Model 05RA4-43-9876B is the same as Model 05RA4-43-9876A except for the Battery/AC/DC change-over system and the substitution of 1L4 tubes for 1U4's. The hand-operated switch is replaced by a type which is operated by plugging the power cord into a chassis socket. This socket is near the back edge of the chassis. There is a slot for only one prong of the power cord plug; the other prong hangs over the back apron. The detachable power cord and the socket for it on the chassis are replaced by a conventional power cord.

The Replacement Parts List for Model 05RA4-43-9876B is the same as the List for Model 05RA4-43-9876A except for the following changes:

REMOVE:

	84-77	Cord, power, AC/DC.......
	52-196	Knob, AC/DC/battery switch
	45-121	Plug, AC/DC.............
R8	60-676	Resistor, 30,000 ohm, ½ w...
R19	60-726	Resistor, 2.2 megohm, ½ w..
	69-173	Switch, AC/DC/battery.....

ADD:

	23-151	Cord, power, AC/DC...........
R8	60-745	Resistor, 27,000 ohm, ½ w.......
R19	60-799	Resistor, 820,000 ohm, ½ w......
R20	60-744	Resistor, 22,000 ohm, ½ w. 10%
C23	16-157	Capacitor, .1 mfd. 200 volt......
	69-196	Switch, AC/DC/battery.........

NOTE: For additional data, See Model 05RA4-43-9876A, Pgs. 21-22 through 21-24.

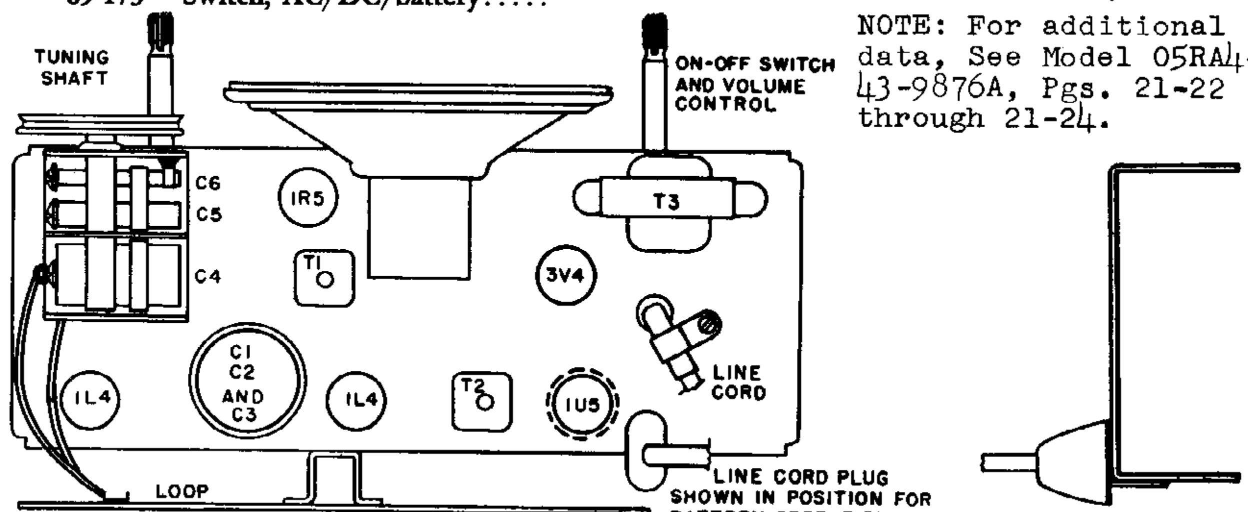


Fig. 2. Chassis—top view

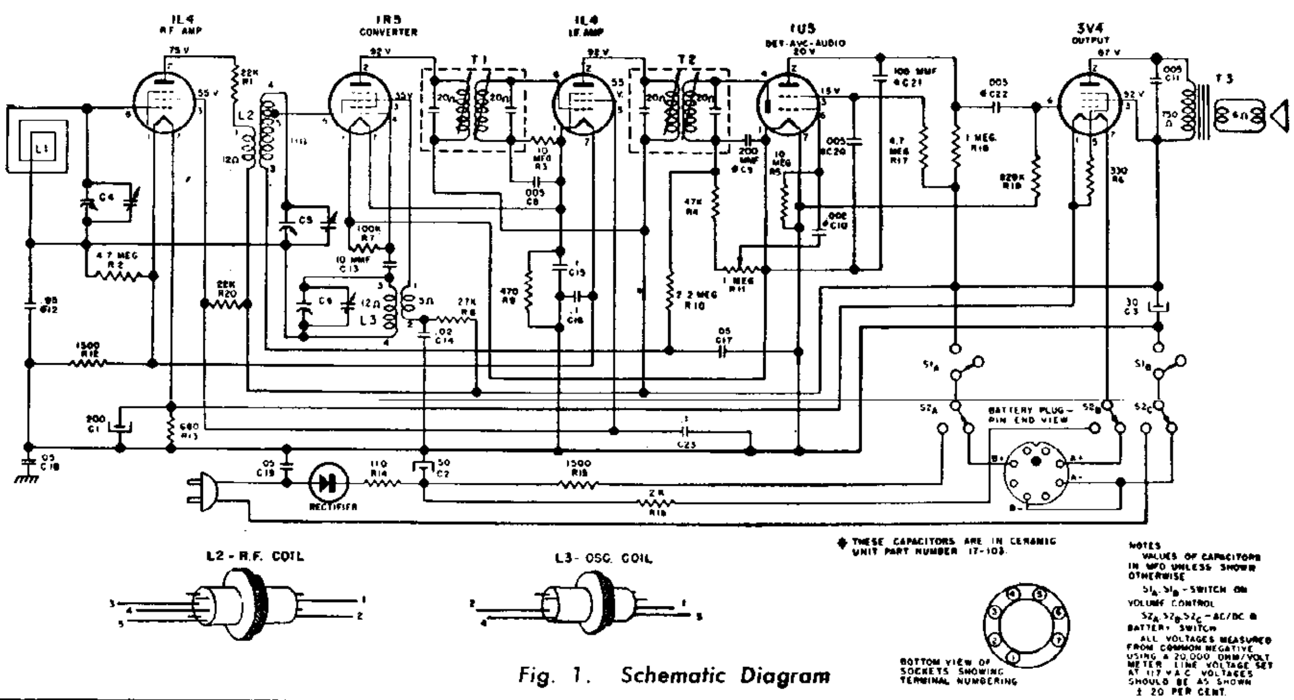
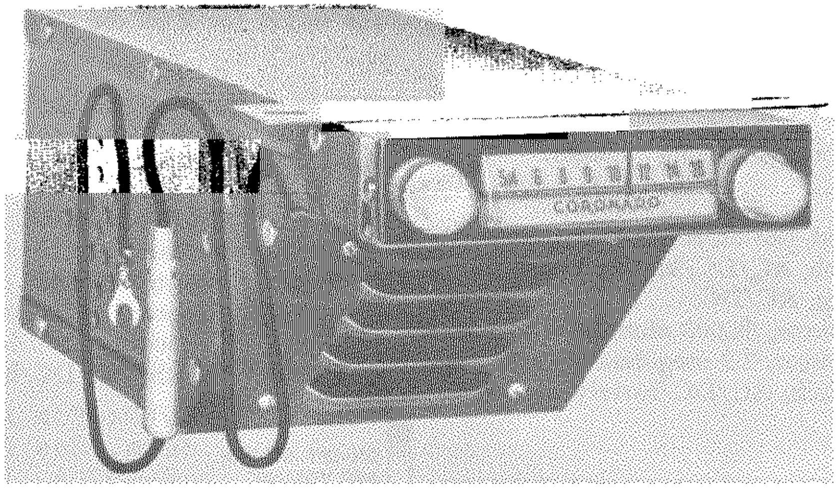


Fig. 1. Schematic Diagram

MODEL 05RA33-43-5016A



SPECIFICATIONS

Power Supply	6.3 volts DC
Frequency Range	540 KC to 1600 KC
Intermediate Frequency	257.5 KC
Antenna	Whip type
Tuning	Permeability
Speaker	4", P.M. voice coil impedance 3.2 ohms
Power Output	2.5 watts undistorted, 3.5 watts maximum
Sensitivity	1 uv for 500 milliwatts output
Selectivity	40 KC broad at 1000 times, signal at 1000 KC
Signal to Noise Ratio	10 to 1

Tubes used are as follows:

- 6BA6 R.F. Amplifier
- 6BE6 Oscillator-Converter
- 6BA6 I.F. Amplifier
- 6AV6 A.V.C., Detector, and Audio Amplifier
- 6AQ5 Power Output
- 6X4 Power Rectifier

UNPACK CAREFULLY, YOU WILL FIND:

Radio

1 Mounting bracket

1 Bag mounting parts:

Hardware, generator condenser, and distributor resistor.

MOUNTING

The chassis contains the complete radio, power supply, and speaker. This unit may be mounted to, and directly below, the instrument panel at any convenient location. Two holes must be drilled in the stiffening lip of the instrument panel about 3/4 inch back from the front of the panel and spaced approximately 6 inches apart. These holes must be large enough to pass the two No. 8 machine screws provided in the bag of mounting parts for fastening the radio in place. After the holes are drilled, insert the mounting screws through the holes in the mounting plate of the radio and in the instrument panel lip, and place lock washers and nuts on screws. These nuts must be securely fastened. It is also very important that the paint be removed from the instrument panel lip directly under the nut so that a good ground connection is made.

Drill a hole to pass a No. 10 machine screw in the fire wall or some other convenient place, and bolt one end of the metal strap with series of holes to this place. Insert the 1/4-20 stud in tapped hole in the back of the radio, and fasten the mounting strap to the back of the radio by means of this stud, lock washer, and nut. This is the back support for the radio, and good ground connections must also be considered in this assembly.

CONNECTIONS

Connect the fused power lead from the radio to the ammeter or circuit breaker of the vehicle. A 10 ampere fuse is provided in this lead; never replace this fuse with one of another value.

The antenna lead is plugged into the antenna jack.

If a second, or external, speaker is desired, a speaker socket is provided. Just connect the proper plug onto this second speaker, and insert plug in the external speaker socket.

After installation, tune in a weak station near 1600 KC, and adjust antenna trimmer, TC1, for maximum volume. If, for any reason, the set is out of alignment, these adjustments must be made by a competent service man and with the use of a good signal generator.

ALIGNMENT PROCEDURE

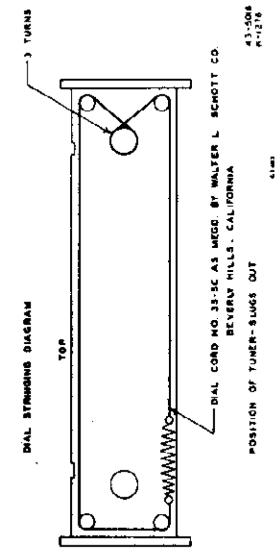
The following is for use only by competent service men having the proper equipment:

The alignment should be made with volume control fully on and the output voltage from the signal generator as low as possible to prevent A.V.C. action from interfering with the proper alignment. With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts using a signal which is modulated at 400 c.p.s.

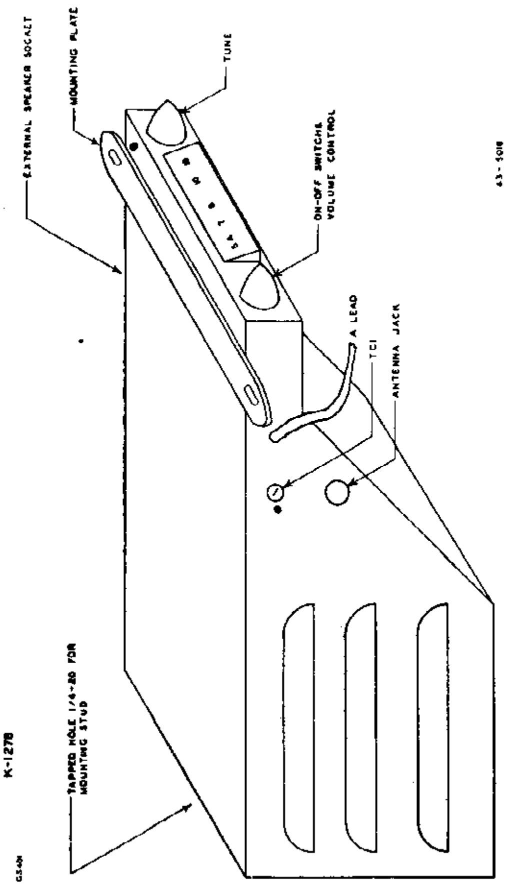
Adjust all trimmers for maximum output. After adjusting IF1 and IF2, "rock" the tuner to make sure that the I.F. coils are not tuned to an image. Repeat the alignment procedure given below as a final check.

SIGNAL GENERATOR Frequency	Dummy Antenna	Connection To Radio	Position Of Tuner	Adjust for Max. Output
262.5 KC	100 MMFD	6BE6 Grid Pin No. 7	Slugs Out	IF1 & IF2
1610 KC	100 MMFD	Ant. Jack	Slugs Out	TC3
1610 KC	100 MMFD	Ant. Jack	Slugs Out	TC2
1610 KC	100 MMFD	Ant. Jack	Slugs Out	TC1
1400 KC	100 MMFD	Ant. Jack	Tune in Signal Gen.	LA Slug & LR Slug

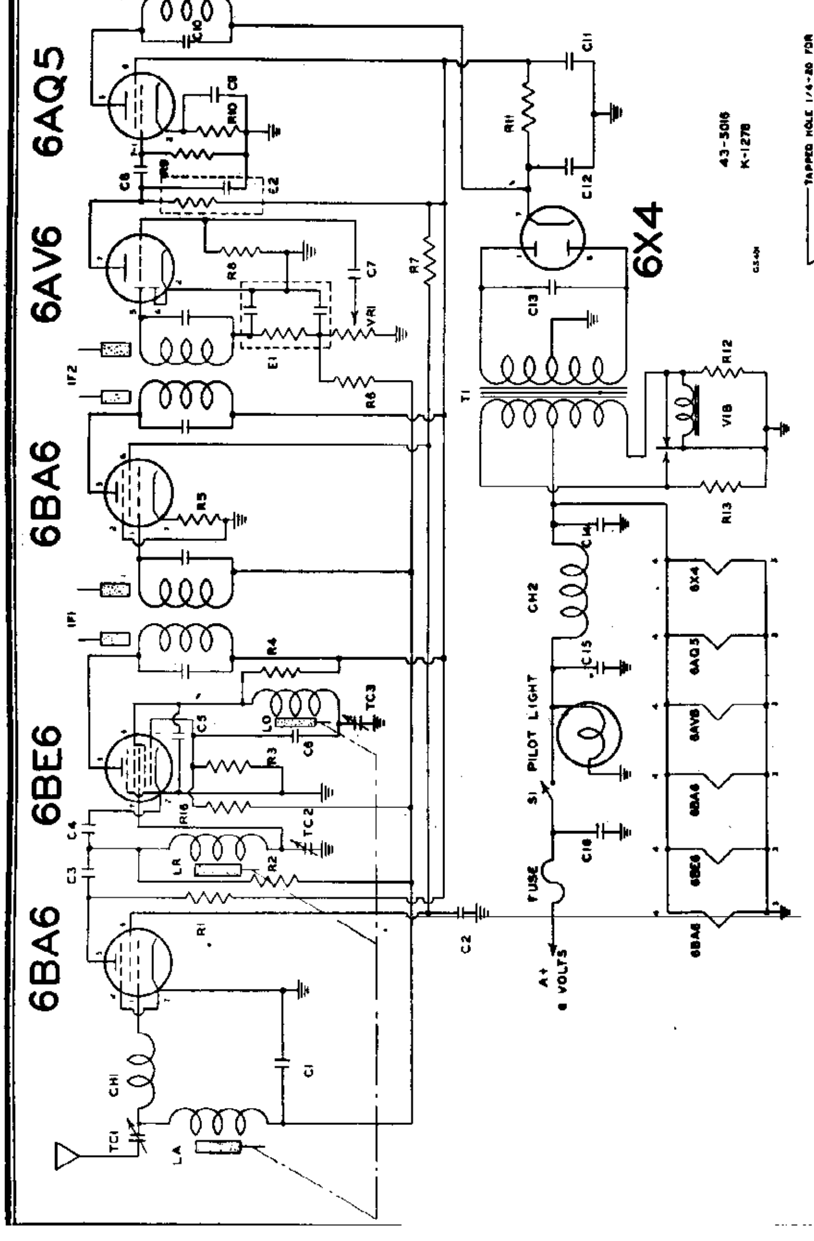
MODEL 05RA33-43-5016A

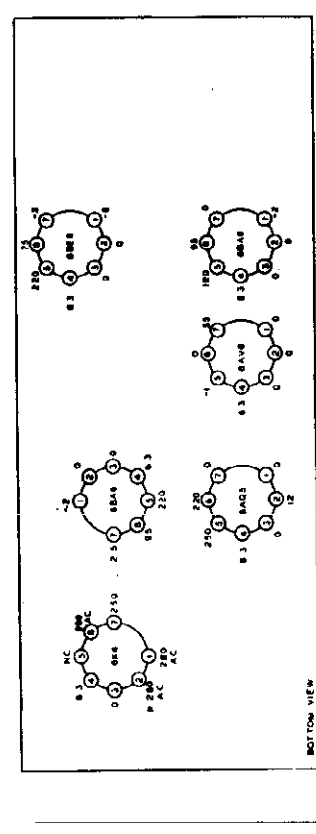


(Cut GS403, Dial stringing diagram)



(Cut GS404, Pictorial view)





(Cut GS405, Voltage chart)

MODEL 05RA33-43-5016A

PARTS NUMBERS

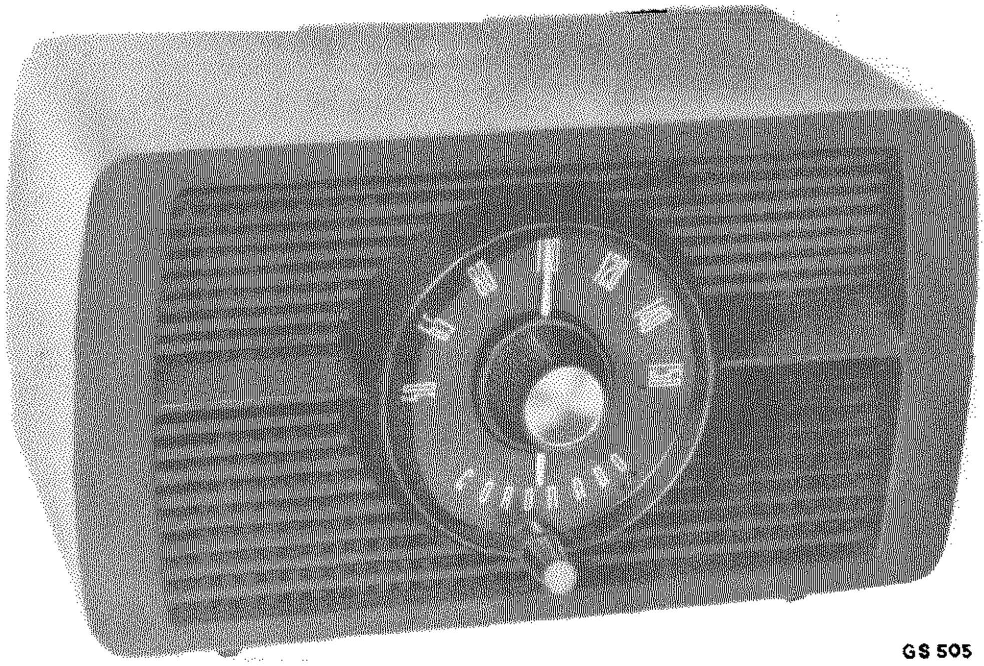
CIRCUIT COMPONENTS

SYMBOL	PART NO.	DESCRIPTION	VALUE	RATING
TC2-TC3	VC1276-2	Dual Trimmer		
TC1	VC1276-1	Trimmer		
C9, C11, C12	C-15-15-25-3.5-.25	Electrolytic	15-15-25 MFD	350-350-25 volts
	C5G	Generator, capacitor	.5 MFD	
C14, C15	C52	Capacitor, paper	.5 MFD	200 volts
C1	CO472	Capacitor, paper	.047 MFD	200 volts
C2	CO474	Capacitor, paper	.047 MFD	400 volts
C8	CO156	Capacitor, paper	.015 MFD	600 volts
C7, C10	CO16	Capacitor, paper	.01 MFD	600 volts
C13	COO5616	Capacitor, buffer	.0056 MFD	1600 volts
C5	C14205M	Capacitor, mica	1420 MMFD	500 volts
C4	C3005M	Capacitor, mica	300 MMFD	500 volts
C6	C505M	Capacitor, mica	50 MMFD	500 volts
C3	C105M	Capacitor, mica	10 MMFD	500 volts
C16	C2002OM	Capacitor, spark	200 MMFD	2000 volts
LA	1276LA	Antenna coil		
LR	1276LR	R.F. coil		
LO	1276LO	Oscillator coil		
	LV-1276	Permeability tuner, complete		
CH2	L16	A choke		
CH1	L47	Spark choke	4.7 MH	
T1	PT1276	Vibrator transformer		
T2	OT1276	Output transformer		
IF1, IF2	IF1276	I.F. transformer		
R12, R13	R680.5	Resistor	68 ohms	½ watt
R5	R122.5	Resistor	1200 ohms	½ watt
R1, R3	R223.5	Resistor	22K ohms	½ watt
R4	R333.5	Resistor	33K ohms	½ watt
R9	R474.5	Resistor	470K ohms	½ watt
R2	R185.5	Resistor	1.8 megohm	½ watt
R6	R225.5	Resistor	2.2 megohm	½ watt
R8	R106.5	Resistor	10 megohm	½ watt
R10	R4511	Resistor	450 ohms	1 watt
R11	R1021	Resistor	1000 ohms	1 watt
R7	R2731	Resistor	27K ohms	1 watt
	R103S	Resistor, suppressor	10K ohms	
VR1	VR1276	Volume control	1 megohm	
S1	VR1276	Switch SP.S.T. on volume control		
E2	CR2	Capristor	270K ohm/100 MMFD	
E1	CR1	Diode filter unit	100-100 MFD/47K ohm	
SPKR	SPK1276	Speaker		
VIB	E659	Vibrator		
Fuse		Fuse 10 ampere		
		Pilot light No. 47		

MECHANICAL PARTS

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
M-1801	Chassis and wrapper	H-81651	Dial rivet
M-1802	Top cover	P-1802	Knob
M-1803	Speaker cover	GR14	Rubber grommet
M-1804	Panel	H-81644-5	Vibrator socket
M-1805	Dial plate	H-81644-6	Miniature tube socket
H-1801	I.F. Mounting clip	H-81644-9	Pilot light socket
H-1802	Speed nut	H-81644-6	Antenna jack
H-1803	Eyelet	H-81644-7	Speaker socket
H-1804	Spade lug No. 10	H-81644-8	Fuse holder
P-1801	Dial scale	H-81641-8	Terminal board No. 8
A-1801	Dial cord assembly	H-81641-3	Terminal board No. 3
M-1806	Dial pointer	H-81641-27	Terminal board No. 27
		H12754	Vibrator clamp

MODELS 05RA33-43-8136A,
05RA33-43-8137A



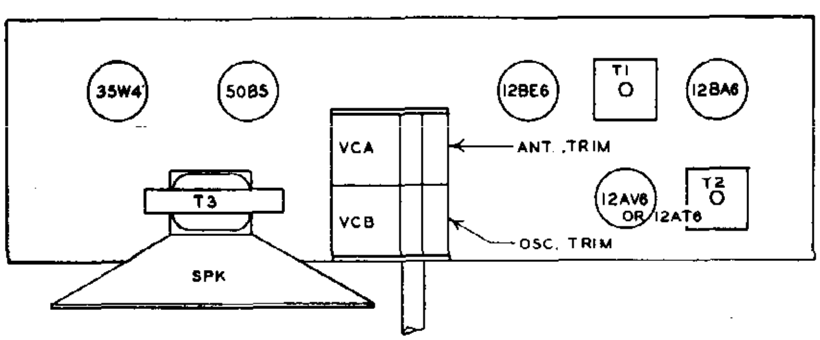
GS 505

SPECIFICATIONS

Power Supply	117 volts 60 cycle AC, 117 volts DC, 29 watts
Frequency Range	535 KC to 1630 KC
Intermediate Frequency	455KC
Antenna	Built-in Loop
Tuning	Variable Capacity
Speaker	4", P.M. voice coil impedance 3.2 ohms
Power Output	0.8 watt undistorted, 1.8 watts maximum
Sensitivity	400 uv/m average for 50 milliwatts output
Selectivity	55 KC broad at 1000 times, signal at 1000KC

Tubes used are as follows:

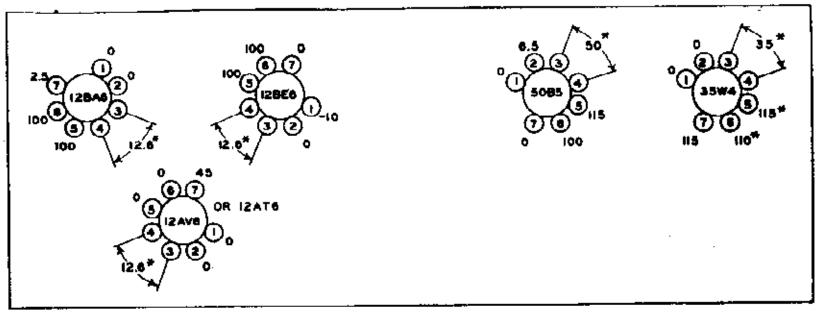
- 12BE6 Oscillator-Converter
- 12AV6 or 12AT6 AVC, Detector, and Audio
- 12BA6 I.F. Amplifier
- 50B5 Power Output
- 35W4 Power Rectifier



CHASSIS LAYOUT TOP VIEW

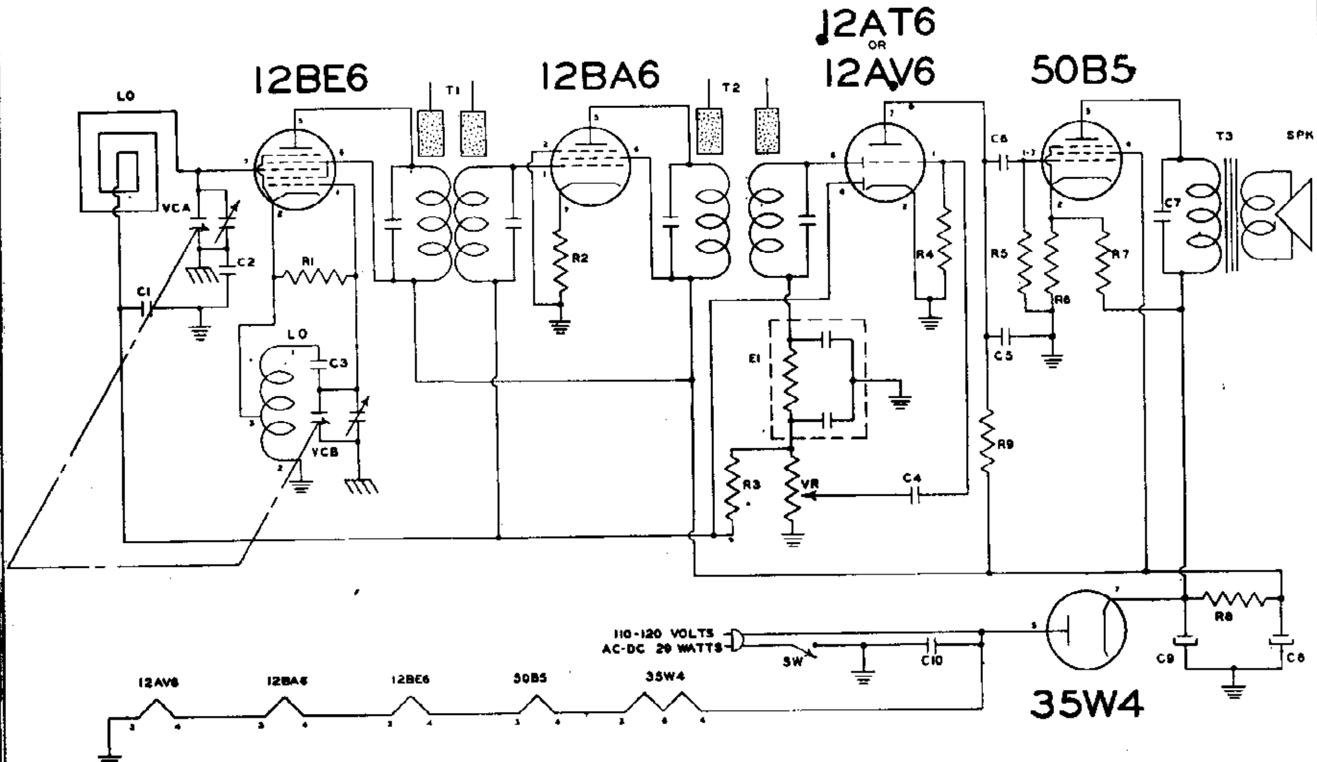
CSH502

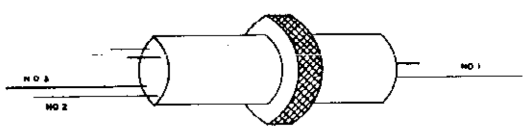
MODELS 05RA33-43-8136A,
05RA33-43-8137A



ALL DC VOLTAGES IN REFERENCE TO COMMON GROUND
*AC EXCEPT WHEN USED ON DC

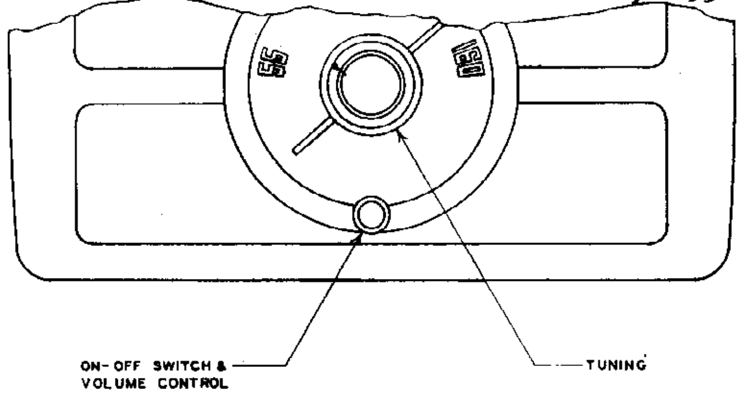
VOLTAGE CHART CHASSIS BOTTOM VIEW





OSC COIL LO

MODELS 05RA33-43-8136A, 05RA33-43-8137A



FRONT VIEW

ALIGNMENT PROCEDURE

The following procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent AVC action from interfering with proper alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts, using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat the alignment procedure given below as a final check.

CAUTION: This is an AC/DC receiver, and when aligning the set it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or to place a .2 MFD condenser in each test lead of the signal generator.

SIGNAL GENERATOR Frequency	Dummy Antenna	Connection to Radio	POSITION OF VARIABLE	ADJUST FOR MAXIMUM OUTPUT
455 KC	.1 MFD	12BE6 Grid Stator VCA	Fully Open	T1 & T2
1625 KC		12BE6 Grid Stator VCA	Fully Open	VCB Oscillator
1400 KC	.1 MFD	Loosely Coupled to Loop	Tune in Signal Generator	VCA Antenna

Connect low side of signal generator to common negative.

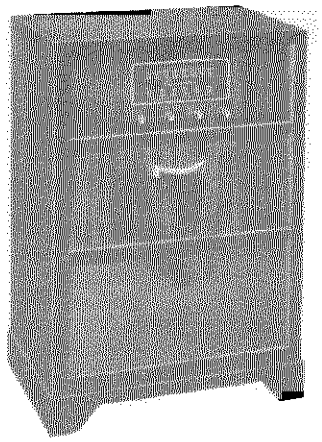
PARTS VALUES FOR T67G GAMBLE'S AC/DC CLIPPER

CIRCUIT COMPONENTS SYMBOL	PART NO.	DESCRIPTION	VALUE	RATING
VCA-VCB	VCT67G	Condenser, 2 gang		
C1	CO52	Condenser, paper	.05 MFD	200 volts
C2	C12	Condenser, paper	.1 MFD	200 volts
C3	C026	Condenser, paper	.02 MFD	600 volts
C4-C6-C7	C0056	Condenser, paper	.005 MFD	600 volts
C5	C2505M	Condenser, mica	250 MMFD	500 volts
C8	C40-20-1.5	Condenser, electrolytic	20 MFD	150 volts
C9	C40-20-1.5	Condenser, electrolytic	40 MFD	150 volts
C10	C054	Condenser, paper	.05 MFD	400 volts
R1	R223.5	Resistor	22K ohm	½ watt
R2	R391.5	Resistor	390 ohm	½ watt
R3	R105.5	Resistor	1 megohm	½ watt
R4	R106.5	Resistor	10 megohm	½ watt
R5-R9	R474.5	Resistor	470K ohm	½ watt
R6	R121.5	Resistor	120 ohm	½ watt
R7	R1031	Resistor	10K ohm	1 watt
R8	R1021	Resistor	1000 ohm	1 watt
E1	CR1	Diode filter unit	2X100 MMFD-47K ohm	
VR	VRT67G	Volume control	1 megohm	
LA	LT67A	Antenna loop		
LO	LOT67	Oscillator coil		
T1-T2	T111-31-A	I.F. transformer		
T3	E-81645-T	Output transformer		
SW	VRT67G	Switch S.P.S.T. on volume control		
SPK	SPKT67	4" P.M. speaker		

MECHANICAL PARTS

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
M-1801	Chassis	H-1805	Ground lug	P-18011	Cabinet, ivory
M-1802	Chassis cover	H-81644-6	Miniature tube socket	P-1704AW	Pointer knob, walnut
H-1601	Trimount ⅝"	W-1802	Line cord and plug	P-1704AI	Pointer knob, ivory
H-1802	Trimount ¼"	SR-3P	Strain relief	P-1704W	Round knob, walnut
T111-31-B	I.F. mounting clip	P-1801W	Cabinet, walnut	P-1704I	Round knob, ivory

MODEL 15RA1-43-7654A



ELECTRICAL SPECIFICATIONS

Power Consumption —
117 volts AC—60 cycles 40 Watts
60 watts phono operating

Power Output —
1.5 watts maximum
.8 watts 10% distortion

Speaker—8" PM dynamic

Frequency Ranges —
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency —
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM — 950 KC broad at 200 times down

AM Sensitivity—(For .5 watt output with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

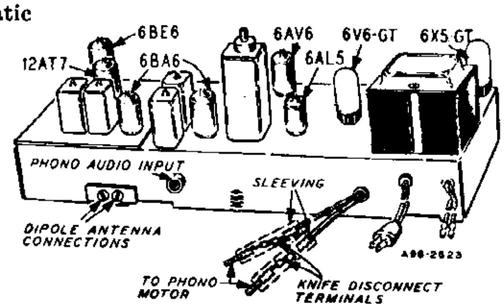
Record Changer —
See Manual No. 619-12

GENERAL DESCRIPTION

This radio is an 8 tube (including rectifier tube) AC receiver with automatic record changer, designed for reception of stations in the standard broadcast band between 540 and 1600 kilocycles and FM (Frequency Modulation) stations in the FM Band of 88-108 megacycles. Controls are provided on the front panel for tuning, tone, volume and band or phono selection. Special features include two built-in antennas, a grounded grid R-F amplifier stage on the FM Band, automatic volume control, compensator circuits to prevent oscillator drift, beam power output stage, permanent magnet dynamic speaker and an electrostatic shield in the power transformer to reduce power line noise.

Tube and Dial Lamp Complement

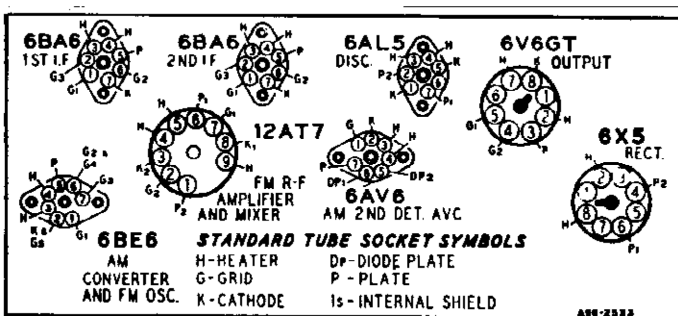
1 6BE6 AM Converter & FM Osc.
1 6BA6 1st I-F Amplifier
1 6BA6 2nd I-F Amplifier
1 6AL5 FM Discriminator
1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
1 6V6GT Audio Output
1 6X5GT Rectifier
1 12AT7 R-F Amplifier & Mixer
2 No. 47 Dial Lamps



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage ....117 Volts AC
Signal Input ....None
A Variation of ±10% is usually permissible.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

	SIGNAL GENERATOR						
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open.	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection
RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN							

FM ALIGNMENT NOTES

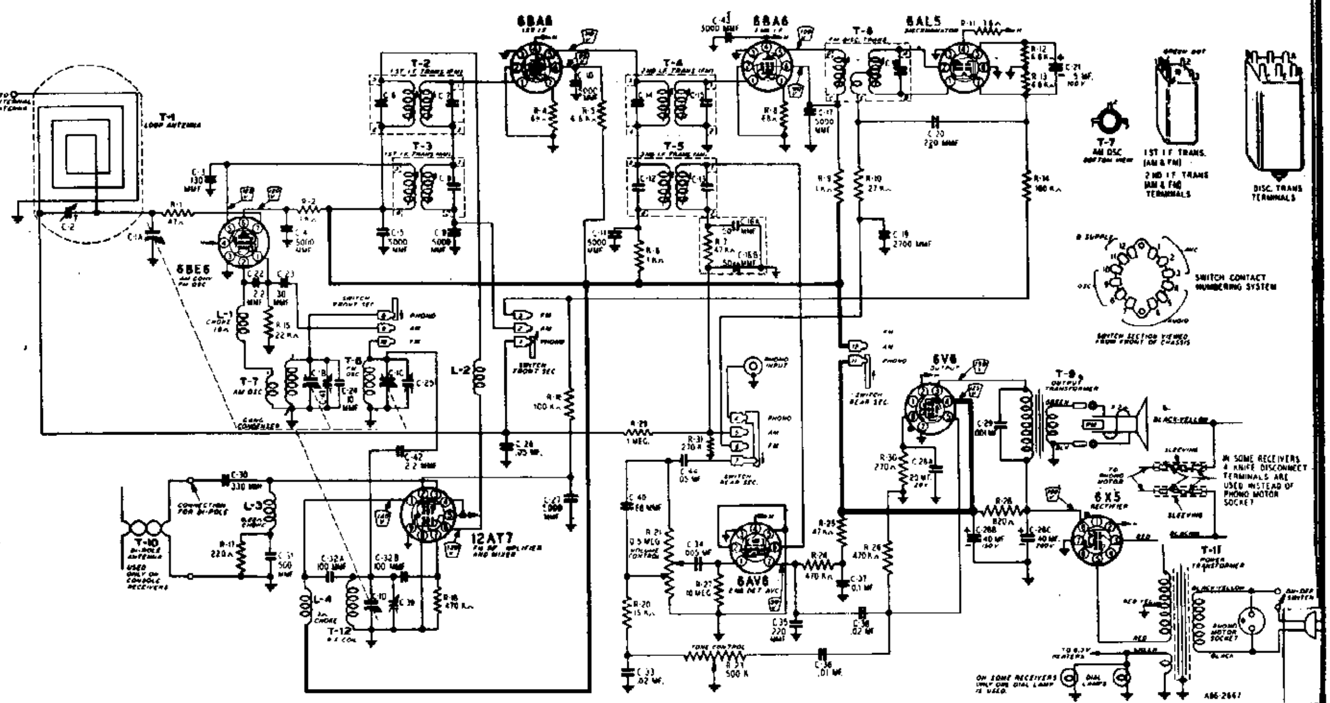
NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

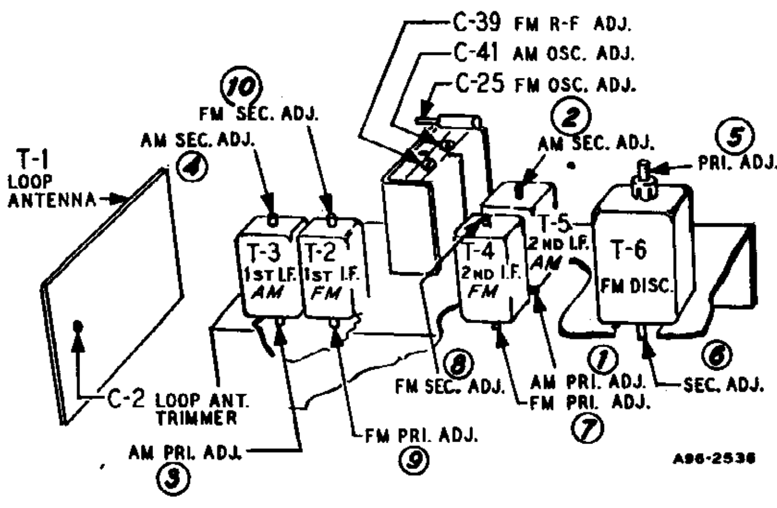
NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the 27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

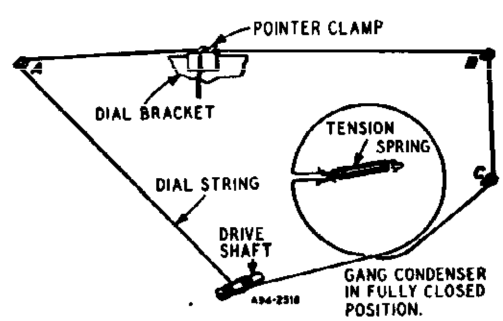
MODEL 15RA1-43-7654A





DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



REPLACEMENT PARTS LIST

CAPACITORS

Ref. No.	Description	Part No.
C-1	Gang Condenser Assembly	14A209
C-2	Capacitor, Trimmer; 2-24 mmf	17A256
C-3	Capacitor, Ceramic; 130 mmf	47X559
C-4, C-5, C-9, C-10, C-11, C-17, C-27, C-43	Capacitor, Ceramic; 5000 mmf	47X507
C-6, C-7	Part of T-2 (1st I-F Trans. F.M.)	
C-8	Part of T-3 (1st I-F Trans. AM)	
C-12, C-13	Part of T-5 (2nd I-F Trans. AM)	
C-14, C-15	Part of T-4 (2nd I-F Trans. FM)	
C-16A, C-16B	Capacitor, Dual Mica; 50-50 mmf	47X112
C-18	Part of T-6 (Discriminator Trans.)	
C-19	Capacitor, Molded Mica; 2700 mmf	47X492
C-20, C-35	Capacitor, Ceramic; 220 mmf	47X468
C-21	Capacitor, Dry Electrolytic; 5 mf 100 V	45X361
C-22, C-42	Capacitor, Ceramic; 2.2 mmf	47X557
C-23	Capacitor, Ceramic; 30 mmf	47X558
C-24	Capacitor, Ceramic; 10 mmf	47X523
C-25	Capacitor, Trimmer; 1-8 mmf	17A255
C-26, C-44	Capacitor, Tubular; .05 mf 200 V	B66503
C-28A, C-28B, C-28C	Capacitor; Dry Electrolytic; 20 mf 20 V, 40 mf 150 V, 40 mf 200 V	45X360
C-29	Capacitor, Tubular; .001 mf 800 V	H66102
C-30	Capacitor, Molded Mica; 330 mmf	47X470
C-31	Capacitor, Ceramic; 500 mmf	47X508
C-32A, C-32B	Capacitor, Dual Ceramic; 100 mmf	76X4
C-33	Capacitor, Tubular; .02 mf 200 V	B66203
C-34	Capacitor, Tubular; .005 mf 400 V	D66502
C-36	Capacitor, Tubular; .01 mf 200 V	B66103
C-37	Capacitor, Tubular; .1 mf 400 V	D66104
C-38	Capacitor, Tubular; .02 mf 400 V	D66203
C-39, C-41	Part of C-1 (Gang Condenser)	
C-40	Capacitor, Ceramic; 68 mmf	47X471

RESISTORS

Ref. No.	Description	Part No.
R-1	Resistor, Carbon; 47 ohms 0.5 W	B85470
R-2, R-6, R-9	Resistor, Carbon; 1000 ohms 0.5 W	B85102
R-4, R-8	Resistor, Carbon; 68 ohms 0.5 W	B84680
R-5, R-12, R-13	Resistor, Carbon; 6800 ohms 0.5 W	B84682
R-7, R-25	Resistor, Carbon; 47 K ohms 0.5 W	B85473
R-10	Resistor, Carbon; 27 K ohms 0.5 W	B85273
R-11	Resistor, Wirewound; 3.6 ohms 0.5 W	43X233
R-14, R-16	Resistor, Carbon; 100 K ohms 0.5 W	B85104
R-15	Resistor, Carbon; 22 K ohms 0.5 W	B85223
R-17	Resistor, Carbon; 220 ohms 0.5 W	B85221
R-18, R-24, R-26	Resistor, Carbon; 470 K ohms 0.5 W	B85474
R-20	Resistor, Carbon; 15 K ohms 0.5 W	B85153
R-21	Volume Control & Switch; .5 megohm	36X372
R-23	Tone Control; .5 megohm	40X310
R-27	Resistor, Carbon; 10 megohms 0.5 W	B85106
R-28	Resistor, Carbon; 820 ohms 2.0 W	D84821
R-29	Resistor, Carbon; 1 megohm 0.5 W	B85105
R-30	Resistor, Carbon; 270 ohms 0.5 W	B84271
R-31	Resistor, Carbon; 270 K ohms 0.5 W	B84274

TRANSFORMERS AND COILS

Ref. No.	Description	Part No.
L-1	Choke, Insulated	35A5
L-2	Choke, Parasitic	9A2103
L-3	Choke, Insulated	35A9
L-4	Choke, Insulated	35A8
T-1	"B" Range Loop Antenna	9A2099
T-2	1st I-F Trans. (FM)	9A2060
T-3	1st I-F Trans. (AM)	9A2062
T-4	2nd I-F Trans. (FM)	9A2061
T-5	2nd I-F Trans. (AM)	9A2063
T-6	Discriminator Transformer	9A2161
T-7	Oscillator Coil (AM)	9A2065
T-8	Oscillator Coil (FM)	9A2067
T-9	Output Transformer	51X134
T-10	Dipole Antenna	9A2003
T-11	Power Transformer	53X291
T-12	Antenna Coil (FM)	9A2066

DIAL AND TUNING PARTS

Description	Part No.
No. 47 Pilot Light	7A103
Pilot Light Socket Assembly	7A199
Escutcheon	4X1060
Rubber Grommets (mtg. Gang Cond.)	6X66
Drive Cord Assembly	10X72
Pointer	15X251
"C" Washer (Drive Shaft)	19X192
Condenser Cushion Stud	20X260
Dial Bracket	25X1650
Drive Shaft	26X486
Drive Cord Tension Spring	28X113
Spring (Dial Glass)	28X564
Dial Glass	58X744

MISCELLANEOUS

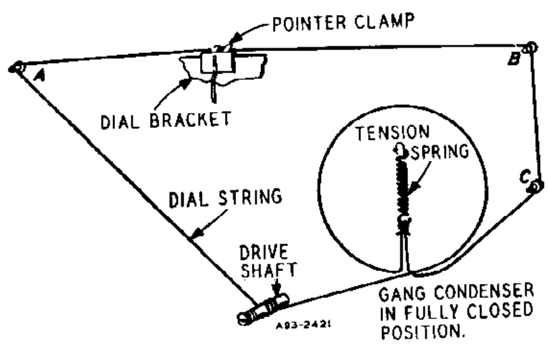
Description	Part No.
Band Change Switch	2A393
Phono Socket (Single Pin)	3A305
Tube Socket (1st 6BA6)	3A426
Tube Socket (6BE6)	3A427
Tube Socket, Molded (Octal)	3A435
Tube Socket (Miniature)	3A439
Tube Socket (12AT7)	3A443
Knob (Tuning)	10A699
Knob (Off-Volume)	10A700
Knob (Tone)	10A701
Knob (FM-BC-PH)	10A702
Speaker, 8" P.M.	12A477
Record Changer — 3 speed	28A171
Line Cord & Plug Assembly	13X546
Line Cord Clamp	30X560

MODEL 15RA1-43-7902A

MODERN OAK RADIO PHONO CONSOLE

DRIVE CORD REPLACEMENT

Use a new 10X38 drive cord assembly or a new length of cord 46 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.

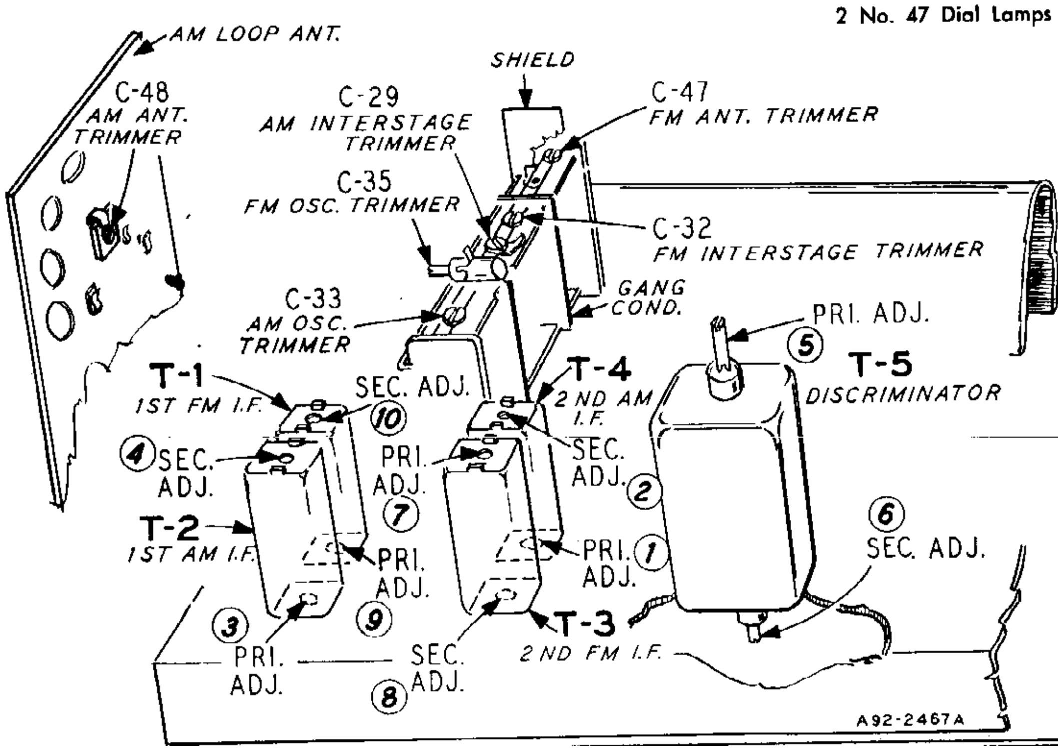


ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455 KC FM—10.7 MC
Selectivity	AM—43 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—760 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 10 microvolts average
FM Sensitivity	(For .5 watt output) 30 microvolts average
Power Output	8.5 watts maximum 6.0 watts 10% distortion
Loud Speaker	12" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles
Record Changer	See Manual No. 619-12

Tube and Dial Lamp Complement

- 1 6BA6 AM-FM R-F Amplifier
- 1 12AT7 FM & AM Osc. & Mixer
- 1 6BA6 FM-AM 1st I-F Amplifier
- 1 6BA6 FM 2nd I-F Amplifier
- 1 6AL5 FM Detector
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 2 6K6-GT Audio Output
- 1 5Y3-GT Rectifier
- 1 6AV6 Phase Inverter
- 2 No. 47 Dial Lamps



MODEL 15RA1-43-7902A

ALIGNMENT PROCEDURE

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas —.1 mf, 200 mmf.

Volume Control -Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
I-F	455 kc	12AT7 Pin 7 and Chassis	.1 mf	Broadcast	Rotor Fully Open	2nd I-F Pri. & Sec. (1) & (2) 1st I-F Pri. & Sec. (3) & (4)	Maximum Output
Broadcast	1620 kc	External ant. term.	200 mmf	Broadcast	Rotor Fully Open	Broadcast Oscillator C-33	
	1400 kc	External ant. term.	200 mmf	Broadcast	Turn Rotor to Max. Output	Broadcast Interstage C-29	
	1400 kc	External ant. term.	200 mmf	Broadcast	Set pointer to 1400 kc See Note A	Loop Antenna C-48	

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

FM STAGES

The following equipment is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)
Allow chassis and signal generator to warm up for several minutes.

	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
Discriminator	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Center
I-F	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. Note A and D (7) 2nd I-F Sec. Note A and E (8)	Maximum Deflection
Discriminator	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Center
	10.7 MC Note F	FM-RF Gang Condenser terminal	.01 mf	FM	Rotor Fully Open	1st I-F Pri. (9) 1st I-F Sec. (10) Notes A, D & E	Maximum Deflection
Recheck I-F Adjustments in order given							
R-F & Osc.	108.4 Note H	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Oscillator C-35 Note G	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	FM Interstage C-32	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	Ant. C-47	Maximum Deflection
Recheck R-F and Osc. Adjustments in order given							

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the junction of resistor R-22 and condenser C-18 for all adjustments except the discriminator secondary adjustment, for which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and connect to junction of R-18 and C-62. Adjust for zero voltage indication.

NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor across the 2nd I.F. secondary terminals. Input may have to be increased to .1 volt if receiver is *badly* mis-aligned.

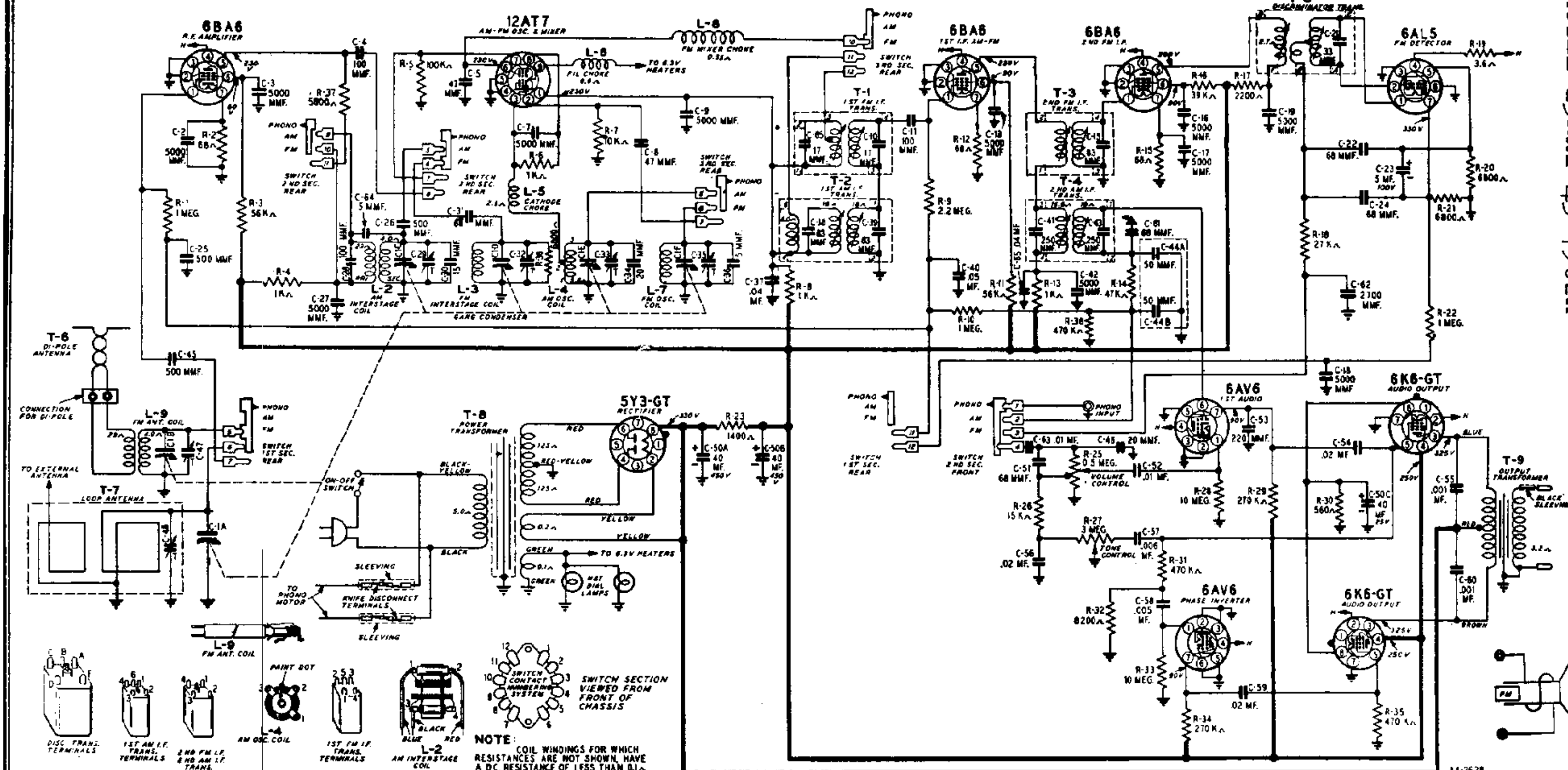
NOTE E—Disconnect 1000 ohm load resistor from secondary terminals and connect across the 2nd I.F. primary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

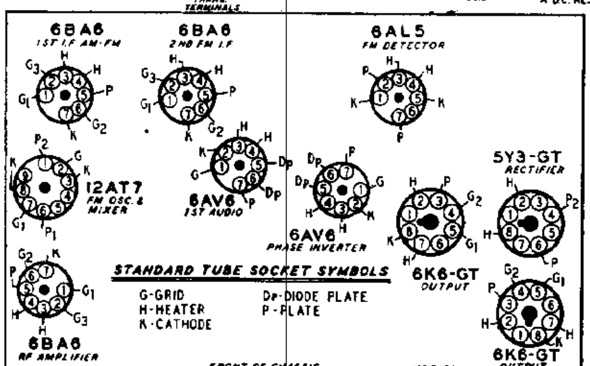
NOTE F—Input can be reduced to 10,000 microvolts.

NOTE G—Oscillator frequency above signal frequency.

NOTE H—Remove the 1000 ohm load resistor before attempting to check the R-F and oscillator adjustments.

MODEL 15RA1-43-7902A

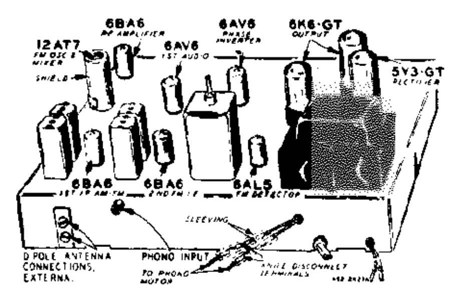




TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage ....117 Volts AC
Signal Input ....None
A variation of ±10% is usually permissible.



REPLACEMENT PARTS LIST

CAPACITORS

Ref. No.	DESCRIPTION	Part No.
C-1	Gang Condenser and Pulley	14A207
C-2, C-3, C-7, C-9, C-13, C-16, C-17, C-18, C-19, C-27, C-42	Capacitor, Silvered Mica, 5000 mmf	47X507
C-4	Capacitor, Ceramic, 100 mmf ± 20%	47X497
C-5	Capacitor, Ceramic, 47 mmf ± 5%	47X499
C-8	Capacitor, Ceramic 47 mmf ± 10%	47X498
C-10, C-65	Part of T-1	
C-11, C-28	Capacitor, Ceramic, 100 mmf ± 10%	47X550
C-15	Part of T-3	
C-21	Part of T-5	
C-22, C-24, C-31, C-51	Capacitor, Ceramic, 68 mmf ± 10%	47X501
C-23	Capacitor, Dry Electrolytic, 5 mf 100 V.	45X361
C-25, C-26, C-45	Capacitor, Ceramic, 500 mmf ± 20%	47X496
C-29, C-32, C-33, C-47	Part of C-1	
C-30	Capacitor, Ceramic, 15 mmf ± 10%	47X552
C-34, C-46	Capacitor, Ceramic 20 mmf ± 10%	47X516
C-35	Capacitpr, Trimmer, 1-8 mmf	26A489
C-36, C-64	Capacitor, Ceramic, 5 mmf ± 10%	47X549
C-37, C-65	Capacitor, Tubular, .04 mf 600 V	F66403
C-38, C-39	Part of T-2	
C-40	Capacitor, Tubular, .05 mf 200 V.	B66503
C-41, C-43	Part of T-4	
C-44A, C-44B	Capacitor, Dual Mica, 50-50 mmf.	47X112
C-48	Part of T-7	
C-50A, C-50B, C-50C	Capacitor, 3 section Electrolytic: 40 mf 450 V.; 40 mf 450 V.; 40 mf 25 V.	45X374
C-52	Capacitor, Tubular, .01 mf 600 V.	F66103
C-53	Capacitor, Ceramic, 220 mmf ± 20%	47X468
C-54, C-59	Capacitor, Tubular, .02 mf 600 V	F66203
C-55, C-60	Capacitor, Tubular, .001 mf 600 V.	F66102
C-56	Capacitor, Tubular, .02 mf 200 V.	B66203
C-57	Capacitor, Tubular, .006 mf 600 V.	F66602
C-58	Capacitor, Tubular, .005 mf 200 V.	B66502
C-61	Capacitor, Ceramic, 68 mmf ± 20%	47X471
C-62	Capacitor, Molded Mica, 2700 mmf ± 10%	47X492
C-63	Capacitor, Tubular, .01 mf 120 V.	46X328

RESISTORS

Ref. No.	DESCRIPTION	Part No.
R-1, R-10, R-22	Resistor, Carbon 1 Megohm .5 W.	B85105
R-2, R-12, R-15	Resistor, Carbon 68 Ohms .5 W.	B83680
R-3, R-11	Resistor, Carbon 56K Ohms .5 W.	B84563
R-4, R-6, R-8, R-13	Resistor, Carbon 1000 Ohms .5 W.	B84102
R-5	Resistor, Carbon 100K Ohms .5W.	B85104
R-7	Resistor, Carbon 10K Ohms .5 W.	B84103
R-9	Resistor, Carbon 2.2 Megohm .5 W.	B85225
R-14	Resistor, Carbon 47K Ohms .5 W.	B85473
R-16	Resistor, Carbon 39K Ohms 1.0 W.	C84393
R-17	Resistor, Carbon 2200 Ohms .5 W.	B85222
R-18	Resistor, Carbon 27K Ohms .5 W.	B84273
R-19	Resistor, Wire Wound 3.6 Ohms .5 W.	43X233
R-20, R-21	Resistor, Carbon 6800 Ohms .5 W.	B83682
R-23	Resistor, Wire Wound 1400 Ohms 5.0 W.	43X242
R-25	Volume Control & Switch .5 meg.	36X379
R-26	Resistor, Carbon 15K Ohms .5 W.	B85153
R-27	Tone Control 3 meg.	40X288
R-28, R-33	Resistor, Carbon 10 Megohm .5 W.	B85106
R-29, R-34	Resistor, Carbon 270K Ohms .5 W.	B85274
R-30	Resistor, Carbon 560 Ohms 2.0 W.	D83561
R-31, R-35, R-38	Resistor, Carbon, 470 K Ohms .5 W	B85474

MODEL 15RA1-43-7902A

REPLACEMENT PARTS LIST (continued)

Ref. No.	DESCRIPTION	Part No.
R-32	Resistor, Carbon 8200 Ohms .5 W.	B84822
R-36	Resistor, Carbon 6800 Ohms .5 W.	B84682
R-37	Resistor, Carbon 5600 Ohms .5 W.	B84562

COILS AND TRANSFORMERS

Ref. No.	DESCRIPTION	Part No.
L-2	Coil, Interstage (AM)	9A2025
L-3	Coil, Interstage (FM)	9A2024
L-4	Coil, Oscillator (AM)	9A2022
L-5	Choke, Insulated	35A5
L-6	Choke, Filament	9A1881
L-7	Coil, Oscillator (FM)	9A2023
L-8	Choke (FM Mixer Plate)	35A7
L-9	Coil, Antenna (FM)	9A2027
T-1	1st I.F. Coil Assembly (FM)	9A2043
T-2	1st I.F. Coil Assembly (AM)	9A2029
T-3	2nd I.F. Coil Assembly (FM)	9A2030
T-4	2nd I.F. Coil Assembly (AM)	9A2042
T-5	Discriminator Coil Assembly	9A2161
T-6	Dipole Antenna Assembly	9A2004
T-7	"B" Range Loop Antenna Assembly	9A1972
T-8	Power Transformer	53X286
T-9	Output Transformer	51X142

DIAL AND TUNING PARTS

DESCRIPTION	Part No.
Escutcheon	4X1073
Rubber Grommets } Mtg. Gang Condenser	6X67
Condenser Mtg. Bracket } Mtg. Gang Condenser	25X1630
Drive Cord Assembly	10X38
Pointer	15X251
"C" Washer (Drive Shaft)	19X192
Drive Shaft	26X509
Drive Cord Tension Spring	28X113
Dial Bracket Assembly	S-25X72
Consisting of:	
Tubular Rivet	20X1564
Shoulder Rivet	20X1580
Shoulder Rivet	20X1581
Eyelet	20X1508
Dial Bracket	25X1610
Support Bracket, L. H.	25X1611
Support Bracket, R. H.	25X1612
Olive Green Lacquer Enamel (Type 8)	1801J
Dial Assembly	S-58X46
Consisting of:	
Dial Bracket Assembly	S-25X72
Rubber Band	8X185
Rubber Strip	8X195
Trimount Stud	28X56
Spring	28X564
Light Shield	41X86
Dial Glass	58X716

MISCELLANEOUS

DESCRIPTION	Part No.
Band Change Switch	2A404
Phono Socket (Single Pin)	3A305
Molded Octal Tube Socket	3A435
Tube Socket (miniature, for AM-FM Converter)	3A436
Tube Socket (Miniature)	3A439
No. 47 Pilot Light	7A103
Pilot Light Socket Assembly	7A231
Knobs	10A772
12" P.M. Speaker	12A502
Record Changer	28A171
Line Cord & Plug Assembly	13X546
Tube Shield (AM-FM Converter)	32X388
Tube Shield (Miniature)	32X390

The Model 15RA2-43-9105A is a television, AM radio and phonograph combination The television chassis is in no way connected to the radio or phonograph, as the phono TV switch and audio input plug on the rear of the television chassis is not utilized.

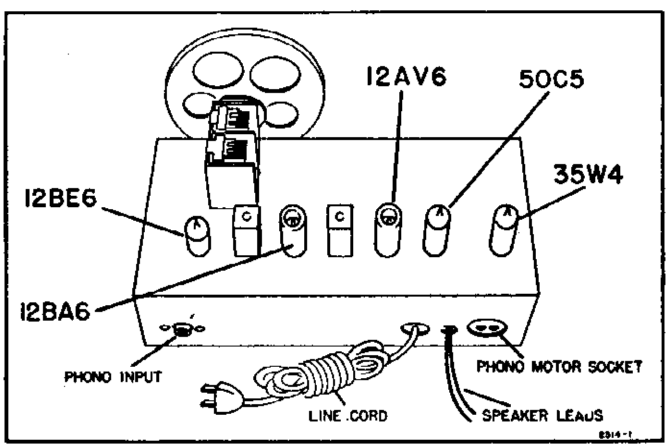
The phonograph obtains its AC power through a connection to the radio chassis and also uses the audio section for amplification.

This manual covers only the service and repair parts information for the radio chassis. For service and repair parts information for the television receiver refer to television service manual

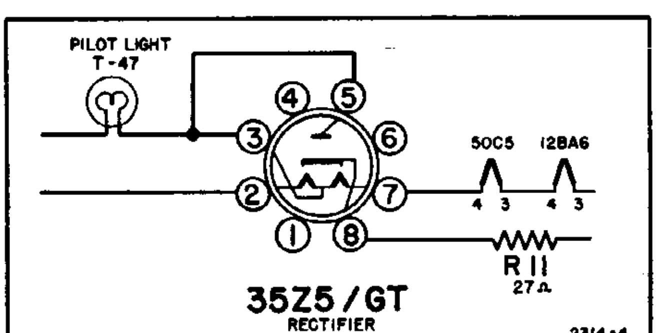
SERVICE DATA

ELECTRICAL SPECIFICATIONS

Power Supply	115 volts; 60-cycles AC, 60 watts. (Including phonograph)
Frequency Range	540 to 1600 kc.
Intermediate Freq.	455 kc.
Selectivity	At 1000 kc. 50 kc. at 1000 x signal.
Sensitivity	20 microvolts average for .05 watts output.



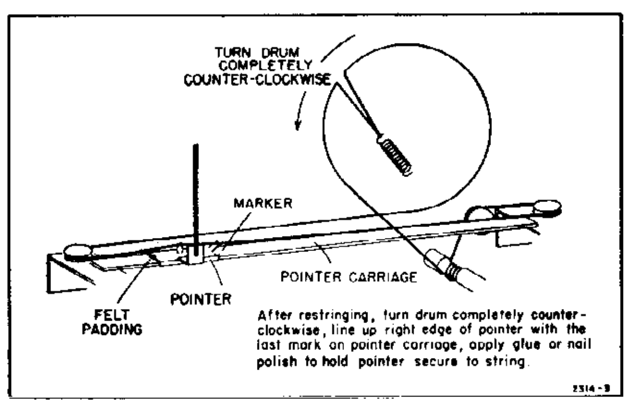
Chassis View



MAINTENANCE

DIAL LIGHT—If the dial lamp burns out, the set should not be operated until a new lamp has been installed. Failure to heed this caution may result in a burned-out rectifier tube. To replace the lamp, pull out the back cover inside the changer compartment. Use only a type T-47 lamp for replacement.

Power Output	0.75 watts undistorted, 1.25 watts maximum.
Loud Speaker	12" P.M., v.c. impedance 3.2 ohms.
Tube Complement	12BE6, converter. 12BA6, I.F. amplifier. 12AV6, detector, AVC, audio amplifier. 50C5, output amplifier. 35Z5 or 35W4, rectifier. Pilot lite, 6-8 volts, T-47.



Dial Cord Stringing

PRODUCTION CHANGE

Due to procurement difficulties the 35W4 rectifier tube was replaced by a 35Z5. The only change in parts list is a A-15B-10440 octal tube socket. Refer to the drawing at the left for the 35Z5 wiring diagram.

MODEL 15RA2-43-9105A

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

Alignment must be done in the cabinet.

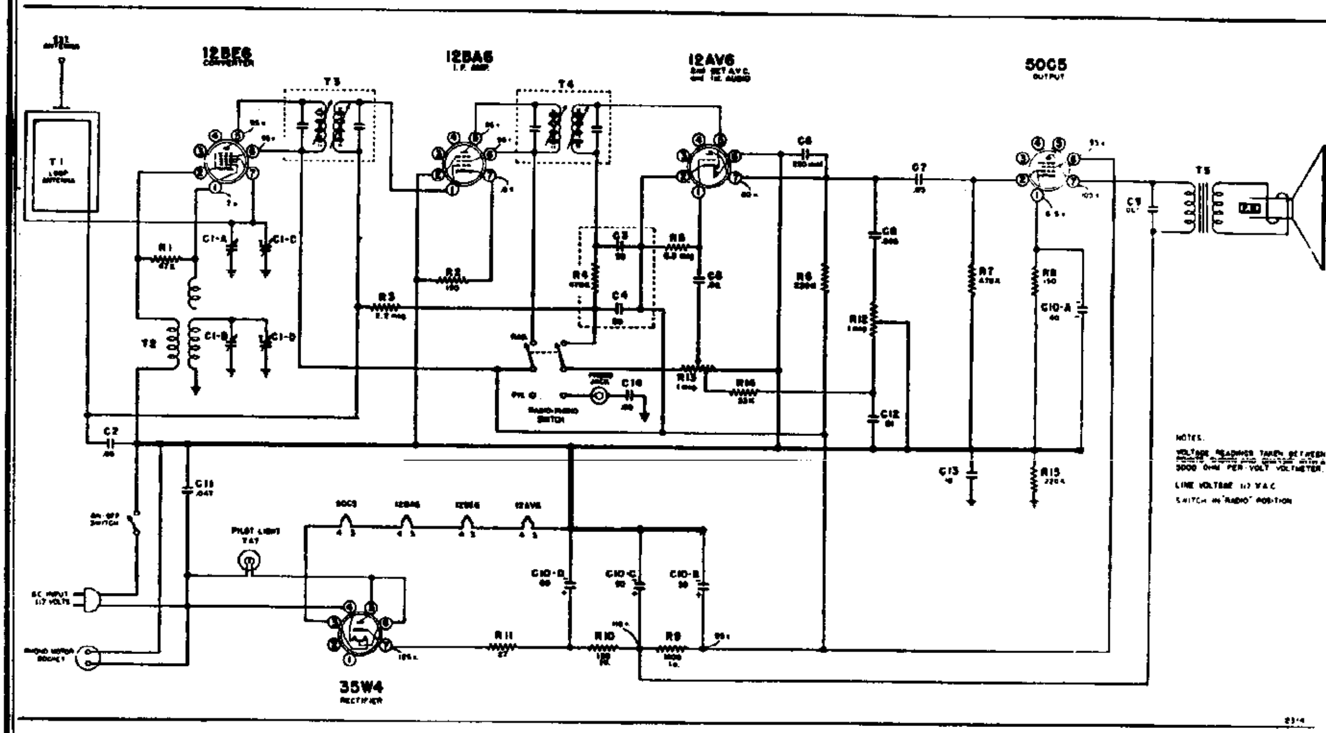
The signal source must be an accurately calibrated signal generator capable of supplying both RF and 455 kc signals modulated 30% with a 400-cycle audio signal. Variations of plus or minus 25% are usually permissable.

The table below lists the sensitivity at the input of each stage. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of 0.4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected.

- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Loop antenna should be connected to receiver and in its proper position when making adjustments.

SIGNAL GENERATOR						
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection	TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50 MILLIWATT OUTPUT
455 kc.	.1 mf.	12BE6, Pin 7	B MINUS POINT BUSS LEAD	(Capacitor fully open) (plates out of mesh)	Top and bottom Cores in output and input I.F. cans	60 microvolts
1620 kc.	.1 mf.	12BE6, Pin 7		(Capacitor fully open) (plates out of mesh)	Oscillator trimmer C1-D on gang	67 microvolts
535 kc.	.1 mf.	12BE6, Pin 7		Capacitor fully closed	Check for adequate range	61 microvolts
1400 kc.	————	Lay Generator lead near back of cabinet		Set dial pointer at 1400 kc.	Antenna trimmer C1-C on gang	200 to 400 microvolts
400 cycles	.1 mf.	12AV6, Pin 1		————	————	.03 volts

SCHEMATIC DIAGRAM WITH VOLTAGES



NOTE: Either 12AV6 or 12AT6 tubes may be used.

MODEL 15RA2-43-9105A

Please specify PART number and chassis model number when ordering replacements.

REPLACEMENT PARTS LIST

CAPACITORS

Ref. No.	Part No.	Description
C1A-B	B-8A-18997	Gang tuning condenser
C1C, D		Trimmers on gang
C2-7	C-8D-10770	.05 mfd x 200 volts
C3-4- & R4	A-201-15005	Filpec
C5	C-8D-11304	.02 mfd x 200 volts
C6	C-8G-14459	220 mmf, ceramic
C8-9	C-8D-10935	.005 mfd x 600 volts
C10-A-B-C-D	A-8C-19085	Electrolytic condenser
C11	C-8J-16081	.047 mfd x 400 volts
C12	C-8D-10761	.01 mfd x 400 volts
C13	C-8D-11111	.18 mfd x 400 volts
C14	C-8D-11251	.09 mfd x 400 volts

RESISTORS

Ref. No.	Part No.	Description
R1	C-9B1-82	47K ohms, 1/2 watt, 10%
R2-8	C-9B1-52	150 ohms 1/2 watt, 10%
R3	C-9B1-33	2.2 megohms, 1/2 watt, 20%
R5	C-9B1-36	6.8 megohms, 1/2 watt, 20%
R6-15	C-9B1-90	220K ohms, 1/2 watt, 10%
R7	C-9B1-29	470K ohms, 1/2 watt, 20%
R9	C-9B2-62	1000 ohms, 1 watt, 10%
R10	C-9B2-52	150 ohms, 1 watt, 10%
R11	C-9B1-43	27 ohms, 1/2 watt, 10%
R12	A-11A-19004	Tone control and radio phono switch
R13	A-10A-19005	Volume control and switch
R14	C-9B1-80	33K ohms, 1/2 watt, 10%

TRANSFORMERS AND COILS

Ref. No.	Part No.	Description
T1	C-13E-19087-1	Loop antenna assembly
T2	B-13D-19064	Oscillator coil
T3	B-13B-17731	Input IF transformer
T4	B-13B-17731	Output IF transformer
T5	B-12C-19009	Output transformer

DIAL PARTS

Ref. No.	Part No.	Description
	A-2D-17627	Pointer bar bracket
	B-2M-19006	Pointer bar
	A-3H-10299	Pulley
	B-2G-19433	Dial pointer
	B-53A-18547	Dial string
	A-49A-11324	Tension spring

RECORD CHANGER

Ref. No.	Part No.	Description
	B-201-18874	Record changer ~~(VM Model 950)~~
	3129-H	Motor assembly
		Electro voice 33-4 crystal cartridge
		Electro voice 0-2, needle

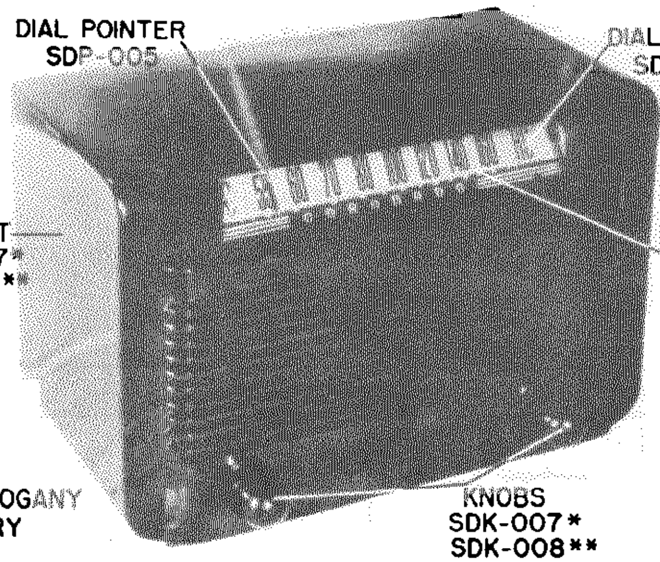
MISCELLANEOUS

Ref. No.	Part No.	Description
	B-2C-19053	Background plate
	A-3A-19003	Tuning shaft
	B-47A-19060	Pilot light assembly
	A-46A-10793	Pilot light, T-47
	A-2H-10974	Tube shield
	A-15C-16007	7-prong socket
	A-23A-10344	Line cord lock
	B-14M-11479-5	A.C. line cord and plug
	A-19B-12170	Phono socket
	A-19B-12468	Phono motor socket
	B-2D-15432-1	Loop mounting bracket

CABINET PARTS

Ref. No.	Part No.	Description
	R-24D-19482	Cabinet
	C-2M-18944	Escutcheon
	D-2M-18943	Escutcheon mask
	C-30M-18966	Picture glass
	B-2M-18768	Channel indicator plate
	B-2M-17068	Contrast off volume plate
	B-18A-19130	12" PM speaker
	A-2G-18788	Pointer
	B-5B-18781-76	Tuning knob
	B-5B-17761-76	Off-on volume knob
	B-5B-17762-76	Contrast knob
	A-25M-18172	White rubber knob
	A-25M-18177	Red rubber knob
	A-25M-18178	Blue rubber knob
	C-23J-19178	Cabinet back
	B-14M-17758	Line cord and plugs
	N-43E-15569	Wing nut, 6-32
	N-201-18519-2	T.V. inside antenna
	B-5B-18382-36	Antenna knob
	A-3M-19398	Centering adjusting rod
	B-2C-19362	Cover plate
	B-30A-19481	Radio dial scale
	B-2G-18928	Radio escutcheon
	B-201-18874-1	Record changer
	B-5B-18876-76	Radio knob (line)
	B-5B-18877-76	Radio knob
	B-23M-19163	Bottom cover
	A-55L-16671	Plug receptacle
	B-14M-11479	Radio line cord
	~~A-23A-10344~~	~~Line cord lock~~

MODELS 43-37I-1, 43-37I-2,
43-8175, 43-8176



Model 43-37I-1 Mahogany Cabinet (Illustrated)
Model 43-37I-2 Ivory Cabinet (Not Illustrated)

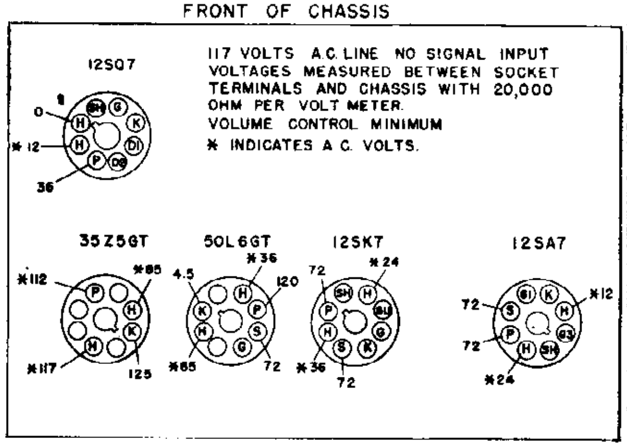
CAUTION: One side of the power line is connected to the chassis. Avoid any ground connection to the radio unless an isolating transformer is used in the power line.

SPECIFICATIONS

5 Tube Superheterodyne, including rectifier tube
Speaker--4 inch P.M. Dynamic, voice coil impedance 3.2
Antenna----Self contained loop antenna, also provision for external antenna
Tuning------------------------------Two gang capacitor
Power supply-----------------------105-125 V. AC or DC
Frequency on AC------------------------40 to 60 cycles

Power Consumption-----------------------------30 watts
Power Output-----0.8 watts undistorted, 1.4 w. maximum
Frequency range-------------------------540 to 1725 KC
Intermediate Frequency---------------------------455 KC
Antenna Sensitivity---140 mv. average for 0.5 w output
Selectivity 70 KC at 1000 times signal at 1000 KC

FRONT OF CHASSIS



BOTTOM VIEW OF CHASSIS

SOCKET VOLTAGE DIAGRAM

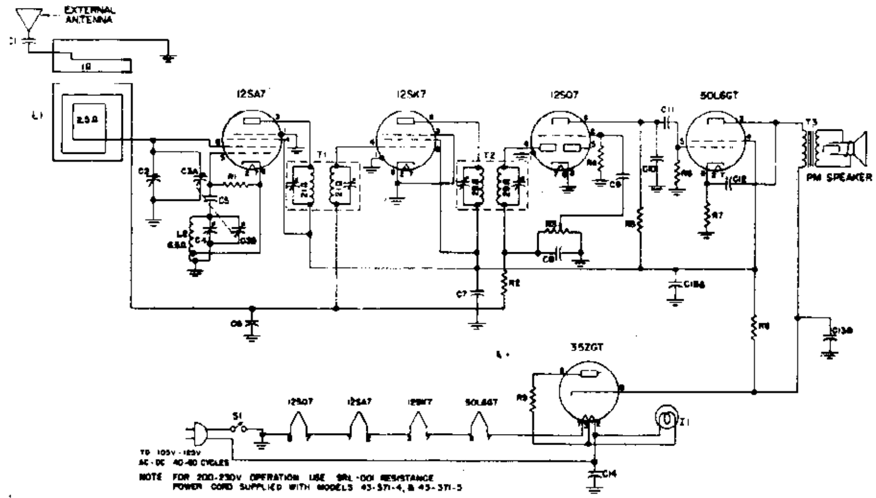
ALIGNMENT PROCEDURE

Allow unit to heat for a few minutes before starting alignment.
Volume control set to maximum.
Output meter across speaker.
Align for maximum output.
Keep input as low as readable meter reading of output will permit.

Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

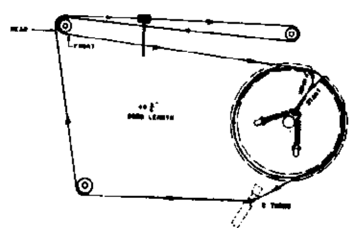
FREQUENCY	SIGNAL GENERATOR COUPLING CAPACITOR	SIGNAL GENERATOR CONNECTION TO RADIO	GROUND CONNECTION	TUNING CONDENSER SETTING	ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown)
455 KC	0.1 mf	Converter grid	Chassis	Wide open	2nd IF transformer trimmers 1st IF transformer trimmers
1725 KC	200 mmf	Receiver antenna post	Chassis	Wide open	Oscillator trimmer C4
1500 KC	200 mmf	Receiver antenna post	Chassis	Tune for maximum output	Antenna trimmer C2

MODELS 43-37I-1, 43-37I-2, 43-8175, 43-8176

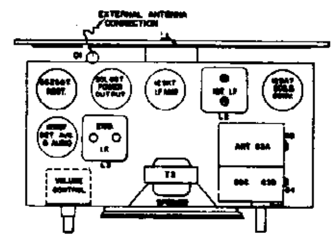


SCHEMATIC DIAGRAM

DRIVE CORD REPLACEMENT

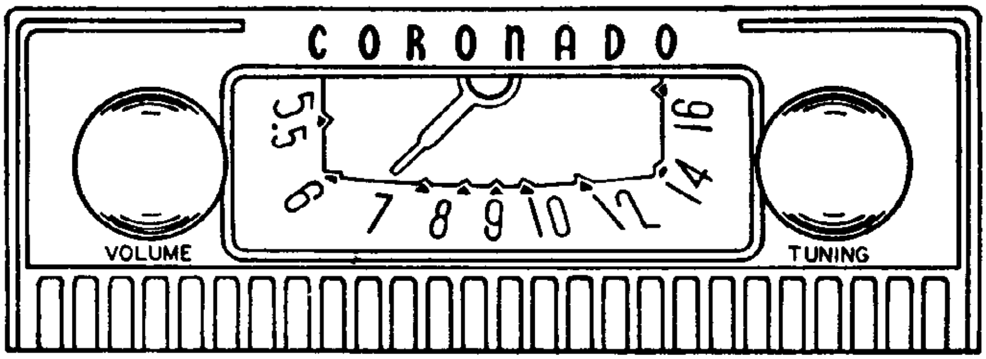


TUBE AND TRIMMER LOCATION



SYMBOL	TITLE	VALUE	RATING	PART NO.
C1	Paper capacitor	.02 mf.	400 V.	UCC-026
C2	Antenna trimmer			Part of SCT-015
C3	2 Gang variable condenser			SCT-015
C4	Oscillator trimmer			Part of SCT-015
C5	Mica capacitor	220 mmf.		UCU-036
C6	Paper capacitor	.05 mf.	400 V.	UCC-028
C7	Paper capacitor	.05 mf.	400 V.	UCC-028
C8	Paper capacitor	220 mmf.		UCU-036
C9	Paper capacitor	.01 mf.	400 V.	UCC-040
C10	Mica capacitor	220		UCC-036
C11	Paper capacitor	.01 mf.	400 V.	UCC-025
C12	Paper capacitor	.02	400 V.	UCC-026
C13A	Electrolytic capacitor	30 mf.	150 V.	SCE-022
C13B	Electrolytic capacitor	30 mf.	150 V.	SCE-022
C14	Paper capacitor	.05 mf.	400 V.	UCC-028
R1	Carbon resistor	22,000 ohm	½ W.	URD-081
R2	Carbon resistor	2.2 megohm	½ W.	URD-129
R3	Volume control & switch (S1)	1.0 megohm		SRC-045
R4	Carbon resistor	4.7 megohm	½ W.	URD-137
R5	Carbon resistor	470,000 ohm	½ W.	URD-113
R6	Carbon resistor	470,000 ohm	½ W.	URD-113
R7	Carbon resistor	150 ohm	½ W.	URD-029
R8	Carbon resistor	2,700 ohm	2 W.	URF-059
R9	Carbon resistor	18 ohm	½ W.	URD-007
S1	Switch, on-off part of R3			
L1	Loop antenna assembly			SAB-015
L2	Coil, oscillator			SLC-013
T1	Transformer, 1st I.F.			STL-001
T2	Transformer, 2nd I.F.			STL-002
T3	Transformer output, part of LS1			
LS1	Speaker, 4 inch P.M.			SOP-004
I1	Lamp, pilot	GE 47	6-8V.	UDL-018
	Socket, tube, octal-base			SJS-003
	Cord-power cord			SWL-002
	Back fasteners			RHH-002
	Pilot light socket assembly			SJS-001

MODELS 43-5006B,
43-5006C



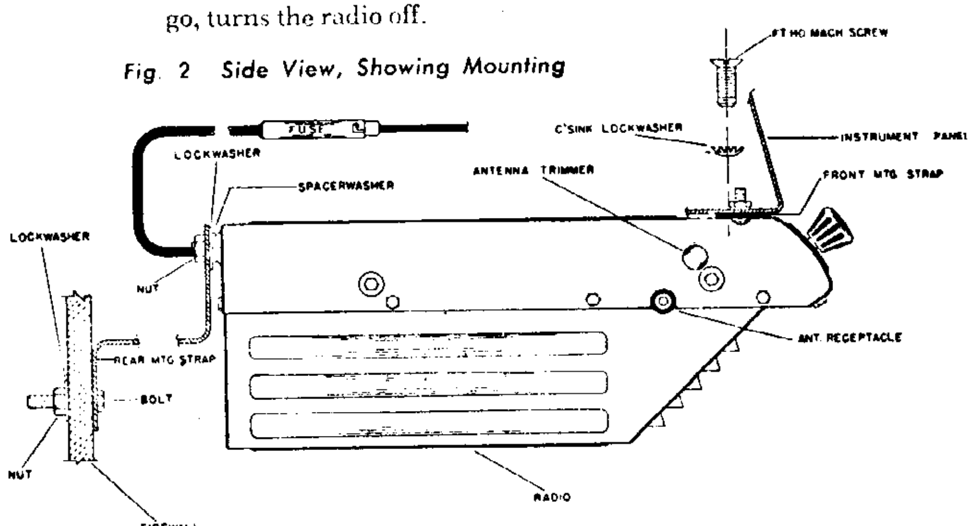
A52-257 KNOBS D40-141 ESCUTCHEON
B67-522 DIAL SCALE A58-55 DIAL POINTER

Fig. 1 Front View

OPERATION

To turn the receiver on, rotate the volume control and switch knob (left hand knob) to the right about half its range. After allowing about 30 seconds for the tubes to warm up, the desired station may be tuned by rotating the tuning control (right hand knob) to the desired frequency. The dial scale is calibrated in kilocycles minus the final two zeros. After the station has been properly tuned, the volume may be adjusted by means of the volume control knob. To increase the volume, turn the control to the right; to decrease the volume, turn it to the left. Turning this control to the left as far as it will go, turns the radio off.

Fig. 2 Side View, Showing Mounting



ELECTRICAL SPECIFICATIONS

The tube compliment of this receiver is as follows:

1—6SK7GT—R. F. Amplifier.

1—6SA7GT—Converter.

1—6SK7GT—I.F. Amplifier.

1—6SQ7—Detector—AVC—1st audio.

1—6V6GT—Power output.

1—6X5GT—Rectifier.

Power Supply	6.3 volts DC
Current	4.8 amp. average
Frequency Range	540 to 1600 KC
I. F. Frequency	455 KC
Speaker	4" P. M.
Power Output	1.2 watts, undistorted 2.5 watts, maximum
Sensitivity	10 microvolts average for 1 watt output
Selectivity	20 KC broad at 1000 times signal, at 1000 KC

SERVICE NOTES

Voltages taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 5).

All voltages should be measured with an input voltage of 6.3 volts DC.

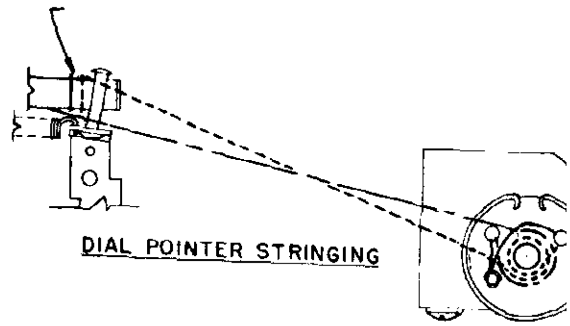
INSTRUCTIONS FOR REMOVING CHASSIS FROM THE CASE

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

FINAL ADJUSTMENTS

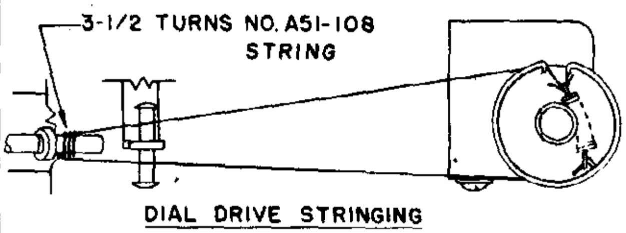
The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 600 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 2) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.



Dial Pointer Stringing

43-5006B & 43-5006C



Dial Stringing 43-5006B & 43-5006C

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unle it becomes necessary to replace a coil or transformer, the adjustments have been tampered with in the fiel Always make certain that other circuit components, su as tubes, condensers, resistors, etc., are normal before pr ceeding with realignment.

CAUTION: Before attempting to remove the top cov to service condensers, resistors, etc., the screw connecti the spark plate to the "A" terminal (inside case) must removed. This is a round head screw, and is located on t rear of the case, close to the mounting stud bolt. It recessed in a ½ inch hole in the case itself, thereby pe mitting contact with the spark plate.

After removing the spark plate screw, remove the tv knobs by pulling forward and remove the eight (screws securing the cover to the chassis. Lift the chassis the rear, at the same time moving it away from the fro of the case so that the volume and tuning shafts will cle the holes in the cover.

NOTE: When reinstalling the chassis into the case, sure the screw connecting the spark plate to the "A" te minal (inside case) is tightened very securely, otherw the receiver will not operate properly.

MODELS 43-5006B,
43-5006C

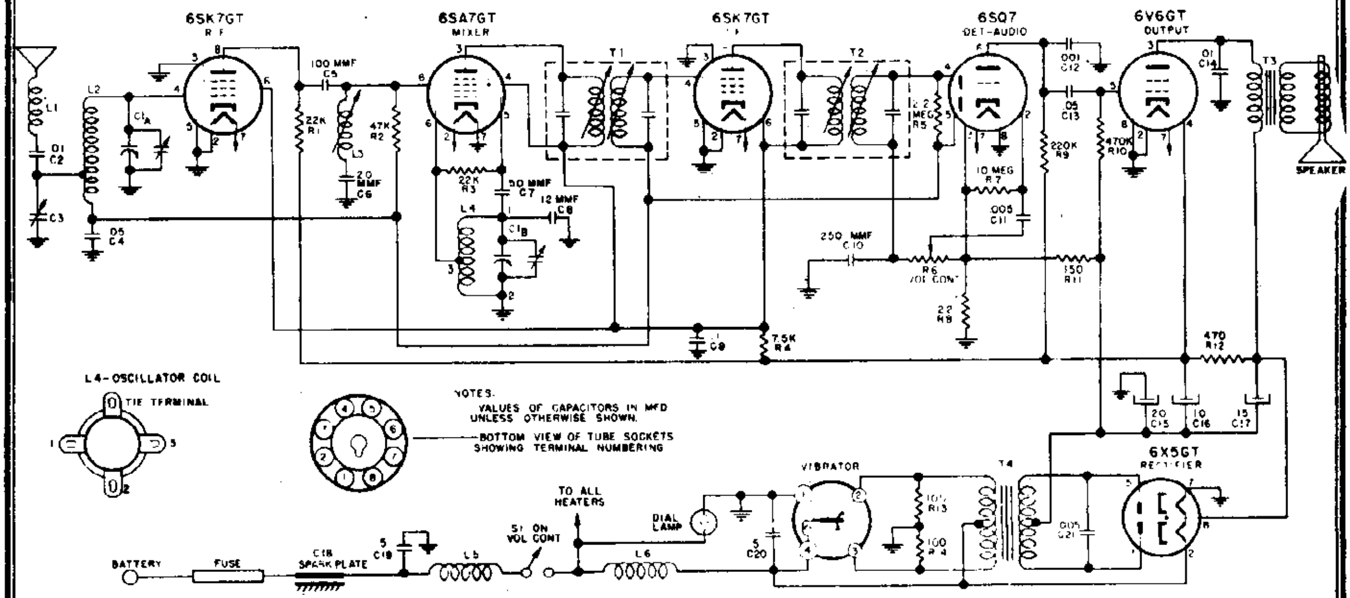


Figure 3 Schematic Drawing 43-5006B

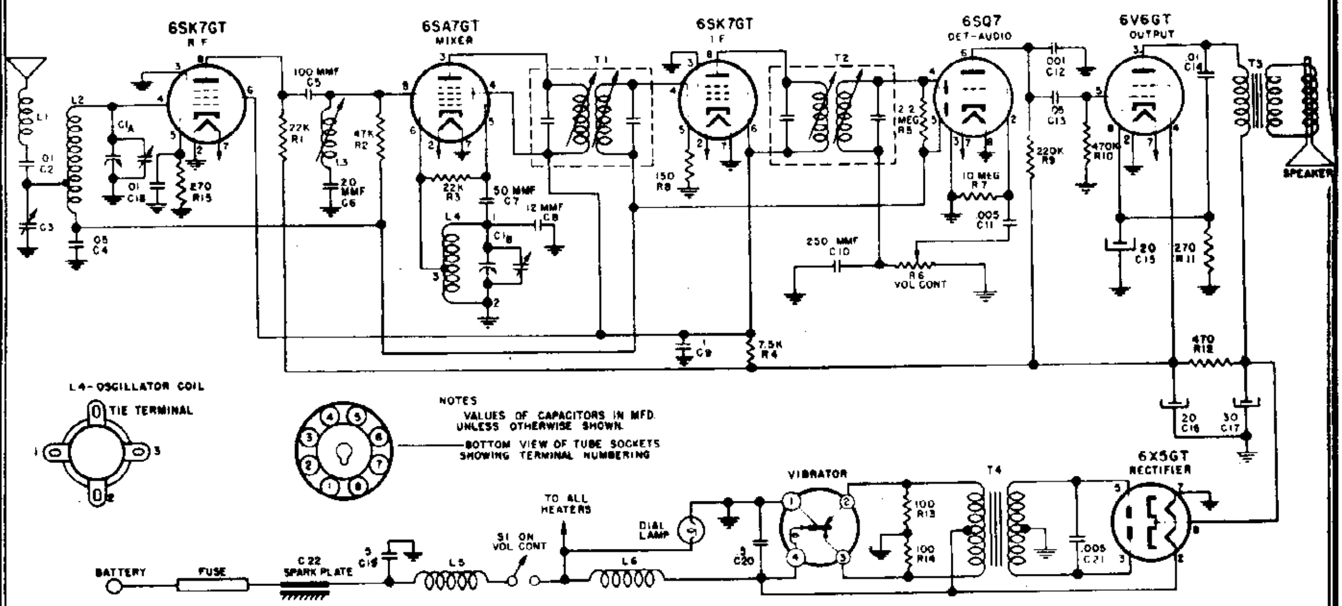
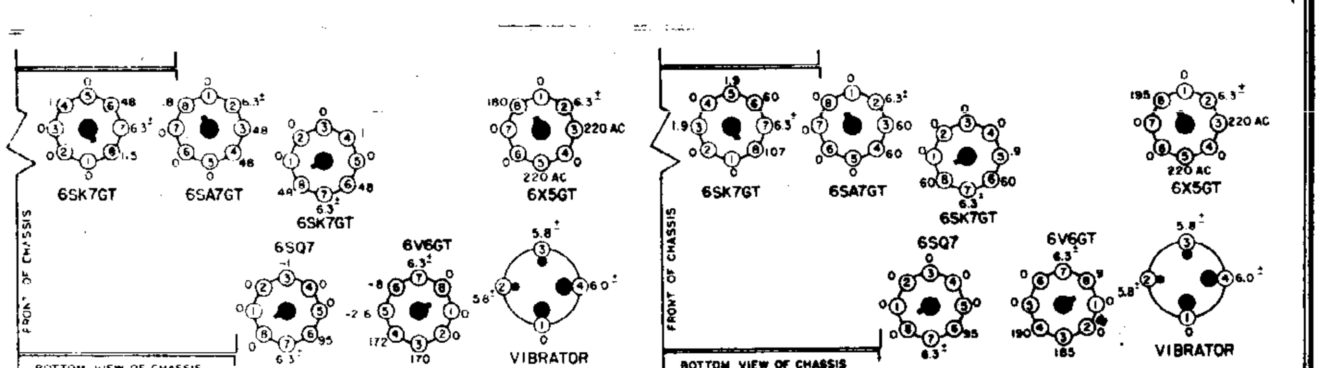


Figure 4 Schematic Drawing 43-5006C



43-5006B Figure 5 Socket Voltages 43-5006C

MODELS 43-5006B, 43-5006C

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter.

