VOLUME XVIII

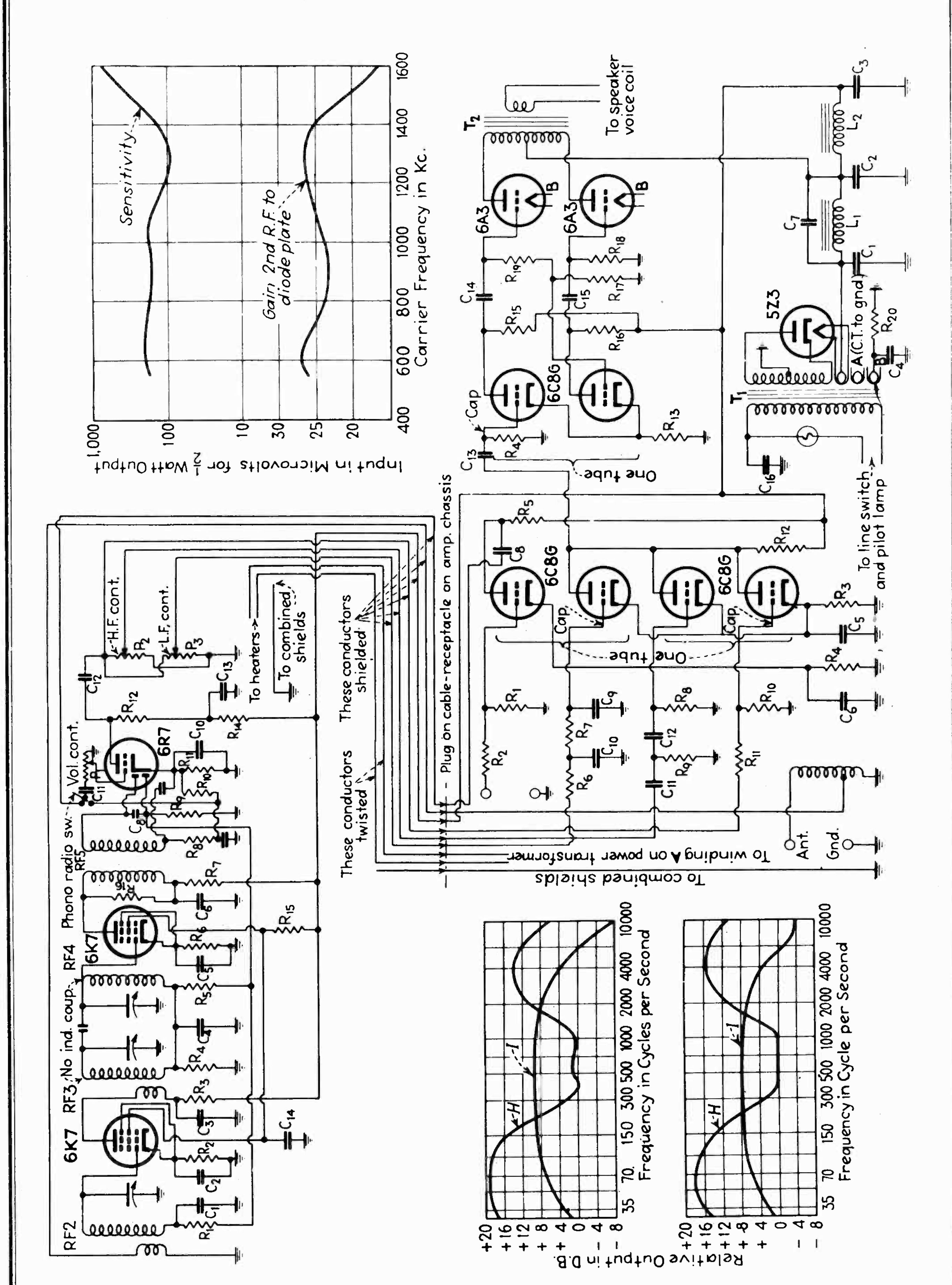
PERPETUAL TROUBLE SHOOTER'S MANUAL

REG. U.S. PAT. OFF.

JOHN F. RIDER

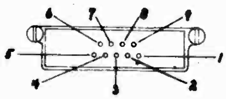
PACENT ENGINEERING CORP.

MODEL 9-R

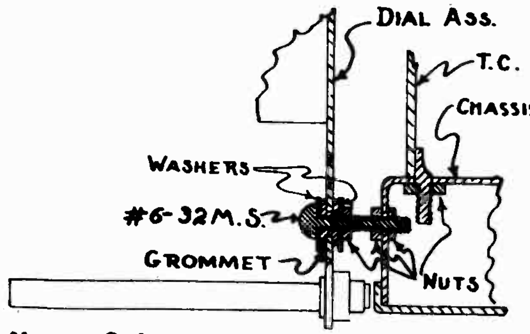


MODEL 9-R

PACENT ENGINEERING CORP.

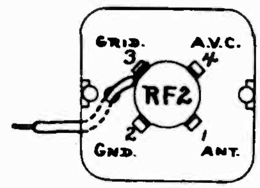


TUNER SOCKET CONNECTIONS	
1	HEATER
2	GROUND
3	HIGH FREQ.
4	B +
5	PHONO OUT
6	ANTENNA
7	MIDDLE FREQ.
8	LOW FREQ.
9	HEATER

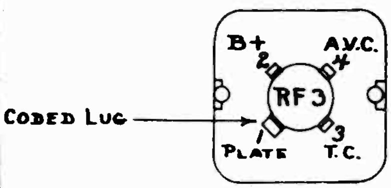


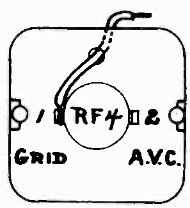
METHOD OF ATTACHING DIAL TO CHASSIS WHICH AVOIDS BINDING TUNING CONDENSER SHAFT

ANTENNA COIL

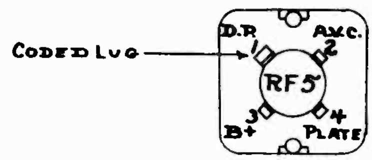


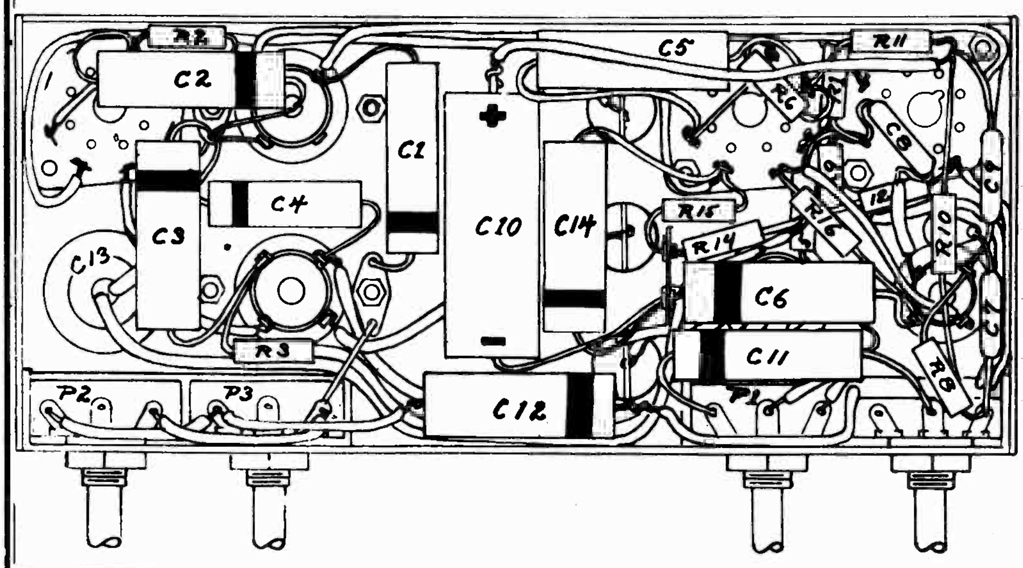
BAND PASS INTER STAGE COILS



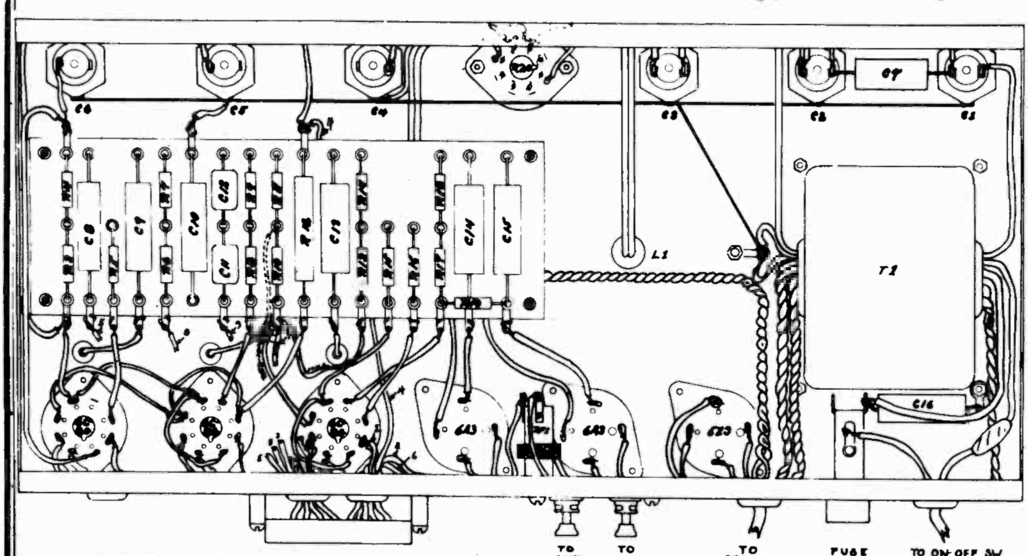


BROAD BAND TRANS.



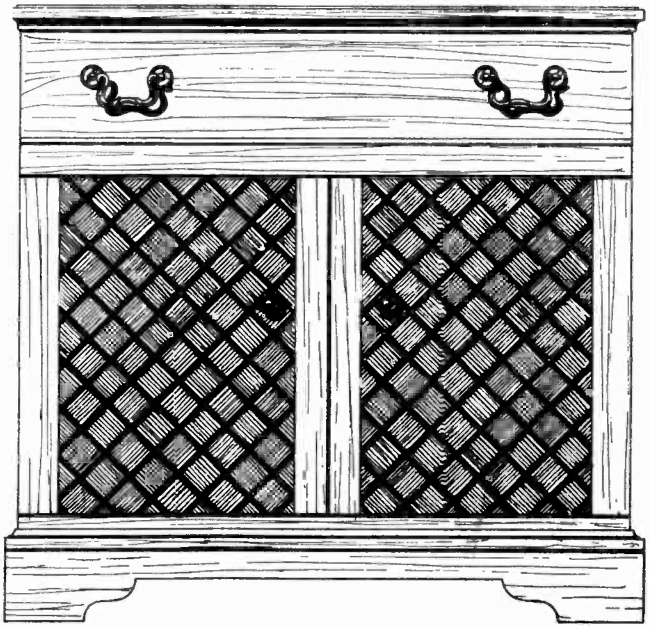


TUNER CONSTANTS			
R1	1 M ½W	C1	0.05MFD. 200V
R2	400 "	C2	0.05 " 200V
R3	10K "	C3	0.05 " 400V
R4	0.25M "	C4	0.02 " 200V
R5	1 M "	C5	0.05 " 200V
R6	400 "	C6	0.05 " 400V
R7	10K "	C7	50MMFD. MICA
R8	25K "	C8	50 " "
R9	1 M "	C9	50 " "
R10	0.25M "	C10	10MFD. 25V
R11	4K "	C11	0.05 " 400V
R12	20K "	C12	0.05 " 400V
		C13	4 " 250V
R14	50K "	C14	0.05 " 400V
R15	50K "		
R16	20K "		
P1	0.5M "		
P2	0.5M "		
P3	0.5M "		



AMPLIFIER CONSTANTS			
R1	0.1M ½W	C1	8MFD. 600V
R2	0.5M "	C2	20 " 500V
R3	600 "	C4	24 " 350V
R4	1750 "	C5	10 " 12 V
R5	50K "	C6	50 " 12 V
R6	80K "	C7	0.25 " 400V
R7	50K "	C8	0.01 " 600V
R8	0.25M "	C9	0.05 " 200V
R9	0.25M "	C10	0.05 " 200V
R10	0.125M "	C11	0.0001 MICA
R11	5K "	C12	0.0001 MICA
R12	50K 2W	C13	0.03 " 600V
R13	1.5K ½W	C14	0.03 " 600V
R14	0.5M "	C15	0.03 " 600V
R15	0.1M "	C16	0.02 " 1000V
R16	0.1M "	C3	20 " 500V
R17	17K "		
R18	0.5M "		
R19	0.5M "		
R20	750 40W		
R21	10K 20W		

PACKARD-BELL COMPANY MODELS 673A, 673B, 880



CABINET

Electrical Rating:

Line Voltage	110–120 volts, 50–60 cycles, A.C.
Power Consumption	67 watts

Tuning Frequency Range:
540 to 1620 KC

Intermediate Frequency:
455 KC

Electrical Power Output:

Undistorted	3.0 watts
Maximum	5.0 watts

Loudspeaker:

Type	Permanent Magnet
Outside Cone Diameter	10″
Voice Coil Impedance	3.2 ohms at 400 cycles
Magnet Rating	4.64 Oz. Alnico V

Tubes:

Tube	No.	Function
6SK7	V-1	R.F. Amplifier
6SA7	V-2	Frequency Converter
6SK7	V-3	I.F. Amplifier
6J5	V-4	Oscillator
6SK7	V-5	A. F. Amplifier
6V6/GT	V-6	Power Amplifier
6J5	V-7	Detector
5Y3/GT	V-8	Rectifier

GENERAL INFORMATION

This model is a console radio-phonograph combination with a Webster model 56 changer and a Shure P-30 "Silentronic" crystal pickup. The set is housed in a bleached modern, walnut or mahogany period cabinet.

SPECIAL SERVICE INFORMATION

Stage Gain Measurements:

Measurements taken with volume and tone controls maximum. Switch in Radio position. AVC shorted out.

Standard Output	50.0 milliwatts
Dummy Antenna	200.0 Mmf.

Antenna to R.F. Grid	6X at 1000 KC
R.F. Grid to Converter Grid	7X at 1000 KC
Converter Grid to 1st I.F. Grid	46X at 455 KC
1st I.F. Grid to 2nd Detector	62X at 455 KC
Overall Audio Gain	320X at 0.5 watts, 400 cycles

Oscillator Cathode Voltages:

Measured at 117 volts A.C. line voltage with an A.C. type vacuum tube voltmeter, input impedance above 10 megohms.

1500 KC	1.0 volts A.C.
1000 KC	1.0 volts A.C.
800 KC	1.1 volts A.C.
600 KC	1.1 volts A.C.

D.C. Resistance Measurements:

1st and 2nd I.F. Coils

Primary	17.0 ohms
Secondary	17.0 ohms*

*NOTE: To obtain the true reading of the secondary of the second I.F. coil, it is necessary to remove it from the can. This is due to the 47K resistor inside the can.

Oscillator Coil

Primary	1.0 ohms
Secondary	6.0 ohms

Antenna Coils

Start to Finish	12.2 ohms
Start to Tap	10.5 ohms

R.F. Coil

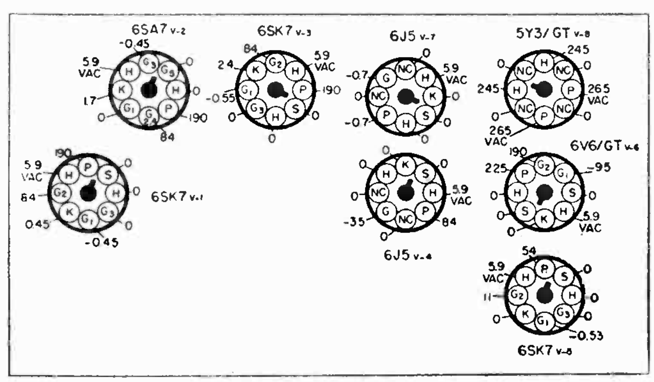
Primary	58.0 ohms
Secondary	4.2 ohms

NOTE: Due to the variation in winding methods, the D.C. resistance on all coils is subject to a 20% tolerance.

Socket Voltages:

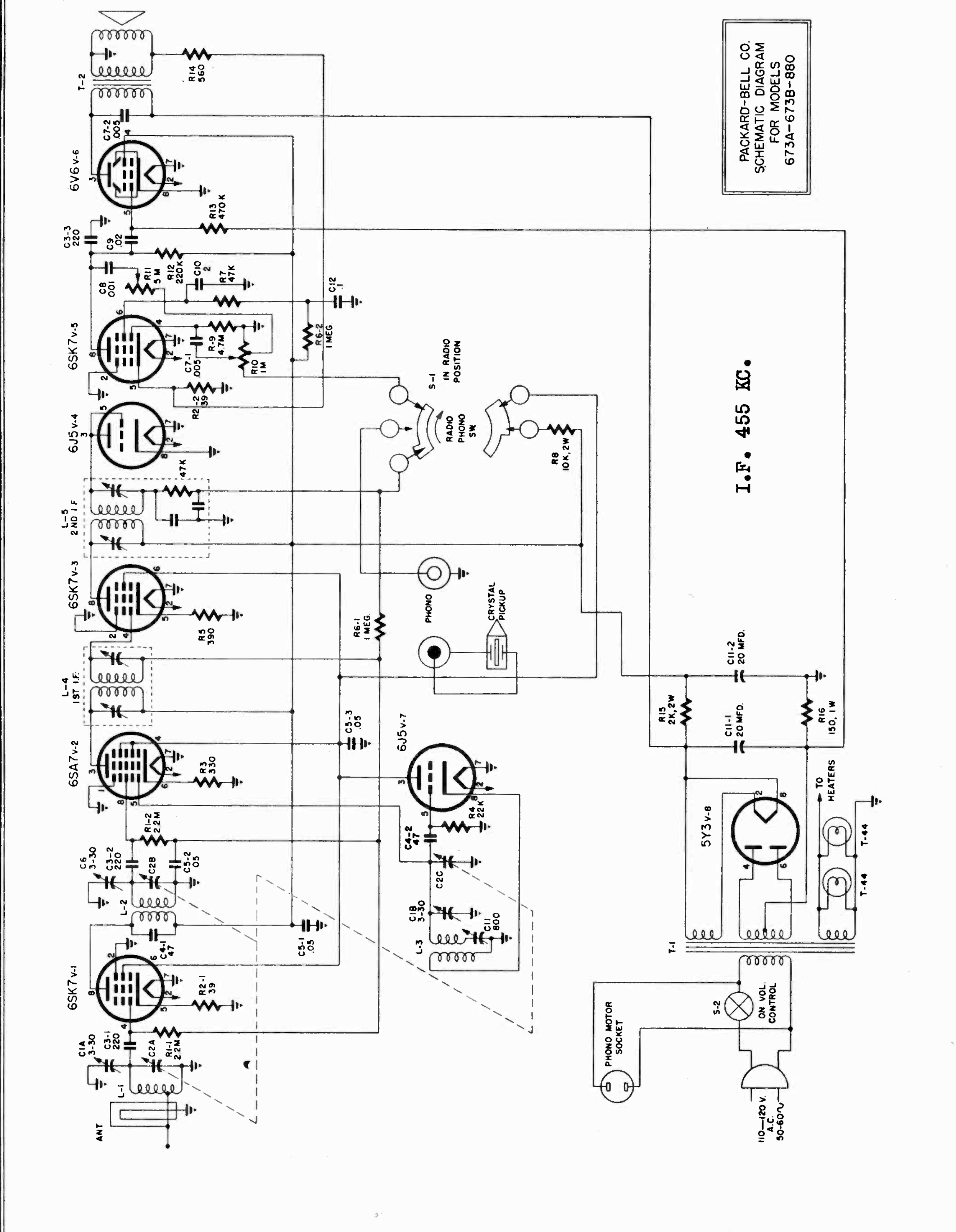
All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis.—A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to chassis. Volume and tone controls maximum.—Switch in Radio position.—No signal.—117 volts A.C. line.

All voltages shown are positive D.C. unless otherwise noted.



SOCKET VOLTAGES

MODELS 673A, 673B, 880 PACKARD-BELL COMPANY



RECORD CHANGER: Webster Model 56, RCD.CH. 15-10

PACKARD-BELL COMPANY

MODELS 673A, 673B, 880

ALIGNMENT PROCEDURE

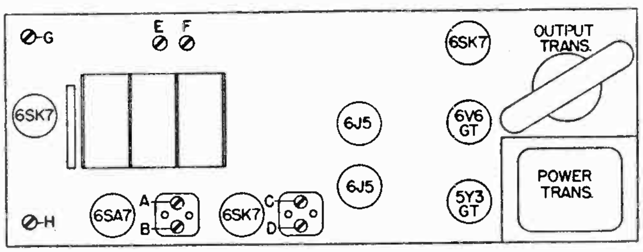
Alignment procedure consists of the steps outlined in the Alignment Chart.

Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completion of this step, "Rock" the variable condenser to assure that the I.F.'s have been aligned to the correct frequency, not the image frequency.

Use the Hazeltine Standard Test Loop No. 1150, or a reasonable substitute for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

It will be noted that all trimmers are accessable without removing the chassis from the cabinet.

IMPORTANT NOTICE: Make certain that each alignment step is done with a minimum input signal.



TRIMMER LOCATIONS

A—I.F. Trimmer	E—Osc. Trimmer
B—I.F. Trimmer	F—R.F. Trimmer
C—I.F. Trimmer	G—Ant. Trimmer
D—I.F. Trimmer	H—600 KC Padder

ALIGNMENT CHART

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. (.01 Mfd. Cap.)	455 KC	540 KC	Trimmers A, B, C & D
2	Standard Test Loop*	1620 KC	1620 KC	Trimmer E to 1620 KC
3	Standard Test Loop*	600 KC	Rock Variable	Trimmer H to 600 KC
4	Standard Test Loop*	1500 KC	1500 KC	Trimmers F & G
5	Repeat Steps 2, 3 & 4			

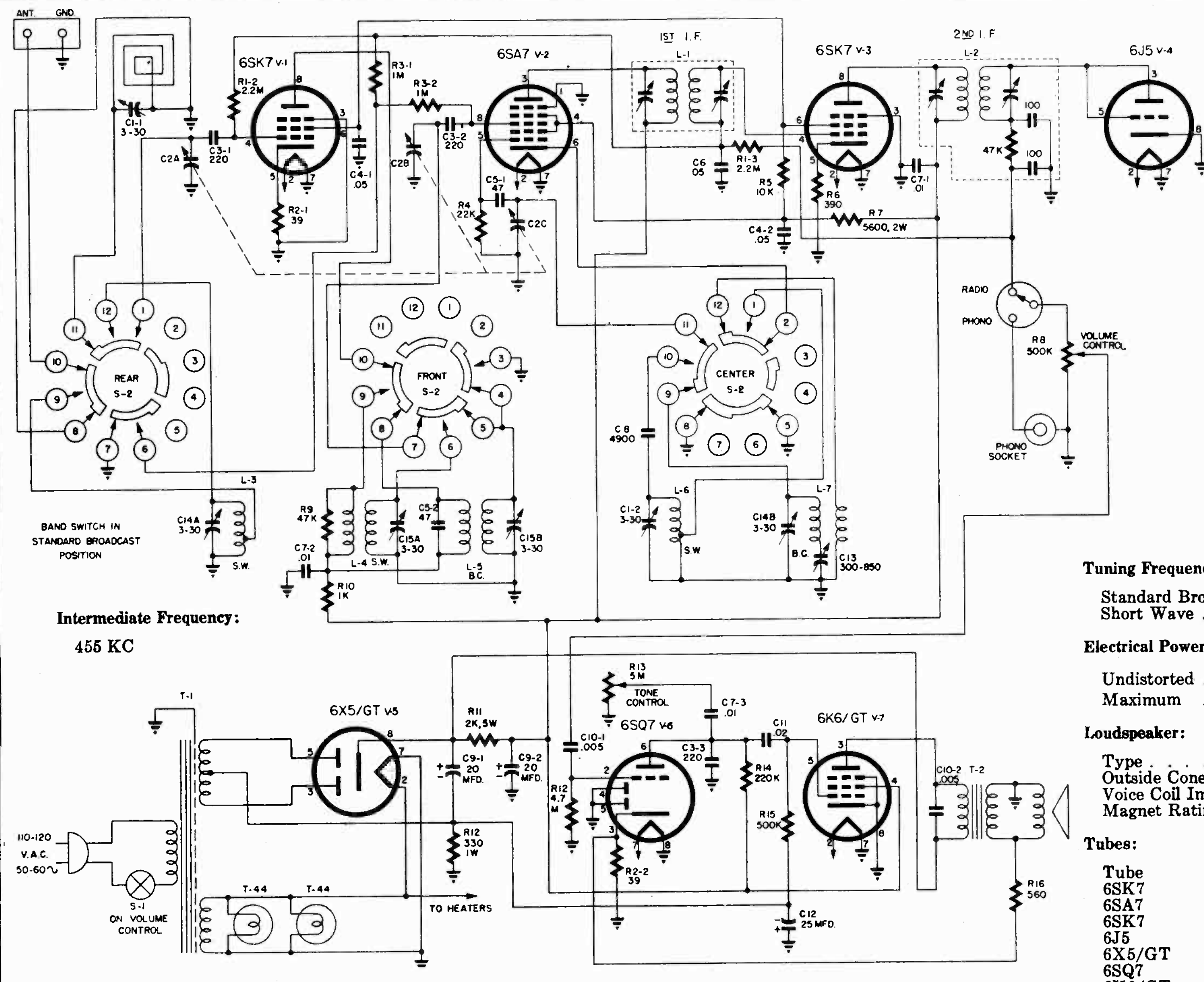
*NOTE: Hazeltine Test Loop No. 1150 (or a reasonable substitute).

TABLE OF REPLACEABLE PARTS

PART NO.	REF. SYMBOL	DESCRIPTION
21065		Cabinet—880
21053D		Cabinet—673-A
21053-1		Cabinet left back
21053-2		Cabinet right back
23401	C1 A,B	Capacitor, trimmer, dual 3-30 Mmf.
23520	C2 A,B,C	Capacitor, variable
23915	C3-1 to 4	Capacitor, ceramic, 220 Mmf. 20%
23912	C4-1 to 2	Capacitor, ceramic, 47 Mmf. 20%
23009	C5-1 to 3	Capacitor, tubular, .05 Mf. 400 V.
23406	C6	Capacitor, trimmer, single 3-30 Mmf.
23004	C7-1 to 2	Capacitor, tubular, .005 Mf. 600 V.
23001	C8	Capacitor, tubular, .001 Mf. 600 V.
23007	C9	Capacitor, tubular, .02 Mf. 600 V.
23020	C10	Capacitor, tubular, .2 Mf. 400 V.
24003	C11-1 to 2	Capacitor, electrolytic, 20 Mf. 350 V.
23011	C12	Capacitor, tubular, .1 Mf. 400 V.
29400B	L1	Coil, antenna
29102F	L2	Coil, R.F.
29205C	L3	Coil, Oscillator
29004E	L4	Coil, 1st I.F.
29007	L5	Coil, 2nd I.F.
32003G		Cord, A.C.
34002D		Cover, volume control
38088		Dial, stationized
38089		Dial, eastern
40003		Cord, drive
52015C		Knob
54001		Lamp, dial (.25 amp.) T44
58022A		Changer assembly
59001		Needle, pickup
63026		Pickup cartridge, Shure P-30
69006A		Pulley, variable
73055	R1-1 to 2	Resistor, 2.2 megohms, ½w, 20%
73008	R2-1 to 2	Resistor, 39 ohms, ½w, 10%
73019	R3	Resistor, 330 ohms, ½w, 10%
73041	R4	Resistor, 22,000 ohms ½w, 20%
73020	R5	Resistor, 390 ohms, ½w, 10%
73053	R6-1 to 2	Resistor, 1 megohm, ½w, 20%
73045	R7	Resistor, 47,000 ohms, ½w, 10%
73125	R8	Resistor, 10,000 ohms, 2w, 10%
73057	R9	Resistor, 4.7 megohm, ½w, 20%
25010B	R10	Control, volume, 1 megohm
25506C	R11	Control tone, 5 megohm
73049	R12	Resistor, 220,000 ohms, ½w, 20%
73051	13	Resistor, 470,000 ohms, ½w, 20%
73022	R14	Resistor, 560 ohms, ½w, 10%
73214	R15	Resistor, 2,000 ohms, 2w, 10%
73081	R16	Resistor, 150 ohms, 1w, 10%
79002		Socket, tube
79005		Socket, pickup
79007		Socket, A.C.
79010B		Socket, lamp
83705		Speaker, 10" P.M.
86008	S1	Switch, radio-phono
89016	T1	Transformer, power
89405E	T2	Transformer, output (5,000 ohm to 3.2)

MODELS 771, 771X

PACKARD-BELL COMPANY



Intermediate Frequency:

455 KC

Tuning Frequency Range:

Standard Broadcast	540 to 1620 KC
Short Wave	6 to 18 MC

Electrical Power Output:

	771	771X
Undistorted	1.2 watts	3.5 watts
Maximum	2.0 watts	5.0 watts

Loudspeaker:

Type	Permanent Magnet
Outside Cone Diameter	6"
Voice Coil Impedance	3.2 ohms at 400 cycles
Magnet Rating	3.16 Oz. Alnico V

Tubes:

Tube	No.	Function
6SK7	V-1	R.F. Amplifier
6SA7	V-2	Frequency Converter
6SK7	V-3	I.F. Amplifier
6J5	V-4	2nd Detector and AVC
6X5/GT	V-5	Rectifier
6SQ7	V-6	Audio Amplifier
6K6/GT	V-7	Power Amplifier
5Y3/GT	(V-5)	Rectifier, 771X
6V6/GT	(V-7)	Power Amplifier

Electical Rating:

Line Voltage	110–120 volts, 50–60 cycle A.C.
Power Consumption	56 watts

GENERAL INFORMATION

Model 771 is a table model, two band superheterodyne receiver. This model employs six tubes, plus a rectifier and a permanent magnet speaker. Listed below are the features contained in this set.

1. Two bands; Standard Broadcast and Short Wave.
2. Export version (771X) may be used on either 120 or 240 volts A.C. by the removal of a plate and manipulating a switch on the back of the chassis.
3. Built-in high impedance loop antenna which gives excellent signal pickup while rejecting a large part of the noise.

PACKARD-BELL COMPANY **MODELS 771, 771X**

ALIGNMENT PROCEDURE

Alignment consists of the steps outlined in the Alignment Procedure Chart.

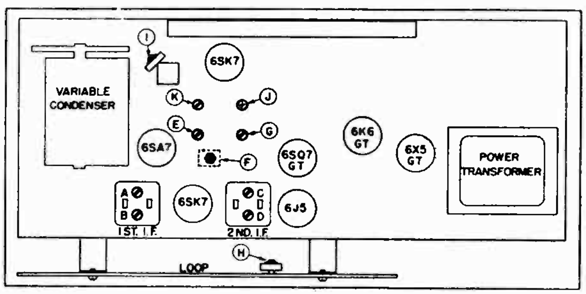
Connect the test oscillator leads to the mixer grid and ground, in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completion of this step, "Rock" the variable condenser to assure that the I.F.'s have been aligned to the correct frequency, not the image frequency.

Use a Hazeltine Standard Test Loop No. 1150, or a reasonable substitute for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

IMPORTANT NOTICE: Make certain that each alignment step is done with a minimum input signal.

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. (.01 Mfd Cap.)	455 KC	540 KC	Trimmers A, B, C, D
2	Standard Test Loop	1620 KC	1620 KC	Trimmer E to 1620 KC
3	Standard Test Loop	600 KC	600 KC	Trimmer F to 600 KC
4	Standard Test Loop	1500 KC	1500 KC	Trimmers G & H
5	Repeat Steps 2, 3, 4.			
6	Standard Test Loop	18 MC	18 MC	Trimmer I to 18 MC
7	Standard Test Loop	15 MC	15 MC	Trimmers J & K

ALIGNMENT CHART



TRIMMER LOCATIONS

A, B, C, D—I.F. Trimmers
E—Broadcast Osc. Trimmer
F—Broadcast Osc. Padder
G—Broadcast R.F. Trimmer
H—Broadcast Antenna Trimmer
I—Short Wave Osc. Trimmer
J—Short Wave R.F. Trimmer
K—Short Wave Antenna Trimmer

SPECIAL SERVICE INFORMATION

Stage Gain Measurements—Broadcast Band:

Measurements taken with volume and tone controls maximum. Switch in Broadcast position. AVC shorted out.

Standard Output	50.0 milliwatts
Dummy Antenna	200.0 Mmf.
Antenna to R.F. Grid	10X at 1000 KC
R.F. Grid to Converter Grid	5X at 1000 KC
Converter Grid to 1st I.F. Grid	50X at 455 KC
1st I.F. Grid to 2nd Detector	60X at 455 KC
Overall Audio Gain	0.1 volt audio input for 1.0 watt, 400 cycles

Stage Gain Measurements—Short Wave Band:

Measurements taken with volume and tone controls maximum. Switch in Short Wave position. AVC shorted out.

Standard Output	50.0 milliwatts
Dummy Antenna	400 ohms
Antenna to R.F. Grid	2.0X at 10.0 MC
R.F. Grid at Converter Grid	4.0X at 10.0 MC
Converter Grid to I.F. Grid	45.0X at 10.0 MC

Oscillator Cathode Voltages—Broadcast Band:

Measured at 117 volts A.C. line voltage with an A.C. type Vacuum Tube Voltmeter, input impedance above 10 megohms.

1500 KC	5.8 volts A.C.
1000 KC	4.9 volts A.C.
600 KC	4.2 volts A.C.

Oscillator Cathode Voltages—Short Wave Band:

Measured at 117 volts A.C. line voltage with an A.C. type Vacuum Tube. Voltmeter, input impedance above 10 megohms.

16.0 MC	6.8 volts A.C.
10.0 MC	4.5 volts A.C.
6.0 MC	1.9 volts A.C.

D.C. Resistance Measurements:

1st and 2nd I.F. Coils
Primary . . . 17 ohms
Secondary . . 17 ohms*

*NOTE: To obtain the true reading of the secondary of the 2nd I.F. coil, it must be removed from the can. This is due to the 47K resistor inside the can.

Oscillator Coils

Broadcast		Short Wave	
Primary	1.0 ohms	Start to Finish	4.0 ohms
Secondary	6.0 ohms	Start to Tap	2.0 ohms

Antenna Coils

Broadcast		Short Wave	
Start to Finish	12.2 ohms	Start to Finish	0.25 ohms
Start to Tap	10.5 ohms	Start to Tap	0.20 ohms

R.F. Coils

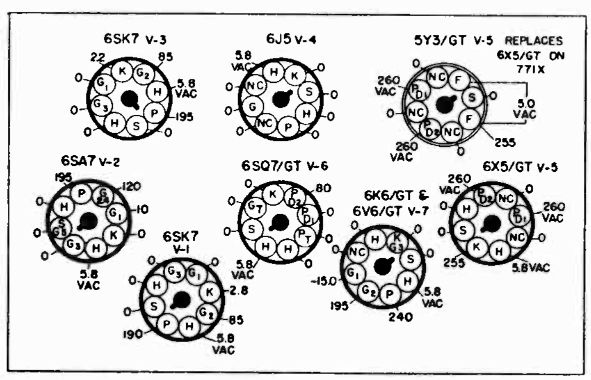
Broadcast		Short Wave	
Primary	75.0 ohms	Primary	5.5 ohms
Secondary	6.5 ohms	Secondary	0.2 ohms

NOTE: Due to a variation in winding methods, the D.C. resistance on all coils is subject to a 20% tolerance.

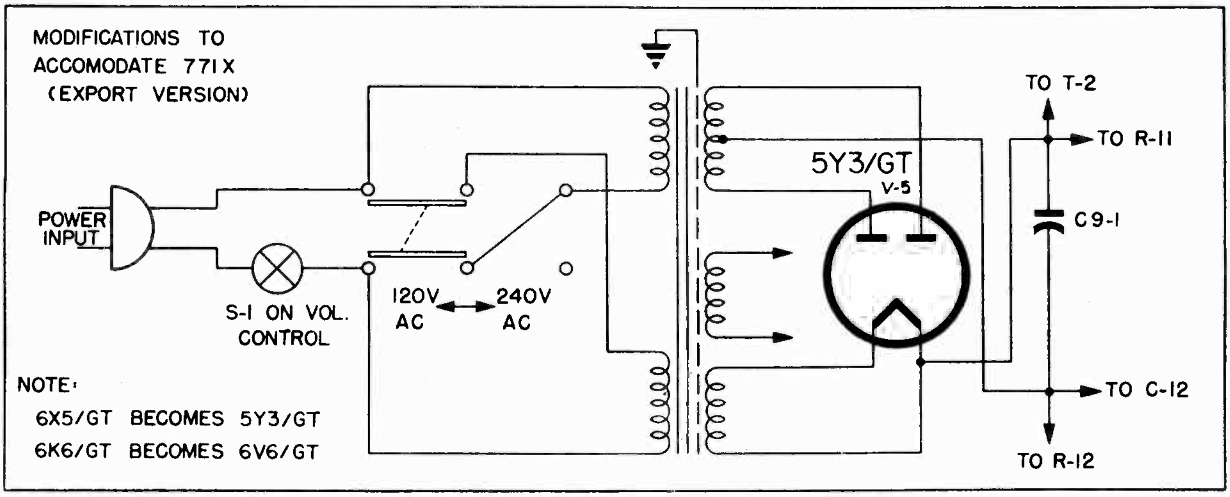
Socket Voltages:

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis.—A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to chassis.

Volume and tone controls maximum.—Switch in Broadcast position.—No signal. 117 volts A.C. line. All voltages shown are positive D.C. unless otherwise noted.



SOCKET VOLTAGES



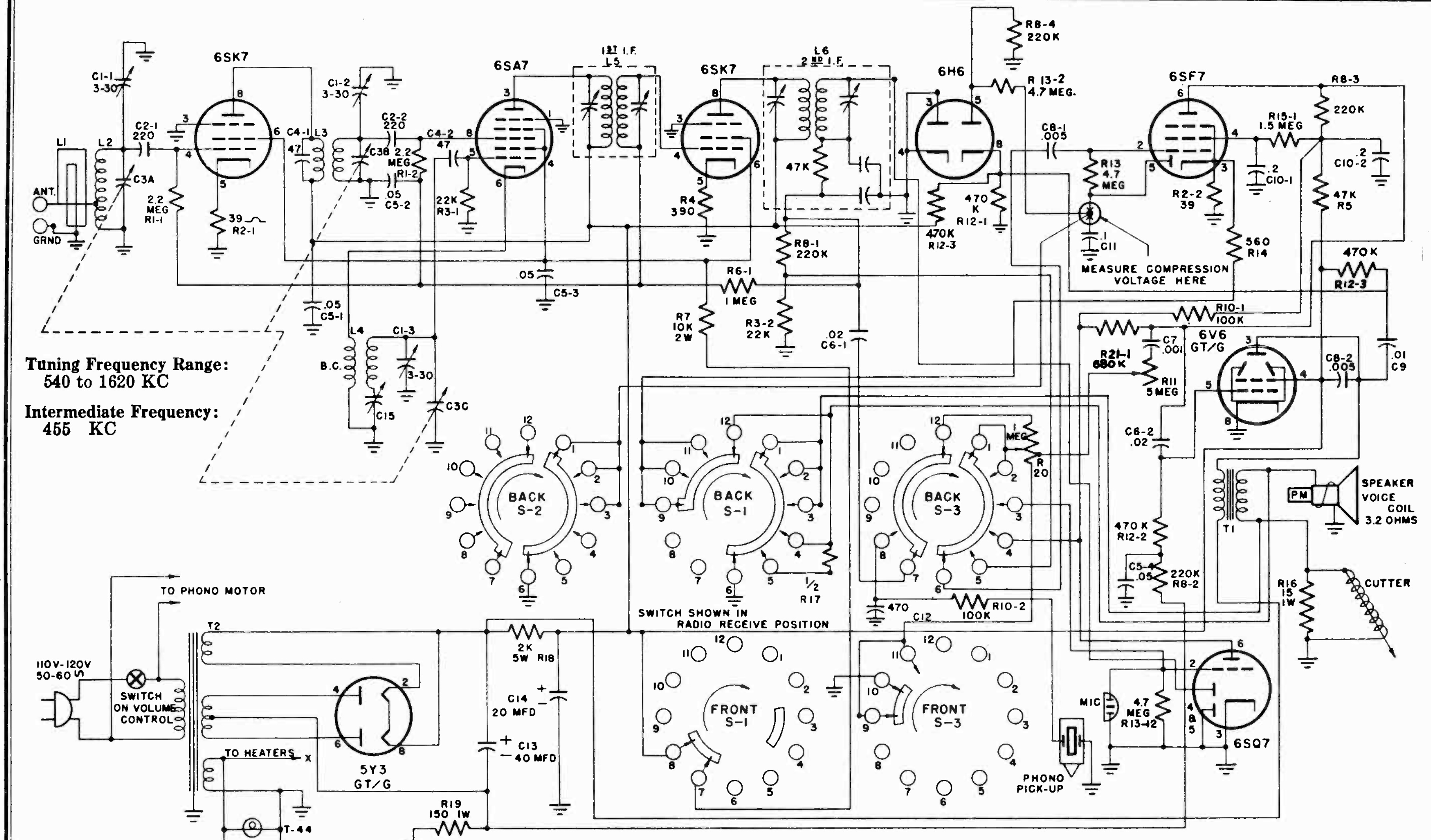
PART NO.	REF. SYMBOL	DESCRIPTION
21052A		Cabinet
23406	C1-1 to 2	Capacitor, trimmer, single 3-30 Mmf.
23500C	C2 A,B,C	Capacitor, variable, 3 gang
23206-1	C3-1 to 3	Capacitor, ceramic, 220 Mmf. 20%
23009	C4-1 to 2	Capacitor, tubular, .05 Mf. 400 V.
23912	C5-1 to 2	Capacitor, ceramic, 47 Mmf. 20%
23017	C6	Capacitor, tubular, .05 Mf. 200 V.
23023	C7-1 to 2	Capacitor, tubular, .01 Mf. 500 V.
23207	C8	Capacitor, ceramic, 4900 Mmf. 20%
24003	C9-1 to 2	Capacitor, electrolytic, 20 Mf. 350 V.
23004	C10-1 to 2	Capacitor, tubular, .005 Mf. 600 V.
23007	C11	Capacitor, tubular, .02 Mf. 600 V.
24006	C12	Capacitor, electrolytic, 25 Mf. 25 V.
23404A	C13	Capacitor, trimmer, single 300-850 Mmf.
23401	C14 A,B	Capacitor, trimmer, dual, 3-30 Mmf.
23401	C15 A,B	Capacitor, trimmer, dual, 3-30 Mmf.
29004E	L1	Coil, 1st I.F.
29001	L2	Coil, 2nd I.F.
29401	L3	Coil, S.W. Antenna
29101B	L4	Coil, S.W. R.F.
29102F	L5	Coil, B.C. R.F.
29201A	L6	Coil, S.W. Oscillator
29205C	L7	Coil, B.C. Oscillator
29318-A		Loop Antenna
32012		Cord, A.C. 6'
34018B		Cover, back
38056		Dial, stationized
38058		Dial, eastern
40003		Cord, dial drive
40114		Drive, planetary
AB52015-C		Knob, brown (3)
AL52015		Knob, ivory (3)
AB52032		Knob, brown (1)
AL52032		Knob, ivory (1)
54001		Lamp, dial (0.25 amp.)
67022		Pointer assembly
63038		Decal, broadcast—short wave

PART NO.	REF. SYMBOL	DESCRIPTION
68042		Decal, volume
68043		Decal, tone
68045		Decal, tuning
69003C		Pulley, variable
73055	R1-2 to 3	Resistor, 2.2 megohm ½w, 20%
73008	R2-1 to 2	Resistor, 39 ohms ½w, 10%
73053	R3-1 to 2	Resistor, 1 megohm ½w, 20%
73041	R4	Resistor, 22,000 ohm, ½w, 10%
73037-1	R5	Resistor, 10,000 ohm, ¼w, 10%
73020-1	R6	Resistor, 390 ohm, 1w, 10%
73127	R7	Resistor, 5600 ohms, 2w, 10%
25003B	R8	Control, volume, 500,000 ohm
73045	R9	Resistor, 47,000 ohm, ½w, 10%
73025-1	R10	Resistor, 1,000 ohm, ¼w, 10%
73902	R11	Resistor, 2,000 ohm, 5w, wire wound
73070	R12	Resistor, 330 ohm, 1w, 10%
*25509	R13	Control, tone, 3 megohm
73049	R14	Resistor, 220,000 ohm, ½w, 20%
73051	R15	Resistor, 500,000 ohm (470,000 ohm, ½w, 20%)
73022	R16	Resistor, 560 ohm, ½w, 10%
79002		Socket, tube
79010B		Socket, lamp
79005		Socket, pickup
83103		Speaker, 6" x 9" oval
83302		Speaker, 6" round
86001A	S2	Switch, band
86704		Switch, radio-phono
89008C	T1	Transformer, power, 771
89018A	T1	Transformer, power, 771X
89402	T2	Transformer, output, 771 (8,000 ohm to 3.2)
89410B	T2	Transformer, output, 771 (8,000 ohm to 3.2)
89405F	T2	Transformer, output, 771X (5,000 ohm to 3.2)
86703		Switch, slide, 771X
65047D		Plate, switch, 771X

*R-13 is shown on schematic as 5 megohms. 3 megohm is proper control.

PACKARD-BELL COMPANY

MODEL 881



Tuning Frequency Range:
540 to 1620 KC

Intermediate Frequency:
455 KC

GENERAL INFORMATION

Model 881 is a PhonOcord console employing 8 tubes and a ten-inch permanent magnet speaker.

Listed below are features contained in this model.

1. Superheterodyne receiver.
2. Automatic Home Recording with Public Address System.
3. Phonograph with automatic record changer.
4. Specially designed low impedance loop antenna.

To service tubes, reach through the hole in left back.

Electrical Rating:

Line Voltage	110–120 volts, 50–60 cycle A.C.
Power Consumption	80 Watts

Electrical Power Output:

Undistorted	3 Watts
Maximum	5 Watts

Loudspeaker

Type	Permanent Magnet
Outside Cone Diameter	10″
Voice Coil Impedance	3.2 ohms at 400 cycles
Magnet Rating	4.64 Oz. Alnico V

Tubes:

Tube	Function
6SK7	R.F. Amplifier
6SA7	Frequency Converter
6SK7	I.F. Amplifier
6SF7	1st Audio Amplifier
6V6-GT/G	Power Amplifier
5Y3-GT/G	Rectifier
6H6	Compressor Rectifier
6SQ7	Microphone Amplifier, 2nd Detector

RECORD CHANGER: Packard Bell Model 58004-B, RCD.CH. 15-1

ALIGNMENT PROCEDURE

Alignment Procedure consists of the 5 steps outlined in the Alignment Chart.

Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completion of this step "Rock" the variable condenser to assure that the I.F.'s have been aligned to the correct frequency. Output should remain constant for any setting of the variable condenser.

Use the Hazeltine Test Loop No. 1150 or a reasonable substitute for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

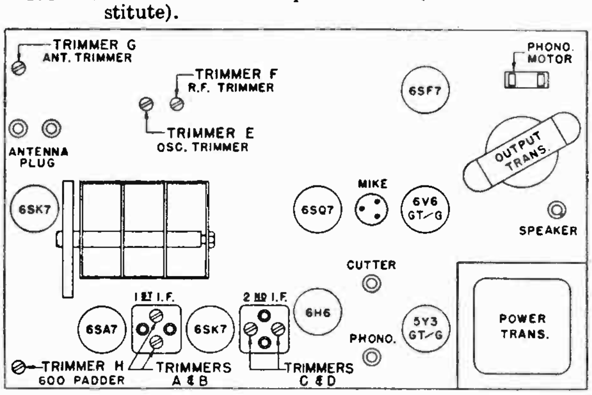
It will be noted that all alignment trimmers are accessible without removing the chassis from the cabinet.

IMPORTANT NOTICE: Make certain that each alignment step is done with a minimum input signal.

ALIGNMENT CHART

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. (.01 Mfd Cap.)	455 KC	540 KC	Trimmers A, B, C, & D
2	Standard Test Loop*	1620 KC	1620 KC	Trimmer E to 1620 KC
3	Standard Test Loop*	600 KC	Rock Variable	Trimmer H to 600 KC
4	Standard Test Loop*	1500 KC	1500 KC	Trimmers F & H
5	Repeat Steps 2, 3 & 4			

*NOTE: Hazeltine Test Loop No. 1150 (or reasonable substitute).



TRIMMER LOCATION

RECORDING HEAD PRESSURE

The proper recording head pressure is 1¼ oz. Adjustment of this pressure is made by turning the small screw on the top of the recording arm. This adjustment is very critical and should be made in quarter turns. TURN THE SCREW CLOCKWISE TO INCREASE THE CUTTING DEPTH and COUNTERCLOCKWISE TO DECREASE THE CUTTING DEPTH.

This adjustment is made at the factory with an ordinary postal scale, consequently, field adjustments should be made in a like manner.

HOW TO CHECK COMPRESSION VOLTAGE

Turn the Selector Switch to Radio Record position. Feed a 1 volt (RMS) 1000 cycle signal into the diode return of the 2nd I.F. (brown lead). Connect the leads of a vacuum tube voltmeter to the point indicated on Figure 4, Schematic Diagram, and ground. The voltage at this point should be approximately a minus 2.25 volts.

BRIEF DESCRIPTION OF COMPRESSION CIRCUIT

One diode section of the 6H6 serves as the compressor rectifier. The compression system is automatic, and is in the circuit on both record positions. A portion of the output voltage is rectified by the 6H6 and varies grid bias of the first audio, 6SF7.

SPECIAL SERVICE INFORMATION

Stage Gain Measurements:

Measurements taken with volume and tone controls maximum.—AVC shorted out.

Standard Output . . . 50 milliwatts
Dummy Antenna . . . 200 Mmf.

Antenna post to R.F. grid . . . . . 7X at 1000 KC
R.F. grid to Converter grid . . . . . 7.5X at 1000 KC
Converter grid to 1st I.F. grid . . . . 56X at 455 KC
1st I.F. grid to 2nd Detector . . . . 57X at 455 KC
Overall Audio Gain . . . . 320X at .5 watts 400 cycles

OSCILLATOR CATHODE VOLTAGES:

Measured at 117 volts AC line voltage with AC vacuum tube voltmeter, input loading above 10 megohms.

1600 KC . . . . 2.15 volts AC
1000 KC . . . . 2.0 volts AC
600 KC . . . . 2.2 volts AC

D.C. RESISTANCE MEASUREMENTS:

1st and 2nd I.F. Coils:
Primary . . . . . . 17 ohms
Secondary . . . . . 17 ohms*

*NOTE: To obtain the true reading of the secondary of the 2nd I.F. Coil, it must be removed from the can. This is because of the 47K resistor inside the can.

Oscillator Coil:
Primary . . . . . . 1 ohm
Secondary . . . . . 6 ohms

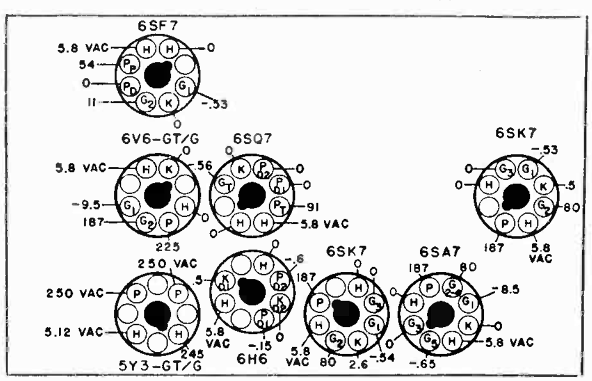
Antenna Coil:
Start to finish . . . . 12.2 ohms
Start to tap . . . . . 10.5 ohms

R.F. Coil:
Primary . . . . . . 58 ohms
Secondary . . . . . 4.2 ohms

NOTICE: The D.C. Resistance measurements on all coils are subject to a 20% tolerance due to the variation of winding methods.

SOCKET VOLTAGES

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis.—A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to chassis. —Volume and tone controls maximum.—Switch in Radio Receive position. No signal. 117 volts A.C. line. All voltages shown are positive D.C. unless otherwise noted.



SOCKET VOLTAGES

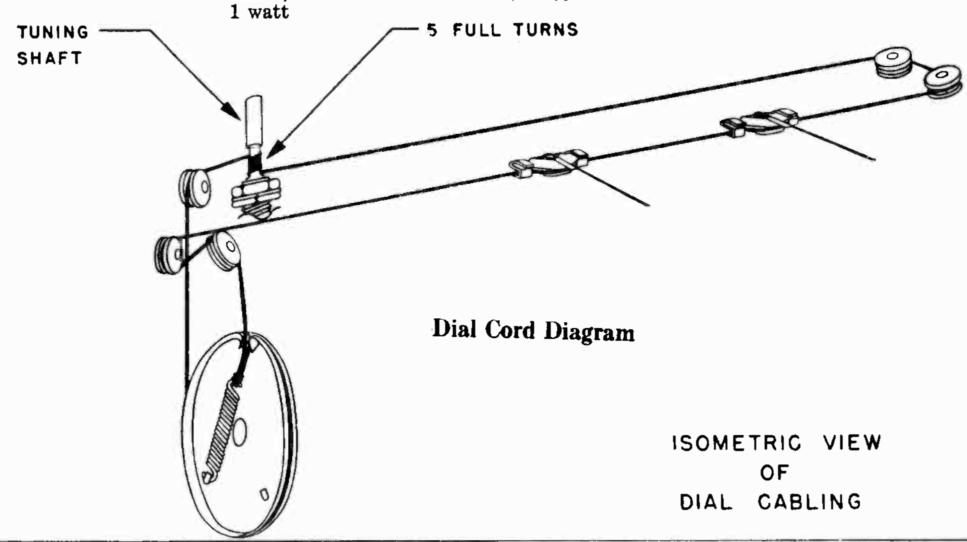
PACKARD-BELL COMPANY

MODEL 881

PART NO.	REF. SYMBOL	DESCRIPTION
21060		Cabinet
23400	C1-1 C1-2	Capacitor, Trimmer: 3-30 mmf.
23406	C1-3	Capacitor Trimmer
23915	C2-1 C2-2	Capacitor, ceramic: 220 mmf. 20%
23521	C3A, B, & C	Capacitor, variable ass'y.
23912	C4-1 C4-2	Capacitor, ceramic or mica: 47 mmf., 20%
23009	C5-1 C5-2 C5-3 C5-4	Capacitor, paper: .05 mfd., 400 volt
23007	C6-1 C6-2	Capacitor, paper: .02 mfd., 600 volt
23001	C7	Capacitor, paper: .001 mfd., 600 volt
23004	C8-1 C8-2	Capacitor, paper: .005 mfd., 600 volt
23006	C9	Capacitor, paper: .01 mfd., 500 volt
23020	C10-1 C10-2	Capacitor, paper: 0.2 mfd., 400 volt
23019	C11	Capacitor, paper: 0.1 mfd. 200 volt
24004B	C13	Capacitor, electrolytic: 40 mfd., 450 volt
24003	C14	Capacitor, electrolytic: 20 mfd., 350 volt
23402	C15	Capacitor, padder: 300–800 mmf.
92194	L1	Loop, Antenna: (19.5 feet of 300 ohm twin lead)
29400B	L2	Coil, antenna
29102F	L3	Coil, R.F.
29205C	L4	Coil, oscillator
29004E	L5	Coil, 1st I.F.: 455 KC
29007	L6	Coil, 2nd I.F.: 455 KC
32003-1		Cord, AC: 8′
34002D		Cover, volume control
36024		Cutter, cartridge
38082		Dial, glass: stationized
38083		Dial, glass: export
40003		Dial drive cord
52016BG		Knob, plastic: bar type, Brown
52015BG		Knob, plastic: round type, Brown

PART NO.	REF. SYMBOL	DESCRIPTION
54001		Dial Lamp .250 Amp.
57004		Microphone with cable
57005		Microphone handle
57006		Microphone base
58004E		Automatic Record Changer
59002		Needle, cutter
63026		Phono Crystal, Shure Bros. #P-30
65069		Plate, dial
66004		Plug, pin type: Speaker, phono & antenna
66013		Plug, microphone
67026A		Pointer slide Ass'y.
68169		Instruction book
69001		Pulley, dial
69003C		Pulley, dial
73055	R1-1	Resistor, carbon: 2.2 Megohm, 20%, ½ watt
	R1-2	
	R13-3	
73022	R14	Resistor, carbon: 560 ohms, 10%, ½ watt
73054	R15-1	Resistor, carbon: 1.5 megohms, 20%, ½ watt
73903	R16	Resistor, wire wound: 15 ohms, 10%, 1 watt

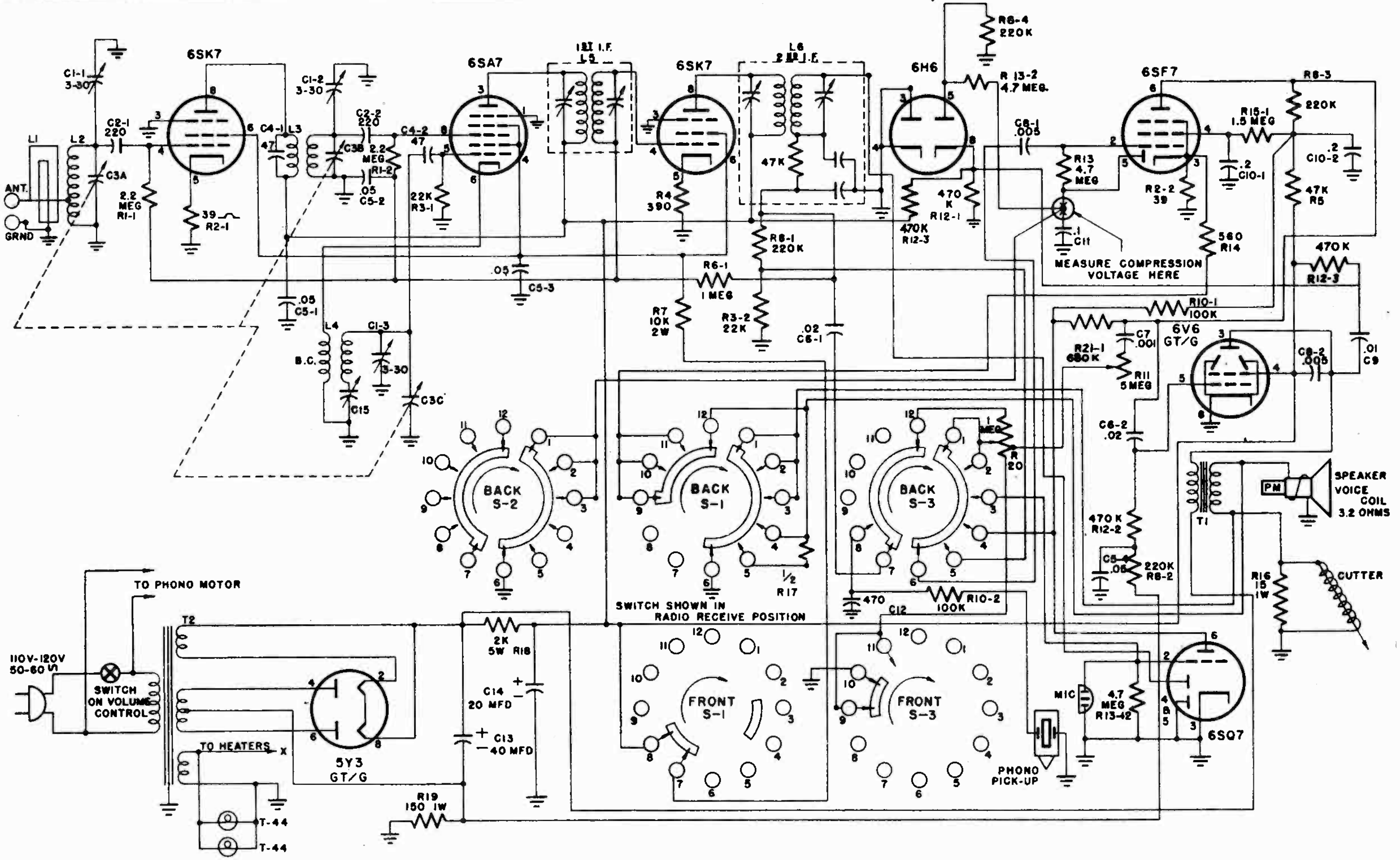
PART NO.	REF. SYMBOL	DESCRIPTION
73910	R17	Resistor, wire wound: ½ ohm, 10%, 1 watt
73902	R18	Resistor, wire wound: 2,000 ohms, 10%, 5 watt
73081	R19	Resistor, carbon: 150 ohms, 10%, 1 watt
25010B	R20	Control, volume: 1 megohm, tapped at 200,000 ohms, with A.C. switch
73052	R21	Resistor, carbon: 680,000 ohms, 20%, ½ watt
77016A		Shaft, dial
78008		Shield, microphone plug
79002		Socket, tube: 8 prong octal, wafer type
79004		Socket, microphone
79005		Socket, phonograph
79007		Socket, phono motor
79010B		Socket, dial lamp: bayonet base
83703		Speaker, permanent magnet: 10″
84003A		Spring, knob
84028		Spring, dial cord
86009A	S1	Switch, rotary, 3 deck
89409D	T1	Transformer, output (5000 ohm to 3.2)
89016B	T2	Transformer, power



Dial Cord Diagram

MODEL 882

PACKARD-BELL COMPANY



GENERAL INFORMATION

Model 882 is a PhonOcord console employing 8 tubes and a twelve-inch permanent magnet speaker.

Listed below are features contained in this model.

1. Superheterodyne receiver.
2. Automatic Home Recording with Public Address System.
3. Phonograph with automatic record changer.
4. Specially designed low impedance loop antenna.

To service tubes, remove plate in record changer compartment.

Electrical Rating:

Line Voltage	110-120 volts, 50-60 cycle A.C.
Power Consumption . .	80 Watts

Tuning Frequency Range:
540 to 1620 KC

Intermediate Frequency:
455 KC

Electrical Power Output:

Undistorted	3 Watts
Maximum	5 Watts

Loudspeaker

Type	Permanent Magnet
Outside Cone Diameter	12"
Voice Coil Impedance .	3.2 ohms at 400 cycles
Magnet Rating	6.8 Oz. Alnico V

Tubes:

Tube	Function
6SK7	R.F. Amplifier
6SA7	Frequency Converter
6SK7	I.F. Amplifier
6SF7	1st Audio Amplifier
6V6-GT/G	Power Amplifier
5Y3-GT/G	Rectifier
6H6	Compressor Rectifier
6SQ7	Microphone Amplifier, 2nd Detector

ALIGNMENT PROCEDURE

Alignment Procedure consists of the 5 steps outlined in the Alignment Chart.

Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completion of this step "Rock" the variable condenser to assure that the I.F.'s have been aligned to the correct frequency. Output should remain constant for any setting of the variable condenser.

Use the Hazeltine Test Loop No. 1150 or a reasonable substitute for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

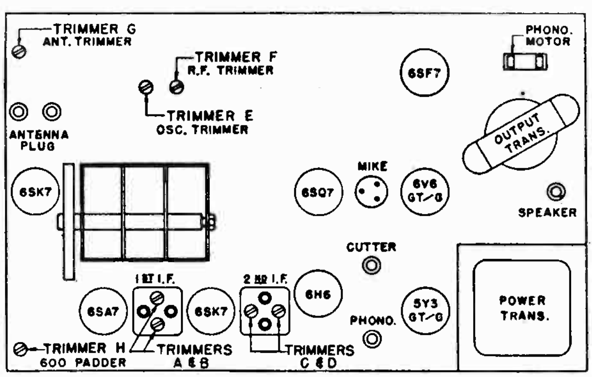
It will be noted that all alignment trimmers are accessible without removing the chassis from the cabinet.

IMPORTANT NOTICE: Make certain that each alignment step is done with a minimum input signal.

ALIGNMENT CHART

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd. (.01 Mfd Cap.)	455 KC	540 KC	Trimmers A, B, C, & D
2	Standard Test Loop*	1620 KC	1620 KC	Trimmer E to 1620 KC
3	Standard Test Loop*	600 KC	Rock Variable	Trimmer H to 600 KC
4	Standard Test Loop*	1500 KC	1500 KC	Trimmers F & H
5	Repeat Steps 2, 3 & 4			

*NOTE: Hazeltine Test Loop No. 1150 (or reasonable substitute).



TRIMMER LOCATION

RECORDING HEAD PRESSURE

The proper recording head pressure is 1¼ oz. Adjustment of this pressure is made by turning the small screw on the top of the recording arm. This adjustment is very critical and should be made in quarter turns. TURN THE SCREW CLOCKWISE TO INCREASE THE CUTTING DEPTH and COUNTERCLOCKWISE TO DECREASE THE CUTTING DEPTH.

This adjustment is made at the factory with an ordinary postal scale, consequently, field adjustments should be made in a like manner.

BRIEF DESCRIPTION OF COMPRESSION CIRCUIT

One diode section of the 6H6 serves as the compressor rectifier. The compression system is automatic, and is in the circuit on both record positions. A portion of the output voltage is rectified by the 6H6 and varies grid bias of the first audio, 6SF7.

HOW TO CHECK COMPRESSION VOLTAGE

Turn the Selector Switch to Radio Record position. Feed a 1 volt (RMS) 1000 cycle signal into the diode return of the 2nd I.F. (brown lead). Connect the leads of a vacuum tube voltmeter to the point indicated on Figure 4, Schematic Diagram, and ground. The voltage at this point should be approximately a minus 2.25 volts.

SPECIAL SERVICE INFORMATION

Stage Gain Measurements:

Measurements taken with volume and tone controls maximum.—AVC shorted out.

Standard Output . . . 50 milliwatts
Dummy Antenna . . . 200 Mmf.

Antenna post to R.F. grid	7X at 1000 KC
R.F. grid to Converter grid	7.5X at 1000 KC
Converter grid to 1st I.F. grid	56X at 455 KC
1st I.F. grid to 2nd Detector	57X at 455 KC
Overall Audio Gain	320X at 0.5 watt 400 cycles

OSCILLATOR CATHODE VOLTAGES:

Measured at 117 volts AC line voltage with AC vacuum tube voltmeter, input loading above 10 megohms.

1600 KC . . . . 2.15 volts AC
1000 KC . . . . 2.0 volts AC
600 KC . . . . 2.2 volts AC

D.C. RESISTANCE MEASUREMENTS:

1st and 2nd I.F. Coils:
Primary . . . . . . 17 ohms
Secondary . . . . . 17 ohms*

*NOTE: To obtain the true reading of the secondary of the 2nd I.F. Coil, it must be removed from the can. This is because of the 47K resistor inside the can.

Oscillator Coil:
Primary . . . . . . 1 ohm
Secondary . . . . . 6 ohms

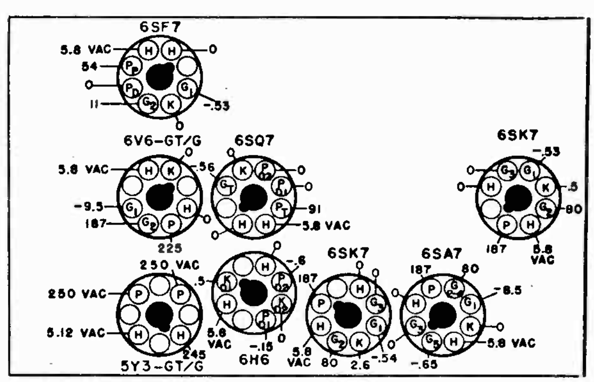
Antenna Coil:
Start to finish . . . . 12.2 ohms
Start to tap . . . . . 10.5 ohms

R.F. Coil:
Primary . . . . . . 58 ohms
Secondary . . . . . 4.2 ohms

NOTICE: The D.C. Resistance measurements on all coils are subject to a 20% tolerance due to the variation of winding methods.

SOCKET VOLTAGES

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis.—A.C. voltages measured with a 1000 ohms per volt A.C. meter from socket contacts to chassis. —Volume and tone controls maximum.—Switch in Radio Receive position. No signal. 117 volts A.C. line. All voltages shown are positive D.C. unless otherwise noted.



SOCKET VOLTAGES

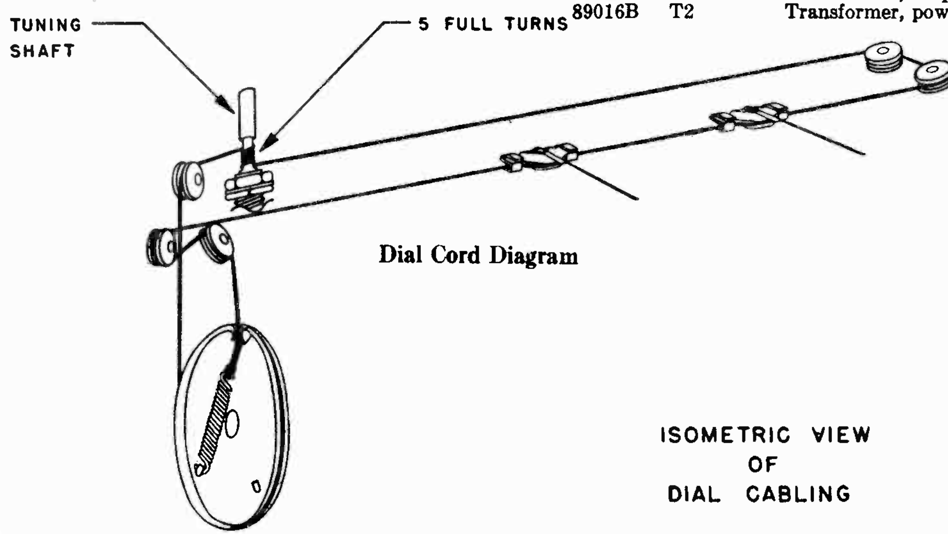
MODEL 882

PACKARD-BELL COMPANY

PART NO.	REF. SYMBOL	DESCRIPTION
21058		Cabinet
23400	C1-1 C1-2	Capacitor, Trimmer: 3-30 mmf.
23406	C1-3	Capacitor Trimmer
23915	C2-1 C2-2	Capacitor, ceramic: 220 mmf. 20%
23521	C3A, B, & C	Capacitor, variable ass'y.
23912	C4-1 C4-2	Capacitor, ceramic or mica: 47 mmf., 20%
23009	C5-1 C5-2 C5-3 C5-4	Capacitor, paper: .05 mfd., 400 volt
23007	C6-1 C6-2	Capacitor, paper: .02 mfd., 600 volt
23001	C7	Capacitor, paper: .001 mfd., 600 volt
23004	C8-1 C8-2	Capacitor, paper: .005 mfd., 600 volt
23006	C9	Capacitor, paper: .01 mfd., 500 volt
23020	C10-1 C10-2	Capacitor, paper: 0.2 mfd., 400 volt
23019	C11	Capacitor, paper: 0.1 mfd. 200 volt
24004B	C13	Capacitor, electrolytic: 40 mfd., 450 volt
24003	C14	Capacitor, electrolytic: 20 mfd., 350 volt
23402	C15	Capacitor, padder: 300–800 mmf.
92199	L1	Loop, Antenna.
29400B	L2	Coil, antenna
29102F	L3	Coil, R.F.
29205C	L4	Coil, oscillator
29004E	L5	Coil, 1st I.F.: 455 KC
29007	L6	Coil, 2nd I.F.: 455 KC
32003-1		Cord, AC: 8'
34002D		Cover, volume control
36024		Cutter, cartridge
38082		Dial, glass: stationized
38083		Dial, glass: export
40003		Dial drive cord
52016BG		Knob, plastic: bar type, Brown
52015C-BG		Knob, plastic: round type, Brown
54001		Dial Lamp 0.250 Amp.
57004		Microphone with cable
57005		Microphone handle
57006		Microphone base

PART NO.	REF. SYMBOL	DESCRIPTION
58004E		Automatic Record Changer
59002		Needle, cutter
63026		Phono Crystal, Shure Bros. #P-30
65069-B		Plate, dial
66004		Plug, pin type: Speaker, phono & antenna
66013		Plug, microphone
67026A		Pointer slide Ass'y.
68169		Instruction book
69001		Pulley, dial
69003C		Pulley, dial
73055	R1-1 R1-2	Resistor, carbon: 2.2 Megohm, 20%, ½ watt
73008	R2-1 R2-2	Resistor—carbon: 39 ohms, 10% ½ watt
73041	R3-1 F3-2	Resistor—carbon: 22,000 ohms 10% ½ watt
73020	R4	Resistor—carbon: 390 ohms, 10% ½ watt
73045	R5	Resistor—carbon: 47,000, 10% ½ watt
73053	R6-1	Resistor—carbon: 1 megohm 20%, ½ watt
73125	R7	Resistor—carbon: 10,000 ohms, 10% 2 watt
73049	R8-1 R8-2 R8-3 R8-4	Resistor—carbon: 220,000 ohms, 20% ½ watt
73047	R10-1 R10-2	Resistor—carbon: 100,000 ohms, 20% ½ watt

PART NO.	REF. SYMBOL	DESCRIPTION
25506C	R11	Control—tone: 5 megohms
73051	R12-1 R12-2 R12-3	Resistor—carbon: 470,000 ohms 20%, ½ watt
73057	R13-1 R13-2 R13-3	Resistor—carbon: 4.7 megohms, 20% ½ watt
73022	R14	Resistor, carbon: 560 ohms, 10%, ½ watt
73054	R15-1	Resistor, carbon: 1.5 megohms, 20%, ½ watt
73903	R16	Resistor, wire wound: 15 ohms, 10%, 1 watt
73910	R17	Resistor, wire wound: ½ ohm, 10%, 1 watt
73902	R18	Resistor, wire wound: 2,000 ohms, 10%, 5 watt
73081	R19	Resistor, carbon: 150 ohms, 10%, 1 watt
25010B	R20	Control, volume: 1 megohm, tapped at 200,000 ohms, with A.C. switch
73052	R21	Resistor, carbon: 680,000 ohms, 20%, ½ watt
77016A		Shaft, dial
78008		Shield, microphone plug
79002		Socket, tube: 8 prong octal, wafer type
79004		Socket, microphone
79005		Socket, phonograph
79007		Socket, phono motor
79010B		Socket, dial lamp: bayonet base
83802		Speaker, permanent magnet: 12"
84003A		Spring, knob
84028		Spring, dial cord
86009A	S1	Switch, rotary, 3 deck
89409D	T1	Transformer, output (5000 ohm to 3.2)
89016B	T2	Transformer, power

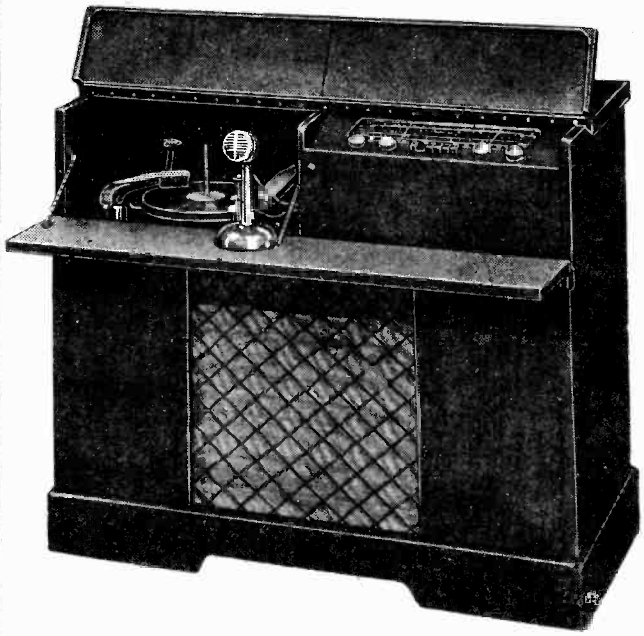


Dial Cord Diagram

ISOMETRIC VIEW OF DIAL CABLING

PACKARD-BELL COMPANY

MODEL 1063



Tubes:

Tube	Function
6SK7	R.F. Amplifier
6SA7	Frequency Converter
6SK7	I.F. Amplifier
6SF7	2nd Detector & Expansion Amplifier
6H6	Expansion Rectifier & Delayed Audio AVC
6SQ7	Microphone Amplifier
6SF7	1st Audio Amplifier
6H6	Compression Rectifier
6V6-GT/G	Power Amplifier
5Y3-GT/G	Rectifier

GENERAL INFORMATION

Model 1063 is a PhoOcord console with a two band superheterodyne receiver. This model employs ten tubes and a permanent magnet speaker.

Listed below are some of the features contained in this Model PhonOcord.

1. Two band superheterodyne receiver.
2. Automatic Home Recording with Public Address System.
3. Phonograph with automatic record changer.
4. Volume Expansion.
5. Volume Compression for Home Recording.
6. Low Level Dynamic Bass Boost.

The output of the microphone and radio on Mixed Program Record may be regulated by varying the controls on the top of the chassis. (See Figure 2, Trimmer Location).

An early run of this model utilized a 20 Mfd. filter (C18) in the input voltage instead of a 40 Mfd.

Electrical Rating:

Line Voltage . . . 110-120 volts 50-60 cycle AC
Power Consumption . . . 106 watts

Tuning Frequency Range:

Standard Broadcast . . . 540 to 1620 KC
Short Wave . . . 6 to 18 MC

Intermediate Frequency:

455 KC

Electrical Power Output:

Undistorted . . . 3.5 watts
Maximum . . . 6 watts

Loudspeaker:

Type . . . Permanent Magnet
Outside Cone Diameter . . . 10"
Voice Coil Impedance . . . 3.2 ohms at 400 cycles
Magnet Rating . . . 6.8 Oz. Alnico 5

SPECIAL SERVICE INFORMATION

STAGE GAIN MEASUREMENTS:

Measurements taken with volume and tone controls maximum. — Band Switch in Standard Broadcast position. — Push Button Switch in Radio Receive position. — AVC shorted out.

Standard Output . . . 50 milliwatts
Dummy Antenna . . . 200 Mmf.
Antenna Grid to R.F. Grid . . 6X at 1000 KC
R.F. Grid to Converter Grid . . . 12.5X at 1000 KC
Converter Grid to 1st I.F. Grid . . . 61X at 455 KC
1st .F. Grid to 2nd Detector . . . 120X at 455 KC
Overall Audio Gain . . . 620X at 1 watt 400 cycles

OSCILLATOR CATHODE VOLTAGES:

Measured at 117 Volts AC line voltage with AC vacuum tube voltmeter input loading above 10 megohms.

1620 KC . . . 3.4 volts AC
1300 KC . . . 3.2 volts AC
750 KC . . . 3.2 volts AC
550 KC . . . 3.7 volts AC

D.C. RESISTANCE MEASUREMENTS:

I.F. COILS

1st I.F.		2nd I.F.	
Primary	. . . 17 ohms	Primary	. . . 17 ohms
Secondary	. . . 17 ohms	Secondary	. . 17 ohms*

*NOTE: To obtain the true reading of the secondary of the 2nd I.F. coil it must be removed from the can. This is so because of the 56,000 ohm resistor in series with the AVC lead inside the can.

OSCILLATOR COILS

Broadcast		Short Wave	
Primary	. . . 1 ohm	Start to Finish	. . 4 ohms
Secondary	. . . 6 ohms	Start to Tap	. . . 2 ohms

ANTENNA COILS

Broadcast		Short Wave	
Start to Finish	. . 12.2 ohms	Start to Finish	. . .25 ohms
Start to Tap	. . . 10.5 ohms	Start to Tap	. . . . .20 ohms

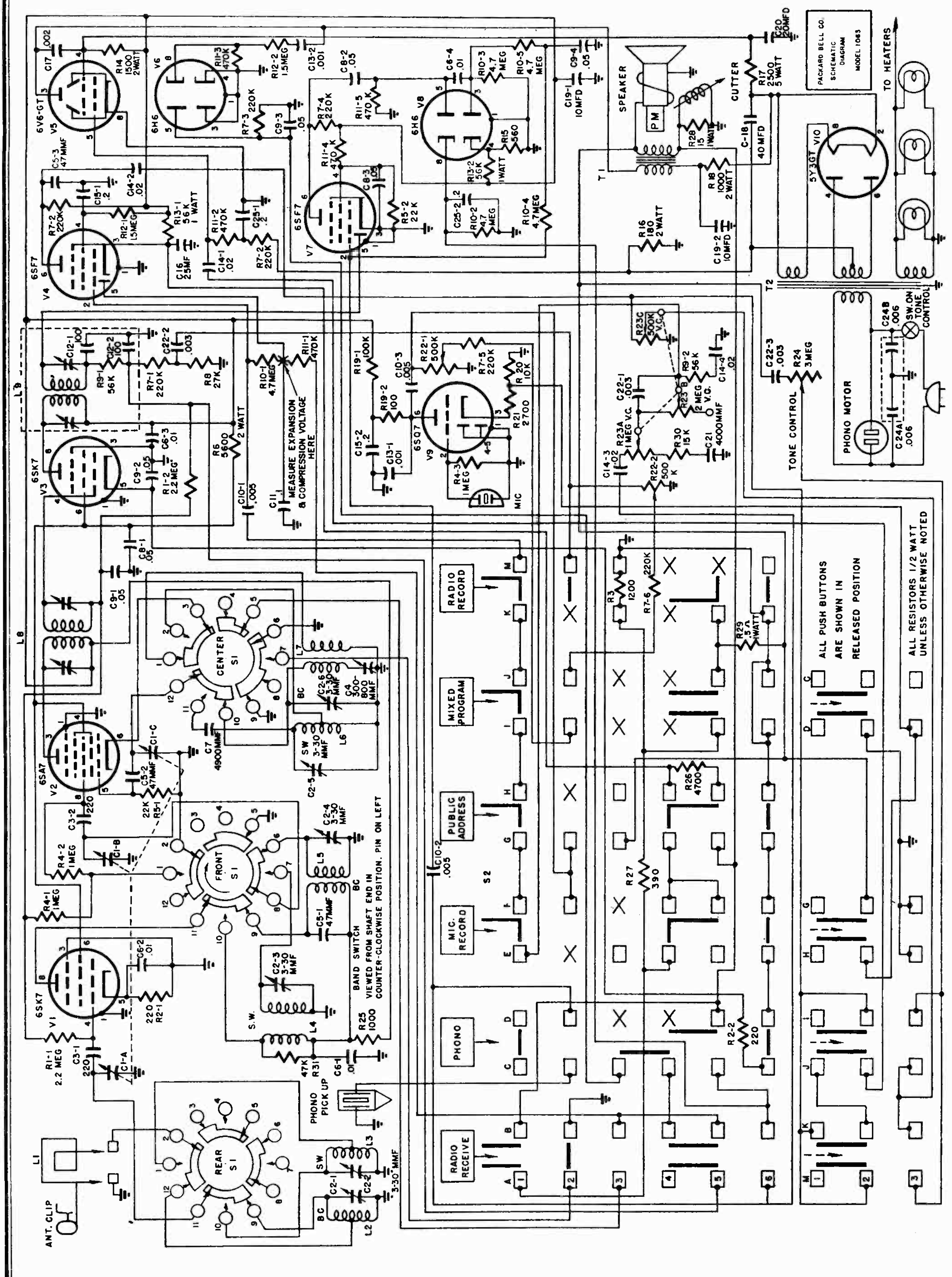
R.F. COILS

Broadcast		Short Wave	
Primary	. . . 5 8 ohms	Primary	. . . 5.5 ohms
Secondary	. . . 4.2 ohms	Secondary	. . . .2 ohms

NOTE: Due to the variation of winding methods, the D.C. resistance on all coils is subject to a 20% tolerance.

MODEL 1063

PACKARD-BELL COMPANY



PACKARD-BELL COMPANY MODEL 1063

ALIGNMENT PROCEDURE

Alignment procedure consists of the 7 steps outlined in the Alignment Procedure Chart.

Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. capacitor (dummy load) for step No. 1, I.F. Alignment. Upon completing this step "Rock" the variable condenser to assure that the I.F.s have been aligned to the correct frequency. Output should remain constant at any setting of the variable condenser.

Use the Hazeltine Test Loop or a reasonable substitute for the balance of the alignment. Place the test loop about two feet from the receiver loop in a vertical position.

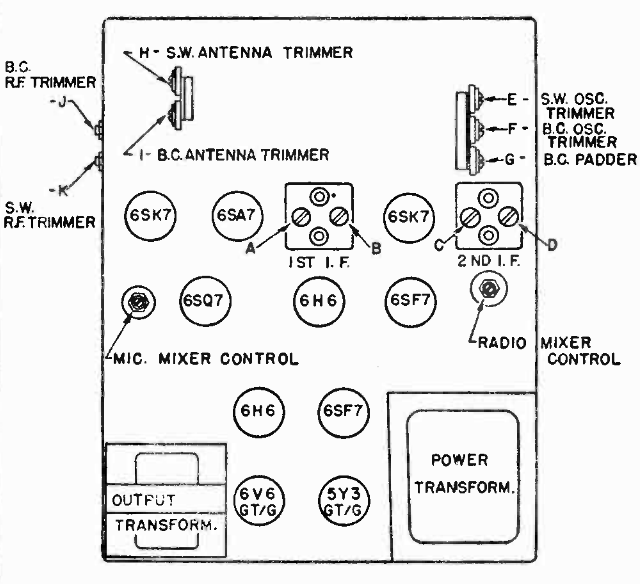
It will be noted that all trimmers are accessable without removing the chassis from the cabinet.

IMPORTANT NOTICE: Make certain that each alignment step is done with a minimum input signal.

ALIGNMENT CHART

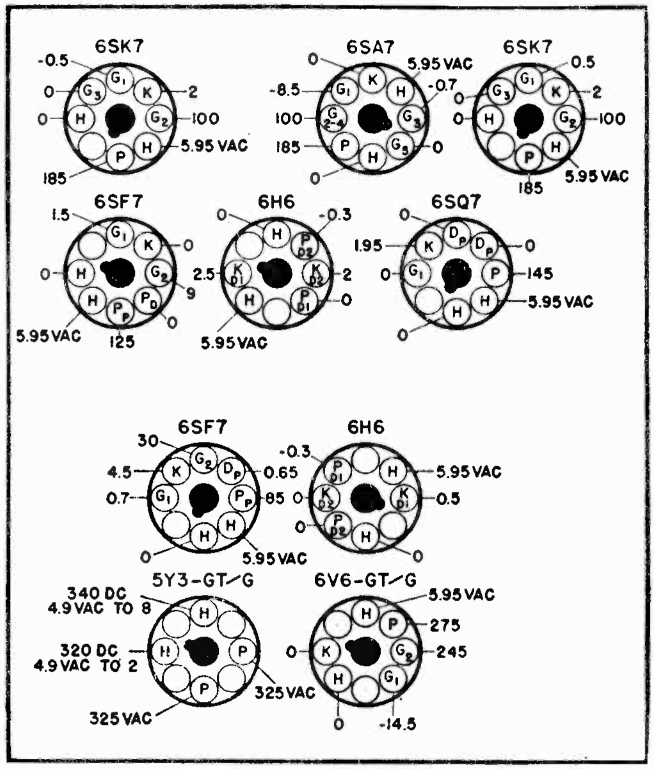
STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Grd.	455 KC	540 KC	Trimmers A, B, C & D
2	Standard* Test Loop	1620 KC	1620 KC	Trimmer F to 1620 KC
3	Standard* Test Loop	600 KC	600 KC	Trimmer G to 600 KC
4	Standard* Test Loop	1500 KC	1500 KC	Trimmers I & J
5	REPEAT STEPS 2, 3, & 4			
6	Standard* Test Loop	18 MC	18 MC	Trimmer E to 18 MC
7	Standard* Test Loop	15 MC	15 MC	Trimmers K & H

*NOTE: Hazeltine Standard Test Loop No. 1150 or a reasonable substitute.



Trimmer Location

No signal.
117 volts A.C. line voltage.
Band switch in standard broadcast position.
All voltages shown are positive D.C. unless otherwise noted.
All voltages measured from socket contacts to chassis. D.C. voltages measured with a vacuum tube voltmeter. A.C. voltages measured with a 1000 ohm per volt A.C. meter.
Volume and tone controls maximum.



Socket Voltages

BRIEF DESCRIPTON OF EXPANDER AND COMPRESSOR CIRCUITS:

V7, 6SF7 and V6, 6H6 embrace the expansion circuit. Referring to Figure 3, Schematic Diagram, it will be noted that expansion is in the circuit only when the "Phono" or "Radio Receive" buttons are depressed. V7, 6SF7, serves as the 2nd detector and expansion amplifier. V6, 6H6 functions as the expansion rectifier in one diode section and furnishes delayed audio AVC in the other diode section. V8, 6H6, functions as the compressor rectifier.

HOW TO CHECK EXPANSION VOLTAGE:

Feed a 1 volt (RMS) 400 cycle signal into the phono input plug. Make certain the Phono Button is depressed. Connect the leads of a vacuum tube voltmeter* to the location indicated on Figure 3, Schematic Diagram, and ground. The voltage at this point should be between 3 and 4 volts positive D.C. As a cross check measure the cathode voltage of V4, 6SF, which should read about 5 volts D.C. The expansion voltage should be about 1 volt less.

HOW TO CHECK COMPRESSION VOLTAGE:

Depress the "Radio Record" button. Feed a 1 volt (RMS) 400 cycle signal into the diode return of the 2nd I.F. (brown lead). In the same manner outlined in the preceeding paragraph, measure the compression voltage, which should be a minus 2 to 3 volts.

*VTVM: Input loading above 10 megohms.

MODEL 1063

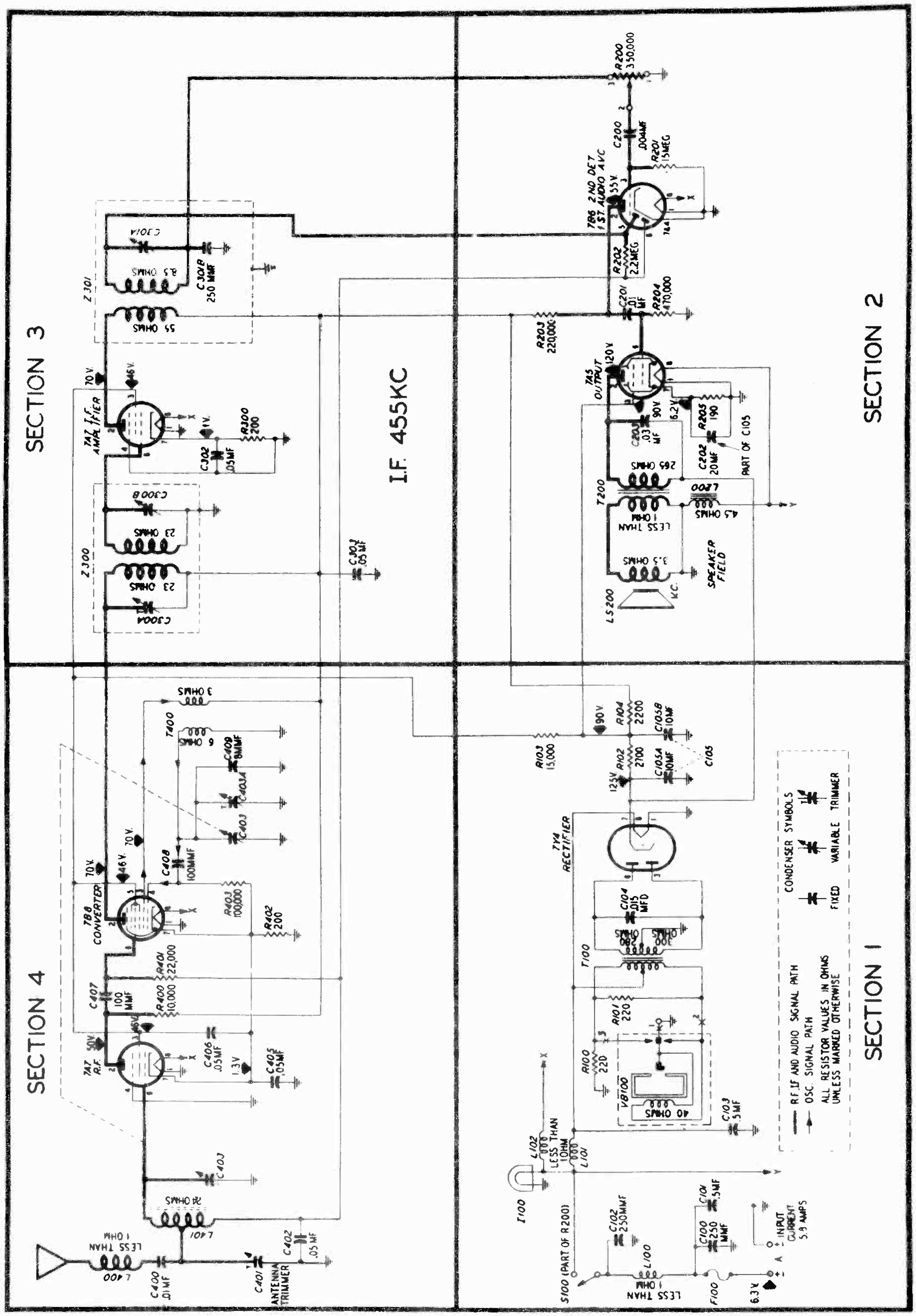
PACKARD-BELL COMPANY

PART NO.	REF. SYMBOL	DESCRIPTON
10505A		Assembly, switch arm
10506B		Assembly, pointer
10512		Assembly Kit, chassis
10513		Assembly Kit, record changer
11013A		Arm, switch
11014		Arm, stop
18032A		Bracket, compartment light
18081		Bracket, reject stop
18039A		Bracket, planetary
18043C		Bracket, dial
18068		Bracket, changer shipping
21045-1		Cabinet Back, right
21045-2		Cabinet Back, left
CU-21045		Cabinet, radio: natural mahogany
BN-21045		Cabinet, radio: dark mahogany
BG-21045		Cabinet, radio: walnut
23500C	C1A, B & C	Capacitor, variable: 3 gang with pulley
23400A	C2-1	Capacitor, trimmer: dual 30 Mmf.
	C2-2	
	C2-3	
	C2-4	
	C2-5	
	C2-6	
23228	C3-1	Capacitor, mica: 220 Mmf. 20%
	C3-2	
23402	C4	Capacitor, padder: 300 to 800 Mmf.
23225	C5-1	Capacitor, mica: 47 Mmf. 20%
	C5-2	
	C5-3	
23006	C6-1	Capacitor, paper: .01 Mfd. 200 volt
	C6-2	
	C6-3	
	C6-4	
23207A	C7	Capaictor, mica: 4900 Mmf. 5%
23010	C8-1	Capacitor, paper: .05 Mfd. 600 volt
	C8-2	
	C8-3	
23017	C9-1	Capacitor, paper: .05 Mfd. 200 volt
	C9-2	
	C9-3	
	C9-4	
23004	C10-1	Capacitor, paper: .005 Mfd. 600 volt
	C10-2	
	C10-3	
23019	C11	Capacitor, paper: .1 Mfd. 200 volt
	C12-1	Capacitor, mica: 100 Mmf. (Part of 2nd I.F. assembly)
	C12-2	
23001	C13-1	Capacitor, paper: .001 Mfd. 600 volt
	C13-2	
23007	C14-1	Capacitor, paper: .02 Mfd. 600 volt
	C14-2	
	C14-3	
	C14-4	
23020	C15-1	Capacitor, paper: .2 Mfd. 400 volt
	C15-2	
24006	C16	Capacitor, electrolytic: 25 Mfd. 25 WV
23002	C17	Capacitor, paper: .002 Mfd. 600 volt
24030	C18	Capacitor, electrolytic: 40 Mfd. 450 WV
24002	C19-1	Capacitor, electrolytic: 10 Mfd. 450 WV
	C19-2	
24001	C20	Capacitor, electrolytic: 20 Mfd. 450 WV
23208	C21	Capacitor, mica: 400 Mmf. 10%
23016	C22-1	Capacitor, paper: .003 Mfd. 600 volt
	C22-2	
	C22-3	
23901	C24A & B	Capacitor, paper: 2 X .006 Mfd. 600 volt (in metal case)
92194	L1	Loop Antenna, 18' of 300 ohm twin lead
29400A	L2	Coil, antenna: standard broadcast
29401A	L3	Coil, antenna: short wave
29101A	L4	Coil, R.F.: short wave
29102A	L5	Coil, R.F.: standard broadcast
29201A	L6	Coil, oscillator: short wave
29205A	L7	Coil, oscillator: standard broadcast
29004D	L8	Coil, 1st I.F.: 455 KC
29007	L9	Coil, 2nd I.F.: 455 KC
32003C		Cord, A.C.: 8'
32015		Cord, A.C.: 2½'
36024		Cutter cartridge
38042		Dial Scale, stationized
38043		Dial Scale, export
40101C		Drive, planetary
41012-CU		Escutcheon, dial: mahogany
41012-BG		Escutcheon, dial: walnut
41012-BN		Escutcheon, dial: dark mahogany
CU-52019A		Knob, control: natural mahogany
CU-52020A		Knob, control: natural mahogany
BG-52019A		Knob, control: walnut
BG-52020A		Knob, control: walnut
BN-52019A		Knob, control: dark mahogany
BN-52020A		Knob, control: dark mahogany
AB-52023		Knob, push button: brown, (no spring)
AP-52024A		Knob, push button: tan, (no spring)
52026		Knob, automatic stop

PART NO.	REF. SYMBOL	DESCRIPTON
54001		Lamp, dial: bayonet base
57004		Microphone with cable
57005		Microphone handle
57006		Microphone base
58004E		Automatic record changer
59001		Needle, phono: permanent sapphire
59002		Needle, cutter
63026		Pick-up cartridge
64006		Escutcheon pin
65004E		Plate, dial
65028B		Plate, mounting
66001		Plug, pin
66004		Plug, pin
66013		Plug, microphone
67013A		Pointer, cutter stop
68073		PhonOcord playhouse
68142		Decal, push buttons
68144		Instruction sheet, F-M
68109		Instruction Book
69005		Pulley, drive: 60 cycle
69007A		Pulley, drive: 50 cycle
73055	R1-1	Resistor, carbon: 2.2 megohms, 20%, ½ watt
	R1-2	
73017	R2-1	Resistor, carbon: 220 ohms, 10%, ½ watt
	R2-2	
73026	R3	Resistor, carbon: 1200 ohms, 10%, ½ watt
73053	R4-1	Resistor, carbon: 1 megohm, 20%, ½ watt
	R4-2	
	R4-3	
73041	R5-1	Resistor, carbon: 22,000 ohms, 10%, ½ watt
	R5-2	
73127	R6	Resistor, carbon: 5600 ohms, 10%, 2 watt
73049	R7-1	Resistor, carbon: 220,000 ohms, 20%, ½ watt
	R7-2	
	R7-3	
	R7-4	
	R7-5	
	R7-6	
	R7-7	
73042	R8	Resistor, carbon: 27,000 ohms, 10%, ½ watt
73060	R9-1	Resistor, carbon: 56,000, 10%, ½ watt
	R9-2	
73057	R10-1	Resistor, carbon: 4.7 megohms, 20%, ½ watt
	R10-2	
	R10-3	
	R10-4	
	R10-5	
73051	R11-1	Resistor, carbon: 47,000 ohms, 20%, ½ watt
	R11-2	
	R11-3	
	R11-4	
	R11-5	
73054	R12-1	Resistor, carbon: 1.5 megohms, 20%, ½ watt
	R12-2	
73076	R13-1	Resistor, carbon: 56,000 ohms, 10%, 1 watt
	R13-2	
73126	R14	Resistor, carbon: 1500 ohms, 10%, 2 watt
73022	R15	Resistor, carbon: 560 ohms: 10%, ½ watt
73077	R16	Resistor, carbon: 180 ohms, 10%, 2 watt
73907	R17	Resistor, wire wound: 2500 ohms, 10%, 5 watt
73120	R18	Resistor, carbon: 1000 ohms, 10%, 2 watt
73047	R19-1	Resistor, carbon: 100,000 ohms, 20%, ½ watt
	R19-2	
73037	R20	Resistor, carbon: 10,000 ohms, 10%, ½ watt
73030	R21	Resistor, carbon: 2700 ohms, 10%, ½ watt
25800	R22-1	Control, mixer: 500,000 ohms
	R22-2	
25500A	R23A, B & C	Control, volume: 3 section; section A-1 megohm, Section B-2 megohms, Section C-500,000 ohms
25507	R24	Control, tone: 3 megohms, with AC switch
73025	R25	Resistor, carbon: 1000 ohms, 10%, ½ watt
73033	R26	Resistor, carbon: 4700 ohms, 10%, ½ watt
73020	R27	Resistor, carbon: 390 ohms, 10%, ½ watt
73903	R28	Resistor, wire wound: 15 ohms, 10%, 1 watt
73910	R29	Resistor, wire wound: .5 ohm, 10%, 1 watt
73039	R30	Resistor, carbon: 15,000 ohms, 10%, ½ watt
73045	R31	Resistor, carbon: 47,000 ohms, 10%, ½ watt
77013B		Shaft, switch arm
78008A		Shield, microphone plug
78031A		Shield, compartment lamp
79002		Socket, tube: 8 prong octal, wafer type
79004		Socket, microphone
79005		Socket, speaker & cutter
79007		Socket, phono motor
79010B		Socket, dial lamp: bayonet base
79023		Socket, loop leads
79033		Socket, compartment lamp
83701A		Speaker, 10" permanent magnet
84001		Spring, push button knob
84028		Spring, dial cord
86001A	S1	Switch, rotary: 3 section, band switch
86301	S2	Switch, push button
86802A		Switch, micro: (part of automatic cutter stop)
89409D	T1	Transformer, output
89006E	T2	Transformer, power
89015		Transformer, step down

PHILCO CORP.

MODEL UN6-100



NOTE: All voltage, capacity, and resistance values shown are average. The voltages were measured between the points indicated and the receiver chassis (B–), using a 20,000-ohms-per-volt meter, with 6.3 volts d-c input to the receiver power supply; the volume control was set at minimum, and the tuning condenser at 550 kc.

ALIGNMENT PROCEDURE

CONNECT THE SIGNAL-GENERATOR output lead as follows:

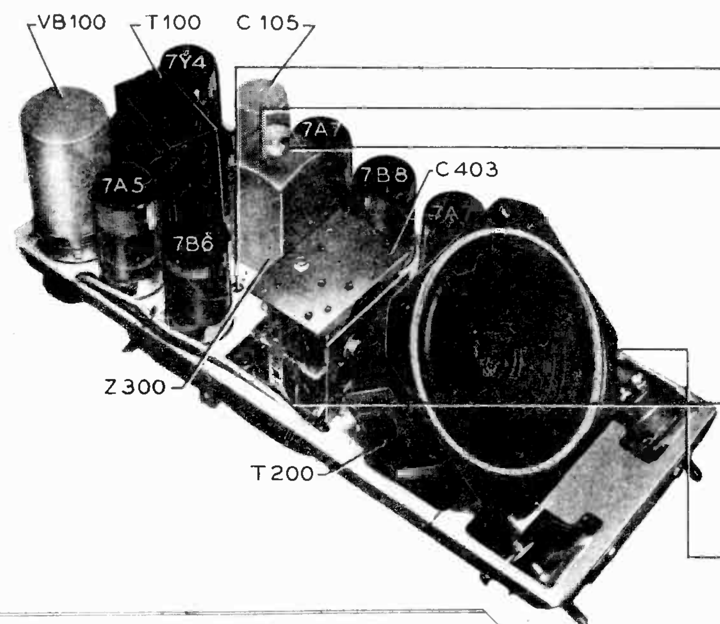
For the i-f alignment (steps 1 and 2 in the chart), apply the modulated r-f signal through a .05-mf. condenser to the aerial receptacle.

For the r-f alignment (steps 3 and 4), inject the modulated r-f signal through a 30-mmf. condenser in series with an aerial lead (Part No. 95-0185) plugged into the aerial receptacle. If an aerial lead is not available, inject the signal through the 30-mmf. condenser alone, and connect a second 30-mmf. condenser from the aerial receptacle to the receiver chassis.

CONNECT THE OUTPUT METER across the speaker voice-coil terminals.

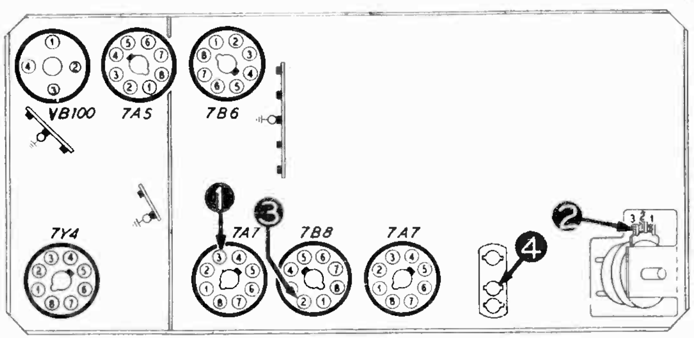
SET THE DIAL POINTER to coincide with the index dot at the low-frequency end of the scale, when the tuning-condenser plates are fully meshed.

SET THE RECEIVER VOLUME CONTROL at maximum. Using the lowest range on the output meter, adjust the signal-generator output, as alignment progresses, to keep the meter needle near center scale.

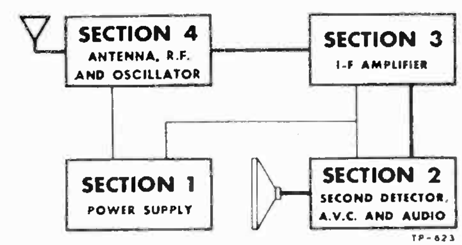


ADJUST IN ORDER	SPECIAL INSTRUCTIONS	DIAL SETTINGS SIG. GEN.	RECEIVER
C301A C300B C300A	1. Ground the oscillator grid (pin 4) of the 7B8 converter. Adjust the i-f trimmers for maximum in the order listed.	455 kc.	550 kc.
	2. Repeat step 1. Then remove the ground from pin 4 of the 7B8.		
C403A	3. Adjust for maximum.	1600 kc.	1600 kc.
C401	4. Adjust for maximum. Final adjustment to be made after the receiver has been reinstalled in the car, with the aerial connected.	1400 kc.	1400 kc.

Top view, showing trimmer-condenser locations.



Bottom view, showing test points.



Block diagram (Heavy lines indicate signal path.)

PHILCO CORP. MODEL UN6-100

TROUBLE-SHOOTING PROCEDURE

In this manual, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, as shown in figure 2. Normal indications, secured when checking these points, eliminate the section under test as a source of trouble. Isolation of the faulty part is accomplished by testing in the order shown in the sectional test charts. A high-quality signal generator and volt-ohmmeter and a 6.3-volt d-c power source are required. The voltage readings shown were taken with a 20,000-ohms-per-volt meter.

To localize trouble, connect the receiver to the 6.3-volt d-c power source, and turn the receiver volume control to maximum; see that all tube filaments are lighted; then proceed in the order given in the following chart. When abnormal indications appear, make voltage and resistance checks of the circuit under test. Remedy any defect encountered before proceeding with the next step.

IMPORTANT

The aerial and aerial lead-in form part of the r-f tuning circuit. When testing or aligning this receiver on the bench it is important that an aerial dummy load of equal capacity be used.

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Measure voltage between point 1 and chassis (B—).	46 volts.
2	Apply audio signal between point 2 and chassis, through a condenser (.01 to .25 mf.).	Loud, clear signal from speaker.
3	Apply a modulated r-f signal (455 kc.) between point 3 and chassis, through a condenser (.01 to .25 mf.).	Loud, clear signal.
4	Turn tuning condenser to half-meshed position. Apply a modulated r-f signal between point 4 and chassis, through a condenser (.01 to .25 mf.). Tune signal generator until the signal is heard in the speaker.	Loud, clear signal.

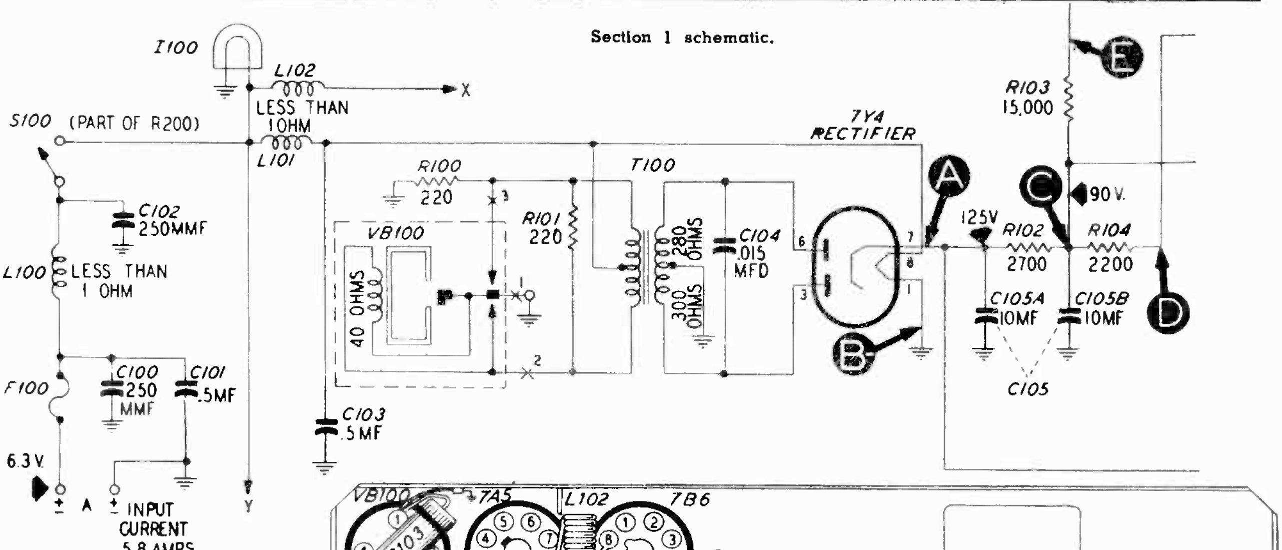
TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

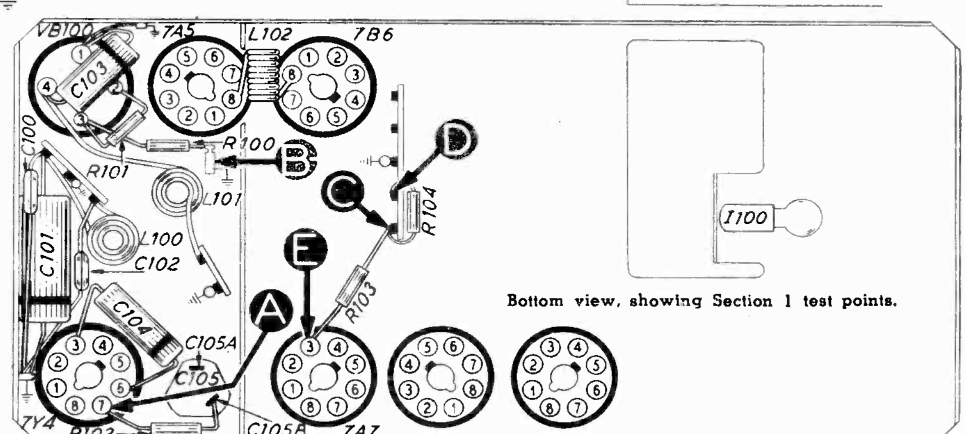
Make all measurements for this section with a volt-ohmmeter, using the applicable d-c range. All voltages given in this manual are average, and were taken with 6.3 volts d-c input to the power supply; the volume control was set at minimum, and the tuning-condenser plates were fully meshed.

WARNING: If the 7Y4 rectifier is found to be defective, check the main filter condenser, C105, for shorts before inserting a new tube. If the vibrator is found to be defective, check C104 for a short before inserting a new vibrator.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
A to B—	125 volts	Defective 7Y4, VB100, T100, C104, or C105A.
C to B—	90 volts	Defective C105B or R102.
D to B—	70 volts	Defective R104 or C303 (shown in Section 3).
E to B—	46 volts	Defective R103 or C406 (shown in Section 4).

Section 1 schematic.





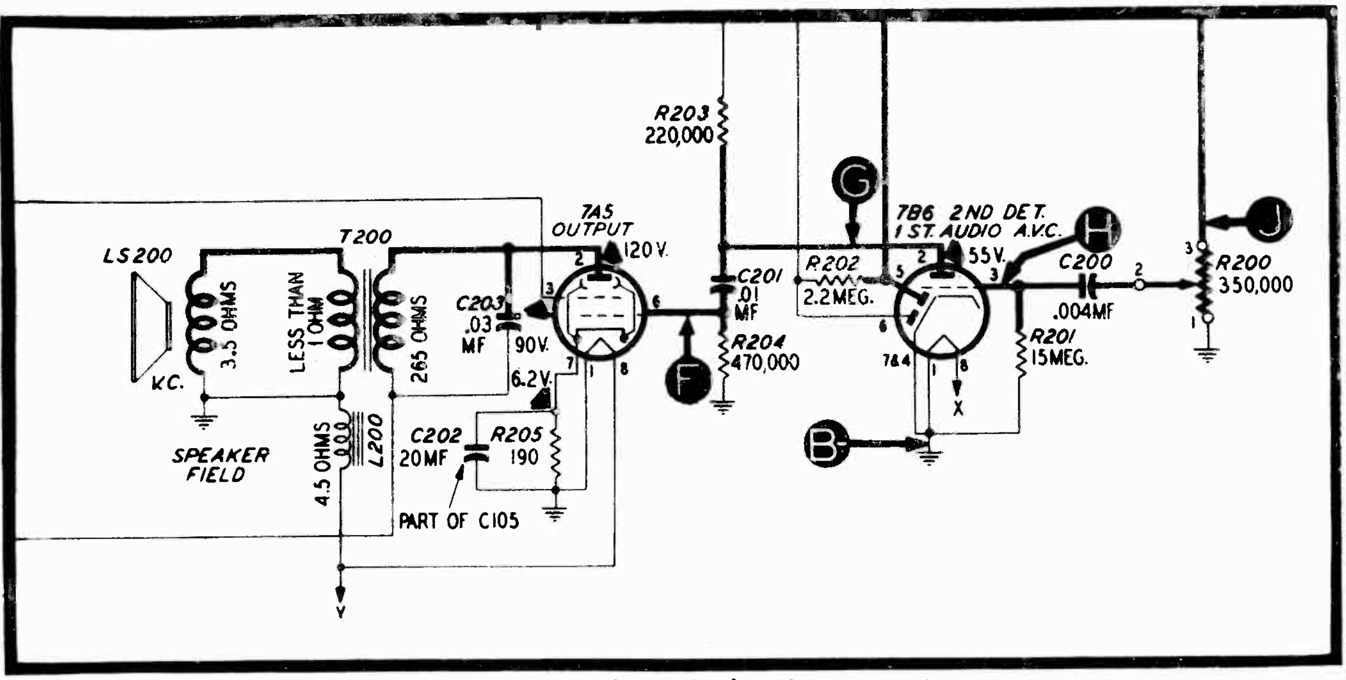
Bottom view, showing Section 1 test points.

PHILCO CORP.

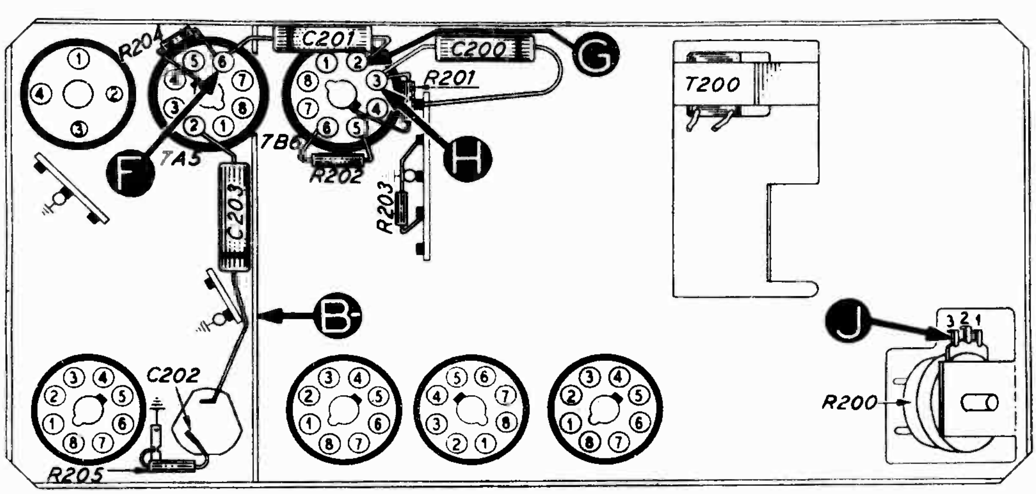
TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

For all tests in this section, use an audio signal. Connect the generator output lead through a condenser (.01 to .25 mf.) to the test points indicated; connect the ground lead to the receiver chassis (B—). Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
F to B—	Loud, clear signal.	Defective 7A5, T200, LS200, C201, C202, C203, R204, or R205.
G to B—	Loud, clear signal.	Open C201.
H to B—	Clear signal, much louder than preceding test.	Defective 7B6, R201, or R203.
J to B—	Loud, clear signal.	Defective C200, R200 (rotate R200 through its entire range for complete check) or Z301 (shown in section 3).



Section 2 schematic.

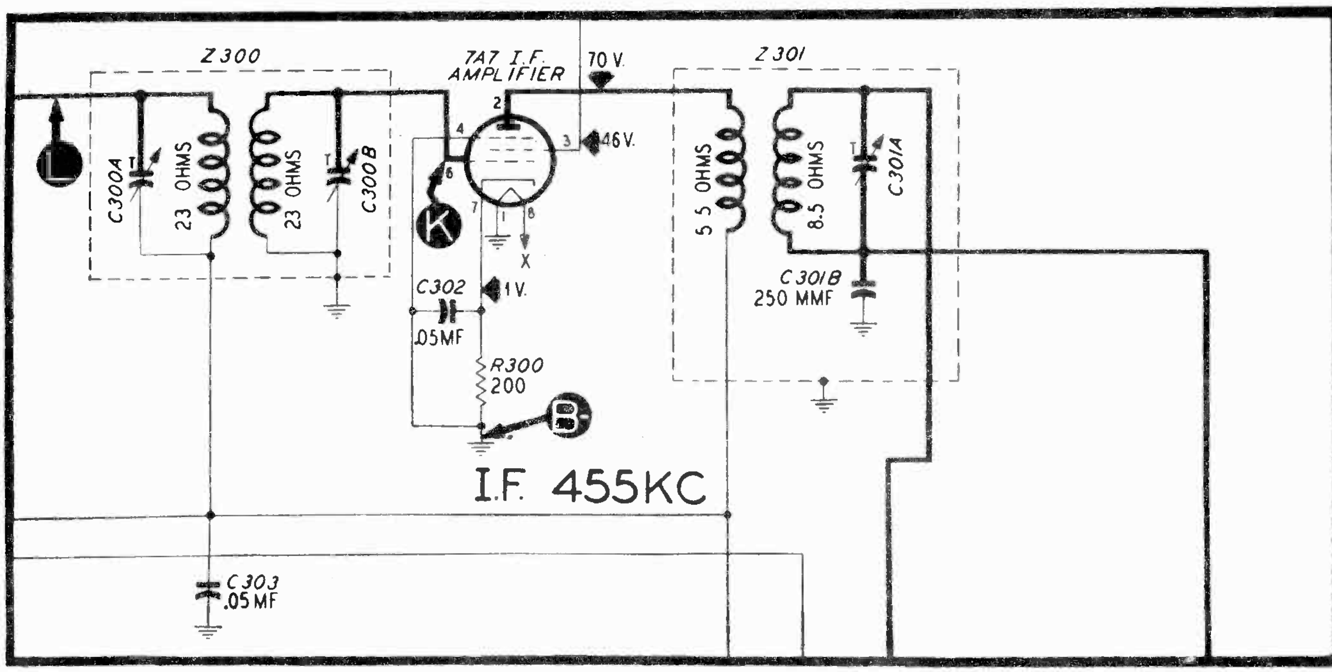


Bottom view, showing Section 2 test points.

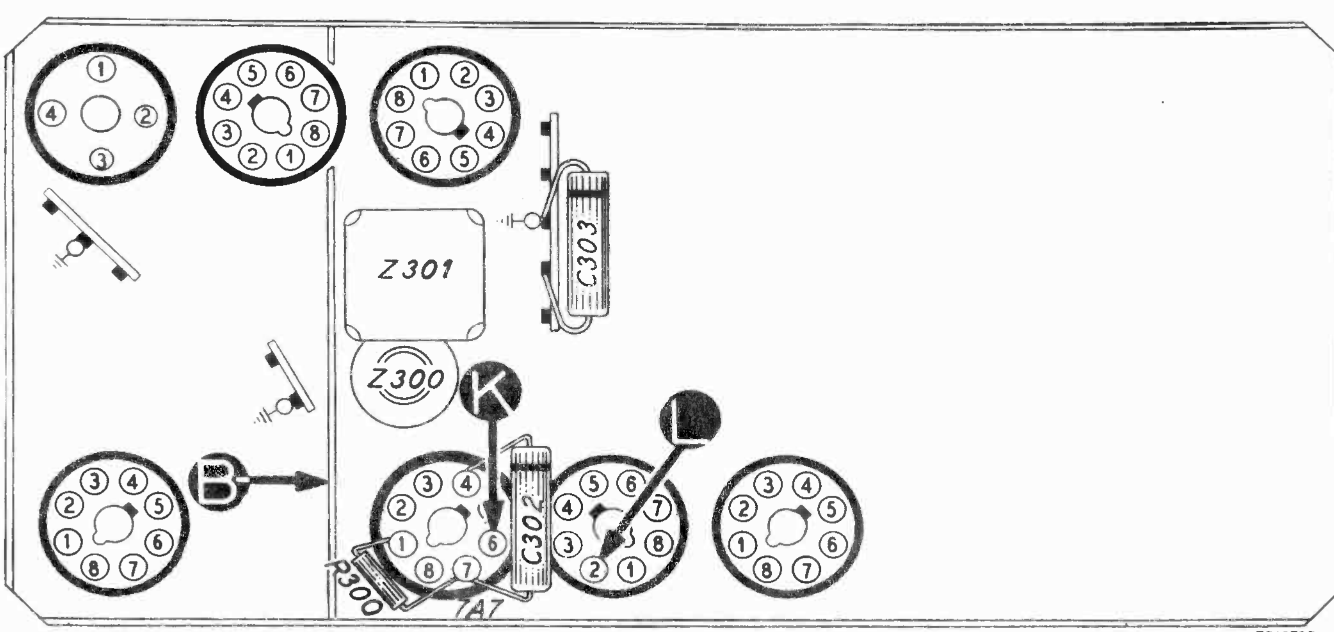
TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

For all tests in this section, use a modulated 455-kc. signal. Connect the generator output lead through a condenser (.01 to .25 mf.) to the points indicated; connect the ground lead to the receiver chassis (B—). Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
K to B—	Loud, clear signal.	Defective 7A7, Z301, C302, R300, or C406 (shown in Section 4).
L to B—	Loud, clear signal.	Defective or misaligned Z300.



Section 3 schematic.



Bottom view, showing Section 3 test points.

TP1275D

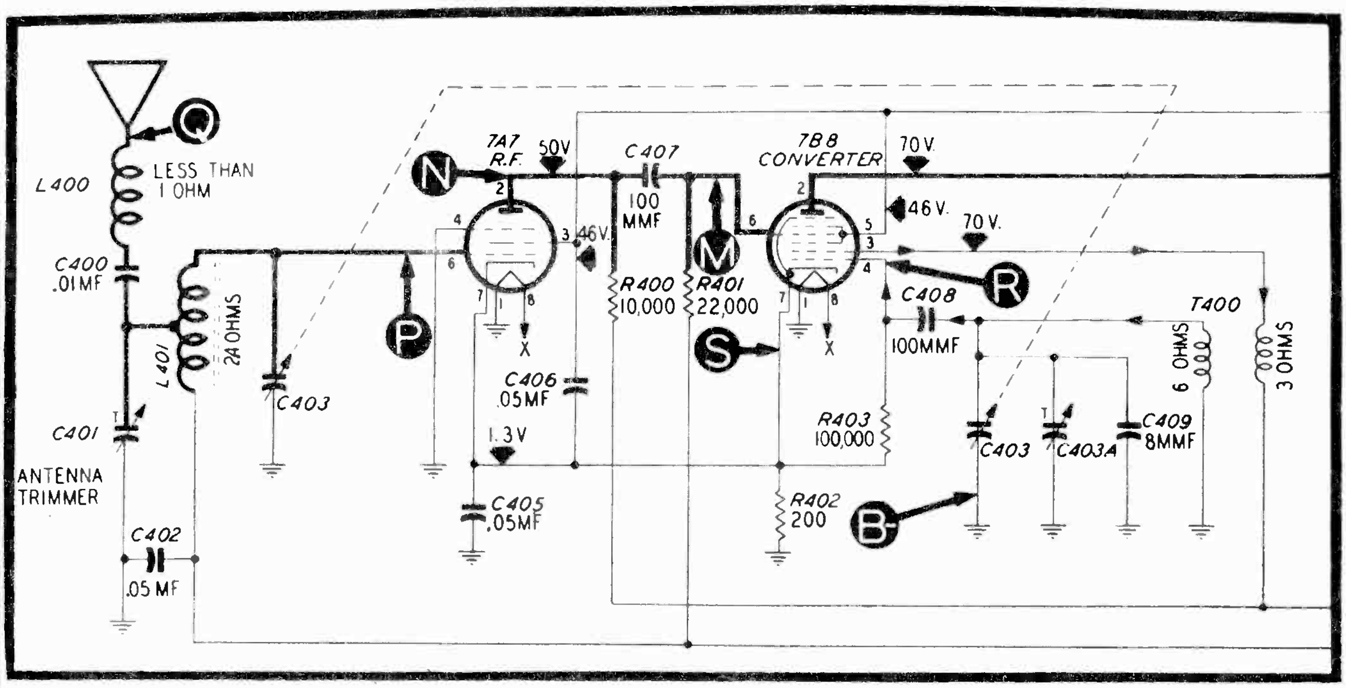
TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

1. Set the volume control at maximum. Rotate the tuning condenser through its entire range. Any scraping noise from the speaker indicates bent plates, or dirt between plates or on wiper contacts. Remedy such conditions before proceeding further.

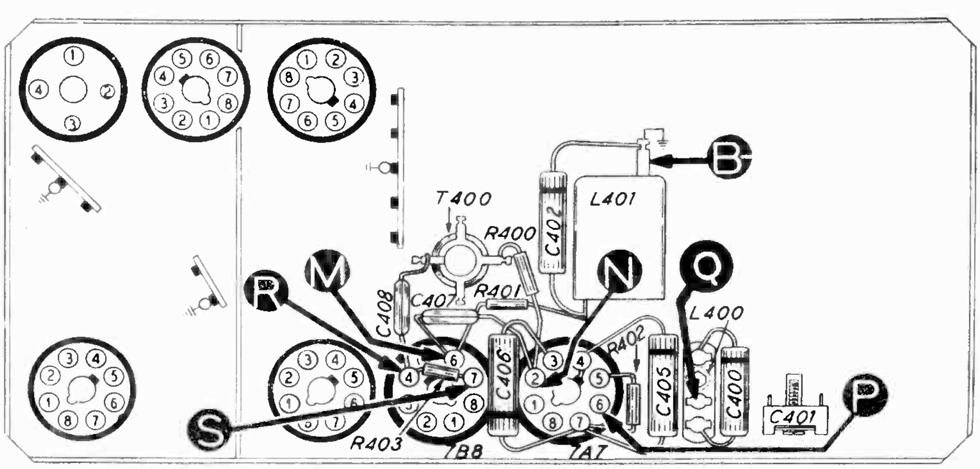
2. Attach the positive lead of a 20,000-ohms-per-volt meter to point S, and the prod end of the negative lead through a 50,000-ohm resistor to point R. Set the meter on a 10-volt or similar range, and rotate the tuning condenser through its entire range. Absence of voltage at any point indicates that the oscillator is not functioning. If this is the case, check the components listed in the first test below.

3. Connect the signal-generator output lead through a condenser (.01 to .25 mf.) to the points indicated; connect the ground lead to the receiver chassis. Using a modulated signal, tune the generator and receiver to 1000-kc., and proceed as below.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
M to B–	Loud, clear signal.	Defective 7B8, T400, C403, C403A, C405, C407, C408, C409, R401, R402, or R403.
N to B–	Loud, clear signal.	Open C407.
P to B–	Clear signal, louder than preceding test.	Defective 7A7, L401, C403, or R400.
Q to B–	Loud, clear signal.	Defective L400, L401, C400, C401, or C402.



Section 4 schematic.



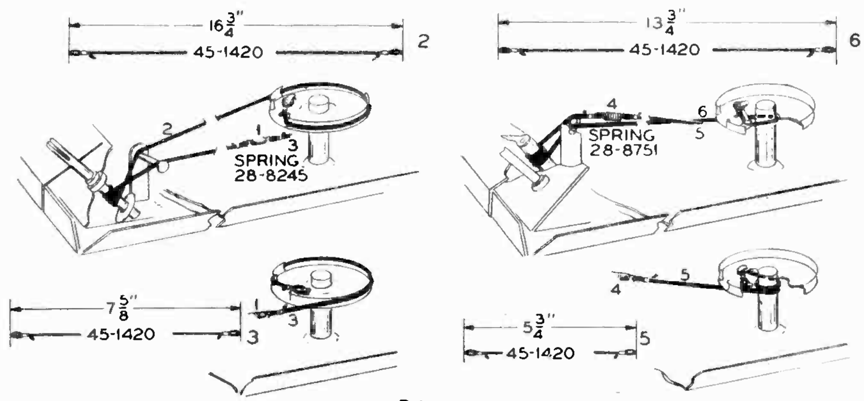
Bottom view, showing Section 4 test points.

PHILCO CORP.

MODEL UN6-100

SPECIFICATIONS

CIRCUIT	Six-tube, superheterodyne
FREQUENCY RANGE	550 to 1600 kc.
INTERMEDIATE FREQUENCY	455 kc.
POWER INPUT	6.3 volts, 5.8 amperes, d.c.
PHILCO TUBES USED	7A7(2), 7B8, 7B6, 7A5, 7Y4
AERIAL	Philco universal auto radio type



Drive-cord installation details.

Symbol designations used in the schematics and parts list are as follows:

C—condenser
F—fuse
I—pilot lamp
L—choke or coil
LS—loud speaker
R—resistor
S—switch
T—transformer
VB—vibrator
Z—electrical assembly

NOTE: Parts marked with an asterisk (*) are general replacement items, and the part numbers will not be identical with those used on factory assemblies. Use only the "Service Part No." shown in the parts list when ordering replacements.

REPLACEMENT PARTS LIST

SECTION 1

Reference No.	Description	Service Part No.
C100	Condenser, 250 mmf.	60-10245307*
C101	Condenser, .5 mf.	61-0137*
C102	Condenser, 250 mmf.	60-10245307*
C103	Condenser, .5 mf.	61-0137*
C104	Condenser, .015 mf.	61-0138*
C105	Condenser, electrolytic, 10-10-20 mf.	61-0068*
	C105A: condenser, 10 mf.	Part of C105
	C105B: condenser, 10 mf.	Part of C105
F100	Fuse	45-2559*
I100	Lamp, pilot	34-2039*
L100	Choke, "A"	32-2477
L101	Choke, vibrator	65-0204
L102	Choke, "A"	32-2477
R100	Resistor, 220 ohms	66-1224340*
R101	Resistor, 220 ohms	66-1224340*
R102	Resistor, 2,700 ohms	66-2274340*
R103	Resistor, 15,000 ohms	66-3153340*
R104	Resistor, 2,200 ohms	66-2223340*
S100	Switch	Part of R200
T100	Transformer, power	65-0404*
VB100	Vibrator	83-0026*

SECTION 2

Reference No.	Description	Service Part No.
C200	Condenser, .004 mf.	61-0179*
C201	Condenser, .01 mf.	61-0120*
C202	Condenser, 20 mf.	Part of C105
C203	Condenser, .03 mf.	61-0119*
L200	Speaker, field	Part of LS200
LS200	Speaker	73-0027*
R200	Control, volume, 350,000 ohms	67-0020*
R201	Resistor, 15 megs.	66-6154340*
R202	Resistor, 2.2 megs.	66-5224340*
R203	Resistor, 220,000 ohms	66-4223340*
R204	Resistor, 470,000 ohms	66-4474340*
R205	Resistor, 190 ohms	66-1193340*
T200	Transformer, output	Part of LS200

SECTION 3

Reference No.	Description	Service Part No.
C302	Condenser, .05 mf.	61-0122*
C303	Condenser, .05 mf.	61-0122*
R300	Resistor, 200 ohms	66-1203340*
Z300	Transformer, 1st i-f	65-0191
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
Z301	Transformer, 2nd i-f	65-0192
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, 250 mmf.	Part of Z301

SECTION 4

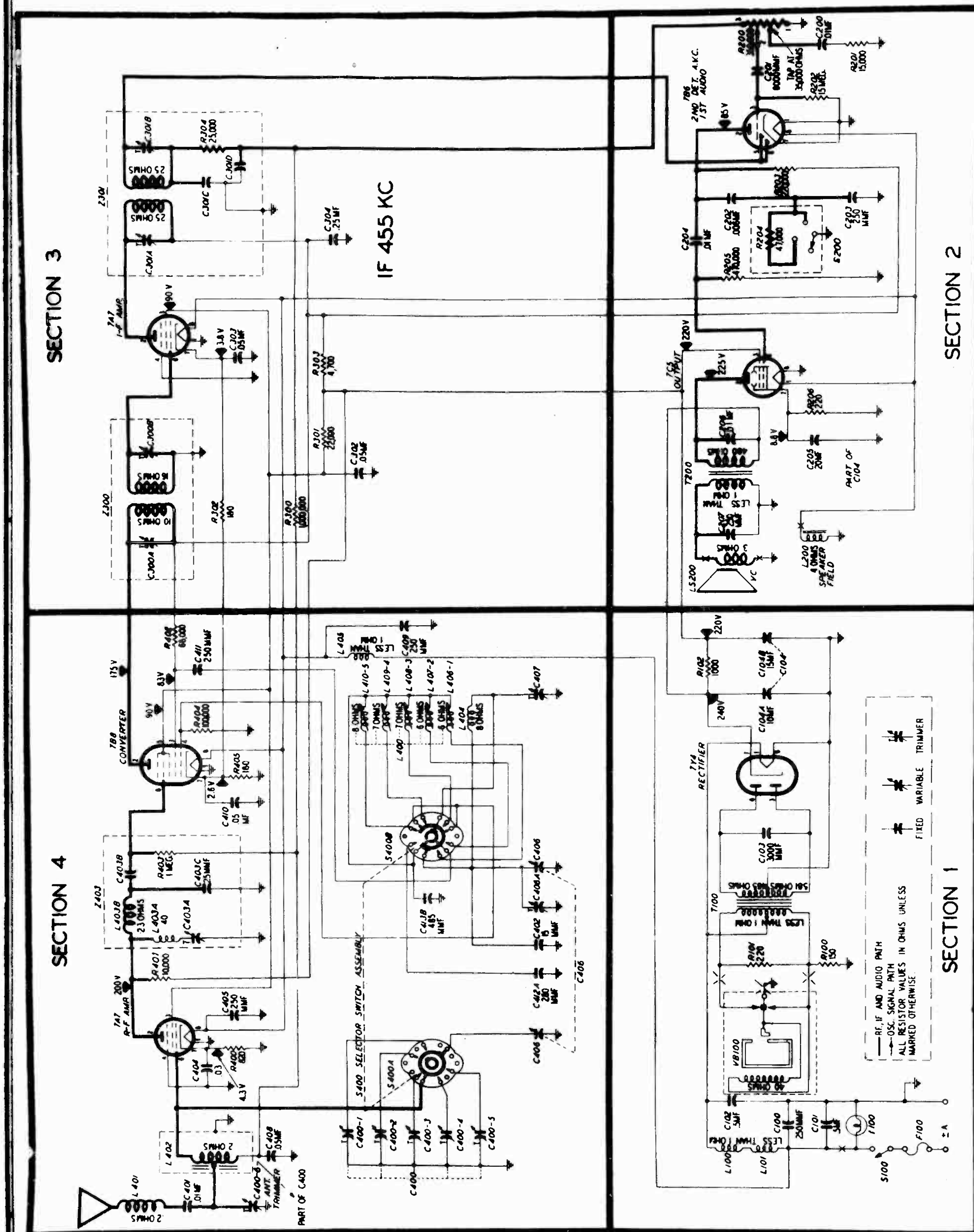
Reference No.	Description	Service Part No.
C400	Condenser, .01 mf.	61-0120*
C401	Condenser, trimmer	63-0030*
C402	Condenser, .05 mf.	61-0122*
C403	Condenser, tuning	63-0028
	C403A: condenser, trimmer	Part of C403
C405	Condenser, .05 mf.	61-0122*
C406	Condenser, .05 mf.	61-0122*
C407	Condenser, 100 mmf.	60-10105407*
C408	Condenser, 100 mmf.	60-10105407*
C409	Condenser, 8 mmf.	60-00105407*
L400	Coil, antenna choke assembly	65-0168
L401	Coil, antenna	65-0196
R400	Resistor, 10,000 ohms	66-3103340*
R401	Resistor, 22,000 ohms	66-3223340*
R402	Resistor, 200 ohms	66-1203340*
R403	Resistor, 100,000 ohms	66-4103340*
T400	Transformer, oscillator	65-0194

MISCELLANEOUS

Description	Service Part No.
"A"-lead assembly	77-0217
Bushing, pointer	57-2671FA3
Clamp, vibrator	57-1637FA3
Clip, coil mounting (oscillator)	28-5002FA1
Cord, drive (25-foot spool)	45-1420
Dial window parts	
Clip, brass	28-3445
Rivet	1W36671FA4
Window, glass	55-0501
Dial and frame assembly	
Dial	55-1200
Frame	57-1399FA3
Fuse lead assembly	77-0235
Grommet, tuning condenser mounting	27-4596
Housing assembly	
Connector, aerial	57-0591FA3
Cover, tube side	76-1702
Cover assembly, wiring side	77-0561FJ22
Screw, front cover	1W21813FA3
Screw, side cover	W1586FA3
Knob, tuning control and volume control	77-0765
Mounting parts kit	
Bolt, bracket-to-cap	1W16117FA3
Bracket, set mounting	57-0812FJ22
Lockwasher, bracket-to-set	1W57223FA1
Lockwasher, bracket-to-set	1W24516FA1
Lockwasher, bracket-to-set	1W32403FA1
Nut, bracket-to-set	1W21291FA3
Nut, front mounting	W1532FA3
Screw, bracket-to-set	1W11510FA3
Screw, front mounting	1W13212FA3
Pilot lead assembly	76-1703
Pointer	57-1940FCP
Screw, speaker mounting	1W12922FA3
Shaft, tuning	57-0802FA3
Socket, tube	27-6128*
Socket, vibrator	27-6153*
Socket assembly, pilot lamp	77-0342FA3
Spring, drive cord (music wire)	28-8245
Spring, drive cord (spring wire)	28-8751
Spring, pilot lamp (music wire)	57-0701
Strap, back	28-5998FA3
Suppression kit	
Condenser, interference filter	30-4007
Resistor, distributor	33-1196
Washer, tuning shaft	1W52353FA3

MODEL UN6-550

PHILCO CORP.

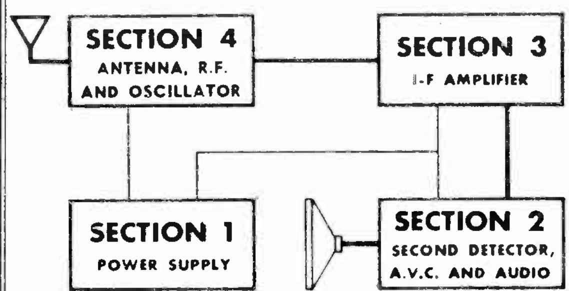


NOTE: All voltage, capacity, and resistance values shown are average. The voltages shown were measured with a 20,000-ohms-per-volt meter between the indicated test points and chassis (C), with 6.3 volts d-c input to the receiver power supply.

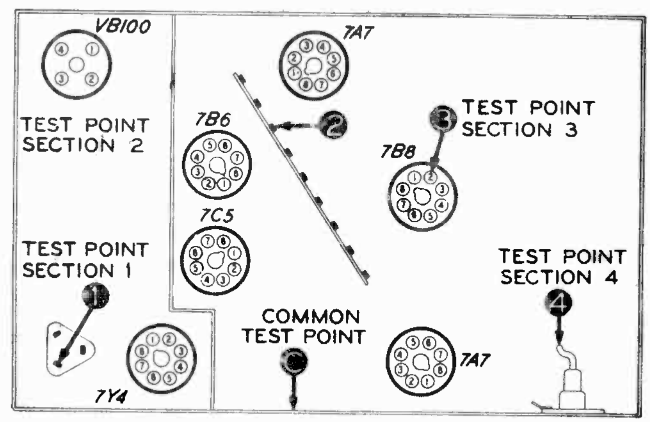
PHILCO CORP. MODEL UN6-550

SPECIFICATIONS

CIRCUIT .... Six-tube, superheterodyne
FREQUENCY RANGE .... 550 to 1580 kc.
INTERMEDIATE FREQUENCY .... 455 kc.
POWER INPUT .... 6.3 volts, 8.3 amperes, d.c. (with speaker connected)
PHILCO TUBES USED .... 7A7(2), 7B8, 7B6, 7C5, 7Y4
AERIAL .... Philco universal auto-radio type



Block diagram
(Heavy lines indicate signal path)



Bottom view, showing test points.

TROUBLE-SHOOTING PROCEDURE

In this manual, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, as shown in figure 2. Normal indications, secured when checking at these points, eliminate the section under test as a source of trouble. Isolation of the faulty part is accomplished by testing in the order shown in the sectional test charts. A high-quality signal generator, volt-ohmmeter, ammeter (0 to 30 amps., d.c.), and a source of 6.3 volts d.c. are required. The voltage readings shown were taken with a 20,000-ohms-per-volt meter.

To localize trouble, connect the receiver to the power supply; turn the receiver volume control to maximum; see that all tube filaments are lighted; then proceed in the order given in the following chart. Remedy any defect encountered before proceeding to next check.

When using the signal generator, always connect a condenser (.01 to .25 mf.) in series with the output lead.

IMPORTANT

The aerial and aerial lead-in form part of the r-f tuning circuit. When testing or aligning this receiver on the bench it is important that an aerial dummy load of equal capacity be used.

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Place ammeter in series with power source, and measure current drain of set. Measure voltage between test point 1 and chassis (C).	Approx. 8.3 amps. 220 volts
2	Apply audio signal between point 2 and chassis (C).	Loud, clear signal from speaker.
3	Apply weak, modulated 455-kc. signal between point 3 and C.	Loud, clear signal.
4	Apply weak, modulated, r-f signal (approx. 1000 kc.) between point 4 and C. Set selector switch to "DIAL",* and tuning cond. to half-meshed; tune sig. gen. until a signal is heard. Test also in "AUTOMATIC" positions 1—5 inclusive.	Loud, clear signal.

* To set the selector switch in "DIAL" position, unscrew the locking screw (see figure 11, page 6) until it protrudes ½" from the outside of the case. Then rotate the selector switch until it locks. This will be the "DIAL" position, and the "AUTOMATIC" positions 1 to 5 may be found by releasing the lock and rotating the switch clockwise, while watching the rotor arm contact on the rear of the switch wafer nearest the side of the chassis.

MODEL UN6-550 PHILCO CORP.

ALIGNMENT PROCEDURE

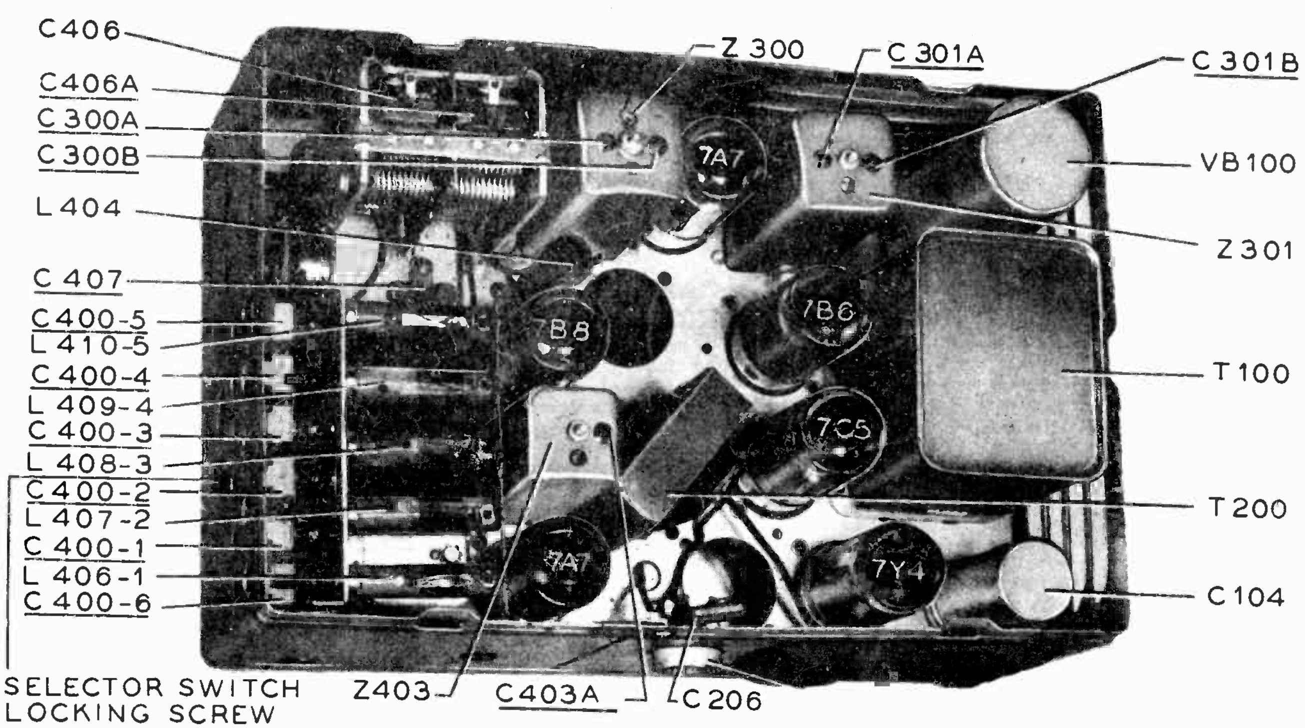
OUTPUT METER: Connect to the voice-coil lugs on the speaker. SIGNAL GENERATOR: Connect the output lead as indicated in the chart below; connect the ground lead to the receiver chassis. Set the receiver volume control at maximum. Then adjust the signal-generator output to give a readable deflection on the output meter, using the meter range that best indicates small changes in output. Reduce the signal-generator output as alignment progresses, to prevent the meter needle from going off scale.

DIAL CALIBRATION: When the radio is re-installed in the car, the dial pointer must be set to coincide with the index dot at the low-frequency end of the dial, with the tuning condenser fully meshed.

NOTE: Instructions for setting up the automatic push-button tuning control may be found in the UN6-550 Operating and Installation Instructions, Philco Part No. 39-7882.

ALIGNMENT CHART

SIGNAL GENERATOR			RECEIVER		
	Connections to Receiver	Dial Setting	Tuning-Condenser Setting	Special Instructions	Adjust Trimmers
1	Through .05 mf. to the antenna receptacle.	455 kc.	Fully meshed.	Preset C403A fully tight.	C403A (fully tight)
				Lock station-selector switch in "DIAL" position (see instructions at bottom of page 1); ground stator of oscillator section of gang. Adjust for maximum in given order; then repeat procedure.	C301B C301A C300B C300A
2	Same as 1.	455 kc.	Fully meshed.	Adjust for minimum; then remove ground from oscillator section of gang.	C403A
3	Through 30 mmf. in series with antenna lead, Philco Part No. 95-0185 to the antenna receptacle.	1580 kc.	Fully open.	Adjust for maximum.	C406A
4	Same as 3.	1400 kc.	Tune to maximum signal.	Adjust for maximum. Final adjustment must be made after radio has been re-installed in car with antenna connected.	C400-6
5	Same as 3.	580 kc.	Tune to maximum signal.	Adjust while rocking tuning gang.	C407
6	Same as 3.			Repeat steps 3, 4, and 5.	



Top view, showing trimmer-condenser locations.

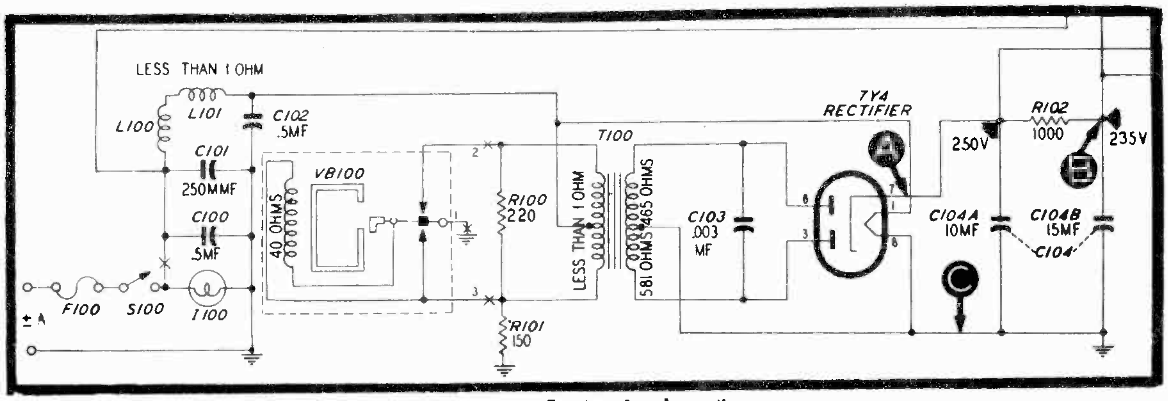
PHILCO CORP. MODEL UN6-550

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

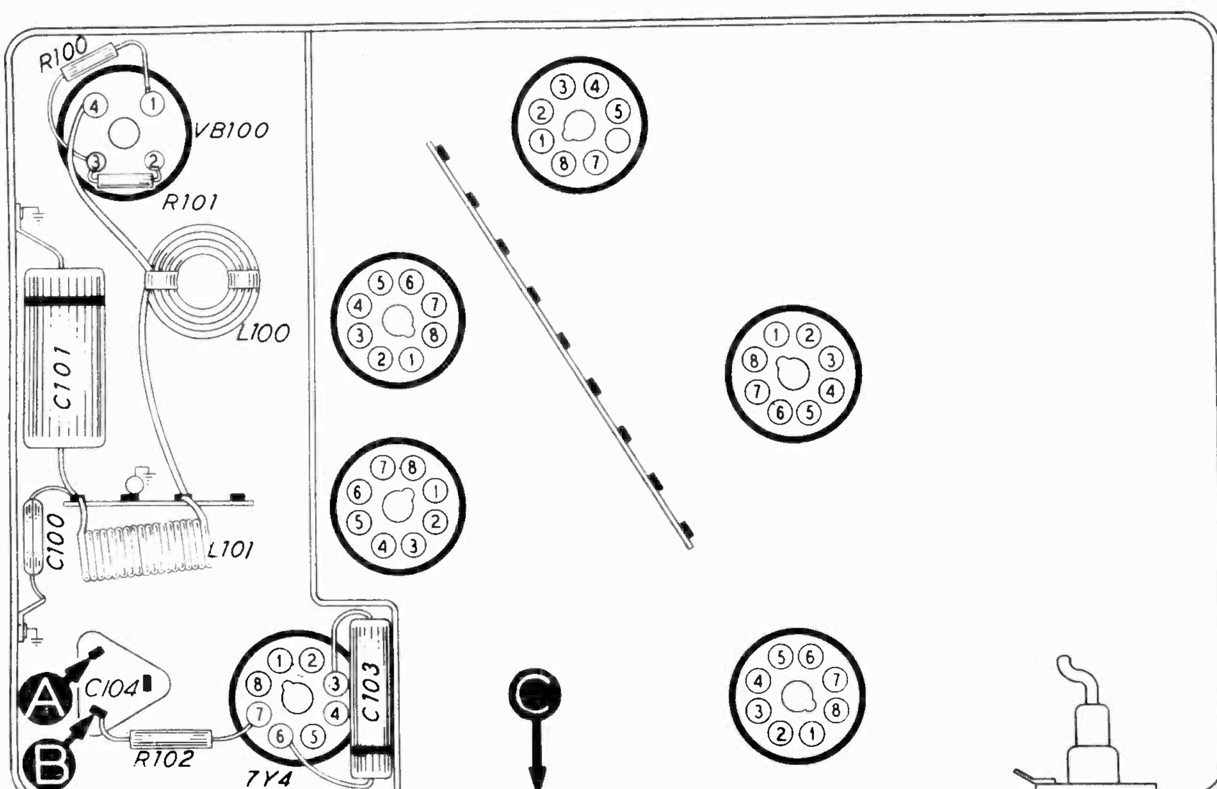
With the exception of the first test, all measurements in this section should be made with a volt-ohmmeter, using the applicable d-c range. The voltages given were measured with the volume control at minimum, and with 6.3 volts d-c input to the receiver power supply.

NOTE: If the 7Y4 is found to be defective, check C104A and C104B for shorts before inserting a new tube. If the vibrator is found to be defective, check C103 for a short before inserting a new vibrator.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
Ammeter in series with power source.	8.3 amps.	Excessively high or low current indicates defective VB100, T100, C103, or 7Y4.
A to C	240 volts	Defective 7Y4, C104A, or C104B.
B to C	220 volts	Defective R102, C104B, C302, or C304 (see Section 3 for location).



Section 1 schematic



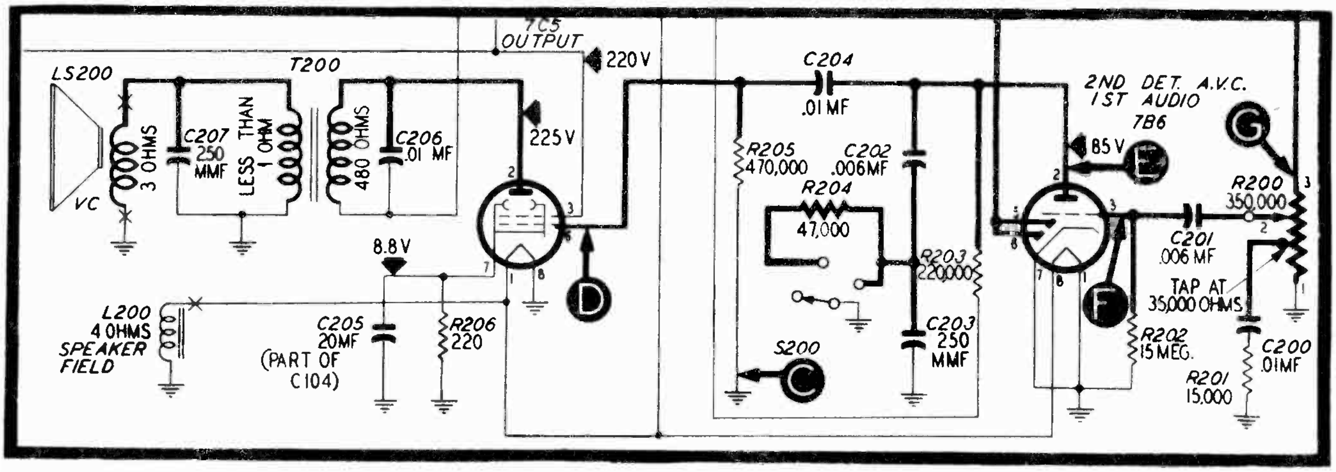
Bottom view, showing Section 1 test points.

MODEL UN6-550 PHILCO CORP.

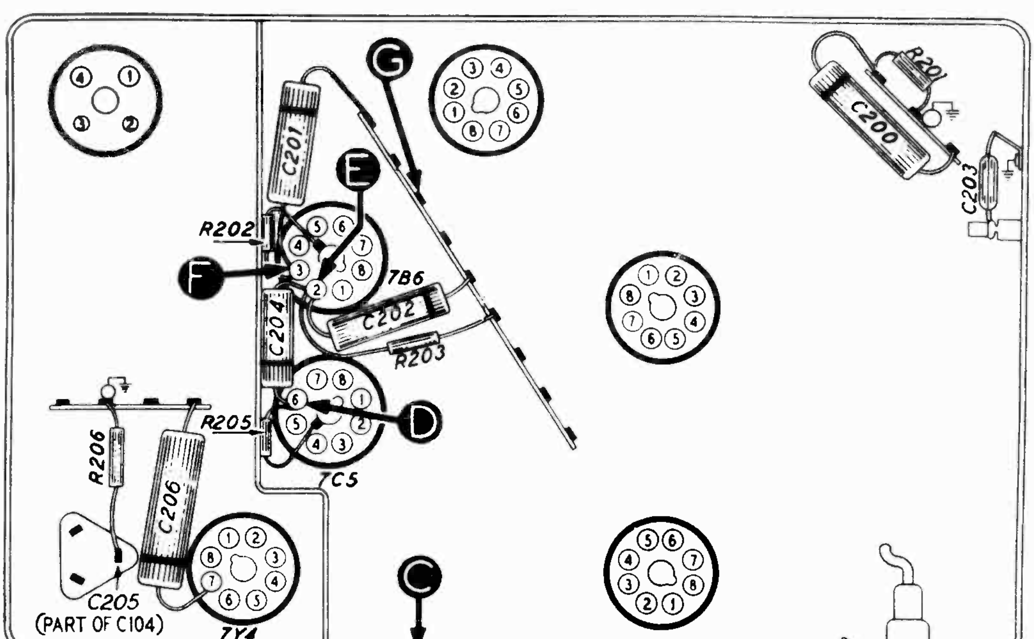
TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

For all tests in this section, use an audio signal. Connect the signal-generator output lead through a condenser (.01 to .25 mf.) to the test points indicated; connect the ground lead to the receiver chassis (C). Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
D to C	Loud, clear signal from speaker.	Defective 7C5, T200, LS200, C204, C205, C206, C207, or R206.
E to C	Loud, clear signal.	Open C204.
F to C (Short out C203)	Clear signal, noticeably louder than preceding test.	Defective 7B6, open R202, R203, R303, or shorted C202.
G to C (Remove short from C203)	Loud, clear signal.	Defective C201 or R200 (Rotate R200 through its entire range for complete check).



Section 2 schematic.



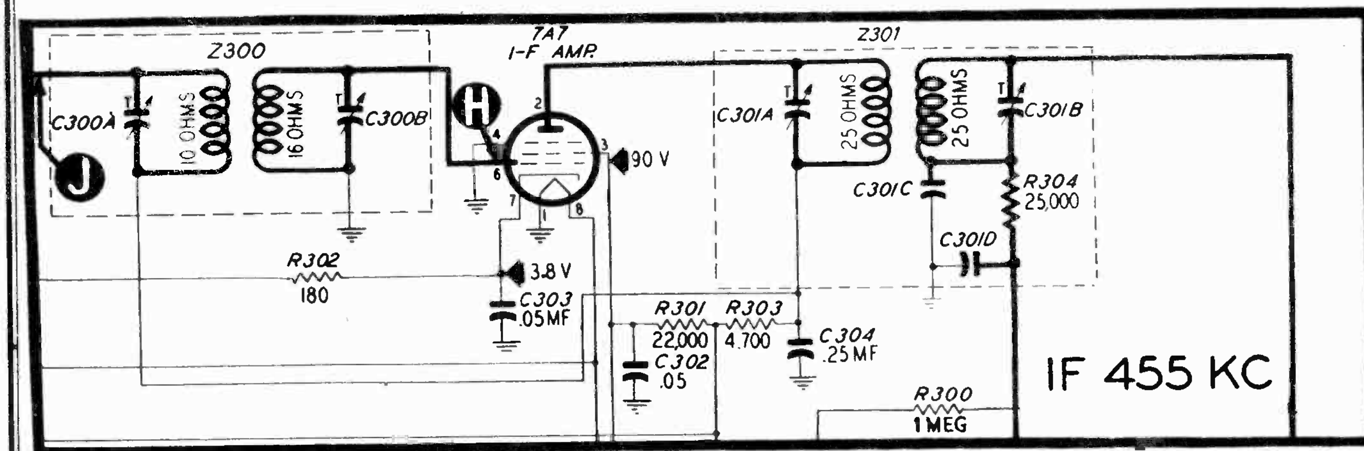
Bottom view, showing Section 2 test points.

PHILCO CORP. MODEL UN6-550

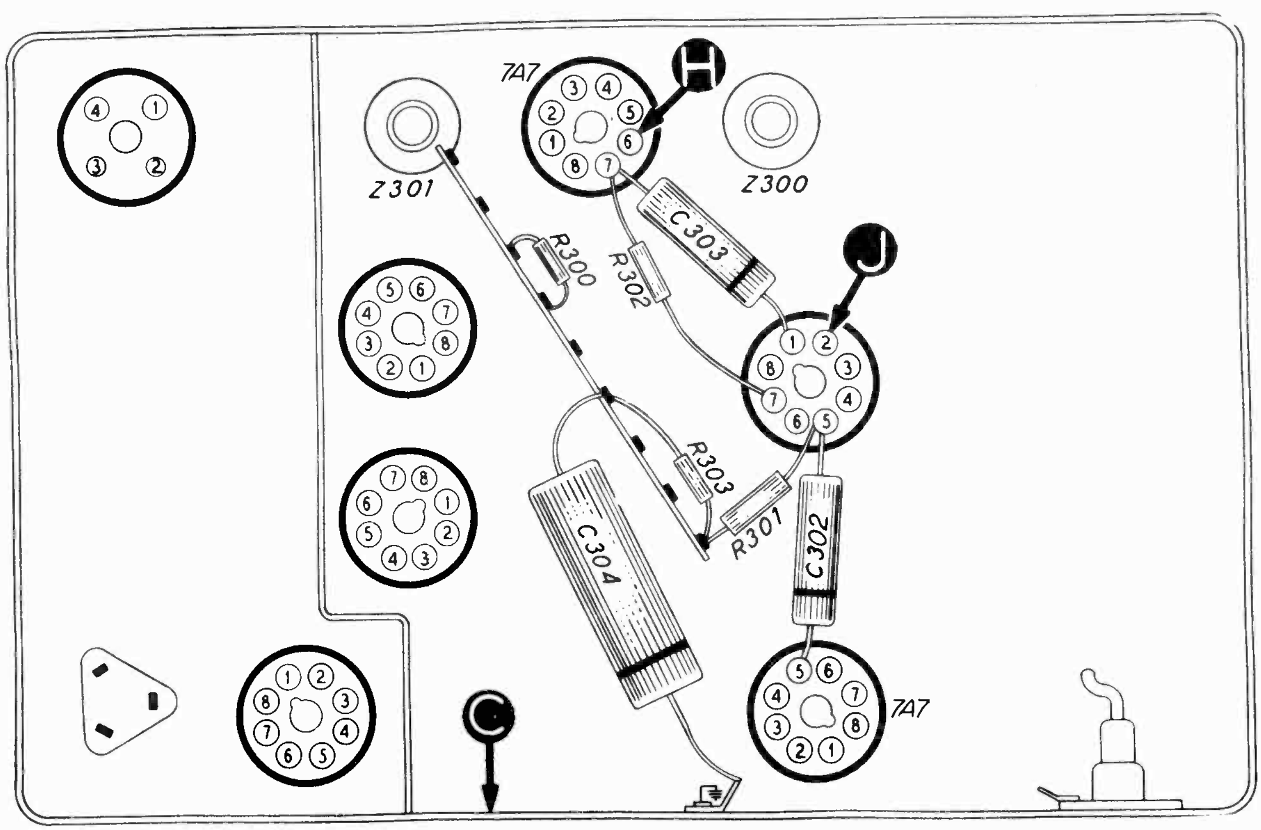
TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

For all tests in this section, set the signal generator at 455 kc., with modulation on. Connect the generator output lead through a condenser (.01 to .25 mf.) to the points indicated; connect the generator ground lead to the receiver chassis (C). Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
H to C	Loud, clear signal from speaker.	Defective 7A7, Z301, C302, C303, C304, R301, R302, R303, or R405 (see Section 4 for location).
J to C	Loud, clear signal.	Defective Z300.



