HEWLETT hp PACKARD

MANUAL CHANGES

MODEL 606A
HF SIGNAL GENERATOR

Manual Serial Prefixed: 644-
Manual Printed: August 1966

MAKE ALL CORRECTIONS IN THIS MANUAL ACCORDING TO ERRATA BELOW, THEN CHECK THE FOLLOWING TABLE FOR YOUR INSTRUMENT SERIAL PREFIX (3 DIGITS) OR SERIAL NUMBER (8 DIGITS) AND MAKE ANY LISTED CHANGE(S) IN THE MANUAL.

► NEW ITEM.

SERIAL PREFIX OR NUMBER	MAKE MANUAL CHANGES	SERIAL PREFIX OR NUMBER	MAKE MANUAL CHANGES
842-	1		
842- above 12330	1, 2		

ERRATA:

Table 1-1:
Change FREQUENCY DRIFT specification to read, "(Attenuator on 1 volt range and below) Less than 50 parts in 10^6 (or 5 cycles, whichever is greater) per 10 minute period after 2 hour warm-up. Less than 10 minutes to restabilize after changing frequency."

Change the Output Impedance Specification to read: "50 ohms; SWR less than 1.2 on 0.3 volt attenuator range and below." Delete the remainder of the specification.

Paragraph 4-62:
Change steps d, e, and f to read:

(d) To check the output impedance, switch the VTVM to the 1 volt range, and the attenuator to the 0.3 volt range.

(e) . . . . . 1 on the 0.1 scale at 20 MHz.

(f) Remove the 50-ohm load. Output voltage should rise to 2 ±0.2V.

Paragraph 4-64:
Change step a to read, "Allow Model 606A to warm up for at least two hours."

Parts List:
Change the Stock No. of tubes V3 and V4 from 1923-0030 to 1923-0072.

Figure 4-8 and Parts List:
Change resistor R206 from 1500 ohms,
Stock No. 0687-1521 to 1100 ohms, Stock No. 0686-1125.

Figure 4-10 and Parts List:
Change V109 tube type from 5651 to 5651A.
► Reverse C102 and C101A reference designators.

Parts List:
Change stock number of V5 from 1932-0027 to 1932-0045.

CHANGE 1:

Figure 4-9 and Parts List:
Substitute the attached schematic for the crystal calibrator part of Figure 4-9.

Add R136, 20K, Stock No. 0816-0018; and CR113, 26.1V, Stock No. 1902-3268, as shown in attached schematic.

CHANGE 1: Parts List:
(Cont.) Substitute the below listings for crystal calibrator parts:
(Prefix Reference Designator with "A4".)

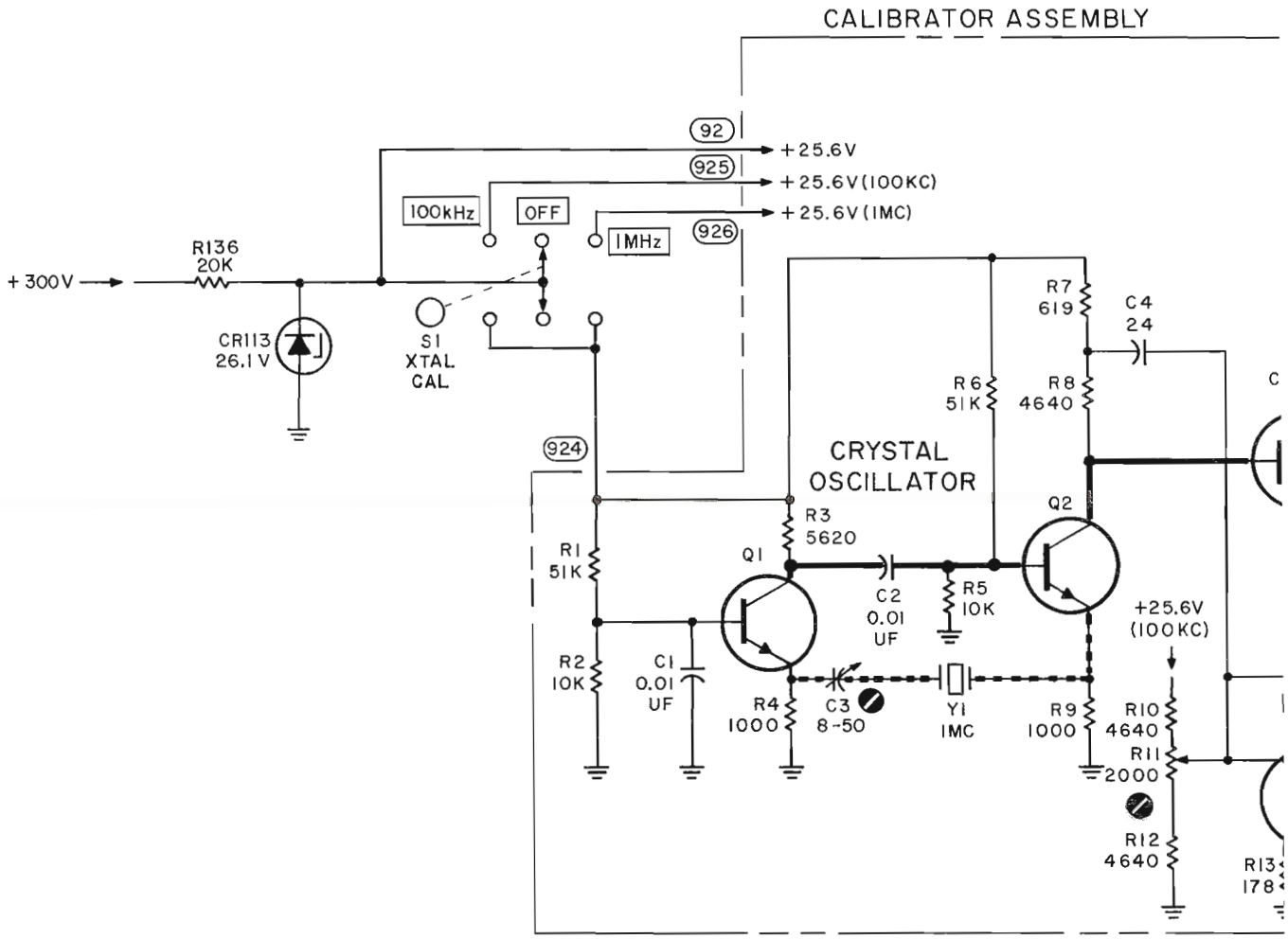
Reference Designation	℗ Part No.	Description #	Note
A4	00606-603	BOARD ASSY:CRYSTAL CALIBRATION	
	0380-0059	SPACER:SLEEVE BRASS FOR #6 HDW	
C1	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
C2	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
C3	0130-0017	C:VAR CER 8-50 PF	
C4	0160-0196	C:FXD MICA 24PF 5% 300VDCW	
C5	0140-0200	C:FXD MICA 390 PF 5%	
C6	0140-0204	C:FXD MICA 47PF 5% NPO 500VDCW	
C7	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
C8	0150-0050	C:FXD CER 1000 PF 600VDCW	
C9	0150-0050	C:FXD CER 1000 PF 600VDCW	
C10	0140-0176	C:FXD MICA 100 PF 2%	
C11	0140-0204	C:FXD MICA 47PF 5% NPO 500VDCW	
C12	0150-0121	C:FXD CER 0.1UF +80%-20% 50VDCW	
C13	0150-0096	C:FXD CER 0.05 UF +80-20% 100VDCW	
C14	0180-0155	C:FXD ELECT 2.2UF 20% 20VDCW	
C15	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
CR1	1901-0025	DIODE:SILICON 100WV 100MA	
CR2	1910-0016	DIODE:SILICON 1N1566	
CR3	1910-0016	DIODE:SILICON 1N1566	
CR4	1910-0016	DIODE:SILICON 1N1566	
CR5	1910-0016	DIODE:SILICON 1N1566	
CR6	1910-0040	DIODE:SILICON 30MA 30WV	
CR7	1901-0040	DIODE:SILICON 30MA 30WV	
CR8	1910-0016	DIODE:SILICON 1N1566	
CR9	1910-0016	DIODE:SILICON 1N1566	
Q1	1854-0005	TRANSISTOR:SILICON NPN 2N708	
Q2	1854-0005	TRANSISTOR:SILICON NPN 2N708	
Q3	1854-0005	TRANSISTOR:SILICON NPN 2N708	
Q4	1853-0009	TRANSISTOR:SILICON PNP	
Q5	1853-0009	TRANSISTOR:SILICON PNP	
Q6	1854-0071	TRANSISTOR:SILICON NPN	
R1	0757-0458	R:FXD MET FLM 51.1K OHM 1% 1/8W	
R2	0757-0442	R:FXD MET FLM 10.0K OHM 1% 1/8W	
R3	0757-0200	R:FXD MET FLM 5.62K OHM 1% 1/8W	
R4	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
R5	0757-0442	R:FXD MET FLM 10.0K OHM 1% 1/8W	
R6	0757-0458	R:FXD MET FLM 51.1K OHM 1% 1/8W	
R7	0757-0418	R:FXD MET FLM 619 OHM 1% 1/8W	
R8	0698-3155	R:FXD MET FLM 4.64K OHM 1% 1/8W	
R9	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
R10	0698-3155	R:FXD MET FLM 4.64K OHM 1% 1/8W	
R11	2100-1774	R:VAR WW 2K OHM 10% LIN 1/2W	
R12	0698-3155	R:FXD MET FLM 4.64K OHM 1% 1/8W	
R13	0698-3439	R:FXD MET FLM 178 OHM 1% 1/8W	
R14	0757-0123	R:FXD MET FLM 34.8K OHM 1% 1/8W	
R15	0757-0418	R:FXD MET FLM 619 OHM 1% 1/8W	

CHANGE 1:
(Cont.)

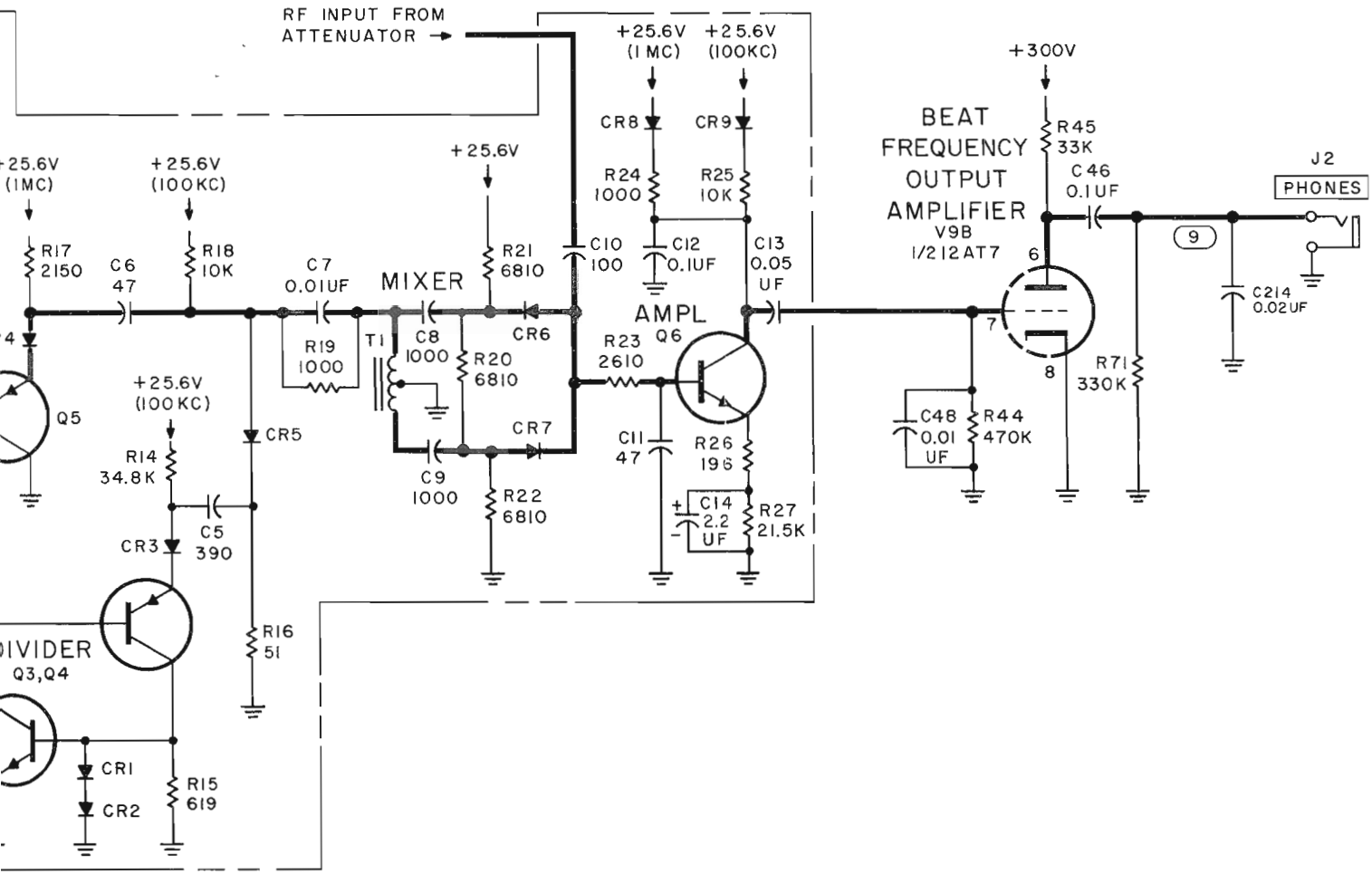
Reference Designation	hp Part No.	Description #	Note
R16	0757-0394	R:FXD MET FLM 51.1 OHM 1% 1/8W	
R17	0698-0084	R:FXD MET FLM 2.15K OHM 1% 1/8W	
R18	0757-0442	R:FXD MET FLM 10.0K OHM 1% 1/8W	
R19	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
R20	0757-0439	R:FXD MET FLM 6.81K OHM 1% 1/8W	
R21	0757-0439	R:FXD MET FLM 6.81K OHM 1% 1/8W	
R22	0757-0439	R:FXD MET FLM 6.81K OHM 1% 1/8W	
R23	0698-0085	R:FXD MET FLM 2.61K OHM 1% 1/8W	
R24	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
R25	0757-0442	R:FXD MET FLM 10.0K OHM 1% 1/8W	
R26	0698-3440	R:FXD MET FLM 196 OHM 1% 1/8W	
R27	0757-0199	R:FXD MET FLM 21.5K OHM 1% 1/8W	
T1	9100-0399	TRANSFORMER	
Y1	0410-0013	CRYSTAL:QUARTZ 1MHZ	

CHANGE 2: Figure 4-8 and Parts List:
Change R209 to 1.5K, 5%, stock no. 0686-1525.
Change R203 and R206 to "factory selected part".

Delete "factory selected . . ." from R210 and R211 description.



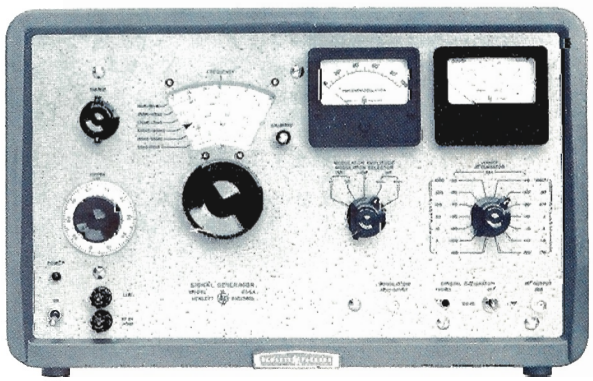
606B-MOD/CAL-606A


RF INPUT FROM ATTENUATOR
+25.6V (1MC)
+25.6V (100KC)
+25.6V
+25.6V (1MC)
+25.6V (100KC)
+300V
R17 2150
C6 47
R18 10K
C7 0.01UF
MIXER
R21 6810
C10 100
CR8
CR9
R24 1000
R25 10K
C12 0.1UF
C13 0.05 UF
AMPL Q6
R23 2610
CR6
T1
C8 1000
R20 6810
R19 1000
CR7
C9 1000
R22 6810
C11 47
R26 196
C14 2.2 UF
R27 21.5K
BEAT FREQUENCY OUTPUT AMPLIFIER V9B 1/2 12AT7
R45 33K
C46 0.1UF
J2
PHONES
C214 0.02UF
R71 330K
C48 0.01 UF
R44 470K
Q5
R14 34.8K
CR5
C5 390
CR3
R16 51
IVIDER Q3,Q4
CR1
CR2
R15 619

OPERATING AND SERVICE MANUAL

SIGNAL GENERATOR

606A



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CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.

WARRANTY AND ASSISTANCE

All Hewlett-Packard products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the operating manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period. No other warranty is expressed or implied. We are not liable for consequential damages.

For any assistance contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

OPERATING AND SERVICE MANUAL

MODEL 606A

HIGH FREQUENCY SIGNAL GENERATOR

SERIALS PREFIXED: 644-

(For other serials see Appendix)

00170-6

Printed: AUG 1966

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Table 1-1. Specifications

FREQUENCY RANGE:
50 kc to 65 mc in 6 bands

50 - 170 kc	1.76 - 6.0 mc
165 - 560 kc	5.8 - 19.2 mc
530 - 1800 kc	19.0 - 65.0 mc

FREQUENCY ACCURACY: Within ±1%

FREQUENCY CALIBRATOR:
Crystal oscillator provides check points at 100-kc (useful to 6 mc) and 1-mc intervals accurate within 0.01% from 0° to 50°C

RF OUTPUT LEVEL:
Continuously adjustable from 0.1 μv to 3 volts into a 50-ohm resistive load. Calibration is in volts and dbm (0 dbm is 1 milliwatt).

OUTPUT ACCURACY:
Within ±1 db into 50-ohm resistive load

FREQUENCY RESPONSE:
Within ±1 db into 50 ohms resistive load over entire frequency range at any output level setting

OUTPUT IMPEDANCE:
50 ohms, swr less than 1.1 on 0.3 volt range; on 1-volt and 3-volt ranges, less than 1.1 to 20 mc and less than 1.2 to 65 mc. BNC output connector mates with UG-88A/B/C/D.

SPURIOUS HARMONIC OUTPUT: Less than 3%

LEAKAGE:
Negligible; permits receiver sensitivity measurements down to at least 0.1 microvolt

AMPLITUDE MODULATION:
Continuous adjustable from 0 to 100%. Indicated by a panel meter. Modulation level is constant within ±1/2 db regardless of carrier frequency and output level changes.

INTERNAL MODULATION:
0 to 100% sinusoidal modulation at 400 cps ±5% or 1000 cps ±5%

MODULATION BANDWIDTH:
DC to 20 kc maximum, depends on carrier frequency, f_c, and percent modulation as shown in the following table:

Max. Mod. Frequency:

30% Mod.	70% Mod.	Squarewave Mod.
$0.06\ f_c$	$0.02\ f_c$	$0.003\ f_c$ (3 kc max.)

EXTERNAL MODULATION:
0 to 100% sinusoidal modulation dc to 20 kc, 4.5 volts peak produces 100% modulation at modulating frequencies from dc to 20 kc. Input impedance is approximately 600 ohms. May also be modulated by square waves and other complex signals.

ENVELOPE DISTORTION:
On the 1-volt and lower ranges, less than 1% at 30% modulation using internal 400 or 1000 cps source, less than 3% from 0 to 70% modulation.

MODULATION METER ACCURACY:
Within ±5% of full scale (from 0 to 90% modulation) for modulation frequencies to 10 kc; within 10% of full scale from 10 to 20 kc.

INCIDENTAL FM:
On the 1-volt and lower ranges and 30% modulation: ±0.0025% or ±100 cps, whichever is greater

SPURIOUS FM:
Less than ±0.0001% or ±20 cps whichever is greater

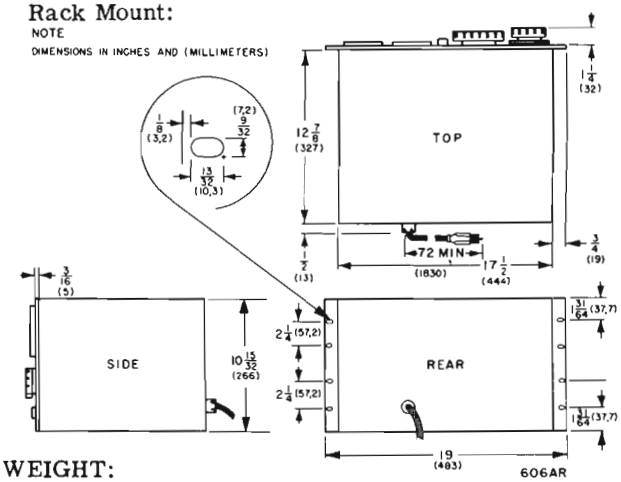
SPURIOUS AM:
Hum and noise sidebands are 70 db below carrier down to thermal level of 50-ohm output system

FREQUENCY DRIFT:
(Attenuator on 1 volt range and below) Less than 50 parts in 10^6 (or 5 cycles, whichever is greater) per 10 minute period after 2 hour warmup. Less than 10 minutes to restabilize after changing frequency.

POWER:
115 or 230 volts ±10%, 50 to 1000 cps, 135 watts

DIMENSIONS:
Cabinet Mount: 20-3/4 in. wide, 12-1/2 in. high, 14-3/4 in. deep

Rack Mount:



WEIGHT:
Cabinet Mount: Net 46 lb, shipping 57 lb
Rack Mount: Net 43 lb, shipping 58 lb

ACCESSORIES AVAILABLE:
11507A Output Termination. Three positions, 50 ohms, for use into high impedance; 5 ohms (10:1 voltage division); IRE Standard Dummy Antenna (driven from 10:1 divider)

10503A Cables

11509A Fuseholder, type N connectors. Protects output attenuator.

SECTION I
GENERAL INFORMATION

1-1. GENERAL DESCRIPTION.

1-2. The Hewlett-Packard Model 606A is a general-purpose signal generator with a frequency range of 50 kc to 65 mc. The instrument has a direct reading frequency dial calibrated to an accuracy of 1%. Output is held constant within ±1 db and is continuously adjustable from .01 microvolt to 3 volts into a 50 ohm resistive load. An internal crystal calibrator provides check points at 100 kc and 1 mc intervals with an error of less than 0.01%. A front-panel meter accurately indicates the percent amplitude modulation for frequencies within the modulation bandwidth of the signal generator.

1-3. The Model 606A has a highly refined amplitude modulation system which allows modulation up to 90% with low distortion and incidental fm. This feature makes possible precision distortion checks of receivers from antenna to output. The instrument can be internally modulated at 400 or 1000 cps. It can be externally modulated from dc to 20 kc or more, depending on rf frequency in use. Complex waveforms, square waves, and dc voltages may be used to modulate the Model 606A for testing and evaluating filters, networks, amplifiers, and receivers.

1-4. DIFFERENCES BETWEEN INSTRUMENTS.

1-5. The Model 606A carries a five-digit serial number with a three-digit prefix (000-00000). The prefix changes only when a change is made in the instrument. The prefix, then, is an identifier, and it appears on the title page of this manual to indicate to which instrument this manual directly applies. A supplement may be included with this manual to indicate the necessary changes to be made in the manual to make it apply directly to instruments which carry a different serial number prefix.

1-6. UNPACKING AND INSPECTION.

1-7. Unpack and inspect the Model 606A as soon as possible after receipt. Save all packing materials until inspection is complete. These materials may be required for reshipment should you discover any damage.

1-8. Inspect the instrument first for signs of physical damage such as scratched or abraded panel, broken knobs, etc. If possible, energize the instrument and check it electrically. Operation check is described in paragraph 4-56. If there is any indication of damage, notify the carrier and your Hewlett-Packard sales and service office immediately.

Figure 1-1. Model 606A High Frequency Signal Generator

1-9. POWER REQUIREMENTS.

1-10. The Model 606A can be operated from a 115- or 230-volt, 50- to 1000-cps source. A two-position slide switch to the rear inside the instrument, on the panel next to the RF cover, selects AC operation mode. The line voltage at which the instrument is set to operate appears on the slider of the switch. A 2-ampere slo-blow fuse is used for 115-volt operation; a 1-ampere slo-blow fuse is used for 230-volt operation.

1-11. INSTALLATION INSTRUCTIONS.

1-12. The Model 606A should not be operated in an ambient temperature greater than +50°C. Do not install the rack-mount model near other equipment discharging hot air around the Model 606A.

1-13. POWER CABLE.

1-14. To protect operating personnel, the National Electrical Manufacturers' Association (NEMA) recommends that instrument panel and cabinet be grounded. This instrument is equipped with a three-conductor power cable which, when plugged into an appropriate receptacle, grounds the instrument. The offset round pin on the power cable connector is the ground pin.

1-15. To preserve the protection feature when operating the instrument from a two-contact outlet, use a three-prong to two-prong adapter, and connect the green pigtail on the adapter to ground.

1-16. ACCESSORIES AVAILABLE.

1-17. 11507A OUTPUT TERMINATION. The 606A-34A provides the following:

a) 50 ohm termination reduces the source impedance to 25 ohms.

b) 20 db attenuator (10:1 voltage divider) which reduces the source impedance to 5 ohms.

c) Simulates IRE standard dummy antenna (10:1 voltage division) for precision measurements on receivers.

1-18. 11509A FUSED ATTENUATOR PROTECTOR. Prevents the Model 606A output attenuator from burning out when working with transceiver type equipment. If the transmitter is accidentally keyed the 11509A prevents power from being applied to the RF OUTPUT jack of the Model 606A. (Requires two BNC to type "N" adapters UG-201A/U and UG-349A/U. Not furnished.)

SECTION II
OPERATING INSTRUCTIONS

2-1. OUTPUT TERMINATION.

2-2. The Model 606A output level is calibrated only when terminated with a 50-ohm resistive load. For use into any other load the ℗ 11507A output termination is recommended (see paragraph 1-20).

2-3. A coaxial cable of 50 ohms nominal impedance with BNC male connectors is suitable for use with the Model 606A. Single braid shield types are suitable for use from maximum output to approximately -80 dbm (30 microvolts). Double braid or solid types are recommended for use over the entire attenuation range. A good general purpose cable is 3 feet of RG-55U (double braid shield) with UG-88C/U BNC connectors on each end. See figure 2-3, External Output Termination, for information concerning output cable termination.

2-4. The output jack on the ℗ 11507A has been provided as a BNC connector for maximum shielding. Clip-lead connection may be provided easily by inserting a UG-290U connector with soldered-on clip leads into the output jack of the Output Termination. Keep the length of the clip leads as short as possible.

2-5. SETTING THE CURSOR.

2-6. Set the cursor (movable index) with the CALIBRATE knob so that it is aligned with the line under the engraving reading FREQUENCY before setting the frequency. The FREQUENCY dial is calibrated only after this operation is performed.

2-7. OUTPUT ATTENUATOR.

CAUTION

Damage to output attenuator may be incurred if: 1) Output is shorted in the 3-volt range, 2) External voltage is applied to the attenuator output.

2-8. The output attenuator contains resistors which can be burned out by careless usage. If the output is shorted out in the 3-volt range or if voltage is fed into the attenuator accidently, these resistors may be burned out or heated up so that they are no longer calibrated. This may occur while measuring the sensitivity of the receiver in a mobile transmitter-receiver installation when the transmit button is pushed accidently. An attenuator fuse is available as an accessory when it is desired to use this generator under conditions where the attenuator may be burned out (see paragraph 1-21). The resistors in the attenuator are NOT field replaceable. Do not open the attenuator to check these resistors as placement of the resistors is critical. The attenuator may be removed from the instrument and returned separately to the factory for repair.

2-9. USE OF THE 3-VOLT RANGE.

2-10. The unusually high output range of 3 volts is useful for driving rf bridges or other equipment requiring a calibrated high-level high-frequency voltage. This useful range is obtained at the expense of operating the power amplifier stage near the overload point. You will obtain best life from these tubes by not leaving the generator on the 3 VOLT range any longer than necessary to make your measurement. Never leave it on this range while warming up or during standby operation.

2-11. EXTERNAL MODULATION.

2-12. Take care when using external modulation with direct coupling. The dc level of the signal will affect the average rf level. If only the ac component of the modulating signal is desired, switch the MODULATION SELECTOR to EXT. AC. Do not apply more than 10 volts dc or ac to the MODULATION jack. Overloading will shorten life of the MODULATION AMPLITUDE control.

2-13. EXTERNAL SYNCHRONIZATION SIGNAL.

2-14. When the Model 606A is modulated internally a signal is available at the MODULATION INPUT-OUTPUT jack for synchronization purposes. This signal is fed from the same oscillator which modulates the carrier. It is of approximately ≅3 vrms amplitude from a high impedance source. Since the signal comes from a high impedance source use it only as a voltage source and do not attempt to draw current.

2-15. B+ FUSE.

2-16. The regulated B+ voltage is fused on the front panel. If excessive modulation is accidentally applied to the instrument the tuned circuits may flash over from excessive peak rf voltage. This will blow the B+ fuse. The instrument will have no output and the output level meter will be pinned to the left of zero. If this happens, the fuse must be replaced to restore operation.

2-17. MODULATION DATA.

2-18. Figure 2-1 shows the modulation limits for various types of modulation over the operating frequency range.

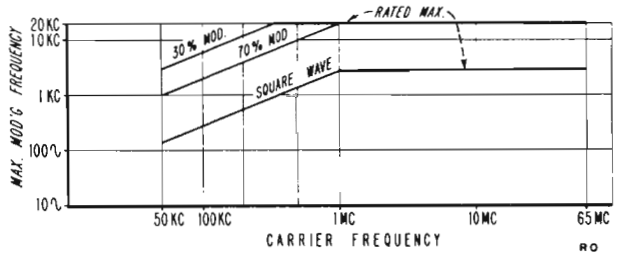
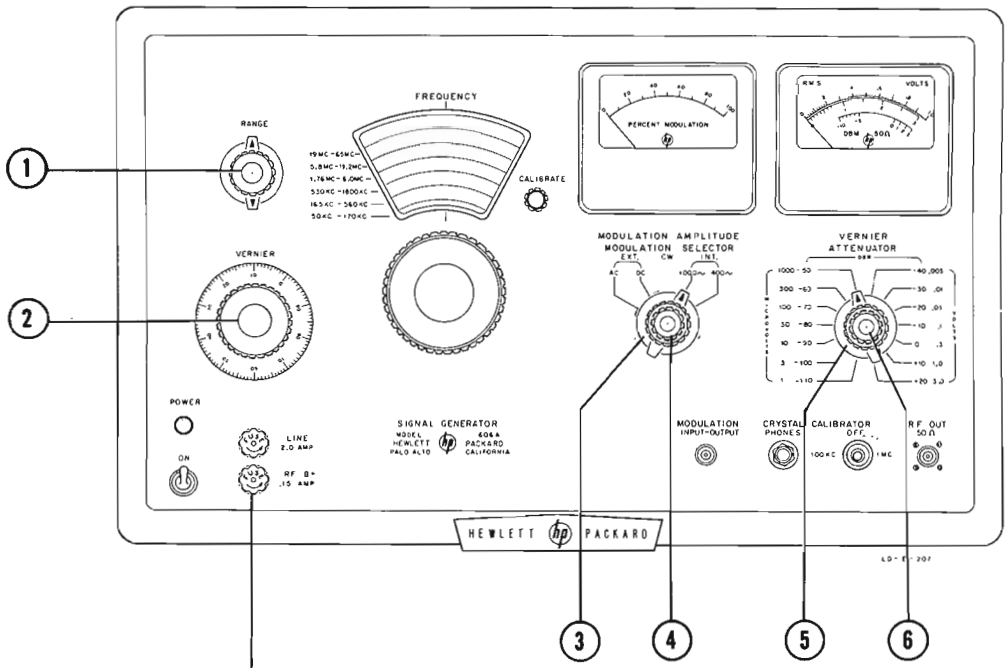


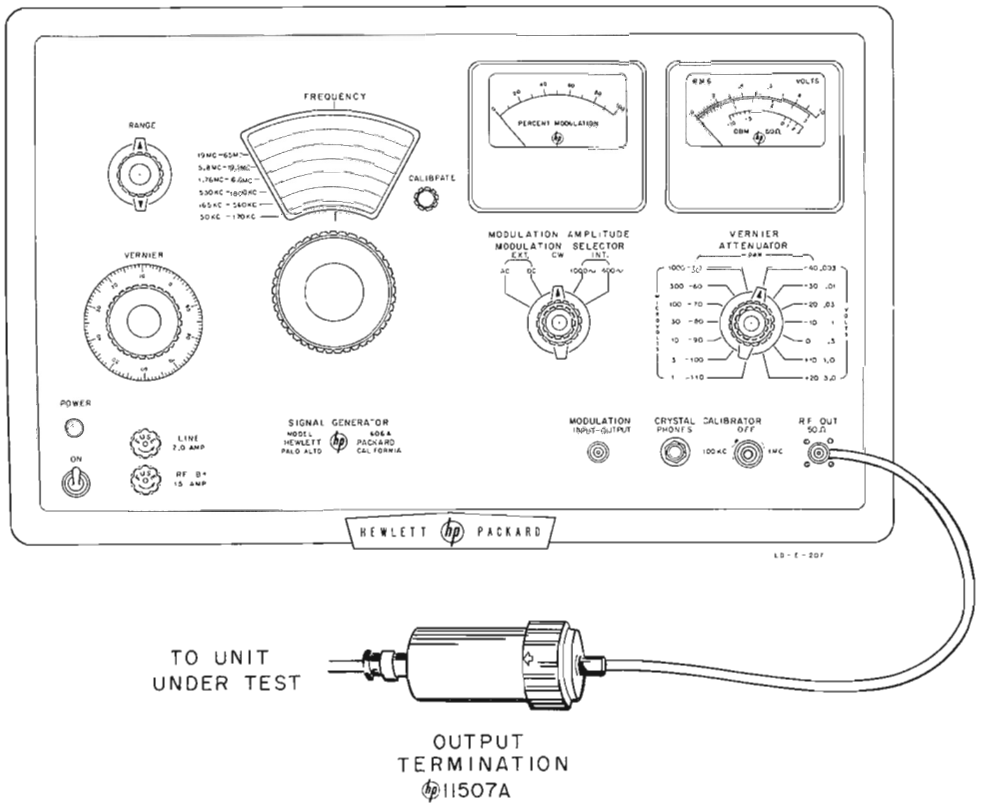
Figure 2-1. Modulating vs Carrier Frequency



B+ FUSE NO R.F. OUTPUT AND OUTPUT METER PINNED TO LEFT IF BLOWN.

1. Rotate RANGE switch to select desired band.
2. Rotate FREQUENCY control to desired frequency. Read frequency on scale indicated by pointer.
3. Rotate MODULATION SELECTOR to INT (either 400 cps or 1000 cps modulation is available).
4. Set modulation level as read on PERCENT MODULATION meter with MODULATION AMPLITUDE control.
5. Rotate ATTENUATOR to select output voltage level desired.
6. Rotate ATTENUATOR VERNIER to desired output level. Read range of output meter on ATTENUATOR switch and value on meter.

Figure 2-2. General Operation



The attenuator on the Model 606A Signal Generator is calibrated only when used with a load of 50 ohms. For high impedance loads or receiver inputs the output termination (hp 11507A) is recommended. This output termination is designed for use at the end of a 50 ohm shielded cable, and to operate into a high impedance (500 ohms or greater) load.

