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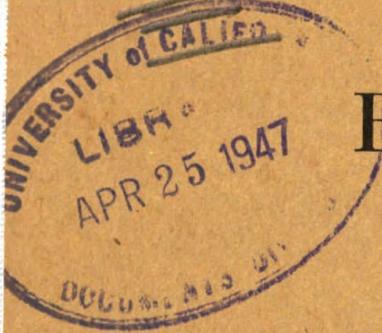
# TM 11-867

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

## RADIO RECEIVER

### BC-787-B



**RESTRICTED.** DISSEMINATION OF RESTRICTED MATTER. The information contained in restricted documents and the essential characteristics of restricted materiel may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 28, AR 380-5, 15 Mar 1944.)

WAR DEPARTMENT

21 JULY 1944



# RADIO RECEIVER

## BC-787-B



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WAR DEPARTMENT,  
WASHINGTON 25, D. C., 21 July 1944.

TM 11-867, Radio Receiver BC-787-B, is published for the information and guidance of all concerned.

[A. G. 300.7 (21 July 1944).]

BY ORDER OF THE SECRETARY OF WAR:

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11-237.

For explanation of symbols, see FM21-6.

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# DESTRUCTION NOTICE

**WHY** —To prevent the enemy from using or salvaging this equipment for his benefit.

**WHEN**—When ordered by your commander.

**HOW** —1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut — Use axes, handaxes, machetes.

3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives— Use firearms, grenades, TNT.

5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

## USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

**WHAT**—1. Smash — Meters, jacks, switches, transformers, coils, and tubes.

2. Cut — All wiring, resistors, and capacitors.

3. Burn — All technical literature.

4. Bend — Mountings, clamps, cabinet, and chassis.

5. Bury or scatter—All of the above items after destroying their usefulness.

# DESTROY EVERYTHING

TL 15224



Figure 1. Radio Receiver BC-787-B and Mounting FT-377-A, front view.

# RESTRICTED

## SECTION I DESCRIPTION

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### 1. GENERAL CHARACTERISTICS.

Radio Receiver BC-787-B (fig. 1) is a three-band superheterodyne receiver for mobile or fixed station use. It is designed for the reception of either amplitude-modulated (a-m) or frequency-modulated (f-m) signals in the frequency range of 27.8 to 143 megacycles. It is also possible to receive continuous-wave (c-w) signals by using the beat-frequency oscillator. If desired, stand-by operation of the receiver can be controlled at some remote point. The receiver may be operated with the internal power supply or external "A" and "B" batteries.

### 2. MAIN COMPONENTS, WEIGHTS, AND DIMENSIONS.

Quantity	Name of component	Dimensions (in.)			Weight (lb)
		Height	Width	Depth	
1	Mounting FT-377-A	4 $\frac{7}{8}$	21 $\frac{1}{4}$	14 $\frac{1}{2}$	12
1	Radio Receiver BC-787-B	9 $\frac{5}{16}$	21 $\frac{1}{4}$	14 $\frac{1}{2}$	78

### 3. DESCRIPTION OF MAIN COMPONENTS.

**a. Mounting FT-377-A.** The mounting reduces mechanical shock that would otherwise be carried to the receiver chassis. The mounting consists of two base rails to which four pedestals are bolted. Each pedestal terminates in a rubber grommet. The four rubber grommets support and cushion a metal tray. When in use the receiver is held firmly in the tray by four trunk clamps.

**b. Radio Receiver BC-787-B.** The receiver is housed in an all-metal ventilated cabinet. A hinged lid provides access to all tubes and adjustments with the exception of the three acorn tubes which are reached by removing the shield covering the r-f section. Side frames extending above the chassis provide protection and ease of handling when the receiver is removed from the cabinet for service. All external connections, with the exception of the phones, are made at the rear of the chassis. The following controls, all plainly marked, are located on the front panel: R.F. GAIN, ANTENNA, SELECTIVITY, TONE, PITCH CONTROL, A.M./F.M., A.F. GAIN, TUNING, and BAND SWITCH. In addition to the controls there are four toggle switches marked for the circuits in which they are used. A meter in the upper right-hand corner of the panel gives a visual indication of the signal strength.

### c. Tube Complement.

<i>Symbol</i>	<i>Signal Corps Type</i>	<i>Commercial Type</i>	<i>Function</i>
V1	VT-238	956	R-f amplifier
V2	VT-120	954	Converter
V3	VT-112	6AC7	1st i-f amplifier
V4	VT-176	6AB7	2d i-f amplifier
V5	VT-117	6SK7	3d i-f amplifier
V6	VT-90	6H6	A-m second detector and automatic noise limiter (A-N-L)
V7	VT-112	6AC7	F-m limiter
V8	VT-90	6H6	F-m discriminator
V9	VT-299	6SL7GT	Audio voltage amplifier
V10	VT-139	VR-150-30	Voltage regulator
V11	VT-107A	6V6GT	Audio power amplifier
V12	VT-107A	6V6GT	Audio power amplifier
V13	VT-224	5U4G	Full-wave rectifier
V14	VT-94	6J5	Beat-frequency oscillator
V15	VT-121	955	High-frequency oscillator

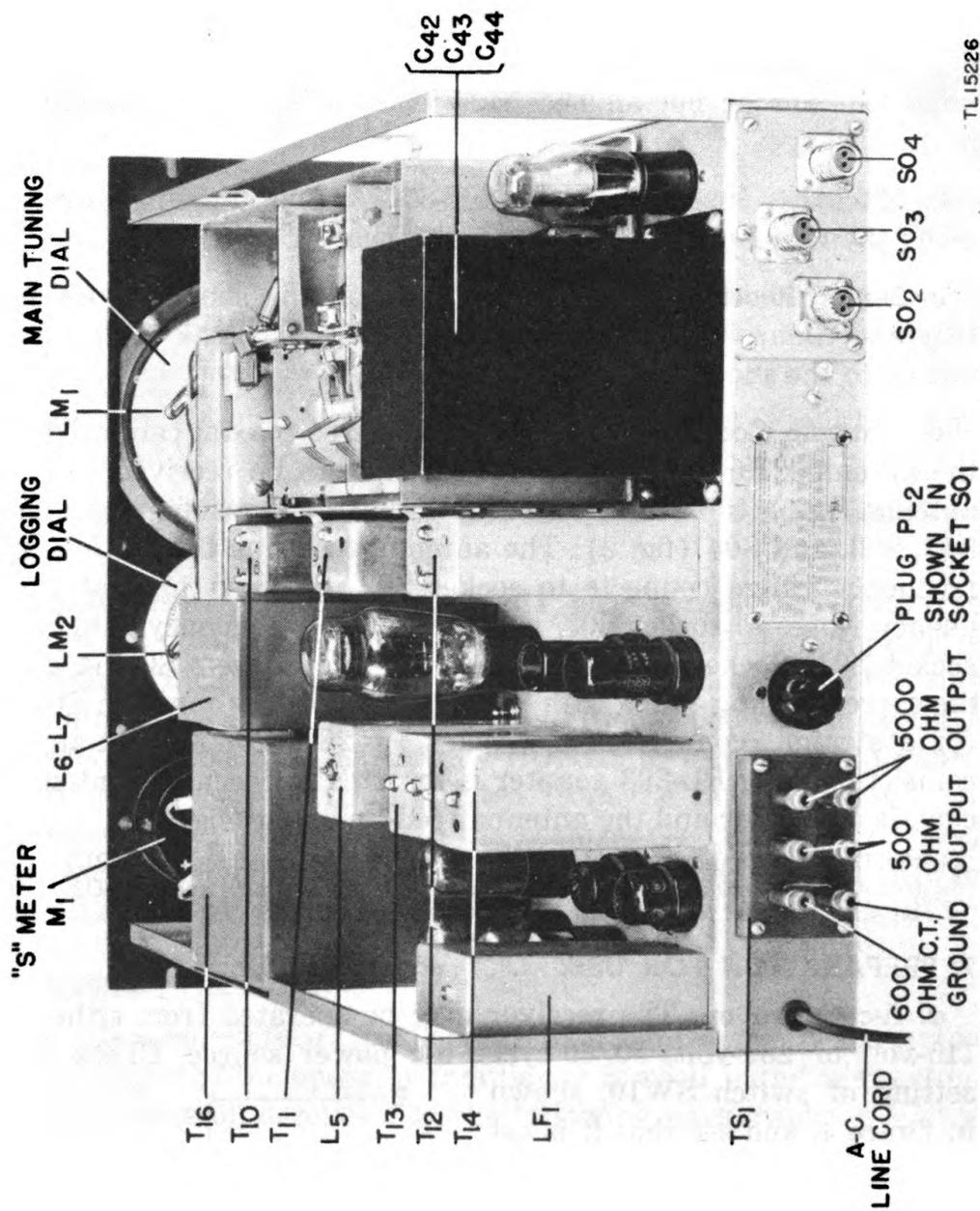
### 4. FREQUENCY COVERAGE.

Radio Receiver BC-787-B provides continuous coverage of frequencies from 27.8 to 143 megacycles in three bands—Band 1, 27.8 to 47 mc; Band 2, 46 to 82 mc; Band 3, 82 to 143 mc.

### 5. POWER REQUIREMENTS.

The receiver is designed to operate from either a 115-volt or 230-volt, 50/60 cycle source or from a 6-volt storage battery and 270-volts of "B" battery. A vibrator power supply may also be used if it meets with the above requirements.

A-c operation	D-c operation
Line voltage . . . . 115 volts, 230 volts Line current . . . 1.025 amp, 0.513 amp Power consumption . . . . . 110 watts	Filament voltage . . . . 6.3 volts Filament current . . . . 4.5 amp "B" voltage . . . . . 270 volts "B" current . . . . . 145 ma



TL15226

Figure 2. Radio Receiver BC-787-B, top rear view.

# SECTION II

## INSTALLATION AND OPERATION

### 6. INSTALLATION.

**a. Unpacking.** Carefully unpack and inspect the various components for any possible damage during shipment. Check to determine whether or not all necessary components were contained in the packages.

**b. Mounting.** Install Mounting FT-377-A. Bolt it down securely, using the four holes in each shock absorber.

**c. Setting Receiver.** Place the receiver in the shock mounting tray and clamp it firmly in place with the four trunk clamps attached to the shock mount.

**d. Antenna Connections.** Connect the three coaxial cables from the antennas for each of the three bands to be received to the antenna connections on the rear apron of the chassis, designated S02, S03, and S04 (fig. 2). The antenna feed line for the lowest frequency range connects to socket S02, the next highest frequency range to socket S03, and the highest frequency range to socket S04. Sockets S02, S03, and S04 are Sockets S0-264 and the corresponding plugs with which the feed lines must be fitted for a straight connection are Plugs PL-284. For a right-angle connection Plug PL-293 adapter is inserted between the antenna chassis connector and the antenna feed-line plug (fig. 2).

**NOTE:** Before applying power to the receiver by connecting plug PL1 to an a-c source or by connecting a d-c source through socket S01, be sure to read paragraphs 7 and 8.

### 7. PREPARATION FOR USE.

**a. A-c Operation.** The receiver may be operated from either a 115-volt or 230-volt, 50/60-cycle, a-c power source. Check the setting of switch SW10, shown in figure 4, and see that it is set for the line voltage to be used. If the set is to be operated from an a-c line, plug PL2 (furnished wired as shown in figure 22) must be in socket S01 located on the rear apron of the chassis. This is necessary to provide continuity in the power circuits (figs. 3 and 22).

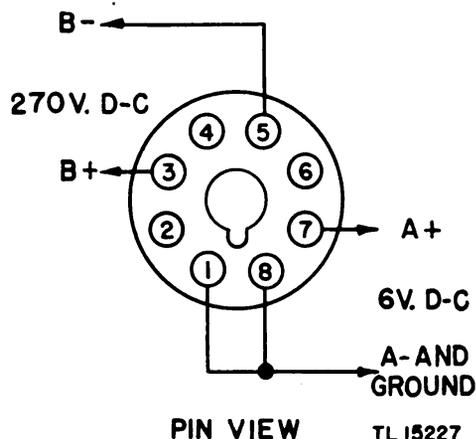


Figure 3. Radio Receiver BC-787-B, wiring diagram for d-c power plug.

**b. D-c Operation.** The receiver may be operated from external batteries delivering 6 volts at 4.5 amperes and 270-volts at 145 milliamperes. If such operation is desired, connect the batteries to the unwired duplicate of plug PL2 (furnished as an accessory) as shown in figure 3. This plug should then replace plug PL2 in socket S01.

**c. Remote Stand-by Operation.** Remote control of the stand-by switch in the receiver can be obtained by connecting leads to pins 3 and 4 of either plug PL2 or its substitute plug mentioned above, and running them to an external switch or relay. When this remote-control feature is used, set the REC./SEND switch (SW5) at REC. Figure 22 illustrates the circuit connections.

**d. Pilot Lamps.** Two Lamps LM-27 should be in sockets located behind the translucent calibrated dials. These can be reached by raising the receiver-cabinet lid.

**e. Fuse.** Check the fuse container, accessible from the front panel, and see that Fuse FU-27 is in operating condition.

