

Assembly
and
Operation
of the



SSB RECEIVER
MODEL SB-300

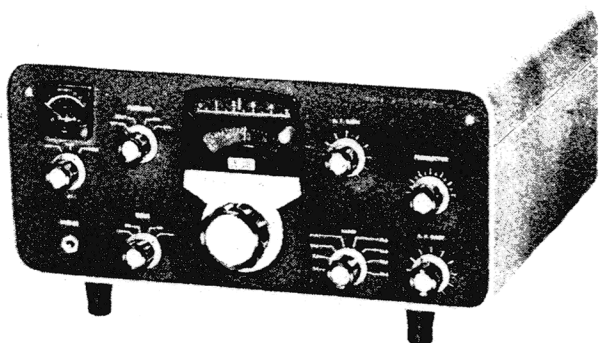


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HEATH COMPANY,
BENTON HARBOR,
MICHIGAN

SPECIFICATIONS

Frequency Range (megacycles)	3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30.
Intermediate Frequency.	3,395 megacycles.
Frequency Stability.	Less than 100 cps per hour after 20 minutes warmup under normal ambient conditions. Less than 100 cps for $\pm 10\%$ line voltage variation.
Visual Dial Accuracy.	Within 200 cps on all bands.
Electrical Dial Accuracy.	Within 400 cps on all bands after calibration at nearest 100 kc point.
Backlash.	No more than 50 cps.
Sensitivity.	Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation.
Modes Of Operation.	Switch selected: LSB, USB, CW, AM.
Selectivity.	SSB: 2.1 kc at 6 db down, 5.0 kc maximum at 60 db down (crystal filter supplied). AM: 3.75 kc at 6 db down, 10 kc maximum at 60 db down (crystal filter available as accessory). CW: 400 cps at 6 db down, 2.5 kc maximum at 60 db down (crystal filter available as accessory).
Spurious Response.	Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt.
Audio Response.	SSB: 350 to 2450 cps nominal at 6 db. AM: 200 to 3500 cps nominal at 6 db. CW: 800 to 1200 cps nominal at 6 db.
Audio Output Impedance.	Unbalanced nominal 8 Ω speaker and high impedance headphone.
Audio Output Power.	1 watt with less than 8% distortion.
Antenna Input Impedance.	50 Ω nominal.
Muting.	Open external ground at Mute socket.
Crystal Calibrator.	100 kc crystal.
Front Panel Controls.	Main Tuning dial. Function switch. Mode switch. AGC switch. Band switch. AF Gain control. RF Gain control. Preselector. Phone jack.

Rear Apron Connections.	Spare socket. HF Antenna. VHF #1 Antenna. VHF #2 Antenna. Mute. Spare socket. ANTI-VOX 500 Ω . 8 Ω speaker. Line cord socket. Heterodyne Oscillator Output. LMO output. BFO output. VHF Converter socket.
Tube Complement.	1 - 6BZ6 RF amplifier. 1 - 6AU6 1st mixer. 1 - 6AB4 Heterodyne oscillator. 1 - 6AU6 2nd mixer. 1 - 6AU6 Linear master oscillator. 2 - 6BA6 IF amplifier. 1 - 6AU6 Crystal calibrator. 1 - 6HF8 1st audio, audio output. 1 - 6AS11 Product detector, BFO, and BFO amplifier.
Power Supply.	Transformer operated with silicon diode rectifiers.
Power Requirements.	120 volts AC, 50/60 cps, 50 watts.
Dimensions	14-7/8" wide x 6-5/8" high x 13-3/8" deep.
Net Weight.	17 lbs.
Shipping Weight.	22 lbs.

Test Equipment Used To Make Specification Measurements.	Hewlett-Packard Signal Generator, Model 606A. Radio Products, Inc. Panoramic Analyzer, Model SB-12 Hewlett-Packard Electronic Counter, Model 524B. Boonton Electronics Distortion Analyzer, Model 330B. Daven Company Power Output Meter, Type OP961.
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All prices are subject to change without notice. The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.



INTRODUCTION

The Heathkit Model SB-300 SSB Receiver is capable of receiving SSB, AM, and CW signals on all amateur bands from 3.5 to 30 megacycles. A separate crystal filter can be obtained and is switch-selected from the front panel for each of these modes of operation to assure optimum selectivity and performance. In the absence of the optional filters, AM stations are received using the exalted carrier method, and CW may be received in either SSB position.

The preassembled-prealigned linear master oscillator (LMO) and crystal-controlled heter-

odyne oscillators assure highly accurate and stable operation. The use of circuit boards and a wiring harness provide clean chassis layout.

Other features of this Receiver are special antenna and power connections for VHF converters, a 100 kc crystal calibrator, provision for transceiver operation with a compatible transmitter, and a smooth, virtually backlash free dial tuning mechanism. The transformer-operated, silicon diode power supply is a long-life, low-heat power source.

CIRCUIT DESCRIPTION

Refer to the Schematic (fold-out from Page 79) and Block (fold-out from Page 7) Diagrams when reading the Circuit Description. To locate parts on the Schematic, the letter-number designations for the parts are coded as follows:

1 to 99	RF Circuit Board
100 to 199	IF Circuit Board
200 to 299	Chassis Parts

NOTE: To make the various functions of the Receiver easier to understand, a selected lower sideband frequency of 3,895 megacycles will be used when tracing through the circuit in this description. All switches are shown in their

appropriate positions on the Schematic. Figure 1 lists the various frequencies that will be found throughout the Receiver. Line one indicates the frequencies referred to in the Circuit Description.

RF AMPLIFIER

The received signal is connected from the antenna through the Converter switch to BS6R (Band switch, wafer 6, rear of wafer). The Converter switch is also used to select the output signal from a choice of two accessory VHF (very high frequency) converters and to apply power to the converter. BS6R selects the primary

BAND	HETERODYNE OSCILLATOR FREQUENCY (CRYSTAL FIXED)	RECEIVED SIGNAL FREQUENCY	PASSBAND SIGNAL FREQUENCY (BETWEEN 8,395 AND 8,895)	LMO MIXER OUTPUT CRYSTAL FILTERS AND IF (FIXED)	LMO (BETWEEN 5 AND 5.5 MC)
3.5 to 4	12.395	3.895	8.5	3.395	5.105
7 to 7.5	15.895	7.2	8.695	3.395	5.3
14 to 14.5	22.895	14.2	8.695	3.395	5.3
21 to 21.5	29.895	21.3	8.595	3.395	5.2
28 to 28.5	36.895	28.1	8.795	3.395	5.4
28.5 to 29	37.395	28.7	8.695	3.395	5.3
29 to 29.5	37.895	29.2	8.695	3.395	5.3
29.5 to 30	38.395	29.6	8.795	3.395	5.4

FREQUENCIES IN MEGACYCLES

Figure 1

of the antenna coil and BS5F (Band switch, wafer 5, front of wafer) selects the secondary of the antenna coil for the band being used. Each tuned circuit consists of a coil and capacitor combination which resonates at frequencies within the band in use. The signal, after passing through coil L2, is connected to BS5R, C200, and C201 by a tie pin that connects the selector contacts of BS5F and the entire rotor portion of BS5R. Capacitors C200 and C201 are adjusted by the Preselector control to tune the grid circuit of V1, the RF amplifier, to the desired frequency in the 3.5 megacycle band. Only capacitor C201 is used on the higher bands.

The plate circuit is also tuned to the same frequency as the grid circuit by capacitors C202 and C203, and coil L7. The plate coil for the band being used is selected by BS4F, and the appropriate tuning capacitor is selected by the use of a tie pin to BS4R. B+ is supplied to this stage by a small tie pin that connects the rotor of BS4F to BS4R. Only capacitor C203 is used for the higher bands.

HETERODYNE OSCILLATOR AND FIRST MIXER

The amplified signal from V1 is coupled through capacitor C7 to the grid of V2, the first Mixer. Also being fed to the grid of V2 is a highly stable crystal-controlled signal from V4, the Heterodyne Oscillator. BS1R selects the proper crystal for the band being used. In this case Y6 is switched into the grid circuit of V4 to produce an oscillator frequency of 12.395 megacycles.

The plate circuit of V4 is tuned by coils L12 through L19. The proper coil is connected to BS3R through a tie pin at BS3F to the plate of tube V4. (Each of these coils has a small pickup link which is selected by BS2R. The signal picked up by these small secondaries is fed to the Heterodyne Oscillator jack on the rear of the Receiver for use with a transmitter for transceiver operation.) The received signal of 3.895 megacycles and the oscillator signal are mixed in V2 to produce the sum and difference frequencies of 16.29 and 8.5 megacycles, respectively. Passband filter T2 is designed to pass only frequencies in a range between 8.395 and 8.895 megacycles, and to greatly attenuate all other frequencies. The 16.29 megacycle frequency, being too high, is attenuated, whereas the difference frequency of 8.5 megacycles passes through T2 without attenuation. A small tie pin connects the rotor of BS3R to BS3F supplying B+ to this stage.

LINEAR MASTER OSCILLATOR (LMO) AND SECOND MIXER

The 8.5 megacycle signal from T2 is coupled to the grid of V3, the second mixer. Coupled to the cathode of V3 is a signal from the tunable LMO. The LMO, consisting of tube V5 with its associated circuit, forms a very stable linear oscillator that operates over a frequency range of 5 to 5.5 megacycles. See Figure 2. Varying C4

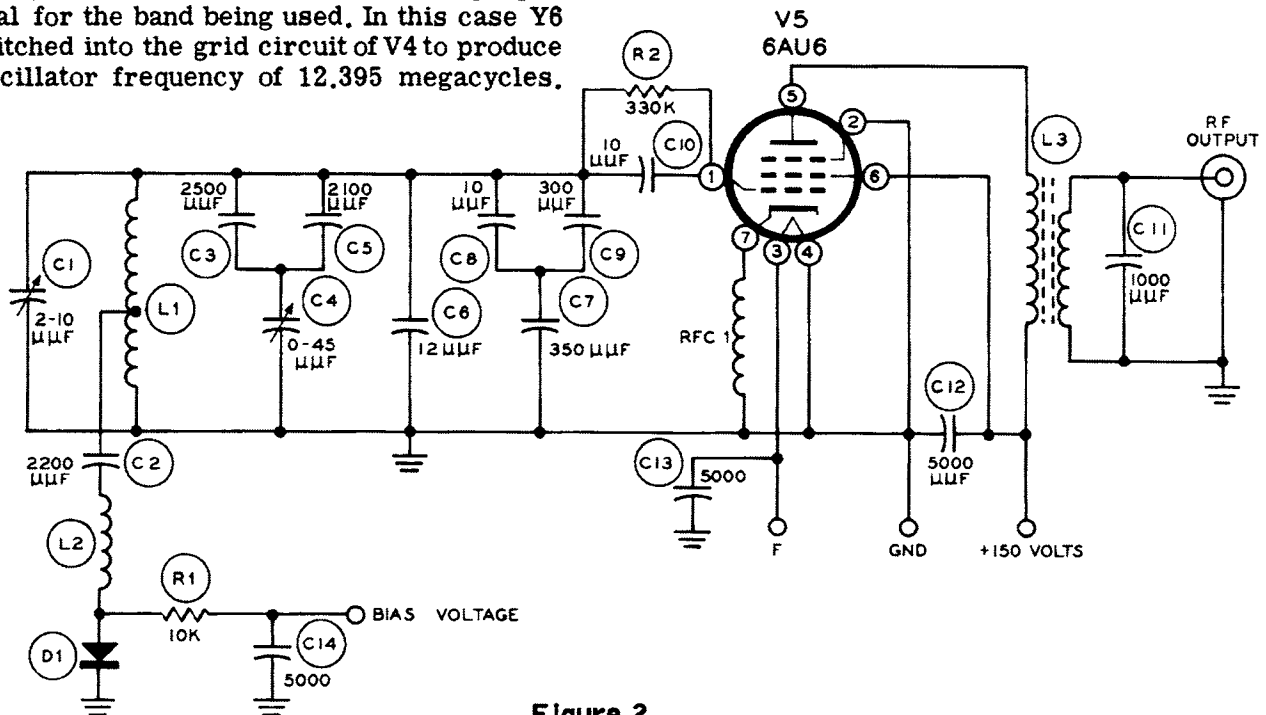


Figure 2

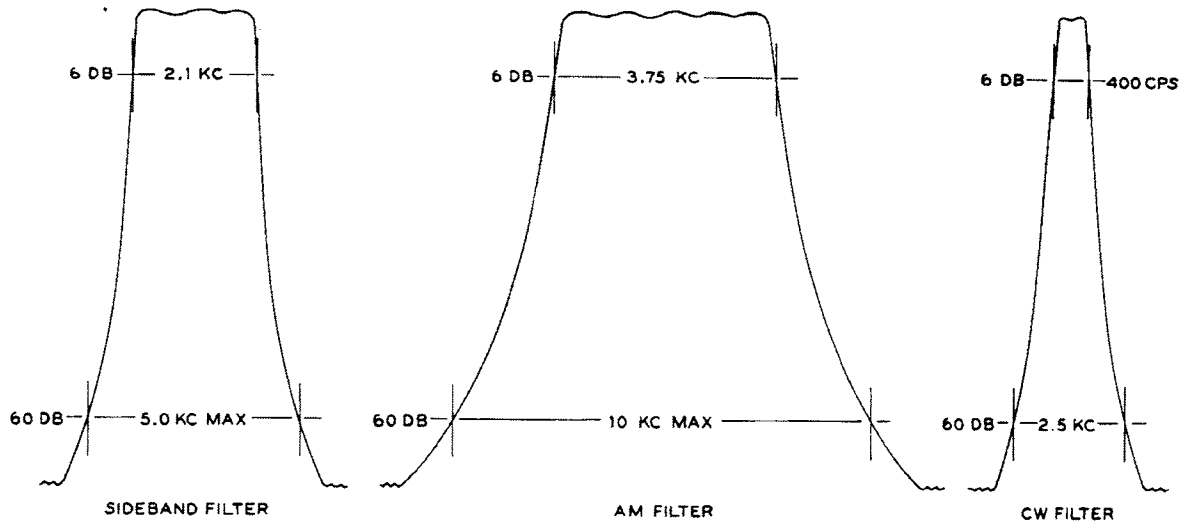


Figure 3

changes the frequency of the LMO and thus changes the operating frequency of the Receiver. The frequency at which the LMO operates is always the difference between the output frequency from the passband filter, T2, and the 3.395 megacycle IF frequency.

In this instance, a signal at 3.895 megacycles beating with the heterodyne oscillator frequency of 12.395 megacycles produces an output frequency of 8.5 megacycles. An LMO frequency of 5.105 megacycles is required to obtain the 3.395 megacycle IF frequency.

The output from the LMO is also coupled through capacitor C15 to a LMO jack on the rear of the Receiver for use with a transmitter for transceiver operation.

The output signal from V3 is then passed through crystal filter FL1 for bandwidth selectivity. The input and output of the SSB (single sideband), CW, or AM crystal filters are selected by MS2R (Mode switch, wafer 2, rear of wafer) and MS1F respectively.

Only the SSB filter is furnished with the Receiver. The CW and AM filters may be obtained as accessories. See Figure 3 for the bandpass characteristic of each filter.

IF AMPLIFIERS

The signal is then fed through capacitor C100, and through stages V6 and V7, the first and second IF amplifiers. These stages are high

gain voltage amplifiers. T3 and T4 are tuned for maximum gain per stage.

The "S" meter is connected in the IF circuits to indicate received signal strength. Control R108 is adjusted for zero S-units with the antenna disconnected and RF Gain control R208 fully clockwise.

AGC

The desired amount of amplification for the RF and IF amplifiers is determined by the negative grid bias set by control R208, the RF Gain control. Also present on this same line is the AGC (automatic gain control) voltage. This voltage is obtained by coupling a portion of the IF output signal through capacitor C110 to AGC diodes CR1 and CR2. These diodes produce a negative DC voltage proportional to the signal strength. A signal producing a negative AGC voltage higher than the preset bias voltage causes the gain of V1, V6, and V7 to be reduced below the preset level. This produces an output level from the first RF and IF amplifier stages that remains nearly constant in spite of wide changes in the amplitude of the received signal. The AGC action is instantaneous, however, the length of time it remains in control is determined by capacitors C109 and C223 along with resistor R118. These capacitors are charged by the AGC voltage when a higher than normal signal is received. C109 has a fast rate of discharge, and C223 a slow rate of discharge. The capacitors discharge through resistors R211 and R209, and control R208. Because resistor R211

is so much larger than R209 and control R208, changing the setting of control R208 has very little or no effect on the discharge time of capacitors C109 and C223. Only one of these capacitors is in the circuit at a time, as determined by the setting of the AGC switch.

PRODUCT DETECTOR/BFO AND BFO AMPLIFIER

Tube V9 is made up of two triode and one pentode sections. The IF output signal in the LSB, USB, and CW modes is fed through capacitor C114 to the grid of V9A. V9B serves as a BFO (beat frequency oscillator). The frequency at which V9B oscillates is determined by crystals Y9 and Y10. These crystals are selected by MS4R.

Operation on LSB (lower sideband) has been described to this point. If USB (upper sideband) operation is desired, the Mode switch is placed in the USB position. MS4R switches crystal Y10 into the circuit, increasing the operating frequency of the BFO by 2.8 kilocycles. When this is done the LMO frequency must also be changed 2.8 kilocycles, but in the opposite direction. These frequency changes result in changing to the upper sideband without changing the dial setting. The change in operating frequency of the LMO is done by switching diode D1 (see Figure 2). When in the LSB mode, diode D1 is biased with a positive 50 volts, making the diode an electrical short, reducing the electrical length of coil L1. In the USB mode a negative 50 volts bias is applied to D1, making it an open circuit, thus, increasing the electrical length of coil L1.

The output signal from the BFO is coupled through capacitor C234 to V9C, a BFO amplifier. The output signal from V9C is coupled through capacitor C237 to the BFO jack on the rear of the Receiver for use with a transmitter for transceiver operation.

AF AMPLIFIERS

The audio output signal results from mixing the IF and BFO frequencies in the Product Detector.

The audio signal is coupled through capacitor C231 to MS4R. From MS4R the signal is fed to the grid of V10A, the first audio amplifier. This amplified signal is coupled through capacitor C116 to V10B, the second audio amplifier. The signal is then coupled through output transformer T5 to a speaker or headphones.

From the secondary of T5, an 8 Ω output is available for speaker operation, and a 500 Ω output is available for headphone operation. The 500 Ω output is also used for ANTI-VOX (voice operated transmitter or transceiver) operation.

Resistor R115 and capacitor C115 from the secondary of T5 to the cathode of V10A form a negative feedback circuit. The negative feedback circuit is used to provide a low distortion, stable audio output power of 1 watt.

AM DETECTION

In the AM mode, the BFO is turned off and the Product Detector is disconnected from the audio amplifier by MS4R. The IF output signal is coupled through capacitor C113 to CR3, the AM detector diode. RF signals are bypassed to ground through capacitor C112. The resulting amplitude detected audio signal is coupled by MS4R to the AF Gain control R229 and to Audio Amplifier stages V10A and V10B. The setting of control R229 determines the audio output level from the Receiver.

CRYSTAL CALIBRATOR

The 100 kc signal produced by V8, the crystal controlled calibrator stage, is coupled to the Converter switch. This signal can be used at any time to check dial calibration by placing the Function switch in the CAL position, and the Mode switch in the LSB or USB position. Zero beat cannot be heard in the CW mode due to the narrow bandpass of the CW filter, nor in the AM mode due to the absence of BFO injection.

MUTE JACK

The Mute jack on the rear of the Receiver is used with a transmitter for VOX operation to bias receiver tube stages V1, V2, V6, V7, V10B, and any converter stages to cutoff for muting.

POWER SUPPLY

The power supply uses a transformer for isolation from the AC line. Diodes CR4 and CR5 are used in a full-wave rectifier circuit. The B+ voltage is filtered by capacitors C227A, C227B, and C227C, and resistors R215 and R216. Diode CR6 is used to develop negative voltage for use as bias. Transformer T1 includes a separate secondary winding for tube filament and pilot lamp voltage.

CONSTRUCTION NOTES

This manual is supplied to assist you in every way to complete your kit with the least possible chance for error. The arrangement shown is the result of extensive experimentation and trial. If followed carefully, the result will be highly stable and dependable performance. We suggest that you retain the manual in your files for future reference, both in the use of the equipment and for its maintenance.

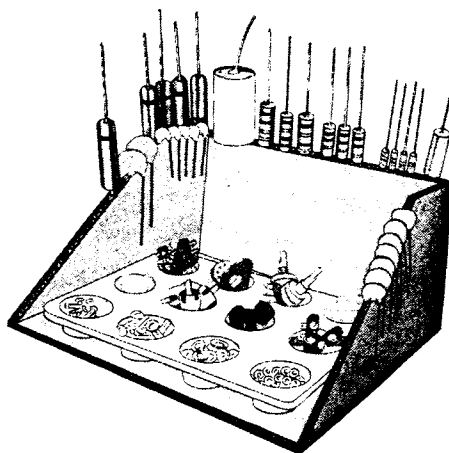
Resistors generally have a tolerance rating of 10% unless otherwise stated in the Parts List. Tolerances on capacitors are generally even greater. Limits of +100% and -20% are common for electrolytic capacitors.

We suggest that you do the following before work is started:

1. Lay out all parts so that they are readily available.
2. Provide yourself with good quality tools. Basic tool requirements consist of a screwdriver with a 1/4" blade; a small screwdriver with a 1/8" blade; long-nose pliers; wire cutters, preferably separate diagonal cutters; a penknife or a tool for stripping insulation from wires; a soldering iron (or gun) and rosin core solder. A set of nut drivers and a nut starter, while not necessary, will aid extensively in construction of the kit.

UNPACK THE KIT CAREFULLY AND CHECK EACH PART AGAINST THE PARTS LIST. In so doing, you will become acquainted with the parts. Refer to the information on the inside covers of the manual to help you identify the components. If some shortage or parts damage is found in checking the Parts List, please read the Replacements section and supply the information called for therein.

Most kit builders find it helpful to separate the various parts into convenient categories. Muffin tins or molded egg cartons make convenient trays for small parts. Resistors and capacitors may be placed with their lead ends inserted in the edge of a piece of corrugated cardboard until they are needed. Values can be written on the cardboard next to each component. The illustration shows one method that may be used.



PARTS LIST

The numbers in parentheses in the Parts List are keyed to the numbers on the Parts Pictorial to aid in parts identification.

PART No.	PARTS Per Kit	DESCRIPTION	PART No.	PARTS Per Kit	DESCRIPTION
<u>Resistors (1/2 Watt)</u>			<u>Resistors (2 Watt)</u>		
(1) 1-103	1	33 Ω (orange-orange-black)	(2) 1B-20	1	100 Ω (brown-black-brown)
1-1	1	47 Ω (yellow-violet-black)	1B-16	1	330 Ω (orange-orange-brown)
1-2	2	68 Ω (blue-gray-black)	1B-3	1	10 K Ω (brown-black-orange)
1-3	2	100 Ω (brown-black-brown)	<u>Capacitors</u>		
1-66	2	150 Ω (brown-green-brown)	(3) 20-52	1	7.5 μmf mica
1-6	2	470 Ω (yellow-violet-brown)	20-130	1	12 μmf mica
1-9	17	1000 Ω (brown-black-red)	20-100	1	30 μmf mica
1-90	2	2000 Ω (red-black-red)	20-96	4	36 μmf mica
1-13	1	2700 Ω (red-violet-red)	20-97	5	50 μmf mica
1-14	3	3300 Ω (orange-orange-red)	20-76	2	68 μmf mica
1-16	1	4700 Ω (yellow-violet-red)	20-119	3	90 μmf mica
1-20	1	10 K Ω (brown-black-orange)	20-102	5	100 μmf mica
1-109	1	12 K Ω (brown-red-orange)	20-105	1	180 μmf mica
1-21	7	15 K Ω (brown-green-orange)	20-114	2	270 μmf mica
1-132	1	20 K Ω (red-black-orange)	(4) 21-78	4	5 μmf disc ceramic
1-23	1	27 K Ω (red-violet-orange)	21-56	4	470 μmf disc ceramic
1-24	2	33 K Ω (orange-orange-orange)	21-14	4	.001 μfd disc ceramic
1-25	4	47 K Ω (yellow-violet-orange)	21-36	2	.002 μfd disc ceramic
1-26	9	100 K Ω (brown-black-yellow)	21-72	2	.005 μfd disc ceramic, 1.4 kv
1-31	2	330 K Ω (orange-orange-yellow)	21-16	40	.01 μfd disc ceramic
1-33	4	470 K Ω (yellow-violet-yellow)	(5) 25-19	3	20 μfd 150 V electrolytic
1-86	1	5.6 megohm (green-blue-green)	25-70	1	100-40-40 μfd 250-250-200 V electrolytic
<u>Resistor (1 Watt)</u>			(6) 26-74	1	4-section variable
1A-3	1	3300 Ω (orange-orange-red)	(7) 27-34	3	.2 μfd Mylar* (polyester film)
			(8) 28-2	1	1 μmf phenolic (brown-black-white)
			28-1	1	2.2 μmf phenolic (red-red-white)
			(9) 31-36	1	8-50 μmf ceramic trimmer

*DuPont Registered Trademark



PART No.	PARTS Per Kit	DESCRIPTION	PART No.	PARTS Per Kit	DESCRIPTION
<u>Coils-Transformers-Choke</u>			<u>Diodes-Crystals-Tubes-Lamps-Fuse (cont'd.)</u>		
40-521	1	80 meter antenna coil	404-200	1	3.395 mc-2.1 kc SSB filter
40-522	1	40 meter antenna coil	404-205	1	3393.6 kc crystal
40-523	1	20 meter antenna coil	404-206	1	3396.4 kc crystal
40-524	1	15 meter antenna coil	404-207	1	12.395 mc crystal
40-525	1	10 meter antenna coil	404-208	1	15.895 mc crystal
40-526	1	80 meter RF amplifier plate coil	404-209	1	22.895 mc crystal
40-527	1	40 meter RF amplifier plate coil	404-210	1	29.895 mc crystal
40-528	1	20 meter RF amplifier plate coil	404-211	1	36.895 mc crystal
40-529	1	15 meter RF amplifier plate coil	404-212	1	37.395 mc crystal
40-530	1	10 meter RF amplifier plate coil	404-213	1	37.895 mc crystal
40-531	1	12,395 kc heterodyne oscillator coil	404-214	1	38.395 mc crystal
40-532	1	15,895 kc heterodyne oscillator coil	411-11	3	6AU6 tube
40-533	1	22,895 kc heterodyne oscillator coil	411-58	1	6AB4 tube
40-534	1	29,895 kc heterodyne oscillator coil	411-90	2	6BA6 tube
40-535	4	Heterodyne oscillator coil (36,895 kc, 37,395 kc, 37,895 kc, 38,395 kc)	411-126	1	6BZ6 tube
40-546	1	8.5 megacycle trap coil	411-171	1	6HF8 tube
40-603	1	BFO output coil	411-200	1	6AS11 tube
45-43	1	Parasitic choke	412-20	3	#47 pilot lamp
51-105	1	Audio output transformer	421-3	1	2 ampere slow-blow fuse
(10) 52-65	1	IF bandpass filter transformer	<u>Grommets-Terminal Strips-Sockets-Jack-Plugs</u>		
52-71	2	3395 kc IF transformer	73-3	2	1/2" grommet
54-146	1	Power transformer	(16) 431-1	1	Dual-lug terminal strip
<u>Controls-Switches</u>			(17) 431-49	5	11-lug terminal strip
(11) 10-61	1	200 Ω tab-mount control	(18) 432-4	1	Line cord socket
(12) 10-128	1	10 K Ω control	(19) 434-4	1	Octal socket
10-16	1	500 K Ω control	(20) 434-42	11	Phono socket
63-332	1	Function switch	(21) 434-74	11	Ceramic crystal socket
63-370	1	Mode switch	(22) 434-90	3	Pilot lamp socket
63-334	1	Band switch	(23) 434-121	1	12-pin compactron socket
63-335	1	AGC switch	(24) 434-129	7	7-pin tube socket
63-336	1	Converter switch	(25) 434-130	1	9-pin tube socket
<u>Diodes-Crystals-Tubes-Lamps-Fuse</u>			(26) 436-11	1	Banana jack
(13) 56-4	1	Crystal diode	(27) 436-21	1	Phone jack
(14) 56-24	2	Crystal silicon diode (yellow-green-gray)	(28) 438-4	12	Phono plug
(15) 57-27	3	500 ma silicon diode	(29) 438-6	1	Octal plug
404-43	1	100 kc crystal	<u>Wire-Cable-Sleeving</u>		
			89-3	1	Line cord
			134-84	1	Wiring harness
			340-2	1	Bare wire
			343-5	1	RG-62/U coaxial cable
			343-7	1	RG-174/U coaxial cable
			344-50	1	Length black hookup wire
			344-51	1	Length brown hookup wire
			344-52	1	Length red hookup wire
			344-53	1	Length orange hookup wire
			344-54	1	Length yellow hookup wire
			344-55	1	Length green hookup wire
			344-56	1	Length blue hookup wire
			344-57	1	Length violet hookup wire
			344-59	1	Length white hookup wire
			346-1	1	Sleeving

PART No.	PARTS Per Kit	DESCRIPTION	PART No.	PARTS Per Kit	DESCRIPTION
<u>Hardware</u>			<u>Metal Parts</u>		
30)	250-172	40 3-48 x 3/8" screw	90-268	1	Cabinet
31)	250-251	2 3-48 x 3/8" flat head screw	200-387F943-944	1	Chassis
32)	250-27	2 6-32 x 2" screw	203-M359F942	1	Front panel
33)	250-40	2 6-32 x 1-1/2" screw	204-M557	2	Capacitor mounting bracket
34)	250-26	4 6-32 x 5/8" screw	204-M560	2	Chassis brace
35)	250-32	4 6-32 x 3/8" screw (flat head)	206-M221F945	1	Coil enclosure
36)	250-89	5 6-32 x 3/8" screw (binder head)	(74) 206-M222	1	Mode switch shield
37)	250-218	2 6-32 x 3/8" oval head screw	(75) 206-M223	2	Coil partition shield
38)	250-31	44 6-32 x 1/4" screw	<u>Miscellaneous</u>		
39)	250-137	4 8-32 x 3/8" screw	74-4	1	Insulating tape
40)	250-260	2 8-32 x 1/4" oval head screw	85-71F946	1	IF circuit board
41)	250-87	6 8-32 x 3/16" screw	85-72F947	1	RF circuit board
42)	250-34	11 4-40 x 1/2" screw	110-13	1	Linear master oscillator
43)	250-105	10 8-32 x 1/8" allen setscrew	206-86	3	Pilot lamp shield
44)	250-156	1 4-40 x 1/8" allen setscrew	(76) 260-29	11	Crystal holding clips
45)	251-1	2 6-32 spade bolt	261-9	4	Rubber feet
46)	252-1	42 3-48 nut	(77) 255-59	2	Foot spacer
47)	252-15	11 4-40 nut	(78) 266-72	1	8-position switch detent
48)	252-3	62 6-32 nut	266-73	1	4-position switch detent
	252-66	2 6-32 wing nut	352-M8	1	Silicon grease
49)	252-4	4 8-32 nut	391-26	1	Nameplate
50)	252-7	9 Control nut	407-99	1	0-1 ma S-meter
51)	253-25	4 #6 flat washer	(79) 423-1	1	Fuseholder
	253-40	4 #6 thin flat washer	440-1	1	Octal plug cap
52)	253-10	9 Control flat washer	446-40	1	Dial escutcheon
53)	254-7	55 #3 lockwasher	453-123	1	Preselector shaft
54)	254-9	15 #4 lockwasher	(80) 455-13	1	1/4" x 1/4" bushing
55)	254-1	65 #6 lockwasher	(81) 456-4	1	Insulated coupling
56)	254-2	8 #8 lockwasher	(82) 456-16	2	Switch shaft coupling
57)	254-5	7 Control lockwasher	462-159	1	Small black knob
58)	259-6	15 #6 small solder lug	462-175	1	Small aluminum knob
59)	259-1	6 #6 solder lug	462-191	7	Small green knob with skirt
60)	259-10	2 Control solder lug	462-193	1	Large knob with skirt
61)	435-1	1 Octal socket mounting ring	481-1	1	Electrolytic capacitor
62)	260-7	1 BFO coil mounting clip	469-1	1	mounting wafer
<u>Dial Drive Assembly #100-M450</u>			490-1	1	Sandpaper
consisting of:			490-85	1	Alignment tool
63)	266-74	1 Spiral drive pawl	490-23	1	#8 allen wrench
64)	100-M447	1 Pointer drive arm assembly	331-6	1	#4 allen wrench
65)	100-M449	1 Circular dial plate assembly	595-639	1	Solder
	204-553	1 Dial pointer mounting bracket assembly			Manual
66)	100-443	1 Pointer scale bracket			
67)	100-444	1 Dial drive pulley			
68)	100-445	1 Zero set drive pulley			
69)	455-42	1 Drive shaft bushing assembly (in envelope)			
70)	464-30F949	1 Slide scale dial			
71)	250-63	1 3-48 x 1/8" screw (in envelope)			

PROPER SOLDERING TECHNIQUES

Only a small percentage of customers find it necessary to return equipment for factory service. By far the largest portion of malfunctions in this equipment are due to poor or improper soldering.

If terminals are bright and clean and free of wax, frayed insulation and other foreign substances, no difficulty will be experienced in soldering. Correctly soldered connections are essential if the performance engineered into a kit is to be fully realized. If you are a beginner with no experience in soldering, a half hour's practice with some odd lengths of wire may be a worthwhile investment.

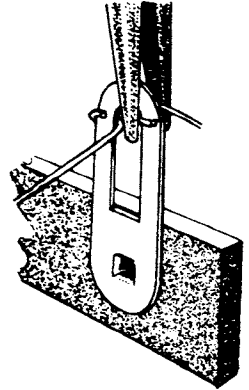
For most wiring, a 25 to 100 watt iron or its equivalent in a soldering gun is very satisfactory. A lower wattage iron than this may not heat the connection enough to flow the solder smoothly. Keep the iron tip clean by wiping it from time to time with a cloth.

CHASSIS WIRING AND SOLDERING

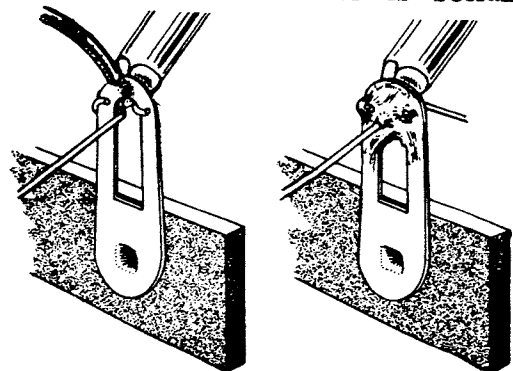
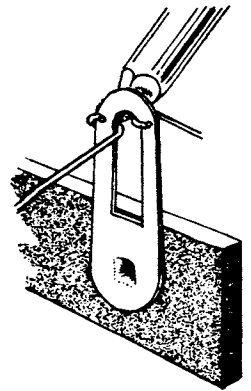
1. Unless otherwise indicated, all wire used is the type with colored insulation (hookup wire). In preparing a length of hookup wire, 1/4" of insulation should be removed from each end unless directed otherwise in the assembly step.
2. To avoid breaking internal connections when stripping insulation from the leads of transformers or similar components, care should be taken not to pull directly on the lead. Instead, hold the lead with pliers while it is being stripped.
3. Leads on resistors, capacitors, and similar components are generally much longer than need be to make the required connections. In these cases, the leads should be cut to proper length before the part is installed. In general, the leads should be just long enough to reach their terminating points.
4. Wherever there is a possibility of bare leads shorting to other parts or to the chassis, the leads should be covered with insulating sleeving. Where the use of sleeving is specifically intended, the phrase "use sleeving" is included in the associated assembly

step. In any case where there is the possibility of an unintentional short circuit, sleeving should be used. Extra sleeving is provided for this purpose.

5. Crimp or bend the lead (or leads) around the terminal to form a good joint without relying on solder for physical strength. If the lead is too large to allow bending or if the step states that it is not to be crimped, position it so that a good solder connection can still be made.



6. Position the work, if possible, so that gravity will help to keep the solder where you want it.
7. Place a flat side of the soldering iron tip against the joint to be soldered until it is heated sufficiently to melt the solder.
8. Then place the solder against the connection and it will immediately flow over the joint; use only enough solder to thoroughly wet the junction. It is usually not necessary to fill the entire hole in the terminal with solder.
9. Remove the solder and then the iron from the completed joint. Use care not to move the leads until the solder is solidified.



A poor or cold solder joint will usually look crystalline and have a grainy texture, or the solder will stand up in a blob and will not have adhered to the joint. Such joints should be reheated until the solder flows smoothly. In some cases, it may be necessary to add a little more solder to achieve a smooth, bright appearance.

ROSIN CORE SOLDER HAS BEEN SUPPLIED WITH THIS KIT. THIS TYPE OF SOLDER MUST BE USED FOR ALL SOLDERING IN THIS KIT. ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE EQUIPMENT IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. IF ADDITIONAL SOLDER IS NEEDED, BE SURE TO PURCHASE ROSIN CORE (60:40 or 50:50 TIN-LEAD CONTENT) RADIO TYPE SOLDER.

CIRCUIT BOARD WIRING AND SOLDERING

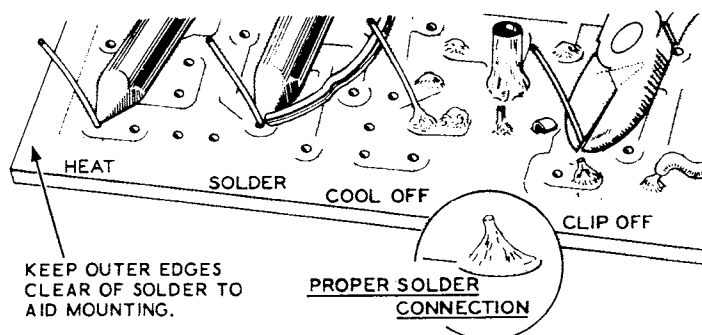
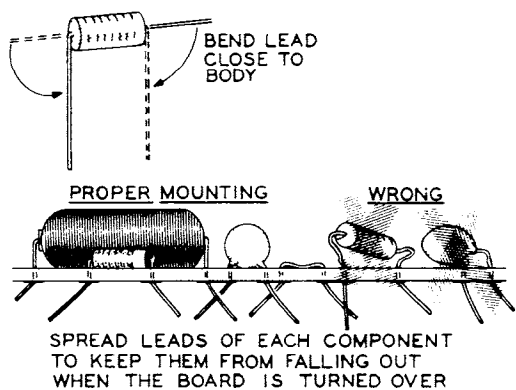
Before attempting any work on the circuit board, read the following instructions carefully and study the Figures. It is only necessary to observe the following basic precautions to insure proper operation of the unit the first time it is turned on.

Proper mounting of components on the board is essential for good performance. A good general rule to follow is that all components on the board should be mounted tightly to the board, unless instructions state otherwise. All leads should be kept as short as possible to minimize the effects of stray capacity in the wiring. Proper and improper methods of mounting are illustrated in the accompanying Figures.

NOTE: Exercise care not to damage resistors or capacitors when bending the leads as shown.

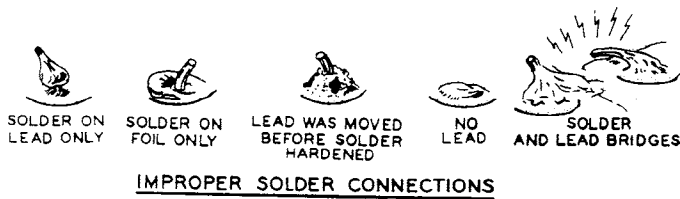
Parts should be inserted as instructed, and the leads bent outward, as illustrated, to lock them in place. After the part is in position, cut the leads off about 1/4" from the board. When a group of parts have been installed on a circuit board, solder each lead to the foil pattern and clip off the excess wire.

The actual technique of soldering leads to a circuit board is quite simple. Position the tip of the soldering iron so that it firmly contacts both the circuit board foil and the wire or lug to be soldered, as shown. The iron should be held so that solder is not likely to flow to adjacent foil conductors or connections. The solder should immediately be placed between the iron and the joint to be soldered. Remove the length of solder as soon as its end begins to melt and flow onto the lead and foil. Hold the tip of the iron in place only until the solder begins to flow outward over the foil; then remove the iron quickly.



Tubular capacitors and resistors will fit properly if the leads are bent as shown. Disc capacitors will generally fit in place with no lead preparation other than determining that the leads are straight. Components with lugs normally require no preparation unless the lugs appear to be bent, in which case they can be straightened with pliers.

Avoid overheating the connection. A soldering pencil or small iron (approximately 25 watts) is ideal for use in circuit board work. If only a high wattage iron or soldering gun is available, precautions must be taken to avoid circuit board damage due to overheating and excess solder.



Do not allow solder to bridge between two different foils. The use of excessive amounts of solder will increase the possibility of bridging between foil conductors or plugging holes which are to be left open for wires which may be

added later on. If solder is accidentally bridged across insulating areas between conductors, it can be cleaned off by heating the connection carefully and quickly wiping or brushing the solder away with a soft cloth or clean brush. Holes which become plugged can be cleared by heating the area immediately over the hole while gently pushing the lead of a resistor through the hole from the opposite side, and withdrawing the lead before the solder rehardens. Do not force the lead through; too much pressure before the solder has time to soften may separate the foil from the board.

STEP-BY-STEP PROCEDURE

The following instructions are presented in a logical step-by-step sequence to enable you to complete your kit with the least possible confusion. Be sure to read each step all the way through before beginning the specified operation. Also read several steps ahead of the actual step being performed. This will familiarize you with the relationship of the subsequent operations. When the step is completed, check it off in the space provided. This is particularly important as it may prevent errors or omissions, especially if your work is interrupted. Some kit builders have also found it helpful to mark each wire and part in colored pencil on the Pictorial as it is added.

ILLUSTRATIONS

The fold-out diagrams in this manual may be removed and attached to the wall above your working area; but because they are an integral part of the instructions, they should be returned to the manual after the kit is completed.

