communications

OPERATING and SERVICE INSTRUCTIONS

S-81
RUN 1

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

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GENERAL DESCRIPTION

Your Hallicrafters Model S-81 is an FM receiver which covers the police, fire, taxicab, railroad, private telephone, forestry and other industrial services operating in the 152 to 173 megacycle communication band. It uses a selenium rectifier and 6 tubes in a superheterodyne circuit with a ratio detector and is designed to operate from 105 to 125 volt direct current (DC) or 50/60 cycle alternating current (AC).

The dial is calibrated for both frequency and type of service. Due to the close spacing of channel assignments in the frequency range of the receiver, it is not possible to indicate all of the services on the dial. However, a complete listing of the services covered by the receiver as well as their frequency assignments can be found on page 3. In some localities, all of the available channels are not being used at the present time.

92X1560

Model S-81 Civic Patrol

A 5-inch Alnico V permanent magnet speaker is mounted in the top of the cabinet. For headphone operation, tip jacks have been provided on the rear of the chassis to accommodate any standard 500 to 3000 ohm headphones. The speaker-headphones selector switch is on the rear of the chassis.

Services similar to those covered by the S-81 also operate in the 30 to 50 megacycle range. A companion receiver, the S-82, covers this range and is available from your Hallicrafters dealer.

To get the maximum enjoyment from your Hallicrafters receiver, carefully follow the instructions contained in this book.

INSTALLATION INSTRUCTIONS

UNPACKING - Check all shipping labels and tags for instructions before removing or destroying them.

LOCATION - The receiver is equipped with rubber feet for table top or shelf mounting. When locating the receiver, avoid excessively warm locations near radiators, hot air outlets, etc. Ventilation openings have been provided in the top and back of the cabinet. Care should be taken not to allow these holes to be covered or ventilation impeded in any way.

POWER SOURCE - The receiver is designed to operate from 50/60 cycle 105-125 volt alternating current (AC) or 105-125 volt direct current (DC). The power consumption is 30 watts. If in doubt about your power supply, call your power company before plugging in the receiver. A wrong power supply may cause damage to the receiver.

IMPORTANT - When operating on DC, reverse the power plug at the wall outlet if the receiver does not operate after a one minute warm up period.

Mobile operation of the receiver is easily possible by the use of a 6 volt DC to 110 volt AC power inverter such as Cornell-Dubilier Model 6R10 or American Television and Radio Model 6-RSC. Such a unit equips the receiver for operation from 6 volt battery sources normally found in automobiles, trucks, etc.

ANTENNA INSTALLATION - The terminals marked A and G on the back of the receiver are for antenna and ground connections. To facilitate antenna installation, a two foot antenna wire has been included with your receiver. This antenna vertically mounted will provide reception of signals over a distance of approximately 7 to 10 miles. If you are located farther from a transmitting station, an outside antenna may be required. The outside antenna may be either a vertical whip or vertical doublet. A doublet antenna can be easily constructed from standard 300 ohm twin-lead TV transmission line. (See Fig. 1.) Whip antennas such as Master Mobile Mounts Models 113 and 114 are suitable for both outdoor and mobile use.

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INDOOR ANTENNA (Supplied with Receiver)

1. Uncoil the antenna wire which has been included with your receiver and connect one end of it to terminal A.

2. Erect the antenna wire so that the major portion is vertical. The antenna may be held in a vertical position by fastening it to the cabinet back with a piece of tape.

DOUBLET ANTENNA

1. Construct the antenna from a length of 300 ohm twin-lead transmission line as shown in Fig. 1.

2. All transmissions in the frequency range of the receiver are vertically polarized. For maximum signal pickup, the receiving antenna should also be similarly polarized. To properly polarize the doublet antenna, mount it so that length of the antenna is vertical.

3. The antenna should be erected as high as possible since the height of the antenna above ground determines the ability to pick up distant stations.

4. Use 300 ohm twin-lead transmission line as the lead-in from the antenna to the receiver. The lead-in should be run away at right angles to the antenna for at least 12 inches. At the receiver, connect the lead-in to terminals A and G.

