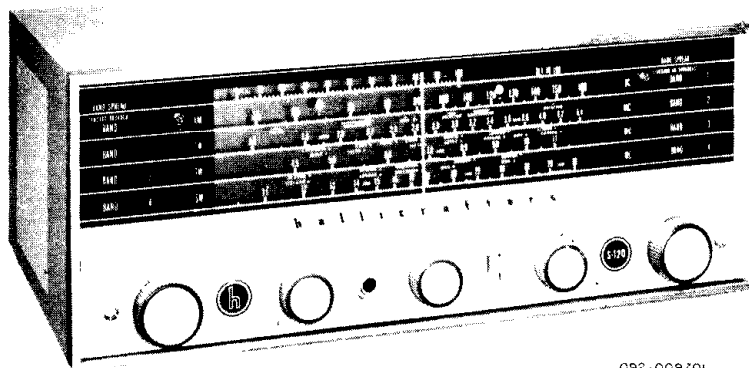


# Owner's Guide

## MODEL S-120



092-009701

### GENERAL DESCRIPTION

Your new Hallicrafters Receiver Model S-120 tunes from 540 kilocycles to 31 megacycles to bring you the finest in world-wide radio reception. You'll hear foreign and domestic shortwave broadcasts, amateurs, police, aircraft, ships, and countless other exciting, distant stations...as well as all your favorite programs on standard broadcast. The receiver employs the latest type superheterodyne circuit and provides for reception of AM (voice) and CW (code) signals over its entire tuning range. Special features in your receiver include: a high sensitivity built-in ferrite antenna for broadcast band reception...a 45 inch collapsible whip antenna for shortwave reception...an electrical bandspread dial for fine tuning of the amateur and shortwave bands...a BFO control (beat frequency oscillator) for CW reception...a powerful built-in Alnico V permanent magnet speaker...provisions for headphone operation...a RECEIVE-STANDBY switch on the front panel that permits you to silence the receiver without turning it off.

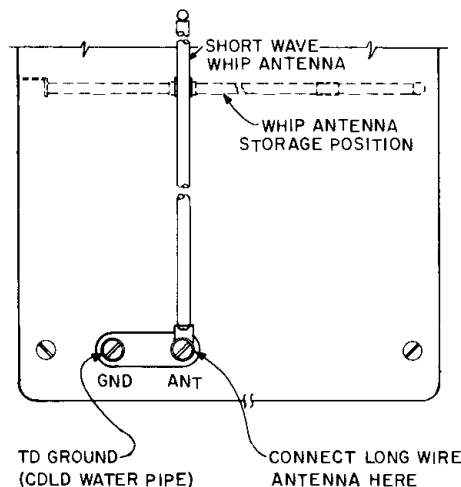
### POWER SOURCE

The receiver is designed to operate on 105 to 125 volt 50/60 cycle, AC or DC current. It may also be operated on 210 to 250 volt AC or DC current using Line Cord Adapter 087-201566, available as an accessory from your Hallicrafters dealer. Power consumption is 30 watts.

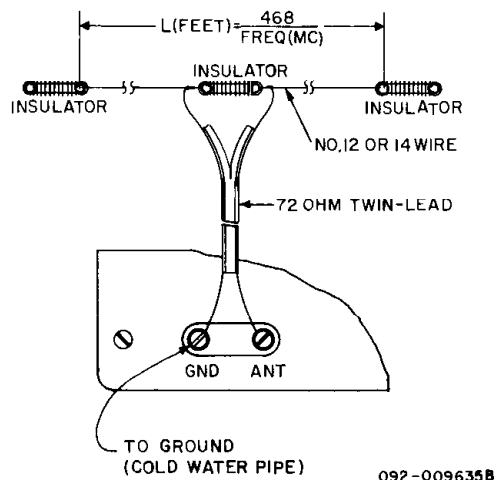
### HEADPHONES

A phone jack is provided on the front panel for connecting headphones. Any commercial headphones ranging from 50 to 10,000 ohms may be used. Insertion of the headphone plug into the PHONES jack automatically disconnects the internal speaker.