In general, the illustrations in this manual correspond to the actual configuration of the kit; however, in some instances the illustrations may be slightly distorted to facilitate clearly showing all of the parts.

SOLDERING

The abbreviation "NS" indicates that a connection should not be soldered yet as other wires will be added. When the last wire is installed, the terminal should be soldered and the abbreviation "S" is used to indicate this. Note that a number will appear after each solder instruction. This number indicates the number of leads that are supposed to be connected to the terminal in point before it is soldered. For example, if the instruction reads, "Connect a wire to lug 1 (S-2)," it will be understood that there will be two wires connected to the terminal at the time it is soldered. (In cases where a wire passes through a terminal or lug and then connects to another point, it will count as two wires, one entering and one leaving the terminal.)

STEP-BY-STEP ASSEMBLY

CIRCUIT BOARDS

IF AMPLIFIER CIRCUIT BOARD

Before starting, be sure you read Circuit Board Wiring and Soldering on Page 13.

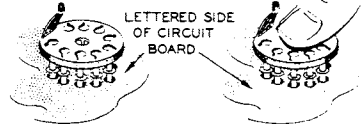
Locate the IF amplifier circuit board (#85-71F946). Position it with the lettered side up, as shown in Pictorial 1, then install IF transformers and tube sockets as directed.

INSTALLATION OF IF TRANSFORMERS-TUBE SOCKETS.

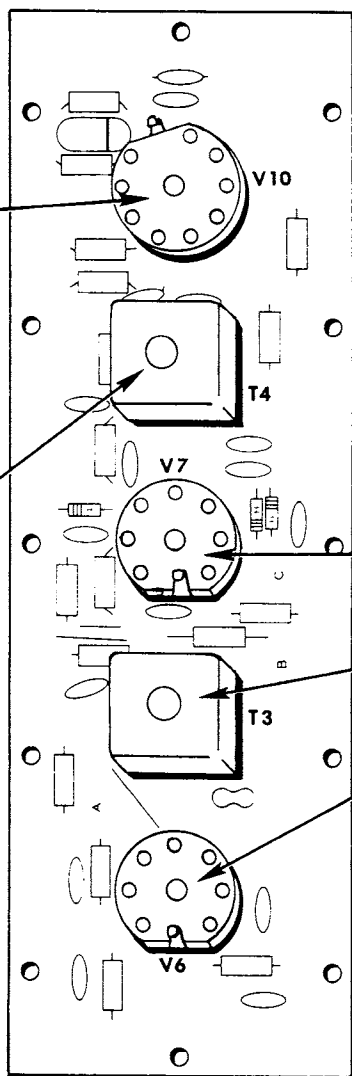
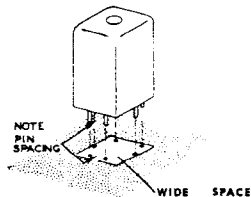
START

- () Mount a 9-pin tube socket at V10. Solder all pins and the center post to the foil.

ALIGN ALL PINS TO THEIR RESPECTIVE HOLES. PRESS THE SOCKET FIRMLY INTO PLACE.



- () Mount an IF transformer (#52-71) at T4. Solder all pins to the foil.



CONTINUE

- () Mount a 7-pin tube socket at V7. Solder all pins and the center post to the foil.
- () Mount the remaining IF transformer (#52-71) at T3. Solder all pins to the foil.
- () Mount a 7-pin tube socket at V6. Solder all pins and the center post to the foil.
- () Inspect the foil side of the circuit board to be sure there are no unsoldered connections.

PROCEED TO PICTORIAL 2 AND PERFORM THE STEPS.

PICTORIAL 1

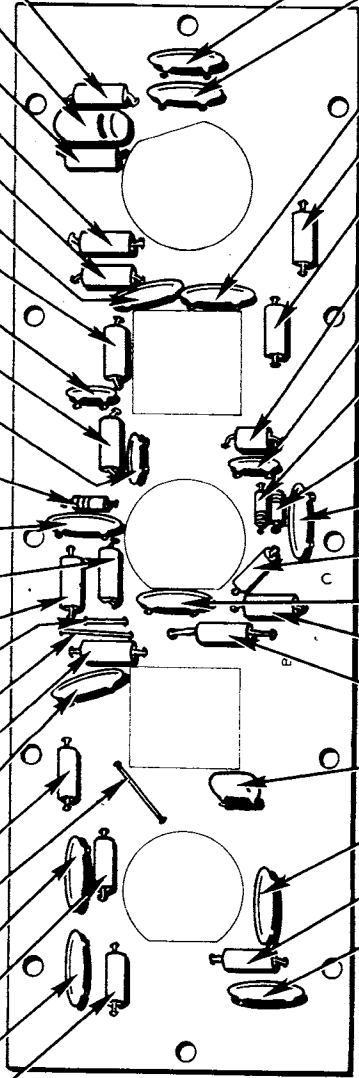
START

NOTE: All resistors used in the following steps are 1/2 watt unless otherwise specified.

INSTALLATION OF RESISTORS-CAPACITORS-DIODES-WIRES.

CONTINUE

- () 100 K Ω (brown-black-yellow).
- () .2 μ f Mylar. Place the banded end as shown.
- () 470 Ω (yellow-violet-brown).
- () 100 K Ω (brown-black-yellow).
- () 1000 Ω (brown-black-red).
- () .01 μ f disc.
- () 47 K Ω (yellow-violet-orange).
- () 470 μ f disc.
- () 330 K Ω (orange-orange-yellow).
- () 5 μ f disc.
- () Crystal diode (red-green-violet). Position color banded end as shown.
- () .01 μ f disc.
- () 1000 Ω (brown-black-red).
- () 1000 Ω (brown-black-red).
- () 3/4" bare wire.
- () 1" bare wire.
- () 1000 Ω (brown-black-red).
- () .01 μ f disc.
- () 100 Ω (brown-black-brown).
- () 1" bare wire.
- () .01 μ f disc.
- () 33 K Ω (orange-orange-orange).
- () .01 μ f disc.
- () 68 Ω (blue-gray-black).
- () Solder all leads to the foil side of the board. After soldering, clip off each lead close to the board.



- () .01 μ f disc.
- () .01 μ f disc.
- () .01 μ f disc.
- () 330 K Ω (orange-orange-yellow).
- () 33 Ω (orange-orange-black).
- () 1 μ f (brown-black-white) tubular.
- () 5 μ f disc.
- () Silicon diode (yellow-green-gray). Position color banded end as shown.
- () Silicon diode (yellow-green-gray). Position color banded end as shown.
- () .01 μ f disc.
- () 4700 Ω (yellow-violet-red).
- () .01 μ f disc.
- () 100 K Ω (brown-black-yellow).
- () 68 Ω (blue-gray-black).
- () 50 μ f mica.
- () .001 μ f disc.
- () 2000 Ω (red-black-red).
- () .001 μ f disc.
- () Solder all leads to the foil side of the board. After soldering, clip off each lead close to the board. Be sure there are no solder bridges between foils. Now set this board aside until it is called for later.

FINISH

PROCEED TO PICTORIAL 3 AND PERFORM THE STEPS.

PICTORIAL 2

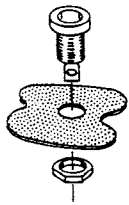
START

Locate the RF amplifier circuit board (#85-72F947). Position it with the lettered side up as shown in Pictorial 3, then install the resistors and capacitors as directed.

INSTALLATION OF TUBE SOCKETS, CRYSTAL SOCKET, TRIMMER CAPACITOR, BANANA JACK, AND TRANSFORMER.

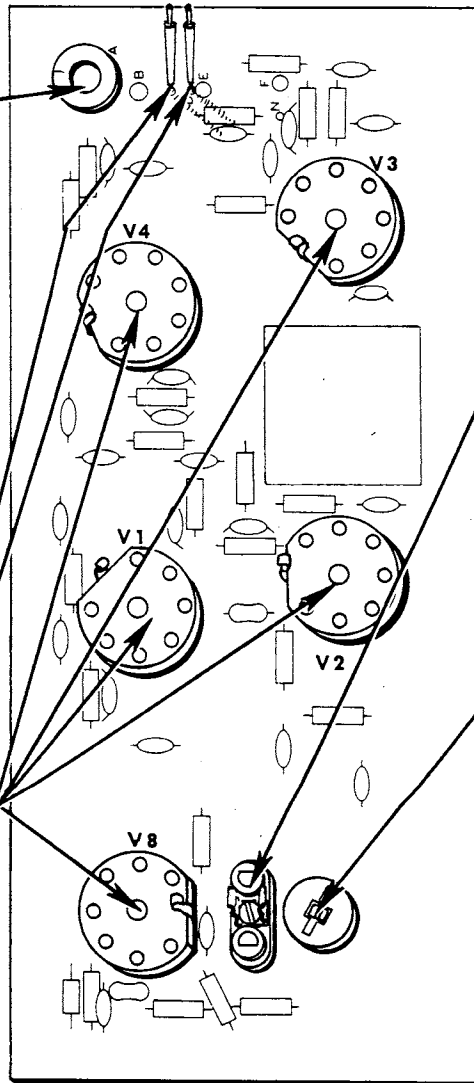
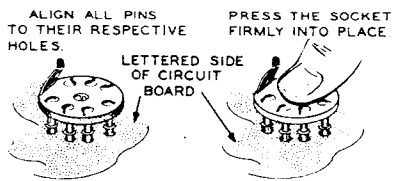
CONTINUE

- () Mount the banana jack (#436-11) at A. Use the hardware supplied with the jack.

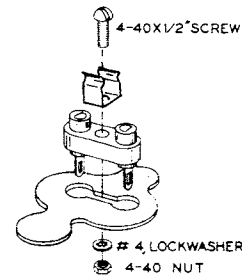


NOTE: When wire is called for, cut a length of hookup wire to the specified length and remove 1/4" of insulation from each end. Only one end of each wire will be connected to the circuit board now. The remaining end will be connected later.

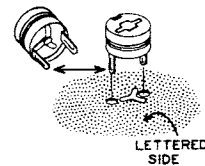
- () 1-1/2" brown wire to hole C (S-1).
- () 1-1/2" black wire to hole D (S-1).
- () Mount 7-pin tube sockets at V4, V1, V8, V2, and V3. Solder all of the pins and the center post of each socket to the foil.



- () Mount a ceramic crystal socket and crystal clip on the board. Use a 4-40 x 1/2" screw, a #4 lockwasher, and a 4-40 nut. Bend the socket lugs down and away from the mounting screw, then solder them to the foils.



- () Mount an 8-50 μμf ceramic trimmer capacitor on the board. Position the Y lug as shown. Solder lugs to the foil by bridging from the lugs to the foil with solder.



- () Inspect the foil side of the circuit board to be sure there are no unsoldered connections.

PICTORIAL 3

PROCEED TO PICTORIAL 4 AND PERFORM THE STEPS.

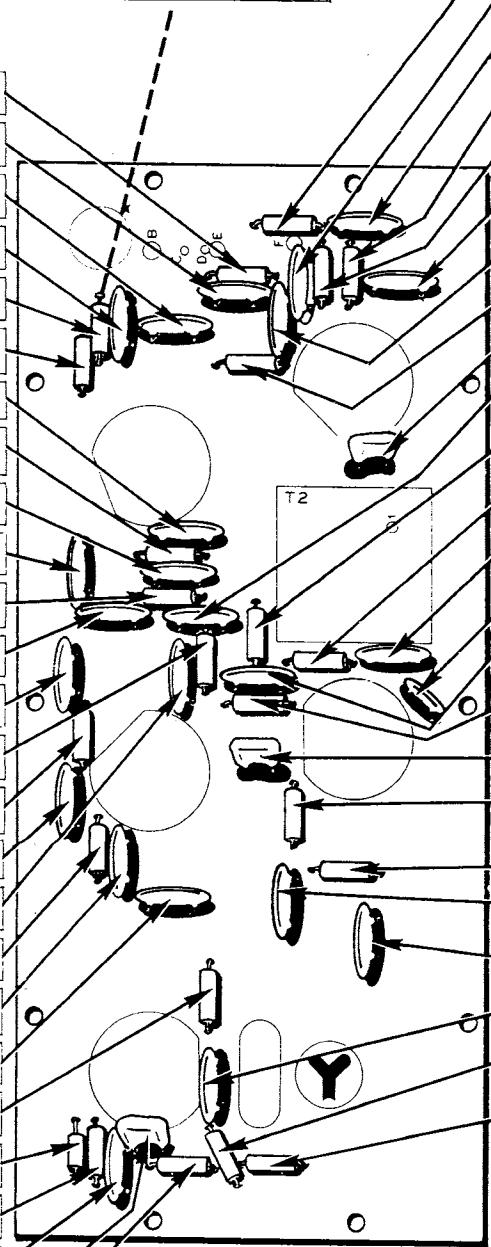
INSTALLATION OF RESISTORS-
CAPACITORS-TRANSFORMER

CONTINUE

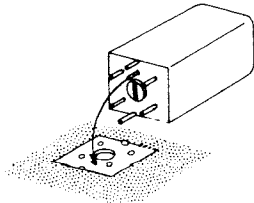
* DO NOT CUT THIS LEAD OFF.
IT WILL BE USED LATER.

START

- () 100 Ω (brown-black-brown).
- () .01 μfd disc.
- () .01 μfd disc.
- () .01 μfd disc.
- * () 100 KΩ (brown-black-yellow).
- () 100 KΩ (brown-black-yellow).
- () .01 μfd disc.
- () 1000 Ω (brown-black-red).
- () .01 μfd disc.
- () .01 μfd disc.
- () 1000 Ω (brown-black-red).
- () .01 μfd disc.
- () .001 μfd disc.
- () 47 KΩ (yellow-violet-orange).
- () 470 KΩ (yellow-violet-yellow).
- () .001 μfd disc.
- () .01 μfd disc.
- () 150 Ω (brown-green-brown).
- () .01 μfd disc.
- () .01 μfd disc.
- () 470 KΩ (yellow-violet-yellow).
- () 2.2 μmf (red-red-white) tubular.
- () 100 KΩ (brown-black-yellow).
- () .01 μfd disc.
- () 180 μmf mica.
- () 27 KΩ (red-violet-orange).
- () Solder all leads to the foil side of the board. After soldering, clip off each lead close to the board except the indicated (*) lead of the 100 KΩ resistor.



- () 1000 Ω (brown-black-red).
- () .01 μfd disc.
- () .01 μfd disc.
- () 2000 Ω (red-black-red).
- () 1000 Ω (brown-black-red).
- () .01 μfd disc.
- () .01 μfd disc.
- () 1000 Ω (brown-black-red).
- () 12 μmf mica.
- () .01 μfd disc.
- () 1000 Ω (brown-black-red).
- () 100 KΩ (brown-black-yellow).
- () .01 μfd disc.
- () 5 μmf disc.
- () .01 μfd disc.
- () 1000 Ω (brown-black-red).
- () 50 μmf mica.
- () 100 KΩ (brown-black-yellow).
- () 1000 Ω (brown-black-red).
- () .01 μfd disc.
- () .01 μfd disc.
- () .01 μfd disc.
- () 1000 Ω (brown-black-red)
- () 1000 Ω (brown-black-red).
- () Mount the IF Band Pass Filter transformer (#52-65) at T2, as shown in Detail 4A.
- () Be sure all connections are soldered and that all excess wire has been clipped off, except the indicated (*) lead of the 100 KΩ resistor. Now set the board aside until it is called for later and proceed to Parts Mounting on the chassis.



Detail 4A

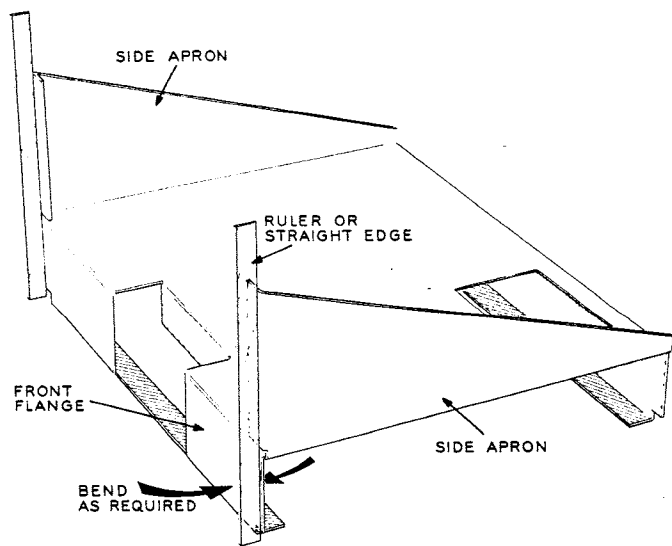
FINISH

CHASSIS PARTS MOUNTING

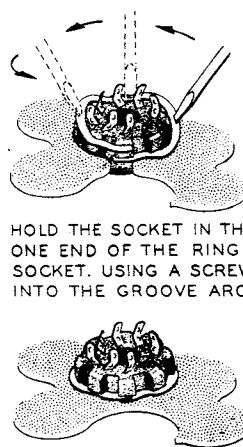
Refer to Pictorial 5 for the following steps.

NOTE: Because of the complexity of the dial mechanism used in this kit, it is very important that the front edges of the chassis be in perfect alignment. This alignment is checked at the factory, however, if the kit receives rough handling in shipping, this alignment might be changed. Therefore, this alignment should be checked at this time as follows, and care should be used in handling the chassis throughout the assembly of the kit.

- () Referring to Detail 5A, check to see that the front flange of the chassis is in perfect alignment with the front edge of the side aprons. This can be done by placing a ruler or other straight edge along this surface as shown. Straighten the front flange of the chassis as required by carefully bending the flange.
- () Locate the chassis and position it as shown.
- () Mount the 8-pin octal tube socket at BB on the rear apron. Use the octal socket mounting ring as shown in Detail 5B. Position the socket keyway as shown by the arrow in Pictorial 5.

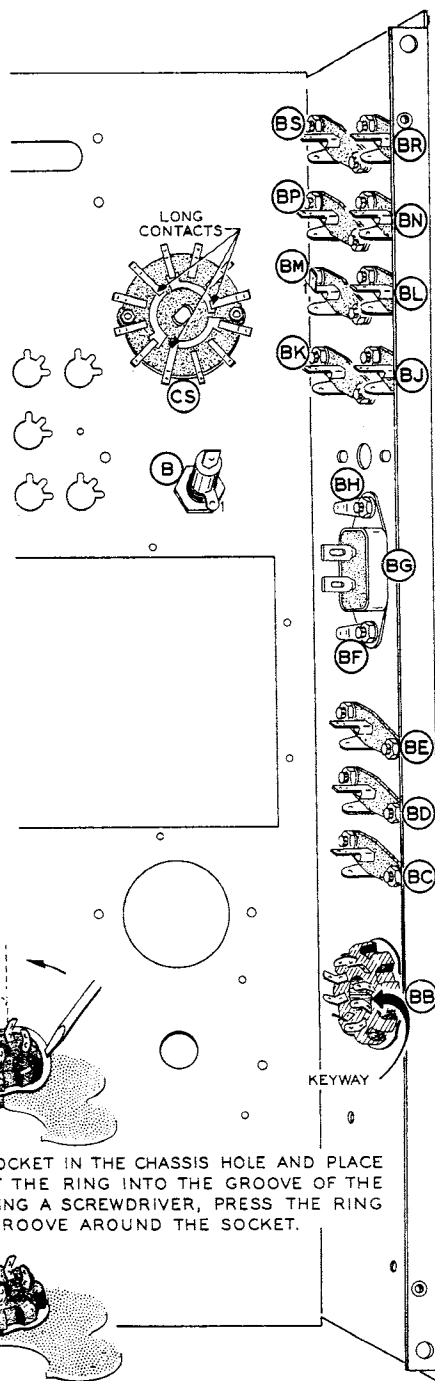


Detail 5A



HOLD THE SOCKET IN THE CHASSIS HOLE AND PLACE ONE END OF THE RING INTO THE GROOVE OF THE SOCKET. USING A SCREWDRIVER, PRESS THE RING INTO THE GROOVE AROUND THE SOCKET.

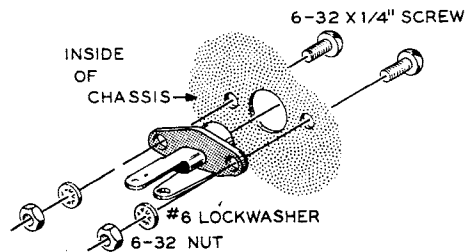
Detail 5B



PICTORIAL 5

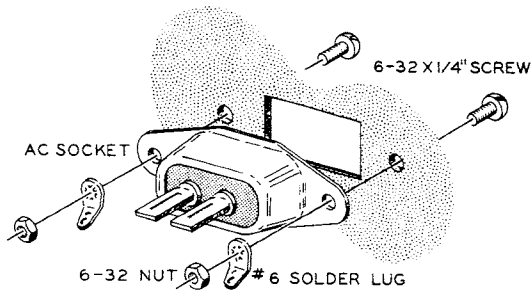
NOTE: Lockwashers and nuts will be used with all screws when mounting parts, unless stated otherwise in the assembly steps. Consequently, the following steps will call out only the size and type of the hardware to be used. For example, the phrase "Use 6-32 x 1/4" hardware" means to use 6-32 x 1/4" screws, #6 lockwashers, and 6-32 nuts.

- () Refer to Detail 5C and mount a phono socket at BC. Use 6-32 x 1/4" hardware.



Detail 5C

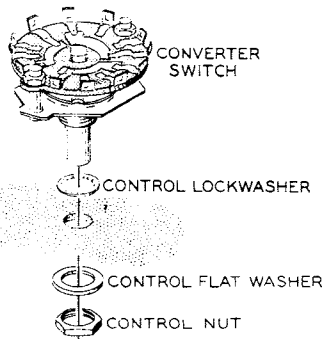
- () In the same manner mount phono sockets at locations BD, BE and BJ through BS. Use 6-32 x 1/4" hardware.
- () Bend lug 1 of phono socket BM over as shown in Pictorial 5.



Detail 5D

- () Refer to Detail 5D and mount the AC socket at BG with large #6 solder lugs on the mounting screws at BF and BH. Use 6-32 x 1/4" screws and 6-32 nuts.

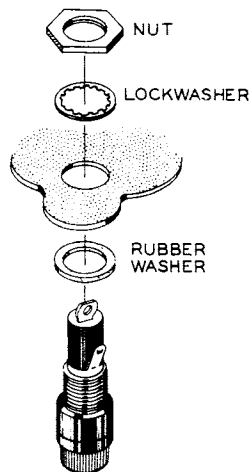
Detail 5E



- () Mount the converter switch (#63-336) at CS. Use a control lockwasher, a control flat washer, and a control nut as shown in Detail 5E. Position the switch so the long contacts are as shown in Pictorial 5.

- () Install a small black knob on converter switch CS. Position the index mark as shown in Pictorial 22 (fold-out from Page 59).

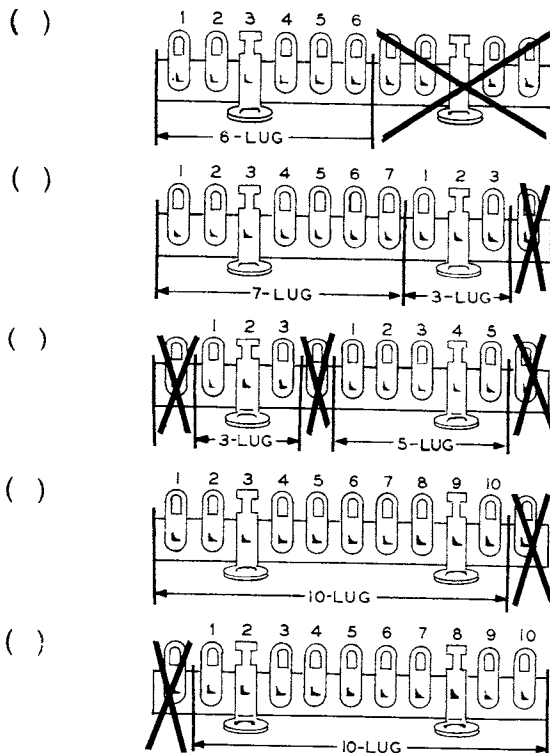
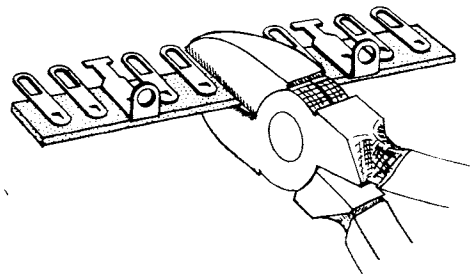
- () Refer to Detail 5F and mount the fuseholder at B. Use the hardware supplied with the fuseholder. Bend lug 1 of the fuseholder away from the body after mounting as shown in Pictorial 5.



Detail 5F

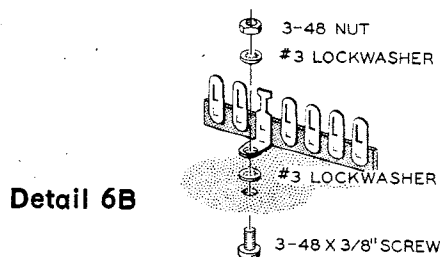
Refer to Pictorial 6 (fold-out from Page 23) for the following steps.

- () Install the 1/2" rubber grommets in holes HA and HB.
- () Locate the five 11-lug terminal strips. It will be necessary to cut these terminal strips as shown in Detail 6A for use in the following steps. The terminal strips can be cut with diagonal cutters.



Detail 6A

- () Mount a 7-lug terminal strip at A. Use 3-48 x 3/8" hardware as shown in Detail 6B.

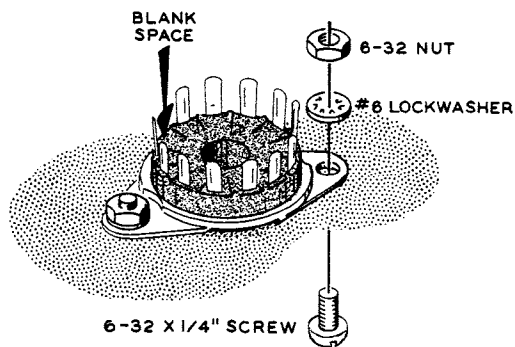


Detail 6B

- () Mount 10-lug terminal strips at J and K with 3-48 x 3/8" hardware. Use the 10-lug terminal strip with lugs 2 and 8 as ground lugs at J, and use the remaining 10-lug terminal strip at K. Position each terminal strip as shown.

- () Mount a 5-lug (#4 lug ground) at E. Use 6-32 x 1/4" hardware.

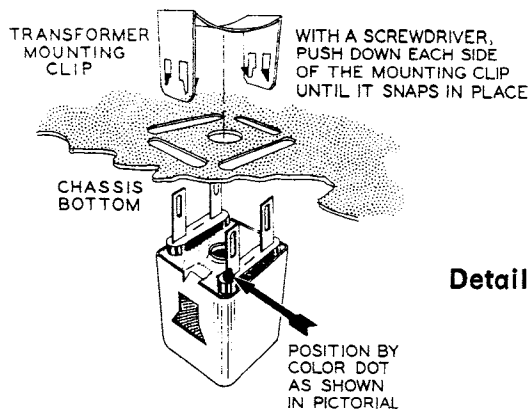
- () Mount a 6-lug terminal strip at F. Use 6-32 x 1/4" hardware.



Detail 6C

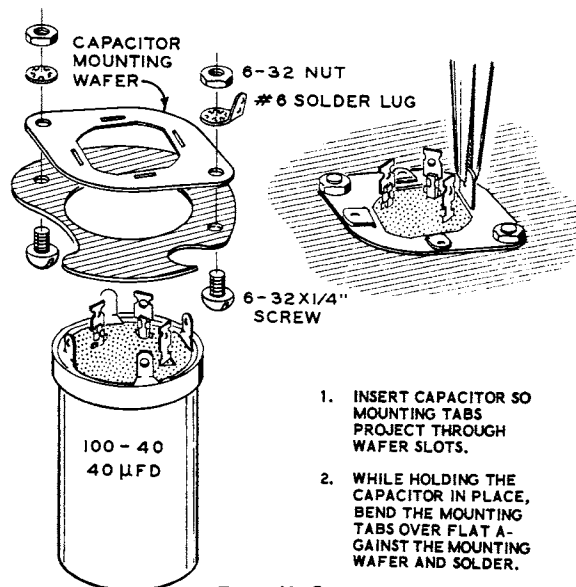
- () Refer to Detail 6C and mount the 12-pin tube socket at V9 with 6-32 x 1/4" hardware. Be sure to position the wide space between lugs 1 and 12 as shown in Pictorial 6.

- () Refer to Detail 6D and mount the BFO output coil (#40-603) at L20. Use the BFO coil mounting clip. Be sure to position the green dot as shown in Pictorial 6.



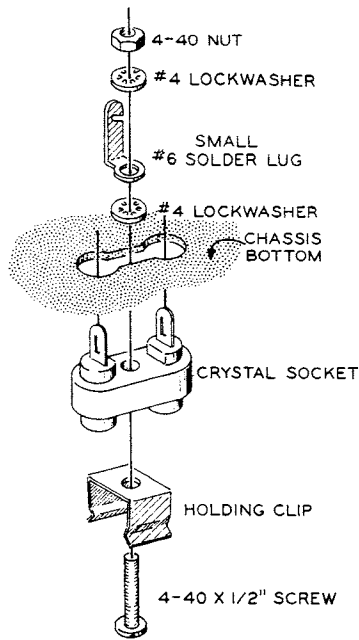
Detail 6D

- () Refer to Pictorial 6 and Detail 6E and mount the electrolytic capacitor mounting wafer at H with a #6 solder lug under one mounting screw. Use 6-32 x 1/4" hardware.

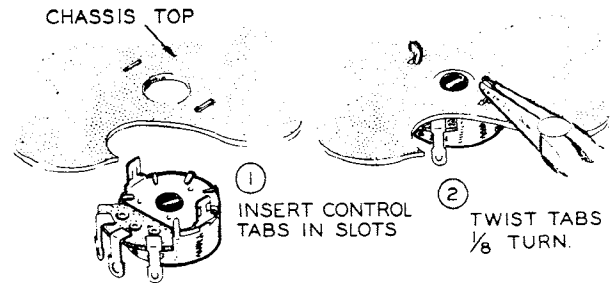


Detail 6E

- () Mount the 100-40-40 μfd electrolytic capacitor at H. Position the capacitor lug markings as shown in Pictorial 6. Secure the capacitor by bending each mounting tab flat against the mounting wafer and soldering the tabs to the wafer. See Detail 6E.



Detail 6F



Detail 6G

- () Locate the power transformer (#54-146) and cut the leads to the following lengths. Measure the lead from the point at which it leaves the transformer.

LEAD COLOR	LEAD LENGTH
------------	-------------

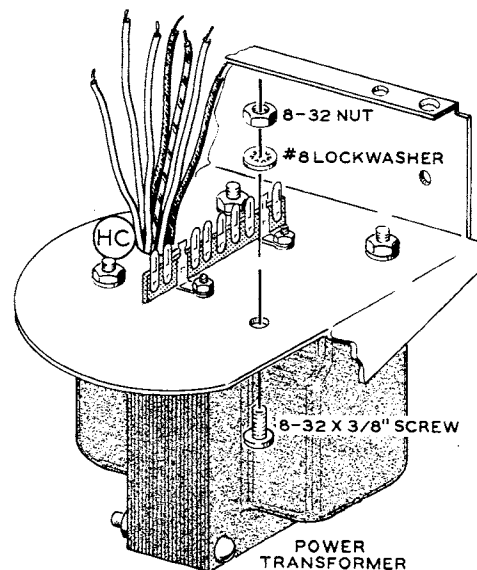
- | | |
|-------------------|--------|
| () Either black | 1-1/2" |
| () Other black | 1" |
| () Both red | 1" |
| () Either yellow | 1-1/4" |
| () Other yellow | 2" |
| () Red-yellow | 1-1/2" |

NOTE: When installing ceramic crystal sockets in the following steps be careful not to overtighten the hardware or you will crack the sockets.

- () Refer to Detail 6F and mount ceramic crystal sockets and crystal holding clips at Y9 and Y10. Use 4-40 x 1/2" screws, #4 lockwashers, small #6 solder lugs, and 4-40 nuts. Bend the solder lugs up away from the chassis 90 degrees as shown in Pictorial 6.
- () In the same manner, mount ceramic crystal sockets and crystal holding clips at Y3 and Y7. Use 4-40 x 1/2" screws, #4 lockwashers, small #6 solder lugs, and 4-40 nuts. Bend the solder lugs and place them against the crystal socket lugs as shown in Pictorial 6.
- () Mount the remaining ceramic crystal sockets and crystal holding clips at Y1, Y2, Y4, Y5, Y6, and Y8. Use 4-40 x 1/2" hardware.
- () Mount the 200 Ω tab-mount control (#10-61) at L as shown in Detail 6G. Position the control lugs as shown in Pictorial 6. Secure the control by twisting each mounting tab 1/8 turn.

- () Remove 1/4" of insulation from the end of each power transformer lead. Melt a small amount of solder on the exposed lead ends to hold the wire strands together.

- () Mount the power transformer on the chassis with the leads passing through hole HC. Secure the transformer with 8-32 x 3/8" hardware as shown in Detail 6H. Center the screws in the slotted transformer holes.

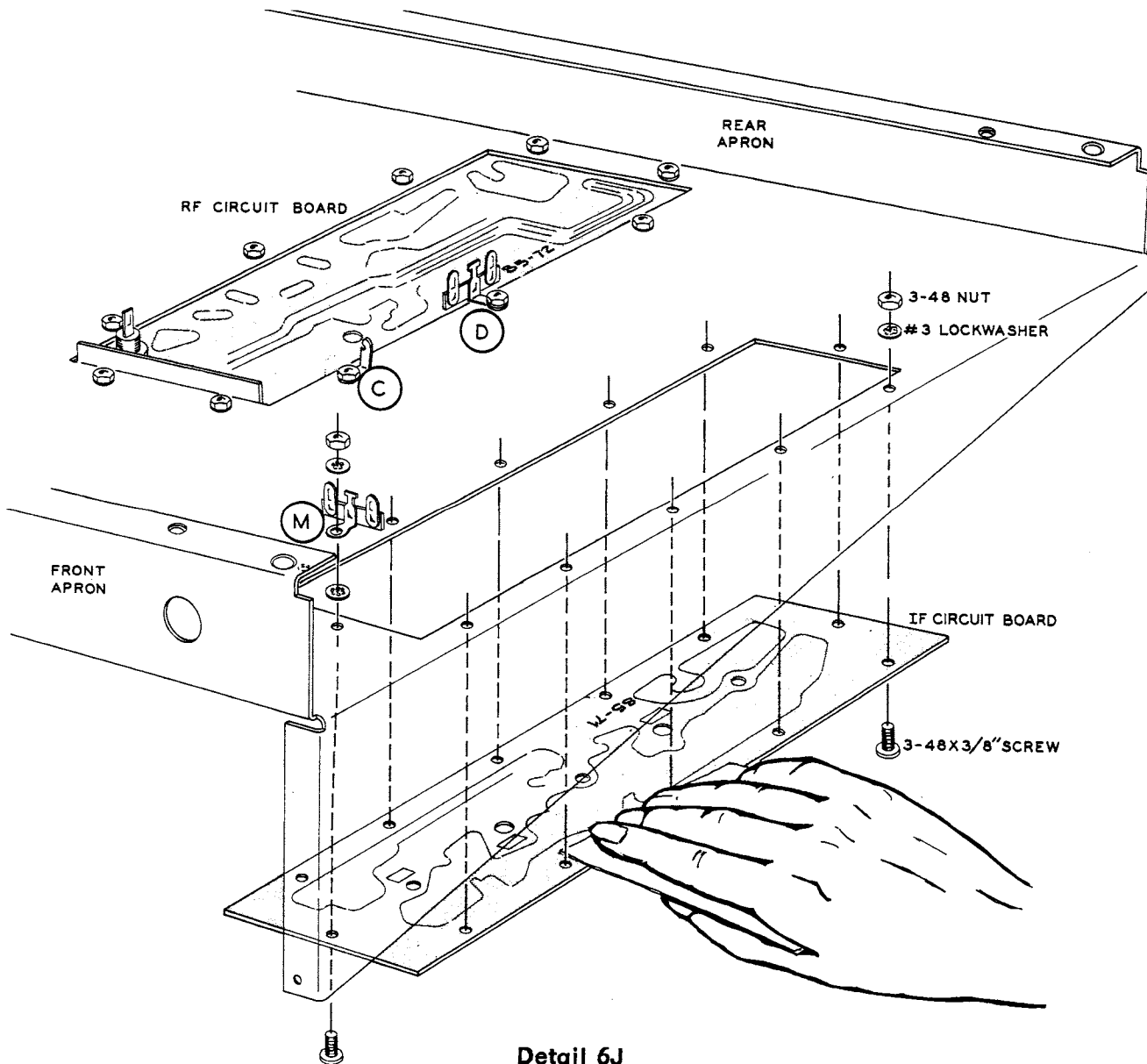


Detail 6H

Refer to Detail 6J and Pictorial 6 for the following circuit board mounting steps.

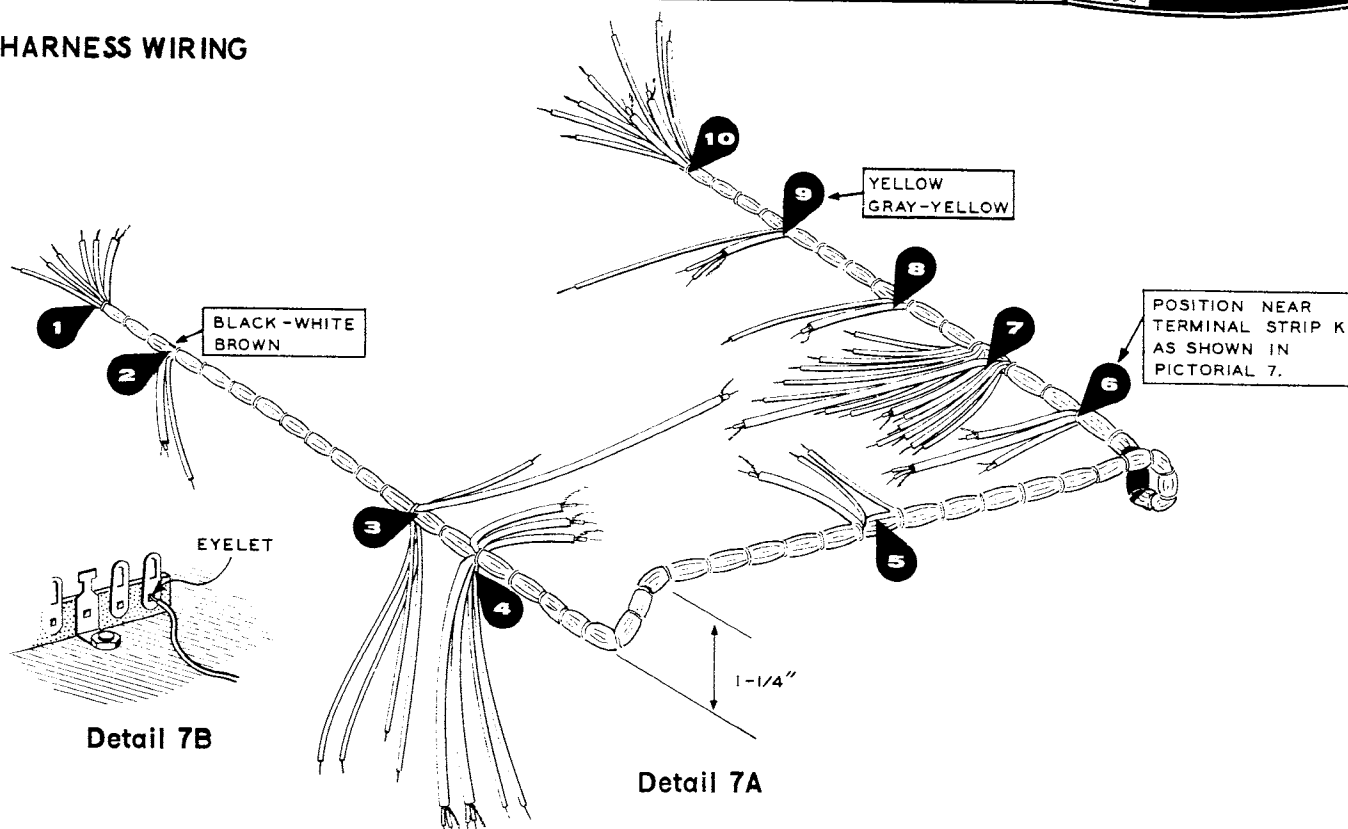
- (1) Using the sandpaper supplied, lightly sand the foil around the outside edge of the circuit boards to remove the lacquer coating and thus permit a good ground connection between the circuit board foil and the chassis.
- (2) Mount the IF circuit board (#85-71F946) on the chassis with 3-48 x 3/8" hardware, except at location M. Be sure to position the circuit board as shown.
- (3) Mount a 3-lug miniature terminal strip at M. Use 3-48 x 3/8" hardware.

- (4) Mount the RF circuit board (#85-72F947) on the chassis with 3-48 x 3/8" hardware, except at locations D and C. Be sure to position the circuit board as shown.
- (5) Mount a 3-lug miniature terminal strip at D. Use 3-48 x 3/8" hardware with a lock-washer above and under the terminal strip mounting foot.
- (6) Mount a small #6 solder lug at C. Use 3-48 x 3/8" hardware. Position the solder lug as shown and bend it up 90 degrees from the chassis.



Detail 6J

HARNESS WIRING



Refer to Pictorial 7 for the following steps.

- () Locate the wiring harness and unfold it. Refer to Detail 7A and locate the various breakouts. Once the breakouts have been identified, bend the harness to the shape shown in Detail 7A. The side of the harness is bent up 1-1/4" so that it will fit into an angle bracket that is installed later.
- () Fit the harness in the bottom of the chassis exactly as shown in Pictorial 7. Place the wires from breakout #2 through grommet HA. Place the brown, yellow, and blue wires from breakout #3, and the white wire, the white-yellow wire and the two gray shielded cables from breakout #4 through grommet HB.