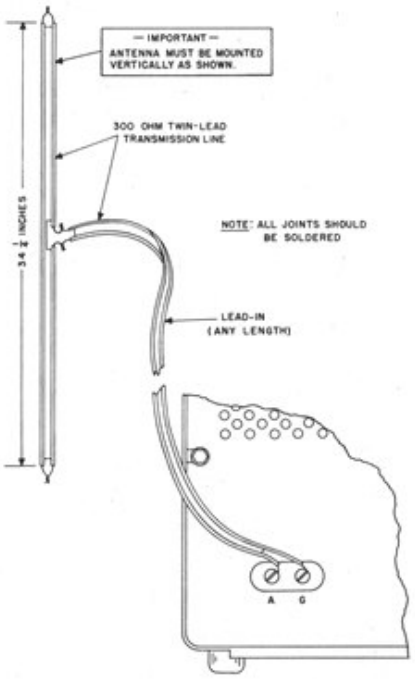

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Fig. 1. Construction Details of the Doublet Antenna

OPERATING INSTRUCTIONS

To operate the receiver, perform the following simple steps:

1. Turn the receiver on by rotating the VOLUME control knob to the right. Allow about one minute for warm up. If the receiver fails to operate on DC, reverse the power plug at the wall outlet to obtain proper polarity.

2. Turn the VOLUME control knob to a well advanced position. This control will have to be reset for the desired volume level after a station has been tuned in.

3. Tune in the desired station by rotating the TUNING control knob slowly until the dial pointer indicates the station frequency. After the station is located, the pointer should be moved back and forth until the point of loudest and clearest reception is found.

4. Readjust the VOLUME control knob for the desired volume.

5. To turn the receiver off, turn the VOLUME control knob to the left until a click is heard.

***FREQUENCY ASSIGNMENTS OF SERVICES COVERED BY MODEL S-81**

Telephone - Base	Special Emergency	Forest Products Service	Power
152.51 - 152.81	157.47	153.05 - 153.35	153.41 - 153.71
152.03 - 152.2	159.51 - 161.99	158.31 - 158.43	158.13 - 158.25
Telephone - Mobile	**Police**	**Petroleum**	**Forestry**
157.77 - 158.07	154.65 - 156.7	153.05 - 153.35	156.87 - 156.93
158.49 - 158.67	158.73 - 161.7	158.31 - 158.43	159.27 - 159.51
			161.79
Taxicabs - Base & Mobile	**Fire**	**Highway Maintenance**	170.425 - 170.575
152.27 - 152.45	153.77 - 154.43	156.99 - 157.41	171.425 - 171.575
	159.51 - 161.79	159.51 - 161.79	172.225 - 172.375
Taxicabs - Mobile Only	166.25		
157.53 - 157.71	170.15	**Motion Picture**	**Railroad**
		152.87 - 152.99	159.51 - 161.91

* All frequencies in megacycles.

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SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes and Rectifiers	6 tubes and 1 selenium rectifier
Speaker	5 inch PM
Voice Coil Impedance	3.2 ohms
Headphone Output Impedance	100 ohms
Antenna Input Impedance	72 ohms
Antenna	Vertically polarized whip or doublet (See Page 3)
Intermediate Frequency	10.7 MC
Power Supply	105-125 volts DC or 50-60 cycle AC
Frequency Coverage	152 to 173 MC

