by a 12" record, some additional action is necessary to allow for the fact that the 10" record is nominally thinner—this is the most critical action of an intermixed changer, and it is accomplished by the post link shoe and the vertical action of the lifter plunger. Whenever the post link

shoe comes in contact with the edge of a 10″ record, it is forced back as the selector arms rotate and the lifter plunger lifts the 12″ record immediately above, together with the rest of the stack, to such a height that the selector blades enter into a clear space between the 10″ and 12″ records. Further rotation of the arms release the 10″ records onto the turntable.

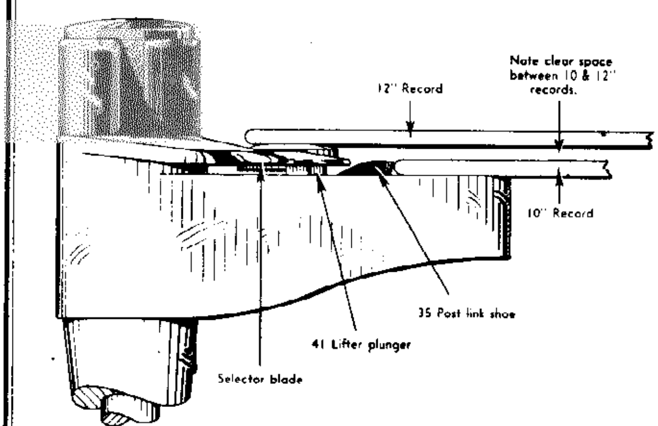

FIG. 11. CUTAWAY—SIDE VIEW

Figure 11 shows this action with the 12″ record raised on the lifter plungers and a clear space available into which the selector blade can enter.

Figure 12 shows the cutaway view of the selector arm with the post link shoe and the lifter plunger in the normal unloaded position. These parts must operate freely and return to the normal position after the post link shoe has either been depressed (as in the case of the 12″ record) or has been pushed back (as in the case of the 10″ record). Any tendency to stick or bind in either position will cause incorrect operation of the changer.

B. SELECTOR ARM #2 controls the tone arm indexing for 10″ or 12″ records through the action of the post link shoe on post #2. If the post link shoe is pushed back by the edge of a 10″ record, the tone arm will be indexed for a 10″ record. If the post link shoe is depressed by a 12″ record, the tone arm will be indexed for a 12″ record.

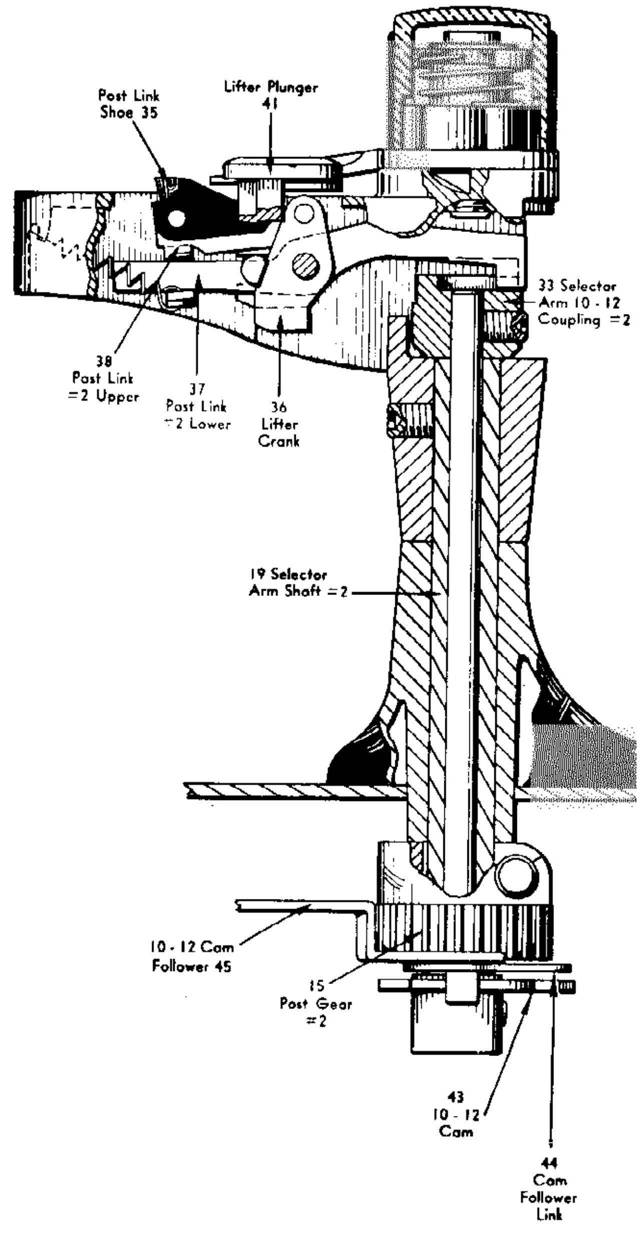

FIG. 12. CUTAWAY—SIDE VIEW

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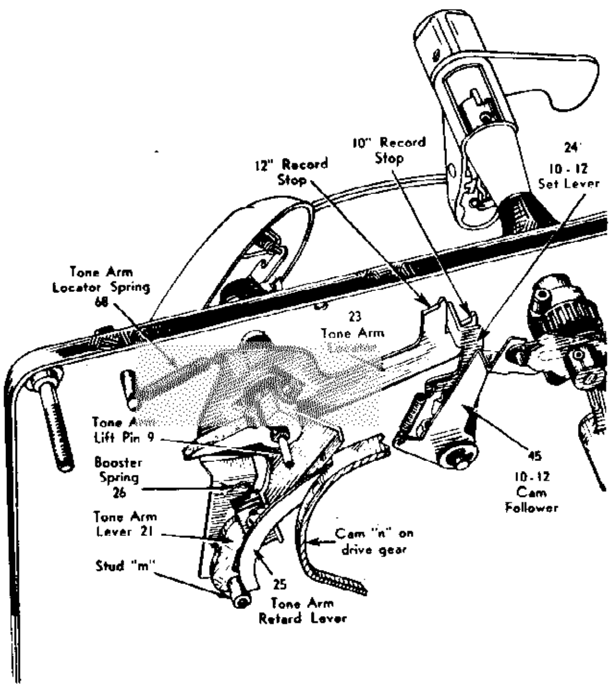

FIG. 12A. CUTAWAY—BOTTOM VIEW

The 10-12 set lever (24), the 10-12 cam follower (45), the 10-12 cam (43) and the 10-12 cam follower link (44) index the tone arm properly for a 10" or 12" record, depending on the lowest record on the selector arms. This is accomplished by the action of the selector arm 10-12 coupling #2 (33) when actuated by the post link shoe (35), the lifter crank (36), post link #2 lower (37), and post link #2 upper (38) in transmitting the motion of selector arm shaft #2.

The engagement of the 10-12 set lever, with the tone arm locator, determines the indexing of the tone arm. This engagement must be such that the hook on the tone arm locator prevents manual changing of the setting. All parts above must return freely. (See Fig. 8.)

It should be noted that when the post link shoe is depressed there is no mechanical connection with the selector arm coupling since post link #2 clears the selector arm coupling completely. Only when the post link shoe is in normal position or **is pressed back is there mechanical connection with those components which control the tone arm indexing.**

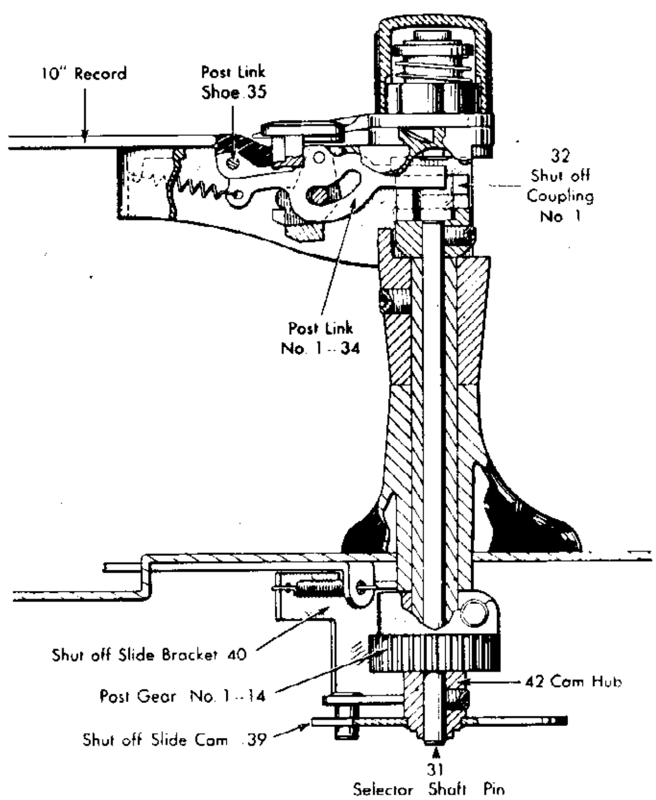

FIG. 13. CUTAWAY—SIDE VIEW

C. **SELECTOR ARM #1 controls the automatic shutoff through the action of the post link shoe in post #1. There are three possible positions of this post link shoe: unloaded, pushed back (by a 10" record) or depressed (by a 12" record). Under the first condition, corresponding to an unloaded changer, the post link #1 will engage the selector arm coupling #1 and will set into motion the automatic shutoff cycle as described in Part III. In either of the other two positions —that is, either pushed back or depressed, the post link #1 entirely clears the shutoff coupling #1 (as shown in Fig. 13) and thus the automatic shutoff mechanism is not actuated.**

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D. SELECTOR ARM #3—provides a symetrical support and separating device in conjunction with arms #1 and #2. Unlike arms #1 and #2 there is no mechanical connection between the post link shoe or lifter plunger and the mechanism beneath the changer.

III A. AUTOMATIC SHUTOFF—

Is of the gravity triggered type. Upon completion of an automatic shutoff cycle the following functions have been performed: (a) Moved the tone arm into a positive locked position at the outside edge of panel, (b) moved the control knob to the "OFF" position, and (c) turned off the motor switch. After the last record has dropped from the selector arm posts, the following actions occur:

1. The dropping of the last record from the selector arms permits the post link shoe (35) to resume its normal rest position, so that on the next change cycle, the post link #1 (34) drops into the slot in the selector arm shutoff coupling #1 (32), in a position to move the shutoff slide bracket (40), through the action of the shutoff slide cam (39). This cam and hub are mounted on the selector shaft pin (31).

The last record having finished, the drive gear is set in motion by the automatic tripping action. (See page 8.)

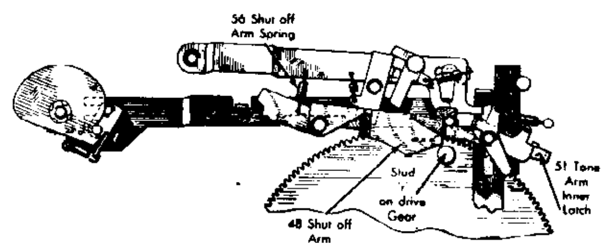


FIG. 14. CUTAWAY—BOTTOM VIEW

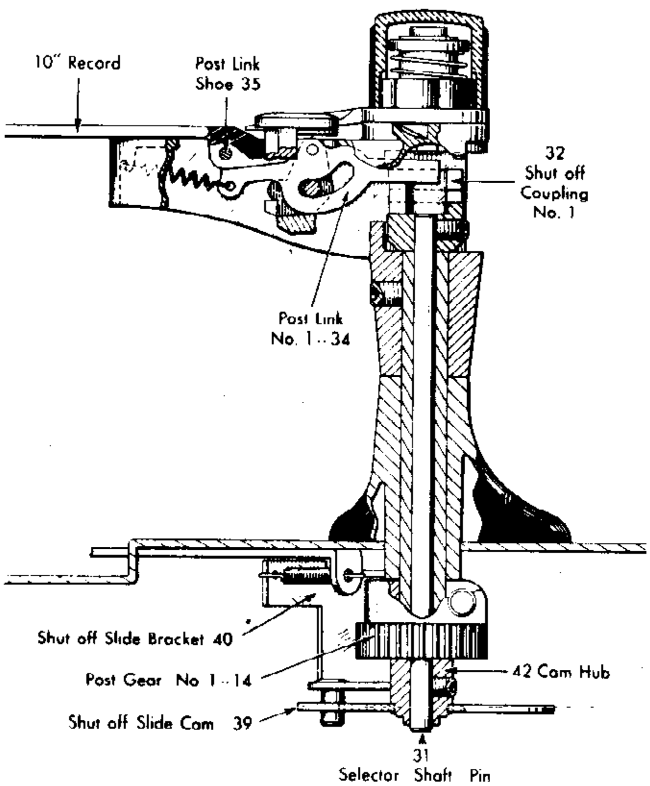


FIG. 13. CUTAWAY—SIDE VIEW

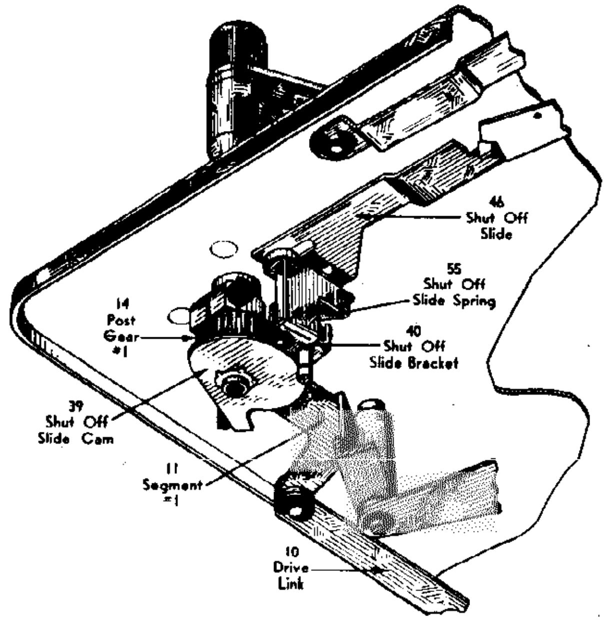


FIG. 15. CUTAWAY—BOTTOM VIEW

2. As the drive gear (6) rotates, the stud "r" leaves contact with the shutoff arm (48) which moves in toward the drive gear (6) by the action of the shutoff arm spring (56).

3. The drive link (10) and segment #1 (11) move the post gear #1 (14) rotating the shutoff slide cam (39) against the stud on the shutoff slide bracket (40). The shutoff slide (46) will be moved by the shutoff slide spring (55).

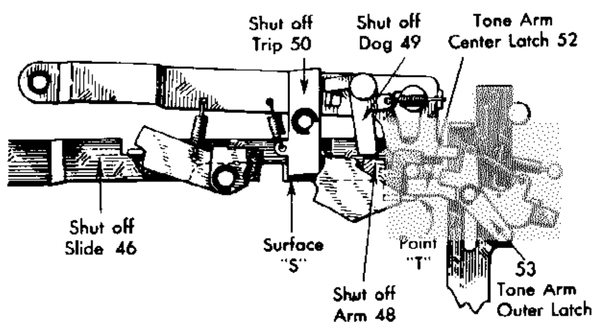


FIG. 16. CUTAWAY—BOTTOM VIEW

4. The shutoff slide (46) moves against the shutoff trip (50) at surface "s". The resulting rotation of the shutoff trip disengages it from the shutoff dog (49) and allows the latter to align itself with the shutoff arm (48). (See page 15 for detailed operation of shutoff trip and dog.)

During the preceding portion of the change cycle, the tone arm has been moved out to the rest position and momentarily locked by the tone arm inner latch (51). This preceding action is part of the normal change cycle. During an automatic shutoff cycle, the movement of the shutoff slide described above results in the end of that slide locking when the tone arm outer latch (53) is engaged by the cam on the outer edge of the drive gear. (See page 17 for detailed action of tone arm latches.) After the cam on the drive gear has passed the outer latch (53) the shutoff slide moves back to its normal position.

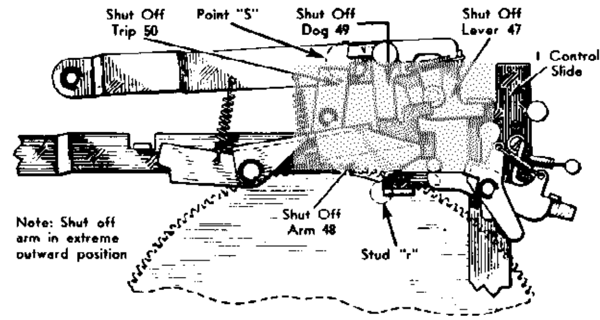


FIG. 17. CUTAWAY—BOTTOM VIEW

5. Just at the end of the drive gear cycle, the stud "r" engages the shutoff arm (48), moves the latter to its extreme outer position, (this position shown in Fig. 17), and through the locked shutoff dog (49), moves the shutoff lever (47). This latter movement forces the control slide (1) into the "OFF" position and turns off the power switch (2). The completion of the drive gear cycle permits the shutoff arm (48) to resume its rest position. As the shutoff lever (47) moves to the rest position, the shutoff dog (49), pivoted thereon, is caught by the shutoff trip (50) and reset in its rest position. (See Fig. 14 for "rest" position of these parts. See page 15 for detailed operation of shutoff trip and dog.)

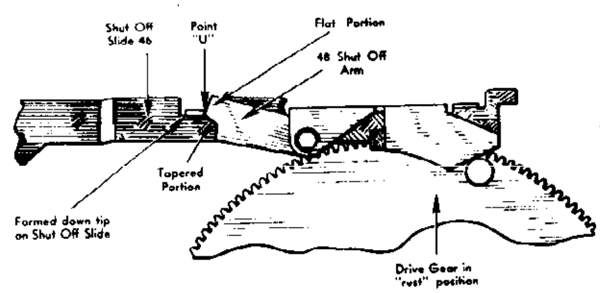


FIG. 18. DIAGRAMATIC

B. SHUTOFF GUARD ACTION is necessary to prevent tripping the automatic shutoff mechanism when the selector arms are manually rotated.

When the shutoff slide cam (39) is manually operated, through the selector arm knobs, while the drive gear is in the rest position and there are no records on the selector arms, an important action take place. The shutoff slide (46) moves forward until it is blocked by shutoff arm (48) at point "u". This blocking action prevents rotation of the shutoff trip (50) and subsequent tripping of the shutoff dog (49). The preceding motions prevent operation of the automatic shutoff mechanism. It should be noted that this guard action can occur only when the drive gear is in the rest position.

This guard action is cleared during an automatic shutoff cycle as soon as the shutoff arm moves in. Movement of the shutoff slide is then possible because the formed down tip on the shutoff slide can move until it strikes the tapered portion instead of being blocked at the flat portion at the rear of the shutoff arm.

C. CLEARANCE POINTS:

1. SHUTOFF CAM & POST #1

There are two conditions on post link #1 and the selector arm shutoff coupling #1 should be checked:

a. When there are records on the selector arms these two parts clear so there is no mechanical coupling.

b. When there are no records on the arms, the post link #1 should drop into the slot in the shutoff coupling so that there is positive engagement. (See Fig. 13, page 11.)

2. SHUTOFF SLIDE—(refer to Sec. II-A for action of the shutoff slide during normal automatic shutoff cycle, and to Sec. II-B for the guard action of the shutoff slide). There are two clearance positions that must be checked at point 1, Fig. 19.

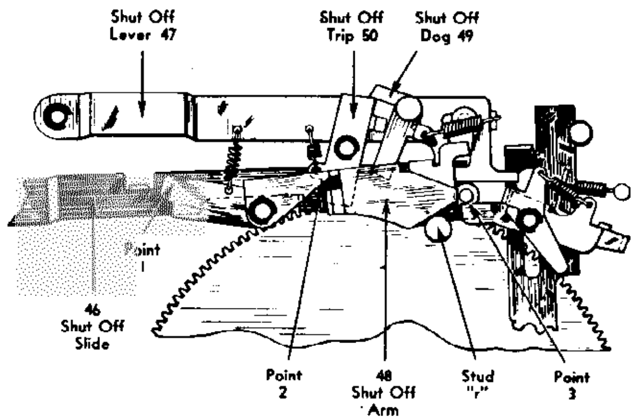


FIG. 19. CUTAWAY—BOTTOM VIEW

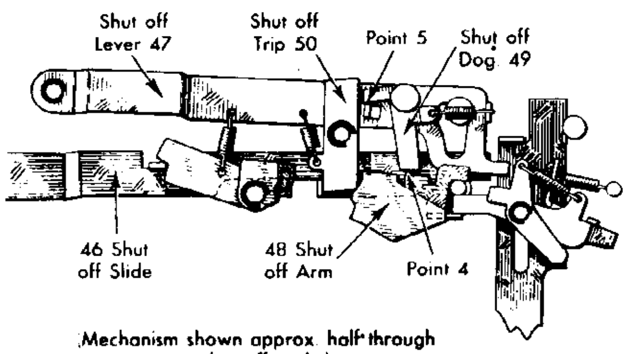
a. The first of these occurs when the shutoff arm is resting against the stud on the drive gear in the normal rest position. Under this condition the tail of the shutoff arm must clear the formed down portion of the slide so that it does not touch as the shutoff arm rotates, but this same clearance must be sufficiently small so that the slide cannot move forward far enough to take up the clearance at points 2 or 3 (the first of which would actuate the shutoff trip and the second of which would block the movement of the tone arm center latch).

b. The second condition under which this clearance point must be checked occurs when the stud on the drive gear has rotated just far enough into a change cycle so as to move out of contact with the shutoff arm and allow the arm to rotate into its extreme position against the stud on the panel. Under this condition there is additional clearance at point 1. This additional clearance must now be sufficient to:

(1) Allow the shutoff slide to actuate the shutoff trip at point 2. If the clearance at

point 1 is too small to allow sufficient motion of the slide, the shutoff trip may fail to operate (since it will not completely clear the shutoff dog and set up the mechanism for an automatic shutoff cycle). The shutoff slide must move far enough so that the shutoff trip completely clears the shutoff dog and the dog is free to rotate against the stop.

(2) Block the tone arm center latch at point 3 (See Fig. 16, point "t" for blocked condition). Excessive clearance at this point will allow the inner latch lever to be partially disengaged by the rotation of the drive gear. Insufficient clearance might cause a wedging action which would prevent smooth operation of the shutoff slide.



(Mechanism shown approx. half through an automatic shut off cycle.)

FIG. 20. CUTAWAY—BOTTOM VIEW

3. SHUTOFF TRIP AND SHUTOFF DOG: Point 4 is the point of contact between the shutoff arm and the shutoff dog. As described in the previous section, the shutoff slide actuates the shutoff trip clearing the shutoff dog and allowing it to rotate from the position shown in Figure 14 to the position in Figure 20. At point 4 and in the position shown in Figure 20, it is necessary that there be sufficient clearance between the formed up end of the shutoff arm and end of the shutoff dog at point 4 so that the dog can assume the position shown in Figure 20.

It should be understood that the shutoff trip is fastened to the changer panel and is spring loaded, while the shutoff dog is atached to the shutoff lever and is also spring loaded. As the automatic shutoff cycle progresses, the drive gear stud rotates until it strikes the shutoff arm with a cam action forcing it out toward the edge of the panel. This outward motion of the shutoff arm is transmitted to the shutoff lever because of the abutment shown in Figure 20 at point 4. (Remember that this alignment occurs only during an automatic shutoff cycle. At any other time, the shutoff dog does not engage the shutoff arm.) Further movement of the shutoff arm and the shutoff lever toward the outer edge of the panel will result in the shutoff dog completely clearing the shutoff trip. This position is shown in Figure 17. When this occurs the shutoff trip is free to rotate slightly so that when the shutoff arm, shutoff lever and the shutoff dog return, the shutoff dog will engage the trip at point 5, and will return to the position in Figure 14. Until such a time as movement of the control slide again operates the shutoff trip, the automatic shutoff mechanism will remain inoperative since the shutoff dog is not in a position to line up with the shutoff arm and engage it at point 4. The maximum outward motion of the shutoff arm and the shutoff lever must be sufficient so that the shutoff dog is carried far enough to completely clear the shutoff trip at point 5 in Figure 17.

Failure of the shutoff dog to return to the position shown in Figure 14 will result in repeated automatic shutoff cycles. This condition may result from insufficient clearance at either point 4 or point 5.

4. SHUTOFF LEVER—CONTROL SLIDE: Point 6 is the point of contact between the automatic shutoff mechanism and the control slide. It is through this contact that the control slide is moved to the "OFF" position

(which also turns off the motor switch). This operation occurs when the shutoff lever is moved toward the outside edge of the panel by stud "r" on drive gear as described in the preceding paragraph.

The tip of the shutoff lever in normal position must permit free movement of the control

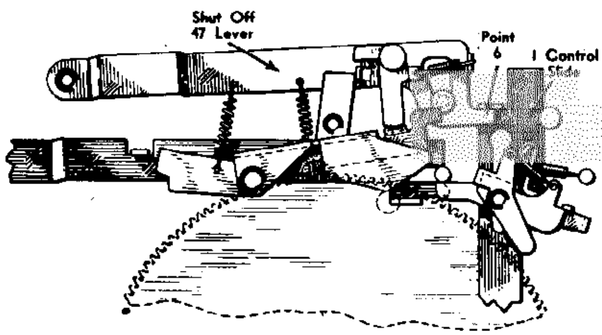


FIG. 21. CUTAWAY—BOTTOM VIEW

slide into the "REJECT" position. During shutoff cycle the shutoff lever must move the control slide into "OFF". Incorrect clearance will result in:

a. Moving the control slide too far into "MANUAL" or

b. Moving slide too little and leaving it in "AUTO", which will leave the motor switch turned on.

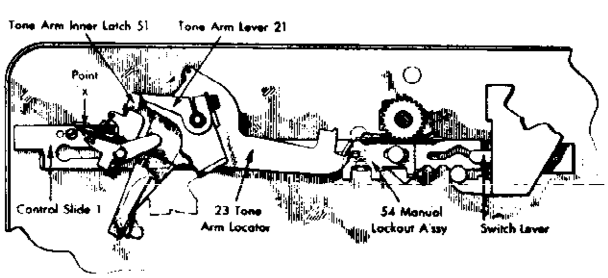


FIG. 22. CUTAWAY—BOTTOM VIEW

IV MANUAL OPERATION—

With the control knob in "MANUAL", the control slide (1) sets up four conditions:

a. The motor switch is on.

b. The end of the control slide (1) at point "x" partially disengages the tone arm inner latch (51) from its locked position. This latch now serves as a detent for the tone arm while in the rest position, and prevents its movement due to accidental bumping.

c. The manual lockout assembly (54) on the control slide prevents the tone arm locator (23) from moving outward, thereby permitting free movement of the tone arm by hand. (See page 18 for detailed description of manual lockout operation.)

d. The manual reject lever (3) is pulled back so that the clutch engagement lever (5) is held up, and prevented from engaging the pinion gear. (See Fig. 2, page 6.)

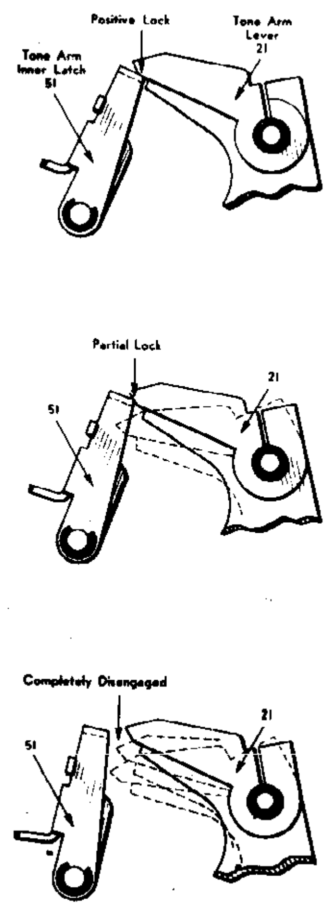


FIG. 23. DIAGRAMATIC

V DETAILED DESCRIPTION OF CERTAIN OPERATION AND PARTS—

A. TONE ARM LATCH LEVERS (also see Fig. 16, page 13)

1. Functions and Positions:

a. A positive lock for the tone arm when the latter is swung to the outside of the panel, in all positions of the control slide other than "MANUAL". This is brought about by the engagement between the tone arm lever (21) and the tone arm inner latch (51).

b. A partial lock, or detent, for the tone arm while the control slide is in "MANUAL". This results when the control slide is moved to "MANUAL" position. The back end of the control slide moves the tone arm inner latch (51).

c. Complete disengagement results through the cam "j" on the outside edge of the drive gear, acting on the tone arm outer latch (53) during the AUTOMATIC change cycle. Also, it is this unlatching action which puts the tone arm back into AUTOMATIC operation when the control slide is moved to the "REJECT" position.

2. ACTIONS

a. When the tone arm is playing a record in AUTOMATIC position and is moved to the rest position, the tone arm inner latch (51) must positively lock the tone arm lever (21).

b. When the control slide is moved to "MANUAL", the end of the slide must move the tone arm inner latch (51), and change its contact with the tone arm lever (21) from a positive lock to a partial lock, giving a light smooth detent action when the tone arm is in rest position.

c. When the changer goes through an automatic shutoff cycle, the tone arm must remain latched in the outermost position. Normally, the tone arm would attempt to follow the cam surface of the drive gear after being unlatched, as described under "cycle of automatic operation". During the automatic shutoff cycle, it is therefore necessary to prevent this automatic disengagement by allowing the outer tone arm latch lever to move with the cam surface of the drive gear but disengaging it from the inner latch lever (and hence maintaining the positive lock on the tone arm lever).

The disengagement between the outer and inner latch levers is accomplished by holding the center latch lever in position by blocking its movement with the shutoff slide. This blocking action allows:

(1) The outer latch lever to move independently, its movement being absorbed by a spring.

(2) Inner latch lever to operate as a "positive" tone arm latch.

(3) The center tone arm latch lever to serve as a limit device for the other two latch levers and as a connecting linkage between the two.

CAUTION: The blocking action between the shutoff slide and the center latch lever during an automatic shutoff cycle must be such that the center latch lever cannot rotate enough to disengage the positive tone arm latch.

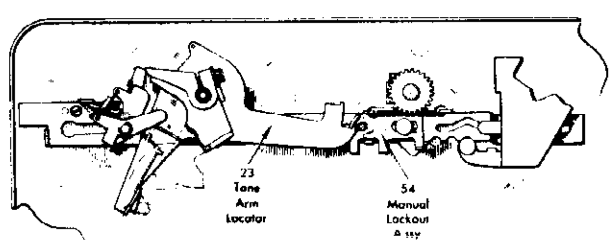


FIG. 24. CUTAWAY—BOTTOM VIEW

B. MANUAL LOCKOUT ASSEMBLY (54) engages and retains the tone arm locator (23) in its outermost position while the control slide is set in the MANUAL position. There are three actions involved:

1. When the tone arm is in the rest position, and the control slide is moved into MANUAL, the outer manual lockout can remain engaged to hold the tone arm locator from moving outward.

2. The outer manual lockout and the tone arm locator (23) must remain engaged while the control slide is moved into any other position, until automatically released by the drive gear cam.

3. With the control slide in "MANUAL" position the manual lockout will slide back and allow the lockout engagement described in 1 above if the tone arm is being moved into the rest position.

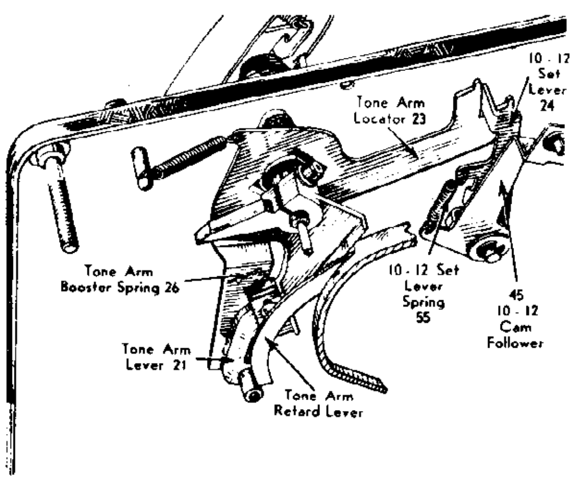


FIG. 25. CUTAWAY—BOTTOM VIEW

C. TONE ARM RETARD LEVER (25) has two functions:

1. To maintain a light pressure outwards during that part of the cycle after the tone arm lever (21) leaves the cam surface on the drive gear. The purpose is to prevent overswinging of the tone arm and, hold it at the radius previously determined by the tone arm locator (23) immediately prior to and during the time of lowering the needle on to the record.

2. To prevent action of the tone arm booster spring (26) until such a time that the needle has actually landed on the margin of the record. (See Fig. 2 for details of lever and spring.)

EXCESSIVE TENSION—on the tone arm retard lever spring (Fig. 2, item 58) would tend to cause a jerky motion of the tone arm during the part of the cycle described in "1" above. Extreme tension might even cause incorrect indexing by not allowing the tone arm to go into the proper diameter as determined by the tone arm locator (23).

INSUFFICIENT TENSION on the retard lever spring would result in a premature booster spring action so that the needle would land inside the margin of the record. Extremely weak pressure, or no pressure at all, would result in an overswing of the tone arm causing the needle to land some place in the middle of the record.

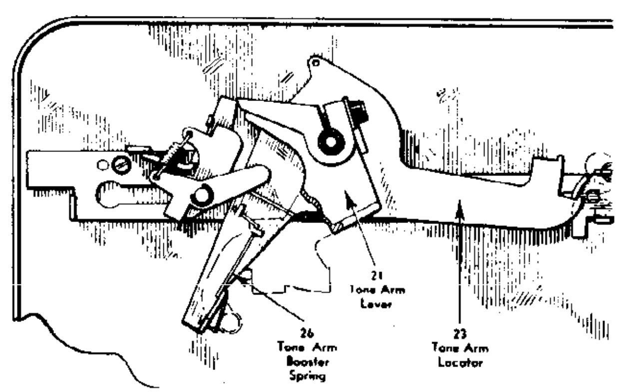


FIG. 26. CUTAWAY—BOTTOM VIEW

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D. TONE ARM BOOSTER SPRING (26)—Its purpose is to move the needle into the first playing groove on records which do not have a lead-in groove. Booster spring pressure is correctly adjusted when it causes the needle to move from the index point to the starting groove and no further. Excess pressure may cause the needle to scrape across the first few grooves. See preceding section for tie-in with retard lever action.

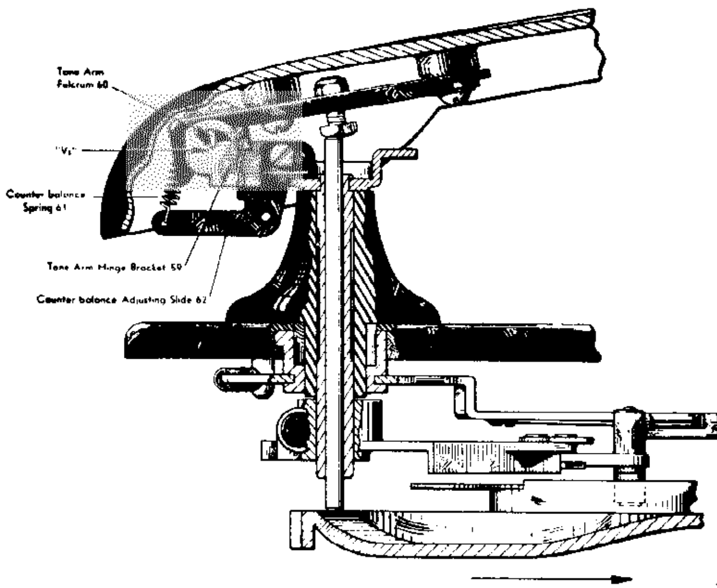

FIG. 27. CUTAWAY—SIDE VIEW

E. TONE ARM KNIFE EDGE HINGE:

In order to reduce vertical friction of the tone arm to a minimum, as required for best operation with light pressure pickups, the tone arm hinge bracket (59) is of the knife edge type. A hardened steel fulcrum (60) seats, under counterbalance spring (61) pressure, into "v's" in the lower bracket.

1. The fulcrum knife edge must not be broken or damaged.

2. There must be a slight amount of sidewise play between the bracket and the lower part of the fulcrum shoulder, and also between the brackets themselves.

NOTE: Side clearance of the fulcrum shoulder in its bracket will give correct performance during playing, since the knife edge is held solidly seated in the bracket by a spring. Also, the movement of the fulcrum in the bracket, when the arm is handled manually, has no significance since the knife edge reseats itself due to the spring action when released.

3. Incorrect side play or clearance:

a. Insufficient sidewise play will result in rubbing or vertical friction.

b. Excessive clearance will result in erratic tone arm landing and cutoff operation, since the whole arm may shift slightly during the change cycle.

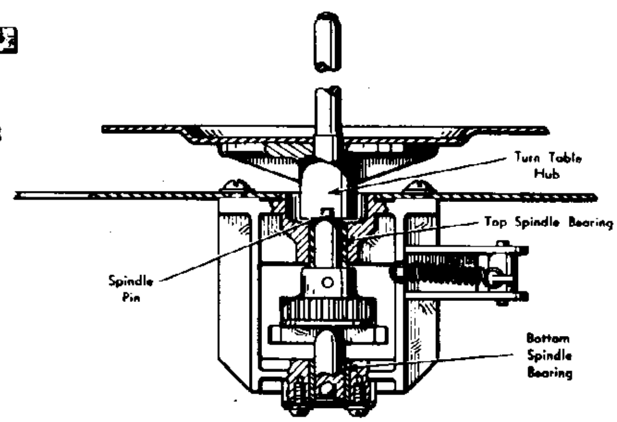

FIG. 28. CUTAWAY—SIDE VIEW

F. HOW TO REMOVE TURNTABLE

It should be removed, by lifting carefully, tapping spindle lightly if necessary. This will expose top spindle bearing. When replacing turntable, the slot in the hub must seat properly over the spindle pin. (Rotate 180° for best fit.)

CAUTION: Push idler wheel in while lowering, so rubber rim will not be damaged by turntable edge.

VI MECHANICAL ADJUSTMENTS—

A. MOTOR FAILURE, possible causes:

1. Power supply off, worn or broken wire, or defective plug.

2. Faulty switch.

3. Linkage between switch and control slide. CAUTION: The control slide must operate an over-center action of the switch when it is moved slowly in either of the positions adjacent to "OFF".

4. Burned out, or open motor coils.

B. MECHANICAL BINDS

1. During change cycle:

   a. Rotate turntable by hand, clockwise.

   b. If it seems to bind at one point only, examine the drive and pinion gears for foreign matter between the teeth.

   c. Examine the turntable spindle and selector arm bearings for lack of lubrication.

2. During playing cycle, idler wheel slide should move freely and its spring tension must be positive so that idler wheel maintains constant contact with turntable rim and motor pulley. (See Fig. 34, page 25.)

   CAUTION: Excessive tension on this spring will cause rapid wear of idler wheel and "rumble" when playing.

C. MECHANICAL JAMS

Shut off power and proceed as follows:

1. Rotate the turntable counter-clockwise slightly. This should free it.

2. Examine the mechanism for loose or bent parts, or foreign matter.

3. A bent clutch engagement lever (5) would cause a failure in the meshing of drive and pinion gear teeth at the start of a change cycle.

4. As further aid, it is recommended that the text and sketches, starting with page 7 , be studied.

D. RECORD JAMS are caused by:

1. Selector arms improperly set.

2. Odd-sized, badly warped or damaged records. Play these in "MANUAL" position.

3. Selector blades damaged or improperly adjusted. See V-G.

E. RECORDS DROP ONE SIDE ONLY if it has an unusually large center hole or a broken edge. Also examine the mechanism for a bent spindle or selector arm post, due to rough handling.

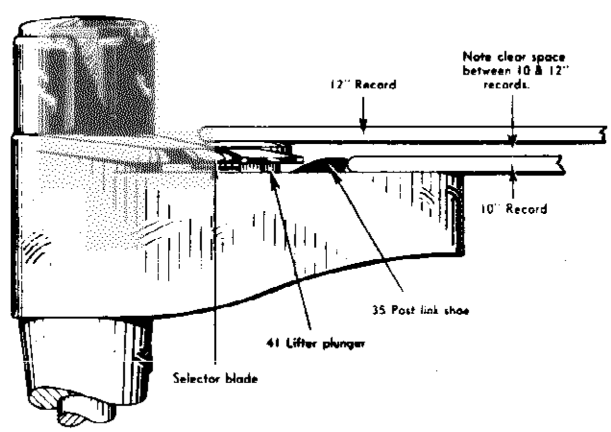

FIG. 29. CUTAWAY—SIDE VIEW

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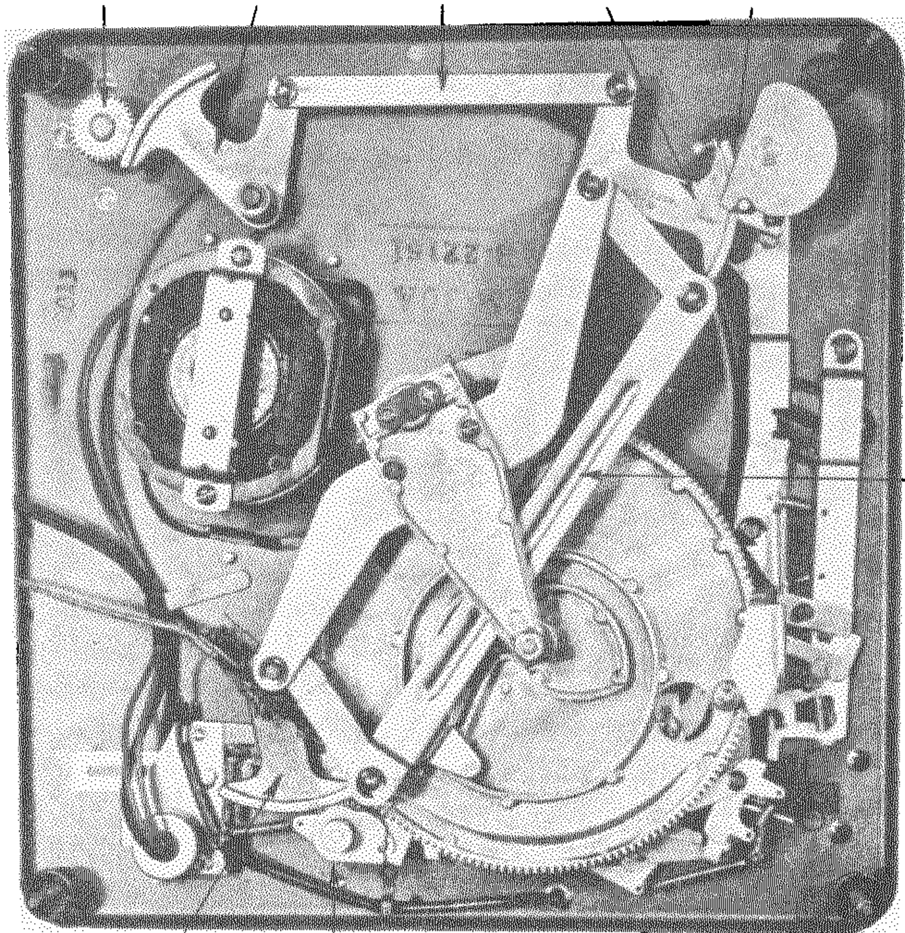

FIG. 30. BOTTOM VIEW

F. SELECTOR ARMS must be synchronized so that the record will drop evenly on the turntable. The arms are given a slight tilt downward (about .020"), in order to accommodate warped records.

Setting of Selector Arms, Gears, and Segments:

1. Set the drive gear in neutral position. Place a 10" record on the selector arms, with all arms turned to approximately a normal playing position, and with the edge of the record approximately 3/16" from the ends of the post link shoes.

2. With the mechanism set, as described above, the stud on the drive link must be in the extreme outer position on the drive gear cam. Post gears #1 and #2 must be meshed so that there are 4 teeth disengaged between the matching segment and the split in the post gear. The relationship of the three segments is fixed by the dimensions of the segment link and the drive link.

Should it be necessary to remove the segments from mesh with the post gears, it is suggested that the gear and segment be marked across the gear teeth before removal. This will definitely locate the gear mesh upon re-assembly.

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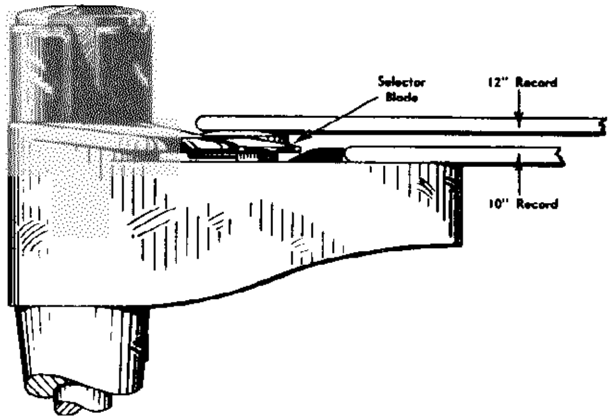

FIG. 31. CUTAWAY—SIDE VIEW

G. SELECTOR BLADES:

1. If an adjustment is necessary, place a 10" record of slightly less than average thickness (.070" on the selector arms, and manually rotate the arms, counter-clockwise. The blade must just clear the top of a record of the above thickness. The blade may be adjusted by bending, very slightly, to the correct position. (Use pliers with tape lined jaws.)

2. With a 12" record on the selector arms the blade will rise after it first contacts the edge of the record. This rising cam action results whenever pressure is applied to the leading edge of the selector blade. Unless the height of the blade is properly set (as described above) the blade will attempt to change two records at a time, due to the cam action which *always* operates in an *up* direction.

3. The blade must be free in its mounting so that it will return to normal position.

4. The leading edge of *each* blade must be smooth and well polished. This edge must not be sharp or rough. DO NOT USE FILE, SANDPAPER OR EMERY—the blades should be buffed if anything is required.

H. INCORRECT TONE ARM INDEXING:

1. Study the text and Fig. 25 on page 18. Examine the 10-12" set lever spring (55) for being loose, of improper tension or missing.

2. Incorrect spring tension of locator spring (68).

   a. Insufficient spring tension will produce erratic or incorrect tone arm landing since it will not seat in the fixed 10-12" indexing position. It will also result in a jerky action of the tone arm, since the tone arm lever will not accurately follow the cam surface of the drive gear.

   b. Excessive spring tension will result in a stiff, heavily loaded "feel" as the tone arm is moved into the rest position. It may also produce a stiff action of the control slide (when the manual lockout is engaged) and cause increased wear on moving parts.

3. Tone arm retard lever (25) binds. Examine its pivot point for foreign matter between gear casting and shoulder screw. Also examine retard lever spring (58) for proper action. (See Fig. 2, page 6.)

4. Excessive clearance at tone arm hinge bracket. (See page 19.)

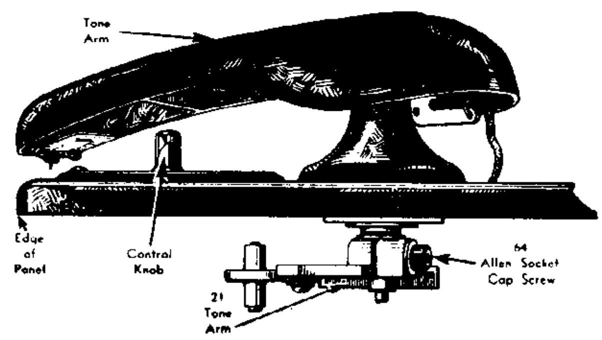

FIG. 32. CUTAWAY—SIDE VIEW

I. TONE ARM POSITIONING is as follows:

NOTE: Before attempting the following procedure in order to correct tone arm landing,

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be sure to check the preceding section, since any one of those reasons may be the actual cause of incorrect landing.

1. Set the control knob in the "OFF" position (power plug out).

2. Place a 10" record on the turntable, and one on the selector arms, with the arms moved to an extreme clockwise position.

3. Loosen the Allen socket cap screw (64) just enough to allow the tone arm lever to still hold its position.

4. Line up the tone arm's outer edge evenly with the panel edge. This gives the tone arm an approximate setting.

5. Push the control knob to "REJECT" and release it. Rotate the turntable clockwise and observe where the needle first touches the record. This should be about 1/8" from the edge. Variations should be corrected by slipping the tone arm lever (21) in correct direction.

   CAUTION: Before tightening the Allen screw, make certain that there is enough vertical clearance in the tone arm shaft to avoid binding while the tone arm swings.

6. Replace the 10" with a 12" record on the turntable. Set selector arms in extreme clockwise position, place a 12" record on the arms, and check for positioning. If the 10" adjustment was properly made, the 12" indexing should be correct.

J. TONE ARM HEIGHT adjustment:

1. The height to which the tone arm rises is correct when there is an approximate 3/8" clearance between it and the bottom of a 10" record on the selector arms. This clearance is regulated by the tone arm adjusting screw (69).

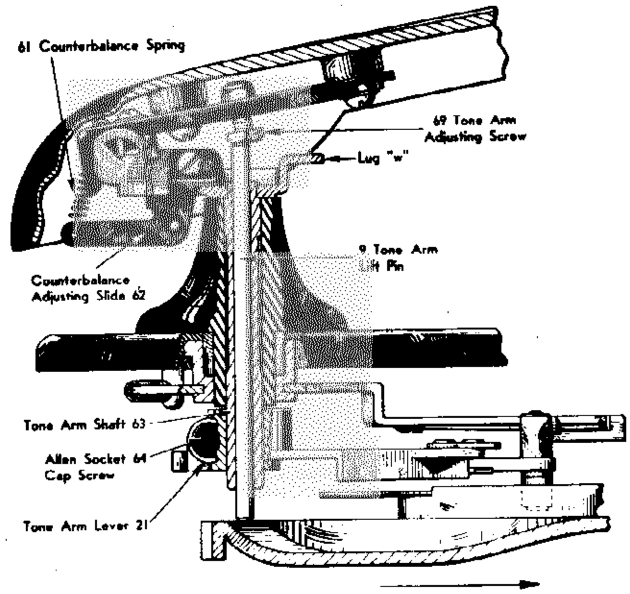

FIG. 33. CUTAWAY—SIDE VIEW

2. The down position of the tone arm is fixed by lug "w" on the tone arm hinge assembly. The correct height is that which will allow the bottom edge of the tone arm and cartridge to clear the turntable surface by approximately 1/16". This adjustment may be corrected by a slight bending of lug "w".

K. NEEDLE FORCE is controlled by the counterbalance spring (61) in back of the tone arm. The pressure is variable through the counterbalance adjusting slide (62). The needle force should not be less than 1 oz.

L. FAILURE TO TRIP may be caused by the following:

1. Old style records without proper cutoff grooves. These should be played in "MANUAL" position.

2. Broken, worn or improper needle which does not follow cutoff groove.

3. Closed-circle trip is incorrectly set. The trip shoe (28) is moveable and loosening its holding screw allows it to be adjusted as required. This adjustment is correct when the needle is 1-7/8" from the record center and the trip shoe pushes the trip lever which releases the clutch engagement lever.

4. Tight tone arm lead wire. The shielded wire emerging from the back of the arm should be draped so as to permit free movement of the tone arm. Never pull it tight or tie it down.

5. The clutch engagement lever (5) not unlatching. This lever has a loose fit at its pivot point and operates by gravity. It is intended to operate dry and must never be lubricated. Keep free from dust and lint. Rotate drive gear 180° from rest position for detailed examination of lever. (See Fig. 6, page 7.)

6. Trip lever (4) binding at its pivot point and failing to unlatch clutch engagement lever. Examine for foreign matter between gear casting, lever and shoulder screw. (See Fig. 2, page 6.)

7. Tone arm binds when moved toward spindle as a result of insufficient vertical clearance for tone arm shaft (63). This is caused by tone arm lever (21) being too close to underside of panel; loosen Allen socket cap screw (64), reset and retighten. (See Fig. 33.)

8. Trip failure with eccentric cutoff grove records. This can best be analyzed by studying the text and Fig 10 on page 9.

M. REPEATED TRIPPING IS caused by:

1. FAILURE OF CLUTCH ENGAGEMENT LEVER (5) TO LATCH. With the mechanism stopped in the playing position (pinion is open tooth portion of drive gear), latch the clutch engagement lever with the aid of a pencil and unlatch by moving the control knob to "REJECT". Repeat this several times. If it fails to latch:

a. Examine the trip lever (4) for binds or insufficient tension in the trip lever spring (65). Replacement of a weak spring will give a positive latch-up. Do not increase tension to a point where it will cause a trip failure. (See Fig. 2, page 6.)

b. Control knob binding in "REJECT" position due to sticking control slide (1) or its associated levers and springs. Examine for loose or missing springs.

c. Manual reject slide incorrectly positioned so that it fails to clear the trip lever while in "AUTOMATIC" operation.

2. FAILURE OF STOP LEVER to properly detent drive gear. (See Fig. 9, page 8.) Examine for proper spring tension.

N. TURNTABLE SPEED should be checked with a stroboscopic disc under running conditions and with the needle on a record. Slow speed may be produced by lack of lubrication in the spindle bearings or slipping of idler wheel (66). In the latter case, examine for a weak idler wheel spring (67) or for oil on the rubber rim which must be clean and dry.

VII REPRODUCTION FAULTS—

A. NO RESPONSE due to:

1. Pickup cartridge dead.

2. Short in shielded lead circuits.

3. Failure of amplifier system.

B. POOR TONE QUALITY.

1. Broken or worn needle. Replace with a new, approved needle.

2. Defective pickup cartridge, (try a new cartridge).

3. Improper needle force—Adjust to that recommended by the pickup manufacturer and in no case less than 1 oz.

4. Vertical friction—Examine tone arm hinge for binds while moving arm up and down. (See Fig. 22.) The shielded wire emerging from back of the tone arm should be draped so as to allow free movement of the arm.

C. NEEDLE JUMPS GROOVES due to:

1. Worn, broken or improper needle. Replace with new, approved needle.

2. Booster spring too strong. Relax booster spring (26) pressure slightly, by bending outward (Fig. 26, page 18).

3. Vertical friction. Examine tone arm hinge for binds while moving arm up and down. (See Fig. 27.) The shielded wire emerging from back of the tone arm should be draped so as to allow free movement of arm.