The 11507A has three positions as the rear shell is rotated clockwise as follows:

a. DUMMY ANTENNA. Output impedance varies as per IRE Standard Dummy Antenna* at an output level 20 db below the input level (10:1 voltage division ratio).

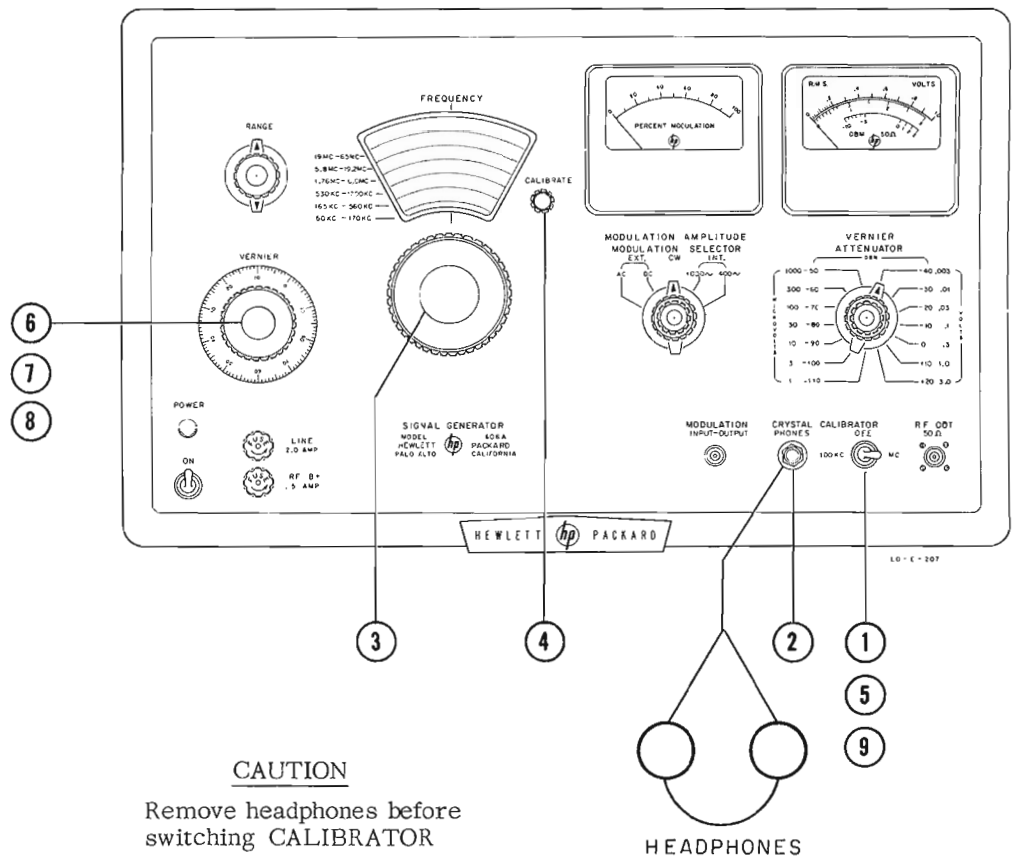
b. ZERO DB ATTENUATION. 25 ohms output impedance (1:1 voltage ratio).

c. TWENTY DB ATTENUATION. 5 ohms output impedance (10:1 voltage division).

Note: Maximum permissible input power to probe is 180 milliwatts (3 volts across 50 ohms).

* See "Standards on Radio Receivers", Institute of Radio Engineers, 1938; and Terman, "Radio Engineers Handbook", any edition -- section entitled "Measurements on Radio Receivers".

Figure 2-3. External Output Termination

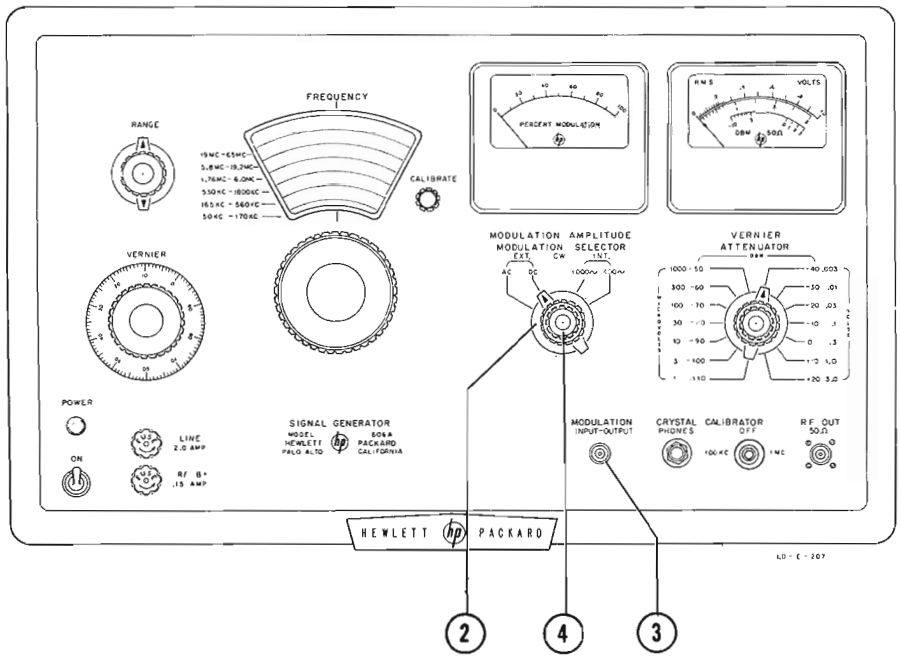


CAUTION

Remove headphones before switching CALIBRATOR

1. Switch CRYSTAL CALIBRATOR to 1 MC.
2. Plug a set of high impedance headphones into PHONES jack.
3. Zero-beat nearest even megacycle division to desired frequency.
4. Set the cursor exactly on the megacycle mark.
5. Switch CRYSTAL CALIBRATOR switch to 100 KC (lower frequencies only).
6. Turn VERNIER dial toward desired frequency while counting 100 kc beats. This procedure will set the frequency within 100 kc. If the frequency is desired with greater accuracy follow the remaining steps:
7. Determine number of scale divisions on VERNIER dial between zero-beat of the two 100 kc beats on either side of the desired frequency.
8. Set VERNIER dial to proportional number of divisions from nearest 100 kc beat to the desired frequency.
9. Turn CRYSTAL CALIBRATOR to OFF. If left on it will modulate output signal.

Figure 2-4. Calibration



1. Perform procedure for CW operation (figure 2-2)
2. Set MODULATION SELECTOR to EXT (AC or DC coupling).
3. Connect modulating signal (3 volts or more adjustable) to MODULATION terminal.
4. Turn MODULATION AMPLITUDE fully clockwise.
5. Increase signal from external generator until a reading of 100% is obtained on the PERCENT MODULATION meter.
6. Reduce the percent modulation to the desired level with the MODULATION AMPLITUDE control.

The limits of modulation frequency depend upon the maximum tolerable envelope distortion. For three percent envelope distortion the limits in terms of the carrier frequency, f_c, are:

	30% Mod.	70% Mod.	Square-Wave Mod.
$f_{mod.\ max}$ =	$.06\ f_c$	$.02\ f_c$	$.003\ f_c$
absolute $f_{mod.\ max}$ =	20 kc	20 kc	3 kc

Applying these formulas, typical bandwidths are:

Carrier Freq.	Modulation Frequency		
Frequency	30% Mod.	70% Mod.	Square Wave
50 kc	3 kc	1 kc	150 cps
200 kc	12 kc	4 kc	600 cps
500 kc	20 kc	10 kc	1500 cps
1 mc and above	20 kc	20 kc	3 kc

NOTE: On the 3 VOLT output range and between 19 - 65 mc in frequency, modulation beyond 30% is not recommended.

Figure 2-5. External Modulation

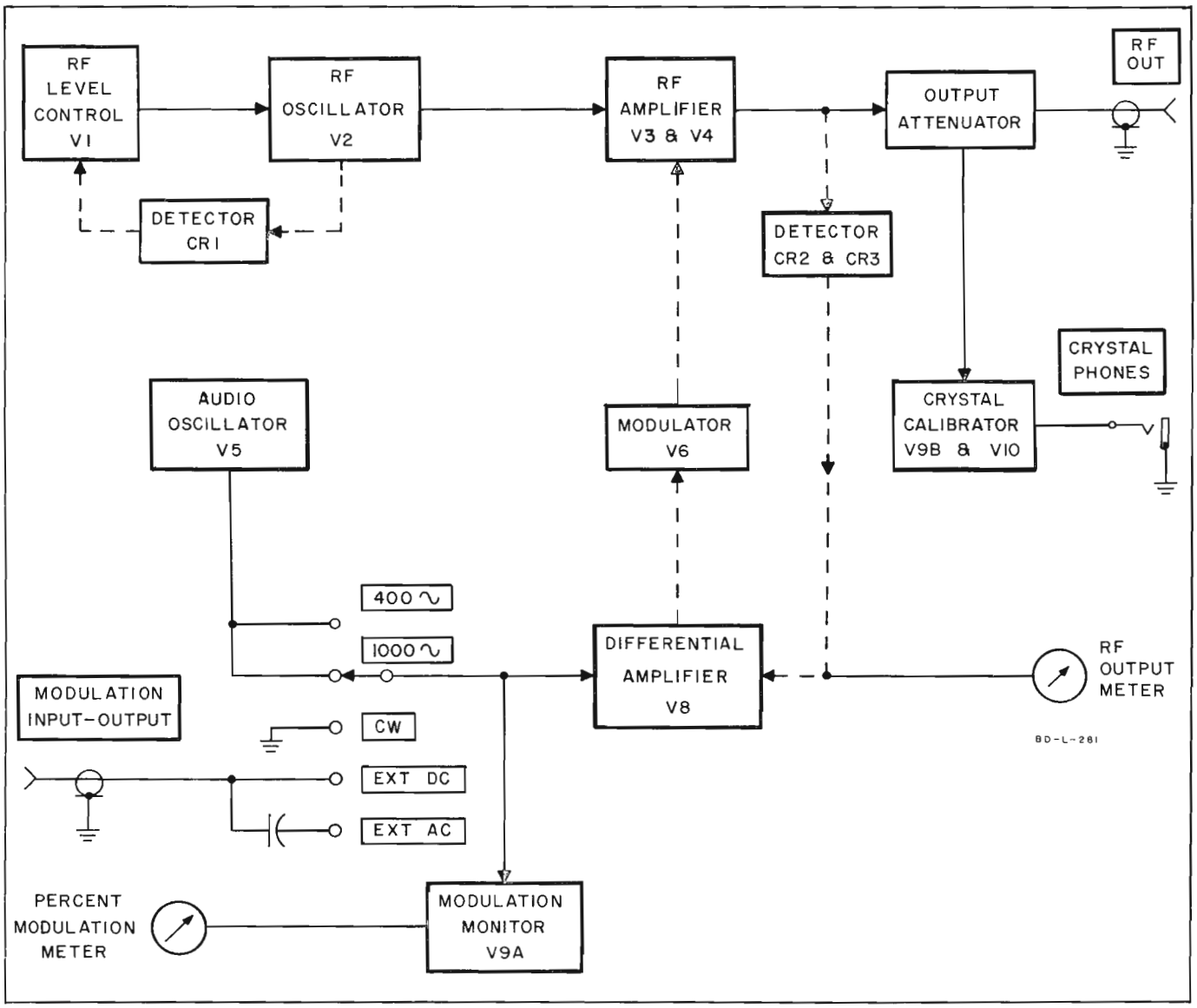


Figure 3-1. Model 606A Block Diagram

SECTION III
THEORY OF OPERATION

3-1. OVERALL OPERATION.

3-2. Refer to the block diagram figure 3-1. The level of the rf oscillator is stabilized by a feedback circuit from the rf oscillator to the oscillator level control tube. In a similar way the rf output and modulation levels are held constant by a feedback loop from the rf output through the differential amplifier to the modulator. The rest of the block diagram represents standard circuitry for signal generators.

3-3. CIRCUIT DESCRIPTION.

3-4. RF OSCILLATOR AND LEVEL CONTROL. The rf oscillator is a tuned-plate push-pull oscillator. The pentode section of V1 acts as a variable cathode resistor for V2 to control the oscillator level. The control grid of this pentode receives a rectified portion of the oscillator signal. This voltage decreases the current through V1 when the oscillator level rises and vice versa. Since this current is also the cathode current of the rf oscillator, the level of oscillation will be held constant. The triode section of V1 is a cathode follower which provides bias voltage for the grids of the oscillator and amplifier.

3-5. RF AMPLIFIER. The rf oscillator signal is fed to the control grids of the push-pull rf amplifier stage, V3 and V4. The screen grids are connected directly to +300 volts. The amplifier cathode current is controlled by V6, which acts as a variable cathode resistor. See the next paragraph for an explanation.

3-6. MODULATOR. Triode V6 is inserted in the cathode circuit of the rf amplifier to obtain cathode modulation. The internal resistance of the triode changes according to the applied modulation signal at the control grid. Thus cathode current of the rf amplifier is varied which, in turn, amplitude modulates the rf level.

3-7. RF FEEDBACK AND LEVEL CONTROL CIRCUIT. The modulated rf output signal is sampled at the secondary winding of the rf output transformer and rectified by crystal diodes CR2 and CR3. The time constant of the rc filter is determined by the position of the frequency RANGE selector. This time constant is selected to bypass the rf component but not the modulation or dc level. The demodulated rf signal is then fed to the control grid, pin 7, of the differential amplifier.

3-8. This demodulated signal is dc-coupled and thus has a dc component equal to the cw level of the output plus an ac component corresponding to the modulation. The demodulated rf signal also passes through an rf filter R36, C37, C38, and L6 which minimizes leakage. At the output of this filter a dc current is obtained which is proportional to the cw rf level. This current is then fed to the rf output meter.

3-9. A two-position attenuator, which controls the amount of feedback, is inserted between the crystal detectors and the differential amplifier. In the 1 VOLT and lower output positions the feedback is obtained through the divider R25 and R36. Only in the 3 VOLT position is R36 (in feedback loop) shunted by R26. This raises the current through the rf amplifier by 10 db. This switching is done automatically by relay K1 whenever the ATTENUATOR selector is switched to the 3 VOLT position.

3-10. RF ATTENUATOR. The rf output signal is tapped off the secondary winding of the output rf transformer and fed to the input of the output attenuator. This attenuator provides a maximum attenuation of 120 db in 10 db ranges. The output level may be varied between ranges by changing the input to the attenuator with the ATTENUATOR VERNIER control. Input is monitored by the rf level meter. The 3 VOLT rf output is obtained by reducing the demodulator rf feedback.

3-11. CRYSTAL CALIBRATOR. A small signal, coupled from the attenuator, is fed to the control grid (pin 2) of a mixer amplifier (triode section of V10). The output of the crystal oscillator (pentode section of V10) is also fed to this grid. The mixed signal from V10 is fed into an output triode amplifier, V9B. The beat-frequency output of V9B is brought out to the front panel CRYSTAL CALIBRATOR PHONE output jack.

3-12. The crystal oscillator is the pentode section of V10 operating as an electron-coupled oscillator. Positive feedback to the control grid is obtained from the screen grid through the crystals. Two crystals provide oscillation at either 1 mc or 100 kc, as selected by the CRYSTAL CALIBRATOR switch. The plate of the oscillator provides the signal necessary to drive the mixer grid of the triode section.

3-13. AUDIO OSCILLATOR. The audio oscillator is a modified Wien bridge oscillator with amplitude stabilization. The feedback signal is taken from the secondary winding of the output transformer. Two oscillator frequencies (400 and 1000 cps) can be selected by switching different resistors in the Wien bridge. The level of oscillation is set by the Modulation Oscillator Adjustment (R51) which controls the feedback to lamp RT1. Increased feedback causes the lamp to heat up, increasing its resistance. The increased resistance causes more degeneration in the cathode of V5, limiting the gain.

3-14. In the INT. position the modulating voltage is available at the front panel MODULATION INPUT-OUTPUT jack. This voltage is supplied for synchronization purposes. It has a source impedance of 82K ohms.

3-15. PERCENT MODULATION METER CIRCUIT. The modulating signal goes to pin 2 of V9A, a cathode-follower. This tube feeds shunt diode CR5 which rectifies the signal. A dc voltage corresponding to the modulation is fed to the PERCENTAGE MODULATION meter. Clamp diode CR4 prevents the cathode of V9 from going negative to protect capacitor C56, whose voltage rating is 25 volts. This point would otherwise go toward -200 volts if V9 was removed or was weak.

3-16. The modulating signal also goes to pin 2 of V8. The signal level to V8 can be controlled by the ATTENUATOR VERNIER. When the signal level is varied the output modulation is varied, as explained in the following paragraph. This circuit is also used to reduce the voltage on the rf amplifier during switching. As soon as the RANGE switch is rotated out of the detent position, S7 disconnects the +300 volt power supply, hence grid voltage of V8 drops to ground potential. The B+ is not reconnected until after the turret has made contact in its new position. This action keeps the amplifier tubes from drawing excessive screen current when the turret is disengaged from the plate circuit. When the +300 volt dc supply is disconnected R64 is substituted as a load to keep the power supplies in regulation.

3-17. DIFFERENTIAL AMPLIFIER. The external modulation signal fed into the MODULATION jack is combined with the dc reference level in the same manner as the internal modulation. Either of these signals is applied to a resistive network consisting of R57, R62 and R68 and is added to the dc reference voltage. The combined voltages appear at the ATTENUATOR VERNIER (R63). This control varies the dc, which controls the carrier, and the modulation signal at the same rate. Thus the percentage of modulation remains constant regardless of carrier level.

3-18. The dc (carrier level) and ac (modulation) signals are fed through an rf filter to pin 2, grid of the triode section of V8, as a reference signal to be compared to a signal from the output which is fed to the pentode grid (pin 7). This triode plus the pentode section of the same tube form a differential amplifier. The ac level of both of these signals is proportional to the modulation. The modulating signal is the reference voltage and the actual modulation of the output is compared to this reference. The dc level of the output (proportional to the rf) is compared to a reference dc level that is proportional to the desired rf level, as set by the ATTENUATOR VERNIER control.

3-19. Since the cathodes of V8 are connected together, the reference signal applied to the triode section will also appear on the cathode of the pentode section. This signal will be compared to the signal from the output which is applied to the grid. Any deviation from a fixed voltage difference between these two signals results in an output signal which has a polarity such as to reduce this difference. Thus the original conditions are restored. For example, if the rf level drops, the voltage on pin 7 of V8 will become more negative. This will reduce the amount of current flowing through this tube so the plate will become more positive. The grid voltage of V6 is proportional to the plate voltage of V8. As this grid voltage becomes more positive the current through V6 will increase. But this current is also the cathode current for the rf amplifier, so the output will increase until the original conditions are restored. By this action the output is stabilized and is constant to better than ±1 db over the entire frequency range. The rf level can be changed by varying the ATTENUATOR VERNIER (R63) which will change the reference bias. In a similar way the modulation is held constant. Since the crystal detector circuit has a time constant fast enough to follow the modulation envelope, the output modulation is compared to the modulating frequency and distortion is minimized.

3-20. BIAS SUPPLY. One half of V7 is used as a constant voltage source to furnish the plate potential needed for the triode section of the differential amplifier. The other half of V7 supplies the screen potential for the pentode section of the differential amplifier. The screen potential is adjusted for rf amplifier cut-off when both grids of the differential amplifier are at ground potential. This establishes the zero point of the ATTENUATOR VERNIER control.

SECTION IV
MAINTENANCE

4-1. INTRODUCTION.

4-2. This section contains instructions for adjusting and servicing the Model 606A Signal Generator. In addition it contains a performance check suitable for incoming or quality-control inspection. The performance check does not require cabinet removal or internal adjustments.

4-3. CABINET REMOVAL.

a. Disconnect the power cord from the receptacle.

b. Remove the four screws on the rear cover of the cabinet and remove the rear cover.

c. Unplug the inner chassis power cord from the rf filter box mounted in the cover.

d. Tip the unit up on its back.

e. Loosen the two screws on the bottom of the cabinet which clamp the cabinet to the front panel. (Do not remove any screws from the front panel.)

f. Lift the cabinet off the instrument.

CAUTION

When the cabinet is removed, dangerous voltages are exposed. Take adequate safety precautions.

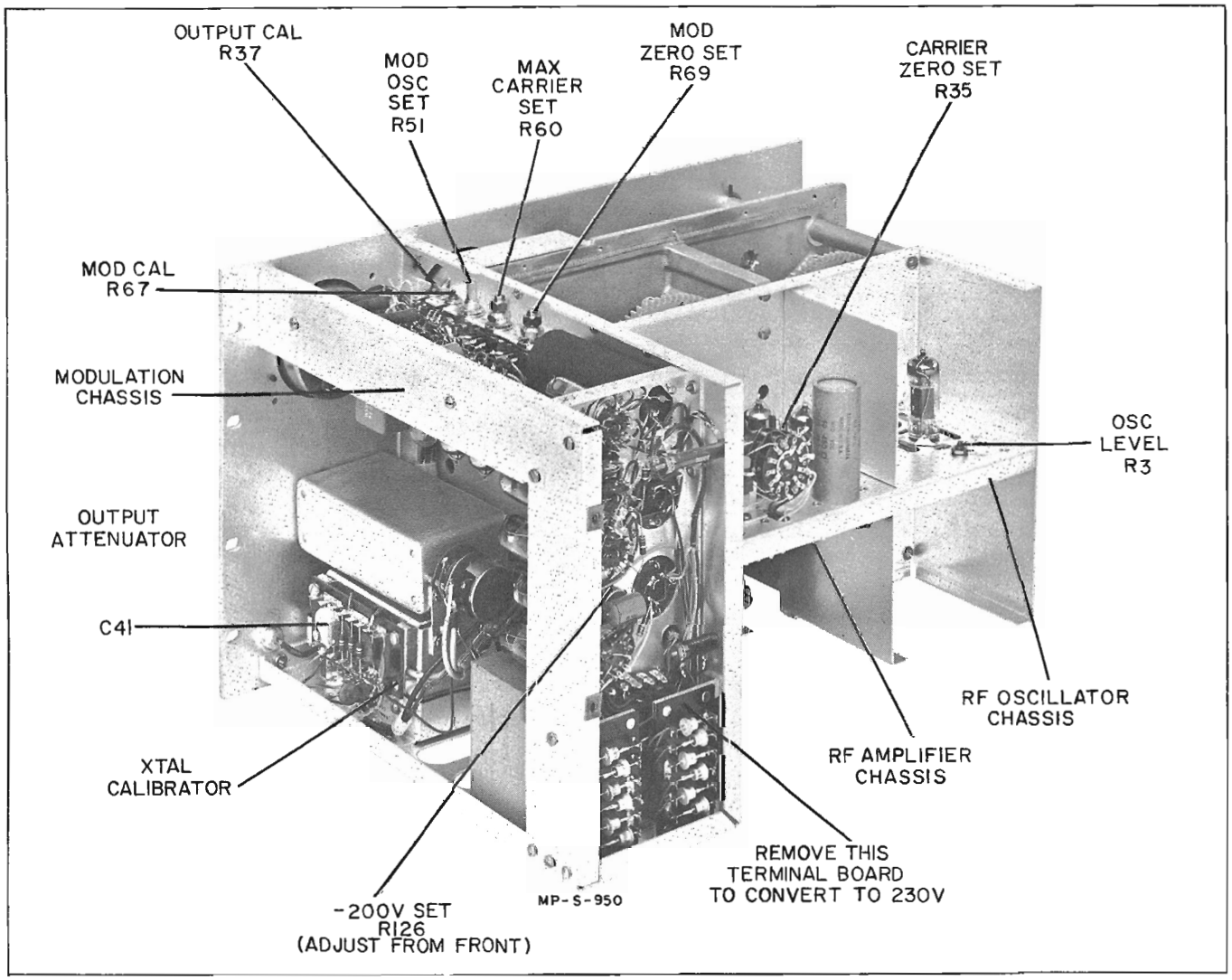


Figure 4-1. Location Diagram Model 606A

4-4. RF SHIELD REMOVAL.

a. Remove all screws holding the rf shield (use allen wrench clipped to top of shield to remove cap screws).

b. Remove the rf shield by pulling to rear.

4-5. TEST EQUIPMENT REQUIRED.

4-6. The following equipment is required to test the Model 606A:

a. VTVM accurate to ±3% with a high frequency probe, such as the hp Model 410B Vacuum Tube Voltmeter.

b. AC voltmeter accurate to ±2%, such as the hp Model 400D/H/L Vacuum Tube Voltmeter.

c. Clip-on dc milliammeter, such as the hp Model 428A/B Clip-On DC Milliammeter or a conventional 300 ma milliammeter.

d. Electronic counter, such as hp Models 524B/C/D Electronic Counters with Model 525A Converter.

e. Oscilloscope, such as hp Model 150A, 160B, or 170A.

f. Variable transformer continuously adjustable over the range 100 to 130 volts, equipped with a monitor voltmeter accurate within 1 volt.

g. Square-wave generator, such as the hp Model 211A Square Wave Generator.

4-7. TUBE REPLACEMENT.

4-8. In many cases instrument malfunction can be corrected by replacing a weak or defective tube. Before changing the setting of any internal adjustment check the tubes. Adjustments made in an attempt to restore operation when the cause is a defective tube will often complicate the repair problem.

4-9. Check tubes by substitution rather than using a "tube checker". The results obtained from the "tube checker" can be misleading. Before removing a tube, mark it so that if the tube is good it can be returned to the same socket. Replace only those tubes proved to be weak or defective.

4-10. Any tube with corresponding standard EIA characteristics can be used as replacement. Where variations in tube characteristics will affect circuit performance an adjustment is provided. Table 4-1 lists the tests to make and the adjustments that may be necessary if such tubes are replaced.

Table 4-1. Tube Replacement

Circuit Ref.	Tube Type	Function	Tests and/or Adjustments	Par. Ref.
V1	6AW8	Oscillator Level Control	Set Maximum Oscillator Current	4-45
V2	12AT7	RF Oscillator	Set Maximum Oscillator Current	4-45
V3, 4	6CL6	RF Amplifier	Carrier Zero Set Maximum Carrier Set RF Output Meter	4-46 4-47 4-49
V5	12AT7	Audio Oscillator	Audio Oscillator Mod. Zero Set Modulation Meter	4-42 4-47 4-48
V6	12B4	Modulator	Maximum Carrier Set Mod. Zero Set RF Output Meter Modulation Meter	4-47 4-47 4-49 4-48
V7	12AT7	Cathode Follower	Carrier Zero Set Maximum Carrier Set Mod. Zero Set RF Output Meter Modulation Meter	4-46 4-47 4-47 4-49 4-48
V8	6AW8	Differential Amplifier	Same as V7	
V9	12AT7	Modulation Monitor and Beat Frequency Output	Mod. Zero Set Modulation Meter Crystal Calibrator	4-47 4-48 4-43
V10	6AW8	Crystal Oscillator and Mixer	Crystal Oscillator	4-43
V101, 2, 3, 4, 5	12B4A	Regulators	Power Supplies	4-36
V106	6AW8	Amplifier		
V107	12B4A	Regulator		
V108	6AW8	Amplifier		
V109	5651	Voltage Reference		

4-11. FRONT PANEL OPERATION CHECK.

4-12. The following in-cabinet procedures are simple checks to be performed first whenever difficulty is encountered in operation of the signal generator. These checks will isolate the trouble to either the signal generator or associated equipment and if the trouble is in the signal generator will isolate it to a particular section.

4-13. PRELIMINARY CHECK.

4-14. Always perform these check before attempting to isolate the trouble within the instrument.

a. Turn unit on with no load and allow to warm up five minutes or more.

b. If output meter is off scale in the negative direction, check for blown B+ fuse.

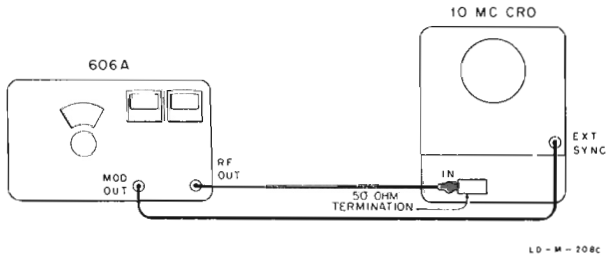


Figure 4-2. Modulation Meter Calibration

4-15. MODULATION METER CALIBRATION.

a. Connect the unit to a 10 mc oscilloscope as shown in figure 4-2.

b. Set RANGE switch to 530-1800 kc band.

c. Set FREQUENCY control to 1000 kc.

d. Set MODULATION SELECTOR to CW.

e. Set ATTENUATOR to 1 VOLT.

f. Adjust vertical sensitivity of oscilloscope to get 4 cm of deflection.

g. Set MODULATION SELECTOR switch to 1000 ∿.

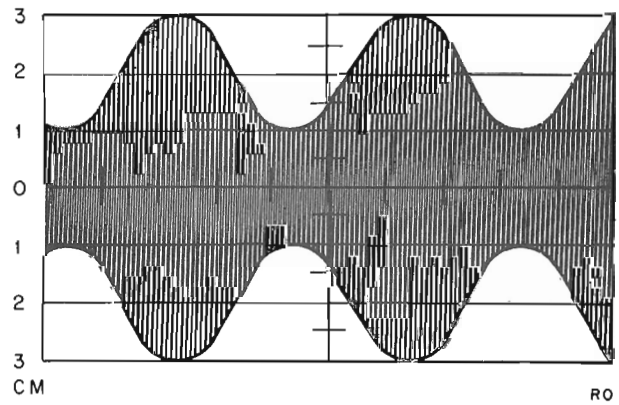


Figure 4-3. Waveform for 50% Modulation

h. Adjust MODULATION SELECTOR control until maximum deflection is exactly 6 cm high (see figure 4-3). Modulation meter should be reading between 45 and 55%.

i. Check modulation meter calibration from 0 to 90%. It should be accurate within ±5% of full scale.

4-16. FREQUENCY CALIBRATION.

4-17. The easiest way to check frequency calibration is with a counter, such as the ℌ Model 524B/C/D with a 525B plug-in converter. If a counter is not available proceed as follows:

a. Allow both a receiver capable of receiving WWV and the Model 606A to warm up for fifteen minutes.

b. Tune in WWV on 5, 10, or 15 mc, whichever gives best reception.

c. Lightly couple a single wire from the RF OUT jack of the Model 606A to the antenna as shown in figure 4-4.

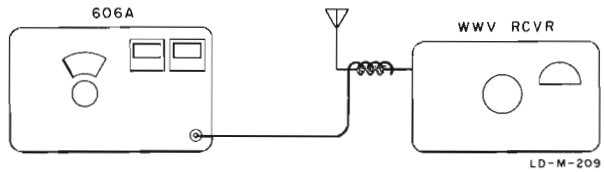


Figure 4-4. Frequency Calibration

d. Tune the RANGE and FREQUENCY controls of the Model 606A to the frequency of the incoming WWV signal. The MODULATION SELECTOR switch should be on CW (no modulation).

e. Adjust the output level to be about the same as WWV (use S meter on receiver if it has one). Too much signal will block the receiver and obscure the beat-note.

f. Zero-beat the frequency of the Model 606A to the WWV signal during a time that WWV has no modulation. Do not disturb the FREQUENCY dial after this adjustment. Set CALIBRATE adjustment to align window.

g. Listen to 1 MC CALIBRATOR with headphones. If beat-note is a low audio tone, less than 1 kc, crystal calibrator is within specifications.

h. Repeat step g using 100 KC CALIBRATOR.

i. With the CALIBRATOR on 1 MC check all megacycle marks on the dial on all bands. Beat-note should be within 1% of the dial reading.

4-18. OUTPUT LEVEL FREQUENCY RESPONSE.

a. Connect ac probe of ℌ Model 410B High Frequency VTVM to 11507A Output Termination as shown in figure 4-5. Solder tip of Model 410B ac probe to center conductor of UG-290/U connector. Clip ground lead

of probe to skirt of connector. Insert connector into OUTPUT connector of Output Termination.

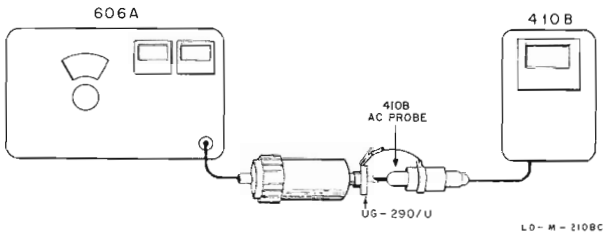


Figure 4-5. Output Level Frequency Response

b. Set the output to 0.9 volt on the 530-1800 kc band and run the FREQUENCY dial and RANGE switch throughout all bands. The voltage should not vary more than ±11% (1 db) at any output level setting.

4-19. TROUBLESHOOTING.

4-20. In general, internal controls have only a limited range and are designed to compensate for minor variations in tubes and/or circuit components. If a major section or the complete instrument is inoperative adjustment of internal controls will seldom, if ever, restore operation. To avoid complications and reduce "down time" locate and correct the cause of a dead instrument before you make internal adjustments. Refer to paragraph 4-7 before making internal adjustments.

4-21. When a section shows up faulty, refer to the appropriate section of table 4-2 and perform the recommended tests. If the trouble is in the output termination or attenuator you may return them separately to the factory for repair. They are not field repairable.

4-22. A good starting point when repairing a dead instrument is with the power supply. Check line cord, both fuses, and the power supply output voltages. BE SURE TO CHECK THE B+ FUSE IN ADDITION TO THE MAIN FUSE, ESPECIALLY IF THE OUTPUT METER IS PINNED TO THE LEFT. If you find a dead power supply tube, tube replacement will normally restore instrument operation without any internal adjustments. However, check the output voltages of each supply to see if the output is within limits. If the output is within the limits given in the power supply section do not attempt to refine the adjustments.

4-23. IF THE INSTRUMENT IS INOPERATIVE, FIRST TRY BLOWING OUT THE PLATES OF THE TUNING CAPACITOR WITH A LOW VELOCITY AIR STREAM SUCH AS THAT FROM A VACUUM CLEANER. Blow out these plates every time you remove the instrument from the cabinet for maintenance.

4-24. TROUBLESHOOTING CHART, TABLE 4-2. Since the operation of many sections in this generator is dependent upon the proper operation of other sections, troubleshooting in this instrument must be done in proper sequence. After determining in which section the trouble lies, refer to the appropriate section of this chart and perform the tests indicated. Also, if the trouble cannot be found by any other means, go through table 4-2 from the beginning. Once the trouble has been found and fixed do not continue with the tests in this table.

4-25. If output is obtained, troubleshoot the particular section giving difficulty by referring to the appropriate part of table 4-2.

4-26. If no output is obtained, the trouble may be anywhere in the feedback loop. Refer to table 4-3, Troubleshooting the Feedback Loop, for instructions.

