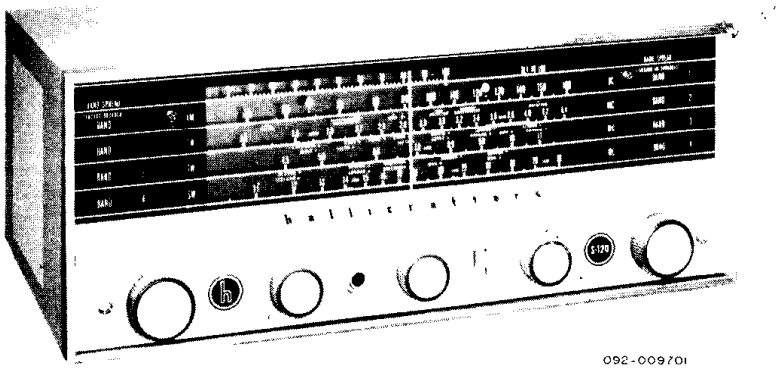
Owner's Guide

MODEL S-120



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.

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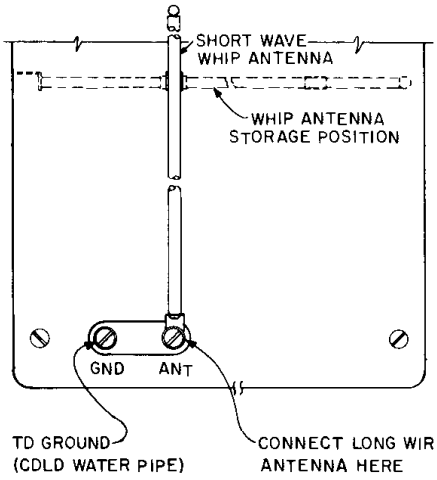

Fig. 1. Whip and Single-Wire Antenna

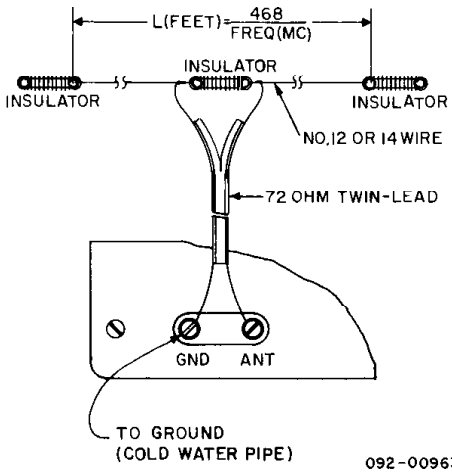

Fig. 2. Doublet Antenna

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.

92X1401-C

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.

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio prnducts.

Form No. 94X622

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SERVICE DATA MODEL S-120

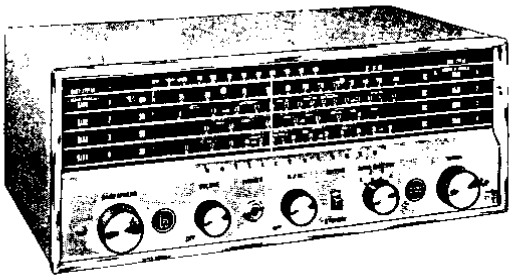

Figure 1. Hallicrafters Model S-120

TECHNICAL SPECIFICATIONS

TUBES. . . . . Four, plus rectifier
SPEAKER. . . . . 5 inch PM, 8 ohm voice coil
ANTENNA . . . . . Broadcast - Self contained ferrite loopstick
Short wave - 45" collapsible whip antenna and provision for single wire or 50-600 ohm line
POWER SUPPLY. 105-125 volts DC or AC (50-60 CPS)
POWER CONSUMPTION . . . . . .30 watts
INTERMEDIATE FREQUENCY. . . . . 455 KC
FREQUENCY COVERAGE . . . . . .540 KC to 31 MC
DIMENSIONS. .5-7/8" high, 13-1/2" wide, 8-3/4" deep
WEIGHT. . . . . .10-1/4 lbs.
SHIPPING WEIGHT . . . . . .12 lbs. approximately

TUBE AND DIAL LAMP REPLACEMENT

For access to the tubes, remove the cabinet rear panel which is held in place by two screws. Care should be exercised so as not to damage the leads to the loopstick antenna mounted on the inside of the rear panel. For dial lamp replacement, remove the chassis from the cabinet (see CHASSIS REMOVAL).

CHASSIS REMOVAL

To remove the chassis from the cabinet, remove the four screws (within the plastic feet) that secure the chassis to the cabinet. Slide the chassis out the rear of the cabinet.

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

Remove the chassis from the cabinet to restring either dial cord (see CHASSIS REMOVAL).

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.