Section 3 schematic.



Bottom view, showing Section 3 test points.

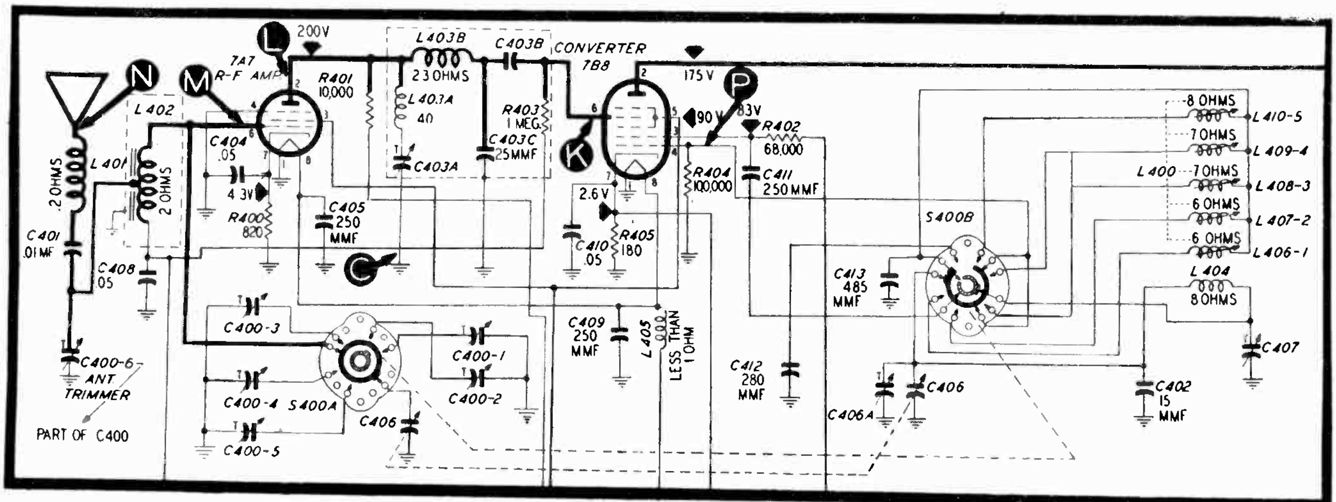
MODEL UN6-550 PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

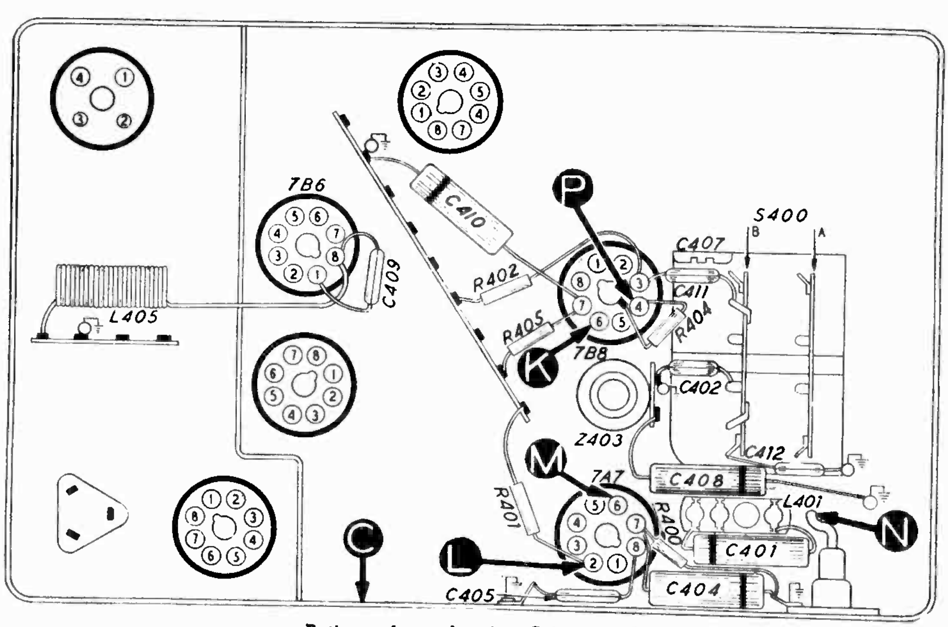
1. Attach the positive lead of a 20,000-ohms-per-volt meter to the receiver chassis, and the prod end of the negative lead through a 50,000-ohm-resistor to point P. Set the meter on a 10-volt or similar range, and rotate the tuning condenser through its entire range on each position of the band switch. Absence of voltage indicates that the oscillator is not functioning. If this is the case, check the components indicated in column 3 of the first test below, in the order listed.

2. Connect the signal-generator output lead through a condenser (.01 to .25 mf.) to the test points indicated. Connect the ground lead to the receiver chassis, set the receiver volume control at maximum, and proceed as below. The normal indication in each case will be a loud, clear signal, when the signal generator is tuned to the same frequency as the receiver, with modulation on.

1. TEST POINTS	2. SELECTOR SWITCH	3. POSSIBLE CAUSE OF ABNORMAL INDICATION
K to C (chassis)	Dial (see note, bottom of page 1).	Defective 7B8, R402, R405, C402, C406, C406A, C407, C410, C411, L404, or S400B.
K to C	Automatic Positions 1—5.	Defective L406-1, L407-2, L408-3, L409-4, L410-5, or S400B.
L to C	Dial	Defective Z403 (shown in Figure 11, page 6).
M to C	Dial	Defective 7A7, R400, R401, C404, C406, or S400A.
N to C	Dial	Defective L401, L402, or C401.
N to C	Automatic Positions 1—5.	Defective C400-1, C400-2, C400-3, C400-4, C400-5, or S400A.



Section 4 schematic.



Bottom view, showing Section 4 test points.

REPLACEMENT PARTS LIST

Symbol designations used in the schematics and parts list are as follows:

C—condenser
F—fuse
I—pilot lamp
L—choke or coil
LS—loud speaker
R—resistor
S—switch
T—transformer
VB—vibrator
Z—electrical assembly

NOTE: All parts marked with an asterisk (*) are general replacement items, and the part numbers will not be identical with those used on factory assemblies. Use only the "Service Part No." shown in this parts list when ordering replacements

SECTION 1

Reference	Description	Service Part No.
C100	Condenser, 250 mmf.	60-10245307*
C101	Condenser, .5 mf.	61-0137*
C102	Condenser, .5 mf.	61-0137*
C103	Condenser, .003 mf.	61-0115*
C104	Condenser, electrolytic, 10-15-20 mf.	61-0089*
	C104A: condenser, 10 mf.	Part of C104
	C104B: condenser, 15 mf.	Part of C104
F100	Fuse	45-2559*
I100	Lamp, pilot	34-2039*
L100	Choke, vibrator	65-0433
L101	Choke, "A"	65-0037
R100	Resistor, 150 ohms	66-1153340*
R101	Resistor, 220 ohms	66-1223340*
R102	Resistor, 1,000 ohms	66-2104340*
S100	Switch, power	85-0112*
T100	Transformer, power	65-0234*
VB100	Vibrator	83-0026*

SECTION 2

Reference	Description	Service Part No.
C200	Condenser, .01 mf.	61-0120*
C201	Condenser, .006 mf.	45-3500-7*
C202	Condenser, .006 mf.	45-3500-7*
C203	Condenser, 250 mmf.	60-10245307*
C204	Condenser, .01 mf.	61-0120*
C205	Condenser, 20 mf.	Part of C104
C206	Condenser, .01 mf.	61-0124*
C207	Condenser, 250 mmf.	60-10245307*
L200	Field, speaker	Part of LS200
LS200	Speaker	73-0047*
R200	Control, volume, 350,000 ohms	67-0032*
R201	Resistor, 15,000 ohms	66-3153340*
R202	Resistor, 15 megs.	66-6153340*
R203	Resistor, 220,000 ohms	66-4223340*
R204	Resistor, 47,000 ohms	66-3473340*
R205	Resistor, 470,000 ohms	66-4473340*
R206	Resistor, 220 ohms	66-1224340*
S200	Switch, tone-control	77-0733*
T200	Transformer, output	65-0408*

SECTION 3

Reference	Description	Service Part No.
C302	Condenser, .05 mf.	61-0122*
C303	Condenser, .05 mf.	61-0122*
C304	Condenser, .25 mf.	61-0125*
R300	Resistor, 1 meg.	66-5103340*
R301	Resistor, 22,000 ohms	66-3224340*
R302	Resistor, 180 ohms	66-1183340*
R303	Resistor, 4,700 ohms	66-2473340*
R304	Resistor, 25,000 ohms	66-3253340*
Z300	Transformer, 1st i-f	65-0319
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
Z301	Transformer, 2nd i-f	65-0320
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, trimmer	Part of Z301
	C301C: condenser	Part of Z301
	C301D: condenser	Part of Z301
	R304: resistor, 25,000 ohms (Part of Z301)	66-3253340*

SECTION 4

Reference	Description	Service Part No.
C400	Trimmer-condenser assembly	77-1187
	C400-1: condenser, push-button trimmer	Part of C400
	C400-2: condenser, push-button trimmer	Part of C400
	C400-3: condenser, push-button trimmer	Part of C400
	C400-4: condenser, push-button trimmer	Part of C400
	C400-5: condenser, push-button trimmer	Part of C400
	C400-6: condenser, antenna-trimmer	Part of C400
C401	Condenser, .01 mf.	61-0120*
C402	Condenser, 15 mmf.	60-00155407*
C404	Condenser, .05 mf.	61-0122*
C405	Condenser, 250 mmf.	60-10245307*
C406	Condenser, tuning	63-0077
	C406A: condenser, oscillator-trimmer	Part of C406
C407	Condenser, oscillator-padder	63-0048
C408	Condenser, .05 mf.	61-0122*
C409	Condenser, 250 mmf.	60-10245307*
C410	Condenser, .05 mf.	61-0122*
C411	Condenser, 250 mmf.	60-10245307*
C412	Condenser, 280 mmf.	30-1220-8*
C413	Condenser, 485 mmf.	30-1220-23*

SECTION 4 (Continued)

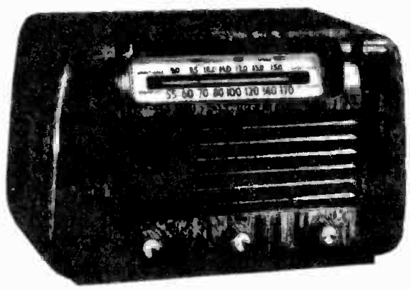
Reference	Description	Service Part No.
L401	Choke, antenna	65-0168
L402	Coil, antenna	65-0323
L404	Coil, manual-oscillator	65-0420
L405	Choke, "A"	65-0452
L406-1	Coil, push-button oscillator	65-0467
L407-2	Coil, push-button oscillator	65-0468
L408-3	Coil, push-button oscillator	65-0469
L409-4	Coil, push-button oscillator	65-0470
L410-5	Coil, push-button oscillator	65-0471
R400	Resistor, 820 ohms	66-1823340*
R401	Resistor, 10,000 ohms	66-3103340*
R402	Resistor, 68,000 ohms	66-3683340*
R404	Resistor, 100,000 ohms	66-4103340*
R405	Resistor, 180 ohms	66-1183340*
S400	Switch, selector	76-2432*
	Wafer switch shaft	77-0936
Z403	Transformer, r-f	65-0321
	C403A: condenser, r-f trimmer	Part of Z403
	C403B: condenser, coupling	Part of Z403
	C403C: condenser, 25 mmf.	Part of Z403
	L403A: coil, r-f	Part of Z403
	L403B: coil, r-f	Part of Z403
	R403: resistor, 1 meg. (Part of Z403)	66-5103340*

MISCELLANEOUS

Description	Service Part No.
Control assembly	42-5865
Case	56-3180
Cord, drive (25-foot spool)	45-1459
Cover	56-3181
Dial	55-1194
Drum assembly	77-0755
Lead, "A" (control to set)	38-8221
Lead, "A" (control to fuse)	41-3387
Lead, "A" (control to ammeter)	77-0235
Lead, tone-control	95-0135
Pilot-lamp assembly	77-0541
Plate, dial-background	57-1885
Pointer	57-1889
Shaft assembly, volume control	57-1384
Sleeve, knob	57-1324FA3
Station-indicator-shaft assembly, push-button	57-1386
Tuning-shaft assembly, manual	57-1385
Housing	77-0694FJ21
Cover, tube-side	76-1696
Cover, wiring-side	57-1345FJ21
Screw, tube-side-cover mounting	1W21813FA26
Set mounting hardware	
Bolt, hook, set-mounting	57-1340FA3
Lockwasher, set-mounting	1W57223FA1
Nut, set-mounting	1W21291FA3
Speaker unit	
Baffle, speaker	55-0957
Bolt, bracket-to-bracket	97-0061FA3
Bolt, bracket-to-instrument-panel	1W17331FA4
Bracket, speaker	57-1461FA3
Bracket, "U"	57-2162FA3
Gasket and screen	55-1320
Lockwasher, bracket-to-instrument-panel	1W35032FE7
Lockwasher, bracket-to-bracket and bracket-to-instrument-panel	1W24260FE7
Lockwasher, speaker-mounting and speaker-to-bracket	1W24257FE7
Nut, speaker-to-bracket	1W19988FA3
Nut, bracket-to-bracket and bracket-to-instrument-panel	1W21291FA3
Screw, speaker-to-bracket	1W10638FA4
Spacer, cardboard	55-0449
Washer, speaker-to-bracket	1W52353FA3
Suppressor kit	
Condenser, interference	30-4007
Resistor, distributor	33-1196
"A" lead	95-0227
Clamp, vibrator	57-1637FA3
Clip, coil-mounting	28-5002FA1
Connector, antenna	57-0591FA3
Cup, core	W2032
Grommet, "A" lead	27-4676
Grommet, tuning-condenser-mounting	27-4596
Screw and core assembly	57-1744FA3
Shield, power	57-1744FA3
Socket, speaker	55-1318*
Socket, tube	27-6128*
Socket, vibrator	27-6153

MODEL 46-427

PHILCO CORP.



Model 46-427

SPECIFICATIONS

CABINET	Model 46-427 (Wood, walnut finish)
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGE	Broadcast—540 to 1700 kc. Short-wave—9.5 to 15.0 mc.
POWER INPUT	105 to 120 volts—A.C. or D.C.
POWER CONSUMPTION	32 watts
ANTENNA	Built-in loop or external
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES USED	14AF7/XXD, 7B7 (2), 7C6, 50L6GT, 35Z5GT/G
PILOT LAMP	6 to 8-volt, bayonet base, brown bead, Part No. 34-2068

PHILCO TROUBLE-SHOOTING PROCEDURE

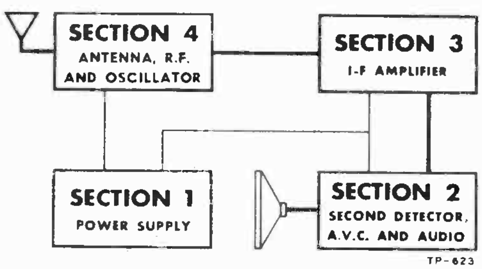


Figure 1. Block diagram (Heavy lines indicate signal path).

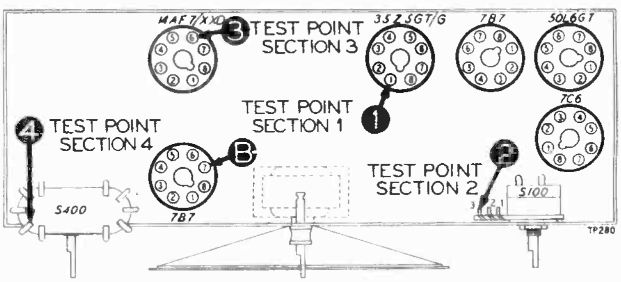


Figure 2. Bottom view, showing test points.

In this manual, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, as shown in figure 2. Abnormal indications, secured when checking at these test points, localize trouble to the section under test. After localization, isolation of the faulty part is accomplished by testing in the order shown in the sectional test charts. A high-quality signal generator and a volt-ohmmeter are required. Voltage readings shown were taken with a 20,000-ohms-per-volt meter. To localize trouble, connect the receiver to the power line; turn receiver volume control full on; see that all tube filaments are lighted; then proceed in the order given in the following chart. When applying a signal, connect the signal-generator output lead through a condenser (.01 to .25 mf.). Remedy any defect encountered before proceeding to the next check.

TESTS TO ISOLATE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Measure voltage between point 1 (+) and B–.	*85 volts
2	Apply an audio signal through a condenser (.01 to .25 mf.) between point 2 and B–.	Loud, clear signal
3	Apply a weak modulated r-f signal (455 kc.) through a condenser (.01 to .25 mf.) between point 3 and B–.	Loud, clear signal
4	Apply a weak modulated r-f signal (1,000 kc.) through a condenser (.01 to .25 mf.) between point 4 and B–. (Band switch in "Broadcast" position.) Repeat this test at 12.0 mc. with band switch in "Shortwave" position.	Loud, clear signal

* For 117-volt a-c input. When operating on d-c line and no voltage can be measured, reverse power plug.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

Make all tests for this section with a volt-ohmmeter, using the 0-250v. d-c range. See figures 3 and 4 for location of test points.

TESTS POINTS	NORMAL READING	POSSIBLE CAUSE OF ABNORMAL READING
A to B–	112v.	No voltage indicates defective 35Z5, or shorted C-101. Low voltage indicates defective 35Z5, leaky or open C-101, or shorted C-200. (Refer to Section 2 for location.)
C to B–	85v.	No voltage indicates open speaker field. Low voltage indicates leaky C-101 or C-200. (Refer to Section 2 for location.)

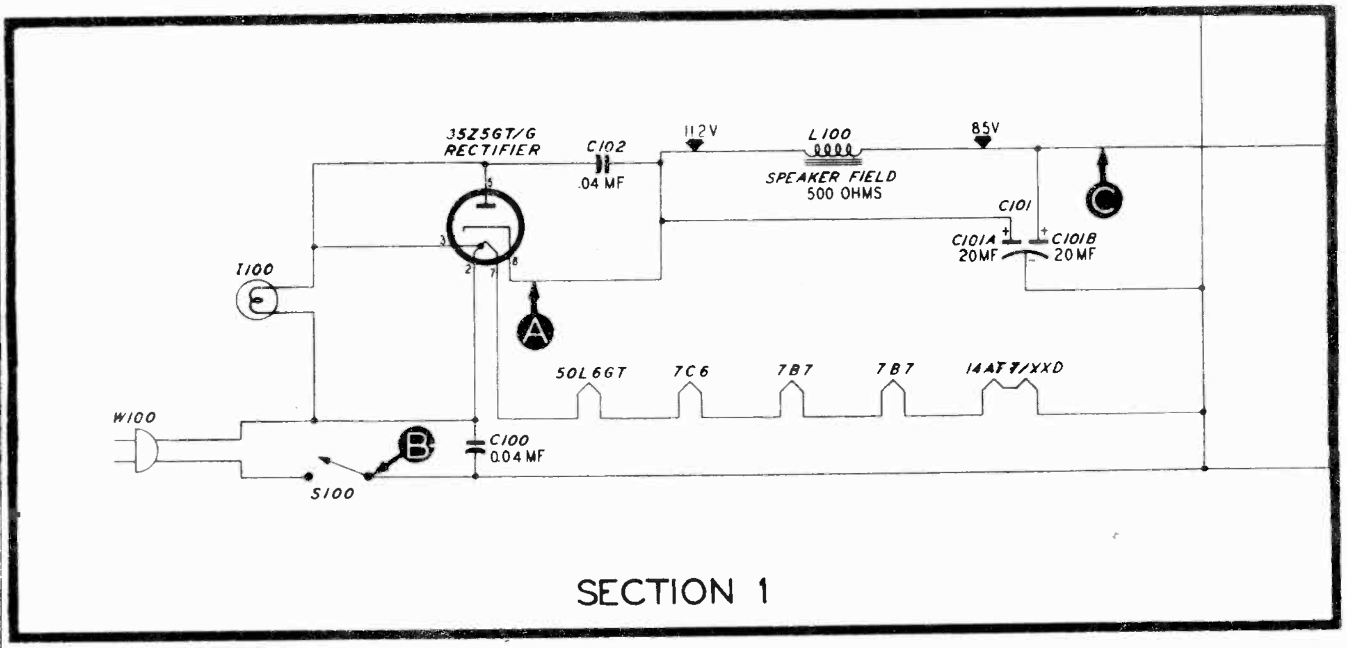


Figure 3. Section 1 schematic.

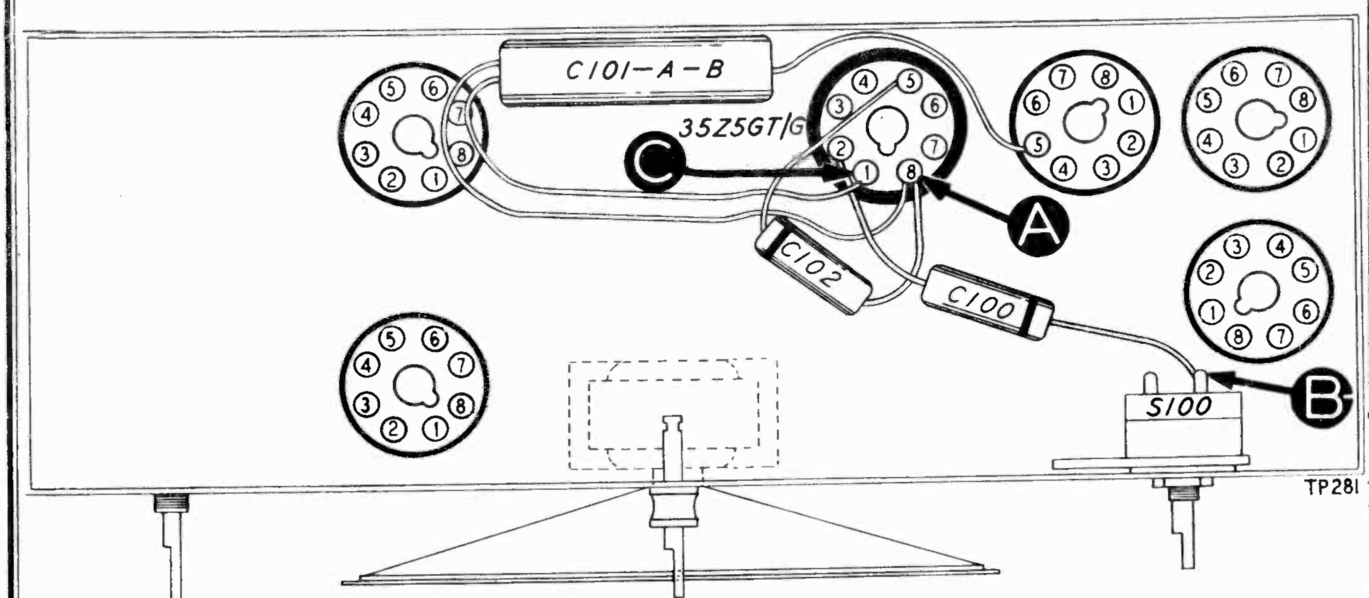


Figure 4. Bottom view, showing section 1 test points.

PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

For all tests in this section, use the audio range of the signal generator. Connect the output lead through a condenser (.01 to .25 mf.) to the point indicated, and the ground lead to B–. Adjust signal generator output for a clear, audible signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
D to B–	Clear, audible signal from speaker.	No signal, weak, or distorted signal indicates defective 50L6, output transformer T-200, or speaker LS-200, shorted condenser C-201, leaky condenser C-202, or open resistor R-204.
E to B–	Clear, audible signal, same as preceding test.	No signal indicates open condenser C-202.
F to B–	Clear, audible signal, noticeably louder than preceding test.	No signal, or weak signal, indicates defective 7C6, or open resistor R-202.
G to B–	Clear, audible signal, same as preceding test.	No signal indicates open condenser C-203. Hum, noise, or distortion indicates defective volume control.*

* In making this test, the volume control should be rotated throughout its range. Noise, or distortion indicates a defective control.

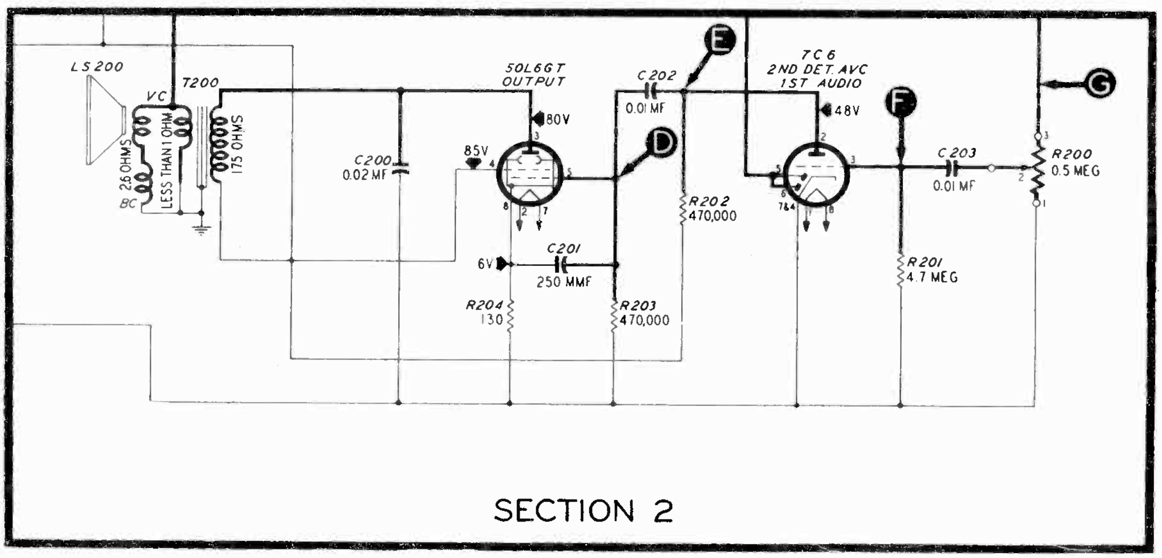


Figure 5. Section 2 schematic.

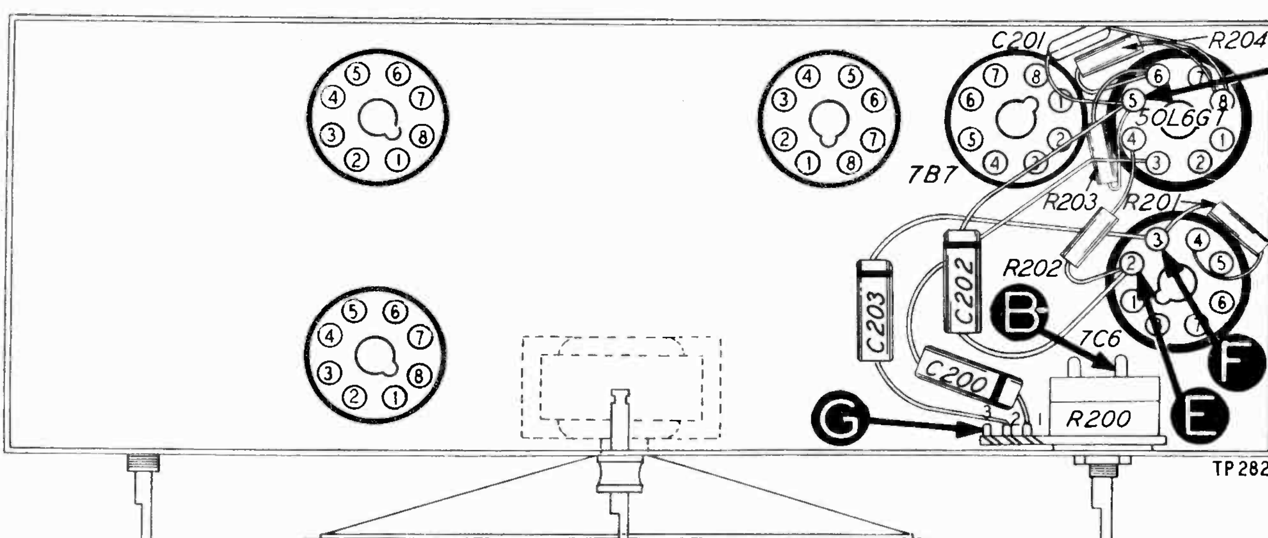


Figure 6. Bottom view, showing section 2 test points.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

For all tests in this section, set signal generator at 455 kc., modulation ON. Connect output lead through a condenser (.01 to .25 mfd.) to point indicated, and ground lead to point B—. Adjust signal generator output for clear, audible signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
H to B—	Audible signal from speaker.	No signal indicates defective 7B7, i-f transformer Z-302, shorted condenser C-303, open resistor R-301, or defective diode section of 7C6 (Section 2).
J to B—	Audible signal from speaker, louder than preceding test.	No signal indicates defective 7B7, or i-f transformer Z-301.
K to B—	Audible signal from speaker, same as preceding test.	No signal indicates defective i-f transformer Z-300, or open resistor R-300.

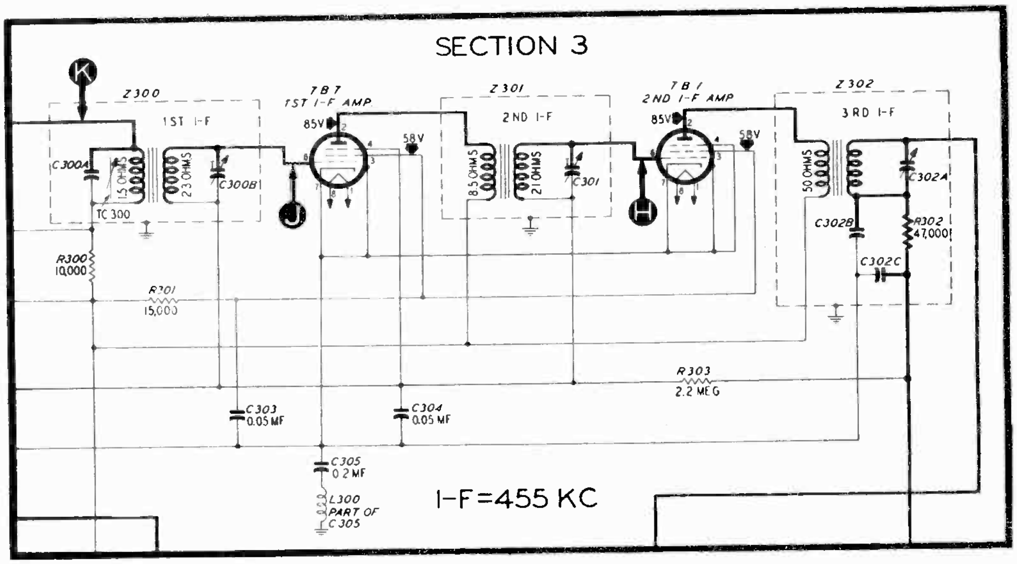


Figure 7. Section 3 schematic.

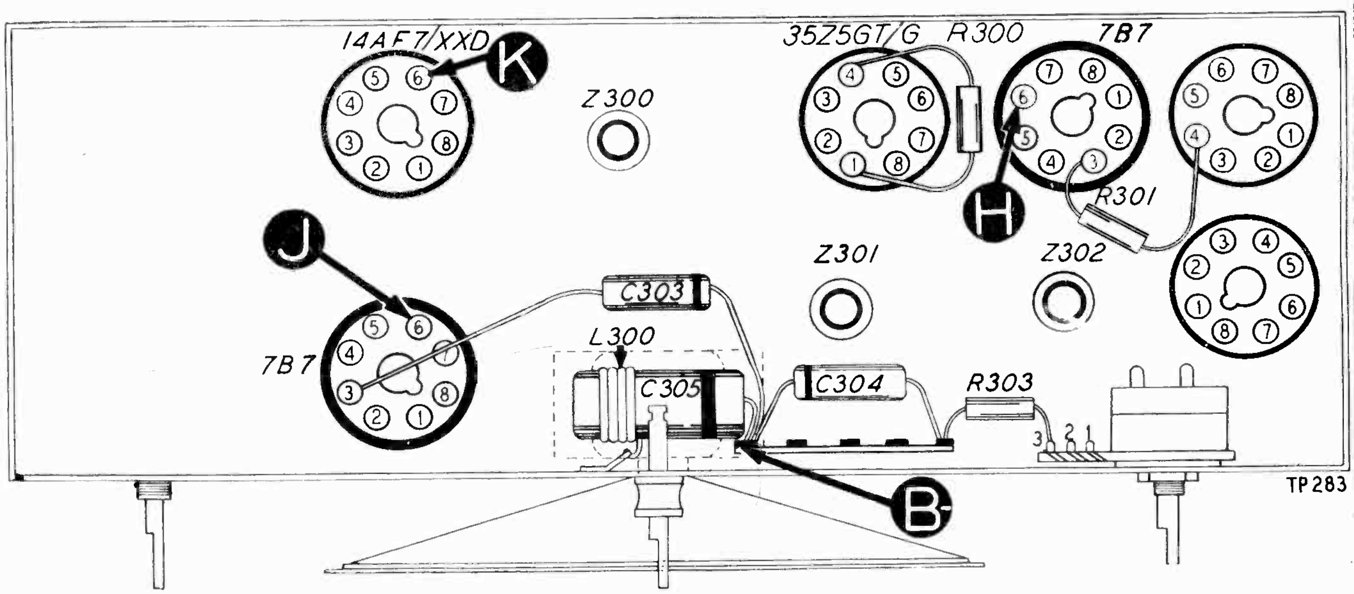


Figure 8. Bottom view, showing section 3 test points.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

NOTE: As a preliminary test, the tuning control should be rotated throughout its range. Any scraping noise heard in the speaker indicates bent plates, dirty wiper contacts, or dirt between the plates.

To fully check this section, all tests should first be made with the receiver and signal generator set at 540 kc., and then repeated at 1700 kc.

This procedure should also be followed in testing the short-wave band, with the receiver and signal generator set at 9.5 mc.; and then at 15 mc.

Connect the signal-generator output through a condenser (.01 to .25 mfd.) to the point indicated, and the ground lead to B–. Adjust the signal-generator output control for a clear, audible signal.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
L to B–	Clear, audible signal from speaker.	No signal indicates defective 14AF7 or transformer T-401, open resistor R-402, or shorted condenser C-409. †(For supplementary oscillator test see footnote below.)
M to B–	Clear, audible signal from speaker.	No signal indicates defective coil L-400 (Broadcast) or T-400 (Short-wave).

OSCILLATOR GRID BIAS VOLTAGE

† Attach the positive lead of a 20,000-ohms-per-volt meter to point P, and the prod end of the negative lead, through a 50,000-ohm resistor, to point N. Set the meter on 10-volt or similar range and rotate the tuning condenser through its entire range on each position of the band switch. Absence of voltage at any point indicates that the oscillator is not functioning. If so, check the components listed in the first test in the chart above.

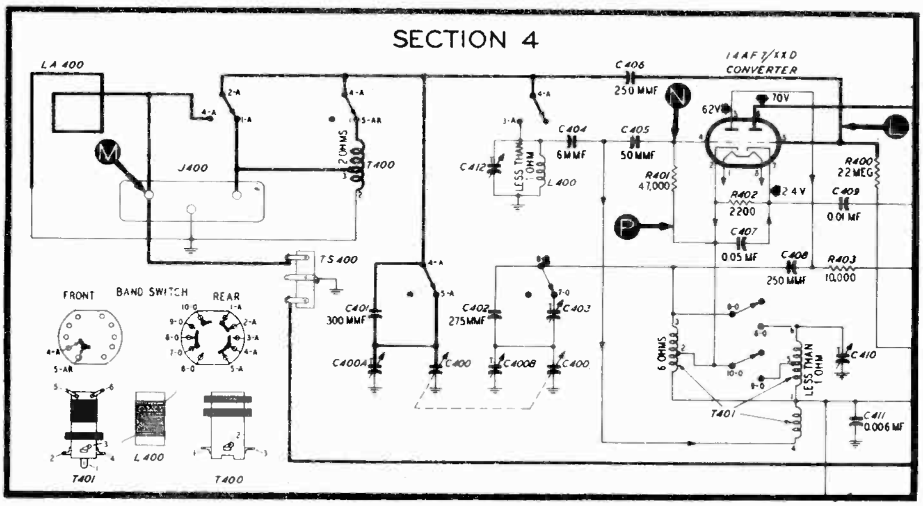


Figure 9. Section 4 schematic.

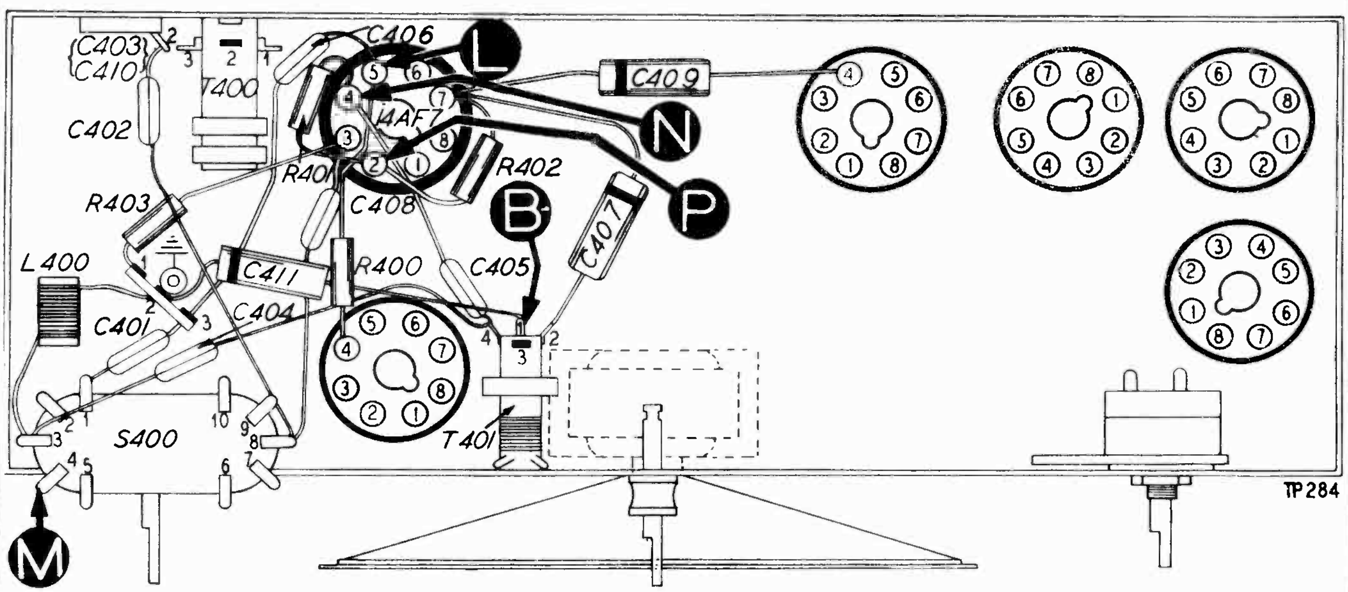


Figure 10. Bottom view, showing section 4 test points.

CONNECTING ALIGNING EQUIPMENT

Output Meter: Connect between output (left hand) and ground (center) lugs of terminal strip TS-400 on rear of chassis, shown in figure 11.

Signal Generator: Connect output lead through a .05 mfd. condenser to indicated test point and ground lead to B–.

Adjust generator output to give a readable deflection on the output meter, using meter range that best indicates small changes in output. Reduce generator output as alignment progresses to prevent meter needle from going off scale.

Turn receiver volume control to maximum and adjust all trimmers, in the order listed, for maximum output.

ALIGNMENT CHART

	SIGNAL GENERATOR		RECEIVER			
	Connections to Receiver	Dial Setting Kc.	Band Switch Position	Dial Setting Kc.	Special Instructions	Adjust Trimmers in Order Given
1	Stator terminal of antenna section of tuning condenser.	455	Broadcast	Plates fully meshed	Set pointer to index mark on back plate. Preset C-300-B by turning down tight; then adjust all 4 i-f trimmers for maximum, in the order listed.	C-302 C-301 TC-300 C-300B
2	Antenna connection of TS-400.	1700	Broadcast	1700	Preset C-403 by turning down tight, then backing off 1/3 turn.	C-400B
3	Same as 2	1500	Broadcast		Tune receiver to signal generator.	C-400A
4	Same as 2	1700	Broadcast	1700		C-400B
5	Same as 2	1500	Broadcast		Repeat adjustment in step 3.	C-400A
6	Same as 2	15.0 mc.	Short Wave	15.0 mc.		C-410 C-412
7	Same as 2	9.5 mc.	Short Wave	9.5 mc.		C-403

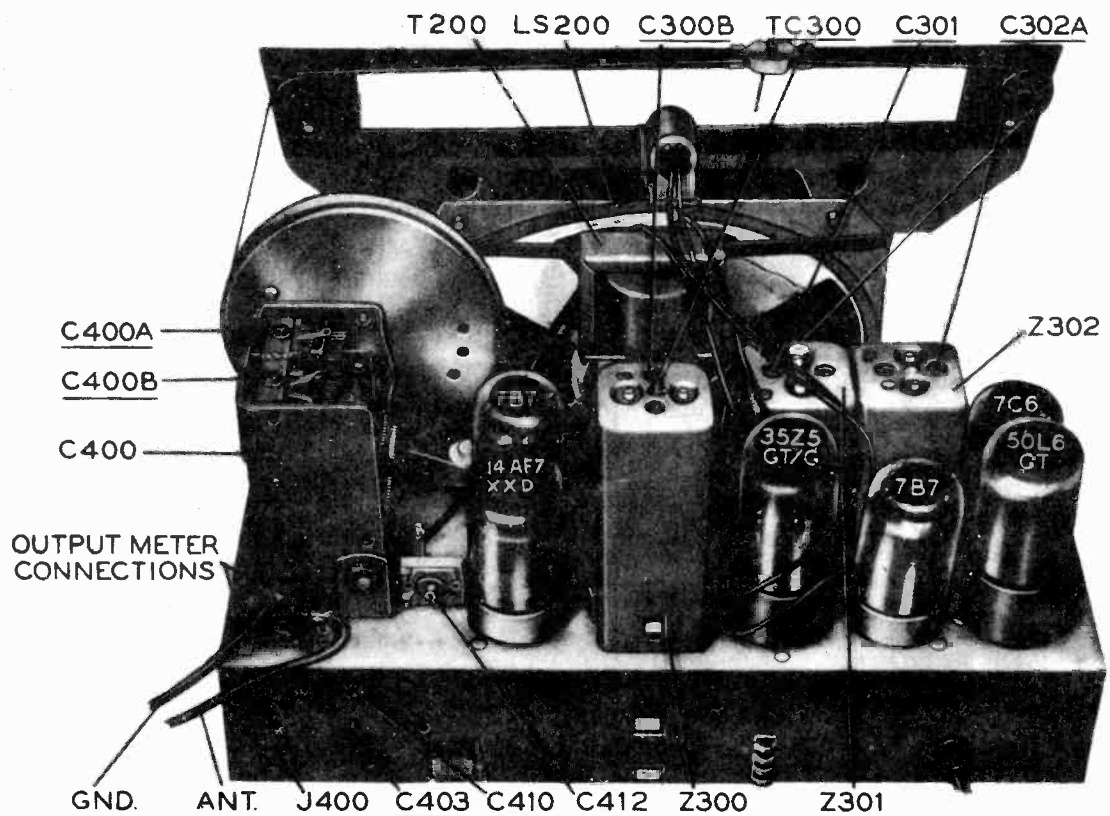


Figure 11. Top view, showing trimmer condenser locations.

MODEL 46-427

PHILCO CORP.

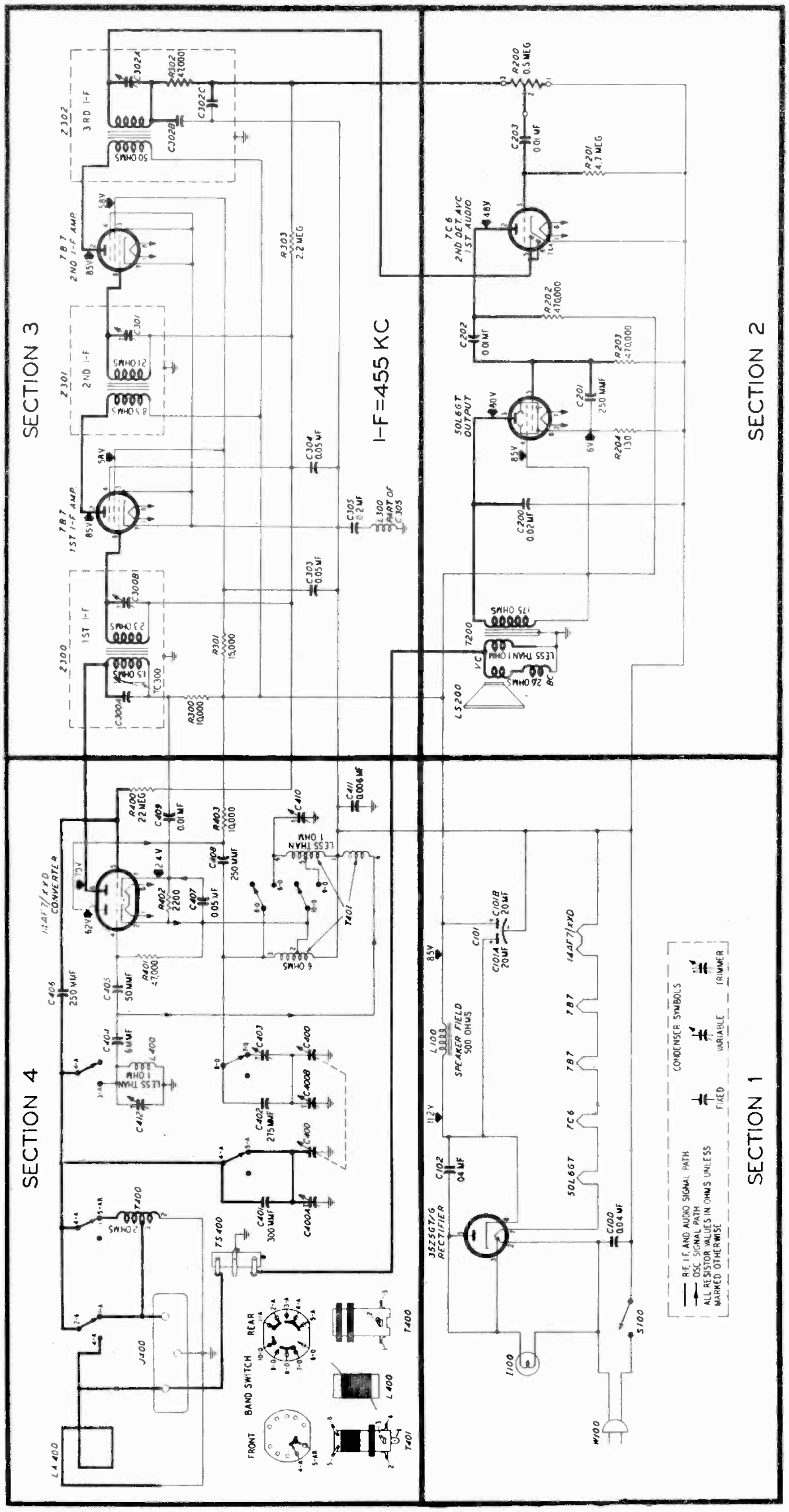


Figure 12. Complete Schematic.

NOTE: All voltage, capacity, and resistance values shown are average. The voltages shown were measured with a 20,000-ohms-per-volt meter between the indicated test points and B– (negative return of power supply).

Symbol designations used in the schematics and parts list are as follows:

C—condenser
I—pilot lamp
LA—loop antenna
LS—loudspeaker
R—resistor
S—switch
T—transformer
W—power cord and plug
Z—i-f transformer assembly

NOTE: Parts marked with an asterisk (*) are general replacement items, and the part numbers will not be identical with those used on factory assemblies. Use only the "Service Part No." shown below when ordering replacements.

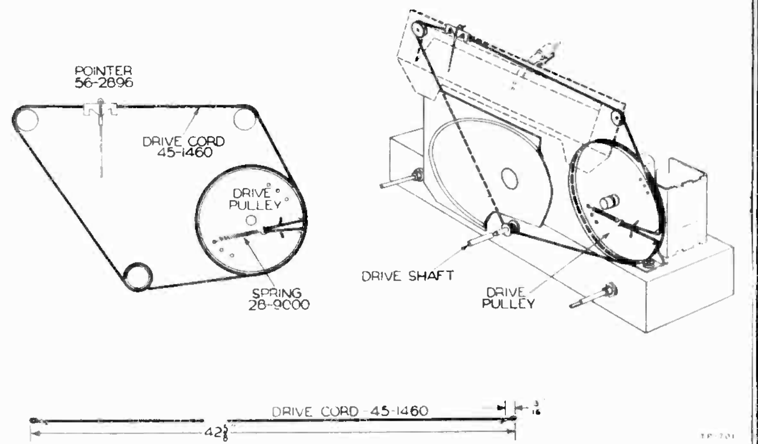


Figure 13. Drive cord installation details.

REPLACEMENT PARTS LIST

SECTION 1

Reference Number	Description	Service Part No.
C100	Condenser, .04 mf.	30-4119
C101	Condenser, electrolytic, 20-20 mf.	30-2541
C101A	Condenser, 20 mf.	Part of C101
C101B	Condenser, 20 mf.	Part of C101
C102	Condenser, .04 mf.	30-4119
I100	Lamp, pilot	34-2068
L100	Coil, field	Part of LS200
S100	Switch, a-c	Part of R200
W100	Cord, line	L3199

SECTION 2

Reference Number	Description	Service Part No.
C200	Condenser, .02 mf.	30-4599*
C201	Condenser, 250 mmf.	60-10245407*
C202	Condenser, .01 mf.	61-0120*
C203	Condenser, .01 mf.	61-0120*
LS200	Speaker	36-1533*
R200	Volume control, .5 meg.	33-5458
R201	Resistor, 4.7 megs.	66-5473340*
R202	Resistor, 470,000 ohms	66-4473340*
R203	Resistor, 470,000 ohms	66-4473540*
R204	Resistor, 130 ohms	66-1133340*
T200	Transformer, output (mounted on speaker)	Part of LS200

SECTION 3

Reference Number	Description	Service Part No.
C300A	Condenser	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301	Condenser, trimmer	Part of Z301
C302A	Condenser, trimmer	Part of Z302
C302B	Condenser	Part of Z302
C302C	Condenser	Part of Z302
C303	Condenser, .05 mf.	30-4518*
C304	Condenser, .05 mf.	30-4518*
C305	Condenser-and-choke assembly	76-1161
L300	Choke	Part of C305
R300	Resistor, 10,000 ohms	66-3103340*
R301	Resistor, 15,000 ohms	66-3153340
R302	Resistor, 47,000 ohms	Part of Z302
R303	Resistor, 2.2 megs.	66-5223340*
Z300	Transformer, 1st i-f	32-3956
Z301	Transformer, 2nd i-f	32-3957
Z302	Transformer, 3rd i-f	32-3958

SECTION 4

Reference Number	Description	Service Part No.
C400	Condenser, tuning	31-2555
C400A	Condenser, trimmer	Part of C400
C400B	Condenser, trimmer	Part of C400
C401	Condenser, 300 mmf.	60-10305307
C402	Condenser, 275 mmf.	30-1220-7
C403	Condenser bc. oscillator trimmer	Part of C-410
C404	Condenser, 6 mmf.	60-90505007*

SECTION 4 (Cont.)

Reference Number	Description	Service Part No.
C405	Condenser, 50 mmf.	60-00515307*
C406	Condenser, 250 mmf.	60-10245407*
C407	Condenser, .05 mf.	30-4518*
C408	Condenser, 250 mmf.	60-10245407*
C409	Condenser, .01 mf.	61-0120*
C410	Condenser, s-w oscillator-trimmer	31-6453
C411	Condenser, .006 mf.	30-4504*
C412	Condenser, s-w antenna-trimmer	31-6426
J400	Socket, antenna	27-6145
LA400	Loop assembly	76-1279
L400	Coil, antenna, s-w shunt	32-3716
R400	Resistor, 2.2 megs.	66-5223340*
R401	Resistor, 47,000 ohms	66-3473340*
R402	Resistor, 2200 ohms	66-2223340
R403	Resistor, 10,000 ohms	66-3103340*
S400	Switch, band	42-1772
T400	Coil, antenna	32-4008
T401	Coil, oscillator	32-3991
TS400	Wiring-panel assembly	12W45654

MISCELLANEOUS

Description	Service Part No.
Bands, rubber, scale-mounting	54-4176
Cabinet	10650
Clamp, electrolytic-condenser-mounting	56-1466FA5
Clip, antenna-coil	28-5002FA3
Dial, back-plate assembly	76-1588
Drive-shaft assembly	76-1323
Drive cord (25 ft. spools)	45-1460
Feet, felt	W2190
Grill-cloth assembly	40-6774
Grommet, rubber, tuning-condenser front mounting	27-4596
Grommet, tuning-condenser rear mounting	54-4020
Knob assembly	54-4311
Pointer	56-2896
Reflector, light	27-5730
Rivets	1W36671FA5
Scale, dial	27-5895
Screw and lockwasher, scale-mounting	1W32228FA3
Screw and lockwasher, speaker-mounting	1W32228FA3
Screw, gang-mounting	W758-FA3
Sleeve, tuning-condenser	28-5665FA3
Socket—Loktal	27-6138*
Socket—octal	27-6199*
Socket assembly, pilot-light	76-1392*
Spring, drive-cord	28-9000
Strap, scale-mounting	56-2068
Washer, chassis-mounting	1W37654FA3
Washer, gang-mounting	1W52353FA3
Wiring panel, 3 lugs	76-2148
Wiring panel, 5 lugs	12W45672

MODELS 48-141, 48-145 PHILCO CORP.

Circuit Description

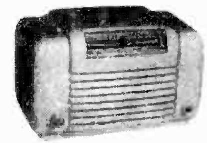
Philco Models 48-141 and 48-145 are four-tube, battery-operated superheterodynes, providing reception on the standard broadcast band, 540–1720 kc. Manual tuning is employed. Both models are identical except for the cabinets, knobs, and dial scales, as indicated in the parts list. A 100-foot (over-all), outdoor aerial, such as Philco Part No. 45-1469, is recommended.

The converter stage employs a type 1LA6 pentagrid converter tube; in this tube, the oscillator signal is fed to the mixer section through the electron stream within the tube.

A type 1LN5 pentode tube is used in the i-f amplifier stage. The diode section of the 1LH4 tube provides detection and a-v-c voltage, and the triode section functions as the first audio amplifier.

The first audio stage is resistance-coupled to the type 3LF4 output tube, which drives the permanent-magnet dynamic loud-speaker.

MODEL 48-141



MODEL 48-145

SPECIFICATIONS

CABINET

Model 48-141	Plastic, walnut finish
Model 48-145	Plastic, ivory finish
CIRCUIT	Four-tube superheterodyne
FREQUENCY RANGE	540–1720 kc.
AUDIO OUTPUT	220 mw.
POWER SUPPLY	Battery pack, Philco P-60B-6L
PLATE VOLTAGE AND CURRENT	90 volts, 10 ma.
FILAMENT VOLTAGE AND CURRENT,	1.5 volts, .25 amp.
POWER CONSUMPTION (total, plate and filament)	1 watt
AERIAL	External, Philco Part No. 45-1469
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (4)	1LA6, 1LN5, 1LH4, 3LF4

TP-3125 & TP-933

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

The following preliminary checks should be made before turning on the radio:

1. Carefully inspect the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Disconnect the battery, and measure the resistance between B+ (red lead of battery plug) and chassis, with the ohmmeter polarity such that the highest resistance reading is obtained. If this reading is lower than 10,000 ohms, check condensers C100, C203, and C404 for leakage or shorts.

TROUBLE SHOOTING

Section 1

For the tests in this section, use a d-c voltmeter, connecting the leads between the chassis, test point C, and the test points indicated in the chart. The voltages indicated were obtained from a fresh battery pack, and were measured with a 20,000-ohms-per-volt meter, with the radio turned on.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

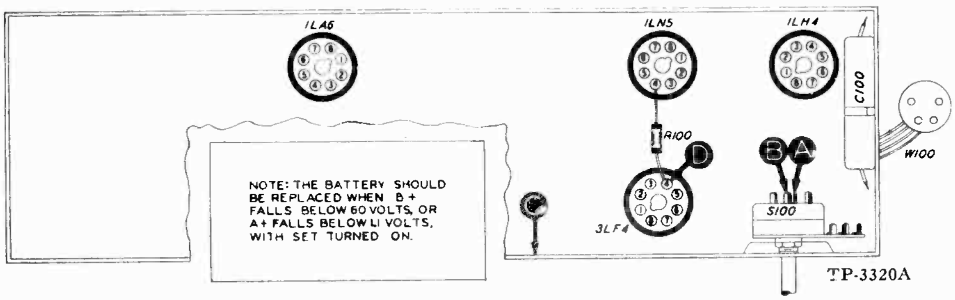


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A B D	85 volts 1.5 volts Negative 5 volts		Trouble within this section. Isolate by the following tests.
2	A	85 volts	No voltage Low voltage	Open battery cable. Defective S100. Open R100. Shorted C100. Weak battery. Change in value of R100. Leaky C100. Excessive current drain in Sections 2, 3, or 4.
3	B	1.5 volts	No voltage Low voltage	Open battery cable. Defective S100. Weak battery.
4	D	Negative 5 volts		Change in value of R100. Open R100. Excessive current drain in Sections 2, 3, or 4.

TROUBLE SHOOTING

Section 2

For the tests in this section, use an audio signal. Connect the signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the radio volume control to maximum.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 3; if not, isolate and correct the trouble in this section.

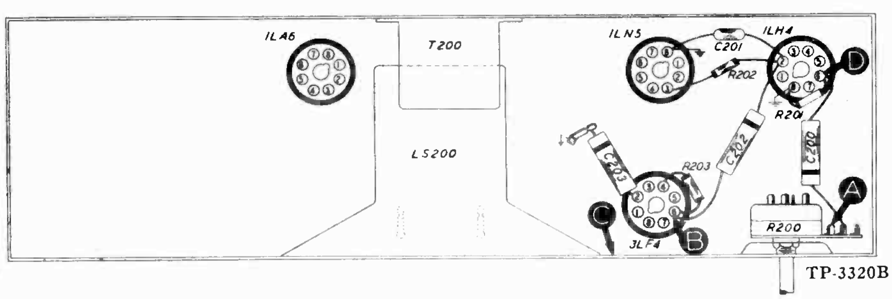


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with moderate signal input.	Trouble within this section. Isolate by the following tests.
2	B	Normal, clear signal with strong signal input.	Defective 3LF4 tube, T200, or LS200. Shorted or leaky C203 or C201.
3	D	Loud, clear signal with moderate signal input.	Defective 1LH4 tube. Open R202 or C202.
4	A	Loud, clear signal with moderate signal input.	Defective R200. Shorted C301D. Open C200.

Listening Test: Distortion may be caused by leaky C201, C202, C203, or C200, or by open R203 or R201.

MODELS 48-141, 48-145 PHILCO CORP.

TROUBLE SHOOTING Section 3

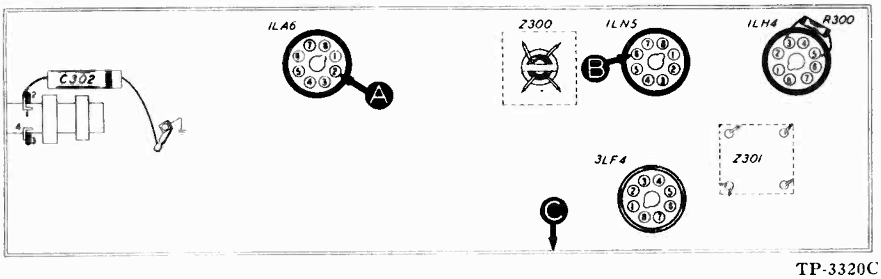


Figure 3. Bottom View, Showing Section 3 Test Points

For the tests in this section, use an r-f signal generator with frequency set at 455 kc. (modulated output). Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the radio volume control to maximum.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with moderate signal input.	Trouble within this section. Isolate by the following tests.
2	B	Loud, clear signal with moderate signal input.	Defective 1LN5 or 1LH4 (diode section) tube. Defective or misaligned Z301. Open C302.
3	A	Loud, clear signal with moderate signal input.	Defective or misaligned Z300.

TROUBLE SHOOTING Section 4

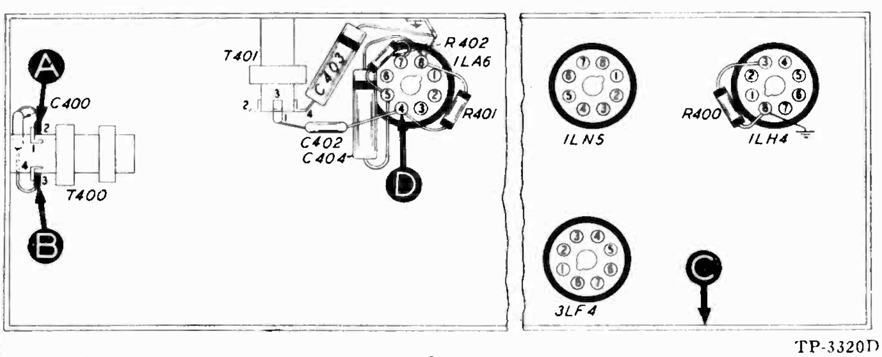


Figure 4. Bottom View, Showing Section 4 Test Points

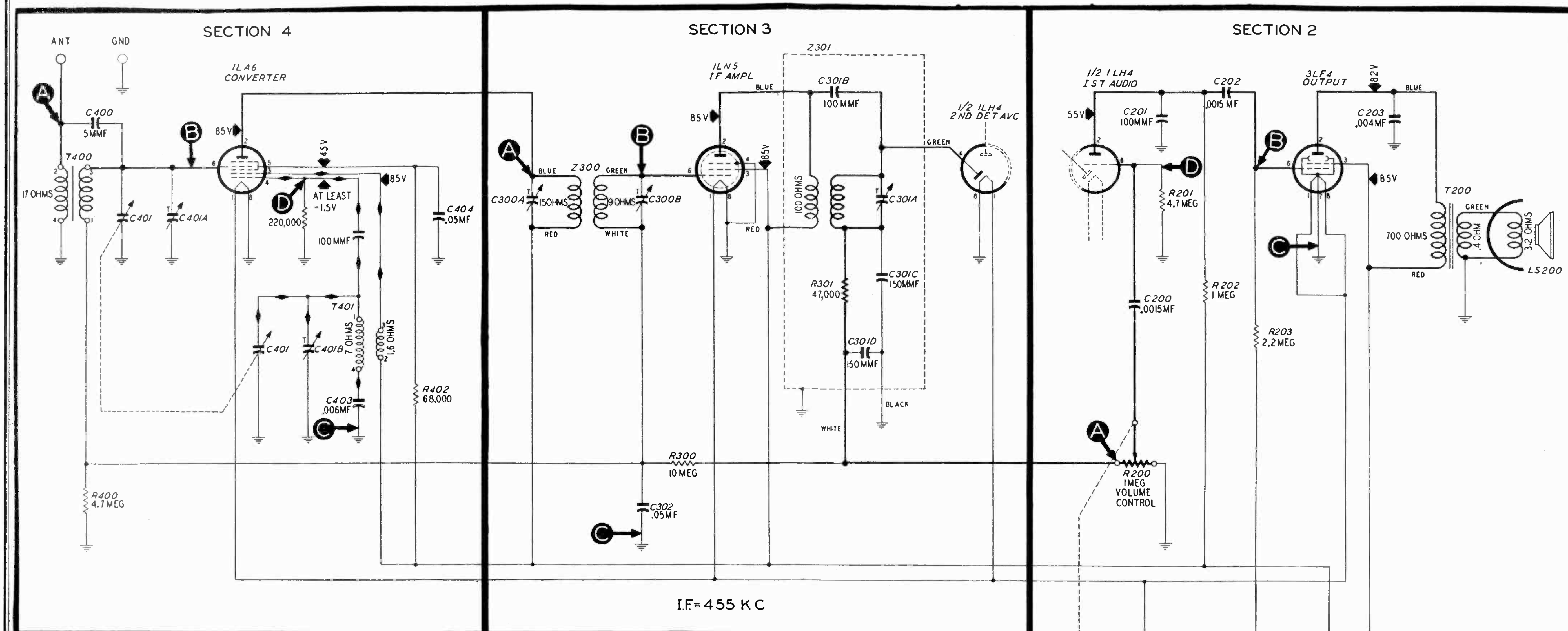
For the tests in this section, use an r-f signal generator with modulated output. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the generator and radio dials as noted in the chart.

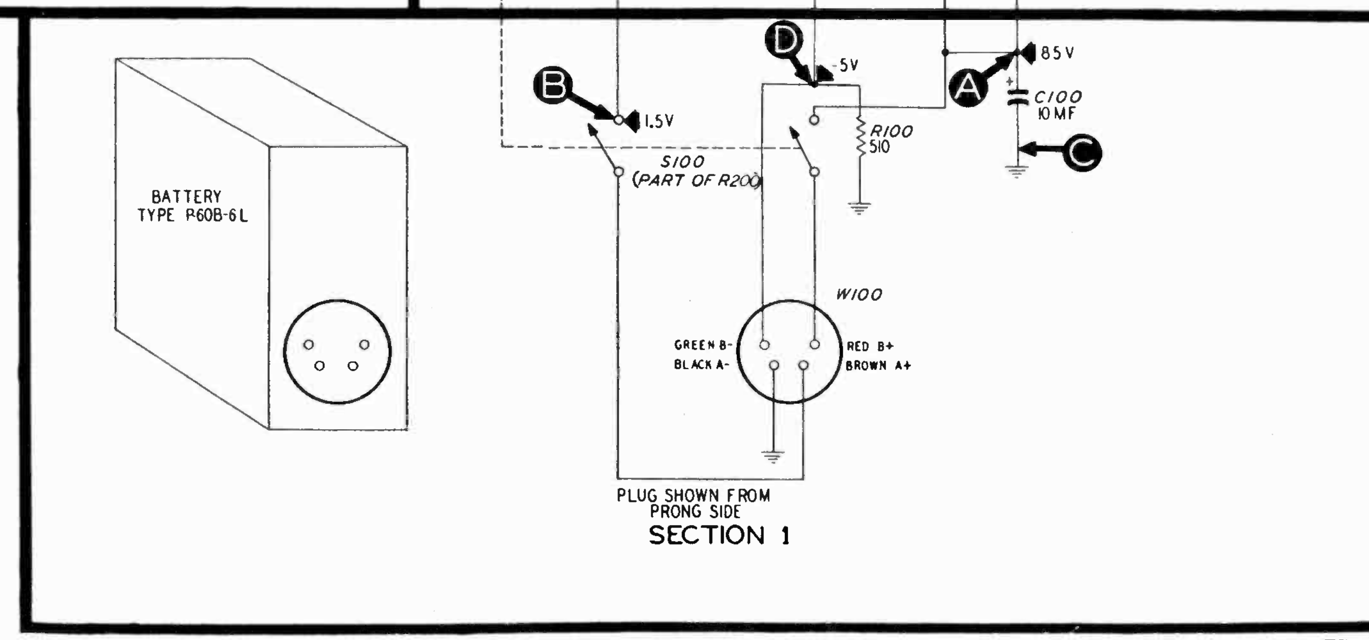
Inspect the tuning condensers for bent plates, dirt, or poor wiper contacts; any of these conditions will cause noise.

If the "NORMAL INDICATION" is not obtained in the first step, isolate the trouble by following the remaining steps.

STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	540 kc.	540 kc.	Loud, clear signal with low signal input.	Trouble within this section. Isolate by the following tests.
2	B	540 kc.	540 kc.	Loud, clear signal with moderate signal input.	Defective 1LA6 tube, C401, C401A, or oscillator circuit. Shorted C404. Misaligned Z300.
3	D Osc. test (See Note below.)		540 to 1720 kc.	Negative voltage (at least 1.5 volts) over complete range.	Defective 1LA6 tube, T401, C401, or C401B. Open R401, R402, C402, or C403. Shorted or leaky C402 or C403.
4	A	540 kc.	540 kc.	Loud, clear signal with low signal input.	Defective T400 or C401.

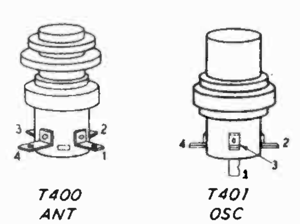
NOTE: Connect positive lead of 20,000-ohms-per-volt meter to the chassis, test point C; connect prod end of negative lead through 100,000-ohm isolating resistor to test point D (oscillator grid, pin 4 of 1LA6 tube).





NOTE: THE VOLTAGES INDICATED ON THE SCHEMATIC DIAGRAM ARE AVERAGE VALUES. THE VOLTAGES WERE MEASURED BETWEEN THE POINTS INDICATED AND THE CHASSIS, USING A 20,000-OHMS PER-VOLT METER, WITH A FRESH BATTERY.

OSCILLATOR GRID VOLTAGE WAS MEASURED BETWEEN THE CHASSIS AND OSC. GRID (PIN 4) OF THE 1LA6 TUBE, USING A 100,000-OHM ISOLATING RESISTOR IN SERIES WITH THE PROD END OF THE NEGATIVE VOLTMETER LEAD.



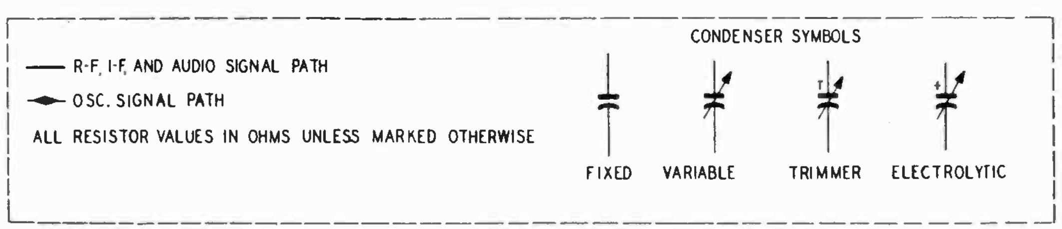


FIGURE 5. PHILCO RADIO MODELS 48-141 AND 48-145, COMPLETE SECTIONALIZED SCHEMATIC, SHOWING ALL TEST POINTS

TP-3320

ALIGNMENT PROCEDURE

TURN ON RADIO POWER, AND SET VOLUME CONTROL TO MAXIMUM

DIAL—Alignment points should be marked on the dial backplate. Measurements for these points are shown in the composite dial-and-backplate photo, figure 8. With tuning condensers fully meshed, set dial pointer to index mark.

OUTPUT METER—Connect across speaker voice coil.

SIGNAL GENERATOR—Connect ground lead to chassis; connect output lead as indicated in chart.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below 1 volt.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to stator of aerial tuning condenser.	455 kc.	Tuning condenser fully meshed.	Adjust trimmers, in order given, for maximum output.	C301A C300A C300B
2	Through 200-mmf. condenser to external aerial connector.	1700 kc.	1700 kc.	Adjust for maximum output.	C401B
3	Same as Step 2.	1500 kc.	1500 kc. (approx.)	Tune radio to generator signal, and adjust trimmer for maximum output.	C401A

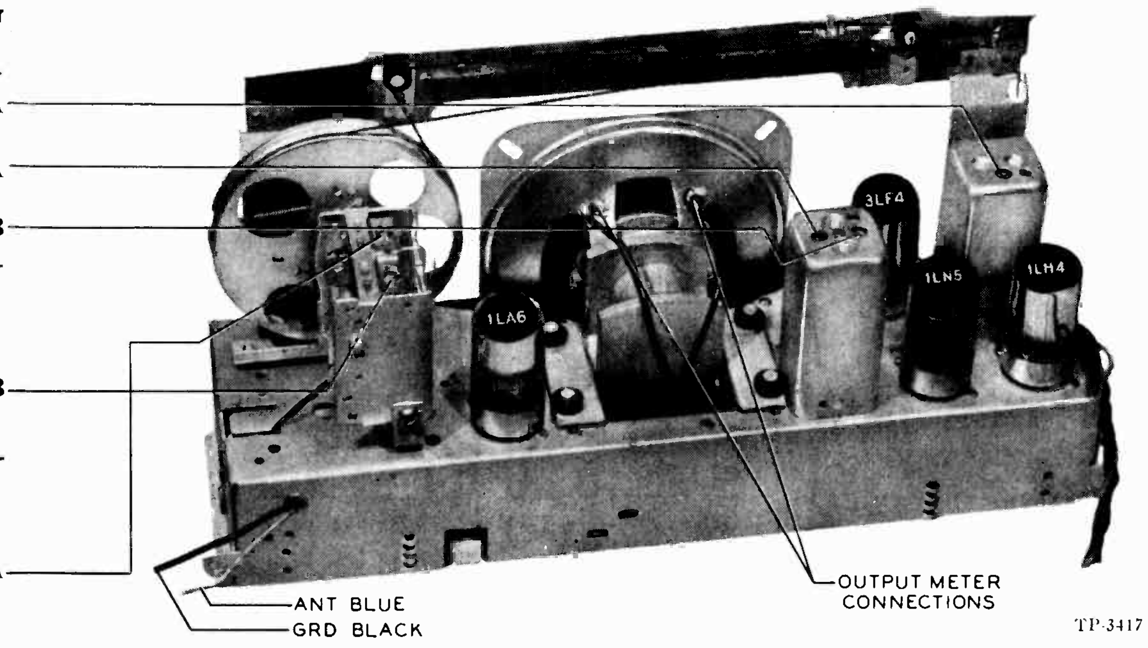


Figure 6. Top View, Showing Trimmer Locations

SYMBOLIZATION AND TERMINOLOGY

All components in the radio circuit are symbolized and located as follows:

C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loud-speaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

100-series components are in Section 1—the power supply.

200-series components are in Section 2—the audio amplifier.

300-series components are in Section 3—the i-f amplifier, detector, and a-v-c circuits.

400-series components are in Section 4—the aerial and oscillator circuits.

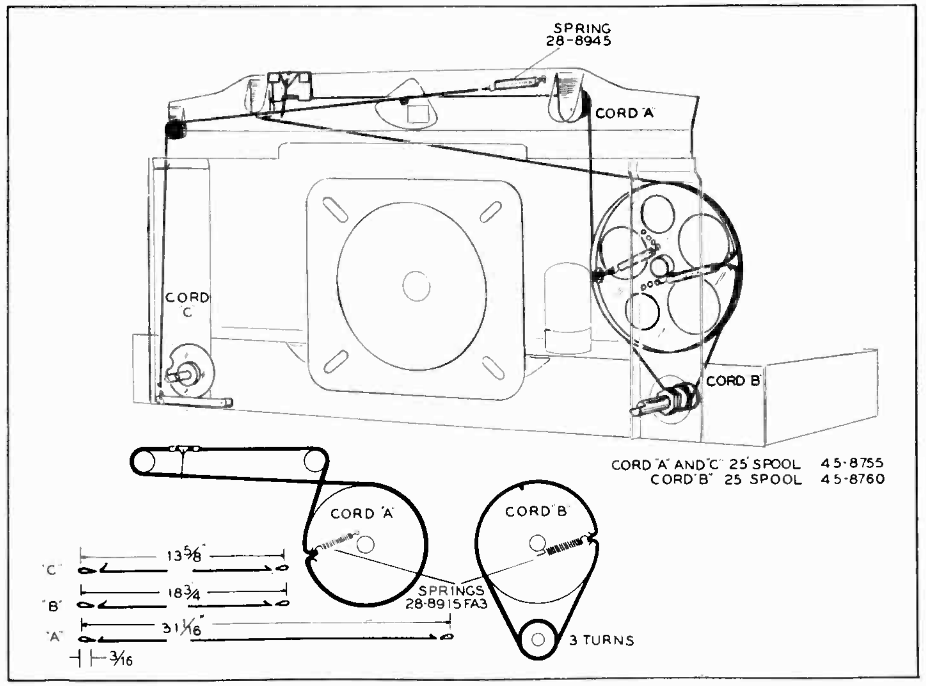
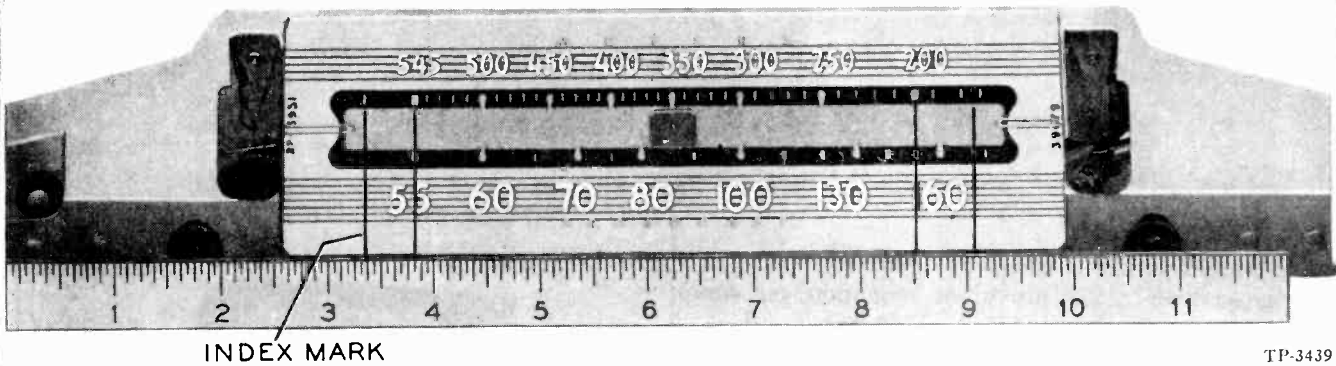


Figure 7. Drive-Cord Installation Details

TP-3320E

PHILCO CORP. MODELS 48-141, 48-145



TP-3439

Figure 8. Composite Dial and Backplate, Calibration Details

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) in the following parts list are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
BA100	Battery pack	P-60B-6L
C100	Condenser, electrolytic, 10 mf., a-f and r-f by-pass	30-2540*
R100	Resistor, 510 ohms, bias	66-1513340*
S100	Switch, power	Part of R200
W100	Battery-cable assembly	41-3477-1

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, .0015 mf., d-c blocking	45-3500-6*
C201	Condenser, 100 mmf., r-f by-pass	60-10105407*
C202	Condenser, .0015 mf., d-c blocking	45-3500-6*
C203	Condenser, .004 mf., tone compensation	61-0179*
LS200	Speaker	36-1507-3
R200	Volume control, 1 megohm	33-5554
R201	Resistor, 4.7 megohms, d-c grid return	66-5473340*
R202	Resistor, 1 megohm, plate load	66-5103340*
R203	Resistor, 2.2 megohms, d-c grid return	66-5223340*
T200	Output transformer	32-8323

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Not used	
C301C	Condenser, 150 mmf., i-f filter	Part of Z301
C301D	Condenser, 150 mmf., i-f filter	Part of Z301
C302	Condenser, .05 mf., a-v-c filter	61-0122*
C303	Condenser, 100 mmf., coupling, part of Z301	60-10105407*
R300	Resistor, 10 megohms, a-v-c filter	66-6103340*
R301	Resistor, 47,000 ohms, i-f filter, part of Z301	66-3473340*
Z300	Transformer, 1st i-f, includes C300A and C300B	32-3949-1
Z301	Transformer, 2nd i-f, includes C301A, C301C, C301D, C303, and R301	32-3897

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, 5 mmf., coupling	30-1221-5
C401	Condenser, main tuning	31-2721
C401A	Condenser, trimmer, aerial coil	Part of C401
C401B	Condenser, trimmer, osc. coil	Part of C401
C402	Condenser, 100 mmf., osc. grid	60-10105407*

SECTION 4 (Continued)

Reference Symbol	Description	Service Part No.
C403	Condenser, .006 mf., osc. tracking	45-3500-7*
C404	Condenser, .05 mf., r-f by-pass	61-0122*
R400	Resistor, 4.7 megohms, a-v-c voltage divider	66-5473340*
R401	Resistor, 220,000 ohms, osc. grid leak	66-4223340*
R402	Resistor, 68,000 ohms, screen dropping	66-3683340*
T400	Transformer, aerial	32-3919-2
T401	Transformer, oscillator	32-3385-2

MISCELLANEOUS

Description	Service Part No.
Cabinet, Less Dial Scale	
Model 48-141	10618A
Model 48-145	10618D
Cabinet Hardware	
Baffle and cloth assembly	40-6910
Dial Scale	
Model 48-141	27-5951
Model 48-145	27-5951-1
Dial-Scale Hardware	
Band, rubber, dial scale	54-4025
Screw, strap mtg.	1W23129FA3
Strap, scale mtg., r.h.	56-2672FA3
Strap, scale mtg., l.h.	56-2671FA3
Knob	
Model 48-141	54-4323
Model 48-145	54-4375
Stud, baffle mtg.	W2235-2FA9
Scale Plate, Flag and Upright Assembly	76-3131
Cord, drive (25-ft. spool), for flag	45-8755
Cord, drive (25-ft. spool), for pointer	45-8755
Pointer	56-2896
Spring, flag drive	28-9011FA3
Spring, cam plate, flag drive	57-0701FA1
Spring, retaining	57-1468FA1
Transfer-lever assembly	76-1655-1
Socket, Loktal	27-6138
Tuning-Condenser Hardware	
Cord, drive (25-ft. spool), for tuning condenser	45-8760
Drum, drive assembly	76-2485
Mounts, rubber, tuning condenser	27-4596
Spring, tuning-condenser drive	28-8913FA3
Tuning-shaft assembly	31-2640

Circuit Description

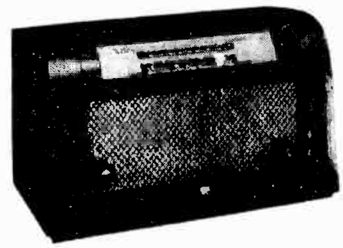
Philco Model 48-150 is a five-tube, battery-operated, superheterodyne radio providing reception on the standard broadcast band, 540 to 1720 kc. For best performance, the radio should be operated with an external aerial, such as Philco Part No. 45-1469.

A type 1LG5 pentode is used as the r-f amplifier and a type 1LA6 pentagrid converter as the mixer and oscillator, to provide high sensitivity and high signal-to-noise ratio. The r-f stage is coupled to the mixer by a transformer, and the oscillator is coupled to the mixer by the electron stream within the converter tube.

The 455-kc., i-f amplifier stage employs a type 1LN5 pentode. This stage is coupled to the output of the mixer by a double-tuned i-f transformer, and is coupled to the detector-diode section of the 1LH4 diode-triode by a single-tuned i-f transformer. The diode circuit of the 1LH4 rectifies the i-f signal and produces the audio signal and a-v-c voltage.

Two a-v-c filter circuits are used; one circuit couples the a-v-c voltage to the r-f amplifier; the other couples the a-v-c voltage to the mixer.

The audio output of the detector is resistance-coupled to the triode section of the 1LH4, which, in turn, is resistance-coupled to the type 3LF4 beam-tetrode output stage. Fixed bias is supplied to the output stage from a resistor in series with the negative return to the battery plug. The permanent-magnet, dynamic loud-speaker is transformer-coupled to the output stage.



MODEL 48-150

SPECIFICATIONS

CABINET .... **Wood**
CIRCUIT .... **Five-tube superheterodyne**
FREQUENCY RANGE .... **540 to 1720 kc.**
AUDIO OUTPUT .... **220 mw.**
POWER INPUT . . **Battery pack, Philco Type P-60D-11L: plate supply, 12 ma. at 90 volts; filament supply, 300 ma. at 1.5 volts; total power consumption, 1.4 watts**
AERIAL .... **External, Philco Part No. 45-1469**
INTERMEDIATE FREQUENCY .... **455 kc.**
PHILCO TUBES (5), 1LA6, 1LG5, 1LH4, 1LN5, 3LF4

TP-3411A

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble-shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis, showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure. Failure to obtain "NORMAL INDICATION" in any given step indicates trouble within the circuit under test. After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

The following preliminary checks should be made before turning on the radio:

1. Carefully inspect the top and bottom of the chassis. Be sure that all tubes are securely mounted in the proper sockets. Look for bad connections burned resistors, or other obvious signs of trouble.

2. Disconnect the battery and measure the resistance between B+ (red lead of battery plug) and chassis. Use the ohmmeter polarity that gives the highest reading. If the resistance is lower than 10,000 ohms, check condensers C100, C203, C201, and C403 for leakage or shorts.

TROUBLE SHOOTING

Section 1

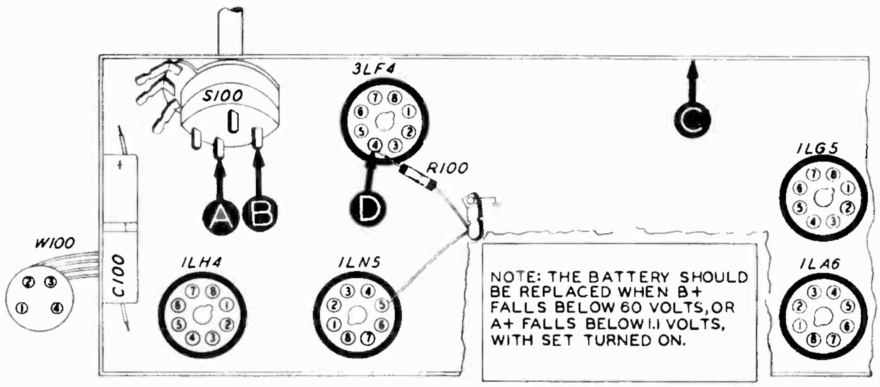


Figure 1. Bottom View, Showing Section 1 Test Points

Make the tests for this section with a d-c voltmeter. The voltages indicated in the chart were measured with a 20,000-ohms-per-volt meter, with a fresh battery pack installed, and with the radio turned on. Set the volume control to minimum and the dial pointer to 540 kc. Connect the meter between the radio chassis, test point C, and the test points indicated in the chart.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A B D	85 volts 1.5 volts Negative 5.5 volts		Trouble within this section; isolate by the following tests.
2	A	85 volts	No voltage Low voltage	Open battery cable or R100. Defective S100. Shorted C100. Weak battery. Change in value of R100. Leaky C100. Excessive current drain in Sections 2, 3, or 4.
3	B	1.5 volts	No voltage Low voltage	Open battery cable. Defective S100. Weak battery.
4	D	Negative 5.5 volts		Change in value of R100. Open R100. Excessive current drain in Sections 2, 3, or 4.

TROUBLE SHOOTING

Section 2

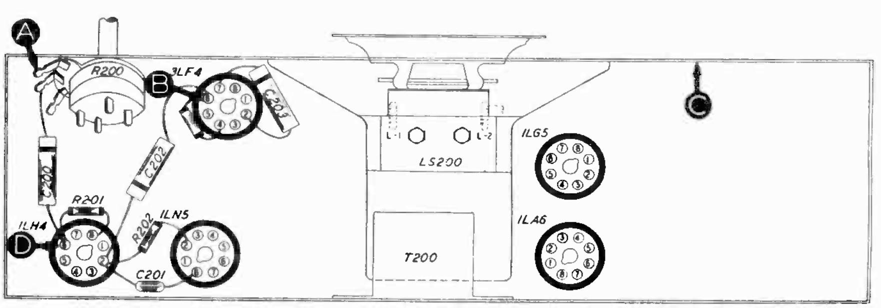


Figure 2. Bottom View, Showing Section 2 Test Points

Make the tests for this section with an audio-frequency signal generator. Connect the ground lead to the radio chassis, test point C, and the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the volume control to maximum. If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3; if not, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with moderate signal input.	Trouble in this section; isolate by the following tests.
2	B	Moderate, clear signal with strong signal input.	Defective 3LF4, T200, or LS200. Shorted C203 or C201. Leaky C203 or C201.
3	D	Same as step 1.	Defective 1LH4. Open R202 or C202.
4	A	Same as step 1.	Open C200. Defective R200.
Listening Test: Distortion may be caused by leaky C201, C202, C203 or C200, or by open R203.			

MODEL 48-150 PHILCO CORP.

TROUBLE SHOOTING Section 3

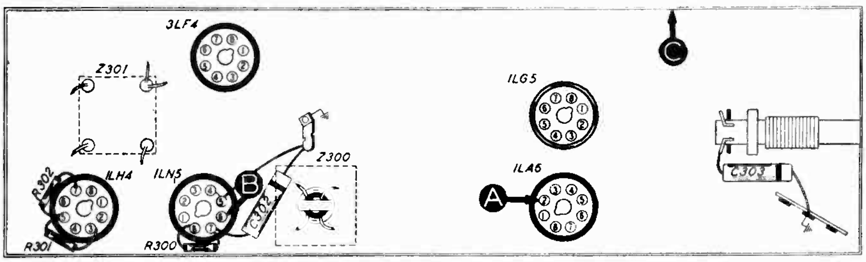


Figure 3. Bottom View, Showing Section 3 Test Points

Make the tests for this section with an r-f signal generator (modulated output); set the generator to 455 kc. Connect the ground lead to the radio chassis, test point C, and the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the volume control to maximum. If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4; if not, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with moderate signal input.	Trouble in this section; isolate by the following tests.
2	B	Same as step 1.	Defective 1LN5 or 1LH4 (diode section). Defective or misaligned Z301.
3	A	Same as step 1.	Defective or misaligned Z300.

TROUBLE SHOOTING Section 4

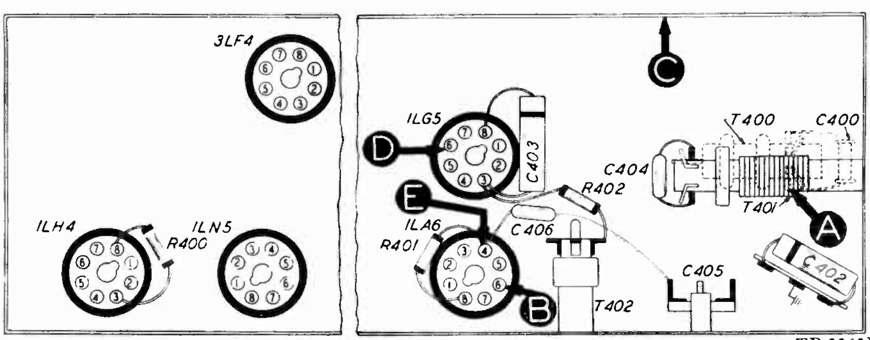


Figure 4. Bottom View, Showing Section 4 Test Points

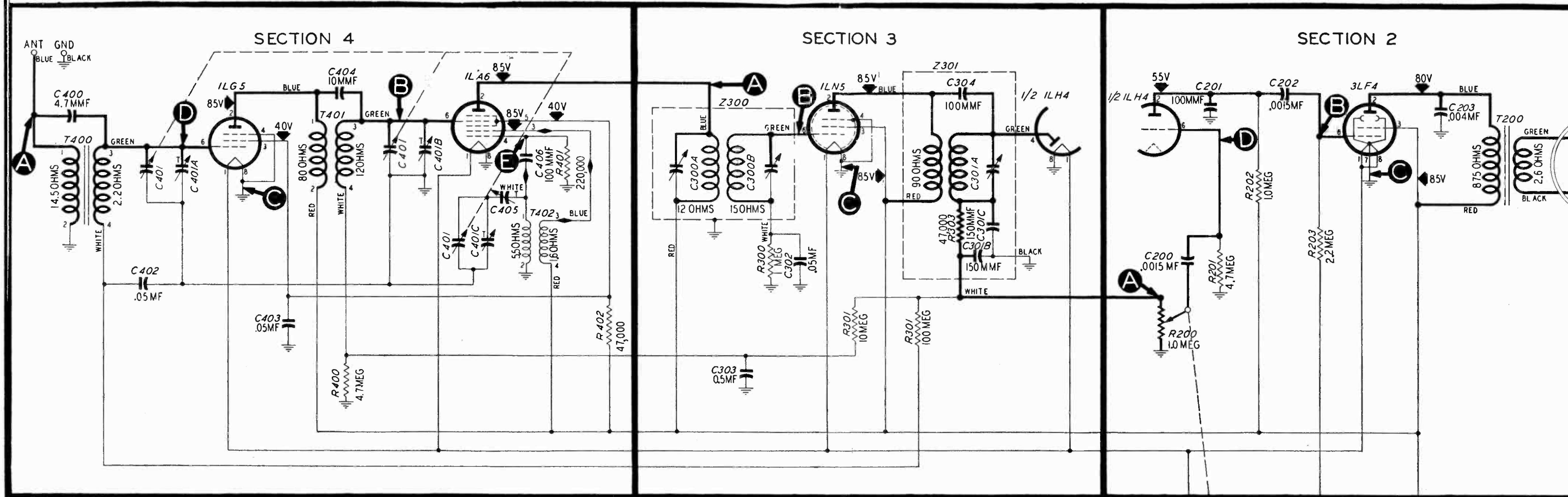
Make the tests for this section with an r-f signal generator (modulated output); set the frequency as noted in the chart. Connect the generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

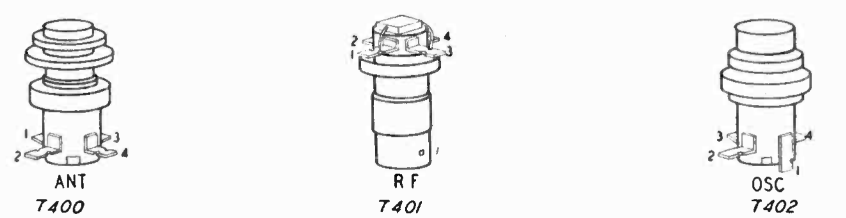
Inspect the tuning condensers for bent plates, dirt, or poor wiper contacts; any of these conditions will cause noise. If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble within this section.

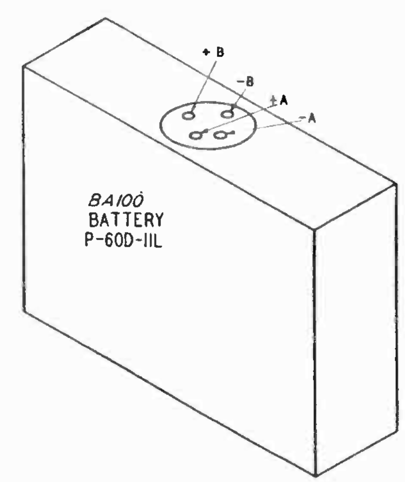
STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	540 kc.	540 kc.	Loud, clear signal with low signal input.	Trouble in this section; isolate by the following tests.
2	E Osc. test (See note below.)		540 to 1720 kc.	Negative voltage (at least 1.5 volts) over complete range.	Defective 1LA6, T402, R401, R402 or C405. Shorted C403 or osc. section of C401.
3	B	540 kc.	540 kc.	Same as step 1.	Same as step 2.
4	D	540 kc.	540 kc.	Same as step 1.	Defective 1LG5 or T401. Shorted ant. or r-f section of C401.
5	A	540 kc.	540 kc.	Same as step 1.	Defective T400. Open C402.

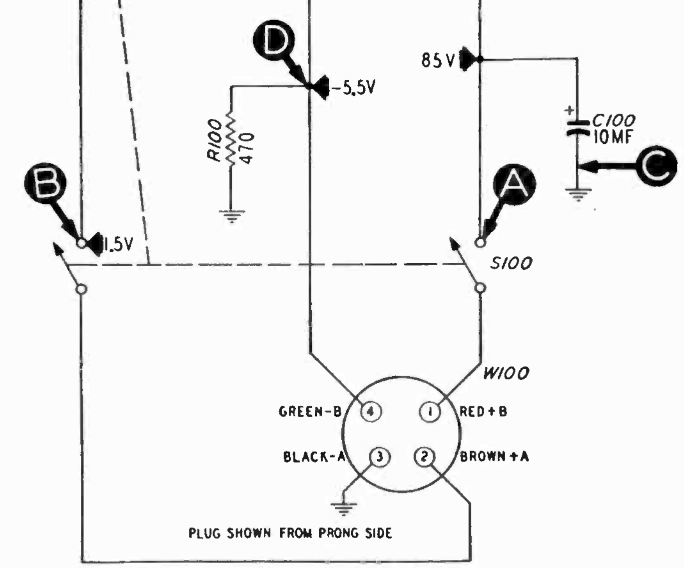
NOTE: Connect positive lead of a 20,000-ohms-per-volt meter to radio chassis, test point C; connect prod end of negative lead through a 100,000-ohm isolating resistor to test point E (osc. grid, pin 4 of 1LA6).

PHILCO CORP.









RF, IF AND AUDIO SIGNAL PATH

OSC SIGNAL PATH

ALL RESISTOR VALUES IN OHMS UNLESS MARKED OTHERWISE.

CONDENSER SYMBOLS

FIXED VARIABLE TRIMMER ELECTROLYTIC

FIGURE 5. PHILCO RADIO MODEL 48-150, SECTIONALIZED SCHEMATIC, SHOWING TEST POINTS

ALIGNMENT PROCEDURE

TURN ON RADIO AND SET VOLUME CONTROL FULLY ON

DIAL—Alignment points should be marked on the dial backplate as shown in figure 8. Turn tuning gang until fully meshed, and set dial pointer to index mark.

OUTPUT METER—Connect meter to voice-coil lugs on loud-speaker. Set meter to 2.5-volt or similar range.

SIGNAL GENERATOR—Connect ground lead to radio chassis; connect output lead as indicated in chart.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below 1 volt.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to stator of aerial tuning condenser.	455 kc.	Tuning condenser fully meshed.	Turn C300B fully clockwise. Adjust trimmers, in order given, for maximum output.	C301A C300A C300B
2	Through 200-mmf. condenser to aerial lead.	600 kc.	600 kc.	Adjust for maximum output.	C405
3	Same as step 2.	1700 kc.	1700 kc.	Same as step 2.	C401C
4	Same as step 2.	1500 kc.	1500 kc. (approx.)	Tune radio to generator signal and adjust trimmers for maximum output.	C401B C401A
5	Same as step 2.	600 kc.	600 kc. (approx.)	Adjust trimmers for maximum output while rocking tuning control.	C405
6	Repeat steps 3 and 5 until no further increase in output is noted.				

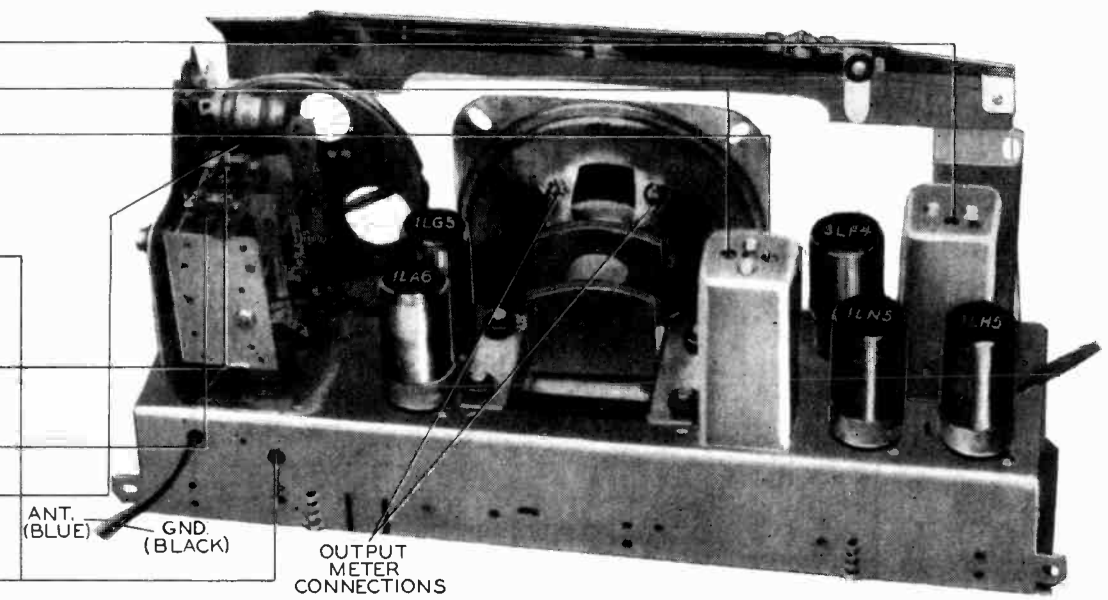


Figure 6. Top View, Showing Trimmer Locations

TP-3413

SYMBOLIZATION AND TERMINOLOGY

All components in the radio circuit are symbolized and located as follows:

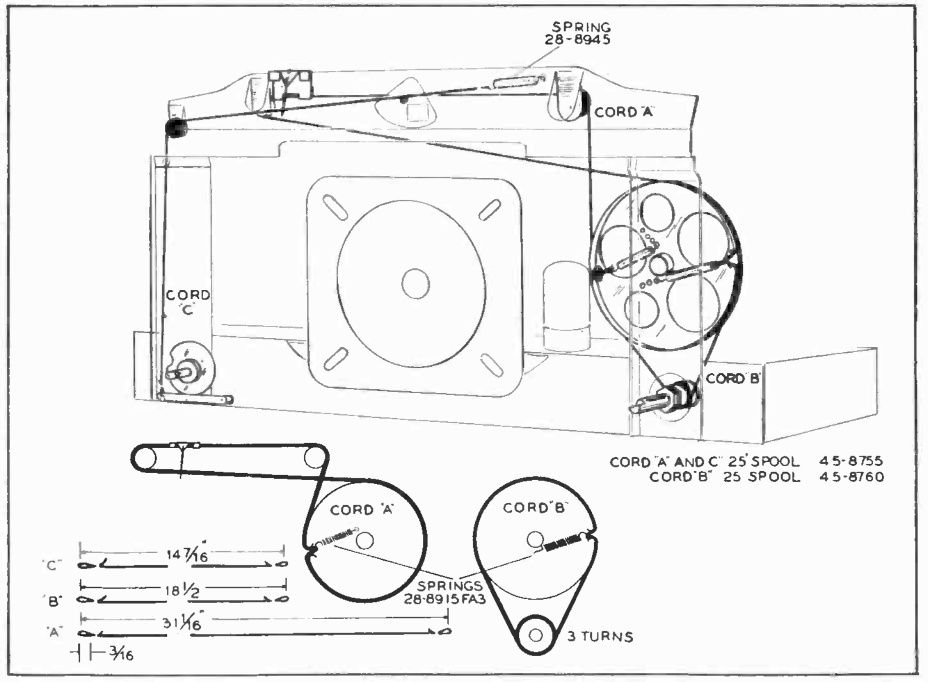
C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loud-speaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

100-series components are in Section 1—the power supply.

200-series components are in Section 2—the audio amplifier.

300-series components are in Section 3—the i-f amplifier, detector, and a-v-c circuits.

400-series components are in Section 4—the aerial, r-f, and oscillator circuits.



TP-3320E

Figure 7. Drive-Cord Installation Details

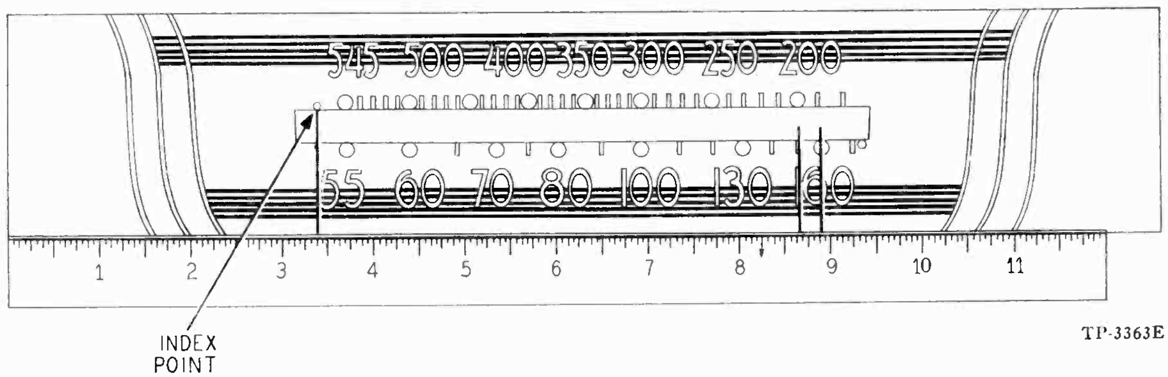


Figure 8. Composite Dial and Backplate, Calibration Details

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) in the following parts list are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
BA100	Battery pack	P-60D-11L
C100	Condenser, electrolytic, 10 mf.	30-2540*
R100	Resistor, bias, 470 ohms	66-1473340*
S100	Power switch	Part of R200
W100	Battery-cable assembly	41-3710

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .0015 mf.	45-3500-6*
C201	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C202	Condenser, d-c blocking, .0015 mf.	45-3500-6*
C203	Condenser, tone compensation, .004 mf.	61-0179*
LS200	Loud-speaker	36-1507-3
R200	Volume control (with power switch), 1 megohm	33-5554
R201	Resistor, grid return, 4.7 megohms	66-5473340*
R202	Resistor, plate load, 1 megohm	66-5103340*
R203	Resistor, grid return, 2.2 megohms	66-5223340*
T200	Output transformer	32-8323

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, i-f filter, 150 mmf.	Part of Z301
C301C	Condenser, i-f filter, 150 mmf.	Part of Z301
C302	Condenser, r-f by-pass, .05 mf.	61-0122*
C303	Condenser, a-v-c filter, .05 mf.	61-0122*
C304	Condenser, coupling, 100 mmf., part of Z301	60-10105407*
R300	Resistor, grid return, 1 megohm	66-5103340*
R301	Resistor, a-v-c filter, 10 megohms	66-6103340*
R302	Resistor, a-v-c filter, 10 megohms	66-6103340*
R303	Resistor, i-f filter, 47,000 ohms, part of Z301	66-3473340*
Z300	Transformer, 1st i.f., includes C300A and C300B	32-3949-1
Z301	Transformer, 2nd i.f., includes C301A, C301B, C301C, C304, and R303	32-3897-2

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, coupling, 4.7 mmf.	30-1221-5*
C401	Condenser, three-section tuning	31-2726
C401A	Condenser, trimmer	Part of C401
C401B	Condenser, trimmer	Part of C401
C401C	Condenser, trimmer	Part of C401
C402	Condenser, a-v-c filter, .05 mf.	61-0122*
C403	Condenser, r-f by-pass, .05 mf.	61-0122*
C404	Condenser, coupling, 10 mmf.	Part of T401
C405	Condenser, oscillator trimmer	31-6473-7
C406	Condenser, oscillator coupling, 100 mmf.	60-10105407*
R400	Resistor, a-v-c filter, 4.7 megohms	66-5473340*
R401	Resistor, grid return, 220,000 ohms	66-4223340*
R402	Resistor, screen dropping, 47,000 ohms	66-3473340*
T400	Transformer, aerial	32-3919-3
T401	Transformer, r-f	32-3974-2
T402	Transformer, oscillator	32-3385-3

MISCELLANEOUS

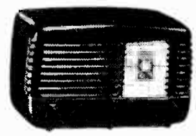
Description	Service Part No.
Cabinet, less accessories	10675
Baffle-and-felt assembly	40-6911
Felt foot	W2190
Knob	76-3051
Scale, dial	27-5966
Scale strap	56-4756
Scale plate, flag-and-upright assembly	76-3131
Cam plate	56-2700-1FA3
Drive cord, flag and pointer (25-foot spool)	45-8755
Drive cord, tuning gang (25-foot spool)	45-8760
Lever assembly	76-1655-1
Pointer	56-2896
Spring, gang and pointer drive	28-8913FA3
Spring, flag drive	28-8945
Spring, cam plate	57-0701FA1
Spring, retaining	57-1468FA1
Socket, Loktal	27-6138
Tuning Shaft	31-2484-2

MODELS 48-200, 48-200-I, 48-214, PHILCO CORP.
Code 125

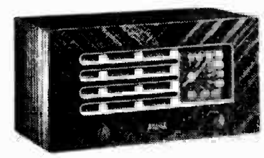
Codes 121 of these models use oscillator transformer part number 32-3880. Codes 122 use oscillator transformer part number 32-4263.

Code 121 of each of these three models is identical to Code 125 of each model, with the following exceptions:

1. The type 35Y4 rectifier tube was replaced by a type 35Z5GT tube.
2. The type 50L6GT output tube was replaced by a type 50A5 tube.



MODEL 48-200 (Walnut)
MODEL 48-200-I (Ivory)



MODEL 48-214

Circuit Description

The Philco Models 48-200, 48-200-I and 48-214 are 5-tube, table-model superheterodyne radios, providing reception in the standard broadcast band. The three models, which started in factory production as Code 125, are identical, except for cabinet and dial parts, as indicated in the parts list.

The high-impedance loop aerial normally provides adequate signal pickup. An external aerial may be connected, if desired, by detaching the aerial lead (shown in figure 6) from the chassis, and connecting the lead to an external aerial lead-in. Do not use a ground.

The loop is coupled to the 7A8 converter tube. Variable-condenser tuning is employed, the oscillator rotor-section plates being shaped to obtain tracking, thus eliminating the necessity for a series padding condenser.

The 7A8 is transformer coupled to the 14A7 i-f amplifier, which is also transformer coupled to the diodes of the 14B6 second detector—first audio-frequency amplifier. A-v-c voltage is applied to the control grids of both the i-f and converter tubes.

The triode section of the 14B6 is the first audio stage, and is resistance coupled to the 50L6GT output tube. The output tube is transformer coupled to a permanent-magnet dynamic speaker.

D-c operating voltages are obtained from a 35Y4 half-wave rectifier, the output of which is filtered by a two-section resistor—condenser filter.

Condenser C304 in Section 3, figures 3 and 5, is a special condenser, inductively wound to form a series-tuned circuit, resonant at the intermediate frequency. This special condenser offers less impedance at this frequency than a conventional condenser, thus permitting higher i-f gain, with no tendency toward instability. Since the tuning gang is connected to the chassis, by-passing at broadcast and short-wave frequencies is adequate. The inductive effect is negligible at audio frequencies.

The 150,000-ohm resistor, R100, in Section 1, prevents hum which might otherwise occur under conditions of high humidity.

SPECIFICATIONS

CABINET:
Models 48-200 and 48-200-I .... Bakelite
Model 48-214 .... Wood

CIRCUIT .... Five-tube superheterodyne

FREQUENCY RANGE .... 540 to 1620 kc.

OPERATING VOLTAGE . . 105 to 120 volts, a.c. or d.c.

POWER CONSUMPTION .... 30 watts

AERIAL . . . . Loop fastened to cabinet; terminal also provided for outside aerial

INTERMEDIATE FREQUENCY .... 455 kc

PHILCO TUBES (5),
7A8, 14A7, 14B6, 50L6GT, 35Y4

PANEL LAMP,
6—8-volt, bayonet base, Part No. 34-2068

Philco TROUBLE-SHOOTING *Procedure*

In this manual, the schematic diagram is divided into four sections, with a chassis layout for each section, showing components and test points for each section. The test points are also indicated on the schematic diagram in the corresponding section. A simplified trouble-shooting procedure is given in a chart for each section. The first step in each chart is a master check, indicating whether trouble exists in that section. Failure to obtain the "NORMAL INDICATION" in a given step indicates trouble, which should be located by voltage, resistance, or capacitance checks of parts indicated in the step, and remedied before testing further.

Preliminary Checks

The following preliminary checks are recommended before turning on the radio:

1. Carefully inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets (see figure 6), and look for bad connections, burnt resistors, or other obvious sources of trouble.

2. Measure the resistance between B plus and B minus (test points C and B— in figure 1), using the ohmmeter polarity giving the highest resistance reading; if the reading is lower than 50,000 ohms, check C101A, C101B, and C101C, for leakage or shorts.

PHILCO CORP. MODELS 48-200, 48-200-I, 48-214, Code 125

TROUBLE SHOOTING Section 1

Make the tests for this section with a d-c voltmeter, connecting the leads to the test points indicated in the chart. The voltages shown were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, 60 cycles.

Turn the volume control to minimum, and set the dial pointer at 540 kc.

Follow steps in sequence. If "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 2; if not, isolate and correct the trouble within this section.

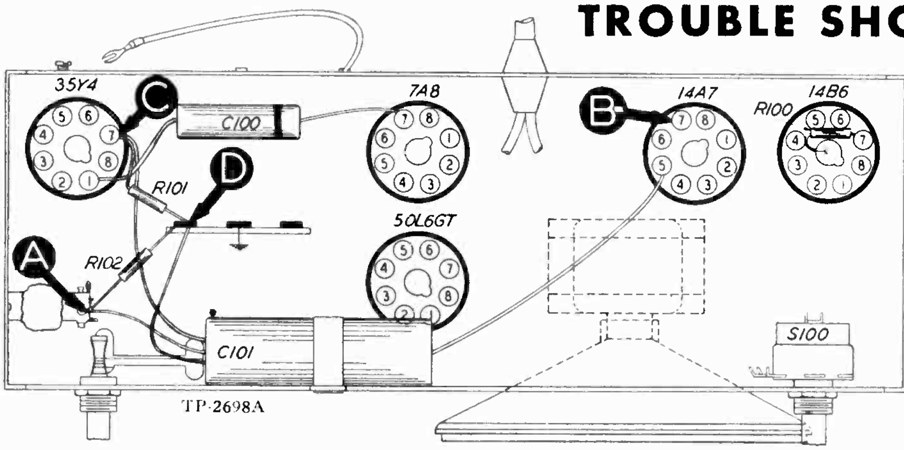


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A to B—	90v		Trouble within this section; isolate by the following tests.
2	C to B—	115v	No voltage Low voltage High voltage	Defective 35Y4 tube. Shorted C101A. Defective 35Y4 tube. Open C101A or I100. Leaky C101A. Open R101.
3	D to B—	105v	No voltage Low voltage High voltage	Shorted C101B. Open C101B. Leaky C'01B or C203. Open R102. T200, or R204.
4	A to B—	90v	No voltage Low voltage High voltage	Shorted C101C. Leaky C101C. Open R204.

Listening Test: Abnormal hum may be caused by open C101A, C101B, or C101C.

TROUBLE SHOOTING Section 2

Make tests for this section by using an audio signal. Connect ground lead of signal generator to B—; connect output lead through a .1-mf condenser to the test points indicated in the chart. Set the volume control at maximum. If "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 3; if not, isolate and correct the trouble within this section.

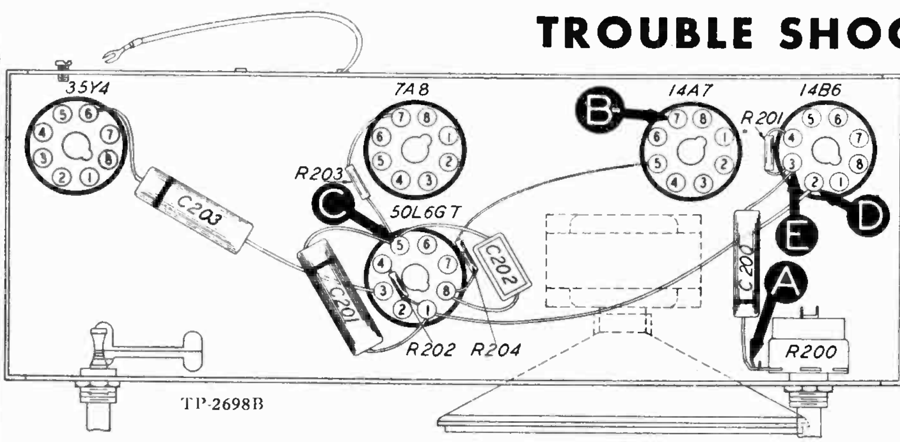


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with low signal-generator output	Trouble within this section; isolate by the following tests.
2	C	Clear signal with high signal-generator output	No signal: Open or shorted LS200 or T200. Shorted C203. Open R204. Defective 50L6GT tube. Weak or distorted signal: Defective 50L6GT tube. or LS200. Leaky C202 or C201. Open R203. Shorted R204.
3	D	Same as step 2	No signal: Open C201. Weak or distorted signal: Leaky C201.
4	E	Same as step 1	No signal: Open R202. Defective 14B6 tube. Weak or distorted signal: Shorted C200. Open R201. Defective 14B6 tube.
5	A	Same as step 1 Note: Rotate R200 through range	No signal: Open C200. Shorted C300D. Weak or distorted signal: Defective R200.

TROUBLE SHOOTING *Section 3*

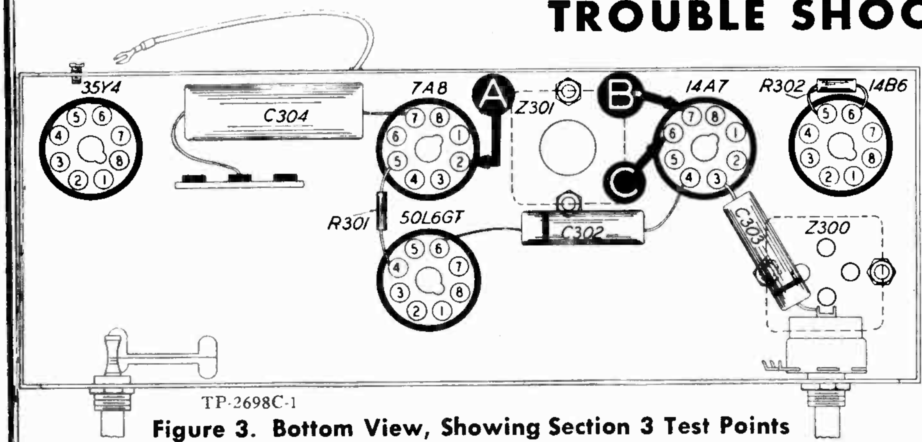


Figure 3. Bottom View, Showing Section 3 Test Points

Make tests for this section by using an r-f signal generator with modulated output. Set generator frequency to 455 kc. Connect ground lead of signal generator to B–; connect output lead through a .1-mf condenser to the test points indicated in the chart. Set the volume control at maximum. If "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 4; if not, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Clear signal with low signal-generator output	Trouble within this section; isolate by the following tests.
2	C	Same as step 1	No signal: Open or shorted Z300. Defective 14B6 or 14A7 tube. Open R301. Shorted C303. Weak or distorted signal: Leaky C303. Open C303 or C304. Defective 14B6 or 14A7 tube. Misaligned Z300. Leaky or open C302.
3	A	Same as step 1	No signal: Open or shorted Z301. Weak or distorted signal: Misaligned Z301.

TROUBLE SHOOTING *Section 4*

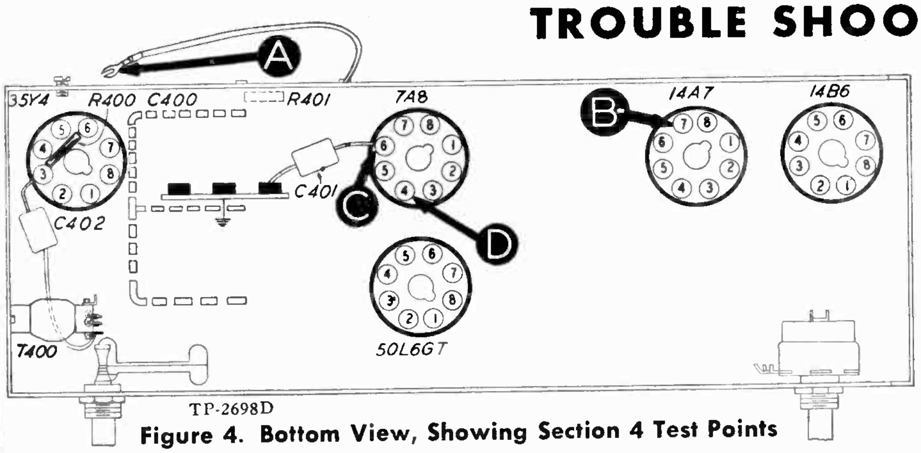


Figure 4. Bottom View, Showing Section 4 Test Points

Make tests for this section by using an r-f signal generator with modulated output. Set frequency as noted in chart. Connect generator ground lead to B–; connect output lead through a .1-mf condenser to the test points indicated in the chart.

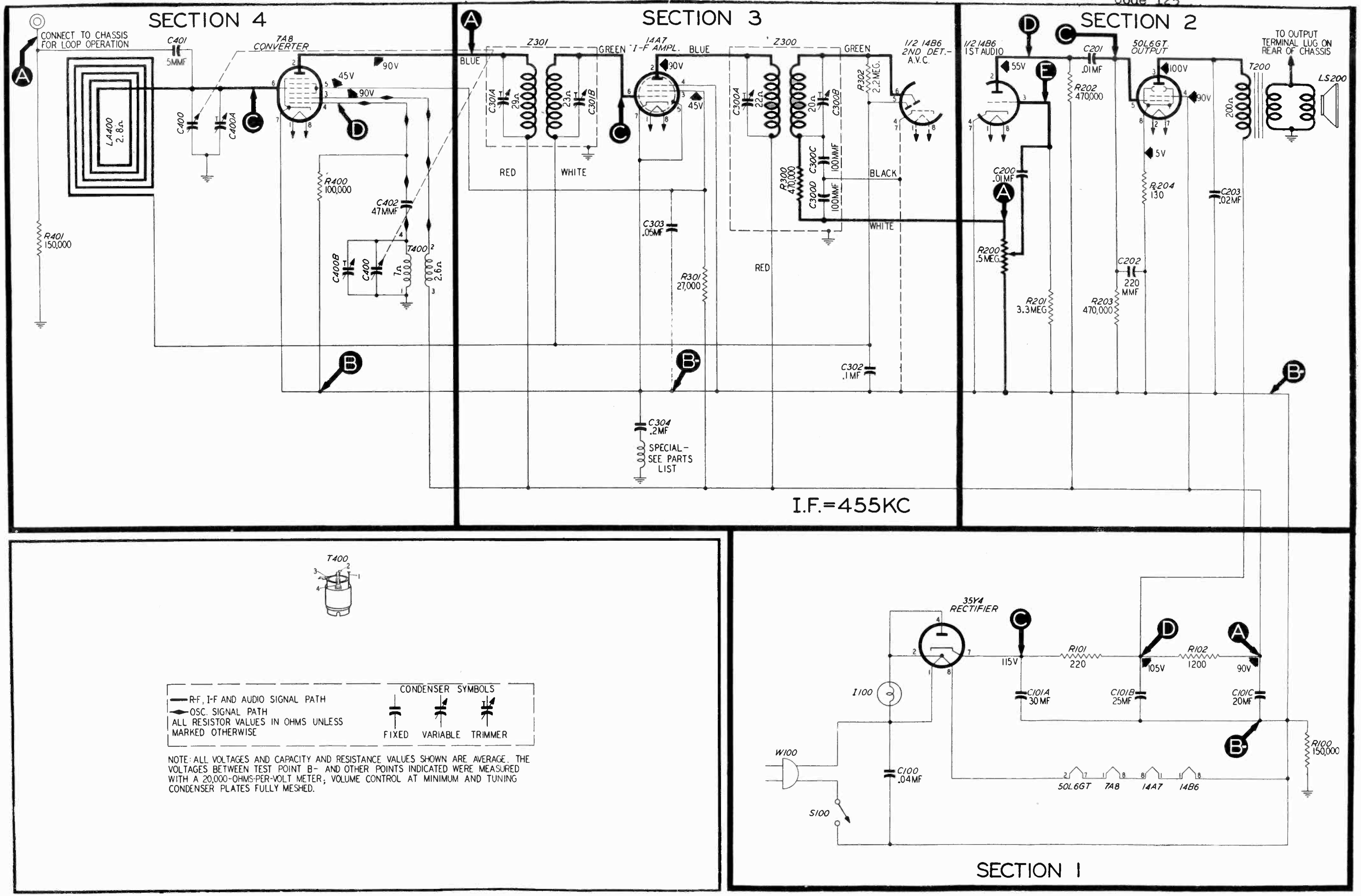
Inspect tuning condensers for bent plates, dirt, or poor wiper contacts; any or all of these will cause noise. If "NORMAL INDICATION" is not obtained in step 1, isolate trouble by following the remaining steps.

STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	540 kc	540 kc	Clear signal with low signal-generator output	Trouble within this section; isolate by the following tests.
2	Osc. Test (see Note below)		540 to 1620 kc	Negative voltage	Open or shorted T400, C402, or R400. Shorted C400 or C400B. Defective 7A8 tube.
3	C	540 kc	540 kc	Same as step 1	No signal: Open or shorted Z301. Shorted C400 or C400A. Defective 7A8 tube. Weak or distorted signal: Shorted or open LA400. Defective 7A8 tube.
4	A	540 kc	540 kc	Same as step 1	Weak signal: Open C401.

NOTE: Oscillator test.—Connect positive lead of a 20,000-ohms-per-volt meter to B–; prod end of negative lead through a 100,000-ohm isolating resistor to test point D. Proper operation of oscillator is indicated by a negative voltage of 9 to 12 volts throughout range of tuning condenser.

PHILCO CORP

MODELS 48-200, 48-200-I, 48-214, Code 125



TP-2698-1

FIGURE 5. PHILCO MODELS 48-200, CODE 125, 48-200-I, CODE 125, AND 48-214, CODE 125; COMPLETE SECTIONALIZED SCHEMATIC, SHOWING ALL TEST POINTS

PHILCO CORP.

ALIGNMENT PROCEDURE

TURN ON THE RADIO POWER, AND SET THE VOLUME CONTROL FULL ON

DIAL POINTER—Turn tuning condensers to full-mesh position. Set dial pointer to index dot, located to the left of "55."

OUTPUT METER—Connect to left (output) lug and center (chassis) lug of terminal panel, shown in figure 6.

SIGNAL GENERATOR—Connect ground lead to B−; connect output lead as indicated in the chart.

OUTPUT LEVEL—During alignment, adjust the signal-generator output to maintain an output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1				Turn C301B (copper screw) down tight.	
2	Through .1-mf. condenser to test-point C of Section 4.	455 kc.	540 kc.	Adjust trimmers, in the order given, for maximum output.	C300A C300B C301A C301B
3	Through 100-mmf. condenser to external aerial connector.	1600 kc.	1600 kc.	Disconnect external aerial lug from chassis. Adjust trimmer for maximum output.	C400B
4	Same.	1500 kc.	1500 kc.	Adjust for maximum output.	C400A

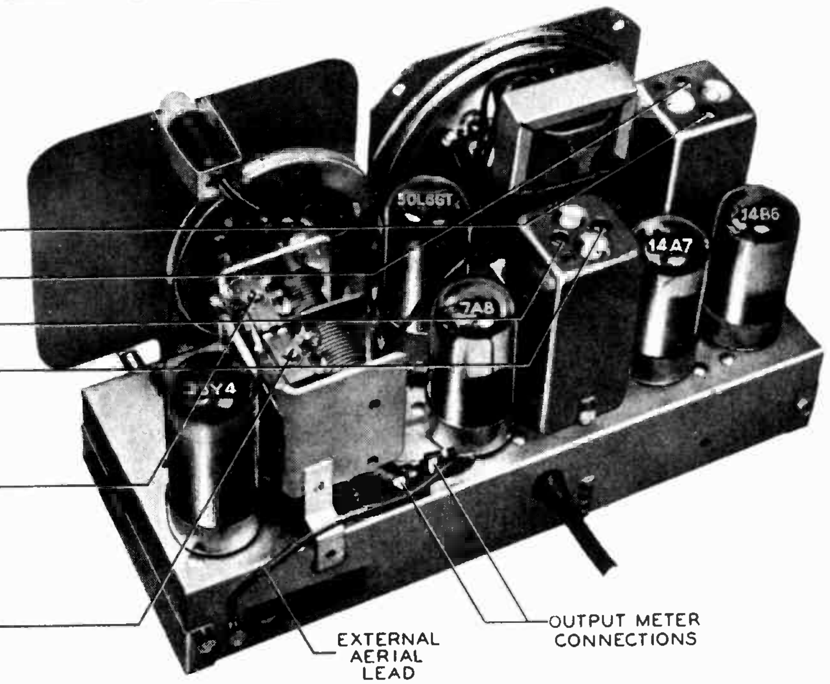


Figure 6. Chassis View, Showing Trimmer Locations TP-3126

SYMBOLIZATION AND TERMINOLOGY

All components in the radio circuits are symbolized and located as follows:

C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loudspeaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

100-series components are in Section 1—the power supply.

200-series components are in Section 2—the second detector, a-v-c, and audio circuits.

300-series components are in Section 3—the i-f amplifier.

400-series components are in Section 4—the aerial, r-f, and oscillator circuits.

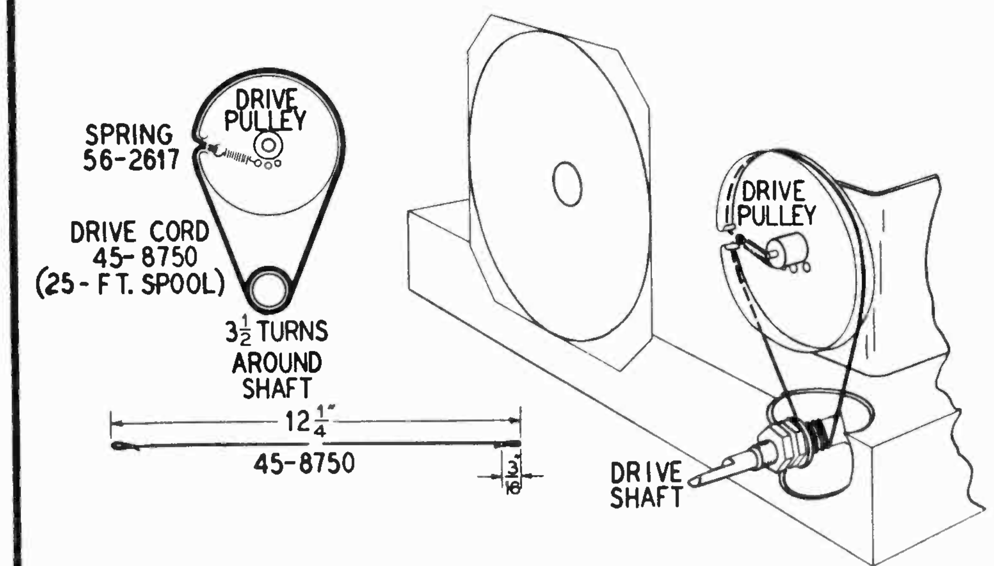


Figure 7. Drive-Cord Installation Details TP-2698E

PHILCO CORP. MODELS 48-200, 48-200-I, 48-214, Code 125

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items, and the numbers listed may not be identical with those on factory assemblies; also, the electrical values of some replacement items furnished may differ from the values indicated in the schematic and parts list. The values substituted in any case are so chosen that the operation of the instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No." in this parts list.

SECTION 1

Symbol	Description	Service Part No.
C100	Condenser, line filter, .04 mf	45-3500-2*
C101	Condenser, electrolytic, 3-section filter	30-2573
C101A:	Condenser, electrolytic, 30 mf	Part of C101
C101B:	Condenser, electrolytic, 25 mf	Part of C101
C101C:	Condenser, electrolytic, 20 mf	Part of C101
R100	Resistor, leakage, 150,000 ohms	66-4153340*
R101	Resistor, filter, 220 ohms	66-1224340*
R102	Resistor, filter, 1200 ohms	66-2123340*
S100	Switch, power	Part of R200
W100	Power cord and plug	L3363
I100	Panel lamp	34-2068

SECTION 2

Symbol	Description	Service Part No.
C200	Condenser, coupling, .01 mf	61-0120*
C201	Condenser, coupling, .01 mf	61-0120*
C202	Condenser, by-pass, 220 mmf	60-10205307*
C203	Condenser, by-pass, .02 mf	61-0108*
R200	Volume control (with power switch), 500,000 ohms	33-5429
R201	Resistor, grid load, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid load, 470,000 ohms	66-4473340*
R204	Resistor, bias, 130 ohms	66-1123340*
LS200	Speaker	36-1614
T200	Output transformer	Part of LS200

SECTION 3

Symbol	Description	Service Part No.
C302	Condenser, a-v-c by-pass, .1 mf	61-0113*
C303	Condenser, screen by-pass, .05 mf	61-0122*
C304	Condenser, special i-f by-pass, .2 mf	30-4644
R300	Resistor, diode load, 47,000 ohms	Part of Z300
R301	Resistor, screen, 27,000 ohms	66-3273340*
R302	Resistor, a-v-c, 2.2 megohms	66-5223340*
Z300	Transformer, 2nd i-f	32-3952
C300A:	Condenser, trimmer	Part of Z300
C300B:	Condenser, trimmer	Part of Z300
C300C:	Condenser, by-pass, 100 mmf	Part of Z300
C300D:	Condenser, by-pass, 100 mmf	Part of Z300
Z301	Transformer, 1st i-f	32-3967
C301A:	Condenser, trimmer	Part of Z301
C301B:	Condenser, trimmer	Part of Z301

SECTION 4

Symbol	Description	Service Part No.
C400	Condenser, tuning, 2-section	31-2527-2
C400A:	Condenser, trimmer	Part of C400
C400B:	Condenser, trimmer	Part of C400
C401	Condenser, coupling, 5 mmf	60-90505007*
C402	Condenser, isolating, 47 mmf	60-00515307*
R400	Resistor, osc., grid, 100,000 ohms	66-4103340*
R401	Resistor, aerial discharge, 150,000 ohms	66-4153340*
T400	Transformer, oscillator	32-3880
LA400	Loop aerial:	
	Models 48-200, 200-I	32-4052-5
	Model 48-214	32-4052-6

MISCELLANEOUS

Description	Service Part No.
Cabinet	
Model 48-200	10542D
Model 48-200-I	10542E
Model 48-214	10621
Cabinet Hardware	
Back	
Model 48-200	27-9879
Model 48-200-I	27-9922
Model 48-214	54-7080
Foot, felt	W2190
Knob	
Model 48-200	27-4820
Model 48-200-I	54-4118
Model 48-214	54-4154
Window, acetate	
Models 48-200, 200-I	54-4088
Model 48-214	54-4212
Clip, coil mounting	28-5002FA1
Dial-Scale Hardware	
Cord, drive (25-ft. spool)	45-8750
Pointer	
Models 48-200, 200-I	27-4891-1
Model 48-214	54-4148-2
Scale, dial	
Model 48-200	27-5965
Model 48-200-I	27-5965-1
Model 48-214	27-5839
Screw, scale mounting	1W19674FA3
Spring, drive cord	56-2617
Washer, scale mounting	2W54094
Panel, terminal, loop aerial	76-2148
Panel, lamp assembly	76-1472
Shaft, drive assembly	31-2718
Socket, Loktal	27-6138*
Socket, octal	27-6174*

MODELS 48-250, 48-251,
Codes 121, 122, 126

PHILCO CORP.

CODE 121

Model 48-250, Code 121, is identical to Model 48-250, Code 126, with the following exceptions:

1. The type 50B5 output tube was replaced by a type 50A5 tube. The 50B5 miniature socket, Part No. 27-6226, was replaced by an octal socket, Part No. 27-6199.
2. The type 35Y4 rectifier tube was replaced by a type 35Z5GT tube.

CODE 122

Model 48-250, Code 122, is identical to Model 48-250, Code 121, with the following exceptions:

1. The permanent-magnet speaker (LS200), Part No. 36-1615, was replaced by an electrodynamic speaker, Part No. 36-1591.
2. Resistor R101 was removed.
3. Resistor R102 was removed.
4. Condenser C101 was replaced by a 2-section electrolytic condenser, 20-20 mf., Part No. 30-2547.*
5. Resistors R101 and R102 were replaced by the 500-ohm field coil of the speaker.

Circuit Description

The Philco Radio, Model 48-250, is a five-tube, table-model superheterodyne, providing reception in the standard-broadcast band.

The high-impedance loop aerial normally provides adequate signal pickup. Provisions are made for the connection of an external aerial.

The loop is coupled to the 7A8 converter. Variable condenser tuning is employed; the oscillator rotor-section plates are properly shaped to obtain tracking, thus eliminating the necessary for a series padding condenser.

The 7A8 is transformer-coupled to the 14A7 i-f amplifier, which is also transformer-coupled to the diodes of the 14B6 second detector—first audio-frequency amplifier. A-v-c voltage is applied to the control grids of both the i-f and converter tubes.

The triode section of the 14B6 is the first audio stage, and is resistance-coupled to the 50B5 output stage. The output tube is transformer-coupled to the permanent-magnet dynamic speaker.

D-c operating voltages are obtained from the 35Y4 half-wave rectifier, the output of which is filtered by a two-section resistor-condenser filter.

Condenser C302 in Section 3 is a special condenser, inductively wound with wire to form a series-tuned circuit, resonant at the intermediate frequency. This special condenser offers less impedance at this frequency than a conventional condenser, thus permitting higher i-f gain, with no tendency towards instability. The inductive effect at audio frequencies is negligible. Since the tuning gang is connected to the chassis, by-passing at broadcast frequencies is adequate.

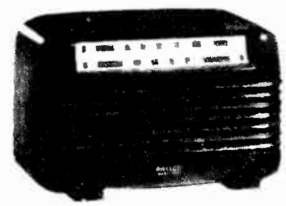
Resistor R100, the 150,000-ohm resistor in Section 1, prevents hum which might otherwise occur under conditions of high humidity.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section without going through the entire test procedure.

Failure to obtain "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.



MODEL 48-250 (Walnut)
MODEL 48-250-I (Ivory)

SPECIFICATIONS

CABINET	Plastic (ivory or walnut)
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
OPERATING VOLTAGE	105—120 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	Loop fastened to cabinet; terminal also provided for outside aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8, 14A7, 14B6, 50B5, 35Y4

TP-2670

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube-electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before turning on the power.

1. Inspect the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.
2. Measure the resistance between B+ (pin 7 of the 35Y4 rectifier) and B— (test point B). When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1500 ohms, check condenser C101A, C101B, and C101C for leakage or shorts.

The resistance value, which is must lower than normal, is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 are performed.

Section 1 TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B—, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohm-per-volt meter, at a line voltage of 117 volts, a-c.

Turn on the power, and set the volume control to minimum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

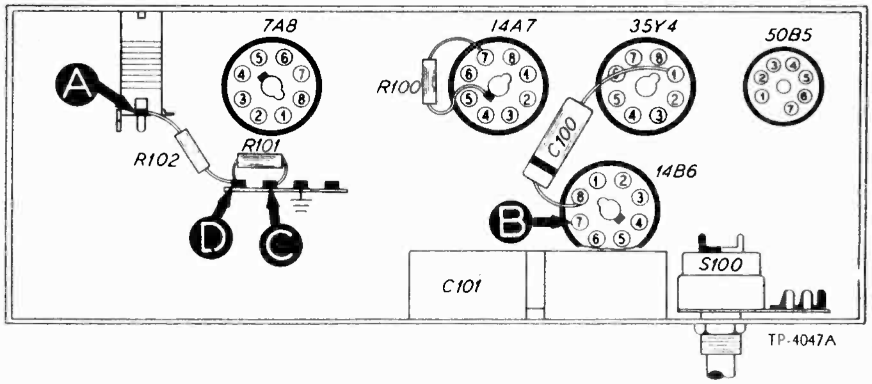


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	107v		Trouble within this section. Isolate by the following tests.
2	C	130v	No voltage Low voltage High voltage	Defective: 35Y4, S100, W100. Shorted: C101A. Defective: 35Y4. Open : C101A, I100. Leaky: C101A. Open: R101, R102, R203*, T200*.
3	D	120v	No voltage Low voltage High voltage	Shorted: C101B. Open: R101. Shorted: C203*. Leaky: C101B, C203*. Open: R102, R203*, T200*.
4	A	107v	No voltage Low voltage High voltage	Shorted: C101C. Leaky: C101C. Open: R203*.
Listening Test: Abnormal hum may be caused by open C101B, C101C, or R100.				

* This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio signal generator. Connect the ground lead of the generator to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3. If not, isolate and correct the trouble in this section.

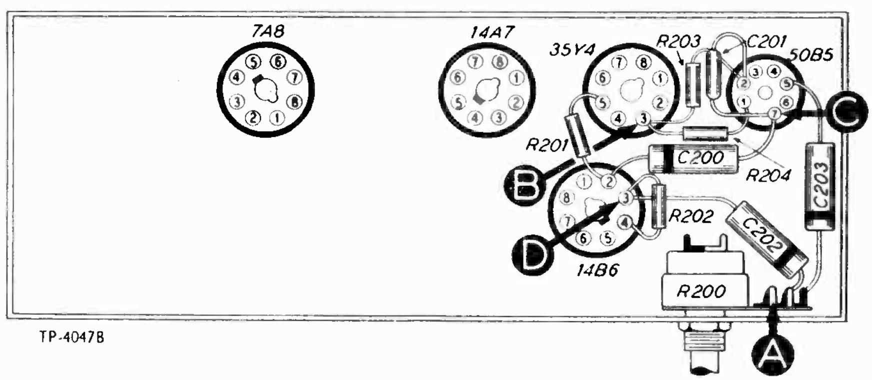


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	No signal—Open or shorted: LS200, T200. Shorted: C201, C203. Open: R203. Defective: 50B5.
3	D	Same as step 1.	Open: R201, R202, R204. Open, shorted, or leaky: C200. Defective: 14B6.
4	A	Same as step 1.	Defective: R200((rotate through entire range). Open, shorted or leaky: C202. Shorted: C301D*

* This part, located in another section, may cause trouble in this section.

Section 3 TROUBLE SHOOTING

For the tests in this section use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests in Section 4; if not, isolate and correct the trouble in this section.

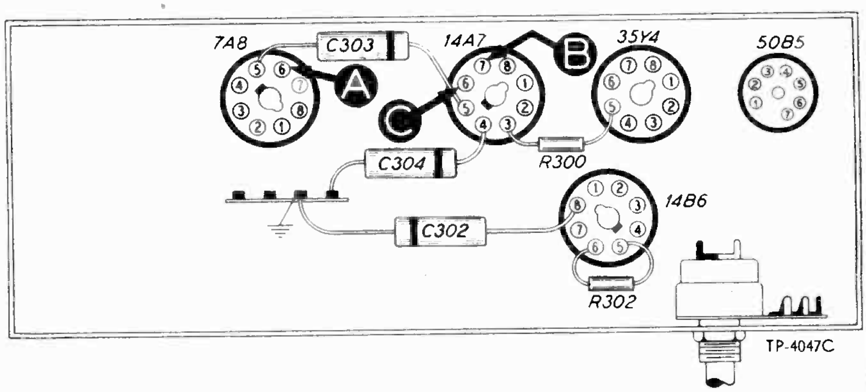


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Clear signal with moderate signal input.	Defective or misaligned: Z301. Defective: 14B6 (diode section), 14A7. Open: R300, C302. Shorted, leaky, or open: C303.
3	A	Same as step 1.	Defective or misaligned: Z300. Defective: 7A8*. Open: C302, LA400*.

* This part, located in another section, may cause trouble in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

Set the radio and signal-generator dials as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in this section.

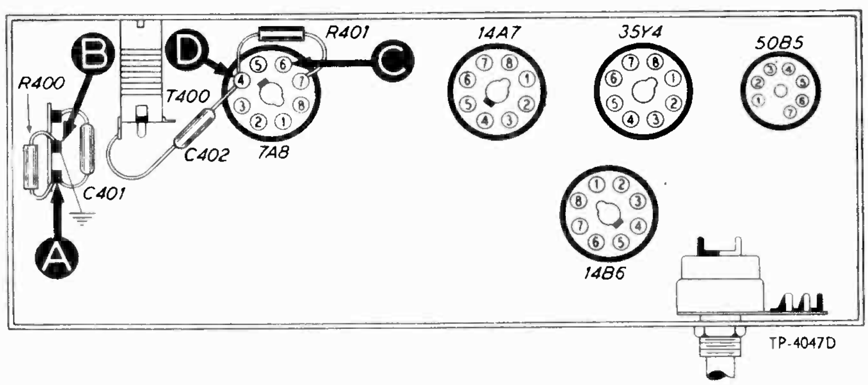


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS

STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	540 kc.	540 kc.	Clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	540 kc.	540 kc.	Same as step 1.	Shorted: C400, C400A. Defective: 7A8. Trouble in oscillator section.
3	Oscillator Test (see Note below)		540 to 1620 kc.	Negative 7 to 11 volts.	Defective: T400, 7A8. Open or shorted: C402. Shorted: C400, C400B.
4	A	540 kc.	540 kc.	Same as step 1.	Defective: LA400. Open: C401.

OSCILLATOR-TEST NOTE: Connect positive lead of high-resistance voltmeter to B—, test point B; connect prod end of negative lead through a 100,000-ohm isolating resistor to the 7A8 oscillator grid, test point D. Use suitable meter range, such as 0—50 volts. Proper operation of oscillator is indicated by negative voltage of 7 to 11 volts (measured with a 20,000-ohms-per-volt meter) throughout range of tuning control.

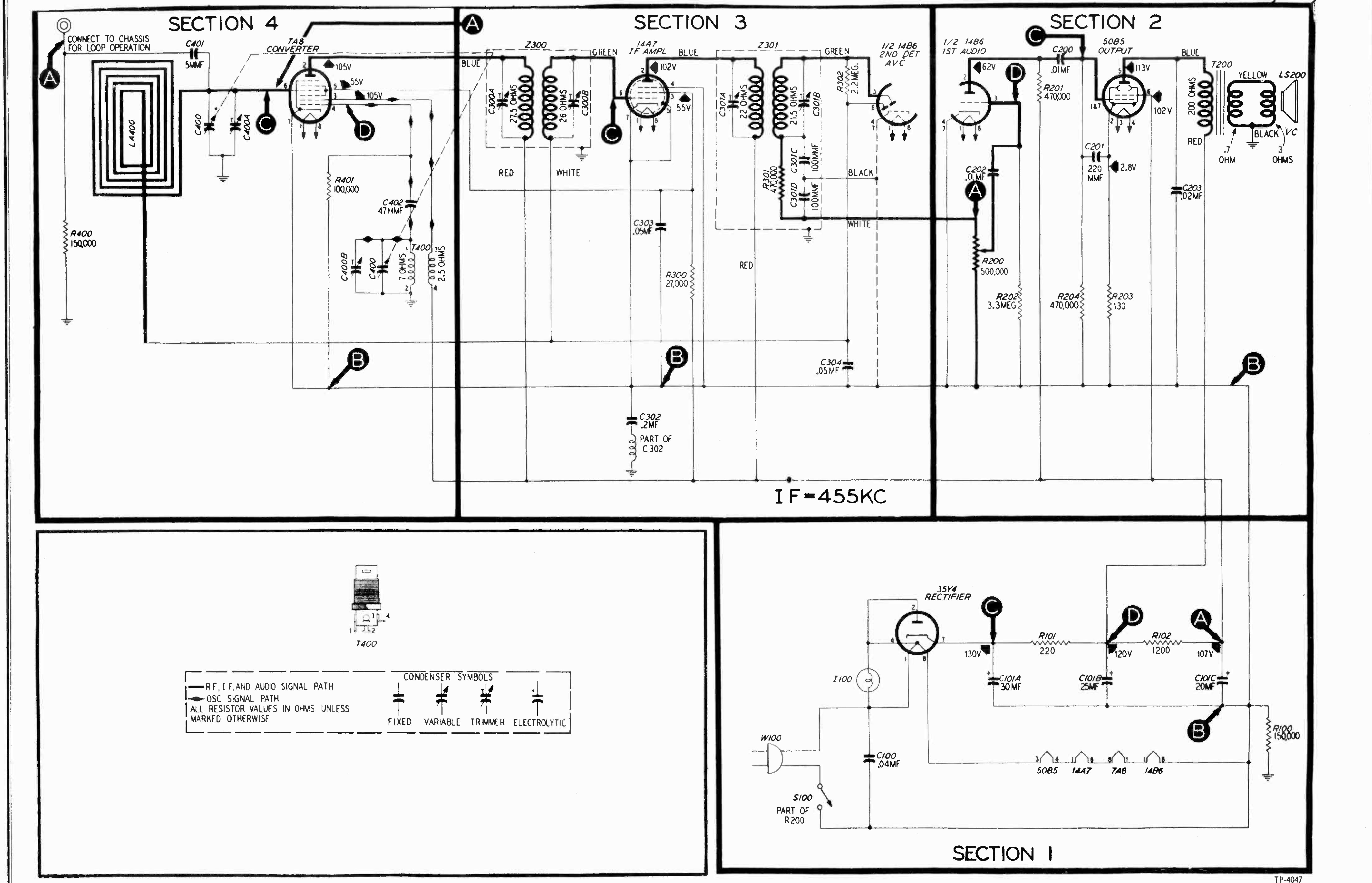


FIGURE 5. PHILCO RADIO MODELS 48-250 AND 48-250-I, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

ALIGNMENT PROCEDURE

TURN ON THE RADIO, AND SET THE VOLUME CONTROL TO MAXIMUM.

DIAL—Turn tuning condensers to full-mesh position. Set dial pointer to coincide with index mark, located to the left of "550."

OUTPUT METER—Connect to left (output) lug and center (chassis) lug of terminal panel, shown in figure 6.

SIGNAL GENERATOR—Connect as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B—; output lead through a .1-mf. condenser to test point C of Section 4.	455 kc.	540 kc.	Turn C300B (copper screw) fully tight, then adjust trimmers, in order given, for maximum output.	C301B C301A C300B C300A
2	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust for maximum.	C400F
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C400A

NOTE: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop.

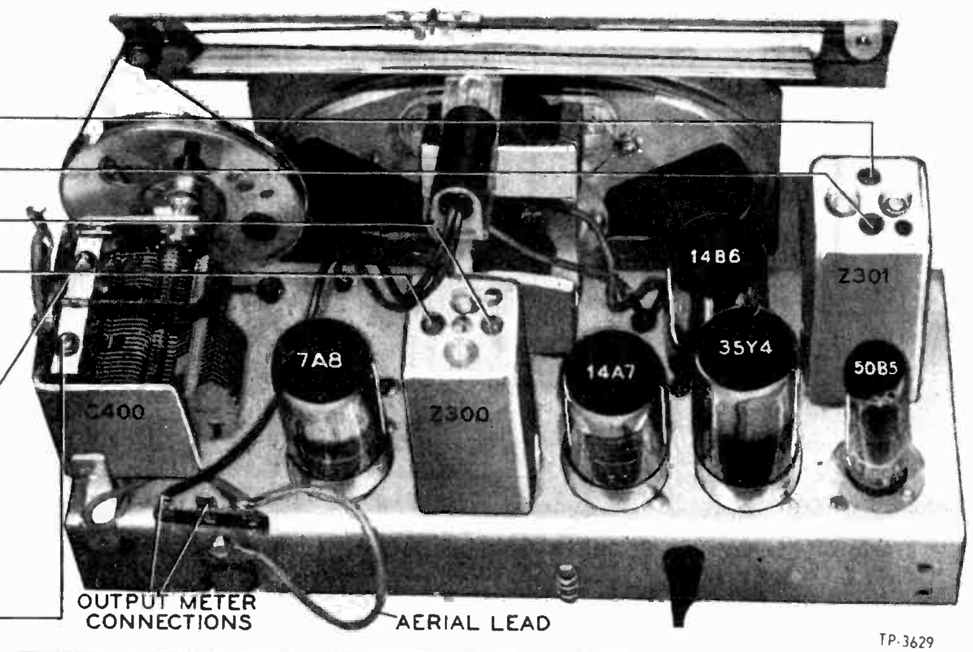


FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS

SYMBOLIZATION

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loud-speaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

The number of the symbol designates the section in which the part is located, as follows:

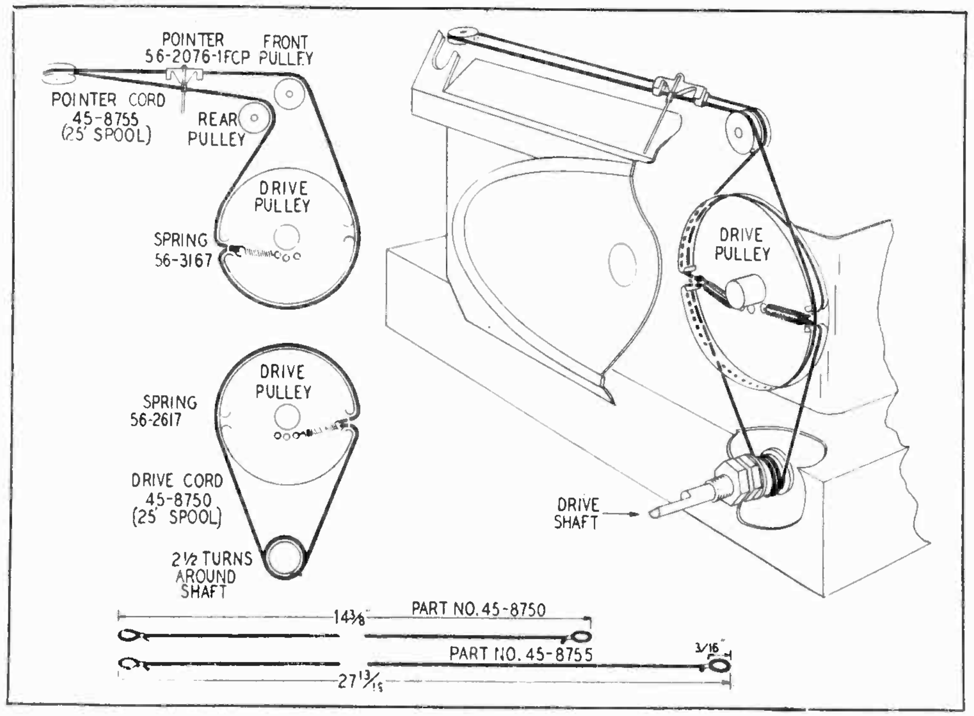
100-series components are in Section 1—the power supply.

200-series components are in Section 2—the audio circuits.

300-series components are in Section 3—the i-f amplifier, detector, and a-v-c circuits.

400-series components are in Section 4—the aerial, r-f, and oscillator circuits.

A suffix letter identifies the part as a non-replaceable component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.



TP-1985

FIGURE 7. DRIVE-CORD INSTALLATION DETAILS

PHILCO CORP. MODELS 48-250, 48-251, Codes 121, 122, 126

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .04 mf.	45-3500-2*
C101	Condenser, electrolytic, 3-section	30-2573*
C101A:	Condenser, filter, 30 mf.	Part of C101
C101B:	Condenser, filter, 25 mf.	Part of C101
C101C:	Condenser, filter, 20 mf.	Part of C101
I100	Lamp, pilot	34-2068
R100	Resistor, leakage, 150,000 ohms	66-4153340*
R101	Resistor, filter, 220 ohms	66-1224340
R102	Resistor, filter, 1200 ohms	66-2123340
S100	Switch, power	Part of R200
W100	Power cord and plug	L-3199

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, blocking, .01 mf.	61-0120*
C201	Condenser, by-pass, 220 mmf.	62-122001001*
C202	Condenser, blocking, .01 mf.	61-0120*
C203	Condenser, tone compensating, .02 mf.	61-0108*
LS200	Speaker	36-1615
R200	Volume control, .5 megohm	45-5007*
R201	Resistor, plate load, 470,000 ohms	66-4473340*
R202	Resistor, grid load, 3.3 megohms	66-5333340*
R203	Resistor, bias, 130 ohms	66-1123340*
R204	Resistor, grid load, 470,000 ohms	66-4473340*
T200	Transformer, output	Part of LS200

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, by-pass	Part of Z301
C301D	Condenser, by-pass	Part of Z301
C302	Condenser and choke assembly, i-f by-pass, .2 mf.	30-4644
C303	Condenser, screen by-pass, .05 mf.	61-0122*
C304	Condenser, a-v-c filter, .05 mf.	61-0122*
R300	Resistor, screen dropping, 27,000 ohms	66-3273340
R301	Resistor, i-f filter, 47,000 ohms	Part of Z301
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
Z300	Transformer, 1st i-f, including C300A and B300B	32-3968
Z301	Transformer, 2nd i-f, including C301A, C301B, C301C, C301D, and R301	32-3674*

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning, 2-section	31-2727-1
C400A:	Condenser, trimmer	Part of C400
C400B:	Condenser, trimmer	Part of C400

SECTION 4 (Continued)

Reference Symbol	Description	Service Part No.
C401	Condenser, coupling, 5 mmf.	60-90505007*
C402	Condenser, isolating, 47 mmf.	60-00515307*
LA400	Loop aerial	32-4052-4
R400	Resistor, aerial discharge, 150,000 ohms	66-4153340*
R401	Resistor, oscillator grid, 100,000 ohms	66-4103340*
T400	Transformer, oscillator	32-3880

MISCELLANEOUS

Description	Service Part No.
Cabinet	
Model 48-250 (less scale)	10524P
Model 48-250-I (less scale)	10524R
Cabinet Hardware	
Back	
Model 48-250	27-9817
Model 48-250-I	27-9870
Knob assembly	
Model 48-250	54-4052
Model 48-250-I	27-4805
Scale, dial	
Model 48-250	27-5907
Model 48-250-I	27-5908
Scale strap	56-2059FA3
Screw	1W23129FA3
Stud, back mounting	W2235FA9
Dial Backplate and Associated Hardware	
Cord, drive (pointer)	45-8755
Cord, drive (gang)	45-8750
Diffusing panel, Model 48-250-I	54-4343
Light reflector, Model 48-250	27-9816-1*
Pointer	56-2076-1FCP
Pulley	11W29740
Rubber band	54-4064
Screw and lock washer	1W32228FA3
Spring	
Gang drive cord	56-2617
Pointer drive cord	56-3167
Spring clip, diffusing screen, Model 48-250-I	56-3587
Panel, wiring	76-2148
Panel, wiring	12W45654
Pilot lamp socket assembly	76-1981
Shaft, assembly	31-2663
Socket, tube	
Loktal	27-6138*
Miniature	27-6226

Circuit Description

Philco Model 48-300 is a 5-tube, portable superheterodyne radio, designed to operate on a self-contained battery or a standard source of a.c. or d.c. The frequency range is 540—1620 kc. The built-in loop (high impedance) is adequate in most localities; however, where signal strength is low, an external aerial may be used.

The converter stage employs a type 1R5. The i-f stage, using a 1T4, operates at 455 kc. A 3-mmf. condenser (C305) and the socket capacity of the 1T4 socket are used to neutralize the inter-electrode capacitance of the 1T4, thus preventing oscillation.

The diode section of the 1U5 provides detection and a.v.c. The pentode section functions as the first audio stage; this stage is resistance-coupled to the 3V4 output amplifier.

For a-c or d-c power-line operation, plate, screen, and filament power is supplied through the 117Z3 rectifier.

By leaving the cathode bias resistor (R207) unbypassed, degeneration is developed in the output stage to improve the frequency response.

The 150,000-ohm leakage resistor (R102) prevents hum under conditions of high humidity.

Philco TROUBLE-SHOOTING Procedure

For rapid trouble shooting, the radio circuit is divided into four sections, as follows:

- Section 1—the power supply
- Section 2—the audio circuits
- Section 3—the i-f, detector, and a-v-c circuits
- Section 4—the r-f and converter circuits

Test points are specified for each section, and are indicated on the sectionalized schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the location of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before connecting the radio to a source of power:

MODEL 48-300

SPECIFICATIONS

CABINET	Leatherette-covered wood
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	160 milliwatts
OPERATING VOLTAGES	Battery pack: "B", 90 volts; "A", 7.5 volts A.c./d.c.: 105—120 volts
POWER CONSUMPTION	Battery: "B", 13ma. at 90 volts; "A", 50 ma. at 7.5 volts A.c./d.c.: 25 watts
AERIAL	Built-in loop; terminal also provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	1R5, 1T4, 1U5, 3V4, 117Z3
BATTERY TYPE	Philco P-841A

TP-3980

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Check the total filament resistance, with the power switch turned on, the plug disconnected from the battery, and the change-over switch in the battery position (power-cord plug inserted in receptacle on rear of chassis). If the resistance between the A+ and A- pins on the battery-cable plug is higher than 100 ohms, one of the tube filaments is probably open. NOTE: If the 3V4 filament is open, check C101D before replacing with a new tube.

3. Measure the resistance between B+ (pin 6 of the 117Z3 rectifier tube) and B-, test point B (see figure 1). When the ohmmeter test leads are connected in the correct polarity, the highest resistance reading will be obtained. If the reading is lower than 1040 ohms, check condensers C101A and C101B for leakage or shorts.

The resistance value above, which is much lower than normal, is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 are performed.

TROUBLE SHOOTING

Section 1

POWER SUPPLY

Make the tests in this section with a d-c voltmeter connecting the leads between B–, test point B, and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

With the power-cord plug connected to a source of power (a.c. or d.c.), turn on the power, and set the volume control to minimum (clockwise).