Table 4-2. Troubleshooting Chart

Measure	Normal Indication	Possible Cause of Malfunction
A. -200 VDC SUPPLY PREPARATION: Disable +300 vdc supply by disconnecting R101 (5 ohm 5 watt wirewound resistor found just above rectifier terminal boards at rear of instrument). Temporarily connect a 1 megohm 1 watt resistor between pins 2 and 9 of V107. Measure the voltage to ground at the following points:		
1. C108 filter cap.	-200 vdc ±5%	Open or shorted C105 C108 open or shorted, also disconnect load and remeasure
2. Transform.sec.(blue)	143 volts rms ±10%	Open or shorted secondary
3. C105 unregulated dc	+195 vdc ±10% (one side)	V107 (12B4) defective. Check heater (6.3 vrms)
4. V109 pins 1, 5 (plate)	-110 vdc (nominal) ±20%	V109 (5651) defective. Check for orange glow.
5. V108 pins 1, 6 (cathode)	-112 vdc (nominal) ±20%	V108 or associated components defective; check heater (6.3 volt rms).

Table 4-2. Troubleshooting Chart (Cont'd)

Measure	Normal Indication	Possible Cause of Malfunction
B. +300 VDC SUPPLY		
PREPARATION: The -200 vdc supply is assumed to be operating (remove 1 megohm resistor and reconnect +300 volt supply if these temporary changes were made to troubleshoot -200 vdc supply). Adjust line to 115 volts rms.		
1. C104 filter cap	+300 vdc ±5%	Also measure with RANGE switch between ranges; this will isolate a defective tuning capacitor in RF OSC. or AMP.
2. Transf.sec.(red) R101	+175 volts rms ±10%	Open or shorted turns in transformer
3. C101 and C102	250 vdc across each	C101, 102, and 104 or CR101, 102, 103 and 104 open or shorted.
4. V101 pin 9 (plate)	+500 vdc	C101, 102 or CR101, 102, 103 and 104 open or shorted. Check V101, 102, 103, 104, 105 and 106.
5. V106		
pin 9 (plate)	+270 vdc	V106, R102, 103 and 104
pin 8 (screen)	+ 38 vdc	V106, CR103, R110, R111 and -200 volts
pin 6 (cathode)	+ 3.6 vdc	V106, R113 and -200 volt supply
C. RF OSCILLATOR		
PREPARATION: This procedure assumes the power supply is operating correctly. Use a clip-lead to short across R30 (caution -200 volts) to disable RF Amplifier temporarily while measuring the following voltages: (Measure voltage to ground.)		
1. V2 pin 9 (tie point)	+26 vdc ±10%	Check voltage at rf filter Check voltage at junction of CR110 and 112
pin 5 to 9	6.3 vdc ±10%	Open heater-check for visible glow
2. V1 pin 5	+26 vdc ±10%	Same as step 1, V2 pin 9
pin 4 to 5	6.3 vdc	Same as step 1, V2 pin 5 to 9
pin 3	+295 vdc (nominal)	Check B+ fuse, detent micro-switch S7, rf filter (C8, 10ABC, 11, 16, 32 and 33 for shorts, L4 for open circuit). Turn range switch between ranges-should be no change
pin 2	+99 vdc	Check R1, 2, 3 and C1
pin 1	+100 vdc	Check R19, V1 or rf lead to 6CL6's
3. V2 pin 1 & 6 (plates)	+295 vdc (nominal)	Check R9, and C4, 5 and 7 for shorts
pin 2 & 7 (grids)	+100 vdc	Check V1 and associated components
pin 3 & 8 (cathode)	+110 vdc	Check V1, 2, CR1 or associated components
pin 2 & 7 (grids)	6 volt rms (nom.) to 19 mc 3 to 5 rms to 65 mc (meas. with hp 410B-AC Probe).	Check V2, CR1, C4, 5, 7, T2 (tank coil) and grid line to 6CL6's.
4. R9 (turn off and measure resistance)	100 ohms ±10%	Check C4, 5 or V1 or V2 for shorts
D. RF AMPLIFIER		
PREPARATION: This procedure assumes the power supply and oscillator are operating. (Disconnect short across R30, if installed in step C.) Measure voltage at:		
1. C111	+27 vdc ±10%	C109, C110, C111, R132, V1 to 4, and V6 to 8
2. V3, 4, 7 &8 (acr.htrs)	6.3 vdc ±10%	Same as above
V6	12.6 vdc ±10%	Same as above

Table 4-2. Troubleshooting Chart (Cont'd)

Measure	Normal Indication	Possible Cause of Malfunction
	D. RF AMPLIFIER (CONT'D)	
3. R15 at tank term.	+295 vdc ±10%	R15 open, C10C, 11 shorted
4. V8 (6AW8) pin 2	0 to 3.5 vdc as R63 is rotated	R31, 53, 57, 60, 61, 62, 64, 65 and 68
pin 6	+4.1 vdc (nominal)	C29, R32, 33, 34, 35, V7, 8
pin 9	+76 vdc (nominal)	R20, 22, 23, 29, 30, V8
pin 3	+150 vdc (nominal)	R28, 29, R33, 34, 35, V7
pin 8	+54 vdc (nominal)	Same as pin 3
pin 7	0 to +3.4 vdc as R63 is rotated	C23, 24, 25, CR2, 3, R17, 24, 25, 26, 36, V8
5. V6 (12B4) pin 2, 7	-10 to -25 vdc as R63 is rotated	C19, R20, 22, 23, 29, 30, V7 or 8
pin 9	+110 vdc (nominal)	R10, 38, V3, 4, 6
6. V3 and 4 (6CL6's)		
pin 6	+295 vdc (nominal)	Shorted C12,14,15, open T3 or contacts on turret
pin 3, 8	+295 vdc (nominal)	Check C10, 11, 14, 15, 16, R10, 15
pin 2, 9	+100 vdc (nominal). If this voltage is incorrect the rf oscillator is not functioning properly	R11, 12 triode section of V1
pin 1	+112 vdc (nominal)	R13, 14, check voltage on pin 9 V6
7. CR2, anode	6 volt rms (nominal) with 1 VOLT output level. Varies 0 to 6 volt rms as ATTENUATOR VERNIER is turned	Check V3 and 4 plate voltage and output voltage as given in table 4-4

Symptom	Possible Cause
8. Fuse F1, (0.15 amp) burns out	Defective C8, 10ABC, 32, 33, 53 and L1, 4 Foreign material across tuning capacitors: C4, 5, 7, 14, 15 and 18 Defective microswitch S7 Feedback system defective
9. Sharp drop (hole) in power output level, or a sharp increase (peak) in oscillator or amplifier current as frequency dial is tuned	Check shorting fingers in turret. This prevents next lower band coil from resonating and absorbing power
10. R15 (100 ohms) burns out	Shorted tuned capacitor C14, 15 or 18 Open or shorted CR2, 3 Shorted C23, 24, 25 or S3 If this condition affects one band only, check the turret contact and coil for that one band. Also check switch S3 (on rf deck) for shorts This condition persists on all bands see table 4-3

E. AUDIO OSCILLATOR

Most troubles can be found easily by measuring the voltages in the circuit as follows:
Set MODULATION SELECTOR to INT. 1000 ∿
MODULATION AMPLITUDE to 100%

V5 (12AT7)	pin 1	3.7 volts rms	+180 vdc (approximate voltages)
	pin 2	6.6 volts rms	0 vdc
	pin 3	6.2 volts rms	+2.6 vdc
	pin 6	80 volts rms	+292 vdc
	pin 7	3.8 volts rms	0 vdc
	pin 8	1.88 volts rms	+4.8 vdc
T1 leads	green	20 volts rms	0 vdc (approximate voltages)
	yellow	3 volts rms	0 vdc
	blue	80 volts rms	+292 vdc

Table 4-2. Troubleshooting Chart (Cont'd)

F. MODULATION MONITOR

Most troubles can be found easily by measuring the voltages in the circuit as follows:
Set MODULATION SELECTOR to INT. 1000 ∿
MODULATION AMPLITUDE to 100%

V9A (1/2 12AT7)		
pin 2	2.8 volts rms	0 vdc (approximate voltages)
pin 3	2.8 volts rms	+3.9 vdc

Diode CR4 (1N90) prevents a high negative voltage developing at the cathode of V9A during warmup. Such a high voltage of reversed polarity would damage electrolytic capacitor C56. The high negative voltage could also be developed if the heater of V9 burned out or if the instrument were turned on with V9 removed.

Diode CR5 (1N90) is the detector for the modulation meter.

Both diodes can be measured only out of the circuit. Forward resistance should be approximately 500 ohms. Back resistance should be greater than 100K ohms.

G. CRYSTAL CALIBRATOR

Most troubles can be found easily by measuring the voltages in the circuit as follows:
Set CRYSTAL CALIBRATOR to either 100 KC or 1 MC as indicated.

	100 KC		1 MC		
V10 (6AW8A)	DC	AC	DC	AC	
pin 1	0 vdc	0 volt rms	0 vdc	0 volt rms	
pin 2	-58 vdc	41 volts rms	-34 vdc	23 volts rms	
pin 3	+71 vdc	0.44 volt rms	+196 vdc	0.1 volt rms	all
pin 6	0 vdc	0 volt rms	0 vdc	0 volt rms	voltages
pin 7	-82 vdc	60 volts rms	-35 vdc	23 volts rms	approximate
pin 8	+108 vdc	31 volts rms	+122 vdc	7.5 volts rms	
pin 9	+240 vdc	41 volts rms	+222 vdc	22 volts rms	

Table 4-3. Troubleshooting the Feedback Loop

SYMPTOM. No output on all ranges, or R15 (100 ohms) burns out on all ranges.

PREPARATION. This procedure assumes that:

a) The -200 volt and +300 volt supplies are functioning properly.

b) All heater voltages in the rf chassis measure the correct value.

c) All tubes have been checked.

d) The oscillator is working properly on all bands and gives approximate voltages and currents as listed in table 4-4.

e) The tuning capacitor or its leads are not short circuited.

PROCEDURE. Unless otherwise noted all measurements are made at 115 volts rms, 60 cycle line, with the Model 606A on CW.

Proceed from step to step. Rectify any troubles before proceeding to the next step.

Measurements are made with an hp Model 410B VTVM and Model 428A Clip-On Milliammeter, or other milliammeter.

E = dc voltages; e = ac voltages; I = current.

Procedure	Observe or Measure
1. Disable the feedback by connecting pin 2. V6 (12B4) to -200 volts by shorting R30 (220K).	This bias should cutoff V6 and provide no current for V3 or V4. There should be no current through R15. Check with hp Model 428A.

Table 4-3. Troubleshooting the Feedback Loop (Cont'd)

Procedure	Observe or Measure			
2. Connect a series combination of 5K, 5W, fixed and a 2K, 2W variable resistor from pin 9 of V6 (12B4) to ground. Terminate output with 50 ohm load. Adjust 2K pot. to obtain 1 volt at 1 mc.	V6 (12B4)	pin 1 to ground	I_k is approx.	19 ma
	R10 (33K)		I_k is approx.	5.6 ma
	R38 (33K)	bands 1 to 5	I_k is approx.	5.6 ma
		band 6	" "	0 ma
	V3 or V4 (6CL6)	pin 6 to ground	e is approx.	7.8 vrms
		pin 1 to ground	" "	2.0 vrms
		pin 1 to 2	E is approx.	-14 vdc
		pin 6 to ground	" "	+295 vdc
		pin 8 to ground	" "	+295 vdc
		pin 7 to ground	" "	+110 vdc
	Drop across R13 or 14 (39 ohms)		E is approx.	0.15 vdc
	CR2 (anode)		e is approx.	5.7 vrms
	CR3 (cathode)		E is approx.	7.1 vdc
	V8 (6AW8)	pin 7 to ground	E is approx.	3.1 vdc
		pin 7 to ground	e "	0 vrms
	R18 (50 ohms)	input voltage	is approx.	2 vrms
		output voltage	"	1 vrms
3. Repeat for bands 1, 2, 4, 5 and 6	Check with data on table 4-4. Data for CR2, CR3 and V8 for this test are same as listed in item 2			
4. Adjust the 2K variable resistor until 3.1 vdc appears on pin 7 of V8 (6AW8A). Set R63 (ATTENUATOR VERNIER) fully counterclockwise (zero ohms).	V8 (6AW8)	pins 1 and 6	E is approx.	+3.9 vdc
		pin 2	" "	0 vdc
		pin 3	" "	+143 vdc
		pin 4	" "	+19.5 vdc
		pin 5	" "	+13 vdc
		pin 7	" "	+3.1 vdc
		pin 8	" "	+54 vdc
		pin 9	" "	+10 vdc
	V7 (12AT7)	pins 1 and 6	E is approx.	+295 vdc
		pin 2	" "	+50 vdc
		pin 3	" "	+54 vdc
		pins 4 and 5	" "	+19.5 vdc
		pin 7	" "	+135 vdc
		pin 8	" "	+143 vdc
		pin 9	" "	+13 vdc
5. Turn R63 (ATTENUATOR VERNIER) fully clockwise (5K).	V8 (6AW8)	pins 1 and 6	E is approx.	+4.5 vdc
		pin 2	" "	+3.3 vdc
		pin 3	" "	+138 vdc
		pin 6	" "	+4.5 vdc
		pin 7	no voltage change as R63 is rotated	
		pin 8	E is approx.	+54 vdc
		pin 9	" "	+42 vdc
6. Disconnect jumper from pin 2 V6 to -200 volts. Remove 5K and 2K resistor.	The unit should be working properly.			
7. Realign the rf oscillator and amplifier sections if any tubes or components have been replaced or altered.	See section on Max. Carrier Set, Mod. Zero Set, Carrier Zero Set, Percentage Mod. and Carrier Output Meters.			

Table 4-4. Typical Voltage(1). Oscillator and Amplifier Current Output
1 Volt into 50 Ohms, CW

FREQ. (6)	I_o (2)	e_{go} V2 pin 2, 7	e_{po} V2 pin 1 or 6	e_{ko} @C4/ C5	I_a (3)	e_{ga} V3 or 4 pin 2	e_{pa} V3 or 4 pin 6	e_{ka} @C14/ C15	e_{out} term. (5)	e_{fb} term. (4)	I_k 12B4 V6 pin 1
94 KC	1.3 ma	7.1 v	92 v	209 v	5.7 ma	7.1 v	9.3 v	58 v	2.0 v	5.5 v	19 ma
310 KC	2.8	7.0	70	150	4.9	7.1	9.8	31	2.0	5.3	19
1 MC	4.8	5.9	130	130	6.4	5.9	7.8	19	2.0	5.7	19
3.33 MC	5.3	6.7	93	93	7.6	6.8	19	19	2.0	5.5	26
10.9 MC	4.6	6.9	55	55	4.0	6.85	15.5	15.5	2.0	5.5	17
36.3 MC	14.0	6.6	24.5	25	9.4	5.3	6.8	6.8	2.0	5.5	26

Notes:
(1) Measured by DC VTVM, such as ℗ Model 410B
(2) Measured by ℗ Model 428A Clip-On Milliammeter at red-green wire loop between B+ and R9 (beneath rf oscillator stator turret contacts).
(3) Measured by ℗ Model 428A Clip-On Milliammeter at red-green wire loop between B+ and R15 (beneath rf amplifier stator turret contacts).
(4) Feedback voltage terminal (4) next to diode detector CR2.
(5) Output voltage terminal (5) next to generator terminating resistor, R18.
(6) Leave dial set at 1 MC, rotate range switch only to desired band.

Explanation of symbols:
e = voltage
I = current
g = grid
o = oscillator
k = cathode
a = amplifier
f = filament
p = plate

4-27. TURN-ON PROCEDURE AFTER REPAIR.

4-28. Be sure to check for shorts in tuning capacitors C4 and C5, C14 and C15 with an ohmmeter after repair and before turning on the instrument. Solder splashes may occur which short these capacitors when repairing other parts of the instrument. If the instrument is turned on with these capacitors shorted, resistors R9 or R15 may be damaged.

4-29. MECHANICAL ADJUSTMENT OF METER ZERO.

4-30. When meter is properly zero-set, pointer rests over the zero calibration mark on the meter scale when instrument is: 1) at normal operating temperature, 2) in its normal operating position, and 3) turned off. Zero-set as follows to obtain best accuracy and mechanical stability:

a. Allow the instrument to operate for at least 20 minutes; this allows meter movement to reach normal operating temperature.

b. Turn instrument off and allow 30 seconds for all capacitors to discharge.

c. Rotate mechanical zero-adjustment screw clockwise until meter pointer is to left of zero and moving upscale toward zero.

d. Continue to rotate adjustment screw clockwise; stop when pointer is right on zero. If pointer overshoots zero, repeat steps c and d.

e. When pointer is exactly on zero, rotate adjustment screw approximately 15 degrees counterclockwise. This is enough to free adjustment screw from the meter suspension. If pointer moves during this step you must repeat steps c through e.

4-31. GENERAL TEST AND ALIGNMENT.

4-32. Usually the instrument will not need complete test and adjustment. This is particularly true when repair has been accomplished without changing any internal adjustments. BEFORE MAKING ANY INTERNAL ADJUSTMENTS, SEE PARAGRAPH 4-7. If unnecessary adjustments are eliminated you will often save time by being able to finish a repair without completing the entire test and adjustment procedure.

4-33. The procedures are listed in a recommended sequence for a complete test and adjustment operation. Test instrument recommendations are given in paragraph 4-5. The test frequencies and voltages are based upon the use of these recommended instruments. If other equipment is substituted, you may have to alter the procedures accordingly. When other equipment or methods are used, it is important to select components and techniques which have equal or greater accuracy. Any instrument can be adjusted for optimum performance at a particular frequency or voltage, or the most commonly used range.

4-34. The specifications for the Model 606A are given in the front of this manual. The test procedures contain extra checks to help you analyze the instrument. These extra checks and the data they include are not to be considered as specifications.

4-35. A ten to fifteen minute warmup at normal line voltage (nominally 115 or 230 volts) and power supply output voltage measurements are always recommended before making any other tests or adjustments. Refer to paragraph 4-36 before making any power supply adjustments.

4-36. POWER SUPPLIES.

4-37. The power supplies in this instrument are extremely stable and will require infrequent adjustment. The output voltages may be measured at regular intervals or as a first troubleshooting step but unnecessary adjustment should be avoided. A defective tube or component may overload the power supply and lead you to believe that the power supply is not functioning properly.

4-38. As long as the power supply regulator is functioning properly, you need not know the absolute values of the power supply output voltages. However, when power supply adjustment is necessary, you should use a voltmeter with a known calibration accuracy.

4-39. Regulation of the power supply can be checked by varying the power line voltage between 103 and 127 volts. The output voltage will vary only slightly, if at all, from the value measured with a 115 volt line. Loss of power supply regulation is most easily detected, as a sudden large increase in power supply ripple as the line voltage is raised and lowered ±10% from 115 volts.

4-40. When the power supply output voltages are within limits with the line voltage at 115 volts, adjustment is not necessary. Do NOT adjust in attempt to refine the existing control settings.

4-41. To test the power supplies proceed as follows:

a. Measure power supply outputs. They should be within the limits shown in table 4-5.

b. If the voltage is outside the limits in the table adjust R126 (-200 volt set) for -200 volts. This control is in the center of the power supply deck with access only from the front side of the chassis.

c. You may wish to check the regulation of each power supply as the line voltage is varied between 103 and 127 volts. All regulated voltages should remain within ±1% over this range of line voltage.

d. Measure the ripple voltage on the various supplies. They should approximate the values indicated in table 4-5 with the power line voltage set at 115 or 230 volts.

Table 4-5. Regulated Power Supply Tolerances

Nominal Voltage	Nominal Ripple at 115/230 vrms Input	Output Voltage Range
-200 (violet wire)	10 mv	200 ±8 volts
+300 (red wire)	10 mv	300 ±12 volts
+27 (brown-orange wire)	---	unregulated

4-42. AUDIO OSCILLATOR.

a. Set RANGE 540 KC-1800KC
MODULATION SELECTOR . . . . . INT 400 ∿

b. Turn POWER switch to ON.

c. Connect an hp Model 400D AC VTVM to output tap on audio transformer (yellow lead on signal tie point behind rf output meter). Connect ground lead of voltmeter to ground.

d. Set Mod.Osc.Adj (R51) potentiometer for 3.2 volts. This control is the middle one in the row of five potentiometers on top of the modulation deck.

4-43. CRYSTAL CALIBRATOR.

a. Set CRYSTAL CALIBRATOR to 100 KC.

b. Connect an electronic counter to pin 2 of the crystal oscillator tube (V10).

c. Adjust trimmer (C41) for exactly 100.000 KC. This trimmer is the ceramic capacitor on the right side (as viewed from the front) of the instrument under the modulation deck.

d. Set CRYSTAL CALIBRATOR to 1 MC and read counter. Reading should be between 999.900 and 1000.100 KC.

e. Set CRYSTAL CALIBRATOR to 100 KC and read counter. Reading should be between 99.990 and 100.010 KC.

f. Set trimmer C41 to best compromise between the above limits.

g. Turn CRYSTAL CALIBRATOR to OFF.

4-44. TUNE OSCILLATOR AND AMPLIFIER.

Note

This procedure should be performed only if there is a definite indication that the oscillator is off frequency. It should NOT be done on a routine basis.

a. Set CALIBRATE cursor to align with FREQUENCY centerline
ATTENUATOR . . . . . .3 VOLT
MODULATION SELECTOR. . . . . CW
FREQUENCY dial. . . . . .low end of one of the bands (except highest frequency)

b. Connect RF OUT terminal to an electronic counter, such as the hp Model 524B/C/D with a Model 525A Converter.

c. If the frequency as read on the low end of the dial is off more than 1%, adjust the slug in the oscillator coil to correct. This slug can be reached by removing the cabinet and the shield (see paragraphs 4-3 and 4-4). Clockwise rotation of the slug will decrease the frequency.

d. Shift the frequency to the high end of the band. If the frequency as read on the FREQUENCY dial is off more than 1% adjust the trimmer capacitor across the oscillator coil to correct. Always use a plastic screwdriver when making this adjustment.

e. Repeat steps c and d until no further adjustment is necessary.

f. Repeat steps b through e on the other bands. On the highest frequency band adjust the slug with a plastic allen wrench (#8). If any adjustment is necessary check maximum oscillator current as in paragraph 4-45.

g. Connect the probe of an oscilloscope to the cathode of CR3. This point can be found on the pink-white wire between the amplifier stator turret terminal block and the tie-point for the 33K resistor R25.

h. Set the MODULATION SELECTOR to EXT.DC.

i. Connect a square-wave generator, such as the hp Model 211A set to 1 KC to the MODULATION INPUT-OUTPUT connector. Feed in sufficient square-wave signal so that the carrier is cut off for at least part of the cycle.

j. Tune throughout all bands and check the pattern on the oscilloscope for ringing or squegging. Reduce the frequency of the external modulation to 300 cps on the lowest frequency band to keep from overmodulating. If ringing is found tune the amplifier.

k. Measure the rf amplifier plate current with hp Model 428A/B Clip-On Milliammeter clipped over the red-green lead going to the 100 ohm resistor R15 on the turret stator contact terminal block (beneath rf amplifier chassis). If a Model 428A/B is not available, unsolder the red-green lead on the B+ side and insert a conventional 300 ma dc milliammeter. Bypass the point between the 100 ohm resistor and the meter with a 0.1 μf capacitor.

m. Tune inner slug in the amplifier coil from the top for a plate current dip at the low end of one band.

n. Tune trimmer capacitor for a plate current dip at the high end of the same band. This adjustment is made through a hole in the chassis between V3 and V4 underneath the amplifier turret shaft. Use a plastic screwdriver for this adjustment. In addition, if this tool has a metal tip, slide a tiny piece of tubing over the metal tip to prevent the trimmer shorting to ground when making this adjustment.

p. Recheck ringing as in step j.

q. Repeat steps j through p on all bands.

4-45. SET MAXIMUM OSCILLATOR CURRENT.

a. Set MODULATION SELECTOR . . . . . CW
RANGE . . . . . 19 MC-65 MC

b. Measure rf oscillator plate current with hp Model 428A/B Clip-On Milliammeter clipped over red-green lead going to the 100 ohm resistor R9 on turret stator contact terminal block (beneath oscillator chassis). If a Model 428A/B is not available, unsolder the red-green lead on the B+ side and insert a conventional 300 ma dc milliammeter. Bypass the point between 100 ohm resistor and meter with a 0.1 μf capacitor.

c. Tune FREQUENCY dial throughout the 19 MC - 65 MC band while noting the current.

d. Adjust Osc. Level control (R3) on the oscillator chassis for a maximum current of 25 ma at the frequency of maximum current. If this adjustment is made, check the following:

(1) Paragraph 4-46, Carrier Zero Set

(2) Paragraph 4-47, Maximum Carrier Set and Modulation Zero Set

(3) Paragraph 4-48, Set Percentage Modulation Meter.

4-46. CARRIER ZERO SET.

a. Set RANGE . . . . . 50 KC - 170 KC
ATTENUATOR . . . . . 1 VOLT
ATTENUATION VERNIER . . . . . fully ccw
Carrier Output Zero (R35) . . . . . fully ccw
MOD. SELECTOR . . . . . EXT DC with no input
MODULATION VERNIER . . . . . fully ccw

b. Connect oscilloscope to output of the Output Termination.

c. Zero-set the carrier output meter with the instrument off as explained in paragraph 4-29.

d. Turn on and allow 5 minutes warmup.

e. Slowly turn Carrier Zero Set control (R35) on the rf amplifier chassis clockwise until there is some output on the oscilloscope. Then adjust carrier zero set until the indication on the oscilloscope, set to the most sensitive range, just collapses. Set the sweep on the oscilloscope for a free-running condition so that the indication will not disappear for lack of synchronizing signal.

f. Check for zero output across the band on each range. Bands 5.8 MC-19.2 MC and 19.2 MC-65 MC typically have a minimum output of 0.03 volt rms. If this adjustment is made, check the following:

(1) Paragraph 4-47, Maximum Carrier Set and Modulation Zero Set

(2) Paragraph 4-48, Set Percentage Modulation Meter.

4-47. MAXIMUM CARRIER SET AND MODULATION ZERO SET.

a. Set ATTENUATOR VERNIER pot . . fully cw
MODULATION SELECTOR . . . . . EXT AC

b. Connect Model 410B ac probe to end of output termination. Solder tip of 410B ac probe to center conductor of a UG-290/U connector. Clip ground end of probe to skirt of connector. Insert connector into OUTPUT connector of output termination.

c. Set RANGE switch to band 1 (see box on schematic for band frequency ranges) and turn FREQUENCY dial over the band at moderate speed, noting the minimum output voltage read on the Model 410B.

d. Repeat step c on bands 2,3,4,5; and repeat on band 6 but turn much more slowly.

e. Set Model 606A to the range and frequency having lowest output voltage. Set MODULATION SELECTOR switch to CW, adjust Max. Carrier Set (R60) for 1.05 volt rf output on Model 410B. This control is fourth from the front in the row of five potentiometers on the top of the modulation deck.

f. Switch MODULATION SELECTOR from CW to EXT AC while noting output change on the Model 410B. There should be no change in voltage shown on the Model 410B. If necessary adjust Mod. Zero Set (R69, rearmost control in row of five controls on modulation chassis) until there is no change of output when the MODULATION SELECTOR is switched. Turn the MODULATION AMPLITUDE control. The output should not change. If necessary, adjust R69.

g. Recheck step e and f and adjust, if necessary. The two controls R69 and R60 interact with each other. Recheck the other adjustment any time one control is adjusted.

4-48. SET PERCENT MODULATION METER.

a. Set FREQUENCY. . . . . 1 MC
MODULATION SELECTOR. . . . . INT 1000 ∿
ATTENUATOR . . . . . 1 VOLT range
VERNIER . . . . . 1 volt
Meter mechanical zero . . . . . par. 4-29
MODULATION AMPLITUDE meter. . . 50% on

b. Connect the RF OUT output, properly terminated, to the vertical input terminals of an oscilloscope such as an hp Model 150A. If a lower frequency oscilloscope is used it may be necessary to set the Model 606A to a lower frequency.

c. Synchronize pattern internally so that several modulation cycles are visible on the screen.

d. Set the MODULATION SELECTOR to CW.

e. Adjust the sensitivity control on the oscilloscope until the pattern is exactly 4 centimeters high. Do not use the 3 VOLTS range on the Model 606A.

f. Switch the MODULATION SELECTOR to INT 1000 ∿ .

g. Set PERCENTAGE MODULATION meter to 50% with the MODULATION AMPLITUDE control. The pattern on the screen should now be 6 centimeters high at the peaks and 2 centimeters high at the troughs (see figure 4-3). If pattern is not exactly three times as high at the peaks as at the troughs, adjust the MODULATION AMPLITUDE control until it is. The Model 606A is now modulating exactly 50%.

h. Adjust Mod. Cal. (R67) control until PERCENTAGE MODULATION meter reads 50%. This control is second from the front in the row of five controls on the modulation chassis.

i. Set ATTENUATOR VERNIER to 0.2 VOLTS.

j. Repeat steps d to g. If the reading on the PERCENTAGE MODULATION meter is not 50 ± 5% adjust MODULATION AMPLITUDE until it is. Now adjust Carrier Zero Set (R35) slightly until the pattern on the oscilloscope is as in step g. Recheck MAXIMUM CARRIER SET paragraph 4-47 resetting R60 if necessary.

4-49. RF OUTPUT METER CALIBRATION.

a. Check the output meter zero adjustment (see paragraph 4-29).

b. Connect ac probe of Model 410B High Frequency VTVM (1 volt range) to the end of the output termination using a UG-290/U connector. Solder tip of 410B ac probe to center conductor of connector (see figure 4-5). Insert connector into OUTPUT connector of output termination.

c. Set ATTENUATOR VERNIER so that the Model 606A output meter reads 0.9 volt rms.

d. Rotate the FREQUENCY dial and RANGE switch through all frequencies, keeping the reading on the Model 606A output meter at 0.9 volt. Record the lowest and highest readings on the Model 410B.

e. Determine the average of the two readings recorded in step d.

f. Set the FREQUENCY dial and RANGE switch to a frequency that will give this average reading on the Model 410B.

g. Set attenuator vernier so that the Model 410B reads 0.9 volt.

h. Set the output meter to read 0.9 volts by adjusting Output Cal. control (R37).

4-50. ATTENUATOR REPAIR.

4-51. The A1 (606A-34C) output attenuator is a precision device. It is held to rigid electrical and mechanical specifications during manufacture. Testing of the attenuator is extremely involved; it requires special equipment and techniques which are not normally available. It is recommended that the attenuator be returned to the factory for necessary repair.

4-52. ADJUST FEEDBACK RELAY.

4-53. Set ATTENUATOR to 3 VOLTS. Feedback relay K1 should operate, increasing the output to 3 volts. If the relay does not operate, complete the following procedure:

a. Clip an (hp) Model 428A/B Clip-On Milliammeter probe over the lead going to the coil of relay, K1. If a Model 428A/B is not available, unsolder the lead and insert a conventional 10 ma dc milliammeter.

b. Set ATTENUATOR to 3 VOLTS range. The current through the relay should be a nominal 5.5 ma. If the current is not approximately this value, check the +300 volts supply and C26, C27, R27, R28 and R46. If this current does not operate the relay, fix or replace the relay. If the relay operates but the output does not increase to 3 volts, check R25, R26 and the entire feedback loop.

4-54. DRIVE CABLE ASSEMBLY REPLACEMENT.

4-55. Replacement of the drive cable assembly ((hp) stock number 606A-18) requires only the removal of the old drive cable assembly and winding the replacement drive cable onto the idler shaft, tuner pulley, and drive pulley. An adjustment of the drive cable assembly is made to obtain proper rotation of the frequency dial and tuner plates. No special tools are required. Following is the installation procedure:

a. Disconnect power. Remove cabinet and rf generator shield.

b. Turn instrument upside-down and remove the aluminum shielding plate between the rf oscillator and rf amplifier.

c. Refer to figure 4-6. Loosen the two setscrews in the spring load nut and the one setscrew in the end of the drive pulley.

d. Remove old drive cable assembly.

e. Push end of replacement drive cable nearest drive collar over tuner pulley. Press the drive collar into the notch in tuner pulley.

f. Wrap the short end of drive cable around the tuner pulley as shown in figure 4-6. Attach end of

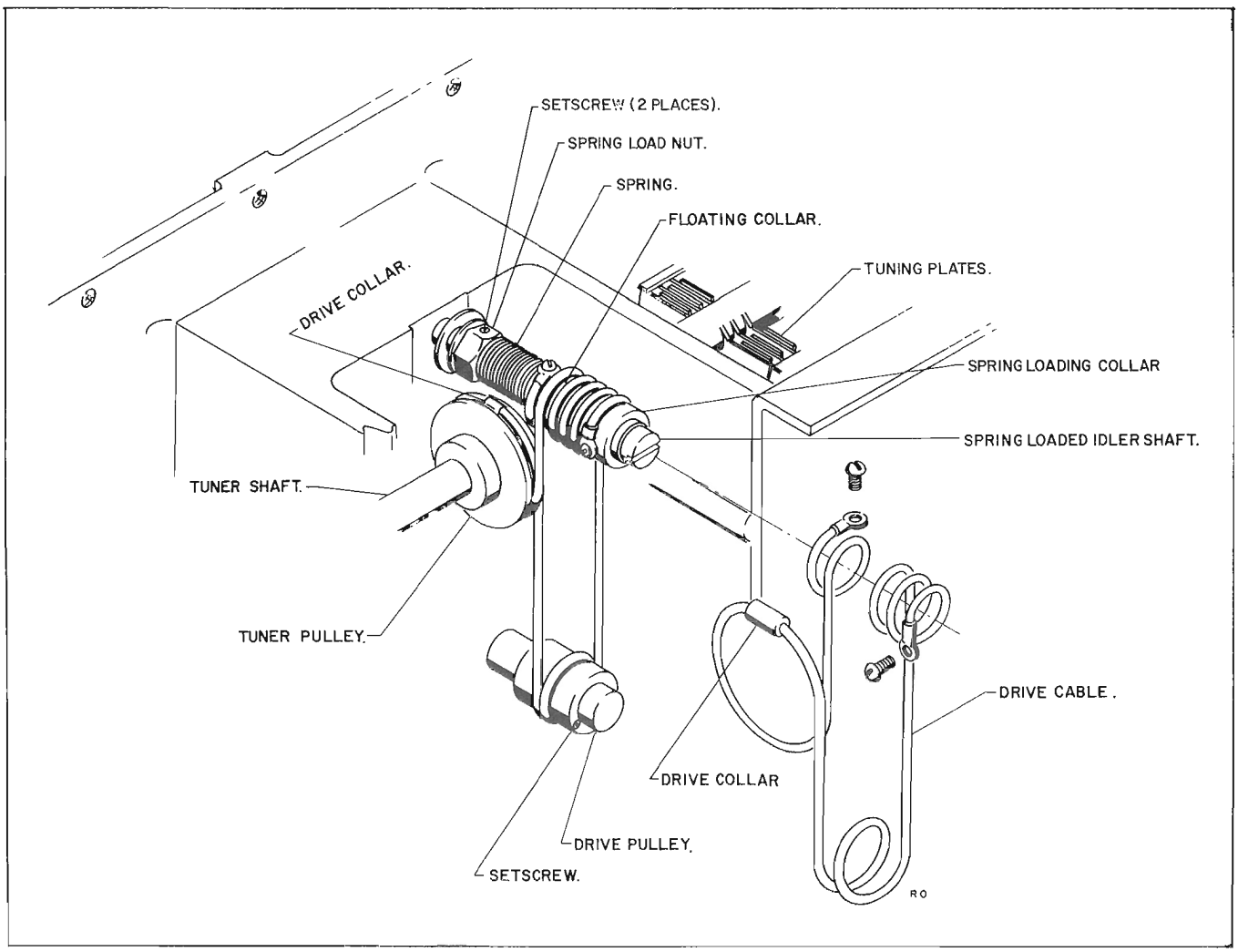


Figure 4-6. Installation of Drive Cable Assembly

cable to the floating collar on the spring loaded idler shaft with 4-40 x 1/4 inch round-head machine screw.

g. Wind two full turns of the drive cable onto the floating collar. Be sure the spring load nut is positioned so that one of the setscrews is accessible. Place a 9/16 inch open-end wrench over the spring load nut to prevent its turning.

h. Wrap one and a half turns of the drive cable around the drive pulley as shown in figure 4-6.

i. Rotate the spring-loaded idler shaft so that the number 4-40 screw hole in the spring-loading collar is accessible.

j. Attach the long end of drive cable to the spring loading collar using the 4-40 x 1/4 round-head machine screw.

k. Place a screwdriver in the slot at end of the spring-loaded idler shaft and rotate shaft counterclockwise to remove slack in drive cable. Continue to hold spring-load nut with end wrench.

m. Tighten one setscrew in the spring-load nut and remove end wrench.

n. Turn frequency dial to approximately mid-range and seat cable in the slot on the drive pulley.

p. Holding spring-load nut with 9/16 inch open-end wrench, loosen the previously tightened setscrew in spring-load nut and turn spring-loaded idler shaft counterclockwise to a torque of approximately 7 inch-pounds. Retighten setscrew and remove wrench.

q. Hold frequency dial against its low frequency stop. Slip the drive cable on the drive pulley by turning the spring-loaded idler shaft with screwdriver. Turn the idler shaft until both tuning capacitors are fully meshed.

r. Tighten the 4-40 allen setscrew in drive pulley.

s. Rotate frequency dial through its range and observe position of drive cable.

t. Check dial calibration as outlined in para. 4-16.

u. Replace aluminum shielding plate between the rf oscillator and rf amplifier.

v. Turn instrument right-side up. Replace rf generator shield and cabinet. This completes the procedure.