4. Lateral friction. Examine tone arm shaft (63) for insufficient vertical clearance and reset as required. (See par. L-7, page 24.) The shielded wire emerging from back of tone arm should be draped so as to allow free movement of the arm.

D. FEEDBACK or microphonism are produced if the changer is not floating freely on its four mountings, or output volume is too high. (Hold down devices should have been loosened or removed as required.)

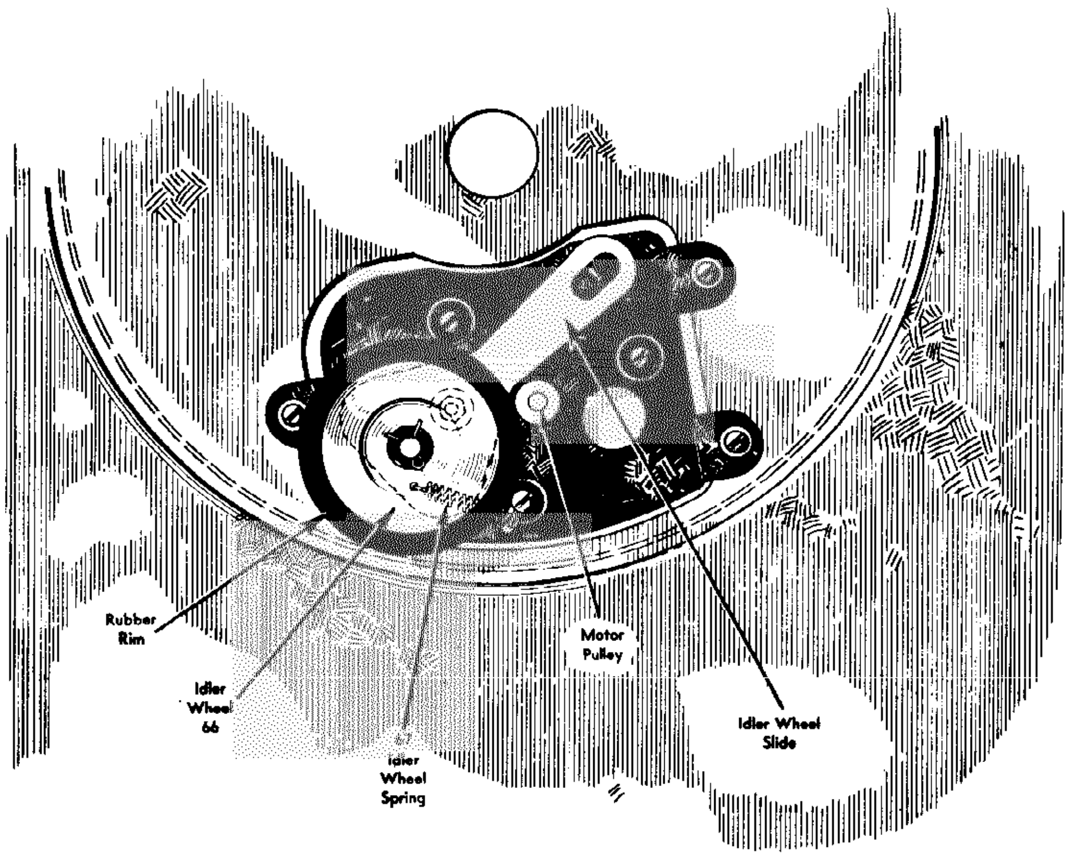

FIG. 34. CUTAWAY—TOP VIEW

E. "QUAVER" OR "WOW" is usually due to quick variations in turntable speed. With the drive gear in open tooth or playing position, remove turntable and check:

1. Rotation of spindle. Examine for bind at any point, and oil sparingly if required, after cleaning.

2. Idler wheel rubber rim should be undamaged and perfectly free from oil and grease.

3. Idler wheel mounting and slide should move freely. Spring tension on slide must be maintained. Oil slide sparingly if necessary. (See Fig. 34.)

F. RUMBLE is caused by:

1. Damaged or badly worn rubber rim on idler wheel.

2. Motor plate loose on panel, or motor loose on plate.

3. Damaged motor—rotor knocked out of alignment.

VIII LUBRICATION

A. DO NOT LUBRICATE:

1. Clutch engagement lever.
2. Idler wheel rim and turntable rim.
3. Moving parts on the selector arms and posts.

B. OIL, if necessary:

1. All shafts.
2. Spindle bearings.

C. GREASE, if necessary:

1. Cam surfaces and gear teeth.

WIPE OFF ALL EXCESS LUBRICANT—
OVER LUBRICATION IS DANGEROUS

POOR TONE QUALITY
EXCESSIVE NEEDLE SCRATCH

Usually due to a damaged or worn needle or record. Replacing either, or both, is the obvious remedy.

RECORD HANGING OR CATCHING ON SELECTOR ARMS

May be caused by using defective or badly warped records. These should be played manually.

SLIPPING ON TURNTABLE

Is caused by a warped record that does not present enough contact surface to the record below it and slips, producing an uneven sound.

DO NOT STALL

The turntable by hand while it is in motion.

LUBRICATION

Lubrication applied at the time of manufacture is usually sufficient for several years of normal operation. If, after a prolonged period, there is reason to believe that further oiling is necessary, it is recommended that you consult your dealer.

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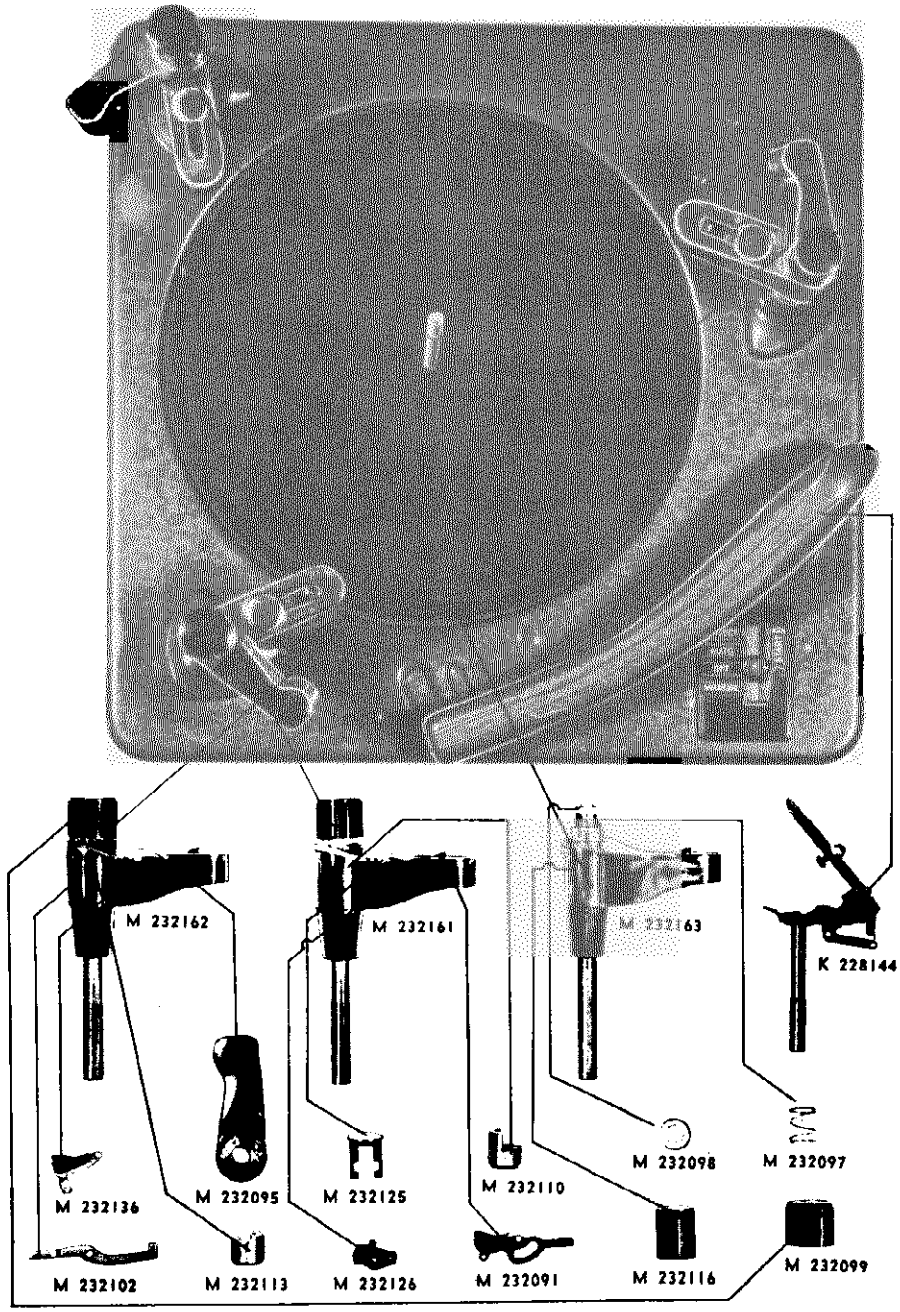

FIG. 35

M-232162	Selector Arm Assembly #2	M-232163	Selector Arm Assembly #3
M-232136	Post Link #2 (Upper) Assembly	M-232110	Selector Arm Shutoff Coupling #1
M-232102	Post Link #2—Lower	M-232091	Post Link #1 and #3 Assembly
M-232161	Selector Arm Assembly #1	M-232098	Cup Washer
M-232095	Selector Blade	M-232116	Selector Arm Cover
M-232113	Selector Arm 10-12" Coupling #2	K-228144	Tone Arm Hinge Assembly
M-232125	Lifter Plunger	M-232097	Selector Blade Spring
M-232126	Lifter Crank	M-232099	Selector Arm Knob

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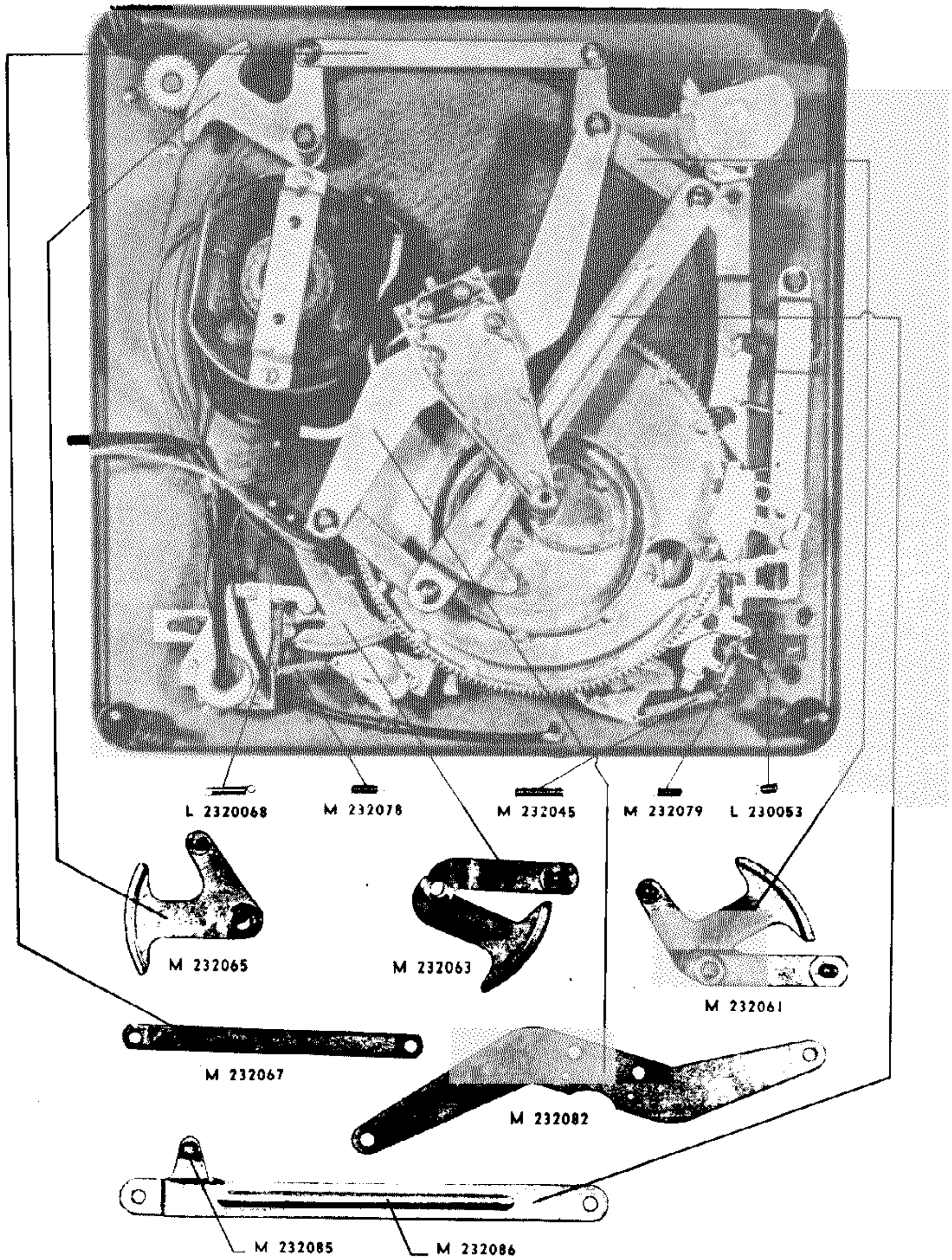

FIG. 36

L-230068	Detent Arm Spring	M-232063	Segment #2 Assembly
M-232078	Shutoff Lever Spring	M-232067	Segment Link
M-232045	Tone Arm Locator Spring	M-232061	Segment #1 Assembly
M-232079	Shutoff Arm Spring	M-232082	Segment Tie Plate
M-232065	Segment #3 Assembly	M-232086	Drive Link Assembly
L-230053	Tone Arm Latch Spring (Outer)	M-232085	Drive Link Roller

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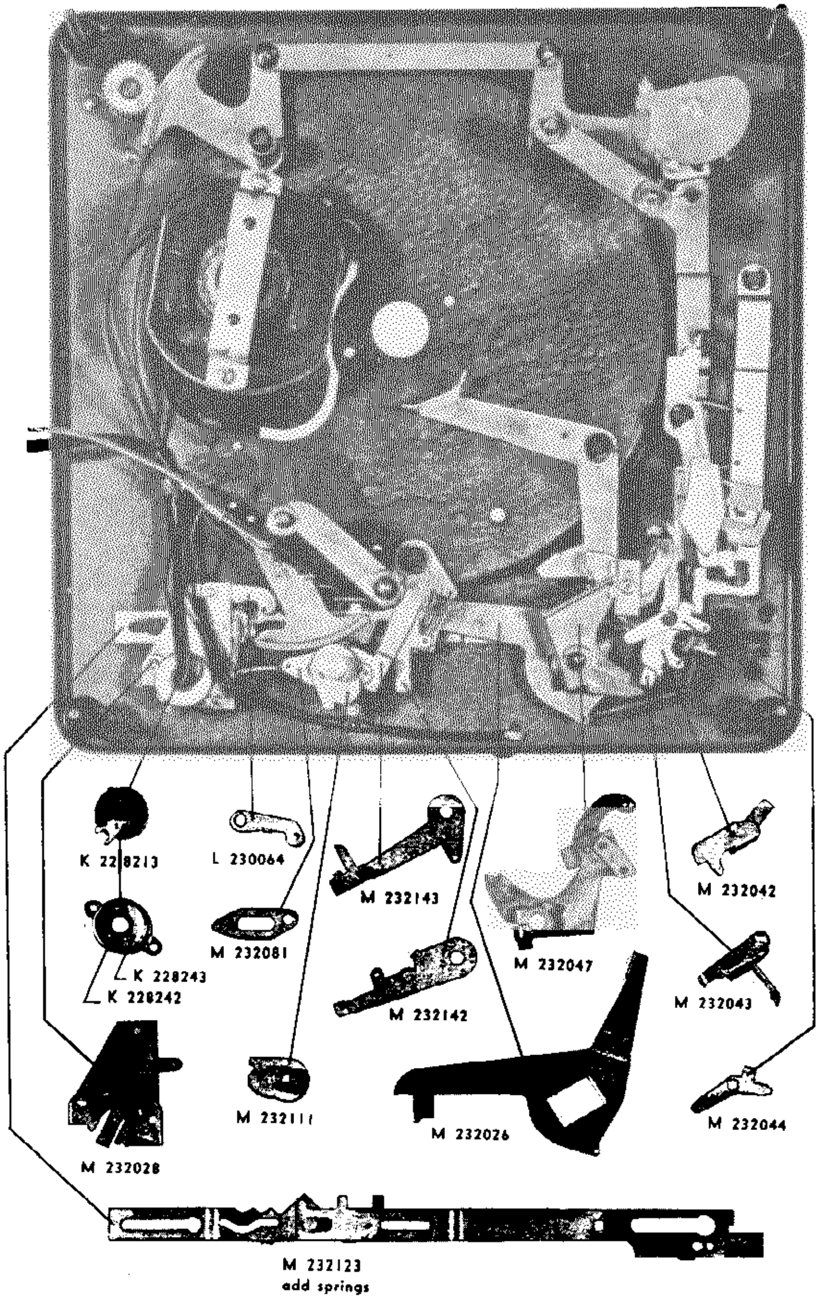

FIG. 37

K-228213	Switch
L-230064	Detent Arm Assembly
K-228243	Switch Cover
K-228242	Switch Cover Insulator
M-232081	10-12" Cam Follower Link
M-232028	Switch Plate Assembly
M-232111	10-12" Cam Assembly
M-232123	Control Slide Assembly
M-232143	10-12" Cam Follower
M-232142	10-12" Set Lever
M-232026	Tone Arm Locator Assembly
M-232047	Tone Arm Lever Assembly
M-232042	Tone Arm Latch—Center
M-232043	Tone Arm Latch—Inner
M-232044	Tone Arm Latch—Outer

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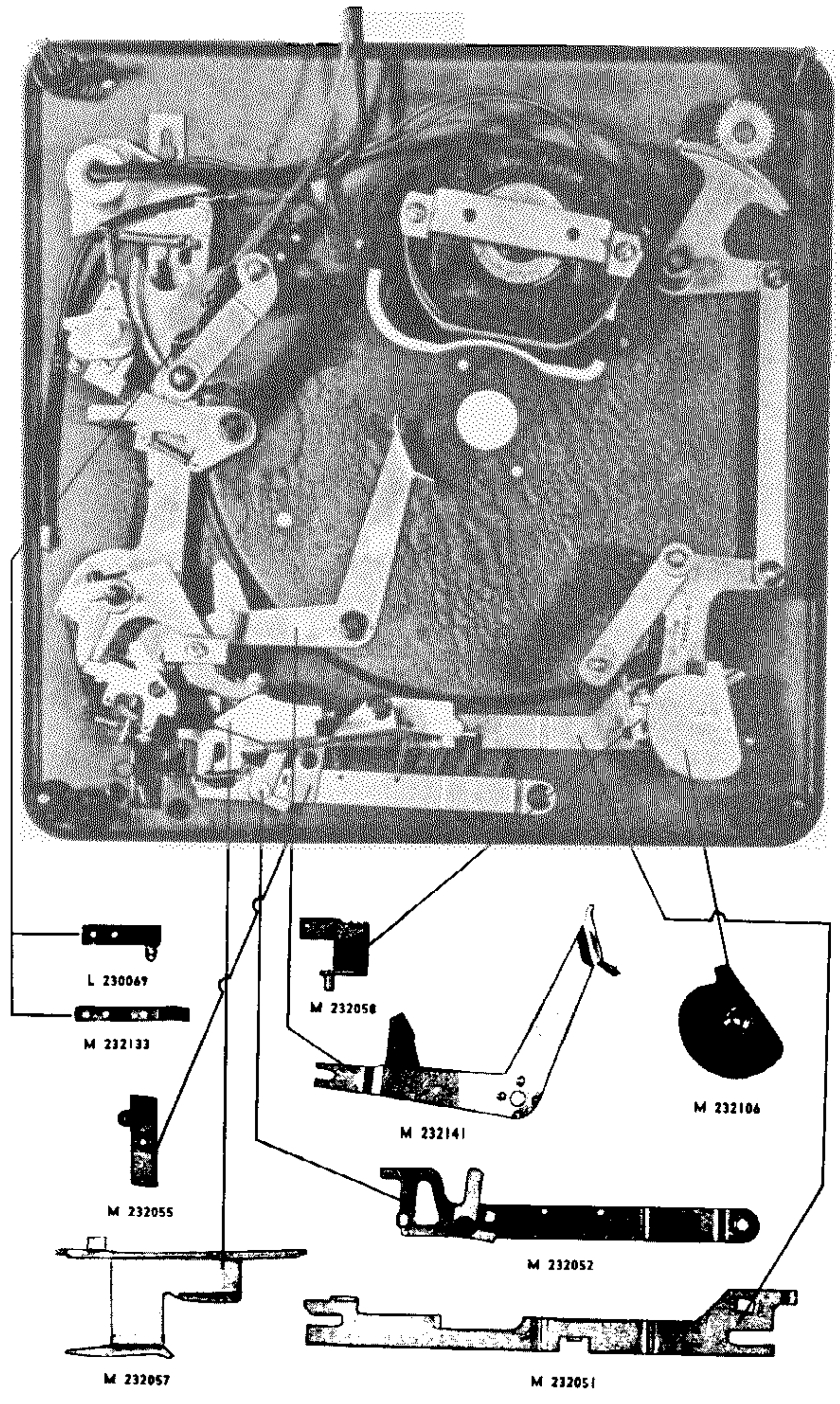

FIG. 38

L-230069	Contact Mounting Strip Assembly	M-232141	Manual Reject Lever
M-232133	Muting Switch Blade Assembly	M-232106	Shutoff Slide Cam Assembly
M-232055	Shutoff Trip Assembly	M-232052	Shutoff Lever Assembly
M-232057	Shutoff Arm	M-232051	Shutoff Slide
M-232058	Shutoff Slide Bracket Assembly		

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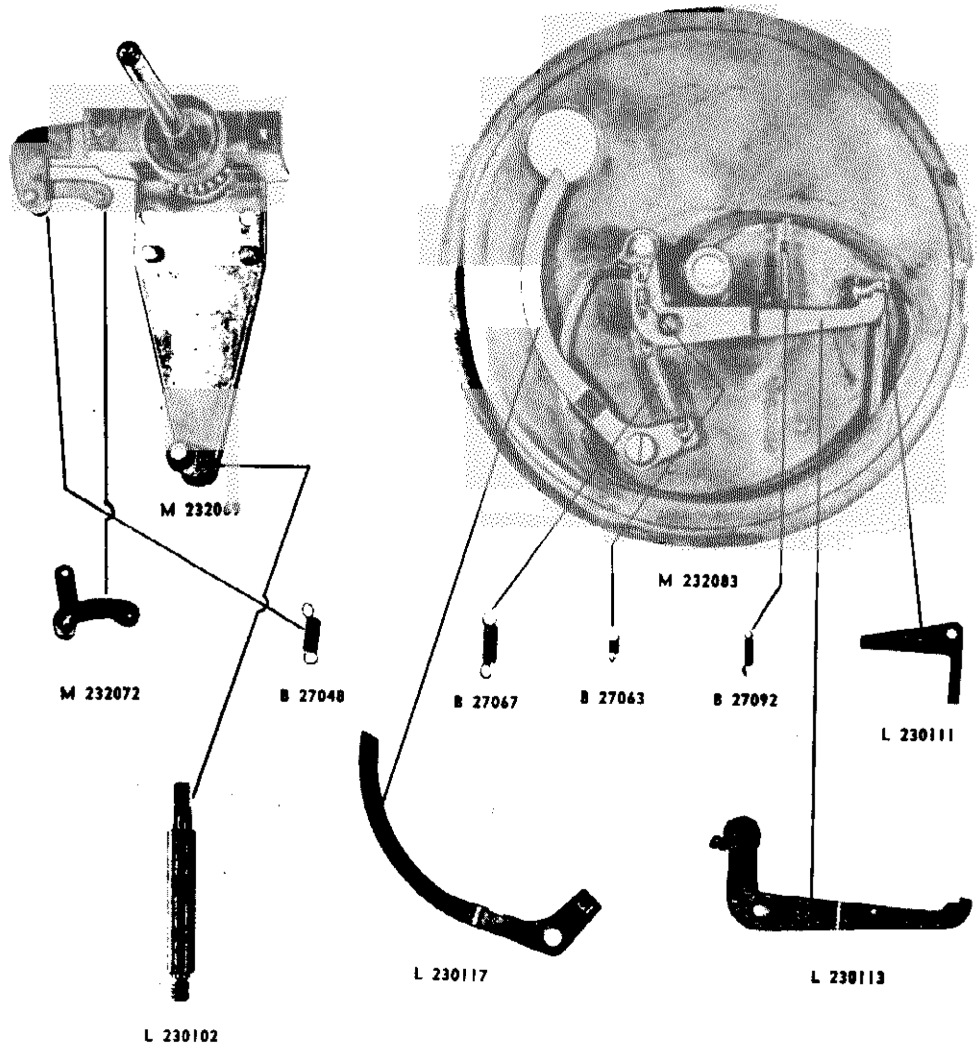

FIG. 39

M-232069	Spindle & Housing Assembly	M-232083	Drive Gear Assembly
M-232072	Drive Gear Stop Lever Assembly	B-27063	Trip Dog Spring
L-230102	Drive Gear Shaft	B-27092	Trip Lever Spring
B-27048	Stop Lever Spring	L-230111	Clutch Engagement Lever
B-27067	Retard Lever Spring	L-230113	Trip Lever Assembly
L-230117	Tone Arm Retard Lever		

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Ref. No.	Description	Part Number
1	Control Slide	M-232020
2	Power Switch	K-228213
3	Manual Reject Lever	M-232141
4	Trip Lever	L-230114
5	Clutch Engagement Lever	L-230111
6	Drive Gear	M-232084
7	Pinion Gear	L-230101
8	Muting Switch Blade	M-232118
9	Tone Arm Lift Pin	K-228199
10	Drive Link	M-232087
11	Segment #1	M-232062
12	Segment #2	M-232064
13	Segment #3	M-232066
14	Post Gear #1	M-232089
15	Post Gear #2	M-232089
16	Post Gear #3	M-232089
17	Segment Link	M-232067
18	Selector Arm Shaft #1	M-232088
19	Selector Arm Shaft #2	M-232088
20	Selector Arm Shaft #3	M-232114
21	Tone Arm Lever	M-232049
22	Tone Arm Latch Lever Assembly	M-232042, 3, 4
23	Tone Arm Locator	M-232027
24	10-12" Set Lever	M-232142
25	Tone Arm Retard Lever	L-230117
26	Tone Arm Booster Spring	H-20129
27	Drive Gear Stop Lever Assembly	M-232072
28	Trip Shoe	K-228156
29	Trip Plate	B-27037
30	Trip Dog	K-228174
31	Selector Shaft Pin	M-232109
32	Selector Arm Shutoff Coupling #1	M-232110
33	Selector Arm 10-12 Coupling #2	M-232113
34	Post Link #1 and #3	M-232092
35	Post Link Shoe	M-232127

Part Number	Item
H-20065	"C" Washer
H-20129	Tone Arm Booster Spring
H-20143	Panel Support Spring (Upper)
H-20199	Clamp Nut
J-22021	"C" Washer (small)
J-22058	Manual Lockout Spring (outer)
J-22096	Thrust Plate
J-22117	Thrust Wafer
B-27048	Stop Lever Spring
B-27050	Thrust Washer

Ref. No.	Description	Part Number
36	Lifter Crank	M-232126
37	Post Link #2 Lower	M-232102
38	Post Link #2 Upper	M-232103
39	Shutoff Slide Cam	M-232107
40	Shutoff Slide Bracket	M-232059
41	Lifter Plunger	M-232125
42	Cam Hub	M-232108
43	10-12" Cam	M-232112
44	10-12" Cam Follower Link	M-232081
45	10-12" Cam Follower	M-232143
46	Shutoff Slide	M-232051
47	Shutoff Lever	M-232053
48	Shutoff Arm	M-232057
49	Shutoff Dog	M-232054
50	Shutoff Trip	L-230045
51	Inner Tone Arm Latch	M-232043
52	Center Tone Arm Latch	M-232042
53	Outer Tone Arm Latch	M-232044
54	Manual Lockout Assembly	M-232019
55	Shutoff Slide Spring 10-12" Set Lever Spring	L-230038
56	Shutoff Arm Spring	M-232079
57	Shutoff Lever Spring	M-232078
58	Retard Lever Spring	B-27067
59	Tone Arm Hinge Bracket	K-228146
60	Tone Arm Fulcrum	K-228224
61	Counterbalance Spring	K-228099
62	Counterbalance Adjusting Slide	K-228150
63	Tone Arm Shaft	K-228147
64	Allen Socket Cap Screw	71468
65	Trip Lever Spring	B-27092
66	Idler Wheel	M-232038
67	Idler Wheel Spring	See numerical list
68	Tone Arm Locator Spring	M-232045
69	Tone Arm Adjusting Screw	K-228238

Part Number	Item
K-228145	Hinge Bracket & Shaft Assembly
	Consists of:
	K-228146 Tone Arm Hinge Bracket
	72134 Flatwasher
	K-228147 Tone Arm Shaft
K-228150	Counterbalance Adjusting Slide
K-228156	Trip Shoe
K-228175	Retard Lever Rubber Bumper
K-228199	Tone Arm Lift Pin
K-228202	Trip Dog Rubber Bumper
K-228203	Trip Lever Bumper

Part Number	Item
B-27063	Trip Dog Spring
B-27067	Retard Lever Spring
B-27088	Retard Lever Screw
B-27092	Trip Lever Spring
71468	3/4x10-32 Allen Socket Cap Screw
72040	Spring Washer
75042	1/4x10-32 Allen Head Set Screw
75047	5/8x10-32 Allen Socket Cap Screw
75068	3/16x8-32 Hex Socket Head Set Screw
80036	3/4x3/0 Taper Pin
K-228099	Counterbalance Spring
K-228144	Tone Arm Hinge Assembly
	Consists of:
	K-228145 Hinge Bracket & Shaft Assembly
	K-228225 Tone Arm Bracket Assembly
	K-228224 Tone Arm Fulcrum
	K-228223 Fulcrum Clamp
	71789 Round Head Machine Screw
L-230069	Contact Mounting Strip Assembly
	Consists of:
	L-230070 Contact Mounting Strip
	L-230071 Mounting Strip Contact
	74058 Solder Lug
L-230076	Muting Switch Clamp
L-230087	Tone Arm Rubber Bumper
L-230101	Pinion Gear
L-230102	Drive Gear Shaft
L-230113	Trip Lever Assembly
	Consists of:
	L-230156 Trip Lever & Bushing Assembly
	K-228174 Trip Dog
	L-230115 Trip Dog Stud
	L-230158 Trip Roller
	L-230159 Trip Roller Bushing
L-230146	Turntable Assembly
L-230193	Panel Retainer Spring
*L-230211	Tone Arm—Aluminum
M-232023	Manual Lockout Spring—Inner
M-232025	Tone Arm Locator Hub

Part Number	Item
K-228211	Stop Lever Pivot Pin
K-228212	Wire Clip
K-228213	Switch
K-228217	Tone Arm Special Washer
K-228225	Tone Arm Bracket Assembly
	Consists of:
	70086 Elastic Stop Nut
	K-228148 Tone Arm Bracket
K-228238	Tone Arm Adjusting Screw
K-228242	Switch Cover Insulator
K-228243	Switch Cover
L-230022	Speed Nut
L-230028	Control Knob Assembly
L-230038	Shutoff Slide Spring
L-230053	Tone Arm Latch Spring (Outer)
L-230064	Detent Arm Assembly
	Consists of:
	L-230065 Detent Arm
	L-230066 Detent Arm Pin
L-230067	Pickup Lead Clamp
L-230068	Detent Arm Spring
**M-232032	Motor Assembly (See Note 2)
**M-232038	Idler Wheel Assembly (See Note 2)
M-232042	Tone Arm Latch—Center
M-232043	Tone Arm Latch—Inner
M-232044	Tone Arm Latch—Outer
M-232045	Tone Arm Locator Spring
M-232047	Tone Arm Lever Assembly
	Consists of:
	M-232048 Lever Pin & Trip Plate Assembly
	K-228156 Trip Shoe
	72036 Flatwasher
	71050 Binding Head Machine Screw
	73076 Kantlink Lockwasher
	71468 Allen Screw
M-232051	Shutoff Slide
M-232052	Shutoff Lever Assembly
	Consists of:
	M-232053 Shutoff Lever
	M-232054 Shutoff Dog
	L-230042 Shutoff Dog Rivet
M-232055	Shutoff Trip Assembly
	Consists of:

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Part Number	Item
M-232065	Segment #3 Assembly
M-232067	Segment Link
M-232069	Spindle & Housing Assembly
	Consists of:
	M-232070 Housing and Bushing Assembly
	M-232072 Drive Gear Stop Lever Assembly
	K-228211 Stop Lever Pivot Pin
	B-27048 Stop Lever Spring
	M-232074 Turntable Spindle Assembly
	L-230101 Pinion Gear
	80036 Taper Pin
	J-22096 Thrust Plate
	J-22117 Thrust Wafer
	71759 Shakeproof Sems
	L-230102 Drive Gear Shaft
	73087 Split Lockwasher
	70077 1/4-20 Nut
	M-232082 Segment Tie Plate
	71791 Shakeproof Sems
M-232070	Spindle Bushing & Housing Assembly
	Consists of:
	M-232071 Spindle Housing
	J-22082 Spindle Bushing
M-232072	Drive Gear Stop Lever Assembly
	Consists of:
	M-232073 Drive Gear Stop Lever
	B-27045 Stop Lever Roller
	B-27046 Stop Lever Roller Pin
M-232074	Turntable Spindle Assembly
	Consists of:
	M-232076 Spindle
	K-228279 Drive Pin
	11266 Steel Ball
	M-232132 Sleeve
M-232106	Shutoff Slide Cam Assembly
	Consists of:
	M-232107 Shutoff Slide Cam
	M-232108 Cam Hub
M-232109	Selector Shaft Pin
M-232110	Selector Arm Shutoff Coupling #1
M-232111	10-12" Cam Assembly
	Consists of:
	M-232112 10-12" Cam
	M-232108 Cam Hub

Part Number	Item
M-232078	Shutoff Lever Spring
M-232079	Shutoff Arm Spring
M-232081	10-12" Cam Follower Link
M-232082	Segment Tie Plate
M-232083	Drive Gear Assembly
	Consists of:
	M-232138 Drive Gear Sub-Assembly
	L-230113 Trip Lever Assembly
	J-22021 C Washer
	B-27063 Trip Dog Spring
	B-27092 Trip Lever Spring
	K-228202 Trip Dog Bumper
	K-228203 Trip Lever Bumper
	L-230117 Tone Arm Retard Lever
	K-228175 Retard Lever Bumper
	72040 Spring Washer
	B-27088 Retard Lever Screw
	B-27067 Retard Lever Spring
M-232085	Drive Link Roller
M-232086	Drive Link Assembly
	Consists of:
	M-232087 Drive Link
	K-228186 Drive Link Stud
M-232089	Post Gears #1, and #2 & #3
M-232091	Post Link #1 and #3 Assembly
	Consists of:
	M-232092 Post Link #1
	M-232127 Post Link Shoe
	M-232131 Lifter Link Pin
M-232095	Selector Blade
M-232097	Selector Blade Spring
M-232098	Cup Washer
M-232099	Selector Arm Knob
M-232102	Post Link #2—Lower
M-232104	Lifter Crank Screw
M-232135	Post Link Spring
M-232136	Post Link #2 (Upper) Assembly
	Consists of:
	M-232103 Post Link #2—Upper
	M-232127 Post Link Shoe
	M-232131 Lifter Link Pin
M-232138	Drive Gear Sub-Assembly
	Consists of:
	M-232084 Drive Gear
	L-230110 Drive Gear Shutoff Sleeve
	L-230112 Trip Lever Stud

Part Number	Item
M-232113	Selector Arm 10-12" Coupling #2
M-232116	Selector Arm Cover
M-232117	Control Escutcheon
M-232123	Control Slide Assembly
	Consists of:
	M-232019 Manual Lockout Assembly
	M-232023 Manual Lockout Spring—Inner
	J-22058 Coil Spring
M-232125	Lifter Plunger
M-232126	Lifter Crank
M-232129	Lifter Crank Pin
M-232130	Pickup Lead
M-232133	Muting Switch Blade Assembly
	Consists of:
	M-232118 Muting Switch Blade
	L-230075 Muting Switch Contact
M-232134	Selector Arm & Shaft Assembly #1 and #2
	Consists of:
	M-232093 Selector Arm
	M-232088 Support Arm Shaft
	M-232096 Selector Blade Stud
	75042 Set Screw
	M-232095 Selector Blade
	M-232097 Selector Blade Spring
	M-232098 Cup Washer
	H-20065 C Washer
M-232162	Selector Arm Assembly #2
	Consists of:
	M-232134 Selector Arm Shaft Assembly
	M-232136 Post Link #2 (Upper) Assembly
	M-232102 Post Link #2 Lower
	M-232109 Selector Shaft Pin
	M-232113 Selector Arm 10-12" Coupling #2
	75068 Set Screw
	M-232125 Lifter Plunger
	M-232126 Lifter Crank
	M-232104 Lifter Crank Screw
	M-232129 Lifter Crank Pin
	M-232135 Post Link Spring
	M-232095 Selector Blade
	M-232097 Selector Blade Spring
	M-232098 Cup Washer
	H-20065 C Washer

Part Number	Item
	L-230111 Clutch Engagement Lever
	79102 Tubular Rivet
M-232141	Manual Reject Lever
M-232142	10-12" Set Lever
M-232143	10-12" Cam Follower
M-232152	Selector Arm & Shaft Assembly #3
	Consists of:
	M-232093 Selector Arm
	M-232114 Selector Arm Shaft #3
	M-232096 Selector Blade Stud
	75042 Set Screw
M-232161	Selector Arm Assembly #1
	Consists of:
	M-232134 Selector Arm & Shaft Assembly
	M-232091 Post Link Assembly
	M-232109 Selector Shaft Pin
	M-232110 Selector Arm Shutoff Coupling #1
	75068 Set Screw
	M-232125 Lifter Plunger
	M-232126 Lifter Crank
	M-232104 Lifter Crank Screw
	M-232129 Lifter Crank Pin
	M-232135 Post Link Spring
M-232163	Selector Arm Assembly #3
	Consists of:
	M-232152 Selector Arm & Shaft Assembly #3
	M-232091 Post Link Assembly
	M-232125 Lifter Plunger
	M-232126 Lifter Crank
	M-232104 Lifter Crank Screw
	M-232129 Lifter Crank Pin
	M-232135 Post Link Spring
	M-232095 Selector Blade
	M-232097 Selector Blade Spring
	M-232098 Cup Washer
	H-20065 C Washer
M-232180	Pickup Cartridge

CORRECTIVE ADJUSTMENTS

FOR FAILURE TO CYCLE AUTOMATICALLY: If the record changer fails to cycle, it may be due to improper operation of the automatic trip mechanism. Check for:

1. Control Button in "MANUAL" position.
2. No velocity lead-in groove or eccentric groove in center of record.
3. Velocity Trip and Roller Assembly binding (44, Fig. 4).
4. Actuating Pawl stuck. This part of Main Cam Assembly, (42, Fig. 4), is engaged by hook end of Velocity Trip and Roller Assembly (44).
5. Automatic Trip Arm (26, Fig. 3) bent and not hitting the Velocity Trip and Roller Assembly (44).
6. Needle jumping grooves due to foreign matter in record groove, badly worn record, or badly worn or bent needle.

Proper operation of the automatic trip mechanism is as follows: When the movement of the Pick-up Arm toward the Center Post is greater than 1/8 inch in 1/2 revolution of the Turntable, the Automatic Trip Arm (26, Fig. 3) trips the Velocity Trip and Roller Assembly (44, Fig. 3). This releases the Actuating Pawl on the Main Cam Actuating Gear (43, Fig. 4) and drives the mechanism through the change cycle.

The Automatic Trip Arm follows the movement of the Pick-up Arm through a Spring-Compression Clutch (25, Fig. 3). This clutch must be kept free from oil or grease so that trip arm follows movement of Pick-up Arm.

Should it become necessary to clean the clutch, loosen the set screw (point "A", Fig. 5) to relieve the spring tension and clean the clutch parts with carbon tetrachloride. Reset the clutch spring tension by locking the collar at least 1/4 inch below the Main Plate. This tension should be just sufficient to operate the trip mechanism without placing undue drag on the movement of the Pick-up Arm.

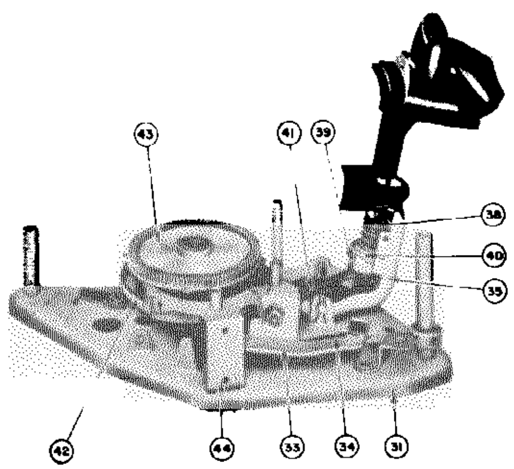


Fig. 4

FOR FAILURE TO CYCLE WHEN OPERATING "REJECT" CONTROL BUTTON: If record changer will not cycle when Control Button is pushed to "REJECT" position, check for:

1. **Manual Trip Lever (29, Fig. 3) hair spring bent or broken.**
2. **Velocity Trip and Roller Assembly binding (44, Fig. 4).**
3. **Actuating Pawl stuck.**

When the reject trip mechanism is operating properly, movement of the Control Button to the "START-REJECT" position actuates the Manual Trip Lever (29, Fig. 3). This lever trips the Velocity Trip and Roller Assembly and puts the mechanism in cycle.

FOR CONTINUOUS CYCLING: Check for:

1. Velocity Trip and Roller Assembly (44, Fig. 4) rubbing on Main-Cam-Actuating Gear (42, Fig. 4).
2. Manual-Trip Lever (29, Fig. 3) binding at rivet.
3. Hook end of Velocity Trip and Roller Assembly bent and not engaging pawl.
4. Bakelite roller broken on Velocity Trip and Roller Assembly.

FOR NEEDLE SKIPPING GROOVES: Check for:

1. Record changer not level.
2. Pick-up Arm binding.
3. Foreign matter in record groove.
4. Badly worn record groove.
5. Badly worn or bent needle.

Under normal operating conditions, with the Pick-up Arm in playing position, the arm is practically free-floating on its pivot. There is no lead-in spring which might drag the needle over the first few grooves of the record or minimum radius device to jam the arm on the inside grooves. The pressure required to operate the trip mechanism is negligible.

FOR PICK-UP ARM OR NEEDLE STRIKING EDGE OF RECORD: Needle should approach the top record of a full stack on the Turntable with approximately 1/8 inch clearance. Check for binding of the Pick-up Arm Raising Lever at its pivot. If the condition is not due to binding, adjust by bending the Pick-up Arm Raising Lever at Point C, Fig. 5. Do not attempt to move Pick-up Arm Raising Disc (27, Fig. 3) up or down.

FOR INCORRECT DROP POINT: If the needle doesn't land at the proper place on the record, this condition may be corrected by adjusting the Eccentric Screw. This screw is accessible through a hole at the top of the Pick-up Arm, and it may be rotated clockwise to move the needle toward the Center Post or counter-clockwise to move the needle away from the Center Post. Should further adjustment be necessary, proceed as follows:

1. Set the Record Support Arm to the 10" position.
2. Operate the mechanism by revolving the Turntable manually until the needle drops to within 1/8 inch of a ten inch record on the Turntable.
3. With a #8 Bristol wrench in each of the set screws (Points D and E, Fig. 5) alternately loosen one and tighten the other until the needle rests above the record lead-in groove at the desired point.
4. Turn the Record Support Arm to the "12" inch position and check the needle drop on a twelve inch record.
5. Be sure that both set screws are tight when this adjustment is completed.

FOR PICK-UP ARM DROPPING OFF REST POST: When the Pick-up Arm is placed on the Rest Post, the lip of the Pick-up Arm Raising Disc (27, Fig. 3) rests in the groove of the Collar (24, Fig. 3). Adjust the position of the Collar (Point F, Fig. 5) so that the lip of the Pick-up Arm Raising Disc rests in the groove of the Collar with the Pick-up Arm Pivot (22, Fig. 3) touching the Sub Plate. When properly adjusted, there should be 0.010 inches clearance between the lip of the Pick-up Arm Raising Disc and the bottom of the collar groove. This should also be checked by moving the Pick-up Arm back and forth manually to see that the lip approaches the Collar at about the middle of the chamfer.

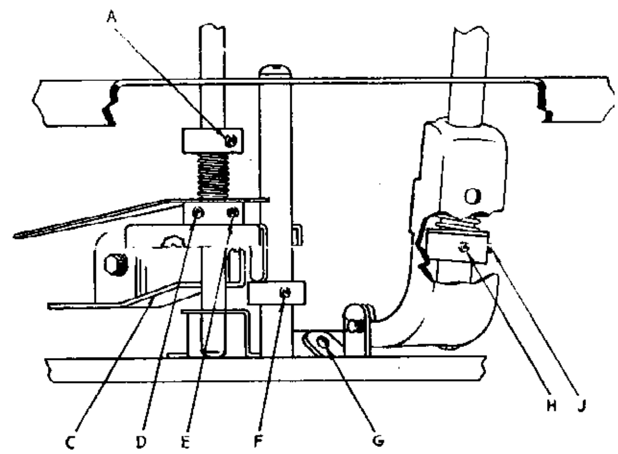


Fig. 5

FOR INCORRECT SUPPORT AND DROPPING OF RECORDS: If Record Support Arm is improperly positioned or spaced with respect to Center Post or if Floating Latch near top of Center Post is binding, one or more of the following faults may occur.

1. **Records do not rest securely on Support Arm.**
2. **Records dropping on Pick-up Arm.**
3. **Multiple dropping of records.**
4. **Incorrect ejection of records.**

Whenever any of these symptoms is encountered, it is advisable to carefully inspect operation of Floating Latch and to check positioning and spacing of Support Arm as described below.

The Floating Latch at the top of the Center Post is so spaced that only one record at a time can slide between the heel of the latch and the step of the Post. The hole in the Latch is elongated so that Latch can slip into recess of Post when records are being removed. If more than one record is dropped at a time, it may be due to:

a. Foreign matter in recess of Center Post causing Latch to bind and remain in wrong position.
b. Exceptionally thin records.

The Record Support Arm should be so positioned that the curve of the shelf matches the curve of the record. If position is incorrect it may be adjusted as follows:

a. Turn Record Support Arm to the "10" inch position.

b. Place a ten inch record on the Center Post in the normal position for automatic playing.

c. With a #8 Bristol wrench in each of the set screws (points H and J, Fig. 5) alternately loosen one and tighten the other until the angle of the Record Support Arm is correct. Be sure that both set screws are tight at the completion of this adjustment.

Spacing between Record Support Arm and Center Post should now be checked. Note that as the change cycle is started by the needle being in the center lead-in groove of the record, the first motion of the main cam causes the Support Arm to move toward the Center Post about 3/32 inches. This position is maintained until the Pick-up Arm has made its full lateral excursion at which time the Record Support Arm again moves toward the Center Post, causing the bottom record to drop down the post into playing position.

If the Record Support Arm has been bent back, away from the Center Post, it is possible for a standard record to rest on the Center Post step with its edge just over the edge of the Record-Support-Arm Shelf. Then as the change cycle is started, the record is pushed off the Center Post by the initial movement of the Record Support Arm, so that it drops on the Pick-up Arm.

To correct this condition, the Rocker Arm Assembly (35, Fig. 4) must be bent so that the Record Support Arm is brought nearer to the Center Post.

a. With the mechanism at rest, wedge the Rocker Arm firmly by inserting a screwdriver between the Rocker Arm and the Sub Plate at a point between the Rocker-Arm Pivot (36, Fig. 6) and the stud to the right of it.

b. With the heel of the hand, press the Record Support Arm toward the Center Post, so that a standard record rests at least half way over the Record Support Arm ledge when placed on the Center Post step.

CAUTION: Be certain that a standard size record is used in making this adjustment.

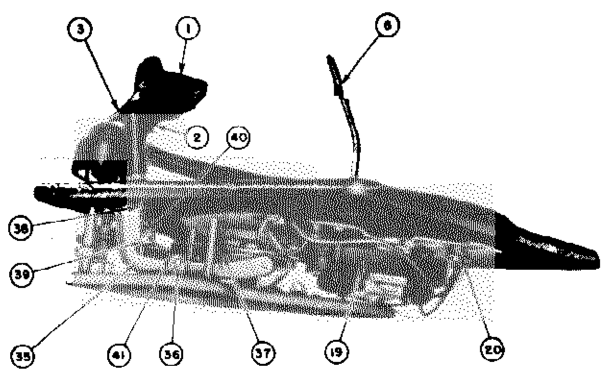


Fig. 6

LUBRICATION

The record changer leaves the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, lubrication should be performed more frequently as required.

AVOID EXCESSIVE LUBRICATION: Do not permit any oil or grease to get on the rubber Idler Drive Wheel or the Motor Pulley (11 and 21, Fig. 7), on Turntable drive rim or on the Automatic-Trip-Arm clutch. Any oil or grease on these parts should be removed with the aid of Carbon Tetrachloride.

The recommended lubricants and points of lubrication are as follows:

A. #10 OIL (apply with a small oil can or medicine dropper).

1. Motor Bearings. Saturate top and bottom felts.
2. Pick-up Arm Shaft (22, Fig. 3) Apply one drop each to bottom bearing point, bracket hole and hole through Main Base Plate.
3. Ball Bearing Assembly (7, Fig. 7).
4. Idler Wheel Felt (13, Fig. 7).

B. LUBRIPLATE (apply with small brush):

1. Idler Wheel Link (16, Fig. 7).
2. Turntable-Shaft Stud.
3. Pick-up Arm Hinge Pins.
4. Knife edge of Raising Lever (33, Fig. 4).
5. Main Cam Bearing. (It is necessary to remove the Sub Plate Assembly to lubricate this bearing. See "MECHANICAL REPAIRS").

C. STA-PUT (apply with small brush)

1. Teeth of Main-Cam-Actuating Gear (43, Fig. 4).
2. Track of Main Cam Gear (42, Fig. 4).
3. Teeth of Large and Small Idler Gears (9, Fig. 7).
4. Raising-Lever Bracket bearing surfaces (33, Fig. 4).
5. Selector-Lever Stop (40, Fig. 6).

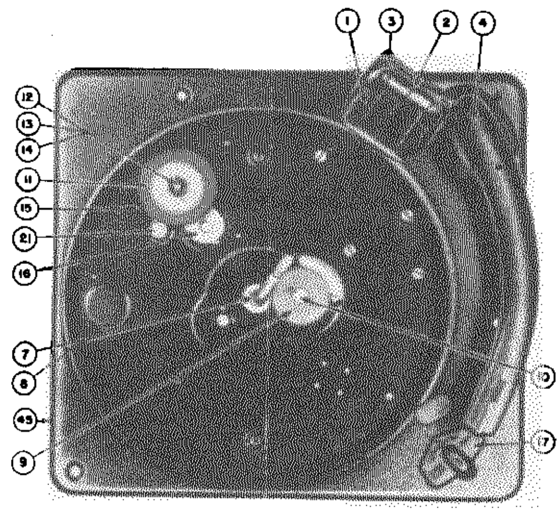


Fig. 7

REMOVING AND INSTALLING PARTS

TO REPLACE A PICK-UP CARTRIDGE:

1. Remove needle by taking out the small screw visible at the front of the Pick-up Arm.
2. Raise Pick-up Arm and remove two screws holding Cartridge.
3. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connector off the cartridge pin.

TO REMOVE THE SUB-PLATE ASSEMBLY: In the event that it becomes necessary to replace any of the major parts in the Sub-Plate Assembly (Fig. 4), the entire assembly should first be removed from the Main Plate.