**f. Headset.** Plug a headset into the jack marked PHONES on the front panel.

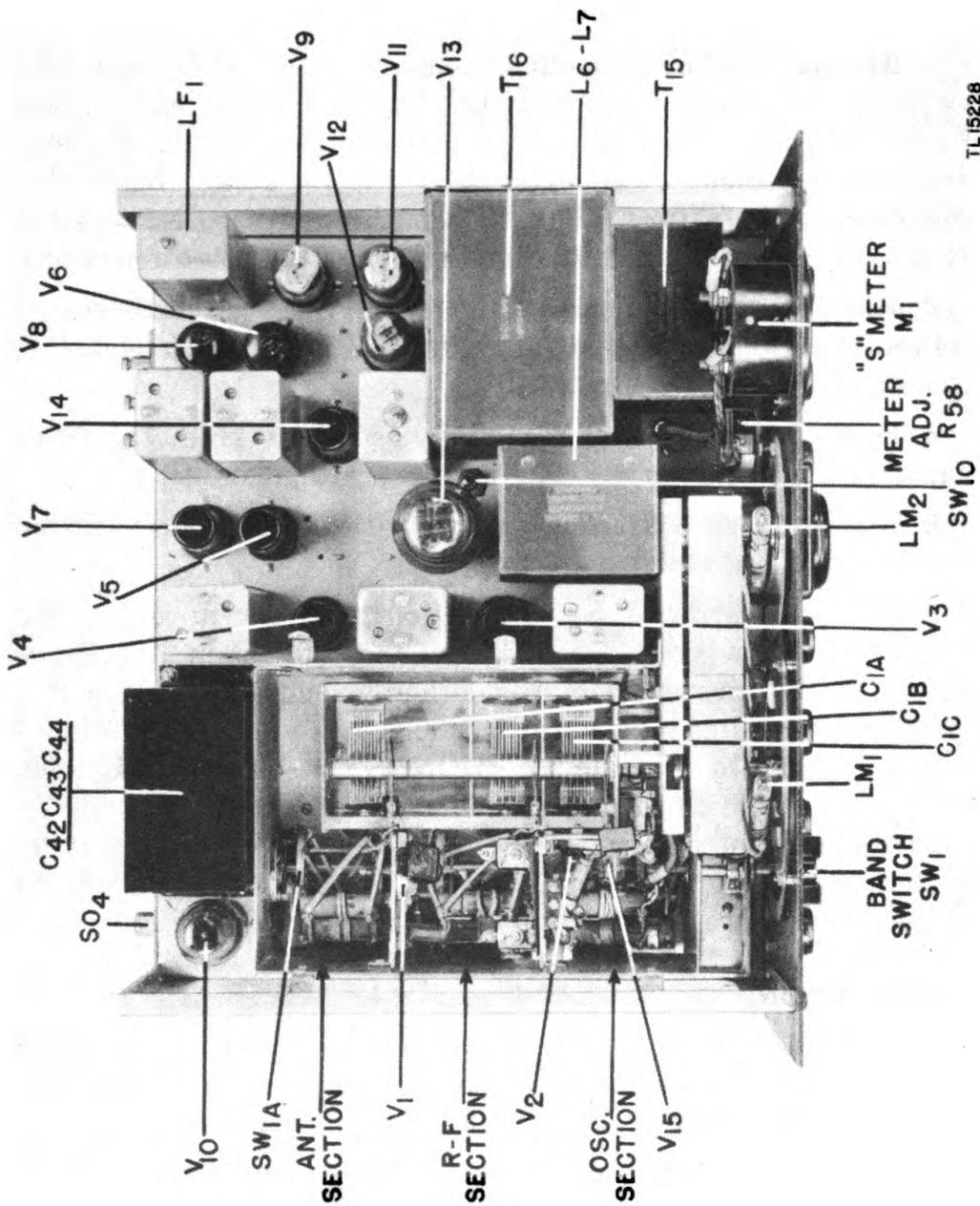
**g. Speaker.** Terminal board TS1 on the rear apron of the chassis has provisions for 500-ohm and 5,000-ohm impedance outputs which are used to feed either a loudspeaker or a line terminated in a like impedance. In addition, a 600-ohm impedance line is available by utilizing the PHONES jack on the front panel, both sides of which are insulated from the chassis ground. By connecting a jumper between the posts marked 600 C. T., located on terminal strip TS1, this 600-ohm line may be balanced to ground. See figure 2 for location and wiring.

## 8. OPERATION.

**a. General.** Before actual operation of the receiver is attempted it is suggested the operator familiarize himself with the function of each control, described in the following paragraphs:

(1) **R.F. GAIN.** The R.F. GAIN (radio-frequency gain) controls the sensitivity of the receiver by varying the cathode voltage on the first and second intermediate-frequency amplifier tubes V3 and V4. Ganged to this control is switch SW3 which connects the "S" meter into the circuit when the control is rotated completely to the right.

(2) **BAND SWITCH.** The BAND SWITCH is used to select the desired band, covering the frequencies shown on the main tuning dial.



TL15228

Figure 4. Radio Receiver BC-787-B, top view, r-f shield cover removed.

(3) **A.V.C.** The A.V.C. (automatic-volume control) switch activates a circuit which controls the sensitivity of the receiver. This action provides a more nearly uniform audio output level to the speaker or headset. The switch should be ON whenever receiving amplitude-modulated phone signals and OFF when receiving c-w signals.

(4) **ANTENNA.** The ANTENNA dial controls capacitor C2 which is used to compensate for misalignment of antenna transformers T1, T2, and T3 due to antenna impedance variations. Once set for a given antenna, its calibration will hold for a wide range of frequencies. Since this capacitor acts as a trimmer for capacitor C1A, its use will have a slight detuning effect on the high-frequency end of Band 3 and will have to be "touched-up" to retune the desired signal.

(5) **REC./SEND.** The REC./SEND switch is used to silence the receiver for short periods of time. It connects the high voltage to the receiver circuits when set at REC. It is set at REC. whenever the remote stand-by connection is used. Refer to paragraph 7c for wiring details of the remote stand-by feature.

(6) **SELECTIVITY.** The SELECTIVITY switch turns the receiver on and off when operating from an a-c power source and controls the band width of the intermediate-frequency amplifier stages.

(7) **TONE.** The TONE switch controls a feed-back circuit in the audio amplifier stages which allows the audio fidelity to be modified from bass boost through high fidelity to high-frequency cut-off.

(8) **A.N.L.** The A.N.L. switch activates a circuit which will increase the intelligibility of the received signal when a high noise level distorts the signal. The circuit clips the noise peaks in excess of the normal signal level. The switch should be left at OFF when the receiving conditions are normal.

(9) **TUNING.** The TUNING wheel sets the capacitance of capacitor C1 which tunes the receiver to the desired frequency. The frequency of reception is read directly from the main tuning dial. The scale on the logging dial is used in conjunction with the outermost scale on the main tuning dial.

(10) **PHONES.** The PHONES jack is connected to the 600-ohm secondary winding of the output transformer and is insulated from the chassis. It can be used to feed a headset or a 600-ohm line. Refer to paragraph 7g for details on other output facilities.

(11) **METER ADJ.** The METER ADJ. control is used to set the "S" meter to its "0" signal position when the receiver is set for amplitude-modulation reception.

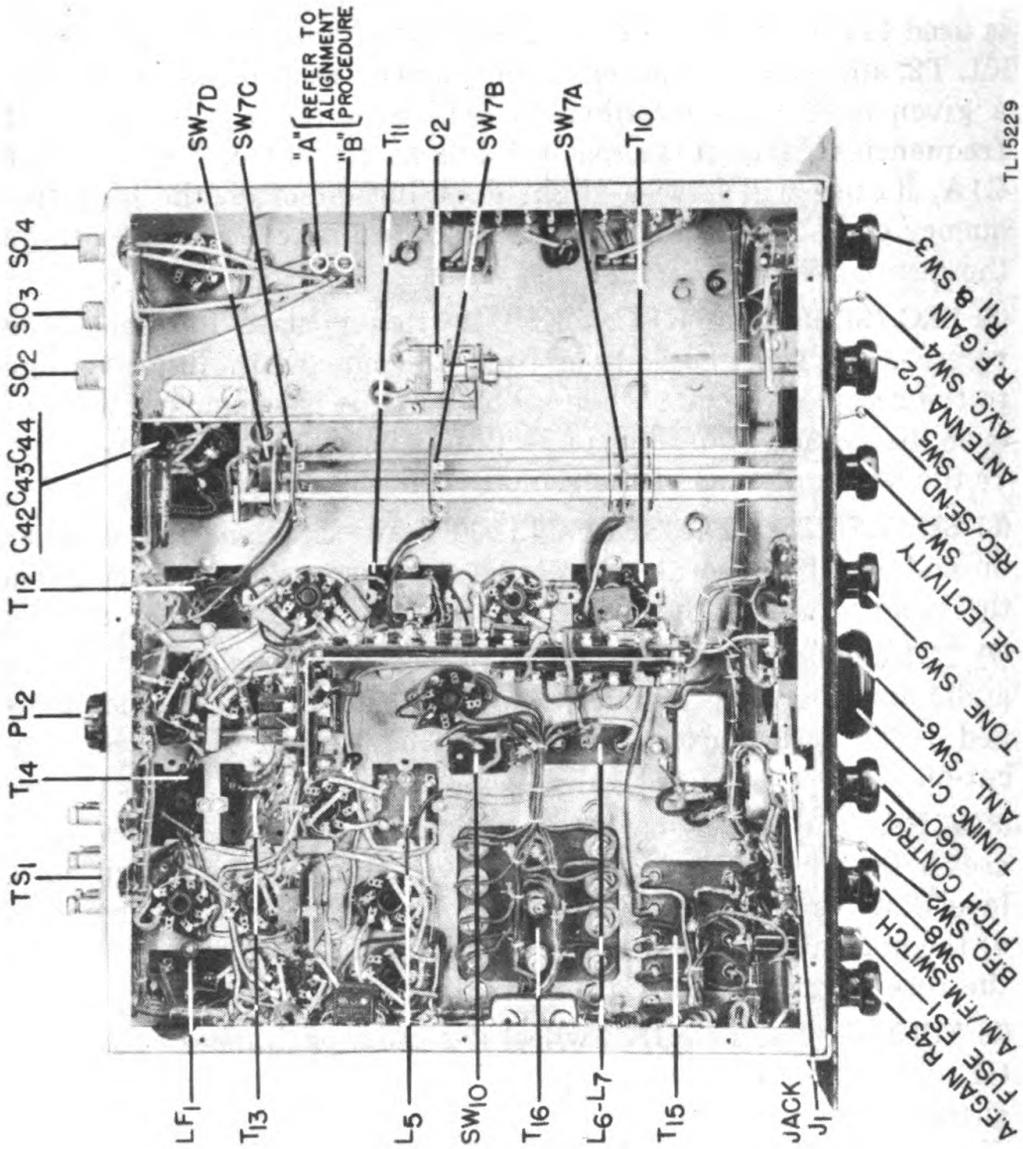


Figure 5. Radio Receiver BC-787-B, bottom view of chassis.

(12) **PITCH CONTROL.** The PITCH CONTROL knob varies the pitch of the c-w signal.

(13) **B.F.O.** The B.F.O. switch turns on the beat-frequency oscillator circuit, used to produce the beat note for the reception of c-w signals.

(14) **A.M./F.M.** The A.M./F.M. switch connects the output of either the a-m detector or the f-m discriminator to the audio amplifier and switches the tuning meter from one circuit to the other.

(15) **"S" METER.** This "S" METER or tuning meter, indicates the carrier strength of the received signal when the receiver is set for a-m operation. To put the meter in operation, turn the R.F. GAIN control to the extreme right until the switch (SW3) snaps on. The meter is not used when receiving c-w signals. When the receiver is set for f-m operation, the tuning meter is used to indicate resonance with the carrier. As the receiver is tuned through an f-m carrier the meter pointer will first deflect to one side of "0", return to "0," and deflect an equal distance on the opposite side of "0" and return to "0". The zero center position in the middle of the swing represents the correct setting of the receiver tuning dial and indicates resonance.

(16) **FUSE HOLDER.** The FUSE HOLDER contains a 3-ampere 250-volt fuse which protects the receiver against accidental overloads.

(17) **A.F. GAIN.** The A.F. GAIN controls the audio output level of the receiver by varying the signal level to the grid of the first audio-amplifier tube (V9).

**b. Calibration and Logging.** The three frequency ranges shown on the main tuning dial are calibrated directly in megacycles. The fourth, or outside scale on the calibrated dial, is used for logging purposes. The logging scale runs from 1 to 23. Each of the 23 divisions is further divided into 100 parts by the vernier dial scale, located just above the TUNING wheel. The vernier dial makes one revolution as the calibrated dial moves one division along the logging scale. Hence, the log reading will be the calibrated dial log reading followed by a decimal point and the vernier dial reading.

**c. A-m Signal Reception.** To receive amplitude-modulated signals set the front panel controls as follows:

- SELECTIVITY switch—A.C. OFF when the set is not in use.  
Set at SHARP for reception of phone signals.
- A.M./F.M. switch —Set at A.M.
- BAND SWITCH —Set to band covering desired frequency.
- A.V.C. switch —Set at ON.
- REC./SEND switch —Set at REC. Set in SEND position to disable the receiver for short periods.
- B.F.O. switch —Set at OFF.
- PITCH CONTROL —Not used.
- TUNING wheel —Set dial to frequency of desired signal adjust for maximum tuning meter reading (subpar. *a* (15) above).
- R.F. GAIN control —Turn to right until tuning meter switch snaps on.
- ANTENNA trimmer —Adjust for maximum tuning meter reading.
- A.F. GAIN control —Adjust for desired signal level at headset or speaker.
- TONE switch —Set at HIGH FID. or BASS BOOST when signal to noise ratio is high or at NORMAL or LOW when signal to noise ratio is low.
- A.N.L. switch —Set at OFF unless background noise is excessive.

**d. F-m Signal Reception.** To receive frequency-modulated signals set the front panel controls as follows:

- SELECTIVITY switch—A.C. OFF when set is not in use.  
Set at BROAD for reception of phone signals.
- A.M./F.M. switch —Set at FM.
- BAND SWITCH —Set at band covering desired frequency.
- A.V.C. switch —Not used.
- REC./SEND switch —Set at REC. Set in SEND position to disable the receiver for short periods.

B.F.O. switch	—Set at OFF.
PITCH CONTROL	—Not used.
TUNING wheel	—Set dial to frequency of desired signal adjust for center “0” position of tuning meter (subpar. <i>a</i> (15) above).
R.F. GAIN control	—Turn to right until tuning meter switch snaps on.
ANTENNA trimmer	—Adjust for maximum signal strength.
A.F. GAIN control	—Adjust for desired signal level at headset or speaker.
TONE switch	—Set at BASS BOOST or HIGH FID.
A.N.L. switch	—Set at OFF.

**e. C-w Reception.** To receive continuous-wave (c-w) signals set the front panel controls as follows:

SELECTIVITY switch	—A.C. OFF when the set is not in use. Set at SHARP for c-w reception.
A.M./F.M. switch	—Set at A.M.
BAND SWITCH	—Set to band covering desired frequency.
A.V.C. switch	—Set at OFF.
REC./SEND switch	—Set at REC. Set in SEND position when disabling receiver for short periods of time.
B.F.O. switch	—Set at ON.
PITCH CONTROL	—Adjust to produce approximately a 1,000-cycle code signal.
TUNING wheel	—Set dial to frequency of signal. Tune for maximum signal level at headset or speaker.
R.F. GAIN control	—Turn up as high as the signal strength of the received signal will allow.
ANTENNA trimmer	—Adjust for maximum signal level at headset or speaker.
A.F. GAIN control	—Adjust for desired signal level at headset or speaker.
TONE switch	—Set at LOW.

# SECTION III

## FUNCTIONING OF PARTS

### 9. GENERAL.

**a. A-m Signal Reception.** When receiving a-m signals the circuit consists basically of a stage of radio-frequency amplification, a converter stage, a high-frequency oscillator, three stages of intermediate-frequency amplification, second detector, audio-frequency voltage amplifier, push-pull audio-frequency power amplifier, signal-level indicator, automatic-volume control circuit, and automatic noise-limiter circuit.

**b. F-m Signal Reception.** When receiving f-m signals the circuit consists basically of a stage of tuned radio-frequency amplification, a converter stage, a high-frequency oscillator, two stages of intermediate amplification, limiter, discriminator, tuning indicator, audio-frequency voltage amplifier, and a push-pull audio-frequency power amplifier. The block diagram in figure 6 illustrates the above circuit arrangements.