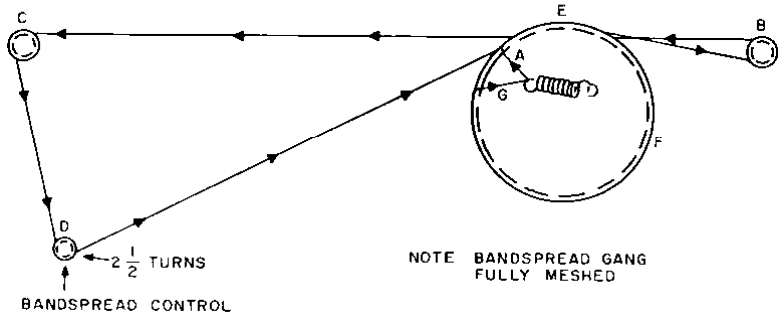

Figure 2. Band Spread, Stringing Diagram Front View

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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.

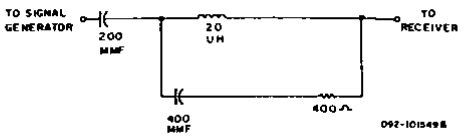


Figure 3. EIA Dummy Antenna

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 rear 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.

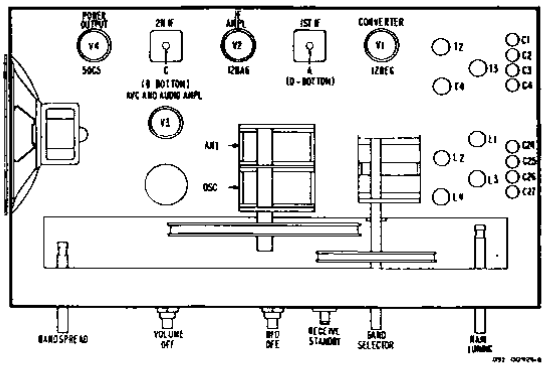


Figure 4. Chassis, Top View

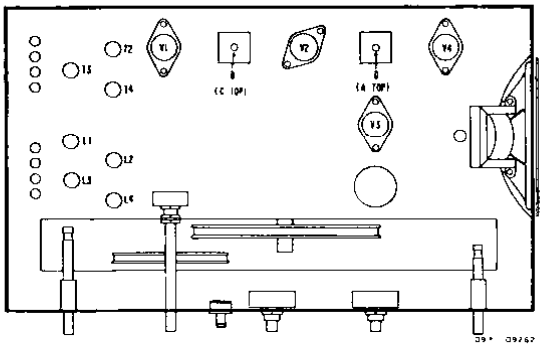


Figure 5 Chassis, Bottom View

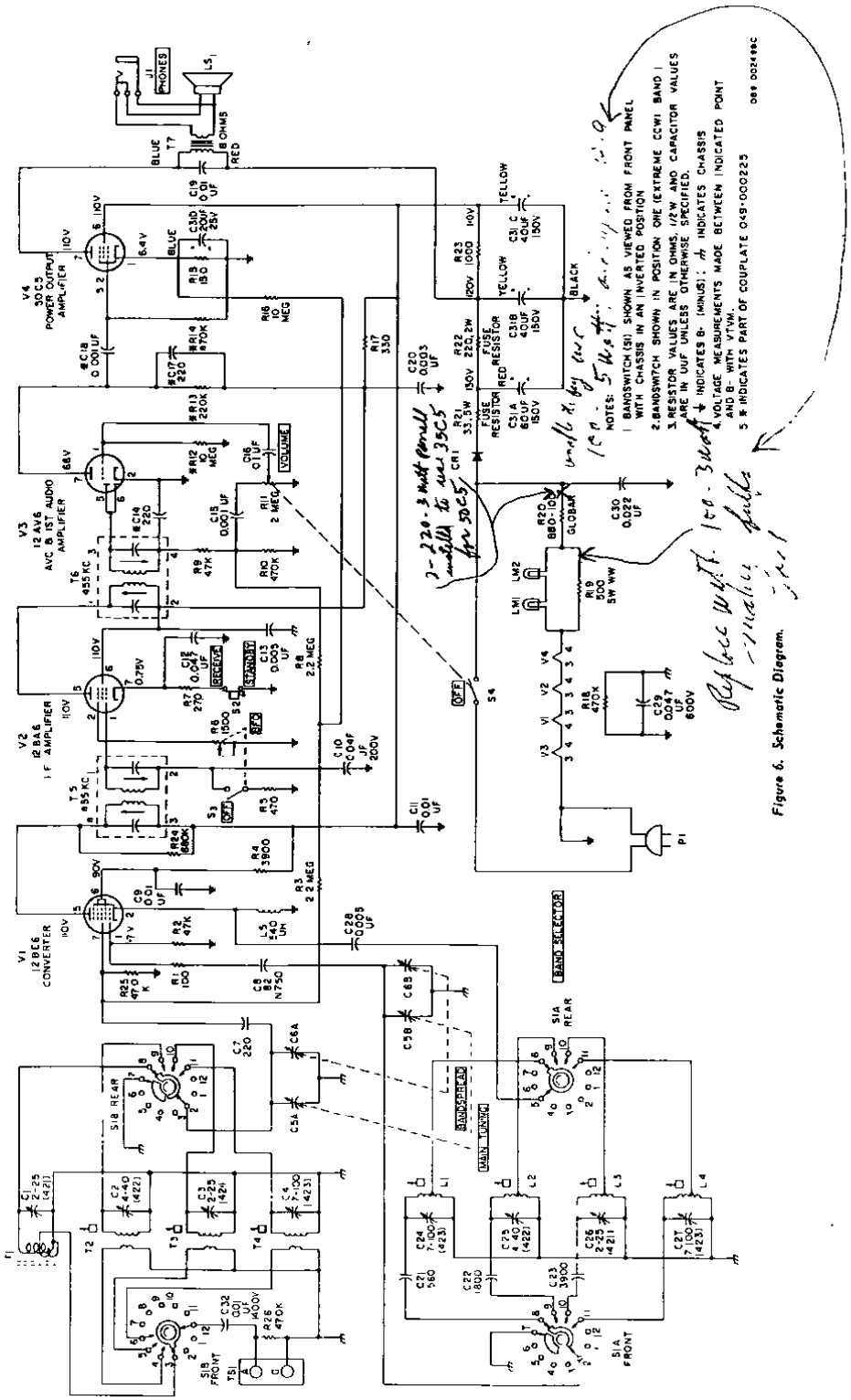
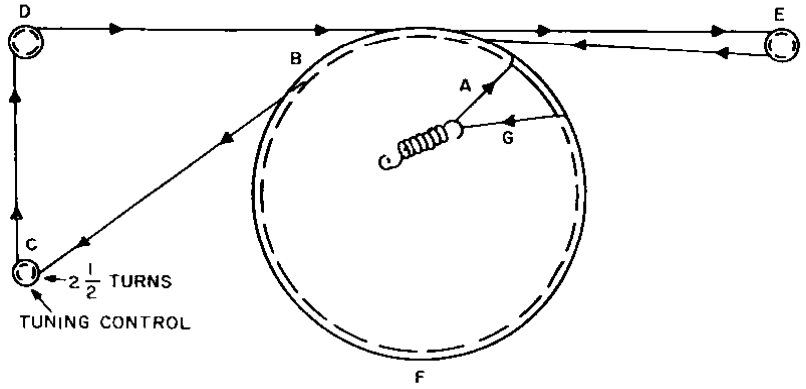