**the hallicrafters co.**  
4401 W. FIFTH AVENUE • CHICAGO 24, ILLINOIS



**Fig. 1. Whip and Single-Wire Antenna**



**Fig. 2. Doublet Antenna**

## ANTENNAS

In most localities, satisfactory results throughout the entire tuning range can be obtained with the internal ferrite loop antenna and shortwave whip antenna supplied with the receiver.

The internal ferrite loop antenna is effective on the broadcast band only (Band 1) and does not require that the shortwave whip be in place. In some localities, it may be found that a slight orientation of the receiver will improve broadcast band reception. Further improvement in the reception of distant signals on the broadcast band may be obtained by the use of the whip antenna or a length of wire connected to the antenna terminal.

For short wave reception the whip antenna should be installed as shown in figure 1 and extended to its full length. In steel constructed buildings or where receiving conditions are exceptionally poor, an outside antenna 50 to 100 feet long may be necessary.

For top performance on the shortwave and amateur bands, the use of a half-wave doublet or other type of tuned antenna is recommended (see figure 2). The doublet antenna should be cut to the proper length for the most used frequency or band of frequencies. The overall length in feet of a doublet antenna is determined by the following formula:

$$\text{Length in feet} = \frac{468}{\text{frequency in megacycles}}$$

For maximum signal pick-up, the doublet antenna should be erected with its length at right angles to the desired station.

When using outside antennas we strongly recommend, as a protection against lightning, that the receiver be protected by the use of a lightning arrestor in the antenna lead-in.

**IMPORTANT:** When using outside antennas a safety ground wire (ordinary copper wire) is required between a cold water pipe (or other approved ground) and the GND terminal of the receiver.

## TUNING DIAL

The top dial scale (Band 1) is the standard broadcast band. To convert the readings on this band to kilocycles simply add one zero. For example: 70 on the dial is 700 kilocycles. The shortwave bands are marked 2, 3, and 4. The reading on these bands are in megacycles. The standard broadcast band is marked with a "CD" emblem and a dot at 640 and 1240 kilocycles to indicate the two official civil defense frequencies. In a civil defense emergency, tune to either of these two frequencies for official civil defense news, instructions, and information.

## **RECEIVE-STANDBY SWITCH**

This switch is normally set at RECEIVE. When set at STANDBY, the receiver is silenced but the tubes remain at operating temperature for instant use. To resume reception at any time, simply return the switch to RECEIVE position.

## **BAND SELECTOR CONTROL**

Set this control for the band you wish to tune. The four positions of this control correspond to the band numbers at the left side of the dial.

## **OFF-VOLUME CONTROL**

Turn this control clockwise to turn the receiver ON and to increase volume. Allow about one minute for the tubes to warm up. When operating on DC (direct current) reverse the power plug in the wall outlet if the receiver does not operate after the one minute warm up, as the receiver will operate ONLY with the plug in one position. When operating on AC (alternating current), try reversing the power plug for minimum hum after the receiver is in operation. To turn the receiver off, simply rotate the OFF-VOLUME control fully counter-clockwise, until a click is heard.

## **TUNING AND BANDSPREAD CONTROLS**

Wide tuning is performed with the TUNING control and fine tuning with the BANDSPREAD control. To tune the receiver, set the Bandspread dial pointer at 100 and then slowly turn the TUNING control to the desired station. When trying to locate weak, distant stations, it is suggested that the OFF-VOLUME control be initially set near maximum and then readjusted for the desired level after the station has been tuned in. For CW (code) reception, adjust the TUNING control for the desired pitch when tuning in the station. The dial readings will correspond to the station frequencies only if the Bandspread dial pointer is set at 100.

The Bandspread control is an electrical fine tuning adjustment which permits you to accurately tune in stations on crowded bands by spreading them out. It may be used in two different ways. The first method of tuning is used when it is desired to tune in a single signal with precision accuracy. The Bandspread dial pointer is set at about 95 then the signal is located with the TUNING control, and finally the signal is accurately tuned in by rocking the BANDSPREAD control (turning it a few degrees to the left and right) until the signal is loudest and clearest. The second method of tuning is used when one wishes to tune through a range of frequencies, such as the amateur bands. Set the bandspread dial pointer at 100, set the TUNING control for the high end of the selected band or range of frequencies, and then tune through the range with the Bandspread control. Turning the BANDSPREAD control from 0 to 100 tunes the receiver progressively higher in frequency.