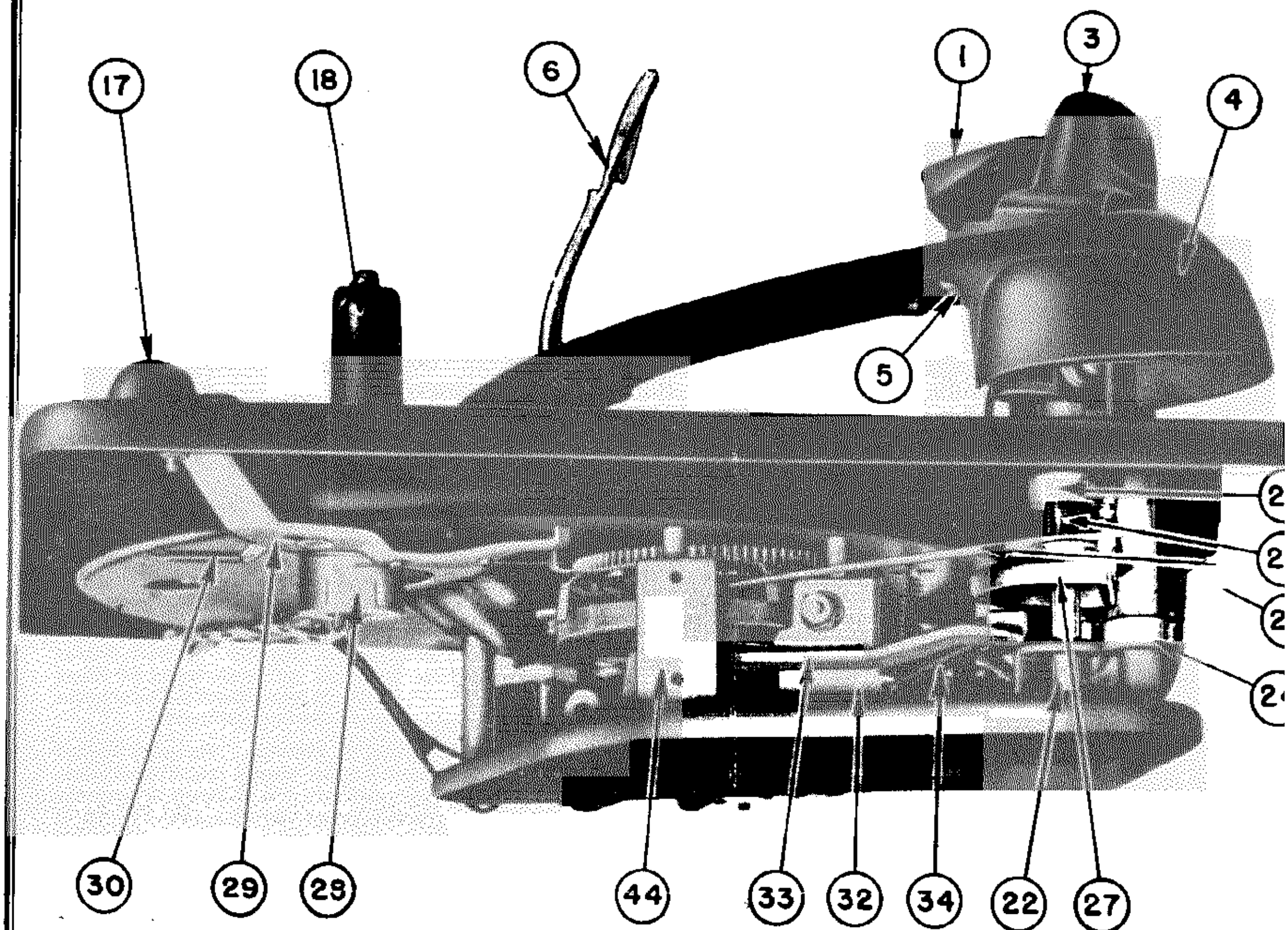
1. Remove the Center Post which is held in by a cotter pin under the Sub-Plate.
2. Remove the Turn-table.
3. Unhook the Rocker-Arm-Return Spring. (37, Fig. 6).
4. Remove the Rocker-Arm-Pivot Pin (36, Fig. 6).
5. Remove the five #8-32x¼ screws holding the sub-plate studs and the #8-32x⅜ screw holding the Main-Cam-Actuating-Gear Shaft to the Main Plate.

TO REPLACE THE SUB-PLATE ASSEMBLY: Reverse the above procedure making certain that all parts fall into their proper positions. Particularly note the Selector Lever and Selector-Lever Compression Spring (41, Fig. 4) to see that they are in position with the lever through the slot in the Pick-up-Arm-Raising-Lever Bracket. (32, Fig. 3).

TO REMOVE THE RECORD SUPPORT ARM AND ROCKER-ARM ASSEMBLY:

1. Unhook the Rocker-Arm-Return Spring (37, Fig. 6).
2. Remove the Rocker-Arm-Pivot Pin (36, Fig. 6).
3. Lift out the Record Support Arm, Rocker Arm and Crescent Assembly as a unit.
4. In replacing the Rocker-Arm Assembly, note position of Selector Lever as described in the above paragraph entitled "TO REPLACE THE SUB-PLATE ASSEMBLY."

STEWART-WARNER CORP. MODEL W-504J



PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION
1	504600	Record Clip
2	504601	Spring; Record Clip tension
3	504602	Record Support Arm
4, 5, 22	504885	Pick-up Arm, Hinge and Shaft Assembly
6	504200	Center Post
7	504364	Ball Bearing for Center Post
8	504607	Washer; Bearing Race
9	504361 504362	Fibre Drive Gear (1-5/8" dia.) Fibre Drive Gear (1" dia.)
10	504608	Screw; Idler Gear Mtg.
11	504360	Rubber Drive Wheel
12	504609	Clip; Idler retaining
13	504610	Washer; idler felt
14	504611	Washer; idler fibre
15	504612	Spring; Idler Tension
17	504613	Knob; Control
18	504614	Rest Post
19	504201	Motor; 115 Volt, 60 cycle
20	504615	Grommet; Motor Mounting
21	504618 504202	Motor Hub (60 cycle) Motor Hub (50 cycle)
23	504621	Lock; Clutch Spring Tension
25	504622	Spring; Clutch Tension
26	504623	Lever; Automatic Trip
27	504624	Disc; Pick-up Arm Raising
28	504203	On-Off Switch
29	504625	Lever; Manual Trip Assy.
30	504626	Spring, Coil; Manual Trip Tension
32	504627	Bracket; Raising Lever Pivot

DIAG. NO.	PART NO.	DESCRIPTION
33	504628	Lever; Pick-up Arm Raising
34	504629	Spring; Raising Lever Tension
35	504630	Arm; Rocker Arm and Roller Assy.
36	504631	Pin; Rocker Arm Pivot
37	504633	Spring; Rocker Arm Tension
38	504634	Spring; Selector Shaft Compression
39	504635	Collar Assy.; Selector Lever
40	504636	Stop; Selector Lever
41	504637	Spring; Selector Lever Compression
42	504638	Cam; Main Cam Assy.
43	504639	Gear; Main Cam Actuating
44	504640	Trip Assy.; Velocity Trip and Roller Assy.
	504620	Bracket; Pick-up Arm Lift Stop
	504609	Clip; Pivot Retaining
	502461	Crystal Cartridge
	500966	Male Plug—Single Prong
	501031	Male Plug—2 Prong
	504606	Nut; Bearing Stud Mtg.
	502460	Phonograph Needle
	504641	Rubber bushing; for mtg. record changer
	504632	Screw; for mtg. record changer
	504617	Screw; Motor Mounting
	504364	Set Screw for Needle
	504616	Sleeve; Motor Mounting
	504642	Spring; For Mtg. Record Changer
	504605	Stud; Turntable Bearing
	504363	Turntable
	504564	Wrench for No. 8 Bristol Set Screws

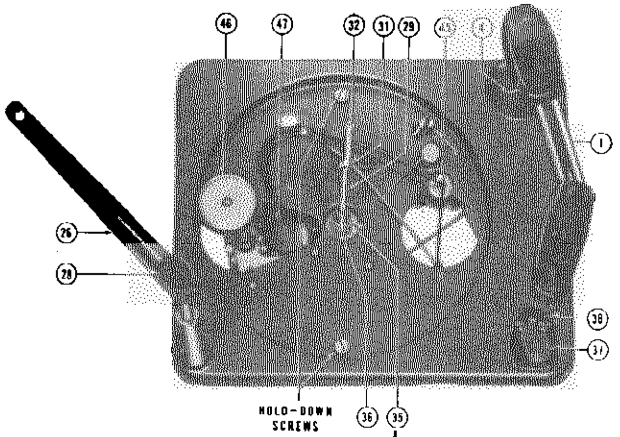


Fig. 3

NOTE: This Pinion Spring (35) must be located below the Pinion Gear (36) on record changers of the type shown in **Fig. 5** so that it holds the gear in mesh with the turntable hub at all times. Only changers of the type shown in Fig. 4 have the spring located above the gear.

DESCRIPTION OF CYCLE

STARTING . . . Turning the Control Button (37) to the "ON" position actuates the Control Link Assembly (39) which closes the Switch (45), thus supplying power to the Motor (47) causing the Turntable (34) to rotate.

With record changer shown in Fig. 4, continuing to turn the Control Button (37) to the "REJ." position causes a leg of the Control Lever (41) to move further hitting and tripping the Ratchet and Rod (48). The action of the rod releases the Catch (53) allowing the Latch Spring (55) to push the Latch (54) forcing up the Pinion Gear (36). This gear now engages rotating Turntable (34) and transmits this motion to Main Cam (56).

The record changer shown in Fig. 5 uses a different type trip mechanism which operates as follows: Continuing to turn the Control Button (37) to the "REJ." position causes a leg of Control Lever (41) to move further hitting the Ratchet and Rod (72). The action of the rod releases the Clutch Pawl (70) allowing the Clutch Pawl Spring (71) to pull it into engagement with the teeth on revolving Pinion Gear (35). This turns the Main Cam Assembly (69) past the open space in its periphery and starts the change cycle.

CYCLING . . . A single revolution of the Main Cam (56) results in complete automatic cycling of the changer. A roller on the Lift Arm (58) moves along a heart shaped groove, in the Main Cam (56), thus, moving the arm forward, then back again to the starting position. Inclined planes on either end of Lift Arm (58) effects the selection of record from stack, lifting Pick-up Arm (1) from rest position and setting needle on edge of record. Upon completion of its revolution, the lower rim of the Main Cam (56) (See Fig. 4) pushes down Latch (54) allowing Catch (53) to re-engage it. This allows Pinion Spring (35) to push Pinion Gear (36) away from Turntable (34) disengaging change mechanism during playing cycle (See Fig. 12).

The changer mechanism shown in Fig. 5 completes its cycle differently than that just described. Near completion of the revolution of the Main Cam Assembly (69) the arm of the Ratchet and Rod (72) engages the Clutch Pawl (70) pulling it away from Pinion Gear (36). At the same time Cam Stop Pawl (65) fits between two locating pins on the upper side of the Main Cam Assembly (69) holding it so that its open periphery is adjacent to the Pinion Gear (36).

RECORD FEED . . . As the Lift Arm (58) goes through its swing the inclined plane pushes up the Center Post Roller (30). This movement is transferred to the Ejection Lever (31) by a push-up rod inside the Center Post, pushing record off shoulder of the Center Post (29) allowing it to drop to the Turntable (34).

PICK-UP ARM MOVEMENT . . . The Lift Arm (58) also controls movement of Pick-up Arm (1). Lift is effected by the Lift Rod (23) riding along the incline plane of the Lift Arm (58) as the latter swings through its cycle. Direction is controlled by the engagement of the Ratchet Arm (15) with the Lift Arm (58). Upon completion of the latter's cycle it swings sufficiently clear to permit the Ratchet Arm (15) and the attached Pick-up Arm (1) to proceed across the record.

PICK-UP ARM SET DOWN POINT; 10" RECORD . . . While Pick-up Arm (1) completes its return movement, the Return Spring (22) forces Set Down Locator (20) against a stop in Base Plate (64). This provides the correct set down point of Pick-up Arm (1) for a 10" record.

PICK-UP ARM SET DOWN POINT: 12" RECORD . . . The record changer operates normally in the 10-inch position. When a 12-inch record drops, it hits the Trip Lever (4) at rear of Pick-up Arm (1). This in turn actuates the Index Cam (5) which causes the Index Lever (7) to move around and holds it in that position by a shoulder. A leg on the Index Lever (7) moves down an incline of the arm on the Adjusting Ring (8) (See Fig. 9) when the Pick-up Arm (1) moves back over the record. This provides the correct set down point for a 12-inch record.

PAWL TRIP ACTION . . . As the Pick-up Arm (1) approaches the Center Post (29) the Ratchet Pawl (16) engages the Ratchet and Rod (48) or (72). Any reversal of the Pick-up Arm (1), caused either by the eccentric spiral groove of the record or by returning arm manually, trips the Ratchet and Rod (48) or (72) thus starting the cycle.

AUTOMATIC SHUT-OFF . . . Dropping of the last record lowers the Record Support Arm (26) so that it rests on the offset shoulder of the

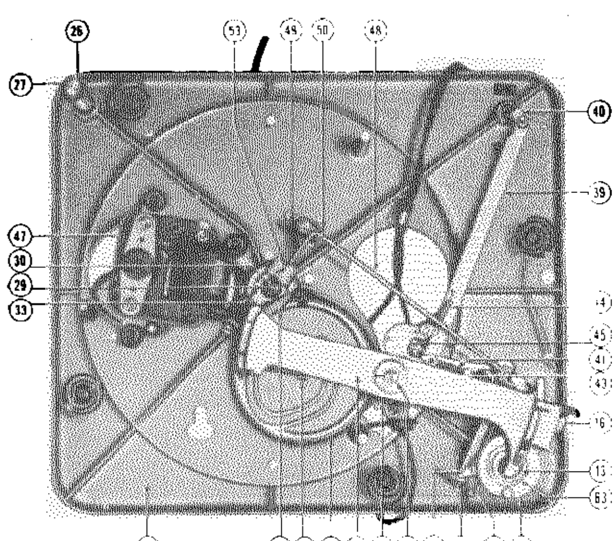


Fig. 4

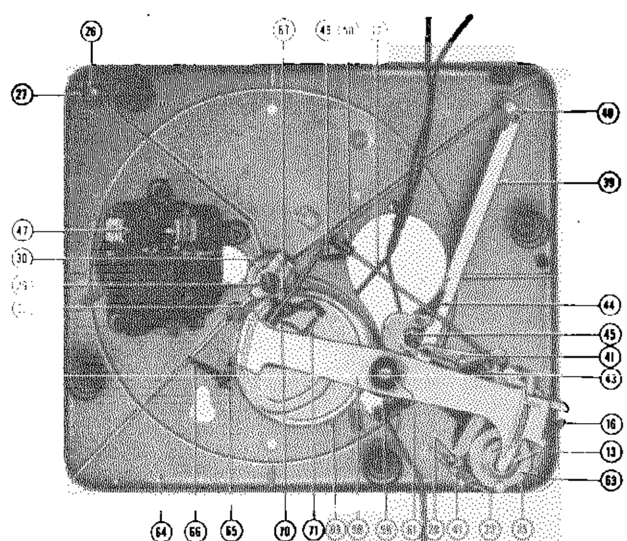


Fig. 5

Center Post (29). The hole in the arm prevents the Ejection Lever (31) from pushing all the way out, on the next change cycle. This allows the brass bushing at the base of the Center Post (29) to be in the path of the Automatic Shut-Off Rod (59). The latter is attached to the Lift Arm (58) and engages the brass bushing when the arm makes its incoming sweep. This turns the other end of the Automatic Shut-Off Rod (59) 90° so it will engage and push the Control Lever (41) when the rod makes its return sweep. The movement of the Control Lever (41) actuates the Switch (45) shutting the record changer off.

CORRECTIVE ADJUSTMENTS

FOR IMPROPER STARTING OF RECORD CHANGER: Investigate each of the following items:

1. Record Changer may have been stopped during change cycle. Merely rotate Turntable (34) **one** turn **clockwise** by hand and turn Control Button (37) on again.
2. Idler Wheel (46) not engaging rim of Turntable (34). Check for any binding action of plate or lever on which Idler Wheel (46) is mounted to motor.
3. Grease on Idler Wheel (46) or rim of Turntable (34). Clean with carbon tetrachloride.
4. Turntable bearing may be too tight or binding. Remove Turntable (34), clean and relubricate bearing with light oil.
5. Turn Control Button (37) to "REJ." position. Holding it in this position, check to see if a leg of Control Lever (41) is hitting and tripping the Ratchet and Rod (48) or (72) sufficiently to trip cycling mechanism. Check for loose Trip Rod Bearing (51). Also check to see that trip rod is not loose in ratchet.
6. If Ratchet and Rod (48), shown in Fig. 4, is operating correctly, check the following:
   a. Catch (53) not releasing Latch (54). Polish any burrs on contacting surfaces with a fine emery or crocus cloth. Lubricate with light oil. (See Fig. 12.)
   b. Latch (54) being released properly but not lifting Pinion Gear (36) to engage teeth on hub of Turntable (34). Latch (54) may be binding with center post bearing clean and remove burrs, or Latch Spring (55) which fits under Latch (54) may be defective or missing.
7. If the record changer incorporates the trip mechanism shown in Figure 5 and the Ratchet and Rod (72) is operating correctly, check to determine that the Clutch Pawl (70) moves forward and engages the teeth on the Pinion Gear (36). A defective Pawl Spring (71) or binding between Clutch Pawl (70) and the Cam would prevent this action. If binding occurs, clean out foreign matter and check for freedom but do not oil.

   Pinion Gear Spring (35) broken or missing. This spring holds pinion gear in contact with turntable hub at all times.
8. Operating temperature too low. If the changer has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.
9. If changer continues to be inoperative in the change cycle, check section entitled "For Changer Stalling During Cycle" on Page 6.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 10-INCH RECORDS: If, when playing 10" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Improper setting of Pick-up Arm.
   a. With a 10" record on the Turntable (34), start changer and turn Control Knob (37) to "REJ." position. Allow changer to cycle and just after Pick-up Arm (1) drops down, shut changer off. Raise Pick-up Arm (1) and be sure that leg of Index Lever (7) is in the **first** step of the Adjusting Ring (8) as shown in Fig. 6.

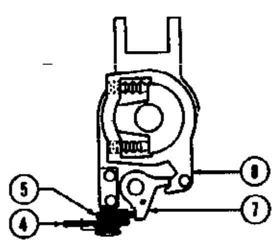
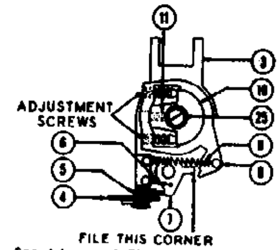


Fig. 6

   b. Note two Adjustment Screws (See Fig. 7). If needle is setting too far out on edge or off record, loosen the **back screw** about ¼ turn and tighten front screw to lock adjustment in-place.
   c. If needle is setting too far in on the record, loosen the **front** screw about ¼ turn and tighten back screw.



See Adjustment 7b in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 12" Records"

Fig. 7

2. Hinge Bearing (10) out of relation with Pick-up Arm Locator (12). This may be adjusted as follows:
   a. Place the Pick-up Arm (1) on the rest post and turn Control Knob (37) to "OFF" position.
   b. Control Lever (41) should be engaging leg on Set Down Locator (20) as shown in Figs. 4 and 8. If improperly set, position Set Down Locator (20) correctly.
   c. Lift Pick-up Arm (1) and note Set Screw (11) (See Fig. 7). Note: It may be necessary to line up hole in Adjusting Ring (8) by moving Adjustment Screws, to gain access to Set Screw (11). After loosening Set Screw (11), turn Ratchet Arm (15) until pin on upper side reaches end of slot closest to leg on Set Down Locator (20) (See Fig. 8).

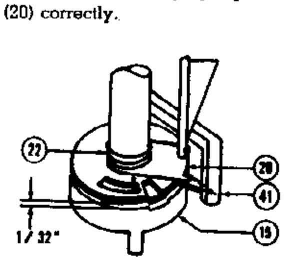


Fig. 8

   d. Place a 1/32" shim between Ratchet Arm (15) and Set Down Locator (20). Take up all the play between the parts by pressing up on the bottom of Ratchet Arm (15) and down on the top of Hinge Bearing (10). Be sure that Hinge Bearing (10) is turned **counterclockwise as far as it will go.** Now tighten Set Screw (11).
   e. Recheck set down point of Pick-up Arm (1) by referring to items 1 a, b, and c.
3. If Pick-up Arm continually lands in 12" position it may be due to Index Lever (7) not returning to 10" record position and may be corrected by the following:
   a. Stop record changer in mid-cycle at the point when the Lift Arm (58) has moved as far out as it will go and is about to start to move back to its starting point.
   b. Lift Pick-up Arm (1) and see if there is a gap of at least 1/64" between the end of the leg of the Index Lever (7) and outer tip of the Adjustment Ring (8). This space allows Index Spring (6) to pull Index Lever (7) against Index Cam (5). (See Fig. 7.)
   c. Allow the changer to cycle and Pick-up Arm (1) to set down in the 12" position. Trip Lever (4) should return to a horizontal position. If this should not be the case, check if there is a clearance of about 1/64" between Index Lever (7) and Index Cam (5) (See Fig. 9). File the edge of the Index Lever (7) closest to the Index Cam (5) to provide the required space. If space is adequate check for loose or broken index cam spring.
   d. Check for binding between Hinge Bearing (10) and body of Hinge Assembly (3). Clean and relubricate with Lubriplate. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 7.
4. Should the Pick-up Arm (1) have an erratic set down point, that is not consistently setting down in the same place, it may be due to a broken, loose or missing Ring Spring (9). The above condition may also be due to binding between Safety Spring (14) and Ratchet Arm (15) and can be checked and corrected as follows:

a. Remove the lower part of the Pick-up Arm Assembly. See section entitled "To Disassemble Pick-up Arm Mechanism on Page 7.

b. Hold Pick-up Arm Locator (12) shaft in one hand and turn Ratchet Arm (15) with other. Check to see if locator is returned all the way to stop in Ratchet Arm (15).

c. Remove Safety Spring (14). Now turn Pick-up Arm Locator (12) and check for binding. Remove all burrs and sharp edges on both locator and spring.

d. Reassemble and adjust according to Item 2 above followed by Item 1.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 12" RECORDS: If, when playing 12" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Check to see if record is hitting Trip Lever (4). Standard Records should be used. They should have a diameter of 11⅞" plus or minus 1/32".

2. Trip Lever (4) should be in a horizontal position before record drops.

   a. If it is raised up above this point, when a 12" record drops, it will miss it entirely. If this is the case, check to see if spring on Trip Lever (4) is loose or broken.

   b. If it is lower than the horizontal position, see Item 3c in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Record" on page 3.

3. Records with too large a center hole will produce the same effect as an undersize record.

4. If record still does not hit the Trip Lever (4) the projection on the bottom end of the Hinge Assembly (3) which contacts a stop in the Base Plate (64) may be defective. This would allow Pick-up Arm (1) to swing out too far creating the same effect as an undersize record. To remove, see section entitled "To Disassemble Pick-up Arm Mechanism" on page 7.

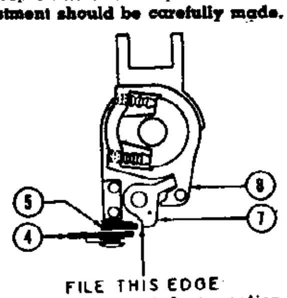
5. If record hits Trip Lever (4) but lever fails to stay down, raise Pick-up Arm (1) and check Index Lever (7) to see that there is freedom of movement and that Index Spring (6) is not unhooked or missing. This spring should keep Index Lever (7) against Index Cam (5).

6. Pick-up Arm (1) not properly adjusted. Check Adjustment 1 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records." **This adjustment should be carefully made.**

7. If record hits Trip Lever (4) but Pick-up Arm (1) lands in the 10" position, it may be due to improper relation of Index Lever (7) and leg on Adjusting Ring (8).

   a. Check to see if leg of Index Lever (7) is sliding down incline as described in section entitled "Pick-up Arm Set Down Point; 12" Record" under "Description of Cycle" and note that final position should be as shown in Fig. 9.

   b. If Index Lever (7) does not slide down incline, file about a 1/64" bevel on corner of Index Lever (7). (See Fig. 7 for location.) Be careful not to round off end.



See Adjustment 3c in section entitled "For Incorrect Drop of Pick-up Arm When Playing 10" Records"

Fig. 9

8. If Pick-up Arm lands correctly in 10" position but does not land properly in 12" position, the distance that controls the indexing is improper and may be corrected as follows:

   a. Allow a 12" record to drop to the Turntable (34) as described in the instruction section on Page 1.

   b. Should the Pick-up Arm approach the record but land too far on the record, it will be necessary to file the "12" stop" deeper (See Fig. 10).

   c. Should the Pick-up Arm (1) approach the record, but land to the right of it, it will be necessary to file the "10" stop" deeper (See Fig. 10).

   d. Carefully readjust set-down point as described in Adjustment 1 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" after each filing.

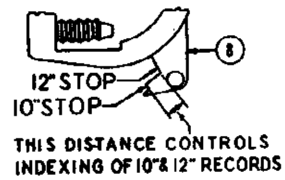


Fig. 10

9. Binding between Safety Spring (14) and Ratchet Arm (15). See Adjustment 4 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records."

FOR INCORRECT HEIGHT OF PICK-UP ARM: The following faults may occur:

1. **Needle striking edge of top record.**
2. **Needle not contacting record.**
3. **Pick-up Arm striking records still resting on offset** of Center Post.
4. **Pick-up Arm striking rest post.**

Whenever any of the above symptoms are encountered it will be necessary to adjust height of Pick-up Arm (1) as described below:

   a. Raise the Pick-up Arm (1) and note Height Adjusting Screw (25) (See Fig. 7).

   b. Hold Lift Rod (23) steady and turn screw clockwise to lower Pick-up Arm (1) and counterclockwise to raise arm.

Edge of Pick-up Arm (1) should clear Rest Post by about ⅛" when changer is going thru its cycle.

FOR FAILURE OF RECORDS TO DROP: Check for:

1. Pusher shaft in Center Post broken. Roller Assembly will drop out. Replace with new Center Post (29) which may be done in the following manner:

   a. Locate Set Screw (33) (See Fig. 4 or 5). Loosen screw, and Center Post (29) may be withdrawn from top of changer.

   b. Replace with new Center Post (29) making sure Set Screw (33) engages hole near bottom of Center Post (29) (See Fig. 11).

2. Ejector Lever (31) does not move out far enough.

   a. Check to see if the scored indents on the side of the Center Post (29) opposite the Ejector Lever (31) are preventing this lever from coming out far enough. If this is so, file off any interfering burrs at sides of scored areas.

   b. Check to see if Screw (61) is loose.

3. Ejector Lever (31) pushing up whole stack of records. This lever should first rise inside the slot in the Center Post (29) then move forward pushing one record off the shoulder of Center Post (29). If Ejector Lever (31) is being pushed forward prematurely, the Center Post (29) will have to be replaced.

4. Lift Arm (58) not turning during cycle. Check for broken roller on Lift Arm (58).

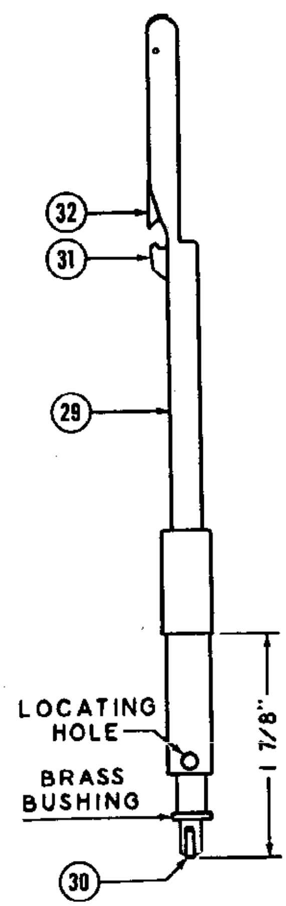


Fig. 11

FOR MULTIPLE DROPPING OF RECORDS: Check for:

1. Center hole in record too large or badly worn.
2. Record Changer not level.
3. Improper setting of Record Support Arm (26). See Instructions for "Placing Records on Changer" on Page 1. The Record Support Arm (26) must be able to slide down by its own weight. If this support does not follow the records down as they are being lowered to the Turntable (34) multiple dropping of records will result. Where this occurs, it is generally due to binding between the Support Arm (26) and the Center Post (29).
   a. Check to see if Center Post (29) is straight. Carefully straighten.
   b. Tip of Record Support Arm (26) bent up slightly. Straighten so that when shaft of Support Arm (26) comes to rest the tip should be resting on the shoulder of offset of Center Post (29).
   c. If hole in tip of Record Support Arm (26) is not centered over the Center Post (29) after checking the above steps, raise support arm up as far as it will go and with the heel of your hand, bend shaft slightly until hole is centered over Center Post (29). Lower Record Support Arm (26) until locating pin in shaft enters base plate. There should be an equal amount of play on each side of the hole in tip of the arm. Bend to correct position.
   d. If Record Support Arm (26) is loose on its shaft, replace.
4. Slide (32) in upper part of Center Post (29) not all the way down. Check to see that it is not binding at any point. When records are placed on the Center Post (29), be sure the Slide (32) is all the way down. It will normally raise slightly as a record is being dropped but it should return to place immediately after record has dropped.

FOR IMPROPER DROPPING OF RECORDS: If when ejecting a record it should land on Pick-up Arm (1) or if when ejecting a 12" record, it should wabble by and fail to hit Trip Lever (4), check for:

1. Ejector Lever (31) does not move out far enough. See Item 2 in section entitled "For Failure of Records to Drop."
2. Ejector Lever (31) extending out too far. Turn Control Button (37) to "REJ." position and then turn it back to "OFF" position. Now rotate Turntable (34) by hand until Ejector Lever (31) reaches its maximum outward position, then, with a **new** record as a gauge, check to see if any binding occurs. With a fine file remove high spots.
3. Pick-up Arm (1) improperly adjusted. See Adjustments 1 a, b, and c in section entitled "For Incorrect Drop Point of Pick-up Arm when Playing 10" Records" on page 3.

FOR NEEDLE SKIPPING GROOVES: Check for:

1. Foreign matter in record groove.
2. Badly worn record.
3. Badly worn or bent needle.
4. Ratchet Arm (15) not disengaging from the Set Down Locator (20) when a cycle is completed. There should be a space of approximately 1/32" between the above parts. See Fig. 8 as well as section entitled "To Disassemble Pick-up Arm Mechanism" on Page 7.

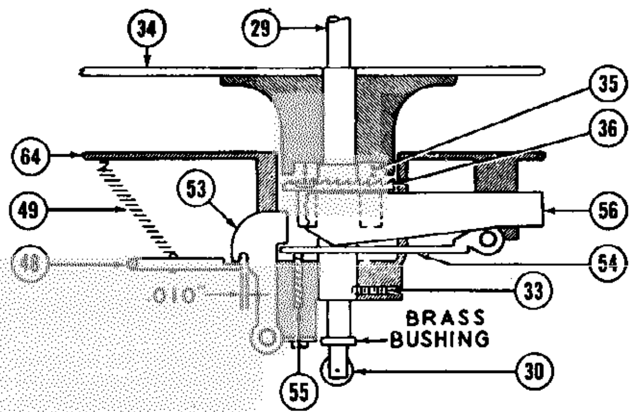


Fig. 12

5. Check for binding between Ratchet Arm (15) and Set Down Locator (20).
6. Check for binding in hinge bearing assembly. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 7.

FOR INCORRECT TRIP POINT: If Pick-up Arm (1) starts to cycle before reaching end of the record, check for:

1. Hole in record too large.
2. The edge of the Catch (53) on which end of Ratchet and Rod (48) rests, (see Figs. 4 and 12), should be smooth and highly polished. Clean and polish with emery or crocus cloth. If polishing fails, replace Catch. There should be free movement of Catch (53) on its hinge pin.
3. Not enough space between end of Ratchet and Rod (48) and Catch (53) to allow the former to swing into its locking position. There should be about .010" space between the above parts when the raised portion of the lower rim of Main Cam (56) has depressed Latch (54) as far as it will go (See Fig. 12). Move or bend Trip Rod Bearing (50) to provide this space.
4. Binding of Catch (53) on its hinge pin. Also be sure that slot into which Catch (53) fits is free from burrs.
5. Ratchet and Rod (48) or (72) should have perfect freedom of movement in its bearings.
6. Trip Rod Spring (49) has insufficient tension. After checking the above five items, making sure there is no binding and space requirements are sufficient, adjust spring either by taking off a few coils or by replacing.
7. With the mechanism shown in Fig. 5 the Trip Rod Spring (49) should have enough tension to pull the Ratchet and Rod (72) back to a fully engaged position if an eccentric record is being played. The Ratchet and Rod (72) should trip on an eccentric of 3/16" and not trip on an eccentric of 1/8". If spring tension is insufficient adjust by taking off coils, or replace.

FOR RECORD CHANGER FAILING TO CYCLE: If Pick-up Arm (1) fails to trip mechanism when it reaches spiral groove in record, it may be due to one of the following:

1. Record has no eccentric groove.
2. Binding between Ratchet and Rod (48) or (72) and Bearings (50) and (51).
3. Ratchet Pawl (16) not properly engaging serrated section on Ratchet and Rod (48) or (72).
   a. Check to be sure that Ratchet Pawl (16) has freedom of movement, that Pawl Spring (17) has sufficient tension and that point on Ratchet Pawl (16) is sharp. Resharpen with a stone.
   b. Ratchet section on Ratchet and Rod (48) or (72) may be too far away from Ratchet Pawl (16) requiring an excessive eccentric motion. Move or bend Trip Rod Bearing (51) to move ratchet sector closer. Be careful not to move it too far in as this will cause excessive tripping pressure.
4. Defective Catch (53) or rough surface on Trip Rod (48). See Item 2 in section entitled "For Incorrect Trip Point."
5. Needle jumping out of eccentric groove. This may be due to:
   a. Eccentric groove too shallow. Try a record which is known to have a good groove.
   b. Needle badly worn or bent.
   c. Trip pressure may be too great. Check to see that ratchet sector is not in too far against Ratchet Pawl (16).
   d. Check for defective Catch (53). See Item 4 above.
6. With the mechanism shown in Figs. 4 and 12 the changer may fail to trip due to the Clutch teeth on Pinion Gear (36) not engaging teeth on hub of Turntable (34).
   a. Check to see that Catch (53) and Latch (54) are operating correctly.
   b. Pinion Gear (36) binding on center post bearing. Clean and relubricate with Lubriplate.
   c. Foreign matter in teeth of Pinion Gear (36) or Main Cam (56).
   d. Latch Spring (55) may be broken or missing.

7. Clutch Pawl binding on the Cam face. On the record changer mechanism shown in Fig. 5 the Clutch Pawl (70) must be free to move forward and engage the Pinion Gear teeth when the Ratchet and Rod (72) releases it. Check for burrs or foreign matter lodged between the Clutch Pawl (70) and the Cam. Do not oil.

Pinion Gear Spring (35) broken or missing. On changers with mechanism shown in Fig. 5 this spring must be located **under** Pinion Gear (36) so that it holds the gear in mesh with hub of turntable at all times.

FOR CONTINUOUS TRIPPING: If record changer continuously cycles, it may be due to one of the following:

1. Catch (53) defective or not engaging Latch (54) properly. See Item 2 under "For Incorrect Trip Point."
2. Binding between Ratchet and Rod (48) or (72) and Trip Rod Bearings (50) and (51).
3. Insufficient tension on Trip Rod Spring (49). See Item 6 under "For Incorrect Trip Point."
4. Changers having the trip mechanism shown in Fig. 5, the arm of the Ratchet and Rod (72) should contact the bent up section of the Clutch Pawl (70) and push it out of engagement with the Pinion Gear (36). If the Ratchet and Rod (72) is not free to meet the Clutch Pawl (70) continuous cycling will result. Check Items 2 and 3.
5. Control Lever (41) holding Ratchet and Rod (48) or (72) in reject position. Check to see that there is no binding in Control Link Assembly (39) including Control Crank (40) and Control Lever (41). Also check for loose or missing Reject Spring (44).
6. With the mechanism shown in Fig. 4 and 12 the Pinion Gear (36) must disengage from the turntable hub at the end of the cycle. Should this not occur, check following:
   a. Pinion Spring (35) missing.
   b. Burrs or binding between Pinion Gear (36) and center post bushing. Clean out and relubricate with Lubriplate.
   c. Foreign matter in teeth of Pinion Gear (36) or Main Cam (56).
7. Latch (54) not being forced down far enough to allow Catch (53) to engage it. If this should occur try placing a thin fiber washer between Main Cam (56) and Base Plate (64). The above trouble may also be due to cam bearing having an excessive amount of play, a warped Main Cam (56) or a bent cam bearing.
8. During change cycle Pinion Gear (36) is held up against hub of Turntable (34) by upper rim of Main Cam (56). Upon completion of cycle recess in rim allows Pinion Gear (36) to drop thus disengaging from hub of Turntable (34). Check for foreign matter, or burrs in recess. Clean and relubricate with Lubriplate.

FOR CHANGER STALLING DURING CYCLE:

1. Idler Wheel (46) slipping or not engaging Turntable (34). Check to see if plate or lever on which Idler Wheel (46) is mounted is free. Also check for grease on the tire or rim of Turntable (34). Clean with carbon tetrachloride.
2. Turntable bearing may be too tight or binding. Remove turntable (34), clean and relubricate bearing with light oil.

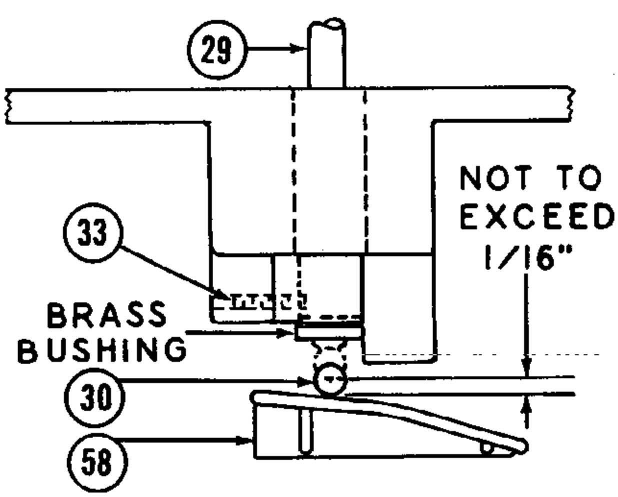


Fig. 13

3. Operating temperature too low. See Item 8 in section entitled "For Improper Starting of Record Changer" on Page 3.
4. Line voltage too low. It should not be less than 105 volts.
5. Binding in drive mechanism.
   a. Remove Idler Wheel (46). Take off Lift Arm (58). Turn Control Button (37) to "REJ." position. Replace Turntable (34) and rotate it very slowly by hand thru one cycle, checking for any binding action. If binding occurs check for: foreign matter in the gear teeth of the Main Cam (56) or (69), bent main cam bearing shaft, bent center post bushing.
   b. Replace Lift Arm (58). This time remove "C" Washer (62) at base of Lift Rod (23). Lift Pick-up Arm (1) and take out rod. Remove Lift Rod Spring (63). Now loosen Set Screw (33) and raise Center Post (29) so that inclined plane of Lift Arm (58) will not contact it. While holding Center Post in this position, cycle changer by hand and again check for any binding action. If binding occurs, check lift arm bearing for freedom and lift arm roller to be sure it is not bent causing binding in the heart shaped groove in the Main Cam (56) or (69).
6. Binding between Lift Rod (23) and inclined plane of Lift Arm (58). Replace Lift Rod (23) taken off in Instruction 5 b, but leave Center Post (29) in raised position. Now rotate Turntable (34) until Lift Arm (58) has moved out as far as it will go and is about to return. Lift Pick-up Arm (1) and raise Lift Rod (23), by pulling up. Feel the Lift Arm (58). There should be a small amount of play. Lift Rod (23) may still be contacting the inclined plane but it should not bind. If this does occur, the lift arm bearing shaft may be bent or the fiber washer under the Lift Arm (58) should be removed to lower the arm.
7. Center Post Roller (30) being compressed too far. Replace Center Post (29) to its normal position which was raised for Tests 5 and 6. Turn Control Button (37) to the "REJ." position. Rotate the Turntable (34) by hand while watching the action of the lower part of the Center Post (29) as the roller goes up the inclined plane of the Lift Arm (58). As the Center Post Roller (30) approaches the end of the face, the brass bushing is stopped by the Base Plate (64) (See Fig. 13) but the Center Post Roller (30) continues and is further compressed a distance not to exceed 1/16". Should the latter movement exceed this, the changer may stall in the cycle due to excessive pressure caused by binding of Lift Arm (58).
   a. Should the above occur check the lift arm bearing shaft to determine that it is square with the Base Plate (64).
   b. Try removing fiber washer between metal washer and bottom of Lift Arm (58).
   c. Center Post (29) may be too long. The critical 1⅞" dimension shown in Fig. 11 should not be exceeded.
8. If change mechanism is not binding and Idler Wheel (46) is not slipping it may be assumed that the motor is weak (has low torque) and should be replaced.

FOR FAILURE OF CHANGER TO SHUT OFF AUTOMATICALLY: Check for:

1. Record Support Arm (26) binding and not dropping all the way to the offset in the Center Post (29). See Item 3 in section entitled "For Multiple Dropping of Records" on Page 5.
2. Changer stalling during cycle. See section on "For Changer Stalling During Cycle."
3. Automatic Shut-Off Rod (59) not engaging brass bushing as described in "Automatic Shut-Off" paragraph on Page 2. Check for the following:
   a. Record Support Arm (26) tip not resting on off set or shoulder of Center Post. See Item 3 in section entitled "For Multiple Dropping of Records" on Page 5.
   b. Set Screw (33) not fitting properly in locating hole of Center Post (29), thus not holding it securely.
   c. Screw (61) that holds Lift Arm (58) loose.
   d. Bent up end of Automatic Shut-Off Rod (59) too short. Replace.

FOR INCORRECT REST POSITION OF PICK-UP ARM AFTER AUTOMATIC SHUT-OFF: Check for:

1. Control Lever (41) not engaging Set Down Locator (20) as shown in Fig. 8. On the return sweep of the Automatic Shut-Off Rod (59) it should contact a projection on the Control Lever (41) moving the levers so as to bring a leg in the path of the Set Down Locator (20).

2. Hinge Bearing out of relation with Pick-up Arm Locator (12). See Item 2 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.

FOR RECORD CHANGER SHUTTING OFF PREMATURELY: Check for:

1. Center Post Roller (30) moving up too far. See Item 7 in section entitled "For Changer Stalling During Cycle."
2. Record too thick. In this case, the changer will shut off instead of dropping the record.
3. Automatic Shut-Off Rod (59) not being reset. On the change cycle following a cycle in which the changer was automatically shut off, the Automatic Shut-Off Rod (59) should return to its original position. On the in sweep, the bent-up part of the rod engages a projection on the Control Lever (41) which turns the rod 90°. It is held against a stop on the Lift Arm (58) by a flat Spring (60).
   a. Check the tension of Spring (60). Should it be insufficient it would allow the Automatic Shut-Off Rod (59) to be out of position thus turning off changer prematurely.
   b. Lubricate the automatic shut-off rod bearings and Spring (60) with Lubriplate.
   c. In normal operation there should be enough clearance between the projection on the Control Lever (41) and the Automatic Shut-Off Rod (59) when the latter is turned fully down. Bending of rod may be necessary.

FOR SLOW TURNTABLE SPEED: Check for:

1. See Items 1, 2, 3, and 4 in section entitled "For Changer Stalling During Cycle."
2. Motor weak, (has low torque).

FOR NOISY OPERATION DURING PLAYING CYCLE: Check for:

1. Rumble. If a low pitched rumbling sound is heard while playing records, it may be due to Motor (47) not floating freely on its rubber mounts. Also check to be sure wire leads are not pulled tight. Rumbling may also be due to defective or dirty turntable bearing. Clean and relubricate.
2. If a rapid thumping sound is heard while motor is running, it is probably due to a flat spot on the Idler Wheel (46). Replace.
3. If a scraping sound is heard when Turntable (34) is revolving, check for:
   a. Turntable (34) warped, causing outer rim to rise and fall.
   b. Idler Wheel (46) bent.
   c. Wire beneath turntable rubbing.
4. If squeaking sounds are heard, it would indicate lack of oil. See section under "Lubrication" on Page 8.

FOR NOISY OPERATION DURING CHANGE CYCLE:

There is a certain amount of clicking noise as the mechanism goes through its cycle. If any excessive grinding sounds are heard, check for worn or defective parts or a lack of lubricant.

REPLACEMENT OF PARTS

TO REPLACE A PICK-UP CARTRIDGE:

1. Remove needle by taking out the small screw visible at the front of the Pick-up Arm.
2. Raise Pick-up Arm and remove two screws holding Cartridge.
3. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connector off the cartridge pins.

TO DISASSEMBLE PICK-UP ARM MECHANISM: The support which holds and locates the Pick-up Arm (1) is made up of an upper and lower major assembly.

These assemblies are held together by Set Screw (11). (For location see Fig. 7.) It may be necessary to line up hole in Adjusting Ring (8) by moving adjustment screws.

TOP ASSEMBLY: Before attempting to work on top assembly, it will be necessary to unsolder and disconnect the shielded lead at the terminal strip on underside of Base Plate (64). Then withdraw lead from Hinge Assembly (10) and proceed as follows to disengage top assembly:

1. Loosen Set Screw (11). It will be noted that top assembly may now be lifted straight out.
2. Disconnect one end of Ring Spring (9), being careful not to break the peened over stud around which it is fastened.
3. Loosen adjustment screws on Adjusting Ring (8). The major assembly may now be separated into three assemblies; Adjusting Ring (8), Hinge Bearing (10) and Hinge Assembly (3).
4. Pick-up Arm (1) and Counterbalance Spring (68) may be taken off of Hinge Bearing (3) by driving out Hinge Pin (2).

Care should be exercised not to lose three Ball Bearings (18) and Ball Bearing Spacer (19) resting in ball cup on Base Plate (64).

BOTTOM ASSEMBLY: Before attempting to work on bottom assembly, it will be necessary to take off Lift Arm (58) by removing Screw (61). Disassembling bottom assembly may now proceed as follows:

1. Loosen Set Screw (11). It will be noted that bottom assembly may now be withdrawn.
2. If a further breakdown is required, it may be done in the following manner: Take off "C" Washer (62) and withdraw Lift Rod (23). Take out Safety Spring (14). Remove "C" Washer (13). Ratchet Arm (15) and Pick-up Arm Locator (12) may now be separated.

REASSEMBLING PICK-UP ARM MECHANISM: The Pick-up Arm mechanism should be reassembled by reversing the procedure given in the preceding paragraphs, exercising the following precautions:

1. When replacing shielded lead in Pick-up Arm (1) care should be exercised that after lead comes out of hole in Hinge Bearing (10) that it lays in groove provided for it and then is passed around both Hinge Pin (2) and Counterbalance Spring (68). It should then be laid in special recesses around inside edge of Pick-up Arm (1).
2. When replacing Lift Arm (58) roller on arm should fit into heart shaped groove in Main Cam (56) or (69).

For final setting of Set Screw (11) and adjustment of Pick-up Arm (1), reference should be made to adjustments 2 c, d, and e in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.

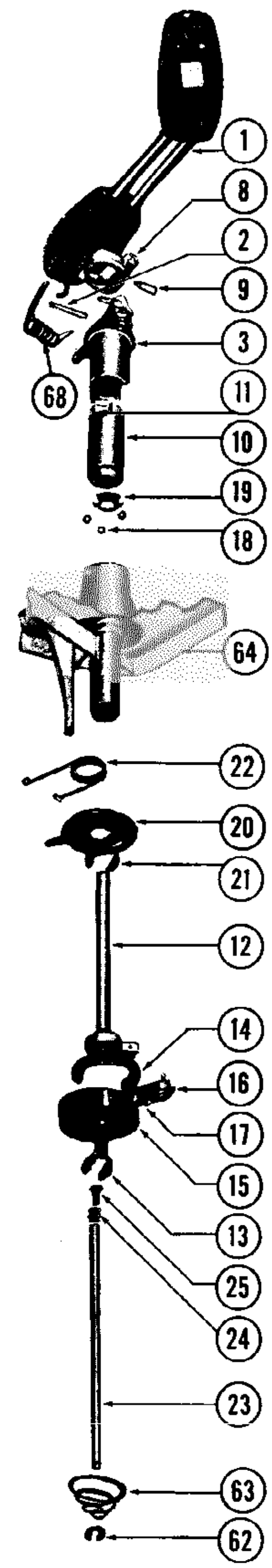


Fig. 14

LUBRICATION

Additional Lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperature, it may require lubrication.

The recommended lubricants and points of lubrication are as follows:

A. **LUBRIPLATE** (apply with small brush):

1. Hinge Bearing (10).
2. Ratchet Arm (15) and Set Down Locator (20).
3. Inclined Planes on Lift Arm (58), lift arm bearing, and automatic shut-off rod bearing.
4. Between Automatic Shut-Off Rod (59) and Spring (60).
5. Heart shaped groove in Main Cam (56) or (69) and main cam bearing.
6. At lower section of Center Post (29) where the brass bushing and center post roller support go in body of Center Post (29).
7. Ball bearings in hub of Turntable (34).

B. **LIGHT OIL** (apply with small oil can or medicine dropper):

1. Pickup Arm Locator (12) inside of Ratchet Arm (15) and bearing surfaces.
2. Ball Bearings (18) inside pickup arm housing in Base Plate (64).
3. Ratchet Pawl (16) bearing.
4. Automatic Shut-Off Rod (59) bearings.
5. Control Link Assembly (39) bearings.
6. Catch (53) bearing.
7. Latch (54) bearing.
8. Turntable bearing; that is where Turntable (34) comes in contact with body of Center Post (29).
9. Pinion Gear (36) bearing.
10. On contacting surface of Catch (53) and Latch (54).

PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION	LIST PRICE
1	505240	Pick-up Arm	$ 2.10
2	505241	Hinge Pin for Pick-up Arm	.20
—	502461	Crystal Cartridge	6.10
—	502460	Needle	1.50
—	504364	Thumb Screw for Needle	.15
3	505242	Hinge Assembly	2.10
4	—	Trip Lever (part of Item 3)	—
5	—	Index Cam (part of Item 3)	—
6	—	Spring, Index (part of Item 3)	—
7	—	Index Lever (part of Item 3)	—
8	505243	Adjusting Ring	.95
9	505244	Ring Spring	.06
10	505245	Hinge Bearing	2.00
11	505246	Set Screw 8-32x3/16	.20
12	505247	Pick-up Arm Locator	1.00
13	505248	"C" Washer for Pick-up Arm Locator	.02
14	505249	Safety Spring	.04
15	505250	Ratchet Arm	1.00
16	—	Ratchet Pawl (part of Item 15)	—
17	505251	Pawl Spring	.16
18	505252	Ball Bearing	.02
19	505253	Ball Bearing Spacer	.02
20	505254	Set Down Locator	.10
21	505255	"C" Washer for Set Down Locator	.02
22	505256	Return Spring	.10
23	505289	Lift Rod	.30
24	505290	Lock Spring	.04
25	505291	Height Adjusting Screw	.02
26	505257	Record Support Arm	2.80
27	505248	"C" Washer for Record Support Arm	.02
28	505258	Knob for Record Support Arm	.30
29	505259	Center Post Assembly (includes Ejection Lever, Slide and Roller)	6.80
30	—	Center Post Roller (part of Item 29)	—
31	—	Ejector Lever (part of Item 29)	—
32	—	Slide (part of Item 29)	—
33	505260	Set Screw for Center Post	.04
34	505261	Turntable	5.30
35	505262	Pinion Spring	.02
36	505263	Pinion Gear	.30
37	505258	Control Button (Knob)	.30
38	505264	Escutcheon, "OFF-ON-REJ"	.30
39	505265	Control Link Assembly	$ 1.55
40	—	Control Crank (part of Item 39)	—
41	—	Control Lever (part of Item 39)	—
42	505266	"C" Washer for Control Crank	.02
43	505267	"C" Washer for Control Lever	.02
44	505268	Reject Spring	.16
45	505269	Switch	.85
46	505270	Idler Wheel used with Sampsel Motor which is identified by having name printed on winding	1.90
46	505271	Idler Wheel used with G. I. Motor which is identified by a red dot of paint	1.90
46	505272	Idler Wheel used with Russell Motor has no identification marking	1.90
47	505273	Motor; 115V—60 Cyc.	10.90
47	505274	Motor; 115V—50 Cyc.	11.25
48	505275	Ratchet and Rod	1.20
49	505276	Trip Rod Spring	.06
50	505277	Trip Rod Bearing	.09
51	505278	Trip Rod Bearing	.10
52	505279	"C" Washer on Control Rod	.02
53	505280	Catch	.16
54	505281	Latch	.25
55	505282	Latch Spring	.02
56	505283	Main Cam	1.20
57	505284	"C" Washer for Main Cam	.02
58	505285	Lift Arm (includes Items 59 & 60)	1.90
59	505286	Automatic Shut-off Rod	.30
60	505287	Spring, Automatic Shut-off Lever	.02
61	505288	Screw for Lift Arm	.04
62	505267	"C" Washer for Lift Rod	.02
63	505292	Spring, Lift Rod	.02
64	505293	Base Plate	7.95
65	505646	Cam Stop Pawl	.20
66	505647	Spring for Cam Stop Pawl	.04
67	505648	Washer, Pinion Gear Spring Support	.02
68	505642	Spring, Pick-Up Arm Counterbalance	.04
69	505643	Main Cam Assembly includes Clutch Pawl (70) and Clutch Pawl Spring (71)	3.00
70	—	Clutch Pawl (part of item 69)	—
71	505251	Clutch Pawl Spring	.16
72	505645	Ratchet and Rod	1.25

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

DESCRIPTION OF CYCLE

STARTING: By sliding the Control Button (7) to the "ON-REJECT" position, the attached On-Off Lever (8) will snap the Switch (9) to the "ON" position which supplies power to rotate the Turntable. This revolving motion is transmitted to the Turntable Bearing (13) and its attached Pulley (15) causing the Drive Belt (45) to rotate the Drum (31).

The movement of the On-Off Lever (8) also starts automatic cycling by engaging the Release Bracket (41). This releases the Drive Dog (34) which is attached to the Main Cam (32), causing it to drop

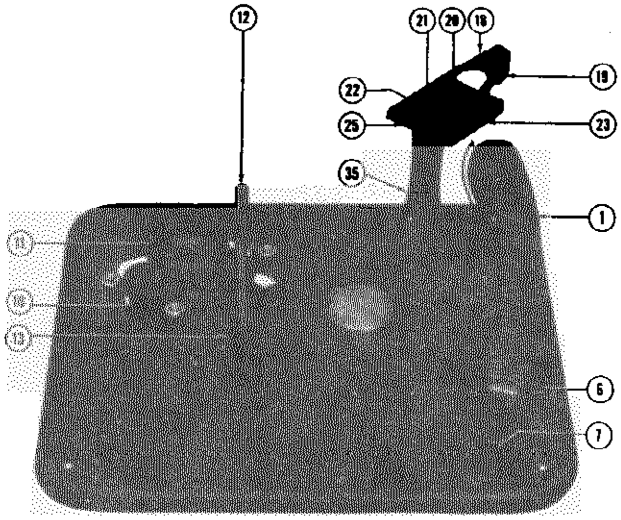


Fig. 3

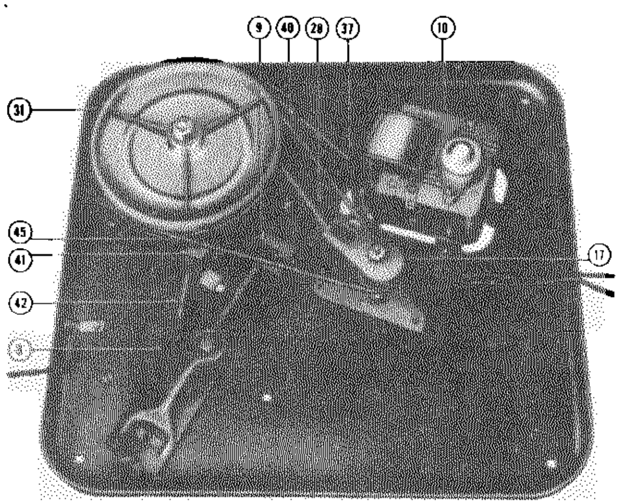


Fig. 4

down onto the rotating Drum (31). It now comes in contact with one of the bosses on the Drum (31) causing the Main Cam (32) to rotate with it.