Figure 6. Schematic Diagram.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C1, 2, 3, 4	2-25, 4-40, 2-25, 7-100 mmf., Var, Quad Trimmer, Assy, Inc. mtg. bracket	044-000533
C5A, B	MAIN TUNING; Var. Cap.	048-000479
C6A, B	BAND SPREAD, Var. Cap.	048-000477
C7	220 mmf., 000V, 20%; Cer. Tub.	483-021221
C8	82 mmf., 500V, 10%, N750, Cer. Tub.	491-126820-05
C9	.01 mfd., 500V, GMV, Cer. Disc	047-100224
C10	.047 mfd., 200V, 20%, Molded Paper	499-014473
C11	.01 mfd., 500V, +80-20%, Cer. Disc	047-100217
C12, 29	.047 mfd., 000V, 20%, Molded Paper	499-034473
C13, 28	.005 mfd., 500V, 20%, Cer. Disc	047-100442
C14, 17, 18	Part of Audio Couplate	----------
C15	.001 mfd., 600V, 20%, Molded Paper	499-034102
C16	0.1 mfd., 20%, 100V; Molded Paper	046-001259-05
C19	.01 mfd., 000V, 20%, Molded Paper	499-034103
C20	.003 mfd., 500V, 20%, Molded Paper	499-034202
C21	560 mmf., 5%, 125V, Plastic	505-102561
C22	1800 mmf., 5%, 125V, Plastic	505-102182
C23	3500 mmf., 0%, 125V, Plastic	505-102392
C24, 25, 26, 27	7-100, 4-40, 2-25, 7-100 mmf., Var, Quad Trimmer, Inc. mtg. bracket	044-000534
C30	.022 mfd., 600V, 20%, Molded Paper	499-034223
C31A, B, C, D	60-40-40 mfd., 150V; 20 mfd., 25V, Electrolytic	045-000711
C32	.01 mfd., 1400V, Spark Gap type, Cer. Disc	047-001309
	*RESISTORS	
R1	100 ohm	451-252101
R2, 8	47K ohm	451-252473
R3, 8	2.2 megohm	451-252225
R4	3.9K ohm	451-252392
R5	470 ohm	451-252471
R6	1.5K ohm, 30%, 1/4 watt, Variable, BFO control, Inc. Switch S3	025-002024
R7	270 ohm	451-252271
R10, 18, 25, 26	470K ohm	451-252474
R11	2 megohm, 30%, 1/8 watt Variable, VOLUME Control; Inc. Switch S4	025-002025
R12, 13, 14	Part of Audio Couplate	----------
R15	150 ohm	451-252151
R16	10 megohm	451-252106
R17	330 ohm	451-252331
R19	500 ohm, 5W, Wirewound	024-001328-06
R20	880-100 ohm, Globar	023-000327
R21	Resistor, Fuse, 33 ohm, 5W	024-001398
R22	Resistor, Fuse, 220 ohm, 2W	024-001399
R13	1K ohm	451-252102
R14	600K ohm	451-252684
	*ALL RESISTORS are 10%, 1/2 watt, carbon type, unless otherwise specified.	
	COILS AND TRANSFORMERS	
T1	Antenna Loop Stick Assembly	150-001606
T2	Coil, RF (band 2)	051-003473
T3	Coil, RF (band 3)	051-003474
T4	Coil, RF (band 4)	051-003475
T5	Transformer, 1st IF	050-300531
T6	Transformer, 2nd IF	050-300532
T7	Transformer, Audio Output, Part of LS1	----------
L1	Coil, Oscillator (band 1)	051-003476
L2	Coil, Oscillator (band 2)	051-003477
L3	Coil, Oscillator (band 3)	051-003478
L4	Coil, Oscillator (band 4)	051-003479
L5	540 UH, RF Choke	053-100107
	SWITCHES	
S1A, B	BAND SELECTOR	060-002526
S2	STANDBY - RECEIVE	060-002548
S3	BFO - OFF, Part of R6	----------
S4	VOLUME - OFF, Part of R11	----------
	SOCKETS AND CONNECTORS	
J1	PHONES, jack	036-000339
	Socket, wafer (V1-V4)	006-101056
TS1	Terminal Board, antenna	088-100020
P1	Line Cord	087-100078
	Socket, Dial light assembly	086-000578

Schematic Symbol	Description	Hallicrafters Part Number
	TUBES, LAMPS AND RECTIFIERS	
CR1	Rectifier, Selenium	027-000290
LM1, 2	Lamp, Dial type #47	039-100004
V1	12 BE6, Converter	090-000040
V2	12 BA6, IF Amplifier	090-900039
V3	12 AV6; AVC and 1st Audio Amplifier	090-901187
V4	50C5; Power Output Amplifier	090-000541
	MISCELLANEOUS	
	Antenna, Telescoping	057-000421
	Bracket, Antenna	067-009150
	Bracket, Dial Plate	067-008786
	Cabinet (Inc. Trim Strip)	150-000981
	Clip, IF mtg.	076-100385
	Clip, fuse (antenna mtg.)	076-102724
	Couplate, Audio	048-000225
	Dial Scale, Calibrated	083-000982
	Dial Cord	038-000049
	Escutcheon, trim plate	007-000793
	Foot, Front	016-201072
	Foot, Rear	016-201073
	Grommet, nylon plastic (foot and rear panel mtg.)	002-202441
	Grommet, nylon plastic (escutcheon mtg.)	002-102453
	Grommet, nylon plastic (dial scale mtg.)	002-202445
	Grommet (speaker and tuning capacitor mtg.)	016-100718
	Grommet (capacitor stabilizer plate)	016-100681
	Iron Core	003-004564
	Knob, MAIN TUNING and BAND SPREAD	015-001680
	Knob, VOLUME and BFO	015-001678
	Knob, BAND SELECTOR	015-001679
	Lock, Line Cord	075-200397
LS1	Speaker, 8 ohm Voice Coil, Inc. T7	085-000210
	Plate, Dial	063-004908
	Pointer, BAND SPREAD	082-000471
	Pointer, MAIN TUNING	082-000472
	Rear Panel	068-001250
	Ring, Electrolytic mtg.	076-003384
	Ring, Retaining	076-100883
	Spacer, Insulation (escutcheon)	073-003879
	Spring, dial cord	075-100012
	Shield, Tube (V1)	068-100232
	Shield, Base (V1)	076-100402
	Shaft, BAND SPREAD	074-002606
	Shaft, MAIN TUNING	074-002607



NOTE: TUNING GANG FULLY MESHED

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Figure 7. Main Tuning Stringing Diagram, Rear View.

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