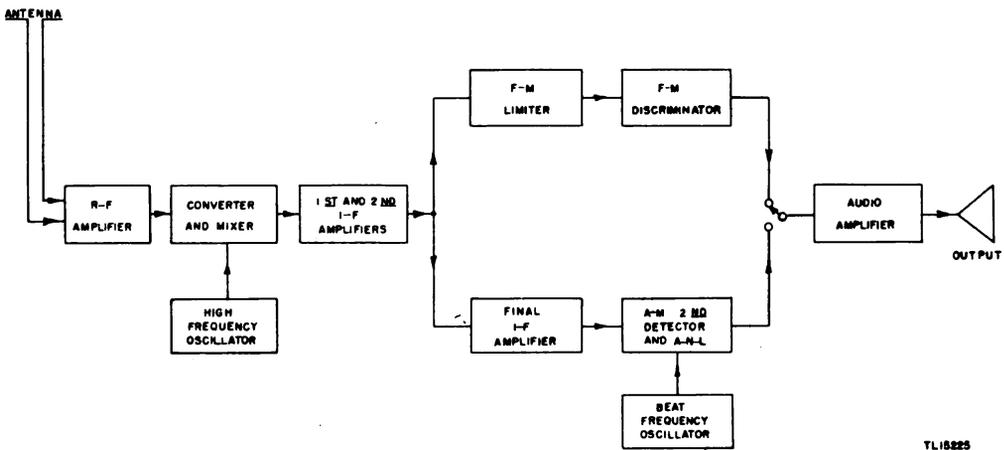


Figure 6. Radio Receiver BC-787-B, block diagram.

**c. R-f Amplifier (fig. 7).** Since the electrical functioning of Bands 1, 2, and 3 are essentially the same, this discussion will describe the circuits with the **BAND SWITCH** at band 3 position. Referring to figure 7, the r-f amplifier employs a type 956 acorn remote cut-off pentode tube. Signals present at the antenna are fed to the primary of transformer T3 through a concentric line. The secondary is tuned by ganged tuning capacitor C1A and trimmer capacitor C2. R-f signals selected by the parallel resonant circuit

are applied to the grid of tube V1 and appear in greater amplitude across the primary of transformer T6. Resistor R26 prevents parasitic or unwanted oscillations and tends to stabilize the amplifier. Cathode resistor R1 bypassed by capacitor C4 provides self-bias. Screen voltage is supplied through resistor R2, which in conjunction with capacitor C5, forms a decoupling network. Resistors R3 and R4, in conjunction with capacitors C6 and C78, comprise the plate load decoupling network. Capacitor C7 provides a small amount of capacitive coupling to improve response at the high frequency end of the band, thus equalizing the r-f signal amplitude over the tunable frequency range.

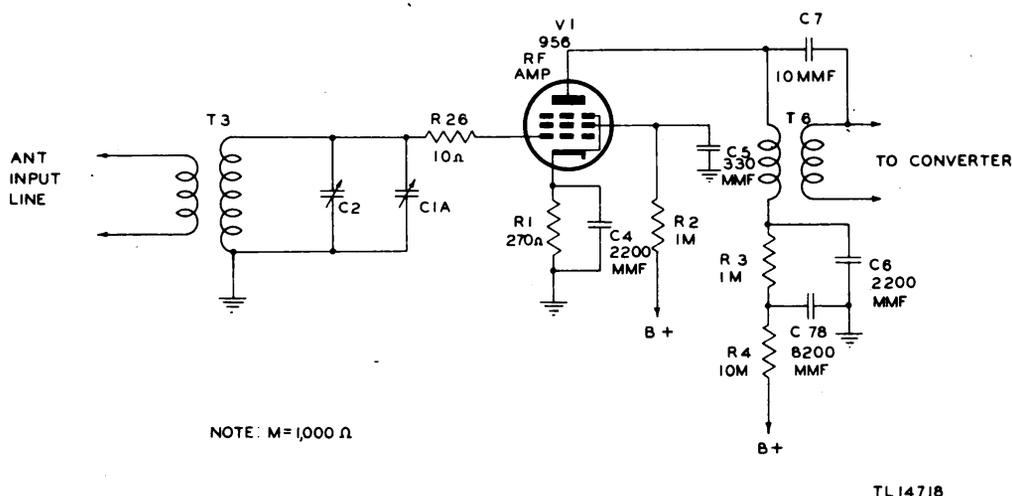


Figure 7. Radio Receiver BC-787-B, r-f amplifier schematic.

**d. Converter and Mixer (fig. 8).** The converter-mixer stage utilizes a type 954 acorn pentode tube which, in conjunction with its associated circuit components and the r-f oscillator, converts the incoming signal to an i-f frequency of 5.25 megacycles. The r-f stage output is coupled to the mixer input through transformer T6 and coupling capacitor C7. Tuning capacitor C1B, in conjunction with trimmer capacitor C65, resonates the grid input circuit. Cathode resistor R5 provides self bias. The r-f oscillator signal is applied to the cathode through capacitor C9. The incoming signal applied to the grid of tube V2 and the r-f oscillator output applied to the cathode heterodyne within the tube, producing a third signal at the i-f frequency. This third signal appears across the i-f input transformer T10. Capacitor C68 resonates the primary of transformer T10. Series plate resistor R70 prevents parasitic oscillations. Capacitor C62, in conjunction

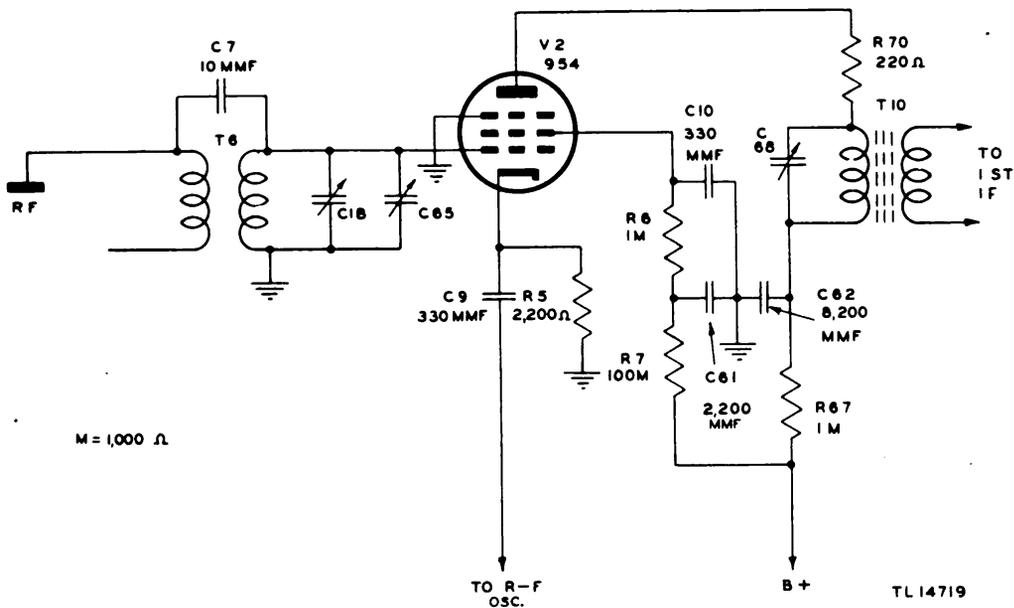


Figure 8. Radio Receiver BC-787-B, converter and mixer schematic.

with resistor R67, forms the plate load decoupling network. Capacitors C10 and C61 and resistor R6 form the screen decoupling network. Dropping resistor R7 supplies the proper screen potential. The converter-mixer output is applied to the i-f amplifier input through i-f amplifier input transformer T10.

**e. R-f Oscillator (fig. 9).** The r-f oscillator generates an r-f signal 5.25 megacycles away from the incoming signal. On Band 1 this frequency is 5.25 megacycles higher than the received signal, and, on Bands 2 and 3, 5.25 megacycles lower than the incoming signal. The oscillator utilizes a type 955 acorn triode in a tuned plate, untuned grid circuit. Resistor R63, in conjunction with r-f choke L1, resistor R62 and capacitor C55, forms the plate load decoupling network. When plate voltage is applied, the grid and cathode are at the same potential and plate current increases, resulting in a feedback voltage through blocking capacitor C56 and coil assembly T9. As oscillations build up, the grid is driven positive and the potential developed across grid resistor R64 charges grid capacitor C57. During negative half-cycles, capacitor C57 tends to discharge through resistor R64. Capacitor C57 acquires an average negative charge on the grid side providing bias. As the triode is alternately driven to saturation and cut-off, oscillations are produced in the tuned circuit at a frequency determined by transformer T9 and tuning capacitor C1C. Resistor R66 limits the amplitude of oscillations and thus limits grid current. The r-f voltage induced across the lower coil of assembly T9 is applied to the cathode of converter-mixer tube V2 through capacitor C9.

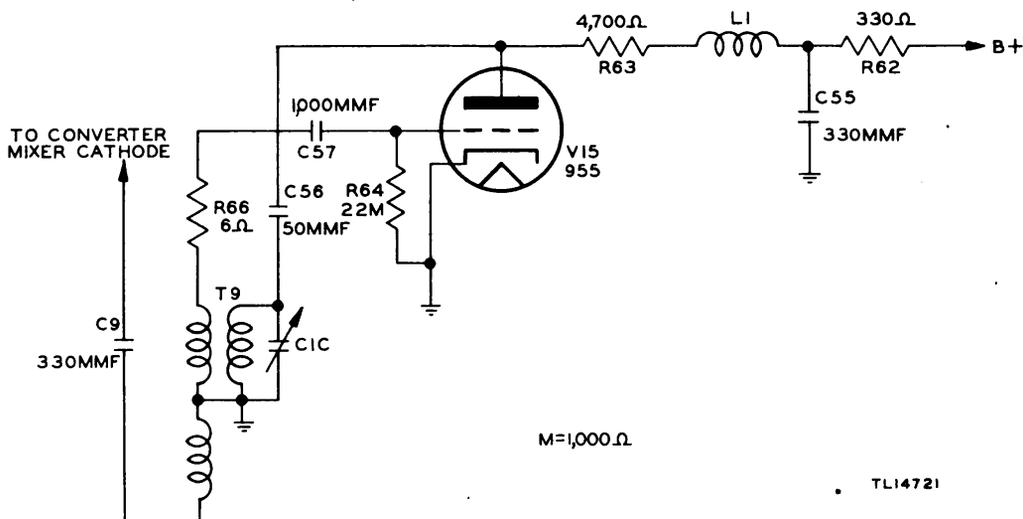
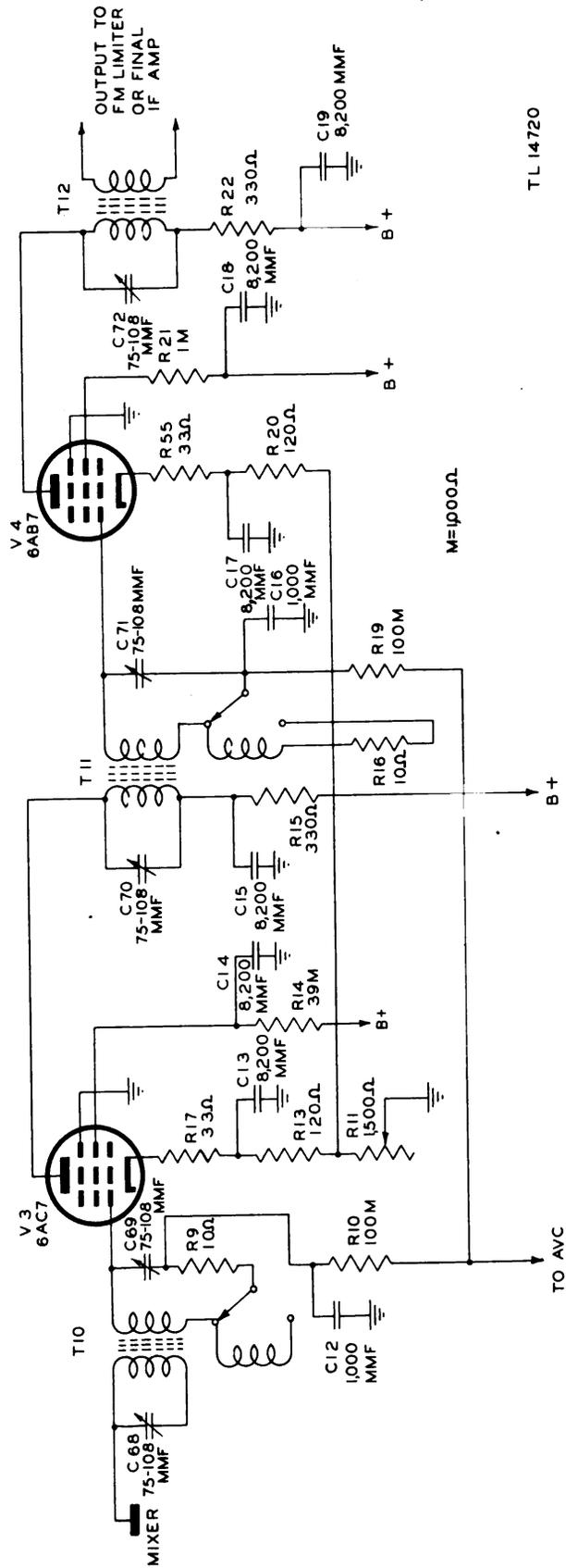


Figure 9. Radio Receiver BC-787-B, high frequency oscillator schematic.

**f. First and Second I-f Amplifiers (fig. 10).** The i-f amplifiers select the 5.25-megacycle mixer output signal and increase its amplitude. The first i-f stage employs a type 6AC7 sharp cut-off r-f pentode. The mixer stage i-f component appearing across the secondary of transformer T10, resonated by capacitor C69, is applied to the input of tube V3, and appears in greater amplitude across the primary of transformer T11. Capacitor C70 resonates the primary of transformer T11. Capacitor C15, in conjunction with resistor R15, forms the plate load decoupling network. Self bias is provided by resistors R17, R13, and r-f gain control R11. Resistors R13 and R11 are bypassed by capacitor C13. Since R17 is unbypassed, a slight amount of degeneration is introduced. Resistors R17 and R13 also limit the minimum bias when r-f gain control R11 is turned to a maximum clockwise position (resistance removed from circuit). Resistor R9, connected in series with the secondary of input transformer T10, extends the band width slightly by introducing a small amount of resistance in series with the resonant circuit. When the selectivity switch is positioned to include the inductance at the lower end of T10, the band-pass characteristics of T10 are further broadened to facilitate high fidelity f-m reception. Resistor R10 and capacitor C12 serve as the a-v-c decoupling network. Screen dropping resistor R14 is bypassed by capacitor C14. The output of the first i-f amplifier V3 is applied to the second i-f amplifier stage, which employs a type 6AB7 pentode tube. Since the circuit components of both i-f stages are nearly the same, the circuit discussion of the first i-f stage is applicable to the second. The i-f signal component appearing across transformer T12 is applied to the f-m limiter stage in the f-m channel and also to the final i-f amplifier in the a-m channel.



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Figure 10. Radio Receiver BC-787-B, 1st and 2nd i-f amplifier schematic.