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	455 KC	75 MMFD.	Ant. lead	L3	Minimum	Wave trap
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C3	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

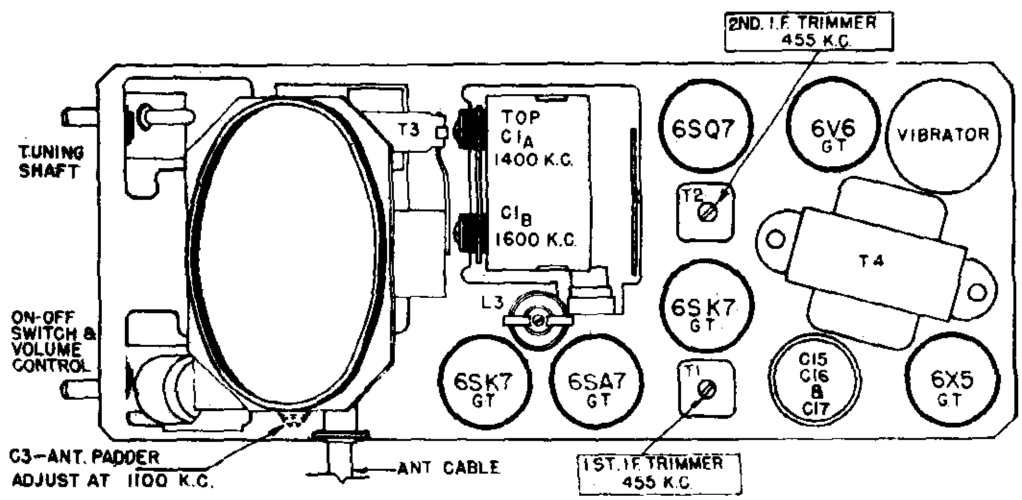


Figure 6 Tube & Trimmer Locations 43-5006B & 43-5006C

CONDENSERS

Ref. No.	Description	Part Number Model 5006B	5006C
C1A, C1B	Variable condenser	A19-201	A19-201
C2, C14	.01 MFD 400 volt condenser	A16-192	A16-192
C3	Trimmer condenser	A20-145	A20-145
C4	.05 MFD 400 volt condenser	A16-189	A16-189
C5	100 MMFD ceramic condenser	A15-196	A15-196
C6	20 MMFD ceramic condenser	A15-202	A15-202
C7	50 MMFD ceramic condenser	A15-204	A15-204
C8	12 MMFD ceramic condenser, temp. comp.	A15-205	A15-205
C9	.1 MFD 400 volt condenser	A16-187	A16-187
C10	250 MMFD mica condenser	A15-176	A15-176
C11	.005 MFD 600 volt condenser	A16-190	A16-190
C12	.001 MFD ceramic condenser	A16-195	A16-195
C13	.05 MFD 600 volt condenser	A16-193	A16-193
C15	20 MFD 25 volt electrolytic condenser		
C16	10 MFD 350 volt electrolytic condenser	A18-293	
C17	15 MFD 350 volt electrolytic condenser		
C15	20 MFD 25 volt electrolytic condenser		
C16	20 MFD 350 volt electrolytic condenser		A18-289
C17	30 MFD 350 volt electrolytic condenser		
C18	.01 MFD 400 volt condenser		A16-192
C19, C20	.5 MFD 100 volt condenser	A16-184	A16-184
C21	.005 MFD 1600 volt oil filled condenser	A16-185	A16-185

MODELS 43-5006B,
43-5006C

Ref. No.	Description	Model 5006B	5006C
		Part Number	
	RESISTORS		
R1, R3	22K ohm ½ watt 20% resistor	A60-659	A60-659
R2	47K ohm ½ watt 20% resistor	A60-685	A60-685
R4	7.5K ohm 2 watt 10% resistor	A60-769	A60-769
R5	2.2 megohm ½ watt 20% resistor	A60-726	A60-726
R6	Volume control, 500,000 ohm, with switch	A24-177	A24-177
R7	10 megohm ½ watt 20% resistor	A60-728	A60-728
R8	22 ohm ½ watt 10% resistor	A60-768	
R8	150 ohm ½ watt 10% resistor		A60-767
R9	220K ohm ½ watt 20% resistor	A60-667	A60-667
R10	470K ohm ½ watt 20% resistor	A60-731	A60-731
R11	150 ohm ½ watt 10% resistor	A60-767	
R11	270 ohm ½ watt 10% resistor		A60-771
R12	470 ohm ½ watt 10% resistor	A60-770	A60-770
R13, R14	100 ohm ½ watt 10% resistor	A60-752	A60-752
R15	270 ohm ½ watt 10% resistor		A60-771
	COILS AND TRANSFORMERS		
L1	Antenna Loading Coil	A10-527	A10-527
L2	Antenna Coil	B10-511	B10-511
L3	I. F. Trap Coil	A10-510	A10-510
L4	Oscillator Coil	A10-512	A10-512
L5	Choke "A" Line	A33-229	A33-229
L6	Choke vibrator hash	A33-228	A33-228
T1	1st I. F. Transformer	A10-508	A10-508
T2	2nd I. F. Transformer	A10-509	A10-509
T3	Output Transformer (Part of Speaker, not furnished separately)	B80-242	B80-242
T4	Power transformer	B80-243	B80-243
	DIAL PARTS	**5006B**	**5006C**
	Bracket, Dial Scale	A11-303	A11-303
	Bracket, String Guide	B11-328	B11-328
	Bushing, Tuning Shaft Bearing	A72-29	A72-29
	Clip, Spring, for Tuning Shaft	A70-130	A70-130
	Dial Escutcheon	D40-141	D40-141
	Dial Pointer	A58-55	A58-55
	Dial Scale	B67-522	B67-522
	Gasket for Speaker	A28-101	A28-101
	Knob	A52-257	A52-257
	Link, String Guide	A11-329	A11-329
	Pilot Light, No. 47 Bayonet	A89-10	A89-10
	Rivet, Shoulder, for Dial Pointer Stringing	A65-37	A65-37
	Rivet, Shoulder, for String Guide Brkt. and Link	A65-41	
	Rivet, Shoulder, for String Guide Brkt. and Link		A65-42
	Rivet, Shoulder, for Dial Drive Stringing	A65-12	A65-12
	Shaft, tuning	A75-70	A75-70
	Shaft, for Dial Pointer	A75-74	A75-74
	Spring, for Pilot Light Socket	A70-132	A70-132
	Spring, Dial Drive String Tension	A70-135	A70-135
	Spring, Pointer Drive String Tension		A70-137
	Spring, Pointer Drive String Tension	A70-142	
	String, Pointer Travel, 17"		A51-105
	String, Condenser Drive, 19"		A51-108
	MISCELLANEOUS		
	"A" lead assembly	S84-233	S84-233
	Clip, I. F. Transformer Mounting	A83-421	A83-421
	Clip, Oscillator Coil Mounting	A83-517	A83-517
	Fuse, 15 Amp.	A43-10	A43-10
	Grommet, rubber, (Spkr. & Gang Mounting)	A47-112	A47-112
	Mounting strap, rear	B31-134	B31-134
	Mounting Plate, Front	B31-139	B31-139
	Mounting parts kit	S84-192	S84-192
	Receptacle, Antenna Cable	A87-38	A87-38
	Speaker, 4" P.M. (includes Output Transformer)	B79-362	B79-362
	Suppression Kit Assembly	S84-322	S84-322
	Vibrator	A34-105	A34-105
	Wiper, grounding, for case covers	A83-519	A83-519

MODEL 43-8111

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as-possible, to prevent A.V.C. action from interfering with correct alignment.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T1	I.F.
Fully open	1625 KC	.00025	*Antenna Wire	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	*Antenna Wire	C1A	Antenna

*Connect ground lead of signal generator to chassis.

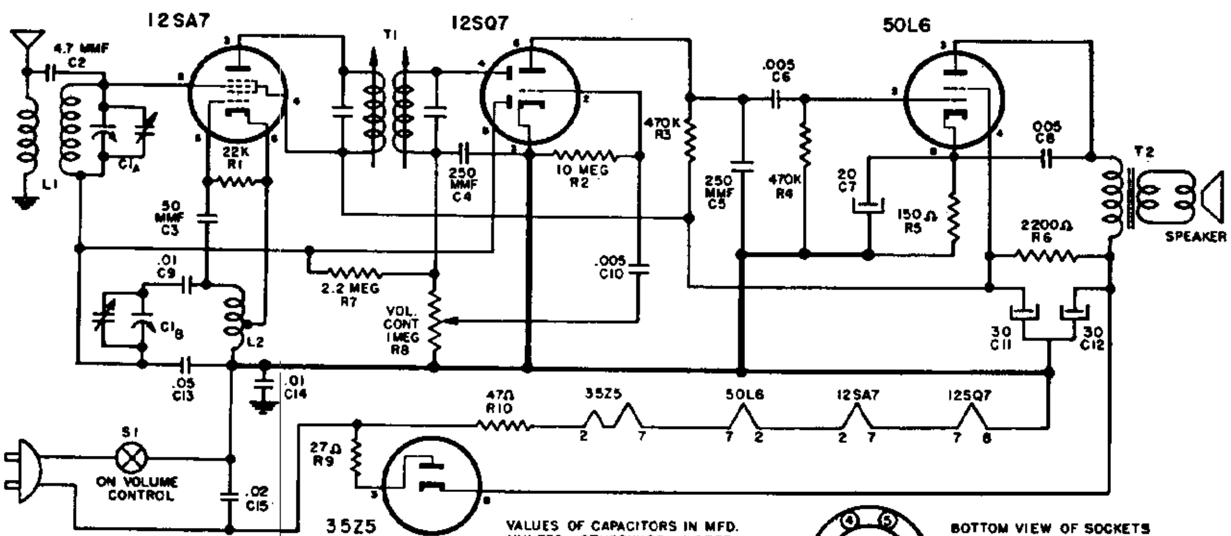
DESCRIPTION

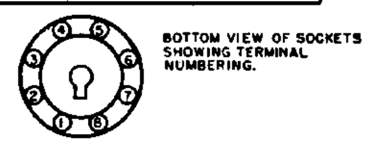
Model 12801 is a superheterodyne receiver, designed for use on 105-125 volt 60 cycle AC or DC current.

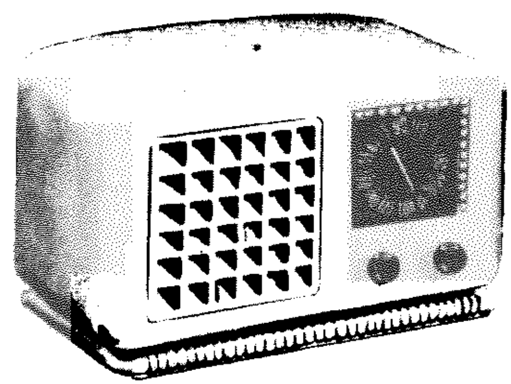
The tubes used are:

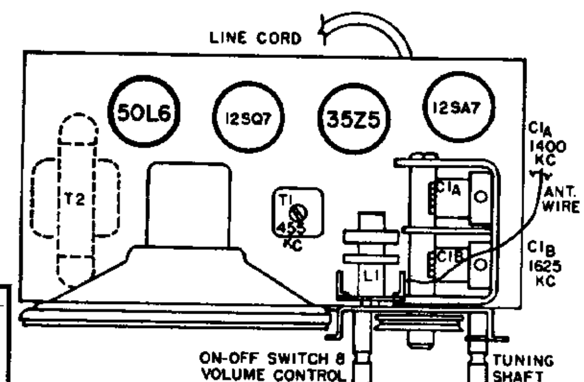
12SA7—Oscillator-Mixer
12SQ7—Detector and first Audio
50L6—Power Output
35Z5—Rectifier

This receiver covers the frequency range from 540 to 1625 KC. The dial scale is calibrated in kilocycles, minus the final zero.









PARTS LIST

CODE	PART NO.	DESCRIPTION
C1A, C1B	B10-194	Variable Condenser
C2	A83-355	4.7 Mmfd Condenser
C3	A15-175	50 Mmfd Mica Condenser
C4, C5	A15-176	250 Mmfd Mica Condenser
C6, C8, C10	A16-153	.005 Mfd 600 Volt Condenser
C7	A18-278	20 Mfd 25 Volt Electrolytic Condenser
C9, C14	A16-156	.01 Mfd 400 Volt Condenser
C11, C12	A18-283	30x30 Mfd 150 Volt Electrolytic Condenser
C13	A16-152	.05 Mfd. 200 Volt Condenser
C15	A16-151	.02 Mfd 600 Volt Condenser

CODE	PART NO.	DESCRIPTION
R1	A60-659	22K ohm ½ watt Resistor
R2	A60-663	10 Megohm ½ watt Resistor
R3, R4	A60-662	470K ohm ½ watt Resistor
R5	A60-686	150 ohm ½ watt Resistor
R6	A60-737	2200 ohm 1 watt Resistor
R7	A60-664	2.2 Megohm ½ watt Resistor
R8	A24-174	Volume Control, 1 Megohm
R9	A60-690	27 ohm ½ watt Resistor
R10	A60-750	47 ohm 1 watt Resistor
L1	A10-485	Antenna Coil
L2	B10-502	Oscillator Coil
T1	A10-479	I.F. Transformer
T2	A80-239	Output Transformer

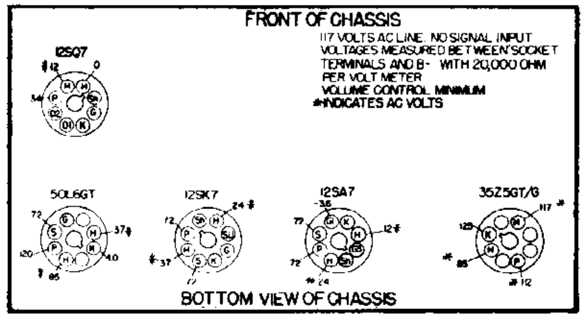
CODE	PART NO.	DESCRIPTION
	B79-380	Speaker, 5" P.M.
	A91-57	Antenna Wire, 20 feet
	C21-118	Cabinet Back
	D42-424	Cabinet, Ivory
	A42-433	Cabinet, Black
	A42-434	Cabinet, Red
	A42-435	Cabinet, Green
	A46-42	Dial Crystal
	B67-510	Dial Scale
	A58-69	Dial Pointer
	A52-222	Knob, White
	A52-243	Knob, Black

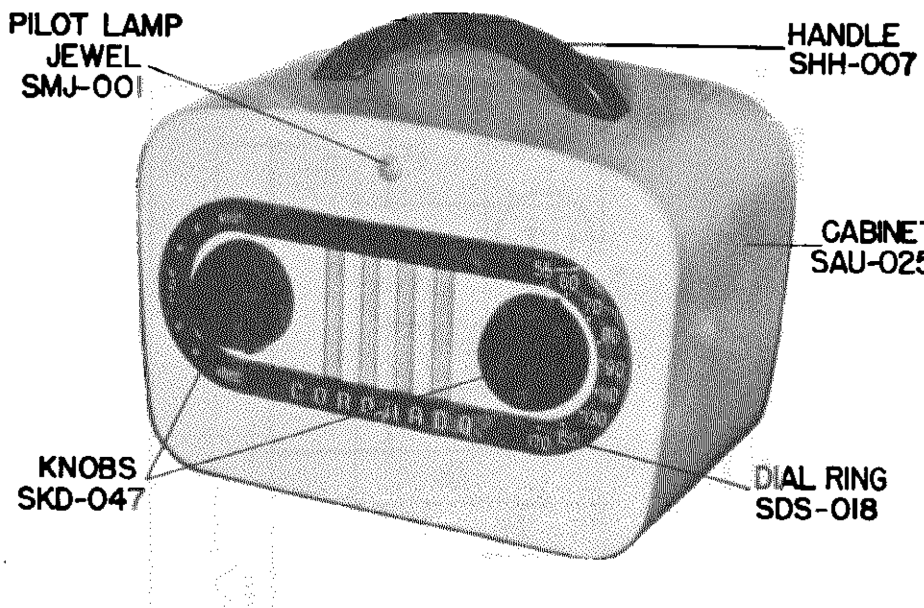
MODEL 43-8190

SPECIFICATIONS

5 Tube Superheterodyne, including rectifier tube
Speaker ------ 4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
Antenna ---- Self contained loop antenna, also provision for external antenna
Tuning ---------------- Direct drive—2 gang condenser
Power supply ---------------- 105 to 125 Volts, AC or DC
Frequency on AC ---------------------- 40 to 60 cycles
Power Consumption -------------------------- 25 watts
Power Output ---- 0.6 w undistorted, 1.5 w minimum full power output
Frequency range ---------------------- 540 to 1720 KC
Intermediate Frequency ------------------------ 455 KC
Antenna Sensitivity ---- 300 mv. average for 0.5 w output
Selectivity -- 75 KC broad at 1000 times signal at 1000 KC

SOCKET VOLTAGE DIAGRAM





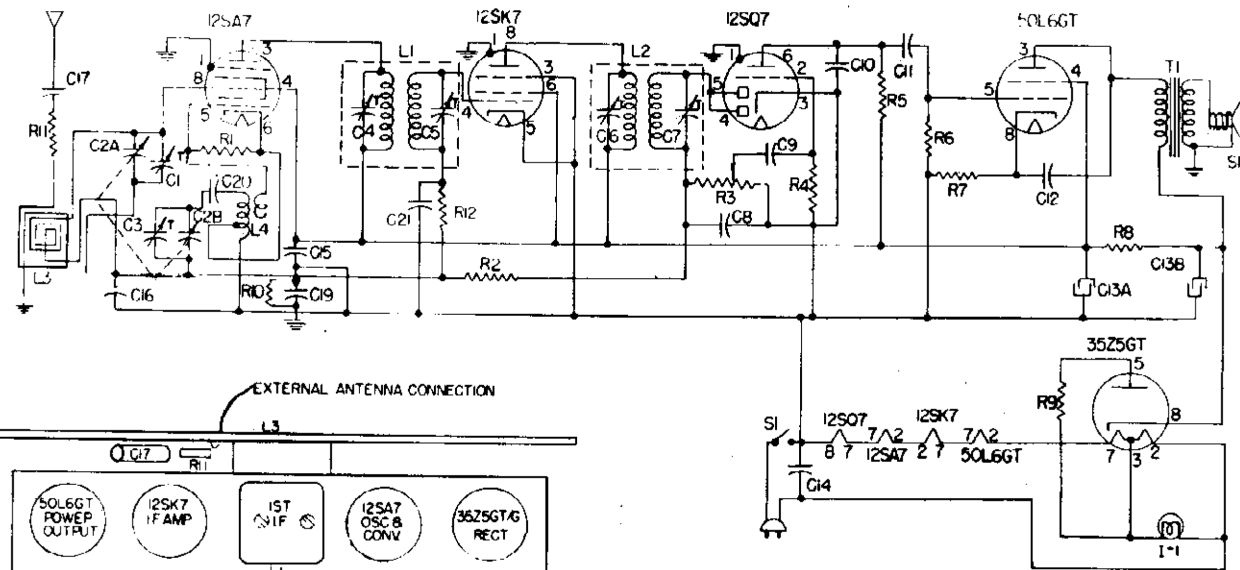
ALIGNMENT PROCEDURE

Allow unit to heat for a few minutes before starting alignment.
Volume control set to maximum.
Output meter across speaker.
Align for maximum output.
Keep input as low as readable meter reading of output will permit.

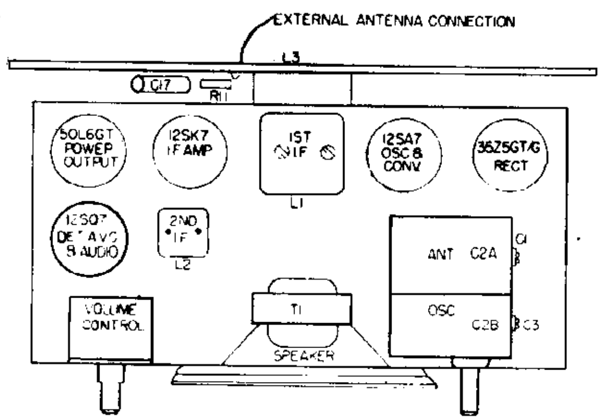
Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

FREQUENCY	SIGNAL GENERATOR COUPLING CAPACITOR	SIGNAL GENERATOR CONNECTION TO RADIO	GROUND CONNECTION	TUNING CONDENSER SETTING	ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown)
455 KC	0.1 mf	Converter grid	B−	Wide open	2nd IF transformer trimmer 1st IF transformer trimmer
1720 KC	200 mmf	Receiver antenna post	Chassis	Wide open	Oscillator trimmer C3
1500 KC	200 mmf	Receiver antenna post	Chassis	Tune for maximum output	Antenna trimmer C1

MODEL 43-8190



SCHEMATIC DIAGRAM



TUBE AND TRIMMER LOCATION

PARTS DESCRIPTION LIST

SYMBOL	TITLE	VALUE	RATING	TOLERANCE	PART NO
C1	Antenna trimmer				*
C2A	Variable Condenser ant. section				SCT-013
C2B	Variable Condenser osc. section				SCT-013
C3	Oscilaltor trimmer				*
C8	Mica capacitor	220 mmf	500WVDC	±20%	UCU-036
C9	Paper capacitor	.005mf	600WVDC	+40-15%	UCC-044
C10	Mica capacitor	220 mmf	500WVDC	±20%	UCU-036
C11	Paper capacitor	.01mf	600WVDC	±20%	UCC-040
C12	Paper capacitor	.02mf	600WVDC	±20%	UCC-041
C13A	Electrolytic capacitor	30mf	150WVDC		SCE-026
C13B	Electrolytic capactor	30mf	150WVDC		SCE-026
C14	Paper capacitor	.05mf	600WVDC	±20%	UCC-045
C15	Paper capacitor	.05mf	600WVDC	±20%	UCC-045
C16	Paper capacitor	.05mf	600WVDC	±20%	UCC-045
C17	Paper capacitor	.01 mf	600WVDC	±20%	UCC-040
C19	Paper capacitor	.1mf	600WVDC	+20-10%	UCC-048
C20	Paper capacitor	.02mf	600WVDC	±20%	UCC-041
C21	Paper capacitor	.005mf	600WVDC	+40-15%	UCC-044
R1	Carbon resistor	22,000 ohm	½ W	±20%	URD-081
R2	Carbon resistor	2.2 megohm	½ W	±20%	URD-129
R3	Volume control	0.5 megohm			SRC-070
R4	Carbon resistor	4.7 megohm	½W	±20%	URD-137
R5	Carbon resistor	470,000 ohm	½W	±20%	URD-113
R6	Carbon resistor	470,000 ohm	½W	±20%	URD-113
R7	Carbon resistor	150 ohm	½W	±20%	URD-029
R8	Carbon resistor	2700 ohm	2 W	±20%	URE-059
R9	Carbon resistor	18 ohm	½W	±10%	URD-007
R10	Carbon resistor	470,000 ohm	½W	±10%	URD-113
R11	Carbon resistor	470 ohm	½W	±20%	URD-041
R12	Carbon resistor	470,000 ohm	½W	±20%	URD-113
L1	1st IF Transformer				STL-016
L2	2nd IF Transformer				STL-015
L3	Antenna loop				SLL-002
L4	Oscillator coil				SLC-001
S1	Power switch, with R3				SRC-070
I1	Pilot lamp	GE 47	6.8v-.15A		UDL-013
T1	No. P104J58 output transformer				STO-004
SPKR	No. P104J59 speaker				SOP-005
SPKR & T1	Speaker and output transformer assembly for models not covered by previous two listings				SOP-006
	Octal base tube socket				SJS-003

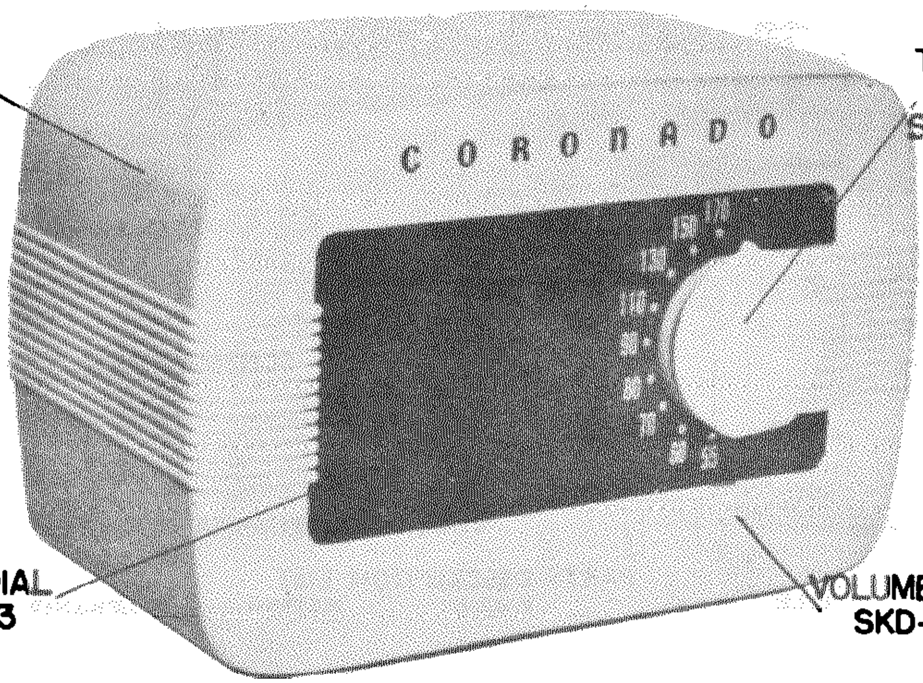
*Part of SCT-013

MODEL 43-8201

SPECIFICATIONS FOR CORONADO RADIO MODEL 43-8201

5 Tube Superheterodyne, including rectifier tube
Speaker ------- 4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
Antenna ----------------------- external hank antenna
Tuning ----------------- Direct drive—2 gang condenser
Power supply -------------- 105 to 125 Volts, AC or DC
Frequency on AC --------------------- 40 to 60 cycles

Power Consumption -------------------- 28 watts at 117V
Power Output --------- 0.8 w undistorted, 1.5 w minimum full power output
Frequency range ----------------------- 540 to 1720 KC
Intermediate Frequency ---------------------- 455 KC
Antenna Scntivity ------- 50 mv. average for 0.5 w output
Selectivity -- 50 KC broad at 1000 times signal at 1000 KC



PARTS DESCRIPTION LIST

SYMBOL	TITLE	VALUE	RATING	TOLERANCE	PART NO.
C1	Paper capacitor	.05mf	600WDVC	+40-10%	UCC-045
C2A	Electrolytic capacitor	40mf	150WVDC	+100-10%	SCE-003
C2B	Electrolytic capacitor	40mf	150WVDC	+100-10%	SCE-003
C3	Paper capacitor	.02mf	600WDVC	+40-10%	UCC-041
C4	Mica capacitor	330mmf	500WVDC	±20%	UCU-1040
C5	Paper capacitor	.01mf	600WDVC	+40-10%	UCC-040
C6	Paper capacitor	.005mf	600WDVC	+40-10%	UCC-039
C7	Mica capacitor	330mmf	500WVDC	±20%	UCU-1040
C8	Mica capacitor	47mmf	500WVDC	±20%	UCU-1020
C9	Antenna Trimmer				*
C10A	Variable condenser, ant. sect.				SCT-003
C10E	Variable condenser, osc. sect.				SCT-003
C11	Oscillator trimmer				*
C12	Paper capacitor	.05mf	600WDVC	+40-10%	UCC-045
C18	Paper capacitor	.05mf	600WDVC	+40-10%	UCC-045
C19	Paper capacitor	.005mf	600WDVC	+40-10%	UCC-039
R1	Carbon resistor	18 ohm	1w	±20%	URE-007
R2	Carbon resistor	150 ohm	2w	±20%	URF-053
R3	Carbon resistor	150 ohm	½w	±20%	URD-029
R4	Carbon resistor	470,000 ohm	½w	±20%	URD-113
R5	Carbon resistor	220,000 ohm	½w	±20%	URD-105
R6	Carbon resistor	10 megohm	½w	±20%	URD-145
R7	Volume control	.5 megohm			SRC-004
R8	Carbon resistor	2.2 megohm	½w	±20%	URD-129
R9	Carbon resistor	22,000 ohm	½w	±20%	URD-081
L2	1st IF transformer				STL-003
L3	2nd IF transformer				STL-004
L4	Oscillator coil				SLC-002
L5	Antenna coil				SLA-001
T1	Output transformer				SOP-001
S1	Power switch, with R7				SRC-004
SPKR	4" PM speaker				SOP-001
	Back Cover for cabinet				SAB-009
	Baffle for speaker				SAE-001
	Socket-octal base tube socket				SJS-002
	Speed nuts—for fastening grill in cabinet				SMC-003
	Fasteners—for fastening back cover				SMF-003

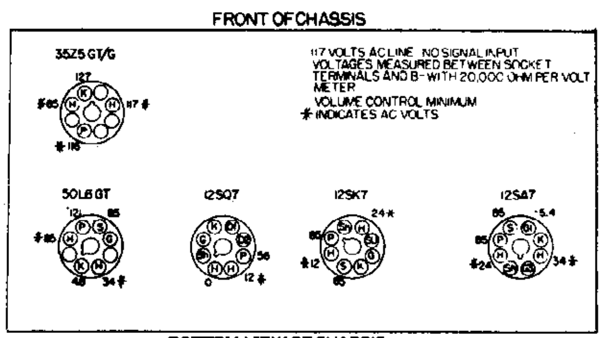
*Part of SCT-003

ALIGNMENT PROCEDURE

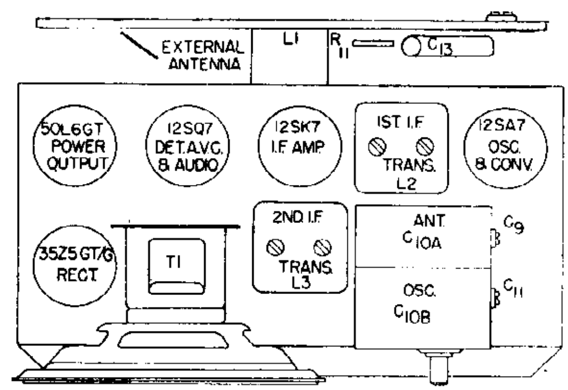
Allow unit to heat for a few minutes before starting alignment.
Volume control set to maximum.
Output meter across speaker.
Align for maximum output.
Keep input as low as a readable meter reading of output will permit.

Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

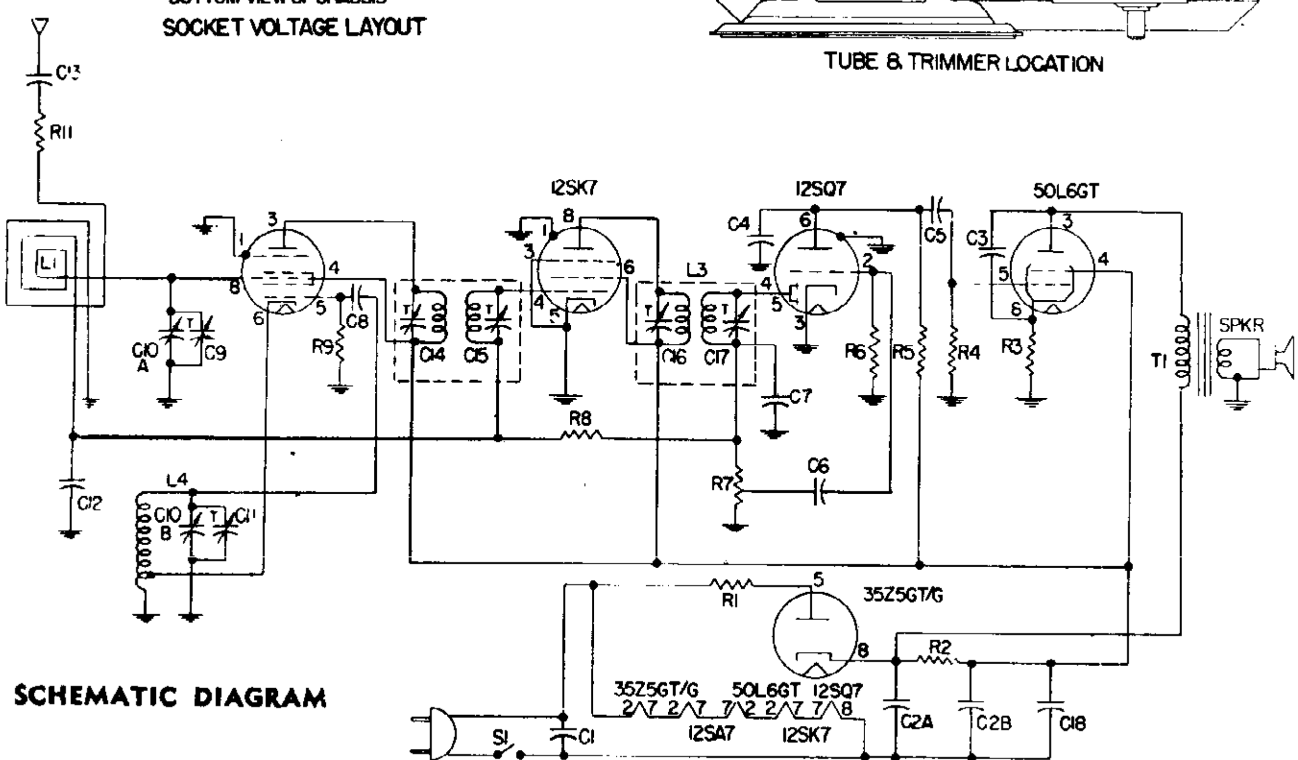
FREQUENCY	SIGNAL GENERATOR COUPLING CAPACITOR	SIGNAL GENERATOR CONNECTION TO RADIO	GROUND CONNECTION	TUNING CONDENSER SETTING	ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown)
455 KC	0.1 mf	Converter grid	Chassis	Wide open	2nd IF transformer trimmer 1st IF transformer trimmer
1720 KC	200 mmf	Receiver antenna post	Chassis	Wide open	Oscillator trimmer C11
1500 KC	200 mmf	Receiver antenna post	Chassis	Tune for maximum output	Antenna trimmer C9



SOCKET VOLTAGE LAYOUT



TUBE & TRIMMER LOCATION

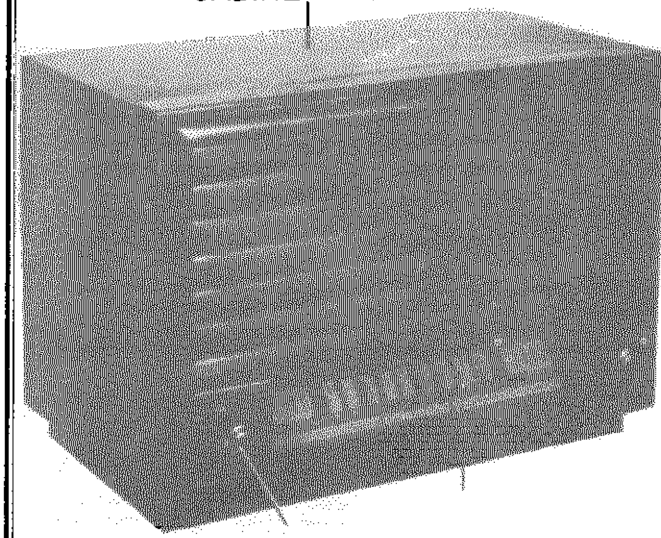


SCHEMATIC DIAGRAM

MODELS 43-8330,
43-8420

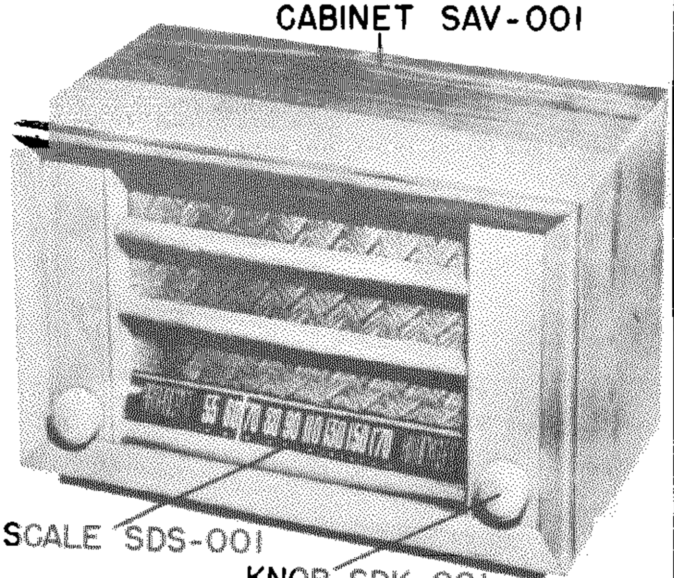
SPECIFICATIONS

5 Tube Superheterodyne, including rectifier tube
Speaker--5 1/4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
Antenna----Self contained loop antenna, also provision for external antenna
Power supply----------------------105-125 V. AC or DC
Frequency on AC---------------------40 to 60 cycles
Power Consumption----------------------------25 watts
Power Output-----0.8 watts undistorted, 1.5 w. minimum full power output
Frequency range------------------------540 to 1720 KC
Intermediate Frequency-------------------------455 KC
Antenna Sensitivity---170 uv. average for 0.5 w output
Selectivity------60 KC at 1000 times signal at 1000 KC



SCALE SDS-002
KNOB SDK-002

43-8330



43-8420

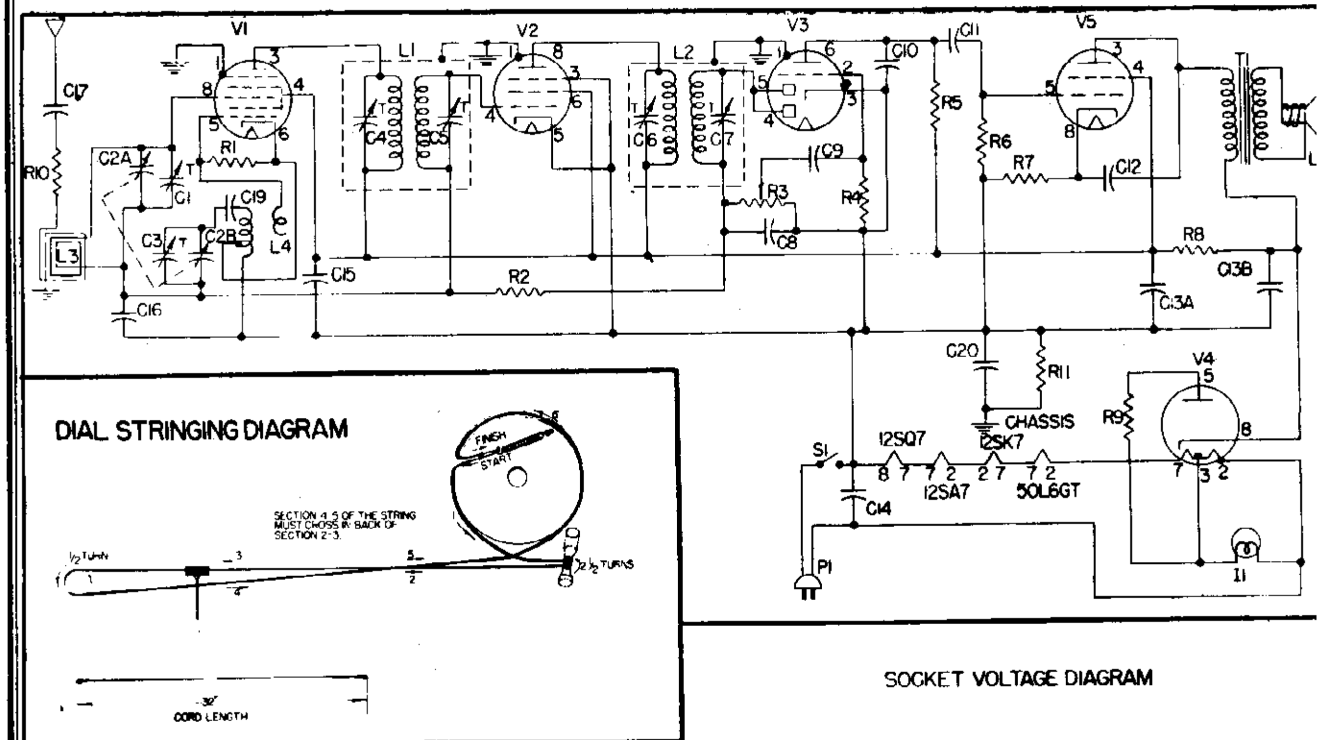
ALIGNMENT PROCEDURE

Allow unit to heat for a few minutes before starting alignment.
Volume control set to maximum.
Output meter across speaker.
Align for maximum output.
Keep input as low as readable meter reading of output will permit.

Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

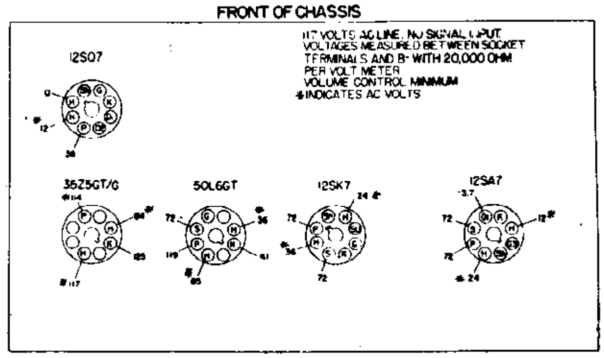
FREQUENCY	SIGNAL GENERATOR COUPLING CAPACITOR	SIGNAL GENERATOR CONNECTION TO RADIO	GROUND CONNECTION	TUNING CONDENSER SETTING	ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown)
455 KC	0.1 mf	Converter grid	B-	Wide open	2nd IF transformer trimmer 1st IF transformer trimmer
1720 KC	200 mmf	Receiver antenna post	Chassis	Wide open	Oscillator trimmer C3
1500 KC	200 mmf	Receiver antenna post	Chassis	Tune for maximum output	Antenna trimmer C1

MODELS 43-8330
43-8420

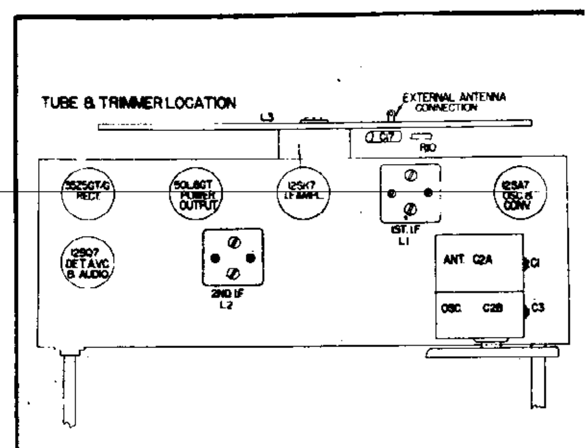


SOCKET VOLTAGE DIAGRAM

FRONT OF CHASSIS



BOTTOM VIEW OF CHASSIS



SYMBOL	TITLE	VALUE	TOLERANCE	RATING	PART NO.
C1	Ant. Trimmer				SCT-002
C2A	Variable Cond. Ant. Sect.				SCT-002
C2B	Variable Cond. Osc. Sect.				SCT-002
C3	Osc. Trimmer				SCT-002
C4	Trimmer 1st I.F.				STL-007
C5	Trimmer 1st I.F.				STL-007
C6	Trimmer 2nd I.F.				STL-008
C7	Trimmer 2nd I.F.				STL-008
C8	Capacitor, Mica	330 uuf	20%	500 V	UCU-040
C9	Capacitor, Paper	.005 uf	40-15%	600 V	UCC-039
C10	Capacitor, Mica	330 uuf	20%	500 V	UCU-040
C11	Capacitor, Paper	.01 uf	40-10%	400 V	UCC-025
C12	Capacitor, Paper	.02 uf	20%	600 V	UCC-041
C13A	Electrolytic Capacitor	30 uf		150 V	SCE-022
C13B	Electrolytic Capacitor	30 uf		150 V	SCE-022
C14	Capacitor, Paper	.05 uf	20%	600 V	UCC-045
C15	Capacitor, Paper	.05 uf	40-10%	400 V	UCC-028
C16	Capacitor, Paper	.05 uf	40-10%	400 V	UCC-028
C17	Capacitor, Paper	.01 uf	40-10%	400 V	UCC-025
C19	Capacitor, Paper	.02 uf	40-10%	400 V	UCC-026
C20	Capacitor, Paper	.1 uf	40-10%	400 V	UCC-030
R1	Resistor, Carbon	22 Kohm	20%	½W	URD-081
R2	Resistor, Carbon	2.2 Meg	20%	½W	URD-129
R3	Volume Control	.5 Meg	20%	½W	SRC-008
R4	Resistor, Carbon	4.7 Meg	20%	½W	URD-137
R5	Resistor, Carbon	470 Kohm	20%	½W	URD-113
R6	Resistor, Carbon	470 Kohm	20%	½W	URD-113
R7	Resistor, Carbon	150 Ohm			URD-029
R8	Resistor, Carbon	2700 Ohm	10%	2 W	URF-059
R9	Resistor, Carbon	22 Ohm	20%	½W	URD-009
R10	Resistor, Carbon	470 Ohm	20%	½W	URD-041
R11	Resistor, Carbon	470 Kohm	20%	½W	URD-113
L1	1st I.F. Transformer				STL-007
L2	2nd I.F. Transformer				STL-006
L3	Loop Assembly				SLL-001
L4	Oscillator Coil				SLC-001
S1	Power Switch				SRC-008
I1	Pilot Light, GE 51				UDL-013
LS	Speaker 5-1/4 PM				UOP-528
T1	Output Transformer				STO-005
V1	12SA7				
V2	12SK7 Metal Tube				
V3	12SQ7 Metal Tube				
V4	35Z5GT/G				
V5	50L6GT				
	Dial Cord				SDC-001
	Terminal Strip				SJG-014
	Socket-Octal Base Tube Socket				SJS-003
	Drum Spring				SMS-013
	Drive Shaft & Bushing Assembly				SMU-005
	Cabinet Jack				SAJ-002
	Tee Pins				SHF-003
	Cabinet Used on Model 43-8420				SAV-001
	Knob Used on Model 43-8420				SDK-001
	Dial Scale Used On Model 43-8420				SDS-001
	Cabinet Used on Model 43-8330				SAV-002
	Knob Used On Model 43-8330				SDK-002
	Dial Scale Used On Model 43-8330				SDS-002
	Tuning Condenser				SCT-002
	Dial Pointer				SDP-001
	Output Terminals				SJP-002
	Pilot Light Assembly				SJP-001
	Idler Pulley				SMW-001
	Power Cord				SWL-001

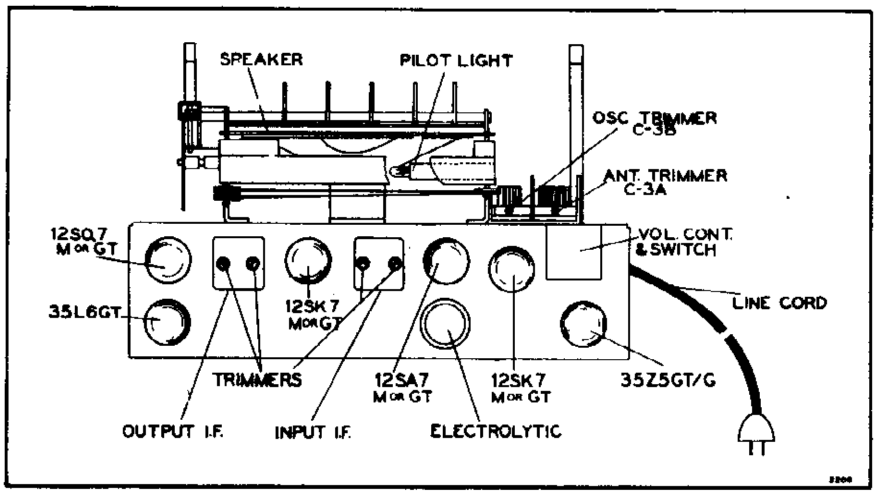
MODELS 43-8353,
43-8354

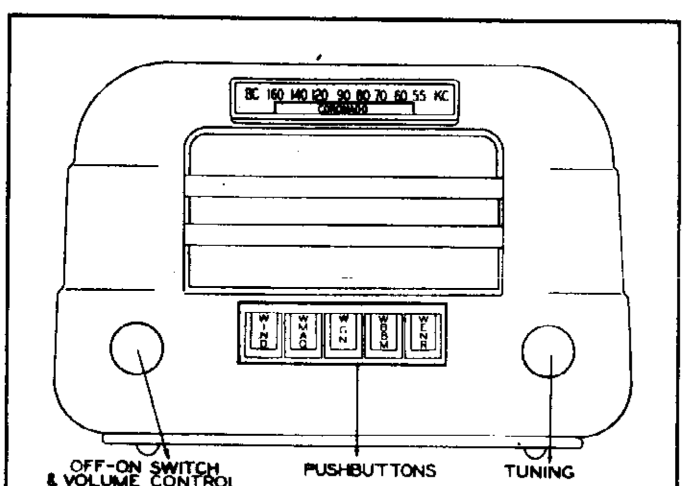
SPECIFICATIONS

6 tube superheterodyne, including rectifier

Intermediate Frequency	455KC
Power Output	.65W. undistorted
Frequency Range	530 to 1650 KC
Tuning	two-gang capacitor
Power Supply	105-125 Volts ac/dc
Power Consumption	35W
Speaker	4" by 6" oval P.M. Voice Coil 3.2 ohms
Antenna	Built-in loop, also provision for external antenna

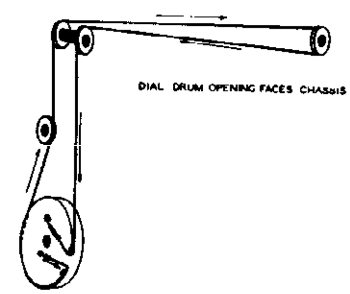
CHASSIS VIEW





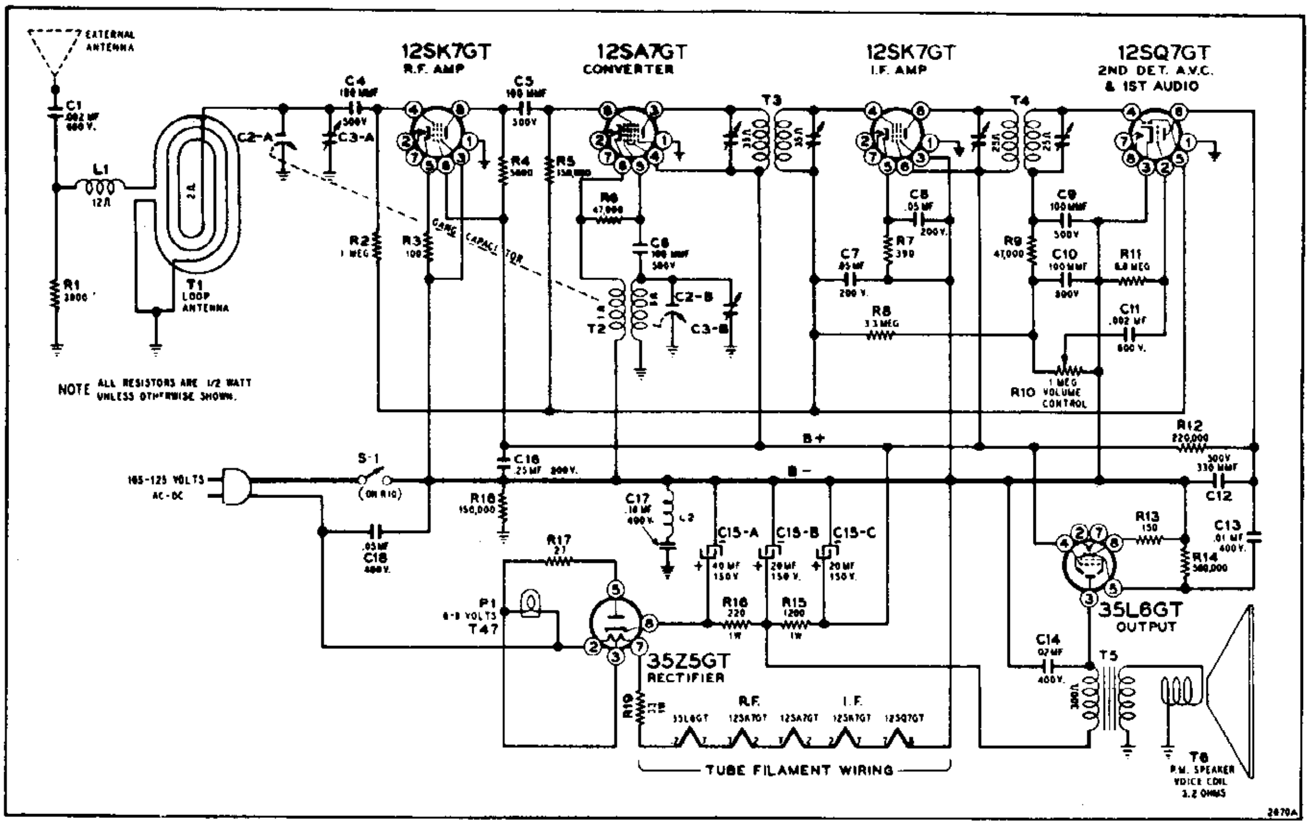
MODEL 43-8353 - WALNUT CABINET
MODEL 43-8354 - IVORY CABINET

DRIVE CORD REPLACEMENT



MODELS 43-8353, 43-8354

SCHEMATIC DIAGRAM



X-1045 GAMBLES 43-8353, 54

ALIGNMENT PROCEDURE

(Refer to Chassis View)

- Output meter across 3.2-ohm output load.
- Volume control at maximum.
- Connect ground post of signal generator to B— of radio.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

SIGNAL GENERATOR			TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT (in order shown)
Frequency	Dummy Antenna	Connection to Radio		
455 kc	0.1 mf	Stator of antenna section of gang	Rotor full open (plates out of mesh)	Trimmers on output and input I.F. cans
1650 kc	0.1 mf	Stator of antenna section of gang	Rotor full open (plates out of mesh)	Oscillator trimmer C3B
1400 kc	200 mmf	External antenna clip	1400 kc	Antenna trimmer C3A

MODELS 43-8353, 43-8354

PARTS LIST

Ref. No.	Part No.	Description	Qty.
		CONDENSERS	
C2-A,B			
C3-A,B,	B-8A-11136	Two gang Variable Cond.	1
C17	C-8D-11111	Condenser .18 Mf.x400 V. 10%	1
C18	C-8D-10813	Condenser .05 Mfx400 V. 20%	1
C1,11	C-8D-10778	Condenser .002 Mfx600V. 15%	2
C16	C-8D-10775	Condenser .25 Mfx200 V. 20%	1
C14	C-8D-10774	Condenser .02 Mfx400 V. 20%	1
C7,8	C-8D-10770	Condenser .05 Mfx200 V. 20%	2
C13	C-8D-10761	Condenser .01 Mfx400 V. 20%	1
C12	C-8F3-119	Mica Condenser 330 Mmf 10%	1
C4,5,6,9,10	C-8F3-113	Mica Condenser 100 Mmf 500 V. 10%	5
C15-A,B,C,	A-8C-10077	Electrolytic Filter Condenser	1
		RESISTORS	
R10,S1	A-10A-1146	Volume Control & Switch	1
R19	C-9B2-44	Resistor 33 ohms 1 watt 10%	1
R6,R9	C-9B1-23	Resistor 47K ohms, ½ watt 20%	2
R5,R18	C-9B1-26	Resistor 150 K ohms, ½ watt 20%	2
R12	C-9B1-27	Resistor 220K ohms ½ watt 20%	1
R2	C-9B1-31	Resistor 1 megohm, ½ watt 20%	1
R8	C-9B1-34	Resistor 3.3 megohm ½ watt 20%	1
R11	C-9B1-36	Resistor 6.8 megohms, ½ watt 20%	1
R17	C-9B1-43	Resistor 27 ohms, ½ watt 10%	1
R3	C-9B1-50	Resistor 100 ohms, ½ watt 10%	1
R13	C-9B1-52	Resistor 150 ohms, ½ watt 10%	1
R7	C-9B1-57	Resistor 390 ohms, ½ watt 10%	1
R1	C-9B1-69	Resistor 3900 ohms, ½ watt 10%	1
R4	C-9B1-71	Resistor 5600 ohms, ½ watt 10%	1
R14	C-9B1-95	Resistor 560K ohms, ½ watt 10%	1
R16	C-9B2-54	Resistor 220 ohms, 1 watt 10%	1
R15	C-9B2-63	Resistor 1200 ohms, 1 watt 10%	1
		COILS & TRANSFORMERS	
L1	A-16A-11177	Loop loading coil	1
T1	C-212-11176	Walnut loop antenna assembly	1
T1	C-212-11176-1	Ivory loop antenna assembly	1
T5	B-12C-11203	Output transformer for speaker	1
T2	A-13D-11160	Broadcast osc. coil	1
T3	B-13A-11133	Input I.F. Coil	1
T4	B-13B-11132	Output I.F. coil	1
		SPEAKER	
T6	B18A-11137	Speaker	1

Ref. No.	Part No.	Description	Qty.
		DIAL & TUNING PARTS	
	A-55A-10093-1	Pilot lite socket & bracket	1
	B-2M-7758	Snap in rivets to fasten diffuser	2
	A-31-7192	Pinion gear	1
	A-2C-10607	Gear segment with bushing	1
	A-49A-10628	Return spring for levers	5
	A-2C-10654	Retainer yoke	1
	A-2C-10655	Cam yoke	1
	A-3F-10656	Yoke lock screw	1
	A-2C-10658	Cam	1
P1	A-46A-10793	6-8 Volt pilot lite bulb type T-47	5
	A-49A-10887	Tension spring for dial string	1
	A-53-10989	Dial String 3 ft.	1
	B-5B-11131-8	Knob Ivory	3 ft.
	B-5B-11131-37	Knob Walnut	2
	C-6D-11140	Dial Scale	2
	C-5B-11144-8	Pushbutton Ivory	1
	C-5B-11144-37	Pushbutton Walnut	5
	A-3C-11148	Spacer-between cams	5
	A-3C-11149	Spacer between cams	4
	A-2G-11151	Pointer	2
	A-2C-11152	Key Washer	1
	A-3A-11153	Tuning Shaft	1
	A-2L-11162	Lever with cam roller	1
	A-6A-11166	Diffuser	5
	A-6C-11458	Acetate tabe-to cover call letters	1
	A-23L-11459	Set station call letters	1
		MISCELLANEOUS	
	5C-10042-9	Bakelite cabinet-Ivory	
	5C-10042-36	Bakelite cabinet-Walnut	
	B-15B-10076	Socket for electrolytic	
	B-14M-10088	Line cord & plug	1
	A-2M-10096	Stud- to mount antenna to cabinet	
	A-23A-10344	Line cord lock	2
	A-15B-10440	Socket-Eight prong octal	1
	A-2H-10715	Tube shield-for use with metal based 12SA7GT or 12SK7GT	4
	A-25B-10736	Rubber bumpers-for bottom of cabinet	2
	B-23J-11134	Speaker baffle	4
	A-15C-11201	Socket-Eight prong octal laminated	1
	B-2M-11205	Stud-to mount antenna to cabinet	2
	A-2H-11271	Tube shield- use with bakelite based 12SA7GT or 12SK7GT	3
	B-23K-12674	Grille Screen	2
	A-43D-12779	Push on fastener to fasten baffle	1

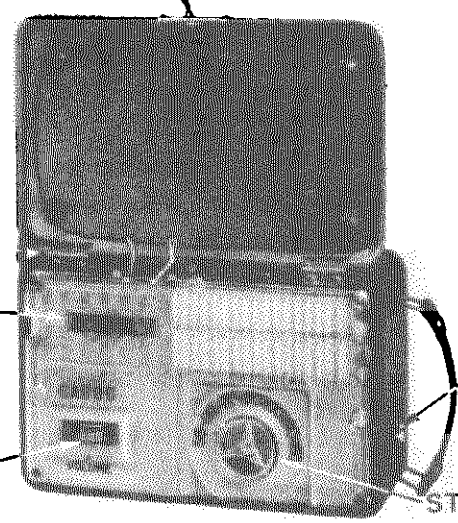


FIG.I RECEIVER IN OPERATING POSITION

FIG 2 REAR VIEW - BACK COVER REMOVED SHOWING LOCATION OF BATTERIES

BATTERY REQUIREMENTS: The following batteries are required:

QUANTITY	TYPE	MANUFACTURER
1	1½ volt "A"	Eveready size "D", Burgess No. 2, Ray-O-Vac size "D" or equivalent.
1	67½ volt "B"	Eveready #467, Burgess Type XXD, Ray-O-Vac Type 4367 or equivalent.

TUNING RANGE: Broadcast 540 to 1650 Kilocycles (180 to 555 meters).

DIAL SCALE: The dial scale is calibrated in kilocycles. Example: Read "60" as 600 Kc.

TUBES: The tubes used and their functions are as follows:

1R5 Converter	1S5 Detector, AVC and Audio Amp.
1T4 I.F. Amplifier	3S4 Power Amplifier

MODELS 4A-1B, 4A-2B

INSTALLATION: The Model 4A is a complete personal receiver for broadcast reception, after battery installation. The complete receiver is housed in a small attractive case with a self-contained loop antenna concealed in the recessed portion of the hinged plastic front cover. A plastic handle located at one end of the case is provided for ease in carrying. The receiver is automatically turned on when the hinged front cover is opened, and in addition is instantaneous in its operation. Space is provided on the plastic front panel for inserting your initials if desired. The following procedure should be followed for the installation of the "A" and "B" batteries (see Fig. 2.

(a) Remove the back cover by depressing the back cover release button adjacent to the handle while sliding the back upward and out.

CAUTION: In removing the back cover, raise the lock end of the back cover only enough to clear the case edge before sliding the cover toward the strap handle to release the opposite end from the two protruding bottom case tabs that hold it down. Failure to observe this precaution may result in breaking out the two bottom holes from the cover.

(b) Insert the 1½ volt "A" battery into the spring holder with the protruding center contact at the top of the "A" battery always facing the position shown on the diagram rear of back cover or Fig. 2, opposite page. Do not insert the "A" battery in the opposite position in the spring holder.

(c) Connect the "B" battery contact strip fitted with snap fasteners to the corresponding contacts on the "B" battery.

(d) Insert the "B" battery into the compartment provided as shown on the diagram rear of back cover or Fig. 2, opposite page.

(e) Replace back cover by inserting the two holes at the bottom edge of the back cover into the two protruding case tabs at the rear edge of the case and slide forward while depressing the back cover release button. The receiver is now ready for operation.

ALIGNMENT: (Receiver removed from cabinet.) Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

(1) Set the signal generator to 455 KC and connect to the stator lug (rear section) of variable capacitor. Extend the loop leads and solder to original points. Connect the signal generator ground lead to the chassis. Connect a suitable output meter across the speaker voice coil connections. Turn the volume control to the maximum position. Turn the variable capacitor to the extreme clockwise position (minimum capacity).

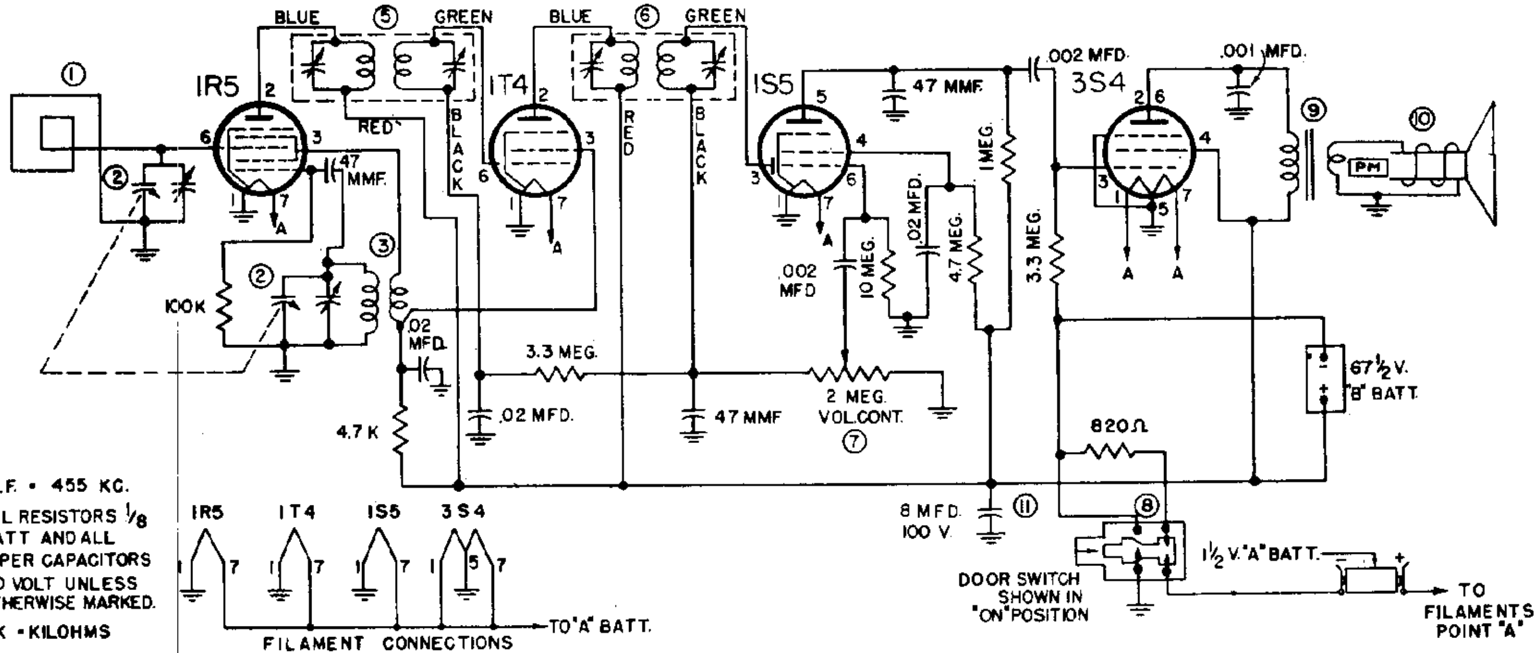
(2) Adjust the trimmers located at the top of the first and second I.F. Transformers for maximum output, as indicated on the output meter.

(3) Loosely couple the signal generator lead to the loop and set to 1650 KC.

(4) With the variable capacitor set at minimum capacity, tune in the 1650 KC signal by means of the oscillator trimmer on the variable capacitor (rear section).

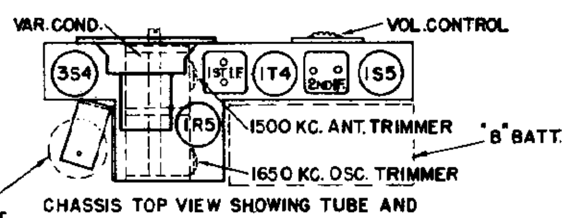
(5) Set the signal generator to 1500 KC and turn the tuning control until this frequency is heard. Adjust the antenna trimmer on the variable capacitor (front section) for maximum output.

(6) Install the chassis into the cabinet and re-adjust the antenna trimmer at 1500 KC. No other adjustments are necessary.



I.F. = 455 KC.
ALL RESISTORS 1/8 WATT AND ALL PAPER CAPACITORS 150 VOLT UNLESS OTHERWISE MARKED.
K = KILOHMS

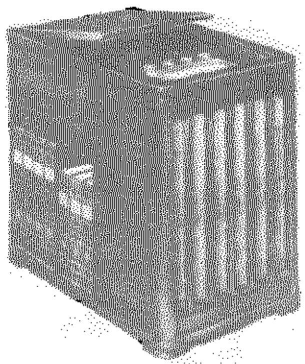
(1) 1.467 LOOP ANTENNA
(2) 2.214 2 GANG VARIABLE CONDENSER
(3) 1.466 OSCILLATOR COIL
(4) NOT USED
(5) 1.412≥1 ST. I.F. TRANSFORMER
(6) 1.413≥2 ND. I.F. TRANSFORMER
(7) 8.216 OR 8.204 VOLUME CONTROL
(8) 11.214 DOOR SWITCH
(9) 9.215 OUTPUT TRANS.
(10) 30.315 2½" P.M. SPEAKER
(11) 5.417 8MFD. 100 V. ELEC. CAP.



CHASSIS TOP VIEW SHOWING TUBE AND TRIMMER LOCATION

MODEL 4A SCHEMATIC DIAGRAM AND TUBE LAYOUT

MODEL 6DCP-2,
The Chairside



CONTROLS:

A description of the four controls *from left to right* on the front panel is given below:

(A) On-Off Switch and Volume Control: This control combines the line On-Off Switch and Volume Control.

(B) Tone Control: When turned to the right (clockwise), a deep bass effect is produced, while rotation to the left (counter-clockwise) produces a more brilliant tone. Various shadings between the extremes *may be* obtained at intermediate settings of the control.

(C) Band Selector Switch: This three-position control selects the frequency band to be used, and also connects the "Phono" pickup into the circuit for use of the record changer. The extreme left hand position is the "Broadcast" band, the middle position the "Short Wave" band, and the extreme right hand position *is the "Phono"* position.

(D) Tuning Control: *This control is coupled to the tuning capacitor* through a reduction drive and serves to select the desired broadcast or short wave station along the slide-rule dial, the *frequency of which* is indicated by the dial pointer.

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 60 Cycles, Alternating Current (AC) only.

POWER CONSUMPTION INCLUDING RECORD CHANGER: 85 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 Meters)

Short Wave: 5.7 to 18.5 Megacycles (16 to 53 Meters)

DIAL: The dial scale is calibrated in Kilocycles times 10 for the Broadcast Band, and in Megacycles for the Short Wave Band, corresponding with newspaper or periodical listings.

TUBES: The tubes used, and their functions, are as follows:

6SG7 R. F. Amplifier
6SA7 Converter
6SK7 I. F. Amplifier
6SQ7 Detector, Avc and Audio Amplifier
6V6 Beam Power Amplifier
5Y3GT Rectifier

ALIGNMENT:

Realignment of this receiver should not be attempted unless all other possible causes have been thoroughly investigated. An accurately calibrated signal generator, which will cover the necessary bands, and an output meter for indicating the effect of adjustments are required.

During the alignment procedure, all adjustments should be *made* under the following conditions (refer to Trimmer and Tube Location Diagram below for trimmer location):

(a) Line voltage as indicated on instruction sheet.

(b) Volume Control at maximum position.

(c) Tone Control at extreme left position (brilliant).

(d) Minimum input from signal generator. This procedure should be adhered to, otherwise adjustments will be broad, due to the action of the automatic volume control.

BROADCAST *(Band Switch in extreme left position)*

I. F. Adjustment:

(1) Set the signal generator to 455 KC and connect to the lower side of the Loop Antenna Trimmer through a .1 MFD capacitor. Connect the signal generator *ground* lead to the chassis. Connect a suitable output meter across the speaker voice coil connections. Turn the Variable Capacitor to the extreme clockwise position (minimum capacity).

(2) Adjust the trimmers located at the top of the first and second I. F. *Transformers for maximum output as indicated on the output meter.*

BC. R. F. Adjustment: It is desirable to align this band on the loop.

(1) Couple the signal generator to the receiver loop by means of a two or three turn loop.

(2) With the *Variable Capacitor* set at the extreme clockwise position *(minimum capacity), tune in the 1650 KC signal by means of the* broadcast oscillator trimmer (C2).

(3) Set the signal generator *to 1500 KC and* turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer (C1) on the loop for maximum output.

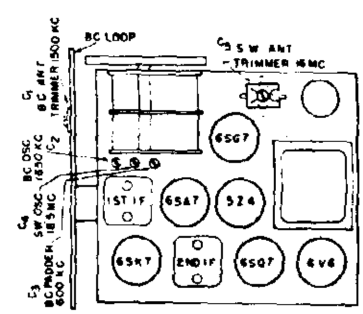
(4) Set the signal generator to *600 KC and turn the* Tuning Control so that this frequency is indicated on the dial. Adjust the broadcast oscillator padder capacitor (C3) for maximum response while "rocking" the Variable Capacitor. Recheck the 1500 KC high frequency adjust*ment trimmer (C2).*

SHORT WAVE *(Band Switch in the middle position)*

(1) Connect the signal generator through a standard short wave dummy antenna to the antenna (green wire) and the ground lead to the chassis of the receiver. Set the *signal generator* to 18.5 MC.

(2) With the Variable Capacitor set at the extreme clockwise position (minimum capacity), tune in the 18.5 MC signal by means of the S. W. oscillator trimmer (C4).

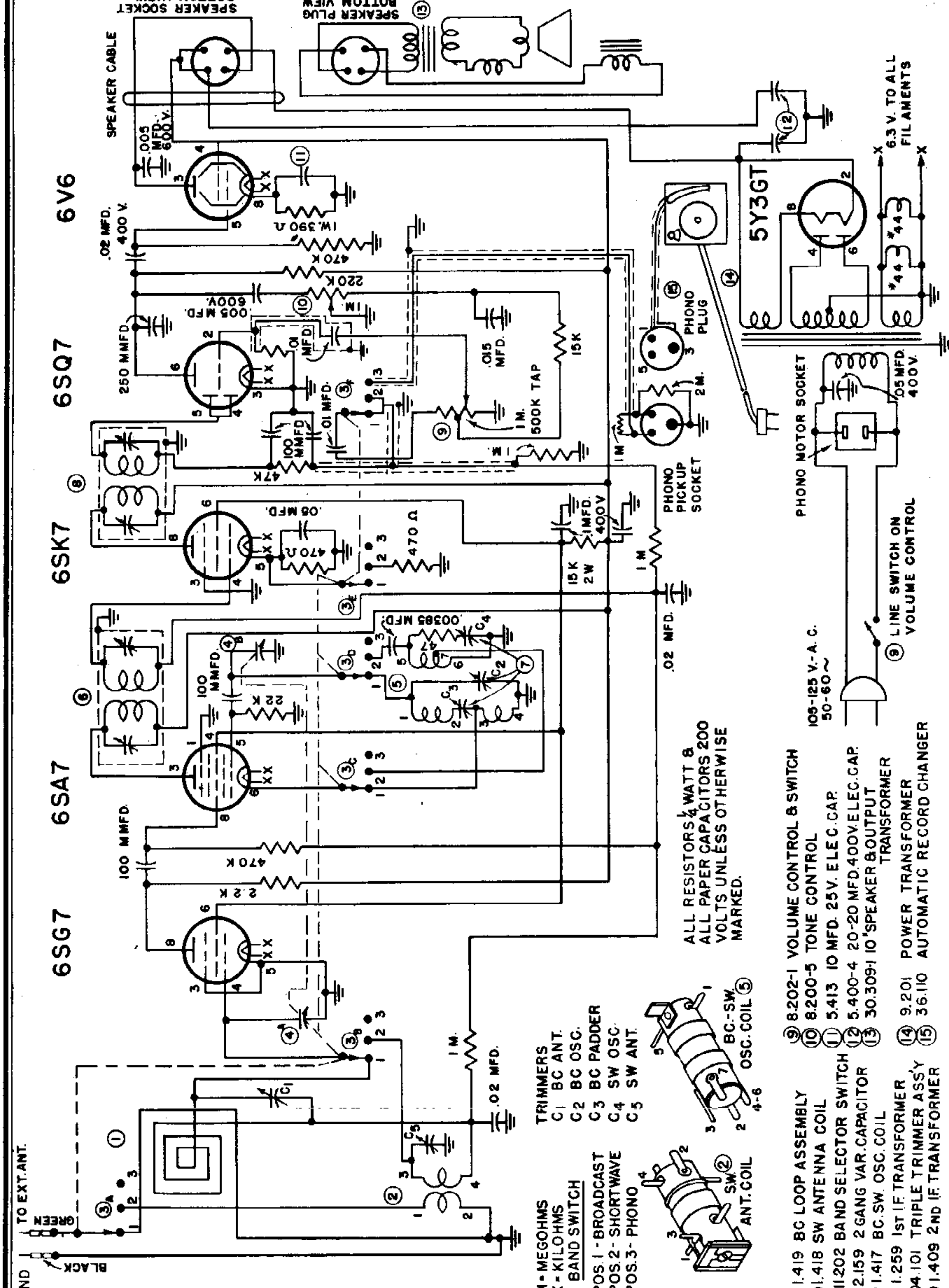
(3) Set the signal generator to 16 MC and turn the tuning control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer (C5) on the short wave coil for maximum output *while rocking* the Variable Capacitor from left to right for maximum output. No other adjustments are necessary.



TRIMMER AND TUBE LOCATION DIAGRAM

NOTE : The receiver chassis is assembled to a shelf and may be removed for servicing purposes by removing the knobs and four screws. Two screws and washers are located on the inside panel of the record changer compartment. The two other screws and washers are located on the same panel below the changer compartment. Reverse the above procedure for installation to cabinet and reconnect changer cables to chassis sockets.

MODEL 6DCP-2,
The Chairside



SPECIFICATIONS

CABINET:

MODEL	MATERIAL	COLOR
414	Plastic	Mahogany
415	Plastic	Ivory
416	Plastic	Maroon
430	Wood	Mahogany

ELECTRICAL RATING:	Voltage..105-125, 50-60 cycles or DC Watts.......................... 26
OPERATING FREQUENCIES:	Standard Wave Band...... 540-1600 KC I-F Amplifier............... 455 KC
POWER OUTPUT:	Undistorted.................. 1 watt Maximum.................. 1.75 watts
LOUDSPEAKER:	Type...................... Alnico PM Outside Cone Diameter...... 4 inches Voice Coil Impedance @ 400 cycles.................... 3.2 ohms
TUBE COMPLEMENT:	V1 Oscillator-Converter..... 12SA7 V2 I-F Amplifier............ 12BA6 V3 Detector-Audio........... 12SQ7 V4 Rectifier................ 35W4 V5 Audio Power Amplifier.... 50C5 I1 Dial Light..... GE Mazda No. 47

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED

1. Test oscillator, tone amplitude-modulated.
2. A-C output meter, 1 1/2 volts full scale.
3. .05 mfd., paper capacitor.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation power transformer.

ALIGNMENT PROCEDURE

The alignment steps are given in the table form of the Alignment Chart. Adjustment points are shown in the illustration of Fig. 1.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.
2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers, to prevent short circuiting of equipment and shock hazard.
3. The output meter is connected across the terminals of the loudspeaker voice coil.
4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 1/4 volts output meter reading at the loudspeaker.
5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver B-Bus.
6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the generator's output terminals and then locating the loop about one foot from the radio loop antenna.

To prevent possible errors in comparative readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

7. Relocate dial pointer on tuning shaft at 1500 KC on the dial to correspond to the tuning capacitor setting in Step 5.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Radio Dial Setting	Adjust for Maximum
	I-F ALIGNMENT			
1	V2,12BA6 grid (Pin 1), in series with .05 mfd.	455 KC	.....	Cores of second i-f transformer T3
2	V1,12SA7 grid (Pin 8), in series with .05 mfd.	455 KC	.....	Cores of first i-f transformer T2
3	V1,12SA7 grid (Pin 8), in series with .05 mfd.	455 KC	.....	Recheck adjustment of T1 and T2, for maximum
	R-F ALIGNMENT			
4	Inductively coupled to radio loop	1620 KC	Minimum capacity C2A,C2B	C3, oscillator trimmer
5	Inductively coupled to radio loop	1500 KC	For Maximum	C1, r-f trimmer
6	Set pointer to 150. See Note 7.			

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F GAIN

12SA7 Grid to 12BA6 Grid	50 @ 455 KC
12BA6 Grid to 12SQ7 Diode Plate	100 @ 455 KC

2. AUDIO GAIN

Input of 0.15 volts at 400 cycles across volume control (R4) with control set at maximum will develop approximately 1/2 watt output across the speaker voice coil terminals.

3. OSCILLATOR GRID BIAS

D-C voltage developed across the oscillator grid leak (R1) averages 7.5 volts at 1000 kc dial setting (no signal).

4. TUBE SOCKET PIN VOLTAGES

The schematic diagram of Fig. 3 shows voltages from tube pins to B-. Voltage readings differing greatly from those specified may help localize defective components

MODELS 414, 415, 416, 430

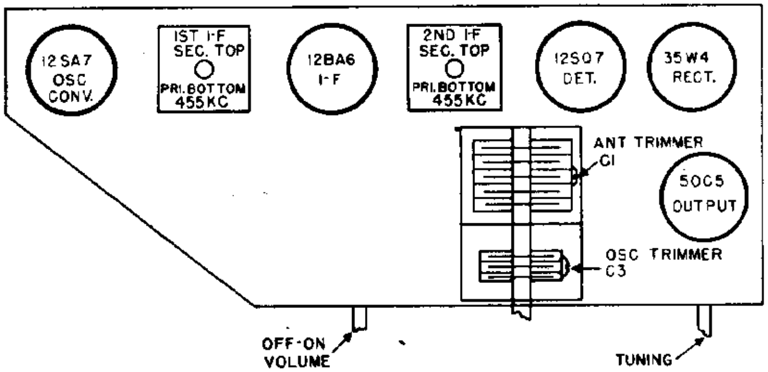


FIG. 1. LOCATION OF TUBES AND ADJUSTMENTS

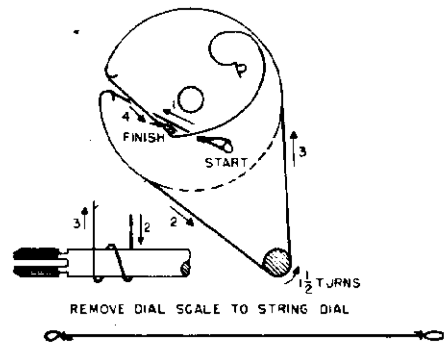
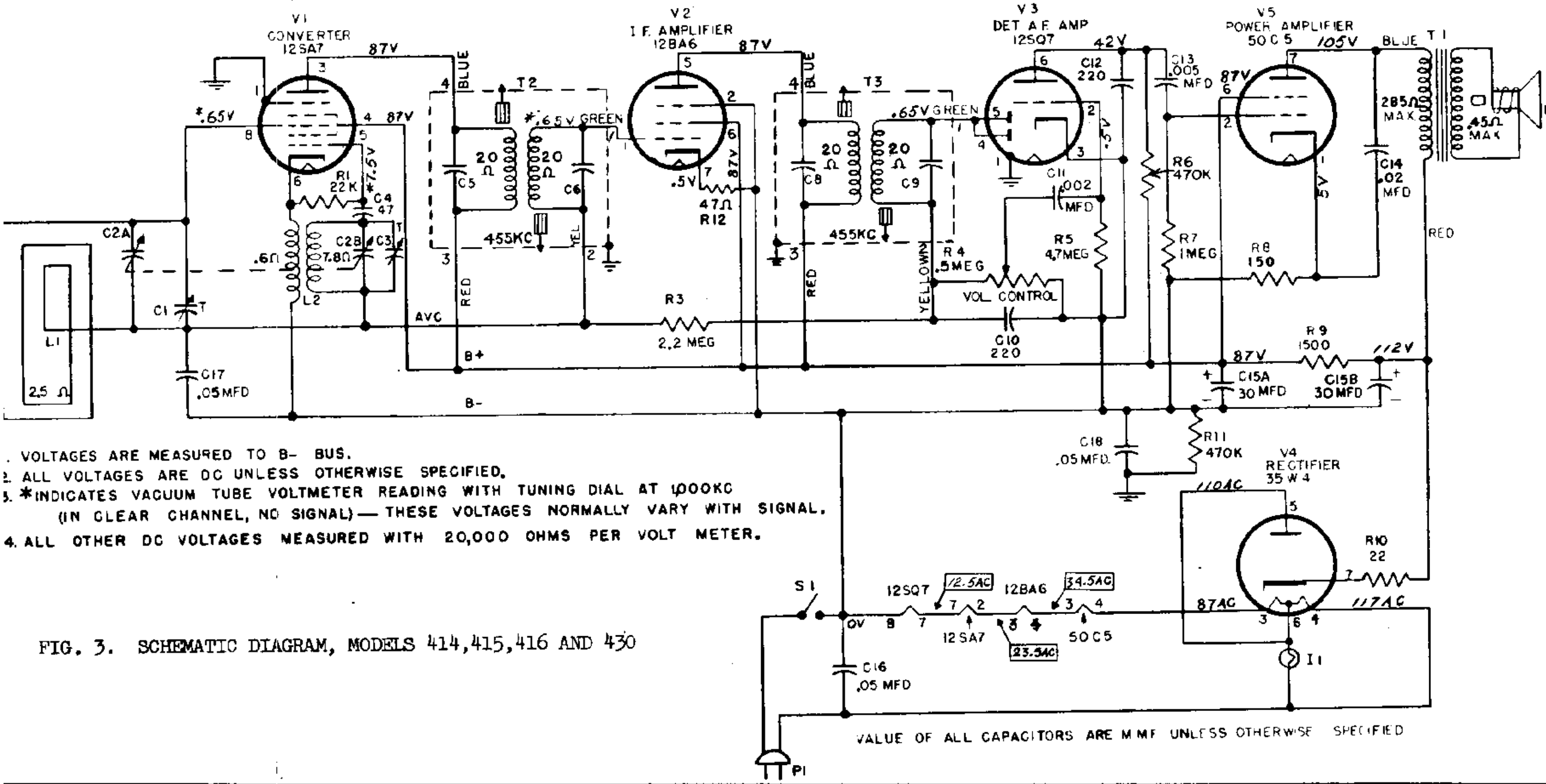


FIG. 2 DIAL CORDING DIAGRAM



1. VOLTAGES ARE MEASURED TO B- BUS.
2. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
3. *INDICATES VACUUM TUBE VOLTMETER READING WITH TUNING DIAL AT 1000KC (IN CLEAR CHANNEL, NO SIGNAL) — THESE VOLTAGES NORMALLY VARY WITH SIGNAL.
4. ALL OTHER DC VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER.

FIG. 3. SCHEMATIC DIAGRAM, MODELS 414, 415, 416 AND 430

REPLACEMENT PARTS LIST
MODELS 414,415,416 and 430

Cat. No.	Symbol	Description
		CAPACITORS
*RCE-127	C15A,B	30 mf., 150 v.; 30 mf. 150 v., electrolytic
RCT-058	C2A,B, C1,C3	Tuning capacitor with trimmers
*RCW-3025	C10,11, 12,13	220 mmf., .002 mf., 220 mmf., .005 mf., 450 v., ceramic
*UCU-020	C4	47 mmf., ceramic
*UCC-041	C14	.02 mf., 600 v., paper
*UCC-045	C16,17, 18	.05 mf., 600 v., paper
		RESISTORS (carbon)
*URD-009	R10	22 ohms, 1/2 w.
*URD-017	R12	47 ohms, 1/2 w.
*URD-029	R8	150 ohms, 1/2 w.
*URD-081	R1	22,000 ohms, 1/2 w.
*URD-113	R6,11	470,000 ohms, 1/2 w.
*URD-121	R7	1 meg., 1/2 w.
*URD-129	R3	2.2 meg., 1/2 w.
*URD-137	R5	4.7 meg., 1/2 w.
*URF-053	R9	1500 ohms, 2 w.
		POTENTIOMETER
RRC-172	R4,S1	500,000 ohms, composition, volume control and ON-OFF switch
		COILS AND TRANSFORMERS
*RLC-090	L2	COIL - Oscillator coil for V1
*RTL-133	T2,C5, C6,T3, C8,C9	TRANSFORMER - 1st or 2nd i-f, with tuning cores (capacitors are part of molded base assembly)
*RTO-069	T1	TRANSFORMER - Audio output
		MISCELLANEOUS ELECTRICAL
*RJS-003		SOCKET - 8-pin wafer, 1 3/8 in. hole mount spacing, for 12SA7 or 12SQ7
RJS-092		SOCKET - 7-pin wafer 1 1/4 in. hole mount spacing for 35W4 or 50C5 tubes
*RJS-141		SOCKET - 8-pin wafer 1 3/8 in. hole mount spacing for 12BA6 tube
RWL-009	P1	POWER CORD - A-C power cord and plug (brown) for Models 414,416,430
*RWL-016	P1	POWER CORD - A-C power cord & plug (white) for Model 415
*RWX-040		SOCKET - Dial light socket with leads
*S403D7	LS1	LOUDSPEAKER - 4 inch PM
		MISCELLANEOUS MECHANICAL
RDC-032		CORD - Dial cord, bulk quantity 25 yds.
RDP-063		DIAL POINTER - Plastic pointer may be furnished in lieu of brass
RDS-109		DIAL SCALE - Plastic dial plate, gold finish, translucent numerals
*RHC-024		CLIP - 7/8 inch, mounts C15A, B

Cat. No.	Symbol	Description
		MISCELLANEOUS MECHANICAL (cont'd)
*RHC-034		CLIP - For mounting I-F can assembly to chassis
RHG-006		GROMMET - For 110 v. line cord, in back apron of chassis
*RHG-018		GROMMET - Rubber, for mounting tuning capacitor
*RHH-004		FASTNER - Snap fastner for Models 414, 415, or 416, holds cabinet back to cabinet
*RHJ-007		SPACER - Metal, in grommet mounting tuning capacitor
RHS-004		SCREW - #4 x 1/4 in. stove head shakeproof type #25, mounts speaker in Models 414, 415 or 416 cabinet
*RJC-004		CLIP - Female speaker connector on audio output leads
*RMC-002		CLIP - Osc. coil mounting clip, United carr #521D7
RMS-118		SPRING - Dial cord tension spring
RMS-214		CLIP - Metal clip used on plastic dial
RMX-195		SHAFT - Tuning shaft and bushing assembly
		CABINETS AND CABINET PARTS
RAB-172	L1	CABINET BACK - Antenna loop on cabinet back cover.
*RAG-033		GRILLE CLOTH - Maroon, behind speaker grille, in Model 414 or 416 cabinet
*RAG-034		GRILLE CLOTH - Ivory, behind speaker grille on Model 415 cabinet
RAU-350		CABINET - Plastic, Ivory, for Model 415
RAU-351		CABINET - Plastic, Maroon, for Model 416
RAU-352		CABINET - Plastic, Mahogany, for Model 414
RAV-177		CABINET - Wood, Mahogany for Model 430
*RDK-003		KNOB - Plastic, two tone fawn and gold leaf finish, volume or tuning for Model 430
RDK-260		KNOB - Plastic, fawn color, volume or tuning for Model 414, 415 or 416
RDW-052		DIAL WINDOW - Formed plastic with mounting tabs for Models 414, 415 or 416
RDW-053		DIAL WINDOW - 6 9/32" x 3 3/4" glass for Model 430
*RHF-008		FOOT - Cabinet foot rest, 1/2 inch, metal and felt composition, for Model 430

*Parts used on previous receivers

MODELS 422, 423

SPECIFICATIONS

CABINET:	Model 422...........Mahogany plastic Model 423..............Ivory plastic
POWER SUPPLY:	Voltage......105-120 volts a-c or d-c Frequency............50 or 60 cycles Wattage..................... 30 watts
OPERATING FREQUENCIES:	Broadcast Band...........540-1600 KC I.F. Amplifier................455 KC
POWER OUTPUT:	Undistorted....................1 watt Maximum.................. 1.75 watts
LOUDSPEAKER:	Type.....................Alnico 5 PM Outside cone Diameter... 5 1/4 inches Voice coil impedance at 400 cycles............. 3.2 ohms

TUBE COMPLEMENT:	SYMBOL	PURPOSE	TYPE
	V1	RF Amplifier	12SK7
	V2	Oscillator Converter	12SA7
	V3	IF Amplifier	12BA6
	V4	Detector-Audio Ampl.	12SQ7
	V5	Rectifier	35Z5
	V6	Audio Power Ampl.	35L6GT
	I1	Pilot Lamp	GE Mazda No. 47

GENERAL INFORMATION

The Models 422 or 423 is a five-tube (plus rectifier tube) a-c or d-c superheterodyne AM standard broadcast receiver equipped with an efficient built-in antenna loop and incorporating automatic volume control, a permanent magnet speaker, and beam power output.

CAUTION: USE ISOLATION TRANSFORMER TO ISOLATE THE RECEIVER FROM THE POWER LINE.

ELECTRICAL CIRCUIT ALIGNMENT

Equipment required:

1. Test oscillator with tone modulation.
2. AC voltmeter, 1 1/2 volts full scale.
3. Paper capacitor, 0.05 mf.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation transformer.

Alignment Procedure:

The alignment steps are given in table form of Alignment Chart. Adjustment trimmers are shown in the illustration of Fig. 3.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.

2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers to prevent short circuiting of equipment and shock hazard.

3. The output meter is connected across the terminals of the loudspeaker voice coil.

4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 1/4 volts output meter reading at the loudspeaker.

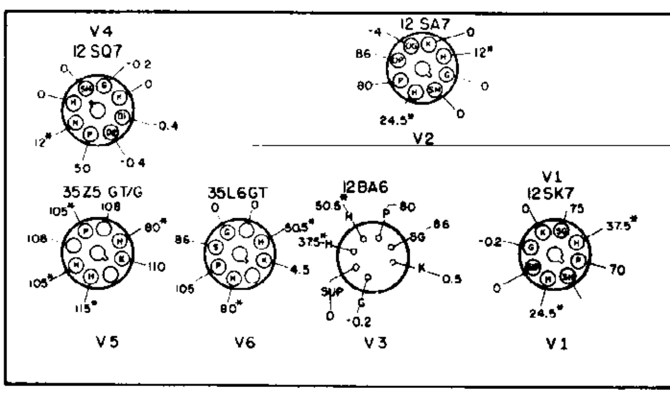
5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver chassis.

6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

ALIGNMENT CHART

Step	Connect Test Oscillator to:	Test Osc. Setting	Radio Dial Setting	Adjust Trimmers for Maximum
I-F ALIGNMENT				
1	V3, 12BA6 grid (Pin 1), in series with 0.5 mfd.	455 KC	....	C9 and C8 of second i-f transformer T3.
2	V2, 12SA7 grid (Pin 8) in series with .05 mfd.		....	C7 and C6 of first i-f transformer, T2.
3			....	Recheck adjustment of C9, C8, C7, C6, for maximum
R-F ALIGNMENT				
4	Inductively coupled to radio loop.	1620 KC	Minimum capacity C1A,C1B	C3, oscillator trimmer
5		1500 KC	Tune for Maximum	C1, r-f trimmer C2, ant. trimmer

FRONT OF CHASSIS



117 VOLTS AC LINE, NO SIGNAL INPUT.
VOLTAGES MEASURED BETWEEN
SOCKET TERMINALS AND B- WITH
20,000 OHMS PER VOLT METER.
VOLUME CONTROL MINIMUM
* INDICATES AC VOLTS.