Follow the steps in the order given. If the "NORMAL INDICATION," is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

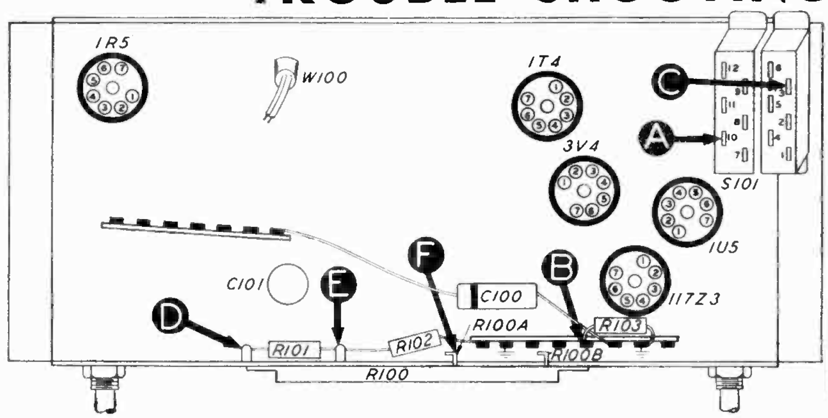


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS TP-4099A

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A C	7.5v 80v		Trouble in this section. Isolate by the following tests.
2	D	107v	Low voltage No voltage	Defective: 117Z3. Open C101A. Defective: 117Z3. Open: S100, S101.
3	E	103v	Low voltage No voltage	Changed Resistance: R101. Leaky: C101A. Open: R101. Shorted: C101A.
4	F	55v	Low voltage No voltage	Changed Resistance: R100A. Leaky: C101B. Open: R100A. Shorted: C101B.
5	A	7.5v	Low voltage High voltage No voltage	Changed Resistance: R100A. Open: filament of one or more tubes. Open: R100A.
6	C	80v	Low voltage High voltage No voltage	Changed Resistance: R102. Leaky: C101C. Open: R207*, T200*. Open: R102. Shorted: C101C.
Listening Test: Hum may be caused by open C101B, C101C, C100, or R103.				

* This part, located in another section, may cause abnormal indication in this section.

BATTERY VOLTAGE: Replace battery when (with radio turned on) "B" voltage falls below 66 volts, or "A" voltage falls below 6 volts.

TROUBLE SHOOTING

Section 2

AUDIO CIRCUITS

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

With the power-cord plug connected to a source of power (a.c. or d.c.), set the volume control to maximum (counterclockwise). Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

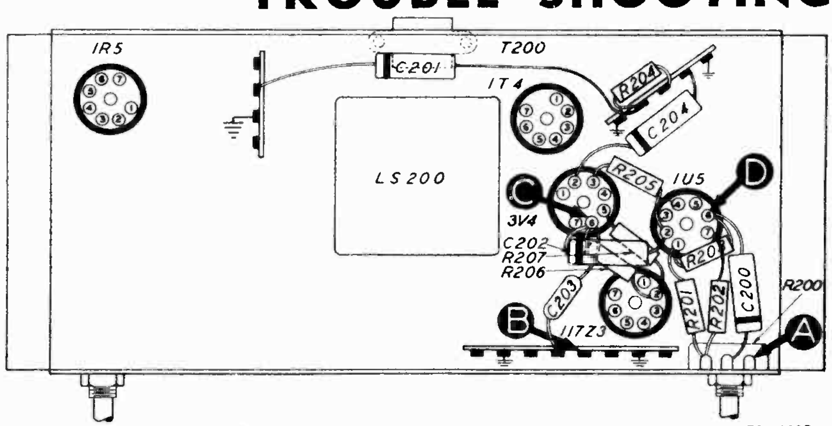


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS TP-4099B

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Defective: 3V4, LS200. Open: R206, R207, T200. Shorted or leaky: C202, C203, C204, T200.
3	D	Same as step 1.	Defective: 1U5. Open: R204, R205. Shorted or leaky: C201, C203.
4	A	Same as step 1.	Open: R200 (rotate through range), R201, R202, C200, R203, C304*.
Listening Test: If speech or music is distorted (with section 1 operating normally), check R203, R201, and R202 for opens, and C200 for leakage.			

* This part located in another section, may cause abnormal indication in this section.

TROUBLE SHOOTING

Section 3

I-F, DETECTOR, AND A-V-C CIRCUITS

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

With the power-cord plug connected to a source of power (a.c. or d.c.), set the volume control to maximum (counterclockwise).

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in this section.

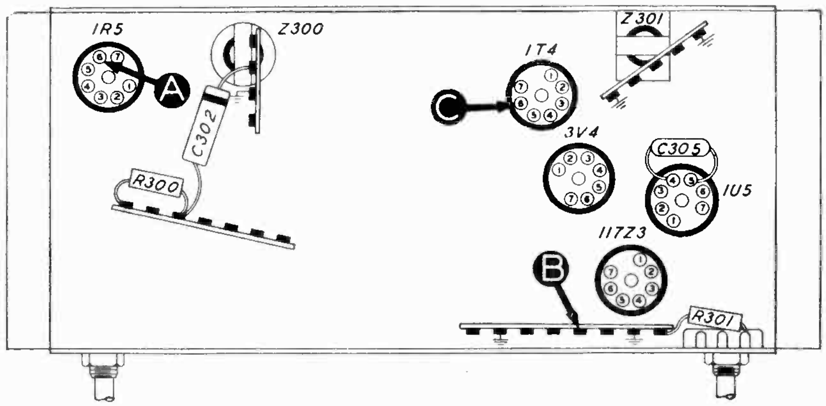


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS TP-4099C

Since the circuit location of test point A for this section is the same as that of test point C for section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear signal with moderate signal input.	Defective: 1T4. Open: R300, Z301 pri. or sec., R302. Shorted: C300B, C301A, C303, C302.
3	A	Same as step 1.	Defective: 1R5*. Shorted: C400*, C400A*, C300A, C300B. Open: Z300* pri. or sec., T400*.
Listening Test: Oscillation or instability may be caused by open C305.			

* This part located in another section, may cause abnormal indication in this section.

TROUBLE SHOOTING

Section 4

R-F AND CONVERTER CIRCUITS

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator, with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum (counterclockwise).

Set the tuning control and signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate the trouble by following the remaining steps.

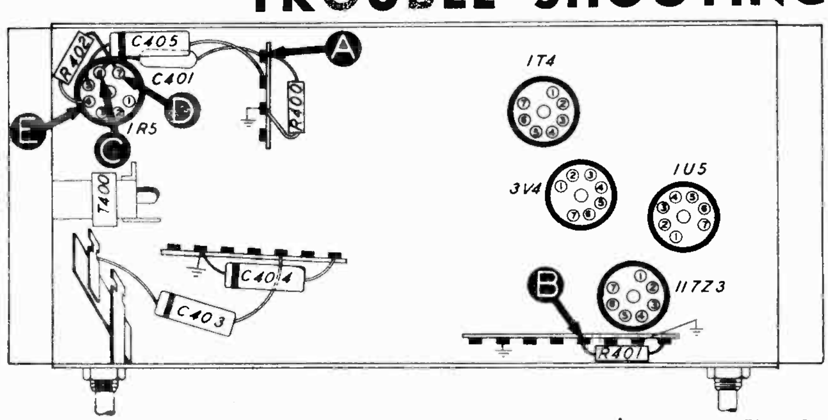
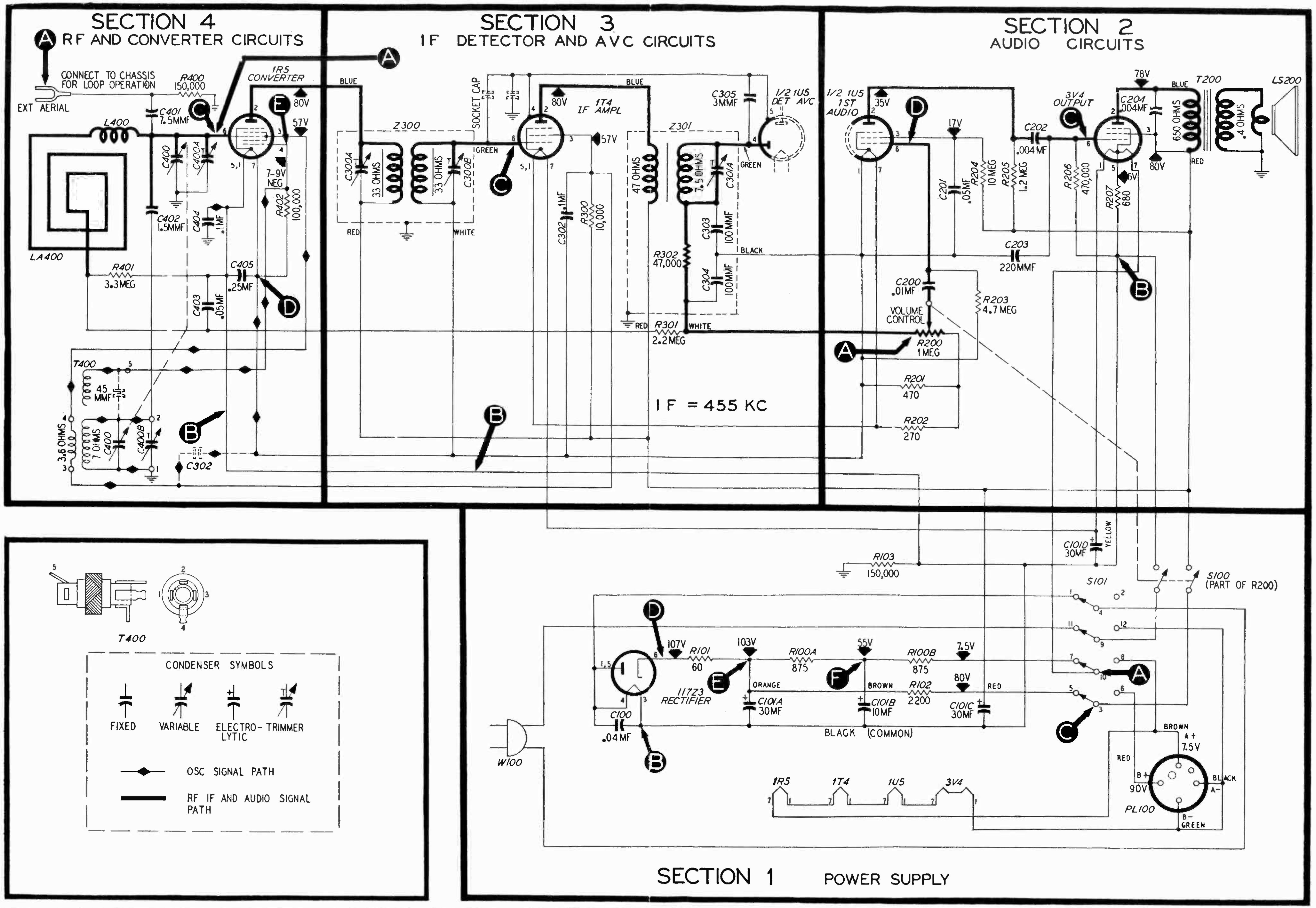


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS TP-4099D

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	Tune to signal.	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	1000 kc.	Tune to signal.	Same as step 1.	Shorted: C400, C400A, C405, C402. Trouble in oscillator circuit (step 3).
3	E to D (Osc. test; see note below.)		Rotate through range.	Negative 7 to 9 volts.	Defective: 1R5. Open: R402, T400. Shorted: C400, C400B.
4	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C401, L400, LA400, R401.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to the 1R5 positive filament terminal, pin 7 (test point D); connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the 1R5 oscillator grid, pin 4 (test point E). Use a suitable meter range, such as 0—10 volts. Absence of negative grid voltage throughout the tuning range indicates that the oscillator is not operating. The normal grid voltage given in the chart was measured with a 20,000-ohms-per-volt meter.


SECTION 4
RF AND CONVERTER CIRCUITS
CONNECT TO CHASSIS FOR LOOP OPERATION
EXT AERIAL
R400 150,000
1R5 CONVERTER
C401 7.5MMF
L400
C400
C400A
C402 1.5MMF
C404 .1MF
80V
57V
7-9V NEG
R402 100,000
LA400
R401 3.3MEG
C405 .25MF
C403 .05MF
T400
45 MMF
3.6 OHMS
7 OHMS
C400B
C302
SECTION 3
IF DETECTOR AND AVC CIRCUITS
BLUE
Z300
SOCKET CAP
GREEN
C300A
33 OHMS
C300B
RED
WHITE
1T4 IF AMPL
80V
57V
C302 .1MF
R300 10,000
Z301
47 OHMS
7.5 OHMS
C301A
C305 3MMF
1/2 1U5 DET AVC
C303 100MMF
C304 100MMF
R302 47,000
BLACK
R301 2.2MEG
I F = 455 KC
SECTION 2
AUDIO CIRCUITS
1/2 1U5 1ST AUDIO
35V
17V
3V4 OUTPUT
78V
C202 .004MF
C204 .004MF
T200
LS200
650 OHMS
.4 OHMS
C201 .05MF
R204 10 MEG
R205 1.2 MEG
R206 470,000
R207 680
6V
80V
C203 220MMF
C200 .01MF
VOLUME CONTROL
R203 4.7 MEG
R200 1MEG
R201 470
R202 270
T400
CONDENSER SYMBOLS
FIXED
VARIABLE
ELECTRO-LYTIC
TRIMMER
OSC SIGNAL PATH
RF IF AND AUDIO SIGNAL PATH
YELLOW
C101D 30MF
R103 150,000
S101
S100 (PART OF R200)
107V
R101 60
103V
R100A 875
55V
R100B 875
7.5V
80V
117Z3 RECTIFIER
ORANGE
C101A 30MF
BROWN
C101B 10MF
R102 2200
C101C 30MF
RED
C100 .04MF
BLACK (COMMON)
W100
1R5
1T4
1U5
3V4
BROWN
A+ 7.5V
RED
B+ 90V
BLACK A-
B- GREEN
PL100
SECTION 1
POWER SUPPLY

ALIGNMENT PROCEDURE

OUTPUT METER—Connect between chassis and voice-coil terminal of output transformer T200.

VOLUME CONTROL—Set to maximum (counterclockwise).

OUTPUT LEVEL—Input signal should be attenuated, as alignment progresses, to hold output-meter reading below 1 volt.

SIGNAL GENERATOR—Connect as indicated in chart.

I-F ALIGNMENT—I-f alignment should be made with chassis out of cabinet.

R-F ALIGNMENT—R-f alignment should be made with chassis in cabinet, built-in loop connected, and external aerial lead connected to chassis.

DIAL POINTER—With tuning condensers fully meshed, adjust dial pointer to coincide with index mark at low-frequency end of dial scale.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL	DIAL	SPECIAL INSTRUCTIONS	
1	Ground lead to B-; output to external aerial lead (disconnected from chassis).	455 kc.	Gang fully meshed.	Adjust trimmers, in order given, for maximum output (chassis out of cabinet).	C301A—2nd i-f sec. C300B—1st i-f sec. C300A—1st i-f pri.
2	Install chassis in cabinet, and adjust dial pointer.				
3	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust for maximum.	C400B—Oscillator (shunt)
4	Same as step 3.	1600 kc.	1600 kc.	Adjust for maximum.	C400A—Aerial (shunt)

RADIATING LOOP: Make up a coil of insulated wire, consisting of 6 to 8 turns, about 6" in diameter. Connect coil ends to signal-generator leads, and suspend coil near radio loop.

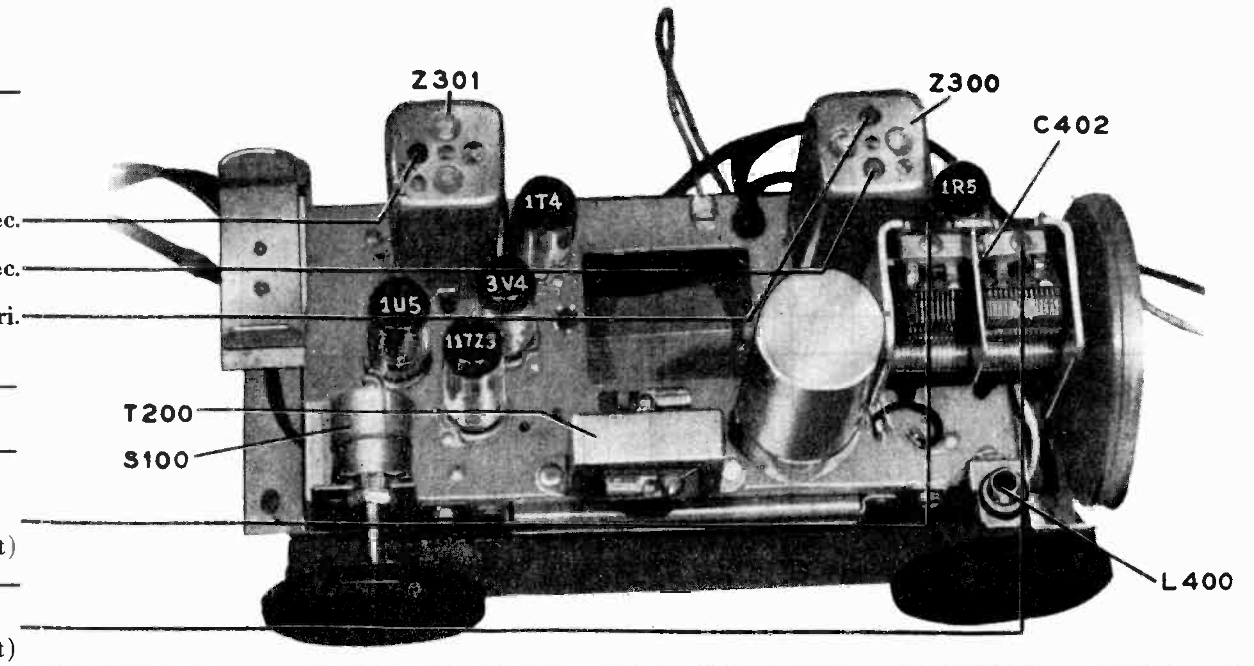


FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS TP-4185

SYMBOLIZATION

The components in the radio circuit are symbolized according to the types of parts and the section of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loud-speaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

The number of the symbol designates the section in which the part is located, as follows:

100-series components are in Section 1—the power supply.
200-series components are in Section 2—the audio circuits.
300-series components are in Section 3—the i-f amplifier, detector, and a-v-c circuits.
400-series components are in Section 4—the r-f and converter circuits.

A suffix letter identifies the part as a component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.

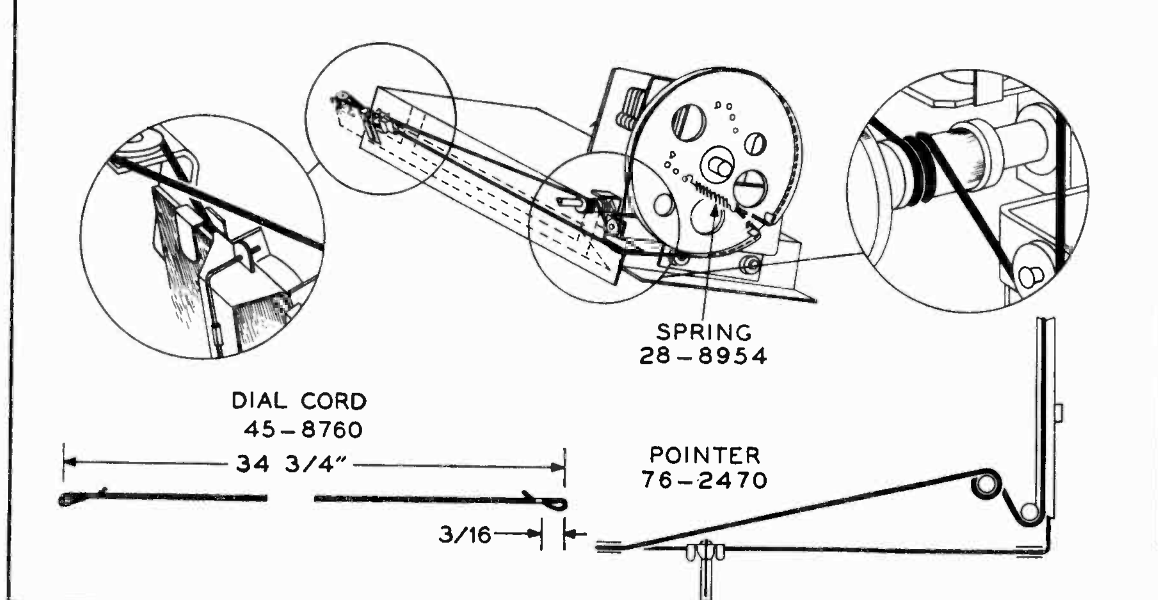


FIGURE 7. DRIVE-CORD INSTALLATION DETAILS TP-4099E

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies: also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .04 mf.	45-3500-2*
C101	Condenser, electrolytic, 4-section	30-2560*
C101A	Condenser, filter, 30 mf., 150v	Part of C101
C101B	Condenser, filter, 10 mf., 150v	Part of C101
C101C	Condenser, filter, 30 mf., 150v	Part of C101
C101D	Condenser, filter, 30 mf., 25v	Part of C101
PL100	Plug-and-cable assembly	41-3712-2
R100	Resistor, 2-section	33-3431-4
R100A	Resistor, filament dropping, 875 ohms	Part of R100
R100B	Resistor, filament dropping, 875 ohms	Part of R100
R101	Resistor, limiting, 60 chms	34-1334
R102	Resistor, dropping, 2200 ohms	66-2223340*
R103	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, on-off	Part of R200
S101	Switch, battery—a.c./d.c.	42-1821
W100	Power cord and plug	41-3755-17

SECTION 2
AUDIO CIRCUITS

C200	Condenser, d-c blocking, .01mf.	61-0120*
C201	Condenser, screen by-pass, .05 mf.	61-0122*
C202	Condenser, d-c blocking, .004 mf.	61-0179*
C203	Condenser, r-f by-pass, 220 mmf.	30-1227-9*
C204	Condenser, tone compensating, .004 mf.	61-0179*
LS200	Speaker	36-1598
R200	Volume control (with on-off switch), 1 megohm	33-5526
R201	Resistor, diode return, 470 ohms	66-1473340*
R202	Resistor, diode return, 270 ohms	66-1473340*
R203	Resistor, grid return, 4.7 megohms	66-5473340*
R204	Resistor, screen dropping, 10 megohms	66-6103340*
R205	Resistor, plate load, 1.2 megohms	66-5123340*
R206	Resistor, grid return, 470,000 ohms	66-4473340*
R207	Resistor, cathode bias, 680 ohms	66-1683340*
T200	Transformer, output	32-8259

SECTION 3
I-F, DETECTOR, AND A-V-C CIRCUITS

C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C302	Condenser, screen by-pass, .1 mf.	61-0113*
C303	Condenser, i-f by-pass (part of Z301), 100 mmf.	30-1225-2*

SECTION 3 (Continued)

Reference Symbol	Description	Service Part No.
C304	Condenser, i-f by-pass (part of Z301), 100 mmf.	30-1225-2*
C305	Condenser, neutralizing, 3 mmf.	30-1221
R300	Resistor, screen dropping, 10,000 ohms	66-3103340*
R301	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R302	Resistor, i-f filter (part of Z301), 47,000 ohms	66-3473340*
Z300	Transformer, 1st i-f	32-3968-4
Z301	Transformer, 2nd i-f	32-3987-1

SECTION 4
R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning gang	31-2692
C400A	Condenser, aerial trimmer	Part of C400
C400B	Condenser, oscillator trimmer	Part of C400
C401	Condenser, isolating, 7.5 mmf.	30-1224-8
C402	Condenser, neutralizing, 1.5 mmf.	30-1221-3
C403	Condenser, a-v-c filter, .05 mf.	61-0122*
C404	Condenser, filament by-pass, .1 mf.	61-0113*
C405	Condenser, filament by-pass, .25 mf.	61-0125*
L400	Coil, aerial loading	32-4260
LA400	Loop aerial	32-4052-17
R400	Resistor, discharge, 150,000 ohms	66-4153340*
R401	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R402	Resistor, oscillator grid bias, 100,000 ohms	66-4103340*
T400	Transformer, oscillator	32-4095-3

MISCELLANEOUS

Description	Service Part No.
Cabinet	10692
Back-catch assembly	76-2273
Foot	45-6041
Handle	54-7416-1
Handle loop	56-4919
Scale	27-5982
Scale strap	56-3846
Cord, drive (25-ft. spool)	45-8760*
Dial-backplate assembly	76-2023
Pulley (small)	11W29741
Knob	54-4212-2
Pointer	76-2470
Pully (large)	11W29743FA3
Shaft and pulley	76-2028
Socket (miniature)	27-6203
Spring, drive-cord	28-8954
Stud (pulley)	11W29752FA5
Switch plunger	76-3061

MODEL 48-360 PHILCO CORP.

Circuit Description

Philco Model 48-360 is a six-tube, portable, superheterodyne radio, operating on a self-contained battery or a standard power source of a.c. or d.c. High sensitivity, selectivity, and power output are outstanding features. The frequency range is 540–1600 kc. The built-in loop aerial is adequate in most localities. Where signal strength is low, an external aerial may be used.

The tuned r-f stage, using a 1T4, provides a high signal-to-noise ratio. The converter employs a type 1R5 pentagrid converter.

The i-f stage, using another 1T4, has double-tuned transformers operating at 265 kc.; the voltage gain of this stage is increased considerably by positive screen feedback taken from the tertiary winding of the second i-f transformer.

The diode section of the 1U5 provides detection and a-v-c voltage. The pentode section functions as the first audio stage; this stage is resistance-coupled to the 3LF4 output amplifier. The speaker is a permanent-magnet dynamic type.

For a-c or d-c power-line operation, plate, screen, and filament power is supplied through the 117Z3 rectifier.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and components of that section.

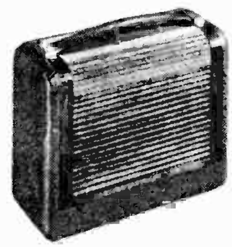
In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before turning on the power:



MODEL 48-360

SPECIFICATIONS

CABINET	Fabrikoid finish, wood trim
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGE	540—1600 kc.
AUDIO OUTPUT	160 milliwatts
OPERATING VOLTAGES	Battery: "B," 90 volts; "A," 9 volts. A.c./d.c.: 105—120 volts
POWER CONSUMPTION	Battery: "B," 12 ma. at 90 volts; "A," 50 ma. at 9 volts. A.c./d.c.: 25 watts
AERIAL	Built-in loop; terminal also provided for external aerial
INTERMEDIATE FREQUENCY	265 kc.
PHILCO TUBES (6)	1T4 (2), 1R5, 1U5, 3LF4, 117Z3
BATTERY TYPE	Philco P-841A

TP-1584

1. Inspect the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Check the total filament resistance by measuring between the A+ and A− pins on the battery-cable plug (disconnected from battery) while holding down the change-over switch, S100. If the resistance is higher than 100 ohms, one of the tube filaments is probably open.

3. With the change-over switch in the a.c./d.c. position, measure the resistance between B+ (pin 6 of the 117Z3 rectifier) and B−, test point B. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1100 ohms, check condensers C100A, C100B, and C100C for leakage or shorts.

The resistance value above, which is much lower than normal, is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 are performed.

Section 1 TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B—, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.•

Turn on the power, and set the volume control to minimum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

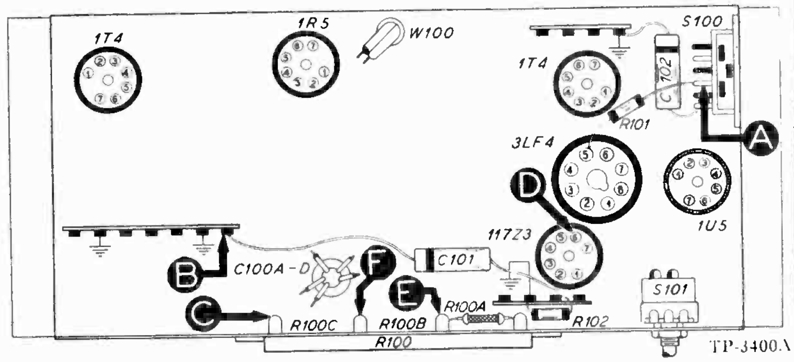


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A C	80 volts 8.5 volts		Trouble in this section. Isolate by the following tests.
2	D	105 volts	High voltage Low voltage No voltage	Open: R100A, R100B, R100C, R101, T200*. Defective: S100, S101. Defective: 117Z3. Leaky: C100A. Leaky or shorted: C100B, C100C, C100D. Defective: 117Z3, S100, S101, W100.
3	E	99 volts	Low voltage No voltage	Defective: R100A. Leaky: C100A. Shorted: C100B, C100C, C100D. Open: R100A. Shorted: C100A.
4	F	55 volts	Low voltage No voltage	Defective: R100B. Shorted: C100C, C100D. Leaky: C100B. Open: R100B. Shorted: C100B.
5	A	80 volts	Low voltage No voltage	Defective: R101. Leaky: C100C. Open: R101. Shorted: C100C.
6	C	8.5 volts	High voltage Low voltage No voltage	Defective: Any tube, R207*, S100, S101. Leaky: C100D. Defective: R100C. Open: R100C. Shorted: C100D.
Listening Test: Distortion or abnormal hum may be caused by open C100B, C100C, or C100D.				
*This part, located in another section, may cause abnormal indication in this section.				
BATTERY VOLTAGE: Replace battery when (with radio turned on) "B" voltage falls below 60 volts, or "A" voltage falls below 7.2 volts.				

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3; if not, isolate and correct the trouble in this section.

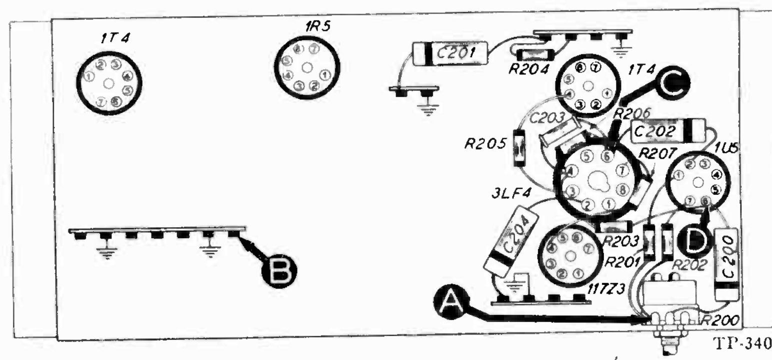


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Defective: 3LF4, LS200, T200. Shorted: C203, C204.
3	D	Loud, clear signal with weak signal input.	Defective: 1U5. Open: C202, C201, R205, R204. Shorted or leaky: C202, C201.
4	A	Loud, clear signal with weak signal input.	Defective: R200. Open: C200, R201, R202.
Listening Test: Distortion on strong signals may be caused by shorted or leaky C200.			

Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 265 kc. Connect the generator ground lead to B−, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

Since the circuit location of test point A for this section is the same as that of test point C for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

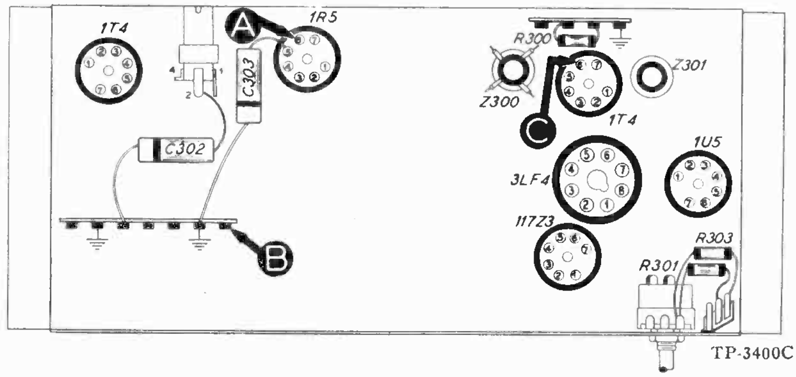


Figure 3. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Defective: 1T4, Z301. Misaligned: Z301. Open: R300, C302. Shorted or leaky: C302.
3	A	Loud, clear signal with weak signal input.	Defective: 1R5*, Z300. Misaligned: Z300. Shorted: C406*.

* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to B−, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

Set the radio and signal-generator dials as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate the trouble by following the remaining steps.

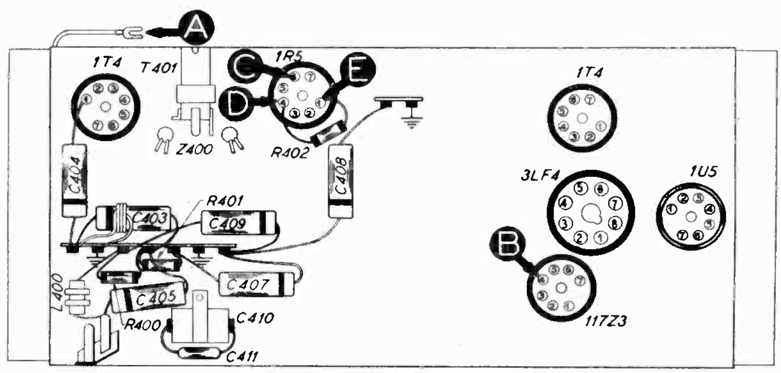


Figure 4. Bottom View, Showing Section 4 Test Points (Locations of C402 and T400 shown in figure 6.)

STEP	TEST POINT	DIAL SETTINGS: SIG. GEN.	DIAL SETTINGS: RADIO	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	1000 kc.	1000 kc.	Clear signal with strong signal input.	Defective: 1R5. Open: C407, C408. Trouble in oscillator circuit.
3	E to D (Osc. test; see note below.)		Rotate tuning control	Negative 2 to 4 volts.	Defective: 1R5 (osc. section), T401. Open: R402. Shorted: C410, C410A, C400, C400C.
4	A	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Defective: 1T4, T400, Z400. Shorted: C400, C400A, C400B. Open: R400, R401.

OSCILLATOR-TEST NOTE: Connect positive lead of high-resistance voltmeter to 1R5 filament, test point E; connect prod end of negative lead through 100,000-ohm isolating resistor to 1R5 oscillator grid, test point D. Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage of 2 to 4 volts (measured with 20,000-ohms-per-volt meter) throughout range of tuning control.

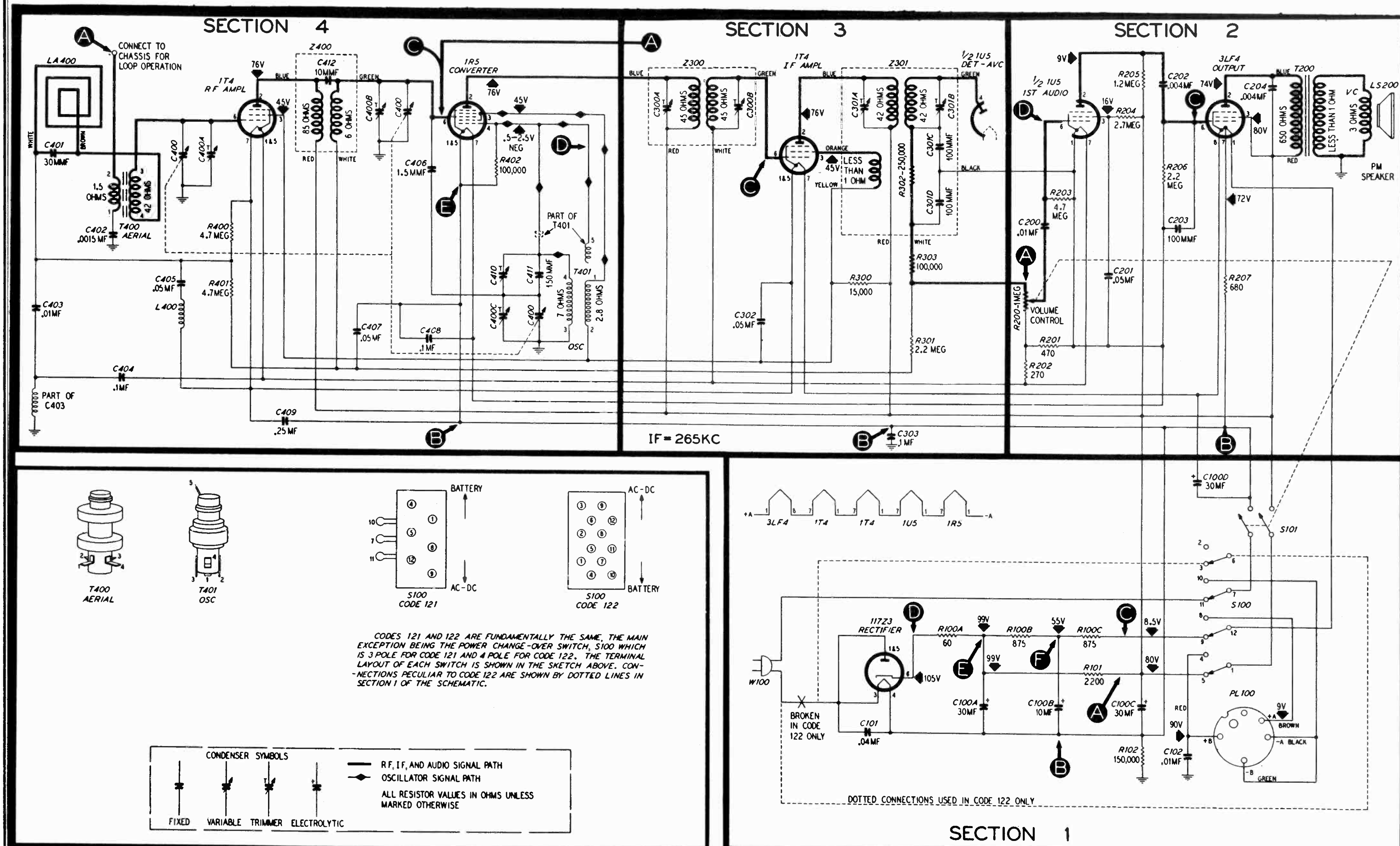


FIGURE 5. PHILCO RADIO, MODEL 48-360, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

TP-3400

ALIGNMENT PROCEDURE

THE ALIGNMENT SHOULD BE MADE WITH THE RADIO INSTALLED IN THE CABINET AND THE LOOP CONNECTED

DIAL—Turn tuning condensers to full-mesh position. Set dial pointer to coincide with index mark at low-frequency end of dial.

OUTPUT METER—Connect between chassis and voice-coil terminal on output transformer, T200.

SIGNAL GENERATOR (modulated)—Connect as indicated in chart.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below .4 volt.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to lug on T400 (see figure 6); output lead to ext. aerial lug.	265 kc.	Set at index mark.	Turn C300B fully tight, then adjust trimmers, in order given, for maximum output.	C301B, C301A, C300A, C300B
2	Radiating loop (see Note below).	1600 kc.	1600 kc.	Adjust for maximum.	C400C
3	Same as step 2.	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	C410
4	Same as step 2.	1600 kc.	1600 kc.	Adjust for maximum.	C400C
5	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C400B
6	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C400A
7	Repeat steps 3, 4, 5, and 6 until no further improvement is obtained.				

NOTE: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop.

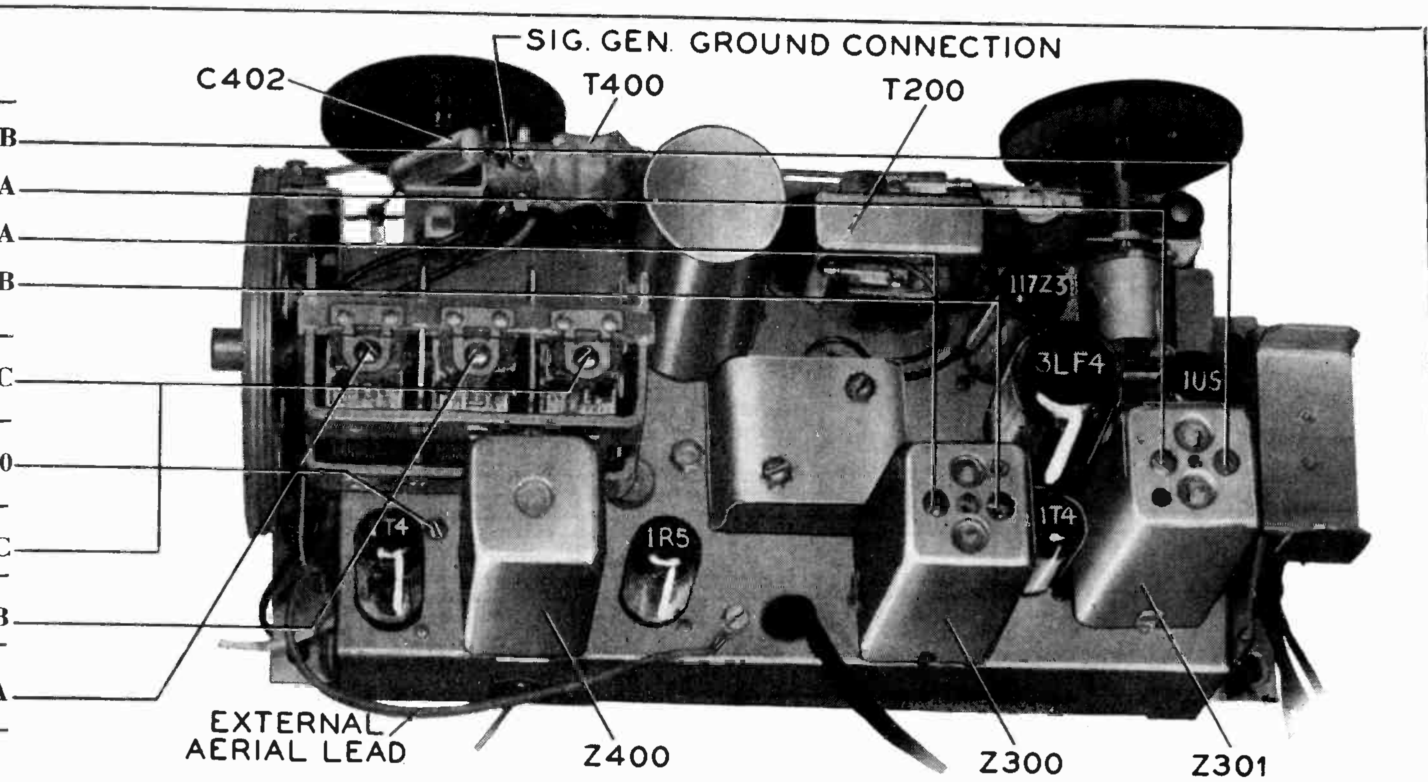


Figure 6. Top View, Showing Trimmer Locations

TP-3627

SYMBOLIZATION

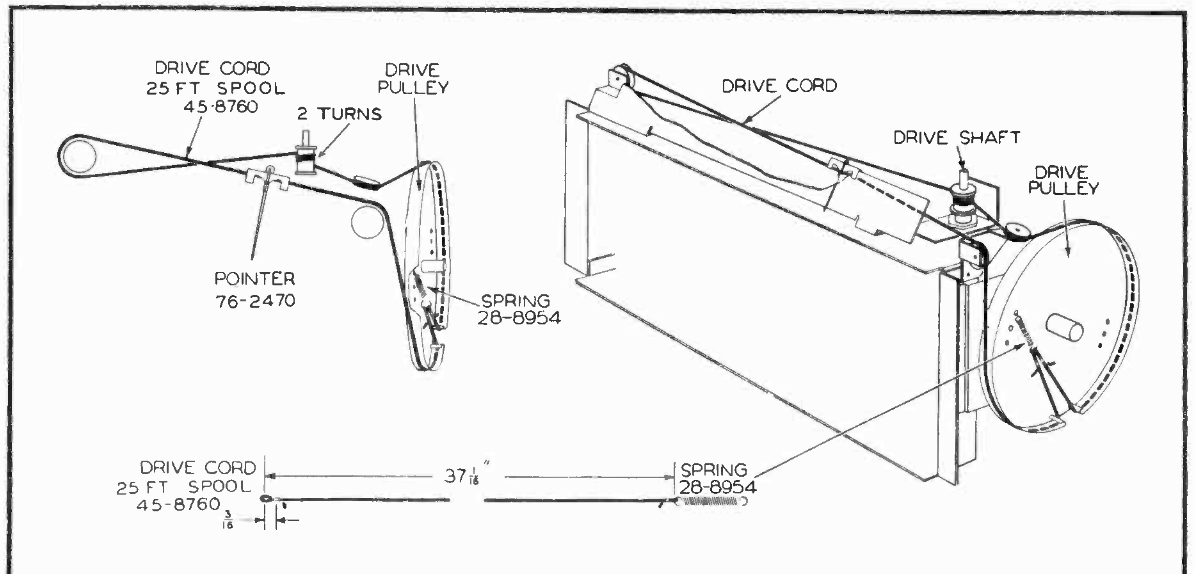
The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C—condenser	**LA—loop aerial**	**S—switch**
I—pilot lamp	**LS—loud-speaker**	**T—transformer**
L—choke or coil	**R—resistor**	**Z—electrical assembly**

The number of the symbol designates the section in which the part is located, as follows:

100-series components are in Section 1—the power supply.
200-series components are in Section 2—the audio circuits.
300-series components are in Section 3—the i-f amplifier, detector and a-v-c circuits.
400-series components are in Section 4—the aerial, r-f, and oscillator circuits.

A suffix letter identifies the part as a non-replaceable component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.



TP-708

Figure 7. Drive-Cord Installation Details

REPLACEMENT PARTS LIST

NOTE

Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, electrolytic, 4-section	30-2560
C100A	Condenser, filter, 30 mf.	Part of C100
C100B	Condenser, filter, 10 mf.	Part of C100
C100C	Condenser, filter, 30 mf.	Part of C100
C100D	Condenser, bias-resistor by-pass, 30 mf.	Part of C100
C101	Condenser, line filter, .04 mf.	30-4119
C102	Condenser, by-pass, .01 mf.	61-0120*
PL100	Plug, battery cable	54-4272
R100	Resistor, 3-section	33-3431-4
R100A	Resistor, filament dropping, 60 ohms	Part of R100
R100B	Resistor, filament dropping, 875 ohms	Part of R100
R100C	Resistor, filament dropping, 875 ohms	Part of R100
R101	Resistor, plate dropping, 2200 ohms	66-2223340*
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, change-over (code 121)	42-1553-1
S100	Switch, change-over (code 122)	42-1821
S101	Switch, on-off	Part of R200
W100	Power cord and plug (code 121)	L-3339
W100	Power cord and plug (code 122)	41-3755-17

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, coupling, .01 mf.	61-0120*
C201	Condenser, screen by-pass, .05 mf.	61-0122*
C202	Condenser, d-c blocking, .004 mf.	61-0179*
C203	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C204	Condenser, tone compensating, .004 mf.	61-0179
LS200	Speaker	36-1598
R200	Volume control, 1 megohm	33-5526
R201	Resistor, grid return, 470 ohms	66-1473340*
R202	Resistor, grid return, 270 ohms	66-1273340*
R203	Resistor, grid return, 4.7 megohms	66-5473340*
R204	Resistor, screen dropping, 2.7 megohms	66-5273340*
R205	Resistor, plate load, 1.2 megohms	66-5123340*
R206	Resistor, grid return, 2.2 megohms	66-5223340*
R207	Resistor, bias, 680 ohms	66-1683340*
T200	Output transformer	32-8259

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer, primary	Part of Z300
C300B	Condenser, trimmer, secondary	Part of Z300
C301A	Condenser, trimmer, primary	Part of Z301
C301B	Condenser, trimmer, secondary	Part of Z301
C301C	Condenser, i-f filter, 100 mmf.	Part of Z301
C301D	Condenser, i-f filter, 100 mmf.	Part of Z301
C302	Condenser, screen by-pass, .05 mf.	61-0122*
C303	Condenser, i-f by-pass, .1 mf.	61-0113*
R300	Resistor, screen dropping, 15,000 ohms	66-3153340*
R301	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R302	Resistor, filter, 25,000 ohms	Part of Z301
R303	Resistor, a-v-c filter, 100,000 ohms	66-4103340
Z300	Transformer, 1st i-f, including C300A and C300B	32-3970
Z301	Transformer, 2nd i-f, including C301A, C301B, C301C, and C301D	32-3971-2

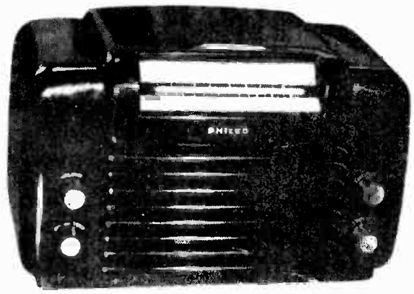
SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning, 3-section	31-2689
C400A	Condenser, aerial trimmer	Part of C400
C400B	Condenser, r-f trimmer	Part of C400
C400C	Condenser, oscillator trimmer	Part of C400
C401	Condenser, compensating, 30 mmf.	60-00305307*
C402	Condenser, aerial blocking, .0015 mf.	45-3500-6*
C403	Condenser-and choke-assembly, i-f by-pass, .01 mf.	76-2271
C404	Condenser, by-pass, .1 mf.	61-0113*
C405	Condenser, by-pass, .05 mf.	61-0122*
C406	Condenser, neutralizing, 1.5 mmf.	30-1221-3
C407	Condenser, by-pass, .05 mf.	61-0122*
C408	Condenser, by-pass, .1 mf.	61-0113*
C409	Condenser, by-pass, .25 mf.	61-0125
C410	Condenser, oscillator series padder	31-6410
C411	Condenser, tracking, 150 mmf.	60-10155407*
C412	Condenser, coupling, 10 mmf. (part of Z400)	62-010009001
LA400	Loop aerial	32-4080
L400	Choke	32-4007
R400	Resistor, grid return, 4.7 megohms	66-5473340*
R401	Resistor, a-v-c filter, 4.7 megohms	66-5473340*
T400	Aerial transformer	32-3972
T401	Oscillator transformer	32-4095-1
Z400	R-f transformer (code 121), including C412	32-3974
Z400	R-f transformer (code 122), including C412	32-4210

MISCELLANEOUS

Description	Service Part No.
Bolt, speaker mounting	W2022FA3
Cabinet (less scale)	10647F
Back, cabinet (code 122)	45-6391
Back-catch assembly	76-6182
Foot	45-6041
Grille, metal front	56-3351-1
Handle loop	56-3954
Handle shield	54-4390
Hinge (code 121)	45-6182
Scale, dial	27-5891
Scale strap	56-3846
Clip, coil mounting	28-5002FA1
Dial-backing-and-pulley assembly	76-2023
Cord, drive (25-ft. spool)	45-8760*
Pointer	76-2470
Pulley-and-bracket assembly	76-2027
Spring, drive cord	28-8954
Cover switch (volume control)	56-3209
Grommet, tuning-condenser mounting	27-4596
Knob	54-4214
Shaft and pulley	76-2028
Socket, Loktal	27-6138
Socket, miniature	27-6203
Switch-plunger assembly	
Code 121	76-2025
Code 122	76-3061

PHILCO CORP.



MODEL 48-464

SPECIFICATIONS

CABINET	Bakelite, brown
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540 — 1720 kc
Short wave	9 — 15.5 mc
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	115 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	Built-in loop; terminal also provided for external aerial
INTERMEDIATE FREQUENCY	455 kc
SPEAKER	Dynamic, permanent magnet, 4" x 6"; voice-coil impedance, 3.4 ohms
PHILCO TUBES (6)	14AF7, 7B7 (2), 7C6, 50A5, 35Y4

Circuit Description

Philco Model 48-464 is a six-tube, manually tuned superheterodyne radio, providing reception in the standard-broadcast band, 540—1720 kc, and the short-wave range between 9 mc and 15.5 mc. A low-impedance loop within the cabinet provides adequate signal pickup in most areas. Where additional pickup is required, an external aerial may be used. Do not use a ground. The tube complement is as follows: 14AF7, converter; two 7B7's, i-f amplifiers; 7C6, det. — a.v.c. — 1st audio; 50A5, output; 35Y4, rectifier.

The choke-and-condenser combinations C305/L300 and C306/L301 form series-tuned circuits, resonant at frequencies relative to the i.f. The former is resonant at 455 kc; the latter is resonant at 910 kc (i-f second harmonic); the combination formed by all the above components is resonant at 1365 kc (i-f third harmonic). The impedance of any of these combinations at resonance is much lower than that of a conventional by-pass condenser at the same frequency. By providing high-efficiency by-passing between the chassis and B–, these combinations function to prevent instability of the high-gain i-f amplifiers and to minimize signal interference and beat notes.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure. Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

The following preliminary checks should be made before turning on the radio:

1. Carefully inspect both the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of 35Y4 rectifier) and B–. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1500 ohms, check condensers C101, C102A, C102B, C102C, and C203 for leakage or shorts.

Section 1 TROUBLE SHOOTING

Make tests for this section with d-c voltmeter; connect negative lead to test point B–, and positive lead to test points indicated in chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Set wafer switch to broadcast position; turn volume control to minimum, and tone control to nearly "off" position.

Follow steps in sequence; if the "NORMAL INDICATION" is obtained in step 1, proceed with tests for Section 2; if not, isolate and correct the trouble in this section.

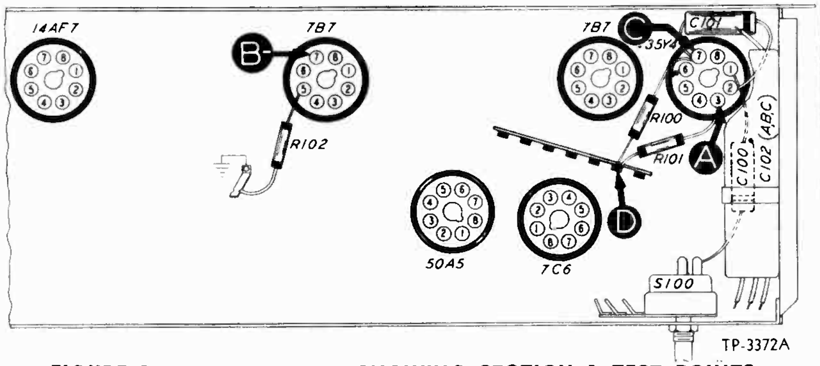


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS.

It will be noted that certain parts in other sections of the radio are listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION", since they may cause abnormal voltage readings in this section.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	92v		Trouble in this section. Isolate by the following tests.
2	C	128v	No Voltage Low Voltage High Voltage	Defective 35Y4, S100, or W100. Shorted C101, C102A, or C100. Defective 35Y4. Leaky C101, C102A, C102B, or C102C. Open I100 or C102A. Open R100.
3	D	110v	No Voltage Low Voltage High Voltage	Open R100. Shorted C102B. Defective R100. Leaky C102B or C102C. Shorted or leaky C203. Open R101, T200, or R204.
4	A	92v	No Voltage Low Voltage	Defective R101. Shorted C102C. Defective R101. Leaky C102C.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect generator ground lead to test point B–; connect output lead through .1-mf condenser to test points indicated in chart.

Set radio volume control to maximum, and tone control to nearly "off" position. Adjust signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3; if not, isolate and correct the trouble in this section.

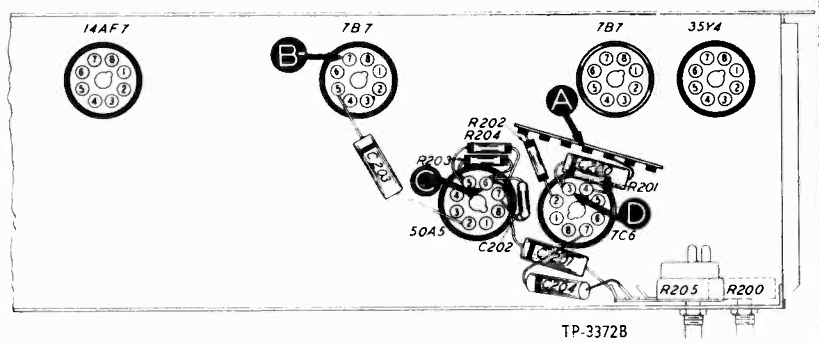


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS.

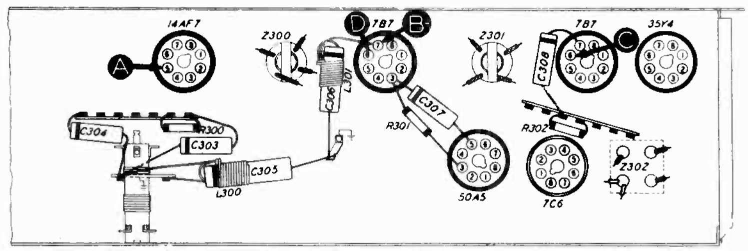
STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Moderate, clear signal with strong signal input.	Defective 50A5, T200, LS200, R203, or R204. Shorted or leaky C203 or C202.
3	D	Loud, clear signal with weak signal input.	Defective 7C6. Open R202. Shorted C201 or C204 (rotate tone control).
4	A	Loud, clear signal with weak signal input.	Defective R200, C200, or R201.
Listening Test: Distortion may be caused by leaky C200, C201, or C202; hum may be caused by open R201 or R203.			

Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator with modulated output, set at 455 kc. Connect generator ground lead to test point B–; connect output lead through .1-mf condenser to test points indicated in chart.

Set wafer switch to broadcast position.

Set radio volume control to maximum, and tone control to nearly "off" position.



TP-3372C

FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

It will be noted that for this section the circuit location of the test point for step 1 (the master check), and also for step 4, is the same as for test point C in Section 4; therefore, certain components in Section 4 may cause an abnormal indication. These components are listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION".

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective 7C6 or 7B7 (2nd i.f.). Open R301 or R302. Shorted C307. Defective or misaligned Z302.
3	D	Loud, clear signal with moderate signal input.	Defective 7B7 (1st i.f.). Defective or misaligned Z301.
4	A	Loud, clear signal with weak signal input.	Defective 14AF7. Open R401, R403, or R300. Shorted C303. Defective or misaligned Z300.

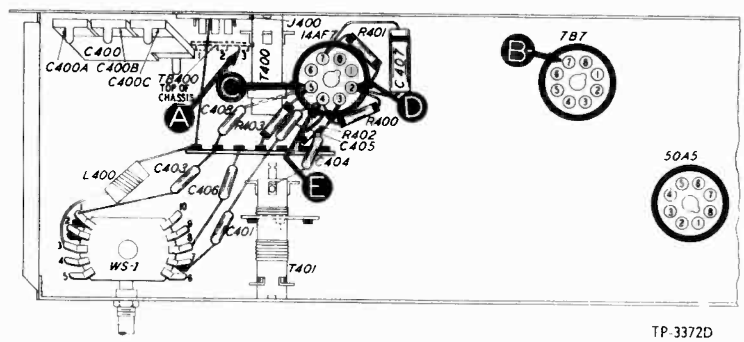
Section 4 TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator tests (steps 3 and 6), use an r-f signal generator with modulated output. Connect generator ground lead to test point B–; connect output lead through .1-mf condenser to test points indicated in chart.

Set radio volume control to maximum, and tone control to nearly "off" position.

Set wafer switch, tuning control, and signal-generator frequency as indicated in chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate the trouble by proceeding with the remaining steps.

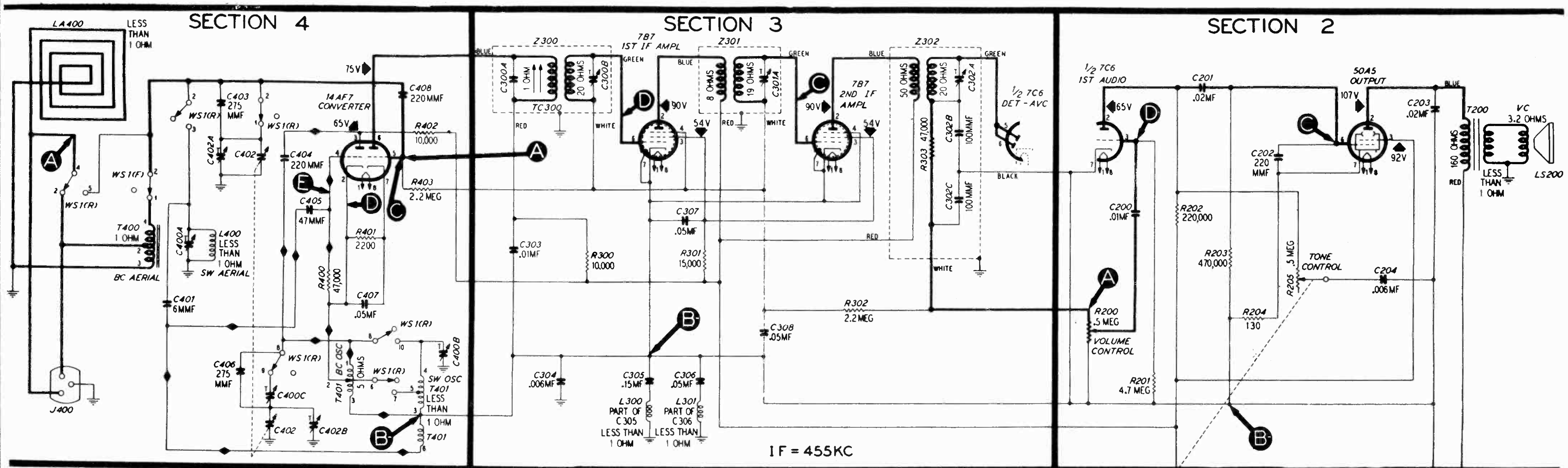


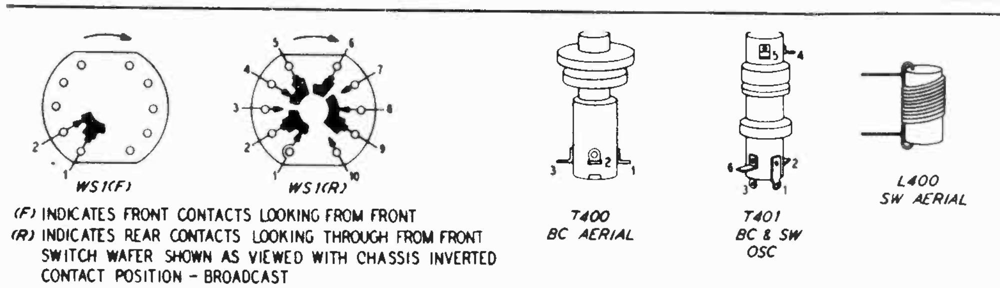
TP-3372D

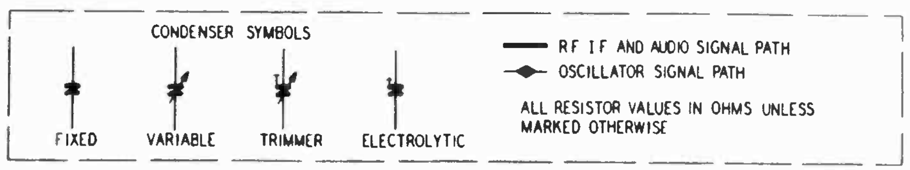
FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS.

STEP	TEST POINT	SIG. GEN. DIAL SETTING	WAFER SWITCH	RADIO DIAL SETTING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc	BC	1000 kc	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	1000 kc	BC	1000 kc	Loud, clear signal with weak signal input.	Open C407. Trouble in oscillator circuit.
3	E to D (Osc. test; see Note below.)		BC	Turn tuning control through range.	Negative 1 to 2 volts.	Defective 14AF7, T401, or WS1 (R). Open or shorted C404 or C405. Open R400, R402, or C400. Shorted plates of tuning condenser (osc. section).
4	A	1000 kc	BC	1000 kc	Loud, clear signal with weak signal input.	Open C408. Defective WS1 or T400.
5	A	15 mc	SW	15 mc	Loud, clear signal with weak signal input.	Defective 14AF7 or WS1. Open C403, L400, or C401. Shorted C400A.
6	E to D Osc. test (see Note below.)		SW	Turn tuning control through range.	Negative 1 to 2 volts.	Defective 14AF7, T401, or WS1 (R). Open C406.

NOTE: For oscillator tests (BC in step 3 and SW in step 6), connect positive lead of high-resistance, d-c voltmeter to test point D (14AF7 osc. cathode); connect prod end of negative lead through 100,000-ohm isolating resistor to test point E (14AF7 osc. grid). Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage throughout range of tuning condenser.







SYMBOLIZATION

THE PREFIX LETTER OF THE SYMBOL DESIGNATES THE TYPE OF PART, AS FOLLOWS:

C - CONDENSER	R - RESISTOR
I - PANEL LAMP	S - SWITCH
L - CHOKE OR COIL	T - TRANSFORMER
LA - LOOP AERIAL	WS - WAFER SWITCH
LS - LOUD-SPEAKER	Z - ELECTRICAL ASSEMBLY

THE NUMBER OF THE SYMBOL DESIGNATES THE SECTION IN WHICH THE PART IS LOCATED, AS FOLLOWS:
- 100-SERIES COMPONENTS ARE IN SECTION 1-THE POWER SUPPLY.
- 200-SERIES COMPONENTS ARE IN SECTION 2-THE AUDIO CIRCUITS.
- 300-SERIES COMPONENTS ARE IN SECTION 3-THE I-F AMPLIFIER, DETECTOR, AND AVC CIRCUITS.
- 400-SERIES COMPONENTS ARE IN SECTION 4-THE R-F, AERIAL AND OSCILLATOR CIRCUITS.

A SUFFIX LETTER IDENTIFIES THE PART AS A NON-REPLACEABLE COMPONENT OF THE ASSEMBLY WHICH BEARS AN IDENTICAL NUMBER WITHOUT A SUFFIX LETTER, AND WITH PERHAPS A DIFFERENT PREFIX LETTER.

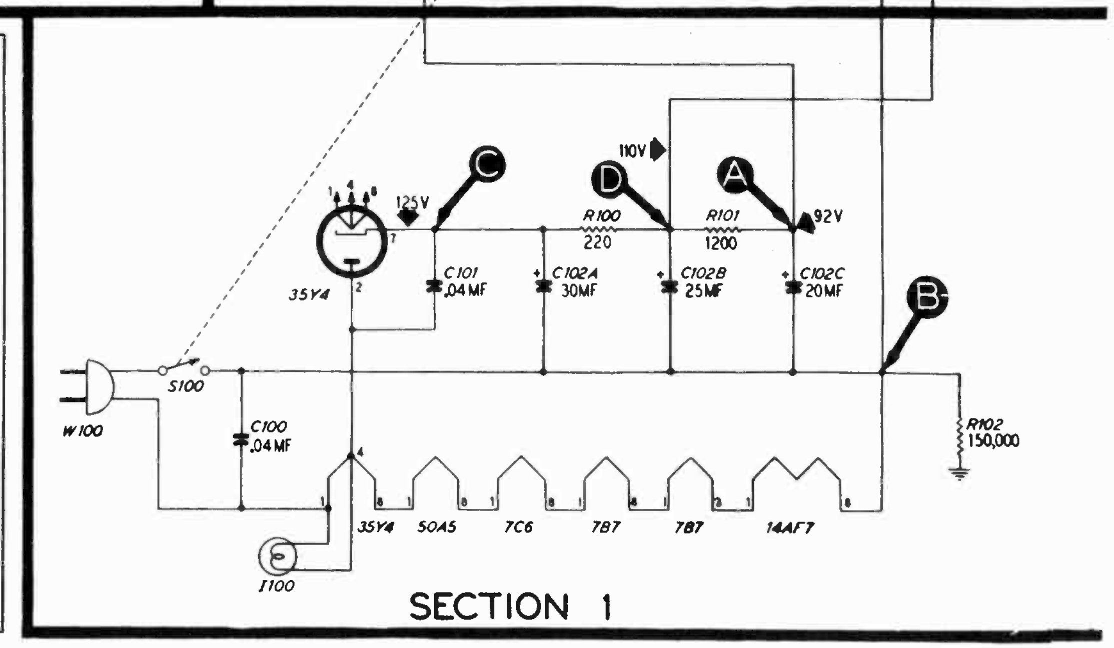


FIGURE 5. PHILCO RADIO MODEL 48-464, SECTIONALIZED SCHEMATIC, SHOWING TEST POINTS.

PHILCO CORP.

ALIGNMENT PROCEDURE

NOTE: Make alignment with loop connected to radio.

DIAL — Alignment points should be marked on the dial backplate. Measurements for these points are shown in the composite dial-and-backplate photo, figure 6. With tuning condensers fully meshed, set dial pointer to index mark.

OUTPUT METER — Connect to terminals indicated in figure 7.

CONTROLS — Set volume control to maximum, tone control nearly "off", and wafer switch as indicated in chart.

SIGNAL GENERATOR—Connect as indicated in chart.

OUTPUT LEVEL — During alignment, adjust signal-generator output to maintain output-meter indication below 1.25 volts.

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	DIAL SETTING	WAFER SWITCH	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1	Ground lead to B-; output lead through .1-mf condenser to tuning-condenser stator (ant. section).	455 kc	BC	540 kc	Adjust trimmers once only, in order given, for maximum output.	C302A C301A TC300 C300B
2	Radiating loop (see Note below).	580 kc	BC	580 kc	Adjust for maximum.	C400C
3	Same as step 2.	1700 kc	BC	1700 kc	Adjust for maximum.	C402B
4	Same as step 2.	1500 kc	BC	1500 kc	Adjust for maximum.	C402A
5	Same as step 2.	580 kc	BC	580 kc	Adjust for maximum while rocking tuning control.	C400C
6	Same as step 2.				Repeat steps 3, 4, and 5 until no further improvement is noted; then repeat step 3.	
7	Same as step 2.	15 mc	SW	15 mc	Adjust for maximum on first peak from loose position. Check for image with sig. gen. at 14.1 mc.	C400B
8	Same as step 2.	15 mc	SW	15 mc	Adjust for maximum while rocking tuning control.	C400A

NOTE: Make up a six-to-eight-turn, 6-inch diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop.

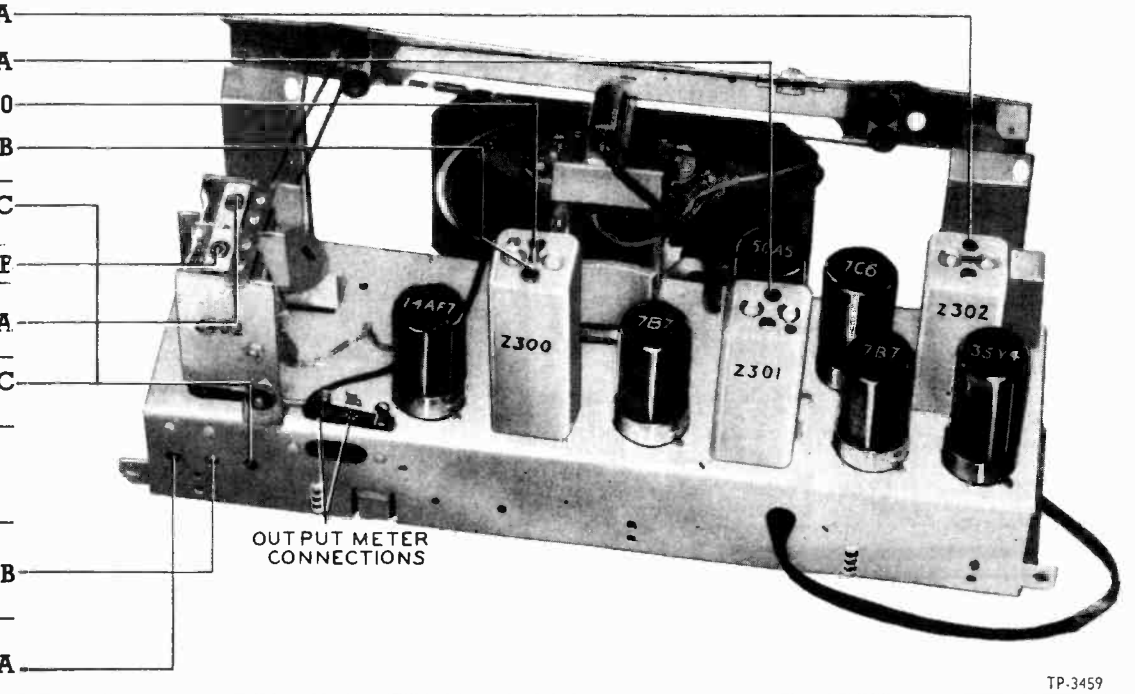


FIGURE 7. TOP VIEW, SHOWING TRIMMER LOCATIONS.

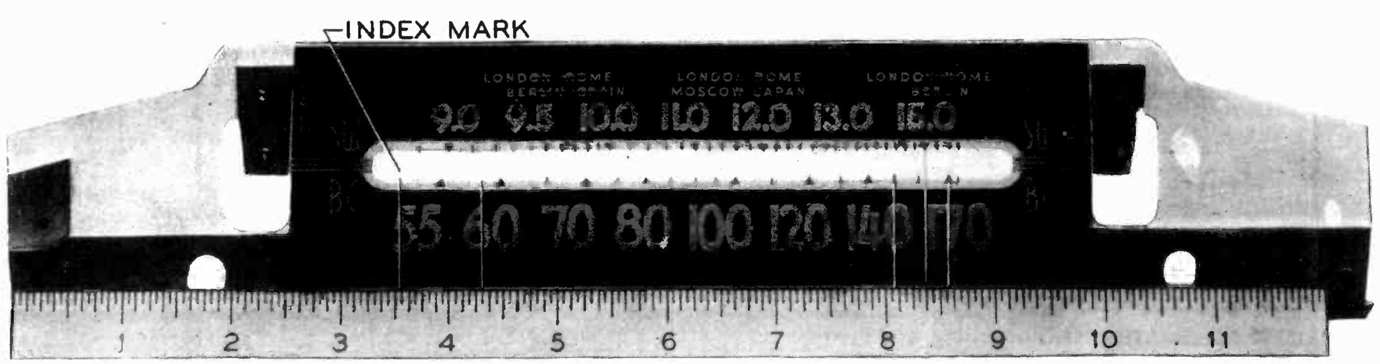


FIGURE 6. COMPOSITE DIAL AND BACKPLATE, CALIBRATION DETAILS.

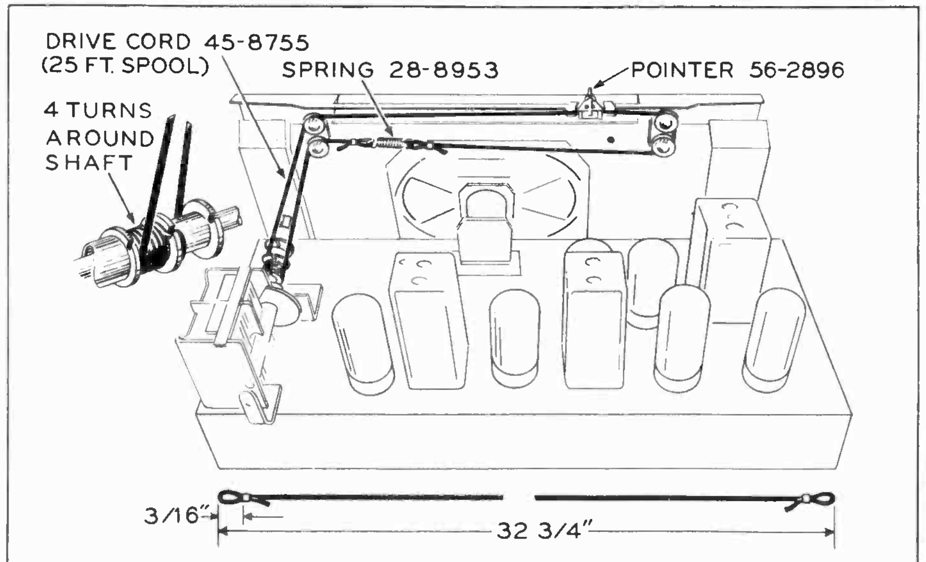


FIGURE 8. DRIVE-CORD INSTALLATION DETAILS. TP-3372E

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No.".

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, by-pass, .04 mf	45-3500-2*
C101	Condenser, by-pass, .04 mf	45-3500-2*
C102	Condenser, electrolytic, 3-section	30-2573*
C102A:	Condenser, filter, 30 mf	Part of C102
C102B:	Condenser, filter, 25 mf	Part of C102
C102C:	Condenser, filter, 20 mf	Part of C102
I100	Panel lamp	34-2068
R100	Resistor, 1st B+ filter, 220 ohms	66-1224340
R101	Resistor, 2nd B+ filter, 1200 ohms	66-2123340
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, a-c power	Part of R205
W100	Line cord	L3199

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, coupling, .01 mf	61-0120*
C201	Condenser, coupling, .02 mf	61-0108*
C202	Condenser, r-f by-pass, 220 mmf	60-122001001*
C203	Condenser, tone compensation, .02 mf	61-0108*
C204	Condenser, tone compensation, .005 mf	45-3500-7*
LS200	Loud-speaker	36-1615-1
R200	Volume control, .5 megohm	33-5539-11
R201	Resistor, grid return, 4.7 megohms	66-5473340
R202	Resistor, plate load, 220,000 ohms	66-4223340
R203	Resistor, grid return, 470,000 ohms	66-4473340
R204	Resistor, cathode bias, 130 ohms	66-1123340
R205	Tone control, .5 megohm	33-5538-14
T200	Output transformer	Part of LS200

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed, primary	Part of Z300
C300B	Condenser, trimmer, secondary	Part of Z300
C301A	Condenser, trimmer, secondary	Part of Z301
C302A	Condenser, trimmer, secondary	Part of Z302
C302B	Condenser, i-f filter, 100 mmf	Part of Z302
C302C	Condenser, i-f filter, 100 mmf	Part of Z302
C303	Condenser, r-f by-pass, .01 mf	61-0120*
C304	Condenser, r-f by-pass, .006 mf	45-3500-7*
C305	Condenser-and-choke assembly, by-pass, .15 mf	38-9851-2
C306	Condenser-and-choke assembly, by-pass, .05 mf	76-2362
C307	Condenser, screen r-f by-pass, .05 mf	61-0122*
C308	Condenser, a-v-c filter, .05 mf	61-0122*
L300	Choke	Part of C305
L301	Choke	Part of C306
R300	Resistor, plate load, 10,000 ohms	66-3103340*
R301	Resistor, screen dropping, 15,000 ohms	66-3153340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R303	Resistor, i-f filter, 47,000 ohms	Part of Z302
Z300	Transformer, 1st i-f, 455 kc, including C300A and C300B	32-3956-2
Z301	Transformer, 2nd i-f, 455 kc, including C301A	32-3957-2
Z302	Transformer, 3rd i-f, 455 kc, including C302A, C302B, C302C, and R303	32-3955-2

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser strip, trimmer, 3-section	31-6477-2
C400A:	Condenser, shunt trimmer, s-w aerial	Part of C400
C400B:	Condenser, shunt trimmer, s-w oscillator	Part of C400
C400C:	Condenser, series padder, bc. oscillator	Part of C400
C401	Condenser, feedback, 6 mmf	60-90505007*
C402	Condenser, main tuning gang	31-2715
C402A:	Condenser, shunt trimmer, bc. aerial	Part of C402
C402B:	Condenser, shunt trimmer, bc. oscillator	Part of C402
C403	Condenser, spread tuning, s-w aerial, 275 mmf	30-1220-7
C404	Condenser, plate feedback, 220 mmf	60-122001001*
C405	Condenser, oscillator grid, 47 mmf	60-00515307*
C406	Condenser, spread tuning, s-w oscillator, 275 mmf	30-1220-7
C407	Condenser, cathode coupling, .05 mf	61-0122*
C408	Condenser, grid coupling, 220 mmf	60-122001001*
J400	Aerial socket	27-6145
L400	Coil, shunt, s-w aerial	32-3517-1
LA400	Loop-aerial assembly	76-2436
R400	Resistor, oscillator grid, 47,000 ohms	66-3473340*
R401	Resistor, cathode bias, 2200 ohms	66-2223340
R402	Resistor, plate load, 10,000 ohms	66-3103340
R403	Resistor, grid return, 2.2 megohms	66-5223340*
T400	Coil, bc. aerial	32-3846-1
T401	Coils, bc. and s-w oscillator	32-3715-1
WS1	Wafer (band) switch	42-1791
WS1(F):	Front contacts, wafer switch	Part of WS1
WS1(R):	Rear contacts, wafer switch	Part of WS1

MISCELLANEOUS

Description	Service Part No.
Cabinet	10618B
Back	54-7236
Baffle-and-cloth assembly	40-6822
Dial scale	27-5928
Band, rubber, scale mtg.	54-4025
Strap, scale mtg., l.h.	56-2671FA3
Strap, scale mtg., r.h.	56-2672FA3
Knob	56-4376
Stud, loop mtg.	W-2436FA9
Dial-backplate assembly	76-2390
Bracket, dial backplate	56-2681FA3
Cord, drive (25-ft. spool)	45-8755
Light reflector	27-9816-1
Pilot-lamp-socket assembly	76-2142
Pointer	56-2896
Spring, drive cord	28-8953
Socket, Loktal	27-6138

MODEL 48-472, Code 122 PHILCO CORP.

Circuit Description

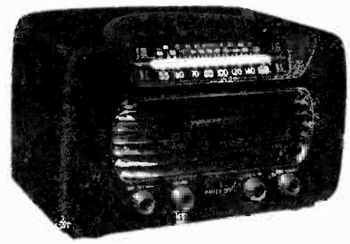
Philco Radio Model 48-472, Code 122, is an eight-tube superheterodyne, which provides reception on the standard-broadcast band and on the FM band. A built-in high-impedance loop is used as the aerial on the broadcast band and the line cord is used as the aerial on the FM band. These aerials normally provide adequate signal pickup; if additional pickup is required, Philco Dipole Aerial, Part No. 45-1462 may be used. When connecting the dipole aerial, disconnect the black lead from terminal 2 of TB400, and attach it to pin 1 of the dipole-aerial plug which fits into J400. No additional coupler is required.

To eliminate complicated switching and to provide greater stability and gain on both bands, separate converter tubes are used for broadcast and FM reception. A 12AU6 high-gain pentode is used as a tuned r-f amplifier on the FM band. The output of this stage is fed to a 14F8 dual triode which functions as the converter for the FM signal. A 12AU7 dual triode is used as the converter for the broadcast signal. Band switching is accomplished by means of a single-wafer switch, which connects the B+ voltage to the proper mixer plate.

6BJ6 type tubes are used in the two i-f-amplifier stages. Two sets of i-f transformers are used; one set is tuned to 455 kc. for standard broadcast, and the other set is turned to 9.1 mc. for FM. The use of two sets of transformers makes better shielding possible, so that undesirable beat signals and interaction between transformers are eliminated.

Two diode sections of the 19T8 triple-diode-triode are used in a ratio detector circuit for detection of FM signals. The other diode section is used in a half-wave rectifier circuit for detection of standard-broadcast signals and to provide a-v-c voltage.

The triode section of the 19T8 is employed as the first audio amplifier, and is resistance-coupled to the 50A5 output tube, which supplies an audio output of approximately one watt to the permanent-magnet dynamic speaker.



MODEL 48-472

SPECIFICATIONS

CABINET	Plastic, walnut finish
CIRCUIT	Eight-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1620 kc.
FM	88—108 mc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGES	105—120 volts, a.c. or d.c.
POWER CONSUMPTION	40 watts
AERIALS	Built-in loop and FM line cord; provisions for connection of external aerial
INTERMEDIATE FREQUENCIES	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (8)	12AU6, 12AU7, 14F8, 6BJ6-(2), 19T8, 50A5, 117Z3

TP-4880

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, as follows:

Section 1—the power supply
Section 2—the audio circuits
Section 3—the i-f, detector, and a-v-c circuits
Section 4—the r-f and converter circuits

Test points are specified for each section, and are indicated in the sectionalized schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire chart.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before turning on the power:

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between the B+, pin 6 of the 117Z3, and B–, test point B. When the ohmmeter leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1250 ohms, check condensers C102, C103A, C103B, and C103C for leakage or shorts. This resistance value, which is much lower than normal, does not represent a quality check of these condensers; it is the lowest value which will permit the rectifier to operate safely while the voltage checks of Section 1 (power supply) are performed.

3. If the 50A5 tube or the 6BJ6 (2nd i-f amplifier) tube is burned out, check condenser C314 for a short before installing a new tube.

Important!

To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical positions as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be changed.

Section 1 TROUBLE SHOOTING

POWER SUPPLY

Make the tests for this section with a d-c voltmeter. Connect the negative lead to B–, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

Set the volume control to minimum, turn the tone control fully clockwise, and set the band switch to the broadcast position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

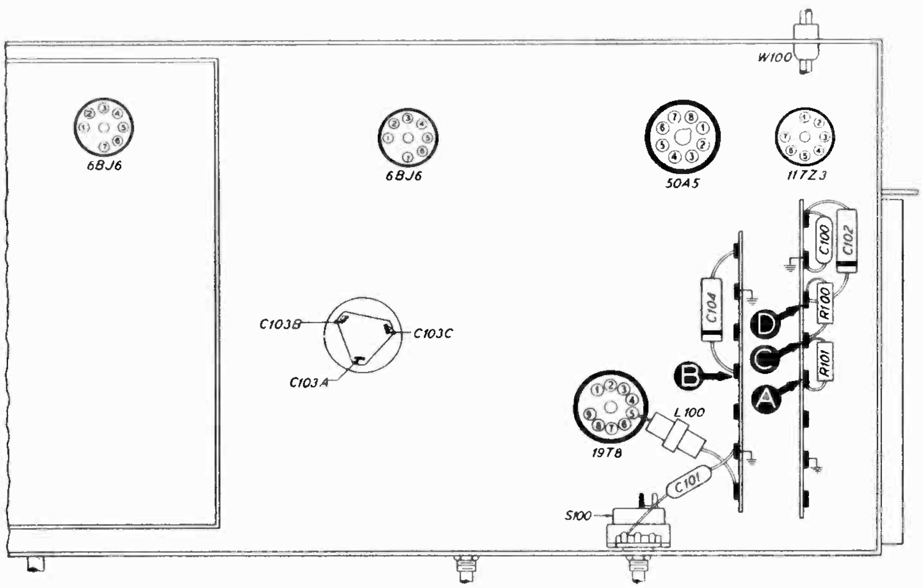


Figure 1. Bottom View, Showing Section 1 Test Points TP-5398A

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	95v		Trouble in this section. Isolate by the following tests.
2	C	100v	No voltage	Defective: 117Z3. Open: W100, S100. Shorted: C103A, C103B, C102.
			Low voltage	Defective: 117Z3. Leaky: C103A, C103B, C103C. Shorted: C103C.
			High Voltage	Open: R100, R101, T200*, R204*.
3	D	118v	No voltage	Open: R100. Shorted: C103B.
			Low voltage	Increased value: R100. Leaky: C103B. Shorted: C103C.
			High Voltage	Open: R101, T200*, R204*.
4	A	95v	No voltage	Open: R101. Shorted: C103C.
			Low voltage	Leaky: C103C. Increased value: R101. Shorted: C312*, C311*, C317*, C419*, C406*, C315*, C318*, C411*.
Listening Test: Abnormal hum may be caused by open C103A, C103B, or C103C.				

* This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

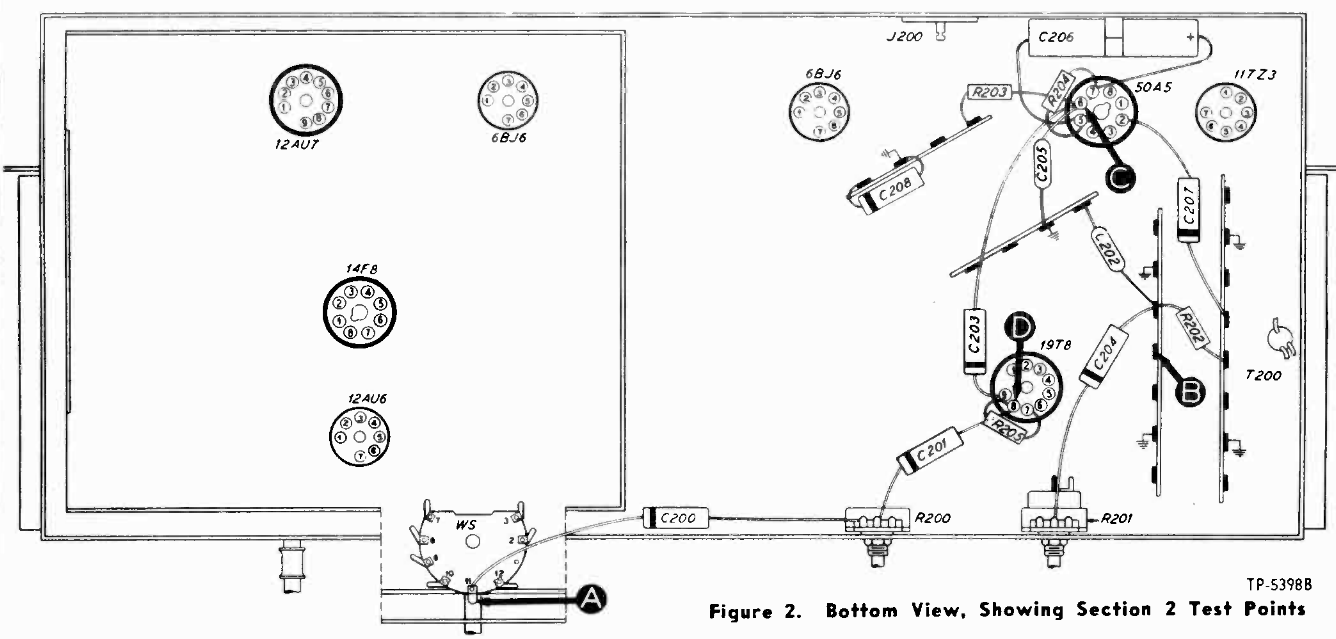
AUDIO CIRCUITS

For the tests in this section. use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the tone control fully counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 50A5. Shorted: LS200, T200. Open: R203, R204, C205, LS200, T200. Shorted or leaky: C202, C204, C205, C206, C207.
3	D	Loud, clear output with moderate input.	Defective: 19T8. Open: R205, R202, C202. Shorted or leaky: C202, C203 (rotate R201 through range).
4	A	Loud, clear output with moderate input.	Open: R200 (rotate through range), C200, C201. Shorted or leaky: C200, C201.
Listening Test: Distortion may be caused by leaky C200, C201, or C202.			



TP-5398B

Figure 2. Bottom View, Showing Section 2 Test Points

Section 3 TROUBLE SHOOTING

I-F, DETECTOR, AND A-V-C CIRCUITS

AM Circuits

For the tests of the AM circuits, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the tone control fully counterclockwise. Set the band switch to the broadcast position, and rotate the tuning control until the tuning gang is fully meshed.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits; if not, isolate and correct the trouble in the AM circuits.

Since test point A for the AM circuits is placed at the grid of the 12AU7 mixer in Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

Section 3 — Cont. TROUBLE SHOOTING

AM Chart

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in AM circuits. Isolate by the following tests.
2	D	Loud, clear output with moderately strong input.	Defective: 19T8, 6BJ6 (2nd i-f amplifier). Open: R307, R308, R309, R311, R312, L305B, C317, L305A, L304A, WS. Shorted or leaky: C316, C317, C315. Shorted: L305A, L305B, WS.
3	E	Loud, clear output with moderate input.	Defective: 6BJ6 (1st i-f amplifier). Open: R301, R302, R303, R304, R305, R306, C311, C313, L302A, L302B, L303A, L303B. Shorted or leaky: C311, C312, C313, C308. Shorted: L303A, L303B.
4	A	Loud, clear output with weak input.	Defective: 12AU7*. Open: R411*, R413*, R409*, L300A, L300B, L301A, L301B, WS. Shorted or leaky: C424*, C410*. Shorted: L301A, L301B, L301C, WS.
Listening Test: Hum and distortion may be caused by shorted or leaky C309, C310, C314, C321, C320, C307, C420*, C421*, C422*, C423*, C100*, C101*.			

* This part, located in another section, may cause abnormal indication in this section.

FM Circuits

For the tests of the FM circuits, use an r-f signal generator, set at 9.1 mc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Detune the generator frequency to one side or the other until a satisfactory test signal is obtained.

Set the band switch to the FM position; set the other radio controls as directed under AM CIRCUITS.

The parts which were found to be satisfactory for AM operation, with the exception of those indicated in the chart, will usually be satisfactory for FM operation.

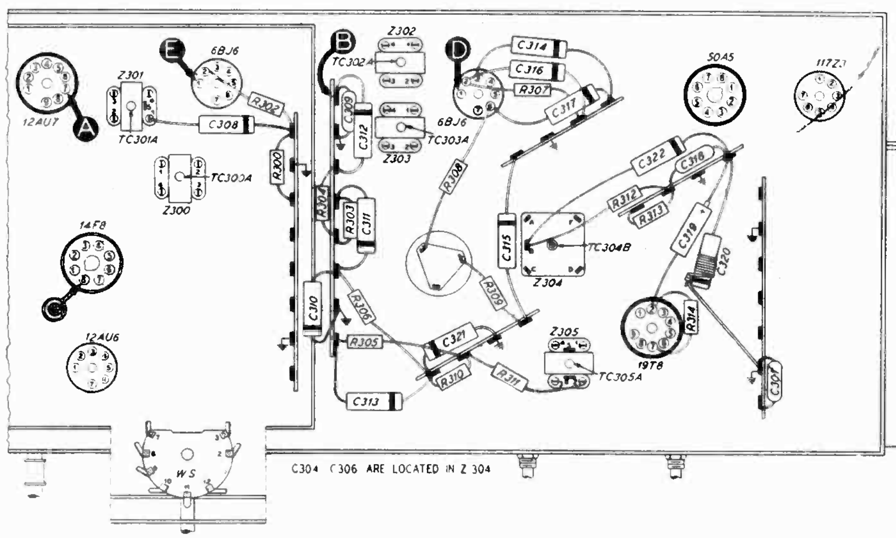


Figure 3. Bottom View, Showing Section 3 Test Points TP-5398C

The best indication of satisfactory FM-detector operation is the ability of this circuit to take the alignment properly (see page 10).

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits of this section.

Since test point C for the FM circuits is placed at the grid of the 14F8 mixer in Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

FM Chart

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	C	Loud, clear speaker output with weak generator input.	Trouble in FM circuits. Isolate by the following tests.
2	D	Loud, clear output with strong input.	Defective: 6BJ6 (2nd i-f amplifier), Z304, 19T8, WS. Misaligned: Z304. Open: R312, R313, R314, C320, C319, C318, C304, C306. Shorted or leaky: C319, C320, C304, C306.
3	E	Loud, clear output with moderate input.	Defective: 6BJ6 (1st i-f amplifier). Misaligned: Z302. Shorted: L302A, L302B.
4	C	Loud, clear output with weak input.	Defective: 14F8*. Open: R300, R406, R407*, R405*, L404*, L300A, WS. Shorted or leaky: C418*, C419*. Shorted: L300A, L300B, WS.

* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

R-F AND CONVERTER CIRCUITS

AM Circuits

For the tests of the AM circuits, use an r-f signal generator, with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, turn the tone control fully counterclockwise, and set the band switch to the broadcast position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits; if not, isolate and correct the trouble in the AM circuits.

FM Circuits

Before proceeding with the tests for the FM circuits, set the band switch to the FM position.

If the "NORMAL INDICATION" is obtained in step 1, further tests should be unnecessary; if not, isolate and correct the trouble in the FM circuits. If the trouble is not revealed by the tests for the FM circuits, check the alignment.

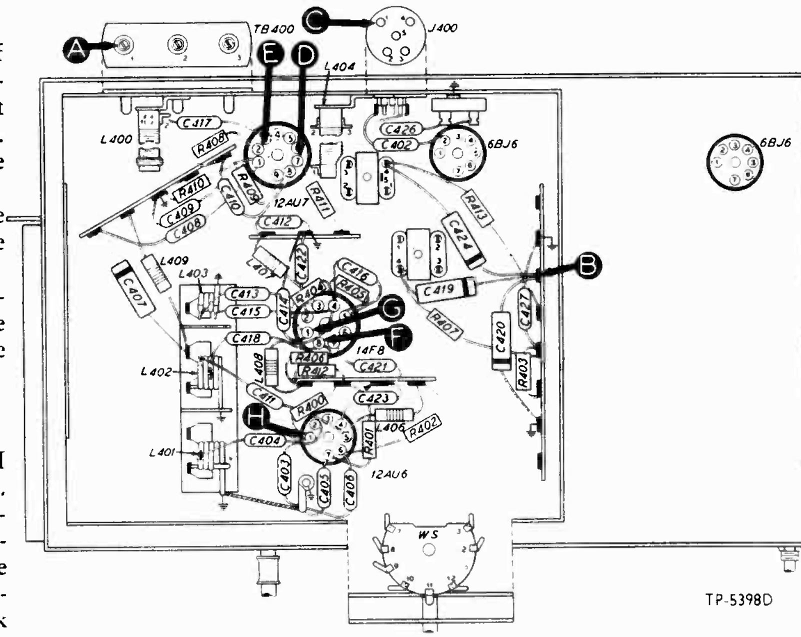


Figure 4. Bottom View, Showing Section 4 Test Points

AM Chart

STEP	TEST POINT	SIG. GEN. FREQUENCY	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	1000 kc.	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests.
2	D	1000 kc.	1000 kc.	Loud, clear output with moderate input.	Defective: 12AU7, oscillator circuits. Shorted: C424, C410, WS. Open: R409, R411, R413, WS.
3	E to B (Osc. test; see note below.)		Rotate through range.	Negative 2 to 4 volts.	Defective: 12AU7. Open: R408, L404, C408, R410, C407. Shorted or leaky: C408, C409, C400, C401B.
4	A	1000 kc.	1000 kc.	Same as step 1.	Open: L400, C417, L405. Shorted: C400, C401A, C425.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B–, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 2 of 12AU7), test point E. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage within the range given in the chart (measured with a 20,000-ohms-per-volt meter) throughout the tuning range.

FM Chart

STEP	TEST POINT	SIG. GEN. FREQUENCY	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	C	95 mc.	Tune to signal.	Loud, clear speaker output with weak generator input.	Trouble in FM circuits. Isolate by the following tests.
2	F	95 mc.	Tune to signal.	Loud, clear output with moderate input.	Defective: oscillator circuits, 14F8. Open: C418, R406, R407, R405, L408, L402. Shorted: C418, C400, C400B, C419, C416, L402.
3	G to B (Osc. test; see note below.)		Tune through range.	Negative 1 to 2.5 volts.	Defective: 14F8. Open: R404, L408, L407, R403, C413, C415, L403. Shorted: C400, C400C, C413, C415, C414, C412, L403, L407.
4	H	95 mc.	Tune to signal.	Loud, clear output with weak input.	Defective: 12AU6. Open: L406, R402, R401, R400, C411, C406, C418, R412, L402. Shorted: C405, C406, C411, C400, C400B, C404, L402.
5	C	95 mc.	Tune to signal.	Loud, clear output with weak input.	Open: C402, C404, R412, L402. Shorted: C404, C400, C400A, L402.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B–, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 1 of 14F8), test point G. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage within the range given in the chart (measured with a 20,000-ohms-per-volt meter) throughout the tuning range.

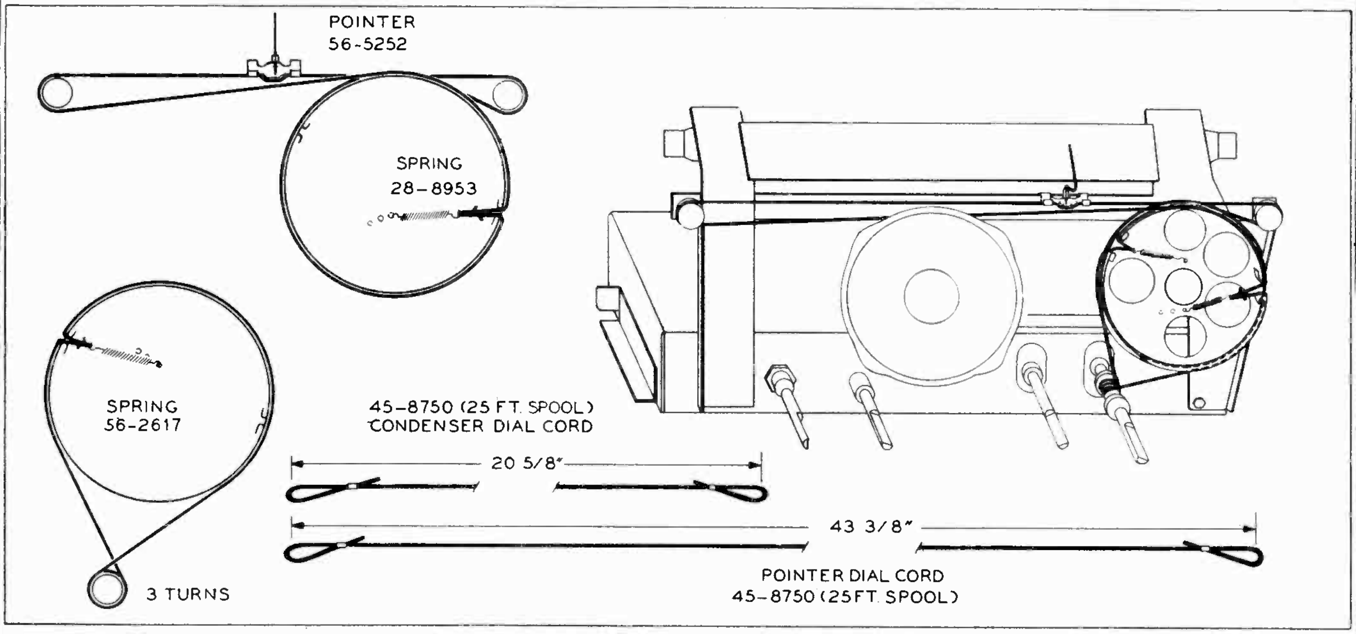


Figure 5. Drive-Cord Installation Details

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, r-f by-pass, 100 mmf.	62-110009001
C101	Condenser, r-f by-pass, 100 mmf.	62-110009001
C102	Condenser, r-f by-pass, .01 mf.	61-0120*
C103	Condenser, electrolytic, 3-section	30-2568-10
C103A	Condenser, filter, 40 mf.	Part of C103
C103B	Condenser, filter, 70 mf.	Part of C103
C103C	Condenser, filter, 40 mf.	Part of C103
C104	Condenser, line filter, .04 mf.	45-3500*
I100	Panel lamp, 110v, screw base	34-2477
L100	Choke, filament, 100 millihenries	32-4143-4
R100	Resistor, filter, 220 ohms	66-1224340
R101	Resistor, filter, 470 ohms	66-1474340
S100	Switch, power	Part of R201
W100	Line cord and plug (incl. FM line aerial)	L-2183*

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .006 mf.	45-3500-7*
C201	Condenser, d-c blocking, .006 mf.	45-3500-7*
C202	Condenser, plate by-pass, 100 mmf.	62-110009001
C203	Condenser, d-c blocking, .002 mf.	30-4579*
C204	Condenser, tone compensation, .01 mf.	61-0120*
C205	Condenser, r-f by-pass, 100 mmf.	62-110009001
C206	Condenser, cathode by-pass, 25 mf.	45-3001*
C207	Condenser, tone compensation, .02 mf.	61-0108*
C208	Condenser, r-f by-pass, .01 mf.	61-0120*
J200	Socket, FM test	27-6180
LS200	Loud-speaker, permanent magnet	36-1625
R200	Volume control, 2 megohms	33-5539-19
R201	Tone control, 500,000 ohms	33-5538-11
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*

SECTION 2 (Continued)
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R204	Resistor, cathode bias, 120 ohms	66-1124340*
R205	Resistor, grid return, 10 megohms	66-6103340*
T200	Output transformer	32-8296-4

SECTION 3
I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C300A	Condenser, shunt	Part of Z300
C300B	Condenser, shunt	Part of Z300
C301A	Condenser, shunt	Part of Z301
C301B	Condenser, shunt	Part of Z301
C302A	Condenser, shunt	Part of Z302
C302B	Condenser, shunt	Part of Z302
C303A	Condenser, shunt	Part of Z303
C303B	Condenser, shunt	Part of Z303
C304	Condenser, shunt, 68 mmf.	Part of Z304
C305A	Condenser, shunt	Part of Z305
C305B	Condenser, shunt	Part of Z305
C305C	Condenser, a-v-c filter	Part of Z305
C305D	Condenser, a-v-c filter	Part of Z305
C306	Condenser, shunt, (part of Z304), 5 mmf.	30-1224-5
C307	Condenser, r-f by-pass, 100 mmf.	62-110009001
C308	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C309	Condenser, r-f by-pass, 100 mmf.	62-110009001
C310	Condenser, r-f by-pass, .05 mf.	61-0122*
C311	Condenser, screen by-pass, .01 mf.	61-0120*
C312	Condenser, plate by-pass, .01 mf.	61-0120*
C313	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C314	Condenser, r-f by-pass, .01 mf.	61-0120*
C315	Condenser, plate by-pass, .01 mf.	61-0120*
C316	Condenser, cathode by-pass, .01 mf.	61-0120*
C317	Condenser, screen by-pass, .01 mf.	61-0120*
C318	Condenser, decoupling, 1500 mmf.	62-215001001

REPLACEMENT PARTS LIST (Continued)

SECTION 3 (Continued)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C319	Condenser, electrolytic, filter, FM detector, 2 mf.	30-2417-7
C320	Condenser-and-cnoke assy., by-pass, .05 mf.	38-9851-6
C321	Condenser, r-f by-pass, .01 mf.	61-0120*
C322	Condenser, compensating, .01 mf.	61-0120*
L300A	Primary coil, 1st FM i-f transformer	Part of Z300
L300B	Secondary coil, 1st FM i-f transformer	Part of Z300
L301A	Primary coil, 1st AM i-f transformer	Part of Z301
L301B	Secondary coil, 1st AM i-f transformer	Part of Z301
L301C	Tertiary coil, 1st AM i-f transformer	Part of Z301
L302A	Primary coil, 2nd FM i-f transformer	Part of Z302
L302B	Secondary coil, 2nd FM i-f transformer	Part of Z302
L303A	Primary coil, 2nd AM i-f transformer	Part of Z303
L303B	Secondary coil, 2nd AM i-f transformer	Part of Z303
L304A	Primary coil, 3rd FM i-f transformer	Part of Z304
L304B	Secondary coil, 3rd FM i-f transformer	Part of Z304
L304C	Tertiary coil, 3rd FM i-f transformer	Part of Z304
L305A	Primary coil, 3rd AM i-f transformer	Part of Z305
L305B	Secondary coil, 3rd AM i-f transformer	Part of Z305
R300	Resistor, decoupling, 68 ohms	66-0683340*
R301	Resistor, grid return, 1 megohm	66-5103340*
R302	Resistor, cathode bias, 47 ohms	66-0473340*
R303	Resistor, screen dropping, 1000 ohms	66-2103340*
R304	Resistor, plate decoupling, 1000 ohms	66-2103340*
R305	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R306	Resistor, r-f decoupling, 68 ohms	66-0683340*
R307	Resistor, cathode bias, 47 ohms	66-0473340*
R308	Resistor, screen dropping, 1000 ohms	66-2103340*
R309	Resistor, plate decoupling, 1000 ohms	66-2103340*
R310	Resistor, diode load, 330,000 ohms	66-4333340*
R311	Resistor, diode load, 47,000 ohms	66-3473340*
R312	Resistor, decoupling, 47,000 ohms	66-3473340*
R313	Resistor, decoupling, 100,000 ohms	66-4103340*
R314	Resistor, FM-detector load, 47,000 ohms	66-3473340*
TC300A	Primary tuning core, 1st FM i-f trans.	Part of Z300
TC300B	Secondary tuning core, 1st FM i-f trans.	Part of Z300
TC301A	Primary tuning core, 1st AM i-f trans.	Part of Z301
TC301B	Secondary tuning core, 1st AM i-f trans.	Part of Z301
TC302A	Primary tuning core, 2nd FM i-f trans.	Part of Z302
TC302B	Secondary tuning core, 2nd FM i-f trans.	Part of Z302
TC303A	Primary tuning core, 2nd AM i-f trans.	Part of Z303
TC303B	Secondary tuning core, 2nd AM i-f trans.	Part of Z303
TC304A	Primary tuning core, 3rd FM i-f trans.	Part of Z304
TC304B	Secondary tuning core, 3rd FM i-f trans.	Part of Z304
TC305A	Primary tuning core, 3rd AM i-f trans.	Part of Z305
TC305B	Secondary tuning core, 3rd AM i-f trans.	Part of Z305
WS-B	Switch-wafer section	Part of 42-1834†
Z300	Transformer, 1st FM i-f	32-4257
Z301	Transformer, 1st AM i-f	32-4258
Z302	Transformer, 2nd FM i-f	32-4257-1
Z303	Transformer, 2nd AM i-f	32-4160-3
Z304	Transformer, 3rd FM i-f	32-4261
Z305	Transformer, 3rd AM i-f	32-4240-2

SECTION 4

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2724-1
C400A	Condenser, trimmer, FM aerial	Part of C400
C400B	Condenser, trimmer, FM r-f	Part of C400
C400C	Condenser, trimmer, FM oscillator	Part of C400
C401	Condenser, trimmer, 2-section	31-6476-13
C401A	Condenser, trimmer, BC aerial	Part of C401
C401B	Condenser, trimmer, BC oscillator	Part of C401
C402	Condenser, aerial coupling, 100 mmf.	62-110009001
C403	Condenser, r-f by-pass, 100 mmf.	62-110009001
C404	Condenser, blocking, 51 mmf.	30-1224-2*
C405	Condenser, cathode by-pass, 33 mmf.	30-1224*
C406	Condenser, screen by-pass, 100 mmf.	62-110009001
C407	Condenser, isolating, .01 mf.	61-0120*
C408	Condenser, blocking, 100 mmf.	62-110009001
C409	Condenser, r-f by-pass, 220 mmf.	62-122001001

SECTION 4 (Continued)

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C410	Condenser, cathode by-pass, 1500 mmf.	62-215001001
C411	Condenser, d-c blocking, 100 mmf.	62-110009001
C412	Condenser, r-f by-pass, 1500 mmf.	62-215001001
C413	Condenser, d-c blocking, 220 mmf.	62-122001001
C414	Condenser, r-f by-pass, 100 mmf.	62-110009001
C415	Condenser, d-c blocking, 220 mmf.	62-122001001
C416	Condenser, cathode by-pass, 100 mmf.	62-110009001
C417	Condenser, isolating, 100 mmf.	62-110009001
C418	Condenser, isolating, 100 mmf.	62-110009001
C419	Condenser, plate decoupling, .01 mf.	61-0120*
C420	Condenser, r-f by-pass, .03 mf.	45-3500-1*
C421	Condenser, r-f by-pass, 100 mmf.	62-110009001
C422	Condenser, r-f by-pass, 100 mmf.	62-110009001
C423	Condenser, r-f by-pass, 100 mmf.	62-110009001
C424	Condenser, plate decoupling, .01 mf.	61-0120*
C425	Condenser, aerial coupling, 10 mmf.	62-010009001
C426	Condenser, aerial coupling, 100 mmf.	62-110009001
C427	Condenser, r-f by-pass, 1500 mmf.	62-215001001
J400	Aerial socket	27-6214
L400	Coil, BC aerial	32-4217-1
L401	Coil, FM aerial	32-4158-1
L402	Coil, FM r-f	32-4159-1
L403	Coil, FM oscillator	32-4018-5
L404	Coil, BC oscillator	32-4221-1
L405	Coil, r-f choke	32-4061-2
L406	Coil, FM r-f plate load	32-4061-2
L407	Coil, FM oscillator plate load	32-4061-2
L408	Coil, r-f choke	32-4061-2
L409	Coil, r-f choke	32-4061-2
LA400	Loop aerial	32-4052-16
PL400	Plug, FM aerial	Part of W100
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, cathode bias, 68 ohms	66-0683340*
R402	Resistor, screen dropping, 1000 ohms	66-2103340*
R403	Resistor, plate decoupling, 4700 ohms	66-2473340*
R404	Resistor, grid return, 15,000 ohms	66-3153340*
R405	Resistor, cathode bias, 1500 ohms	66-2153340*
R406	Resistor, grid return, 10,000 ohms	66-3103340*
R407	Resistor, plate decoupling, 33,000 ohms	66-3333340*
R408	Resistor, grid return, 15,000 ohms	66-3153340*
R409	Resistor, cathode bias, 2200 ohms	66-2223340*
R410	Resistor, plate load, 15,000 ohms	66-3153340*
R411	Resistor, grid return, 1 megohm	66-5103340*
R412	Resistor, r-f decoupling, 68 ohms	66-0683340*
R413	Resistor, plate decoupling, 33,000 ohms	66-3333340*
TB400	Aerial terminal panel	38-9942
WS-A	Switch-wafer section	Part of 42-1834†

MISCELLANEOUS

Description	Service Part No.
Cabinet (less scale)	10666
Baffle-and-cloth assembly	40-6965
Cabinet back	54-7465-1
Clip, baffle mounting	28-4279FA1
Dial scale	27-5954-2
Strap, scale mounting (L.H.)	56-4032
Strap, scale mounting (R.H.)	56-4031
Dial-Backplate Assembly	
Dial cord (25-ft. spool)	45-8750*
Diffusing panel	54-7506
Pointer	56-5252
Spring, pointer	28-8953
Spring, gang	56-2617
Upright assembly	76-3461
Dial drive shaft	76-3479
Knob	54-4376
Rubber mount, r-f chassis	54-4295
Socket, 9-pin miniature	27-6203-5
Socket, 8-pin Loktal	27-6138*
Socket, 7-pin miniature	27-6226

†42-1834 is WS, wafer switch, single wafer (includes WS-A and WS-B).

PHILCO CORP.

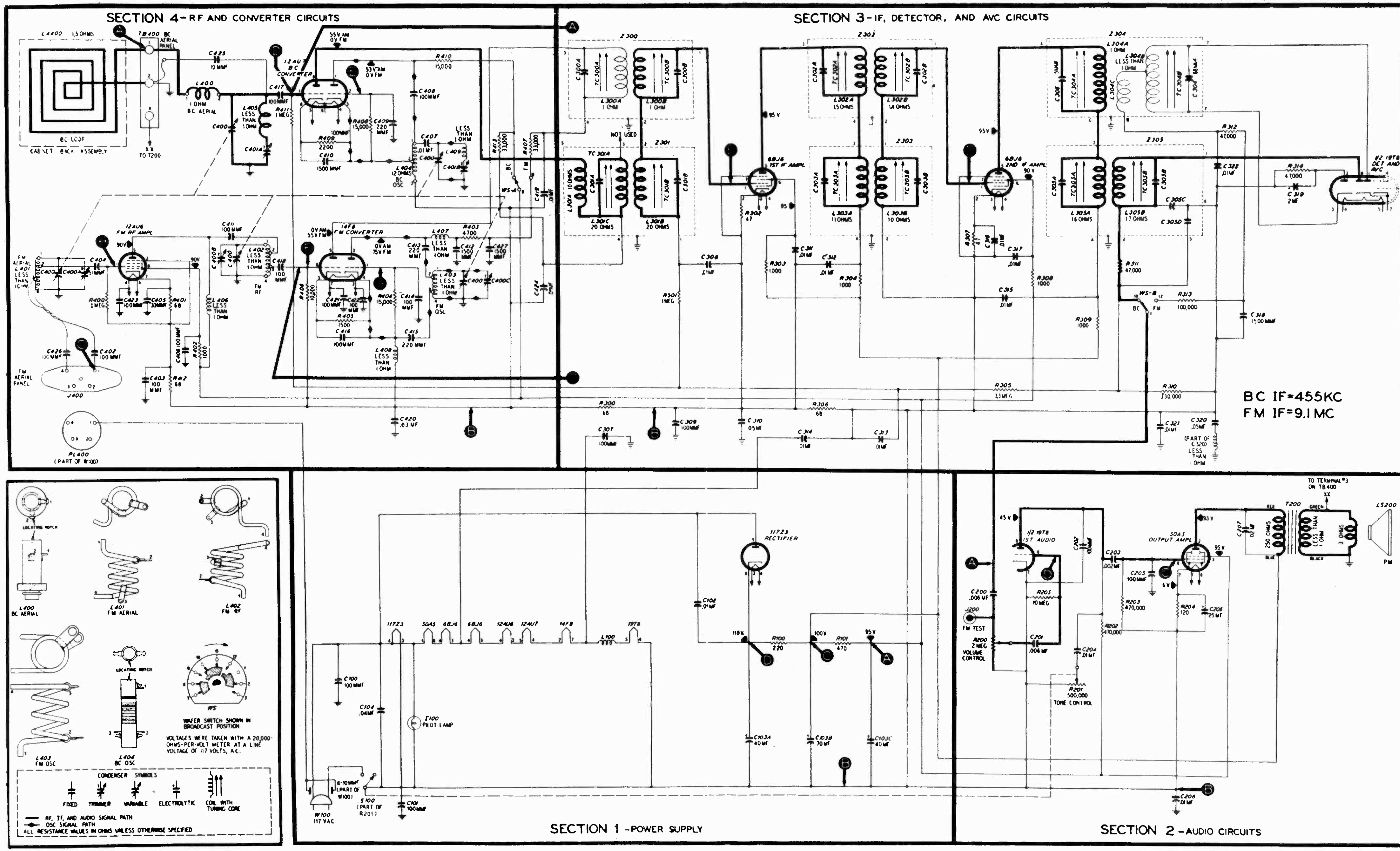


Figure 6. Philco Radio Model 48-472, Code 122, Sectionalized Schematic Diagram, Showing Test Points

MODEL 48-472, Code 122

PHILCO CORP.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Groud lead to B–, test point B; output lead through .1-mf. condenser to terminal 1 of TB400.	455 kc.	540 kc.	Adjust each trimmer, in order given, for maximum output. Do not repeat adjustments.	TC305B—3rd i-f sec. TC305A—3rd i-f pri. TC303B—2nd i-f sec. TC303A—2nd i-f pri. TC301B—1st i-f sec. TC301A—1st i-f pri.
2	Loosely coupled with loop. See note below.	1600 kc.	1600 kc.	Adjust for maximum output.	C401B—BC osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C401A—BC aerial

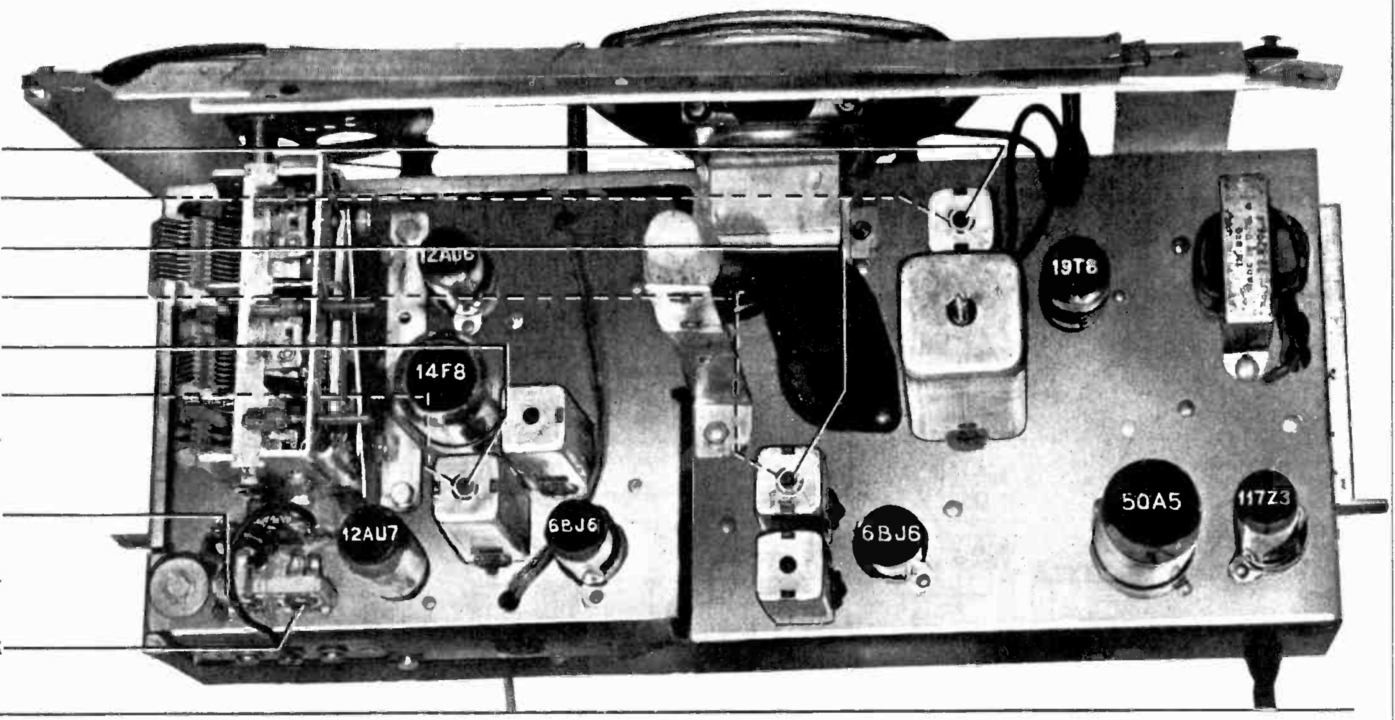


Figure 8. Top View, Showing AM Trimmer Locations

TP-5816

NOTE: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to the signal-generator leads and place near the radio loop.

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to pin 1 of 6BJ6, 1st i-f amplifier.	9.1 mc.	88 mc.	Adjust for maximum reading on alignment indicator. Attenuate signal generator to maintain reading of approximately 10 volts. Repeat adjustments until no further improvement is noted. After this step, do not disturb any of these trimmers except as directed in step 3.	TC304B—3rd i-f sec. TC304A—3rd i-f pri. TC302B—2nd i-f sec. TC302A—2nd i-f pri.
2	Through .1-mf. condenser to pin 8 of 14F8.	9.1 mc.	88 mc.	Adjust for maximum reading on alignment indicator. Repeat adjustments until no further improvement is noted. Do not disturb these trimmers after this step.	TC300B—1st i-f sec. TC300A—1st i-f pri.
3	Same as step 2.	9.1 mc.	88 mc.	Adjust for minimum reading on output meter. This adjustment is critical; repeat to make sure it is correct.	TC304B—3rd i-f sec.
4	To terminal 2 of J400.	105 mc.	105 mc.	Adjust for maximum reading on alignment indicator.	C400C—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Same as step 4. Rock tuning control.	C400B—FM r-f
6	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C400A—FM aerial
7	Same as step 4.	92 mc.	92 mc.	Same as step 4. See note page 10.	L403—FM osc. (tracking)
8	Same as step 4.	92 mc.	92 mc.	Same as step 7.	L402—FM r-f (tracking)
9	Same as step 4.	92 mc.	92 mc.	Same as step 7.	L401—FM aerial (tracking)
10	Repeat steps 4 through 9 until no further improvement is obtained.				

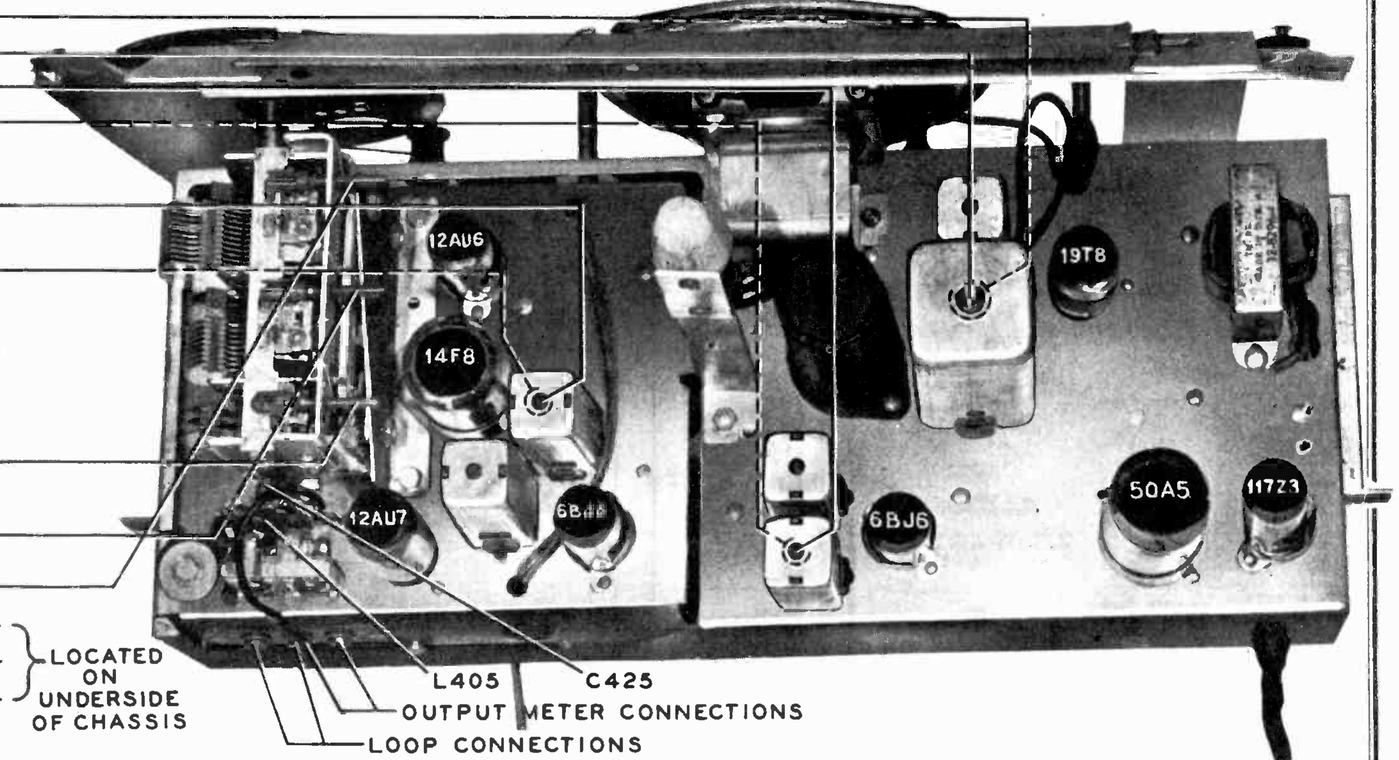


Figure 9. Top View, Showing FM Trimmer Locations

TP-5816

ALIGNMENT OF AM CIRCUITS

Make alignment with loop aerial connected to radio. The AM alignment should be completed before the FM alignment is made.

DIAL POINTER—With tuning condenser fully meshed, adjust dial pointer to coincide with index mark at low-frequency end of dial. See "CALIBRATING DIAL BACKPLATE" for method of measuring backplate for index and calibration marks.

OUTPUT METER—Connect between terminal 3 (voice-coil connection) of aerial terminal panel and TB400 and chassis.

AM SIGNAL GENERATOR—Connect as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain radio output below 1.25 volts, as read on output meter.

CONTROLS—Set volume control to maximum, turn tone control fully counterclockwise, and set band switch to broadcast position.

ALIGNMENT OF FM CIRCUITS

Align the AM Circuits first

OUTPUT METER—Connect between terminal 3 (voice-coil connection) of aerial terminal panel TB400 and chassis.

ALIGNMENT INDICATOR—Connect negative lead of a 20,000-ohms-per-volt, d-c voltmeter to pin 2 of 19T8 tube; connect positive lead to B–, test point B in Section 2. Use 10-volt range.

AM SIGNAL GENERATOR—Generator must have sufficient output to give a reading of at least 8.5 volts on alignment indicator. Connect generator ground lead to B–, test point B; connect output lead as indicated in chart. Use modulated output.

CONTROLS—Same as for alignment of AM circuits, except set band switch to FM position. Allow radio and signal generator to warm up for at least 15 minutes before making alignment.

NOTE: Check resonance of coils L401, L402, and L403 by inserting each end of a powdered-iron tuning core, such as Philco Part No. 56-6100, in the coils. If the signal strength increases when the iron end is inserted, compress the turns slightly. If the signal strength increases when the threaded brass end is inserted, spread the turns slightly. If the signal strength decreases when either the iron or the brass end is inserted, no further adjustment is necessary. Do not spread or compress turns of coil excessively; only a small change is required at these high frequencies.

SYMBOLIZATION

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part as follows:

C —condenser	LS —loud-speaker	W —line cord
I —pilot lamp	R —resistor	WS—wafer switch
J —socket	S —switch	Z —electrical assembly
L —choke or coil	T —transformer	
LA—loop aerial	TB—terminal panel	

The number of the symbol, except when the number is less than 100, designates the section in which the part is located, as follows:

100-series components are in Section 1, the power supply
200-series components are in Section 2, the audio circuits
300-series components are in Section 3, the i-f, detector, and a-v-c circuits
400-series components are in Section 4, the r-f and converter circuits

CALIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial backplate below the pointer.

The method of measuring for these points is illustrated in figure 7. Hold a ruler against the dial backplate, with the start of the ruler at the reference line shown, and mark pencil dots at the proper points for the required frequency settings.

After installation of the chassis in the cabinet, the dial pointer should be moved to coincide with the index mark on the dial. Coincidence of the pointer and index mark should occur with the tuning condenser fully meshed.

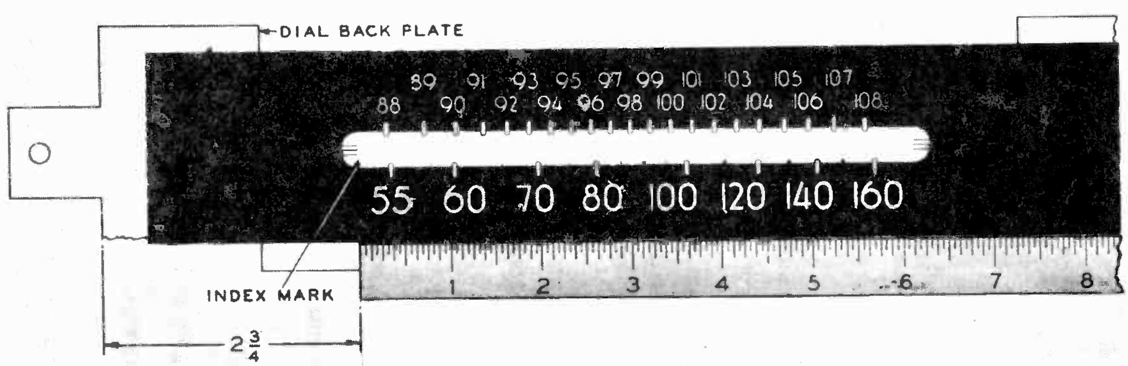
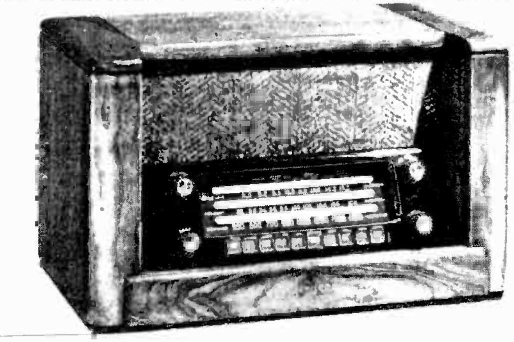


Figure 7. Dial-Backplate Calibration Measurements



CABINET	Walnut-finish table model
CIRCUIT	Nine-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540 — 1720 kc
Short wave	9.3 — 15.5 mc
FM	88 — 108 mc
POWER OUTPUT	3 watts
PUSH BUTTONS	Ten: One for OFF, six for broadcast-station selection, and three for band selection.
OPERATING VOLTAGE	105 to 120 volts, 60 cycles, A.C.
POWER CONSUMPTION	80 watts
AERIALS	Built-in cabinet loop, a-c line aerial (FM), or external aerial.
INTERMEDIATE FREQUENCIES	
AM	455 kc
FM	9.1 mc
PHILCO TUBES USED (9)	7W7, 7F8, 7H7 (2), 7B7, 6SQ7GT, FM1000, 6V6GT, 5Y3GT
PILOT LAMPS (2)	6—8-volt, Part No. 34-2040

PRELIMINARY CHECKS

Before starting the trouble-shooting procedure, ıe following steps are recommended:

1. Before connecting the radio to a source of power, inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin No. 2 of 5Y3GT rectifier tube) and the radio chassis. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If this reading is lower than 50,000 ohms, check condensers C104, C102C, C105, C102A, C102B, C103, and C416 for leakage or shorts.

SETTING PUSH BUTTONS

1. Connect the output meter between terminal No. 3 on aerial terminal panel and radio chassis.

2. Turn the radio volume control about half-way on, bass tone control fully counterclockwise, and treble tone control fully clockwise.

3. Couple the signal generator loosely through a coil of wire to the radio loop aerial (see NOTE under AM alignment chart).

4. Turn on the power, and allow the radio to warm up for 15 minutes before starting the adjustments.

5. Starting with the lowest frequency desired, set the signal generator (modulation on) to the desired frequency, push the left-hand station-selector button, and adjust the associated oscillator tuning core and aerial trimmer condenser (marked on rear of chassis) for maximum indication on the output meter. Reset the signal-generator frequency, and repeat the procedure for each remaining station-selector button.

6. Turn off the signal generator and make a final adjustment of all tuning cores and trimmer condensers while listening to the stations for which the adjustments are being made.

CIRCUIT DESCRIPTION

Philco Radio, Model 48-482, is a nine-tube superheterodyne radio, providing reception on the standard-broadcast band, 540 to 1720 kc., the short-wave range between 9.3 and 15.5 mc., and the FM band, 88 to 108 mc.

There are ten push buttons; six for instant tuning of stations in the standard-broadcast band, three for selecting standard broadcast, short wave, or FM band, and one for power OFF (any one of the other nine buttons turns on the radio power).

A low-impedance loop within the cabinet is used for the standard-broadcast and short-wave bands, and a built-in a-c-line aerial is provided for the FM band. In areas where FM signals are weak, an outdoor dipole aerial (Philco Part No. 45-1462) will provide additional pickup.

A tuned r-f amplifier stage, using a type 7W7 high-frequency pentode tube, is provided for FM reception. A 7F8 high-frequency double-triode tube is employed as a converter.

Three transformer-coupled i-f stages are used. The first, third, and fourth i-f transformers have two sets of windings; one set is tuned to 455 kc. for AM operation, and the other to 9.1 mc. for FM operation. The second i-f transformer uses an untuned-primary, tuned-secondary combination for AM operation, to prevent instability; the single primary winding is tuned to 9.1 mc., one secondary is tuned to 9.1 mc., and the other to 455 kc. Switching of the windings, to attenuate undesired beat-frequencies, is necessary only in the first i-f transformer. One 7B7 and two 7H7 high-transconductance pentodes are used in the i-f stages.

The new Philco advanced FM detector circuit, employing the new FM1000 tube of special design, is used for FM reception.

One diode of the 6SQ7GT tube provides detection and a-v-c action for AM reception; the other diode develops a-v-c voltage for FM operation. The high-mu-triode section of this tube functions as the first audio stage; this stage is resistance-coupled to the 6V6GT beam-pentode output tube. The output stage is transformer-coupled to a five-by-seven inch, oval, electrodynamic speaker. Inverse feedback is obtained by connecting the secondary of the output transformer through resistor R208 to the junction of the volume control, R200, and the 4.7-ohm resistor R201.

SECTION 1 – TROUBLE SHOOTING

CAUTION

Do not turn on radio power with speaker disconnected, as this will cause damage to the set.

With the BC push button depressed, check the voltage between the chassis (test point C) and each of the remaining test points indicated in the chart. The voltages given were measured with a 20,000-ohms-per-volt meter, using a power source of 117 volts, 60 cycles, a.c. Any voltage may be considered normal if it is within ±10% of the indicated value.

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B to C D to C E to C F to C	200 volts 187 volts Negative 13 volts Negative 1.1 volts	Error greater than 10%	Trouble within this section. Isolate by following tests.
2	A to C	250 volts	No voltage Low voltage High voltage	Defective 5Y3GT tube or T100. Shorted C104, C102C, C103, C105, or C416. Defective 5Y3GT tube or T100. Leaky C104, C102C, C103, C105, or C416. Shorted C102A, C102B, or C106. Open L100. Shorted L100. Open R103, R104, or T200.
3	B to C	200 volts	No voltage Low voltage High voltage	Shorted C102A. Open R100. Leaky C102A. Off-value R100. Off-value R100.
4	D to C	187 volts	No voltage Low voltage High voltage	Shorted C102B. Open R101. Leaky C102B. Off-value R101. Off-value R101.
5	E to C	Negative 13 volts	Error greater than 10%	Shorted or leaky C106. Open or off-value R102, R103, or R104. Open, shorted, or partially shorted L100.
6	F to C	Negative 1.1 volts	Error greater than 10%	Open or off-value R104.

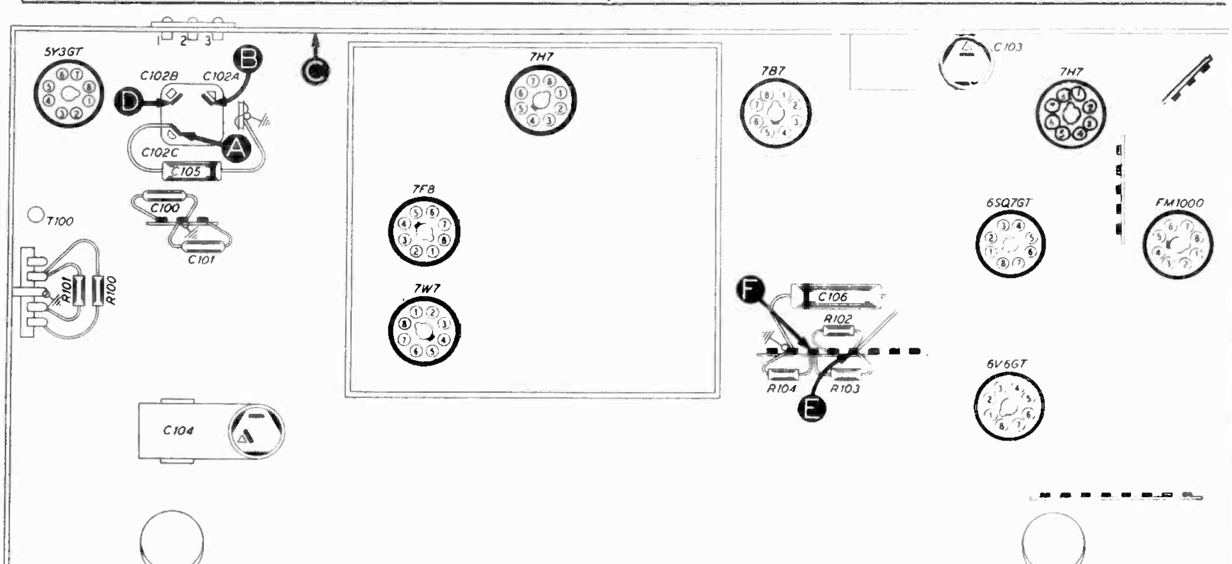


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS.

SECTION 2 – TROUBLE SHOOTING

For all tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated.

Set the volume control at maximum, treble tone control clockwise, and bass tone control counter-clockwise; depress the BC push button. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in the first step, proceed to the tests in Section 3; if not, isolate and remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	D	Loud, clear signal with weak signal input	Trouble within this section. Isolate by following tests.
2	A	Loud, clear signal with strong signal input	Defective 6V6GT tube or LS200. Shorted or leaky C205. Open or shorted T200. Open R205 or C204. Shorted or leaky C200 or C201.
3	B	Loud, clear signal with weak signal input	Defective 6SQ7GT (triode section). Open R204 or R202. Leaky or shorted C200.
4	D	Same as step 3	Open or off-value R200. Open C202.

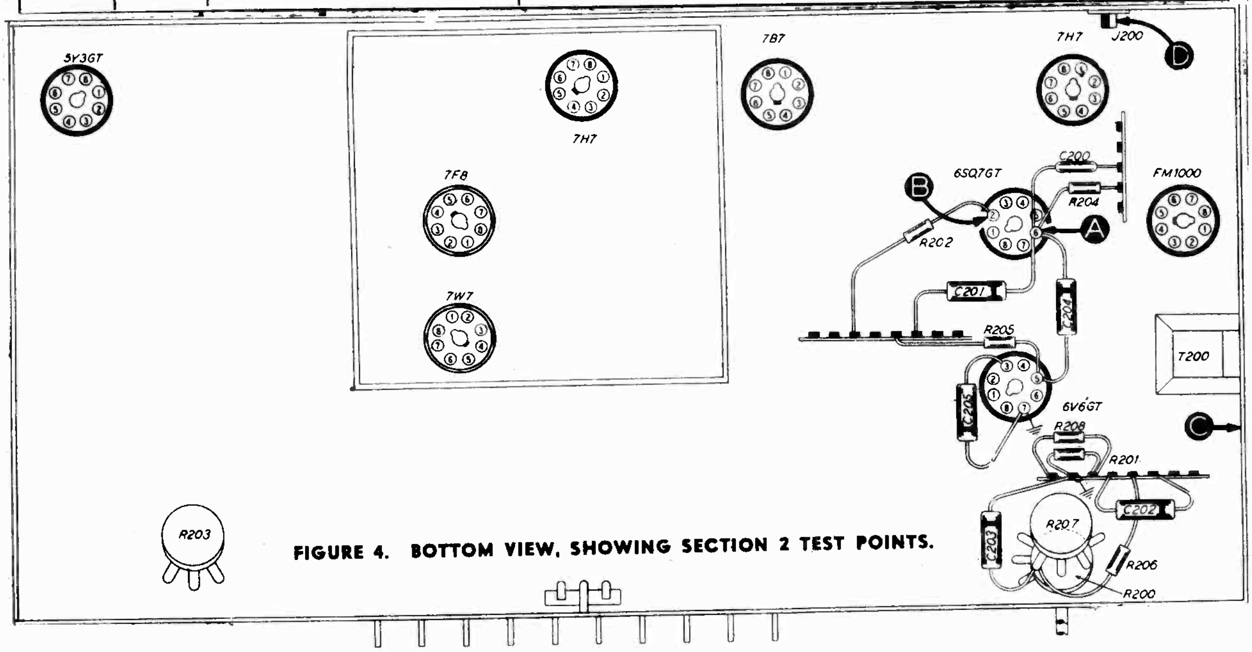


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS.

SECTION 3 – TROUBLE SHOOTING (FM DETECTOR)

The tests in this section are made with an audio-frequency generator, an AM r-f signal generator, and a 20,000-ohms-per-volt voltmeter. Use a .1-mf condenser in series with the output lead of each generator.

In Step 1, unmodulated r-f signals, together with d-c voltage readings, are used to check the response of the detector circuit to FM by observing the voltage drops across the audio-load resistor R302 for different input frequencies within the i-f range of the detector. In Step 3, the oscillator section of the FM detector is made inoperative, thereby converting the circuit to an AM detector, and making it possible to check certain components with an AM signal.

The tests in this section will not indicate the condition of alignment of the detector unless the circuit is extremely misaligned.

NOTE: In Steps 1 and 3, the AM signal-generator output must be at least .5 volt. If the output is below this value, instead of connecting to test point D, the generator lead may be connected in Section 4, to test point A or B, depending upon the maximum output of the generator used. The tests made from these points will be effective if the last i-f stages are trouble free. If abnormal indications are obtained in BOTH Steps 1 and 3, the i-f stages may be at fault.

Set the radio controls as follows: Volume control at maximum; bass control fully counterclockwise; treble control fully clockwise; FM push button depressed.

If the "NORMAL INDICATION" is obtained in the first test, proceed to the tests for Section 4; if not, isolate and remedy the trouble in this section.

SECTION 3 — (Continued)

STEP	PROCEDURE	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	Connect positive d-c voltmeter lead to test point A, negative lead to test point B, with meter on 50-volt range. Connect AM generator to test point D; turn off modulation and adjust generator output to approximately .5 volt (see NOTE above). Swing generator frequency from approximately 80 kc above to 80 kc below 9.1 mc.	Approximately 15 volts for 9.1-mc signal (or no signal); 8 volts for 80 kc above 9.1 mc; 23 volts for 80 kc below 9.1 mc.	Trouble within this section. Isolate by the following tests.
2	Connect audio-signal generator to test point E; adjust for high generator output.	Loud, clear signal output from radio.	Defective Z300, FM1000, or PB 10. Shorted C305. Open C304 or R303.
3	Short test point F (pin No. 2, FM1000) to chassis. Connect r-f generator output to test point D (see NOTE above). Use modulated signal. Set generator for 9.1 mc and maximum output.	Loud, clear signal output from radio.	Defective FM1000 tube. Shorted or leaky C306 or C307. Open R304, L300, or R302.
4	Remove short from test point F. Connect negative lead of d-c voltmeter to test point F through a 50,000-ohm isolating resistor; connect positive lead to test point C (chassis). Set meter to 10-volt range.	Approximately 2.5 volts negative (osc. grid voltage).	Defective FM1000 tube, or Z300. Open L300 or C301. Shorted or leaky C303. Open R306. Open or off-value R305 or R301.

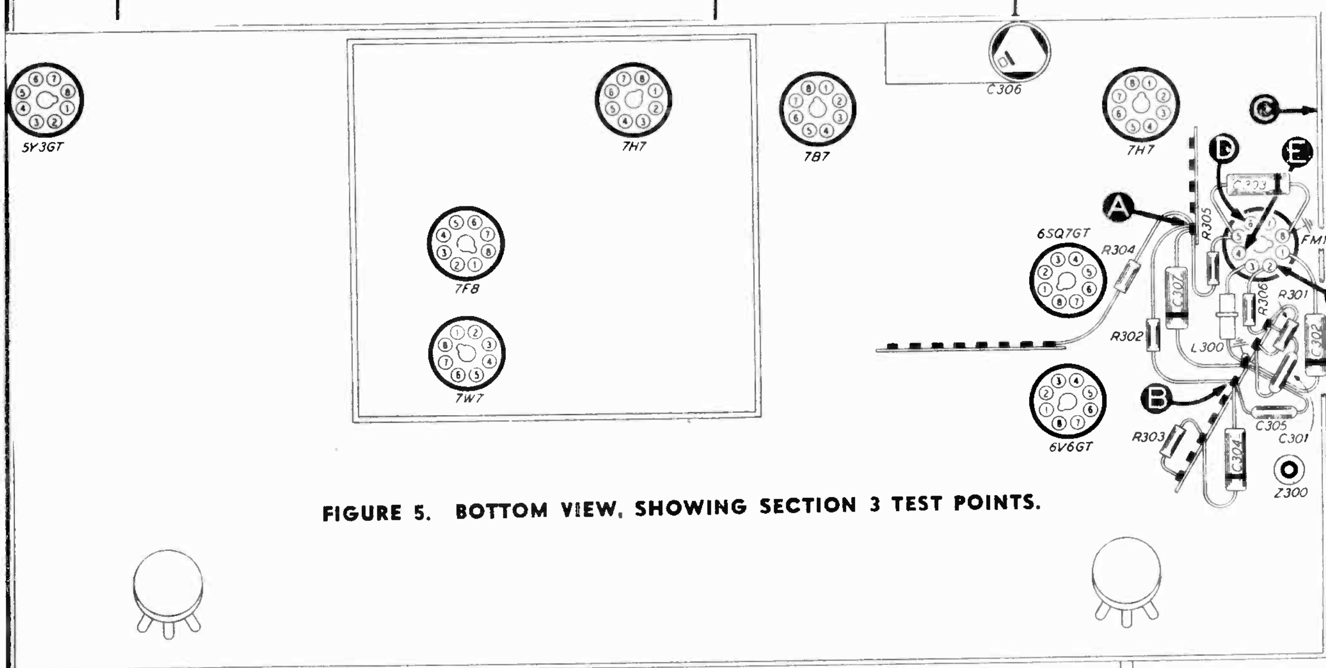


FIGURE 5. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS.

SECTION 4 – TROUBLE SHOOTING

AM CIRCUITS

For the AM circuit tests in this section, use an AM r-f signal generator with frequency set to 455 kc. Connect the signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated. Depress the BC push button (PB 8), set the radio volume control at maximum, the bass tone control fully counterclockwise, and the treble control fully clockwise. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in the first step, proceed to the tests for FM CIRCUITS in this section, or to Section 5; if not, isolate and remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	Clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	A	Clear signal with strong signal input.	Defective or misaligned Z403. Open R416, R418, R419, R411, R414, R415, or C424. Defective 6SQ7GT or 7H7 tube. Shorted, open, or leaky C418, C419 or C420. Shorted C425.
3	B	Clear signal, louder than step 2.	Defective or misaligned Z402. Defective 7B7 tube. Open R405, R406, R409, or R410. Shorted C411 or C414. Shorted, leaky or open C413 or C415.
4	D	Clear signal, louder than step 3.	Defective or misaligned Z401. Defective 7H7 tube. Open R402, R403, R404, or R407. Shorted C407. Shorted, open or leaky C408 or C409.
5	E	Clear signal, approx. same as step 4.	Defective or misaligned Z400. Open R401.

FM CIRCUITS

For the FM circuit tests in this section, short test point F, in Section 3, to the radio chassis, to permit use of an AM signal. Connect the AM signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated in the chart. With the exception of the i-f switch, tubes, and transformers (all of which may function properly at 455 kc but not at 9.1 mc) and the parts specified in the chart, the parts in this section which are normal on AM will be normal on FM.

Set the r-f signal generator to 9.1 mc, with modulation ON. Depress the FM push button (PB 10). Set the radio volume control at maximum, the bass tone control fully counterclockwise, and the treble control fully clockwise. Adjust the signal-generator output as required for each step.

SECTION 4 — (Continued)

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	A	Clear signal with strong signal input.	Defective or misaligned Z403. Defective 7H7 or 6SQ7GT (diode section) tube. Shorted or open C423.
3	B	Loud, clear signal with moderate signal input.	Defective or misaligned Z402. Defective 7B7 tube, or PB 10. Open C414.
4	D	Loud, clear signal with weak signal input.	Defective or misaligned Z401. Defective 7H7 tube. Open C407.
5	E	Loud, clear signal with weak signal input.	Defective or misaligned Z400.

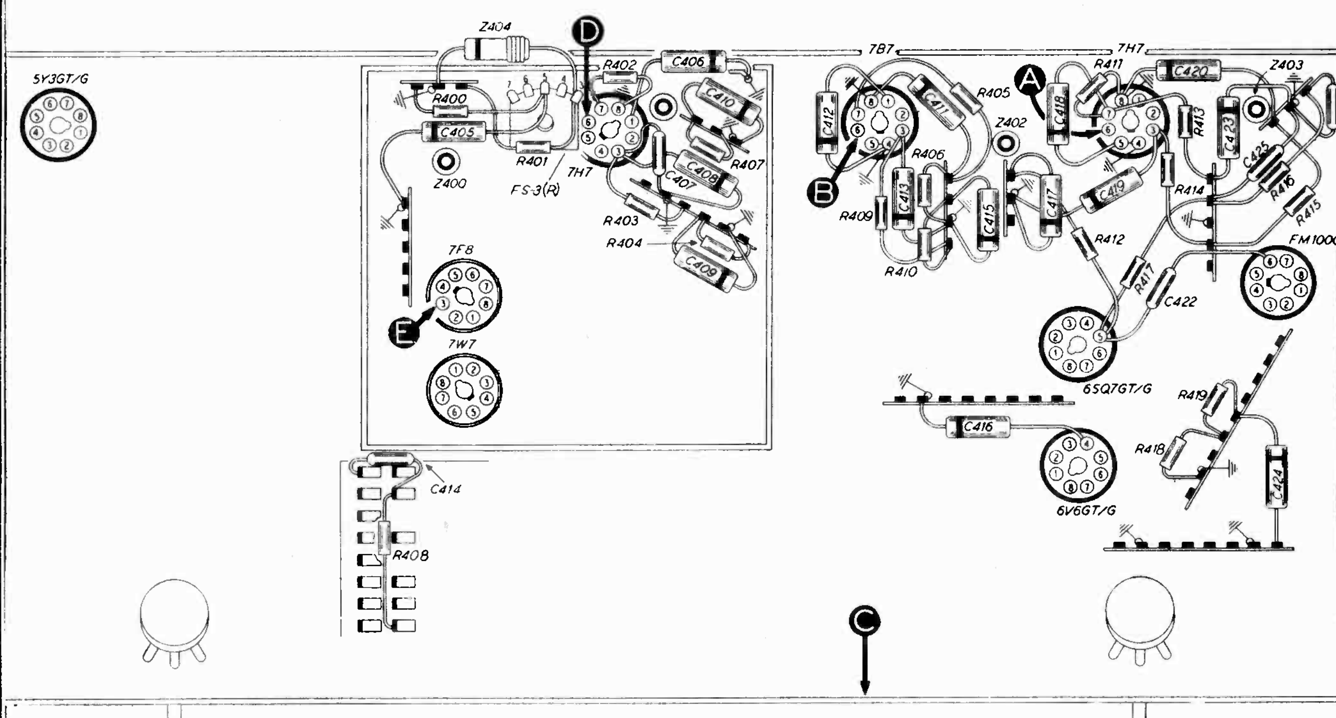


FIGURE 6. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS.

SECTION 5 – TROUBLE SHOOTING AM CIRCUITS

For the signal tests, use an r-f signal generator with amplitude-modulated output. Connect the signal-generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf condenser to the test points indicated. Turn the radio volume control to maximum, treble tone control fully clockwise, and bass tone control fully counterclockwise. Set the signal generator for weak generator output.

OSCILLATOR TESTS

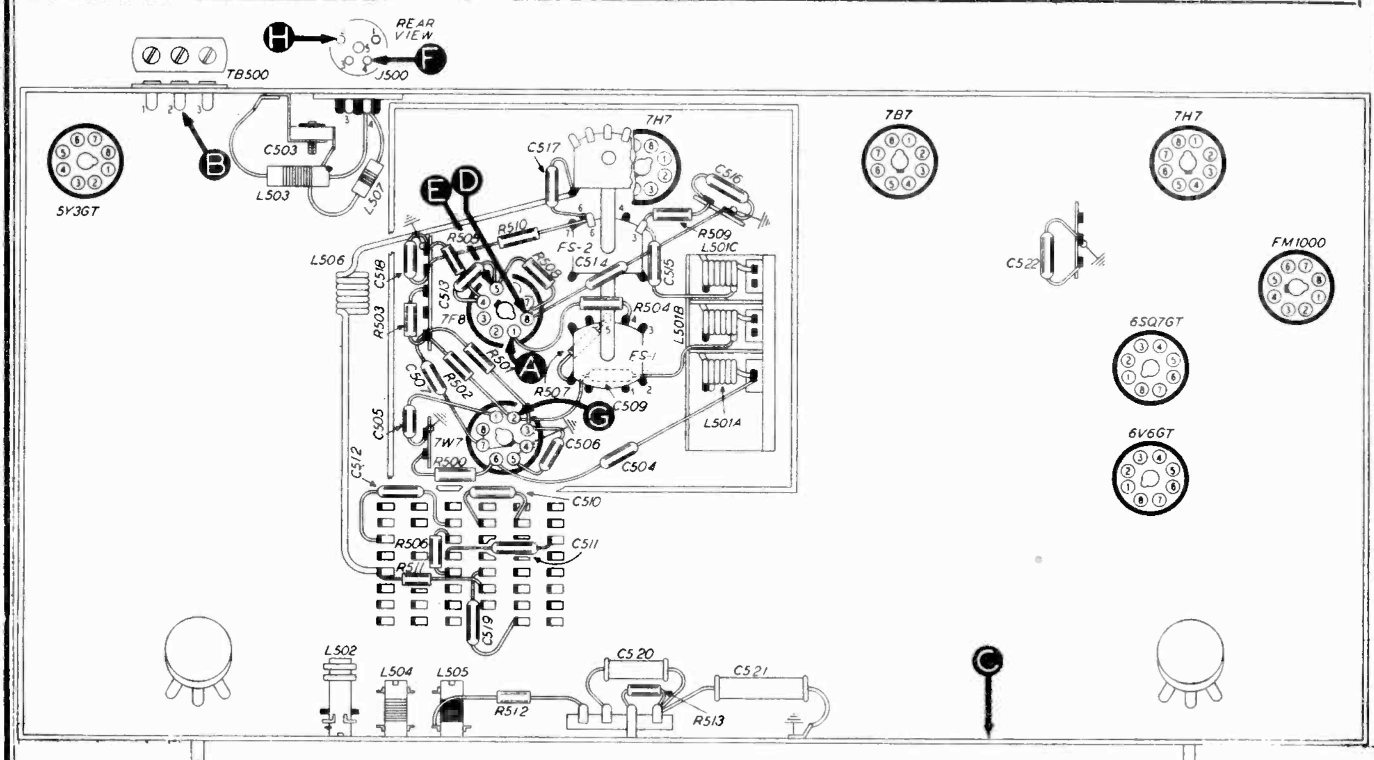
For steps 5, 8, and 10, connect the positive lead of a 20,000-ohms-per-volt meter to test point E, and the prod end of the negative lead through a 100,000-ohm isolating resistor to test point D. Read the voltage on the 10-volt range. Absence of negative voltage at any dial or band position indicates that the oscillator is not functioning properly; check the parts listed in the chart for the oscillator tests.

STEP	TEST POINT	SIGNAL-GEN. SETTING	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B	Vary through range of each button	Depress, in order, PB 2 to PB 7	Loud, clear signal when each button is depressed	Trouble within push-button band. Isolate by steps 4, 5, and 6.
2	B	1000 kc	Depress BC push button (PB 8). Tune radio to signal	Loud, clear signal	Trouble within BC band. Isolate by steps 7 and 8.
3	F	12 mc	Depress SW push button (PB 9). Tune radio to signal	Loud, clear signal	Trouble in short-wave section. Isolate by steps 9 and 10.
4	A	Adjust to frequency of push button	Depress PB 7	Loud, clear signal	Defective 7F8 tube or FS 1 (F). Open R505, R400, or C513. Shorted C405.
5	D to E (see OSC. TESTS)		Depress, in order, PB 2 to PB 7	Negative voltage	No voltage for any one push button: Defective coil (L500A to L500F) or push button. No voltage for all push buttons: Defective 7F8 tube, FS 2, PB 9, or PB 8. Open C517, C520, C521, or C514. Open R508, R510, R513, L506, or R511. Shorted C515, C516, C518, or C522.
6	B	Vary through range of each button	Depress, in order, PB 2 to PB 7	Loud, clear signal	Defective L502. Shorted C502A, C500A to C500F. Open C511, R504, or R507.
7	B	1000 kc	Depress BC push button PB 8. Tune to signal from generator	Loud, clear signal	Defective C501, or PB 8.
8	D to E (see OSC. TESTS)		Depress BC push button PB 8. Rotate radio tuning control through entire range	Negative voltage over entire tuning range	Defective L505. Open R512.
9	F	12 mc	Depress SW push button PB 9. Tune to signal from generator	Loud, clear signal	Defective L503 or L507. Shorted C503. Open C510.
10	D to E (see OSC. TESTS)		Depress SW push button PB 9. Rotate tuning control through entire range	Negative voltage over entire tuning range	Defective 7F8 tube, or L504. Shorted C502C. Open C519.

FM CIRCUITS

Before proceeding with the FM circuit tests, connect test point F, in Section 3, to the radio chassis. Follow the same general procedure given for AM tests.

STEP	TEST POINT	SIGNAL-GEN. SETTING	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	H	100 mc	Depress FM push button PB 10. Tune to signal	Loud, clear signal	Trouble in FM band. Isolate by following tests.
2	D to E (See OSC. TESTS under AM CIRCUITS)		Depress FM push button PB 10. Rotate tuning control through entire range	Negative voltage over entire range	Defective 7F8 tube, FS 2 (F), L501C, C501, or PB 10. Open R509. Shorted C515 or C501C.
3	G	100 mc	Depress FM push button PB 10. Tune to signal	Loud, clear signal	Defective L501B, C501, or FS 1 (F). Open or shorted C509. Shorted C501B.
4	H	Same	Same	Loud, clear signal	Defective 7W7 tube, L501A, C501. Open R500, R502, or R503. Shorted C506, C501A, or C507.



BOTTOM VIEW, SHOWING SECTION 5 TEST POINTS.

CALIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial backplate below the pointer. The proper locations for the points may be determined as follows:

1. Hold a rule against the dial backplate as shown in figure 1.

2. Mark pencil dots at the proper points for the index mark and the desired frequency settings.

With the tuning gang fully meshed, the dial pointer on the drive cord should be adjusted to coincide with the index mark.

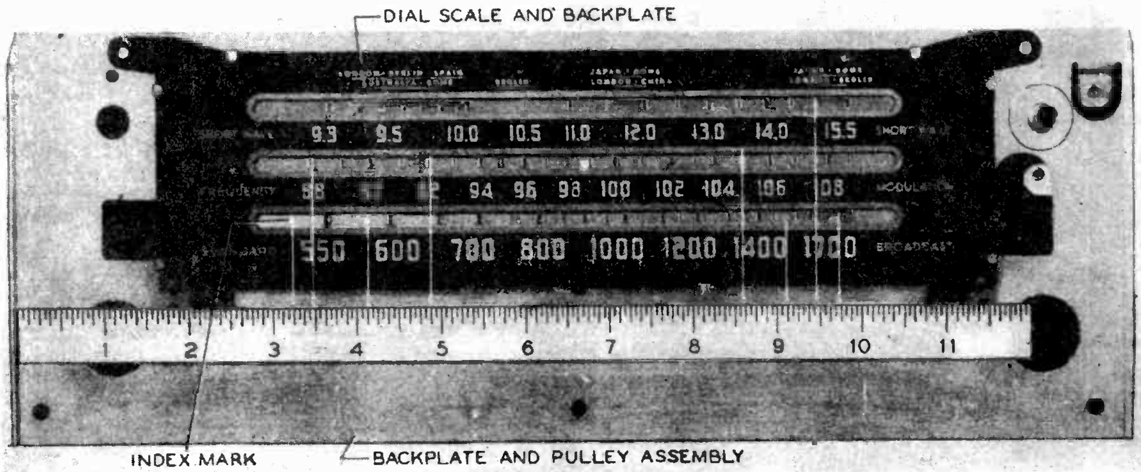


FIGURE 1. DIAL BACKPLATE CALIBRATION MEASUREMENTS. TP-2826

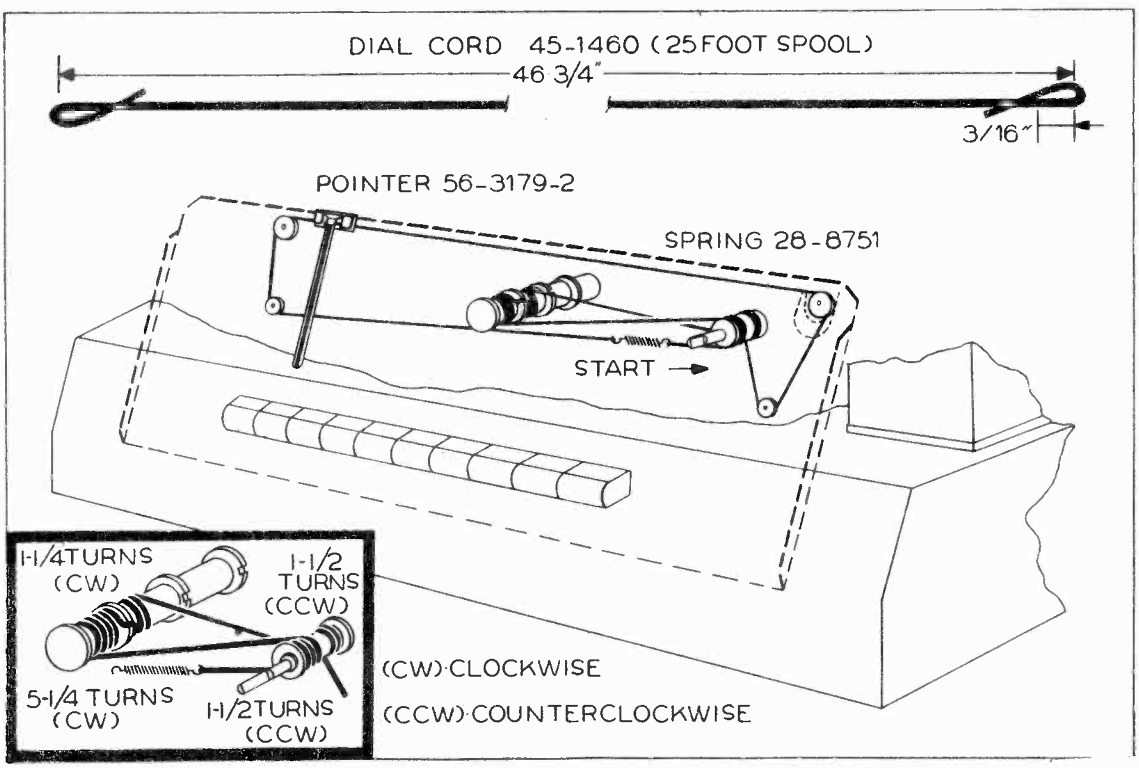


FIGURE 2. DRIVE-CORD INSTALLATION DETAILS.