NOTE: The following connections concern the wires extending from breakouts in the wiring harness. In some cases the wire will be connected to the small eyelet at the bottom of the terminal strip lug as shown in Detail 7B. The eyelet connections will be soldered as soon as all connections to them have been made. Separate soldering instructions will be given for the top of the lug. Clip off any excess wire after soldering the connection.

Connect the leads from breakout #10 as follows:

- () White-black wire to lug 1 of switch CS (S-1).
- () White-gray-black to lug 3 of switch CS (S-1).
- () White-brown to lug 4 of switch CS (S-1).
- () White-orange-yellow to lug 5 of switch CS (S-1).
- () White-red to lug 11 of switch CS (S-1).
- () White-gray-green to lug 12 of switch CS (S-1).
- () Yellow wire to lug 1 of phono socket BM (S-1).

NOTE: When soldering the coaxial cable connections, do not overheat the connection as the insulation on the inner conductor will melt and permit a short to the shield.

- () Black with green stripe shielded cable: inner conductor to lug 1 of phono jack BK (S-1), shield to lug 2 of phono jack BM (S-1).
- () Black with orange stripe shielded cable: inner conductor to lug 1 of phono socket BJ (S-1), shield to lug 2 of phono socket BL (NS).

Connect the wires from breakout #9 as follows:

- () Yellow wire to hole M on the RF circuit board (S-1).
- () Gray with yellow band shielded cable: black wire to lug 2 of fuseholder B (S-1), red wire to lug 2 of AC socket BG (NS), and the shield to solder lug BH (NS).

Connect the wires from breakout #8 as follows:

- () White wire to point P on the RF circuit board (S-1).
- () Black with blue stripe shielded cable: inner conductor to lug 1 (S-1), and the shield to lug 2 (NS) of phono socket BC.

Connect the wires from breakout #7 as follows:

- () White-red wire to lug 2 of electrolytic capacitor H (NS).
- () White-gray-black wire to the eyelet in lug 3 of terminal strip J (NS).
- () Both brown wires to the eyelet in lug 3 of terminal strip J (S-3).
- () White-yellow wire to the eyelet in lug 9 of terminal strip J (NS).
- () Both yellow wires to the eyelet in lug 9 of terminal strip J (S-3).
- () Blue wire to lug 9 of terminal strip J (NS).
- () White-yellow-brown to the eyelet in lug 10 of terminal strip J (S-1).

NOTE: Route the harness wires going to socket BB against the rear apron.

- () White-orange-yellow wire to lug 1 of socket BB (S-1).
- () White-black wire to lug 3 of socket BB (S-1).
- () Green wire to lug 4 of socket BB (S-1).
- () White-gray-green wire to lug 6 of socket BB (S-1).
- () White-brown wire to lug 8 of socket BB (S-1).

- () Black with blue stripe shielded cable: inner conductor to lug 3 (NS) and the shield to lug 4 (NS) of BFO coil L20.

- () Black with green stripe shielded cable: inner conductor to the eyelet in lug 8 (NS), and the shield to the eyelet in lug 9 (NS) of terminal strip K.

Connect the wires from breakout #6 as follows:

- () Black with violet stripe shielded cable: inner conductor to the eyelet in lug 10 (S-1), and the shield to the eyelet in lug 9 (S-2) of terminal strip K.
- () Black with red stripe shielded cable: inner conductor to eyelet in lug 8 (S-2), and the shield to lug 9 (S-1) of terminal strip K.
- () Gray shielded cable: red wire to the eyelet in lug 4 (S-1), shield to the eyelet in lug 3 (S-1), and the black wire to the eyelet in lug 2 (S-1) of miniature terminal strip K.

Connect the wires from breakout #5 as follows:

- () Black with yellow stripe shielded cable: inner conductor to point K (S-1), and the shield to point L (S-1) on the IF circuit board.
- () Either brown wire to point M on the IF circuit board (S-1).
- () Other brown wire to point N on the IF circuit board (S-1).

Connect the wires from breakout #4 as follows:

- () Black with red stripe shielded cable: inner conductor to the eyelet of lug 1 (S-1) and the shield to the eyelet of lug 2 (NS) of miniature terminal strip M.

The black with orange stripe and black with violet stripe shielded cables will be connected later.



Connect the wires from breakout #3 as follows:

- () White-yellow wire to point A on the IF circuit board (S-1).

Black with white stripe shielded cable will be connected later.

The other wires from this breakout pass through grommet HB to the top of the chassis. They will be connected later.

NOTE: The wires from breakout #2 pass through grommet HA to the top of the chassis. They will be connected later.

Connect the wires from breakout #1 as follows:

- () Blue wire to the eyelet in lug 5 of terminal strip A (S-1).
- () White-yellow wire to the eyelet in lug 1 of terminal strip A (NS).
- () Yellow wire to the eyelet in lug 1 of terminal strip A (NS).
- () Green wire to the eyelet in lug 1 of terminal strip A (S-3).
- () White-yellow-brown wire to the eyelet in lug 2 of miniature terminal strip A (S-1).
- () Black with yellow stripe shielded cable: inner conductor to the eyelet in lug 6 of terminal strip A (S-1) and the shield to the eyelet in lug 3 of terminal strip A (S-1).

This completes the harness wiring on the bottom of the chassis except for the three shielded cables at breakouts #3 and #4 which will be connected later.

INITIAL WIRING

CHASSIS BOTTOM

Refer to Pictorial 8 for the following steps.

Connect the power transformer leads as follows:

LEAD COLOR

CONNECT TO

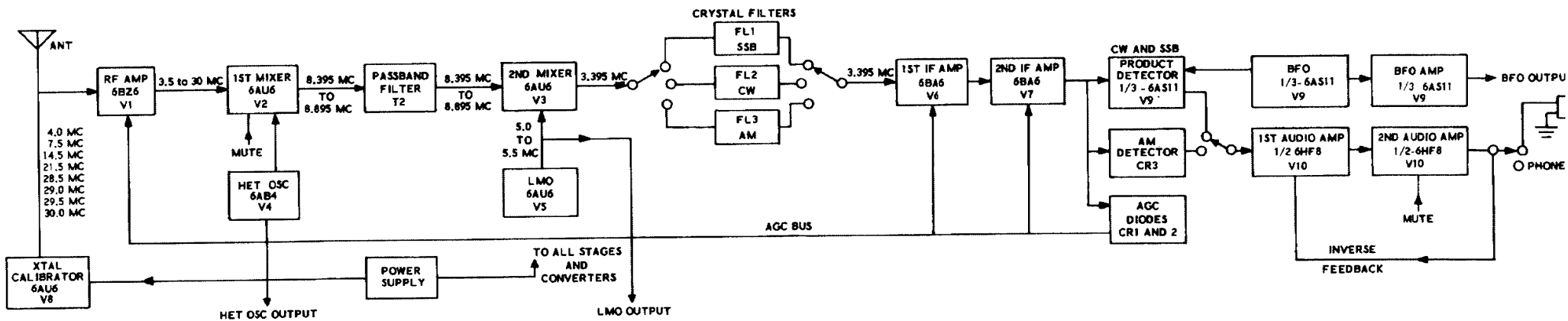
- () Red-yellow the eyelet in lug 2 of terminal strip J (S-1).
- () Short yellow lug 3 of terminal strip J (NS).
- () Long yellow do not connect at this time.
- () Either red lug 6 of terminal strip K (NS).
- () Other red lug 5 of terminal strip K (NS).
- () Short black lug 4 of terminal strip K (S-1).
- () Other black lug 2 of terminal strip K (S-1).
- () Connect a 4-3/4" white wire from lug 8 of terminal strip K (NS) to point J on the IF circuit board (S-1).
- () Connect a 2-3/8" yellow wire between lugs 7 (NS) and 1 (NS) of terminal strip K.
- () Connect a 4-1/2" yellow wire from lug 9 of terminal strip J (NS) to point F on the IF circuit board (S-1).
- () Connect a 3-3/8" yellow wire from lug 9 of terminal strip J (NS) to point R on the RF circuit board (S-1).
- () Connect one end of a 7-1/2" yellow wire to lug 4 of terminal strip J (NS). Route this wire as shown in Pictorial 8. The other end will be connected later.
- () Connect a 3-1/2" brown wire from lug 3 of terminal strip J (S-2) to lug 1 of tube socket V9 (NS).

- () Connect a 2-1/4" brown wire from lug 1 of tube socket V9 (S-2) to point S on the RF circuit board (S-1).
- () Connect a 4-1/4" brown wire between points T (S-1) and X (S-1) on the RF circuit board.
- () Connect a 3-1/2" brown wire between points W (S-1) and C (S-1) on the RF circuit board.
- () Connect a 6-3/4" brown wire between points D (S-1) and O (S-1) on the RF circuit board.
- () Connect the free end of the resistor lead extending from the RF circuit board near banana jack A to A (S-1).
- () Connect a 3-1/2" red wire from lug 1 of electrolytic capacitor H (NS) to lug 3 of terminal strip D (NS).
- () Connect one end of an 8" red wire to lug 1 of terminal strip D (NS). Place the other end of this wire through hole B in the RF circuit board. It will be connected later.
- () Connect a 1-1/2" red wire from lug 1 of electrolytic capacitor H (NS) to lug 6 of terminal strip J (NS).
- () Connect a 1-3/4" red wire from lug 2 of electrolytic capacitor H (NS) to point Q on the RF circuit board (S-1).
- () Connect a 3-1/2" red wire from lug 5 of terminal strip F (NS) to point P on the IF circuit board (S-1).
- () Connect an 8" red wire from lug 2 of electrolytic capacitor H (NS) to point P on the IF circuit board (S-1).
- () Connect a 4-3/4" red wire from lug 2 of electrolytic capacitor H (NS) to point G on the IF circuit board (S-1).
- () Connect a 4-1/2" red wire from lug 2 of electrolytic capacitor H (NS) to lug 1 of terminal strip F (NS).
- () Connect a 4" red wire from lug 2 of electrolytic capacitor H (NS) to lug 3 of terminal strip E (NS).
- () Connect a 4" green wire from lug 6 of tube socket V9 (NS) to point E on the IF circuit board (S-1).
- () Connect one end of a 3-1/2" green wire to point B on the IF circuit board (S-1). Place the free end of this wire through grommet HB, it will be connected later.
- () Connect a 5-1/2" white wire from lug 1 of control L (S-1) to point D on the IF circuit board (S-1).
- () Place one end of a 2" bare wire through lug 3 (S-2) to lug 2 (S-1) of control L. Connect the other end of this bare wire to the eyelet in lug 2 of terminal strip M (S-2).
- () Connect a 1" brown jumper wire from point R (S-1) to point S (S-1) on the IF circuit board.

BACK PANEL

- () Place one end of a 2" bare wire through lug 7 (S-2) to lug 2 (S-1) of socket BB. Connect the other end of this wire to lug 2 of phono socket BC (S-2).
- () Connect a .005 μ fd disc capacitor from lug 2 of AC socket BG (S-2) to solder lug BF (S-1).
- () Connect a .005 μ fd disc capacitor from lug 1 of AC socket BG (NS) to solder lug BH (S-2).
- () Connect a 1-1/8" bare wire from lug 1 of AC socket BG (S-2) to lug 1 of fuseholder B (S-1).
- () Connect a 1/2" bare wire from lug 1 of phono socket BP (S-1) to lug 8 of switch CS (S-1).
- () Connect a 1-1/4" bare wire from lug 1 of phono socket BN (S-1) to lug 9 of switch CS (S-1).
- () Connect a 1-1/2" bare wire from lug 1 of phono socket BS (S-1) to lug 10 of switch CS (S-1).

BLOCK DIAGRAM



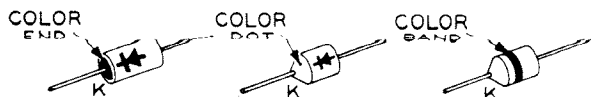
COMPONENT INSTALLATION

Refer to Pictorial 9 for the following steps:

- () Connect a 330 Ω (orange-orange-brown) 2 watt resistor between lugs 2 (S-6) and 3 (NS) of electrolytic capacitor H. Apply enough heat and solder to obtain a good solder connection.
- () Connect a 100 Ω (brown-black-brown) 2 watt resistor between lugs 3 (NS) and 1 (S-3) of electrolytic capacitor H.
- () Connect a 3300 Ω (orange-orange-red) 1 watt resistor from lug 5 of terminal strip J (NS) to lug 6 of terminal strip K (NS).
- () Connect a 12 K Ω (brown-red-orange) 1/2 watt resistor from lug 1 of terminal strip J (NS) to lug 7 of terminal strip K (NS).

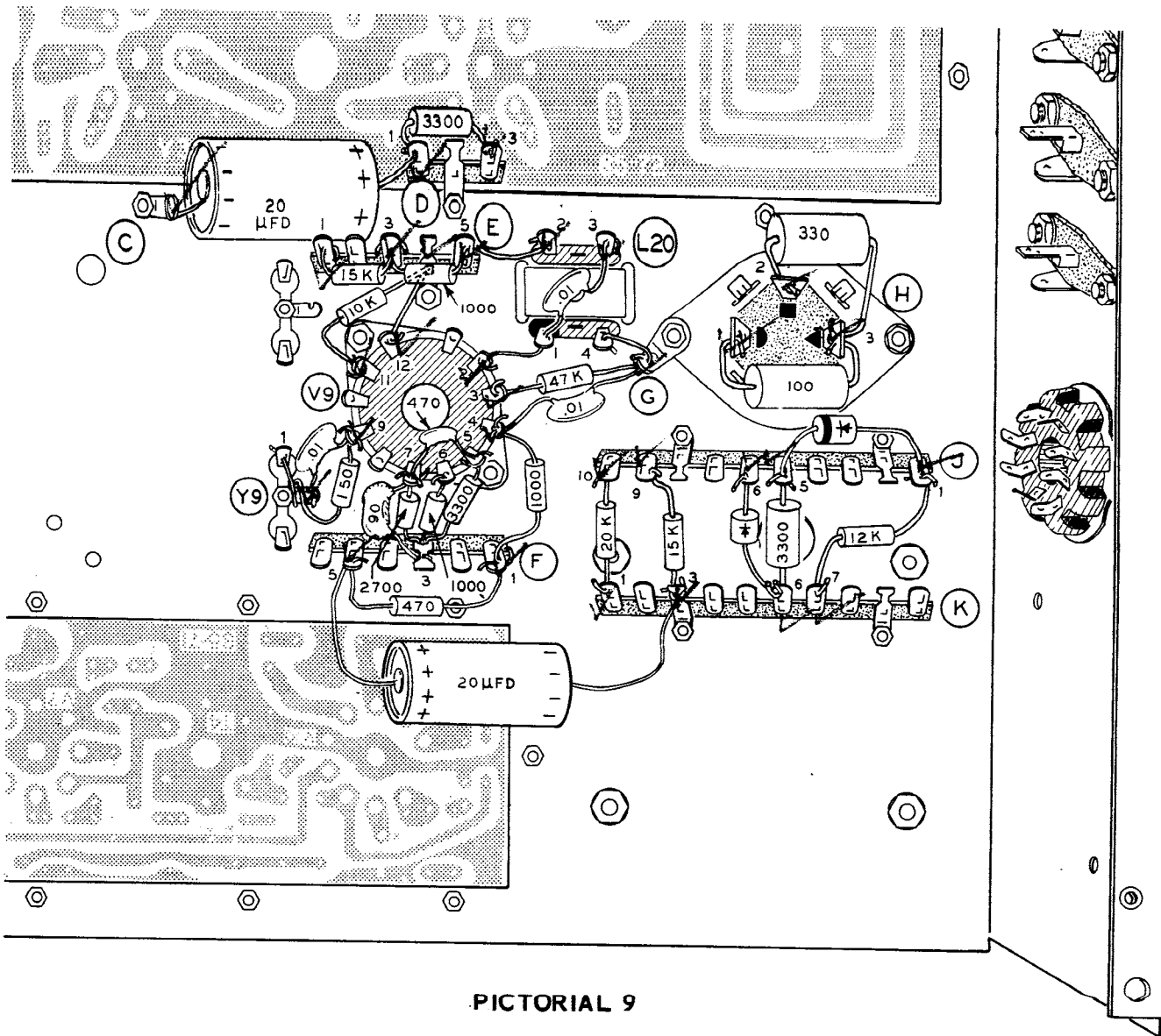
NOTE: Refer to Detail 9A in the following steps to determine the proper polarity of the silicon diodes. Be sure the diodes are installed as specified to prevent damage to them and related components.

NOTE: WHEN INSTALLING SILICON DIODES, THE CATHODE END SHOULD BE PLACED AS DIRECTED. THE CATHODE END IS MARKED WITH EITHER A COLOR END, COLOR DOT OR COLOR BAND. IN THE ILLUSTRATION, THE SYMBOL K INDICATES THE CATHODE END.



Detail 9A

- () Connect the cathode (K) lead of a silicon diode to lug 5 (NS) and the other lead to lug 1 (NS) of terminal strip J.
- () Connect the cathode (K) lead of a silicon diode to lug 6 of terminal strip J (NS) and the other lead to lug 6 of terminal strip K (S-3).
- () Connect a 15 K Ω (brown-green-orange) 1/2 watt resistor from lug 9 of terminal strip J (S-4) to lug 3 of terminal strip K (NS).
- () Connect a 20 K Ω (red-black-orange) 1/2 watt resistor from lug 10 of terminal strip J (S-1) to lug 1 of terminal strip K (S-2).
- () Place one lead of a .01 μ f disc capacitor through solder lug G (NS) to lug 4 of BFO coil L20 (S-2). Connect the other lead to lug 4 of tube socket V9 (NS).
- () Connect a 47 K Ω (yellow-violet-orange) 1/2 watt resistor from lug 3 of tube socket V9 (NS) to solder lug G (S-3).
- () Connect a 2700 Ω (red-violet-red) 1/2 watt resistor from lug 7 of tube socket V9 (NS) to the eyelet in lug 3 of terminal strip F (NS).
- () Connect a 1000 Ω (brown-black-red) 1/2 watt resistor from lug 6 of tube socket V9 (S-2) to the eyelet in lug 3 of terminal strip F (NS).
- () Connect a 3300 Ω (orange-orange-red) 1/2 watt resistor from lug 5 of tube socket V9 (NS) to the eyelet in lug 3 of terminal strip F (S-3).
- () Connect a 470 μ f disc capacitor between lugs 5 (S-2) and 7 (NS) of tube socket V9.
- () Connect a 1000 Ω (brown-black-red) 1/2 watt resistor from lug 4 of tube socket V9 (S-2) to lug 1 of terminal strip F (S-3).
- () Connect a 470 Ω (yellow-violet-brown) 1/2 watt resistor between lugs 1 (S-3) and 3 (NS) of terminal strip F.
- () Connect the positive (+) lead of a 20 μ f electrolytic capacitor to lug 5 of terminal strip F (NS). Connect the other lead to lug 3 of terminal strip K (S-2).
- () Connect a 90 μ f mica capacitor from lug 7 of tube socket V9 (NS) to lug 3 of terminal strip F (NS).
- () Connect a .01 μ f disc capacitor from lug 9 of tube socket V9 (NS) to the solder lug on crystal socket Y9 (NS).
- () Connect one lead of a 150 Ω (brown-green-brown) 1/2 watt resistor to lug 9 of tube socket V9 (S-2). Wrap the other lead around the solder lug mounted on crystal socket Y9 (NS) and connect it to lug 1 of Y9 (S-1).



PICTORIAL 9

- () Connect a 10 KΩ (brown-black-orange) 1/2 watt resistor from lug 11 of tube socket V9 (NS) to the eyelet in lug 4 of terminal strip E (NS).
- () Connect a 1" bare wire from lug 12 of tube socket V9 (S-1) to the eyelet in lug 4 of terminal strip E (S-2).
- () Connect a 15 KΩ (brown-green-orange) 1/2 watt resistor between lugs 1 (NS) and 3 (NS) of terminal strip E.
- () Place one lead of a 1000 Ω (brown-black-red) 1/2 watt resistor through lug 5 of terminal strip E (S-2) to lug 2 of BFO coil L20 (NS). Connect the other lead to lug 3 of terminal strip E (NS).
- () Place one lead of a .01 μfd disc capacitor through lug 1 of BFO coil L20 (S-2) to lug 2 of tube socket V9 (S-1). Connect the other lead of this capacitor to lug 3 of L20 (S-2).
- () Connect a 3300 Ω (orange-orange-red) 1/2 watt resistor between lugs 1 (NS) and 3 (S-2) of terminal strip D.
- () Connect the positive (+) lead of a 20 μfd electrolytic capacitor to lug 1 of terminal strip D (S-3) and the other lead to solder lug C (S-1).

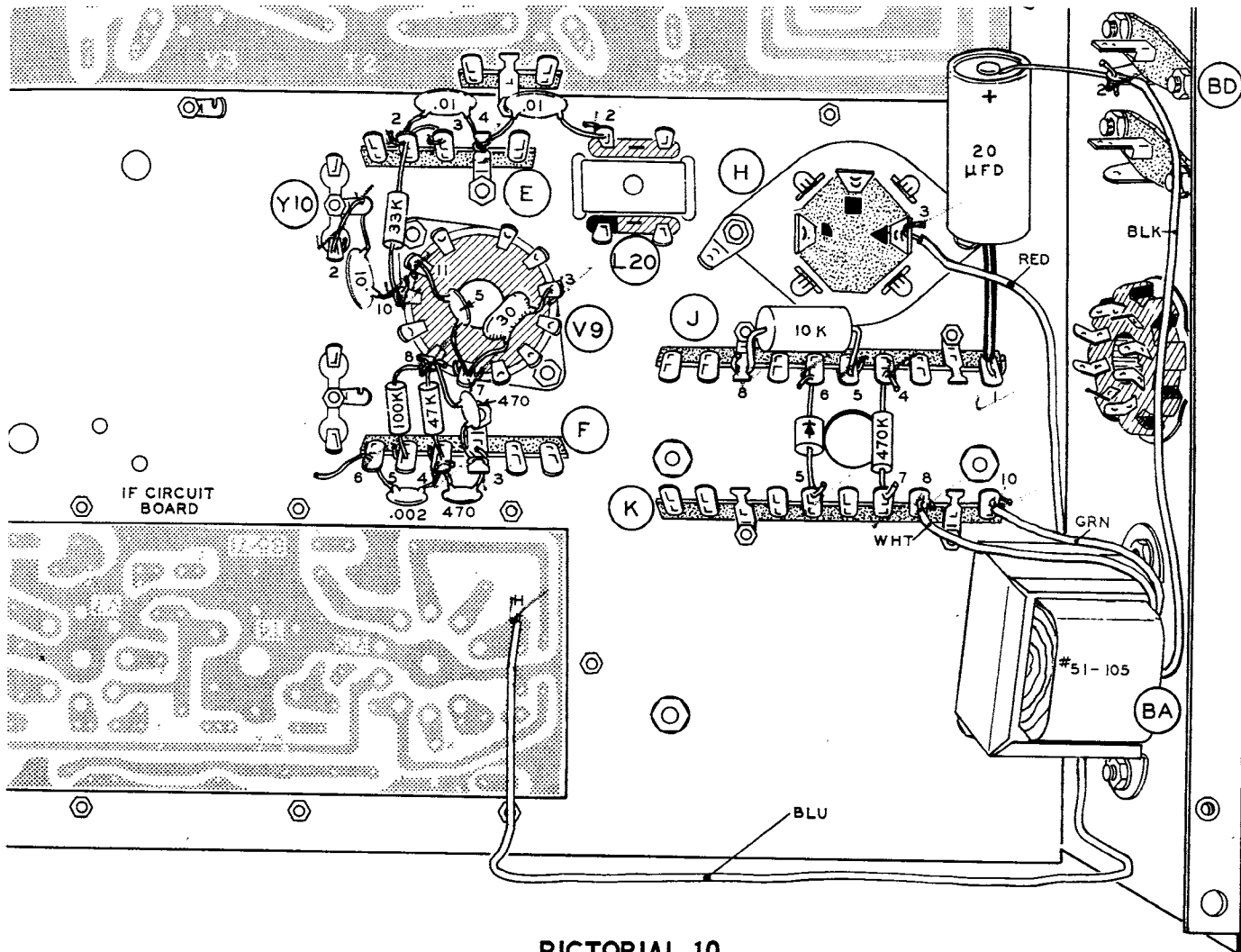


Refer to Pictorial 10 for the following steps.

- () Connect a 470 K Ω (yellow-violet-yellow) 1/2 watt resistor from lug 4 of terminal strip J (S-2) to lug 7 of terminal strip K (S-3).
- () Connect the cathode (K) lead of a silicon diode to lug 6 of terminal strip J (S-3) and the other lead to lug 5 of terminal strip K (S-2).
- () Connect a 10 K Ω (brown-black-orange) $\frac{2}{2}$ watt resistor between lugs 5 (S-3) and 8 (NS) of terminal strip J.
- () Connect a 100 K Ω (brown-black-yellow) 1/2 watt resistor from lug 5 of terminal strip F (S-4) to lug 8 of tube socket V9 (NS).
- () Connect a 47 K Ω (yellow-violet-orange) 1/2 watt resistor from lug 8 of tube socket V9 (NS) to lug 4 of terminal strip F (NS).
- () Connect a 470 $\mu\mu\text{f}$ disc capacitor from lug 8 of tube socket V9 (S-3) to lug 3 of terminal strip F (NS).
- () Place one lead of a .002 μf disc capacitor through lug 6 of terminal strip F (S-2). Leave the end of this lead free, as it will be connected later. Connect the other lead of this capacitor to lug 4 of F (NS).
- () Connect a 470 $\mu\mu\text{f}$ disc capacitor between lugs 4 (S-3) and 3 (S-3) of terminal strip F.
- () Connect a 30 μf mica capacitor between lugs 3 (NS) and 7 (NS) of tube socket V9.
- () Connect a 5 $\mu\mu\text{f}$ disc capacitor between lugs 7 (S-5) and 11 (S-2) of tube socket V9.
- () Connect one lead of a .01 μf disc capacitor to lug 10 of tube socket V9 (NS). Connect the other lead around the solder lug on crystal socket Y10 (S-2) to lug 2 of Y10 (S-1).
- () Connect one lead of a 33 K Ω (orange-orange-orange) 1/2 watt resistor to lug 10 of tube socket V9 (S-2). Connect the other lead through lug 2 (NS) to lug 3 (S-4) of terminal strip E.
- () Connect a .01 μf disc capacitor between lugs 2 (S-3) and 4 (NS) of terminal strip E.
- () Connect a .01 μf disc capacitor from lug 4 of terminal strip E (S-2) to lug 2 of BFO coil L20 (S-2).

Cut the audio output transformer (#51-105) leads to the following lengths. Measure the length from the point where the leads leave the transformer.

<u>LEAD COLOR</u>	<u>LEAD LENGTH</u>
() Blue	6-3/4"
() Black	4-1/2"
() Red	3"
() Green	3"
() White	2-1/4"
() Remove 1/4" of insulation from the end of each lead of the audio output transformer. Melt a small amount of solder on the exposed lead ends to hold the wire strands together.	

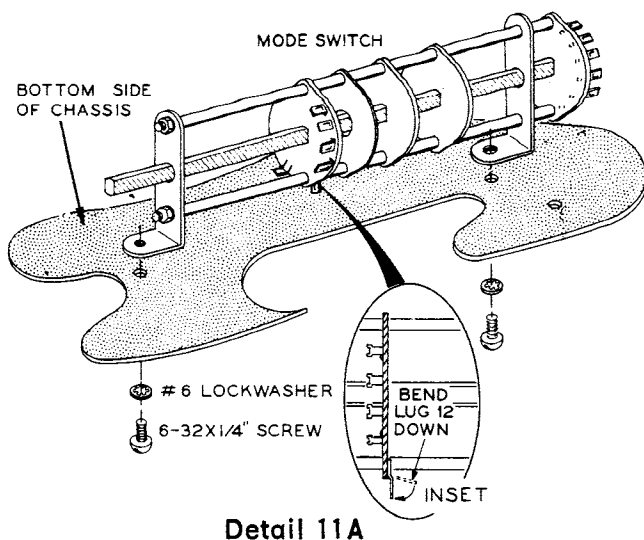


PICTORIAL 10

() Connect the audio output transformer leads as follows:

LEAD COLOR	CONNECT TO
() Red	lug 3 of electrolytic capacitor H (S-3).
() Black	lug 2 of phono socket BD (NS).
() Green	lug 10 of terminal strip K (S-1).
() White	lug 8 of terminal strip K (S-2).

- () Mount the audio output transformer at BA on the back apron of the chassis. Use 6-32 x 1/4" hardware. Position the transformer so that the leads are as shown in Pictorial 10.
- () Connect the blue lead of the audio output transformer to point H on the IF circuit board (S-1). Route this lead along the cable harness.
- () Connect the positive (+) lead of a 20 μ fd electrolytic capacitor to lug 2 of phono socket BD (NS). Connect the other lead to lug 1 of terminal strip J (S-3). Use a 3/4" length of sleeving on the lead to J.



Detail 11A

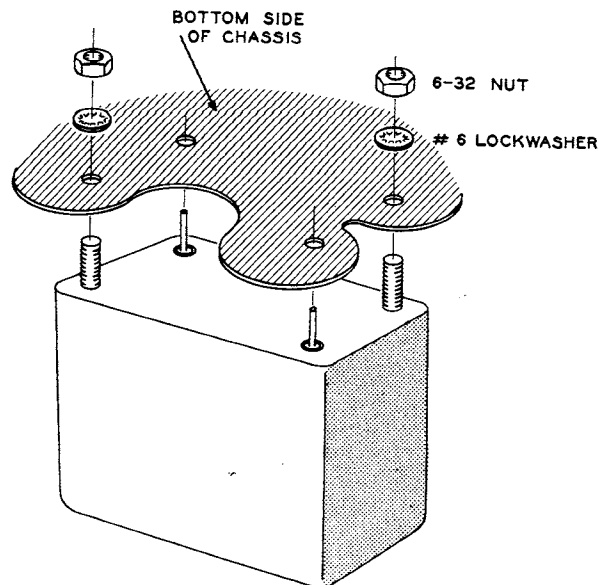
MODE SWITCH AND CRYSTAL FILTER WIRING

Refer to Pictorial 11 (fold-out from Page 28) for the following steps.

NOTE: The shaft of the Mode switch is removable and turns easily. It has been taped in the fully counterclockwise position and should not be turned.

- () Mount the Mode switch (#63-333) at MS with 6-32 x 1/4" screws and #6 lockwashers. Refer to Detail 11A.
- () Bend lug 12, on the rear of the first wafer of the Mode switch, straight down, as shown in the inset drawing on Detail 11A.

NOTE: Three different crystal filters are available for this Receiver: a 2.1 kc SSB filter, a 400 cps CW filter, and a 3.75 kc AM filter. The SSB filter is supplied with the kit and the other two filters are available as accessories. The mounting and wiring for all three filters is shown in Pictorial 11. The mounting and wiring steps for each of these filters are given separately in the following steps. Follow the steps that apply to the filter (or filters) to be installed. Be sure to position the filter (or filters) as shown in the Pictorial. Necessary hardware and wire for the accessory filters is supplied with this kit and should be held for future use if the filters are not installed at this time. Since all filter input and output circuits are symmetrical, polarity is not important.



Detail 11B

The following steps concern wiring of the Mode switch. In each step the direction will read as in the following example: Connect a 1-3/4" bare wire from MS2-2 (S-1) to lug 1 of filter FL-1 (S-1). This would mean to connect a 1-3/4" bare wire from the Mode switch (MS), second wafer (2), lug 2 (2) to lug 1 of filter FL-1. See the inset drawing on Pictorial 11 to identify switch lug numbers. This system will be used throughout the rest of the manual whenever a connection is made to the Mode switch.

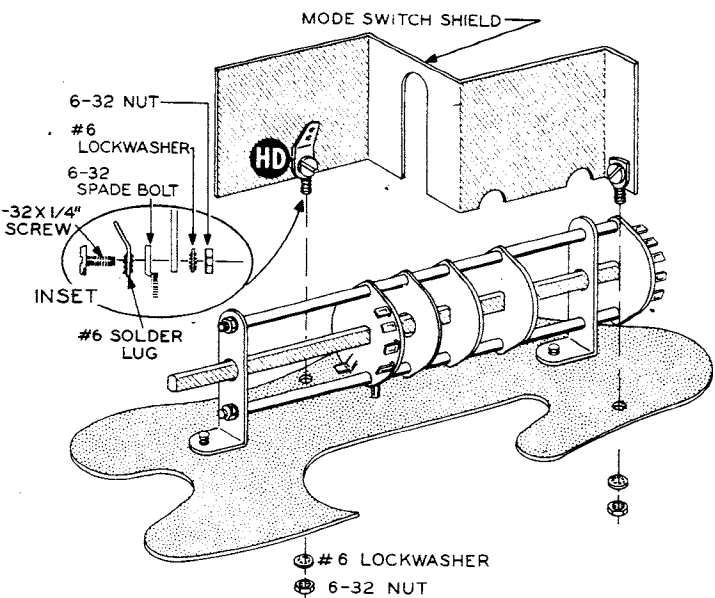
2.1 KC SSB FILTER (#404-200)

- () Mount the SSB Filter at location FL-1. Use #6 lockwashers and 6-32 nuts. See Detail 11B.
- () Connect a 1-3/4" bare wire from lug 1 of filter FL-1 (S-1) through MS2-2 (S-2) to MS2-3 (S-1).
- () Connect a 1-3/4" bare wire from lug 2 of filter FL-1 (S-1) through MS1-9 (S-2) to MS1-8 (S-1).

3.75 KC AM FILTER (#404-201 or 404-M201P22)

- () Mount the AM filter at location FL-3. Use #6 lockwashers and 6-32 nuts. See Detail 11B.

- () Connect a 2-1/4" bare wire from lug 1 of filter FL-3 (S-1) to MS2-5 (S-1).
- () Connect a 2" bare wire from lug 2 of filter FL-3 (S-1) to MS1-11 (S-1). Use a 1-1/2" length of sleeving.



Detail 11C

- () Refer to Detail 11C and install two 6-32 spade bolts on the Mode switch shield. Use 6-32 x 1/4" hardware with a #6 solder lug at HD. Position the offset of the spade bolts as shown in the inset drawing.
- () Install the Mode switch shield on the chassis as shown in Detail 11C. Secure it with #6 lockwashers and 6-32 nuts.

400 CPS CW FILTER (#404-202 or 404-M202P23)

- () Mount the CW Filter at location FL-2. Use #6 lockwashers and 6-32 nuts. See Detail 11B.
- () Connect a 3" bare wire from lug 1 of filter FL-2 (S-1) to MS2-4 (S-1).
- () Connect a 2-1/2" bare wire from lug 2 of filter FL-2 (S-1) to MS1-10 (S-1).

FINAL MODE SWITCH WIRING

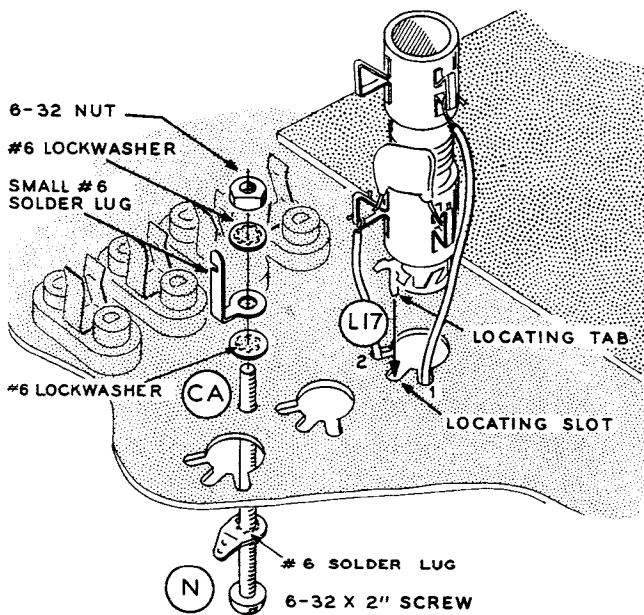
Refer to Pictorial 11 for the following steps.

- () Connect a 2-3/4" bare wire from MS1-12 (S-1) to point C on the IF circuit board (S-1). Use a 2" length of sleeving.
- () Connect a 1" bare wire from MS1-1 (S-1) to solder lug HD (S-1).
- () Connect a 3" bare wire from MS2-1 (S-1) to point Y on the RF circuit board (S-1). Use a 2-1/2" length of sleeving.
- () Connect a 4" red wire from MS3-2 (S-1) to lug 1 of terminal strip E (S-2).
- () Connect the free end of the yellow wire coming from lug 4 of terminal strip J to MS3-3 (NS).
- () Place a length of bare wire through MS3-3 (S-2), over MS3-4 (S-2) to MS3-5 (S-1).
- () Connect one end of a 5-1/2" yellow wire to MS3-6 (S-1). Place the other end through hole E in the RF circuit board. It will be connected later.
- () Connect a 1-1/2" bare wire from MS4-1 (S-1) to lug 2 of crystal socket Y9 (S-1). Use a 1" length of sleeving.
- () Place one end of a 1-1/2" bare wire through MS4-2 (S-2) to MS4-3 (S-1). Connect the other end of this wire to lug 1 of crystal socket Y10 (S-1). Use a 5/8" length of sleeving.
- () Connect a 2-1/2" green wire from MS4-5 (S-1) to lug 3 of tube socket V9 (S-3).
- () Place a length of bare wire through MS4-7 (S-1) and over MS4-8 (S-2) to MS4-9 (NS).
- () Connect the free end of the capacitor lead extending from lug 6 of terminal strip F to MS4-9 (S-2).
- () Connect the shield of the black with white stripe shielded cable coming from breakout #3 of the harness, to the solder lug on crystal socket Y9 (S-4). Connect the inner conductor of this cable to MS4-11 (S-1).
- () Connect a 2-1/2" bare wire from MS4-10 (S-1) to point T on the IF circuit board (S-1). Use a 2-1/8" length of sleeving.

COIL WIRING

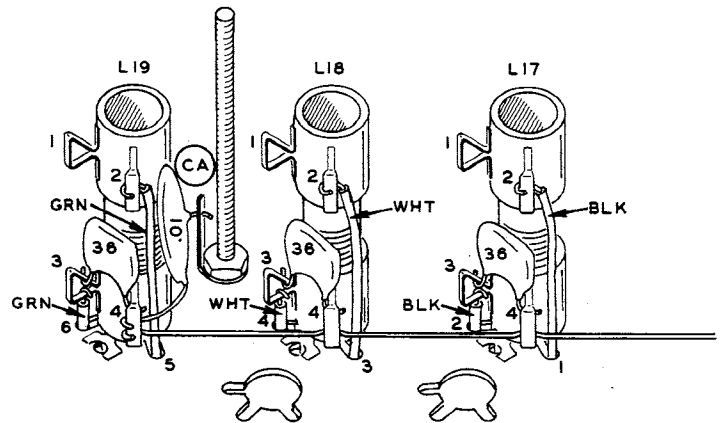
Refer to Pictorial 12 for the following steps.

- () Install a 6-32 x 2" screw and a #6 solder lug at location N on the bottom of the chassis and a small #6 solder lug at CA on top of the chassis. Use #6 lockwashers and a 6-32 nut as shown in Detail 12A.
- () Refer to Detail 12B and connect a 36 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-535 coil.



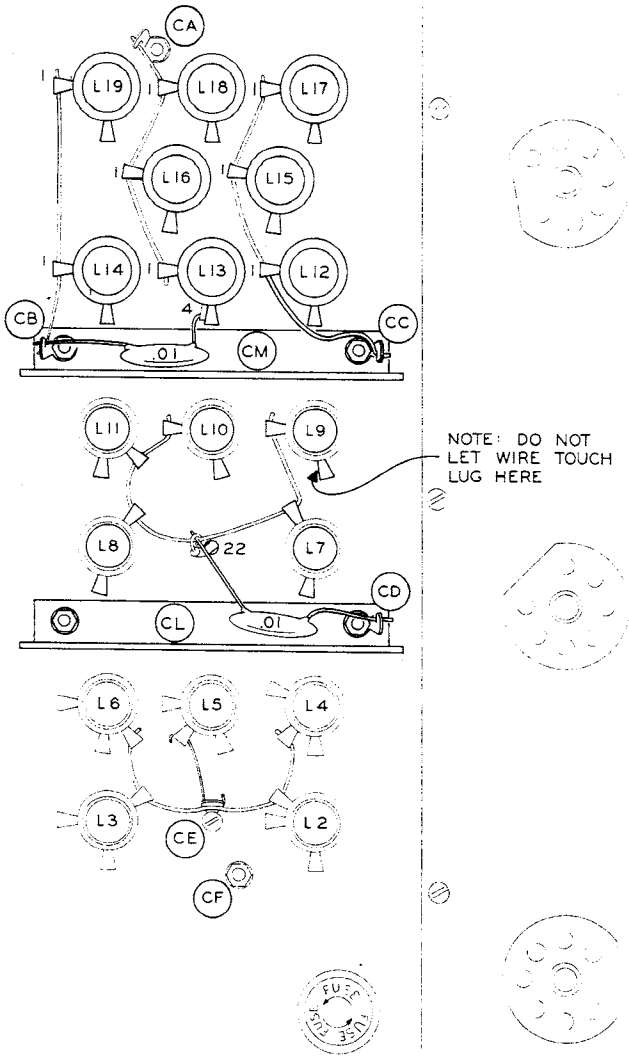
Detail 12A

- () Connect one end of a 2-1/8" black wire to lug 3 of this coil (S-2).
- () Connect one end of a 3-1/2" black wire to lug 2 of this coil (S-1).
- () Mount this coil at L17 on top of the chassis as shown in Detail 12A. Be sure to place the locating tab in the index slot as shown. Place the black wire from lug 3 through slot 2 and the black wire from lug 2 through slot 1.