BOTTOM VIEW OF CHASSIS

FIG. 2. SOCKET VOLTAGE DIAGRAM

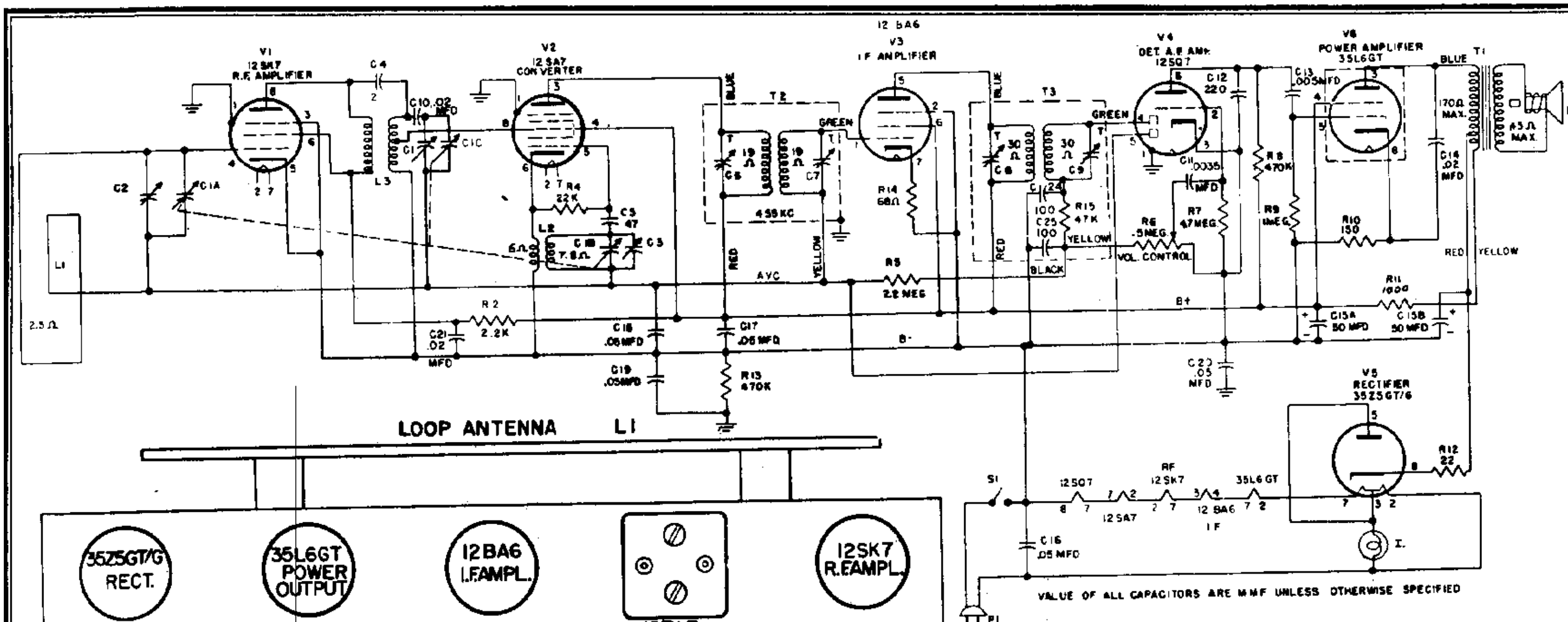


FIG. 1. SCHEMATIC DIAGRAM, MODEL 422 & 423

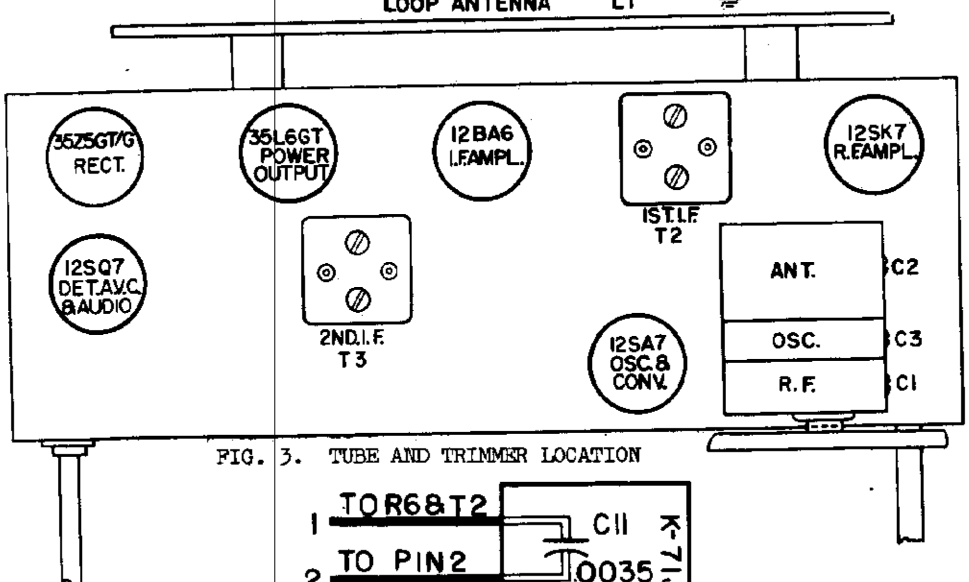


FIG. 3. TUBE AND TRIMMER LOCATION

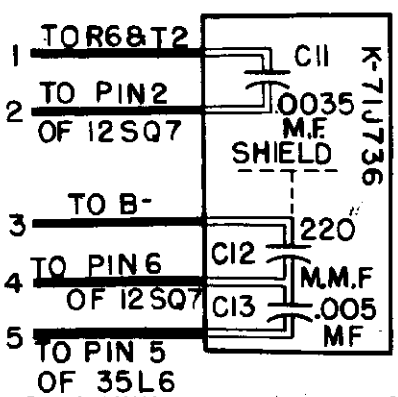


FIG. 5. CERAMIC CAPACITOR RCW-3036

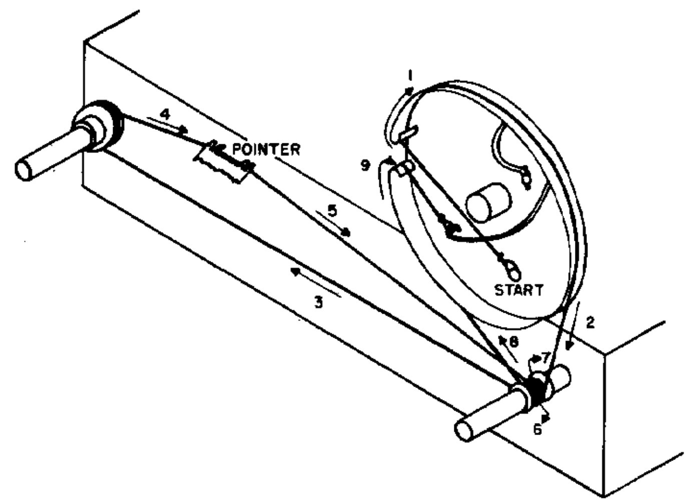


FIG. 4. DIAL STRINGING DIAGRAM

MODELS 422, 423

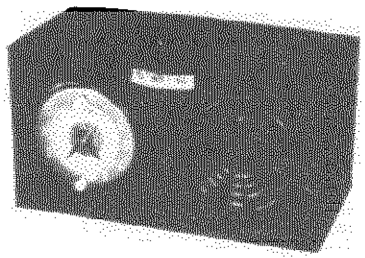
MODELS 422 AND 423 REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION
		CAPACITORS
RCE-050*	C15A,B	50 mf., 150 v., 50 mf., 150 v.; dry electrolytic
RCN-039*	C4	2 mmf., mica
RCT-046*	C1A,B,C, C2,C3	Tuning capacitor with trimmers
RCW-3036*	C11,C12, C13	.0035 mf., 220 mmf., .005 mf., three section ceramic (see UCC-037, UCC-039, UCU-1036)
UCC-037*	C11	.003 mf., 600 v., paper (alternate replacement for RCW-3036)
UCC-039*	C13	.005 mf., 600 v., paper (alternate replacement for RCW-3036)
UCC-041*	C14,C21	.02 mf., 600 v., paper
UCC-045*	C16,C17, C18, C19,C20	.05 mf., 600 v., paper
UCU-020*	C5	47 mmf., mica
UCU-1036*	C10,C12	220 mmf., mica (alternate replacement for RCW-3036)
		RESISTORS & POTENTIOMETER
RRC-149*	R6,S1	POTENTIOMETER - 500,000 ohms; volume control and switch S1
URD-009*	R12	RESISTOR - 22 ohms, 1/2 w., carbon
URD-021*	R14	RESISTOR - 68 ohms, 1/2 w., carbon
URD-029*	R10	RESISTOR - 150 ohms, 1/2 w., carbon
URD-057*	R2	RESISTOR - 2.2 K ohms, 1/2 w., carbon
URD-081*	R4	RESISTOR - 22,000 ohms, 1/2 w., carbon
URD-113*	R8,R13	RESISTOR - 470,000 ohms, 1/2 w., carbon
URD-121*	R9	RESISTOR - 1 meg., 1/2 w., carbon
URD-129*	R5	RESISTOR - 2.2 meg., 1/2 w., carbon
URD-137*	R7	RESISTOR - 4.7 meg., 1/2 w., carbon
URF-049*	R11	RESISTOR - 1000 ohms, 2 w., carbon
		COILS & TRANSFORMERS
RLC-105*	L2	COIL - Oscillator
RLI-125*	L3	COIL - R-F
RTL-115*	T2	TRANSF. - First I-F
RTL-116*	T3	TRANSF. - Second I-F
RTO-083*	T1	TRANSF. - Audio output
		MISCELLANEOUS ELECTRICAL
RJS-003*		SOCKET - Tube socket
RJS-141*		SOCKET - Tube, for 12BA6
ROP-020*		SPEAKER - PM, 5 1/4"

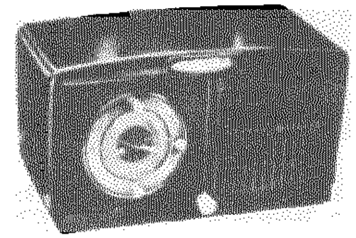
CAT. NO.	SYMBOL	DESCRIPTION
		MISCELLANEOUS ELECTRICAL
RWL-009		POWER CORD - A-C power cord and plug
RWL-016*		POWER CORD - Model 423
RWX-043		ASSEMBLY - Pilot light socket
		MISCELLANEOUS MECHANICAL
RDC-032*		CORD - Bulk dial cord
RDP-064		POINTER - Dial scale
RHC-018		CLIP - Loop clip
RHC-024*		CLIP - Capacitor clip
RHC-038*		CLIP - For R-F coil
RHG-006*		GROMMET - On tuning shaft
RHG-018*		GROMMET - Cushion mounting for tuning capacitor
RHG-032*		GROMMET - Speaker lead ins.
RHI-017*		STRAIN RELIEF
RHJ-007*		SPACER - Spacer bushing for mounting tuning capacitor
RHR-010*		RIVET-For terminal board
RHR-013*		RIVET- For output transf.
RHS-061*		SCREW - For loop back mounting
RHS-062*		SCREW - For chassis mounting
RHS-063		SCREW - For tuning capacitor mounting
RJC-004*		CONNECTOR - Antenna loop lead connecting clip
RMC-002*		CLIP - For oscil. coil
RMM-035*		SHIELD - Tube shield
RMM-200*		HOOD - Pilot light hood
RMS-118*		SPRING - Dial cord tension spring
RMW-070*		PULLEY - Idler pulley
RMX-196		SHAFT AND BUSHING - Tuning shaft and mounting bushing, late prod.
RMX-200		DRIVE SHAFT AND BUSHING ASSEMBLY, early prod.
		CABINET & CABINET PARTS
RAB-142*	L1	CABINET BACK - With antenna loop
RAG-038*		ASSEMBLY - Grill cloth assembly, Model 422
RAG-039*		ASSEMBLY - Grill cloth assembly, Model 423
RAU-353		CABINET - Mahogany cabinet (plastic) for Model 422
RAU-354		CABINET - Ivory cabinet (plastic), for Model 423
RDE-124		ESCUTCHEON - Dial esc.
~~RDS-110~~		~~SCALE - Dial scale~~
RDK-181*		KNOB - For Model 422
RDK-229*		KNOB - For Model 423

*Parts used on previous models.

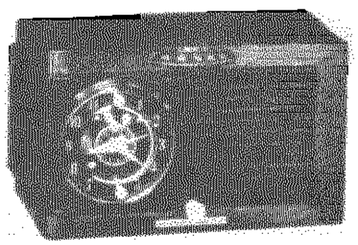
MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F



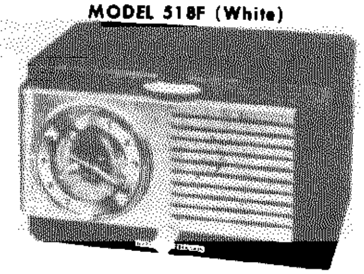
MODEL 510F (Brown)
MODEL 511F (Ivory)



MODEL 515F (Brown Mottle)
MODEL 517F (Maroon)
MODEL 516F (Ivory)
MODEL 518F (White)



MODEL 512F (Mahogany Mottle)
MODEL 513F (Antique Ivory)



MODEL 521F (Dark Mahogany)
MODEL 522F (Blonde Mahogany)

SPECIFICATIONS

OVER-ALL CABINET DIMENSIONS	Model	510F, 511F	515E, 516F, 517F, 518F	521F, 522F, 512F, 513F
	Height	6¼ in.	6 3/16 in.	6 3/16 in.
	Width	11⅜ in.	11 15/16 in.	10½ in.
	Depth	5 5/16 in.	4¼ in.	6 in.
ELECTRICAL RATING	Voltage	105–120		
	Frequency	60 cycles (only)		
	Watts	30		
OPERATING FREQUENCIES	R-F Broadcast	540–1600 kc		
	I-F Amplifier	455 kc		
POWER OUTPUT	Undistorted	1 watt		
	Maximum	1.75 watts		
LOUDSPEAKER	Type	Alnico PM		
	Outside Cone Diameter	4 inches		
	Voice Coil Impedance @ 400 Cycles	3.5 ohms		

TUBE COMPLEMENT	Purpose	Type
	Oscillator-Converter	12BE6
	I-F Amplifier	12BA6
	Detector 1st Audio	12AV6
	Audio Output	50C5
	Rectifier	35W4

GENERAL INFORMATION

The Models 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F and 522F clock—radio receivers employ four tubes, plus rectifier tube in an a-c/d-c superheterodyne circuit using a Beam-a-scope antenna. Each model has an electric time clock with wake-up alarm. The cabinets are of plastic composition in the finishes and design shown in the photos.

A special feature of the Model 515F, 516F, 517F, 518F, 521F and 522F receivers includes a receptacle at the rear of the receiver which is controlled by the clock to provide automatic power control to an external appliance. The slide switch adjacent to the receptacle is used to turn off the radio if desired, while using the appliance. *When radio operation is to be resumed, this switch must be set to the "ON" position.* In addition, the clocks of this group of receivers are equipped with a sleep control which may be used to automatically turn off the radio and/or appliance.

The Models 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F and 522F receivers employ a new type chassis construction and change of tube type from that of other General Electric clock radios, described in ER-S-510, ER-S-515 and ER-S-521, bearing the same model number but without the suffix "F."

The distinguishing feature of this new type chassis construction may be noted in the connection to components and layout. Resistors and capacitors are connected directly by their leads to special tube sockets or terminal board in contrast to previous conventional methods using conventional tube sockets.

The cabinets and clocks of this series receivers whose model numbers are suffixed by "F" are identical to respective model numbers which do not bear the letter "F" as shown upon the identification label.

CAUTION: One side of the power line is connected to B−. Avoid any ground connections direct to B−. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

COMPONENT REPLACEMENT—Except for tube socket replacement, it should not be necessary to remove the doughnut shaped shields over the tube sockets in servicing the chassis. The time and effort otherwise spent to remove shields and heat connections to free components may be spared and a neater job done without the risk of damage to the socket, by using the following method in wiring a replacement.

Clip the defective unit out, leaving enough of its leads to remain attached to the tube socket or terminal strip so an eye loop may be formed in each lead. Each lead of the new component may then be passed through the proper loop, pruned to length, crimped and soldered.

PRODUCTION WIRING CHANGE—Some early receivers will be found with one lead of the power cord connected to the pin 2 socket connection of the 35W4 rectifier tube. This connection has been known to be the cause of damage to the rectifier tube due to a 110 volt a-c arc within the tube between pin 2 and one of the tube elements. For this reason, it is recommended that the following change in wiring be made when the receiver is in the shop for service.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, etc.

The power cord lead is removed from pin 2 of the rectifier tube socket by clipping it off close to the socket connection. The a-c power lead to the clock is similarly removed from pin 8 of the 50C5 output tube socket. Strip, splice, and solder the two leads together, properly taping the connection for adequate insulation. At least two wraps of standard friction tape is required. The remaining bus wire between pin 2 of the 35W4 tube and pin 8 of the 50C5 should then be clipped off close to the socket connection and removed. Some later sets have both leads inserted in pin No. 8 of the 50C5 socket and still later sets utilize pin No. 8 of the 35W4 socket and pin No. 8 of the 12AV6 socket for this connection. Both of these methods are satisfactory and should cause no trouble.

It is only when a solid B− connection is made to pins 1 or 2 of the 35W4 that the arc occurs. A direct short to one of these pins might by coincidence cause this phenomena.

OSCILLATOR COIL, T4—The oscillator coil is wired to be self-supporting through the use of solid bus wire connections. With the exception of some early receivers, the coil lugs are spaced sixty degrees from each other so that they are grouped over one half of the coil circumference as shown in Figure 2. An early type coil may occasionally be found whose lug spacing is eighty degrees. However this presents no difficulty in lug identification, if one bears in mind that the wider space of one hundred and twenty degrees is to be oriented with that half of the coil form which is bare of lugs in the illustration.

CLOCK SERVICE AND REPLACEMENT PARTS—For clock service data and repair parts, contact your local Wholesale General Electric Radio Distributor.

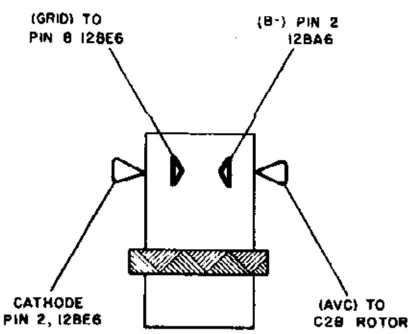


Fig. 1. Oscillator Coil Connections

C17, C19, C20, AND C26

The lead identification for the four-section ceramic capacitor RCW-3048 (K71J670) can be observed from the illustration of Figure 2.

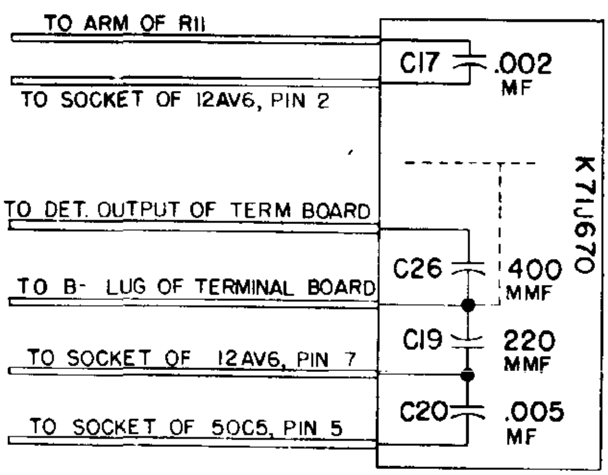


Fig. 2. Capacitor RCW-3048

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

R-F . . . . 1500 kc
R-F . . . . 1620 kc
I-F . . . . 455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1½ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 6.)
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the last calibration mark on the scale (low frequency side of 550 kc) should face directly to the front of the chassis so that the mark will align with the index tab or mark located on the cabinet over the tuning control wheel. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. CAUTION: Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.

2. For i-f alignment, it is necessary to remove the chassis from the cabinet.

3. Connect the output meter across the loudspeaker voice coil terminals.

4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.

5. Connect the capacitor, listed in column 2 of the alignment chart, between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.

6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust for Maximum Output
1	12BA6 grid (1) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd I-F transformer cores
2	12BE6 grid (7) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	1st I-F transformer cores
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

(1) I-F Stage Gains.
12BE6 Grid to 12BA6 Grid . . . . 50 @ 455 kc
12BA6 Grid to 12AV6 Diode Plate . . . . 50 @ 455 kc

(2) Audio Gain.
0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately ½-watt output across the loudspeaker, LS1, voice coil.

(3) Oscillator Grid Bias.
D-c voltage developed across the oscillator grid leak (R1) averages 6 volts at 1000 kc.

(4) Socket Pin Voltages.
Figure 4 shows voltages from all tube pins to B− unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F

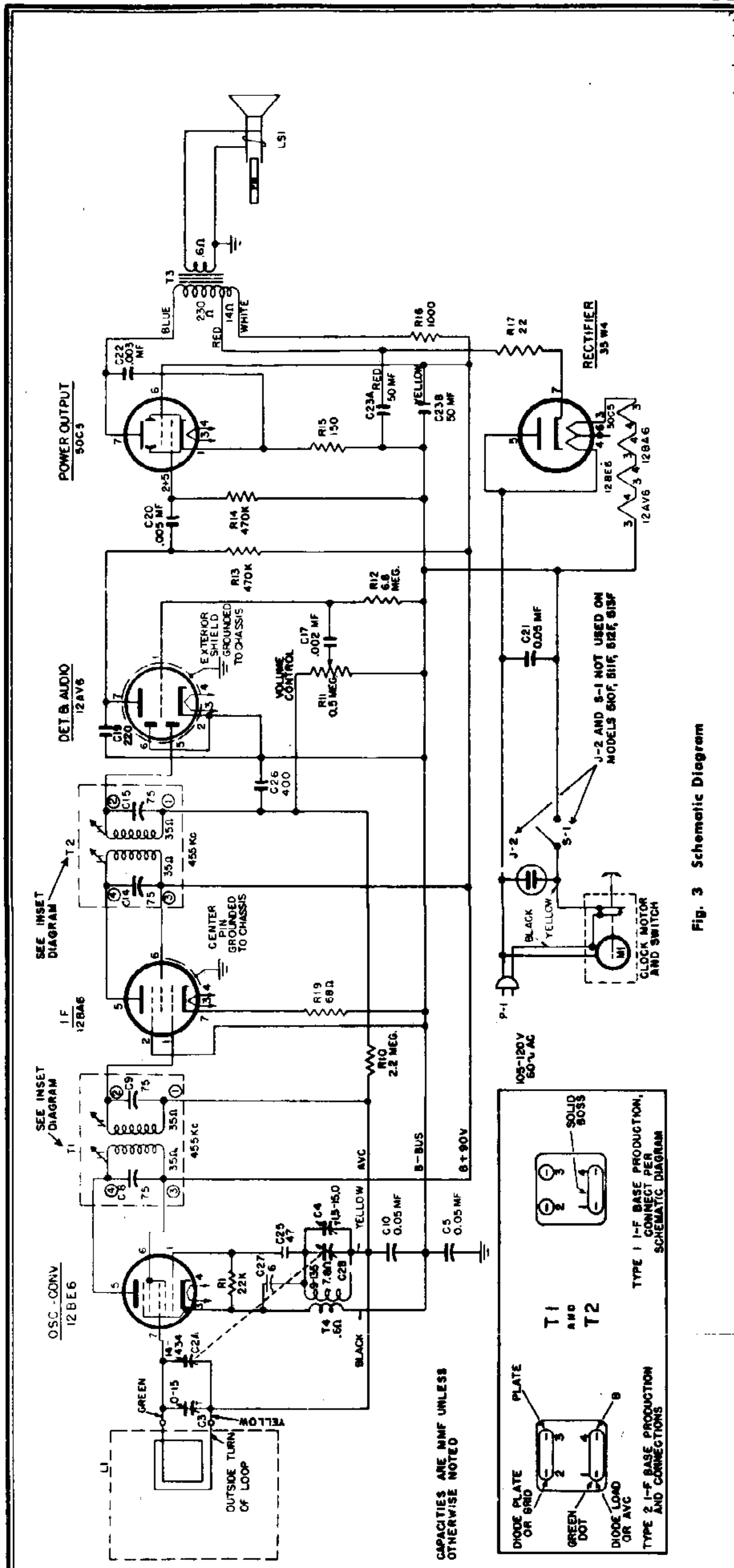


Fig. 3 Schematic Diagram

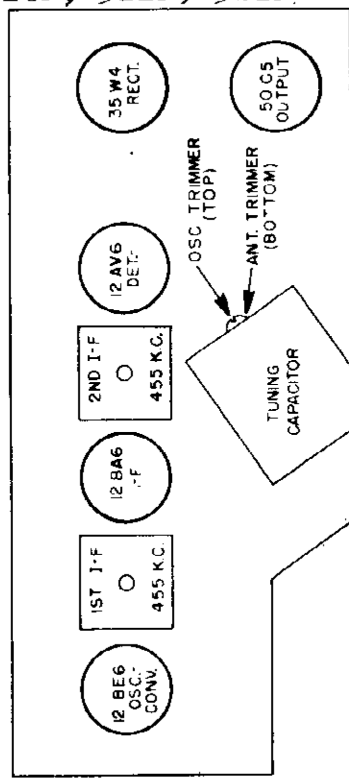


Fig. 5. Tube and Trimmer Location

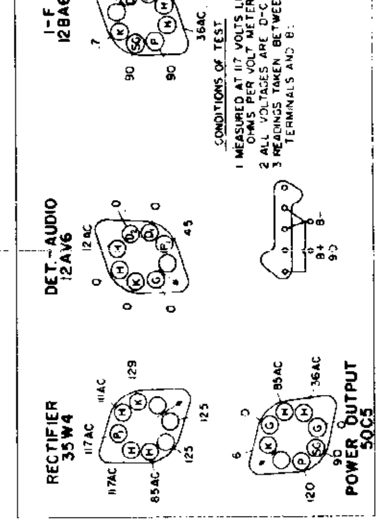


Fig. 4. Socket Voltages

MODELS 510F, 511F, 512F,
513F, 515F, 516F, 517F,
518F, 521F, 522F

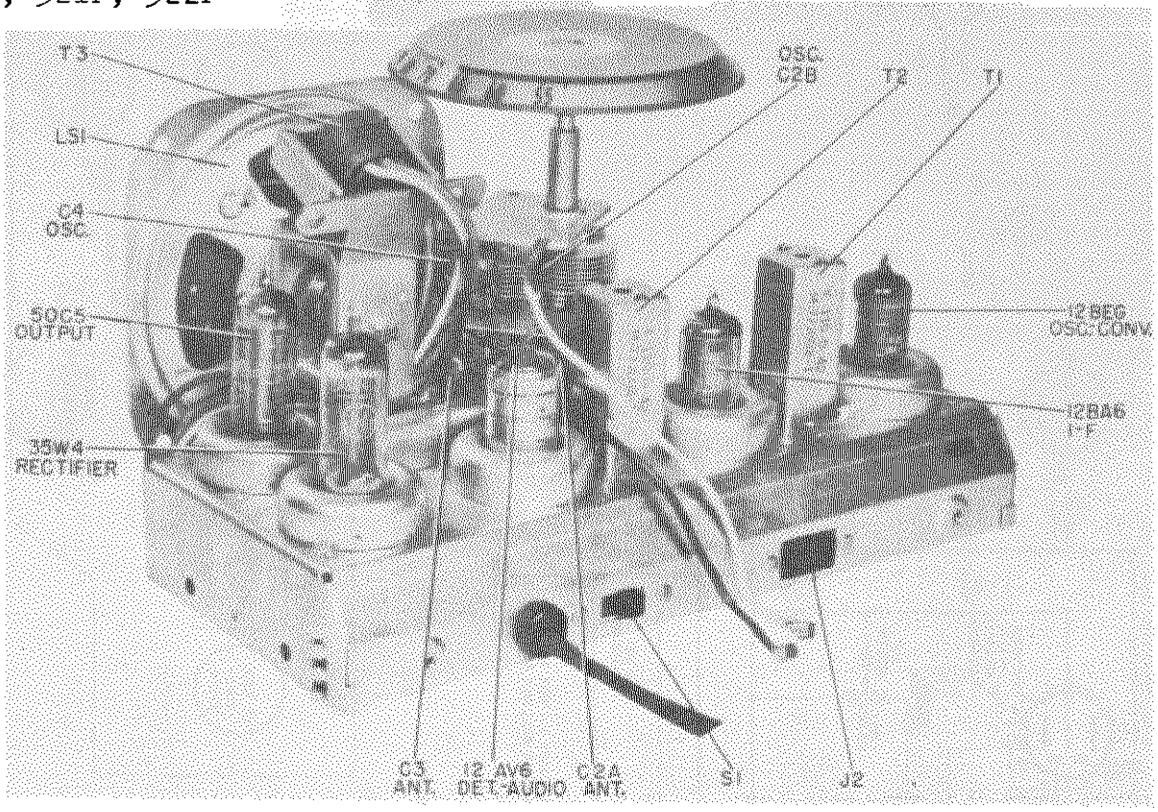


Fig. 6. Photo of Chassis (Top View)

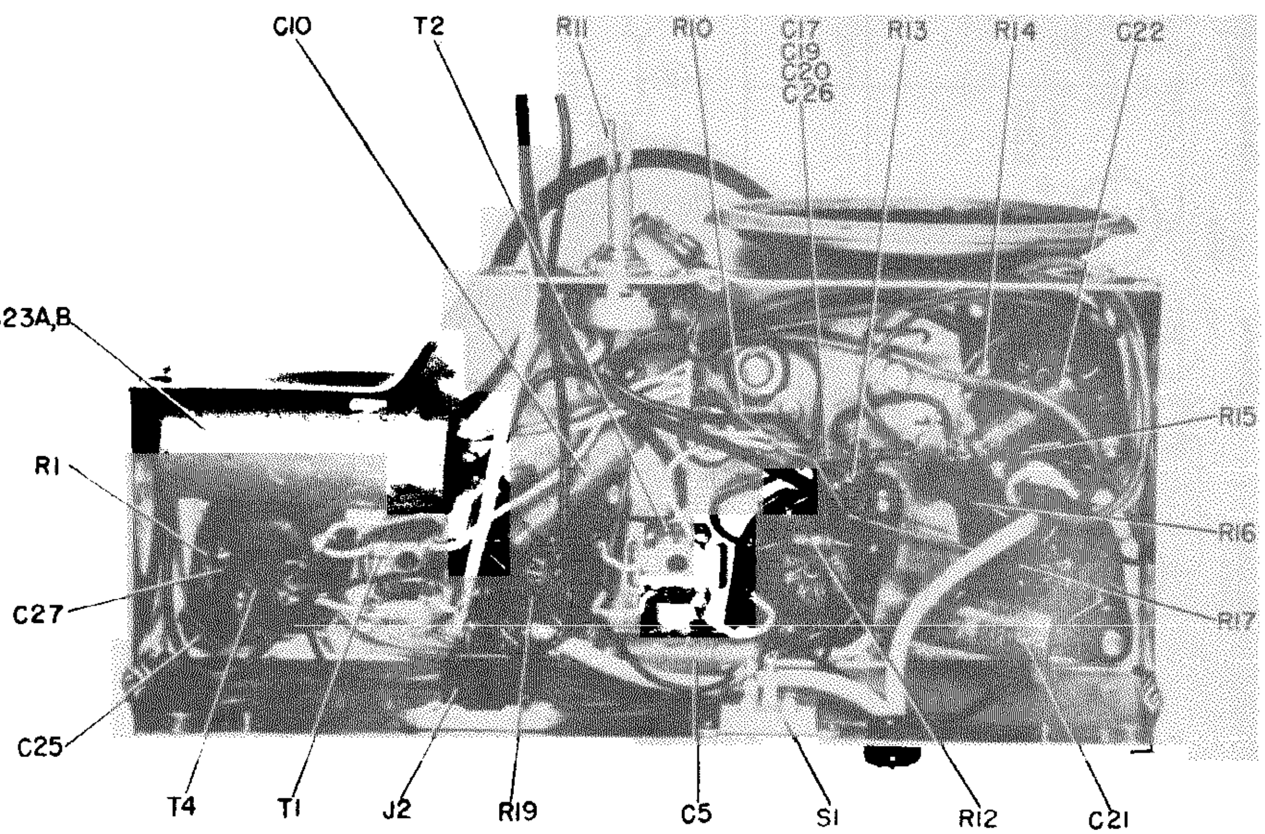


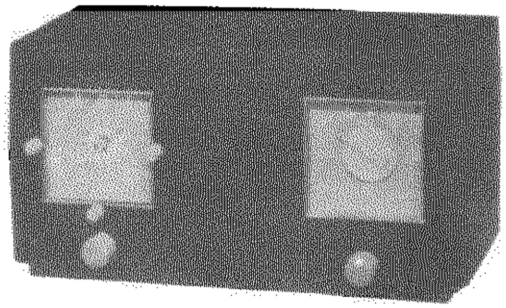
Fig. 7. Photo of Chassis (Bottom View)

MODELS 510F, 511F, 512F
513F, 515F, 516F, 517F,
518F, 521F, 522F

REPLACEMENT PARTS LIST—MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, AND 522F

Cat. No.	Symbol	Description
RAB-149	L1	CABINET BACK—Back cover to cabinet, includes antenna loop, L1, for Models 510F, 511F
RAB-150	L1	CABINET BACK—Back cover to cabinet, includes antenna loop, L1, for Models 515F, 516F, 517F, 518F
*RAB-151	L1	CABINET BACK—Back cover to cabinet, includes antenna loop, for Models 512F, 513F, 521F, 522F
*RAC-085		BRACKET—Clock mounting bracket (metal shield cover over back of clock)
*RAG-033		GRILLE—Cabinet grille cloth (dark maroon) for Models 510F, 515F, 517F
*RAG-034		GRILLE—Cabinet grille cloth (ivory) for Models 511F, 516F
*RAG-035		GRILLE—Cabinet grille cloth (white) for Model 518F
RAG-037		GRILLE—Cabinet grille cloth (gold finish) for Models 521F or 522F
*RAU-336		CABINET—Brown, plastic cabinet for Model 510F
*RAU-337		CABINET—Ivory plastic cabinet for Model 511F
*RAU-338		CABINET—Brown mottle, plastic cabinet for Model 515F
*RAU-339		CABINET—Ivory, plastic cabinet for Model 516F
*RAU-340		CABINET—Maroon, plastic cabinet for Model 517F
*RAU-341		CABINET—White, plastic cabinet for Model 518F
*RAU-342		CABINET—Dark mahogany, plastic cabinet for Model 521F
*RAU-343		CABINET—Blonde mahogany, plastic cabinet for Model 522F
RAU-348		CABINET—Mahogany mottle, plastic cabinet for Model 512F
RAU-349		CABINET—Antique ivory, plastic cabinet for Model 513F
RCC-107	C21	CAPACITOR—.047 mf., 600 v., paper
RCC-108	C22	CAPACITOR—.003 mf., 600 v., paper
RCE-127	C23A, B	CAPACITOR—50 50 mf., 150 v., electrolytic
*RCT-045	C2A, B	CAPACITOR—420-126 mmf., dial tuning capacitor
RCW-3048	C17, 19, 20, 26	CAPACITOR—.002 mf., 220 mmf., .005 mf., 400 mmf., four section ceramic unit
RCW-3049	C27	CAPACITOR—6 mmf. ±5%, 1400 to 2200 neg. temp. coefficient, ceramic
*RDK-215		KNOB—Volume control knob (white) for Model 518F
*RDK-216		KNOB—Dial tuning control knob (maroon) for Models 510F, 511F
*RDK-217		KNOB—Dial tuning control knob (gold bronze color) for Models 515F, 516F, 517F, 521F, 522F
*RDK-218		KNOB—Volume control knob (maroon) for Model 517F
*RDK-219		KNOB Dial tuning control knob (aluminum color) for Model 518F
*RDK-230		KNOB—Volume control knob (ivory) for Models 510F, 511F, 513F, 515F, 516F, 512F, 522F
RDK-243		KNOB—Volume control knob (fawn) for Model 512F
RDK-245		KNOB—Dial tuning control knob (ivory scale, maroon numerals) for Model 513F
RDK-246		KNOB—Dial tuning control knob (brown scale, gold numerals) for Model 512F
*RHC-024		CLIP—Mounting clip for electrolytic capacitor, C23A, B
*RHC-034		CLIP Metal clip fastener used to mount 1st and 2nd i-f transformer can assemblies to chassis
*RHG-015		GROMMET—Rubber grommet used to insulate and shock mount tuning capacitor (C2A, B) to chassis
*RHH-004		FASTENER—Snap-on fastener for holding cabinet back to cabinet (used only on Models 521F, 522F)
*RHI-010		GROMMET—Strain relief and insulating grommet in chassis back apron for power cord for Models 515F, 516F, 517F, 518F, 521F, 522F
*RHJ-005		SPACER—Metal spacer bushing in grommet mounting tuning capacitor (C2A, B) to chassis
*RHS-048		SHIELD—Metal tube shield for V3, 12-AV6
RHS-073		SHIELD—Doughnut shaped metal cover over soldered pin connections of tube sockets
RHS-074		SHIELD—Metal protective shield cover on top of chassis over wiring terminal board
RHS-075		SCREW—Screw No. 6 x ⅜-in. long used to fasten chassis in cabinet
*RJJ-008	J2	RECEPTACLE—AC power receptacle on chassis back apron used for automatic control of electrical appliances for Models 515F, 516F, 517F, 518F, 521F, 522F
RJS-158		SOCKET—Tube socket for V2, 12BA6
RJS-162		SOCKET—Tube socket for V1, 12BE6
RJS-163		SOCKET—Tube socket for V3, 12AV6; V4, 50C5; V5, 35W4
RLC-109	T4	COIL—Oscillator coil
*RMS-214		SPRING—Spring retaining ring for hub of dial tuning knob
*RRC-054	R11	POTENTIOMETER—500,000 ohms, composition volume control
*RSW-067	S1	SWITCH—Radio ON-OFF switch (slide type) on chassis back apron for Models 515F, 516F, 517F, 518F, 521F, 522F
*RTL-117	T1, 2	TRANSFORMER—1st or 2nd i-f coupling
RTO-099	T3	TRANSFORMER—Audio output
*RWL-009	P1	CORD—AC power cord and plug (brown) for Models 510F or 512F
*RWL-016	P1	CORD—AC power cord and plug (ivory) for Models 511F or 513F
*RWL-024	P1	CORD—AC power cord and plug (white) for Model 518F
*RWL-025	P1	CORD AC power cord and plug (brown) for Models 515F, 517F, 521F, 522F
*RWL-026	P1	CORD—AC power cord and plug (ivory) for Model 516F
*RYN-005		NAMEPLATE—General Electric monogram (metal, on cabinet) for Models 512F, 513F, 521F or 522F
*RZC-009	M1	CLOCK—60 cycle, 105–125 v., clock assembly for Models 515F, 516F, 517F, 521F, 522F
*RZC-011	M1	CLOCK—60 cycle, 105–125 v. clock assembly for Model 518F
*RZC-012	M1	CLOCK—60 cycle, 105–125 v. clock assembly for Models 510F, 511F
RZC-014	M1	CLOCK—60 cycle, 105–125 v., clock assembly for Model 512F
RZC-015	M1	CLOCK—60 cycle, 105–125 v., clock assembly for Model 513F
ROP-022		LOUDSPEAKER—4 inch PM
*UCC-036	C17	CAPACITOR—.002 mf., 600 v., paper
*UCC-039	C20	CAPACITOR .005 mf., 600 v., paper
*UCC-045	C5, 10	CAPACITOR—.05 mf., 600 v., paper
*UCG-020	C25	CAPACITOR—47 mmf., 500 v., silver mica
*UCU-1036	C19	CAPACITOR—220 mmf., mica
*URD-009	R17	RESISTOR—22 ohms, ½ w., carbon
*URD-021	R19	RESISTOR 68 ohms, ½ w., carbon
*URD-029	R15	RESISTOR—150 ohms, ½ w., carbon
*URD-081	R1	RESISTOR—22,000 ohms, ½ w., carbon
*URD-113	R13, 14	RESISTOR 470,000 ohms, ½ w., carbon
*URD-129	R10	RESISTOR—2.2 meg., ½ w., carbon
*URD-141	R12	RESISTOR—6.8 meg., ½ w., carbon
*URF-049	R16	RESISTOR 1000 ohms, 2 w., carbon

MODEL 535



SPECIFICATIONS

CABINET

Color	Mottled Mahogany
Height, inches	5¾
Width, inches	11¼
Depth, inches	6

ELECTRICAL

Voltage	105-125 volts
Frequency	60 cycles
Wattage	35 watts

OPERATING FREQUENCIES

Broadcast Band	540-1620 kc
Intermediate Frequency	455 kc

AUDIO POWER OUTPUT

Undistorted	.75 watt
Maximum	1.5 watts

LOUDSPEAKER

Type	Alnico PM
Size	4-inch cone
Voice Coil Impedance at 400 cycles	3.2 ohms

TUBES

R-F Amplifier	Type 12BA6
Oscillator-Converter	Type 12BE6
I-F Amplifier	Type 12BA6
Detector and 1st Audio	Type 12AV6
Power Output	Type 35C5
Rectifier	Type 35W4

CLOCK

Motor	60 cycles, 110 volts, self-starting
Hands	Luminous, except sweep second hand
Switch	"Wake-up" and "Sleep" type
Dial	Square dial, luminous Arabic numerals

GENERAL INFORMATION

The Model 535 is an a-c/d-c superheterodyne receiver which uses five amplifier tubes, and one rectifier tube. The sensitivity of the r-f amplifier stage plus provisions for using an external antenna make this radio especially suitable for use in low signal strength areas.

Special features include an electric alarm clock, with a "wake-up" and "sleep" control switch. In addition, the timer receptacle at the rear of the receiver provides an outlet connection for external appliances consuming up to 1100 watts, which is controlled by alarm and "sleep" control mechanism of the clock. The radio ON-OFF switch adjacent to the timer outlet permits the radio to be turned off if so desired while using the external appliance.

STAGE GAIN AND VOLTAGE CHECKS

CAUTION: One side of the power line is connected to B— Avoid any direct connections to ground. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

Stage gain measurements, using a vacuum tube voltmeter or similar measuring device, may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ±20 per cent. Readings should be taken with low signal input so that AVC is not effective.

R-F and I-F GAIN

12BA6 R-F Grid to 12BE6 Grid	6 @ 1000 kc
12BE6 Grid to 12BA6 I-F Grid	50 @ 455 kc
12BA6 I-F Grid to 12AV6 Diode	100 @ 455 kc

AUDIO GAIN

0.15 volts at 400 cycles across the volume control with the control set at maximum will produce approximately 1.2 volts (½ watt) at the speaker voice coil.

AUDIO POWER

With a 400 cycle signal driving the 35C5 sufficiently to begin to overload the output circuit as shown by distortion of the waveshape on an oscilloscope, an output meter at the speaker terminals should read about 1.5 volts (.75 watt). Maximum output should be about 2.2 volts or 1.5 watts.

OSCILLATOR GRID BIAS

The d-c voltage developed across the oscillator grid leak resistor (R4) averages 6 volts at 1000 kc using a 20K ohms/volt meter.

HUM MEASUREMENT

With the volume control at minimum, an oscilloscope connected through a 0.25 mfd. capacitor across C18A shows a 14-volt sawtooth wave; across C18B, a 0.7-volt rounded-hump wave (both peak-to-peak).

Hum measured across C18A with a 1000 ohms/volt output meter in series with a 1.0 mf. capacitor should not exceed 4.0 volts RMS. Hum at the speaker voice coil should not exceed .007 RMS volts.

ALIGNMENT FREQUENCIES

R-F	1500 kc and 1620 kc
I-F	455 kc

EQUIPMENT REQUIRED

1. Signal generator with 400 cycle modulation.
2. A-C output meter.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 3.)
5. Insulated screwdriver.
6. Isolation transformer.

PROCEDURE—GENERAL

1. With the tuning condenser plates fully meshed, set the tuning dial pointer at the index line just below the 550 mark on the dial.

2. Connect an output meter across the loudspeaker voice coil terminals. Keep the volume control at maximum and attenuate the signal generator output so that the output meter never exceeds 1 volt.

3. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals. Locate the loop parallel to the radio antenna about one foot away.

CAUTION: One side of the power line is connected to B—. Avoid any ground connections direct to B—. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

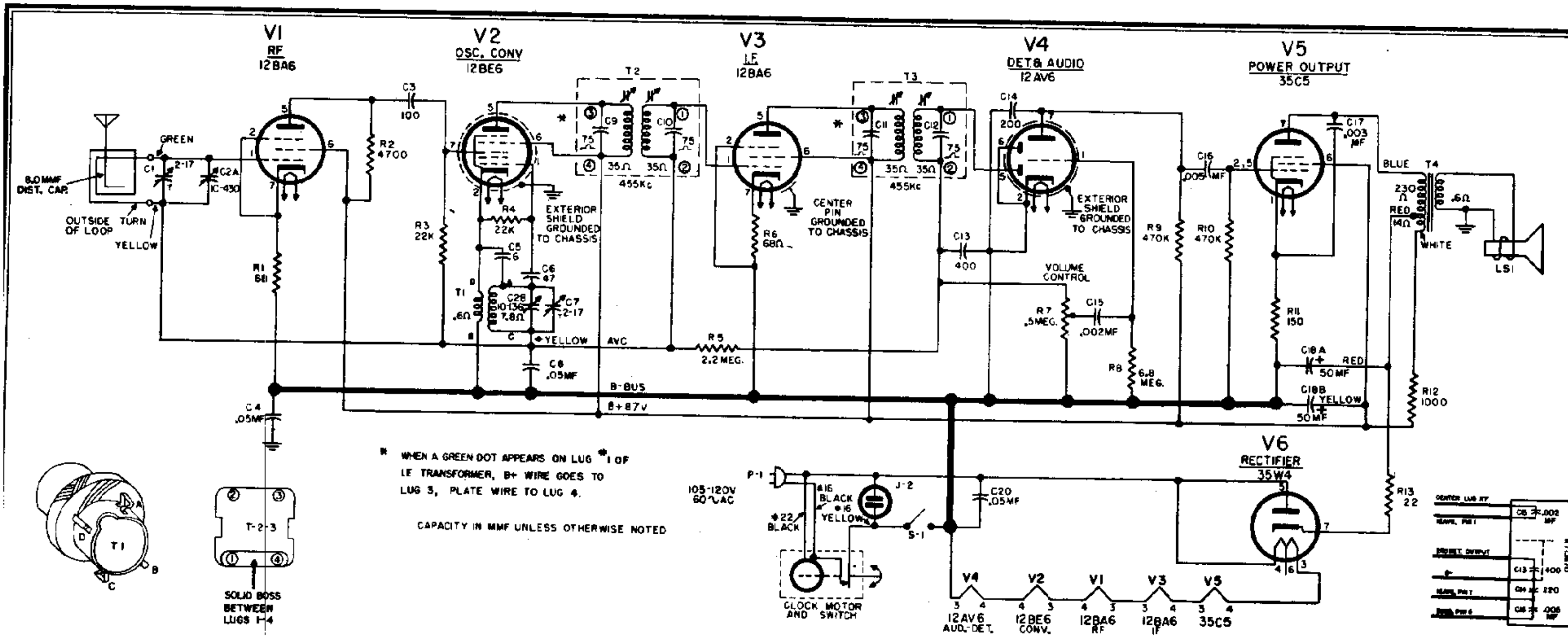


Fig. 1 Schematic Diagram

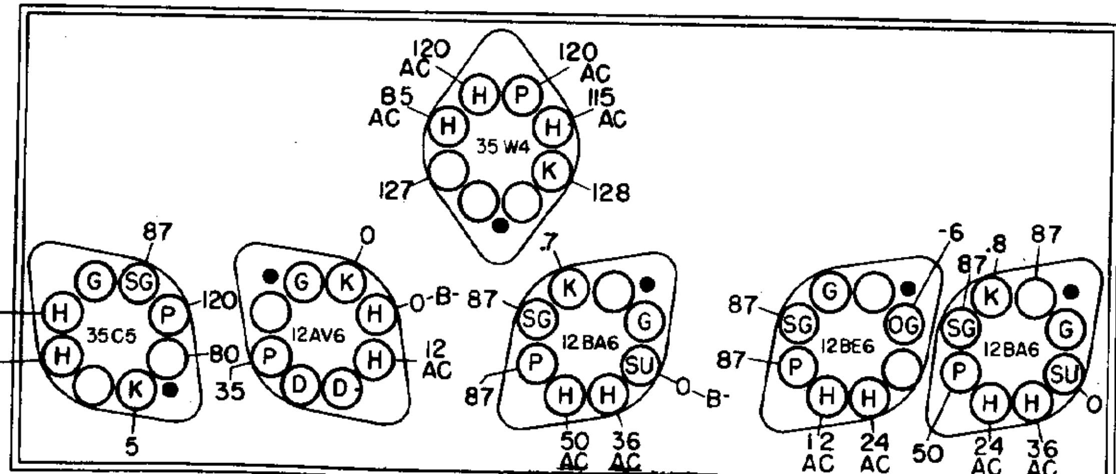


Fig. 2 Socket Voltages

ALIGNMENT CHART

STEP	CONNECT TEST OSCILLATOR TO	TEST OSC. SETTING	TUNING CAPACITOR SETTING	ADJUST FOR MAXIMUM OUTPUT
1	12BA6 IF grid pin No. 1 in series with 0.05 mf. cap.	455 KC	Minimum Capacity	2nd I-F transformer cores.
2	12BE6 grid Pin No. 7 in series with 0.05 mf. cap.	455 KC	Minimum Capacity	1st and 2nd I.F. transformer cores
3	Inductively coupled to radio loop	1620 KC	Minimum Capacity	C7 (oscillator)
4	Inductively coupled to radio loop	1500 KC	Tune for Maximum	C1 (antenna)

TEST CONDITIONS

All readings to B— ground

D-C readings taken with 20K ohms/volt meter

Line voltage 120 volts, 60 cycles

No signal applied or received during test

Pin #8 on each socket is a dummy pin used for a spare terminal. A small hole in the tube socket between pins #1 & #8 is used to key these pins.

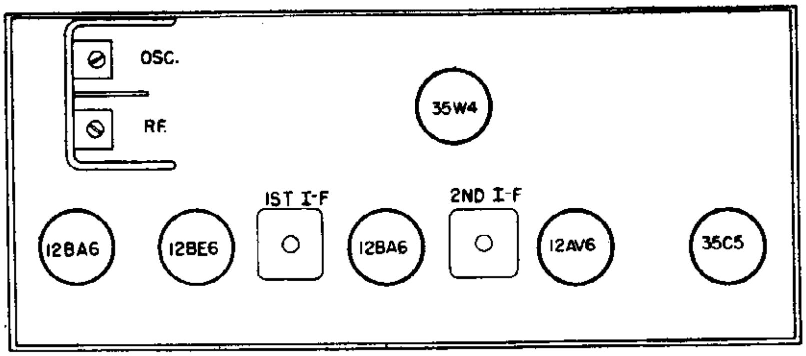


Fig. 3 Tube and Trimmer Location

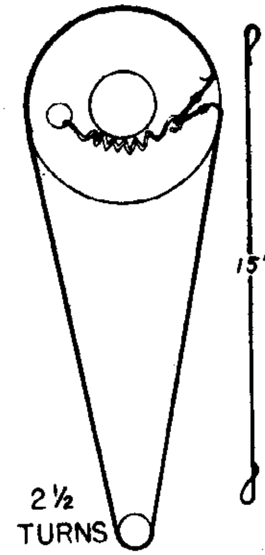


Fig. 4 Dial Stringing

SERVICE SUGGESTIONS

COMPONENT REPLACEMENT

Except for tube socket replacement, it should not be necessary to remove the doughnut-shaped shields over the tube sockets. The following method of wiring replacement parts is recommended:

Cut the defective unit out, leaving enough wire attached to the socket or terminal strip to form a small loop. Pass the lead of the new component through the loop, trim excess wire, crimp, and solder.

CLOCK SERVICE

To remove the clock from the cabinet, remove the metal shield which covers the clock mechanism. Four screws holding the clock to the cabinet then become accessible.

Clock parts and service instructions may be obtained from your General Electric Distributor or any Telechron Service Store.

PRODUCTION CHANGES

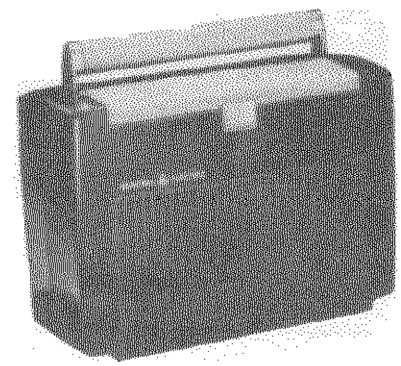
Early production sets omitted R1, a 68-ohm resistor in the cathode circuit of the R-F amplifier. R4 osc. grid leak went directly to B—.

Due to procurement difficulties, it may be necessary to use I-F transformers from two manufactur. The electrical ratings are identical, the primary leads of one are reversed internally, requiring special hook-up considerations. The transformer having its No. 1 lug coded green should have its primary lugs wired in reverse order from that shown on the schematie.

REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
RAB-157		BACK—Cabinet back and loop antenna
RAC-090		COVER—Metal cover for clock mechanism
RAC-091		SHIELD—Metal plate shields bottom of chassis
RAG-040		CLOTH—Maroon grille cloth mounted on cardboard
RAU-347		CABINET—Mahogany plastic cabinet for Model 535
*RDC-032		CORD—Dial cord (25 yards bulk)
RDE-109		BEZEL—Dial window escutcheon bezel
RDK-242		KNOB—Alarm set knob (fawn)
RDK-243		KNOB—Volume control and tuning knob (fawn)
RDK-254		KNOB—Sleep and manual switch knob (fawn with white dot)
RDP-059		POINTER—Dial pointer
RDS-104		SCALE—Dial scale and mounting plate
RDW-046		WINDOW—Dial window
*RHC-024		CLIP—Electrolytic capacitor mounting clip
*RHC-034		CLIP—I-F transformer mounting clip
RHC-048		CLIP—Dial scale mounting clip
*RHG-015		GROMMET—Tuning gang mounting grommet
*RHI-010		INSULATOR—Power cord strain relief insulator
*RHJ-005		SPACER—Tuning gang mounting spacer
*RHS-048		SHIELD—Short tube shield for converter V2
*RHS-073		SHIELD—Tube socket pin cover shield
*RHS-074		SHIELD—Terminal board cover shield
*RHS-075		SCREW—Chassis mounting screw
RHS-085		SHIELD—1¾" long tube shield for 2nd detector V4
*RJC-004		CONNECTOR—Loop lead connector
*RJJ-008	J2	OUTLET—110 v., appliance outlet
*RJS-158		SOCKET—V3 (I-F) tube socket with center shield pin
*RJS-162		SOCKET—V2 (conv.) impregnated tube socket
*RJS-163		SOCKET—V1, V4, V5 and V6 tube socket
RLC-110	T1	TRANSFORMER—Oscillator transformer
RMC-002		CLIP—Oscillator coil mounting clip
RMS-243		SPRING—Dial cord tension spring
RMX-180		SHAFT—Tuning shaft and bushing assembly

Cat. No.	Symbol	Description
ROP-021		SPEAKER—4-inch PM loudspeaker
*RSW-067	S1	SWITCH—ON-OFF switch (slide type)
*RTL-117	T2, 3	TRANSFORMER—1st or 2nd I-F transformer
RTO-100	T4	TRANSFORMER—Output transformer
*RWL-025	P1	CORD—Brown heavy-duty AC power cord
†RZC-013		CLOCK ASSEMBLY—Includes all appearance items, less metal cover
		RESISTORS
RRC-153	R7	POTENTIOMETER—0.5 meg., volume control
*URD-009	R13	RESISTOR—22 ohms, ½ w., carbon
*URD-021	R6	RESISTOR—68 ohms, ½ w., carbon
*URD-29	R11	RESISTOR—150 ohms, ½ w., carbon
*URD-065	R2	RESISTOR—4700 ohms, ½ w., carbon
*URD-081	R3, 4	RESISTOR—22K ohms, ½ w., carbon
*URD-113	R9, 10	RESISTOR—470K ohms, ½ w., carbon
*URD-129	R5	RESISTOR—2.2 meg., ½ w., carbon
*URD-141	R8	RESISTOR—6.8 meg., ½ w., carbon
*URF-049	R12	RESISTOR—1000 ohms, 2 w., carbon
		CAPACITORS
*RCC-108	C17	CAPACITOR—.003 mf., 600 v., paper
*RCE-127	C18A, B	CAPACITOR—50-50 mf. @ 150 v., electrolytic capacitor
*RCN-053	C4, 7	CAPACITOR—.047 mf., 600 v., paper
RCT-050	C1; C2A, B; C7	CAPACITOR—126 and 420 mmf., tuning capacitor and trimmers
*RCW-3048	C13, 14, 15, 16	CAPACITOR—400 mmf., .002 mf., 220 mmf., .005 mf., ceramic "bullplate"
RCW-3049	•	CAPACITOR—6 mmf. ±10%, ceramic
*UCC-045	C20	CAPACITOR—.05 mf., 600 v., paper
*UCG-020	C6	CAPACITOR—47 mmf., 500 v., silver mica
*UCG-028	C3	CAPACITOR—100 mmf., 500 v., silver mica



SPECIFICATIONS

CABINET

Model 605	Maroon Plastic
Model 606	Green Plastic
Height, inches	$6\frac{3}{4}$
Width, inches	$10\frac{1}{8}$
Depth, inthes	$3\frac{9}{16}$
Weight with batteries	$5\frac{1}{2}$ lbs.

ELECTRICAL

Voltage (AC-DC)	105-125 volts
Frequency (AC)	50-60 cycles
Wattage	10 watts

BATTERY REQUIREMENTS

A Battery	$7\frac{1}{2}$ volts, Eveready #717
B Battery	$67\frac{1}{2}$ volts, Eveready #467

OPERATING FREQUENCIES

Broadcast Band	540-1600 KC
I-F Amplifier	455 KC

POWER OUTPUT:

Undistorted	100 milliwatts
Maximum	125 milliwatts

LOUDSPEAKER:

Type	Alinco PM
Cone Diameter	4 inches
Voice Coil Impedance (400 Cycles)	3.2 ohms

TUBE COMPLEMENT:

Oscillator-Converter	1R5
I-F Amplifier	1T4
Detector and 1st Audio	1U5
Power Amplifier	3V4

GENERAL INFORMATION

The Models 605 and 606 portable radios utilize the new ferrite antenna, a long tuning coil with a powdered iron core. Its small size facilitates mounting without the necessity of flexible connections. Because of its construction, its signal pick-up is principally electro-magnetic, resulting in reduced electrostatic interference.

This receiver has a "floating" chassis, connected to the power line only thru a resistor and a capacitor. All chassis voltages are in reference to the internal B– circuit except the speaker voice coil, which is grounded to the chassis. The use of an isolation transformer is recommended to protect line-powered test equipment.

STAGE GAIN AND VOLTAGE CHECKS

CAUTION: One side of the power line is connected to B– Avoid any direct connections to ground. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

Stage gain measurements, using a vacuum tube voltmeter or similar measuring device, may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ±20 per cent. Readings should be taken with low signal input so that AVC is not effective.

I-F GAIN

1R5 Grid to 1T4 Grid	40 @ 455 kc
1T4 Grid to 1S5 Diode	65 @ 455 kc

AUDIO GAIN

.03 volts at 400 cycles across the volume control with the control set at maximum will produce approximately .4 volts (50 mw) at the speaker voice coil.

AUDIO POWER

With a 400 cycle signal driving the 3V4 sufficiently to begin to overload the output circuit as shown by distortion of the waveshape, an oscilloscope at the speaker terminals should read 1.5 volts (peak-to-peak), which equals about 0.1 of a watt. Maximum possible output is about 1.8 volts (peak-to-peak) or 0.13 of a watt.

OSCILLATOR GRID BIAS

The d-c voltage developed across the oscillator grid leak resistor (R1) averages 5 volts as calculated by measuring the grid current (.0002 amp) through R1 (100K ohms).

HUM MEASUREMENT

With the volume control at minimum, an oscilloscope connected through a 0.25 mfd capacitor across C8A shows a 14-volt sawtooth wave; across C8B, a 0.4-volt rounded, hump wave (both peak-to-peak).

Hum measured across C8A with a 1000 ohm/volt output meter in series with a 1 mfd capacitor should not exceed 5 volts RMS. Hum at the speaker voice coil should not exceed .007 RMS volts.

MODELS 605, 606

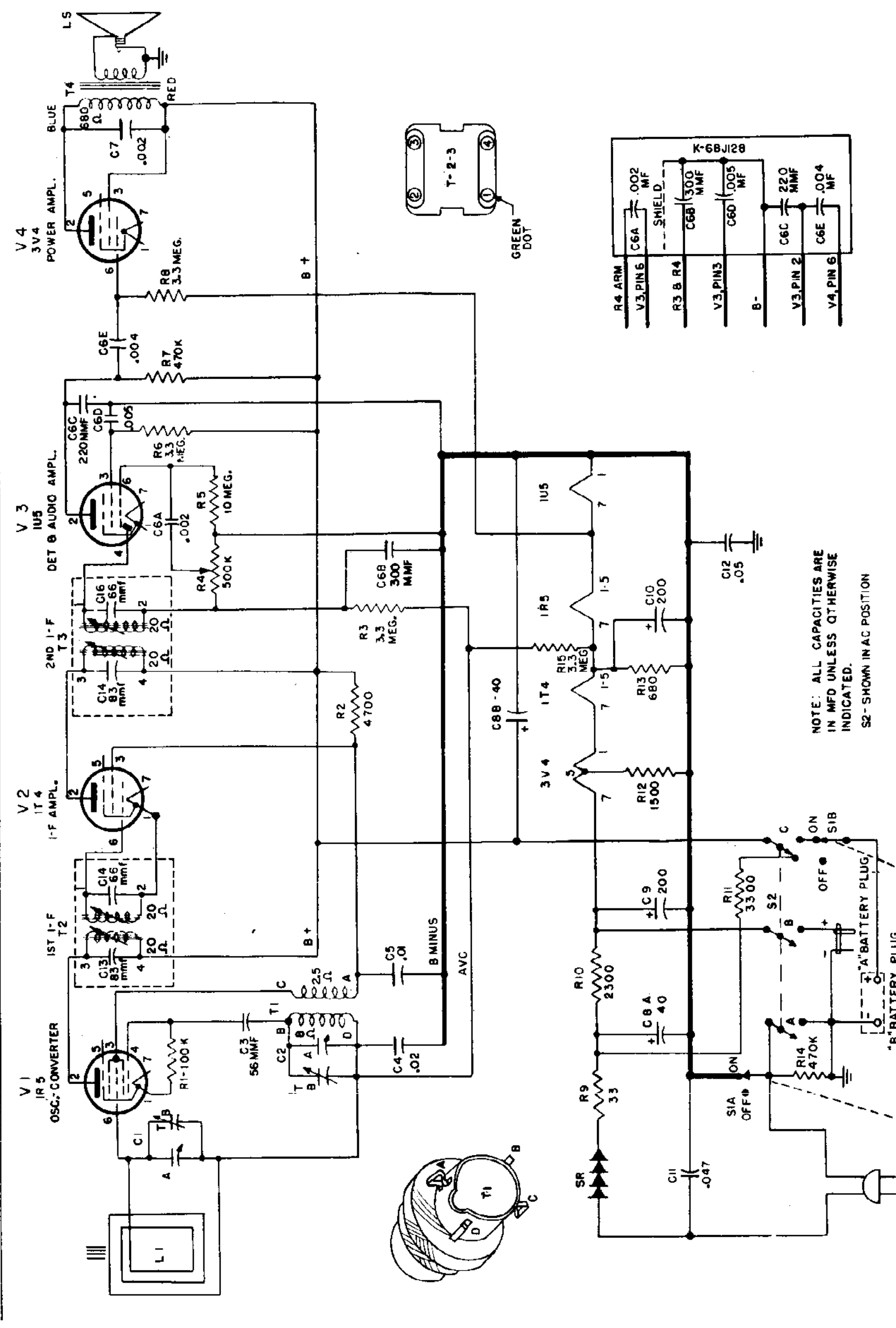


Fig. 1. Schematic Diagram

REPLACEMENT PARTS LIST—MODELS 605 AND 606

Cat. No.	Symbol	Description
		CAPACITORS
*RCE-051	C8, A, B	40-40 mfd., 150 w.v., electrolytic filter capacitor
RCE-132	C9, 10	200 mfd., 10 w.v., electrolytic filter capacitor
RCT-053	C1A, C1B, C2A, C2B	Tuning capacitor
*RCW-3015	C6A, B, C, C6D, E	.002 mfd., .004 mfd., .005 mfd., 220 mmf., 300 mmf., ceramic
*RCW-3018	C7	.002 mfd., ceramic
*RCW-3054	C5	.01 mfd., ceramic
*UCC-041	C4	.02 mfd., 600 v., paper
*RCN-053	C11	.047 mfd. 600 v. molded paper
*UCC-045	C12	.05 mfd., 600 v., paper
*UCG-022	C3	56 mmf., silver mica
		RESISTORS
RRW-042	R10	2300 ohms, 10 w., w.w.
*URD-013	R9	33 ohms ±10%, ½ w., carbon
*URD-045	R13	680 ohms ±10%, ½ w., carbon
*URD-053	R12	1500 ohms ±10%, ½ w., carbon
*URD-065	R2	4700 ohms ±10%, ½ w., carbon
*URD-097	R1	100,000 ohms ±10%, ½ w., carbon
*URD-113	R7	470,000 ohms ±10%, ½ w., carbon
*URD-133	R6, 8, 15	3.3 meg. ±10%, ½ w., carbon
*URD-145	R5	10 meg. ±10%, ½ w., carbon
*URE-061	R11	3300 ohms ±10%, 1 w., carbon
		MISCELLANEOUS ELECTRICAL PARTS
REX-005	SR	RECTIFIER Selenium rectifier
RJC-022		CONNECTOR—"B" battery connector
RJP-033		PLUG—"A" battery plug
*RJS-100		SOCKET—7 pin miniature tube socket, tan, wax impregnated
*RJS-124		SOCKET—7 pin miniature tube socket, dark brown, unimpregnated
*RJS-125		SOCKET—7 pin miniature tube socket, unimpregnated, dark brown with center shield pin
*RLC-101	T1	TRANSFORMER—Oscillator transformer
RLL-046	L1	ANTENNA—Ferrite antenna
RRC-166	R4, S1A, B	CONTROL—0.5 meg., volume control with ON-OFF switch
*RSW-088	S2A, B, C	SWITCH—Battery-line changeover switch
*RTL-052	T2, 3, C13, 14, 15, 16	TRANSFORMER—1st or 2nd i-f transformer with capacitors molded in base
*RTO-108	T4	TRANSFORMER—Audio output transformer
RWL-005		POWER CORD—A-C line cord and plug
*S400D	L5	SPEAKER—4-inch PM loudspeaker
		MISCELLANEOUS MECHANICAL PARTS
RAD-078		BRACKET—Ferrite antenna mounting bracket
RAX-028		BRACKET—Latch bracket and spring
*RDC-032		DIAL CORD—Fine nylon dial cord, 25 yards bulk
RDP-061		POINTER—Dial pointer

Cat. No.	Symbol	Description
		MISCELLANEOUS MECHANICAL PARTS (Cont'd)
RDS-107		DIAL SCALE
RHB-016		STUD—Chassis cover mounting stud
*RHC-008		CLIP—1 inch electrolytic filter capacitor mounting clip
RHI-017		INSULATOR—Power cord strain relief insulator
*RHM-001		WASHER "C" washer for tuning shaft
*RHM-052		CLIP—Tinnerman speaker mounting clip
RHS-083		SCREW—Round-head Phillips screw for mounting latch clip
RII-060		INSULATOR—Tuning gang mounting insulator (top)
RII-061		INSULATOR—Tuning gang mounting insulator (bottom)
RII-065		INSULATOR—Fiber bushing for mounting handle ends to chassis
RMC-002		CLIP—Oscillator coil mounting clip
*RMC-053		CLIP—Back cover latch clip
*RMS-130		SPRING—Dial cord tension spring
RMX-183		SHAFT—Tuning shaft and bushing
		CABINET PARTS
RAB-163		BACK—Maroon plastic cabinet back for Model 605
RAB-164		BACK—Green plastic cabinet back for Model 606
RAC-095		CABINET—Maroon plastic cabinet less back cover, hinges, etc., for Model 605
RAC-096		CABINET—Green plastic cabinet less back cover, hinges, etc., for Model 606
RAC-097		COVER—Front dial cover, plastic
RAG-044		GRILLE CLOTH—Maroon grille cloth mounted on cardboard
RAG-045		GRILLE CLOTH—Green grille cloth mounted on cardboard
RAI-008		COVER STOP—Black rubber block
RDK-252		KNOB—Green plastic knob with clip
RDK-253		KNOB—Fawn plastic knob with clip
*RHC-036		CLIP—Tinnerman cover mounting clip
*RHE-010		EYELET—For mounting front cover
*RHI-016		HINGE—Back hinge
*RHN-020		POST—Mounts handle bar to handle end
*RHR-013		RIVET—For cabinet back hinge
*RHS-081		SCREW—Mounts handle bar to handle end
RHS-084		SCREW—For mounting cabinet catch
*RHY-034		HANDLE END—Chromium plated end
*RHY-035		HANDLE BAR—Fawn plastic rod for handle
*RHY-036		HANDLE BAR—Green plastic rod for handle
RML-051		LATCH—Front cover release
RMP-031		PIVOT ROD—Brass rod, .062 in. x 1¾ in. long for latch
RMS-244		SPRING—Left spring for front cover
RMS-245		SPRING—Right spring for front cover

RADIO CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

Signal generator	Insulated screwdriver
Output meter	Isolation transformer
.05 mf paper capacitor	A battery*

PROCEDURE:

R-F and Oscillator adjustments can be easily made with the chassis in the cabinet; to make I-F adjustments, remove the chassis from the cabinet, unsolder the AVC wires from the antenna and the tuning capacitor frame, remove the metal shield from the bottom of the chassis, resolder the AVC wires to the antenna and tuning capacitor again before aligning.

With the tuning gang condenser fully closed, slip the dial pointer along the dial string until it points to the small index mark on the dial just below the 550 kc position.

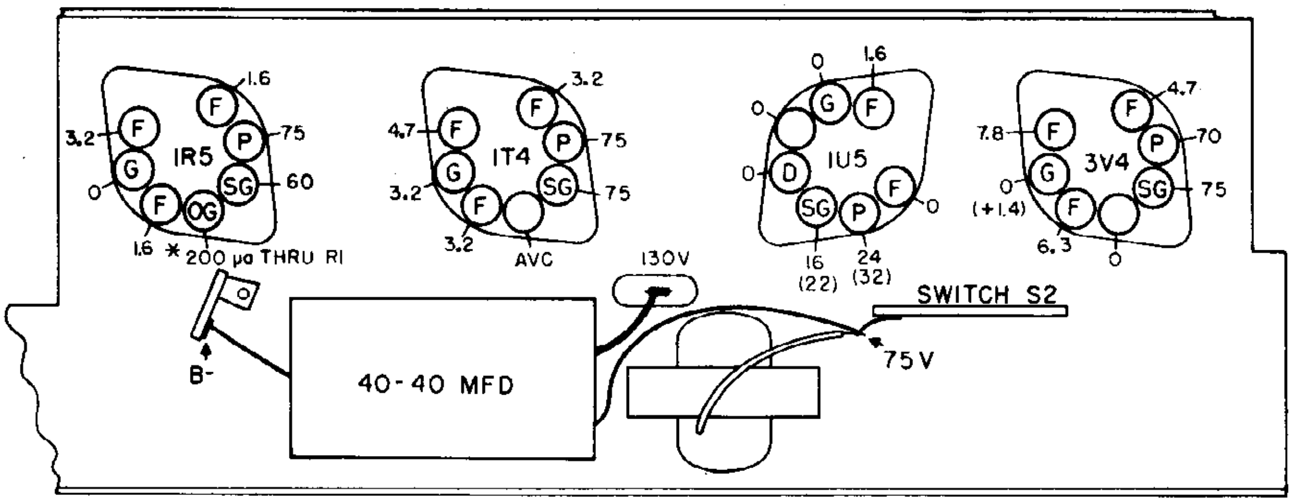
Connect the output meter across the voice coil terminals of the speaker. If the lowest range on your output meter is greater than 3 volts, better peak indications can be had by connecting the output meter to the plate of the output tube (pin 2 of 3S4 tube) through a series .05 capacitor and using the 50-volt scale. Since the bottom shield must be in place for the RF section alignment, connect the .05 capacitor to the tube pin as follows: Slip a piece of spaghetti over one lead of the capacitor, leaving about 3/16" of bare wire at the end; carefully bend the bare end around pin 2 of the 3S4 in a tight-fitting loop; re-insert the tube in its socket.

During I-F alignment, the ground lead from the signal generator should be connected to B−, and the signal lead to the proper grid through a .05 capacitor. For R-F adjustments the input signal should be inductively coupled to the receiver antenna by connecting a 4-turn, 6-inch diameter loop of bell wire to the signal generator terminals. The loop and the antenna should be spaced about a foot apart, and arranged coaxially: that is, the antenna points through the center of the loop.

The volume control should be at maximum during all adjustments, and the signal generator output should be adjusted so that the output meter never reads more than .4 volt at the speaker, or about 20 volts at the plate of the output tube. Tune all adjustments for maximum output.

* Make the final ANT. trimmer adjustment with the chassis installed in the cabinet and an "A" battery in position and connected, since the battery affects the tuning of the antenna.

MODELS 605, 606



VOLTAGES MEASURED WITH 20,000Ω/VOLT METER TO B-, NO RF OR IF SIGNAL, SET OPERATING FROM 60 ∿ 120 VOLT LINE.
*DIRECT VOLTAGE READING UNRELIABLE. (22) INDICATES VTVM READING.

Fig. 2. Socket Voltages

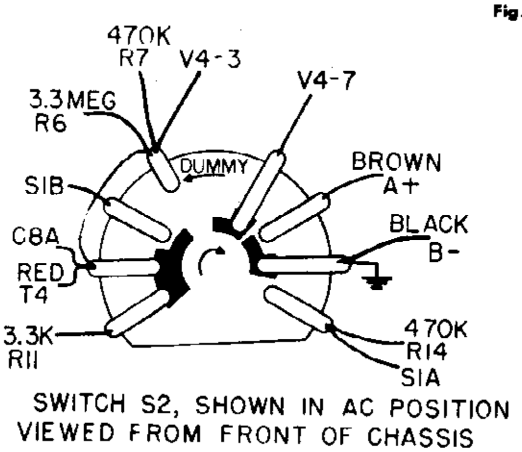


Fig. 3. Battery-line Switch Wiring

ALIGNMENT CHART

Step	Sig. Gen. Connected to	Sig. Gen. Frequency	Dial Setting	Adjust For Max. Output
1	1T4 Grid Pin 6	455 kc	550 kc	Cores of I-F Trans. T3
2	IR5 Grid Pin 6	455 kc	550 kc	Cores of I-F Trans. T2
3	IR5 Grid Pin 6	455 kc	550 kc	Re-adjust T2 and T3
4	Inductively Coupled	1620 kc	1620 kc	Osc. trimmer C2B
5	Inductively Coupled	1500 kc	Tune for maximum	R-F trimmer C1B

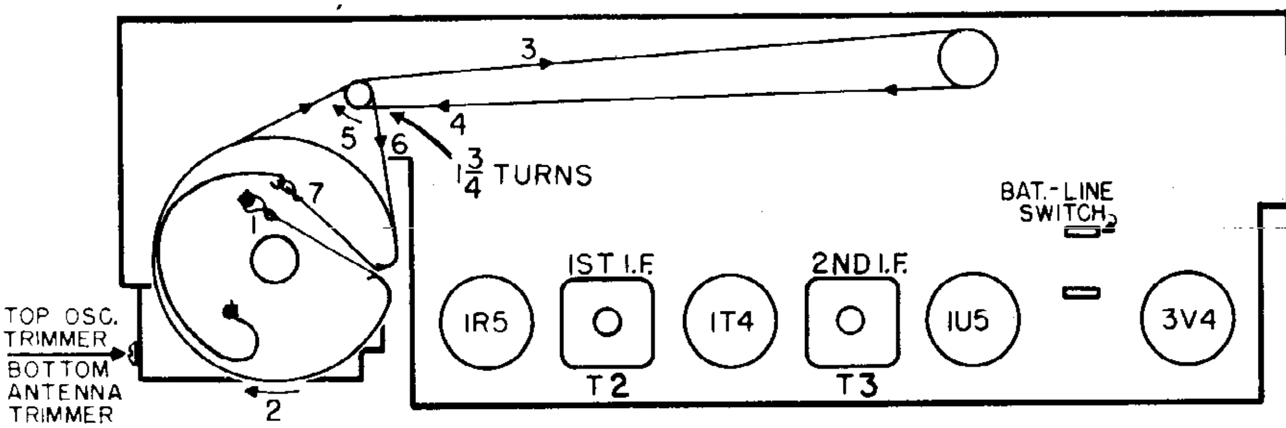
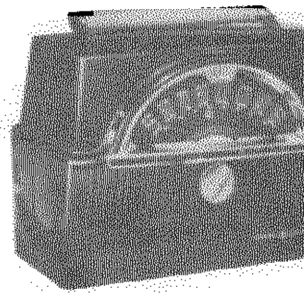


Fig. 4. Dial Stringing and Tube and Trimmer Location



Model 610 Maroon
Model 611 Green

SPECIFICATIONS

CABINET:	Composition .... Plastic Height .... 8⅞ inches Depth .... 5⅞ inches Width .... 12 inches Weight (with batteries) .... 11 pounds
POWER SUPPLY:	Battery..... Eveready No. 756, or equivalent AC or DC operation .... 105–115 volts Frequency (on AC) .... 60 cycles Power Consumption .... 25 watts
OPERATING FREQUENCIES:	Broadcast Band .... 540–1600 kc I-F Amplifier .... 455 kc
POWER OUTPUT:	Undistorted .... 180 milliwatts Maximum .... 250 milliwatts
LOUDSPEAKER:	Type .... Alnico PM Outside Cone Diameter .... 4 inches Voice Coil Impedance (400 cycles) ... 3.2 ohms
TUBE COMPLEMENT:	R-F Amplifier .... 1T4 Oscillator-Converter .... 1R5 I-F Amplifier .... 1T4 Detector Audio Amplifier .... 1U5 Power Amplifier .... 3V4 Dial Lamp .... Mazda No. 49

GENERAL INFORMATION

These portable radios are five-tube superheterodyne broadcast receivers with a range of 540 to 1600 kc. The power source may be either 105–115 volts, 50–60 cycles a-c, or d-c, when a power outlet is available. The receiver will also operate from its battery source, thus making it independent of external electrical power, providing excellent operation in any location where external power is not available.

If the dial light is burnt out or missing, reduced performance will be noted on AC and DC operation. However, battery operation will be normal.

When this receiver is stored for long periods of time, the power plug should be removed from the chassis outlet.

BATTERY—AC OR DC OPERATION.

The center knob turns on the battery, provided that the power plug is well inserted into the socket in the chassis.

For a-c or d-c supply (105–115 volts, 50- to 60-cycle operation), the same knob switches on the power when the power plug is pulled out of its socket in the chassis and inserted into the house outlet.

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

1. Test Oscillator with Tone Modulation..
2. A-C Output Meter.
3. Paper Capacitor .05 Mf.
4. Insulated Screwdriver.
5. Coupling Loop for Test Oscillator (see text).
6. Isolation Transformer.

PROCEDURE—GENERAL.

1. The Alignment Chart gives the alignment procedure with correct sequence of trimmer adjustments. The chassis must b removed from the cabinet during i-f alignment. The locatio of the i-f and r-f adjustments are shown in Figure 2.

2. The "low" side of the test oscillator output should be co nected to B minus; the "high" side should be connect as indicated in the alignment chart. The test oscillator outp signal should be attenuated so that the output meter readi never exceeds ½ volt. Connect the capacitor listed in column of the alignment chart between the "high" side of the test osc lator and the point of input specified.

PRECAUTION: ***Use an isolating transformer between the pow supply and the radio receiver input. The use of an isolati capacitor is not recommended, as a-c through the capacitor w introduce hum modulation and/or create the possibility of burned out signal generator attenuator.***

3. The output meter should be connected across the voi coil terminals of the speaker.

4. During the entire alignment procedure the volume cont should be rotated clockwise to its maximum position.

5. For alignment of the antenna trimmer, the input sig should be inductively coupled to the radio loop antenna connecting a 4-turn, 6-inch diameter loop of bell wire acr the signal generator output terminals, and locate the loop abo one foot from the radio loop for alignment. The position of t loop with respect to the radio loop should not be changed duri any one set of adjustments to prevent possible errors in pe readings.

6. The antenna loop acquires a different inductance wh the back is closed. Therefore, the adjustment of the anten trimmer has to be made with the back closed, through the ope ing on the right side of the cabinet which normally is closed a plug button. After adjustments have been completed, the pl button has to be put in place again.

ALIGNMENT CHART

Step	Test-Osc. Connected to:	Test-Osc. Setting	Pointer Setting	Adjust for Maximum Outp
1	1T4 (V3) I-F grid (pin 6) in series with .05 mfd. and B– bus.	455 KC	550 KC	Iron cores of I-F Transformer T2.
2	1R5 (V2) converter grid (pin 6) in series with .05 mfd. and B– bus.	455 KC	550 KC	Iron cores of I-F Transformer T1.
3	1T4 (V1) R-F amplifier grid (pin 6) in series with .05 mfd. and B– bus.	1670 KC	Gang condenser fully open	C1B oscillator tri mer for maximun
4		1500 KC	For maximum output	C1C R-F trimm for maximum.
5		580 KC		Core of T4 for maximum.
6	Repeat steps 4 and 5 to give maximum performance.			
7	Inductively coupled. See note 5.	1500 KC	For maximum output	C1A trimmer fo maximum with cabinet back clo See Note 6.

MODELS 610, 611

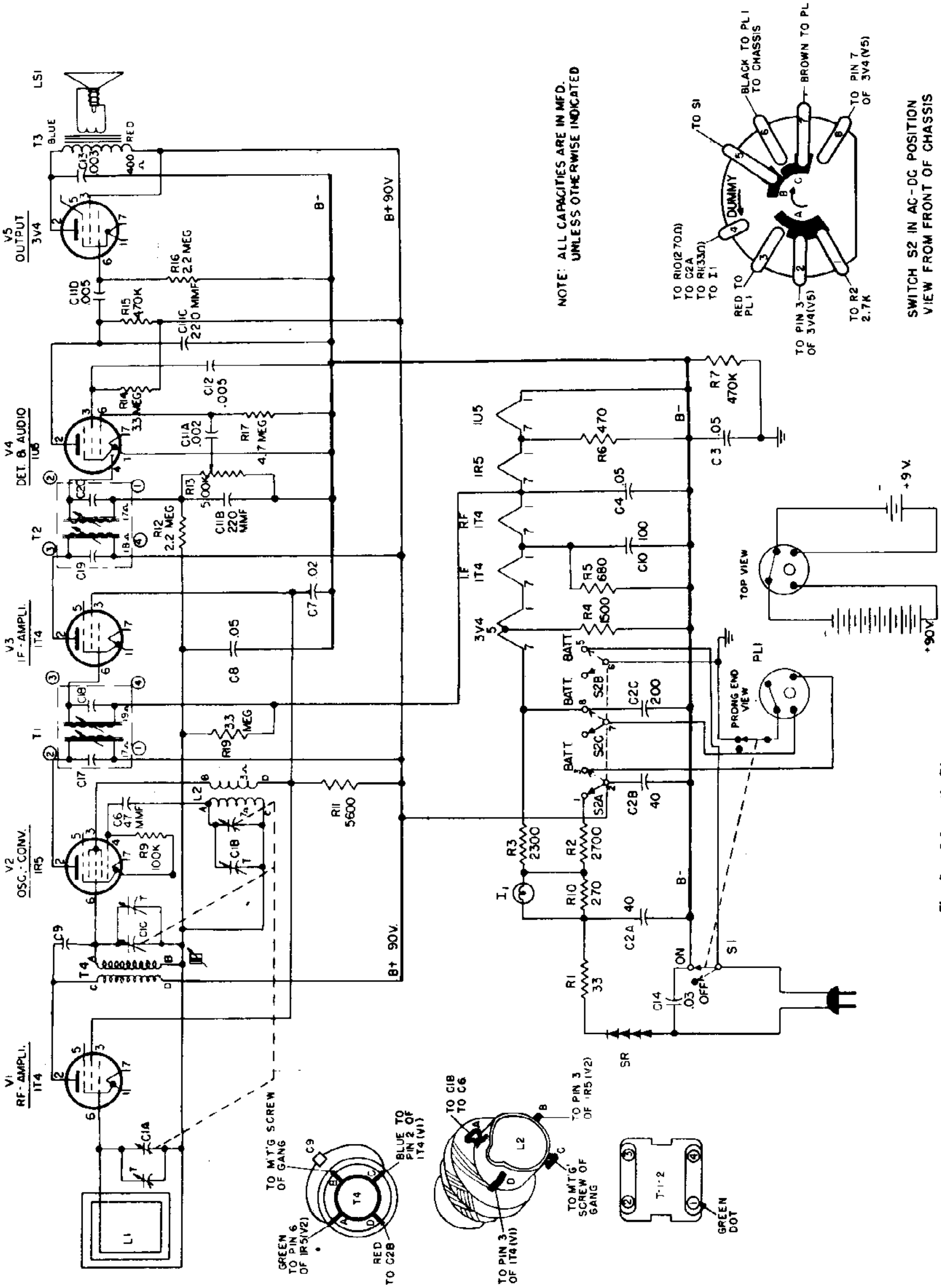


Fig. 1. Schematic Diagram

STAGE GAINS AND VOLTAGE CHECKS

In order to check circuit performance and facilitate trouble shooting, the measurement of stage gain by means of a vacuum voltmeter or similar measuring device is recommended. The gain values listed may have tolerances of 20%. Readings should be taken with low signal input so that the AVC is not effective.

(1) R-F STAGE GAINS.

1T4 R-F Grid (Pin 6) to 1R5 Grid (Pin 6) . . . . 12 @ 1000 KC
1R5 Grid (Pin 6) to 1T4 Grid (Pin 6) . . . . 18 @ 1000 KC
1T4 Grid (Pin 6) to 1U5 Diode Plate (Pin 4) . . 45 @ 455 KC

(2) AUDIO GAIN.

.020 volt at 400 cycles across volume control (R13) with control set at maximum will give approximately .05 watts output across speaker voice coil.

(3)

D-C voltage developed across oscillator grid resistor (R9) averages −8 volts at 1000 kc with respect to B−.

(4) SOCKET PIN VOLTAGES.

Figure 4 shows voltages from all tube pins to B−. Voltage readings much lower than those specified may help localize defective components or tubes.

(5) MULTIPLE CERAMIC CAPACITOR.

This multiple capacitor unit is of the ceramic capacitor typ and contains five capacitors C11A, B, C, D and C12. This unit RCW-3015, is illustrated in Figure 2 for lead identification. I during service the ceramic capacitor unit is found to be defective the entire unit may be replaced by the identical part, RCW 3015, or the defective section may be located and disconnecte from the receiver circuit and a single universal capacitor of equiv alent electrical value used in its place.

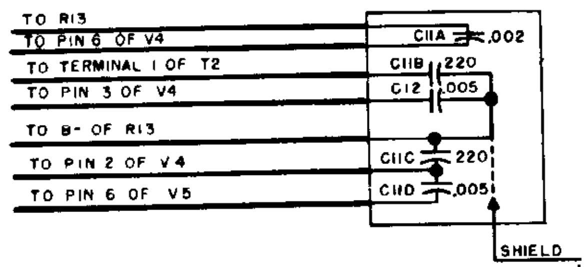


Fig. 2. Connections for Capacitor RCW-3015

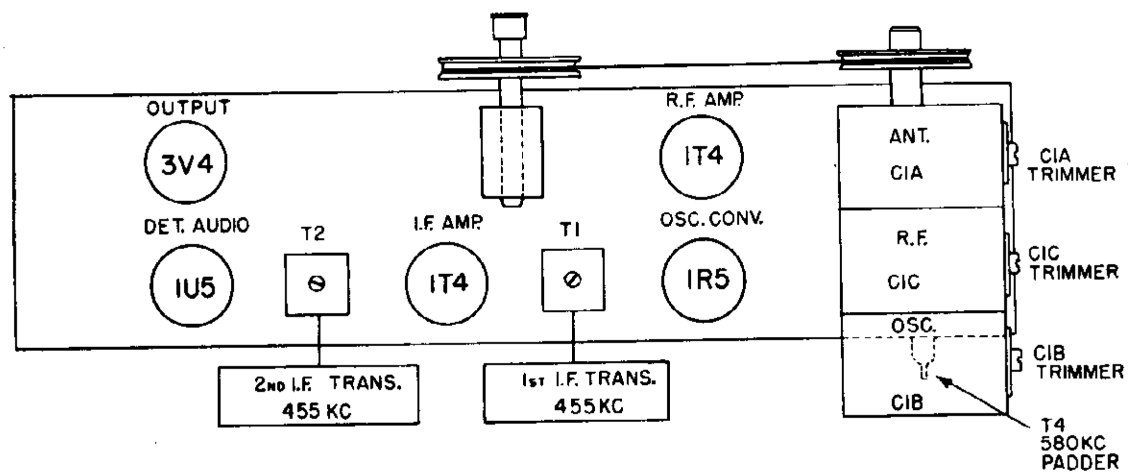
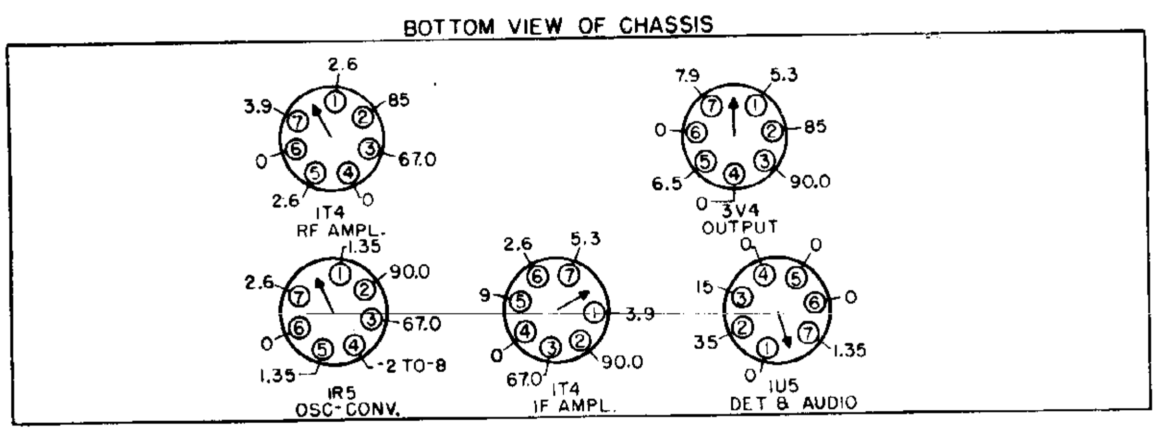


Fig. 3. Tube and Trimmer Location



DC VOLTAGES TO B- UNLESS OTHERWISE SPECIFIED. ALL
ALL RATINGS ARE A.C. OPERATION MEASURED WITH REFERENCE TO B-.
RATINGS FOR BATTERY ARE SIMILAR TO AC RATINGS.
VOLTAGE IS MEASURED WITH 20,000 OHMS PER VOLT METER.

Fig. 4. Socket Voltages

MODELS 610, 611

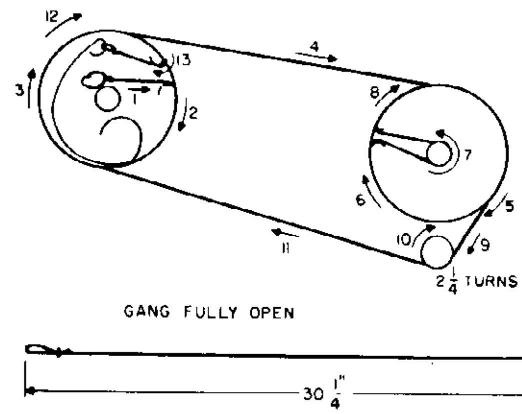


Fig. 5. Dial Stringing

REPLACEMENT PARTS LIST

CAPACITORS

Cat. No.	Symbol	Description
*RCE-095	C2A, B, C	40, 40, 200 mfd., 150, 150; 25 volts, electrolytic
RCE-131	C10	100 mfd., 6 v., electrolytic
RCT-051	C1A, B, C	Tuning capacitor
*RCW-1073	C6	47 mmf., ceramic
RCW-3015	C11A, B, C, C11D, C12	Ceramic
*RCW-8056	C9	4.7 mmf., ceramic
*UCC-037	C13	.003 mf., 600 v., paper
*UCC-041	C7	.02 mf., 600 v., paper
*UCC-042	C14	.03 mf., 600 v., paper
*UCC-045	C3, 4, 8	.05 mfd., 600 v., paper

RESISTORS

Cat. No.	Symbol	Description
RRC-155	R13, S1A, S1B	VOLUME CONTROL AND SWITCH
*RRW-027	R3	2300 ohms, 10 w., w.w.
*URD-041	R6	470 ohms, ½ w., carbon
*URD-045	R5	680 ohms, ½ w., carbon
*URD-053	R4	1500 ohms, ½ w., carbon
*URD-067	R11	5600 ohms, ½ w., carbon
*URD-097	R9	100,000 ohms, ½ w., carbon
*URD-113	R7, 15	470,000 ohms, ½ w., carbon
*URD-129	R12, 16	2.2 meg., ½ w., carbon
*URD-133	R14, 19	3.3 meg., ½ w., carbon
*URD-137	R17	4.7 meg., ½ w., carbon
*URE-013	R1	33 ohms, 1 w., carbon
*URE-059	R2	2700 ohms, 1 w., carbon
*URF-035	R10	270 ohms, 2 w., carbon

MISCELLANEOUS ELECTRICAL PARTS

Cat. No.	Symbol	Description
*RER-001	SR	RECTIFIER—Selenium rectifier
*RHS-010		SHIELD—Tube shield for V4
RII-065		INSULATOR—For handle
*RJP-025	PL1	PLUG—Battery plug (male)
*RJS-100		SOCKET—Tube socket for V2
*RJS-124		SOCKET—Tube socket for V4 and V5
*RJS-125		SOCKET—Tube socket for V1, V3
RJX-031		SOCKET—Dial light socket
*RLB-030	T4	TRANSFORMER—RF coupling
*RLC-068	L2	COIL—Oscillator coil
RLL-045	L1	LOOP
RSW-088	S2A, B, C	SWITCH—AC, DC to battery switch
*RTL-052	T1	TRANSFORMER—1st IF transformer
*RTL-079	T2	TRANSFORMER—2nd IF transformer
*RTO-050	T3	TRANSFORMER—Output transformer
*RWL-005		POWER CORD
*S-400C-19		SPEAKER—4-inch speaker

MISCELLANEOUS MECHANICAL PARTS

Cat. No.	Symbol	Description
RDS-106		DIAL SCALE
RDP-060		DIAL POINTER
RDX-047		DRUM—Pointer drum and shaft assemly, fastened with retaining ring RHM-043
RHB-006		PLUG BUTTON—For 610

MISCELLANEOUS MECHANICAL PARTS (Cont'd)

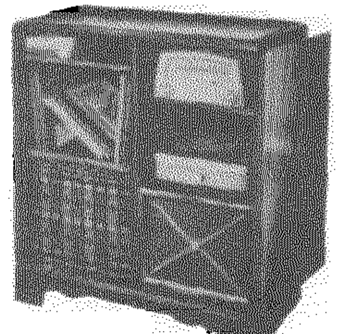
Cat. No.	Symbol	Description
RHB-015		PLUG BUTTON—For 611
*RHC-015		CLIP—For oscillator coil
RHE-010		EYELET—For cabinet catch
*RHG-018		GROMMET—For mounting tuning condenser
*RHI-011		STRAIN RELIF—On power cord
RHI-016		HINGE—Cabinet hinge
RHJ-005		SPACER—For mounting gang
*RHM-043		RING—Retaining ring for pointer shaft
RHN-020		POST—Screw post for handle
*RHR-002		RIVET—For cabinet back catch
RHR-013		RIVET—For cabinet hinge
*RHS-005		SPACER—For mounting tuning condenser
RHS-081		SCREW — Handle screw extends through handle
RHS-082		SCREW—Hex-head screw #6 x ⅜ in. long for cabinet back catch
*RJS-024		PLATE—Mounting plate for electrolytic capacitor (C2)
RMC-053		CATCH—For cabinet back
*RMS-120		SPRING—Dial cord tension spring
RMU-074		SHAFT—Tubular shaft for tuning control

CABINETS AND CABINET PARTS

Cat. No.	Symbol	Description
RAB-161		BACK—Cabinet back (maroon) for 610
RAB-162		BACK—Cabinet back for Model 611
RAC-092		FRONT—Cabinet front (maroon) for 610
RAC-093		FRONT—Cabinet front (green) for Model 611
RAC-094		COVER—Chassis cover
RAD-077		BRACKET—For mounting cabinet handle
RAG-042		GRILLE CLOTH—Maroon, for Model 610
RAG-043		GRILLE CLOTH—Gray, for Model 611
*RDC-032		DIAL CORD
RDE-116		ESCUTCHEON—Cabinet escutcheon for Model 610
RDE-117		ESCUTCHEON—For Model 611
RDK-248		KNOB—ON-OFF-VOLUME for Model 610, fawn color
RDK-249		KNOB — ON-OFF-VOLUME knob for Model 611, green color
RDK-250		KNOB—Tuning knob for Model 610, fawn color
RDK-251		KNOB—Tuning knob for Model 611, green color
RHF-011		FOOT—Cabinet foot button (maroon) for Model 610
RHF-012		FOOT—Cabinet foot button (gray) for Model 611
RHY-034		HANDLE END
RHY-035		HANDLE—Fawn colored for Model 610
RHY-036		HANDLE—Green, for Model 611

*PARTS USED ON PREVIOUS MODELS.

Even if the "A" battery is not connected to the circuit it should be in place in the cabinet for optimum RF pick-up. The loop has been tuned with the battery in place and becomes detuned if the battery is removed.



SPECIFICATIONS

CABINET:

Model 755
Material .... Wood
Color .... Mahogany
Height .... $34\frac{7}{8}$ in.
Width .... $33\frac{5}{16}$ in.
Depth .... 16 in.

ELECTRICAL RATING:

Voltage 105–125
Frequency .... 60 cycles
Wattage (Radio only) .... 85 watts
(With phono) .... 100 watts

OPERATING FREQUENCIES:

AM Band .... 540–1600 kc
FM Band .... 88–108 mc

INTERMEDIATE FREQUENCIES:

AM .... 455 kc
FM .... 10.7 mc

AUDIO POWER OUTPUT (120 VOLTS LINE):

Undistorted .... 6.5 watts
Maximum .... 8 watts

LOUDSPEAKER:

Type .... Alnico PM
Size .... 12 inches
Voice Coil Impedance at 400 cycles .... 3.2 ohms

RECORD CHANGER .... Model P15 ($33\frac{1}{3}$, 45 and 78 RPM)

PHONOGRAPH PICKUP:

Type .... Dual stylus, variable reluctance
DC Resistance .... 340 ohms

ANTENNA:

AM .... Built-in loop
FM .... Cabinet antenna or 300-ohm FM ant.