4-56. RANGE SWITCH DETENT ASSEMBLY.

4-57. Difficulty in changing bands, or a loss of the detent action in the 606A Signal Generators may occur due to a misalignment of the components in the range switch. Numerous "life tests" of this switch detent assembly show that with proper alignment and lubrication, trouble-free operation over the life of the instrument is assured. Molybdenum-disulfide grease is an effective lubricant for the bearing surfaces of the rollers and the aluminum detent lift assembly.

4-58. With improper alignment and continued use, the roll-pin pressed into the aluminum detent lift assembly may work loose and fall out. Alignment applies to the positioning of the two rollers on the detent cam and detent lift assembly. On the attached sketch, Figure 4-6A, the proper positioning of one of these rollers is shown. The roller can be adjusted by loosening the 8-32 x 1/2" binding head mounting screw on the leaf spring. If this screw is loosened to make the adjustment, take care to assure that it is securely retightened. The lower roller (not shown in the sketch) is aligned in the same manner. In the case where the roll pin is loose or has fallen out, the following is a recommended repair procedure: back the RF Generator casting from the front panel by removing the appropriate knobs, shield cover screws, and four round head screws through the front panel. The roll pin hole in the face of the drive gear-detent lift part of the switch will then be accessible and may be tapped to provide for a 4-40 x 7/8" round head stainless steel screw. This screw installed in the new threaded hole will substitute nicely for the missing pin.

4-59. PERFORMANCE CHECK.

4-60. The following procedures check performance and verify proper operation of the Model 606A.

4-61. FREQUENCY CALIBRATION.

a. Set line voltage to 115 volts.

b. Perform operations listed in paragraph 4-17.

c. Repeat this procedure with line voltage set at 102.5 volts and 127.5 volts.

4-62. OUTPUT.

a. With line voltage set at 115 volts perform operations indicated in paragraph 4-18.

b. Rotate output meter RANGE switch through each position, adjusting output control at each setting. Output should be adjustable from zero to full scale in each position of the range switch.

c. Repeat steps a and b with line voltage set at 102.5 volts and 127.5 volts.

d. To check output impedance switch VTVM to 3 volt range.

e. Adjust Model 606A output to read 1 volt on VTVM at 20 mc.

f. Remove the 50 ohm load. Output voltage should rise to 2 volts ±0.1 volt.

g. Set Model 606A FREQUENCY dial to 65 mc and reconnect the 50 ohm load.

h. Reset output to 1 volt as indicated by VTVM.

i. Remove 50 ohm load. Output should rise to 2 volts ±0.2 volt.

4-63. MODULATION.

a. Perform procedure outlined in paragraph 4-15 with line voltage set at 115 volts.

b. Rotate FREQUENCY dial through all ranges; observe envelope pattern for distortion and squegging.

c. Repeat steps a and b with line voltage set at 102.5 volts and 127.5 volts.

d. Reset line voltage to 115 volts.

e. To check external modulation set MODULATION SELECTOR to EXT. AC.

f. Turn MODULATION AMPLITUDE control fully clockwise.

g. Set FREQUENCY control to 15 mc.

h. Connect an audio oscillator (20 cps to 20 kc) to MODULATION input jack of Model 606A and SYNC input of oscilloscope.

i. Adjust the audio oscillator to produce a signal of 4.5 volts peak. PERCENT MODULATION meter of Model 606A should indicate at least 100%.

j. Repeat steps e to i with line voltage set at 102.5 volts and 127.5 volts.

4-64. FREQUENCY DRIFT.

a. Allow Model 606A to warm up for at least two hours.

b. Set FREQUENCY control to 1 mc.

c. Monitor output of Model 606A with a counter for 10 minutes. Frequency drift should be less than 50 cycles over the 10 minute period.

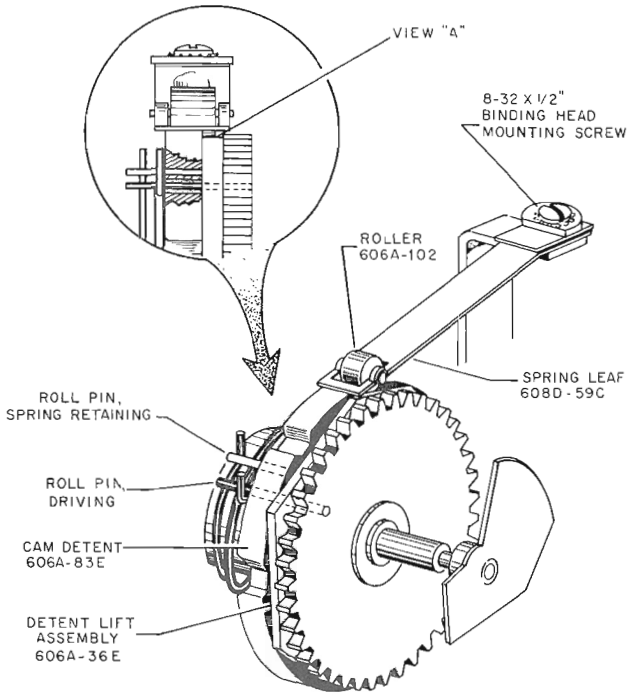


Figure 4-6A. Range Switch Detent Mechanism

SCHEMATIC DIAGRAM NOTES

1. Heavy solid line shows main signal path; heavy dashed line shows control, secondary signal, or feedback path.
2. Heavy box indicates front-panel engraving.
3. Arrows on potentiometers indicate clockwise rotation as viewed from the round shaft end; counterclockwise from the rectangular shaft end.
4. Resistance values in ohms, inductance in microhenry, and capacitance in picofarads unless otherwise specified.
5. Rotary switch schematic are electrical representations; for exact switching details refer to the switch assembly drawings.
6. Relays shown in condition prevailing during normal instrument operation.
7. Interconnecting parts and assemblies are shown on cable diagram.
8. * indicates factory adjustment. Part may be omitted.

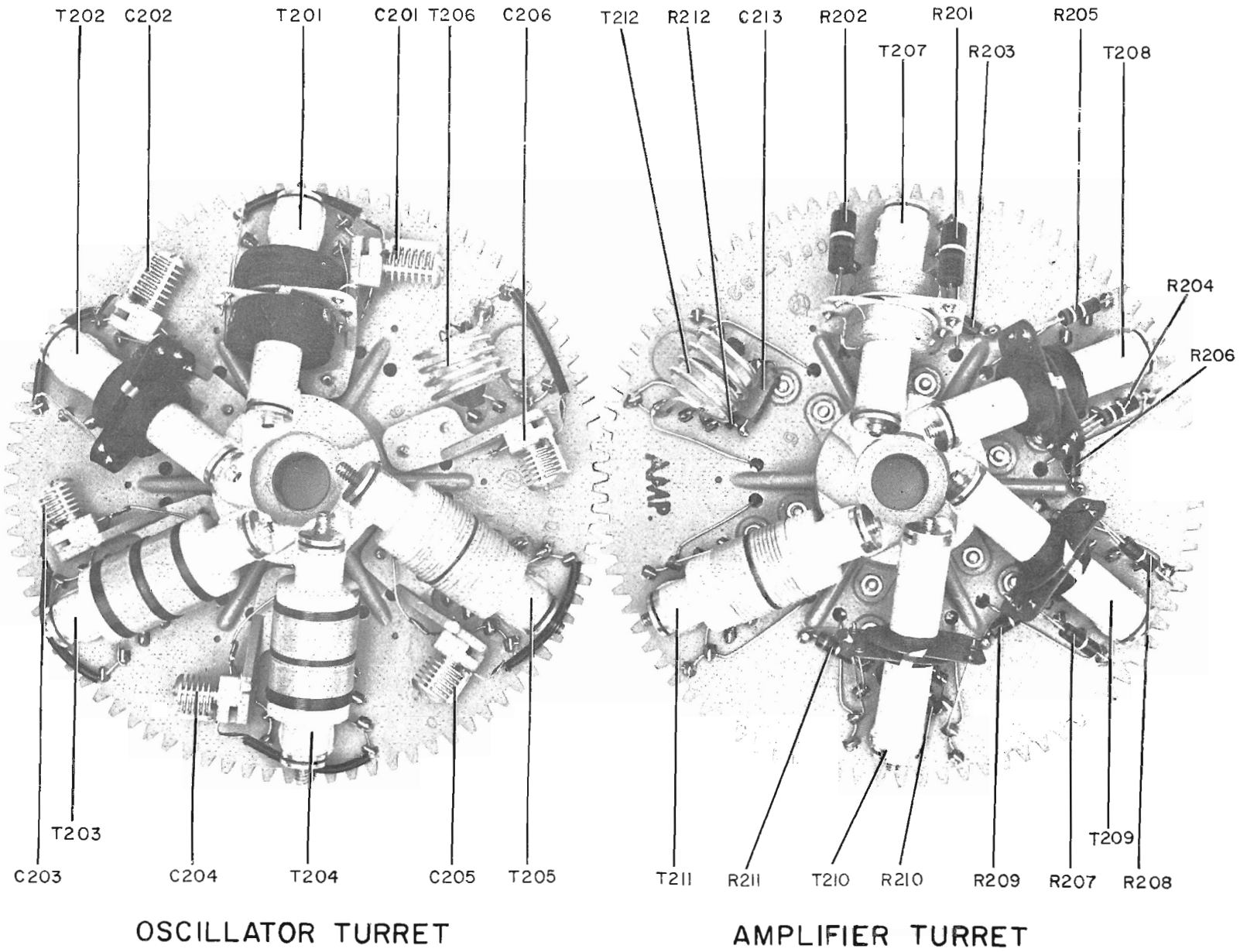


Figure 4-7. Oscillator and Amplifier Turrets viewed from Front Panel

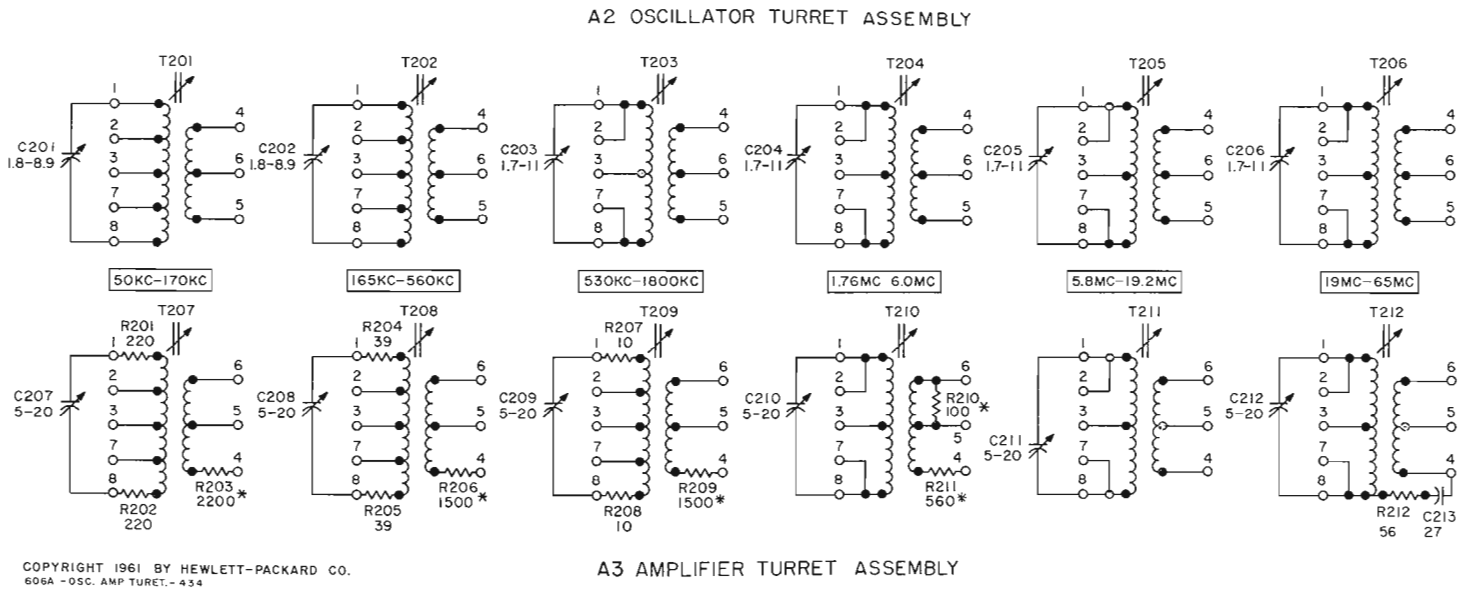
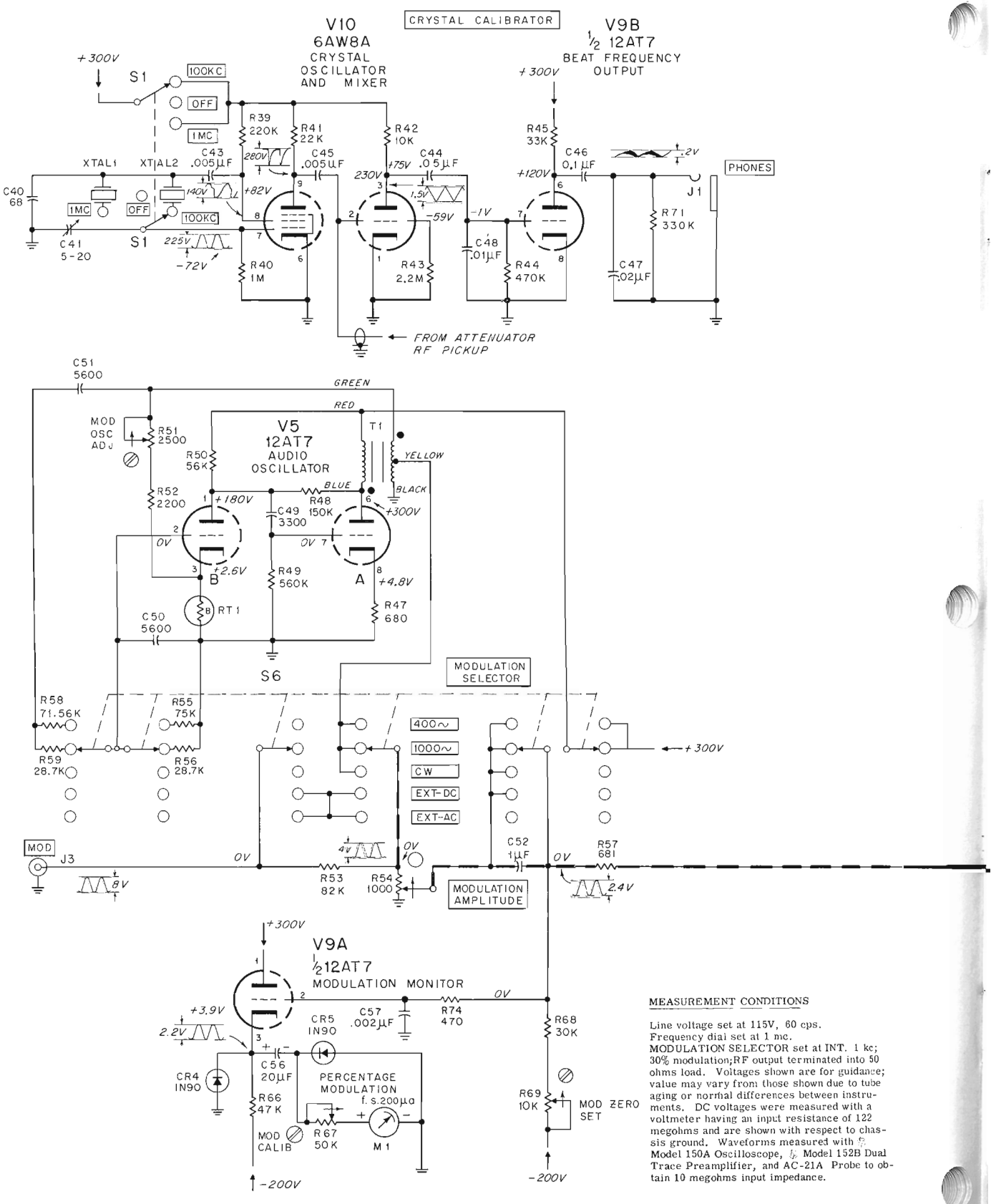


Figure 4-8. Oscillator and Amplifier Turrets Schematic



MEASUREMENT CONDITIONS

Line voltage set at 115V, 60 cps.
Frequency dial set at 1 mc.
MODULATION SELECTOR set at INT. 1 kc; 30% modulation; RF output terminated into 50 ohms load. Voltages shown are for guidance; value may vary from those shown due to tube aging or normal differences between instruments. DC voltages were measured with a voltmeter having an input resistance of 122 megohms and are shown with respect to chassis ground. Waveforms measured with a Model 150A Oscilloscope, a Model 152B Dual Trace Preamplifier, and AC-21A Probe to obtain 10 megohms input impedance.

Figure 4-9. Signal Generator (Sheet 1 of 2)

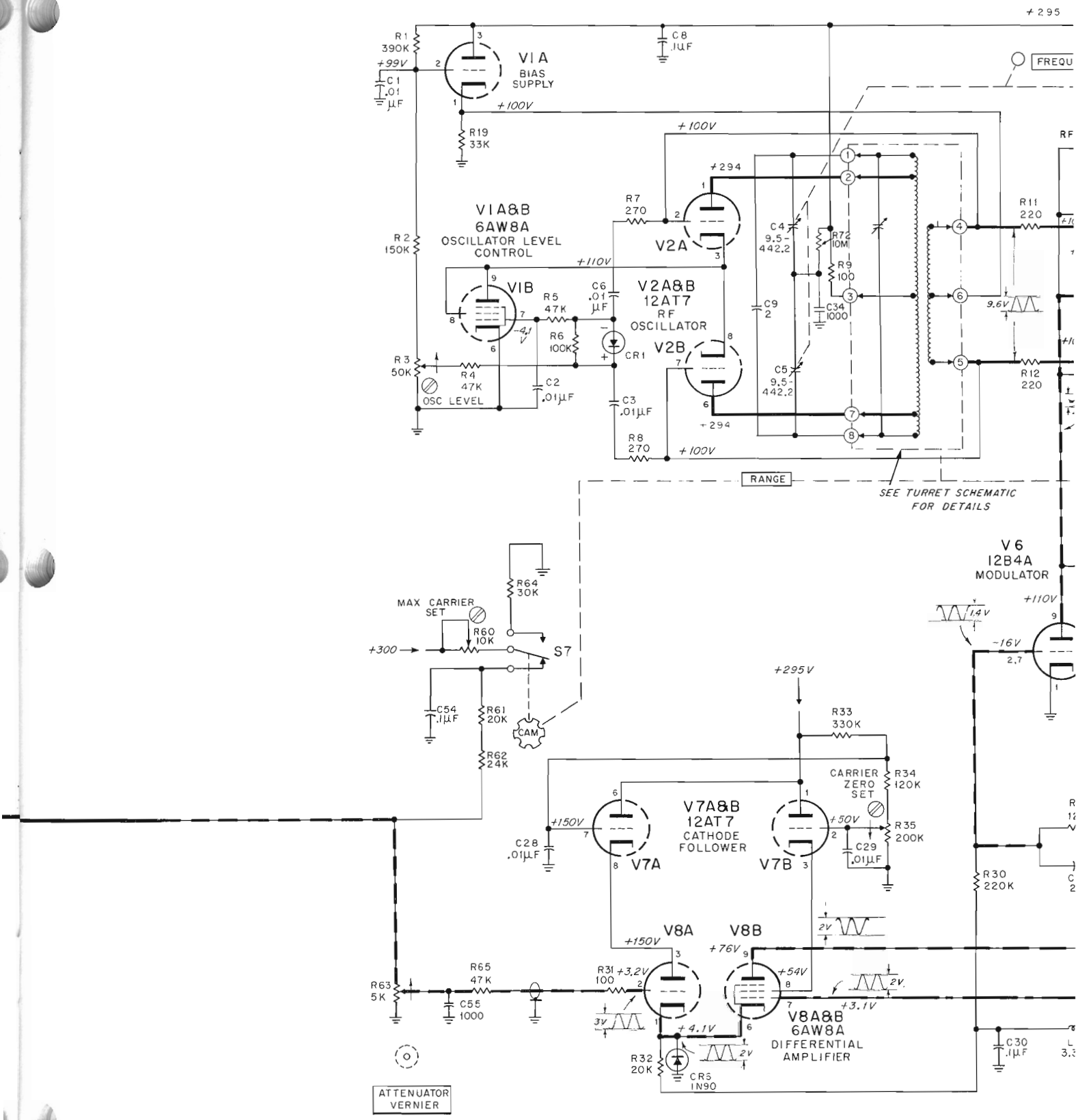


Figure 4-9. Signal Gene

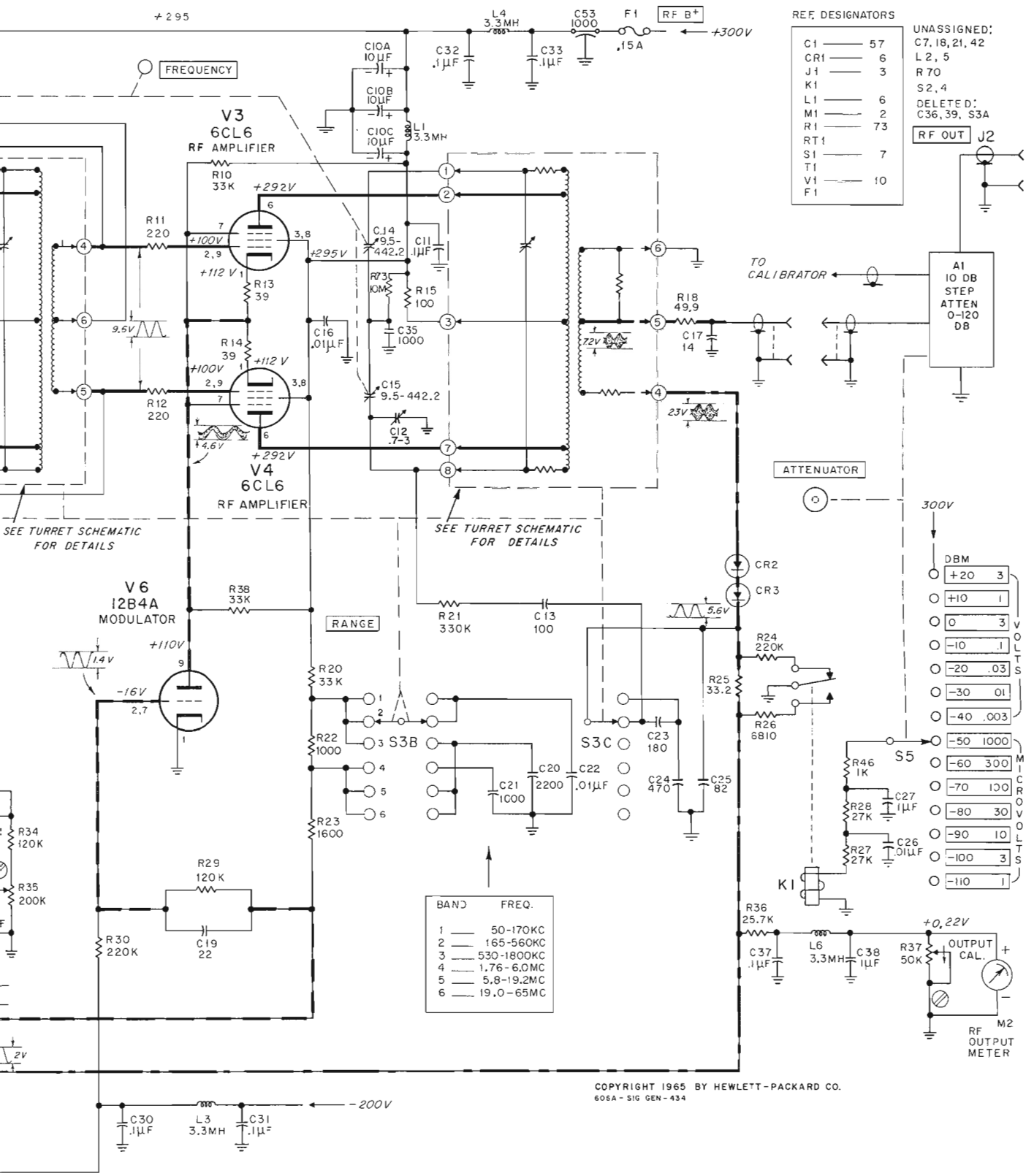


Figure 4-9. Signal Generator (Sheet 2 of 2)

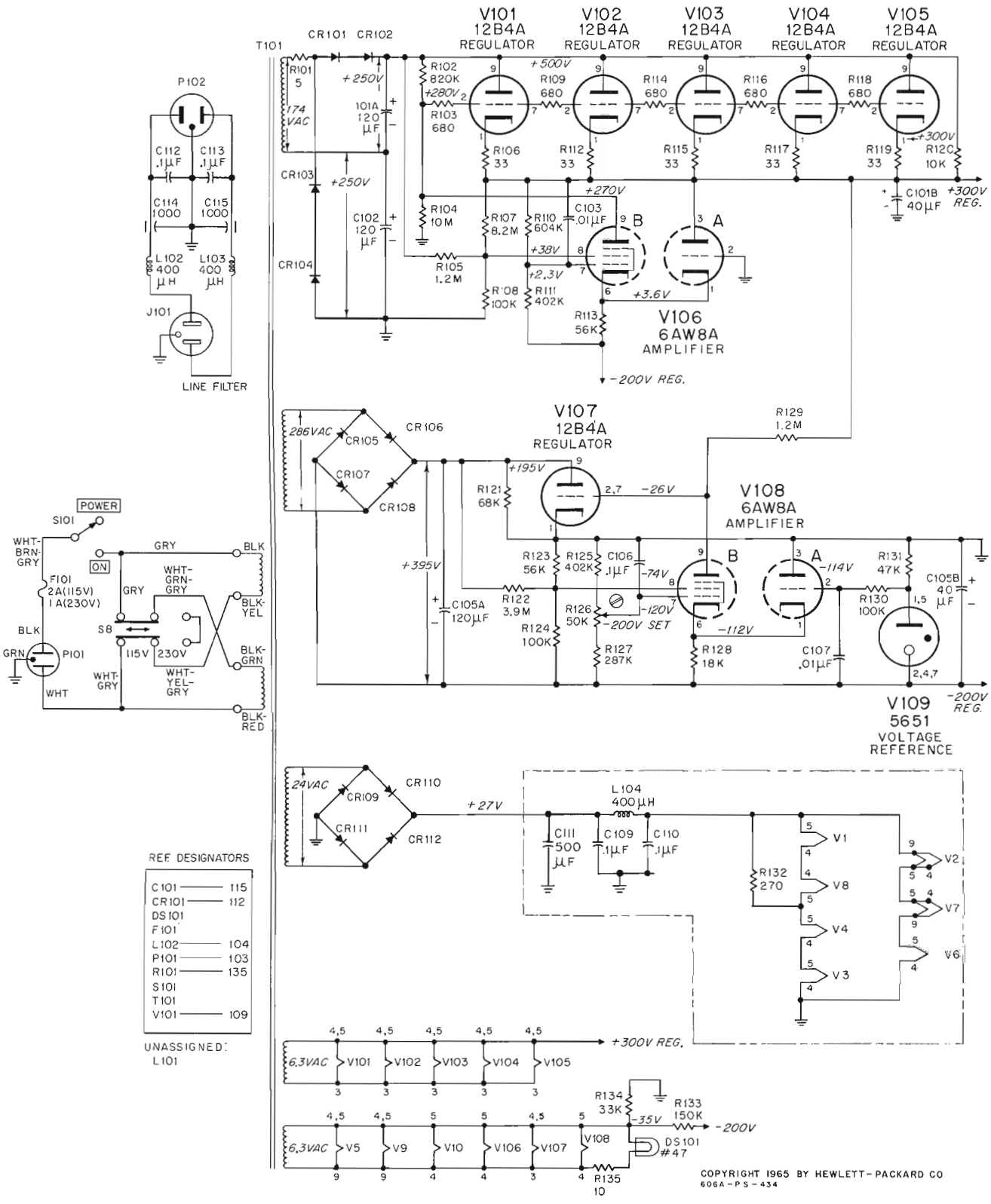
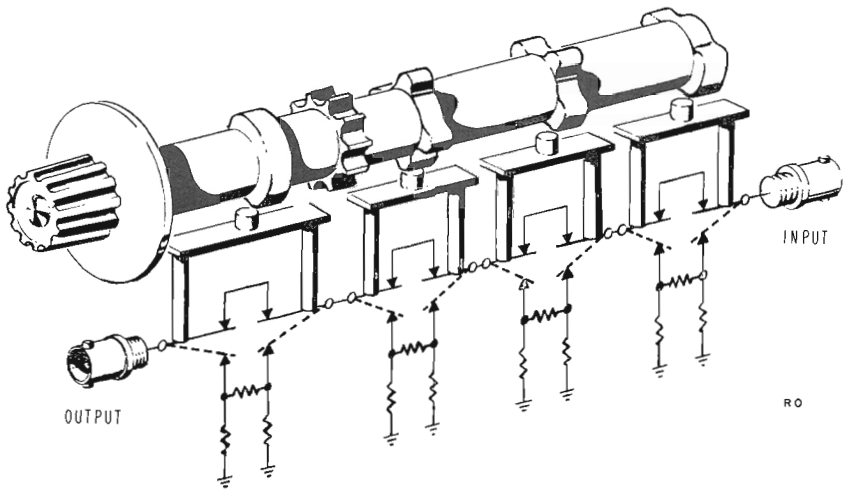


Figure 4-10. Power Supply



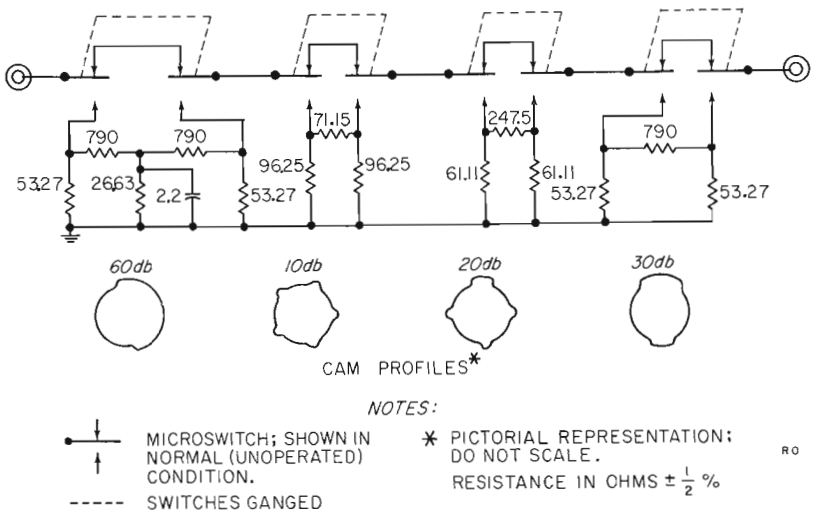


Figure 4-11. Model 606A Output Attenuator

SECTION V
REPLACEABLE PARTS

5-1. INTRODUCTION.

5-2. This section contains information for ordering replacement parts for the Model 606A, High Frequency Signal Generator.

5-3. Table 5-1 lists replaceable parts in alpha-numerical order of their reference designations. Miscellaneous parts are included at the end of the list. Table 5-2 lists parts in order of their hp stock number. Detailed information includes the following:

a. Full description of the part.

b. Manufacturer of the part in a five-digit code; see list of manufacturers in Table 5-3.

c. Hewlett-Packard stock number.

d. Total quantity used in the instrument (TQ col).

5-4. An Illustrated Parts Identification list follows Table 5-3.

5-5. ORDERING INFORMATION.

5-6. To order a replacement part, address order or inquiry to your nearest Hewlett-Packard sales and service office (see lists at the rear of this manual).

5-7. Specify the following information for each part:

a. Model and complete serial number of instrument.

b. Hewlett-Packard stock number.

c. Circuit reference designations.

d. Description.

5-8. To order a part not listed in Table 5-1, give a complete description of the part and include its function and location.