Detail 12B

- () Connect a 36 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-535 coil.
- () Connect one end of a 2" white wire to lug 3 of this coil (S-2).
- () Connect one end of a 3-3/8" white wire to lug 2 of this coil (S-1).
- () Mount this coil at L18. Place the white wire from lug 3 through slot 4 and the white wire from lug 2 through slot 3.
- () Connect a 36 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-535 coil.
- () Connect one end of a 2-1/4" green wire to lug 3 of this coil (S-2).
- () Connect one end of a 3-1/2" green wire to lug 2 of this coil (S-1).
- () Cut either lead of a .01 μfd disc capacitor to 3/8". Connect this lead to lug 4 of this coil (NS).
- () Mount this coil at L19. Place the green wire from lug 3 through slot 6 and the green wire from lug 2 through slot 5. Position the .01 μfd disc capacitor between coils L18 and L19 as shown in Detail 12B.
- () Connect the free lead of the .01 μfd disc capacitor from lug 4 of coil L19 to solder lug CA (NS).

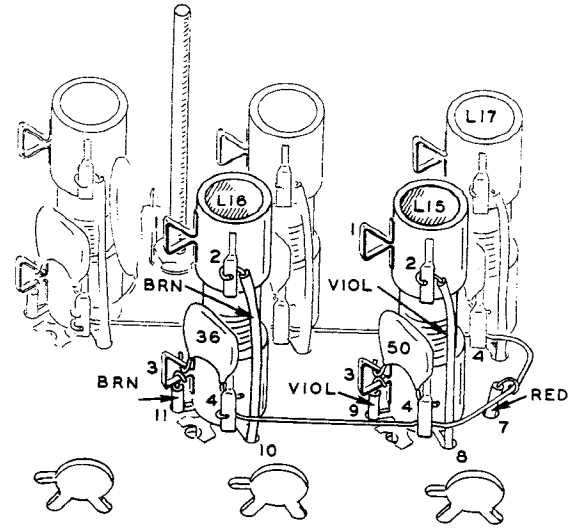


PICTORIAL 12

- () Place one end of a 3-1/4" bare wire through lug 4 of coils L17, L18, and L19. Solder each lug. Leave the other end of this bare wire straight out from lug 4 of coil L17.

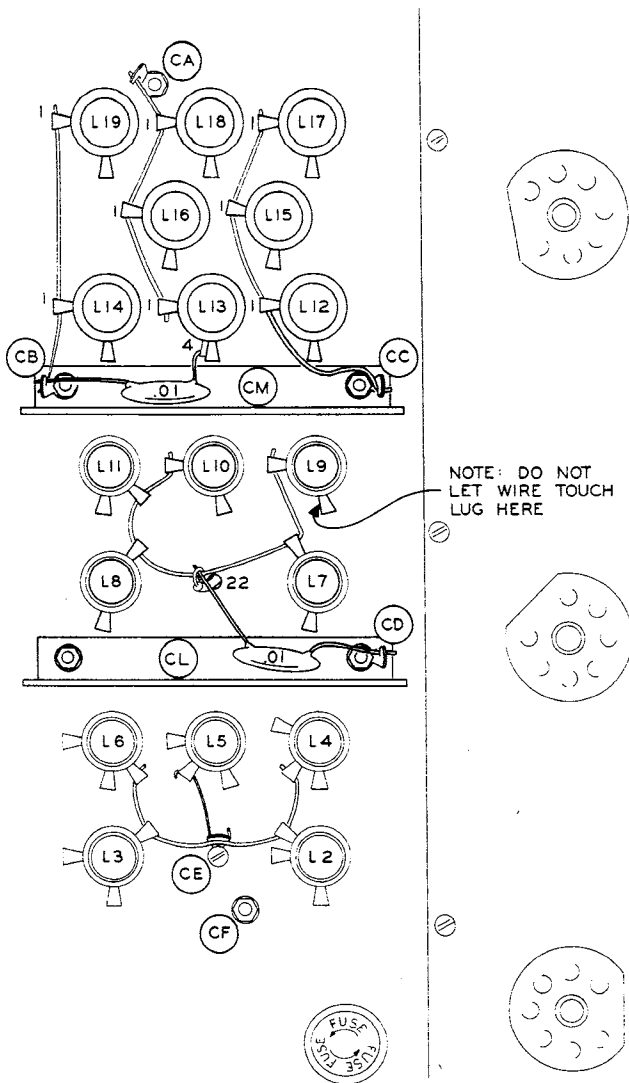
Refer to Detail 12C and Pictorial 12 for the following steps.

- () Connect a 50 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-534 coil.
- () Connect one end of a 1" violet wire to lug 3 of this coil (S-2).

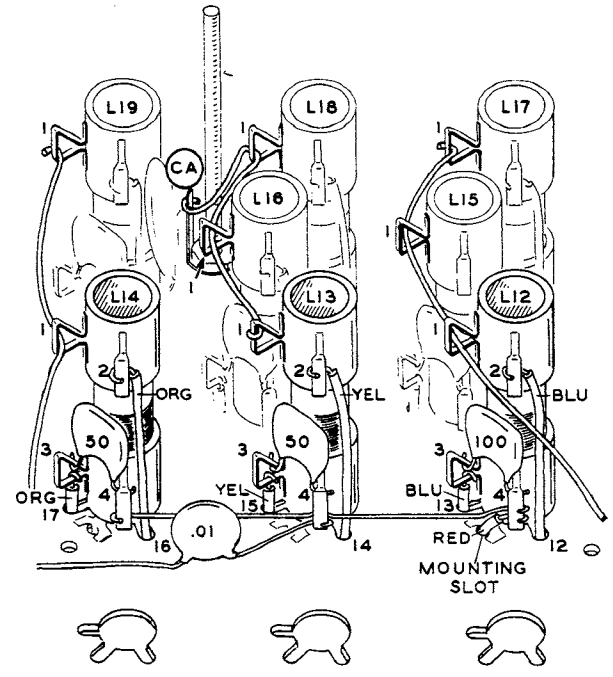


Detail 12C

- () Connect one end of a 3-3/4" violet wire to lug 2 of this coil (S-1).
- () Mount this coil at L15. Place the violet wire from lug 3 through slot 9 and the violet wire from lug 2 through slot 8.
- () Connect a 36 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of the remaining #40-535 coil.
- () Connect one end of a 1" brown wire to lug 3 of this coil (S-2).
- () Connect one end of a 4" brown wire to lug 2 of this coil (S-1).
- () Mount this coil at L16. Place the brown wire from lug 3 through slot 11 and the brown wire from lug 2 through slot 10.
- () Bend the free end of the bare wire extending from lug 4 of coil L17 into a U shape and place the free end through lug 4 of coils L15 (S-3) and L16 (S-2).
- () Form a hook on one end of a 2" red wire. Place the hook over the bare wire coming from coil L17 and coil L15 (S-1). Place the free end of this wire through hole 7.



PICTORIAL 12



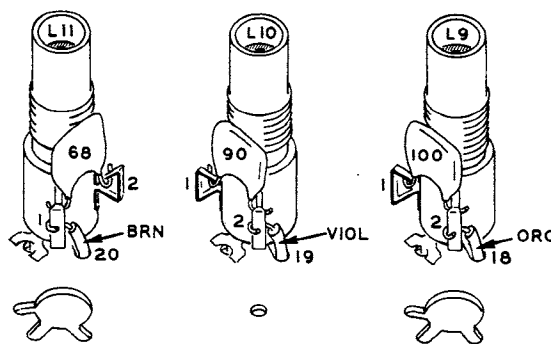
Detail 12D

Refer to Detail 12D and Pictorial 12 for the following steps.

- () Connect a 100 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-531 coil.
- () Connect one end of a 2-1/4" blue wire to lug 3 of this coil (S-2).

- () Connect one end of a 2-1/4" red wire to lug 4 of this coil (NS).
- () Connect one end of a 3-3/4" blue wire to lug 2 of this coil (S-1).
- () Mount this coil at L12. Place the blue wire from lug 3 through slot 13 and the red wire from lug 4 through the mounting slot. Bend the coil mounting tab slightly to freely pass the red wire. Place the blue wire from lug 2 through slot 12.
- () Connect a 50 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-532 coil.
- () Connect one end of a 2-1/4" yellow wire to lug 3 of this coil (S-2).
- () Connect one end of a 3-3/4" yellow wire to lug 2 of this coil (S-1).

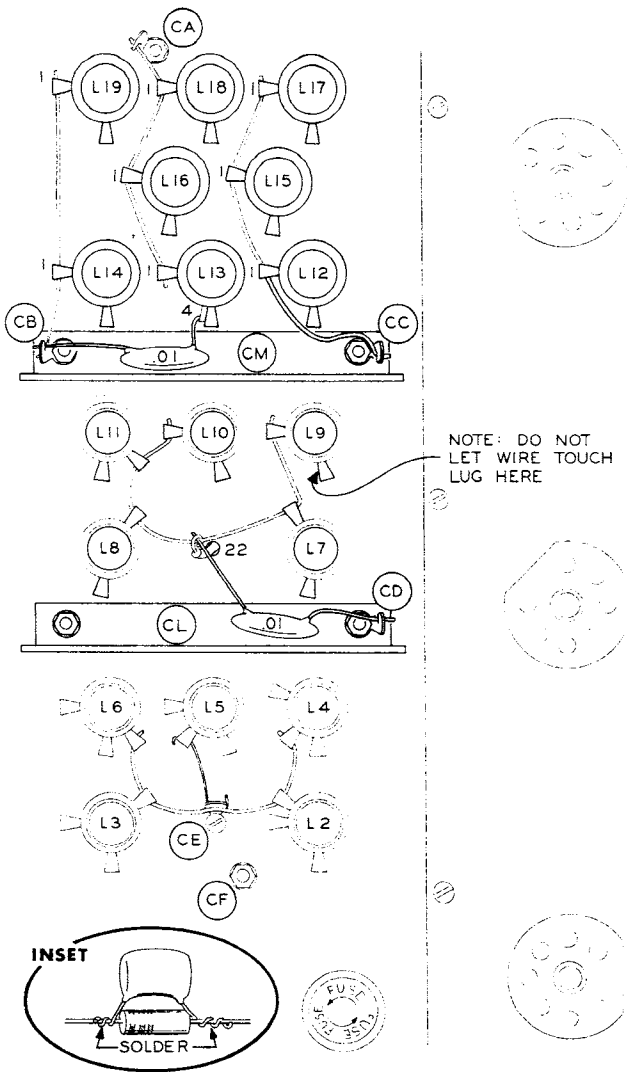
- () Mount this coil at L13. Place the yellow wire from lug 3 through slot 15 and the yellow wire from lug 2 through slot 14.
- () Connect a 50 $\mu\mu\text{f}$ mica capacitor between lugs 3 (NS) and 4 (NS) of a #40-533 coil.
- () Connect one end of a 2-1/4" orange wire to lug 3 of this coil (S-2).
- () Connect one end of a 3-3/4" orange wire to lug 2 of this coil (S-1).
- () Mount this coil at L14. Place the orange wire from lug 3 through slot 17 and the orange wire from lug 2 through slot 16.
- () Place one end of a 1-1/2" bare wire through lug 4 of coil L12 (S-3) through lug 4 of coil L13 (NS) to lug 4 of coil L14 (S-2).
- () Cut either lead of a .01 μfd disc capacitor to 3/8". Connect this lead to lug 4 of coil L13 (S-4). Position this capacitor as shown in Pictorial 12. The other lead will be connected later.
- () Place one end of a 2-1/2" bare wire through lug 1 of coil L12 (S-2), through lug 1 of coil L15 (S-2), to lug 1 of coil L17 (S-1). Leave the other end free. It will be connected later.
- () Place one end of a 2-1/2" bare wire through lug 1 of coil L13 (S-1), through lug 1 of coil L16 (S-2), through lug 1 of coil L18 (S-2), to solder lug CA (S-2).
- () Place one end of a 2-1/4" bare wire through lug 1 of coil L14 (S-2) to lug 1 of coil L19 (S-1). Leave the other end free. It will be connected later.



Detail 12E

Refer to Detail 12E and Pictorial 12 for the following steps.

- () Connect a 100 $\mu\mu\text{f}$ mica capacitor between lugs 1 (NS) and 2 (NS) of a #40-528 coil.
- () Connect one end of a 1-1/4" orange wire to lug 2 of this coil (S-2).
- () Mount this coil at L9. Place the orange wire from lug 2 through slot 18.
- () Connect a 90 $\mu\mu\text{f}$ mica capacitor between lugs 1 (NS) and 2 (NS) of a #40-529 coil.
- () Connect one end of a 1" violet wire to lug 2 of this coil (S-2).
- () Mount this coil at L10. Place the violet wire from lug 2 through slot 19.
- () Connect a 68 $\mu\mu\text{f}$ mica capacitor between lugs 1 (NS) and 2 (NS) of a #40-530 coil.
- () Connect one end of a 1-1/4" brown wire to lug 1 of this coil (S-2).
- () Mount this coil at L11. Place the free end of the brown wire from lug 1 through slot 20.

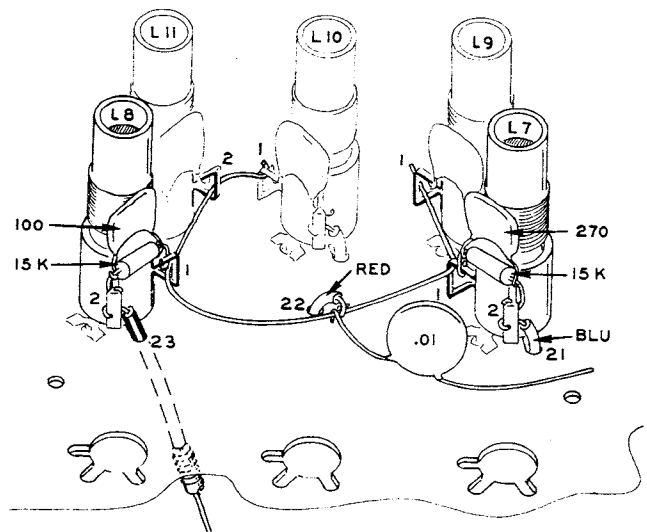


PICTORIAL 12

Refer to Detail 12F and Pictorial 12 for the following steps.

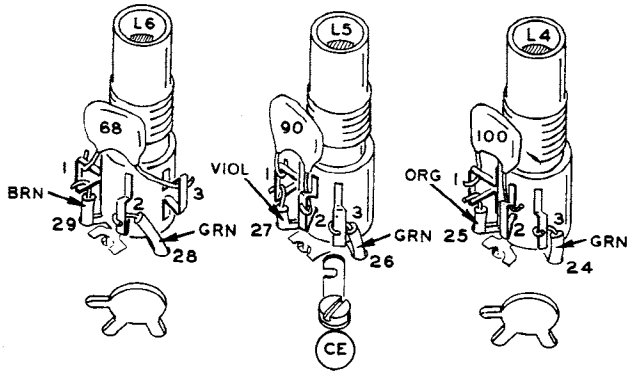
Referring to the inset drawing on Pictorial 12, prepare the following resistor-capacitor combinations:

- () 100 $\mu\mu\text{f}$ mica capacitor and 15 K Ω (brown-green-orange) 1/2 watt resistor.
- () 100 $\mu\mu\text{f}$ mica capacitor and 15 K Ω (brown-green-orange) 1/2 watt resistor.
- () 270 $\mu\mu\text{f}$ mica capacitor and 15 K Ω (brown-green-orange) 1/2 watt resistor.
- () 270 $\mu\mu\text{f}$ mica capacitor and 15 K Ω (brown-green-orange) 1/2 watt resistor.



Detail 12F

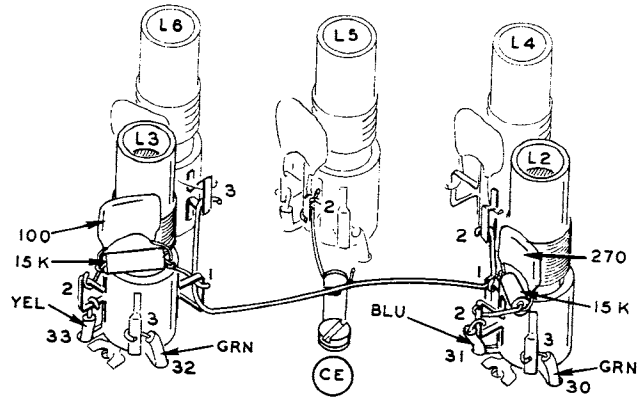
- () Connect a resistor-capacitor combination, 15 K Ω and 270 $\mu\mu\text{f}$, between lugs 1 (NS) and 2 (NS) of a #40-526 coil.
- () Connect one end of a 2-1/8" blue wire to lug 2 of this coil (S-2).
- () Mount this coil at L7. Place the blue wire through slot 21.
- () Connect a resistor-combination, 15 K Ω and 100 $\mu\mu\text{f}$, between lugs 1 (NS) and 2 (NS) of a #40-527 coil.
- () Mount this coil at L8.
- () Locate the parasitic choke (#45-43). Place a 1-3/8" length of sleeving on either lead.
- () Insert the lead with the sleeving through hole 23 from the bottom side of the chassis. Connect the end of this lead to lug 2 of coil L8 (S-2). Make sure the lead does not touch the chassis.
- () Place one end of a 2" bare wire through lug 1 of coil L8 (S-3) through lug 2 of coil L11 (S-3) to lug 1 of coil L10 (S-2).
- () Bend the other end of this wire to form a U shape and place the wire end through lug 1 of coil L7 (S-3) to lug 1 of coil L9 (S-2).
- () Form a hook at one end of a 2-3/4" red wire and connect this wire to the middle of the U shaped bare wire (S-1). See Detail 12F.
- () Place the free end of this red wire through hole 22.
- () Cut one lead of a .01 μfd disc capacitor to 3/8". Form a hook in this lead and connect it to the bare wire next to the red wire connected previously (S-1).



Detail 12G

() Position the capacitor as shown in Pictorial 12. The other lead will be connected later. Refer to Detail 12G and Pictorial 12 for the following steps.

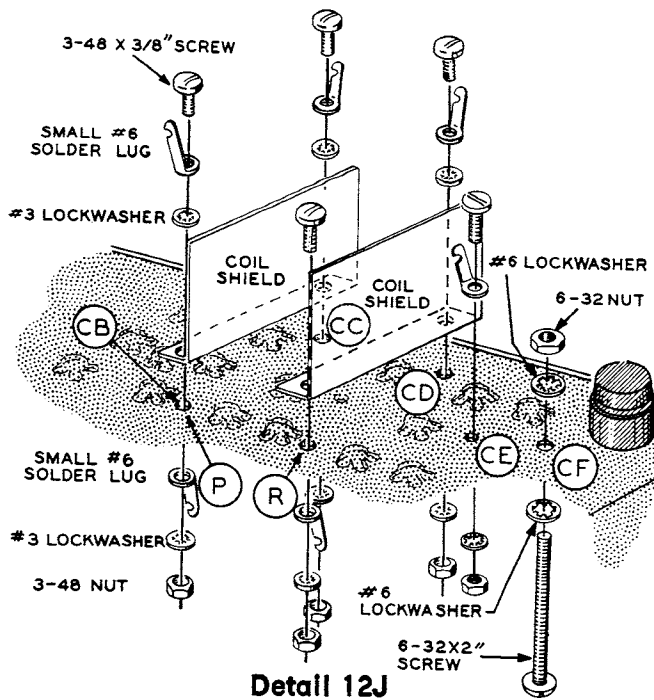
- () Mount a small #6 solder lug at CE on top of the chassis. Use 3-48 x 3/8" hardware with a #3 lockwasher between the solder lug and chassis. Bend the solder lug up at a 90 degree angle as shown.
- () Connect a 100 $\mu\mu\text{f}$ mica capacitor between lugs 1 (NS) and 2 (NS) of a #40-523 coil.
- () Connect one end of a 1-1/8" orange wire to lug 1 of this coil (S-2).
- () Connect one end of a 2-7/8" green wire to lug 3 of this coil (S-1).
- () Mount this coil at L4. Place the orange wire from lug 1 through slot 25 and the green wire from lug 3 through slot 24.
- () Connect a 90 $\mu\mu\text{f}$ mica capacitor between lugs 1 (NS) and 2 (NS) of a #40-524 coil.
- () Connect one end of a 1-1/4" violet wire to lug 1 of this coil (S-2).
- () Connect one end of a 2-3/4" green wire to lug 3 of this coil (S-1).
- () Mount this coil at L5. Place the violet wire through slot 27 and the green wire through slot 26.
- () Connect a 68 $\mu\mu\text{f}$ mica capacitor between lugs 1 (NS) and 3 (NS) of a #40-525 coil.
- () Connect one end of a 1-1/4" brown wire to lug 1 of this coil (S-2).
- () Connect one end of a 2-3/4" green wire to lug 2 of this coil (S-1).



Detail 12H

() Mount this coil at L6. Place the brown wire from lug 1 through slot 29 and the green wire from lug 2 through slot 28. Refer to Detail 12H and Pictorial 12 for the following steps.

- () Connect a resistor-capacitor combination, 15 K Ω and 270 $\mu\mu\text{f}$, between lugs 1 (NS) and 2 (NS) of a #40-521 coil.
- () Connect one end of a 2" blue wire to lug 2 of this coil (S-2).
- () Connect one end of a 2" green wire to lug 3 of this coil (S-1).
- () Mount this coil at L2. Place the blue wire from lug 2 through slot 31 and the green wire from lug 3 through slot 30.
- () Connect a resistor-capacitor combination, 15 K Ω and 100 $\mu\mu\text{f}$, between lugs 1 (NS) and 2 (NS) of a #40-522 coil.
- () Connect one end of a 2-3/4" yellow wire to lug 2 of this coil (S-2).
- () Connect one end of a 1-1/2" green wire to lug 3 of this coil (S-1).
- () Mount this coil at L3. Place the yellow wire from lug 2 through slot 33 and the green wire from lug 3 through slot 32.
- () Connect a 3/4" bare wire from lug 2 of coil L5 (S-2) to solder lug CE (NS).
- () Place one end of a 1-1/4" bare wire through lug 1 of coil L3 (S-3) to lug 3 of L6 (S-2).
- () Bend the other end of this wire into a U shape. Pass it against solder lug CE and place the wire end through lug 1 of coil L2 (S-3) to lug 2 of coil L4 (S-2). Now solder lug CE (S-3).



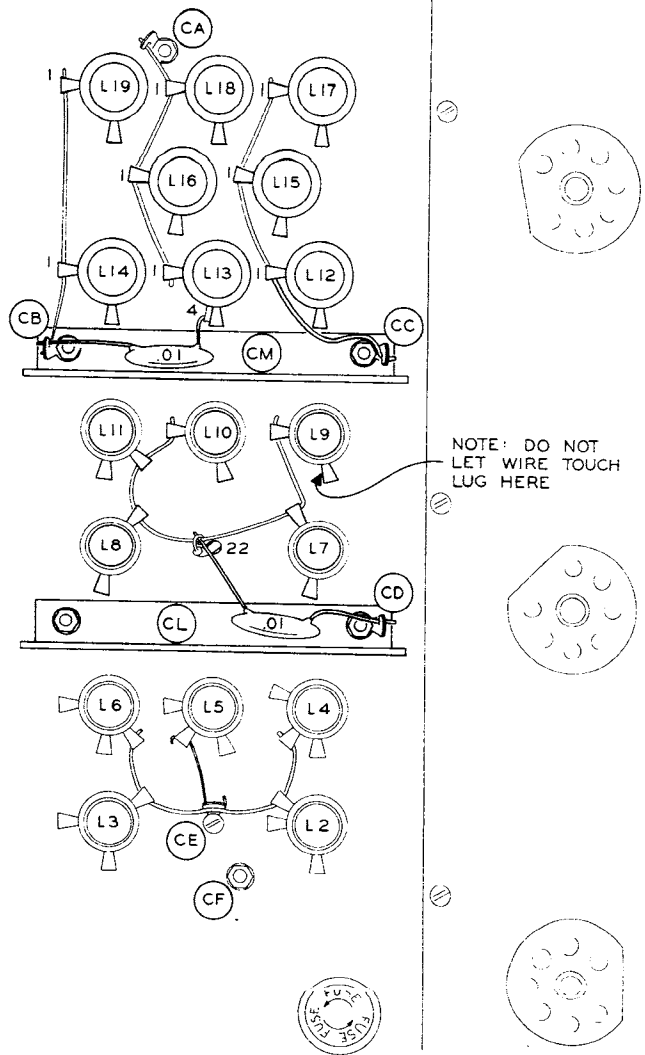
Detail 12J

Refer to Detail 12J and Pictorial 12 for the following steps.

- () Install a 6-32 x 2" screw from the bottom of the chassis at CF as shown in Pictorial 12 and Detail 12J. Use #6 lockwashers and a 6-32 nut.
- () Mount a coil partition shield (#206-M223) at location CM and small #6 solder lugs at CB and CC on top of the chassis, and mount a small #6 solder lug at P on the bottom of the chassis. Use 3-48 x 3/8" hardware as shown in Detail 12J. Bend the solder lugs at 90 degree angles from the chassis as shown.
- () Mount the remaining coil partition shield at CL and a small #6 solder lug at CD on top of the chassis, and mount a small #6 solder lug at R on the bottom of the chassis. Use 3-48 x 3/8" hardware. Bend the solder lugs at 90 degree angles from the chassis as shown.

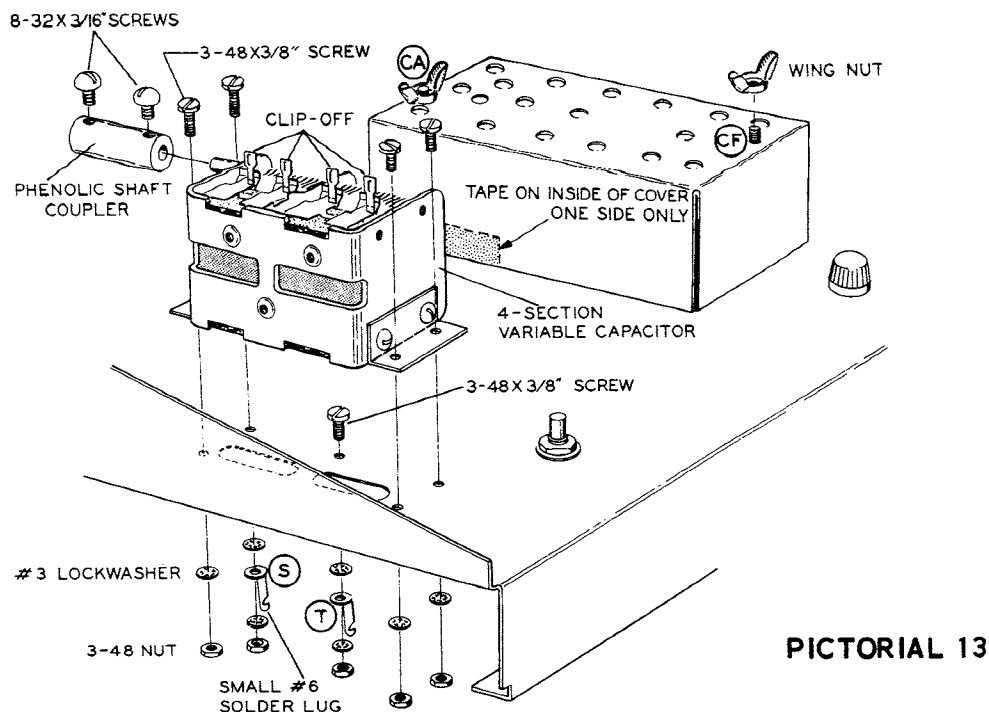
Refer to Pictorial 12 for the following steps.

- () Connect the free lead of the .01 μ fd disc capacitor extending from lug 4 of coil L13 to solder lug CB (NS). Use a 1/2" length of sleeving on the lead to CB.



PICTORIAL 12

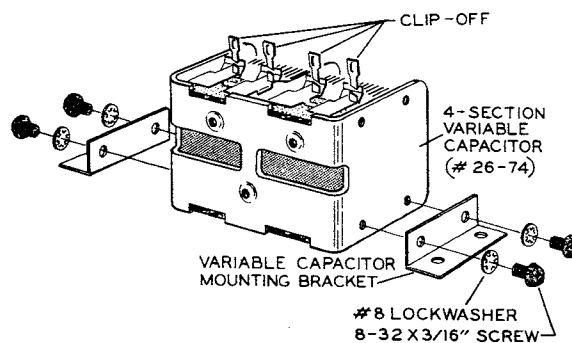
- () Connect the free end of the bare wire extending from lug 1 of coil L14 to solder lug CB (S-2).
- () Connect the free end of the bare wire extending from lug 1 of coil L12 to solder lug CC (S-1).
- () Connect the free lead of the .01 μ fd disc capacitor extending from the bare wire at hole 22 to solder lug CD (S-1). Use a 1/2" length of sleeving on the lead to CD.



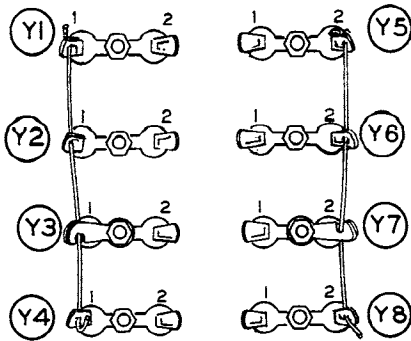
PICTORIAL 13

Refer to Pictorial 13 for the following steps.

- () Locate the coil cover and place a length of the insulating tape supplied on the inside of the coil cover only in the area shown.
- () Install the coil cover over the coils and secure it with wing nuts at CA and CF.
- () Install a small #6 solder lug on the bottom of the chassis at T. Use 3-48 x 3/8" hardware. Refer to Pictorial 13. Bend the solder lug 90 degrees from the chassis as shown.
- () Locate the 4-section variable capacitor (#26-74) and the two capacitor mounting brackets (#204-M557).
- () Refer to Detail 13A and mount the variable capacitor to the mounting brackets. Use 8-32 x 3/16" screws and #8 lockwashers.
- () Mount the variable capacitor to the chassis using 3-48 x 3/8" hardware, with a small #6 solder lug at S on the bottom of the chassis, as shown in Pictorial 13. Bend solder lug S up 90 degrees from the chassis.



Detail 13A



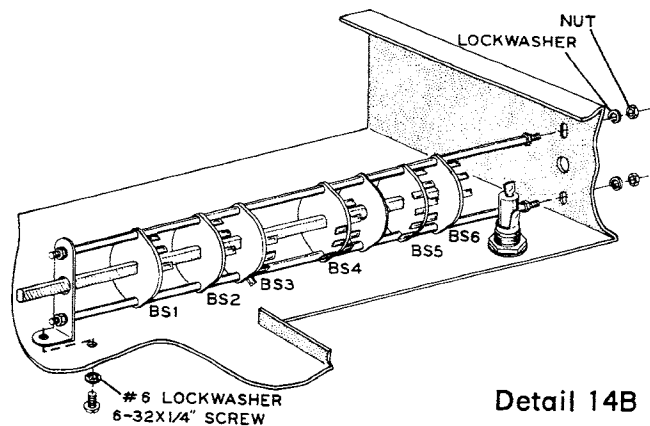
Detail 14A

BAND SWITCH AND CHASSIS WIRING

Refer to Pictorial 14 (fold-out from Page 45) and Detail 14A for the following steps.

- () Turn the chassis over and position it as shown.
- () Twist lug 1 of crystal sockets Y1 through Y4 at a 45 degree angle.
- () Pass one end of a 1-5/8" bare wire through lug 1 of crystal sockets Y1, Y2, Y3, and Y4. Solder lug 1 of Y4 (S-1), Y3 (S-3), Y2 (S-2), and Y1 (S-1).
- () Twist lug 2 of crystal sockets Y5 through Y8 at a 45 degree angle.
- () Pass one end of a 1-5/8" bare wire through lug 2 of crystal sockets Y5, Y6, Y7, and Y8. Solder lug 2 of Y5 (S-1), Y6 (S-2), and Y8 (S-1). Y7 will be soldered later.
- () Position all coil wires and the parasitic choke extending through the chassis to clear the Band switch. See the inset on Pictorial 14.
- () Locate the Band switch (#63-334). The rotor shaft has been positioned in the full counter-clockwise position and should not be rotated.

- () Remove one nut and lockwasher from the rear of each switch stud. Now mount the switch by placing the two mounting studs through the slots in the rear chassis apron and securing them with the two nuts and lockwashers removed previously. Center the switch rotor shaft in the hole in the rear chassis apron. Do not turn the rotor shaft from its original position. Secure the front of the switch with a 6-32 x 1/4" screw and #6 lockwasher. Refer to Detail 14B.

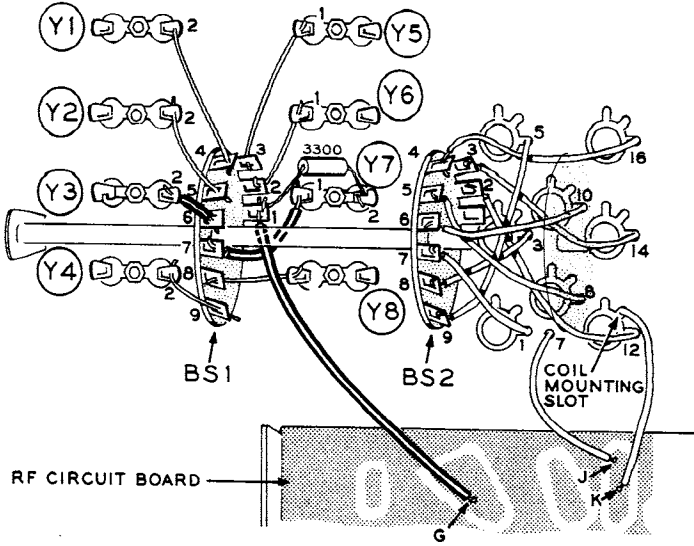


Detail 14B

Refer to Detail 14C for the following steps.

NOTE: The following steps concern wiring of the Band switch. In each step the direction will read as in the following example: Connect a 2" bare wire from BS1-R2 (S-1) to lug 1 of crystal socket Y1 (S-2). This would mean to connect a 2" bare wire from the Band switch (BS); first wafer (1) rear side (R); lug 2 to lug 1 of crystal socket Y1. This system will be used throughout the rest of the manual whenever a connection is made to the Band switch.

- () Connect a 3/4" bare wire from BS1-R2 (S-1) to lug 1 of crystal socket Y6 (S-1).
- () Connect a 1-1/4" bare wire from BS1-R3 (S-1) to lug 1 of crystal socket Y5 (S-1).
- () Connect a 1-3/8" bare wire from BS1-R4 (S-1) to lug 2 of crystal socket Y1 (S-1).



Detail 14C

- () Connect a 2" bare wire from BS1-R7 (S-1) to lug 1 of crystal socket Y7 (S-1). Use a 1-5/8" length of sleeving.
- () Connect a 1-1/2" bare wire from BS1-R8 (S-1) to lug 1 of crystal socket Y8 (S-1).
- () Connect a 1-1/2" bare wire from BS1-R9 (S-1) to lug 2 of crystal socket Y4 (S-1).
- () Connect a 3-1/2" bare wire from BS1-R1 (NS) to point G on the RF Amplifier circuit board (S-1). Use a 2-3/4" length of sleeving. Route this wire between the switch rotor shaft and the lower switch stud.
- () Connect a 3300 Ω (orange-orange-red) 1/2 watt resistor from BS1-R1 (S-2) to lug 2 of crystal socket Y7 (S-4).

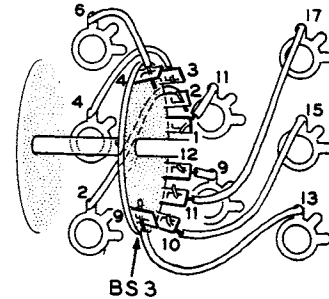
- () Connect a 1-3/4" bare wire from BS1-R5 (S-1) to lug 2 of crystal socket Y2 (S-1).
- () Connect a 2" bare wire from BS1-R6 (S-1) to lug 2 of crystal socket Y3 (S-1). Use a 1-1/2" length of sleeving.

NOTE: The following steps concern the connection of the wire ends extending through the holes in the chassis to the Band switch. These will be identified by their color and by the hole number from which they extend. Be sure that you identify each wire properly before connecting it to the Band switch.

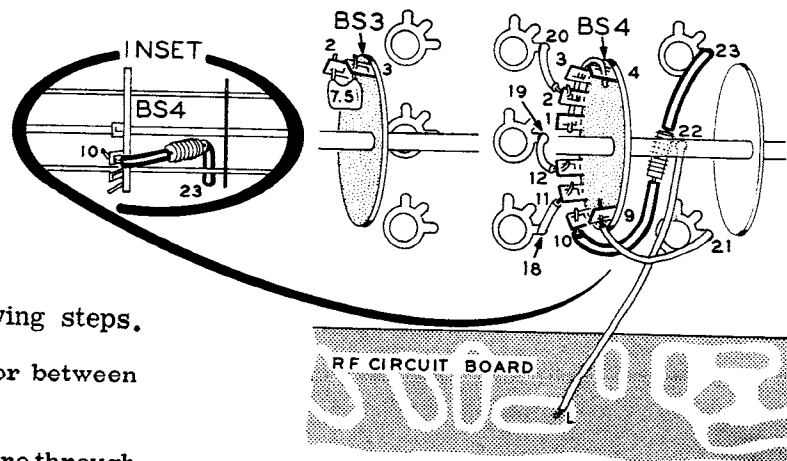
<u>COLOR WIRE</u>	<u>FROM HOLE</u>	<u>CONNECT TO</u>
() Red	from the mounting hole of coil L12	to point K on the RF circuit board (S-1).
() Red	7	to point J on the RF circuit board (S-1).
() Blue	12	BS2-R2 (S-1).
() Yellow	14	BS2-R3 (S-1).
() Orange	16	BS2-R4 (S-1).
() Violet	8	BS2-R5 (S-1).
() Brown	10	BS2-R6 (S-1).
() Green	5	BS2-R9 (S-1).
() White	3	BS2-R8 (S-1).
() Black	1	BS2-R7 (S-1).

Refer to Detail 14D for the following steps.

<u>COLOR WIRE</u>	<u>FROM HOLE</u>	<u>CONNECT TO</u>
() Brown	11	BS3-R1 (S-1).
() Black	2	BS3-R2 (S-1).
() White	4	BS3-R3 (S-1).
() Green	6	BS3-R4 (S-1).
() Violet	9	BS3-R12 (S-1).
() Orange	17	BS3-R11 (S-1).
() Yellow	15	BS3-R10 (S-1).
() Blue	13	BS3-R9 (S-1).



Detail 14D



Detail 14E

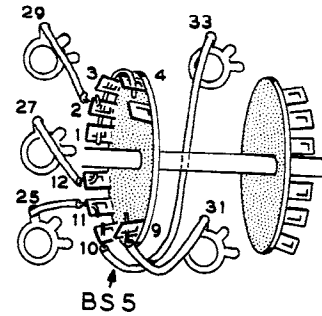
Refer to Detail 14E for the following steps.

- () Connect a 7.5 μmf mica capacitor between BS3-F2 (NS) and BS3-F3 (NS).
- () Place one end of a 1-1/4" bare wire through BS4-F4 (S-1) and route it over lugs F3 (S-2), F2 (NS), to F1 (S-1).

<u>COLOR WIRE</u>	<u>FROM HOLE</u>	<u>CONNECT TO</u>
() Red	22	to point L on the RF circuit board (S-1).
() Brown	20	BS4-F2 (S-3).
() Violet	19	BS4-F12 (S-1).
() Orange	18	BS4-F11 (S-1).
() Parasitic choke	23	BS4-F10 (S-1). Position the choke as shown in the inset drawing on Detail 14E. Use 3/4" of sleeving.
() Blue	21	BS4-F9 (S-1).

Refer to Detail 14F for the following steps.

<u>COLOR WIRE</u>	<u>FROM HOLE</u>	<u>CONNECT TO</u>
() Violet	27	BS5-F12 (S-1).
() Orange	25	BS5-F11 (S-1).
() Yellow	33	BS5-F10 (S-1).
() Blue	31	BS5-F9 (S-1).
() Brown	29	BS5-F2 (NS).



Detail 14F

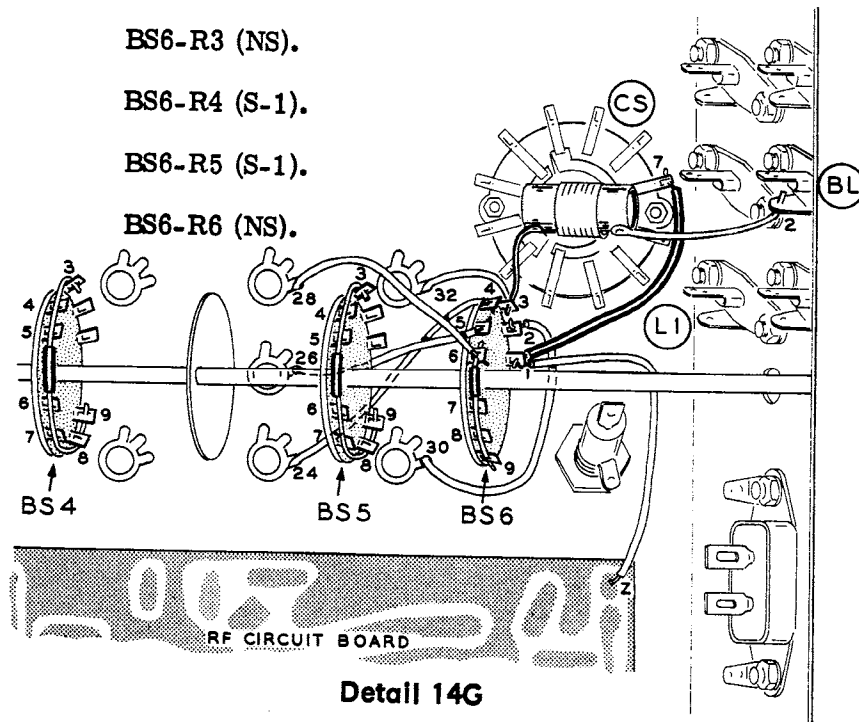
- () Place one end of a 1-1/4" bare wire through BS5-F4 (S-1), and route it over lugs F3 (S-2), F2 (S-3), to F1 (S-1).

Refer to Detail 14G for the following steps.

<u>COLOR WIRE</u>	<u>FROM HOLE</u>	<u>CONNECT TO</u>
() Green	30	BS6-R2 (S-1).
() Green	32	BS6-R3 (NS).
() Green	24	BS6-R4 (S-1).
() Green	26	BS6-R5 (S-1).
() Green	28	BS6-R6 (NS).