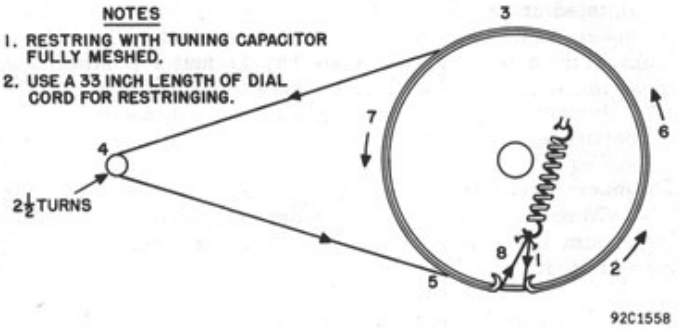

Fig. 2. Dial Cord Stringing Diagram

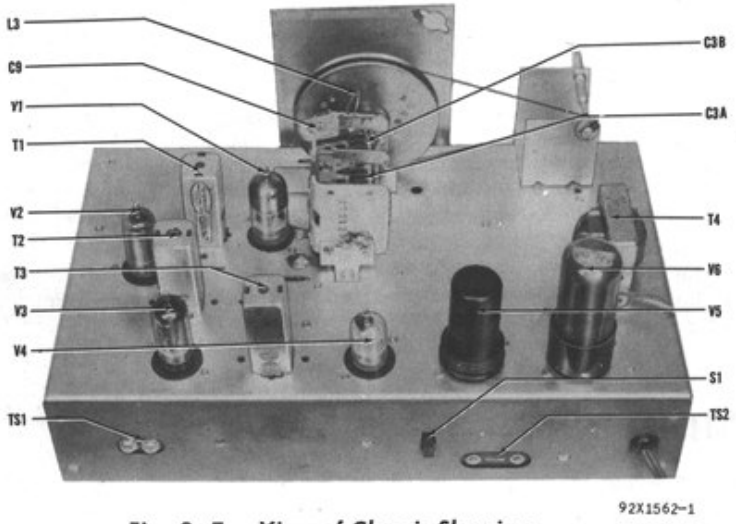

Fig. 3. Top View of Chassis Showing Component Location

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 4. Access to all tubes is possible by removing the cabinet back cover. When installing a replacement octal tube: (1) Insert the center guide pin of the tube into the center hole of the tube socket (2) Rotate the tube until the key on the guide pin drops into the notch in the socket hole and (3) Push down on the tube until the base of the tube rests firmly on the socket. When installing a replacement miniature tube, line up the seven pins on the tube with the socket holes before pushing the tube into place. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