If it is necessary to install an external FM antenna, the brown wire extending from the rear of the cabinet should be disconnected from the antenna terminal strip.

TUBE COMPLEMENT:

(V1) R-F Amplifier 6BA6
(V2) Osc. and FM Converter 12AT7
(V3) AM Converter and 1st FM I-F Amplifier 6BA6
(V4) I-F Amplifier 6BA6
(V5) FM Limiter 6AU6
(V6) FM Discriminator, AM Detector and Audio Amplifier 6T8
(V7) Phono Preamplifier 6AU6
(V8) Phase Inverter 6J5
(V9) and (V10) Power Amplifier 6V6 (2)
(V11) Rectifier 5Y3GT
Dial Lamps .... Two Mazda No. 44

RECORD CHANGER SERVICE DATA:

Complete service information for the Model P15 record changer can be found in ER-S-P15.

STAGE GAINS

Stage gain measurements using a vacuum tube voltmeter or oscilloscope with a calibrated signal generator may be used to check circuit performance and isolate trouble. Use small signals to eliminate AVC action. Tolerance ±20%. Signal applied through 3.3 K resistor and 1000 mmfd. capacitor in series.

STAGE	GAIN AM	GAIN FM
Ant. to V1 Grid	......	1 (98 MC)
V1—V2 Grid	......	6 (98 MC)
V1—V3 Grid	14 (1000 KC)	......
V2—V3 Grid	......	10 (10.7 MC)
V3—V4 Grid	70 (455 KC)	45 (10.7 MC)
V4—V5 Grid	......	20 (10.7 MC)
V4—V6 Grid	80 (455 KC)	......

AUDIO GAIN:

0.1 volt at 400 cps across the volume control will give approximately ½ watt (1.25 v. a-c) across the speaker voice coil.

OSCILLATOR GRID BIAS:

D-C voltage developed across R28. Use 100K resistor to isolate meter. Tolerance ±20%.

	VTVM	20K ohms/volt meter
1000 KC	7 volts	4 volts
98 MC	3 volts	2 volts

HUM MEASUREMENT:

Hum measured across the voice coil of the speaker with the volume control set at minimum and band switch in the AM position should not exceed 7 millivolts.

On FM position, ground the limiter grid through a .01 mfd. capacitor. Hum should not exceed 15 millivolts.

MODEL 755

METER ALIGNMENT CHART

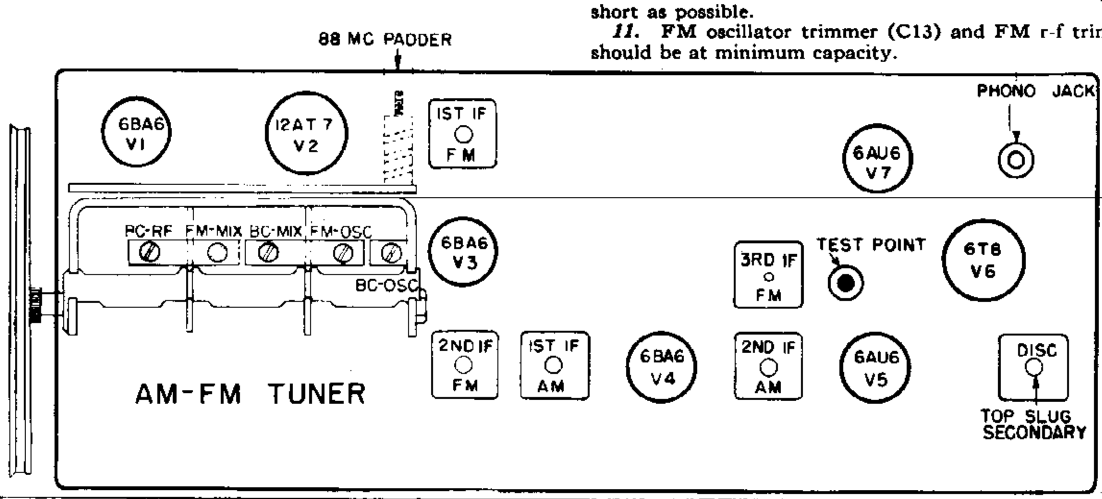
Step No.	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
AM ALIGNMENT						
1	455 KC	Lug on C1E. Conv. tuning condenser	AM	C1 completely open.	Primary and secondary cores of T5 and T2 for maximum.	3, 4
2	1620 KC	Loop Ant. See Note 5.	AM	C1 completely open.	Adjust OSC. C16 for maximum.	3, 4 5, 7, 8
3	1500 KC	Loop Ant. See Note 5.	AM	Rock C1 for max. signal	Adjust RF C25, and ANT. C9 trimmers for maximum.	3, 4 5, 7, 8
FM ALIGNMENT						
4	10.7 MC AM or FM See Note 9.	6BA6 grid (Pin 1 of V4) thru .01 mfd.	FM	....	T6 secondary (top core) for minimum.	3, 4, 6, 9
5	10.7 MC AM or FM See Note 9.	6BA6 grid (Pin 1 of V4) thru .01 mfd.	FM	....	T6 primary (bottom core) for maximum.	3, 4, 6, 9
6	Retune signal generator for null point obtained in step 4 (10.7 MC).					
7	10.7 MC unmodulated.	6BA6 grid (Pin 1 of V4) thru .01 mfd.	FM	....	Core of L10 for maximum.	1, 2, 10
8	10.7 MC unmodulated.	6BA6 grid (Pin 1 of V3) thru .01 mfd.	FM	....	Primary and secondary cores of T3 for maximum.	1, 2, 10
9	10.7 MC unmodulated.	12AT7 cathode (Pin 8 of V2) thru .01 mfd.	FM	....	Primary and secondary cores of T1 for maximum.	1, 2, 10
10	88 MC unmodulated	Dipole terminals.	FM	88 MC	FM oscillator slug (T9) for maximum.	1, 2, 7, 11
11	108 MC unmodulated	Dipole terminals.	FM	108 MC	Adjust FM oscillator trimmer C13 to 1st peak.	1, 2, 7, 11
12	108 MC unmodulated	Dipole terminals.	FM	108 MC	Adjust FM R-F trimmer (C18) for max. while rocking dial across 108 signal.	1, 2, 7, 11
13	Repeat Steps 10, 11.					

EQUIPMENT REQUIRED

1. Signal Generator, General Electric YGS-3 or equivalent.
2. 20,000 ohm-per-volt meter or vacuum tube voltmeter.
3. Output meter.
4. .01 mfd., paper capacitor.
5. 200,000 ohm resistor.
6. Loop of wire. See Note 5.

ALIGNMENT NOTES

1. Use unmodulated signal.
2. Connect 20,000 ohm-per-volt meter or VTVM from the limiter grid Test Point (J5) near V5 to the chassis. Test voltage will be negative. Use 2.5 volt scale. Keep signal generator output low so that meter indicates not more than 1 volt.
3. Use 400 cycle modulation.
4. Connect a standard output meter across speaker voice coil. Turn volume control full on. Keep signal generator output down so that output meter indicates not more than ½ watt output during alignment (approximately 1.25 volts a-c).
5. For alignment of the AM oscillator and R-F trimmer, the signal should be inductively coupled to the loop antenna by connecting a four turn, six inch diameter loop of wire across the signal generator terminals, located about one foot from the radio loop antenna.
6. When tuning the secondary of T6, two peaks will be obtained. The center null between the two peaks is the correct setting. As the transformer is tuned either side of 10.7 MC, the meter reading should increase.
7. Before adjusting oscillator for proper dial calibration, set pointer at index line near 88 MC mark by slipping along dial string as required. Have tuning gang completely closed.
8. C9 ANT. trimmer to be readjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 KC.
9. When detuning the signal generator in step 5, two maximum meter readings will be obtained, one on each side of 10.7 MC. The primary of T6 should be aligned to maximum when the signal generator is tuned to the smaller of these two peaks.
10. Make all chassis connections for FM-IF alignment as short as possible.
11. FM oscillator trimmer (C13) and FM r-f trimmer (C9) should be at minimum capacity.



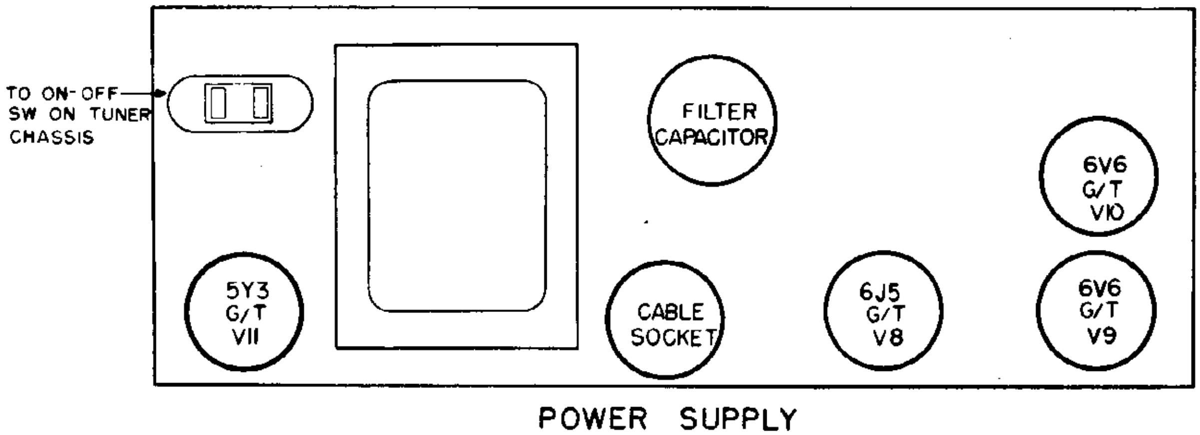


Fig. 1. Tube and trimmer location

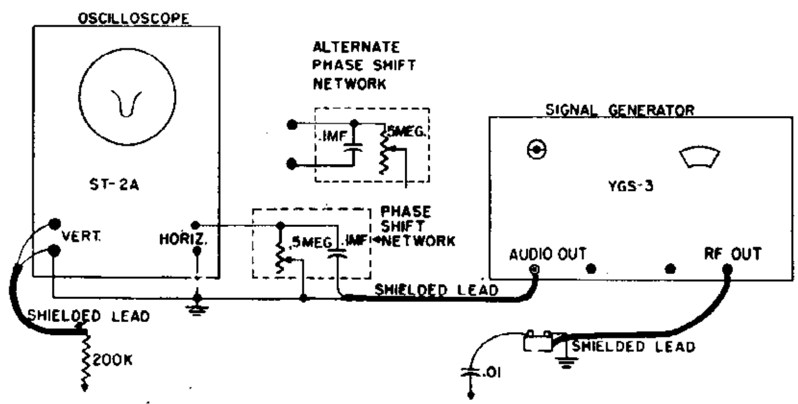


Fig. 2. Visual alignment equipment

PHASE SHIFT NETWORK

Connect 60 cps audio signal from the signal generator to the HORIZONTAL AMPLIFIER terminals on the scope through a phase shift network, as shown in Fig. 2, which permits the double traces on the scope to be joined together. The alternat phase shift network may be required on scopes other tha General Electric Model ST-2A.

VISUAL ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
			AM ALIGNMENT			
1	455 kc FM mod. ±20 kc at 60 cps rate	Lug on C1E—conv. tuning cond.	AM	....	T2 and T5 for max. amplitude of curve. See Fig. 3A.	3
2	1620 kc AM mod. with 60 cps.	Inductively coupled to antenna loop.	AM	Gang C1 completely open.	C16 (BC-Osc.) for steepest slope of straight line on scope. See Fig. 3-C.	3, 6
3	1500 kc FM mod. ±20 kc at 60 cps rate.	Inductively coupled to antenna loop.	AM	Gang C1 for max. amplitude of curve.	C25 (BC-Mix.) for max. amplitude of curve. See Fig. 3-A.	3, 4, 5, 6

MODEL 775

FM ALIGNMENT

4	10.7 mc FM mod. ± .3 mc at 60 cps rate.	Lug on C1B thru .01 mfd.	FM	....	Cores of T1, T3, and L10 for max. amplitude of curve. See Fig. 3-A.	1
5				....	Secondary of T6 for symmetry of curve of Fig. 3-B.	3
6				....	Primary of T6 for max. amplitude of positive and negative peak.	3
7	Repeat Step 5.					
8	88 mc AM mod. at 60 cps.	FM antenna terminals.		At 88 mc	Core of T9 for steepest slope. See Fig. 3-C.	1, 2
9	108 mc AM mod. at 60 cps.			At 108 mc	C39 (FM-OSC.) for steepest slope of straight line trace on scope. Fig. 3-C.	1, 2, 4
10	108 mc FM mod. ± .3 mc at 60 cps rate.			Rock in C1 for max.	Adjust C18 (FM-MIX) for max. amplitude of response. See Fig. 3-A.	1, 2, 4
11	Repeat Steps 8, 9.					

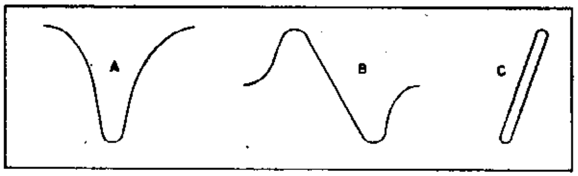


Fig. 3. Alignment curves

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 or equivalent sweep generator.
2. General Electric ST-2A scope or equivalent.
3. 200 K, ½ watt resistor.
4. ½ meg., potentiometer.
5. One .1 paper capacitor.

NOTES FOR VISUAL ALIGNMENT

1. Connect vertical plates of scope to the grid of the limiter tube (pin 1 of V5) through the Test Point and to chassis. Reduce input from signal generator until "grass" begins to appear on scope.
2. Set pointer at index line near 88 mc mark by slipping pointer along dial string as required. Have tuning gang completely closed.
3. Connect vertical plates of scope at junction of C57 and TONE SW. S2B through 200 K res. Reduce input from signal generator until "grass" begins to appear on scope.
4. In some cases tuning of the converter grid will cause "pulling in" of the oscillator and will change the oscillator frequency. If peaking C9 or C18 as in steps 3 or 10 causes the curve to move off the screen, it is necessary to recalibrate the oscillator as in steps 2 and 9.
5. C9 (BC-RF) trimmer to be adjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 kc.
6. For alignment of the AM oscillator and r-f trimmers, the signal should be inductively coupled to the loop antenna, by connecting a four-turn, six-inch diameter loop of wire to the signal generator terminals. Locate this loop about one foot from the radio loop antenna.

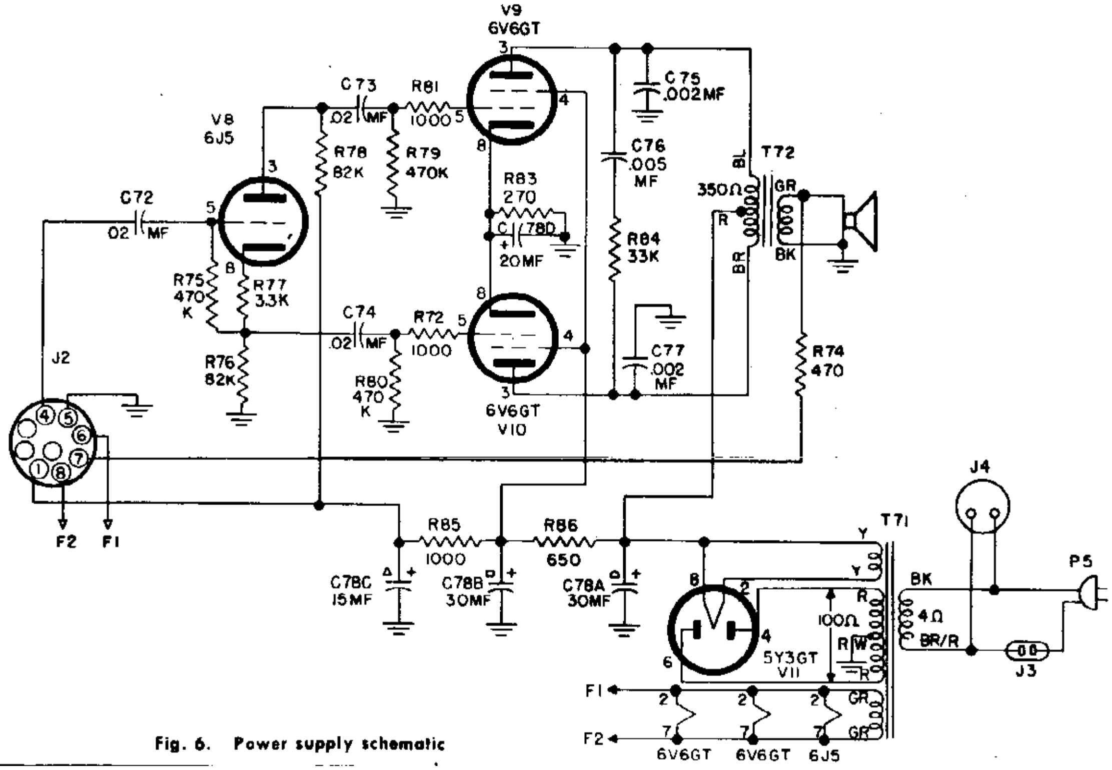


Fig. 6. Power supply schematic

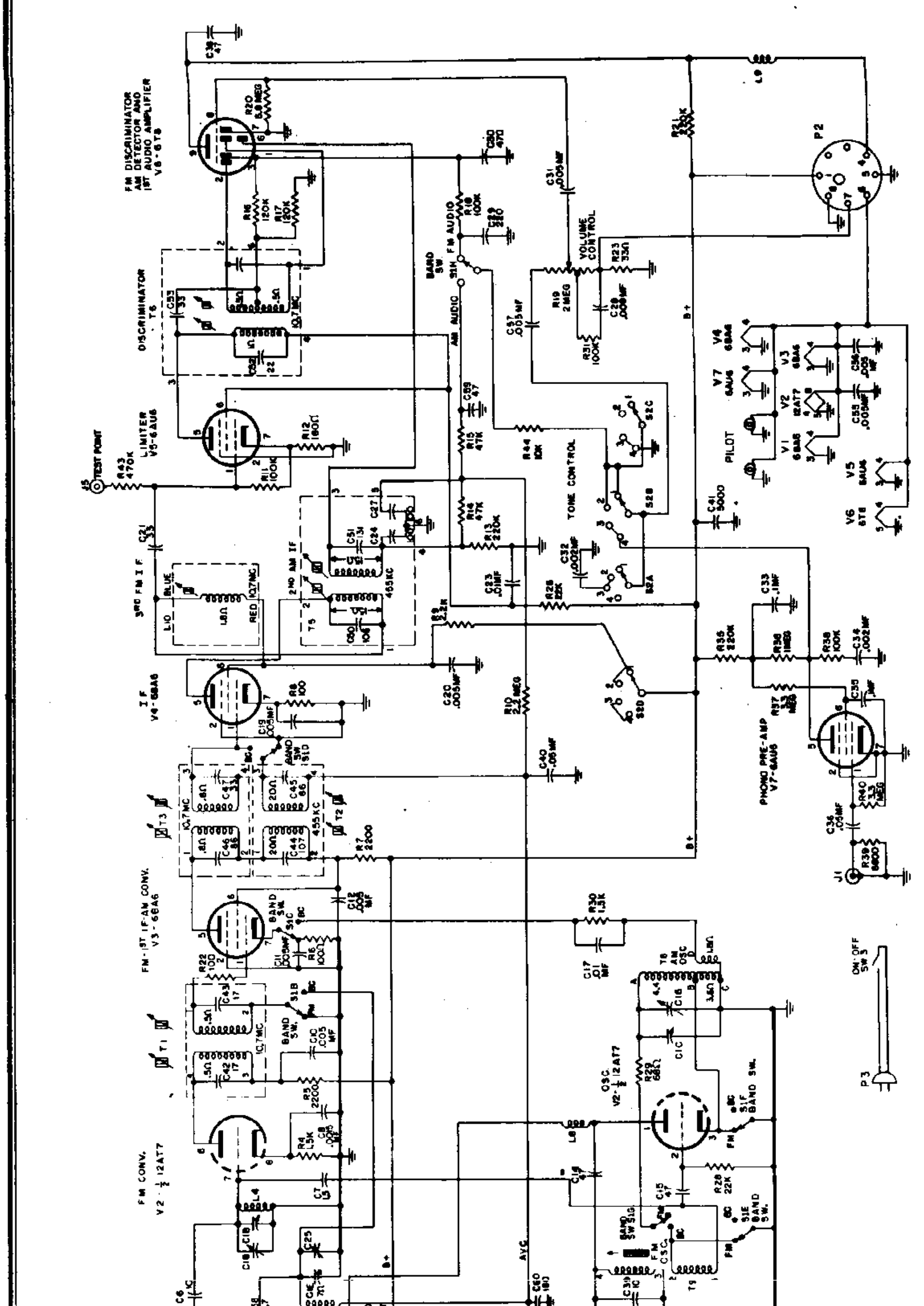


Fig. 3. AM-FM tuner schematic

RECORD CHANGER: See Model P15, RCD.CH.21-13 to RCD.CH.21-18.

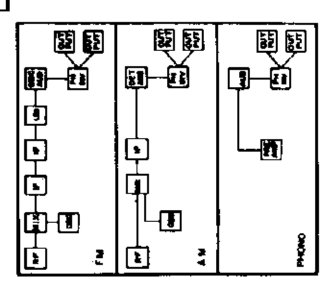


Fig. 4. Block diagram

MODEL 755

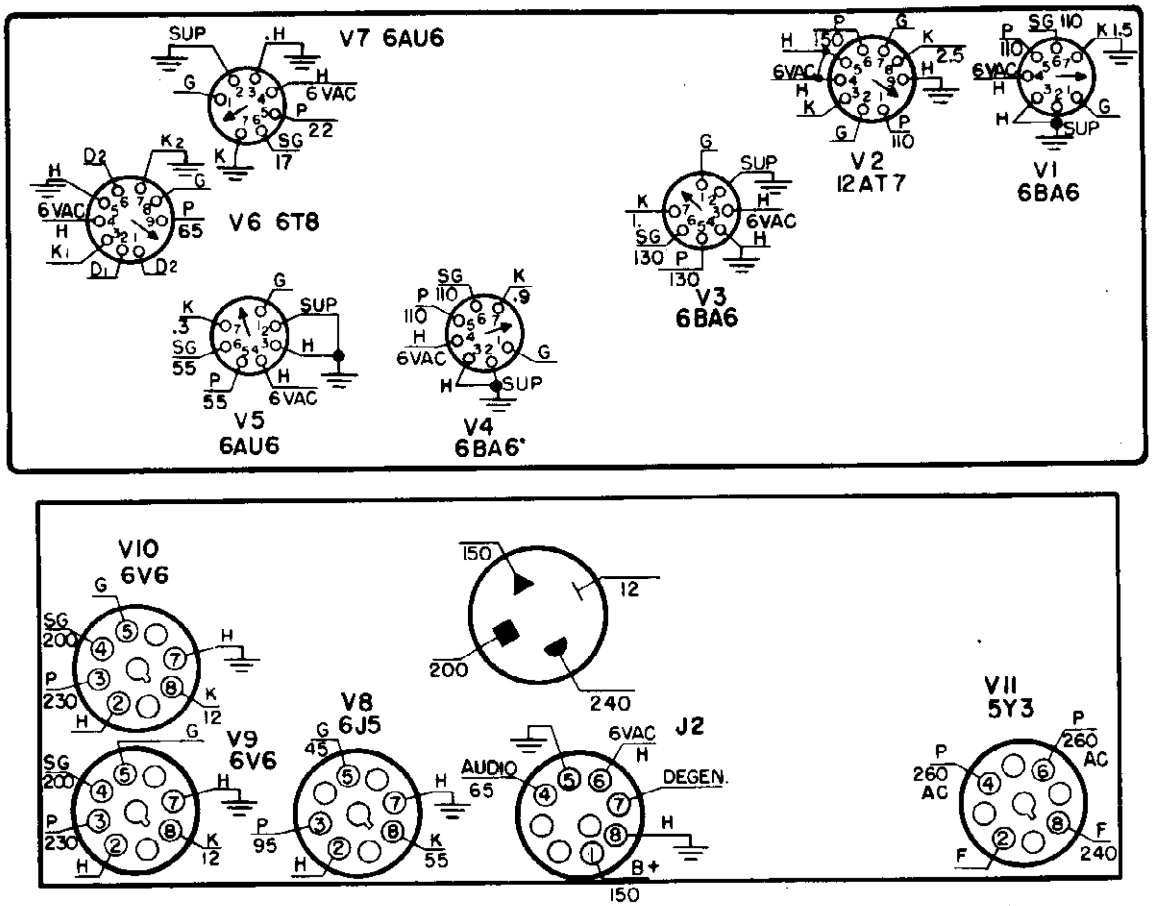
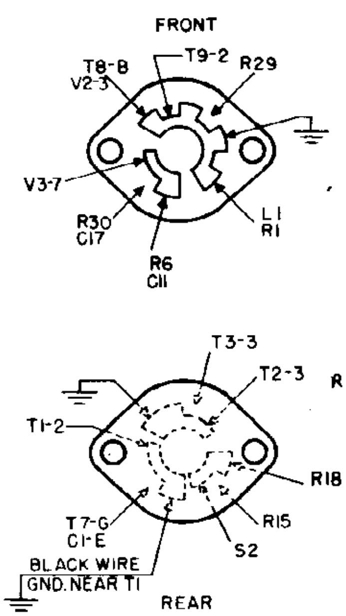


Fig. 7. Socket voltages

SOCKET VOLTAGES—TEST CONDITIONS: Band switch on FM—Tone switch on Radio—117 volts AC line—No signal input—Measured to chassis with 20,000 ohm-per-volt meter, volume control minimum.

NOTE: 6 volt heater circuit actually grounded at Tuner chassis only.



VIEWED FROM FRONT

Fig. 8. Band switch

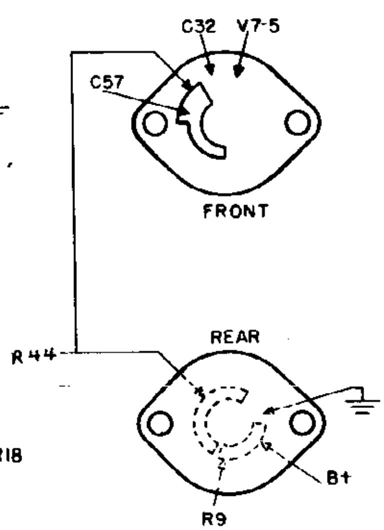


Fig. 9. Tone switch

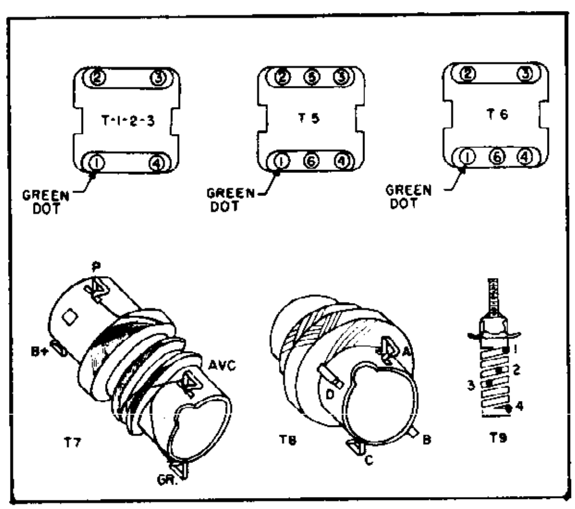


Fig. 10. Transformer connections

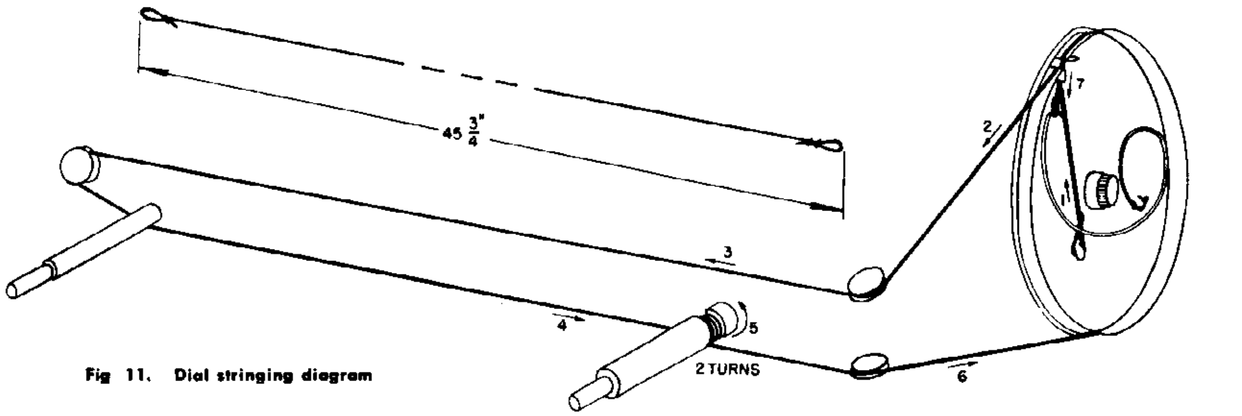


Fig 11. Dial stringing diagram

REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
*RAA-002		ARM—Switch arm (shaft)
*RAA-003		ARM—Switch arm (switch)
RAB-145		BACK—Cabinet back, Model 755
*RAC-084		COVER—Changer pan cover
RAD-057		BRACKET—FM osc. transformer mounting bracket
RAV-142		CABINET—Mahogany, Model 755
*RCE-039	C78	CAPACITOR—Filter, 30-30 mf. @ 350 v., 15 mf. @ 300 v., 20 mf. @ 25 v.
RCN-040	C3	CAPACITOR—6 mmf., silver mica
RCN-048	C7	CAPACITOR—1.5 mmf., ceramic
RCT-047	C1	CAPACITOR—Tuning gang capacitor
*RCW-026	C8	CAPACITOR—.0015 mfd., ceramic
RCW-1058	C37	CAPACITOR—10 mmf., mica
*RCW-3014	C5, 10, 11, 12, 19, 41, 53, 55, 56	CAPACITOR—.005 mfd., ceramic
*RCW-3029	C4	CAPACITOR—100 mmf., ceramic
RCW-3039		CAPACITOR—2.7 mmf., ceramic
*RDC-032		DIAL CORD—25 yds., bulk
RDE-098		ESCUTCHEON—Plastic dial escutcheon, includes dial window
*RDK-212		KNOB—Pull-out knob on phono changer cover
RDK-233		KNOB—Tuning knob
RDK-234		KNOB—Band switch knob (arrow)
RDK-235		KNOB—Volume control knob
RDK-236		KNOB—Tone switch knob (dot)
RDM-025		WIRE—Dial pointer guide wire
RDP-058		POINTER—Dial pointer
*RHC-017		CLIP—Mounting clip for BC oscillator transformer
*RHC-034		CLIP—Mounting clip for IF transformers
*RHC-038		CLIP—Mounting clip for BC RF transformer
*RHG-010		GROMMET—Preamplifier socket mounting grommet
*RHG-015		GROMMET—Tuning gang mounting grommet
*RHG-029		GROMMET—Speaker lead insulator grommet
*RHI-011		INSULATOR—Strain relief insulator for power cord
*RHJ-006		SLEEVE—Tuning gang mounting sleeve
*RHM-001		WASHER—"C" washer for tuning shaft
RHN-015		NUT—Guide wire retaining nut
*RHS-058		SCREW—⅝ in. wood screw for bottom of escutcheon
*RHS-064		SCREW—$\frac{5}{16}$ in. wood screw, for top of escutcheon
*RHS-066		SCREW—Hex head screw for tuning gang mounting
*RJC-001		CONNECTORS—Loop and speaker wire connectors
*RJJ-008	J3	RECEPTACLE—AC power receptacle
*RJP-003	P4	PLUG—AC power plug for phono motor
*RJP-004	P1	PLUG—Phono audio input plug
*RJS-003		SOCKET—Octal wafer socket, for V8, V9, V10, V11
*RJP-010	J1	JACK—Phono audio input jack
*RJS-012		PLATE—Mounting plate for filter condenser
*RJS-049	J4	RECEPTACLE—Phono motor power receptacle
*RJS-094		SOCKET—7 pin socket, for V7
*RJS-118		SOCKET—9 pin socket, for V6
RJS-143		SOCKET—9 pin socket, for V2
*RJS-145		SOCKET—7 pin socket, for V1, V3, V4, V5
*RJS-147		SOCKET—Pilot light socket
RJS-152	J2	SOCKET—Inter-chassis cable socket
RJS-153	P2	PLUG—Inter-chassis cable plug
RJS-154		SHELL—Cable plug shell
*RLC-104	T9	TRANSFORMER—FM oscillator transformer
*RLC-106	T8	TRANSFORMER—BC oscillator transformer
*RLI-122	L8	CHOKE—Oscillator plate choke, molded
*RLI-124	L3, 9	CHOKE—Audio filter choke, RF plate choke, 18 turns
RLI-128	L4	CHOKE—FM mixer grid choke, 6 turns
RLI-129	T7	TRANSFORMER—BC RF transformer

Cat. No.	Symbol	Description
RLI-130	L1	CHOKE—FM antenna choke, 11 turns
RLL-039	L2	LOOP—BC antenna loop
*RMM-151		GASKET—Phono changer rubber mounting gasket
*RMM-153		MOUNT—Phono drawer slide mount
*RMS-119		SPRING—Dial cord spring
*RMS-221		SPRING—Phono mounting spring
RMU-066		SHAFT—Band switch drive shaft
RMU-067		SHAFT—Tuning shaft
*RQB-001		BRUSH—Stylus brush
RRC-152	R19; S2, 3	CONTROL—On-Off switch, tone switch, volume control, 2 meg.
RRW-056	R85, 86	RESISTOR—Filter resistor, 650 ohms-10 w.; 1000 ohms-8 w.; w.w.
RSW-085	S1	SWITCH—Band switch
*RTD-010	T6	TRANSFORMER—FM discriminator transformer
RTL-079	T2	TRANSFORMER—1st IF-AM transformer
RTL-100	L10	TRANSFORMER—3rd IF-FM transformer
*RTL-111	T5	TRANSFORMER—2nd IF-AM transformer
*RTL-112	T1	TRANSFORMER—1st IF-FM transformer
*RTL-113	T3	TRANSFORMER—2nd IF-FM transformer
RTO-094	T72	TRANSFORMER—Output transformer
RTP-306	T71	TRANSFORMER—Power transformer
*RWL-004	P3, 5	CORD—Power cord and plug
*S1212-D7		SPEAKER—12-inch PM speaker
*UCC-036	C32, 34	CAPACITOR—.002 mfd., 600 v., paper
*UCC-039	C20, 31	CAPACITOR—.005 mfd., 600 v., paper
*UCC-040	C17	CAPACITOR—.01 mfd., 600 v., paper
*UCC-041	C72, 73, 74	CAPACITOR—.02 mfd., 600 v., paper
*UCC-045	C22, 36, 40	CAPACITOR—.05 mfd., 600 v., paper
*UCC-048	C33, 35	CAPACITOR—.1 mfd., 600 v., paper
*UCC-056	C75, 77	CAPACITOR—.002 mfd., 1000 v., paper
*UCC-059	C76	CAPACITOR—.005 mfd., 1000 v., paper
*UCC-070	C28	CAPACITOR—.008 mfd., 600 v., paper
*UCG-004	C6	CAPACITOR—10 mmf., silver mica
*UCG-016	C21	CAPACITOR—33 mmf., silver mica
*UCG-020	C14, 15, 38, 59	CAPACITOR—47 mmf., silver mica
*UCG-1026	C26	CAPACITOR—82 mmf., silver mica
*UCU-044	C30	CAPACITOR—470 mmf., mica
*UCU-536	C29	CAPACITOR—220 mmf., mica
UCU-1034	C60	CAPACITOR—180 mmf., mica
*URD-013	R23	RESISTOR—33 ohms, ½ w., carbon
*URD-021	R29	RESISTOR—68 ohms, ½ w., carbon
*URD-025	R2, 6, 8, 22	RESISTOR—100 ohms, ½ w., carbon
*URD-031	R12	RESISTOR—180 ohms, ½ w., carbon
*URD-033	R1, 41	RESISTOR—220 ohms, ½ w., carbon
*URD-041	R74	RESISTOR—470 ohms, ½ w., carbon
*URD-049	R72, 81	RESISTOR—1000 ohms, ½ w., carbon
*URD-053	R4, 30	RESISTOR—1500 ohms, ½ w., carbon
*URD-057	R5, 7, 9	RESISTOR—2200 ohms, ½ w., carbon
*URD-061	R77	RESISTOR—3.3K ohms, ½ w., carbon
*URD-069	R39	RESISTOR—6.8K ohms, ½ w., carbon
*URD-081	R28	RESISTOR—22K ohms, ½ w., carbon
*URD-089	R14, 15	RESISTOR—47K ohms, ½ w., carbon
*URD-095	R76, 78	RESISTOR—82K ohms, ½ w., carbon
*URD-097	R11, 18, 31, 38	RESISTOR—100K ohms, ½ w., carbon
*URD-099	R16, 17	RESISTOR—120K ohms, ½ w., carbon
*URD-105	R13, 21, 35	RESISTOR—220K ohms, ½ w., carbon
*URD-113	R34, 43, 75, 79, 80	RESISTOR—470K ohms, ½ w., carbon
*URD-121	R36	RESISTOR—1 meg., ½ w., carbon
*URD-129	R10	RESISTOR—2.2 meg., ½ w., carbon
*URD-133	R37, 40	RESISTOR—3.3 meg., ½ w., carbon
*URD-141	R20	RESISTOR—6.8 meg., ½ w., carbon
*URE-081	R26	RESISTOR—22K ohms, 1 w., carbon
*URE-085	R84	RESISTOR—33K ohms, 1 w., carbon
*URF-035	R83	RESISTOR—270 ohms, 2 w., carbon
*URF-057	R3	RESISTOR—2200 ohms, 2 w., carbon
RDS-105		Dial Scale

*Parts used on previous models.

MODEL 757

SPECIFICATIONS

CABINET:

Material.......Wood
Color.......Mahogany
Height.......34 in.
Width.......32 in.
Depth.......16 in.

ELECTRICAL RATING:

Voltage.......105–125
Frequency.......60 cycles
Wattage (Radio only).......85 watts
(With phono).......100 watts

AUDIO POWER OUTPUT (120 VOLTS LINE):

Undistorted.......6.5 watts
Maximum.......8 watts

OPERATING FREQUENCIES:

AM–RF.......540–1600 kc
FM–RF.......88–108 mc
AM–IF.......455 kc
FM–IF.......10.7 mc

LOUDSPEAKER:

Type.......Alnico PM
Size.......12 inches
Voice Coil Impedance at 400 cycles.......3.2 ohms

RECORD CHANGER:

Model P16.......33⅓, 45 and 78 RPM
Complete service information for the Model P16 record changer can be found in ER-S-P16.

PHONOGRAPH PICKUP:

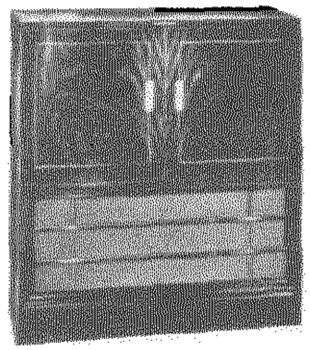
Type.......Dual stylus, variable reluctance
DC Resistance.......340 ohms

ANTENNA:

AM.......Built-in-loop
FM.......Cabinet antenna or 300-ohm FM ant.
If it is necessary to install an external FM antenna, the built-in cabinet antenna should be disconnected from the antenna terminas.

TUBE COMPLEMENT:

(V1) R-F Amplifier.......6BA6
(V2) Osc. and FM Converter.......12AT7
(V3) AM Converter and 1st FM I-F Amplifier.......6BA6
(V4) I-F Amplifier.......6BA6
(V5) FM Limiter.......6AU6
(V6) FM Discriminator, AM Detector and Audio Amplifier.......6T8
(V7) Phono Preamplifier.......6AU6
(V8) Phase Inverter.......6J5
(V9) and (V10) Power Amplifier.......6V6 (2)
(V11) Rectifier.......5Y3GT
Dial Lamps.......Two Mazda No. 47



STAGE GAINS

Stage gain measurements using a vacuum tube voltmeter or oscilloscope with a calibrated signal generator may be used to check circuit performance and isolate trouble. Use small signals to eliminate AVC action. Tolerance 20%. Signal applied through 3.3K resistor and 1000 mmfd. capacitor in series.

STAGE	GAIN AM	GAIN FM
Ant. to V1 Grid	......	1 (98 MC)
V1—V2 Grid	......	6 (98 MC)
V1—V3 Grid	14 (1000 KC)	......
V2—V3 Grid	......	10 (10.7 MC)
V3—V4 Grid	70 (455 KC)	45 (10.7 MC)
V4—V5 Grid	......	20 (10.7 MC)
V4—V6 Grid	80 (455 KC)	......

OSCILLATOR GRID BIAS:

D-C voltage developed across R28. Use 100K resistor to isolate meter. Tolerance 20%.

	VTM	20K ohms/volt meter
1000 KC	7 volts	4 volts
98 MC	3 volts	2 volts

AUDIO GAIN:

0.1 volt at 400 cps across the volume control will give approximately ½ watt (1.25 v. a-c) across the speaker voice coil.

AUIDO POWER:

With a 400-cycle signal driving the 6V6GT output tubes sufficiently to begin to overload the output circuit as shown by distortion of the waveshape on an oscilloscope, an output meter at the speaker terminals should read about 4.5 volts. Maximum possible output is about 5 volts.

HUM MEASUREMENT:

With the volume control at minimum, an oscilloscope connected through a 0.25 mfd. capacitor across C78A shows a 12-volt saw-tooth wave; across C78B, 1 volt rounded hump wave. (Both peak-to-peak.)

Hum measured across C78A with a 1000 ohms/volt output meter in series with a 1.0 mf capacitor should not exceed 5 volts RMS; across C78B .2 of a volt.

Hum at the speaker voice coil should not exceed .007 volt RMS.

METER ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
			AM ALIGNMENT			
1	455 KC	Lug on C1E. Conv. tuning condenser	AM	C1 completely open.	Primary and secondary cores of T5 and T2 for maximum.	3, 4
2	1620 KC	Loop Ant. See Note 5.			Adjust OSC. C16 for maximum.	3, 4 5, 7, 8
3	1500 KC	Loop Ant. See Note 5.		Rock C1 for max. signal	Adjust RF C25, and ANT. C9 trimmers for maximum.	
			FM ALIGNMENT			
4	10.7 MC AM or FM See Note 9.	6BA6 grid (Pin 1 of V4) thru .01 mfd.	FM	....	T6 secondary (top core) for minimum.	3, 4, 6, 9
5				....	T6 primary (bottom core) for maximum.	
6	Retune signal generator for null point obtained in step 4 (10.7 MC).					
7	10.7 MC unmodulated.	6BA6 grid (Pin 1 of V4) thru .01 mfd.	FM	....	Core of L10 for maximum.	1, 2, 10
8		6BA6 grid (Pin 1 of V3) thru .01 mfd.		....	Primary and secondary cores of T3 for maximum.	
9		12AT7 cathode (Pin 8 of V2) thru .01 mfd.		....	Primary and secondary cores of T1 for maximum.	
10	88 MC unmodulated	Dipole terminals.		88 MC	FM oscillator slug (T9) for maximum.	1, 2, 7, 11
11	108 MC unmodulated	Dipole terminals.		108 MC	Adjust FM oscillator trimmer C13 to 1st peak.	
12	108 MC unmodulated	Dipole terminals.		108 MC	Adjust FM R-F trimmer (C18) for max. while rocking dial across 108 signal.	
13	Repeat Steps 10, 11.					

METER ALIGNMENT

EQUIPMENT REQUIRED

1. Signal Generator, General Electric YGS-3 or equivalent.
2. 20,000 ohm-per-volt meter or vacuum tube voltmeter.
3. Output meter.
4. .01 mfd., paper capacitor.
5. 200,000 ohm resistor.
6. Loop of wire. See Note 5.

ALIGNMENT NOTES

1. Use unmodulated signal.

2. Connect 20,000 ohm-per-volt meter or VTVM from the limiter grid Test Point (J5) near V5 to the chassis. Test voltage will be negative. Use 2.5 volt scale. Keep signal generator output low so that meter indicates not more than 1 volt.

3. Use 400 cycle modulation.

4. Connect a standard output meter across speaker voice coil. Turn volume control full on. Keep signal generator output down so that output meter indicates not more than ½ watt output during alignment (approximately 1.25 volts a-c).

5. For alignment of the AM oscillator and R-F trimmer, the signal should be inductively coupled to the loop antenna by connecting a four turn, six inch diameter loop of wire across the signal generator terminals, located about one foot from the radio loop antenna.

6. When tuning the secondary of T6, two peaks will be obtained. The center null between the two peaks is the correct setting. As the transformer is tuned either side of 10.7 MC, the meter reading should increase.

7. Before adjusting oscillator for proper dial calibration, set pointer at index line near 88 MC mark by slipping along dial string as required. Have tuning gang completely closed.

8. C9 ANT. trimmer to be readjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 KC.

9. When detuning the signal generator in step 5, two maximum meter readings will be obtained, one on each side of 10.7 MC. The primary of T6 should be aligned to maximum when the signal generator is tuned to the smaller of these two peaks.

10. Make all chassis connections for FM-IF alignment as short as possible.

11. FM oscillator trimmer (C13) and FM r-f trimmer (C9) should be at minimum capacity.

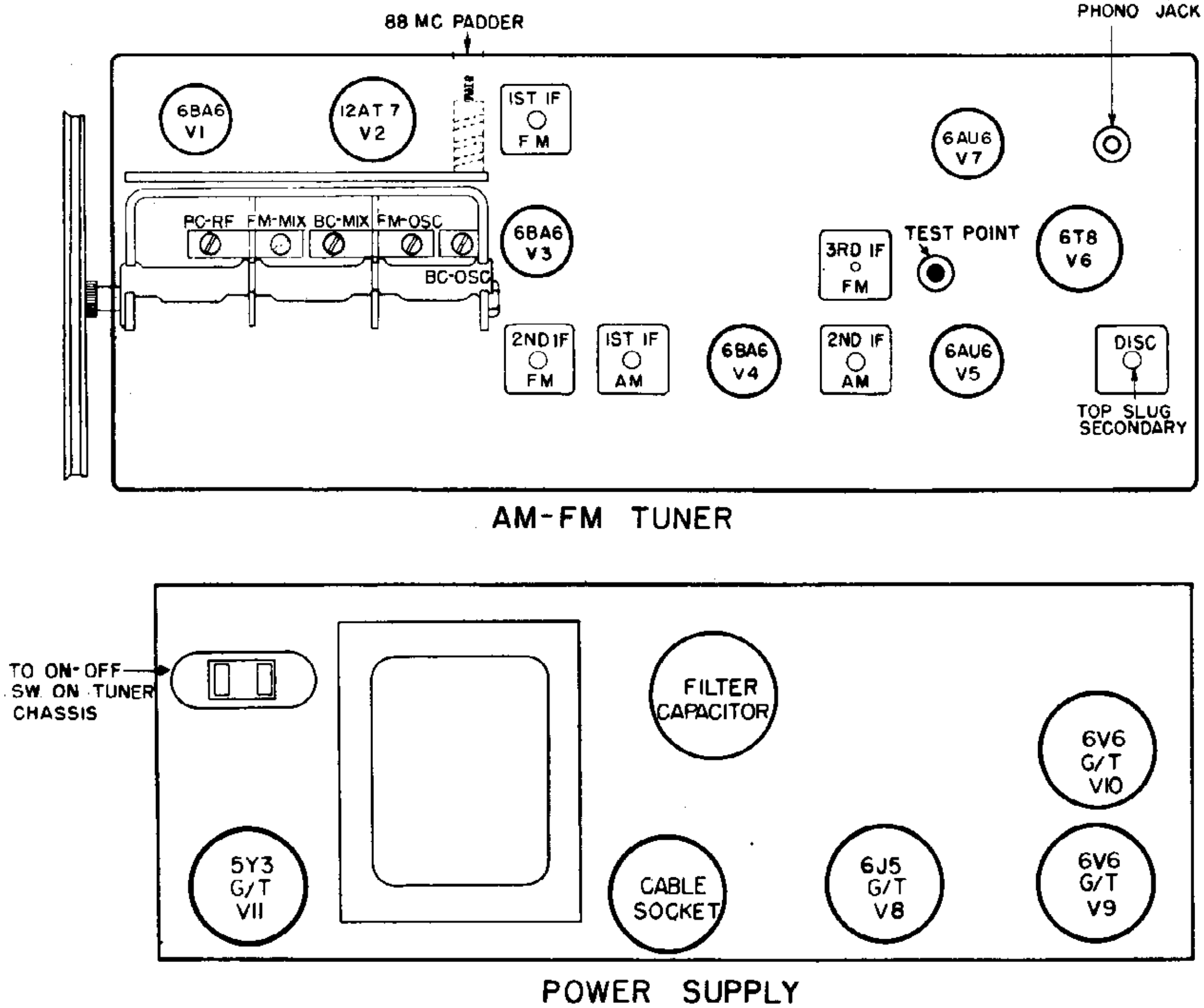


Fig. 1. Tube and Trimmer Location

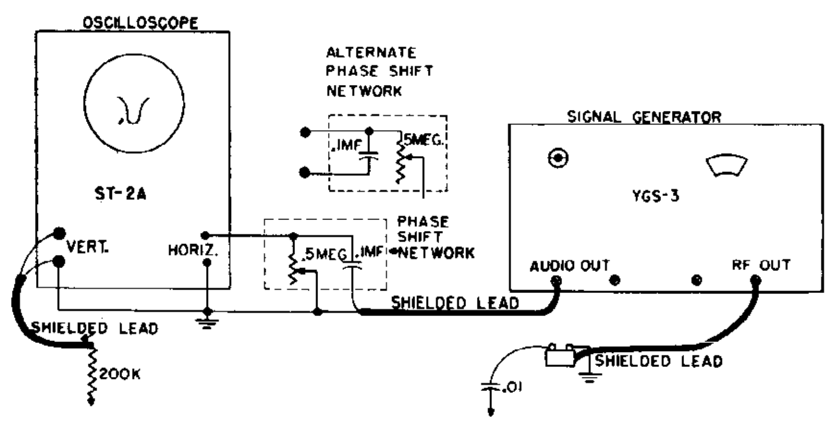


Fig. 2. Visual Alignment Equipment

PHASE SHIFT NETWORK

Connect 60 cps audio signal from the signal generator to the HORIZONTAL AMPLIFIER terminals on the scope through a phase shift network, as shown in Fig. 2, which permits the double traces on the scope to be joined together. The alternate phase shift network may be required on scopes other than General Electric Model ST-2A.

VISUAL ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
			AM ALIGNMENT			
1	455 kc FM mod. ±20 kc at 60 cps rate	Lug on C1E conv. tuning cond.	AM		T2 and T5 for max. amplitude of curve. See Fig. 3A.	3
2	1620 kc AM mod. with 60 cps.	Inductively coupled to antenna loop.	AM	Gang C1 completely open.	C16 (BC-Osc.) for steepest slope of straight line on scope. See Fig. 3-C.	3, 6
3	1500 kc FM mod. ±20 kc at 60 cps rate.	Inductively coupled to antenna loop.	AM	Gang C1 for max. amplitude of curve.	C25 (BC-Mix.) for max. amplitude of curve. See Fig. 3-A.	3, 4, 5, 6
			FM ALIGNMENT			
4	10.7 mc FM mod. ±.3 mc at 60 cps rate.	Lug on C1B thru .01 mfd.	FM	....	Cores of T1, T3, and L10 for max. amplitude of curve. See Fig. 3-A.	1
5	10.7 mc FM mod. ±.3 mc at 60 cps rate.	Lug on C1B thru .01 mfd.	FM	....	Secondary of T6 for symmetry of curve of Fig. 3-B.	3
6	10.7 mc FM mod. ±.3 mc at 60 cps rate.	Lug on C1B thru .01 mfd.	FM	....	Primary of T6 for max. amplitude of positive and negative peak.	3
7	Repeat Step 5.		FM			
8	88 mc AM mod. at 60 cps.	FM antenna terminals.	FM	At 88 mc	Core of T9 for steepest slope. See Fig. 3-C.	1, 2,
9	108 mc AM mod. at 60 cps.	FM antenna terminals.	FM	At 108 mc	C39 (FM-OSC.) for steepest slope of straight line trace on scope. Fig. 3-C.	1, 2, 4
10	108 mc FM mod. ±.3 mc at 60 cps rate.	FM antenna terminals.	FM	Rock in C1 for max.	Adjust C18 (FM-MIX) for max. amplitude of response. See Fig. 3-A.	1, 2, 4
11	Repeat Steps 8, 9.					

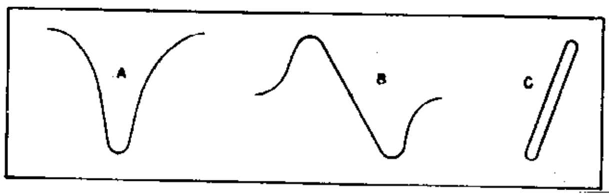


Fig. 3. Alignment Curves

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 or equivalent sweep generator.
2. General Electric ST-2A scope or equivalent.
3. 200 K, ½ watt resistor.
4. ½ meg., potentiometer.
5. One .1 paper capacitor.

NOTES FOR VISUAL ALIGNMENT

1. Connect vertical plates of scope to the grid of the limiter tube (pin 1 of V5) through the Test Point and to chassis. Reduce input from signal generator until "grass" begins to appear on scope.

2. Set pointer at index line near 88 mc mark by slipping pointer along dial string as required. Have tuning gang completely closed.

3. Connect vertical plates of scope at junction of C57 and TONE SW. S2B through 200 K res. Reduce input from signal generator until "grass" begins to appear on scope.

4. In some cases tuning of the converter grid will cause "pulling in" of the oscillator and will change the oscillator frequency. If peaking C9 or C18 as in steps 3 or 10 causes the curve to move off the screen, it is necessary to recalibrate the oscillator as in steps 2 and 9.

5. C9 (BC-RF) trimmer to be adjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 kc.

6. For alignment of the AM oscillator and r-f trimmers, the signal should be inductively coupled to the loop antenna, by connecting a four-turn, six-inch diameter loop of wire to the signal generator terminals. Locate this loop about one foot from the radio loop antenna.

MODEL 757

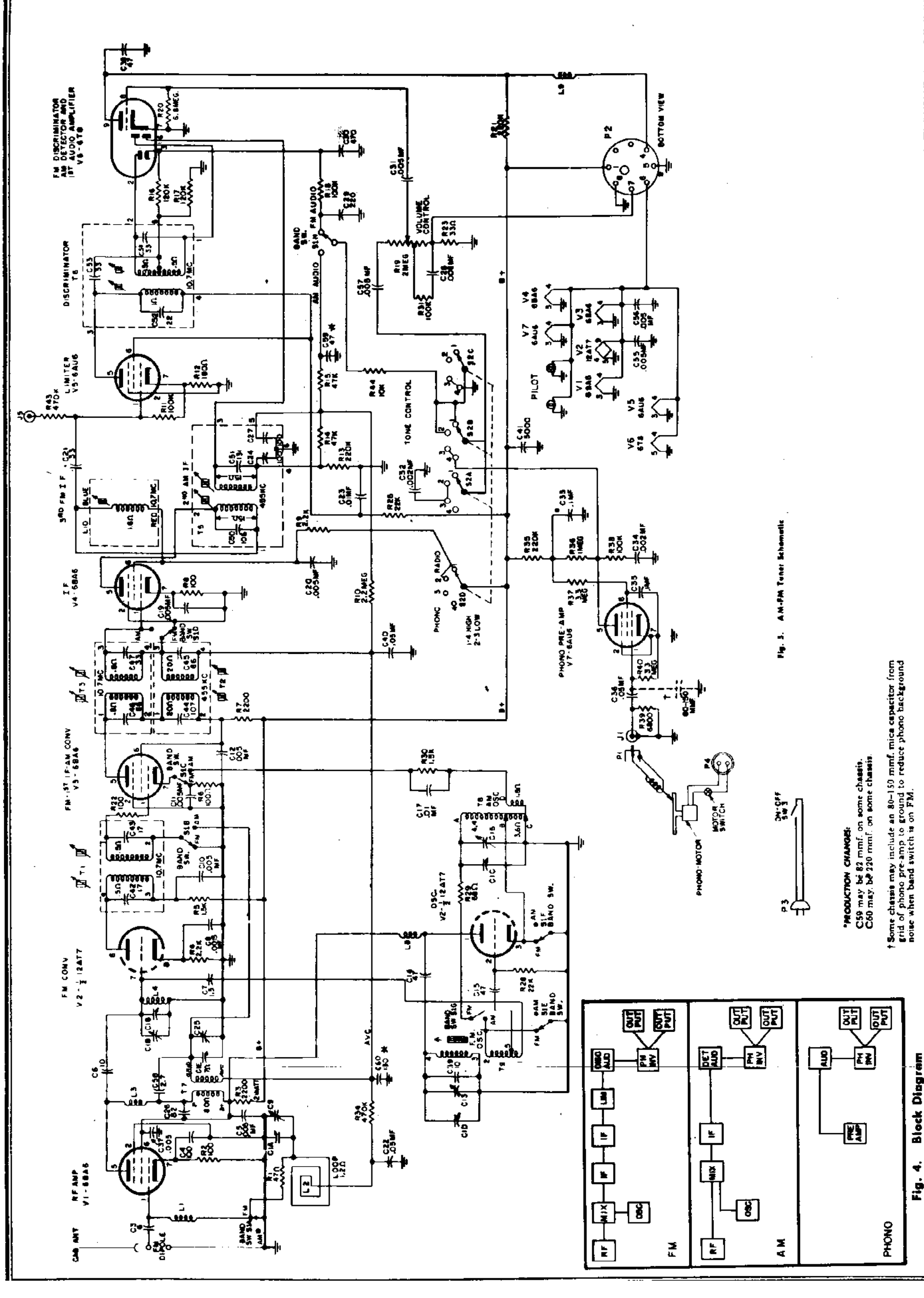


Fig. 3. AM-FM Tuner Schematic

Fig. 4. Block Diagram

*PRODUCTION CHANGES:
C59 may be 82 mmf. on some chassis.
C60 may be 220 mmf. on some chassis.

† Some chassis may include an 80–150 mmf. mica capacitor from grid of phono pre-amp to ground to reduce phono background noise when band switch is on FM.

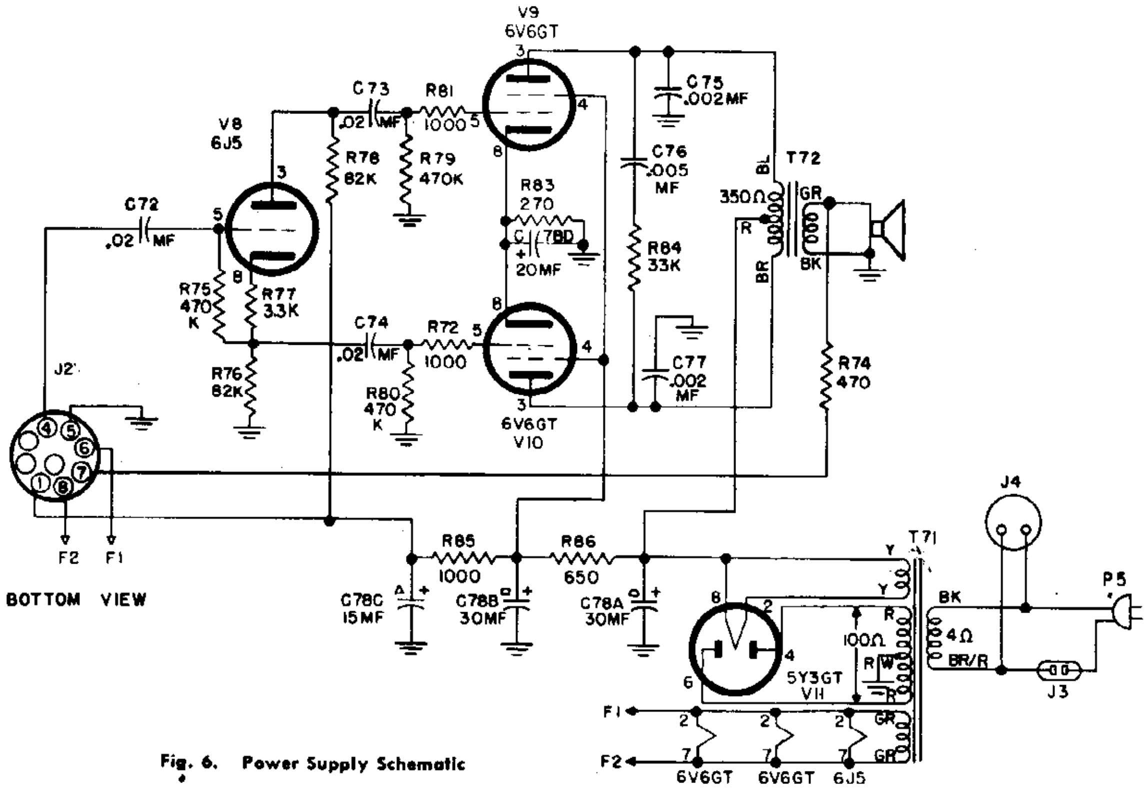
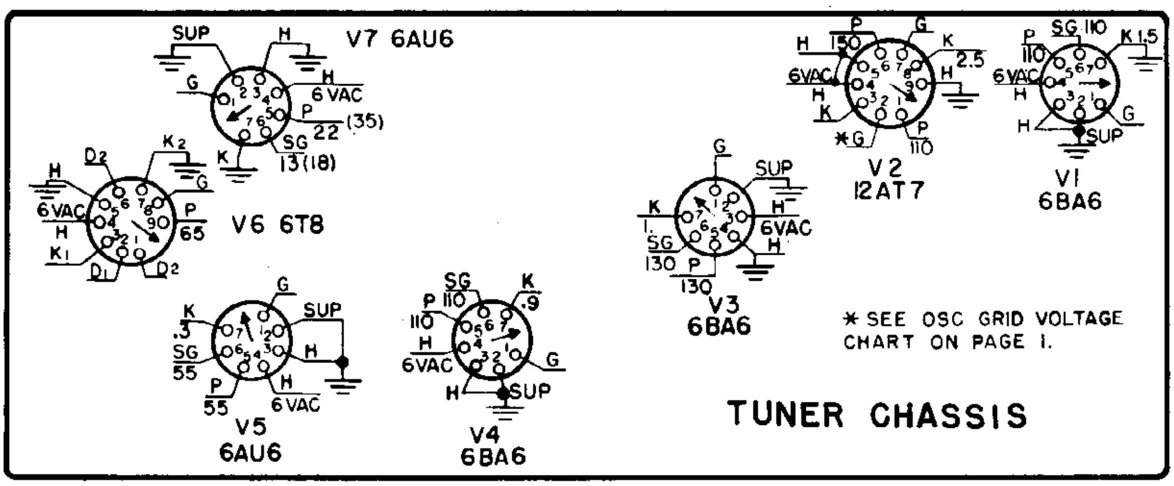


Fig. 6. Power Supply Schematic



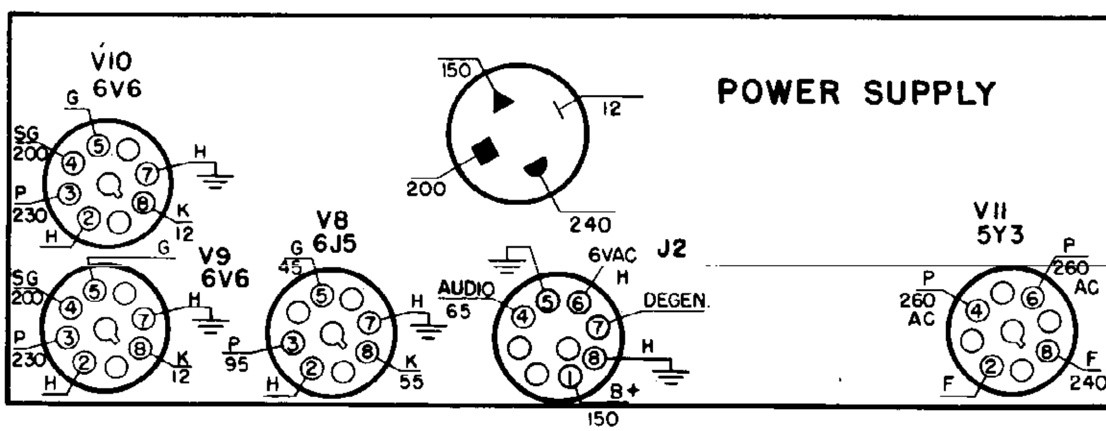


Fig. 7. Socket Voltages

SOCKET VOLTAGES—TEST CONDITIONS: Band switch on FM—Tone switch on Radio—117 volts AC line—No signal input—Measured to chassis with 20,000 ohm-per-volt meter, volume control minimum. (35) indicates VTVM reading.

NOTE: 6 volt heater circuit actually grounded at Tuner chassis only.

MODEL 757

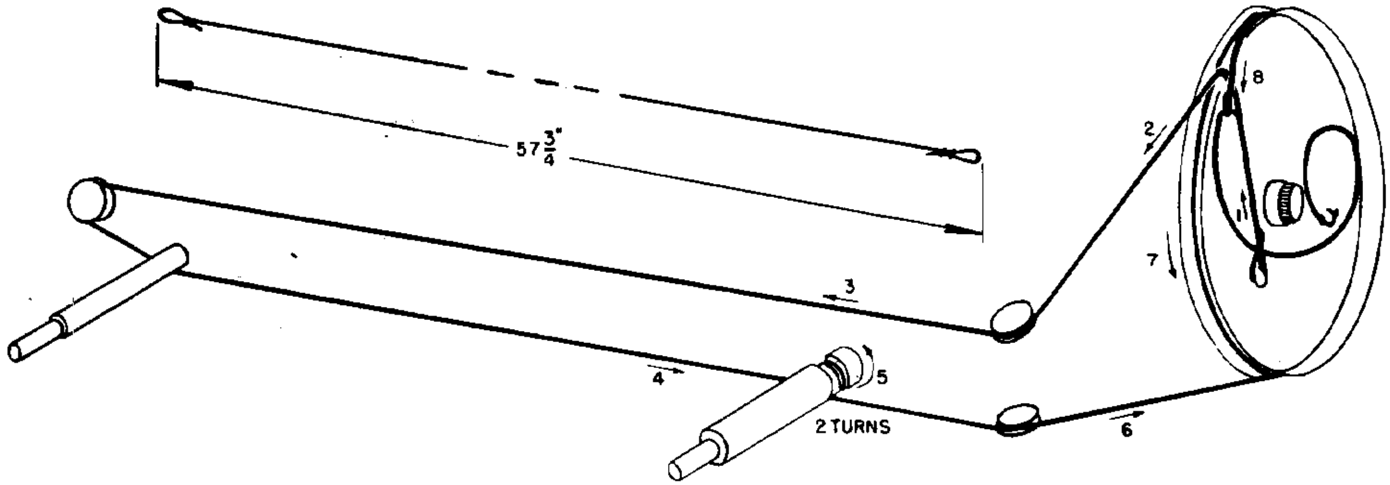


Fig. 11. Dial Stringing Diagram

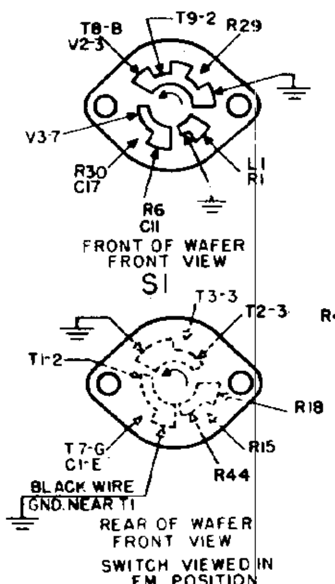


Fig. 8. Single Wafer Band Switch

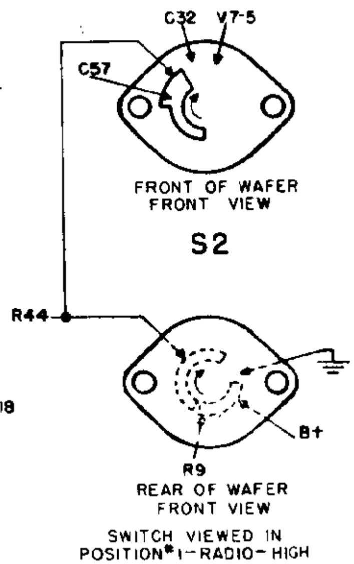


Fig. 9. Single Wafer Tone Switch

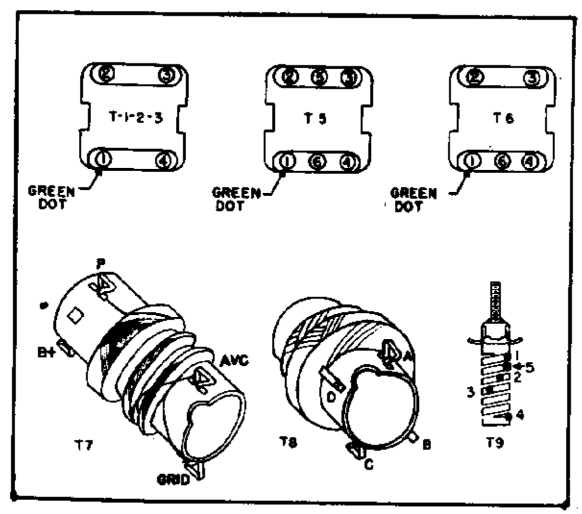


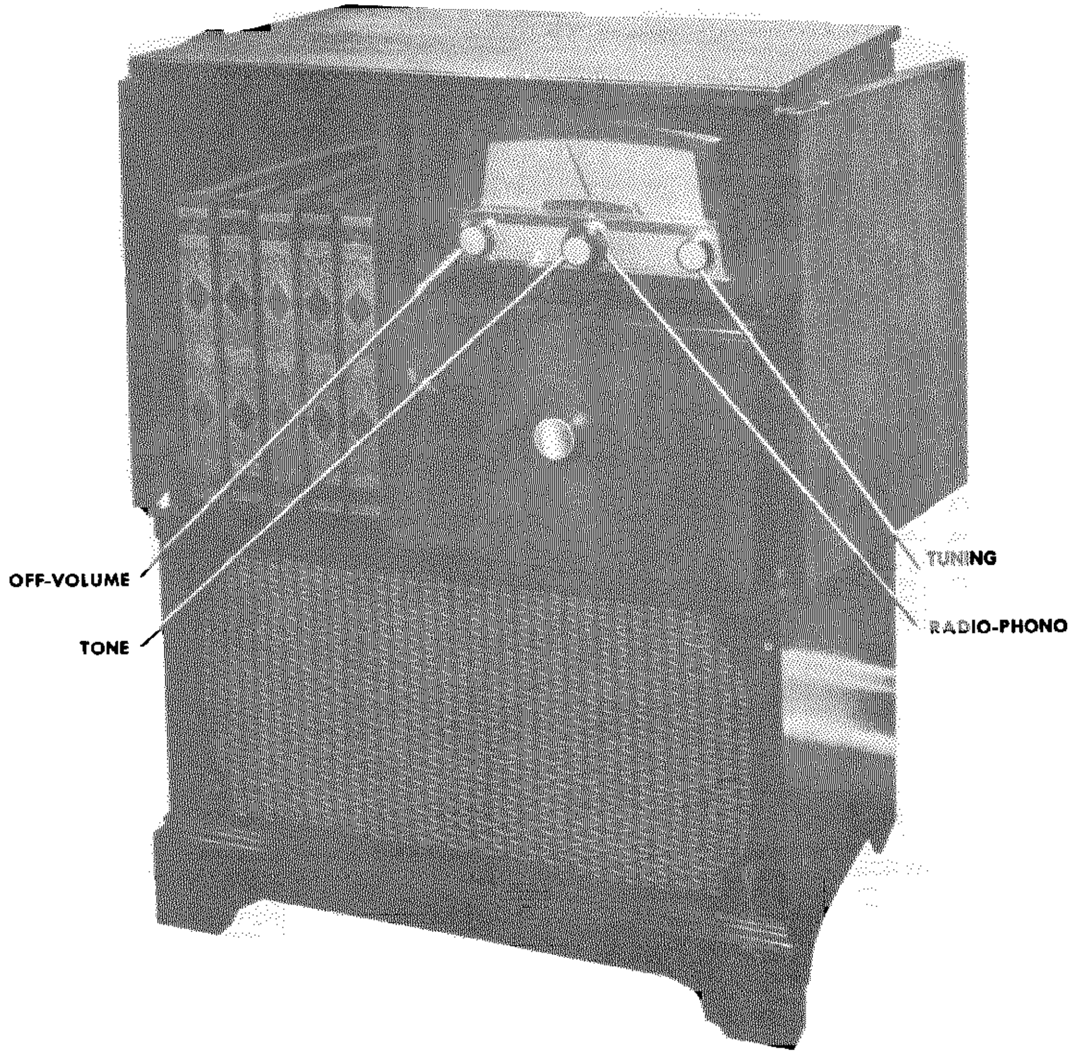
Fig. 10. Transformer Connections

MODEL 757
REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
		CAPACITORS — Values are ±10% unless noted
*RCE-039	C78	Filter, 30-30 mfd @ 300 v., 20 mfd. @ 25 v. electrolytic
*RCN-040	C3	6 mmf., silver mica
*RCN-048	C7	1.5 mmf., ceramic
RCT-052	C1	Tuning gang capacitor (insulated shaft)
*RCW-026	C8	.0015 mfd., ceramic
RCW-1058	C37	10 mmf., ceramic
*RCW-3014	C5, 10, 11, 12, 19, 41, 55, 56	.005 mfd., ceramic
*RCW-3029	C4	100 mmf., ceramic
*RCW-3039	C58	2.7 mmf., ceramic
*UCC-036	C32, 34	.002 mfd., 600 v., paper
*UCC-039	C20, 31	.005 mfd., 600 v., paper
*UCC-040	C17	.01 mfd., 600 v., paper
*UCC-041	C72, 73, 74	.02 mfd., 600 v., paper
*UCC-045	C22, 36, 40	.05 mfd., 600 v., paper
*UCC-048	C33, 35	.1 mfd., 600 v., paper
*UCC-056	C75, 77	.002 mfd., 1000 v., paper
*UCC-059	C76	.005 mfd., 1000 v., paper
*UCC-070	C28	.008 mfd., 600 v., paper
*UCG-044	C6	10 mmf., silver mica
*UCG-016	C21	33 mmf., silver mica
*UCG-020	C14, 15, 38, 59	47 mmf., silver mica
*UCG-1026	C26	82 mmf., silver mica
*UCU-044	C30	470 mmf., 500 v., mica
*UCU-536	C29	220 mmf., 500 v., mica
*UCU-1034	C60	180 mmf., mica
		RESISTORS
*RRW-056	R85, 86	Filter resistor, 650 ohms, 10 w., 1000 ohms, 8 w., w. w.
		½ watt, carbon ±10%
*URD-013	R23	33 ohms
*URD-017	R1	47 ohms
*URD-021	R29	68 ohms
*URD-025	R2, 6, 8, 22	100 ohms
*URD-031	R12	180K ohms
*URD-033	R41	220 ohms
*URD-041	R74	470 ohms
*URD-049	R72, 81	1000 ohms
*URD-053	R5, 30	1500 ohms
*URD-057	R4, 7, 9	2200 ohms
*URD-061	R77	3.3K ohms
*URD-069	R39	6.8K ohms
*URD-073	R44	10K ohms
*URD-081	R28	22K ohms
*URD-089	R14, 15	47K ohms
*URD-095	R76, 78	82K ohms
*URD-097	R11, 18, 31, 38	100K ohms
*URD-099	R16, 17	120K ohms
*URD-105	R13, 21, 35	220K ohms
*URD-113	R34, 43, 75, 79, 80	470K ohms
*URD-121	R36	1 meg.
*URD-129	R10	2.2 meg.
*URD-133	R37, 40	3.3 meg.
*URD-141	R20	6.8 meg.
*URE-081	R26	22K ohms—1 watt, carbon, ±10%
*URE-085	R84	33K ohms—1 watt, carbon, ±10%
*URF-035	R83	270 ohms—2 watt, carbon, ±10%
*URF-057	R3	2200 ohms—1 watt, carbon, ±10%
		MISCELLANEOUS ELECTRICAL
*RJC-001		CONNECTOR—Loop wire connector
*RJC-019		CONNECTOR—Speaker wire connector
*RJJ-008	J3	RECEPTACLE—AC power outlet receptacle
*RJP-003	P4	PLUG—AC plug for phono motor
*RJP-004	P1	PLUG—Phono audio input plug
*RJP-031	P2	PLUG—Inter-chassis cable plug
*RJS-003		SOCKET—Octal wafer socket, for V8, V9, V10, V11
*RJS-049	J4	RECEPTACLE—Phono motor power receptacle
*RJS-092		SOCKET—7 pin impregnated wafer socket
*RJS-101		JACK—Phono jack
*RJS-118		SOCKET—9 pin socket for V6
*RJS-143		SOCKET—9-pin socket for V2
*RJS-145		SOCKET—7 pin socket for V1, V3, V4, V5
*RJS-147		SOCKET—Pilot light socket
*RJS-152	J2	SOCKET—Inter-chassis cable socket
*RJS-154		SHELL—Cable plug shell

Cat. No.	Symbol	Description
		MISCELLANEOUS ELECTRICAL (Cont'd)
*RLC-106	T8	TRANSFORMER—BC oscillator transformer
*RLC-111	T9	TRANSFORMER—FM oscillator transformer
*RLI-122	L8	CHOKE—Oscillator plate choke, red, molded, 2.2 uh.
*RLI-124	L3, 9	CHOKE—Audio filter choke, RF plate choke, 18 turns
*RLI-128	L4	CHOKE—FM RF grid choke, 6 turns
*RLI-129	T7	TRANSFORMER—BC RF transformer
RLL-047	L2	LOOP—BC Antenna loop
*RRC-152	R19, S2, S3	CONTROL—On-off switch, tone switch, and volume control, 2 meg.
RSW-087	S1	SWITCH—Band switch
*RTD-010	T6, C52, C53, C54	TRANSFORMER—FM discriminator transformer, 10.7 mc, capacitors molded in base
*RTL-079	T2, C44, C45	TRANSFORMER—BC 1st IF transformer, 455 kc, capacitors molded in base
*RTL-111	T5, C24, C27, C50, C51	TRANSFORMER—BC 2nd IF transformer, 455 kc, capacitors molded in base
*RTL-112	T1, C42, C43	TRANSFORMER—FM 1st IF transformer, 10.7 mc, capacitors molded in base
*RTL-113	T3, C46, C47	TRANSFORMER—FM 2nd IF transformer, 10.7 mc, capacitors molded in base
*RTL-124	L10	CHOKE—3rd IF FM choke
*RTO-094	T72	TRANSFORMER—Output transformer
*RTP-306	T71	TRANSFORMER—Power transformer
*RWL-009	P3, 5	CORD—AC line cord and plug
*S-1212D-7		SPEAKER—12 inch PM speaker
		MISCELLANEOUS MECHANICAL
*RAA-002		ARM—Switch arm (for shaft)
*RAA-003		ARM—Switch arm (for switch)
*RAD-057		BRACKET—FM oscillator transformer mounting bracket
*RDC-032		CORD—Nylon dial cord, 25 yds. bulk
*RDM-025		WIRE—Dial pointer guide wire
*RDP-058		POINTER—Dial pointer and slide assembly
RDS-105		SCALE—Dial scale printed on chassis cover plate
*RHC-017		CLIP—Mounting clip for BC oscillator transformer
*RHC-034		CLIP—Mounting clip for I-F transformers
*RHC-038		CLIP—Mounting clip for BC RF trans.
*RHG-010		GROMMET—Preamp. socket mounting grommet
*RHG-015		GROMMET—Tuning gang mounting grommet
*RHG-029		GROMMET—Speaker lead insulating grommet
*RHI-011		INSULATOR—Strain relief insulator for power chassis power cord, .52" diameter
*RHI-017		INSULATOR—Strain relief insulator for tuner chassis power cord, .47" diameter
*RHJ-006		SLEEVE—Tuning gang mounting sleeve
*RHM-001		WASHER—"C" washer for tuning shaft
*RHN-015		NUT—Dial guide wire retaining nut
*RHS-066		SCREW—Hex head screw for tuning gang mounting
*RJS-012		PLATE—Mounting plate for filter capacitor
*RMS-119		SPRING—Dial cord tension spring
*RMS-221		SPRING—Record changer pan slide spring
*RMU-066		SHAFT—Band switch drive shaft
*RMU-067		SHAFT—Tuning shaft
*RQB-001		BRUSH—Stylus brush
		CABINET PARTS
RAB-166		BACK—Cabinet back for Model 757
RAC-098		PAN—Record changer base pan
†RAV-168		CABINET—Mahogany cabinet for Model 757
*RDE-098		ESCUTCHEON—Plastic dial escutcheon, includes dial window
*RDK-212		KNOB—Changer pan pull out knob
*RDK-233		KNOB—Tuning knob
*RDK-234		KNOB—Band switch knob, with arrow
*RDK-235		KNOB—Volume control knob
*RDK-236		KNOB—Tone switch knob, with dot
*RHS-057		SCREW—Wood screw for cabinet back
*RHS-058		SCREW—7/16 inch brass plated wood screw for top of escutcheon
*RHS-064		SCREW—⅝ inch brass plated wood screw for bottom of escutcheon
*RHS-077		SCREW—Wood screw for mounting loop
*RMM-153		SLIDE—Phono drawer slide

MODEL 741



SPECIFICATIONS

CABINET:

Material	Wood
Height	34 7/8 inches
Width	25 15/16 inches
Depth	16 11/16 inches

ELECTRICAL (INPUT):

Voltage (AC only)	105–120
Frequency	60 cps
Wattage (on Radio)	35
Wattage (on Phono)	55

OPERATING FREQUENCIES:

Broadcast Band	540–1600 kc
I-F Amplifier	455 kc

POWER OUTPUT (117 Volts Line):

Undistorted	1 watt
Maximum	2 watts

LOUDSPEAKER:

Type	Alnico PM
Outside Cone Diameter	10 inches
Voice Coil Impedance at 400 cps	3.2 ohms

PHONOGRAPH PICKUP:

Type	High Output Variable Reluctance
Cat. No.	RPX-048
Stylus Cat. No.	RPJ-014

RECORD CHANGER:

P16	33⅓, 45 and 78 RPM

TUBE COMPLEMENT:

V1	RF Amplifier	12SK7
V2	Oscillator Converter	12SA7
V3	IF Amplifier and Phono Preamp	6AU6
V4	Detector-Audio Amplifier	12SQ7
V5	Rectifier	35Z5GT/G
V6	Audio Power Amplifier	50L6GT
I1	Pilot Lamp	GE Mazda No. 47

GENERAL

This receiver is a superheterodyne radio, phonograph combination. The receiver employs five tubes and a rectifier. The I-F amplifier V3 (6AU6) is also used as a phono preamplifier.

This receiver uses a new high output variable reluctance pickup RPX-048. When replacing the pickup it must be replaced with an RPX-048 pickup to insure proper operation of the phonograph. When replacing the dual stylus assembly replace only with an RPJ-014 dual stylus assembly.

CAUTION

One side of the power line is connected to B−. Use an isolation transformer when making service adjustments with the chassis removed from the cabinet.

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ±20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. *I-F Gain*

12SA7 Grid to 6AU6 Grid..........50 @ 455 KC
6AU6 Grid to 12SQ7 Diode Plate...50 @ 455 KC

2. *Audio Gain*

Input of 0.15 volts at 400 cycles across volume control (R22) with control set at maximum will develop approximately ½ watt output across the speaker voice coil terminals.

3. *Oscillator Grid Bias*

DC voltage developed across the oscillator grid leak (R3) averages 8.5 volts at 1000 kc.

4. *Hum Measurement*

Hum measured across the voice coil of the speaker with the volume control set at minimum and band switch in the radio position should not exceed 12 millivolts.

PRODUCTION CHANGE

On early production R11 was a 1 meg 20% resistor and R12 was a 470,000 ohm 20% resistor. To improve phono sensitivity R11 was changed to 1.2 megohm 10% (URD-123) and R12 was changed from a 20% to a 10% tolerance resistor. The voltage on phono at the plate pin 5 of V3 should not drop below 13 volts as measured by a vacuum tube voltmeter.

TOUBLE SHOOTING NOTE

A gassy 12SA7 or 12SK7 may cause poor A.V.C. action thereby overloading the R.F. circuits and causing audio distortion at any setting of the volume control.

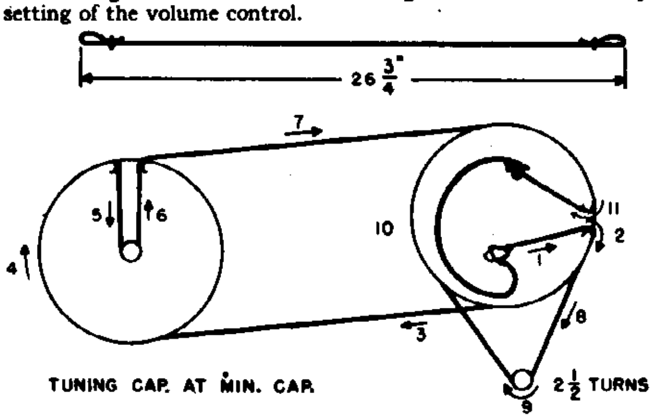


FIG. 1. STRINGING DIAGRAM

ALIGNMENT PROCEDURE

1. The chassis must be removed from the cabinet for I-F oscillator and r-f adjustments, steps 1 through 5. For alignment of the antenna trimmer on the loop, step 6, the chassis and loop should be mounted in position in the cabinet.

Connect an output meter across the speaker leads and make the necessary adjustments for maximum reading on the meter.

2. An isolation transformer should be used for the receiver power source when aligning or servicing these receivers to prevent short circuiting of equipment and shock hazard.

3. The output meter should be connected across the terminals of the loudspeaker voice coil.

4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than ½ watt output at the loudspeaker.

5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to B minus.

6. To align the antenna trimmer, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

7. Switch S2 should be in radio position during alignment.

ALIGNMENT CHART

Step	Connect Test Oscillator Between	Test Osc. Setting	Radio Dial Setting	Adjust Trimmers for Maximum
		I-F ALIGNMENT		
1	V3, 6AU6 grid (Pin 1), in series with .05 mfd and B minus			C7 and C8 of second i-f transformer, T3
2	V2, 12SA7 grid (Pin 8) in series with .05 mfd and B minus	455 KC		C5 and C6 of first i-f transformer, T2
3				Recheck C8, C7, C6, C5 for max.
		R-F ALIGNMENT		
4	V1, 12SK7 grid (Pin 4) in series with .05 mfd and B minus	1620 KC	Minimum capacity	C2B, oscillator trimmer
5	V1, 12SK7 grid (Pin 4) in series with .05 mfd and B minus	1500 KC	Tune for Maximum	C3B, r-f trimmer
6	Inductively coupled to the loop. See Note 6	1500 KC	Tune for Maximum	C1A antenna trimmer on loop

MODEL 741

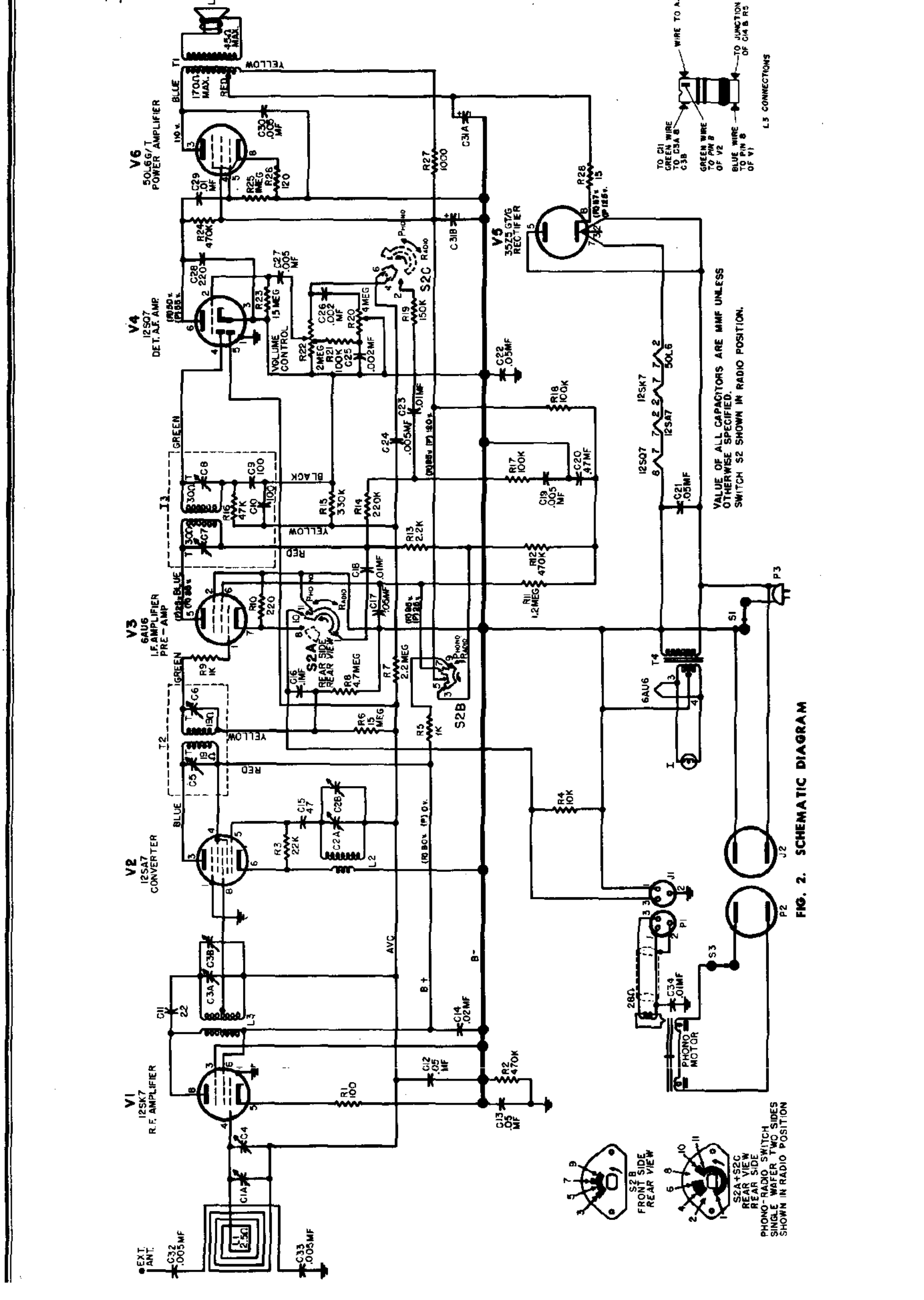


FIG. 2. SCHEMATIC DIAGRAM

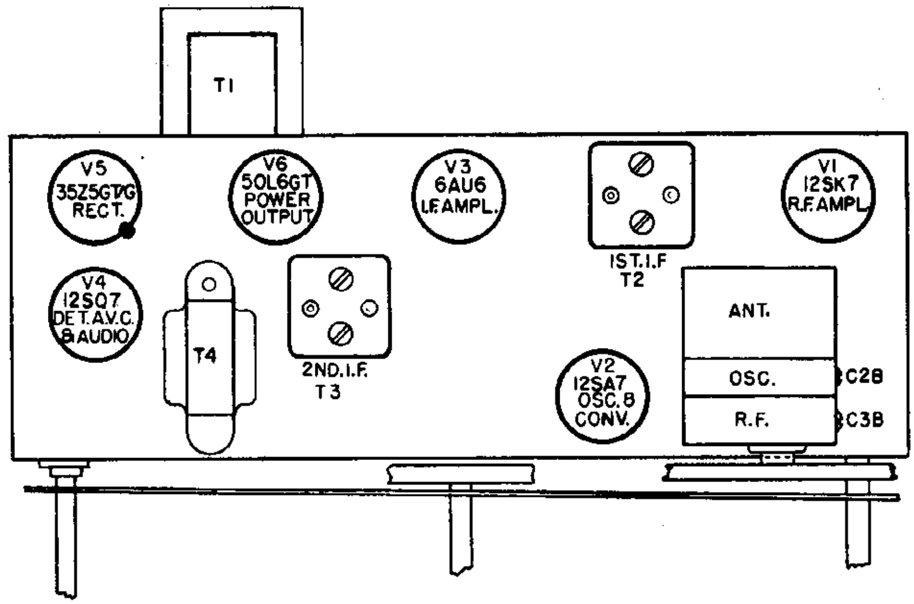
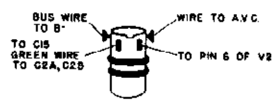


FIG. 3. TUBE AND TRIMMER LOCATION



L2 CONNECTIONS

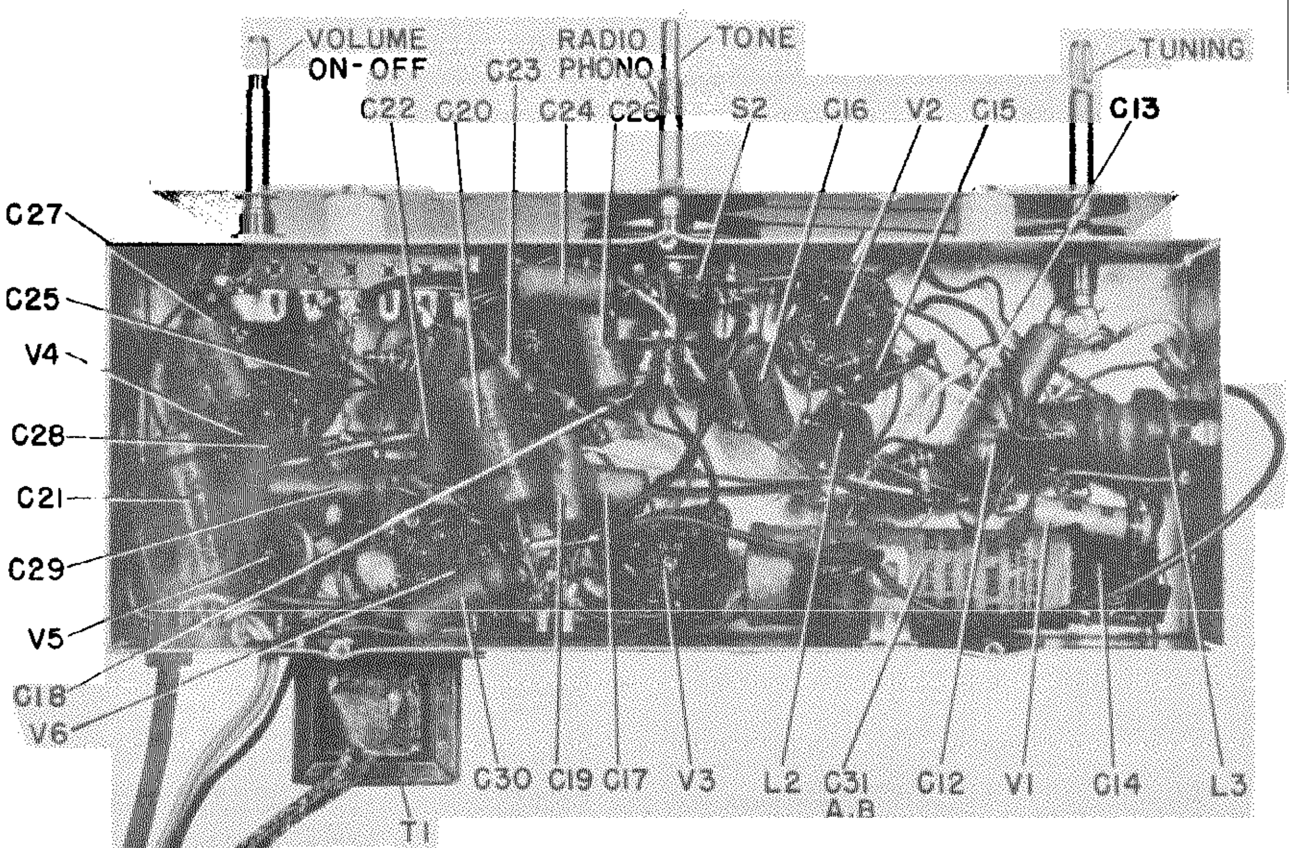
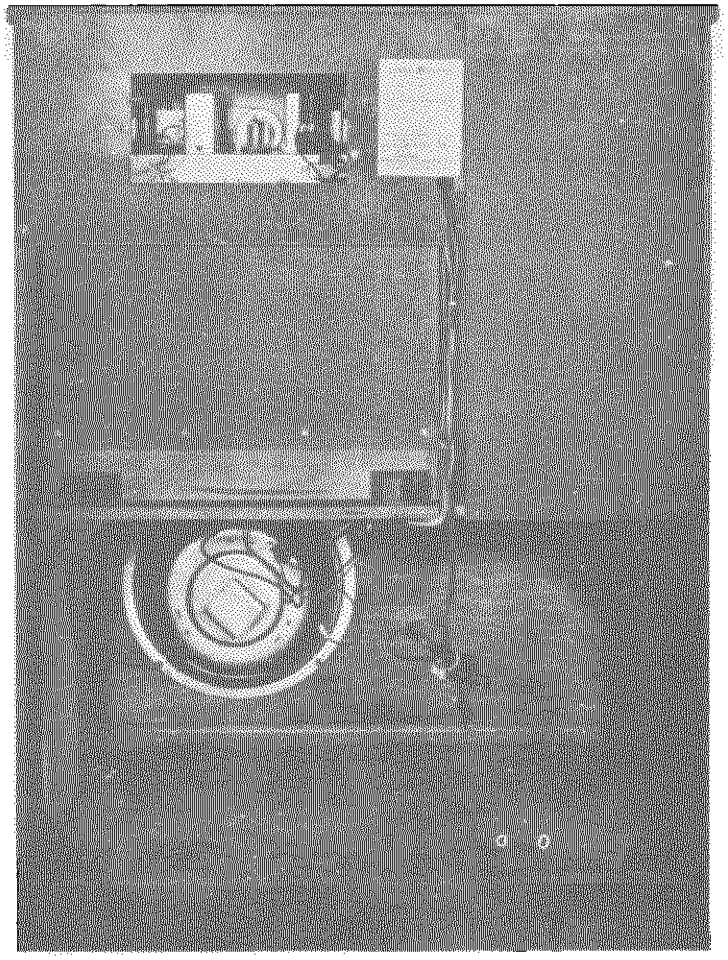


FIG. 4. BOTTOM VIEW

MODEL 741



MODEL 741 REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
		CAPACITORS
RCC-110	C16	.1 mfd, 200 v
RCE-135	C31A, B	Electrolytic
*RCN-039	C11	2.2 mmf, silver mica
*RCT-048	C1A, 2A, 2B, 3A, 3B	Tuning gang
*RCY-016	C4	Trimmer
*UCG-020	C15	47 mmf, silver mica
*UCG-1036	C28	220 mmf, silver mica
*UCC-036	C25, 26	.002 mf., 600 v, paper
*UCC-039	C19, 24, 27, 30, 32, 33	.005 mf, 600 v, paper
*UCC-040	C18, 23, 29	.01 mf, 600 v, paper
*UCC-041	C14	.02 mf, 600 v, paper
*UCC-045	C12, 13, 17, 21, 22	.05 mf, 600 v, paper
*UCC-048	C20	.1 mf, 600 v, paper
		RESISTORS
*RRC-151	R22, S1	Volume and switch
RRC-167	R20, S2	Tone and switch
*URD-005	R28	15 ohms, ½ w
*URD-025	R1	100 ohms, ½ w
*URD-027	R26	120 ohms, ½ w
*URD-033	R10	220 ohms, ½ w
*URD-049	R5, 9	1000 ohms, ½ w
*URD-057	R13	2,200 ohms ½ w
*URD-073	R4	10,000 ohms, ½ w
*URD-081	R3	22,000 ohms, ½ w
*URD-097	R17, 18, 21	100,000 ohms, ½ w
*URD-101	R19	150,000 ohms, ½ w
*URD-105	R14	220,000 ohms, ½ w
*URD-109	R15	330,000 ohms, ½ w
*URD-113	R2, 12, 24	470,000 ohms, ½ w
*URD-121	R25	1 meg, ½ w
*URD-123	R11	1.2 meg, ½ w
*URD-129	R7	2.2 meg, ½ w
*URD-137	R8	4.7 meg, ½ w
*URD-149	R6, 23	15 meg, ½ w
*URF-049	R27	1000 ohms, 2 w
		COILS AND TRANSFORMERS
*RLC-105	L2	OSCILLATOR COIL
*RLI-125	L3	R.F. TRANSFORMER
*RTF-001	T4	FILAMENT TRANSFORMER
*RTL-115	T2, C5, C6	1ST I.F. TRANSFORMER
*RTL-116	T3, C7, 8, 9, 10, R16	2ND I.F. TRANSFORMER
RTO-111	T1	OUTPUT TRANSFORMER

*Parts used on previous models.