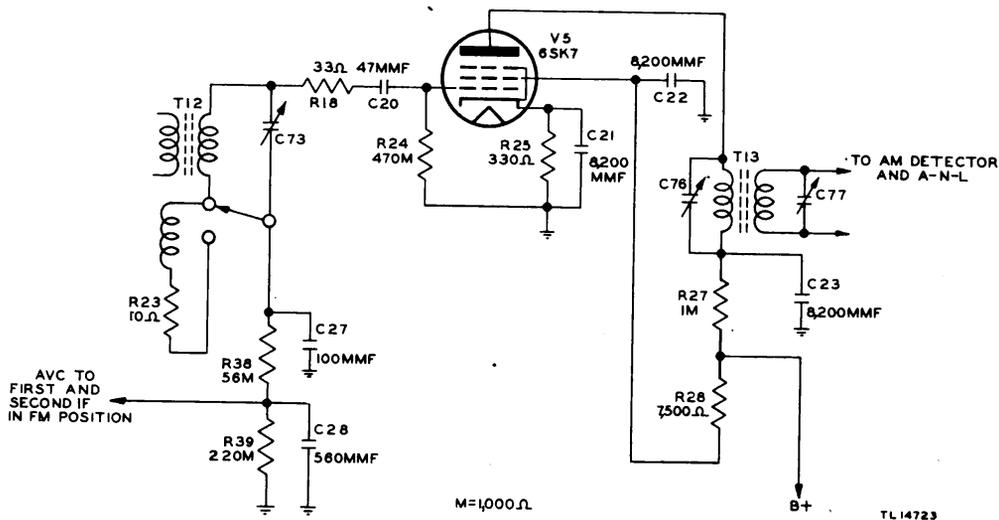


Figure 11. Radio Receiver BC-787-B, final i-f amplifier schematic.

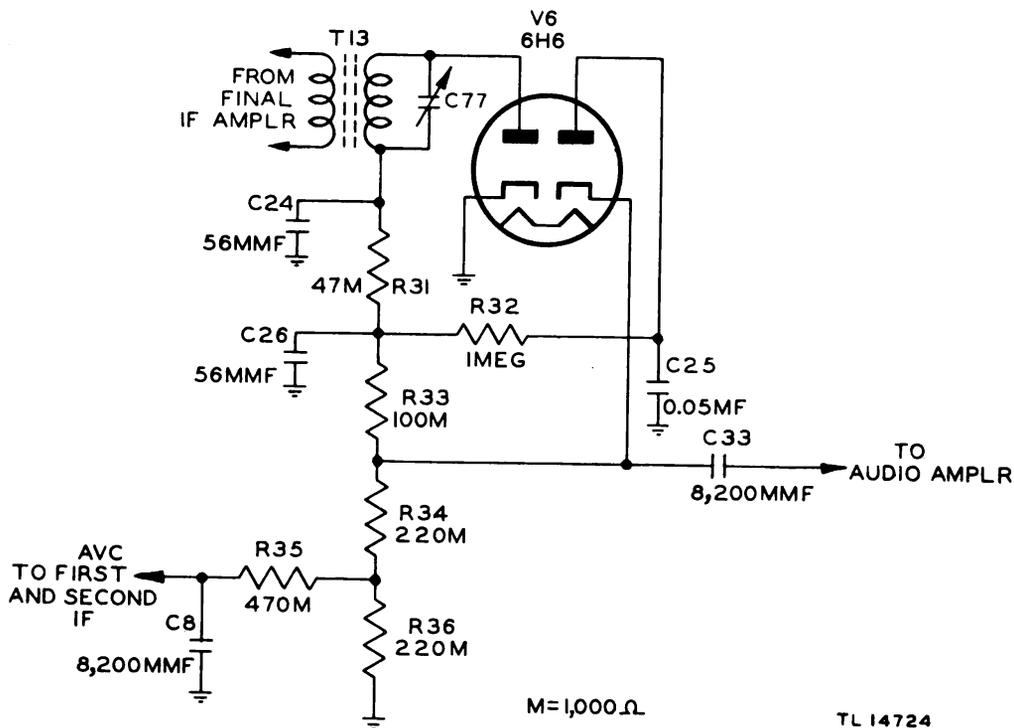
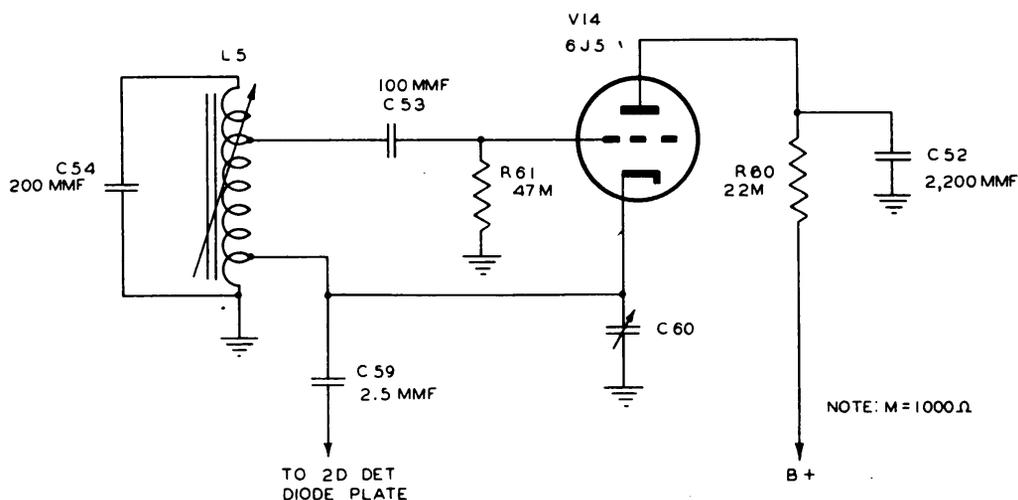


Figure 12. Radio Receiver BC-787-B, second detector A-V-C and A-N-L schematic.

**g. Final I-f Amplifier (fig. 11).** The final i-f amplifier further increases the amplitude of the i-f signal component before it is applied to the second detector. Referring to figure 11, note that the i-f signal appearing across the secondary of transformer T12, resonated by capacitor C73, is applied to the input of tube V5, a type 6SK7 pentode. Resistor R18 prevents parasitic oscillations. Blocking capacitor C20 isolates the grid bias d-c component from the rest of the circuit. Tube V5 is self-biased by resistor R25 bypassed by capacitor C21. Resistor R24 forms the grid load. Screen voltage is supplied through dropping resistor R28 bypassed by capacitor C22. Resistor R27 in conjunction with capacitor C23 forms the plate load decoupling network. When the selectivity switch is positioned to include resistor R23 and the series inductance at the lower end of transformer T12, the band-pass characteristics of transformer T12 are broadened to facilitate high fidelity f-m reception. When operating as an f-m receiver a-v-c action is obtained by applying a portion of the voltage developed across resistors R38 and R39 (bypassed by capacitors C27 and C28) to the control grids of the first and second i-f amplifiers. The primary of transformer T13 is resonated at the i-f frequency by capacitor C76, and the i-f component appearing across its secondary is applied to the second detector.

**h. Second Detector, AVC, and ANL (fig. 12).** The final i-f amplifier output is applied to the second detector which employs one half of tube V6, a type 6H6 twin diode. Transformer T13 secondary is resonated by capacitor C77 and the i-f signal is applied across the first half of diode V6. Capacitors C24 and C26, in conjunction with resistor R31, form an i-f decoupling network between transformer T13 and diode load resistors R33, R34, and R36. The audio signal voltage appearing across load resistor R34 and R36 is applied through capacitor C33 to the audio amplifier. A-v-c voltage developed in this network is applied to the grids of the first and second i-f amplifiers through filter network R35 and C8. The second diode section of tube V6 is used as an automatic noise limiter (ANL) and functions as follows: Capacitor C25 is charged by the rectified carrier voltage. The time constant of this capacitor and resistor R32 is such that the audio-frequency variations do not alter this charge. However, during a severe noise pulse the cathode becomes more negative than the charge held by capacitor C25 and current flows, shorting the audio voltage to ground through capacitor C25. By this action noise pulses are clipped off and do not appear in the output as sudden blasts of noise.

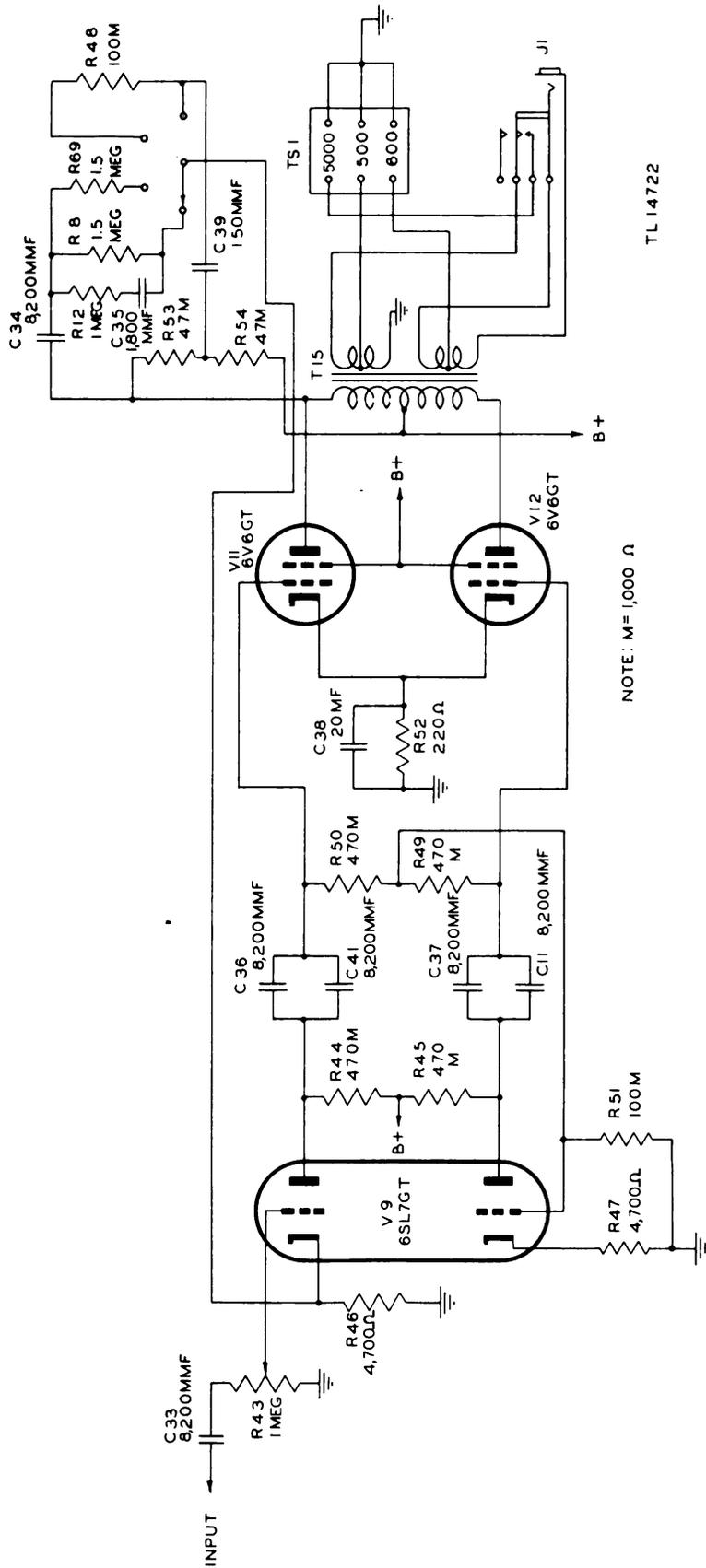


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Figure 13. Radio Receiver BC-787-B, B-F-O schematic.

**i. Beat-Frequency Oscillator (fig. 13).** The beat-frequency oscillator generates a signal approximately 1,000 cycles higher than the i-f frequency. The BFO output is combined with the i-f signal at the second detector. A 1,000-cycle tone is produced to provide for reception of unmodulated signals. Tube V14, a type 6J5 triode, is used in a modified Hartley circuit. When plate voltage is applied, the grid and cathode are at equal potentials and plate current increases, resulting in a feedback voltage through capacitor C52 to the lower end of coil L5. As oscillations build up, the grid is driven positive and the voltage developed across grid resistor R61 charges capacitor C53. During negative half-cycles the grid capacitor tends to discharge through resistor R61. Capacitor C53 acquires an average negative charge on the grid side providing bias. As the triode is alternately driven to saturation and cut-off, oscillations are produced in the parallel resonant circuit at a frequency determined by coil L5 and capacitor C54. Variable capacitor C60 varies the oscillator frequency slightly, thus varying the pitch of the note to suit the operator. The oscillator output is applied through capacitor C59 to the second detector diode plate.

**j. Audio Amplifier (fig. 14).** The audio amplifier consists of a push-pull voltage amplifier utilizing tube V9, a type 6SL7GT twin triode, and a push-pull power amplifier using two type 6V6 beam power amplifiers V11 and V12. The audio signal from either the a-m detector or the f-m discriminator is fed to the control grid of the first triode section of tube V9 through coupling capacitor C33 and a-f gain control R43. Self-bias is provided by cathode resistors R46 and R47, and since they are unbypassed, degeneration is introduced. The audio signal appears in greater amplitude



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Figure 14. Radio Receiver BC-787-B, audio amplifier schematic.

across plate load resistors R44 and R45 and is coupled to the grids of tubes V11 and V12 through coupling capacitors C36, C41, C37, and C11. The second section of tube V9 receives its input signal across grid resistor R51 from tubes V11 and V12 and grid load resistors R49 and R50. Since the input signal applied to the first half section of V9 is phase-inverted the grids of V9 are push-pull excited. Tubes V11 and V12 are self-biased by cathode resistor R52 which is bypassed by capacitor C38. The network consisting of resistors R8, R12, R48, R53, R54, and R69 together with capacitors C34, C35, and C39 provides degeneration in varying degrees in the audio amplifier for tone control from bass boost to high-frequency cut-off. Output transformer T15 secondary has two tapped windings which terminate at terminal board TS1 and jack J1. The 500- and 5,000-ohm impedance outputs may be used to feed a loudspeaker or a line terminated in a like impedance. In addition a 600-ohm impedance line may be had by utilizing the PHONES jack J1 on the front panel. *Both sides of this winding are insulated from chassis ground. By connecting a jumper between the posts marked 600 on terminal strip TS1 this 600-ohm line may be balanced to ground.*

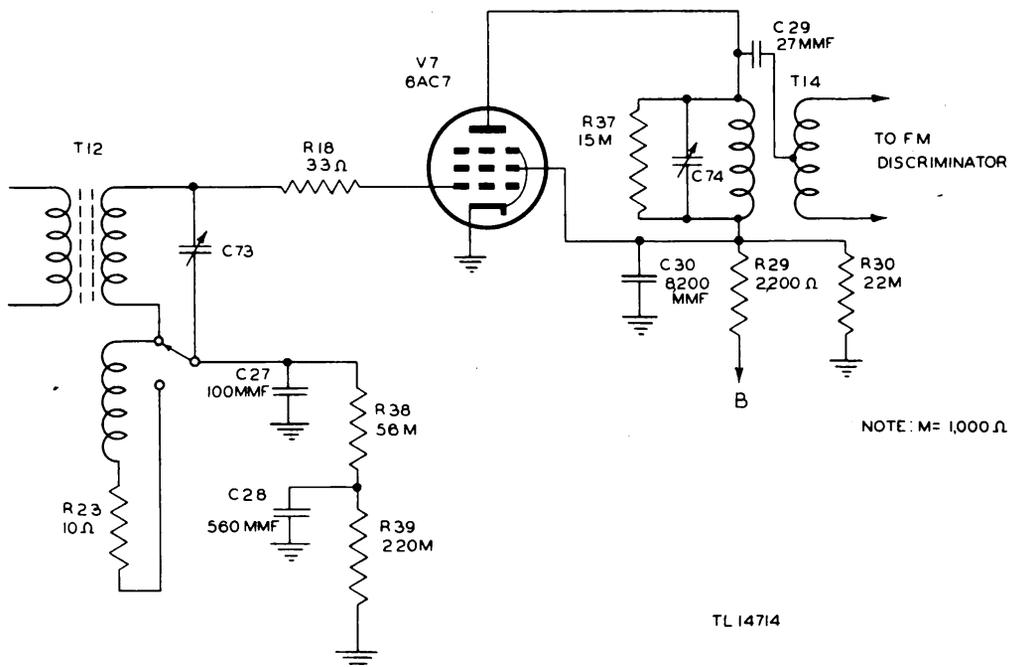


Figure 15. Radio Receiver BC-787-B, F-M limiter schematic.