REFERENCE DESIGNATORS

A = assembly	E = misc electronic part	MP = mechanical part	TB = terminal board
B = motor	F = fuse	P = plug	TP = test point
BT = battery	FL = filter	Q = transistor	V = vacuum, tube, neon bulb, photocell, etc.
C = capacitor	J = jack	R = resistor	
CP = coupler	K = relay	RT = thermistor	W = cable
CR = diode	L = inductor	S = switch	X = socket
DL = delay line	M = meter	T = transformer	Y = crystal
DS = device signaling (lamp)			

ABBREVIATIONS

A = amperes	GE = germanium	N/C = normally closed	RMO = rack mount only
A.F.C. = automatic frequency control	GL = glass	NE = neon	RMS = root-mean square
AMPL = amplifier	GRD = ground(ed)	NI PL = nickel plate	RWV = reverse working voltage
		N/O = normally open	
	H = henries	NPO = negative positive zero (zero temperature coefficient)	S-B = slow-blow
B.F.O. = beat frequency oscillator	HEX = hexagonal		SCR = screw
BE CU = beryllium copper	HG = mercury		SE = selenium
BH = binder head	HR = hour(s)	NRFR = not recommended for field replacement	SECT = section(s)
BP = bandpass			SEMICON = semiconductor
BRS = brass		NSR = not separately replaceable	SI = silicon
BWO = backward wave oscillator	IF = intermediate freq		SIL = silver
	IMPG = impregnated		SL = slide
	INCD = incandescent		SPL = special
CCW = counter-clockwise	INCL = include(s)	OBD = order by description	SST = stainless steel
CER = ceramic	INS = insulation(ed)	OH = oval head	SR = split ring
CMO = cabinet mount only	INT = internal	OX = oxide	STL = steel
COEF = coefficient			
COM = common	K = kilo = 1000	P = peak	
COMP = composition		PC = printed circuit	TA = tantalum
CONN = connector	LIN = linear taper	PF = picofarads 10^{-12} farads	TD = time delay
CP = cadmium plate	LK WASH = lock washer		TGL = toggle
CRT = cathode-ray tube	LOG = logarithmic taper	PH BRZ = phosphor bronze	TI = titanium
CW = clockwise	LPF = low pass filter	PHL = Phillips	TOL = tolerance
		PIV = peak inverse voltage	TRIM = trimmer
	M = milli = 10^{-3}	P/O = part of	TWT = traveling wave tube
DEPC = deposited carbon	MEG = meg = 10^{6}	POLY = polystyrene	U = micro = 10^{-6}
DR = drive	MET FLM = metal film	PORC = porcelain	
	MET OX = metallic oxide	POS = position(s)	VAR = variable
ELECT = electrolytic	MFR = manufacturer	POT = potentiometer	VDCW = dc working volts
ENCAP = encapsulated	MINAT = miniature	PP = peak-to-peak	
EXT = external	MOM = momentary	PT = point	W/ = with
	MTG = mounting	PWV = peak working voltage	W = watts
F = farads	MY = "mylar"	RECT = rectifier	WIV = working inverse voltage
FH = flat head		RF = radio frequency	
FIL H = fillister head	N = nano (10^{-9})	RH = round head	WW = wirewound
FXD = fixed		RIV = reverse inverse voltage	W/O = without

01194-11

Table 5-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
A1	606A-34C	ASSEMBLY:ATTENUATOR	
A2	606A-42B	ASSEMBLY:OSCILLATOR TURRET, INCLUDES: C201 THRU C206, T201 THRU T206.	
A3	606A-42A	ASSEMBLY:AMPLIFIER TURRET, INCLUDES: C207 THRU C213, R201 THRU R212, T207 THRU T212.	
C1 THRU C3	0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	
C4 AND C5	0121-0144	C:VAR AIR 12.2-454.4 PF	
C6	0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	
C7		NOT ASSIGNED	
C8	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C9	0150-0025	C:FXD CER 2PF± 1 PF 500VDCW	
C10	0180-0016	C:FXD ELECT 3 X 10 UF +50-10% 450VDCW	
C11	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C12	0132-0003	C:VAR POLY 0.7-3.0 PF	
C13	0140-0041	C:FXD MICA 100 PF 5% 500VDCW	
C14 AND C15	0121-0145	C:VAR AIR 12.2-454.4 PF	
C16	0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	
C17	0160-0196	C:FXD MICA 24 PF 5% 500VDCW	
C18		NOT ASSIGNED	
C19	0140-0034	C:FXD MICA 22 PF 5% 500VDCW	
C20	0140-0024	C:FXD MICA 2200 PF 10% 500VDCW	
C21	0140-0079	C:FXD MICA 1000 PF 5% 500VDCW	
C22	0140-0008	C:FXD MICA.01 UF 10% 300VDCW	
C23	0140-0023	C:FXD MICA 180 PF 10% 500VDCW	
C24	0140-0027	C:FXD MICA 470 PF 10% 500VDCW	
C25	0140-0146	C:FXD MICA 82 PF 5% 300VDCW	
C26	0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	
C27 AND C28	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C29	0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	
C30 THRU C33	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C34 AND C35	0150-0019	C:FXD CER 1000 PF 20% 500VDCW	
C36		NOT ASSIGNED	
C37 AND C38	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C39		NOT ASSIGNED	
C40	0140-0082	C:FXD MICA 68 PF 5% 500VDCW	
C41	0130-0006	C:VAR CER 5 TO 20 PF 500VDCW	
C42		NOT ASSIGNED	
C43	0150-0014	C:FXD CER 0.005 UF 500VDCW	
C44	0150-0052	C:FXD CER 0.05 UF 20% 400VDCW	
C45	0150-0014	C:FXD CER 0.005 UF 500VDCW	
C46	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C47	0150-0024	C:FXD CER 0.02 UF +80-20% 600VDCW	
C48	0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	
C49	0160-0008	C:FXD PAPER 0.0033 UF 10% 600VDCW	
C50	0140-0071	C:FXD MICA 5600 PF 1% 500VDCW	
C51	0140-0071	C:FXD MICA 5600 PF 1% 500VDCW	
C52	0170-0018	C:FXD MY 1 UF 5% 200VDCW	
C53	0150-0005	C:FXD CER 1000 PF 25% 500VDCW	

See list of abbreviations in introduction to this section

Table 5-1. Reference Designation Index (Cont'd)

Reference Designation	℗ Stock No.	Description #	Note
C54	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C55	0140-0003	C:FXD MICA 1000 PF 10% 500VDCW	
C56	0180-0045	C:FXD ELECT 20 UF 25VDCW	
C57	0150-0023	C:FXD CER 2000 PF 20% 1000VDCW	
C58 THRU C100		NOT ASSIGNED	
C101 AND C102	0180-0030	C:FXD ELECT 2 SECTIONS 120/40 UF 450VDCW	
C103	0150-0012	C:FXD CER 0.1 UF 20% 1000VDCW	
C104		NOT ASSIGNED	
C105	0180-0030	C:FXD ELECT 2 SECTIONS 120/40 UF 450VDCW	
C106	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C107	0150-0012	C:FXD CER 0.1 UF 20% 1000VDCW	
C108		NOT ASSIGNED	
C109 AND C110	0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	
C111	0180-0047	C:FXD ELECT 500 UF 75VDCW	
C112 AND C113	0160-0001	C:FXD PAPER 0.1 UF 10% 600VDCW	
C114 AND C115	0150-0019	C:FXD CER 1000 PF 20% 500VDCW	
C116 THRU C200		NOT ASSIGNED	
C201 AND C202	606A-95C	C:VAR AIR 1.8 TO 8.9 PF(INCLUDES BRACKET)	
C203 THRU C206	606A-95B	C:VAR AIR 1.7 TO 11 PF(INCLUDES BRACKET)	
C207 THRU C212	0130-0006	C:VAR CER 5 TO 20 PF 500VDCW	
C213	0140-0042	C:FXD MICA 27 PF 5% 500VDCW	
CR1 THRU CR3	1910-0011	DIODE:GERMANIUM	
CR4 THRU CR6	1910-0004	DIODE:GERMANIUM 1N90	
CR7 THRU CR100		NOT ASSIGNED	
CR101-CR108	1901-0028	DIODE:SILICON	
CR109-CR112	1901-0026	DIODE:SILICON	
DS1 THRU DS100		NOT ASSIGNED	
DS101	2140-0009	LAMP:INCANDESCENT 0.15 AMP	
F1	2110-0017	FUSE:CARTRIDGE 0.15 AMP SLO-BLO	
F2 THRU F100		NOT ASSIGNED	
F101	2110-0006	FUSE:CARTRIDGE 2 AMP(115 VOLT OPERATION)	
	2110-0007	FUSE:CARTRIDGE 1 AMP(230 VOLT OPERATION)	
J1	1251-0071	JACK:TELEPHONE	
J2		N.S.R. PART OF A1 ASSEMBLY	
J3	1250-0001	CONNECTOR:BNC FEMALE	
J4 THRU J100		NOT ASSIGNED	

See list of abbreviations in introduction to this section

Table 5-1. Reference Designation Index (Cont'd)

Reference Designation	℗ Stock No.	Description #	Note
J101	1251-0095	CONNECTOR:POWER 2 FEMALE CONTACTS	
K1	0490-0018	RELAY:ARMATURE SPDT 5000 OHMS	
L1	9140-0052	COIL:RF 3.3 MH	
L2		NOT ASSIGNED	
L3 AND L4	9140-0052	COIL:RF 3.3 MH	
L5		NOT ASSIGNED	
L6	9140-0052	COIL:RF 3.3 MH	
L7 THRU L101		NOT ASSIGNED	
L102 THRU L104	9140-0051	COIL: 400 UH 5%	
M1	1120-0075	METER:MODULATION	
M2	1120-0074	METER:OUTPUT	
P1 THRU P100		NOT ASSIGNED	
P101	8120-0045	POWER CORD: 24" LONG	
P102	8120-0015	POWER CORD: 7' LONG	
R1	0690-3941	R:FXD COMP 390K OHM 10% 1W	
R2	0690-1541	R:FXD COMP 150K OHM 10% 1W	
R3	2100-0141	R:VAR COMP 50K OHM 20% LIN 1/4W	
R4 AND R5	0687-4731	R:FXD COMP 47K OHM 10% 1/2W	
R6	0687-1041	R:FXD COMP 100K OHM 10% 1/2W	
R7 AND R8	0687-2711	R:FXD COMP 270 OHM 10% 1/2W	
R9	0690-1011	R:FXD COMP 100 OHM 10% 1W	
R10	0693-3331	R:FXD COMP 33K OHM 10% 2W	
R11 AND R12	0687-2211	R:FXD COMP 220 OHM 10% 1/2W	
R13 AND R14	0687-3901	R:FXD COMP 39 OHM 10% 1/2W	
R15	0690-1011	R:FXD COMP 100 OHM 10% 1W	
R16 AND R17		NOT ASSIGNED	
R18	0757-0072	R:FXD MET FLM 49.9 OHM 1% 1/2W	
R19	0690-3331	R:FXD COMP 33K OHM 10% 1W	
R20	0693-3331	R:FXD COMP 33K OHM 10% 2W	
R21	0687-3341	R:FXD COMP 330K OHM 10% 1/2W	
R22	0686-1025	R:FXD COMP 1000 OHM 5% 1/2W	
R23	0686-1625	R:FXD COMP 1600 OHM 5% 1/2W	
R24	0687-2241	R:FXD COMP 220K OHM 10% 1/2W	
R25	0757-0044	R:FXD MET FLM 33.2K OHM 1% 1/2W	
R26 AND R27	0757-0835	R:FXD MET FLM 6.81K OHM 1% 1/2W	
R28	0693-2731	R:FXD COMP 27K OHM 10% 2W	
R29	0690-1241	R:FXD COMP 120K OHM 10% 1W	
R30	0690-2241	R:FXD COMP 220K OHM 10% 1W	
R31	0687-1011	R:FXD COMP 100 OHM 10% 1/2W	
R32	0816-0018	R:FXD WW 20K OHM 10% 10W	
R33	0690-3341	R:FXD COMP 330K OHM 10% 1W	
R34	0690-1241	R:FXD COMP 120K OHM 10% 1W	
R35	2100-0016	R:VAR COMP 200K OHM 10%	

See list of abbreviations in introduction to this section

Table 5-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
R36	0757-0112	R:FXD MET FLM 25.7K OHM 1% 1/4W	
R37	2100-0141	R:VAR COMP 50K OHM 20% LIN 1/4W	
R38	0693-3331	R:FXD COMP 33K OHM 10% 2W	
R39	0687-2241	R:FXD COMP 220K OHM 10% 1/2W	
R40	0687-1051	R:FXD COMP 1 MEGOHM 10% 1/2W	
R41	0687-2231	R:FXD COMP 22K OHM 10% 1/2W	
R42	0687-1031	R:FXD COMP 10K OHM 10% 1/2W	
R43	0687-2251	R:FXD COMP 2.2 MEGOHM 10% 1/2W	
R44	0687-4731	R:FXD COMP 470K OHM 10% 1/2W	
R45	0693-3331	R:FXD COMP 33K OHM 10% 2W	
R46	0687-1021	R:FXD COMP 1000 OHM 10% 1/2W	
R47	0687-6811	R:FXD COMP 680 OHM 10% 1/2W	
R48	0687-1541	R:FXD COMP 150K OHM 10% 1/2W	
R49	0687-5641	R:FXD COMP 560K OHM 10% 1/2W	
R50	0690-5631	R:FXD COMP 56K OHM 10% 1W	
R51	2100-0067	R:VAR COMP 2500 OHM 10% LIN	
R52	0687-2221	R:FXD COMP 22K OHM 10% 1/2W	
R53	0687-8231	R:FXD COMP 82K OHM 10% 1/2W	
R54		N.S.R. PART OF S6	
R55	0757-0856	R:FXD MET FLM 75.0K OHM 1% 1/2W	
R56	0698-3103	R:FXD MET FLM 28.7K OHM 1% 1/2W	
R57	0757-0816	R:FXD MET FLM 681 OHM 1% 1/2W	
R58	0757-0888	R:FXD MET FLM 71.5K OHM 1% 1/4W	
R59	0698-3103	R:FXD MET FLM 28.7K OHM 1% 1/2W	
R60	2100-0053	R:VAR WW 10K OHM 20% 2W	
R61	0771-0004	R:FXD MET FLM 20K OHM 10% 4W	
R62	0771-0005	R:FXD MET FLM 24K OHM 10% 4W	
R63	2100-0225	R:VAR WW 5000 OHM 10% LIN 2W	
R64	0815-0001	R:FXD WW 30K OHM 5% 10W	
R65	0687-4731	R:FXD COMP 47K OHM 10% 1/2W	
R66	0693-4731	R:FXD COMP 47K OHM 10% 2W	
R67	2100-0141	R:VAR COMP 50K OHM 20% LIN 1/4W	
R68	0771-0007	R:FXD MET FLM 30K OHM 10% 4W	
R69	2100-0053	R:VAR WW 10K OHM 20% 2W	
R70		NOT ASSIGNED	
R71	0687-3341	R:FXD COMP 330K OHM 10% 1/2W	
R72 AND			
R73	0690-1061	R:FXD COMP 10 MEGOHM 10% 1W	
R74	0687-4711	R:FXD COMP 470 OHM 10% 1/2W	
R75 THRU			
R100		NOT ASSIGNED	
R101	0813-0017	R:FXD WW 5 OHM 10% 5W	
R102	0687-8241	R:FXD COMP 820K OHM 10% 1/2W	
R103	0687-6811	R:FXD COMP 680 OHM 10% 1/2W	
R104	0687-1061	R:FXD COMP 10 MEGOHM 10% 1/2W	
R105	0687-1251	R:FXD COMP 1.2 MEGOHM 10% 1/2W	
R106	0687-3301	R:FXD COMP 33 OHM 10% 1/2W	
R107	0687-8251	R:FXD COMP 8.2 MEGOHM 10% 1/2W	
R108	0687-1041	R:FXD COMP 100K OHM 10% 1/2W	
R109	0687-6811	R:FXD COMP 680 OHM 10% 1/2W	
R110	0757-0155	R:FXD MET FLM 604K OHM 1% 1/2W	
R111	0698-4022	R:FXD MET FLM 402K OHM 1% 1/2W	
R112	0687-3301	R:FXD COMP 33 OHM 10% 1/2W	
R113	0693-5631	R:FXD COMP 56K OHM 10% 2W	
R114	0687-6811	R:FXD COMP 680 OHM 10% 1/2W	
R115	0687-3301	R:FXD COMP 33 OHM 10% 1/2W	

See list of abbreviations in introduction to this section

Table 5-1. Reference Designation Index (Cont'd)

Reference Designation	℗ Stock No.	Description #	Note
R116	0687-6811	R:FXD COMP 680 OHM 10% 1/2W	
R117	0687-3301	R:FXD COMP 33 OHM 10% 1/2W	
R118	0687-6811	R:FXD COMP 680 OHM 10% 1/2W	
R119	0687-3301	R:FXD COMP 33 OHM 10% 1/2W	
R120	0816-0008	R:FXD WW 10K OHM 10% 10W	
R121	0690-6831	R:FXD COMP 68K OHM 10% 1W	
R122	0687-3951	R:FXD COMP 3.9 MEGOHM 10% 1/2W	
R123	0687-5631	R:FXD COMP 56K OHM 10% 1/2W	
R124	0687-1041	R:FXD COMP 100K OHM 10% 1/2W	
R125	0698-4022	R:FXD MET FLM 402K OHM 1% 1/2W	
R126	2100-0141	R:VAR COMP 50K OHM 20% LIN 1/4W	
R127	0757-0154	R:FXD MET FLM 287K OHM 1% 1/2W	
R128	0690-1831	R:FXD COMP 18K OHM 10% 1W	
R129	0690-1251	R:FXD COMP 1.2 MEGOHM 10% 1W	
R130	0687-1041	R:FXD COMP 100K OHM 10% 1/2W	
R131	0687-4731	R:FXD COMP 47K OHM 10% 1/2W	
R132	0690-2711	R:FXD COMP 270 OHM 10% 1W	
R133	0687-1541	R:FXD COMP 150K OHM 10% 1/2W	
R134	0687-3331	R:FXD COMP 33K OHM 10% 1/2W	
R135	0690-1001	R:FXD COMP 10 OHM 10% 1W	
R136 THRU R200		NOT ASSIGNED	
R201 AND R202	0690-2211	R:FXD COMP 220 OHM 10% 1W	
R203	0687-2221	R:FXD COMP 2200 OHM 10% 1/2W	
R204 AND R205	0687-3901	R:FXD COMP 39 OHM 10% 1/2W	
R206	0687-1521	R:FXD COMP 1500 OHM 10% 1/2W	
R207 AND R208	0687-1001	R:FXD COMP 10 OHM 10% 1/2W	
R209	0687-1521	R:FXD COMP 1500 OHM 10% 1/2W FACTORY SELECTED PART;TYPICAL VALUE GIVEN	
R210	0687-1011	R:FXD COMP 100 OHM 10% 1/2W FACTORY SELECTED PART;TYPICAL VALUE GIVEN	
R211	0687-5611	R:FXD COMP 560 OHM 10% 1/2W FACTORY SELECTED PART;TYPICAL VALUE GIVEN	
R212	0687-5601	R:FXD COMP 56 OHM 10% 1/2W	
RT1	2140-0007	LAMP:INCANDESCENT 250V 10W	
S1	3101-0012	SWITCH:TOGGLE DPDT	
S2		NOT ASSIGNED	
S3	3100-0197	SWITCH:ROTARY 2 SECTION, 6 POSITION	
S4		NOT ASSIGNED	
S5	3130-0105	SWITCH:WAFER	
S6	3100-0190	SWITCH:ROTARY 1 SECTION, 5 POSITION	
S7	3102-0010	SWITCH:SENSITIVE SPDT	
S8	3101-0033	SWITCH:SLIDE DPDT	
S9 THRU S100		NOT ASSIGNED	
S101	3101-0030 3101-0012	SWITCH:TOGGLE SPST(115V ONLY) SWITCH:TOGGLE DPDT(230V ONLY)	
T1	9120-0036	TRANSFORMER:AUDIO	
T2 THRU T100		NOT ASSIGNED	
T101	9100-0101	TRANSFORMER:POWER	
T102 THRU T200		NOT ASSIGNED	

See list of abbreviations in introduction to this section

Table 5-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
T201	606A-60A	TRANSFORMER:OSCILLATOR 50 TO 170 KC	
T202	606A-60C	TRANSFORMER:OSCILLATOR 165 TO 560 KC	
T203	606A-60E	TRANSFORMER:OSCILLATOR 530 TO 1800 KC	
T204	606A-60G	TRANSFORMER:OSCILLATOR 1.76 TO 6.0 MC	
T205	606A-60J	TRANSFORMER:OSCILLATOR 5.8 TO 19.2 MC	
T206	606A-60L	TRANSFORMER:OSCILLATOR 19 TO 65 MC,	
		CONSISTS OF: PRIMARY COIL	
	606A-60M	SECONDARY COIL	
T207	606A-60B	TRANSFORMER:AMPLIFIER 50 TO 170 KC	
T208	606A-60D	TRANSFORMER:AMPLIFIER 165 TO 560 KC	
T209	606A-60F	TRANSFORMER:AMPLIFIER 530 TO 1800 KC	
T210	606A-60H	TRANSFORMER:AMPLIFIER 1.76 TO 6.0 MC	
T211	606A-60K	TRANSFORMER:AMPLIFIER 5.8 TO 19.2 MC	
T212	606A-60N	TRANSFORMER:AMPLIFIER 19 TO 65 MC,	
		CONSISTS OF: PRIMARY COIL(SAME AS T206)	
		SECONDARY COIL	
V1	1933-0002	ELECTRON TUBE: 6AW8	
V2	1932-0027	ELECTRON TUBE: 12AT7	
V3 AND			
V4	1923-0030	ELECTRON TUBE: 6CL6	
V5	1932-0027	ELECTRON TUBE: 12AT7	
V6	1921-0010	ELECTRON TUBE: 12B4A	
V7	1932-0027	ELECTRON TUBE: 12AT7	
V8	1933-0002	ELECTRON TUBE: 6AW8	
V9	1932-0027	ELECTRON TUBE: 12AT7	
V10	1933-0002	ELECTRON TUBE: 6AW8	
V11 THRU			
V100		NOT ASSIGNED	
V101 THRU			
V105	1921-0010	ELECTRON TUBE: 12B4A	
V106	1933-0011	ELECTRON TUBE: 6AW8A	
V107	1921-0010	ELECTRON TUBE: 12B4A	
V108	1933-0011	ELECTRON TUBE: 6AW8A	
V109	1940-0001	ELECTRON TUBE: 5651	
XTAL 1	0410-0013	CRYSTAL UNIT:QUARTZ 1000 KC	
XTAL 2	0410-0014	CRYSTAL UNIT:QUARTZ 100 KC	
		MISCELLANEOUS	
	606A-27A	ASSEMBLY,LINE FILTER	
	606A-18	ASSEMBLY,FREQUENCY DRIVE CABLE	
	606A-95A	ASSEMBLY,TURRET CONTACT	
	608D-59C	DETENT SPRING LEAF	
	1400-0084	FUSEHOLDER:EXTRACTOR POST TYPE	
	606A-14E	GEAR FREQUENCY,VERNIER PINION	
	1450-0020	JEWEL,PILOT LIGHT: POWER	
	0370-0036	KNOB:BAR W/ARROW(RANGE)	
	0370-0037	KNOB:CONCENTRIC(MOD SELECTOR & ATTENUATOR)	
	0370-0066	KNOB:BLACK(FREQUENCY)	
	0370-0083	KNOB:BLACK(CALIBRATE)	
	0370-0063	KNOB:RED(ATTENUATOR & MOD AMPLITUDE)	
	9170-0024	SLUG,POLYIRON:FOR T212	
	1251-0156	SPRING,GROUND ON LINE FILTER	

See list of abbreviations in introduction to this section

Table 5-2 Replaceable Parts

℔ Stock No.	Description #	Mfr.	Mfr. Part No.	TQ
0121-0144	C:VAR AIR 12.2-454.4 PF	28480	0121-0144	2
0121-0145	C:VAR AIR 12.2-454.4 PF	28480	0121-0145	2
0130-0006	C:VAR CER 5-20 PF 500VDCW	72982	503-000-B2P028R	7
0132-0003	C:VAR POLY 0.7-3.0 PF 350VDCW	72982	535-016-4R	1
0140-0003	C:FXD MICA 0.001 UF 10% 500VDCW	00853	RCM20E 102K	1
0140-0008	C:FXD MICA 0.01 UF 10% 300VDCW	00853	TYPE C-B CHAR	1
0140-0023	C:FXD MICA 180 PF 10% 500VDCW	00853	TYPE K1318E10	1
0140-0024	C:FXD MICA 2200 PF 10% 500VDCW	00853	TYPE C1222B10	1
0140-0027	C:FXD MICA 470 PF 10% 500VDCW	28480	0140-0027	1
0140-0034	C:FXD MICA 22 PF 5% 500VDCW	28480	0140-0034	1
0140-0041	C:FXD MICA 100 PF 5% 500VDCW	28480	0140-0041	1
0140-0042	C:FXD MICA 27 PF 5% 500VDCW	28480	0140-0042	1
0140-0071	C:FXD MICA 5600 PF 2% 500VDCW	28480	0140-0071	2
0140-0079	C:FXD MICA 1000 PF 5% 500VDCW	28480	0140-0079	1
0140-0082	C:FXD MICA 68 PF 5% 500VDCW	28480	0140-0082	1
0140-0146	C:FXD MICA 82 PF 5% 300VDCW	28480	0140-0146	1
0150-0005	C:FXD CER 1000 PF 25% 500VDCW	28480	0150-0005	1
0150-0012	C:FXD CER 0.01 UF 20% 1000VDCW	56289	H 1038	10
0150-0014	C:FXD CER 0.005 UF 500VDCW	04222	BCD-D1-4(5K PF)	2
0150-0019	C:FXD CER 1000 PF 20% 500VDCW	72982	327005X5U0102M	4
0150-0023	C:FXD CER 2000 PF 20% 1000VDCW	91418	JF-2KPF PORM 20%	1
0150-0024	C:FXD CER 0.02 UF +80-20% 600VDCW	71590	DD203	1
0150-0025	C:FXD CER 2 PF± 1 PF 500VDCW	72982	315-000-P3K0-209F	1
0150-0052	C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A/50000 PF	1
0160-0001	C:FXD PAPER 0.1 UF 10% 600VDCW	28480	0160-0001	2
0160-0008	C:FXD PAPER 0.0033 UF 10% 600VDCW	28480	0160-0008	1
0160-0196	C:FXD MICA 24 PF 5% 500VDCW	28480	0160-0196	1
0170-0018	C:FXD MY 1 UF 5% 200VDCW	84411	HEW-4	1
0170-0022	C:FXD MY 0.1 UF 20% 600VDCW	09134	TYPE 27	14
0180-0016	C:FXD ELECT 3 X 10 UF +50-10% 450VDCW	28480	0180-0016	1
0180-0030	C:FXD ELECT 2 SECTIONS120/40 UF 450VDCW	28480	0180-0030	3
0180-0045	C:FXD ELECT 20 UF 25VDCW	56289	D32696	1
0180-0047	C:FXD ELECT 500 UF 75VDCW	56289	D32443	1
0370-0036	KNOB:BAR W/ARROW(RANGE)	28480	0370-0036	1
0370-0037	KNOB:CONCENTRIC(MOD SELECTOR & ATTENUATOR	28480	0370-0037	2
0370-0063	KNOB:RED(ATTENUATOR & MOD AMPLITUDE)	28480	0370-0063	2
0370-0066	KNOB:BLACK(FREQUENCY)	28480	0370-0066	1
0370-0083	KNOB:BLACK(CALIBRATE)	28480	0370-0083	1
0410-0013	CRYSTAL UNIT:1000 KC	28480	0410-0013	1
0410-0014	CRYSTAL UNIT:100 KC	28480	0410-0014	1
0490-0018	RELAY:ARMATURE SPDT 5000 OHM	77342	RS-1124 5000 OHM	1
606A-14E	GEAR FREQUENCY:VERNIER PINION	28480	606A-14E	2
606A-18	ASSY:FREQ. DRIVE CABLE	28480	606A-18	1
606A-27A	ASSY:LINE FILTER	28480	606A-27A	1
606A-34C	ASSY:ATTENUATOR	28480	606A-34C	1
606A-42A	ASSY:AMPLIFIER TURRET	28480	606A-42A	1
606A-42B	ASSY:OSCILLATOR TURRET	28480	606A-42B	1
606A-60A	TRANSFORMER:OSC. 50-170 KC	28480	606A-60A	1
606A-60B	TRANSFORMER:AMPL. 50-170 KC	28480	606A-60B	1
606A-60C	TRANSFORMER:OSC. 165-560 KC	28480	606A-60C	1
606A-60D	TRANSFORMER:AMPL. 165-560 KC	28480	606A-60D	1
606A-60E	TRANSFORMER:OSC. 530-1800 KC	28480	606A-60E	1
606A-60F	TRANSFORMER:AMPL. 530-1800 KC	28480	606A-60F	1
606A-60G	TRANSFORMER:OSC. 1.76-6.0 MC	28480	606A-60G	1
606A-60H	TRANSFORMER:AMPL. 1.76-6.0 MC	28480	606A-60H	1

See list of abbreviations in introduction to this section

Table 5-2. Replaceable Parts (Cont'd)

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ
606A-60J	TRANSFORMER:OSC. 5.8-19.2 MC	28480	606A-60J	1
606A-60K	TRANSFORMER:AMPL. 5.8-19.2 MC	28480	606A-60K	1
606A-60L	TRANSFORMER:OSC. 19-65 MC	28480	606A-60L	2
606A-60M	TRANSFORMER:SECONDARY COIL	28480	606A-60M	1
606A-60N	TRANSFORMER:AMPL. 19-65 MC	28480	606A-60N	1
606A-95A	ASSY:TURRET CONTACT	28480	606A-95A	2
606A-95B	C:VAR AIR 1.7 TO 11 PF (INCL. BRACKET)	28480	606A-95B	4
606A-95C	C:VAR AIR 1.8 TO 8.9 PF(INCL. BRACKET)	28480	606A-95C	2
608D-59C	DETENT SPRING LEAF	28480	608D-59C	2
0686-1025	R:FXD COMP 1000 OHM 5% 1/2W	01121	EB 1025	1
0686-1625	R:FXD COMP 1600 OHM 5% 1/2W	01121	EB 1625	1
0687-1001	R:FXD COMP 10 OHM 10% 1/2W	01121	EB 1001	2
0687-1011	R:FXD COMP 100 OHM 10% 1/2W	01121	EB 1011	1
0687-1021	R:FXD COMP 1K OHM 10% 1/2W	01121	EB 1021	1
0687-1031	R:FXD COMP 10K OHM 10% 1/2W	01121	EB 1031	1
0687-1041	R:FXD COMP 100K OHM 10% 1/2W	01121	EB 1041	5
0687-1051	R:FXD COMP 1 MEGOHM 10% 1/2W	01121	EB 1051	1
0687-1061	R:FXD COMP 10 MEGOHM 10% 1/2W	01121	EB 1061	1
0687-1251	R:FXD COMP 1.2 MEGOHM 10% 1/2W	01121	EB 1251	1
0687-1521	R:FXD COMP 1.5K OHM 10% 1/2W	01121	EB 1521	2
0687-1541	R:FXD COMP 150K OHM 10% 1/2W	01121	EB 1541	2
0687-2211	R:FXD COMP 220 OHM 10% 1/2W	01121	EB 2211	2
0687-2221	R:FXD COMP 2.2K OHM 10% 1/2W	01121	EB 2221	2
0687-2231	R:FXD COMP 22K OHM 10% 1/2W	01121	EB 2231	1
0687-2241	R:FXD COMP 220K OHM 10% 1/2W	01121	EB 2241	2
0687-2251	R:FXD COMP 2.2 MEGOHM 10% 1/2W	01121	EB 2251	1
0687-2711	R:FXD COMP 270 OHM 10% 1/2W	01121	EB 2711	2
0687-3301	R:FXD COMP 33 OHM 10% 1/2W	01121	EB 3301	5
0687-3331	R:FXD COMP 33K OHM 10% 1/2W	01121	EB 3331	1
0687-3341	R:FXD COMP 330K OHM 10% 1/2W	01121	EB 3341	2
0687-3901	R:FXD COMP 39 OHM 10% 1/2W	01121	EB 3901	5
0687-3951	R:FXD COMP 3.9 MEGOHM 10% 1/2W	01121	EB 3951	1
0687-4711	R:FXD COMP 470 OHM 10% 1/2W	01121	EB 4711	1
0687-4731	R:FXD COMP 47K OHM 10% 1/2W	01121	EB 4731	4
0687-4741	R:FXD COMP 470K OHM 10% 1/2W	01121	EB 4741	1
0687-5601	R:FXD COMP 56 OHM 10% 1/2W	01121	EB 5601	1
0687-5611	R:FXD COMP 560 OHM 10% 1/2W	01121	EB 5611	1
0687-5631	R:FXD COMP 56K OHM 10% 1/2W	01121	EB 5631	1
0687-5641	R:FXD COMP 560K OHM 10% 1/2W	01121	EB 5641	1
0687-6811	R:FXD COMP 680 OHM 10% 1/2W	01121	EB 6811	6
0687-8231	R:FXD COMP 82K OHM 10% 1/2W	01121	EB 8231	1
0687-8241	R:FXD COMP 820K OHM 10% 1/2W	01121	EB 8241	1
0687-8251	R:FXD COMP 8.2 MEGOHM 10% 1/2W	01121	EB 8251	1
0690-1001	R:FXD COMP 10 OHM 10% 1W	01121	GB 1001	1
0690-1011	R:FXD COMP 100 OHM 10% 1W	01121	GB 1011	3
0690-1061	R:FXD COMP 10 MEGOHM 10% 1W	01121	GB 1061	2
0690-1241	R:FXD COMP 120K OHM 10% 1W	01121	GB 1241	2
0690-1251	R:FXD COMP 1.2 MEGOHM 10% 1W	01121	GB 1251	1
0690-1541	R:FXD COMP 150K OHM 10% 1W	01121	GB 1541	1
0690-1831	R:FXD COMP 18K OHM 10% 1W	01121	GB 1831	1
0690-2211	R:FXD COMP 220 OHM 10% 1W	01121	GB 2211	2
0690-2241	R:FXD COMP 220K OHM 10% 1W	01121	GB 2241	1
0690-2711	R:FXD COMP 270 OHM 10% 1W	01121	GB 2711	1
0690-3331	R:FXD COMP 33K OHM 10% 1W	01121	GB 3331	1

See list of abbreviations in introduction to this section

Table 5-2. Replaceable Parts (Cont'd)

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ
0690-3341	R:FXD COMP 330K OHM 10% 1W	01121	GB 3341	1
0690-3941	R:FXD COMP 390K OHM 10% 1W	01121	GB 3941	1
0690-5631	R:FXD COMP 56K OHM 10% 1W	01121	GB 5631	1
0690-6831	R:FXD COMP 68K OHM 10% 1W	01121	GB 6831	1
0693-2731	R:FXD COMP 27K OHM 10% 2W	01121	HB 2731	2
0693-3331	R:FXD COMP 33K OHM 10% 2W	01121	HB 3331	4
0693-4731	R:FXD COMP 47K OHM 10% 2W	01121	HB 4731	1
0693-5631	R:FXD COMP 56K OHM 10% 2W	01121	HB 5631	1
0698-3103	R:FXD MET FLM 28.7K OHM 1% 1/2W	28480	0698-3103	2
0698-4022	R:FXD MET FLM 402K OHM 1% 1/2W	28480	0698-4022	2
0757-0044	R:FXD MET FLM 33.2K OHM 1% 1/2W	28480	0757-0044	1
0757-0072	R:FXD MET FLM 49.9 OHM 1% 1/2W	28480	0757-0072	1
0757-0112	R:FXD MET FLM 25.7K OHM 1% 1/4W	28480	0757-0112	1
0757-0154	R:FXD MET FLM 287K OHM 1% 1/2W	28480	0757-0154	1
0757-0155	R:FXD MET FLM 604K OHM 1% 1/2W	28480	0757-0155	1
0757-0816	R:FXD MET FLM 681 OHM 1% 1/2W	28480	0757-0816	1
0757-0835	R:FXD MET FLM 6.81K OHM 1% 1/2W	28480	0757-0835	1
0757-0856	R:FXD MET FLM 75.0K OHM 1% 1/2W	28480	0757-0856	1
0757-0888	R:FXD MET FLM 71.5K OHM 1% 1/4W	28480	0757-0888	1
0771-0004	R:FXD MET FLM 20K OHM 10% 4W	28480	0771-0004	1
0771-0005	R:FXD MET FLM 24K OHM 10% 4W	28480	0771-0005	1
0771-0007	R:FXD MET FLM 30K OHM 10% 4W	28480	0771-0007	1
0813-0017	R:FXD WW 5 OHM 5% 5W	28480	0813-0017	1
0815-0001	R:FXD WW 30K OHM 5% 10W	28480	0815-0001	1
0816-0008	R:FXD WW 10K OHM 10% 10W	28480	0816-0008	1
0816-0018	R:FXD WW 20K OHM 10% 10W	28480	0816-0018	1
1120-0074	METER:OUTPUT	28480	1120-0074	1
1120-0075	METER:MODULATION	28480	1120-0075	1
1250-0001	CONNECTOR:BNC FEMALE	91737	30379-1	1
1251-0071	JACK,TELEPHONE FOR 2 CONDUCTOR PLUG	82389	3J-1259	1
1251-0095	CONNECTOR:POWER 2 FEMALE CONTACTS	75382	221	1
1251-0156	SPRING:GROUND ON LINE FILTER	01009	CS 402ACG	1
1400-0084	FUSEHOLDER:EXTRACTOR POST TYPE	75915	342014	2
1450-0020	JEWEL,PILOT LIGHT:POWER	72765	#14L-113	1
1901-0026	DIODE:SILICON 200 PIV	28480	1901-0026	4
1901-0028	DIODE:SILICON	28480	1901-0028	8
1910-0004	DIODE:GERMANIUM 1N90	73293	1N90	3
1910-0011	DIODE:GERMANIUM	28480	1910-0011	3
1921-0010	ELECTRON TUBE: 12B4A	28480	1921-0010	7
1923-0030	ELECTRON TUBE: 6CL6	28480	1923-0030	2
1932-0027	ELECTRON TUBE: 12AT7	28480	1932-0027	4
1933-0002	ELECTRON TUBE: 6AW8	28480	1933-0002	5
1933-0011	ELECTRON TUBE: 6AW8A	82047	6AW8A	2
1940-0001	ELECTRON TUBE: 5651	28480	1940-0001	1
2100-0016	R:VAR COMP 200K OHM 10%	28480	2100-0016	1
2100-0053	R:VAR WW 10K OHM 20% 2W	28480	2100-0053	2
2100-0067	R:VAR COMP 2500 OHM 10% LIN	28480	2100-0067	1
2100-0141	R:VAR COMP 50K OHM 20% LIN 1/4W	28480	2100-0141	4
2100-0225	R:VAR WW 5000 OHM 10% LIN 2W	28480	2100-0225	1
2110-0006	FUSE:CARTRIDGE 2 AMP(115V OPERATION)	75915	313002	1
2110-0007	FUSE:CARTRIDGE 1 AMP(230V OPERATION)	75915	313001	1
2110-0017	FUSE:.15 AMP SLO-BLO(115 OR 230V OP.)	75915	313.150	1
2140-0007	LAMP:INCANDESCENT 250V 10W	24455	8A/S6-12V	1
2140-0009	LAMP:INCANDESCENT 6-8V 0.15 AMP	24455	TYPE 47	1
3100-0190	SWITCH:ROTARY 1 SECTION 5 POSITION	28480	3100-0190	1

See list of abbreviations in introduction to this section

Table 5-2. Replaceable Parts (Cont'd)

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ	
3100-0197	SWITCH:ROTARY 2 SECTION 6 POSITION	28480	3100-0197	1	
3101-0012	SWITCH:TOGGLE DPDT(230V ONLY)	04009	82609J	2	
3101-0030	SWITCH:TOGGLE SPST(115V ONLY)	88140	8906K368	1	
3101-0033	SWITCH:SLIDE DPDT(115-230V)	42190	4633	1	
3102-0010	SWITCH:SENSITIVE SPDT	28480	3102-0010	1	
3130-0105	SWITCH:WAFER	28480	3130-0105	1	
8120-0015	CABLE:POWER	70903	KH3981/PH70/7.5FT.	1	
8120-0045	POWER CORD:24" LONG	70903	KH-4077	1	
9100-0101	TRANSFORMER:POWER	28480	9100-0101	1	
9120-0036	TRANSFORMER:AUDIO	28480	9120-0036	1	
9140-0051	COIL:FXD 400 UH 5%	28480	9140-0051	3	
9140-0052	COIL:FXD RF 3.3 MH	28480	9140-0052	4	
9170-0024	SLUG,POLYIRON FOR T212	28480	9170-0024	1	

See list of abbreviations in introduction to this section

TABLE 5-3
CODE LIST OF MANUFACTURERS

The following code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 (Name to Code) and H4-2 (Code to Name) and their latest supplements. The date of revision and the date of the supplements used appear at the bottom of each page. Alphabetical codes have been arbitrarily assigned to suppliers not appearing in the H4 Handbooks.