CYCLING: A single revolution of the Main Cam (32) results in complete automatic cycling of the changer. This includes selection of record from stack, lifting Pick-up Arm (1) from rest position and setting needle on edge of record. Upon completion of the revolution, Release Bracket (41) lifts Drive Dog (34) from Drum (31) thus disengaging Main Cam (32) (see Fig. 5).

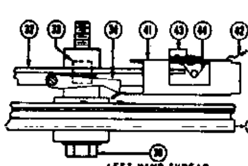


Fig. 5

RECORD FEED: Edge of Main Cam (32) controls record selection. Motion of the Record Feed Roller (27) about the edge of the Cam results in a forward and backward movement of Record Selector Lever & Shaft (26). This causes Record Feed Cam (24 in Fig. 10) to move Record Feed Plate (23) forward thus pushing record off the shoulder of Center Post (12) and allowing it to drop to the Turntable.

PICK-UP ARM MOVEMENT: The upper side of the Main Cam (32) controls Pick-up Arm (1) movement. Lift is effected by motion of the Lift Rod Assembly (4) along the top edge of the cam as the latter rotates. Direction is controlled by Sweep Lever & Pin (38) which follows a groove in the Main Cam (32).

PAWL TRIP ACTION: As the Pick-up Arm (1) approaches the Center Post (12) the Trip Lever (5) engages a Trip Pawl (43) on the Release Bracket (41). Any reversal of the Pick up Arm, caused either by the eccentric spiral groove of the record or by returning arm manually causes the Trip Lever (5) to disengage the Release Bracket (41) and allowing the Drive Dog (34) to drop onto the Drum (31) thus putting the mechanism into a change cycle.

TEN-INCH OR TWELVE-INCH OPERATION: Adjustment of the Record Support Arm (See Fig. 1) to the ten-inch or twelve-inch position rotates the Record Selector Cam (29) thru 180 degrees. The stud, which holds the Index Lever (36) and Sweep Lever (38) together, fits into the detent of the Record Selector Cam (29). Any change in relative position of this stud makes a corresponding change in the position of the Sweep Lever & Pin (38). The location of this pin with respect to the pivot point on the Trip Lever (5) determines the drop point of the Pick-up Arm (1).

CORRECTIVE ADJUSTMENTS

FOR INCORRECT DROP POINT: If Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Record player not level.
2. Shielded lead binding or pulling on rear of Pick-up Arm (1). This may cause it to approach the correct drop point and then suddenly swerve to the left so that it lands on the middle of the record. The condition should be remedied by relieving the bind and providing enough slack to avoid pulling.
3. Pick-up Arm (1) out of position with respect to Sweep Lever and Pin (38). This will cause Pick-up Arm to drop before reaching record or needle to land on wrong point. Before adjusting for incorrect drop point, be certain that Pick-up Arm (1) is in correct position. Pick-up Arm (1) may be moved sideways forcing it out of position. To reposition Arm (1) move it toward Center Post until it snaps into normal position.

   To adjust drop point, proceed as follows:
   a. Slide Control Button (7) to "ON-REJECT" position and allow changer to start cycling momentarily then slide Control to "OFF" position. Continue the change cycle by revolving the turntable by hand until Pick-up Arm (1) is about to land on the record. At this point the Sweep Lever and Pin (38) is still securely held by the groove in the Main Cam (32), thus retaining all the working parts in their correct relationship.

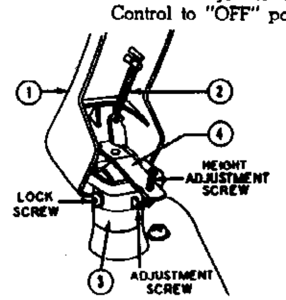


Fig. 6

   b. Loosen Lock Screw on Hub Sleeve (See Fig. 6).
   c. Now turn Adjusting Screw (on front of hub sleeve) in either direction until proper point is reached.
   d. Carefully tighten Lock Screw.
4. If in turning the Adjustment Screw, you are unable to swing the Pick-up Arm (1) to the position desired it will be necessary to do the following:
   a. Proceed as in adjustment "3a."
   b. Now loosen the two set screws at the back and side of the middle part of Hub Assembly (3), move Pick-up Arm to desired position.
   c. Tighten set screws carefully.
   d. Now make final adjustment by following steps "3b, 3c, and 3d."

NOTE: These are the only adjustments to be made. There are no adjustments to be made under the motor board for setting drop point of Pick-up Arm (1).

FOR FAILURE TO PLAY FIRST RECORD: If Pick up Arm (1) approaches record and drops correctly but Needle does not touch record, or does not raise high enough to clear the top record of a full stack, adjustment may be made as follows:

1. Lift Pick-up Arm (1) and note Height Adjustment Screw (see Fig. 6). Loosen the Lock Nut on this screw.
2. Adjust screw to lower or raise Pick-up Arm (1).
3. Retighten Lock Nut.

CAUTION: Be sure bracket which holds Height Adjustment Screw is not bent before making the above adjustments.

FOR INCORRECT TRIP POINT: If Pick-up Arm (1) starts to cycle before reaching the end of the record or if it fails to cycle after reaching the spiral groove at the center of the record it may be due to the following:

1. Shielded lead on Pick-up Arm (1) binding or too tight. Loosen and provide sufficient slack.
2. Eccentric groove in record not deep enough and needle cannot follow the groove.
3. Sticky Release Bracket (41) and Trip Pawl (43). This is a critical item and should pivot freely on the stud upon which it is mounted. To remove Release Bracket (41) take off Drive Belt (45) and Release Bracket Spring (42). Then remove clip on stud and work Release Bracket (41) clear of Drum (31). Clean and relubricate with light machine oil. Check Trip Pawl Spring (44), also see that Trip Pawl (43) moves freely. If still sluggish, replace entire Release Bracket assembly. Also check to see that Release Bracket Spring (42) is not loose or missing.

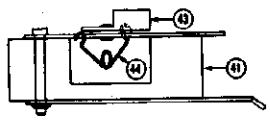


Fig. 7

4. Pick up Arm (1) may be sticking due to gummy lubricant.
   a. Proceed as in "3a" under "For Incorrect Drop Point." This will give you a reference point when replacing Pick-up Arm.
   b. Remove Pick-up Arm (1) by loosening the two set screws at the back and side of the middle part of Hub Assembly (3).
   c. Clean and relubricate with light machine oil.
   d. Replace Pick-up Arm and with set screws still loose proceed as in adjustment "4b, c, and d," under "For Incorrect Drop Point."
5. Trip Lever (5) may be loose on Pick-up Arm Bearing. Check by holding Pick-up Arm steady in one hand and see if there is any play when moving Trip Lever (5). If there is, replace with new Trip Lever and Pick-up Arm Bearing (5).
6. Trip Lever (5) may be pressed too close to base plate so that it will slide between base plate and the Trip Pawl (43) and not contact the trip pawl as it should. Merely bend Trip Lever (5) away from base plate so that it will engage Trip Pawl (43) when Pick-up Arm (1) is swung toward Center Post (12).

FOR INCORRECT SUPPORT AND DROPPING OF RECORDS: One or more of the following symptoms may occur:

Records do not rest securely on Record Support Shelf (25).
Records dropping on Pick-up Arm (1).
Multiple dropping of records.
Incorrect ejection of records.
Records fail to drop.

These symptoms may be due to the following faults:

1. Exceptionally thin or thick records.
2. Records with too large or badly worn center hole.
3. Record Support Shelf (25) out of position with respect to Center Post (12).

The Record Support Shelf (25) should be so positioned that the curve of the plate matches the curve of the record and both corners are equidistant from the center of the Center Post (1); (see Fig. 8).

If record rests on only part of the Record Support Shelf (25), it should be adjusted in the following manner:

a. With Record Support in 10-inch position, carefully place a standard 10-inch record so that it rests on Record Support Shelf and shoulder off-set in the Center Post (12).
b. Loosen Set Screw at rear of Record Support Post (see Fig. 8). Rotate the shelf in either direction until curve of the shelf matches the curve of the record and both corners are equidistant from the edge of the record.
c. Tighten set Screw.

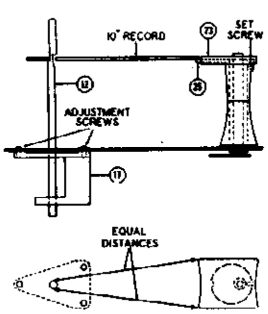


Fig. 8

If the Record Support Shelf (25) is spaced too far away or too close to the Center Post (12), its position may be changed by shifting the position of the center Post (12) in the following manner:

d. Remove Turntable from changer. Loosen three Phillips head Adjustment Screws (see Fig. 8) that hold Center Post Support (17) to base plate.
e. With Record Support in 10-inch position, carefully place a standard 10-inch record so that it rests on Record Support Shelf (25) and shoulder off-set in the Center Post (12).
f. Adjust the distance by sliding the Center Post (12) assembly until record rests on the Record Support Shelf (25) but not on Record Feed Plate (23). There should be a small amount of play to allow next record to drop and to prevent record from jamming between Record Support Shelf (25) and Center Post (12).
g. Retighten the three Phillips head adjustment screws which hold Center Post Support and then replace the Turntable.

FOR CONTINUOUS TRIPPING: If Pick-up Arm (1) goes into cycle immediately without playing the record check for:

1. Sticking Release Bracket. See adjustment "2" under "For Incorrect Trip Point."
2. Drive Dog (34) on Main Cam (32) may be stuck or stiff. Clean and relubricate. Also check leaf spring on Main Cam (32). This should exert a downward pressure on the Drive Dog of about 2 grams.

FOR RECORD CHANGER STALLING DURING CYCLE: Check for:

1. Grease on motor Drive Wheel (11). Clean with carbon tetrachloride.
2. Records jamming between Center Post (12) and Record Support Shelf (25). See adjustments starting with "d" under "For Incorrect Support and Dropping of Records."
3. Main Cam (32) sticking or hard to turn. Check Friction Spring (33). If broken or deformed, replace. See section entitled "To Replace Main Cam and Drum Assembly" in next column.
4. If changer mechanism is not binding and drive wheel does not slip, it may be due to weak or slipping Drive Belt (45). Replace Drive Belt.
5. If the changer still continues to stall after the above four items have been checked it may be assumed that motor is weak, (has low torque) and should be replaced.

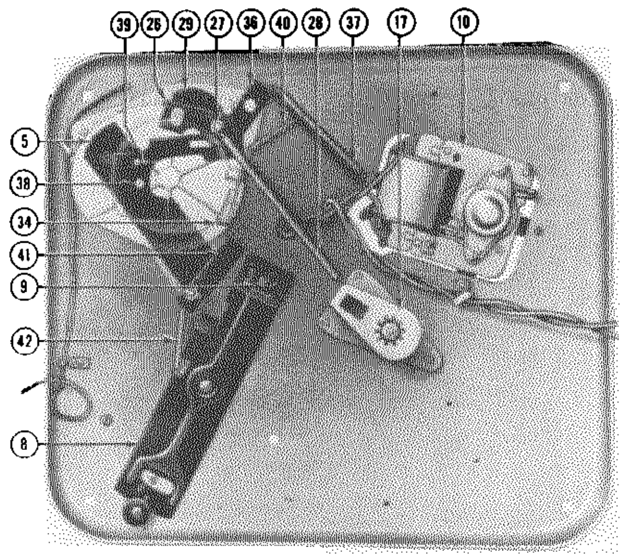


Fig. 9

FOR SLOW TURNTABLE SPEED: Check for:

1. Turntable Bearing (13) sticking. Clean and relubricate or replace bearing.
2. Drum (31) sticking. Clean and relubricate (see section entitled "To Replace Main Cam and Drum Assembly" that follows).
3. Low line voltage.
4. Motor (10) weak (has low torque). Replace. **CAUTION:** In replacing Motor (10). Index Spring (37) should be anchored under one of the nuts holding motor. (See Fig. 9).

REMOVING AND INSTALLING PARTS

1. Remove thumb screw and needle at front of Pick-up Arm.
2. Raise the arm and remove two screws holding Cartridge.
3. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connectors off the Cartridge pins.

TO REMOVE PICK-UP ARM:

1. Lift Pick-up Arm and unhook counter balance spring.
2. Squeeze pivot spring together until pivot points are out of Pick up Arm.
3. Disconnect electrical connections as described above.

TO REPLACE MAIN CAM AND DRUM ASSEMBLY: In event it becomes necessary to remove Main Cam or Drum or any other part associated with these two parts, which is otherwise inaccessible, use the following procedure.

1. Remove Drive Belt (45). Disconnect Release Bracket Spring (42) and swing bracket to one side. Also unhook Record Feed Lever Spring (28) and turn lever away from Main Cam (32).

STEWART-WARNER CORP.

2. To remove Main Stud (30) turn it in a **clockwise** direction until it is completely out. NOTE: Main Stud (30) has a **left hand thread.**
3. Main Cam (32) may now be lifted off. Care should be exercised not to damage or deform Friction Spring (33). Drum (31) will slip off easily.

In replacing Main Cam (32) & Drum (31), care should again be exercised not to damage or deform Friction Spring (33).

To re-assemble to the base plate, the reverse of the above procedure should be followed. Be sure that Pin on Sweep Lever (38) falls into proper groove in Main Cam (32) and does not exert any pressure on the wire spring in the groove of the Main Cam (32).

TO REPLACE RECORD SELECTOR CAM & TUBE: In event this part must be replaced, relationship between Record Selector Cam (29) and Record Support Shelf (25) should be maintained. When the support shelf is in the 10-inch position, the large side of the Record Selector Cam (29) should be toward the Center Post (12). Final check should be made by referring to adjustments "a, b, and c" under "For Incorrect Support and Dropping of Records."

LUBRICATION

The record changer leaves the factory completely oiled and lubricated. This should be adequate for the normal life of the unit. However, if it is subjected to severe operating conditions, it is well to clean and relubricate the moving parts.

AVOID EXCESSIVE LUBRICATION: Do not permit any oil or grease to get on the rubber Drive Wheel (11) or the rim of Turntable.

a. **LUBRIPLATE No. 105** should be applied liberally to Main Cam (32).
b. **LIGHT MACHINE OIL** should be applied to all other precision fitting parts.

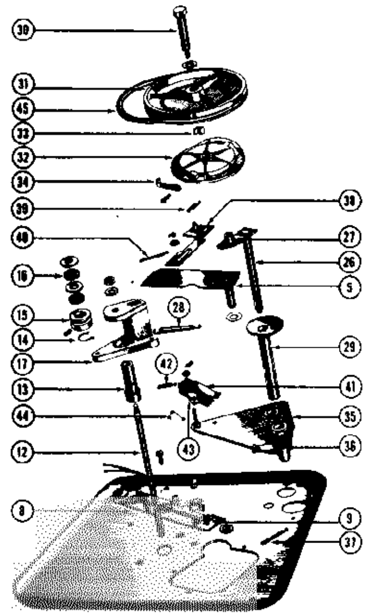


Fig. 13

TO REPLACE RECORD CLIP: Should Record Clip (18) be replaced or removed, care must be exercised in replacing it in the correct position. Fig. 10 shows Record Support Shelf (25) in 10-inch position and Record Clip (18) as well as Rubber Finger (19) in correct relative position.

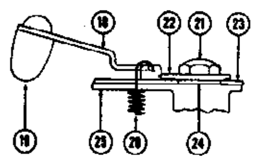
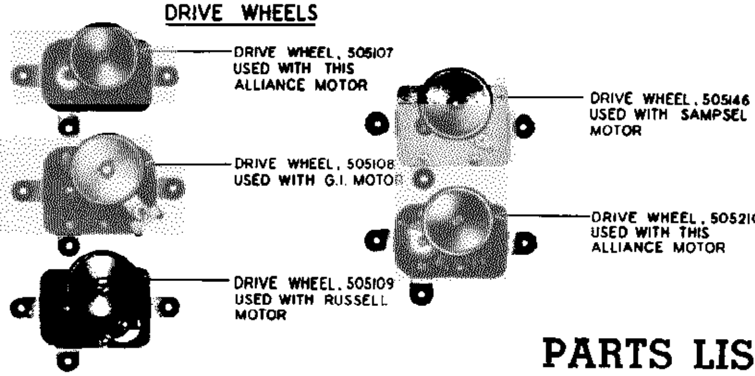


Fig. 10

DRIVE WHEELS



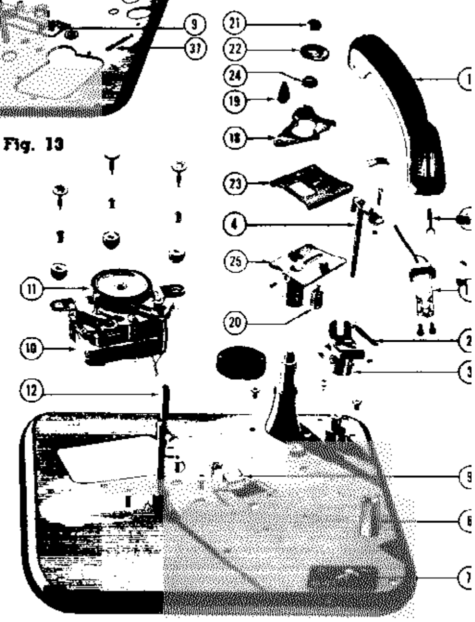


Fig. 12

PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION
1	505110	Pick-up Arm
1A	502461	Crystal Cartridge
—	502460	Needle
1B	504364	Thumb Screw for Needle
2	505111	Counter Balance Spring
3	505112	Hub and Hinge Assembly
4	505113	Lift Rod Assembly
5	505114	Trip Lever and Tone Arm Bearing
6	505115	Rest Post
7	505116	Control Button
8	—	On-Off Lever (part of item 7)
9	505117	Switch
10	505118	Motor 115 Volt; 60 cycle
	505019	Motor 115 Volt; 50 cycle
11	505107	Drive Wheel used with Alliance Motor
	505108	Drive Wheel used with G.I. Motor
	505109	Drive Wheel used with Russell Motor
	505146	Drive Wheel used with Sampsell Motor
	505210	Drive Wheel used with Alliance Motor
		NOTE See Figure 11 for identification of above drive wheels.
12	505119	Center Post
13	505120	Turntable Bearing
14	505121	Clip, Turntable Bearing
15	505122	Pulley
16	505123	Thrust Bearing
17	505124	Center Post Support
18	505125	Record Clip
19	505126	Rubber Finger
20	505127	Spring, Record Clip

DIAG. NO.	PART NO.	DESCRIPTION
21	505128	Nut, Record Selector Arm
22	505129	Washer, Cover
23	505130	Record Feed Plate
24	505131	Record Feed Cam
25	505132	Record Support Shelf
26	505133	Record Selector Lever & Shaft
27		Record Feed Roller (part of item 26)
28	505134	Spring, Record Feed Roller
29	505135	Record Selector Cam and Tube
30	505136	Stud for Main Cam
31	505137	Drum
32	505138	Main Cam
33	505139	Friction Pad
34	—	Drive Dog (part of item 32)
35	505140	Sub Plate, Pick-up Arm Bearing & Record Sup.
36		Index Lever (part of Item 35)
37	505141	Spring, Index Lever
38	505142	Sweep Lever & Pin
39	505143	Spring, Sweep Lever
40	505144	Spring, Pull In
41	505145	Release Bracket (includes Trip Pawl (43) and Spring (44))
42	505144	Spring, Release Bracket
43	—	Trip Pawl (part of item 41)
44	505147	Spring, Trip Pawl
45	505148	Drive Belt
—	505149	Turntable
—	504989	Spring, Mounting
—	504988	Rubber Pad, Mounting
—	19121	Screw 10-24x1¾" Chg. Mtg.
—	19122	Lock Nut, Chg. Mtg.

DESCRIPTION OF CYCLE

STARTING . . . Turning the Control Button (37) to the "ON" position actuates the Control Link Assembly (39) which closes the Switch (45), thus supplying power to the Motor (47) causing the Turntable (34) to rotate.

Continuing to turn the Control Button (37) to the "REJ." position causes a leg of Control Lever (41) to move further hitting the Ratchet and Rod (72). The action of the rod releases the Clutch Pawl (70) allowing the Clutch Pawl Spring (71) to pull it into engagement with the teeth on revolving Pinion Gear (36). This turns the main Cam Assembly (69) past the open space in its periphery and starts the change cycle.

CYCLING . . . A single revolution of the Main Cam (69) results in complete automatic cycling of the changer. A roller on the Lift Arm (58) moves along a heart shaped groove, in the Main Cam (69), thus, moving the arm forward, then back again to the starting position. Inclined planes on either end of Lift Arm (58) effects the selection of record from

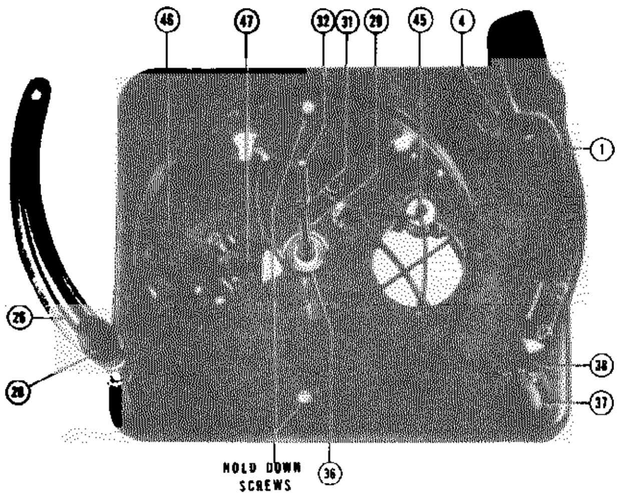


Fig. 3

stack, lifting Pick-up Arm (1) from rest position and setting needle on edge of record. Near completion of the revolution of the Main Cam Assembly (69) the arm of the Ratchet and Rod (72) engages the Clutch Pawl (70) pulling it away from Pinion Gear (36). At the same time Cam Stop Pawl (65) fits between two locating pins on the upper side of the Main Cam Assembly (69) holding it so that its open periphery is adjacent to the Pinion Gear (36).

RECORD FEED . . . As the Lift Arm (58) goes through its swing the inclined plane pushes up the Center Post Roller (30). This movement is transferred to the Ejection Lever (31) by a push-up rod inside the Center Post, pushing record off shoulder of the Center Post (29) allowing it to drop to the Turntable (34).

PICK-UP ARM MOVEMENT . . . The Lift Arm (58) also controls movement of Pick-up Arm (1). Lift is effected by the Lift Rod (23) riding along the incline plane of the Lift Arm (58) as the latter swings through its cycle. Direction is controlled by the engagement of the Ratchet Arm (15) with the Lift Arm (58). Upon completion of the latter's cycle it swings sufficiently clear to permit the Ratchet Arm (15) and the attached Pick-up Arm (1) to proceed across the record.

PICK-UP ARM SET DOWN POINT; 10" RECORD . . . While Pick-up Arm (1) completes its return movement, the Return Spring (22) forces Set Down Locator (20) against a stop in Base Plate (64). This provides the correct set down point of Pick-up Arm (1) for a 10" record.

PICK-UP ARM SET DOWN POINT; 12" RECORD . . . The record changer operates normally in the 10-inch position. When a 12-inch record drops, it hits the Trip Lever (4) at rear of Pick-up Arm (1). This in turn actuates the Index Cam (5) which causes the Index Lever (7) to move around and holds it in that position by a shoulder. A leg on the Index Lever (7) moves down an incline of the arm on the Adjusting Ring (8) (See Fig. 8) when the Pick-up Arm (1) moves back over the record. This provides the correct set down point for a 12-inch record.

PAWL TRIP ACTION . . . As the Pick-up Arm (1) approaches the Center Post (29) the Ratchet Pawl (16) engages the Ratchet and Rod (72). Any reversal of the Pick-up Arm (1), caused either by the eccentric spiral groove of the record or by returning arm manually, trips the Ratchet and Rod (72) thus starting the cycle.

AUTOMATIC SHUT-OFF . . . Dropping of the last record lowers the Record Support Arm (26) so that it rests on the offset shoulder of the Center Post (29). The hole in the arm prevents the Ejection Lever (31) from pushing all the way out, on the next change cycle. This allows the brass bushing at the base of the Center Post (29) to be in the path of the Automatic Shut-Off Rod (59). The latter is attached to the Lift Arm (58) and engages the brass bushing when the arm makes its incoming sweep. This turns the other end of the Automatic Shut-Off Rod (59) 90° so it will engage and push the Control Lever (41) when the rod makes its return sweep. The movement of the Control Lever (41) actuates the Switch (45) shutting the record changer off.

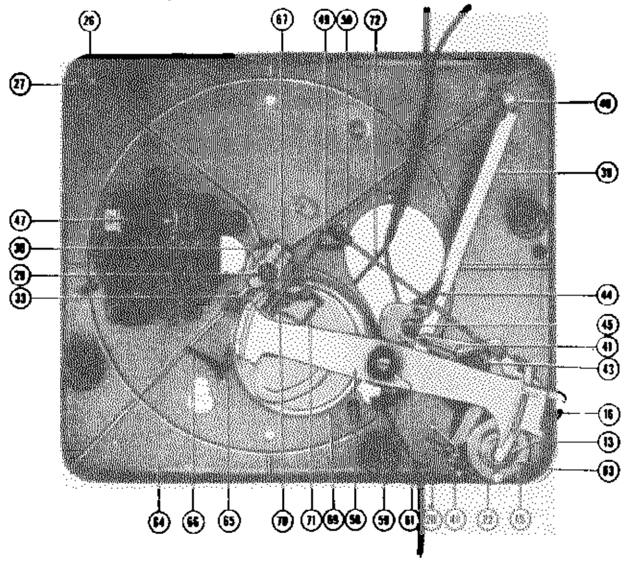


Fig. 4

CORRECTIVE ADJUSTMENTS

FOR IMPROPER STARTING OF RECORD CHANGER: Investigate each of the following items:

1. Record Changer may have been stopped during change cycle. Merely rotate Turntable (34) **one** turn **clockwise** by hand and turn Control Button (37) on again.
2. Idler Wheel (46) not engaging rim of Turntable (34). Check for any binding action of plate or lever on which Idler Wheel (46) is mounted to motor.
3. Grease on Idler Wheel (46) or rim of Turntable (34). Clean with carbon tetrachloride.
4. Turntable bearing may be too tight or binding. Remove Turntable (34), clean and relubricate bearing with light oil.
5. Turn Control Button (37) to "REJ." position. Holding it in this position, check to see if a leg of Control Lever (41) is hitting and tripping the Ratchet and Rod (72) sufficiently to trip cycling mechanism. Check for loose Trip Rod Bearing (51). Also check to see that trip rod is not loose in ratchet.
6. If the Ratchet and Rod (72) is operating correctly, check to determine that the Clutch Pawl (70) moves forward and engages the teeth on the Pinion Gear (36). A defective Pawl Spring (71) or binding between Clutch Pawl (70) and the Cam would prevent this action. If binding occurs, clean out foreign matter and check for freedom but do not oil.

   Pinion Gear Spring (35) which fits under Pinion Gear (36) broken or missing. This spring holds pinion gear in contact with turntable hub at all times.
7. Operating temperature too low. If the changer has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.
8. If changer continues to be inoperative in the change cycle, check section entitled "For Changer Stalling During Cycle" on Page 5.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 10-INCH RECORDS: If, when playing 10" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Crystal Cartridge may be off center which would cause needle to set down on wrong point on record. Merely slide it until it is centrally located.

2. Improper setting of Pick-up Arm.

   a. With a 10" record on the Turntable (34), start changer and turn Control Knob (37) to "REJ." position. Allow changer to cycle and just **after** Pick-up Arm (1) drops down, shut changer off. Raise Pick-up Arm (1) and be sure that leg of Index Lever (7) is in the **first** step of the Adjusting Ring (8) as shown in Fig. 5.

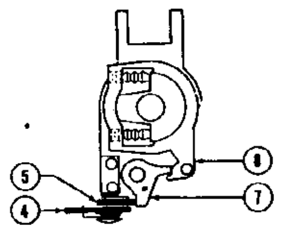
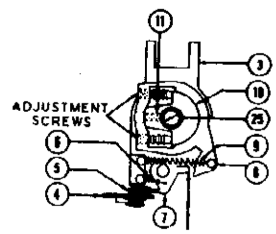


Fig. 5

   b. Note two Adjustment Screws (See Fig. 6). If needle is setting too far out on edge or off record, loosen the **back** screw about ¼ turn and tighten front screw to lock adjustment in place.

   c. If needle is setting too far in on the record, loosen the **front** screw about ¼ turn and tighten back screw.



FILE THIS CORNER
See Adjustment 8b in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 12" Records."

Fig. 6

3. Hinge Bearing (10) out of relation with Pick-up Arm Locator (12). This may be adjusted as follows:

   a. Place the Pick-up Arm (1) on the rest post and turn Control Knob (37) to "OFF" position.

   b. Control Lever (41) should be engaging leg on Set Down Locator (20) as shown in Figs. 4 and 7. If improperly set, position Set Down Locator (20) correctly.

   c. Lift Pick-up Arm (1) and note Set Screw (11) (See Fig. 6). Note: It may be necessary to line up hole in Adjusting Ring (8) by moving Adjustment Screws, to gain access to Set Screw (11). After loosening Set Screw (11), turn Ratchet Arm (15) until pin on upper side reaches end of slot closest to leg on Set Down Locator (20) (See Fig. 7).

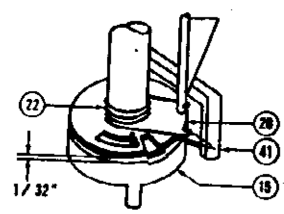


Fig. 7

   d. Place a 1/32" shim between Ratchet Arm (15) and Set Down Locator (20). Take up all the play between the parts by pressing up on the bottom of Ratchet Arm (15) and down on the top of Hinge Bearing (10). Be sure that Hinge Bearing (10) is turned **counterclockwise as far as it will go.** Now tighten Set Screw (11).

   e. Recheck set down point of Pick-up Arm (1) by referring to items 1, 2a, b and c.

4. If Pick-up Arm continually lands in 12" position, it may be due to Index Lever (7) not returning to 10" record position and may be corrected by the following:

   a. Stop record changer in mid-cycle at the point when the Lift Arm (58) has moved as far out as it will go and is about to start to move back to its starting point.

   b. Lift Pick-up Arm (1) and see if there is a gap of at least 1/64" between the end of the leg of the Index Lever (7) and outer tip of the Adjustment Ring (8). This space allows Index Spring (6) to pull Index Lever against Index Cam (5). (See Fig. 6.)

   c. Allow the changer to cycle and Pick-up Arm (1) to set down in the 12" position. Trip Lever (4) should return to a horizontal position. If this should not be the case, check if there is a clearance of about 1/64" between Index Lever (7) and Index Cam (5) (See Fig. 8). File the edge of the Index Lever (7) closest to the Index Cam (5) to provide the required space. If space is adequate check for loose or broken index cam spring.

   d. Check for binding between Hinge Bearing (10) and body of Hinge Assembly (3). Clean and relubricate with Lubriplate. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.

5. Should the Pick-up Arm (1) have an erratic set down point, that is not consistently setting down in the same place, it may be due to a broken, loose or missing Ring Spring (9). The above condition may also be due to binding between Safety Spring (14) and Ratchet Arm (15) and can be checked and corrected as follows:

   a. Remove the lower part of the Pick-up Arm Assembly. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.

   b. Hold Pick-up Arm Locator (12) shaft in one hand and turn Ratchet Arm (15) with other. Check to see if locator is returned all the way to stop in Ratchet Arm (15).

   c. Remove Safety Spring (14). Now turn Pick-up Arm Locator (12) and check for binding. Remove all burrs and sharp edges on both locator and spring.

   d. Reassemble and adjust according to Item 3 above followed by Item 2.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 12" RECORDS: If, when playing 12" records Pick-up Arm (1) approaches record but drops to the right of it, or **needle lands on wrong point** on record it may be due to one of the following:

1. Crystal Cartridge may be off center which would cause needle to set down on wrong point on record. Merely slide it until it is centrally located.

2. Check to see if record is hitting Trip Lever (4). Standard Records should be used. They should have a diameter of 11⅞" plus or minus 1/32".

3. Trip Lever (4) should be in a horizontal position before record drops.

   a. If it is raised up above this point, when a 12" record drops, it will miss it entirely. If this is the case, check to see if spring on Trip Lever (4) is loose or broken.

   b. If it is lower than the horizontal position, see Item 4c in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Record."

4. Records with too large a center hole will produce the same effect as an undersize record.

5. If record still does not hit the Trip Lever (4) the projection on the bottom end of the Hinge Assembly (3) which contacts a stop in the Base Plate (64) may be defective. This would allow Pick-up Arm (1) to swing out too far creating the same effect as an undersize record. To remove, see section entitled "To Disassemble Pick-up Arm Mechanism" on page 6.

6. If record hits Trip Lever (4) but lever fails to stay down, raise Pick-up Arm (1) and check Index Lever (7) to see that there is freedom of movement and that Index Spring (6) is not unhooked or missing. This spring should keep Index Lever (7) against Index Cam (5).

7. Pick-up Arm (1) not properly adjusted. Check Adjustment 1 and 2 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records." **This adjustment should be carefully made.**

FOR NEEDLE SKIPPING GROOVES: Check for:

1. Foreign matter in record groove.
2. Badly worn record.
3. Badly worn or bent needle.
4. Ratchet Arm (15) not disengaging from the Set Down Locator (20) when a cycle is completed. There should be a space of approximately 1/32" between the above parts. See Fig. 7 as well as section entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.
5. Check for binding between Ratchet Arm (15) and Set Down Locator (20).
6. Check for binding in hinge bearing assembly. See action entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.

FOR INCORRECT TRIP POINT: If Pick-up Arm (1) starts to cycle before reaching end of the record, check for:

1. Hole in record too large.
2. Ratchet and Rod (72) should have perfect freedom of movement in its bearings.
3. Trip Rod Spring (49) has insufficient tension. Trip Rod Spring (49) should have enough tension to pull the Ratchet and Rod (72) back to a fully engaged position if an eccentric record is being played. The Ratchet and Rod (72) should trip on an eccentric of 3/16" and not trip on an eccentric of ⅛". If spring tension is insufficient adjust by taking off coils, or replace.

FOR RECORD CHANGER FAILING TO CYCLE: If Pick-up Arm (1) fails to trip mechanism when it reaches spiral groove in record, it may be due to one of the following:

1. Record has no eccentric groove.
2. Binding between Ratchet and Rod (72) and Bearings (50) and (51).
3. Ratchet Pawl (16) not properly engaging serrated section on Ratchet and Rod (72).
   a. Check to be sure that Ratchet Pawl (16) has freedom of movement, that Pawl Spring (17) has sufficient tension and that point on Ratchet Pawl (16) is sharp. Reshapen with a stone.
   b. Ratchet section on Ratchet and Rod (72) may be too far away from Ratchet Pawl (16) requiring an excessive eccentric motion. Move or bend Trip Rod Bearing (51) to move ratchet sector closer. Be careful not to move it too far in as this will cause excessive tripping pressure.
4. Needle jumping out of eccentric groove. This may be due to:
   a. Eccentric groove too shallow. Try a record which is known to have a good groove.
   b. Needle badly worn or bent.
   c. Trip pressure may be too great. Check to see that ratchet sector is not in too far against Ratchet Pawl (16).
5. Clutch Pawl binding on the Cam face. Clutch Pawl (70) must be free to move forward and engage the Pinion Gear teeth when the Ratchet and Rod (72) releases it. Check for burrs or foreign matter lodged between the Clutch Pawl (70) and the Cam. **Do not oil.**
6. Pinion Gear Spring (35) broken or missing. This spring must be located **under** Pinion Gear (36) so that it holds the gear in mesh with hub of turntable at all times.

FOR CHANGER STALLING DURING CYCLE:

1. Idler Wheel (46) slipping or not engaging Turntable (34). Check to see if plate or lever on which Idler Wheel (46) is mounted is free. Also check for grease on the tire or rim of Turntable (34). Clean with carbon tetrachloride.
2. Turntable bearing may be too tight or binding. Remove turntable (34), clean and relubricate bearing with light oil.
3. Operating temperature too low. If the changer has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.
4. Line voltage too low. It should not be less than 105 volts.
5. Binding in drive mechanism.
   a. Remove Idler Wheel (46). Take off Lift Arm (58). Turn Control Button (37) to "REJ." position. Replace Turntable (34) and rotate it very slowly by hand thru one cycle, checking for any binding action. If binding occurs check for: foreign matter in the gear teeth of the Main Cam (69), bent main cam bearing shaft, bent center post bushing.
   b. Replace Lift Arm (58). This time remove "C" Washer (62) at base of Lift Rod (23). Lift Pick-up Arm (1) and take out rod. Remove Lift Rod Spring (63). Now loosen Set Screw (33) and raise Center Post (29) so that inclined plane of Lift Arm (58) will not contact it. While holding Center Post in this position, cycle changer by hand and again check for any binding action. If binding occurs, check lift arm bearing for freedom and lift arm roller to be sure it is not bent causing binding in the heart shaped groove in the Main Cam (69).
6. Binding between Lift Rod (23) and inclined plane of Lift Arm (58). Replace Lift Rod (23) taken off in Instruction 5 b, but leave Center Post (29) in raised position. Now rotate Turntable (34) until Lift Arm (58) has moved out as far as it will go and is about to return. Lift Pick-up Arm (1) and raise Lift Rod (23), by pulling up. Feel the Lift Arm (58). There should be a small amount of play. Lift Rod (23) may still be contacting the inclined plane but it should not bind. If this does occur, the lift arm bearing shaft may be bent or the fiber washer under the Lift Arm (58) should be removed to lower the arm.

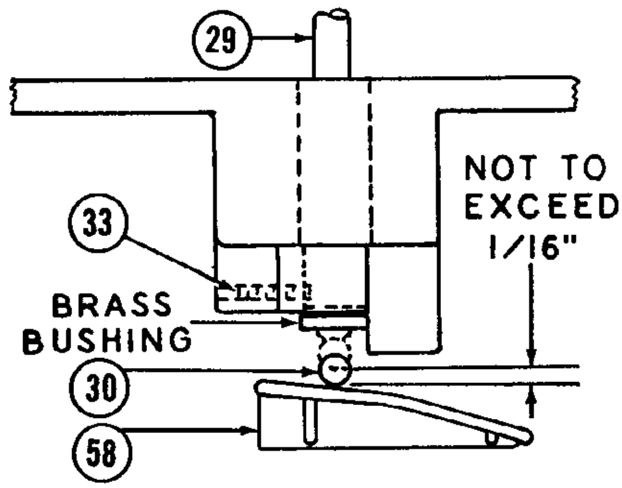


Fig. 11

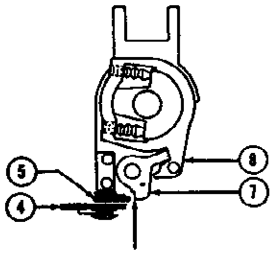
7. Center Post Roller (30) being compressed too far. Replace Center Post (29) to its normal position which was raised for Tests 5 and 6. Turn Control Button (37) to the "REJ." position. Rotate the Turntable (34) by hand while watching the action of the lower part of the Center Post (29) as the roller goes up the inclined plane of the Lift Arm (58). As the Center Post Roller (30) approaches the end of the face, the brass bushing is stopped by the Base Plate (64) (See Fig. 11) but the Center Post Roller (30) continues and is further compressed a distance not to exceed 1/16". Should the latter movement exceed this, the changer may stall in the cycle due to excessive pressure caused by binding of Lift Arm (58).
   a. Should the above occur check the lift arm bearing shaft to determine that it is square with the Base Plate (64).
   b. Try removing fiber washer between metal washer and bottom of Lift Arm (58).
   c. Center Post (29) may be too long. The critical 1⅞" dimension shown in Fig. 10 should not be exceeded.
8. If change mechanism is not binding and Idler Wheel (46) is not slipping it may be assumed that the motor is weak (has low torque) and should be replaced.

FOR CONTINUOUS TRIPPING: If record changer continuously cycles, it may be due to one of the following:

1. Binding between Ratchet and Rod (72) and Trip Rod Bearings (50) and (51). The arm of Ratchet and Rod (72) should be free to contact the bent up section of the Clutch Pawl (70) and push it out of engagement with Pinion Gear (36).

8. If record hits Trip Lever (4) but Pick-up Arm (1) lands in the 10" position, it may be due to improper relation of Index Lever (7) and leg on Adjusting Ring (8).

a. Check to see if leg of Index Lever (7) is sliding down incline as described in section entitled "Pick-up Arm Set Down Point; 12" Record" under "Description of Cycle" and note that final position should be as shown in Fig. 8.



See Adjustment 4a in section entitled "For Incorrect Drop of Pick-up Arm When Playing 10" Records."

Fig. 8

b. If Index Lever (7) does not slide down incline, file about a 1/64" bevel on corner of Index Lever (7). (See Fig. 6 for location.) Be careful not to round off end.

9. If Pick-up Arm lands correctly in 10" position but does not land properly in 12" position, the distance that controls the indexing is improper and may be corrected as follows:

a. Allow a 12" record to drop to the Turntable (34) as described instruction section on Page 1.

b. Should the Pick-up Arm approach the record but land too far on the record, it will be necessary to file the "12" stop" deeper (See Fig. 9).

c. Should the Pick-up Arm (1) approach the record, but land to the right of it, it will be necessary to file the "10" stop" deeper (See Fig. 9).

d. Carefully readjust set-down point as described in Adjustment 2 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" after each filing.

Fig. 9

10. Binding between Safety Spring (14) and Ratchet Arm (15). See Adjustment 5 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records."

FOR INCORRECT HEIGHT OF PICK-UP ARM: The following faults may occur:

1. **Needle striking edge of top record.**
2. **Needle not contacting record.**
3. **Pick-up Arm striking records still resting on offset of Center Post.**
4. **Pick-up Arm striking rest post.**

Whenever any of the above symptoms are encountered it will be necessary to adjust height of Pick-up Arm (1) as described below:

a. Raise the Pick-up Arm (1) and note Height Adjusting Screw (25) (See Fig. 6).

b. Hold Lift Rod (23) steady and turn screw clockwise to lower Pick-up Arm (1) and counterclockwise to raise arm.

Edge of Pick-up Arm (1) should clear Rest Post by about 9/16" when changer is going thru its cycle.

FOR MULTIPLE DROPPING OF RECORDS: Check for:

1. Center hole in record too large or badly worn.
2. Record Changer not level.
3. Improper setting of Record Support Arm (26). See Instructions for "Placing Records on Changer" on Page 1. The Record Support Arm (26) must be able to slide down by its own weight. If this support does not follow the records down as they are being lowered to the Turntable (34) multiple dropping of records will result. Where this occurs, it is generally due to binding between the Support Arm (26) and the Center Post (29).

a. Check to see if Center Post (29) is straight. Carefully straighten.

b. Tip of Record Support Arm (26) bent up slightly. Straighten so that when shaft of Support Arm (26) comes to rest the tip should be resting on the shoulder of offset of Center Post (29).

c. If hole in tip of Record Support Arm (26) is not centered over the Center Post (29) after checking the above steps, raise support arm up as far as it will go and with the heel of your hand, bend shaft slightly until hole is centered over Center Post (29). Lower Record Support Arm (26) until locating pin in shaft enters base plate. There should be an equal amount of play on each side of the hole in tip of the arm. Bend to correct position.

d. If Record Support Arm (26) is loose on its shaft, replace.

4. Slide (32) in upper part of Center Post (29) not all the way down. Check to see that it is not binding at any point. When records are placed on the Center Post (29), be sure the Slide (32) is all the way down.

FOR IMPROPER DROPPING OF RECORDS: If, when ejecting a record, it should land on Pick-up Arm (1) or if, when ejecting a 12" record, it should wabble by and fail to hit Trip Lever (4), check for:

1. Ejector Lever (31) does not move out far enough. Check to see if Screw (61) is loose.

2. Ejector Lever (31) extending out too far. Turn Control Button (37) to "REJ." position and then turn it back to "OFF" position. Now rotate Turntable (34) by hand until Ejector Lever (31) reaches its maximum outward position, then, with a new record as a gauge check to see if any binding occurs. With a fine file remove high spots.

3. Pick-up Arm (1) improperly adjusted. See Adjustments 1, 2a, b, and c in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on page 2.

FOR FAILURE OF RECORDS TO DROP: Check for:

1. Pusher shaft in Center Post broken. Roller Assembly will drop out. Replace with new Center Post (29) which may be done in the following manner:

a. Locate Set Screw (33) (See Fig. 4). Loosen screw, and Center Post (29) may be withdrawn from top of changer.

b. Replace with new Center Post (29) making sure Set Screw (33) engages hole near bottom of Center Post (29) (See Fig. 10).

2. Ejector Lever (31) does not move out far enough. Check to see if Screw (61) is loose. (See Fig. 4 for location.)

3. Ejector Lever (31) pushing up whole stack of records. This lever should first rise inside the slot in the Center Post (29) then move forward pushing one record off the shoulder of Center Post (29). If Ejector Lever (31) is being pushed forward prematurely, the Center Post (29) will have to be replaced.

4. Lift Arm (58) not turning during cycle. Check for broken roller on Lift Arm (58).

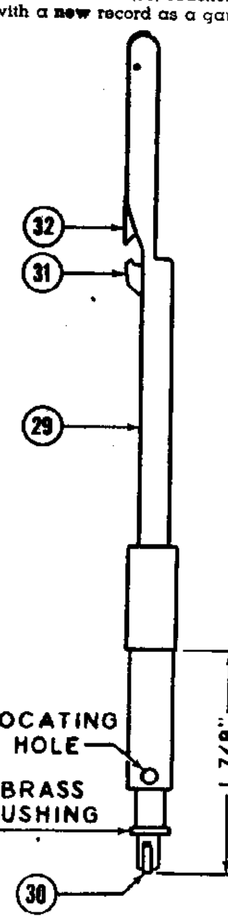


Fig. 10

FOR FAILURE OF PICK-UP ARM TO PROPERLY TRACK ACROSS RECORD: If Pick-up Arm (1) properly approaches record but needle fails to track across the record check for the following:

1. Pick-up cartridge locked in a "retracted" position. Slide cartridge until it is centrally located and it should regain its "floating" action.

2. Needle recessed into metal guard at bottom of cartridge. Merely bend needle until it protrudes 1/32" beyond metal guard at base of cartridge.

2. Insufficient tension on Trip Rod Spring (49). See Item 3 under "For Incorrect Trip Point."
3. Control Lever (41) holding Ratchet and Rod (72) in reject position. Check to see that there is no binding in Control Link Assembly (39) including Control Crank (40) and Control Lever (41). Also check for loose or missing Reject Spring (44).

FOR FAILURE OF CHANGER TO SHUT-OFF AUTOMATICALLY: Check for:

1. Record Support Arm (26) binding and not dropping all the way to the offset in the Center Post (29). See Item 3 in section entitled "For Multiple Dropping of Records" on Page 4.
2. Changer stalling during cycle. See section on "For Changer Stalling During Cycle" on Page 5.
3. Automatic Shut-Off Rod (59) not engaging brass bushing as described in "Automatic Shut-Off" paragraph on Page 2. Check for the following:
   a. Record Support Arm (26) tip not resting on off set or shoulder of Center Post. See Item 3 in section entitled "For Multiple Dropping of Records" on Page 4.
   b. Set Screw (33) not fitting properly in locating hole of Center Post (29), thus not holding it securely.
   c. Screw (61), that holds Lift Arm (58), is loose. (See Fig. 9 for location.)
   d. Bent up end of Automatic Shut-Off Rod (59) too short. Replace.

FOR INCORRECT REST POSITION OF PICK-UP ARM AFTER AUTOMATIC SHUT-OFF: Check for:

1. Control Lever (41) not engaging Set Down Locator (20) as shown in Fig. 7. On the return sweep of the Automatic Shut-Off Rod (59) it should contact a projection on the Control Lever (41) moving the lever so as to bring a leg in the path of the Set Down Locator (20).
2. Hinge Bearing out of relation with Pick-up Arm Locator (12). See Item 3 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.

FOR RECORD CHANGER SHUTTING OFF PREMATURELY: Check for:

1. Center Post Roller (30) moving up too far. See Item 7 in section entitled "For Changer Stalling During Cycle."
2. Record too thick. In this case, the changer will shut off instead of dropping the record.
3. Automatic Shut-Off Rod (59) not being reset. On the change cycle following a cycle in which the changer was automatically shut off, the Automatic Shut-Off Rod (59) should return to its original position. On the in sweep, the bent-up part of the rod engages a projection on the Control Lever (41) which turns the rod 90°. It is held against a stop on the Lift Arm (58) by a flat Spring (60).
   a. Check the tension of Spring (60). Should it be insufficient it would allow the Automatic Shut-Off Rod (59) to be out of position thus turning off changer prematurely.
   b. Lubricate the automatic shut-off rod bearings and Spring (60) with Lubriplate.
   c. In normal operation there should be enough clearance between the projection on the Control Lever (41) and the Automatic Shut-Off Rod (59) when the latter is turned fully down. Bending of rod may be necessary.

FOR SLOW TURNTABLE SPEED: Check for:

1. See Items 1, 2, 3 and 4 in section entitled "For Changer Stalling During Cycle."
2. Motor weak, (has low torque).

FOR NOISY OPERATION DURING PLAYING CYCLE: Check for:

1. Rumble. If a low pitched rumbling sound is heard while playing records, it may be due to Motor (47) not floating freely on its rubber mounts. Also check to be sure wire leads are not pulled tight. Rumbling may also be due to defective or dirty turntable bearing. Clean and relubricate.
2. If a rapid thumping sound is heard while motor is running, it is probably due to a flat spot on the Idler Wheel (46). Replace.
3. If a scraping sound is heard when Turntable (34) is revolving, check for:
   a. Turntable (34) warped, causing outer rim to rise and fall.
   b. Idler Wheel (46) bent.
   c. Wire beneath turntable rubbing.
4. If squeaking sounds are heard, it would indicate lack of oil. See section under "Lubrication."

FOR NOISY OPERATION DURING CHANGE CYCLE:

There is a certain amount of clicking noise as the mechanism goes through its cycle. If any excessive grinding sounds are heard, check for worn or defective parts or a lack of lubricant.

LUBRICATION

Additional Lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperature, it may require lubrication.

The recommended lubricants and points of lubricants are as follows:

A. **LUBRIPLATE** (apply with small brush):
1. Hing Bearing (10).
2. Ratchet Arm (15) and Set Down Locator (20).
3. Inclined Planes on Lift Arm (58), lift arm bearing, and automatic shut-off rod bearing.
4. Between Automatic Shut-Off Rod (59) and Spring (60).
5. Heart shaped groove in Main Cam (69) and main cam bearing.
6. At lower section of Center Post (29) where the brass bushing and center post roller support go in body of Center Post (29).

B. **LIGHT OIL** (apply with small oil can or medicine dropper):
1. Pick-up Arm Locator (12) inside of Ratchet Arm (15) and bearing surfaces.
2. Ball Bearings (18) inside pick-up arm housing in Base Plate (64).
3. Ratchet Pawl (16) bearing.
4. Automatic Shut-Off Rod (59) bearings.
5. Control Link Assembly (39) bearings.
6. Turntable bearing; that is where Turntable (34) comes in contact with body of Center Post (29).
7. Pinion Gear (36) bearing.

REPLACEMENT OF PARTS

TO REMOVE A PICK-UP CARTRIDGE:

1. While holding the Pick-up Arm (1) in a vertical position, grasp the cartridge near the front. Now pull cartridge outward and push it down toward the rear of the Pick-up Arm.
2. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connectors off the cartridge.

TO REPLACE A PICK-UP CARTRIDGE:

1. Hook flat spring which is located at top of crystal Cartridge so that it hooks over lip of bracket which is attached to the Pick-up Arm (1). With cartridge in this position pull it away from Pick-up Arm until step on it clears the bracket. Now push forward on rear of cartridge until the two ears on the bracket fit into "V" groove in body of cartridge.
2. Slip the "quick disconnect" type electrical connectors on prongs of crystal cartridge.

NOTE: Be sure crystal cartridge is centrally located and has a "floating action." Also be sure that needle protrudes 1/32" beyond metal guard at base of cartridge.

TO DISASSEMBLE PICK-UP ARM MECHANISM: The support which holds and locates the Pick-up Arm (1) is made up of an upper and lower major assembly.

These assemblies are held together by Set Screw (11). (For location see Fig. 6.) It may be necessary to line up hole in Adjusting Ring (8) by moving adjustment screws.

TOP ASSEMBLY: Before attempting to work on top assembly, it will be necessary to unsolder and disconnect the shielded lead at the terminal strip on underside of Base Plate (64). Then withdraw lead from Hinge Assembly (10) and proceed as follows to disengage top assembly:

STEWART-WARNER CORP.

1. Loosen Set Screw (11). It will be noted that top assembly may now be lifted straight out.

2. Disconnect one end of Ring Spring (9), being careful not to break the peened over stud around which it is fastened.

3. Loosen adjustment screws on Adjusting Ring (8). The major assembly may now be separated into three assemblies; Adjusting Ring (8), Hinge Bearing (10) and Hinge Assembly (3).