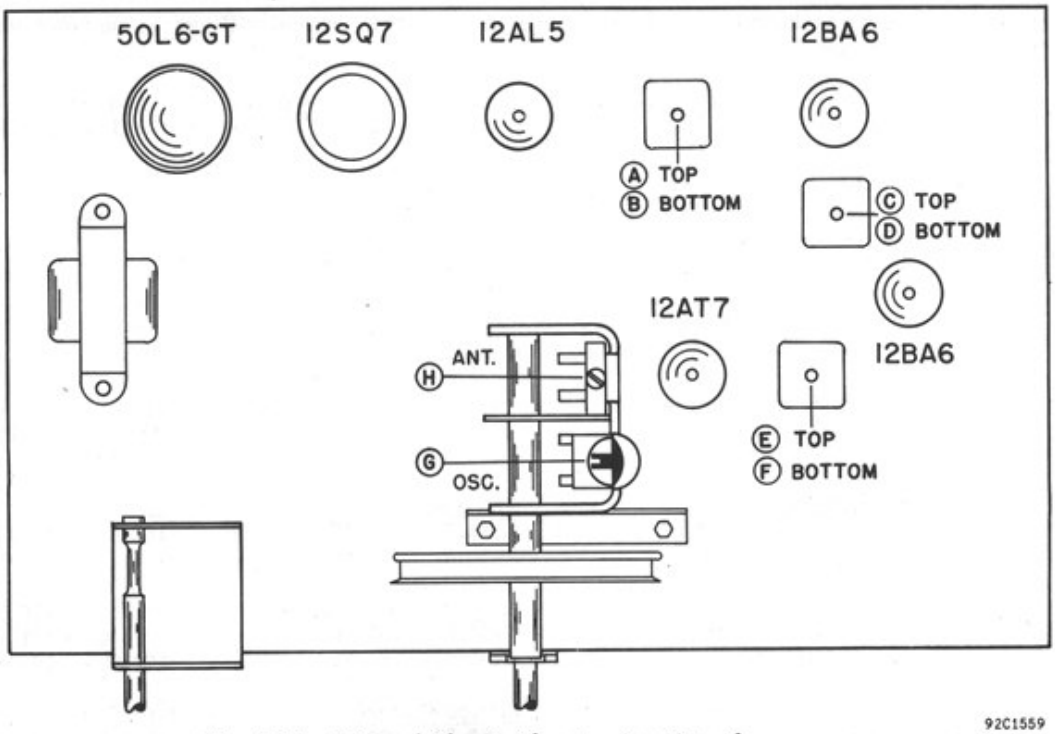

Fig. 4. Top View of Chassis Showing Location of Alignment Adjustments and Tubes

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IF ALIGNMENT

- Use a 10.7 MC signal generator either amplitude modulated or unmodulated.
- Connect high side of generator through a .01 mfd. capacitor to pin 7 of V-1 (see Fig. 7) and low side to chassis.
- Adjust generator output to maintain approximately a one volt reading on the VTVM.
- Set VOLUME control at maximum.
- Refer to Fig. 4 for location of all alignment adjustments.

1. Connect a VTVM from pin 2 of V-4 (see Fig. 7) to the chassis. Adjust B, C, D, E and F for a maximum meter reading.
2. Connect two 470,000 ohm resistors in series from pin 2 of V-4 to the chassis. Connect the common lead of the VTVM to the center tap of the two resistors and the probe to the junction of R-10 and C-17. (Refer to the schematic diagram and Fig. 5.) Adjust A for a zero reading between a positive and negative peak. The two peaks should have approximately the same amplitude. If not, readjust B slightly.

RF ALIGNMENT

- Use a signal generator either amplitude modulated or unmodulated which covers 156 MC and 170 MC.
- Connect high side of generator through a 68 ohm resistor to A on antenna terminal strip on rear of chassis. Connect low side to G.
- Refer to Fig. 4 for location of alignment adjustments.
- Connect a VTVM from pin 2 of V-4 (see Fig. 7) to the chassis.
- Adjust the generator output to maintain approximately a one volt reading on the VTVM.
- Set VOLUME control at maximum.
- Use a non-metallic alignment tool.

1. Set the generator and receiver dial to 170 MC and adjust G and then H for maximum output. When adjusting H, rock the tuning capacitor slightly.
2. Check the calibration at the low end of the receiver by setting the generator and receiver dial to 156 MC. A calibration adjustment is usually not necessary and should not be made unless the oscillator coil on the top front of the tuning gang has been damaged or bent. If the adjustment is required, the frequency can be increased by squeezing the sides of the coil or decreased by spreading them apart slightly.
3. Repeat Step 1.