- () Place one end of a 2-3/4" bare wire through BS4-R3 (NS), and route it over lugs R4 (S-2), R5 (S-2), R6 (S-2), R7 (S-2), R8 (S-2), to R9 (S-1). Use sleeving between lugs R5 and R6.

- () Place one end of a 2-3/4" bare wire through BS5-R3 (NS), and route it over lugs R4 (S-2), R5 (S-2), R6 (S-2), R7 (S-2), R8 (S-2), to R9 (S-1). Use sleeving between lugs R5 and R6.



Detail 14G

- () Place one end of a 1-5/8" bare wire through BS6-R6 (S-2), and route it over lugs R7 (S-2), R8 (S-2), to R9 (S-1). Use sleeving between lugs R6 and R7.

- () Connect a 3-3/4" green wire from BS6-R1 (NS) to point Z on the RF circuit board (S-1).

- () Connect a 2-1/2" bare wire from BS6-R1 (S-2) to lug 7 of switch CS (S-1). Use 2-1/8" of sleeving.

- () Locate coil L1 (#40-546). Notice that one end of the coil contains a 100 μμf disc capacitor. Connect the lead from this end of L1 to lug 2 of phono socket BL (S-2). Connect the other lead of this coil to BS6-R3 (S-2).



Refer to Pictorial 15 for the following steps.

- () Cut the following lengths of small coaxial cable and prepare them as shown in Detail 15A.

8-1/4"	4-1/8"
3-3/8"	3-3/8"
6"	8"

- () Using an ohmmeter, be sure there is no short between the inner conductor and shield of each cable before installing the cable.

- () At the end of the 8-1/4" shielded cable with 1" shield lead, connect the inner conductor to BS2-R1 (S-1) and the shield to solder lug N (NS).

- () At the other end of this cable, connect the inner conductor to lug 1 (S-1) and the shield to lug 2 (S-1) of phono socket BE.

- () At the end of a 3-3/8" coaxial cable with the 1" shield lead, connect the inner conductor to BS3-F2 (S-2) and the shield to solder lug N (S-2).

- () At the other end of this coaxial cable, connect the inner conductor to point H (S-1) and the shield to the adjacent GND point (S-1) on the RF circuit board.

- () At the end of the 6" coaxial cable with the 1" shield lead, connect the inner conductor to BS3-F3 (S-2) and the shield to solder lug P (NS).

- () At the other end of this coaxial cable, connect the inner conductor to point U (S-1) and the shield to the adjacent GND point (S-1) on the RF circuit board.

- () At the end of the 4-1/8" coaxial cable with the 1" shield connect the inner conductor to BS4-R1 (S-1) and the shield to solder lug R (NS).

- () At the other end of this coaxial cable, connect the inner conductor to point V (S-1) and the shield to the adjacent GND point (S-1) on the RF circuit board.

- () At the end of the 3-3/8" coaxial cable with the 1" shield lead, connect the inner conductor to BS5-R1 (S-1) and the shield to solder lug R (NS).

- () At the other end of this coaxial cable, connect the inner conductor to point N (S-1) and the shield to the adjacent GND point (S-1) on the RF circuit board.

- () At the end of the 8" coaxial cable with the 1" shield lead, connect the inner conductor to lug 1 (S-1) and the shield to lug 2 (S-3) of phono socket BD.

- () At the other end of the coaxial cable, connect the inner conductor to point F (S-1) and the shield to the adjacent GND point (S-1) on the RF circuit board.

Refer to Detail 15B and prepare the following lengths of small coaxial cable:

4"	3-3/4"
4"	3-3/4"

- () At either end of a 4" coaxial cable, connect the inner conductor to BS5-R2 (S-1) and the shield to solder lug R (NS).

- () At the other end of this coaxial cable, connect the inner conductor to lug 4 of the variable capacitor (S-1) and the shield to solder lug T (NS).

- () At either end of a 4" coaxial cable, connect the inner conductor to BS5-R3 (S-2) and the shield to solder lug R (NS).

- () At the other end of this coaxial cable connect the inner conductor to lug 3 of the variable capacitor (S-1) and the shield to solder lug T (S-2).

- () Connect one end of a 1" bare wire to the metal shield between wafers 4 and 5 (S-1) and down to solder lug R (S-5).

- () At either end of a 3-3/4" coaxial cable, connect the inner conductor to BS4-R2 (S-1) and the shield to solder lug P (NS).

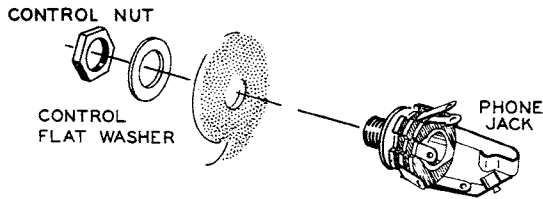
- () At the other end of this cable, connect the inner conductor to lug 2 of the variable capacitor (S-1) and the shield to solder lug S (NS).

- () At either end of a 3-3/4" coaxial cable, connect the inner conductor to BS4-R3 (S-2) and the shield to solder lug P (S-3).
- () At the other end of this coaxial cable, connect the inner conductor to lug 1 of the variable capacitor (S-1) and the shield to solder lug S (S-2).

FRONT APRON WIRING

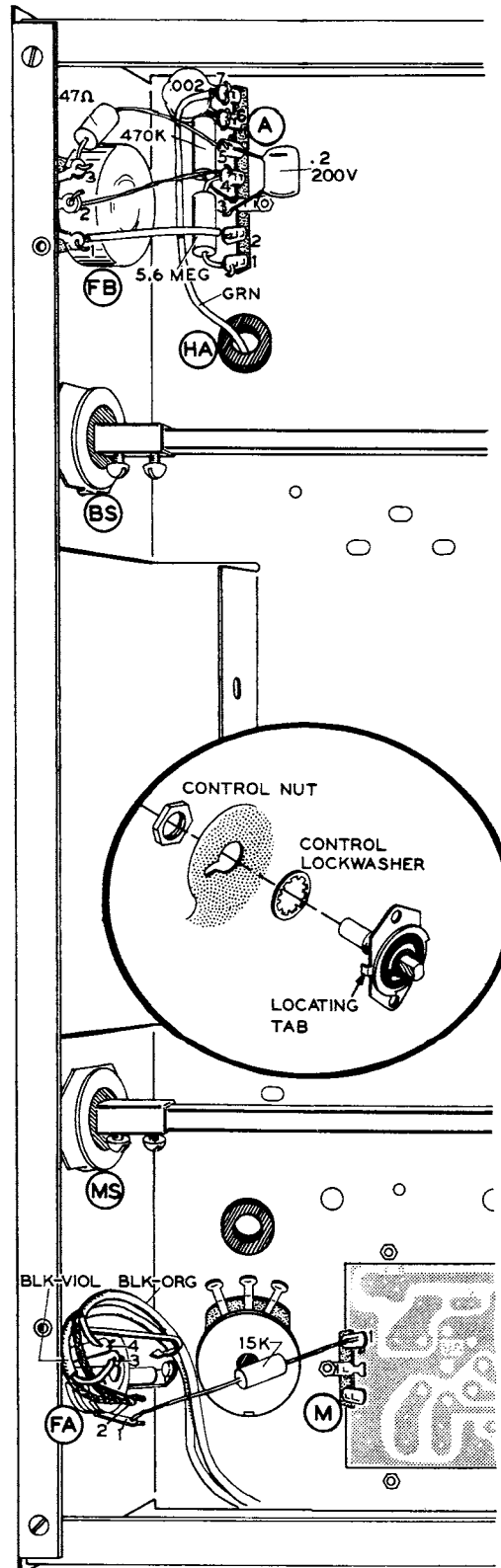
Refer to Pictorial 16 for the following steps.

- () Refer to Detail 16A and temporarily mount the phone jack at FA. Use a control flat washer and a control nut. Position the lugs as shown in Pictorial 16.

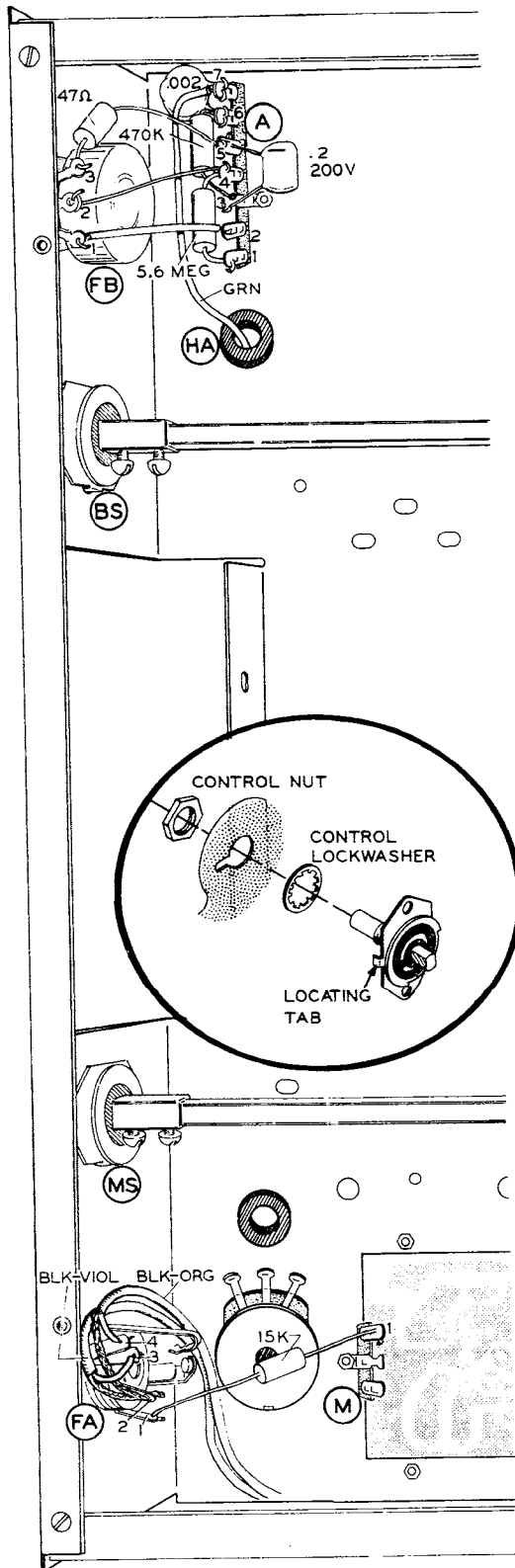


Detail 16A

- () Start two 6-32 x 1/4" screws in a switch shaft coupler. Slide one end of the coupler on the front end of the Mode switch rotor shaft. Do not tighten the setscrews.
- () Remove the tape from the rotor shaft. Be careful not to turn the shaft from its preset position.
- () Refer to the inset drawing on Pictorial 16 and temporarily mount the 4-position Mode switch detent (#266-73) at MS. Use a control lockwasher on the bushing and a control nut on the front apron. Slide the rotor shaft of the Mode switch back if necessary. The index tab on the detent should fit in the slot on the front apron.
- () Be sure the switch detent is fully counter-clockwise, then slide the switch shaft coupler from the Mode switch rotor shaft onto the detent shaft. Push the rotor shaft against the detent and tighten the two 6-32 screws.
- () Start two 6-32 x 1/4" screws in the remaining switch shaft coupler. Slide this coupler onto the rotor shaft of the Band switch.

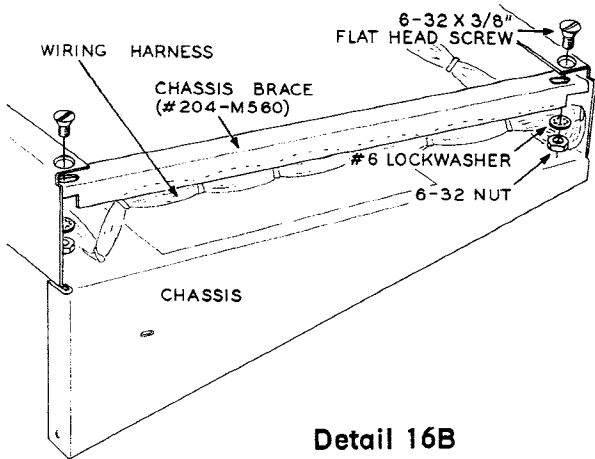


PICTORIAL 16

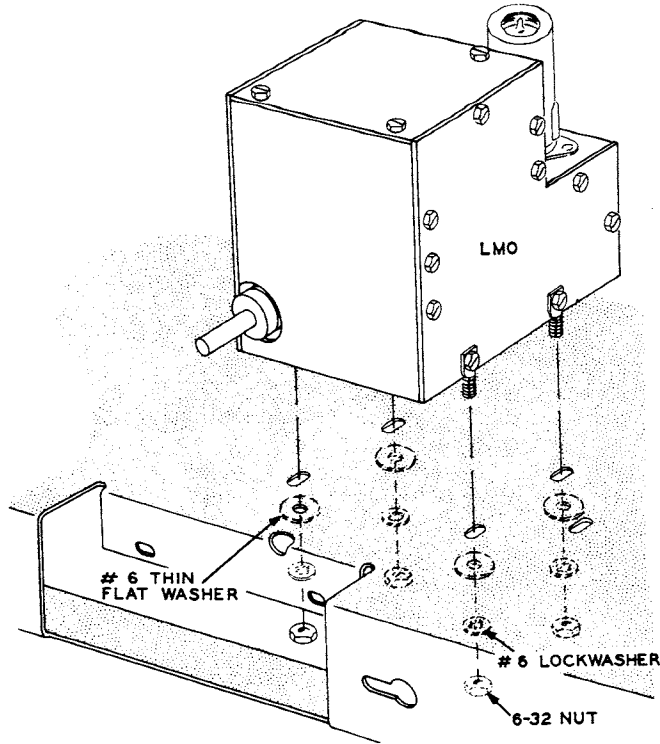


PICTORIAL 16

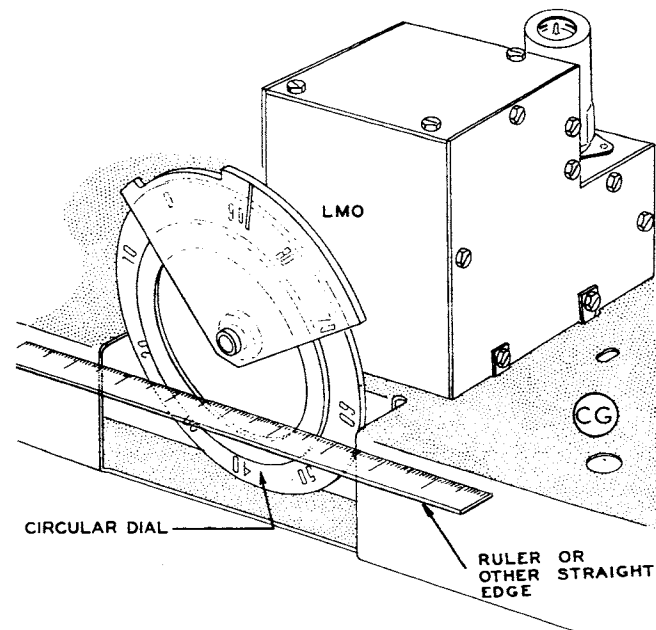
- () Temporarily, mount the 8-position switch detent (#266-72) at BS. Use a control lockwasher and a control nut.
 - () Be sure the switch detent shaft is fully counterclockwise then slide the switch shaft coupler onto the detent shaft. Push the rotor shaft against the detent and tighten the two 6-32 screws.
 - () Temporarily, mount the 10 KΩ control (#10-128) at FB. Use a control lockwasher and a control nut.
 - () Connect a .002 μfd disc capacitor between lugs 6 (NS) and 7 (NS) of terminal strip A.
 - () Connect a 1-1/2" black wire from lug 1 of control FB (S-1) to lug 2 of terminal strip A (S-1).
 - () Connect a 1-3/4" bare wire from lug 2 of control FB (S-1) to lug 4 of terminal strip A (NS).
 - () Connect a 47 Ω (yellow-violet-black) 1/2 watt resistor from lug 3 of control FB (S-1) to lug 5 of terminal strip A (NS).
 - () Connect a 5.6 megohm (green-blue-green) 1/2 watt resistor between lugs 1 (S-1) and 4 (S-2) of terminal strip A.
 - () Connect the lead from the banded end of a .2 μfd Mylar capacitor to lug 5 (S-2) and the other lead to lug 3 (NS) of terminal strip A.
 - () Connect one end of a 6" green wire to lug 7 of terminal strip A (S-2). Place the free end through grommet HA.
 - () Connect a 470 KΩ (yellow-violet-yellow) 1/2 watt resistor between lugs 3 (S-2) and 6 (S-2) of terminal strip A.
- NOTE: The following steps concern the shielded cables extending from breakout #3 of the harness.
- () Connect the black with violet stripe shielded cable inner conductor to lug 3 (S-1) and the shield to lug 2 (NS) of phone jack FA.
 - () Connect the black with orange stripe shielded cable inner conductor to lug 4 (S-1) and the shield to lug 2 (S-2) of phone jack FA.



Detail 16B



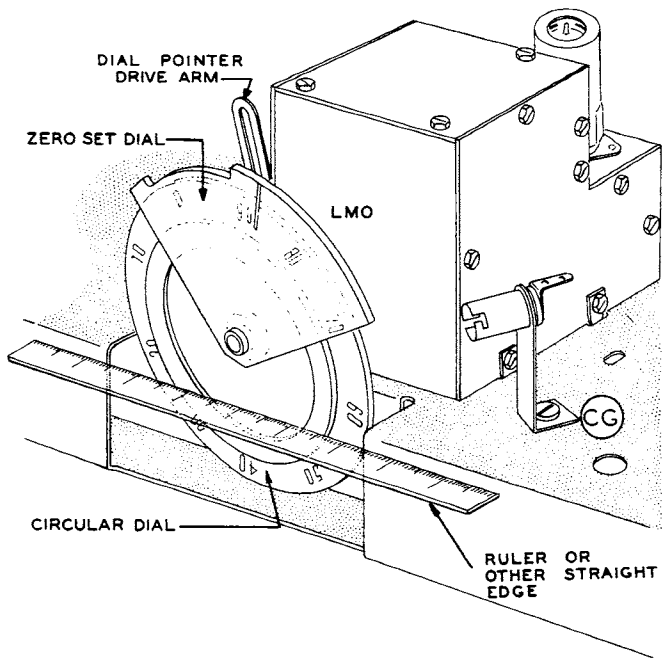
Detail 17A



Detail 17B

- () Connect a 15 K Ω (brown-green-orange) 1/2 watt resistor from lug 1 of terminal strip M (S-1) to lug 1 of phone jack FA (S-1).
- () Refer to Detail 16B and install the left chassis brace. Use 6-32 x 3/8" flat head screws, #6 lockwashers, and 6-32 nuts.
- () Install the right chassis brace on the chassis. Use 6-32 x 3/8" flat head screws, #6 lockwashers, and 6-32 nuts.
- () Form the wiring harness so that it fits into the angle bracket as shown in Detail 16B.
- () Turn the chassis over and position it as shown in Detail 17A.
- () Locate the LMO (linear master oscillator) and position it on top of the chassis so that the 6-32 spade bolts pass through the slots in the chassis as shown in Detail 17A. Temporarily secure the LMO with #6 thin flat washers, #6 lockwashers, and 6-32 nuts. Position the spade bolts in the center of the slots. Tighten the nuts just enough to hold the LMO in place on the chassis. The #6 thin flat washers go between the chassis and the #6 lockwashers.
- () Slide the circular dial on the shaft of the LMO. Place a ruler or other straight edge along the front of the chassis. Adjust the LMO so the circular dial is parallel to the front edge of the chassis. See Detail 17B. With all spade lugs centered in the slotted holes, tighten the nuts that secure the LMO to the chassis.

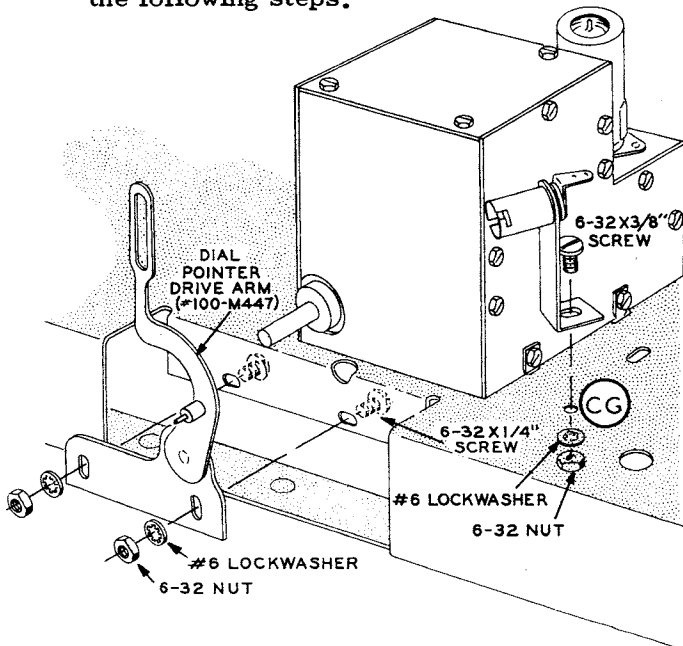
- () Remove the circular dial from the LMO shaft.



PICTORIAL 17

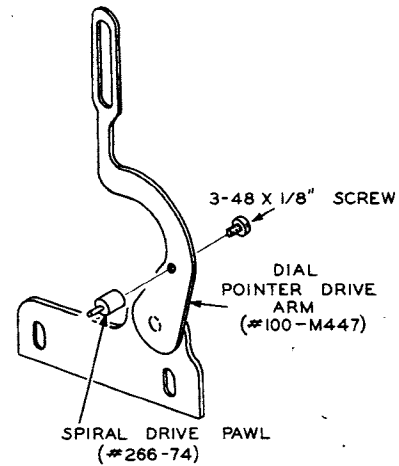
Refer to Details 17C, 17D, and Pictorial 17 for the following steps.

- () Mount a pilot lamp socket at CG using 6-32 x 3/8" hardware. Bend the socket lug as shown in Detail 17C.
- () Locate the Dial Drive Assembly package (#100-M450). These parts will be used in the following steps.



Detail 17C

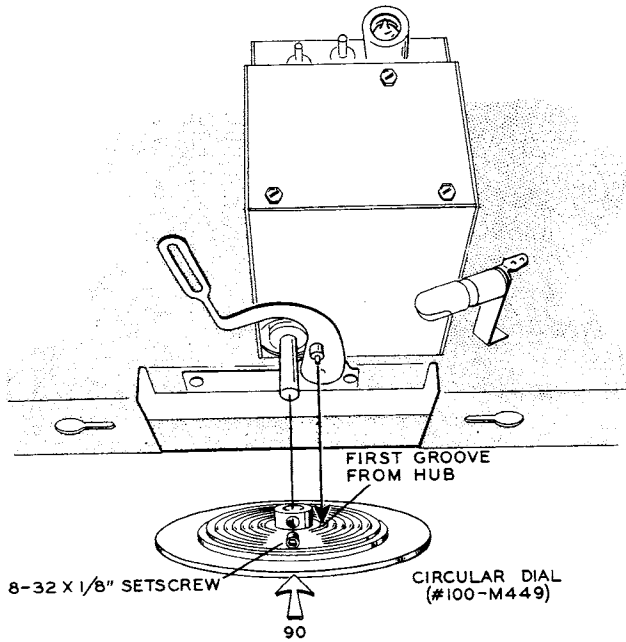
- () Locate the pointer drive arm (#100-M447) and mount the nylon spiral drive pawl (#266-74) with a 3-48 x 1/8" screw as shown in Detail 17D. Use care not to overtighten and strip the threads in the pawl.
- () Install the dial pointer drive arm on the chassis, using 6-32 x 1/4" hardware. Position the hardware in the center of the chassis and dial pointer drive arm slots.



Detail 17D

Refer to Detail 17E and Pictorial 17 for the following steps.

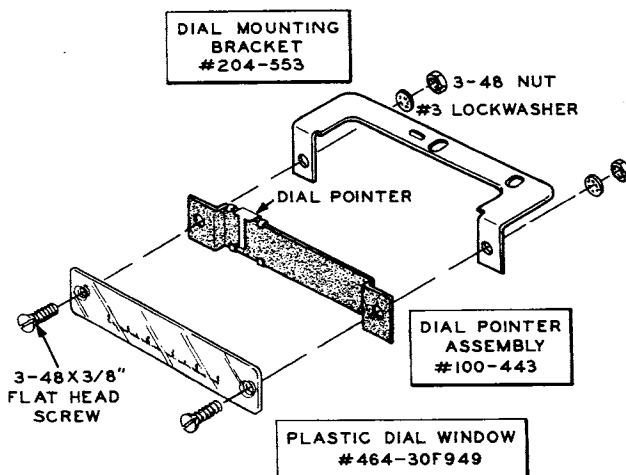
- () Turn the shaft of the LMO fully counter-clockwise against its stop.
- () Start an 8-32 x 1/8" setscrew in the hub of the circular dial (#100-M449).
- () Hold the circular dial in front of the LMO shaft with the 90 marking straight up as shown in Pictorial 17.
- () Push the circular dial on the LMO shaft and at the same time insert the spiral drive pawl into the 1st groove from the hub of the dial plate until the drive pawl just touches the bottom of the groove in the circular dial. Tighten the setscrew in the circular dial hub. Again check to be sure the circular dial is parallel to the front edge of the chassis. See Pictorial 17.



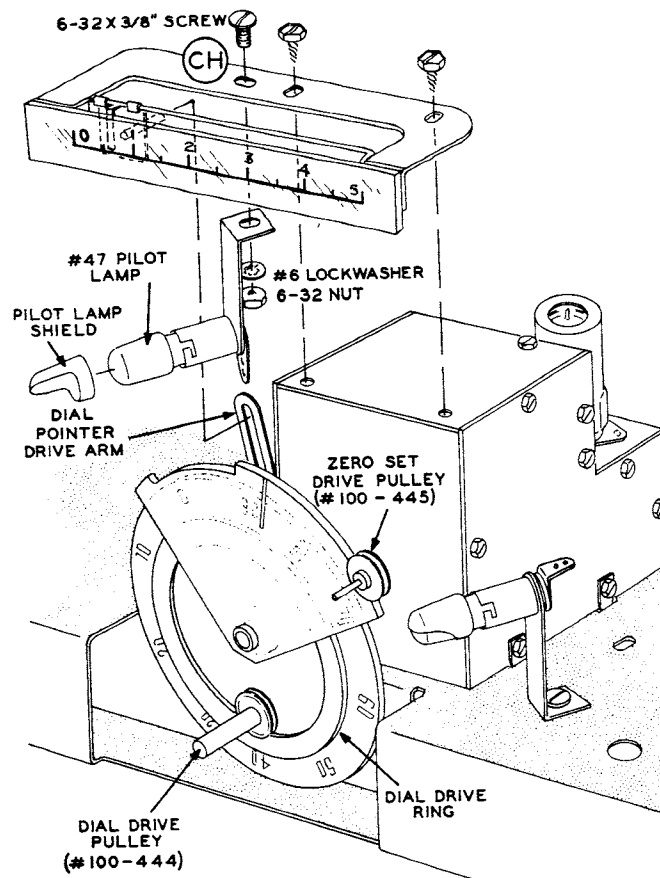
Detail 17E

Refer to Detail 18A and Pictorial 18 for the following steps.

- () Mount the plastic dial window and dial back plate on the dial mounting bracket. Use 3-48 x 3/8" flat head screws, #3 lockwashers, and 3-48 nuts. Be sure to position the dial window and dial back plate as shown in Detail 18A.

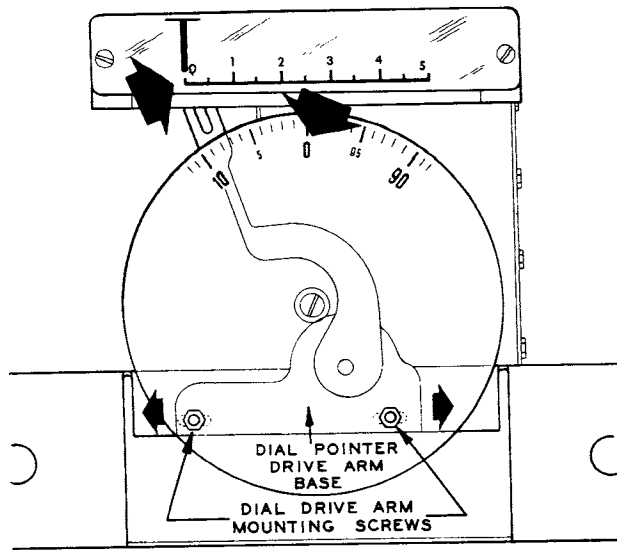


Detail 18A



PICTORIAL 18

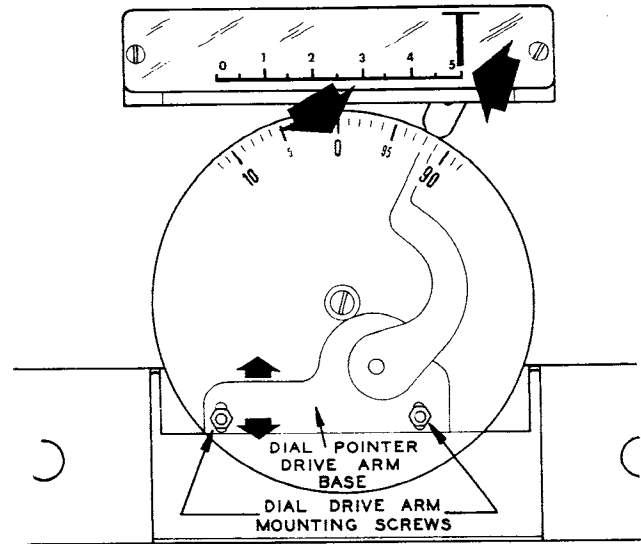
- () Mount a pilot lamp socket on the dial mounting bracket at CH. Use 6-32 x 3/8" hardware. Position the pilot lamp socket as shown. Do not tighten yet.
- () Position the chassis as shown in Pictorial 18 and remove the two front cover mounting screws from the top of the LMO.
- () Mount the dial mounting bracket to the top of the LMO. Be sure to pass the stud, extending from the rear of the dial pointer, through the hole in the center of the pointer drive arm. Center the dial bracket in the mounting slots. Position the front of the plastic dial window flush with the zero set dial on the circular dial.
- () Check to see that the 90 marking in the circular dial is directly under the 2-1/2 mark on the plastic dial window. If not, loosen the circular dial setscrew and make the necessary adjustment. Retighten the setscrew.



Detail 18B

Refer to Detail 18B for the following steps.

- () Rotate the circular dial clockwise from the fully counterclockwise position (90 marking) to the first zero marking. The dial pointer should be at the zero marking on the plastic dial window. If not, perform one of the following two steps.
- () 1. If the dial pointer is to the right of the zero marking, loosen the dial pointer drive arm mounting screws and move the dial pointer drive arm base to the right until the dial pointer is at zero. Do not move the dial pointer drive arm base up or down. Retighten the screws.
- () 2. If the dial pointer is to the left of the zero marking, loosen the dial pointer drive arm mounting screws, and move the dial pointer drive arm base to the left until the dial pointer is at zero. Do not move the dial pointer drive arm base up or down. Retighten the screws.



Detail 18C

Refer to Detail 18C for the following steps.

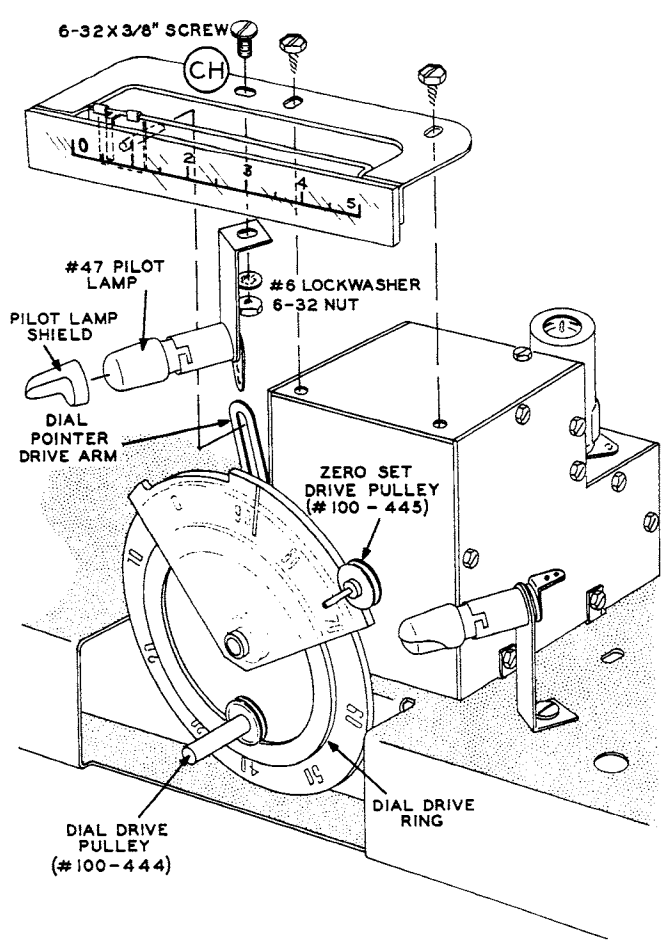
- () Rotating the circular dial in a clockwise direction one revolution (zero to zero) should move the dial pointer to the 1 marking on the plastic dial window. Each time the circular dial is rotated one revolution clockwise, the dial pointer should advance one more number on the plastic dial window. After five complete revolutions the dial pointer should be very close to the 5 marking on the plastic dial window. If not, perform one of the following two steps.
- () 1. If the dial pointer is to the left of the 5 marking, loosen the dial pointer drive arm mounting screws and move the dial pointer drive arm base down until the dial pointer is at the 5 marking. Do not move the dial pointer drive arm base to the left or right. Tighten the screws.

- () 2. If the dial pointer is to the right of the 5 marking, loosen the dial pointer drive arm mounting screws and move the dial pointer drive arm base up until the pointer is at the 5 marking. Do not move the dial pointer drive arm base to the left or right. Tighten the screws.

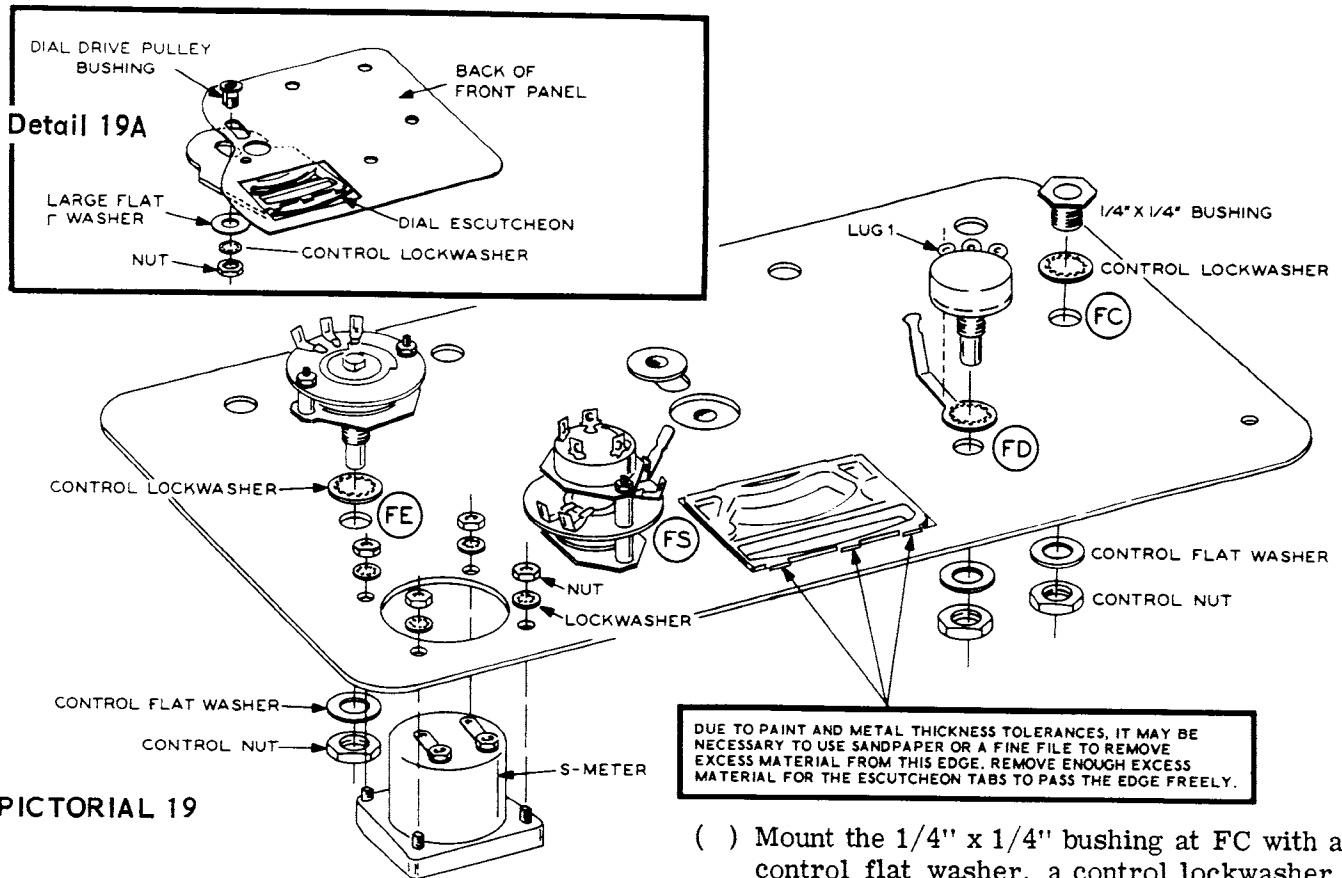
This adjustment may affect the dial pointer setting at the zero marking. Repeat the entire procedure as many times as necessary to obtain proper dial and pointer calibration. The dial pointer need not be exactly at a number when the circular dial is at one of its five possible zero settings, however, following the preceding steps should permit fairly close calibration. Rotating the circular dial from the fully counterclockwise position to the fully clockwise position will cause the dial pointer to go to the left of the zero marking and to the right of the 5 marking on the plastic dial window.

- () Check the mechanical operation of the drive assembly by rotating the circular dial plate until the LMO shaft hits its fully clockwise stop. At this position the dial plate should have rotated five full turns plus enough to have the dial read 10. The operation should be smooth with no binding or rubbing of the drive pawl in the circular dial groove. If there is any binding, loosen the setscrew in the hub of the circular dial plate and move it out toward the end of the LMO shaft a very small amount to relieve any binding and re-tighten the setscrew.

- () Clip the dial drive pulley (#100-444) onto the dial drive ring as shown in Pictorial 18.
- () Clip the zero set drive pulley (#100-445) onto the edge of the zero set dial as shown in Pictorial 18.



PICTORIAL 18



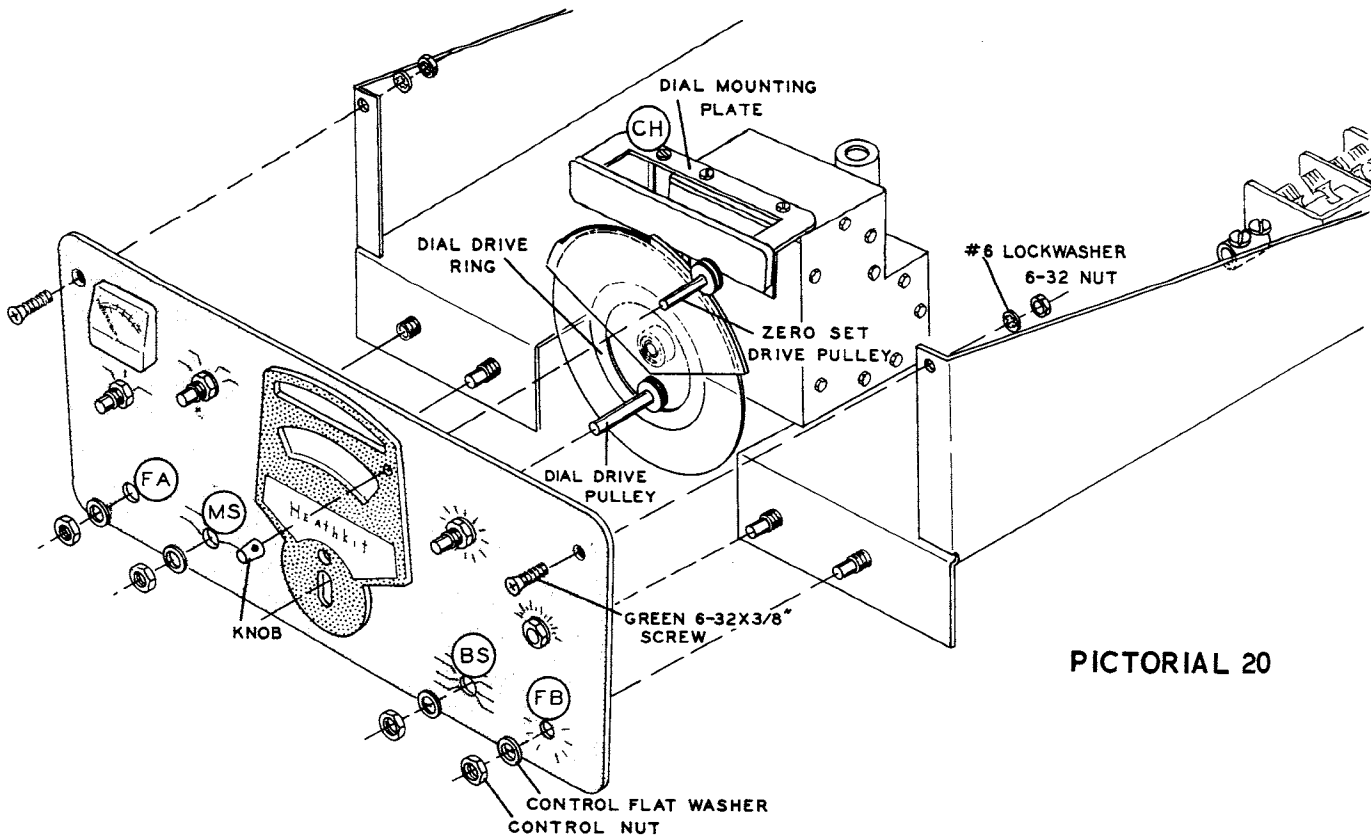
PICTORIAL 19

Refer to Pictorial 19 for the following steps.