Cat. No.	Symbol	Description
		MISCELLANEOUS ELECTRICAL
*RJC-019		PINS—Speaker lead
RJP-003	P2	PLUG Phono power (male)
*RJS-003		SOCKET—Tube for V1, V2, V4, V5, V6
*RJS-049	J2	SOCKET—Phono power female
*RJS-097	J1	SOCKET Phono on chassis
*RJS-141		SOCKET—Tube for V3
RJX-007	P1	PLUG Phono (male)
RJX-031		SOCKET—Pilot lamp
RPJ-014		STYLUS Dual stylus for pickup RPX-048
RPX-048		PICKUP—High output dual stylus pickup
*RWL-004		CORD Power
		MISCELLANEOUS MECHANICAL
*RDC-032		DIAL CORD (25 y'ds)
RDP-062		POINTER
RDS-108		BACK PLATE AND DIAL SCALE
*RHC-017		CLIP - For oscillator coil L2
*RHC-038		CLIP—R.F. coil mtg.
*RHC-024		CLIP Capacitor
*RHG-018		GROMMET—Gang mtg.
*RHG-029		GROMMET—Phono power cord
*RHI-017		STRAIN RELIEF (Power cord)
*RHJ-007		SPACER—Gang mtg.
*RMC-002		CLIP—Osc. coil
*RMS-130		SPRING—Dial cord
RMX-174		DRIVE SHAFT AND BUSHING—For tuning control
*ROP-018		SPEAKER—10 in.
*RQB-001		BRUSH—Record changer
		CABINETS AND CABINET PARTS
RAB-168	L1	LOOP AND BACK ASSEMBLY
RAV-171		CABINET—Model 741
RDE-122		ESCUTCHEON & DIAL WINDOW
RDK-257		KNOB—(Brown) Volume OFF-ON tuning
RDK-258		KNOB—(Brown) for switch
RDK-259		KNOB—(Brown) (Tone)

GENERAL

Tubes . . . . Seven plus rectifier

Speaker . . . . 5-inch PM

Speaker V.C. Impedance . 3.2 ohms

Headset Output . . . . Low Impedance

Antenna . . . . Provision for external antenna

Tuning. . . . . Manual

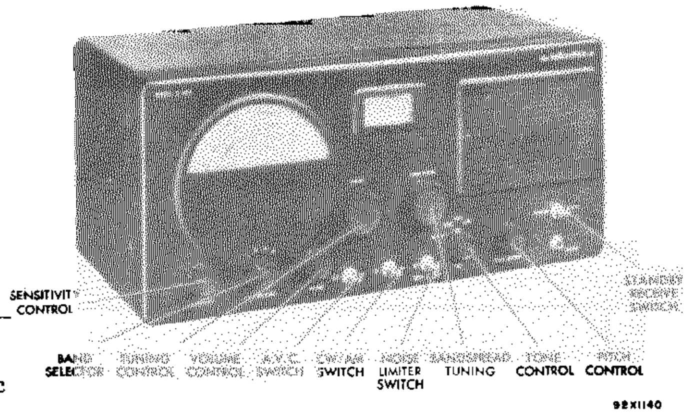
Tuning Range . . . .

Band Selector Position	Frequency Range
1.	540 kc - 1680 kc
2.	1680 kc - 5.4 mc
3.	5.3 mc - 15.5 mc
4.	15.5 mc - 44 mc

Intermediate Frequency . 455 kc.

Power Supply . . . . Standard Model 105-125 V. 60 cycles AC
Universal Model 105-250 V. 25/135 cycles AC

Power Consumption. . . . 75 Watts



RESTRINGING DIAL CORD

To restring the general coverage tuning dial cord, cut an 18-inch length of 30 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Follow the numbers "1" through "4", and at position "4" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord cut a 36-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

REPLACING LAMPS

Refer to Fig. 7 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. Mazda #44 (Blue bead) lamps or equivalent.

ALIGNMENT PROCEDURE

For I-F amplifier alignment it will be necessary to remove the receiver chassis from the cabinet. The chassis is held in the cabinet by three screws along both the bottom edge of the front panel and the rear of the cabinet, and two screws on either side of the front panel.

NOTE - R-F alignment should be accomplished through the holes provided in the cabinet bottom as the oscillator calibration will be effected slightly by changes in the capacity between the cabinet bottom and the r-f coils and wiring.

Before starting the alignment procedure, check the position of the general coverage dial index marker on the low frequency end of the range and the bandspread dial on zero position. The general coverage condenser should index at max. capacity, and the bandspread condenser at min. capacity.

The standard RMA dummy antenna mentioned in the alignment chart consists of a 200 mmf. condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

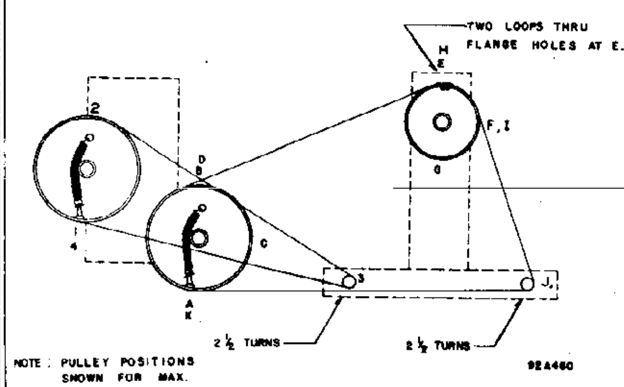


Fig 1. Dial cable stringing procedure

Set the following controls before alignment.

SENSITIVITY . . . . Set at maximum
VOLUME . . . . Set at maximum
AVC switch. . . . . Set at OFF
BAND SPREAD . . . . Set at zero
CW/AM . . . . Set at AM (See Step 2)
NOISE LIMITER . . . . Set at OFF
STANDBY RECEIVE . . . . Set at RECEIVE
TONE SWITCH . . . . Set at HIGH

For the settings of the remaining controls, see alignment chart.

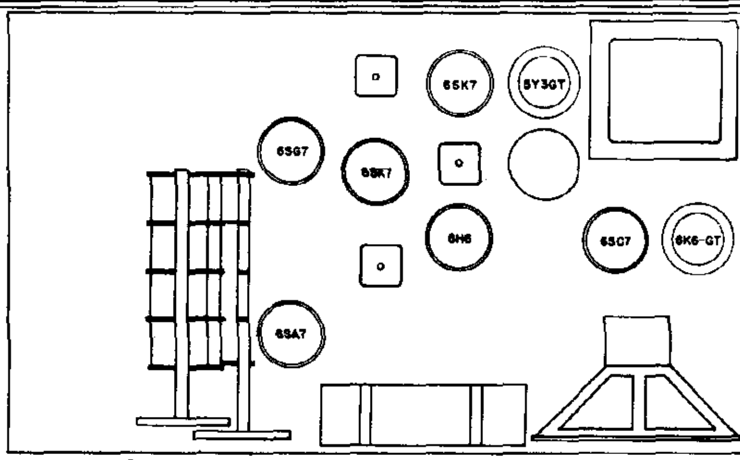


Fig. 7. Top view, location of tubes and dial lamps

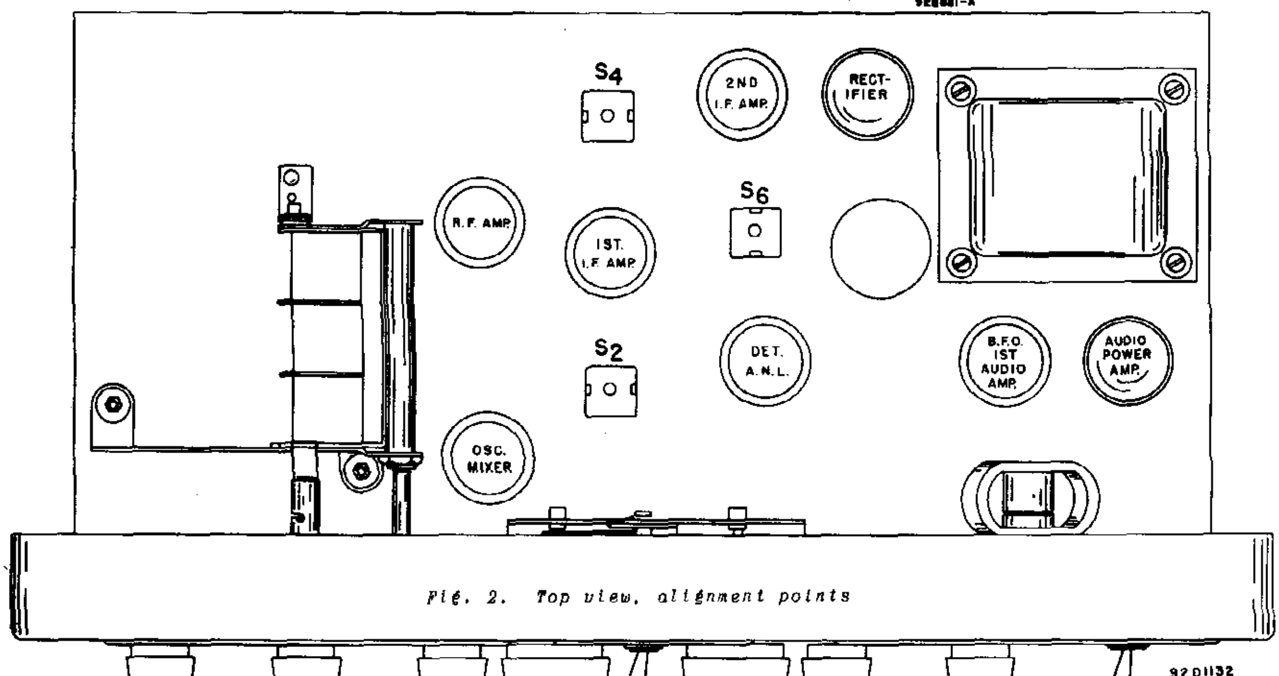


Fig. 2. Top view, alignment points

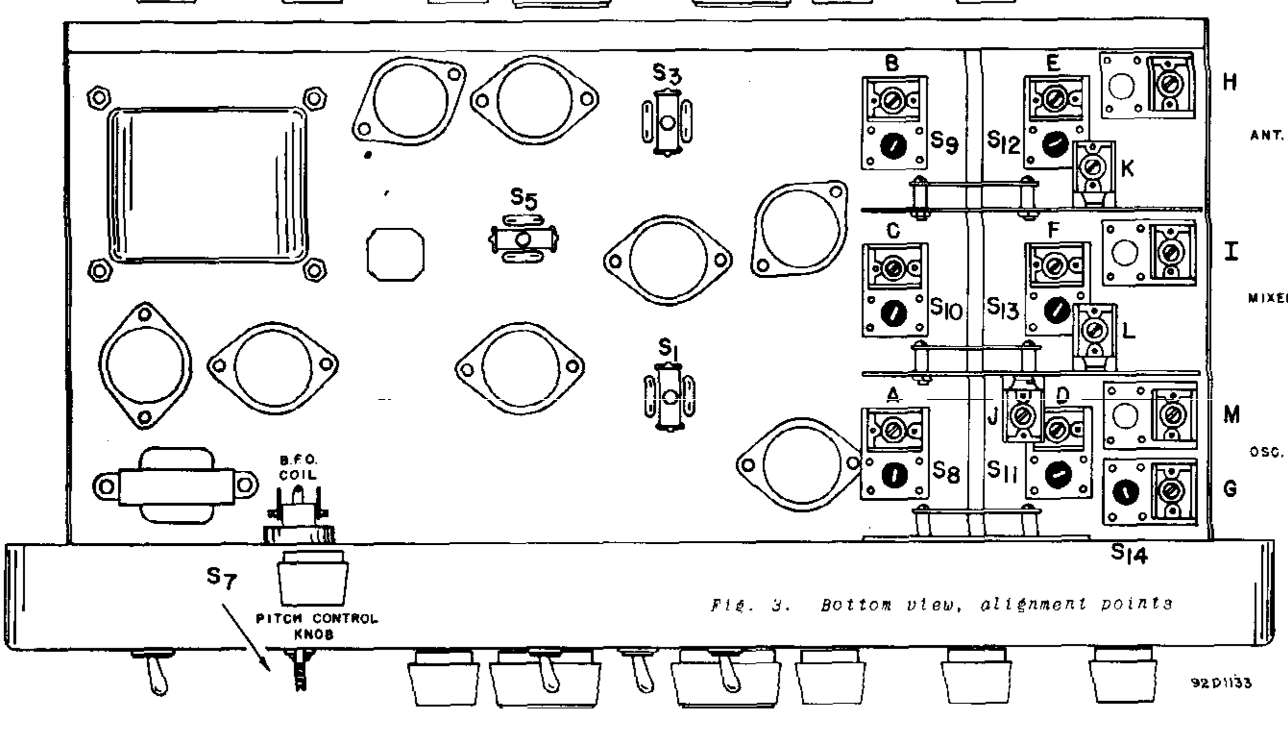


Fig. 3. Bottom view, alignment points

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust	Remarks
1	None	Stator plates in center section of tuning gang.	455 kc	"1"	1000 kc	S1,S2,S3 S4,S5,S6	Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 MW signal level.
2	None	See step 1	455 kc (No modulation)	"1"	1000 kc	S7	With the CW/AM switch set at CW, remove the pitch control knob and adjust S1 for zero beat. Replace the knob with the dot in the center position.
3	Std RMA dummy	"A1" on antenna strip. Jumper connected between "A2" and "G".	36 mc	"4"	36 mc	*A, B, C	Maximum output as in step 1
			18 mc		18 mc	*S8,S9,S10	
4	Std RMA dummy	See step 3	14 mc	"3"	14 mc	*D, E, F	Maximum output as in step 1
			10 mc		10 mc	*S11,S12,S13	
5	Std RMA dummy	See step 3	5 mc	"2"	5 mc	*G, H, I	Maximum output as in step 1
			1.8 mc		1.8 mc	*S14	
6	Std RMA dummy	See step 3	1500 kc	"1"	1500 kc	*J, K, L	Maximum output as in step 1
			600 kc		600 kc	*M	

*Note - Calibration adjustments.

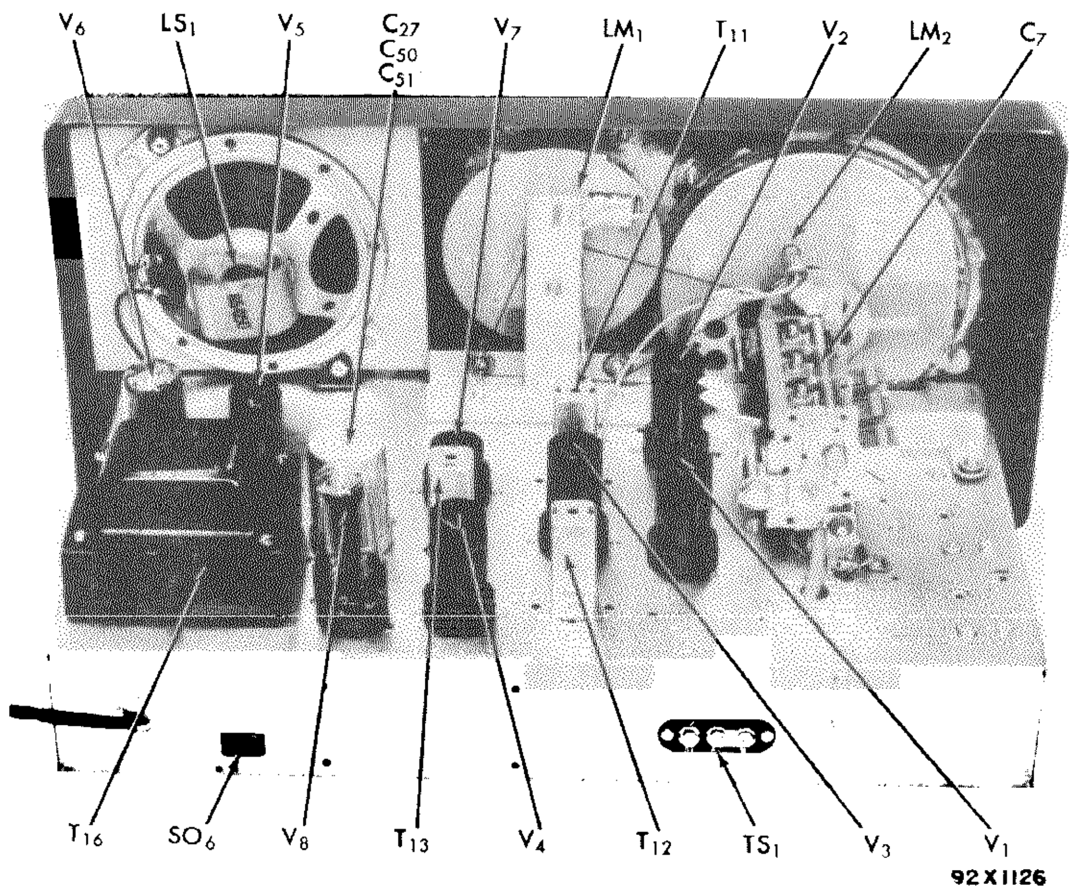


Fig. 4. Top view, component location

MODEL S-40B

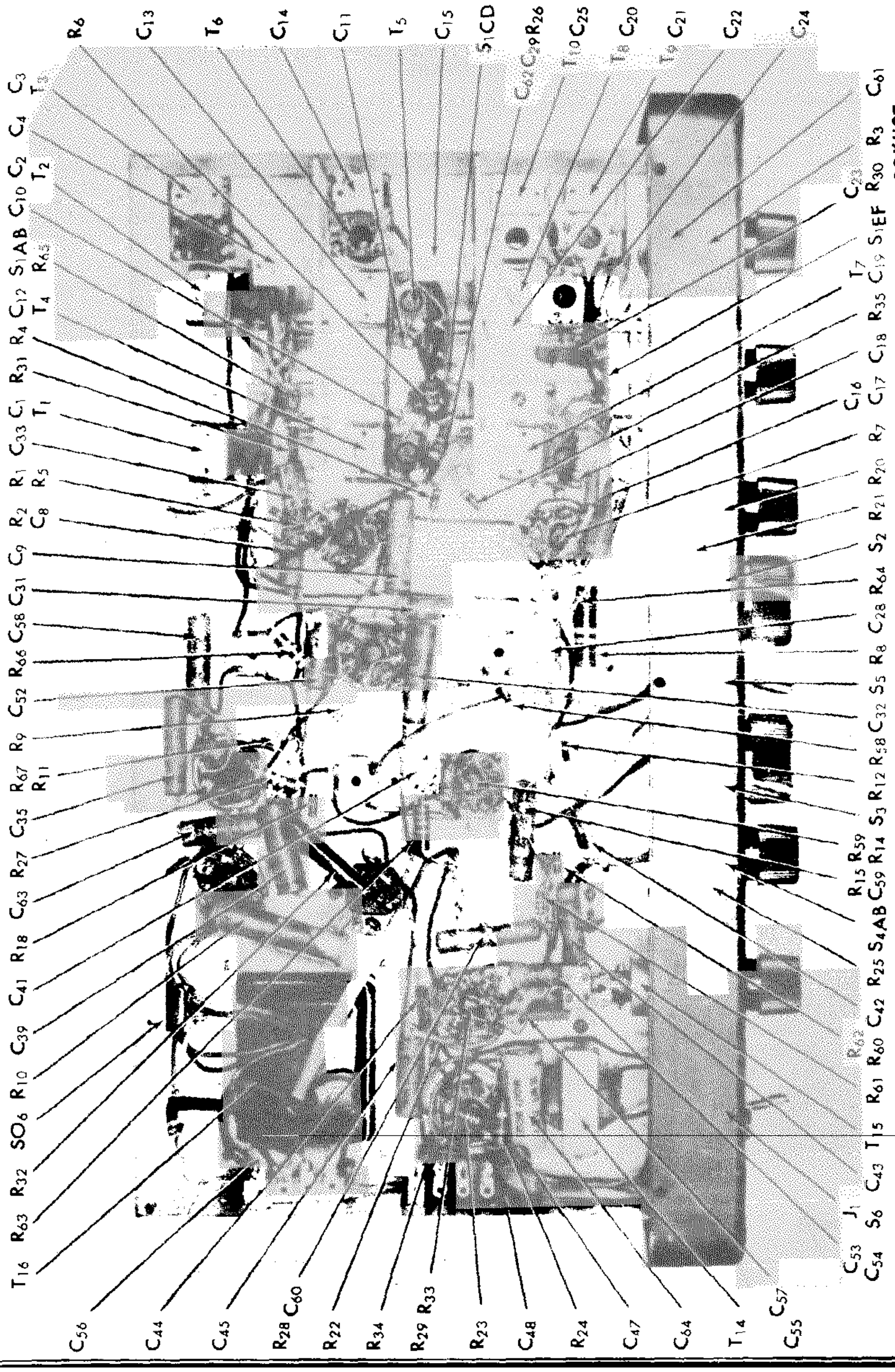


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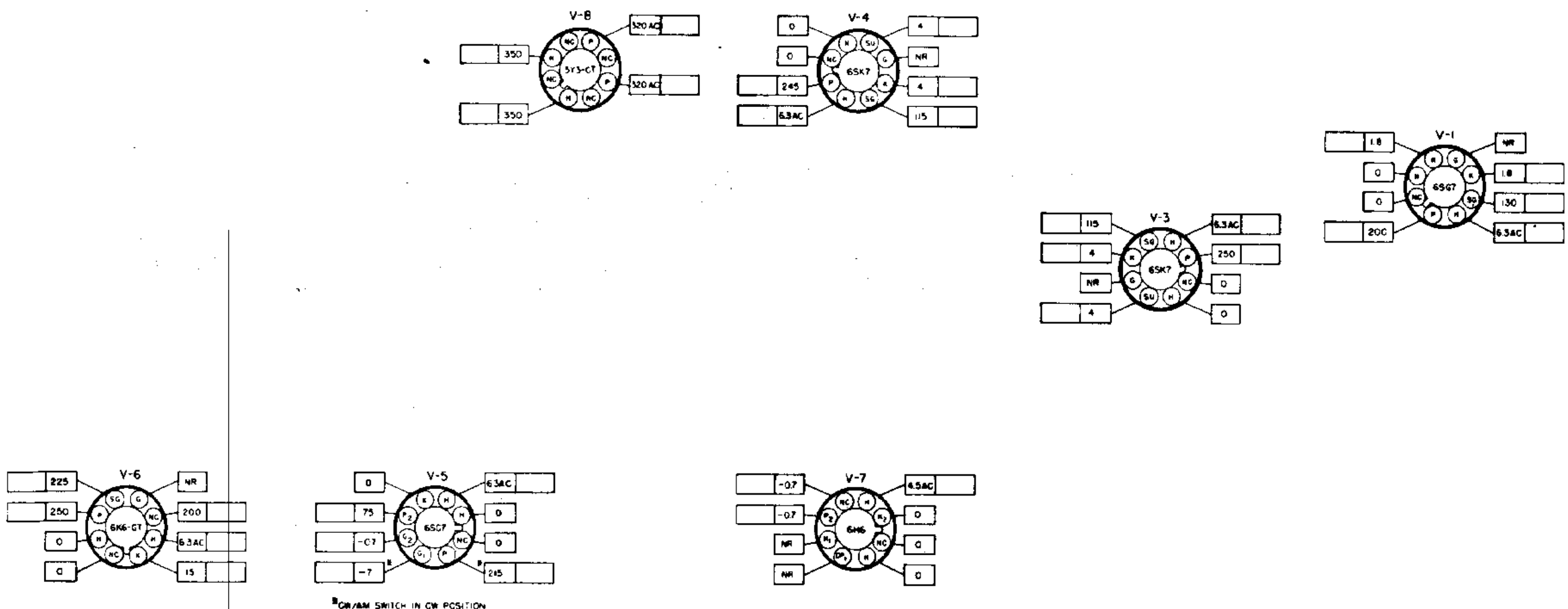
Fig. 5. Bottom view, component location



*CW/AM SWITCH IN CW POSITION

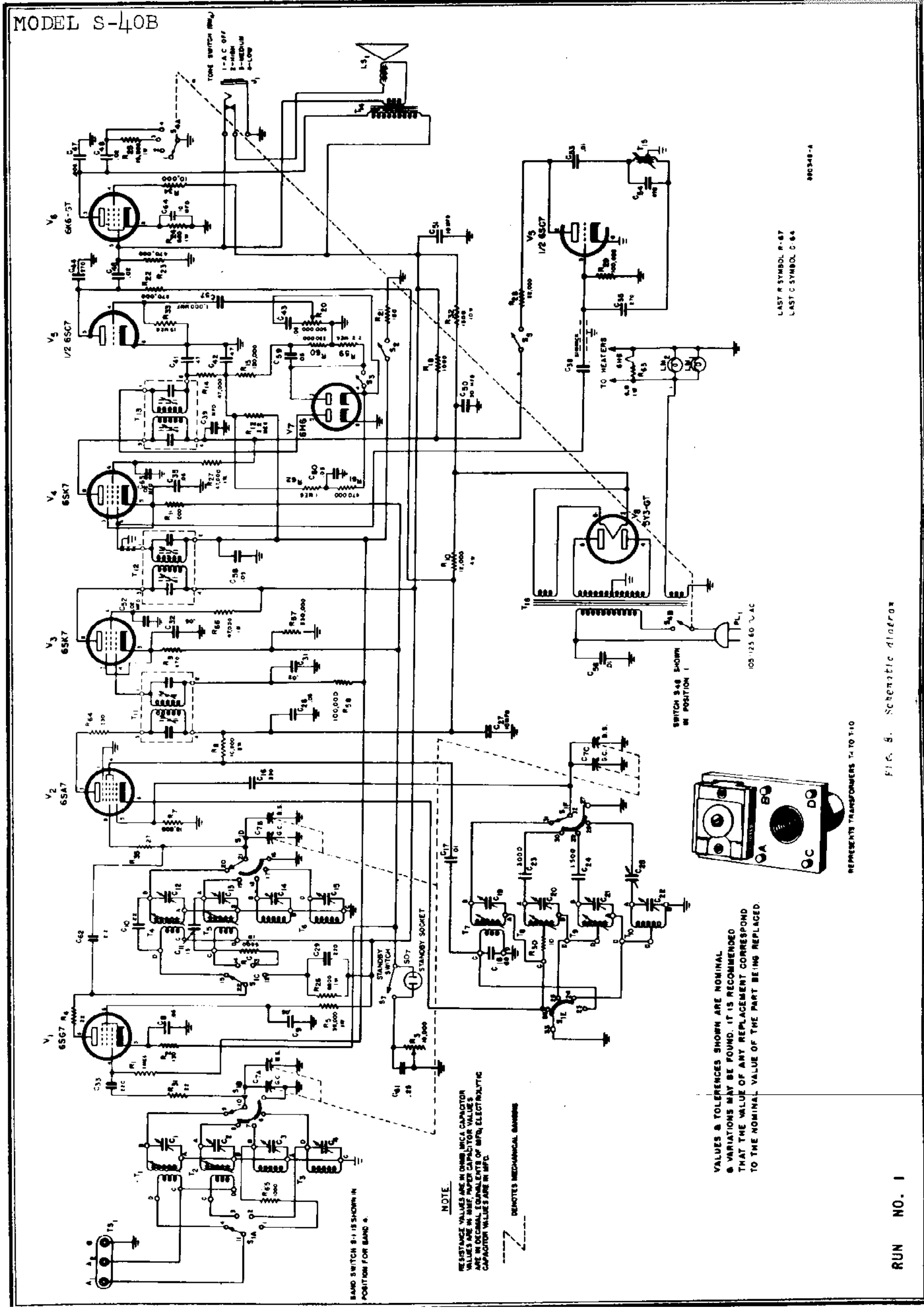
NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT
3. LINE VOLTAGE 117 V AC
4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC"–NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG)
7. "NR"–NOT READABLE (READING GENERALLY MEANINGLESS)
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS

FRONT APRON
BOTTOM VIEW OF CHASSIS

92E1097

Fig. 6. Tube socket voltage chart

MODEL S-40B


V1 6SG7
V2 6SA7
V3 6SK7
V4 6SK7
V5 1/2 6SC7
V6 6K6-GT
V7 6H6
V8 5Y3-GT
V9 1/2 6SC7
STANDBY SWITCH
STANDBY SOCKET
TO HEATERS
LAST R SYMBOL R-67
LAST C SYMBOL C-64
VALUES & TOLERENCES SHOWN ARE NOMINAL & VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.
NOTE
DENOTES MECHANICAL GANGING
RUN NO. 1

SERVICE PARTS LIST

CONDENSERS

Ref. No.	Description	Hallicrafters Part Number
C-1,2,12, 13,19	Trimmer, adjustable, part of transformers T-1,2,4,5 and 7	44A149
C-3	Trimmer, adjustable, part of transformer T-3	44A389
C-4,15,22	Trimmer, adjustable	44A191
C-7	Tuning capacitor, 3 sections ganged	48C240-B
C-8,32,35, 58,59,60	.05 mfd. 200 V., tubular	46AU503J
C-9,28	.05 mfd. 600 V., tubular	46AY503J
C-10	22 mmf. 500 V., ceramic	47X21UK220M
C-11	15 mmf. 500 V., ceramic	47X21UK150M
C-14,21	Trimmer, adjustable, part of transformers T-6 and 9	44A147
C-16	390 mmf. 500 V., mica	47X20B391K
C-17,53	.01 mfd. 600 V., tubular	46AY103J
C-18	68 mmf. 500 V., ceramic	47X25UK680K
C-20	Trimmer, adjustable, part of transformer T-8	44A148
C-25	Padder, adjustable, part of transformer T-10	44A188
C-23	3000 mmf. 500 V., mica	47X30C302K
C-24	1500 mmf. 500 V., mica	47X30C152J
C-27,50,51	30-10-10 mfd. 450 V., electrolytic	45A062
C-29,33	220 mmf. 500 V., mica	47X20B221K
C-31,43	.02 mfd. 200 V., tubular	46AU203J
C-38	2 mmf., twisted wire gimmick	
C-39	.1 mfd. 600 V., tubular	46AY104J
C-41,42	47 mmf. 500 V., mica	47X20B470M
C-44,55	270 mmf. 500 V., mica	47X20B271K
C-45,48,52, 63	.02 mfd. 600 V., tubular	46AY203J
C-47	.002 mfd. 1000 V., tubular	46A104
C-54	470 mmf. 500 V., mica	47X20B471J
C-56	.01 mfd. 600 V., molded paper	46AC103J
C-57	1000 mmf. 500 V., mica	47X25B102M
C-61	.25 mfd. 200 V., tubular	46AT254J
C-62	2.2 mmf. 500 V., bakelite	47A160-4
C-64	10 mfd. 25 V., electrolytic	45A121

RESISTORS

Ref. No.	Description	Hallicrafters Part Number
R-1,62	1 megohm 1/2 watt, carbon	23X20X105M
R-2	120 ohms 1/2 watt, carbon	23X20X121K
R-3	10,000 ohms, SENSITIVITY control	25B590
R-4,31	22 ohms 1/2 watt, carbon	23X20X220M
R-5	39,000 ohms 1 watt, carbon	23X30X393K
R-6,26	6800 ohms 1 watt, carbon	23X30X682K
R-7	18,000 ohms 1/2 watt, carbon	23X20X183K
R-8	10,000 ohms 2 watts, carbon	23X40X103K
R-9	470 ohms 1/2 watt, carbon	23X20X471K
R-10	12,000 ohms 4 watts, carbon	23X65CE123K
R-11,18,65	1000 ohms 1/2 watt, carbon	23X20X102K
R-12,59	2.2 megohms 1/2 watt, carbon	23X20X225M
R-14	47,000 ohms 1/2 watt, carbon	23X20X473M
R-15,29,58	100,000 ohms 1/2 watt, carbon	23X20X104M
R-20	1/2 megohm , VOLUME control	25A534
R-21	150 ohms 1/2 watt, carbon	23X20X151M
R-22	270,000 ohms 1/2 watt, carbon	23X20X274K
R-23,61	470,000 ohms 1/2 watt, carbon	23X20X474M
R-24	680 ohms 1 watt, carbon	23X30X681K
R-25	15,000 ohms 1 watt, carbon	23X30X153M
R-27,66	47,000 ohms 1 watt, carbon	23X30X473K
R-28	22,000 ohms 1/2 watt, carbon	23X20X223M
R-30	10 ohms 1/4 watt, carbon	23X10X100M
R-32	1500 ohms 10 watts, WW	24BG152E
R-33	15 megohms 1/4 watt, carbon	23X10X156M
R-34	10,000 ohms 1/2 watt, carbon	23X20X103M
R-35	27 ohms 1/4 watt, carbon	23X10X270K
R-60,67	330,000 ohms 1/2 watt, carbon	23X20X334K
R-63	6.8 ohms 1 watt, carbon	23X30X068K
R-64	330 ohms 1/2 watt, carbon	23X20X331K

TRANSFORMERS AND COILS

Ref. No.	Description	Hallicrafters Part Number
T-1	Transformer, antenna stage, band 4	51B783
T-2	Transformer, antenna stage, band 3	51B782
T-3	Transformer, antenna stage, band 1 and 2	51B1241
T-4	Transformer, mixer stage, band 4	51B787
T-5	Transformer, mixer stage, band 3	51B786
T-6	Transformer, mixer stage, band 1 and 2	51B1240
T-7	Transformer, oscillator stage, band 4	51B791
T-8	Transformer, oscillator stage, band 3	51B913
T-9	Transformer, oscillator stage, band 2	51B789
T-10	Transformer, oscillator stage, band 1	51B912
T-11,12	Transformer, 1st and 2nd IF stages	50C243
T-13	Transformer, detector stage	50C242
T-14	Transformer, audio output	55B093
T-15	Transformer, BFO	54B044
T-16	Transformer, power	52A209
*T-16	Transformer, power (Universal)	52C210

SWITCHES

Ref. No.	Description	Hallicrafters Part Number
S-1	Bandswitch, wafer, antenna stage	60B389
	Bandswitch, wafer, mixer stage	62B039
	Bandswitch, wafer, oscillator stage	62B044
	Bandswitch, shaft	60B392
S-2,3, 5,6	Switch, toggle, S.P.S.T., A.V.C., A.N.L., CW-AM, and STANDBY-RECEIVE	60A138
S-4	Switch, PWR-TONE control	60A225

PLUGS AND SOCKETS

Ref. No.	Description	Hallicrafters Part Number
J-1	Jack, headset	36A002
PL-1	Line cord	87B1573
SO-6	Socket, standby	10A015
	Socket, octal (tube)	6A035
	Socket, dial light, general coverage dial	86A070
	Socket, dial light, bandspread dial	86B049

TUBES, RECTIFIERS AND LAMPS

Ref. No.	Description	Hallicrafters Part Number
V-1	Type 6SG7, r-f amplifier	90X6SG7
V-2	Type 6SA7, mixer	90X6SA7
V-3,4	Type 6SK7, 1st and 2nd i-f amplifiers	90X6SK7
V-5	Type 6SC7, B.F.O. and audio amplifier	90X6SC7
V-6	Type 6K6GT, audio power amplifier	90X6K6GT
V-7	Type 6H6, A.N.L. and detector	90X6H6
V-8	Type 5Y3GT, rectifier	90X5Y3GT
LM-1,2	Lamp, dial light, Mazda #44	39A003

MISCELLANEOUS

Ref. No.	Description	Hallicrafters Part Number
TS-1	Terminal strip, antenna	88A032
	Lock, line cord	76A397
	Spring, retainer (Bandspread, and main tuning drive shaft)	75A062
	Dial cord	38A001
	Spring, dial cord	75A012
	Dial, bandspread	83B372
	Dial, general coverage	83C240
	Glass, general coverage dial	22B199
	Window, bandspread	22A307
LS-1	Speaker, P.M. (5-inch)	85B050
	Knob, PITCH CONTROL	12A058
	Knob, SENSITIVITY, VOLUME and TONE	15A046
	Knob, TUNING and BANDSPREAD	15A047
	Knob, BAND SELECTOR	15A266
	Foot, rubber	16A007

* Used on Universal Model S-40BU only.

Radio Receiver Model S-77, front view.

Tubes	Seven plus rectifier
Speaker	5-inch PM
Speaker V.C. Impedance .	3.2 ohms
Headset Output	Low Impedance
Antenna	Provision for external antenna
Tuning.	Manual
Intermediate Frequency .	455 kc
Power Supply	105-125 V. DC/60 cycles AC (using 117 V. ballast tube, R-38) or 210-250 V. DC/60 cycles AC (using 220 V. ballast tube, R-39)
Power consumption . . .	40 Watts

TUNING RANGE

Band Selector Position	Frequency Range
1.	540 kc - 1680 kc
2.	1680 kc - 5.4 mc
3.	5.3 mc - 15.5 mc
4.	15.5 mc - 44 mc

SERVICE INSTRUCTIONS

RESTRINGING DIAL CORD

To restring the main tuning dial cord, cut a 15-inch length of 30 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Follow the numbers "1" through "4", and at position "4" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord cut a 22-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

REPLACING LAMPS

Refer to Fig. 7 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. G.E. #47 (brown bead) lamps or equivalent.

ALIGNMENT PROCEDURE

For I-F amplifier alignment it will be necessary to remove the receiver chassis from the cabinet. The chassis is held in the cabinet by three screws along both the bottom edge of the front panel and the rear of the cabinet, and two screws on either side of the front panel.

NOTE - R-F alignment should be accomplished through the holes provided in the cabinet bottom as the oscillator calibration will be effected slightly by changes in the capacity between the cabinet bottom and the r-f coils and wiring.

Before starting the alignment procedure, check the position of the main tuning index marker on the low frequency end of the range and set the bandspread dial on zero position. The main tuning condenser should index at max. capacity, and the bandspread condenser at min. capacity.

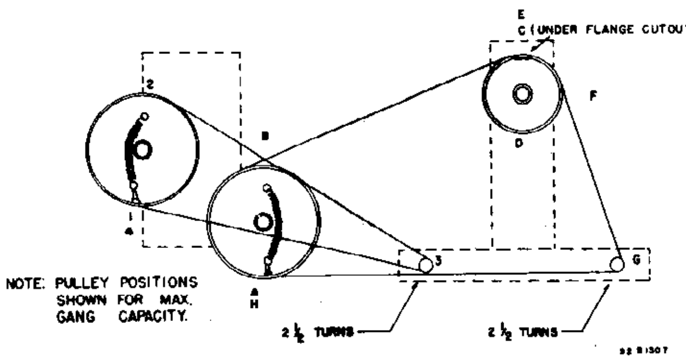


FIG. I. DIAL CABLE STRINGING PROCEDURE

The standard RMA dummy antenna mentioned in the alignment chart consists of a 200 mmf. condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf. condenser in series with a 400 ohm carbon resistor.

Set the following controls before alignment

SENSITIVITY . . . . Set at maximum

VOLUME . . . . Set at maximum

AVC switch. . . . . Set at OFF

BAND SPREAD . . . . Set at zero

CW/AM . . . . Set at AM (See Step 2)

NOISE LIMITER . . . . Set at OFF

STANDBY/RECEIVE . . . . . Set at RECEIVE

TONE SWITCH . . . . Set at HIGH

For the settings of the remaining controls, see alignment chart.

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust	Remarks
1	None	Stator plates in center section of tuning gang.	455 kc	"1"	1000 kc	A,B,C, D,E,F	Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 MW signal level.
2	None	See step 1	455 kc (No modulation)	"1"	1000 kc	G	With the CW/AM switch set at CW, remove the pitch control knob and adjust "G" for zero beat. Replace the knob with the dot on the center position.
3	Std RMA dummy	"A1" on antenna strip. Jumper connected between "A2" and "G".	36 mc	"4"	36 mc	*H,I,J	Maximum output as in step 1.
			18 mc		18 mc	*K,L,M	
4	Std RMA dummy	See step 3	14 mc	"3"	14 mc	*N,O,P	Maximum output as in step 1.
			10 mc		10 mc	*Q,R,S	
5	Std RMA dummy	See step 3	5 mc	"2"	5 mc	*T,U,V	Maximum output as in step 1.
			1.8 mc		1.8 mc	*W	
6	Std RMA dummy	See step 3	1500 kc	"1"	1500 kc	*X,Y,Z	Maximum output as in step 1.
			600 kc		600 kc	*Z'	

*Note - Calibration adjustments.

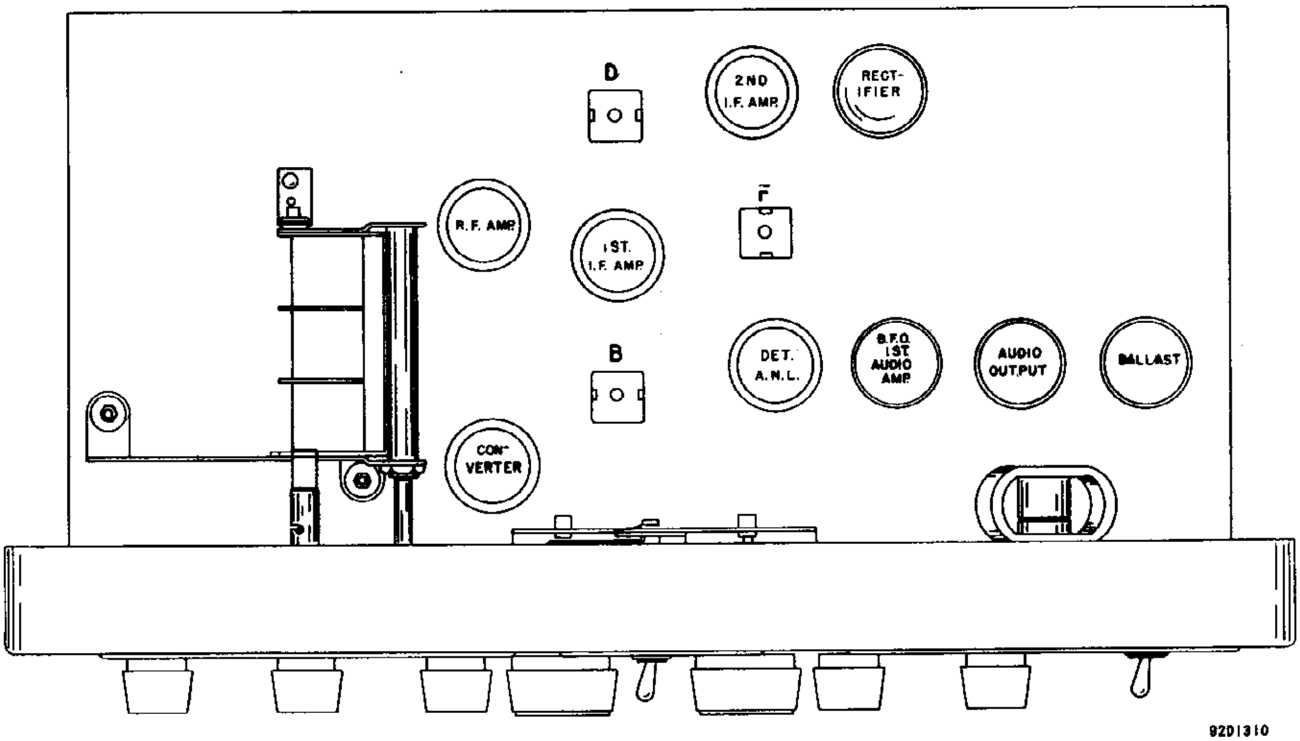


FIG. 2. TOP VIEW, ALIGNMENT POINTS

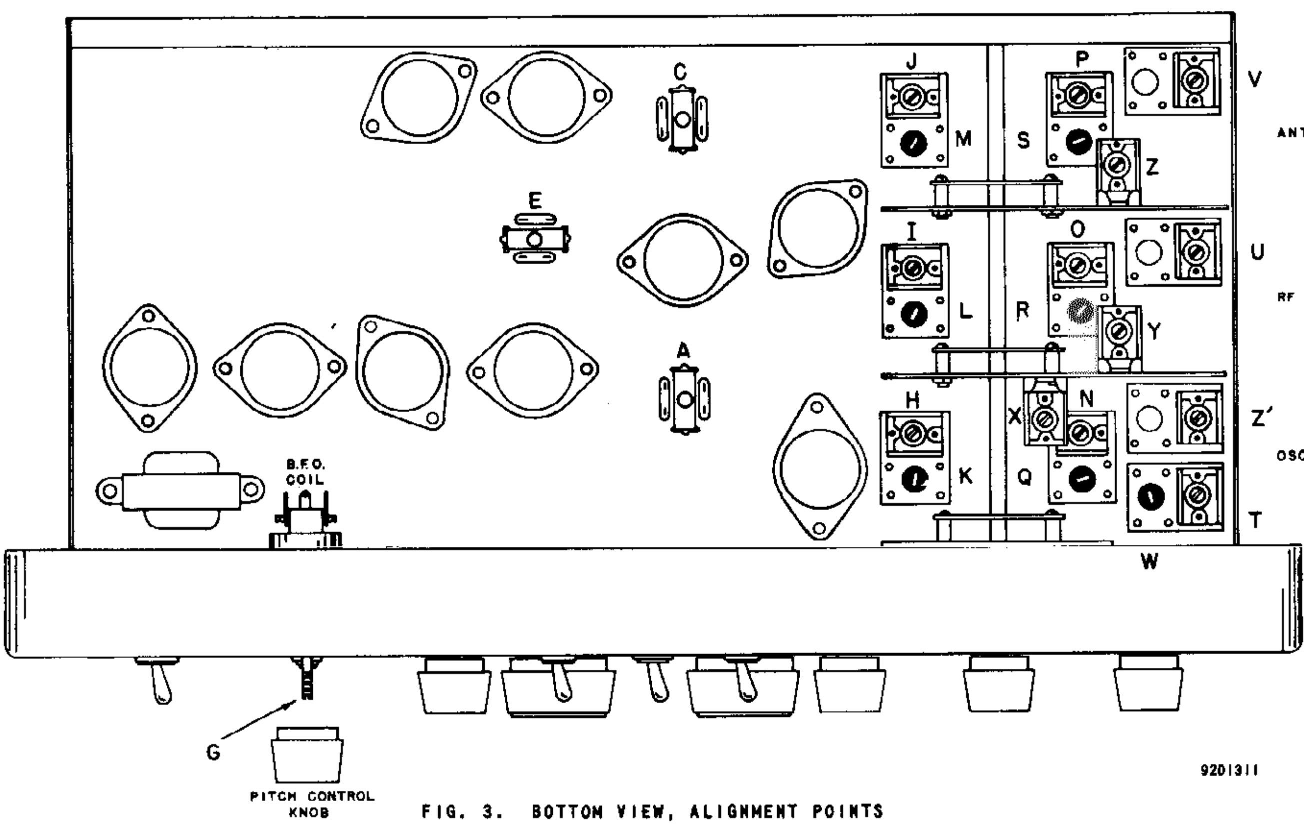


FIG. 3. BOTTOM VIEW, ALIGNMENT POINTS

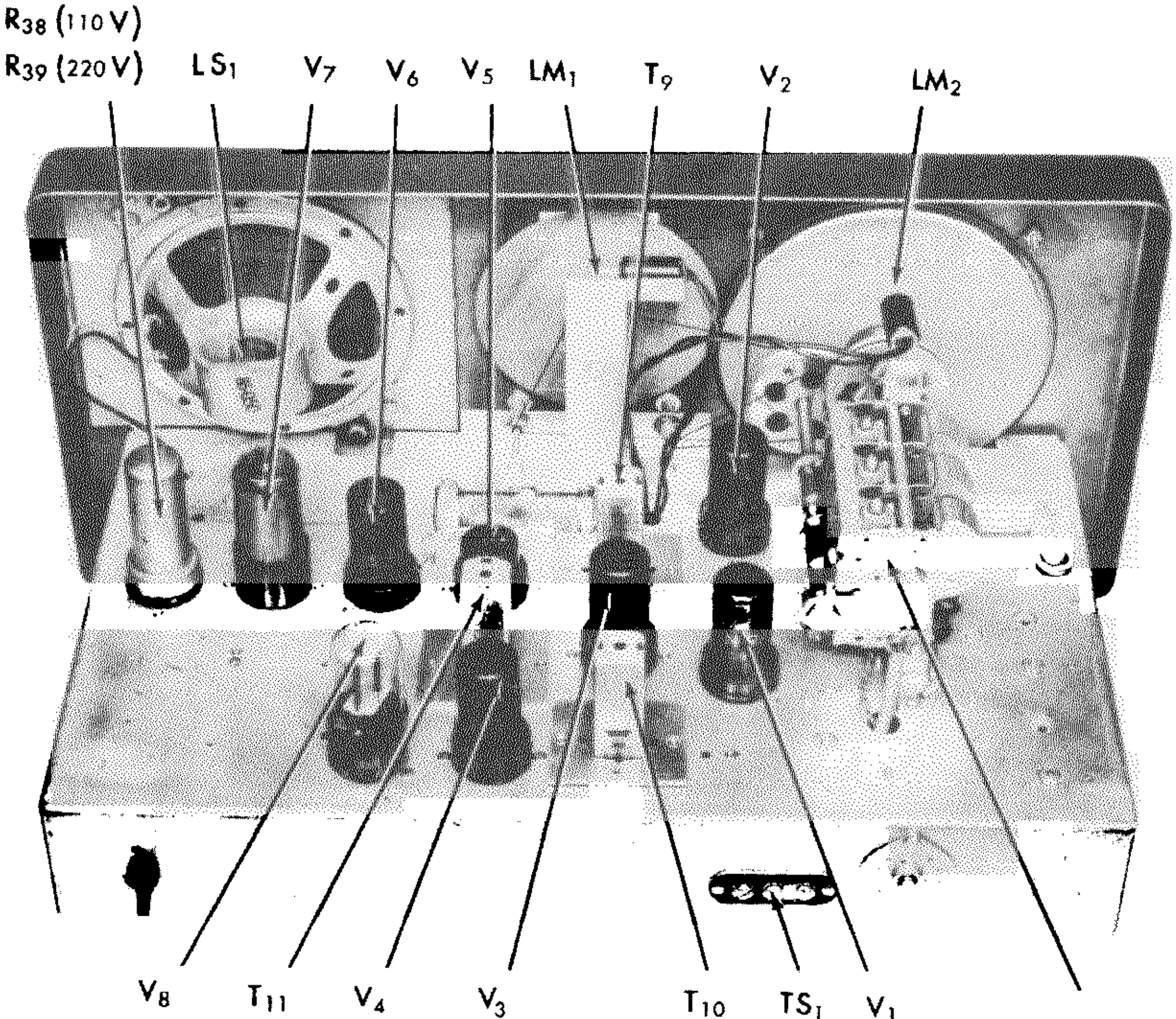


FIG. 4. TOP VIEW, COMPONENT LOCATION

92X1313

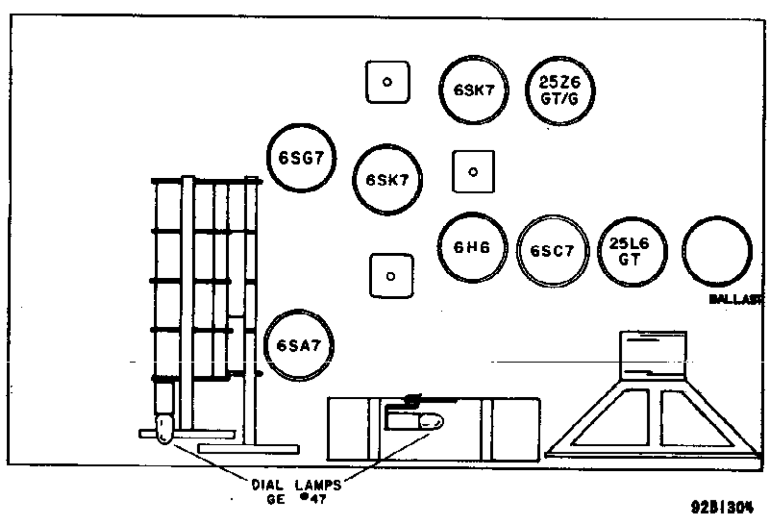


FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS

MODEL S-77

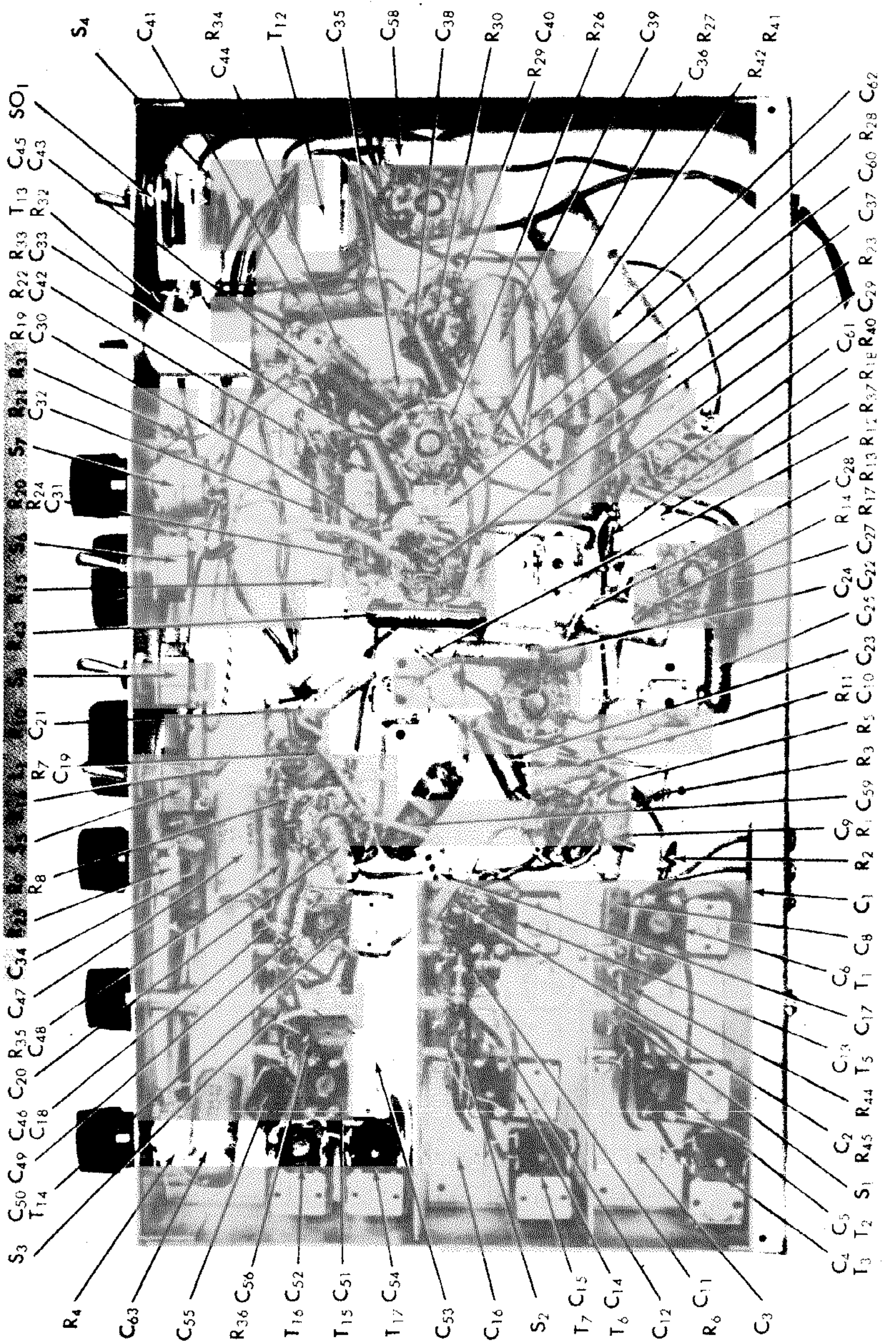
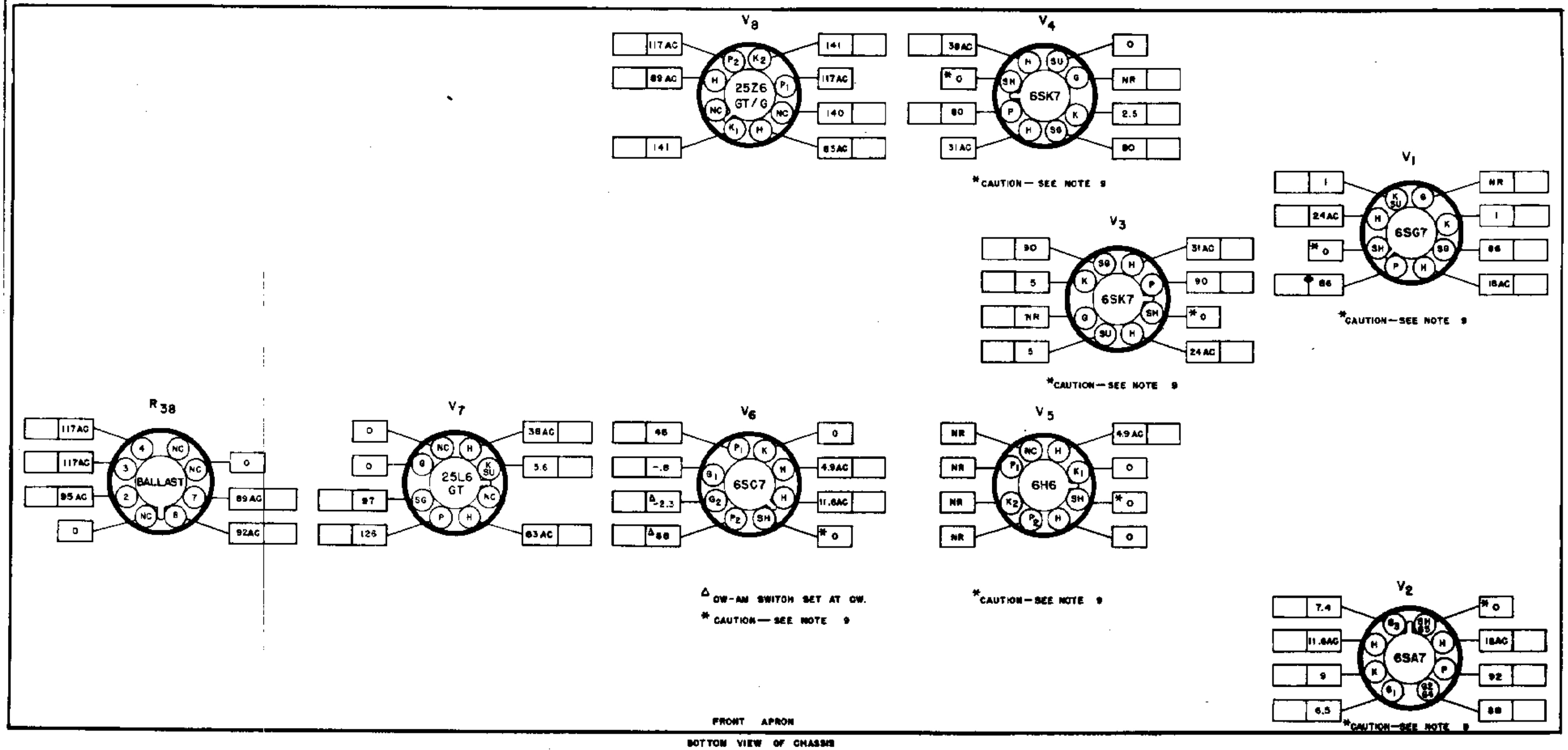


FIG. 5. BOTTOM VIEW, COMPONENT LOCATION



NOTES—

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND THE ELECTRICAL GROUND BUSS (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE — 117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC" — NO CONNECTION. (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR" — NOT READABLE (READING GENERALLY MEANINGLESS).
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS.
9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT SAME POTENTIAL WITH THE CHASSIS GROUNDED.

CONTROL	SETTING
SENSITIVITY	FULL CLOCKWISE
BAND SELECTOR	BAND 4
AVC	ON
CW/AM	AM
NOISE LIMITER	OFF
STANDBY/RECEIVE	RECEIVE

92D1309

FIG. 6. TUBE SOCKET VOLTAGE CHART

MODEL S-77

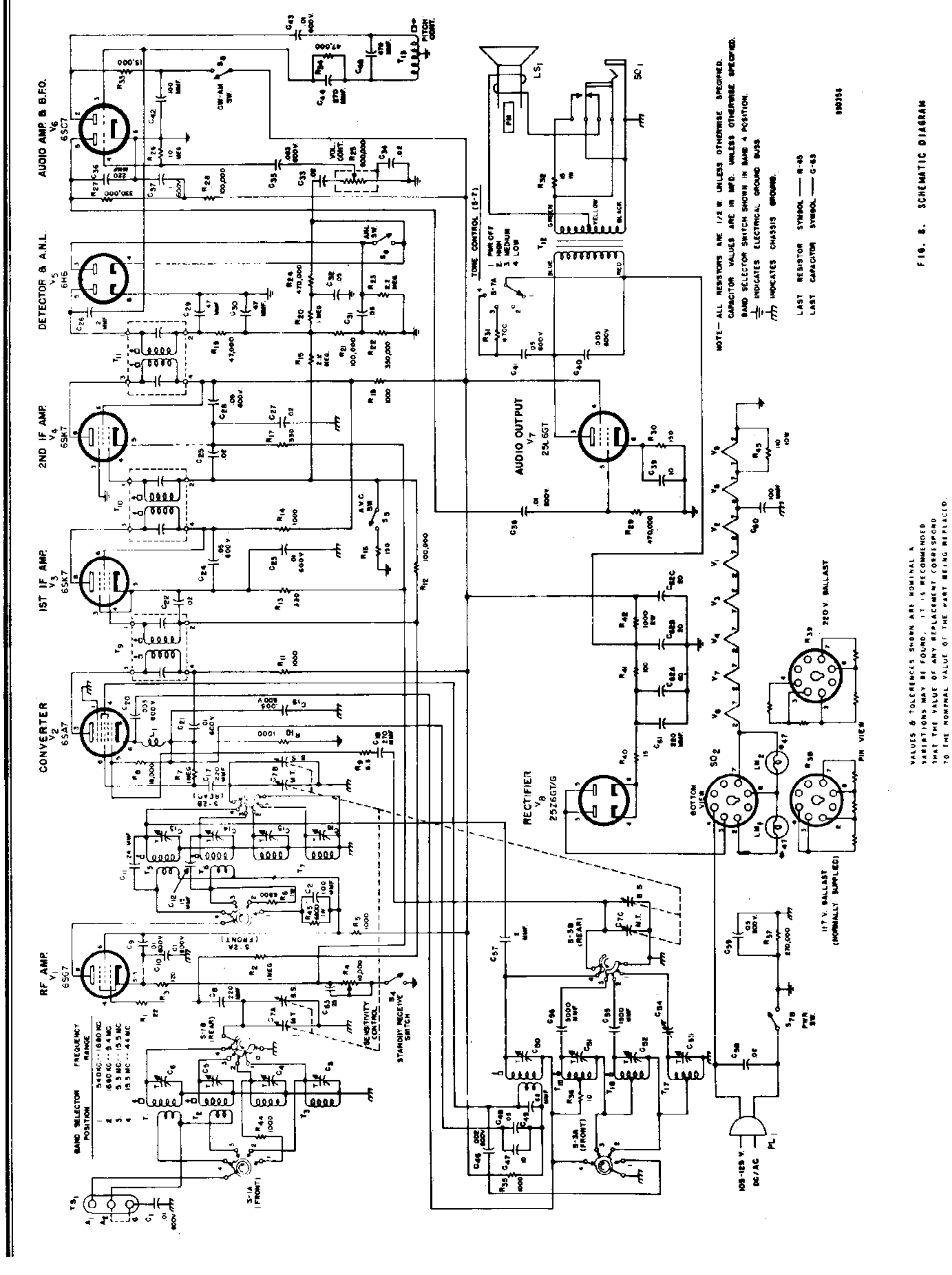


FIG. 8. SCHEMATIC DIAGRAM

SERVICE PARTS LIST

CAPACITORS

Ref. No.	Description	Hallicrafters Part Number
C-1,9,10,21, 23,38,43	.01 mfd. 600V., tubular paper	46AZ103J
C-2,42,60	100 mmf. 500V., mica	47X20B101K
C-3,16,53	Trimmer, 2-20 mmf.	44A191
C-4	Trimmer (part of coil T-3)	
C-5	Trimmer (part of coil T-2)	
C-6	Trimmer (part of coil T-1)	
C-7	Tuning capacitor, 3 section; ganged	48C240-B
C-8,17,36, 61	220 mmf. 500V., mica	47X20B221K
C-11	24 mmf., ceramic	47X25UK240M
C-12	15 mmf., ceramic	47X21UK150M
C-13	Trimmer (part of coil T-5)	
C-14	Trimmer (part of coil T-6)	
C-15	Trimmer (part of coil T-7)	
C-18,44	270 mmf. 500V., mica	47X20B271K
C-19,40	.005 mfd. 600V., tubular paper	46AZ502J
C-20,35	.003 mfd. 600V., tubular paper	46AY302J
C-22,25,27, 33,34	.02 mfd. 200V., tubular paper	46AU203J
C-24,28,41	.05 mfd. 600V., tubular paper	46AY503J
C-26,57	2 mmf., wire gimmick	
C-29,30	47 mmf. 500V., mica	47X20B470K
C-31,32,48	.05 mfd. 200V., tubular paper	46AU503J
C-37	.1 mfd. 600V., tubular paper	46AY104J
C-39	10 mfd. 25V., electrolytic	45A121
C-45	470 mmf. 500V., mica	47X20B471J
C-46	.002 mfd. 600V., tubular paper	46AZ202J
C-47	10 mfd. 150V., electrolytic	45A097
C-49	68 mmf., ceramic	47X25UK680K
C-50	Trimmer (part of coil T-14)	
C-51	Trimmer (part of coil T-15)	
C-52	Trimmer (part of coil T-16)	
C-54	Padder (part of coil T-17)	
C-55	1500 mmf. 500V., mica	47X35C152J
C-56	3000 mmf. 500V., mica	47X35B302K
C-58	.02 mfd. 600V., molded tubular paper	46BR203L6
C-59	Resonant capacitor (.05 mfd. 600V.)	46A150
C-62	60-20-20 mfd. 150V., electrolytic	45B128-C
C-63	.25 mfd. 200V., tubular paper	46AT254J

RESISTORS

Ref. No.	Description	Hallicrafters Part Number
R-1	22 ohms 1/2 watt, carbon	23X20X220K
R-2,7,20	1 megohm 1/2 watt, carbon	23X20X105M
R-3	120 ohms 1/2 watt, carbon.	23X20X121K
R-4	10,000 ohms; SENSITIVITY control	25B590
R-5,10,11, 14,18,35, 44	1000 ohms 1/2 watt, carbon	23X20X102K
R-6,45	6800 ohms 1 watt, carbon	23X30X682K
R-8	18,000 ohms 1/2 watt, carbon	23X20X183K
R-9	6.8 ohms 1/2 watt, carbon	23X20X068K
R-12,21,28	100,000 ohms 1/2 watt, carbon	23X20X104M
R-13,17	330 ohms 1/2 watt, carbon	23X20X331K
R-15,23	2.2 megohms 1/2 watt, carbon	23X20X225M
R-16,30	150 ohms 1/2 watt, carbon	23X20X151K
R-19,34	47,000 ohms 1/2 watt, carbon	23X20X473K
R-22,27	330,000 ohms 1/2 watt, carbon	23X20X334M
R-24,29	470,000 ohms 1/2 watt, carbon	23X20X474M
R-25	500,000 ohms; VOLUME control	25B586
R-26	10 megohms 1/2 watt, carbon	23X20X106M
R-31	4700 ohms 1/2 watt, carbon	23X20X472K
R-32	15 ohms 1 watt, carbon	23X30X150M
R-33	15,000 ohms 1/2 watt, carbon	23X20X153K
R-36	10 ohms 1/2 watt, carbon	23X20X100K
R-37	270,000 ohms 1/2 watt, carbon	23X20X274M
R-38	Ballast tube (117V.)	24B875
R-39	Ballast tube (220V.)	24B874
R-40	15 ohms 1/2 watt, carbon	23X20X150K
R-41	100 ohms 1/2 watt, carbon	23X20X101K
R-42	1000 ohms 2 watts, carbon	23X40X102K
R-43	110 ohms 10 watts, WW	24BG111E

TRANSFORMERS AND COILS

Ref. No.	Description	Hallicrafters Part Number
L-1	Choke, RF	53A138
T-1	Coil, antenna; band 4	51B783
T-2	Coil, antenna; band 3	51B782
T-3	Coil, antenna; bands 1 and 2	51B1241
T-5	Coil, RF; band 4	51B787
T-6	Coil, RF; band 3	51B786
T-7	Coil, RF; bands 1 and 2	51B1240
T-9,10	Transformer, 1st and 2nd IF	50C243
T-11	Transformer, IF (detector stage)	50C242
T-12	Transformer, audio output	55B110
T-13	Coil, PITCH CONTROL	54B044
T-14	Coil, oscillator; band 4	51B791
T-15	Coil, oscillator; band 3	51B913
T-16	Coil, oscillator; band 2	51B789
T-17	Coil, oscillator; band 1	51B912

SWITCHES

Ref. No.	Description	Hallicrafters Part Number
S-1	Wafer, bandswitch; antenna stage	60B389
S-2	Wafer, bandswitch; RF stage	62B039
S-3	Wafer, bandswitch; oscillator stage	62B044
S-4,5,6,8,	Switch, toggle (SPST); STANDBY-RECEIVE, A.V.C., A.N.L., and CW-AM	60A138
S-7	Switch, PWR-TONE	60A225

PLUGS AND SOCKETS

Ref. No.	Description	Hallicrafters Part Number
PL-1	Line cord and plug	87B1573
SO-1	Jack, PHONES	36B004
SO-2	Socket, octal; ballast tube	6A250
	Socket, octal; tube	6A250
	Socket, dial lamp (main tuning dial)	86B101
	Socket, dial lamp (bandspread dial)	68B068

TUBES, RECTIFIERS AND DIAL LAMPS

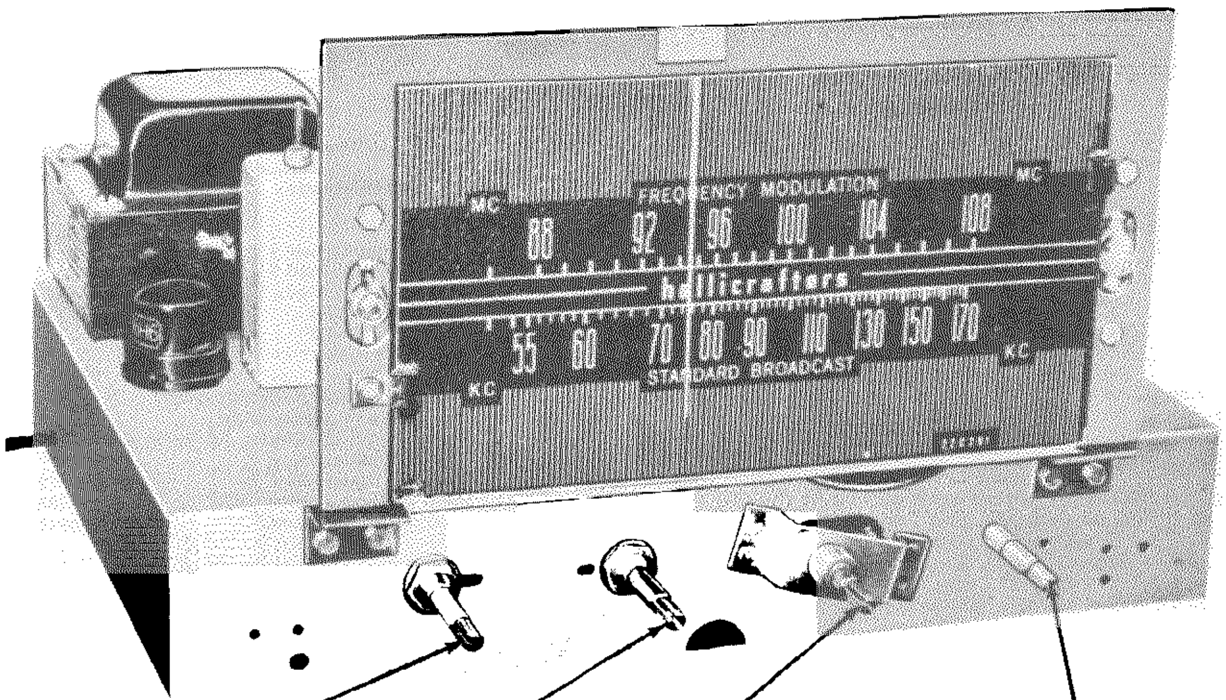
Ref. No.	Description	Hallicrafters Part Number
V-1	Type 6SG7, RF amplifier	90X6SG7
V-2	Type 6SA7, converter	90X6SA7
V-3,4	Type 6SK7, 1st and 2nd IF amplifiers	90X6SK7
V-5	Type 6H6, detector and A.N.L.	90X6H6
V-6	Type 6SC7, audio amp. and B.F.O.	90X6SC7
V-7	Type 25L6GT, audio output	90X25L6GT
V-8	Type 25Z6GT/G, rectifier	90X25Z6GT/G
LM-1,2	Lamp, dial; GE #47	39A004

MISCELLANEOUS

Ref. No.	Description	Hallicrafters Part Number
	Bandswitch and shaft	60B392
	Cabinet (lower section)	66E359
	Cabinet front panel	68D160
	Cabinet top	66D616
	Dial, bandspread	83B372
	Dial, main tuning	83C240
	Dial cord	38A001
	Foot, rubber	16A007
	Glass, bandspread tuning dial	22A307
	Glass, main tuning dial	22B199
	Knob, BAND SELECTOR	15A266
	Knob, PITCH CONTROL	15A058
	Knob, TUNING and BANDSPREAD	15A047
	Knob, SENSITIVITY, VOLUME and TONE	15A049
	Lock, line cord	76A397
	Screw, Allen head (6-32 x 3/16)	3A1122
	Slug, adjustable tuning	77A068
LS-1	Speaker, PM; 5 inch	85B050
	Spring, dial cord	75A012
	Spring, retainer	75A062
TS-1	Terminal strip, antenna	88A032

MODEL S-78

USE OF OPERATING CONTROLS



92X125

OFF-VOICE-NORMAL-BASS-HI-FI

This is a combination power switch and tone control. In position one the receiver is completely turned off. To turn the receiver on, set this control at any of the four remaining positions, depending upon the tone qualities desired. Illumination of the dial indicates that the receiver is obtaining power from the wall outlet and ready for use. The tone control settings generally used are VOICE and NORMAL for speech and BASS and HI FI for musical entertainment.

VOLUME

Turn this control clockwise to increase volume and counter clockwise to decrease volume.

FM-BROADCAST-PHONO

This is the combination range and operation switch. In the FM (Frequency Modulation) position, the receiver tunes the 88 to 108 megacycle FM band; and in the BROADCAST position, the receiver operates as a standard broadcast receiver tuning the frequency range 540 to 1750 kilocycles. To use the receiver as a record player, set this switch at PHO and operate the volume and tone controls as for normal radio reception.

TUNING

The tuning control "tunes in" either BC or FM stations depending upon the setting of the range switch. The standard broadcast band dial is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles. The frequencies of the FM stations are shown directly in megacycles. The frequencies of local stations are generally listed in local newspapers, BC stations in kilocycles and FM stations in megacycles. When tuning for the station, tune carefully and obtain top performance from your receiver.

GENERAL SPECIFICATIONS

Tubes	Ten plus rectifier	Tuning Range	Broadcast 540 kc - 1750 kc Frequency Modulation 88 mc - 108 mc
Speaker Output	3.2 and 500 ohms.	Intermediate Frequency	455 kc/10.7 mc.
Speaker Connection	Std. 5 pin socket.	Power Supply	105-125 V. 50/60 cycles AC
Antenna	Provisions for external antennas	Power Consumption	90 Watts
Tuning	Manual		

INSTALLATION

When locating the receiver, avoid excessively warm locations such as are found near radiators or hot air registers. When placing the receiver with its back to the wall, leave about an inch or two of clearance between the back of the cabinet and the wall for proper ventilation.

There are three basic connections to be made, antenna, speaker, and power, to completely set up the receiver. All connections are located on the rear apron of the chassis.

ANTENNA - Terminals are provided for separate AM broadcast (BC) and FM broadcast (FM) antennas. The BC band antenna terminals are marked "A" and "G" and the FM band antenna terminals are identified by "D-D"

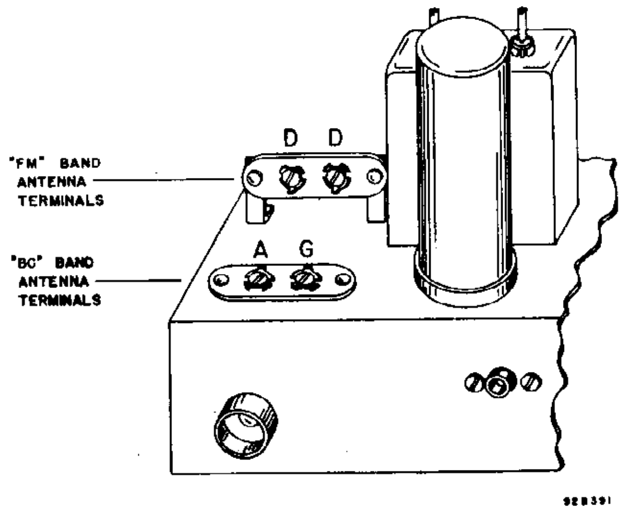


Fig. 2. Antenna terminal strip connections

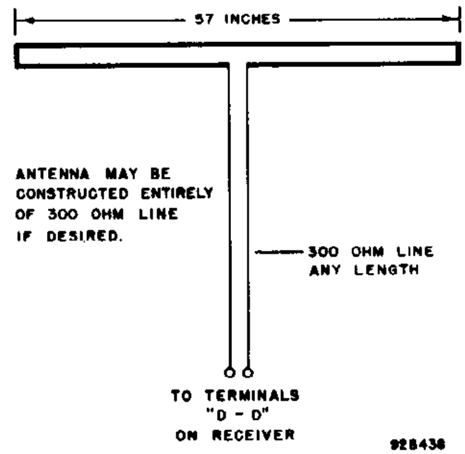


Fig. 3. Folded doublet antenna details.

BC Antenna - The standard broadcast band antenna may consist of any single length of wire from approximately ten feet to fifty feet depending upon the local receiving conditions. Attach the wire to the "A" terminal of the antenna terminal strip. Erect outdoor antenna installations as high and as free from surrounding objects as possible. Erecting this type of antenna at right angles to local "man made" sources of static, (street car lines, power lines, etc.) is recommended for best results. An excessively long antenna will not necessarily be the most desirable antenna. Use the length that will provide adequate signal pick up.

For some installations it will be found desirable to connect a ground wire to the "G" terminal of the terminal strip. A radiator or water pipe will generally serve as a good ground connection.

FM Antenna - The antenna for FM reception may consist of any type of antenna that operates with a 300-ohm transmission line. If a commercial antenna is installed, be sure it uses a 300-ohm transmission line. The transmission line from the antenna is connected to terminals "D-D" on the receiver.

The simplest antenna which will provide satisfactory results, mounted either on the back of a console cabinet or outside the building, is the folded doublet. This antenna may be constructed from 300-ohm transmission line as shown in Fig. 3. Keep in mind that the doublet antenna response favors signals broadside to its length and should be erected with its length at right angles to the direction of reception. This is especially important where receiving conditions are poor and maximum antenna pickup is required.

POWER SOURCE - The receiver operates from a 105-125 V. 60 cycle AC source only. The receiver will not operate from a 115 V. direct current source or 25 cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative and avoid costly repairs. The nominal power consumption for this receiver is 90 watts.

DIAL LAMP REPLACEMENT

Refer to Fig. 6 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, unclip the dial lamp socket by compressing the side springs. The socket may then be brought out into the open to change the defective lamp.

SPEAKER CONNECTIONS

The speaker connector is located on the rear apron of the receiver. Connection is to be made through a standard 5 pin tube socket. The receiver is designed to operate into either a 3.2 ohm or a 500 ohm speaker load. For detailed information on making connections for either load refer to the schematic diagram. If a matching transformer is used in connection with the speaker load it should be capable of handling approximately 10 watts of audio power.

RECORD PLAYER CONNECTION

A shielded type receptacle is provided at the rear chassis apron to accommodate a record player pickup cable connector. Any record player employing a crystal cartridge or high level magnetic pickup in its tone arm may be used with the receiver. A utility receptacle is provided at the rear apron of the receiver to accommodate the power plug of the record player. The use of this receptacle will permit the record player to be turned off with the receiver.

TUBE REPLACEMENT

The types of tubes required and their relative position in the receiver are shown in the illustration, Fig. 6. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; and push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing into place. Handle with care as all tubes are considered fragile and do not tolerate much mechanical abuse.

MODEL S-78

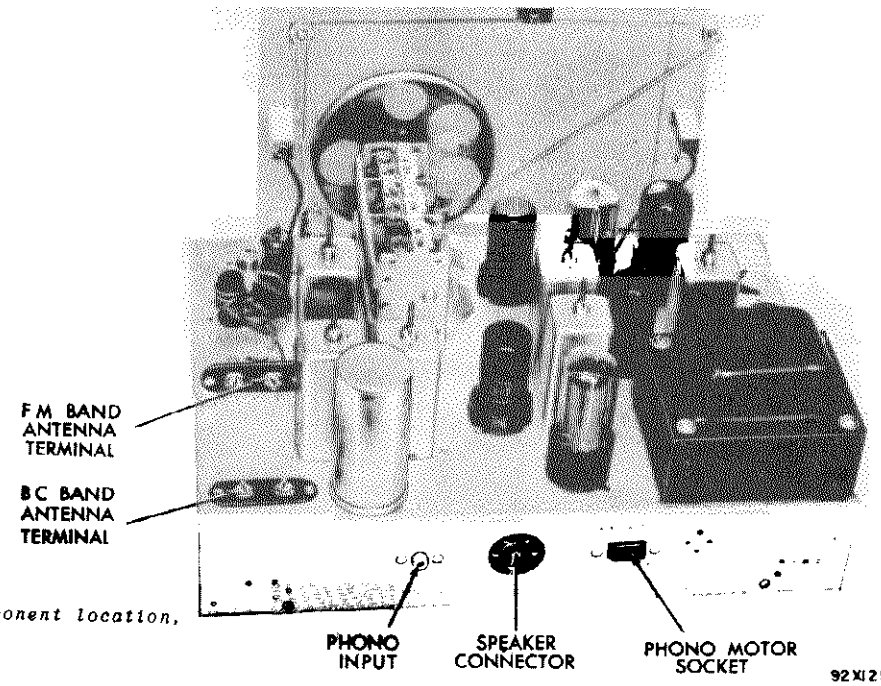


Fig. 4. Component location, rear view

ALIGNMENT PROCEDURE

The receiver is equipped with AUTOMATIC FREQUENCY CONTROL on the FM band to compensate for oscillator drift and improve the tuning function on the FM band. The correction factor is approximately 5 times: AFC takes hold 250 kc before the station frequency is reached and releases before tuning 500 kc beyond the station frequency when receiving a 1000 microvolt signal.

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

When making the alignment adjustments set the tone control at NORMAL and the volume control at maximum volume. Use just enough signal generator output to obtain the results indicated on the chart.

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Pos.	Radio Dial Setting	Adjust	Remarks
1	0.01 mfd. cap	To high cap. stator of center section.	455 kc	"BC"	1000 kc	A,B,C,D, E	Adjust for max. audio output. Keep audio output below 500 MW to avoid AVC action.
2	0.01 mfd. cap. in series with a 4700 ohm carbon resistor.	To low cap. stator of center section.	10.7 mc	"FM"	90 mc	F,G,H,I, J,K	Adjust for max. voltage as measured between pin #3 of 6H6 and ground with an electronic volt meter. Adjust signal generator output for approx. 2 volts DC at this point.
3	0.01 mfd cap.	See step 2.	10.7 mc	"FM"	90 mc	L	Adjust for zero voltage as measured between the junction of R27 and R28 and ground with an electronic volt meter.
4.	Std RMA dummy	To terminals "A" and "G" on terminal strip TS-2.	1500 kc	"BC"	1500 kc	*M,N,O	Adjust for max. output as in step 1.
5.	Two 150 ohm carbon resistors	To terminals "D-D" on terminal strip TS-1.	105 mc	"FM"	105 MC	*P,Q	Adjust for max. voltage as measured across R54 with an electronic volt meter. Adjust signal generator output for approx. 1 volt DC at this point.

RESTRINGING DIAL CORD

Restring the dial drive with 30 lb. test dial cord. Tie one end to the tension spring and follow the sequence outlined in Fig. 5. Stretch the tension spring and tie the end of the cord securely to the spring as shown.

Set the tuning condenser at maximum capacity (closed), attach the pointer to the string and line it up with the left hand index mark on the dial scale.

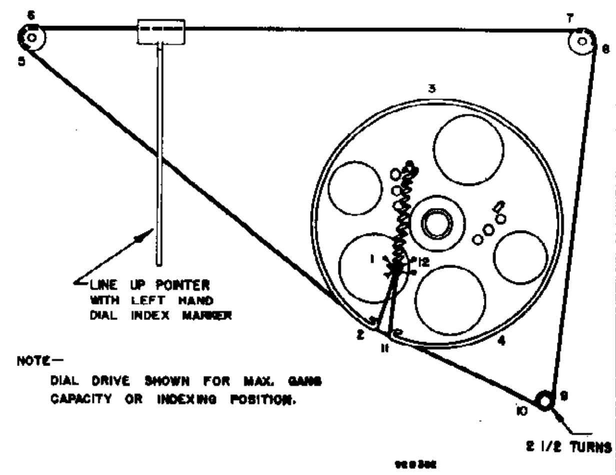


Fig. 5. Dial cable stringing procedure.

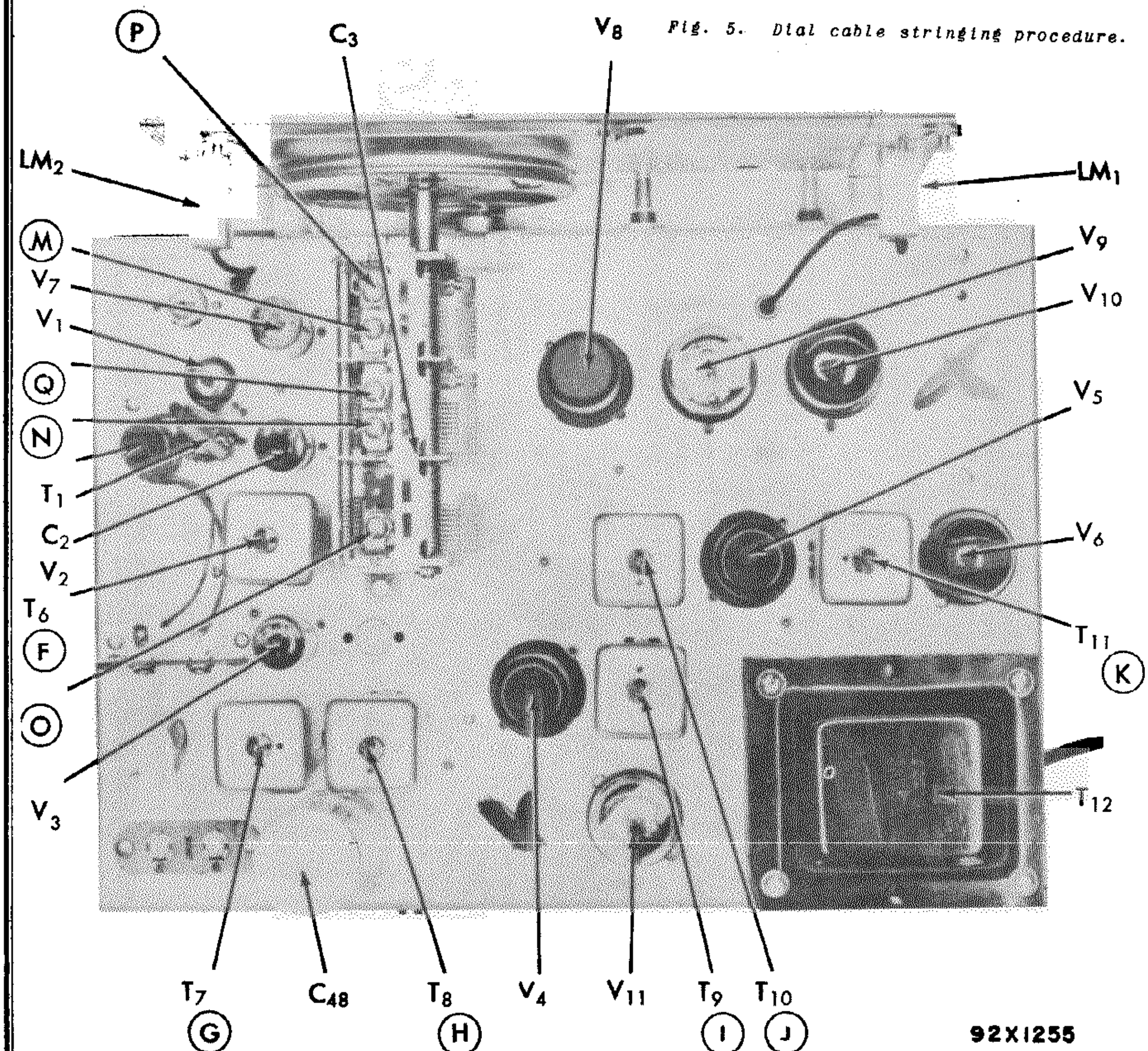


Fig. 6. Top view alignment points & component locations

MODEL S-78

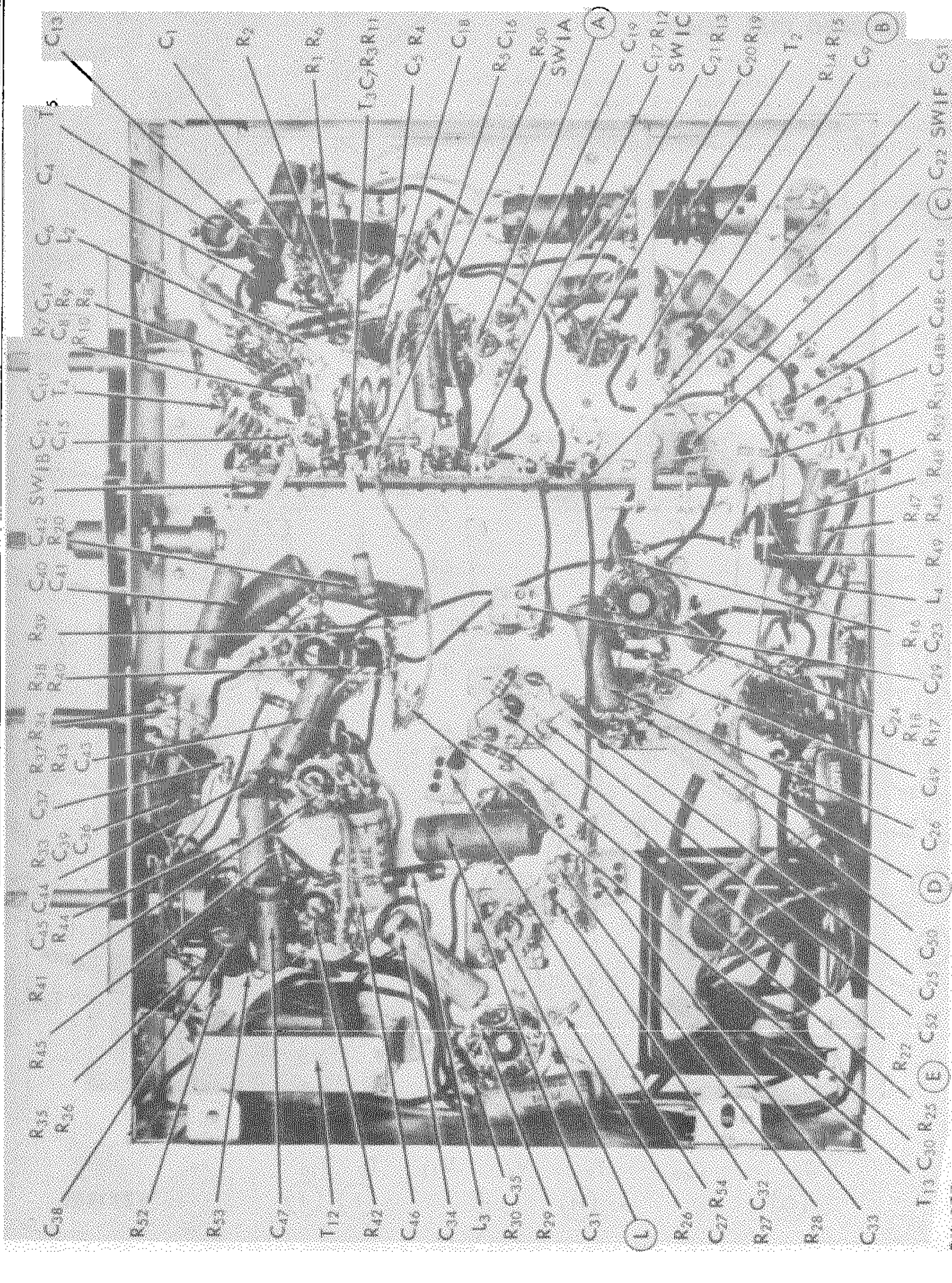
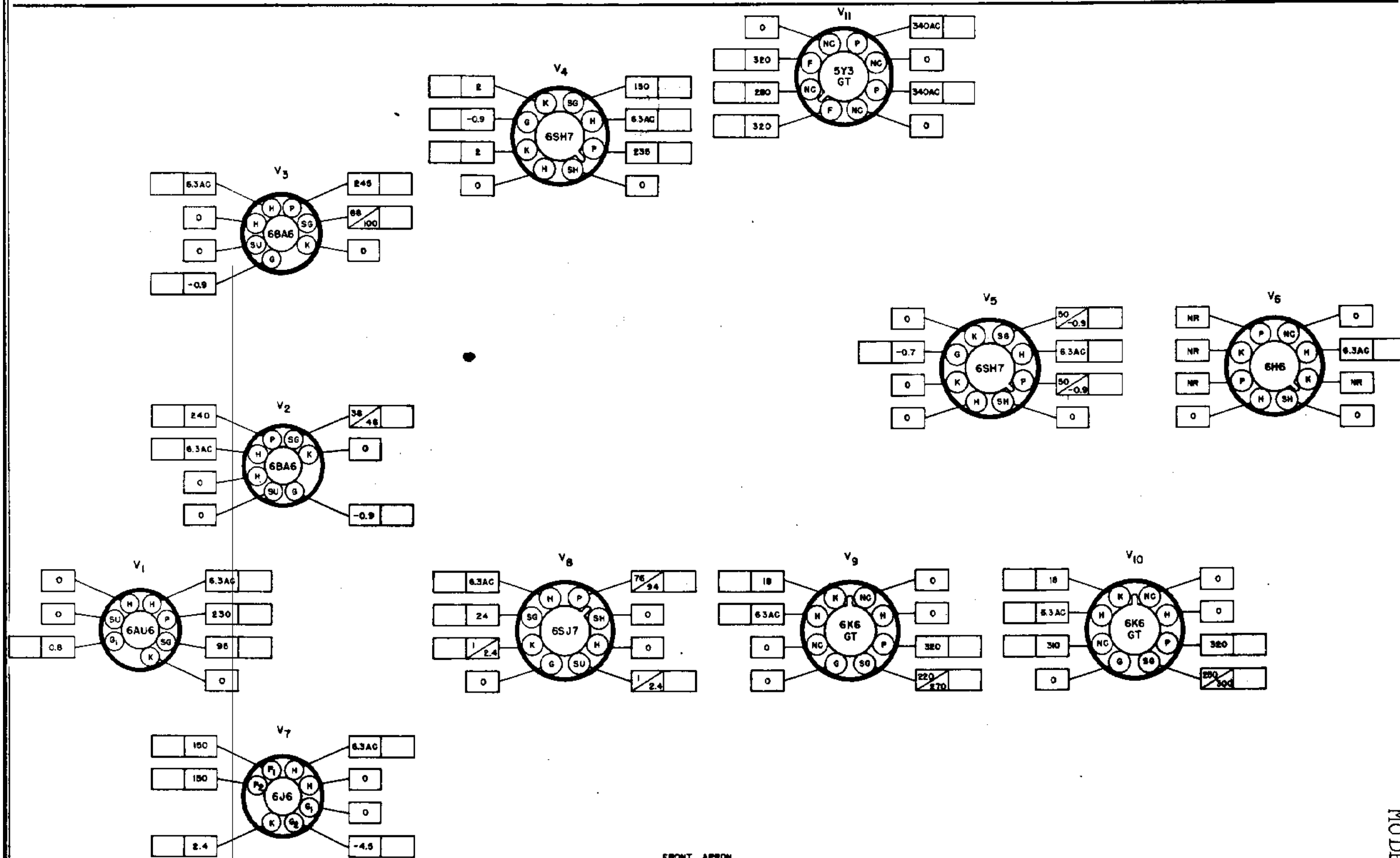


Fig. 7. Bottom view alignment points & component locations

2X1253

Fig. 8. Tube socket voltage chart



BOTTOM VIEW OF CHASSIS

NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS.
3. LINE VOLTAGE—117 V. AC.
4. ALL VOLTAGES SHOWN WERE MEASURED WITH A 20,000 OHM/VOLTMETER AND AT ZERO SIGNAL.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
7. ▭ THE BLANK SPACES ARE PROVIDED FOR THE SERVICEMAN. FILL IN THE ACTUAL READING AS TAKEN WITH YOUR OWN EQUIPMENT. A NORMAL OPERATING RADIO SHOULD BE USED FOR THESE MEASUREMENTS.
8. FM/AM WHERE TUBE SOCKET VOLTAGES CHANGE FROM FM TO AM RECEPTION TWO READINGS ARE SHOWN, UPPER LEFT SHOWS FM READINGS-LOWER RIGHT SHOWS AM READINGS.