## **BFO CONTROL**

This control is primarily used to provide the necessary beat frequency tone when receiving CW (code) signals. In addition to this function, however, the Model S-120 circuit is designed so that this control also acts as a sensitivity adjustment making reception of extremely weak signals possible.

**Operation of the control is as follows:**

**To receive normal AM broadcasts:** The control should be set in the OFF position (maximum counter-clockwise).

**To increase sensitivity for weak signal reception:** Turn the control ON and advance slowly in a clockwise direction to the point where maximum weak signal sensitivity is obtained.

**To receive CW (code) signals:** The control should be advanced fully clockwise and slowly turned counter-clockwise to the point that produces the clearest tone. The frequency of the tone may be adjusted with either the main tuning or bandspread control.

It will be found during the course of using this control that a point exists between the setting required for weak signal reception, and that required for CW reception where receiver noise will increase considerably. This is a normal condition. It is undesirable to operate the receiver with the control set at or very near this point as tuning will become extremely critical.

#### SERVICE OR OPERATING QUESTIONS

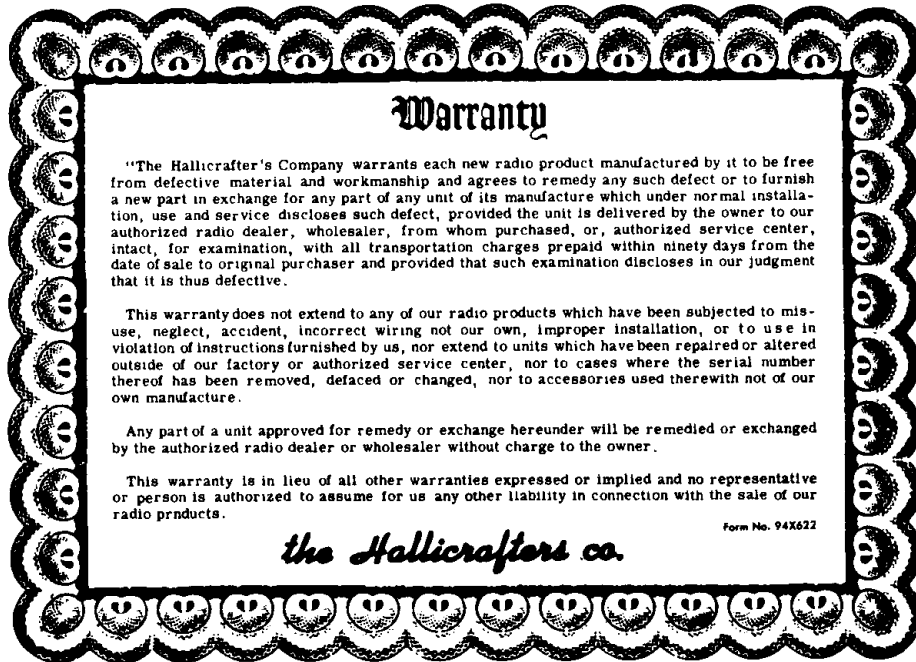
For any further information regarding operation or servicing of your unit, contact your Hallicrafters dealer. The Hallicrafters Co. maintains an extensive system of authorized service centers where any required service will be performed promptly and efficiently at a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown at the right. For the location of the one nearest you, consult your dealer or telephone directory.

Make no service shipments to the factory unless instructed to do so by letter. The Hallicrafters Co. will not accept the responsibility for unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment, and assumes no obligation to incorporate these revisions in earlier models.



92X1401-C



## TECHNICAL SPECIFICATIONS

## TUBE AND DIAL LAMP REPLACEMENT

## CHASSIS REMOVAL

**CAUTION:** Just before removing the chassis from the cabinet rotate the MAIN TUNING and BAND SPREAD controls fully counterclockwise to prevent damage of the tuning capacitors.

## DIAL CORD RESTRINGING

To restring the BAND SPREAD dial cord remove control knobs, phone jack retaining nut, escutcheon trim plate and clip on each end of plate (2 screws) insulation spacer, dial scale (two screws), and dial plate (four hex head screws). Care should be taken when removing the dial plate not to damage the pointers. Referring to figure 2, follow the arrows and letter sequence to string the dial cord. The dial cord spring should be expanded from 1/4" to 1/2". Place the BAND SPREAD pointer on the bottom of the dial rail and engage the dial cord with the pointer clips. Replace the dial plate, dial scale, escutcheon trim strip (replace clips on either end of plate), and control knobs. With BAND SPREAD control fully counter-clockwise, align the pointer on "O" and apply a drop of cement to the dial cord and pointer clip. Replace chassis in the cabinet.