- () Place a soft cloth over your work area to protect the finish on the front panel in the following steps.
- () Position the front panel as shown in Pictorial 19.
- () Refer to Detail 19A and mount the plastic dial escutcheon (#446-40). Be sure that the tabs at the top of the escutcheon fit behind the front panel. Push it as far as possible to the top of the front panel.
- () Locate the dial drive pulley bushing. Place the bushing through the dial escutcheon from the back of the panel. Place the large flat washer, the control lockwasher, and nut on the rear of the bushing. Place the bushing about 1/16" from the bottom of the slot and tighten the nut temporarily.
- () Mount the S-Meter on the front panel. Use the hardware supplied with the meter as shown in Pictorial 19. Be sure to position the meter so that the lettering is right side up when viewing the front panel. Remove the meter shorting wire from between the meter terminals.
- () Mount the 1/4" x 1/4" bushing at FC with a control flat washer, a control lockwasher, and a control nut as shown in Pictorial 19.
- () Place a control solder lug over the bushing of the 500 K Ω control (#10-16). Rebend the solder lug so that it touches lug 1 of the control.
- () Mount the 500 K Ω control at FD on the front panel. Use the control solder lug, a control flat washer and a control nut. Position the control lugs and control solder lug as shown.
- () Mount the AGC switch (#63-335) at FE on the front panel. Use a control lockwasher, control flat washer and a control nut. Position the switch lugs as shown.
- () Place a control solder lug on the bushing of the Function switch (#63-332). Rebend the solder lug so that it just clears the wafer of the switch.
- () Mount the Function switch at FS on the front panel. Use a control solder lug, control flat washer, and a control nut. Position the switch lugs and the control solder lug as shown.

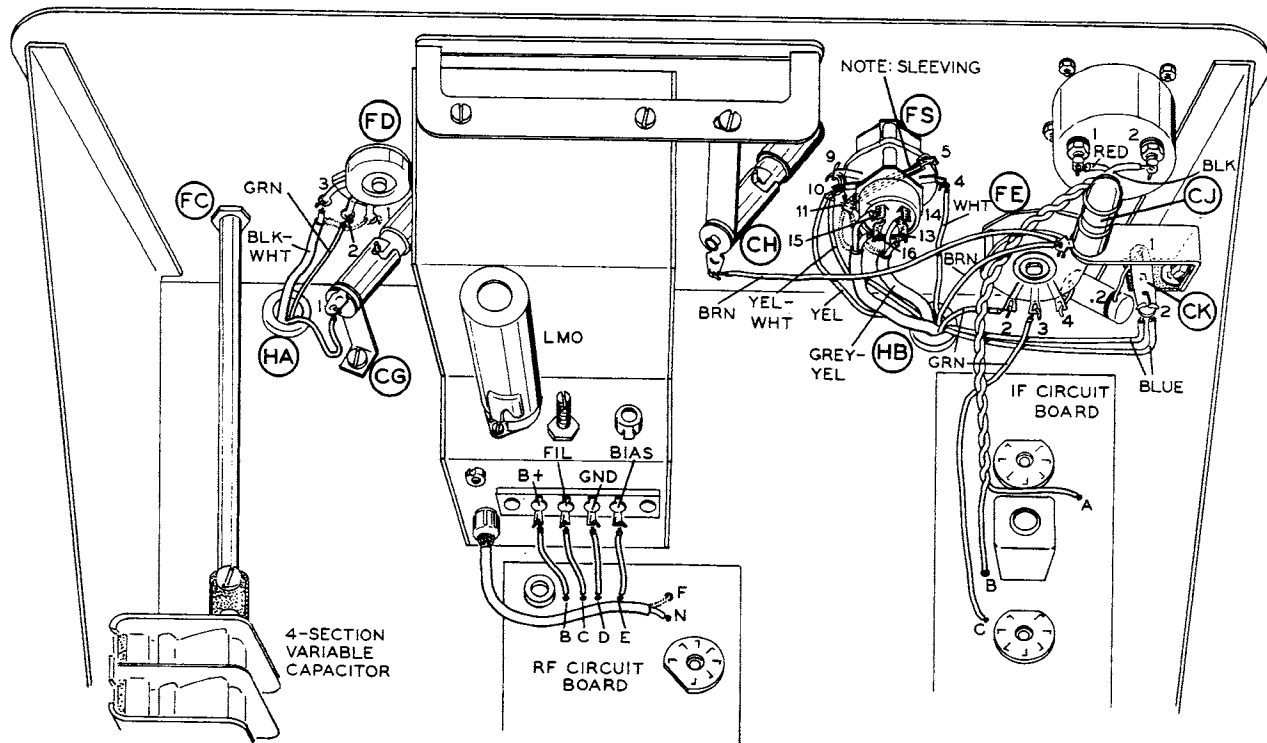
Refer to Pictorial 20 for the following steps.

- () Remove the control nuts from FA, MS, BS and FB.



PICTORIAL 20

- () Apply a very thin layer of silicon grease to the shaft of the dial drive pulley. Be very careful not to get the grease on the pulley or any other part of the Receiver.
- () Refer to Pictorial 20 and place the front panel in position on the chassis. Place the dial drive pulley shaft through the bushing in the dial escutcheon, and place the zero set drive pulley shaft through the hole in the upper right-hand corner of the dial escutcheon. NOTE: In all phases of dial mechanism installation, it is very important to be careful and follow the instructions closely for best results.
- () Start a control flat washer and control nut on FB, BS, MS, and FA. Leave these finger-tight. Now center the small hole at the center of the dial escutcheon exactly over the LMO drive shaft. When properly done, the front panel bottom edge should be parallel with the bottom of the chassis. This must be done very carefully for good smooth operation of the dial mechanism. Once the hole and shaft are lined up, tighten the nuts on FA, MS, BS, and FB.
- () Secure the two top corners of the front panel with the oval phillips head 6-32 x 3/8" screws, #6 lockwashers and 6-32 nuts.
- () Start a 4-40 x 1/8" setscrew in the small aluminum knob.
- () Push the zero set drive pulley flush with the back of the dial escutcheon. Place the small aluminum knob on the shaft of the pulley and tighten the setscrew. Be sure the zero set dial does not rub against the circular dial plate. They should be separated by at least 1/64".
- () Slide the dial mounting bracket forward until the plastic dial window touches the dial escutcheon and the numerals are centered in the dial window. Tighten the two mounting screws.
- () Loosen the large dial drive bushing and pull up on the shaft of the dial drive pulley until the pulley comes off of the dial drive ring. Now push the dial drive pulley down until it just slides over the drive ring. Now tighten the nut on the dial drive bushing. You should now be able to rotate the dial drive pulley shaft and turn the circular dial. The amount of torque required to turn the circular dial can be adjusted by moving the dial drive pulley onto or away from the dial drive ring.



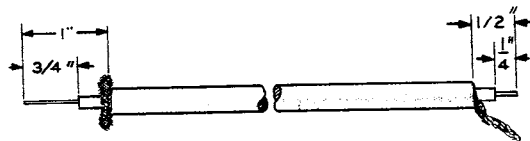
PICTORIAL 21

Refer to Pictorial 21 for the following steps.

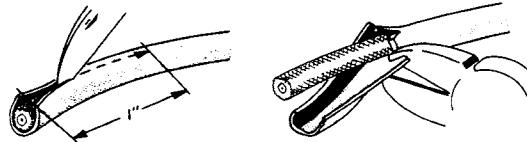
- () Connect the free end of the green wire extending from grommet HA to lug 2 of control FD (S-1).
- () Connect the inner conductor of the black with white stripe shielded cable extending from grommet HA, to lug 3 (S-1) and the shield to lug 1 (S-2) of control FD. Be sure that the control solder lug is soldered to lug 1 of the control.
- () Connect the free end of the brown wire extending from grommet HA to lug 1 of pilot lamp socket CG (S-1).
- () Connect the free end of the white wire extending from grommet HB to lug 4 of switch FS (S-1).
- () Connect one end of a 1-3/4" bare wire to lug 5 of switch FS (S-1). Place the other end of this wire through lug 11 (S-2) of FS to the solder lug mounted on FS (NS). Use a 1-1/4" length of sleeving between lugs 5 and 11 of FS.
- () Remove an additional 1/2" of insulation from the free end of the yellow wire extending through grommet HB, then place the wire through lug 10 (NS) to lug 9 (S-1) of switch FS.
- () Connect the free end of the white-yellow wire extending from grommet HB to lug 10 of switch FS (S-3).
- () Connect the black lead of the gray with yellow band shielded cable extending from grommet HB to lug 14 (S-1) and the red lead to lug 13 (S-1) of switch FS. Connect the shield to the solder lug mounted on FS (NS).
- () Connect the black lead of the other gray shielded cable extending from grommet HB to lug 15 (S-1) and the red lead to lug 16 (S-1) of switch FS. Connect the shield to the solder lug mounted on FS (S-3).
- () Connect the free end of the green wire extending from grommet HB to lug 2 of switch FE (S-1).

- () Connect a 5-1/2" green wire from lug 3 of switch FE (S-1) to point C on the IF circuit board (S-1).
- () Twist a 7" red and a 7" black wire together for 4". At the twisted end of this pair connect the red wire to lug 1 (S-1) and the black wire to lug 2 (S-1) of the meter. Route the pair down against the chassis and over to the IF circuit board.
- () At the other end of this twisted pair connect the red wire to point A (S-1) and the black wire to point B (S-1) on the IF circuit board.
- () Mount pilot lamp socket CJ and a dual-lug terminal strip at CK on the side apron of the chassis. Use a 6-32 x 3/8" screw, #6 lockwashers, and a 6-32 nut.
- () Connect a .2 μ fd Mylar capacitor from lug 4 of switch FE (S-1) to lug 1 of terminal strip CK (S-1). Position the banded end of the capacitor as shown in Pictorial 21.
- () Connect the free ends of both blue wires extending through grommet HB to lug 2 of terminal strip CK (S-2).
- () Connect the free end of the brown wire, extending through grommet HB, to lug 1 of pilot lamp socket CJ (NS).
- () Connect a 4-1/4" brown wire from pilot lamp socket CJ (S-2) to pilot lamp socket CH (S-1).
- () Connect the free end of the red wire extending through hole B in the RF circuit board to the B+ lug on the LMO (S-1).
- () Connect the free end of the brown wire extending from point C on the RF circuit board to lug FIL on the LMO (S-1).
- () Connect the free end of the black wire extending from point D on the RF circuit board to the GND lug on the LMO (S-1).
- () Connect the free end of the yellow wire extending from hole E in the RF circuit board to the Bias lug on the LMO (S-1).

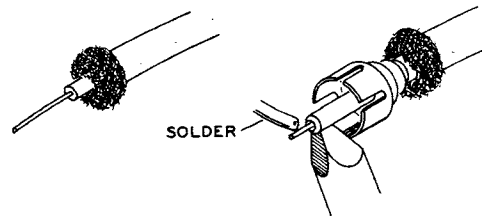
CUT THE CABLE ACCORDING TO THE DIMENSIONS BELOW. PREPARE EACH END AS SHOWN.



TAKING CARE NOT TO CUT THE OUTER SHIELD OF VERY THIN WIRES, REMOVE THE OUTER INSULATION.



PUSH THE SHIELD BACK AS FAR AS IT WILL GO AND REMOVE 3/4" OF INSULATION FROM THE INNER CONDUCTOR.



PLACE THE PHONO CONNECTOR ON THE CABLE FIRMLY AGAINST THE INNER INSULATION. SOLDER THE INNER CONDUCTOR.



Detail 21A

PUSH THE SHIELD UP ON THE BASE OF THE CONNECTOR AND SOLDER, THEN TRIM THE INNER CONDUCTOR FROM THE TIP.

- () Refer to Detail 21A and prepare a 4" small coaxial cable with a phono plug on the 1" stripped end.
- () Insert the phono plug in the phono socket on the LMO.
- () At the other end of this coaxial cable, connect the inner conductor to point N (S-1) and the shield to point F (S-1) on the RF circuit board.
- () Place the variable capacitor extension shaft through bushing FC and into the shaft coupling on the 4-section variable capacitor. Tighten the 8-32 setscrew. If the shaft binds, loosen the bushing and reposition it until no further binding is noticed. Retighten the bushing. Place a drop of oil on the shaft where it passes through the bushing.

Refer to Figure 4 for the following steps.

- () Remove the tube from the LMO.
- () Be sure the free end of the yellow power transformer lead that was not connected is not touching any part of the Receiver. Now measure the DC resistance from lug 3 of terminal strip J to chassis ground. See Figure 4. The reading should be infinite. If an infinite reading is obtained, connect the yellow power transformer lead to lug 8 of terminal strip J (S-2). If any resistance reading is obtained, look for a wiring error or short circuit in the filament string. Replace the tube in the LMO.

Refer to Pictorial 22 for the following steps.

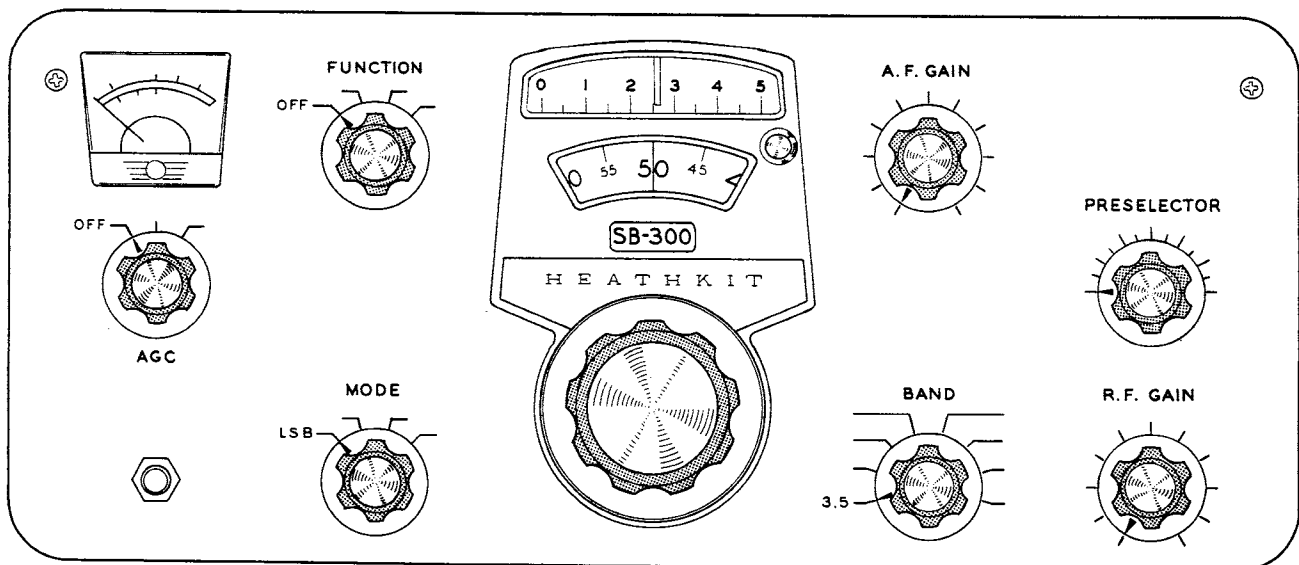
- () Install the crystals in their appropriate sockets. The crystal frequencies are stamped on top of the crystals and lettered on the chassis.
- () Install #47 pilot lamps in the three pilot lamp sockets. Place pilot lamp shields over the lamps. Tighten the hardware that secures lamp socket CH.
- () Install the tubes in their appropriate sockets.

- () Install a 2 ampere slow-blow fuse in the fuseholder.

Refer to Pictorial 23 for the following steps.

- () Turn all controls, except the Main Tuning knob, fully counterclockwise.
- () Start 8-32 x 1/8" setscrews in each of the small knobs.
- () Install these knobs on all controls except the main tuning shaft. Position the skirt markings as shown in Pictorial 23.
- () Start two 8-32 x 1/8" setscrews in the large knob. Install this knob on the main tuning shaft.
- () Remove the backing from the nameplate and mount it in the rectangular recess in the dial escutcheon.

This completes the assembly of your Heathkit SSB Receiver, Model SB-300.



PICTORIAL 23

INITIAL INSPECTION AND TESTS

Carefully examine the wiring for unintentional shorts. Be sure that all wire clippings and solder splashes are removed from the Receiver, and that all mechanical connections are secure.

Set the front panel controls as follows:

- RF GAIN - Full clockwise.
- BAND switch - 3.5 MC.
- MODE switch - LSB.
- AGC switch - SLOW.
- FUNCTION switch - OFF.
- AUDIO GAIN - Full counterclockwise.
- PRESELECTOR - Full counterclockwise.
- Main Tuning - Anywhere.
- Converter switch (on back of chassis) - HF.

Measure the DC resistance from the points indicated on Figure 4 to chassis ground. Be sure to check the four resistances at phono socket BM with the Function switch in the position marked on Figure 4.

This completes the Initial Inspection and Test. If any discrepancies were noted, refer to the In Case Of Difficulty section (on Page 65) of this manual.

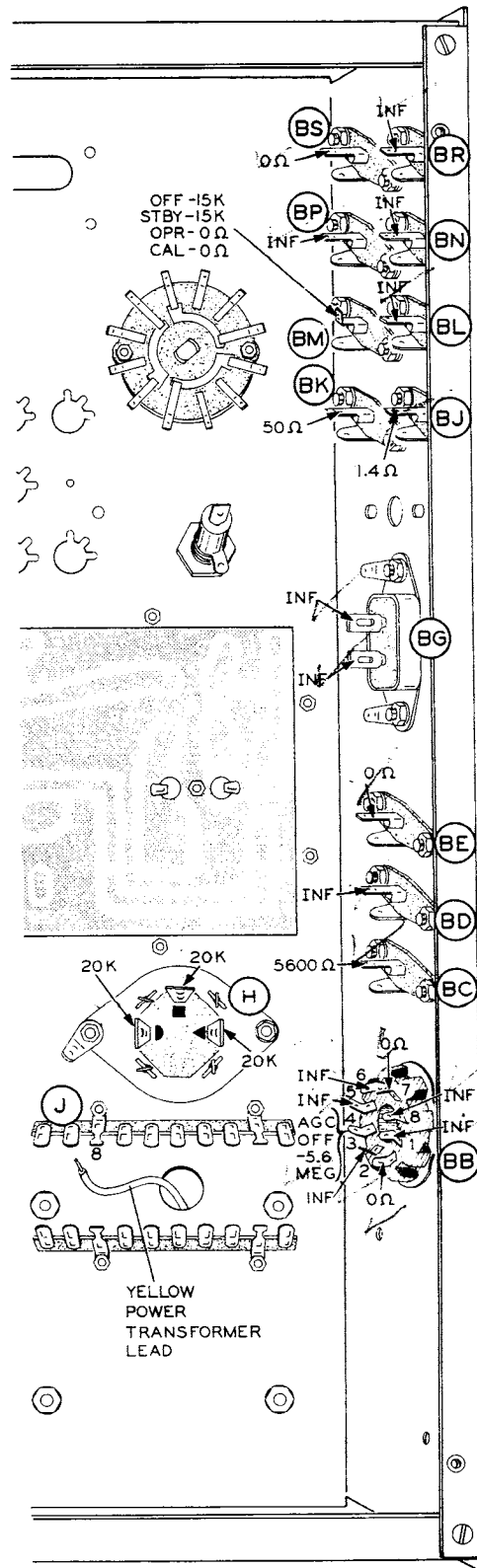


Figure 4

ALIGNMENT

READING RECEIVER FREQUENCY

To read frequency, add to the BAND switch setting, in megacycles, the slide rule pointer setting in hundreds of kilocycles and the circular dial setting in kilocycles.

For example: if the BAND switch is set to 3.5 and the slide rule pointer is between 2 and 3 and the circular dial is set to 53, the frequency is 3,753 mc. If the BAND switch is set to 14.0, the slide rule pointer between 0 and 1 and the circular dial is set to 12, the frequency is 14,012 mc.

NOTE: A speaker should be connected to the Receiver whenever it is turned on.

There are two methods of alignment that can be used with this Receiver. One requires the use of an accurate signal generator covering frequencies from 3,395 mc to 30 mc. In the other method, a receiver capable of receiving WWV is used to calibrate the 100 kc crystal calibrator. The crystal calibrator will then be used for a signal source. A broadcast receiver can also be used to calibrate the 100 kc crystal calibrator, but the accuracy will be slightly less than with WWV. Refer to Pictorial 22 for all alignment points. At no time should the slug in coil L20 be adjusted as it is prealigned at the factory.

ALIGNMENT USING A SIGNAL GENERATOR

IF TRANSFORMER ALIGNMENT

✓ Set the front panel controls as follows:

PRESELECTOR - Any place.
 RF GAIN - full clockwise
 BAND switch - 3.5 MC
 AF GAIN - 3 o'clock
 AGC - FAST
 FUNCTION switch - OFF
 Mode switch - LSB
 Main Tuning - 4.0 mc
 Converter switch (at rear of chassis) - HF

✓ Plug the line cord into the Receiver and then into a 120 volt, 50/60 cps AC outlet.

✓ Turn the FUNCTION switch to the OPR position.

✓ Adjust the METER ADJ control for a zero S-Meter reading. Turn the FUNCTION switch to OFF.

✓ Connect the RF output of the signal generator through a .01 or .001 μ fd disc capacitor to lug 1 of tube socket V6. Use a 1 millivolt signal level. Set the generator for a 3,395 mc unmodulated signal.

✓ Adjust IF transformers T3 and T4 for maximum S-Meter reading. Alternate from T3 to T4 until no further increase can be noticed in the S-Meter reading.

✓ Turn the Receiver off and disconnect the signal generator.

HETERODYNE OSCILLATOR ADJUSTMENT

✓ Turn the FUNCTION switch to OPR.

✓ Connect a vacuum tube voltmeter with an 11 megohm input impedance between the chassis and test point A on the RF circuit board. Use the voltmeter 5 volt scale to read -DC.

✓ Refer to the following chart and complete each step by adjusting the indicated coil for the indicated voltage: On one side of the voltage peak, the voltage will rise and drop in a slow linear fashion. Use this side of the slope. On the wrong side of the peak, the voltage will drop rapidly. The frequency of each coil is marked on the coil cover in the area designated HET. OSC.

BAND SWITCH POSITION	ADJUST COIL	DC VOLTS AT TEST POINT A
3.5 MC	3.5	-1.8 volt
7.0 MC	7.0	-1.3 volt
14.0 MC	14.0	-1.5 volt
21.0 MC	21.0	-1.7 volt
28.0 MC	28.0	-2 volts
28.5 MC	28.5	-2 volts
29.0 MC	29.0	-1.7 volt
29.5 MC	29.5	-1.5 volt

Recheck the adjustment of each coil for proper voltage.

NOTE: After the Antenna and RF Amplifier Alignment has been completed, readjust the Heterodyne Oscillator coils for a maximum S-Meter reading. Be sure to keep the coil on the side of the peak with the slow rise and fall of voltage.

ANTENNA AND RF AMPLIFIER ALIGNMENT

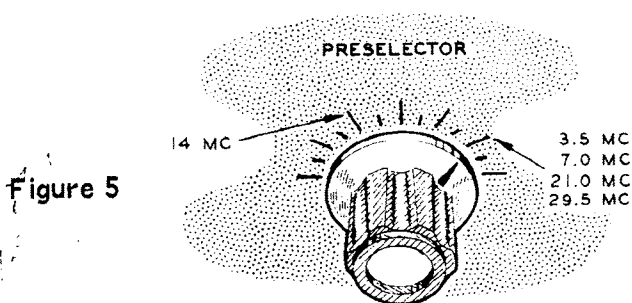


Figure 5

NOTE: It is very important that the PRE-SELECTOR be adjusted properly during the rest of the Alignment procedure. The proper PRE-SELECTOR knob settings for the various bands are shown in Figure 5.

- () All front panel controls should be set as described for the previous adjustments. Be sure to turn the PRESELECTOR to the position indicated in Figure 5 for the band being aligned.
- () Connect the RF output of the RF signal generator to the HF ANTENNA jack on the rear of the Receiver.
- () Complete each step as indicated in the following chart. Be sure to keep the signal generator level as low as possible while still obtaining a usable reading on the S-Meter.

NOTE: The crystal filter has a very narrow passband and care must be taken to tune the Main Tuning knob to maintain the signal in the center of the filter passband indicated by maximum S-Meter reading.

BAND SWITCH	RECEIVER AND GENERATOR FREQUENCY	ADJUST FOR MAXIMUM	SECTION BEING ADJUSTED
3.5 MC	4.0 MC	3.5	Antenna Coil
*3.5 MC	4.0 MC	3.5	RF Amp Plate Coil
7.0 MC	7.5 MC	7.0	Antenna Coil
7.0 MC	7.5 MC	7.0	RF Amp Plate Coil
14.0 MC	14.5 MC	14.0	Antenna Coil
14.0 MC	14.5 MC	14.0	RF Amp Plate Coil
21.0 MC	21.5 MC	21.0	Antenna Coil
21.0 MC	21.5 MC	21.0	RF Amp Plate Coil
29.5 MC	30.0 MC	28.0	Antenna Coil
29.5 MC	30.0 MC	28.0	RF Amp Plate Coil

No adjustments are made for the 28.0, 28.5, and 29.0 BAND switch positions.

*Upon completion of this step, repeak transformer T3 and T4 to compensate any error in the preceding IF Alignment.

SB-300 to the CAL position. Turn the SB-300 AUDIO GAIN control fully counterclockwise.

- () Tune the other receiver to WWV or a standard broadcast station as described above. Adjust ceramic trimmer capacitor C on the RF circuit board with an insulated screwdriver for "zero beat" heard in the other receiver. When WWV is used, the period when no tone modulation is present allows easier identification of zero beat. Zero beat will be recognized as the point at which a harmonic of 100 kc corresponds to the frequency of the station that is tuned in on the receiver. As zero beat is approached, a tone, decreasing in frequency until it finally stops, will be heard from the receiver. Set the FUNCTION switch to OPR and then back to CAL to be sure you have a true zero beat.

CRYSTAL CALIBRATOR ALIGNMENT

- () Couple the antenna connector of the SB-300 Receiver to the antenna connector of another receiver capable of receiving WWV at 2.5 mc, 5 mc, 10 mc, or 15 mc. If this is not possible, a receiver tuned to a standard broadcast station, operating at an even multiple of 100 kc can be used.
- () Turn ON the SB-300 and the other receiver. Set the FUNCTION switch of the

ALIGNMENT WITH 100 KC CRYSTAL CALIBRATOR

The output of the crystal calibrator will be used as the signal source in this alignment procedure. In order to obtain this signal, place the FUNCTION switch in CAL position and tune the Main Tuning knob to one side of the zero beat, placing the signal in the center of the crystal filter passband as indicated by a maximum S-Meter reading.

() Set the Front Panel controls as follows:

PRESELECTOR - To the proper setting for the band being aligned. See Figure 5.
 RF GAIN - full clockwise
 BAND switch - 3.5 MC
 AF GAIN - 3 o'clock
 AGC - FAST
 FUNCTION switch - OFF
 MODE switch - LSB
 Main Tuning - 4.0 MC
 Converter switch (at rear of chassis) - HF

- () Plug the Receiver into a 120 volt, 50/60 cps AC outlet and turn the FUNCTION switch to the OPR position and adjust the Meter Adjust control for a zero reading on the S-Meter.
- () Perform the Heterodyne Oscillator Adjustment as described on Page 60.
- () Perform the Crystal Calibrator Alignment as described on Page 61.
- () With the SB-300 still set on one side of zero beat, adjust IF transformers T3 and T4 for a maximum audio output or S-Meter reading.
- () Place the PRESELECTOR knob in the position indicated in Figure 5 for the band being aligned.
- () Alignment of the antenna and RF amplifier plate coils can now be performed. Use the chart on Page 61. Turn the Receiver's FUNCTION switch to CAL and tune the Main Tuning to the side of zero beat that gives a maximum S-Meter indication at the frequencies noted in the SB-300 Receiver And Generator Frequency column of the Chart. Then adjust the coil as described.

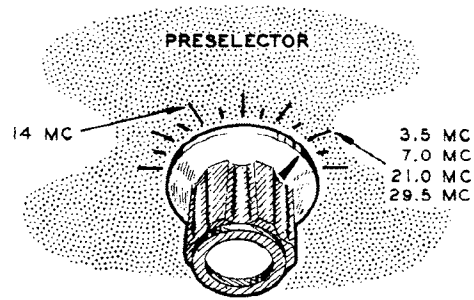


Figure 5

LMO SHIFTER ADJUSTMENT

- () Set the Main Tuning for 3.8 mc.
- () Turn the FUNCTION switch to CAL. Carefully zero beat the calibrator signal (using the Main Tuning knob) with the MODE switch in the USB position and peak the PRESELECTOR.
- () Turn the MODE switch to the LSB position. Be careful not to touch the Main Tuning dial. Now note that the calibrate signal may or may not be exactly at zero beat in the LSB position. Turn the Frequency Shift adjustment on the LMO for an exact zero beat in the LSB mode. Recheck the zero beat in the USB mode to be certain of the adjustment. Repeat the procedure if necessary.

DIAL CALIBRATION

- () Zero beat the crystal calibrator at 3.8 mc.
- () Set the zero set marking in the center of the circular dial window.
- () Remove the knob from the Main Tuning shaft without disturbing the zero beat.
- () Place a screwdriver through the hole in the dial escutcheon directly above the Main Tuning shaft and into the LMO dial drive shaft.
- () Hold the LMO drive shaft on zero beat and loosen the setscrew in the circular dial bushing. Turn the circular dial until the 0 is directly under the marking on the zero set dial. Now tighten the setscrew.

() Make sure that the circular dial turns freely and that the spiral drive pawl is properly engaged in the spiral before proceeding.

() Replace the knob on the Main Tuning shaft.

This completes the alignment of your Heathkit SSB Receiver.

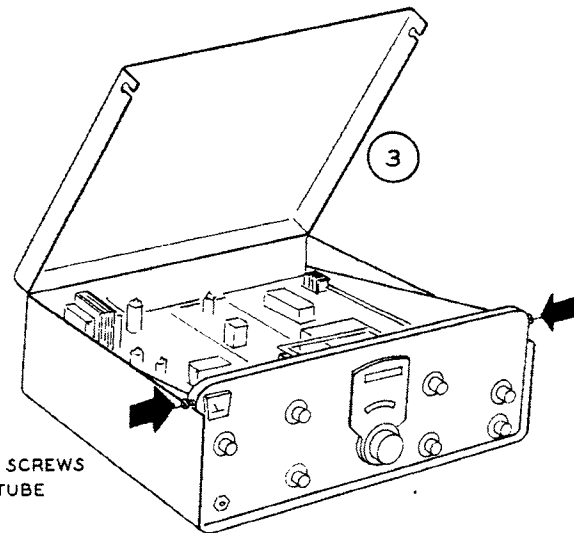
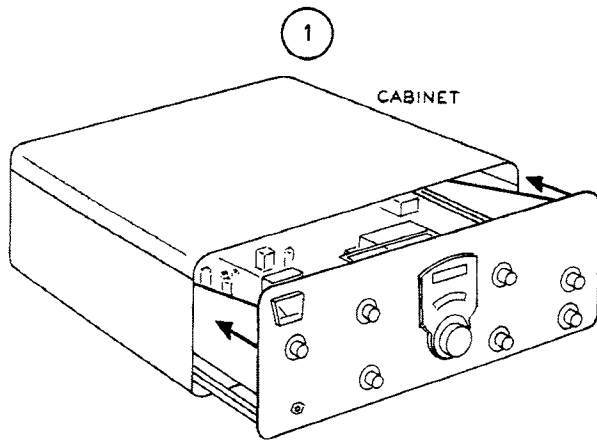
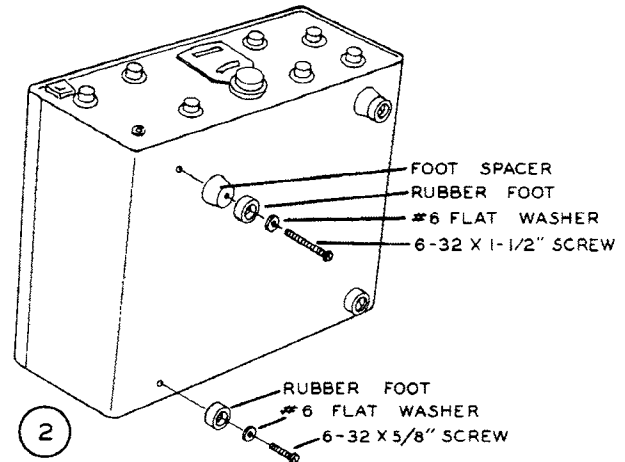


Figure 6 LOOSEN THESE TWO SCREWS TO LIFT COVER FOR TUBE REPLACEMENT.

CABINET INSTALLATION

Refer to Figure 6 for the following steps.

() Slide the Receiver into the cabinet from the front. Be sure the cabinet is right-side up.

() Turn the Receiver and cabinet over and mount a rubber foot on each rear corner. Use 6-32 x 5/8" screws, with #6 flat washers. Fasten the screws into the tapped holes on the bottom of the chassis. If you do not wish to have the Receiver set at an angle, mount two rubber feet on the front of the Receiver in the same manner. For angle positioning of the Receiver, see the next two steps.

() Place a #6 flat washer in one of the remaining rubber feet. Place a 6-32 x 1-1/2" screw through the foot. Now slip a foot spacer over the screw with the wide end up. Screw the 6-32 screw into the bottom of the cabinet at either front corner.

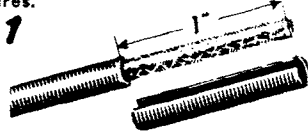
() Similarly, mount the other rubber foot and foot spacer on the front of the cabinet.

() Install the 8-32 x 1/4" undercut oval head screws in the cabinet as shown to secure the cabinet top cover, close the top and tighten the screws.

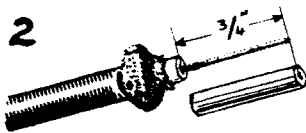
INSTALLATION

Refer to Figures 7 (fold-out from Page 59), 8, and 9 (fold-out from Page 60) for examples of station hookup using the Receiver. Although the Receiver operates at a normal ambient temperature, it should be placed where adequate circulation is present. Refer to Figure 7A for installing a phono plug on the RG-62/U coaxial cable supplied with the kit. These cables are for the LMO, BFO, and Heterodyne Oscillator output jacks for transceiver operation. They must be cut to exactly 24". They should be made up at this time and stored for future use.

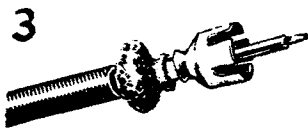
Remove 1" of outer insulation. It may be necessary to slit the insulation lengthwise to remove. Take care not to cut shield wires.



Push the shield back as far as it will go and strip off 3/4" of insulation from the inner conductor and tin inner conductor.



Place phono connector on cable firmly against inner insulation. Solder inner conductor.



Dress shield up on base of connector and solder. Then trim inner conductor from tip.



Figure 7A

REAR APRON CONNECTIONS

HF ANTENNA - The antenna input circuit is designed to accept a 50 Ω unbalanced antenna. The receiving antenna for signals in the 3.5 to 30 MC amateur bands should be connected to the socket.

VHF NO 1 AND NO 2 ANTENNA - The 28 mc output of the VHF converters used is connected to either of these input sockets. Either socket is switch selected by the Converter switch at the rear of the chassis.

MUTE - The muting function is connected to the VOX control relay in the transmitter. Normal operation is obtained with the FUNCTION switch in STBY and the muting cable is shorted through the VOX relay. Muting occurs under transmission when the VOX relay is open.

ANTI-VOX-500 Ω - The anti-vox is connected into the anti-vox jack on the transmitter to prevent the Receiver audio from tripping the transmitter VOX.

SPEAKER - The speaker socket is for the connection of an 8 Ω speaker.

LMO OUTPUT - The LMO operating frequency is present at this socket for connection to a compatible transmitter for transceiver operation. Use the RG-62/U coaxial cable supplied.

HETERODYNE OSCILLATOR - The heterodyne oscillator operating frequency is available at this socket for connection to a compatible transmitter for transceiver operation. Use the RG-62/U coaxial cable supplied.

BFO - The BFO output signal is present at this socket for connection to a compatible transmitter for transceiver operation. Use the RG-62/U coaxial cable supplied.

CONVERTER SOCKET - B+ and filament voltages are present at this socket for VHF NO 1 and VHF NO 2 converter operation. These voltages are applied to the appropriate converter when the converter switch on the rear of the chassis is switched to the converter position. An AGC voltage is available for connection to converters for gain control.

OPERATION

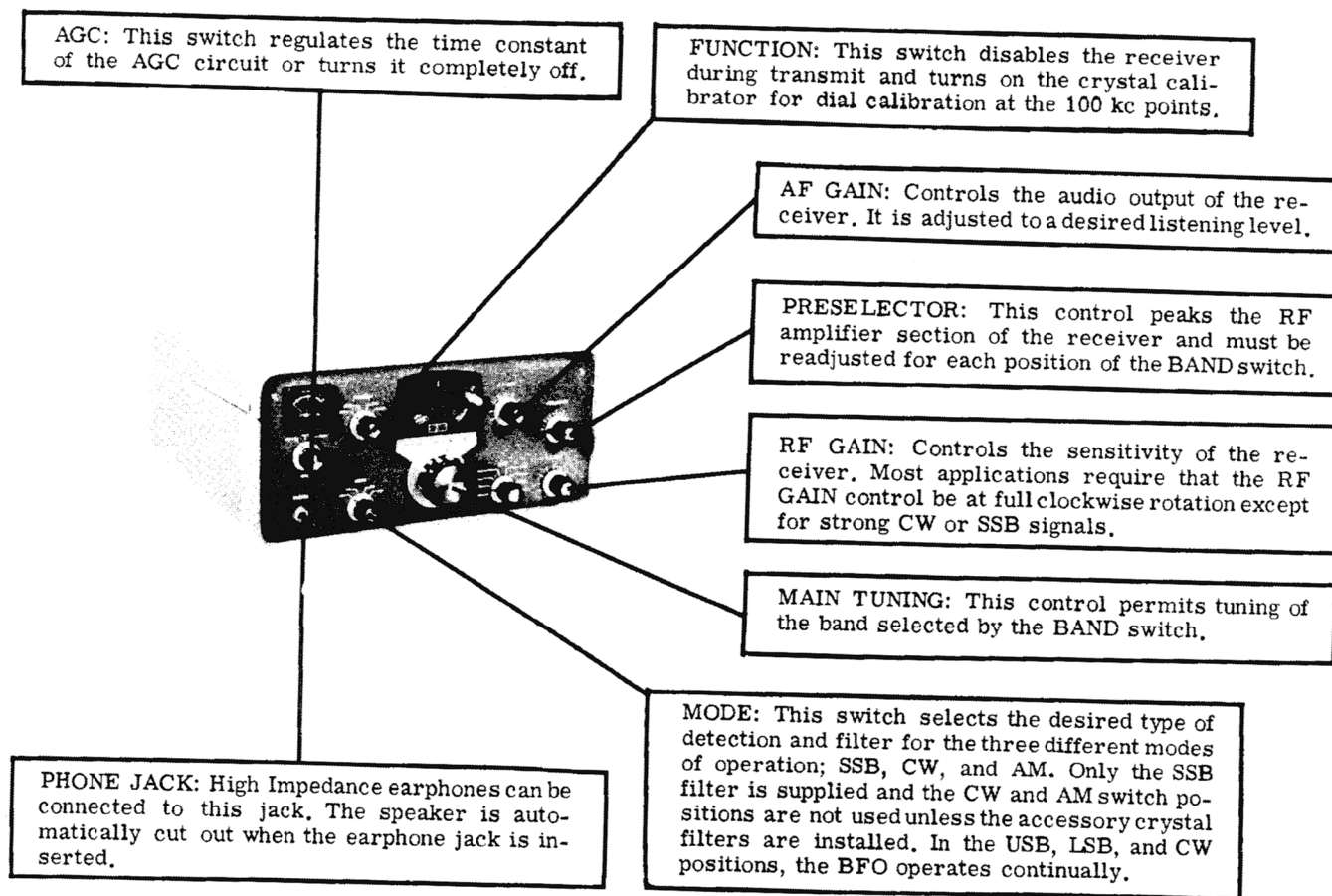


Figure 10

Refer to Figure 10 for a complete explanation of each front panel control. The Operation section will be broken into three separate sections: Single Sideband Tuning, AM Tuning, and CW Tuning.

SINGLE SIDEBAND TUNING

1. Place the front panel controls as follows:

RF GAIN control - Full clockwise
 BAND switch - Desired Band
 AF GAIN control - 10 o'clock
 MODE switch - USB or LSB as desired
 AGC switch - SLOW
 FUNCTION switch - CALibrate
 Main Tuning - Desired frequency

2. Zero beat the calibrator signal at the calibration point nearest the desired signal frequency. Turn the Zero Set knob until the zero set line is directly over the zero on the circular dial. Turn the FUNCTION switch to OPR.
3. Peak the PRESELECTOR for maximum audio or S-Meter reading.
4. Tune in a single sideband signal and adjust the AF GAIN control for the desired audio output level.

AM TUNING

Set the front panel controls the same as for "Single Sideband Tuning" except place the AGC switch in the FAST position, and if an AM crystal filter was installed in your receiver, place the MODE switch to AM. Otherwise, leave the MODE switch in the USB or LSB position.

1. Adjust the AF GAIN control for the desired audio output level.
2. Peak the PRESELECTOR for maximum audio or S-Meter reading.
3. Tune in an AM signal and adjust the AF GAIN control for the desired audio output level. NOTE: If you are using the single sideband filter for the reception of AM signal, you will hear a heterodyne beat note on the AM signal. It is necessary to zero beat this note to obtain satisfactory AM signal reception.

CW TUNING

1. Set the front panel controls as described

under "Single Sideband Tuning" except place the MODE switch in the CW position, if the CW crystal filter was installed in your receiver. If not, leave the MODE switch in the USB or LSB position.