ALIGNMENT PROCEDURE

ALIGNMENT OF AM CIRCUITS

When the complete AM and FM alignment is to be made, the AM alignment should be made FIRST; however, if FM alignment is not required, the AM alignment alone may be made.

OUTPUT METER: Connect between terminal No. 3 (voice-coil connection) of aerial terminal panel and chassis.

AM SIGNAL GENERATOR: Connect ground lead to radio chassis, and output lead as indicated in chart.

DIAL POINTER: With tuning condenser fully closed, the dial pointer must coincide with the index mark at the low-frequency end of the scale. See CALIBRATING DIAL BACKPLATE, page 3.

CONTROLS: Set volume control at maximum, bass tone control fully counterclockwise, and treble tone control fully clockwise; set the radio band push button, radio dial, and signal-generator dial as indicated in the chart.

OUTPUT LEVEL: During alignment, the signal-generator output must be attenuated to maintain the radio output below 1.5 volts, as indicated by the output meter.

PHILCO CORP.

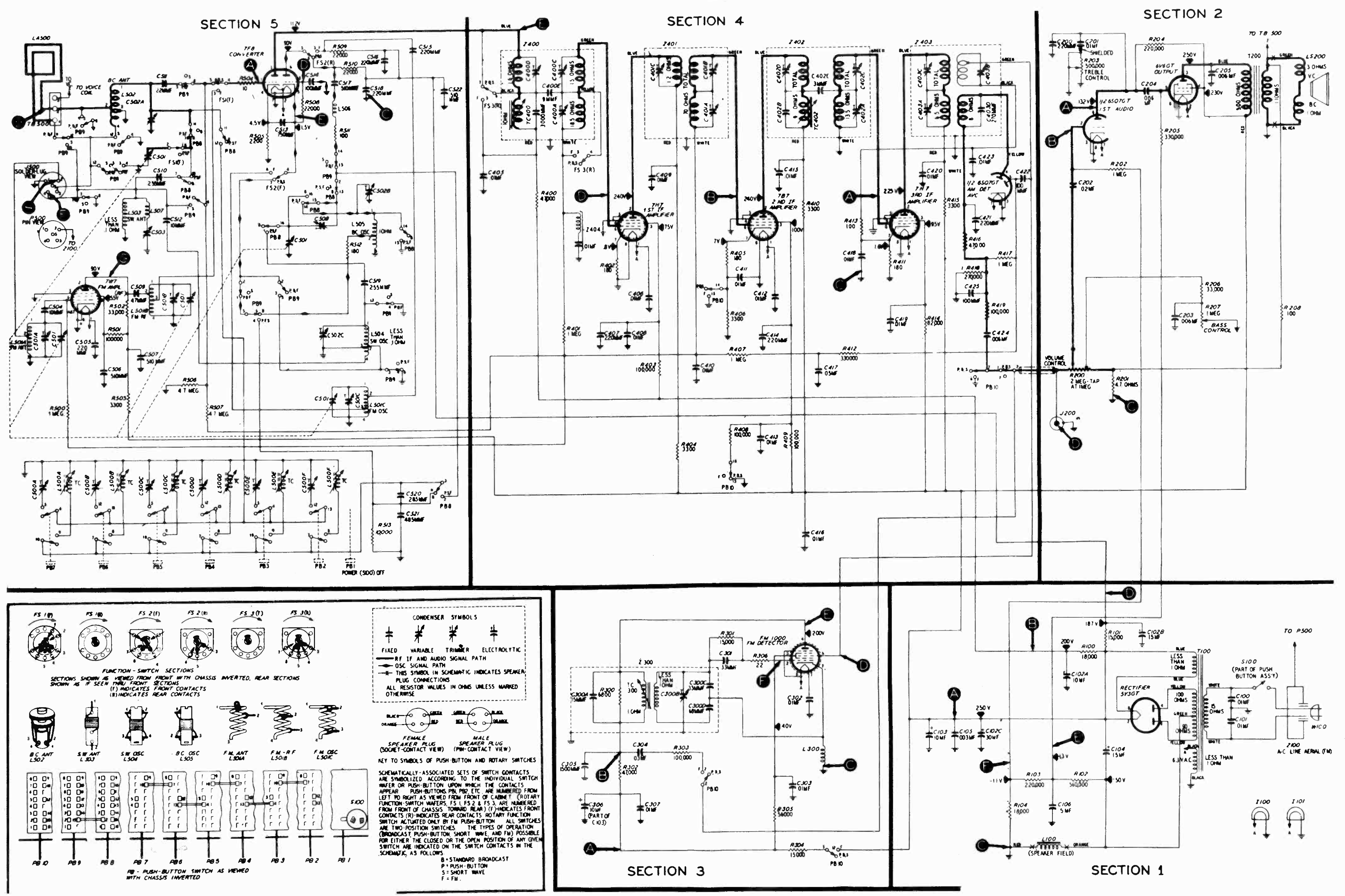


FIGURE 8. PHILCO MODEL 48-482: COMPLETE SECTIONALIZED SCHEMATIC, SHOWING ALL TEST POINTS.

AM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	DIAL SETTING	BAND PUSH BUTTON	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST TRIMMER
1	Through .1-mf condenser to stator of ant. section of tuning gang	455 kc	BC	1700 kc	Adjust each trimmer, in order, for maximum output. Do not repeat adjustments.	C403A C402A TC402 C401A C400A TC400
2	Loosely coupled with loop (see Note below)	15 mc	SW	15 mc	Adjust for maximum output. Check for image at 14.1 mc.	C502C
3	Same	15 mc	SW	15 mc	Adjust for maximum output (rock tuning control).	C503
4	Same	1700 kc	BC	1700 kc	Adjust for maximum output.	C502B
5	Same	1500 kc	BC	1500 kc	Adjust for maximum output.	C502A
6	Same	580 kc	BC	580 kc	Adjust for maximum output (rock tuning control).	C508
7	Repeat steps 4, 5 and 6 in order until no further increase is noted. Then repeat step 4.					

NOTE: Make up a six-to-eight-turn, 6-inch diameter loop, using insulated wire; connect to the signal-generator leads and place near the radio loop.

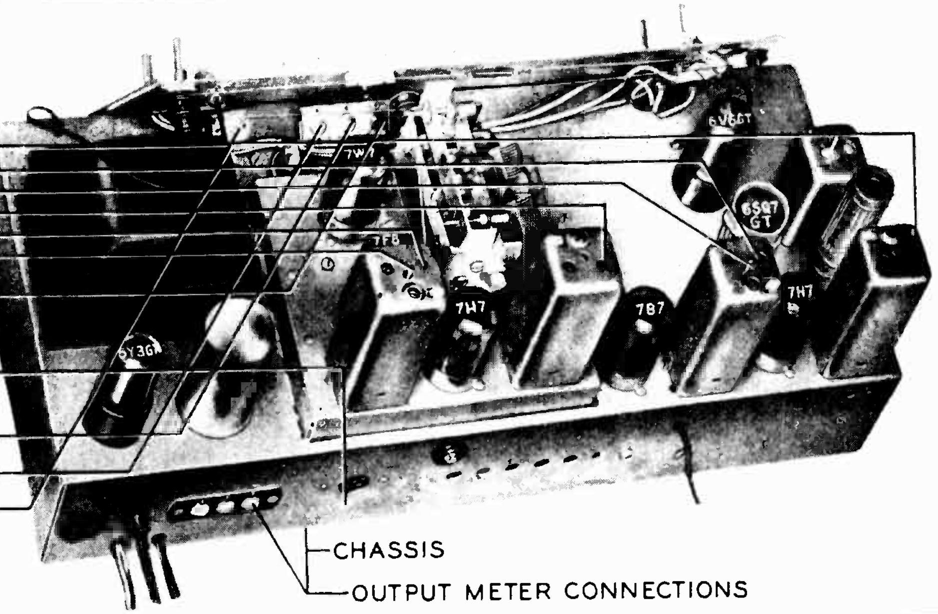


FIGURE 9. CHASSIS VIEW, SHOWING AM TRIMMER LOCATIONS.

FM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO		
STEP	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST TRIMMER
1	To terminal 3 of L501B (figure 10)	9.1mc (Mod. on)	Gang fully closed	Connect jumper between pin No. 2 of FM1000 tube and chassis (Note 1). Connect loading network (Note 2) between top of padder C403B and chassis (Note 3).	C403C
2	Same	Same	Same	Connect loading network between pin No. 2 (blue lead) of third i-f tube and chassis.	C403B
3	Same	Same	Same	Connect loading network between pin No. 6 (green lead) of third i-f tube and chassis.	C402D
4	Same	Same	Same	Connect loading network between pin No. 2 (blue lead) of second i-f tube and chassis.	C402C
5	Same	Same	Same	Connect loading network between pin No. 6 (green lead) of second i-f tube and chassis.	C401C
6	Same	Same	Same	Connect loading network between pin No. 2 (blue lead) of first i-f tube and chassis.	C401B
7	Same	Same	Same	Leave loading network connected as in step 6.	C400C C400D
8	To grid (pin No. 6) of third i-f amplifier	9.1 mc (Mod. off)	Same	Remove loading network, and remove jumper from pin No. 2 of FM1000 tube and chassis. Connect jumper between pin No. 4 (blue lead) of FM1000 tube and junction of R302 and red lead of Z300. Adjust trimmer for zero beat.	C300D
9	Same as step 8	Same	Same	Remove jumper used in step 8. Adjust trimmer for zero beat (see Note 4).	TC300
10	To terminal No. 2 of J500 (see Note 5)	105 mc (Mod. on)	105 mc	Connect jumper between pin No. 2 of FM1000 tube and chassis. Adjust for maximum output.	C501C
11	Same as step 10	88 mc	88 mc	Adjust coil L501C for maximum output (Note 6).	
12	Repeat steps 10 and 11 until no further improvement is noted.				
13	Same as step 10	105 mc	105 mc	Adjust for maximum output (rock tuning control).	C501B
14	See Note 7	105 mc	105 mc	Adjust for maximum output.	C501A
15	Same as step 14	92 mc	92 mc	Adjust coil L501B, then L501A, for maximum output.	
16	Repeat steps 13, 14 and 15 until no further improvement in sensitivity can be obtained.				

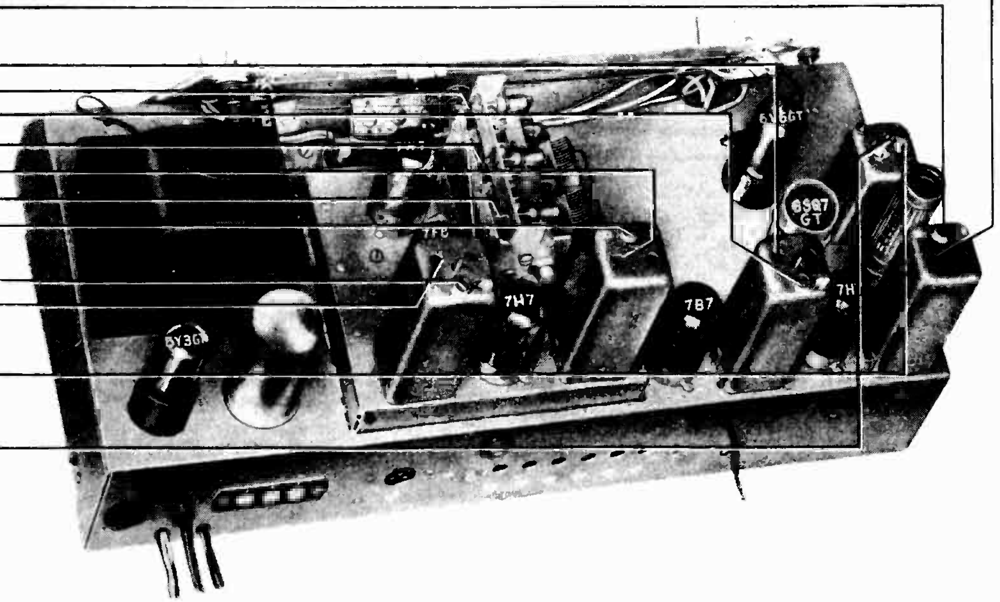


FIGURE 10. CHASSIS VIEW, SHOWING FM TRIMMER LOCATIONS.

ALIGNMENT OF FM CIRCUITS

Align the AM circuits first.

AM SIGNAL GENERATOR: Connect the generator ground lead to the radio chassis; connect the output lead through a .1-mf condenser to the points specified in the chart.

OUTPUT METER: Connect the output meter between terminal No. 3 of the aerial terminal panel and the radio chassis.

CONTROLS: Set volume control at maximum, bass tone control fully counterclockwise, and treble tone control fully clockwise. Depress FM push button.

LOCATION OF FM COILS: For the location of coils L501A, L501B, and L501C (steps 11 and 15), refer to the base layout of Section 5, figure 7.

FM ALIGNMENT NOTES

1. When pin No. 2 of the FM1000 tube is connected to the chassis, the oscillator section of the tube is made inoperative, thereby converting the circuit from an FM to an AM detector.

2. Make the loading network by connecting a 4700-ohm resistor and a .1-mf condenser in series. Attach an alligator clip to each free end of the network. When this network is connected across the primary or secondary circuit of an i-f transformer, the network loads the circuit so that the transformer is effectively below critical coupling; the unloaded winding may then be correctly peaked at the intermediate frequency.

3. The top of padder C403B can be reached only from the top of the shield can. Slide a length of flattened solder or wire down between the ceramic form and the edge of the trimmer plate. Attach the loading network between this connection and the chassis.

4. It is essential that the output from the generator be kept below the point where the detector-oscillator locks in, otherwise an erroneous zero-beat will be obtained. When a single very sharp zero-beat point is obtained, the adjustment is correct.

5. The use of a signal generator for steps 10 to 16 is recommended only if the available generator is sufficiently accurate to insure correct frequency settings. Otherwise, an alternate procedure employing FM broadcast station signals in place of a signal generator is recommended. For adjustment at the high-frequency end of the band, use the station nearest 105 mc; for the low-frequency adjustments, use the stations nearest 88 and 92 mc. If the radio is greatly misaligned, it may be necessary to adjust the padders and coils for maximum noise at each end of the band before station signals can be heard. The oscillator section of the FM detector must be made inoperative, as given in step 10 of FM circuit alignment.

6. Check all coil adjustments with a tuning wand. If inserting the brass end in or near the coil increases the output-meter reading, spread the turns; if the powdered-iron end increases the output reading, compress the turns. If both ends cause a decrease in output, the coil is correctly tuned. Do not change the coils excessively, since only a small adjustment is required at these frequencies.

7. Make two simple dipole aerials to feed signals from the signal generator to the radio. Each dipole aerial may consist of two 30-inch lengths of rubber-covered wire. Connect one dipole aerial to terminal Nos. 1 and 2 on the radio FM aerial socket J500. Connect the other dipole to the output of the signal generator. Space the two dipoles several feet apart.

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items, and the part numbers may not be identical with those on the original parts; also, the electrical values of some replacement items furnished may differ from the values indicated in the schematic and parts list. The values substituted in any case are so chosen that the operation of the instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No." in this parts list.

Reference No.	Description	Service Part No.
C100	Condenser, .01 mf, line filter	61-0120*
C101	Condenser, .01 mf, line filter	61-0120*
C102	Condenser, electrolytic, 3 section	30-2570-1*
	C102A: Condenser, 10 mf, isolating filter	Part of C102
	C102B: Condenser, 15 mf, isolating filter	Part of C102
	C102C: Condenser, 30 mf, high-voltage filter	Part of C102
C103	Condenser, electrolytic, 2 section	30-2552*
	C103: Condenser, 10-mf section, high-voltage filter	Part of C103
	C306: Condenser, 15-mf section (see Section 3)	Part of C103
C104	Condenser, elec., 15 mf, high-voltage filter	30-2568-1*
C105	Condenser, .003 mf, r-f by-pass	61-0117*
C106	Condenser, .5 mf, bias filter	61-0133*
I100	Lamp, pilot	34-2040*
I101	Lamp, pilot	34-2040*
L100	Field, speaker	Part of LS200
R100	Resistor, 18,000 ohms, voltage dropping	66-3184340*
R101	Resistor, 15,000 ohms, voltage dropping	66-3154340*
R102	Resistor, 560,000 ohms, bias divider	66-4563340*
R103	Resistor, 220,000 ohms, bias divider	66-4223340*
R104	Resistor, 18,000 ohms, bias divider	66-3183340*
S100	Switch, a-c power (on push-button assembly)	42-1714
T100	Transformer, power	32-8281
W100	Cord, line	L-3199

SECTION 2

C200	Condenser, 220 mmf, r-f by-pass	60-10245307*
C201	Condenser, .01 mf, treble control	61-0120*
C202	Condenser, .02 mf, audio coupling	61-0108*
C203	Condenser, .006 mf, bass compensation	45-3500-7*
C204	Condenser, .006 mf, audio coupling	45-3500-7*
C205	Condenser, .006 mf, high a-f by-pass	61-0153
J200	Socket, single prong, FM test point	27-6180
LS200	Speaker	36-1608
R200	Potentiometer, 2 meg (tap at 1 meg), vol. cont.	33-5535-3
R201	Resistor, 4.7 ohms, divider, inverse feedback	66-9474360*
R202	Resistor, 1 meg, 1st-audio grid	66-5103340*
R203	Potentiometer, 500,000 ohms, treble control	33-5539-3
R204	Resistor, 220,000 ohms, plate loading	66-4223340*
R205	Resistor, 330,000 ohms, output-tube grid	66-4333340*
R206	Resistor, 33,000 ohms, divider, bass compensation	66-3333340*
R207	Potentiometer, 1 meg, bass control	33-5539-4*
Reference No.	**Description**	**Service Part No.**
R208	Resistor, 100 ohms, divider, inverse feedback	66-1103340*
T200	Transformer, output	32-8249*

SECTION 3

C301	Condenser, 33 mmf, osc. grid (FM det.)	66-00365307*
C302	Condenser, .01 mf, fil. by-pass	61-0120*
C303	Condenser, .01 mf, r-f by-pass	61-0120*
C304	Condenser, .03 mf, audio coupling	45-3500-1*
C305	Condenser, 1500 mmf, r-f by-pass	60-20155404*
C306	Condenser, elec., 15 mf, filter	Part of C103
C307	Condenser, .01 mf, r-f by-pass	61-0120*
L300	Choke, r-f osc. cathode (FM det.)	32-3352
R301	Resistor, 15,000 ohms, osc. grid leak (FM det.)	66-3153340*
R302	Resistor, 47,000 ohms, audio load (FM det.)	66-3473340*
R303	Resistor, 100,000 ohms, r-f choke	66-4103340*
R304	Resistor, 15,000 ohms, voltage dropping	66-3153340*
R305	Resistor, 56,000 ohms, voltage dropping	66-3563340*
R306	Resistor, 22 ohms, parasitic suppressor	60-0223340*
Z300	Transformer, FM detector	32-4004
	C300A: Condenser, fixed, 15 mf	Part of Z300
	C300B: Condenser, trimmer (9.1 mc), FM det.	Part of Z300
	C300C: Condenser, 33 mmf, r-f voltage divider	Part of Z300
	C300D: Condenser, 68 mmf, r-f voltage divider	Part of Z300
	R300A: Resistor, 6800 ohms, damping	Part of Z300
	TC300: Core, tuning (9.1 mc), FM det.	Part of Z300

SECTION 4

C405	Condenser, .01 mf, r-f by-pass	61-0120*
C406	Condenser, .01 mf, fil. by-pass	61-0120*
C407	Condenser, 220 mmf, r-f by-pass	60-10245307*
C408	Condenser, .01 mf, r-f by-pass	61-0120*
C409	Condenser, .01 mf, r-f by-pass	61-0120*
C410	Condenser, .01 mf, r-f by-pass	61-0120*
C411	Condenser, .01 mf, r-f by-pass	61-0120*
C412	Condenser, .01 mf, fil. by-pass	61-0120*
C413	Condenser, .01 mf, r-f by-pass	61-0120*
C414	Condenser, 220 mmf, r-f by-pass	60-10245307*
C415	Condenser, .01 mf, r-f by-pass	61-0120*
C416	Condenser, .01 mf, B+ by-pass	61-0120*
C417	Condenser, .05 mf, a-v-c filter	61-0122*
C418	Condenser, .01 mf, r-f by-pass	61-0120*
C419	Condenser, .01 mf, r-f by-pass	61-0120*

SECTION 4 (Continued)

Reference No.	Description	Service Part No.
C420	Condenser, .01 mf, r-f by-pass	61-0120*
C421	Condenser, 220 mmf, r-f by-pass	60-10245307*
C422	Condenser, 100 mmf, a-v-c diode coupling (FM)	60-10105407*
C423	Condenser, .01 mf, r-f by-pass	61-0120*
C424	Condenser, .006 mf, audio coupling	45-3500-7*
C425	Condenser, 100 mmf, r-f by-pass	60-10105407*
FS3 (R)	Switch, shorting, 1st i-f	Part of FS
R400	Resistor, 47,000 ohms, voltage dropping	66-3473340*
R401	Resistor, 1 meg, decoupling	66-5103340*
R402	Resistor, 180 ohms, degeneration	66-1183340*
R403	Resistor, 100,000 ohms, voltage dropping	66-4103340*
R404	Resistor, 3300 ohms, decoupling	66-2333340*
R405	Resistor, 180 ohms, degeneration	66-1183340*
R406	Resistor, 3300 ohms, bias (bc, sw)	66-2333340*
R407	Resistor, 1 meg, decoupling	66-5103340*
R408	Resistor, 100,000 ohms, bleeder (bc, sw), 7B7 screen	66-4103340*
R409	Resistor, 100,000 ohms, voltage dropping	66-4103340*
R410	Resistor, 3300 ohms, decoupling	66-2333340*
R411	Resistor, 180 ohms, degeneration	66-1183340*
R412	Resistor, 330,000 ohms, a-v-c filter	66-4333340*
R413	Resistor, 100 ohms, decoupling (FM)	66-1103340*
R414	Resistor, 82,000 ohms, voltage dropping	66-3823340*
R415	Resistor, 3300 ohms, decoupling	66-2333340*
R416	Resistor, 47,000 ohms, decoupling	66-3473340*
R417	Resistor, 1 meg, a-v-c filter	66-5103340*
R418	Resistor, 270,000 ohms, diode lead	66-4273340*
R419	Resistor, 100,000 ohms, r-f choke	66-4105340*
Z400	Transformer, 1st i-f	32-4020-1
	C400A: Condenser, trimmer (455 kc)	Part of Z400
	C400B: Condenser, fixed, 3000 mmf	Part of Z400
	C400C: Condenser, trimmer (9.1 mc)	Part of Z400
	C400D: Condenser, trimmer (9.1 mc)	Part of Z400
	C400E: Condenser, fixed, 9 mmf	Part of Z400
	TC400: Core, tuning (455 kc)	Part of Z400
Z401	Transformer, 2nd i-f	32-4001
	C401A: Condenser, trimmer (455 kc)	Part of Z401
	C401B: Condenser, trimmer (9.1 mc)	Part of Z401
	C401C: Condenser, trimmer (9.1 mc)	Part of Z401
Z402	Transformer, 3rd i-f	32-4002
	C402A: Condenser, trimmer (455 kc)	Part of Z402
	C402B: Condenser, fixed, 330 mmf	Part of Z402
	C402C: Condenser, trimmer (9.1 mc)	Part of Z402
	C402D: Condenser, trimmer (9.1 mc)	Part of Z402
	C402E: Condenser, fixed, 3 mmf	Part of Z402
	TC402: Core, tuning (455 kc)	Part of Z402
Z403	Transformer, 4th i-f	32-4003-2
	C403A: Condenser, trimmer (455 kc)	Part of Z403
	C403B: Condenser, trimmer (9.1 mc)	Part of Z403
	C403C: Condenser, trimmer (9.1 mc)	Part of Z403
	C403D: Condenser, fixed, 270 mmf	Part of Z403
Z404	Condenser (.01 mf) and choke assembly, i-f by-pass	38-9851-3

SECTION 5

C501	Condenser, main tuning gang	31-2694
	C501A: Condenser, FM aerial-coil trimmer	Part of C501
	C501B: Condenser, FM r-f-coil trimmer	Part of C501
	C501C: Condenser, FM osc. coil trimmer	Part of C501
C502	Condenser, 3-section, trimmer assembly	31-647
	C502A: Condenser, shunt trimmer, bc aerial	Part of C502

REPLACEMENT PARTS LIST — Continued

SECTION 5 (Continued)

Reference No.	Description	Service Part No.
	C502B: Condenser, shunt trimmer, bc osc.	Part of C502
	C502C: Condenser, shunt trimmer, s-w osc.	Part of C502
C503	Condenser, shunt trimmer, s-w aerial	31-6473-2
C504	Condenser, 10 mmf, coupling, r-f tube grid (FM)	60-00105407*
C505	Condenser, 220 mmf, fil. r-f by-pass	60-10245307*
C506	Condenser, 510 mmf, r-f by-pass	60-10515307*
C507	Condenser, 510 mmf, r-f by-pass	60-10515307*
C508	Condenser, series trimmer, bc osc.	31-6473-3
C509	Condenser, 47 mmf, output coupling (FM r-f)	60-00515307*
C510	Condenser, 255 mmf, spread tuning, s-w aerial coil	60-10255307*
C511	Condenser, 22 mmf, coupling (bc), mixer grid	60-00205307*
C512	Condenser, 10 mmf, mixer neutralizing (sw)	60-00105407*
C513	Condenser, 750 mmf, oscillator-to-mixer coupling	60-10755301*
C514	Condenser, 100 mmf, osc. grid feedback	60-10105407*
C515	Condenser, 220 mmf, osc. plate feedback (FM)	60-10245307*
C516	Condenser, 220 mmf, r-f filter, osc. plate circuit	60-10245307*
C517	Condenser, 510 mmf, osc. plate feedback (bc, sw)	60-10515307*
C518	Condenser, 220 mmf, r-f filter, osc. plate circuit	60-10245307*
C519	Condenser, 255 mmf, spread tuning, s-w osc. coil	60-10255307*
C520	Condenser, 285 mmf, r-f voltage divider, osc. (pb)	30-1224-14
C521	Condenser, 485 mmf, r-f voltage divider, osc. (pb)	30-1224-15
C522	Condenser, 510 mmf, r-f B+ by-pass	60-10515307*
FS	Rotary function switch, 3-section	76-2211
	FS 1: switch section	Part of FS
	FS 2: switch section	Part of FS
	FS 3: switch section	Part of FS
J500	Socket, aerial	27-6214-1
L501A	Coil, FM aerial	32-3993
L501B	Coil, FM r-f	32-3992
L501C	Coil, FM oscillator	32-3994
L502	Coil, bc aerial	32-4049
L503	Coil, s-w aerial	32-4050
L504	Coil, s-w oscillator	32-3996
L505	Coil, bc oscillator	32-4019-2
L506	Choke, r-f, parasitic suppressor, osc. plate (bc, sw)	32-4089
L507	Choke, r-f, s-w aerial trimmer	32-4111

SECTION 5 (Continued)

Reference No.	Description	Service Part No.
LA500	Loop, bc	76-2237
P500	Plug, a-c line aerial (FM) connector	27-4788
PB	Push-button switch assembly (including a-c switch)	42-1774
	C500: Push-button padder-strip assembly (C500A to C500F)	
	L500: Push-button coils (L500A to L500F)	
	L500A, L500B, L500C: coils, push button	32-4059
	L500D, L500E, L500F: coils, push button	32-4059-1
R500	Resistor, 1 meg, grid isolating, r-f stage	66-5103340*
R501	Resistor, 100,000 ohms, voltage dropping	66-4103340*
R502	Resistor, 33,000 ohms, plate loading	66-3333340*
R503	Resistor, 3300 ohms, decoupling, r-f plate	66-2333340*
R504	Resistor, 10 ohms, parasitic suppressor	66-0103340*

SECTION 5 (Continued)

Reference No.	Description	Service Part No.
R505	Resistor, 2200 ohms, mixer cathode	66-222340*
R506	Resistor, 4.7 meg, a-v-c divider (converter)	66-5473340*
R507	Resistor, 4.7 meg, a-v-c divider (converter)	66-5473340*
R508	Resistor, 22,000 ohms, osc. grid leak	66-3223340*
R509	Resistor, 22,000 ohms, osc. plate dropping (FM)	66-3223340*
R510	Resistor, 22,000 ohms, osc. plate dropping (bc, sw)	66-3223340*
R511	Resistor, 100 ohms, parasitic suppressor osc. (bc, sw)	66-1103340*
R512	Resistor, 180 ohms, degeneration (bc osc.)	66-1183340*
R513	Resistor, 10,000 ohms, osc. (push-button) cathode choke	66-3103340*
TB500	Terminal panel, loop aerial	38-9942

MISCELLANEOUS

Description	Service Part No.
Cabinet, complete	10651A
Cabinet Parts and Hardware	
Nut, (4) speaker mtg.	1W19988FA3
Baffle and grille cloth assembly	40-8783
Dial scale-and-backplate assembly	76-2267
Bolt (2) speaker mtg.	W1695
Bolt (2) speaker mtg.	W2123FA3
Cable and plug, speaker	41-3734
Chassis Mounting Hardware	
Screw (4)	1W17323FA3
Washer (4)	1W52540FA3
Clip, bc ant. coil mtg.	28-5002FA1
Dial-Scale Hardware	
Backplate and pulley assembly	76-2254
Drive-cord (25-ft. spool, with clips)	45-1460
Pointer	56-3179-2
Screw (5) backplate mtg.	1W19670FA3
Shaft, tuning drive	76-2258
Spring, drive cord	28-8751
Function-Switch Hardware	
Fulcrum assembly	76-2206
Fasteners (2), mtg. switch to fulcrum	28-4279FA1
Link, switch to fulcrum	54-7169
Screw (2), fulcrum mtg.	1W19644FA3
Knob (4), control	54-4227
Knob (10), push button	54-4292
Push-Button-Assembly Hardware	
Cap (10), push button	54-4294
Clip (6), coil holding	56-2250
Core (6), tuning	56-6100
Grommet (2), rubber, p-b switch mtg.	27-4596
Screw (2), p-b switch mtg.	1W19674FA3
Spring (6) tension	56-2249
Switch assembly, push button (including a-c switch)	42-1774
Tab kit assembly (call letters)	40-6766
Tab, BC	54-4318
Tab, FM	54-4320
Tab, OFF	54-4317
Tab, SW	54-4319
Trimmer condenser and bracket assembly	31-6449-1
R-F Unit Mounting Hardware	
Grommet (3), rubber	54-4295
Screw (3)	1W19674FA3
Spacer (3)	1W29158FA3
Washer (3)	1W52224FA3
Shield, FM1000 tube	56-2731
Shield, 6SQ7GT	56-3358
Socket assembly, dial light	76-2109
Socket assembly (3½" lead), dial lamp	76-2109-1
Socket (3), Loktal, main chassis	27-6138
Socket (3), octal, main chassis	27-6174
Socket (2), Loktal, r-f unit	27-6213
Socket, Loktal, r-f unit	27-6138

Circuit Description

Philco Radio Model 48-485 is a six-tube superheterodyne, which provides reception in the standard-broadcast band. The circuit includes a 14AF7 converter, a 7B7 1st i-f amplifier, a 7B7 2nd i-f amplifier, a 7C6 detector, a.v.c., and 1st audio amplifier, and a 35L6GT output amplifier. The power supply employs a 50X6 rectifier in a voltage-doubling circuit.

A low-impedance loop aerial, located within the cabinet, normally provides adequate signal pickup. If greater signal pickup is required, the jumper should be disconnected from the terminal at the rear of the chassis and an external aerial connected to the terminal.

Two series-resonant circuits, consisting of condensers C302 and C303 together with the coils wound on these condensers, function as traps to prevent feedback of the intermediate frequency and the second harmonic of the intermediate frequency through the B– lead. One circuit is resonant at 455 kc., and the other at 910 kc. Each circuit offers a very low impedance to the resonant frequency, and, therefore, shunts it to the chassis.

Philco TROUBLE-SHOOTING Procedure

For rapid trouble shooting, the radio circuit is divided into four sections, as follows:

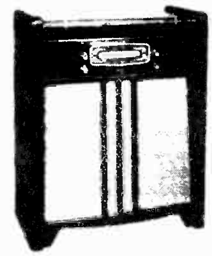
Section 1—the power supply
Section 2—the audio circuits
Section 3—the i-f, detector, and a-v-c circuits
Section 4—the r-f and converter circuits

Test points are specified for each section, and are indicated in the sectionalized schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.



MODEL 48-485

SPECIFICATIONS

CABINET	Wood, mahogany
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
INTERMEDIATE FREQUENCY	455 kc.
AUDIO OUTPUT	2.5 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	40 watts
AERIAL	Built-in low-impedance loop; provisions for external aerial.
PHILCO TUBES (6)	14AF7, 7B7(2), 7C6, 35L6GT, 50X6

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before connecting the radio to a source of power.

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.
2. Measure the resistance between B+ (pin 7 of 50X6 rectifier) and B–. When the ohmmeter leads are connected in the proper polarity, the highest reading will be obtained. If the reading is lower than 3000 ohms, check condensers C101, C102, C103A, and C207 for leakage or shorts.

NOTE: The resistance value above, which is much lower than normal, does not represent a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 (power supply) are performed.

TROUBLE SHOOTING

Section 1—Power Supply

Make the tests for this section with a d-c voltmeter; connect the leads between B–, test point B, and the test points indicated in the chart.

The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts.

Set the volume control to minimum, and the tone control fully clockwise.

Follow the steps in the order given. If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

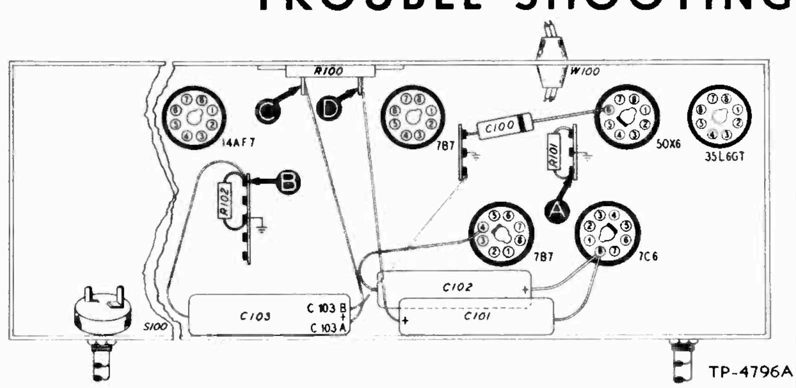


Figure 1. Bottom View, Showing Section 1 Test Points

PHILCO CORP. MODEL 48-485

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	107v		Trouble in this section. Isolate by the following tests.
2	D	225v	No voltage Low voltage High voltage	Defective: 50X6, S100, W100, PL100. Shorted: C101 and C102. Defective: 50X6. Open: C101, C102. Leaky: C101, C102, C103A, C103B. Open: R100, R101.
3	C	190v	No voltage Low voltage High voltage	Shorted: C103A. Open: R100. Changed resistance: R100. Shorted: C207*, C103B. Leaky: C103A. Open: R101, T200*, R207*.
4	A	107v	No voltage Low voltage High voltage	Shorted: C103B. Open: R101. Leaky: C103B. Open: R207*, T200*.

Listening Test: Abnormal hum may be caused by open C100, C103A, C103B, or R102.

* This part, located in another section, may cause abnormal indication in this section.

Section 2—Audio Circuits

TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and the tone control fully clockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

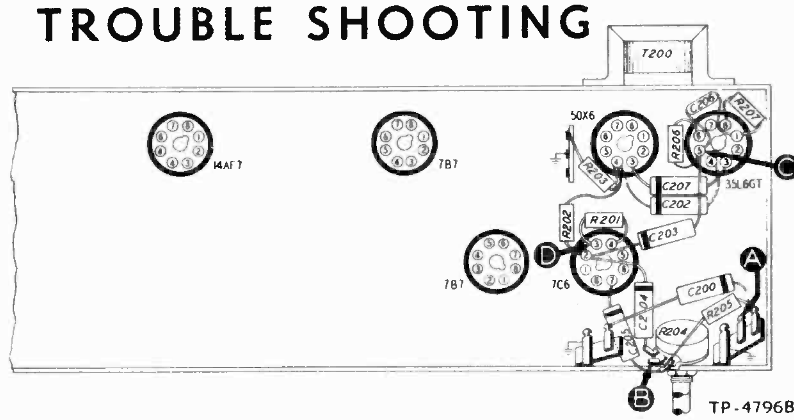


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Open: T200, R207. Shorted: C203, C206, C207, C205. Leaky: C203. Defective: 35L6GT, LS200.
3	D	Same as step 1.	Open: R202, R203, C203. Shorted: C202, C204. Defective: 7C6 (triode section).
4	A	Same as step 1.	Open: C200, C201, R200 (rotate through range). Shorted: C307*, C301D*.

Listening Test: Distortion may be caused by open R201 or R206, or by shorted or leaky C200 or C201.

Section 3—I-F, Detector, and A-V-C Circuits

TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and the tone control fully clockwise. Rotate the tuning control until the tuning condenser is fully meshed.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in this section.

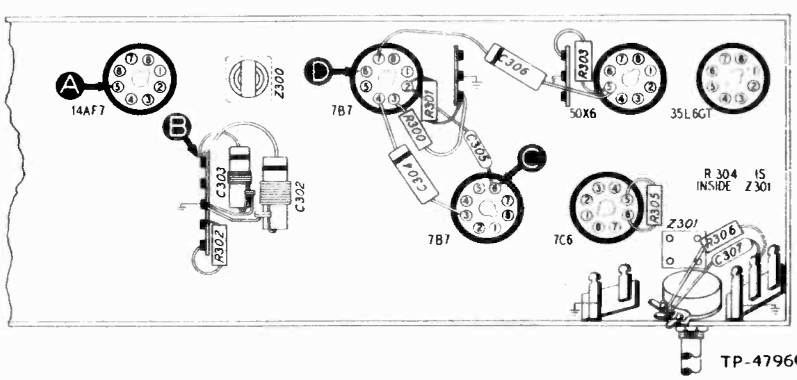


Figure 3. Bottom View, Showing Section 3 Test Points

Since the circuit location of test point A for this section is in Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

MODEL 48-485 PHILCO CORP.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear signal with moderate signal input.	Defective: 7B7 (2nd i-f amplifier), 7C6 (diode section). Open: L301A, L301B, R306, R304, R303, R300. Shorted: C305, C301A, C301B, C306, C304, C301C, L301A, L301B. Leaky: C305.
3	D	Same as step 1.	Defective: 7B7 (1st i-f amplifier). Open: C305, R301, R302. Shorted: C300B, L300B.
4	A	Same as step 1.	Defective: 14AF7. Open: R402*, L401*, L300A, C300A, L300B. Shorted: C300A, L300A.

NOTE: Voltage on the chassis may be caused by shorted C302 or C303. Oscillation may be caused by open C302 or C303.

* This part, located in another section, may cause abnormal indication in this section.

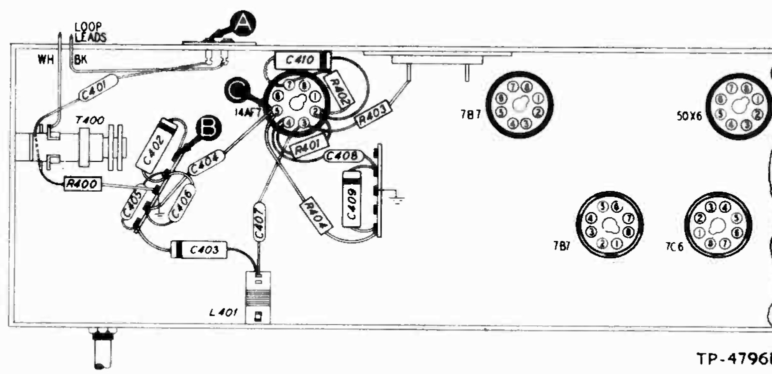
Section 4—R-F and Converter Circuits

TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and the tone control fully clockwise. Set the radio tuning control and signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in this section.



TP-4796D

Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	Tune to signal.	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C (Osc. test; see note below.)		Rotate through range.	Negative 3.5 to 5 volts.	Defective: 14AF7. Open C403, C407, C408, L401, R401. Shorted: C405, C400A, C400C, C408, C407. Leaky: C407, C408.
3	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C401, C404, T400. Shorted: C400B, C400D, C406.

Listening Test: Distortion and hum may be caused by open C409 or R404.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B–, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 4 of the 14AF7), test point C. Proper operation of the oscillator is indicated by negative voltages of approximately the values given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

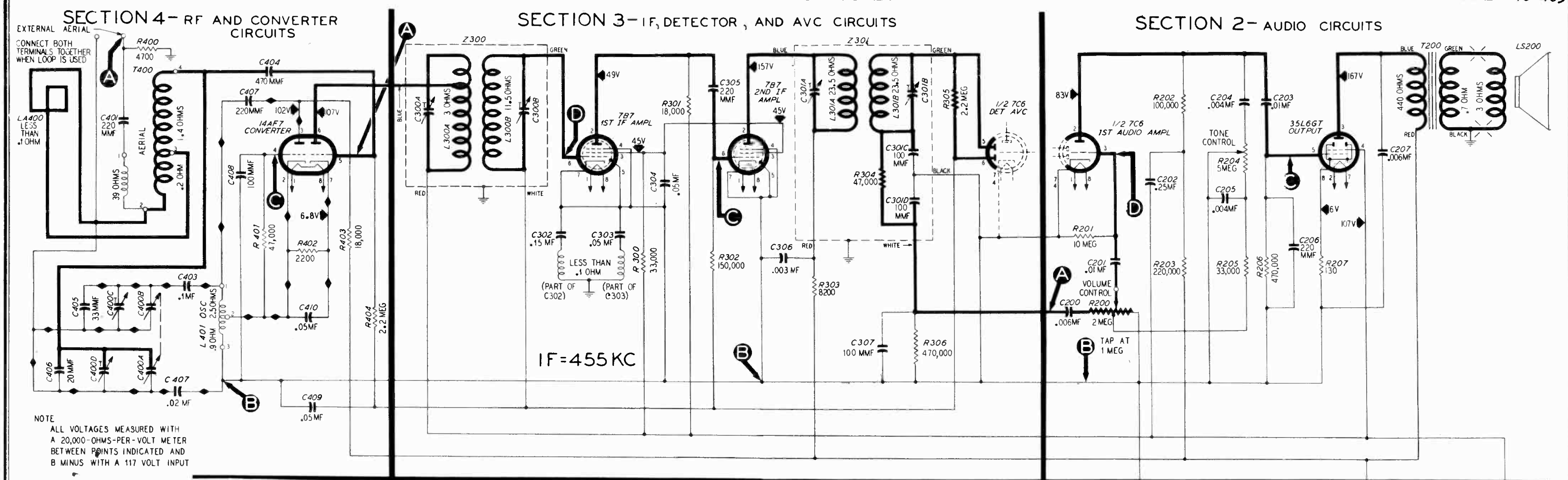
SECTION 1 POWER SUPPLY

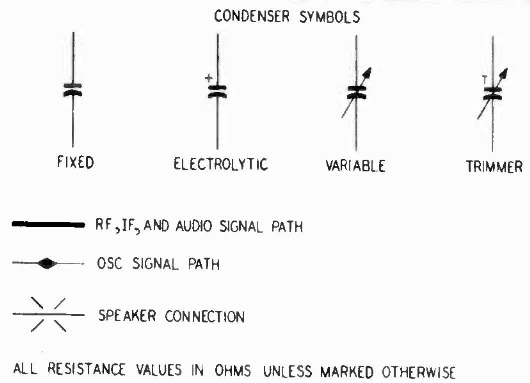
Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .05 mf.	61-0122*
C101	Condenser, filter, 15 mf., 200v	30-2575-11
C102	Condenser, filter, 15 mf., 200v	30-2575-11
C103	Condenser, electrolytic, 2-section	30-2575-17
C103A	Condenser, filter, 75 mf., 250v	Part of C103
C103B	Condenser, filter, 10 mf., 250v	Part of C103
I100	Pilot lamp	34-2477*
R100	Resistor, filter, 500 ohms	33-3435-3
R101	Resistor, filter, 8200 ohms	66-2824340
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, on-off	42-1837
W100	Power cord	41-3755-13
PL100	A-c plug	Part of W100

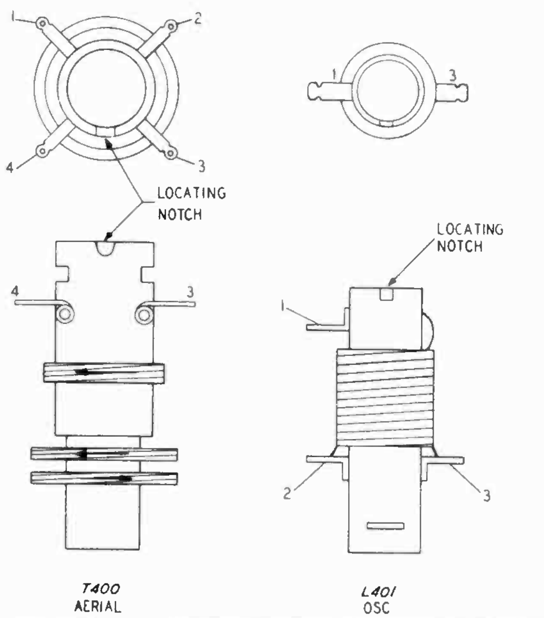
SECTION 2 AUDIO CIRCUITS

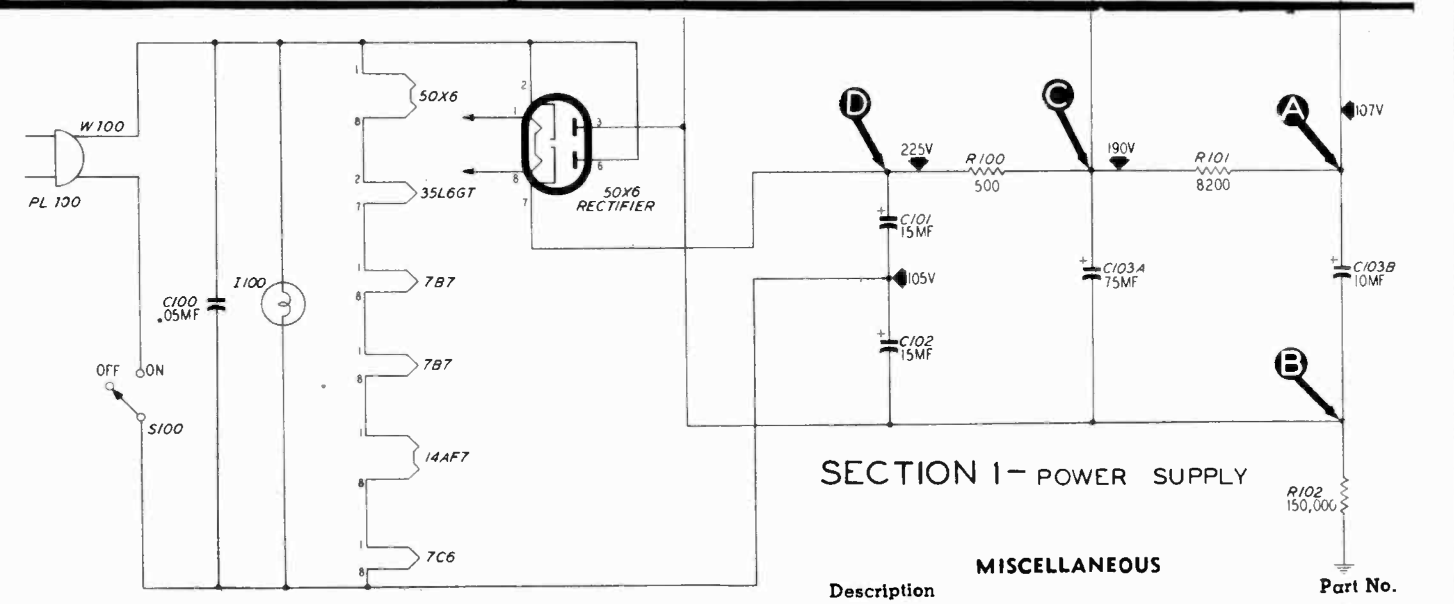
C200	Condenser, d-c blocking, .006 mf.	30-4504*
C201	Condenser, d-c blocking, .01 mf.	61-0120*
C202	Condenser, plate decoupling, .25 mf.	61-0125*
C203	Condenser, d-c blocking, .01 mf.	61-0120*
C204	Condenser, tone control, .004 mf.	30-4623*
C205	Condenser, tone compensation, .004 mf.	30-4623*
C206	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C207	Condenser, tone compensation, .006 mf.	30-4504*
LS200	Speaker, 8" p-m	36-1626-1
R200	Volume control, 2 megohms (center-tapped)	33-5535-15
R201	Resistor, grid return, 10 megohms	66-6103340*
R202	Resistor, plate load, 100,000 ohms	66-4103340*
R203	Resistor, plate dropping, 220,000 ohms	66-4223340*
R204	Tone control, 5 megohms	33-5539-33
R205	Resistor, tone compensation, 33,000 ohms	66-3333340*
R206	Resistor, grid return, 470,000 ohms	66-4473340*
R207	Resistor, cathode bias, 130 ohms	66-1123340*
T200	Transformer, output	32-8242-3

PHILCO CORP.









SECTION 3
I-F, DETECTOR, AND A-V-C CIRCUITS

C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, a-v-c filter, 100 mmf.	Part of Z301
C301D	Condenser, a-v-c filter, 100 mmf.	Part of Z301
C302	Condenser-and-choke assembly, i-f filter, .15 mf.	38-9851-8
C303	Condenser-and-choke assembly, i-f filter, .05 mf.	38-9851-4
C304	Condenser, screen by-pass, .05 mf.	61-0122*
C305	Condenser, d-c blocking, 200 mmf.	60-10205307*
C306	Condenser, plate by-pass, .003 mf.	30-4582
C307	Condenser, r-f by-pass, 100 mmf.	60-10105407*
L300A	Transformer primary, 1st i-f	Part of Z300
L300B	Transformer secondary, 1st i-f	Part of Z300
L301A	Transformer primary, 2nd i-f	Part of Z301

SECTION 3 (Continued)
I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
L301B	Transformer secondary, 2nd i-f	Part of Z301
R300	Resistor, screen dropping, 33,000 ohms	66-3333340*
R301	Resistor, plate load, 18,000 ohms	66-3183340*
R302	Resistor, grid return, 150,000 ohms	66-4153340*
R303	Resistor, plate decoupling, 8200 ohms	66-2823340*
R304	Resistor, i-f filter, 47,000 ohms	Part of Z301
R305	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R306	Resistor, diode load, 470,000 ohms	66-4473340*
Z300	Transformer, 1st i-f	32-4151-1
Z301	Transformer, 2nd i-f	32-3948-9

SECTION 4
R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning gang	31-2715-1
C400A	Condenser, oscillator tuning	Part of C400
C400B	Condenser, aerial tuning	Part of C400
C400C	Condenser, oscillator trimmer	Part of C400
C400D	Condenser, aerial trimmer	Part of C400
C401	Condenser, aerial isolating, 220 mmf.	60-10205307*
C402	Condenser, r-f by-pass, .02 mf.	61-0108*
C403	Condenser, isolating, .1 mf.	30-4527
C404	Condenser, d-c blocking, 470 mmf.	60-10515307*
C405	Condenser, shunt, 33 mmf.	60-00305307*
C406	Condenser, shunt, 20 mmf.	60-00205307*
C407	Condenser, d-c blocking, 220 mmf.	60-10205307*
C408	Condenser, osc. grid, 100 mmf.	60-10105407*
C409	Condenser, a-v-c filter, .05 mf.	61-0122*
C410	Condenser, cathode by-pass, .05 mf.	61-0122*
L401	Coil, oscillator	32-4019-6
LA400	Loop aerial	76-3583
R400	Resistor, aerial discharge, 4700 ohms	66-2473340*
R401	Resistor, grid return, 47,000 ohms	66-3473340*
R402	Resistor, cathode bias, 2200 ohms	66-2223340*
R403	Resistor, plate feed, 18,000 ohms	66-3183340*
R404	Resistor, grid return, 2.2 megohms	66-5223340*
T400	Transformer, aerial	32-4023-1

MISCELLANEOUS

Description	Part No.
Bracket-and-clip assembly, pilot lamp	76-3177
Cabinet (less scale)	10701
Baffle and cloth	40-6981
Baffle, wood	219102
Bezel	56-5287
Dial scale	27-5994
Dome	45-6190
Scale strap	56-4756
Dial-backplate assembly	76-3713
Cord, drive (25-ft. spool)	45-8750*
Pointer	56-3583-3FCP
Spring	28-8953
Knob	54-4486
Pilot-lamp-socket assembly	27-6233
Socket, Loktal	27-6138*
Socket, octal	27-6174

Figure 5. Philco Radio Model 48-485, Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

DIAL—Calibration and pointer-index measurements are shown in figure 6. With tuning gang fully meshed, set pointer to index mark.

OUTPUT METER—Connect to voice-coil terminals.

SIGNAL GENERATOR—Connect as indicated in chart. Use modulated output.

RADIO CONTROLS—Set volume control to maximum, and tone control fully counterclockwise.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1				Turn trimmer fully tight.	C300B—1st i-f sec.
2	Through .1-mf. condenser to mixer grid (pin 5 of 14AF7).	455 kc.	Tuning gang fully meshed.	Adjust trimmers, in order given, for maximum output.	C301B—2nd i-f sec. C301A—2nd i-f pri. C300B—1st i-f sec. C300A—1st i-f pri.
3	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C400C—osc.
4	Same as step 3.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C400D—aerial.

RADIATING-LOOP NOTE: Make up a 6—8 turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop aerial. Make certain that radio loop aerial is connected to radio.

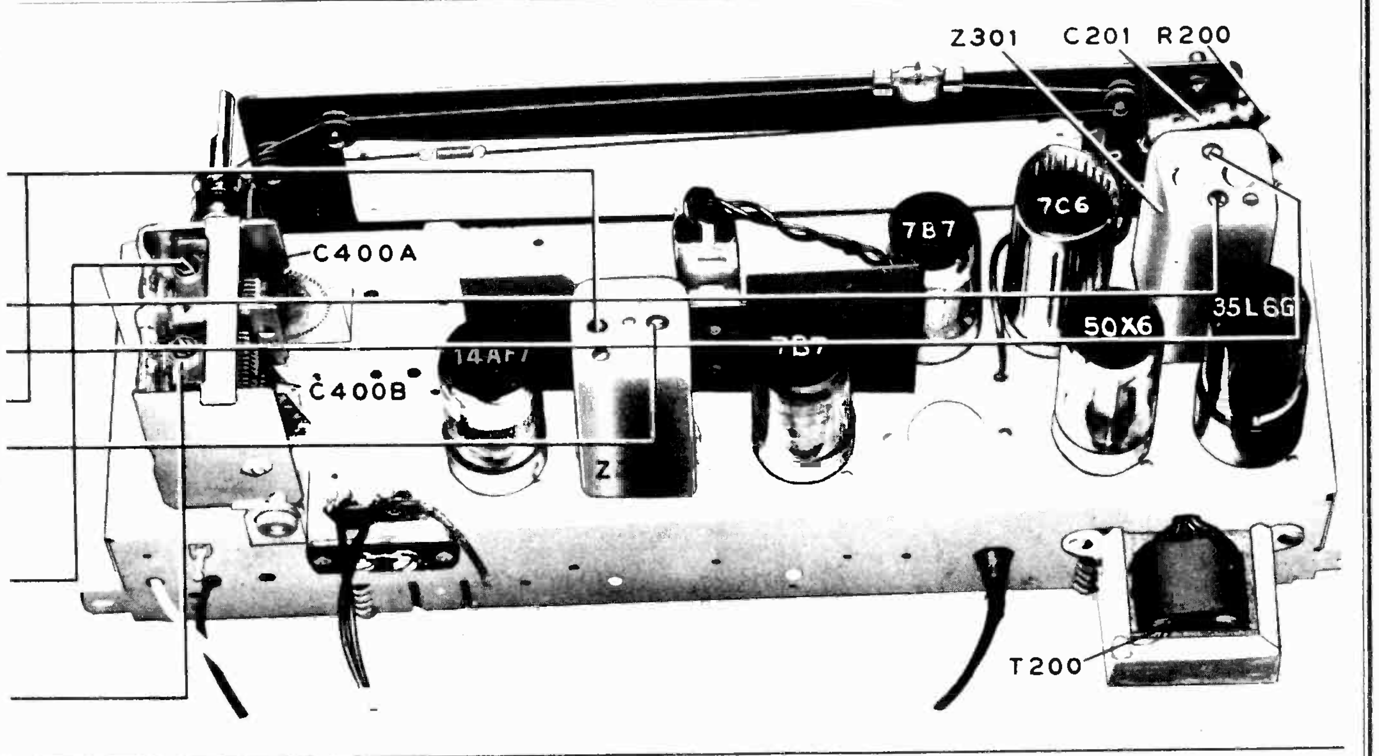


Figure 7. Top View, Showing Trimmer Locations

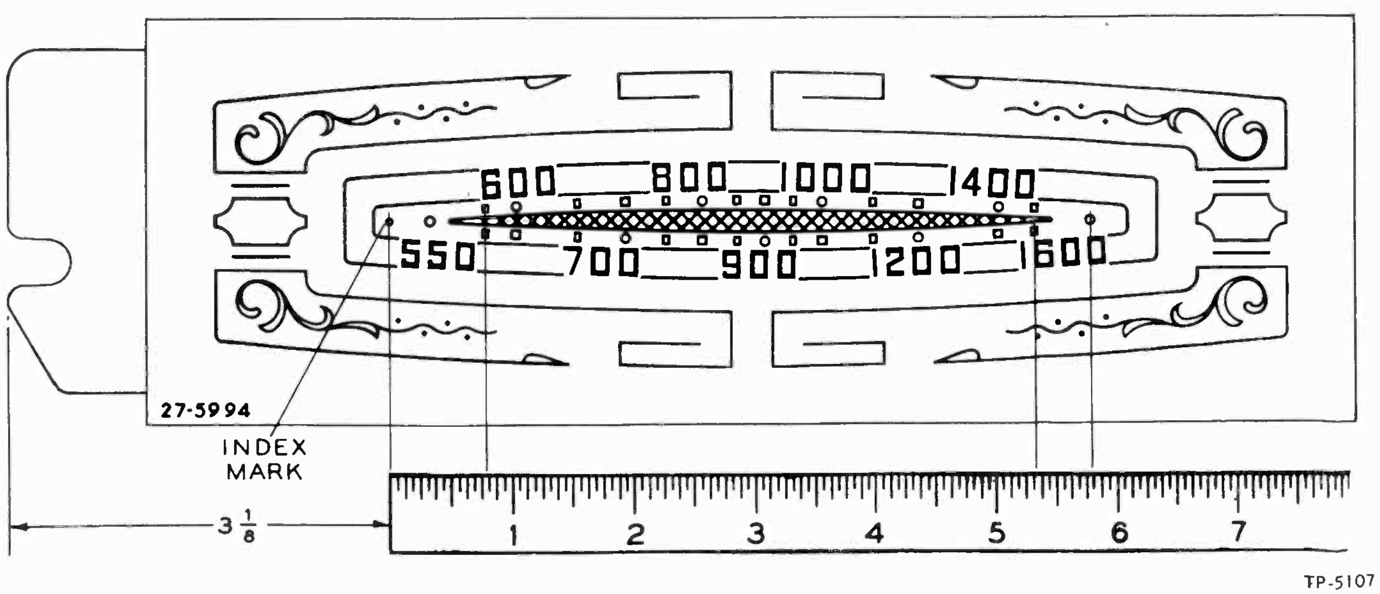


Figure 6. Calibration Measurements for Dial Backplate

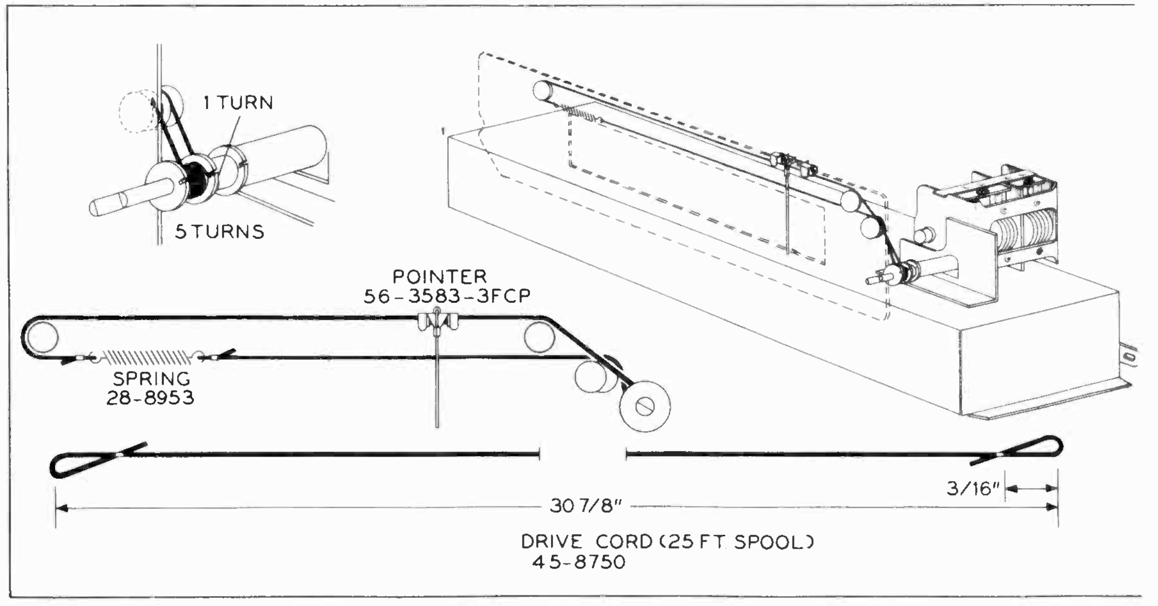
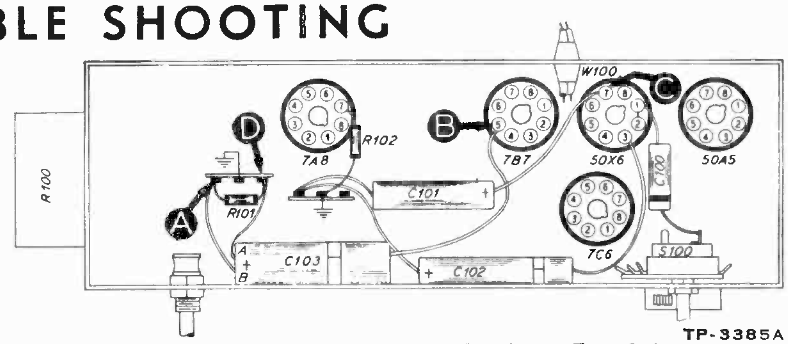


Figure 8. Drive-Cord Installation Details

TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to the B— bus, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

With the radio-phono switch set to the radio position, turn the volume control to minimum.



TP-3385A

Figure 1. Bottom View, Showing Section 1 Test Points

Follow the steps in sequence; if the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

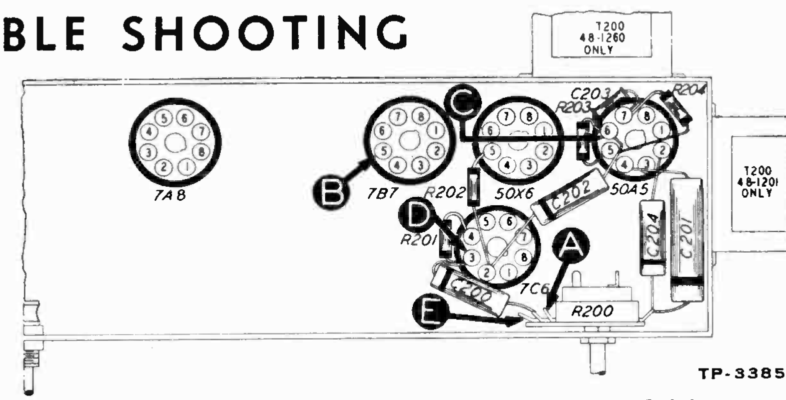
STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	90v		Trouble within this section. Isolate by the following tests.
2	C	215v	No voltage Low voltage High voltage	Defective: 50X6, S100, W100. Shorted: C101, C102, C100. Defective: 50X6. Open: C101, C102. Leaky: C101, C102, C103A. Open: R100, R204,* T200.*
3	D	185v	No voltage Low voltage High voltage	Open: R100. Shorted: C103A. Shorted: C103B. Leaky: C103A. Open: R101, R204,* T200.*
4	A	90v	No voltage Low voltage	Open: R101. Shorted: C103B. Leaky: C103B.
Listening Test: Abnormal hum or garbled speech may be caused by open C100, C101, C102, C103A, C103B, or R102.				

* This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to the B— bus, test point B; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

In steps 1 and 4, set the volume control to maximum in the radio position when testing at test point A, and to maximum in the phono position when testing at test point E. Adjust the signal-generator output as required for each step.



TP-3385B

Figure 2. Bottom View, Showing Section 2 Test Points

If the "NORMAL INDICATION" is obtained for both test points A and E in step 1, proceed with the tests for Section 3. If the "NORMAL INDICATION" is obtained at one test point and not at the other, the volume control is defective. If the "NORMAL INDICATION" is not obtained at either test point, isolate and correct the trouble within this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A E	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: 50A5, LS200. Shorted: C203, C204, T200. Open: R204, T200.
3	D	Loud, clear signal with weak signal input.	Defective: 7C6. Open: C202, R202, R203. Shorted: C202. Leaky: C202.
4	A E	Loud, clear signal with weak signal input.	Defective: R200. Open: C200. Shorted: C305.* Leaky: C305.*
Listenting Test: Distortion on strong signals may be caused by open-circuited R201 or by short-circuited or leaky C200. Hum modulation on phonograph operation may be caused by open-circuited C201.			

Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the B— bus, test point B; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the volume control to maximum in the radio position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

NOTE: Since the circuit location of test point A for this section is the same as that of test point C for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

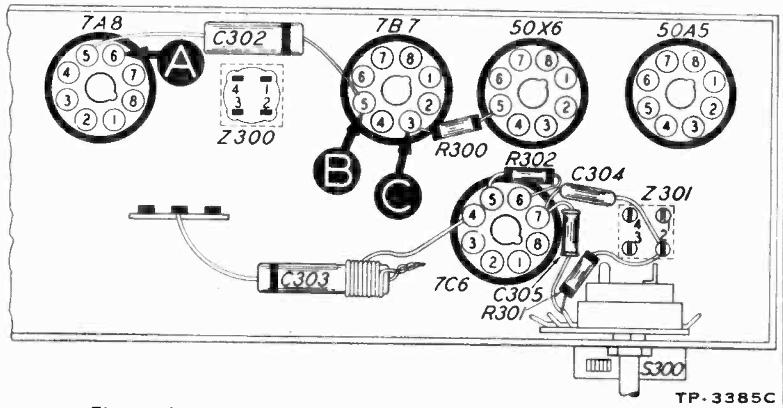


Figure 3. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: 7B7, 7C6, Z301. Open: C302, R300, R301, R302. Shorted: C302, C304, C305.
3	A	Loud, clear signal with weak signal input.	Defective: 7A8,* Z300. Misaligned: Z300.

* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section (with the exception of the oscillator test), use an r-f signal generator with modulated output. Connect the generator ground lead to the B— bus, test point B; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the volume control to maximum in the radio position.

Except as noted for the oscillator test, set the radio and signal-generator dials to 1000 kc.

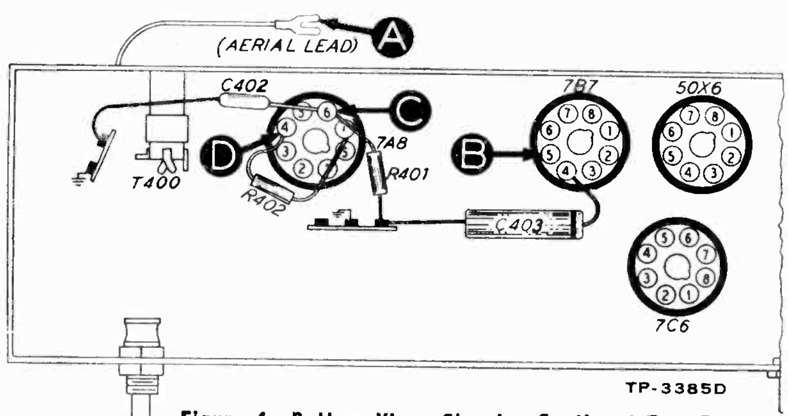
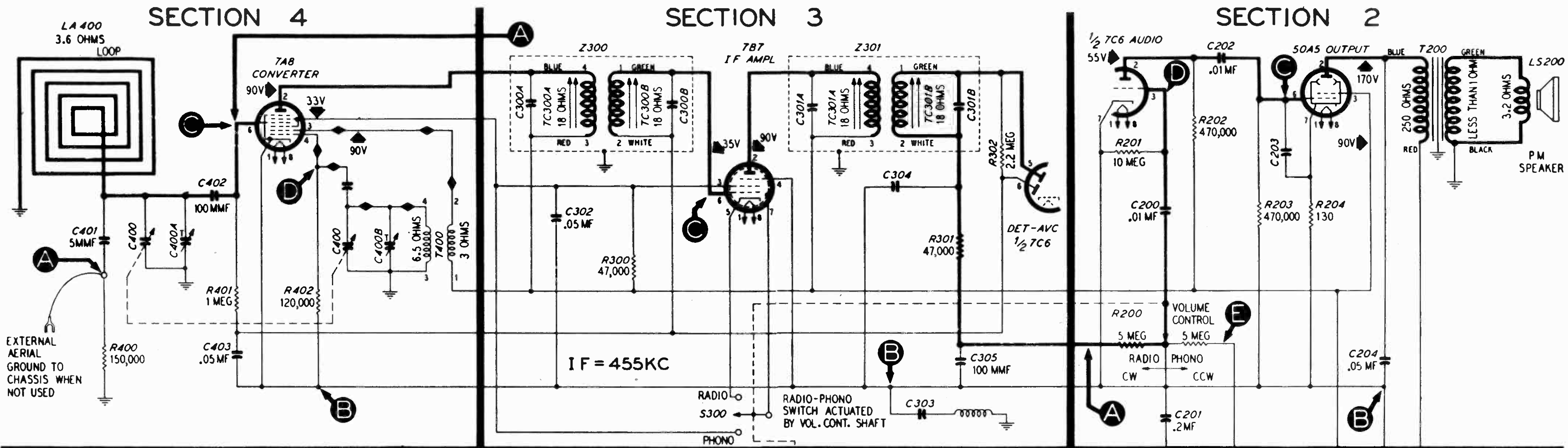


Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with moderate signal input.	Defective: 7A8, osc. circuit. Misaligned: osc. circuit. Open: C403, R401.
3	D (Osc. test; see note below.)	Negative 4—8 volts.	Defective: 7A8, T400. Shorted: C400, C400B. Open: R402.
4	A	Loud, clear signal with weak signal input.	Defective: LA400. Shorted: C400, C400A. Open: C401, C402.

OSCILLATOR-TEST NOTE: Connect positive lead of high-resistance d-c voltmeter to B— bus, test point B; connect prod end of negative lead through 100,000-ohm isolating resistor to oscillator grid, test point D. Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage of 4 to 8 volts (measured with 20,000-ohms-per-volt meter) throughout range of tuning control.



Circuit Description

Philco Radio-Phonographs, Models 48-1201 and 48-1260 are identical electrically. The radio is a five-tube superheterodyne with a built-in loop aerial and provisions for connecting an external aerial.

The loop aerial feeds into the mixer section of a 7A8 pentagrid converter. The aerial and oscillator circuits are tuned by ganged, variable tuning condensers, and the oscillator-section rotor plates are shaped to provide proper tracking without the use of a series padding condenser.

The output of the 7A8 converter is transformer-coupled to the 7B7 i-f amplifier which, in turn, is transformer-coupled to the diode section of the 7C6 diode-triode. Each of the i-f coupling transformers has permeability-tuned primary and secondary windings.

One diode functions as the 2nd detector; the other diode develops the a-v-c voltage, which is applied to the mixer section of the converter and to the i-f amplifier. The output of the 2nd detector is resistance-coupled to the triode section of the 7C6 which, in turn, is resistance-coupled to the 50A5 beam-power output tube. The output tube is transformer-coupled to the permanent-magnet dynamic loud-speaker, to which it supplies approximately 1.8 watts of audio power.

D-c operating voltages are supplied from a voltage-doubler power supply employing a 50X6 full-wave rectifier and a resistor-condenser filter network.

A 120,000-ohm resistor, R102, is connected between B— and the chassis to prevent hum under conditions of high humidity. A series-tuned circuit consisting of a condenser, C303, and a choke is also connected between B— and the chassis. This combination is resonant at 455 kc. and, therefore, offers a lower impedance at the i.f. than the condenser alone would offer. The more effective grounding of the i-f circuits improves the stability of the high-gain i-f stages.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Carefully inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of the 50X6 rectifier) and the B— bus, test point B. When the ohmmeter leads are connected in proper polarity, the highest resistance reading will be obtained. This reading should be no lower than 4000 ohms. If it is lower, check condensers C101, C102, C103A, C103B, and C204 for leakage or shorts.

SPECIFICATIONS

CABINET
Model 48-1201; wood, mahogany finish, harvest (L)
Model 48-1260; wood, Philcote finish
CIRCUIT .... Five-tube superheterodyne
FREQUENCY RANGE .... 540 to 1600 kc.
AUDIO OUTPUT .... 1.8 watts
OPERATING VOLTAGE
105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION
Radio, 45 watts; Phonograph, 60 watts
AERIAL .... Built-in loop;
terminal also provided for external aerial
INTERMEDIATE FREQUENCY .... 455 kc.
PHILCO TUBES (5) 7A8, 7B7, 7C6, 50A5, 50X6
PHONOGRAPH

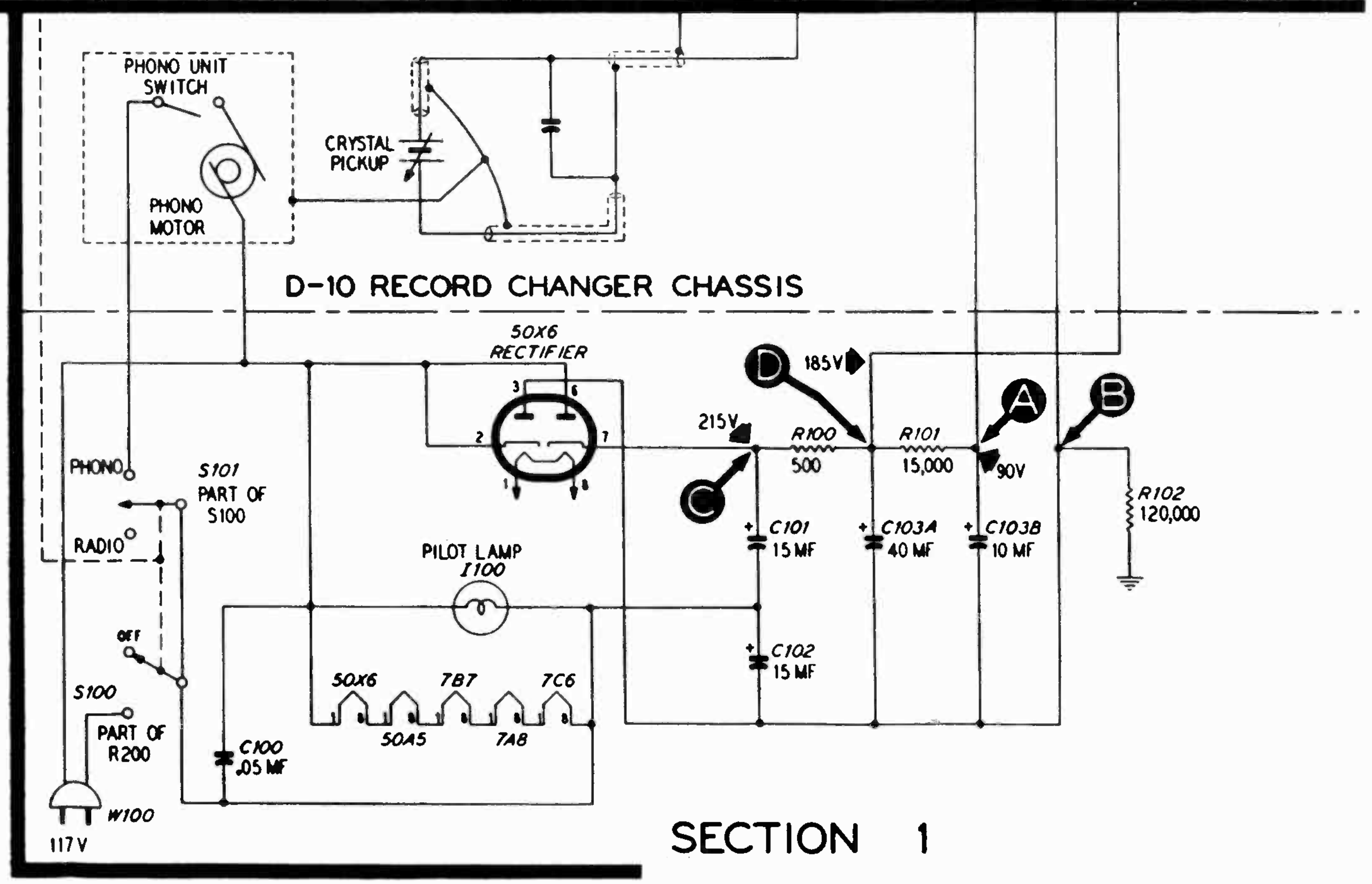


Figure 5. Philco Radio-Phonograph Models 48-1201 and 48-1260. Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

TURN VOLUME CONTROL TO MAXIMUM IN THE RADIO POSITION

NOTE: Make alignment with loop connected to radio.
OUTPUT METER—Connect to terminals indicated in figure 7.

DIAL—Calibration and pointer-index measurements are shown in figure 8. With tuning gang fully meshed, set pointer to index mark.

SIGNAL GENERATOR—Connect ground lead to B— bus; connect output lead as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to ext. aerial lead.	455 kc.	Gang fully meshed.	Adjust trimmers for maximum output in order given.	TC301B TC301A * TC300B TC300A *
2	Through 100-mmf. condenser to ext. aerial lead.	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C400B
3	Same as step 1.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C400A
4	Repeat steps 2 and 3.				

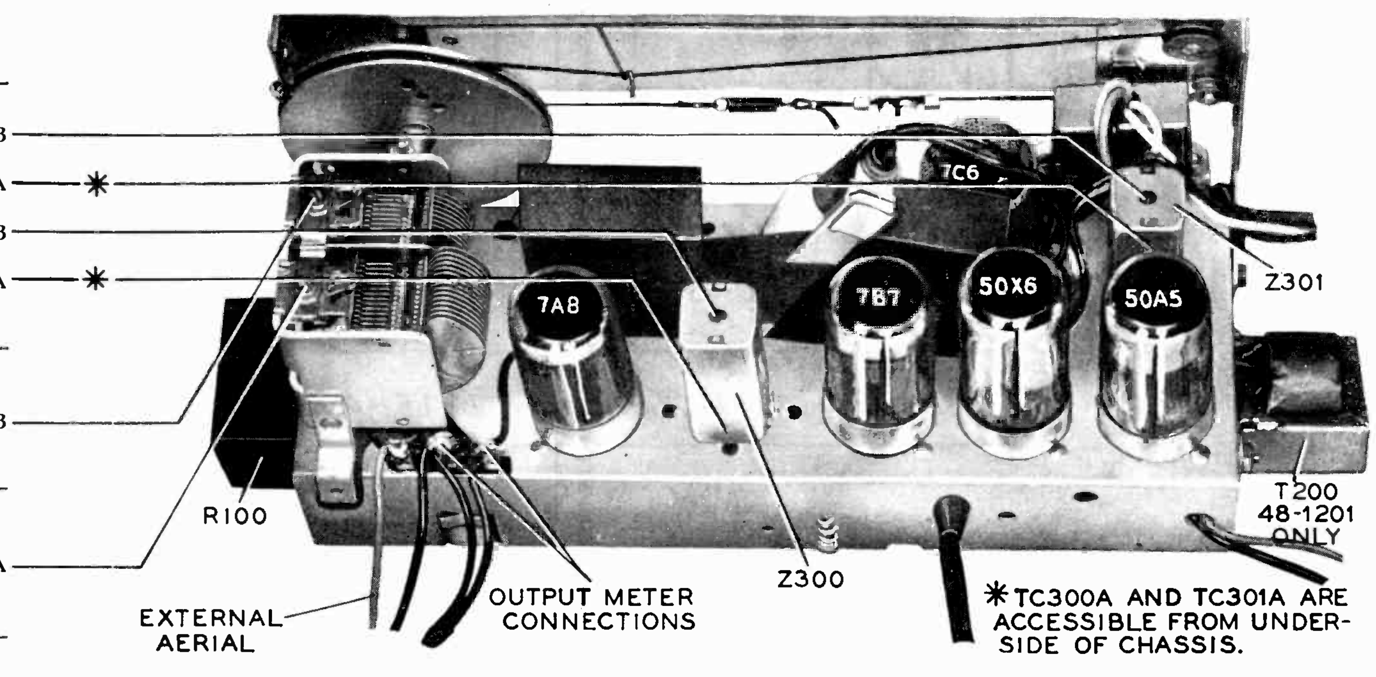


Figure 7. Top View, Showing Trimmer Locations

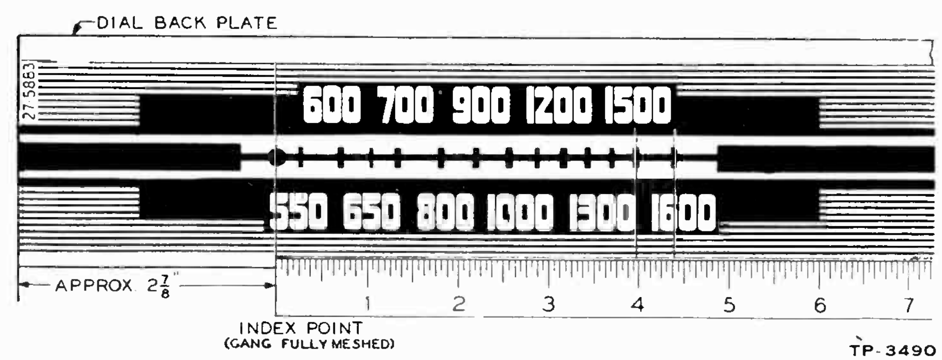


Figure 8. Calibration Measurements for Dial Backplate

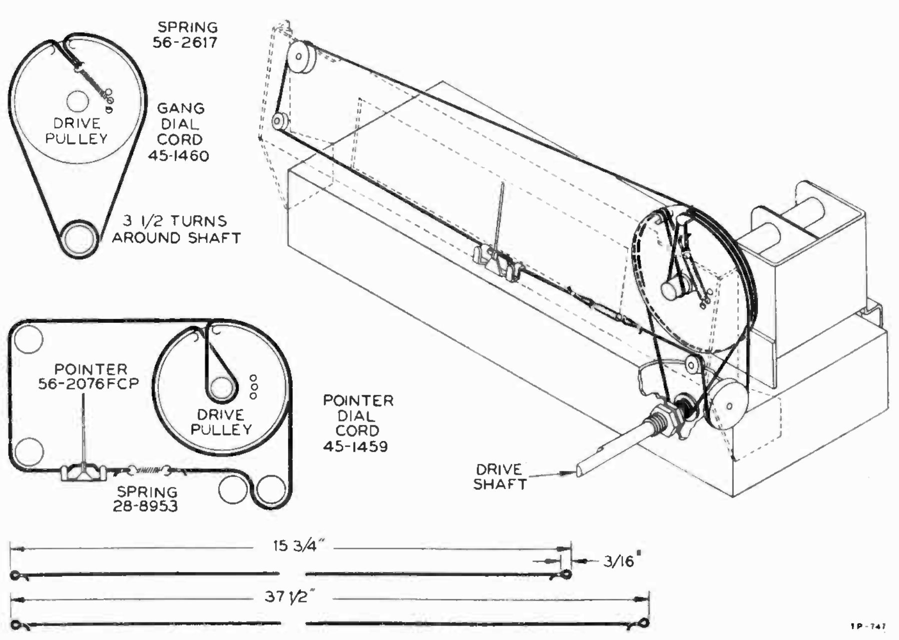
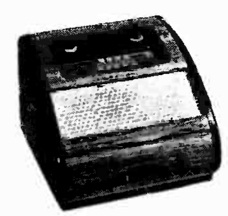


Figure 6. Drive-Cord Installation Details



MODEL 48-1201

MODEL 48-1260

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Section 1

Reference Symbol	*Description*	*Service Part No.*
C100	Condenser, line filter, .05 mf.	61-0122*
C101	Condenser, electrolytic, filter, 15 mf.	45-3018-18*

Section 1 (Continued)

Reference Symbol	*Description*	*Service Part No.*
C102	Condenser, electrolytic, filter, 15 mf.	45-3018-18*
C103	Condenser, dual electrolytic	30-2575-12*

REPLACEMENT PARTS LIST (Continued)

Section 1 (Continued)

Reference Symbol	Description	Service Part No.
C103A	Condenser, electrolytic, filter 40 mf.	Part of C103
C103B	Condenser, electrolytic, filter, 10 mf.	Part of C103
I100	Panel lamp	34-2477
R100	Resistor, filter, 500 ohms	33-3435-3
R101	Resistor, filter, 15,000 ohms	66-3154340
R102	Resistor, leakage, 150,000 ohms	66-4123340*
S100	Switch, off-on, power	Part of R200
S101	Switch, radio-phono	42-1736
W100	A-c power cord	L-3199

Section 2

Reference Symbol	Description	Service Part No.
C200	Condenser, blocking, .01 mf.	61-0120*
C201	Condenser, audio by-pass, .2 mf.	45-3500-3*
C202	Condenser, blocking, .01 mf.	61-0120*
C203	Condenser, by-pass, 240 mmf.	60-10245307*
C204	Condenser, tone compensation, .05 mf.	61-0122*
R200	Volume control, center-tapped, 1 megohm	33-5519
R201	Resistor, grid leak, 10 megohms	66-6103340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid leak, 470,000 ohms	66-4473340*
R204	Resistor, cathode bias, 130 ohms	66-1133340*
LS200	Loud-speaker	
	Model 48-1201	36-1617-Z
	Model 48-1260	36-1626
T200	Output transformer	
	Model 48-1201	32-8310
	Model 48-1260	32-8310-1

Section 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed, primary	Part of Z300
C300B	Condenser, fixed, secondary	Part of Z300
C301A	Condenser, fixed, primary	Part of Z301
C301B	Condenser, fixed, secondary	Part of Z301
C302	Condenser, screen by-pass, .05 mf.	61-0122*
C303	Condenser-and-choke assembly, by-pass, .2 mf.	76-1161
C304	Condenser, i-f by-pass, 100 mmf.	60-10105407*
C305	Condenser, i-f by-pass, 100 mmf.	60-10105407*
R300	Resistor, screen dropping, 47,000 ohms	66-3473340*
R301	Resistor, filter, 47,000 ohms	66-3473340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
S300	Switch, phono-radio	Part of S101
Z300	Transformer, 1st i.f., 455 kc., includes C300A and C300B	32-4160
Z301	Transformer, 2nd i.f., 455 kc., includes C301A and C301B	32-4161

Section 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2527-2
C400A	Condenser, aerial trimmer	Part of C400
C400B	Condenser, oscillator trimmer	Part of C400
C401	Condenser, coupling, 5 mmf.	60-90505007*
C402	Condenser, coupling, 100 mmf.	60-10105407*
C403	Condenser, a-v-c filter, .05 mf.	61-0122*
LA400	Loop aerial	
	Model 48-1201	76-2127-3
	Model 48-1260	76-2127-4
R400	Resistor, ext. aerial loading, 150,000 ohms	66-4153340*
R401	Resistor, grid leak, 1 megohm	66-6103340*
R402	Resistor, grid leak, 120,000 ohms	66-4123340*
T400	Oscillator transformer	32-4095-2

Miscellaneous — Model 48-1201

Description	Service Part No.
Aerial-lead assembly	76-1472
Cabinet (less scale)	10664B
Baffle and cloth	40-6827
Bar-and-clip assembly	76-2111
Bottom cover	54-7243
Button (2 required)	56-3920
Button, springs (2 required)	56-3919
Door	21-9058
Frame and base	76-2499
Hinge (2 required)	56-3910

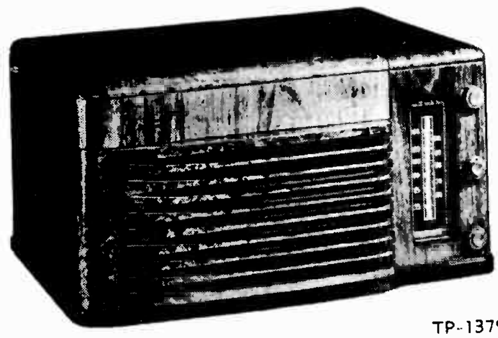
Miscellaneous — Model 48-1201 (Continued)

Description	Service Part No
Knob (2 required)	54-4255
Rubber foot (4 required)	54-4377
Rubber mount	27-4610
Snap fastener (4 required)	28-4279FA1
Scale	27-5883-1
Scale strap	56-2261
Wooden baffle	21-9055
Dial backplate	76-1940
Cam assembly	76-1638
Drive cord, gang drive (25-foot spool)	45-8740
Drive cord, pointer (25-foot spool)	45-8755
Pointer	56-2076-2
Shaft assembly	31-2680
Spring, gang drive	56-2617
Spring, pointer	28-8953
Hardware	
Bolt, speaker mounting (4 required)	W-2123
Clamp, electrolytic mounting	56-1466
Clip, coil mounting	28-5002FA1
Retainer (2 required)	56-3918
Screw, backplate mtg.	1W19670FA3
Screw (4 required)	1W22285FA9
Spring retainer	28-8658
Pickup cable	41-3708
Socket, Loktal (5 required)	27-6138
Socket, pilot lamp	27-6233
Speaker cable	41-3759
Switch-lever assembly	76-1642

Miscellaneous — Models 48-1260M (Mahogany) and 48-1260L (Light)

Description	Service Part No
Cabinet (L)	10677A
(M)	10677B
Bar and clip assembly	76-2111
Baffle and cloth (L)	40-6927
(M)	40-6927-1
Bezel	56-4954
Bullet catch (L)	45-6002-1
(M)	45-6002
Door	56-4921FJ31
Door spring	56-5027FA38
Door pull (2 required) (L)	56-4796
(M)	56-4796-1
Dome (4 required)	45-6190
Knife hinge (2 required)	56-4056
Knob (2 required) (L)	54-4214-1
(M)	54-4214
Rail (2 required)	56-4797FA1
Scale	27-5883
Scale strap (2 required)	56-2261
Washer, scale strap (2 required)	1W51931
Snap fastener (4 required)	28-4279FA1
Strike plate (L)	45-6003-1
(M)	45-6003
Wood baffle	21-9087
Wood screw (12 required)	1W25223
Dial backplate assembly	76-3176
Bracket (4 required)	56-4991
Cam assembly	76-1638
Drive cord, pointer and gang drive (25-foot spool)	45-8750
Frame and bracket	76-2468-1FJ31
Pointer	56-2076-2
Shaft assembly	31-2860
Spring, pointer	28-8953
Spring, gang drive	56-2617
Screw, backplate mtg. (4 required)	1W19670FA3
Hardware	
Bolt, speaker mtg. (4 required)	W-1695
Clamp, electrolytic mtg.	56-1456
Clip, coil mtg.	28-5002FA1
Eye screw	56-4991
Nut (4 required)	1W19988FA3
Rubber mount, gang mtg.	27-4610
Screw, R. H. (4 required)	1W24984
Speed nut (4 required)	1W60108
Spring retainer	28-8658
Pickup cable	41-3735-10
Socket, Loktal (5 required)	27-6138
Socket, pilot lamp	27-6233
Switch-lever assembly	76-1642

PHILCO CORP.



TP-1379

MODEL 48-1256

SPECIFICATIONS

CABINET	Wood, walnut or mahogany finish
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	60 watts
AERIAL	Built-in loop; terminal provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (6)	7C7, 7A8, 14A7, 7C6, 35L6GT, 50X6
RECORD CHANGER	Philco Automatic Record Changer, Model D-10 *(For service information, see manual PR-1156.)*

Circuit Description

Philco Model 48-1256 is a table-model radio-phonograph combination consisting of a six-tube, a-c, superheterodyne radio and a Philco Model D-10 Automatic Record Changer. The tuning range is 540—1620 kc. The built-in, high-impedance loop is usually adequate, although an external aerial may be used where additional signal pickup is required. The tube complement is as follows: 7C7, r-f amplifier; 7A8, converter; 14A7, i-f amplifier; 7C6, detector-a.v.c.-1st audio; 35L6GT, output amplifier; 50X6, rectifier.

A series-resonant, i-f by-pass, C304 (with choke), is connected between the chassis and B–; this combination functions as an r-f by-pass at broadcast frequencies. If short-wave interference originating near 14—28 mc. is encountered, install a .01-mf. by-pass condenser between the chassis and B– (the choke wound on C304 has appreciable impedance at these frequencies).

The d-c operating voltages are obtained from a voltage-doubler circuit using a 50X6 rectifier; a resistance-capacitance network is used for filtering. The radio operates on a.c. only.

The radio-phono switch, which is mechanically connected to the volume-control shaft, is operated by turning the control to either side of center—clockwise for radio and counterclockwise for phonograph.

Preliminary Checks

The following preliminary checks should be made before turning on the radio:

1. Carefully inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of the 50X6 rectifier) and B–, test point B; use the ohmmeter polarity that gives the highest resistance reading. If the reading is lower than 3000 ohms, check condensers C101, C102, C103A, and C103B for leakage or shorts.

The resistance value above, which is much lower than normal, is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests for Section 1 are performed.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure. Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Section 1 TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B–, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn the power on; set the volume control to minimum for radio, and the tone control counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

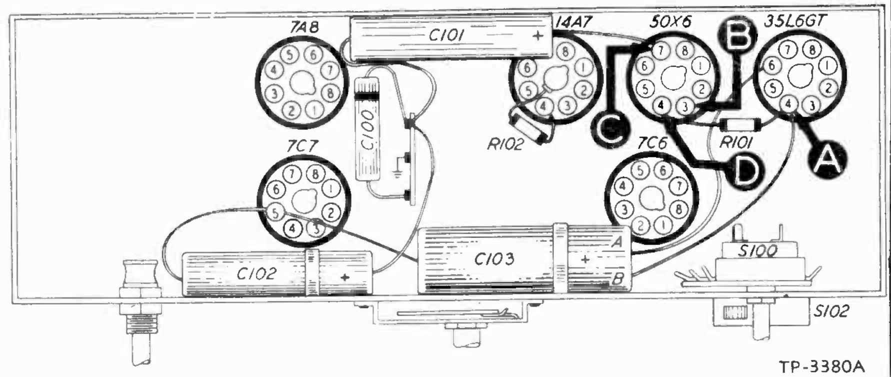


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	140v	Trouble within this section. Isolate by the following tests.
2	C	215v	Defective: 50X6. Open: W100, S100, C101, C102. Shorted or leaky: C101, C102, C103A, C103B, C204*, C205*.
3	D	200v	Change in value: R100. Leaky: C103A.
4	A	140v	Change in value: R101. Leaky: C103B.

Listening Test: Abnormal hum may be due to loss of capacitance in C101, C102, C103A, or C103B; test by substituting good condensers.

* This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the volume control to maximum for radio, and the tone control counterclockwise. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3; if not, isolate and correct the trouble in this section.

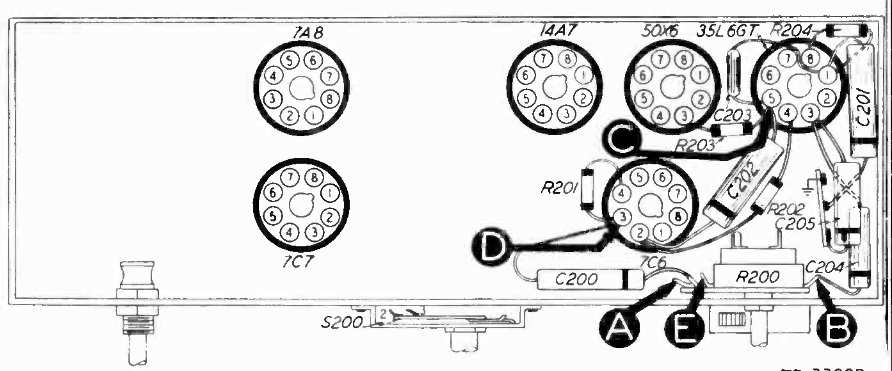


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with moderate signal input.	Trouble within this section. Isolate by the following tests.
2	C	Moderate, clear signal with strong signal input.	Defective: 35L6GT. Open: LS200 voice coil, T200 pri. or sec., R204. Shorted: C202, C203, C204, C205, LS200 voice coil, T200 pri. or sec.
3	D	Loud, clear signal with moderate signal input.	Defective: 7C6. Open: C202, C203, R202.
4	A	Loud, clear signal with moderate signal input.	Open: C200, R200. Shorted: C303*.
5	E	Volume control at maximum for phono. Loud, clear signal with moderate signal input.	Open: R200. Shorted: crystal pickup, shielded pickup cable.

Listening Test: Distortion or hum may be due to defective 7C6 or 35L6GT (test by substituting good tubes). Distortion may also result from open R201, or shorted or leaky C200.

* This part, located in another section, may cause abnormal indication in this section.

Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the volume control to maximum for radio, and the tone control counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

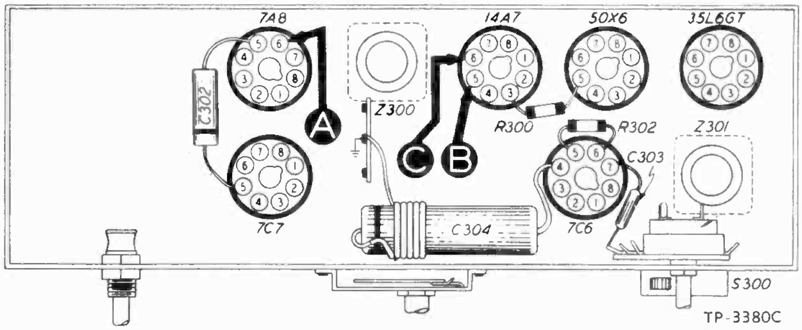


Figure 3. Bottom View, Showing Section 3 Test Points

Since the circuit location of test point A for this section is the same as that of test point C for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with moderate signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: 14A7, 7C6 (diode section). Misaligned: Z301. Open: Z301 pri. or sec., C301A, C301B, C303, R300, R301. Shorted: Z301 pri. or sec., C301A, C301B, C301C, C301D, C300B, C302.
3	A	Loud, clear signal with moderate signal input.	Defective: 7A8*. Misaligned: Z300. Open: Z300 pri. or sec., C300A, C300B, C302, R300, S300, R403*. Shorted: Z300 pri. or sec., C300A, C300B, C302, T400* sec.
Listening Test: Instability or whistles may be due to shorted coil on C304, or by open C302.			

* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section (with the exception of the oscillator test), use an r-f signal generator with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the volume control to maximum for radio, and the tone control counterclockwise.

Set the tuning control and signal-generator frequency as indicated in the chart.

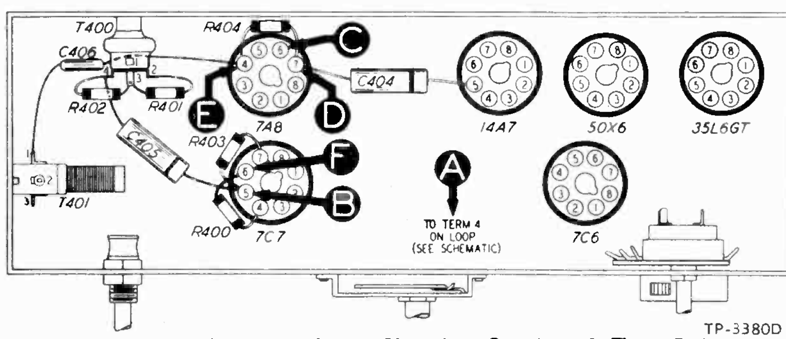


Figure 4. Bottom View, Showing Section 4 Test Points (Locations of C400, C401, C403, and C407 are shown in figure 7.)

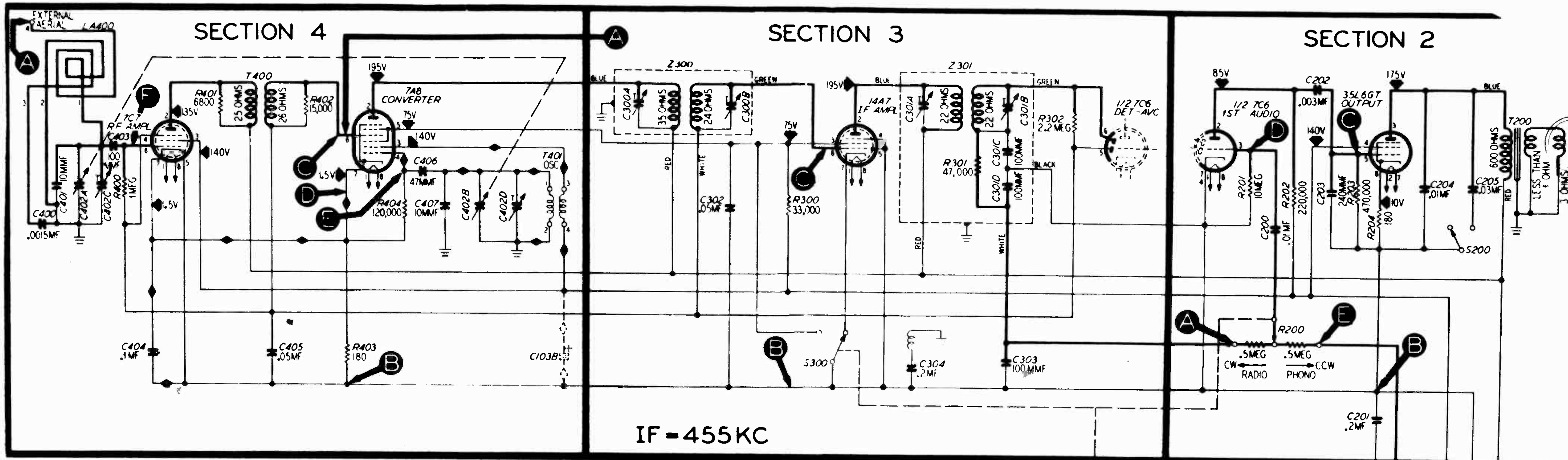
If the "NORMAL INDICATION" is not obtained in step 1, isolate the trouble by following the remaining steps.

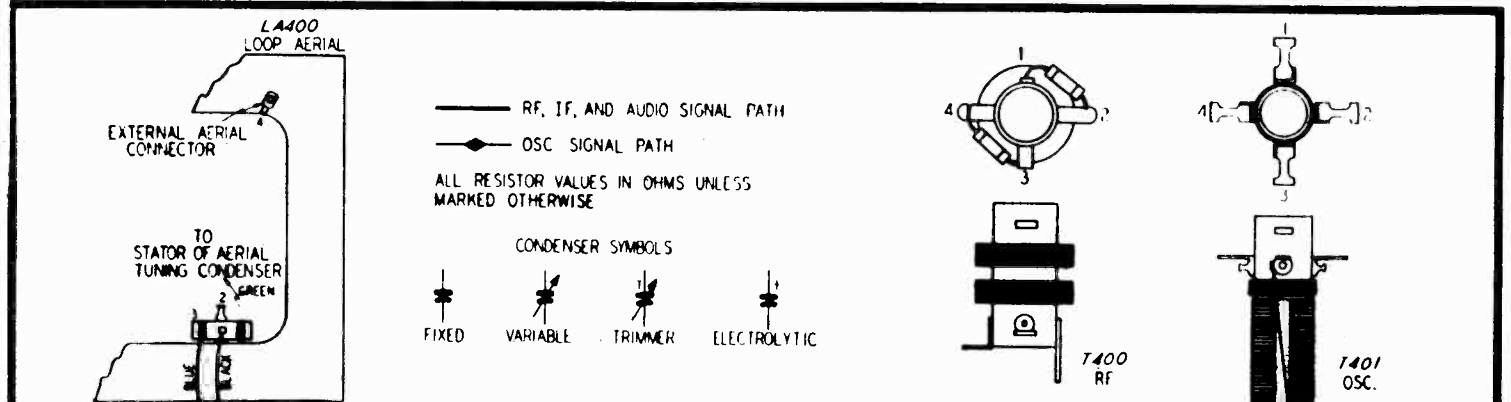
STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	1000 kc.	1000 kc.	Clear signal with moderate signal input.	Oscillator trouble (see oscillator test below) Defective: 7A8. Misaligned: T401. Open: T401 pri. or sec., C406, R404. Shorted: C402B, C402D, C407.
3	F	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Defective: 7C7. Open: T400 pri. or sec., C405, C404.
4	A	1000 kc.	1000 kc.	Somewhat louder signal than in step 3.	Misaligned: C402C. Open: LA400, C400, C403. Shorted: LA400, C401.

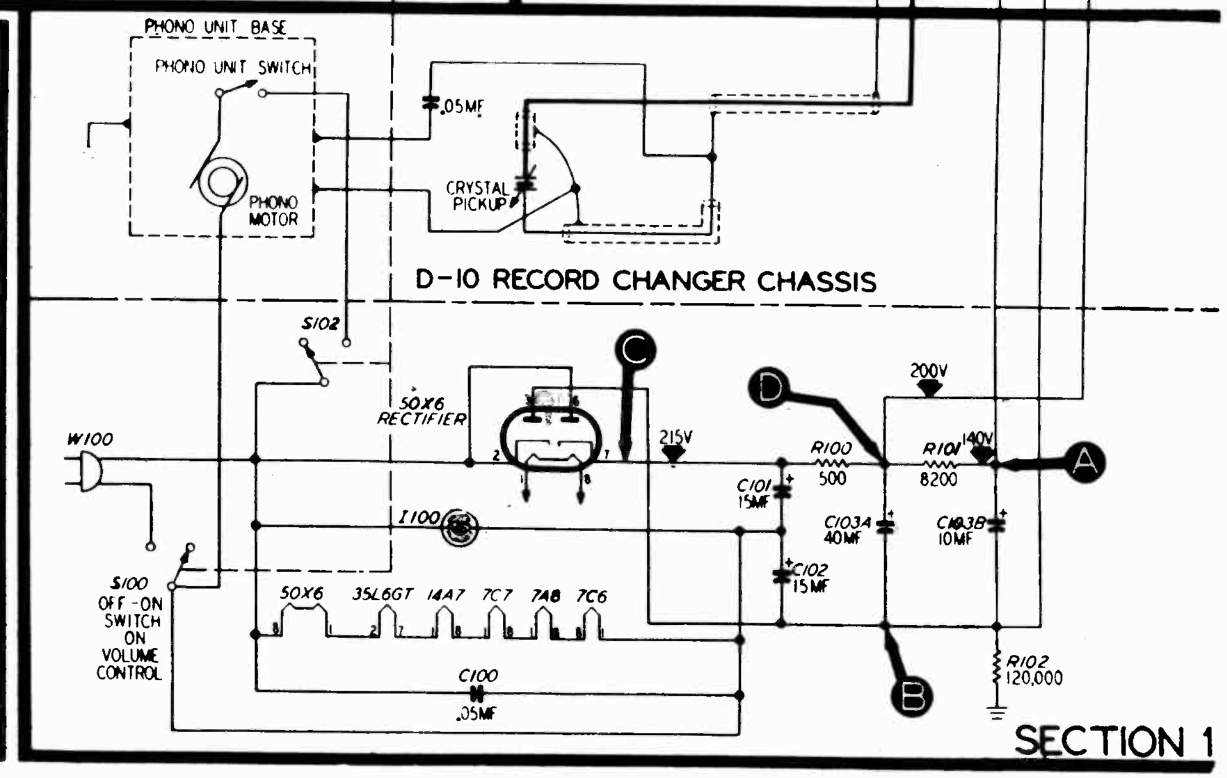
Listening Test: Distortion may be due to open R400.

OSCILLATOR TEST: Connect positive lead of high-resistance, d-c voltmeter to test point D; connect the prod end of the negative lead through 100,000-ohm isolating resistor to oscillator grid (pin 4 of 7A8), test point E. Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage throughout range of tuning condenser.

PHILCO CORP.







SYMBOLIZATION AND TERMINOLOGY

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C—condenser	LA—loop aerial	S—switch
I—pilot lamp	LS—loud-speaker	T—transformer
L—choke or coil	R—resistor	Z—electrical assembly

The number of the symbol designates the section in which the part is located, as follows:

100-series components are in Section 1—the power supply.
200-series components are in Section 2—the audio circuits.
300-series components are in Section 3—the i-f amplifier, detector, and a-v-c circuits.
400-series components are in Section 4—the aerial, r-f, and oscillator circuits.

A suffix letter identifies the part as a non-replaceable component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.

Figure 5. Philco Radio-Phonograph, Model 48-1256, Sectionalized Schematic, Showing Test Points

ALIGNMENT PROCEDURE

TURN THE VOLUME CONTROL FOR RADIO TO MAXIMUM.

DIAL—Calibration and pointer-index measurements are shown in figure 6. With the tuning condensers fully meshed, set the pointer to the index mark.

OUTPUT METER—Connect to the right-hand (output) lug and center (chassis) lug of the terminal panel, shown in figure 7.

SIGNAL GENERATOR—Connect the ground lead to B–; connect the output lead as indicated in the chart. Use modulated output.

OUTPUT LEVEL—During alignment, adjust the signal-generator output to maintain an output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1				Turn C300B (copper screw) down tight.	
2	Through .1-mf. condenser to test point C of Section 4.	455 kc.	540 kc.	Adjust, in order given, for maximum output.	C301A C301B C300A C300B
3	Through 200-mmf. condenser to external aerial connector.	1600 kc.	1600 kc.	Adjust for maximum output.	C402D
4	Same as step 3.	1500 kc.	1500 kc.	Adjust for maximum output.	C402C

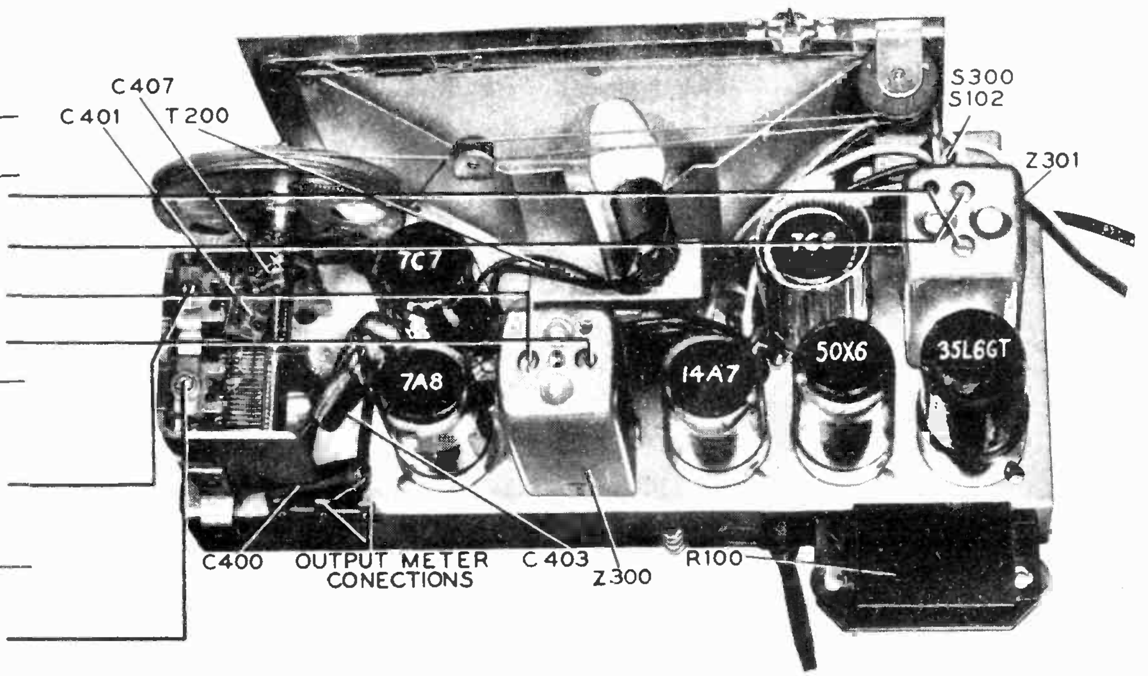


Figure 7. Top View, Showing Trimmer Locations

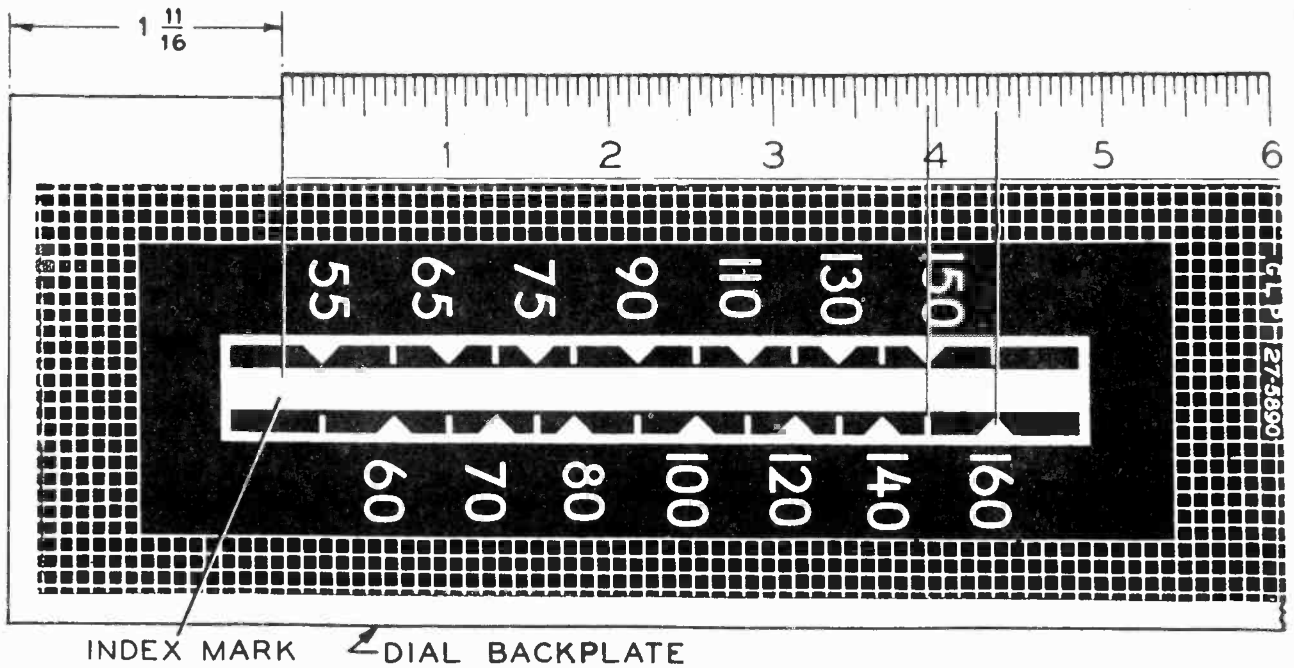


Figure 6. Calibration Measurements for Dial Backplate

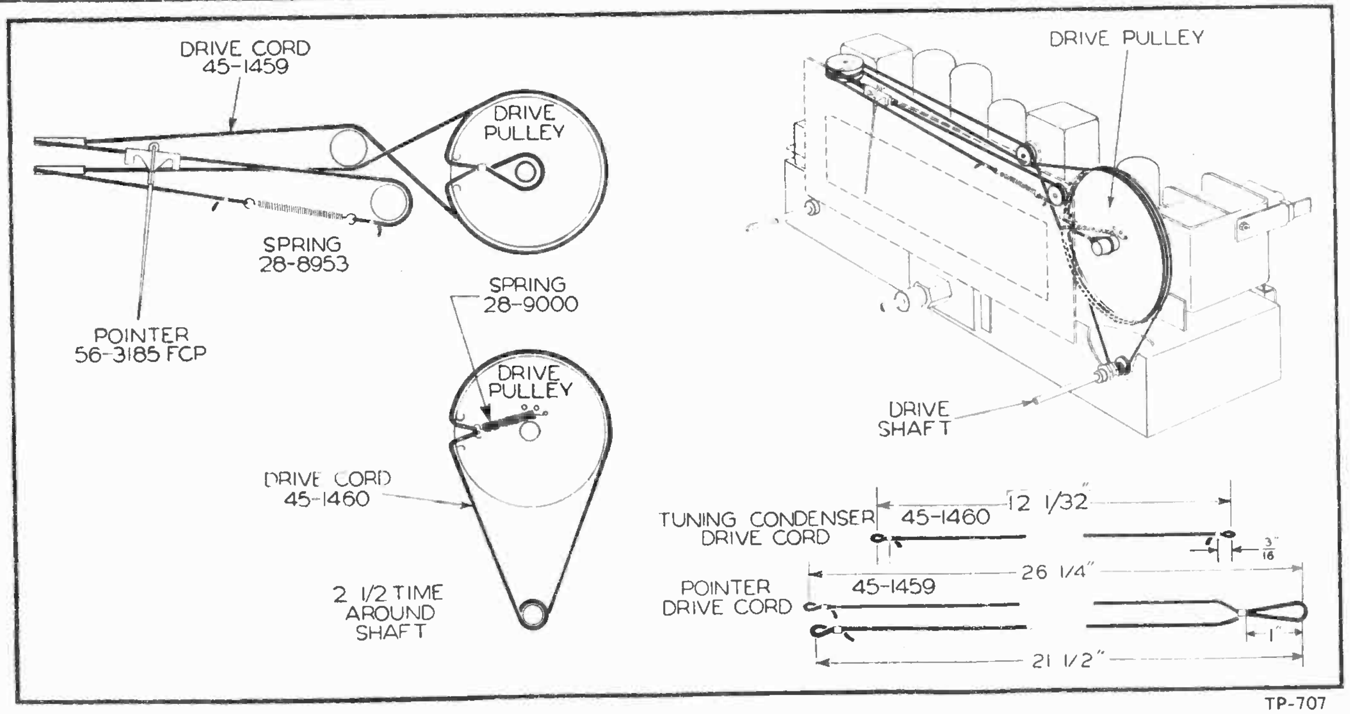


Figure 8. Drive-Cord Installation Details

REPLACEMENT PARTS LIST

NOTE

Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, power-line by-pass, .05 mf.	61-0122
C101	Condenser, electrolytic, filter, 15 mf.	30-2575-11
C102	Condenser, electrolytic, filter, 15 mf.	30-2575-11
C103	Condenser, electrolytic, 2-section	30-2575-12
C103A	Condenser, filter, 40 mf.	Part of C103
C103B	Condenser, filter, 10 mf.	Part of C103
I100	Lamp, panel, 110 volts, 6 watts	34-2477
R100	Resistor, filter, 500 ohms	33-3435-3
R101	Resistor, filter, 8200 ohms	66-2824340*
R102	Resistor, a-c leakage, 120,000 ohms	66-4123340*
S100	Switch, a-c power	Part of R200
S102	Switch, phono-motor power	Part of 42-1736

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .01 mf.	61-0120*
C201	Condenser, a-c isolation, .2 mf.	45-3500-3*
C202	Condenser, d-c blocking, .003 mf.	61-0109*
C203	Condenser, r-f by-pass, 240 mmf.	60-10245307*
C204	Condenser, tone compensating, .01 mf.	61-0120*
C205	Condenser, tone control, .03 mf.	45-3500-1*
LS200	Speaker	36-1613
R200	Control, volume, .5 megohm each side of center tap	33-5503
R201	Resistor, grid return, 10 megohms	66-6103340*
R202	Resistor, plate load, 220,000 ohms	66-4223340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*
R204	Resistor, cathode bias, negative feedback, 180 ohms	66-1183340*
S200	Switch, tone control	42-1770
T200	Transformer, audio output	32-8242

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, r-f by-pass	Part of Z301
C301D	Condenser, r-f by-pass	Part of Z301
C302	Condenser, r-f by-pass, .05 mf.	61-0122*
C303	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C304	Condenser-and-choke assembly, resonant at 455 kc.	76-1198
R300	Resistor, screen dropping, 33,000 ohms	66-3333340*
R301	Resistor, r-f filter	Part of Z301
R302	Resistor, a-v-c decoupling, 2.2 megohms	66-6103340*
S300	Switch (combined with S102), radio disabling	Part of 42-1736
Z300	Transformer, 1st i-f, 455 kc., including C300A and C300B	32-3962
Z301	Transformer, 2nd i-f, 455 kc., including C301A, C301B, C301C, C301D, and R301	32-4005

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, aerial isolating, .0015 mf.	45-3500-6*
C401	Condenser, fixed circuit capacitance, 10 mmf.	60-00105407*
C402	Condenser, tuning gang	31-2527-2
C402A	Condenser, aerial tuning	Part of C402
C402B	Condenser, oscillator tuning	Part of C402
C402C	Condenser, aerial trimmer	Part of C402
C402D	Condenser, oscillator trimmer	Part of C402
C403	Condenser, d-c blocking, 100 mmf.	60-10105407*
C404	Condenser, cathode r-f by-pass, .1 mf.	61-0113*
C405	Condenser, a-v-c filter, .05 mf.	61-0122*
C406	Condenser, d-c blocking, 47 mmf.	60-10255237*
C407	Condenser (ceramic), fixed circuit capacitance, 10 mmf.	62-010009001*
LA400	Loop-aerial assembly	76-3020
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, 6800 ohms	Part of T400
R402	Resistor, 15,000 ohms	Part of T400
R403	Resistor, cathode bias, 180 ohms	66-1183340*
R404	Resistor, oscillator grid leak, 120,000 ohms	66-4123340*
T400	Transformer, r-f band-pass, including R401 and R402	32-3595
T401	Transformer, oscillator	32-4190

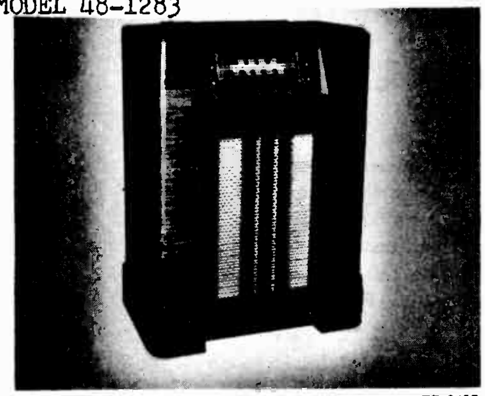
MISCELLANEOUS

Description	Service Part No.
Backplate assembly, dial	76-3178
Cabinet (less scale), mahogany	10641E
Cabinet (less scale), walnut	10641G
Baffle-and-cloth assembly	40-6798
Band, rubber, scale mounting	54-4168
Grommet, for corner plate	54-4313
Hinge, butt	45-6306
Hinge, lid support	45-6305
Knob	54-4488
Plate, corner, record-changer mounting	56-3103
Scale, dial	27-5890
Screw, chassis-board mounting	1W15471FA9
Screw, chassis mounting	1W13210FA3
Strap, dial mounting	56-2234
Washer, cupped, for 1W15471FA9 screw	1W42303FA9
Cable, pickup	41-3708
Cam assembly, phono-radio switch	76-1638
Clamp, electrolytic-condenser mounting	56-1466
Clip, coil mounting (oscillator, r.f.)	28-5002FA1
Cord, tuning-condenser drive (25-ft. spool)	45-8750*
Cord, pointer drive (25-ft. spool)	45-8755*
Diffusing panel	54-4257
Grommet, tuning-condenser mounting	27-4610
Lever assembly, phono-radio switch	76-1642
Plate, backing, tuning condenser	56-2105
Pointer, dial	56-3185
Pulley, dial	11W29740
Shaft, tuning-condenser drive	76-1717
Socket, Loktal	27-6138*
Socket, octal	27-6174
Spring, tuning-condenser drive	56-2617
Spring, retaining, switch-lever assembly	28-8658
Spring, pointer drive	28-8953
Stud, switch lever	56-2945

Change of parts list:
Z300 Transformer, first IF 32-4160

MODEL 48-1262, Code 121,
MODEL 48-1283

PHILCO CORP.



TP-3457

MODEL 48-1262

SPECIFICATIONS

CABINET	Wood, walnut finish
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGE	540 to 1620 kc.
AUDIO OUTPUT	2.5 watts
OPERATING VOLTAGE	105 to 120 volts 60-cycle, a.c. only
POWER CONSUMPTION	Radio, 40 watts Phonograph, 20 watts
AERIAL	Built-in loop; terminal also provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (6)	7B7(2), 7C6, 14AF7, 35L6GT, 50X6
PHONOGRAPH	Philco Automatic Record Changer, Model D-10

Circuit Description

Philco Model 48-1262 is a console combination of a Philco Model D-10 Automatic Record Changer and a six-tube superheterodyne radio which provides reception within the Standard Broadcast Band.

The loop aerial normally provides adequate signal pickup. If greater pickup is required, an external aerial may be connected.

The loop works into a 14AF7 converter, and variable-condenser tuning is used. The two i-f stages employ 7B7 high-transconductance tubes. To obtain good stability, resistance coupling is employed between the first and second i-f tubes. The diodes of the 7C6 provide detection and a-v-c voltage. The triode section of this tube functions as the first audio amplifier, and is resistance-coupled to the 35L6GT output tube. The loud-speaker is a permanent-magnet dynamic type. The power supply employs a 50X6 full-wave voltage-doubling rectifier and a resistor-condenser filter network.

The 120,000-ohm resistor, R102, is connected between B— and the chassis to prevent hum under conditions of high humidity.

The two series-resonant circuits, C304 and C305, function as by-passes of exceptionally low impedance; one is resonant at the i.f., 455 kc., while the other is resonant at the second harmonic of the i.f., 910 kc.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Carefully inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of the 50X6 rectifier) and the B— bus, test point B. When the ohmmeter leads are connected in the proper polarity, the highest resistance reading will be obtained. This reading should be not lower than 3000 ohms. If it is lower, check condensers C101, C102, C103A, and C204 for leakage or shorts.

The above resistance value is not intended as a quality check for these condensers. It is the lowest value at which the rectifier will operate safely while the voltage tests of Section 1 are being performed.

For service information concerning Model 48-1283

Model 48-1283 is similar to Model 48-1262, Code 121, with the exceptions given in this supplement. The radio-phonograph is contained in a cabinet which has two record shelves. The aerial loop is mounted on rails at the back of the cabinet. Automatic Record Changer Model M-8 is used, and the isolating condenser and the load resistor for the crystal pickup are mounted on a terminal strip located on the speaker baffle.

SCHEMATIC DIAGRAM

Section 1

The .05-mf. condenser between the phono chassis and the phono-cable shield is removed, and is connected between the phono chassis and the radio chassis. This condenser is located on a terminal strip attached to the cabinet.

A 1-megohm resistor is connected across the crystal pickup.

A .01-mf. condenser is connected between the low side of the crystal pickup and the phono-cable shield.

R102 is 150,000 ohms.

Section 2

C200 is removed and the cable shield is connected directly to B—.

C205 is .03 mf.

Section 3

R302 is 150,000 ohms.

Section 4

R400 is 150,000 ohms.

LA400 is 3.5 ohms.

REPLACEMENT PARTS LIST

Section 1

R102 is 150,000 ohms, Service Part No. 66-4153340*.

Section 2

C200 is removed.

C205 is .03 mf., Service Part No. 45-3500-1*.

LS200 is Service Part No. 36-1626-1.

Section 3

C304 is .15 mf., Service Part No. 38-9851-5.

C305 is .05 mf., Service Part No. 38-9851-4.

R302 is 150,000 ohms, Service Part No. 66-4153340*.

Section 4

C400 is Service Part No. 31-2715-1.

LA400 is Service Part No. 32-4273.

R400 is 150,000 ohms, Service Part No. 66-4153340*.

Section 1 TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to the B— bus, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

With the radio-phono switch set to the radio position, turn the volume control to minimum and turn the tone control fully clockwise.

Follow the steps in sequence; if the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

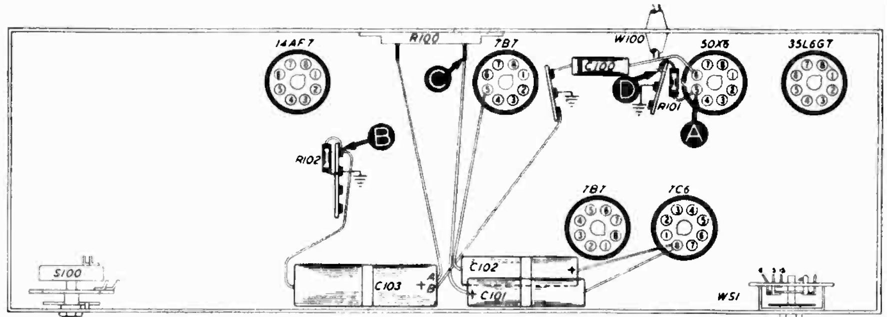


Figure 1. Bottom View, Showing Section 1 Test Points TP-3395A

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	167 v.		Trouble within this section. Isolate by the following tests.
2	C	214 v.	No voltage. Low voltage. High voltage.	Defective: 50X6, S100, W100. Shorted: C101, C102. Defective: 50X6. Open: C101, C102. Leaky: C101, C102, C103A, C103B. Open: R100, T200,* R204.*
3	D	181 v.	No voltage. Low voltage. High voltage.	Shorted: C103A. Open: C103A. Leaky: C103A, C204.* Open: R101, R204,* T200.*
4	A	167 v.	No voltage. Low voltage. High voltage.	Shorted: C103B. Leaky: C103B. Open: R204,* T200.*
Listening Test: Abnormal hum may be caused by open C103A, C103B, or R102.				

* This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to the B— bus, test point B; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and the tone control fully clockwise. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed to the tests in Section 3; if not, isolate and correct the trouble in this section.

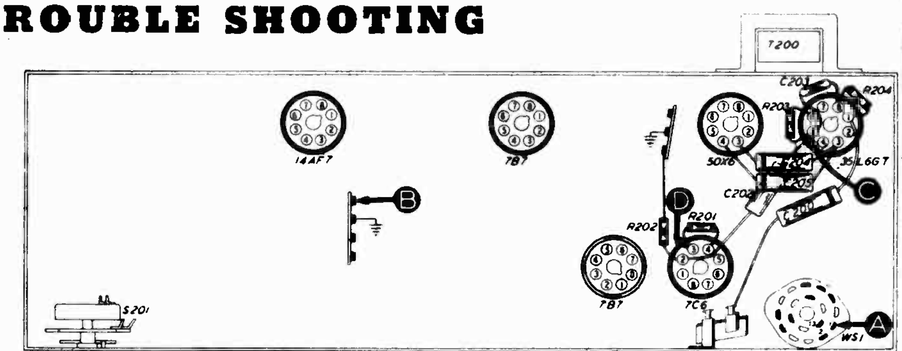


Figure 2. Bottom View, Showing Section 2 Test Points TP-3395B

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: 35L6GT, LS200, T200. Shorted: C202, C203, C204, C205. Leaky: C202, C203, C204, C205. Open: R203, R204.
3	D	Loud, clear signal with weak signal input.	Defective: 7C6. Open: C202, R202, R201. Leaky: C202.
4	A	Loud, clear signal with weak signal input. (Rotate R200 through its range.)	Defective: WS1, R200. Open: C201. Shorted: C301D.*
Listening Test: Distortion on strong signals may be caused by short-circuited or leaky C201, or open-circuited R201.			

* This part, located in another section, may cause abnormal indication in this section.

MODEL 48-1262, Code 121 PHILCO CORP.

Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the B— bus, test point B; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio-phono switch to radio, turn the volume control to maximum, and set the tone control fully clockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

NOTE: Since the circuit location of test point A for this section is the same as that of test point C for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

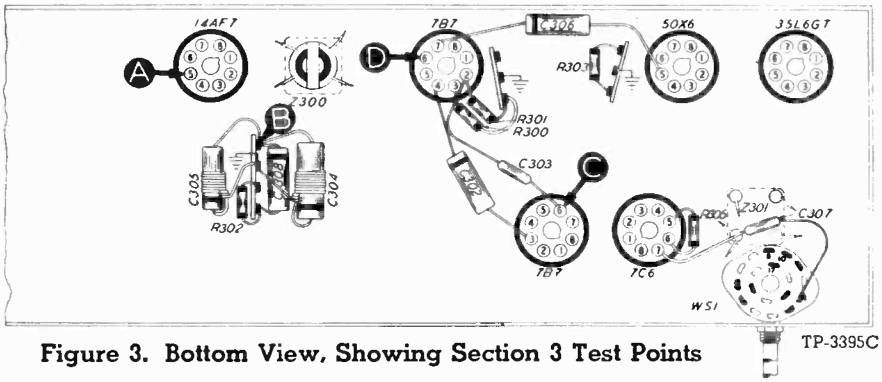


Figure 3. Bottom View, Showing Section 3 Test Points TP-3395C

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: WS1, 7B7 (2nd i.f.), 7C6, Z301. Open: C302, C306, R300, R302. Shorted: C302, C306. Leaky: C302, C306.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7 (1st i.f.). Open: C303, C304, C305, C308, R301, R302. Shorted: C303. Leaky: C303.
4	A	Loud, clear signal with weak signal input.	Defective: 14AF7,* Z300. Misaligned: Z300. Open: R402,* R401.*

* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section (with the exception of the oscillator test), use an r-f signal generator with modulated output. Connect the generator ground lead to the B— bus, test point B; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio-phono switch to radio, turn the volume control to maximum, and set the tone control fully clockwise.

Except as noted for the oscillator test, set the radio and signal-generator dials to 540 kc.

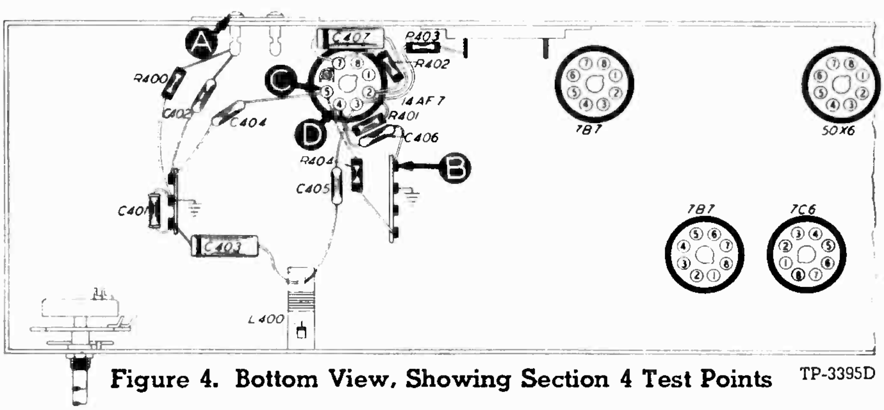
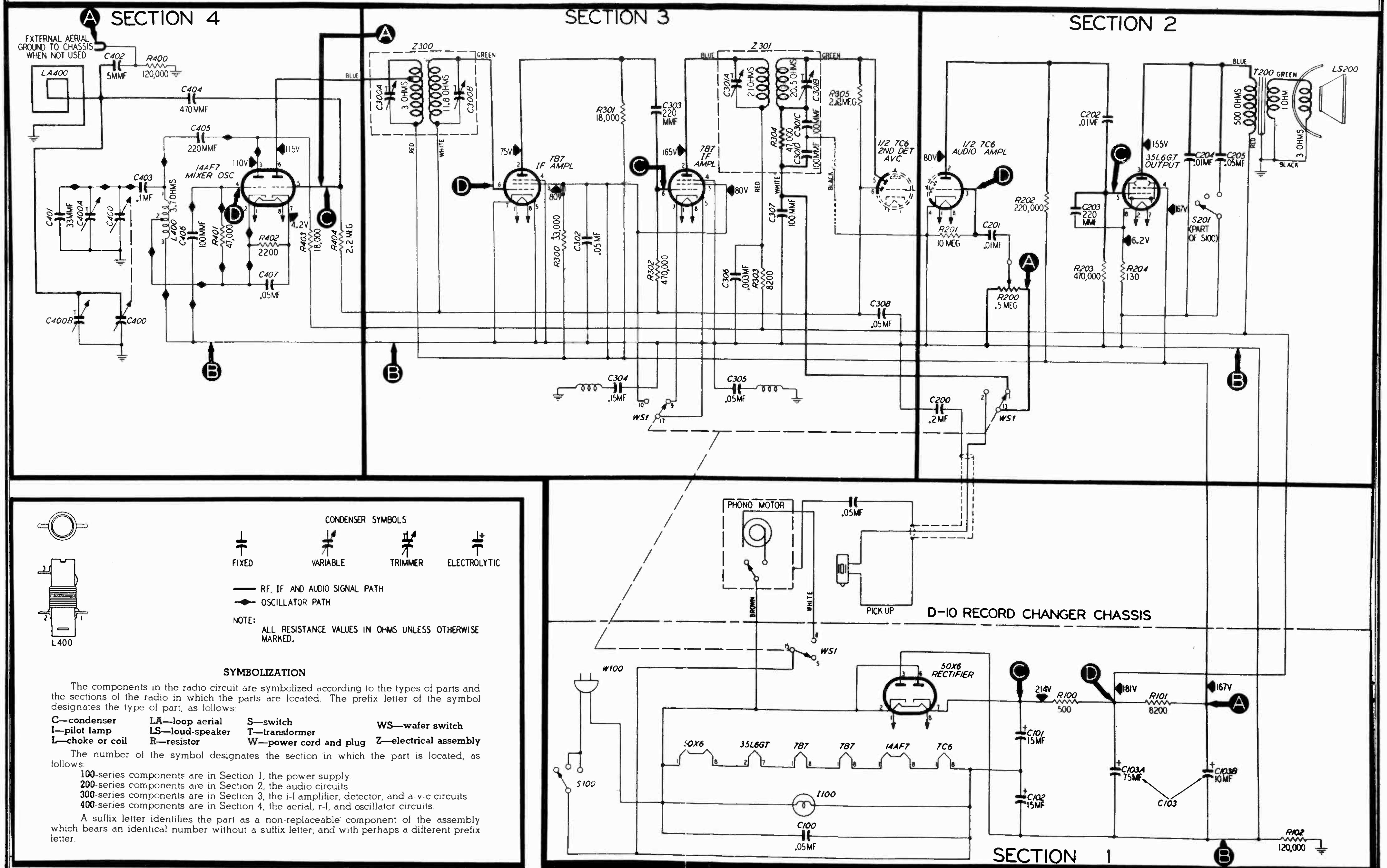


Figure 4. Bottom View, Showing Section 4 Test Points TP-3395D

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with weak signal input.	Defective: 14AF7, osc. circuit. Open: C407, R402. Shorted: C407. Leaky: C407.
3	D (Osc. test; see Note below.)	Negative 3.3 to 4.2 volts.	Defective: L400. Open: C403, C405, C406, R401, R403. Shorted: C400, C400A, C401, C403, C405, C406.
4	A	Loud, clear signal with weak signal input.	Defective: LA400. Shorted: C400, C400A, C402, C404. Open: C402, C404. Leaky: C402, C404.

OSCILLATOR-TEST NOTE: Connect positive lead of high-resistance d-c voltmeter to B— bus, test point B; connect prod end of negative lead through 100,000-ohm isolating resistor to oscillator grid, test point D. Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage of 3.3 to 4.2 volts (measured with 20,000-ohms-per-volt meter) throughout range of tuning control.



NOTE:
ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE MARKED.

SYMBOLIZATION

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C—condenser	LA—loop aerial	S—switch	WS—wafer switch
I—pilot lamp	LS—loud-speaker	T—transformer	
L—choke or coil	R—resistor	W—power cord and plug	Z—electrical assembly

The number of the symbol designates the section in which the part is located, as follows:

100-series components are in Section 1, the power supply.
200-series components are in Section 2, the audio circuits.
300-series components are in Section 3, the i-f amplifier, detector, and a-v-c circuits.
400-series components are in Section 4, the aerial, r-f, and oscillator circuits.

A suffix letter identifies the part as a non-replaceable component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.

Figure 5. Philco Radio-Phonograph, Model 48-1262, Sectionalized Schematic Diagram, Showing Test Points

TP-3395

ALIGNMENT PROCEDURE

SET RADIO-PHONO SWITCH TO RADIO POSITION AND TURN VOLUME CONTROL TO MAXIMUM

NOTE: Make alignment with loop aerial connected to radio.

DIAL—Calibration and pointer-index measurements are shown in figure 6. With tuning gang fully meshed, set pointer to index mark.

OUTPUT METER—Connect to terminals indicated in figure 7.

SIGNAL GENERATOR (modulated)—Connect as indicated in chart.

OUTPUT LEVEL—During alignment, adjust signal generator output to maintain output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1				Turn C300B down tight.	
2	Through .1-mf. condenser to test point C, Section 4 (pin 5, 14AF7).	455 kc.	540 kc.	Adjust trimmers in order given for maximum output.	C301B C301A C300B C300A
3	Radiating loop (see Note below).	1600 kc.	1600 kc.	Adjust for maximum.	C400B
4	Same as step 3.	1500 kc.	1500 kc.	Adjust for maximum.	C400A

RADIATING-LOOP NOTE: Make up a 6—8-turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop aerial.

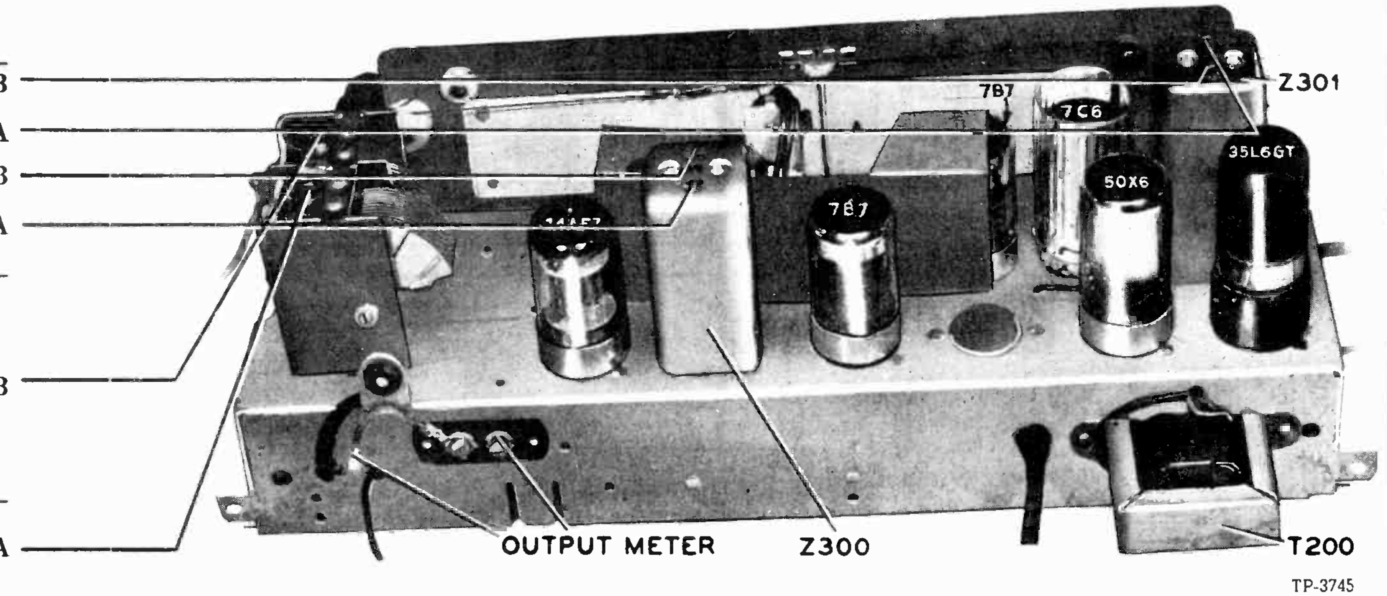


Figure 7. Top View, Showing Trimmer Locations

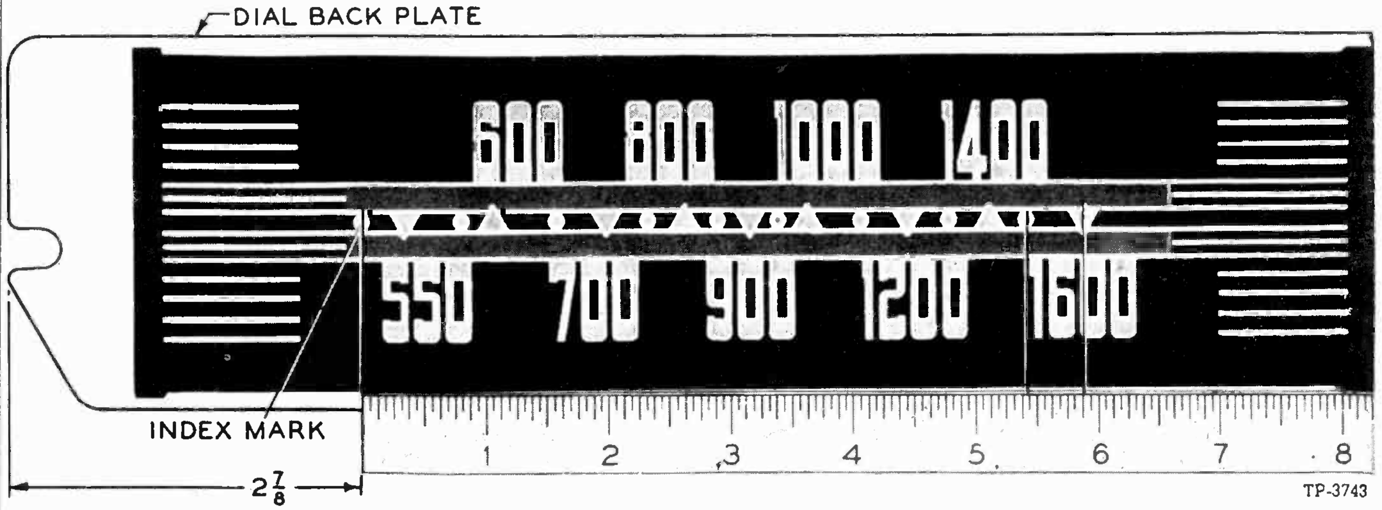


Figure 6. Calibration Measurements for Dial Backplate

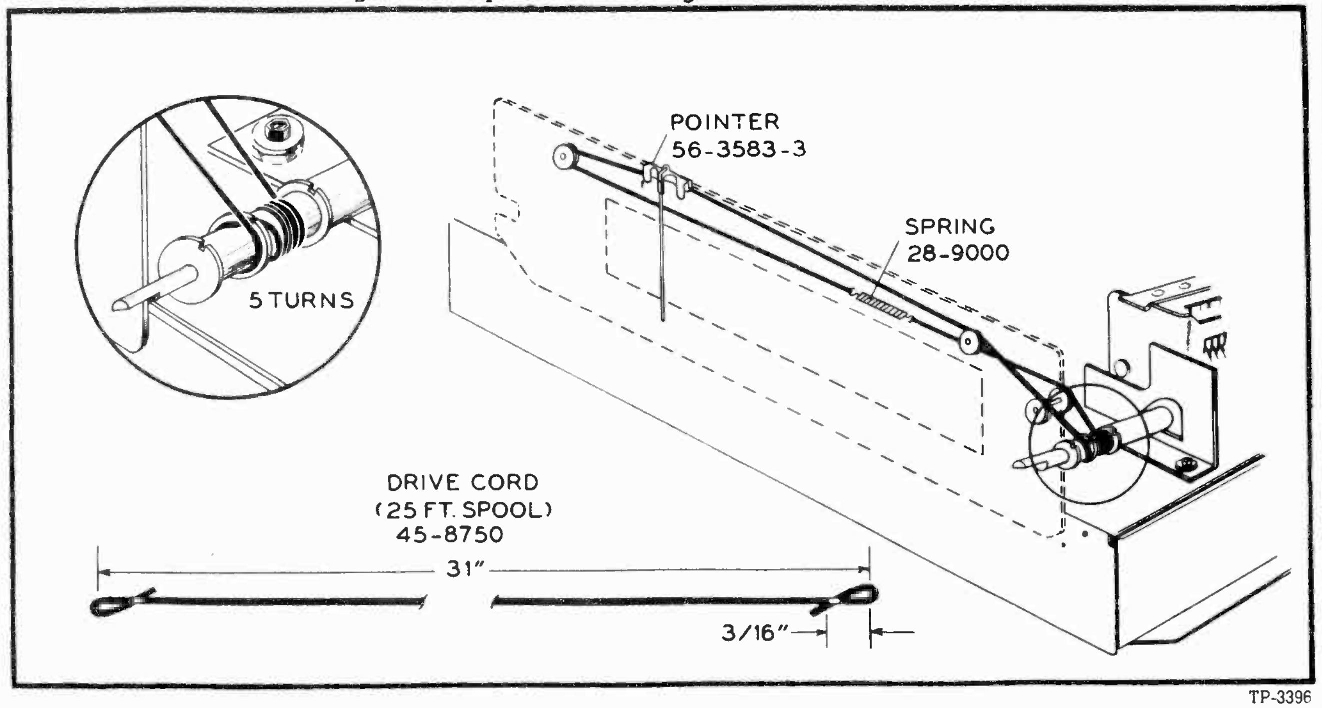


Figure 8. Drive-Cord Installation Details

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .05 mf	61-0122*
C101	Condenser, electrolytic, filter, 15 mf	30-2575-11
C102	Condenser, electrolytic, filter, 15 mf	30-2575-11
C103	Condenser, electrolytic, 2-section filter	30-2575-17
C103A:	Condenser, electrolytic, filter, 75 mf	Part of C103
C103B:	Condenser, electrolytic, filter, 10 mf	Part of C103
I100	Panel lamp	34-2477*
R100	Resistor, filter, 500 ohms	33-3435-3
R101	Resistor, filter, 82,000 ohms	66-2824340
R102	Resistor, leakage, 120,000 ohms	66-4123340
S100	Switch, on-off, power	42-1816-1
W100	Line cord	41-3755-13

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, audio by-pass, .2 mf	45-3500-3*
C201	Condenser, blocking, .01 mf	61-0120*
C202	Condenser, blocking, .01 mf	61-0120*
C203	Condenser, by-pass, 220 mmf	60-10205307*
C204	Condenser, tone compensator, .01 mf	61-0120*
C205	Condenser, tone compensator, .05 mf	61-0122*
LS200	Loud-speaker	36-1626
R200	Volume control, .5 megohm	33-5539-22
R201	Resistor, grid return, 10 megohms	66-6103340*
R202	Resistor, plate load, 220,000 ohms	66-4223340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*
R204	Resistor, cathode bias, 130 ohms	66-1133260
S201	Tone-control switch	Part of S100
T200	Output transformer	32-8242-3
WS1	Wafer switch, radio-phono	42-1824-1

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, by-pass	Part of Z301
C301D	Condenser, by-pass	Part of Z301
C302	Condenser, by-pass, .05 mf	61-0122*
C303	Condenser, coupling, 220 mmf	60-10205307*
C304	Condenser-and-choke assembly, .05 mf	38-9851-4
C305	Condenser-and-choke assembly, .15 mf	38-9851-5
C306	Condenser, by-pass, .003 mf	61-0109*
C307	Condenser, by-pass, 100 mmf	60-10105407*
C308	Condenser, a-v-c by-pass, .05 mf	61-0122*
R300	Resistor, screen dropping, 33,000 ohms	66-3333340*
R301	Resistor, plate load, 18,000 ohms	66-3183340*
R302	Resistor, grid load, 470,000 ohms	66-4473340*
R303	Resistor, plate dropping, 82,000 ohms	66-2823340*

SECTION 3—Continued

Reference Symbol	Description	Service Part No.
R304	Resistor, diode load, 47,000 ohms	Part of Z301
R305	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
Z300	Transformer, 1st i. f., 455 kc., includes C300A and C300B	32-4151-1
Z301	Transformer, 2nd i. f., 455 kc., includes C301A, C301B, C301C, and C301D	32-3948-9

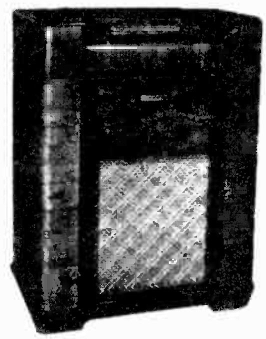
SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	33-5539-22
C400A:	Condenser, trimmer	Part of C400
C400B:	Condenser, trimmer	Part of C400
C401	Condenser, compensating, 33 mmf	60-00305307*
C402	Condenser, series blocking, 4.7 mmf	30-1221-5
C403	Condenser, isloating, .1 mf	61-0113*
C404	Condenser, coupling, 470 mmf	60-10515307*
C405	Condenser, osc. plate, 220 mmf	60-10205307*
C406	Condenser, osc. grid, 100 mmf	60-10105407*
C407	Condenser, by-pass, .05 mf	61-0122*
LA400	Loop aerial	76-3310
R400	Resistor, ext. aerial loading, 120,000 ohms	66-4123340
R401	Resistor, oscillator grid, 47,000 ohms	66-3473340*
R402	Resistor, cathode bias, 2200 ohms	66-2223340*
R403	Resistor, plate dropping, 18,000 ohms	66-3183340*
R404	Resistor, grid return, 2.2 megohms	66-5223340*
L400	Coil, oscillator	32-4019-6

MISCELLANEOUS

Description	Service Part No.
Cabinet less scale, Mahogany	10706A
Cabinet less scale, Light Walnut	10706B
Back, cabinet	54-7540-1
Baffle and cloth assembly	219109
Baffle and cloth	40-6991-1
Bezel	56-5367
Bin mechanism (l.h.)	76-3223
Bin mechanism (r.h.)	76-3223-1
Dome	45-6190
Door pull	56-4420-2
Drop door	45-6447
Feet, wood	45-6423
Frame assembly (changer mtg.)	76-3222-1
Hinge	56-4066
Instrument panel	45-6422
Spring, bin mechanism	56-4978
Cable, pickup	41-3837-3
Condenser, crystal isolating, .01 mf	61-0120*
Dial Scale	27-5999
Backplate	76-3713
Drive cord (25-ft. spool)	45-8750*
Pointer	56-3583-3
Strap	56-4756
Spring, drive cord	28-8953
Knob	54-4486-2
Lamp bracket	56-2332
Pilot-light assembly	27-6233
Resistor, crystal load, 1 megohm	66-5103340*
Socket, octal	27-6174
Socket, Loktal	27-6138*

To reduce phonograph rumble, a 1 megohm resistor, part number 66-5103340, has been added across the crystal pickup.



MODEL 48-1263

Circuit Description

Philco Model 48-1263 is a console model radio-phonograph combination consisting of an eight-tube superheterodyne radio and a Philco Model D-10 Automatic Record Changer. The radio provides reception within the standard broadcast band, 540 to 1720 kc., and within the short-wave band, 9.3 to 15.5 mc.

The built-in loop aerial is usually adequate for normal reception, but provision is made for connecting an external aerial if additional pickup is required.

A 7AF7 dual-triode converter is used to provide high signal-to-noise ratio. Oscillator-to-mixer coupling is made by a condenser connected between the cathodes of the mixer and oscillator. On the short-wave band, reverse feedback from the oscillator to the mixer is applied through a 10-mmf. condenser to minimize the reaction on the oscillator frequency caused by adjustment of the aerial trimmer.

Two i-f amplifier stages, operating at 455 kc. and using type 7A7 pentodes, provide high gain and good selectivity. The diode section of the 7C6 dual-diode triode operates as the detector and a-v-c rectifier, while the triode section operates as the first audio amplifier. The type 6J5GT triode functions as a phase inverter and drives the two 6K6GT beam-power output tubes in push-pull operation.

The audio section employs inverse feedback to provide bass compensation and to reduce distortion. The feedback takes place from the secondary of the output transformer to the input of the first audio stage. The tone control is continuously variable, and, when rotated clockwise, provides: first, an increase in bass response, and then, as rotation is continued, attenuation of the higher audio frequencies. The 12-inch electrodynamic loud-speaker is capable of excellent bass reproduction.

SPECIFICATIONS

CABINET	Wood, walnut finish
CIRCUIT	Eight-tube superheterodyne
FREQUENCY RANGES	Broadcast: 540 to 1720 kc. Short Wave: 9.3 to 15.5 mc.
AUDIO OUTPUT	6 watts
OPERATING VOLTAGE	117 volts, 60-cycle, a.c.
POWER CONSUMPTION	Radio, 110 watts Phonograph, 20 watts
AERIAL	Built-in low-impedance loop
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (8)	7AF7, 7A7 (2), 7C6, 6J5GT, 6K6GT (2), 5Y3GT
PHONOGRAPH	Philco Automatic Record Changer Model D-10. (For service information, refer to PR-1156.)

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube-electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Carefully inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for broken or shorted connections, burned resistors, or other obvious sources of trouble.
2. Measure the resistance between B+ (pin 8 of the 5Y3GT rectifier) and the radio chassis, test point C. When the ohmmeter leads are connected in the proper polarity, the highest resistance reading will be obtained. This reading should be not lower than 3400 ohms. If it is lower, check condensers C101 and C102A for leakage or shorts.

The above resistance value is not intended as a quality check of these condensers. It is the lowest value at which the rectifier will operate safely while the voltage tests of Section 1 are being performed.

Section 1 TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to the radio chassis, test point C; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

Set the wafer switch to BC, turn the volume control to minimum, and turn the tone control fully counterclockwise.

Follow the steps in sequence; if the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

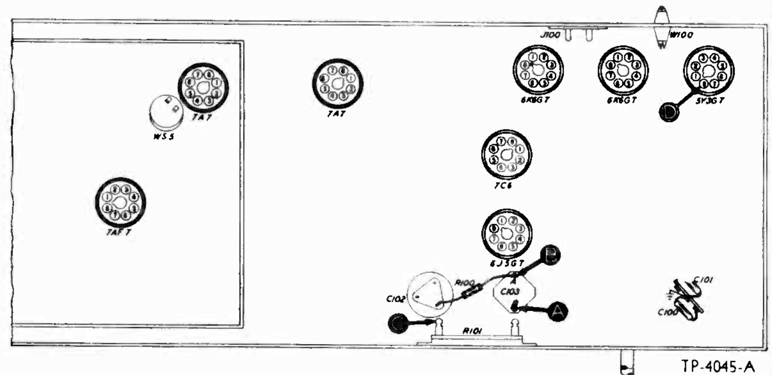


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	235v		Trouble within this section. Isolate by the following tests.
2	D	340v	No voltage Low voltage High voltage	Defective: 5Y3GT, S100, T100. Shorted: C102. Defective: 5Y3GT, T100. Open: C102. Leaky: C102. Shorted: C103A, C103B. Open: L100, R100, T200*.
3	B	235v	No voltage Low voltage	Open: R100. Shorted: C102A. Leaky: C103A. Shorted: C304*, C308*, C407*.
4	A	235v	No voltage Low voltage High voltage	Open: L100, R101. Shorted: C305*. Shorted: C309*, C410*. Defective: T200*. Defective: T200*.
Listening Test: Abnormal hum may be caused by open-circuited C102, C103A, or C103B.				

*This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to the radio chassis, test point C; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, turn the tone control fully counterclockwise, and set the wafer switch to BC. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed to the tests in Section 3; if not, isolate and correct the trouble in this section.

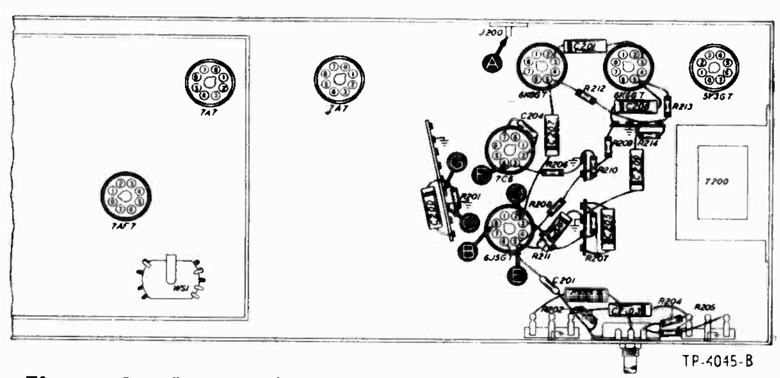


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	B	(Remove 6J5GT.) Loud, clear signal with strong signal input.	Defective: 6K6GT, T200, LS200. Open: C208, R213. Shorted: C208. Leaky: C208.
3	D	Same as step 2.	Defective: 6K6GT, T200, LS200. Open: C207, R212. Shorted: C207. Leaky: C207.
4	E	(Replace 6J5GT.) Loud, clear signal with moderate signal input.	Defective: 6J5GT. Open: R209, R210, R211. Shorted: C206. Leaky: C206.
5	F	Loud, clear signal with weak signal input.	Open: C206, R207. (Rotate volume control through its range.) Shorted: C205, C204. Leaky: C204. Defective: 7C6.
6	A	Same as step 5.	Defective: WS1(F), R200. Open: C200, C202, R204, R206.
7	G	Same as step 5. (Set wafer switch to phono.)	Defective: WS1(F), PL200. Open: R201.
Listening Test: Distortion may be caused by leaky C202, C206, C207, C208, C209, or C200, or by shorted C209 or open-circuited R214. Hum will result if C209 is open-circuited.			