4. Pick-up Arm (1) may be taken off of Hinge Bearing (3) by driving out Hinge Pin (2).

Care should be exercised not to lose three Ball Bearings (18) and Ball Bearing Spacer (19) resting in ball cup on Base Plate (64).

BOTTOM ASSEMBLY: Before attempting to work on bottom assembly, it will be necessary to take off Lift Arm (58) by removing Screw (61). Disassembling bottom assembly may now proceed as follows:

1. Loosen Set Screw (11). It will be noted that bottom assembly may now be withdrawn.

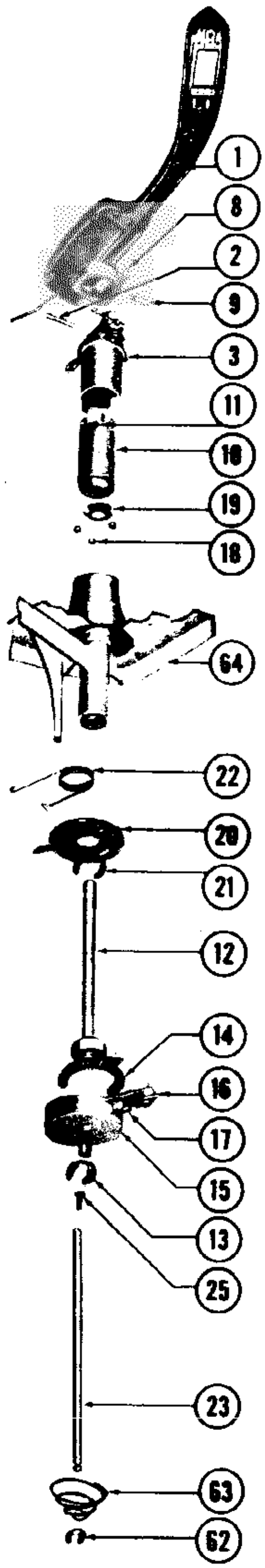
2. If a further breakdown is required, it may be done in the following manner: Take off "C" Washer (62) and withdraw Lift Rod (23). Take out Safety Spring (14). Remove "C" Washer (13). Ratchet Arm (15) and Pick-up Arm Locator (12) may now be separated.

REASSEMBLING PICK-UP ARM MECHANISM: The Pick-up Arm mechanism should be reassembled by reversing the procedure given in the preceding paragraphs, exercising the following precautions:

1. When replacing shielded lead in Pick-up Arm (1) care should be exercised that after lead comes out of hole in Hinge Bearing (10) it lays in groove provided for it and then is passed around Hinge Pin (2). It should then be laid in special recesses around inside edge of Pick-up Arm (1) and routed under strengthener plate.

2. When replacing Lift Arm (58) roller on arm should fit into heart shaped groove in Main Cam (69).

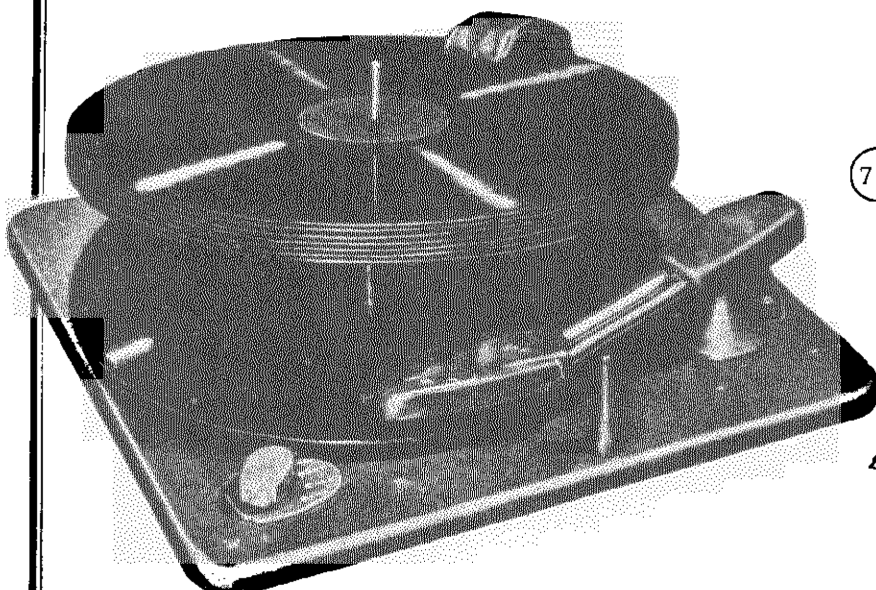
For final setting of Set Screw (11) and adjustment of Pick-up Arm (1), reference should be made to adjustments 3 c, d and e in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.



PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION
1	505828	Pick-up Arm includes strengthener plate (less cartridge)
2	505241	Hinge Pin for Pick-up Arm
—	505100	Crystal Cartridge (includes needle)
—	505717	Needle
—	505716	Set Screw for Needle
3	505242	Hinge Assembly
4	——	Trip Lever (part of Item 3)
5	——	Index Cam (part of Item 3)
6	——	Spring, Index (part of Item 3)
7	——	Index Lever (part of Item 3)
8	505243	Adjusting Ring
9	505244	Ring Spring
10	505245	Hinge Bearing
11	505246	Set Screw 8-32x3/16
12	505247	Pick-up Arm Locator
13	505248	"C" Washer for Pick-up Arm Locator
14	505249	Safety Spring
15	505250	Ratchet Arm
16	——	Ratchet Pawl (part of Item 15)
17	505251	Pawl Spring
18	505252	Ball Bearing
19	505253	Ball Bearing Spacer
20	505254	Set Down Locator
21	505255	"C" Washer for Set Down Locator
22	505256	Return Spring
23	505289	Lift Rod
25	505291	Height Adjusting Screw
26	505832	Record Support Arm
27	505248	"C" Washer for Record Support Arm
28	505829	Knob for Record Support Arm
29	505259	Center Post Assembly (includes Ejection Lever, Slide and Roller)
30	——	Center Post Roller (part of Item 29)
31	——	Ejector Lever (part of Item 29)
32	——	Slide (part of Item 29)
33	505260	Set Screw for Center Post
34	505833	Turntable
35	505262	Pinion Spring, fits under Pinion Gear (36)
36	505263	Pinion Gear
37	505829	Control Button (Knob)
38	505830	Escutcheon, "OFF-ON-REJ"
39	505265	Control Link Assembly
40	——	Control Crank (part of Item 39)
41	——	Control Lever (part of Item 39)
42	505266	"C" Washer for Control Crank
43	505267	"C" Washer for Control Lever
44	505268	Reject Spring
45	505269	Switch
46	505271	Idler Wheel used with G. I. Motor which is identified by a letter "G" stamped on plate or "GI" stamped on bottom bearing
	505272	Idler Wheel used with Russell Motor which is identified by a letter "R" stamped on plate and absence of identifying mark on lower bearing
47	505273	Motor: 115V—60 Cyc.
	505274	Motor: 115V—50 Cyc.
49	505276	Trip Rod Spring
50	505277	Trip Rod Bearing
51	505278	Trip Rod Bearing
52	505279	"C" Washer on Control Rod
57	505284	"C" Washer for Main Cam
58	505285	Lift Arm (includes Items 59 & 60)
59	505286	Automatic Shut-off Rod
60	505287	Spring, Automatic Shut-off Lever
61	505288	Screw for Lift Arm
62	505267	"C" Washer for Lift Rod
63	505292	Spring, Lift Rod
64	505831	Base Plate
65	505646	Cam Stop Pawl
66	505647	Spring for Cam Stop Pawl
67	505648	Washer, Pinion Gear Spring Support
69	505643	Main Cam Assembly includes Clutch Pawl (70) and Clutch Pawl Spring (71)
70	——	Clutch Pawl (part of Item 69)
71	505251	Clutch Pawl Spring
72	505645	Ratchet and Rod
—	500966	Plug—Phono Pick-up Cable
—	501031	Plug—Phono Motor Cable



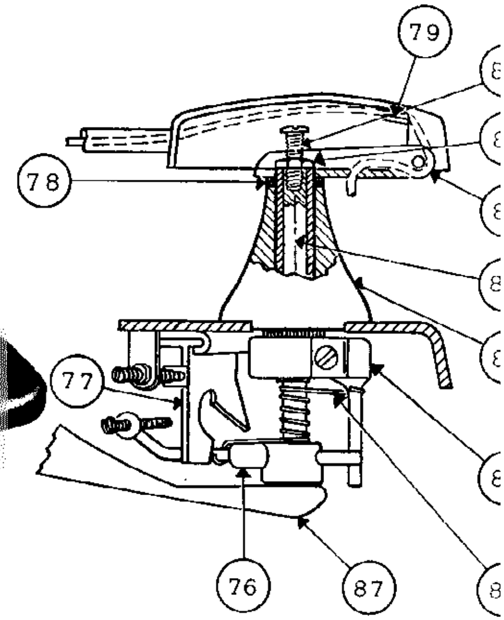


Figure No. 1

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperature, the changer should be lubricated as follows:

APPLY LUBRIPLATE TO:

1. Worm threads (106).
2. Lift shaft (83).
3. Contact point between pickup crank (85) and trip crank (76).
4. Follower arm (30, 87).
   a. At pivot of fulcrum (51).
   b. At contact point of trip crank (76).
   c. At contact point of sub-frame (63).
5. Ejector Arm (55).
   a. At contact point with trigger (95).
   b. At contact point of follower arm (30) and screw head (53).
6. Index (77) on surfaces of slide for trip crank arm (76).
7. Follower guide (65) where follower (64) bears.

APPLY A SMALL QUANTITY OF LIGHT OIL TO:

1. Between turntable shaft (102) and storage shaft (100).
2. Follower (64) at pivot with follower arm (30).
3. Ejector arm (55) at pivot with ejector fulcrum (59).
4. Index (40) at bearing with slide bracket (48).
5. Trip link (52).
   a. At bearing in fulcrum (51).
   b. At bearing in trip bracket (60).
6. Trip plate (50) at bearing in fulcrum (51).

ADJUSTMENTS

NEEDLE SET-DOWN: Set-down of needle is adjusted by index screw (36). If needle sets down too far out, turn screw clockwise. Conversely, if needle sets down too far in, screw must be turned counter-clockwise. If set-down has been disturbed from holding tone arm during cycle or other wilful damage, tone arm crank (44) must first be properly aligned with tone arm. Loosen crank screw (43) slightly, turn tone arm crank (44) until it is stopped by screw (42) in base place, push tone arm (10) until it is approximately ¼" from storage shaft (3); lock tone arm crank into this alignment with tone arm by tightening crank screw (43) securely. Proceed to adjust set-down as above described.

CENTER TRIP: Center trip is adjusted by turning the trip screw (35) until changer trips when the needle reaches a point 1⅞" from the center of the record.

EJECTOR SLIDE POSITION: Tabs on ejector slide (93) should be approximately ½" from the edge of a record. This is adjusted by screw (97).

TIMING: Timing of record drop is adjusted by screw (53) on end of ejector arm (55). Adjustment should be such to just release the bottom record of a stack of ten 12" records during cycle.

TONE ARM HEIGHT: The tone arm height is adjusted by the scr (80) located on top of the tone arm lift rod. Turn the screw out or until the top of the tone arm clears the records on the storage sh by 1/16" to ⅛" during cycle.

Caution: All adjustments must be locked into position by means lock nuts provided for each adjusting screw.

SERVICE INFORMATION

TURNTABLE DOES NOT REVOLVE WHEN CONTRO KNOB IS TURNED TO "ON" POSITION:

1. Machine stalled in cycle:
   Turn turntable carefully by hand until it starts rotatir under it's own power.
2. No current at motor:
   a. Check to determine if current is reaching A. C. leads changer.
   b. Check switch to determine if it is closing the electric circuit.
   c. Check wiring and soldered terminals in changer.
3. Motor defective:
   Remove turntable to allow motor to operate without load. current is reaching motor and pulley does not rotate, th motor is defective. Repair or replace.
4. Motor idler wheel not engaging turntable rim:
   If motor pulley is turning but turntable is not;
   a. Check motor idler assembly to determine if it is free contact the motor pulley and the turntable.
   b. Wipe off the inside rim of the turntable to remove flock if oily, clean turntable rim and rubber tire of idler whe with carbon tetrachloride.
5. Turntable bearing tight:
   Hold idler wheel away from turntable or remove idler whe and rotate turntable by hand to see if it is free. If bindin occurs, remove turntable and lubricate the oilite turntabl shaft bearing with light oil.

CHANGER DOES NOT CYCLE WHEN CONTROL KNOB I TURNED TO "REJ" POSITION:

1. Changer stalled or motor not driving turntable. (See "TURN TABLE DOES NOT REVOLVE WHEN CONTROL KNOB I TURNED TO "ON" POSITION"-1, 2, 3, 4 and 5.
2. Manual reject not actuating trip:
   Turn control knob to "REJ" position, hold and see if hook o end of trip link (52) is pulled back sufficiently to allow worr follower (64) to drop and engage in worm threads (106).
   a. If trip link does not release follower, check control lin rod (28). If rod is bent, carefully straighten and check fo trip again.
   b. If trip link is not restricting follower, but follower still doe not engage in worm, the follower must be removed fron the follower arm (30) and dirt or other foreign particle cleaned from the pivot point and from between the line c contact between the two parts.

To remove follower:

(1) Be sure changer is not in cycle.

(2) Remove turntable.

(3) Remove two screws (62) from base plate and sub-frame (63).

(4) Carefully work sub-frame assembly (63) out of base plate and revolve assembly counter-clockwise to work off of follower and follower arm.

(5) Remove follower.

c. If follower drops but does not engage in worm:

(1) Check for excessive wear in pivot of follower and follower arm.

(2) Check to see if spring (29) has become unhooked.

(3) Check for dirt in follower—follower arm pivot as per paragraph 2-b, above.

3. Turntable not engaging turntable lock:

If turntable has become unseated from the turntable lock, re-seat per first paragraph, (PREPARING FOR OPERATION).

4. Turntable lock loose on turntable shaft:

Replace with new lock (103) or with new turntable shaft assembly (102).

RECORD DOES NOT DROP WHEN CHANGER CYCLES:

1. Check for bent storage shaft (3).
2. Check for under or over size record or enlarged center hole.
3. Check position of ejector slide (93) per third paragraph under "ADJUSTMENTS."
4. Check screw in ejector arm (53) to see if it hits follower arm (30) when follower (64) is at bottom of worm (106). If lock nut on this screw has worked loose, reset screw per fourth paragraph under "ADJUSTMENTS."
5. Check to see if ejector slide (93) is properly seated with its pushing mechanism on the trigger (95).
6. Check for defective trigger (95) by slowly pulling ejector arm (55) down by hand and checking if record drops. If record does not drop, trigger (95) must be repaired or replaced. To remove trigger:
   a. Unhook index spring (49) from ejector link (56).
   b. Remove 4 screws (57) from base plate and housing assembly.
   c. Lift trigger from housing and check for broken weld on strengthening brace.

TWO RECORDS DROP AT ONCE:

1. Hole in record too large or records undersized.
2. Slide (101) in storage shaft (100) not fully down.
   a. Check slide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten if necessary. **DO NOT OIL.**
   b. When records are placed on storage shaft, be sure the slide is all the way down.
3. Check for position of ejector slide (93) per third paragraph under "ADJUSTMENTS."

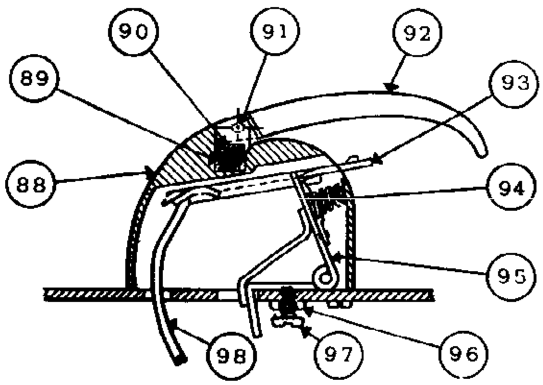


Figure No. 2

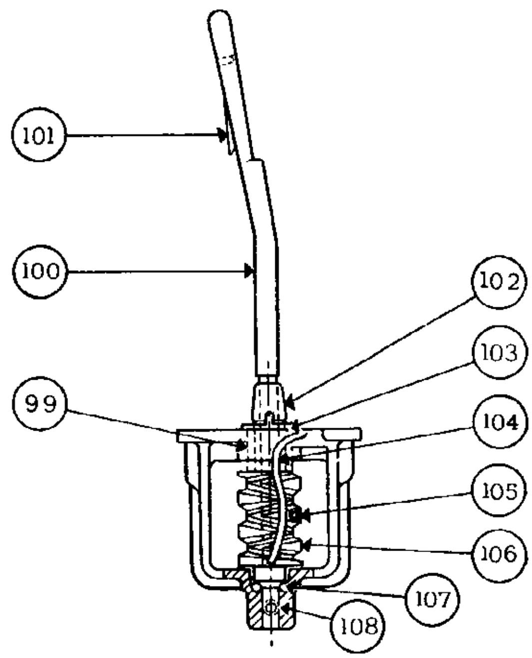


Figure No. 3

RECORD HITS PICKUP ARM:

1. Check timing of changer cycle per fourth paragraph under "ADJUSTMENTS."
2. Check for a creeping index (40). Index "creeps" if it moves when changer goes through cycle. To correct this condition:
   a. Be sure that the pickup (10) and pickup crank (44) are aligned with each other as described in first paragraph under "ADJUSTMENTS."
   b. Place ejector slide (5) in 12" position, cycle changer until follower (64) is at bottom of worm (106). Index spring (49) should be **just barely slack.** Ejector link (56) may be bent forward or back to give the index spring this required slack.
3. Check for too much gap between follower arm (87) and trip crank (76). This gap should be about the thickness of a sheet of paper (.005 to .016). To reduce gap, do **one** of the following:
   a. Bend follower arm up.
   b. Replace follower arm.

NEEDLE DOES NOT SET ON BOTH 10" AND 12" RECORDS:

1. Check needle set-down for 10" position by holding the index (40) in with the fingers as far as it will go and cycle changer.
2. Check needle set-down for 12" position by holding the index out with the fingers as far as it will go and cycle changer.
3. If 1 and 2 above are all right, when index is held in either position, check for "creeping index" per paragraph "RECORD HITS PICKUP ARM"-2.
4. Check for bind between guide tabs on index (40) and index screw (36).
5. Check for bind between index (40) and index slide bracket (48).

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY:

1. Check for gap between follower arm (87) and trip crank (76). This gap should be about the thickness of a sheet of paper (.005 to .016). To increase gap do **one** of the following:
   a. Bend follower arm down.
   b. Place an appropriate thickness washer over the lift shaft (83) and under the lift nut (81).
2. Check for lack of vertical play of pickup shaft in the pickup post (84). There should be .003 to .010 play here. To correct, loosen screw in pickup crank (85), place shim between pickup hinge washer and pickup post and re-set pickup and pickup crank per first paragraph under "ADJUSTMENTS," and remove shim.
3. Check for lack of lubrication between pickup shaft and pickup post.

CENTER TRIP DEFECTIVE:

1. Check to be sure control knob is in "AUT" position.
2. If changer trips too soon or too late, re-adjust per second paragraph under "ADJUSTMENTS."
3. If changer does not center trip, push trip plate (50) back by hand and see if hook on trip link (52) is pulled back sufficiently to release worm follower (64) "CHANGER DOES NOT CYCLE WHEN CONTROL KNOB IS TURNED TO "REJ" POSITION"-2. If trip link hook does not release the follower, check for the following:
   a. Weak or damaged spring (61).
   b. Bind between trip bracket (60) and trip link (52).
   c. Binding due to burrs between die-cast fulcrum (51) and trip link.
   d. If none of the above show trouble, bend the tail of the trip link (52) in toward the side of the fulcrum (51). This will allow the hook on the other end of the trip link to pull back farther.
4. If changer continues to trip, check for the following:
   a. Spring (33) weak or unhooked.
   b. Binding between trip plate rod (50) and the die-cast fulcrum (51).
   c. Too much clearance between hook on trip link (52) and follower (64). Correct by bending tail on trip link away from side of fulcrum casting (51). This will cause the hook end of the trip link to engage the follower more closely.
5. If needle jumps out of eccentric groove in record:
   a. Check trip pressure. This should not exceed 12 grams. If trip pressure is too high, check:
      (1) For binding as in 4-b above.
      (2) Spring (33) too strong. May be weakened by carefully stretching one of the center loops.
   b. Record may be defective. The trip grooves are often too shallow. Check with a record known to be good.
   c. Needle point may be worn.

TURNTABLE SPEED TOO SLOW:

1. Binding in turntable bearing. See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-5, this section.
2. Motor pulley too small in diameter. Replace with motor pulley of greater diameter.
3. Line voltage too low. Voltage in a 115 Volt changer should not be less than 100 Volts.
4. Operating temperature too low. Surrounding temperature should not be less than 60° F.

TURNTABLE SPEED TOO FAST:

Motor pulley too large in diameter. Replace with motor pulley of smaller diameter.

TURNTABLE STALLS IN CYCLE:

1. Motor idler not engaging turntable. See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-4.
2. Turntable bearing tight. See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-5.
3. Operating temperature to low. See "TURNTABLE SPEED TOO SLOW"-4.
4. Line voltage too low. See "TURNTABLE SPEED TOO SLOW"-3.
5. Binding between follower (64) and worm (106).
   a. Check lubrication of follower arm (30) at point of bearing with sub-frame (63).
   b. Check lubrication of worm threads.
   c. File some metal from follower arm (30) at point of bearing with sub-frame (63) to allow more clearance between worm (106) and follower (64). To remove follower arm (30):
      (1) See "CHANGER DOES NOT CYCLE WHEN CONTROL KNOB IS TURNED TO "REJ" POSITION."
      (2) Remove spring (29).
      (3) Remove cotter pin (31).
      (4) Remove follower arm.
5. Trip crank (76) jams on index (77):
   a. Check for lubrication on index at point of bearing with trip crank.
   b. Check for burrs on index (77) incline surface. Surface must be very smooth. Polish with crocus cloth.
   c. Check for grooves worn into trip crank arm at contact point with index. File smooth with fine file, if necessary.

NOISE DURING PLAYING OF RECORD:

1. Rumble:
   a. **From Motor:** If a low pitched rumbling sound comes from the loud speaker while a record is being played, check the motor grommets (22) to be sure the motor is freely suspended on them. The motor lead wires should have slack to allow the motor to float. Motor rumble may also come from an out of balance motor rotor. In this case, the motor should be replaced.
   b. **From Bearings:** Defective turntable shaft bearings can cause rumble. Check for foreign matter. Lubricate with lubriplate or light oil.
2. Defective Motor Idler Wheel:
   A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel (21). Remove the turntable and check the rubber tire on the idler. If the surface of the rubber tire is not smooth and even, replace the idler.
3. Defective Needle:
   A bad needle will cause loud needle scratch or hiss through both the speaker and the air directly from the needle. For reduced needle scratch and "needle talk," use a needle with high vertical compliance such as an off-set "dog leg" type needle.
4. Defective Record:
   Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records causing "wow," a waver in the recorded sound. An enlarged hole in the record can also cause "wow."
5. Turntable scrapes:
   If a scraping sound occurs as the turntable revolves, check:
   a. Turntable warped, causing outer rim to rise and fall.
   b. Motor idler bent.
6. Squeaks:
   Squeaking sound as changer operates, indicates lack of lubricant. Lubricate points indicated under LUBRICATION.

NOISE DURING CYCLING:

1. There is normally an audible snap when the follower (64) engages with the hook end of the trip link (52) at the end of the cycle.
2. Squeaks: See LUBRICATION.
3. Grinding sound indicates lack of lubrication or worn parts.

DISTORTION OF RECORDED SOUND:

1. Defective needle. See "NOISE DURING PLAYING OF RECORD"-3.
2. Defective record. See "NOISE DURING PLAYING OF RECORD"-4.
3. Defective pickup cartridge:
   When the cartridge is defective, the recorded sound may be distorted, weak or stop entirely.
4. Defective amplifier:
   Check phonograph amplifier and speaker.

NO SOUND DURING PLAYING

1. Defective cartridge. See "DISTORTION OF RECORDED SOUND"-3.
2. Defective wiring.
   Check pickup leads for a shorted or open lead.
3. Defective amplifier. See "DISTORTION OF RECORDED SOUND"-4.

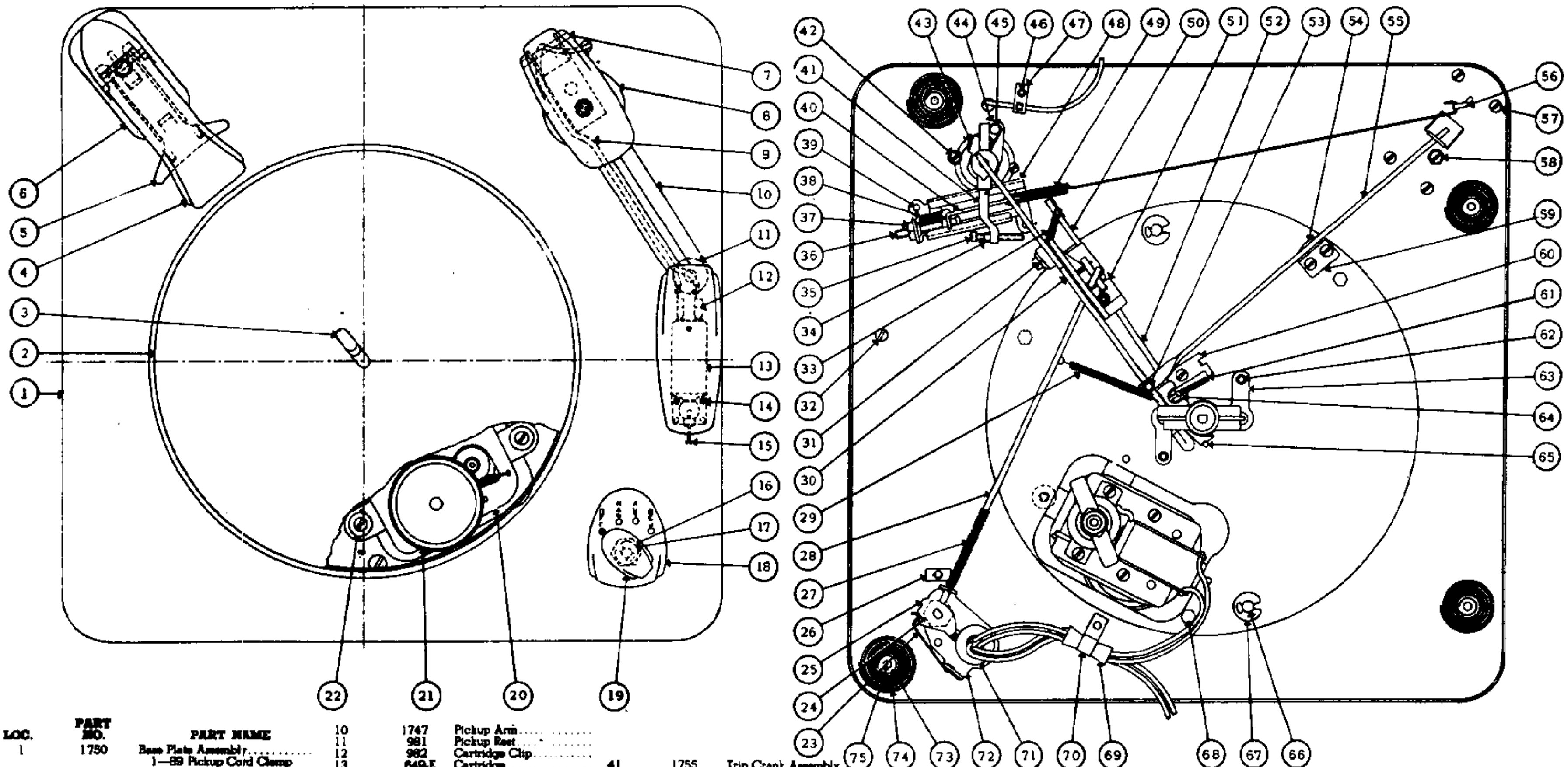
EXCESSIVE RECORD WEAR:

1. Binding in pickup arm. See "NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY"-1 & 2.
2. Defective needle. See "NOISE DURING PLAYING OF RECORD"-3.
3. Excessive needle pressure:
   The pickup arm is designed to give the proper needle pressure when an aluminum cased cartridge is used. If a cartridge with a die-cast housing is used, a compensating spring must be used to bring the needle pressure down to the usual standard of 1 oz. to 1½ oz. If the needle pressure is too great on a pick-up arm using a compensating spring, bend the long end of the spring.

TURNTABLE CONTINUES TO ROTATE AFTER CONTROL KNOB IS TURNED TO "OFF" POSITION:

Switch defective, check for defects and replace if necessary.

V-M CORPORATION



LOC.	PART NO.	PART NAME
1	1750	Base Plate Assembly
		1—89 Pickup Cord Clamp
		4—90 Rivet
		2—94 Rivet
		1—127 Motor Cord Clamp
		4—478 Spring—Mounting
		1—681 Pickup Post
		2—709B Screw
		4—934 Cup Washer
		1—1741 Base Plate
		2—1771 Rivet
		1—1806 Index Slide Assembly
		1—1877 Stop Washer
2	518	Turntable
3	1754	Storage Shaft Assembly
		1—1555 Guide Spring
		1—1556 Guide
		1—1655 Storage Shaft
		1—1656 Pin
4	1746	Hold-Down
5	1802	Ejector Slide
6	1793	Housing
7	941-B	Hinge Pin—Tone Arm
8	681	Pickup Post
9	984-B	Cable and Clip Assembly
		1—560-B Cable
		2—982 Cartridge Clip
10	1744	Pickup Assembly
		2—713 Screw
		1—589B Lead Clip
		1—649E Cartridge
		1—984B Cable & Clip Assembly
		1—1747 Pickup Arm
10	1747	Pickup Arm
11	981	Pickup Rest
12	982	Cartridge Clip
13	649-E	Cartridge
14	713	Screw #4 x ¼ Type "Z"
15	1572	Cartridge Thumb Screw
16	1789	Control Shaft Bearing
17	1719	"C" Washer
18	963-3	Escutcheon
19	1711	Knob
20	961-B	Motor Assembly
21	904	Idler Wheel
22	516	Motor Spacer
22	962	Grommet
22	970	Washer—Motor Mounting
22	1717	Screw—#6 x ⅝ Type "Z"
23	1788	Cam Spring
24	1660	Control Bearing Nut
25	1800	Control Cam Assembly
26	983	Speed Nut
27	62	Spring—Control rod
28	1784	Control Link
29	1876	Spring—Follower Arm
30	1791	Follower Arm Assembly
31	996-B	Cotter Pin
32	1728	Screw #10 x ½ Type "Z"
33	1909	Spring—Trip Plate
34	1732	Nut—#6-32 x ¼ Hex.
35	873-A	Screw—#6-32 x 1
36	1787	Index Screw
37	712	Nut—#10-32
38	1663	Spring—Slide Return
39	1771	Rivet
40	1785	Index
41	1755	Trip Crank Assembly
		1—833 Lift Shaft
		1—1796 Trip Crank
41	1796	Trip Crank
42	1877	Stop Washer
43	711-B	Screw #10-32 x ⅝ R. H.
44	1743	Pickup Crank
45	686	Spring—Crank
46	94	Rivet—Cord Clamp
47	89	Pickup Cord Clamp
48	1786	Slide Bracket
48	1806	Index Slide Assembly
		1—712 Nut
		1—1663 Spring
		1—1785 Index
		1—1786 Slide Bracket
		1—1787 Index Screw
49	884	Spring—Index
50	1772	Trip Plate Assembly
51	926	Fulcrum
52	1794	Trip Link
53	466	Nut #6—32x5/16 Hex.
53	1807	Screw—#6-32 Phillips B. H.
54	705	Rivet
55	669	Ejector Arm
55	1821	Ejector Arm and Fulcrum Assembly
		1—669 Ejector Arm
		1—705 Rivet
		1—1766 Ejector Arm Fulcrum
56	695	Ejector Link
57	709-B	Screw #6 Type "Z"
58	1668	Screw—#6-32 x ½ B. H.
59	1766	Ejector Arm Fulcrum
60	1765	Trip Bracket
61	1790	Spring—Trip Link
62	409	Screw with Lockwasher
63	1658	Sub-Frame
64	1795	Follower
65	875	Follower Guide
66	1723-A	Shipping Bolt
67	1736	"C" Washer (shipping bolt)
68	1902	Leg Stud
69	138	Motor Cord Loom
70	127	Motor Cord Clamp
71	467	Switch
71	1737	Switch Cover
72	1748	Switch Bracket Assembly
		1—94 Rivet
		1—467 Switch
		1—1737 Switch Cover
		1—1769 Switch Bracket
		1—1788 Cam Spring
72	1769	Switch Bracket
73	934	Cup Washer—Mounting Spring
74	478	Spring—Mounting
75	90	Rivet—Mounting Spring
76	1755	Trip Crank Assembly
		1—833 Lift Shaft
		1—1796 Trip Drank
76	1796	Trip Crank
77	1785	Index
78	48	Fibre Washer
79	589-B	Pickup Lead Clip
80	1616-A	Screw—#5-40 x ½ BH
81	1617	Nut—#5-40 x ¼ Hex.
82	746	Pickup Hinge Assembly
83	833	Lift Shaft
84	681	Pickup Post
85	1743	Pickup Crank
86	686	Spring Crank
87	1791	Follower Arm Assembly
88	1793	Housing
89	428	Spring
90	1757	Hold-down Cup
91	941-A	Hinge Pin—Hold-down
92	1746	Hold-Down
93	1802	Ejector Slide
94	423	Spring
95	777	Trigger Assembly
96	466	Nut #6-32 x 5/16 Hex
97	1668	Screw #6-32 x ½ B. H.
98	695	Ejector Link
99	689-A	Bearing
100	1754	Storage Shaft Assembly
101	1556	Guide
102	1804	Turntable Shaft
102	1805	Turntable Shaft Assembly
		1—679 Turntable Lock
		1—1804 Turntable Shaft

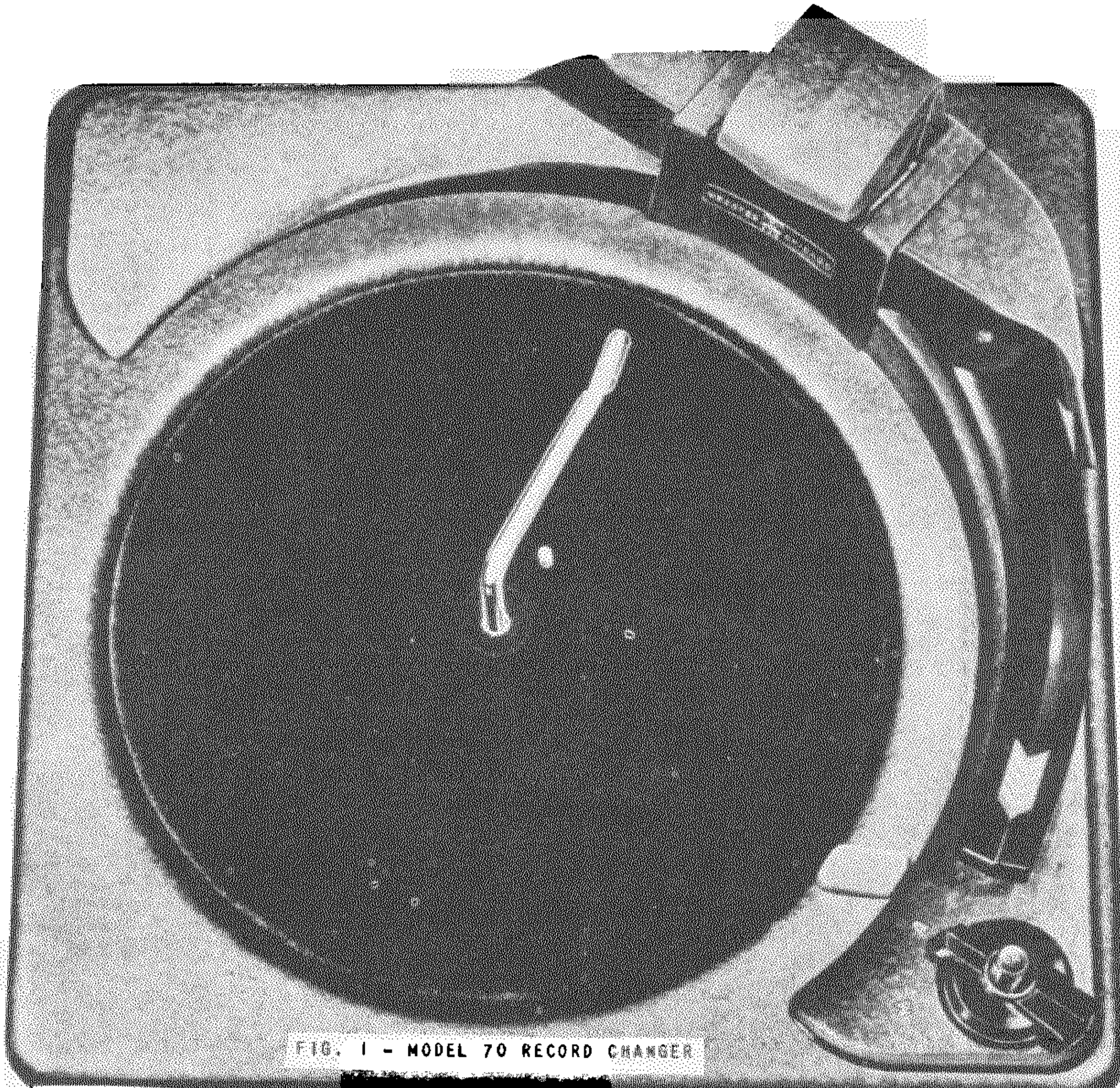


FIG. 1 - MODEL 70 RECORD CHANGER

A - MOTOR

Connect the motor cord to a source of 105-120 volt 60 cycle current only. If it is desired to operate the changer on 50 cycle current, a special motor pulley (Part No. 17X412-4) must be used in place of the one supplied with the changer in order to drive the turntable at the required speed of 78 R.P.M.

NOTE: When the 50 cycle drive sleeve is used, the idler wheel will not be completely retracted from the turntable but will still have some pressure applied to it when the motor is off. This is due to the larger diameter of the 50 cycle pulley.

Do not under any circumstances connect the motor to a source of direct current or to alternating current of any other frequencies.

B - PICKUP

The high impedance crystal cartridge supplied with this changer is the Astatic Nylon 1-J. This cartridge features a genuine Nylon, knee-action, sapphire-tipped needle, having all the advantages of a permanent or fixed needle, with the additional advantage of being easily replaced. When making replacements, the Nylon needle is removed from the Nylon Chuck by means of an ejector screw which fits in a hole in the cartridge housing directly above the top of the needle. Any type screw with a 2-64 thread may be used. It is then a simple matter to insert the new needle in the tapered groove of the chuck until the needle fin locks in place.

Replacement needles can be obtained through any radio distributor handling Astatic products.

C - OPERATION - AUTOMATIC

Model 70 requires no adjustments for the playing of either 10" or 12" records. When a record or stack of records is placed on the spindle step with the edge of the record resting on the Record Selector Shelf, the changer will automatically select and index for the correct record size.

1 - With the Record Ballast Weight turned back, place up to ten 12" records, twelve 10" records or a 1-1/8" stack of intermixed records on the spindle so that the bottom record rests on the step of the spindle and on the shelf of the Record Selector.

2 - Turn the Record Ballast Weight forward to rest on the top record.

3 - Turn the Selector Switch (sleeve of ON button) to AUTOMATIC.

4 - Press the ON button down firmly and release. This action turns on the motor, engages the idler wheel and starts the mechanism in cycle to drop the bottom record of the stack into playing position.

To reject any record while playing in the Automatic position, press the ON button.

NOTE: The OFF button may be pressed during any portion of the change cycle. The Pickup Arm may be moved manually at any time without damage to the mechanism. However, after the last record has been played the Pickup Arm should not be touched until it has come to rest on the OFF button.

5 - After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:

a - Remove the Spindle.

b - Remove the entire stack of records from the turntable and place them to one side.

c - Replace the Spindle making sure that it is inclined toward the Selector Post and that it is engaged in the D slot in the sub-plate.

d - Turn the record ballast weight back out of position.

e - Place the new stack of records on the Spindle, one at a time.

D - OPERATION - MANUAL

1 - Turn the Selector Switch (sleeve of ON button) to MANUAL. When the switch is in this position, the pickup arm will not move to the edge of the record when the ON button is pushed, nor will it lift from the record upon reaching the center grooves.

2 - With the Record Ballast Weight turned back and the spindle in position, place a record on the spindle as in Automatic Operation. The record may then be moved forward slightly to slip over the spindle step and lowered to the turntable in playing position.

3 - Press the ON button.

4 - Place the needle gently on the edge of the record. Do not lift the pickup arm too high as this will cause it to catch in the Automatic Stop Lock position.

The high compliance of the Nylon needle plus the protection offered by the needle guard will protect the sapphire from fracturing or chipping if accidentally dropped on the record. However, it is advisable to use care in handling the pickup arm.

5 - To stop the mechanism at any time, press the OFF button.

This unit has been accurately adjusted, lubricated and tested at the factory and should require no further adjusting in the field. If service repairs become necessary, this bulletin should be studied carefully before making any adjustments, or replacing parts.

Service parts are available at the factory. All parts must be ordered by Part Number, Model Number and production number stamped on the under side of the main plate.

Service repairs and adjustment on the Model 70, listed by the apparent condition are as follows:

A - AUTOMATIC TRIP FAILS TO FUNCTION

When the movement of the pickup arm toward the spindle is greater than 1/8 inch in 1/2 revolution of the turntable, the Automatic Trip Arm trips the Velocity Trip and Roller Assembly. This releases the Actuating Pawl on the Main Cam Assembly, allowing it to engage the Main Cam Actuating Gear and driving the mechanism through the change cycle.

The automatic trip arm follows the movement of the pickup arm through a spring compression clutch. This clutch must be kept free of oil or grease.

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Should it become necessary to clean the clutch, loosen the lock (Point "A" Figure 8) to relieve the spring tension and clean the clutch parts with carbon tetrachloride. Reset the clutch spring tension by setting the lock at least 1/4 inch below the main plate. This tension should be just sufficient to operate the trip mechanism without placing undue drag on the movement of the pickup arm.

Also check for:

1 - Velocity Trip and Roller assembly binding (Illus. 47 Fig. 7).

2 - Actuating pawl stuck. (Part of Main Cam assembly, Illus. 46 Fig. 7, engaged by hook end of Velocity Trip and Roller Assembly.)

3 - Automatic Trip Arm (Illus. 30 Fig. 6) bent and not hitting the Velocity Trip and Roller assembly.

4 - Insufficient compression on clutch spring (Illus. 29 Fig. 6).

5 - Manual Trip Lever binding at rivet (Illus. 34 Fig. 6).

6 - Manual Trip Lever rubbing on switch mounting bracket.

7 - No velocity lead-in groove or eccentric groove in center of record.

8 - Foreign matter in record groove.

9 - Badly worn record.

10 - Badly worn or bent needle.

B - MANUAL TRIP FAILS TO FUNCTION

The manual trip is operated by the ON button. When the button is pressed, the Manual Trip Lever is actuated, tripping the Velocity Trip and Roller Assembly and putting the mechanism in cycle.

1 - Manual Trip Lever (Illus. 34 Fig. 6) hair spring bent or broken.

2 - Velocity Trip and Roller Assembly binding (Illus. 47 Fig. 7).

3 - Actuating pawl stuck.

C - NEEDLE SKIPS GROOVE

With the pickup arm in playing position, the arm is practically free-floating on its pivot. There is no lead-in spring which might drag the needle over the first few grooves of the record or minimum radius device to jam the arm on the inside grooves.

The pressure required to actuate the trip mechanism is negligible.

Should the needle skip grooves at any time, check for:

1 - Record Changer not level.

2 - Pickup Arm binding.

3 - Foreign matter in record groove.

4 - Pickup cord pulled too tight or caught in hinge assembly.

5 - Badly worn record groove.

6 - Badly worn or bent needle.

D - MECHANISM CONTINUES TO CYCLE

At the completion of the change cycle the actuating pawl is engaged by the hook end of the Velocity trip and Roller Assembly which has been returned to its normal position by the reset points on the main cam drive gear. This hook should be adjusted for about .005 - .015 clearance from the bottom of the main cam drive gear. Greater clearance may permit the pawl to bounce past the hook and re-engage. Also check for:

1 - Velocity Trip and Roller Assembly (Illus. 47 Fig. 7.) rubbing on Main Cam Actuating gear (Illus. 45 Fig. 7).

2 - Manual Trip Lever (Illus. 34 Fig. 6.) binding at rivet.

3 - Hook end of Velocity Trip and Roller assembly bent and not engaging pawl.

4 - Bakelite disengage roller broken on Velocity Trip and Roller Assembly.

E - CONTINUES TO PLAY LAST RECORD AND DOES NOT SHUT OFF

1 - Check floating spindle to be sure that it moves up and down freely.

2 - With no records on spindle, check Automatic Shut Off Lock Lever (Point B, Fig. 8.) Hook end of this arm should catch the Pickup Arm Raising Disc at the beginning of the cycle to prevent travel of the arm and to cause it to drop on the OFF button. With no records on the Spindle, this hook should clear the Pickup Arm Raising Disc by 1/32 inch with the mechanism at rest. Bend lip (Point G Fig. 8) if necessary to make this adjustment. Do not attempt to move Pickup Arm Raising Disc up or down.

F - MOTOR DOES NOT SHUT OFF

1 - OFF button stuck.

2 - Defective switch mechanism.

3 - Defective Switch.

NOTE - Do not attempt repairs on the Switch Mechanism or the Switch. If either becomes defective, the entire assembly should be replaced.

G - PICKUP ARM LIFT TOO HIGH OR TOO LOW

1 - The needle should approach the top record of a full stack on the turntable with approximately 1/8 inch clearance. Adjust by bending the Pickup Arm Raising Lever at Point C., Fig. 8. Do not attempt to move Pickup Arm Raising Disc up or down.

H - NEEDLE LET DOWN INDEXING INCORRECT

The eccentric screw,accessible through the top of the Pickup Arm, should take care of any normal adjustment. Turn this screw clockwise to index the needle in toward the spindle and counter-clockwise to index the needle out away from the spindle.

Should further adjustment be necessary; proceed as follows:

1 - Operate the mechanism by revolving the turntable manually until the needle drops to within 1/8 inch of a ten inch record on the turntable.

2 - With a #8 Bristol wrench in each of the set screws (Points D and E, Fig. 8) alternately loosen one and tighten the other until the needle rests above the record lead-in groove at the desired point.

3 - Be sure that both set screws are tight when this adjustment is completed.

4 - The twelve inch position is indexed automatically by the pressure of a 12 inch record on the front of the push-off fingers. These fingers are pivoted and gravity balanced and must move freely. (See Fig. 3).

I - PICKUP ARM DROPS OFF "OFF" BUTTON

When the Pickup Arm is indexed to the OFF position, the lip of the Pickup Arm Raising Disc rests in the groove formed by the inside bevel of the lower Pickup Arm Pivit Shaft Bracket touching the Stud post. (Fig. 8).

Adjust the position of the bracket so that the lip of the Pickup Arm Raising Disc rests in the groove with the Pickup Arm Pivot Shaft touching the sub plate. When properly adjusted, there should be .010 clearance between the lip of the Pickup Arm Raising Disc and the bottom of the groove. The position of the Pickup Arm on the Off Button is adjusted by bending the lip of the Pickup Arm Raising Disc, so that when the Pickup Arm is resting on the Off Button, the lip of the Pickup Arm Disc rests in the groove formed by the bracket and stud. After making this adjustment, check the setdown of the needle on a 12" record to be certain that the lip of the Pickup Arm Raising Disc does not hit the beveled side of this bracket.

J - INCONSISTENT RECORD DROP OR CENTER HOLE DAMAGE

The distance between the push-off fingers and the spindle is critical and should be adjusted as accurately as possible. If this distance is too great, records of minimum diameter will not be pushed off the spindle step during the change cycle. If it is too short, records of maximum diameter will either lie over the tips of the push-off fingers (resulting in no record drop and improper index) or be pushed against the spindle with undue force, causing center hole damage.

CAUTION: Be certain that a standard size record is used in making this adjustment. A standard 10" record measures 9-7/8" ± 1/32" diameter. A standard 12" record measures 11-7/8" ± 1/32" diameter.

With a standard 10" record on the spindle, check the distance between the edge of the record and the front push-off fingers. This distance should

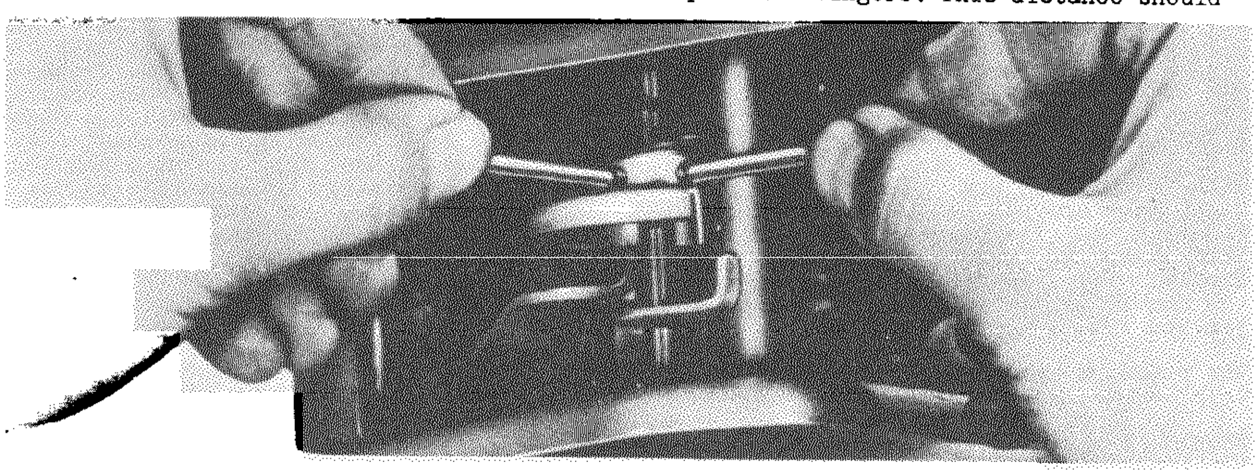

FIG. 2 - ALTERNATE NEEDLE LET DOWN INDEXING ADJUSTMENT

be approximately 5/32" and should be the same for both fingers. With a full stack of records on the spindle, the weight of the records will reduce this distance to about 1/8"

Do not attempt to bend the spindle to adjust this distance. Bending the spindle will destroy the relationship between the heel of the spindle off-set and the horizontal plane of the record. This spacing is set to permit only one record at a time to slide between the heel of the off-set and the step of the spindle.

Standard records are 0.70 to 0.100 in thickness and any change in the angle of the spindle will either close the angle of the off-set, which will result in torn center labels on thick records, or open the angle, permitting two thin records to drop at one time.

To adjust the pushoff distance:

1 - Remove the four screws under the main plate which hold the center trim section.

2 - Remove the center trim section by lifting straight up.

3 - For forward adjustments of the push-off, wedge a screw driver between the rocker arm and the sub-plate in front of the rocker arm pivot. With the heel of the hand, bend the record selector post toward the spindle.

4 - For backward adjustment, wedge the screw driver between the rocker arm and the sub-plate in back of the rocker arm pivot. Pull back on the selector post.

5 - After making any adjustment, make sure that both push-off fingers are equi-distant from the edge of the record.

Model 70 Record Changer leaves the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, this operation should be performed more frequently as required.

NOTE: AVOID EXCESSIVE LUBRICATION

Do not permit any oil or grease to get on the rubber idler drive wheel or the Motor Pulley (Illus. 14 and 27, Fig. 4), on turntable drive rim or on the automatic trip arm clutch. Any oil ~~or grease on these~~ points should be removed using Carbon Tetrachloride.

The recommended lubricants and points of lubrication are as follows:

A - #10 Oil (apply with small oil can or medicine dropper)

1 - Motor Bearings. Saturate top and bottom felts.

2 - Pickup Arm Shaft (Illus. 5 Fig. 6). Apply one drop each to bottom bearing point, bracket hole and hole through Main Base Plate.

3 - Ball Bearing Assembly (Illus. 8 Fig. 4).

4 - Idler Wheel Felt (Illus. 21 Fig. 4).

B - LUBRIPLATE (APPLY WITH SMALL BRUSH)

1 - Idler Wheel Linkage.

2 - Turntable Shaft Stud.

3 - Pickup Arm Hinge Pins.

4 - Knife edge of Raising Lever (Illus. 38 Fig. 7).

5 - Main Cam bearing. (It is necessary to remove the sub-plate assembly to lubriplate this bearing. See paragraph VI-C).

C - STA-PUT (APPLY WITH SMALL BRUSH)

1 - Teeth of Main Cam Actuating Gear (Illus. 45 Fig 7).

2 - Track of Main Cam Gear (Illus. 46 Fig. 7).

3 - Teeth of Large and Small Idler Gears (Illus. 11-12 Fig. 4).

4 - Raising Lever Bracket bearing surfaces (Illus. 38 Fig. 7).

A - TO REMOVE THE PICKUP ARM OR REPLACE A PICKUP CARTRIDGE

A pickup cartridge can be most easily replaced by first removing the pickup arm.

A spring is inserted between the pins of the hinge bracket to prevent its coming apart in shipment. This spring must be removed before the hinge can be taken apart.

1 - Hold the Pickup Arm firmly.

2 - Remove the spacing spring by pressing down on its center until it snaps off the hinge pins.

3 - With a screw driver or long nosed pliers, bend in one of the blue steel pickup arm hinge brackets while lifting up on the arm. This will release the pickup arm hinge pin.

4 - Repeat on the other pickup arm bracket.