If the CW filter is used, the bandpass of the Receiver is so narrow that the zero beat cannot be heard. When the CW signal is centered in the filter passband, an audio signal of 1000 cps will be heard. It is suggested the CW signal be located in the USB mode and tuned for an audio note of 1000 cps. Now switch to the CW mode for elimination of interference and single signal reception.

For extremely weak signals, other than slow AGC may be desired. The Receiver has provision for SLOW, FAST, or OFF AGC. Operation with the AF GAIN control at maximum and adjusting volume with the RF GAIN control will degrade the signal-to-noise performance of the Receiver.

This Receiver can be used with the Heathkit SB-400 Transmitter for transceiver operation. Transceiver operation is discussed in the SB-400 Manual.

IN CASE OF DIFFICULTY

NOTE: At no time should the LMO be opened or the warranty will be voided. The LMO was aligned using the tube supplied. Changing this tube may cause some slight difference in calibration. Replace the tube with one of the same brand if replacement is necessary.

Refer to the photographs and X-ray views at the rear of the manual for the location of the components on the circuit boards and chassis.

1. Recheck the wiring. Trace each lead in colored pencil on the Pictorial as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the constructor.
2. It is interesting to note that about 90% of the kits that are returned for repair, do not function properly due to poor connections and soldering. Therefore, many troubles can be eliminated by reheating all connections to make sure that they are soldered as described in the Proper Soldering Techniques section of this manual.
3. Check to be sure that all tubes are in their proper locations. Make sure that all tubes light up properly.
4. Check the tubes with a tube tester or by substitution of tubes of the same types and known to be good.
5. Check the values of the parts. Be sure that the proper part has been wired into the circuit, as shown in the pictorial diagrams and as called out in the wiring instructions.
6. Check for bits of solder, wire ends or other foreign matter which may be lodged in the wiring.
7. If, after careful checks, the trouble is still not located and a voltmeter is available, check voltage readings against those shown on the Schematic Diagram. NOTE: All voltage readings were taken with an 11 megohm input vacuum tube voltmeter. Voltages may vary as much as 10%.
8. A review of the Circuit Description will prove helpful in indicating where to look for trouble.



TROUBLESHOOTING CHART

NOTE: Refer to the Schematic Diagram (fold-out from Page 79) for voltages and to the Circuit Board X-Ray Views and Chassis Photos (Page 72) for the locations of resistor and capacitors on the Circuit Boards and chassis, by R and C numbers.

SYMPTOM	POSSIBLE CAUSE
Pilot lamps and/or tube filaments do not light.	<ol style="list-style-type: none"> 1. Open fuse in AC line. 2. Function switch incorrectly wired. 3. Terminal strip K (lugs 2, 3, and 4) incorrectly wired to wiring harness or power transformer. 4. Brown leads to circuit boards, V5, and V9 not connected to lug 3 of terminal strip J.
No audio output at speaker.	<ol style="list-style-type: none"> 1. Speaker not connected to 8 Ω speaker socket. 2. Black-orange coaxial cable not internally wired to 8 Ω speaker socket. 3. Black-orange coaxial cable grounded between 8 Ω Speaker socket and lug 4 of phone jack FA. 4. Audio transformer incorrectly wired to terminal strip K, or to B+ and lug 9 of V10. 5. Bad tube at V10. 6. Cathode resistors R114 or R117 open or omitted. 7. AF Gain control R229 incorrectly wired. 8. Black-yellow coaxial cable from lug 2 of V10 to lug 3 of control R229 shorted. 9. Coupling capacitor C116 omitted. 10. Mode switch MS4R incorrectly wired. 11. BFO (V9B) inoperative. 12. No B+ at lug 4 of V9. 13. Y9 or Y10 defective. 14. Product detector (V9A) inoperative. 15. No B+ at lug 8 of V9. 16. Capacitor C114 omitted.
No IF output.	<ol style="list-style-type: none"> 1. Bad tube at V6 or V7. 2. No voltage at lugs 5 and 6 of V6 or V7. 3. Open cathode resistors at V6 or V7. 4. T3 and T4 not peaked at 3395 kc. 5. C114 omitted (for product detection only). 6. C113 omitted (for AM detection only).

SYMPTOM	POSSIBLE CAUSE
AGC inoperative.	<ol style="list-style-type: none"> 1. C110 omitted. 2. Defective diodes at CR1 and CR2. 3. Diode CR1 or CR2 installed backwards. 3. C109 and/or R118 defective or incorrectly wired to AGC switch. 4. IF amplifiers V6 and V7 incorrectly wired to AGC switch. 5. Bad tubes at V6 and V7. 6. AGC switch in OFF position.
S-Meter does not zero.	<ol style="list-style-type: none"> 1. Meter incorrectly wired in circuit. 2. S-Meter Adjust control R108 incorrectly wired. 3. Bad tube at V6 or V7. 4. No B+ voltage at lugs 5 and 6 of V6. 5. Open cathode resistor at V7.
Improper filter selected for mode in use.	<ol style="list-style-type: none"> 1. MS1F and MS2R wired incorrectly. 2. Reversed rotor or wafer at MS1 and MS2.
Improper selection of product or AM detectors.	<ol style="list-style-type: none"> 1. Wrong BFO frequency caused by incorrect wiring at Y9 and Y10. 2. Y9 and Y10 mounted in wrong sockets. NOTE: Selection of detectors is made at MS4R. Selection of BFO frequency for product detection is made at MS4R.
No 2nd mixer (V3) output.	<ol style="list-style-type: none"> 1. Bad tube at V3. 2. No B+ at plate and screen of V3. 3. Open cathode resistor R12. 4. Shorted LMO coaxial cable. 5. No LMO output (5.0 to 5.5 mc). 6. Bad tube at V5. 7. Lack of filament or plate voltage to LMO. 8. Lack of output from V2 and/or T2. 9. No B+ at lugs 5 and 6 of V2. 10. Open cathode resistor R8. 11. No heterodyne oscillator (V4) output. 12. No RF amplifier (V1) output. 13. Reversed rotor or wafer at BS1R and BS3R. 14. Reversed rotor or wafer at BS5F and BS5R. 15. Reversed rotor or wafer at BS6R.
No 1st mixer (V2) output.	<ol style="list-style-type: none"> 1. Bad tube at V2. 2. No B+ at lugs 5 and 6 of V2. 3. Open cathode resistor R8. 4. No heterodyne oscillator (V4) output. 5. No B+ at lug 1 of V4. 6. Heterodyne oscillator plate coil untuned or defective. 7. Crystal defective or not in socket. 8. Crystal improperly wired to BS1R. 9. Plate coils improperly wired to BS3R.

SYMPTOM	POSSIBLE CAUSE
No 1st mixer (V2) output (cont'd.).	10. C8 at BS3F improperly wired or omitted. 11. Coaxial cable from BS3F3 to lug 1 of V2 shorted. 12. No RF amplifier (V1) output. 13. Reversed rotors on wafers at BS1R, BS3R, BS5 and BS6.
No RF Amplifier (V1) output or low sensitivity.	1. Bad tube at V1. 2. No B+ at lugs 5 and 6 of V1. 3. Open cathode resistor R2. 4. Antenna and RF amplifier coils not aligned properly. 5. Low heterodyne oscillator (V4) output. 6. Low B+ to V1 and V4. 7. Antenna and RF amplifier coils incorrectly wired. 8. Coaxial cable from BS5R to lug 1 of V1 shorted. 9. Reversed rotors or wafers at BS6R, BS5, and BS4.
Crystal calibrator (V8) inoperative.	1. Bad tube at V8. 2. No B+ at lugs 5 and 6 of V8. 3. Open cathode resistor R17. 4. C21 omitted or incorrectly wired. 5. Cathode lead to Function switch omitted. 6. Function switch not in <u>CAL</u> position. 7. Crystal not in socket. 8. Trimmer C20 or R16 omitted or miswired.
Power supply difficulties.	1. Check B+ voltages at capacitor H(C227). 2. Check filament voltage at lug 3 of terminal strip J. 3. Check bias voltage at lugs 1 and 10 of terminal strip J and lugs 1 and 7 of terminal strip K. NOTE: These voltages should be as shown on the Schematic.
Converter switching difficulties.	1. Check for filament voltage at lug 11 of Converter switch. 2. Check for B+ voltage at lug 3 of Converter switch. 3. Check wiring from Converter switch to Converter sockets.

SERVICE INFORMATION

SERVICE

If, after applying the information in this manual and your best efforts, you are still unable to obtain proper performance, it is suggested that you take advantage of the technical facilities which the Heath Company makes available to its customers.

The Technical Consultation Department is maintained for your benefit. This service is available to you at no charge. Its primary purpose is to provide assistance for those who encounter difficulty in the construction, operation or maintenance of HEATHKIT equipment. It is not intended, and is not equipped to function as a general source of technical information involving kit modifications nor anything other than the normal and specified performance of HEATHKIT equipment.

Although the Technical Consultants are familiar with all details of this kit, the effectiveness of their advice will depend entirely upon the amount and the accuracy of the information furnished by you. In a sense, YOU MUST QUALIFY for GOOD technical advice by helping the consultants to help you. Please use this outline:

1. Before writing, fully investigate each of the hints and suggestions listed in this manual under In Case Of Difficulty. Possibly it will not be necessary to write.
2. When writing, clearly describe the nature of the trouble and mention all associated equipment. Specifically report operating procedures, switch positions, connections to other units, and anything else that might help to isolate the cause of trouble.
3. Report fully on the results obtained when testing the unit initially and when following the suggestions under In Case Of Difficulty. Be as specific as possible and include voltage readings if test equipment is available.
4. Identify the kit model number and date of purchase, if available. Also mention the date of the kit assembly manual. (Date at bottom of Page 1.)
5. Print or type your name and address, preferably in two places on the letter.

With the preceding information, the consultant will know exactly what kit you have, what you would like it to do for you and the difficulty you wish to correct. The date of purchase tells him whether or not engineering changes have been made since it was shipped to you. He will know what you have done in an effort to locate the cause of trouble and, thereby, avoid repetitious suggestions. In short, he will devote full time to the problem at hand, and through his familiarity with the kit, plus your accurate report, he will be able to give you a complete and helpful answer. If replacement parts are required, they will be shipped to you, subject to the terms of the Warranty.

The Factory Service facilities are also available to you, in case you are not familiar enough with electronics to provide our consultants with sufficient information on which to base a diagnosis of your difficulty, or in the event that you prefer to have the difficulty corrected in this manner. You may return the completed equipment to the Heath Company for inspection and necessary repairs and adjustments. You will be charged a minimal service fee, plus the price of any additional parts or material required. However, if the completed kit is returned within the Warranty period, parts charges will be governed by the terms of the Warranty. State the date of purchase, if possible.

Local Service by Authorized HEATHKIT Service Centers is also available in some areas and often will be your fastest, most efficient method of obtaining service for your HEATHKIT equipment. Although charges for local service are generally somewhat higher than for factory service, the amount of increase is usually offset by the transportation charge you would pay if you elected to return your kit to the Heath Company.

HEATHKIT Service Centers will honor the regular 90 day HEATHKIT Parts Warranty on all kits, whether purchased through a dealer or directly from Heath Company; however, it will be necessary that you verify the purchase date of your kit.

Under the conditions specified in the Warranty, replacement parts are supplied without charge; however, if the Service Center assists you in locating a defective part (or parts) in your kit, or installs a replacement part for you, you may be charged for this service.

HEATHKIT equipment purchased locally and returned to Heath Company for service must be accompanied by your copy of the dated sales receipt from your authorized HEATHKIT dealer in order to be eligible for parts replacement under the terms of the Warranty.

THIS SERVICE POLICY APPLIES ONLY TO COMPLETED EQUIPMENT CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Equipment that has been modified in design will not be accepted for repair. If there is evidence of acid core solder or paste fluxes, the equipment will be returned NOT repaired.

For information regarding modification of HEATHKIT equipment for special applications, it is suggested that you refer to any one or more of the many publications that are available on all phases of electronics. They can be obtained at or through your local library, as well as at most electronic equipment stores. Although the Heath Company sincerely welcomes all comments and suggestions, it would be impossible to design, test, evaluate and assume responsibility for proposed circuit changes for special purposes. Therefore, such modifications must be made at the discretion of the kit builder, using information available from sources other than the Heath Company.

REPLACEMENTS

Material supplied with HEATHKIT products has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Occasionally, improper operation can be traced to a faulty component. Should inspection reveal the necessity for replacement, write to the Heath Company and supply all of the following information.

A. Thoroughly identify the part in question by using the part number and description found in the manual Parts List.

- B. Identify the type and model number of kit in which it is used.
- C. Mention date of purchase.
- D. Describe the nature of defect or reason for requesting replacement.

The Heath Company will promptly supply the necessary replacement. PLEASE DO NOT RETURN THE ORIGINAL COMPONENT UNTIL SPECIFICALLY REQUESTED TO DO SO. Do not dismantle the component in question as this will void the guarantee. This replacement policy does not cover the free replacement of parts that may have been broken or damaged through carelessness on the part of the kit builder.

SHIPPING INSTRUCTIONS

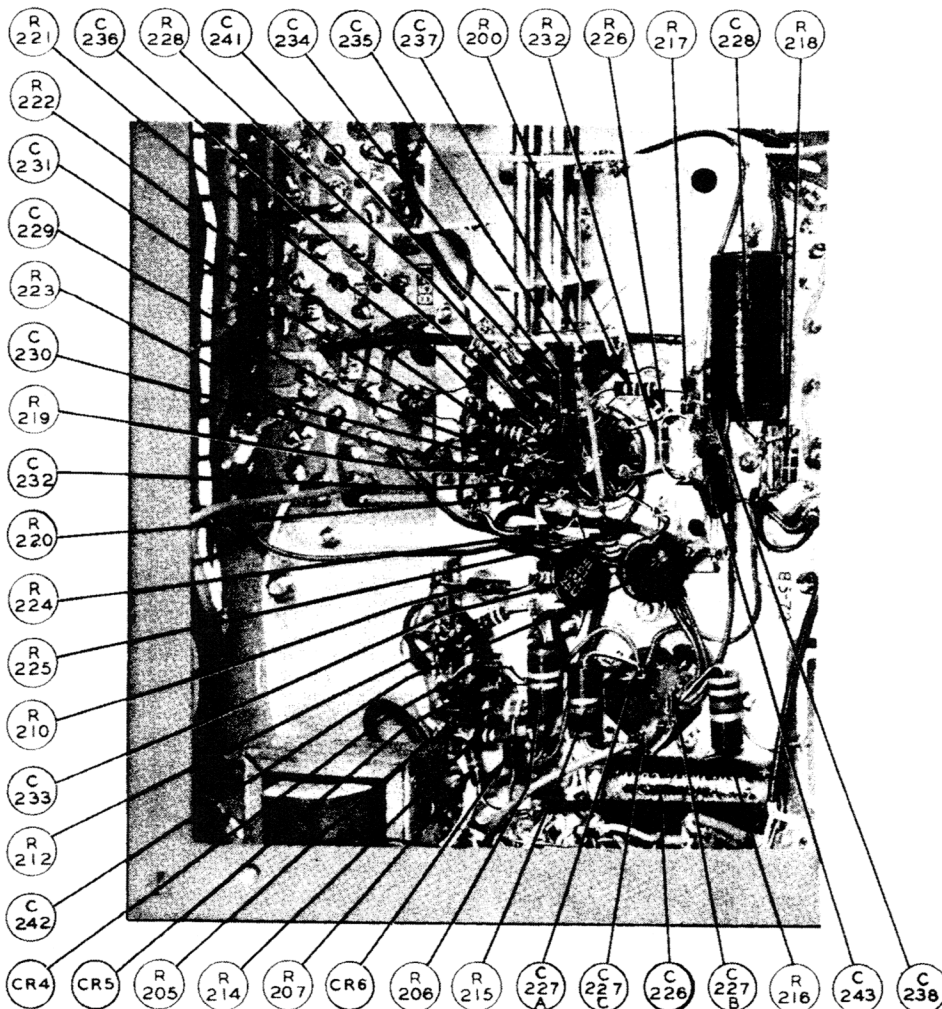
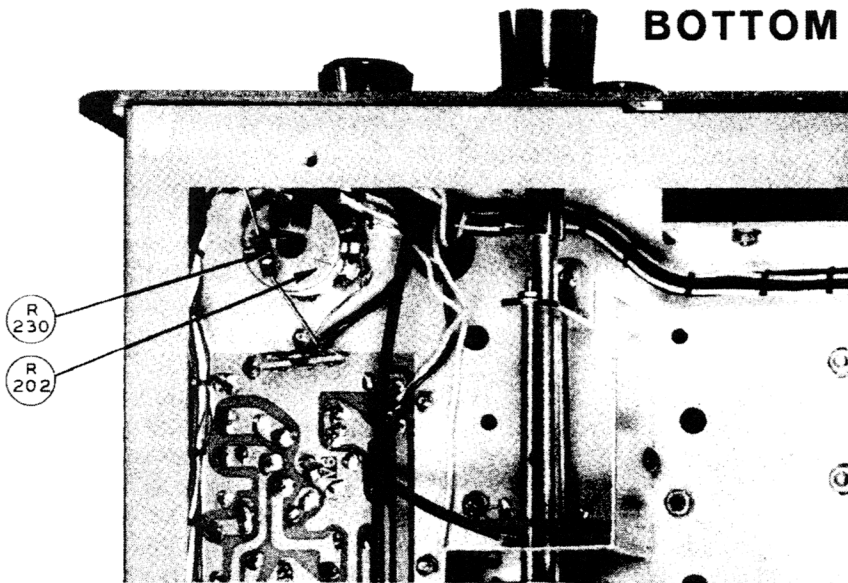
In the event that your instrument must be returned for service, these instructions should be carefully followed.

Wrap the equipment in heavy paper, exercising care to prevent damage. Place the wrapped equipment in a stout carton of such size that at least three inches of shredded paper, excelsior, or other resilient packing material can be placed between all sides of the wrapped equipment and the carton. Close and seal the carton with gummed paper tape, or alternately, tie securely with stout cord. Clearly print the address on the carton as follows:

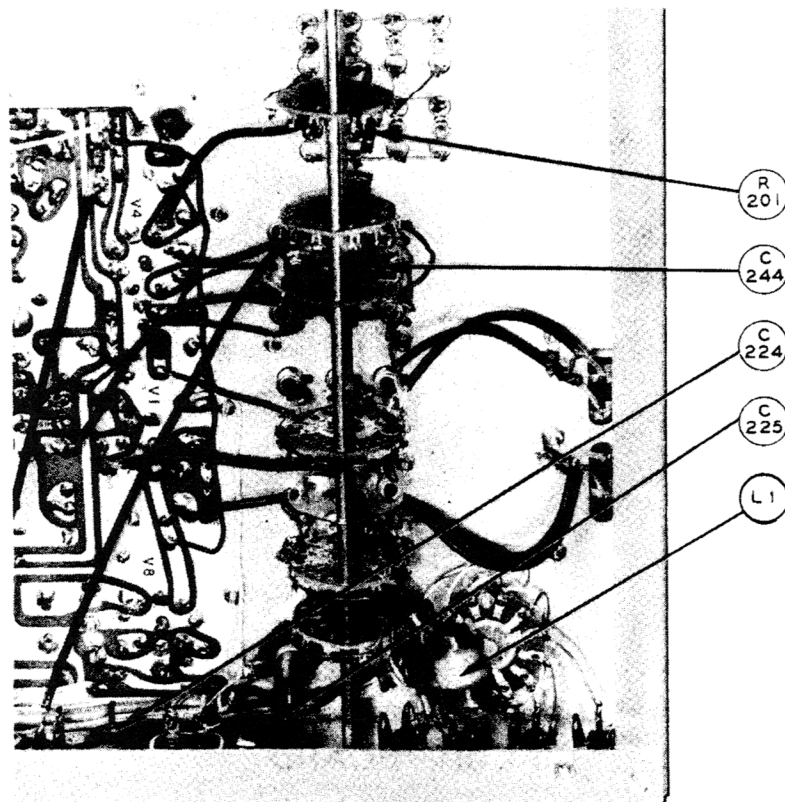
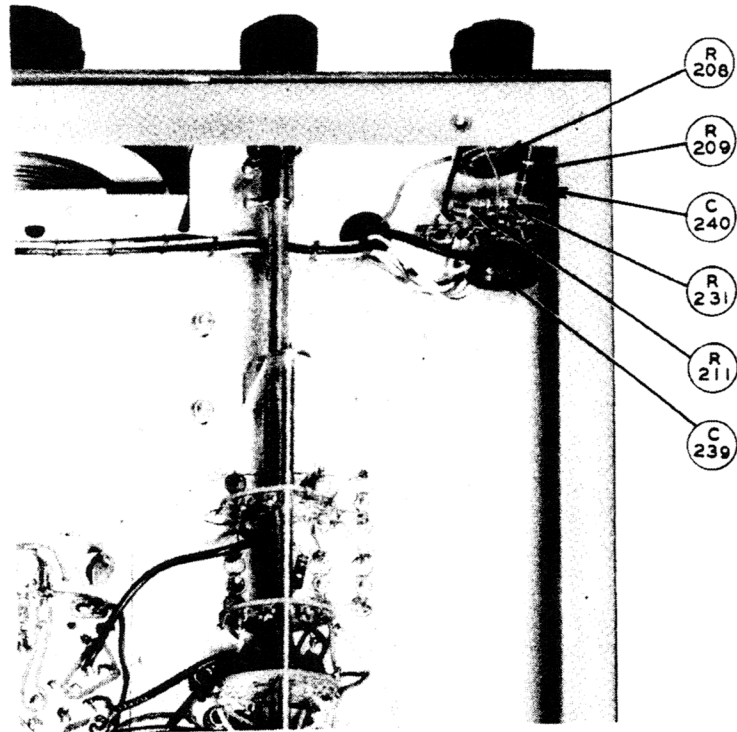
To: HEATH COMPANY
Benton Harbor, Michigan

ATTACH A LETTER TO THE OUTSIDE OF THE CARTON BEARING YOUR NAME, COMPLETE ADDRESS, DATE OF PURCHASE, AND A BRIEF DESCRIPTION OF THE DIFFICULTY ENCOUNTERED. Also, include your name and return address on the outside of the carton. Preferably affix one or more "Fragile" or "Handle With Care" labels to the carton, or otherwise so mark with a crayon of bright color. Ship by insured parcel post or prepaid express; note that a carrier cannot be held responsible for damage in transit if, in HIS OPINION, the article is inadequately packed for shipment.

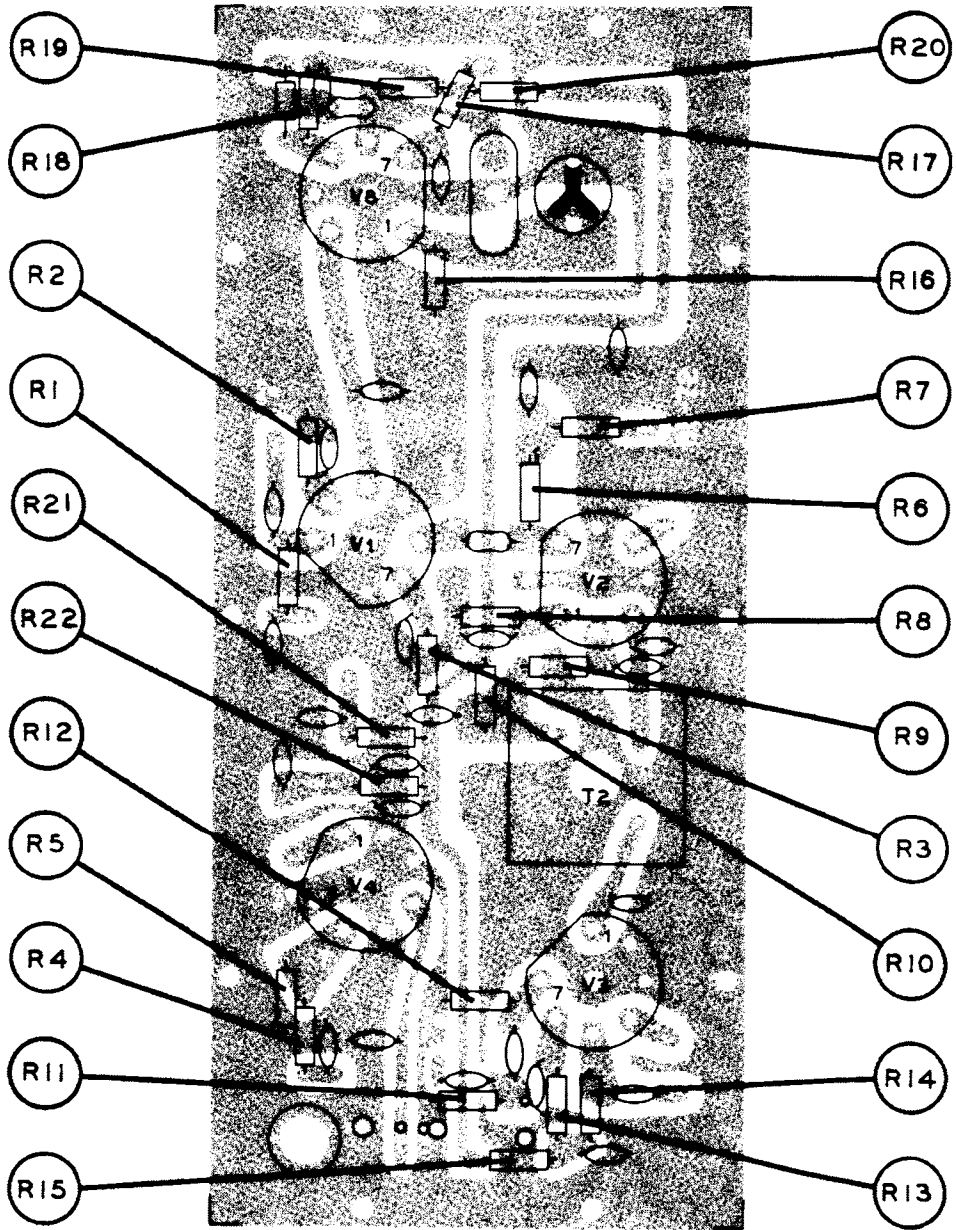
BOTTOM VIEW OF CHASSIS



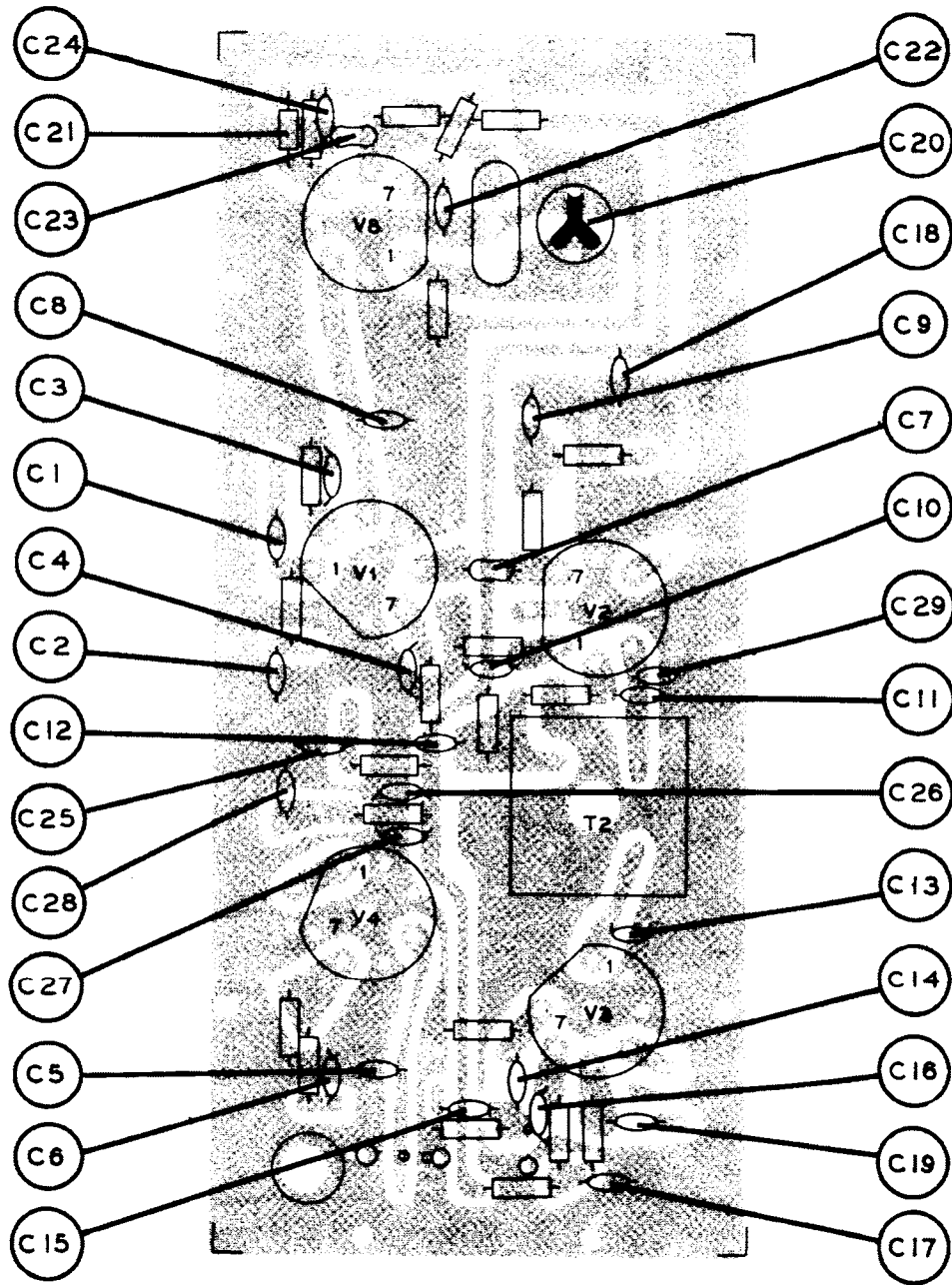
IN FOUR SECTIONS



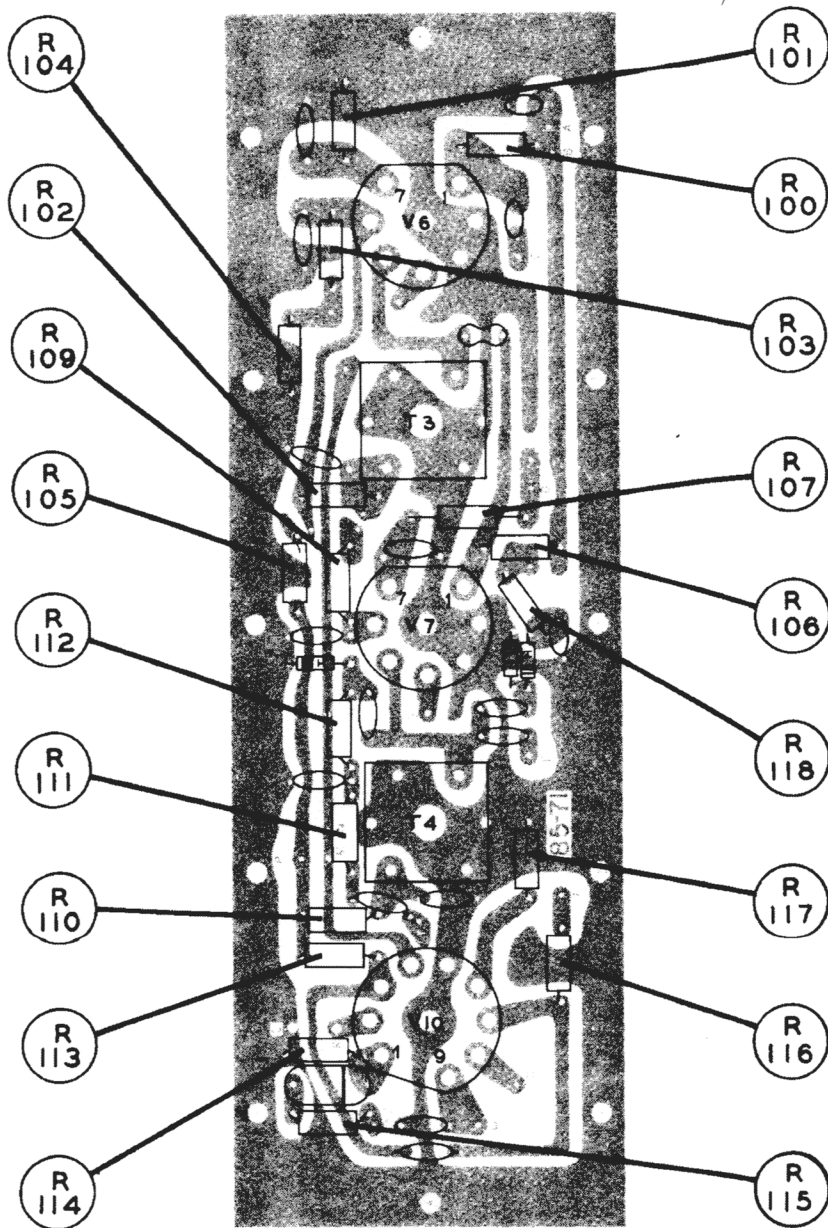
**CIRCUIT BOARD X-RAY VIEWS
(VIEWED FROM FOIL SIDE)**



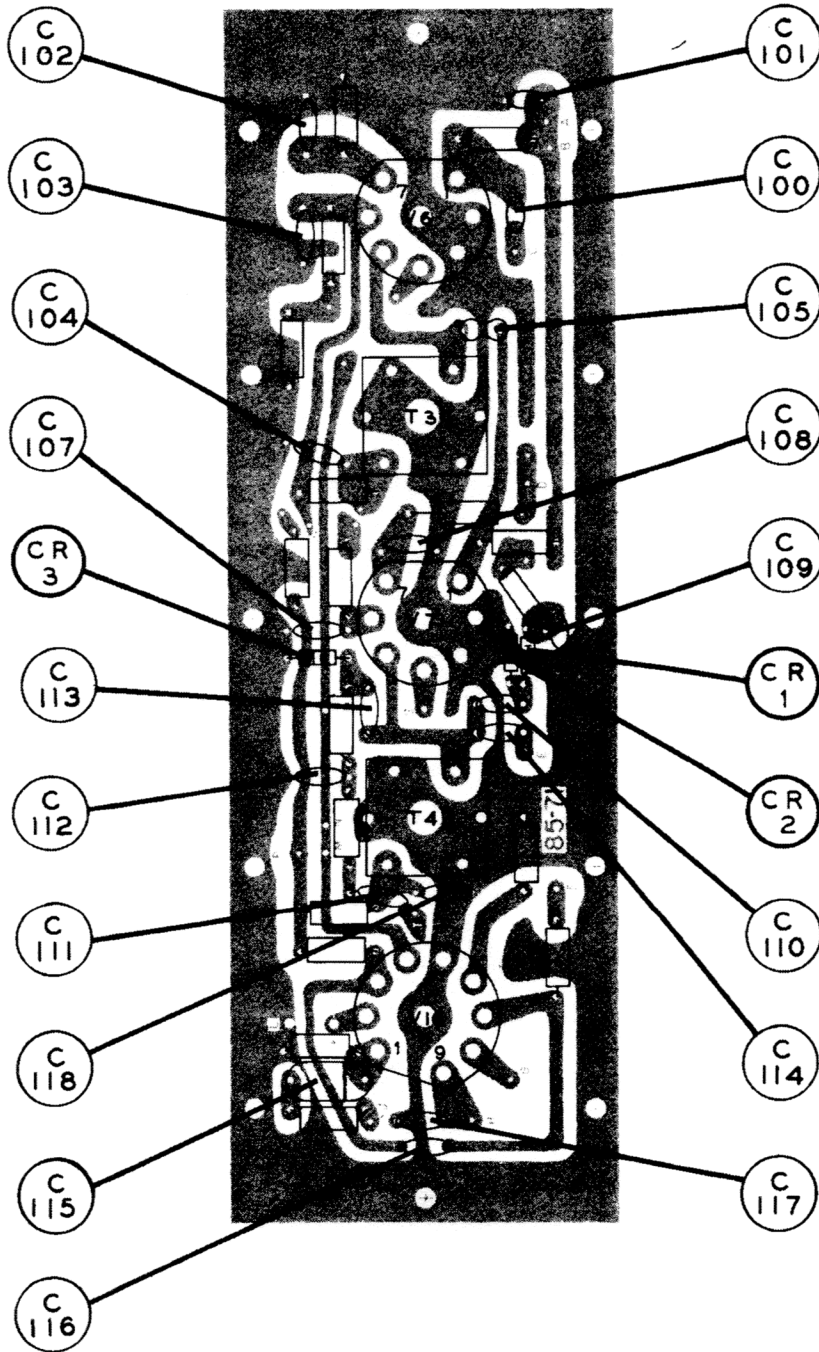
- RESISTORS -
RF AMPLIFIER
CIRCUIT BOARD