**k. F-m Limiter (fig. 15).** The f-m limiter stage utilizing tube V7, a type 6AC7 pentode, operates as a saturated amplifier. The output signal amplitude remains constant over a wide range of input levels, thus eliminating amplitude variations present in the received signal. Since noise disturbances cause very little frequency modulation but do vary the received carrier amplitude

any noise impulses present at the input will not be present at the output. The output of the second i-f amplifier is applied through transformer T12 and series parasitic suppressor resistor R18 to the input of tube V7. Capacitor C73 resonates the secondary of transformer T12 which is returned to ground through a decoupling network consisting of resistors R38 and R39 and capacitors C27 and C28. When the selectivity switch at the lower end of transformer T12 is positioned to include resistor R23 and the series inductance, the band-pass characteristics are broadened to facilitate high fidelity f-m reception. Since low bias is provided and plate screen potentials are of a low value (approximately 75 volts) the tube is easily driven to cut-off and plate current saturation by input signals of high amplitude. The above action effectively removes amplitude variations by clipping the positive and negative peaks of the incoming signal above and below a predetermined level, but does not affect frequency variations. Plate and screen potentials are supplied from a voltage dividing network consisting of resistors R29 and R30 bypassed by capacitor C30. The primary of transformer T14 is resonated by capacitor C74, and primary shunt resistor R37 broadens the band-pass characteristics of transformer T14. The f-m limiter output signal appearing across the primary of transformer T14 is applied to the f-m discriminator input.

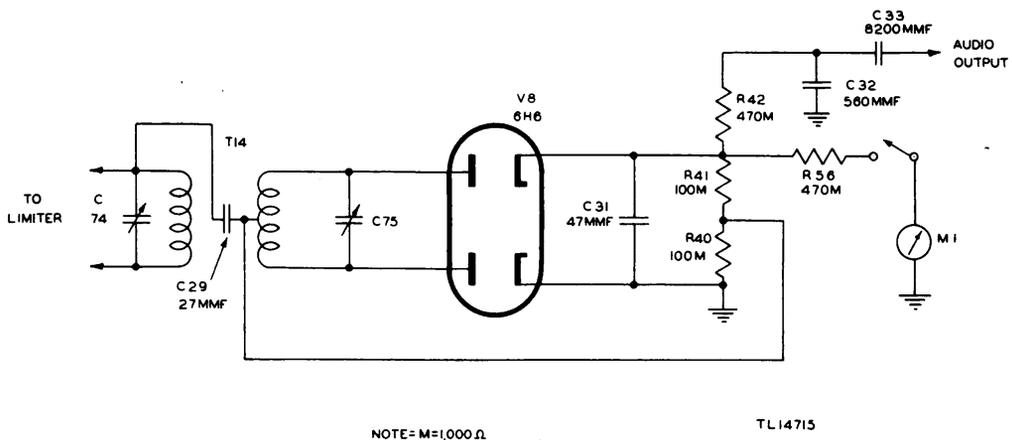
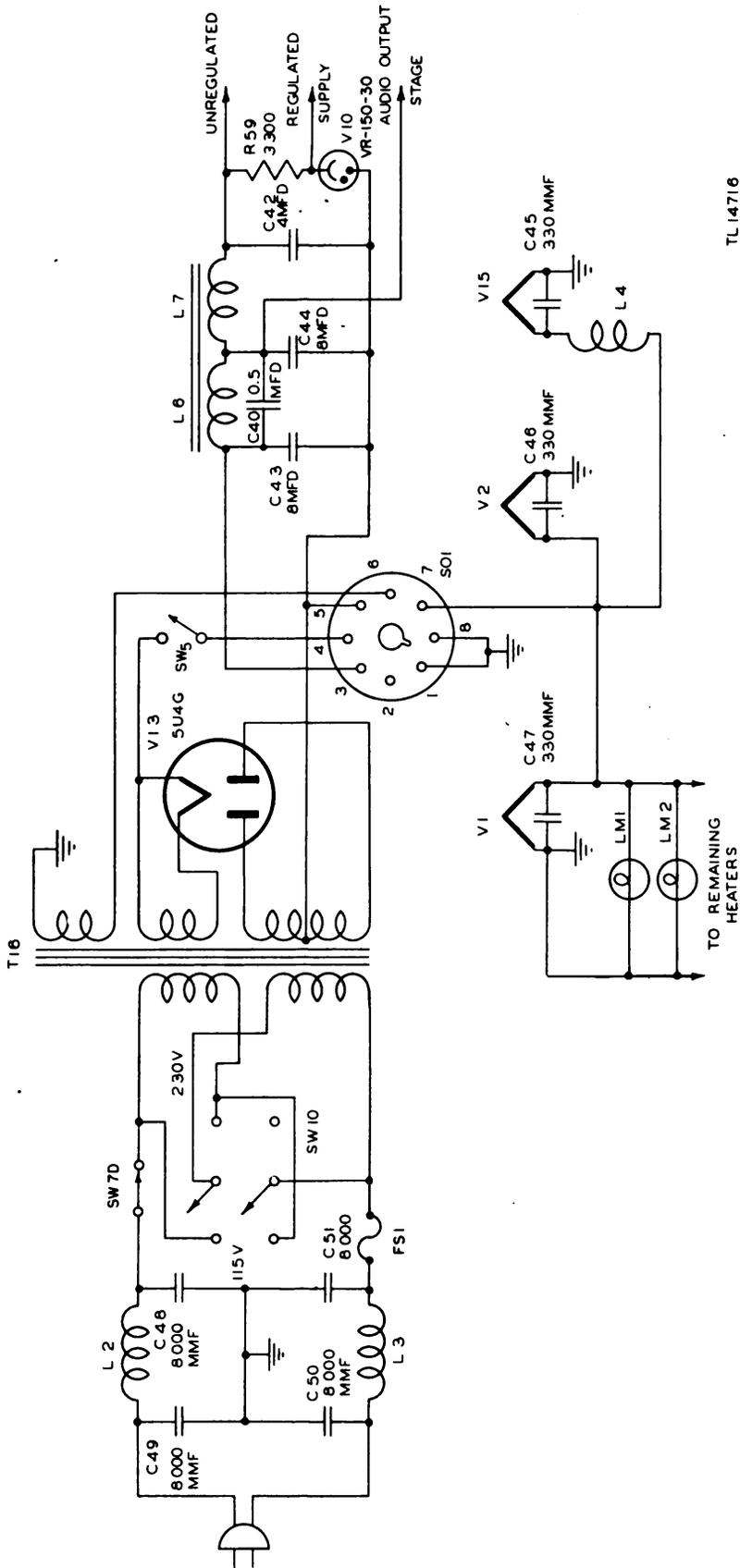


Figure 16. Radio Receiver BC-787-B, F-M discriminator schematic.

**1. F-m Discriminator (fig. 16).** The f-m discriminator circuit produces audio signals, the amplitude of which is proportional to the frequency variations of the applied signals. Tube V8, a type 6H6 twin diode, together with transformer T14, form the main circuit components. The limiter stage output is impressed across transformer T14 the primary and secondary of which are inductively coupled and tuned to the center frequency of the i-f band-pass by capacitors C74 and C75. The primary and secondary are also capacitively coupled by C29 to the midpoint of the secondary

winding. When the applied signals do not vary in frequency, the induced voltages appearing across each half of the secondary cause the diodes to conduct an equal amount in opposite directions across load resistors R40 and R41 which cancel. The phase relations between the primary and secondary currents are such that when the applied signals vary in frequency the induced secondary current lags or leads the capacitively coupled signal. As the applied signal varies above and below the resonant frequency, the tuned secondary becomes inductive or capacitive and the signals add across the top or bottom half of the tapped secondary coil. When unequal voltages are applied to the diode plates, the signal voltages across the diode load resistors will not be equal and since these voltages are of opposite polarity, the difference between them will appear at the audio output. Resistor R42 and capacitor C32 attenuate the high-frequency end of the audio range since these frequencies are emphasized by some transmitters. This network also attenuates interference which may be present at the discriminator output. Meter M1, a 160-0-40 microammeter, in conjunction with resistor R56, is used as a resonance indicator. When the receiver is tuned to the incoming signal the voltages developed across load resistors R40 and R41 cancel, resulting in a zero meter reading. With the receiver off resonance the differences in voltages across the load resistors will be indicated and the meter will deflect left or right as the receiver is tuned above or below the incoming signal. When the receiver is operating in A.M. position, the tuning meter indicates changes in the plate current of the second i-f stage, since maximum current will be drawn with zero signal input the current will decrease in accordance with the signal level. The 160-0-40 meter range is used in f-m position and the 160-0 scale in A.M. position. In the f-m operating position the discriminator output is applied through capacitor C33 to the audio amplifier.

**m. Power Supply (fig. 17).** The receiver is designed to operate from 115- or 230-volt, 50/60 cycle alternating current, or from a 6-volt storage battery and 270 volts of "B" battery or vibrator power supply. The a-c supply is applied to the primary of transformer T16 through two low-pass filters consisting of capacitors C48, C49, C50, and C51 and chokes L2 and L3. This line filter prevents interference from entering the receiver through the power connections. The filtered a-c supply is applied to the power transformer primaries through ON-OFF switch SW7D, fuse FS1, and switch SW10. In the 115-volt position the two primary windings are connected in parallel. In the 230-volt position both transformer primaries are connected in series. The receiver tube



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Figure 17. Radio Receiver BC-787-B, power supply schematic.

heaters and pilot lamps are connected in parallel and supplied with 6.3 volts alternating current from the top secondary winding of transformer T16. Tubes V1 and V2 have r-f decoupling capacitors connected across their heaters, and tube V15 has an r-f decoupling network L4 and C45 connected between its heater and the common heater supply. Tube V13, a type 5U4G, full-wave rectifier, receives its high voltage and filament supplies from the lower secondary windings of transformer T16. The pulsating d-c rectifier output voltage is applied to the ripple filter through socket S01 and RECEIVE-SEND switch SW5. In the a-c operating position, plug PL2 (furnished with the equipment) must be plugged into socket S01 to provide continuity in the power circuits. The filter network L6, L7, C42, C43, and C44 removes the ripple from the rectifier tube output voltage before it is applied to the receiver circuits. Capacitor C40 resonates filter choke L6 at the ripple frequency to provide additional filtering. High voltage for the audio output stage is obtained from the mid-point of chokes L6-L7 since less filtering is required for this stage and a higher potential is available at this point. The d-c output voltage from filter choke L7 supplies the unregulated high-voltage requirements of the receiver. A second output from the unregulated supply is applied through resistor R59 to tube V10, a type VR-150-30 voltage regulator. Tube V10 functions as a variable resistor since its current drain is proportional to the potential applied across it. When the voltage drop across resistor R59 increases or decreases, tube V10 will draw more or less current and maintain the potential between the regulated output and ground at a fixed value. The regulated supply is applied to the r-f oscillator, mixer screen and plate, and second i-f screen. For d-c operation 6 volts at 4.5 amperes and 270 volts at 145 milliamperes is required. For d-c operation, shorting plug PL2 must be removed from socket S01. Batteries are then connected as shown in figure 3 to an unwired duplicate of plug PL2, which is then inserted in socket S01.

## SECTION IV MAINTENANCE

**NOTE:** Failure or unsatisfactory performance of equipment will be reported on W.D. A.G.O. Form No. 468. If this form is not available, see TM 38-250.

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**CAUTION:** Voltages at various points in the r-f stages and under the chassis are sufficiently high to produce a severe shock. When working on the set avoid contact with the high voltage points and remember, improper or rough handling may disable certain component parts. BE CAREFUL.

### 10. INSPECTION BY OPERATING PERSONNEL.

All components of the radio set should be given a thorough inspection upon issue and at regular intervals thereafter. Keep the equipment dry. Moisture, even in a completely tropicalized set such as Radio Receiver BC-787-B, may cause deterioration of material and produce general unsatisfactory operation. Dust and dirt materially effect both electrical and mechanical operation. Keep the various parts clean especially the tuning capacitors and gear drive. A small amount of Grease, Lubricating, Special, Ordnance Spec No. AXS-637, on the gear drive occasionally, will provide smoother operation. Noisy reception may be caused by dirty capacitor wipers, gain controls, switch, loose connections in the cables, tubes, wiring contacts, etc., in the installation. Do not oil any of the switch contacts. Check accessible connections and tubes regularly making sure that all contacts are clean and tight and that tubes are held securely in their sockets.

### 11. REPLACING TUBES, LAMPS, AND FUSES.

All tubes, with the exception of the three acorn types, are accessible at the top of the chassis. The three acorn tubes are reached by removing the top cover of the r-f assembly. These tubes should be inserted with the short end of the body in the socket. The two pilot lamps, LM1 and LM2 are identical and are located behind the translucent dials. They are of the bayonet type and are removed by pressing down slightly in the socket and turning counterclockwise. The fuse is replaceable from the front panel. It is contained in the bayonet type holder that is removed by pressing in slightly and turning counterclockwise to release.

### 12. ADJUSTMENTS FOR FIELD MAINTENANCE.

Service of this equipment in the field in order to maintain operation is limited almost entirely to replacement of tubes, pilot lamps, fuses, and minor repairs. Realignment and major servicing is done at authorized depots by personnel specially trained and with proper equipment to do the work.