5 - The pickup arm, when released from the hinge brackets, may then be turned over and laid on the turntable for easy access to the cartridge.

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B - TO REPLACE THE PICKUP ARM

1 - Hook the roller (on the rear of the hinge assembly) under the pickup arm lift stop bracket.

2 - Use a pair of long nosed pliers to place the Pickup Arm Hinge Brackets over the pins in the Shaft Bracket.

In performing this operation, be sure that the pickup cord lies outside of the hinge and does not become wedged in the bracket.

The spacing spring need not be replaced unless the unit is to be reshipped.

C - TO REMOVE THE SUB-PLATE ASSEMBLY

In the event that it becomes necessary to replace any of the major parts in the sub-plate assembly (Fig. 7) the entire assembly should first be removed from the main plate.

1 - Remove the spindle.

2 - Remove the Turntable.

3 - Remove the Pickup Arm.

4 - Remove the Center Trim Section.

5 - Unhook the Rocker Arm Return Spring.

6 - Remove the Rocker Arm Pivot Pin.

7 - Remove the four #8-32 screws holding the sub-plate studs and holding the center post to the main plate.

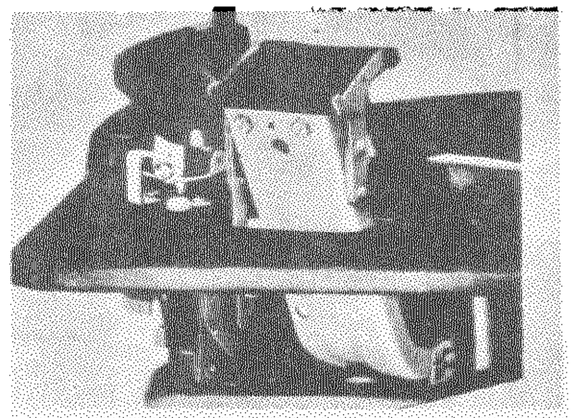

FIG. 3 - REAR VIEW WITH CENTER ESCUTCHEON REMOVED

D - TO REPLACE THE SUB-PLATE ASSEMBLY

Reverse the above procedure making certain that all parts fall into their proper positions.

E - TO REMOVE THE RECORD SELECTOR AND ROCKER ARM ASSEMBLY

1 - Unhook the Rocker Arm Return Spring. (Illus. Fig. 5).

2 - Remove the Rocker Arm Pivot Pin. (Illus. Fig. 5).

3 - Lift out the Selector and Rocker Arm Assembly as a unit.

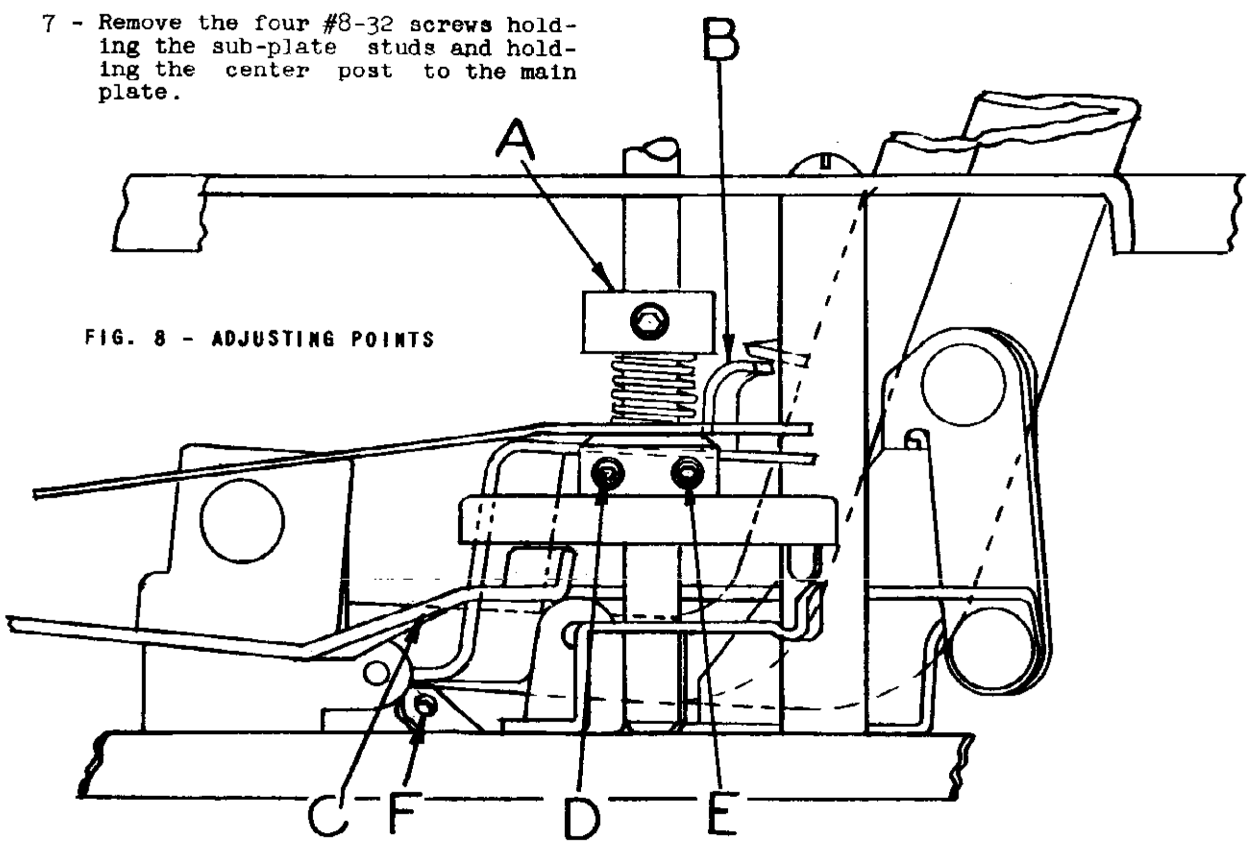

FIG. 8 - ADJUSTING POINTS

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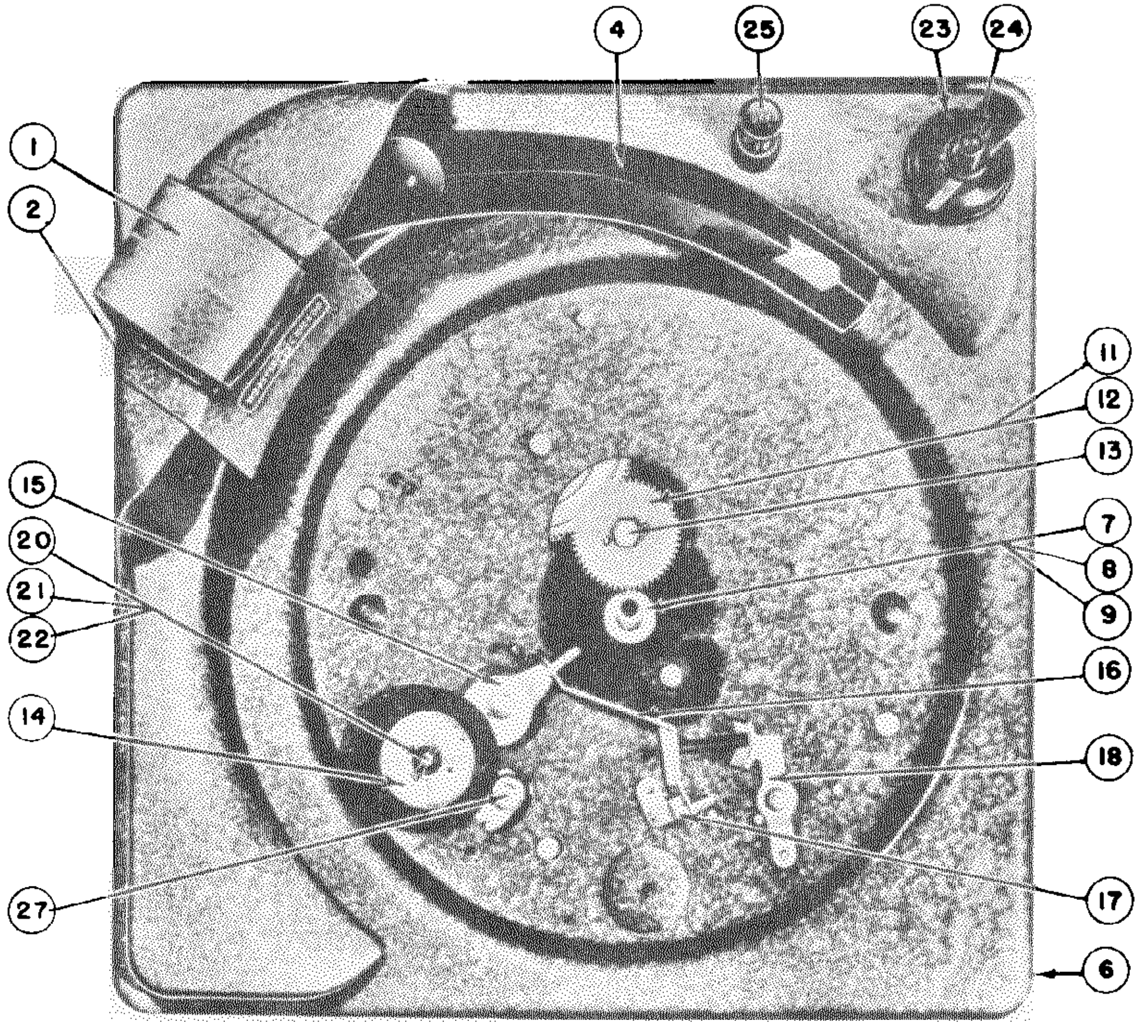

FIG. 4 - PARTS LOCATION - TOP VIEW

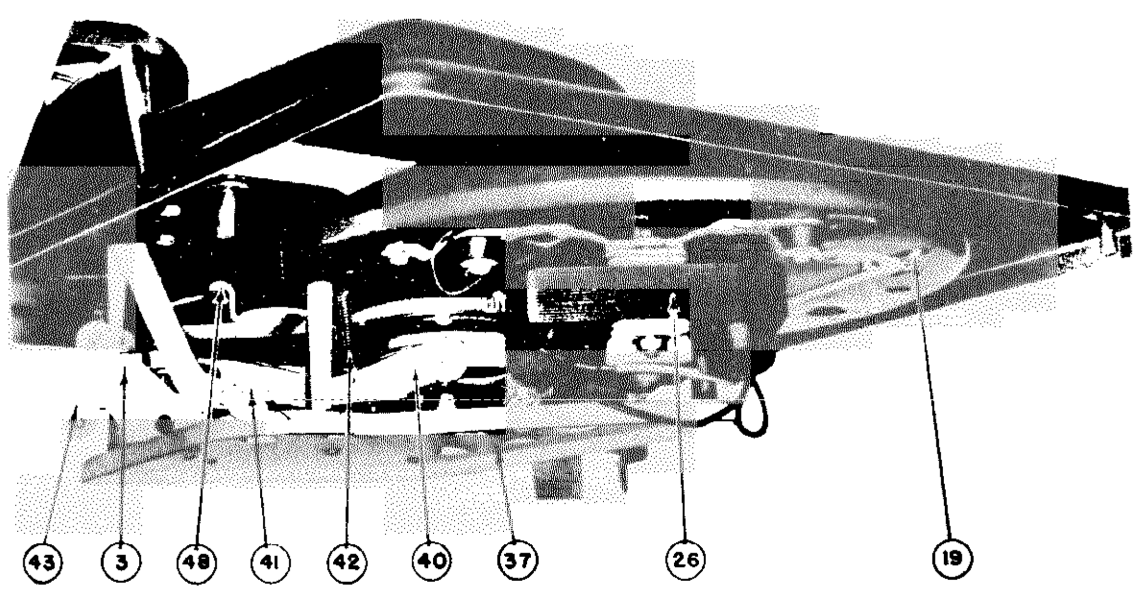

FIG. 5 - PARTS LOCATION -- LEFT SIDE VIEW

MODEL 70

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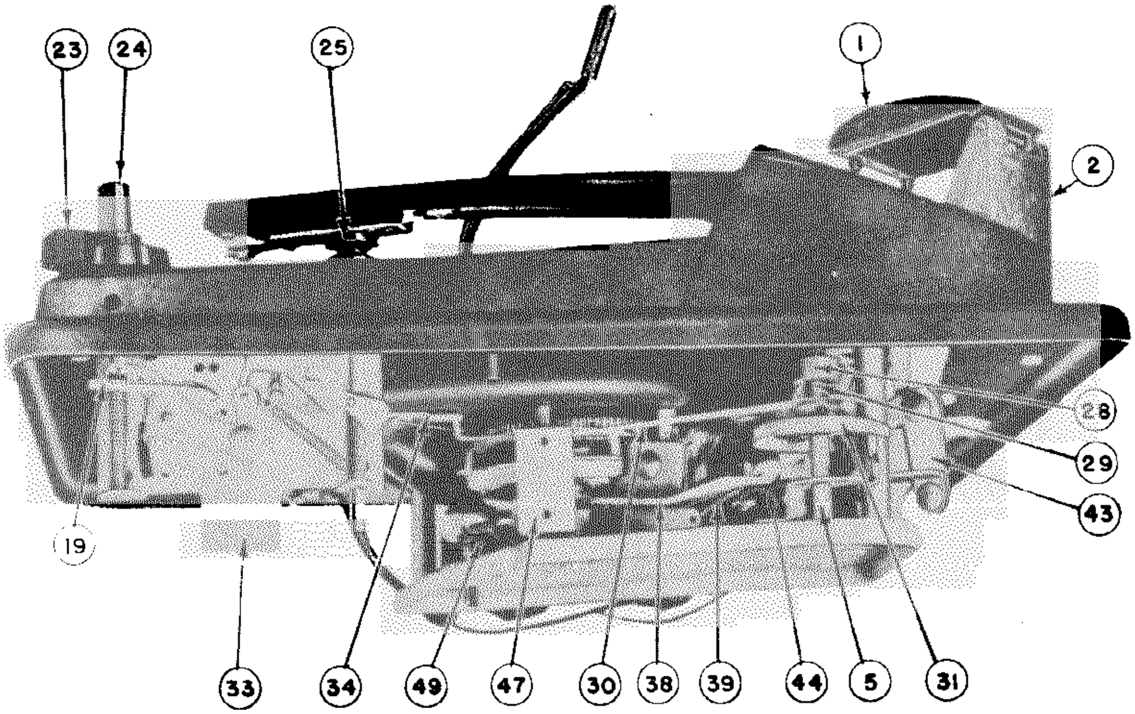

FIG. 6 - PARTS LOCATION -- RIGHT SIDE VIEW

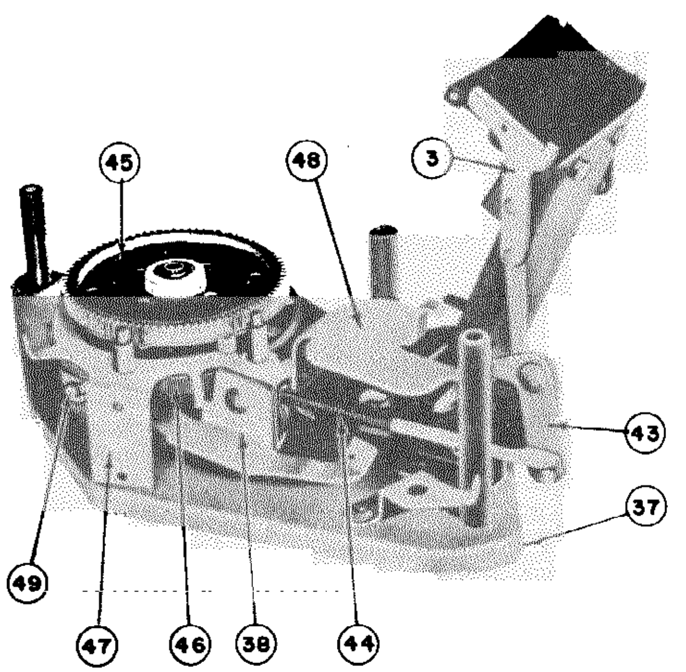

FIG. 7 - PARTS LOCATION -- SUB PLATE ASSEMBLY

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ILLUS. NO.	FIG.	PART NAME	DESCRIPTION	PART NO.
1	4-6	Weight	Record Stabalizer	42P159
		Pin	Weight Pivot	27P074
2	4-6	Escutcheon	Center Trim & Weight Assy.	11G169
3	5-7	Selector	Record Selector & Shelf Assy.	49P044
4	4	Pickup Arm	Less Hardware & Cartridge	49X041
		Hinge Assembly	Pickup Arm Mounting	21X251
		Spring	Hinge Spacing	45P442
5	6	Shaft Assembly	Pickup Arm Pivot	11X136
		Cartridge	Crystal Pickup	(Use Mfgr. No.)
		Cord	Pickup	20X256
		Spindle	Record Spindle	42P163
		Pad	Needle Pad	24P014
		Turntable	Inc. Gear	11X138-1C
6	4	Plate	Main Base Plate	*
7	4	Washer	Bearing Race	25P269
8	4	Bearing	Ball & Retainer Assembly	11X058
9	4	Stud	Turntable Shaft Bearing	41P414
		Nut	Turntable Stud Mtg.	26P687
11	4	Gear	Small Idler (Fibre)	47P023
12	4	Gear	Large Idler (Fibre)	47P024
		Coupling	Idler Gear	45P342
13	4	Screw	Shoulder - Idler Gear Mtg.	41P333
14	4	Wheel	Idler Assembly - (Rubber)	11X003
15	4	Link	Idler Mtg. Assembly	11X075
16	4	Link	Connecting Link & Spring Assy.	11X152
17	4	Bracket	Connecting Link Bracket	45P453
18	4	Lever	Idler Release	45P447
19	5-6	Wire	Idler Release	45P440
		Bracket	Idler Release Wire	45P452
20	4	Washer	Idler Fibre	25P046
21	4	Washer	Idler Felt	25P030
22	4	Clip	Idler Retaining	50P125
23	4-6	Knob	Manual Control	49P040
		Spring Washer	Knob Tension	25P182

ILLUS. NO.	FIG.	PART NAME	DESCRIPTION	PART NO.
24	4-6	Button	ON	49P026
25	4-6	Button	OFF	49P025
26	5	Motor Assembly	50-60 Cycle 117 Volt.	15X084
		Grommet	Motor Mounting	25P281
27	4	Drive Pulley	60 Cycle	17X412-1
		Drive Pulley	50 Cycle	17X412-4
28	6	Lock Collar	Clutch Spring Tension	11X057
29	6	Spring	Clutch Tension	46P127
30	6	Arm	Automatic Trip	45P345
31	6	Disc & Hub Assembly	Pickup Arm Raising	11X031
		Screw	#8/32 x 1/4 Bristol	26P629
		Switch	A-C Power	32P002
		Cover	Switch Cover	32P033
33	6	Switch Assembly	Complete Less Buttons	11X134
34	6	Manual Trip	Lever & Wire Assembly	11X063
		Spring	Manual Trip Tension	46P017
		Shoulder Rivet	Trip Lever, Idler Bracket	
			Idler Release Mtg.	27P102
37	5-7	Sub-Plate	Plate and Stud Assembly	*
38	6-7	Lever Assembly	Pickup Arm Raising Lever and Bracket Assembly	11X097
39	6	Spring	Raising Lever Tension	46P044
40	5	Lever	Rocker Arm Assembly	11X096
41	5	Pin	Rocker Arm Pivot	41P421
42	5	Spring	Rocker Arm Return	46P122
43	5-6-7	Lever	Index Selector	11X104
44	6-7	Spring	Index Compression	46P011
45	7	Gear	Main Cam Actuating	11X032
		"C" Washer	Cam Spacing	25P342
46	7	Cam	Main Cam Assembly	11X033
47	6-7	Trip	Velocity Trip & Roller Assembly	11X047
48	5-7	Lever	Automatic Shut Off Lock	11X079
49	6-7	Pin	Shut Off Lock Pivot	41P443
50	4	Escutcheon	Center Trim Section	*

* Not Stocked for Service

AUTOMATIC RECORD CHANGER ADJUSTMENTS

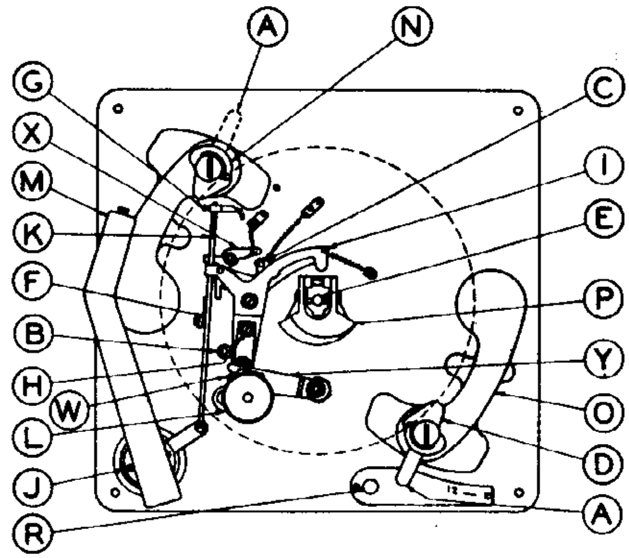
MODELS 6B40B — 6B40M — 6B42M — 6B42W.

DESCRIPTION OF TRIP MECHANISM

(1) In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the trip grooves at the end of the music grooves in all standard records.

(2) All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

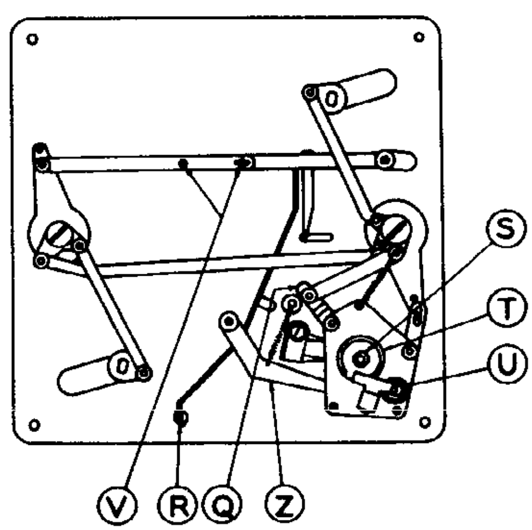
(3) This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.



(4) To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (A) to either the 10 or 12 inch position.

(5) To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (M) swings inwardly, the trip rod (K) moves toward the pickup base until the serrations on the trip rod seen at (K) are in contact with the knife edge of the trip latch (X). If the pickup arm (M) is now moved outwardly, the serrations at (K) will engage with the trip latch (X) permitting the trip cam lift lever (C) to be released so that it will drop in and engage the trip cam (P).

(6) To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (M) inwardly until the trip dog (G) comes in contact with the trip latch (X) and releases trip cam lift lever (C).



(7) The reject button (R), it will be noted, also operates to trip the mechanism by imparting motion to latch (X).

(8) After trip cam lift lever (X) has been released so that it can engage trip cam (P) the forces required to operate the balance of the trip mechanism are derived from the motor.

(9) As trip cam (P) engages trip cam lift lever (C), cam (P) is hinged upwards so that it engages the change mechanism drive wheel control lever (I) and forces the drive wheel (L) into positive frictional engagement with the inside of the turntable rim.

WILCOX-GAY CORP.

(10) To keep wheel (L) in engagement with the turntable rim after lever (I) carries past cam (P), lever (I) is engaged by latch (Y) and the tripping operation is complete.

DESCRIPTION OF SPEED REDUCER AND CAM SHAFT

(11) Driven by the wheel (L) through a double worm and gear reduction, the cam shaft (S) carries cams which control the pickup arm movements, the dropping of records, and at the conclusion of the change cycle, the release of latch (Y).

(12) Cam (T) which is mounted on the lower end of cam shaft (S) raises and lowers the pickup arm (M) through a rocker arm and push rod.

(13) The positioning of the pickup arm (M) for 10 or 12 inch records is controlled by two cams just above the lower cam shaft bearing. The lower of these cams (with short throw) positions the pickup for 12 inch records and the upper cam (with long throw) positions the pickup for 10 inch records.

(14) An examination of the pickup positioning cams will reveal spring fingers at the termination of the cam rise. These spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

(15) When lever (A) is set in the 10 or 12 inch position, the pickup positioning cam follower is shifted up or down so as to engage the proper cam. The pickup positioning cam follower can easily be distinguished by the coil spring mounted thereon and linking the cam follower to its extension. This coil spring will extend, preventing damage, if for any reason the pickup arm (M) becomes obstructed while the pickup positioning cam is forcing the pickup arm (M) inwardly.

(16) Just above the pickup positioning cams is the pickup removal cam which has the function of swinging the pickup arm (M) outwardly when the mechanism has been tripped.

(17) The last and uppermost cam operates through cam follower (Z) to release the wheel latch (Y) thus disengaging wheel (L) from the turntable rim at the completion of the change cycle.

(18) On the upper side of the latch control cam is mounted a roller which engages lever (Q) and actuates the record handling fingers (D) through the connecting links provided.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

(19) To adjust the spiral trip to operate farther from the center of the record, loosen the set screw holding dog (G) and move the dog (G) away from the end of the trip rod (K). (Read paragraph 20 before making adjustment.)

(20) Dog (G) is set at the factory to trip when the pickup needle is 1 3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. To facilitate the location of dog (G) it is best to hold a scale with the end touching the turntable pin (E) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1 3/4" graduation. NOTE: If for any reason the position of the pickup arm (M) with relation to the pickup base becomes changed, the trip dog (G) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (G) (This pickup adjustment is covered in paragraph 34.)

MECHANISM FAILS TO TRIP

(21) If the mechanism fails to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be worn or scratched, in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have been damaged.

(22) The trip rod (K) is held in contact with the trip latch (K) by the trip rod tension spring (F). If the eccentric trip fails to operate, it may be necessary to increase the pressure of spring (F) against trip rod (K) but before changing the adjustment, observe the following:

(1) Make sure that the trip rod does not bind in the bearing where it is linked to the pickup base.

(2) Be sure that the trip rod floats freely.

(3) Examine the serrations at (K) to be certain that the sharp edges have not been damaged.

(4) Remove any dirt which may be embedded in the serrations and which would prevent the trip latch (X) from being engaged.

(5) Examine the knife edge of trip latch (X) to see if it has become damaged.

NOTE: Do not increase the pressure of spring (F) against trip rod (K) any more than is necessary to insure operation of the eccentric trip because excessive spring pressure will cause:

(1) Jumping of the pickup needle out of spiral trip grooves at the tripping point.

(2) The eccentric tripping action will require more power and the needle may jump the grooves and fail to trip altogether.

(23) If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (X) and the trip cam lift lever (C) to make sure that they work freely and do not bind on the studs on which they are mounted. If either of these levers are scraping on the base plate, make sure that the studs which carry them have not worked loose.

(24) If the lever (C) moves freely when it clears the trip latch (X) but does not swing into the path of the trip cam (P) then the spring which connects to lever (C) is either stretched or missing. If lever (C) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place.

CHANGE MECHANISM DRIVE WHEEL FAILS TO ENGAGE

(25) If the trip mechanism functions in a satisfactory manner and wheel (L) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen screws at (H) and move the wheel control lever extension outwardly a distance which will bring wheel (L) into positive contact with the turntable rim. CAUTION: This adjustment is very critical and should be carefully made. If wheel (L) is forced too tightly against the turntable rim, the latch (Y) will stick at the completion of the change cycle and prevent the wheel from becoming disengaged from the turntable rim. As an aid in making this adjustment, it is well to scribe a line on the wheel control lever at the end of the wheel control lever extension, so that it can be seen how far the extension is being moved each time. Before making any adjustment, it is also advisable to check the set screw in wheel (L) to make sure that wheel (L) is tight and not turning on the shaft which carries it.

(26) If latch (Y) fails to hold wheel (L) in position:

(1) Lever (I) may not be following through completely on cam (P), due to either lever (C) being bent down, or lever (I) bent up too far.

(2) At the end of lever (I) in vicinity of wheel (L) is noted a dog (W) which is meant to engage in latch (Y). This dog may have been bent outward so that it does not completely enter latch (Y), when lever (I) has completed its travel on cam (P).

(3) The adjustment of fingers on latch lever (Y) is such that the clearance for the dog (W) should be approximately .010". This can be determined by moving lever (I) outward from the center so that the dog (W) will move into latch (Y) and a feeler gauge inserted between the dog and finger to establish this clearance. To adjust for proper clearance, the finger on latch (Y) may be bent in or out.

(4) Check the spring on lever (Z) to make sure that the spring is not defective or missing.

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MECHANISM REPEATS

(27) If the mechanism repeats (continues to change records without playing them), the wheel (L) may not be disengaging from the turntable rim. This failure to disengage may be due to the following:

(1) Faulty action of the latch (Y). (See "Caution" in paragraph 25.)

(2) A defective or missing return spring on wheel control lever (I).

(3) A defective or missing spring on lever (Z).

(4) Lever (Z) may be bent so that it is not contacting the wheel release cam. (See paragraph 17.)

(28) If wheel (L) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked:

(1) Reject button (R) may be sticking in the depressed position.

(2) The trip cam (P) may be sticking in the raised position.

(3) The reset spring on trip latch (X) may be defective or missing.

(4) The stud on which wheel control lever (I) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE

(29) If the mechanism trips during the playing of a record and before the pickup arm has swung inwardly to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked:

(1) Weak or missing reset spring on latch (X). Tension of spring may be increased by turning the spring anchor lug.

(2) Defective shoulder or trip latch (X) or rounded corner on cam lift lever (C), permitting lever (C) to slip off of the shoulder on trip latch (X).

(3) Rubber bumper (B), against which wheel control lever (I) strikes, may have worked up away from the base plate, permitting lever (I) to over-travel and lock trip rod (K) against trip latch (X). NOTE: Where over-travel of lever (I) due to lever (I) not striking bumper (B) causes tripping during the playing cycle, it is possible that either a weak reset spring on latch (X) or a damaged shoulder on latch (X) is a contributing factor.

PICKUP ARM STICKS OR JAMS

(30) If during normal operation of the unit the pickup arm acts as though it were jammed in any manner, the following procedure should be followed:

First, stop the motor, next remove the turntable, and trip the mechanism. The pickup arm (M) should now be capable of free motion between the normal limits of its travel. (From edge of base plate into within approximately 1" of the center pin (E) depending on the adjustment of trip dog (G).

If trip dog (G) will not slip by the lug against which it strikes on trip latch (X), or the serrations at (K) on trip rod (K) hang up on trip latch (X) and prevent trip rod (K) from sliding by trip latch (X) then investigate the following:

(1) Rubber bumper (B) pushed upwards away from base plate and permitting lever (I) to over-travel.

(2) Excessive pressure exerted against trip rod (K) by spring (F).

(3) Trip rod (K) bent.

(4) An extension on trip latch (X), which extends rearwardly along trip rod (K), may be bent or broken. The function of this extension is to swing trip rod (K) clear of trip latch (X) as soon as tripping takes place.

RECORD SUPPORT ADJUSTMENT

(31) An examination of the unit will disclose the front record support "O" has fixed positions determined by dedents which are located by lever (A). The opposite record support however, is adjustable by means of an overlapping connecting link between the two support bases, underneath the changer unit.
The record support posts should be equidistant from the center of the turntable, so that the opposite sides of the record will be released at nearly the same instant, and so that only one record at a time will be dropped to the turntable. The correct adjustment may best be determined by placing a 10 inch record on the supports, with the support posts in the 10 inch position, and making the adjustment by loosening the screws shown at (V) and moving the record support post (O) to a position so that the entering edges of both separating fingers (N) are equidistant from the edge of the record. (NOTE: The record selected for making this adjustment must be flat and the center hole must fit the center post (E) without excessive looseness.) CAUTION: Before making this adjustment always make sure that lever (A) is firmly located in the proper dedent, and the three feed screw assembly mounting screws are tight. (Vertical alignment of the record centering pin (E) is dependent upon correct feed screw mounting.)
After the adjustment has been made, and the two screws tightened, turn on the motor and observe that the record is released from both support fingers at nearly the same instant. Then place a full stack of records on the supports and observe the dropping of each record. It will be noticed that the combined weight of ten or twelve records resting on the supports, will cause the support posts to spring outward slightly as the change mechanism goes through cycle; and the degree to which the posts swing outward is lessened with a decrease of total record weight. It will also be oberved that one post may spring out more than the other during the change cycle, and this should be taken into consideration in making an adjustment of the support posts, so that the degree of unevenness with which the records are released from the support fingers will be "averaged" for the entire stack of records.

RECORD SUPPORT AND SEPARATING FINGERS

(32) As there is a difference in thickness between 10 inch and 12 inch records, and the equipment is designed to accommodate both sizes, the separating fingers (N) must be in correct adjustment so that they will slide in between the two lower records of the stack, and have no tendency to strike the edge of either record. The record supports (D) and the record separating fingers (N) are so designed that, when in proper alignment, no chipping of standard records will take place. If, however, the separating finger should strike the edge of a record, due to a warped record, or one having chipped edges, fingers (N) may be sprung out of alignment. For proper operation, the fingers (N) must be perfectly flat. As the fingers are usually found to be bent upwards, rather than downwards, when out of correct alignment, it is necessary to remove the fingers from the support posts to straighten them. A heavy screw driver will be required to loosen the large screw at the top of the post, and the order or placement of the fingers and spacers should be noted in removing these parts so that they may be replaced in correct order. Ordinarily, straightening can be accomplished by holding the main part of the finger (N) through which the clamping screw passes, with one hand, and then taking hold of the sickle shaped part of (N) with the fingers of the other hand, bending the sickle shaped part until it is lined up with the main body. DO NOT USE PLIERS NOR ATTEMPT TO STRAIGHTEN THE FINGER (N) IN A VISE. After bending, lay the finger (N) on a flat surface to make sure the straightening has been properly done.

PICKUP ARM LIFT ADJUSTMENT

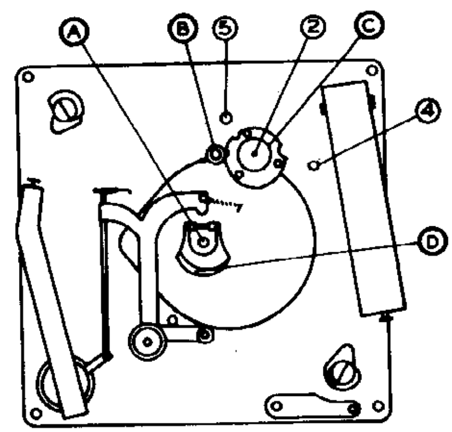
(33) The height to which pickup arm (M) is lifted during the change cycle may be adjusted by the screw (U). In making this adjustment, make sure that the pickup arm will not lift high enough to strike the bottom record on the record supports. Also make sure that the pickup needle drops low enough to rest properly on one record on the turntable. (Recommended needle length 5/8"). If the timing of the pickup lift is not correct, loosen the set screw holding lift cam (T) on shaft (S) and relocate the cam. (The relative position of the remaining cams is fixed.)

ADJUSTMENT OF PICKUP LOWERING POINT

(34) To adjust the pickup arm (M) so that it will be lowered to the correct point on the outside of the record, first shift the lever (A) to the 10" position, and then stop the mechanism with pickup arm positioned ready to set down on edge of record. Now raise the pickup arm to the vertical position and loosen screws at (J) so that the arm (M) can be moved with relation to the pickup base but not too freely. Next holding the pickup base so that it will not turn, force the pickup arm (M) toward the record centering pin (E). Next, carefully pull the pickup arm (M) outwardly until the pickup needle is 4-45/64" from the pin (E). Raise the pickup arm (M) and tighten the locking screws at (J) being careful not to move arm (M) outwardly past the correct setting before tightening the screws. This adjustment will automatically take care of 12" records as well as 10" as will be seen by moving lever (A) to the 12" position and running the unit through its cycle. If the pickup arm (M) always lowers in the 12" position regardless of the position of the lever (A) the pickup positioning cam follower is sticking in the down position.

OILING

When the RECORDIO leaves the factory, the equipment is properly lubricated and requires no immediate attention.



Frequent oiling of the recording mechanism is not required, although the use of a small amount of oil judiciously applied about once a year, in accord with the following directions, will suffice to maintain the equipment in good order.

Remove the turntable by applying upward pressure at the rim of the table, at the same time lightly tapping the top of the turntable spindle with a small tool.

Remove the retaining clip and washer from the drive wheel shaft and remove drive wheel.

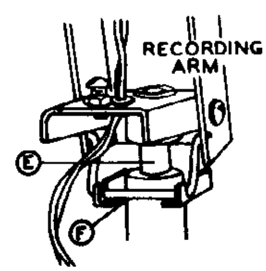
Lubricate the oiling positions indicated in the accompanying drawings, using only two or three drops of electric motor oil at each position, unless otherwise specified.

A. Turntable shaft bearing.

B. Upper motor bearing.

C. Between drive wheel mounting disc and bed plate.

D. Place a coating of petroleum jelly on the lip of the master cam.



E. Recording arm pivot post.

F. Pivot post straddle plate slot.

Carefully apply one or two drops of oil to each drive wheel bearing, so that the oil will not run out on to the rubber rims of the wheels.

The lower motor bearing may be lubricated by application of oil to the felt wick surrounding the lower end of the motor shaft.

AUTOMATIC RECORD CHANGER ADJUSTMENTS

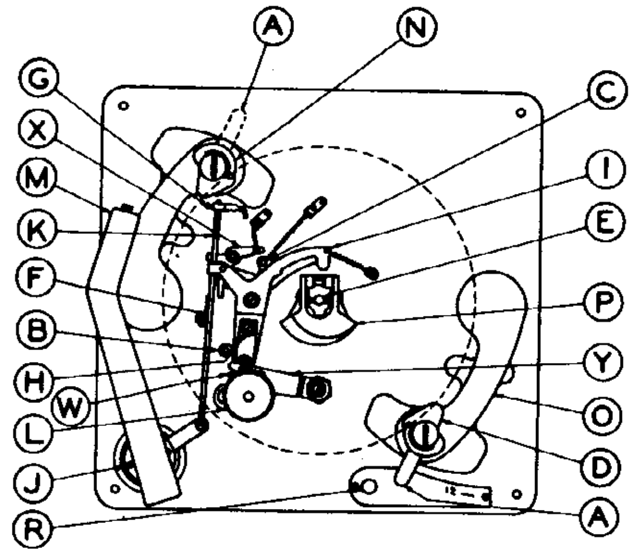
MODELS 6B45B — 6B45B — 6B45W

DESCRIPTION OF TRIP MECHANISM

(1) In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the trip grooves at the end of the music grooves in all standard records.

(2) All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

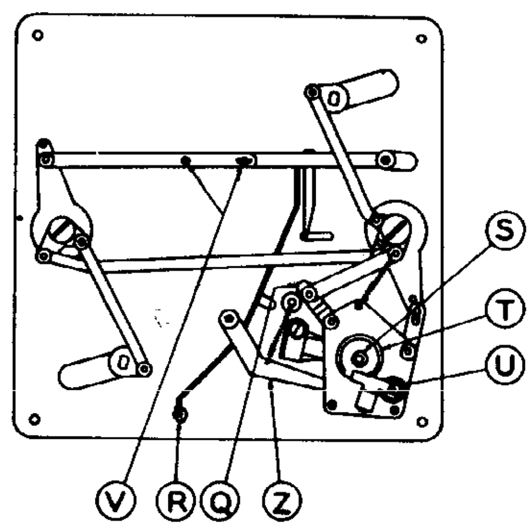
(3) This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.



(4) To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (A) to either the 10 or 12 inch position.

(5) To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (M) swings inwardly, the trip rod (K) moves toward the pickup base until the serrations on the trip rod seen at (K) are in contact with the knife edge of the trip latch (X). If the pickup arm (M) is now moved outwardly, the serrations at (K) will engage with the trip latch (X) permitting the trip cam lift lever (C) to be released so that it will drop in and engage the trip cam (P).

(6) To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (M) inwardly until the trip dog (G) comes in contact with the trip latch (X) and releases trip cam lift lever (C).



(7) The reject button (R), it will be noted, also operates to trip the mechanism by imparting motion to latch (X).

(8) After trip cam lift lever (X) has been released so that it can engage trip cam (P) the forces required to operate the balance of the trip mechanism are derived from the motor.

(9) As trip cam (P) engages trip cam lift lever (C), cam (P) is hinged upwards so that it engages the change mechanism drive wheel control lever (I) and forces the drive wheel (L) into positive frictional engagement with the inside of the turntable rim.

(10) To keep wheel (L) in engagement with the turntable rim after lever (I) carries past cam (P), lever (I) is engaged by latch (Y) and the tripping operation is complete.

DESCRIPTION OF SPEED REDUCER AND CAM SHAFT

(11) Driven by the wheel (L) through a double worm and gear reduction, the cam shaft (S) carries cams which control the pickup arm movements, the dropping of records, and at the conclusion of the change cycle, the release of latch (Y).

(12) Cam (T) which is mounted on the lower end of cam shaft (S) raises and lowers the pickup arm (M) through a rocker arm and push rod.

(13) The positioning of the pickup arm (M) for 10 or 12 inch records is controlled by two cams just above the lower cam shaft bearing. The lower of these cams (with short throw) positions the pickup for 12 inch records and the upper cam (with long throw) positions the pickup for 10 inch records.

(14) An examination of the pickup positioning cams will reveal spring fingers at the termination of the cam rise. These spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

(15) When lever (A) is set in the 10 or 12 inch position, the pickup positioning cam follower is shifted up or down so as to engage the proper cam. The pickup positioning cam follower can easily be distinguished by the coil spring mounted thereon and linking the cam follower to its extension. This coil spring will extend, preventing damage, if for any reason the pickup arm (M) becomes obstructed while the pickup positioning cam is forcing the pickup arm (M) inwardly.

(16) Just above the pickup positioning cams is the pickup removal cam which has the function of swinging the pickup arm (M) outwardly when the mechanism has been tripped.

(17) The last and uppermost cam operates through cam follower (Z) to release the wheel latch (Y) thus disengaging wheel (L) from the turntable rim at the completion of the change cycle.

(18) On the upper side of the latch control cam is mounted a roller which engages lever (Q) and actuates the record handling fingers (D) through the connecting links provided.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

(19) To adjust the spiral trip to operate farther from the center of the record, loosen the set screw holding dog (G) and move the dog (G) away from the end of the trip rod (K). (Read paragraph 20 before making adjustment.)

(20) Dog (G) is set at the factory to trip when the pickup needle is 1 3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. To facilitate the location of dog (G) it is best to hold a scale with the end touching the turntable pin (E) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1 3/4" graduation. NOTE: If for any reason the position of the pickup arm (M) with relation to the pickup base becomes changed, the trip dog (G) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (G) (This pickup adjustment is covered in paragraph 34.)

MECHANISM FAILS TO TRIP

(21) If the mechanism fails to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be worn or scratched, in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have been damaged.

(22) The trip rod (K) is held in contact with the trip latch (K) by the trip rod tension spring (F). If the eccentric trip fails to operate, it may be necessary to increase the pressure of spring (F) against trip rod (K) but before changing the adjustment, observe the following:

(1) Make sure that the trip rod does not bind in the bearing where it is linked to the pickup base.

(2) Be sure that the trip rod floats freely.

(3) Examine the serrations at (K) to be certain that the sharp edges have not been damaged.

(4) Remove any dirt which may be embedded in the serrations and which would prevent the trip latch (X) from being engaged.

(5) Examine the knife edge of trip latch (X) to see if it has become damaged.

NOTE: Do not increase the pressure of spring (F) against trip rod (K) any more than is necessary to insure operation of the eccentric trip because <u>excessive spring pressure</u> will cause:

(1) Jumping of the pickup needle out of spiral trip grooves at the tripping point.

(2) The eccentric tripping action will require more power and the needle may jump the grooves and fail to trip altogether.

(23) If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (X) and the trip cam lift lever (C) to make sure that they work freely and do not bind on the studs on which they are mounted. If either of these levers are scraping on the base plate, make sure that the studs which carry them have not worked loose.

(24) If the lever (C) moves freely when it clears the trip latch (X) but does not swing into the path of the trip cam (P) then the spring which connects to lever (C) is either stretched or missing. If lever (C) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place.

<u>CHANGE MECHANISM DRIVE WHEEL FAILS TO ENGAGE</u>

(25) If the trip mechanism functions in a satisfactory manner and wheel (L) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen screws at (H) and move the wheel control lever extension outwardly a distance which will bring wheel (L) into positive contact with the turntable rim. CAUTION: This adjustment is very critical and should be carefully made. If wheel (L) is forced too tightly against the turntable rim, the latch (Y) will stick at the completion of the change cycle and prevent the wheel from becoming disengaged from the turntable rim. As an aid in making this adjustment, it is well to scribe a line on the wheel control lever at the end of the wheel control lever extension, so that it can be seen how far the extension is being moved each time. Before making any adjustment, it is also advisable to check the set screw in wheel (L) to make sure that wheel (L) is tight and not turning on the shaft which carries it.

(26) If latch (Y) fails to hold wheel (L) in position:

(1) Lever (I) may not be following through completely on cam (P), due to either lever (C) being bent down, or lever (I) bent up too far.

(2) At the end of lever (I) in vicinity of wheel (L) is noted a dog (W) which is meant to engage in latch (Y). This dog may have been bent outward so that it does not completely enter latch (Y), when lever (I) has completed its travel on cam (P).

(3) The adjustment of fingers on latch lever (Y) is such that the clearance for the dog (W) should be approximately .010". This can be determined by moving lever (I) outward from the center so that the dog (W) will move into latch (Y) and a feeler gauge inserted between the dog and finger to establish this clearance. To adjust for proper clearance, the finger on latch (Y) may be bent in or out.

(4) Check the spring on lever (Z) to make sure that the spring is not defective or missing.

MECHANISM REPEATS

(27) If the mechanism repeats (continues to change records without playing them), the wheel (L) may not be disengaging from the turntable rim. This failure to disengage may be due to the following:

(1) Faulty action of the latch (Y). (See "Caution" in paragraph 25.)

(2) A defective or missing return spring on wheel control lever (I).

(3) A defective or missing spring on lever (Z).

(4) Lever (Z) may be bent so that it is not contacting the wheel release cam. (See paragraph 17.)

(28) If wheel (L) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked:

(1) Reject button (R) may be sticking in the depressed position.

(2) The trip cam (P) may be sticking in the raised position.

(3) The reset spring on trip latch (X) may be defective or missing.

(4) The stud on which wheel control lever (I) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE

(29) If the mechanism trips during the playing of a record and before the pickup arm has swung inwardly to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked:

(1) Weak or missing reset spring on latch (X). Tension of spring may be increased by turning the spring anchor lug.

(2) Defective shoulder or trip latch (X) or rounded corner on cam lift lever (C), permitting lever (C) to slip off of the shoulder on trip latch (X).

(3) Rubber bumper (B), against which wheel control lever (I) strikes, may have worked up away from the base plate, permitting lever (I) to over-travel and lock trip rod (K) against trip latch (X). NOTE: Where over-travel of lever (I) due to lever (I) not striking bumper (B) causes tripping during the playing cycle, it is possible that either a weak reset spring on latch (X) or a damaged shoulder on latch (X) is a contributing factor.

PICKUP ARM STICKS OR JAMS

(30) If during normal operation of the unit the pickup arm acts as though it were jammed in any manner, the following procedure should be followed:

First, stop the motor, next remove the turntable, and trip the mechanism. The pickup arm (M) should now be capable of free motion between the normal limits of its travel. (From edge of base plate into within approximately 1" of the center pin (E) depending on the adjustment of trip dog (G).

If trip dog (G) will not slip by the lug against which it strikes on trip latch (X), or the serrations at (K) on trip rod (K) hang up on trip latch (X) and prevent trip rod (K) from sliding by trip latch (X) then investigate the following:

(1) Rubber bumper (B) pushed upwards away from base plate and permitting lever (I) to over-travel.

(2) Excessive pressure exerted against trip rod (K) by spring (F).

(3) Trip rod (K) bent.

(4) An extension on trip latch (X), which extends rearwardly along trip rod (K), may be bent or broken. The function of this extension is to swing trip rod (K) clear of trip latch (X) as soon as tripping takes place.

RECORD SUPPORT ADJUSTMENT

(31) An examination of the unit will disclose the front record support "O" has fixed positions determined by dedents which are located by lever (A). The opposite record support however, is adjustable by means of an overlapping connecting link between the two support bases, underneath the changer unit.
The record support posts should be equidistant from the center of the turntable, so that the opposite sides of the record will be released at nearly the same instant, and so that only one record at a time will be dropped to the turntable. The correct adjustment may best be determined by placing a 10 inch record on the supports, with the support posts in the 10 inch position, and making the adjustment by loosening the screws shown at (V) and moving the record support post (O) to a position so that the entering edges of both separating fingers (N) are equidistant from the edge of the record. (NOTE: The record selected for making this adjustment must be flat and the center hole must fit the center post (E) without excessive looseness.) CAUTION: Before making this adjustment always make sure that lever (A) is firmly located in the proper dedent, and the three feed screw assembly mounting screws are tight. (Vertical alignment of the record centering pin (E) is dependent upon correct feed screw mounting.)
After the adjustment has been made, and the two screws tightened, turn on the motor and observe that the record is released from both support fingers at nearly the same instant. Then place a full stack of records on the supports and observe the dropping of each record. It will be noticed that the combined weight of ten or twelve records resting on the supports, will cause the support posts to spring outward slightly as the change mechanism goes through cycle; and the degree to which the posts swing outward is lessened with a decrease of total record weight. It will also be oberved that one post may spring out more than the other during the change cycle, and this should be taken into consideration in making an adjustment of the support posts, so that the degree of unevenness with which the records are released from the support fingers will be "averaged" for the entire stack of records.

RECORD SUPPORT AND SEPARATING FINGERS

(32) As there is a difference in thickness between 10 inch and 12 inch records, and the equipment is designed to accommodate both sizes, the separating fingers (N) must be in correct adjustment so that they will slide in between the two lower records of the stack, and have no tendency to strike the edge of either record. The record supports (D) and the record separating fingers (N) are so designed that, when in proper alignment, no chipping of standard records will take place. If, however, the separating finger should strike the edge of a record, due to a warped record, or one having chipped edges, fingers (N) may be sprung out of alignment. For proper operation, the fingers (N) must be perfectly flat. As the fingers are usually found to be bent upwards, rather than downwards, when out of correct alignment, it is necessary to remove the fingers from the support posts to straighten them. A heavy screw driver will be required to loosen the large screw at the top of the post, and the order or placement of the fingers and spacers should be noted in removing these parts so that they may be replaced in correct order. Ordinarily, straightening can be accomplished by holding the main part of the finger (N) through which the clamping screw passes, with one hand, and then taking hold of the sickle shaped part of (N) with the fingers of the other hand, bending the sickle shaped part until it is lined up with the main body. DO NOT USE PLIERS NOR ATTEMPT TO STRAIGHTEN THE FINGER (N) IN A VISE. After bending, lay the finger (N) on a flat surface to make sure the straightening has been properly done.

PICKUP ARM LIFT ADJUSTMENT

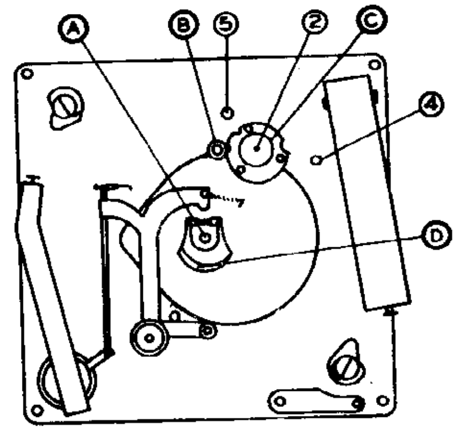
(33) The height to which pickup arm (M) is lifted during the change cycle may be adjusted by the screw (U). In making this adjustment, make sure that the pickup arm will not lift high enough to strike the bottom record on the record supports. Also make sure that the pickup needle drops low enough to rest properly on one record on the turntable. (Recommended needle length 5/8"). If the timing of the pickup lift is not correct, loosen the set screw holding lift cam (T) on shaft (S) and relocate the cam. (The relative position of the remaining cams is fixed.)

ADJUSTMENT OF PICKUP LOWERING POINT

(34) To adjust the pickup arm (M) so that it will be lowered to the correct point on the outside of the record, first shift the lever (A) to the 10" position, and then stop the mechanism with pickup arm positioned ready to set down on edge of record. Now raise the pickup arm to the vertical position and loosen screws at (J) so that the arm (M) can be moved with relation to the pickup base but not too freely. Next holding the pickup base so that it will not turn, force the pickup arm (M) toward the record centering pin (E). Next, carefully pull the pickup arm (M) outwardly until the pickup needle is 4-45/64" from the pin (E). Raise the pickup arm (M) and tighten the locking screws at (J) being careful not to move arm (M) outwardly past the correct setting before tightening the screws. This adjustment will automatically take care of 12" records as well as 10" as will be seen by moving lever (A) to the 12" position and running the unit through its cycle. If the pickup arm (M) always lowers in the 12" position regardless of the position of the lever (A) the pickup positioning cam follower is sticking in the down position.

OILING

When the RECORDIO leaves the factory, the equipment is properly lubricated and requires no immediate attention.



Frequent oiling of the recording mechanism is not required, although the use of a small amount of oil judiciously applied about once a year, in accord with the following directions, will suffice to maintain the equipment in good order.

Remove the turntable by applying upward pressure at the rim of the table, at the same time lightly tapping the top of the turntable spindle with a small tool.

Remove the retaining clip and washer from the drive wheel shaft and remove drive wheel.

Lubricate the oiling positions indicated in the accompanying drawings, using only two or three drops of electric motor oil at each position, unless otherwise specified.

A. Turntable shaft bearing.

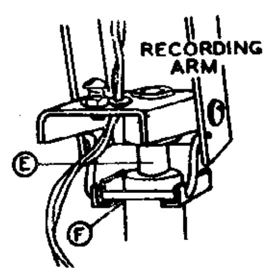
B. Upper motor bearing.