Code No.	Manufacturer	Address
00000	U.S.A. Common	Any supplier of U.S.
00136	McCoy Electronics	Mount Holly Springs, Pa.
00213	Sage Electronics Corp.	Rochester, N.Y.
00287	Cemco Inc.	Danielson, Conn.
00334	Humidial	Colton, Calif.
00348	Microtron Co., Inc.	Valley Stream, N.Y.
00373	Garlock Inc., Electronics Products Div.	Camden, N.J.
00656	Aerovox Corp.	New Bedford, Mass.
00779	Amp. Inc.	Harrisburg, Pa.
00781	Aircraft Radio Corp.	Boonton, N.J.
00815	Northern Engineering Laboratories, Inc.	Burlington, Wis.
00853	Sangamo Electric Co., Pickens Div.	Pickens, S.C.
00866	Goe Engineering Co.	Los Angeles, Calif.
00891	Carl E. Holmes Corp.	Los Angeles, Calif.
00929	Microlab Inc.	Livingston, N.J.
01009	Alden Products Co.	Brockton, Mass.
01121	Allen Bradley Co.	Milwaukee, Wis.
01255	Litton Industries, Inc.	Beverly Hills, Calif.
01281	TRW Semiconductors, Inc.	Lawndale, Calif.
01295	Texas Instruments, Inc., Transistor Products Div.	Dallas, Texas
01349	The Alliance Mfg. Co.	Alliance, Ohio
01589	Pacific Relays, Inc.	Van Nuys, Calif.
01930	Amerock Corp.	Rockford, Ill.
01961	Pulse Engineering Co.	Santa Clara, Calif.
02114	Ferroxcube Corp. of America	Saugerties, N.Y.
02286	Cole Rubber and Plastics Inc.	Sunnyvale, Calif.
02660	Amphenol-Borg Electronics Corp.	Chicago, Ill.
02735	Radio Corp. of America, Semiconductor and Materials Div.	Somerville, N.J.
02771	Vocaline Co. of America, Inc.	Old Saybrook, Conn.
02777	Hopkins Engineering Co.	San Fernando, Calif.
03508	G.E. Semiconductor Prod. Dept.	Syracuse, N.Y.
03705	Apex Machine & Tool Co.	Dayton, Ohio
03797	Eldema Corp.	Compton, Calif.
03877	Transitron Electric Corp.	Wakefield, Mass.
03888	Pyrofilm Resistor Co., Inc.	Cedar Knolls, N.J.
03954	Singer Co., Diehl Div. Finderne Plant	Sumerville, N.J.
04009	Arrow, Hart and Hegeman Elect. Co.	Hartford, Conn.
04013	Taurus Corp.	Lambertville, N.J.
04222	Hi-Q Division of Aerovox	Myrtle Beach, S.C.
04354	Precision Paper Tube Co.	Chicago, Ill.
04404	Dymec Division of Hewlett-Packard Co.	Palo Alto, Calif.
04651	Sylvania Electric Products, Microwave Device Div.	Mountain View, Calif.
04713	Motorola, Inc., Semiconductor Prod. Div.	Phoenix, Arizona
04732	Filtron Co., Inc. Western Div.	Culver City, Calif.
04773	Automatic Electric Co.	Northlake, Ill.
04796	Sequoia Wire Co.	Redwood City, Calif.
04811	Precision Coil Spring Co.	El Monte, Calif.
04870	P.M. Motor Company	Westchester, Ill.
05006	Twentieth Century Plastics, Inc.	Los Angeles, Calif.
05277	Westinghouse Electric Corp. Semi-Conductor Dept.	Youngwood, Pa.
05347	Ultronix, Inc.	San Mateo, Calif.
05593	Illumitronic Engineering Co.	Sunnyvale, Calif.
05616	Cosmo Plastic (c/o Electrical Spec. Co.)	Cleveland, Ohio
05624	Barber Colman Co.	Rockford, Ill.
05728	Tiffen Optical Co.	Roslyn Heights, Long Island, N.Y.
05729	Metro-Tel Corp.	Westbury, N.Y.
05783	Stewart Engineering Co.	Santa Cruz, Calif.
05820	Wakefield Engineering Inc.	Wakefield, Mass.
06004	Bassick Co., The	Bridgeport, Conn.
06090	Raychem Corp.	Redwood City, Calif.
06175	Bausch and Lomb Optical Co.	Rochester, N.Y.
06402	E.T.A. Products Co. of America	Chicago, Ill.
06540	Amatom Electronic Hardware Co., Inc.	New Rochelle, N.Y.
06555	Beede Electrical Instrument Co., Inc.	Penacook, N.H.
06666	General Devices Co., Inc.	Indianapolis, Ind.
06751	Semcor Div. Components Inc.	Phoenix, Ariz.
06812	Torrington Mfg. Co., West Div.	Van Nuys, Calif.
06980	Varian Assoc. Emac Div.	San Carlos, Calif.
07088	Kelvin Electric Co.	Van Nuys, Calif.
07126	Digitran Co.	Pasadena, Calif.
07137	Transistor Electronics Corp.	Minneapolis, Minn.
07138	Westinghouse Electric Corp. Electronic Tube Div.	Elmira, N.Y.
07149	Filmohn Corp.	New York, N.Y.
07233	Cinch-Graphik Co.	City of Industry, Calif.
07261	Avnet Corp.	Culver City, Calif.
07263	Fairchild Camera & Inst. Corp. Semiconductor Div.	Mountain View, Calif.
07322	Minnesota Rubber Co.	Minneapolis, Minn.
07387	Birtcher Corp., The	Monterey Park, Calif.
07700	Technical Wire Products Inc.	Cranford, N.J.
07910	Continental Device Corp.	Hawthorne, Calif.
07933	Raytheon Mfg. Co., Semiconductor Div.	Mountain View, Calif.
07966	Shockley Semi-Conductor Laboratories	Palo Alto, Calif.
07980	Hewlett-Packard Co., Boonton Radio Div.	Rockaway, N.J.
08145	U.S. Engineering Co.	Los Angeles, Calif.
08289	Blinn, Delbert Co.	Pomona, Calif.
08358	Burgess Battery Co.	Niagara Falls, Ontario, Canada
08664	Bristol Co., The	Waterbury, Conn.
08717	Sloan Company	Sun Valley, Calif.
08718	ITT Cannon Electric Inc., Phoenix Div.	Phoenix, Arizona
08792	CBS Electronics Semiconductor Operations, Div of C.B.S. Inc.	Lowell, Mass.
08984	Mel-Rain	Indianapolis, Ind.
09026	Babcock Relays Div.	Costa Mesa, Calif.
09134	Texas Capacitor Co.	Houston, Texas
09145	Atohm Electronics	Sun Valley, Calif.
09250	Electro Assemblies, Inc.	Chicago, Ill.
09569	Mallory Battery Co. of Canada, Ltd.	Toronto, Ontario, Canada
10214	General Transistor Western Corp.	Los Angeles, Calif.
10411	Ti-Tal, Inc.	Berkeley, Calif.
10646	Carborundum Co.	Niagara Falls, N.Y.
11236	CTS of Berne, Inc.	Berne, Ind.
11237	Chicago Telephone of California, Inc.	So. Pasadena, Calif.
11242	Bay State Electronics Corp.	Waltham, Mass.
11312	Teledyne Inc., Microwave Div.	Palo Alto, Calif.
11534	Duncan Electronics Inc.	Costa Mesa, Calif.
11711	General Instrument Corp., Semiconductor Div., Products Group	Newark, N.J.
11717	Imperial Electronic, Inc.	Buena Park, Calif.
11870	Melabs, Inc.	Palo Alto, Calif.
12136	Philadelphia Handle Co.	Camden, N.J.
12697	Clarostat Mfg. Co.	Dover, N.H.
12859	Nippon Electric Co., Ltd.	Tokyo, Japan
12881	Metex Electronics Corp.	Clark, N.J.
12930	Delta Semiconductor Inc.	Newport Beach, Calif.
12954	Dickson Electronics Corp.	Scottsdale, Arizona
13103	Thermalloy	Dallas, Texas
13396	Telefunken (GmbH)	Hanover, Germany
13835	Midland-Wright Div. of Pacific Industries, Inc.	Kansas City, Kansas
14099	Sem-Tech	Newbury Park, Calif.
14193	Calif. Resistor Corp.	Santa Monica, Calif.
14298	American Components, Inc.	Conshohocken, Pa.
14433	ITT Semiconductor, A Div. of Int. Telephone & Telegraph Corp.	West Palm Beach, Fla.
14493	Hewlett-Packard Company	Loveland, Colo.
14655	Cornell Dublier Electric Corp.	Newark, N.J.
14674	Corning Glass Works	Corning, N.Y.
14752	Electro Cube Inc.	So. Pasadena, Calif.
14960	Williams Mfg. Co.	San Jose, Calif.
15203	Webster Electronics Co.	New York, N.Y.
15291	Adjustable Bushing Co.	N. Hollywood, Calif.
15558	Micron Electronics	Garden City, Long Island, N.Y.
15566	Amprobe Inst. Corp.	Lynbrook, N.Y.
15772	Twentieth Century Coil Spring Co.	Santa Clara, Calif.
15818	Amelco Inc.	Mt. View, Calif.
15909	Daven Div. Thomas A. Edison Ind. McGraw-Edison Co.	Long Island City, N.Y.
16037	Spruce Pine Mica Co.	Spruce Pine, N.C.
16179	Omni-Spectra Inc.	Detroit, Ill.
16352	Computer Diode Corp.	Lodi, N.J.
16688	Ideal Prec. Meter Co., Inc. De Jur Meter Div.	Brooklyn, N.Y.
16758	Delco Radio Div. of G.M. Corp.	Kokomo, Inc.
17109	Thermonetics Inc.	Canoga Park, Calif.
17474	Tranex Company	Mountain View, Calif.
17675	Hamlin Metal Products Corp.	Akron, Ohio
17745	Angstrohm Prec. Inc.	No. Hollywood, Calif.
18042	Power Design Pacific Inc.	Palo Alto, Calif.
18476	Ty-Car Mfg. Co., Inc.	Holliston, Mass.
18486	TRW Elect. Comp. Div.	Des Plaines, Ill
18583	Curtis Instrument, Inc.	Mt. Kisco, N.Y.
18873	E.I. DuPont and Co., Inc.	Wilmington, Del.
18911	Durant Mfg. Co.	Milwaukee, Wis.
19315	Bendix Corp., The Eclipse-Poineer Div.	Teterboro, N.J.
19500	Thomas A. Edison Industries, Div. of McGraw-Edison Co.	West Orange, N.J.
19644	LRC Electronics	Horseheads, N.Y.
19701	Electra Mfg. Co.	Independence, Kansas
20183	General Atronics Corp.	Philadelphia, Pa.
21226	Executone, Inc.	Long Island City, N.Y.
21335	Fafnir Bearing Co., The	New Britain, Conn.
21520	Fansteel Metallurgical Corp.	N. Chicago, Ill.
23783	British Radio Electronics Ltd.	Washington, D.C.
24455	G.E. Lamp Division	Nela Park, Cleveland, Ohio
24655	General Radio Co.	West Concord, Mass.
26365	Gries Reproducer Corp.	New Rochelle, N.Y.
26462	Grobet File Co. of America, Inc.	Carlstadt, N.J.
26992	Hamilton Watch Co.	Lancaster, Pa.
28480	Hewlett-Packard Co.	Palo Alto, Calif.
33173	G.E. Receiving Tube Dept.	Owensboro, Ky.
35434	Lectrohm Inc.	Chicago, Ill.
36196	Stanwyck Coil Products Ltd.	Hawkesbury, Ontario, Canada
37942	P.R. Mallory & Co. Inc.	Indianapolis, Ind.
39543	Mechanical Industries Prod. Co.	Akron, Ohio
40920	Miniature Precision Bearings, Inc.	Keene, N.H.
42190	Muter Co.	Chicago, Ill.
43990	C.A. Norgren Co.	Englewood, Colo.

TABLE 5-3

CODE LIST OF MANUFACTURERS (Continued)

Code No.	Manufacturer	Address
44655	Ohmite Mfg. Co.	Skokie, Ill.
46384	Penn Eng. & Mfg. Corp.	Doylestown, Pa.
47904	Polaroid Corp.	Cambridge, Mass.
48620	Precision Thermometer & Inst. Co.	Southampton, Pa.
49956	Microwave & Power Tube Div.	Waltham, Mass.
52090	Rowan Controller Co.	Westminster, Md.
52983	Sanborn Company	Waltham, Mass.
54294	Shallcross Mfg. Co.	Selma, N.C.
55026	Simpson Electric Co.	Chicago, Ill.
55933	Sonotone Corp.	Elmsford, N.Y.
55938	Raytheon Co. Commercial Apparatus & Systems Div.	So. Norwalk, Conn.
56137	Spaulding Fibre Co., Inc.	Tonawanda, N.Y.
56289	Sprague Electric Co.	North Adams, Mass.
59446	Telex, Inc.	St. Paul, Minn.
59730	Thomas & Betts Co.	Elizabeth, N.J.
60741	Triplett Electrical Inst. Co.	Bluffton, Ohio
61775	Union Switch and Signal, Div. of Westinghouse Air Brake Co.	Pittsburgh, Pa.
62119	Universal Electric Co.	Owosso, Mich.
63743	Ward-Leonard Electric Co.	Mt. Vernon, N.Y.
64959	Western Electric Co., Inc.	New York, N.Y.
65092	Weston Inst. Inc. Weston-Newark	Newark, N.J.
66295	Wittek Mfg. Co.	Chicago, Ill.
66346	Revere Wollansak Div. Minn. Mining & Mfg. Co.	St. Paul, Minn.
70276	Allen Mfg. Co.	Hartford, Conn.
70318	Allmetal Screw Product Co., Inc.	Garden City, N.Y.
70485	Atlantic India Rubber Works, Inc.	Chicago, Ill.
70563	Amperite Co., Inc.	Union City, N.J.
70903	Belden Mfg. Co.	Chicago, Ill.
70998	Bird Electronic Corp.	Cleveland, Ohio
71002	Birnbach Radio Co.	New York, N.Y.
71041	Boston Gear Works Div. of Murray Co. of Texas	Quincy, Mass.
71218	Bud Radio, Inc.	Willoughby, Ohio
71286	Camloc Fastener Corp.	Paramus, N.J.
71313	Cardwell Condenser Corp.	Lindenhurst L.I., N.Y
71400	Bussmann Mfg Div. of McGraw-Edison Co.	St. Louis, Mo.
71436	Chicago Condenser Corp.	Chicago, Ill.
71447	Calif Spring Co., Inc.	Pico-Rivera, Calif.
71450	CTS Corp.	Elkhart, Ind.
71468	ITT Cannon Electric Inc.	Los Angeles, Calif.
71471	Cinema Plant, Hi-Q Div. Aerovox Corp.	Burbank, Calif.
71482	C.P. Clare & Co.	Chicago, Ill.
71590	Centralab Div. of Globe Union Inc.	Milwaukee, Wis.
71616	Commercial Plastics Co.	Chicago, Ill.
71700	Cornish Wire Co., The	New York, N.Y.
71707	Coto Coil Co., Inc.	Providence, R.I.
71744	Chicago Miniature Lamp Works	Chicago, Ill.
71753	A.O. Smith Corp., Crowley Div.	West Orange, N.J.
71785	Cinch Mfg. Co., Howard B. Jones Div.	Chicago, Ill.
71984	Dow Corning Corp.	Midland, Mich.
72136	Electro Motive Mfg. Co., Inc.	Willimantic, Conn.
72354	John E. Fast Co., Div. Victoreen Instr. Co.	Chicago, Ill.
72619	Dialight Corp.	Brooklyn, N.Y
72656	Indiana General Corp., Electronics Div.	Keasby, N.J.
72699	General Instrument Corp., Cap. Div.	Newark, N.J.
72765	Drake Mfg. Co.	Chicago, Ill.
72825	Hugh H. Eby Inc.	Philadelphia, Pa.
72928	Gudeman Co.	Chicago, Ill.
72964	Robert M. Hadley Co.	Los Angeles, Calif.
72982	Erie Technological Products, Inc.	Erie, Pa.
73061	Hansen Mfg. Co., Inc.	Princeton, Ind.
73076	H.M. Harper Co.	Chicago, Ill.
73138	Helipot Div. of Beckman Inst., Inc.	Fullerton, Calif.
73293	Hughes Products Division of Hughes Aircraft Co.	Newport Beach, Calif.
73445	Amperex Electronic Co., Div. of North American Phillips Co., Inc.	Hicksville, N.Y.
73506	Bradley Semiconductor Corp.	New Haven, Conn.
73559	Carling Electric, Inc.	Hartford, Conn.
73682	George K. Garrett Co., Div. MSL Industries Inc.	Philadelphia, Pa.
73734	Federal Screw Products Inc.	Chicago, Ill.
73743	Fischer Special Mfg. Co.	Cincinnati, Ohio
73793	General Industries Co., The	Elyria, Ohio
73846	Goshen Stamping & Tool Co.	Goshen, Ind.
73899	JFD Electronics Corp.	Brooklyn, N.Y.
73905	Jennings Radio Mfg. Corp.	San Jose, Calif.
74276	Signalite Inc.	Neptune, N.J.
74455	J.H. Winns, and Sons	Winchester, Mass.
74861	Industrial Condenser Corp.	Chicago, Ill.
74868	R.F. Products Division of Amphenol-Borg Electronics Corp.	Danbury, Conn.
74970	E.F. Johnson Co.	Waseca, Minn.
75042	International Resistance Co.	Philadelphia, Pa.
75378	CTS Knights Inc.	Sandwich, Ill.
75382	Kulka Electric Corporation	Mt. Vernon, N.Y.
75818	Lenz Electric Mfg. Co.	Chicago, Ill.
75915	Littlefuse, Inc.	Des Plaines, Ill.
76005	Lord Mfg. Co.	Erie, Pa.
76210	C.W. Marwedel	San Francisco, Calif.
76487	James Millen Mfg. Co., Inc.	Malden, Mass.
76493	J.W. Miller Co.	Los Angeles, Calif.
76530	Cinch-Monadnock, Div. of United Carr Fastener Corp.	San Leandro, Calif.
76545	Mueller Electric Co.	Cleveland, Ohio
76703	National Union	Newark, N.J.
76854	Oak Manufacturing Co.	Crystal Lake, Ill.
77068	Bendix Corp., The Bendix Pacific Div.	N. Hollywood, Calif.
77075	Pacific Metals Co.	San Francisco, Calif.
77221	Phanostran Instrument and Electronic Co.	South Pasadena, Calif.
77252	Philadelphia Steel and Wire Corp.	Philadelphia, Pa.
77342	American Machine & Foundry Co. Potter & Brumfield Div.	Princeton, Ind.
77630	TRW Electronic Components Div.	Camden, N.J.
77638	General Instrument Corp., Rectifier Div.	Brooklyn, N.Y.
77764	Resistance Products Co.	Harrisburg, Pa.
77969	Rubbercraft Corp. of Calif.	Torrance, Calif.
78189	Shakeproof Division of Illinois Tool Works	Elgin, Ill.
78283	Signal Indicator Corp.	New York, N.Y.
78290	Struthers-Dunn Inc.	Pitman, N.J.
78452	Thompson-Bremer & Co.	Chicago, Ill.
78471	Tilley Mfg. Co.	San Francisco, Calif.
78488	Stackpole Carbon Co.	St. Marys, Pa.
78493	Standard Thomson Corp.	Waltham, Mass.
78553	Tinnerman Products, Inc.	Cleveland, Ohio
78790	Transformer Engineers	San Gabriel, Calif.
78947	Ucinite Co.	Newtonville, Mass.
79136	Waldes Kohinoor Inc.	Long Island City, N.Y.
79142	Veeder Root, Inc.	Hartford, Conn.
79251	Wenco Mfg. Co.	Chicago, Ill.
79727	Continental-Wirt Electronics Corp.	Philadelphia, Pa.
79963	Zierick Mfg. Corp.	New Rochelle, N.Y.
80031	Mepco Division of Sessions Clock Co.	Morristown, N.J.
80120	Schnitzer Alloy Products Co.	Elizabeth, N.J.
80130	Times Telephoto Equipment	New York, N.Y.
80131	Electronic Industries Association. Any brand Tube meeting EIA Standards-Washington, DC.	
80207	Unimax Switch, Div. Maxon Electronics Corp.	Wallingford Conn.
80223	United Transformer Corp.	New York, N.Y.
80248	Oxford Electric Corp.	Chicago, Ill.
80294	Bourns Inc.	Riverside, Calif.
80411	Acro Div. of Robertshaw Controls Co.	Columbus, Ohio
80486	All Star Products Inc.	Defiance, Ohio
80509	Avery Adhesive Label Corp.	Monrovia, Calif.
80583	Hammarlund Co., Inc.	New York, N.Y.
80640	Stevens, Arnold, Co., Inc.	Boston, Mass.
81030	International Instruments Inc.	Orange, Conn.
81073	Grayhill Co.	LaGrange, Ill.
81095	Triad Transformer Corp.	Venice, Calif.
81312	Winchester Elec. Div. Litton Ind., Inc.	Oakville, Conn.
81349	Military Specification	. . . . .
81483	International Rectifier Corp.	El Segundo, Calif.
81541	Airpax Electronics, Inc.	Cambridge, Mass.
81860	Barry Controls, Div. Barry Wright Corp.	Watertown, Mass.
82042	Carter Precision Electric Co.	Skokie, Ill.
82047	Sperti Faraday Inc., Copper Hewitt Electric Div.	Hoboken, N.J.
82142	Jeffers Electronics Division of Speer Carbon Co.	Du Bois, Pa.
82170	Fairchild Camera & Inst. Corp., Defense Prod. Division	Clifton, N.J.
82209	Maguire Industries, Inc.	Greenwich, Conn.
82219	Sylvania Electric Prod. Inc. Electronic Tube Division	Emporium, Pa.
82376	Astron Corp.	East Newark, Harrison, N.J.
82389	Switchcraft, Inc.	Chicago, Ill.
82647	Metals & Controls Inc. Spencer Products	Attleboro, Mass.
82768	Phillips-Advance Control Co.	Joliet, Ill.
82866	Research Products Corp.	Madison, Wis.
82877	Rotron Mfg. Co., Inc.	Woodstock, N.Y.
82893	Vector Electronic Co.	Glendale, Calif.
83053	Western Washer Mfg. Co.	Los Angeles Calif.
83058	Carr Fastener Co.	Cambridge, Mass.
83086	New Hampshire Ball Bearing, Inc.	Peterborough, N.H.
83125	General Instrument Corp., Capacitor Div.	Darlington, S.C.
83148	ITT Wire and Cable Div.	Los Angeles, Calif.
83186	Victory Engineering Corp.	Springfield, N.J.
83298	Bendix Corp., Red Bank Div.	Red Bank, N.J.
83315	Hubbell Corp.	Mundelein, Ill.
83330	Smith, Herman H., Inc.	Brooklyn, N.Y.
83385	Central Screw Co.	Chicago, Ill.
83501	Gavitt Wire and Cable Co. Div. of Amerace Corp.	Brookfield, Mass.
83594	Burroughs Corp. Electronic Tube Div.	Plainfield, N.J.
83740	Union Carbide Corp. Consumer Prod. Div.	New York, N.Y.
83777	Model Eng. and Mfg., Inc.	Huntington, Ind.
83821	Loyd Scruggs Co.	Festus, Mo.
83942	Aeronautical Inst. & Radio Co.	Lodi, N.J.
84171	Arco Electronics Inc.	Great Neck, N.Y.
84396	A.J. Glesener Co., Inc.	San Francisco, Calif.
84411	TRW Capacitor Div.	Ogallala, Neb.
84970	Sarkes Tarzian, Inc.	Bloomington, Ind.
85454	Boonton Molding Company	Boonton, N.J.

From: FSC. Handbook Supplements
H4-1 Dated JULY 1965
H4-2 Dated NOV. 1962

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Revised: July, 1966

TABLE 5-3

CODE LIST OF MANUFACTURERS (Continued)

Code No.	Manufacturer	Address
85471	A.B. Boyd Co.	San Francisco, Calif.
85474	R.M. Bracamonte & Co.	San Francisco, Calif.
85660	Koiled Kords, Inc.	Hamden, Conn.
85911	Seamless Rubber Co.	Chicago, Ill.
86197	Clifton Precision Products Co., Inc.	Clifton Heights, Pa.
86579	Precision Rubber Products Corp.	Dayton, Ohio
86684	Radio Corp. of America, Electronic Comp. & Devices Div.	Harrison, N.J.
87034	Marco Industries	Anaheim, Calif.
87216	Philco Corporation (Lansdale Division)	Lansdale, Pa.
87473	Western Fibrous Glass Products Co.	San Francisco, Calif.
87664	Van Waters & Rogers Inc.	San Francisco, Calif.
87930	Tower Mfg. Corp.	Providence, R.I.
88140	Cutler-Hammer, Inc.	Lincoln, Ill.
88220	Gould-National Batteries, Inc.	St. Paul, Minn.
88421	Federal Telephone & Radio Corp.	Clifton, N.J.
88698	General Mills, Inc.	Buffalo, N.Y.
89231	Graybar Electric Co.	Oakland, Calif.
89665	United Transformer Co.	Chicago, Ill.
90179	US Rubber Co., Consumer Ind. & Plastics Prod. Div.	Passaic, N.J.
90970	Bearing Engineering Co.	San Francisco, Calif.
91260	Connor Spring Mfg. Co.	San Francisco, Calif.
91345	Miller Dial & Nameplate Co.	El Monte, Calif.
91418	Radio Materials Co.	Chicago, Ill.
91506	Augat Inc.	Attleboro Mass.
91637	Dale Electronics, Inc.	Columbus, Nebr.
91662	Elco Corp.	Willow Grove, Pa.
91737	Gremar Mfg. Co., Inc.	Wakefield, Mass.
91827	K F Development Co.	Redwood City, Calif.
91929	Honeywell Inc., Micro Switch Div.	Freeport, Ill.
91961	Nahm-Bros. Spring Co.	Oakland, Calif.
92180	Tru-Connector Corp.	Peabody, Mass.
92367	Elgeet Optical Co. Inc.	Rochester, N.Y.
92196	Universal Industries, Inc.	City of Industry, Calif.
92607	Tensolite Insulated Wire Co., Inc.	Tarrytown, N.Y.
93332	Sylvania Electric Prod. Inc. Semiconductor Div.	Woburn, Mass.
93369	Robbins and Myers, Inc.	New York, N.Y.
93410	Stevens Mfg. Co., Inc.	Mansfield, Ohio
93929	G.V. Controls	Livingston, N.J.
94137	General Cable Corp.	Bayonne, N.J.
94144	Raytheon Co., Comp. Div., Ind. Comp. Operations	Quincy, Mass.
94148	Scientific Electronics Products, Inc.	Loveland, Colo.
94154	Tung-Sol Electric, Inc.	Newark, N.J.
94197	Curtiss-Wright Corp. Electronics Div.	East Paterson, N.J.
94222	South Chester Corp.	Chester, Pa.
94310	Tru-Ohm Products Memcor Components Div.	Huntington, Ind.
94330	Wire Cloth Products, Inc.	Bellwood, Ill.
94682	Worcester Pressed Aluminum Corp.	Worcester, Mass.
94696	Magnecraft Electric Co.	Chicago, Ill.
95023	George A. Philbrick Researchers, Inc.	Boston, Mass.
95236	Allies Products Corp.	Miami, Fla.
95238	Continental Connector Corp.	Woodside, N.Y.
95263	Leecraft Mfg. Co., Inc.	Long Island, N.Y.
95264	Lerco Electronics, Inc.	Burbank, Calif.
95265	National Coil Co.	Sheridan, Wyo.
95275	Vitramon, Inc.	Bridgeport, Conn.
95348	Gordos Corp.	Bloomfield, N.J.
95354	Methode Mfg. Co.	Chicago, Ill.
95712	Dage Electric Co., Inc.	Franklin, Ind.
95984	Siemon Mfg. Co.	Wayne, Ill.
95987	Weckesser Co.	Chicago, Ill.
96067	Huggins Laboratories	Sunnyvale, Calif.
96095	Hi-Q Div. of Aerovox Corp.	Olean, N.Y.
96256	Thordarson-Meissner Inc.	Mt. Carmel, Ill.
96296	Solar Manufacturing Co.	Los Angeles, Calif.
96330	Carlton Screw Co.	Chicago, Ill.
96341	Microwave Associates, Inc.	Burlington, Mass.
96501	Excel Transformer Co.	Oakland, Calif.
97464	Industrial Retaining Ring Co.	Irvington, N.J.
97539	Automatic & Precision Mfg.	Englewood, N.J.
97979	Reon Resistor Corp.	Yonkers, N.Y.
97983	Litton System Inc., Adler-Westrex Commun. Div.	New Rochelle, N.Y.
98141	R-Troncis, Inc.	Jamaica, N.Y.
98159	Rubber Teck, Inc.	Gardena, Calif.
98220	Hewlett-Packard Co., Moseley Div.	Pasadena, Calif.
98278	Microdot, Inc.	So. Pasadena, Calif.
98291	Sealectro Corp.	Mamaroneck, N.Y.
98376	Zero Mfg. Co.	Burbank, Calif.
98731	General Mills Inc., Electronics Div.	Minneapolis, Minn.
98734	Paeco Div. of Hewlett-Packard Co.	Palo Alto, Calif.
98821	North Hills Electronics, Inc.	Glen Cove, N.Y.
98978	International Electronic Research Corp.	Burbank, Calif.
99109	Columbia Technical Corp.	New York, N.Y.
99313	Varian Associates	Palo Alto, Calif.
99378	Atlee Corp.	Winchester, Mass.
99515	Marshall Ind. Elect. Products Div.	San Marino, Calif.
99707	Control Switch Division, Controls Co. of America	El Segundo, Calif.
99800	Delevan Electronics Corp.	East Aurora, N.Y.
99848	Wilco Corporation	Indianapolis, Ind.
99934	Renbrandt, Inc.	Boston, Mass.
99942	Hoffman Electronics Corp. Semiconductor Div.	El Monte, Calif.
99957	Technology Instrument Corp. of Calif.	Newbury Park, Calif.

THE FOLLOWING HP VENDORS HAVE NO NUMBER ASSIGNED IN THE LATEST SUPPLEMENT TO THE FEDERAL SUPPLY CODE FOR MANUFACTURERS HANDBOOK.