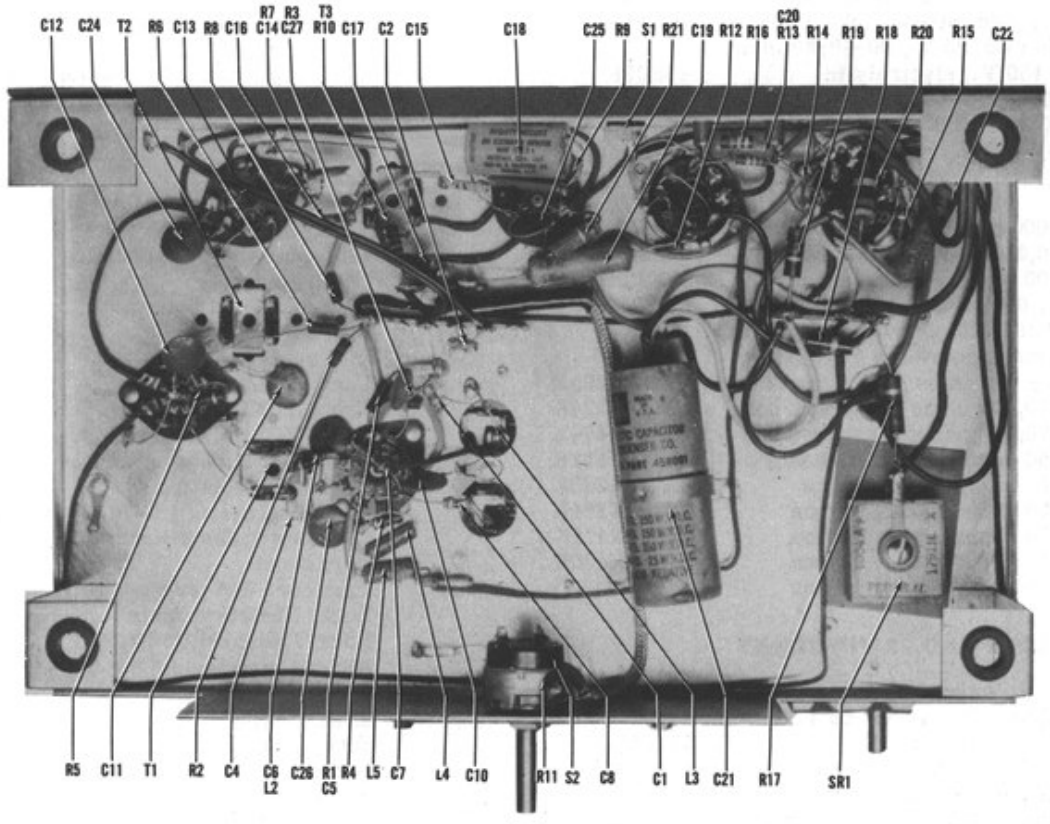

Fig. 5. Bottom View of Chassis Showing Component Location

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SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of the receiver, contact your dealer. Make no service shipments to the factory as the Hallicrafters Co. will not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER which displays the sign shown at the right. For the location of the SERVICE CENTER nearest you, consult your dealer or telephone directory.

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

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2	330 mmf. 500 V., ceramic	47B20331K5
C-3A & B	Tuning capacitor, 2 section	48C278
C-4	33 mmf. 500 V., ceramic	47X25C330J
C-5	.01 mfd. 450 V., ceramic disc	47A224
C-6,10,11, 12,13,14, 24,25,26,27	.005 mfd. 450 V., ceramic disc	47A168
C-7	.68 mmf. 500 V., bakelite	47A160-1
C-8	47 mmf. 500 V., ceramic	47X20UK470K
C-9	Trimmer, ceramic; 4-20 mmf.	44A115
C-15,16	100 mmf. 500 V., ceramic	47X25UK101K
C-17	1000 mmf. 500 V., ceramic	47B20102M5
C-18	2 mfd. 50 V., electrolytic	45B192
C-19,20	.01 mfd. 600 V., tubular paper	46AY103J
C-21A,B,C, & D	20 mfd. 25 V., 60-40-40 mfd. 150 V., electrolytic	45B091
C-22	.005 mfd. 600 V., tubular paper	46AY502J
C-23	.05 mfd. 600 V., tubular paper	46AY503J
	RESISTORS	
R-1,2,3,6,8	1000 ohms ½ watt, carbon	23X20X102K
R-4	10,000 ohms ½ watt, carbon	23X20X103K
R-5,7,16	100 ohms ½ watt, carbon	23X20X101K
R-9,10	47,000 ohms ½ watt, carbon	23X20X473K
R-11	VOLUME control, 2 megohms; includes switch S-2	25B896
R-12	2.2 megohms ½ watt, carbon	23X20X225K
R-13	270,000 ohms ½ watt, carbon	23X20X274K
R-14	470,000 ohms ½ watt, carbon	23X20X474K
R-15	150 ohms ½ watt, carbon	23X20X151K
R-17	22 ohms ½ watt, carbon	23X20X220K
R-18	220 ohms 1 watt, carbon	23X30X221K
R-19	470 ohms 1 watt, carbon	23X30X471K
R-20	47 ohms 2 watts, carbon	23X40X470K
R-21	270 ohms 1 watt, carbon	24BW271E
	COILS AND TRANSFORMERS	
L-1	Coil, antenna	51A1472
L-2	Choke, RF; wound on 4700 ohm resistor	53A239
L-3	Coil, oscillator	51A1471
L-4	Choke, RF; 2.2 microhenries	53A238
L-5	Choke, RF; 3.3 microhenries	53A239
T-1	Transformer, 1st IF	50C519
T-2	Transformer, 2nd IF	50C517
T-3	Transformer, ratio detector	50C518
T-4	Transformer, audio output	55A127