C. Between drive wheel mounting disc and bed plate.

D. Place a coating of petroleum jelly on the lip of the master cam.

E. Recording arm pivot post.

F. Pivot post straddle plate slot.

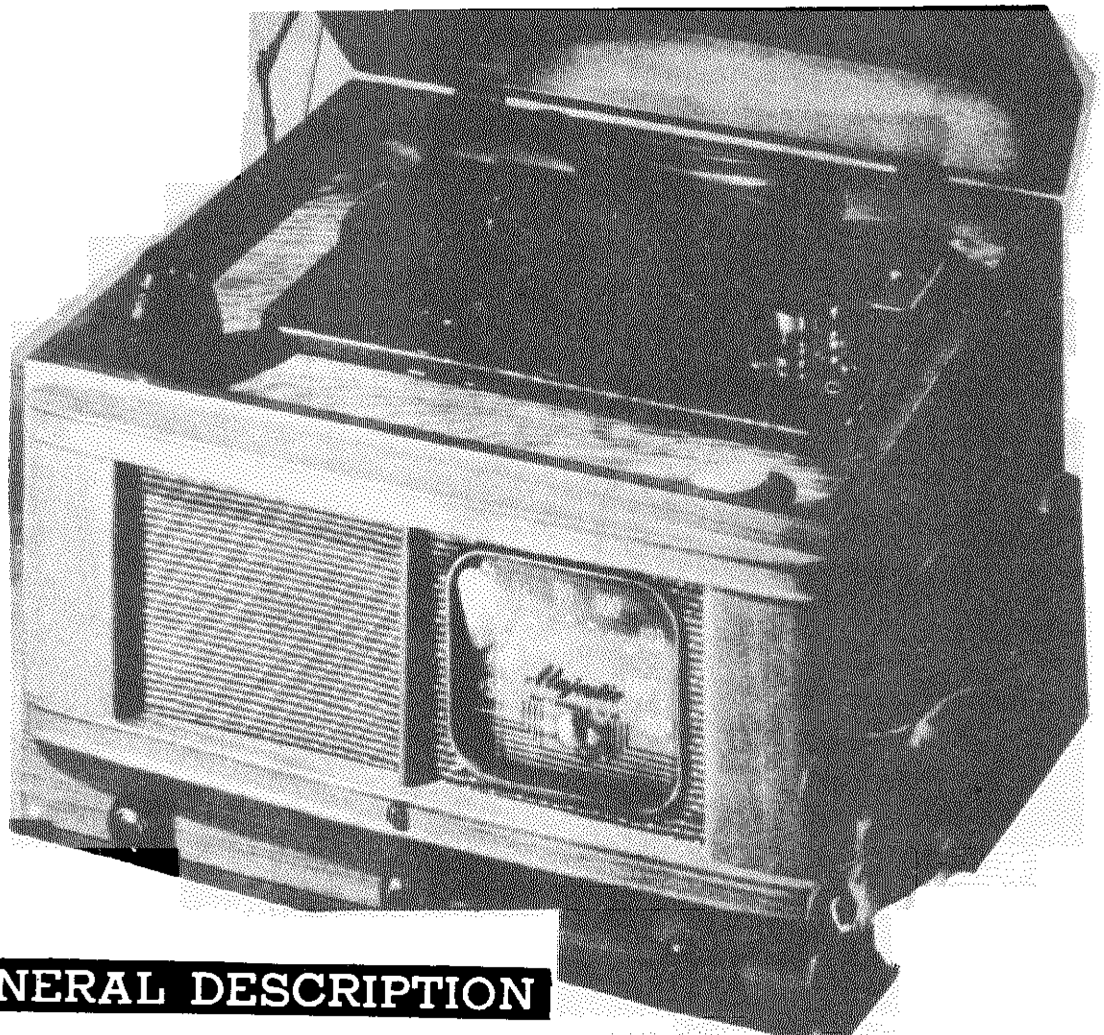


Carefully apply <u>one</u> or <u>two</u> drops of oil to each drive wheel bearing, so that the oil will not run out on to the rubber rims of the wheels.

The lower motor bearing may be lubricated by application of oil to the felt wick surrounding the lower end of the motor shaft.

MAJESTIC RADIO & TELEV. CORP.

MODEL 7YR752
CHASSIS 7B04



GENERAL DESCRIPTION

The Majestic Wire Recorder is designed to record at 78 R.P.M. and rewind at about 400 R.P.M Two motors are provided for the purpose. On play, or record wire position, the 140-59-1 PLAY motor drives the record turntable through 140-57-1 Idler Wheel. The Idler Wheel, mounted on the Idler Bracket Assembly is held against the turntable by slide bracket tension spring 140-63. The drive tension is varied by adjusting the eccentric washer 140-50. CAUTION - this adjustment if improperly made will cause the wire to break or leave the recording head when switching from from rewind to play. In addition a "wow" may result in play back.

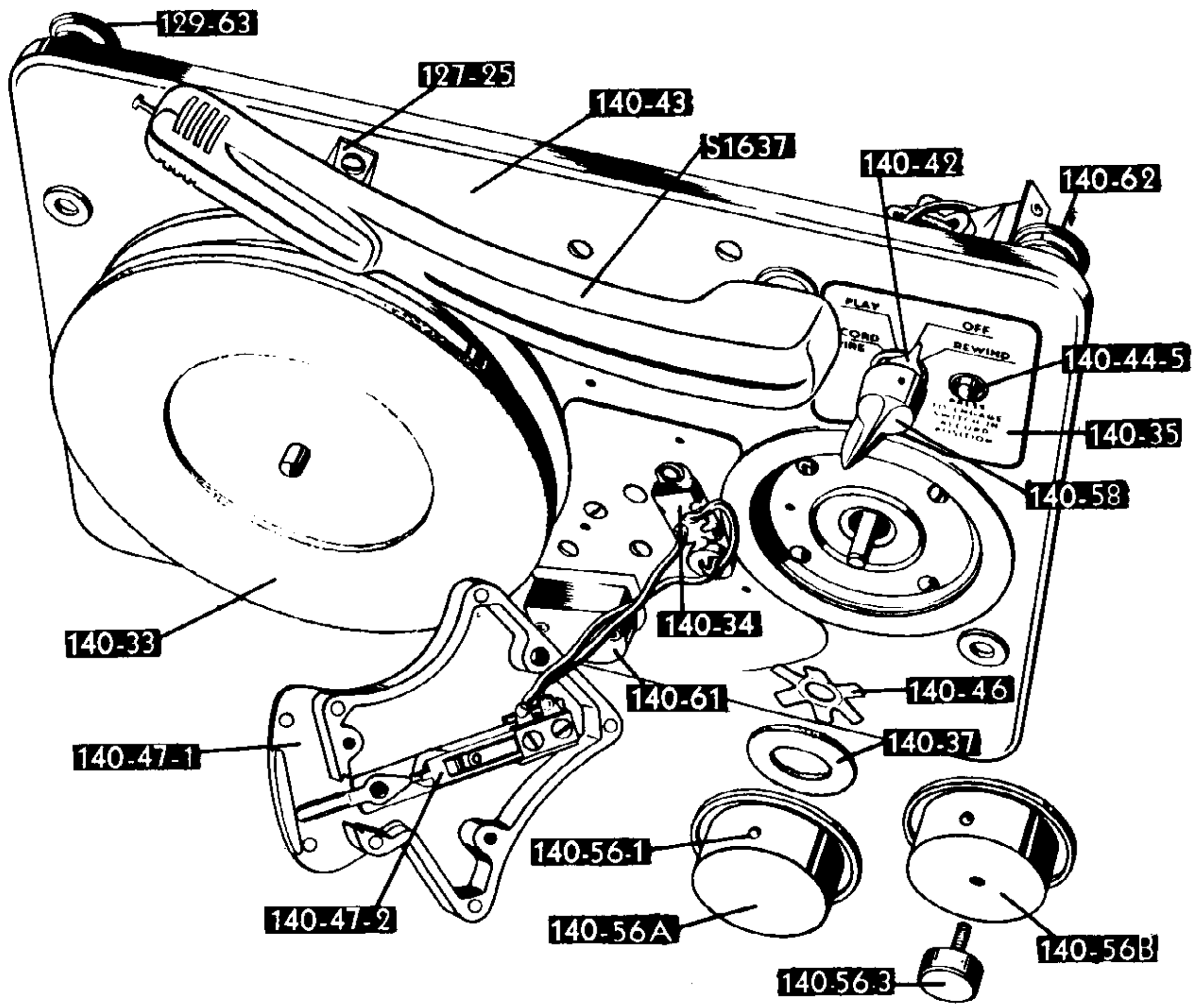
On rewind the Idler Wheel is disengaged from the turntable and the rewind motor is energized by the Idler Wheel Slide Bracket closing the base plate motor switch 140-34.

A level wind mechanism is provided to keep uniform wire distribution on the spool in both rewind and play. The mechanism is driven by worm gear 140-54 or 140-55 and its mating gear assembly 140-51-1 or 140-51-2. The mating gear shaft turns the heart shaped eccentric cam 140-51-3 which drives the cam follower which drives the cam follower attached to the Slide Bracket 140-52-1.

A push button safety switch is provided as part of the selector switch assembly to prevent accidental eraser should the control be rotated beyond the play position.

An automatic cut off switch with a manual reset button is provided to shut off either motors at the end of the wire spool. The celluloid leader passing under the bakelite housing block trips the switch and shuts off AC supply to both motors.

MAJESTIC RADIO & TELEV. CORP.



ADJUSTMENTS

A. IDLER WHEEL

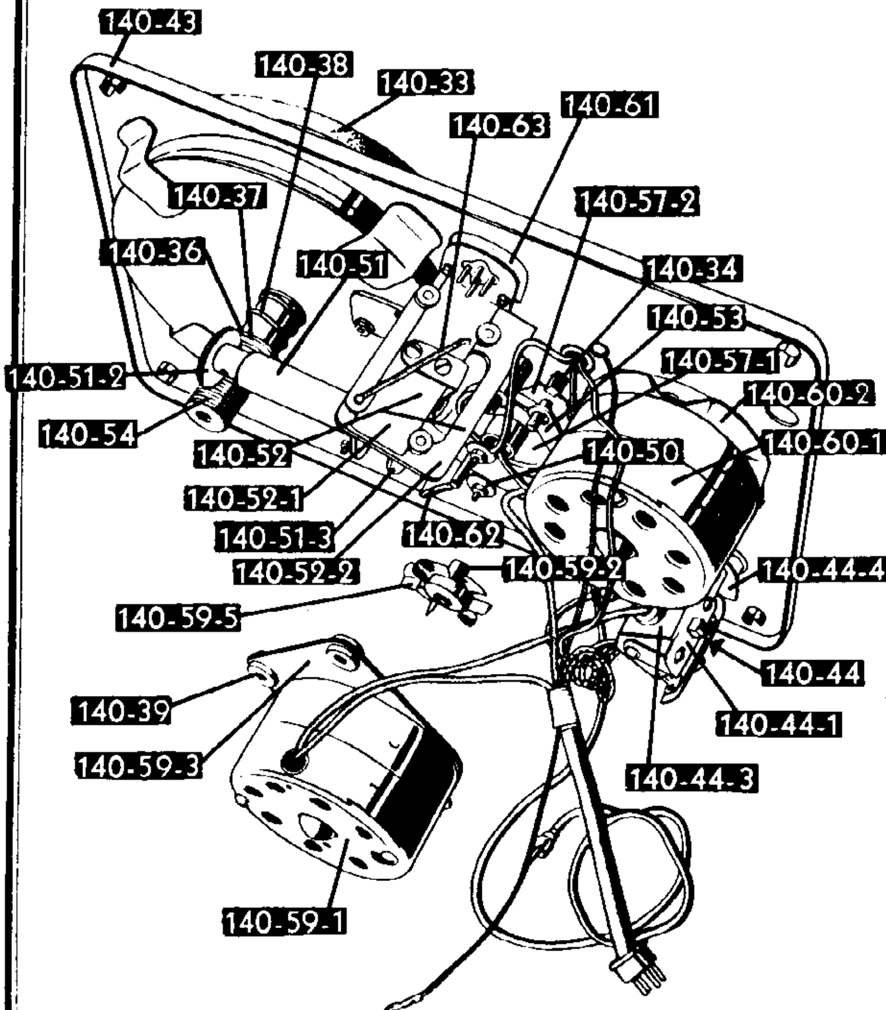
If the wire breaks or leaves the recording head when switching from rewind to play, the Idler Wheel Tension is incorrect. To properly adjust, set the selector switch to play with a spool of wire in position, and rotate the eccentric washer 140-50 until the large turntable turns too slowly. Gradually rotate cam until turntable speed just exceeds 78 R.P.M. (this may be checked with a record stroboscope) if wire continues to break or leave the recording head, a slight correction one way or the other may be necessary. In event this still does not cure wire breakage loosen the bolts holding the play motor to the motor mounting plate and slide the motor forward to provide greater friction between the motor drive shaft and the Idler Wheel. Readjust the eccentric cam as outlined above.

B. SELECTOR SWITCH

Should either of the two slide switches on the Selector Switch Assembly fail to make or break contact, bend the motor cam assembly 140-44-4 to effect proper switch movement.

C. AUTOMATIC CUT-OFF SWITCH

If the motor fails to cut off on the end of a spool, the lever arm or cut off switch 140-47-2 should be bent down slightly being careful not to break the assembly.



D. HEAD POSITION

With the cam follower in the lowest position of the heart shaped cam, if the wire touches the base plate loosen the two screws holding the cam follower to the head slide bracket and move the head up until the wire just clears the base plate.

E. CLEANING RECORDER HEAD WIRE GAP

If the overall quality and volume of recording seems to decrease with use, there is a strong possibility that the Recording Head Gap has been filled with microscopic slivers of wire. A stiff tooth brush should be used to clean the gap in the recording head.

RADIO UNIT

The wire recorder chassi consists of a standard 5-tub radio to which a sub-chassi has been added. The sub chassis has one 12BA6 used as resistance coupled high gai amplifier to provide necessar gain for mike recording and t amplify the minute voltag developed by the recording hea in play-back position.

In addition, this chassi contains a 50B5 tube used as 40KC oscillator. In recordin position the oscillator devel-ops approximately 2.8 VAC (4 K.C.) under the low impedanc recording head load. In al positions except recording, th oscillator is made inoperativ by opening the cathode with th master selector switch on th recording unit.

The recording head has tw magnetic fields, one of whic is a low impedance windin energized by the oscillator The wire passing this field ha its previous magnetic structur destroyed, thereby erasing th previously recorded sound

The wire after passin this part of the head, passe the high impedance windin magnetic field which is ener-gized by the output tube of th radio. The magnetic structur of the wire is re-arranged t conform to the field variation caused by the speech or musi impressed on the head.

The 40 K.C. oscillator ma cause hetrodynes with powerfu local stations when in record-ing position. This conditio varies with location. I objectionable, adjust C29 located on the rear of th small oscillator chassis unti minimized.

MODEL 7YR752
CHASSIS 7BO4A

MAJESTIC RADIO & TELEV. CORP.

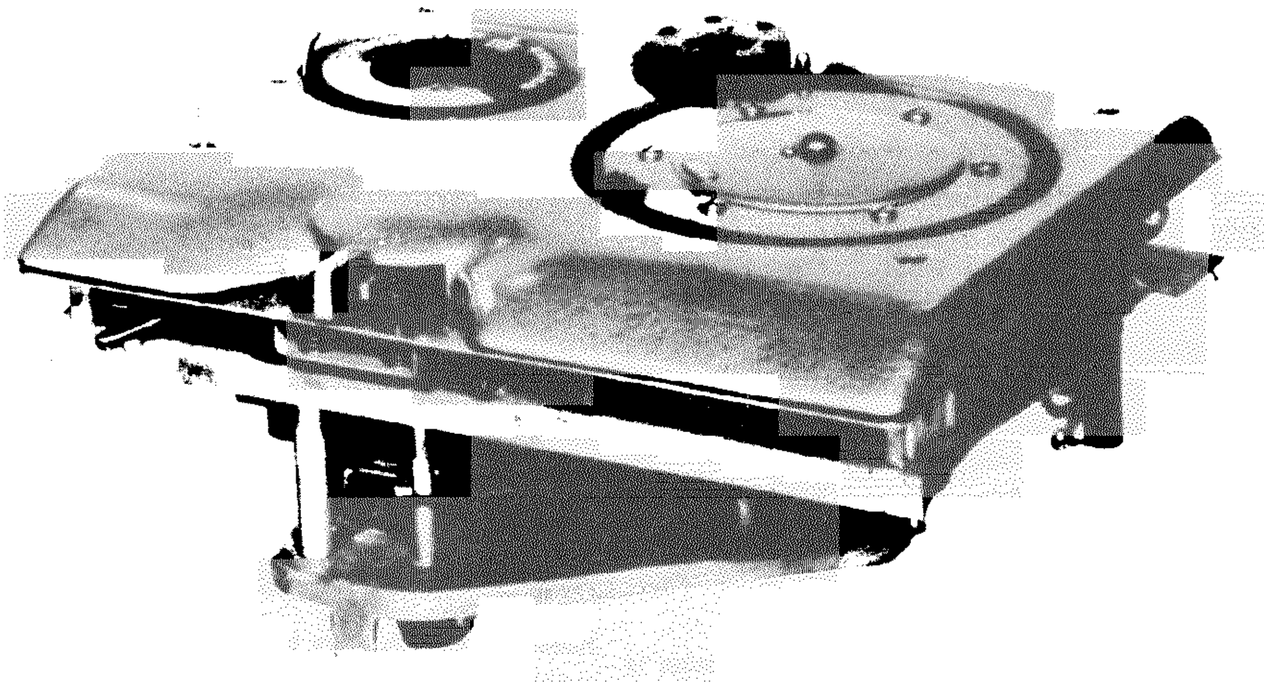
REPLACEMENT PARTS

WIRE RECORDER UNIT

PART NO.	DESCRIPTION
140-33	Turntable Assembly, (6A)*
140-34	Base Plate Motor Switch, (40)*
140-35	Nameplate, Selector Switch, (57)*
140-36	Key Washer, (58)*
140-37	Washer, felt, (59)*
127-25	Bracket, Pickup Arm, (77)*
140-38	Turntable Spring, (93A)*
140-39	Grommet, rubber motor mounting, (96A)*
140-40	Washer, (98A)*
140-41	Washer, (120)*
140-42	Pointer, selector Switch knob, (124)*
140-43	Chasiss base assembly, Staked & Welded, (126A)*
140-44	Selector switch assembly, (129B)*
140-44-1	Switch Assembly, (210)*
140-44-2	Detent Assembly, (200)*
140-44-3	Shield Assembly, (167)*
140-44-4	Motor Cam Assembly, (135)*
140-44-5	Push button assembly, (209)*
140-44-6	"U" Clamp, (222)*
140-44-7	Bracket, (38)*
140-45	Washer, (138)*
140-46	Star spring, re-wind hub, (154A)*
140-47	Reset Switch Assembly, (162A)*
140-47-1	Bakalite Mounting Block (13)*
140-47-2	Automatic Stop Switch, (65)*
140-47-3	Button, (68)*
140-48	Washer, rewind hub, (166)*
140-49	Spring Washer, (168A)*
140-50	Eccentric Washer, (186A)*
140-51	Level Wind Assembly, (194)*
140-51-1	Worm Gear Shaft Assembly, 27 tooth, (195)*
140-51-2	Worm Gear Shaft Assembly 51 tooth, (195)*
140-51-3	Cam & hub, (136)*
140-51-4	"L" Bracket, (153)*
140-51-5	Washer, (98)*

PART NO.	DESCRIPTION
140-52	Level Winder Slide Assembly, (196)*
140-52-1	Slide Bracket, (1)*
140-52-2	L Bracket, die cast, (211 or 15)*
140-52-3	Cam follower
140-53	Link Arm Assembly, (202)*
140-53-1	Roller, (172)*
140-53-2	Spring Clip, (55)*
140-54	Worm Gear, Long, (203)*
140-55	Worm Gear, Short,*
140-56A	Rewind Hub Assembly, Set screw mounting, (204B)*
140-56B	Rewind Hub Assembly, Knurled Knob Mounting
140-56-1	Spring Pin, (190)*
140-56-2	Spring, (189)*
140-56-3	Knurled Knob
140-57	Pulley & Idler Bracket Assembly, Complete, (206)*
140-57-1	Idler Wheel Assembly, (133)*
140-57-2	Slide Bracket less Idler Wheel, (205)*
128-81	Knob, Selector Switch
140-59	Forward Motor Assembly, (216)*
140-59-1	Motor, (174 or 214)*
140-59-2	Extension Shaft, (176)*
140-59-3	Motor Plate, (150)*
140-59-4	Grommets, (96)*
140-59-5	Fan, (177)*
129-62	Mounting Spring, heavy (copper plated), (237)*
129-63	Mounting Spring, light (cad. plated), (238)*
S-1637	Astatic Pickup Arm (with crystal & cord) (241)*
140-65	Crystal Cartridge (Astatic L-71A)
140-60	Rewind Motor Assembly, (275)*
140-60-1	Motor, (215 or 175)*
140-60-2	Motor Plate Assembly, (179)*
140-61	Recording Head, (260)*
140-62	Spring, rewind slide bracket, (99)*
140-63	Spring, Slide Bracket tension, (163)*
140-64	Shoulder washer, motor mounting (37)*

* Indicates St. George Part



GENERAL

The Webster-Chicago Model 79 is a wire recorder foundation unit for those who prefer to build their own wire recorder. It may be used in any location where sound recording is desired and where a source of 105-120 volt 50-60 cycle current is available.

It consists of:

A. A complete, reversible, wire transporting mechanism driven by a four pole, shaded pole induction motor. (50-60 cycle, 105-120 volt).

B. A triple purpose head which records, plays back or erases. This head is mounted on the unit and is actuated by the mechanism to level wind the wire in either the run or rewind position.

C. A 15 minute spool of .004 stainless steel wire which may be used for thousands of successive recordings and from which a recording may be played back thousands of times. Accessory spools of wire are available in 15 minute, 30 minute and one hour lengths.

D. A special oscillator coil designed to give the best results in recordings and erasing when used as recommended in the accompanying circuit diagrams.

The Model 79 mechanism is identical to that used in the Model 80 portable wire recorder.

PURPOSE

The purpose of this unit is to give the experimenter, amateur and professional engineer a basic unit around which to build his own wire recorder and player. It is not in itself a complete recorder. Neither are the accompanying circuit diagrams so complete as to stifle ingenuity or individual accomplishment. Each constructor can best work out his own circuits to meet his exact requirements. However, a simple, basic circuit is offered under the heading "Amplifier Construction". The results obtained from the completed recorder will be largely dependent upon the skill used in following the basic diagrams and in building the necessary amplifier-oscillator circuits.

Those desiring a completely assembled recorder should consider the Webster-Chicago Model 80 Wire Recorder.

MOUNTING INSTRUCTIONS

The Model 79 mechanism must be mounted horizontally and will not operate properly if mounted on a slant or in a vertical position. The motor is mounted on pivot points and is physically shifted to the run and rewind positions. When mounted in a radio console, to be used for recording radio programs and playing back through the radio amplifier and speaker, the wire recorder mechanism should be mounted in much the same manner as an automatic record changer. Four holes for mounting on wooden braces by means of wood screws or on metal supports by means of bolts are accessible by removing the top cover. The Model 79 cover is shaped to permit mounting flush with the panel, which results in a neat, professional appearance in the completed recorder.

If used in locations where excessive vibration is experienced, such as in an automobile, sound truck, small boat or airplane, it is recommended that the entire unit be spring mounted to prevent the motor from bouncing away from the rubber drive wheel.

SHIPPING SCREWS

Before placing the instrument in operation, remove the two shipping screws which hold the motor rigid. The recorder will not operate until these have been removed. Be sure to replace these screws if the Model 79 is reshipped. However, they are not required for normal carrying or travelling.

While the top plate is off, note that the AC line fuse is located in the far righthand corner of the sub plate.

TO REMOVE SHIPPING SCREWS

1. Remove the four top plate screws.
2. Lift the top plate straight up, exposing the wire transporting mechanism.
3. Remove the two shipping screws, indicated by red washers.
4. Replace the top plate and the screws.

LINE VOLTAGE

The Model 79 mechanism is designed to operate on 105-120 volt 60 cycle current, and has a power consumption of 18 watts. It may be used on 50 cycle current providing that recording and playback are made at the same line frequency. On 50 cycle operation, however, the motor will run about 17% slower which will somewhat impair the fidelity of the recording.

CAUTION: DO NOT connect the Model 79 to Direct Current or to sources of any other voltage or frequency. If in doubt, call the local power company and give them your address; they will tell you what current you use.

AMPLIFIER CONSTRUCTION

Recordings whch have been made properly on a magnetic wire recorder may be played back through any good high gain amplifier. In other words, the output of the recording head voice coil on the Model 79 (terminals 1 and 2) could be connected to any good microphone amplifier for playback only.

In designing a complete unit for recording and playback, the following functional circuits must be considered:

1. A recording amplifier with high gain for microphone and low gain for radio-phono recording.
2. An oscillator to provide a "supersonic bias" for recording and erase voltage.
3. A playback amplifier.
4. A power supply.

In the interests of cost and size, it is also desirable to keep the number of tubes and associated circuits at a minimum and to construct the amplifier from standard parts which are readily available. This can lead to complications since in using the same tubes for recording and playback, normal construction would bring the grid of the first tube and the plate of the second tube into an unshielded switch in an "in phase" condition. This would result in regeneration in the amplifier.

The impedance of the head without the matching network is 15,000 ohms at 1,000 cycles.

The oscillator develops 5 volts at 1.0 ampere (R.F.) at 35-40 kc. This may be tested by shorting a 6.3 volt pilot light across the secondary of the oscillator coil, since most meters will not accurately measure radio frequency values. The pilot light should light to a medium brilliance if the oscillator is functioning properly.

The circuit shown is unusual in one respect, a 6SN7 is used in cascade for the second stage. This inversion circuit permits taking off the recording signal out of phase with the 6SJ7 grid, eliminating any tendency toward oscillation when the plate-grid circuits are controlled by a common switch.

SUGGESTED CIRCUIT

In order to overcome this and other problems and as a guide to the experimenter who wishes to build his own amplifier, Webster-Chicago engineers have developed this suggested circuit for recording and playback. It is designed to record from a crystal or high impedance dynamic microphone with a sensitivity of about −55DB or from a crystal phono pickup or the second detector of a radio receiver when the signal is approximately 1.0 volt.

The output on playback is approximately 1.0 volt which may be used for listening or monitoring with earphones or can be used to drive a power amplifier. When used with an external amplifier, the output of the Model 79 amplifier is fed into the phono input of the amplifier.

When a radio receiver is provided with a phono-input, the wire recorder output may be connected into the phono-input jack. When it is not provided connected directly into the circuit as explained later under the section on "connections"

The compensating R-C network consisting of R-1 and C-1 is designed to flatten the middle register response which is characteristic of magnetic recording. These components may be varied to give more highs or more lows but as specified should give good response from 50 to 5,000 cycles. The .25 megohm volume control for the second triode section of the 6SN7 may be mounted with the shaft protruding from the top of the chassis. It should be adjusted so that the output of the second section is approximately 10 volts with .005 volts input at terminal 2 on P-1, Fig. 3 and the volume control on full.

NOTE: The power supply shown in the diagram will not accommodate additional tubes. Select a heavier power transformer and associated parts if a transformer coupled push pull stage is to be added for direct speaker operation.

Switch SW-1 is a rotary wafer switch such as a Mallory No. 1312L or equivalent. When using the Mallory switch, the connections indicated on the diagram are recommended.

Many circuit variations will occur to the experienced constructor, including power supplies, choice of rectifier tube, input circuits and additional amplification. Two examples of alternate input circuits are shown on page 10.

CONSTRUCTION NOTES

The usual care must be exercised in dressing the leads. Keep plate leads as far from grid leads as possible. Keep grid leads as far from AC leads as possible. Use a toggle "on-off" switch; do not use a switch on the volume control for this purpose. A metal cover over the bottom of the chassis helps to eliminate hum pickup from surrounding apparatus.

A high inductance in the plate lead of the 6V6 oscillator permits operating it as a pentode with increased output. The primary of an inexpensive output transformer was used because of its relatively high inductance and availability. Cut off and ignore the voice coil leads.

The transformer T-1 has a 5 volt filament which will permit the use of a 5Y3G rectifier if desired.

If a glass 6SJ7 must be used, be certain it is shielded. A metal tube is preferred.

Connecting the volume control between the 6SJ7 and the 6J5 avoids thermal noises inherent in circuits placing the volume control ahead of the first tube.

Condenser C-2 must be shielded by the constructor if a shielded input condenser cannot be purchased. Use foil and insulate it with waxed paper.

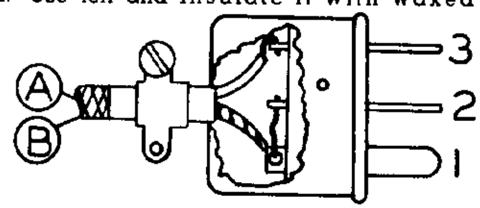
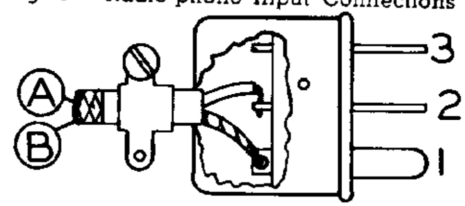


Fig. 1 — Radio-phono Input Connections



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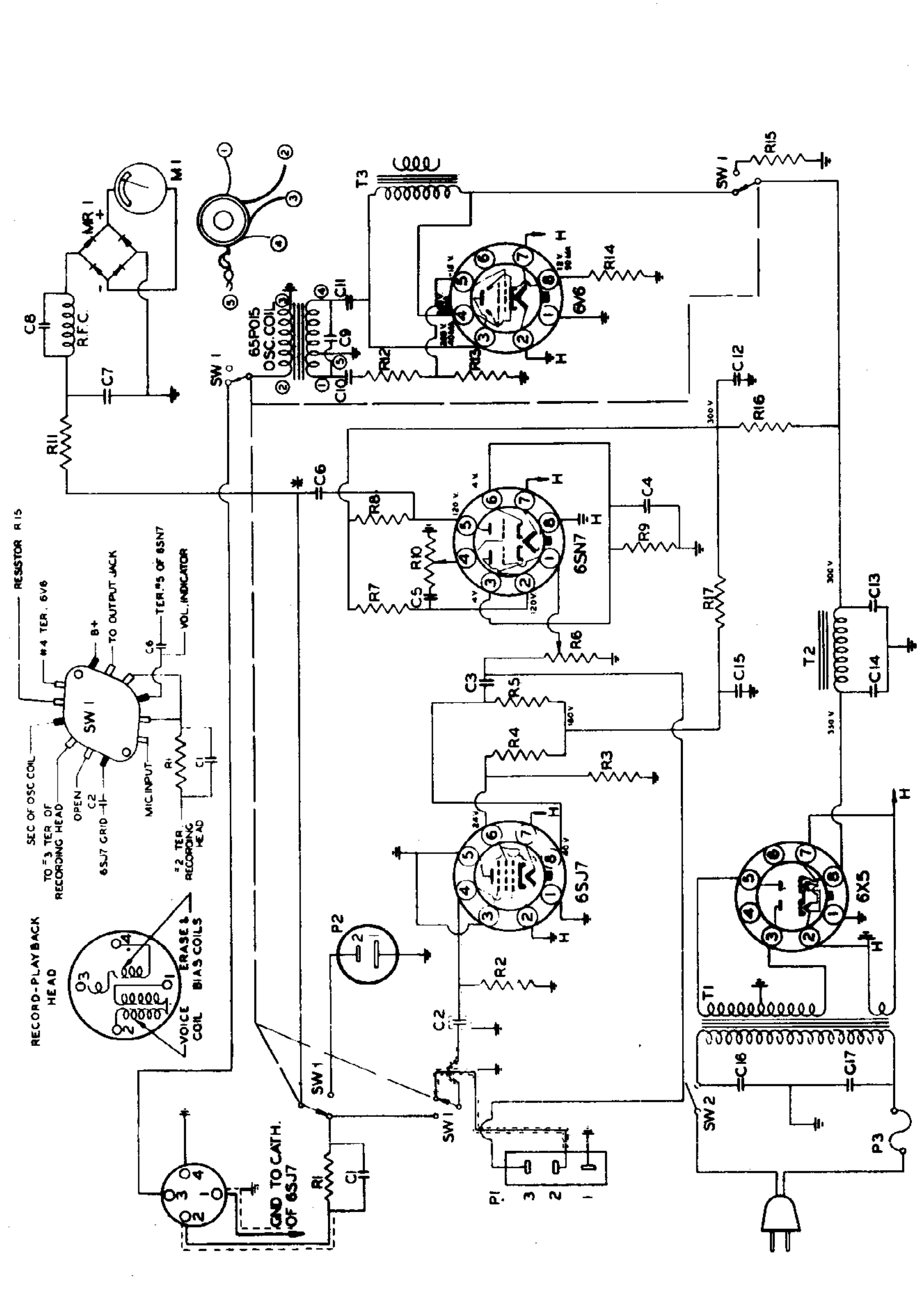

Fig. 3 — Suggested Circuit Diagram

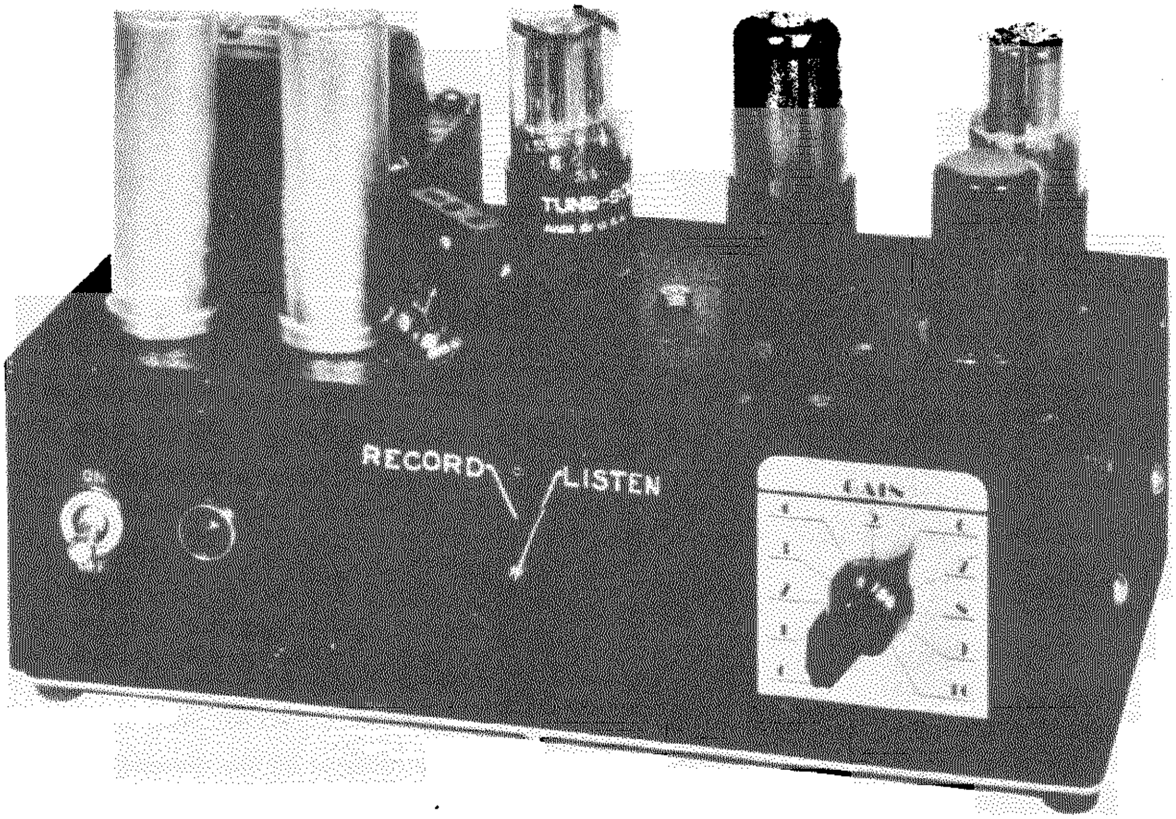

Fig. 4 — Parts Layout of Laboratory Model of Amplifier Described in Fig. 3

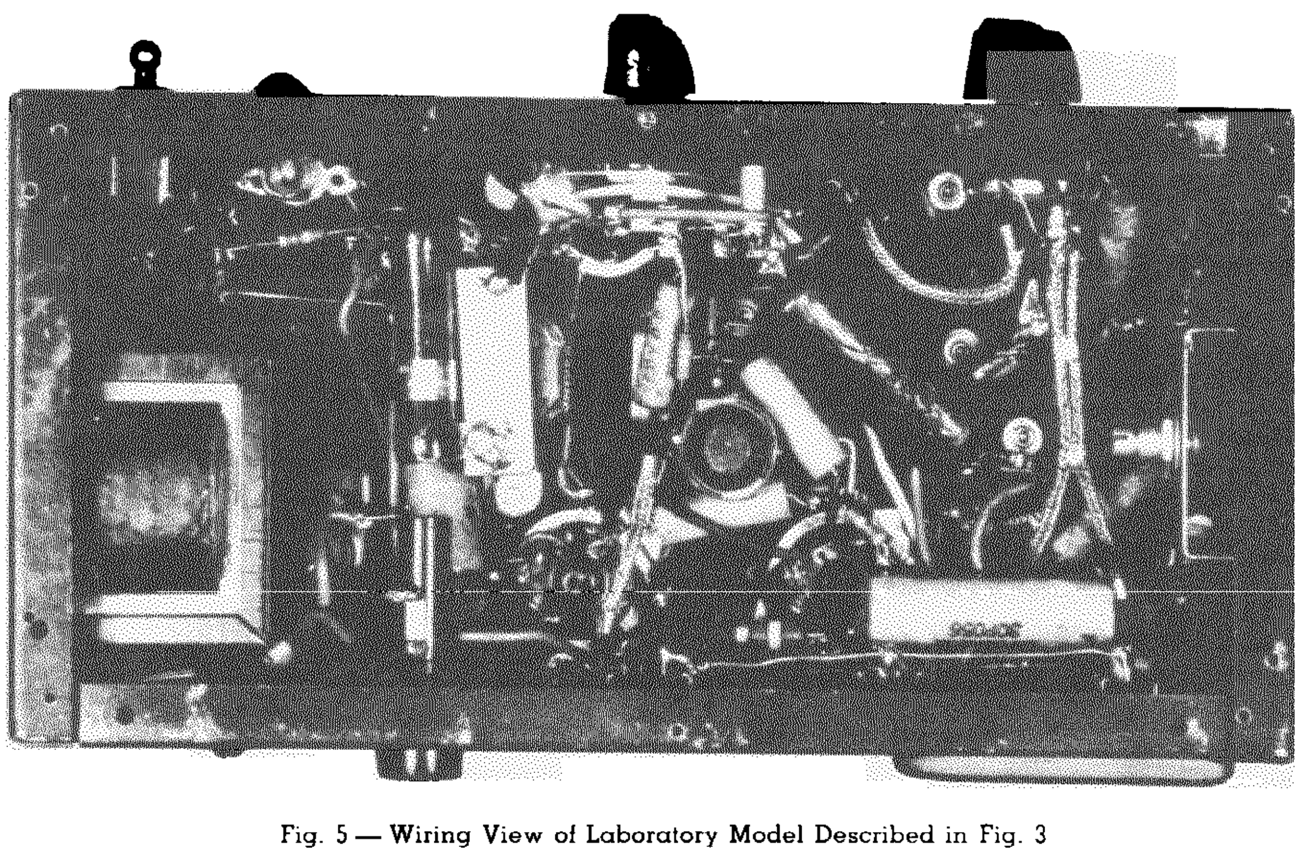

Fig. 5 — Wiring View of Laboratory Model Described in Fig. 3

For best results the ground terminal No. 3 of the oscillator coil should be carried directly to the chassis end of the braided ground lead from terminal No. 4 of the recording head. This lead carries 5 watts of high frequency R.F. so the connections must be especially good.

CONNECTIONS

To Record From Radio:

Connect the radio-phono input (Terminals 1 and 3 on P-1) across the volume control of the radio receiver by means of a suitable plug or connector. The volume will be controlled by the volume control on the recorder.

To Record From Phonograph:

Connect the radio-phono input to the leads from the high impedance crystal pickup by means of a suitable plug or connector as in Radio Recording.

NOTE: Connecting the radio or phono pickup to terminal 1 and 3 of P-1 automatically feeds the signal to the first grid of the 6SN7. This leaves the grid of the 6SJ7 open. Terminal 2 of the input-plug must be grounded to terminal 1 to short out the 6SJ7 grid and the input plug *must* be removed during playback. See Figs. 1 and 2.

To Record From Microphone:

Connect the leads from a high impedance crystal or dynamic microphone to the "microphone input" (Terminals 1 and 2 on P-1) by means of a suitable plug or connector.

To Playback Through a Radio:

Connect the output of the amplifier to the "television" or "FM, Audio" connection of the radio or across the volume control as indicated in the typical circuit diagram. A switch should be provided to break the B+ as indicated to silence the radio effectively. The volume may be controlled by either the radio or by the recorder volume control.

To Playback Through an Audio Amplifier:

Connect the output of the wire recorder amplifier to the "phono input" jack of the external audio amplifier.

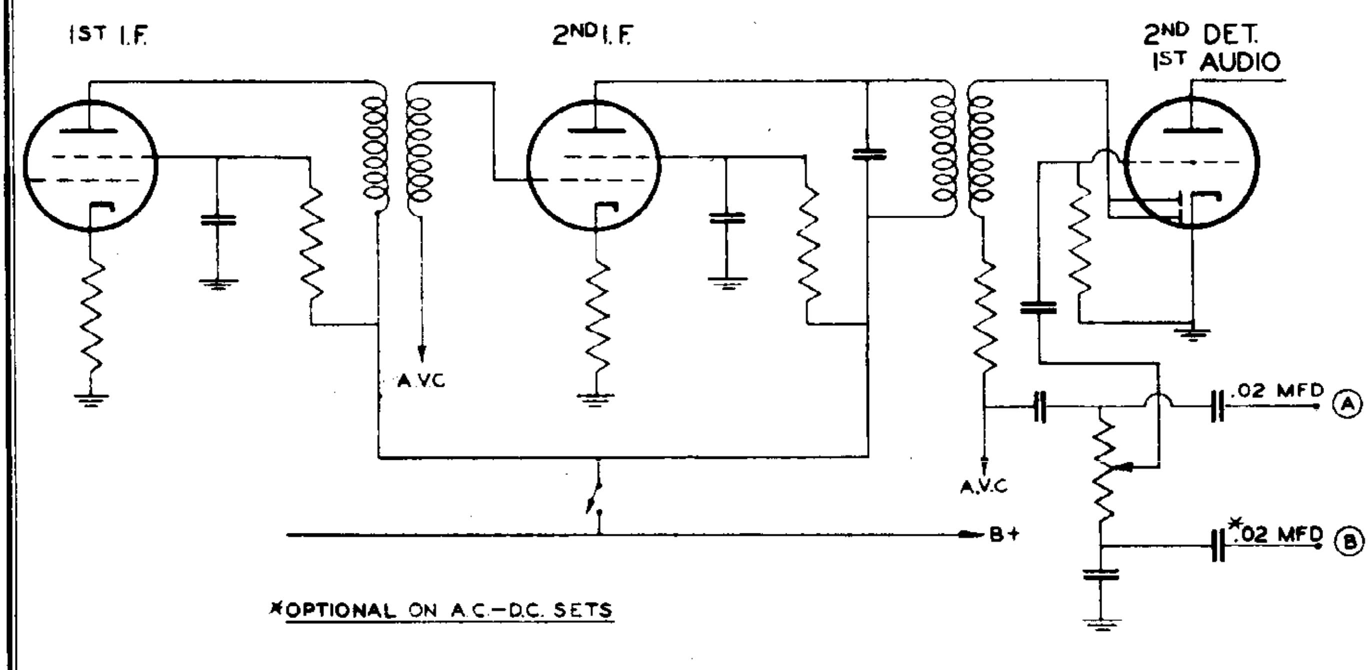

Fig. 6 — Connections to a Typical Radio Receiver

VOLUME LEVEL INDICATOR

Although experience will indicate the best volume setting for the proper recording level, visual volume level indicators are a definite advantage. Two methods of monitoring the volume level are illustrated.

1. A. C. Output Meter:

To Calibrate: Feed 7 volts at 400 cps from an audio oscillator to the input (indicated by an asterisk in Fig 3) measured with a VTVM. Calibrate the meter at that setting.

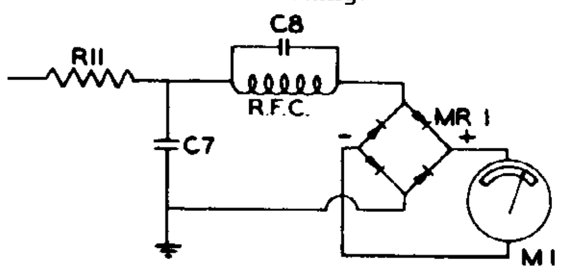

Fig. 7 — A.C. Output Meter

If a suitable audio oscillator and A.C. VTVM are not available, a "cut and try" method of calibration is as follows:

1. Secure a 1000 cycle test phonograph record.
2. Use a crystal phono pickup with an output of 1 volt.
3. Record the 1000 cycle tone at various volume control settings.
4. Mark the meter to indicate the level which is distorted and difficult to erase.

To Use:

Measure the voltage being applied to the recording head by connecting to the point (*) indicated in the schematic diagram. Do not exceed the over-load mark on the meter on peaks. In order to preserve the full dynamic range when recording, permit the level to rise and fall with the natural level of the program. Do not keep the needle at the "over-load" point.

2. Neon Bulb Volume Level Indicator:

To Calibrate: Substitute a variable resistor for the 220,000 ohm resistor. Fig. 8. Apply 7 volts from an audio oscillator, to the .01 mfd. conden-

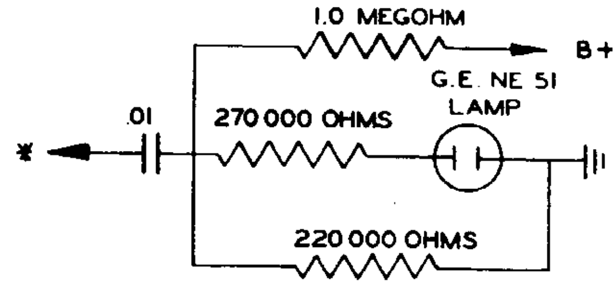

Fig. 8 — Neon Bulb Volume Level Indicator

ser, measured with a VTVM, and adjust the vari able resistor until the bulb just flashes. Replac with suitable resistor in the circuit. The value suggested in the circuit diagram are for a 30 volt D.C. power supply, hence the need for cali bration.

To Use:

Connect permanently into the circuit at the poin indicated by an asterisk in the amplifier diagram Adjust the volume control when recording so tha the neon bulb just flashes on peaks only. Most c the time the bulb should not flash if the full dy namic range of a program is to be preserved.

RECORDING

A 15 minute spool of recording wire is supplie with the Model 79 as standard equipment. Extr spools for 15 minutes, 30 minutes and 1-hour re cordings are available as accessories.

1. Place the spool of wire in position with the label side up.
2. Rotate the large righthand drum by hand unti the recording head reaches the top of its vertical travel. This is important for both recording and playback.
3. Pull the loose end of the wire from the spool so that it is long enough to reach across the back of the recording head, through the groove in the large drum and under the clip, with about one inch to spare.
4. Press down on the button in the center of the large drum to release the clip so that the wire can be slipped under it.
5. Press down on the Control Lever Limiting But-

ton and move the control lever from the "STOP" to the "RUN" position. (These buttons are provided to prevent moving the control past the stop position when returning from either the "RUN" or "REWIND" postions. Moving past the "STOP" position would release the brakes on the trailing drum and cause the wire to spill.) This will start the motor and wind the wire from the spool to the drum, across the recording head, at the rate of approximately two feet per second. The recording head will move up and down to distribute the wire evenly on the drum. The recording may be interrupted at any time by moving the control switch to the "STOP" position.

6. AT THE COMPLETION OF THE RECORDING, MOVE THE "RECORD-LISTEN" SWITCH TO LISTEN POSITION AND THE CONTROL SWITCH TO THE REWIND POSITION. The drum and spool will then start revolving in the reverse direction, increasing in speed to about seven times the recording speed.

If the wire is permitted to run all the way off the drum and onto the supply spool, the clip will release the end of the wire. Note that when this occurs, the last turn of wire will be "tucked" into the spool and the spool will not unravel.

However, it is not necessary to let the wire run all the way off the drum, especially if an immediate playback is to be made. The pilot light has been placed in such a position that the wire on the drum is easily watched and the mechanism can be stopped before it has completely unwound.

A recording may be played back thousands of times without any appreciable loss of volume or quality or it may be stored indefinitely. On the other hand, having served its purpose, the recordings may be erased and the wire used again and again for successive recordings. Further details are given in the paragraph entitled "Erasing a Recording".

NEW SPOOL OF WIRE

Before making a permanent recording on a new spool of wire, run the entire spool through the recorder once and rewind it. This is important for two reasons: First, the wire will then be phased on the spool in direct relation to the rise and fall of the recording head. Second, the rewound spool will be somewhat more loosely wound and the free end will "tuck in" more securely.

BROKEN WIRE

If the wire is accidentally broken, or if it is desired to remove or insert a section for editing purposes, splice the ends by tying them together with a simple square knot. Pull the knot tight and cut off the loose ends close to the splice. The knot will pull across the recording head without catching.

ERASING A RECORDING

As the wire passes across the recording head, with the control switch set to "RUN" and the "RECORD-LISTEN" switch to "RECORD", it is first demagnetized by the action of the erase coil before it reaches the recording coil, both coils being incorporated in the dual-purpose head. Therefore, recording is always done on demagnetized wire. It follows that if the wire passes through the recording head with the switch in "RECORD" and the volume control turned off, the wire will be erased and no recording will remain. This feature of magnetic recording makes it possible to erase a word or phrase in a voice recording and if desired, insert a new word or phrase in its place.

A wire may be used for thousands of successive recordings or a complete spool may be erased without putting any other sound on the wire.

It is possible, by turning the volume control on full and shouting into the microphone, to magnetize the wire to such a degree that the recording cannot be erased by normal means. Later recordings will not be clear but will be distorted due to the over-magnetization of the wire. When this occurs, "erase" the wire two or more times to remove the over-magnetization before recording on the wire again.

SERVICE NOTES

The Model 79 Wire Recorder mechanism is carefully adjusted and lubricated before shipment. Additional lubrication should be added approximately every six months as explained in detail in the Service Manual.

Be careful to keep the rubber surfaces of the idler wheels and the face of the drums free of oil. Ar lubricant on these surfaces should be remove immediately with carbon tetrachloride.

Dust will gradually accumulate in the recordir head groove. This will cause noise and scrat sounds on the recording and during playbac Remove the dust by means of a small brush ar carbon tetrachloride.

Should specific service problems arise, consult tl service manual for additional suggestions.

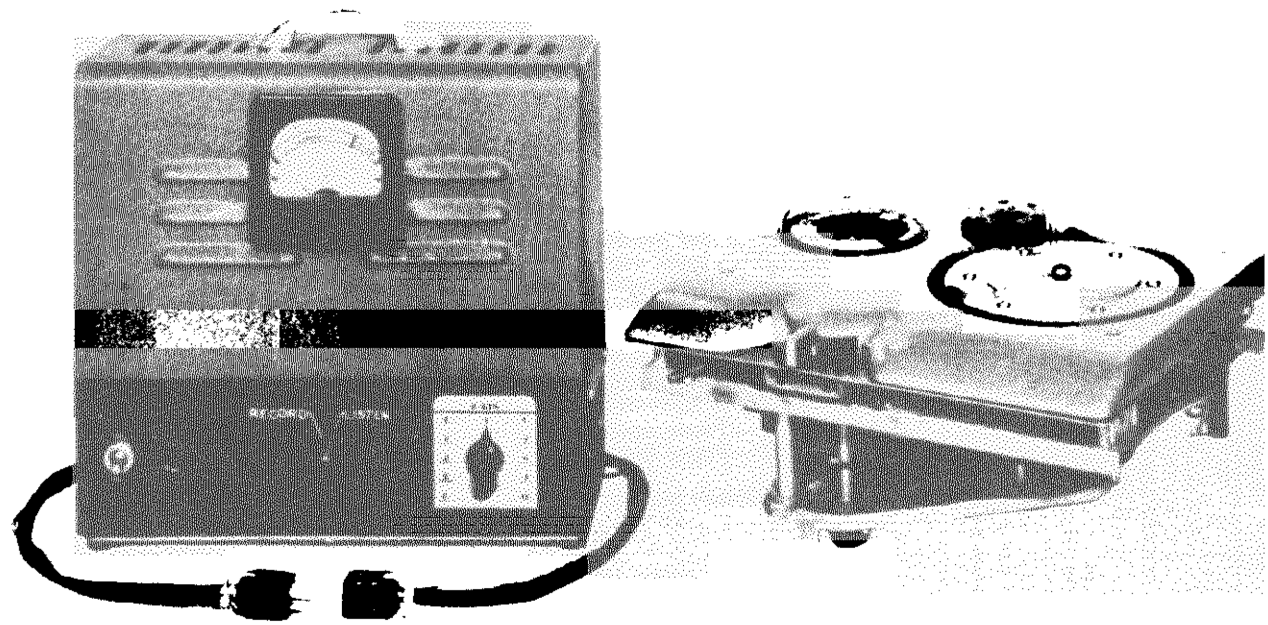

Fig. 9 — The circuit suggested in Fig. 3 can be assembled in an attractive chassis and cover as abo and Fig. 4 or assembled and mounted to suit the constructor's convenience.