0000F	Malco Tool and Die	Los Angeles, Calif.
0000M	Western Coil Div. of Automatic Ind., Inc.	Redwood City, Calif.
0000Z	Willow Leather Products Corp.	Newark, N.J.
000AA	British Radio Electronics Ltd.	Washington, D.C.
000AB	ETA	England
000BB	Precision Instrument Components Co.	Van Nuys, Calif.
000MM	Rubber Eng. & Development	Hayward, Calif.
000NN	A "N" D Mfg. Co.	San Jose, Calif.
000QQ	Cooltron	Oakland, Calif.
000WW	California Eastern Lab.	Burlington, Calif.
000YY	S.K. Smith Co.	Los Angeles, Calif.

From: FSC. Handbook Supplements
H4-1 Dated JULY 1965
H4-2 Dated NOV. 1962

ILLUSTRATED PARTS IDENTIFICATION

MODEL 606A
HIGH FREQUENCY SIGNAL GENERATOR

PRINTED: JULY 1964

REF.	STOCK NO.	DESCRIPTION	QTY.
1		See Figure 2	
2		See Figure 3	
3		See Figure 4	
4		See Figure 5	
5		See Figure 10	
6		See Figure 9	
7		See Figure 6	
8		See Figure 6	
9		See Figure 6	
10		See Figures 7 & 8	
11	606A-55A	Shield Box	1
12	606A-44A-2	Cabinet Body Assembly	1
13	5000-0201	Cover, Rear (Cabinet only)	1

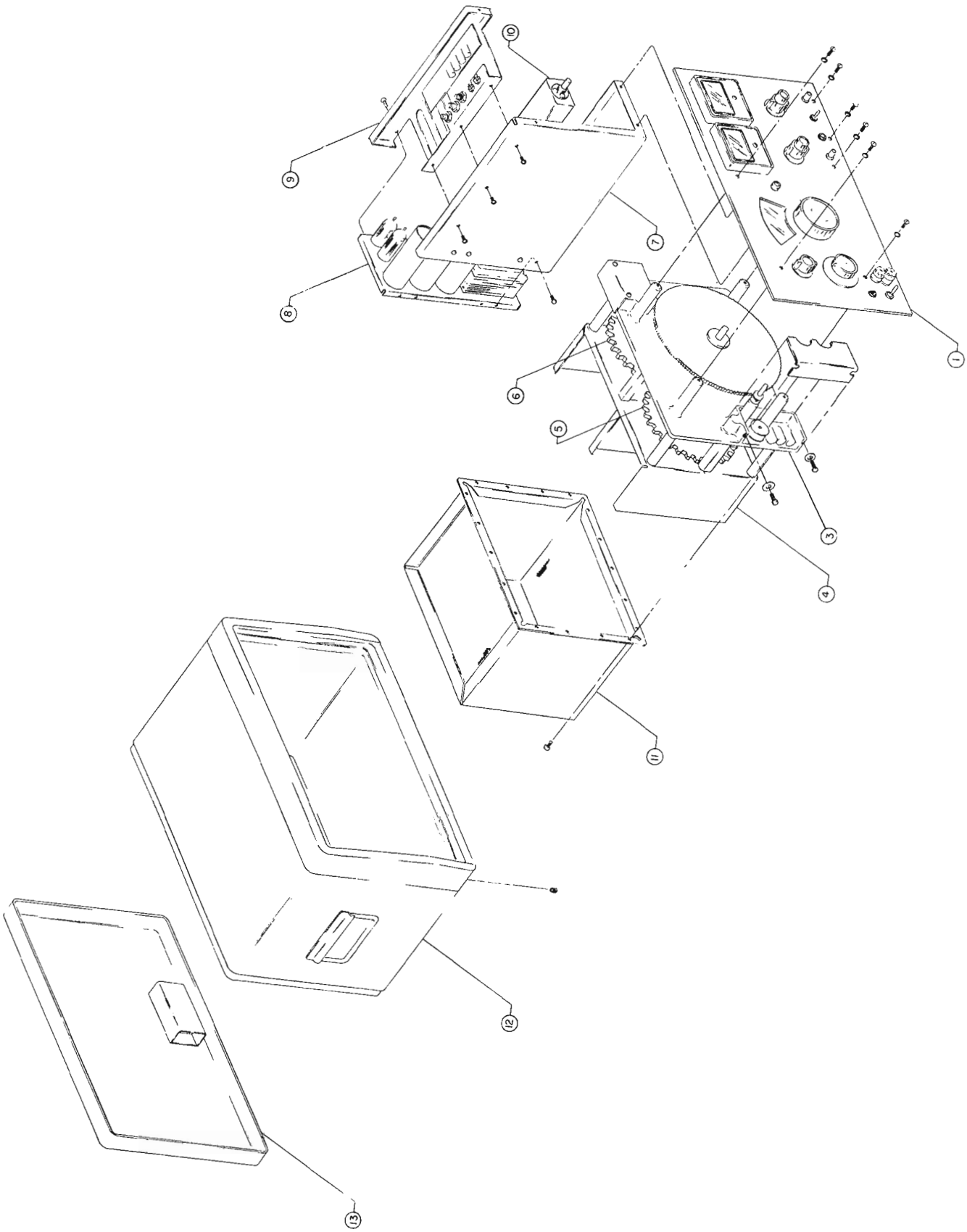

Figure 1. Model 606A High Frequency Signal Generator, General Arrangement

REF.	STOCK NO.	DESCRIPTION	QTY.
1	3100-0190	Switch: Rotary 1 Section 5 Position	1
2	2190-0016	Washer: Lock ph brz np 1/2 od x 3/8 id	2
3	0360-0024	Terminal: Lug grounding for potentiometer	1
4	606A-83D	Window: Dial	1
5	606A-110	Boss: Guide	1
6	0510-0040	Ring: Retaining stl cp 5/16 id x 0.025 thk	1
7	560A-88E	Washer: Flat	1
8	1251-0071	Connector: Jack telephone type 2 contact	1
9	2190-0016	Washer: Lock ph brz np 1/2 od x 3/8 id	3
10	2950-0001	Nut: Hex br np 3/8-32 x 1/2	4
11	3101-0012	Switch: Toggle dpdt on-off-on	1
12	2950-0035	Nut: Hex brx np 15/32-32 x 9/16 x 5/16 thk	2
13	2950-0007	Nut: Hex brs np 5/16-32 x 7/16 x 3/32 thk	1
14	1450-0019	Lampholder: Pilot light	1
15	2140-0009	Lamp: Incandescent 6.8v type 47	1
16	2190-0025	Washer: Lock ext ph brz np S5/16 Scr x 19/32	1
17	3101-0030	Switch: Toggle spst 15 amp 125 vac	1
18	2950-0038	Nut: Hex 1/2-24 x 11/16 x 1/8 thk	2
19	2190-0037	Washer: Lock int sstl cp 0.781 od x 0.52 id	2
20	606A-2A	Panel: Front	1
21	2930-0004	Screw, Flat head ss 10-24 thd, 1/2 in. lg.	2
22	3050-0022	Washer: Flat brs np 7/16 od x 0.318 id x 0.02	1
23	606A-74A	Knob: Assembly: calibrate assembly	1
24	0590-0012	Nut: Knurled brs np 15/32-32 x 0.60 od x 1/16	2
25	1400-0084	Fuseholder: Extractor post type	2
26	0900-0016	Gasket: Rubber 11/16 od x 1/2 id x 3/32 dia	2
27	1450-0020	Jewel: Pilot light red faceted plastic	1
28	606A-40B	Knob: 100 divisions	1
29	0370-0036	Knob: Plastic black 1 inch bar	1
30	0370-0066	Knob: Plastic black 2-3/4 dia 3/8 shaft	1
31	2220-0002	Screw: Machine fil h sstl 4-40 x 1/4	4
32	1250-0001	Connector: BNC	2
33	3050-0032	Washer: Flat brass 0.189 id x 5/16 od x 0.10 thk	6
34	2920-0002	Screw: Machine rh sstl 10-24 x 1/2	6
35	3050-0067	Washer: Flat brs np 5/8 od x 3/8 id x 0.031 thk	1
36	1120-0075	Microammeter: 200 microamperes Z0 to 10 0Z	1
37	1120-0074	Microammeter: 0.100 microamperes	1
38	2460-0007	Screw: Machine pan hd phl dr brs	4
39	0590-0038	Nut: Hex brs np 1/2-32 x 5/8 x 3/32	1
40	0370-0037	Knob: Concentric	2
41	0370-0063	Knob: 3/4" red	2

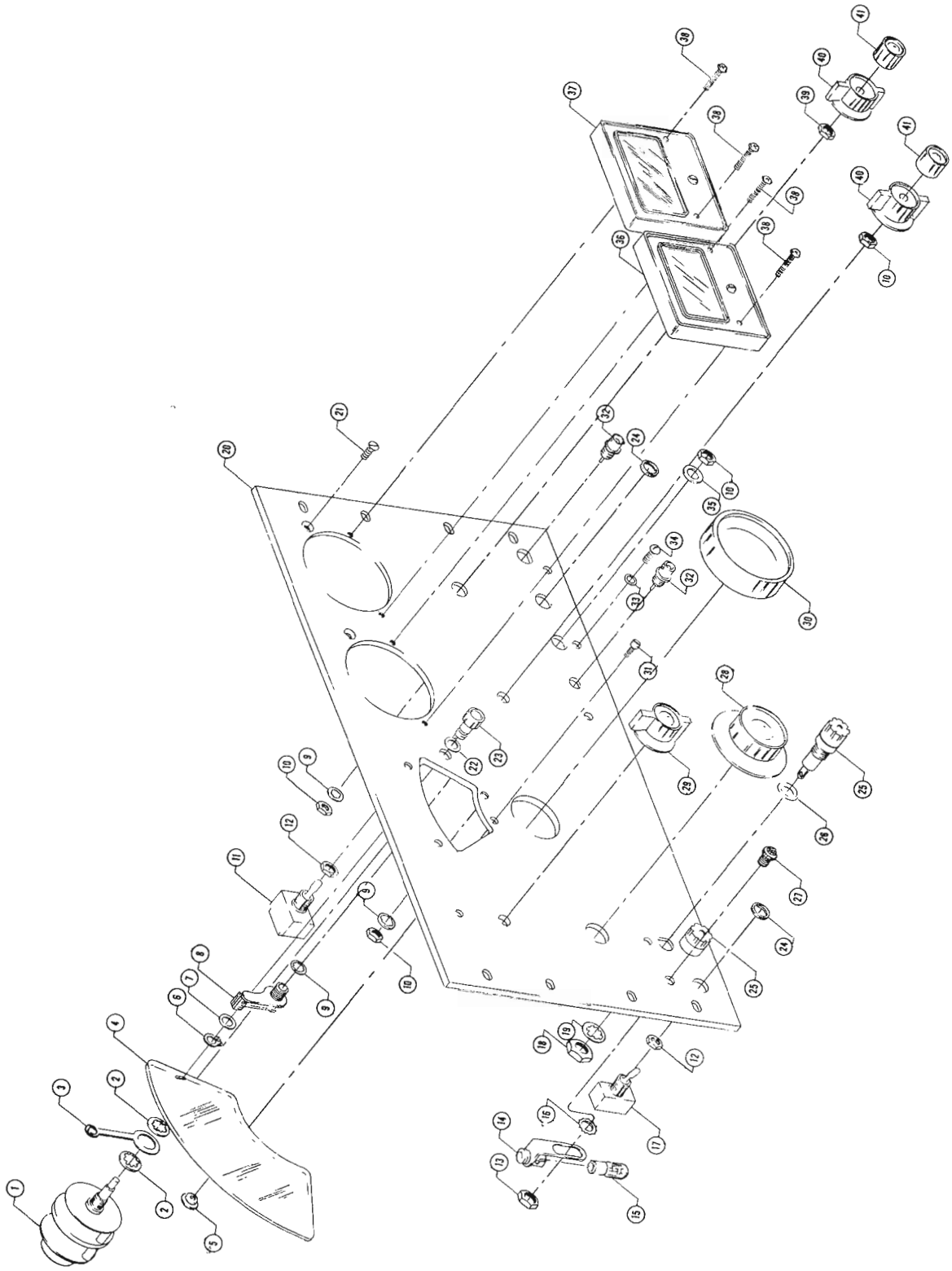

Figure 2. ℎ𝑝 Model 606A High Frequency Signal Generator, Front Panel Assembly

REF.	STOCK NO.	DESCRIPTION	QTY.
1	606A-20A	Main Casting	1
2	606A-47A	Spacer: Chassis Mounting (Hallow)	1
3	1480-0085	Pin: Drive sstl 3/32 od x 9/16	1
4	3030-0005	Screw: Machine set cup-pt st cp 8-32 x 1/8	2
5	606A-100E	Drum: Dial Drive	1
6	0510-0081	Ring: Retaining stl 0.5 id x 0.035 thk	1
7	3030-0018	Screw: Machine headless set 4-40 x 1/4 hex dr	1
8	606A-47B	Spacer: Chassis Mounting (Solid)	3
9	Not Assigned		
10	3030-0001	Screw: Machine Set cup-pt st 8-32 x 3/16	12
11	606A-37A	Shaft: Turret Drive	1
12	606A-36G	Spur Gear: Turret Drive	1
13	2190-0011	Washer: Lock int ph brz np S10 scr x 0.373 id	3
14	2920-0003	Screw: Machine rh sstl 10-24 x 5/8	3
15	1480-0008	Drive Pin: Stl 1/16 od x 1/2	1
16	606A-14B	Shaft: Vernier	1
17	606A-14E	Pinion: Vernier load	2
18	1480-0079	Roll Pin: Stl 3/32 od x 7/8	1
19	Not Assigned		
20	1460-0067	Spring: Helical stl cp 2-3/16	1
21	606A-37B	Shaft: Pointer	1
22	606A-105A	Hub: Dial	1
23	1480-0084	Roll Pin: Stl 1/8 od x 1/2	1
24	1460-0022	Spring: Helical 1/8 od x 1-1/2	1
25	0510-0005	Ring: Retainer st cp 1/4"	2
26	3050-0074	Washer: Flat be cu 3/4 od x 0.255 id x 0.006 thk	1
27	606A-99A	Indicator: Dial range	1
28	1480-0016	Roll Pin: Stl 5/32 od x 1	1
29	3050-0024	Washer: Flat be cu 17/32 id x 1-1/4 od x 0.006	1

REF.	STOCK NO.	DESCRIPTION	QTY.
30	0510-0080	Ring: Retaining st cp 1/2"	1
31	606A-40A	Dial: Frequency	1
32	Not Assigned		
33	606A-48T	Strap: Grounding	4
34	606A-17	Bushing: Dial Shaft	1
35	1410-0019	Bearing: Ball 1.125 od x 0/5 id x 0.25	2
36	606A-37D	Shaft: Tuner	1
37	0510-0079	Ring: Retaining stl cp 0.461 id x 0.035 thk	1
38	606A-105B	Hub: Outer Dial	1
39	2370-0002	Screw: Machine fh sstl 6-32 x 3/8	4
40	606A-16B	Part of Cable Assembly (Amplifier Output)	0
41	2190-0016	Washer: Lock ph brz np 1/2 od x 3/8 id	1
42	1410-0003	Bushing: Threaded 3/8-32 x 1/2" lg	1
43	606A-37F	Shaft: Turret Oscillator	1
44	606A-48T	Strap Grounding	2
45	3050-0025	Washer: Flat be cu 1-1/4 od x 9/32 id x 0.006	1
46	0510-0080	Ring: Retaining St cp 1/2"	1
47	1460-0053	Spring: Helical sst 1-3/8 id	1
48	1480-0085	Pin: Drive sstl 3/32 od x 9/16	4
49	606A-36E	Detent Lift Assembly	1
50	3050-0191	Washer: Flat brs laminated 718 id x 1-118 od	1
51	0510-0077	Ring: Retaining stl 7/8 id x 0.042 thk	1
52	606A-108A	Cam Assembly: Dial Pointer	1
53	2550-0009	Screw: Machine bh sstl 8-32 x 1/2 W/ext lk W	2
54	3050-0129	Washer: Pressure al 5/8 od x 3/16 id x 1/8 thk	2
55	606A-91B	Spring: Leaf	2
56	608D-59C	Spring: Detent	2
57	606A-36H	Bracket: Detent Mounting	1
58	606A-102	Roller: Detent	2

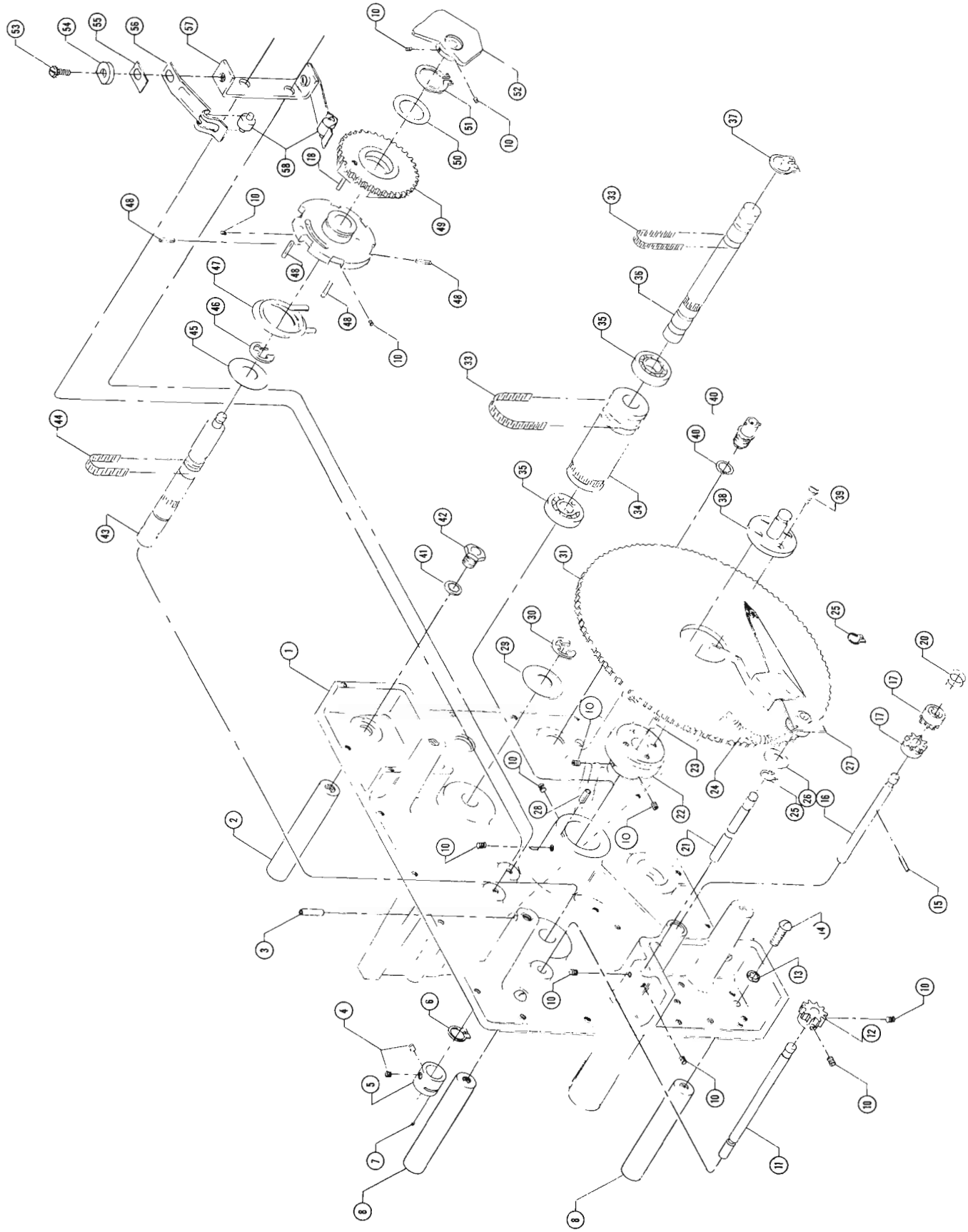

Figure 3. ⓗp Model 606A High Frequency Signal Generator Front Section RF Signal Generator

REF.	STOCK NO.	DESCRIPTION	QTY.
1	606A-20	Main Casting	1
2	2510-0001	Screw: Machine th sst phillips dr 8-32 x 5/8	6
3	2190-0017	Washer: Lock split-ring ph br np 5164 No. 8	6
4	3050-0006	Washer: Fiber extruded 1/2 od x 1/16 tk	6
5	0121-0026	C: Var air 12.2 to 454.4 pf	1
6	606A-88	Washer: Shoulder	6
7	3050-0071	Washer: Flat brs cp 7/16 od x 0.172 id x 0.031 tk	6
8	0121-0027	C: Var air 12.2 to 454.4 pf	1
9	606A-48L	Shorting Contact Assembly	1
10	2210-0002	Screw: Machine fh sst 4-40 x 1/4	2
11	1480-0004	Pin. Roll st 0.094 od x 3/8	2
12	606A-48R	Shorting Contact Assembly	1
13	3030-0001	Screw: Machine set cup-pt st 8-32 x 3/16	4
14	5040-0223	Coupling 0.375 flexible	1
15	606A-16B	Cable Assembly: coaxial	1
16	3030-0033	Screw: Machine set cup-pt st cp 6-32 x 3/16	2
17	606A-83C	Cable Drum	1
18	0510-0080	Ring: Retaining st cp 1/2 inch	2
19	606A-48T	Strap Grounding	4
20	606A-37E	Shaft: Turrent amplifier	1
21	606A-37F	Shaft: Turrent oscillator	1
22	1410-0017	Bearing: Ball 0.3125 id x 0.6882 od	1
23	0510-0084	Ring: Retaining st 5/16 inch	1
24	606A-100A	Nut: Spring, loading	1
25	3030-0005	Screw: Machine set cup-st cp 8-32 x 1/8	3
26	1460-0052	Spring: Torsion 13/32 id x 1/2 od	1
27	606A-100B	Collar: Tension free	1
28	606A-100C	Collar: Tension fixed	1
29	606A-37C	Shaft: Idler	1
30	3030-0061	Screw: Machine set st cup-pt 10-32 x 3/16	4
31	606A-42A	Turrent Assembly: Oscillator	1
32	606A-42B	Turrent Assembly: Amplifier	1
33	3030-0022	Screw: Machine set cup pt st cp 6-32 x 1/8	2
34	1500-0005	Coupling, Mechanical, brs np 1/4 id x 1/2 x 3/16	1
35	1500-0004	Coupling, Mechanical, Nylon 1/2 od x 7/32	1

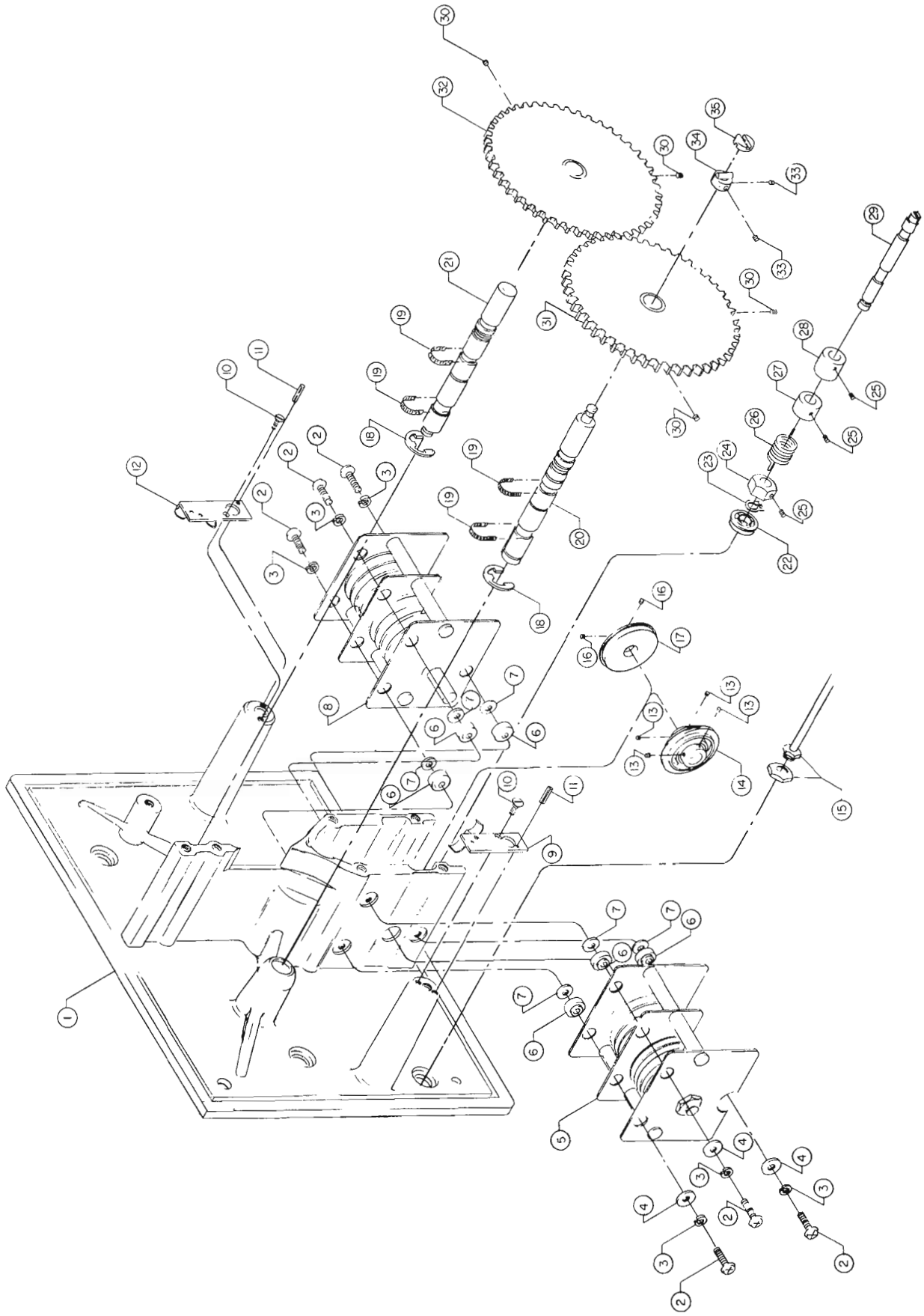

Figure 4 ℗ Model 606A High Frequency Signal Generator, Front Section RF Signal Generator Rotated 180°

REF.	STOCK NO.	DESCRIPTION	QTY.
1	606A-6D	Shield: Turrent	1
2	2420-0001	Nut: Hex stl np 6-32 x 5/16 w/lockwasher	3
3	3050-0066	Washer: Flat brs np 0.147 id x 3/8 od x 0.031 thk	3
4	1400-0053	Clamp: Loop cable	1
5	2390-0009	Screw: Machine bh sst 6-32 x 3/8 w/lockwasher	8
6	2190-0010	Washer: Lock ext ph brz np for S8 screw	4
7	606A-95A	Contact Subassembly	2
8	2550-0007	Screw: Machine bh sst 8-32 x 3/8 w/lockwasher	6
9	1500-0005	Coupling: Mechanical brs np 1/4 id x 1/2 x 3/16	1
10	2950-0001	Nut: Hex br np 3/8-32 x 1/2	2
11	2190-0022	Washer: Lock int ph brz np 0.690D x 0.678 id	3
12	606A-12C	Switch Bracket: Amplifier	1
13	3100-0197	Switch: Rotary 2 section, 6 position	1

REF.	STOCK NO.	DESCRIPTION	QTY.
14	606A-4D	Chassis: RF	1
15	2100-0016	R: Var comp 200k ohm 10% cwlog	1
16	0590-0035	Nut: Brs np 3/8-32 x 7/16 x 7/32	1
17	0590-0036	Bushing: Lock brs np 1/4 x 1/2 x 1/2	1
18	2190-0016	Washer: Lock ph brz np 1/2 od x 3/8 id	1
19	2950-0006	Nut: Hex brs np 1/4-32 x 318 x 3132 thk	1
20	2190-0027	Washer: Lock int ph brz np for 1/4 screw x 15/32	1
21	2100-0141	R: Var comp 50k ohm 20% lin 1/4 w	1
22	2190-0009	Washer: Lock int ph brz np for S8 screw x 0.332	4
23	2520-0001	Screw: Machine rh sstl 8/32 x 1/4	4
24	606A-6B	Shield: RF upper	1
25	606A-6C	Shield: RF lower	1

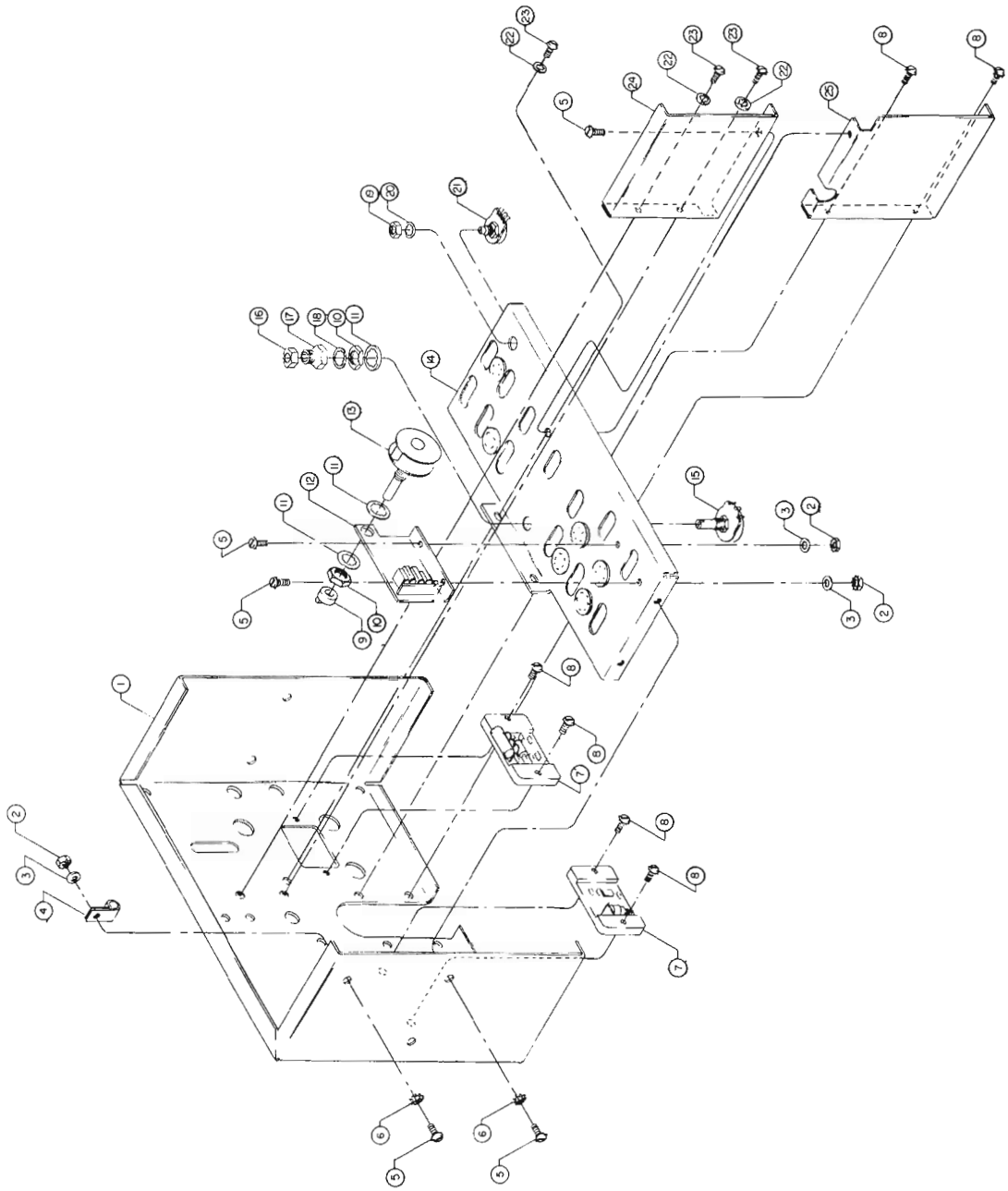

Figure 5 Model High Frequency Signal Generator, Rear Section RF Generator Assembly

REF.	STOCK NO.	DESCRIPTION	QTY.
1	606A-4C	Crystal Calibrator Assembly	1
2	2390-0007	Screw: Machine bh sst 6-32 x 5/16	20
3	606A-43C	See Figures No. 6 & 7	
4	0410-0014	Crystal-Quartz 100 kc	1
5	0180-0047	C: Fxd elect 500 uf 75 vdcw	1
6	0410-0013	Crystal Unit: Quartz 100 kc	1
7	2200-0009	Screw: Machine ne rh sst 4-40 x 1/2	2
8	3050-0082	Washer: Flat phenolic 0.11 id x 0.188 od x 0.037	2
9	1200-0028	Socket: Crystal 2-Contact	2
10	5000-0011	Clip: Electrical retaining	2
11	2420-0001	Nut: Hex st np 6-32 x 5/16 w/lockwasher	2
12	2190-0005	Washer: Lock ext ph brz np for S4 screw x C.282	2
13	2260-0001	Nut: Hex sstl 4-40 x 1/4 x 3/32	2
14	2550-0007	Screw: Machine bh sst 8/32 x 3/8 w/lockwasher	2
15	3050-0066	Washer: Flat brs np 0.147 id x 3/8 od x 0.031	6
16	606A-12D	Bracket: Capacitor shield	1
17	606A-75B	Terminal Board: Audio oscillator	1
18	606A-75E	Terminal Board: Rectifier right	1
19	3050-0036	Washer: Flat fiber 3/8 id x 3/4 od x 1/16 thk	2
20	2950-0030	Nut: Hex brs np 3/8-32 x 9/16 x 3/32 thk	3
21	2190-0022	Washer: Lock int ph brz np 0.692 od x 0.678 id	3
22	2950-0006	Nut: Hex brs np 1/4-32 x 318 x 3132 thk	2
23	2190-0027	Washer: Lock int ph brz np for 1/4 scr x 15/32	2
24	0590-0036	Bushing: Lock brs np 1/4 x	2
25	0590-0035	Nut: Brs np 3/8-32 x 7/16 x 7/32	2
26	606A-4A	Chassis: Modulator	1
27	1450-0013	Socket: Candelabra	1
28	2190-0006	Washer: Lock sstl sr for S6 scr x 5/64 x 1/32	1
29	2470-0003	Screw: Machine bh brs np 6-32 x 3/4	2
30	606A-75A	Terminal Board: Crystal calibrator	1
31	2190-0006	Washer: Lock sstl sr for S6 src x 5/64 x 1/32	1
32	0360-0005	Terminal: Lug brs	1
33	2190-0008	Washer: Lock ext ph brz np for S6 scr x 0.312	1
34	9120-0036	Transformer: Audio	1
35	606A-75C	Terminal Board: Audio oscillator	1
36	9100-0101	Transformer: Power	1
37	606A-4B	Chassis: Power supply	1
38	2580-0003	Nut: Hex stl np 8/32 x 11/32 x 1/8	4
39	606A-75D	Rectifier Board: Left	1
40	2420-0001	Nut: Hex st np 6/32 x 5/16 w/lockwasher	4