To restring the MAIN TUNING dial cord with the chassis removed from the cabinet, refer to figure 7 and follow the arrows and letter sequence. The dial cord spring should be expanded 1/4" to 1/2". Place the MAIN TUNING pointer on the dial rail and engage the dial cord with the pointer clips. With the MAIN TUNING control fully counterclockwise, align the pointer with "O" on the BAND SPREAD scale and apply a drop of cement to the dial cord and pointer clip. Replace the chassis in the cabinet.



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# ALIGNMENT PROCEDURE

- Use an amplitude modulated generator covering 455 KC to 30 MC.
- Connect the output meter across the speaker voice coil.
- Use a non-metallic alignment tool.
- Use a standard EIA dummy antenna as shown in figure 3.
- Set BFO control to OFF, VOLUME control maximum clockwise, RECEIVE/STANDBY control to RECEIVE, and the BAND SPREAD control to 100.
- Refer to figures 4 and 5 for location of adjustments.

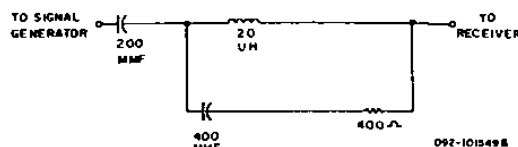


Figure 3. EIA Dummy Antenna

Step	Signal Generator Connections	Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust
*1	High side through a .01 mfd capacitor to stator plates of rear section of TUNING capacitor.	455 KC (30% mod.)	1	1.0 MC	A, B, C and D for maximum output. Keep reducing the generator output to keep the output meter below 50 milliwatts.
2	High side through EIA antenna to terminal ANT on rnr of chassis. Low side to chassis.	1400 KC (30% mod.)	1	1400 KC	C1 and C24 for maximum output as in step 1.
3	Same as step 2.	600 KC (30% mod.)	1	600 KC	L1 for maximum output as in step 1.
4	Same as step 2.	-	1	-	Repeat steps 2 and 3 until an increase in output can be obtained on either adjustment.
5	Same as step 2.	4.3 MC (30% mod.)	2	4.3 MC	C2 and C25 for maximum output as in step 1.
6	Same as step 2.	1.9 MC (30% mod.)	2	1.9 MC	T2 and L2 for maximum output as in step 1.
7	Same as step 2.	-	2	-	Repeat steps 5 and 6 until no increase in output can be obtained.
8	Same as step 2.	11 MC (30% mod.)	3	11 MC	C3 and C26 for maximum output as in step 1.
9	Same as step 2.	5 MC (30% mod.)	3	5 MC	T3 and L3 for maximum output as in step 1.
10	Same as step 2.	-	3	-	Repeat steps 8 and 9 until no increase in output can be obtained.
11	Same as step 2.	30 MC (30% mod.)	4	30 MC	C4 and C27 for maximum output as in step 1.
12	Same as step 2.	14 MC (30% mod.)	4	14 MC	T4 and L4 for maximum output as in step 1.
13	Same as step 2.	-	4	-	Repeat steps 11 and 12 until no increase in output can be obtained.

\*Before beginning IF procedure, rotate AM/CW ratio control to its full counterclockwise position.