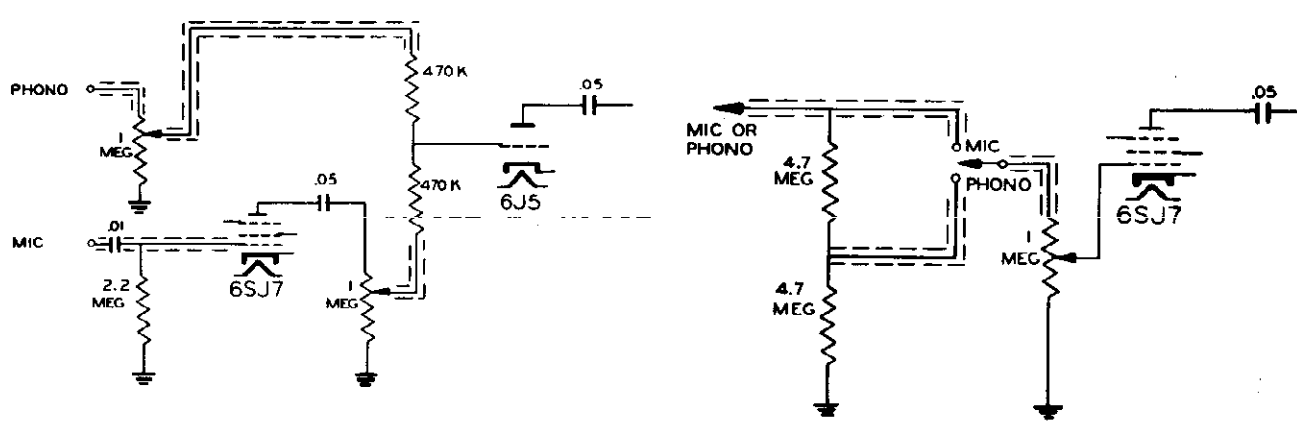

Fig. 10 — Possible Input Circuit Variations

WEBSTER CHICAGO CORP.

Part No.	Description
R-1	68M ohm ½ watt — Carbon resistor
R-2	4.7 megohm ½ watt — Carbon resistor
R-3	47M ohm ½ watt — Carbon resistor
R-4	220M ohm ½ watt — Carbon resistor
R-5	220M ohm ½ watt — Carbon resistor
R-6	1 megohm — Volume control
R-7	39M ohm ½ watt — Carbon resistor
R-8	39M ohm ½ watt — Carbon resistor
R-9	470 ohm 1 watt — Carbon resistor
R-10	250M ohm — Volume control
R-11	15M ohm ½ watt — Carbon resistor
R-12	820 ohm ½ watt — Carbon resistor
R-13	68M ohm ½ watt — Carbon resistor
R-14	270 ohm 1 watt — Fixed resistor
R-15	10M ohm 20 watt — Fixed resistor
R-16	820 ohm ½ watt — Carbon resistor
R-17	100M ohm ½ watt — Carbon resistor
C-1	.001 mfd 600V — Paper condenser
C-2	.01 mfd 400V — Paper condenser
C-3	.02 mfd 400V — Paper condenser
C-4	10 mfd 25V — Electrolytic condenser
C-5	.02 mfd 400V — Paper condenser
C-6	.5 mfd 400V — Paper condenser
C-7	.002 mfd 400V — Paper condenser
C-8	.002 mfd 400V — Paper condenser
C-9	.01 mfd 600V — Mica condenser
C-10	.002 mfd 600V — Mica condenser
C-11	.002 mfd 600V — Mica condenser
C-12-15	20-20 mfd 450V — Electrolytic condenser (vertical)
C-13-14	20-20 mfd 450V — Electrolytic condenser (vertical)
C-16	.05 mfd 400V — Paper condenser
C-17	.05 mfd 400V — Paper condenser
	5" x 10" x 9" chassis and cover
	Bottom plate
	4 octal sockets
T-1	Stancor No. P6119 power transformer or equivalent
T-2	Stancor type No. C1003 — Filter choke or equivalent
T-3	Stancor type No. A3877 — Output transformer or equivalent
	6SJ7 tube
	6SN7 tube
	6V6 tube
	6X5 tube
SW-1	Mallory 1 gang, 4 position, non shorting switch type 1312L
P-1	Jones socket and plug 3 contact No. 303-AB
P-2	Jones socket and plug 2 contact No. 302-AB
P-3	Extractor fuse post and 1 amp fuse
SW-2	S. P. S. T. toggle switch
	Pilot light and Jewell socket
	Switch knob
	Volume control knob
	Dial plate for volume control
	Hookup wire
	Mtg. bracket for R-10
RFC	10MH R. F. choke
M-1	0-500 Microammeter Triplett model 327T or equivalent
MR-1	Conant meter rectifier, series 160 or equivalent
MM-35	Webster-Chicago crystal microphone or any high impedance crystal or dynamic microphone with output level of −55DB or better.

WIRECORDER CORP.

GENERAL:

The Model A-1 WiRecorder is a highly advanced design in a precision-built, professional type magnetic sound recorder fully capable of producing exceptionally high fidelity recordings, providing the operator familiarizes himself with the information contained in this manual, and providing the unit is properly connected to a suitable amplifier.

EQUIPMENT INCLUDED

The Model A-1 WiRecorder includes the newly engineered mechanical drive unit with patented "Magneflo" clutches, a four-purpose recording head, a set of chromed WIRecorder spools with approximately 7500 feet of the finest quality .004 stainless steel sound recording wire, (sufficient for more than one hour of continuous recording or playback,) a time indicator for re-locating any portion of a full hour's recording quickly and easily, an oscillator coil to be used in generating high frequency erase-bias voltage, four special rubber mounts for chassis adaptation, and complete schematic instructions for switching and connecting to an amplifier.

TO UNPACK:

Remove corrugated fillers surrounding the Model A-1 drive unit. The wire and spools will be found in a separate box which should be preserved as a storage container when new spools are purchased for future recordings.

The oscillator coil, time indicator bracket and flexible coupling cable, and envelope containing rubber mounts should next be removed and checked.

The WiRecorder drive unit, mounted on a corrugated board base, may now be taken from the top of the carton. Care should be taken to avoid bending brake arms 12 and 13 (Figure 1), when removing the unit from the carton.

While the WiRecorder may be operated on the corrugated board base with wooden supports, most owners will prefer a standard chassis base using the shock mountings furnished to support the unit.

If the WiRecorder is operated on the corrugated shipping base make sure the stop button and stop button arm 2 (Figure 2) are clear of the base. In any type mounting this stop button must operate freely without binding.

REMOVING REAR SEPARATOR BLOCKS

Next the separator blocks and retaining wire required for safe shipment must be removed. These will be found in the rear of the unit. The separator blocks are of masonite, punched to receive the retaining wire. Using ordinary wire cutters and pliers, sever wire and pull wire carefully through separator blocks. Blocks may now be removed with pliers or fingers, allowing clutch hubs 16 and 25 (fig.2) to bear against rear drive wheel 11.

HANDLING AND APPLYING SPOOLS:

The unit is now ready to operate mechanically, save for the final brake adjustment which must be done with spools in place and power connected.

Brake adjustment is made at the factory prior to shipment, and the following instructions are including only in event of maladjustment resulting from shipping. As a double check to assure proper brake operation it is advisable to familiarize oneself with the following procedure.

Note that the recording wire is attached to both spools and will remain so except in event of mishandling or accidental wire breakage. An automatic trip trigger on the rear flange of both spools stops the mechanism before the wire leaves either spool.

To apply the spools to the two shafts, first lift the front guide wire extending below the recording head. This wire is hinged at the head and will swing upward with the application of slight pressure at the bottom of the wire.

Now place the full spool on the left shaft and the nearly empty spool on the right shaft, pushing both spools firmly against the locking springs until they snap into position.

KEEP WIRE STRETCHED TIGHTLY BETWEEN SPOOLS DURING THIS PROCEDURE. ALWAYS MAKE SURE WIRE IS STRETCHED TIGHTLY BETWEEN THE TWO SPOOLS BEFORE STARTING WIRECORDER EITHER IN FORWARD OR REWIND. Any slack should be removed manually by turning either spool counter-clockwise.

With the spools securely in place the hinged wire guide may now be swung downward, and snapped into place against the rear guide, with the recording wire held between them.

Now with power disconnected, turn wire control knob 1 (fig.2) clockwise slowly until it locks in place. Neoprene pinch idler 3 (fig. 1) and guide arm 4 (fig.1) have now lifted the wire into the recording head, and the entire left hand clutch assembly has been pushed away from rear drive wheel 11 (fig. 1), as will be determined from clearance visible between clutch hub 25 and rear drive wheel tire.

BRAKE ADJUSTMENT:

In this position brake arm 12 (fig. 1) should be set by means of adjustment screws in rear so that the felt pad bears against the hub lightly. This is a preliminary adjustment only. Final setting must be made with power on, which will be described in later paragraph.

To set right hand brake 13, push stop button 2. This drops pinch idler and guide arm to neutral, and allows both clutches to engage rear drive wheel. Now turn wire control knob 1 counter clockwise to locking position. Clutch 16 is now pushed away from rear drive tire. In this position brake arm 13 is to be set, by means of rear adjustment screws, to bear against hub 16 lightly, as a preliminary adjustment.

FINAL BRAKE ADJUSTMENT

Once again press stop button 2, returning mechanism to neutral "off" position. Connect unit to standard 105-120 volt 60 cycle current and turn wire control clockwise to "forward" position, raising wire into head and starting motor. The WiRecorder is now moving the wire forward for recording or playback.

In this position, if the preliminary brake adjustment was made properly, brake arm 12 will bear against clutch 25 with just enough pressure to stop rotation of the hub. Meanwhile brake arm 13 should not be in contact with clutch hub 16 which is being driven freely from the rear drive tire.

Allow the unit to run for about 1 minute in the "forward" position, and then push stop button 2. Turning wire control knob counter clockwise, start WiRecorder into "rewind". In this position brake 13 should bear against clutch hub 16 with just enough pressure to stop rotation of the hub.

IMPORTANT: Brake pressures should always be set at a minimum to stop rotation of hub against which they are bearing.

TIME INDICATOR

A time indicator is furnished with each Model A-1 WiRecorder. It consists of a feed screw attached to a mounting bracket, an adjustable carriage and a flexible coupling shaft.

One end of the coupling shaft is to be connected to the feed screw while the other end is threaded into the center of fiber gear 19 (fig. 2).

The indicator bracket may be mounted vertically or horizontally providing no binding of the flexible shaft occurs.

The indicator carriage is movable manually along the feed screw by twisting the carriage knob slightly to the right or left and sliding. This is of special advantage when changing spools.

The time indicator automatically reverses itself in rewind, and when used with a calibrated panel scale which is easily made, gives ready reference to any portion of a recording. The indicator moves across the entire length of the feed screw in 65 minutes.

OPERATING SUGGESTIONS

ALWAYS make sure wire is taut between two spools before turning wire control knob. If wire is loose turn either spool counter-clockwise by hand to remove slack.

In going from "forward" to "rewind", or to stop unit, STOP button must be pushed before wire control knob is turned to new position.

Always allow spools to come to a full stop before turning wire control to new position.

When new spools and wire are placed on your WiRecorder for the first time it is advisable to run the entire hour spool through a complete cycle (forward and rewind) to "phase" the wire for best level winding action.

ADAPTATION TO AMPLIFIER

Less than a watt of power is required to record on the Model A-1 WiRecorder. Consequently, for recording, virtually any amplifier or radio will suffice. However, the output off the wire for playback is approximately one millivolt, making a high gain amplifier of the "public address" type essential.

High frequency "bias" of the wire, applied through a special winding in the recording head itself, is required for recording. The power for this biasing action, as well as for wire erasure, must be generated by a circuit separate from the amplifier proper.

THE BIAS-ERASE OSCILLATOR

The complete circuit diagram for the oscillator, the equalizer, and volume indicator is shown in Figure 6. The oscillator coil itself L4, L5, is furnished with the Model A-1 WiRecorder, and all connections with reference to the circuit may be easily identified from Figure 7 showing the terminals of the coil.

One watt of power is required from this oscillator, at a frequency between 30 and 40 kc. Thus a wide choice of readily available tubes is permitted.

Measured at points X_1X_2, with the head connected to the oscillator, between 3.5 and 4 volts should be indicated. Less than 3.5 volts will result in incomplete erasure and possible distortion at low frequencies. Too high a voltage, if sustained, may result in damage to recording head. If components shown in schematic diagram of oscillator circuit are followed, the correct voltage may be expected.

THE RECORDING-REPRODUCING HEAD

The Model A-1 WiRecorder is equipped with a specially designed multi-function head. Three windings are incorporated in the head: First, the erase winding, energized whenever the selector switch is in "recording" position; Second, the bias winding inductively coupled to the third section, which is the "voice coil" winding.

The voice coil winding is of high impedance, approximating 2200 ohms at 1000 cycles, making it feasible to couple from the plate of an amplifier tube without transformer matching, for recording, and to drive the grid of an amplifier tube directly for playback.

MODEL A-1

WIRECORDER CORP.

The incorporated erase winding assures automatic erasure of an old recording a split second before the new recording is made. With the erase oscillator cut off in playback, there is no danger of accidental erasure.

THE RECORD-LISTEN SELECTOR SWITCH

For quick switching of the WiRecorder from record to listen, and vice versa, a wafer-type switch is recommended. Figure 5, in conjunction with Schematic Figure 6 gives complete wiring information. To avoid interstage oscillation it is important that the diagram be followed faithfully.

THE EQUALIZER

All high frequency equalization is done in recording through a simple RC network shown in schematic diagram 6. This consists of a 75,000 ohm resistor shunted by a .001 condenser in series with the recording head. No bass boost should be used in recording, although 10 to 15 db of bass boost will improve playback quality.

VOLUME INDICATOR

Volume Indicator NE-51, a standard type neon glow tube, is adjustable through a 100K ohm resistor as shown in Figure 6. This indicator lamp should be set to flash at recording peaks of approximately .3 of a volt as measured across X_3X_4 in record position, using a vacuum tube voltmeter. Oscillator power must be cut off to measure this voltage. In the absence of such a meter the setting may be made by "cut and try" tests. Once adjusted properly this volume indicator setting need not be changed.

SHELF LIFE OF WIRE RECORDINGS

Wire recordings made on the Model A-1 may be stored indefinitely without loss of magnetism in the wire. Or, wire recordings may be played back thousands of times without appreciable wear, loss in quality or change in background noise.

It is entirely practical to "edit" wire recordings just as one might edit home movie film, taking portions from one spool and adding to another. Empty spools are available for this purpose, and wire may be spliced at will simply by tying an ordinary square knot to secure the ends. DO NOT USE HEAT as this weakens the wire. Ends of the wire should be cut off as close to the knot as possible.

SERVICING:

The following service information covers such adjustments and lubrication recommendations that may easily be taken care of by the owner of the Model A-1 WiRecorder.

In event of major repair or adjustments not covered in these pages it is advisable to return the unit to the factory.

LUBRICATION

Oilite bearings throughout the Model A-1 WiRecorder make frequent lubrication unnecessary and undesireable.

Oil wicks adjacent to these bearings may be lubricated every 100 hours, with a light machine oil. USE OIL SPARINGLY. In addition to the oil wicks readily visible from the top of the WiRecorder, the following points may be lubricated:

Shaft bearings behind spools. Remove spools and apply one drop of oil to each bearing.

Neoprene idler bearing. (3, Fig. 1). Remove idler retaining screw, slip idler from bearing and apply one drop of light oil. Great care must be taken to guard against oil creeping to surface of this idler.

Worm gear on right hand shaft, fiber gear and heart cam. Apply small amount of vaseline.

Motor. Apply one drop through ducts, front and rear, appearing at top of casing.

WARNING: Oil on any of the driving surfaces, such as the clutch hubs, the rear drive wheel, the front drive wheel, the neoprene idler, or capstan roller (5), capstan flange (10) or felt brake pads will cause serious slippage, resulting in varying wire speed. Oil creepage caused by centrifugal force or capillary action should be guarded against, and all driving surfaces kept clean.

LEVEL WIND ADJUSTMENT

In event of uneven level wind either in "forward" or "rewind" position, the recording head should first be checked. The head may have become bent with relation to the brass drive shaft. If it is not at right angles to this shaft from all positions, it may be straightened by light finger pressure.

If this fails to rectify the level wind trouble the spool shafts may have to be moved forward or backward. To move these shafts a single #8 Allan wrench is required to loosen the set screws in clutch hubs 23 and 24, figure 1.

When set screws have been loosened, ends of shafts may be tapped lightly for placement.

CAPSTAN FLANGE BRAKE ADJUSTMENT

When the WiRecorder is in STOP or REWIND position, the capstan flange 10 is pushed away from front drive puck 9, braking against arm 21 to stop rotation of the flange. This brake arm is adjustable by means of screws 22. IT MUST NOT contact the flange when the unit is moving the wire forward for recording or playback.

AUTOMATIC SHUT-OFF LEVERS

Immediately below the wire spools will be found trip levers 14 and 15. These are actuated by trigger wires in the spools themselves, released as the last layer of wire begins to unwind.

If the trigger wire from the spool fails to hit the lever the automatic shut-off will fail. These levers may be bent into proper position with ordinary pliers if care is taken to avoid fracturing the metal.

GLASS GUIDE ARM

Glass guide arm 4 is subject to some wear after many hours of operation, and should be rotated a few degrees whenever wire does not slide smoothly along its surface. The surface may be rotated by loosening the retaining screw on the end of the shaft. Avoid tightening this screw to the point where breakage of the quartz glass tube may occur.

It is advisable to clean the glass guide arm from time to time, removing lubricant deposited from the wire.

NEOPRENE IDLER

If lubricant from the wire collects on the neoprene idler 3, the idler may be removed and cleaned with soap and water. NEVER use carbon tetrachloride, gasoline, benzine or other types of cleaning compound on this roller, as such products may be injurious to the neoprene.

Watch for excessive wear on this idler, apparent from roughness of the surface. For perfect speed control of the wire the idler surface must be smooth, free from dirt or pock marks.

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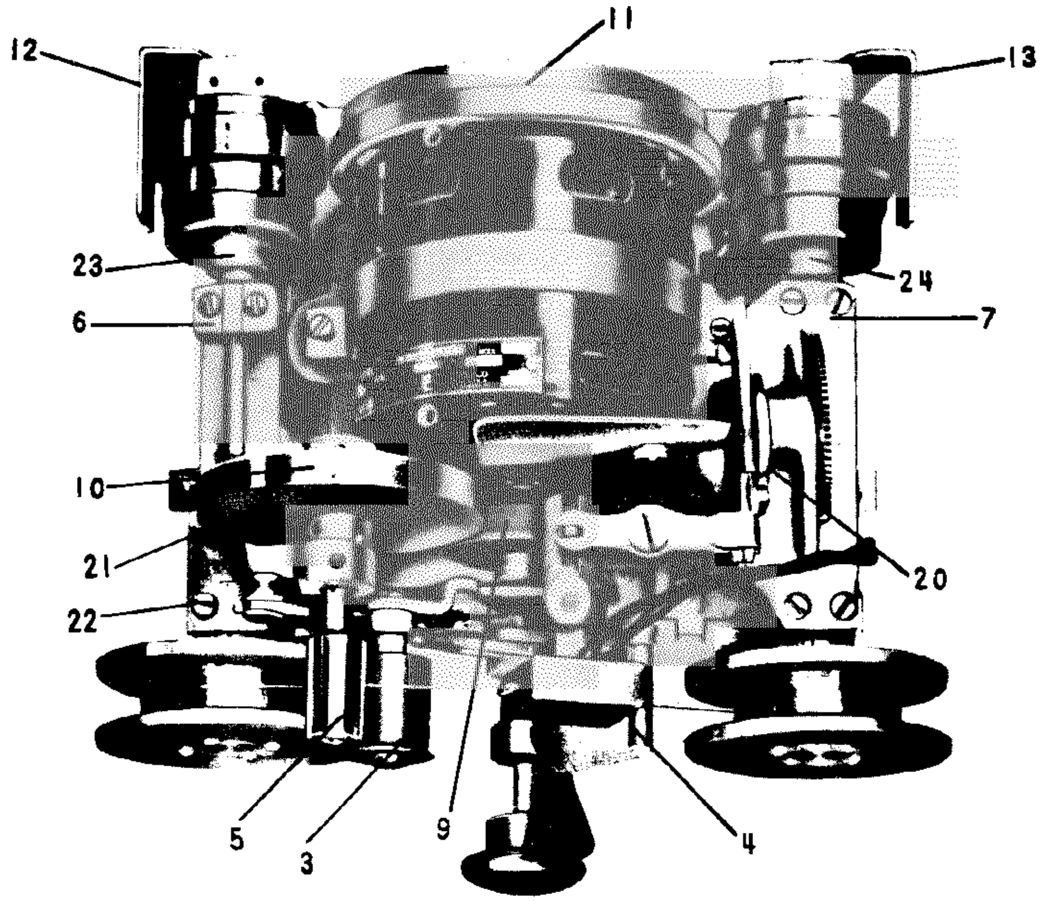

Fig. 1. TOP VIEW - MODEL A-1 WIRECORDER

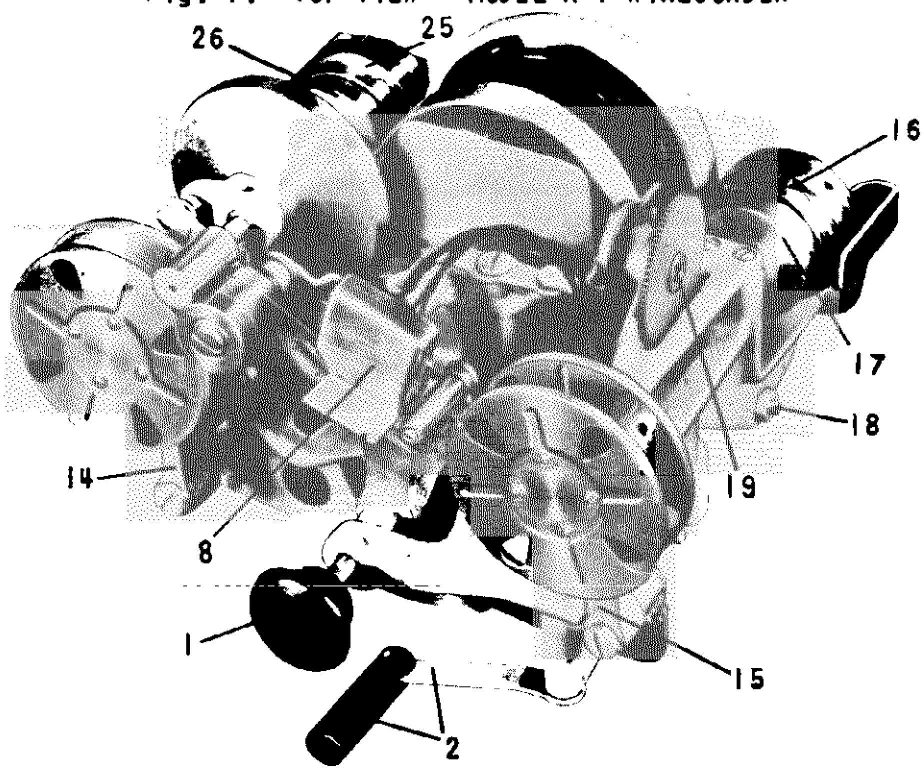

Fig. 2. FRONT VIEW - MODEL A-1 WIRECORDER

WIRECORDER CORP.

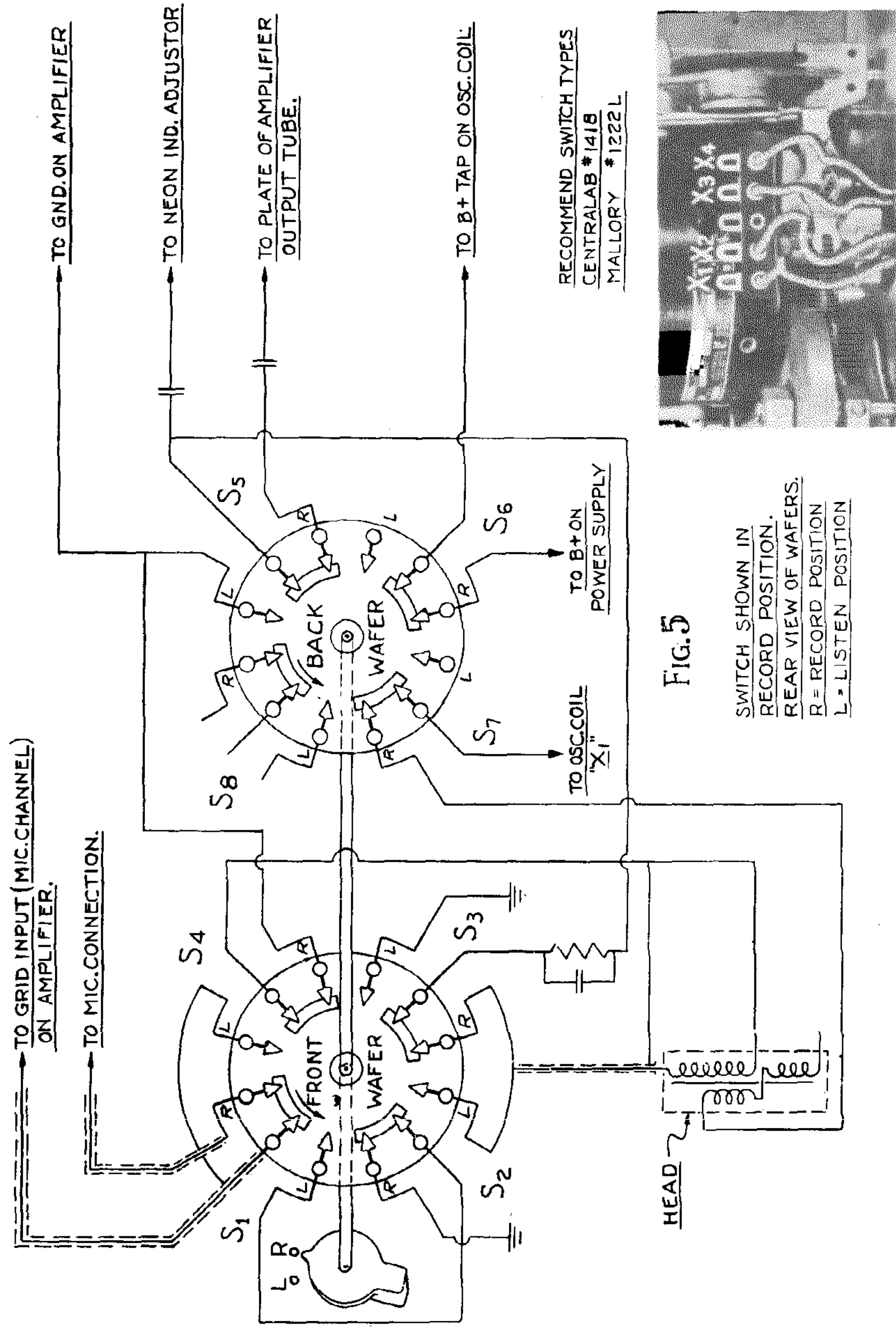

FIG. 5

Fig. 4

MODEL A-1

WIRECORDER CORP.

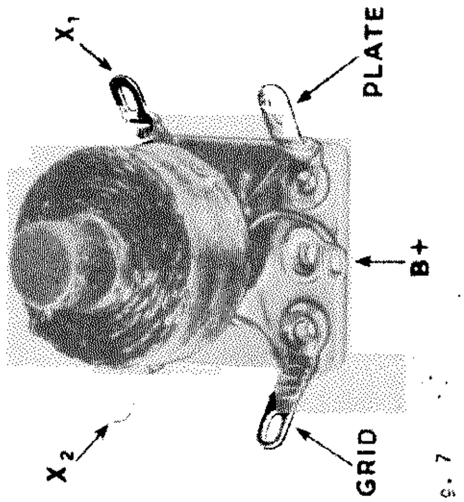

Fig. 7

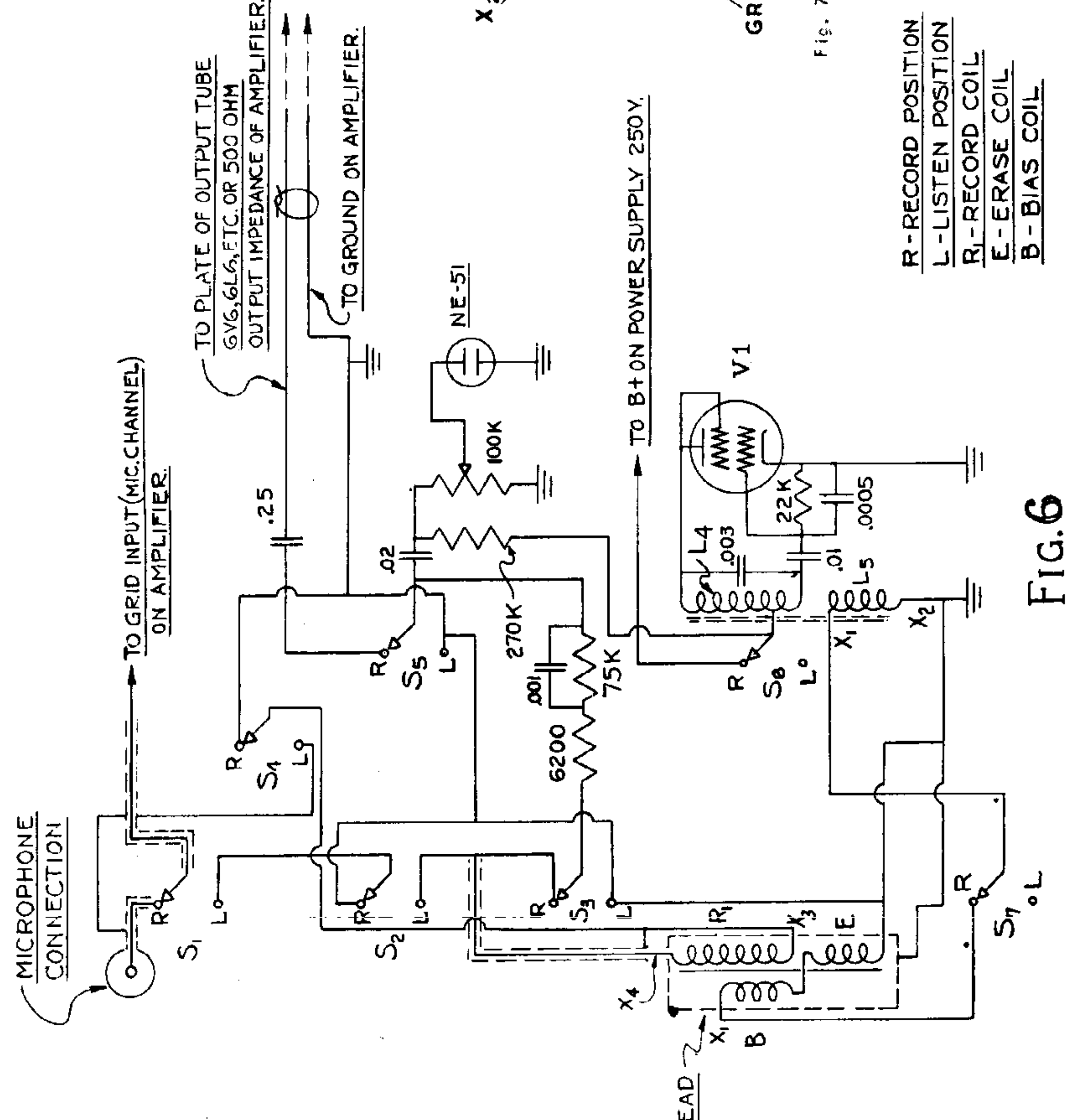

FIG. 6

WIRECORDER CORP.

GENERAL

The Model PA WiRecorder is a precision-built, professional type high fidelity magnetic recorder-reproducer unit for adaptation to any "public address" type amplifier.

The amplifier with which the Model PA WiRecorder is used should have an overall gain of not less than 100 db. Less than one watt of power is required for recording. Hence the power output of the amplifier is not important.

An advanced design in the wire recorder field, the Model PA is capable of continuous recording or playback for a period of 65 minutes, and spools may be changed at any time, without rewinding, in a matter of seconds.

It is EXTREMELY IMPORTANT that the owner familiarize himself with the operational instructions contained in this manual.

TO UNPACK

WARNING: The Model PA WiRecorder is shipped with special packing devices to insure safe delivery. The unit cannot be operated until these precautionary devices are detached from the mechanism.

First, remove the WiRecorder from the cabinet by removing the four chassis screws from the bottom, and the two panel screws from the upper left and upper right hand corners of the front panel. Now, by grasping the large WIRE CONTROL knob from the front, and pushing the chassis from the rear the unit will slide forward from the front of the cabinet.

Now, referring to Figure 3, a rear view of the chassis and WiRecorder shows the retaining wire 29, and the two separator blocks 27 and 31 all of which must be carefully removed. The wire should be severed with wire cutters, and withdrawn, and the two small blocks pulled out. Care should be taken in this operation to guard against forcing the two rear clutches against the left and right brake arms, and thus bending them.

Next the WIRE CONTROL knob must be removed, using the ALLAN WRENCH which will be found attached to the inside of the front cover of the cabinet. Reference to Figure 4 will show fiber collar 32 behind this control knob which must now be removed, and the WIRE CONTROL knob replaced securely on the shaft.

Screws 28 and 30 must now be removed, and the large washer under each screw discarded. The screws themselves should then be replaced.

The removal of the washers and the fiber collar permits the WiRecorder to float freely on the four shock mounts, dampening vibration.

Before replacing the unit in the cabinet it is advisable to actually operate the mechanism with the wire spools in place.

HANDLING AND APPLYING THE SPOOLS

One set of spools, containing some 7500 feet of .004" stainless steel recording wire sufficient for more than one hour of continuous recording or playback, is included with each Model PA WiRecorder, and will be found packed in an individual container.

Note that the recording wire is attached to both spools and will remain so except in event of mishandling or accidental wire breakage. An automatic trip trigger on the rear flange of both spools stops the mechanism before the wire leaves either spool.

To apply the spools to the two shafts, first lift the front guide wire extending below the recording head. This wire is hinged at the head and will swing upward with the application of slight pressure at the bottom of the wire.

Now place the full spool on the left shaft and the nearly empty spool on the right shaft, pushing both spools firmly against the locking springs until they snap into position.

KEEP WIRE STRETCHED TIGHTLY BETWEEN SPOOLS DURING THIS PROCEDURE. ALWAYS MAKE SURE WIRE IS STRETCHED TIGHTLY BETWEEN THE TWO SPOOLS BEFORE STARTING WIRECORDER EITHER IN FORWARD OR REWIND. Any slack should be removed manually by turning either spool counter-clockwise.

With the spools securely in place the hinged wire guide may now be swung downward, and snapped into place against the rear guide, with the recording wire held between them.

MECHANICAL OPERATION

Forward and reverse travel of the wire is controlled by the single large knob marked "Wire Control."

To start the wire moving forward (from left to right) for recording or playback, first make sure power switch is "on". Now turn wire control knob clockwise until it locks in position. Note that the wire has been lifted into the recording head by the neoprene pinch idler and by the guide arm to the right of the head, and the motor turned on.

To stop the motion of the wire, merely press the red button marked "Stop".

Now, to rewind, turn wire control knob counter-clockwise until it locks in position.

WARNING: In going from "forward" to "rewind" or vice versa or to stop wire motion, STOP button MUST be pushed before turning wire control knob to new position.

AUTOMATIC STOP

The specially designed WiRecorder spools include an automatic trip trigger which stops the wire before it leaves either spool, either in forward or rewind. Thus threading or handling of the wire is unnecessary at any time.

MODEL PA

WIRECORDER CORP.

BRAKE ACTION

With the WiRecorder removed from the cabinet, note the mechanical operation of the patented "Magneflo" clutches at the rear of each spool shaft.

If the adjustment of brake arms 12 and 13 (figure 1) has not been disturbed in the process of removing the special shipping devices, the following action will be noted:

When the wire is moving forward, for recording or playback, the entire clutch assembly and shaft 6 (figure 1) is swung against brake arm 12, stopping rotation of outer clutch hub 25 (figure 2.)

When the wire is rewinding the clutch assembly and shaft 7 (figure 1) is swung against brake arm 13, stopping rotation of outer clutch hub 16.

If these brakes are operating as described, the unit may be replaced in the cabinet and is ready for service. If slippage of the clutch hubs is taking place, reference to brake adjustment in the servicing section of this manual will indicate the remedy.

CONNECTIONS TO AMPLIFIER

Two simple connections to any standard public address type amplifier are all that is required. In addition to the power cord extending from the rear of the Model PA chassis, two other cables will be found. One, a shielded cable terminated with a female Amphenol connector, is to be connected to the high impedance microphone input of the amplifier. The other, a twisted pair, must be connected to the voice coil output of the amplifier at any impedance between 3.2 and 16 ohms. The black lead should be connected to the grounded side of the output on the amplifier.

The speaker itself is to be disconnected from the amplifier, and plugged into the phone jack at the rear of the Model PA chassis.

Likewise, a high impedance microphone for voice recording is to be connected to the Model PA chassis, using the Amphenol male connector provided.

A feed from a record turntable or radio may be connected in normal fashion through the "phono" channel of the amplifier itself.

RECORDING PROCEDURE

To make a wire recording on the Model PA, the following steps must be taken:

1. Turn selector switch at lower left hand corner of panel to "record" position.

2. Adjust volume control on public address amplifier until level indicator neon light flashes on peaks. NOTE: Best results will be obtained with a minimum of flash. Constant flashing indicates too much volume. Amplifier tone controls should be set at "flat" position, with no treble or bass boost, or attenuation.

3. Turn wire control clockwise to a locking position, thus starting wire forward. You are now recording.

TIME INDEX

The time scale across the top of the panel is calibrated in minutes. With a full spool on the left and the index set at zero, the time scale will indicate the length of each recording. As the wire is rewound, the indicator motion is reversed thus making it easy to return to any desired spot in a recording.

The indicator carriage is movable manually along the feed screw by twisting the carriage knob slightly to the right or left and sliding. This is of special advantage when changing spools.

PLAYBACK PROCEDURE

To play back a wire recording, the following steps must be taken:

1. Having completed the recording, the STOP button must be pushed. The wire must now be rewound to the start of the recording. Turn wire control knob counter clockwise to a locking position, and watch time indicator for rewind to proper spot in wire.

2. Push stop button.

3. Turn selector switch at lower left hand corner to "Listen".

4. Turn wire control knob clockwise to locking position, thus starting wire forward.

5. Adjust volume of playback with volume control on the public address amplifier. Any tone controls on the amplifier may also be adjusted to suit the listener's ear.

OPERATING SUGGESTIONS

Always make sure wire is taut between two spools before turning wire control knob. If wire is loose turn either spool counter-clockwise by hand to remove slack.

In going from "forward" to "rewind", or to stop unit, STOP button must be pushed before wire control knob is turned to new position.

When turning wire control knob clockwise into recording or playback position, too rapid a motion is not advisable. Smooth, even, turning pressure will assure positive action.

Always allow spools to come to a full stop before turning wire control to new position.

When new spools and wire are placed on your WiRecorder for the first time it is advisable to run the entire hour spool through a complete cycle (forward and rewind) to "phase" the wire for best level winding action.

WIRECORDER CORP.

SHELF LIFE OF WIRE RECORDINGS

Wire recordings made on the Model PA may be stored indefinitely without loss of magnetism in the wire. Or, wire recordings may be played back thousands of times without appreciable wear, loss in quality or change in background noise.

It is entirely practical to "edit" wire recordings just as one might edit home movie film, taking portions from one spool and adding to another. Empty spools are available for this purpose, and wire may be spliced at will simply by tying an ordinary square knot to secure the ends. DO NOT USE HEAT as this weakens the wire. Ends of the wire should be cut off as close to the knot as possible.

SERVICING

The following service information covers such adjustments and lubrication recommendations that may easily be taken care of by the owner of the Model PA WiRecorder.

In event of major repair or adjustments not covered in these pages it is advisable to return the unit to the factory.

LUBRICATION

Oilite bearings throughout the Model PA WiRecorder make frequent lubrication unnecessary and undesirable.

Oil wicks adjacent to these bearings may be lubricated every 100 hours, with a light machine oil. USE OIL SPARINGLY. In addition to the oil wicks readily visible from the top of the WiRecorder, the following points may be lubricated:

Shaft bearings behind spools. Remove spools and apply one drop of oil to each bearing.

Neoprene idler bearing. (3, Fig. 1). Remove idler retaining screw, slip idler from bearing and apply one drop of light oil. Great care must be taken to guard against oil creeping to surface of this idler.

Worm gear on right hand shaft, fiber gear and heart cam. Apply small amount of vaseline.

Motor. Apply one drop through ducts, front and rear, appearing at top of casing.

Time indicator feed screw and end bearings. Use vaseline.

WARNING: Oil on any of the driving surfaces, such as the clutch hubs, the rear drive wheel, the front drive wheel, the neoprene idler, or capstan roller (5), capstan flange (10) or felt brake pads will cause serious slippage, resulting in varying wire speed. Oil creepage caused by centrifugal force or capillary action should be guarded against, and all driving surfaces kept clean.

LEVEL WIND ADJUSTMENT

In event of uneven level wind either in "forward" or "rewind" position, the recording head should first be checked. The head may have become bent with relation to the brass drive shaft. If it is not at right angles to this shaft from all positions, it may be straightened by light finger pressure.

If this fails to rectify the level wind trouble the spool shafts may have to be moved forward or backward. To move these shafts a single #8 Allan wrench is required to loosen the set screws in clutch hubs 23 and 24, figure 1.

When set screws have been loosened, ends of shafts may be tapped lightly for placement.

BRAKE ADJUSTMENT

If the brake action as described on page 2 is not functioning properly, the following adjustments may be made:

With the wire moving forward (in record or playback position) note that the right hand clutch assembly 16, figure 2, remains in contact with rear drive wheel 11, while the left hand clutch assembly 25 is swung against felt-padded brake arm 12. In this position brake arm 12 should be adjusted by means of two adjustment screws on the rear of the base so that it exerts just enough pressure on clutch hub 25 to stop rotation and thus furnish the proper amount of drag to stop wire whip.

Now set the wire control in rewind position. Note that clutch assembly 25 is in contact with the rear drive-wheel, while right hand clutch assembly 16 is swung away, bearing against brake arm 13. In this position brake arm 13 should be adjusted to give just enough braking pressure to stop rotation.

IMPORTANT: Brake pressures should always be set at a minimum to stop rotation of the hub against which they are bearing.

CAPSTAN FLANGE BRAKE ADJUSTMENT

When the WiRecorder is in STOP or REWIND position, the capstan flange 10 is pushed away from front drive puck 9, braking against arm 21 to stop rotation of the flange. This brake arm is adjustable by means of screws 22. IT MUST NOT contact the flange when the unit is moving the wire forward for recording or playback.

AUTOMATIC SHUT-OFF LEVERS

Immediately below the wire spools will be found trip levers 14 and 15. These are actuated by trigger wires in the spools themselves, released as the last layer of wire begins to unwind.

If the trigger wire from the spool fails to hit the lever the automatic shut-off will fail. These levers may be bent into proper position with ordinary pliers if care is taken to avoid fracturing the metal.

GUIDE ARM

Guide arm 4, figure 1, has a specially treated smooth surface. It may show slight wear after many hours of use, causing the wire to slide across its surface irregularly. In this event the guide arm may be rotated a few degrees to expose a new surface to the wire.

CLEANING THE HEAD

Dirt, dust, and wire lubricant sometimes collect in a recording head, resulting in loss in high frequencies and level. If the accumulation becomes too severe actual jamming of the wire may take place.

To clean the head quickly and easily, lift the front wire guide and run a small piece of stout silk or linen thread through the wire groove, back and forth several times. Dipping the thread in a cleaning fluid such as carbon tetrachloride may prove helpful.

NEOPRENE IDLER

If lubricant from the wire collects on the neoprene idler 3, the idler may be removed and cleaned with soap and water.. NEVER use carbon tetrachloride, gasoline, benzine or other types of cleaning compound on this roller, as such products may be injurious to the neoprene.

Watch for excessive wear on this idler, apparent from roughness of the surface. For perfect speed control of the wire the idler surface must be smooth, free from dirt or pock marks.

CAPSTAN YOKE SPRING ADJUSTMENT

The yoke supporting the capstan (5, figure 1) and capstan flange (10, figure 1) pivots on a bearing in the base, moving against drive puck 9 when the wire is moving forward, and against brake 21 when the wire is rewinding, or when the WiRecorder is shut off.

An adjustable spring on the left hand side of the base casting immediately below brake arm 21 controls the amount of pressure between the capstan flange 10, and the drive puck 9.

If the wire has a tendency to "loop" between the recording head and the neoprene roller when the control knob is turned clockwise for recording or playback, this pressure may be too great.

On the other hand, if the pressure is too light the flange will slip on the drive puck thus failing to drive the wire at a constant speed of 2' per second, causing "wows".

This spring adjustment is critical, and has been properly made before shipment. It should not be tampered with unless adjustment is absolutely necessary.

VOLUME INDICATOR ADJUSTMENT

The volume indicator adjustment controlling the flash of the neon bulb is located on the right hand side of the chassis. Set at the factory, this adjustment is regulated to flash the neon bulb at peaks of .3 of a volt, measured across the voice coil of the recording head, with the 50L6 Oscillator tube removed from its socket. The voice coil leads are the two right hand leads on the terminal strip on top of the motor, looking down on the unit.

ERASE VOLTAGE

In event of incomplete erasure the voltage across the erase coil which is incorporated in the head itself should be measured. Erase coil leads are the two left hand leads on the terminal strip above the motor. This voltage should be between 3.5 and 4, measured with a vacuum tube voltmeter, and must be measured with the selector switch in record position. The frequency of the erase voltage is between 30 and 40 KC.

FREQUENCY RESPONSE

The frequency response of the Model PA WiRecorder, when used with an amplifier capable of delivering flat response from 100 to 10,000 cycles for recording, and delivering 10 db of bass boost for playback, will be flat ± 5 db from 100 to 6000 cycles.

The response curves off the wire with constant current input, equalizer curve and recommended amplifier playback curve are shown in Figure 6.

WARNING! Before turning the selector switch to "record" position, make sure microphone volume control on amplifier is at a low setting. Increase volume control slowly until level indicator on WiRecorder flashes occasionally. Failure to follow this procedure may result in damage to recording head and level indicator.

WIRECORDER CORP.

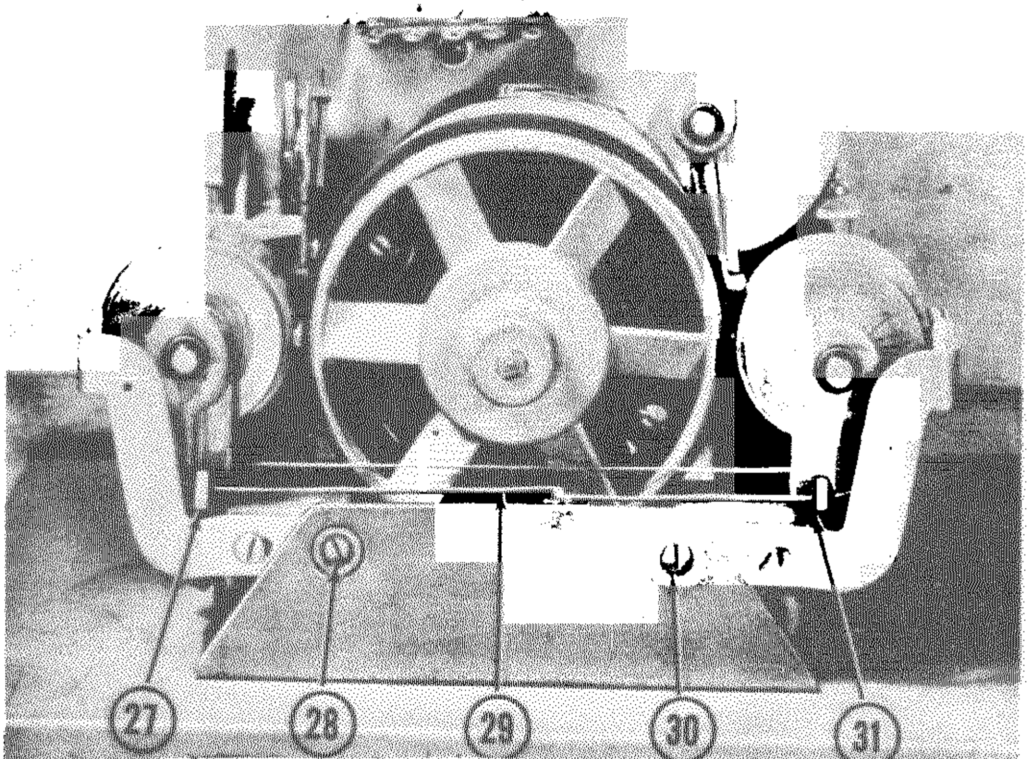

FIG. 3 - REAR VIEW, MODEL PA WIRECORDER

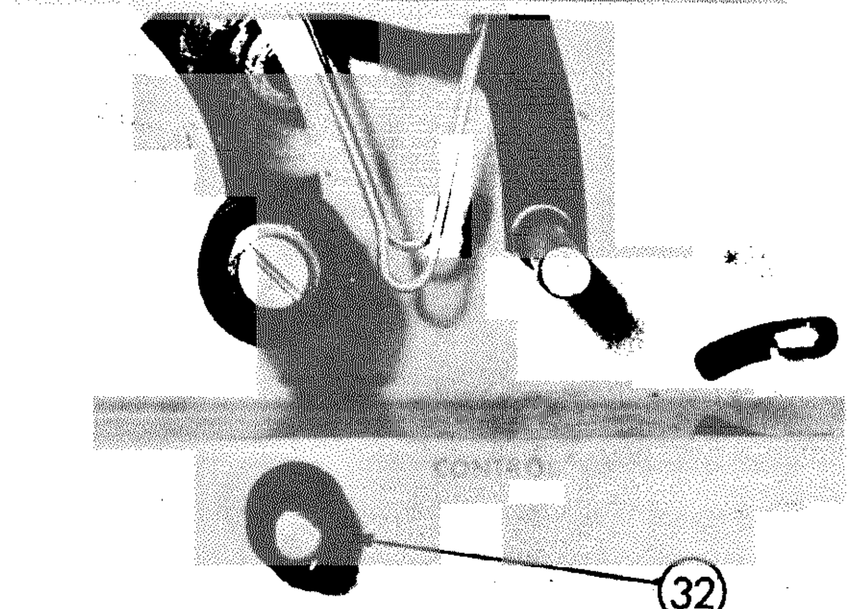

FIG. 4 - SHIPPING WASHER INSERT - FRONT PANEL

MODEL PA

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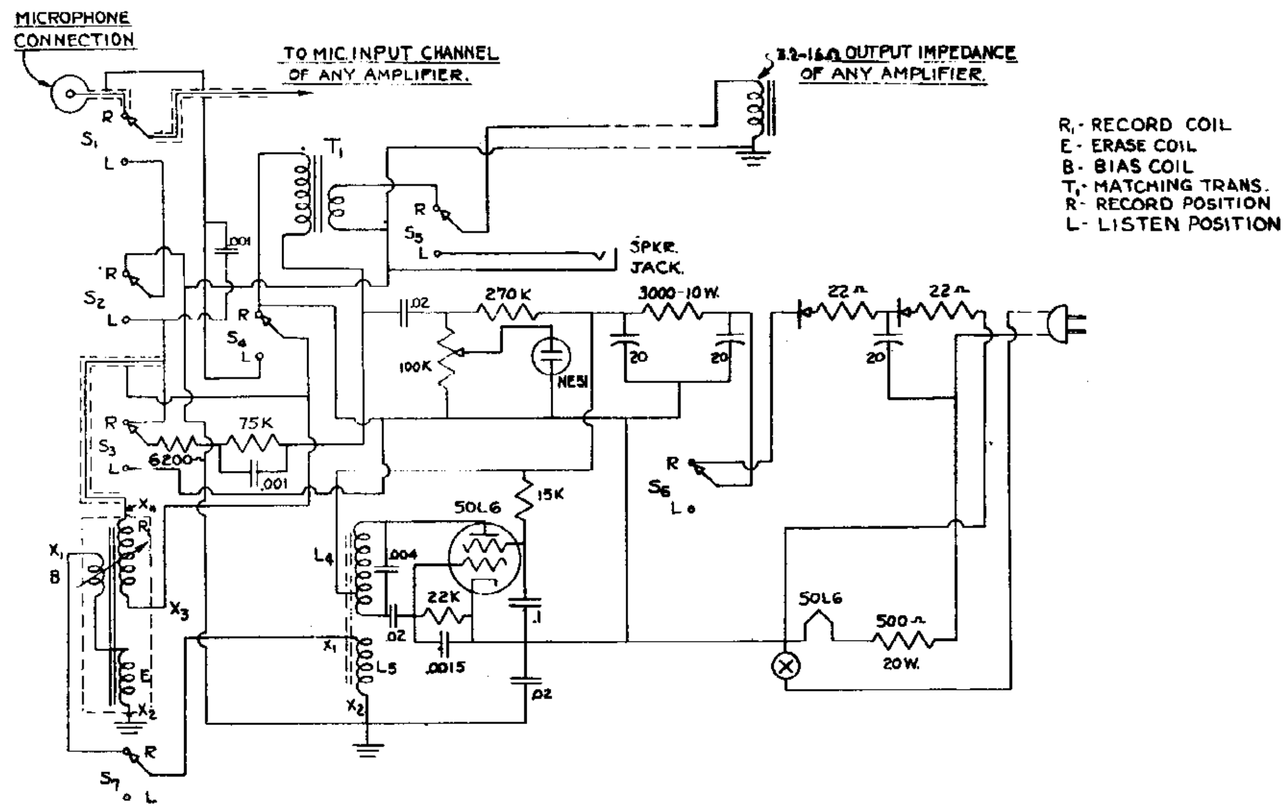

FIG. 5 - WIRING DIAGRAM, MODEL PA WIRECORDER