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MODEL S-78

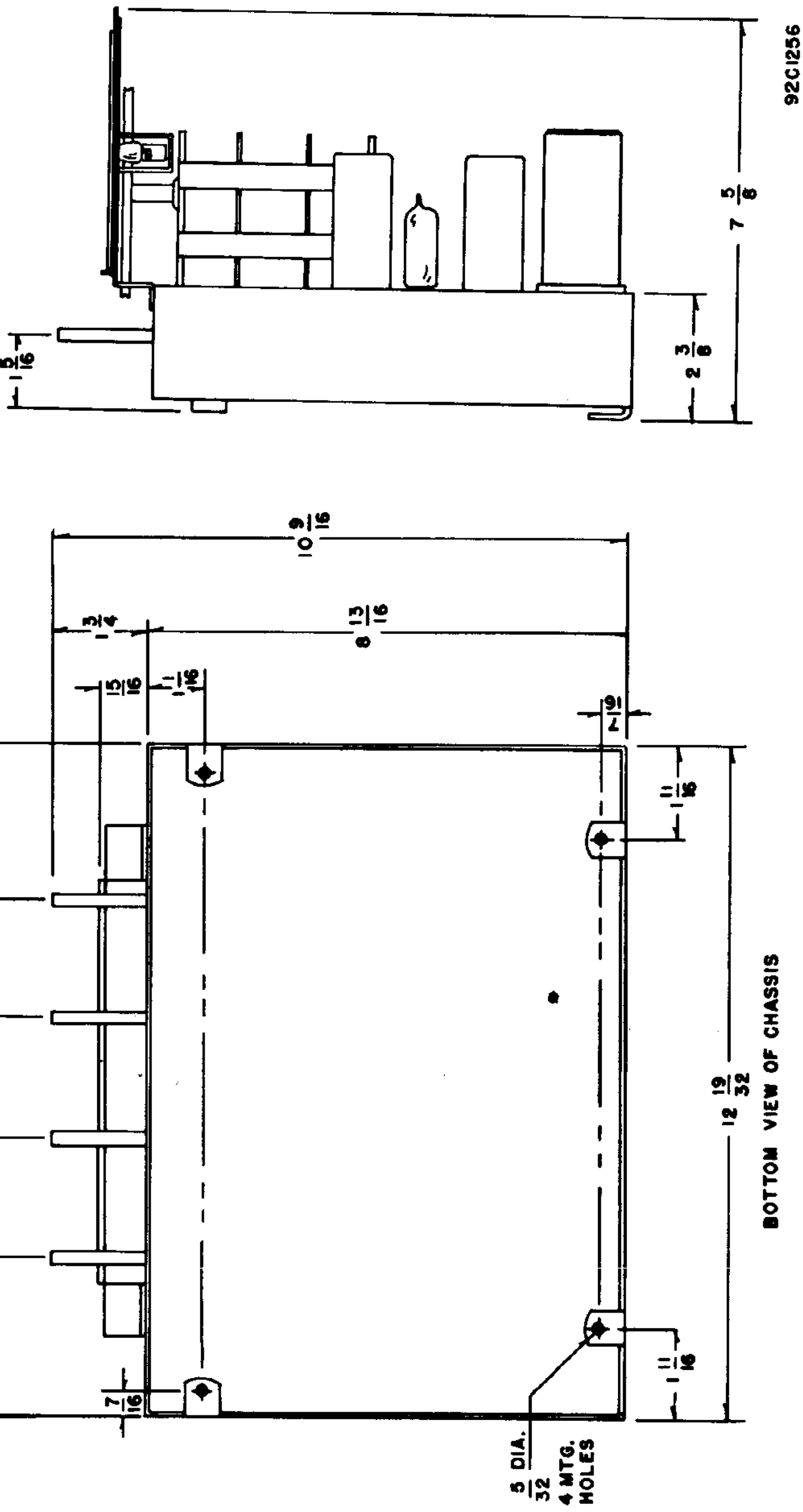


Fig. 9. Mounting dimensions.

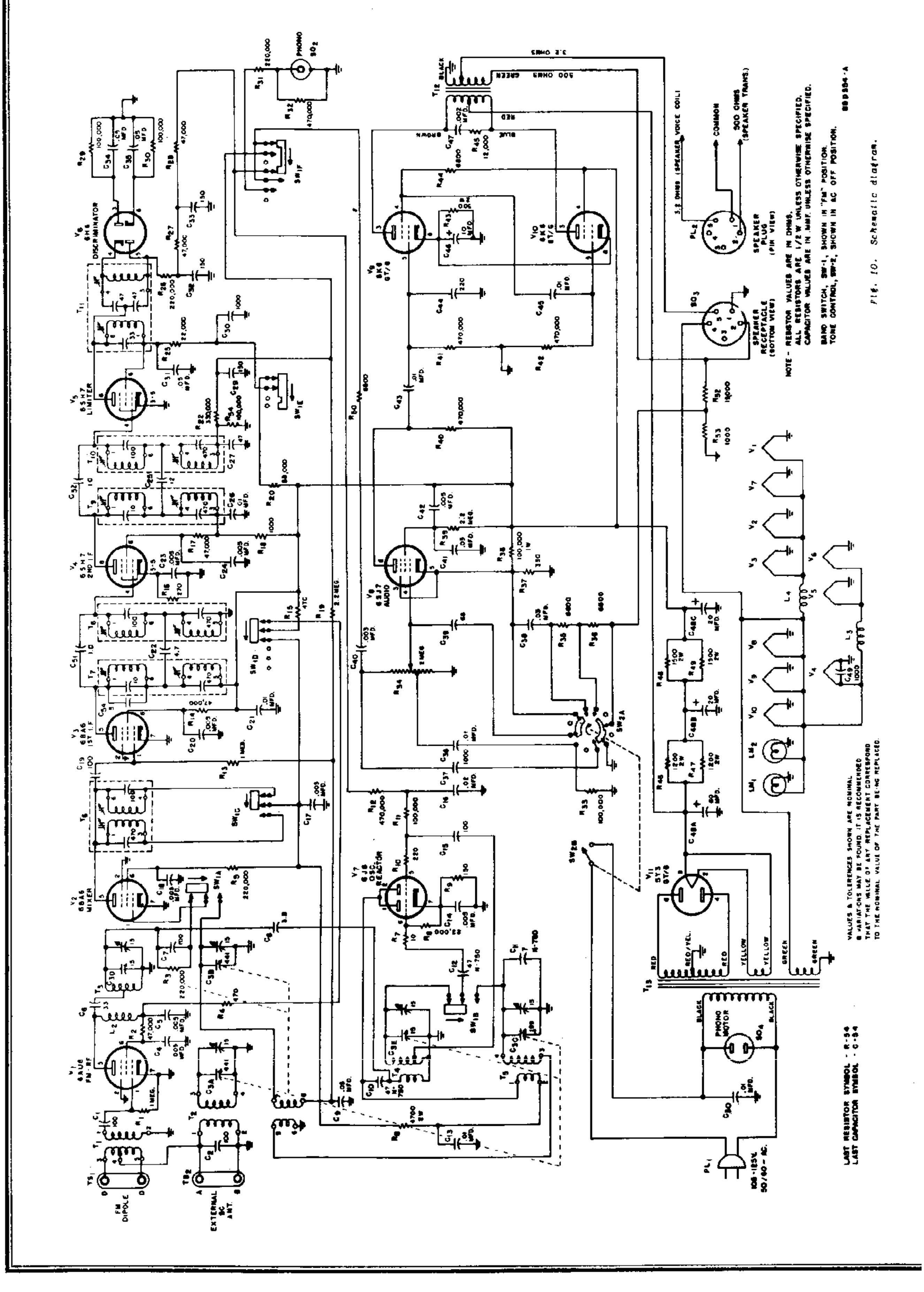


Fig. 10. Schematic diagram.

MODEL S-78

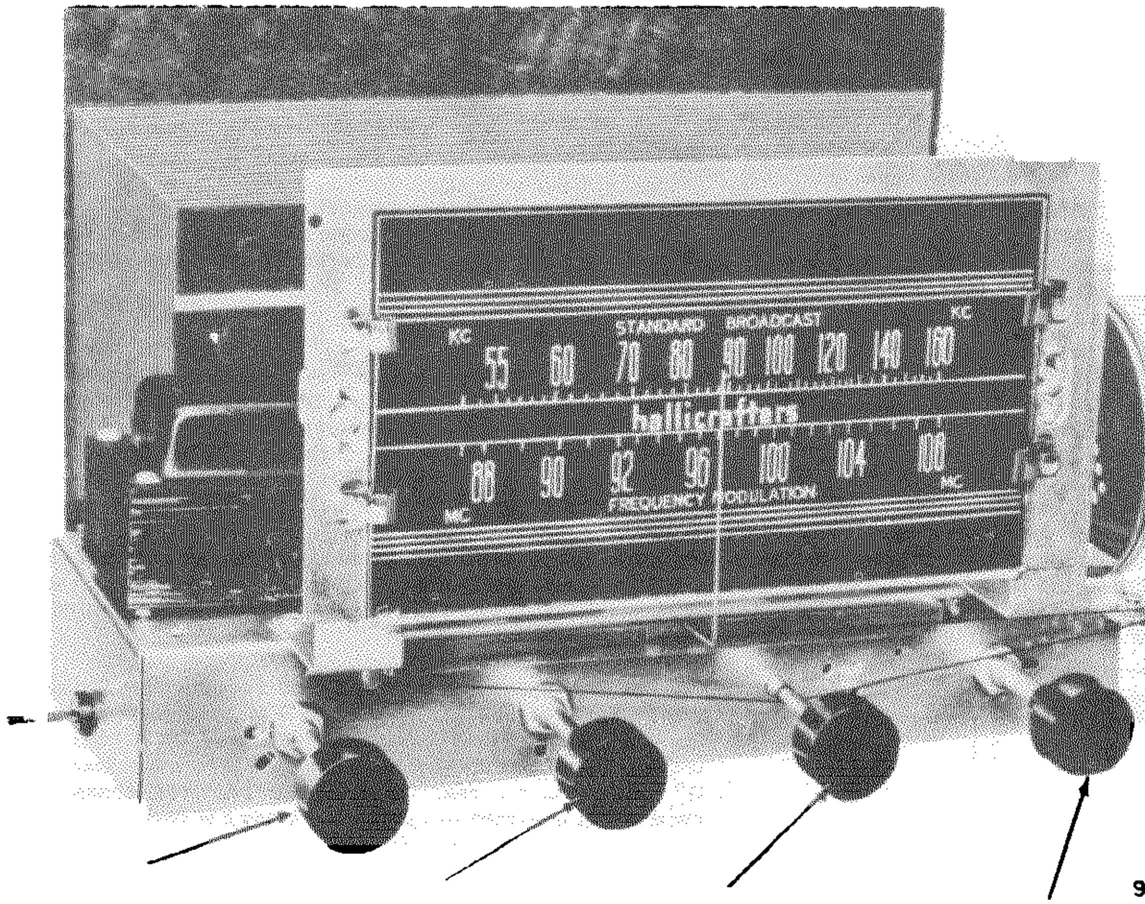
SERVICE PARTS LIST

Ref. No.	Description	Hallicrafter's Part Number
	CONDENSERS	
C-1,7,15,19	100 mmf. 500 V., ceramic	47B20101M5
C-2	100 mmf. 500 V., mica	CM20A101M
C-3	Tuning condenser, 5 sections	48C196
C-4,5,14,17, 18,20,23,24	.005 mfd. 450 V., ceramic	47A168
C-6	33 mmf. 500 V., ceramic	CC20UK330K
C-8	3.3 mmf. 500 V., bakelite	47A160-5
C-9,34,35	.05 mfd. 200 V., tubular paper	46AU503J
C-10,12	47 mmf. 500 V., ceramic	CC20UK470M
C-11	7 mmf. 500 V., ceramic	CC20UK070K
C-13,21,26, 36,43,45	.01 mfd. 600 V., tubular paper	46AZ103F
C-16	.02 mfd. 200 V., tubular paper	46AU203J
C-22	4.7 mmf. 500 V., bakelite	47A160-6
C-25	12 mmf. 500 V., mica	CM20A120K
C-27	47mmf. 500 V., mica	CM20A470M
C-29,32, 33	150 mmf. 500 V., mica	CM20A151M
C-30,37,49	1000 mmf. 500 V., ceramic	47B20102M5
C-31,41	.05 mfd. 600 V., tubular paper	46AY503J
C-38	.03 mfd. 200 V., tubular paper	46AU303J
C-39	68 mmf. 500 V., mica	CM20A680M
C-40	.003 mfd. 600 V., tubular paper	46AZ302J
C-42	.005 mfd. 600 V., tubular paper	46AZ502J
C-44	220 mmf. 500 V., mica	CM20A221M
C-46	10 mfd. 25 V., electrolytic	45A121
C-47	.002 mfd. 600 V., tubular paper	46AZ202J
C-48	60-20-20 mfd. 450 V., electrolytic	45B113
C-50	.01 mfd 600 V., molded paper	46AG103J
C-51,52	1 mmf. 500 V., bakelite	47A160-2
	RESISTORS	
R-1,13	1 megohm ½ watt, carbon	RC20AE105M
R-2,14,17, 27,28	47,000 ohms ½ watt, carbon	RC20AE473M
R-3,5,26,31	220,000 ohms ½ watt, carbon	RC20AE224M
R-4,15	470 ohms ½ watt, carbon	RC20AE471M
R-6	4700 ohms 2 watts, carbon	RC40AE472M
R-7	10 ohms ½ watt, carbon	RC20AE100M
R-8,25	22,000 ohms ½ watt, carbon	RC20AE223M
R-9	150 ohms ½ watt, carbon	RC20AE151M
R-10	220 ohms ½ watt, carbon	RC20AE221M
R-11,33,54	100,000 ohms ½ watt, carbon	RC20AE104M
R-12,32,40, 41,42	470,000 ohms ½ watt, carbon	RC20AE474M
R-16	270 ohms ½ watt, carbon	RC20AE271K
R-18,53	1000 ohms ½ watt, carbon	RC20AE102M
R-19,39	2.2 megohms ½ watt, carbon	RC20AE225M
R-20	68,000 ohms ½ watt, carbon	RC20AE683M
R-22	330,000 ohms ½ watt, carbon	RC20AE334M
R-29,30	100,000 ohms ½ watt, carbon	RC20AE104K
R-34	Volume control, 2 megohms (tapped)	25B623
R-35,36, 44,50	6800 ohms ½ watt, carbon	RC20AE682M
R-37	330 ohms ½ watt, carbon	RC20AE331K
R-38	100,000 ohms 1 watt, carbon	RC30AE104K
R-43	300 ohms 2 watt, carbon	RC40AE301J
R-45	12,000 ohms ½ watt, carbon	RC20AE123K
R-46,47	1200 ohms 2 watt, carbon	RC40AE122K
R-48,49	1500 ohms 2 watt, carbon	RC40AE152K
R-52	15,000 ohms 1/2 watt carbon	RC20AE153K
	TRANSFORMERS AND COILS	
T-1	Transformer, FM, antenna stage	51B1021
T-2	Transformer, BC, mixer stage	51B1059
T-3	Transformer, FM, mixer stage	51B1022
T-4	Transformer, FM, osc. stage	51B1073
T-5	Transformer, BC, osc. stage	51B1020
T-6	Transformer, 1st I.F.	50B409
T-7,9	Transformer, 2nd I.F. and AM Detector & FM limiter	50B407

SERVICE PARTS LIST (Cont.)

Ref. No.	Description	Hallicrafter's Part Number
	TRANSFORMERS AND COILS (Cont.)	
T-8,10	Transformer, 2nd I.F. and AM Detector & FM limiter	50B408
T-11	Transformer, FM, detector stage	50B410
T-12	Transformer, audio output	55B158
T-13	Transformer, power	52C152
L-2	Plate choke for tube V1	53B124
L-3	Filament choke for tubes V5 & 6	53B123
L-4	Filament choke for tubes V1,2,3, & 7	53A136
	SWITCHES	
SW-1	Band switch assembly	60B318
SW-2	Switch, tone control	60B319
	PLUGS AND SOCKETS	
PL-1	Line cord and plug	87A078
SO-2	Receptacle, television, phono	36A029
SO-3	Receptacle, speaker	6A277
SO-4	Receptacle, phono motor	10A015
	Socket, octal (tube)	6A296
	Socket, miniature (tube)	6A297
	Socket & bracket, dial light	86A062
	TUBES, RECTIFIERS AND LAMPS	
V-1	6AU6 antenna	90X6AU6
V-2,3	6BA6 mixer, 1st I.F.	90X6BA6
V-4,5	6SH7 2nd I.F., limiter	90X6SH7
V-6	6H6 discriminator	90X6H6
V-7	6J6 osc. & AFC	90X6J6
V-8	6SJ7 audio amp.	90X6SJ7
V-9,10	6K6GT power amp.	90X6K6GT
V-11	5Y3GT rectifier	90X5Y3GT
LM-1,2	Lamp, 6-8 V., 250 Ma., Mazda #44	39A003
	MISCELLANEOUS	
	Shaft, tuning	74A247
	Pulley, idler	28A052-6
	Switch, cam	77A261
	Drive pin	74A246
	Collar	77A267
	Bushing	77A266
	Bracket, dial plate mtg.	67A793
	Dial plate	63B332
	Dial background (paper)	32A446
	Dial glass (calibrated)	22C201
	Clip (for dial glass 22C201)	76A390
	Rubber spacer, for dial clip	16A126
	Pointer	82A147
	Dial cord	38A019
	Spring, dial cord	75A012
	Dial glass (clear)	22B205
	Clip (for dial glass 22B205)	76A331
	Escutcheon (Model S-55)	7C067-1
	Escutcheon (Model S-56)	7C067
	Knob, tone and range controls (Model S-55)	15B077-4
	Knob, tone and range controls (Model S-56)	15B068-3
	Knob, tuning and volume controls (Model S-55)	15B068-4
	Knob, tuning and volume controls (Model S-56)	15B077-3
TS-1	Terminal strip, antenna (Marked D-D)	87A379
TS-2	Terminal strip, antenna (Marked A-G)	88A327
	Line cord lock	76A299
	Mounting foot, rubber	16A007

OPERATION



92X1269

This is a combination power switch and tone control. In the **OFF** position the receiver is completely turned off. To turn on the receiver, turn the control to the right. The power switch will click and the dial light will illuminate the dial face indicating that the receiver is receiving power from the wall outlet. After tuning in the station this control is again adjusted for the desired tonal response. Turning the control clockwise decreases the bass response.

VOLUME - Turn this control clockwise to increase volume and counter-clockwise to decrease volume.

TUNING - The tuning control "tunes in" either **AM** (Standard Broadcast) or **FM** (Frequency Modulation) stations depending upon the setting of the range switch. The standard broadcast band dial is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles. The frequencies of the **FM** stations are shown directly in megacycles. The frequencies of local stations are generally listed in local newspapers, AM stations in kilocycles and FM stations in megacycles. Tune for the clearest reception to obtain top performance from your receiver.

This is the combination range and operation switch. In the **FM** (Frequency Modulation) position, the receiver tunes the 88 to 108 megacycle **FM** band; in the **AM** (Standard Broadcast) position, the receiver operates as a regular broadcast receiver tuning the frequency range 540 to 1600 kilocycles. To use the receiver as a record player, set this switch at **PHONO** and operate the volume and tone controls as for normal radio reception.

MODEL ST-74

DESCRIPTION

The model ST-74 receiver is a superheterodyne receiver covering the standard broadcast (540 kc - 1600 kc) and FM broadcast (88 mc-108 mc) services. The receiver is supplied in chassis form for custom installations.

A shielded connector and power receptacle located on the rear apron of the chassis permit the attachment of a record player for recorded entertainment.

To place the receiver in operation it is merely necessary to connect the antenna and speaker and plug the power plug into the wall outlet. Refer to the installation details that follow, especially to the paragraph on "Power Source", before connecting the receiver to the wall outlet to avoid unnecessary and perhaps costly repairs.

INSTALLATION

UNPACKING - Check all shipping instruction tags carefully before removing them.

LOCATING - When locating and mounting the receiver give careful consideration to ventilation. Avoid warm locations such as are found near radiators, or hot air registers. Carefully avoid dead air spaces in the installation.

ANTENNA - The receiver is equipped with a built in loop antenna for local reception on both the FM (frequency modulation) and AM (standard broadcast) bands. Due to the directional effect of a loop antenna, it may be necessary to rotate the receiver slightly to obtain optimum performance from all of the broadcasting stations. In general, however, the receiver may be placed in operation without further antenna considerations.

Where receiving conditions are poor and maximum antenna pickup is required, antenna terminals have been provided for an outdoor antenna system.

Standard Broadcast Antenna - When required, a single wire approximately 25 to 50 feet long may be connected to the terminal marked EXTERNAL BROADCAST ANTENNA, located at the rear of the receiver, to improve reception in the standard broadcast band (540-1600 kc). This wire may be concealed in the room or erected outside the building as desired.

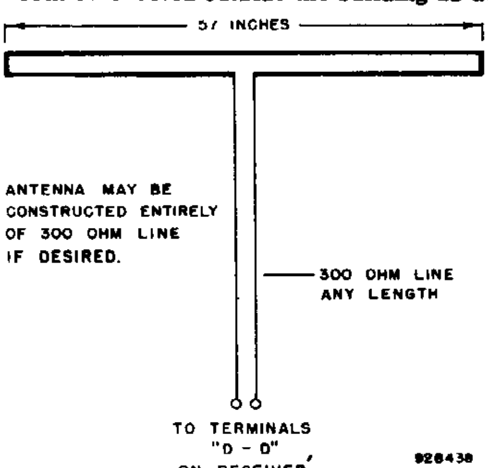


Fig. 2. Folded doublet antenna details.

FM Broadcast Antenna - Where receiving conditions demand more signal pickup on the FM band than provided by the built in loop, an FM band antenna may be erected and its transmission line connected to the two terminals marked "D-D" located on the rear apron of the receiver chassis. The receiver is designed to operate with any FM band antenna using a 300-ohm transmission line.

The simplest antenna which will provide satisfactory FM reception is the folded doublet. This antenna may be constructed of 300-ohm transmission line available at most radio supply houses. Cut and solder the transmission line conductors together as shown in Fig. 2.

Satisfactory reception may be obtained by concealing the antenna under the rug, along the molding, or along the back of a cabinet. If receiving conditions are poor in the particular location, it may be desirable to erect the antenna outdoors as high as practical. In either case the reception will be best when the antenna runs at right angles to the direction of reception.

POWER SOURCE - The receiver operates from a 105-125 V. 60 cycle AC (Alternating current) power source only. The receiver will not operate from a DC (Direct Current) or 25 cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative to avoid costly repairs. The normal power consumption for this receiver is 60 watts.

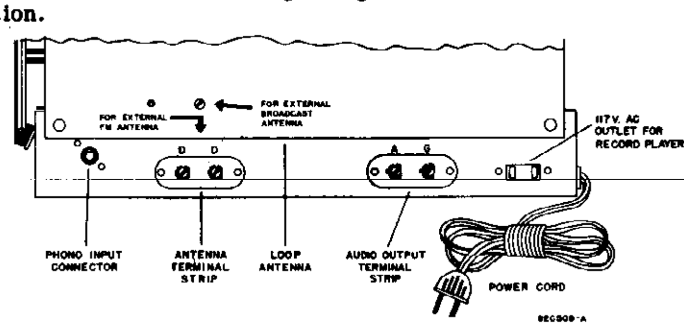


Fig. 3. Antenna & record player connections

RECORD PLAYER CONNECTION - A shielded type receptacle, accessible at the rear chassis apron, is provided to accommodate a record player pickup cable connector. Any record player employing a crystal cartridge or high level magnetic pickup in its tone arm may be used with the receiver. An a-c receptacle is also provided to accommodate the power plug on the record player. The record player is automatically shut off with the receiver when using this power outlet.

SERVICE

GENERAL SPECIFICATIONS

Tubes	Six plus rectifier	Tuning	Manual
High Impedance Output		Frequency Range. . .	Broadcast 540 kc - 1600 kc Frequency Modulation 88 mc - 108 mc
Antenna	Built-in loop type Antenna. Provisions for external antenna.	Intermediate Frequency.	455 kc/10.7 mc
		Power Supply	105-125 V. 60 cycles AC
Phono Input	High impedance	Power Consumption . .	60 watts

TUBE REPLACEMENT - The tube types and their relative position in the receiver are shown in the illustration, Fig. 5. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; and push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing the tube into the socket. Handle all tubes with care as they are considered fragile and do not tolerate much mechanical abuse.

DIAL LAMP REPLACEMENT - Refer to Fig. 5. for the location of the two dial lamps. To replace a defective dial lamp, unclip the dial lamp socket by compressing the side springs. The socket and defective lamp may then be brought out into the open for service. Replace defective lamps with 6-8 V. Mazda #44 (Blue bead) or equivalent.

RESTRINGING DIAL CORD

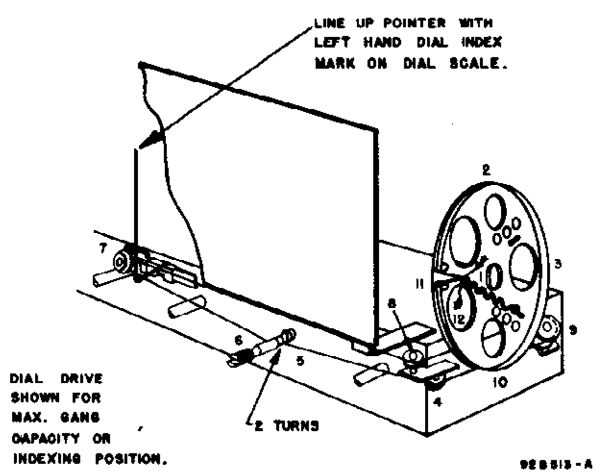


Fig. 4. Dial cable stringing procedure

Restring the dial drive with a 48-inch length of 20 lb. test dial cord. Tie one end to the tension spring and follow the stringing sequence outlined in Fig. 1. Stretch the tension spring and tie the end of the cord securely to the spring as shown.

Set the tuning condenser at maximum capacity (closed), attach the dial pointer to the drive string and line it up with the left hand index mark on the dial scale.

ALIGNMENT

Generator connection . . . . . See chart
Generator ground . . . . To chassis
Output meter connection . . . Across voice coil
Electronic voltmeter connection . . . . See chart
Volume control position. . . . . Maximum
Tone control position . . . . Optional

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

MODEL ST-74

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Radio Range Switch Position	Radio Dial Setting	Adjust	Remarks
1.	.01 mfd. cap.	To stator plates of high cap. mixer section	455 kc	2	1000 kc	A,B,C,D	Adjust for max. audio output at voice coil. Keep audio output below 50 mw to avoid AVC action.
2.	.01 mfd. cap.	To stator plates of low cap. mixer section	10.7 mc (No modulation)	1	100 mc	E,F,G,H	Adjust for max. DC voltage between pin #7 of the 6AL5 and chassis. Connect a 500,000 ohm resistor in series with voltmeter probe. Use just enough signal generator output to obtain approx. 2 volts at the electronic voltmeter.

3. After completing the adjustments required by step 2. detune the signal generator on each side of 10.7 mc and note the generator dial or frequency reading for one half of the DC voltage measured by the electronic voltmeter. Use just enough signal generator output to obtain a maximum of 2 volts at the center frequency of the IF channel. Set the signal generator frequency at the midpoint of the two readings obtained above and align the FM detector transformer as follows:

4. Without changing the setup, adjust the primary of the FM detector transformer (I) for maximum DC voltage. Disconnect the electronic voltmeter probe and reconnect it to the junction of R24 and R25 using the 500,000-ohm resistor as before for isolation. Adjust the secondary of the FM detector (J) for the null or zero DC voltage. This completes the IF amplifier adjustment.

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Radio Range Switch Position	Radio Dial Setting	Adjust	Remarks
5.	Std. RMA dummy	To BC antenna terminal on back of loop.	1500 kc	2	1500 kc	*K,L	Adjust for max. audio output as in step 1.
			600 kc	2	600 kc	*M	
6.	300-ohm carbon resistor	To terminals "D-D" on rear chassis apron. Connect resistor to high side or ungrounded terminal	108 mc	1	108 mc	*N,O	Adjust for max. DC voltage as in step 2.

*Calibration adjustment.

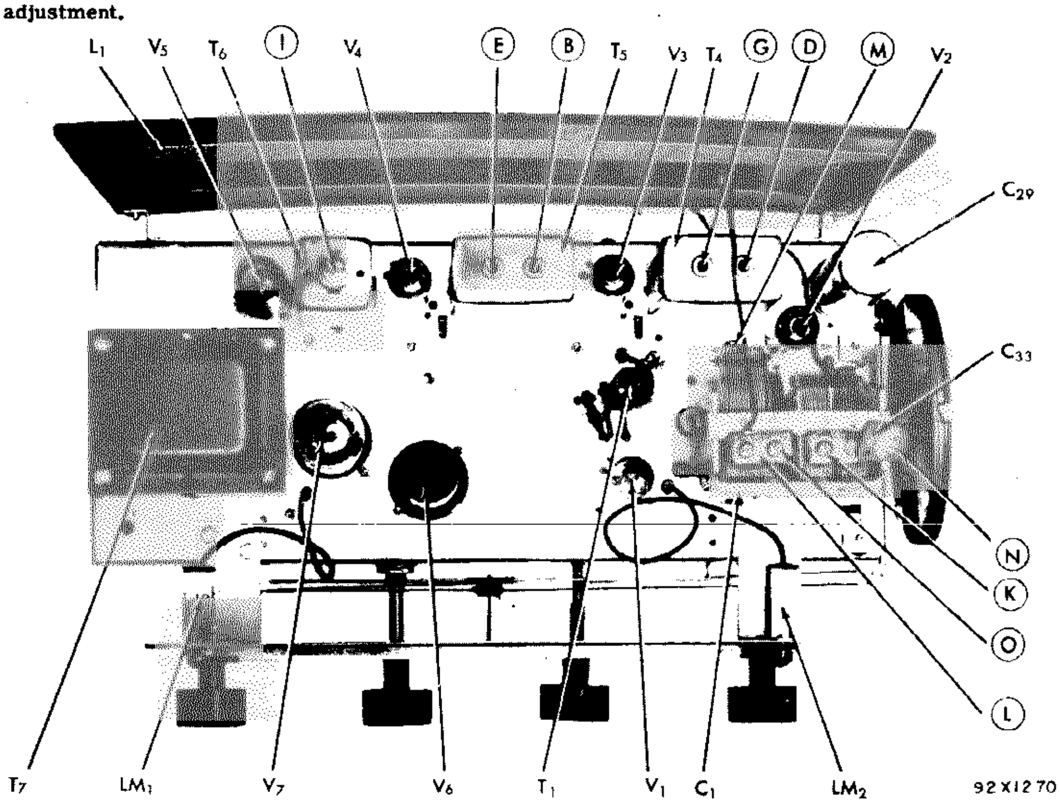


Fig. 5. Top view, alignment, adjustments and component location.

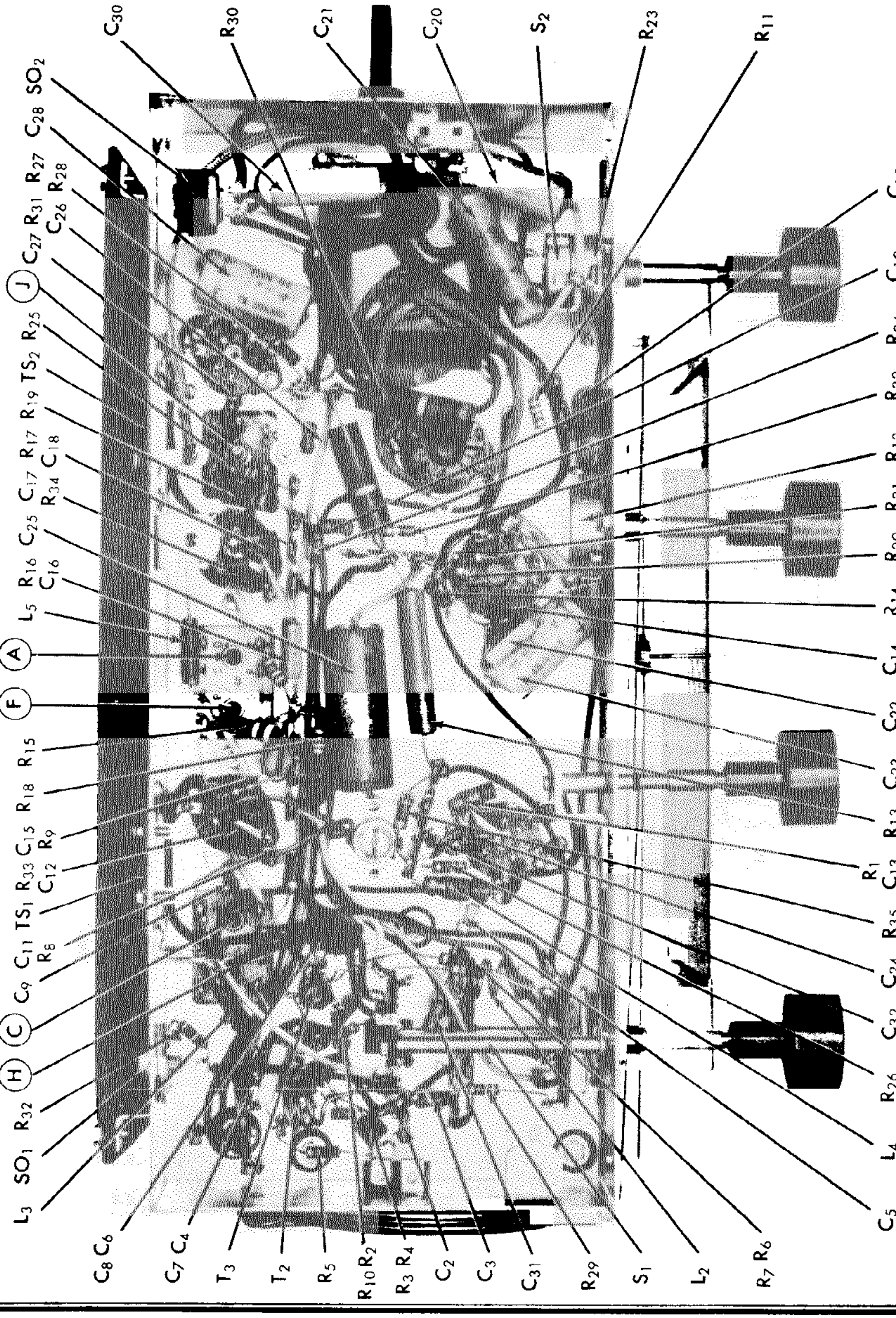
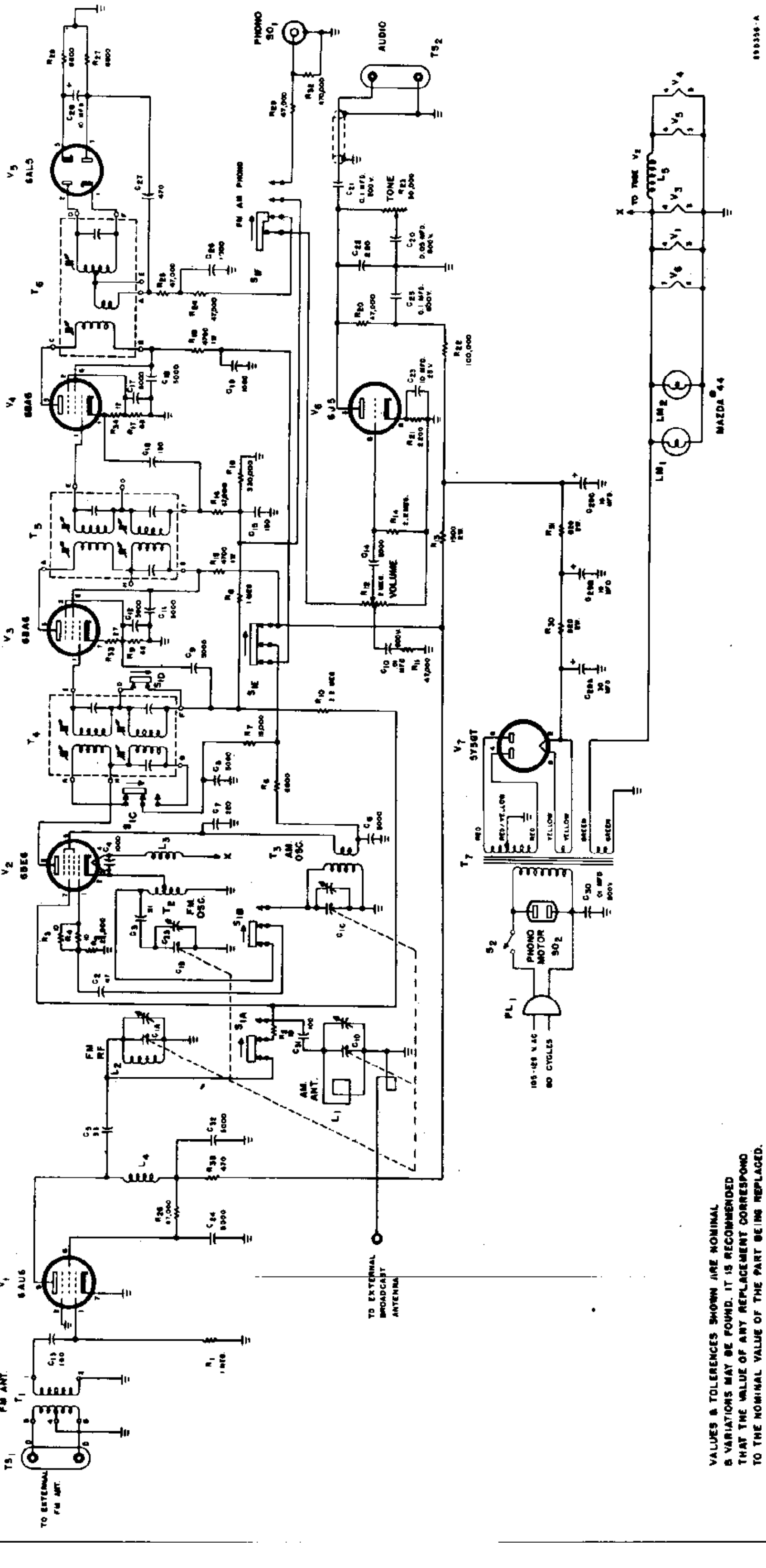


Fig. 6. Bottom view, alignment adjustments and component location

92X1271

MODEL ST-74



VALUES & TOLERENCES SHOWN ARE NOMINAL
& VARIATIONS MAY BE FOUND. IT IS RECOMMENDED
THAT THE VALUE OF ANY REPLACEMENT CORRESPOND
TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

NOTES-
RESISTOR VALUES ARE IN OHMS.
RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
RANGE SWITCH S-1 SHOWN IN FM. POSITION.

LAST CAPACITOR SYMBOL —— C-33
LAST RESISTOR SYMBOL —— R-35

Fig. 7. Schematic Diagram

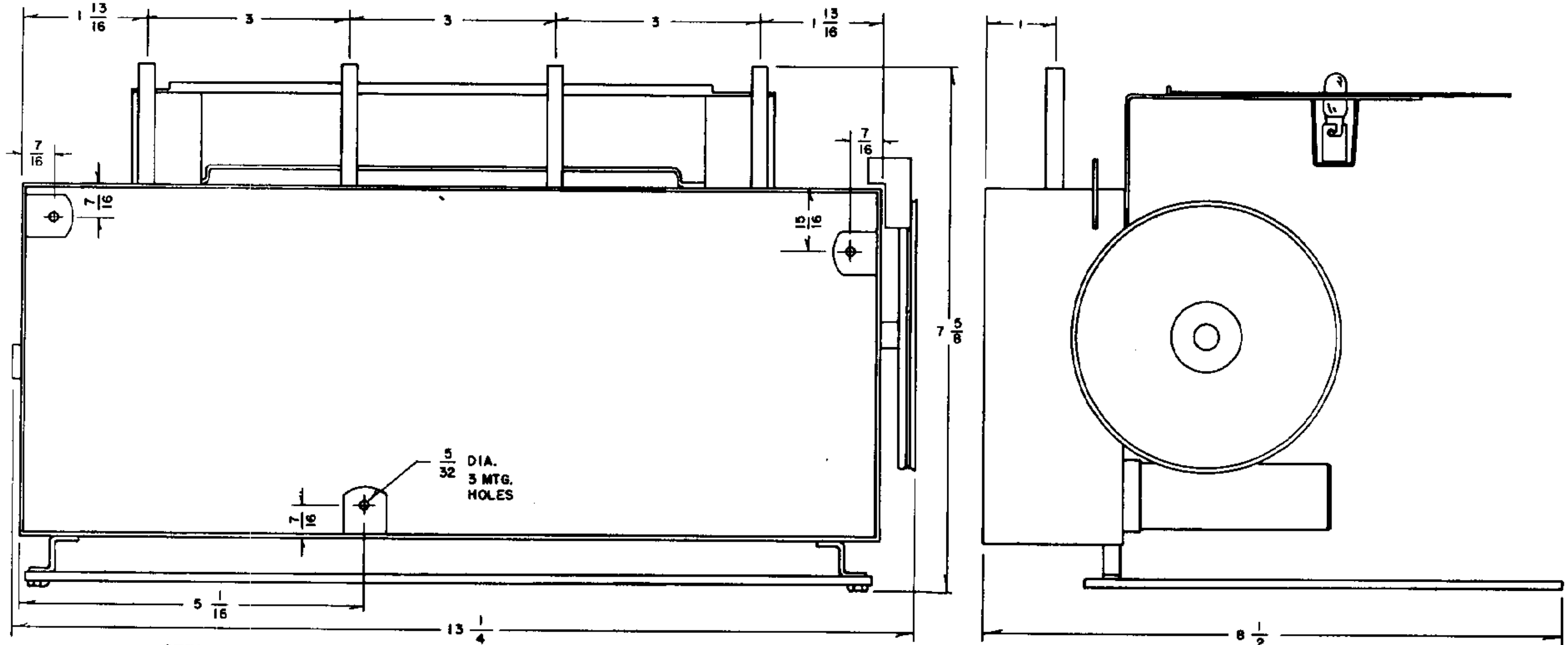


Fig. 8. Chassis mounting dimensions

SERVICE PARTS LIST

CONDENSERS

Ref. No.	Description	Manufacturer's Part Number
C-1	Capacitor, main tuning	48C203-1
C-2	47 mmf. 500 V., ceramic	47X21UK470K
C-3	51 mmf. 500 V., ceramic	47X21UK510J
C-4,19,26	1000 mmf. 500 V., ceramic	47B20A102N5
C-5	33 mmf. 500 V., ceramic	47X20UK330K
C-6,8,9,11, 12,14,17, 18,24,32	5000 mmf. 500 V., Hi Kap	47A168
C-7,22	220 mmf. 500 V., mica	47X20B221M
C-10	.01 mfd. 600 V., tubular paper	46AY103J
C-13,31	100 mmf. 500 V., Hi Kap	47B20A101M5
C-15,16	150 mmf. 500 V., mica	47X20B151M
C-20	.05 mfd. 600 V., tubular paper	46AY503J
C-21	.1 mfd. 200 V., tubular paper	46AU104J
C-23,28	10 mfd. 25 V., electrolytic	45A121
C-25	.1 mfd. 600 V., tubular paper	46AY104J
C-27	470 mmf. 500 V., ceramic	47B20A471M5
C-29	30-10-10 mfd. 350 V., electrolytic	45B131
C-30	.01 mfd. 600 V., molded paper	46AG103J
C-33	Trimmer	44A115

TRANSFORMERS AND COILS

T-1	Coil, FM antenna	51B1021
T-2	Coil, FM oscillator	51A1062
T-3	Coil, AM oscillator	51B1063
T-4	Transformer, 1st IF	50B399
T-5	Transformer, 2nd IF	50B400
T-6	Transformer, ratio detector	50B401
T-7	Transformer, power	52C200-B
L-1	Loop Antenna	57D123
L-2	Coil, FM-RF	51A1061
L-3,4	Choke, RF	53A136
L-5	Choke, RF	53B124

SWITCHES

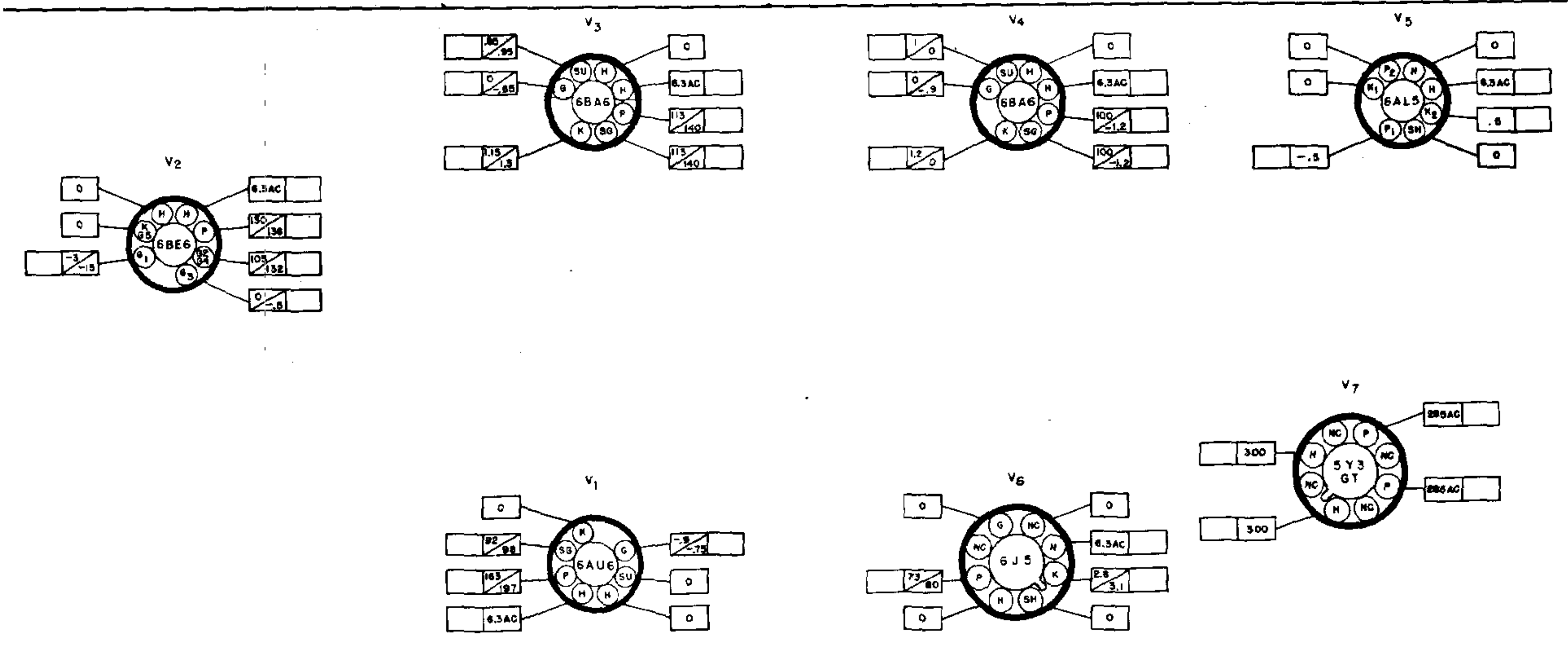
S-1	Switch, assembly band selector	60B328
S-2	Switch, power (part of tone control R-23)	

RESISTORS

R-1,8	1 megohm 1/2 watt, carbon	23X20X105M
R-2,3,4	10 ohms 1/2 watt, carbon	23X20X100M
R-5	22,000 ohms 1/2 watt, carbon	23X20X223K
R-6,27,28	6800 ohms 1/2 watt, carbon	23X20X682K
R-7	15,000 ohms 1/2 watt, carbon	23X20X153M
R-9,17	68 ohms 1/2 watt, carbon	23X20X680K
R-10,14	2.2 megohms 1/2 watt, carbon	23X20X225M
R-11,16,20, 24,25,26, 29	47,000 ohms 1/2 watt, carbon	23X20X473K
R-12	Volume control, 2 megohms	25B624
R-13	1500 ohms 2 watt, carbon	23X40X152M
R-15,19	4700 ohms 1 watt, carbon	23X30X472M
R-18	330,000 ohms 1/2 watt, carbon	23X20X334M
R-21	2200 ohms 1/2 watt, carbon	23X20X222K
R-22	100,000 ohms 1/2 watt, carbon	23X20X104M
R-23	Tone control and AC switch, 50,000 ohms	25B759
R-30,31	820 ohms 2 watt, carbon	23X40X821K
R-32	470,000 ohms 1/2 watt, carbon	23X20X474M
R-33	27 ohms 1/2 watt, carbon	23X20X270K
R-34	12 ohms 1/2 watt, carbon	23X20X120K
R-35	470 ohms 1/2 watt, carbon	23X20X471K

MODEL ST-74

	PLUGS AND SOCKETS	
'L-1	*Line cord and plug*	87B1669
O-1	Receptacle, phono	36A041
O-2	Socket, AC receptacle	*10A015*
	Socket, octal (tubes V-6,7)	6A296
	Socket, miniature (tubes V-1,2,3,4,5)	6A308
	Socket, dial light	86A062-1
	TUBES, RECTIFIERS AND LAMPS	
'-1	Type 6AU6, RF amp.	90X6AU6
'-2	Type 6BE6, mixer/osc.	90X6BE6
'-3	Type 6BA6, 1st IF amp.	90X6BA6
'-4	Type 6BA6, 2nd IF amp. and *detector (AM)*	90X6BA6
V-5	Type 6AL5, detector (FM)	90X6AL5
V-6	Type 6J5, audio amp.	90X6J5
V-7	Type 5Y3GT, rectifier	90X5Y3GT
LM-1,2	Lamp, 6-8 V., Mazda #44 (Blue bead)	39A003
	MISCELLANEOUS	
TS-1	Terminal strip, antenna (FM)	88A379
TS-2	Terminal strip, audio output	88A327
	Bracket, dial plate mtg.	67A834
	Bracket, gang mtg.	67B825
	Dial background (black)	32A446
	Dial cord	38A001
	Dial plate	63B332
	Dial scale (glass)	22B301
	Escutcheon	7D067
	Glass	22B205
	Knob, tuning and volume controls	15B067-2
	Knob, tone and range controls (1 dot)	15B142-6
	Line cord lock (male section)	76A397-1
	Line cord lock (*female section*)	76A397-2
	Pointer	82A152
	Shaft, tuning	74A251
	Shield, tube V-5	69A232
	Spring, dial cord	75B012
	Spring, retainer	75A062
	Template	95D177



FRONT APRON

BOTTOM VIEW OF CHASSIS

Fig. 9 Tub. socket voltage chart

NOTES—

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS.
3. LINE VOLTAGE — 117V. AC.
4. ALL VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER AND AT ZERO SIGNAL.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
6. FM/AM WHERE TUBE SOCKET VOLTAGES CHANGE FROM FM TO AM RECEPTION TWO READINGS ARE SHOWN, UPPER LEFT SHOWS FM READINGS — LOWER RIGHT SHOWS AM READINGS.
7. "NC"— NO CONNECTION. READING SHOWN ONLY WHEN TERMINAL IS USED AS A TIE LUG.
8. "NR"— NOT READABLE OR READING GENERALLY MEANINGLESS.
9. THE BLANK SPACES ARE PROVIDED FOR THE SERVICE METER READING. FILL IN THE ACTUAL READING AS TAKEN WITH YOUR OWN TEST EQUIPMENT USING A NORMAL OPERATING RADIO FOR THESE MEASUREMENTS.

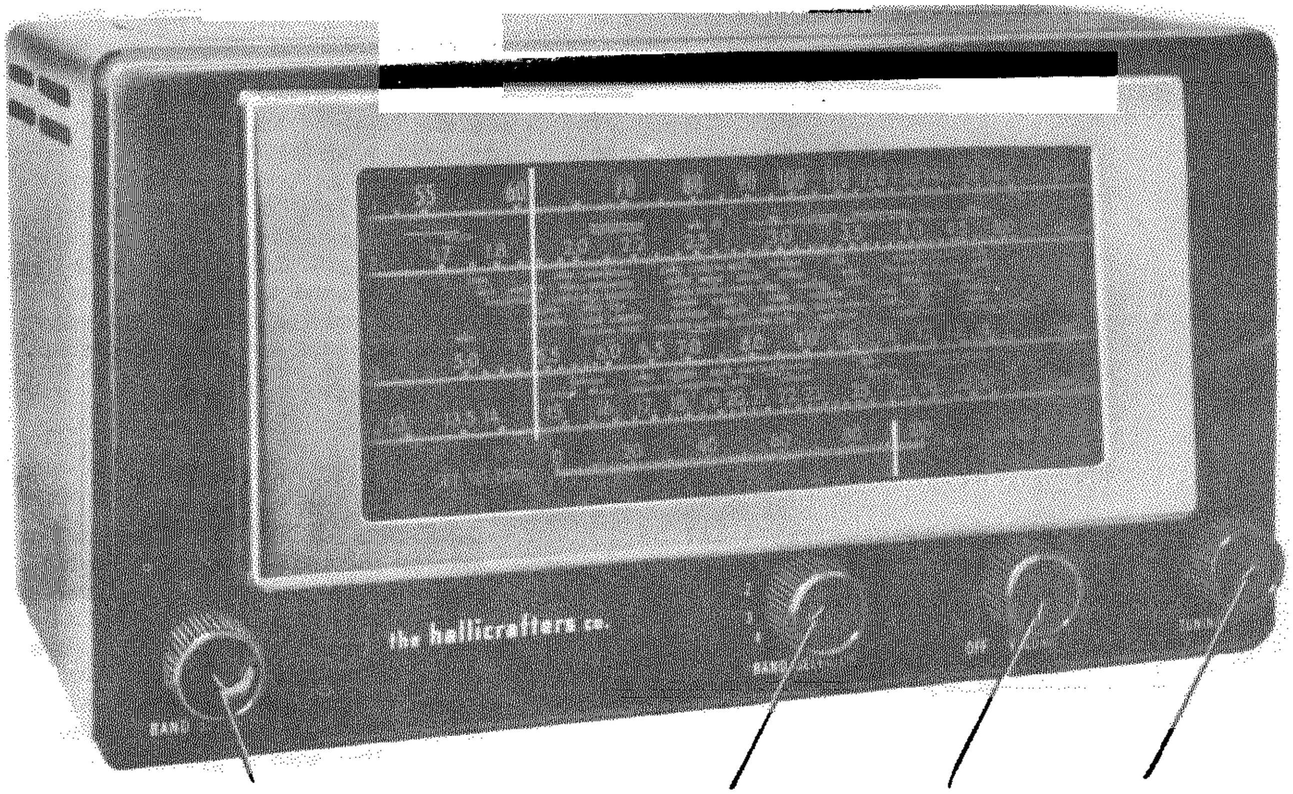


FIG. 1. RADIO RECEIVER MODEL 5R10

INSTALLATION

LOCATION - The receiver is equipped with rubber feet for table top or shelf mounting. When locating and mounting the receiver, avoid excessively warm locations such as those found near radiators and hot air registers or recessed installations which prevent proper circulation of air. If the receiver is placed with its back to the wall, leave about an inch or two of clearance between the back of the cabinet and the wall for proper ventilation.

POWER SOURCE - The receiver operates from a 105-125 volt DC (direct current) or 60 cycles AC (alternating current) source. The normal power consumption of the receiver is 30 watts. The receiver will not operate from a 25-cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative to avoid costly repairs. If the receiver does not respond after a minute warm-up period when operating on a DC source, it may be necessary to reverse the power plug at the wall outlet.

Operation from a 210-250 volt AC/DC source is possible by using a special line cord adapter available as an accessory. Consult your Hallicrafters dealer regarding this adapter unit (Hallicrafters part number 87D1566) if 210-250 volt operation is desired.

ANTENNA - A three terminal strip is provided on the rear chassis apron for antenna connections. The terminals are marked "A1", "A2" and "G". A jumper bar is normally connected between terminals "A2" and "G" for single wire antenna systems and unbalanced antenna transmission lines. For doublet antenna installations using a balanced transmission line, the jumper between "A2" and "G" is disconnected. A good ground connection, when used, is connected to terminal "G".

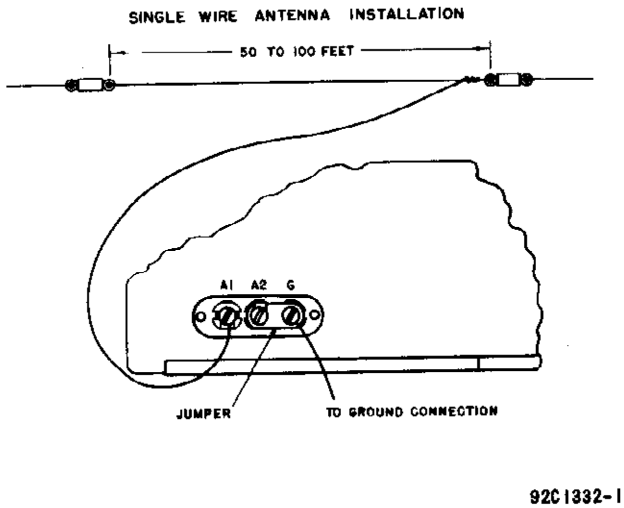


FIG. 2. SINGLE WIRE ANTENNA INSTALLATION

SINGLE WIRE ANTENNA - For a single wire antenna installation, connect a jumper between antenna terminals "A2" and "G". A single wire antenna of about 50 to 100 feet long (including lead-in) is then connected to terminal "A1". Erect the antenna as high and free of surrounding objects as possible. For improved reception, it may be desirable to connect a ground wire between terminal "G" and a suitable ground such as a water pipe or outside ground stake.

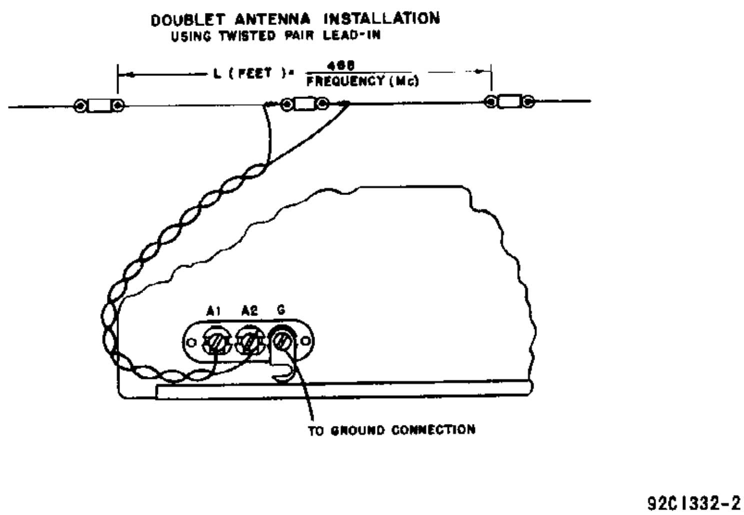


FIG. 3. DOUBLET ANTENNA INSTALLATION

DOUBLET ANTENNA - The doublet antenna is recommended for the high frequency bands, especially where a maximum signal to noise ratio is required over a relatively narrow range of frequencies. The antenna transmission line is connected to terminals "A1" and "A2". If a concentric line with a grounded outer conductor is used, connect the inner conductor to terminal "A1", the outer conductor to terminal "A2", and connect a jumper between terminals "A2" and "G".

The overall length (feet) of a doublet antenna may be determined by dividing the constant 468 by the desired frequency in megacycles. Keep in mind that this type of antenna is directional broadside to its length and should be so oriented if maximum pickup from a given direction is desired.

OPERATION

STANDARD BROADCAST RECEPTION - For standard broadcast reception set the BAND SELECTOR switch to position "1", the SPEAKER/PHONES switch to "SPEAKER" and the BAND SPREAD dial pointer to "0". Note that the main tuning dial calibration will be true only when the bandspread dial pointer is set at zero. Turn on the receiver with the VOLUME control by turning it clockwise beyond the point of switch action. Adjust the TUNING and VOLUME controls in the usual manner, tuning carefully for the clearest reception. When operating the receiver from a DC source allow about a minute for warm-up. If the receiver doesn't respond after this warm-up period, reverse the power plug at the wall outlet to obtain proper polarity. In certain cases hum picked up from an AC outlet may be reduced by properly polarizing the power plug.

To turn off the receiver, turn the VOLUME control fully counter-clockwise beyond the point of switch action.

SHORT-WAVE RECEPTION - Reception in the short-wave bands is accomplished as described above for standard broadcast reception except that the BAND SELECTOR is set for bands 2, 3, or 4. The frequency of reception is read from the dial scale which corresponds to the setting of the BAND SELECTOR. Any narrow range of frequencies covered by the receiver may be spread out by tuning the stations with the BAND SPREAD control as explained below.

BAND SPREAD TUNING - To use the band spread dial, set the bandspread dial pointer to zero, set the main tuning dial pointer at the high frequency limit of the range of frequencies to be covered and then tune in the stations with the BAND SPREAD control. For example: Assume that the 40 meter amateur band is to be covered. Set the BAND SELECTOR to position "3", the main tuning dial pointer to 7.3 MC and tune in the stations with the BAND SPREAD control.

IMPORTANT - The calibrations on the main tuning dial scale are correct only when the BAND SPREAD dial pointer is set at "0".

SPEAKER PHONES - Normally this switch is set at "SPEAKER" for loud speaker operation. Setting the switch to the "PHONES" position switches the output circuit from the speaker to the headset output jacks located on the rear apron of the chassis.

SERVICE

GENERAL SPECIFICATION

Tubes . . . . Four plus rectifier
Speaker . . . . 5-inch PM
Voice coil impedance . . . . 3.2 ohms
Headset output . . . . High impedance (1500 to 5000 ohms)
Antenna . . . . . Provisions for external antenna with transmission line or single wire feed.
Intermediate frequency. . . . . 455 KC
Power Supply . . . . 105-125 volts DC or 60 cycles AC
Power Consumption . . . . 30 watts
Tuning. . . . . Manual

TUNING RANGE

Band Selector Position	Frequency Range
1	540 KC - 1650 KC
2	1.65 MC - 5.1 MC
3	5 MC - 14.5 MC
4	13 MC - 31 MC

RESTRINGING DIAL CORD

MAIN TUNING DIAL POINTER DRIVE

Restring the main tuning dial pointer drive with a 39-inch length of 30 lb. test dial cord. Set the main tuning capacitor in a fully closed position. Tie one end of the cord to the tension spring at position "A" and follow the stringing procedure "A" through "I" as illustrated in Fig. 4. At position "I", stretch the tension spring and tie the cord securely. Note that three and a quarter turns of dial cord are wrapped around the main tuning drive shaft for proper traction.

Index the main tuning dial pointer by setting the main tuning gang at maximum capacity (fully closed) and aligning the dial pointer with the left hand dial index marker.

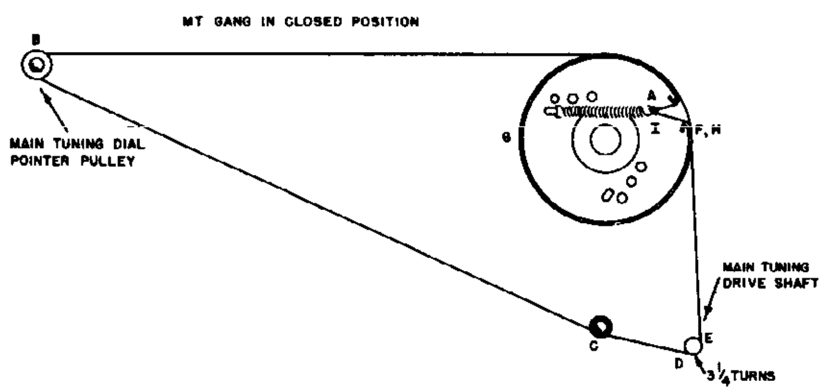


FIG. 4. MAIN TUNING DIAL POINTER DRIVE STRINGING PROCEDURE

MODEL 5R10

MAIN TUNING GANG DRIVE

Restring the main tuning capacitor drive with a 30-inch length of 30 lb. test dial cord. Set the main tuning capacitor in a fully open position. Tie one end of the cord to the tie point at position "1" and follow the stringing sequence "1" through "14" as shown in Fig. 5. At position "14", stretch the tension spring and tie the cord securely to the spring.

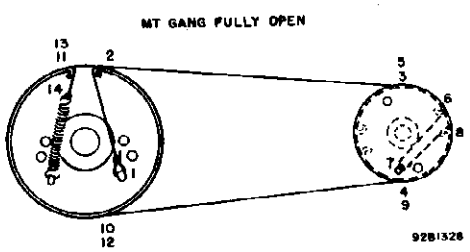


FIG. 5. MAIN TUNING GANG DRIVE STRINGING PROCEDURE

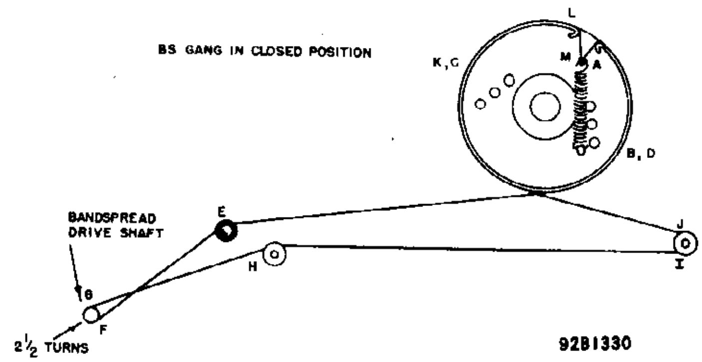


FIG. 6. BAND SPREAD GANG AND DIAL POINTER DRIVE STRINGING PROCEDURE

BAND SPREAD GANG AND POINTER DRIVE

Restring the band spread gang and pointer drive with a 44-inch length of 30 lb. test dial cord. Set the band spread capacitor in a fully closed position. Tie one end of the cord to the tension spring at position "A" and follow the sequence outlined in Fig. 6. At position "M", stretch the tension spring and tie the cord securely.

Index the band spread dial pointer by setting the band spread gang at maximum capacity and aligning the pointer with the position marked "100" on the band spread dial.

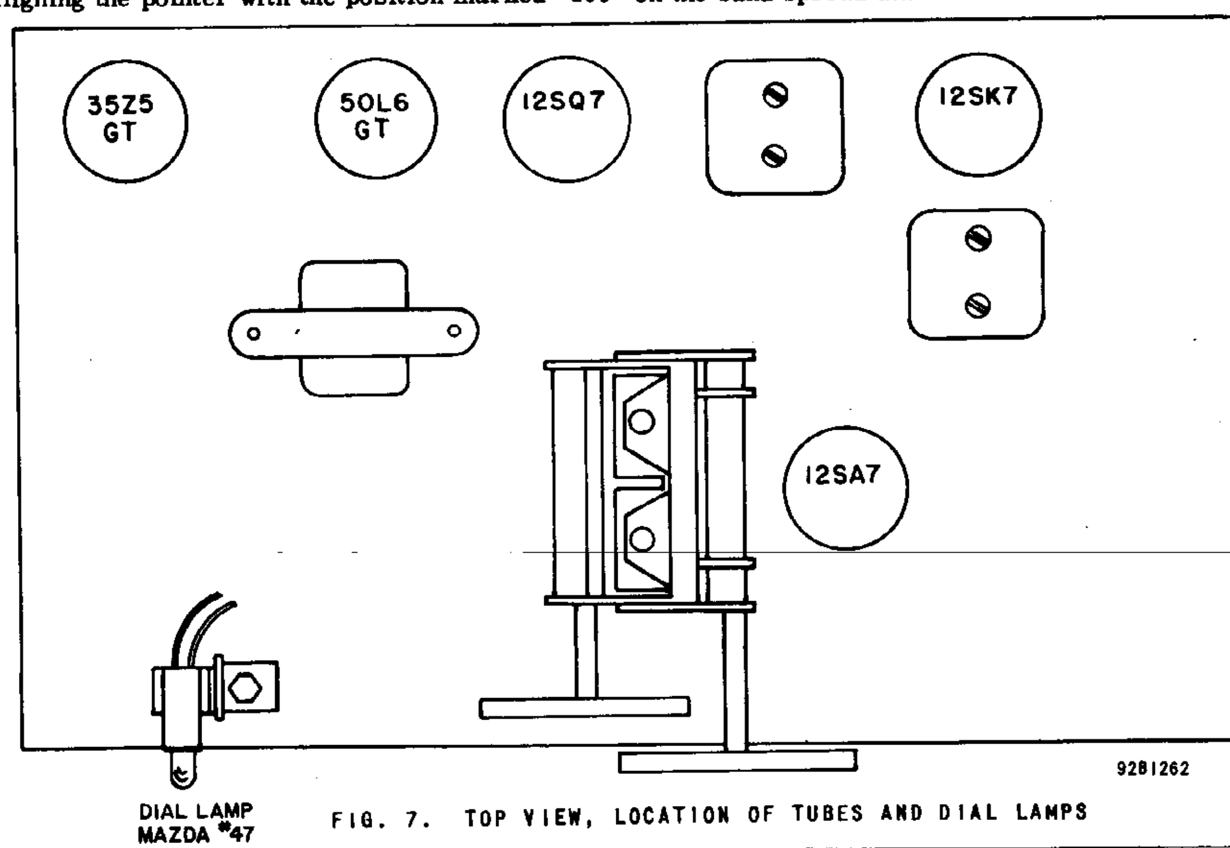


FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS

TUBE REPLACEMENT

The tube types and their relative position in the receiver are shown in the illustration, Fig. 7. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole and then push down until the tube rests firmly on the socket.

Handle tubes with care as they are considered fragile and do not tolerate much mechanical abuse.

DIAL LAMP REPLACEMENT

Refer to Fig. 7. for the location of the dial lamp used in the receiver. To replace a defective lamp, remove the cabinet back, reach in through the rear of the cabinet and unclip the dial lamp socket from the mounting clip. The socket may then be brought out into the open for dial lamp replacement. Make replacement with 6-8 volt Mazda #47 (brown bead) lamps or equivalent.

ALIGNMENT PROCEDURE

Holes in the bottom cover permit minor adjustment of the oscillator and converter stage trimmers; however for complete alignment, the chassis will have to be removed from the cabinet. To separate the chassis from the cabinet, first remove the cabinet back, the bottom cover which is held in place by the four mounting feet, and the front control knobs. Next, remove the speaker from the cabinet. The chassis is fastened to the cabinet by four Phillips head screws located at the bottom of the cabinet.

CAUTION - The rubber grommets, fiber washers and nylon insulators are used to insulate the chassis from the cabinet. Check the condition of these insulators and replace them if necessary.

The standard RMA dummy antenna specified in the alignment chart consists of a 200 mmf. capacitor in series with a 20 micro-henry r-f choke which is shunted by a 400 mmf. capacitor in series with a 400 ohm carbon resistor.

Before starting alignment, set the SPEAKER/PHONES switch at SPEAKER, the VOLUME control fully clockwise and the BAND SPREAD control to zero. For the settings of the remaining controls, see the alignment chart.

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust	Remarks
1	.01 mfd cap.	Stator plates, front section of tuning gang.	455 kc	1	1000 kc	A,B, C,D	Adjust for max. audio out-output at speaker voice coil. Use just enough signal generator output to obtain a suitable output indication.
2	Std. RMA dummy	High side to term. A1 on antenna strip. Jumper wire between A2 and G.	30 mc	4	30 mc	F,G	Max. output as in step 1.
3	Std. RMA dummy	See step 2.	14 mc	3	14 mc	H,J	Max. output as in step 1.
4	Std. RMA dummy	See step 2.	5 mc	2	5 mc	K,L	Max. output as in step 1.
5	Std. RMA dummy	See step 2.	1500 kc 600 kc	1	1500 kc 600 kc	M,N P	Max. output as in step 1.

MODEL 5R10

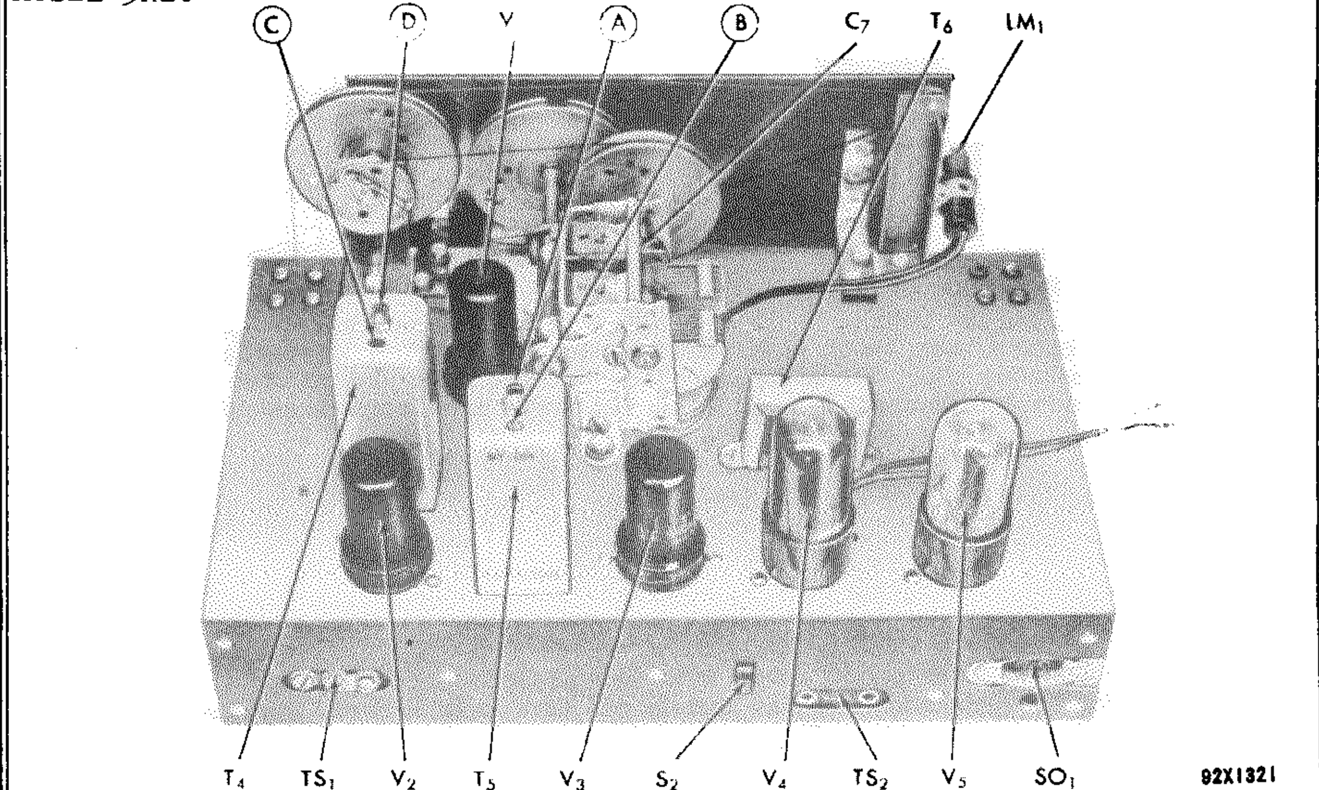


FIG. 8. TOP VIEW, ALIGNMENT POINTS AND COMPONENT LOCATIONS

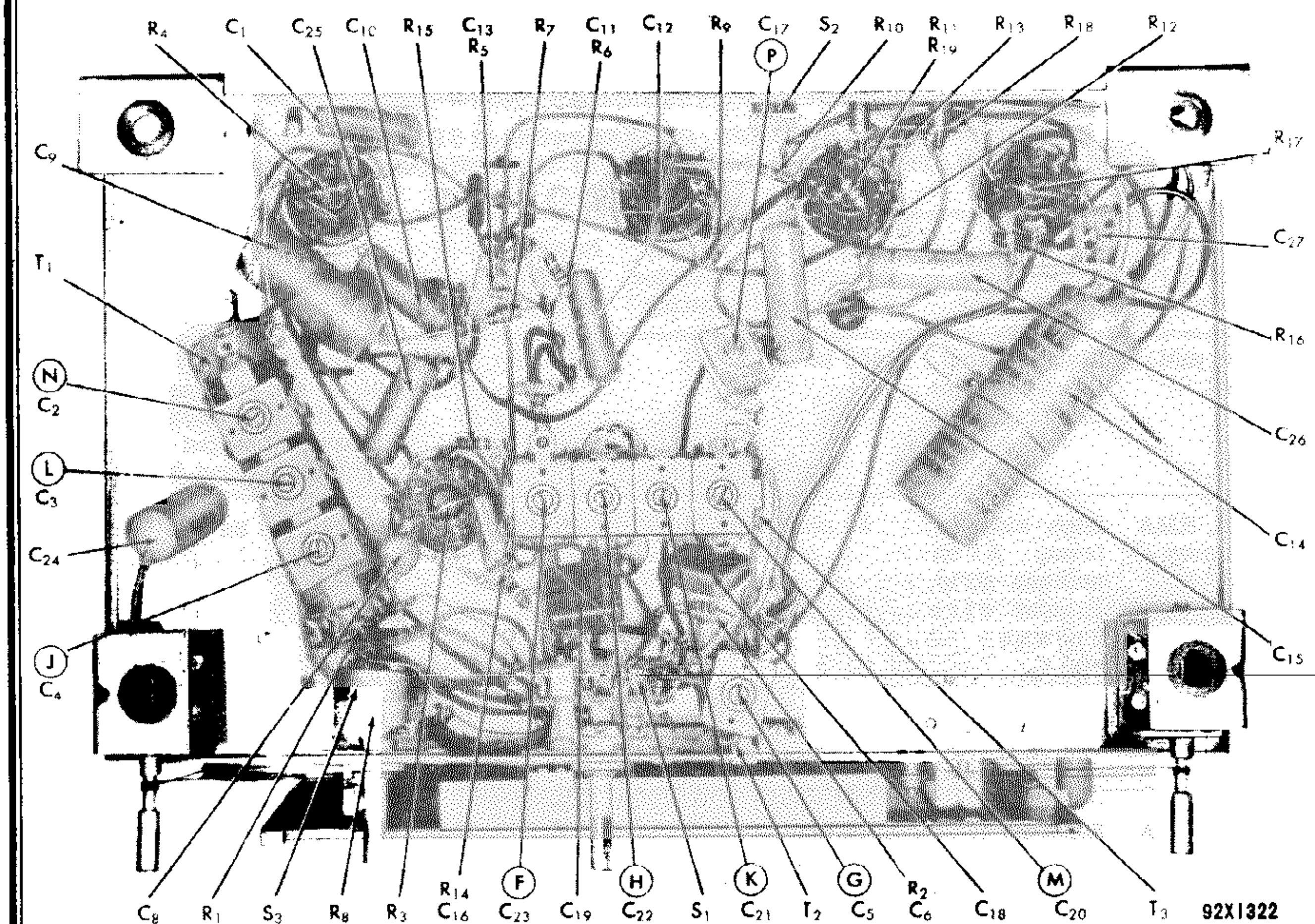
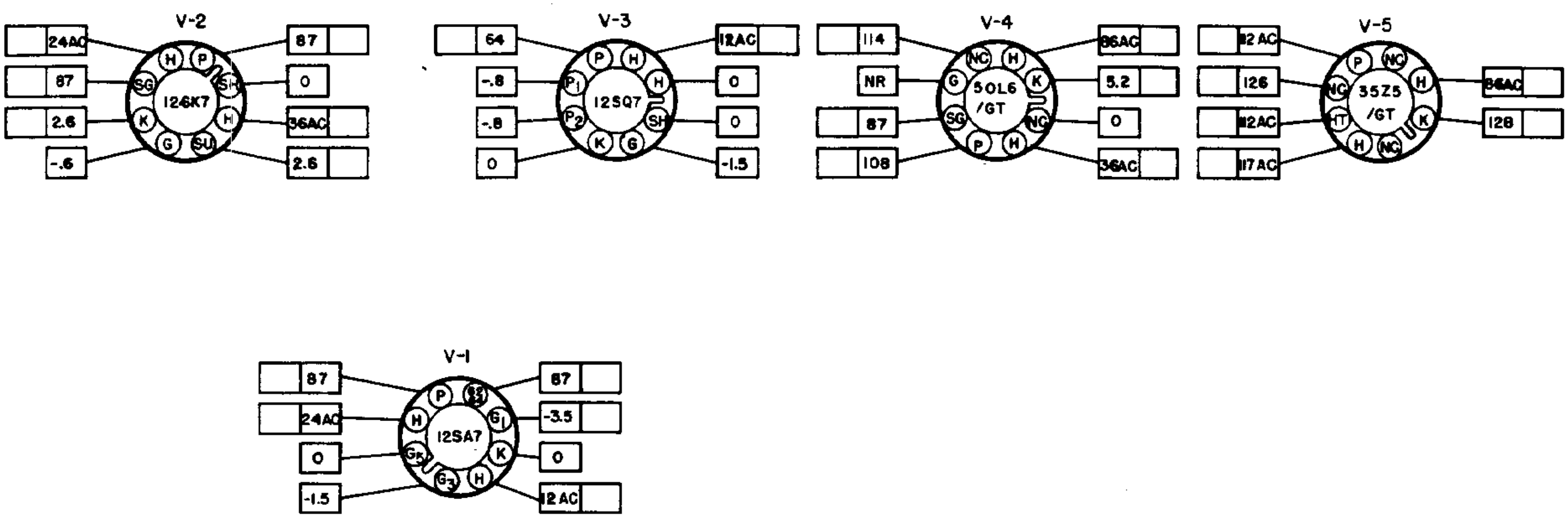


FIG. 9. BOTTOM VIEW, ALIGNMENT POINTS AND COMPONENT LOCATIONS



FRONT APRON

BOTTOM VIEW OF CHASSIS

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & CHASSIS, WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE—117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC" NO CONNECTION. (VOLTAGES SHOWN FOR THIS TERMINAL ONLY WHEN TERMINALS ARE USED AS A TIE LUG.)
7. "NR" NOT READABLE. (READING GENERALLY MEANINGLESS)
8. ☐ SPACE PROVIDED FOR SERVICE METER READINGS.
9. BAND SELECTOR SWITCH AT BAND "4" POSITION.

92C1327

FIG. 10. TUBE SOCKET VOLTAGE CHART

MODEL 5R10

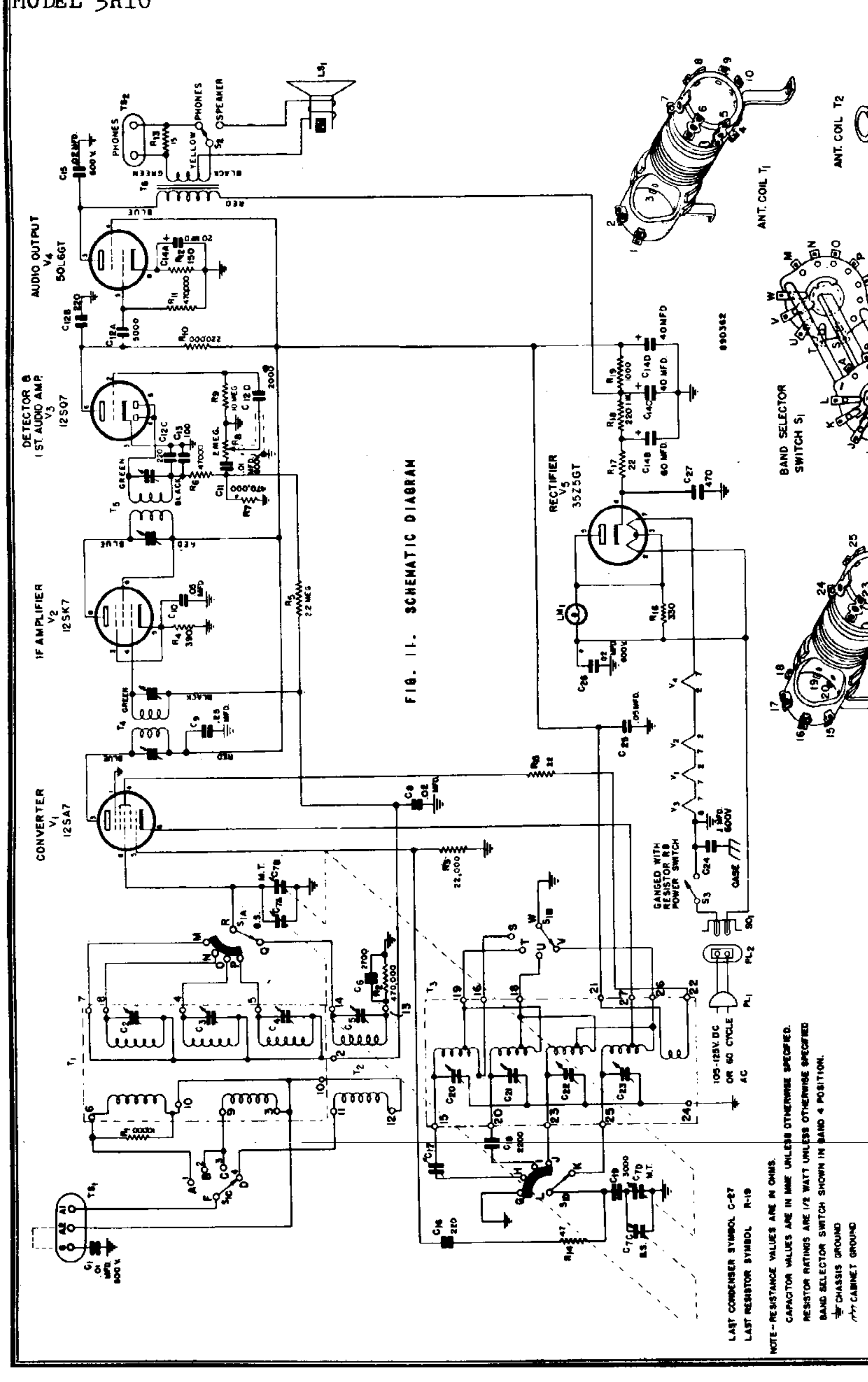


FIG. 11. SCHEMATIC DIAGRAM

LAST CONDENSER SYMBOL C-27
LAST RESISTOR SYMBOL R-19

NOTE–RESISTANCE VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
BAND SELECTOR SWITCH SHOWN IN BAND 4 POSITION.
CHASSIS GROUND
CABINET GROUND

VALUES & TOLERENCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED

NOTE: DIMENSIONS & PROPORTIONS SHOWN IN PICTORIAL VIEWS HAVE BEEN EXAGGERATED FOR CLARITY OF TERMINAL LUG LOCATION.

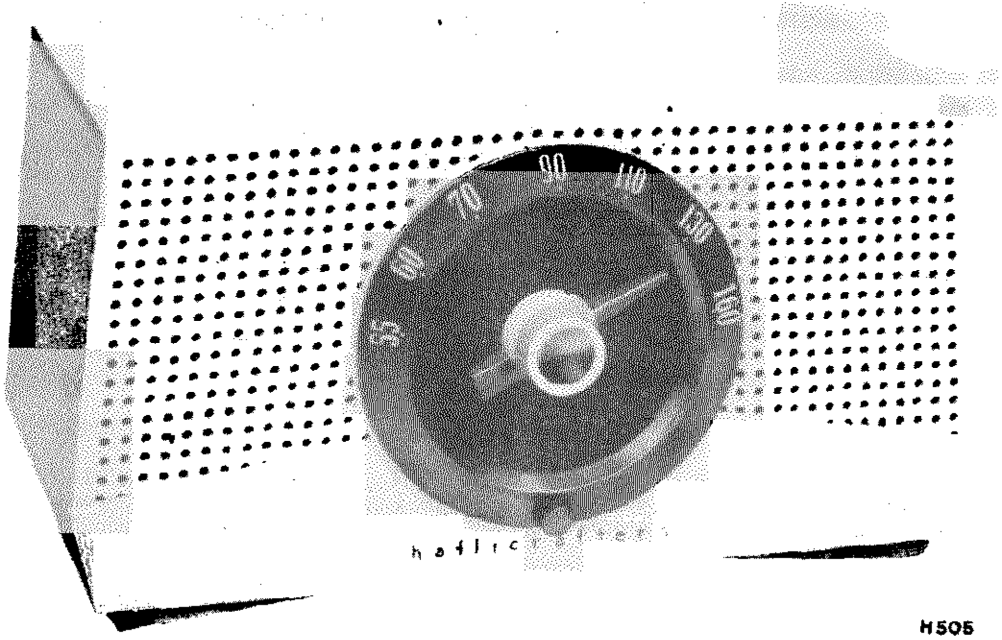
SERVICE PARTS LIST

Ref. No.	Description	Manufacturer's Part Number
	CAPACITORS	
C-1,11	.01 mfd. 600 V., tubular paper	46AZ103J
C-2,3,4	Trimmer, adj. (part of antenna coil T-1)	
C-5	Trimmer, adj. (for antenna coil T-2)	44A039
C-6	2700 mmf. 500 V., mica	47X30B272J
C-7	Tuning capacitor, 2 section	48C246-B
C-8	.02 mfd. 400 V., tubular paper	46AW203J
C-9	.25 mfd. 200 V., tubular paper	46AT254J
C-10,25	.05 mfd. 200 V., tubular paper	46AU503J
C-12	Capacitor, composite: 5000, 2X220, and 2000 mmf. 500 V.; ceramic	46A151
C-13	100 mmf. 500 V., mica	47X20B101K
C-14	60-40-40 mfd. 150 V., 20 mfd. 25 V., electrolytic	45B091
C-15,26	.02 mfd. 600 V., tubular paper	46AY203J
C-16	220 mmf. 500 V., mica	47X20B221K
C-17	Padder, adj. (for oscillator coil T-3, band 1)	44A349
C-18	2200 mmf. 500 V., mica	47X30B222J
C-19	3000 mmf. 500 V., mica	47X30B302J
C-20,21, 22,23	Trimmer, adj. (part of oscillator coil T-3)	
C-24	.1 mfd. 600 V., tubular paper	46AZ104J
C-27	470 mmf. 500 V., mica	47X20B471M
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103M
R-2,7,11	470,000 ohms 1/2 watt, carbon	23X20X474M
R-3	22,000 ohms 1/2 watt, carbon	23X20X223M
R-4	390 ohms 1/2 watt, carbon	23X20X391K
R-5	2.2 megohms 1/2 watt, carbon	23X20X225M
R-6	47,000 ohms 1/2 watt, carbon	23X20X473M
R-8	2 megohms; VOLUME control	25B896
R-9	10 megohms 1/2 watt, carbon	23X20X106M
R-10	220,000 ohms 1/2 watt, carbon	23X20X224M
R-12	150 ohms 1/2 watt, carbon	23X20X151K
R-13	15 ohms 1/2 watt, carbon	23X20X150M
R-14	47 ohms 1/2 watt, carbon	23X20X470M
R-15,17	22 ohms 1/2 watt, carbon	23X20X220M
R-16	330 ohms 1/2 watt, carbon	23X20X331M
R-18	220 ohms 1 watt, carbon	23X30X221M
R-19	1000 ohms 1/2 watt, carbon	23X20X102M
	TRANSFORMERS AND COILS	
T-1	Coil, antenna (bands 1, 2 and 3)	51C821

Ref. No.	Description	Manufacturer's Part Number
	TRANSFORMERS AND COILS (Cont.)	
T-2	Coil, antenna (band 4)	51B1015
T-3	Coil, oscillator (all bands)	51C822
T-4	Transformer, 1st i-f	50B183
T-5	Transformer, i-f (detector)	50B184
T-6	Transformer, audio output	55A127
	SWITCHES	
S-1	Bandswitch assembly	60C393
S-2	Switch, slide; SPEAKER-PHONES	60A243
S-3	Switch, power (part of VOLUME control R-8)	
	CONNECTORS	
PL-1	Line cord and plug PL-2	87A1668-1
TS-1	Terminal strip, antenna	88A671
TS-2	Jack, PHONES	88A071
SO-1	Socket, power	10A286
	Socket, dial lamp	86B105
	Socket, octal; tube	6A250
	TUBES, RECTIFIERS AND DIAL LAMPS	
V-1	Type 12SA7, converter	90X12SA7
V-2	Type 12SK7, i-f amplifier	90X12SK7
V-3	Type 12SQ7, detector and 1st audio amplifier	90X12SQ7
V-4	Type 50L6GT, audio output	90X50L6GT
V-5	Type 35Z5GT, rectifier	90X35Z5GT
LM-1	Lamp, dial; Mazda #47	39A004
	CABINET PARTS	
	Baffle, speaker	78B579-B
	Cabinet	66B634-B
	Cabinet back	8C1204-B
	Channel, rubber; 4 inch (for escutcheon glass)	16A211
	Channel, rubber, 3/8 inch (for escutcheon glass)	16A212
	Cover, cabinet bottom	8C1212
	Clip, antenna coil T-2 mtg.	76A326
	Dial background	32B488
	Dial cord	38A019
	Dial scale (glass)	22B318-C
	Escutcheon	7C248
	Foot, mounting; rubber	16A007
	Glass, escutcheon	22B319
	Grommet, rubber; brown	16A015
	Grommet, rubber; red	16A201
	Insulator, nylon (fits in red insulating grommet)	4A647
	Knob, BAND SELECTOR	15B322
	Knob, BANDSPREAD, OFF-VOLUME and TUNING	15B323
	Pointer, bandspread tuning	82A179
	Pointer, main tuning	82A180
	Shield, dial lamp	8A1249
LS-1	Speaker, PM; 5 inch	85C030
	Spring, dial cord	75A012
	Washer, insulating	4A646

MODELS 5R11, 5R12,
5R13, 5R14

RADIO MODELS 5R11, 5R12, 5R13, 5R14



H505

SPECIFICATIONS

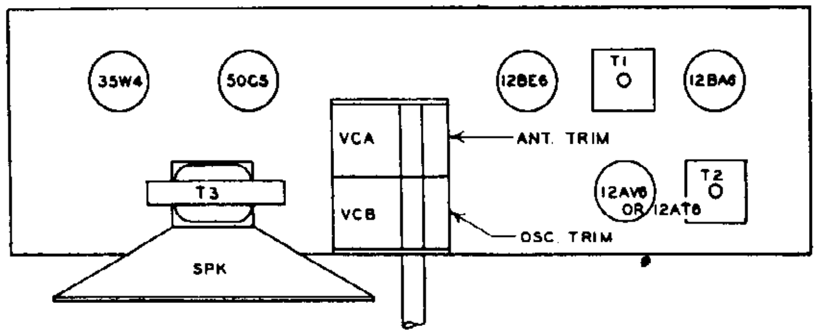
Power Supply	117 volts 60 cycle AC, 117 volts DC, 29 watts
Frequency Range	535 KC to 1630 KC
Intermediate Frequency	455KC
Antenna	Built-in Loop
Tuning	Variable Capacity
Speaker	4", P.M. voice coil *impedance 3.2 ohms*
Power Output	0.8 watt undistorted, 1.8 watts maximum
Sensitivity	400 uv/m average for 50 milliwatts output
Selectivity	55 KC broad at 1000 times, signal at 1000KC

Tubes used are as follows:

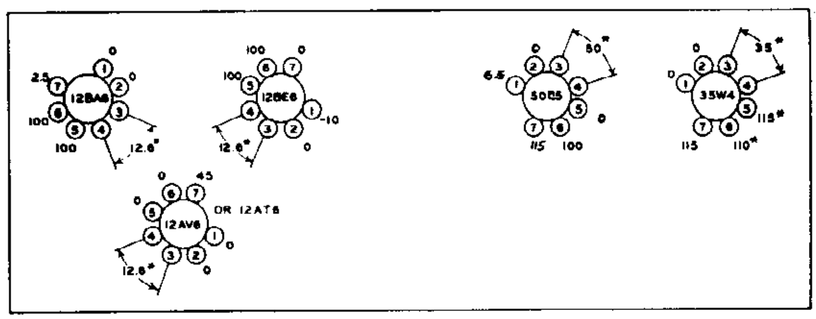
- 12BE6 Oscillator-Converter
- 12AV6 or 12AT6 AVC, Detector, and Audio
- 12BA6 I.F. Amplifier
- 50C5 Power Output
- 35W4 Power Rectifier

MECHANICAL PARTS

PART NO.	DESCRIPTION	MODEL RADIO
2A2047	Nut, Push-on	Used On Radio
3A189	Screw, #6X3/8 Pan Hd.	Models 5R11,
3A974	Screw, Sems 6-32X1/4 Rd. Hd.	5R12, 5R13,
3A1628	Screw, Sems 8-32X3/16 Rd. Hd.	5R14 *Unless*
32VLXY	Screw, 6-32X3/8 H H S Tap	Otherwise
3ZVUKZ	Screw, 6-32X1 1/2 Pan Hd.	Indicated
4AXEV	Washer, Flat #6	
5AO58	Rivet .088X.187	
6A340	Socket, 7 Pin	
7C237	Dial Escutcheon	
8A1211	Strain Relief	
11A110	Ground Lug	
15A309	Knob, Volume	5R11, 5R12, 5R13
15A310	Knob, Volume	5R14
15B313	Knob, Tuning (Front)	5R11, 5R12, 5R13
15B314	Knob, Tuning (Front)	5R14
15B318	Knob, Pointer Ass'y	5R14
33A325	Waxpaper	
66C636	Chassis Cover	
70D956	Chassis	
73A591	Spacer 1 1/8	
76A651	I.F. Mounting Clip	
78F567	Cabinet	5R11
78F568	Cabinet	5R12
78F569	Cabinet	5R13
78F570	Cabinet	5R14
87A716	Wire, #22 *Blue*	
87A717	Wire, #22 Red	
87A718	Wire, #22 Green	
87A721	Wire, #22 Orange	
87A723	Wire, #22 Tinned Buss	
87B1669	Line Cord	
94X655	*Instruction Book*	

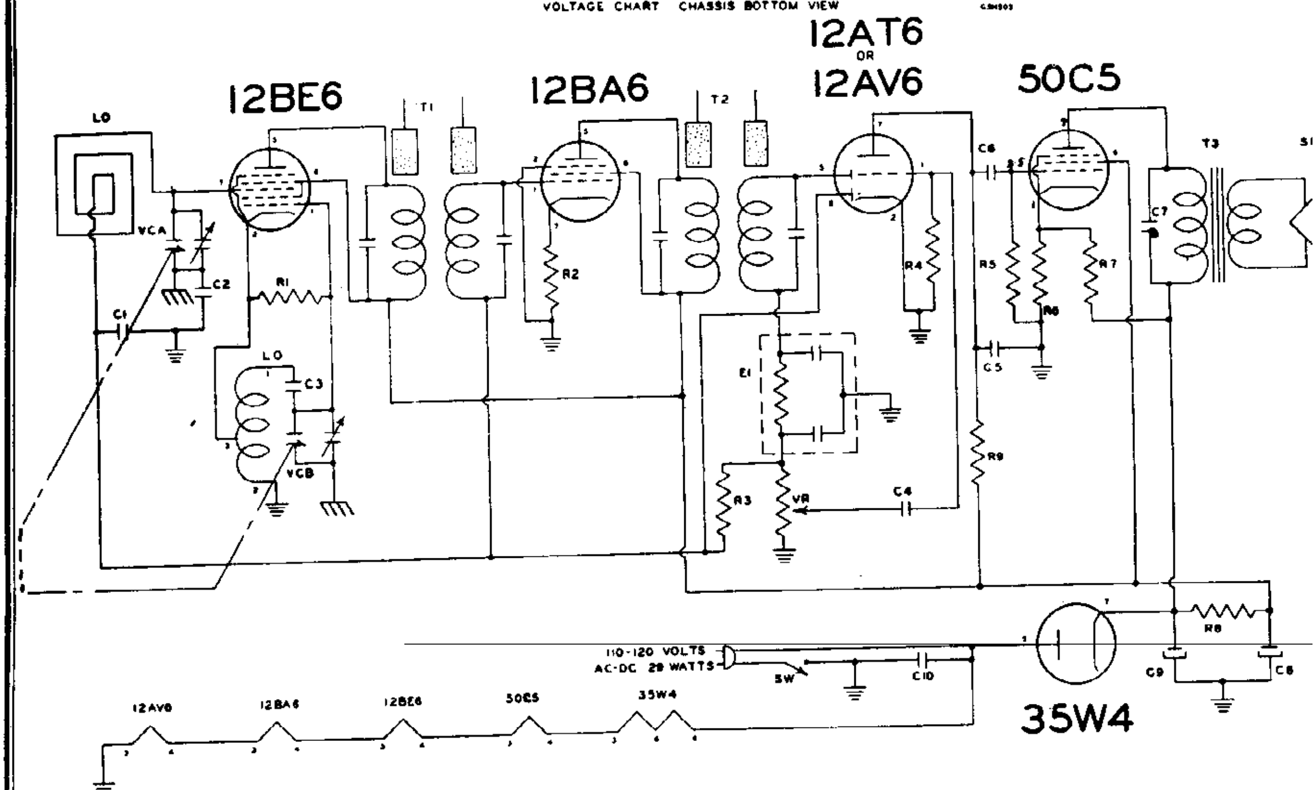


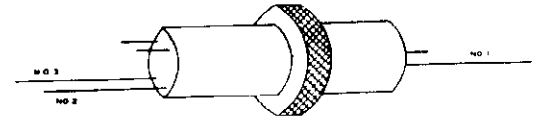
CHASSIS LAYOUT TOP VIEW CSH502



ALL DC VOLTAGES IN REFERENCE TO COMMON GROUND
*AC EXCEPT WHEN USED ON DC

VOLTAGE CHART CHASSIS BOTTOM VIEW CSH503





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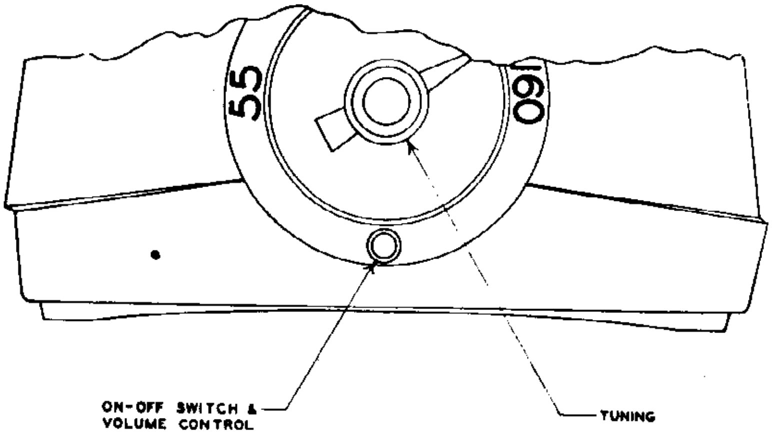
CSH501

MODELS 5R11, 5R12, 5R13, 5R14



FRONT VIEW

ALIGNMENT PROCEDURE

(Refer to chassis view)

The following procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent AVC action from interfering with proper alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts, using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat the alignment procedure given below as a final check.