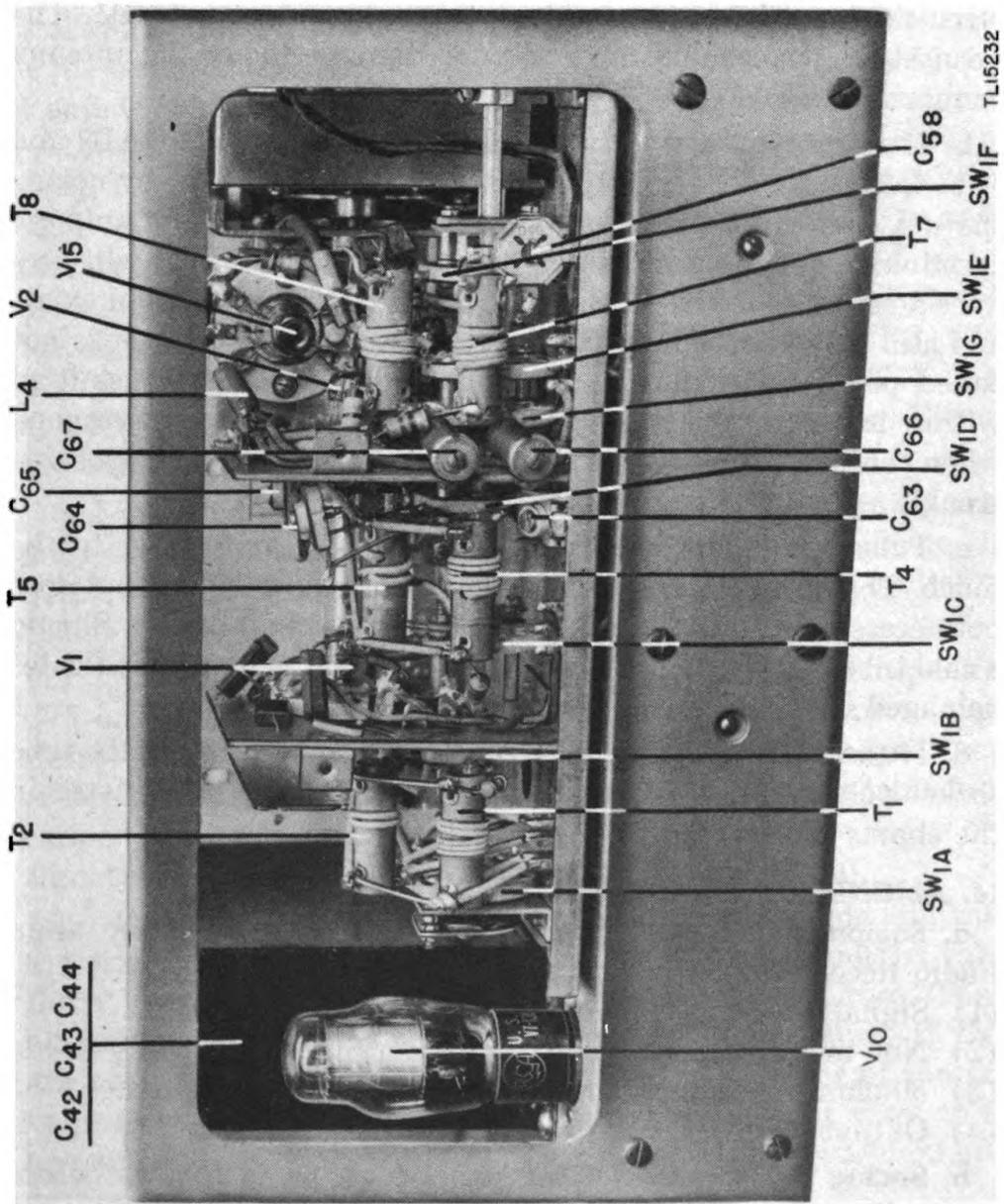


Figure 18. Radio Receiver BC-787-B, side view of r-f section with shield removed.

### 13. PROCEDURE IN CASE OF FAILURE.

a. Should the receiver "go dead" after once operating, start checking connections. The a-c power source may be dead or plug PL1 disconnected. Batteries, if used, may have become disconnected or the voltage dropped to too low a value to operate the receiver. The fuse may have blown because of overload or short circuit. Plug PL2 may have been taken out of socket SO1. The headset or speaker may have become disconnected or the antenna connections loosened.

b. If all external connections are tight, turn the R.F. GAIN and A.F. GAIN controls full on to check the receiver itself by noting the noise level. If the receiver is "alive," touching the antenna terminals (not the outer shield) with a metallic object will produce a response in the headset or speaker. If this condition exists and still no signal is heard, it indicates that either the set is not tuned properly or that there are no signals being transmitted within range of the receiver. If the receiver does not respond when controls are set at maximum, it is an indication of probable trouble within the radio receiver.

c. Tubes should be firmly in their sockets and warm to the touch. This is an indication that the filament is working, but does not necessarily mean that the tube is functioning properly. Should a cold tube be found, replace it. Excessive heat generally indicates damaged elements in the tube.

d. If the spot checks do not clear up the trouble, check the tube socket voltages and resistance to ground against those listed in the charts shown in Section V.

### 14. ALIGNMENT PROCEDURE.

a. **Equipment Needed.** Equipment required to properly align Radio Receiver BC-787-B is as follows:

- (1) Signal generator tunable from 5.25 mc to 140 mc.
- (2) Non-metallic screwdriver.
- (3) 50-ohm non-inductive resistor for a dummy antenna.
- (4) Output meter.

b. **Setting of Controls.** Set the panel controls as follows before proceeding with the alignment.

R.F. GAIN control	Maximum.
BAND SWITCH	Band 2.
A.V.C. switch	OFF.
ANTENNA trimmer	Immaterial.
REC./SEND switch	REC.
SELECTIVITY switch	SHARP.
TONE switch	Immaterial.

A.N.L. switch	OFF.
PITCH CONTROL	Immaterial.
B.F.O. switch	OFF.
A.M./F.M.	A.M.
A.F. GAIN control	Maximum.

**c. I-f Alignment.** Remove the grid clip from tube V2 (the grid is the center connection on the short end of the tube). See figures 4 and 18 for location. Connect the "hot" side of the signal generator to the grid by means of a small clip or flexible piece of wire. DO NOT attempt to solder to the lead as the heat from the iron will crack the glass envelope. Connect the "cold" side of the signal generator to the chassis. Connect the output meter across the speaker output terminals on terminal strip TS1. Set the signal generator at 5.25 mc and adjust capacitors C68, C69, C70, C71, C72, C73, C76, and C77 on transformers T10, T11, T12, and T13 for maximum output. See figure 19 for location. Repeat the adjustment at least once to assure proper alignment.

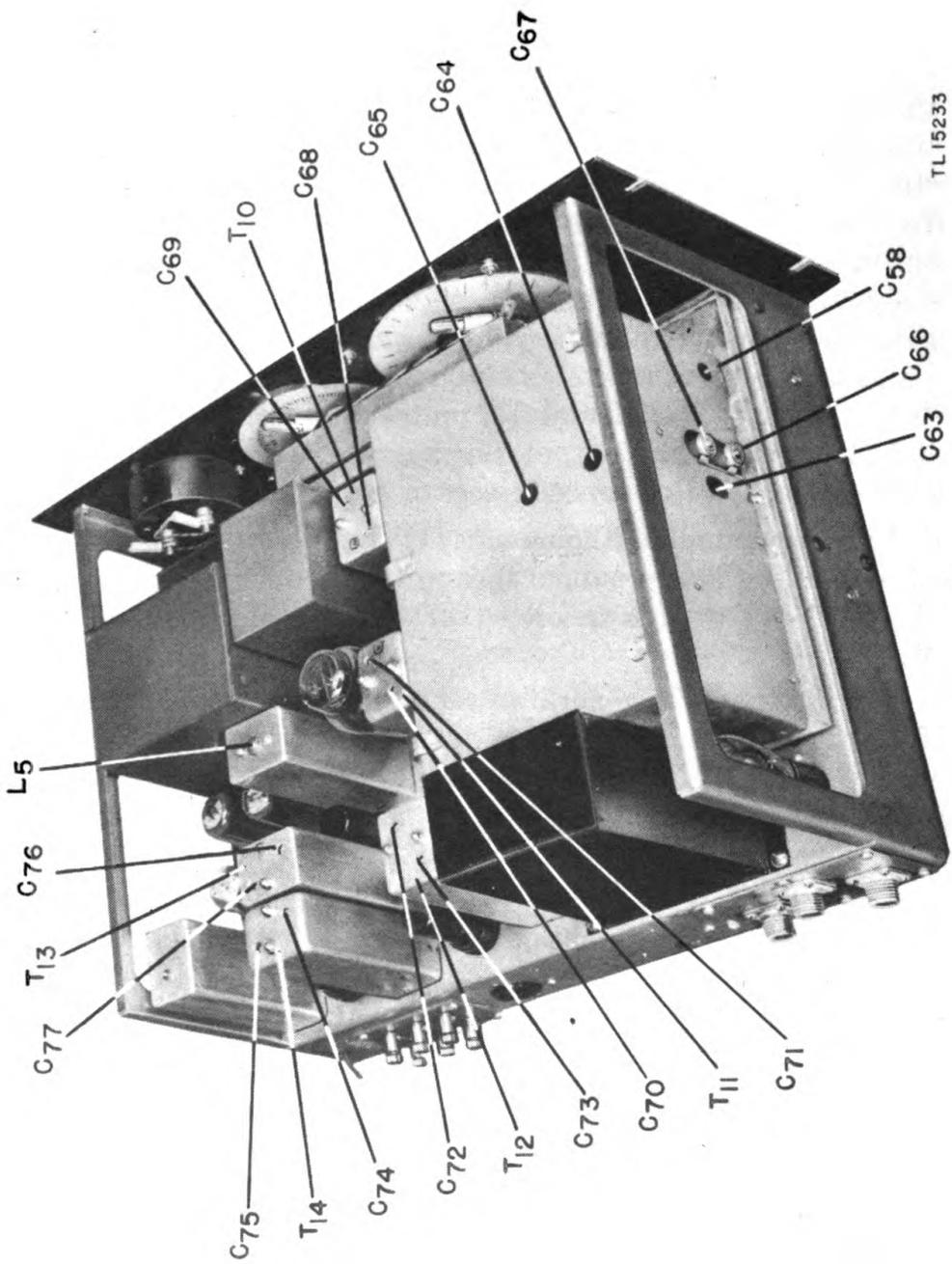
**d. F-m Discriminator Alignment.** (1) Let the front-panel controls remain as set in subparagraph **b** above except change the SELECTIVITY switch to BROAD and the A.M./F.M. switch to F.M.

(2) With the signal generator set at 5.25 mc., tune capacitor C75 on transformer T14 slowly until the output drops to zero. Refer to figure 19 for location. Slightly detune the signal generator to either side until the output meter gives a readable indication. Readjust capacitor C74 for maximum output. Reset the signal generator to 5.25 mc and check for zero output.

(3) Next detune the signal generator to first one side and then the other side of resonance and note the maximum output value for a given frequency deviation each side of resonance. These maximum values should be the same for good balance. If they are not equal, tune the signal generator to the lower of the two values and readjust capacitor C75 until the output rises to an amount equal to half the difference between the two maximum output values previously noted.

(4) Retest for balance as in subparagraph (3) above and repeat procedure outlined until the maximum output values are identical when the signal generator is detuned to each side of resonance.

(5) If a balance cannot be obtained it is an indication that the secondary of transformer T14 is detuned off center. A very slight adjustment of capacitor C75 in either direction will be required to allow a condition of balance to be reached. The direction of adjustment that will allow equal maximum output peaks when



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Figure 19. Radio Receiver BC-787-B, top side view showing aligning points.

the signal generator is detuned to each side of resonance is the correct setting of capacitor C75.

(6) Extreme care must be exercised in adjusting the secondary of transformer T14 by tuning capacitor C75 as a slight misadjustment will result in distorted reception of f-m signals.

**e. R-f Alignment.** Leave the front-panel controls set as in subparagraph **b** above except change BAND SWITCH to Band 1 and A.M./F.M. switch to A.M. Disconnect the signal generator from the grid of V2 and the chassis. Replace the receiver grid clip on tube V2. Connect the "hot" side of the signal generator to terminal "B" through the dummy antenna and the "cold" side of terminal "A" located on the underside of the chassis. See figure 5 for location of these terminals—terminal "B" connects to the rotor arm of switch SW1A and terminal "A" to the common connection of the primaries of transformers T1, T2, and T3. Connecting the signal generator to these terminals allows use of the BAND SWITCH SW1 to shift the generator signal to the band being aligned and eliminates the need of changing connections when aligning the receiver.

(1) **BAND 1 ALIGNMENT.** Tune the signal generator and receiver to 42 mc. Adjust capacitor C66 for maximum signal. Adjust capacitor C63 and ANTENNA trimmer C2 for maximum response. Refer to figures 18 and 19 for location of adjustment points. On this band the high-frequency oscillator transformer T7 is tuned 5.25 mc higher than the antenna transformer T1 and the R-F transformers T4. Retune both the signal generator and the receiver to 28 mc. Adjust capacitor C50 for maximum output while rocking the TUNING control (capacitor C1).

(2) **BAND 2 ALIGNMENT.** Set the BAND SWITCH SW1 at Band 2. Tune the signal generator and receiver to 75 mc. Adjust capacitor C67 for maximum signal. Adjust capacitor C64 and ANTENNA trimmer C2 for maximum response while rocking the TUNING control (capacitor C1). Refer to figure 19. Readjust capacitor C67 for peak output. On this band the high-frequency oscillator transformer T8 is tuned 5.25 mc lower than the antenna transformer T2 and the R-F transformer T5. No low-frequency adjustment is provided on this band.

(3) **BAND 3 ALIGNMENT.** Set the BAND SWITCH at Band 3. Tune the signal generator and the receiver to 120 mc. Adjust capacitor C65 and the ANTENNA trimmer C2 for maximum response while rocking the TUNING control (capacitor C1). See figures 18 and 19 for adjusting points. It is not recommended that the frequency of the oscillator transformer T9 be adjusted in the field. However, should it be necessary to do so to insure opera-

tion, first locate the primary of transformer T9. This is the white wire winding on the coil directly beneath tube V15. One end of this winding is connected to a terminal on the coil form. The other end of this winding or the free end can be shifted slightly, thus changing the frequency of the transformer. If this winding is moved from its original position, it should be cemented in place with a low-loss cement when the adjustment is completed. If the frequency of the oscillator transformer T9 is shifted, repeat the adjustment of capacitor C65 and the ANTENNA trimmer C2 for maximum response while rocking TUNING control (capacitor C1). On Band 3 the high-frequency oscillator transformer T9 is tuned 5.25 mc lower than the signal. No low-frequency adjustment is provided on this band.

## 15. MOISTUREPROOFING AND FUNGIPROOFING RADIO RECEIVER BC-787-B.

**α. General.** The operation of Signal Corps equipment in tropical areas where temperature and relative humidity are extremely high, requires special attention. The following items represent problems which may be encountered in operation:

- (1) Resistors, capacitors, coils, chokes, transformer windings, etc., fail.
- (2) Electrolytic action takes place in resistors, coils, chokes, transformer windings, etc., causing eventual break-down.
- (3) Hook-up wire and cable insulation break down. Fungus growth accelerates deterioration.
- (4) Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs.
- (5) Moisture provides leakage paths between battery terminals.

**b. Treatment.** A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied by means of a spray gun or brush. Refer to TB Sig 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing.

**CAUTION:** Varnish spray may have toxic effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten cheesecloth or other cloth material over nose and mouth.

### c. Step-by-step Instructions for Treating Radio Receiver BC-787-B.

**(1) PREPARATION.** Make all repairs and adjustments necessary for the proper operation of the equipment.

**(2) DISASSEMBLY.**

(a) Disconnect the power cord and antenna connectors.

(b) Remove the five screws holding the front panel to the cabinet, the twelve "PK" screws located on the bottom of the cabinet and pull the receiver out of its case.

(c) Remove the tuning unit cover plate on top of the chassis.

(d) Remove the shield housing from the left-hand side of the tuning unit.

(e) Clean all dirt, dust, rust, fungus, oil, grease, etc., from the equipment to be processed.

**(3) MASKING.**

(a) Mask open switches, air capacitors, sockets, bearings, etc.