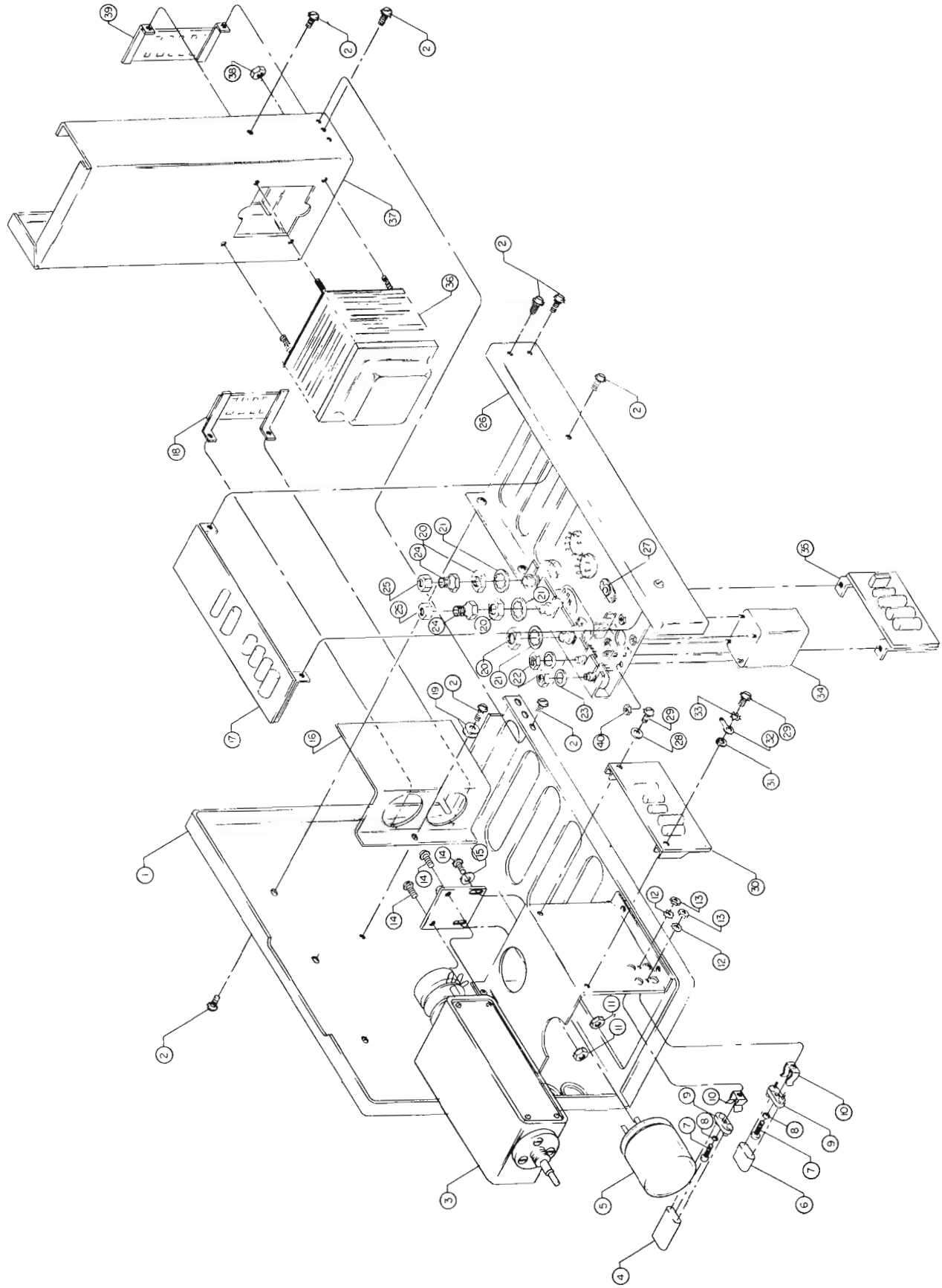

Figure 6. Model 606A High Frequency Signal Generator, Right Deck Arrangement

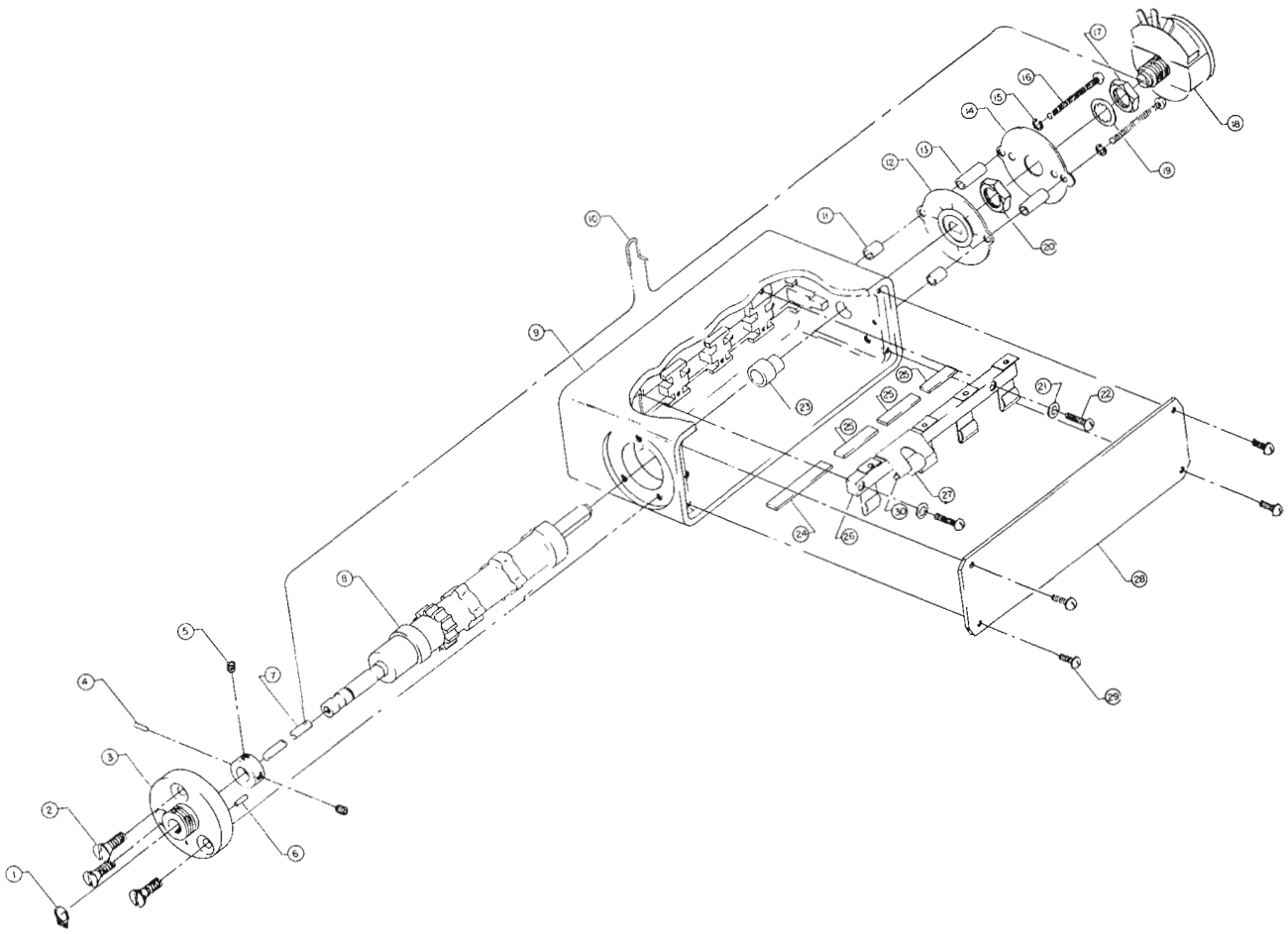

Figure 7. Model 606A High Frequency Signal Generator, VHF Attenuator Details

REF.	STOCK NO.	DESCRIPTION	QTY.
1	0510-0005	Ring: Retainer stl cp 1/4 inch	1
2	2530-0003	Screw: Machine fh 8-32 x 1/2	3
3	606A-34B-9	Collar: Mounting	1
4	1480-0059	Pin: Roll stl 1/16 od x 1/4	1
5	3030-0005	Screw: Machine set cup-pt stl cp 8-32 x 1/8	2
6	1480-0074	Pin: Roll be cu 1/16 od x 7/16	1
7	606A-34C-2	Shaft: Straight	1
8	606A-95E	Cam Shaft	1
9	606A-34C-1	Housing: Main	1
10	3130-0038	Coupling: Mechanical Switch	1
11	0380-0020	Spacer: Sleeve brs np for S5 Screw 1/4	2
12	3100-0189	Switch: Wafer	1
13	0380-0033	Spacer: Sleeve brs np for S4 Screw 1/2	2
14	3100-0189	Switch Wafer	1
15	2190-0003	Washer: Lock split-ring sst 1/16 no. 4	2
16	2200-0011	Screw: Machine rh sst 4-40 x 7/8	2
17	2950-0001	Nut: Hex brs np 3/8/32 x 1/2	1
18	2100-0225	R: Var ww 5000 ohm 10% lin 2w	1
19	2190-0016	Washer: Lock ph brx np 1/2 x 3/8 id	1
20	2950-0001	Nut: Hex brs np 3/8-32 x 1/2	1
21	2190-0004	Washer: Lock ph brz np 0.270 od for 4 Screw	2
22	2200-0009	Screw: Machine rh sst 4-40 x 1/2	2
23	606A-34C-7	Bushing: Sleeve	1
24	355C-107C	Actuator Bar	1
25	355C-107B	Actuator Bar	3
26	355C-32	Spring Assembly Attenuator	1
27	355A-102	Roller: Detent	1
28	606A-34C-8	Cover Plate: Attenuator	1
29	2200-0004	Screw: Machine rh sst 4-40 x 1/4	4
30	355A-101	Detent Pin	1

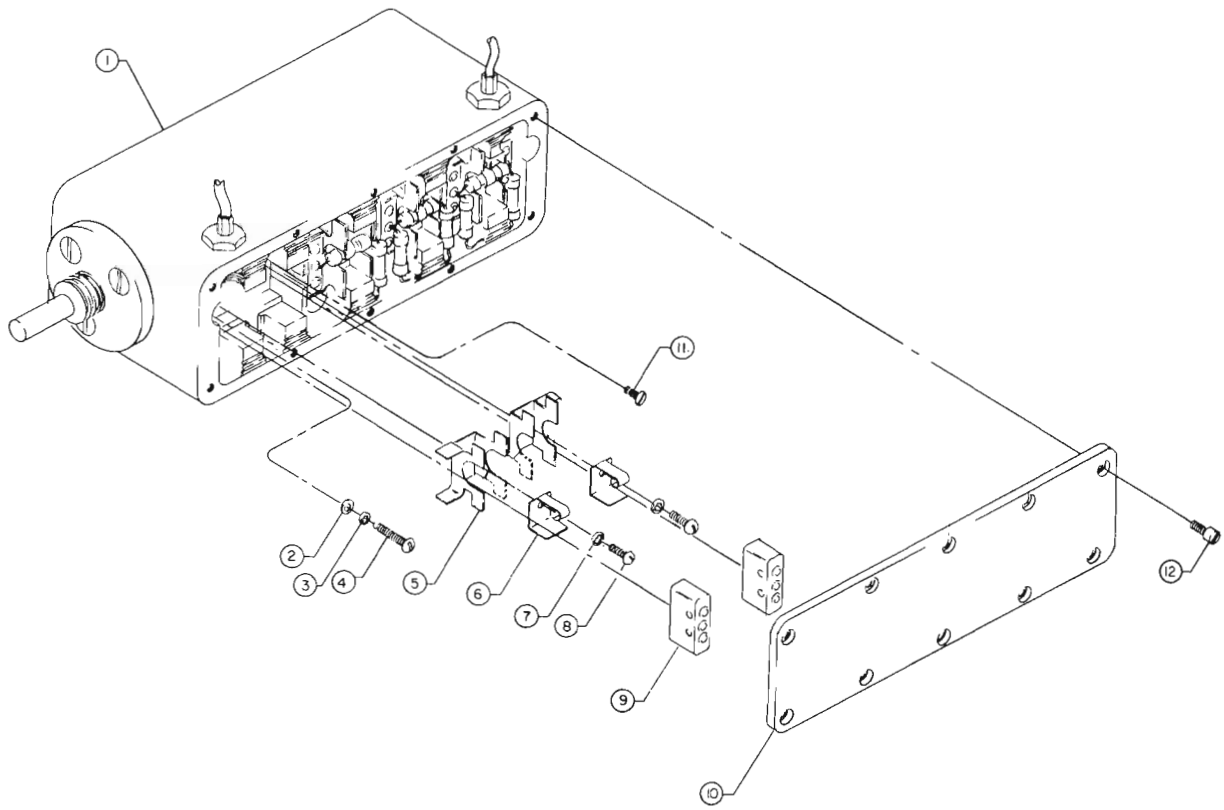

Figure 8. Model 606A High Frequency Signal Generator, VHF Attenuator Details Rotated 180°

REF.	STOCK NO.	DESCRIPTION	QTY.
1	606A-34C-1	Housing: Attenuator	1
2	3050-0098	Washer: Flat sstl 1/40D x 1/32 thk for S2	2
3	2190-0014	Washer: Lock int ph brz np 0.18 od x 0.091 id	2
4	0520-0020	Screw: Machine rh sst 2/56 x 3/4	2
5	355C-6B	Shield: Attenuator Section	5
6	355C-6A	Shield: Resistor	5

REF.	STOCK NO.	DESCRIPTION	QTY.
7	2190-0014	Washer: Lock int ph brz np 0.187 od x 0.091 id	7
8	0520-0024	Screw: Machine bh sst 2/56 x 3/16	8
9	3102-0006	Switch: Sensitive spdt pin plunger	8
10	606A-34C-9	Cover Plate: Attenuator	1
11	0520-0036	Screw: Machine fh sst 2/56 x 1/2	2
12	2220-0002	Screw: Machine fil h sstl 4-40 x 1/4	10

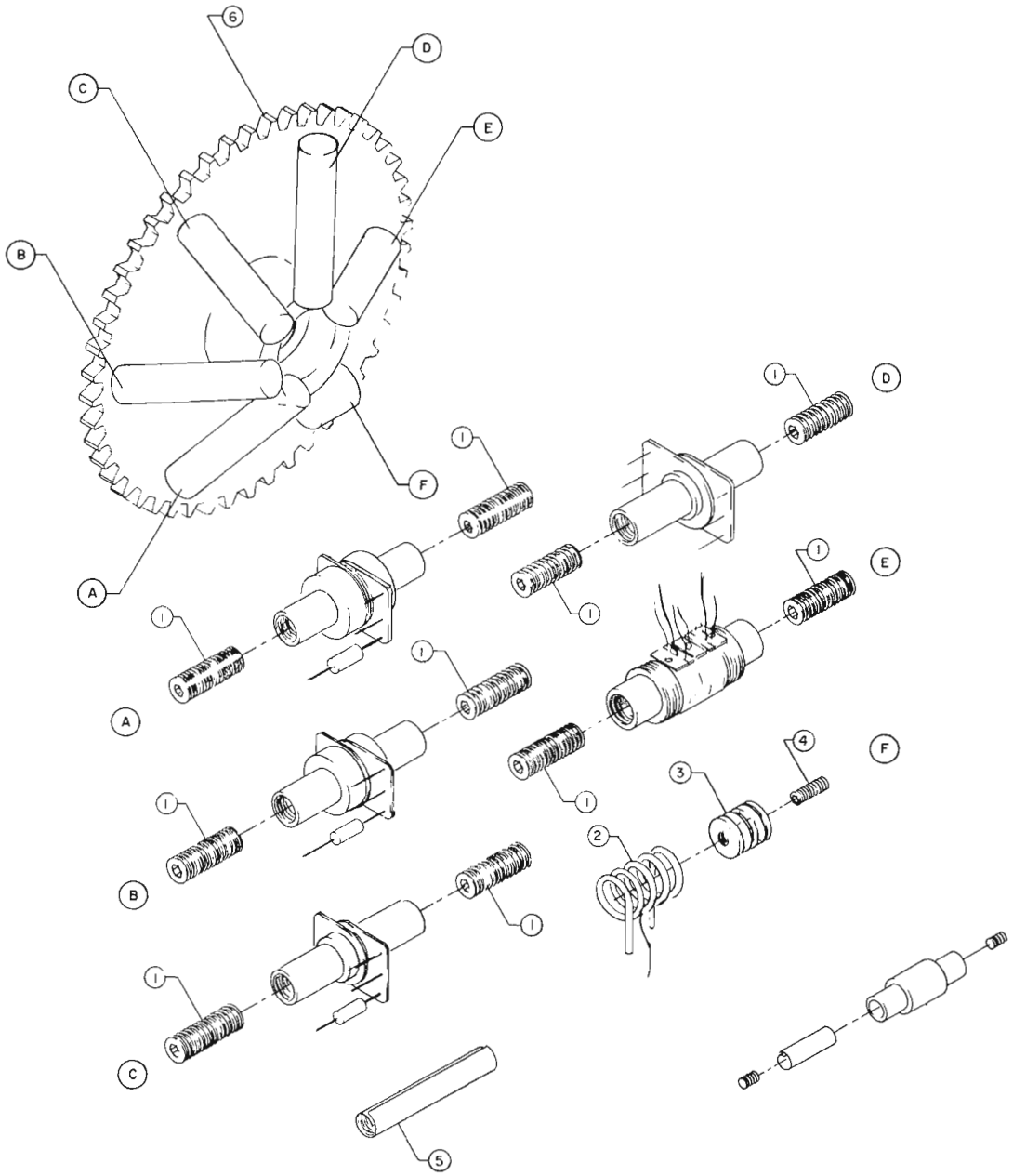

Figure 9. Model 606A High Frequency Signal Generator, Amplifier Turret

REF.	STOCK NO.	DESCRIPTION	QTY.
A	606A-60B	Transformer: Amplifier turret 50-170 kc	
B	606A-60D	Transformer: Amplifier turret 165-560 kc	
C	606A-60F	Transformer: Amplifier turret 530-1800 kc	
D	606A-60H	Transformer: Amplifier turret 1.76-6.0 mc	
E	606A-60K	Transformer: Amplifier turret 5.8-19.2 mc	
F	606A-60N	Coil: Primary, amplifier turret 19-65 mc	

REF.	STOCK NO.	DESCRIPTION	QTY.
	606A-60L	Coil: Secondary, Amplifier turret 19-65 mc	
1	9170-0040	Core: Ferrite, adjustable tuning 5/16-28 x 718	10
2	606A-60L	Coil: Primary, band 6	1
3	606A-56C	Coil Form	1
4	9170-0024	Core: Iron, threaded, 3/8 od w/10-32 hole	1
5	9150-0033	Coil Form: .338 od x 1-7/8	5
6	606A-83A	Turret Mold	1

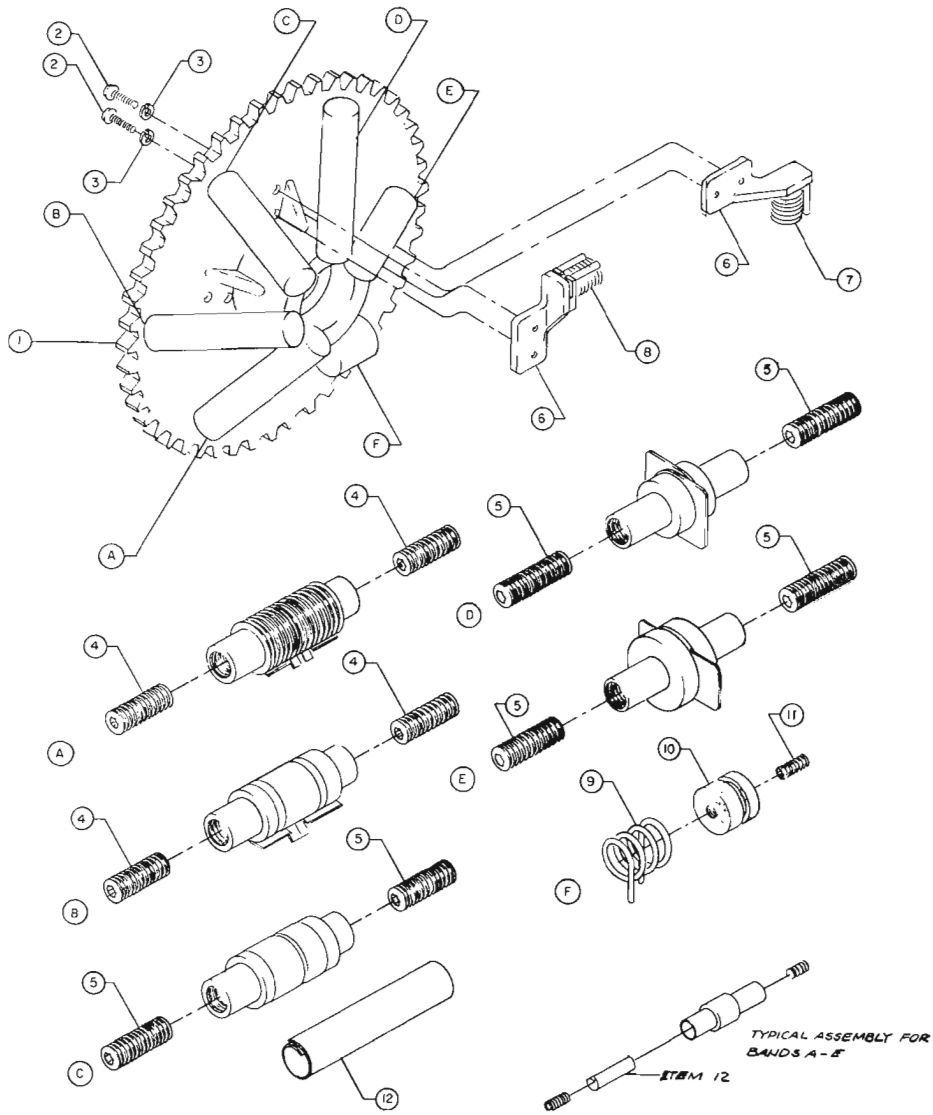

Figure 10. ℗ Model 606A High Frequency Signal Generator, Oscillator Turret

REF.	STOCK NO.	DESCRIPTION	QTY.
A	606A-60J	Transformer: Oscillator turret 5.8-19.2 mc	
B	606A-60G	Transformer: Oscillator turret 1.76-6.0 mc	
C	606A-60E	Transformer: Oscillator turret 560-1800 kc	
D	606A-60C	Transformer: Oscillator turret 165-560 kc	
E	606A-60A	Transformer: Oscillator turret 50-170 kc	
F	606A-60L	Coil: Primary, Oscillator turret 19-65 mc	
	606A-60M	Coil: Secondary, Oscillator turret 19-65 mc	
1	606A-83A	Turret, Molded	1

REF.	STOCK NO.	DESCRIPTION	QTY.
2	0624-0002	Screw: Machine thread-cutting rh sst S4 x 1/2	12
3	2190-0030	Washer: Lock ph brz np split ring S4 x 3/16 od	12
4	9170-0041	Core: Adjustable tuning polyiron 5/16-28	4
5	9170-0040	Core: Adjustable tuning 5/16-28 x 7/8	6
6	606A-83F	Bracket: Capacitor mounting	
7	0121-0032	C: Var Air 2.2-8.45 pf	4
8	0121-0031	C: Var Air 1.85-10.38 pf	2
9	8100-0001	Wire, Electrical .062 dia .003 thk	1
10	606A-56C	Coil Form	1
11	9170-0024	Core: Adjustable tuning 3/8 od w/10-32 hole	1
12	9150-0033	Coil Form: .338" od x 1-7/8" long	5

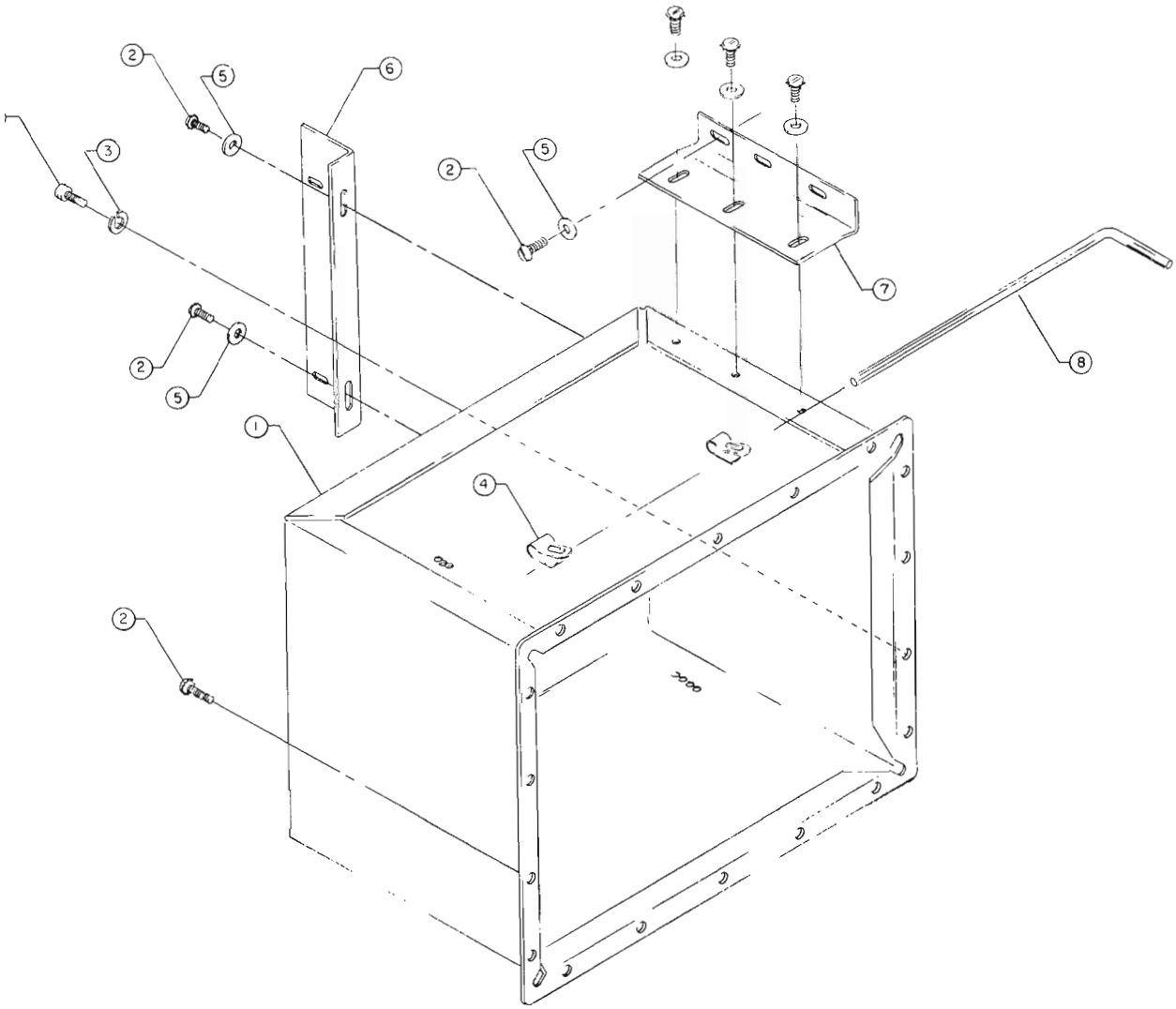

Figure 11. ℗ Model 606A High Frequency Signal Generator, Shield Box Assembly

REF.	STOCK NO.	DESCRIPTION	QTY.
1	606A-55A	Shield Box	1
2	2390-0009	Screw: Machine bh sst 6-32 x 3/8 w/ext lockwasher	25
3	2190-0018	Washer: Lock ph brz #6 x 5/64 od x 1/32 thk	4
4	1400-0043	Clip: Fahnstock brs np 3/4 x 5/16	2

REF.	STOCK NO.	DESCRIPTION	QTY.
5	3050-0066	Washer: Flat brs np #6 x 3/8 od x 0.003 in	11
6	606A-55A-5	Brace: Shield box upper	1
7	606A-55A-4	Brace: Shield box left	1
8	1470-0010	Wrench: Hex socket 0.1087 across flats	1

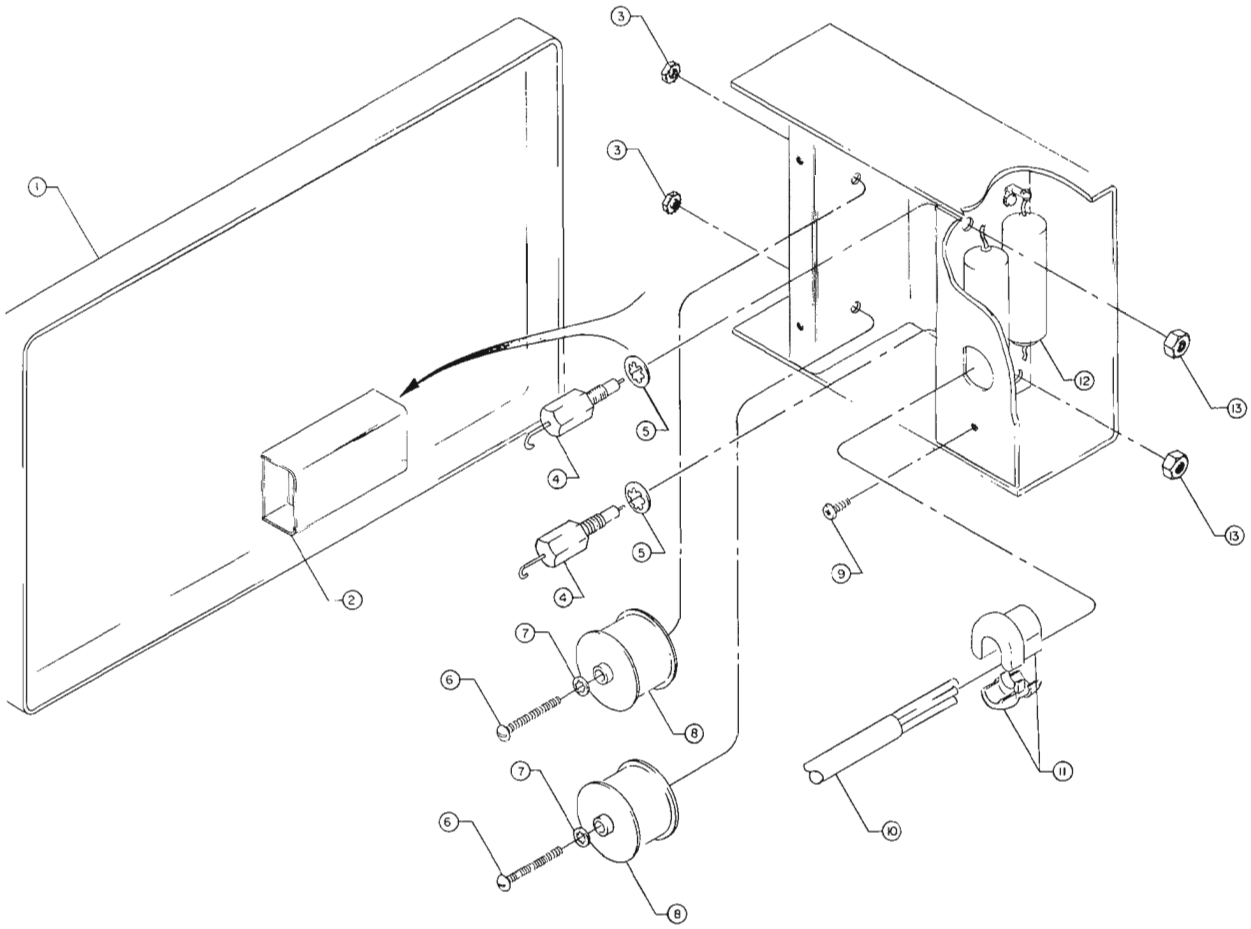

Figure 12. Model 606A High Frequency Signal Generator, Rear Cover Filter Assembly

REF.	STOCK NO.	DESCRIPTION	QTY.
1	5000-0201	Rear Cover	1
2	606A-27A	Line Filter Cover	1
3	2420-0001	Nut: Hex stl np 6-32 x 7/64 w/lockwasher	2
4	0150-0019	C: Fxd cer 1000 pf 20% feed-thru type	2
5	2190-0027	Washer: Lock ph brz np for 1/4 in. screw	2
6	2360-0015	Screw: Machine rh sst 6-32 x 1-1/8	2
7	2190-0007	Washer: Int lock ph brz np for #6 screw	2
8	9140-0051	Coil: Fxd 400 uh 5%	2
9	0626-0001	Screw: Thread-cutting sst bh #6 x 1/4 phl dr	2
10	8120-0015	Cable: Electrical 3 x #18 awg x 7.5 ft.	4
11	0400-0004	Grommet: Strain-relief nylon 5/8 in.	1
12	0160-0001	C: Fxd 0.1 uf 10% 600 V D	2
13	2950-0041	Nut: Brs cp 1/2-28 x 5/16 x 1/8	2

APPENDIX
MANUAL CHANGES

This manual applies directly to instruments with serial prefix 644-. For other serials, make the manual changes indicated below. Where parts have been changed to improve performance the original parts have not been listed. If differences exist between the manual and your instrument which are not explained here, the parts indicated in the manual are preferred.

Serial Prefix	Manual Changes	Serials Prefix	Manual Changes
434-	1	038-	1 thru 6
417-	1 and 2	009-	1 thru 7
301-	1 thru 3	943-	1 thru 8
248-	1 thru 4	139-	1 thru 9
244-	1 thru 5		

CHANGE 1 C4, C5: Change Stock No. to 0121-0027
C14, C15: Change Stock No. to 0121-0026

CHANGE 2 S8: Delete. The transformer is wired for either 115- or 230- volts. To change the connections:
a) Remove rear cover of instrument
b) Remove right-hand rectifier board (see Figure 4-1).
c) Change jumper arrangement on transformer terminal board:

1. For 230-volt operation, connect the black-yellow wire to the black-green. Use one amp slow-blow fuse.
2. For 115-volt operation, connect the black to the black-green, and the black-yellow to the black-red. Use two amp slow-blow fuse.

On schematic, delete switch S8 and connect wires directly.

CHANGE 3 R31: Change to R: fxd ww 100 ohm 10% 5W; hp Part No. 0813-0020.

CHANGE 4 Figure 4-9, Signal Generator (sheet 2 of 2):
C16 is shown connected to ground. Connect instead to the junction of C14/C15 and R73/C35.
C12 is shown connected to ground. Change to show that C12 is connected to junction of C14/C15.

CHANGE 5 Table 5-1, Replaceable Parts: R121: Change wattage to 1/2W; hp Stock No. 0687-6831.

CHANGE 6 Figure 4-9, Signal Generator (sheet 2 of 2):
S3: Add a section to this switch so that the connection between R38 and R20 is open in the position.

C57, R74: Delete. Replace C57 with an open, R74 with a short.

Table 5-1, Replaceable Parts: C57, R74: Delete.

CHANGE 7 Delete C34, R72, C35, and R73. This side of the tuning capacitors connected directly to ground.

CHANGE 8 Coil forms in turrets changed. New forms interchangeable with old. Order by new stock numbers.

CHANGE 9 Amplifier feedback network and coil assemblies changed. Use new circuit and parts as shown in this manual. Old circuit not recommended.

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