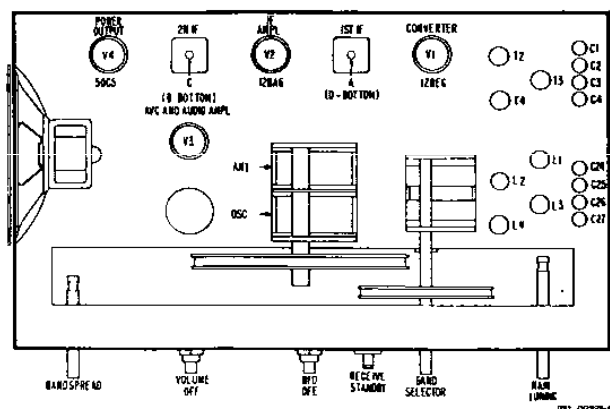


Figure 4. Chassis, Top View

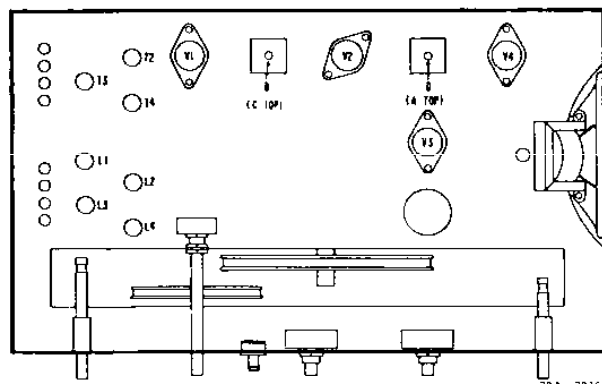