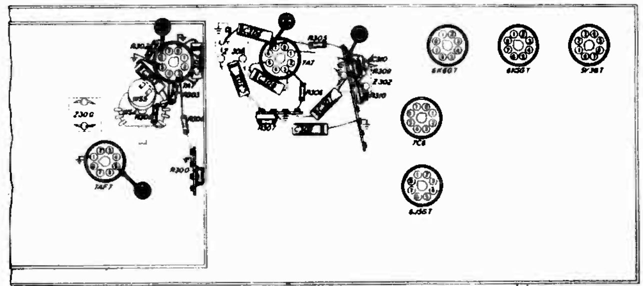
MODEL 48-1263 PHILCO CORP.

Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the radio chassis, test point C; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the wafer switch to BC, turn the volume control to maximum and turn the tone control fully counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.



TP-4045-C

Figure 3. Bottom View, Showing Section 3 Test Points

NOTE: Since the circuit location for test point A of this section is the same as that for test point B of Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

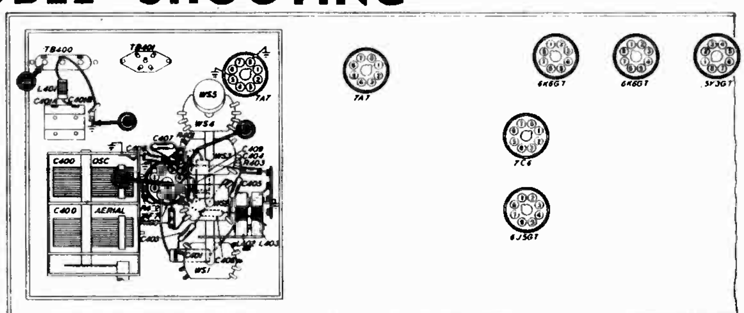
STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	B	Loud, clear signal with moderate signal input.	Defective: 7C6, Z302, 7A7, WS1 (R). Misaligned: Z302. Open: C306, C308, C309, R305, R306, R307, R309. Shorted: C306, C308, C309, C310. Leaky: C306, C308, C309.
3	D	Loud, clear signal with weak signal input.	Defective: 7A7, Z301. Misaligned: Z301. Open: C303, C304, C305, C307, R301, R302, R303, R304. Shorted: C303, C304, C305, C307.
4	A	Loud, clear signal with weak signal input.	Defective: 7AF7*, WS3 (F)*, Z300. Misaligned: Z300. Open: C410*, L402*, R402*.

* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section (with the exception of the oscillator tests), use an r-f signal generator with modulated output. Connect the generator ground lead to the radio chassis, test point C; connect the generator output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the volume control to maximum and the tone control fully counterclockwise. Set the wafer switch, signal generator dial, and radio dial as indicated in the chart.

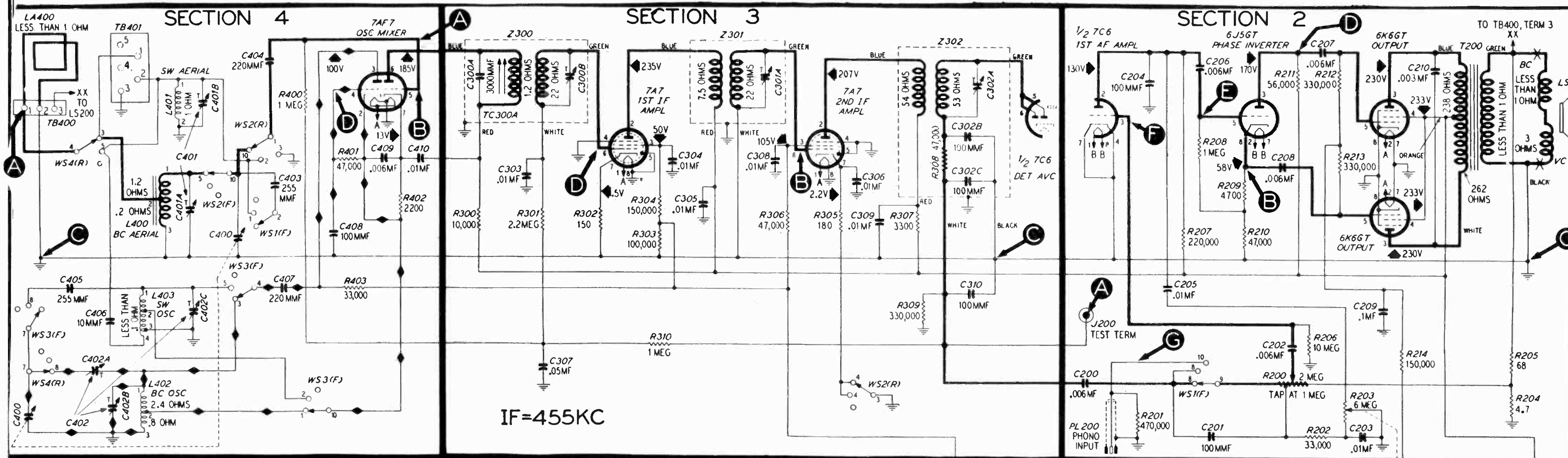


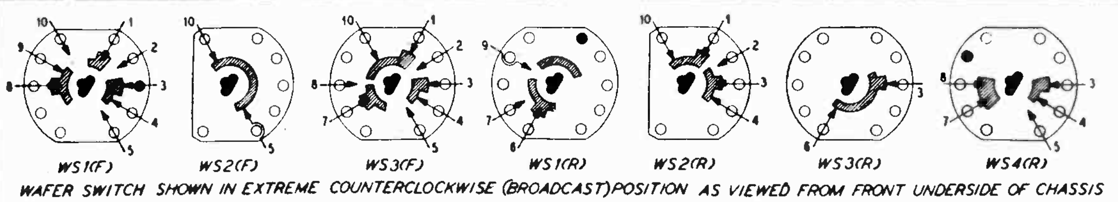
TP-4045-D

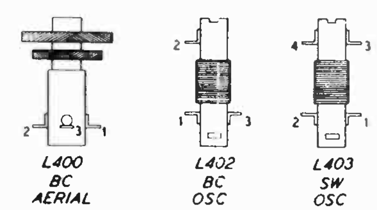
Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	WAFER SWITCH	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
			SIG. GEN.	RADIO		
1A	A	BC	1000 kc.	1000 kc. (tune to signal)	Loud, clear signal with weak signal input.	Trouble within BC circuits. Isolate by performing steps 2, 3, and 4.
1B	A	SW	15 mc.	15 mc. (tune to signal)	Loud, clear signal with weak signal input.	Trouble within SW circuits. Isolate by performing steps 5 and 6.
2	B	BC	1000 kc.	1000 kc. (tune to signal)	Loud, clear signal with moderate signal input.	Defective: 7AF7, Osc. circuit. Open: C409, R400.
3	D (Osc. test; see Note below.)	BC	Not used	Rotate through range	Negative voltage 5 to 7 volts.	Defective: 7AF7, WS3, WS4. Open: R403, R401, L402, C407, C408. Shorted: C400, C402B, C407, C408. Leaky: C407, C408
4	A	BC	1000 kc.	1000 kc. (tune to signal)	Loud, clear signal with weak signal input.	Defective: WS2, WS4, L400. Open: C404. Shorted: C400, C401A, C404. Leaky: C404.
5	D (Osc. test; see Note below.)	SW	Not used	Rotate through range	Negative voltage 2 to 3 volts.	Defective: 7AF7, WS3, WS4, L403. Shorted: C402C, C405. Open: C405.
6	A	SW	15 mc.	15 mc. (tune to signal)	Loud, clear signal with weak signal input.	Defective: 7AF7, WS2, WS4, L401. Shorted: C401B, C403. Open: C404. Leaky: C404.

OSCILLATOR-TEST NOTE: Connect positive lead of high-resistance d-c voltmeter to radio chassis, test point C; connect prod end of negative meter lead through 100,000-ohm isolating resistor to oscillator grid, test point D. Use suitable meter range, such as 0 to 10 volts. Proper operation of oscillator is indicated by negative voltage within limits shown in "NORMAL INDICATION" column throughout range of tuning control. Indicated values were measured with 20,000-ohms-per-volt meter.







SYMBOLIZATION

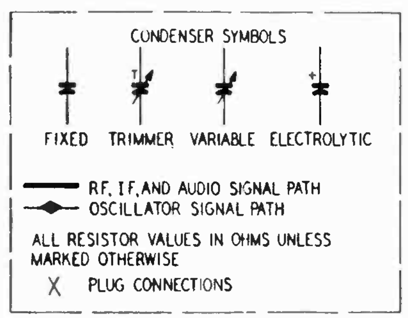
The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C —condenser	LA—loop aerial	S —switch	WS—wafer switch
I —pilot lamp	LS—loud-speaker	T —transformer	Z —electrical assembly
L —choke or coil	R —resistor	W —power cord and plug	

The number of the symbol designates the section in which the part is located, as follows:

100-series components are in Section 1, the power supply.
200-series components are in Section 2, the audio circuits.
300-series components are in Section 3, the i-f amplifier, detector, and a-v-c circuits.
400-series components are in Section 4, the aerial, r-f, and oscillator circuits.

A suffix letter identifies the part as a non-replaceable component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.



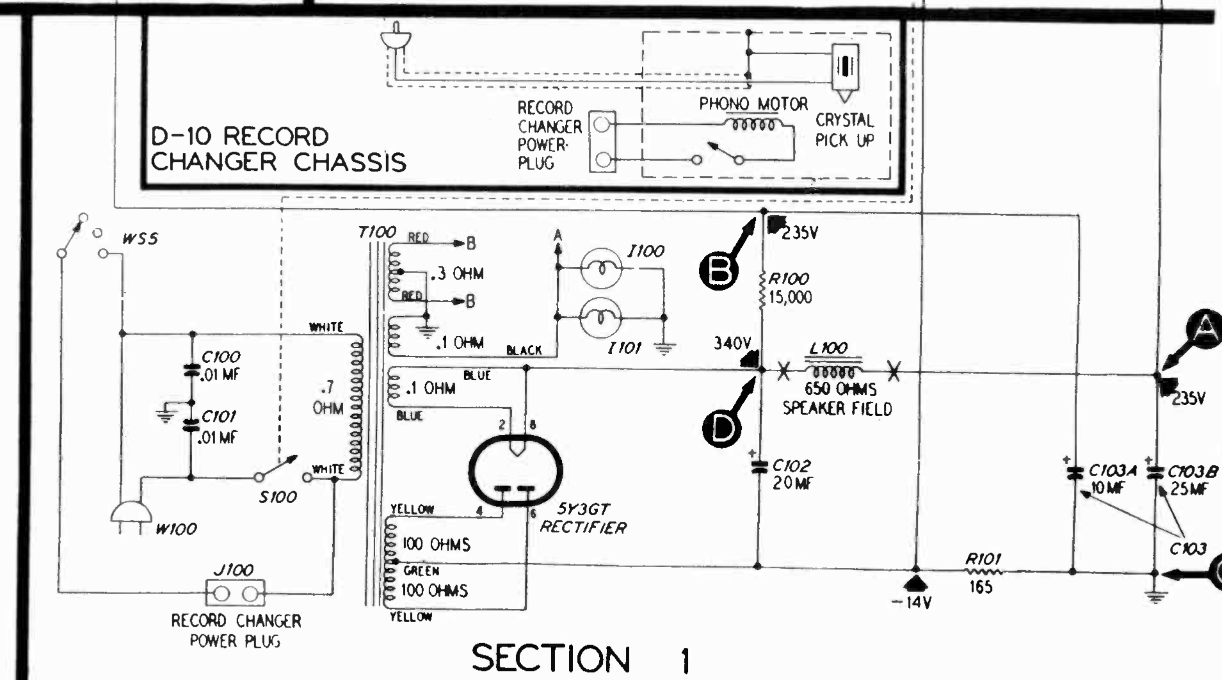


Figure 5. Philco Radio-Phonograph Model 48-1263, Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

CAUTION: Do not turn on the radio with the loud-speaker disconnected.

NOTE: Make alignment with loop aerial connected to the radio.

DIAL: Calibration and pointer-index measurements are shown in figure 6. With tuning gang fully meshed, set pointer to index mark.

OUTPUT METER: Connect to terminals indicated in figure 7.

SIGNAL GENERATOR (modulated): Connect as indicated in chart.

OUTPUT LEVEL: During alignment, adjust signal-generator output to maintain output-meter indication below 1.5 volts. Set volume control fully clockwise and tone control fully counterclockwise.

STEP	SIGNAL GENERATOR		RADIO			
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	WS POSITION	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to Terminal 1 of TB400.	455 kc.	540 kc.	BC	Adjust for maximum, ONCE only, in order.	C302A C301A C300B TC300
2	Radiating loop (see Note below).	580 kc.	580 kc.	BC	Adjust for maximum.	C402A
3	Same as step 2.	1700 kc.	1700 kc.	BC	Adjust for maximum.	C402B
4	Same as step 2.	1500 kc.	1500 kc.	BC	Adjust for maximum.	C401A
5	Same as step 2.	580 kc.	580 kc. (approx.)	BC	Rock tuning control while adjusting for maximum.	C402A
6	Repeat steps 3, 4, 5, and 3, in order, until no improvement results.					
7	Same as step 2.	15 mc.	15 mc.	SW	Adjust for maximum on FIRST peak from loose position. Image should be heard at 14.1 mc.	C402C
8	Same as step 2.	15 mc.	15 mc.	SW	Adjust for maximum.	C401B

RADIATING-LOOP NOTE: Make up a 6—8-turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator lead and place near radio loop aerial.

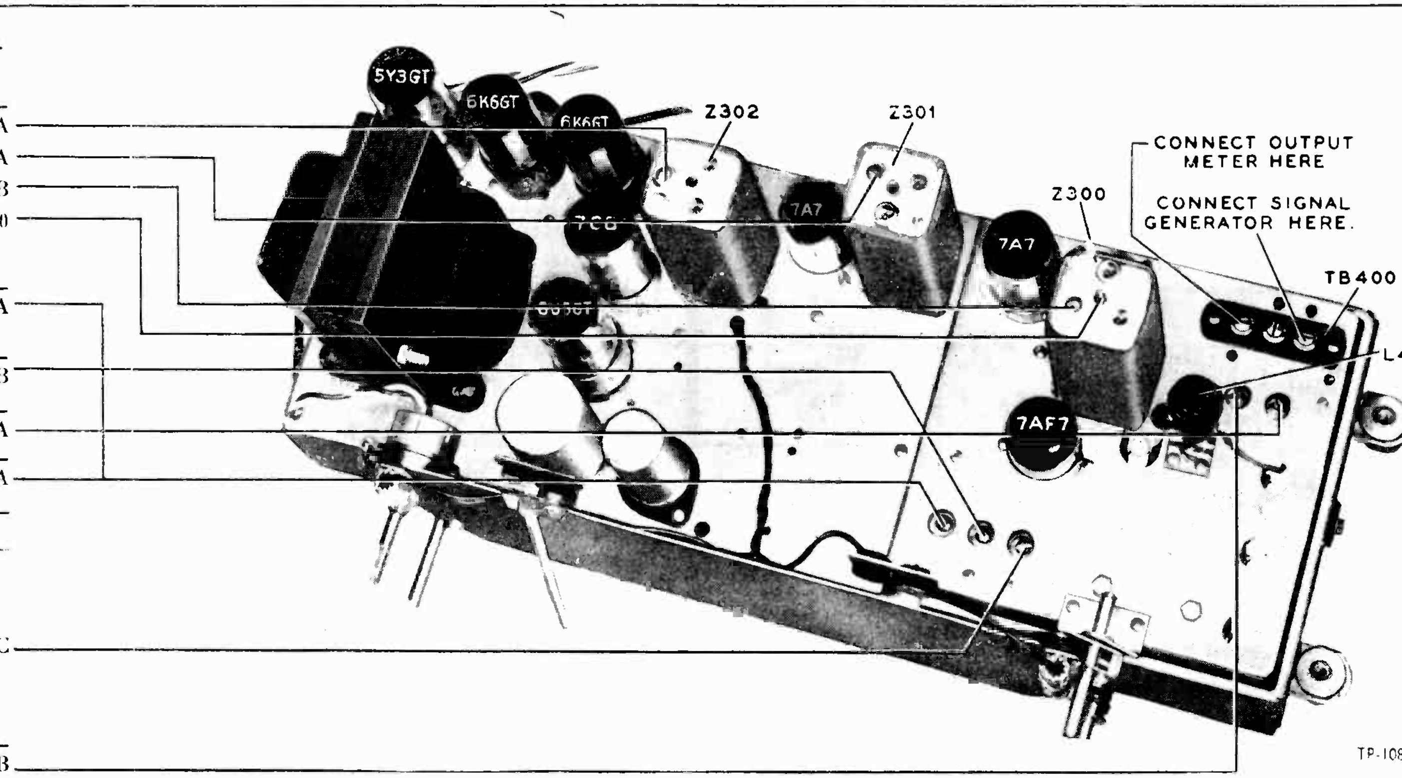


Figure 7. Top View, Showing Trimmer Locations

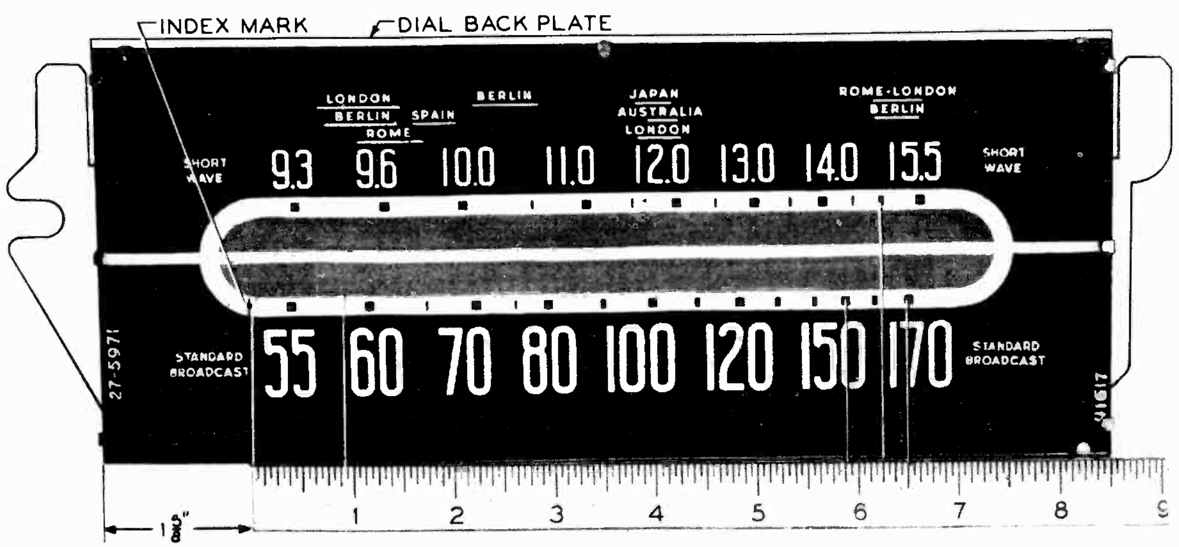


Figure 6. Calibration Measurements for Dial Backplate TP-2780

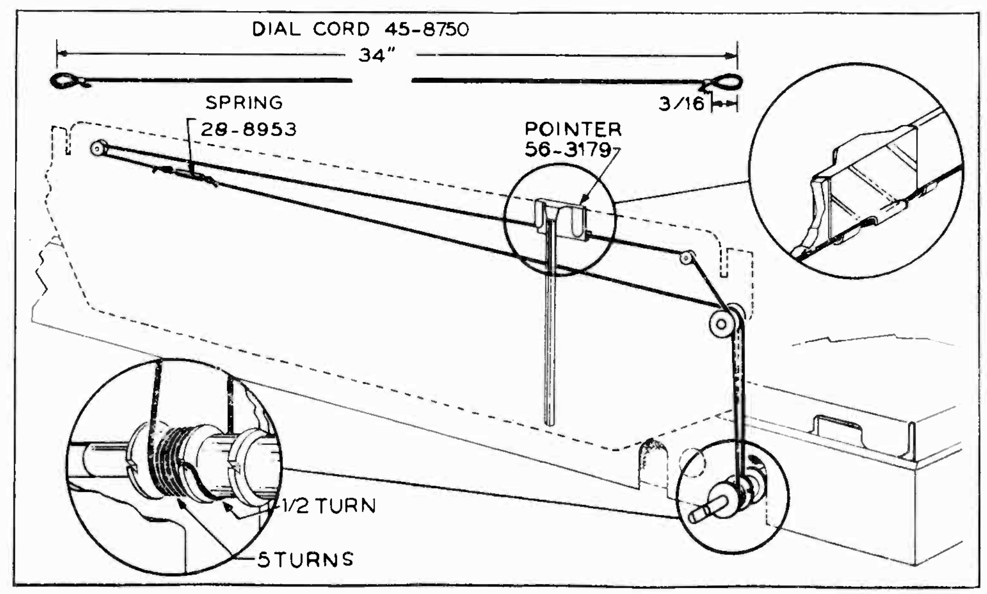


Figure 8. Drive-Cord Installation Details TP-1653-1

PHILCO CORP. MODEL 48-1263

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No.".

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .01 mf	61-0120*
C101	Condenser, line filter, .01 mf	61-0120*
C102	Condenser, electrolytic, filter, 20 mf	30-2555
C103	Condenser, two-section, electrolytic	30-2556
C103A	Condenser, filter, 10 mf	Part of C103
C103B	Condenser, filter, 25 mf	Part of C103
I100	Panel lamp	34-2040
I101	Panel lamp	34-2040
J100	Record-changer power socket	27-6200
L100	Speaker, field	Part of LS200
R100	Resistor, screen dropping, 15,000 ohms	66-3155340
R101	Resistor, grid bias, 165 ohms	33-3435-1
S100	Power switch	Part of R203
T100	Power transformer	32-8248
W100	Line cord and plug	L3339
WS5	Wafer switch	Part of WS

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .006 mf	45-3500-7*
C201	Condenser, r-f by-pass, 100 mmf	60-10105407*
C202	Condenser, d-c blocking, .006 mf	45-3500-7*
C203	Condenser, tone compensation, .01 mf	61-0120*
C204	Condenser, r-f by-pass, 100 mmf	60-10105407*
C205	Condenser, tone compensation, .01 mf	61-0120*
C206	Condenser, d-c blocking, .006 mf	45-3500-7*
C207	Condenser, d-c blocking, .006 mf	45-3500-7*
C208	Condenser, d-c blocking, .006 mf	45-3500-7*
C209	Condenser, audio by-pass, .1 mf	61-0113*
C210	Condenser, tone compensation, .003 mf	61-0109*
J200	Test socket	27-6180
LS200	Loud-speaker	36-1595
R200	Volume control, 2 megohms	33-5535-1
R201	Resistor, crystal load, 470,000 ohms	66-4473340*
R202	Resistor, tone compensation, 33,000 ohms	66-3333340*
R203	Tone control, 6 megohms	33-5538-1
R204	Resistor, feedback voltage divider, 4.7 ohms	473340
R205	Resistor, feedback voltage divider, 68 ohms	66-0683340*
R206	Resistor, grid return, 10 megohms	66-6103340*
R207	Resistor, plate load, 220,000 ohms	66-4223340*
R208	Resistor, grid return, 1 megohm	66-5103340*
R209	Resistor, cathode bias, 4700 ohms	66-2473340*
R210	Resistor, cathode load, 47,000 ohms	66-3473340*
R211	Resistor, plate load, 56,000 ohms	66-3563340*
R212	Resistor, grid return, 330,000 ohms	66-4333340*
R213	Resistor, grid return, 330,000 ohms	66-4333340*
R214	Resistor, bias filter, 150,000 ohms	66-4153340*
WS1 (F)	Wafer switch	Part of WS
T200	Output transformer	32-8271

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed, 3000 mmf	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C302A	Condenser, trimmer	Part of Z302
C302B	Condenser, r-f by-pass, 100 mmf	Part of Z302
C302C	Condenser, r-f by-pass, 100 mmf	Part of Z302
C303	Condenser, r-f by-pass, .01 mf	61-0120*
C304	Condenser, r-f by-pass, .01 mf	61-0120*
C305	Condenser, r-f by-pass, .01 mf	61-0120*
C306	Condenser, r-f by-pass, .01 mf	61-0120*
C307	Condenser, a-v-c filter, .05 mf	61-0122*
C308	Condenser, r-f by-pass, .01 mf	61-0120*
C309	Condenser, r-f by-pass, .01 mf	61-0120*
C310	Condenser, r-f by-pass, 100 mmf	60-10105407*
R300	Resistor, plate dropping, 10,000 ohms	66-4103340*
R301	Resistor, a-v-c decoupling, 2.2 megohms	66-5223340*
R302	Resistor, cathode bias, 150 ohms	66-1153340*
R303	Resistor, screen voltage divider, 100,000 ohms	66-3103340*
R304	Resistor, screen voltage divider, 150,000 ohms	66-4153340*
R305	Resistor, cathode bias, 180 ohms	66-1183340*

SECTION 3 (Continued)

Reference Symbol	Description	Service Part No.
R306	Resistor, screen dropping, 47,000 ohms	66-3473340*
R307	Resistor, plate dropping, 33,000 ohms	66-2333340*
R308	Resistor, r-f filter, 47,000 ohms	66-3473340*
R309	Resistor, diode load, 330,000 ohms	66-4333340*
R310	Resistor, a-v-c filter, 1.0 megohm	66-5103340*
WS1 (R)	Wafer switch	Part of WS
Z300	Transformer, 1st i.f., 455 kc., includes C300A and C300B	32-3956-3
Z301	Transformer, 2nd i.f., 455 kc., includes C301A	32-3957-3
Z302	Transformer, 3rd i.f., 455 kc., includes C302A, C302B, and C302C	32-3955-3

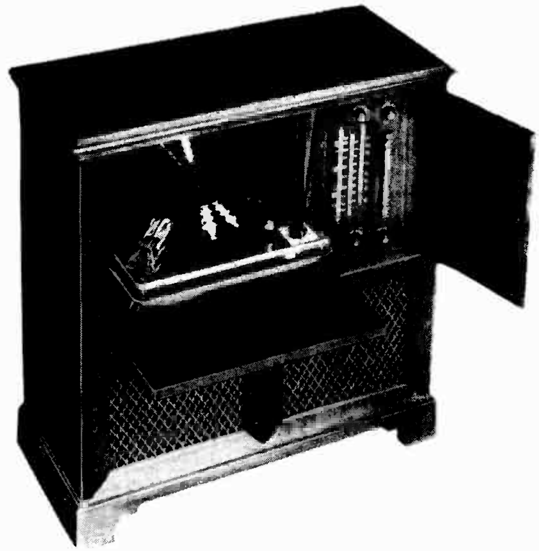
SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2719
C401	Condenser, antenna trimmer, two-section	31-6476-4
C401A	Condenser, trimmer	Part of C401
C401B	Condenser, trimmer	Part of C401
C402	Condenser, osc. trimmer and padder, three-section	31-6464
C402A	Condenser, padder	Part of C402
C402B	Condenser, trimmer	Part of C402
C402C	Condenser, trimmer	Part of C402
C403	Condenser, fixed, 255 mmf	30-1220-24*
C404	Condenser, d-c blocking, 220 mmf	60-10205307*
C405	Condenser, fixed, 225 mmf	30-1220-24
C406	Condenser, feedback, 10 mmf	60-00105407*
C407	Condenser, d-c blocking, 220 mmf	60-10205307*
C408	Condenser, oscillator feedback, 100 mmf	30-1225-2*
C409	Condenser, oscillator coupling, .006 mf	45-3500-7*
C410	Condenser, r-f by-pass, .01 mf	61-0120*
L400	Coil, BC aerial	32-4033-1
L401	Coil, SW aerial	32-4050-6
L402	Coil, BC osc.	32-4019-2
L403	Coil, SW osc.	32-4113
LA400	Loop aerial	76-1989-2
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, grid leak, 47,000 ohms	66-3473340*
R402	Resistor, cathode bias, 2200 ohms	66-2223340*
R403	Resistor, plate dropping, 33,000 ohms	66-3333340*
TB400	Terminal panel, aerial	27-6213
TB401	Socket, 5-prong, external aerial	27-6214-1
WS	Switch, wafer, five-section	42-1813

MISCELLANEOUS

Description	Service Part No.
Cabinet (less scale)	10682
Baffle and cloth	40-6933
Bezel	56-4878
Bin mechanism (R.H.)	76-3223-3
Bin mechanism (L.H.)	76-3223-2
Domes	45-6042
Door pull	56-4867
Frame assembly	76-2199
Hinge	45-6200
Scale strap	56-4916
Scale and backplate	76-3187
Speaker grille	56-4920
Wood baffle	219085
Dial backplate assembly	76-2005-3
Drive cord (25-ft. spool)	45-8750*
Pointer	56-3179
Spring, pointer	28-8953
Knob	54-4376
Link assembly (wafer switch)	76-2186-3
Phono cable	41-3735-2
Pilot light assembly	76-2109
Shaft (wafer switch)	56-3298FA11
Shield, cable (7")	47-3754-5
Shield, cable (6")	47-3754-11
Speaker cable	41-3701
Socket, Loktal	27-6138*
Socket, octal	27-6174

MODEL 48-1270 PHILCO CORP.



PHILCO RADIO-PHONOGRAPH
MODEL 48-1270

Circuit Description

Philco Radio-Phonograph, Model 48-1270, contains a 13-tube superheterodyne, providing reception on the standard-broadcast band, 540 to 1720 kc., the short wave range between 9.3 and 15.5 mc., and the FM band 88 to 108 mc.

A low-impedance loop within the cabinet provides adequate signal pickup for the standard-broadcast and short-wave bands. In most locations, the built-in FM dipole aerial provides satisfactory FM reception. In areas where FM signals are weak, an outdoor dipole aerial (Philco Part No. 45-1462) will provide additional pickup.

The r-f stage (FM only), converter stage, and first i-f stage are mounted on a separate chassis to insure reliable performance at high frequencies. A 7W7 high-frequency pentode is used in the r-f stage, and a 7F8 high-frequency double triode is employed as a converter. These stages provide high signal-to-noise ratio, high conversion efficiency, and good image rejection. The FM tuning gang is constructed with copper plates to obtain the high Q required for proper selectivity.

Three transformer-coupled i-f stages are used. The first, third, and fourth i-f transformers have two sets of windings; one set is tuned to 455 kc. for AM operation, and the other to 9.1 mc. for FM operation. The second i-f transformer, having a single primary winding tuned to 9.1 mc., one secondary winding tuned to 9.1 mc., and another secondary winding tuned to 455 kc., provides untuned-primary, tuned-secondary coupling on AM, to prevent instability. All transformers provide tuned-primary, tuned-secondary coupling on FM, to supply the additional gain needed at 9.1 mc. Switching of the windings, to attenuate undesired beat frequencies, is necessary only in the first i-f transformer; the large difference between the two intermediate frequencies makes further switching unnecessary. One 7B7 and two 7H7 high-transconductance pentodes are used in the i-f stages.

The new Philco advanced FM detector circuit, employing the FM1000 tube of special design, is used for FM reception. This circuit has excellent tuning characteristics, and inherently rejects AM and noise. Very briefly, the circuit functions as follows: The first and second grids (pins 2 and 5) of the FM1000 are used as grid and anode, respectively, of a modified Colpitts

SPECIFICATIONS

CABINET	Wood, mahogany or walnut finish
CIRCUIT	13-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1720 kc.
Short wave	9.3—15.5 mc.
FM	88—108 mc.
AUDIO OUTPUT	10 watts
PUSH BUTTONS	Ten: One for OFF, five for broadcast-station selection, three for band selection and one for phonograph operation
OPERATING VOLTAGE	105—120 volts, 60 cyles, a.c.
POWER CONSUMPTION	Radio: 110 watts Phonograph: 140 watts
AERIALS	Built-in loop and dipole; external aerial also may be used
INTERMEDIATE FREQUENCY	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (13)	7W7, 7F8, 7H7(2), 7B7, FM1000, 7AF7, 6SQ7GT, 6V6GT(2), 7F7, 7E7, 5U4G
RECORD PLAYER	Philco Automatic Record Changer, Model M-4

oscillator, which nominally operates at the intermediate frequency of 9.1 mc. The output of the i-f amplifier stages is fed into the injection grid (pin 6). The reactive coupling between the plate and oscillator circuits causes the oscillator to lock in and follow the frequency variations of the i-f signal. As the oscillator frequency increases, the plate current through R324 decreases, and as the oscillator frequency decreases, the plate current increases. This variation is linear with respect to frequency deviation; the plate current, therefore, produces the same wave shape as the modulation of the FM carrier. This audio signal is fed to the audio amplifier through the decoupling network, C331 and R322.

The high-mu-triode section of a 6SQ7GT is used in the first audio stage, and is biased from the bleeder in the negative return of the power supply. The first audio stage is resistance-coupled to one triode section of a 7AF7 twin-triode. This section functions as a cathode-and-plate-loaded phase inverter, and is resistance-coupled to the audio output stage, which employs two 6V6GT beam pentodes in push-pull combination. The output tubes are transformer-coupled to a twelve-inch electrodynamic speaker, and are biased from the bleeder circuit connected across the speaker field in the negative return of the power supply. Inverse feedback is obtained by connecting the secondary of the output transformer, through the resistor network, R203 and R204, to the volume control. The second triode section of the 7AF7 tube is used as the phonograph preamplifier stage, and is self-biased by cathode resistor R213.

The new Philco scratch-eliminator circuit reduces the high-frequency surface noise during the low-volume passages on a phonograph record, and permits maximum treble response during the high-volume passages. The circuit consists of a reactance tube (pentode section of the 7E7), a two-stage amplifier (7F7), and a half-wave rectifier (diode section of the 7E7). The reactance tube (connected to the plate circuit of the phono amplifier) functions as a variable capacitance which shunts a controlled amount of the surface-noise frequencies to ground. A portion of the audio signal is amplified, rectified, and applied as a bias voltage to the grid of the reactance tube. During the low-volume passages, when the surface noise tends to mask the high frequencies, the low bias voltage increases the capacitance of the reactance tube, and the surface noise is reduced. During the high-volume passages, when the surface noise itself is masked by the volume, the high bias voltage decreases the capacitance of the tube, thus permitting all audio frequencies to pass relatively unaffected.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring the tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before turning on the power:

1. Inspect the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.
2. Measure the resistance between B+ (pin 2 of the 5U4G) and the radio chassis (test point C). When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1000 ohms, check condensers C101A, C101B, C101C, C102, and C103 for leakage or shorts.

This resistance value, which is much lower than normal, is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 are performed.

Symbolization

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part, as follows:

C—condenser	LS—loud-speaker	W—line cord
I—pilot lamp	PB—push button	TB—terminal board
J—socket	R—resistor	WS—wafer switch
L—choke or coil	S—switch	Z—electrical assembly
LA—loop aerial	T—transformer	

The number of the symbol, except when the number is less than 100, designates the section in which the part is located, as follows:

100-series components are in Section 1—the power supply.
200-series components are in Section 2—the audio and scratch-eliminator circuits.
300-series components are in Section 3—the i-f amplifier, detector, & a-v-c circuits.
400-series components are in Section 4—the aerial, r-f, and oscillator circuits.

A suffix letter identifies the part as a non-replaceable component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.

Section 1 TROUBLE SHOOTING

CAUTION: Do not turn on the power with the speaker disconnected, or the radio may be damaged.

For the tests in this section, use a d-c voltmeter. Connect the negative lead to the chassis (test point C); connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

Depress the BC push button, set the volume control to minimum, and turn both tone controls counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

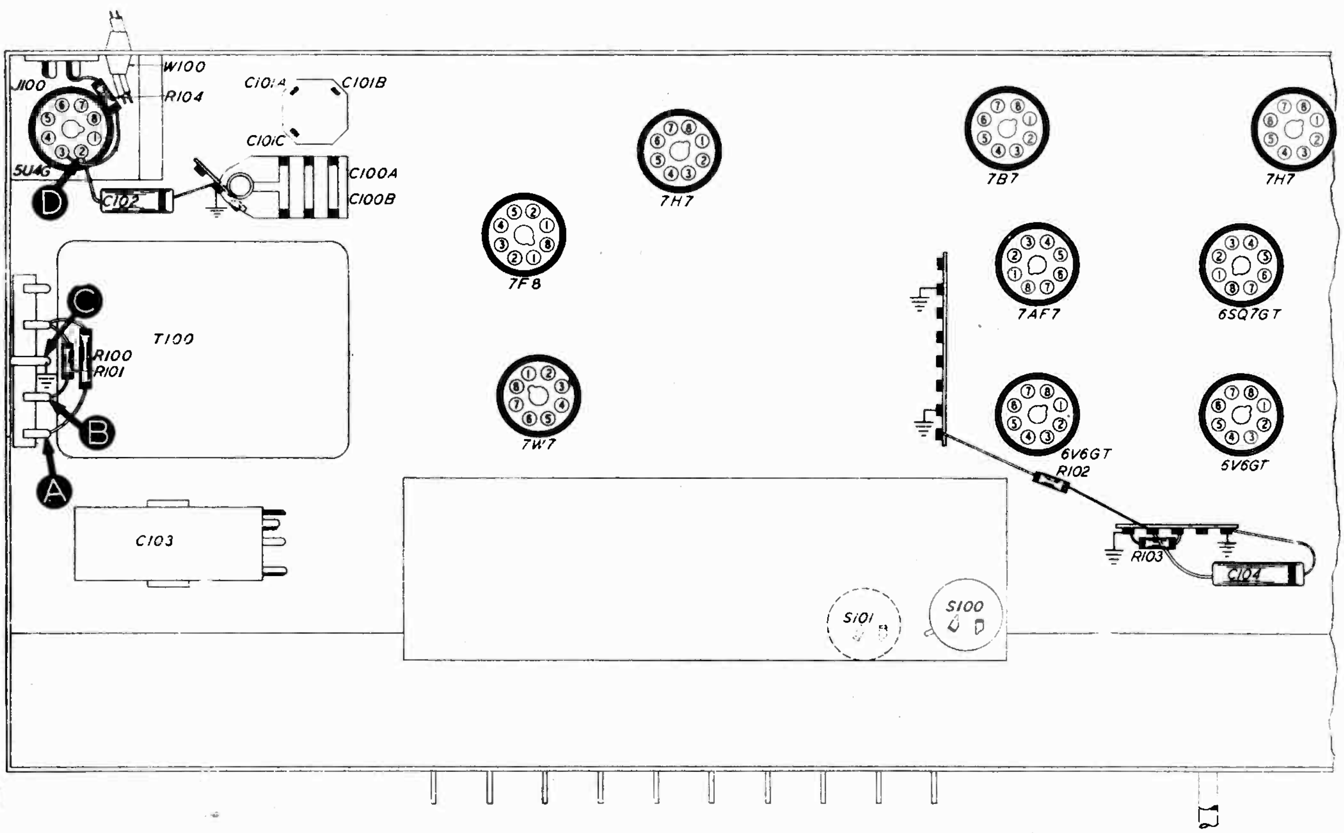


Figure 2. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A B	220v 200v		Trouble within this section. Isolate by the following tests.
2	D	250v	No voltage	Defective: 5U4G, T100, W100, S100. Shorted: C101C, C102, C316*, C317*. Open: L100, C316*.
			Low voltage	Defective: 5U4G, T100. Leaky: C101C, C102, C103, C316*, C317*. Open: R102.
			High voltage	Defective: 6V6GT*. Open: R103, T200*.
3	B	200v	No voltage	Open: R101. Shorted: C101B, C417*, C419*, C421*.
			Low voltage	Defective: R101. Leaky: C101B, C417*, C419*, C421*.
			High voltage	Defective: 6V6GT*, T200*.
4	A	220v	No voltage	Open: R100. Shorted: C101A.
			Low voltage	Defective: R100. Leaky: C101A.

Listening Test: Abnormal hum may be caused by open C101A, C101B, C101C, or C103.

*This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

AUDIO-CIRCUIT TESTS

For the tests in the audio circuit, use an audio signal generator. Connect the ground lead of the generator to the chassis (test point C); connect the output lead through a .1-mf. condenser to the test points indicated.

Set the radio volume control to maximum, turn both tone controls counterclockwise, and depress the phono push button.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the scratch-eliminator-circuit tests. If not, isolate and correct the trouble in the audio circuit.

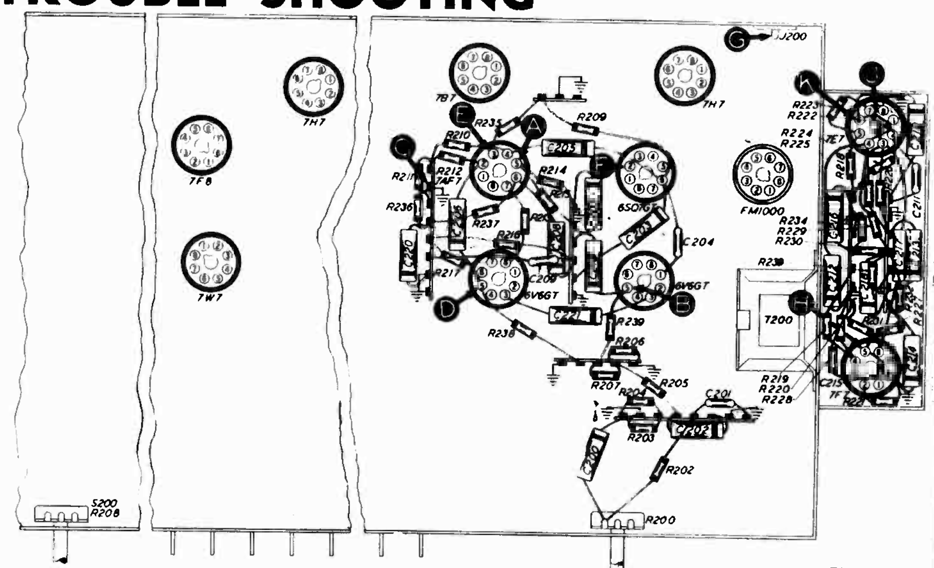


Figure 3. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in audio circuit. Isolate by the following tests.
2	B D	Loud, clear signal with strong signal input.	Defective: 6V6GT, T200, LS200, R238, R239. Shorted or leaky: C221. Open: C104.
3	E	Loud, clear signal with moderate signal input.	Defective: 7AF7, R211, R212, R235. Open: C206, C219. Shorted or leaky: C206, C219.
4	F	Loud, clear signal with weak signal input.	Defective: 6SQ7GT. Open: R208 (rotate through entire range), R209, R210. Shorted or leaky: C203, C204, C205.
5	G	Same as step 4.	Defective: R200, R203, R205, R206, R207. Shorted or leaky: C202.
6	A	Same as step 4.	Defective: 7AF7, R236, R237, PB9. Shorted or leaky: C220. Open: C208, R216, R217.

SCRATCH-ELIMINATOR-CIRCUIT TESTS

For the tests in the scratch-eliminator circuit, set the volume control to maximum, turn the bass tone control counterclockwise, and depress the phono push button. Set the scratch-eliminator switch, which is operated by the treble-tone-control knob, as directed in the chart.

Connect the output lead of an audio signal generator through a .1-mf. condenser to the test points indicated in the chart. Set the generator for an output frequency of 5000 cycles.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3; if not, isolate and correct the trouble in the scratch-eliminator circuit.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A (With scratch eliminator turned off, adjust generator for 2 volts across voice coil)	.8 volt across voice coil, with scratch eliminator turned on.	Trouble in scratch-eliminator circuit. Isolate by the following tests.
2	H (Adjust generator output to approximately .3 volt)	Approximately −6 volts* from J to C, with scratch eliminator turned on.	Defective: 7F7, 7E7 (diode section). Open: R231, R233, R234, C217. Shorted or leaky: C213, C217, C218.
3	A (Reduce generator output to maintain −6 volts* from J to C)	Considerable reduction in generator output required to maintain voltage from J to C at −6 volts.*	Defective: 7F7. Open: R228, C215, R221, R220, R219, C209. Shorted or leaky: C209, C214, C215.
4	A (Generator output reduced as in step 3)	−1.4 volts* from K to C.	Open: R222, R225, R226. Shorted or leaky: C210, C212, C213.
5	A (Generator adjusted as in step 1)	.8 volt across voice coil, with scratch eliminator turned on.	Defective: 7E7 (pentode section). Open: R218, R223, R224, C210, C211. Shorted or leaky: C211.

* Readings taken with 20,000-ohms-per-volt meter on 10-volt range, with 100,000-ohm resistor connected in series with negative lead.

Section 3

TROUBLE SHOOTING

AM CIRCUITS

For the following tests use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the radio chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Depress the BC push button, set the volume control to maximum, and turn both tone controls counterclockwise.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for the FM circuits. If not, isolate and correct the trouble in this section.

Since the circuit location of test point A for this section is the same as that of test point D for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION".

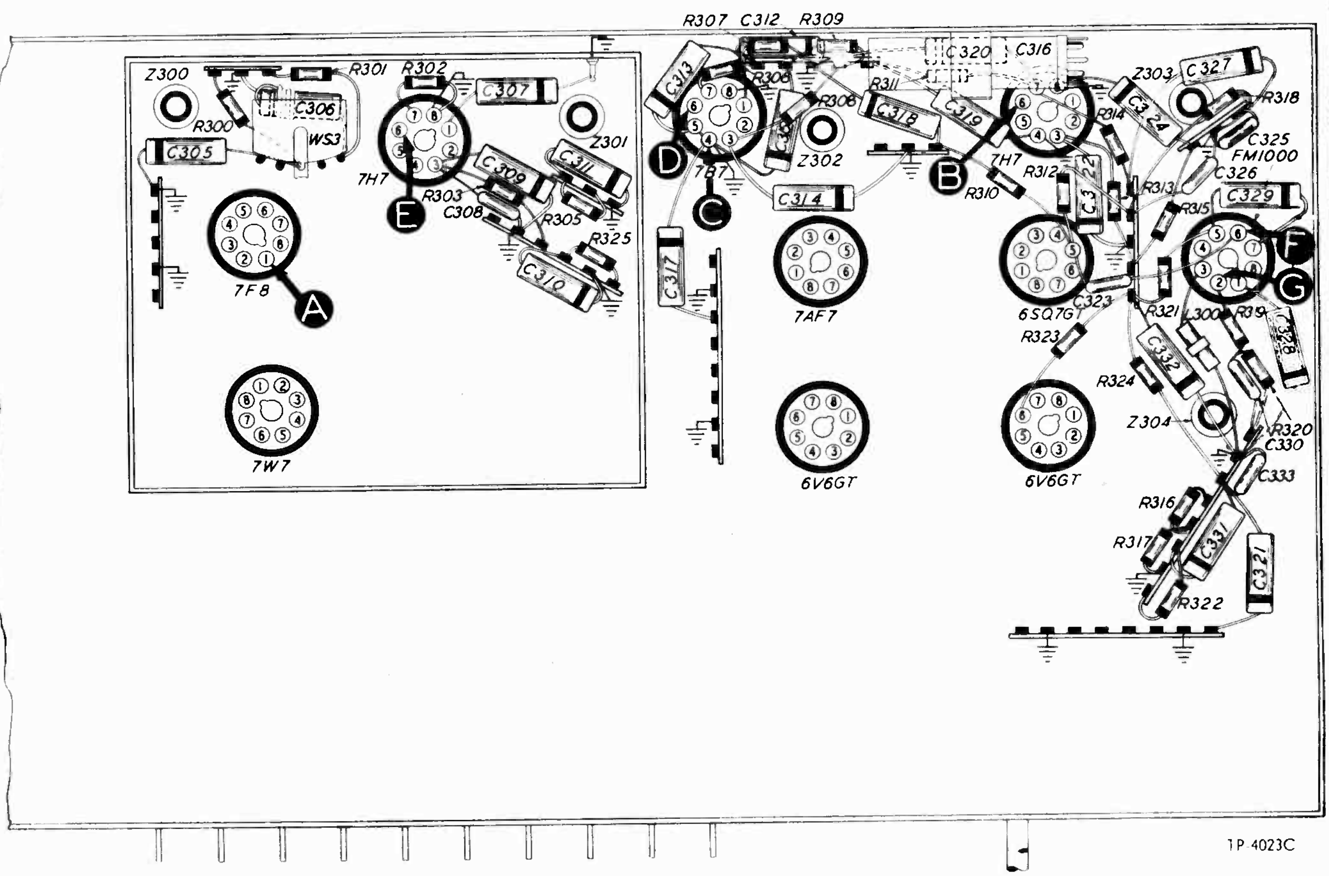


Figure 4. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in AM circuits. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 7H7, 6SQ7GT (diode section), PB1, PB9. Open: R311, R313, R315, R316, R318, C321. Shorted: C320, C322, C324, C325, C326. Defective or misaligned: Z303.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7, PB1. Open: R305, R306, R307, R308, R309. Shorted: C312, C313, C314, C315, C403*. Defective or misaligned: Z302.
4	E	Loud, clear signal with weak signal input.	Defective: 7H7. Open: R301, R302, R303, R325. Shorted: C306, C307, C308, C309, C310. Defective or misaligned: Z301.
5	A	Loud, clear signal with much weaker signal input.	Defective: 7F8*, WS3(R). Open: R300, R410*. Shorted: C305. Defective or misaligned: Z300.

* This part, located in another section, may cause abnormal indication in this section.

Section 3 (Cont.) TROUBLE SHOOTING

FM CIRCUITS (FM DETECTOR)

The tests in this circuit are made with an audio signal generator, an AM r-f signal generator, and a 20,000-ohms-per-volt meter. Connect a .1-mf. condenser in series with the output lead of each generator.

In step 1, unmodulated r-f signals together with d-c voltage readings are used to check the response of the detector circuit to FM, by observing the voltage drops across the audio-load resistor R324 for different input frequencies within the i-f range of the detector. In step 3, the oscillator section of the detector is made inoperative, thereby converting the circuit to an AM detector and making it possible to check certain components with an AM signal. The tests in this section will not indicate the condition of alignment of the detector unless the circuit is extremely misaligned.

NOTE: In steps 1 and 3, the output of the AM signal generator must be at least .5 volt. If the output is insufficient, the generator lead may be connected to test point B or D in this section, depending upon the maximum output of the generator used. When using these test points, it is assumed that the last two i-f stages are trouble-free. These two i-f stages may be at fault, however, if abnormal indications are obtained in BOTH steps. If doubtful, refer to steps 2 and 3 in the chart for "FM CIRCUITS (I-F Amplifier)" and check the components listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION".

Set the radio volume control to maximum. Turn both tone controls counterclockwise, and depress the FM push button.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for "FM CIRCUITS (I-F Amplifier)." If not, isolate and remedy the trouble in the FM detector.

STEP	PROCEDURE	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	Connect d-c voltmeter across resistor R324 (positive lead to junction of R324 and R323; negative lead to junction of R324 and C331), with meter on 50-volt range. Connect r-f-generator output to test point F. Turn off modulation and adjust generator output to approximately .5 volt. Swing generator frequency from approximately 80 kc. above to 80 kc. below 9.1 mc.	Approximately 15 to 30 volts across R324 for 9.1-mc. signal or no signal; a swing of approximately ± 12 to 20 volts for a deviation of ± 80 kc.	Trouble in FM detector. Isolate by the following tests.
2	Connect audio signal generator to test point F; adjust for high generator output.	Loud, clear signal.	Defective: Z304, FM1000, PB1. Shorted: C332, C333. Open: C316B, C331, R322, R323, R324, L300.
3	Short test point G (pin 2 of FM1000) to chassis. Connect r-f-generator output to test point F. Use modulated signal. Set generator for maximum output at 9.1 mc.	Loud, clear signal	Defective: FM1000. Shorted: C316B, C332. Open: R323, R324, L300.
4	Remove short from test point G. Connect negative lead (prod end) of d-c voltmeter through 50,000-ohm resistor to test point G; connect positive lead to test point C. Set meter to 10-volt range.	Approximately 2.5 volts negative.	Defective: FM1000, Z304, L300, C330. Shorted: C329. Open: R320, R321.

FM CIRCUITS (I-F AMPLIFIER)

Follow the preliminary instructions for the AM circuits with these exceptions: Depress the FM push button, set the signal-generator frequency to 9.1 mc., and short test point G (pin 2 of FM1000) to the chassis (test point C), to permit the use of an AM signal.

The parts which were found to be satisfactory for AM, with the exception of those indicated in the chart, will usually operate satisfactorily for FM.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4. If not, isolate and correct the trouble in the FM i-f amplifier.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in FM i-f amplifier. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 7H7. Shorted or open: C327. Defective or misaligned: Z303.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7. Defective or misaligned: Z302.
4	E	Loud, clear signal with weak signal input.	Defective: 7H7. Defective or misaligned: Z301.
5	A	Loud, clear signal with weak signal input.	Defective: 7F8, WS3(R). Defective or misaligned: Z300.

MODEL 48-1270 PHILCO CORP.

Section 4

TROUBLE SHOOTING

For the following tests, with the exception of the oscillator tests, use an r-f signal generator with modulated output. Connect the ground lead to the chassis (test point C); connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Adjust the generator to give a weak input signal.

Set the radio volume control to maximum, and turn both tone controls counterclockwise.

OSCILLATOR TESTS ("AM CIRCUITS" chart, steps 5, 8, and 10; "FM CIRCUITS" chart, step 2): Connect the positive lead of a high-resistance voltmeter to the oscillator cathode (pin 5) of the 7F8, test point E. Connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 8), test point F. Use a suitable meter range, such as 0—10 volts. Absence of negative voltage with any push button (PB8 through PB4 depressed, or for any dial position (push button PB1, PB2, or PB3 depressed), indicates the oscillator is not functioning.

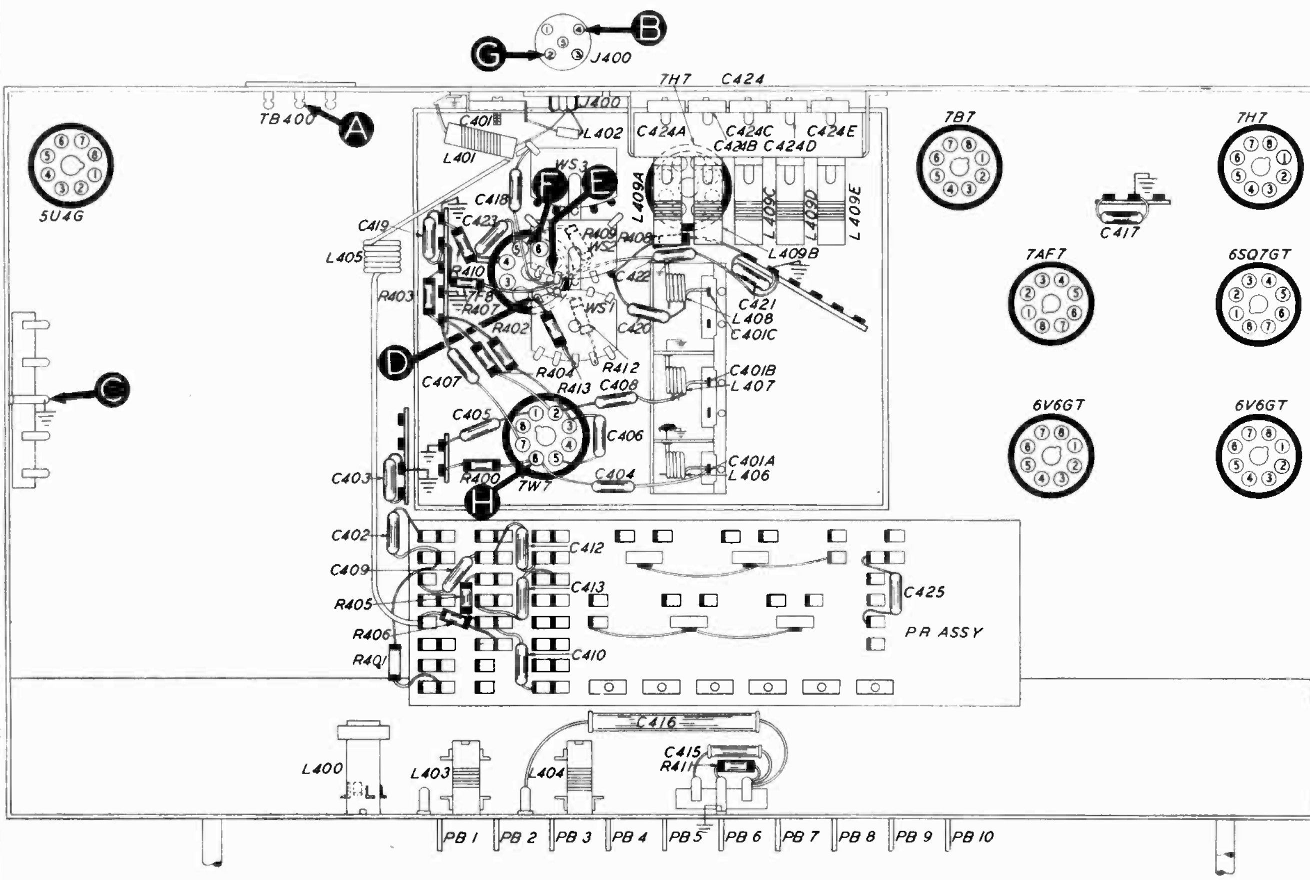


Figure 5. Bottom View, Showing Section 4 Test Points

TP-4023D

AM CIRCUITS

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Adjust to frequency of each push button in sequence.	Depress, in sequence, PB8 through PB4.	Loud, clear signal when each push button is depressed.	Trouble in circuits associated with push-button station selectors. Isolate by tests in steps 4, 5, and 6.
2	A	1000 kc.	Depress BC push button (PB3). Tune in signal with tuning control.	Loud, clear signal.	Trouble in circuits associated with dial tuning (BC band). Isolate by tests in steps 7 and 8.
3	B	12 mc.	Depress SW push button (PB2). Tune in signal with tuning control.	Loud, clear signal.	Trouble in circuits associated with dial tuning (SW band). Isolate by tests in steps 9 and 10.

Section 4 (Cont.) TROUBLE SHOOTING

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
4	D	Adjust to frequency of push button	Depress PB6.	Loud, clear signal.	Defective: 7F8, WS1(F). Open: R410, C423.
5	E to F (Oscillator test)		Depress, in sequence, PB8 through PB4.	Negative voltage.	No voltage for any particular push button—Defective: Coil (L409A through L409E) or push button. No voltage for all push buttons—Defective: 7F8, WS2(F), PB2, PB3, C416. Open: R406, R407, R409, R411, C400, C411B, C415, C418, L404, L405, WS2(F), WS2(R).
6	A	Adjust to frequency of each push button in sequence.	Depress, in sequence, PB8 through PB4.	Loud, clear signal when each push button is depressed.	Defective: TB400, L400, C411C, C424A through C424E, Open: R412, R413, C413, PB2, PB3, WS1(F), WS2(F).
7	A	1000 kc.	Depress BC push button (PB3). Tune in signal with tuning control.	Loud, clear signal.	Defective: C400, PB3.
8	E to F (Oscillator test)		Depress BC push button (PB3). Rotate tuning control through range.	Negative voltage.	Defective: L404.
9	B	12 mc.	Depress SW push button (PB2). Tune in signal with tuning control.	Loud, clear signal.	Defective: J400, L401, L402, C401, C412.
10	E to F (Oscillator test)		Depress SW push button (PB2). Rotate tuning control through range.	Negative voltage.	Defective: 7F8, L403, C409, C411A, C410.

FM CIRCUITS

Before proceeding with the tests for the FM circuits, connect test point G in Section 3 to the chassis.

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	G	100 mc.	Depress FM push button (PB1). Tune in signal with tuning control.	Loud, clear signal.	Trouble in FM circuits. Isolate by the following tests.
2	E to F (Oscillator test)		Depress FM push button. Rotate tuning control through range.	Negative voltage.	Defective: 7F8, L408, C400, C400C, PB1, WS2(F). Open R408. Shorted: C421.
3	H	100 mc.	Depress FM push button (PB1). Tune in signal with tuning control.	Loud, clear signal.	Defective: 7W7. Open: R400, R402, R403, R404, C408. Shorted: C400, C400B, C405, C406, C407, WS2(F).
4	G	100 mc.	Same as step 3.	Loud, clear signal.	Defective: J400, L406, C400A, C404.

CALIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial backplate below the pointer with a pencil.

The method of measuring for these points is illustrated in figure 1. Hold a rule against the dial backplate, with the start of the rule against the inside of the upturned edge of the backplate.

With the tuning gang fully meshed, the pointer should be adjusted on the dial-drive cord to coincide with the index mark.

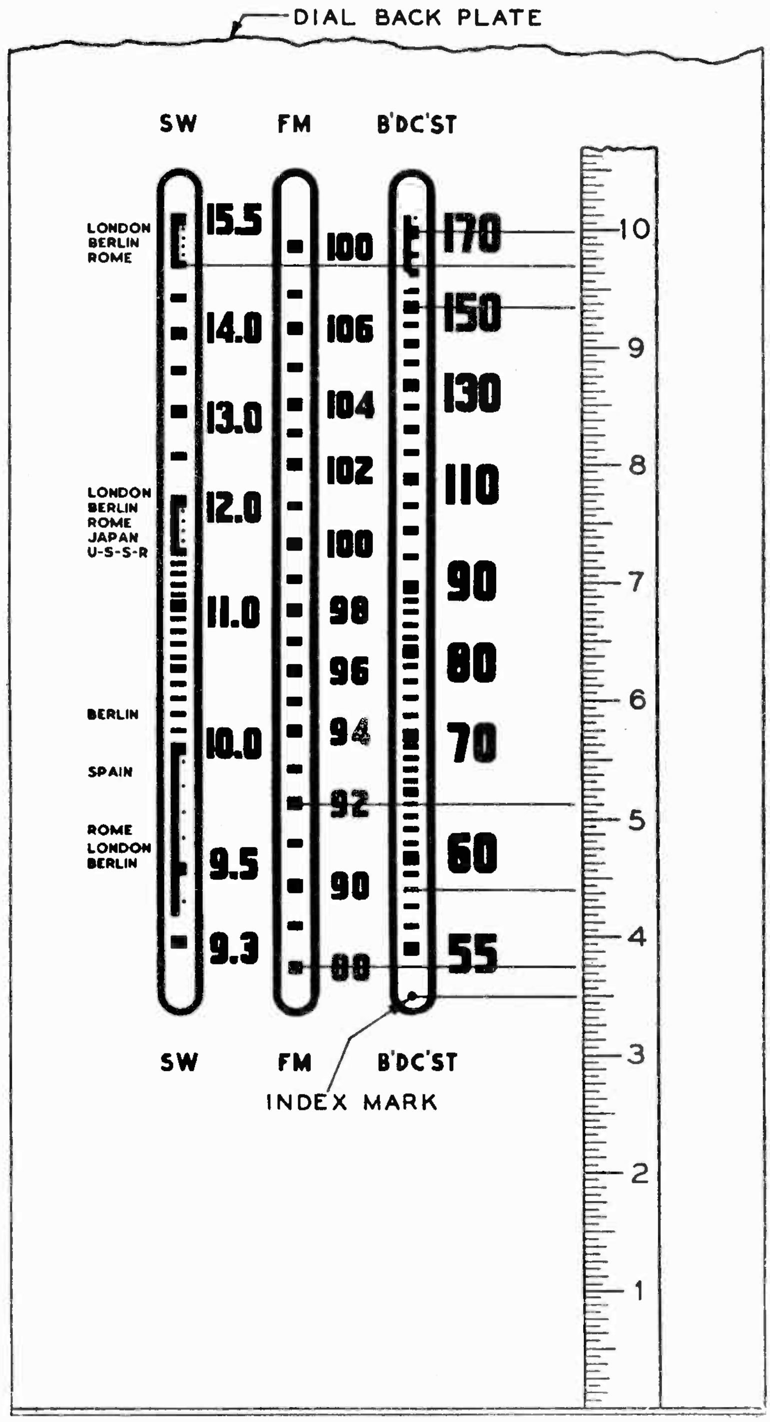
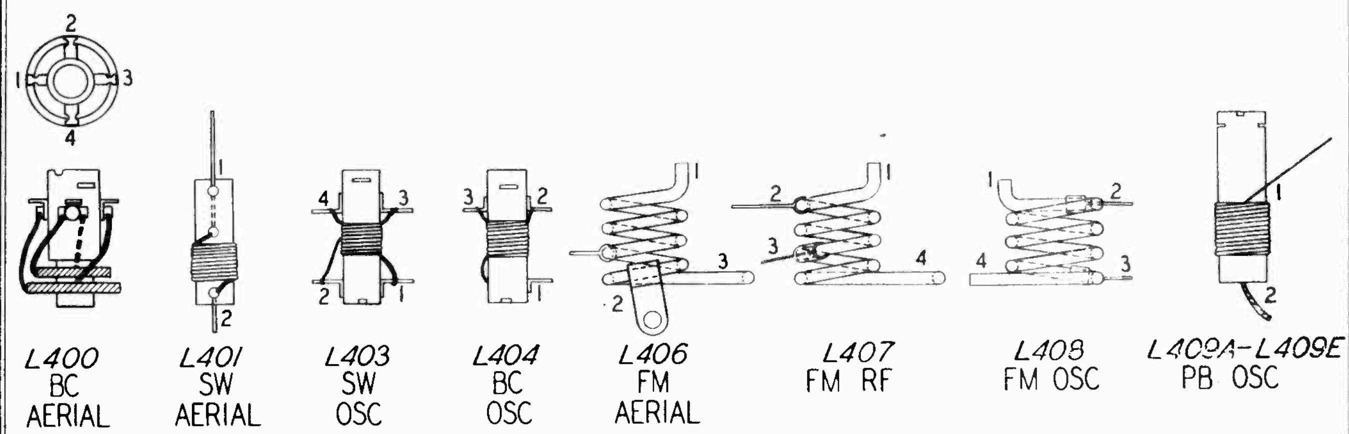
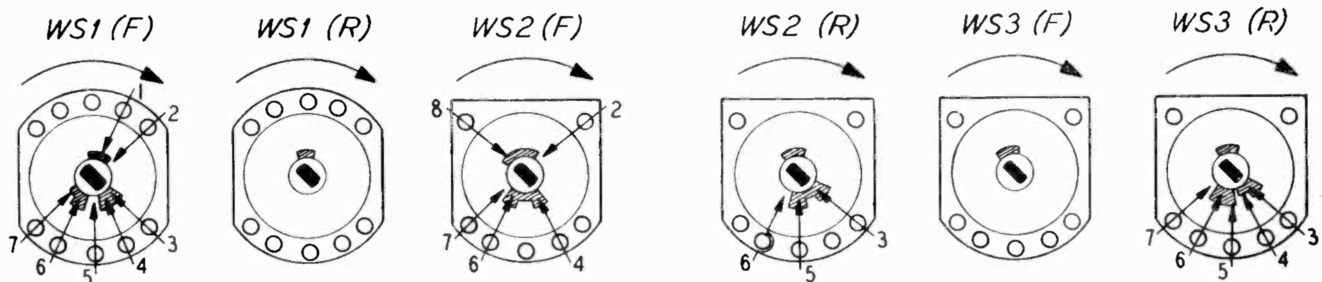


Figure 1. Calibration Measurements for Dial Backplate

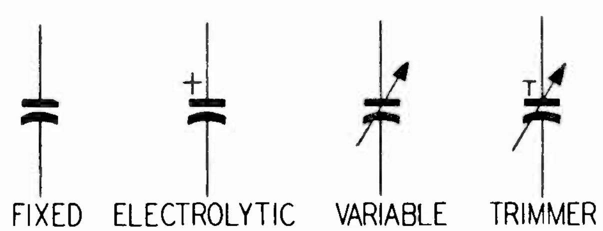
PHILCO CORP. MODEL 48-1270

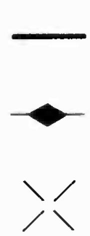




BAND-SWITCH SECTIONS SHOWN IN BROADCAST POSITION AS VIEWED FROM UNDER SIDE OF CHASSIS. (F) INDICATES FRONT CONTACTS, LOOKING FROM FRONT. (R) INDICATES REAR CONTACTS, LOOKING THROUGH WAFER.

CONDENSER SYMBOLS





RF, IF, AND AUDIO SIGNAL PATH

OSCILLATOR SIGNAL PATH

SPEAKER CONNECTION

NOTE:

ALL PUSH BUTTONS EXCEPT PB8 ARE SHOWN IN OUT POSITION. ALL ROTARY SWITCHES ARE LINKED TO FM PUSH BUTTON.

ALL RESISTOR VALUES ARE IN OHMS UNLESS MARKED OTHERWISE.

VOLTAGES IN SECTION 1 AND IN AUDIO CIRCUITS OF SECTION 2 WERE TAKEN WITH BC PUSH BUTTON IN. VOLTAGES IN SCRATCH ELIMINATOR CIRCUITS OF SECTION 2 WERE TAKEN WITH PHONO PUSH BUTTON IN AND TREBLE CONTROL SET TO SCRATCH ELIMINATOR POSITION. VOLTAGES IN SECTIONS 3 AND 4 WERE TAKEN WITH FM PUSH BUTTON IN.

MODEL 48-1270 PHILCO CORP.

ALIGNMENT PROCEDURE

CAUTION: Do not turn on power with speaker disconnected, or the radio may be damaged.

ALIGNMENT OF AM CIRCUITS

When the complete AM and FM alignment is to be made, the AM alignment should be made FIRST; however, if FM alignment is not required, the AM alignment alone may be made.

OUTPUT METER—Connect between No. 3 terminal (voice-coil connection) of the aerial terminal panel and the chassis.

AM SIGNAL GENERATOR—Connect the ground lead to the chassis, and the output lead as indicated in the chart. Use modulated output.

OUTPUT LEVEL—During the alignment, the signal-generator output must be attenuated to maintain the radio output below 1.5 volts, as read on the output meter.

CONTROLS—Set the volume control to maximum, the bass tone control fully counterclockwise, the treble tone control fully clockwise, and the signal-generator dial, radio dial, and radio push buttons as indicated in the chart.

DIAL POINTER—With the tuning condenser fully meshed, the dial pointer must coincide with the index mark at the low-frequency end of the dial. See "CALIBRATING DIAL BACKPLATE" for method of measuring backplate for index and calibration marks.

ALIGNMENT OF FM CIRCUITS

Align the AM circuits first.

OUTPUT METER—Connect the output meter between terminal No. 3 of the aerial terminal panel and the chassis.

AM SIGNAL GENERATOR—Connect the generator ground lead to the radio chassis; connect the output lead through a .1-mf. condenser to the points specified in the chart. Use modulated output.

CONTROLS—Set the treble tone control and the volume control fully clockwise, and the bass tone control fully counterclockwise. Depress the FM push button.

LOCATION OF COILS—For the location of coils L406, L407, and L408 (steps 11 and 15), refer to the base layout of Secton 4, figure 5.

Note 1. When pin 2 of FM1000 is connected to the chassis, the oscillator portion of the FM detector is made inoperative, thereby converting the circuit from an FM to an AM detector.

Note 2. Make the loading network by connecting a 4700-ohm resistor and a .1-mf. condenser in series. Attach an alligator clip to each free end of the network. When this network is connected across the primary or secondary winding of an over-coupled i-f transformer, the network loads the circuit so that the transformer is effectively below critical coupling; the unloaded winding may then be correctly peaked at the intermediate frequency.

Note 3. The top of padder C303D can be reached only from the top of the shield can. Slide a length of flattened solder or wire down between the ceramic form and the edge of the trimmer plate. Attach the loading network between this connection and the chassis.

Note 4. It is essential that the output from the generator be kept below the point where the oscillator of the FM detector locks in, otherwise an erroneous zero beat will be obtained. When a single very sharp zero-beat point is obtained, the adjustment is correct.

Note 5. The use of a signal generator for steps 10 through 16 is recommended only if the available generator is sufficiently accurate to insure correct frequency settings. Otherwise, an alternate procedure employing FM broadcast-station signals in place of a signal generator is recommended. For the adjustments at the high-frequency end of the band, use the station nearest 105 mc.; for the adjustments at the low-frequency end of the band, use the station nearest 88 mc. or 92 mc., as indicated. If the radio is greatly misaligned, it may be necessary to adjust the padders and coils for maximum noise at each end of the band before station signals can be heard. The FM detector must be made inoperative as directed in step 10 of the "FM ALIGNMENT CHART."

Note 6. Check all coil adjustments with a tuning wand. If inserting the brass end in or near the coil increases the output-meter reading, spread the turns; if the powdered-iron end increases the output reading, compress the turns. If both ends cause a decrease in output, the coil is correctly tuned. Do not change the coils excessively, since only a small adjustment is required at these frequencies.

Note 7. Make two simple dipole aerials to feed signals from the signal generator to the radio. Each dipole aerial may consist of two 30-inch lengths of rubber-covered wire. Connect one dipole aerial to terminals 1 and 2 on the FM aerial socket of the radio. Connect the other dipole aerial to the output of the signal generator. Place the two dipoles several feet apart.

PHILCO CORP.

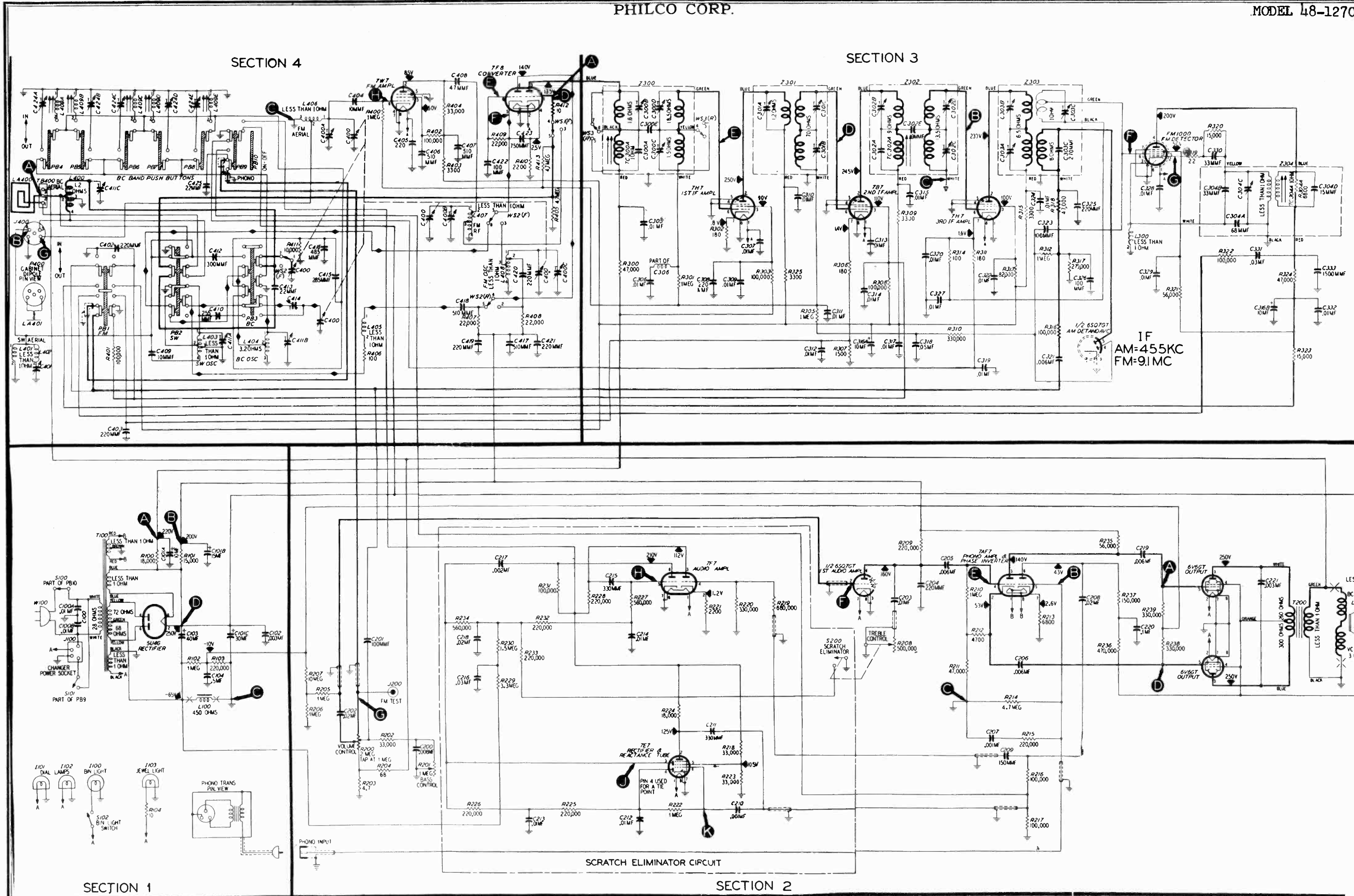


Figure 7. Philco Radio-Phonograph, Model 48-1270, Sectionalized Schematic Diagram, Showing Test Points

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: PUSH BUTTON	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST TRIMMER
1	Through .1-mf. condenser to stator of aerial section of tuning gang.	455 kc.	Depress BC push button (PB3)	1700 kc.	Adjust each trimmer, in order, for maximum output. Do not repeat adjustments.	C303A, C302C, TC302A, C301B, C300C, TC300A
2	Loosely coupled with loop. See note below.	15 mc.	Depress SW push button (PB2).	15 mc.	Adjust for maximum output. Check for image by tuning set to 14.1 mc.	C411A
3	Same as step 2.	15 mc.	Depress SW push button (PB2).	15 mc.	Adjust for maximum output (rock tuning control).	C401
4	Same as step 2.	1700 kc.	Depress BC push button (PB3)	1700 kc.	Adjust for maximum output.	C411B
5	Same as step 2.	1500 kc.	Depress BC push button (PB3)	1500 kc.	Adjust for maximum output.	C411C
6	Same as step 2.	580 kc.	Depress BC push button (PB3)	580 kc.	Adjust for maximum output (rock tuning control).	C414
7	Repeat steps 4, 5, and 6 in order until no further increase in output is noted. Then repeat step 4.					

NOTE: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to the signal-generator leads and place near the radio loop.

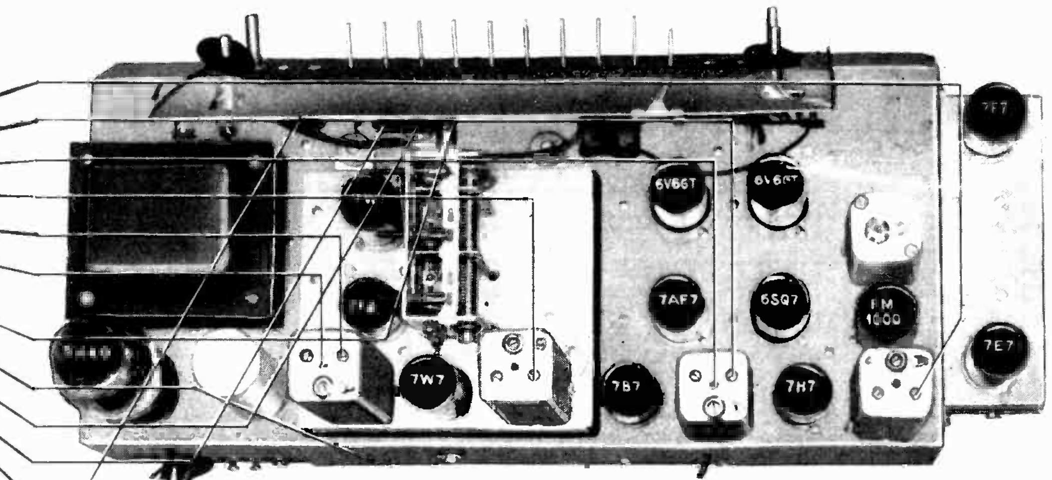


Figure 8. Top View, Showing AM Trimmer Locations

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST TRIMMER
1	To terminal No. 2 of L407 (see page 15).	9.1 mc.	Gang fully closed	Connect jumper between pin 2 of FM1000 and chassis (see Note 1). Connect loading network (see Note 2) between top of padder C303D and chassis (see Note 3).	C303B
2	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 2 (blue lead) of third i-f tube and chassis.	C303D
3	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 6 (green lead) of third i-f tube and chassis.	C302B
4	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 2 (blue lead) of second i-f tube and chassis.	C302D
5	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 6 (green lead) of second i-f tube and chassis.	C301A
6	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 2 (blue lead) of first i-f tube and chassis.	C301C
7	Same as step 1.	9.1 mc.	Same as step 1.	Leave loading network connected as in step 6.	C300D, C300B
8	To grid (pin 6) of third i-f tube.	9.1 mc. (modulation off)	Same as step 1.	Remove loading network, and remove jumper from pin 2 of FM1000 and chassis. Connect jumper between pin 4 (blue lead) of FM1000 and junction of R324 and red lead of Z304. Adjust trimmer for zero beat.	C304C
9	Same as step 8.	9.1 mc. (modulation on)	Same as step 1.	Remove jumper used in step 8. Adjust trimmer for zero beat (see Note 4).	TC304A
10	To terminal No. 2 of J400 (see Note 5).	105 mc.	105 mc.	Connect jumper between pin 2 of FM1000 and chassis. Adjust for maximum output.	C400C
11	Same as step 10.	88 mc.	88 mc.	Adjust coil L408 for maximum output (see Note 6).	
12	Repeat steps 10 and 11 until no further improvement is noted.				
13	Same as step 10.	105 mc.	105 mc.	Adjust for maximum output (rock tuning control).	C400B
14	See Note 7.	105 mc.	105 mc.	Adjust for maximum output.	C400A
15	Same as step 14.	92 mc.	92 mc.	Adjust coil L407, then L406, for maximum output.	
16	Repeat steps 13, 14, and 15 until no further improvement in sensitivity can be obtained.				

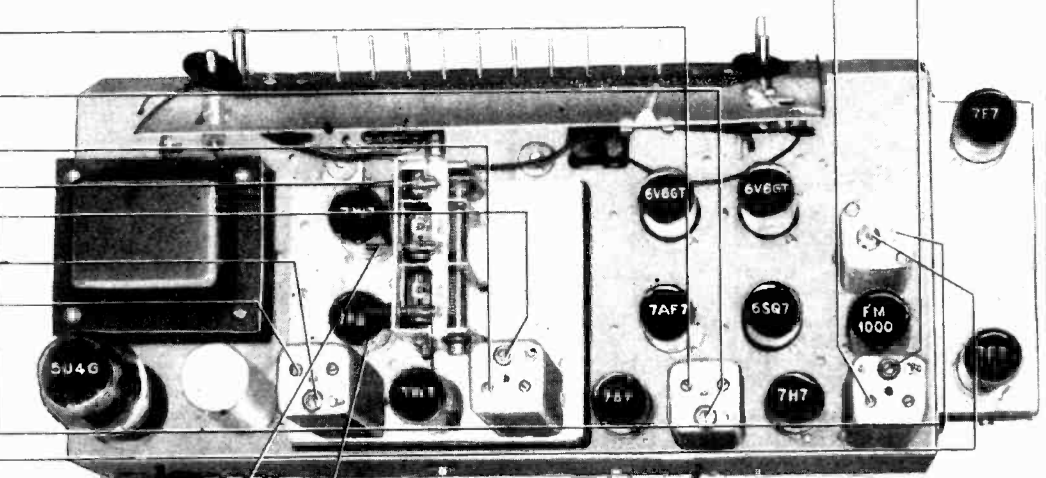


Figure 9. Top View, Showing FM Trimmer Locations

SETTING PUSH BUTTONS

1. Connect the output meter between terminal No. 3 on the aerial terminal panel and the chassis.

2. Turn the volume control to maximum, and both tone controls fully counterclockwise.

3. Couple the signal generator loosely through a coil of wire to the loop aerial (see Note under "AM ALIGNMENT CHART").

4. Turn on the power, and allow the radio to warm up for 15 minutes before starting the adjustments.

5. Starting with the lowest frequency desired, set the signal generator to the desired frequency (modulation on), push the station-selector push button, and adjust the associated oscillator tuning core and aerial trimmer condenser (marked on rear of chassis) for maximum indication on the output meter. During alignment, the input signal must be attenuated to hold the output-meter reading below 1.5 volts.

6. Reset the signal-generator frequency, and repeat the procedure for each remaining station-selector push button.

7. Turn off the signal generator, and make a final adjustment of all tuning cores and trimmer condensers while listening to the stations for which the adjustments are being made.

PHILCO CORP. MODEL 48-1270

REPLACEMENT PARTS LIST

NOTE

Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, two-section	30-1226-1
C100A	Condenser, line filter, .01 mf	Part of C100
C100B	Condenser, line filter, .01 mf	Part of C100
C101	Condenser, electrolytic, three-section	30-2570-1
C101A	Condenser, filter, 10 mf	Part of C101
C101B	Condenser, filter, 15 mf	Part of C101
C101C	Condenser, filter, 30 mf	Part of C101
C102	Condenser, filter, .003 mf	61-0117*
C103	Condenser, filter, 40 mf	30-2568-5
C104	Condenser, bias filter, .5 mf	61-0133*
I100	Lamp, Bin	34-2040
I101	Lamp, dial	34-2040
I102	Lamp, dial	34-2040
I103	Lamp, jewel	34-2040
J100	Socket, phono power	27-6182
L100	Field, speaker	Part of LS200
R100	Resistor, B+ dropping, 18,000 ohms	66-3184340
R101	Resistor, B+ dropping, 15,000 ohms	66-3154340*
R102	Resistor, bias filter, 1 megohm	66-5103340*
R103	Resistor, bias filter, 220,000 ohms	66-4223340*
R104	Resistor, jewel-lamp dropping, 10 ohms	66-0104340
S100	Switch, master power, on—off	Part of PB10
S101	Switch, phono power, on—off	Part of PB9
T100	Transformer, power	32-8282
W100	Line cord	L3199

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, tone compensating, .006 mf	45-3500-7*
C201	Condenser, by-pass, 100 mmf	30-1224-1*
C202	Condenser, audio coupling, .02 mf	61-0108*
C203	Condenser, tone compensating, .01 mf	61-0120*
C204	Condenser, by-pass, 220 mmf	60-10205307*
C205	Condenser, d-c blocking, .006 mf	45-3500-7*
C206	Condenser, d-c blocking, .006 mf	45-3500-7*
C207	Condenser, tone compensating, .001 mf	45-3500-5*
C208	Condenser, d-c blocking, .02 mf	61-0108*
C209	Condenser, d-c blocking, 150 mmf	60-10155407*
C210	Condenser, d-c blocking, .001 mf	45-3500-5*
C211	Condenser, d-c blocking, 330 mmf	60-10335407*
C212	Condenser, bias filter, .01 mf	61-0120*
C213	Condenser, bias filter, .01 mf	61-0120*
C214	Condenser, bias filter, .01 mf	61-0120*
C215	Condenser, d-c blocking, 330 mmf	60-10335407*
C216	Condenser, bias filter, .03 mf	45-3500-1*
C217	Condenser, d-c blocking, .002 mf	61-0062*
C218	Condenser, bias filter, .02 mf	61-0108*

SECTION 2 (Cont.)

Reference Symbol	Description	Service Part No.
C219	Condenser, d-c blocking, .006 mf	45-3500-7*
C220	Condenser, audio by-pass, .1 mf	61-0113*
C221	Condenser, tone compensating, .003 mf	61-0117*
J200	Socket, FM test	27-6180
LS200	Speaker	36-1606
R200	Volume control, 2 megohms, tapped at 1 megohm	33-5535-5
R201	Tone control, bass, 1 megohm	33-5539-7
R202	Resistor, tone compensating, 33,000 ohms	66-3333340*
R203	Resistor, inverse feedback, 4.7 ohms	66-9473340*
R204	Resistor, inverse feedback, 68 ohms	66-0683340
R205	Resistor, grid return, 1 megohm	66-5103340*
R206	Resistor, bias divider, 1 megohm	66-5103340*
R207	Resistor, bias divider, 10 megohms	66-6103340*
R208	Tone control, treble, 500,000 ohms	33-5539-8
R209	Resistor, plate load, 220,000 ohms	66-4223340*
R210	Resistor, grid return, 1 megohm	66-5103340*
R211	Resistor, cathode load, 47,000 ohms	66-3473340*
R212	Resistor, cathode bias, 4700 ohms	66-2473340*
R213	Resistor, cathode bias, 6800 ohms	66-2683340*
R214	Resistor, grid return, 4.7 megohms	66-5473340*
R215	Resistor, tone compensating, 220,000 ohms	66-4223340*
R216	Resistor, voltage divider, 100,000 ohms	66-4103340*
R217	Resistor, voltage divider, 100,000 ohms	66-4103340*
R218	Resistor, voltage divider, 33,000 ohms	66-3334340*
R219	Resistor, tone compensating, 680,000 ohms	66-4683340*
R220	Resistor, grid return, 330,000 ohms	66-4333340*
R221	Resistor, cathode bias, 2200 ohms	66-2224340*
R222	Resistor, grid return, 1 megohm	66-5103340*
R223	Resistor, voltage divider, 33,000 ohms	66-3334340*
R224	Resistor, plate load, 18,000 ohms	66-3183340*
R225	Resistor, bias filter, 220,000 ohms	66-4223340*
R226	Resistor, bias filter, 220,000 ohms	66-4223340*
R227	Resistor, grid return, 560,000 ohms	66-4563340*
R228	Resistor, plate load, 220,000 ohms	66-4223340*
R229	Resistor, bias filter, 3.3 megohms	66-5333340*
R230	Resistor, bias filter, 1.5 megohms	66-5153340*
R231	Resistor, plate load, 100,000 ohms	66-4103340*
R232	Resistor, bias filter, 220,000 ohms	66-4223340*
R233	Resistor, voltage divider, 220,000 ohms	66-4223340*
R234	Resistor, bias filter, 560,000 ohms	66-4563340*
R235	Resistor, plate load, 56,000 ohms	66-3563340*
R236	Resistor, plate decoupling, 470,000 ohms	66-4473340*
R237	Resistor, plate load, 150,000 ohms	66-4153340*
R238	Resistor, grid return, 330,000 ohms	66-4333340*
R239	Resistor, grid return, 330,000 ohms	66-4333340*
S200	Switch, scratch eliminator	Part of R208
T200	Transformer, output	32-8274

REPLACEMENT PARTS LIST

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed trimmer, primary	Part of Z300
C300B	Condenser, trimmer, primary	Part of Z300
C300C	Condenser, trimmer, secondary	Part of Z300
C300D	Condenser, trimmer, secondary	Part of Z300
C300E	Condenser, coupling	Part of Z300
C301A	Condenser, trimmer, primary	Part of Z301
C301B	Condenser, trimmer, secondary	Part of Z301
C301C	Condenser, trimmer, secondary	Part of Z301
C302A	Condenser, fixed trimmer, primary	Part of Z302
C302B	Condenser, trimmer, primary	Part of Z302
C302C	Condenser, trimmer, secondary	Part of Z302
C302D	Condenser, trimmer, secondary	Part of Z302
C302E	Condenser, coupling	Part of Z302
C303A	Condenser, trimmer, primary	Part of Z303
C303B	Condenser, trimmer, primary	Part of Z303
C303C	Condenser, r-f by-pass, 270 mmf	Part of Z303
C303D	Condenser, trimmer, secondary	Part of Z303
C304A	Condenser, voltage divider, 68 mmf	Part of Z304
C304B	Condenser, voltage divider, 33 mmf	Part of Z304
C304C	Condenser, trimmer	Part of Z304
C304D	Condenser, fixed trimmer	Part of Z304
C305	Condenser, r-f by-pass, .01 mf	61-0120*
C306	Condenser-and-choke assembly, i-f by-pass, .01 mf	38-9851-3
C307	Condenser, filament by-pass, .01 mf	61-0120*
C308	Condenser, by-pass, 220 mmf	60-10205307*
C309	Condenser, screen by-pass, .01 mf	61-0120*
C310	Condenser, plate by-pass, .01 mf	61-0120*
C311	Condenser, a-v-c by-pass, .01 mf	61-0120*
C312	Condenser, cathode by-pass, .01 mf	61-0120*
C313	Condenser, filament by-pass, .01 mf	61-0120*
C314	Condenser, screen by-pass, .01 mf	61-0120*
C315	Condenser, plate by-pass, .01 mf	61-0120*
C316	Condenser, electrolytic, two-section	30-2552
C316A	Condenser, by-pass, 10 mf	Part of C316
C316B	Condenser, by-pass, 10 mf	Part of C316
C317	Condenser, r-f by-pass, .01 mf	61-0120*
C318	Condenser, a-v-c filter, .05 mf	61-0122*
C319	Condenser, r-f by-pass, .01 mf	61-0120*
C320	Condenser, cathode by-pass, .01 mf	61-0120*
C321	Condenser, d-c blocking, .006 mf	45-3500-7*
C322	Condenser, screen by-pass, .01 mf	61-0120*
C323	Condenser, coupling, 100 mmf	60-10105407*
C324	Condenser, plate by-pass, .01 mf	61-0120*
C325	Condenser, r-f by-pass, 220 mmf	60-10205307*
C326	Condenser, a-v-c by-pass, 100 mmf	30-1224-1*
C327	Condenser, r-f by-pass, .01 mf	61-0120*
C328	Condenser, filament by-pass, .01 mf	61-0120*
C329	Condenser, screen by-pass, .01 mf	61-0120*
C330	Condenser, oscillator coupling, 33 mmf	60-00305307*
C331	Condenser, audio coupling, .03 mf	45-3500-1*
C332	Condenser, r-f by-pass, .01 mf	61-0120*
C333	Condenser, r-f by-pass, 1500 mmf	60-20155404*
L300	Coil, FM detector	32-4007-1
R300	Resistor, plate dropping, 47,000 ohms	66-3473340*
R301	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R302	Resistor, cathode bias, 180 ohms	66-1183340*
R303	Resistor, screen dropping, 100,000 ohms	66-4103340*
R304A	Resistor, shunt, 6800 ohms	Part of Z304

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
R305	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R306	Resistor, cathode bias, 180 ohms	66-1183340*
R307	Resistor, cathode bias, 1500 ohms	66-2153340
R308	Resistor, screen dropping, 100,000 ohms	66-4103340*
R309	Resistor, plate dropping, 3300 ohms	66-2333340*
R310	Resistor, a-v-c filter, 330,000 ohms	66-4333340*
R311	Resistor, cathode bias, 180 ohms	66-1183340*
R312	Resistor, diode load, 1 megohm	66-5103340*
R313	Resistor, screen dropping, 82,000 ohms	66-3823340*
R314	Resistor, inverse feedback, 100 ohms	66-1103340*
R315	Resistor, plate dropping, 3300 ohms	66-2333340*
R316	Resistor, audio decoupling, 100,000 ohms	66-4103340*
R317	Resistor, diode load, 270,000 ohms	66-4273340*
R318	Resistor, r-f coupling, 47,000 ohms	66-3473340*
R319	Resistor, parasitic suppressor, 22 ohms	66-0273340*
R320	Resistor, grid leak, 15,000 ohms	66-3153340*
R321	Resistor, screen dropping, 56,000 ohms	66-3563340*
R322	Resistor, audio decoupling, 100,000 ohms	66-4103340*
R323	Resistor, plate dropping, 15,000 ohms	66-3153340
R324	Resistor, plate load, 47,000 ohms	66-3473340*
R325	Resistor, plate dropping, 3300 ohms	66-2333340*
TC300A	Tuning core	Part of Z300
TC302A	Tuning core	Part of Z302
TC304A	Tuning core	Part of Z304
WS3 (R)	Switch, wafer	Part of WS
Z300	Transformer, 1st i.f., including C300A, C300B, C300C, C300D, C300E, and TC300A	32-4020-1
Z301	Transformer, 2nd i.f., including C301A, C301B, and C301C	32-4001
Z302	Transformer, 3rd i.f., including C302A, C302B, C302C, C302D, C302E, and TC302A	32-4002
Z303	Transformer, 4th i.f., including C303A, C303B, C303C, and C303D	32-4003-2
Z304	Transformer, FM detector, including C304A, C304B, C304C, C304D, R304A, and TC304A	32-4004

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning	31-2694
C400A	Condenser, trimmer	Part of C400
C400B	Condenser, trimmer	Part of C400
C400C	Condenser, trimmer	Part of C400
C401	Condenser, trimmer	31-6473-2
C402	Condenser, r-f by-pass, 220 mmf	60-10205307*
C403	Condenser, r-f by-pass, 220 mmf	60-10205307*
C404	Condenser, coupling, 10 mf	60-00105407*
C405	Condenser, filament by-pass, 220 mmf	60-10205307*
C406	Condenser, screen by-pass, 510 mmf	60-10515307*
C407	Condenser, plate by-pass, 510 mmf	60-10515307*
C408	Condenser, d-c blocking, 47 mmf	60-00515307*
C409	Condenser, neutralizing (s.w.), 10 mmf	60-00105407*
C410	Condenser, oscillator series, 255 mmf	30-1220-24
C411	Condenser, trimmer assembly, three-section	31-6477
C411A	Condenser, trimmer, oscillator shunt (s.w.)	Part of C411
C411B	Condenser, trimmer, oscillator shunt (bc.)	Part of C411
C411C	Condenser, trimmer, aerial shunt (bc.)	Part of C411

REPLACEMENT PARTS LIST

SECTION 4 (Cont.)

Reference Symbol	Description	Service Part No.
C412	Condenser, aerial series (s.w.), 300 mmf	60-10305307*
C413	Condenser, d-c blocking, 22 mmf	60-00205307*
C414	Condenser, trimmer, b-c series	31-6473-3
C415	Condenser, r-f voltage divider, 285 mmf	30-1224-14
C416	Condenser, r-f voltage divider, 485 mmf	30-1224-15
C417	Condenser, r-f by-pass, 510 mmf	60-10515307*
C418	Condenser, d-c blocking, 510 mmf	60-10515307*
C419	Condenser, r-f by-pass, 220 mmf	60-10205307*
C420	Condenser, d-c blocking, 220 mmf	60-10205307*
C421	Condenser, r-f by-pass, 220 mmf	60-10205307*
C422	Condenser, oscillator coupling, 100 mmf	60-10105407*
C423	Condenser, oscillator-to-mixer coupling, 750 mmf	60-10755301*
C424	Condenser, trimmer assembly, five-section	31-6479
C424A	Condenser, trimmer	Part of C424
C424B	Condenser, trimmer	Part of C424
C424C	Condenser, trimmer	Part of C424
C424D	Condenser, trimmer	Part of C424
C424E	Condenser, trimmer	Part of C424
C425	Condenser, r-f by-pass, 22 mmf	60-00205307*
J400	Socket, s-w and FM aerial	27-6214-1
L400	Coil, bc. aerial	32-4049-1
L401	Coil, s-w aerial	32-4050-2
L402	Coil, FM isolation	32-4111
L403	Coil, s-w oscillator	32-3996
L404	Coil, bc. oscillator	32-4019-4
L405	Choke, oscillator isolation	32-4089
L406	Coil, FM aerial	32-3993
L407	Coil, FM r-f	32-3992
L408	Coil, FM oscillator	32-3994
L409A	Coil, push button	32-4059
L409B	Coil, push button	32-4059
L409C	Coil, push button	32-4059-1
L409D	Coil, push button	32-4059-1
L409E	Coil, push button	32-4059-1
LA400	Loop, bc.	76-2262
LA401	Dipole, FM	76-2381-2
PB1—PB10	Push-button switch assembly	42-1777
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, voltage divider, 100,000 ohms	66-4103340*
R402	Resistor, screen dropping, 100,000 ohms	66-4103340*
R403	Resistor, plate dropping, 3300 ohms	66-2333340*
R404	Resistor, plate load, 33,000 ohms	66-3333340*
R405	Resistor, voltage divider, 4.7 megohms	66-5473340*
R406	Resistor, parasitic suppressor, 100 ohms	66-1103340*
R407	Resistor, plate load, 22,000 ohms	66-3223340*
R408	Resistor, plate load, 22,000 ohms	66-3223340*
R409	Resistor, grid return, 22,000 ohms	66-3223340*
R410	Resistor, cathode bias, 2200 ohms	66-2223340*
R411	Resistor, cathode bias, 10,000 ohms	66-3103340*
R412	Resistor, parasitic suppressor, 10 ohms	66-0103340*
R413	Resistor, grid return, 4.7 megohms	66-5473340*
WS	Wafer switch, three-section	76-2211
WS1	Switch, wafer	Part of WS
WS2	Switch, wafer	Part of WS

MISCELLANEOUS

Description	Service Part No.
Bin-light-socket assembly	27-6233-3
Cabinet (L)	10656-L
(M)	10656-M
(W)	10656-W
Cabinet parts and hardware	
Baffle and cloth, R.H. (L)	40-6795
(M and W)	40-6785
Baffle and cloth, L.H. (L)	40-6796
(M and W)	40-6784
Baffle, wood (L, M, and W)	219047
Bin mechanism, L.H.	76-2368
Bin mechanism, R.H.	76-2174-1
Bolt, speaker (4 required)	W-1587
Bracket, lamp	56-2332
Bracket and cradle	76-2200
Brass pull (L) (2 required)	56-3408
(M and W) (2 required)	56-3249
Bullet catch	45-6002
Bullet strike	45-6003
Continuous hinge	56-3627
Dial-scale-and-backplate assembly (M)	76-2226-4
(L and W)	76-2226-5
Dome (4 required)	45-6042
Doors, cabinet, matched pair (L)	45-1557
(M)	45-1556
(W)	45-1555
Knife hinge	56-4066
Panel, instrument (L)	45-6381
(M)	45-6382
(W)	45-6383
Screw, scale mtg. (4 required)	1W24894FE11
Tell-tale jewel	54-4304
Wire grille (2 required)	56-3250
Cable and plug, phono	41-3735
Cable and plug, speaker	41-3734-3
Cable assembly, 10 5/8 in. (2 required)	41-3754-1
Cable assembly, 5 3/4 in.	41-3754-2
Cable assembly, 8 1/4 in.	41-3754-3
Cable assembly, 18 in.	41-3754-4
Cable assembly	41-3754-16
Chassis mtg. hardware	
Bracket support	56-3616FA3
Grommet, foot mtg.	54-4122
Lock washer	1W24260FA1
Nut	1W19994FA3
Rubber mount	54-4122
Screw (4 required)	1W17326FA3
Screw (4 required)	1W18204FA3
Screw, back (12 required)	1W25345FA9
"T" nut, foot mtg.	W-2502
Washer (2 required)	1W52540FA3
Washer, foot mtg.	W-2271
Clip, bc. aerial coil	28-5002FA1
Cord, drive (25-ft. spool)	45-8750
Dial-scale hardware	
Backplate assembly	76-2108
Pointer	56-3179
Screw (5 required)	1W19670FA3
Spring	28-8953
Gasket, speaker	54-7351

REPLACEMENT PARTS LIST

MISCELLANEOUS (Cont.)

Description	Service Part No.
Knob, control (L) (4 required)	54-4227-1
(M and W) (4 required)	54-4227
Knob, push button (10 required)	54-4292
Loop mtg. hardware	
Spacer (2 required)	1W29184FA3
Washer (6 required)	1W52540FA3
Washer, spring	28-4186
Palnut, volume-control mtg. (3 required)	1W29091FA3
Plug, FM dipole	54-4346
Push-button-assembly hardware	
Cap (10 required)	54-4294
Cover assembly	76-1343
Cap centering (5 required)	28-6936
Rubber mount (2 required)	27-4596
Screw (2 required)	1W19674FA3
Screw, tuning core (5 required)	56-2249
Tab, BC	54-4318
Tab, FM	54-4317-4
Tab kit	40-6943
Tab, OFF	54-4317-1
Tab, PHONO	54 4317-5
Tab, SW	54-4317-3

MISCELLANEOUS (Cont.)

Description	Service Part No.
Terminal strip, coils (5 required)	56-2250FA3
Tuning core (5 required)	56-6100
Record-changer mtg. hardware	
Cover frame	76-2341
Input transformer	32-8256
Rubber mount	54-4313
R-f-unit mtg. hardware	
Grommet (3 required)	54-4295
Screw (3 required)	1W19674FA3
Spacer (3 required)	1W29158FA3
Washer (3 required)	1W52224FA3
Socket, Loktal, r-f unit (2 required)	27-6213
Socket, Loktal, main chassis and r-f unit (7 required)	27-6138*
Socket, octal (4 required)	27-6174
Socket assembly, dial light	76-2109
Socket assembly, dial light, 7-inch lead	76-2109-2
Socket assembly, pilot	41-3737
Tube shield, FM1000	56-2731
Wafer-switch hardware	
Fulcrum assembly	76-2206
Link	54-7169
Tri-mount fasteners	28-4279FA1

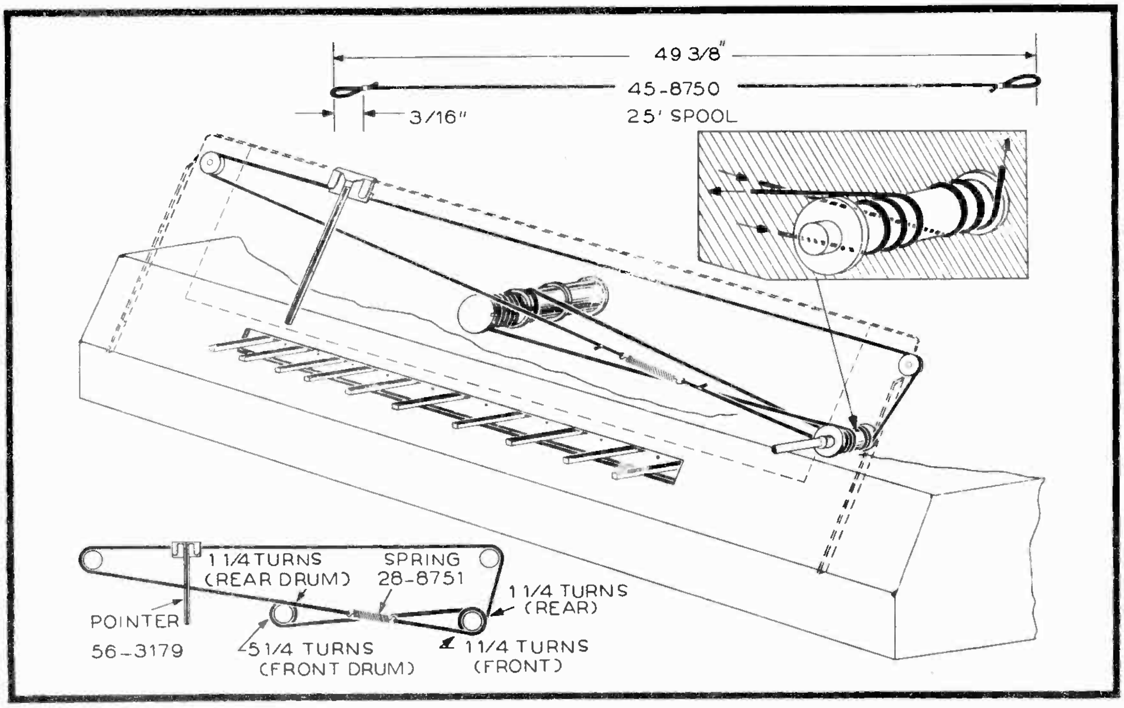


Figure 6. Drive-Cord Installation Details

Circuit Description

Philco Radio-Phonograph Model 48-1286 contains an 11-tube superheterodyne and a Model D-10 Philco Automatic Record Changer.

A low-impedance loop aerial within the cabinet normally provides adequate signal pickup on the standard broadcast band. In most locations, the built-in FM dipole aerial provides satisfactory FM reception. In areas where FM signals are weak, an outdoor dipole aerial (Philco Part No. 45-1462) will provide additional pickup. To increase the pickup on both bands, use the Philco Aerial Coupler, Part No. 76-2353, with the outdoor dipole aerial. For increased pickup on the standard broadcast band only, the coupler may be used with an external aerial of the single-wire type, such as Philco Part No. 45-1494. Information on aerial and coupler connections is given in the external aerial bulletin PR-1200.

The r-f stage (FM only) and converter stage are mounted on a separate chassis, for improved performance at high frequencies. A 6AU6 high-frequency pentode is used in the r-f stage, and a 7F8 high-frequency double triode is employed as a converter.

Two transformer-coupled i-f stages are used. The transformers have two sets of windings; one set is tuned to 455 kc., for AM operation, and the other set is tuned to 9.1 mc., for FM operation. A 6BA6 high-frequency pentode is used in the first i-f stage. The pentode section of a 7R7 duo-diode, pentode functions as the second i-f amplifier; one diode of this tube is used for AM detection, while the other diode provides a.v.c.

The dual-diode section of a 7X7 is employed in the FM ratio-detector circuit; this circuit has good noise-reducing properties and an excellent tuning characteristic.

The triode section of the 7X7 functions as the first audio stage. A 6J5GT triode operates as a plate-and-cathode-loaded phase inverter, driving two 6K6GT output amplifiers, in push-pull operation. Tone fidelity is obtained by the use of inverse feedback in the audio system; feed-back voltage is taken from the secondary of the output transformer.

The Philco Electronic Scratch Eliminator, for phono operation, may be switched on or off, as required. The pentode section of a 7E7 functions as a variable shunt capacitance at the phono-input circuit; at low signal levels, a controlled portion of the higher audio frequencies is by-passed to ground. The grid bias of the reactance tube controls the effective capacitance, which becomes maximum with low bias, and minimum with high bias. This control bias is developed by the audio signal itself; a proportionate amount of the signal is taken from the pickup output, amplified by each triode section of the 7F7, and rectified by the diode section of the 7E7.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, as follows:

Section 1—the power supply
Section 2—the audio circuits
Section 3—the i-f, detector, and a-v-c circuits
Section 4—the r-f and converter circuits

Test points are specified for each section, and are indicated in the sectionalized schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire chart.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

SPECIFICATIONS

CABINET	Wood, mahogany finish
CIRCUIT	11-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1720 kc.
FM	88—108 mc.
AUDIO OUTPUT	6 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	
Radio	110 watts
Phonograph	125 watts
AERIALS	Built-in loop and FM cabinet dipole; external aerial also may be used
INTERMEDIATE FREQUENCIES	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (11)	6AU6, 7F8, 6BA6, 7R7, 7X7, 6J5GT, 6K6GT (2), 7E7, 7F7, 5AZ4
PHONOGRAPH	Philco Automatic Record Changer, Model D-10

Section 1

TROUBLE SHOOTING

POWER SUPPLY

CAUTION: Do not turn on the power with the speaker disconnected, or the set may be damaged.

Make the tests for this section with a d-c voltmeter, connecting the leads between the chassis, test point C, and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

Set the volume control to minimum, and the tone control fully counterclockwise. Set the band selector-phono switch to the broadcast position.

Follow the steps in the order given. If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	195v		Trouble in this section. Isolate by the following tests.
2	B	300v	No voltage. Low voltage. High voltage.	Defective: 5AZ4. Open: S100, T100. Shorted: C102. Defective: 5AZ4. Shorted: C103B, C310*, C411*. Leaky: C102. Open: C102, L100. Shorted: L100. Open: T200*.
3	A	195v	No voltage. Low voltage. High voltage.	Open: R100. Shorted: C103A, C311*. Leaky: C103A, C311*. Changed resistance: R100. Open: T200*.
4	D	Negative 27v	No voltage. High voltage.	Open: R101. Open: R102.
Listening Test: Abnormal hum and instability may be caused by open C103A or C103B.				

* This part, located in another section, may cause abnormal indication in this section.

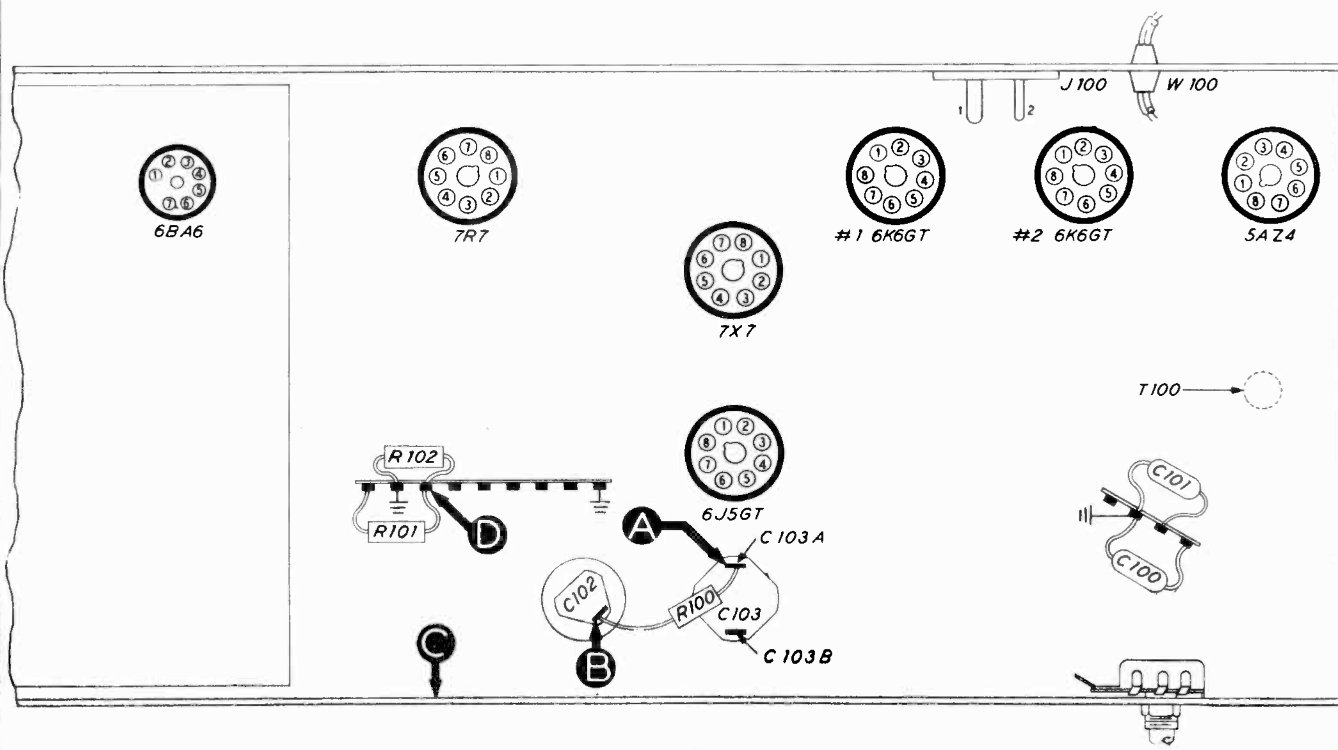


Figure 2. Bottom View, Showing Section 1 Test Points

Section 2

TROUBLE SHOOTING

AUDIO-AMPLIFIER TESTS

AUDIO CIRCUITS

Use an audio-frequency signal generator. Connect the generator ground lead to the chassis, test point C, and connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and the tone control fully counterclockwise. Set the band (wafer) switch to the broadcast position. Make certain that the scratch-eliminator switch is turned off (two-position switch turned counterclockwise). If the "NORMAL INDICATION" is obtained in steps 1 and 6, proceed with the scratch-eliminator tests; if not, isolate and correct the trouble in the audio-amplifier circuits.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in audio-amplifier circuits. Isolate by the following tests.
2	B (Remove 6J5GT)	Clear signal with strong signal input.	Defective: 6K6GT(#1), LS200. Open: C206, R211, T200. Shorted or leaky: C206, C209.
3	D (6J5GT removed)	Same as step 2.	Defective: 6K6GT(#2). Open: C207, R212. Shorted or leaky: C207.
4	E (Replace 6J5GT)	Loud, clear signal with moderate signal input.	Defective: 6J5GT. Open: R208, R209, R207, R210. Shorted or leaky: C205, C204.
5	A	Same as step 1.	Defective: 7X7. Open: R200 (rotate through range), C202, R205, R206. Shorted: C203.
6*	F	Loud, clear signal with weak signal input.	Open: R230, WS-2(R).
Listening Test: Distortion may be caused by leaky C202, C205, C206, or C207; or by open R205, C207, C211, or C212.			

*For this step, set band (wafer) switch to phono.

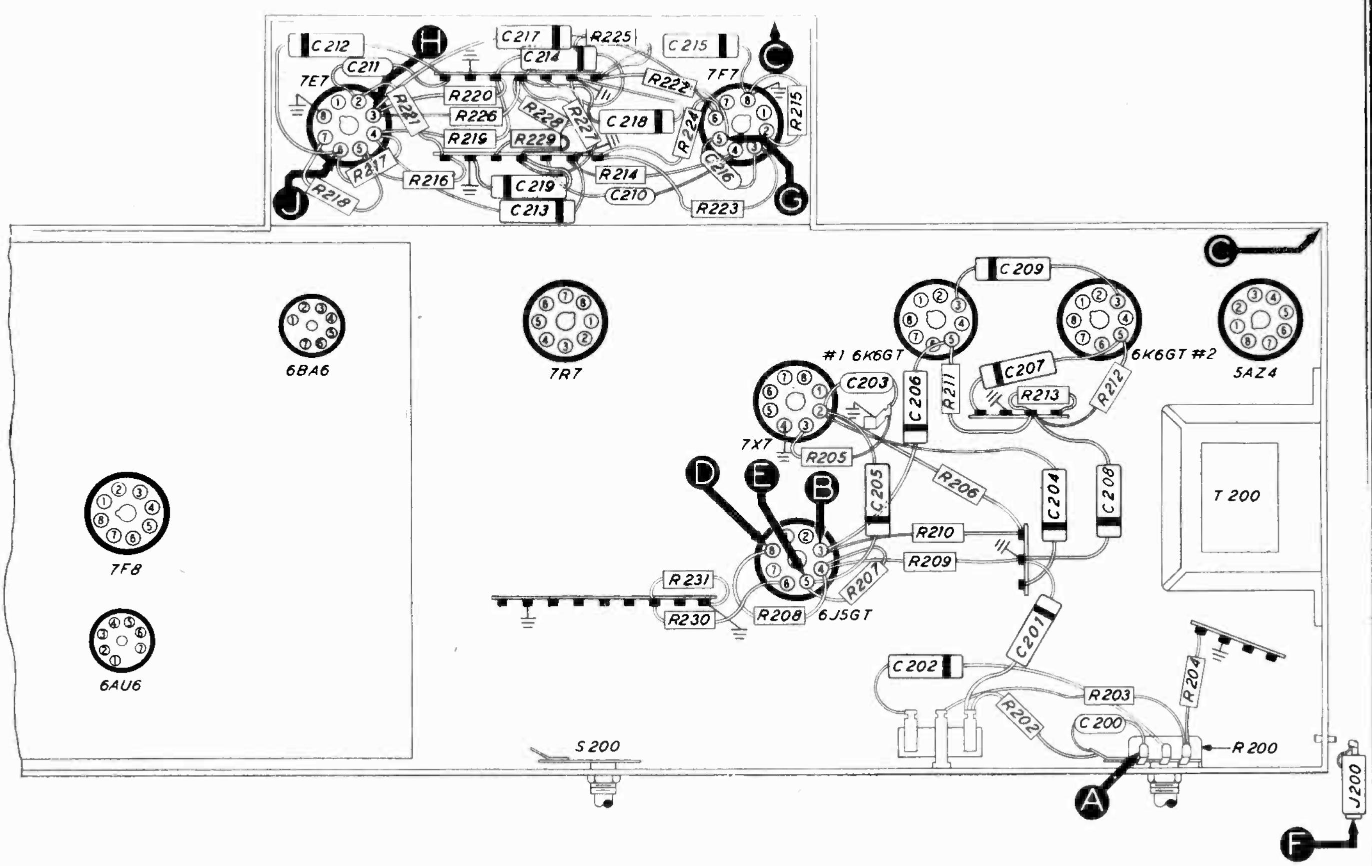


Figure 3. Bottom View, Showing Section 2 Test Points

TP 5328B

Section 2 (Cont.) TROUBLE SHOOTING

SCRATCH-ELIMINATOR TESTS

Set the tone control fully counterclockwise. Turn the band (wafer) switch to the phono position. For all steps except 1(b), set the volume control to maximum; for this step, adjust the volume control as directed in the chart.

Turn the scratch eliminator on or off as indicated in the chart. (The scratch eliminator is on when the two-position switch is turned clockwise.)

Connect an output meter across the *primary* of the output transformer, T200.

IMPORTANT! For all steps except step 4, use the 0—10-volt output-meter range; for step 4 only, use the 0—50-volt range. If the proper ranges are not used, erroneous readings will result.

Connect the ground lead of an audio signal generator to the chassis, test point C, and connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the generator for 5000 cycles. Adjust the generator output as directed in the chart.

If normal operation is indicated by the tests in step 1, (a) and (b), proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in the scratch-eliminator circuits.

NOTE: For steps 2, 3, and 4, connect the positive lead of a 20,000-ohms-per-volt, d-c voltmeter to the chassis, test point C; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the "VOLTMETER" test points indicated in the chart.

STEP	TEST POINT	SIG. GEN. OUTPUT	VOLT-METER	SPECIAL INSTRUCTIONS	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	F	Adjust for 10v output-meter reading, with scratch-eliminator off.		Turn scratch eliminator on; output voltage should drop to 6.5v (approx.).	
1(b)	F	Same as for 1(a).		Reduce volume control to obtain output-meter reading of 1v. Increase generator output for output-meter reading of 10v. Turn scratch eliminator on; output voltage should not drop below 8.8v (approx.).	Trouble in scratch-eliminator circuits. Isolate by the following tests.
2	G	See SPECIAL INSTRUCTIONS.	H	With scratch eliminator on, increase generator output for voltmeter reading of 8.8v, negative; failure to obtain this value indicates trouble.	Defective: 7F7, 7E7 (diode section), WS-3(R). Open R224, R222, R226, R228, C217, S200.
3	G	Same setting which produced 8.8v reading in step 2, with scratch eliminator on.	J	With scratch eliminator on, voltage at point J should be 2v, negative.	Open: R220, R219, R217. Shorted: C213, C214, C212.
4	F	Same as step 2.	H	With scratch eliminator on, voltage at point H should be approx. 28v, negative.	Defective: 7F7. Open: C210, C216, R214, R215, R223. Shorted or leaky: C216.
5	F	Adjust for 10v output-meter reading, with scratch-eliminator off.		Turn scratch eliminator on; output voltage should drop to 6.5v (approx.).	Defective: 7E7 (pentode section). Open: R221, R216, R218, C211, C212. Shorted: C211, C212.

Section 3

TROUBLE SHOOTING

I-F, DETECTOR, AND A-V-C CIRCUITS

AM CIRCUITS

Use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the chassis, test point C, and connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and the tone control fully counterclockwise. Set the band (wafer) switch to the broadcast position. Turn the tuning condensers to full-mesh position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits, or the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the AM circuits.

Since the circuit location of test point A for this section is in Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in AM circuits. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 7R7. Open: R309, R310, R312, L302A, L302C, L302D, R313, R314, R316, C325, C317, WS-3(R). Shorted: C317, C318, C321, C322, C323, C324, C320, C302B. Misaligned: Z302.
3	D	Loud, clear signal with moderate signal input.	Defective: 6BA6. Open: R302, R305, C308, R306, L301A, L301B, L301C, L301D, C301A, C301C, C301D. Shorted: C308, C301C, C301D, C309, C313, L301C, L301D, C300D. Misaligned: Z301.
4	A	Loud, clear signal with weak signal input.	Defective: 7F8*. Open: R406*, R405*, L406*, C300C, L300C, L300D, C300D, R300, WS-4(R), WS-4(F). Shorted: C300C, L300C, C303, C304, L300D. Misaligned: Z300.

*This part, located in another section, may cause abnormal indication in this section.

FM CIRCUITS

These tests are also made with an AM r-f signal generator, using modulated output.

Set the band (wafer) switch to the FM position, and follow the instructions preliminary to the tests for the AM circuits, with these exceptions: set the signal-generator frequency to 9.1 mc., and detune to one side or the other until a satisfactory test signal is obtained.

The best indication of satisfactory FM-detector operation is the ability of this circuit to take the alignment properly (see page 14).

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits.

Section 3 (Cont.) TROUBLE SHOOTING

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in FM circuits. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Open: L302B, C302A, C328, C329, R315, R318, C325, R317, WS-3(R). Shorted: L302A, C319, C302A, C328, L302E, C329, C330, C331, C332, C337.
3	D	Loud, clear signal with moderate signal input.	Defective: 6BA6. Open: R302, R305, C308, R306, L301A, L301B, L301C, L301D, C301A, C301C, C301D. Shorted: C308, C301C, C301D, C309, C313, L301C, L301D, C300D. Misaligned: Z301.
4	A	Loud, clear signal with weak signal input.	Open: WS-4(R), WS-4(F).

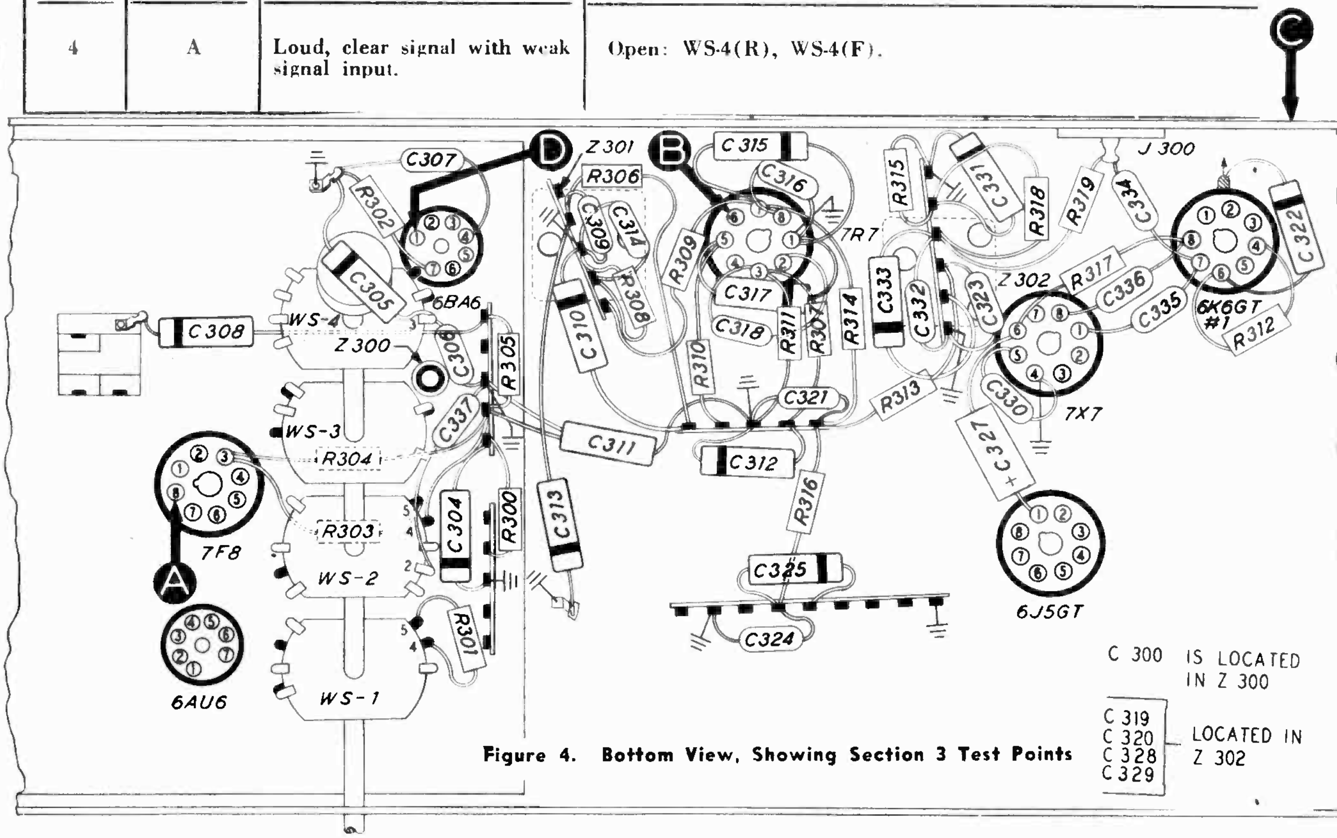


Figure 4. Bottom View, Showing Section 3 Test Points

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before connecting the radio to a source of power:

1. Inspect the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.

2. Measure the resistance across condenser C102 (see figure 2). When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 3500 ohms, check condensers C102 and C103B for leakage or shorts.

The resistance value above, which is much lower than normal, does not represent a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 (power supply) are performed.

Important!

To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical locations as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be changed.

Section 4

TROUBLE SHOOTING

For the following tests, with the exception of the oscillator tests, use an AM r-f signal generator, with modulated output. Connect the generator ground lead to the chassis, test point C, and connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum, and the tone control fully counterclockwise.

Set the band (wafer) switch, tuning control, and signal-generator frequency as indicated in the chart.

OSCILLATOR TESTS (AM AND FM CIRCUITS): Connect the positive lead of a high-resistance d-c voltmeter to the chassis, and connect the negative lead through a 100,000-ohm isolating resistor to the 7F8 oscillator grid (pin 1), test point B. Use a suitable range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltages of approximately the values given in the chart (measured with 20,000-ohms-per-volt meter), throughout the tuning range.

If the "NORMAL INDICATION" is not obtained in step 1 of both the AM and the FM test charts, isolate the trouble by following the remaining steps.

AM CIRCUITS

STEP	TEST POINT	SIG. GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	Broadcast	Tune to signal.	Loud, clear signal with weak signal input.	Trouble in AM circuits. Isolate by the following tests.
2 (Osc. test; see note above.)	B		Broadcast	Tune through range.	Negative 1.5v to 3.5v.	Defective: 7F8. Open: R304*, C405, C404B, C408, L404, R402, WS-2(F), WS-2(R), WS-1(F), WS-3(F), WS-3-(R). Shorted: C405, C404A, C400E, C404B, C408.
3	A	1000 kc.	Broadcast	Tune to signal.	Loud, clear signal with weak signal input.	Open: LA400, R401, L402, C402, C413, WS-1(R) Shorted: L402, C400D, C403.

Listening Test: Distortion may be caused by open R401 or R307*.
Hum and instability may be caused by open C312* or R301*.

*This part, located in another section, may cause abnormal indication in this section.

FM CIRCUITS

Observe the instructions preliminary to the tests for the AM circuits, with the following exception: After tuning the signal generator and the radio to 95 mc., detune one or the other until a satisfactory test signal is obtained.

STEP	TEST POINT	SIG. GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	D	95 mc.	FM	Tune to signal.	Loud, clear signal with weak signal input.	Trouble in FM circuits. Isolate by the following tests.
2 (Osc. test; see note above.)	B		FM	Tune through range.	Negative 1v.	Defective: 7F8. Open: L403, WS-2(F), WS-2(R), WS-1(F), WS-3(F), WS-3-(R). Shorted: L403, C400C, C400H.
3	D	95 mc.	FM	Tune to signal.	Loud, clear signal with weak signal input.	Defective: 6AU6. Open: L400, L405, R400, R403, R404, C409, L401, WS-1-(R). Shorted: L400, C400A, C400F, C407, C409, C410, C411, L401, C400B, C400G.

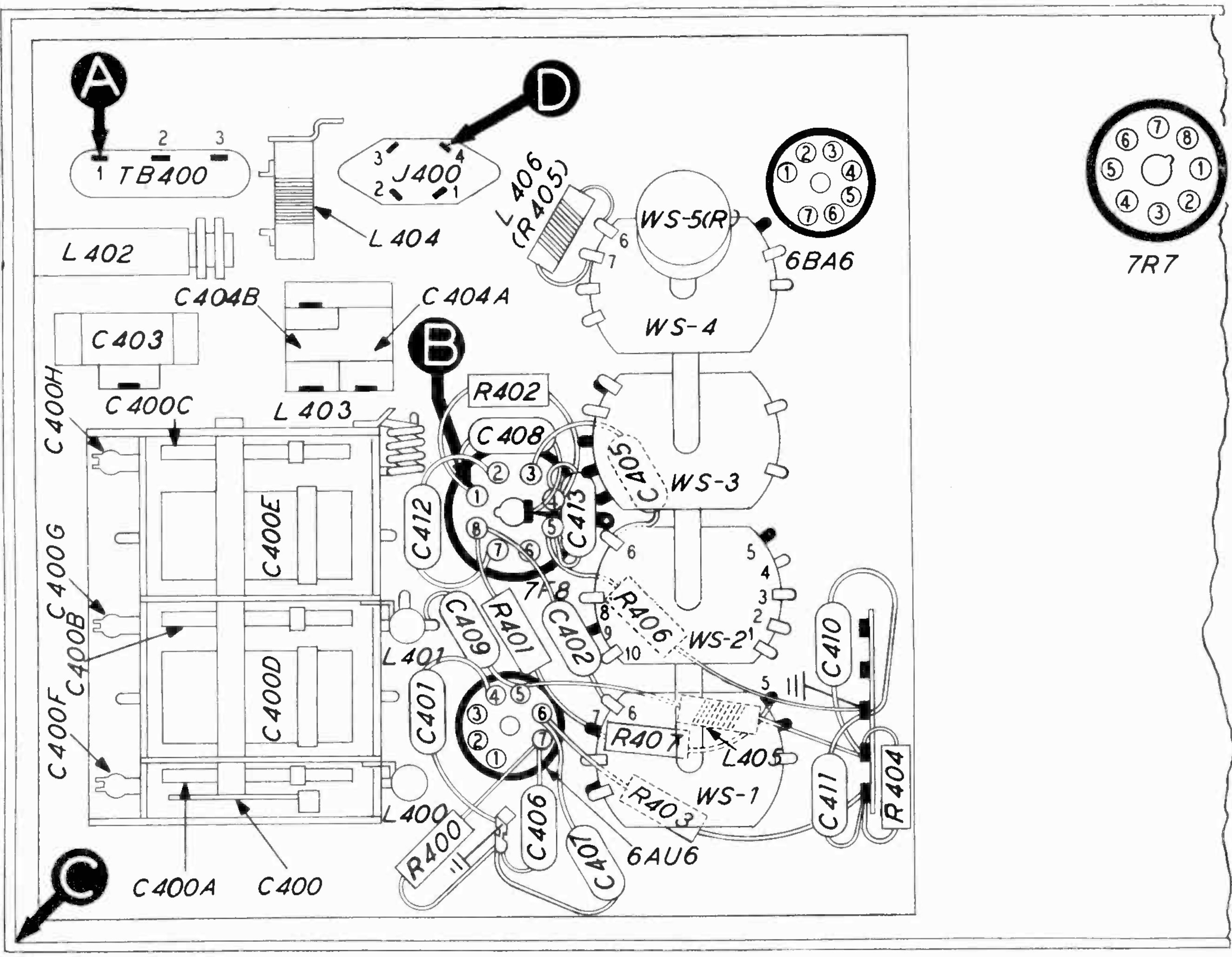


Figure 5. Bottom View, Showing Section 4 Test Points

TP-5328D

CALIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial (chassis) backplate at the end of the pointer with a pencil. The method of measuring for these points is illustrated in figure 1.

With the tuning gang fully meshed, the pointer should be adjusted on the dial-drive cord to coincide with the index mark.

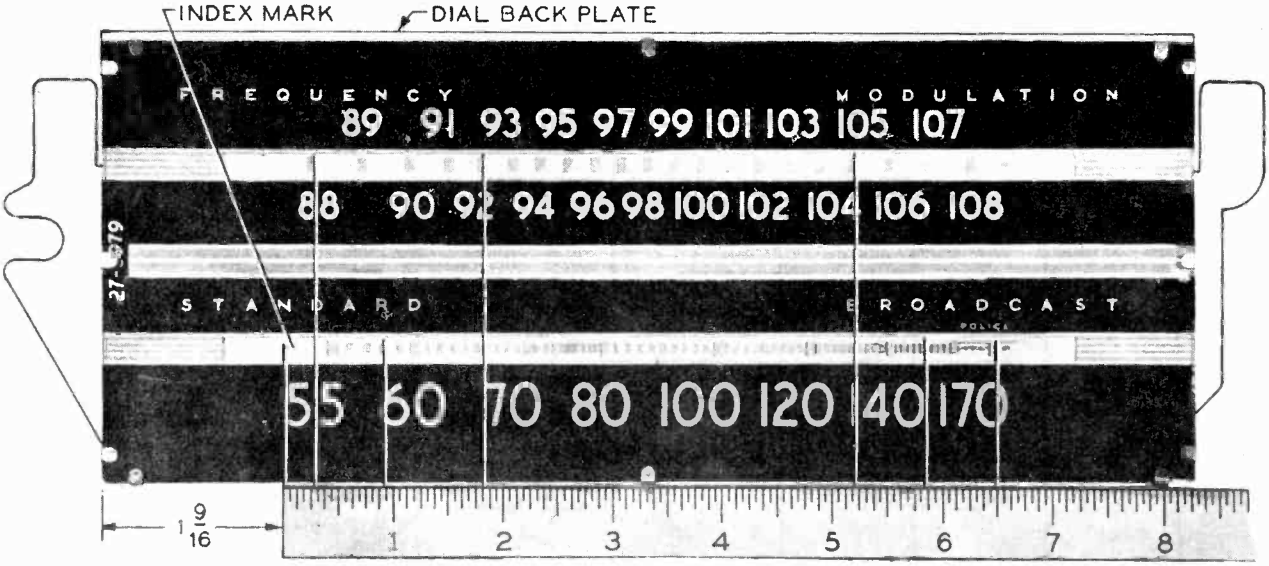


Figure 1. Dial-Backplate Calibration Measurements

PHILCO CORP.

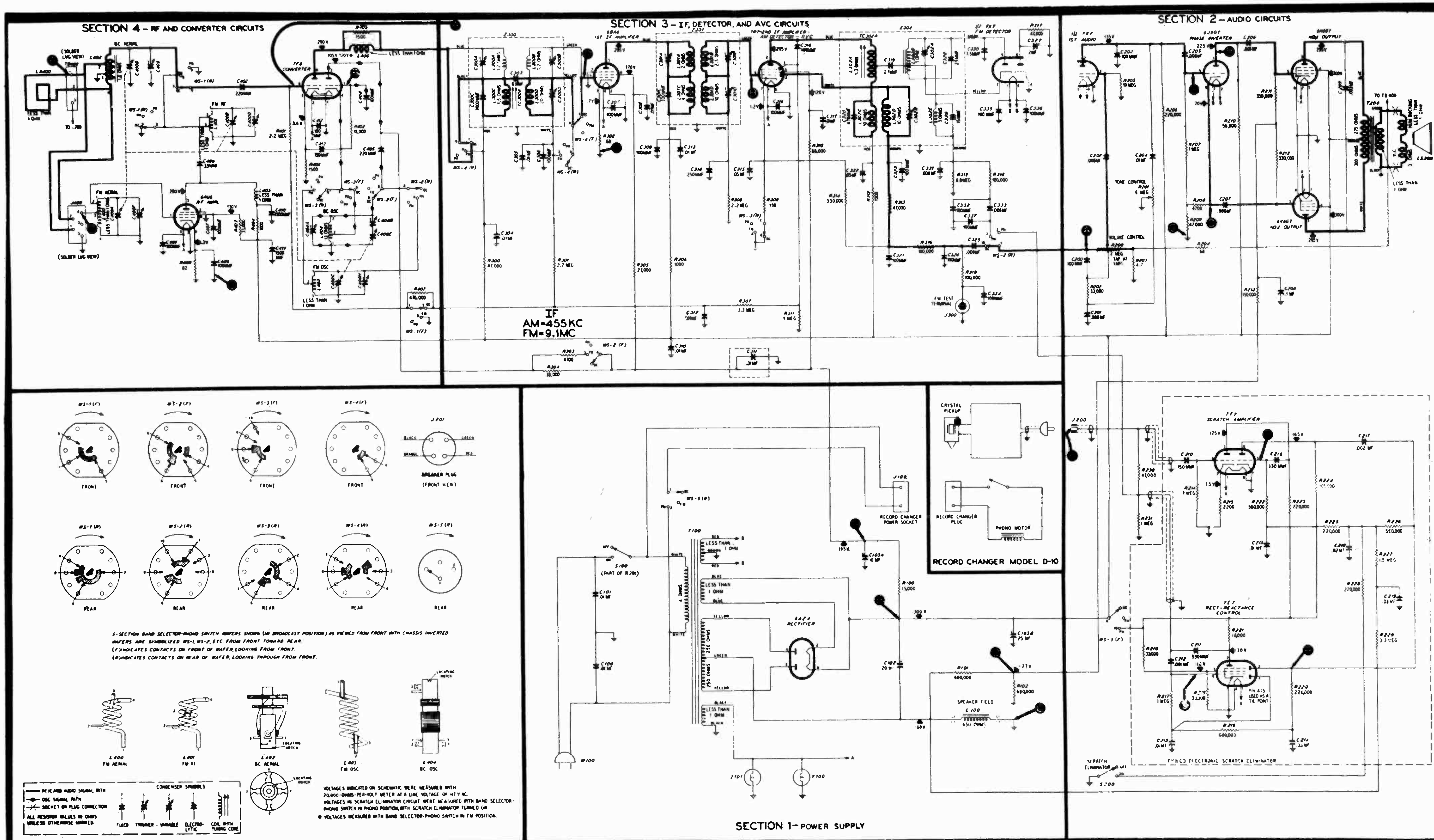


Figure 6. Philco Radio-Phonograph Model 48-1286, Sectionalized Schematic Diagram, Showing Test Points

TP-5320

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to terminal 1 of aerial terminal panel, TB400.	455 kc.	540 kc.	Adjust, in order given, for maximum output.	C302B—3rd i-f sec. C301D—2nd i-f sec. C300D—1st i-f sec. TC300A—1st i-f pri.
2	Radiating loop (see note below).	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	C404B—Osc. (series)
3	Same as step 2.	1700 kc.	1700 kc.	Adjust for maximum.	C404A—Osc. (shunt)
4	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C403—Aerial
5	Same as step 2.	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	C404B—Osc. (series)
6	Repeat steps 2, 3, and 4 until no further improvement is obtained.				

RADIATING LOOP: Make up a six-to-eight turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop.

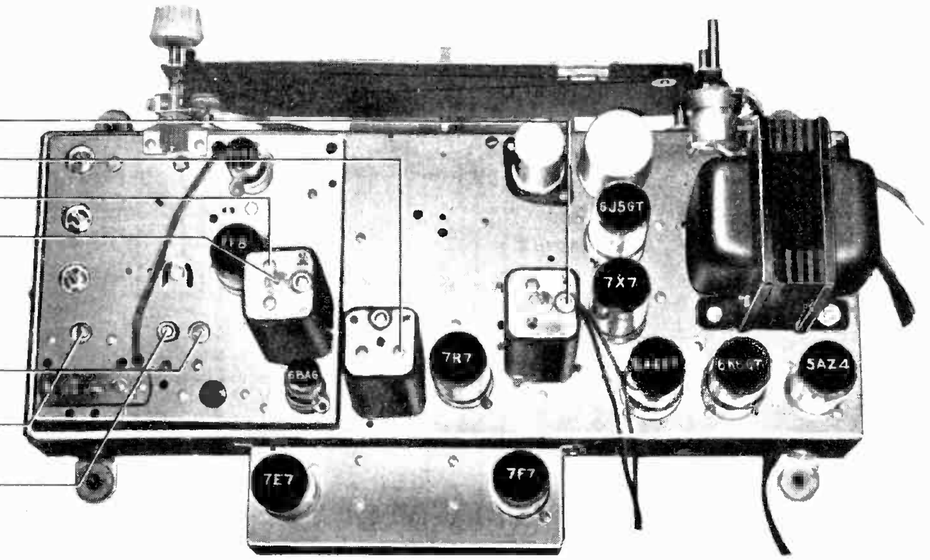


Figure 8. Top View, Showing AM Trimmer Locations

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to grid of 1st i-f ampl., 6BA6 (top plate of trimmer C300B*).	9.1 mc.	88 mc.	Adjust for maximum signal strength, as indicated by d-c voltmeter. Repeat until no further increase is obtained. After this step, do not disturb any of these settings except that of C302A, as directed in step 3.	C302A—Det. balance TC302A—Det. pri. C301B—2nd i-f sec. C301A—2nd i-f pri.
2	Through .1-mf. condenser to mixer grid (pin 8) of 7F8.	9.1 mc.	88 mc.	Adjust for maximum. After this step, do not disturb either of these settings.	C300B—1st i-f sec. C300A—1st i-f pri.
3	Same as step 2.	9.1 mc.	88 mc.	Double-check the adjustment of C302A to make certain that audio output is at minimum. Use output meter. The setting is critical; adjust carefully.	C302A—Det. balance
4	To FM aerial terminal (terminal 4 of J400).	105 mc.	105 mc.	Adjust for maximum.	C400H—Osc.
5	Same as step 4.	105 mc.	105 mc.	Adjust for maximum while rocking tuning control.	C400G—R.f.
6	Same as step 4.	105 mc.	105 mc.	Adjust for maximum.	C400F—Aerial
7	Same as step 4.	92 mc.	92 mc.	Adjust L403 for maximum (see R-F COIL NOTE above).	L403—(Osc. tracking)
8	Same as step 4.	92 mc.	92 mc.	Adjust L401 for maximum while rocking tuning control (see R-F COIL NOTE above).	L401—(R-f tracking)
9	Same as step 4.	92 mc.	92 mc.	Adjust L400 for maximum (see R-F COIL NOTE above).	L400—(Aerial tracking)
10	Repeat steps 4 through 9 until no further increase is obtained.				

FOR LOCATION SEE FIGURE 5

*Make this connection by sliding a piece of flattened wire solder down through alignment slot (see figure 9) in top of i-f transformer can.

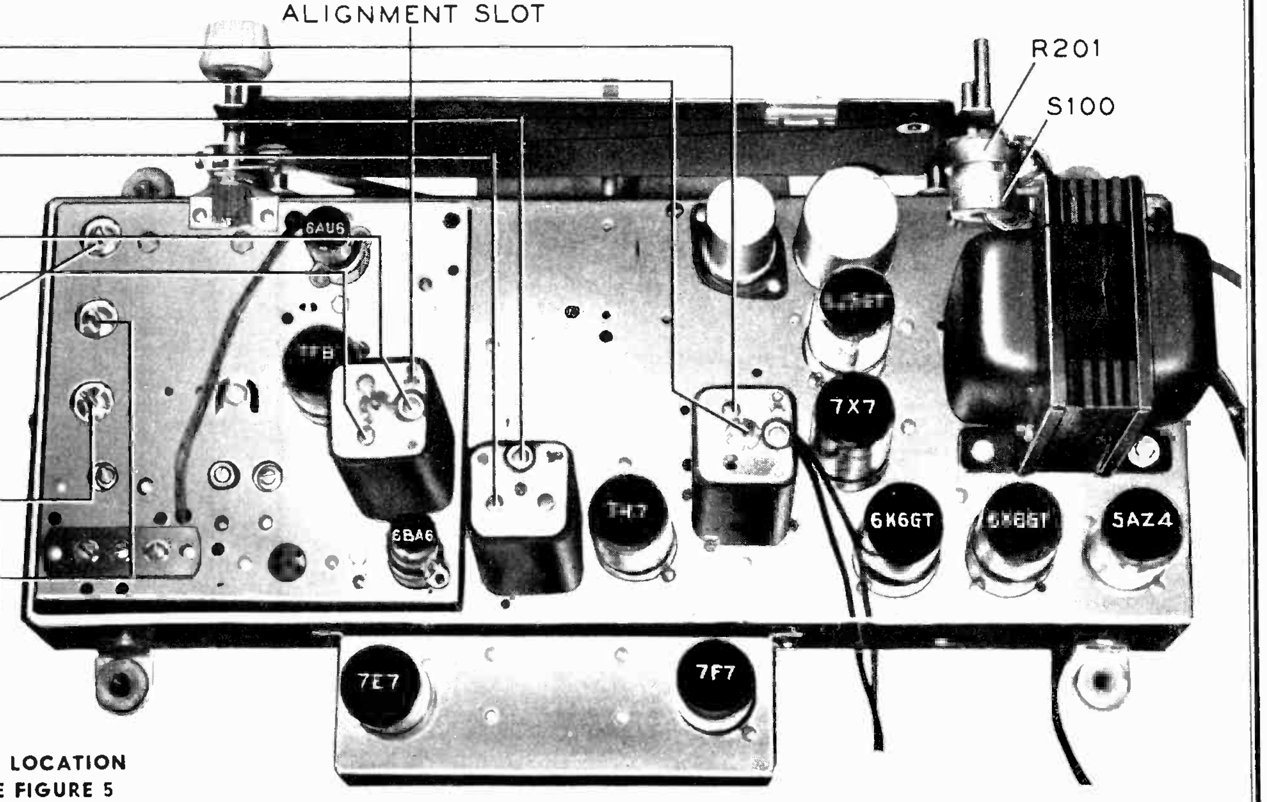


Figure 9. Top View, Showing FM Trimmer Locations

PHILCO CORP. MODEL 48-1286

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .01 mf.	30-1226-1
C101	Condenser, line filter, .01 mf.	30-1226-1
C102	Condenser, electrolytic, input filter, 20 mf., 450v	30-2555
C103	Condenser, electrolytic, 2-section	30-2556
C103A	Condenser, filter, 10 mf., 450v	Part of C103
C103B	Condenser, filter, 25 mf., 450v	Part of C103
I100	Lamp, pilot	34-2064
I101	Lamp, pilot	34-2064
J100	Socket, phono power	27-6200
L100	Speaker, field	Part of LS200
R100	Resistor, filter, 15,000 ohms	66-3155340
R101	Resistor, bias divider, 680,000 ohms	66-4683340*
R102	Resistor, bias divider, 680,000 ohms	66-4683340*
S100	Switch, on-off	Part of R201
T100	Transformer, power	32-8248
W100	Power cord and plug	41-3755-17
WS-5 (R)	Switch-wafer section, phono power	Part of 42-1803-1†

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, tone compensation, 100 mmf.	60-10105407*
C201	Condenser, tone compensation, .006 mf.	45-3500-7*
C202	Condenser, d-c blocking, .006 mf.	45-3500-7*
C203	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C204	Condenser, tone control, .01 mf.	60-0120*
C205	Condenser, d-c blocking, .006 mf.	45-3500-7*
C206	Condenser, d-c blocking, .006 mf.	45-3500-7*
C207	Condenser, d-c blocking, .006 mf.	45-3500-7*
C208	Condenser, bias filter, .1 mf.	61-0113*
C209	Condenser, tone compensation, .003 mf.	61-0117*
C210	Condenser, high-pass filter, 150 mmf.	60-10155407*
C211	Condenser, reactance-feedback, 330 mmf.	60-10335407*
C212	Condenser, d-c blocking, .001 mf.	30-4620*
C213	Condenser, bias filter, .01 mf.	61-0120*
C214	Condenser, bias filter, .03 mf.	30-4517*
C215	Condenser, bias filter, .01 mf.	61-0120*
C216	Condenser, d-c blocking, 330 mmf.	60-10335407*
C217	Condenser, d-c blocking, .002 mf.	30-4622*
C218	Condenser, bias filter, .01 mf.	61-0108*
C219	Condenser, bias filter, .03 mf.	30-4517*
J200	Phono cable and plug	41-3735-2
J201	Speaker cable and plug	41-3734-9
LS200	Speaker	36-1611-3
R200	Volume control, 2 megohms (tap at 1 megohm)	33-5535-1
R201	Tone control (with on-off switch), 6 megohms	33-5538-1
R202	Resistor, tone compensation, 33,000 ohms	66-3333340*
R203	Resistor, voltage divider, inverse feedback, 4.7 ohms	66-9473340*
R204	Resistor, voltage divider, inverse feedback, 68 ohms	66-0683340*
R205	Resistor, grid return, 10 megohms	66-6103340*
R206	Resistor, plate load, 220,000 ohms	66-4223340*
R207	Resistor, grid return, 1 megohm	66-5103340*
R208	Resistor, cathode bias, 4700 ohms	66-2473340*
R209	Resistor, cathode load, 47,000 ohms	66-3473340*
R210	Resistor, plate load, 56,000 ohms	66-3563340*
R211	Resistor, grid return, 330,000 ohms	66-4333340*
R212	Resistor, grid return, 330,000 ohms	66-4333340*
R213	Resistor, bias filter, 150,000 ohms	66-4153340*
R214	Resistor, grid return, 1 megohm	66-5103340*
R215	Resistor, cathode bias, 2200 ohms	66-2223340*
R216	Resistor, screen voltage divider, 33,000 ohms	66-3333340*
R217	Resistor, grid return, 1 megohm	66-5103340*
R218	Resistor, screen voltage divider, 33,000 ohms	66-3333340*
R219	Resistor, bias filter, 680,000 ohms	66-4683340*
R220	Resistor, bias filter, 220,000 ohms	66-4223340*

SECTION 2 (Continued)
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R221	Resistor, plate load, 18,000 ohms	66-3183340*
R222	Resistor, grid return, 560,000 ohms	66-4563340*
R223	Resistor, plate load, 220,000 ohms	66-4223340*
R224	Resistor, plate load, 100,000 ohms	66-4103340*
R225	Resistor, bias filter, 220,000 ohms	66-4223340*
R226	Resistor, diode load, 560,000 ohms	66-4563340*
R227	Resistor, bias filter, 1.5 megohms	66-5153340*
R228	Resistor, diode load, 220,000 ohms	66-4223340*
R229	Resistor, bias filter, 3.3 megohms	66-5333340*
R230	Resistor, low-pass filter, 47,000 ohms	66-3473340*
R231	Resistor, voltage divider, 1 megohm	66-5103340*
S200	Switch, on-off, scratch eliminator	42-1848
T200	Transformer, output	32-8274
WS-3 (F)	Switch-wafer section	Part of 42-1803-1†

SECTION 3
I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C300C	Condenser, shunt, 3000 mmf.	Part of Z300
C300D	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, shunt, 300 mmf.	Part of Z301
C301D	Condenser, trimmer	Part of Z301
C302A	Condenser, trimmer	Part of Z302
C302B	Condenser, trimmer	Part of Z302
C303	Condenser, d-c blocking, 6 mmf.	Part of Z300
C304	Condenser, plate by-pass, .01 mf.	61-0120*
C305	Condenser, r-f by-pass, .01 mf.	61-0120*
C306	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C307	Condenser, filament by-pass, 100 mmf.	62-110009001*
C308	Condenser, screen by-pass, .01 mf.	61-0120*
C309	Condenser, plate by-pass, 100 mmf.	62-110009001*
C310	Condenser, r-f by-pass, .01 mf.	61-0120*
C311	Condenser, r-f by-pass, .01 mf.	30-4641
C312	Condenser, a-v-c filter, .01 mf.	61-0120*
C313	Condenser, plate by-pass, .01 mf.	61-0120*
C314	Condenser, r-f by-pass, 250 mmf.	62-122001001*
C315	Condenser, cathode by-pass, .05 mf.	61-0122*
C316	Condenser, filament by-pass, 100 mmf.	62-110009001*
C317	Condenser, screen by-pass, .01 mf.	61-0120*
C318	Condenser, d-c blocking, 100 mmf.	60-10105407*
C319	Condenser, d-c blocking, 27 mmf.	Part of Z302
C320	Condenser, shunt, 470 mmf.	Part of Z302
C321	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C322	Condenser, plate by-pass, .05 mf.	61-0122*
C323	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C324	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C325	Condenser, d-c blocking, .006 mf.	45-3500-7*
C326	Not used	
C327	Condenser, electrolytic, noise suppressor (FM), 2 mf., 50v	30-2417-7
C328	Condenser, shunt, 25 mmf.	Part of Z302
C329	Condenser, shunt, 15 mmf.	Part of Z302
C330	Condenser, balancing, 7.5 mmf.	30-1224-8
C331	Condenser, tone compensation, .008 mf.	30-4112
C332	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C333	Condenser, d-c blocking, .006 mf.	45-3500-7*
C334	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C335	Condenser, filament by-pass, 100 mmf.	62-110009001*
C336	Condenser, filament by-pass, 100 mmf.	62-110009001*
C337	Condenser, r-f by-pass, 100 mmf.	62-110009001*
J300	Test socket	27-6280
L300A	Transformer, primary (FM), 1st i-f	Part of Z300
L300B	Transformer, secondary (FM), 1st i-f	Part of Z300
L300C	Transformer, primary (AM), 1st i-f	Part of Z300
L300D	Transformer, secondary (AM), 1st i-f	Part of Z300
L301A	Transformer, primary (FM), 2nd i-f	Part of Z301
L301B	Transformer, secondary (FM), 2nd i-f	Part of Z301
L301C	Transformer, primary (AM), 2nd i-f	Part of Z301
L301D	Transformer, secondary (AM), 2nd i-f	Part of Z301
L302A	Transformer, primary (FM), 3rd i-f	Part of Z302

REPLACEMENT PARTS LIST (Continued)

SECTION 3 (Continued)
I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
L302B	Transformer, secondary (FM), 3rd i-f	Part of Z302
L302C	Transformer, primary (AM), 3rd i-f	Part of Z302
L302D	Transformer, secondary (AM), 3rd i-f	Part of Z302
L302E	Transformer winding, isolating, 3rd i-f	Part of Z302
R300	Resistor, plate dropping, 47,000 ohms	66-3473340*
R301	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R302	Resistor, cathode bias, 68 ohms	66-0683340*
R303	Resistor, plate dropping, 4700 ohms	66-2473340*
R304	Resistor, plate dropping, 33,000 ohms	66-3333340*
R305	Resistor, screen dropping, 27,000 ohms	66-3273340*
R306	Resistor, plate decoupling, 1000 ohms	66-2103340*
R307	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R308	Resistor, grid return, 2.2 megohms	66-5223340*
R309	Resistor, cathode bias, 150 ohms	66-1153340*
R310	Resistor, screen dropping, 68,000 ohms	66-3683340*
R311	Resistor, a-v-c load, 1 megohm	66-5103340*
R312	Resistor, plate decoupling, 1000 ohms	66-2103340*
R313	Resistor, i-f filter, 47,000 ohms	66-3473340*
R314	Resistor, diode load, 330,000 ohms	66-4333340*
R315	Resistor, FM detector load, 6.8 megohms	66-5683340*
R316	Resistor, isolating, 100,000 ohms	66-4103340*
R317	Resistor, noise suppressor (FM), 47,000 ohms	66-3473340*
R318	Resistor, isolating, 100,000 ohms	66-4103340*
R319	Resistor, isolating, 100,000 ohms	66-4103340*
TC300A	Tuning core	Part of Z300
TC302A	Tuning core	Part of Z302
WS-2 (F)	Switch-wafer section	Part of 42-1803-1†
WS-2 (R)	Switch-wafer section	Part of 42-1803-1†
WS-3 (R)	Switch-wafer section	Part of 42-1803-1†
WS-4 (F)	Switch-wafer section	Part of 42-1803-1†
WS-4 (R)	Switch-wafer section	Part of 42-1803-1†
Z300	Transformer, 1st i-f	32-4146
Z301	Transformer, 2nd i-f	32-4156
Z302	Transformer, 3rd i-f	32-4147

SECTION 4
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang, 5-section	31-2703-2
C400A	Condenser, tuning, FM aerial	Part of C400
C400B	Condenser, tuning, FM r.f.	Part of C400
C400C	Condenser, tuning, FM osc.	Part of C400
C400D	Condenser, tuning, bc. aerial	Part of C400
C400E	Condenser, tuning, bc. osc.	Part of C400
C400F	Condenser, trimmer, FM aerial	Part of C400
C400G	Condenser, trimmer, FM r.f.	Part of C400
C400H	Condenser, trimmer, FM osc.	Part of C400
C401	Condenser, filament by-pass, 100 mmf.	62-110009001*
C402	Condenser, d-c blocking, 220 mmf.	62-122001001*
C403	Condenser, trimmer, bc. aerial	31-6473
C404	Condenser, trimmer assembly, 2-section	31-6476-5
C404A	Condenser, shunt trimmer, bc. osc.	Part of C404
C404B	Condenser, series padder, bc. osc.	Part of C404
C405	Condenser, d-c blocking, 220 mmf.	62-122001001*
C406	Condenser, cathode by-pass, 100 mmf.	62-110009001*
C407	Condenser, screen grid by-pass, 100 mmf.	62-110009001*
C408	Condenser, osc. grid, 100 mmf.	62-110009001*
C409	Condenser, d-c blocking, 33 mmf.	30-1224*
C410	Condenser, r-f by-pass, 1500 mmf.	62-215001011
C411	Condenser, r-f by-pass, 1500 mmf.	62-215001011
C412	Condenser, filament by-pass, 100 mmf.	62-110009001*
C413	Condenser, d-c blocking, 750 mmf.	60-10755301*
J400	Socket, FM aerial	27-6214-1
L400	Coil, FM aerial	32-4158
L401	Coil, FM r.f.	32-4159
L402	Coil, bc. aerial	32-4049-3
L403	Coil, FM osc.	32-4018-2
L404	Coil, bc. osc.	32-4221
L405	Coil, r-f choke (plate of 6AU6)	32-4061

SECTION 4 (Continued)
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
L406	Coil (including R405), parasitic suppressor (plate of 7F8)	32-4157
R400	Resistor, cathode bias, 82 ohms	66-0823340*
R401	Resistor, grid return, 2.2 megohms	66-5223340*
R402	Resistor, grid return, 15,000 ohms	66-3153340*
R403	Resistor, screen dropping, 33,000 ohms	66-3333340*
R404	Resistor, plate decoupling, 1000 ohms	66-2103340*
R405	Resistor (with coil L406), parasitic suppressor, 1500 ohms	Part of L406
R406	Resistor, cathode bias, 1500 ohms	66-2153340*
R407	Resistor, a-v-c voltage divider (FM), 470,000 ohms	66-4473340*
TB400	Terminal panel, bc. aerial	38-9942
WS-1 (F)	Switch-wafer section	Part of 42-1803-1†
WS-1 (R)	Switch-wafer section	Part of 42-1803-1†
WS-2 (F)	Switch-wafer section	Part of 42-1803-1†
WS-2 (R)	Switch-wafer section	Part of 42-1803-1†
WS-3 (F)	Switch-wafer section	Part of 42-1803-1†
WS-3 (R)	Switch-wafer section	Part of 42-1803-1†
† 42-1803-1	5-section wafer switch (band selector-phono)	

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Hardware	
Back (Masonite)	54-7561
Baffle and cloth	40-6999
Baffle, wood	219111
Bezel	56-4878
Bin mechanism, r.h.	76-3223-8
Bin mechanism, l.h.	76-3223-7
Cabinet, less scale	10704
Dome	45-6042
Door, folding	45-6417
Door pull	56-5398
Escutcheon	56-5491FA30
Frame assembly	76-2199
Front, tilt	45-6416
Hinge, lid	45-6036
Hinge, bin	45-6200
Hinge (under lid)	45-6301
Dial Scale and Backplate Hardware	
Backplate-and-pulley assembly	76-2005-3
Dial scale	76-3187-1
Pointer	56-3179FCP
Scale strap	56-4916
Spring, pointer drive	28-8953
Drive cord (25-ft. spool)	45-8750*
Knob (4 required)	54-4486
Knob, scratch eliminator on-off	54-4338-1
Lamp-socket assembly, pilot (2 required)	76-2109
Shield, pilot lamp	56-2194
Socket, Loktal	27-6177
Socket, octal	27-6174
Socket, Loktal (7F8 only)	27-6213
Socket, miniature (6AU6)	27-6203-1
Socket, miniature (6BA6)	27-6226
Wafer-Switch Hardware	
Link assembly	76-2186-4
Shaft	56-3298FA11

ALIGNMENT PROCEDURE

When the complete AM and FM alignment is to be made, the AM alignment should be made FIRST; if AM alignment is not required, the FM alignment alone may be made.