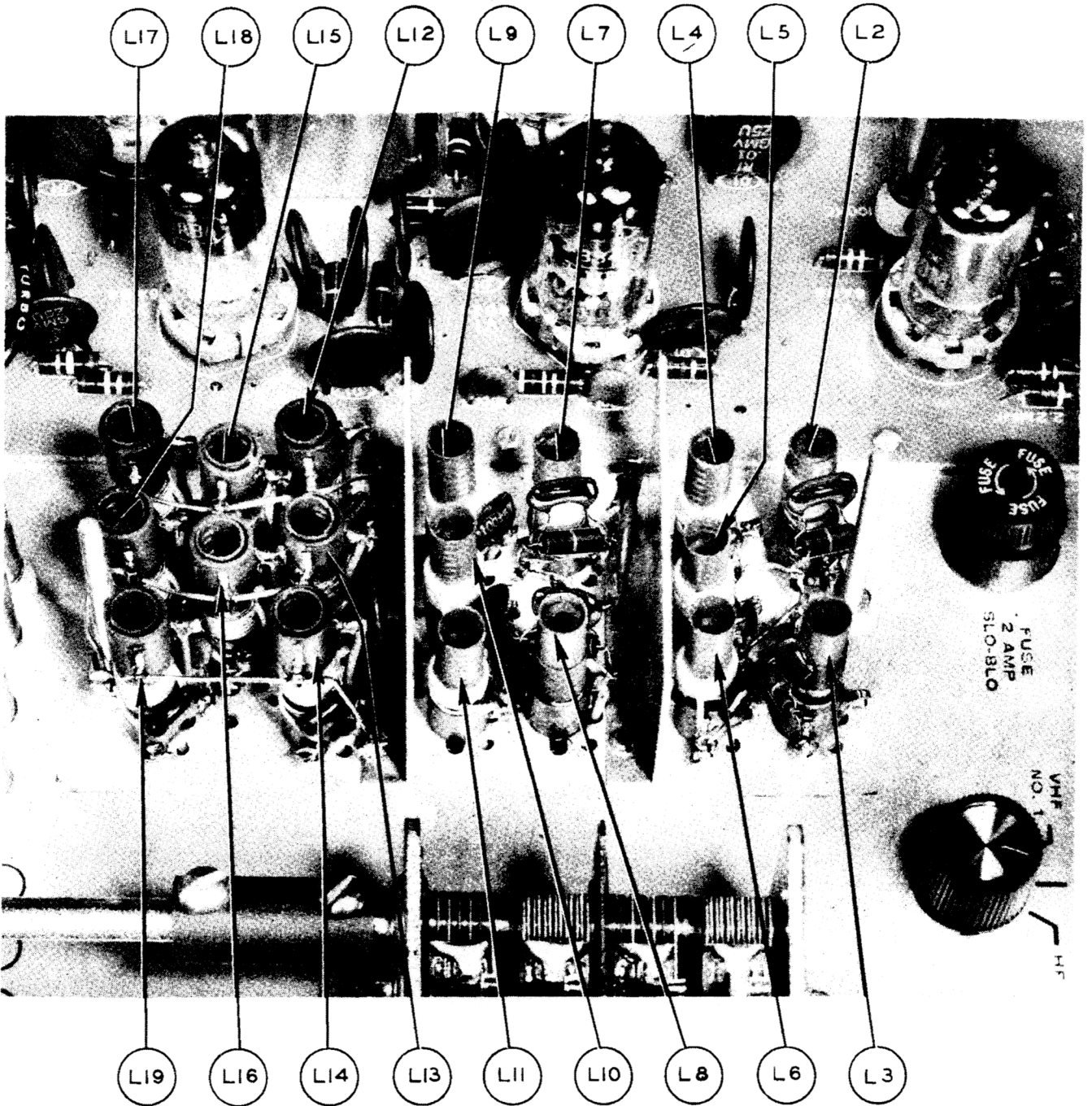
-CAPACITORS-
RF AMPLIFIER
CIRCUIT BOARD

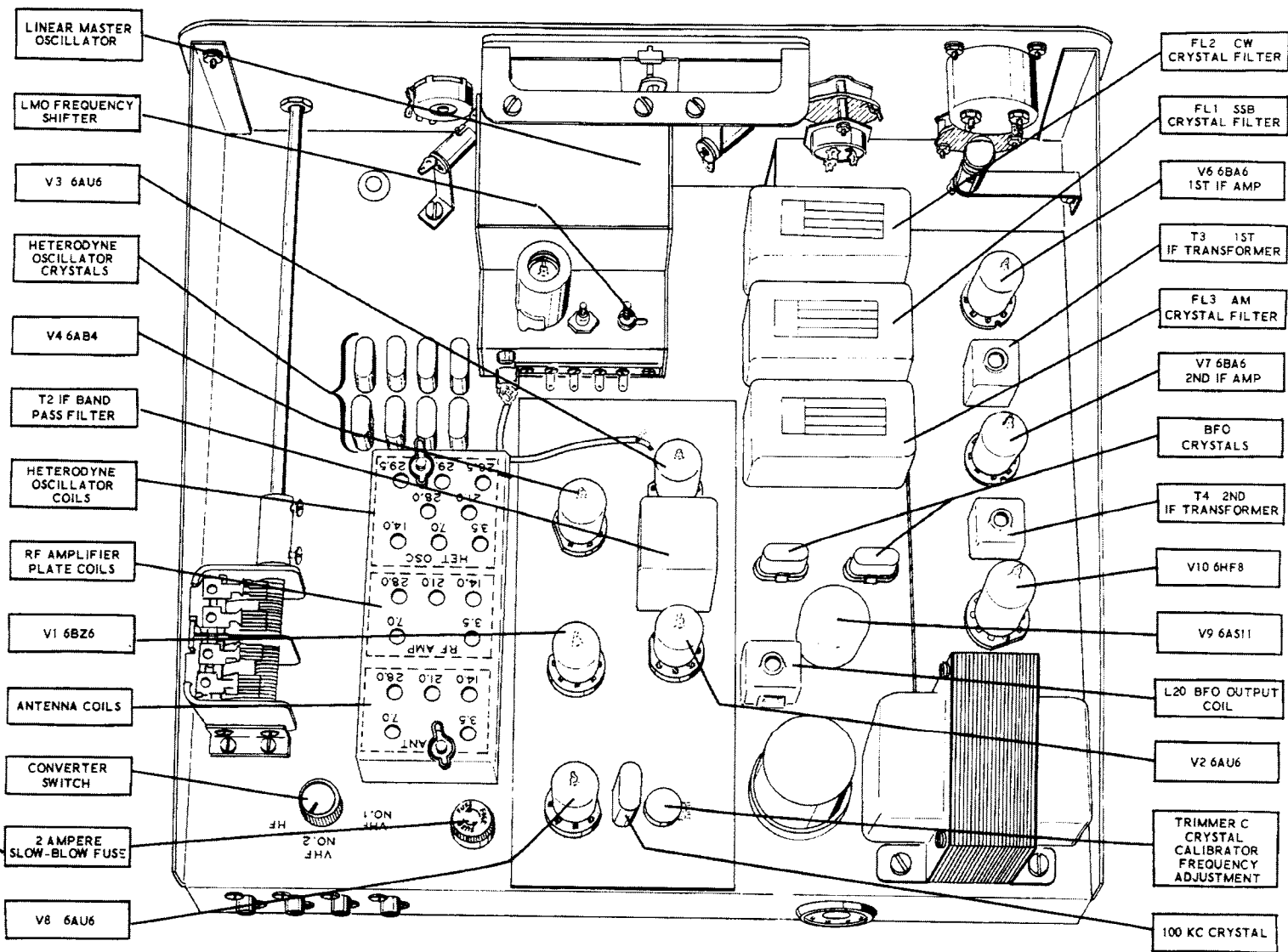


-RESISTORS-
IF AMPLIFIER
CIRCUIT BOARD



-CAPACITORS-
IF AMPLIFIER
CIRCUIT BOARD





PICTORIAL 22

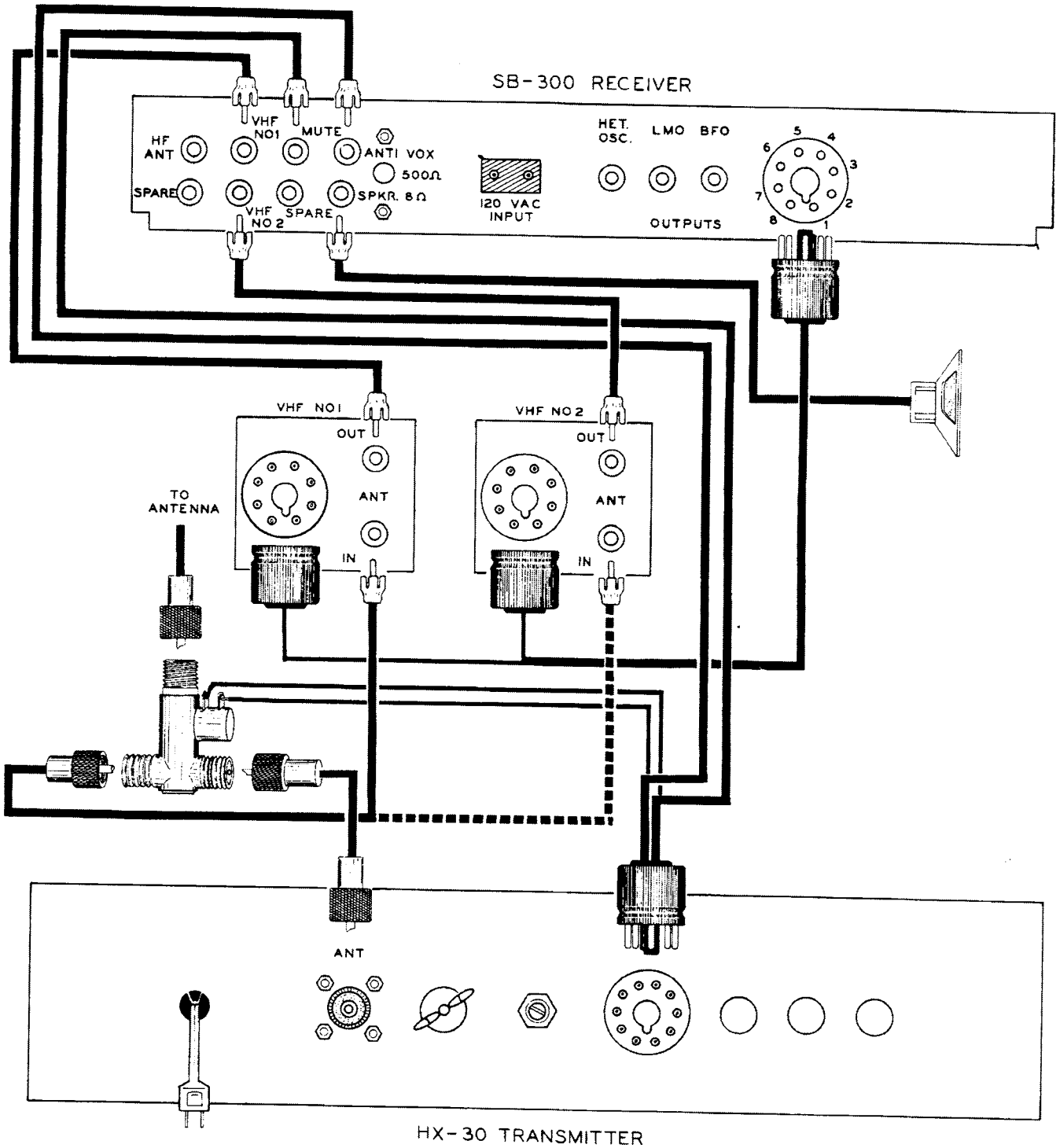


FIGURE 9

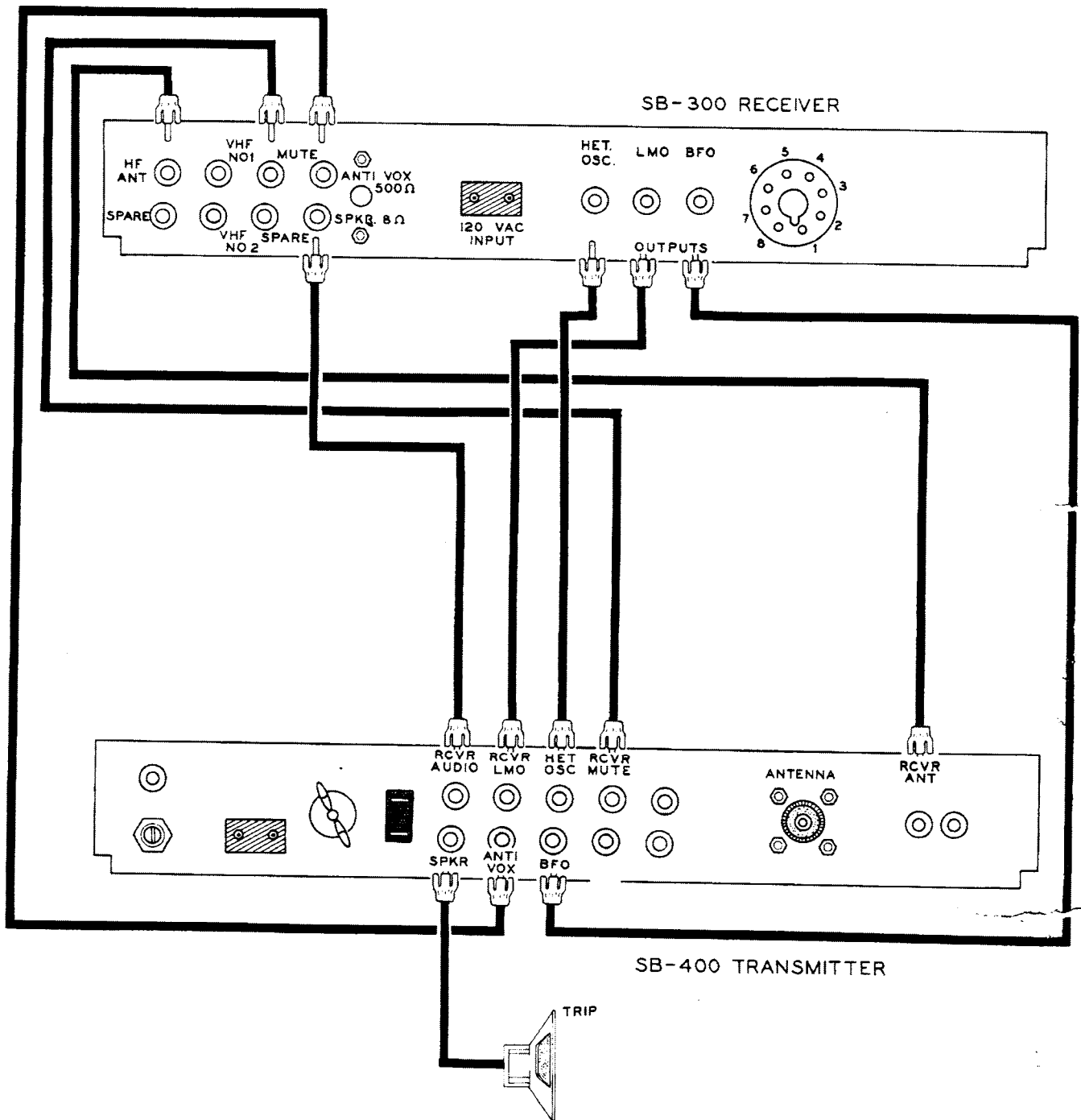


FIGURE 7

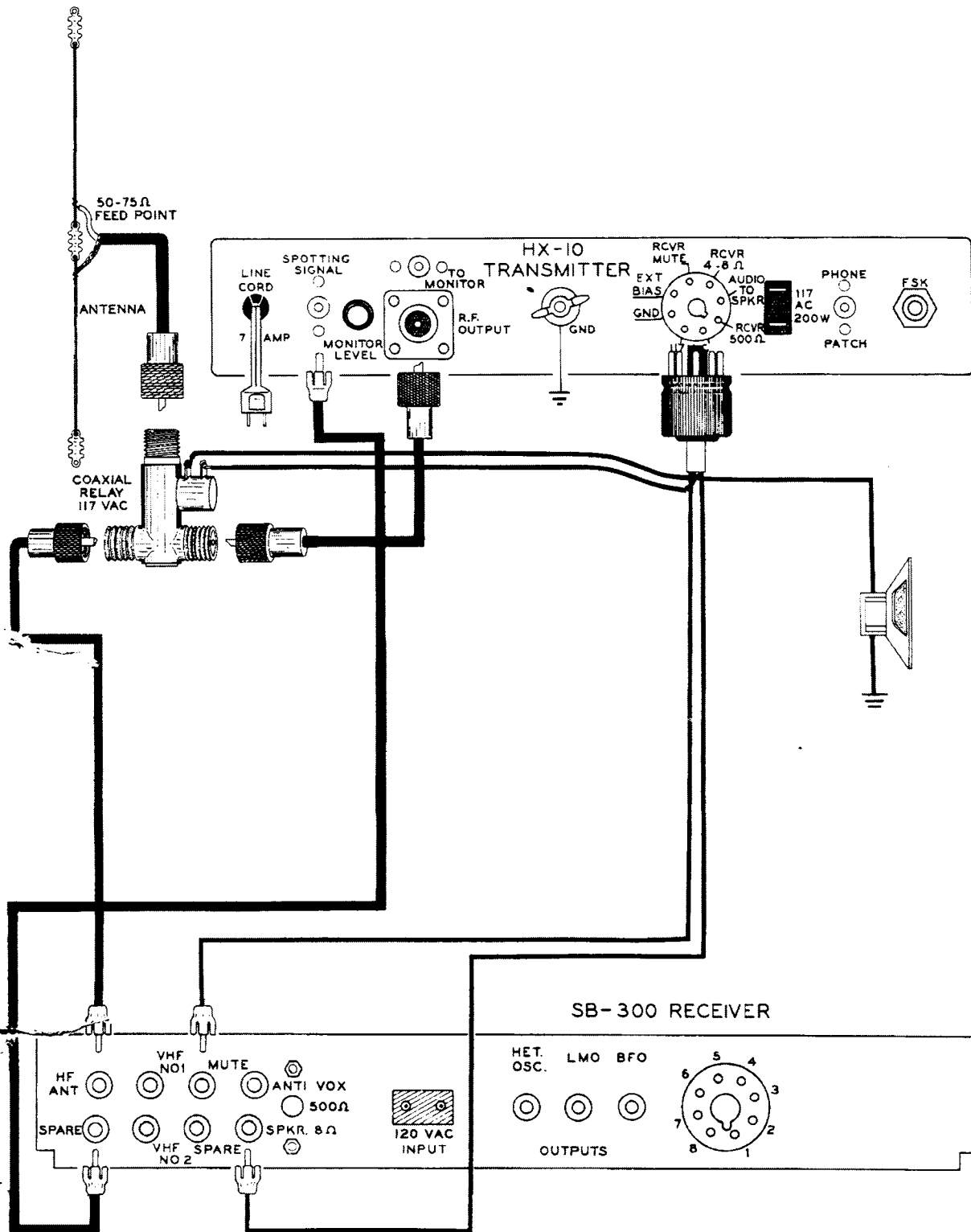


FIGURE 8

WARRANTY

Heath Company warrants that all Heathkit parts shall be free of all defects in materials and workmanship under normal use and service, and in fulfillment of such warranty Heath Company will, for a period of three months from the date of shipment, replace any part upon verification that it is defective.

The foregoing warranty shall apply only to the original buyer, and is and shall be in lieu of all other warranties, whether express or implied and of all other obligations or liabilities on the part of Heath Company and in no event shall Heath Company be liable for any anticipated profits, consequential damages, loss of time or other losses incurred by the buyer in connection with the purchase, assembly or operation of Heathkits or components thereof. No replacement shall be made of parts damaged by the buyer in the course of handling or assembling Heathkit equipment.

The foregoing warranty is completely void if corrosive solder or fluxes have been used in wiring the equipment, Heath Company will not replace or repair any equipment in which corrosive solder or fluxes have been used.

This warranty applies only to Heath equipment sold and shipped within the continental United States including APO and FPO shipments. Warranty replacements for Heathkit equipment outside the United States is on a f.o.b. factory basis. Contact the Heathkit authorized distributor in your country or write: Heath Company, International Division, Benton Harbor, Michigan, U.S.A.

HEATH COMPANY

NOTES:

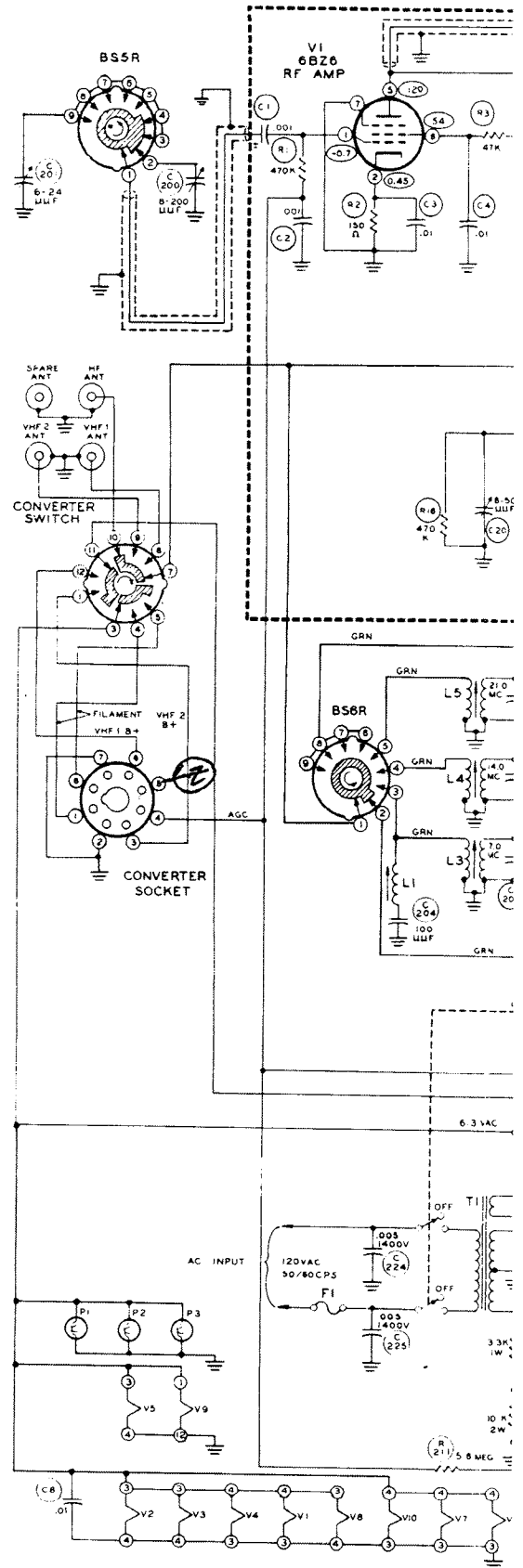
- ALL RESISTORS ARE 1/2 WATT UNLESS MARKED OTHERWISE.
- ALL RESISTOR VALUES ARE IN OHMS (K=1000, MEG=1,000,000).
- ALL CAPACITOR VALUES ARE IN μ F D UNLESS MARKED OTHERWISE.
- INDICATES VOLTAGE READING.
- ALL VOLTAGES MEASURED WITH NO SIGNAL INPUT.
- ALL VOLTAGES ARE DC POSITIVE UNLESS MARKED OTHERWISE.
- ALL VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND, EXCEPT AC VOLTAGES ON POWER TRANSFORMER WINDINGS.
- VOLTAGE READINGS TAKEN WITH AN 11 MEGOHM INPUT VTVM.
- VOLTAGES MAY VARY $\pm 10\%$.
- ALL SWITCHES VIEWED FROM THE REAR, (UNLESS MARKED OTHERWISE), AT FULL COUNTERCLOCKWISE ROTATION.
- ARROW (→) INDICATES CLOCKWISE ROTATION OF KNOB.



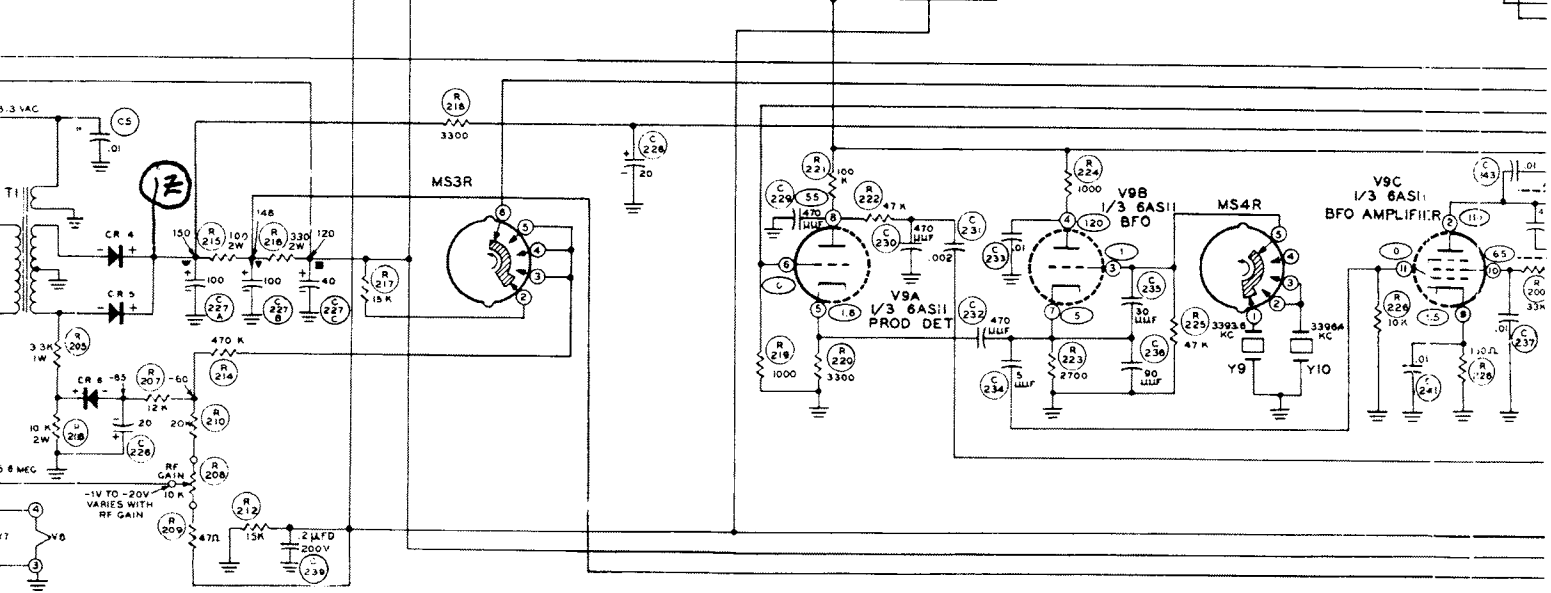
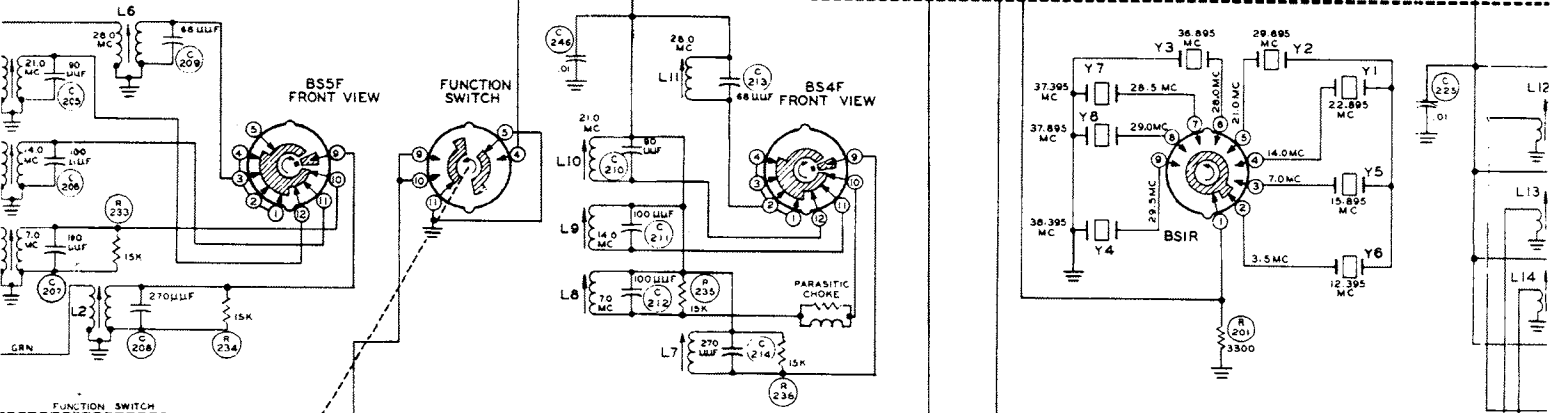
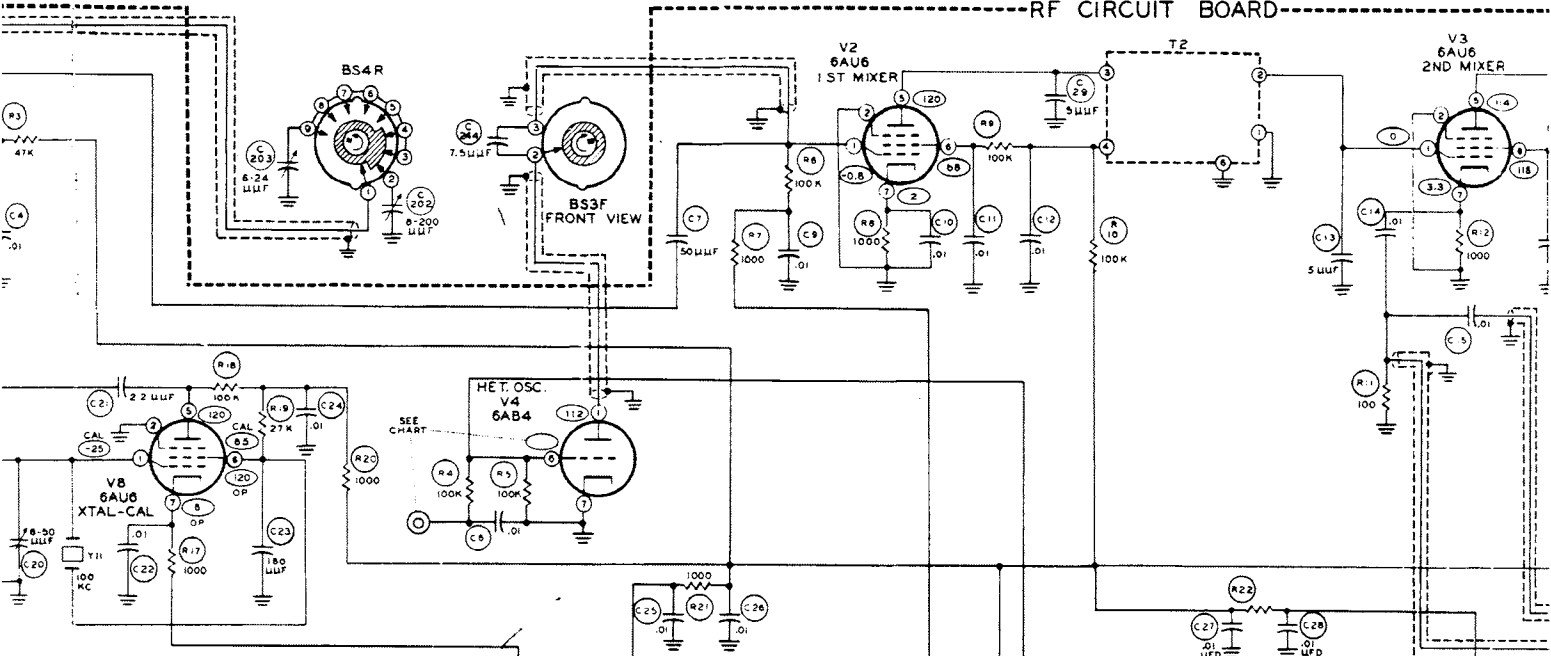
THE SMALL SQUARE DOT IN THE CENTER OF SOME SWITCH WAFERS ON THE FUNCTION, MODE, AND BAND SWITCHES INDICATE A CONNECTION BETWEEN THE FRONT AND REAR ROTORS OF THAT WAFER.

REFER TO THE X-RAY VIEWS FOR THE PHYSICAL LOCATION OF PARTS ON THE CIRCUIT BOARD.

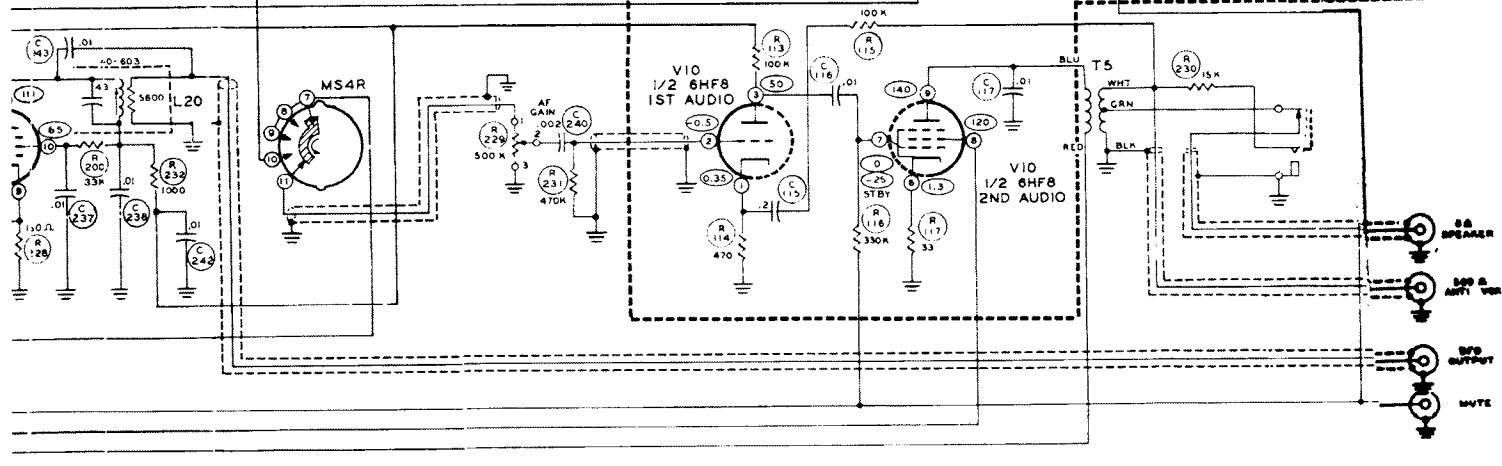
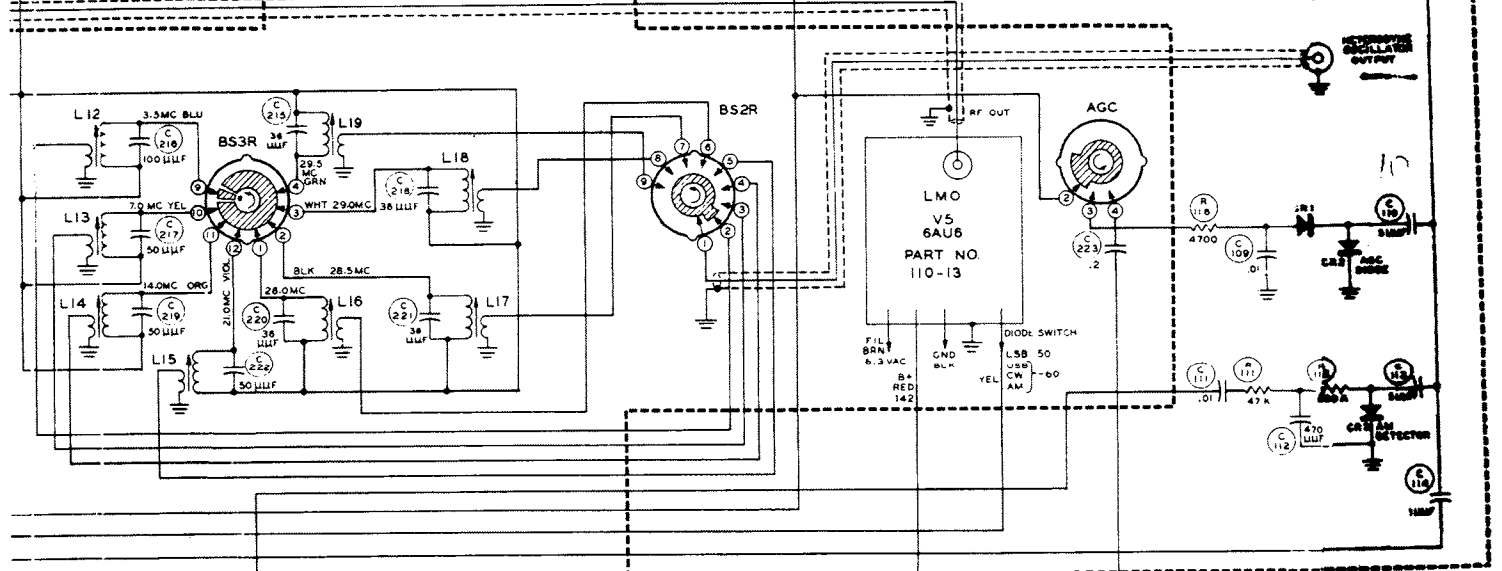
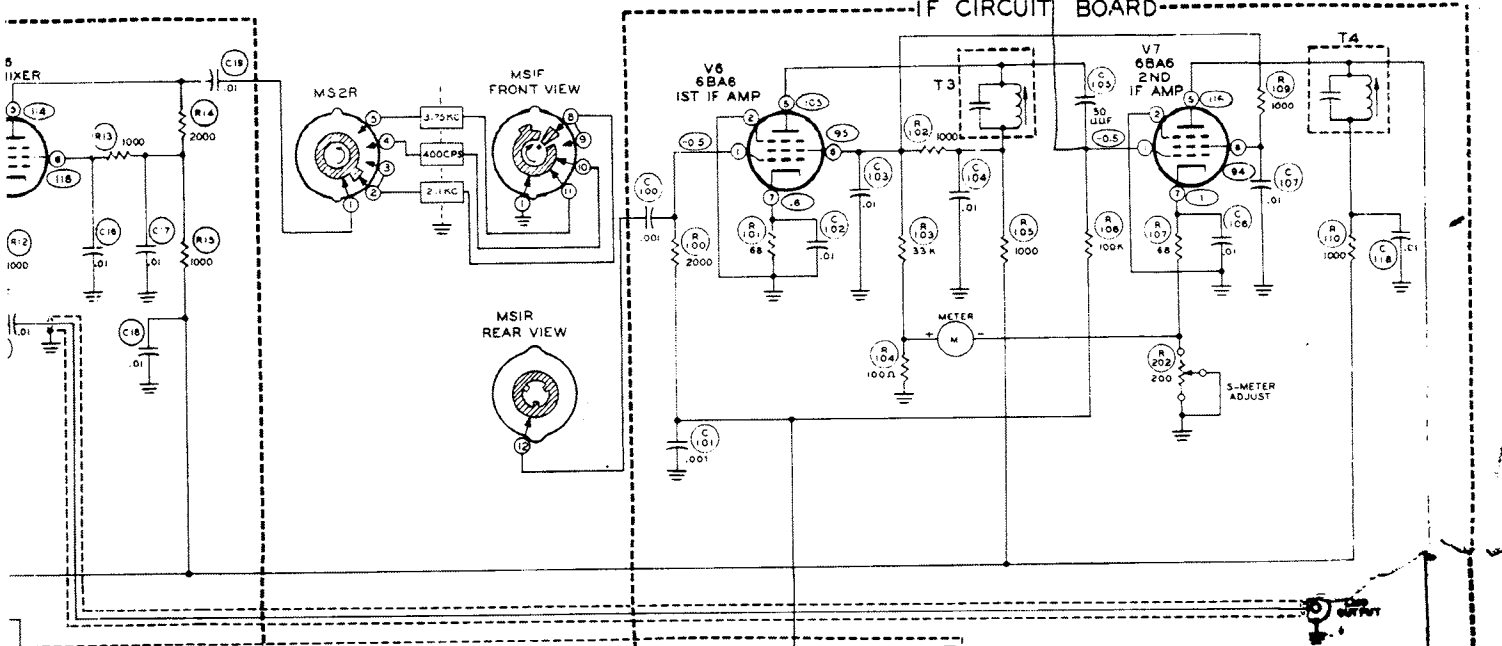
SCHMATIC OF THE
HEATHKIT
SSB AMATEUR RECEIVER
MODEL SB-300



RF CIRCUIT BOARD



FO SCOPE



RESISTOR AND CAPACITOR COLOR CODES

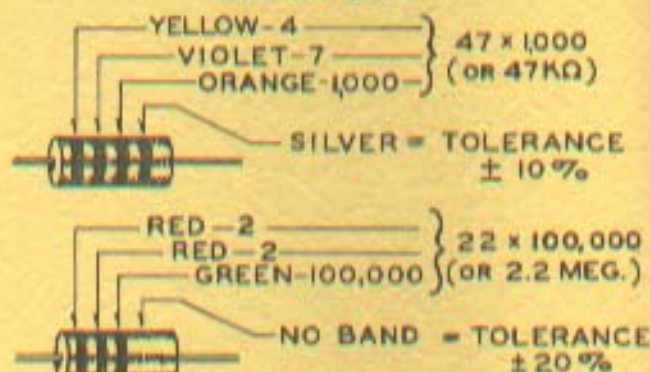
RESISTORS

The colored bands around the body of a color coded resistor represent its value in ohms. These colored bands are grouped toward one end of the resistor body. Starting with this end of the resistor, the first band represents the first digit of the resistance value; the second band represents the second digit; the third band represents the number by which the first two digits are multiplied. A fourth band of gold or silver represents a tolerance of $\pm 5\%$ or $\pm 10\%$ respectively. The absence of a fourth band indicates a tolerance of $\pm 20\%$.

CODE			
COLOR	1ST DIGIT	2ND DIGIT	MULTIPLIER
BLACK	0	0	1
BROWN	1	1	10
RED	2	2	100
ORANGE	3	3	1,000
YELLOW	4	4	10,000
GREEN	5	5	100,000
BLUE	6	6	1,000,000
VIOLET	7	7	10,000,000
GRAY	8	8	100,000,000
WHITE	9	9	1,000,000,000
GOLD	-	-	.1
SILVER	-	-	.01



EXAMPLES



CAPACITORS

Generally, only mica and tubular ceramic capacitors, used in modern equipment, are color coded. The color codes differ somewhat among capacitor manufacturers, however the codes

shown below apply to practically all of the mica and tubular ceramic capacitors that are in common use. These codes comply with EIA (Electronic Industries Association) Standards

MICA

CODE				TOLER. %
COLOR	1 st DIGIT	2 nd DIGIT	MULTIPLIER	
BLACK	0	0	1	± 20
BROWN	1	1	10	± 20
RED	2	2	100	± 20
ORANGE	3	3	1,000	± 20
YELLOW	4	4	10,000	± 20
GREEN	5	5	---	± 5
BLUE	6	6	---	---
VIOLET	7	7	---	---
GRAY	8	8	---	---
WHITE	9	9	---	---
GOLD	-	-	.1	± 10
SILVER	-	-	.01	± 10

EXAMPLE



2700 pF $\pm 5\%$
OR 0027 μ F



TUBULAR CERAMIC

Place the group of rings or dots to the left and read from left to right.

CODE				TOLER. %	EXAMPLE
COLOR	1 st DIGIT	2 nd DIGIT	MULTIPLIER		
BLACK	0	0	1	± 20	± 20
BROWN	1	1	10	± 20	± 20
RED	2	2	100	± 20	± 20
ORANGE	3	3	1,000	± 20	± 20
YELLOW	4	4	10,000	± 20	± 20
GREEN	5	5	---	± 5	± 5
BLUE	6	6	---	---	---
VIOLET	7	7	---	---	---
GRAY	8	8	---	± 25	---
WHITE	9	9	---	± 10	± 10



NOTES:

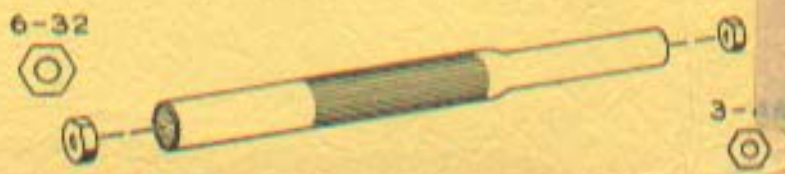
- The characteristic of a mica capacitor is the temperature coefficient, drift capacitance and insulation resistance. This information is not usually needed to identify a capacitor but, if desired, it can be obtained by referring to EIA Standard, RS-153 (a Standard of Electronic Industries Association.)
- The temperature coefficient of a capacitor is the predictable change in capacitance with temperature change and is

expressed in parts per million per degree centigrade. Refer to EIA Standard, RS-198 (a Standard of Electronic Industries Association.)

- The farad is the basic unit of capacitance, however capacitor values are generally expressed in terms of μ F (micro-farad, .000001 farad) and $\mu\mu$ F (micro-micro-farad, .00000001 μ F); therefore, 1,000 $\mu\mu$ F = .001 μ F, 1,000,000 $\mu\mu$ F = 1 μ F.

USING A PLASTIC NUT STARTER

A plastic nut starter offers a convenient method of starting the most used sizes: 3/16" and 1/4" (3-48 and 6-32). When the correct end is pushed down over a nut, the pliable tool conforms to the shape of the nut and the nut is gently held while it is being picked up and started on the screw. The tool should only be used to start the nut.



TYPICAL COMPONENT TYPES

This chart is a guide to commonly used types of electronic components. The symbols and related illustrations

should prove helpful in identifying most parts and reading the schematic diagrams.

<p>RESISTOR</p>	<p>CAPACITOR</p>	<p>TUBE</p>
<p>POTENTIOMETER (CONTROL)</p>	<p>ELECTROLYTIC CAPACITOR</p>	<p>TRANSISTOR</p>
<p>TRANSFORMER (IRON CORE)</p>	<p>VARIABLE CAPACITOR</p>	<p>RECTIFIER (DIODE)</p>
<p>TRANSFORMER (ADJUSTABLE POWDERED IRON CORE) ARROW INDICATES DIRECTION OF CORE MOVEMENT TO INCREASE INDUCTANCE</p>	<p>BATTERY</p>	<p>NEON BULB</p>
<p>TRANSFORMER (ADJUSTABLE CORE)</p>	<p>PHONO JACK</p>	<p>ILLUMINATING BULB</p>
<p>POWER TRANSFORMER</p>	<p>PHONE JACK</p>	<p>METER</p>
<p>INDUCTOR (COIL)</p>	<p>RECEPTACLE</p>	<p>SWITCH (TOGGLE)</p>
<p>PIEZOELECTRIC CRYSTAL</p>	<p>SPEAKER</p>	<p>SWITCH (ROTARY)</p>
<p>BINDING POST</p>	<p>MICROPHONE</p>	<p>FUSE</p>
<p>ANTENNA</p>	<p>EARTH GROUND</p>	<p>CONDUCTORS</p>
<p>GENERAL</p>	<p>CHASSIS GROUND</p>	<p>NOT CONNECTED</p>
<p>LOOP</p>	<p>CONNECTED</p>	<p>SHIELDED</p>