Figure 5. Chassis, Bottom View

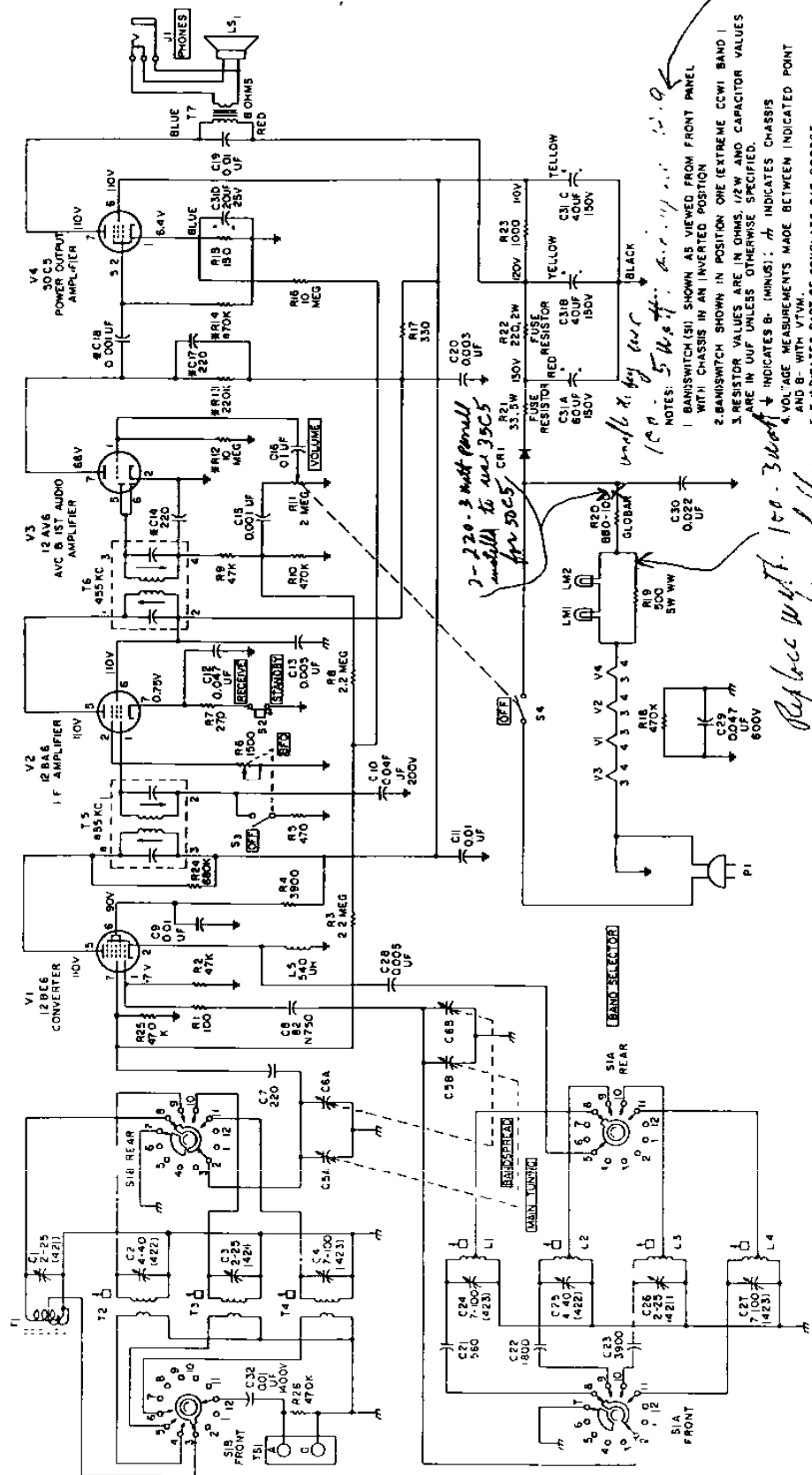
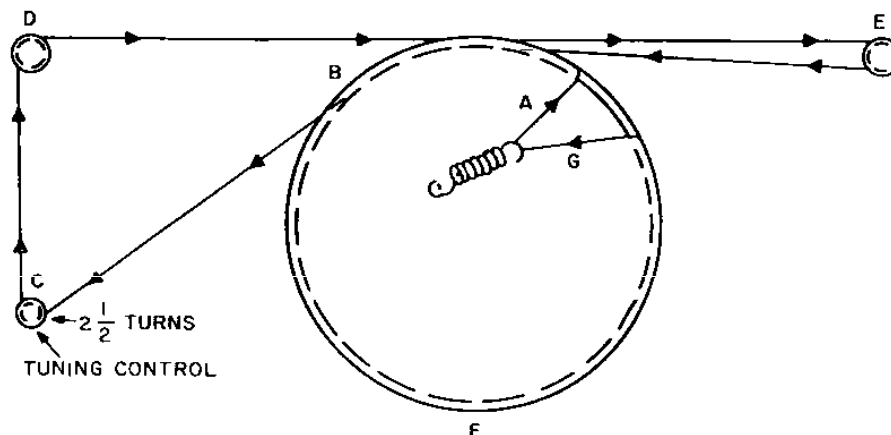