ALIGNMENT OF AM CIRCUITS

DIAL POINTER: With tuning condensers fully meshed, dial pointer must coincide with index mark at low-frequency end of dial. (See "CALIBRATING DIAL BACKPLATE," page 2.)

OUTPUT METER: Connect between No. 3 terminal (voice-coil connection) of aerial terminal panel and chassis.

AM R-F SIGNAL GENERATOR: Connect ground lead to chassis, and output lead as indicated in chart. Use modulated output.

OUTPUT LEVEL: During alignment, signal-generator output must be attenuated to maintain radio output below 1.5 volts, as read on output meter.

CONTROLS: Set band switch to broadcast position. Set volume control to maximum, and tone control fully counterclockwise. Set signal-generator frequency and radio tuning dial as indicated in chart.

ALIGNMENT OF FM CIRCUITS

Make AM alignment first.

OUTPUT METER: Connect as for AM alignment (this meter is used only in step 3).

D-C METER: Connect 20,000-ohms-per-volt meter across 2-mf. condenser, C327, in FM-detector circuit—negative lead to pin 6 of 7X7 tube, and positive lead to chassis. Use 10-volt range.

AM R-F SIGNAL GENERATOR: Use modulated output for entire alignment. Generator must have sufficient output to give reading of approximately 9 volts on d-c meter, and signal should be attenuated during alignment to keep meter at this value. Connect generator ground lead to chassis, and output lead as indicated in chart.

VOLUME AND TONE CONTROLS: Same as for AM alignment.

RADIO BAND SWITCH, RADIO DIAL, AND SIGNAL-GENERATOR DIAL: Set as indicated in chart. Allow radio and generator to warm up for 15 minutes before starting alignment.

R-F COIL NOTE: When making the tracking adjustments, the resonance of the circuits using coils L400, L401, and L403 may be checked with a powdered-iron tuning core, such as Part No. 56-6100. If the signal strength (meter reading) increases when the iron end is placed in, or near, the coil, compress the turns slightly. If the threaded brass end causes an increase in signal strength, spread the turns. Do not compress or spread the turns excessively; only a small change is required at these frequencies.

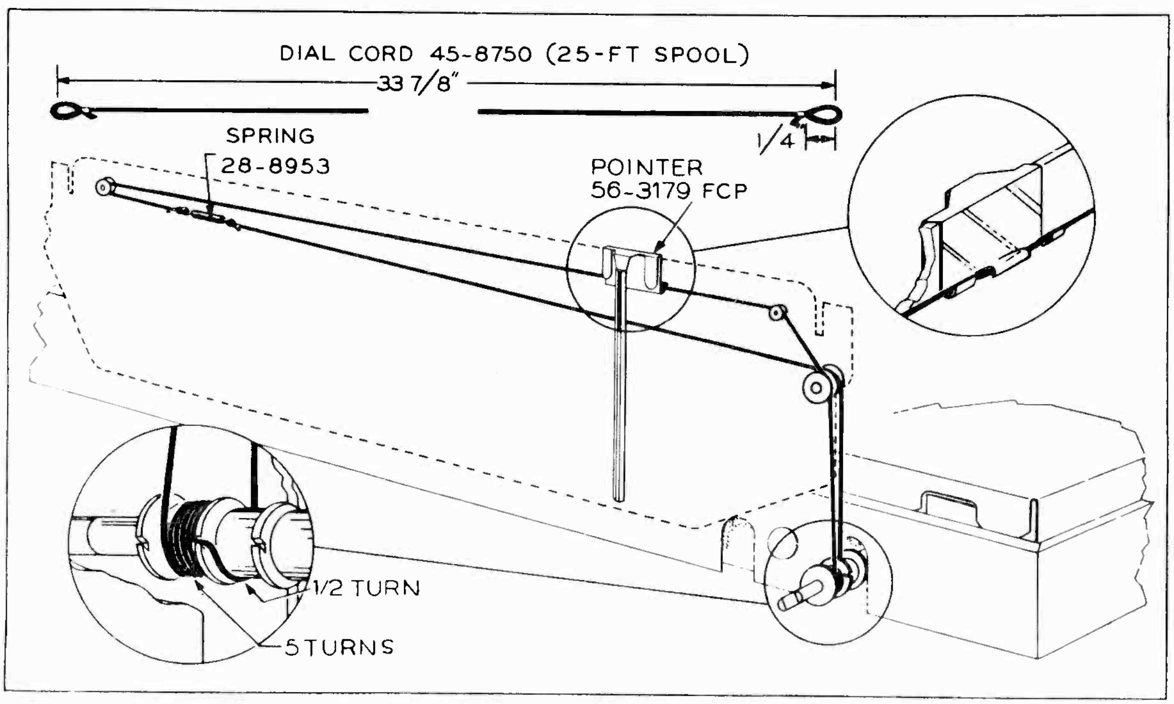


Figure 7. Drive-Cord Installation Details

TP-4058E

PHILCO CORP.

Circuit Description

Philco Radio-Phonograph Model 48-1290 contains a 13-tube superheterodyne and a Model D-10A Philco Automatic Record Changer.

A low-impedance loop within the cabinet normally provides adequate signal pickup for the standard-broadcast and short-wave bands. In most locations, the FM a-c line aerial provides satisfactory FM reception. In areas where FM signals are weak, an outdoor dipole aerial (Philco Part No. 45-1462) will provide additional pickup.

To increase the pickup on all three bands, use the Philco Aerial Coupler, Part No. 76-2353, with the outdoor dipole aerial. Information on aerial and coupler connections is given in the external aerial bulletin PR-1200.

The r-f stage (FM only), converter stage, and first i-f stage are mounted on a separate chassis to insure reliable performance at high frequencies. A 6AU6 high-frequency pentode is used in the r-f stage, and a 7F8 high-frequency double triode is employed as a converter

Three transformer-coupled i-f stages are used. The first, third, and fourth i-f transformers have two sets of windings; one set is tuned to 455 kc. for AM operation, and the other to 9.1 mc. for FM operation. The second i-f transformer, having a single primary winding tuned to 9.1 mc., one secondary winding tuned to 9.1 mc., and another secondary winding tuned to 455 kc., provides untuned primary for AM operation, to prevent instability. All transformers provide tuned-primary, tuned-secondary coupling on FM, to supply the additional gain needed at 9.1 mc. Switching of the windings, to attenuate undesired beat frequencies, is necessary only in the first i-f transformer; the large difference between the two intermediate frequencies makes further switching unnecessary. One 7A7 and two 6BA6 high-transconductance pentodes are used in the i-f stages. The wide-band response required for FM reception is obtained by "over-coupled" FM windings in the i-f transformers.

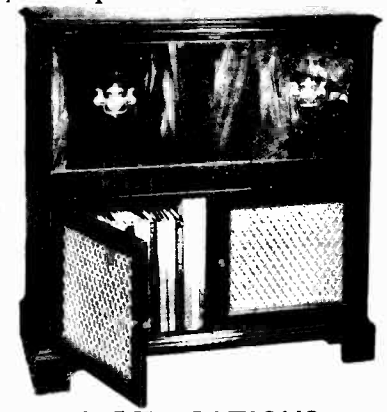
The new Philco advanced FM detector circuit, employing the FM1000 tube of special design, is used for FM reception. This circuit has excellent tuning characteristics, and inherently rejects AM and noise. Very briefly, the circuit functions as follows: The first and second grids (pins 2 and 5) of the FM1000 are used as grid and anode, respectively, of a modified Colpitts oscillator, which normally operates at the intermediate frequency of 9.1 mc. The output of the i-f amplifier stages is fed into the injection grid (pin 6). The reactive coupling between the plate and oscillator circuits causes the oscillator to lock in and follow the frequency variations of the i-f signal. As the oscillator frequency increases, the plate current through R324 decreases, and as the oscillator frequency decreases, the plate current increases. This variation is linear with respect to frequency deviation; the plate current, therefore, produces the same wave shape as the voltage that frequency-modulated the carrier. This audio signal is fed to the audio amplifier through the decoupling network, C331 and R322.

The high-mu-triode section of a 6SQ7GT is used in the first audio stage, and is biased from the bleeder in the negative return of the power supply. The first audio stage is resistance-coupled to one triode section of a 7AF7 twin triode. This section functions as a cathode-and-plate-loaded phase inverter, and is resistance-coupled to the audio output stage, which employs two 6V6GT beam pentodes in push-pull combination. The output tubes are transformer-coupled to a twelve-inch electrodynamic speaker, and are biased from the bleeder circuit connected across the speaker field in the negative return of the power supply. Inverse feedback is obtained by connecting the secondary of the output transformer, through the resistor network, R204 and R203, to the volume control. The second triode section of the 7AF7 tube is used as the phonograph preamplifier stage, and is self-biased by cathode resistor R213.

The Philco Electronic Scratch Eliminator, which is used in phono operation, reduces the high-frequency surface noise during the low-volume passages of a record, and permits maximum treble response during the high-volume passages. The circuit employs a 7F7 double triode as a two-stage audio amplifier and a 7E7 diode, pentode as a half-wave rectifier and reactance tube. The latter functions as a variable capacitance (across the output circuit of the phono preamplifier), which shunts a controlled portion of the higher audio frequencies to ground. The bias on the grid of the reactance tube controls the effective shunt capacitance, which becomes maximum with low bias, and minimum with high bias. The control bias is obtained from the audio signal, of which a definite amount is taken off (at the output circuit of the phono preamplifier), amplified by the 7F7, and rectified by the diode section of the 7E7.

Any push button except the OFF button operates the a-c switch to turn on the power; the OFF button turns off the power.

The treble control, when turned to its maximum clockwise position, actuates switch S200 to place the scratch eliminator in operation; in any other position, the control regulates the treble response in either radio or phono operation.



SPECIFICATIONS

CABINET	Wood, mahogany finish
CIRCUIT	13-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1720 kc.
Short wave	9.3—15.5 mc.
FM	88—108 mc.
AUDIO OUTPUT	10 watts
PUSH BUTTONS	Ten: One for OFF, five for broadcast-station selection, three for band selection, and one for phonograph operation
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	Radio: 110 watts Phonograph: 140 watts
AERIALS	Built-in loop and a-c line (FM) aerial; external aerial also may be used
INTERMEDIATE FREQUENCIES	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (13)	6AU6, 7F8, 6BA6(2), 7A7, FM1000, 7AF7, 6SQ7GT, 6V6GT(2), 7F7, 7E7, 5U4G
PHONOGRAPH	Philco Automatic Record Changer, Model D-10A

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, as follows:

Section 1—the power supply
Section 2—the audio circuits
Section 3—the i-f, detector, and a-v-c circuits
Section 4—the r-f and converter circuits

Test points are specified for each section, and are indicated in the sectionalized schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire chart.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Section 1

TROUBLE SHOOTING
POWER SUPPLY

CAUTION: Do not turn on the power with the speaker disconnected, as this may cause damage to the set.

Make the tests for this section with a d-c voltmeter; connect the leads between the chassis, test point C, and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

Set the volume control to minimum, and the bass and treble controls fully counterclockwise. Depress the BC push button.

Follow the steps in the order given. If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	200v		Trouble in this section. Isolate by the following tests.
2	B	250v	No voltage	Defective: 5U4G. Open: L100, T100. W100, S100. Shorted: C101B, C102, C103, C317*, C405*.
			Low voltage	Defective: 5U4G, T100. Open: C103. Leaky: C101B, C102, C103, C317*, C405*.
			High voltage	Defective: 6V6GT*. Open: T200*.
3	D	Negative 9.8v	No voltage	Shorted: C104. Open: R101.
			Low voltage	Changed resistance: R101.
			High voltage	Open: R102.
4	A	200v	No voltage	Open: R100. Shorted: C101A, C415*, C417*, C419*.
			Low voltage	Changed resistance: R100. Leaky: C101A, C415*, C417*, C419*.
Listening test: Abnormal hum may be caused by open C101A, C101B, or C104.				

* This part, located in another section, may cause abnormal indication in this section.

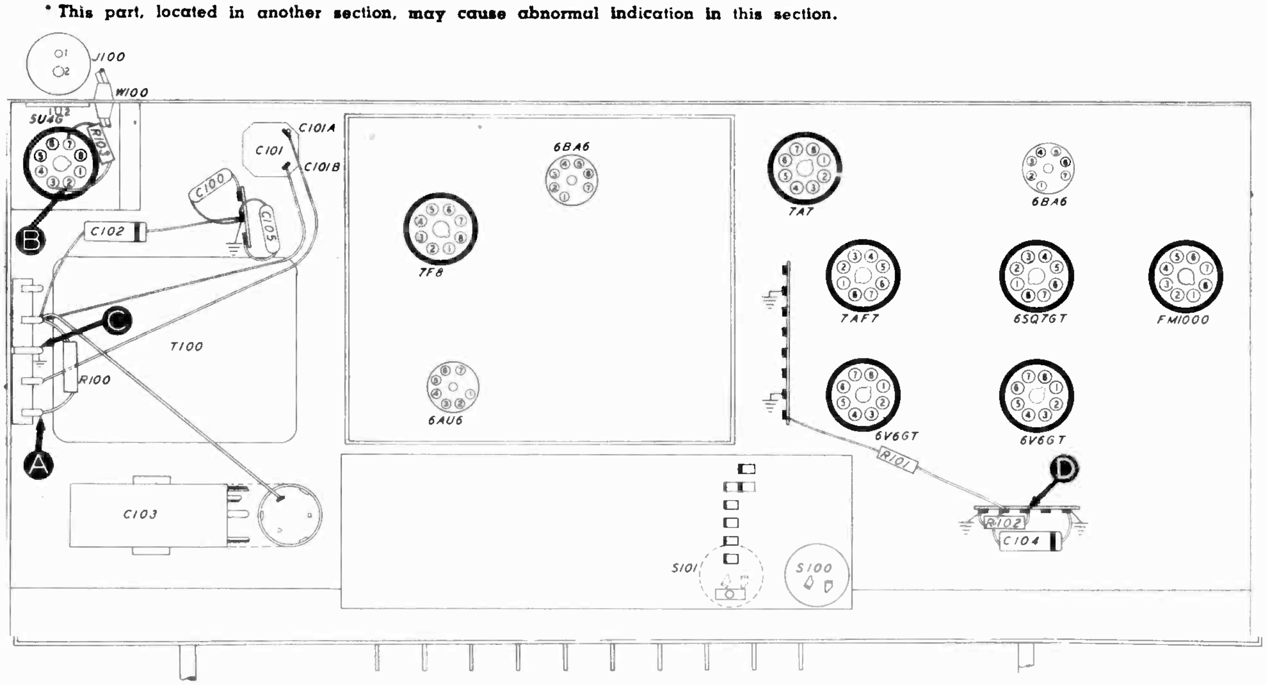


Figure 1. Bottom View, Showing Section 1 Test Points

Section 2

TROUBLE SHOOTING

AUDIO-AMPLIFIER AND PHONO-PREAMPLIFIER TESTS

Use an audio-frequency signal generator. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

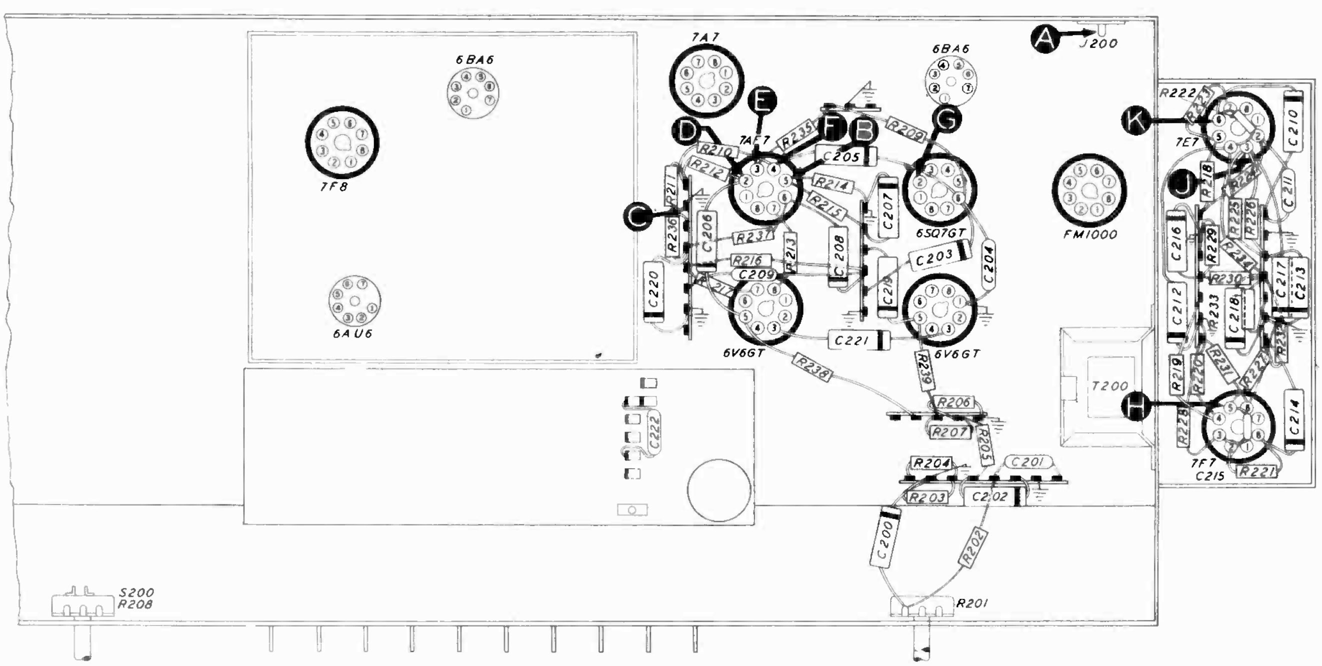
Set the volume control to maximum, and the bass and treble controls fully counterclockwise. Depress the push button indicated in the chart.

If the "NORMAL INDICATION" is obtained in step 1, (a) and (b), proceed with the scratch eliminator tests; if not, isolate the trouble by following the steps as directed in the chart.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	A	Loud, clear signal with weak signal input (with BC button, PB-3, depressed).	Trouble in audio-amplifier circuits. Isolate by steps 2, 3, 4, 5, and 6.
1(b)	B	Loud, clear signal with weak signal input (with PHONO button, PB-9, depressed).	Trouble in phono-preamplifier circuit. Isolate by step 7.
2	D (Remove 7AF7)	Clear signal with strong signal input (BC button depressed).	Defective: 6V6GT. Open: LS200, T200, R238, C206. Shorted or leaky: C221, C206.
3	E (7AF7 removed)	Clear signal with strong signal input (BC button depressed).	Defective: 6V6GT. Open: C219, R239. Shorted or leaky: C219.
4	F (Replace 7AF7)	Loud, clear signal with moderate signal input (BC button depressed).	Defective: 7AF7. Open: R211, R212, R235, R210. Leaky: C205.
5	G	Loud, clear signal with weak signal input (BC button depressed).	Defective: 6SQ7GT. Open: C205, R209. Shorted or leaky: C222, C204.
6	A	Loud, clear signal with weak signal input (BC button depressed).	Open: R200 (rotate through range), C202, R205, R206.
7	B	Loud, clear signal with weak signal input (PHONO button depressed).	Defective: 7AF7. Open: R236, R237, PB-9, C208, R216, R213. Shorted or leaky: C220.

Listening Test: Distortion may be caused by leaky C202, C205, C206, or C219, open R207.

* This part, located in another section, may cause abnormal indication in this section.



TP-53058

Figure 2. Bottom View Showing Section 2 Test Points (location of R200 shown in figure 8)

Section 2 (Cont.)

TROUBLE SHOOTING

SCRATCH-ELIMINATOR TESTS

Set the bass control fully clockwise. Turn the treble control clockwise as far as possible without turning on the scratch eliminator, except as noted in chart (the scratch eliminator is on when this control is turned fully clockwise until switch S200 is actuated). Depress the PHONO push button, PB-9. For all steps except 1(b), set the volume control to maximum; for this step, adjust the volume control as indicated in the chart.

Connect an output meter between terminal 3 (voice-coil connection) of the aerial terminal panel and the chassis.

Connect the ground lead of an audio signal generator to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the generator for 5000 cycles. Adjust the generator output as indicated in the chart.

If normal operation is indicated by the tests in step 1, (a) and (b), proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in the scratch-eliminator circuits.

NOTE: For steps 2, 3, and 4, connect the positive lead of a 20,000-ohms-per-volt, d-c voltmeter to the chassis, test point C; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the points indicated in the "METER POINT" column of the chart.

STEP	TEST POINT	SIG. GEN. OUTPUT	METER POINT	SPECIAL INSTRUCTIONS	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	A	Adjust for 3v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 1.2v (approx.).	
1(b)	A	Adjust for 3v output-meter reading, with scratch eliminator off.		Reduce volume control to obtain output meter reading of .5v. Increase generator output to obtain output-meter reading of 3v. Turn scratch eliminator on; output voltage should not drop more than .6v (approx.).	Trouble in scratch-eliminator circuits. Isolate by the following tests.
2	H	See "SPECIAL INSTRUCTIONS" column.	J	With scratch eliminator on, increase generator output to obtain 11v, negative; failure to obtain this value indicates trouble.	Defective: 7F7, 7E7 (diode section). Open: R231, C217, R234, R233. Shorted: C218, C217.
3	H	Same setting which produced 11v reading in step 2, with scratch eliminator on.	K	With scratch eliminator on, voltage at point K should be 5v, negative.	Open: R222, R225, R226. Shorted or leaky: C212, C213, C210.
4	A	Same as step 3.	J	With scratch eliminator on, voltage at point J should be approx. 28v, negative.	Defective: 7F7. Open: R228, C215, R227, R221, R220, R219, C209. Shorted or leaky: C209, C215, C214.
5	A	Adjust for 3v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 1.2v (approx.).	Defective: 7E7 (pentode section). Open: R224, R218, R223, C210, C211. Shorted or leaky: C211.

Section 3

TROUBLE SHOOTING

I-F, DETECTOR, AND A-V-C CIRCUITS

AM CIRCUITS

Use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Depress the BC push button, PB-3. Set the volume control to maximum, and turn the bass and treble controls fully counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits, or the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the AM circuits.

Since the circuit location of test point A for this section is the same as that of test point D for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in AM circuits. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 6BA6, 6SQ7GT (diode section). Open: PB-1, PB-9, R311, R313, R315, R316, R317, R318, C321, L303A, B, D. Shorted: C322, C324, C325, C326, C302C, L303B, D. Misaligned: Z303.
3	D	Loud, clear signal with moderate signal input.	Defective: 7A7. Open: PB-1, R305, R306, R307, R308, R309, L302A, B, C, D. Shorted: C340, C314, C315, C301B, L302B, C. Misaligned: Z302.
4	E	Loud, clear signal with weak signal input.	Defective: 6BA6. Open: R301, R302, R303, R325, L301A, B, C. Shorted: C308, C309, C310, C300B, L301A, B. Misaligned: Z301.
5	A	Loud, clear signal with signal input much weaker than in step 4.	Defective: 7F8*, WS-3(R). Open: R300, R408*, L300B, C, D. Shorted: C338, C305, L300B, D. Misaligned: Z300.

* This part, located in another section, may cause abnormal indication in this section.

FM CIRCUITS

The tests for the FM circuits are made with an AM r-f signal generator and a 20,000-ohms-per-volt, d-c voltmeter.

In steps 1(a), 4, 5, 6, 7, and 8, the oscillator section of the FM detector is made inoperative, thereby converting the circuit to an AM detector; this makes it possible to use an AM signal for testing the i-f amplifiers and the pentode section of the detector.

In step 1(b), an unmodulated r-f signal is used to check FM detection (with the oscillator section operating); the test is made by observing the d-c voltage drops across the audio load resistor (R324) for different input frequencies within the i-f range of the detector.

In steps 2 and 3, d-c voltage and r-f signal tests are used to check the oscillator section of the FM detector.

Set the volume control to maximum, and turn the bass and treble controls fully clockwise. Depress the FM push button, PB-1. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

NOTE: The "TEST POINT" column refers to signal-generator connections in all cases except for step 2, in which the test is made with the voltmeter only.

If the "NORMAL INDICATION" is obtained in step 1, (a) and (b), proceed with the test for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits.

Since the circuit location of test point A for this section is the same as that of test point D for Section 4, the effectiveness of step 1, (a) and (b), as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

PHILCO CORP.

MODEL 48-1290

Section 3 (Cont.)

TROUBLE SHOOTING

STEP	TEST POINT	SPECIAL INSTRUCTIONS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	A (I-f-ampl. check).	Set generator to 9.1 mc. (mod. on). Short test point G (pin 2 of FM1000) to chassis.	Loud, clear signal with very weak signal input.	Trouble in detector or i-f circuits. Isolate by steps 4, 5, 6, 7, and 8.
1(b)	B (FM-det. check).	Set generator to 9.1 mc. (mod. off), with high output. Remove short from test point G. Connect positive lead of voltmeter to test point J, and negative lead to test point H. Use 50-volt range.	15 to 30 volts for 9.1-mc. signal or no signal. 12 to 20 volts when generator is set at 80 kc. above or 80 kc. below 9.1 mc.	Trouble in FM-detector circuit. Isolate by steps 2 and 3.
2	G (FM-det. osc. check).	Connect positive lead of voltmeter to chassis; connect prod end of negative lead through 100,000-ohm isolating resistor to test point G. Use 10-volt range.	Negative 1.8 volts (approx.)	Defective: FM1000. Open: L305, C330, R321, L304A, B, C342, C341, C343, R319, R320, R304. Shorted: C330, C342, C341, C343, C331, C333, C334, C332, C304A, L304A.
3	B	Using low to moderate output (mod. off), tune generator across 9.1 mc.	Beat signal, with zero beat at 9.1 mc.	Misaligned: Z304. Shorted: L304A, B. Changed capacitance: C342, C343. Open: C331, R322.
4	F	Set generator to 9.1 mc. (mod. on). Short test point G to chassis. Short test point B (for this step only) to chassis.	Clear signal with strong signal input.	Defective: FM1000. Open: R324, R323, PB-1. Shorted or leaky: C329, C333, C334.
5	B	Set generator to 9.1 mc. (mod on). Leave test point G shorted. Remove short from test point B.	Loud, clear signal with strong signal input.	Defective: 6BA6 (3rd i.f.). Shorted or leaky: C303B, C, L303A, C. Open: R314. Misaligned: Z303.
6	D	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with moderate signal input.	Defective: 7A7 (2nd i.f.). Misaligned: Z302. Shorted: C302A, C302B, L302A, B.
7	E	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with weak signal input.	Defective: 6BA6 (1st i.f.). Misaligned: Z301. Shorted: C301A, C301C, L301C.
8	A	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with very weak signal input.	Defective: 7F8*. Misaligned: Z300. Open: L300A, WS-3(R), WS-1(F). Shorted: C300A, C300C, L300A, C.

* This part, located in another section, may cause abnormal indication in this section.

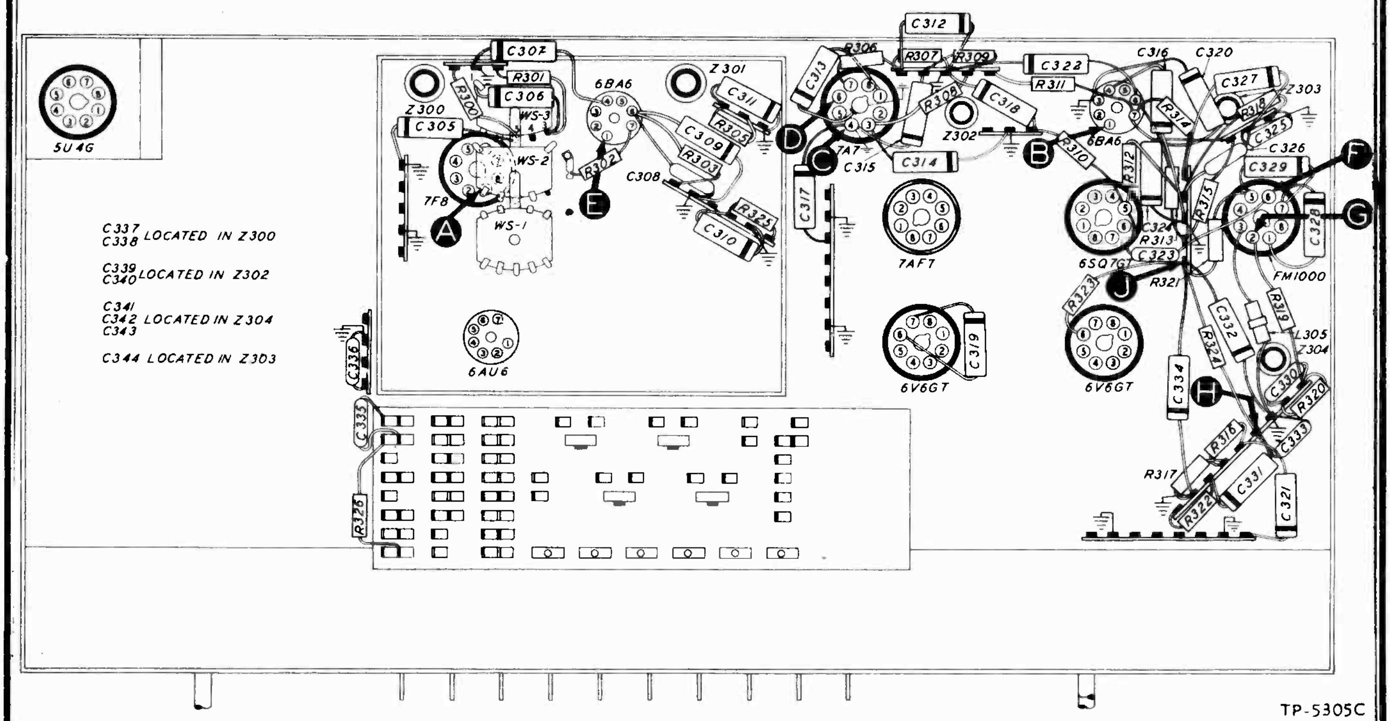


Figure 3. Bottom View, Showing Section 3 Test Points

Section 4

TROUBLE SHOOTING

R-F AND CONVERTER CIRCUITS

For the following tests, with the exception of the oscillator tests, use an r-f signal generator, with modulated output. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Adjust the generator to give a weak input signal.

Set the radio volume control to maximum, and turn the bass and treble controls counterclockwise.

OSCILLATOR TESTS (AM and FM CIRCUITS):

Connect the positive lead of a high-resistance voltmeter to the oscillator cathode (pin 5) of the 7F8, test point F. Connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 8), test point E. Use a suitable range, such as 0—10 volts. Absence of negative voltage with any station-selector push button (PB-8 through PB-4) depressed, or for any dial position with push button PB-1, PB-2, or PB-3 depressed, indicates that the oscillator is not functioning.

AM CIRCUITS

PUSH BUTTON

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Adjust to frequency of each push button, in turn.	Depress, in turn, PB-8 through PB-4.	Loud, clear signal when each push button is depressed.	Trouble in circuits associated with push-button station selectors. Isolate by tests in steps 2 and 3.
2	E to F (Oscillator test)		Depress, in turn, PB-8 through PB-4.	Negative voltage.	No voltage for any particular push button — Defective: Coil (L409A through L409E) or push button. No voltage for all push buttons—Defective: 7F8, WS-2(F), PB-2, PB-3. Open: R404, R405, R407, R409, C413, C414, C416, L405, WS-2(F), WS-2(R). Shorted: C415, C417, C419.
3	A	Adjust to frequency of each push button, in turn.	Depress, in turn, PB-8 through PB-4.	Loud, clear signal when each push button is depressed.	Defective: L400, C411, C424A through C424E. Open: R412, R413, C413, PB-2, PB-3, WS-1(F), WS-2(F).

BROADCAST MANUAL

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
4	A	1000 kc.	Depress BC push button, PB-3. Tune to signal.	Loud, clear signal.	Trouble in broadcast manual-tuning circuits. Isolate by tests in steps 5 and 6.
5	A	1000 kc.	Depress BC push button, PB-3. Tune to signal.	Loud, clear signal.	Open: PB-3, PB-2, C421, C411, WS-1(F) Shorted: C400D, L400.
6	E to F (Oscillator test)		Depress BC push button, PB-3. Rotate tuning control through range.	Negative voltage.	Open: PB-3, L404. Shorted: C409E L404, C400E

SHORT-WAVE MANUAL

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
7	B	12 mc.	Depress SW push button, PB-2. Tune to signal.	Loud, clear signal.	Trouble in short-wave circuits. Isolate by tests in steps 8 and 9.
8	B	12 mc.	Depress SW push button, PB-2. Tune to signal.	Loud, clear signal.	Defective: J400, L401, L402, C401 C410. Open: L401, PB-2.
9	E to F (Oscillator test)		Depress SW push button, PB-2. Rotate tuning control through range.	Negative voltage.	Open: L403, C408, C407. Shorted: C409A.

Section 4 (Cont.)

TROUBLE SHOOTING

FM CIRCUITS

Before proceeding with the tests for the FM circuits, connect test point G in Section 3 to the chassis.

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	G	100 mc.	Depress FM push button, PB-1. Tune to signal.	Loud, clear signal.	Trouble in FM circuits. Isolate by the following tests.
2	E to F (Oscillator test)		Depress FM push button, PB-1. Rotate tuning control through range.	Negative voltage.	Defective: 7F8. Open: L408, R406, PB-1, WS-2(F). Shorted: C400H, C400C, C419, C418.
3	H	100 mc.	Depress FM push button, PB-1. Tune to signal.	Loud, clear signal.	Defective: 6AU6. Open: L410, R401, R400, R402, C406. Shorted: C400B, WS-2(F), C404, C405.
4	G	100 mc.	Same as step 3.	Loud, clear signal.	Open: L406, C402. Shorted: C400A, C400F.

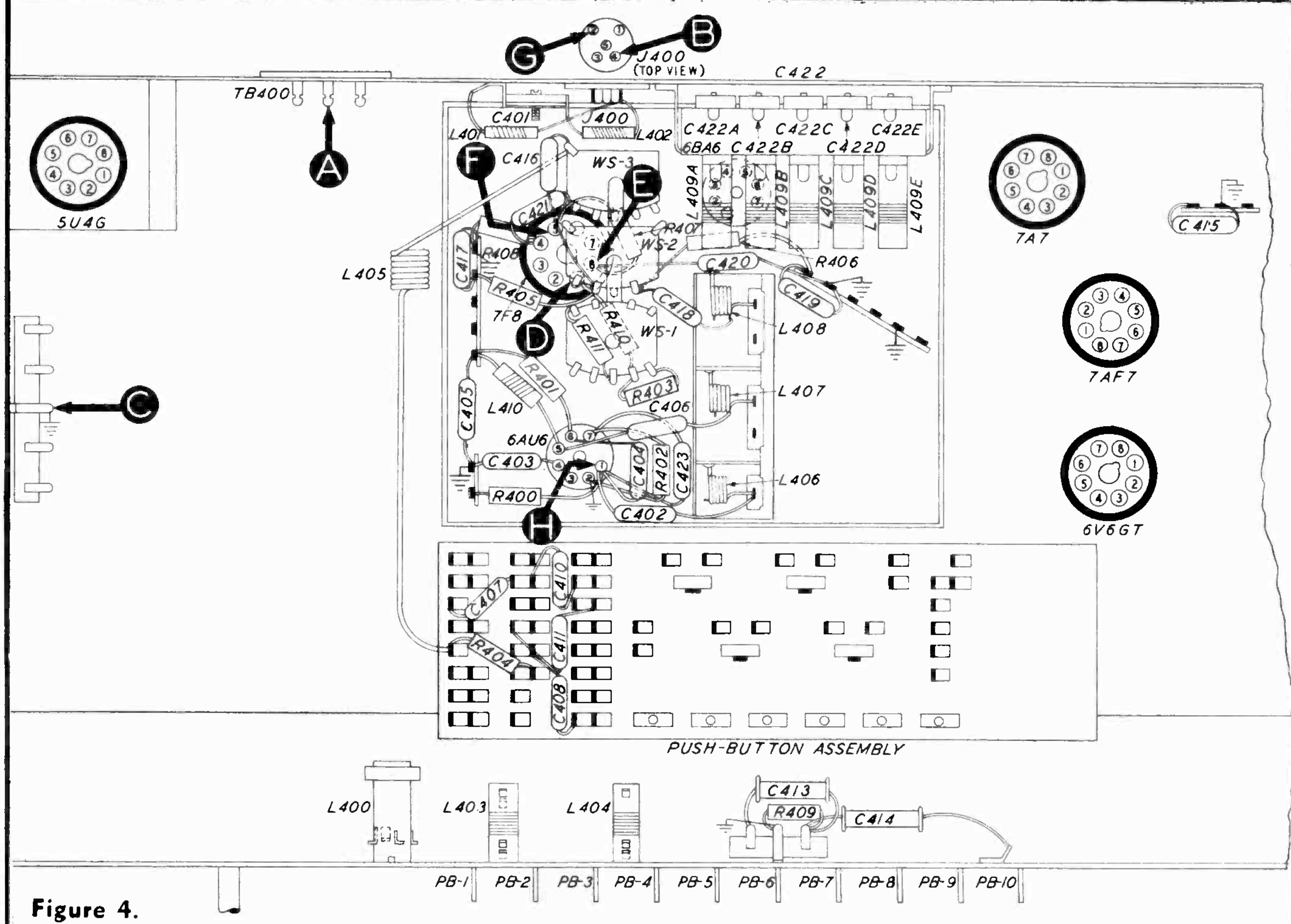


Figure 4.

Bottom View, Showing Section 4 Test Points (locations of C409 and C412 shown in figure 8)

CABLIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked, with a pencil, on the dial backplate at the end of the pointer.

The method of measuring for these points is illustrated in figure 5. Hold a rule against the dial backplate, with the start of the rule against the inside of the upturned edge of the backplate.

With the tuning gang fully meshed, the pointer should be adjusted on the dial-drive cord to coincide with the index mark.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before turning on the power:

1. Inspect the top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.

2. Measure the resistance between B+ (pin 2 of the 5U4G) and the radio chassis. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1000 ohms, check condensers C101B, C102, and C103 for leakage or shorts.

This resistance value, which is much lower than normal, does not represent a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 are performed.

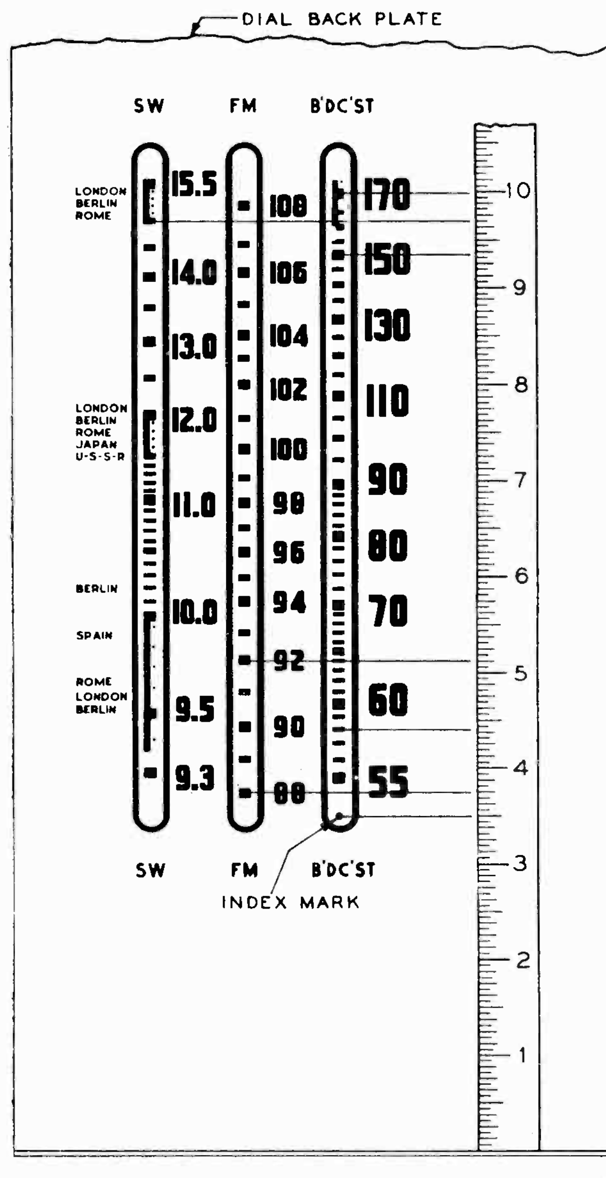


Figure 5. Calibration Measurements for Dial Backplate

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .01 mf.	30-1226-1
C101	Condenser, electrolytic, 2-section	30-2570-19
C101A	Condenser, filter, 10 mf., 450 w. v.	Part of C101
C101B	Condenser, filter, 10 mf., 450 w. v.	Part of C101
C102	Condenser, r-f by-pass, .003 mf.	61-0117*
C103	Condenser, filter, 40 mf., 450 w. v.	30-2568-5

SECTION 1 (Continued)

POWER SUPPLY

Reference Symbol	Description	Service Part No.
C104	Condenser, bias filter, .5 mf.	61-0133*
C105	Condenser, line filter, .01 mf.	30-1226-1
I100	Lamp, bin	34-2040
I101	Lamp, dial	34-2040
I102	Lamp, dial	34-2040
I103	Lamp, telltale	34-2040

REPLACEMENT PARTS LIST (Continued)

SECTION 1 (Continued)

POWER SUPPLY

Reference Symbol	Description	Service Part No.
J100	Socket, phono power	27-6200
L100	Field, speaker	Part of LS200
R100	Resistor, B+ filter, 5600 ohms	66-2564340
R101	Resistor, voltage divider, 1 megohm	66-5103340*
R102	Resistor, voltage divider, 220,000 ohms	66-4223340*
R103	Resistor, telltale-lamp dropping, 10 ohms	66-0103340
S100	Switch, master power, on-off	42-1717
S101	Switch, phono power, on-off	42-1714
T100	Transformer, power	32-8282
W100	Line cord	41-3755-18

SECTION 2

AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, bass control, .006 mf.	45-3500-7*
C201	Condenser, tone compensation, 100 mmf.	30-1224-1*
C202	Condenser, tone compensation, .02 mf.	61-0108*
C203	Condenser, treble control, .01 mf.	61-0120*
C204	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C205	Condenser, d-c blocking, .006 mf.	45-3500-7*
C206	Condenser, d-c blocking, .006 mf.	45-3500-7*
C207	Condenser, tone compensating, .001 mf.	45-3500-5*
C208	Condenser, d-c blocking, .02 mf.	61-0108*
C209	Condenser, high-pass, 150 mmf.	60-10155407*
C210	Condenser, d-c blocking, .001 mf.	45-3500-5*
C211	Condenser, reactance feedback, 330 mmf.	60-10335407*
C212	Condenser, bias filter, .01 mf.	61-0120*
C213	Condenser, bias filter, .01 mf.	61-0120*
C214	Condenser, bias filter, .01 mf.	61-0120*
C215	Condenser, d-c blocking, 330 mmf.	60-10335407*
C216	Condenser, bias filter, .03 mf.	45-3500-1*
C217	Condenser, d-c blocking, .002 mf.	61-0062*
C218	Condenser, bias filter, .02 mf.	61-0108*
C219	Condenser, d-c blocking, .006 mf.	45-3500-7*
C220	Condenser, plate by-pass, .1 mf.	61-0113*
C221	Condenser, tone compensating, .003 mf.	61-0117*
C222	Condenser, r-f by-pass, 22 mmf.	60-00205307*
J200	Socket, FM test	27-6180
LS200	Speaker	36-1606
PB-9	Push button, PHONO	Part of 42-1777†
PL200	Phono plug and cable	41-3735
PL201	Phono plug	Part of T201
R200	Volume control, 2 megohms (tapped at 1 megohm)	33-5535-5
R201	Tone control, bass, 1 megohm	33-5539-7
R202	Resistor, tone compensating, 33,000 ohms	66-3333340*
R203	Resistor, inverse feedback, 4.7 ohms	66-9473340*
R204	Resistor, inverse feedback, 68 ohms	66-0683340
R205	Resistor, grid return, 1 megohm	66-5103340*
R206	Resistor, bias divider, 1 megohm	66-5103340*
R207	Resistor, bias divider, 10 megohms	66-6103340*
R208	Tone control (with scratch-eliminator switch), treble, 500,000 ohms	33-5538-22*
R209	Resistor, plate load, 220,000 ohms	66-4223340*
R210	Resistor, grid return, 1 megohm	66-5103340*
R211	Resistor, cathode load, 47,000 ohms	66-3473340*

† 42-1777 Push-button switch assembly.

SECTION 2 (Continued)

AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R212	Resistor, cathode bias, 4700 ohms	66-2473340*
R213	Resistor, cathode bias, 6800 ohms	66-2683340*
R214	Resistor, grid return, 4.7 megohms	66-5473340*
R215	Resistor, tone compensating, 220,000 ohms	66-4223340*
R216	Resistor, voltage divider, 100,000 ohms	66-4103340*
R217	Resistor, voltage divider, 100,000 ohms	66-4103340*
R218	Resistor, voltage divider, 33,000 ohms	66-3334340*
R219	Resistor, tone compensating, 680,000 ohms	66-4683340*
R220	Resistor, grid return, 330,000 ohms	66-4333340*
R221	Resistor, cathode bias, 2200 ohms	66-2224340*
R222	Resistor, grid return, 1 megohm	66-5103340*
R223	Resistor, voltage divider, 33,000 ohms	66-3333340*
R224	Resistor, plate load, 18,000 ohms	66-3183340*
R225	Resistor, bias filter, 220,000 ohms	66-4223340*
R226	Resistor, bias filter, 220,000 ohms	66-4223340*
R227	Resistor, grid return, 560,000 ohms	66-4563340*
R228	Resistor, plate load, 220,000 ohms	66-4223340*
R229	Resistor, bias filter, 3.3 megohms	66-5333340*
R230	Resistor, bias filter, 1.5 megohms	66-5153340*
R231	Resistor, plate load, 100,000 ohms	66-4103340*
R232	Resistor, bias filter, 220,000 ohms	66-4223340*
R233	Resistor, voltage divider, 220,000 ohms	66-4223340*
R234	Resistor, voltage divider, 560,000 ohms	66-4563340*
R235	Resistor, plate load, 56,000 ohms	66-3563340*
R236	Resistor, plate dropping, 470,000 ohms	66-4473340*
R237	Resistor, plate load, 150,000 ohms	66-4153340*
R238	Resistor, grid return, 330,000 ohms	66-4333340*
R239	Resistor, grid return, 330,000 ohms	66-4333340*
S200	Switch, scratch eliminator	Part of R208
T200	Transformer, output	32-8274
T201	Transformer, phono input	32-8256

SECTION 3

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C300C	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, trimmer	Part of Z301
C302A	Condenser, trimmer	Part of Z302
C302B	Condenser, trimmer	Part of Z302
C302C	Condenser, trimmer	Part of Z302
C303A	Condenser, trimmer	Part of Z303
C303B	Condenser, trimmer	Part of Z303
C303C	Condenser, trimmer	Part of Z303
C304A	Condenser, trimmer	Part of Z304
C305	Condenser, r-f by-pass, .01 mf.	61-0120*
C306	Condenser, i-f by-pass, .01 mf.	61-0120*
C307	Condenser, filament by-pass, .006 mf.	45-3500-7*
C308	Condenser, by-pass, 220 mmf.	60-10205307*
C309	Condenser, screen by-pass, .01 mf.	61-0120*
C310	Condenser, plate by-pass, .01 mf.	61-0120*
C311	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C312	Condenser, cathode by-pass, .01 mf.	61-0120*
C313	Condenser, filament by-pass, .006 mf.	45-3500-7*

MODEL 48-1290 PHILCO CORP.

REPLACEMENT PARTS LIST (Continued)

SECTION 3 (Continued)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C314	Condenser, screen by-pass, .01 mf.	61-0120*
C315	Condenser, plate by-pass, .01 mf.	61-0120*
C316	Condenser, filament by-pass, .006 mf.	45-3500-7*
C317	Condenser, r-f by-pass, .01 mf.	61-0120*
C318	Condenser, a-v-c filter, .05 mf.	61-0122*
C319	Condenser, r-f by-pass, .01 mf.	61-0120*
C320	Condenser, cathode by-pass, .01 mf.	61-0120*
C321	Condenser, d-c blocking, .006 mf.	45-3500-7*
C322	Condenser, screen by-pass, .01 mf.	61-0120*
C323	Condenser, d-c blocking, 100 mmf.	60-10105407*
C324	Condenser, plate by-pass, .01 mf.	61-0120*
C325	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C326	Condenser, r-f by-pass, 100 mmf.	30-1224-1*
C327	Condenser, r-f by-pass, .01 mf.	61-0120*
C328	Condenser, filament by-pass, .006 mf.	45-3500-7*
C329	Condenser, screen by-pass, .01 mf.	61-0120*
C330	Condenser, grid, 33 mmf.	60-00305307*
C331	Condenser, d-c blocking, .03 mf.	45-3500-1
C332	Condenser, r-f by-pass, .01 mf.	61-0120*
C333	Condenser, r-f by-pass, 1500 mmf.	60-20155404*
C334	Condenser, electrolytic, audio by-pass, 10 mf., 450 w. v.	30-2417-6
C335	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C336	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C337	Condenser, fixed trimmer, 3000 mmf., part of Z300	60-20305304
C338	Condenser, coupling, 9 mmf., part of Z300	60-90905417
C339	Condenser, fixed trimmer, 330 mmf., part of Z302	60-10335407
C340	Condenser, coupling, 3.3 mmf., part of Z302	30-1221
C341	Condenser, voltage divider, 68 mmf., part of Z304	60-00683327
C342	Condenser, voltage divider, 33 mmf., part of Z304	60-00333327
C343	Condenser, fixed trimmer, 15 mmf., part of Z304	60-00155327
C344	Condenser, fixed trimmer, 270 mmf., part of Z303	60-10275327
L300A	Primary winding	Part of Z300
L300B	Primary winding	Part of Z300
L300C	Secondary winding	Part of Z300
L300D	Secondary winding	Part of Z300
L301A	Primary winding	Part of Z301
L301B	Secondary winding	Part of Z301
L301C	Secondary winding	Part of Z301
L302A	Primary winding	Part of Z302
L302B	Primary winding	Part of Z302
L302C	Secondary winding	Part of Z302
L302D	Secondary winding	Part of Z302
L303A	Primary winding	Part of Z303
L303B	Primary winding	Part of Z303
L303C	Secondary winding	Part of Z303
L303D	Secondary winding	Part of Z303
L304A	Primary winding	Part of Z304
L304B	Secondary winding	Part of Z304
L305	Coil, FM detector	32-4007-1
PB-1	Push button, FM	Part of 42-1777†
R300	Resistor, plate decoupling, 47,000 ohms	66-3473340

† 42-1777 Push-button switch assembly.

SECTION 3 (Continued)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
R301	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R302	Resistor, cathode bias, 68 ohms	66-0683340*
R303	Resistor, screen dropping, 47,000 ohms	66-3473340*
R304	Resistor, shunt, 6800 ohms, part of Z304	66-2683340*
R305	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R306	Resistor, cathode bias, 180 ohms	66-1183340*
R307	Resistor, cathode bias, 1500 ohms	66-2153340
R308	Resistor, screen dropping, 100,000 ohms	66-4103340*
R309	Resistor, plate decoupling, 3300 ohms	66-2333340*
R310	Resistor, a-v-c filter, 330,000 ohms	66-4333340*
R311	Resistor, cathode bias, 180 ohms	66-1183340*
R312	Resistor, diode load, 1 megohm	66-5103340*
R313	Resistor, screen dropping, 47,000 ohms	66-3473340*
R314	Resistor, inverse feedback, 100 ohms	66-1103340*
R315	Resistor, plate decoupling, 3300 ohms	66-2333340*
R316	Resistor, audio decoupling, 100,000 ohms	66-4103340*
R317	Resistor, diode load, 270,000 ohms	66-4273340*
R318	Resistor, r-f filter, 47,000 ohms	66-3473340*
R319	Resistor, oscillator stabilizing, 27 ohms	66-0273340*
R320	Resistor, grid leak, 15,000 ohms	66-3153340*
R321	Resistor, screen dropping, 56,000 ohms	66-3563340*
R322	Resistor, audio decoupling, 100,000 ohms	66-4103340*
R323	Resistor, plate dropping, 15,000 ohms	66-3153340
R324	Resistor, audio plate load, 47,000 ohms	66-3473340*
R325	Resistor, plate dropping, 3300 ohms	66-2333340*
R326	Resistor, voltage divider, 100,000 ohms	66-4103340*
TC300A	Tuning core	Part of Z300
TC302A	Tuning core	Part of Z302
TC304A	Tuning core	Part of Z304
WS-3(R)	Switch-wafer section	Part of 76-2211‡
Z300	Transformer, 1st i-f, including C300A, C300B, C300C, C337, C338, and TC300A	32-4020-1
Z301	Transformer, 2nd i-f, including C301A, C301B, and C301C	32-4001
Z302	Transformer, 3rd i-f, including C302A, C302B, C302C, C339, C340, and TC302A	32-4002
Z303	Transformer, 4th i-f, including C303A, C303B, C303C, and C344	32-4003-2
Z304	Transformer, FM detector, including C304A, C341, C342, C343, R304, and TC304A	32-4004

SECTION 4

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning	31-2694
C400A	Condenser, trimmer, FM aerial	Part of C400
C400B	Condenser, trimmer, FM r.f.	Part of C400
C400C	Condenser, trimmer, FM osc.	Part of C400
C400D	Condenser section, tuning, AM aerial	Part of C400
C400E	Condenser section, tuning, AM osc.	Part of C400
C400F	Condenser section, tuning, FM aerial	Part of C400
C400G	Condenser section, tuning, FM r.f.	Part of C400
C400H	Condenser section, tuning, FM osc.	Part of C400
C401	Condenser, trimmer, s-w aerial	31-6473-2
C402	Condenser, d-c blocking, 10 mmf.	60-00105407*
C403	Condenser, filament by-pass, 220 mmf.	60-10205307*
C404	Condenser, screen by-pass, 1500 mmf.	60-20155404*

REPLACEMENT PARTS LIST (Continued)

SECTION 4 (Continued)

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C405	Condenser, plate by-pass, 1500 mmf.	60-20155404*
C406	Condenser, d-c blocking, 33 mmf.	60-00335407*
C407	Condenser, neutralizing (s.w.), 10 mmf.	60-00105407*
C408	Condenser, oscillator series, 255 mmf.	30-1220-24
C409	Condenser, trimmer assembly, 3-section	31-6477
C409A	Condenser, trimmer, oscillator shunt (s.w.)	Part of C409
C409B	Condenser, trimmer, oscillator shunt (bc.)	Part of C409
C409C	Condenser, trimmer, aerial shunt (bc.)	Part of C409
C410	Condenser, aerial series (s.w.), 300 mmf.	60-10305307*
C411	Condenser, d-c blocking, 22 mmf.	60-00205307*
C412	Condenser, trimmer, bc. series	31-6473-3
C413	Condenser, r-f voltage divider, 285 mmf.	30-1224-14
C414	Condenser, r-f voltage divider, 485 mmf.	30-1224-15
C415	Condenser, r-f by-pass, 470 mmf.	60-10475307*
C416	Condenser, d-c blocking, 470 mmf.	60-10475307*
C417	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C418	Condenser, d-c blocking, 220 mmf.	60-10205307*
C419	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C420	Condenser, oscillator grid, 100 mmf.	60-10105407*
C421	Condenser, oscillator-to-mixer coupling, 750 mmf.	60-10755301*
C422	Condenser, trimmer assembly, 5-section, aerial tuning (push button)	31-6479
C422A	Condenser, trimmer	Part of C422
C422B	Condenser, trimmer	Part of C422
C422C	Condenser, trimmer	Part of C422
C422D	Condenser, trimmer	Part of C422
C422E	Condenser, trimmer	Part of C422
C423	Condenser, cathode by-pass, 100 mmf.	60-10105407*
J400	Socket, s-w and FM aerial	27-6214-1
L400	Coil, bc. aerial	32-4049-3
L401	Coil, s-w aerial	32-4050
L402	Coil, FM isolation	32-4111
L403	Coil, s-w osc.	32-3996
L404	Coil, bc. osc.	32-4019-4
L405	Choke, osc. isolation	32-4089
L406	Coil, FM aerial	32-3993
L407	Coil, FM r.f.	32-3992
L408	Coil, FM osc.	32-3994
L409A	Coil, push-button osc.	32-4059
L409B	Coil, push-button osc.	32-4059
L409C	Coil, push-button osc.	32-4059-1
L409D	Coil, push-button osc.	32-4059-1
L409E	Coil, push-button osc.	32-4059-1
L410	Choke, FM plate load	32-4061
LA400	Loop, bc.	76-3530
PB-1 to PB-10	Push-button-switch assembly	42-1777
PL400	Plug assembly, FM a-c-line aerial	41-3791
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, screen dropping, 56,000 ohms	66-3563340*
R402	Resistor, cathode bias, 82 ohms	66-0823340*
R403	Resistor, voltage divider, 4.7 megohms	66-5473340*
R404	Resistor, parasitic suppressor, 100 ohms	66-1103340*
R405	Resistor, plate feed, AM, 22,000 ohms	66-3223340*
R406	Resistor, plate feed, FM, 22,000 ohms	66-3223340*
R407	Resistor, grid return, 22,000 ohms	66-3223340*
R408	Resistor, cathode bias, 2200 ohms	66-2223340*
R409	Resistor, cathode bias, 10,000 ohms	66-3103340*
R410	Resistor, parasitic suppressor, 10 ohms	66-0103340*
R411	Resistor, grid return, 4.7 megohms	66-5473340*
WS-1	Switch wafer	Part of 76-2211‡
WS-2	Switch wafer	Part of 76-2211‡

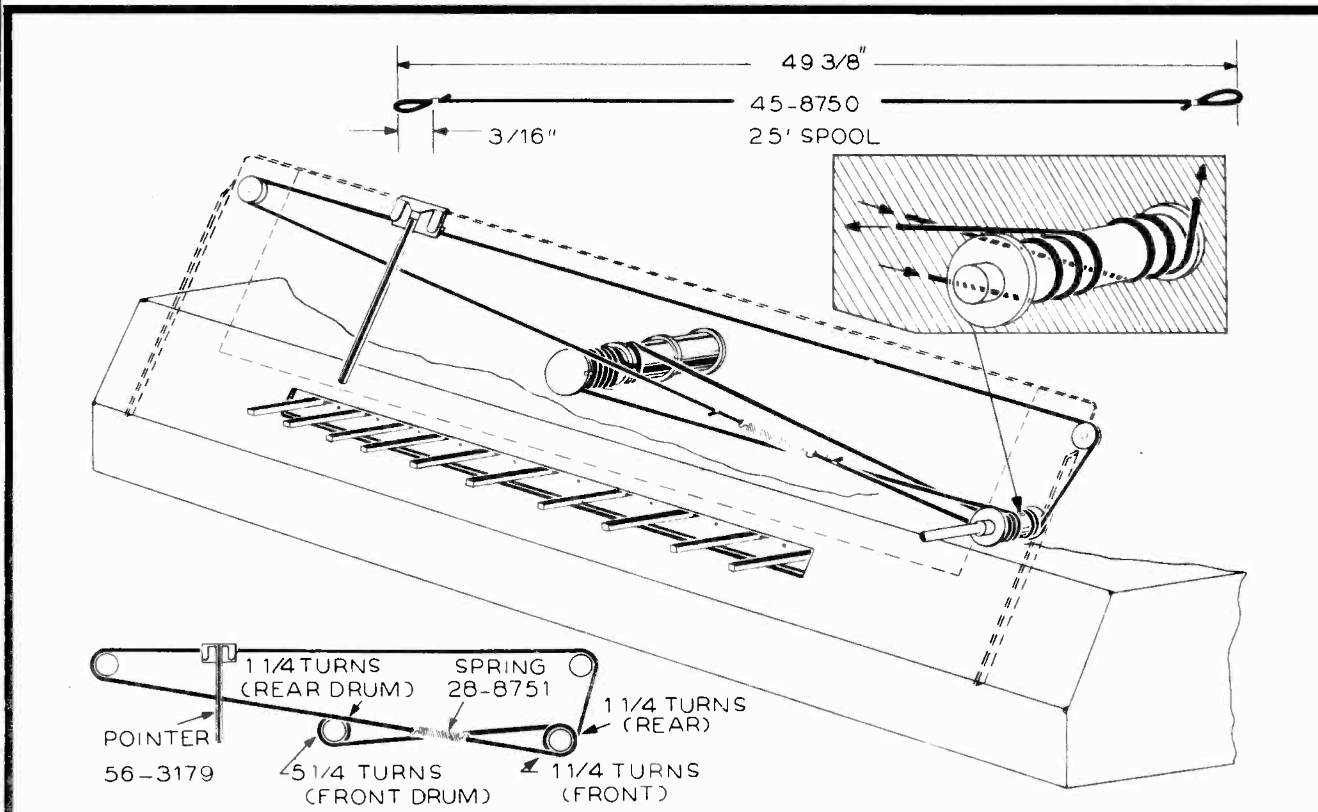
† 42-1777 Push-button switch assembly.
‡ 76-2211 Rotary wafer switch, 3 section.

MISCELLANEOUS

Description	Service Part No.
Bin-lamp-socket assembly	26-6233-3
Cabinet (less scale)	10697
Cabinet Parts and Hardware	
Back, cabinet	54-7516
Baffle and cloth, l.h.	40-6785
Baffle and cloth, r.h.	40-6968-1
Baffle, wood	219001
Bin mechanism, l.h.	76-3223
Bin mechanism, r.h.	76-3223-1
Bolt, speaker (4 req.)	W-1587
Bracket, lamp	56-3545-5
Catch, bullet (2 req.)	45-6002
Cradle assembly	76-3222
Dial-scale-and-backplate assembly	76-3187-4
Dome (4 req.)	45-6042
Door, record album	45-6414
Doors (matched pair furnished)	45-1556
Grille, wire (2 req.)	56-3250
Hinge, continuous	56-3627
Hinge, knife	56-4882
Hinge, stop	56-5278-1
Panel, instrument	45-6382
Pull, brass	56-3249
Spring, bin mechanism	56-4978
Strike, bullet catch (2 req.)	45-6003
Telltale jewel	54-4304
Top, cabinet	45-6415
Cable and plug, speaker	41-3734-3
Cord, drive (25-ft. spool)	45-8750
Dial-lamp-socket assembly, 14" lead	76-2109
Dial-lamp-socket assembly, 8" lead	76-2109-2
Dial-Scale Hardware	
Backplate	76-2106
Pointer	56-3179
Scale strap (2 req.)	56-4916
Spring, drive	28-8953
Grommet, r-f-unit mtg. (3 req.)	54-4295
Knob, control (4 req.)	54-4227
Knob, push button (10 req.)	54-4292
Push-Button-Assembly Hardware	
Cap (10 req.)	54-4294
Cap, centering (5 req.)	28-6936
Cover assembly	76-1343
Screw, tuning core (5 req.)	56-2249
Switch assembly, push-button	42-1777
Tab, BC	54-4317-2
Tab, FM	54-4317-4
Tab kit (station call letters)	40-6943
Tab, OFF	54-4317-1
Tab, PHONO	54-4317-5
Tab, SW	54-4317-3
Telltale-lamp-socket assembly	41-3737
Terminal strip, coils (5 req.)	56-2250FA3
Tuning core (5 req.)	56-6100
Shaft, drive (tuning)	76-2107
Socket, aerial (s-w and FM)	27-6214-1
Socket-adapter plate (3 req.)	56-4033-1FA3
Socket, Loktal (3 req.)	27-6138*
Socket, miniature (2 req.)	27-6226
Socket, octal (4 req.)	27-6174
Socket, Loktal, r-f unit (1 req.)	27-6213
Socket, miniature (1 req.)	27-6203-1
Socket, Loktal, scratch eliminator (2 req.)	27-6138*
Wafer-Switch Hardware	
Fulcrum assembly	76-2206
Link, connecting	54-7169

SETTING PUSH BUTTONS

1. Connect the output meter between the No. 3 terminal of the aerial terminal panel and the chassis.
2. Turn the volume control to maximum, and bass and treble controls fully counterclockwise.
3. Couple the signal generator loosely to the loop aerial (see Note under "AM ALIGNMENT CHART").
4. Turn on the power, and allow the radio to warm up for 15 minutes before starting the adjustments.
5. Starting with the lowest frequency desired, set the signal generator to the desired frequency (modulation on), push the station-selector push button, and adjust the associated oscillator tuning core and aerial trimmer condenser (marked on rear of chassis) for maximum indication on the output meter.
6. Reset the signal-generator frequency, and repeat the procedure for each remaining station-selector push button.
7. Turn off the signal generator, and make a final adjustment of all tuning cores and trimmer condensers while listening to the stations for which the adjustments are being made.



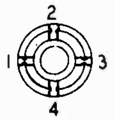
TP-164

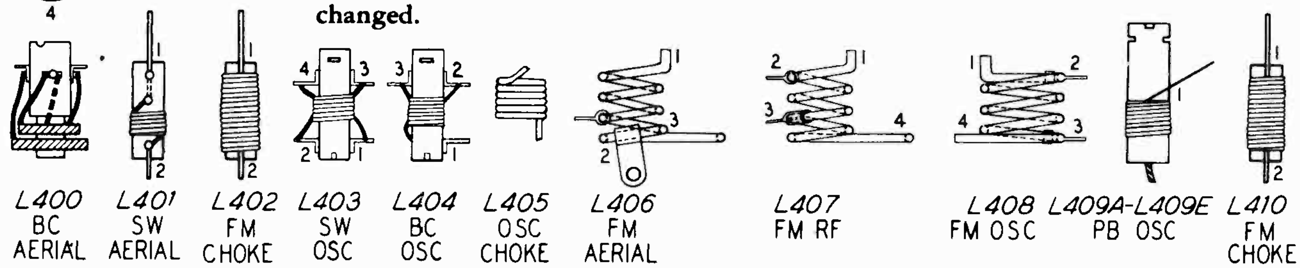
Figure 6. Drive-Cord Installation Details

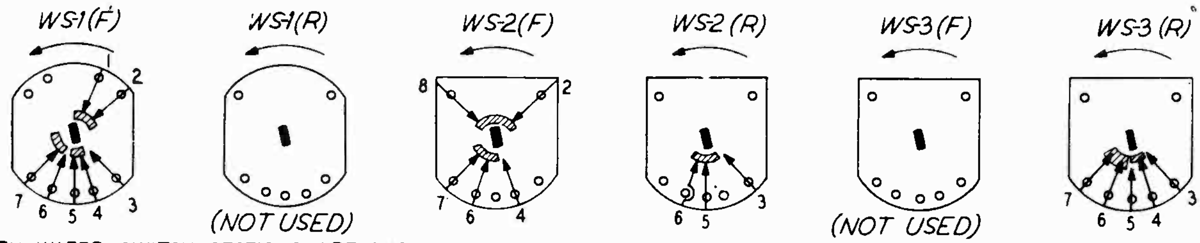
PHILCO CORP. MODEL 48-1290

IMPORTANT!

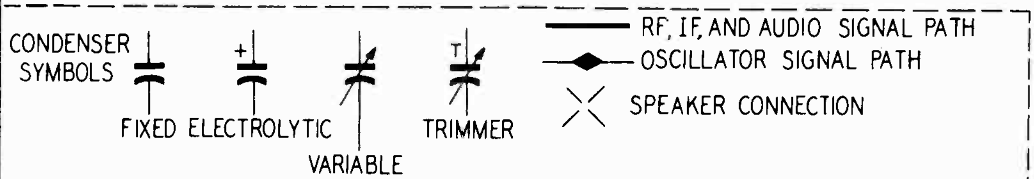
To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical positions as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be changed.



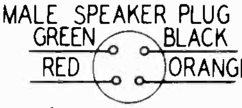




ROTARY WAFER SWITCH SECTIONS ARE SHOWN (AS VIEWED WITH CHASSIS INVERTED) IN THE POSITION FOR BROADCAST, SHORT-WAVE, PUSH-BUTTON, OR PHONO OPERATION. THESE SECTIONS ARE THROWN TO THE FM POSITION WHEN ACTUATED BY THE FM PUSH BUTTON. WAFER SECTIONS ARE SYMBOLIZED WS-1, WS-2, WS-3, FROM FRONT OF CHASSIS TOWARD REAR. (F) INDICATES FRONT CONTACTS, LOOKING FROM FRONT. (R) INDICATES REAR CONTACTS, LOOKING THROUGH FROM FRONT.

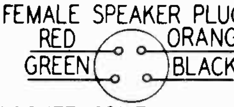


MALE SPEAKER PLUG



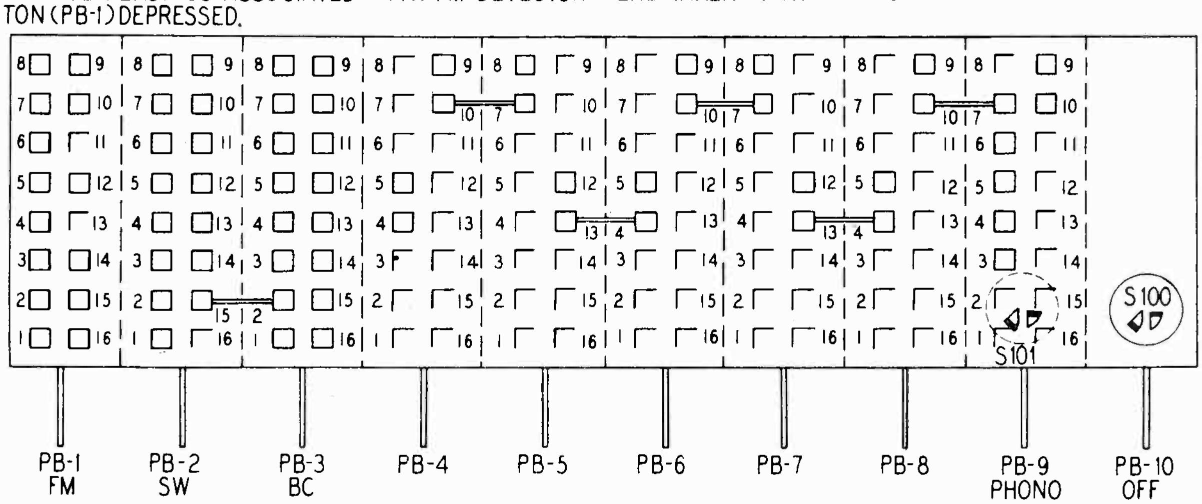
(PIN CONTACT VIEW)

FEMALE SPEAKER PLUG



(SOCKET CONTACT VIEW)

NOTE:-
VOLTAGE READINGS GIVEN WERE TAKEN WITH A 20,000-OHMS-PER-VOLT METER, AT A LINE VOLTAGE OF 117 V A C.
VOLTAGE READINGS IN SCRATCH ELIMINATOR CIRCUITS OF SECTION 2 WERE TAKEN WITH PHONO PUSH BUTTON (PB-9) DEPRESSED, AND TREBLE CONTROL SET TO SCRATCH ELIMINATOR POSITION.
VOLTAGE READINGS ASSOCIATED WITH FM DETECTOR WERE TAKEN WITH FM PUSH BUTTON (PB-1) DEPRESSED.



PUSH-BUTTON SWITCHES AS VIEWED WITH CHASSIS INVERTED.

ALIGNMENT PROCEDURE

CAUTION: Do no turn on power with speaker disconnected, or the radio may be damaged.

ALIGNMENT OF AM CIRCUITS

When the complete AM and FM alignment is to be made, the AM alignment should be made first; however, if AM alignment is not required, the FM alignment alone may be made.

OUTPUT METER—Connect between No. 3 terminal (voice-coil connection) of aerial terminal panel and chassis.

AM SIGNAL GENERATOR—Connect ground lead to chassis, and output lead as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain radio output below 1.5 volts, as read on output meter.

CONTROLS—Set volume control to maximum, bass tone control fully counterclockwise, treble tone control fully clockwise (do not turn on scratch eliminator), and signal-generator dial, radio dial, and radio push buttons as indicated in chart.

DIAL POINTER—With tuning condensers fully meshed, dial pointer must coincide with index mark at low-frequency end of dial. See "CALIBRATING DIAL BACKPLATE" for method of measuring backplate for index and calibration marks.

ALIGNMENT OF FM CIRCUITS

OUTPUT METER—Connect between No. 3 terminal (voice-coil connection) of aerial terminal panel and chassis.

AM SIGNAL GENERATOR—Connect ground lead to chassis; connect output lead through .1-mf. condenser to points specified in chart. Use modulated output unless otherwise specified.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain radio output below 1.5 volts, as read on output meter. All adjustments are made for maximum output, unless otherwise specified in chart.

CONTROLS—Set volume control to maximum, bass tone control fully counterclockwise, and treble tone control fully clockwise. Depress FM push button, PB-1.

LOCATIONS OF COILS—For the locations of coils L406, L407, and L408 (steps 11 and 15), refer to figure 4.

Note 1. When the oscillator grid (pin 2) of the FM1000 is connected to the chassis, the oscillator section of the FM detector is made inoperative; the circuit is thereby converted from an FM to an AM detector.

Note 2. Make the loading network by connecting a 4700-ohm resistor and a .1-mf. condenser in series. Attach an alligator clip to each free end of the network. When this network is connected across the primary or secondary winding of an overcoupled i-f transformer, the network loads the circuit so that the transformer is effectively below critical coupling; the unloaded winding may then be correctly peaked at the intermediate frequency.

Note 3. The top of padder C303C can be reached only from the top of the shield can. Slide a length of flattened solder or wire down between the ceramic form and the edge of the trimmer plate. Attach the loading network between this connection and the chassis.

Note 4. It is essential that the output of the generator be kept below the level at which the oscillator of the FM detector locks in; otherwise, an erroneous zero beat will be obtained. When a single very sharp zero-beat point is obtained, the adjustment is correct.

Note 5. The use of a signal generator for steps 10 through 16 is recommended only if the available generator is sufficiently accurate to insure correct frequency settings. Otherwise, an alternative procedure employing FM broadcast-station signals is recommended. For the adjustments at the high-frequency end of the band, use the station nearest 105 mc.; for the adjustments at the low-frequency end of the band, use the station nearest 88 mc. or 92 mc., as indicated. If the radio is greatly misaligned, it may be necessary to adjust the trimmers and coils for maximum noise at each end of the band before station signals can be heard. The FM detector must be made inoperative, as directed in step 10 of the "FM ALIGNMENT CHART."

Note 6. Check the tracking of oscillator and r-f circuits with a tuning wand. If placing the brass end in or near the coil increases the output-meter reading, spread the turns; if the powdered-iron end increases the output reading, compress the turns. If both ends cause a decrease in output, the coil is correctly tuned. Do not change the coils excessively, since only a small adjustment is required at these frequencies.

Note 7. Make two simple dipole aerials to feed signals from the signal-generator to the radio. Each dipole aerial may consist of two 30-inch lengths of rubber-covered wire. Connect one dipole aerial to terminals 1 and 2 on the FM aerial socket of the radio. Connect the other dipole aerial to the output leads of the signal generator. Place the two dipoles several feet apart.

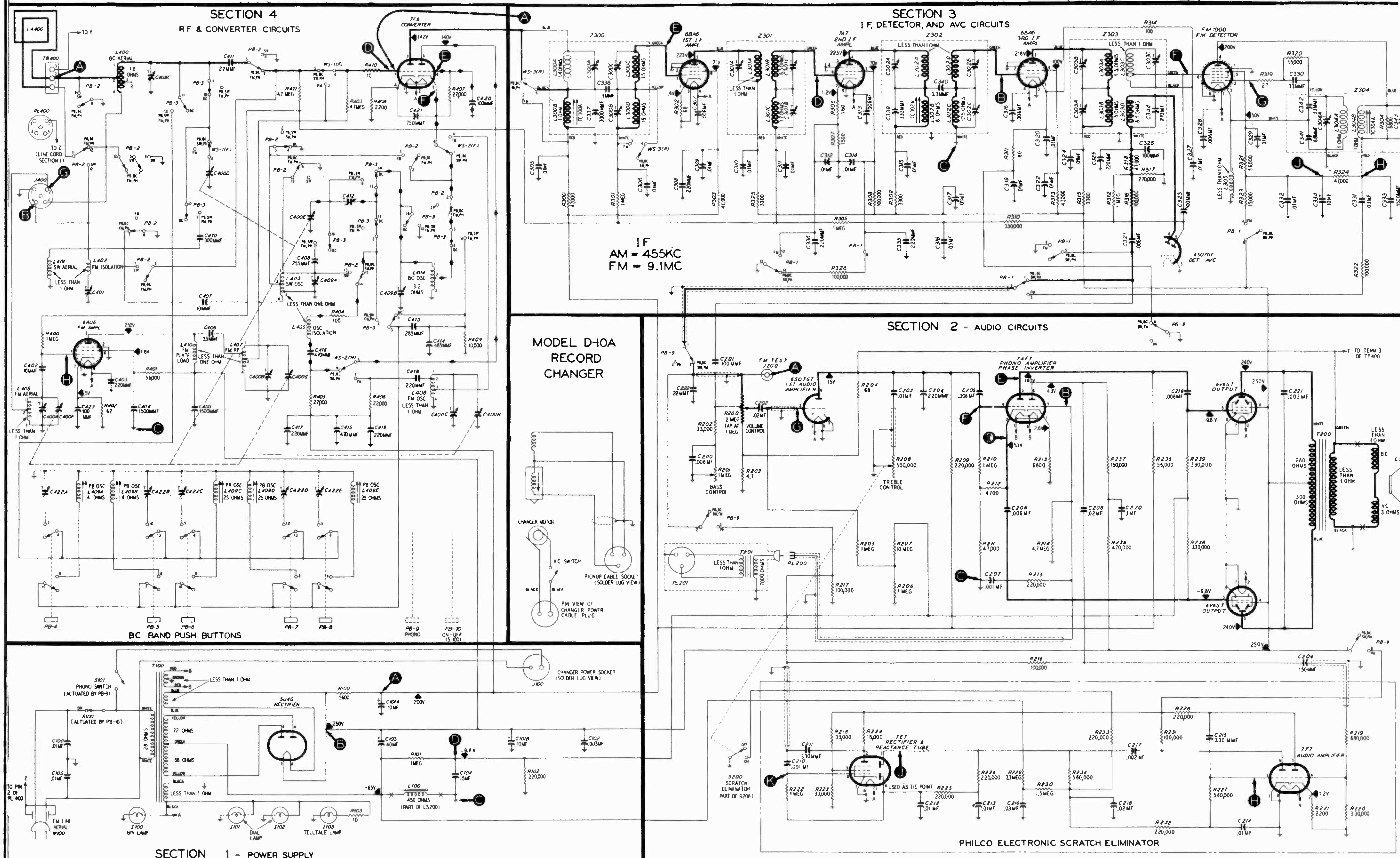


Figure 7. Philco Radio-Phonograph Model 48-1290, Sectionalized Schematic Diagram, Showing Test Points

TF

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: PUSH BUTTON	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to stator of aerial section of tuning gang.	455 kc.	Depress BC push button, PB-3.	1700 kc.	Adjust each trimmer, in order, for maximum output. Do not repeat adjustments.	C303A—4th i-f pri. C302C—3rd i-f sec. TC302A—3rd i-f pri. C301B—2nd i-f sec. C300B—1st i-f sec. TC300A—1st i-f pri.
2	Loosely coupled with loop. See note below.	15 mc.	Depress SW push button, PB-2.	15 mc.	Adjust for maximum output. Image should be heard with set tuned to 14.1 mc.	C409A—SW osc.
3	Same as step 2.	15 mc.	Depress SW push button, PB-2.	15 mc.	Adjust for maximum output (rock tuning control).	C401—SW aerial
4	Same as step 2.	1700 kc.	Depress BC push button, PB-3.	1700 kc.	Adjust for maximum output.	C409B—BC osc. (shunt)
5	Same as step 2.	1500 kc.	Depress BC push button, PB-3.	1500 kc.	Adjust for maximum output.	C409C—BC aerial
6	Same as step 2.	580 kc.	Depress BC push button, PB-3.	580 kc.	Adjust for maximum output (rock tuning control).	C412—BC osc. (series)
7	Repeat steps 4, 5, and 6, in order, until no further increase in output is obtained. Then repeat step 4.					

NOTE: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to the signal-generator leads and place near the radio loop.

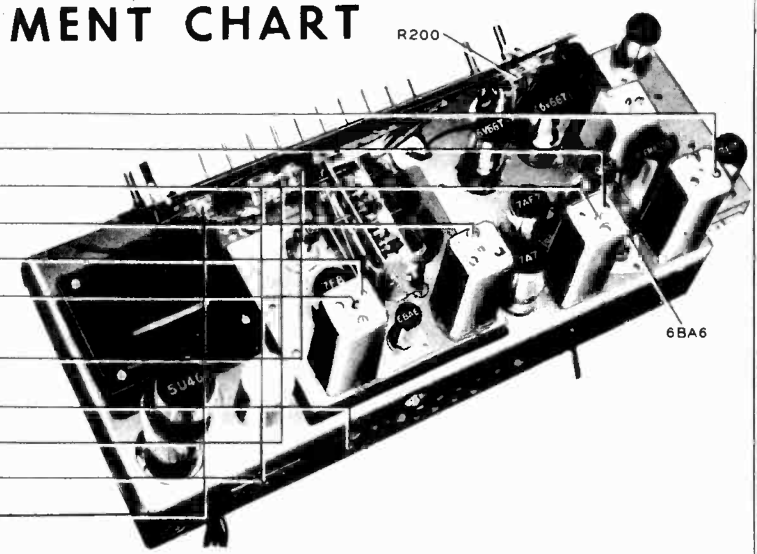


Figure 8. Top View, Showing AM Trimmer Locations

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	To terminal 2 of L407 (see figure 4).	9.1 mc.	Gang fully closed.	Connect jumper between osc. grid, pin 2 of FM1000, and chassis (see Note 1). Connect loading net work (see Note 2) between top of padder C303C and chassis (see Note 3).	C303B—4th i-f pri.
2	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between plate pin 2 (blue lead), of third i-f tube and chassis.	C303C—4th i-f sec.
3	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between grid, pin 6 (green lead), of third i-f tube and chassis.	C302A—3rd i-f pri.
4	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between plate pin 2 (blue lead), of second i-f tube and chassis.	C302B—3rd i-f sec.
5	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between grid, pin 6 (green lead), of second i-f tube and chassis.	C301A—2nd i-f pri.
6	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between plate, pin 2 (blue lead), of first i-f tube and chassis.	C301C—2nd i-f sec.
7	Same as step 1.	9.1 mc.	Same as step 1.	Leave loading network connected as in step 6.	C300C—1st i-f sec. C300A—1st i-f pri.
8	To grid (pin 6) of third i-f tube.	9.1 mc. (modulation off)	Same as step 1.	Remove loading network, and remove jumper from pin 2 of FM1000 and chassis. Connect jumper between plate, pin 4 (blue lead) of FM1000, and junction of R324 and red lead of Z304. Adjust trimmer for zero beat.	C304A—FM det. osc.
9	Same as step 8.	9.1 mc.	Same as step 1.	Remove jumper used in step 8. Adjust tuning core for zero beat (see Note 4).	TC304A—FM det. linearity.
10	To terminal 2 of J400 (see Note 5).	105 mc.	105 mc.	Connect jumper between pin 2 of FM1000 and chassis. Adjust for maximum output.	C400C—FM osc.
11	Same as step 10.	88 mc.	88 mc.	Adjust coil L408 for maximum output (see Note 6).	FM osc. tracking.
12	Repeat steps 10 and 11 until no further improvement is noted.				
13	Same as step 10.	105 mc.	105 mc.	Adjust for maximum output (rock tuning control).	C400B—FM r.f.
14	See Note 7.	105 mc.	105 mc.	Adjust for maximum output.	C400A—FM aerial.
15	Same as step 14.	92 mc.	92 mc.	Adjust coil L407, then L406, for maximum output (see Note 6).	FM r-f and aerial tracking.
16	Repeat steps 13, 14, and 15 until no further improvement in sensitivity can be obtained.				

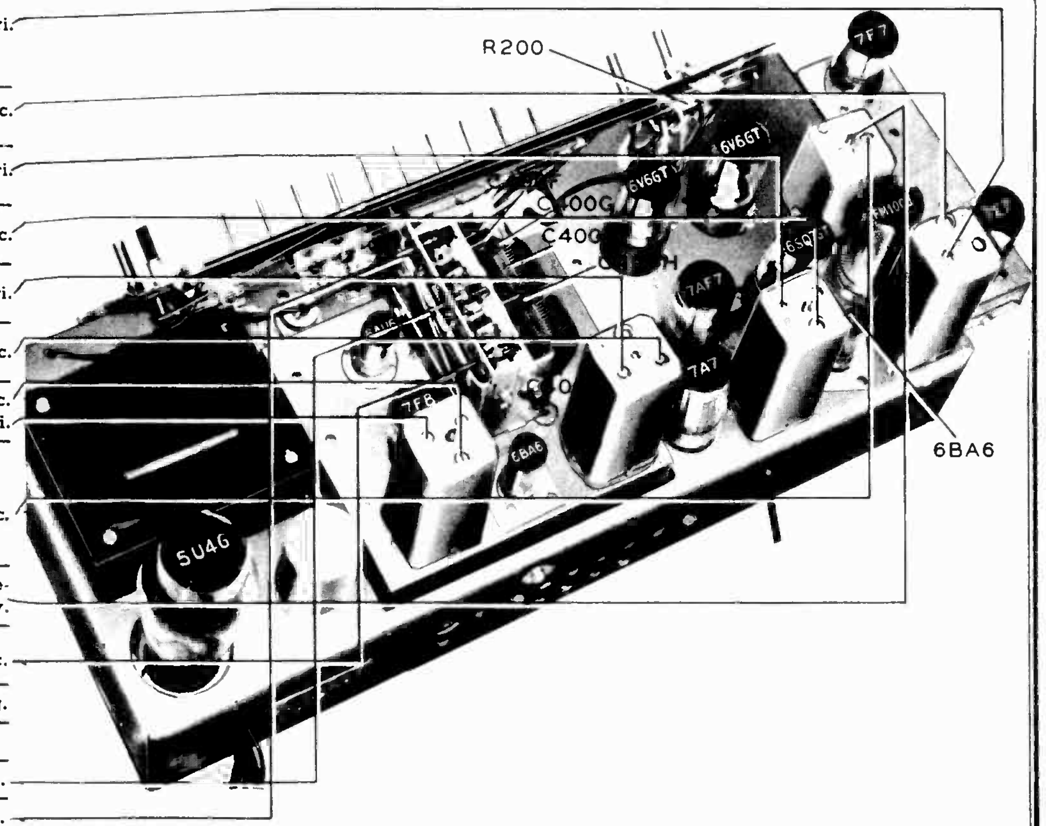


Figure 9. Top View, Showing FM Trimmer Locations

Section 1—Power Supply

TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B–, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn on the power, and set the volume control to minimum.

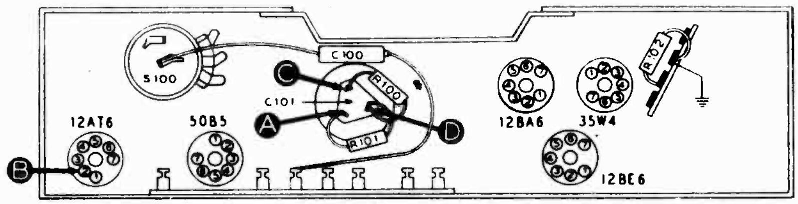


Figure 1. Bottom View, Showing Section 1 Test Points

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	104v		Trouble in this section. Isolate by the following tests.
2	C	133v	No voltage Low voltage High voltage	Defective: 35W4. Open or shorted: C100, C101A, S100, W100. Leaky: C101A. Leaky: C100, C101A. Open: R100.
3	D	121v	No voltage Low voltage High voltage	Open or shorted: C101A, C101B. Open: R100. Leaky: C101A, C101B. Open: R101.
4	A	104v	No voltage Low voltage	Open or shorted: C101C. Open: R101. Leaky: C101B.
Listening Test: Abnormal hum may be caused by open or leaky C100, C101A, C101B, C101C.				

Section 2—Audio Circuits

TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum.

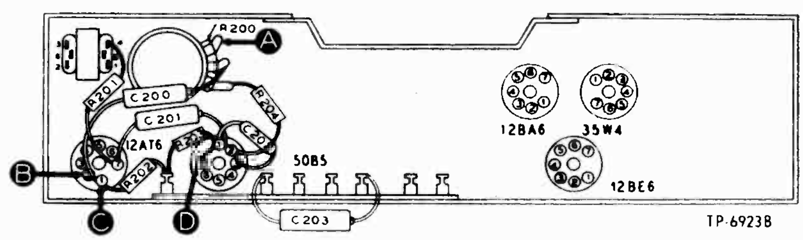


Figure 2. Bottom View, Showing Section 2 Test Points

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	D	Same as step 1.	Defective: 50B5, LS200. Shorted: C203, T200. Open: C203, T200, R205.
3	C	Same as step 1.	Defective: 12AT6. Open: C201, R201, R204. Shorted: C202.
4	A	Same as step 1.	Open: C200. Shorted: Z301*.
Listening Test: Distortion may be caused by shorted or leaky C200, C201.			

* This part, located in another section, may cause abnormal indication in this section.

Section 3—I-F, Detector, And A-V-C Circuits

TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum.

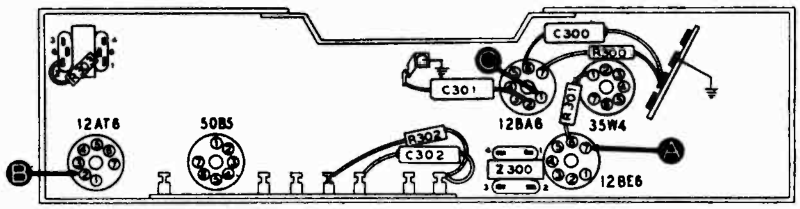


Figure 3. Bottom View, Showing Section 3 Test Points

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not isolate and correct the trouble in this section.

To provide a complete i-f-amplifier check, test point A for this section is placed at the grid of the mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under the "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	C	Same as step 1.	Defective: 12BA6, 12AT6. Open or shorted: C300, C302, Z301. Open: R301, R304. Misaligned: Z301.
3	A	Same as step 1.	Defective: 12BE6*. Open or shorted: Z300. Misaligned: Z300.

* This part, located in another section, may cause abnormal indication in this section.

Section 4—R-F And Converter Circuits

TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum. Set the tuning control and the signal-generator frequency as indicated in the chart.

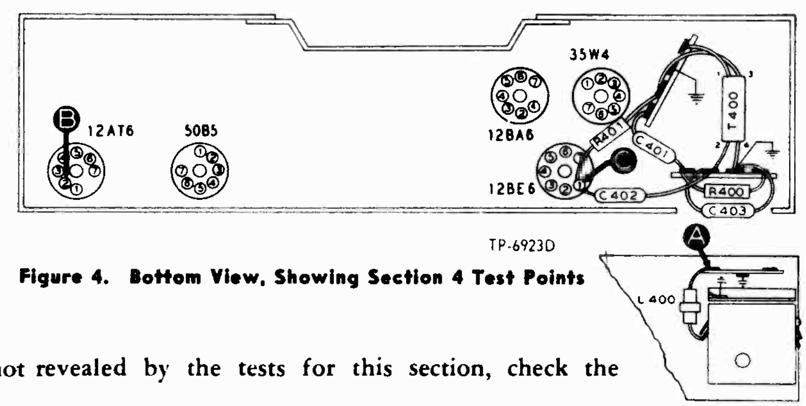


Figure 4. Bottom View, Showing Section 4 Test Points

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in this section. If the trouble is not revealed by the tests for this section, check the alignment.

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	1000 kc.	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests.
2	C (Osc. test; see note		Rotate through range.	Negative 3 to 6 volts.	Defective: 12BE6. Open or shorted: C400, C400B, C402, C403, T400.
3	A	1000 kc.	1000 kc.	Same as step 1.	Open: LA400, L400, C401, R400. Shorted: C400, C400A.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B–, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 1 of 12BE6), test point C. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage of approximately the value given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

PHILCO CORP.

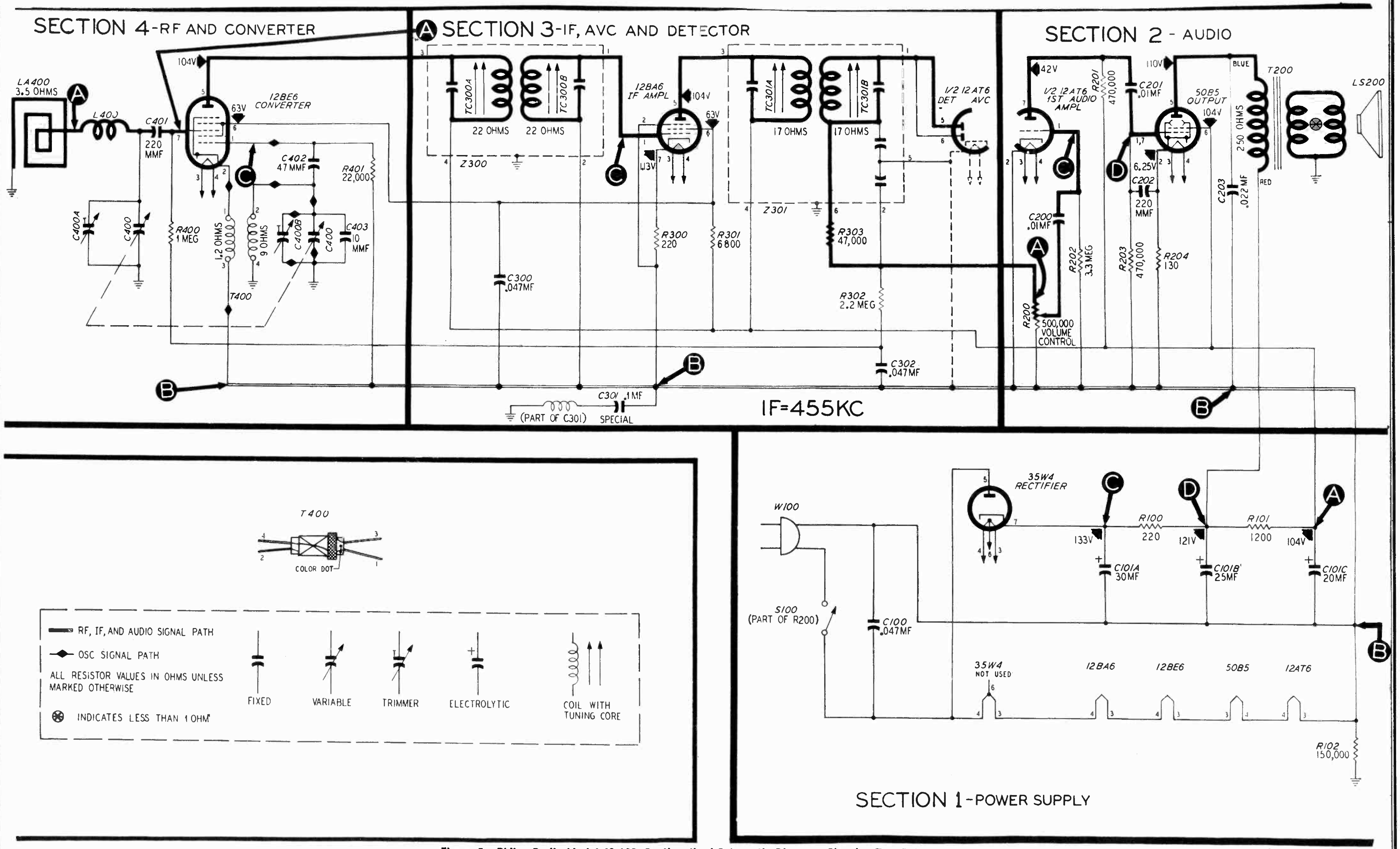


Figure 5. Philco Radio Model 49-603, Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

RADIO CONTROLS — Set volume control to maximum. Set tuning control as indicated in chart.

OUTPUT METER — Connect to left-hand terminal on wiring panel and to chassis.

SIGNAL GENERATOR — Use r-f signal generator, with modulated output. Connect generator and set frequency as indicated in chart.

OUTPUT LEVEL — During alignment, signal-generator output must be attenuated to hold output-meter reading below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL	DIAL	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to aerial loop.	455 kc.	Tuning condenser fully meshed.	Adjust tuning cores, in order given, for maximum output.	TC301B—2nd i-f sec. TC301A—2nd i-f pri. TC300B—1st i-f sec. TC300A—1st i-f pri.
2	Radiating loop. See note below.	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C400B—Osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C400A—Aerial

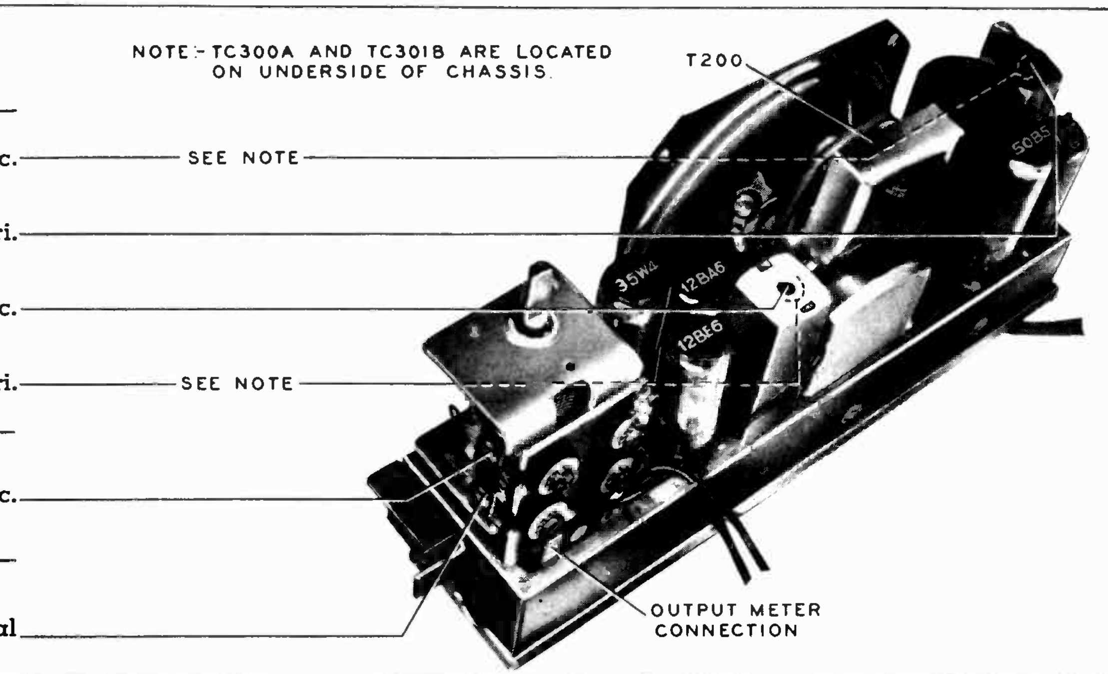
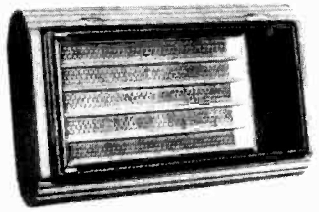


Figure 6. Top View, Showing Trimmer Locations

TP-6620

RADIATING LOOP: Make up a 6—8 turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop aerial. Radio loop aerial must be connected to radio.



MODEL 49-603

SPECIFICATIONS

- CABINET .... Easel style
- CIRCUIT .... Five-tube superheterodyne
- FREQUENCY RANGE .... 540—1620 kc.
- AUDIO OUTPUT .... .8 watt
- OPERATING VOLTAGE .... 105—120 volts, a.c. or d.c.
- POWER CONSUMPTION .... 30 watts
- AERIAL .... Built-in high-impedance loop
- INTERMEDIATE FREQUENCY .... 455 kc.
- PHILCO TUBES (5) 12BE6, 12BA6, 12AT6, 50B5, 35W4

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of 35W4) and B– (test point B). When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1000 ohms, check condensers C101A, C101B, and C203 for leakage or shorts. The resistance value given is much lower than normal, and is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage checks of Section 1 (power supply) are performed.

Circuit Description

Philco Radio Model 49-603 is a five-tube, manually tuned superheterodyne, providing reception on the standard broadcast band, 540—1620 kc. A high-impedance loop within the cabinet normally provides adequate signal pickup.

The converter employs a 12BE6, which provides high-signal-to-noise ratio and high conversion efficiency. The signal from the converter is transformer-coupled to a 12BA6 i-f amplifier. This in turn is transformer-coupled to a 12AT6 tube, one-half of which functions as the detector and supplies a-v-c voltage. Both i-f transformers have permeability-tuned primary and secondary windings.

The other half of the type 12AT6 is used as a first audio amplifier, which is resistance-coupled to the 50B5 output tube. The 50B5 is transformer-coupled to the loud-speaker.

The d-c operating voltages are supplied by a type 35W4 rectifier through a resistance-condenser network.

A 150,000-ohm resistor is connected between B– and the chassis to prevent hum which might otherwise occur under conditions of high humidity.

C301 is a special condenser, inductively wound to act as a series-resonant circuit at the 455-kc. intermediate frequency. This condenser provides an exceptionally low-impedance i-f by-pass between B– and the chassis.

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1

POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .047 mf.	61-0179*
C101	Condenser, electrolytic, 3-section	30-2573
C101A	Condenser, filter, 30 mf.	Part of C101
C101B	Condenser, filter, 25 mf.	Part of C101
C101C	Condenser, filter, 20 mf.	Part of C101
R100	Resistor, filter, 220 ohms	66-1224340*
R101	Resistor, filter, 1200 ohms	66-2123340*
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, power on-off	Part of R200
W100	Line cord	L2183*

SECTION 2

AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .01 mf.	61-0120*
C201	Condenser, d-c blocking, .01 mf.	61-0120*
C202	Condenser, parasitic suppressor, 220 mmf.	30-1224-20*
C203	Condenser, tone compensation, .022 mf.	61-0108*
LS200	Loud-speaker, permanent-magnet type	36-1627-4
R200	Volume control, 500,000 ohms	66-4503340*
R201	Resistor, plate dropping, 470,000 ohms	66-4473340*
R202	Resistor, grid return, 3.3 megohms	66-5333340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*
R204	Resistor, bias, 130 ohms	66-1123340*
T200	Transformer, output	Part of LS200

SECTION 3

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C300	Condenser, screen by-pass, .047 mf.	61-0179*
C301	Condenser, special i-f by-pass, .1 mf.	30-4644-1
C302	Condenser, r-f by-pass, .047 mf.	61-0179*
R300	Resistor, bias, 220 ohms	66-1223340*
R301	Resistor, screen dropping, 6800 ohms	66-2863340*

SECTION 3 (Continued)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R303	Resistor, diode load, 47,000 ohms	66-3473340*
Z300	Transformer, 1st i-f	32-4160-6
Z301	Transformer, 2nd i-f	32-4240

SECTION 4

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2735
C400A	Condenser, r-f tracking	Part of C400
C400B	Condenser, oscillator tracking	Part of C400
C401	Condenser, blocking, 220 mmf.	30-1224-1*
C402	Condenser, isolating, 47 mmf.	30-1224-2*
C403	Condenser, r-f by-pass, 10 mmf.	30-1224-26*
LA400	Loop, aerial	32-4325
L400	Coil, loading	32-4007-2
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, oscillator grid, 22,000 ohms	66-3223340*
T400	Transformer, oscillator	32-4326

MISCELLANEOUS

Description	Service Part No.
Back-panel assembly	76-4229
Button-and-spring assembly	76-4322
Button-and-spring assembly	76-4322-1
Cabinet (complete)	76-4355
Baffle-and-cloth assembly	40-7589
Front-panel assembly	76-4228
Hinge assembly	46-6450
Screw	W2537-5FA3
Socket, miniature	27-6203
Spring, aerial ground	56-6432
Wiring panel	38-5083-10

MODELS 49-900E, 49-900I PHILCO CORP.

Section 1 TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to the B– bus, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, at a line voltage of 117 volts, a.c.

Turn the power switch "on," and set the volume control to minimum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.

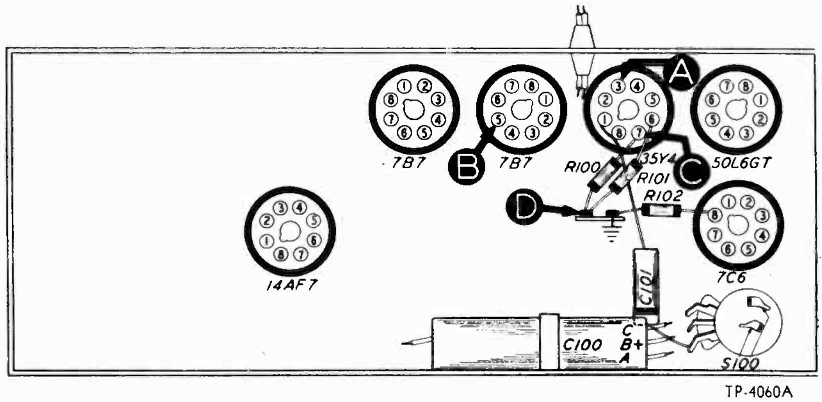


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	98 volts		Trouble within this section. Isolate by the following tests.
2	C	131 volts	No voltage. Low voltage. High voltage.	Defective: 35Y4, W100, S100. Shorted: C100A. Defective: 35Y4. Open: C100A, I100. Leaky: C100A. Open: R100.
3	D	118 volts	No voltage. Low voltage. High voltage.	Shorted: C100B. Leaky: C100B, C100C, C203*. Open: R101, T200*, R204*.
4	A	98 volts	No voltage. Low voltage. High voltage.	Shorted: C100C. Open: R101. Leaky: C100C. Open: R204*.
Listening Test: Abnormal hum may be caused by open C100A, C100B, C100C, or R102.				

* This part, located in another section, may cause abnormal indication in this section.

Section 2 TROUBLE SHOOTING

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum. Adjust the signal-generator output as required for each step.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3. If not, isolate and correct the trouble in this section.

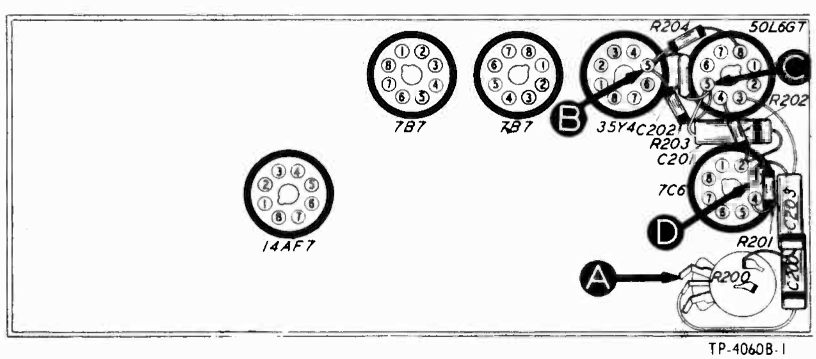


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Defective: 50L6GT, T200, LS200. Shorted or leaky: C203, C202. Open: R204, R203.
3	D	Same as step 1.	Defective: 7C6. Shorted or leaky: C201. Open: R201, R202, C201.
4	A	Same as step 1. Note: Rotate R200 through range.	Defective: R200. Shorted or leaky: C200. Open: R201, C200.
Listening Test: Distortion on strong signals may be caused by leaky C200 or open R201.			

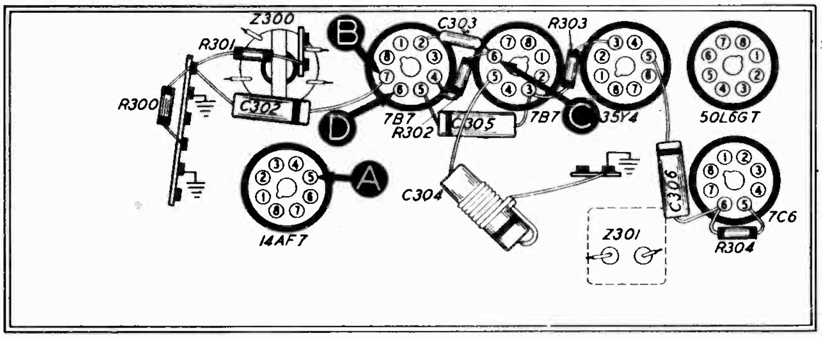
Section 3 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4; if not, isolate and correct the trouble in this section.

Since the circuit location of test point A for this section is the same as that of test point C for Section 4, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in Section 4; these parts are listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION."



TP-4060C-1

FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: 7B7 (2nd i.f.), 7C6 (diode section), Z301. Shorted or leaky: C305. Open: R303. Misaligned: Z301.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7 (1st i.f.). Shorted or leaky: C303, C302. Open: R301, R302, R300, C303, C302.
4	A	Loud, clear signal with weak signal input.	Defective: 14AF7*, Z300. Open: R401*, R403*, C306. Shorted or leaky: C306. Misaligned: Z300.

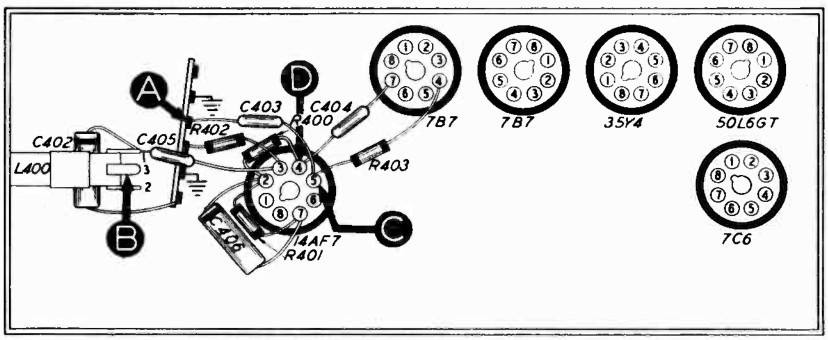
* This part, located in another section, may cause abnormal indication in this section.

Section 4 TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio volume control to maximum.

If the "NORMAL INDICATION" is not obtained in step 1, isolate the trouble by following the remaining steps.



TP-4060D-1

FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS (LOCATION OF C401 SHOWN IN FIGURE 6)

STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A	540 kc.	540 kc.	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	540 kc.	540 kc.	Same as step 1.	Defective: 14AF7. Open: C406, R402. Trouble in oscillator circuit. See step 3.
3	D Osc. Test (See note below.)		540 kc. to 1620 kc.	Negative voltage 1.6 volts to 1.8 volts.	Defective: L400. Open: R400, R402, C405, C404. Shorted: C402, C400, C405, C404, C400A.
4	A	540 kc.	540 kc.	Same as step 1.	Defective: LA400, C400, C400B. Open or shorted: C403.

OSCILLATOR TEST: Connect positive lead of a high-resistance voltmeter to B–, test point B; connect prod end of negative lead through a 100,000-ohm isolating resistor to 14AF7 oscillator grid, test point D. Use a suitable range, such as 0–10 volts. Proper operation of oscillator is indicated by negative voltage of 1.6v to 1.8v (measured with 20,000-ohms-per-volt meter) throughout range of tuning condensers.

MODELS 49-900E, 49-900I PHILCO CORP.

REPLACEMENT PARTS LIST

NOTE

Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, electrolytic, 3-section	30-2570-14
C100A	Condenser, filter, 30 mf.	Part of C100
C100B	Condenser, filter, 25 mf.	Part of C100
C100C	Condenser, filter, 20 mf.	Part of C100
C101	Condenser, line filter, .04 mf.	30-4119
I100	Panel lamp	34-2068
R100	Resistor, filter, 220 ohms	66-1224340*
R101	Resistor, filter, 1200 ohms	66-2123340*
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, a-c power	Part of R200
W100	Power cord and plug	L2183*

SECTION 2
AUDIO CIRCUITS

C200	Condenser, coupling, .01 mf.	61-0120*
C201	Condenser, coupling, .01 mf.	61-0120*
C202	Condenser, by-pass, 220 mmf.	62-122001001*
C203	Condenser, plate, .02 mf.	30-4599*
LS200	Loud-speaker	36-1615
R200	Volume control (with a-c power switch), 500,000 ohms	33-5491
R201	Resistor, grid load, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid leak, 470,000 ohms	66-4473340*
R204	Resistor, bias, 130 ohms	66-1123340*
T200	Transformer, output	Part of LS200

SECTION 3
I-F, DETECTOR, AND A-V-C CIRCUITS

C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, i-f by-pass	Part of Z301
C301D	Condenser, i-f by-pass	Part of Z301
C302	Condenser, by-pass, .003 mf.	30-4582*
C303	Condenser, coupling, 220 mmf.	62-122001001*
C304	Condenser-and-choke assembly, .2 mf.	30-4594
C305	Condenser, screen by-pass, .05 mf.	30-4510*
C306	Condenser, a-v-c by-pass, .05 mf.	30-4510*
R300	Resistor, dropping, 2200 ohms	66-2223340*
R301	Resistor, plate load, 15,000 ohms	66-3153340*
R302	Resistor, grid load, 150,000 ohms	66-4153340*
R303	Resistor, screen, 33,000 ohms	66-3333340*
R304	Resistor, a-v-c, 2.2 megohms	66-5223340*
R305	Resistor, diode load, 47,000 ohms (part of Z301)	66-3473340*

SECTION 3 (Continued)
I-F, DETECTOR, AND A-V-C CIRCUITS

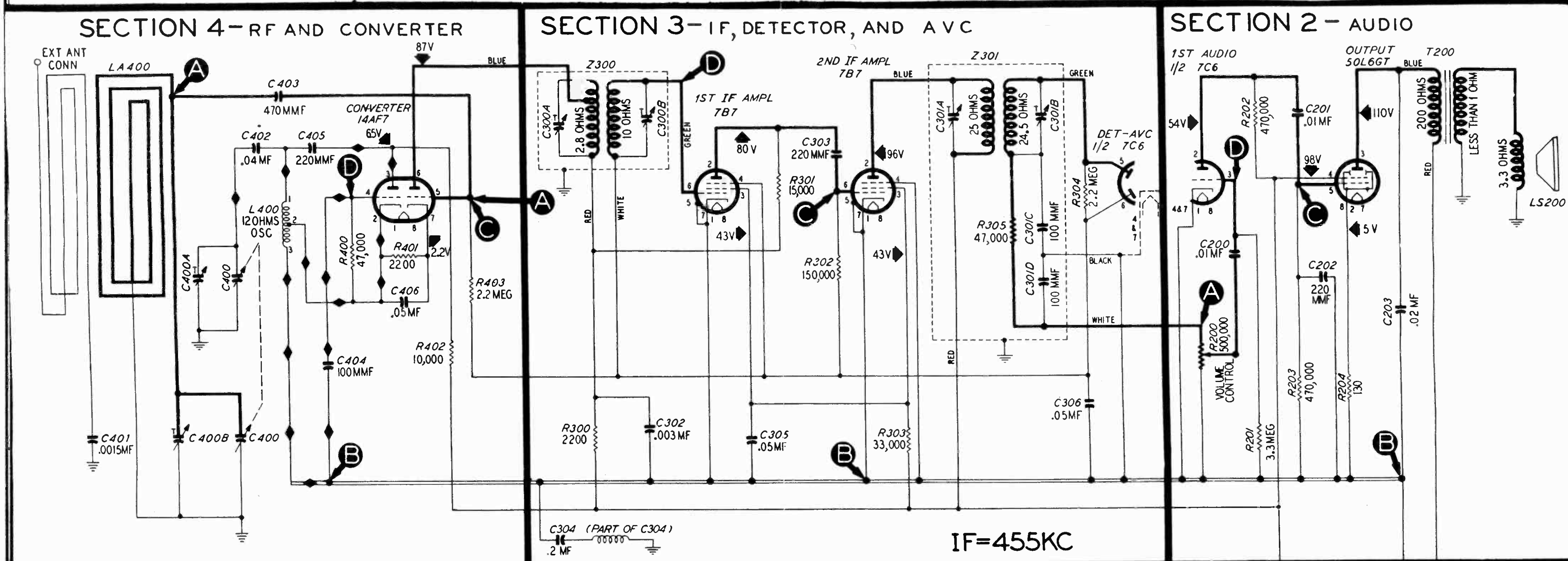
Reference Symbol	Description	Service Part No.
Z300	Transformer, 1st i-f, including C300A and C300B	32-4151
Z301	Transformer, 2nd i-f, including R305, C301A, C301B, C301C and C301D	32-4152

SECTION 4
R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning, 2-section	31-2727
C400A	Condenser, trimmer	Part of C400
C400B	Condenser, trimmer	Part of C400
C401	Condenser, series blocking, .0015 mf.	30-4621*
C402	Condenser, isolating, .04 mf.	45-3500-2*
C403	Condenser, coupling, 470 mmf.	62-147001001*
C404	Condenser, osc. grid, 100 mmf.	30-1225-2
C405	Condenser, osc. plate, 220 mmf.	62-122001001*
C406	Condenser, by-pass, .05 mf.	30-4510*
L400	Coil, oscillator	32-4153
LA400	Loop aerial	32-4052-14
R400	Resistor, oscillator grid, 47,000 ohms	66-3473340*
R401	Resistor, bias, 2200 ohms	66-2223340*
R402	Resistor, dropping, 10,000 ohms	66-3103340*
R403	Resistor, grid, 2.2 megohms	66-5223340*

MISCELLANEOUS

Description	Service Part No.
Cabinet (less scale)	
49-900-E	10629D
49-900-I	10629C
Back, Cabinet	
49-900-E	54-7096
49-900-I	54-7097
Clip, scale mounting	56-3290
Fastener, cabinet back	56-2726FA9
Pointer	54-4253
Pointer bracket and arm assembly	76-1654-2
Spring, pointer bracket	56-3859
Scale, dial	
49-900-E	27-5916-2
49-900-I	27-5916-3
Cord, pointer drive (25-ft. spool)	45-8760*
Cord, tuning-condenser drive (25-ft. spool)	45-8750*
Knob	
49-900-E	54-4218-1
49-900-I	54-4218
Socket assembly, pilot lamp	76-1981
Socket, loktal	27-6177*
Socket, octal	27-6174*
Spring, tuning-condenser drive cord	56-2617
Shaft, tuning	56-3031FA11
Bushing	27-9437
Retaining spring	57-1468FA3



Preliminary Checks

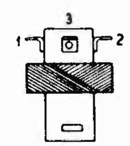
To avoid possible damage to the radio, the following preliminary checks should be made before turning on the power:

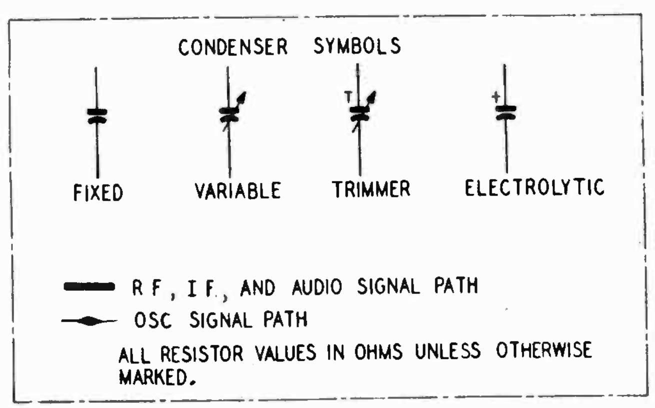
1. Inspect both top and bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of 35Y4 rectifier tube) and B– (test point B). When the ohmmeter test leads are connected in proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1500 ohms, check condensers C100A, C100B, and C100C for leakage or shorts.

This resistance value, which is much lower than normal, is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage tests of Section 1 are performed.

VOLTAGES WERE MEASURED BETWEEN THE POINTS INDICATED AND B-, USING A 20,000-OHMS-PER-VOLT METER WITH AN INPUT OF 117VAC


L400 OSC



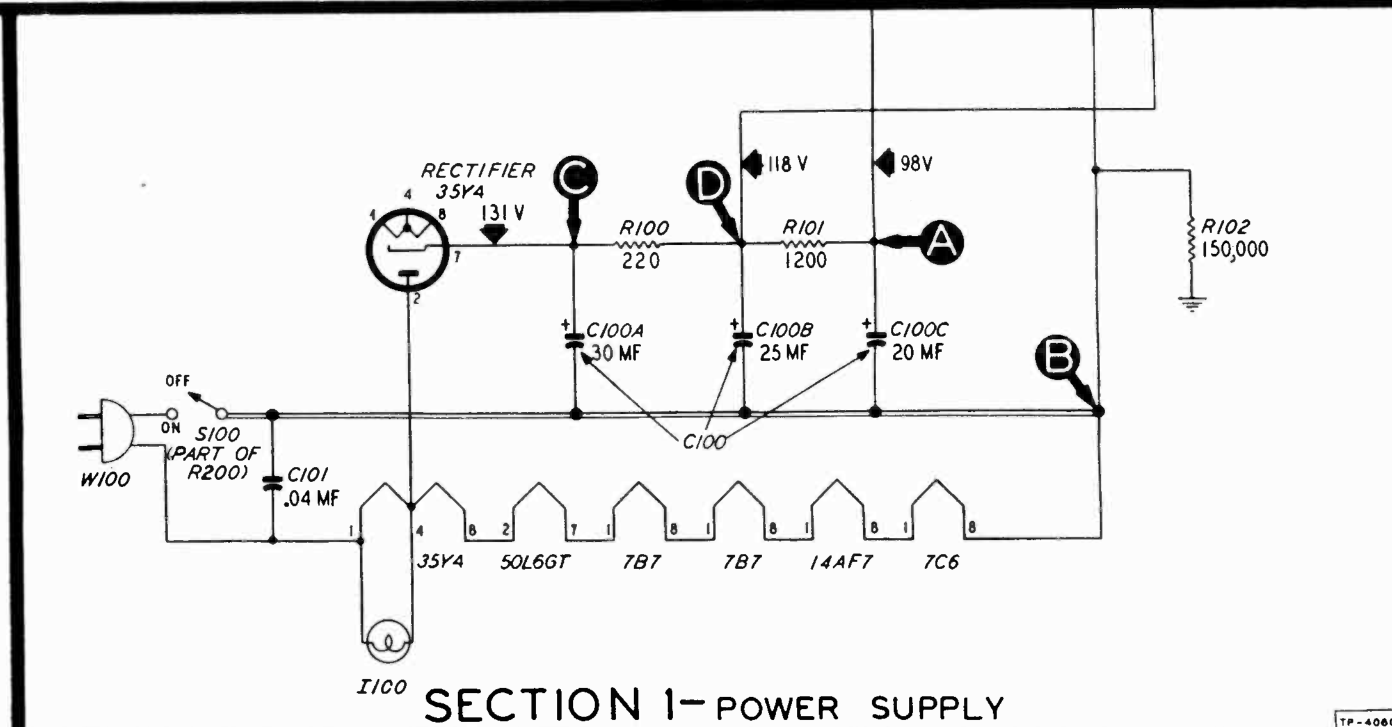


FIGURE 5. PHILCO RADIO, MODELS 49-900-E AND 49-900-I, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

ALIGNMENT PROCEDURE

SET RADIO VOLUME CONTROL TO MAXIMUM

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain an output-meter indication below 1.25 volts.

SIGNAL GENERATOR—Connect as indicated in chart. Use modulated output.

DIAL POINTER—Turn tuning condensers to full-mesh position. Adjust dial pointer to coincide with index dot, located to left of "55."

OUTPUT METER—Connect to left-hand (output) and center (chassis) lug of terminal panel, shown in Figure 6.

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1				Turn C300B down tight.	
2	(Chassis out of cabinet). Ground lead to B–; output lead through .1-mf. condenser to test point C, Section 4.	455 kc.	540 kc.	Adjust trimmers, in the order given for maximum output.	C301B C301A C300B C300A
3	(Chassis in cabinet). Radiating loop. (See note below.)	1600 kc.	1600 kc.	Adjust for maximum output.	C400B
4	Same as step 3.	1500 kc.	1500 kc.	Adjust for maximum output.	C400A

RADIATING LOOP: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop.

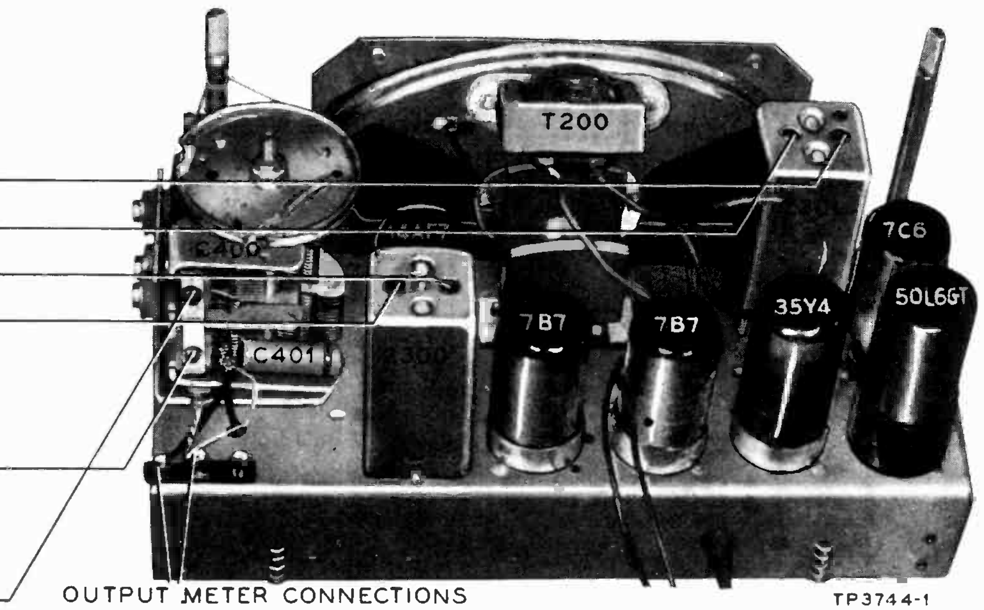


FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS

Circuit Description

Philco Models 49-900-E and 49-900-I are six-tube table-model superheterodyne radios, providing reception in the standard broadcast band. The two models are identical except for the cabinets.

The high-impedance loop aerial normally provides adequate signal pickup. If greater pickup is required, an external aerial may be connected.

The loop works into a 14AF7 converter. Variable condenser tuning is used. The two i-f stages employ 7B7 pentode tubes. To obtain good stability, resistance coupling is employed between the first and second i-f tubes. One diode (pin 5) of the 7C6 provides detection and a-v-c voltage. The triode section of this tube functions as the first audio amplifier, and is resistance-coupled to the 50L6GT output tube. The speaker is a permanent-magnet dynamic. The power supply employs a 35Y4, working into a resistance-capacitance filter system.

The 150,000-ohm resistor R102, connected between B– bus and chassis, prevents the hum which might otherwise occur under conditions of high humidity.

The series-resonant circuit, C304, functions as a by-pass of exceptionally low impedance; C304 is resonant at the i.f., 455 kc.

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and components of that section.

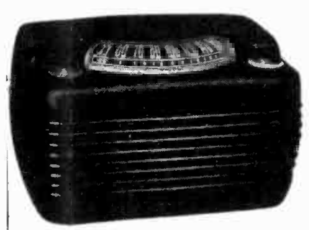
In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring the tube-electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

SPECIFICATIONS

CABINET	
Model 49-900-E	Plastic, ebony
Model 49-900-I	Plastic, ivory
CIRCUIT	6-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	105—120 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	Built-in loop; terminal also provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (6)	14AF7, 7B7 (2), 7C6, 50L6GT, 35Y4



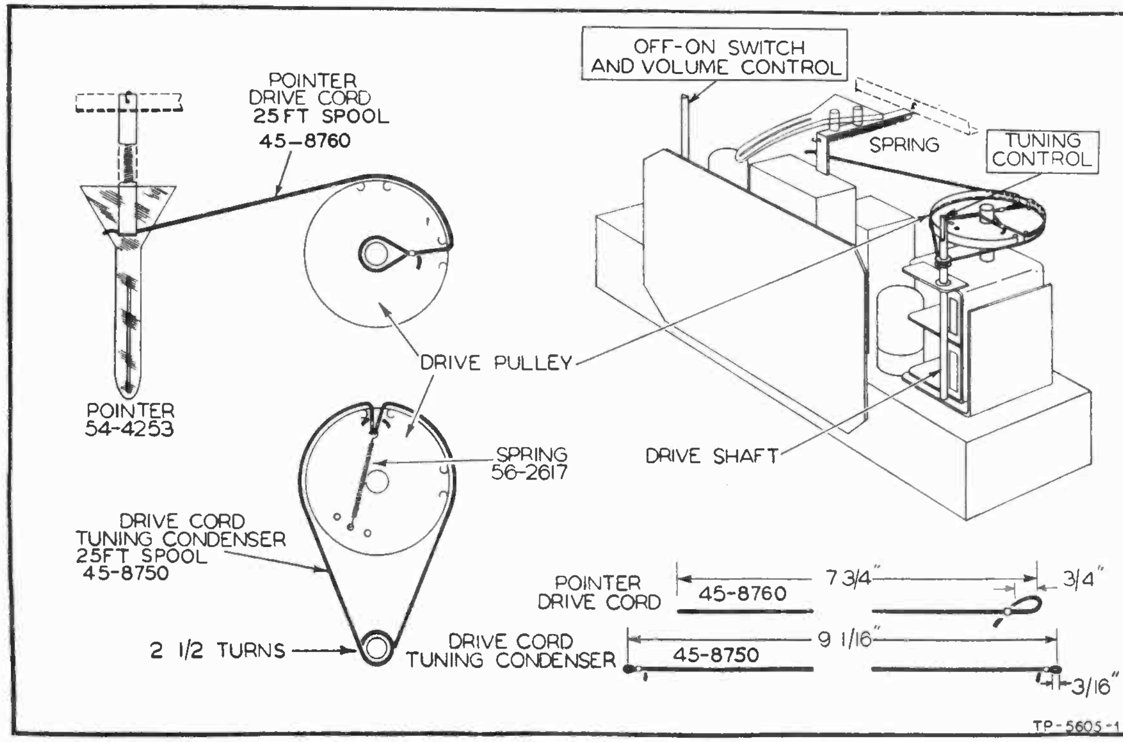


FIGURE 7. DRIVE-CORD INSTALLATION DETAILS

PHILCO CORP. MODEL 49-901

TROUBLE SHOOTING

Section 1

Power Supply

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B—, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn on the power, and set the volume to minimum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

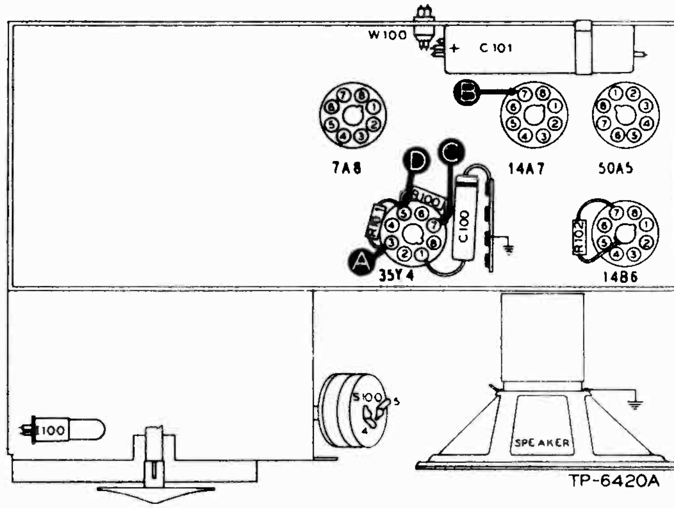


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	100 volts		Trouble within this section. Isolate by the following tests.
2	C	124 volts	No voltage	Defective: 35Y4. Open: W100, S100. Shorted: C101A.
			Low voltage	Leaky: C101A. Open: C101A.
			High voltage	Open: R100.
3	D	111 volts	No voltage	Shorted: C101B. Open: R100.
			Low voltage	Leaky: C101A, C101B. Shorted: C203*.
			High voltage	Open: R101, T200*, R204*.
4	A	100 volts	No voltage	Shorted: C101C. Open: R101.
			Low voltage	Leaky: C101C.
Listening Test: Abnormal hum may be caused by open C101A, C101B, or C101C.				

* This part, located in another section, may cause abnormal indication in this section.

TROUBLE SHOOTING

Section 2

Audio Circuits

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume to maximum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

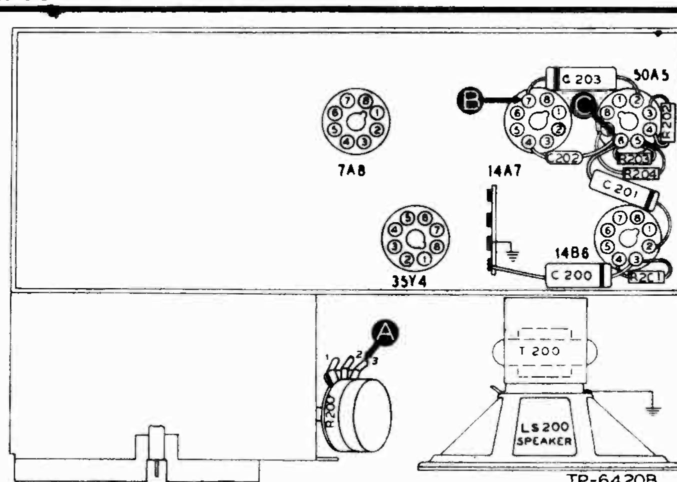


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate signal-generator input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 50A5, LS200. Shorted: C202, C201, C203. Open: T200, R204.
3	D	Loud, clear output with moderate input.	Defective: 14B6. Open: R202, R201, C201.
4	A	Same as step 3.	Shorted: C200, C301D*. Open: C200, R200 (rotate through range).
Listening Test: Distortion may be caused by shorted or leaky C201.			

* This part, located in another section, may cause abnormal indication in this section.

MODEL 49-901 PHILCO CORP.

TROUBLE SHOOTING
Section 3
I-F, Detector, and A-v-c Circuits

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume to maximum.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in this section.

To provide a complete i-f-amplifier check, test point A for this section is placed at the grid of the mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

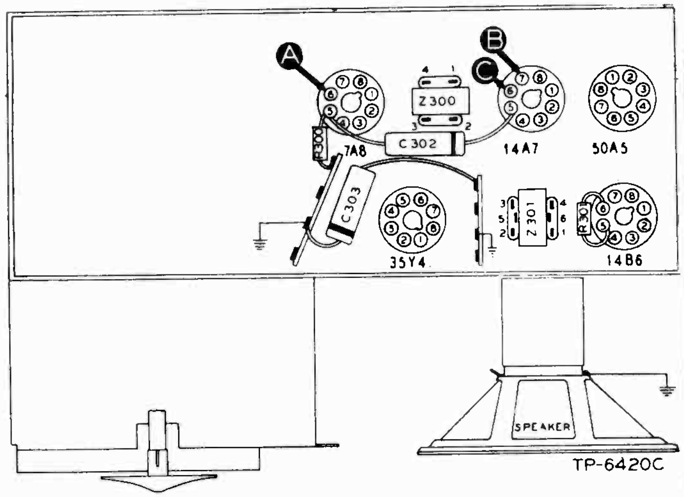


Figure 3. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate signal-generator input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear output with moderate input.	Defective: 14A7, 14B6 (diode section). Shorted: C302, Z301. Open: Z301, R300, R301, R302. Misaligned: Z301.
3	A	Same as step 2.	Defective: 7A8*. Shorted: Z300. Open: Z300. Misaligned: Z300.

* This part, located in another section, may cause abnormal indication in this section.

TROUBLE SHOOTING
Section 4
R-F and Converter Circuits

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume to maximum, and set the drum tuner and the signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in this section. If the trouble is not revealed by the tests for this section, check the alignment.

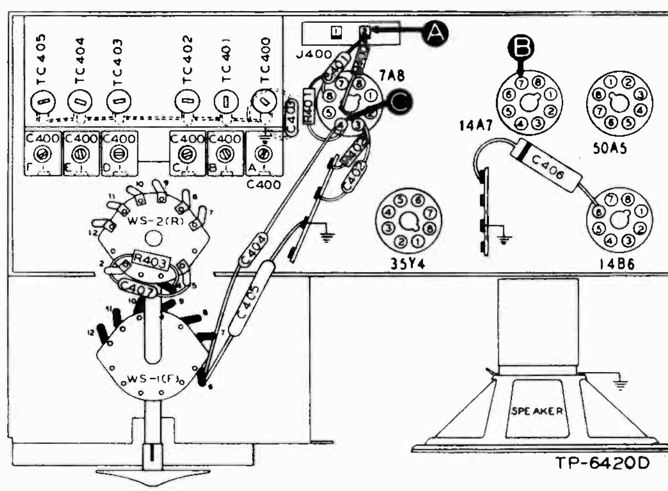
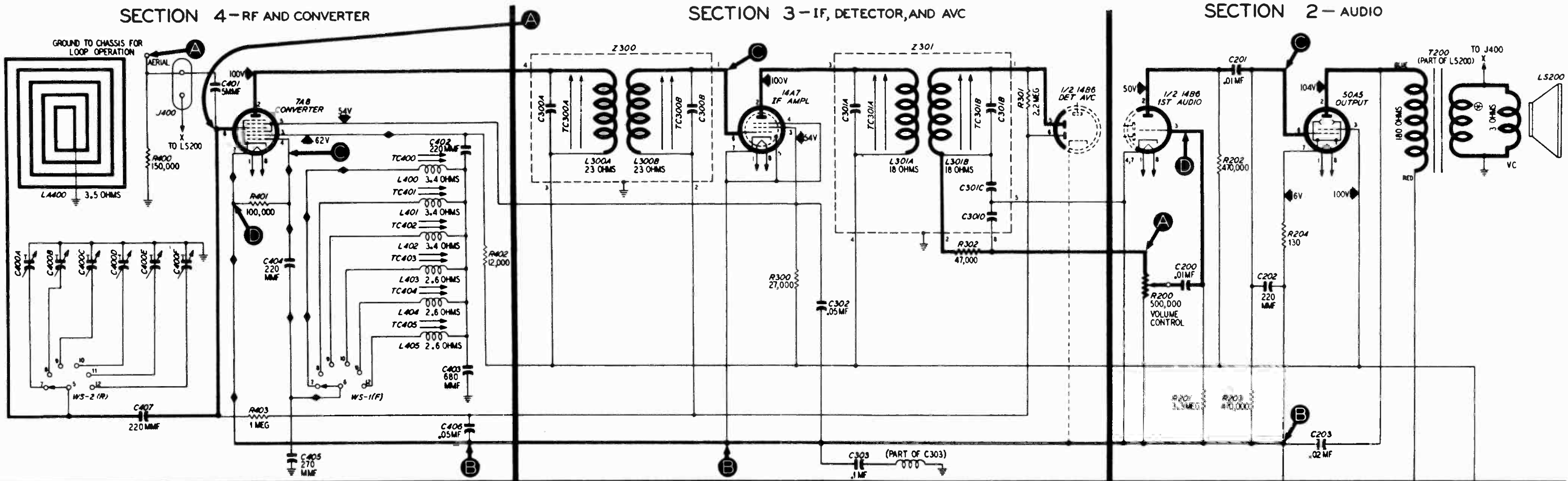


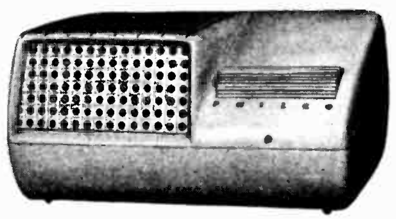
Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIG. GEN. FREQ.	DRUM TUNER	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Adjust to frequency of each station setting.	Depress drum tuner for each station setting, in turn.	Loud, clear speaker output with weak signal-generator input.	Trouble in circuits associated with each position of the station-selector drum tuner. Isolate by steps 2 and 3.
2	C to B Osc. Test (see Note below)		Same as step 1.	-3.5v to -4.5v.	No voltage for any station setting—Defective: 7A8. Shorted: C402, C403, C404, C405, L400 to L405, WS-1(F). Open: L400 to L403, C404, C403, R401.
3	A	Same as step 1.	Same as step 1.	Same as step 1.	Shorted: C407, WS-2(R), C400A—F. Open: C401, C407, R403, WS-2(R), C400A—F.

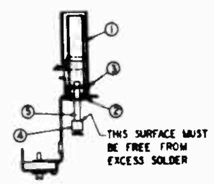
OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B–, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 4 of 7A8), test point C. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage of approximately the value given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

PHILCO CORP.





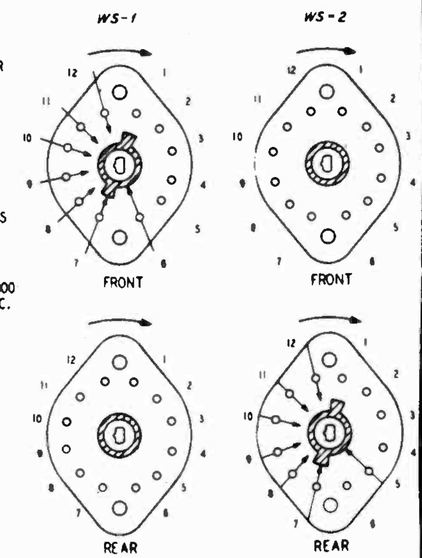
INSTRUCTIONS FOR REMOVING OSCILLATOR COILS



THE FOLLOWING PROCEDURE IS RECOMMENDED FOR REMOVING THE OSCILLATOR COILS:
1. REMOVE ALL WIRE CONNECTIONS AND FIBER SHIELD FROM COILS.
2. HEAT COUPLING (4) WITH SOLDERING IRON AND REMOVE.
3. REMOVE CLIP (2). COIL SHOULD THEN BE REMOVABLE.

REVERSE PROCEDURE FOR REPLACING COILS.
WHEN MOUNTING COUPLING, REMOVE ALL EXCESS SOLDER FROM SCREW THREADS.

ALL VOLTAGES WERE MEASURED FROM B— WITH A 20,000 OHMS-PER-VOLT METER AT A LINE VOLTAGE OF 117 V.A.C.



SIX POSITION WAFER SWITCH SHOWN IN BROADCAST POSITION.
(F) INDICATES FRONT CONTACTS LOOKING FROM FRONT.
(R) INDICATES REAR CONTACTS LOOKING THROUGH FROM FRONT.
SECTIONS OF SWITCH NUMBERED STARTING AT FRONT OF CHASSIS.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

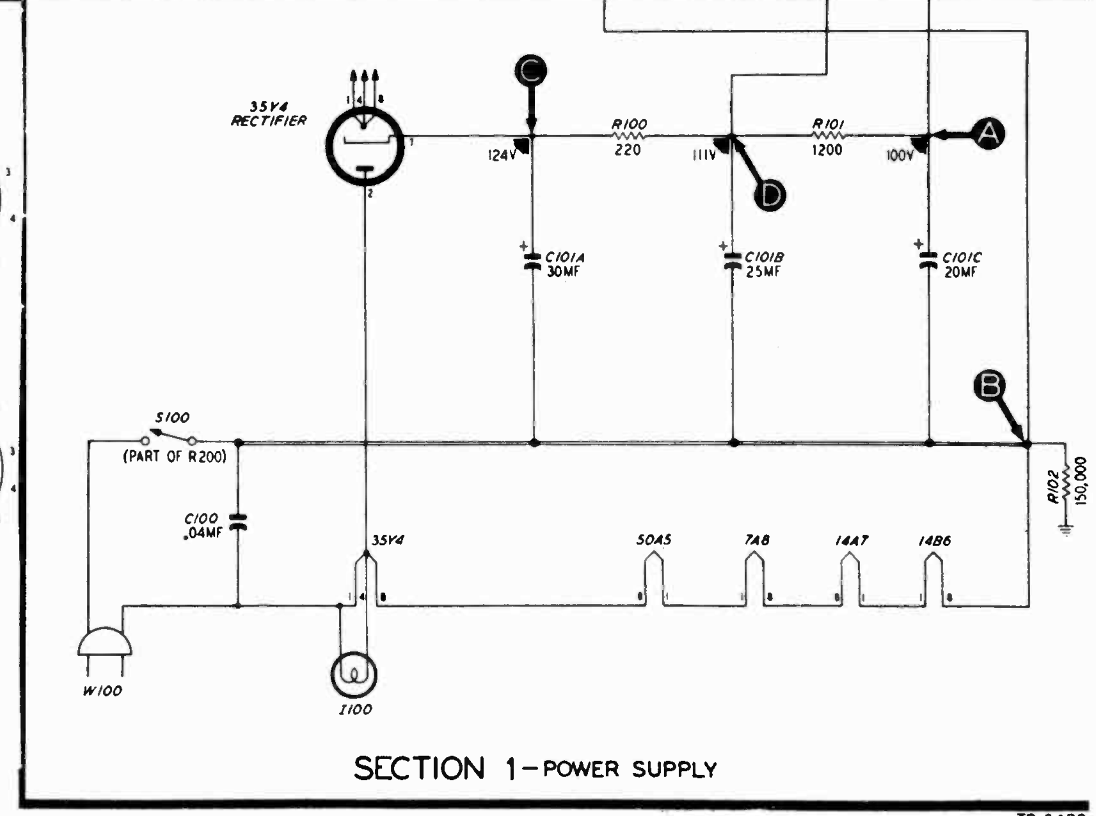
1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.

2. Measure the resistance between B+ (pin 7 of 35Y4 rectifier) and B—, test point B. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1500 ohms, check condensers C101A, C101B, and C203 for leakage or shorts. The resistance value given is much lower than normal, and is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage checks of Section 1 (power supply) are performed.

SPECIFICATIONS

CABINET	Phenolic plastic, green or ivory
CIRCUIT	5-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	105—120 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	High-impedance loop; provision also for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8, 14A7, 14B6, 50A5, 35Y4

TP-6096A.



TP-6420

Figure 5. Philco Radio Model 49-901, Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

I-F CIRCUITS

RADIO CONTROLS—Set volume to maximum.

OUTPUT METER—Connect between left-hand terminal (viewed from rear) of J400 and chassis.

SIGNAL GENERATOR—Use AM r-f signal generator, with modulated output. Connect generator and set frequency as indicated in chart.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to hold output-meter reading below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST TRIMMER
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B–; output lead through .1-mf. condenser to pin 6 of 7A8 converter.	455 kc.	540 kc.	Adjust trimmers, in order given, for maximum output.	TC301B—2nd i-f sec. TC301A—2nd i-f pri. TC300B—1st i-f sec. TC300A—1st i-f pri.

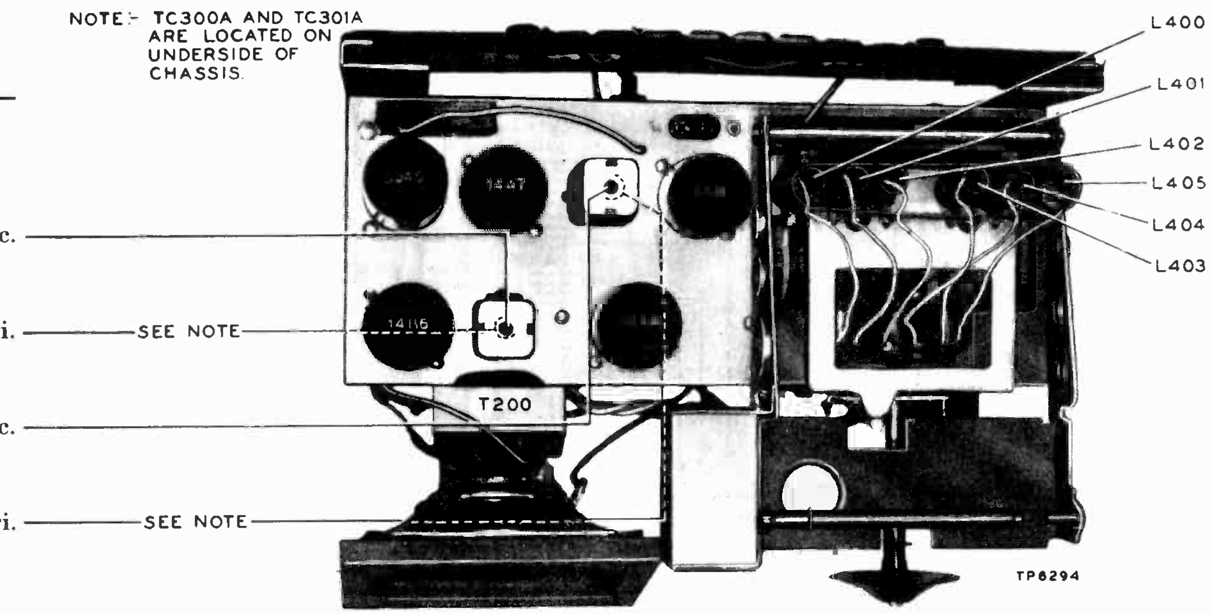


Figure 6. Top View, Showing Trimmer Locations

STATION-SELECTOR ADJUSTMENTS

1. Turn on the power, and set the volume for normal volume level.

2. Couple the signal generator loosely as outlined in Note 1.

3. Allow the radio to warm up for 15 minutes.

4. Starting with the lowest frequency desired, set the signal generator, and depress the drum tuner as indicated in the chart. Adjust the associated oscillator tuning core and aerial trimmer for maximum output.

5. Detune the signal generator, and make a final adjustment of the tuning core and aerial trimmer while listening to the station for which the adjustment is being made.

6. Repeat steps 4 and 5 for each remaining station setting.

Note 1: Make up a 6-to-8 turn, 6-inch-diameter loop, using insulated wire; connect to generator leads and place near radio loop.

Note 2: For a more critical adjustment, a-v-c voltage may be used as a resonance indicator by connecting a 20,000-ohms-per-volt voltmeter from pin 6 of the 14B6 to test point B. Adjust for maximum.

STATION SETTING	FREQUENCY RANGE	OSCILLATOR TUNING CORE	AERIAL TRIMMER
1	540—900 kc.	TC400	C400A
2	600—1100 kc.	TC401	C400B
3	650—1200 kc.	TC402	C400C
4	850—1400 kc.	TC403	C400D
5	900—1600 kc.	TC404	C400E
6	900—1600 kc.	TC405	C400F

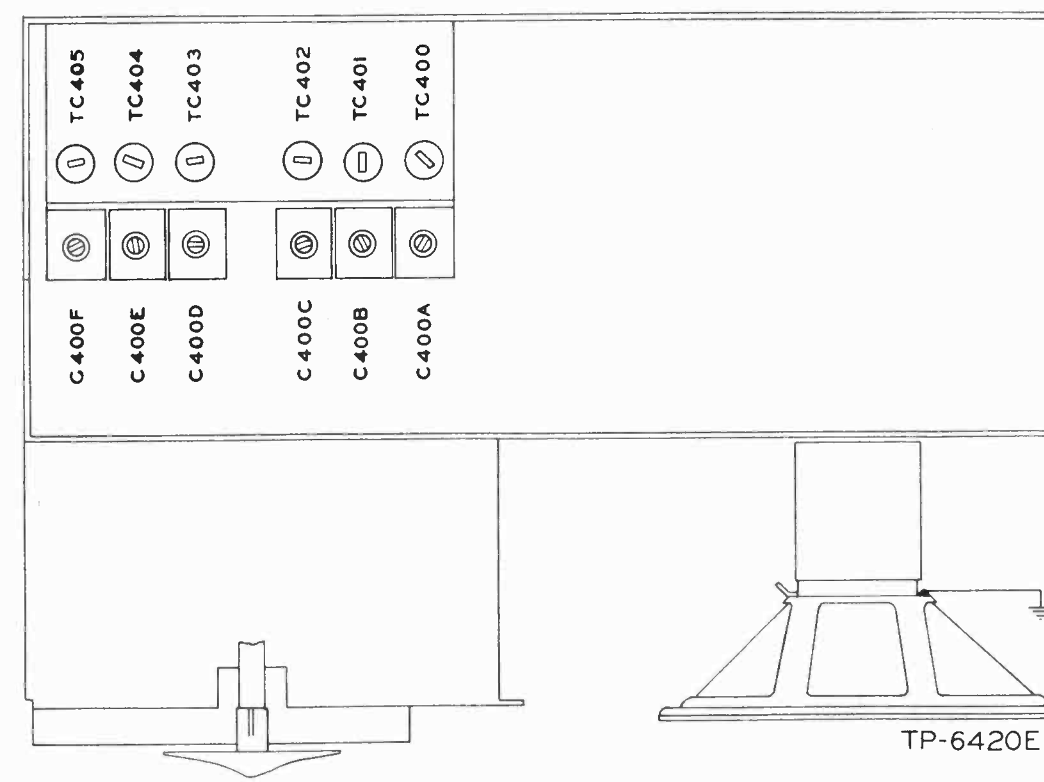


Figure 7. Bottom View, Showing Locations of Station-Selector Adjustments

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) indicate general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and replacement parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1—POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .04 mf	45-3500-2*
C101	Condenser, electrolytic, 3-section	30-2570-14*
C101A:	Condenser, filter, 30 mf	Part of C101
C101B:	Condenser, filter, 25 mf	Part of C101
C101C:	Condenser, filter, 20 mf	Part of C101
I100	Lamp, pilot	34-2068*
R100	Resistor, filter, 220 ohms	66-1224340*
R101	Resistor, filter, 1200 ohms	66-2123340*
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, on-off	Part of R200
W100	Line cord and plug	L2183*

SECTION 2—AUDIO CIRCUITS

C200	Condenser, blocking, .01 mf	61-0120*
C201	Condenser, blocking, .01 mf	61-0120*
C202	Condenser, by-pass, 220 mmf	66-122001001*
C203	Condenser, tone compensation, .02 mf	61-0180*
LS200	Speaker	36-1627
R200	Volume control (with on-off switch), 500,000 ohms	33-5556-6*
R201	Resistor, grid return, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid leak, 470,000 ohms	66-4473340*
R204	Resistor, bias, 130 ohms	66-1123340*
T200	Output transformer	Part of LS200

SECTION 3—I-F, DETECTOR, AND A-V-C CIRCUITS

C300A	Condenser, fixed, 1st i-f primary	Part of Z300
C300B	Condenser, fixed, 1st i-f secondary	Part of Z300
C301A	Condenser, fixed, 2nd i-f primary	Part of Z301
C301B	Condenser, fixed, 2nd i-f secondary	Part of Z301
C301C	Condenser, i-f filter	Part of Z301
C301D	Condenser, i-f filter	Part of Z301
C302	Condenser, screen by-pass, .05 mf	61-0122*
C303	Condenser (inductively wound), i-f by-pass, .1 mf	30-4644-1*
R300	Resistor, screen dropping, 27,000 ohms	66-3273340*
R301	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R302	Resistor, diode load, 47,000 ohms	66-3473340*
TC300A	Core, tuning, 1st i-f primary	Part of Z300
TC300B	Core, tuning, 1st i-f secondary	Part of Z300
TC301A	Core, tuning, 2nd i-f primary	Part of Z301
TC301B	Core, tuning, 2nd i-f secondary	Part of Z301
Z300	Transformer, 1st i-f	32-4160-6
Z301	Transformer, 2nd i-f	32-4240

SECTION 4—R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser assembly, trimmer, 6-section	31-6510
C400A:	Condenser, trimmer, aerial	Part of C400
C400B:	Condenser, trimmer, aerial	Part of C400
C400C:	Condenser, trimmer, aerial	Part of C400
C400D:	Condenser, trimmer, aerial	Part of C400
C400E:	Condenser, trimmer, aerial	Part of C400
C400F:	Condenser, trimmer, aerial	Part of C400
C401	Condenser, blocking, 5 mmf	30-1224-5*
C402	Condenser, d-c blocking, 220 mmf	62-122001001*
C403	Condenser, r-f by-pass, 680 mmf	60-10685331*
C404	Condenser, isolating, 220 mmf	62-122001001*
C405	Condenser, r-f by-pass, 270 mmf	30-1224-14*
C406	Condenser, a-v-c filter, .05 mf	61-0122*
C407	Condenser, blocking, 220 mmf	62-122001001*
J400	Accessory jack	38-9161-7
LA400	Loop aerial	
	49-901 (ivory)	32-4316
	49-901 (green)	32-4315
Tuning coils and trimmer-condenser assembly		76-4082
C400	Aerial trimmer assembly, 6-section	31-6510
L400, L401, or L402	Coil, osc.	32-4059-5*
L403, L404, or L405	Coil, osc.	32-4059-4*
TC400 through TC405	Tuning core, osc.	56-6100*
R400	Resistor, aerial loading, 150,000 ohms	66-4153340*
R401	Resistor, bias, 100,000 ohms	66-4103340*
R402	Resistor, osc. plate load, 12,000 ohms	66-3123340*
R403	Resistor, grid return, 1 megohm	66-5103340*
WS-1(F)	Switch-wafer section	Part of 76-4057†
WS-2(R)	Switch-wafer section	Part of 76-4057†

MISCELLANEOUS

Description	Service Part No.
Cabinet	
49-901 (ivory)	10719
49-901 (green)	10719A
Baffle and cloth	40-7560
Baffle, speaker	54-4636
Light shield	566307FA3
Jewel, telltale	54-4304-1
Wheel assembly	76-4083
Roller-tuning assembly	76-4001
Roller-switch assembly	76-4057
Bracket, mounting, base to top of cabinet	56-6392FA3
Board-and-clamp assembly	76-4079
Tuning-assembly hardware (76-4082)	
Sleeve, adjusting (6)	55-1377
Bushing (12)	54-4610
Ring (6)	57-1684FA3
Link, adjusting (6)	56-4-34FCP
Mounting strip, trimmer	56-2250
Coupling (6)	56-5975
Pilot-lamp assembly	76-1179-7
Socket, Loktal (5)	27-6138*

† 76-4057 Roller switch assembly.

Circuit Description

Philco Model 49-901 is a table-model radio employing a five-tube superheterodyne circuit. The radio is turned on by rotating the drum tuner. Continued rotation adjusts the volume. Any one of six pretuned stations is selected by depressing the drum tuner once for each station. The built-in loop aerial normally provides adequate signal pickup. However, a terminal is provided for connecting an external aerial, if required.

The loop works through a condenser into a 7A8 converter. The 7A8 is transformer-coupled to a 14A7 i-f amplifier, which, in turn, is transformer-coupled to the diode section of a 14B6. Both i-f transformers have permeability-tuned primary and secondary windings, and are tuned to 455 kc. The diode section of the 14B6 provides detection and a-v-c voltage; the a-v-c voltage is applied to the grids of the mixer and i-f amplifier. The 1st audio (triode) section of the 14B6 is resistance-coupled to the 50A5 beam-power output amplifier, which supplies approximately 1 watt of audio power to the PM dynamic speaker.

D-c operating voltages are supplied by a 35Y4 half-wave rectifier and a resistance-capacitance filter. The 150,000-ohm resistor, R102, is connected between B— and the chassis to prevent hum caused by condenser leakage under high-humidity conditions.

Philco TROUBLE-SHOOTING Procedure

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistance; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

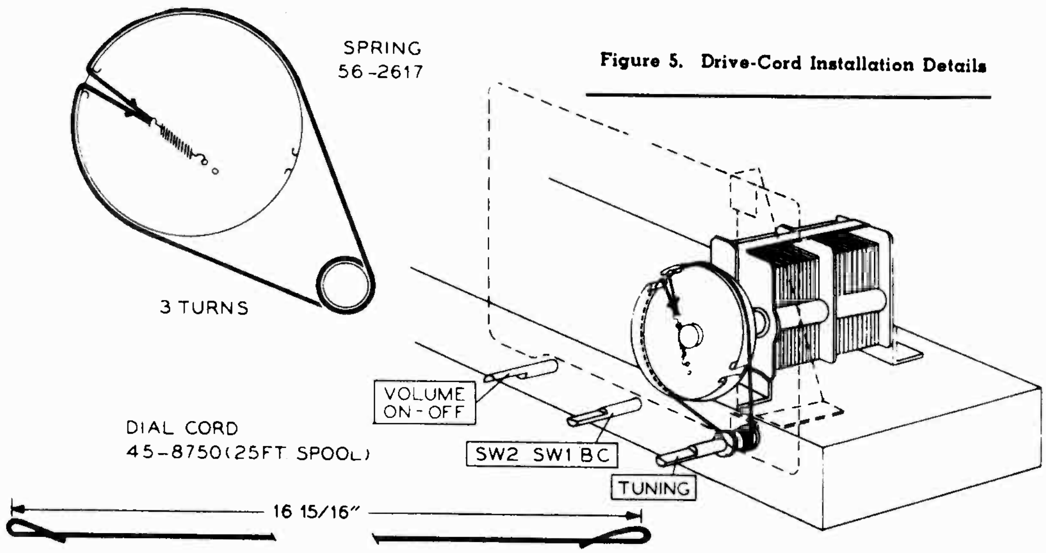


Figure 5. Drive-Cord Installation Details

Circuit Description

Philco Radio Model 49-905 is a six-tube superhetrodyne, which provides reception in the standard-broadcast band and in the FM band. A built-in high-impedance loop is used as the aerial on the broadcast band, and the line cord is used as the aerial on the FM band. These aerials normally provide adequate signal pickup; if additional pickup is required, Philco Dipole Aerial, Part No. 45-1462, may be used. When connecting the dipole aerial, disconnect the blue, external AM aerial lead from the chassis, and attach it to pin 1 of the dipole-aerial plug which fits into J400. No additional coupler is required.