(b) Cover antenna trimmer capacitor, the three wafer sections and detent mechanism of the selectivity switch, the A.M./F.M. switch, the pitch control tuning capacitor, the phone jack, the guide hole in each tube socket, the two rectangular openings in the chassis that provide clearance for the tuning dial and mechanism, and the turned under bottom edge of the chassis to insure good ground connection when the receiver has been reassembled.

**CAUTION:** Do not turn any of the controls after the masking tape has been applied.

**(4) DRYING.** Bake the chassis at a temperature not to exceed 140°F according to instructions furnished with the Moisture and Fungus Proofing Maintenance Kit (MFP Kit).

**(5) VARNISHING.**

(a) Apply moistureproofing and fungiproofing varnish with spray gun to the under side of the chassis only, according to instructions furnished with the MFP Kit.

(b) Apply varnish with brush to the rear surfaces of the "S" meter. Cover all joints and openings. Apply varnish to the joint between the receiver panel and the meter case in front and back and to the joint between the meter case and the glass. Cover the zero adjustment screw.

(c) Apply varnish with brush to all exposed wires, insulators, and circuit elements on top of the chassis.

**CAUTION:** Do not allow the varnish to drip or run on to the band switch contacts and do not apply varnish to the mica trimmers.

(d) Bake the chassis for 10 minutes.

(e) Repeat steps (a), (b), (c), and (d) above three times.

**(6) REASSEMBLY.**

(a) Remove all masking tape.

(b) Clean all contacts with varnish remover, and burnish the contacts.

(c) Reassemble the set and test for operation.

(d) Check the receiver operation carefully. If the alignment of the receiver has been affected, follow the procedure indicated in paragraph 14.

(e) Give the equipment a final operational check, after receiving a 24- to 36-hour aging period, when time permits, before alignment.

**(7) MARKING.** Mark the set with "MFP" and the date of treatment.

**EXAMPLE:** MFP—8 Jun 44.

## SECTION V SUPPLEMENTARY DATA

### 16. SOCKET VOLTAGE CHART.

Measurements below were made with a Weston Model 433, 20,000-ohm per volt meter, 115 volts a-c line voltage. All readings are d-c unless otherwise specified. Refer to figure 20 for socket locations.

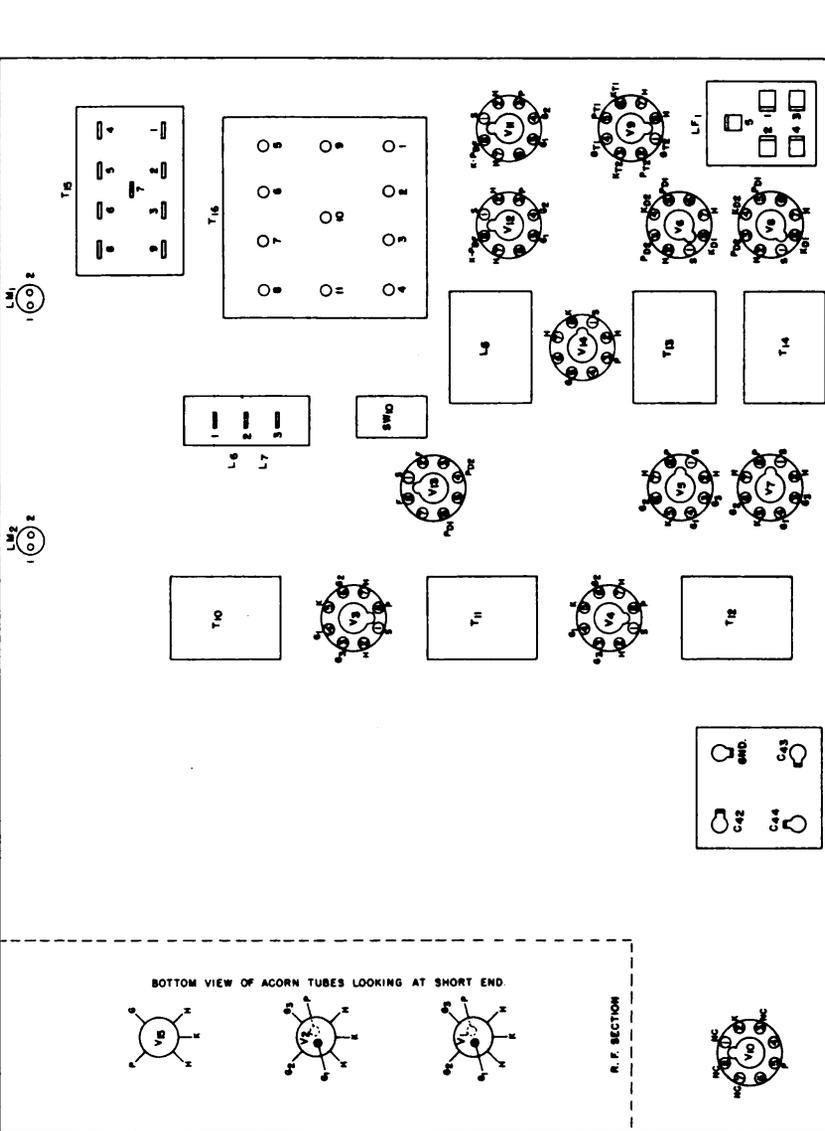
TUBE	SIGNAL CORPS NO.	JAN NO.	H	G1	G2	Pin G3	P	H	K
V1	VT-238	956	6.3 ac	0	104	2.5	142	0	2.5
V2	VT-120	954	0	0	68	0	146	6.3 ac	0
V15	VT-121	955	0	0	x	x	106	6.3 ac	0

TUBE	SIGNAL CORPS NO.	JAN. NO.	Pin							
			1	2	3	4	5	6	7	8
V3	VT-112	6AC7	0	0	0	0	1.9	132	6.3 ac	240
V4	VT-176	6AB7	0	0	0	0	1.8	146	6.3 ac	240
V5	VT-117	6SK7	0	6.3 ac	2.9	0	2.9	100	0	235
V6	VT-90	6H6	0	0	0	0	0	NC	6.3 ac	0
V7	VT-112	6AC7	0	0	0	0	0	72	6.3 ac	81
V8	VT-90	6H6	0	0	0	0	0	NC	6.3 ac	0
V9	VT-229	6SL7GT	0	102	2	0	102	2	0	6.3 ac
V10	VT-139	0D3/ VR-150	0	0	150	NC	150	NC	150	NC
V11	VT-107A	6V6GT/G	0	6.3 ac	263	250	0	NC	0	15
V12	VT-107A	6V6GT/G	0	6.3 ac	263	250	0	NC	0	15
V13	VT-244	5U4G	NC	283	NC	282 ac	NC	282 ac	NC	283
V14	VT-94	6J5	0	0	118+	NC	0	*	6.3 ac	0

NC—No Connection      X—No Pin      \*—Tie Lug  
+—With BFO switch, SW2, ON

### 17. RESISTANCE CHART.

Measurements below were made from tube socket terminals to ground with a Weston Model 772 Analyzer meter. Tubes were in sockets, power off, all front panel switches at ON and all controls at maximum. A.M./F.M. switch was set at A.M. Refer to figure 20 for socket locations.



TL18234

Figure 20. Radio Receiver BC-787-B, terminal layout for voltage charts.

TUBE	SIGNAL CORPS NO.	JAN NO.	ELEMENT	PIN NO.	RESIST- ANCE
V1	VT-238	956	Cathode	—	250
			Heater	—	0
			Screen Grid	—	23,000
			Suppressor Grid	—	250
			Heater	—	0
			Control Grid	Cap	8.5
			Plate	Cap	42,000
V2	VT-120	954	Cathode	—	2,000
			Heater	—	0
			Screen Grid	—	160,000
			Suppressor Grid	—	0
			Heater	—	0
			Control Grid	Cap	0
			Plate	Cap	34,000
V3	VT-112	6AC7	Shield	1	0
			Heater	2	0
			Suppressor Grid	3	0
			Control Grid	4	over 500,000
			Cathode	5	170
			Screen Grid	6	75,000
			Heater	7	0
			Plate	8	30,000
V4	VT-176	6AB7	Shield	1	0
			Heater	2	0
			Suppressor Grid	3	0
			Control Grid	4	A.M. over 500,000
			Cathode	5	180
			Screen Grid	6	34,000
			Heater	7	0
			Plate	8	30,000
V5	VT-117	6SK7	Shield	1	0
			Heater	2	0
			Suppressor Grid	3	290
			Control Grid	4	over 500,000
			Cathode	5	290
			Screen Grid	6	22,500
			Heater	7	0
			Plate	8	31,000

TUBE	SIGNAL CORPS NO.	JAN NO.	ELEMENT	PIN NO.	RESIST- ANCE
V6	VT-90	6H6	Shield	1	0
			Heater	2	0
			Plate—D2	3	over 500,000
			Cathode—D2	4	0
			Plate—D1	5	over 500,000
			No Pin	6	0
			Heater	7	0
			Cathode—D1	8	over 500,000
V7	VT-112	6AC7	Shield	1	0
			Heater	2	0
			Suppressor Grid	3	0
			Control Grid	4	33,500
			Cathode	5	0
			Screen Grid	6	20,000
			Heater	7	0
			Plate	8	20,000
V8	VT-90	6H6	Shield	1	0
			Heater	2	0
			Plate—D2	3	120,000
			Cathode—D2	4	240,000
			Plate—D1	5	120,000
			No Pin	6	0
			Heater	7	0
			Cathode—D1	8	0
V9	VT-229	6SL7GT	Grid—T2	1	over 500,000
			Plate—T2	2	295,000
			Cathode—T2	3	5,750
			Grid—T1	4	100,000
			Plate—T1	5	310,000
			Cathode—T1	6	5,750
			Heater	7	0
			Heater	8	0
V10	VT-139	OD3/VR-150	No Contact	1	0
			Cathode	2	0
			No Contact	3	33,000
			No Pin	4	0
			Plate	5	33,000
			No Pin	6	0
			No Contact	7	33,000
			No Contact	8	0

TUBE	SIGNAL CORPS NO.	JAN NO.	ELEMENT	PIN NO.	RESIST- ANCE
V11	VT-107-A	6V6GT/G	Shield	1	0
			Heater	2	0
			Plate	3	30,000
			Screen Grid	4	29,500
			Control Grid	5	380,000
			No Pin	6	0
			Heater	7	0
			Cathode—PRF	8	250
V12	VT-107-A	6V6GT/G	Shield	1	0
			Heater	2	0
			Plate	3	30,000
			Screen Grid	4	29,500
			Control Grid	5	360,000
			No Pin	6	0
			Heater	7	0
			Cathode—PRF	8	250
V13	VT-244	5U4G	Shield	1	0
			Filament	2	30,000
			No Pin	3	0
			Plate—D2	4	45
			No Pin	5	0
			Plate—D1	6	45
			No Pin	7	0
			Filament	8	30,000
V14	VT-94	6J5	Shield	1	0
			Heater	2	0
			Plate	3	54,000
			No Pin	4	0
			Control Grid	5	50,000
			No Pin	6	0
			Heater	7	0
			Cathode	8	0
V15	VT-121	955	Cathode	—	0
			Heater	—	0
			Plate	—	38,000
			Grid	—	21,500
			Heater	—	0

### 18. TERMINAL VOLTAGE CHART.

Measurements below were made with a Weston Model 433, 20,000-ohms per volt meter; line voltage 115-volts alternating-current. All readings are direct-current unless otherwise specified. All measurements are from terminal to chassis ground unless specified. Refer to figure 20 for layout of terminal.

COMPONENT	TERMINAL										
	1	2	3	4	5	6	7	8	9	10	11
Transformer T15	263	265	263	NR	NR	NR	0	NR	NR	NR	NC
Transformer T16	<sup>3</sup> 115 ac	<sup>4</sup> 115 ac	<sup>3</sup> 115 ac	<sup>4</sup> 115 ac	0	6.3 ac	283	283	282 ac	0	282 ac
Inductance L6 and L7	242	265	278	NC	NC	NC	NC	NC	NC	NC	NC
Line Filter LF1	<sup>1</sup> 115 ac	<sup>1</sup> 115 ac	<sup>2</sup> 115 ac	<sup>2</sup> 115 ac	0	NC	NC	NC	NC	NC	NC
Fuse FS1	<sup>5</sup> 115 ac	<sup>5</sup> 115 ac	NC	NC	NC	NC	NC	NC	NC	NC	NC
Lamp LM1	0	6.3 ac	NC	NC	NC	NC	NC	NC	NC	NC	NC
Lamp LM2	0	6.3 ac	NC	NC	NC	NC	NC	NC	NC	NC	NC
Socket SO1	0	NC	278	278	0	6.3 ac	6.3 ac	0	NC	NC	NC
Filter Capacitors	C42		C43		C44		GND				
	<u>242</u>		<u>278</u>		<u>265</u>		<u>0</u>				

NR—NO READING

NC—NO CONNECTION

<sup>1</sup>Measured between terminals 1 and 2

<sup>2</sup>Measured between terminals 3 and 4

<sup>3</sup>Measured between terminals 1 and 3

<sup>4</sup>Measured between terminals 2 and 4

<sup>5</sup>Measured between either of these terminals and No. 2 on LF1

19. MAINTENANCE PARTS LIST FOR RADIO RECEIVER BC-787-B.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
M1	3F864-1	AMMETER; d-c; 160 0 40-micro-amperes; McClintock Meter Co., No. 3001.	1			*	*	*	*
C3	3D9005E75	CAPACITOR: fixed; ceramic; 5.75-mmf $\pm 0.75$ mmf; 500-v dc (working); temperature coefficient 0.00075 mmf/mm <sup>2</sup> /°C; Centralab, No. 807-004.	1			*	*	*	*
C7	3D9010-34	CAPACITOR: fixed; ceramic; 10-mmf $\pm 10\%$ ; 500-v dc (working); temperature coefficient 0.00055 mmf/mm <sup>2</sup> /°C; Centralab, No. 811-077.	1			*	*	*	*
C56	3D9050-107	CAPACITOR: fixed; ceramic; 50-mmf $\pm 10\%$ ; 500-v dc (working); temperature coefficient 0.00075 mmf/mm <sup>2</sup> /°C; Centralab, No. 812-109.	1			*	*	*	*
C24	3K2556011	CAPACITOR: fixed; mica; 56-mmf $\pm 10\%$ ; 500-v dc (working); AWS No. CM25A560K.	2			*	*	*	*
C26	3K2510111	CAPACITOR: fixed; mica; 100-mmf $\pm 10\%$ ; 500-v dc (working); AWS No. CM25A101K.	2			*	*	*	*
C39	3K2515111	CAPACITOR: fixed; mica; 150-mmf $\pm 10\%$ ; 500-v dc (working); AWS No. CM25A151K.	1			*	*	*	*
C5	3K2033111	CAPACITOR: fixed; mica; 330-mmf $\pm 10\%$ ; 500-v dc (working); AWS No. CM20A331K.	8			*	*	*	*
C9									
C10									
C45									
C46									
C47									
C55									
C79									