Figure 6. Schematic Diagram.

089 002490C

# SERVICE PARTS LIST

Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number
CAPACITORS			*RESISTORS (cont.)			TUBES, LAMPS AND RECTIFIERS		
C1, 2, 3, 4	2-25, 4-40, 2-25, 7-100 mmf., Var. Quad Trimmer, Assy, Inc. mtg. bracket	044-000533	R6	1.5K ohm, 30%, 1/4 watt, Variable, BFO control, Inc. Switch S3	025-002024	CR1	Rectifier, Selenium	027-000290
C5A, B	MAIN TUNING; Var. Cap.	048-000479	R7	270 ohm	451-252271	LM1, 2	Lamp, Dial type #47	039-100004
C6A, B	BAND SPREAD; Var. Cap.	048-000477	R10, 18, 25, 26	470K ohm	451-252474	V1	12 BE6, Converter	090-000040
C7	220 mmf., 500V, 20%; Cer. Tub.	483-021221	R11	2 megohm, 30%, 1/8 watt variable, VOLUME Control; Inc. Switch S4	025-002025	V2	12 BA6, IF Amplifier	090-900039
C8	82 mmf., 500V, 10%; N750, Cer. Tub.	491-126820-85	R12, 13, 14	Part of Audio Couplate	-----	V3	12 AV6; AVC and 1st Audio Amplifier	090-901187
C9	.01 mfd., 500V, GMV, Cer. Disc	047-100224	R15	150 ohm	451-252151	V4	50C5; Power Output Amplifier	090-000541
C10	.047 mfd., 200V, 20%; Molded Paper	499-014473	R16	10 megohm	451-252106	MISCELLANEOUS		
C11	.01 mfd., 500V, +80-20%; Cer. Disc	047-100217	R17	330 ohm	451-252331	Antenna, Telescoping	057-000421	
C12, 29	.047 mfd., 500V, 20%; Molded Paper	499-034473	R19	500 ohm, SW, Wirewound	024-001328-06	Bracket, Antenna	067-009150	
C13, 28	.005 mfd., 500V, 20%; Cer. Disc	047-100442	R20	880-100 ohm, Global	023-000327	Bracket, Dial Plate	087-008786	
C14, 17, 18	Part of Audio Couplate	-----	R21	Resistor, Fuse, 33 ohm, SW	024-001398	Cabinet (Inc. Trim Strip)	150-000981	
C15	.001 mfd., 600V, 20%; Molded Paper	499-034102	R22	Resistor, Fuse, 220 ohm, 2W	024-001399	Clip, IF mtg.	076-100385	
C16	0.1 mfd., 20%, 100V; Molded Paper	046-001259-05	AL3	1K ohm	451-252102	Clip, Fuse (Antenna mtg.)	076-102124	
C19	.01 mfd., 500V, 20%; Molded Paper	499-034103	AL4	600K ohm	451-252684	Couplate, Audio	049-000223	
C20	.003 mfd., 500V, 20%; Molded Paper	499-034202	*ALL RESISTORS are 10%, 1/2 watt, carbon type, unless otherwise specified.			Dial Scale, Calibrated	083-000882	
C21	560 mmf., 5%, 125V, Plastic	505-102561	COILS AND TRANSFORMERS			Dial Cord	038-000046	
C22	1800 mmf., 5%, 125V, Plastic	505-102182	T1	Antenna Loop Stick Assembly	150-001606	Escutcheon, trim plate	007-000793	
C23	3500 mmf., 0%, 125V, Plastic	505-102392	T2	Coil, RF (band 2)	051-003473	Foot, Front	016-201072	
C24, 25, 26, 27	7-100, 4-40, 2-25, 7-100 mmf., Var. Quad Trimmer, Inc. mtg. bracket	044-000534	T3	Coil, RF (band 3)	051-003474	Foot, Rear	016-201073	
C30	.022 mfd., 600V, 20%; Molded Paper	499-034223	T4	Coil, RF (band 4)	051-003475	Grommet, nylon plastic (foot and rear panel mtg.)	002-202441	
C31A, B, C, D	60-40-40 mfd., 150V; 20 mfd., 25V, Electrolytic	045-000711	T5	Transformer, 1st IF	050-300531	Grommet, nylon plastic (escutcheon mtg.)	002-102453	
C32	.01 mfd., 1400V, Spark Out type, Cer. Disc	047-001309	T6	Transformer, 2nd IF	050-300532	Grommet, nylon plastic (dial scale mtg.)	002-202445	
*RESISTORS			T7	Transformer, Audio Output, Part of LSI	-----	Grommet (speaker and tuning capacitor mtg.)	016-100718	
R1	100 ohm	451-252101	L1	Coil, Oscillator (band 1)	051-003476	Grommet (capacitor stabilizer plate)	016-100661	
R2, 8	47K ohm	451-252473	L2	Coil, Oscillator (band 2)	051-003477	Iron Core	003-004564	
R3, 8	2.2 megohm	451-252225	L3	Coil, Oscillator (band 3)	051-003478	Knob, MAIN TUNING and BAND SPREAD	015-001680	
R4	3.8K ohm	451-252392	L4	Coil, Oscillator (band 4)	051-003479	Knob, VOLUME and BFO	015-001676	
R5	470 ohm	451-252471	L5	540 OH, RF Choke	053-100107	Knob, BAND SELECTOR	015-001678	
			SWITCHES			Lock, Line Cord	075-200397	
			S1A, B	BAND SELECTOR	060-002326	LS1	Speaker, 8 ohm Voice Coil, Inc. T7	085-000210
			S2	STANDBY - RECEIVE	060-002348	Plate, Dial	063-004906	
			S3	BFO - OFF, Part of R6	-----	Pointer, BAND SPREAD	082-000471	
			S4	VOLUME - OFF, Part of R11	-----	Pointer, MAIN TUNING	082-000472	
			SOCKETS AND CONNECTORS			Rear Panel	068-001250	
			J1	PHONRS, jack	036-000339	Ring, Electrolytic mtg.	076-003384	
			TS1	Socket, waler (V1-V4)	005-101056	Ring, Retaining	076-100883	
			P1	Terminal Board, antenna	068-100020	Spacer, insulation (escutcheon)	073-003879	
				Line Cord	087-100078	Spring, dial cord	075-100012	
				Socket, Dial light assembly	086-000578	Shield, Tube (V1)	068-100232	



NOTE: TUNING GANG FULLY MESHED

092-009506

Figure 7. Main Tuning Stringing Diagram, Rear View.