A 12AT7 dual triode is used as the oscillator and mixer for both bands by switching the mixer grid and both the oscillator and mixer cathodes to the proper circuits.

For broadcast reception, the i-f signal is transformer-coupled to a 12AU6 i-f amplifier. The output of this stage is transformer-coupled to a diode section of the 19T8, which provides detection and a-v-c action.

For FM reception, an additional i-f amplifier stage, which employs a 6BH6, is used to provide adequate gain and stability. This stage is coupled into the circuit by applying B+ voltage to the plate and screen grid when the band switch is in the FM position. The 6BH6 is transformer-coupled to both the mixer and the second i-f amplifier. The 12AU6 is also transformer-coupled to two diode sections of the 19T8 in a ratio-detector circuit.

In the i-f circuits, two sets of i-f transformers are used; one set is tuned to 455 kc. for standard broadcast, and the other set is tuned to 9.1 mc. for FM. The use of two sets of transformers makes better shielding possible, so that undesirable beat signals and interaction between transformers are eliminated.

The triode section of the 19T8 is employed as the first audio amplifier, and is resistance-coupled to the 35C5 output tube, which supplies an audio output of approximately one watt to the permanent-magnet dynamic speaker.

The power supply utilizes a 35W4 as a half-wave rectifier, which operates from a line voltage of 105—120 volts, a.c. or d.c

SPECIFICATIONS

CABINET	Plastic, brown finish
CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1620 kc.
FM	88—108 mc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	105—120 volts, a.c./d.c.
POWER CONSUMPTION	30 watts
AERIAL	Built-in high-impedance loop for AM, line cord for FM; provision for connecting external aerial.
INTERMEDIATE FREQUENCY	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (6)	35W4, 35C5, 12AU6, 12AT7, 19T8, 6BH6

Philco TROUBLE-SHOOTING *Procedure*

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; those sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of 35W4 rectifier) and B–, test point B. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1700 ohms, check condensers C100A, C100B, C100C, C201, C305, C308, and C310 for leakage or shorts. The resistance value given is much lower than normal, and is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage checks of Section 1 (power supply) are performed.

Important!

To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical positions as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be altered.

Section 1 TROUBLE SHOOTING

POWER SUPPLY

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B–, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn on the power, set the volume control to minimum, and set the band switch to the broadcast position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

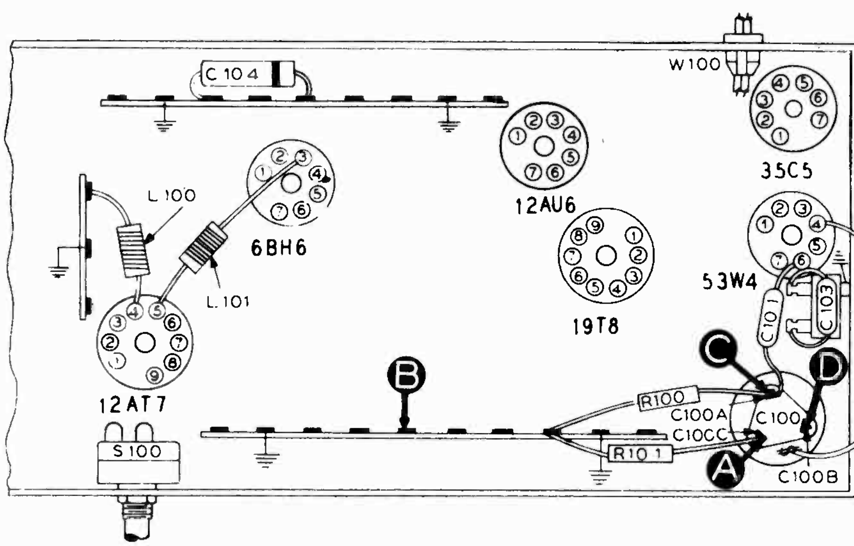


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	104v		Trouble in this section. Isolate by the following tests.
2	C	125v	No voltage	Defective: 35W4. Open: L100, L101, S100, W100. Shorted: C100A, C101.
			Low voltage	Defective: 35W4. Shorted: C100B. Open: C100A.
			High voltage	Open: R100.
3	D	113v	No voltage	Shorted: C100B. Open: R100.
			Low voltage	Open: C100B. Shorted: C201*. Leaky: C100B, C201*.
			High voltage	Open: R101, T200*, R204*. Defective: 35C5*.
4	A	104v	No voltage	Open: R101. Shorted: C100C.
			Low voltage	Leaky: C100C.

Listening Test: Abnormal hum may be caused by leaky or open C100A, C100B, or C100C.

* This part, located in another section, may cause abnormal indication in this section.

MODEL 49-905 PHILCO CORP.

Section 2 TROUBLE SHOOTING

AUDIO CIRCUITS

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum. Set the band switch to the broadcast position for test points A, C, and D, and to the FM position for test point E.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A E	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 35C5, LS200. Open: R204, C200, T200, R203. Shorted: C201, C200, C202. Leaky: C200, C201, C202.
3	D	Same as step 1.	Defective: 19T8 (triode section). Open: R202, C202, R201. Shorted or leaky: C203.
4	A	Same as step 1.	Open: WS, C205, R200 (rotate through range). Shorted: WS-1(F).
5	E	Same as step 1.	Open: WS-1(F). Shorted: WS-1(F).
Listening Test: Distortion may be caused by shorted or leaky C205 or C202.			

* This part, located in another section, may cause abnormal indication in this section.

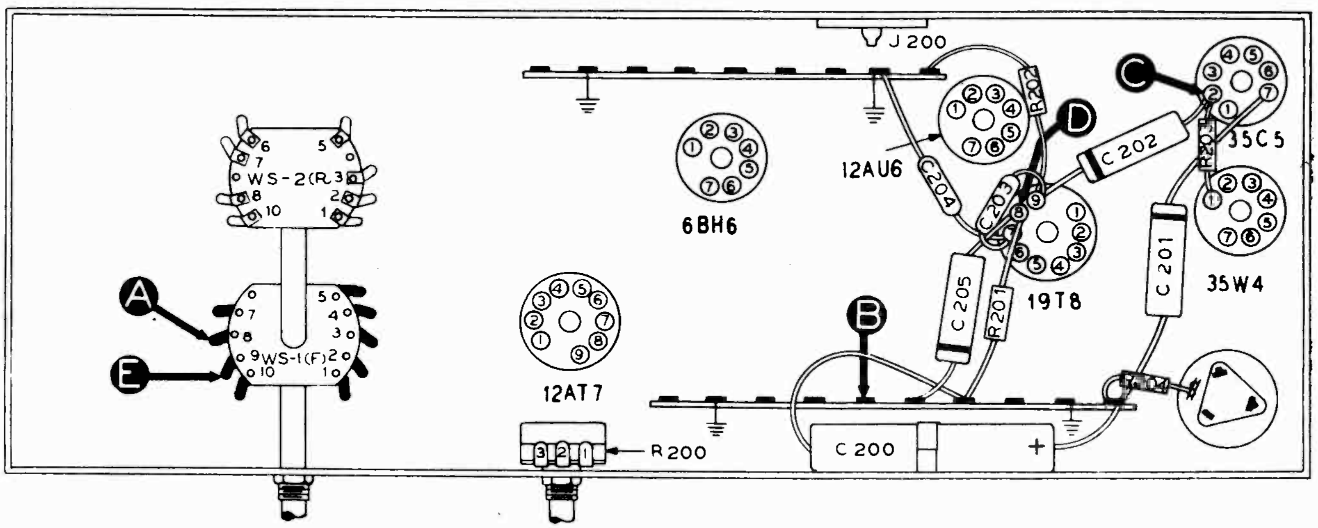


Figure 2. Bottom View, Showing Section 2 Test Points

Section 3 TROUBLE SHOOTING

I-F, DETECTOR, AND A-V-C CIRCUITS

AM Circuits

For the following tests, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, set the band switch to the broadcast position, and rotate the tuning control until the tuning condenser is fully meshed.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits or to the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the AM circuits.

To provide a complete i-f amplifier check, test point A for this section is placed at the grid of the mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under the "POSSIBLE CAUSE OF ABNORMAL INDICATION."

Section 3—Cont. TROUBLE SHOOTING

AM Chart

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in AM circuits. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 12AU6, 19T8. Open: Z303, Z304, R303, R308. Shorted: C310, C312, C304C, Z304, C315, C314.
3	A	Same as step 1.	Open: Z300, Z301, Z302, R302, L300, R402*, R400*, WS-2(R)*. Shorted: Z301, Z302, C308, C309, C305, C408*. Defective: 12AT7* (mixer section). Misaligned: Z302.

* This part, located in another section, may cause abnormal indication in this section.

FM Circuits

The following tests are also made with an AM r-f signal generator, using modulated output.

Observe the instructions preliminary to the tests for the AM circuits, with these exceptions: Set the band switch to the FM position. Set the signal-generator frequency to 9.1 mc., and detune to one side or the other until a satisfactory test signal is obtained.

The best indication of satisfactory FM-detector operation is the ability of this circuit to take the alignment properly (see page 11).

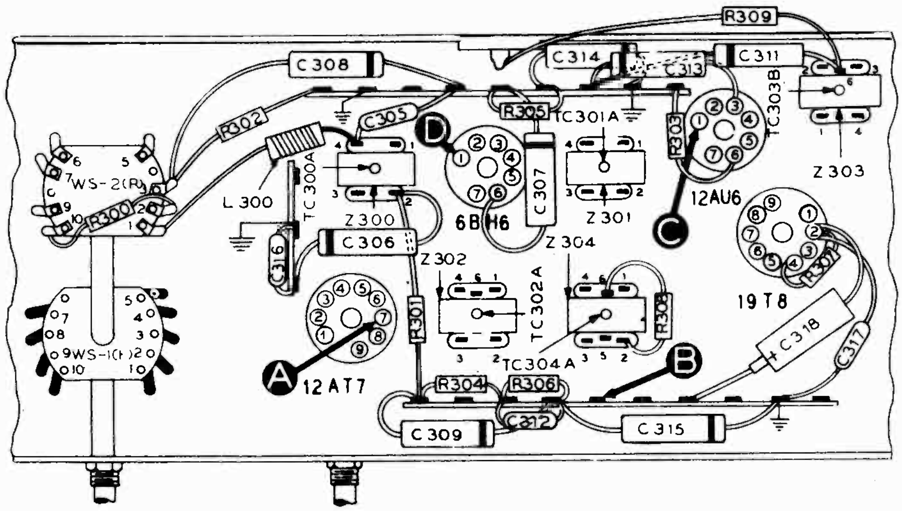


Figure 3. Bottom View, Showing Section 3 Test Points

The parts which were found to be satisfactory for AM operation, with the exception of those indicated in the chart, will usually be satisfactory for FM operation.

If the "NORMAL INDICATION" is obtained in step 1, proced with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits.

FM Chart

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in FM circuits. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 12AU6, 19T8 (diode section). Open: Z301, Z302, Z303, Z304, R304, R307, R309, C318. Shorted: Z301, Z303, C311, C317, C318.
3	D	Loud, clear output with moderate input.	Defective: 6BH6. Open: Z300, Z301, R300, R301, WS-2(R). Shorted: C307, Z301, C306.
4	A	Same as step 1.	Defective: 12AT7*. Open: Z300, C316, C305, WS-2(R)*, C316, R401*. Shorted: C316, Z300.

This part, located in another section, may cause abnormal indication in this section.

MODEL 49-905 PHILCO CORP.

Section 4

TROUBLE SHOOTING

R-F AND CONVERTER CIRCUITS

AM Circuits

For the tests in this section, with the exception of the oscillator test, use an AM r-f signal generator with modulated output. Connect the generator ground lead to B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, set the band switch to the broadcast position, and set the tuning control and the signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in the AM circuits. If the trouble is not revealed by the tests for this section, check the alignment.

FM Circuits

The following tests are also made with an AM r-f signal generator, using modulated output. Observe the instructions preliminary to the tests for the AM circuits with the following exceptions:

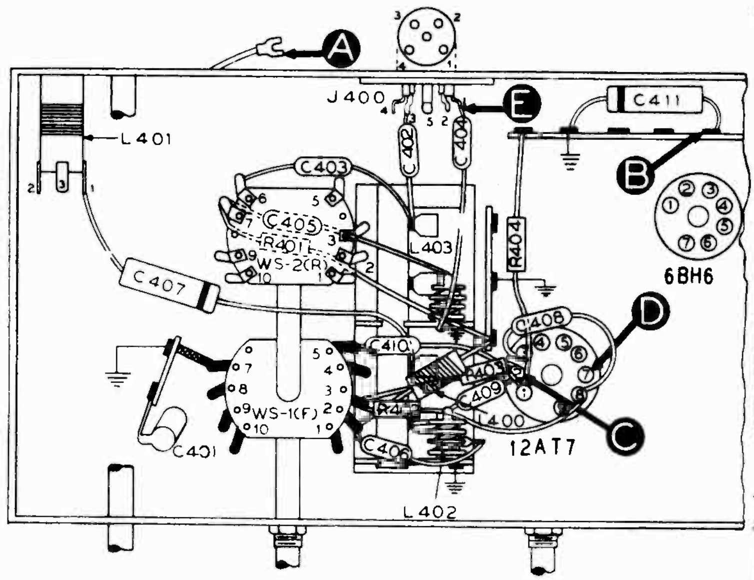


Figure 4. Bottom View, Showing Section 4 Test Points

Set the band switch to the FM position.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in the FM circuits.

AM Chart

STEP	TEST POINT	SIG. GEN. FREQUENCY	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	Tune to signal.	Loud, clear speaker output with weak generator input	Trouble in AM circuits. Isolate by the following tests.
2	C (Osc. test; see note below.)		Tune through range.	Negative 2 to 2.5 volts.	Defective: 12AT7 (osc. section). Open: C410, R404, WS-1(F), R403, L401, C411, C407. Shorted: C409, C410, C407, C411, L401, WS-1(F), C400, C400B.
3	D	1000 kc.	Tune to signal.	Same as step 1.	Defective. 12AT7 (mixer section). Open: R400, R402, WS-2(R). Shorted: WS-2(R), C408.
4	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C402, C403, LA400. Shorted: C400, C400A, LA400.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B-, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 2 of 12AT7), test point C. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage of approximately the value given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

FM Chart

STEP	TEST POINT	SIG. GEN. FREQUENCY	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	100 mc.	Tune to signal.	Loud, clear speaker output with weak generator input	Trouble in FM circuits. Isolate by the following tests.
2	C (Osc. test; see note above.)		Tune through range.	Negative 1 to 1.5 volts.	Defective: 12AT7 (osc. section). Open: C409, C406, L400, C410, L402, WS-1(F). Shorted: C400, C401, L402, C406, C409, C410, L400, WS-1(F).
3	D	100 mc.	Tune to signal.	Same as step 1.	Open: R401, WS-2(R). Shorted: C408, WS-2(R).
4	E	100 mc.	Tune to signal.	Same as step 1.	Open: C404, L403, C405. Shorted: C404, L403, C400, C400C, C405.

PHILCO CORP. MODEL 49-905

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) indicate general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and replacement parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements use only the "Service Part No."

SECTION 1

POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, electrolytic, 3-section	30-2568-10
C100A	Condenser, filter, 40 mf., 150v	Part of C100
C100B	Condenser, filter, 70 mf., 150v	Part of C100
C100C	Condenser, filter, 40 mf., 150v	Part of C100
C101	Condenser, r-f by-pass, 100 mmf.	62-110001001*
C102	Condenser, line by-pass, .04 mf.	45-3500*
C103	Condenser, r-f by-pass, 100 mmf.	62-110001001*
C104	Condenser, line by-pass, .01 mf.	61-0120*
I100	Lamp, pilot, 110 v	34-2068
L100	Coil, r-f choke	32-4111
L101	Coil, r-f choke	32-4111
R100	Resistor, filter, 220 ohms	66-1224340*
R101	Resistor, filter, 470 ohms	66-1474340*
S100	Switch, on-off	Part of R200
W100	Line-cord-and-plug assembly	L-2183*

SECTION 2

AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, electrolytic, cathode by-pass 25 mf., 25v	45-3001
C201	Condenser, tone compensation, .006 mf.	30-4504*
C202	Condenser, d-c blocking, .006 mf.	30-4504*
C203	Condenser, parasitic suppressor, 680 mmf.	60-10685401
C204	Condenser, r-f by-pass, 100 mmf.	62-110001001
C205	Condenser, d-c blocking, .02 mf.	30-4594*
J200	Jack, FM test	27-6180
LS200	Speaker	36-1614
R200	Volume control (with off-on switch), 500,000 ohms	45-5019*
R201	Resistor, grid return, 10 megohms	66-6103340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*
R204	Resistor, cathode bias, 150 ohms	66-1153340*
T200	Transformer, output	Part of LS200
WS-1(F)	Switch-wafer section	Part of 42-1870†

SECTION 3

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed trimmer	Part of Z300
C300B	Condenser, fixed trimmer	Part of Z300
C301A	Condenser, fixed trimmer	Part of Z301
C301B	Condenser, fixed trimmer	Part of Z301
C302A	Condenser, fixed trimmer	Part of Z302
C302B	Condenser, fixed trimmer	Part of Z302
C303A	Condenser, fixed trimmer	Part of Z303
C304A	Condenser, fixed trimmer	Part of Z304
C304B	Condenser, fixed trimmer	Part of Z304
C304C	Condenser, i-f filter	Part of Z304
C304D	Condenser, i-f filter	Part of Z304
C305	Condenser, r-f by-pass, 220 mmf.	62-122001001*
C306	Condenser, r-f by-pass, .01 mf.	61-0120*
C307	Condenser, screen by-pass, .003 mf.	30-4582*
C308	Condenser, plate by-pass, .01 mf.	61-0120*
C309	Condenser, r-f by-pass, .01 mf.	61-0120*
C310	Condenser, screen by-pass, .004 mf.	30-4623
C311	Condenser, r-f by-pass, .01 mf.	61-0120*

SECTION 3 (Continued)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C312	Condenser, r-f by-pass, 100 mmf.	62-110001001*
C313	Condenser, filament r-f by-pass, .01 mf.	61-0120*
C314	Condenser, i-f by-pass, .01 mf.	61-0120*
C315	Condenser, i-f by-pass, .05 mf.	30-4518
C316	Condenser, r-f by-pass, 100 mmf.	62-110001001*
C317	Condenser, r-f by-pass, 100 mmf.	62-110001001*
C318	Condenser, electrolytic, filter, 2 mf., 50v	30-2417-7
L300	Coil, r-f choke	32-4111
R300	Resistor, screen dropping, 1000 ohms	66-2103340*
R301	Resistor, grid return, 1 megohm	66-5103340*
R302	Resistor, plate load, 1000 ohms	66-2103340*
R303	Resistor, screen dropping, 1000 ohms	66-2103340*
R304	Resistor, a-v-c filter, 1 megohm	66-5103340*
R305	Resistor, isolating, 68 ohms	66-0683340*
R306	Resistor, a-v-c return, 1 megohm	66-5103340*
R307	Resistor, FM-detector load, 47,000 ohms	66-3473340*
R308	Resistor, diode load, 47,000 ohms	66-3473340*
R309	Resistor, isolating, 47,000 ohms	66-3473340*
TC300A	Tuning core, FM 1st i-f primary	Part of Z300
TC300B	Tuning core, FM 1st i-f secondary	Part of Z300
TC301A	Tuning core, FM 2nd i-f primary	Part of Z301
TC301B	Tuning core, FM 2nd i-f secondary	Part of Z301
TC302A	Tuning core, AM 1st i-f primary	Part of Z302
TC302B	Tuning core, AM 1st i-f secondary	Part of Z302
TC303A	Tuning core, FM 3rd i-f primary	Part of Z303
TC303B	Tuning core, FM 3rd i-f secondary	Part of Z303
TC304A	Tuning core, AM 2nd i-f primary	Part of Z304
TC304B	Tuning core, AM 2nd i-f secondary	Part of Z304
WS-2(R)	Switch-wafer section	Part of 42-1870†
Z300	Transformer, FM 1st i-f	32-4257
Z301	Transformer, FM 2nd i-f	32-4257-1
Z302	Transformer, AM 1st i-f	32-4258
Z303	Transformer, FM 3rd i-f	32-4310
Z304	Transformer, AM 2nd i-f	32-4240

SECTION 4

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2733
C400A	Condenser, trimmer, AM aerial	Part of C400
C400B	Condenser, trimmer, AM osc.	Part of C400
C400C	Condenser, trimmer, FM aerial	Part of C400
C401	Condenser, trimmer, FM osc.	31-6495-2
C402	Condenser, aerial isolating, 10 mmf.	62-010009001*

REPLACEMENT PARTS LIST (Continued)

SECTION 4 (Continued)

R-F AND CONVERTER CIRCUITS

	Description	Service Part No.
C403	Condenser, isolating, 220 mmf.	62-122001001*
C404	Condenser, isolating, FM aerial, 100 mmf.	62-110001001*
C405	Condenser, d-c blocking, 220 mmf.	62-122001001*
C406	Condenser, d-c blocking, 100 mmf.	62-110001001*
C407	Condenser, d-c blocking, .01 mf.	61-0120*
C408	Condenser, r-f by-pass, 680 mmf.	60-10685401*
C409	Condenser, d-c blocking, 220 mmf.	62-122001001*
C410	Condenser, d-c blocking, 100 mmf.	62-110001001*
C411	Condenser, r-f by-pass, .01 mf.	61-0120*
J400	Jack, FM aerial	27-6214
L400	Coil, r-f choke	32-4111
L401	Coil, AM osc.	32-4153-1
L402	Coil, FM osc.	32-4018-7
L403	Coil, FM aerial	32-4018-8
LA400	Loop aerial	32-4052-21
PL400	Plug, line-cord FM aerial	Part of W100
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, grid return, 22,000 ohms	66-3223340*
R402	Resistor, cathode bias, 1500 ohms	66-2153340*
R403	Resistor, grid return, 22,000 ohms	66-3223340
R404	Resistor; plate load, 8200 ohms	66-2823340
WS-1(F)	Switch-wafer section	Part of 42-1870†
WS-2(R)	Switch-wafer section	Part of 42-1870†

MISCELLANEOUS

Description	Service Part No.
Baffle-and-cloth assembly	40-7535
Cabinet	10714
Back, cabinet	54-7630
Cord, drive (25-ft. spool)	45-8750*
Drive-shaft assembly	76-4034
Knob, tuning	54-4527-1
Knob, band switch	54-4527-4
Knob, volume-on-off	54-4527
Pilot-lamp assembly	76-1179-6
Pointer	54-4599
Scale, dial	54-5011
Socket, miniature (4 required)	27-6226
Socket, 9-pin miniature (2 required)	27-6203-6
Spring, gang drive	56-2617
Window, acetate	54-4595

† 42-1870 is a two-section wafer switch (band switch).

AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be completed before the FM alignment is made.

DIAL POINTER—With tuning-condenser plates fully meshed, adjust dial pointer to coincide with index mark at low-frequency end of dial.

OUTPUT METER—Connect across voice-coil terminals.

AM R-F SIGNAL GENERATOR—Connect as indicated in chart. Use modulated output.

RADIO CONTROLS—Set volume control to maximum, and set band switch to broadcast position.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below 1.25 volts.

FM ALIGNMENT PROCEDURE

Make AM Alignment First

OUTPUT METER—Connect across voice-coil terminals.

ALIGNMENT INDICATOR—Connect negative lead of 20,000-ohms-per-volt meter to pin 2 of 19T8 tube; connect positive lead to B–, test point B, in Section 2. Use 10-volt range.

AM R-F SIGNAL GENERATOR—Generator must have sufficient output to give a reading of 8.5 volts on alignment indicator. Connect ground lead to B–; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS—Set volume control to maximum, and set band switch to FM position. Allow radio and signal generator to operate for at least 15 minutes before making alignment.

NOTE: Check resonance of coils L402 and L403 by inserting each end of a powdered-iron tuning core, such as Philco Part No. 56-6100, into the coils. If the signal strength increases when the iron end is inserted, compress the turns slightly. If the signal strength increases when the brass end is inserted, spread the turns slightly. If the signal strength decreases when either the iron or the brass end is inserted, no further adjustment is necessary. Do not spread or compress turns of coil excessively; only a small change is required at these high frequencies.

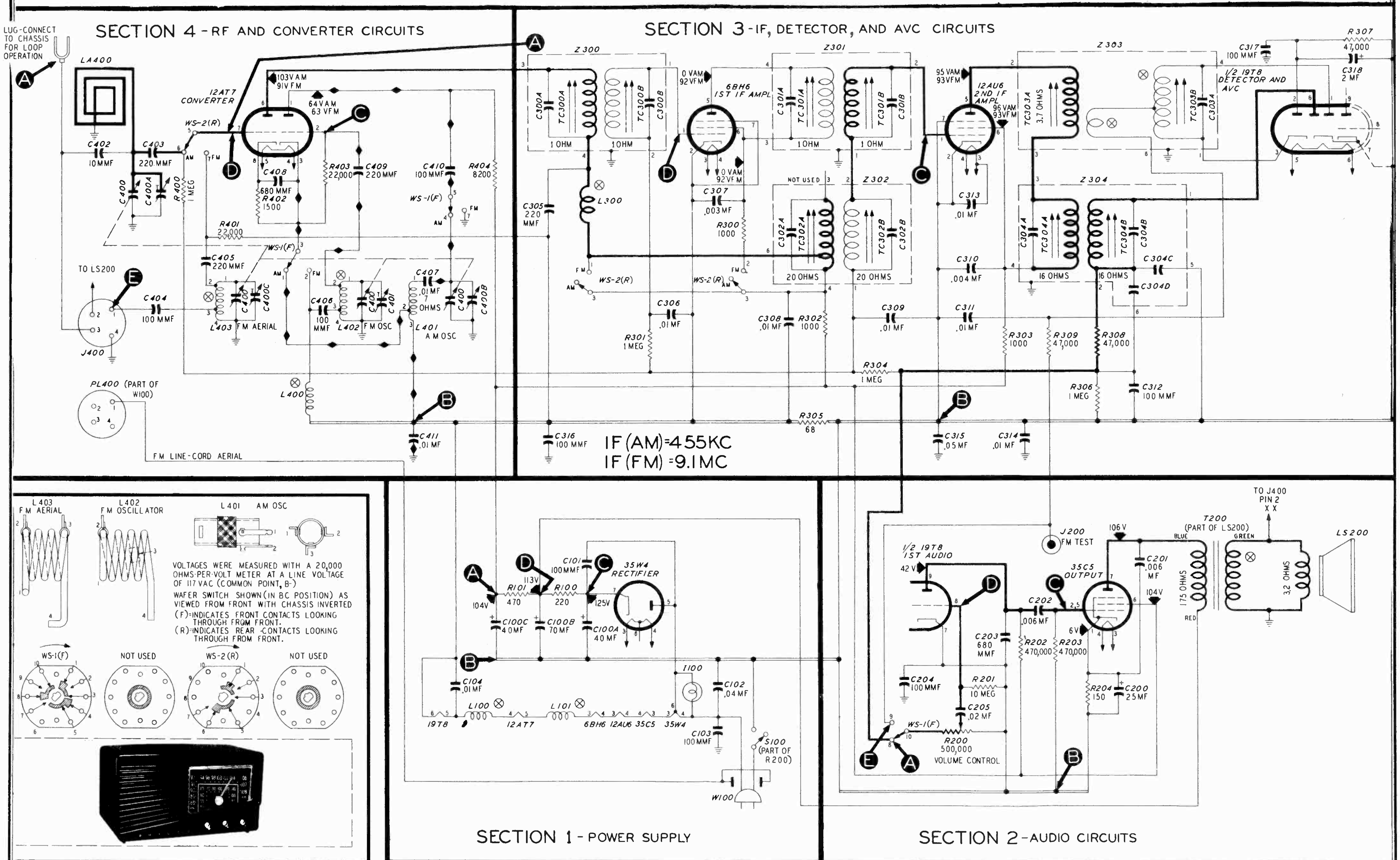


Figure 6. Philco Radio Model 49-905, Sectionalized Schematic Diagram, Showing Test Points

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Ground lead to B-, test point B; output lead through .1-mf. condenser to mixer grid (pin 7 of 12AT7).	455 kc.	540 kc.	Adjust tuning cores, in order given, for maximum output. Do not repeat adjustments.	TC304B—AM 2nd i-f sec. TC304A—AM 2nd i-f pri. TC302B—AM 1st i-f sec. TC302A—AM 1st i-f pri.
2	Radiating loop (See note below.)	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C400B—AM osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C400—AM aerial

NOTE: Make up a six-to-eight-turn, 6-inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop aerial. Make certain that loop aerial is connected to radio.

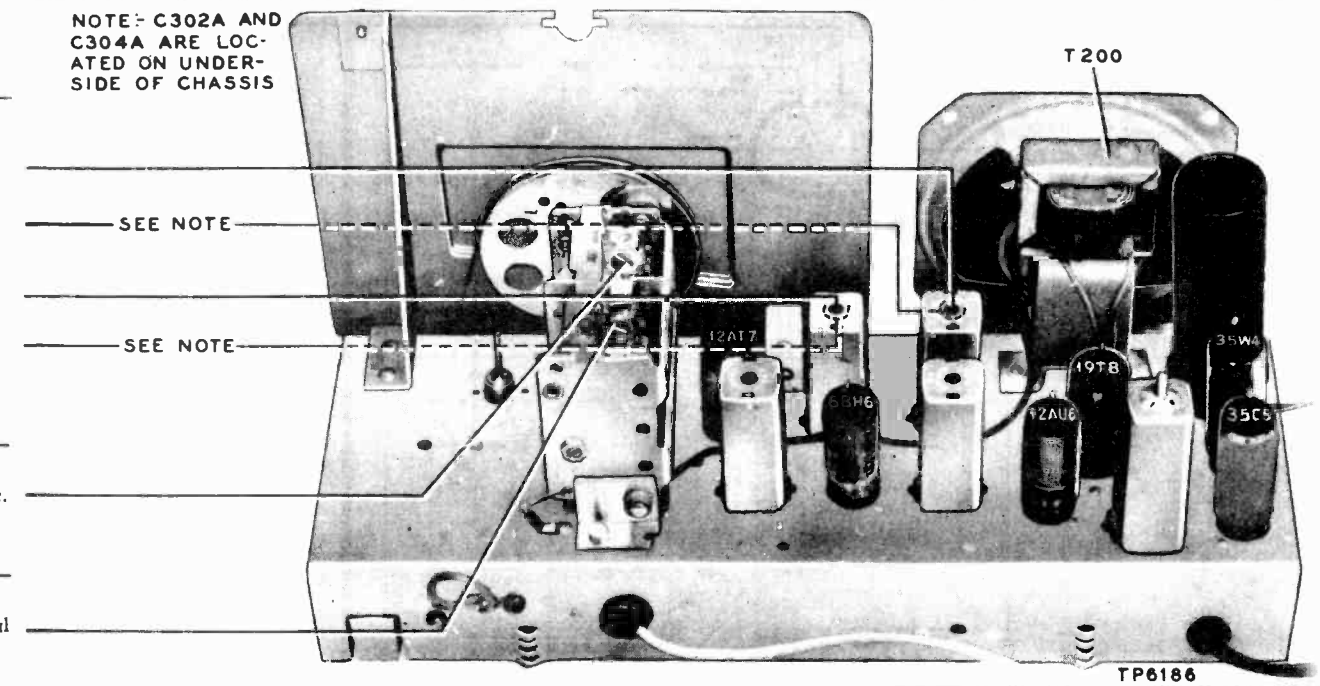


Figure 7. Top View, Showing AM Trimmer Locations

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to pin 1 of 6BH6.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on alignment indicator. Attenuate signal generator to maintain reading of approximately 10 volts. Repeat adjustments until no further improvement is noted. After this step, do not disturb any of these tuning cores, except as directed in step 3.	TC303B—discriminator sec. TC303A—discriminator pri. TC301B—FM 2nd i-f sec. TC301A—FM 2nd i-f pri.
2	Through .1-mf. condenser to pin 7 of 12AT7.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on alignment indicator. Repeat adjustments until no further improvement is noted. Do not disturb these tuning cores after this step.	TC300B—FM 1st i-f sec. TC300A—FM 1st i-f pri.
3	Same as step 2.	9.1 mc.	88 mc.	Adjust tuning core for minimum reading on output meter. This adjustment is critical; repeat to make sure it is correct.	TC303B—discriminator sec.
4	To terminal 1 of J400.	105 mc.	105 mc.	Adjust trimmer for maximum reading on alignment indicator.	C401—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C400C—FM aerial
6	Same as step 4.	92 mc.	92 mc.	Same as step 4.	L402—FM osc. (tracking) LOCATED ON UNDERSIDE OF CHASSIS
7	Same as step 4.	92 mc.	92 mc.	Same as step 4.	L403—FM aerial (tracking) LOCATED ON UNDERSIDE OF CHASSIS
8	Repeat steps 4 through 7 until no further improvement is noted.				

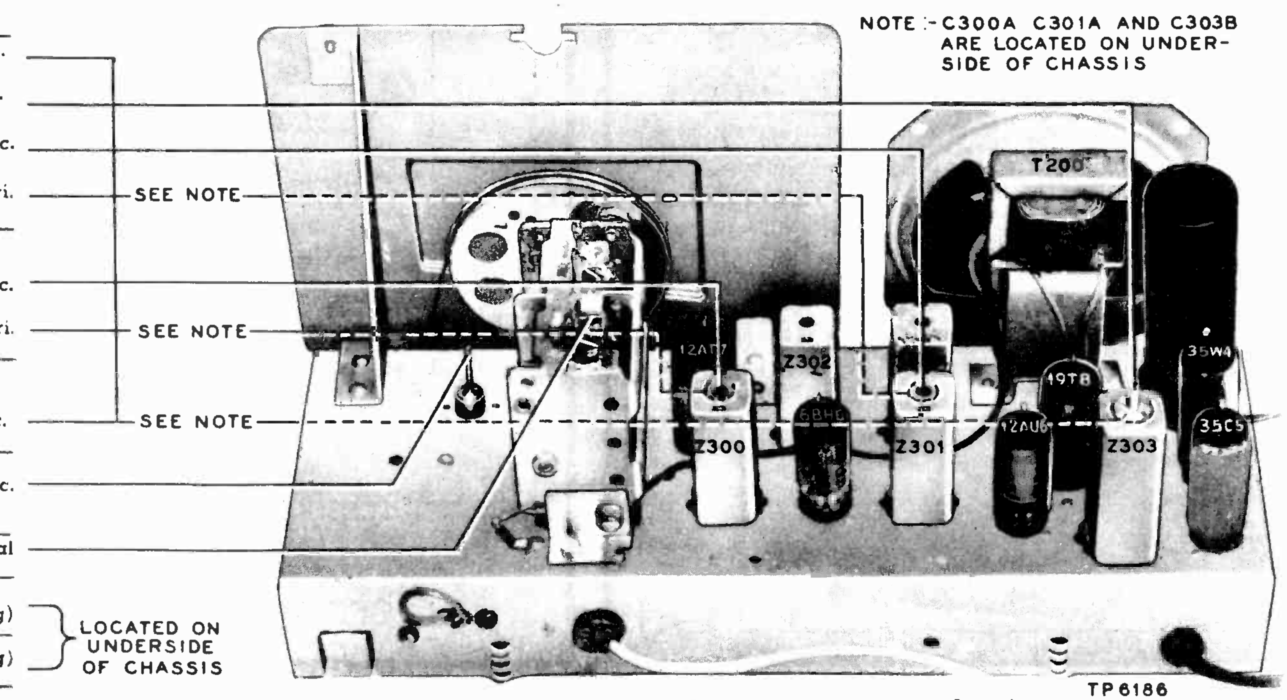
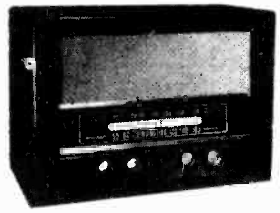


Figure 8. Top View, Showing FM Trimmer Locations

PHILCO CORP.

MODEL 49-909, 49-1101



Circuit Description

Both models are 9-tube superheterodynes designed to provide reception on the standard broadcast band and the FM band. The only electrical difference between the two models is in the broadcast loop aerial; Model 49-909 has a semi-high-impedance loop and a series aerial coil; Model 49-1101 has a low-impedance loop and an aerial transformer. Any other minor differences are indicated in the schematic diagram and the replacement parts list. A built-in line-cord aerial is used for FM reception.

These aerials normally provide adequate signal pickup; if additional pickup is required, Philco Dipole Aerial, Part No. 45-1462, may be used. When connecting the dipole aerial, disconnect the black lead from terminal 2 of TB400, and attach it to pin 1 of the dipole-aerial plug which fits into J400. No additional coupler is required.

To eliminate complicated switching and to provide greater stability and gain on both bands, separate converter tubes are used for broadcast and FM reception. A 12AU6 high-gain pentode is used as a tuned-r-f amplifier on the FM band. The output of this stage is fed to a 14F8 dual triode, which functions as the converter for the FM signal. A 12AU7 dual triode is used as the converter for the broadcast signal. Band-switching is accomplished by means of a single-wafer switch, which connects the B+ voltage to the proper mixer plate.

6BJ6 tubes are used in the two i-f-amplifier stages. Two sets of i-f transformers are used; one set is tuned to 455 kc. for standard broadcast, and the other set is tuned to 9.1 mc. for FM. The use of two sets of transformers makes better shielding possible, so that undesirable beat signals and interaction between transformers are eliminated.

Two diode sections of the 19T8 triple-diode-triode are used in a ratio-detector circuit for the detection of FM signals. The other diode section is used in a half-wave rectifier circuit for detection of standard-broadcast signals and to provide a-v-c voltage.

The triode section of the 19T8 is employed as the first audio amplifier, and is resistance-coupled to the 50L6GT output tube, which supplies an audio output of approximately three watts to the PM dynamic speaker.

The d-c operating voltages are provided by two 117Z3 rectifier tubes in a half-wave doubler circuit. The output is filtered by a resistance-capacitance network.

SPECIFICATIONS

CABINET
- Model 49-909 .... Table model, wood, mahogany
- Model 49-1101 .... Console, wood, mahogany

CIRCUIT .... 9-tube superheterodyne

FREQUENCY RANGES
- Broadcast .... 540—1620 kc.
- FM .... 88—108 mc.

AUDIO OUTPUT .... 3 watts

OPERATING VOLTAGE . 105—120 volts, 50/60 cycles, a.c.

POWER CONSUMPTION .... 45 watts

AERIALS .... Built-in loop (semi-high-impedance for Model 49-909; low-impedance for Model 49-1101); FM line-cord aerial; provision for external aerial

INTERMEDIATE FREQUENCY
- AM .... 455 kc.
- FM .... 9.1 mc.

PHILCO TUBES (9) ..... 12AU6, 12AU7, 14F8, 6BJ6(2), 19T8, 50L6GT, 117Z3(2)

PANEL LAMP ..... 110-volt, screw-base, Part No. 34-2477

TP-5856 & TP-6234A

MODEL 49-909,
49-1101

PHILCO CORP.

Philco TROUBLE-SHOOTING Procedure

For rapid trouble shooting, the radio circuit is divided into four sections, with test points specified for each section; these sections and test points are indicated in the schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

Preliminary Checks

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.

2. Measure the resistance between B+ (lug 1 of R101) and B—, test point B. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1875 ohms, check condensers C104A, C104B, and C104C for leakage or shorts. The resistance value given is much lower than normal, and is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage checks of Section 1 (power supply) are performed.

3. If the 50L6GT or the 6BJ6 1st i-f amplifier is burned out, check C314 for a short before installing a new tube.

Important!

To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical positions as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be changed.

Section 1 TROUBLE SHOOTING

POWER SUPPLY

For the tests in this section, use a d-c voltmeter. Connect the negative lead to B—, test point B; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn on the power, and set the volume control to minimum. Set the tone control for minimum treble response (fully clockwise), and set the band switch to the broadcast position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

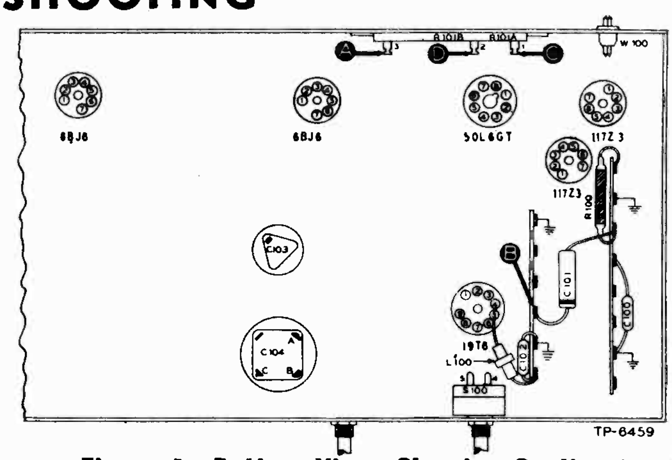


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	120 volts		Trouble in this section. Isolate by the following tests.
2	C	210 volts	No voltage	Defective: 117Z3. Open: W100, S100, R100, C103. Shorted: C101, C104A.
			Low voltage	Defective: 117Z3. Leaky: C104A, C103. Shorted: C103, C104B. Open: C104A.
			High voltage	Open: R101A.
3	D	190 volts	No voltage	Open: R101A. Shorted: C104B.
			Low voltage	Leaky: C104B. Shorted: C104C. Open: C104B.
			High voltage	Open: R101B, T200*, R204*. Defective: 50L6GT.
4	A	120 volts	No voltage	Open: R101B. Shorted: C104C.
			Low voltage	Leaky: C104C. Shorted: C317*, C311*.

Listening Test: Abnormal hum may be caused by open C104A, C104B, or C104C.

* This part, located in another section, may cause abnormal indication in this section.

Section 2

TROUBLE SHOOTING

AUDIO CIRCUITS

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, turn the tone control for maximum treble response (fully counterclockwise), and set the band switch to the broadcast position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate signal-generator input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 50L6GT. Shorted: LS200, T200. Open: R203, R204, C205, LS200, T200. Shorted or leaky: C203, C205, C207.
3	D	Same as step 1.	Defective: 19T8. Open: R205, R202, C203, R207, R201. Shorted or leaky: C202, C204 (rotate R201 through range).
4	A	Same as step 1.	Open: R200 (rotate through range), C200, C201, R206 (rotate R201 through range). Shorted or leaky: C200, C201, C206 (rotate R201 through range), C305D*.
Listening Test: Distortion may be caused by leaky C200, C201, C202, or C203.			

* This part, located in another section, may cause abnormal indication in this section.

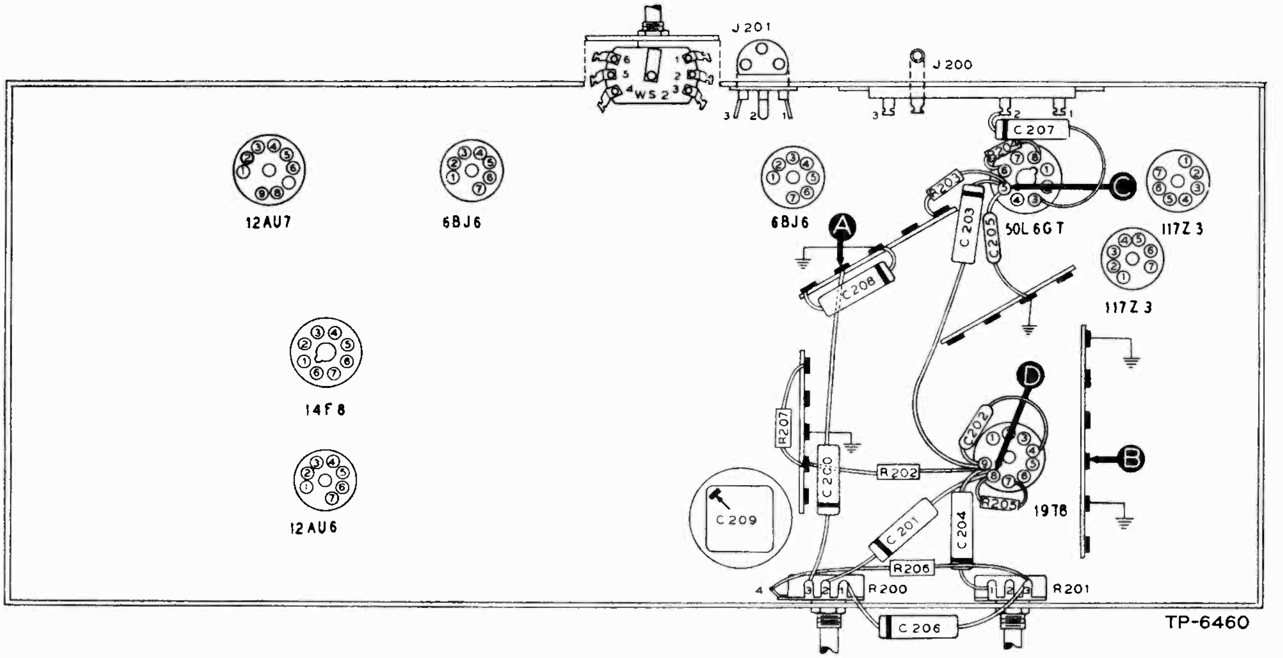


Figure 2. Bottom View, Showing Section 2 Test Points

Section 3

TROUBLE SHOOTING

I-F, DETECTOR, AND A-V-C CIRCUITS—AM CIRCUITS

For the following tests, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the tone control for maximum treble response (fully counterclockwise). Set the band switch to the broadcast position, and rotate the tuning control until the tuning condenser is fully meshed.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits; if not, isolate and correct the trouble in the AM circuits.

To provide a complete i-f-amplifier check, test point A for the AM i-f circuits is placed at the grid of the AM mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

MODEL 49-909,
49-1101

PHILCO CORP.

Section 3 (Cont.)

TROUBLE SHOOTING

I-F, DETECTOR, AND A-V-C CIRCUITS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal-generator input.	Trouble in AM circuits. Isolate by the following tests.
2	D	Loud, clear output with moderate input.	Defective: 19T8, 6BJ6 (2nd i-f amplifier). Open: Z302, Z303, Z304, Z305, R307, WS2, R308, R309, R311, C305C, C305D, WS1, R310. Shorted or leaky: C303B, C315, C316, C317, C324, C305A, C305B, C305C, C305D. Shorted: Z303, Z305.
3	E	Same as step 2.	Defective: 6BJ6 (1st i-f amplifier). Open: Z300, Z301, R301, R305, R306, R302, R304, Z302, Z303. Shorted or leaky: C308, C313, C311. Shorted: Z303.
4	A	Same as step 1.	Defective: 12AU7*. Open: R409*, L404*, R303, R300, Z301, R411*, WS1. Shorted or leaky: C410*, C307. Shorted: Z301.

Listening Test: Hum and distortion may be caused by shorted or leaky C100*, C310, C314, C320, C312, C102*, C420*, C421*, C422*, C423*, C324, C325 or C323.

* This part, located in another section, may cause abnormal indication in this section.

FM CIRCUITS

For the following tests, use an AM r-f signal generator, with modulated output. Set the generator frequency to 9.1 mc. and detune to one side or the other until a satisfactory test signal is obtained. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the tone control for maximum treble response (fully counterclockwise). Set the band switch to the FM position, and rotate the tuning control until the tuning condenser is fully meshed.

The most satisfactory check on the operation of the discriminator is the ability of the circuit to take proper alignment, as directed under "ALIGNMENT PROCEDURE."

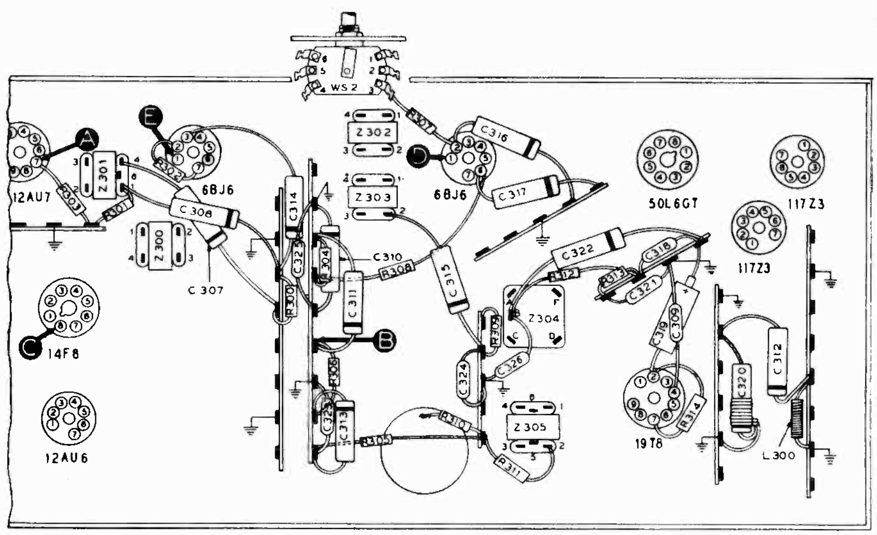


Figure 3. Bottom View, Showing Section 3 Test Points TP-6461

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits.

The parts which were found to be satisfactory for AM operation, with the exception of those indicated in the following chart, will usually be satisfactory for FM operation.

To provide a complete i-f-amplifier check, test point A for the FM i-f circuits is placed at the grid of the FM mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	C	Loud, clear speaker output with weak signal-generator input.	Trouble in FM circuits. Isolate by the following tests.
2	D	Loud, clear output with strong input.	Defective: 6BJ6 (2nd i-f amplifier), 19T8, Z304. Misaligned: Z304. Open: R312, R313, R314, C320, C319, C318, C304, C306. Shorted or leaky: C319, C320, C304, C306, C318, C326.
3	E	Loud, clear output with moderate input.	Defective: 6BJ6 (1st i-f amplifier). Misaligned: Z302. Open: Z302. Shorted: Z302.
4	C	Same as step 1.	Defective: 14F8*. Open: R300, R406*, R405*, R407*, L408*, Z300, WS1. Shorted or leaky: C418*, C419*.

* This part, located in another section, may cause abnormal indication in this section.

PHILCO CORP.

MODEL 49-909, 49-1101

Section 4

TROUBLE SHOOTING

R-F AND CONVERTER CIRCUITS

AM CIRCUITS

For the following tests, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the tone control for maximum treble response (fully counterclockwise). Set the band switch to the broadcast position, and set the tuning control and the signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits, if not, isolate and correct the trouble in the AM circuits.

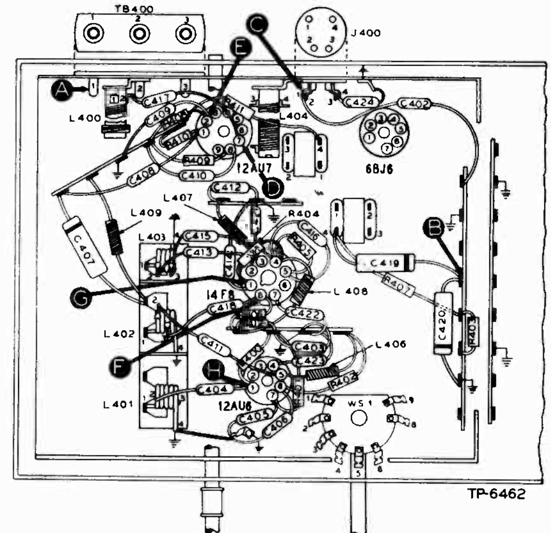


Figure 4. Bottom View, Showing Section 4 Test Points

FM CIRCUITS

For the following tests, with the exception of the oscillator test, use an AM r-f signal generator with modulated output. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the tone control for maximum treble response (fully counterclockwise). Set the band switch to the FM position, and set the tuning control and the signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1, isolate and correct the trouble in the FM circuits. If the trouble is not revealed by the tests for these circuits, check the alignment.

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	1000 kc.	Loud, clear speaker output with weak signal-generator input.	Trouble in AM circuits. Isolate by the following tests.
2	D	1000 kc.	1000 kc.	Loud, clear output with moderate input.	Defective: 12AU7, oscillator circuit. Shorted: C410, C417, WS1. Open: R409, R411, R303*, WS2.
3	E to B (Osc. test, see note below.)		Rotate through range.	Negative 2 to 3 volts.	Defective: 12AU7. Open: R408, R410, L404, C408, C407, L409. Shorted: C408, C409, C400, C401B.
4	A	1000 kc.	1000 kc.	Same as step 1.	Open: L400, C417, L405. Shorted: C400, C401A, C425.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B—, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 2 of 12AU7), test point E. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage of approximately the value given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	C	95 mc.	Tune to signal.	Loud, clear speaker output with weak signal-generator input.	Trouble in FM circuits. Isolate by the following tests.
2	F	95 mc.	Tune to signal.	Loud, clear output with moderate input.	Defective: 14F8, oscillator circuit. Open: R405, R406, R407, L408, C418, L402. Shorted: C418, C416, C400, C400B, C419, L402.
3	G to B (Osc. test, see note below.)		Tune through range.	Negative 1.2 to 2 volts.	Defective: 14F8. Open: R404, L407, R403, C413, C415, L403. Shorted: C400, C400C, C413, C415, C414, C412, L403, L407.
4	H	95 mc.	Tune to signal.	Same as step 1.	Defective: 12AU6. Open: L402, L406, R400, R401, R402, C411, C418, R412. Shorted: C405, C404, C406, C411, C400, C400B, C404, L402.
5	C	95 mc.	Tune to signal.	Same as step 1.	Open: C402, L401, C404, R412. Shorted: C404, C400, C400A, L401.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to B—, test point B; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 1 of 14F8), test point G. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltage of approximately the value given in the chart. (measured with 20,000-ohms-per-volt meter) throughout the tuning range.

MODEL 49-909, 49-1101

PHILCO CORP.

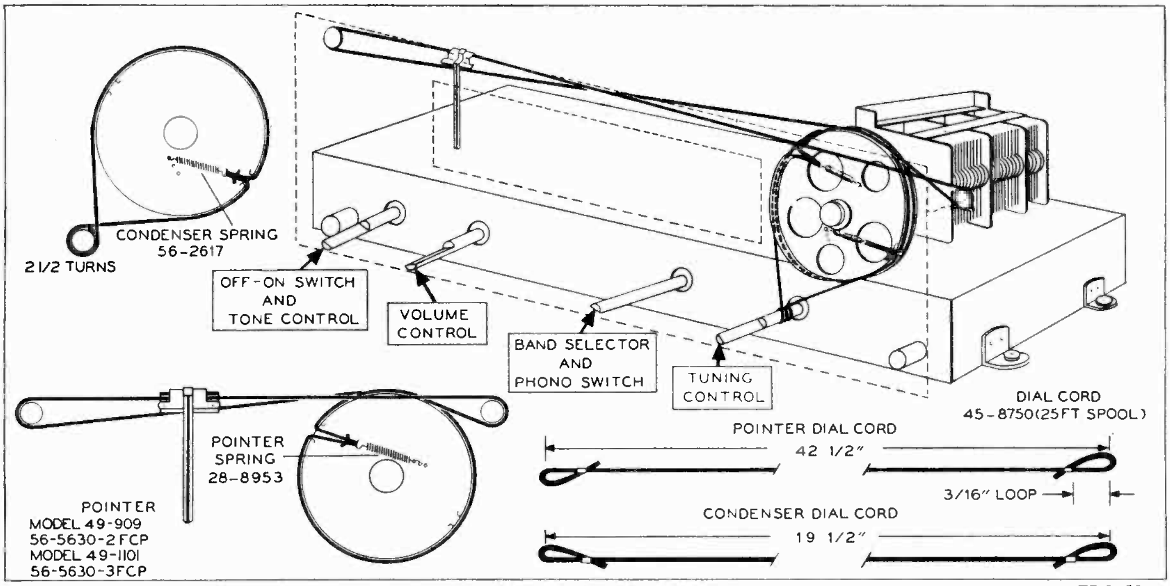


Figure 5. Drive-Cord Installation Details

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1
POWER SUPPLY CIRCUITS

Reference Symbol	Description	Service Part No.
C100	Condenser, r-f by-pass, 100 mmf.	62-110009001
C101	Condenser, line filter, .04 mf.	45-3500-2*
C102	Condenser, r-f by-pass, 100 mmf.	62-110009001
C103	Condenser, electrolytic, voltage doubler, 40 mf., 200 v.	30-2568-11
C104	Condenser, electrolytic, 4-section	30-2568-24
C104A:	Condenser, filter, 40 mf., 250 v.	Part of C104
C104B:	Condenser, filter, 40 mf., 250 v.	Part of C104
C104C:	Condenser, filter, 20 mf., 250 v.	Part of C104
I100	Lamp, pilot, 110 v., screw-base	34-2605
L100	Choke, r-f, filament by-pass	32-4143-4
R100	Resistor, current-limiting, 25 ohms	33-1334-5
R101	Resistor, filter, 2-section	33-3435-20
R101A:	Resistor, filter, 180 ohms	Part of R101
R101B:	Resistor, filter, 3800 ohms	Part of R101
S100	Switch, power on-off	Part of R201
W100	Line-cord-and-plug assembly (including FM line aerial)	41-3755-19*

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .02 mf.	61-0108*
C201	Condenser, d-c blocking, .006 mf.	45-3500-7*
C202	Condenser, plate by-pass, 100 mmf.	62-110009001
C203	Condenser, d-c blocking, .006 mf.	45-3500-7*
C204	Condenser, tone compensation, .006 mf.	45-3500-7*
C205	Condenser, r-f by-pass, 100 mmf.	62-110009001
C206	Condenser, bass compensation, .01 mf.	61-0120*
C207	Condenser, tone compensation, .006 mf.	45-3500-7*
C208	Condenser, r-f by-pass, .01 mf.	61-0120*
C209	Condenser, electrolytic, filter, 10 mf., 250 v.	Part of C104
J200	Jack, FM test	27-6180
J201	Jack, accessory input	27-6126
LS200	Speaker, permanent-magnet	
	Model 49-909	36-1629
	Model 49-1101	36-1626-1
R200	Volume control, 2 megohms	33-5535-17
R201	Tone control (with power on-off switch), 4 megohms	33-5538-34
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*

SECTION 2 (Cont.)
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R204	Resistor, cathode bias, 150 ohms	66-1153340*
R205	Resistor, grid return, 10 megohms	66-6103340*
R206	Resistor, tone compensation, 33,000 ohms	66-3333340*
R207	Resistor, plate decoupling, 100,000 ohms	66-4103340
T200	Transformer, output	32-8242
WS2	Switch-wafer section	Part of 42-1745-2†

† 42-1745-2 Switch, accessory.

SECTION 3
I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C300A	Condenser, shunt	Part of Z300
C300B	Condenser, shunt	Part of Z300
C301A	Condenser, shunt	Part of Z301
C301B	Condenser, shunt	Part of Z301
C302A	Condenser, shunt	Part of Z302
C302B	Condenser, shunt	Part of Z302
C303A	Condenser, shunt	Part of Z303
C303B	Condenser, shunt	Part of Z303
C304	Condenser, shunt, 68 mmf.	Part of Z304
C305A	Condenser, shunt	Part of Z305
C305B	Condenser, shunt	Part of Z305
C305C	Condenser, a-v-c filter	Part of Z305
C305D	Condenser, a-v-c filter	Part of Z305
C306	Condenser, shunt, 5 mmf., Part of Z304	30-1224-5
C307	Condenser, plate decoupling, .01 mf.	61-0120*
C308	Condenser, a-v-c by pass, .01 mf.	61-0120*
C309	Condenser, r-f by-pass, 100 mmf.	62-110009001
C310	Condenser, r-f by-pass, .05 mf.	61-0122*
C311	Condenser, decoupling, .006 mf.	45-3500-7*
C312	Condenser, r-f by-pass, .03 mf.	45-3500-1*
C313	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C314	Condenser, r-f by-pass, .01 mf.	61-0120*
C315	Condenser, plate by-pass, .01 mf.	61-0120*
C316	Condenser, cathode by-pass, .01 mf.	61-0120*
C317	Condenser, screen by-pass, .01 mf.	61-0120*
C318	Condenser, decoupling, 1500 mmf.	62-215001001
C319	Condenser, electrolytic, filter, FM detector, 2 mf., 50 v.	30-2417-7
C320	Condenser-and-choke assembly, .05 mf.	39-9851-6
C321	Condenser, r-f by-pass, 100 mmf.	62-110009001
C322	Condenser, compensating, .01 mf.	61-0120*
C323	Condenser, r-f by-pass, 100 mmf.	62-110009001

PHILCO CORP.

MODEL 49-909, 49-1101

REPLACEMENT PARTS LIST (Cont.)

SECTION 3 (Cont.)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
C324	Condenser, r-f by-pass, 100 mmf.	62-110009001
C325	Condenser, r-f by-pass, 100 mmf.	62-110009001
C326	Condenser, r-f by-pass, 100 mmf.	62-110009001
L300	Choke, r-f by-pass	32-4061-2
R300	Resistor, decoupling, 68 ohms	66-0683340*
R301	Resistor, grid return, 1 megohm	66-5103340*
R302	Resistor, cathode bias, 68 ohms	66-0683340*
R303	Resistor, grid return, 1 megohm	66-5103340*
R304	Resistor, decoupling, 1000 ohms	66-2103340*
R305	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R306	Resistor, isolating, 68 ohms	66-0683340*
R307	Resistor, cathode bias, 120 ohms	66-1123340*
R308	Resistor, screen dropping, 1000 ohms	66-2103340*
R309	Resistor, plate decoupling, 2200 ohms	66-2223340*
R310	Resistor, diode load, 330,000 ohms	66-4333340*
R311	Resistor, diode load, 47,000 ohms	66-3473340*
R312	Resistor, decoupling, 47,000 ohms	66-3473340*
R313	Resistor, decoupling, 100,000 ohms	66-4103340*
R314	Resistor, FM-detector load, 47,000 ohms	66-3473340*
WS1	Switch-wafer section	Part of 42-1834-2‡
WS2	Switch-wafer section	Part of 42-1745-2†
TC300A	Tuning core, primary, 1st FM i-f trans.	Part of Z300
TC300B	Tuning core, secondary, 1st FM i-f trans.	Part of Z300
TC301A	Tuning core, primary, 1st AM i-f trans.	Part of Z301
TC301B	Tuning core, secondary, 1st AM i-f trans.	Part of Z301
TC302A	Tuning core, primary, 2nd FM i-f trans.	Part of Z302
TC302B	Tuning core, secondary, 2nd FM i-f trans.	Part of Z302
TC303A	Tuning core, primary, 2nd AM i-f trans.	Part of Z303
TC303B	Tuning core, secondary, 2nd AM i-f trans.	Part of Z303
TC304A	Tuning core, primary, 3rd FM i-f trans.	Part of Z304
TC304B	Tuning core, secondary, 3rd FM i-f trans.	Part of Z304
TC305A	Tuning core, primary, 3rd AM i-f trans.	Part of Z305
TC305B	Tuning core, secondary, 3rd AM i-f trans.	Part of Z305
Z300	Transformer, 1st FM i-f	32-4257
Z301	Transformer, 1st AM i-f	32-4258
Z302	Transformer, 2nd FM i-f	32-4257-1
Z303	Transformer, 2nd AM i-f	32-4160-3
Z304	Transformer, 3rd FM i-f	32-4261-1
Z305	Transformer, 3rd AM i-f	32-4240-2

SECTION 4

R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning gang	31-2724-3
C400A:	Condenser, trimmer, FM aerial	Part of C400
C400B:	Condenser, trimmer, FM r-f	Part of C400
C400C:	Condenser, trimmer, FM oscillator	Part of C400
C401	Condenser, trimmer, 2-section	31-6476-18
C401A:	Condenser, trimmer, BC aerial	Part of C401
C401B:	Condenser, trimmer, BC oscillator	Part of C401
C402	Condenser, aerial coupling, 100 mmf.	62-110001011
C403	Condenser, r-f by-pass, 100 mmf.	62-110001001
C404	Condenser, blocking, 51 mmf.	62-051009001
C405	Condenser, cathode by-pass, 100 mmf.	62-110001011
C406	Condenser, screen by-pass, 100 mmf.	62-110001001
C407	Condenser, isolating, .01 mf.	61-0120*
C408	Condenser, blocking, 100 mmf.	62-110009001
C409	Condenser, r-f by-pass, 220 mmf.	62-122001001
C410	Condenser, cathode by-pass, 1500 mmf.	62-215001001
C411	Condenser, d-c blocking, 51 mmf.	62-051009001
C412	Condenser, r-f by-pass, 1500 mmf.	62-215001001
C413	Condenser, d-c blocking, 220 mmf.	62-122001001
C414	Condenser, r-f by-pass, 51 mmf.	62-051009001
C415	Condenser, d-c blocking, 220 mmf.	62-122001001
C416	Condenser, cathode by-pass, 100 mmf.	62-110001001
C417	Condenser, isolating, 100 mmf.	62-110001001
C418	Condenser, d-c blocking, 100 mmf.	62-110001001
C419	Condenser, plate decoupling, .01 mf.	61-0120*
C420	Condenser, r-f by-pass, .03 mf.	45-3500-1*
C421	Condenser, r-f by-pass, 100 mmf.	62-110001001

† 42-1745-2 Switch, accessory.
‡ 42-1834-2 Switch, band, BC-FM.

SECTION 4 (Cont.)

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C422	Condenser, r-f by-pass, 100 mmf.	62-110001001
C423	Condenser, r-f by-pass, 100 mmf.	62-110001001
C424	Condenser, aerial coupling, 100 mmf.	62-110001001
C425	Condenser	
	Model 49-909—aerial coupling, 10 mmf.	62-010009001
	Model 49-1101—fixed trimmer, 10 mmf.	62-010009001
L400	Coil, BC aerial	
	Model 49-909	32-4217-1
	Model 49-1101	32-4033-10
L401	Coil, FM aerial	32-4158-1
L402	Coil, FM r-f	32-4159-1
L403	Coil, FM oscillator	32-4018-5
L404	Coil, BC oscillator	32-4221-1
L405	Coil, r-f choke	32-4061-2
L406	Coil, FM r-f plate load	32-4061-2
L407	Coil, FM oscillator plate load	32-4061-2
L408	Coil, r-f choke	32-4061-2
L409	Coil, r-f choke	32-4061-2
LA400	Loop aerial	
	Model 49-909	32-4052-27
	Model 49-1101	76-3583-5
J400	FM aerial socket	27-6214-1
PL400	Plug, FM aerial	Part of W100
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, cathode bias, 100 ohms	66-1103340*
R402	Resistor, screen dropping, 10,000 ohms	66-3103340*
R403	Resistor, plate decoupling, 4700 ohms	66-2473340*
R404	Resistor, grid return, 15,000 ohms	66-3153340*
R405	Resistor, cathode bias, 2200 ohms	66-2223340*
R406	Resistor, grid return, 10,000 ohms	66-3103340*
R407	Resistor, plate decoupling, 10,000 ohms	66-3103340*
R408	Resistor, grid return, 15,000 ohms	66-3153340*
R409	Resistor, cathode bias, 3300 ohms	66-2333340*
R410	Resistor, plate load, 15,000 ohms	66-3153340*
R411	Resistor, plate decoupling, 15,000 ohms	66-3153340*
R412	Resistor, isolating, 68 ohms	66-0683340*
TB400	Terminal panel, aerial	38-9942
WS1	Switch-wafer section	Part of 42-1834-2‡

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Parts	
Bezel, Model 49-1101	56-5855FCP
Cabinet (less dial scale)	
Model 49-909	10722
Model 49-1101	10701A
Cabinet back	
Model 49-909	54-7635
Model 49-1101	54-7640
Dial scale	
Model 49-909	54-5025
Model 49-1101	54-5027
Strap, scale mounting (2 required)	56-4756FE11
Dial-backplate assembly	76-3918
Dial cord (25-foot spool)	45-8750*
Diffusing panel	54-7593
Pointer	
Model 49-909	56-5630-2FCP
Model 49-1101	56-5630-3FCP
Spring, pointer	28-8953
Spring, gang	56-2617
Dial drive-shaft assembly	76-3479-1
Knob, control (4 required)	
Model 49-909	54-4488-1
Model 49-1101	54-4486
Knob, accessory switch	27-4809
Socket assembly, pilot lamp	27-6233
Bracket-and-clip assembly, pilot lamp	76-3919
Socket, 9-pin miniature	27-6203-5
Socket, 8-pin Loktal	27-6138*
Socket, 7-pin miniature	27-6226

‡ Switch, band, BC-FM.

MODEL 49-909,
49-1101

PHILCO CORP.

ALIGNMENT OF AM CIRCUITS

Make alignment with loop aerial connected to radio. The AM alignment should be completed before the FM alignment is made.

DIAL POINTER—With tuning condenser fully meshed, adjust dial pointer to coincide with index mark at low-frequency end of dial. See figure 7.

OUTPUT METER—Connect between terminal 3 (voice-coil connection) of aerial terminal panel TB400 and chassis.

AM SIGNAL GENERATOR—Connect as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to hold radio output below 1.25 volts, as read on output meter.

CONTROLS—Set volume control to maximum, turn tone control for maximum treble response (fully counterclockwise), and set band switch to broadcast position.

ALIGNMENT OF FM CIRCUITS

Align the AM circuits first.

OUTPUT METER—Connect between terminal 3 (voice-coil connection) of aerial terminal panel TB400 and chassis.

ALIGNMENT INDICATOR—Connect negative lead of a 20,000-ohms-per-volt, d-c voltmeter to pin 2 of 19T8 tube; connect positive lead to B—, test point B in Section 2. Use 10-volt range.

AM SIGNAL GENERATOR—Generator must have sufficient output to give a reading of at least 8.5 volts on alignment indicator. Connect generator ground lead to B—, test point B; connect output lead as indicated in chart. Use modulated output.

CONTROLS—Same as for alignment of AM circuits, except set band switch to FM position.

Allow radio and signal generator to warm up for at least 15 minutes before starting alignment.

NOTE: Check resonance of circuits using coils L401, L402, and L403 by inserting each end of a powdered-iron tuning core, such as Philco Part No. 56-6100, in the coil. If the signal strength increases when the iron end is inserted, compress the turns slightly. If the signal strength increases when the threaded brass end is inserted, spread the turns slightly. If the signal strength decreases when either the iron or the brass end is inserted, no adjustment is necessary. Do not spread or compress the turns of the coil excessively; only a small change is required at these high frequencies.

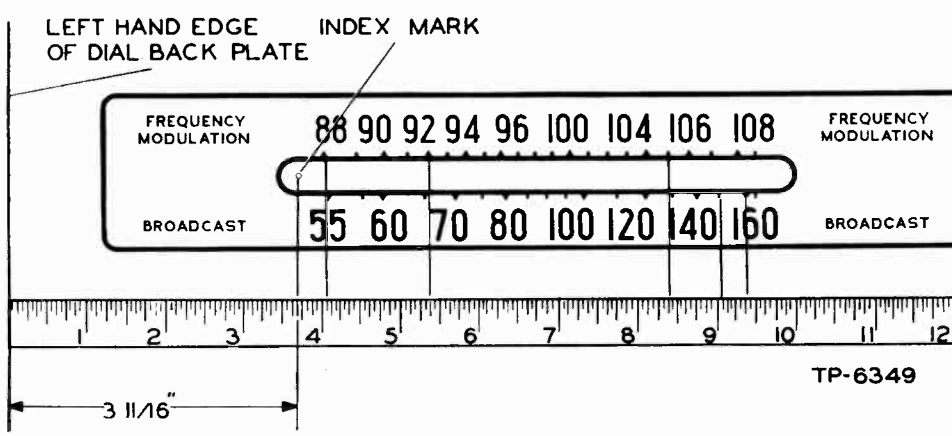


Figure 7. Dial-Backplate Calibration Measurements

PHILCO CORP.

MODEL 49-909, 49-1101

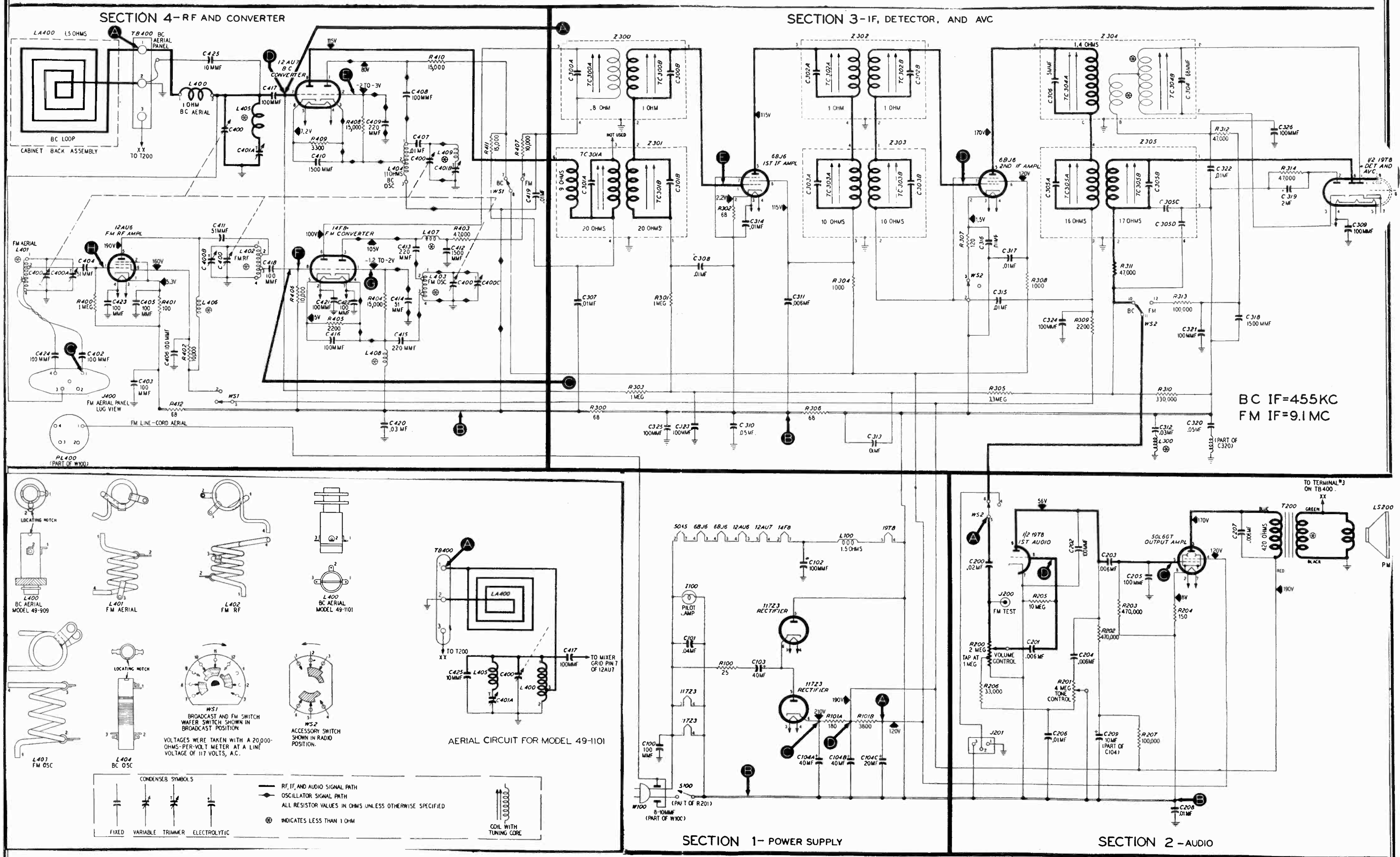


Figure 6. Philco Radio Models 49-909 and 49-1101, Sectionalized Schematic Diagram, Showing Test Points

MODEL 49-909,
49-1101

PHILCO CORP.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Ground lead to B—, test point B; output lead through .1-mf. condenser to terminal 1 of TB400.	455 kc.	540 kc.	Adjust each trimmer, in order given, for maximum output. Do not repeat adjustments.	TC305B—3rd i-f sec. TC305A—3rd i-f pri. TC303B—2nd i-f sec. TC303A—2nd i-f pri. TC301B—1st i-f sec. TC301A—1st i-f pri.
2	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust for maximum output.	C401B—BC osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C401A—BC aerial

RADIATING LOOP: Make up a six-to-eight-turn, 6-inch-diameter loop, using insulated wire; connect to the signal-generator leads and place near the radio loop.

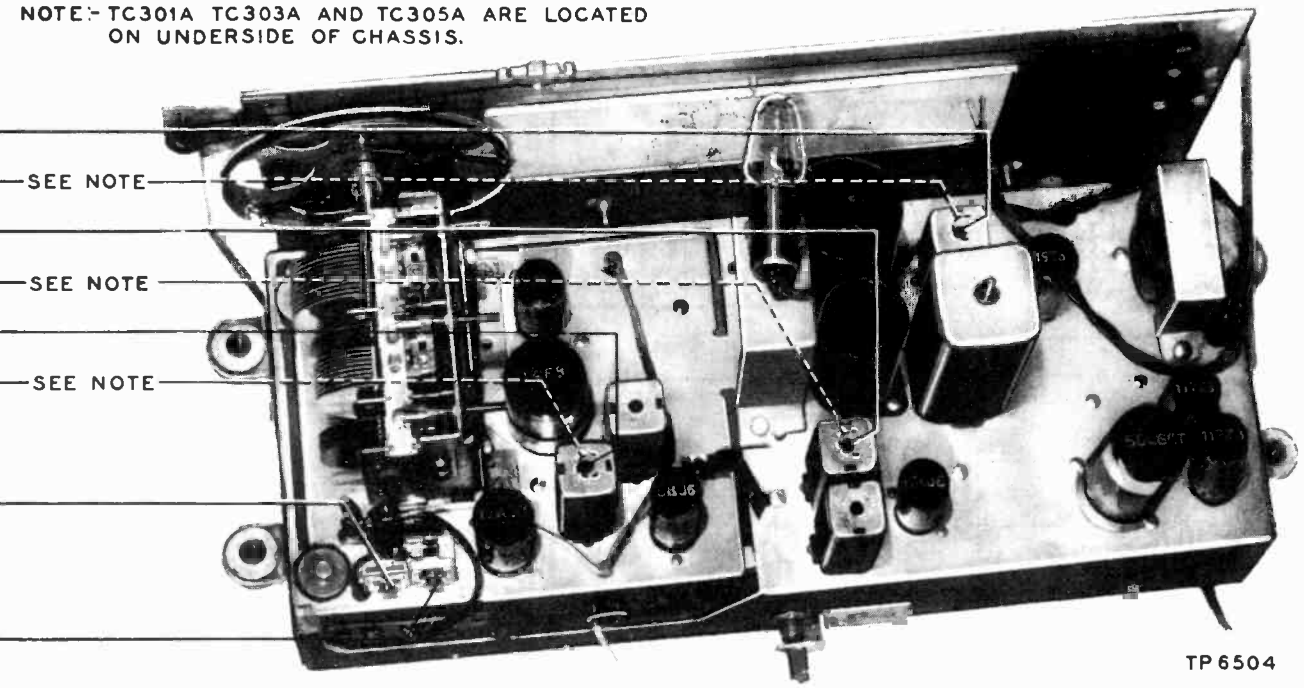


Figure 8. Top View, Showing AM Trimmer Locations

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to pin 1 of 6BJ6 1st i-f amplifier.	9.1 mc.	88 mc.	Adjust for maximum reading on alignment indicator. Attenuate signal generator to maintain reading of approximately 10 volts. Repeat adjustments until no further improvement is noted. After this step, do not disturb any of these trimmers except as directed in step 3.	TC304B—3rd i-f sec. TC304A—3rd i-f pri. TC302B—2nd i-f sec. TC302A—2nd i-f pri.
2	Through .1-mf. condenser to pin 8 of 14F8.	9.1 mc.	88 mc.	Adjust for maximum reading on alignment indicator. Repeat adjustments until no further improvement is noted. Do not disturb these trimmers after this step.	TC300B—1st i-f sec. TC300A—1st i-f pri.
3	Same as step 2.	9.1 mc.	88 mc.	Adjust for minimum reading on output meter. This adjustment is critical; repeat to make sure that it is correct.	TC304B—3rd i-f sec.
4	To terminal 2 of J400.	105 mc.	105 mc.	Adjust for maximum reading on alignment indicator.	C400C—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Same as step 4. Rock tuning control.	C400B—FM r-f
6	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C400A—FM aerial
7	Same as step 4.	92 mc.	92 mc.	Same as step 4. See note on page 10.	L403—FM osc. (tracking)
8	Same as step 4.	92 mc.	92 mc.	Same as step 7.	L402—FM r-f (tracking)
9	Same as step 4.	92 mc.	92 mc.	Same as step 7.	L401—FM aerial (tracking)
10	Repeat steps 4 through 9 until no further improvement is obtained.				

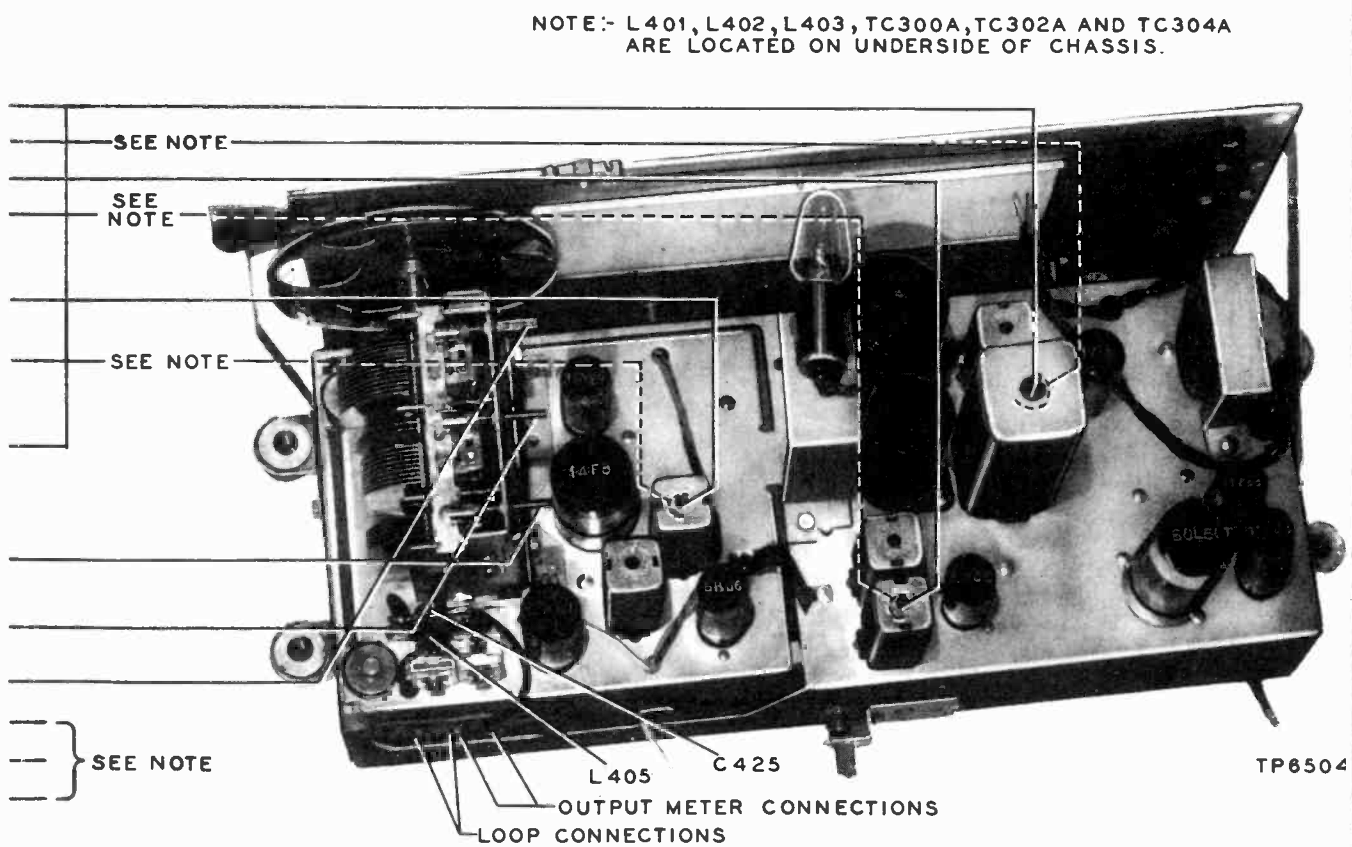
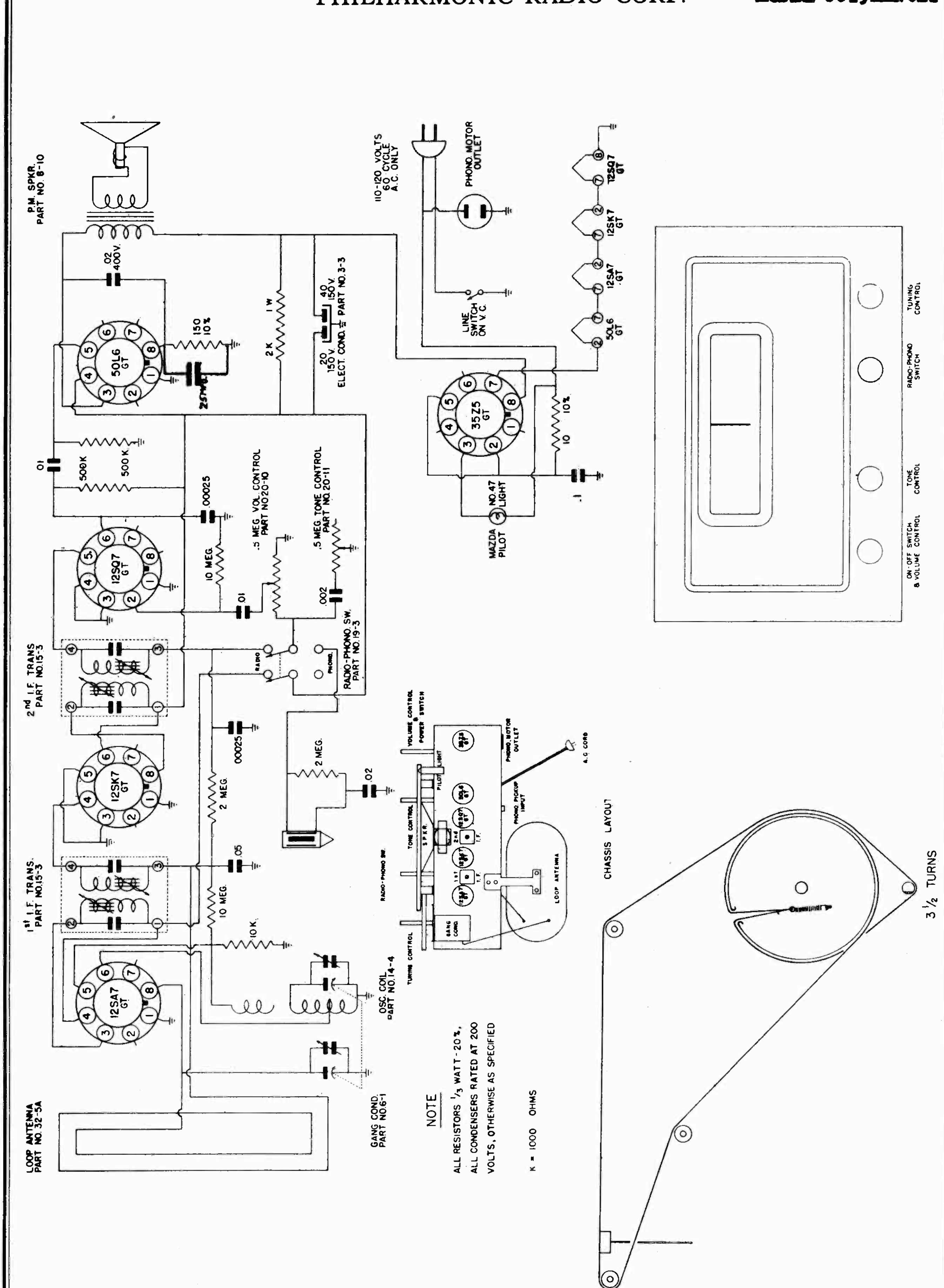


Figure 9. Top View, Showing FM Trimmer Locations

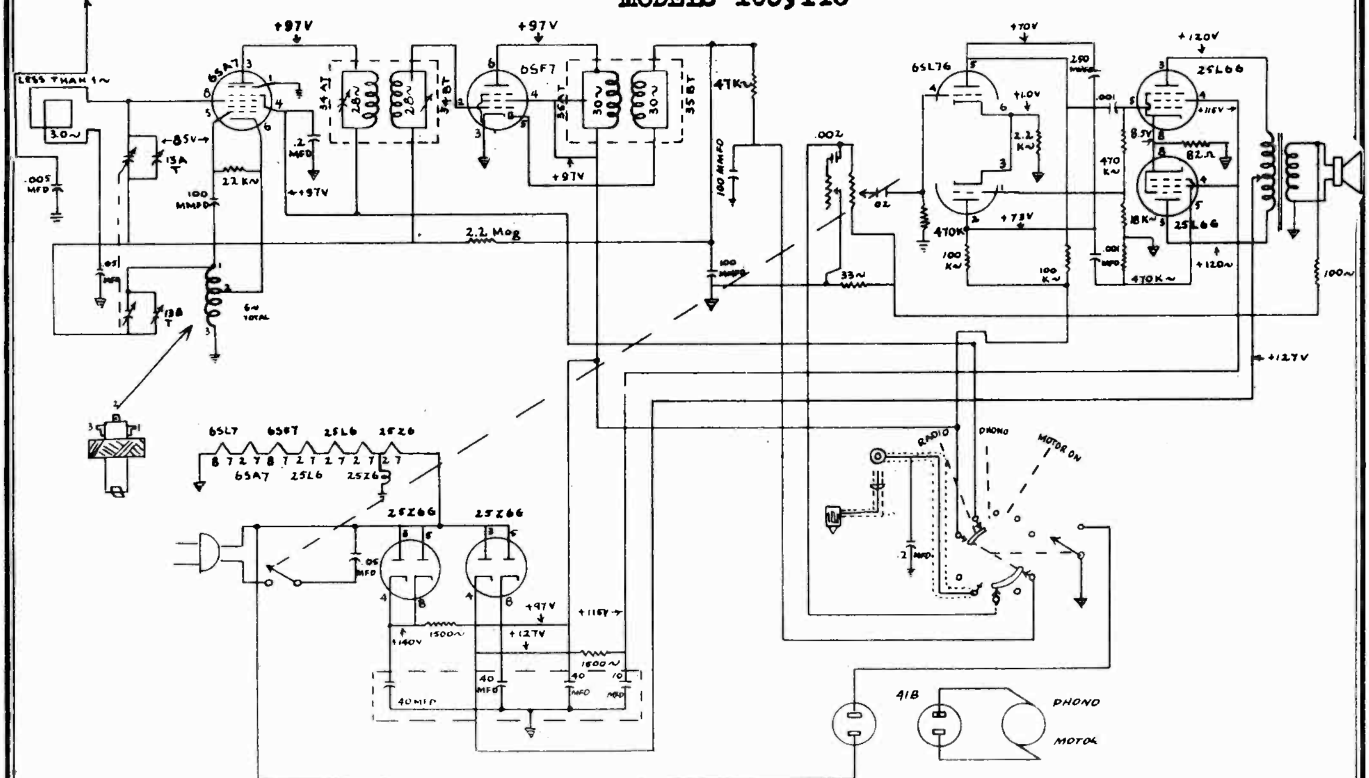
PHILHARMONIC RADIO CORP. **MODEL 99T, MINUET**



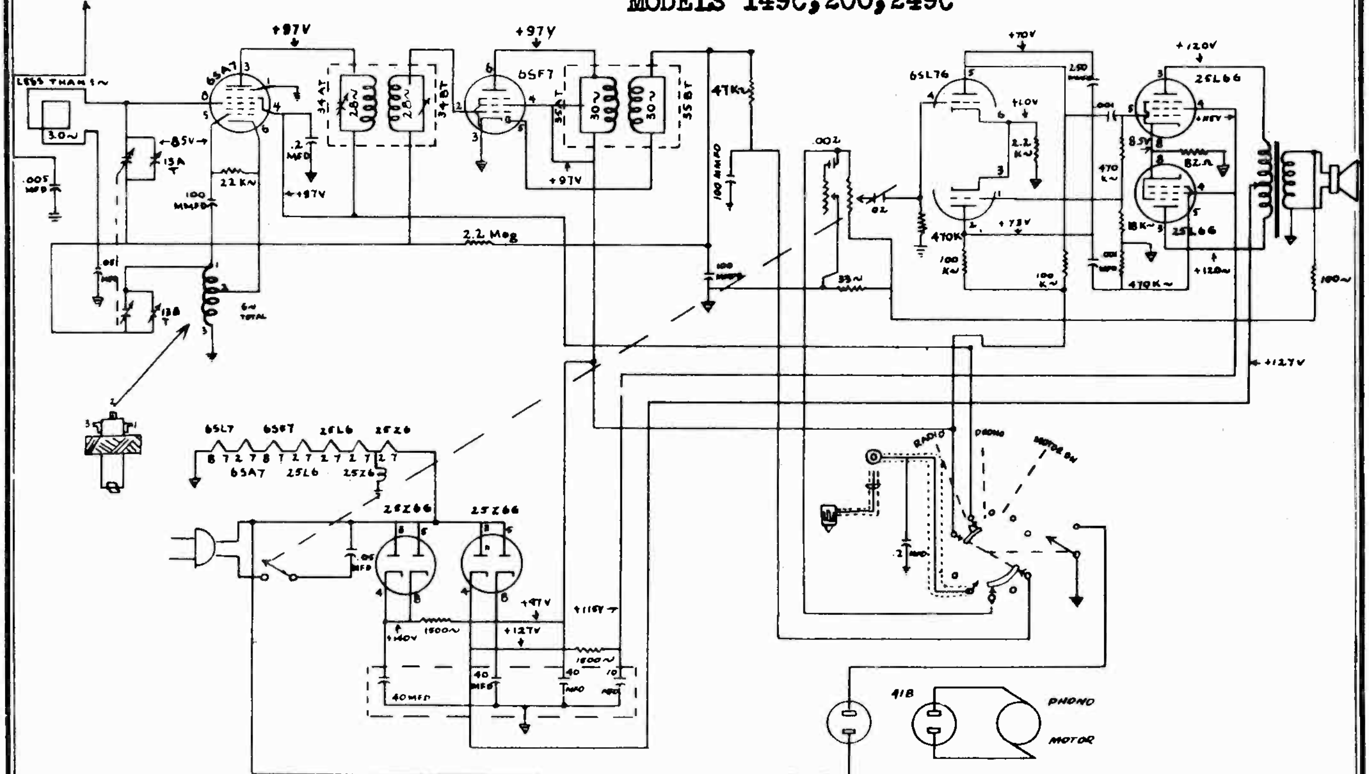
MODELS 100,148
MODELS 149C,200,249C

PHILHARMONIC RADIO CORP.

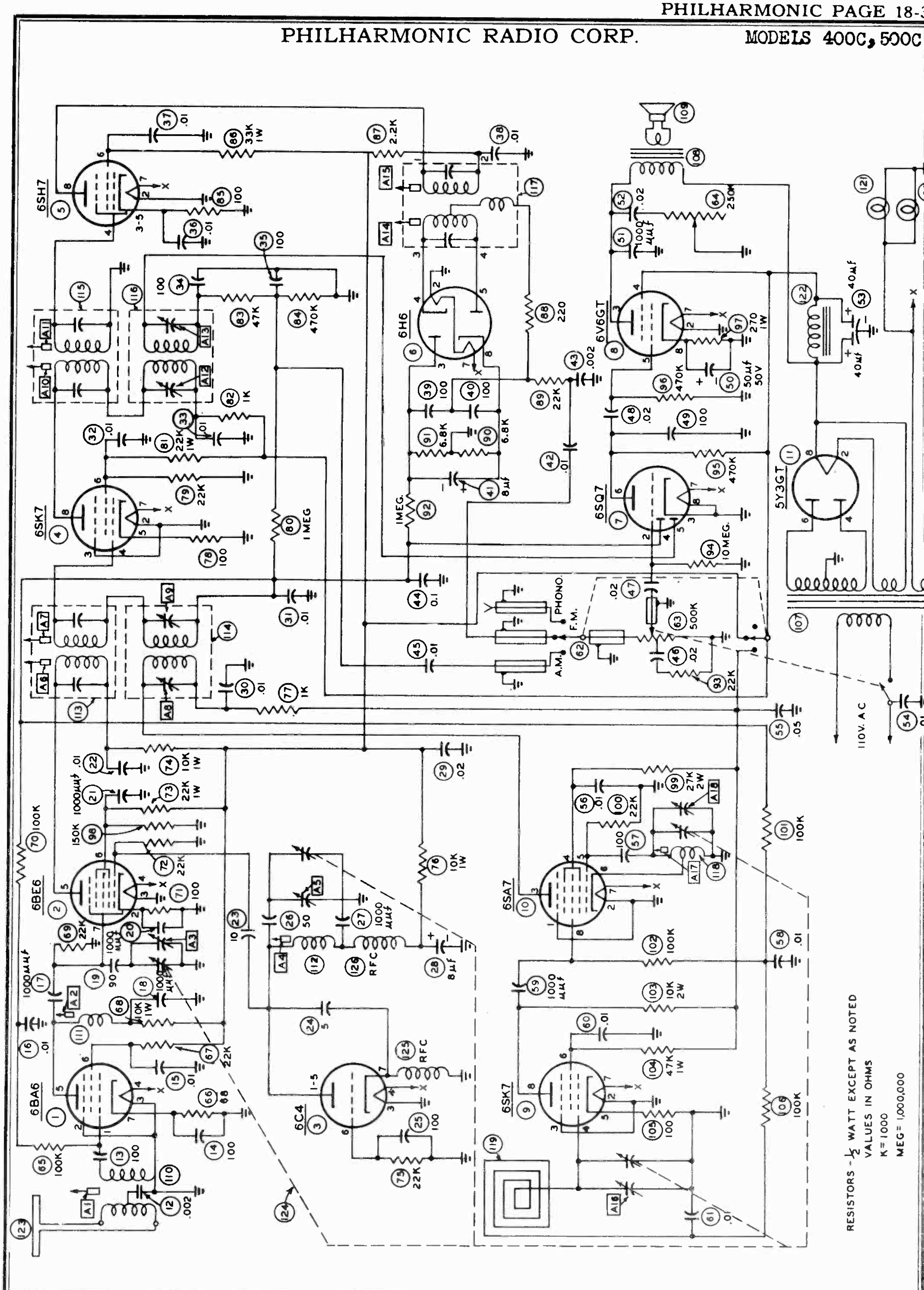
MODELS 100,148



MODELS 149C,200,249C



PHILHARMONIC RADIO CORP. MODELS 400C, 500C



RECORD CHANGER for MODEL 400C: General Instrument Model 205, RCD.CH. 15-5

MODELS 400C, 500C PHILHARMONIC RADIO CORP.

ANTENNAS.— The built-in antennas are satisfactory in most locations, however, external antennas can be used when needed. For amplitude-modulated reception, connect an external antenna and ground wire to the terminals provided on the built-in loop.

For frequency-modulated signals, the antenna and lead-in should have an impedance of 300 ohms. Connect the lead-in to the two left-hand terminal screws on the rear of the chassis. Connect a ground wire to the third terminal screw.

POWER SOURCE.— Connect the power plug to an alternating-current supply of 115-120 volts, 60 cycles. DO NOT CONNECT TO DIRECT CURRENT.

RADIO OPERATION.— Switch on the power by turning the Volume control clockwise. Wait 35-40 seconds for the tubes to reach operating temperature. Set the three-position switch on AM or FM as desired. Select the station with the Tuning control. Adjust the Volume control and Tone control to suit.

TYPE: Eleven-tube F-M/A-M superheterodyne.

FREQUENCY RANGES: A-M, 540-1600 KC. F-M, 88-108 MC.

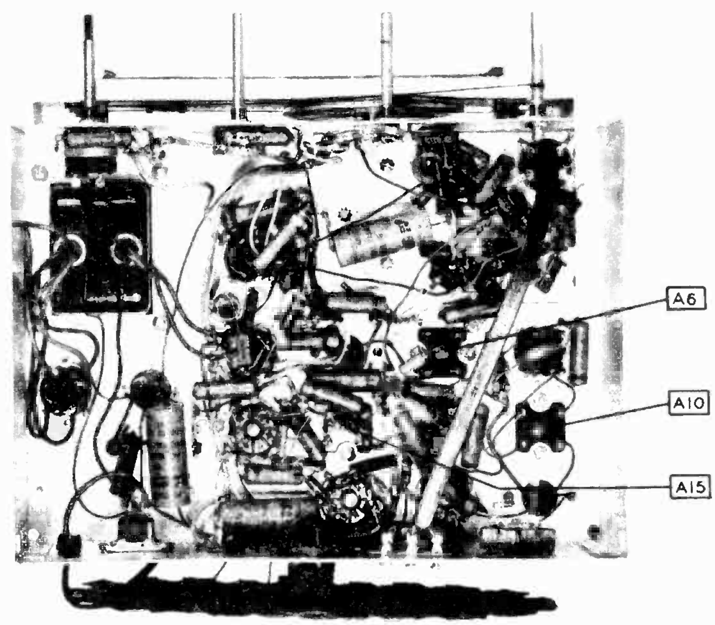
INTERMEDIATE FREQUENCIES: A-M, 456 KC; F-M, 10.7 MC.

POWER SOURCE: 105-125 volts, 60 cycles.

POWER CONSUMPTION:
RADIO, 80 watts.
RADIO AND PHONOGRAPH, 95 watts.

POWER OUTPUT: 4.5 watts

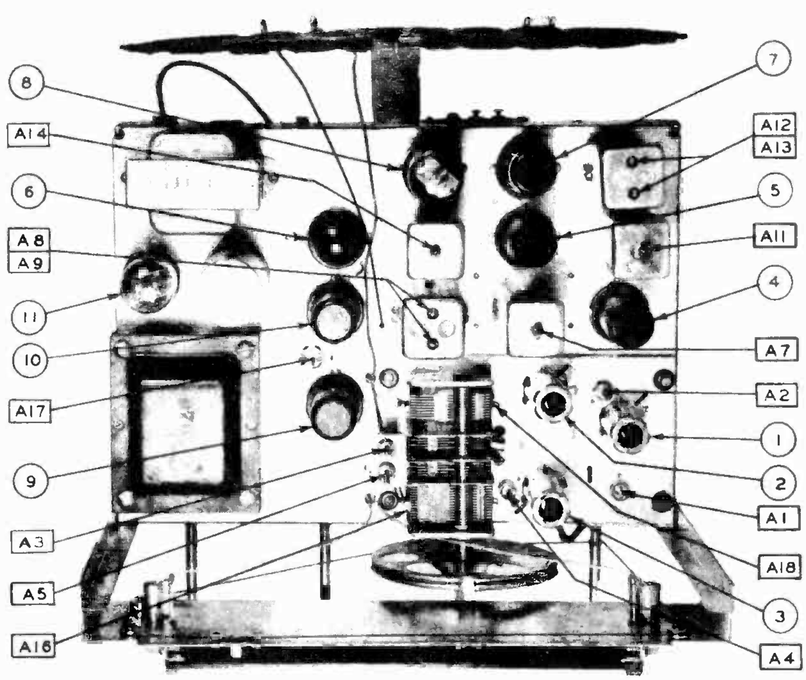
STANDARD RMA WARRANTY APPLIES.



TUBES

1 6BA6
2 6BE6
3 6C4
4 6SK7
5 6SH7
6 6H6
7 6SQ7
8 6V6GT
9 6SK7
10 6SA7
11 5Y3GT

Pilots, Mazda 47



PHILHARMONIC RADIO CORP. **MODELS 400C, 500C**

A-M Alignment

Turn gang condenser to fully meshed position. Set dial pointer on the small dot to the left of the end calibration. Turn volume control to maximum volume. Use a standard A-M signal generator, with the high side coupled to the input point through a .01 uf capacitor. Ground the other side to the chassis. Connect the output meter across the voice coil of output transformer 108. The output of the signal generator should be no higher than necessary to obtain the output reading. Where loop coupling is specified, connect the signal generator output to two or three turns of wire spaced about two feet from the antenna loop.

Signal Generator and Coupling Capacitor	Signal Generator Frequency	Input to	Tuning Dial Setting	Output Meter	Adjust	Remarks
A-M Signal Generator .01 uf.	455 KC	Pin 8 6SA7	Low-Freq. End.	Across Voice Coil of 108	A13, A12, A9, A8	Adjust for max. output. Repeat
	600 KC	"	600 KC	"	A17	Adjust for max. output.
	1600 KC	"	1600 KC	"	A18	" " " "
	600 KC	"	600 KC	"	A17	" " " "
	1400 KC	Loop Coupling	Tune to signal at 1400 KC	"	A16	" " " "
		F-M Alignment				
A-M .002 uf	10.7 MC	Pin 4 6SH7	Low-Freq. End.	Use D-C VTVM. Pin 3 6H6 to gnd.	A15, bottom of ratio-detector can	Adjust for max. reading.
A-M .002 uf	"	"	"	Use D-C VTVM. High Side of capacitor 43 to gnd.	A14, top of ratio-detector can	Adjust for zero voltage. At the correct setting, the slightest movement of A14 will throw the voltage positive or negative. A slow approach to zero indicates that A14 should be turned in the opposite direction.
A-M .002 uf	"	Pin 3 6SK7 item 4	Low-Freq. End.	Use D-C VTVM. Pin 3 6H6	A11, A10	Adjust for max. reading.
A-M .002 uf	"	Pin 7 6BE6	"	"	A7, A6	" " " "
						Repeat last two steps.
F-M Signal Generator Set for 75 Kc. Deviation and 400-cycle Modulation	88 MC	Dipole antenna terminals	88 MC	Output meter across voice coil of 108	A4	Adjust for max. output.
"	"	"	"	"	A2	" " " "
"	108 MC	"	108 MC	"	A5	" " " "
"	"	"	"	"	A3	" " " "
						Repeat last four steps until properly tracked.
"	98 MC	"	Tune to signal at 98 MC	"	A1	Adjust for max. output.

MODELS 400C, 500C PHILHARMONIC RADIO CORP.

PARTS LIST

TUBES

Item No.	Type	Function
1	6BA6	R-F Amplifier (FM)
2	6BE6	Mixer (FM)
3	6C4	Oscillator (FM)
4	6SK7	I-F Amplifier (AM-FM)
5	6SH7	I-F Amplifier (FM)
6	6H6	Second Detector (FM)
7	6SQ7	Second Detector (AM)
8	6V6GT	Beam Power Amplifier
9	6SK7	R-F Amplifier (AM)
10	6SA7	Pentagrid Converter (AM)
11	5Y3GT	Full-Wave Rectifier

CAPACITORS

Capacitances in uf for electrolytic and paper capacitors, uuf for mica.

Item No.	Part No.	Cap.	Volts dcw	
12	CD-1227-3	.002	400	Paper
13	CD-1157-13	100	500	Mica
14	CD-1157-13	100	500	Mica
15	CD-1227-8	.01	400	Paper
16	CD-1227-8	.01	400	Paper
17	CD-1160-5	1000	500	Mica
18	CD-1160-5	1000	500	Mica
19	CD-1158-17	91	500	Mica
20	CD-1085-20	1000	300	Mica
21	CD-1085-20	1000	300	Mica
22	CD-1227-8	.01	400	Paper
23	CD-1245-2	10	500	Silver Mica
24	CD-1245-1	5	500	Silver Mica
25	CD-1157-13	100	500	Mica
26	CD-1245-5	50	500	Silver Mica
27	CD-1160-5	1000	500	Mica
28	CD-1247	8	450	Dry Electrolytic
29	CD-1227-10	.02	400	Paper
30	CD-1227-8	.01	400	Paper
31	CD-1227-8	.01	400	Paper
32	CD-1227-8	.01	400	Paper
33	CD-1227-8	.01	400	Paper
34	CD-1071-22	100	500	Mica
35	CD-1071-22	100	500	Mica
36	CD-1227-8	.01	400	Paper
37	CD-1227-8	.01	400	Paper
38	CD-1227-8	.01	400	Paper
39	CD-1071-22	100	500	Mica
40	CD-1071-22	100	500	Mica
41	CD-1247	8	450	Dry Electrolytic
42	CD-1227-8	.01	400	Paper
43	CD-1227-3	.002	400	Paper
44	CD-1227-15	0.1	400	Paper
45	CD-1227-8	.01	400	Paper
46	CD-1227-10	.02	400	Paper
47	CD-1227-10	.02	400	Paper
48	CD-1227-10	.02	400	Paper
49	CD-1071-22	100	500	Mica
50	CD-1246	50	50	Dry Electrolytic
51	CD-1160-5	1000	500	Mica
52	CD-1227-10	.02	400	Paper
53	CD-1248	40-40	450	Dry Electrolytic
54	CD-1227-8	.01	400	Paper
55	CD-1227-13	.05	400	Paper
56	CD-1227-8	.01	400	Paper
57	CD-1071-22	100	500	Mica
58	CD-1227-8	.01	400	Paper
59	CD-1085-20	1000	300	Mica
60	CD-1227-8	.01	400	Paper
61	CD-1227-8	.01	400	Paper

RESISTORS, FIXED

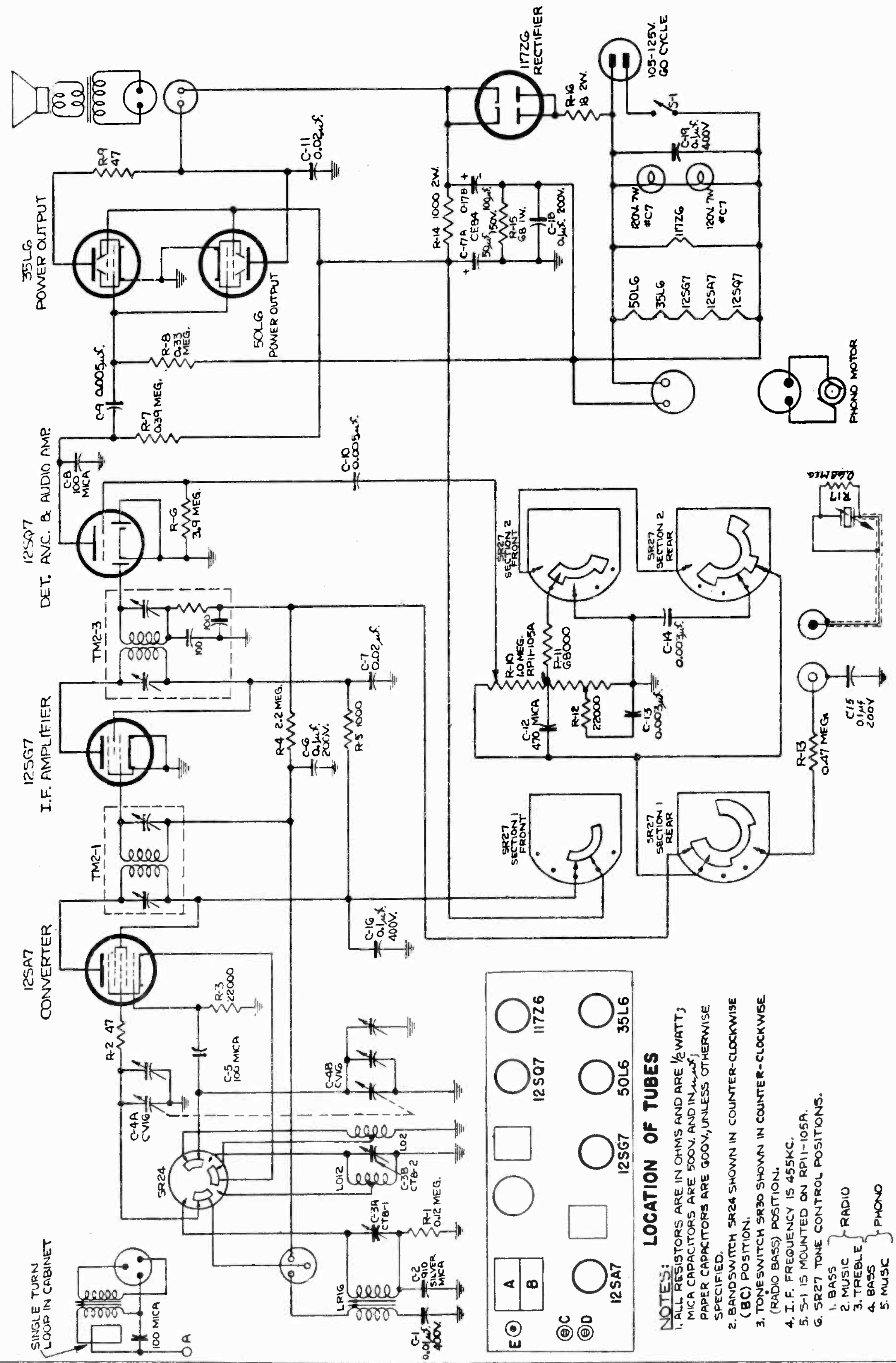
Item No.	Part No.	Res.	Watts
65	RE-1166-107	100K	1/2
66	RE-1139-683	68	1/2
67	RE-1166-226	22K	1/2
68	RE-1168-106	10K	1
69	RE-1166-226	22K	1/2
70	RE-1166-107	100K	1/2
71	RE-1139-104	100	1/2
72	RE-1166-226	22K	1/2
73	RE-1168-226	22K	1
74	RE-1168-106	10K	1
75	RE-1166-226	22K	1/2
76	RE-1168-106	10K	1
77	RE-1166-105	1K	1/2
78	RE-1139-104	100	1/2
79	RE-1166-226	22K	1/2
80	RE-1139-108	1 meg	1/2
81	RE-1168-226	22K	1
82	RE-1166-105	1K	1/2
83	RE-1166-476	47K	1/2
84	RE-1166-477	470K	1/2
85	RE-1139-104	100	1/2
86	RE-1168-336	33K	1
87	RE-1166-225	2.2K	1/2
88	RE-1139-224	220	1/2
89	RE-1166-226	22K	1/2
90	RE-1166-685	6.8K	1/2
91	RE-1166-685	6.8K	1/2
92	RE-1139-108	1 meg	1/2
93	RE-1166-226	22K	1/2
94	RE-1139-109	10 meg	1/2
95	RE-1166-476	470K	1/2
96	RE-1166-477	470K	1/2
97	RE-1063-274	270	1
98	RE-1062-157	150K	1/2
99	RE-1046-276	27K	2
100	RE-1166-226	22K	1/2
101	RE-1166-107	100K	1/2
102	RE-1166-107	100K	1/2
103	RE-1046-106	10K	2
104	RE-1153-476	47K	1
105	RE-1139-104	100	1/2
106	RE-1166-107	100K	1/2

MISCELLANEOUS

Item No.	Part No.	
62	SW-1069	Switch, Radio-Phono
63	RE-1181	Pot. Vol. Cont. and Sw., 500K
64	RE-1182	Pot., Tone Control, 250K
107	TR-1061	Transformer, Power
108	TR-1060	Transformer, Output
109	SK-1016	Speaker
110	TR-1064	Transformer, Antenna
111	CI-1057	R-F Coil (FM)
112	CI-1058	Oscillator Coil (FM)
113	TR-1065	Transformer, IF (FM)
114	TR-1052	Transformer, First IF (AM)
115	TR-1065	Transformer, IF (FM)
116	TR-1051	Transformer, Second IF (AM)
117	TR-1066	Transformer, Ratio Detector
118	CI-1059	Oscillator Coil
119	AT-1019	Antenna Loop
120	LA-1014-32	Pilot Light
121	LA-1014-32	Pilot Light
122	CK-1040	Filter Choke
123	AS-3599	Antenna (FM)
124	CDC-5001	Capacitor, Variable, Tuning
125	CK-1036	R-F Choke
126	CK-1036	R-F Choke

PHILLIPS PETROLEUM CO.

MODEL 3-63A



NOTES:

1. ALL RESISTORS ARE IN OHMS AND ARE 1/2 WATT; MICA CAPACITORS ARE 500V. AND IN µµf.; PAPER CAPACITORS ARE 600V., UNLESS OTHERWISE SPECIFIED.
2. BANDSWITCH SR24 SHOWN IN COUNTER-CLOCKWISE (BC) POSITION.
3. TONESWITCH SR30 SHOWN IN COUNTER-CLOCKWISE (RADIO BASS) POSITION.
4. I.F. FREQUENCY IS 455KC.
5. S-1 IS MOUNTED ON RP11-105A.
6. SR27 TONE CONTROL POSITIONS.
   1. BASS
   2. MUSIC } RADIO
   3. TREBLE
   4. BASS
   5. MUSIC } PHONO

MODEL 3-63A
MODEL 3-81A

PHILLIPS PETROLEUM CO.

MODEL 3-63A

Operation: The set operates on 105-125 volts 60 cycles, AC. The power drain is approximately 35 watts on radio operation and 17 watts additional on phonograph operation.

Range: This set has both a broadcast and shortwave range. The complete broadcast band is covered from 532 to 1700 kilocycles. Since the broadcast dial scale is calibrated from 55 to 160, the actual frequency of the station may be obtained by adding zero to the dial calibration. The shortwave band covers from 5.6 to 12.5 megacycles. The shortwave dial scale is calibrated directly in megacycles.

Alignment: No attempt should be made to re-align this receiver until it has been determined that poor tubes or some local condition is not responsible for faulty reception. The signal generator may be connected through 0.01 mfd capacitor used as a dummy antenna, to the lug on the RF section "B" of the tuning capacitor. Connect ground clip of generator directly to chassis. An output meter may be clipped across the voice coil lug on the speaker. Align IF trimmers to 455 kilocycles, using the least possible input in the signal generator. With tuning plates completely out of mesh (pointer at the extreme right end of travel) the set in broadcast position, adjust the broadcast oscillator trimmer (A) to 1700 kilocycles. Then switch to shortwave and adjust the shortwave oscillator trimmer (D) to 12.5 megacycles. Replace the 01 mfd dummy by a 39 mmfd mica capacitor and connect to antenna terminal "A." Tune set and signal generator to 600 kilocycles and adjust broadcast antenna coil slug for maximum output. Then re-tune set and signal generator to 1550 kilocycles and adjust RF trimmer "B" on tuning capacitor for maximum response. Repeat these adjustments until no further adjustment is required, then switch receiver to shortwave. Tune set and signal generator to 6 megacycles and adjust shortwave antenna coil slug "E" for maximum response. Retune set and signal generator to 10.5 megacycles and tune shortwave antenna, trimmer "C" for maximum response. In these adjustments the tuning control should be rocked for best results. Repeat these adjustments until no further adjustment is needed.

For checking purposes, five marks are engraved on the dial plate. These represent, in order from left to right: the pointer position capacitor plates fully meshed and the pointer settings for 600 kc or 6 mc; 1000-kc, 10.5 mc and 1550 kc.

MODEL 3-81A

Operation: The set operates on 110 to 120 volts, 60 cycles A.C. Power drain is approximately 125 watts for radio and about 20 watts additional for the record changer

Ranges: This receiver has AM broadcast and short-wave and FM ranges

FM—87.4 to 108.7 megacycles

AM Broadcast—535 to 1720 kilocycles

AM Short-Wave—5.6 to 18.5 megacycles

Instructions For Removing Radio From Cabinet

Main Chassis:

To remove main chassis from the cabinet it is first necessary to remove the four control knobs by pulling them gently until they come off. Remove all plugs from the rear of the main chassis and power pack chassis. Pull the 5U4G rectifier tube out of the power pack chassis. The four screws holding the chassis may now be removed. The chassis itself may now be taken out by sliding it straight back toward the rear of the cabinet.

Power Pack Chassis:

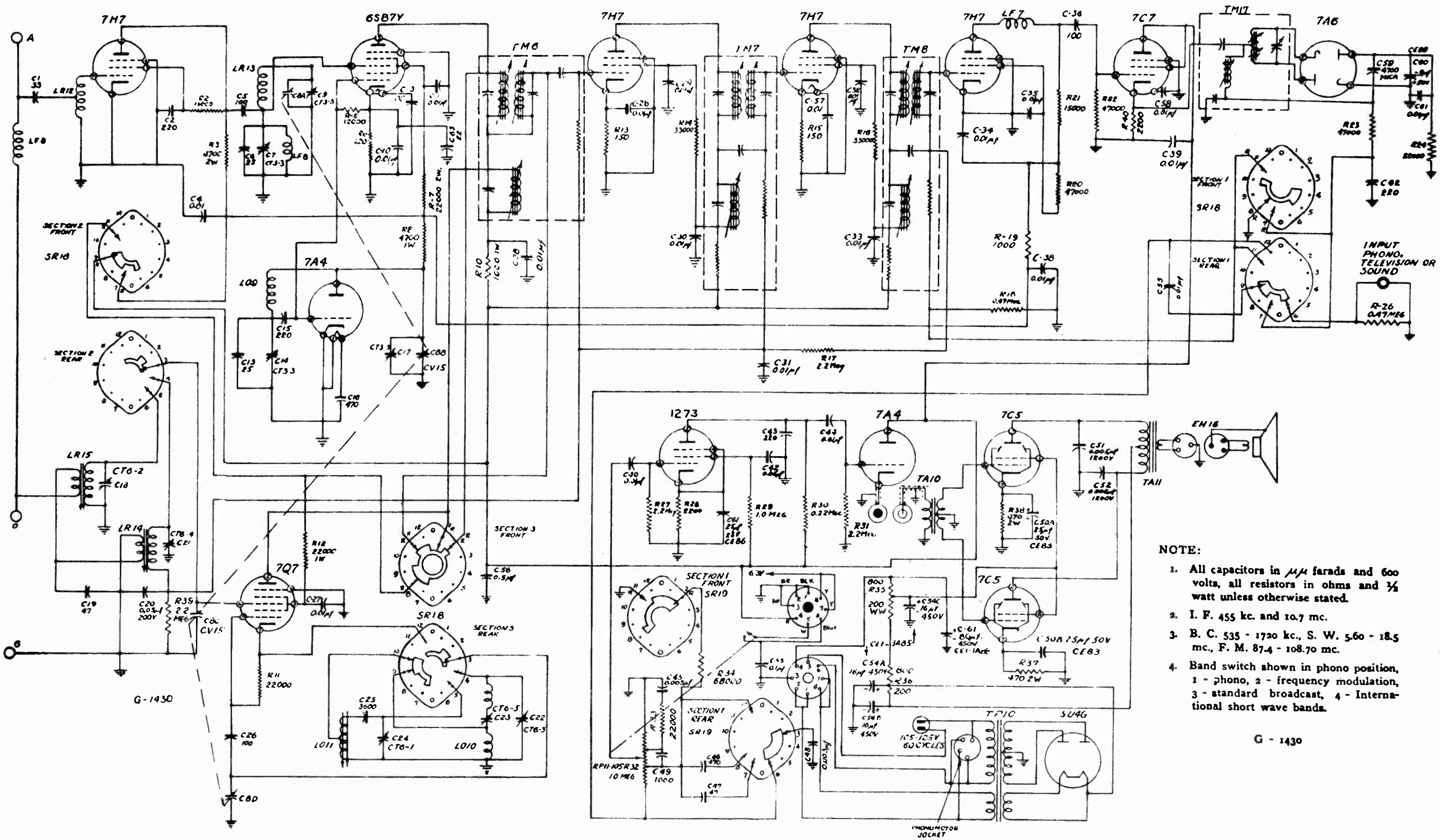
The power pack chassis may be removed from the cabinet by unscrewing the four large screws holding it to its support shelf. These are accessible from the under side of the cabinet.

Record Changer:

Most adjustments may be made to the record changer without removing it from its drawer. Before attempting to remove the record changer from the cabinet the motor plug and the phono pickup plug must first be removed from the main and power pack chassis. Loosen the cable clamps on the rear of the cabinet sufficiently to lift out cables.

Pull changer drawer forward until it hits its stop. Lift the turntable completely off. Be careful not to lose the spring and loose gear on the spindle of the record changer. Remove retaining washers from the mounting screws at the front and rear of the record changer. The mounting screws may now be removed from the bottom of record changer drawer and the record changer may be lifted out.

PHILLIPS PETROLEUM CO.



NOTE:

1. All capacitors in $\mu\mu$ farads and 600 volts, all resistors in ohms and ½ watt unless otherwise stated.
2. I. F. 455 kc. and 10.7 mc.
3. B. C. 535 - 1720 kc., S. W. 5.60 - 18.5 mc., F. M. 87.4 - 108.70 mc.
4. Band switch shown in phono position, 1 - phono, 2 - frequency modulation, 3 - standard broadcast, 4 - International short wave bands.

G - 1430

Alignment:

No attempt should be made to realign this receiver until it has been determined that a poor tube or some local condition is not responsible for faulty reception. The following is a list of minimum equipment necessary to realign this receiver:

1—AM signal generator covering 455KC, 600KC, 1550KC, 6 MC, 10.7 MC and 18 MC

2—FM signal generator covering 10.7 MC, 92 MC and 106 MC

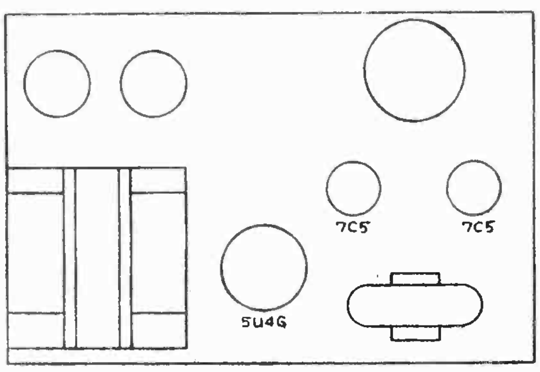
3—Output meter, rectifier type, approximately 0 to 2 volts RMS

4—Dummy antennas
- 0.01 MFD Capacitor
- 200 MMF Mica Capacitor
- 400 Ohm Resistor
- 300 Ohm Resistor

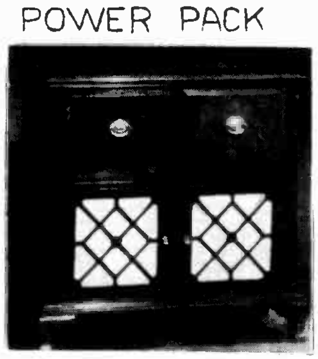
In the following alignment procedure the high side of the signal generator is connected to the terminal indicated in the "Signal Generator Coupling" column below. The ground side of the signal generator is connected directly to the chassis unless otherwise noted. The output meter should be connected across the voice coil of the speaker for all measurements.

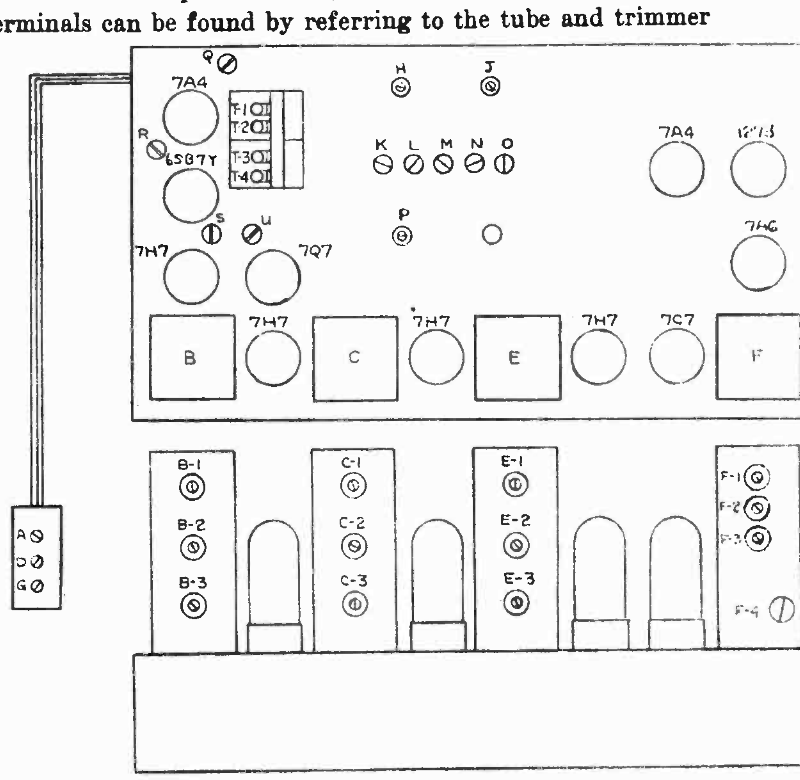
In adjusting the radio frequency trimmers and padders it is advisable to "rock" the variable capacitor gang slightly across the signal being delivered by the signal generator until that particular signal has been accurately peaked.

The location of the following trimmers, padders and terminals can be found by referring to the tube and trimmer location diagram.



POWER PACK





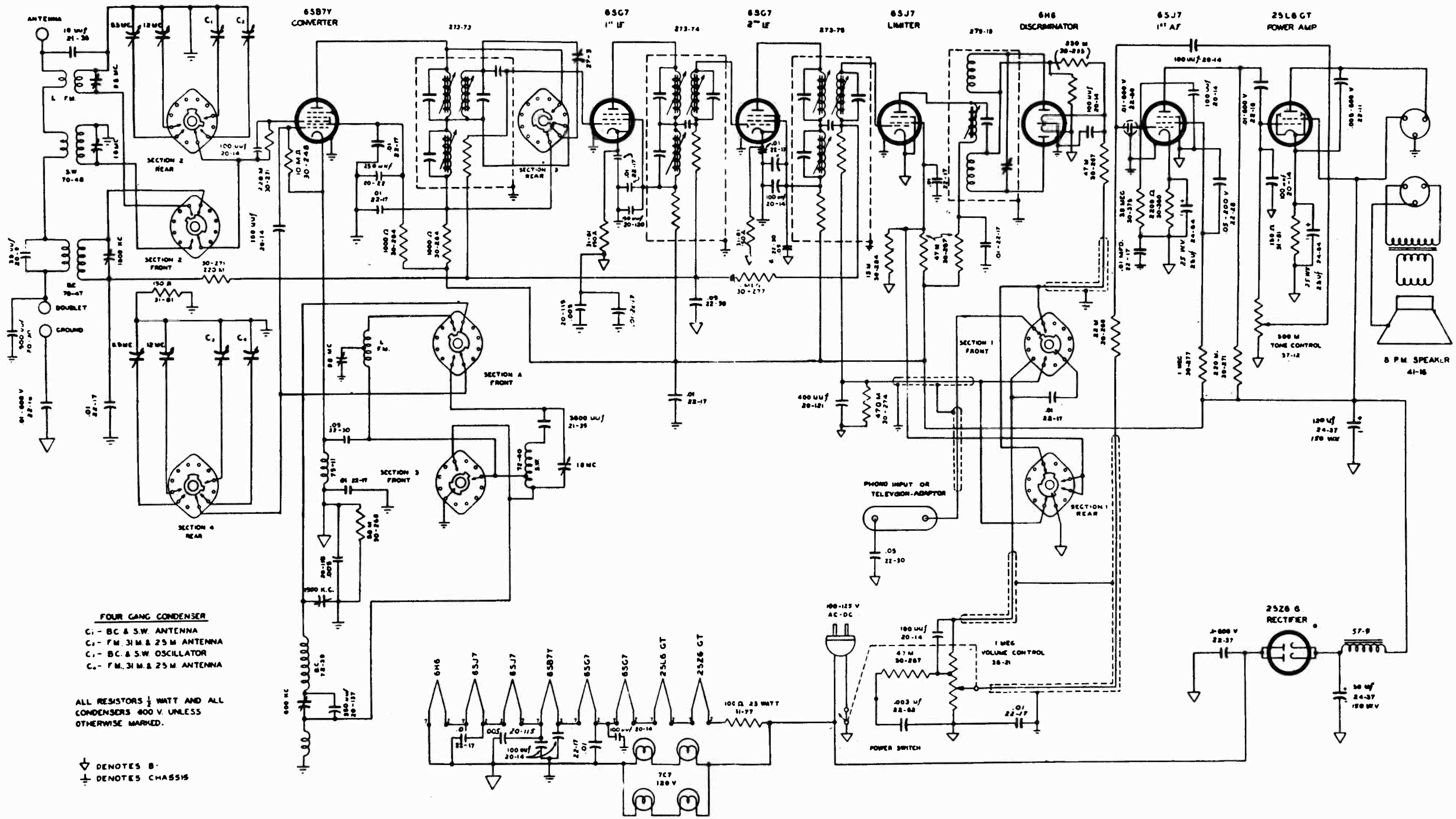
TUBE AND TRIMMER LOCATION

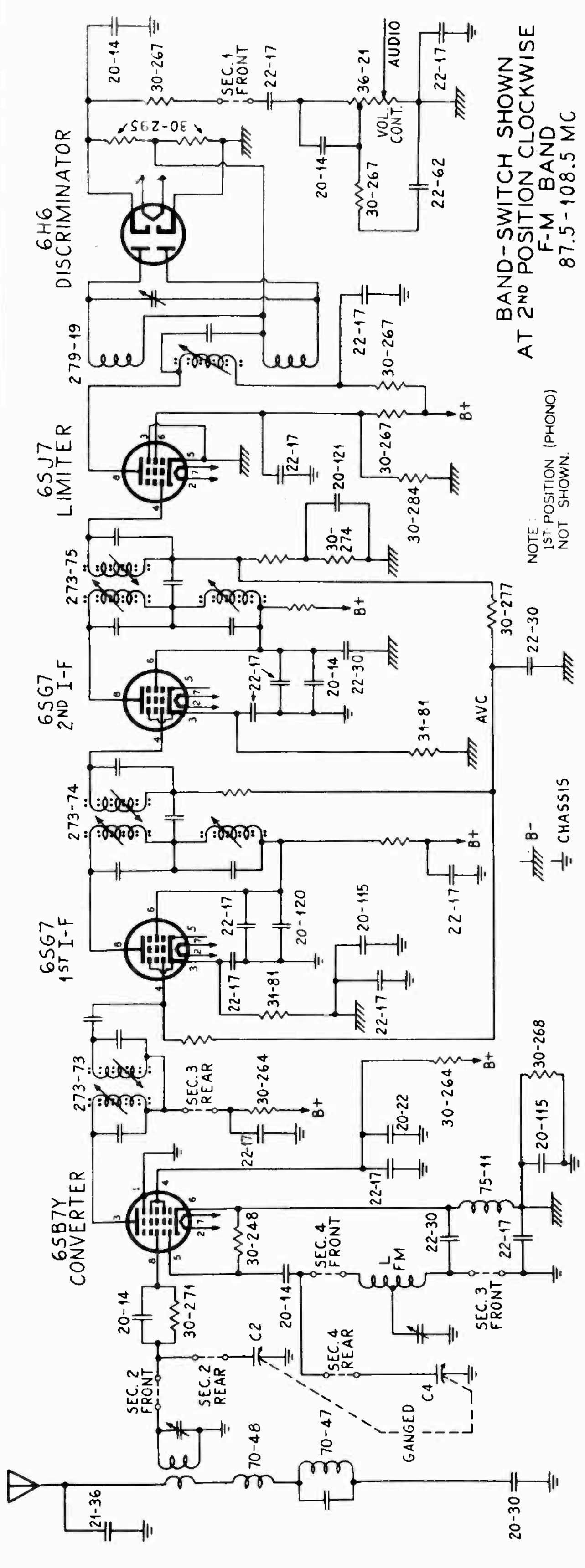
ALIGNMENT PROCEDURE:

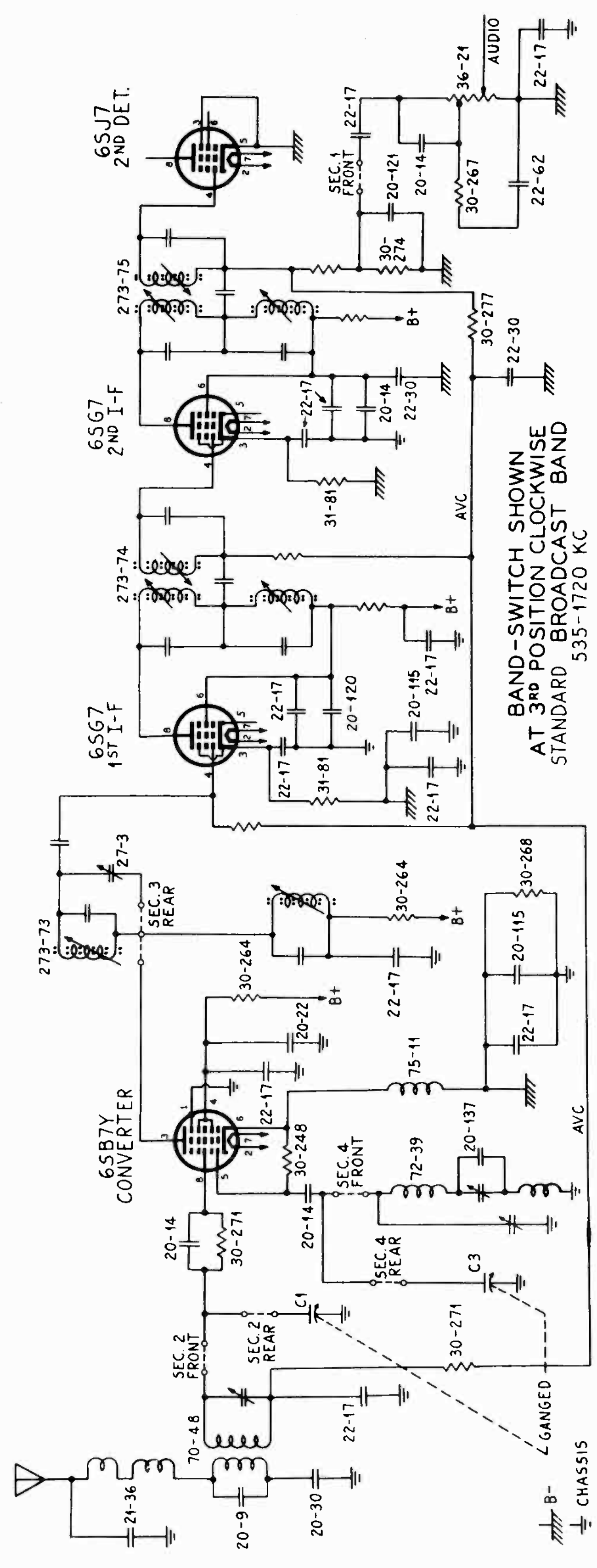
Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Position	Radio Dial Setting	Adjust	Remarks
0.01 MFD	Terminal T-2	455 KC	Broadcast	1700 KC	E-1 C-1 B-1	Adjust for maximum output Repeat for fine adjustment
"	Pin 6 of 7C7 IF tube with FM Signal Generator	10.7MC	FM	108 MC	F-2	Adjust for maximum output (Broad adustment)
"	"	"	"	"	F-4	Adjust for maximum output
"	AM Signal Generator	"	"	"	F-1 or F-3	Adjust whichever is required for minimum output
						Repeat last two steps for fine adjustment until settings for maximum FM output coincides with settings for minimum AM output.
"	"	"	"	"	E-3, E-2	Adjust for maximum output
"	"	"	"	"	C-3, C-2	" " " "
"	"	"	"	"	B-3, B-2	" " " "
						Repeat last three steps for fine adjustment
			Broadcast	535 KC	Pointer	Adjust pointer to reference mark
200 MMF	Terminal D	600 KC	Broadcast	600 KC	O, J.	Adjust for maximum output
"	"	1550 KC	"	1550 KC	M, N	" " " "
400 Ohm Resistor	"	6 MC	Shortwave	6 MC	P, H	" " " "
"	"	18 MC	"	18 MC	K, L	" " " "
300 Ohm Resistor	Terminal A Ground Side of Signal Generator to Terminal D	92 MC	FM	92 MC	R, S	" " " "
"	"	106 MC	"	106 MC	Q, U	" " " "

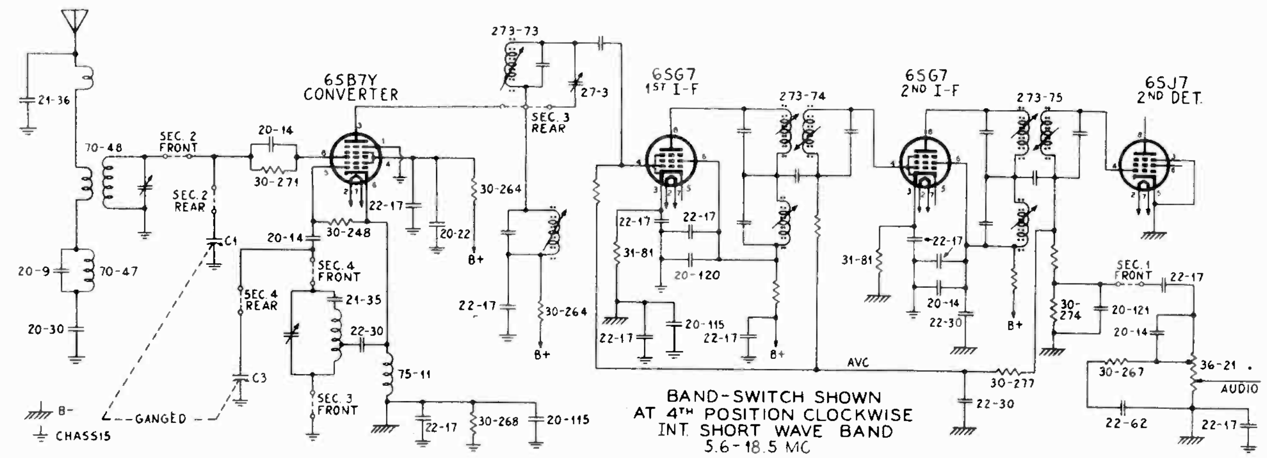
PILOT RADIO CORP.

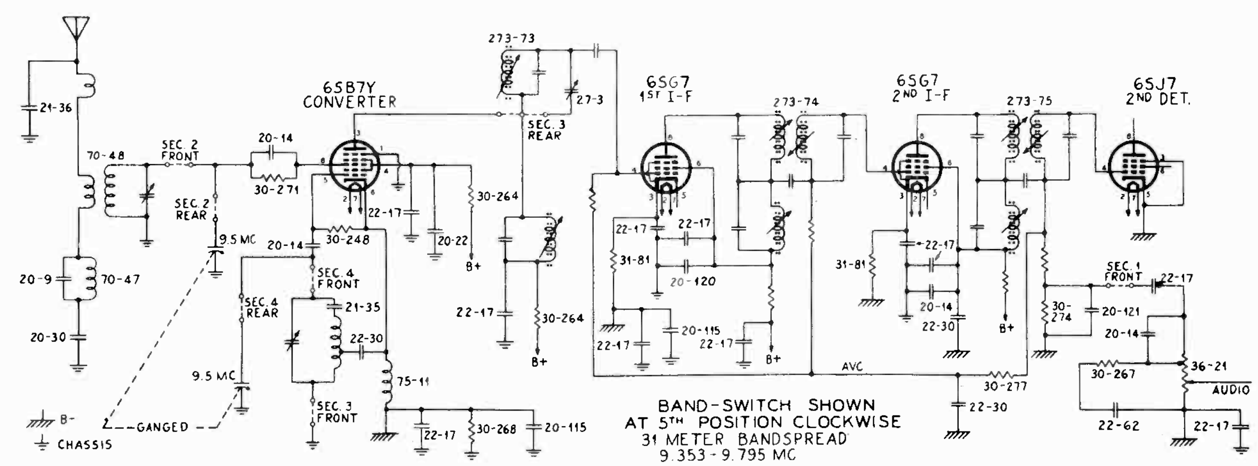
MODELS T-530 SERIES

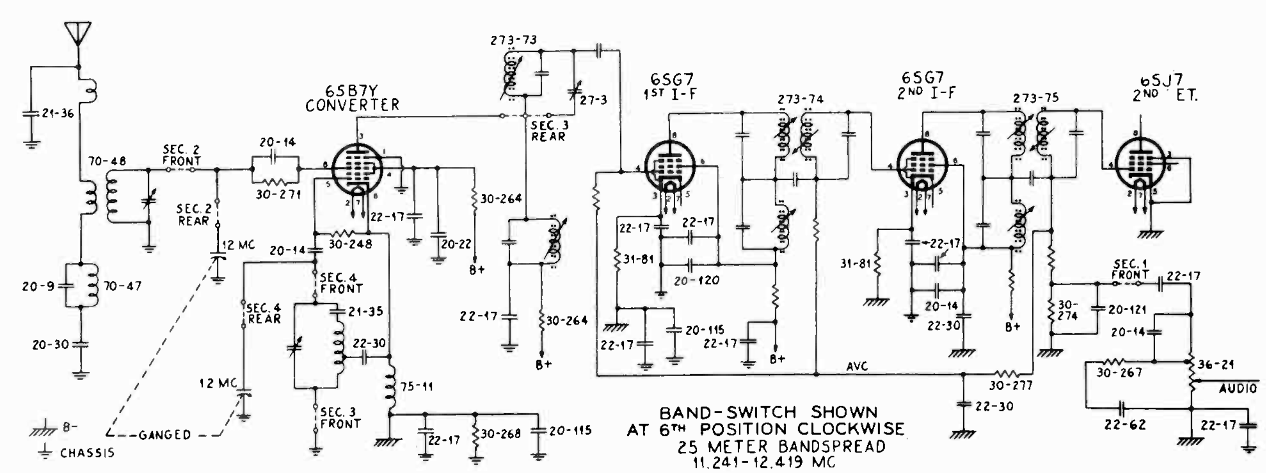



BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE F-M BAND 87.5-108.5 MC
NOTE: 1ST POSITION (PHONO) NOT SHOWN.
6H6 DISCRIMINATOR
6SJ7 LIMITER
6SG7 2ND I-F
6SG7 1ST I-F
6SB7Y CONVERTER


BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE STANDARD BROADCAST BAND 535-1720 KC
6SJ7 2ND DET.
6SG7 2ND I-F
6SG7 1ST I-F
6SB7Y CONVERTER


BAND-SWITCH SHOWN AT 4TH POSITION CLOCKWISE INT. SHORT WAVE BAND 5.6-18.5 MC


BAND-SWITCH SHOWN AT 5TH POSITION CLOCKWISE 31 METER BANDSPREAD 9.353-9.795 MC

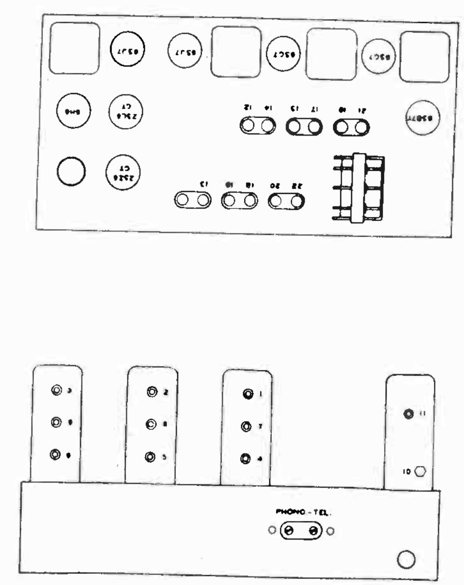

BAND-SWITCH SHOWN AT 6TH POSITION CLOCKWISE 25 METER BANDSPREAD 11.241-12.419 MC

ALIGNMENT CHART

Follow trimmer sequence as indicated

Circuit Aligned	Step	Receiver: Band Switch	Receiver: Dial Pointer	Signal Generator: Frequency	Signal Generator: Connection	Output Meter: (see list) Type	Output Meter: Connection	Trimmer or slug to be adjusted	Procedure
AM IF	1	BC	At low frequency end of dial	455 KC	Through .1 mfd. condenser to grid of 6SB7	A	Across speaker voice coil	#1, 2, and 3	Adjust for maximum output
FM IF	2	FM	"	10.7 MC	"	B	To AVC circuit, connect at 1 Megohm resistor on third I.F. lug assembly.	#4, 5, 6, (secondary) 7, 8, 9 (primary)	1. Grnd. limiter screen grid 2. Adjust slugs for max. reading. Repeat. 3. Remove scr grid ground.
Discriminator	3	"	"	"	"	C	Junction of 47,000 ohm resistor and shielded lead at 6H6 socket	#10	1. #11 counterclockwise to stop. Then clockwise three turns. 2. #10 for center scale rdg. on meter.
	4	"	"	10.6 MC and 10.8 MC	"	B		#11	Repeat adjustment for maximum and identical reading at each frequency.
IF Trap	5	Inter-nat'l SW	Tune near 10.7 MC for max. meter reading		none	"	To I.F. AVC circuit	I.F. Trap trimmer located beneath 1st I.F. transformer	Adjust for minimum meter rdg. with insulated align. tool.
Broadcast RF	6	BC	150 on dial	1500 KC	Through 200 mmf cond. to antenna post "A"	A	Across speaker voice coil	1. #12 (osc.) 2. #13 (ant.)	Adjust for max. reading
	7	"	60 on dial	600 KC	"	"	"	#14 osc. padder	Adjust for max. meter rdg. while rocking var. cond.
	8	"	Repeat	Steps	6 & 7				
Inter-nat'l SW	9	Inter-nat'l SW	18 MC on dial	18 MC	Through 400 ohm resistor to antenna post "A"	A	Across speaker voice coil	1. #15 (osc.) 2. #16 (ant.)	Adjust for max. meter rdg.
31 Meter Band-Spread	10	31 Mtr. Band-Spread	9.5 MC on dial	9.5 MC	"	"	"	1. #17 (osc.) 2. #18 (ant.)	"
25 Meter Band-Spread	11	25 Mtr. Band-Spread	12 MC on dial	12 MC	"	"	"	1. #19 (osc.) 2. #20 (ant.)	"
Frequency Modulation	12	FM	98 MC on dial	98 MC	Through 300 ohm resistor to antenna post "A"	"	"	1. #21 (osc.) 2. #22 (ant.)	"

TRIMMER LAYOUT



ALIGNMENT NOTES

Alignment should be attempted only if the proper output meters and signal generators are at your disposal. Insulated alignment tools are necessary. Output meters should include (1) a low range A.C. meter, (2) a 0-200 D.C. microammeter in series with a 100,000 ohm resistor or 0-20 volt D.C. vacuum tube voltmeter, and (3) a 50-0-50 microammeter in series with a 100,000 ohm resistor. The signal generators must cover frequencies from 450 kc to 108 mc.

It is essential that the signal generator be connected to the points indicated in the alignment chart through the proper dummy antenna.

A good ground connection, between the groundpost of the signal generator and the groundpost of the antenna strip, is necessary.

The output of the signal generator must always be kept at its lowest possible value. This is to prevent the automatic volume control of the receiver from interfering with accurate alignment.

During alignment, the line voltage feeding the receiver power supply should be kept at approximately 117 volts.

The locations of adjustment screws are indicated clearly on the schematic diagram. Alignment adjustments should be made only in the sequence given in the chart.

TUNING RANGE

Band (1) — **Phonograph-Television** — (Must be attached to phonograph or television receiver)

Band (2) — **Frequency Modulation** — (87.5 to 108.5 mc or 2.77 to 3.43 meters)

Band (3) — **Standard Broadcast** — (535 to 1720 kc or 174 to 561 meters)

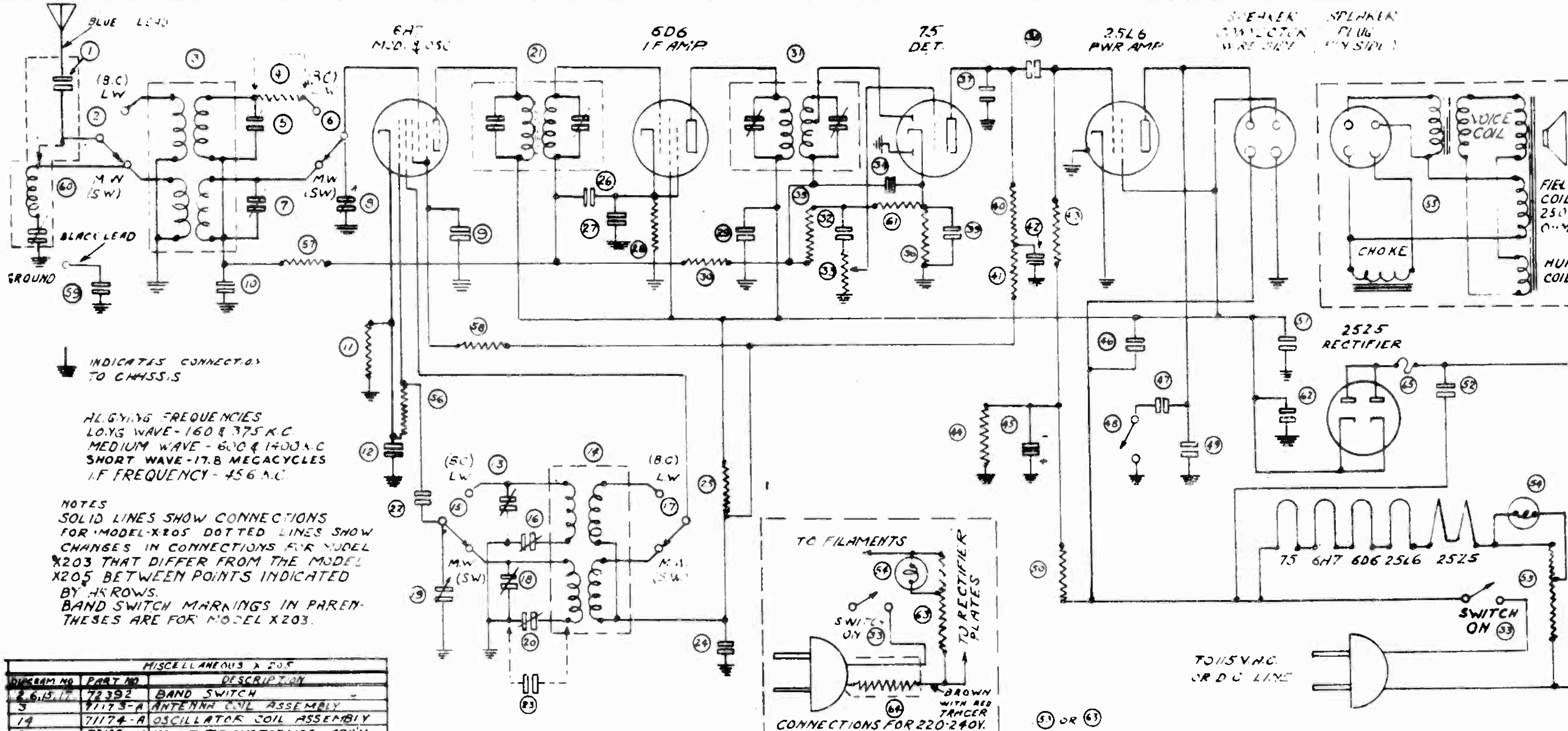
Band (4) — **International Shortwave** — (5.6 to 18.5 mc or 16.2 to 53.6 meters)

Band (5) — **31 Meter Bandspread** — (9.353 to 9.795 mc or 30.65 to 32.10 meters)

Band (6) — **25 Meter Bandspread** — (11.241 to 12.419 mc or 24.15 to 26.70 meters)

MODELS X203, X205

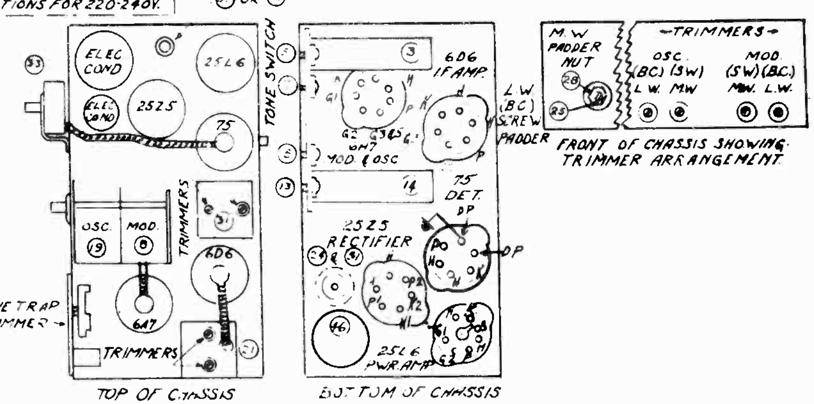
PILOT RADIO CORP.



INDICATES CONNECTION TO CHASSIS

ALIGNING FREQUENCIES
LONG WAVE - 160 & 375 K.C
MEDIUM WAVE - 600 & 1400 K.C
SHORT WAVE - 17.8 MEGACYCLES
I.F FREQUENCY - 456 K.C.

NOTES
SOLID LINES SHOW CONNECTIONS FOR MODEL X205 DOTTED LINES SHOW CHANGES IN CONNECTIONS FOR MODEL X203 THAT DIFFER FROM THE MODEL X205 BETWEEN POINTS INDICATED BY ARROWS.
BAND SWITCH MARKINGS IN PARENTHESES ARE FOR MODEL X203.

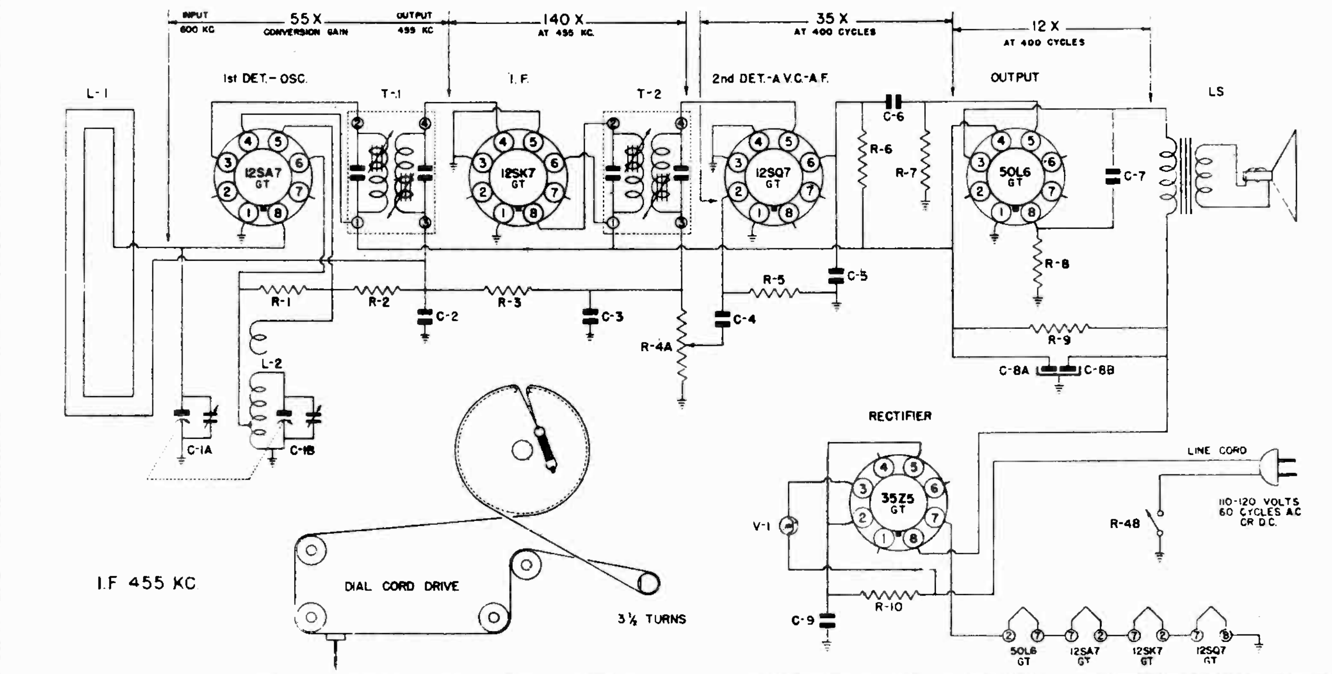


MISCELLANEOUS X 205		
DIAGRAM NO	PART NO	DESCRIPTION
2,6,15,17	72392	BAND SWITCH
3	71173-A	ANTENNA COIL ASSEMBLY
14	71174-A	OSCILLATOR COIL ASSEMBLY
21	73108-A	1st I.F. TRANSFORMER ASS'Y
31	73104	2nd I.F. TRANSFORMER ASS'Y
55	79696	5" SPEAKER & CABLE ASS'Y
48	72049	TONE CONTROL SWITCH
54	72151-	DIAL LAMP 6.3 V. .15 AMP
60	79097-H	WAVE TRAP ASS'Y
65	70053-K	FUSE 1.25 AMP
MISCELLANEOUS - X 203		
SAME AS FOR MODEL X205 WITH FOLLOWING CHANGES		
3	71169-C	ANTENNA COIL ASS'Y
14	71170-C	OSCILLATOR COIL ASS'Y
60	79097-G	WAVE TRAP ASS'Y
CONDENSERS - X 205		
DIAGRAM NO	PART NO	DESCRIPTION
1	22055-AR	.003 MFD. 1000V. PAPER
5,7,13,18	71529	TRIMMER & PANEL ASS'Y
8, 19,	71181-C	405 MMFD 2 GANG VARIABLE
9	22055-P	.05 MFD. 400V. PAPER
27	22055-M	.1 MFD. 200V. PAPER
10,26	22055-H	.02 MFD. 200V. PAPER
16 20	72355-H	DUAL PADDER {20-80 MMFDS 300-600 MMFDS
12	22055-I	.05 MFD. 200V PAPER
29	22055-AE	.25 MFD 400V. PAPER
32, 38, 49	22055-H	.01 MFD 600V. PAPER
42, 62	22055-L	.1 MFD. 400 V. PAPER
47	22055-	.05 MFD 600 V. PAPER
52	22055-U	.01 MFD 1000 V. PAPER
51 24	85021	20 MFDS. 150 V ELECTROLYTIC 4 MFDS. "
45, 39	22481	10 MFDS 25 V ELECTROLYTIC
46	85014-B	40 MFDS 150 V ELECTROLYTIC
34, 37	27701-0	250 MMFDS MICA
22	27723 0	50 MMFDS MICA
59	22055-R	.005 MFD 1000V PAPER

CONDENSERS - X 203		
SAME AS FOR MODEL X205 WITH FOLLOWING CHANGES		
DIAGRAM NO	PART NO	DESCRIPTION
16	71503-E	SINGLE PADDER 300-600 MMFDS
23	27734-W	6000 MMFDS MICA (REPLACES "20")
RESISTORS X 205		
4	13080	50 OHMS ¼ WATT
56	13164	50,000 OHMS ¼ WATT
30	13001	1 MEG ¼ WATT
40,43,50	13171	250,000 OHMS ¼ WATT
44	13147	300,000 OHMS ¼ WATT
11, 28	13115	400 OHMS ¼ WATT
25	3133	3,000 OHMS ¼ WATT
58	13149	6,000 OHMS ¼ WATT
36	13116	2,000 OHMS ¼ WATT
41,57	13031	00,000 OHMS ¼ WATT
35, 61	13043	150,000 OHMS ¼ WATT
53	78553	190" WIRE WOUND TAPPED AT 40"
33	79204	250,000 OHMS VOL. CONTROL & S.W.
RESISTORS X-203		
SAME AS FOR MODEL X205 EXCEPT "4" IS NOT USED		
CHANGES IN RESISTORS FOR 220-240 VOLTS		
53	78553	NOT USED
63	83021	275 OHMS TAPPED @ 40. W.W.
64	79265	180 OHMS LINE RES. CORD

PORTO-PRODUCTS, INC.