CAUTION: This is an AC/DC receiver, and when aligning the set it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or to place a .2 MFD condenser in each test lead of the signal generator.

SIGNAL GENERATOR Frequency	Dummy Antenna	Connection to Radio	POSITION OF VARIABLE	ADJUST FOR MAXIMUM OUTPUT
455 KC	.1 MFD	12BE6 Grid Stator VCA	Fully Open	T1 & T2
1625 KC		12BE6 Grid Stator VCA	Fully Open	VCB Oscillator
1400 KC	.1 MFD	Loosely Coupled to Loop	Tune in Signal Generator	VCA Antenna

Connect low side of signal generator to common negative.

PARTS VALUES FOR HALLICRAFTER MODELS 5R11, 5R12, 5R13, 5R14

CIRCUIT COMPONENTS

SYMBOL	PART NO.	DESCRIPTION	VALUE	RATING	TOL.
VCA-VCB	48-248	Variable Capacitor			
C1	46AU503J	Capacitor, Tub. Paper	.05 MFD	200 volts	
C2	46AU104J	Capacitor, Tub. Paper	.1 MFD	400 volts	
C3	46AY203J	Capacitor, Tub. Paper	.02 MFD	600 volts	
C4, C6, C7	46AY502J	Capacitor, Tub. Paper	.005 MFD	600 volts	
C5	47X20B251K	Capacitor, Mica	250 MMF	500 volts	
C9, C8	45B183	Capacitor, Elect.	40-20 MFD	150 volts	
C10	46AW503J	Capacitor, Tub. Paper	.05 MFD	400 volts	
R1	23X20X223K	Resistor, Carbon	22K Ohm	1/2 watt	20%
R2	23X20X391K	Resistor, Carbon	390 Ohm	1/2 watt	10%
R3	23X20X105M	Resistor, Carbon	1 Megohm	1/2 watt	20%
R4	23X20X106M	Resistor, Carbon	10 Megohm	1/2 watt	20%
R5, R9	23X20X474M	Resistor, Carbon	470K Ohm	1/2 watt	20%
R6	23X20X121K	Resistor, Carbon	120 Ohm	1/2 watt	10%
R7	23X30X103K	Resistor, Carbon	10K Ohm	1 watt	20%
R8	23X30X102K	Resistor, Carbon	1000 Ohm	1 watt	20%
VR-SW	25B918	Volume Control & Switch	1 Megohm	S.P.S.T.	
E1	49A016	Diode Filter Unit	2x100 MMFD-47K Ohm		
LA	57C149-B	Loop Antenna & Back			
LO	51B1300	Oscillator Coil			
T1, T2	50B487	I. F. Coil			
SPK-T3	85C109	Speaker & Output Transformer			
12AV6	90X12AV6	Tube, Type 12AV6			
12BA6	90X12BA6	Tube, Type 12BA6			
12BE6	90X12BE6	Tube, Type 12BE6			
35W4	90X35W4	Tube, Type 35W4			
50C5	90X50C5	Tube, Type 50C5			

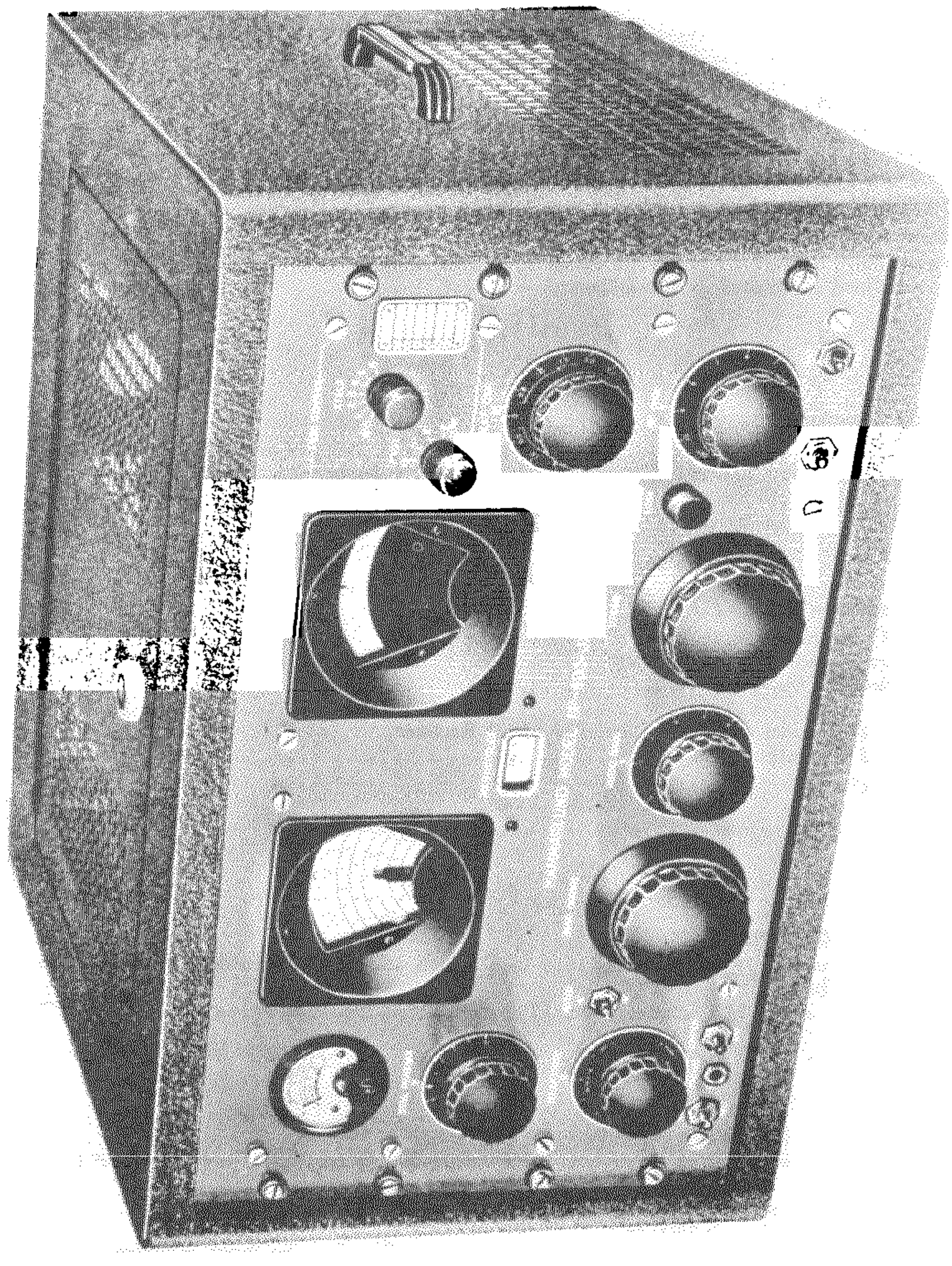


FIG.1
FRONT VIEW OF RECEIVER
SP-600-JX IN CABINET

MODEL SP-600-JX

TECHNICAL SUMMARY

Electrical Characteristics

Frequency Range—total 6 bands	**.54 to 54.0 mc**
Band 1	.54 to 1.35 mc
Band 2	1.35 to 3.45 mc
Band 3	3.45 to 7.40 mc
Band 4	7.40 to 14.8 mc
Band 5	14.80 to 29.7 mc
Band 6	29.70 to 54.0 mc

Maximum Undistorted Output—approximate—2.5 watts.

Output Impedance—600 ohms-balanced split windings.

Phone jack-winding; delivers 15 milliwatts to an 8000 ohm resistive load, when the audio output to the 600 ohm power load is adjusted to 500 milliwatts.

Power Supply Requirements

Line Rating	95, 105, 117, 130, 190, 210, 234 and 260 volt taps, 50-60 cycles.
Power Consumption	130 watts, 1.25 amps. at 117 volts—maximum.

Tube Complement – total 20

RF, IF and BFO Amplifiers	7—	6BA6
HF, 2nd Conversion and BFO Oscillators	3—	6C4
Crystal Controlled HF Oscillator	1—	6AC7
Mixers	2—	6BE6
Detector, "C" Bias Rectifier and Noise Limiter & Meter Rectifier	3—	6AL5
AF Amplifier and IF Output	1—	12AU7
Power Output	1—	6V6GT
Rectifier	1—	5R4GY
Voltage Regulator	1—	0A2

Mechanical Specifications

Rack Model — Dimensions; 19 inches wide, 10½ inches high and 16½ inches deep from rack mounting surface. Weight 66 lbs.

Table Model — Dimensions; 21⅜ inches wide, 12¾ inches high and 17⅛ inches deep. Weight 87½ lbs.

Performance Data – (approximate values-taken on a sample receiver)

Sensitivity is 2.3 microvolts, or better, throughout the entire frequency range, for a signal to noise power ratio of 10 to 1.

Image rejection ratios are better than 80 db throughout the frequency range.

The IF rejection ratio at 600 kc is 2700 to 1

The AVC action will maintain the output constant within 12 db when the input is increased from 2 to 200,000 microvolts.

GENERAL DESCRIPTION

The SP-600-JX is a 20 tube Radio Communications Receiver with self contained power supply. The JX suffix in this model number denotes that this receiver is made in accordance with JAN specifications, with the exception of the use of a few capacitors and resistors where special design considerations require special values and tolerances not included in the JAN preferred value lists or where space limitations do not permit their use. The special components so used are equal or superior to the JAN components in quality.

The receiver is supplied in either a well ventilated steel, table model cabinet finished in dark grey to complement the lighter grey front panel or for mounting in a standard 19 inch relay rack.

The self contained power supply is designed for operation from a single phase, 50 to 60 cycle alternating current power source. The power transformer primary is provided with taps covering a line voltage range from 90 to 270 volts. The power consumption is 130 watts.

The receiver is suitable for either headphone or loud speaker reception of AM radio telephone, CW telegraph or AM MCW telegraph signals.

The standard model provides continuous coverage over a frequency range from 0.54 to 54.0 megacycles in six bands. The large easily operated band change control knob, on the front panel, selects the desired frequency band and a band indicator visible through a small front panel window indicates the frequency band in use. This control also aligns the dial frequency indicator with the proper dial scale.

In addition to the frequency scales, the main dial has an arbitrary scale which in conjunction with the band spread dial provides continuous band spread scales over each frequency band for extremely accurate logging and resetability.

The single tuning control is large and of special design to permit maximum traverse speed as well as exceptional operating ease. It controls both the main and band spread dials. An anti-backlash gear train provides extremely close calibration accuracy and completely accurate resetability. A tuning lock provides positive locking action without affecting the frequency setting.

The tuning ratio from the tuning control to the main dial is 50 to 1 and the ratio from the band spread dial to the main dial is 6 to 1.

An ingeniously designed rotary turret is employed to change bands and to place the coil assemblies of the RF amplifier, Mixer and First Heterodyne Oscillator stages directly adjacent to their respective sections of the four gang tuning capacitor and their respective tubes. This assures maximum sensitivity at high signal to noise ratio.

Two stages of tuned radio frequency amplification are provided on all bands. The circuit for single conversion, used on frequencies up to 7.4 megacycles, includes a mixer, heterodyne oscillator, four stages of IF amplification, detector and AVC rectifier, noise limiter and meter rectifier, beat frequency oscillator, beat frequency buffer amplifier, IF output, AF amplifier and output power stage. The circuit for double conversion, employed for frequencies above 7.4 megacycles, includes a second mixer and a second heterodyne crystal controlled oscillator. The power supply system includes a B power rectifier, C bias rectifier and a voltage regulator.

The frequency control unit provides for fixed channel crystal controlled operation on any six frequencies chosen within the range of the receiver. Front panel controls permit the selection of the normal high stability continuously variable tuning or either of the six selected fixed frequency signals. For crystal controlled fixed channel operation it is only necessary to set the dial to the signal frequency, switch to the crystal frequency desired and tune with the delta frequency control. No retuning of the main tuning is necessary or desirable, when switching from VFO to crystal operation for the same signal frequency. These crystals are not supplied with the receiver, but should be purchased on special order from HAMMARLUND MFG. CO. specifying the **signal** frequency for which it is to function.

The two scale tuning meter normally indicates the relative strength of the received signal in db from 1 microvolt, when operated on AVC and with the RF gain control at maximum. A rear control is provided for adjustment at the plus 20 db scale reading with an RF signal input of 10 microvolts. On depression of the panel meter switch the lower scale of the meter indicates the audio output power level in db from 6 milliwatts. A rear control is provided for adjustment of the 0 db reading.

The AVC circuit is provided with separate time constants for CW and MCW operation. The beat frequency oscillator employs a high capacity Colpitts circuit which gives a high order of frequency stability and minimizes oscillator harmonics. The beat frequency oscillator voltage is introduced into the detector through a buffer amplifier which eliminates oscillator lock-in. This feature makes it possible to tune signals sharply to zero beat and permits the inclusion of the rear control for adjusting the beat oscillator injection to suit operating conditions. A front panel control varies the audio beat frequency from 0 to plus or minus 3 KC.

The noise limiter circuit effectively limits the interference from ignition systems or other sources of pulse type noise. The limiter switch permits optional use of the limiter.

The antenna input circuit is designed for use with a balanced line. The input impedance is nominally 100 ohms. The receiver may also be operated with a conventional single wire antenna.

The audio output circuit is designed for a 600 ohm load or line and is provided with a four terminal split winding for balanced load operation. Undistorted power output is approximately 2.5 watts. The head phone circuit when referred to an 8000 ohm load provides signals attenuated approximately 15 db below the 600 ohm power output.

An RF gain control is provided for the manual control of sensitivity in the presence of strong signals and operates on either MANUAL or AVC.

The send receive switch desensitizes the receiver but leaves the power on to provide for instant reception between transmission periods. A rear receptacle provides for the connection of an external relay.

Radiation is negligible and complies with requirements for shipboard operation and for multi-receiver installations.

Frequency drift after a 15 minute warm up period, ranges between .001 percent and .01 percent of frequency depending on the frequency used. This is a very unusual degree of frequency stability for variable tuned HF oscillators and closely approaches crystal stability.

The selectivity control provides three degrees of crystal and three degrees of non-crystal selectivity ranging from sharp (.2kc) to broad (13.KC). The crystal filter embodies the same circuit features that have proved so effective and desirable in Hammarlund Super Pro Receivers, incorporated in an improved mechanical design.

II
CIRCUIT DESCRIPTION

General — The circuit is shown schematically in Figure 11. A block diagram, Figure 2, is provided to more clearly show the arrangement and functions of the various circuit sections. The location of the various tubes is shown in Figure 3. The circuit, for single conversion, used for signal frequencies up to 7.4 mc consists of two stages of RF amplification V-1 and V-2, First Mixer V-5, First Heterodyne Oscillator V-4, four stages of IF amplification V-7, V-9, V-10 and V-11, Detector and AVC rectifier V-14, Noise Limiter V-15, Beat Frequency Oscillator V-13, IF output and AF amplifier V-16-A and V-16-B, Output Power stage V-17 and the Power Supply system which includes B Power Rectifier V-19, C Bias Rectifier V-20 and Voltage Regulator V-18.

In the circuit for double conversion, used for signal frequencies above 7.4 mc, the Second Mixer V-6 and Second Heterodyne Oscillator V-8 are substituted for the Gate tube V-7.

Input Coupling — The antenna coupling is designed to provide optimum coupling from a 100 ohm transmission line. A balanced doublet or straight wire antenna may be used.

RF Amplifier — An ingeniously designed rotary turret is employed to change bands and to place the coil assemblies of the RF amplifier V-1 and V-2, Mixer V-5 and First Heterodyne Oscillator V-4 stages directly adjacent to their respective sections of the four gang tuning capacitor and their respective tubes. This assures maximum sensitivity at high signal to noise ratio.

First Heterodyne Oscillator — (Variable V-4) — The rotary turret band change switch, advanced design of the four gang, twin section, variable tuning capacitor and rugged construction throughout, provide frequency stability and dial calibration accuracy to a previously unattained degree.

First Heterodyne Oscillator — (Crystal Controlled V-3) — For services requiring extremely stable, fixed frequency operation, a crystal controlled high frequency oscillator is provided. Instant changeover from variable to crystal controlled oscillator, with a choice of six crystal positions, is effected by a front panel control. A second front panel control permits adjustment of the crystal oscillator frequency over a plus or minus .005 percent range.

Intermediate Frequency Amplifier — Single conversion to 455 kc is employed for signal frequencies below 7.4 mc. There are four stages of IF amplification incorporating the Hammarlund patented crystal filter circuit. Six positions of selectivity provide 6 db bandwidths of .2, .5, 1.3, 8 and 13 kc. On the three narrower bandwidth positions, the crystal filter is in operation. The crystal phasing control provides extreme selectivity for the high attenuation of closely adjacent interfering signals.

Double conversion is employed for signal frequencies above 7.4 mc. The signal is heterodyned to 3.955 mc by the First Mixer V-5 and Heterodyne Oscillator V-4 or V-3 for high image rejection. The 3.955 mc signal is then heterodyned to 455 kc by the Second Mixer V-6 and the 3.5 mc Fixed Crystal Controlled Oscillator V-8, for selectivity.

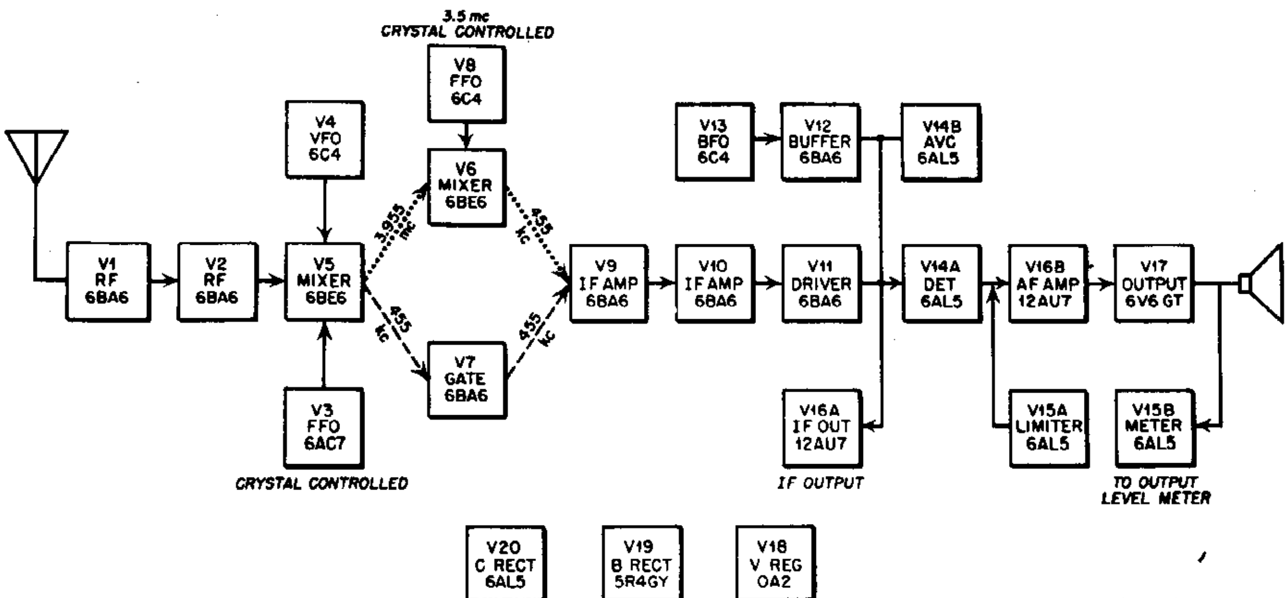
Detector and AVC — The V-14 tube is used as a high level Detector and AVC Rectifier. The AVC circuit is provided with separate time constants for CW and MCW operation.

Beat Frequency Oscillator — The beat frequency oscillator employs a high capacity Colpitts circuit which gives a high order of frequency stability and minimizes oscillator harmonics. The beat frequency Oscillator V-13, is coupled into the detector circuit through Buffer Amplifier V-12, which eliminates oscillator lock-in and permits variation of the beat oscillator injection by means of a control located on the rear of the chassis. A front Panel control varies the audio beat frequency, from zero beat to plus or minus 3 kc.

Noise Limiter — The noise limiter circuit V-15, limits the noise interference from ignition systems or other sources of pulse type noise. A separate control

Power Supply — The power supply is an integral part of the receiver. It includes the B rectifier V-19 and the C rectifier V-20, together with their respective low pass filters and the Voltage Regulator V-18. The power transformer is provided with screw terminal primary taps, covering a power line source range of 90 to 270 volts, 50 to 60 cycles. The power transformer is protected by a fuse in the primary circuit.

Tuning Meter — The tuning meter is used on AVC operation to indicate the accuracy of tuning and the relative strength of received signals. Depression of the Meter Switch converts the meter circuit for indication of output level in db from 6 milliwatts.



·BLOCK DIAGRAM·

FIG. 2

——— Signal path common to all frequencies
·········· Signal path for frequencies above 7.4 mc
- - - - " " " " below 7.4 mc

switch S-6, permits optional use of the limiter on any mode of operation when pulse type interference is present.

Audio Frequency Amplifier — A resistance coupled amplifier triode, V-16-B, amplifies the audio frequency signal from the detector.

Audio Output — The audio output tube V-17, is transformer coupled through a split, balanced winding to deliver 2.5 watts undistorted output to a 600 ohm load. The split balanced winding permits balancing of the direct current in the output circuit, as used for teletype or similar service. A separate secondary winding provides attenuated audio signal output for headphone operation. This winding will deliver an output of 15 milliwatts into an 8000 ohm resistive load when the 600 ohm power secondary is delivering 500 milliwatts to a 600 ohm resistive load.

IF Output — A cathode follower V-16-A provides a low impedance source of intermediate frequency (455 Kc) signal to the connector on the rear skirt of the chassis.

RF Gain Control and Power Switch — The RF gain control is provided for manual control of sensitivity to prevent overloading on strong signals when operating with the AVC-MANUAL switch in the "MANUAL" position. This control also operates when the switch is in the "AVC" position. The Power "ON-OFF" switch is operated at the counter-clockwise extremity of the RF gain control.

Send-Receive Switch — The send-receive switch desensitizes the receiver but leaves the power "on" to provide for instant reception between transmission periods. A receptacle is provided on the rear of the receiver for the external connection of a relay.

Convenience Outlet — A convenience power outlet is provided on the rear of the chassis for the connection of an accessory such as a lamp or electric clock.

Radiation — Advanced design and shielding of the high frequency, second conversion, crystal and beat frequency oscillators has reduced radiation to a negligible point so that interference of this nature, common in multi-receiver installations, is reduced to a minimum.

III
INSTALLATION

Tubes and Packing — Inspect the chassis to see that all tubes are firmly in their respective sockets and that any packing is removed from the receiver.

Power Supply — Make sure that the primary tap lead on the power transformer is connected to the transformer tap which most nearly agrees with the 50 to 60 cycle power source voltage.

Antenna — The input impedance at the antenna terminals is designed to match a 100 ohm transmission line. The angle plug adapter and connector, supplied with the receiver, is designed for use with a small diameter, "TWINAX" transmission line, which should be used with a balanced antenna installation. If it is desired to operate with a single wire antenna, the antenna lead-in wire should be connected to one terminal of the connector plug and a ground lead should be connected from the other terminal of the connector plug to the ground terminal, which is adjacent to the antenna input receptacle at the rear of the tuning unit.

Speaker — The loud speaker should be of the permanent magnet dynamic type and should include a speaker voice coil to 600 ohm line matching transformer for connection to the 600 ohm audio output terminals of the receiver.

Headphones — Either low or high impedance headphones may be used in the phone jack. The high impedance type is recommended. The phone jack is located at the lower left side of the front panel.

Mounting — The receiver may be placed on a table or mounted in a standard 19 inch rack. If a table model is purchased, it is supplied with a steel cabinet. The cabinet should be placed in a position which permits the free access of air for the ventilation louvers.

IV
OPERATION
DESCRIPTION OF CONTROLS

The front panel dials and controls are shown in Figure 1 and the rear chassis skirt controls and terminals are shown in Figure 6.

Tuning Dials — The main dial is to the left and the band spread dial is to the right. The main dial has six frequency band scales, calibrated in megacycles and an arbitrary, outer scale. The band spread dial has an arbitrary, 0 to 100, scale. The numeral under the fixed pointer of the main dial indicates the number of revolutions that have been made by the band spread dial at any setting. Thus, if the pointer, for the outer scale, of the main dial indicates over the figure 4 and the band spread dial indicates 87.6, the reading to log for this setting is read, 487.6. This precise mechanical band spread system divides the rotation of the main dial over each frequency band into approximately 600 band spread divisions, with one half division calibration points. Since it is easy to estimate one tenth divisions, on the band spread scale, this divides each frequency band into approximately 6000 readable settings. This permits extreme accuracy in the logging of stations.

Crystal Controlled HF Oscillator — For operation on fixed frequency channels the "FREQUENCY CONTROL" is provided. The crystals are not supplied with the receiver, but will be supplied on special order. In order to insure correct crystal controlled frequency operation crystal units should be ordered from HAMMARLUND MFG. CO. INC. and the order should specify the **signal** frequency, for which each unit is to be used. The frequency control unit has provision for six crystals. Variable frequency operation or crystal controlled frequency operation on any of the six crystal positions is selected by the "CRYSTAL SWITCH". The crystal oscillator is designed for use with suitable crystals at any frequency in the range of the receiver above one megacycle. The "DELTA FREQ" control is used to compensate for a very small plus or minus frequency tolerance of the crystals.

The procedure for crystal frequency control operation should be as follows: Loosen the knurled thumb screw on top of the crystal unit and push the retainer spring assembly to the rear. Insert the crystal or crystals in the crystal sockets, numbered 1 to 6. Bring the retainer spring assembly forward so that the springs press on top of the crystal holders and tighten the thumb screw. Mark the **signal** frequency for which each crystal was selected, in megacycles on the plastic chart provided for this purpose alongside the crystal switch. Pencil or ink may be used and can be erased if it is desired to change these figures at any time. The numerals on the chart should be used so that they agree with the numerals on the crystal socket positions, which are also indicated by the crystal switch. The main tuning dial should be set at the **signal** frequency for which operation is desired. The crystal switch should be set at the position corresponding to the number for that signal frequency on the chart. The Delta Frequency control should be adjusted for maximum signal or for zero beat as required. It should be noted that this tuning adjustment of the Delta Frequency control must be made each time that the signal frequency is changed and that the main tuning dial should be set to agree with the new signal frequency.

Tuning Lock — The tuning lock, located to the right of the tuning knob, provides a positive locking for the tuning mechanism without affecting the frequency setting, when it is desired to prevent accidental shifting of the tuning or when the receiver is operated under a severe condition of vibration.

Tuning Meter — The tuning meter at the upper left on the front panel is useful in accurately tuning a signal and provides an indication of the relative strength of the received signal in db from 1 microvolt. The "METER ADJ RF" control at the rear of the chassis provides adjustment of the plus 20 db reading on the RF scale, with a 10 microvolt input signal. Depression of the "METER SWITCH" converts the meter circuit for indication of the AF output power level in db from 6 milliwatts. This switch is spring returned to the RF scale circuit position when released and **should not be depressed for the AF scale unless the audio output has been adjusted for low power output, by means of headphones or speaker. Failure to observe this precaution may result in damage to the meter.** The "METER ADJ AF" control at the rear of the chassis provides adjustment of the 0 db reading on the AF scale, which should be made when the AF output power from the 600 ohm audio output terminals is 6 milliwatts or 1.9 volts across a 600 ohm load.

Band Change — The large knob, to the left, is the band change control. Each revolution of this control turns the turret, containing the RF and HF oscillator coil, trimmer and switch contact assemblies, from one frequency band to the next. The turret has no stops and may be turned in either direction desired. A positive detent machanism assures correct location of the various bands. The band change control simultaneously operates the small frequency band dial, located at the center of the panel and aligns the dial frequency indicator with the proper scale.

Selectivity Switch — The selectivity switch provides three crystal and three non-crystal degrees of selectivity, ranging from extremely sharp, for CW reception, to broad for good fidelity MCW operation. The control knob dial indicates the 6 db band width at each setting.

Phasing Control — The phasing control permits high attenuation of closely adjacent channel interference on either side of the signal frequency, when the crystal selectivity positions are used.

Beat Frequency Oscillator — The beat frequency oscillator is turned "on" for CW signal operation by the "MOD-CW" switch. The beat frequency dial should be set at zero for tuning to zero beat and the adjusted to give the desired audio pitch. The beat fre quency oscillator injection voltage is adjustable by the "BFO INJ" control on the rear skirt of the chassis.

Noise Limiter — The noise limiter switch is inde pendent of other controls and is useful in greatly at tenuating noise interference from ignition or simila pulse type sources, regardless of the mode of opera tion.

Send-Receive — The send-receive switch permit desensitizing the receiver during transmission periods to prevent damage to the receiver, when operated i proximity to the transmitter and provides instant re turn to reception between transmission periods.

Relay Receptacle — The relay receptacle, on th rear of the receiver, is connected in parallel with th send-receive switch and provides for the connection o an externally connected relay, to perform the send receive operation. When the relay is used the send receive switch is left in the "open" or "send" positio

AVC-Manual Switch — The AVC-Manual Switc permits the choice of either AVC or Manual sensitiv ity operation as desired. The AVC has a delay bia which insures maximum sensitivity for weak signals.

RF Gain Control — The RF gain control provide adjustment of the sensitivity for signals of variou strength, when under the "manual" operating cond tion, in order that the receiver sensitivity may be ad justed to suit the signal strength and prevent overload ing. This control is also in the circuit when operatin on AVC, in order that the sensitivity may be adjuste to reduce undesirable noise during "off" periods in th transmission of the received signal. When it is de sired to use the tuning meter for indication of relativ signal strength, the RF gain control should be at maxi mum.

Audio Gain Control — The audio gain control ad justs the audio input to the audio amplifier tube. I should be adjusted for the required audio output whe operating on AVC and is best left at or near maximu when operating on MANUAL control.

Phono Input — Terminals are provided on the rea of the receiver for phonograph or other audio fre quency source input to the audio frequency amplifie

Convenience Outlet — A power outlet receptacle provided on the rear of the receiver chassis for opera ing an accessory, such as an electric clock or lamp.

V
MAINTENANCE

This receiver is designed for continuous duty and should normally require little attention beyond the replacement of tubes. However, should trouble develop that cannot be eliminated with new tubes, the socket voltages and resistances should be measured to chassis. Any appreciable departure from the values shown in tables 1 and 2 will generally indicate the component or circuit at fault.

Operating and maintenance of the receiver will b greatly facilitated if the contents of this instructio manual are thoroughly digested. Approximate inpu signal values for stage by stage gain checks are show in table 4.

TUBE SOCKET VOLTAGES—TABLE 1

Voltage to chassis. Measurements made with Weston Model 663 Volt-Ohmmeter, except those indicated by asterisk were made with Measurements Corp. Model 62 VTVM. The 500 volt scale was used for all voltages above 10 volts and the 10 volt scale for voltages below 10 volts. Line voltage 117, no signal input. Audio Gain control at minimum and CW-MOD switch on "CW"

	SOCKET PIN NUMBERS									
TUBE	1	2	3	4	5	6	7	8	9	MODE OF OPERATION
V-1	*-1	—	*6.3ac	—	200	90	—	—	—	RF Gain max.
V-1	*-54	—	*6.3ac	—	260	235	—	—	—	RF Gain min.
V-2	*-1	—	*6.3ac	—	210	100	—	—	—	RF Gain max.
V-2	*-54	—	*6.3ac	—	260	240	—	—	—	RF Gain min.
V-3	—	*6.3ac	—	—	—	0	—	265	—	RF Gain max.—VFO operation
V-3	—	*6.3ac	—	—	—	150	—	265	—	RF Gain max.—Crystal Freq. Control
V-3	—	*6.3ac	—	—	—	0	0	290	—	RF Gain min.—VFO operation
V-3	—	*6.3ac	—	—	—	150	0	280	—	RF Gain min.—Crystal Freq. Control
V-4	130	—	*6.3ac	—	130	—	—	—	—	RF Gain max. or min.
V-5	—	1.2	*6.3ac	—	140	110	—	—	—	RF Gain max. or min.
V-6	—	—	*6.3ac	—	225	—	*-1	—	—	RF Gain max.—Freqs. below 7.4mc
V-6	—	—	*6.3ac	—	260	—	*-1	—	—	RF Gain min.—Freqs. below 7.4mc
V-6	—	—	*6.3ac	—	225	90	*-1	—	—	RF Gain max.—Freqs. above 7.4mc
V-6	—	—	*6.3ac	—	260	105	*-1	—	—	RF Gain min.—Freqs. above 7.4mc
V-7	*-11	—	*6.3ac	—	225	170	—	—	—	RF Gain max.—Freqs. below 7.4mc
V-7	*-11	—	*6.3ac	—	260	190	—	—	—	RF Gain min.—Freqs. below 7.4mc
V-7	*-11	—	*6.3ac	—	225	0	—	—	—	RF Gain max.—Freqs. above 7.4mc
V-7	*-11	—	*6.3ac	—	260	0	—	—	—	RF Gain min.—Freqs. above 7.4mc
V-8	0	—	*6.3ac	—	0	—	—	—	—	Frequencies below 7.4mc
V-8	30	—	*6.3ac	—	30	—	—	—	—	Frequencies above 7.4mc
V-9	*-1	—	*6.3ac	—	205	90	—	—	—	RF Gain max.
V-9	*-54	—	*6.3ac	—	260	235	—	—	—	RF Gain min.
V-10	*-1	—	*6.3ac	—	205	90	—	—	—	RF Gain max.
V-10	*-54	—	*6.3ac	—	260	235	—	—	—	RF Gain min.
V-11	*-11	—	*6.3ac	—	210	145	—	—	—	RF Gain max.
V-11	*-11	—	*6.3ac	—	240	145	—	—	—	RF Gain min.
V-12	—	—	*6.3ac	—	210	40	—	—	—	RF Gain max.—BFO Injection max.
V-12	—	—	*6.3ac	—	240	45	—	—	—	RF Gain min.—BFO Injection max.
V-13	25	—	*6.3ac	—	25	—	—	—	—	RF Gain max. or min.
V-14	—	—	*6.3ac	—	*22	—	—	—	—	RF Gain max. or min.
V-15	—	—	*6.3ac	—	—	—	—	—	—	RF Gain max. or min.
V-16	50	—	1.5	—	—	210	—	6.4	*6.3ac	RF Gain max.
V-16	52	—	1.6	—	—	240	—	7.4	*6.3ac	RF Gain min.
V-17	—	—	260	228	—	—	*6.3ac	12	—	RF Gain max.
V-17	—	—	280	265	—	—	*6.3ac	13	—	RF Gain min.
V-18	150	—	—	—	150	—	—	—	—	RF Gain max. or min.
V-19	—	300	—	—	—	—	—	300	—	RF Gain max.—*5 V ac Pin 2 to Pin 8
V-19	—	320	—	—	—	—	—	320	—	RF Gain min.—*5 V ac Pin 2 to Pin 8
V-20	—	*-96	*6.3ac	—	—	—	*-96	—	—	RF Gain max.
V-20	—	*-97	*6.3ac	—	—	—	*-97	—	—	RF Gain min.

TUBE SOCKET TERMINAL RESISTANCE—TABLE 2

Resistance to chassis. Measurements made with Weston Model 663 Volt-Ohmmeter.

Tube removed from socket under measurement. Audio Gain Control at maximum, RF Gain Control at minimum. Limiter Switch "OFF". CW-MOD Switch on "CW". AVC-MAN Switch on "AVC".

Socket Pin No. / Tube Socket	1	2	3	4	5	6	7	8	9	MODE OF OPERATION
V-1	1.8M	0	—	0	48K	80K	0	—	—	
V-2	1.8M	0	—	0	48K	80K	0	—	—	
V-3	0	—	0	47K	0	46K	—	46K	—	Crystal Freq. control pos. 1–6
V-4	Inf.	Inf.	—	0	Inf.	47K	0	—	—	Crystal Freq. control pos. 1–6
V-4	48K	Inf.	—	0	Inf.	47K	0	—	—	VFO Operation
V-5	47K	150	—	0	48K	53K	500K	—	—	
V-6	22K	0	—	0	46K	Inf.	100K	—	—	Freq. Bands below 7.4mc
V-6	22K	0	—	0	46K	70K	100K	—	—	Freq. Bands above 7.4mc
V-7	115K	0	—	0	46K	Inf.	0	—	—	Freq. Bands above 7.4mc
V-7	115K	0	—	0	46K	80K	0	—	—	Freq. Bands below 7.4mc
V-8	—	—	—	0	Inf.	22K	0	—	—	Freq. Bands below 7.4mc
V-8	—	—	—	0	150K	22K	0	—	—	Freq. Bands above 7.4mc
V-9	1.3M	0	—	0	52K	80K	0	—	—	
V-10	1.3M	0	—	0	52K	80K	0	—	—	
V-11	125K	0	—	0	48K	50K	0	—	—	
V-12	0	0	—	0	48K	145K	*	—	—	*0 to 1K (BFO Injection control)
V-13	—	—	—	0	195K	100K	0	—	—	
V-14	0	770K	--	0	16K	0	220K	—	—	
V-15	94K	Inf.	—	0	Inf.	0	220K	—	—	
V-16	150K	500K	1K	0	0	46K	470K	680	—	
V-17	0	0	46K	46K	470K	Inf.	—	360	—	
V-18	118K	—	—	—	78K	—	0	—	—	
V-19	—	46K	0	55	—	55	—	46K	—	
V-20	50K	65K	—	0	50K	0	65K	—	—	

MODEL SP-600-JX

VI
ALIGNMENT

The alignment of a modern communications receiver requires precision instruments and a thorough knowledge of the circuits involved. This receiver, being a double super-heterodyne, the alignment procedure is even more involved than is usual.

Under normal service the receiver will stay in alignment for extremely long periods of time, consequently realignment should not be attempted unless all other possible causes of a particular trouble have been eliminated. When it has been determined that any realignment should be attempted, a great deal of caution should be exercised in making the adjustments, as any required readjustment should not entail more than a slight angular motion of the adjusting screw.

ALIGNMENT OF THE IF STAGES

The low frequency IF should be aligned first. The recommended method for aligning the low frequency IF involves the use of a sweep frequency signal generator and an oscilloscope. Since these instruments are not available at the average service station the alternate method using an amplitude modulated signal generator and an output meter will be described first. The additional information required for the visual alignment method will be covered in a later paragraph.

The signal generator should be coupled to the grid of the mixer tube V5 through a capacitance of approximately .01 mfd. A miniature tube adapter will be required to make the mixer grid connection available. Such an adapter is manufactured by the Alden Manufacturing Co. An output meter should be connected across the output terminals of the receiver or the speaker voice coil. The receiver controls should now be set as follows:

Control		Position
Selectivity	—	See text
Send — Receive	—	Receive
CW — Mod	—	Mod
Phasing	—	Arrow
AVC — Man	—	Man
Audio Gain	—	Set for approx. 20 volts
RF Gain	—	See text
Band Switch	—	1.35 — 3.45 mc
Dial	—	2.5 mc

The signal generator should be modulated 30 percent at 400 cycles. Turn the selectivity switch to the 3 kc position and advance the RF Gain control to maximum. Set the signal generator frequency to 455 kc and adjust its output until some deflection is noted on the output meter. Refer to figure 3 for the location of the various alignment adjustments. Adjust L42, L41, L39, L38, L36 and L32 for maximum output, reducing the signal generator output and the RF Gain control as required to prevent overload or excessive output. Now turn the selectivity switch to the narrowest position, .2 kc, and adjust the signal generator frequency for the maximum output. This establishes the correct signal frequency by the 455 kc crystal for the IF amplifier and the frequency of the signal generator should not be disturbed for the remainder of the low frequency IF alignment, unless it should be to recheck this establishment of crystal frequency to make sure that the signal generator frequency has not drifted during the alignment. The selectivity switch is now turned to the 3 kc position and L42, L41, L39, L38, L36 and L32 are again adjusted for maximum output. Now turn the selectivity switch to the 1.3 kc position and adjust L37 for maximum output. Before changing this set-up the BFO should be turned on by throwing the CW-Mod switch to CW and checked for zero beat with the BFO knob dial at its zero reading. If necessary L44 should be adjusted for zero output. This check and adjustment of the BFO should be done with the signal generator carrier unmodulated.

The procedure for the visual method of aligning the low frequency IF should be the same as the above except that the adjustments are made for both maximum amplitude and coincidence of the oscilloscope images. The oscilloscope vertical input should be connected across the diode detector load resistance, from the junction of R64 and R65 to chassis.

The high frequency IF should be aligned next. Set the band switch to the 7.4 — 14.8 mc band. The selectivity switch should be in the 3 kc position. Adjust the signal generator frequency to 3.955 mc and adjust L31, L33 and L34 for maximum output.

The 3.5 mc crystal used in the second oscillator is held to a very close frequency tolerance. However, if it is desired that this oscillator frequency be exactly 3.5 mc to permit its use as a frequency standard, as hereinafter described, this may be accomplished by adjusting capacitor C101, underneath the chassis. The exact procedure is as follows; Set the receiver to 7.0 mc on the 3.45 — 7.4 mc band. Temporarily connect, by means of a jumper, the center and the open terminals on switch S4 at the rear of the tuning unit. Attach a two foot length of insulated wire to the antenna terminal and dress the free end around the tube shield on the 3.5 mc oscillator tube V8 with the CW-Mod switch on CW rock the tuning control slightly until a beat note is heard in the headphones or speaker. Now throw the CW — Mod switch to Mod and couple a 1.0 mc frequency standard to the antenna input terminal. Adjust capacitor C101 for zero beat. Remove the jumper from S4 and remove the two foot test lead. If appreciable adjustment of C101 was required it is advisable to repeat the high frequency IF alignment.

The 3.5 mc oscillator may now be used as a frequency standard at multiples of 3.5 mc from 10.5 mc upwards, by temporarily connecting the two foot length of wire as described above.

ALIGNMENT OF THE RF AMPLIFIER & HF OSCILLATOR

To adequately align the RF Amplifier and HF Oscillator an accurately calibrated signal generator and an output meter are required. The frequencies required are shown in table 3. The location of the adjustments is shown in Figure 3. The use of Table 3 and Figure 3 should be made in following this part of the alignment which will now be described for one frequency band. The same procedure should then be followed for the other frequency bands.

To align the .54-1.35 mc band the signal generator is coupled to the antenna input terminal through a 100 ohm carbon resistor. The generator should be modulated 30 percent at 400 cycles and the output meter connected across the receiver output terminals. The receiver controls should be set as follows:

Control		Position
Selectivity	—	3kc
Send-Receive	—	Receive
CW — Mod	—	Mod
AVC — Man	—	See Text
Audio Gain	—	Set for approx. 20 volts
RF Gain	—	See text
Band Switch	—	set for band to be aligned
Limiter	—	off

Set the receiver and signal generator dials to .56 mc. The RF Gain control should be set at maximum and the AVC — Man switch set on AVC. The HF Osc. L adjustment shown in Figure 3, should now be set for maximum output. Then the Ant., 1st RF and 2nd RF L adjustments should be set for maximum output. The receiver and signal generator dials are now set to 1.3 mc and the C adjustments, shown in Figure 3, should be adjusted for maximum output in the same order, beginning with the Osc C adjustment and then making the C adjustments for the Ant, 1st RF and 2nd RF. This procedure should be carefully repeated until no increase in output can be realized. The AVC -- Man switch should then be set to Man and the signal generator should be set for approximately 3 micro volts. The L and C adjustments should now be checked for maximum output, adjusting the RF Gain control as found necessary to maintain the output at approximately 20 volts.

Following the frequencies, shown in Table 3, align the remaining bands using the same procedure as above.

TABLE No. 3

RF AND HF OSCILLATOR ALIGNMENT FREQUENCIES AND ADJUSTMENT DESIGNATIONS

FREQ. BAND IN MC	.54—1.35	1.35—3.45	3.45—7.4	7.4—14.8	14.8—29.7	29.7—54.0
RF & HF OSC ADJUST L AT.	.56	1.4	3.75	7.5	15.0	30.0
RF & HF OSC ADJUST C AT.	1.3	3.4	7.15	14.5	29.0	52.0

TABLE No. 4

APPROXIMATE SIGNAL INPUT AT IF & AF STAGES FOR 20 VOLTS OUTPUT

Output measured across a 600 ohm resistive load at output terminals of receiver. RF signals modulated 30 percent at 400 cycles. Signals applied to tube grids through a .01 mfd capacitor. Selectivity switch at 3 kc AVC — MAN switch on MAN. CW — MOD switch on MOD, RF Gain and Audio Gain at maximum.

BAND SWITCH	FREQUENCY	INPUT TO	APPROX. INPUT
Any	Audio 400 cycles	Pin 5, V17	3.5 volts
Any	~~Audio 400 cycles~~	~~Pin 2, V16B~~	~~.3 volts~~
1.35—3.45 mc	Mod RF 455 kc	Pin 1, V11	.35 volts
1.35—3.45 mc	Mod RF 455 kc	Pin 1, V10	6000 microvolts
1.35—3.45 mc	Mod RF 455 kc	Pin 1, V9	110 microvolts
1.35—3.45 mc	Mod RF 455 kc	Pin 1, V7	40 microvolts
1.35—3.45 mc	Mod RF 455 kc	Pin 7, V5	65 microvolts
7.40—14.8 mc	Mod RF 3.955 mc	Pin 7, V5	40 microvolts
7.40—14.8 mc	Mod RF 3.955 mc	Pin 7, V6	250 microvolts

MODEL SP-600-JX

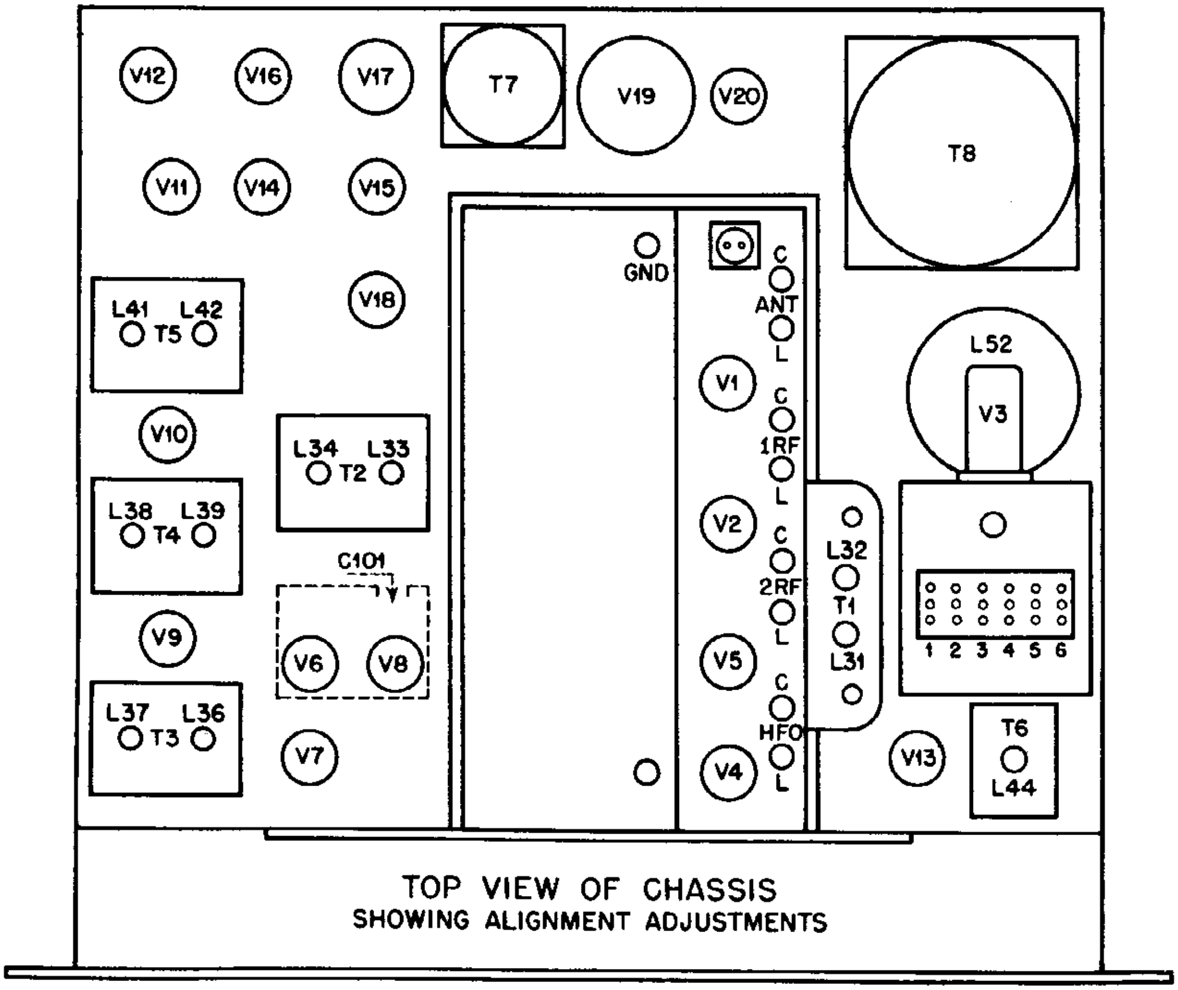


FIG. 3

•AUDIO AND OVERALL FIDELITY CURVES•

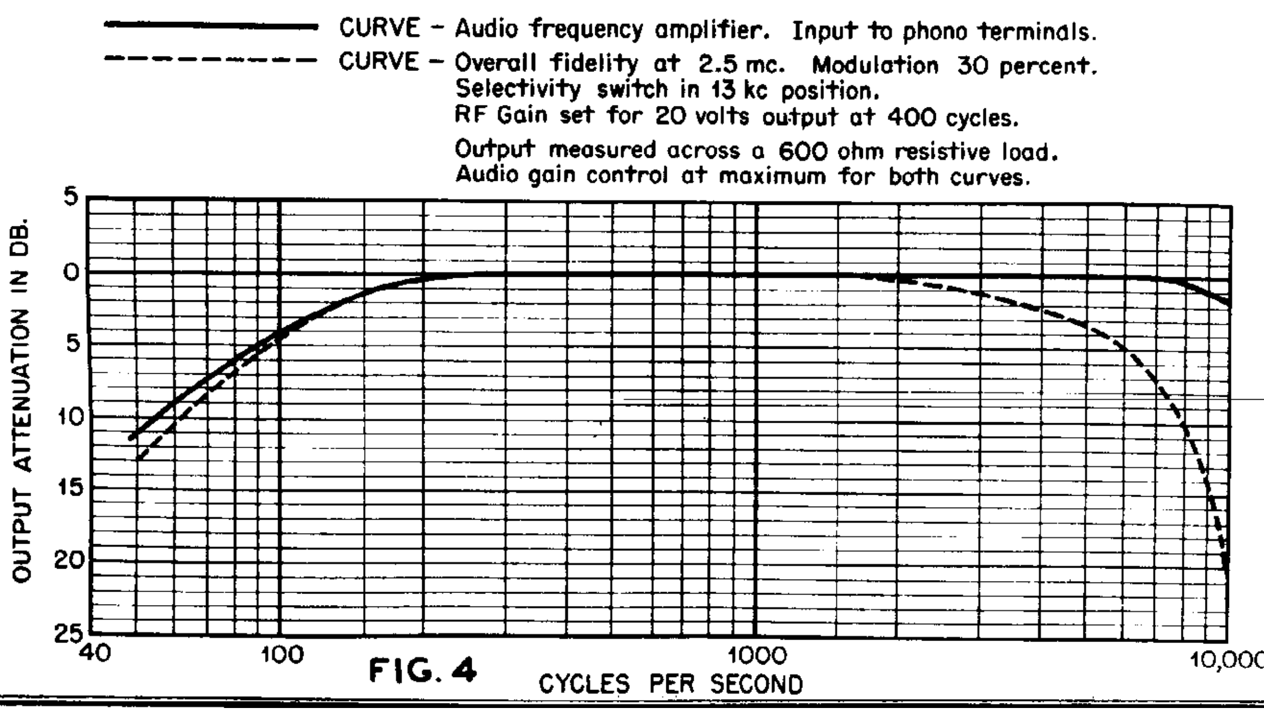


FIG. 4

• SELECTIVITY CURVES
Overall at 2 Megacycles •

NUMBERS DENOTE SELECTIVITY SWITCH POSITIONS
1,2 AND 3 NON CRYSTAL — 4,5 AND 6 CRYSTAL

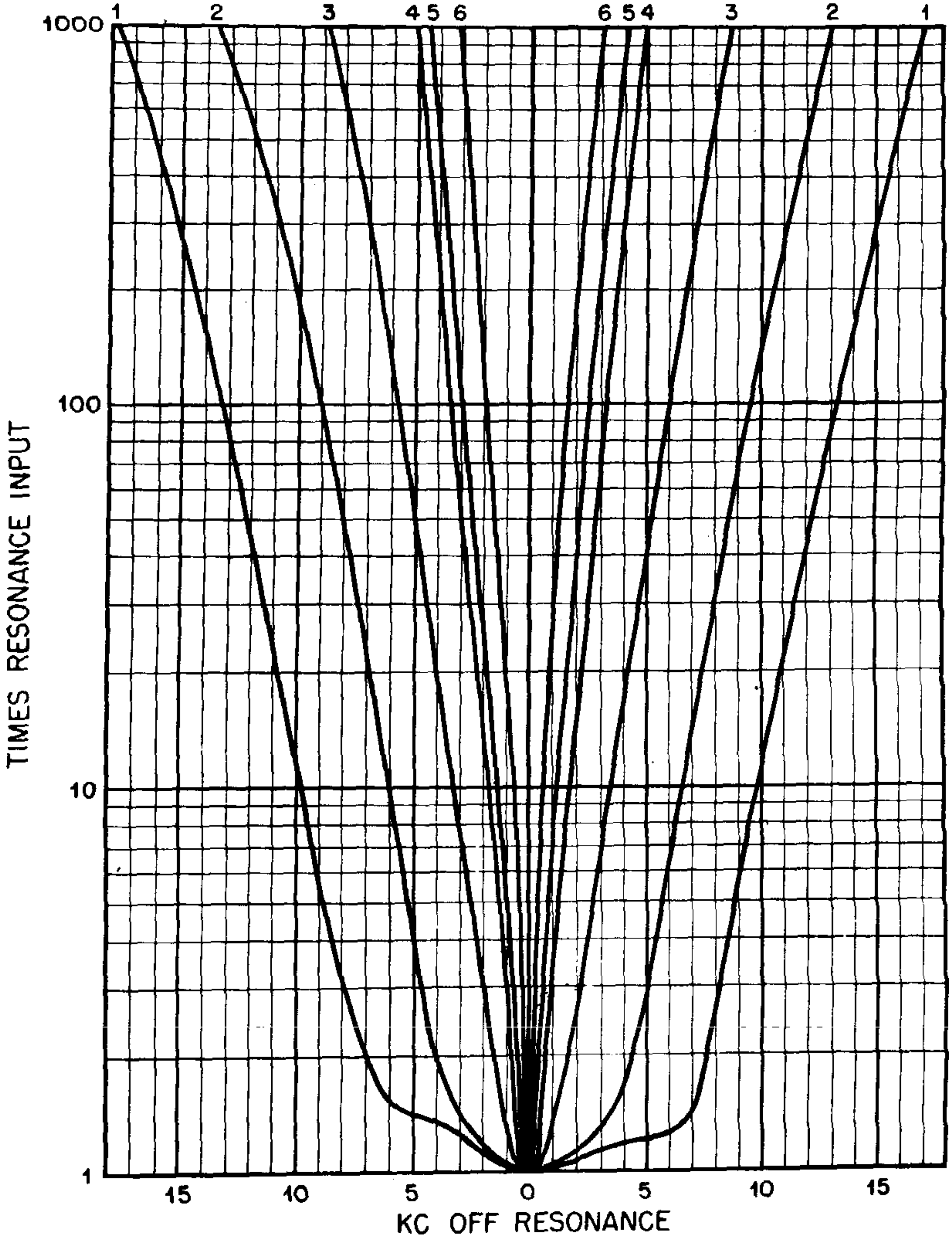


FIG. 5

MODEL SP-600-JX

TABLE No. 5
PARTS LIST

Symbol Designations	DESCRIPTION	Hammarlund Part No.
C1A, B, C, D, E, F, G, H	Capacitor, variable, 8 sections	34001-G1
C3, 5, 19, 20, 21, 22, 23, 24, 27, 29, 40, 41, 42, 43, 44, 47, 49, 61, 64, 66, 68, 70, 71, 72, 73, 74, 100, 105, 115, 116, 121, 122, 127, 135, 153, 154, 155	Capacitor, .01 mfd	23012-1
C6, 30, 50	Capacitor, 20 mmf	23003-41C
C8, 32, 52, 132	Capacitor, 2400 mmf	23011-40C
C9, 33, 53	Capacitor, 33 mmf	23003-45C
C11, 17, 35, 55	Capacitor, 1500 mmf	23011-62C
C12, 138, 145	Capacitor, 7 mmf	23061-168F
C14	Capacitor, 1000 mmf	23011-58C
C15, 139	Capacitor, 15 mmf	23061-155J
C18, 25, 45, 75, 110, 112, 113	Capacitor, 100 mmf	23003-94C
C37, 57, 67	Capacitor, 85 mmf	23071-59
C39, 59, 99, 134	Capacitor, 51 mmf	23003-87C
C60, 88	Capacitor, 12 mmf	23023-65UJ
C62	Capacitor, 2200 mmf	23011-17C
C63	Capacitor, 39 mmf	23003-47C
C65	Capacitor, variable	11726-G109
C69, 107, 117, 124	Capacitor, 220 mmf	23003-102C
C77	Capacitor, 3300 mmf	23011-69C
C78	Capacitor, 404 mmf	23071-67
C79, 80	Capacitor, 5 mmf	23023-8UJ
C82	Capacitor, 810 mmf	23072-53
C83	Capacitor, 10 mmf	23003-2B
C85	Capacitor, 1200 mmf	23011-60C
C87	Capacitor, 120 mmf	23071-50
C89	Capacitor, 190 mmf	23071-64
C91	Capacitor, 92 mmf	23071-71
C92	Capacitor, 51 mmf	23023-45UJ
C93	Capacitor, 379 mmf	23071-63
C95	Capacitor, 42 mmf	23071-69
C96	Capacitor, 610 mmf	23072-52
C97	Capacitor, 65 mmf	23071-58
C98, 102, 103, 104, 106, 108, 109, 118, 123, 136, 146, 147, 148, 156, 157	Capacitor, .022 mfd	23013-1
C101	Capacitor, variable	11725-G151
C111	Capacitor, variable	11776-G1
C114	Capacitor, 270 mmf	23003-104C
C119, 125	Capacitor, 300 mmf	23003-105C
C120, 126	Capacitor, 1300 mmf	23011-61C
C128, 151, 158, 159, 160	Capacitor, 10 mfd, 100V HS Can, Electrolytic	15462-1
C129A, 129B, 152A, 152B	Capacitor, 2 x .05 mfd HS Can, Paper	15461-1
C130	Capacitor, 27 mmf	23023-71UJ
C131, 133	Capacitor, 430 mmf	23003-109C
C137	Capacitor, .25 mfd 200V	23911-79E
C140	Capacitor, 1003 mmf	23015-27A
C141, 142	Capacitor, 100 mmf	23024-24SL
C143, 149	Capacitor, 5100 mmf	23015-16A
C144	Capacitor, .05 mfd	23911-77E
C150	Capacitor, 2500 mmf 800V	23070-40
C161A, B, C	Capacitor, 3 x 20 mfd 450V. HS Can. Electrolytic	15463-1
E1	2 Screw Terminal, Phone Input	4904-5
E2	4 Screw Terminal, Audio Output	31141-1
E3, 4, 5, 6	Dial Lamp, No. 47 Mazda	16004-1
	Dial Lamp Socket Assembly	31453-1
E7	2 Solder Term. strip	16650-12
E8	1 Solder term. strip (left)	16650-9
E9, 10, 11, 12	1 Solder term. strip (right)	16650-11
E13, 14	6 Solder term. strip	16650-10
E15, 16	8 Solder term. strip	31163-G1
E17	15 Solder term. strip	31162-G1
E18	3 Solder term. strip (meter)	31454-G1
F1	Fuse, 3 Amp.	15928-8
	Fuse Holder	15923-1
	Fuse Holder, Spare	15923-4
J1	Antenna Input Socket	15959-1
J2	IF Output Socket	16111-1
J3	Phone Jack	5066-1
J4, 5	Power or Relay receptacle	35013-1
L1	RF Input assembly, includes C2, 3, L1 and Switch contacts for S1A	31387-G1
L2	RF Input assembly, includes C4, 5, L2 and Switch contacts for S1A	31390-G1
L3	RF Input assembly, includes C6, 7, 8, L3 and Switch contacts for S1A	31393-G1
L4	RF Input assembly, includes C9, 10, 11, L4 and Switch contacts for S1A	31396-G1
L5	RF Input assembly, includes C12, 13, 14, L5 and Switch contacts for S1A	31399-G1
L6	RF Input assembly, includes C15, 16, 17, L6 and Switch contacts for S1A	31405-G1
L7, 14, 24, 35	RF Choke, 192 microhenries	15612-G1
L8	RF Transformer assemsembly, includes C26, 27, L8, R7 and Switch contacts for S1B	31386-G1
L9	RF Transformer assembly, includes C28, 29, L9, R8 and Switch contacts for S1B	31389-G1
L10	RF Transformer assembly, includes C30, 31, 32, L10 and Switch contacts for S1B	31392-G1
L11	RF Transformer assembly, includes C33, 34, 35, L11, R10 and Switch contacts for S1B	31395-G1
L12	RF Transformer assembly, includes C36, 37, L12 and Switch contacts for S1B	31398-G1

PARTS LIST (Continued)

Symbol Designations	DESCRIPTION	Hammarlund Part No.
L13	RF Transformer assembly, includes C38, 39, L13 and Switch contacts for S1B	31404-G1
L15	Same as L8, includes C46, 47, L15, R17 and Switch contacts for S1C	31386-G1
L16	Same as L9, includes C48, 49, L16, R18 and Switch contacts for S1C	31389-G1
L17	Same as L10, includes C50, 51, 52, L17, R19 and Switch contacts for S1C	31392-G1
L18	Same as L11, includes C53, 54, 55, L18, R20 and Switch contacts for S1C	31395-G1
L19	Same as L12, includes C56, 57, L19 and Switch contacts for S1C	31398-G1
L20	Same as L13, includes C58, 59, L20 and Switch contacts for S1C	31404-G1
L21	RF Choke, 1 millihenry	15617-G1
L22	RF Choke, 10 millihenries	15618-1
L23	RF Choke, 25 millihenries	15619-1
L25	HF Osc. assembly, includes C76, 77, 78, L25 and Switch contacts for S1D	31385-G1
L26	HF Osc. assembly, includes C81, 82, L26 and Switch contacts for S1D	31388-G1
L27	HF Osc. assembly, includes C83, 84, 85, L27 and Switch contacts for S1D	31391-G1
L28	HF Osc. assembly, includes C86, 87, 88, 89, L28 and Switch contacts for S1D	31394-G1
L29	HF Osc. assembly includes C90, 91, 92, 93, L29 and Switch contacts for S1D	31397-G1
L30	HF Osc. assembly, includes C94, 95, 96, L30, and Switch contacts for S1D	31403-G1
L47	RF Choke, 3.8 millihenries	15616-G1
L48	RF Choke, 2 ohms dc	15611-1
L49, 50	RF Choke, 2.7 ohms dc.	15613-1
L51	1st Filter Choke 8.5 Hy, 170 ohms dc	31030-2
L52	2nd Filter Choke 20 Hy, 440 ohms dc	31031-2
M1	Tuning Meter	4903-2
P1	Power plug and cord	6143-1
P2	Antenna Input Plug	16016-1
P3	Antenna Adapter Connector	15987-1
P4	Cable Connector Plug (for J2)	16071-1
R1, 13, 26	Resistor 510K ohms ⅓ watt	19317-76BF
R2, 12, 44, 52, 57, 82, 90, 91, 92, 70	Resistor 10K ohms ½ watt	19309-278BF
R3, 14, 39, 48, 53	Resistor 33K ohms ½ watt	19309-282BF
R4, 6, 16, 29, 30, 47, 83, 102, 103, 104, 105, 106, 107, 108, 109, 110	Resistor 1000 ohms ½ watt	19309-49BF
R5, 15, 32	Resistor 510 ohms ½ watt	19309-170BF
R7, 8, 17, 18	Resistor 51 ohms ½ watt	19309-193BF
R9, 19	Resistor 24 ohms ½ watt	19309-189BF
R10, 11, 20, 21, 45	Resistor 22 ohms ½ watt	19309-9BF
R22, 23, 64, 65, 77	Resistor 47K ohms ½ watt	19309-89BF
R24, 25	Resistor 180 ohms ½ watt	19309-31BF
R27	Resistor 150 ohms ½ watt	19309-259BF
R28	Resistor 6800 ohms ½ watt	19309-69BF
R31, 37, 41, 49, 54, 58, 80	Resistor 2200 ohms ½ watt	19309-57BF
R33	Resisor 1500 ohms ½ watt	19309-53BF
R34, 35, 38, 43, 51, 56, 62, 67, 68, 75, 76, 81, 100	Resistor 100K ohms ½ watt	19309-97BF
R36, 96	Resistor 22K ohms ½ watt	19309-178BF
R40	Resistor 20K ohms 1 watt	19310-179BF
R42, 50, 55	Resistor 10 ohms ½ watt	19309-1BF
R46	Resistor 100 ohms ½ watt	19309-25BF
R59	Resistor 2200 ohms 1 watt	19310-57BF
R60, 61	Resistor 1 megohm ½ watt	19309-121BF
R63	Resistor 27K ohms ½ watt	19309-83BF
R66	Resistor 18K ohms ½ watt	19309-79BF
R69, 74	Resistor variable 1000 ohms	15363-1
R72	Resistor 20K ohms ½ watt	19309-218BF
R73	Resistor 56K ohms 1 watt	19310-186BF
R78, 98	Resistor 470K ohms ½ watt	19309-113BF
R79	Resistor 680 ohms ½ watt	19309-45BF
R84	Resistor variable 500K ohms	15342-11
R85	Resistor 2500 ohm 10 watts	19396-1
R86, 89, 95	Resistor 82K ohms ½ watt	19309-287BF
R87, 88	Resistor 120K ohms ½ watt	19309-181BF
R93	Resistor variable 50K ohms includes switch S10	15342-21

MODEL SP-600-JX

PARTS LIST (Continued)

Symbol Designations	DESCRIPTION	Hammarlund Part No.	Symbol Designations	DESCRIPTION	Hammarlund Part No.
R94	Resistor 1100 ohms ½ watt	19309-208BF	X4	Tube socket, miniature, ceramic, less center shield	15989-5
R97	Resistor 3.3 megohms ½ watt	19309-133BF	X5	Tube socket, miniature, ceramic, with center shield	15989-3
R99	Resistor 360 ohms 1 watt	19310-211BF	X16	Tube socket, "Noval"	16100-1
R101	Resistor variable 25K ohms	15342-4	X21	Crystal socket, ceramic, for crystals Y1 to Y6	16092-5
S1A, B, C, D	Switch, base and spring assembly	31234-G1	Y1, 2, 3, 4, 5, 6	Crystal, order special, specify signal frequency	31473-spec.
S2	Crystal selector switch	15879-1	Y7	Crystal, 3.5mc	31130-1
S3	Crystal switch	31469-1	Y8	Crystal, 455kc	31471-1
S4	Switch, conversion switching	15862-1	Miscellaneous	Wrench, set screw No. 6	11806-2
S5A, B, C	Selectivity switch, 3 section	15856-1		Wrench, set screw No. 8	11806-3
S6, 9	Toggle Switch SPST	15864-1		Wrench, set screw No. 10	11806-4
S7	Toggle Switch DPST	15866-1		Snap Button Plug	29619-2
S8	Toggle Switch DPDT	15867-1		Shaft Coupling, rigid	31275-G1
S10	Switch "ON-OFF" part of R93	——		Shaft Coupling, flexible, soft	415-G3
S11	Switch, DPDT, spring return	15880-1		Shaft Coupling, flexible, stiff	415-G2
T1	Mixer plate coil assembly, includes C67, 69, 70, L31, 32, R31	31183-G1		Spring, retainer for RF coil assemblies	31003-1
T2	IF Transformer assembly, includes C97, 98, 99, L33, 34, R35	31116-G1		Spring, retainer for RF coil	31004-1
T3	Crystal Filter assembly, includes C107, 110, 111, 112, 113, 114, L36, 37, R41, Y8	31114-G1		Spring, grounding for IF transformer shields	31023-1
				Spring, conversion switch	31125-1
				Spring, indicator slide	31126-1
T4	IF Transformer, includes C117, 118, 119, 120, L38, 39, 40, R49	31102-G1		Spring, band change detent	31205-1
T5	Same as T4, includes C123, 124, 125, 126, L41, 42, 43, R54	31102-G1		Knob, frequency control	31434-G1
				Knob, tuning lock	31462-G1
				Knob & Skirt (large)	31215-G1
T6	Beat Frequency Osc. assy., includes C130, 131, 132, 133, 134, L44, 45, 46, R76, 77	31106-G1		Knob & Dial (RF Gain)	31227-G1
				Knob & Dial (Audio Gain)	31227-G2
T7	Transformer, Audio Output	31029-2		Knob & Dial (Crystal Phasing)	31227-G3
T8	Transformer, Power	31086-2		Knob & Dial (Beat Freq. Osc.)	31227-G4
X1, 2, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 20	Tube socket, miniature.	15989-4		Knob & Dial (Selectivity)	31227-G5
				Chart, frequency control	31463-1
X3 17, 19	Tube socket, octal	16082-1		Spring, anti-backlash	31239-1

VII

CONVERSION OF TABLE MODEL RECEIVER FOR RACK MOUNTING

The SP-600 Receiver is designed for either table cabinet or rack mounting. When table models are ordered, the receiver is not supplied with a bottom cover plate since the cabinet serves this purpose. When rack models are ordered the receiver is supplied with a bottom cover plate, but is not supplied with a top cover plate since in most cases the rack is of the cabinet type.

A cover plate kit is provided, on separate order, for conversion to rack mounting where table models have been ordered and where the covers are desired.

The following instructions should be followed when installing the cover kit; To install the bottom cover plate, remove the two rear corner nut plate brackets by removing the three screws at the lower rear ends of the large side mounting brackets and replace these ones from the kit, using the same screws. Remove the nut and lockwasher from the screw, nearest the bottom edge of the chassis, holding capacitor C151 (see bottom of chassis photograph). Install the short angle bracket, from the kit, using the same screw from which the nut and washer were removed, with the tapped (smaller end) of the bracket replacing the nut. The bottom cover plate is now installed using the five 10-32 screws from the kit and the two 10-32 screws that previously held the bottom of the receiver to the cabinet. To install the top cover plate assembly, place the cover with the angles facing downward toward the chassis and with pressure applied at the rear of the plate, to slightly compress the rubber channel against the rear of the front panel, secure the assembly in place with the four 6-32 screws from the kit, engaging them in the tapped holes in the brackets through the

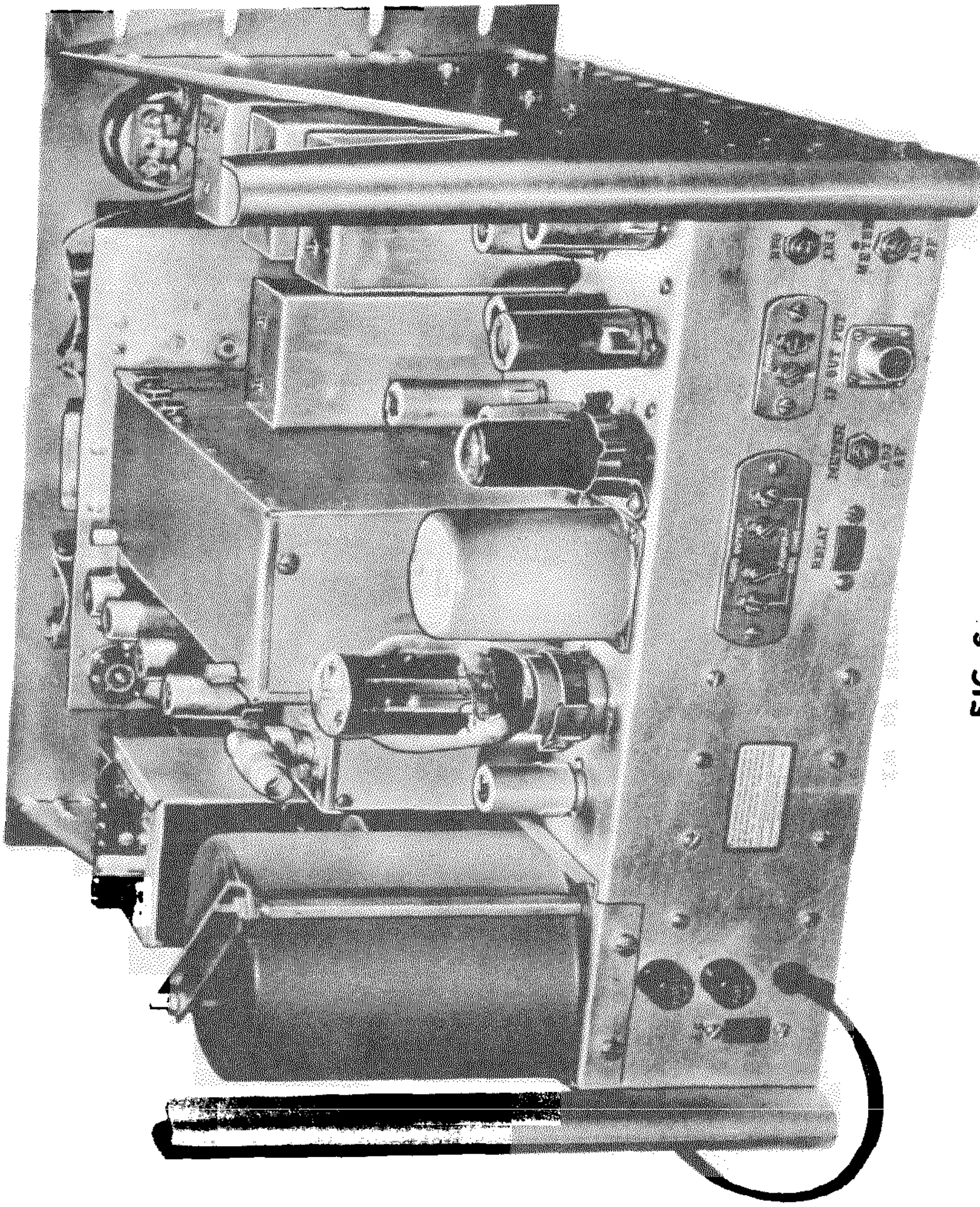


FIG. 6
REAR VIEW OF RECEIVER

MODEL SP-600-JX

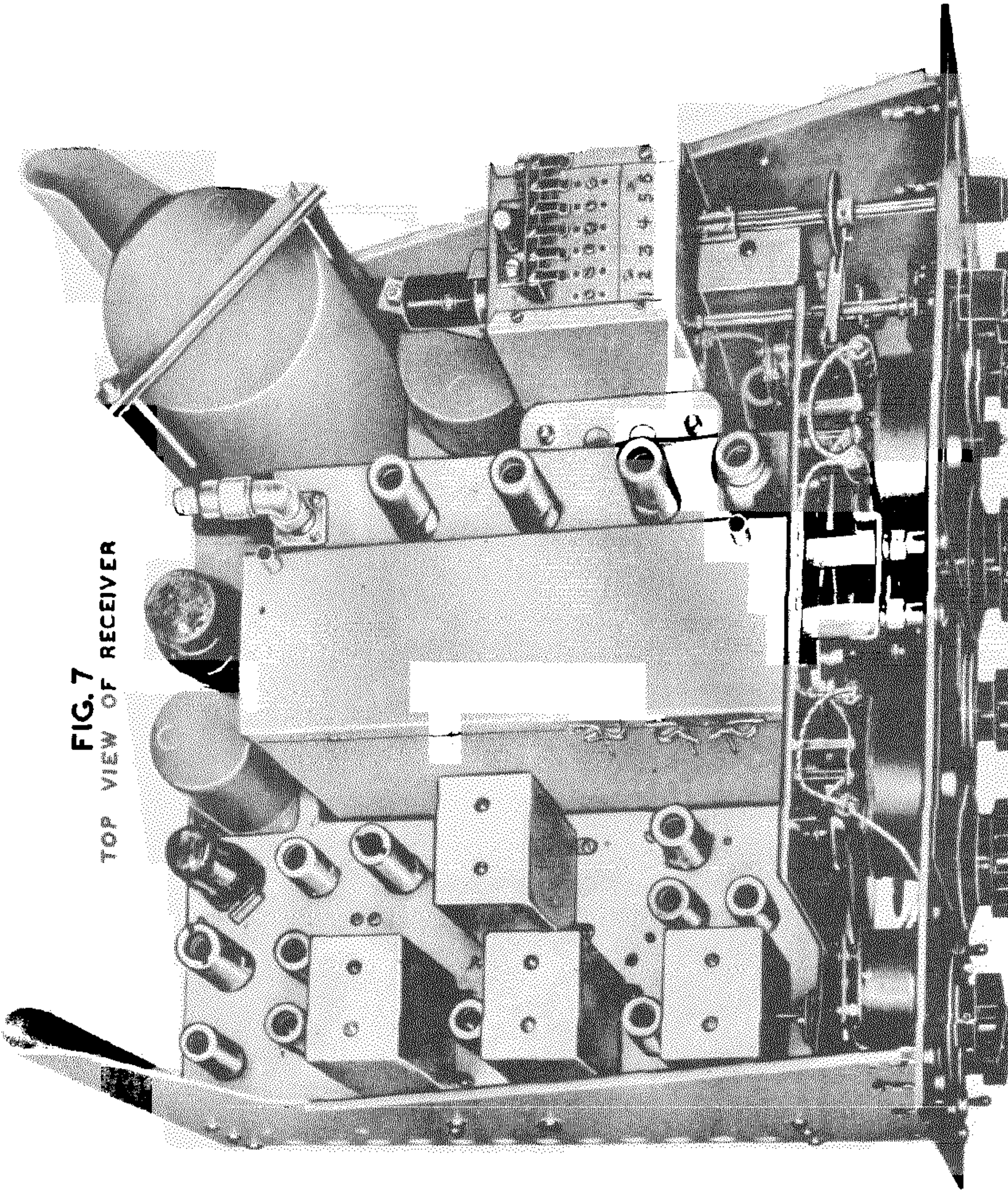


FIG. 7
TOP VIEW OF RECEIVER

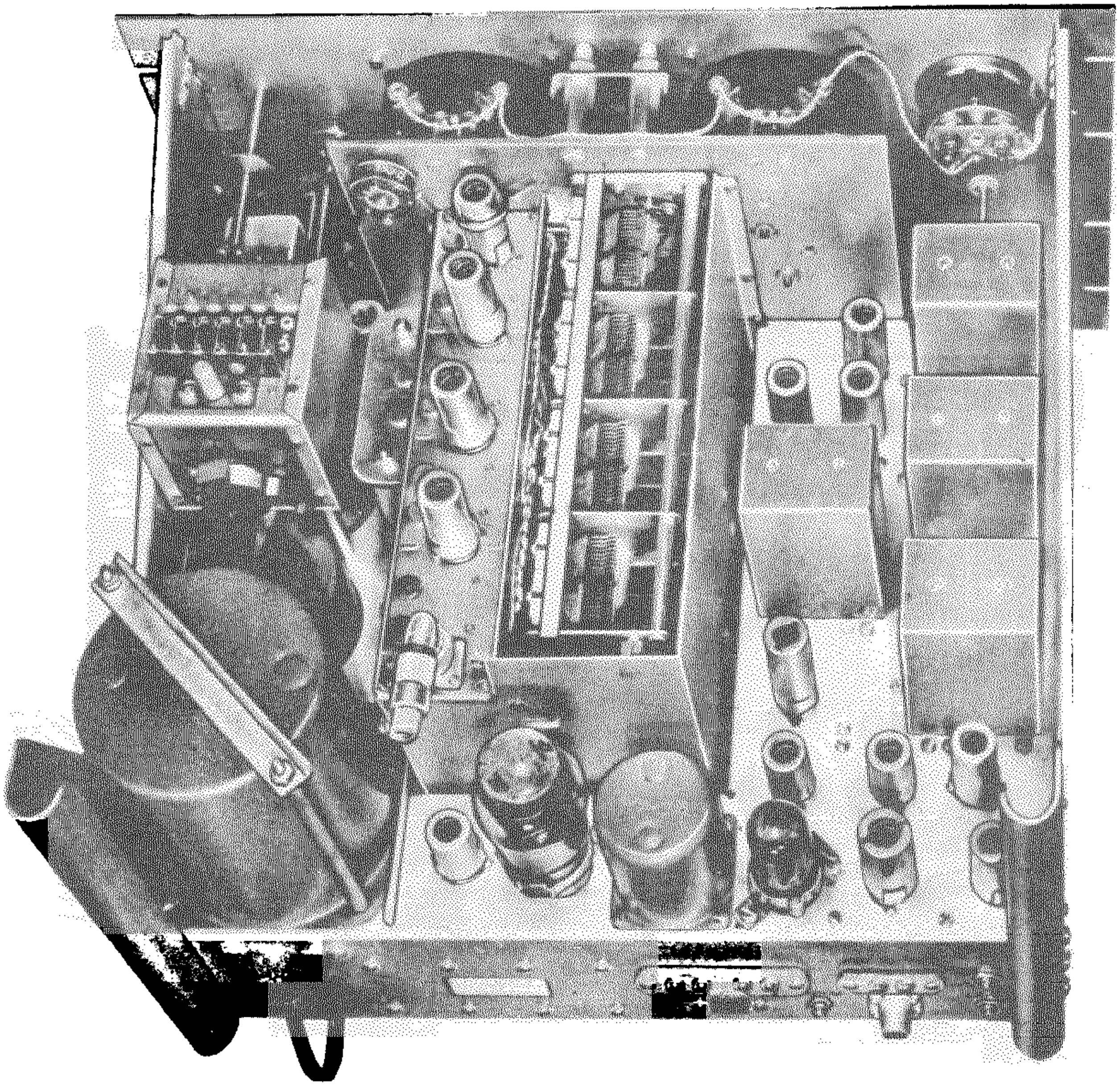


FIG. 8
TOP VIEW OF RECEIVER
CAPACITOR SHIELD REMOVED

MODEL SP-600-JX

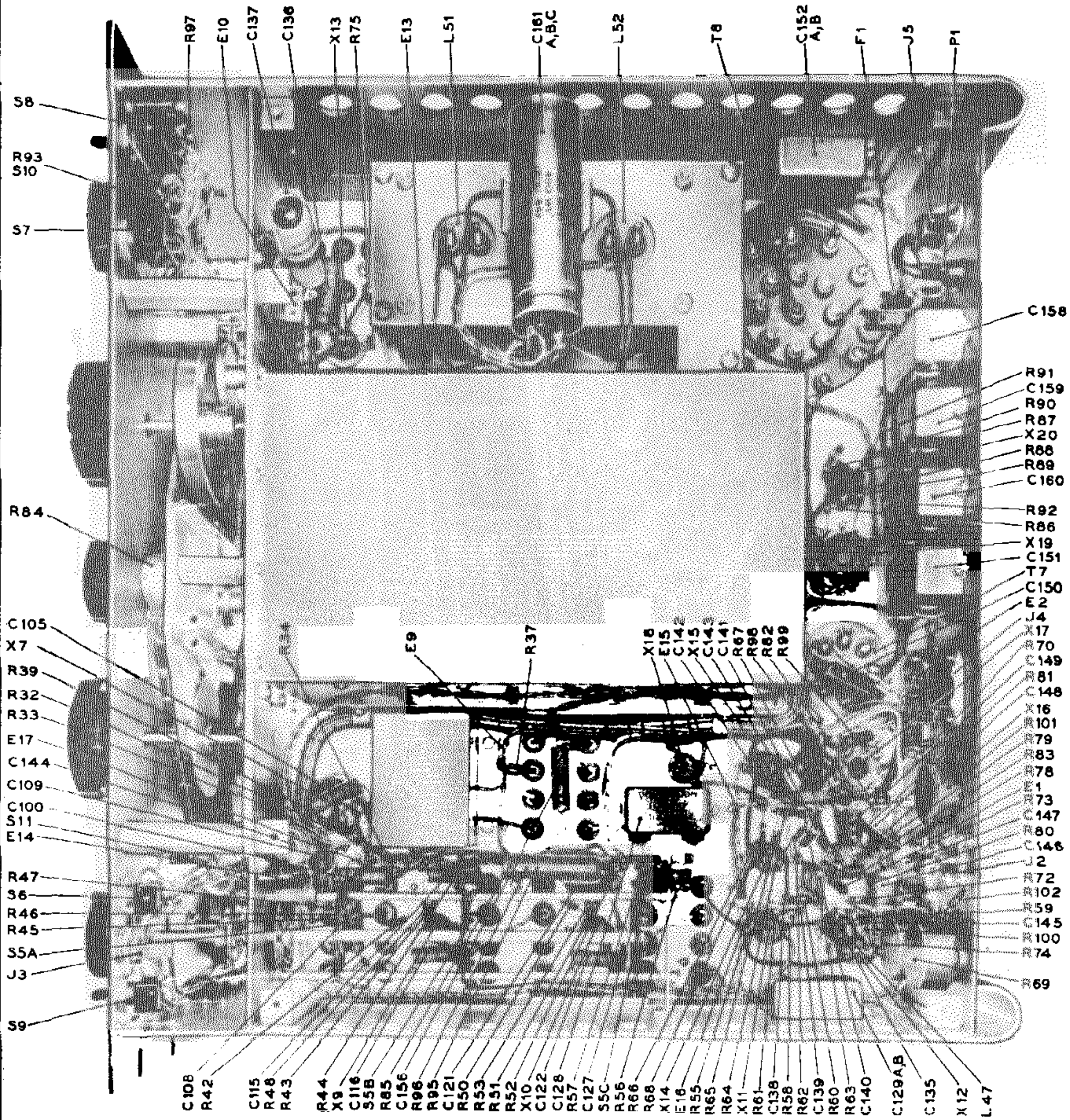


FIG. 9
BOTTOM VIEW OF RECEIVER SP-600-JX

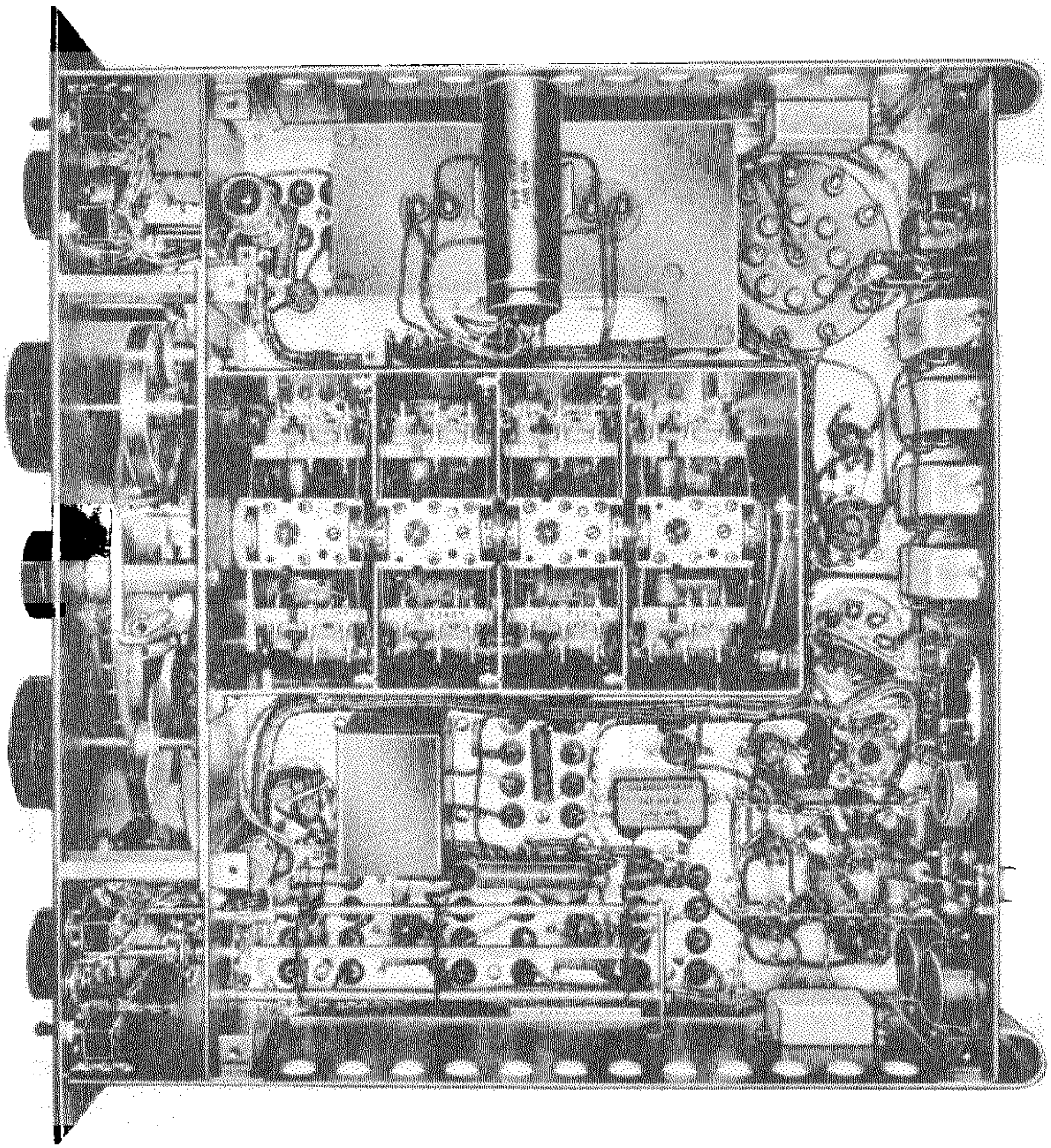


FIG. 10
BOTTOM VIEW OF RECEIVER
TUNING UNIT SHIELD REMOVED

MODEL SP-600-JX

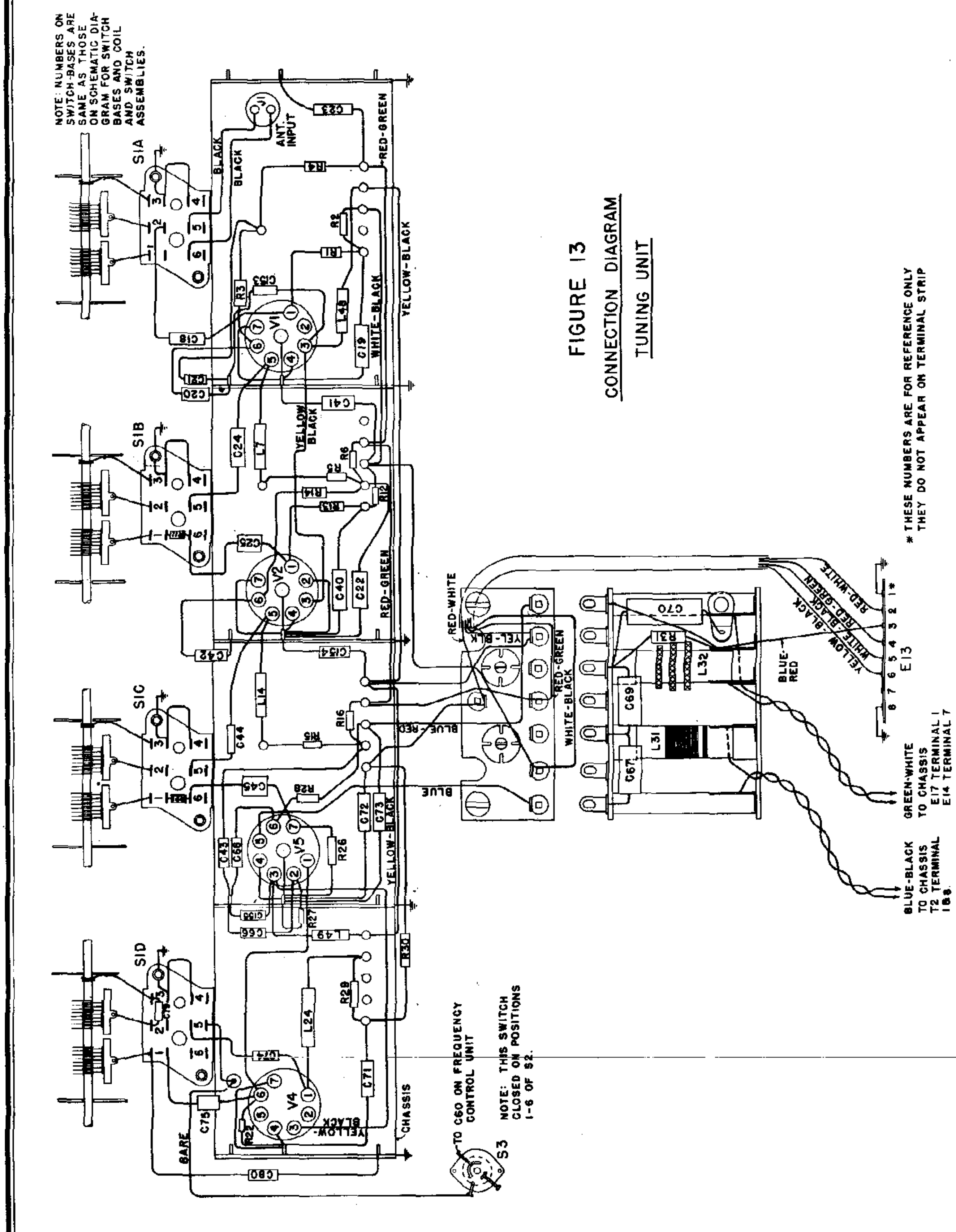
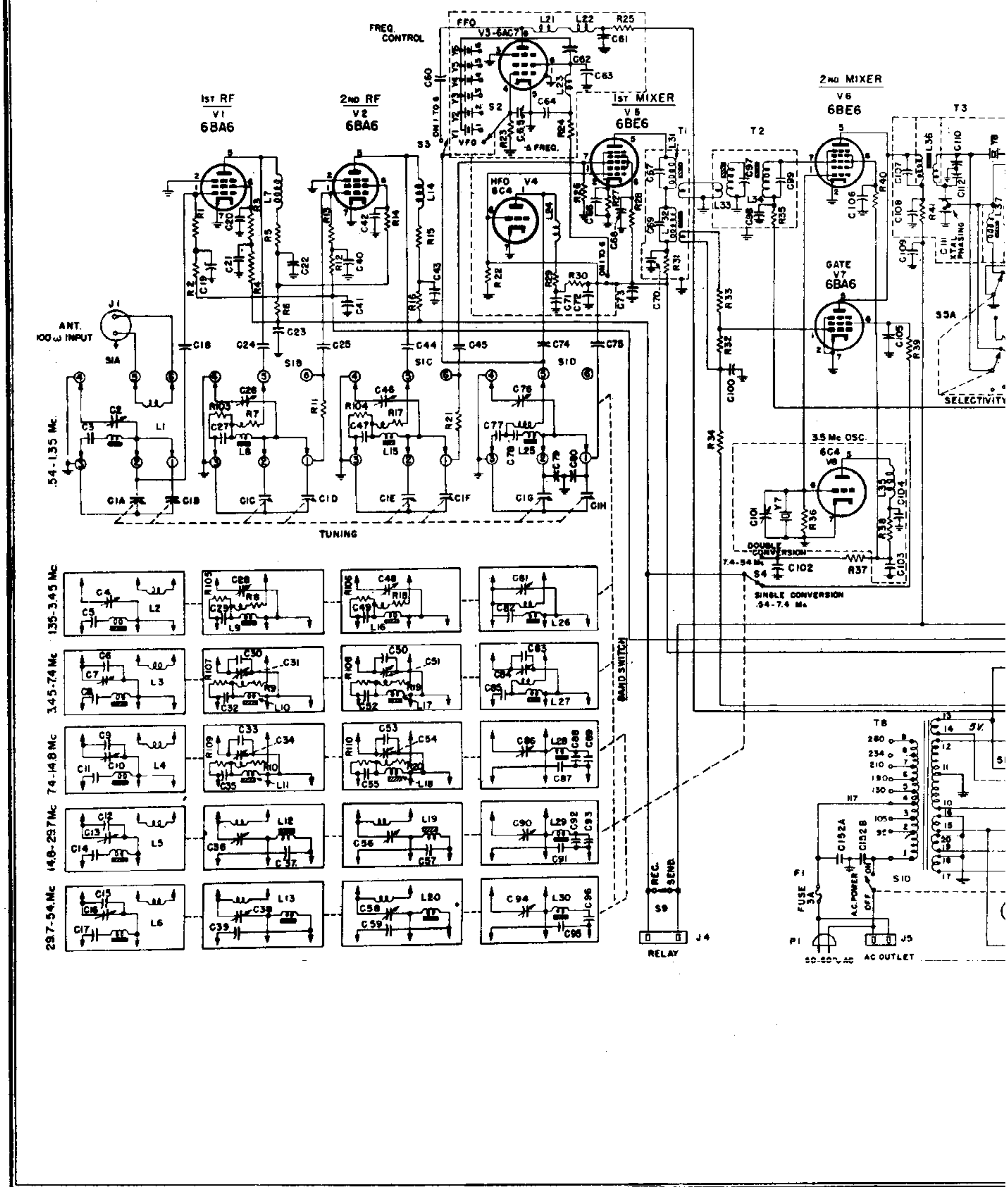