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1	Switch, SPEAKER-PHONES	60A243
S-2	Switch, OFF-ON; part of VOLUME control R-11	------
	TUBES AND RECTIFIERS	
V-1	12AT7: oscillator and mixer	90X12AT7
V-2,3	12BA6: 1st and 2nd IF amplifiers	90X12BA6
V-4	12AL5: ratio detector	90X12AL5
V-5	12SQ7: audio amplifier	90X12SQ7
V-6	50L6-GT: audio output	90X50L6-GT
SR-1	Selenium rectifier, 100 ma	27A161
	MISCELLANEOUS	
	Cabinet	66B764
	Cabinet back	32C509
	Clip, mtg.; for transformers T-1, 2 and 3	76A385
	Clip, push-on; for mounting dial window	76A853
	Cover, cabinet bottom	8C1617
	Dial cord, 31 inches	38A019
	Dial scale	83C404
	Foot, mounting; rubber	16A007
	Knob, TUNING control	15A048
	Knob, VOLUME control	15A049
	Grommet, rubber; chassis-cabinet insulating	16A201
	Insulator, nylon; fits in chassis-cabinet insulating grommet	4A647
PL-1	Line cord and plug	87A078
	Lock, line cord; male	76A397-1
	Lock, line cord; female	76A397-2
TS-2	PHONE jack strip	88A071
	Pointer, dial	82A207
	Shaft, tuning	74A494
	Socket, tube; octal	6A250
	Socket, tube; 7 pin miniature	6B402
	Socket, tube; 9 pin miniature	6A401
LS-1	Speaker, 5 inch PM	85C120
	Spring, dial cord	75A012
TS-1	Terminal strip, antenna	88A809
	Washer, extruded; chassis-cabinet insulating	4A646
	Window, dial	22B345

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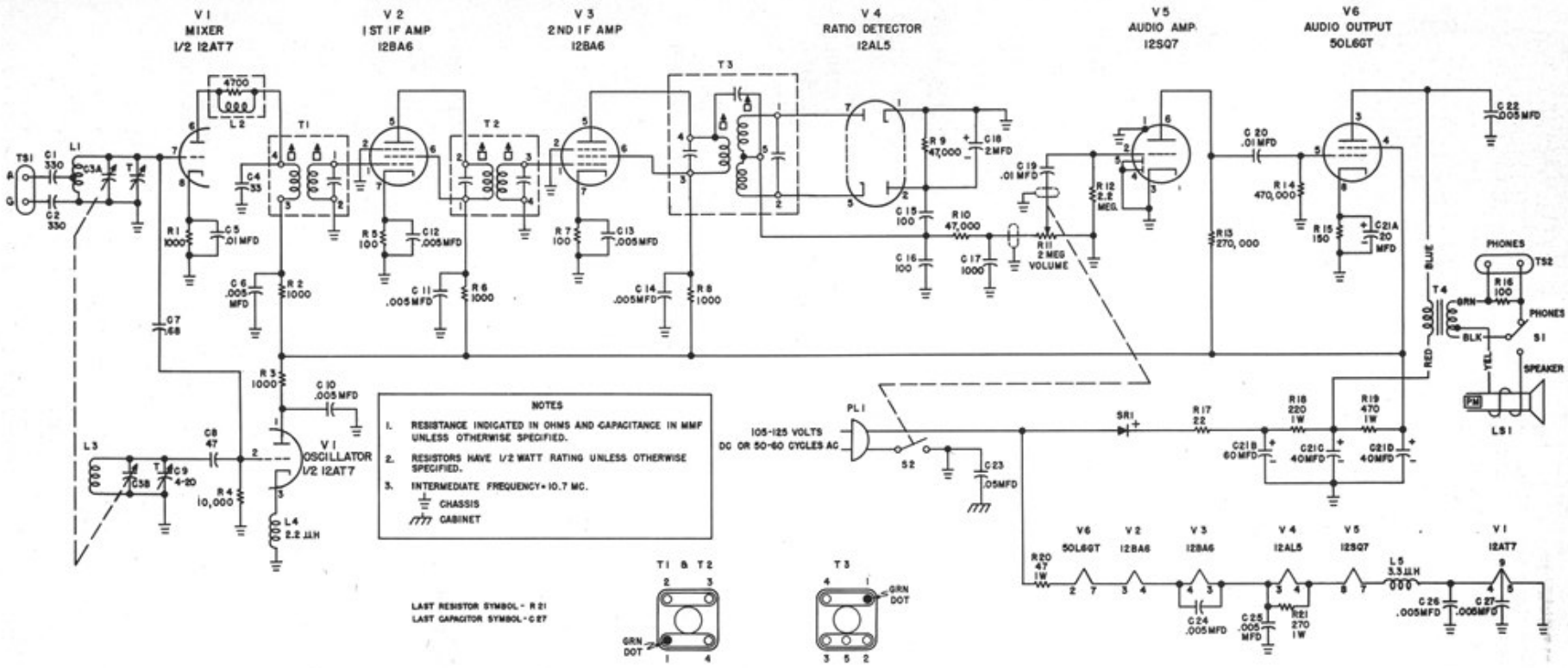