\* Indicated stock available.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C20	3K2547011	CAPACITOR: fixed; mica; 47-mmfm. $\pm 10\%$ ; 500-v dc (working).	2			*	*	*	*
C31									
C28	3K3056111	CAPACITOR: fixed; mica; 560-mmfm $\pm 10\%$ ; 500-v dc (working); AWS No. CM30A561K.	2			*	*	*	*
C32									
C57	3K2510211	CAPACITOR: fixed; mica; 1,000-mmfm $\pm 10\%$ ; 500-v dc (working); AWS No. CM25A102K.	1			*	*	*	*
C35	3K3018211	CAPACITOR: fixed; mica; 1,800-mmfm $\pm 10\%$ ; 500-v dc (working); AWS No. CM30A182K.	1			*	*	*	*
C4	3K3022211	CAPACITOR: fixed; 2,200-mmfm $\pm 10\%$ ; 500-v dc (working); AWS No. CM30A222K.	4			*	*	*	*
C6									
C52									
C61									
C11	3K4082211	CAPACITOR: fixed; mica; 8,200-mmfm $\pm 10\%$ ; 500-v dc (working); AWS No. CM40A822K.	19			*	*	*	*
C13									
C14									
C15									
C17									
C18									
C8									
C19									
C21									
C22									
C23									
C30									
C33									
C34									
C36									
C37									



Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
L4	3C1081-13G	COIL: choke; r-f; S.W. Inductor, No. 662.	1			*	*	*	*
L1	3C1081-13F	COIL; choke; r-f; (15.5 kmh $\pm$ 10%); 4.1-ohm d-c resistance S.W. Inductor, No. 661.	1			*	*	*	*
L5	2Z9644.19	COIL ASSEMBLY: r-f; beat-frequency oscillator; 5.25 mc; includes R61, C53, C54, and C59; S.W. Inductor, No. 3491.	1			*	*	*	*
LF1	3Z1894-17	FILTER ASSEMBLY: line; includes L2, L3, C48, C49, C50, and C51; S.W. Insulator, No. 3492.	1			*	*	*	*
FS1	3Z1937-37	FUSE FU-27: 3-amp; 250-v; type 4AG.	1	5	*	*	*	*	*
	2Z5849.9	HANDWHEEL: oval; bakelite; Midwest Molding special.	1			*	*	*	*
J1	2Z5040-360	HOOD M-360: socket; Amphenol, No. 83-14.	1			*	*	*	*
LM1	2Z5572-7	JACK JK-34: headphone; Utah type No. 1003.	1			*	*	*	*
LM2	2Z5927	LAMP LM-27: pilot light; GE No. 44; 6, 8v; 250-ma; bayonet-base.	2	10	*	*	*	*	*
PL1	3E4142-41	PLUG AND LINE CORD ASSEMBLY: power; 2-prong a-c plug with 6' all rubber-covered #18 wire; Belden, No. 1750.	1			*	*	*	*
PL2	2Z3069	PLUG: male, octal, Amphenol Cp-8				*	*	*	*
R11	2Z7279-41	POTENTIOMETER: wire-wound; 1,500-ohm $\pm$ 20%; Chicago Telephone, No. 25; (straight line taper, with switch).	1			*	*	*	*
R58	2Z7279-40	POTENTIOMETER: carbon; 10,000-ohm $\pm$ 20%; Chicago Telephone, No. RAC 35; (No. 8 reversed taper, with switch).	1			*	*	*	*
SW3						*	*	*	*
R43	2Z7273-52.1	POTENTIOMETER: carbon; 1-meg $\pm$ 20%; (No. 6 taper, no switch) Chicago Telephone, No. 25.	1			*	*	*	*

R66	3Z5996-15	RESISTOR: fixed; carbon; 6-ohm $\pm$ 10%; 1/2-w; Erie No. 504.	1	*	*	*	*	*
R68	3Z5998-5	RESISTOR: fixed; carbon; 8-ohm $\pm$ 10%; 1/2-w; AWS No. RC21-AE100K.	6	*	*	*	*	*
R9	3RC21AE100K	RESISTOR: fixed; carbon; 10-ohm $\pm$ 10%; 1/2-w; AWS No. RC21-AE100K.	4	*	*	*	*	*
R23								
R16								
R26								
R17	3RC21AE330K	RESISTOR: fixed; carbon; 33-ohm $\pm$ 10%; 1/2-w; AWS No. RC21-AE330K.	5	*	*	*	*	*
R18								
R55								
R57								
R65								
R13	3Z6012-1	RESISTOR: fixed; carbon; 120-ohm $\pm$ 10%; 1/2-w; AWS No. RC20AE121K.	2	*	*	*	*	*
R20								
R1	3RC21AE271K	RESISTOR: fixed; carbon; 270-ohm $\pm$ 10%; 1/2-w; AWS No. RC21AE271K.	1	*	*	*	*	*
R15	3RC21AE331K	RESISTOR: fixed; carbon; 330-ohm $\pm$ 10%; 1/2-w; AWS No. RC21AE331K.	4	*	*	*	*	*
R22								
R25								
R62								
R2	3RC25CE102K	RESISTOR: fixed; carbon; 1,000-ohm $\pm$ 10%; 1/2-w; AWS No. RC25CE102K.	6	*	*	*	*	*
R3								
R6								
R21								
R27								
R67								
R5	3RC21AE222K	RESISTOR: fixed; carbon; 2,200-ohm $\pm$ 10%; 1/2-w; AWS No. RC21AE222K.	2	*	*	*	*	*
R29								
R46	3RC21AE472K	RESISTOR: fixed; carbon; 4,700-ohm $\pm$ 10%; 1/2-w; AWS No. RC21AE472K.	3	*	*	*	*	*

\*Indicated stock available.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
R47		AWS No. RC21AE472K.							
R63		RESISTOR: fixed; carbon; 15,000-ohm $\pm$ 10%; 1/2-w;	1			*	*	*	*
R37	3Z6615-26	AWS No. RC20AE153K.							
R64	3RC21AE223K	RESISTOR: fixed; carbon; 22,000-ohm $\pm$ 10%; 1/2-w;	1			*	*	*	*
R14	3RC21AE393K	AWS No. RC21AE223K.							
R31	3RC21AE393K	RESISTOR: fixed; carbon; 39,000-ohm $\pm$ 10%; 1/2-w;	1			*	*	*	*
R53		AWS No. RC21AE393K.							
R54	3RC21AE473K	RESISTOR: fixed; carbon; 47,000-ohm $\pm$ 10%; 1/2-w;	3			*	*	*	*
R38	3RC21AE563K	AWS No. RC21AE473K.							
R7		RESISTOR: fixed; carbon; 56,000-ohm $\pm$ 10%; 1/2-w;	1			*	*	*	*
R33		AWS No. RC21AE563K.							
R40		RESISTOR: fixed; carbon; 100,000-ohm $\pm$ 10%; 1/2-w;	7			*	*	*	*
R41	3Z4550	AWS No. RC29AE104K.							
R48									
R51									
R34	3RC21AE224K	RESISTOR: fixed; carbon; 220,000-ohm $\pm$ 10%; 1/2-w;	3			*	*	*	*
R36		AWS No. RC21AE224K.							
R39									
R24	3RC21AE474K	RESISTOR: fixed; carbon; 470,000-ohm $\pm$ 10%; 1/2-w;	8			*	*	*	*
R35		AWS No. RC21AE474K.							
R42									
R44									



Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
V10 V11 V12 V13 V14 SO1 SO2 SO3 SO4	2Z8795.12 (cont'd)  2Z8799-264	  SOCKET SO-264: 2-terminal; brass body; $\frac{27}{64}$ " long x $\frac{5}{8}$ " OD; threaded $\frac{5}{8}$ "-24; NEF-3 includes 1" square x $\frac{5}{64}$ " thick; 4-hole mounting plate located $\frac{35}{64}$ " from front of socket; $\frac{23}{32}$ " x $\frac{23}{32}$ " mounting centers; 2 solder-lug terminals made in accordance with Signal Corps dwg No. SC-D-5941.	3			*	*	*	*
for SW1	2Z8202.23	SWITCH: shaft and detent assembly; for band switch; Hallicrafter No. 74B118.	1			*	*	*	*
for SW1D SW1B SW1E	3Z9903E-11.3	SWITCH: wafer; for band switch; ceramic; Hallicrafter No. 62A035.	3			*	*	*	*
for SW1F	3Z9903E-11.4	SWITCH: wafer; for band switch; ceramic; Hallicrafter No. 62A036.	1			*	*	*	*
for SW1 SW1G SW1A	3Z9903A-11.5	SWITCH: wafer; for band switch; ceramic; Hallicrafter No. 62A037.	2			*	*	*	*
for SW1 SW1C	3Z9903E-11.6	SWITCH: wafer; for band switch; ceramic; Hallicrafter No. 62A038.	1			*	*	*	*

SW2	3Z9858-8.22	SWITCH: toggle; SPST: CH No. 8280; 3A at 250-v; case 1" long, threaded $1\frac{1}{2}$ "—32 or Hart and Hageman No. 20994 a-c.	3	*	*	*	*
SW4							
SW5							
SW6	3Z9849.92	SWITCH: toggle; DPST: CH No. 8360KZ or 8360K2; 3A at 250-v; case $1\frac{3}{8}$ " x $1\frac{1}{2}$ " x $\frac{9}{16}$ " deep; mounted by bushing $1\frac{1}{2}$ " long, threaded $1\frac{1}{2}$ "—32; solder-lug contact.	1	*	*	*	*
SW7A to SW7D	3Z9825-62.62	SWITCH: rotary; 3-section; 3-position; with single-pole a-c power switch at rear; open in position No. 1; closed positions Nos. 2 and 3; shorting-type contacts; Oak Mfg type H; Hallicrafter No. 60B178.	1	*	*	*	*
SW8A to SW8D	3Z9825-62.63	SWITCH: rotary; 2-position; single-section, non-shorting; Oak Mfg No. QH; Hallicrafter No. 60A177.	1	*	*	*	*
SW9	3Z9825-62.64	SWITCH: rotary selector; single-section; 4-position; Centralab No. BFX7360X; (all metal parts; shorting-type rotor contacts; shaft $\frac{1}{4}$ " diam); Hallicrafter dwg. No. 60B176.	1	*	*	*	*
SW10	3Z9858-3.2	SWITCH: toggle; DPDT; Hart and Hegeman; Hallicrafter dwg No. 60A090; (3-amp; 250-v; $1\frac{3}{4}$ " long x $2\frac{1}{2}$ " wide; $\frac{5}{8}$ " deep; solder-lug contacts).					*
T1	2C4537-27/T1	TRANSFORMER: antenna; 27.8- to 47-meg; S.W. Inductor, No. 651. Hallicrafter dwg No. 51A265.	1	*	*	*	*
T2	2C4537-27/T4	TRANSFORMER: antenna; 46- to 82-meg; S.W. Inductor, No. 654; Hallicrafter dwg. No. 51A268.	1	*	*	*	*
T3	2C4537-27/T7	TRANSFORMER: antenna; 82- to 143-meg; S.W. Inductor, No. 657; Hallicrafter dwg No. 51A271.	1	*	*	*	*
T4	2C4537-27/T2	TRANSFORMER: r-f; 27.8- to 47-meg; S.W. Inductor, No. 652; Hallicrafter dwg No. 51A266.	1	*	*	*	*
T5	2C4537-27/T5	TRANSFORMER: r-f; 46- to 82-meg; S.W. Inductor, No. 655; Hallicrafter dwg No. 51A269.	1	*	*	*	*

\*Indicated stock available.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
T6	2C4537-27/T8	TRANSFORMER: r-f; 82- to 143-meg; S.W. Inductor, No. 658; Hallicrafter dwg No. 51A272.	1						*
T7	2C4537-27/T3	TRANSFORMER: oscillator; 27.8- to 47-meg; S.W. Inductor, No. 653; Hallicrafter dwg No. 51A267.	1						*
T8	2C4537-27/T6	TRANSFORMER: oscillator; 46- to 82-meg; S.W. Inductor, No. 656; Hallicrafter dwg No. 51A270.	1						*
T9	2C4537-27/T9	TRANSFORMER: oscillator; 82- to 143-meg; S.W. Inductor, No. 659; Hallicrafter dwg No. 51A273.	1						*
T10	2Z9643.83	TRANSFORMER: first i-f 5.25-mc; includes R10; C12; C68; and C69; Hallicrafter dwg No. 50C145.	1						*
T11	2Z9643.84	TRANSFORMER: second i-f; 5.25-mc; includes R19; C18; C70; and C71; S.W. Inductor, No. 3487; Hallicrafter dwg No. 50C146.	1						*
T12	2Z9643.85	TRANSFORMER: third i-f; 5.25-mc; includes C72 and C73; S.W. Inductor, No. 3488; Hallicrafter dwg No. 50C147.	1						*
T13	2Z9643.86	TRANSFORMER: i-f; 5.25-mc; includes C76 and C77; S.W. Inductor, No. 3489; Hallicrafter dwg No. 50C148.	1						*
T14	2Z9643.87	TRANSFORMER: discriminator; 5.25-mc; includes C29; C74; and C75; S.W. Inductor, No. 3490; Hallicrafter dwg No. 50C149.	1						*
T15	2Z9632.184	TRANSFORMER: a-f; output; Standard Transformer, No. 10A40; Hallicrafter dwg No. 55C062; (one primary and two secondary windings; primary to match 12,000-ohm push-pull lead at 35 ma; one	1						*

T16	2Z9608-17	secondary to match 600 ohms; 2d secondary ct to match 5,000 tapped at 500; iron core; break-down voltage 1,000 rms v). TRANSFORMER: power; Standard Transformer, No. 10P51; Hallicrafter No. 52C084 (2 sections; primary in series for 115 volts; 3 secondaries: 6.4-v, 5-v, 540-v ct; 270-v; iron core; hermetically sealed case; 4 <sup>15</sup> / <sub>16</sub> " long x 3 <sup>3</sup> / <sub>4</sub> " deep x 5 <sup>5</sup> / <sub>16</sub> " high).	1	*	*	*	*	*	
<b>PART II</b>									
V1	2J956	TUBE: VT-238; JAN-956.	1	*	*	*	*	*	*
V2	2J954	TUBE: VT-120; JAN-954.	1	*	*	*	*	*	*
V3	2J6AC7/1852	TUBE: VT-112; JAN-6AC7.	2	*	*	*	*	*	*
V7									
V4	2J6AB7	TUBE: VT-176; JAN-6AB7/1853.	1	*	*	*	*	*	*
V5	2J6SK7	TUBE: VT-117; JAN-6SK7.	1	*	*	*	*	*	*
V6	2J6H6	TUBE: VT-90; JAN-6H6.	2	*	*	*	*	*	*
V8									
V9	2J6SL7GT	TUBE: VT-229; JAN-6SL7GT.	1	*	*	*	*	*	*
V10	2JVR150-30	TUBE: VT-139; JAN-OD3/VR-150.	1	*	*	*	*	*	*
V11	2J6V6G	TUBE: VT-107-B; JAN-6V6-G.	2	*	*	*	*	*	*
V12									
V13	2J5U4G	TUBE: VT-244; JAN-5U4G.	1	*	*	*	*	*	*
V14	2J6J5	TUBE: VT-94; JAN-6J5.	1	*	*	*	*	*	*
V15	2J955	TUBE: VT-121; JAN-955.	1	*	*	*	*	*	*

\*Indicated stock available.

2684—Phila—44; 1500; November 9, 1944  
9789—Phila—44—03; 703; November 9, 1944

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