FIGURE 13

CONNECTION DIAGRAM

TUNING UNIT


1ST RF
V1
6BA6
2ND RF
V2
6BA6
1ST MIXER
V5
6BE6
2ND MIXER
V6
6BE6
FREQ. CONTROL
VFO
V3-6AC7
HFO V4 6C4
GATE
V7
6BA6
3.5 Mc OSC.
6C4
V8
ANT. 100 Ω INPUT
TUNING
BAND SWITCH
SELECTIVITY
DOUBLE CONVERSION
SINGLE CONVERSION .54-7.4 Mc
.54-1.35 Mc
1.35-3.45 Mc
3.45-7.4 Mc
7.4-14.8 Mc
14.8-29.7 Mc
29.7-54 Mc
RELAY
FUSE 3A
A.C. POWER
AC OUTLET
50-60 ~ AC
XTAL PHASING

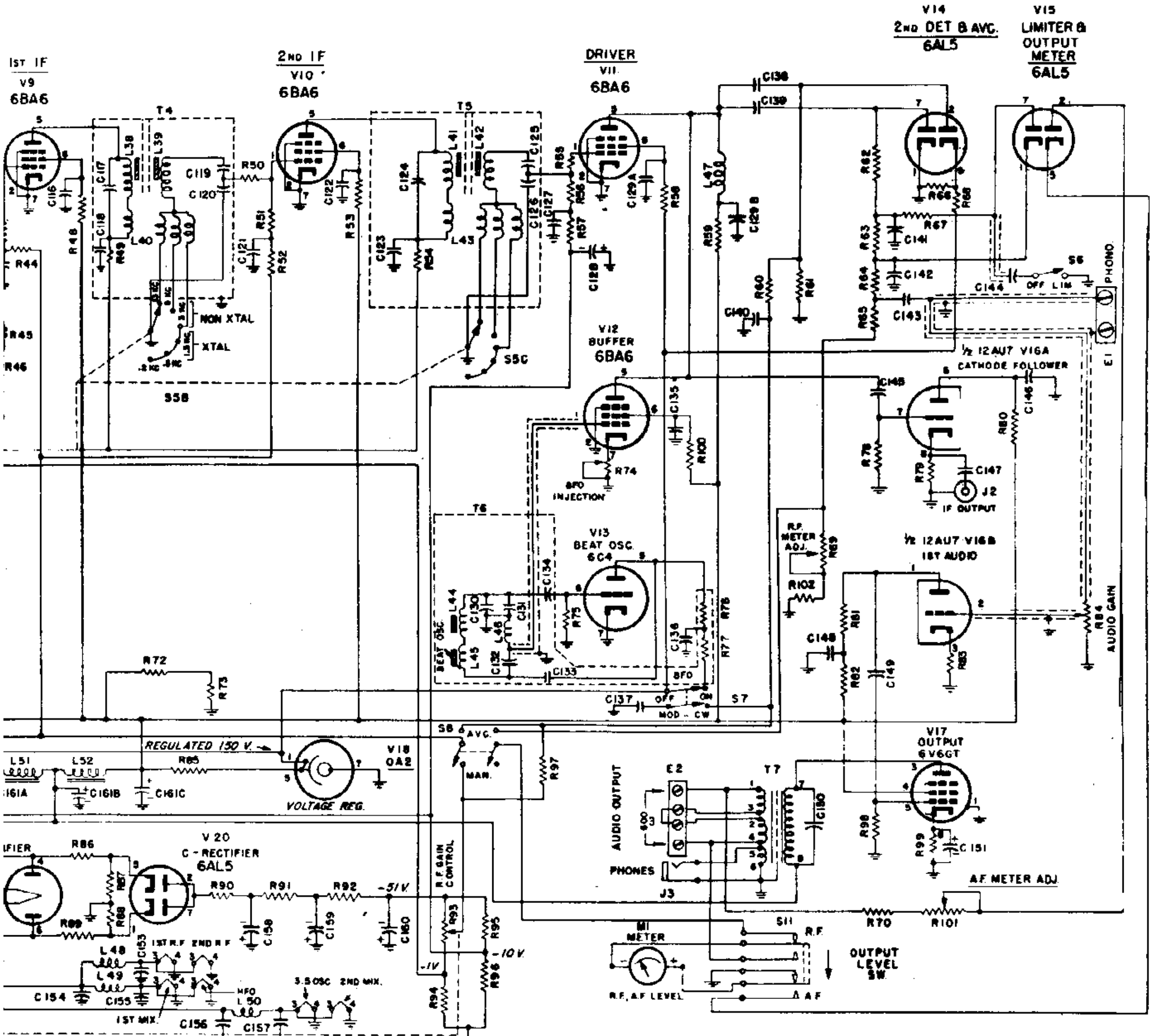


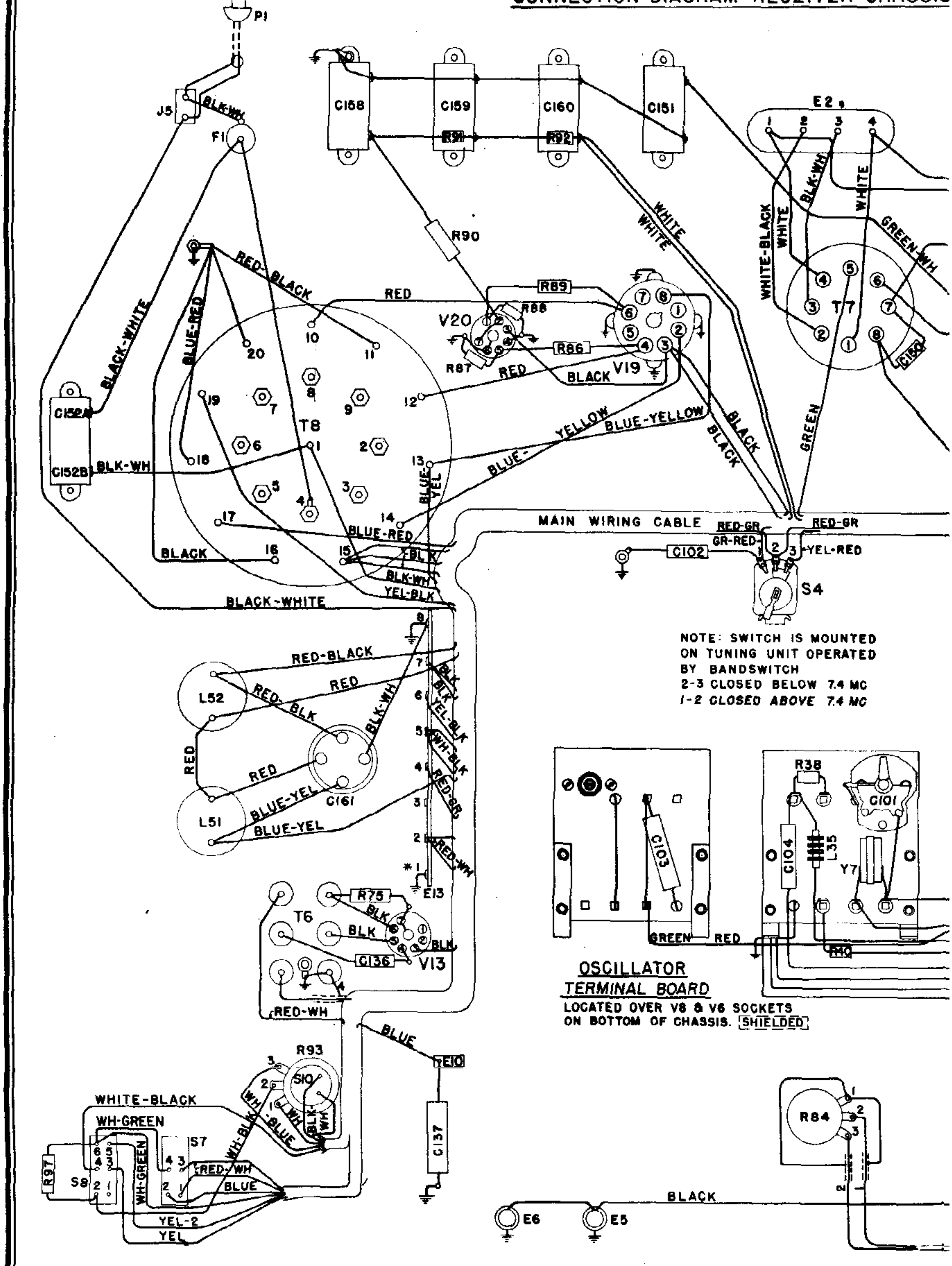
FIG. 11
CIRCUIT DIAGRAM OF RECEIVER

25-26

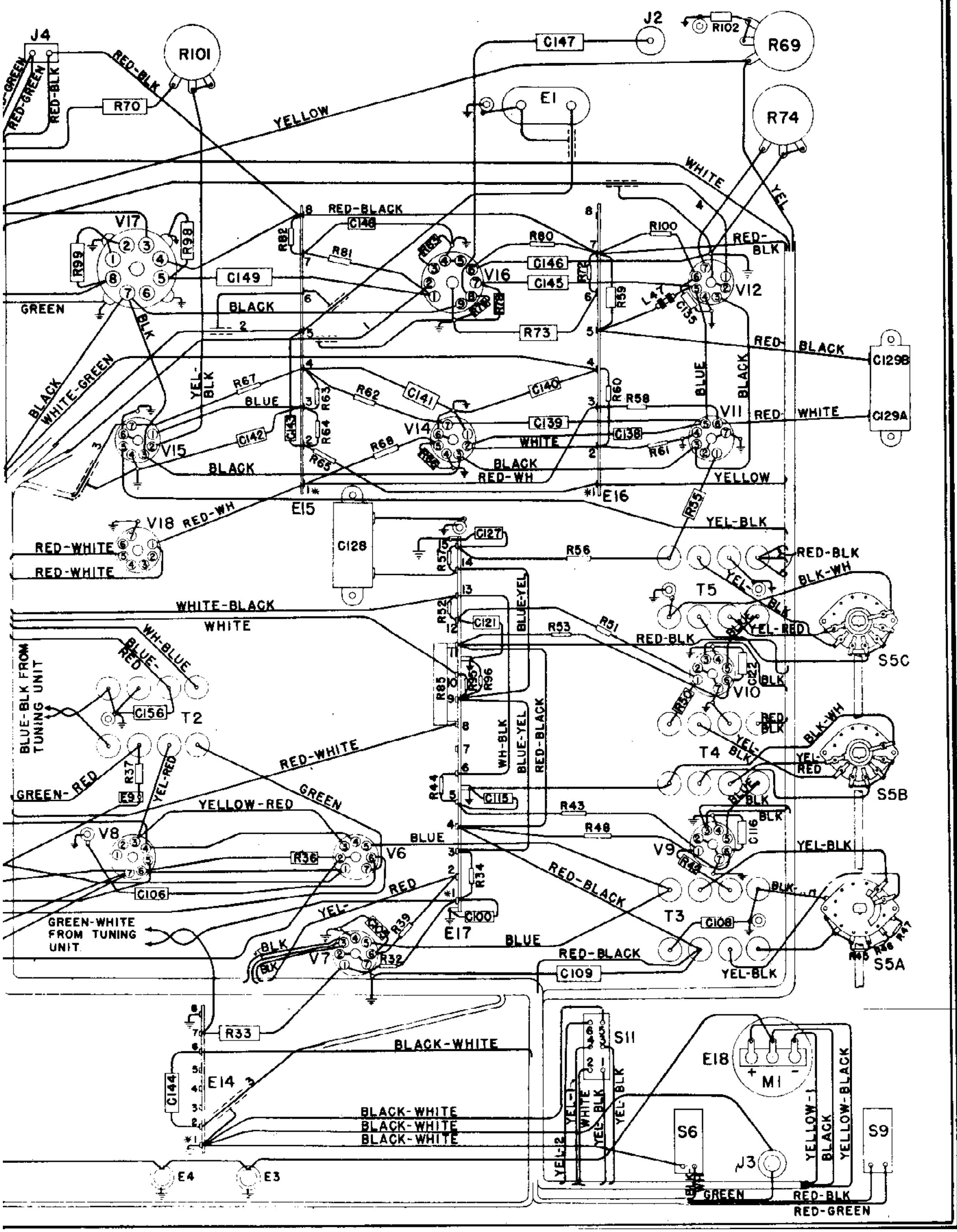
MODEL SP-600-JX

FIGURE NUMBER 12

CONNECTION DIAGRAM-RECEIVER CHASSIS



* THESE NUMBERS ARE FOR REFERENCE ONLY. THEY DO NOT APPEAR ON TERMINAL STRIP.



* THESE NUMBERS ARE FOR REFERENCE ONLY.
THEY DO NOT APPEAR ON TERMINAL STRIP.

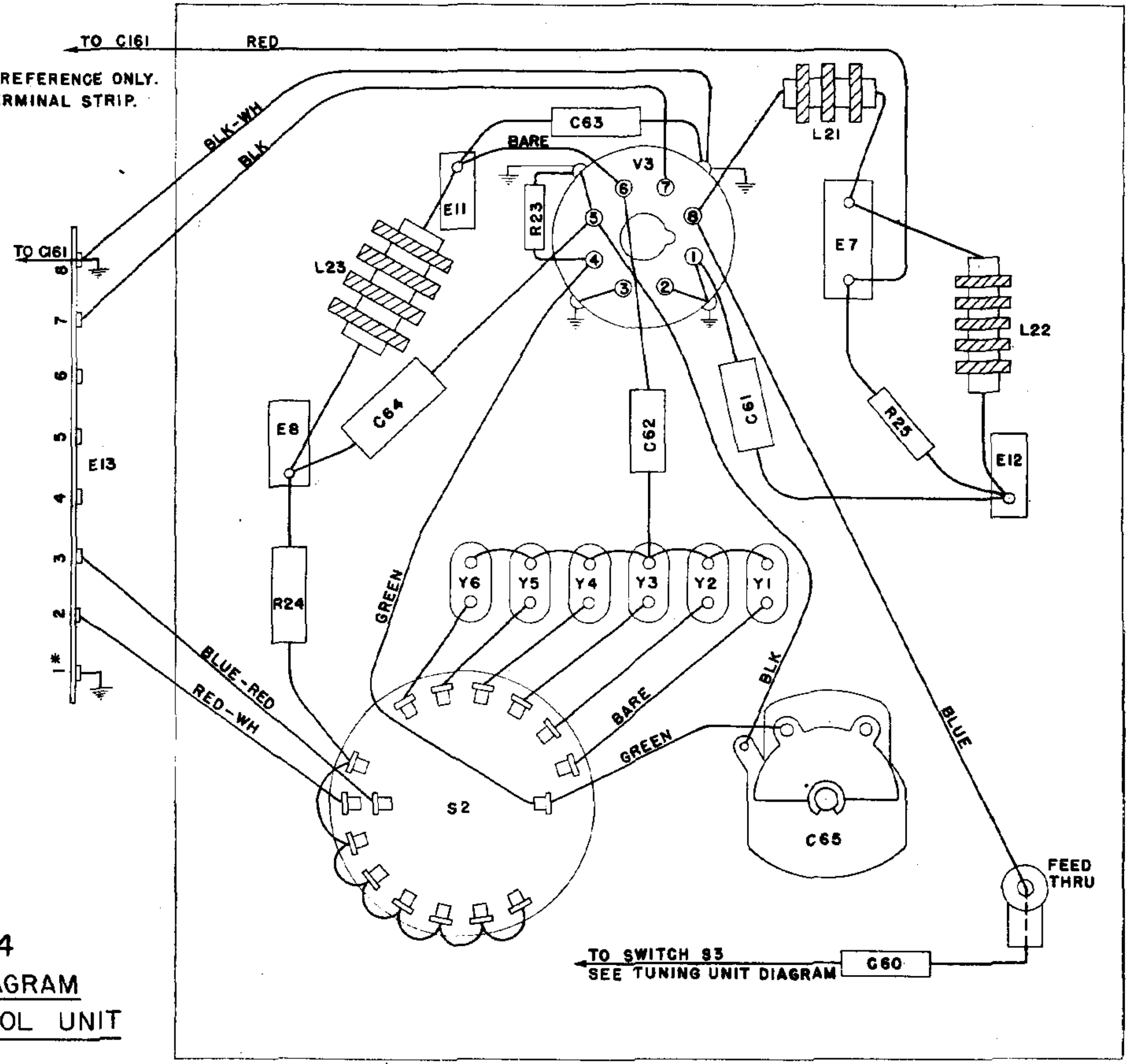
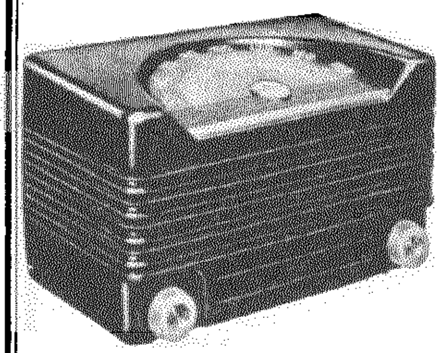


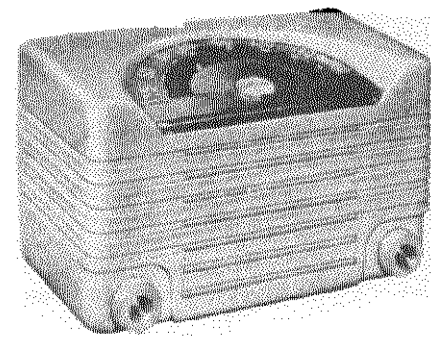
FIGURE 14
CONNECTION DIAGRAM
FREQUENCY CONTROL UNIT



Model 205
Brown

MAJOR COMPONENTS

Cabinet	
Model 204	7582
Model 205	7583
Radio Chassis	165
Loop Antenna	5238
Dial, Calibrated	744A
Dial Insert	746A
Bracket, Dial Mechanism	2434
Backboard	3710
Knobs	3703



Model 204
Ivory

SPECIFICATIONS

Line Voltage	115V DC or 115V AC 60 cps
Power Consumption	26 Watts
Tuning Range	540 KC to 1650 KC
Number of Tubes	5
Audio Power Output	1.0 Watt
Speaker Type	5" PM
Cabinet	
Height	6-3/4"
Width	11"
Depth	6"

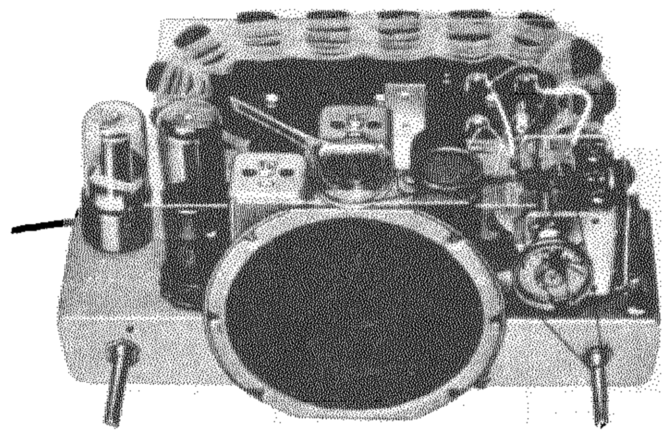


Figure 1. Chassis 165

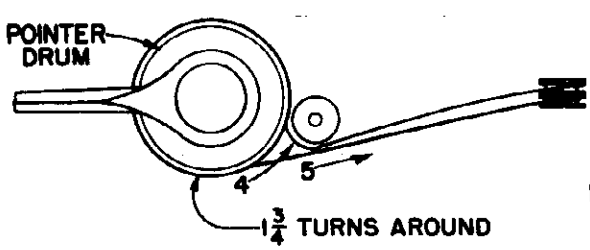
ELECTRICAL AND MECHANICAL DATA

Power Requirements:	
Operating Voltage	115V DC or 115V AC 60 cps
Consumption	26 watts
Tuning Range	540 KC to 1650 KC
Audio Power Output	1.0 watt
Output Impedance	3.2 ohms
Intermediate Frequency	455 KC

TUBE COMPLEMENT

1	12SA7	Converter	V1
1	12SG7	IF Amplifier	V2
1	12SQ7	2nd Det., AVC, 1st Audio	V3
1	50L6GT	Audio Output	V4
1	35Z5GT	Rectifier	V5

Chassis 165 is a 5-tube AM AC-DC superheterodyne incorporating a built-in loop antenna and a 5" PM speaker. A binding post is available on the loop antenna for connection to an external long wire antenna which will be required in very weak signal areas only. Dial stringing information is given in Figure 2.



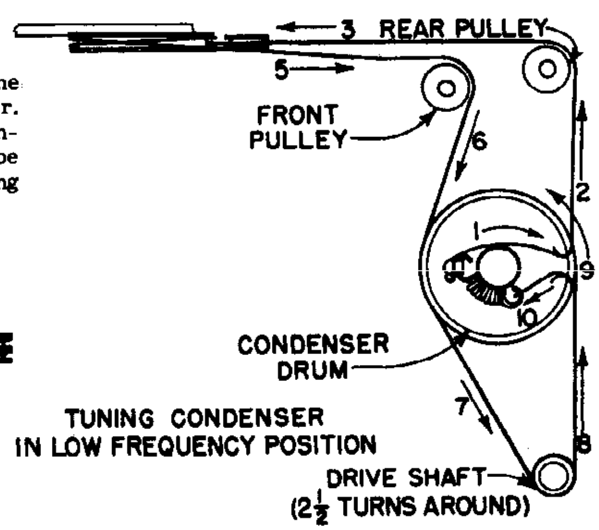


Figure 2. Dial Stringing

MODELS 204, 205, Ch. 165

ALIGNMENT

Equipment:

1. Signal generator capable of generating frequencies of 1650 KC, 1400 KC, and 455 KC.
2. AC meter with 2.5 V scale.
3. 0.1 mfd, 200 V blocking capacitor.

Procedure:

CAUTION: The chassis is the AC-DC type, and care should be exercised to avoid coming in contact with grounded objects when touching the chassis.

If the alignment is performed on a metal topped bench that is grounded, an isolation transformer must be used between the AC supply and the chassis. Allow the receiver to warm up for several minutes. Connect the AC voltmeter across the speaker voice coil. (An output meter may be used.) Set meter to 2.5 volt scale.

TABLE I - ALIGNMENT PROCEDURE

Step No.	Signal Generator Frequency, KC	Adjust	Instructions
		IF	
1	455 modulated	T4 Pri, Sec T3 Pri, Sec	Connect "hot" side of generator to antenna loop binding post, and connect ground side to receiver chassis through 0.1 condenser. Keep signal level low enough to keep maximum reading on lower half of meter scale. Set volume control at maximum and tuning condenser plates all the way unmeshed.
		RF	
2	1650 modulated	C4	Tuning condenser plates unmeshed. Connect generator to wire loop about 6" in diameter. Place loop one foot from and parallel to antenna loop. Generator level should be adjusted to produce reading on lower half of meter scale. Adjust C4 for maximum output.
3	1400 modulated	C3	Generator input remains unchanged. Turn tuning condenser so that dial pointer is over extreme clockwise calibration mark. Adjust C3 for maximum output.

NOTES:
The pin voltage readings are obtained with no signal input to receiver.
D.C. voltages measured with 20,000 ohm/volt meter.
A.C. voltages measured with 1,000 ohm/volt meter.
All voltages measured with reference to B-.
Live voltage 115V A.C.

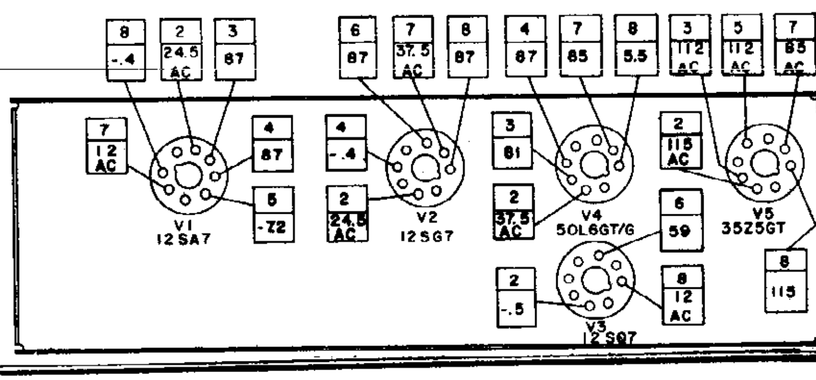


Figure 3. Pin Voltage Diagram

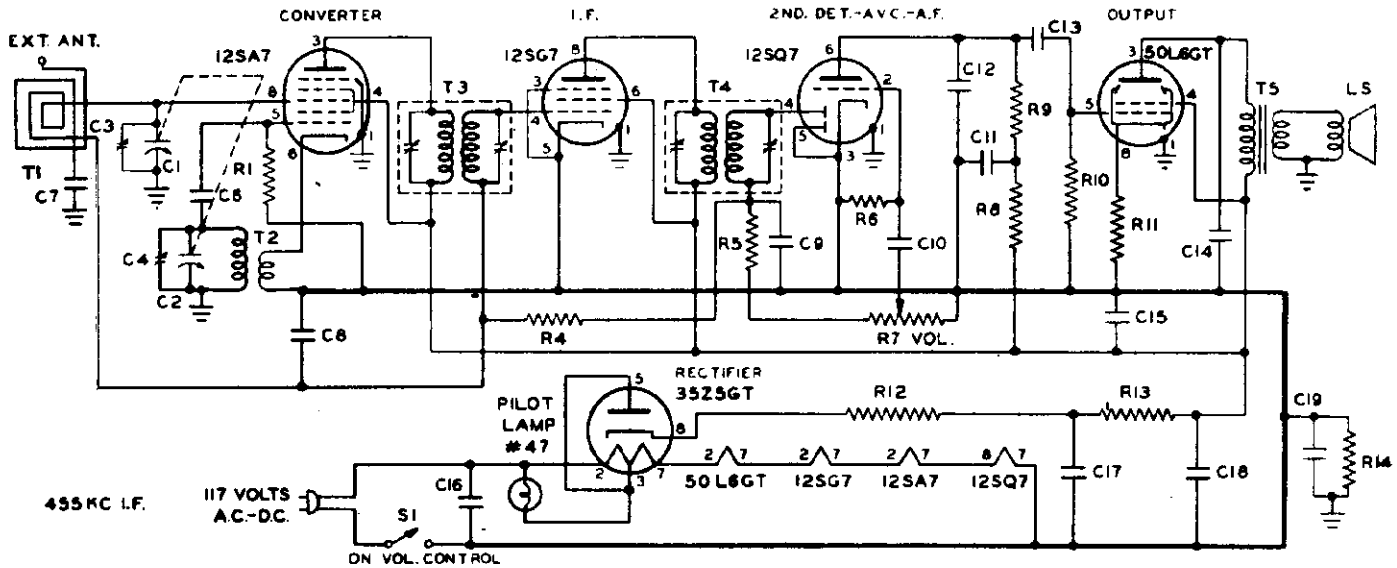


Figure 4 Receiver Schematic

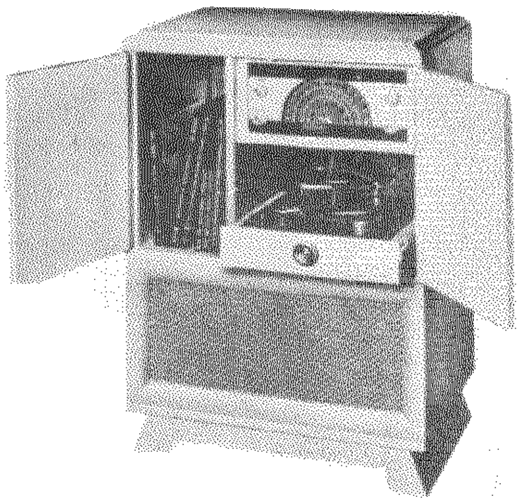
PARTS LIST

All values of capacity are microfarads unless otherwise noted.
All resistors are 1/2 watt composition type with values given in ohms unless otherwise specified.

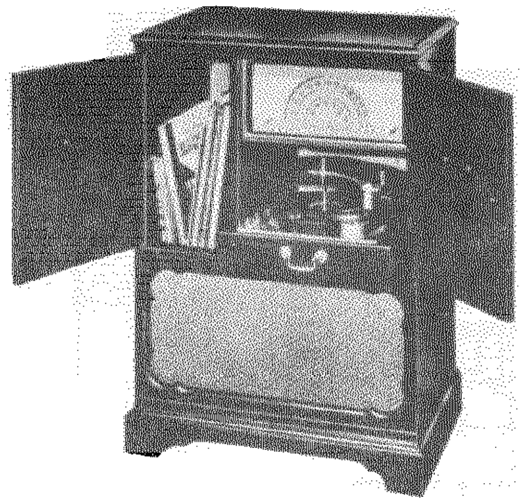
Symbol	Part No.	Value	Tolerance	Watts or Volts	Type
C1 } C2 }	4401	{ 0 - 388 mmf { 0 - 180 mmf			2 Gang Variable
C3 } C4 }	Part of 2 Gang Variable				Trimmers
C5	Not used				
C6	4000	100 mmf	20%		Mica
C7	4102	.005		600	Paper
C8	4100	.05		200	Paper
C9	4001	270 mmf	20%		Mica
C10	4102	.005		600	Paper
C11	4100	.05		200	Paper
C12	4001	270 mmf	20%		Mica
C13	4102	.005		600	Paper
C14	4106	.02		400	Paper
C15	4100	.05		200	Paper
C16	4101	.05		400	Paper
C17		50		150	
C18	4201	30		150	Electrolytic
C19	4121	.1	20%	400	Paper
R1	4501	22K	20%		
R2	Not used				
R3	Not used				
R4	4502	2.2 meg	20%		
R5	4504	47K	20%		
R6	4505	10 meg	20%		
R7	4836	500K			Volume Control
R8	4511	100K	20%		
R9	4500	220K	20%		
R10	4506	470K	20%		
R11	4510	150	20%		
R12	4508	47	20%		
R13	4700	500	10%	5 W	
R14	4506	470K	20%		

Symbol	Part No.	Description
S1	Part of R7	
T1	5238	Loop, Antenna
T2	5208	Coil, Oscillator
T3	5205	Transformer, Input IF (455 KC)
T4	5206	Transformer, Output IF (455 KC)
T5	5101	Transformer, Audio Output
LS	9003	Speaker, 5" PM

MODELS 533,
534, Ch. 167



MODEL 533
Modern Style
Oak Cabinet



MODEL 534
Traditional Style
Mahogany Cabinet

SPECIFICATIONS

Line Voltage	115V AC 60 cps
Power Consumption	95 Watts
Tuning Ranges	
AM	535 KC to 1650 KC
FM	88 MC to 108 MC
Number of Tubes	8
Audio Power Output	3.5 Watts
Speaker Type	12" PM

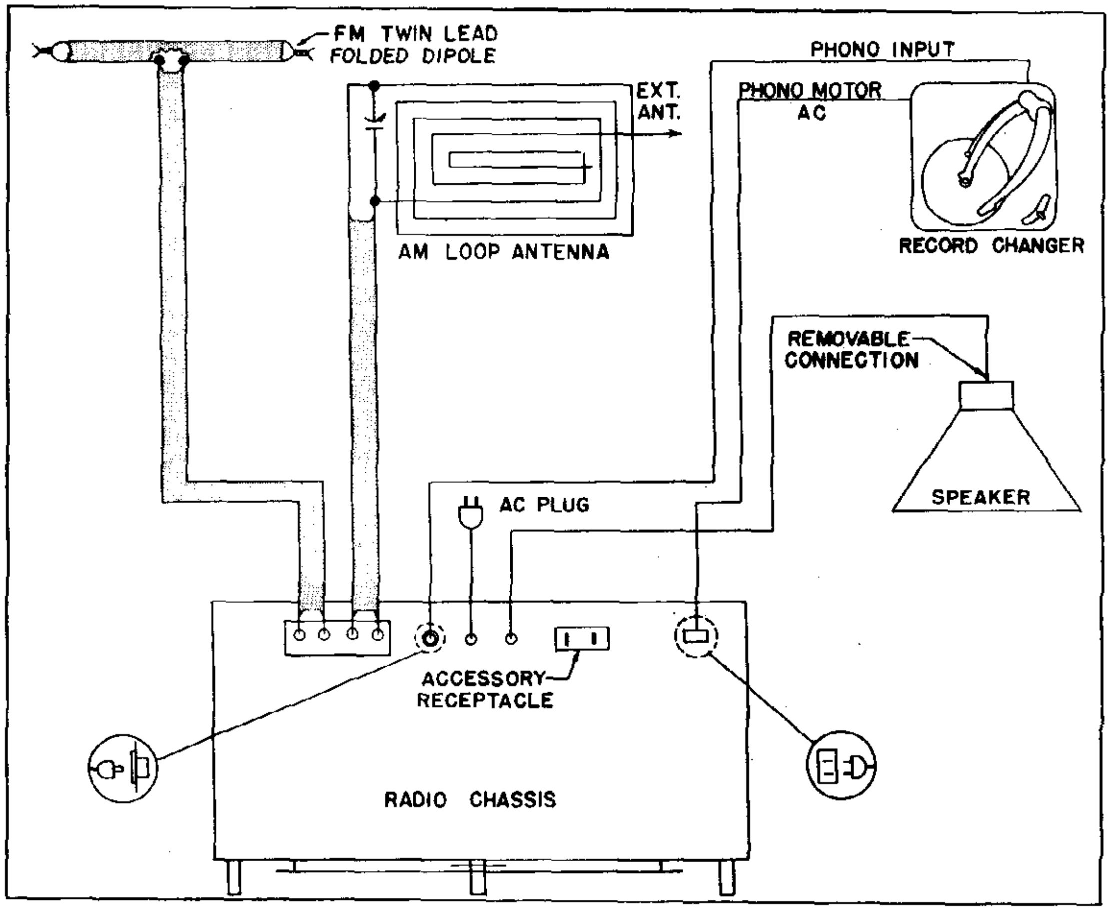
Cabinet*	
Height	36-1/2"
Width	26-1/4"
Depth	17-1/16"
Record Changer	Automatically plays 1" stack of 7", 10", 12" records at 33-1/3 rpm, 45 rpm, or 78 rpm.

* Where there are slight variations in certain of the dimensions for the two models, the largest value is listed.

MAJOR COMPONENTS

Cabinet	
Model 533	7591
Model 534	7590
Radio Chassis	167
Speaker	9070
Antenna	
AM Assembly	55214
FM Assembly	55218
Record Changer	9078

Dial Glass	747
Backboard	3714
Record Changer Drawer	6656
Knobs	
Tuning	33517A
Off-On-Tone	33517A
Volume	33517A
Band Switch	33517C



BLOCK DIAGRAM

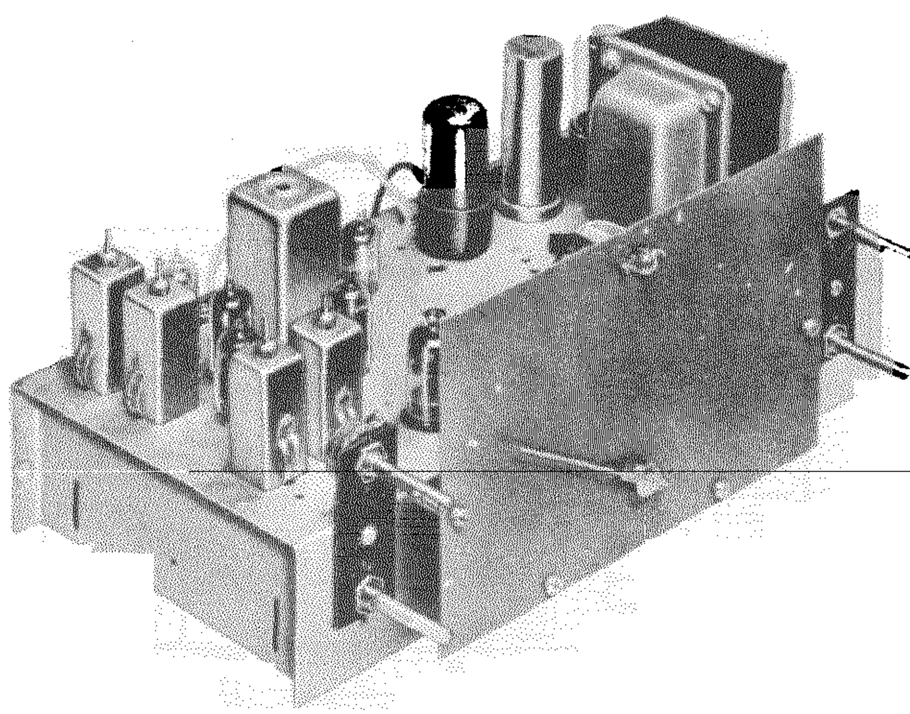


Figure 1. Chassis 167

MODELS 533, 534, Ch. 167

ELECTRICAL AND MECHANICAL DATA

Power Requirements: Operating Voltage	115 V AC 60 cps
Watts:	95
Tuning Range: AM	535 KC to 1650 KC
FM	88 MC to 108 MC
Audio Power Output	3.5 Watts
Output Impedance	3.2 ohms at 400 cps
Intermediate Frequencies: AM	455 KC
FM	10.7 MC
FM Antenna Input Impedance	300 ohms, balanced

Chassis 167 is an 8 tube combination AM-FM radio receiver. It employs an indoor loop antenna for AM reception and is designed to be used with an indoor FM antenna in normal signal areas and an outside FM antenna and a 300 ohm, balanced transmission line in weak signal areas. The indoor antenna is located in the receiver cabinet, and it should be disconnected from the FM antenna terminal posts when an outside antenna is used. The chassis is mounted in place horizontally on rubber shock mounts which rest on wooden blocks that are bolted in the chassis from below. Dial stringing details are indicated in figure 2. Dial calibration appears on the dial glass mounted on the front of the cabinet.

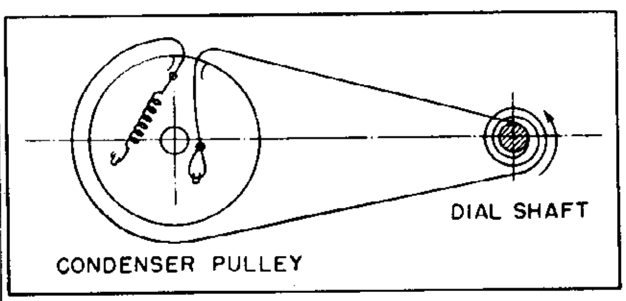


Figure 2. Dial Stringing

TUBE COMPLEMENT

1	12AT7	FM Oscillator-Converter	V1
1	6BE6	AM Oscillator-Converter	V7
1	6BA6	AM-FM 1st IF Amplifier	V2
1	6BA6	FM 2nd IF Amplifier	V3
1	6AL5	FM Detector	V4
1	6AT6	AM Detector-AVC - 1st Audio (AM-FM)	V5
1	6V6GT	Power Output	V6
1	5Y3GT	Rectifier	V8

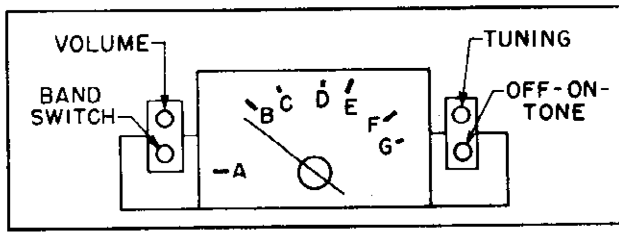


Figure 3. Location of Controls

Note: The alignment calibration marks which appear on the dial background plate are shown lettered for identification purposes. Pointer should be at "A" when condenser is in full mesh.

CONTROLS

Operation of the volume and tuning controls is straightforward. The BAND SWITCH has three positions for selecting one of the following: PHONO, AM radio, or FM radio. The PHONO position is obtained with the switch in the extreme counterclockwise position, and the other two positions are selected in the order listed by clockwise rotation of the band switch control shaft. The fourth control is the OFF-ON-TONE control. Extreme counterclockwise rotation of the control shaft turns the receiver off. Clockwise control turns the receiver on and continuously changes the tone from bass to treble.

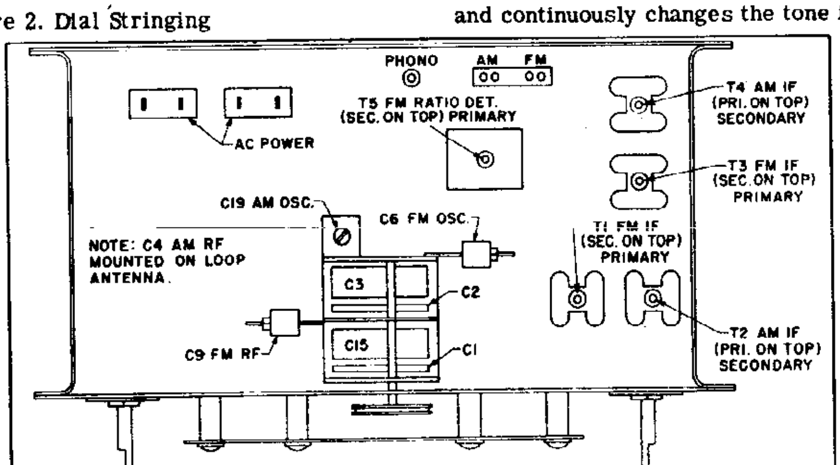


Figure 4. Trimmer Location- Bottom View

ALIGNMENT

This section describes the minimum equipment and procedure that is required to align the receiver satisfactorily. Before beginning alignment, the tuning condenser must be fully open, and the set should be allowed to warm up about 15 minutes. It is suggested that the alignment be performed on a metal-topped bench with generator, receiver, and voltmeter well bonded together. The bench area should be free of strong extraneous radiation.

Equipment:

CW Signal Generator capable of providing the frequencies listed in the table below. Must include audio modulating signal for AM alignment.

A voltmeter with at least a sensitivity of 20,000 ohms per volt (V.T.V.M. preferable). Should have AC scale.

Two 100K ohm composition resistors.

Two 150 ohm composition resistors.

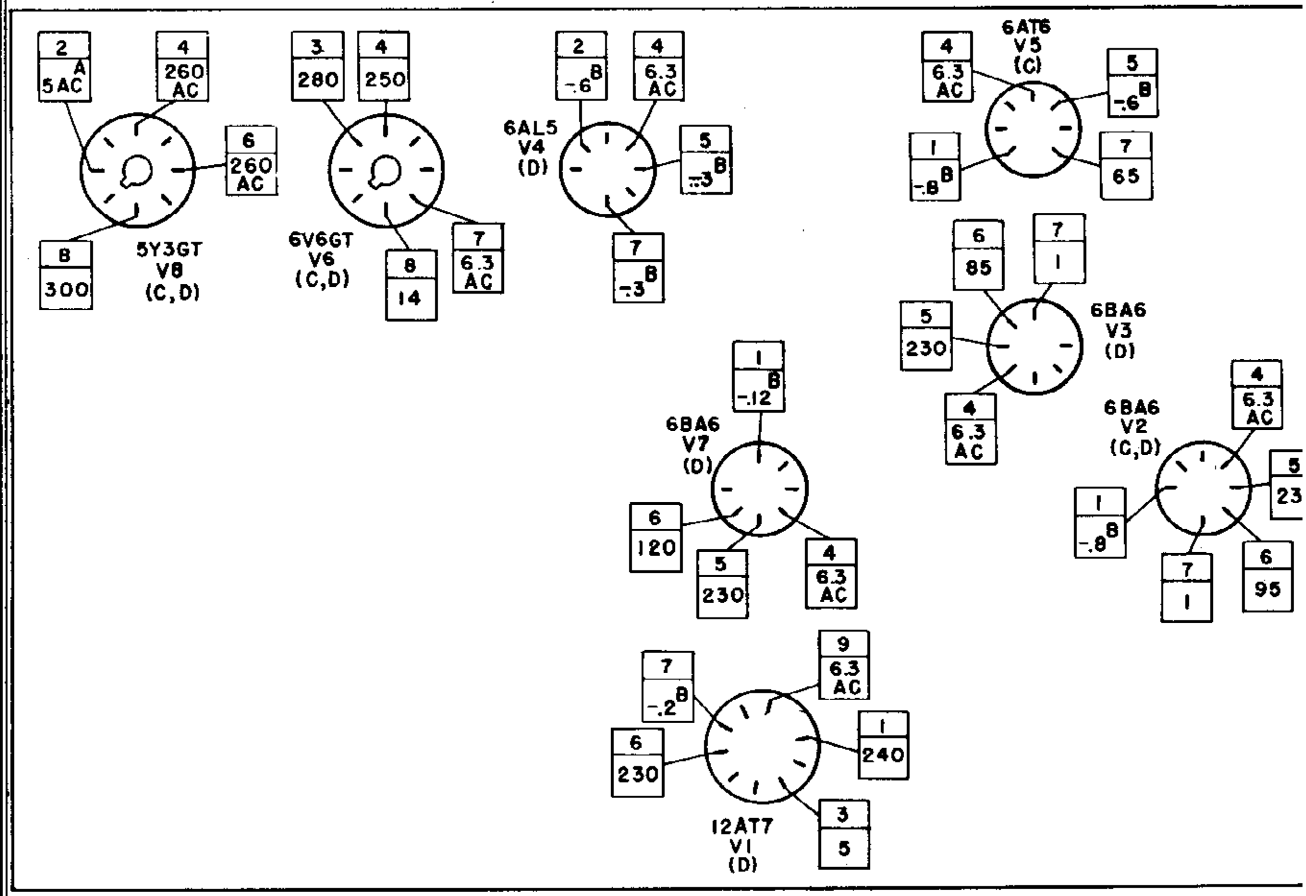


Figure 5. Bottom View, Tube Layout

All voltages measured to chassis unless otherwise noted.
DC voltages measured with 20,000 ohm/volt meter.
All voltages DC unless otherwise noted.
All measurements made with no signal input to receiver and receiver operated at rated line voltage.

A - Measured to pin 8
B - Measured with VTVM having insolating resistor in probe
C - Band switch in AM position
D - Band switch in FM position

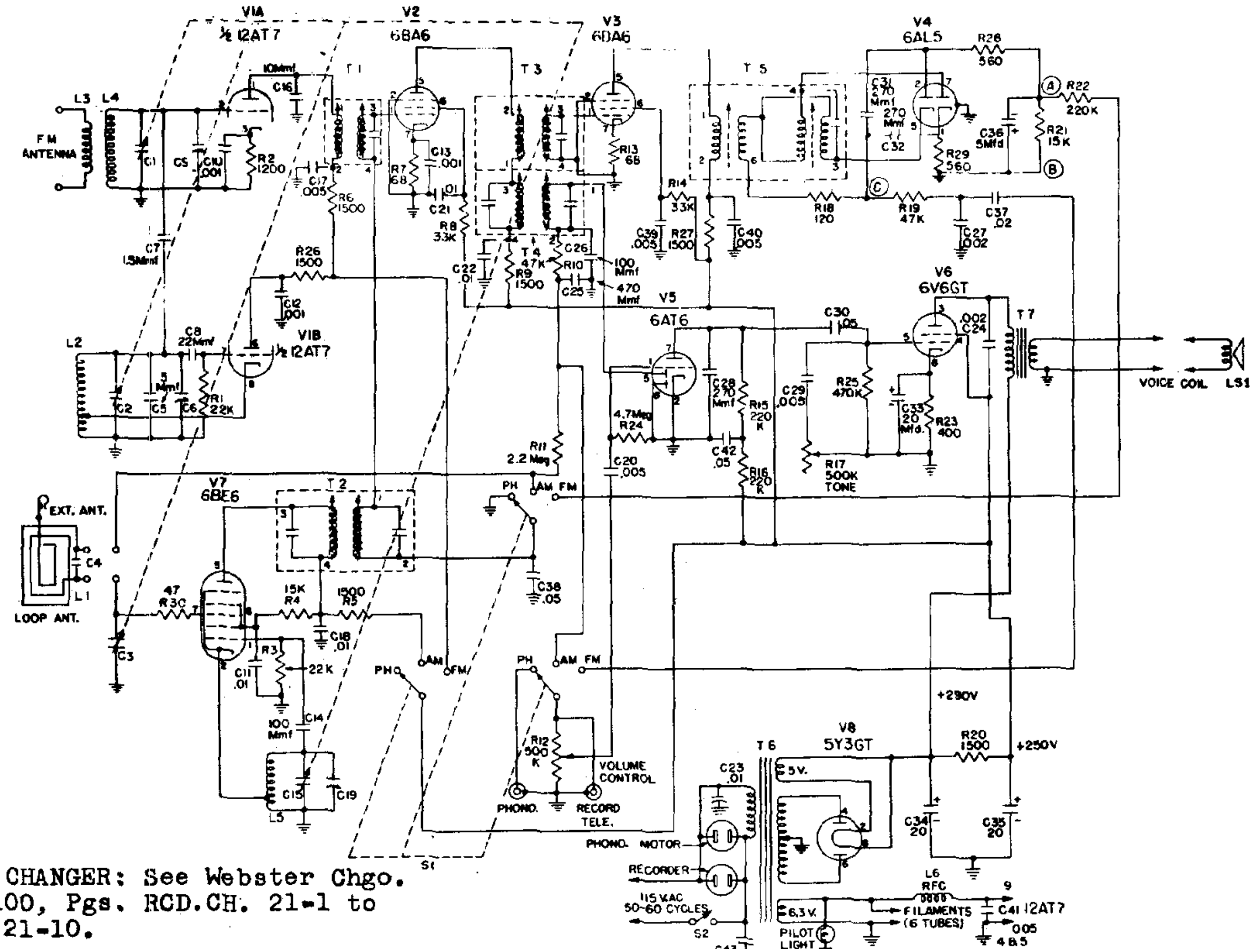
MODELS 533, 534, Ch. 167

Procedure:

The AM section should be completely aligned before beginning the FM alignment. For AM alignment the generator is coupled to the receiver by placing the "hot" lead next to the antenna loop so that lead and loop wire form a condenser. The voltmeter is connected across the voice coil and switched to a low AC scale. The coupling for FM alignment is two 150 ohm composition resistors, one in series with each generator lead. Before tuning the ratio detector transformer, solder two 100K ohm composition resistors in series from point "A", shown in figure 6, to ground. Remove them before aligning the FM RF section.

Step No.	Band Switch Position	Signal Generator Frequency	Connect Signal To	Condenser Setting (See Fig. 3)	Voltmeter	Adjust	Instructions
1	AM	455 KC Mod.	6BE6 V7 Pin 7	Full Open	Across Voice Coil	T2 Pri., Sec. T4 Pri., Sec.	Adjust for max. output. Use as low a signal input as possible.
2	"	1650 KC Mod.	Antenna Loop as described above.	"	"	C19 AM Osc. Trimmer	"
3	"	1410 KC	"	F	"	C4 AM RF Trimmer	"
4	"	600 KC	"	B	"	Plates of C3	Bend plates as required. Adjust for max. reading.
5	FM	10.7 MC CW	FM Ant. Terminals	Full Open	Between point A and ground.	T1 Pri., Sec. T3 Pri., Sec. T5 Pri. only	Adjust for max. voltmeter reading.
6	"	"	"	"	Between junction of two 100K resistors added and point C.	T5 Sec.	Adjust for zero reading, using a low signal input to avoid overloading.
7	"	107 MC CW	"	G	Point A to ground.	C6 FM Osc. Trimmer	Remove the two 100K resistors. Adjust for max. reading. Make certain receiver oscillator freq. is 10.7 MC <u>above</u> incoming signal freq.
8	"	"	"	"	"	C9 FM RF Trimmer	"
9	"	98 MC CW	"	D	"	Plates of C1	Bend plates as required. Adjust for max. reading.
10	"	90 MC CW	"	C	"	"	"

SCHEMATIC DIAGRAM-
CHASSIS 167



RECORD CHANGER: See Webster Chgo. Model 100, Pgs. RCD.CH. 21-1 to RCD.CH.21-10.

MODELS 533, 534, Ch. 167

PARTS LIST

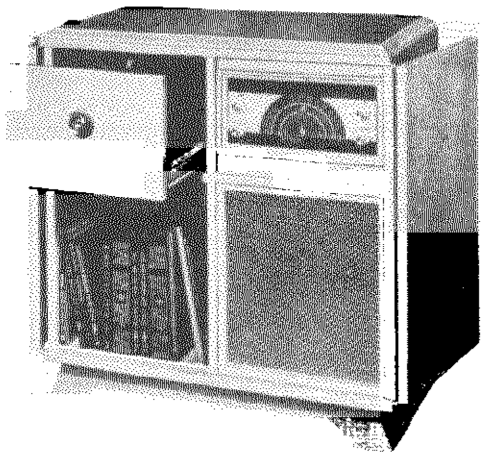
NOTES:
All values of capacity are microfarads unless otherwise noted.
All resistors are 1/2 watt composition type with values given in ohms unless otherwise specified.

Symbol	Part No.	Value	Tol.	Watts or Volts	Type
C1, C2, C3	4410	4 Section Variable			
C4	4313	Trimmer (AM Section)			
C5	4028	5 mmf	10%		Ceramic N750
C6	4318	Trimmer (FM Section)			
C7	4024	1.5 mmf	10%		Mica
C8	4021	22 mmf	10%		Ceramic N150
C9	4318	Trimmer (FM Section)			
C10	4025	1000 mmf	20%		Ceramic Hi-K
C11	4112	.01	20%	400 V	Paper
C12	4025	1000 mmf	20%		Ceramic Hi-K
C13	4025	1000 mmf	20%		Ceramic Hi-K
C14	4000	100 mmf	20%		Mica
C15	4410	Part of 4 Section Variable			
C16	4027	10 mmf	10%		Ceramic
C17	4029	5000 mmf			Ceramic Hi-K
C18	4112	.01	20%	400 V	Paper
C19	4313	Trimmer (AM Section)			
C20	4029	5000 mmf			Ceramic Hi-K
C21	4112	.01	20%	400 V	Paper
C22	4112	.01	20%	400 V	Paper
C23	4105	.01		600 V	Molded Phenolic
C24	4118	.002	20%	600 V	Paper
C25	4003	470 mmf	20%		Mica
C26	4000	100 mmf	20%		Mica
C27	4118	.002	20%	600 V	Paper
C28	4001	270 mmf	20%		Mica
C29	4102	.005	20%	600 V	Paper
C30	4101	.05	20%	400 V	Paper
C31	4001	270 mmf	20%		Mica
C32	4001	270 mmf	20%		Mica
C33	4200	20		25 V	Electrolytic
C34	4200	20		450 V	Electrolytic
C35	4200	20		450 V	Electrolytic
C36	4209	5		50 V	Electrolytic
C37	4106	.02	20%	400 V	Paper
C38	4100	.05	20%	200 V	Paper
C39	4029	5000 mmf			Ceramic Hi-K
C40	4029	5000 mmf			Ceramic Hi-K
C41	4029	5000 mmf			Ceramic Hi-K
C42	4101	.05	20%	400 V	Paper
C43	4105	.01		600 V	Molded Phenolic
R1	4501	22K	20%		
R2	4553	1.2K	10%		
R3	4501	22K	20%		
R4	4539	15K	20%	1 W	

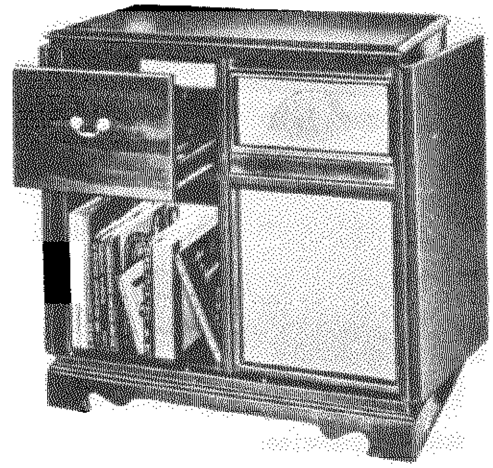
Symbol	Part No.	Value	Tol.	Watts or Volts	Type
R5	4534	1.5K	20%		
R6	4534	1.5K	20%		
R7	4524	68	20%		
R8	4556	33K	20%	1 W	
R9	4534	1.5K	20%		
R10	4504	47K	20%		
R11	4502	2.2 meg	20%		
R12	4842	.5 meg Pot. (Volume Control)			
R13	4524	68	20%		
R14	4556	33K	20%	1 W	
R15	4500	220K	20%		
R16	4500	220K	20%		
R17	4841	.5 meg Pot. w/Switch (Tone Control)			
R18	4546	120	10%		
R19	4504	47K	20%		
R20	4701	1.5K	5%	6-1/2 W	Wire Wound
R21	4521	15K	20%		
R22	4500	220K	20%		
R23	4587	400	10%	1 W	
R24	4544	4.7 meg	20%		
R25	4506	470K	20%		
R26	4534	1.5K	20%		
R27	4534	1.5K	20%		
R28	4507	560	10%		
R29	4507	560	10%		
R30	4508	47	20%		

Symbol	Description	Part No.
L1	Loop Antenna (AM) Assembly with mounting bracket	55214
L2	Oscillator Coil (FM)	5247
L3	Antenna Primary (FM)	5258
L4	Antenna Secondary (FM)	5248
L5	Oscillator Coil (AM)	5282
L6	Filament Choke	5266
T1	1st FM IF Transformer	5284
T2	1st AM IF Transformer	5286
T3	2nd FM IF Transformer	5285
T4	2nd AM IF Transformer	5287
T5	Ratio Detector Transformer	5288
T6	Power Transformer	5012
T7	Output Transformer	5122
S1	Band Switch	6024
S2	Off-On Switch	(Part of R17)

Description	Part No.
Dial Glass	747
Dial Background Plate	2217C
Knob, Indicator	3654C
Knob, Plain	3654A
Plug, Phono	6203
Pointer, Dial	518
Socket, 9 pin	6134
Socket, Miniature	6123
Socket, Octal	6103
Socket, Phono	6121
Socket, Pilot Lamp	6110
Socket, AC Power	6108
Spring, Dial Cable	9507
Strip, Antenna Terminal	424



MODEL 537
Modern Style
Oak Cabinet



MODEL 538
Traditional Style
Mahogany Cabinet

SPECIFICATIONS

Line Voltage	115V AC 60 cps
Power Consumption	150 Watts
Tuning Ranges	
AM	535 KC to 1650 KC
FM	88 MC to 108 MC
Number of Tubes	14
Audio Power Output	15 Watts
Speaker Type	12" PM
Record Changer	Automatically plays 1" stack of 7", 10", or 12" records at 33-1/3 rpm, 45 rpm, or 78 rpm.
Cabinet*	
Height	35"
Width	33-1/4"
Depth	17-1/2"

* Where there are slight variations in certain of the dimensions for the two models, the largest value is listed.

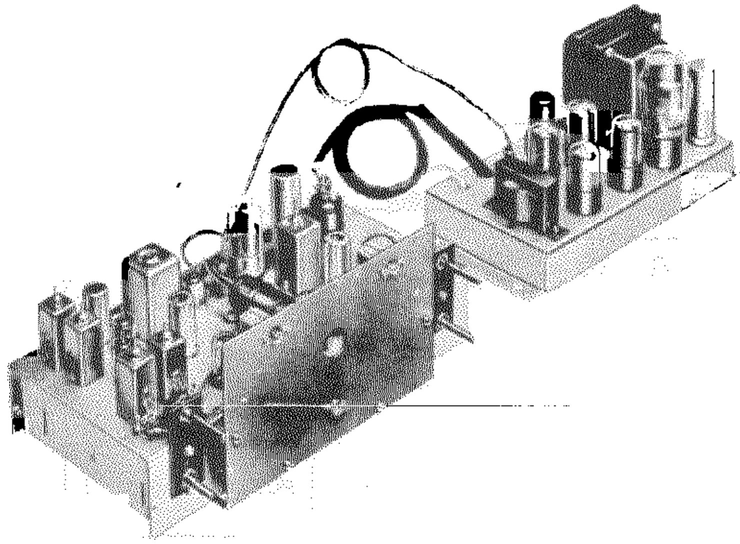


Figure 1. Chassis 168

MAJOR COMPONENTS

Cabinet	
Model 537	7593
Model 538	7592
Radio Chassis	168
Speaker	9070
Antenna	
AM	55213
FM Assembly	55218
Record Changer	9078
Dial Glass	748
Backboard	3715
Record Changer Drawer	6659
Knobs	
Tuning	33517A
Off-On Treble Assembly	33516A
Volume	33517A
Band Switch	33517C
Bass	3656A

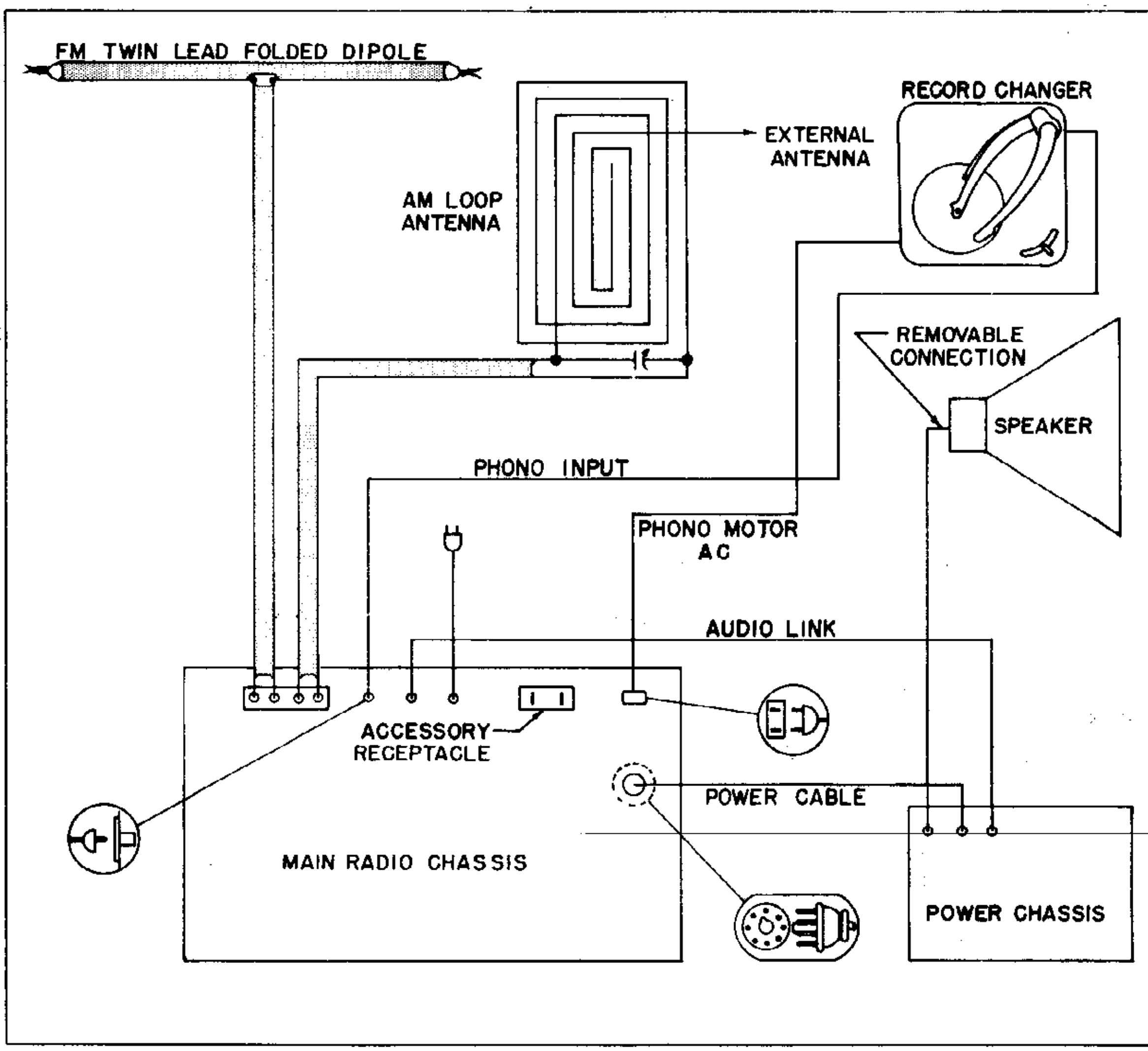
MODELS 537,
538, Ch. 168

ELECTRICAL AND MECHANICAL DATA

Power Requirements:	
Operating Voltage	115 V AC 60 cps
Watts	150
Tuning Range:	
AM	535 KC to 1650 KC
FM	88 MC to 108 MC
Audio Power Output	15 Watts
Output Impedance	3.2 ohms at 400 cps
Intermediate Frequencies:	
AM	455 KC
FM	10.7 MC
FM Antenna Input Impedance	300 ohms, balanced

TUBE COMPLEMENT

1	6BA6	AM RF Amplifier	V1
1	6BE6	AM Oscillator-Converter	V2
1	12AT7	FM Oscillator-Converter	V3A, V3B
1	6BA6	AM-FM 1st IF Amplifier	V4
1	6BA6	FM 2nd IF Amplifier	V5
1	6AL5	FM Ratio Detector	V6
1	6AT6	AM 2nd Detector, AVC, 1st Audio (AM and FM)	V7
1	6J5	2nd Audio Amplifier	V8
1	6J5	Audio Phase Inverter	V9
4	6K6GT	Audio Power Amplifiers	V10, V11, V12, V13
1	5U4G	Rectifier	V14
1	6E5	Tuning Indicator	V15



BLOCK DIAGRAM

Chassis 168 is a fifteen-tube combination AM-FM radio receiver, including tuning indicator and rectifier. The receiver uses an indoor loop antenna for normal AM reception; an external antenna may be used in very weak AM areas. It is designed to be used with an indoor FM antenna in normal signal areas and an outside FM antenna and a 300 ohm, balanced trans-mission line in weak signal areas. The indoor FM antenna is located in the receiver cabinet,and it should be disconnected from the FM antenna terminal posts when an outside antenna is used.

The physical make-up of chassis 168 consists of two units, as shown in figure 1. The unit on the right contains the power supply and power amplifier stages. The main unit, shown on the left side of the figure, contains the AM RF stage, AM and FM oscillator-converter stages, AM and FM IF stages, voltage amplifier stages, and tuning indicator. The main unit contains the dial mech-anism. Dial stringing details are indicated in figure 3. Dial calibration appears on the dial glass mounted on the front of the cabinet. Calibration points needed during alignment are included on the dial background plate. These calibration points are indicated in figure 4.

The main unit is mounted in place horizontally on rubber shock mounts which rest on wooden blocks that are bolted in the cabinet from below the unit. The power unit is mounted horizontally below the main unit. It is shock mounted and held in place by a bolt at each corner.

CONTROLS

Operation of the VOLUME and TUNING controls is conventional. The BAND SWITCH has three positions for selecting one of the following: PHONO, AM radio, or FM radio. The PHONO position is selected with the switch in the extreme counterclockwise position, and the other two positions are selected in the order listed by clockwise rotation of the band switch control shaft.

The BASS and TREBLE controls are the dual type with the OFF-ON switch coupled to the TREBLE control. When the TREBLE control is in its extreme counter-clockwise position, the receiver is turned off. Clockwise rotation of the TREBLE control shaft turns the receiver on and increases the treble tone. Extreme counter-clockwise rotation of the BASS control shaft gives minimum bass, clockwise rotation giving increase in bass tone. Location of the controls is shown in figure 4.

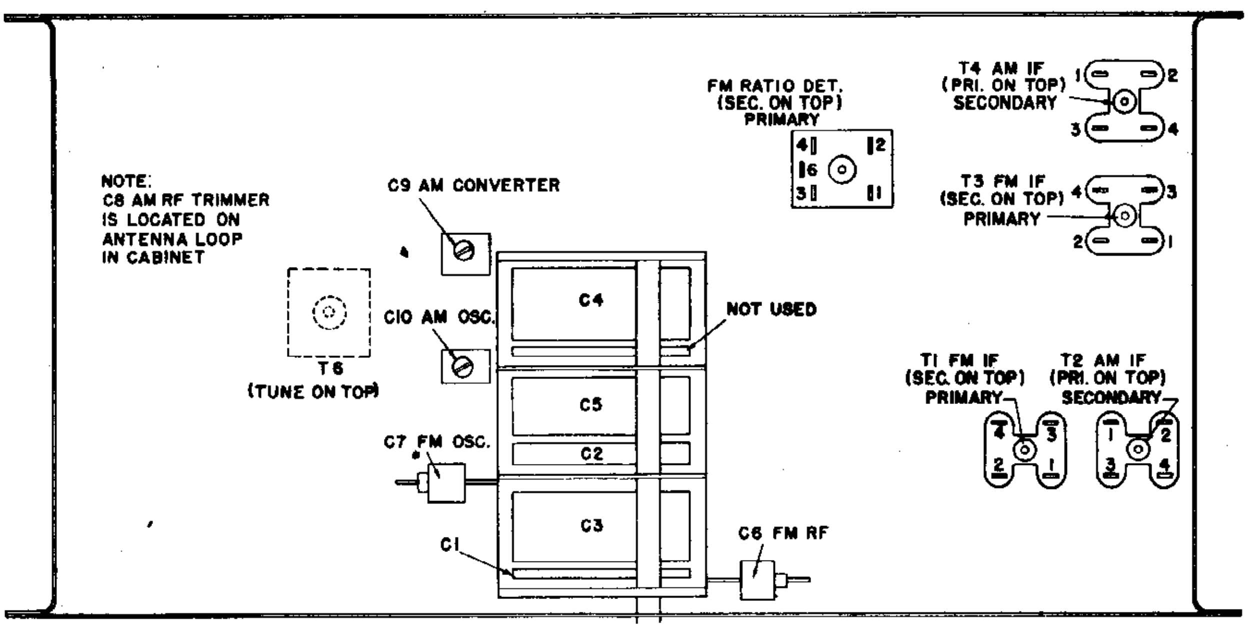


Figure 2. Trimmer Condenser Location - Bottom View

ALIGNMENT

This section describes the minimum equipment and procedure that is required to align the receiver satis-factorily. Before beginning alignment, the tuning condenser must be fully open, and the set should be allowed to warm up about 15 minutes. It is suggested that the alignment be performed on a metal-topped bench with generator, receiver, and voltmeter well bonded together. The bench area should be free of strong extraneous radiation.

Equipment:

CW Signal Generator capable of providing the frequencies listed in the table below. Must include audio modulating signal for AM alignment.

A voltmeter with at least a sensitivity of 20,000 ohms per volt (V.T.V.M. preferable). Should have AC scale.

MODELS 537, 538, Ch. 168

Two 100K ohm composition resistors.

Two 150 ohm composition resistors.

Procedure:

The AM section should be completely aligned before beginning the FM alignment. For AM alignment the generator is coupled to the receiver by placing the "hot" lead next to the antenna loop so that lead and loop wire form a condenser. The voltmeter is connected across the voice coil and switched to a low AC scale. The coupling for FM alignment is two 150 ohm composition resistors, one in series with each generator lead. Before tuning the ratio detector transformer, solder two 100K ohm composition resistors in series from point "A", shown in figure 7, to ground. Remove them before aligning the FM RF section.

ALIGNMENT TABLE

Step No.	Band Switch Position	Signal Generator Frequency	Connect Signal To	Condenser Setting (See Fig. 4)	Voltmeter	Adjust	Instructions
1	AM	455 KC 400 cps Mod.	6BE6 V2 Pin 7	Full Open	Across Voice Coil	T2 Pri., Sec. T4 Pri., Sec.	Adjust for max. output. Use as low a signal input as possible.
2	"	1650 KC 400 cps Mod.	Antenna Loop as described above.	"	"	C10 AM Osc. Trimmer	"
3	"	1410 KC 400 cps Mod.	"	F	"	C8, C9 AM RF Trimmer	"
4	"	600 KC 400 cps Mod.	"	B	"	T6	Adjust for max. output.
5	"	"	"	"	"	Plates of C3	Bend plates as required. Adjust for max. reading.
6	FM	10.7 MC CW	FM Ant. Terminals	Full Open	Between point A and ground.	T1 Pri., Sec. T3 Pri., Sec. T5 Pri. only	Adjust for max. voltmeter reading.
7	"	"	"	"	Between junction of two 100K resistors added and point C.	T5 Sec.	Adjust for zero reading, using a low signal input to avoid overloading.
8	"	107 MC CW	"	G	Point A to ground.	C7 FM Osc. Trimmer	Remove 100K resistors. Adjust for max. reading. Make certain receiver osc. freq. is 10.7 MC above incoming signal freq.
9	"	"	"	"	"	C6 FM RF Trimmer	"
10	"	98 MC CW	"	D	"	Plates of C1	Bend plates as required. Adjust for max. reading.
11	"	90 MC CW	"	C	"	"	"

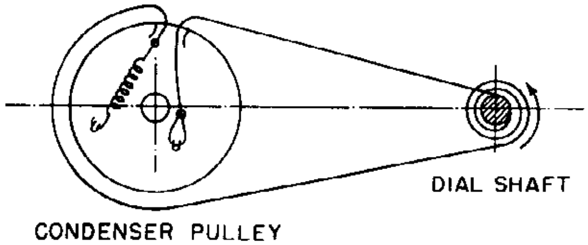


Figure 3. Dial Stringing

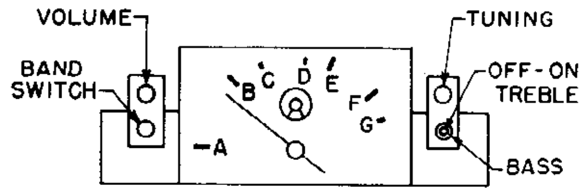


Figure 4. Location of Controls

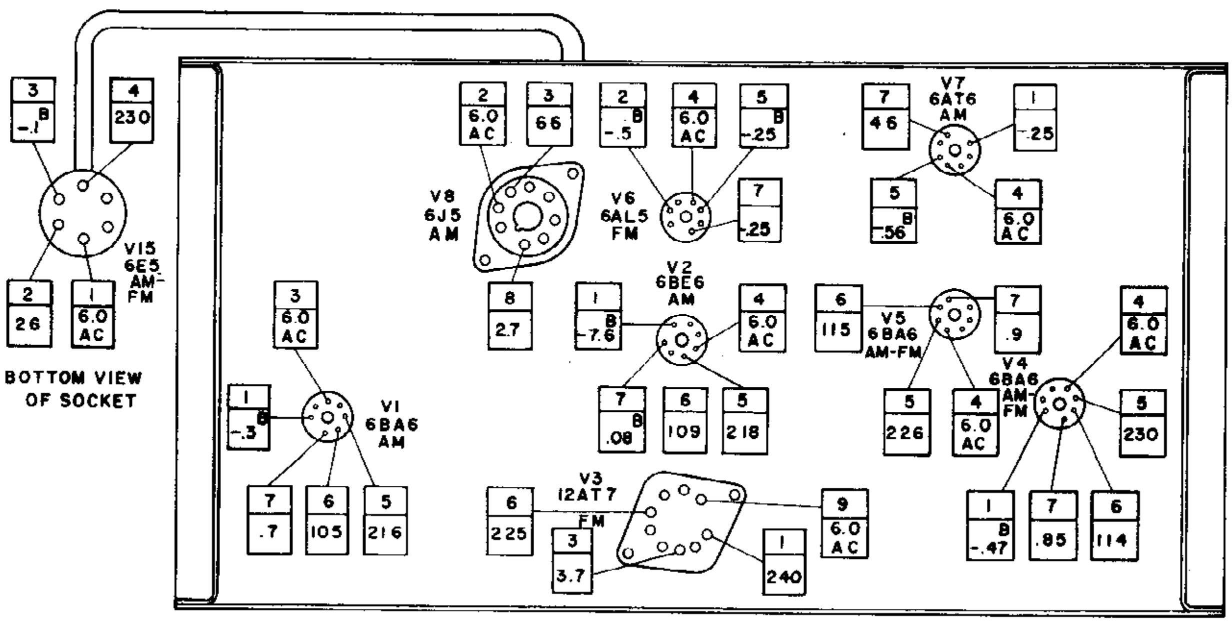
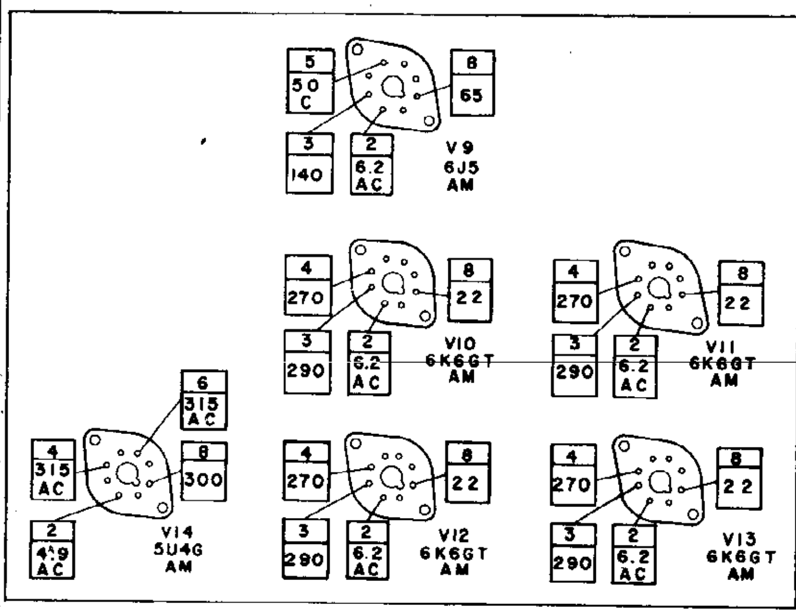


Figure 5. Pin Voltages of Main Unit



NOTES:

All voltages measured to chassis unless otherwise noted.

DC voltages measured with 20,000 ohm/volt meter.

AC voltages measured with 1000 ohm/volt meter.

All measurements made with no signal input to receiver.

All pin voltages not indicated on diagram are at ground potential for all practical purposes.

A Measured from pin 2 to pin 8
B VTVM
C 250 V. scale

Figure 6. Pin Voltages of Power Unit

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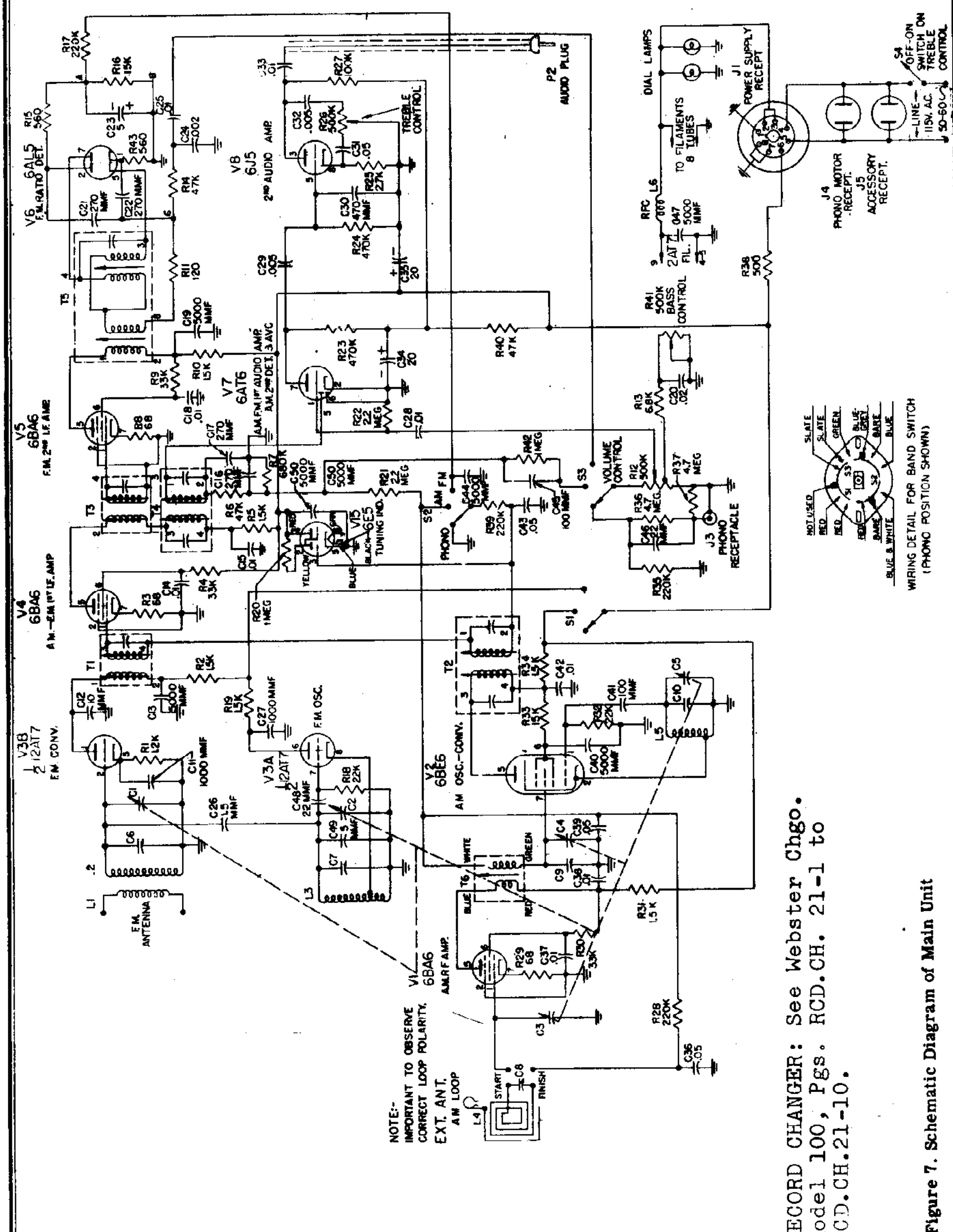

RECORD CHANGER: See Webster Chgo.
Model 100, Pgs. RCD.CH. 21-1 to
RCD.CH.21-10.

Figure 7. Schematic Diagram of Main Unit

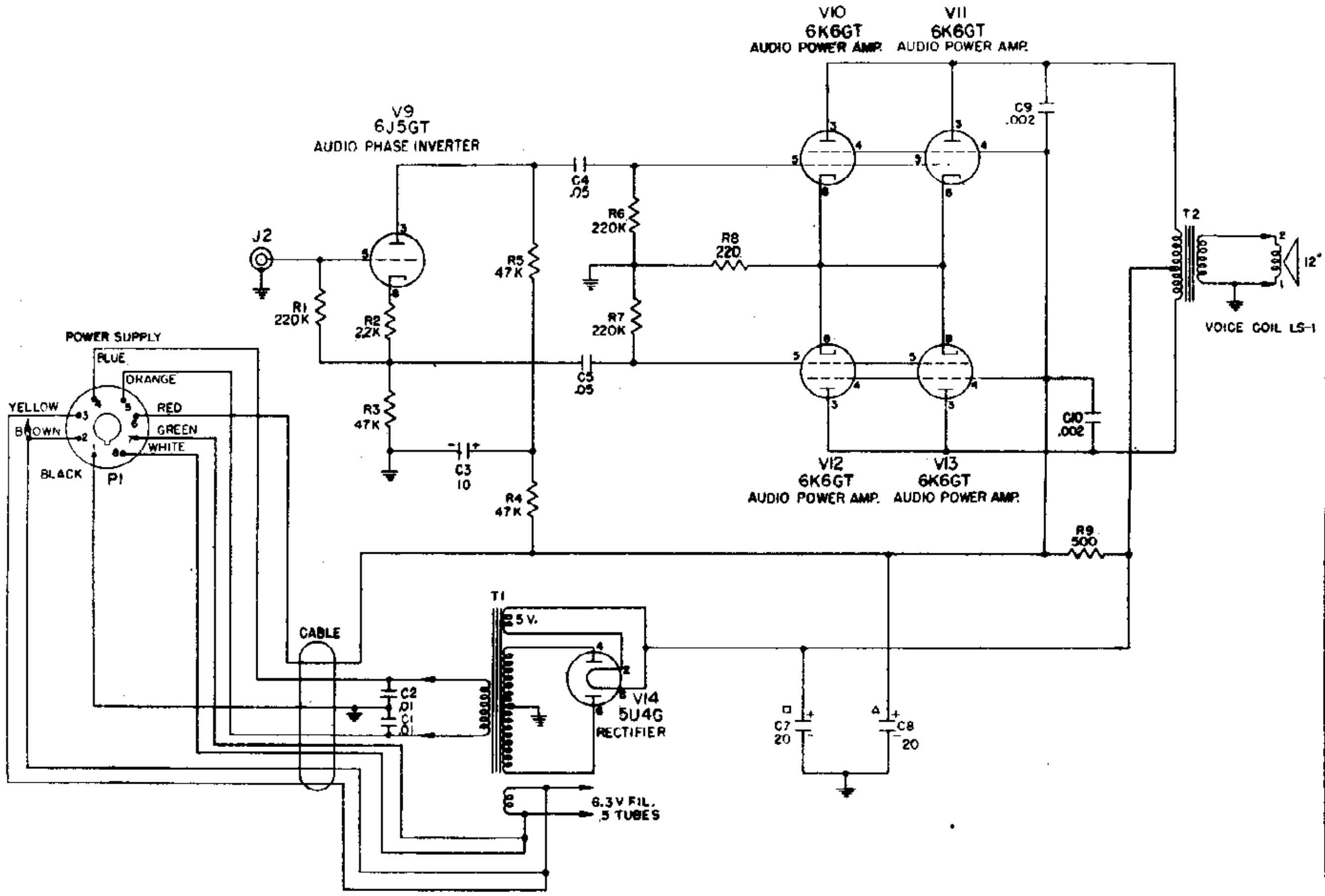

Figure 8. Schematic Diagram of Power Supply and Audio Section

PARTS LIST FOR POWER UNIT

SYMBOL	PART NO.	VALUE	TOL.	WATTS OR VOLTS	TYPE
C1	4105	.01		600 V	Paper
C2	4103	.01		600 V	Paper
C3	4203	10		450 V	Tubular Electrolytic
C4	4101	.05		400 V	Paper
C5	4101	.05		400 V	Paper
C6,	(Not Used)				
C7, C8	4231	20-20		450 V	Electrolytic
C9	4118	.002		600 V	Paper
C10	4118	.002		600 V	Paper
R1	4500	220K	20%		
R2	4512	2.2K	20%		
R3	4559	47K	10%		
R4	4504	47K	20%		
R5	4559	47K	10%		
R6	4500	220K	20%		
R7	4500	220K	20%		
R8	4706	220	20%	3 W	
R9	4700	500	10%	5 W	
T1	5001-4	Power Transformer			
T2	5108	Output Transformer			
P1	6212	Plug, Power Supply			

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PARTS LIST FOR MAIN UNIT

NOTES:
All values of capacity are microfarads unless otherwise noted.
All resistors are 1/2 watt composition type with values given in ohms unless otherwise specified.

SYMBOL	PART NO.	VALUE	TOL.	WATTS OR VOLTS	TYPE
C1, C2, C3, C4, C5	4411	3 Gang AM, FM (1 Section unused)			
C6	4318	Trimmer (FM Section)			
C7	4318	Trimmer (FM Section)			
C8	4313	Trimmer (Located on AM Antenna Loop)			
C9	4313	Trimmer (AM Section)			
C10	4313	Trimmer (AM Section)			
C11	4025	1000 mmf			Ceramic Hi-K
C12	4027	10 mmf	10%		Ceramic
C13	4029	5000 mmf			Ceramic Hi-K
C14	4112	.01		400 V	Paper
C15	4112	.01		400 V	Paper
C16	4001	270 mmf	20%		Mica
C17	4001	270 mmf	20%		Mica
C18	4112	.01		400 V	Paper
C19	4029	5000 mmf			Ceramic Hi-K
C20	4106	.02		400 V	Paper
C21	4001	270 mmf	20%		Mica
C22	4001	270 mmf	20%		Mica
C23	4209	5		50 V	Electrolytic
C24	4118	.002		600 V	Paper
C25	4112	.01		400 V	Paper
C26	4024	1.5 mmf	10%		Mica
C27	4025	1000 mmf			Ceramic Hi-K
C28	4112	.01		400 V	Paper
C29	4102	.005		600 V	Paper
C30	4003	470 mmf	20%		Mica
C31	4100	.05		200 V	Paper
C32	4102	.005		600 V	Paper
C33	4112	.01		400 V	Paper
C34, C35	4200	20-20		450 V	Electrolytic
C36	4100	.05		200 V	Paper
C37	4112	.01		400 V	Paper
C38	4112	.01		400 V	Paper
C39	4100	.05		200 V	Paper
C40	4029	5000 mmf			Ceramic Hi-K
C41	4000	100 mmf	20%		Mica
C42	4112	.01		400 V	Paper
C43	4100	.05		200 V	Paper
C44	4029	5000 mmf			Ceramic Hi-K
C45	4000	100 mmf	20%		Mica
C46	4021	22 mmf	10%		N150 Ceramic
C47	4029	5000 mmf			Ceramic Hi-K
C48	4021	22 mmf	10%		N150 Ceramic
C49	4028	5 mmf	10%		N750 Ceramic
C50	4029	5000 mmf			Ceramic Hi-K
R1	4553	1.2K	20%		
R2	4534	1.5K	20%		
R3	4524	68	20%		
R4	4556	33K	20%	1 W	
R5	4534	1.5K	20%		
R6	4504	47K	20%		
R7	4555	680K	20%		
R8	4524	68	20%		
R9	4556	33K	20%	1 W	
R10	4534	1.5K	20%		
R11	4546	120	10%		
R12	4843	.5 meg.		Volume Control, tapped	

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SYMBOL	PART NO.	VALUE	TOL.	WATTS OR VOLTS	TYPE
R13	4557	6.8K	10%		
R14	4504	47K	20%		
R15	4507	560	10%		
R16	4521	15K	20%	1 W	
R17	4500	220K	20%		
R18	4501	22K	20%		
R19	4534	1.5K	20%		
R20	4513	1 meg.	20%		
R21	4502	2.2 meg.	20%		
R22	4502	2.2 meg.	20%		
R23	4506	470K	20%		
R24	4506	470K	20%		
R25	4519	2.7K	10%		
R26	4840	500K		Dual Bass and Treble Controls	
R27	4511	100K	20%		
R28	4500	220K	20%		
R29	4524	68	20%		
R30	4556	33K	20%	1 W	
R31	4534	1.5K	20%		
R32	4501	22K	20%		
R33	4539	15K	20%	1 W	
R34	4534	1.5K	20%		
R35	4500	220K	20%		
R36	4544	4.7 meg.	20%		
R37	4544	4.7 meg.	20%		
R38	4700	500	10%	5 W	
R39	4500	220K	20%		
R40	4504	47K	20%		
R41	4840	500K		Dual Bass and Treble Controls	
R42	4513	1 meg.	20%		
R43	4507	560	10%		

SYMBOL	PART NO.	DESCRIPTION
L1	5258	FM Antenna Primary
L2	5248	FM Antenna Secondary
L3	5247	FM Oscillator Coil
L4	5279	AM Loop Antenna
L5	5282	AM Oscillator Coil
L6	5266	RFC Filament Choke
T1	5284	FM 1st IF Transformer
T2	5286	AM 1st IF Transformer
T3	5285	FM 2nd IF Transformer
T4	5287	AM 2nd IF Transformer
T5	5288	FM Ratio Detector Transformer
T6	5289	AM RF Interstage Transformer
S1, S2, S3	6024	Band Change Switch (3 Pole - 3 Position Rotary)
S4		Power Switch on Bass and Treble Controls (Part of 4813)
P2	6203	Plug, Audio Output (Single Prong)
	518	Pointer, Dial
J3	6121	Receptacle, Phono
J4	6108	Receptacle, Phono Motor
J5	6108	Receptacle, Accessory
	6134	Socket, 9 Pin Miniature
	6123	Socket, 7 Pin Miniature
	6103	Socket, Octal
	6110	Socket, Pilot Lamp
	9507	Spring, Dial
	424	Strip, Antenna Terminal
	2224D	Plate, Dial Background
	6112	Socket, Tube with Cable (Eye Tube)
	9505	Pilot Lamp