Fig. 6. Schematic Diagram

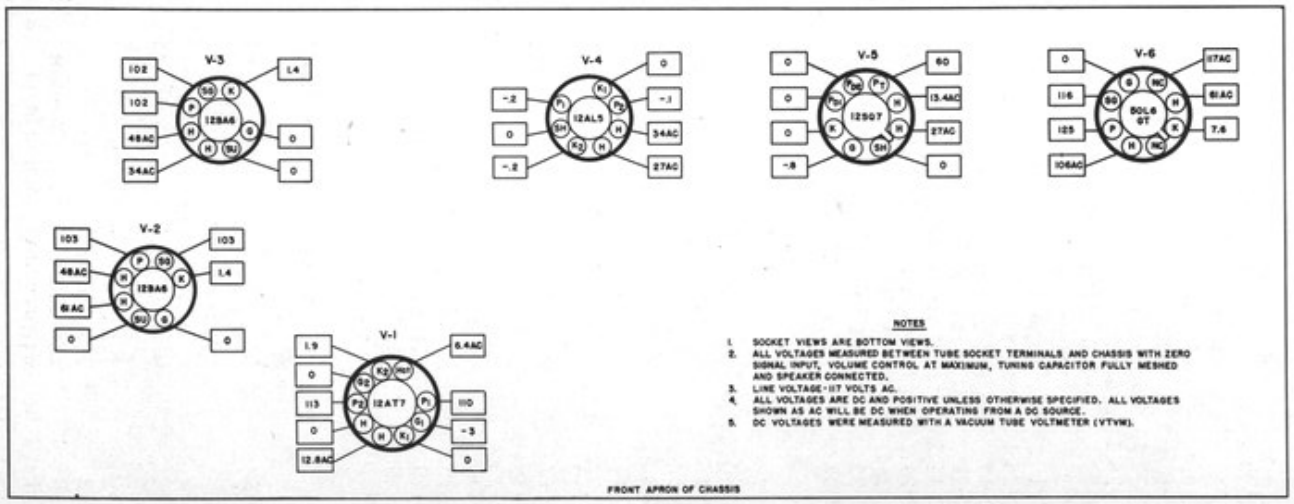

Fig. 7. Tube Socket Voltage Chart

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MODEL S-81
RUN 1

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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 products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X823
10-51—RUN 1

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