MODELS PA-510, PB-520



DUMMY ANT IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.1 MFD.	Lug on trimmer No. 6 on rear section of gang (see figure below for location of trimmer.)	**455 KC**	Any point where it does not affect the signal.	**1 - 2**	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3 - 4	1st I.F.	
LOOP	Radiation to set loop	**1400 KC**	**1400 KC**	**5**	Broadcast Oscillator	Adjust for maximum output
LOOP	Radiation to set loop	**1400 KC**	Tune to 1400 KC generator signal.	**6**	Broadcast Antenna	Adjust for maximum output.

APPROXIMATE STAGE GAIN DATA

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC signal with 400 cycles modulation (use nearby frequency if local station interferes.)

2. For R.F. and I.F. measurements connect negative terminal of a 3-volt battery (two 1½ volt cells in series) to A.V.C. lead and positive terminal to chassis. This provides a definite operating point.

3. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)

4. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

The R.F. and I.F. stage gains shown below are less than under normal operating conditions due to the use of 3 volts fixed bias in order to establish a definite operating point. Therefore, these values are not intended to indicate the full capacity of a stage.

Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

ALIGNMENT PROCEDURE

1. Remove chassis and loop from cabinet.

2. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, release pointer clip on dial and reposition pointer.

3. Connect an output meter across the speaker voice coil or from the plate of the 50L6GT tube to chassis through a .1 Mfd. condenser.

4. Connect the ground lead of the signal generator to the receiver chassis through a .25 Mfd. condenser.

5. Set volume control at maximum volume position and use a weak signal from the signal generator.

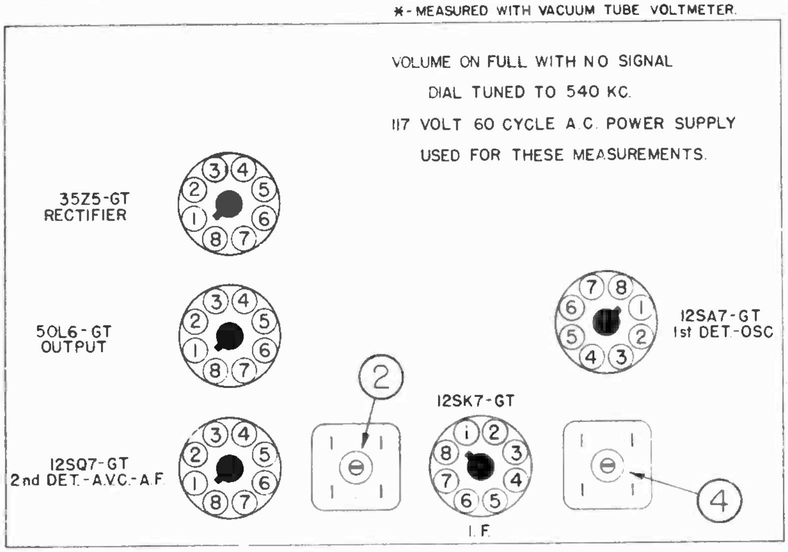
MODELS PA-510, PB-520 PORTO-PRODUCTS, INC.

SOCKET VOLTAGES

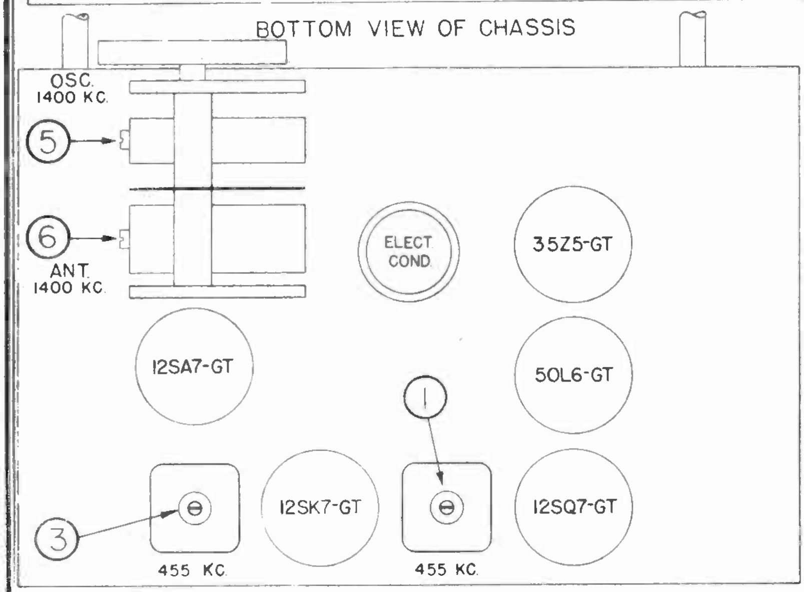
HEATER VOLTAGES MEASURED ACROSS SOCKET TERMINALS. / VOLTAGES MEASURED BETWEEN SOCKET TERMINALS & CHASSIS

TERM NO	TO	TERM NO.	A.C. VOLTS	TUBE TYPE	Socket Terminal No. 1	2	3	4	5	6	8
2	-	7	12	12SA7-GT	0		75	75	-8.7 *	0	-0.7 *
2	-	7	12	12SK7-GT	0		0	-0.7 *	0	75	75
7	-	8	12	12SQ7-GT	0	-1 *	0	-0.7 *	0	50 *	
2	-	7	50	50L6-GT			115	75	0		4.5
2	-	7	31	35Z5-GT					115 A.C.		125
2	-	3	5.6	" "							

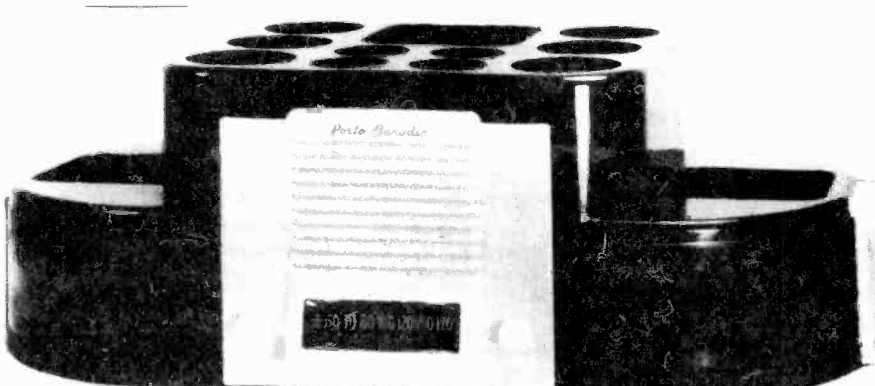
*- MEASURED WITH VACUUM TUBE VOLTMETER.



BOTTOM VIEW OF CHASSIS



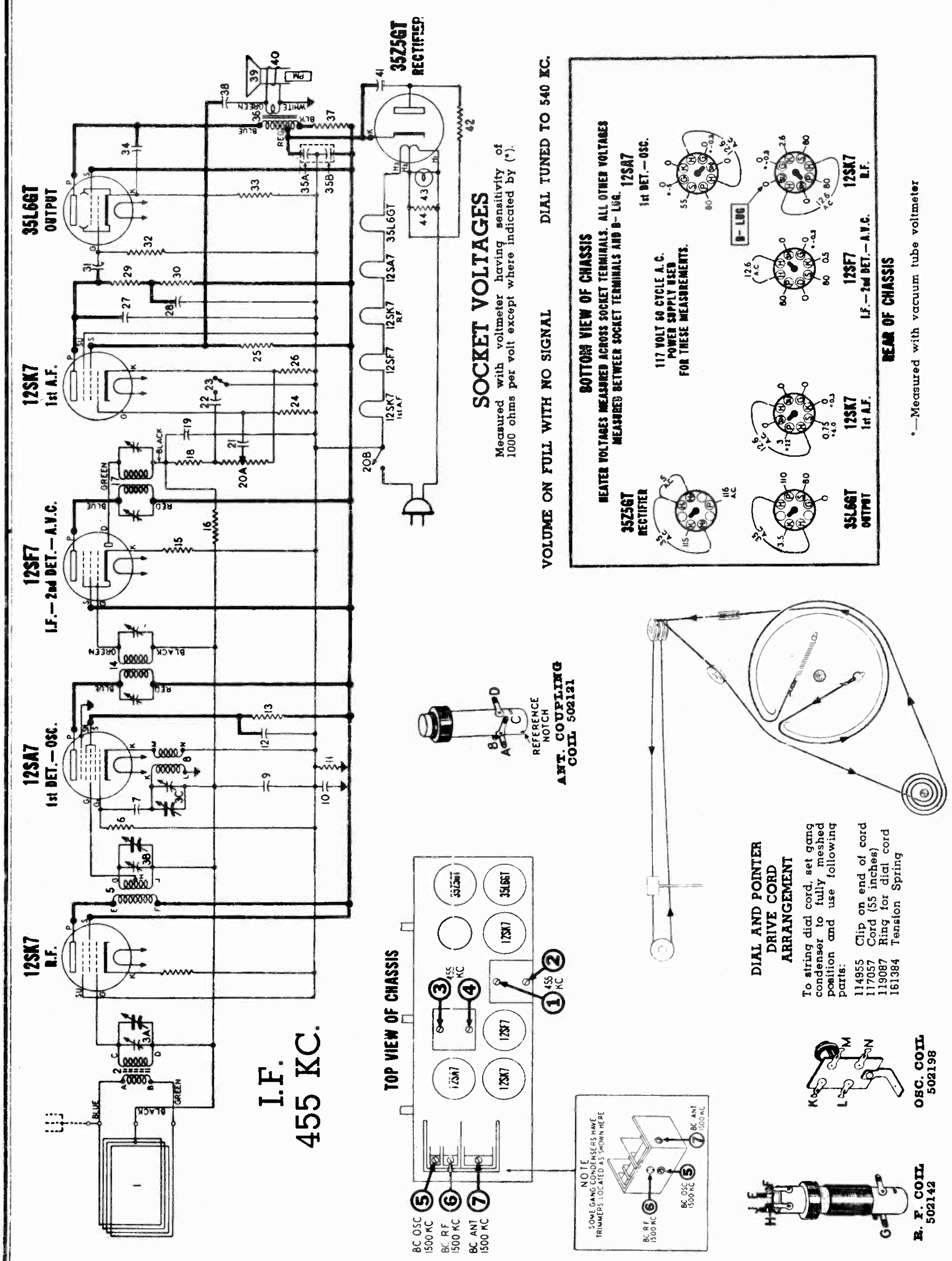
TOP VIEW OF CHASSIS



PARTS LIST

Diagram No.	Part No.	Description
		CONDENSERS
C-1A, 1B	6-6	Condenser—variable gang (with drum)
C-2		Condenser—.05 Mfd. 200 volt
C-3		Condenser—mica 250 Mmfd. 500 volt
C-4		Condenser—.01 Mfd. 200 volt
C-5		Condenser—mica 250 Mmfd. 500 volt
C-6		Condenser—.01 Mfd. 200 volt
C-7		Condenser—.02 Mfd. 400 volt
C-8A, 8B	3-3	Condenser-electrolytic A—20 Mfd. 150 volt B—40 Mfd. 150 volt
C-9		Condenser—.1 Mfd. 200 volt
		RESISTORS
R-1		Resistor—carbon 10,000 ohms 1/3 watt
R-2		Resistor—carbon 10 Meg. 1/3 watt
R-3		Resistor—carbon 2 Meg. 1/3 watt
R-4A, 4B		Volume control—with switch; .5 Meg.
R-5		Resistor—carbon 10 Meg. 1/3 watt
R-6		Resistor—carbon 500,000 ohms 1/3 watt
R-7		Resistor—carbon 500,000 ohms 1/3 watt
R-8		Resistor—carbon 150 ohms 1/3 watt
R-9		Resistor—carbon 2000 ohms 1 watt
R-10		Resistor—carbon 10 ohms 1/3 watt
		COILS AND TRANSFORMERS
L-1	13-3	Loop antenna
L-2	14-4	Coil—Oscillator
T-1	15-3	Transformer—1st I.F.
T-2	15-3	Transformer—2nd I.F.
		OTHER ELECTRICAL PARTS
L-S	8-11	Speaker—P.M. dynamic (4-inch) with output transformer
V-1		Lamp—dial (Mazda 47) 6-8V. 150 Ma.
	18-2	Line cord with plugs
		Cone and voice coil for speaker
	2-18	Base for mtg. electrolytic condenser
		Cabinet—walnut (model PB 520)
		Cabinet—ivory (model PB 510)
		Clip—for mtg. handle
		Clip—for mtg. escutcheon
		Cord—dial drive (10 in. required) per ft
	7-11	Dial scale
		Dial scale backing
		Escutcheon—ivory (model PB 520)
		Escutcheon—gold (model PB 510)
		Handle—ivory (model PB 520)
		Handle—gold (model PB 510)
	36-23	Knob—ivory (model PB 520)
	36-23	Knob—gold (model PB 510)
	2-36	Pointer
		Retaining ring for tuning shaft
		Shaft—tuning control
	22-1	Socket—octal base—specify molded or laminated
	22-12	Socket—for line cord
		Socket—dial lamp
	17-1	Spring—dial cord tension
	2-20	Washer—spring washer for tuning shaft
	7-13	Window—dial

PURE OIL CO., U.S.A. MODELS 506X, 507X, CHASSIS 6D15SW, 6D25SW



MODELS 506X, 507X,
CHASSIS 6D15SW, 6D25SW

PURE OIL CO., U.S.A.

DIA-GRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
3A-3B-3C	502123	Condenser—variable gang (with drum).
7	502159	Condenser—mica—50 Mmfd. 500 Volt
9	502157	Condenser—.05 Mfd. 400 volt
10	502158	Condenser—.2 Mfd. 400 volt
12	502262	Condenser—.25 Mfd. 200 Volt
19	502160	Condenser—mica—110 Mmfd. 500 Volt
21	502453	Condenser—.002 Mfd. 400 Volt
22	502470	Condenser—.0008 Mfd. 400 Volt
27	502160	Condenser—Mica—110 Mmfd. 500 Volt
28	502153	Condenser—.05 Mfd. 200 Volt
31	502156	Condenser—.004 Mfd. 400 Volt
34	502151	Condenser—.01 Mfd. 400 Volt
35A-35B	500256	Condenser — electrolytic A-40 Mfd. 150 Volt B-20 Mfd. 150 Volt
38	502152	Condenser—.02 Mfd. 400 Volt
41	502157	Condenser—.05 Mfd. 400 Volt
		RESISTORS
4	502125	Resistor—carbon 220 Ohms 1/4 watt
6	502130	Resistor—carbon 22,000 Ohms ¼ Watt
11	502133	Resistor—carbon 220,000 Ohms ¼ Watt
13	502291	Resistor—carbon 4700 Ohms, ¼ Watt
15	502264	Resistor—carbon 47 Ohms ¼ Watt
16	502269	Resistor—carbon 3.3 Meg. ¼ Watt
18	502131	Resistor—carbon 47,000 Ohms ¼ Watt
20A-20B	502145	Volume control 500,000 Ohms (with switch)
24	502136	Resistor—carbon 10 Meg. ¼ Watt
25	502135	Resistor—carbon 2.2 Meg. ¼ Watt
26	502128	Resistor—carbon 2200 Ohms ¼ Watt
29-30	502133	Resistor—carbon 220,000 Ohms ¼ Watt
32	502134	Resistor—carbon 470,000 Ohms ¼ Watt
33	502138	Resistor—carbon 130 Ohms ¼ Watt
37	502469	Resistor—carbon 1500 Ohms 1 Watt
42	502574	Resistor—carbon 33 Ohms ½ Watt
44	502140	Resistor—carbon 390 ohms ¼ Watt
		COILS & TRANSFORMERS
1	502504	Loop Antenna
2	502121	Coil—antenna coupling
5	502142	Coil—R.F.
8	502198	Coil—oscillator
14	502102	Transformer 1st I.F.
17	502103	Transformer 2nd I.F.
36	502213	Trans.—output, speaker with prefix "R"
36	502904	Trans.—output, speaker with prefix "A"
36	504244	Trans.—output, speaker with prefix "W"
36	504756	Trans.—output, speaker with prefix "Y"
36	504758	Trans.—output, speaker with prefix "Z"
36	504781	Trans.—output, speaker with prefix "C"
		OTHER ELECTRICAL PARTS
23	500546	Switch-tone control
39	502214	Cone & voice coil, spkr. with prefix "R"
39	502903	Cone & voice coil, spkr. with prefix "A"
39	504245	Cone & voice coil, spkr. with prefix "W"
39	504757	Cone & voice coil, spkr. with prefix "Y"
39	504759	Cone & voice coil, spkr. with prefix "Z"
39	504782	Cone & voice coil, spkr. with prefix "C"
40	502998	Speaker—P.M. dynamic (5 inch)
43	118921	Lamp—dial (Mazda 47) 6-8V. 150 Ma.
		MISCELLANEOUS PARTS
	502502	Back for cabinet
	116467	Base for mtg. electrolytic condenser
	502506	Clamp—dial scale mtg.
	112745	Clip—coil mtg.
	114955	Clip—retainer on end of dial cord
	500497	Clip—retainer for cabinet back
	116563	Connector—for antenna leads
	117657	Cord—dial drive (55 in. required) per ft.
	500324	Cover—cardboard, for elect. cond.
	502500	Dial scale—glass
	502367	Pointer
	81145	Retaining ring for tuning shaft
	119087	Ring for dial cord
	17063	Screw—No. 6 x ¼
	114628	Screw—No. 8 x ½ chassis mtg.
	502173	Shaft—tuning control
	116690	Socket—octal base
	160392	Socket—octal (rectifier)
	500499	Socket—dial lamp (with leads)
	161384	Spring—dial cord tension
	111456	Washer—spring washer for tuning shaft

ALIGNMENT PROCEDURE

1. Remove chassis and loop antenna from cabinet. Reconnect loop to chassis and space it approximately same distance from chassis as when installed in cabinet.
2. Note that there are four calibrating lines stamped into the metal dial frame. When gang condenser is fully meshed, dial pointer should be in the position indicated by first line at the left. If it is set incorrectly, release pointer clip on dial cord and reposition pointer.
3. Connect an output meter across the speaker voice coil or from plate of 35L6GT tube to B— through a .1 Mfd. condenser (see voltage chart for convenient B— connection).
4. Connect ground lead from signal generator to B— through a .25 Mfd. condenser.
5. Set volume control at maximum volume position and use a weak signal from the signal generator.

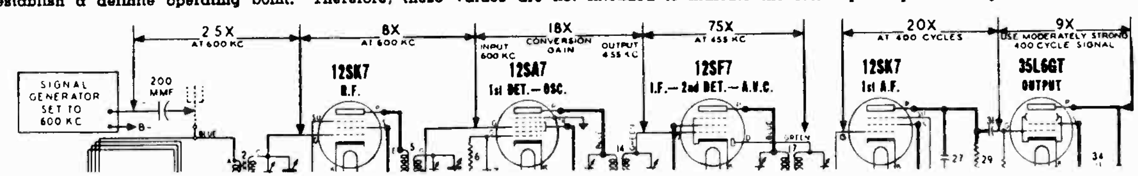
DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
200 MMFD. Mica Condenser	Control Grid of 12SA7	455 KC	Any point where it does not affect the signal	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Set pointer to 1500 KC reference line stamped into metal dial plate (first line at the right)	5	Broadcast Oscillator (Shunt)	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Tune to 1500 KC generator signal	6	Broadcast R.F.	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Tune to 1500 KC generator signal	7	Broadcast Antenna	Adjust for maximum output.

APPROXIMATE STAGE GAIN DATA

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. For R.F. and I.F. measurements connect negative terminal of a 3 volt battery (two 1½ volt cells in series) to A.V.C. lead and positive terminal to B—. This provides a definite operating point. IMPORTANT: Disconnect battery when measuring audio stage gains.
3. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
4. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

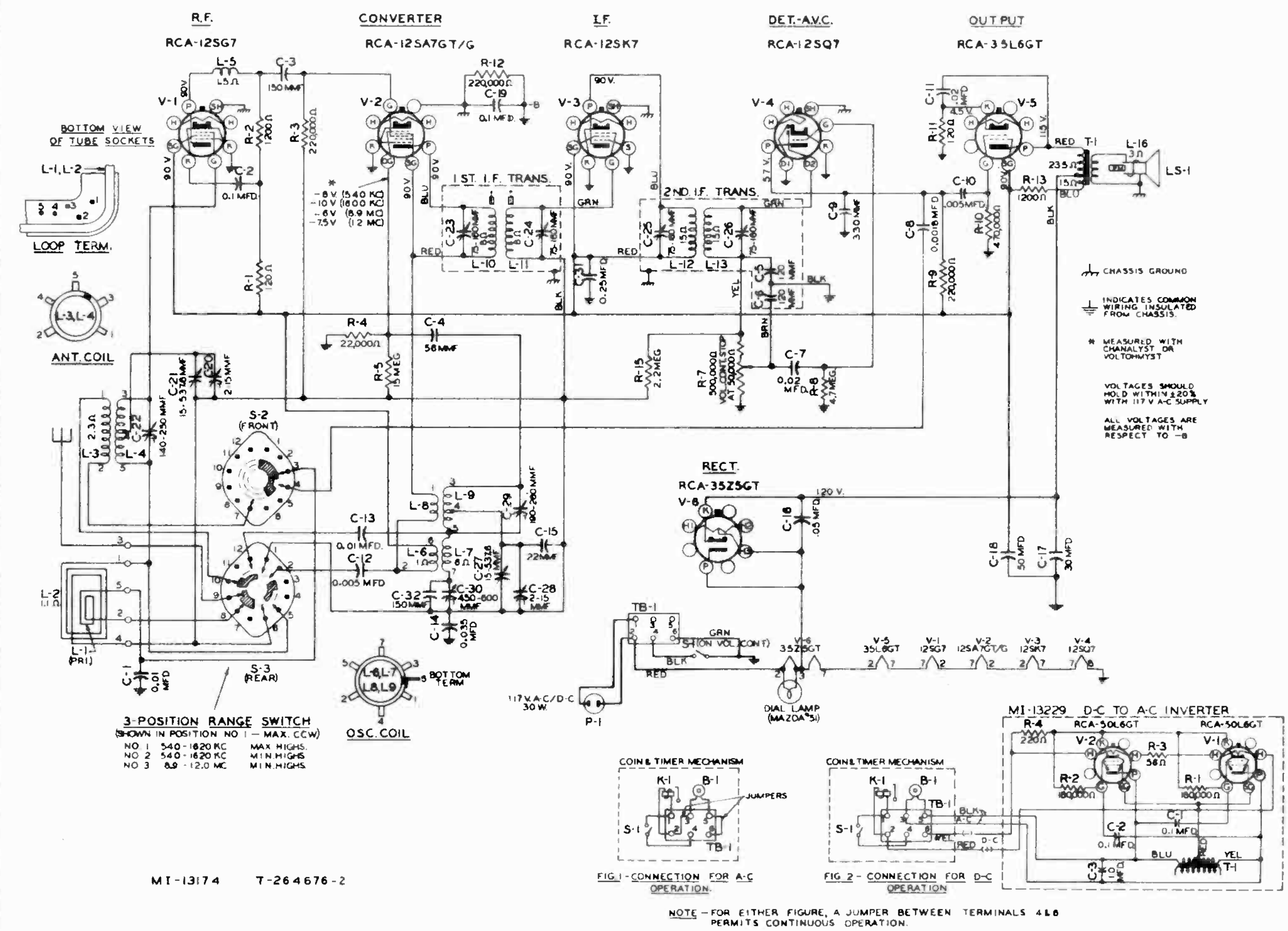
The R.F. and I.F. stage gains shown below are less than under normal operating conditions due to the use of 3 volts fixed bias in order to establish a definite operating point. Therefore, these values are not intended to indicate the full capability of a stage.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

RADIO CORP. OF AMERICA

MODELS MI-13174-1, MI-13174-3



STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC 1023B
39612	Capacitor—Mica, 22 mmf. (C15)
39622	Capacitor—Mica, 56 mmf. (C4)
39632	Capacitor—Mica, 150 mmf. (C3, C32)
70417	Capacitor—Mica trimmer, 140-250 mmf., mounted on antenna coil (C22)
39839	Capacitor—Adjustable mica, comprising 1 section of 190-260 mmf. and 1 section of 450-600 mmf. (C29, C30)
39640	Capacitor—Mica, 330 mmf, (C9)
70712	Capacitor—Tubular, .0018 mfd. 800 volts (C8)
70627	Capacitor—Tubular, .005 mfd. 600 volts, (C10, C12)
70652	Capacitor—Tubular, .01 mfd. 1000 volts (C1, C13)
70711	Capacitor—Tubular, .02 mfd. 700 volts (C7, C11)
70635	Capacitor—Tubular, .035 mfd. 600 volts (C14)
70615	Capacitor—Tubular, .05 mfd. 400 volts (C16)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C2, C19)
70618	Capacitor—Tubular, 0.25 mfd. 400 volts (C31)
39152	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts, and 1 section of 50 mfd., 150 volts (C17, C18)
70416	Coil—Antenna coil (L3, L4, C22)
39892	Coil—Oscillator coil (L6, L7, L8, L9)
70418	Coil—Peaking coil (L5)
70700	Condenser—Variable tuning condenser (C20, C21, C27, C28)
36242	Control—Volume control and power switch (R7, S1)
32634	Cord—Drive cord (approx. 49 inches overall length)
70392	Cord—Power cord
36237	Drum—Drive drum
37068	Indicator—Station selector indicator
11765	Lamp—Dial lamp (Mazda 51)
70980	Lead—Antenna lead
39841	Loop—Antenna loop (L1, L2)
36229	Plate—Dial back plate complete with drive cord pulleys less dial
36230	Pulley—Drive cord pulley
30189	Resistor—120 ohms, ¼ watt (R1, R11)
30731	Resistor—1200 ohms ¼ watt (R2)
6134	Resistor—1200 ohms, 1 watt (R13)
30492	Resistor—22,000 ohms, ¼ watt (R4)
14583	Resistor—220,000 ohms, ¼ watt (R3, R9, R12)
30648	Resistor—470,000 ohms, ¼ watt (R10)
30649	Resistor—2.2 megohms ¼ watt (R15)
30931	Resistor—4.7 megohms, ¼ watt (R8)
38785	Resistor—15 megohms, ¼ watt (R5)
36897	Shaft—Tuning knob shaft
34449	Socket—Lamp socket
37605	Socket—Tube socket, moulded
31251	Socket—Tube socket, wafer
31418	Spring—Drive cord tension spring
39837	Switch—Range switch (S2, S3)
36800	Transformer—Output transformer (T1)
70411	Transformer—First I-F transformer (L10, L11, C23, C24)
70412	Transformer—Second I-F transformer (L12, L13, C5, C6, C25, C26)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLY
	92510-1
70413	Speaker—5-inch P.M. speaker complete with cone and voice coil
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS ASSEMBLIES
70414	Knob—Control knob
30900	Spring—Retaining spring for knob
17397	Feet—Rubber feet for cabinet (4 required)
55063	Clamp—Dial clamp
55064	Dial—Glass dial scale

MODELS MI-13174-1, MI-13174-3

RADIO CORP. OF AMERICA

Alignment Procedure

Critical Lead Dress

1. Dress blue and green leads of both I-F transformers back in shield cans, leaving them as short as possible
2. Dress R-F plate filter capacitor (C2, 0.1 mf.) back against rear chassis apron.
3. Dress yellow and brown leads from 2nd I-F away from all other leads.
4. Dress all heater leads next to chassis.
5. Dress capacitor (C13, .01 mf.) parallel to osc. coil and approximately 3/16 inch from coil.
6. Dress tone control lead and speaker field leads next to chassis and front apron.
7. Dress pilot lamp leads away from ant. coil.
8. Dress leads from loop ant. coil around rectifier tube towards end of chassis.
9. Dress output plate lead against chassis.

Test Oscillator.—Connect high side of test oscillator as shown in chart. Connect low side through a .01 mf. capacitor to common "-B." Keep the output signal as low as possible to avoid A.V.C. action.

Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum clockwise position, station selector switch to broadcast maximum high position (pos. 1), for broadcast alignment and to position 3 for high frequency band.

Dial Pointer Adjustment.—Rotate tuning condenser fully counter-clockwise (plates fully meshed). Adjust indicator pointer to left (max. cap.) mark on dial back plate.

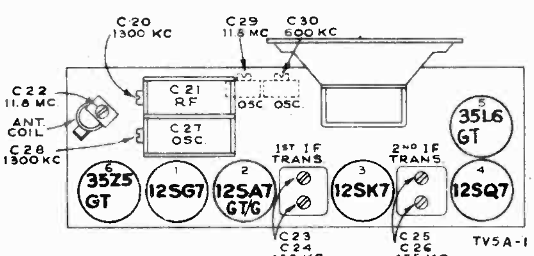
Calibration Scale.—The glass tuning dial may be easily removed from the cabinet and temporarily attached to the dial backing plate.

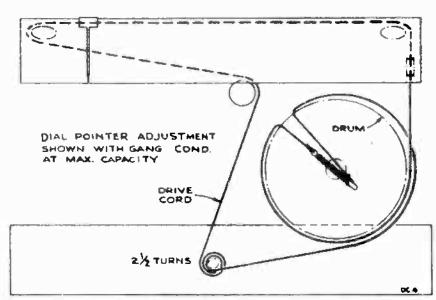
Power Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect high side of the test oscillator to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Pin #8 of 12SA7 in series with 0.1 mfd.	455 kc	Quiet Point at 1,600 kc end of dial	C25, C26 2nd I-F trans.
2				C23, C24† 1st I-F trans.
3	Ant. terminal in series with 220 mmf.	600 kc	600 kc "A" Band	C30 (osc.) Rock gang
4		1300 kc	1300 kc "A" Band	C28 (osc.) C20 (R-F)
5		Repeat 3 Rocking gang		
6		Repeat 3, 4 and 5 for exact cal.		
7	Ant. terminal in series with 0.1 mfd.	11.8 mc	11.8 mc	C29 (osc.)* Rock gang
8	Ant. terminal in series with 47 mmf.	11.8 mc	11.8 mc	C22 (R-F) Rock gang
9	Repeat steps 7 and 8			

* Use minimum capacity peak if two can be obtained. Check for selection of correct peak by tuning receiver to approximately 10.9 mc where a weaker signal should be received.

† Do not readjust C25 or C26.





Specifications

Frequency Range

Broadcast .... 540-1600 kc
Short Wave .... 8.9-12 mc
Intermediate Frequency .... 455 kc
Pilot Lamp .... Mazda No. 51, 6-8 volts, 0.2 amp.

Power Output

Undistorted .... 1.0 watts
Maximum .... 1.5 watts

Loudspeaker (92510-1) "PM"

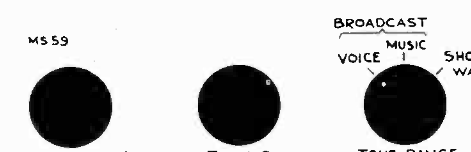
Size 5-inch
V.C. Impedance .... 3.4 ohms at 400 cycles

Power Supply Rating

105-125 volts, AC, 50 or 60 cycles, or DC .... 30 watts
Tuning Drive Ratio 20:1

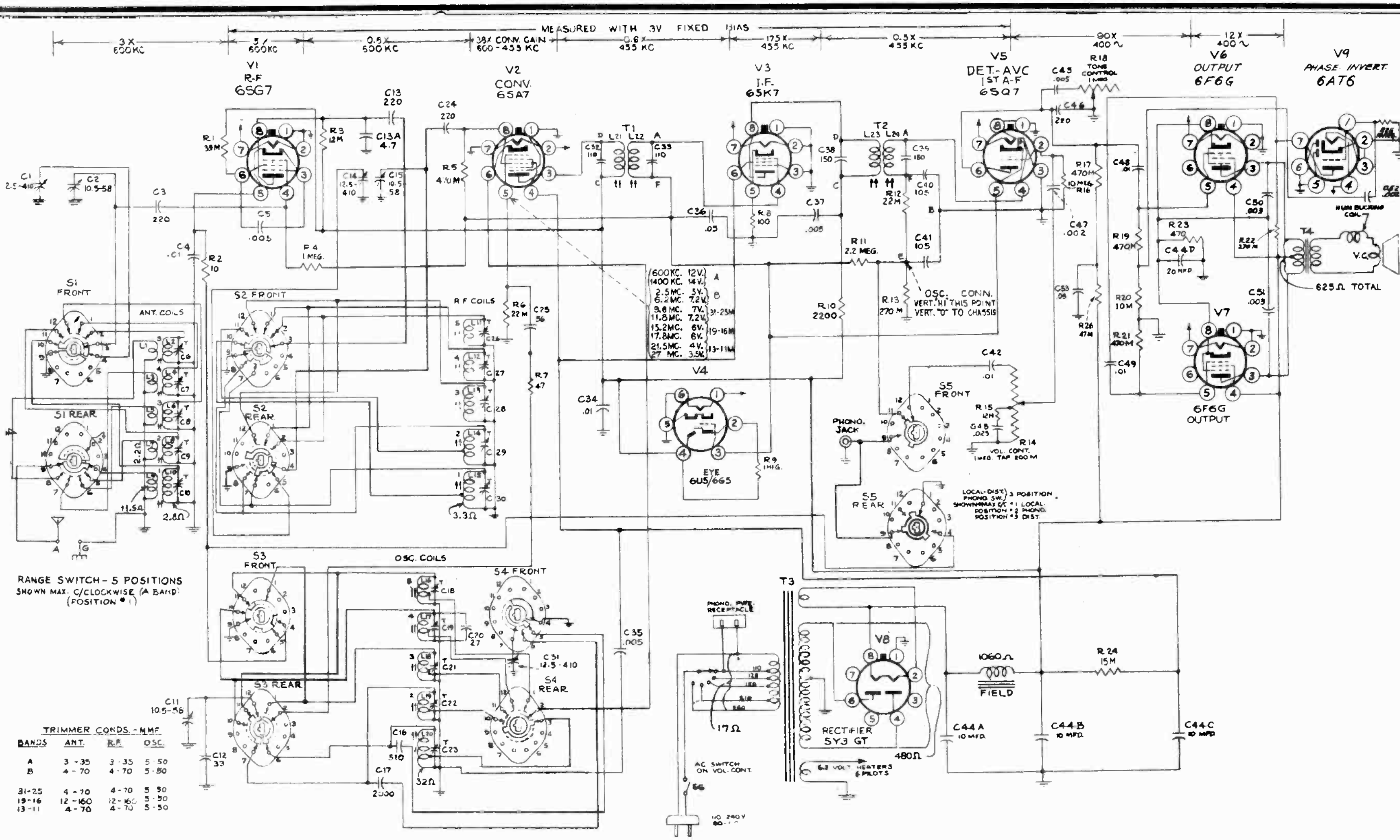
Dimensions

Width .... 16-9/16 inches
Height .... 9¾ inches
Depth .... 10-7/16 inches



RADIO CORP. OF AMERICA

MODELS Q109, Q109X,
CHASSIS RC 602, 602A



Local-Distance-Phono. Switch:

The Local-Distance-Phono. Switch (S5) used in these receivers is unusual in that the rotor segments do not contact consecutive terminals but instead contact every second terminal as explained below.

S5 Front
- Local Position (#1) and Distance Position (#3)
  - Contacts terminals #11 and #12
- Phono. Position (#2)
  - Contacts terminals #9 and #12

S5 Rear
- Local Position (#1) and Phono. Position (#2)
  - No connection
- Distance Position (#3)
  - Contacts terminals #1 and #4

Power Trans. Color Code:

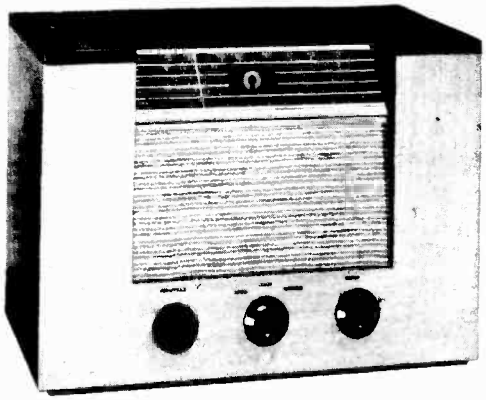
105/125 v. 50-60 cycle—stamped 901944-501
- Primary—Black—Black (6.3 ohms d.c.)
- H.V. Winding—Red—Red/Yellow—Red (510 ohms d.c.)
- Heaters—Brown—Brown
- Rect. Fil.—Yellow—Yellow

105/125 v. 25-60 cycle—stamped 901945-501
- Primary—Black—Black (8 ohms d.c.)
- H.V. Winding—Red—Red/Yellow—Red (460 ohms d.c.)
- Heaters—Brown—Brown
- Rect. Fil.—Yellow—Yellow

110/125/150/210/240 v. 50-60 cycle—stamped 901891-501
- Primary (common)—Black
- Primary 110 v.—Black/Yellow
- Primary 110 v.—Green/Yellow (extension of 110 v. tap)
- Primary 125 v.—Black/Red
- Primary 150 v.—Blue/Yellow
- Primary 210 v.—Green
- Primary 240 v.—Yellow
- D.C. resistance: Black to Black/Red 5.3 ohms
  - Black/Red to Yellow 10.8 ohms
- H.V. Winding—Red—Red/Yellow—Red (470 ohms d.c.)
- Heaters—Brown
- Rect. Fil.—Yellow

MODELS Q109, Q109X

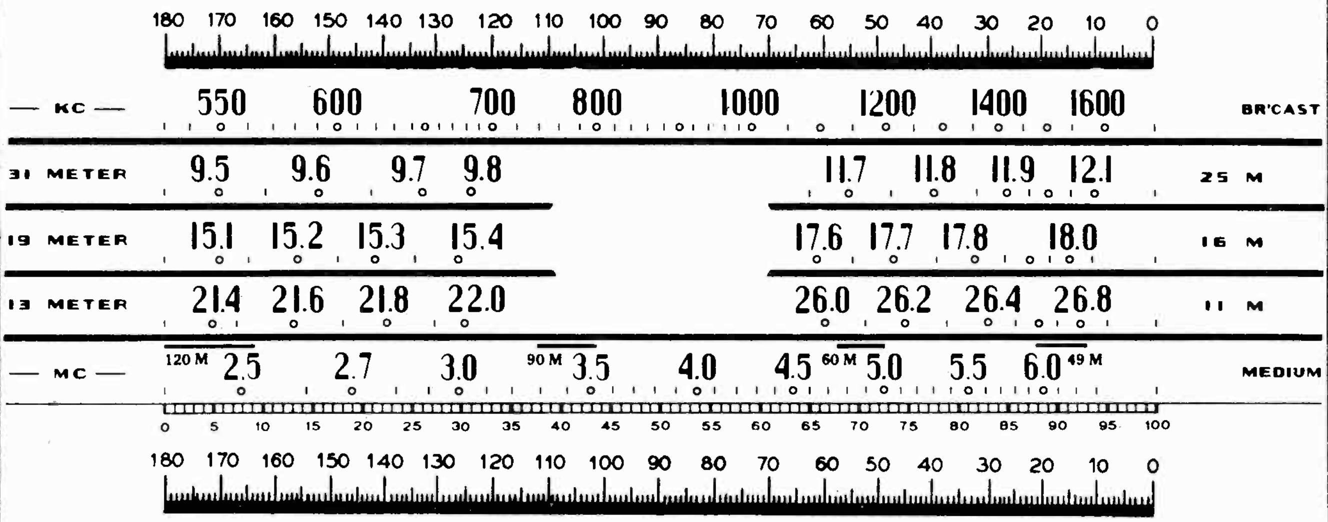
RADIO CORP. OF AMERICA



Loudspeaker

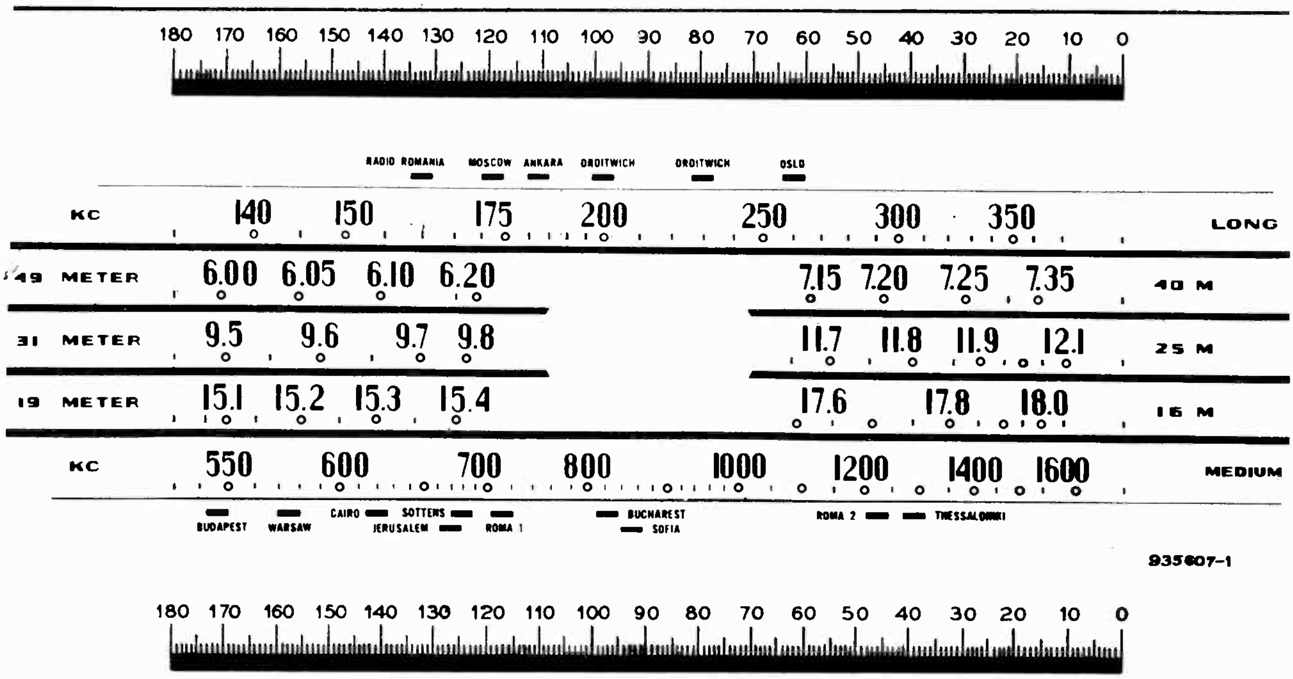
Chassis No. RC 602, RC 602A 92562-1
Type (Electrodynamic) .... 6"x9" Elliptical
V-C Impedance (400 c.p.s.) .... 2.2 ohms

Pilot Lamps .... 2 type 51 6.3 volts, 0.15 amp.
1 tvoe 55 6.3 volts, 0.40 amp.



Reduced Reproduction of Receiver Dial, Q109, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on top calibration scale. For example 150° on the calibration scale corresponds to 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."



Reduced Reproduction of Receiver Dial Q109X, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on top calibration scale. For example 150° on the calibration scale corresponds to 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the Schematic Circuit Diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the indicator-drive-cord-drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "180°" mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the calibration scale drawing which shows the dial with 0-180° calibration scales drawn at top and bottom.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 540 kc mark (the first mark on "A" band to the left of "550"), and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Spread-Band Alignment.—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each spread-band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal-controlled oscillator, or by zero-beating against standard broadcast stations.

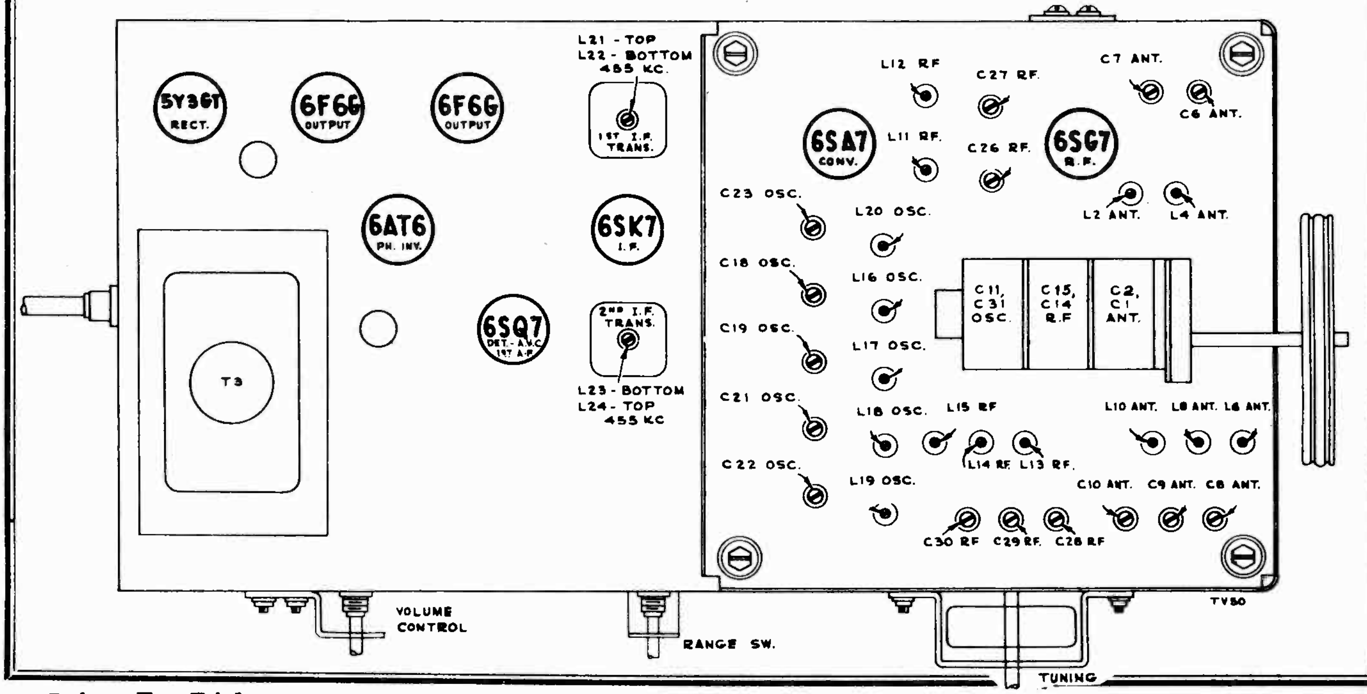
When a test-oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave stations of known frequency, and the magnetite-core oscillator coil for each band should be retouched so that the stations come in at the correct points on the dial.

Q109

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn Range Switch to—	Turn radio dial to—	Adjust the following for max. peak output
1	6SG7 I-F grid in series with .01 mfd.	455 kc	"A" Band	Quiet point near 600 kc (148°)	L23, L24 2nd. I-F trans.
2	6SA7 Det. grid in series with .01 mfd.				L21, L22 1st. I-F trans.
3	Antenna terminal in series with 200 mmfd.	1500 kc	"A" Band	1500 kc (19°)	C23 osc. C30 rf. C10 ant.
4		600 kc		600 kc (148°)	L20 osc. L15 rf.† L10 ant.†
5	Repeat Steps 3 and 4				
6	Antenna terminal in series with 300 ohms	6.2 mc	"B" Band	6.2 mc (14°)	C22 osc.* C29 rf. C9 ant.
7		2.6 mc		2.6 mc (152°)	L19 osc.† L14 rf.† L8 ant.†
8	Repeat Steps 6 and 7				
9	Antenna terminal in series with 300 ohms	11.8 mc	"31-25 Meter" Band	11.8 mc (40°)	C21 osc.* C28 rf.** C8 ant.**
10		9.5 mc		9.5 mc (170°)	L18 osc.† L13 rf.† L6 ant.†
11		17.75 mc	"19-16 Meter" Band	17.75 mc (40°)	C19 osc.* C27 rf.** C7 ant.**
12		15.2 mc		15.2 mc (155°)	L17 osc.† L12 rf.† L4 ant.†
13		26.25 mc	"13-11 Meter" Band	26.25 mc (42°)	C18 osc.* C26 rf.** C6 ant.**
14		21.25 mc		21.25 mc (180°)	L16 osc.† L11 rf.† L2 ant.†

Oscillator tracks above signal on all bands.
*Use minimum capacity peak if two peaks can be obtained.
†These adjustments are pre-set and should not require re-adjustment except when components of the tuning section are changed.
**Rock in—use maximum capacity peak if two peaks can be obtained.

Tube and Trimmer Locations (Top View)



MODELS Q109, Q109X

RADIO CORP. OF AMERICA

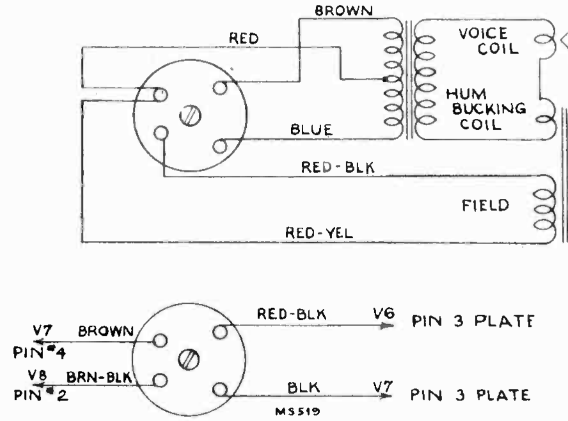
Q109X

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn Range Switch to—	Turn radio dial to—	Adjust the following for max. peak output
1	6SG7 I-F grid in series with .01 mfd.	455 kc	"A" Band	Quiet point near 600 kc (148°)	L23, L24 2nd. I-F trans.
2	6SA7 Det. grid in series with .01 mfd.				L21, L22 1st. I-F trans.
3	Antenna terminal in series with 200 mmfd.	360 kc	"X" Band	360 kc (19°)	C23 osc. C30 rf. C10 ant.
4		160 kc		160 kc (133°)	L20 osc. L15 rf.† L10 ant.†
5	Repeat Steps 3 and 4				
6	Antenna terminal in series with 300 ohms	1500 kc	"A" Band	1500 kc (19°)	C22 osc.* C29 rf. C9 ant.
7		600 kc		600 kc (148°)	L19 osc.† L14 rf.† L8 ant.†
8	Repeat Steps 6 and 7				
9	Antenna terminal in series with 300 ohms	7.2 mc	"49-40 Meter" Band	7.2 mc (44°)	C21 osc.* C28 rf.** C8 ant.**
10		6.1 mc		6.1 mc (141°)	L18 osc.† L13 rf.† L6 ant.†
11		11.8 mc	"31-25 Meter" Band	11.8 mc (40°)	C19 osc.* C27 rf.** C7 ant.**
12		9.5 mc		9.5 mc (170°)	L17 osc.† L12 rf.† L4 ant.†
13		17.75 mc	"19-16 Meter" Band	17.75 mc (40°)	C18 osc.* C26 rf.** C6 ant.**
14		15.2 mc		15.2 mc (155°)	L16 osc.† L11 rf.† L2 ant.†

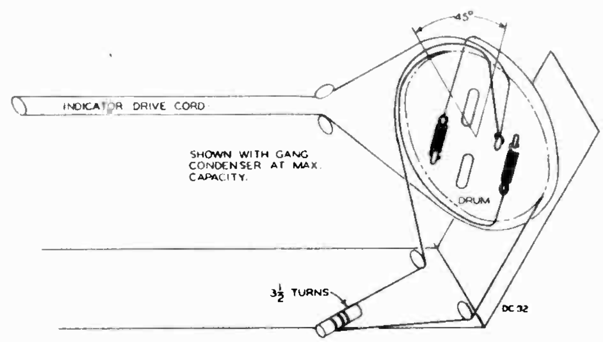
Oscillator tracks above signal on all bands.
*Use minimum capacity peak if two peaks can be obtained.
†These adjustments are pre-set and should not require re-adjustment except when components of the tuning section are changed.
**Rock in—use maximum capacity peak if two peaks can be obtained.

Critical Lead Dress

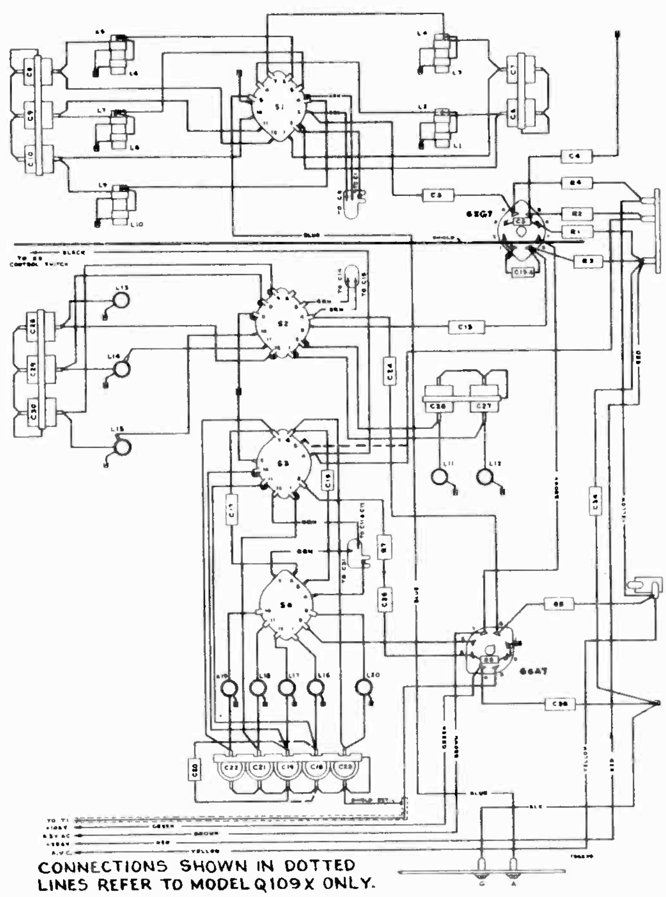
1. Dress C47 and R16 against chassis.
2. Dress R23 against chassis.
3. Dress C48 on power transformer side of terminal board.
4. All resistor and capacitor leads should be as short as practical.
5. Twist electrolytic capacitor leads and dress between chassis and electrolytic capacitor.
6. Twist all A.C. leads and keep close to chassis and away from other component parts and wires.
7. Dress blue treble tone control (R18) lead along intersection of chassis and rear apron and under electrolytic capacitor.
8. Keep tuning indicator and pilot lamp leads away from 6SQ7 tube.
9. Dress C35 against RF plate assembly.
10. Dress C25 and R7 and C24 midway between range switch and RF coil.
11. Keep coil leads to switch and trimmers with minimum slack but not stretched tight.
12. Flexibility of RF plate assembly must be maintained.
13. Dress black lead from phono-radio switch to range switch close to chassis.
14. Dress C13A away from RF shield.
15. Dress C34 against RF plate assembly.
16. Keep all gang leads as short as practical.
17. A loop must be maintained in ground braid connecting RF plate assembly to chassis.
18. Dress blue lead to antenna terminal against RF shield.



Loudspeaker Connections



Dial-Indicator and Drive Mechanism

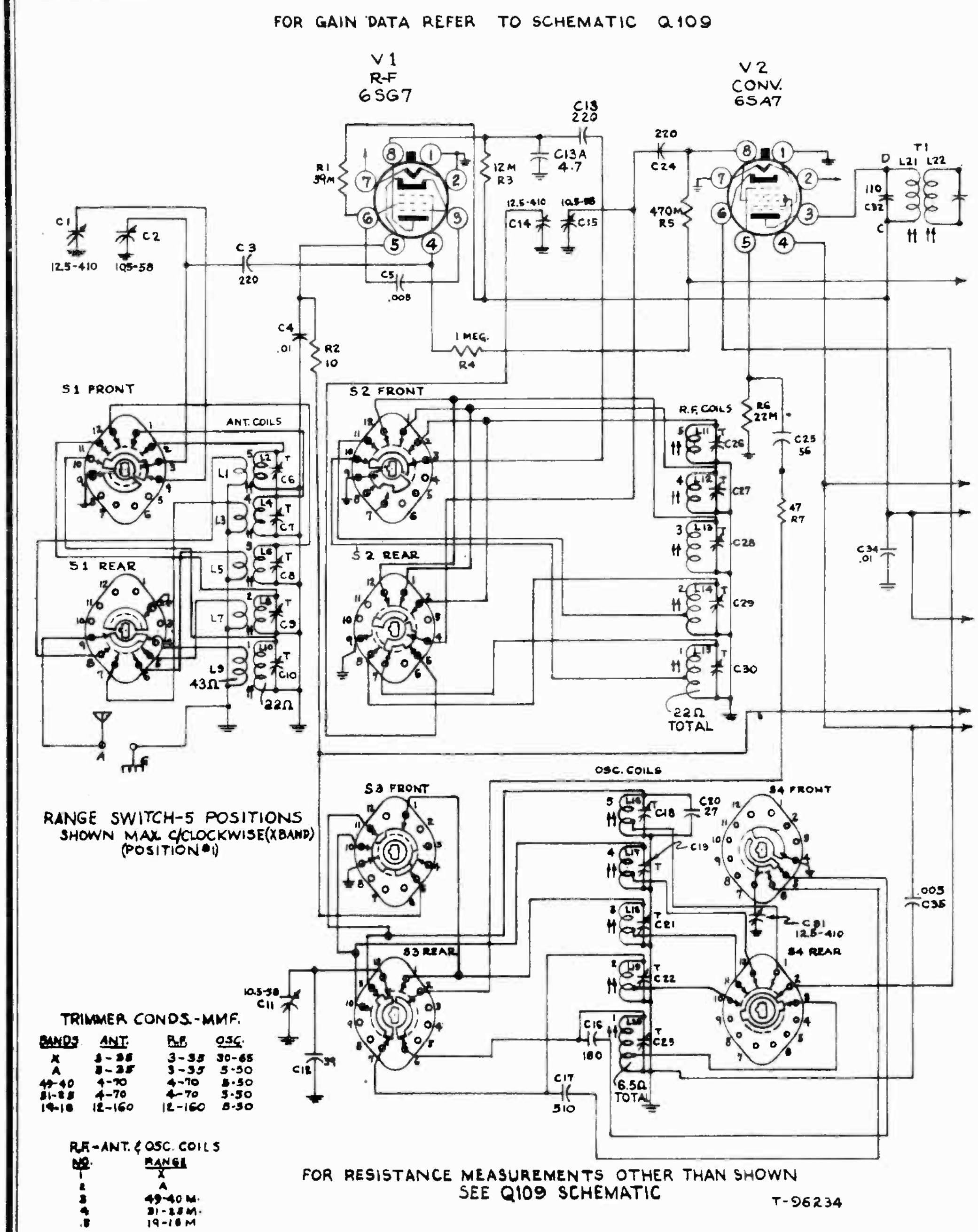


CONNECTIONS SHOWN IN DOTTED LINES REFER TO MODEL Q109X ONLY.

R. F. Wiring Diagram (Bottom View)

RADIO CORP. OF AMERICA

MODELS Q109, Q109X



Frequency Ranges, Q109

Standard Broadcast ("A" Band)	540—1600 kc.	(556—187 m)
Medium Wave ("B" Band)	2.45—6.3 mc.	(122—47.7 m)
"31-25 Meter" Spread Band	9.5 — 12 mc.	(31.6—25 m)
"19-16 Meter" Spread Band	15.1 — 18 mc.	(19.8—16.6 m)
"13-11 Meter" Spread Band	21.4 — 27 mc.	(14 —11.1 m)

Model Q109X will have in place of the "B" Band, and the "13-11 Meter" Band:

Long Wave ("X" Band)	140—375 kc.	(2,140—800 m)
"49-40 Meter" Spread Band	6.—7.3 mc.	(50—41 m)

Intermediate Frequency .... 455 kc.

Tube Complement

(1) RCA 6SG7	R-F Amplifier
(2) RCA 6SA7	1st Detector
(3) RCA 6SK7	I-F Amplifier
(4) RCA 6SQ7	2nd Detector, A.V.C., A-F Amplifier
(5) RCA 6AT6	Phase Inverter
(6) RCA 6F6G	Power Output
(7) RCA 6F6G	Power Output
(8) RCA 5Y3 GT	Rectifier
(9) RCA 6U5/6G5	Tuning Indicator

Power Output Rating

	Undistorted	Maximum
Q109, Q109X	5.0 watts	6.2 watts

Tuning Drive Ratio 22:1

Power Supply Ratings

Symbol	Voltages	Frequency (cycles)	Watts
Rating A	105-125	50-60	80
Rating B	105-125	25-60	80
Rating D	110 position—100 to 115 volts. 125 position—115 to 135 volts. 150 position—135 to 165 volts. 210 position—190 to 230 volts. 240 position—230 to 260 volts.	50/60	80

The desired range may be selected by the proper positioning of a link beneath a cover on the top of the power transformer:

CAUTION: Remove power cord from line receptacle before changing link position.

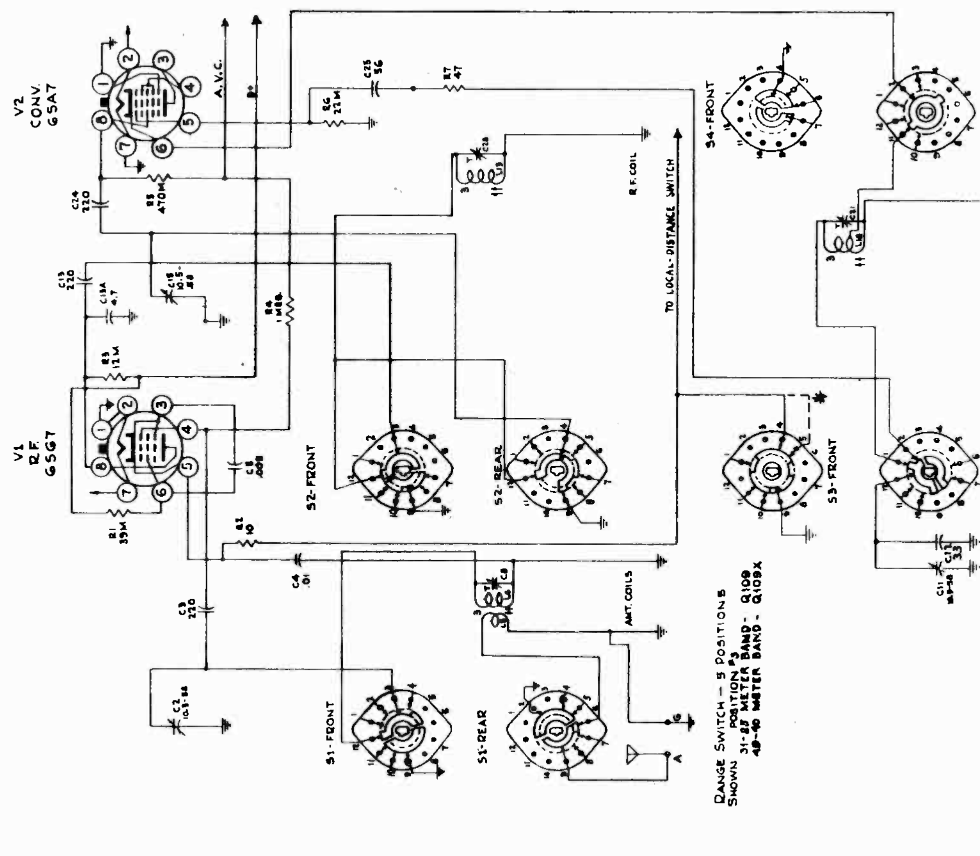
Phonograph Attachment.—A jack is provided on the rear of chassis for connection to a phonograph. The cable from the attachment should be terminated in a Stock No. 31048 plug.

When phonograph is in use, if necessary, tune set off frequency from any very strong station.

CLARI-SKEMATIX

Registered Trademark

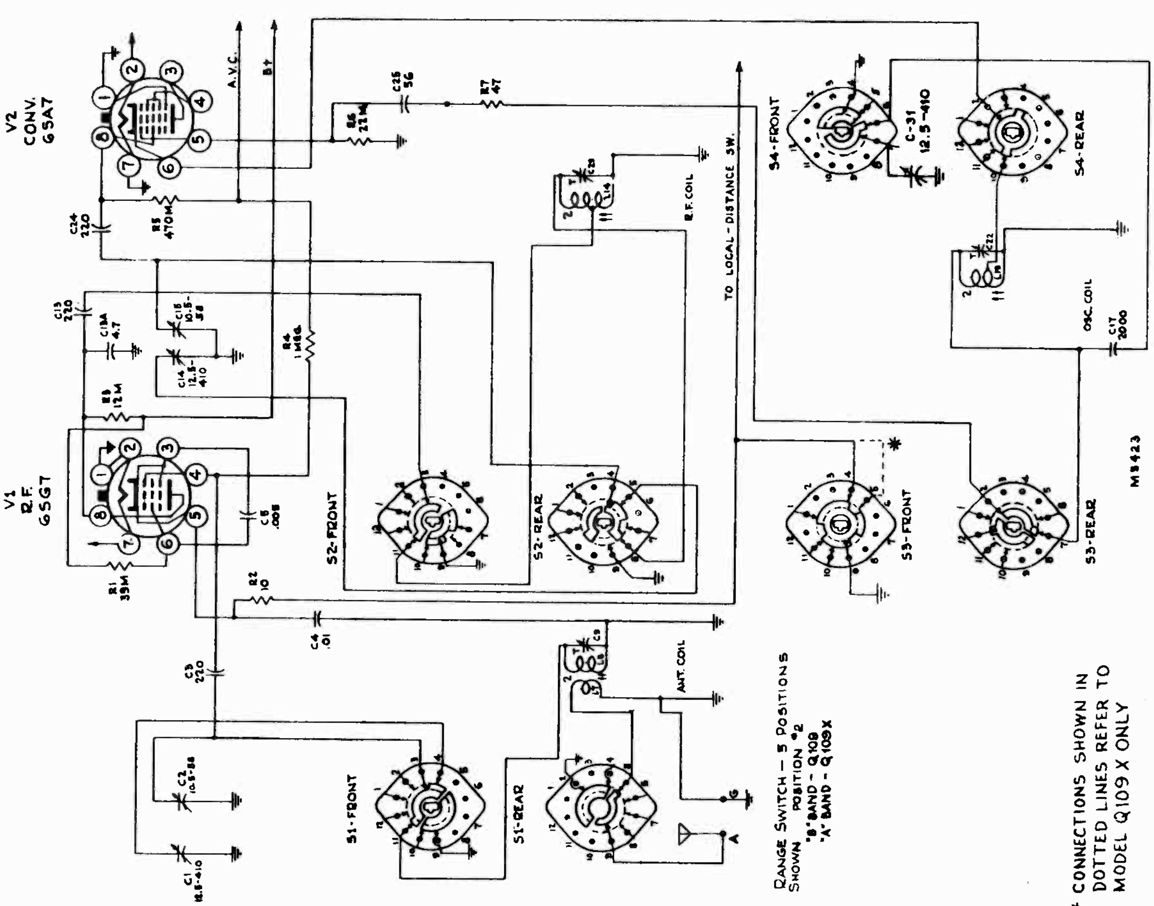
MODELS Q109, Q109X RADIO CORP. OF AMERICA



* CONNECTIONS SHOWN IN DOTTED LINES REFER TO MODEL Q109X ONLY

R. F. Section
Simplified Schematic Diagram

NOTE: Circuits not in use are either disconnected or grounded thru the range switch contacts but are not illustrated.

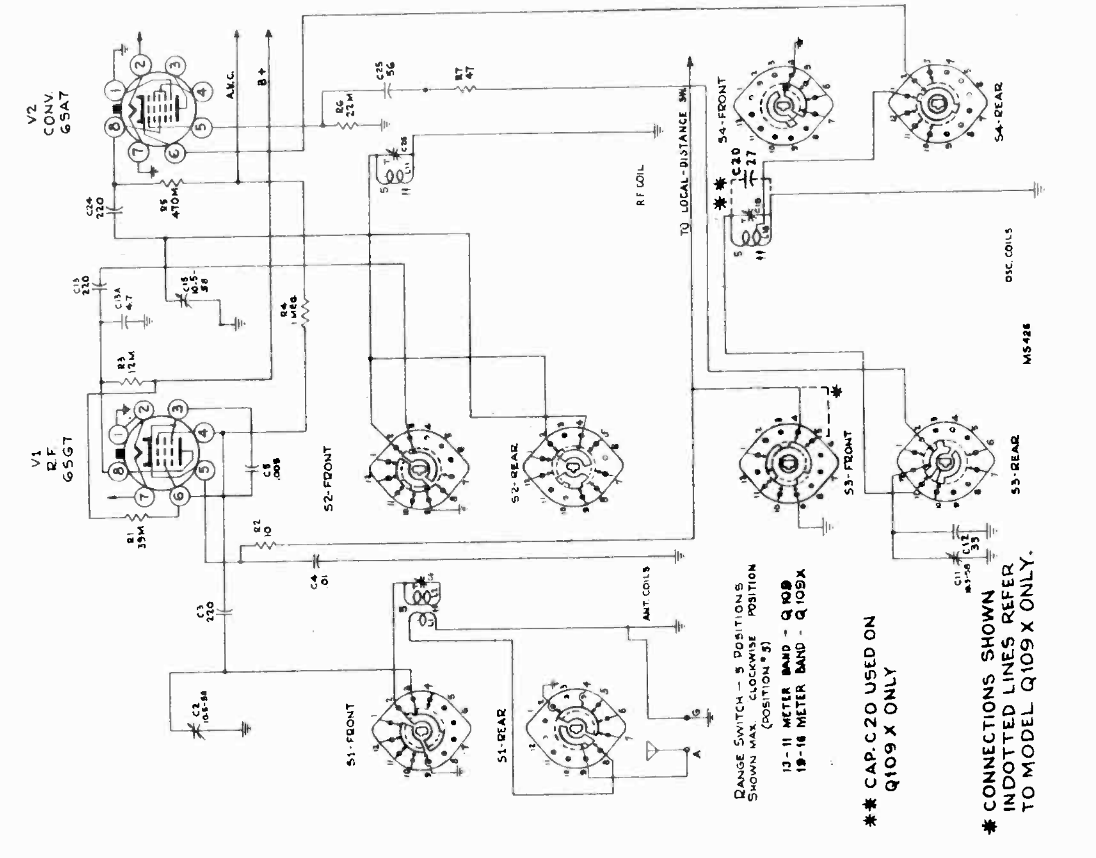


* CONNECTIONS SHOWN IN DOTTED LINES REFER TO MODEL Q109X ONLY

R. F. Section
Simplified Schematic Diagram

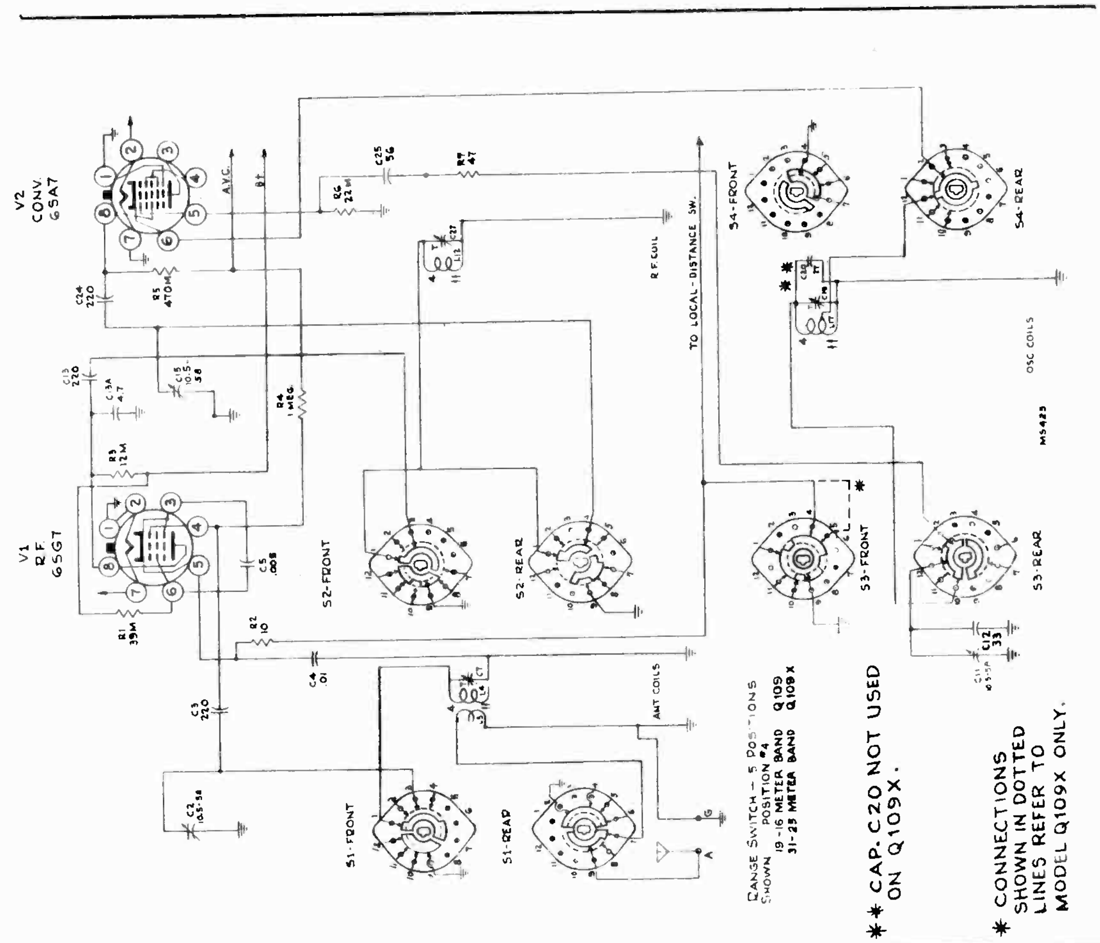
RADIO CORP. OF AMERICA

MODELS Q109, Q109X



R. F. Section
Simplified Schematic Diagram

NOTE: Circuits not in use are either disconnected or grounded thru the range switch contacts but are not illustrated.



R. F. Section
Simplified Schematic Diagram

MODELS Q109, Q109X

RADIO CORP. OF AMERICA

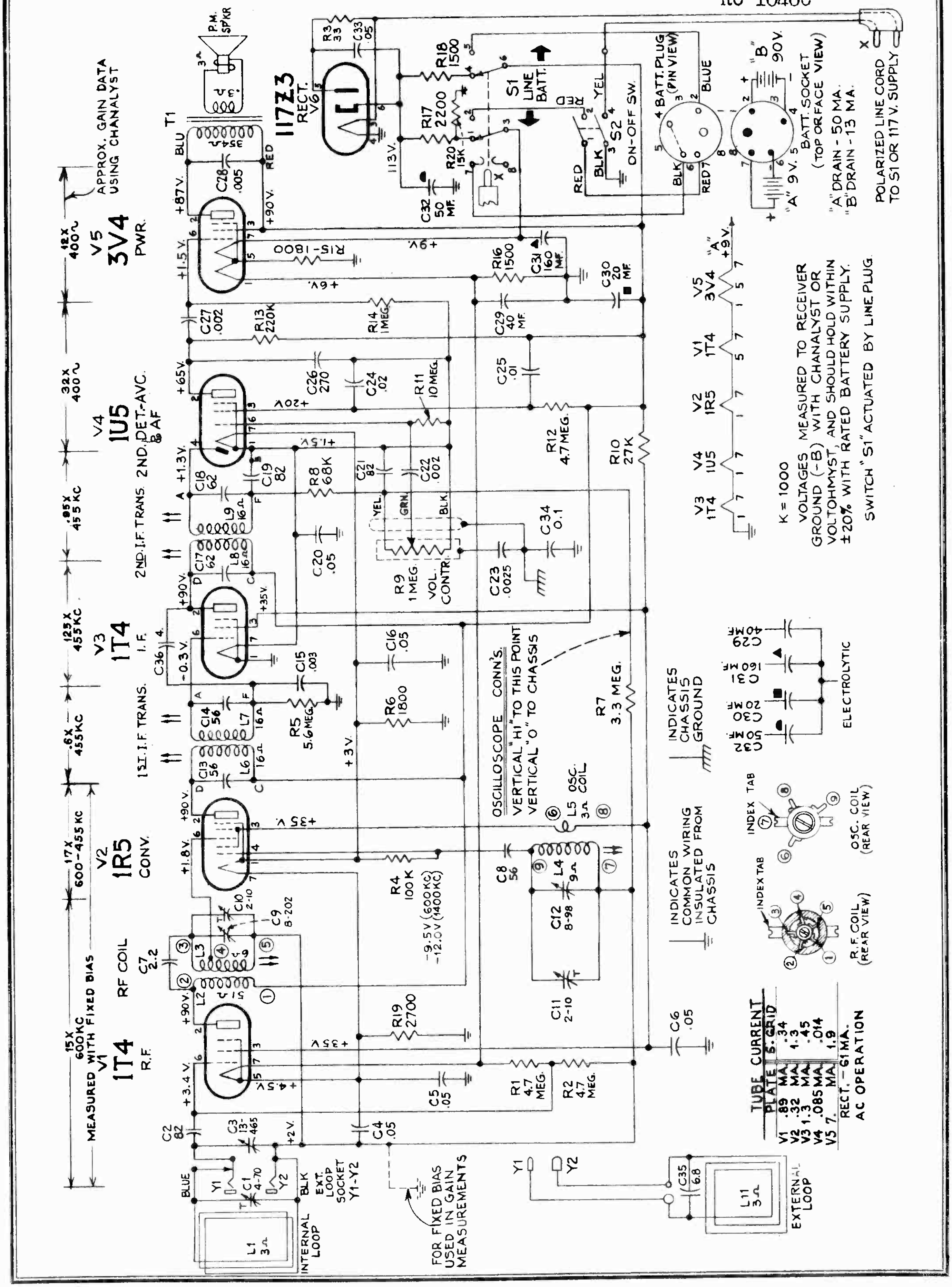
Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC 602-Q109
	RC 602A-Q109X
12930	Board—"Antenna-Ground" board
*70952	Bracket—L.H. bracket complete with drive cord pulley
*70951	Bracket—R. H. bracket complete with four (4) pulleys
*70840	Cable—Bronze cable (20" long) for band indicator mechanism
35795	Calibrator—Drive Drum Calibrator
*71086	Capacitor—Ceramic, 4.7 mmf. ((C13A)
70935	Capacitor—Ceramic, 27 mmf. (C20)
*73247	Capacitor—Ceramic, 33 mmf. (C12)
71924	Capacitor—Ceramic, 56 mmf. (C25)
71933	Capacitor—Mica, 180 mmf. (C16 for Q109X)
39636	Capacitor—Mica, 220 mmf. (C3, C13, C24, C46)
71932	Capacitor—Mica, 510 mmf. (C16 for Q109, C17 for Q109X)
72526	Capacitor—Mica, 2000 mmf. (C17 for Q109)
70931	Capacitor—Mica trimmer, comprising 1 section of 3-35 mmf. and 2 sections of 4-70 mmf. for Q109 (C8, C9, C10, C28, C29, C30)
*70966	Capacitor—Mica trimmer, comprising 2 sections of 3-35 mmf. and 1 section of 4-70 mmf. for Q109X (C8, C9, C10, C28, C29, C30)
70754	Capacitor—Mica trimmer, comprising 1 section of 4-70 mmf. and 1 section of 12-160 mmf. (C6, C7 for Q109X, C26, C27 for Q109)
70745	Capacitor—Mica trimmer, comprising 1 section of 12-160 mmf. and 1 section of 4-70 mmf. (C6, C7 for Q109, C26, C27 for Q109X)
*70965	Capacitor—Ceramic trimmer, comprising 5 sections of 5-50 mmf. for Q109 (C18, C19, C21, C22, C23)
*70967	Capacitor—Ceramic trimmer, comprising 4 sections of 5-50 mmf. and 1 section of 30-65 mmf. for Q109X (C18, C19, C21, C22, C23)
71592	Capacitor—Moulded paper, .002 mfd., 200 volts (C52)
*71590	Capacitor—Moulded paper, .002 mfd., 600 volts (C47)
71087	Capacitor—Moulded paper, .003 mfd., 1000 volts (C50, C51)
71587	Capacitor—Moulded paper, .005 mfd., 600 volts (C5, C35, C37)
71593	Capacitor—Moulded paper, .005 mfd., 600 volts (C45)
*71589	Capacitor—Moulded paper, .025 mfd., 200 volts (C43)
71585	Capacitor—Moulded paper, .01 mfd., 200 volts (C42)
72219	Capacitor—Moulded paper, .01 mfd., 600 volts (C4, C34, C48, C49)
72527	Capacitor—Moulded paper, .05 mfd., 100 volts (C36)
33014	Capacitor—Electrolytic, comprising three (3) sections of 10 mfd., 450 volts and one (1) section of 20 mfd., 25 volts (C44A, C44B, C44C, C44D)
*70953	Clamp—Mounting clamp for electrolytic capacitor
38201	Clamp—Clamp for drive and pointer cords
70726	Clip—Retaining clip for coils core and stud
70923	Coil—Antenna coil, 13-11 meter band for Model Q109 (L1, L2)
70924	Coil—Antenna coil, 19-16 meter band (L1, L2 for Q109X, L3, L4 for Q109)
70925	Coil—Antenna coil, 31-25 meter band (L3, L4 for Q109X, L5, L6 for Q109)
70928	Coil—Antenna coil, 49-40 meter band for Model Q109X (L5, L6)
70926	Coil—Antenna coil, "B" band for Model Q109 (L7, L8)
70927	Coil—Antenna coil, "A" band (L7, L8 for Q109X, L9, L10 for Q109)
70929	Coil—Antenna coil, "X" band for Model Q109X (L9, L10)
*70964	Coil—R. F. coil, 13-11 meter band for Model Q109 (L11)
*70963	Coil—R. F. coil, 19-16 meter, band (L11 for Q109X, L12 for Q109)
*70962	Coil—R. F. coil, 31-25 meter bond (L12 for Q109X, L13 for Q109)
*70961	Coil—R. F. coil, 49-40 meter band for Model Q109X (L13)
*70960	Coil—R. F. coil, "B" band for Model Q109 (L14)
*70959	Coil—R. F. coil, "A" band (L14 for Q109X, L15 for Q109)
*70958	Coil—R. F. coil, "X" band for Model Q109X (L15)
70920	Coil—Oscillator coil, 13-11 meter band for Model Q109 (L16)
70823	Coil—Oscillator coil, 19-16 meter band (L16 for Q109X, L17 for Q109
70825	Coil—Oscillator coil, 31-25 meter band (L17 for Q109X L18 for Q109)
70921	Coil—Oscillator coil, 49-40 meter band for Model Q109X (L18)
70829	Coil—Oscillator coil, "B" band for Model Q109 (L19)
70789	Coil—Oscillator coil, "A" band (L19 for Q109X, L20 for Q109)
70922	Coil—Oscillator coil, "X" band for Model Q109X (L20)
70957	Condenser—Variable tuning condenser (C1, C2, C11, C14, C15, C31)
*70949	Control—Tone control (R18)
*70948	Control—Volume control and power switch (R14, S6)
*72953	Cord—Drive cord (approx. 45" overall length required)
72913	Cord—Indicator cord (approx. 57" overall length required)
70945	Core—Adjustable core and stud for "X" band antenna coil—for Model Q109X
70938	Core—Adjustable core and stud for "A" band antenna coils, for 31-25 meter band R. F. and oscillator coils for Model Q109's "B" band oscillator coil
70944	Core—Adjustable core and stud for 31-25 meter band antenna coils and for Model Q109's "B" band antenna coil and for Model Q109X's 49-40 meter band antenna coil
70943	Core—Adjustable core and stud for 19-16 meter band antenna coil
70941	Core—Adjustable core and stud for Model Q109's 13-11 meter band antenna coil and for Model Q109X's 49-40 meter band oscillator coil
*70968	Core—Adjustable core and stud for Model Q109X's "X" band R. F. coil
*70969	Core—Adjustable core and stud for "A" band R. F. coil
70937	Core—Adjustable core and stud for 19-16 meter band R. F. and oscillator coils and for Q109's 13-11 meter band oscillator coil
*70970	Core—Adjustable core and stud for Model Q109's 13-11 meter band R. F. coil
70942	Core—Adjustable core and stud for Model Q109X's "X" band oscillator coil
70939	Core—Adjustable core and stud for "A" band oscillator coil
72011	Drum—Band indicator actuating drum—located on range switch shaft
31273	Drum—Condenser drive drum
37396	Grommet—Rubber grommet for mounting R. F. assembly (4 required)
35787	Jack—Phono input socket
5117	Lamp—Band indicator lamp—Mazda 55
11765	Lamp—Dial lamp—Mazda 51
35630	Pulley—Drive cord pulley
5040	Plug—4 contact female plug for speaker cable
36637	Receptacle—AC power receptacle
34761	Resistor—10 ohms, ½ watt (R2)
30732	Resistor—47 ohms, ½ watt (R7)
34765	Resistor—100 ohms, ½ watt (R8)
37278	Resistor—470 ohms, 1 watt (R23)
34767	Resistor—2200 ohms, ½ watt (R10)
30436	Resistor—12,000 ohms, ½ watt (R15)
71085	Resistor—12,000 ohms, 2 watts (R3)
35523	Resistor—15,000 ohms, 2 watts (R24)
30492	Resistor—22,000 ohms, ½ watt (R6, R12)
71084	Resistor—39,000 ohms, 1 watt (R1)
30651	Resistor—270,000 ohms, ½ watt (R13, R22)
30648	Resistor—470,000 ohms, ½ watt (R5, R17, R19, R21)
30652	Resistor—1 megohm, ½ watt (R4, R9)
30649	Resistor—2.2 megohms, ½ watt (R11)
30992	Resistor—10 megohms, ½ watt (R16, R20, R25)
14350	Screw—No. 8-32 square head set screw for drive or band indicator drums
*70950	Shaft—Tuning knob shaft and flywheel
34909	Socket—Band indicator lamp socket
31364	Socket—Dial lamp socket
70827	Socket—Tube socket
9914	Socket—Tube socket for 6AT6 tube
*71554	Socket—Tuning tube socket
31418	Spring—Drive or indicator cord spring
*70955	Switch—"Local-Distance" switch (S5)
*70956	Switch—Range switch (S1, S2, S3, S4)
70917	Transformer—First I. F. Transformer (T1, L21, L22, C32, C33)
70918	Transformer—Second I. F. transformer (T2, L23, L24, C38, C39, C40, C41)
*71154	Transformer—Power transformer, 117 volts, 25 cycle (T3)
*71153	Transformer—Power transformer, 117 volts, 60 cycle (T3)
*70947	Transformer—Power transformer, 110/125/150/210/240 volts, 50/60 cycle (T3)
34373	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES
	Stamped 92562-1J
70927	Cone—Cone and voice coil assembly
5039	Plug—4 prong male plug for speaker
70971	Speaker—6"x9" E. M. speaker complete with cone and voice coil less output transformer and plug
37899	Transformer—Output transformer (T4)
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
*70919	Back—Cabinet back
30716	Clip—Tuning tube mounting clip
X1655	Cloth—Grille cloth
*71906	Decal—Control panel decal
*71828	Dial—Glass dial for Q109
*71829	Dial—Glass dial for Q109X
*70977	Disc—Band indicator actuating disc—located on dial frame
11771	Foot—Rubber foot for cabinet (4 required)
*70974	Frame—Dial frame and back plate less dial, tube clip, indicator disc, spring indicator and "C" washer
*70979	Indicator—Station selector indicator
*72954	Knob—"Local-Distance-Phono" switch knob
*72950	Knob—Tone control or range switch knob
*72949	Knob—Volume control or tuning knob
35630	Pulley—Drive cord pulley
*70976	Screen—Band indicator screen—green
6647	Shade—Lamp shade
*70978	Spring—Band indicator disc spring
14270	Spring—Retaining spring for knob
*71143	Washer—"C" washer to hold disc

*This is the first time that this stock number has appeared in service data.

RADIO CORP. OF AMERICA

MODEL 8BX6, CHASSIS RC 1040C



TUBE CURRENT

	PLATE	S. GRID
V1	.89 MA	.34
V2	.32 MA	4.3
V3	1.3 MA	.45
V4	.085 MA	.014
V5	7. MA	1.9

RECT. - 61 MA.
AC OPERATION

RADIO CORP. OF AMERICA

Alignment Procedure

Cathode Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid AVC action.

Battery operation of the receiver is preferable during alignment; on AC operation an isolation transformer (117v./117v.) may be necessary for the receiver if the test oscillator is also AC operated.

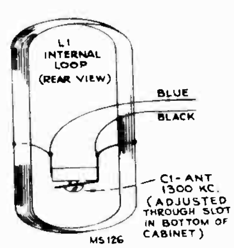
Calibration Scale.—The calibrated dial scale is attached to the chassis. It can be used directly as a reference for alignment.

With the gang at full mesh set the dial pointer so that the pointer is in line with the left hand vertical of the first figure 5 of the figures 55 on the dial scale as illustrated below.

Alignment Tabulation

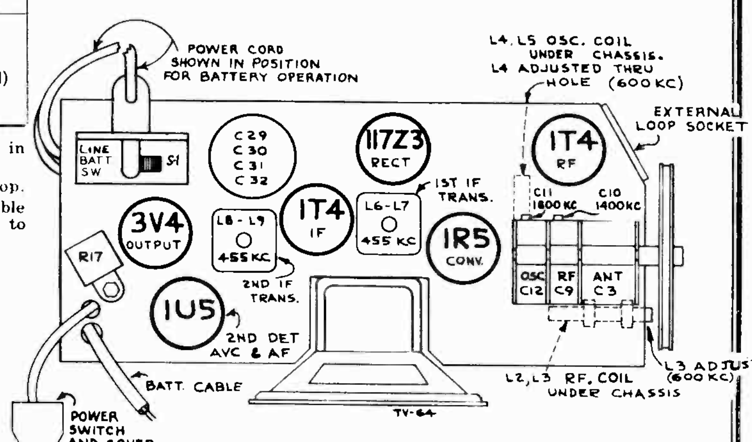
Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 6 of 1T4 I.F. Amplifier thru .01 mfd.	455 kc	Quiet point near 1600 kc	2nd I.F. Trans. L8, L9 top† & bottom
2	Pin No. 6 of 1R5 Converter thru .01 mfd.			1st I.F. Trans. L6, L7 top† & bottom
3				2nd I.F. Trans. L8 bottom core
4	High side of loop (Blue lead) in series with .01 mfd. Bottom shield cover in place	1600 kc	1600 kc	C11 (osc.)
5		1400 kc	1400 kc	C10 (r.f.)
6		600 kc	600 kc	L4 (osc.) L3 (r.f.)
7	Repeat steps 4, 5 and 6			
8	Short wire placed near loop. (Chassis in cabinet and internal loop connected)	1400 kc	1400 kc	C1†† (loop) (Cabinet closed)

† Two peaks may be found, the correct peak is that with the core in the outer position (counter-clockwise).
†† Accessible thru slot in case provided for cable of external loop.
NOTE: Adjustments L8, L9, L6, L7, L4 and L3 do not have visible adjusting screws. The magnetite cores have a screw driver slot to permit adjustment (use non-metallic screw driver).



Critical Lead Dress

1. Dress all filament leads next to chassis.
2. Keep the leads short on the end of the three components which connect to the grid terminal (#6) of the r.f. socket. (R-1, R-2, C-2).
3. Keep lead to center section of gang as short as possible.
4. Dress loop leads away from tuning drum and battery.
5. Dress lead to pin #4 of 1U5 tube away from other wiring.
6. Dress r.f. plate lead away from r.f. grid circuit.
7. Dress components and wiring near external loop socket to clear external loop pins.
8. Dress avc lead away from 2nd IF transformer and associated components.
9. Dress converter plate lead away from chassis and away from output leads.
10. Dress output leads up and away from other wiring.
11. Dress neutralizing capacitor C36, flat against chassis.
12. Dress 1st audio plate lead up and away from other wiring.
13. Dress 33 ohm resistor (R3) over bottom of rectifier socket and clear of other wiring.
14. Dress R.F. tube plate lead slightly away from chassis base.



Tube and Trimmer Locations

Specifications

Frequency Range . . . . 540-1,600 kc

Intermediate Frequency . . . . 455 kc

Power Supply Rating
110 to 125 volts, AC 50 or 60 cycles, or DC . . . . . 18 watts

Batteries required
One RCA Battery Pack VS019 or equivalent

Tube Complement

(1) RCA—1T4 . . . . R.F.
(2) RCA—1R5 . . . . Converter
(3) RCA—1T4 . . . . I.F.-Amplifier
(4) RCA—1U5 . . . . . . 2nd Det. AVC. & A.F.-Amplifier
(5) RCA—3V4 . . . . Power Output
(6) RCA—117Z3 . . . . Rectifier

Current Consumption
Battery Operation . . . . "A" 50 ma., "B" 13 ma.
(Average life of RCA VS019 Battery 125 hrs. intermittent service.)
Total Rect. Current (117 volt, 60 cycle) . . . . 61 ma.

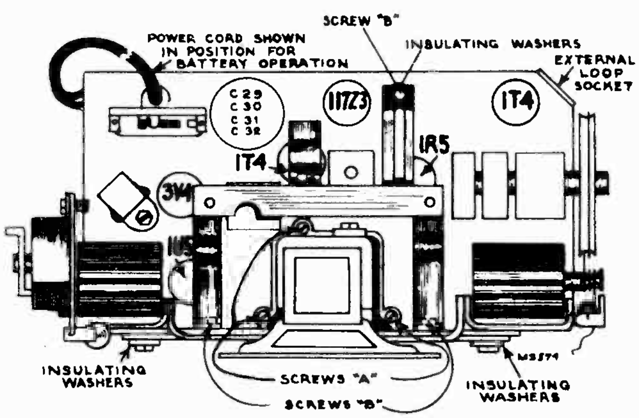
Power Output
Undistorted . . . . .150 watt
Maximum . . . . .275 watt

Loudspeaker . . . . 4 in. P.M. 3.4 ohms at 400 cycles

Cabinet Dimensions
Height . . . 13¼ in. Width . . . 9½ in. Depth . . . 5½ in.

CAUTION.—

1. **Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.**
2. **When cleaning the aluminum portion of the case use soap and water or cleaning fluid. Do not use abrasive cleansers.**



Insulating Washers:

The mounting bracket and dial frame are insulated from the chassis with insulating washers. This serves to insulate the case from the chassis. In servicing make certain that these washers are in place and properly positioned.

To Remove Chassis from Cabinet:

1. Disconnect battery plug and remove battery.
2. Disconnect antenna in cabinet.
3. Remove the two screws in the top of the cabinet (beneath handle).
4. Remove the two battery clips.
5. Remove the chassis from the cabinet

To Remove Speaker:

1. Remove tubes 3V4 and 1U5.
2. Remove the three screws "B" holding power cord bracket assembly and remove bracket.
3. Remove the three screws "A" holding speaker bracket assembly.
4. Disconnect voice coil leads.
5. The speaker and speaker bracket may now be removed.

Using External Loop.—

A loop antenna is mounted inside the cabinet. Under normal conditions this will give satisfactory reception. If however, the receiver is used in a shielded compartment such as an automobile, airplane or railroad train, an RCA VICTOR EXTERNAL LOOP ANTENNA can be used.

This external loop antenna has a strap connector cord with identical two prong plugs on either end, this makes it convenient in connecting it to the circuit through the receptacle located in the left hand side of the chassis.

Open the case, plug the external loop antenna cord into the socket (it will only go in one way), bring the strap out through the slot in the case and attach the external loop antenna by means of the suction cup to any convenient vertical surface.

This external loop antenna can be stored in the cabinet, in the compartment below the battery pack, and the cord in the small compartment in the lower right hand corner of the cabinet.

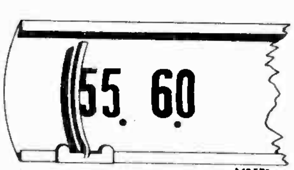
AC-DC Operation.—

This receiver will operate on 105 to 125 volts, AC 50 or 60 cycles, or DC.

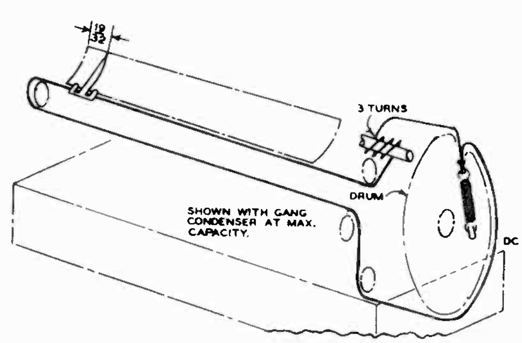
A power cord is stored in the fiber tube which is clamped above the chassis inside the cabinet. To open the cabinet, push the wire latch on the bottom of the case to the right, and raise the back cover upward on its hinges. Then pull the power cord plug out of the socket on the top of the chassis as shown, and take out and unroll the power cord. A slot in the bottom of the cabinet allows the closing of the cabinet with the power cord passing through. Close the cabinet with the cord extending through the slot and insert the plug into a convenient electrical outlet.

When returning to battery operation, be sure to replace the power plug in its socket inside the case with the cord stored in the fiber tube.

NOTE. If reception is not obtained on DC, reverse plug in oulet receptacle. This may also reduce hum on AC operation.



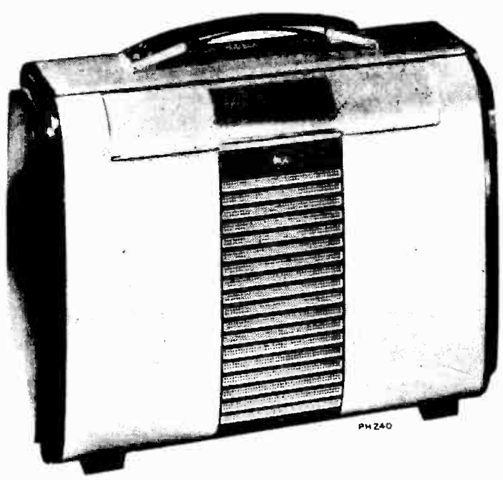
Dial Pointer Setting



Dial-Indicator and Drive Mechanism

MODEL 8BX6, CHASSIS RC 1040C

RADIO CORP. OF AMERICA



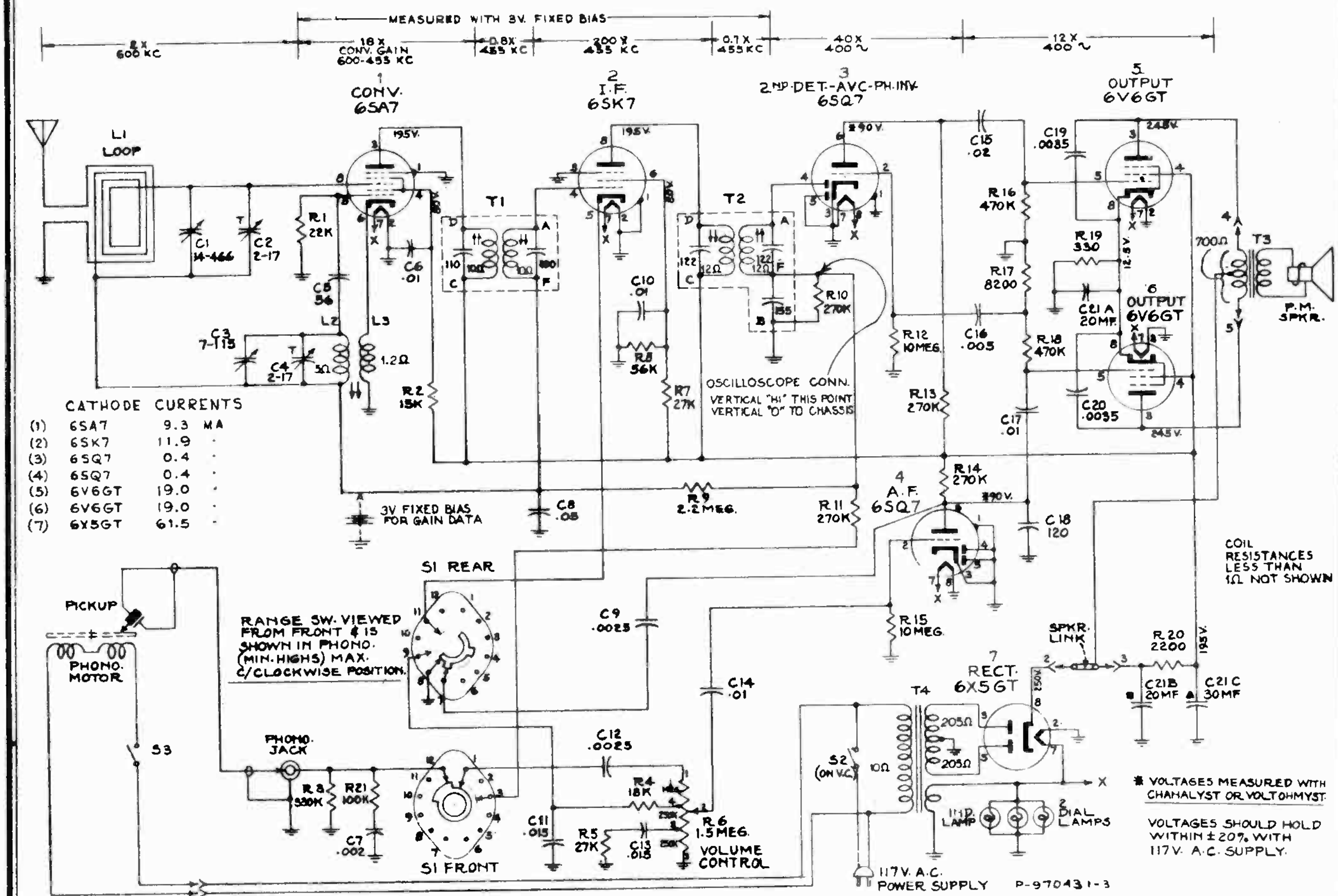
Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1040C
71056	Bracket—Drive cord pulley bracket complete with pulley (volume control side)
71054	Bracket—Drive cord pulley bracket complete with two (2) pulleys
71044	Bracket—Power switch bracket complete with actuating lever less switch
71042	Button—Plug button
71502	Capacitor—Ceramic, 2.2 mmf. (C7)
*73153	Capacitor—Ceramic, 4 mmf. (C36)
71924	Capacitor—Ceramic, 56 mmf. (C8)
71514	Capacitor—Ceramic, 82 mmf. (C2, C21)
71540	Capacitor—Ceramic, 270 mmf. (C26)
70602	Capacitor—Tubular, .0025 mfd., 400 volts (C23)
71552	Capacitor—Tubular, .002 mfd., 400 volts (C22, C27)
71921	Capacitor—Tubular, .003 mfd., 200 volts (C15)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C28)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C25)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C24)
71551	Capacitor—Tubular, .05 mfd., 200 volts (C5, C16, C20)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C4, C6, C33)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C34)
*73113	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts; 1 section of 20 mfd., 150 volts; 1 section of 160 mfd., 25 volts and 1 section of 40 mfd., 25 volts (C29, C30, C31, C32)
*73176	Coil—R-F coil complete with core and stud (L2, L3)
*73114	Coil—Oscillator coil complete with core and stud (L4, L5)
*73112	Condenser—Variable tuning condenser (C3, C9, C10, C11, C12)
71057	Control—Volume control (R9)
†72953	Cord—Drive cord (approx. 38" overall required)
70022	Cord—Power cord
*73118	Dial—Dial scale and window assembly
72283	Grommet—Rubber grommet for mounting tuning condenser (3 required)
71031	Holder—Power cord holder (fibertube)
*73111	Indicator—Station selector indicator
*73121	Knob—Tuning knob (roller-type) or volume control knob (roller-type)
18469	Plate—Mounting plate for electrolytic capacitor
71041	Plug—5 prong male plug for battery cable
36230	Pulley—Drive cord pulley
*73237	Resistor—Wire wound, 33 ohms, 150 MA (R3)
	Resistor—Fixed composition, 1500 ohms, ±10%, ½ watt (R16)
	Resistor—Fixed composition, 1500 ohms, ±10%, 1 watt (R18)
	Resistor—Fixed composition, 1800 ohms, ±10%, ½ watt (R6, R15)
*73238	Resistor—Ballast resistor, 2200 ohms, 6 watts (R17)
	Resistor—Fixed composition, 2700 ohms, ±10%, ½ watt (R19)
	Resistor—Fixed composition, 15,000 ohms, ±20%, ½ watt (R20)
	Resistor—Fixed composition, 27,000 ohms, ±10%, ½ watt (R10)
	Resistor—Fixed composition, 68,000 ohms, ±20%, ½ watt (R8)
	Resistor—Fixed composition—100,000 ohms, ±20%, ½ watt (R4)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R13)
	Resistor—Fixed composition, 1 megohm, ±20%, ½ watt (R14)
	Resistor—Fixed composition, 3.3 meg., ±10%, ½ watt (R7)
	Resistor—Fixed composition, 4.7 meg., ±10%, ½ watt (R1, R2, R12)
	Resistor—Fixed composition, 5.6 meg., ±10%, ½ watt (R5)
	Resistor—Fixed composition, 10 meg., ±20%, ½ watt (R11)
*73122	Shaft—Tuning knob shaft
*73119	Shield—L.H. end shield for dial
*73120	Shield—R.H. end shield for dial
*73115	Socket—Tube socket—miniature—⅞" mounting center—moulded (no center shield)
*73116	Socket—Tube socket—miniature—⅞" mounting center—moulded (center shield)
*73117	Socket—Tube socket—minature—1" mounting center—wafer
70390	Spring—Drive cord tension spring
30900	Spring—Retaining spring for knob
71039	Switch—"Line-Battery" change switch (S1)
71045	Switch—Power switch (S2)
*73174	Transformer—First I-F transformer (L6, L7, C13, C14)
*73175	Transformer—Second I-F transformer (L8, L9, C17, C18, C19)
71047	Transformer—Output transformer (T1)
71081	Washer—"C" washer for tuning knob shaft
*73332	Washer—Insulating washer (flat) for mounting base holder bracket (1 required) and dial support to chassis base (4 required)
*73333	Washer—Insulating washer (extruded) for mounting base holder bracket (1 required) and dial support to chassis base (4 required)
71049	Window—Dial window only
	SPEAKER ASSEMBLY 92577-3
71059	Gasket—Speaker gasket (black tubing)
*73123	Speaker—4" PM speaker complete with cone and voice coil
	SPEAKER ASSEMBLY 922258-2
71059	Gasket—Speaker gasket (black tubing)
71058	Speaker—4"x6" PM speaker complete with cone and voice coil
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
71074	Arm—Shutter arm lever.
*73243	Back—Case back complete with center strip, feet and case spring latch
71073	Bracket—Bearing bracket for shutter arm lever
71070	Bracket—Mounting bracket for capacitor
71069	Capacitor—Adjustable trimmer, 3-35 mmf. (C1)
71080	Clip—Case side spring clip & screw (2 required)
71061	Foot—Case foot for rear section of case (2 required)
71068	Foot—Case foot for front section of case—(2 required)
*73124	Front—Case front complete less shutter
71063	Handle—Carrying handle
*73244	Latch—Latch to mount rear feet (2 required)
71065	Link—Carrying handle link consisting of two (2) links, two (2) shafts and four (4) drive screws (2 required)
71079	Loop—Antenna loop (L1)
71064	Retainer—Battery retainers spring bracket (2 required)
71066	Screw—No. 8—32x5/16" long screw to hold case together (located under carrying handle) (2 required)
71077	Screw—Screw complete with washer and nut to secure case side to case front or to mount rear feet
71071	Shutter—Case shutter
72980	Side—Case side—L.H.
72979	Side—Case side—R.H. (loop side)—less capacitor and bracket
71072	Spring—Case shutter compression spring
31608	Washer—"C" washer for shutter shafts
71078	Washer—Dampening washer for shutter shafts (2 required)

*This is the first time this Stock No. has appeared in Service Data.

RADIO CORP. OF AMERICA

MODEL 8V7, CHASSIS RC-615



Tuning Drive Ratio ....16:1 (8 turns of knob)

Lamps (3)

Dial, indicator or compartment lamp ..Mazda 51, 6-8 volts, 0.2 amp.

Loudspeaker (92569-1)

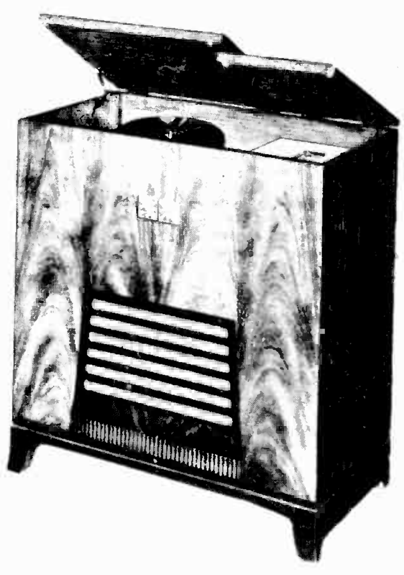
Type ....12-inch P.M.
V. C. impedance at 400 cycles ....2.2 ohms

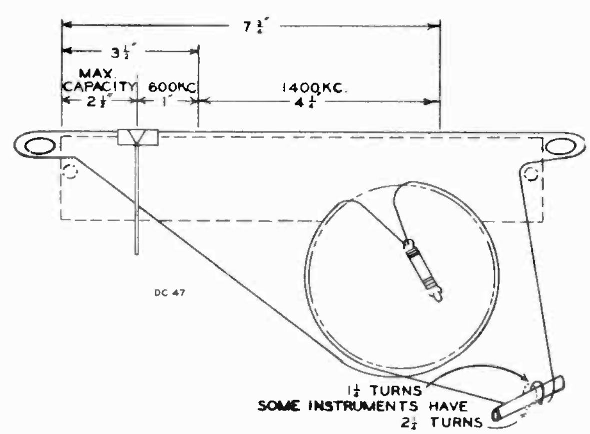
Power Output Rating

Undistorted .... 5 watts
Maximum ....5.5 watts

Record Changer (RP-178)

Record Capacity ....Twelve 10-in., or Ten 12-in.
Turntable Speed ....78 r.p.m.
Type Pickup ....Crystal





Dial Indicator and Drive Mechanism

Frequency Range

Standard Broadcast "A" ....540-1,600 kc

Intermediate Frequency ....455 kc

Tube Complement

(1) RCA-6SA7 ....Converter
(2) RCA-6SK7 ....I-F Amplifier
(3) RCA-6SQ7 ....2nd Det., A. V. C. and Phase Inverter
(4) RCA-6SQ7 ....A-F Amplifier
(5) RCA-6V6GT ....Output
(6) RCA-6V6GT ....Output
(7) RCA-6X5GT ....Rectifier

Power Supply Rating (including record changer)

105-125 volts, 60 cycles ....70 watts

MODEL 8V7 RADIO CORP. OF AMERICA

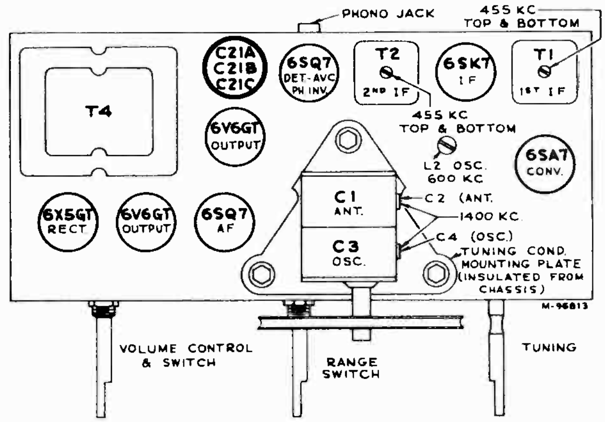
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the Schematic Diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Steps	Connect high side of test oscillator to—	Tune test oscillator to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 grid in series with .01 mfd.	455 kc.	Quiet Point at 550 kc. end of dial	Top and bottom (2nd I-F Trans.) T-2
2	6SA7 grid in series with .01 mfd.			Top and bottom (1st I-F Trans.) T-1
3	Primary lead on loop in series with 200 mmfd.	1,400 kc.	1,400 kc.	C4 (osc.) C2 (ant.)
4		600 kc.	600 kc.	L2 (osc.) Rock gang
5		Repeat steps 3 and 4		



Tube and Trimmer Locations (Top View)

Critical Lead Dress:

1. Dress speaker cable leads down next to chassis.
2. Dress output plate capacitors next to chassis.
3. Dress plate lead of output tube away from grid of audio amplifier.
4. Dress all a-c leads away from volume control down next to chassis.
5. Dress lead from top tap of volume control to range-tone switch along front apron of chassis.
6. Dress R12 and R15 down near chassis base.

Replacement Parts

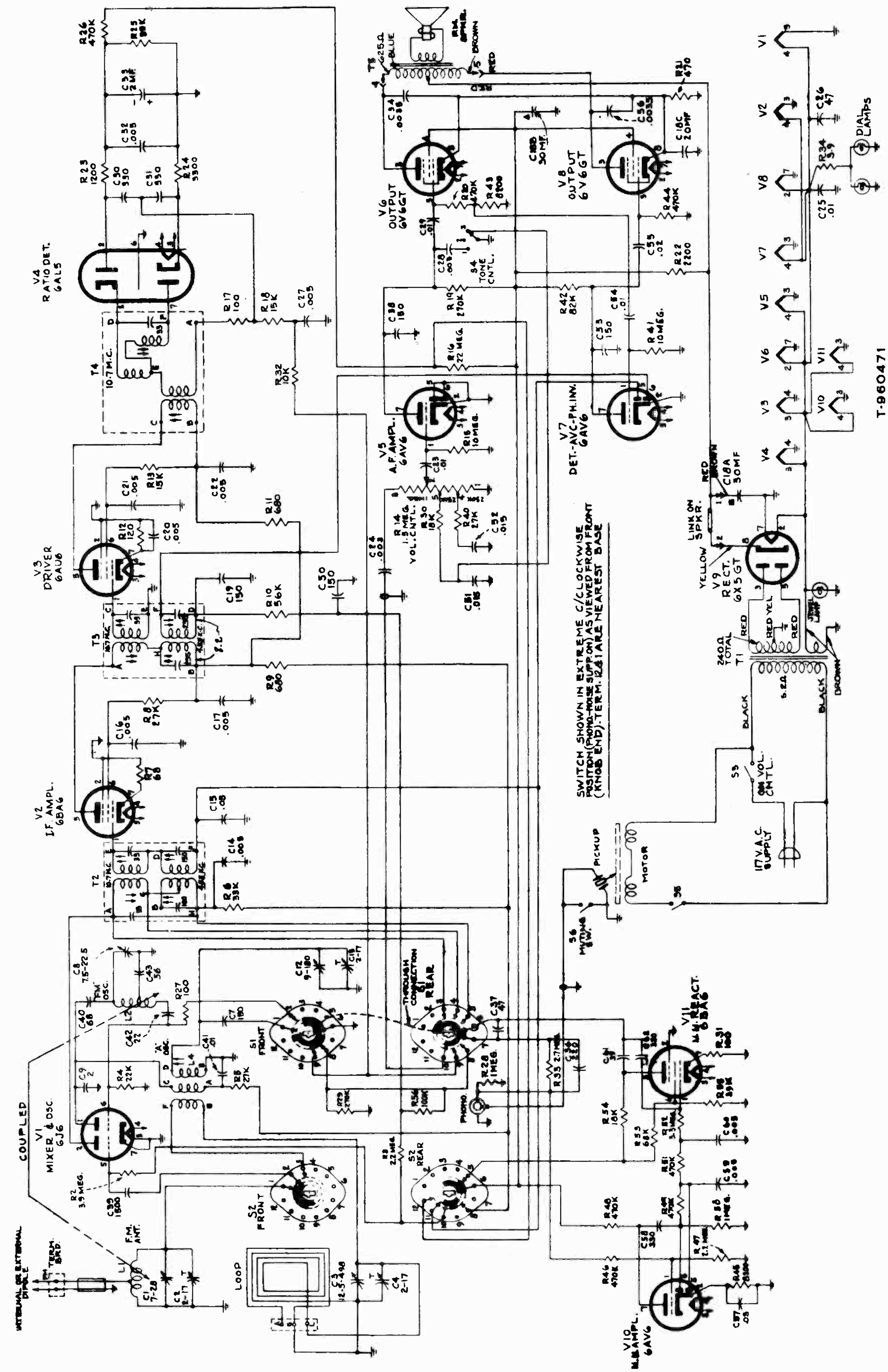
STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 615
*70137	Bracket—Dial bracket—L.H.—complete with drive cord pulley
*70136	Bracket—Dial bracket—R.H.—complete with drive cord pulley
71924	Capacitor—Ceramic, 56 mmf. (C5)
71614	Capacitor—Ceramic, 120 mmf. (C18)
70602	Capacitor—Tubular, .0025 mfd., 400 volts (C9, C12)
70646	Capacitor—Tubular, .0035 mfd., 1000 volts (C19, C20)
70601	Capacitor—Tubular, .002 mfd., 400 volts (C7)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C14, C16)
70572	Capacitor—Tubular, .015 mfd., 400 volts (C13)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C6, C10, C17)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C11, C15)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C8)
71976	Capacitor—Electrolytic, comprising 1 section of 20 mfd., 450 volts; 1 section of 30 mfd., 350 volts; and 1 section of 20 mfd., 25 volts (C21A, C21B, C21C)
*70133	Coil—Oscillator coil (L2, L3)
*70139	Condenser—Variable tuning condenser (C1, C2, C3, C4)
70342	Control—Volume control and power switch (R6, S2)
†72953	Cord—Drive cord (approx. 49" overall length required)
70930	Grommet—Rubber grommet to mount variable condenser (3 required)
71608	Indicator—Station selector indicator
*70138	Plate—Dial back plate
30868	Plug—2 contact female plug for Motor cable
12493	Plug—5 contact female plug for speaker cable
72602	Pulley—Drive cord pulley
	Resistor—Fixed composition, 330 ohms, ±10%, 1 watt (R19)
	Resistor—Fixed composition, 2200 ohms, ±10%, 2 watts (R20)
	Resistor—Fixed composition, 8200 ohms, ±10%, ½ watt (R17)
	Resistor—Fixed composition, 15,000 ohms, ±10%, 2 watts (R2)
	Resistor—Fixed composition, 18,000 ohms, ±10%, ½ watt (R4)
	Resistor—Fixed composition, 22,000 ohms, ±10%, ½ watt (R1)
	Resistor—Fixed composition, 27,000 ohms, ±10%, ½ watt (R5, R7)
	Resistor—Fixed composition, 56,000 ohms, ±10%, ½ watt (R8)
	Resistor—Fixed composition, 100,000 ohms, ±10%, ½ watt (R21)
	Resistor—Fixed composition, 270,000 ohms, ±10%, ½ watt (R10, R11, R13, R14)
	Resistor—Fixed composition, 330,000 ohms, ±10%, ½ watt (R3)
	Resistor—Fixed composition, 470,000 ohms, ±10%, ½ watt (R16, R18)
	Resistor—Fixed composition, 2.2 megohms, ±20%, ½ watt (R9)
	Resistor—Fixed composition, 10 megohms, ±20%, ½ watt (R12, R15)
*70135	Shaft—Tuning knob shaft
31364	Socket—Lamp socket
35787	Socket—Phono input socket
31251	Socket—Tube socket
31418	Spring—Drive cord tension spring

STOCK No.	DESCRIPTION
*70134	Switch—Range switch (S1)
70128	Transformer—First I. F. transformer (T1)
70129	Transformer—Second I. F. transformer (T2)
70127	Transformer—Power transformer, 117 volt, 60 cycles (T4)
35969	Washer—"C" Washer for tuning shaft
	SPEAKER ASSEMBLIES 92569-1W RL 103-1
13867	Cap—Dust cap
36145	Cone—Cone and voice coil assembly
71560	Plug—5 prong male plug for speaker
71961	Speaker—12" P.M. speaker complete with cone and voice coil less output transformer and plug
71145	Suspension—Metal cone suspension
37899	Transformer—Output transformer (T3)
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
71599	Bracket—Indicator lamp bracket
72437	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Indicator lamp jewel
70142	Clamp—Dial clamp
X1796	Cloth—Grille cloth
*73413	Decal—Control panel decal for blonde instruments
73084	Decal—Control panel decal for walnut or mahogany instruments
71966	Decal—Trade mark decal (Victrola)
71910	Decal—Trade mark decal (RCA Victor)
70141	Dial—Glass dial scale
72856	Grommet—Rubber grommet for mounting record changer (3 required)
30698	Hinge—Cabinet lid hinge (4 required)
72824	Knob—Radio-phono-tone switch knob — brown — for blonde instruments
71822	Knob—Radio-phono-tone switch knob—maroon—for walnut or mahogany instruments
72800	Knob—Tuning or volume control knob—brown—for blonde instruments
71821	Knob—Tuning or volume control knob—maroon—for walnut or mahogany instruments
11765	Lamp—Dial,indicator or compartment lamp—Mazda 51
70140	Loop—Antenna loop complete
73109	Nut—Tee nut for mounting record changer (3 required)
31048	Plug—Pin plug for shielded pickup cable
73110	Screw—¼-20 fillister head screw for mounting record changer (3 required)
30900	Spring—Retaining spring for knobs
*73411	Support—Cabinet lid support—L.H.
*73412	Support—Cabinet lid support—R.H.

*This is the first time this Stock No. has appeared in Service Data.
† Stock No. 72953 is a reel containing 250 ft. of cord.

RADIO CORP. OF AMERICA

MODEL 8V112, CHASSIS RC-616



NOTE—2nd I.F. Transformer:
Some chassis may use 2nd I.F. trans. stamped 970435-5 (Stock No. 74019), the 455 k.c. windings have a d.c. resistance of 12 ohms each, the resonating capacitors are 150 mmf. instead of 235 mmf. They are interchangeable with transformers stamped 970435-2 (Stock No. 73363).

RECORD CHANGER: R.C.A. Model RP-178, RCD.CH. 18-14

RADIO CORP. OF AMERICA

Circuit Description

The chassis used in this receiver has a 6J6 tube (V1) (twin triode), one section of which is used as mixer and the other section as oscillator. The FM antenna coil and the FM oscillator coil are placed in such position as to provide coupling between them. A section of the AM oscillator coil is connected in series with the mixer grid input when the selector switch is in AM position.

Dual I-F transformers are used, each transformer containing both AM and FM windings. The I-F amplifier is V2 (6BA6).

The selector switch has five functions:

(1) Selection of tuning range.
(2) Selection of AVC supply voltages to be applied to the controlled tubes. Simple AVC is applied to the grids of V1 and V2 on AM. Delayed AVC is used on FM and is applied only to the grid of V2.
(3) Controls application of B+ voltage to V1, V2, V3 and V11.
(4) Controls audio input to volume control.
(5) Controls circuit loading of M.M. reactor tube V11 (6BA6).

The driver V3 (6AU6) and ratio detector V4 (6AL5) circuits are similar to those used in other RCA Victor AM-FM receivers.

The audio system is conventional. It consists of V5 (6AV6 a.f. amp.), V7 (6AV6 ph. inv.), V6 and V8 (6V6GT p. p. output).

The rectifier is V9 (6X5GT).

The Magic Monitor system uses V10 (6AV6 M. M. amp.) and V11 (6BA6 M. M. reactor).

Tuning Ranges

Standard Broadcast (AM) .... 540-1,600 kc.
Frequency Modulation (FM) .... 88-108 mc.

Intermediate Frequencies ... AM—455 kc., FM—10.7 mc.

Tube Complement

(1) 6J6 .... Mixer and Oscillator
(2) 6BA6 .... I. F. Amplifier
(3) 6AU6 .... Driver
(4) 6AL5 .... Ratio Detector
(5) 6AV6 .... A. F. Amp.
(6) 6V6GT .... Output
(7) 6AV6 .... AM Det.—AVC—Ph. Inv.
(8) 6V6GT .... Output
(9) 6X5GT .... Rectifier
(10) 6AV6 .... M. M. Amp.
(11) 6BA6 .... M. M. Reactor

Power Supply Rating ...... 115 volts, 60 cycles, 90 watts

Loudspeaker

Type 92569-5 .... 12 in. P.M.
Voice coil impedance at 400 cycles .... 3.2 ohms

Tuning Drive Ratio .... 18:1 (9 turns of knob)

Dial Lamps (2) .... Type No. 51, 6-8 volts, 0.2 amp.

Jewel Lamp .... Type No. 51, 6-8 volts, 0.2 amp.

Power Output

Maximum .... 7 watts
Undistorted .... 6 watts

Record Changer (RP-178)

Record Capacity .... Twelve 10-in. or ten 12-in.
Turntable Speed .... 78 r.p.m.

Antennas:

These receivers have built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Under average conditions these antennas will provide satisfactory reception. However, provision is made for the use of external antennas if desired — connect as indicated below:

Ground: Connect external ground to "G" terminal.

AM Antenna: Connect a single wire antenna to terminal "A."

FM Antenna: Remove the built-in FM antenna lead from the "FM" terminals of the terminal board. Connect the transmission line of an external FM dipole antenna to these two "FM" terminals.

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

The FM i-f alignment may be checked by means of an FM sweep generator and cathode ray oscilloscope. Connect the output from the sweep generator, which is set to 10.7 mc., to the mixer grid (6J6 Pin No. 5), low side to chassis. Disconnect the 2 mfd. capacitor C33 from the Ratio Detector circuit.

Connect the high side of the oscilloscope to the junction of R25 and R26, low side to chassis. Adjust the sweep generator and oscilloscope to obtain the response curve.

The Ratio Detector characteristic may be viewed by connecting the oscilloscope across the volume control R14. Capacitor C33 should be re-connected before checking the Ratio Detector characteristic.

CRITICAL LEAD DRESS

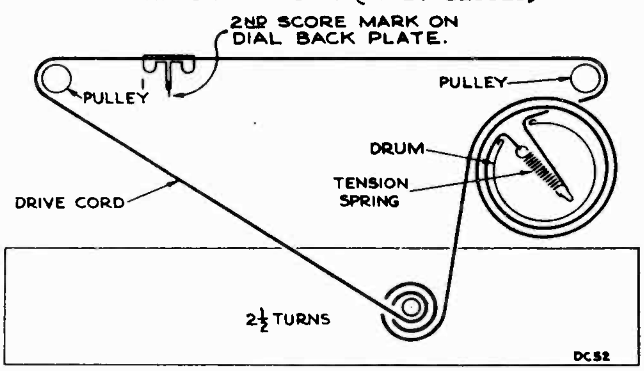
1. Keep leads of C7 short.
2. Dress R27 away from range switch and pin No. 5 of V1.
3. The ground lead of pin No. 2 of V2 and V3 should be down against chassis. Its length is critical.
4. The AVC lead from R26 to range switch should be dressed against chassis and away from 6AU6 driver tube socket.
5. C43 should have short leads and the color code of the capacitor should go to the coil L4. The capacitor should be cemented down with polystyrene cement at the same time L2 is cemented.
6. The lead from the high side of the loop should be dressed away from tubes.
7. Lead from pin No. 2 of V1 to terminal "A" of 1st I. F. transformer should be dressed against the chassis.
8. Connect C40 directly between the gang condenser and pin No. 1 of V1.
9. Make all FM leads as short as possible.
10. Dress lead from pin No. 5 of V2 to terminal "A" of 2nd I. F. transformer down against chassis.
11. Dress resistor R15 near chassis base.
12. Dress all A. C. leads away from volume control.
13. The lead from "FM" terminal of antenna terminal board to L1 tap should be dressed away from V2.
14. The taps on L1 and L2 are critical. L1 tap should be ¾ turn from the ground end. L2 tap should be 2½ turns from the gang condenser C8.
15. Dress C25 and C26 against the chassis with the shortest lead length possible.
16. The position of L1 and L2 is critical. L1 should be midway between V1 and the 1st I. F. transformer. The end of L2 should be approximately 3/16" from V1.

Dial Indicator

With the tuning condenser fully meshed (closed) the indicator should be set to the SECOND REFERENCE MARK from the left hand edge of the dial back plate.

Refer to the dial scale reproduction on page 7.

SHOWN WITH TUNING CONDENSER AT MAXIMUM CAPACITY (FULLY CLOSED)



Dial Indicator and Drive Mechanism

AM Alignment

RANGE SWITCH IN BC POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	C3 in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings.† T3 bottom core (sec.). T3 top core (pri.).
2				AM windings.† T2 top core (sec.). T2 bottom core (pri.).
3	"A" terminal of terminal board at rear of chassis in series with 220 mmf.	1400 kc.	1400 kc.	C13 osc. C4 ant.
4		600 kc.	600 kc.	L4 osc. (Rock gang.)
5	Repeat Steps 3 and 4.			

† Use alternate loading.

Alternate loading involves the use of a 47,000 ohm resistor to load the AM plate winding while the AM grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 47,000 ohm resistor after T3 and T2 have been aligned.

Oscillator frequency is above signal frequency on both AM and FM.

FM Alignment

RANGE SWITCH IN FM POSITION — VOLUME CONTROL MAXIMUM

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C33 and the common lead to chassis. Turn gang condenser to max. capacity (fully meshed).			
2	Pin 1 of 6AU6 in series with .01 mfd.	10.7 mc. modulated 30% 400 cycles AM (Approx. .05 volt).	Max. capacity (fully meshed).	T4 top core for max. d-c voltage across C33. T4 bottom core for min. audio output.*
3	FM ant. term. in series with a 300 ohm resistor. (Remove ant. lead from "FM" term.)	10.7 mc. Adjust to provide 2 to 3 volts indication on VoltOhmyst during alignment.		FM windings.†† T3 top core (sec.). T3 bottom core (pri.).
4				FM windings.†† T2 top core (sec.). T2 bottom core (pri.).
5		106 mc.	106 mc.	L2 osc.** C2 ant. Set C2 at max. capacity while adjusting L2.
6		90 mc.	90 mc.	L1 ant.** (Rock gang.)
7	Repeat Steps 5 and 6 until further adjustment does not improve calibration.			

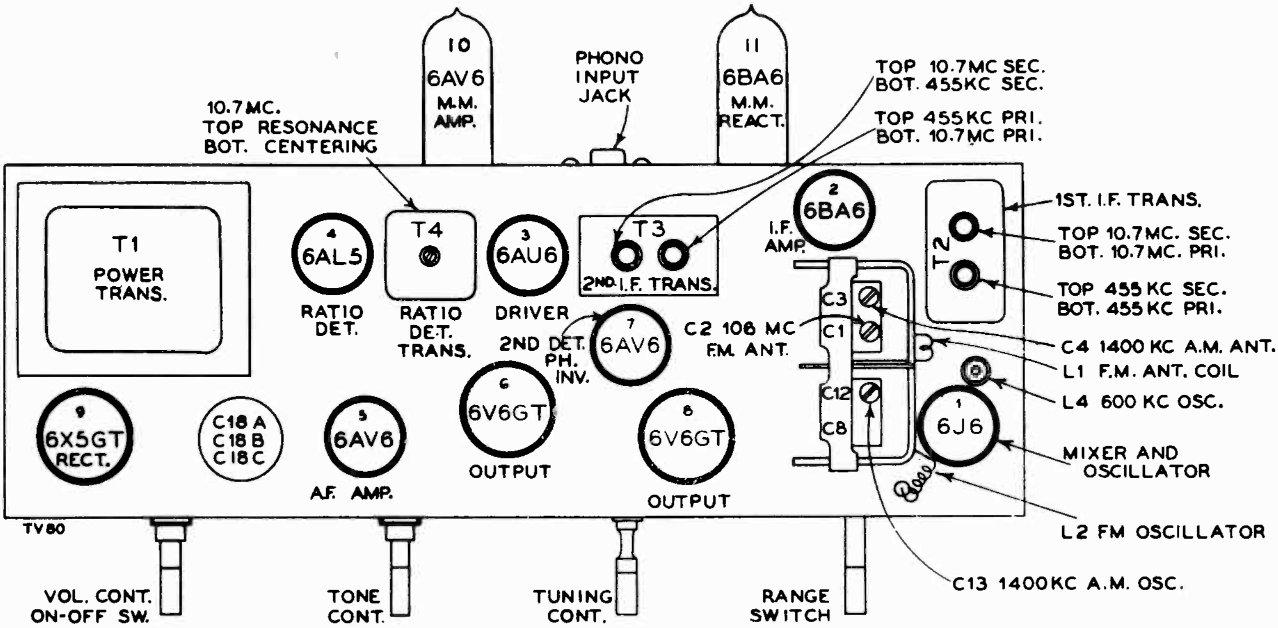
* Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

†† Align T3 and T2 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 47,000 ohm resistor and load the FM windings.

** L1 and L2 are adjustable by increasing or decreasing the spacing between turns.

MODEL 8V112

RADIO CORP. OF AMERICA



Tube and Trimmer Locations

Note: FM mixer and oscillator coils are adjustable by increasing or decreasing the spacing between turns. The position of the coils and location of the taps are critical (refer to "Critical Lead Dress").

SOCKET VOLTAGES

Voltages measured with Chanalyst or VoltOhmyst and should hold within ±20% with rated line voltage. Tuning condenser closed—no signal input.

Tube	Terminal		Voltage			
			M.M.	Phono	A.M.	F.M.
(1) 6J6	Plate	1	—	—	102	98
	Grid	6	–0.4	–0.4	–6.8	–6.0
	Plate	2	—	—	96	110
	Grid	5	–0.7	–0.8	–2.7	–2.5
(2) 6BA6	Plate	5	—	—	196	192
	Screen	6	—	—	100	83
	Cathode	7	—	—	0.7	0.84
	Grid	1	–1.0	–0.9	–1.3	–0.2
(3) 6AU6	Plate	5	—	—	190	185
	Screen	6	—	—	145	141
	Cathode	7	—	—	1.25	1.21
(4) 6AL5	———	—	—	—	—	—
(5) 6AV6	Plate	7	95	125	85	84
	Grid	1	–0.6	–0.6	–0.6	–0.6
(6) 6V6GT	Plate	3	295	299	282	280
	Screen	4	275	295	220	217
	Cathode	8	19.6	21.4	15.5	15.4
(7) 6AV6	Plate	7	158	168	125	125
	Grid	1	–0.5	–0.5	–0.5	–0.5
(8) 6V6GT	Plate	3	295	299	282	280
	Screen	4	275	295	220	217
	Cathode	8	19.6	21.4	15.5	15.4
(9) 6X5GT	Cathode	8	310	313	300	299
(10) 6AV6	Plate	7	171	184	131	130
	Cathode	2	1.85	1.98	1.55	1.53
(11) 6BA6	Plate	5	195	—	—	—
	Screen	6	56.5	—	—	—
	Cathode	7	0.65	—	—	—
	Grid	1	–0.2	–0.8	–0.8	–0.8

MAGIC MONITOR

Circuit Description

The Magic Monitor circuit acts as a capacity shunt across the audio input to the volume control when the selector switch is turned to M. M. position. This shunt is variable, diminishing with increasing input level and increasing with increase of frequency. The phono signal input is applied to the grid of V10 (6AV6 M. M. amp.), is amplified and fed through a resistance-capacity network to the diode plates of V10 which rectifies it and produces a grid voltage on V11 in proportion to the level of the high frequencies contained in the audio signal.

Tests

(1) Feed a .04 volt 400 cycle signal from a low impedance source into the phono jack. Adjust the volume control for maximum output with selector switch in PHONO position. Set switch to M. M. The output level should decrease to approximately one-half.

(2) Repeat Step 1 except using 2 volt signal. The output level should decrease only slightly when the selector switch is turned to M. M. position.

(3) Repeat Step 2 except using 3,000 cycle signal. The output level should not decrease when the selector switch is turned to M. M. position.

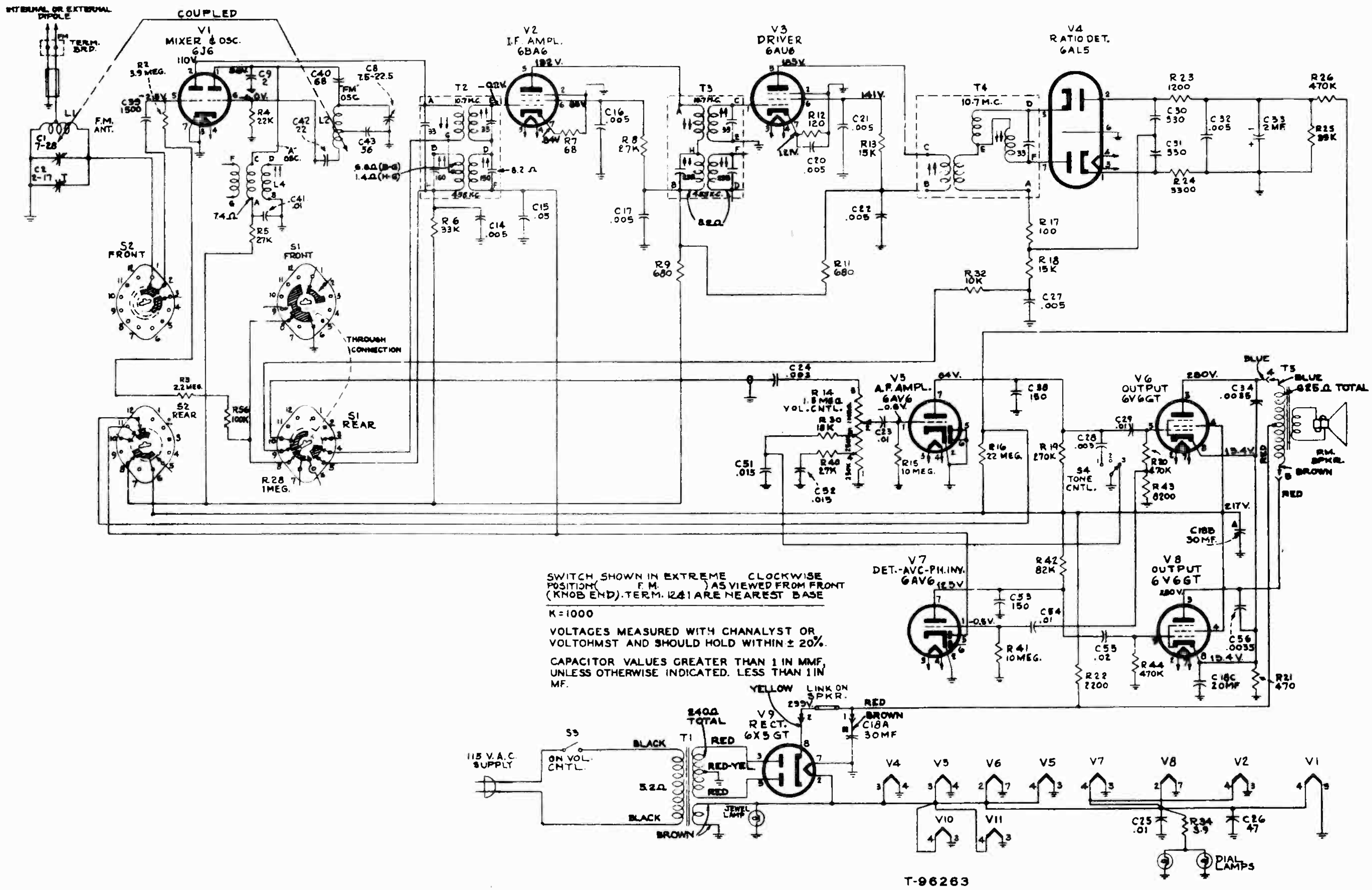
(4) Repeat Step 3 except using .04 volt signal. The output level should decrease to approximately one-fourth when the selector switch is turned to M. M. position.

CATHODE CURRENTS (MA)

Tube	Terminal	M.M.	Phono	A.M.	F.M.
(1) 6J6	7	—	—	8.2	8.7
(2) 6BA6	7	—	—	11.6	13.4
(3) 6AU6	7	—	—	10	9.7
(4) 6AL5	1 & 5	—	—	—	—
(5) 6AV6	2	0.7	0.75	0.5	0.5
(6) 6V6GT	8	23.2	25.1	19.1	18.5
(7) 6AV6	2	1.6	1.7	1.1	1.1
(8) 6V6GT	8	23.2	25.1	19	18.5
(9) 6X5GT	8	57	53	70	70.5
(10) 6AV6	2	0.2	0.25	0.2	0.2
(11) 6BA6	7	8.0	—	—	—

RADIO CORP. OF AMERICA

MODEL 8V112



SWITCH SHOWN IN EXTREME CLOCKWISE POSITION (F.M.) AS VIEWED FROM FRONT (KNOB END). TERM. 12 & 1 ARE NEAREST BASE

K=1000

VOLTAGES MEASURED WITH CHANALYST OR VOLTOHMST AND SHOULD HOLD WITHIN ± 20%.

CAPACITOR VALUES GREATER THAN 1 IN MMF. UNLESS OTHERWISE INDICATED. LESS THAN 1 IN MF.

NOTE—2nd I.F. Transformer:

Some chassis may use 2nd I.F. trans. stamped 970435-5 (Stock No. 74019), the 455 k.c. windings have a d.c. resistance of 12 ohms each, the resonating capacitors are 150 mmf. instead of 235 mmf. They are interchangeable with transformers stamped 970435-2 (Stock No. 73363).

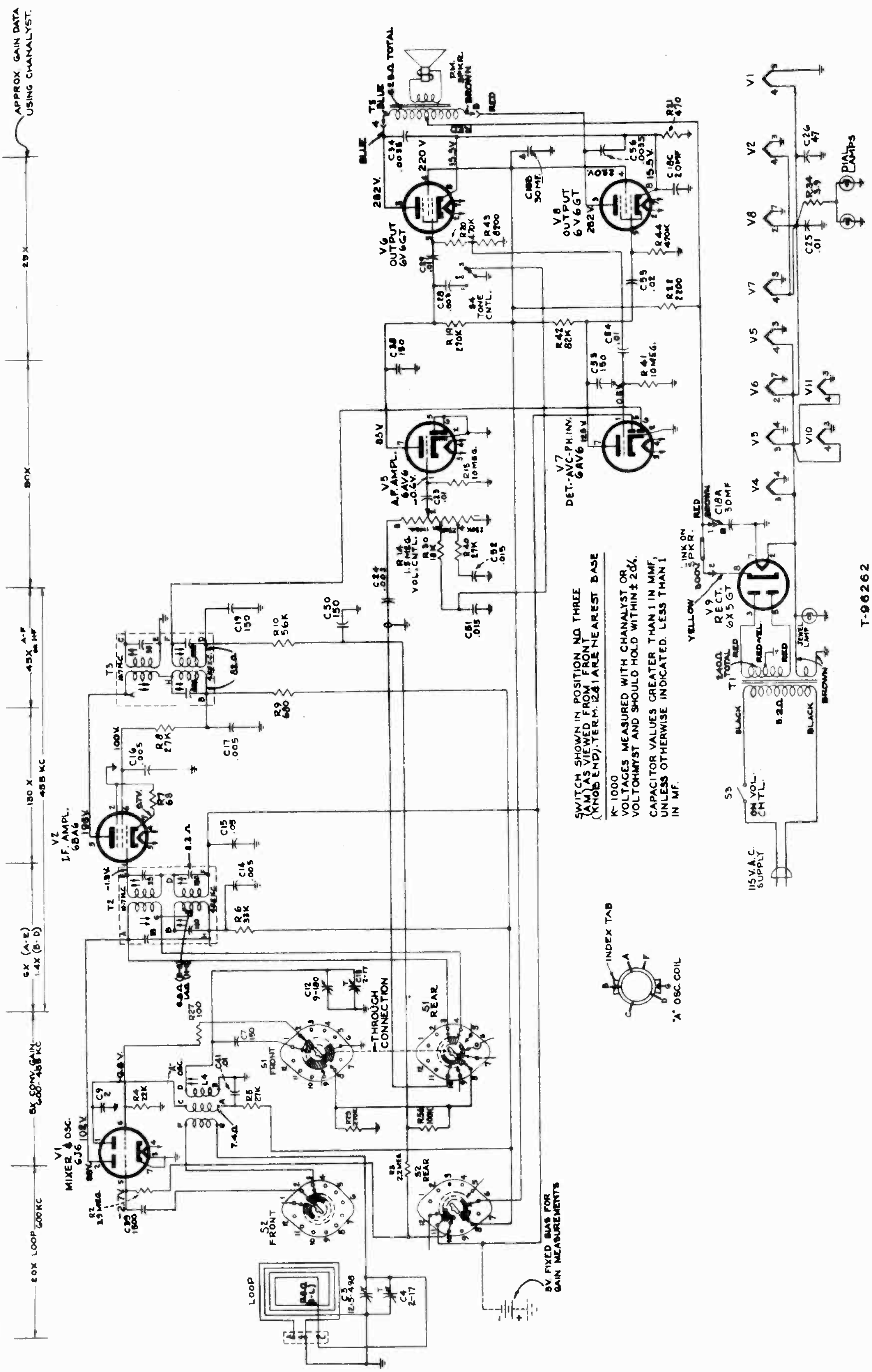
Simplified Schematic Diagram
"FM" Band

CLARI-SKEMATIX

Registered Trademark

MODEL 8V112

RADIO CORP. OF AMERICA

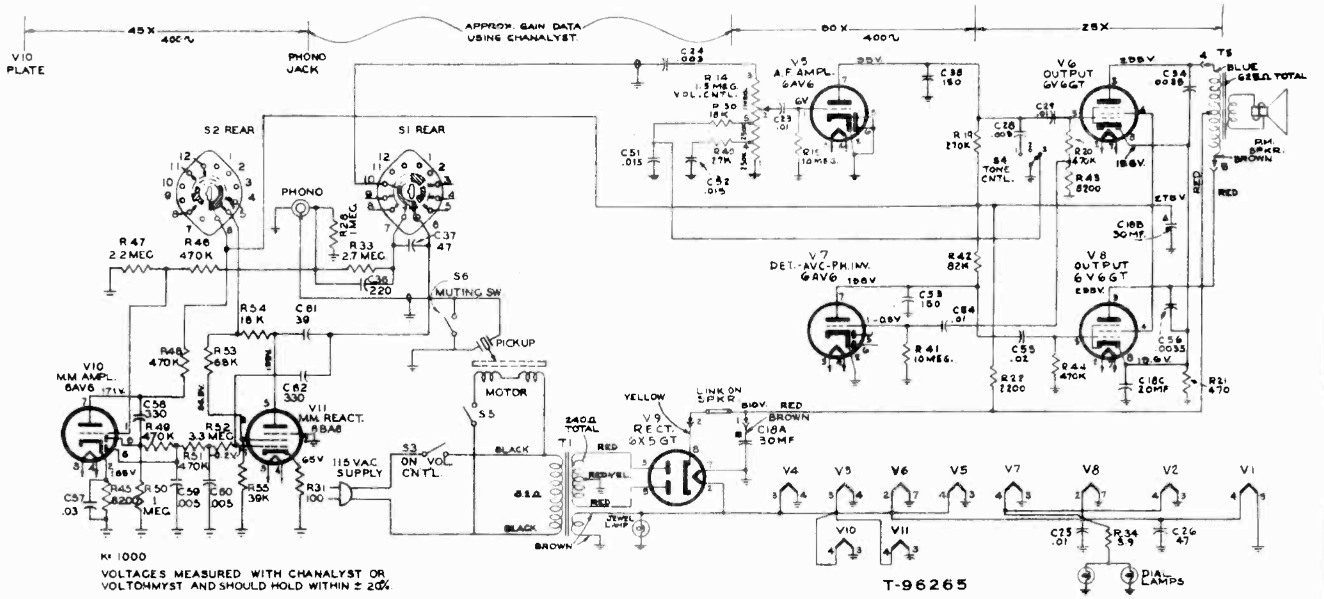


NOTE—2nd I.F. Transformer:
Some chassis may use 2nd I.F. trans. stamped 970435-5 (Stock No. 74019), the 455 k.c. windings have a d.c. resistance of 12 ohms each, the resonating capacitors are 150 mmf. instead of 235 mmf. They are interchangeable with transformers stamped 970435-2 (Stock No. 73363).

Simplified Schematic Diagram
"A" Band

RADIO CORP. OF AMERICA

MODEL 8V112

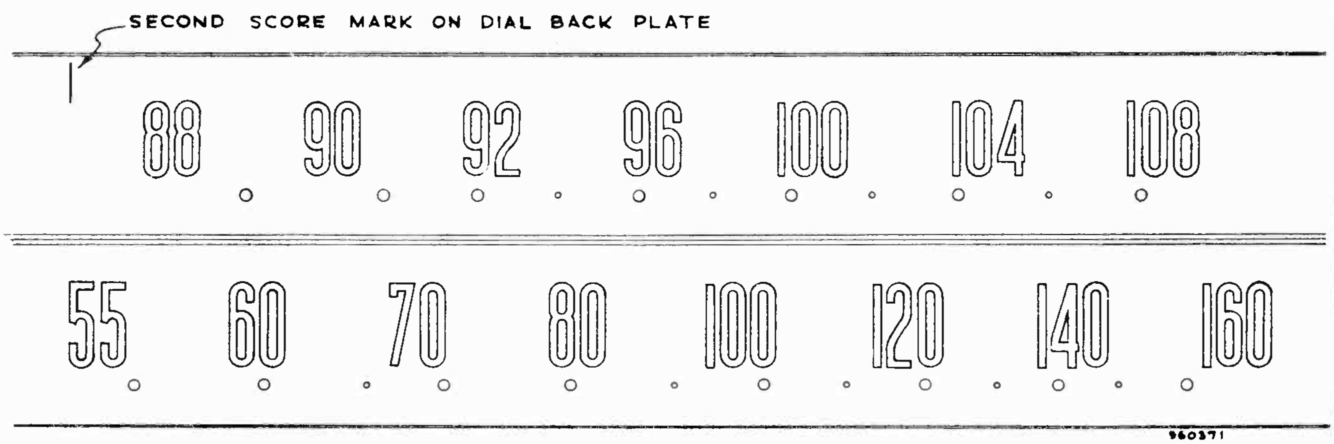


K= 1000

VOLTAGES MEASURED WITH CHANALYST OR VOLTOHMYST AND SHOULD HOLD WITHIN ± 20%

CAPACITOR VALUES GREATER THAN 1 IN MMF. UNLESS OTHERWISE INDICATED. LESS THAN 1 IN MF.

Simplified Schematic Diagram
Magic Monitor Position

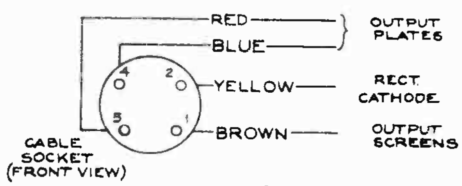


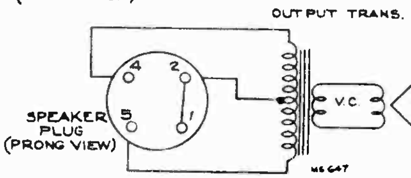
The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

PHONO Position

Similar to that shown above.

Plate and screen supply (term. No. 5 of S2 rear) to V11 (6BA6 M. M. reactor) is disconnected. Signal circuit (term. No. 6 of S1 rear) to V11 is also disconnected. This removes the variable capacity shunt of V11 from the audio circuit.





Speaker Connections

Replacement Parts

Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES **RC 616**
*73610	Board—Terminal board (FM-G) with link
73866	Capacitor—Ceramic, 2 mmf. (C9)
33101	Capacitor—Ceramic, 22 mmf. (C42)
*73664	Capacitor—Ceramic, 39 mmf. (C61)
39042	Capacitor—Ceramic, 47 mmf. (C26, C37)
73867	Capacitor—Ceramic, 56 mmf. (C43)
33103	Capacitor—Ceramic, 68 mmf. (C40)
48125	Capacitor—Ceramic, 150 mmf. (C7, C19, C38, C50, C53)
71920	Capacitor—Ceramic, 220 mmf. (C36)
39640	Capacitor—Mica, 330 mmf. (C30, C31, C58, C62)
73748	Capacitor—Ceramic, 1,500 mmf. (C39)
70646	Capacitor—Tubular, .0035 mfd., 1,000 volts (C34, C56)
*73659	Capacitor—Tubular, .003 mfd., 100 volts (C24)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C28)
71926	Capacitor—Tubular, .005 mfd., 200 volts (C20, C27, C32, C59, C60)
72791	Capacitor—Tubular, .005 mfd., 400 volts (C14, C16, C17, C21, C22)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C51, C52)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C23, C25)

MODEL 8V112

RADIO CORP. OF AMERICA

Replacement Parts (continued)

Stock No.	DESCRIPTION
72827	Capacitor—Tubular, .01 mfd., 400 volts (C29, C41, C54)
*73638	Capacitor—Tubular, .02 mfd., 400 volts (C55)
*73639	Capacitor—Tubular, .03 mfd., 400 volts (C57)
72596	Capacitor—Tubular, .05 mfd., 200 volts (C15)
73747	Capacitor—Electrolytic, 2 mfd., 50 volts (C33)
73372	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 350 volts, 1 section of 30 mfd., 300 volts and 1 section of 20 mfd., 25 volts (C18A, C18B, C18C)
73918	Coil—FM antenna coil (No. 16 tinned bus wire, 8 turns per inch, 1¾ turns L. H., .469 I. D.) (L1)
73916	Coil—FM oscillator coil (No. 16 tinned bus wire, 7 turns per inch, 4¾ turns R. H., .469 I. D.) (L2)
73744	Coil—Oscillator coil, "A" band (L4)
*73607	Condenser—Variable tuning condenser (C1, C2, C3, C4, C8, C12, C13)
*73602	Control—Tone control (S4)
70342	Control—Volume control and power switch (R14, S3)
†72953	Cord—Drive cord (approx. 38" overall length required)
*73690	Cord—Power cord and plug
28451	Cover—Insulating cover for electrolytic capacitor
16058	Grommet—Rubber grommet to mount R. F. shelf (4 required)
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
*73710	Indicator—Station selector indicator
71607	Plate—Dial back plate
30868	Plug—2 contact female plug for motor cable
5040	Plug—4 contact female plug for speaker cable
70250	Resistor—Wire wound, 3.9 ohms, 1 watt (R34)
	Resistor—Fixed, composition, 68 ohms, ±10%, ½ watt (R7)
	Resistor—Fixed, composition, 100 ohms, ±10%, ½ watt (R17, R27, R31)
	Resistor—Fixed, composition, 120 ohms, ±10%, ½ watt (R12)
	Resistor—Fixed, composition, 470 ohms, ±10%, 2 watt (R21)
	Resistor—Fixed, composition, 680 ohms, ±20%, ½ watt (R9, R11)
	Resistor—Fixed, composition, 1,200 ohms, ±5%, ½ watt (R23)
*73637	Resistor—Wire wound, 2,200 ohms, 5 watts (R22)
	Resistor—Fixed, composition, 3,300 ohms, ±5%, ½ watt (R24)
	Resistor—Fixed, composition, 8,200 ohms, ±10%, ½ watt (R43, R45)
	Resistor—Fixed, composition, 10,000 ohms, ±10%, ½ watt (R32)
	Resistor—Fixed, composition, 15,000 ohms, ±10%, ½ watt (R13, R18)
	Resistor—Fixed, composition, 18,000 ohms, ±10%, ½ watt (R30)
	Resistor—Fixed, composition, 18,000 ohms, ±10%, 1 watt (R54)
	Resistor—Fixed, composition, 22,000 ohms, ±20%, ½ watt (R4)
	Resistor—Fixed, composition, 27,000 ohms, ±10%, ½ watt (R8, R40)
	Resistor—Fixed, composition, 27,000 ohms, ±10%, 1 watt (R5)
	Resistor—Fixed, composition, 33,000 ohms, ±10%, ½ watt (R6)
	Resistor—Fixed, composition, 39,000 ohms, ±10%, ½ watt (R25, R55)
	Resistor—Fixed, composition, 56,000 ohms, ±10%, ½ watt (R10)
	Resistor—Fixed, composition, 68,000 ohms, ±10%, 1 watt (R53)
	Resistor—Fixed, composition, 82,000 ohms, ±10%, ½ watt (R42)
	Resistor—Fixed, composition, 100,000 ohms, ±10%, ½ watt (R56)
	Resistor—Fixed, composition, 270,000 ohms, ±10%, ½ watt (R19, R29)
	Resistor—Fixed, composition, 470,000 ohms, ±10%, ½ watt (R20, R26, R44, R46, R48, R49, R51)
	Resistor—Fixed, composition, 1 megohm, ±10%, ½ watt (R28, R50)
	Resistor—Fixed, composition, 2.2 megohm, ±20%, ½ watt (R3, R47)
	Resistor—Fixed, composition, 2.7 megohm, ±10%, ½ watt (R33)
	Resistor—Fixed, composition, 3.3 megohm, ±20%, ½ watt (R52)
	Resistor—Fixed, composition, 3.9 megohm, ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 10 megohm, ±20%, ½ watt (R15, R41)
	Resistor—Fixed, composition, 22 megohm, ±20%, ½ watt (R16)
*73605	Shaft—Tuning knob shaft
31364	Socket—Dial or jewel lamp socket
73606	Socket—Tube socket, 7 prong, miniature, for tubes V1, V2 and V3
35787	Socket—Phono input socket
72516	Socket—Tube socket, 7 prong, miniature, for tubes V4, V5 and V7
73117	Socket—Tube socket, 7 pin, miniature, for tubes V10 and V11

Stock No.	DESCRIPTION
31251	Socket—Tube socket, octal, for tubes V6, V8 and V9
72540	Spring—Drive cord spring
*73603	Support—Dial plate mounting support complete with pulley — R. H.
*73604	Support—Dial plate mounting support complete with pulley — L. H.
*73608	Switch—Range switch (S1, S2)
*73601	Transformer—Power transformer, 115 volts, 60 cycle (T1)
73745	Transformer—First I. F. transformer—dual (T2)
74019	Transformer—Second I. F. transformer—dual (T3)
73743	Transformer—Ratio detector transformer (T4)
33726	Washer—"C" washer for tuning knob shaft

SPEAKER ASSEMBLIES
92569-5W
RL 103B5

Stock No.	DESCRIPTION
13867	Cap—Dust cap
73934	Cone—Cone and voice coil assembly
31826	Plug—4 prong male plug for speaker
73635	Speaker—12" PM speaker complete with cone and voice coil less output transformer and plug (92569-5W)
71145	Suspension—Metal cone suspension
73636	Transformer—Output transformer (T5)

NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.

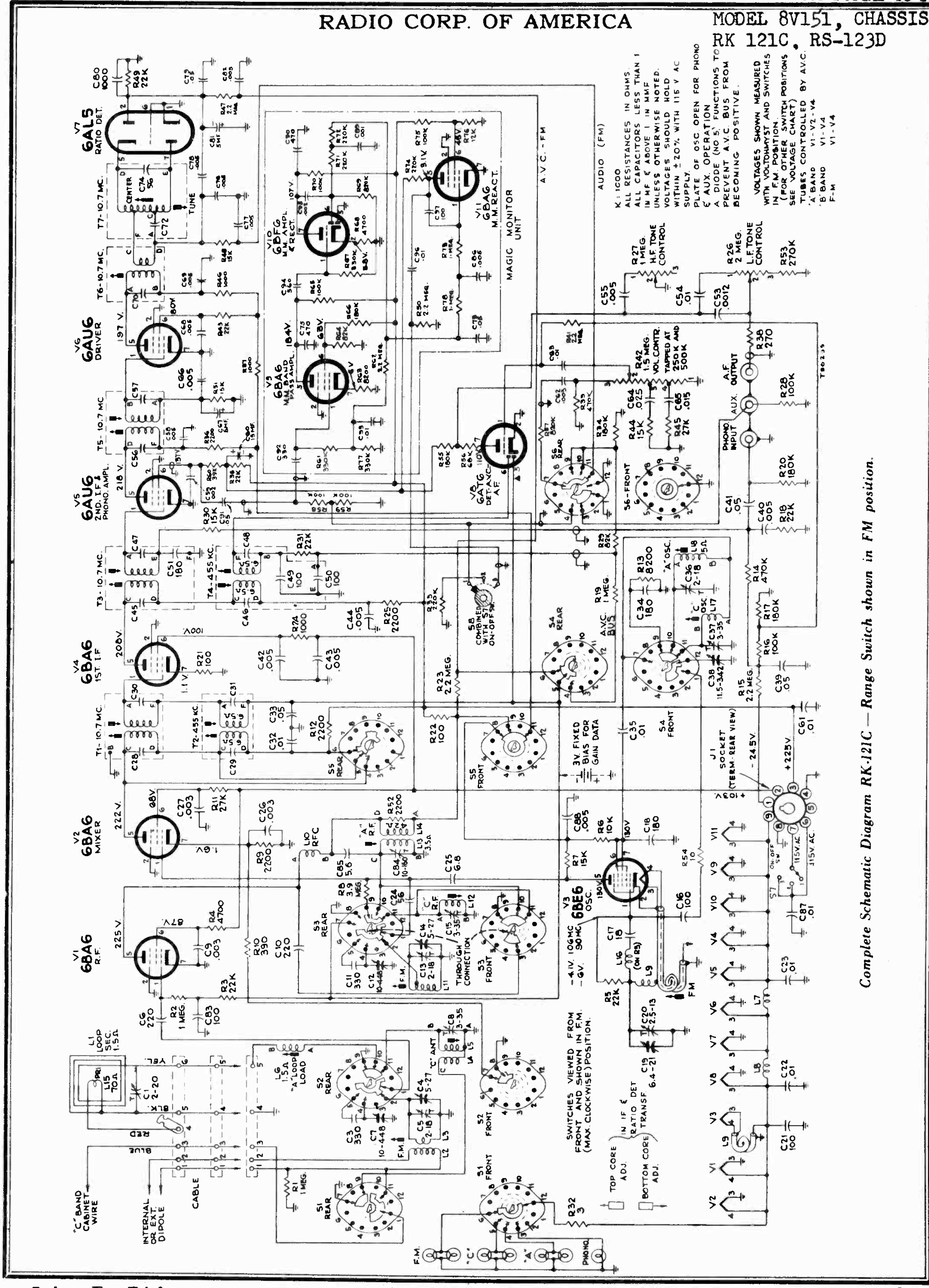
MISCELLANEOUS

Stock No.	DESCRIPTION
71864	Antenna—FM antenna
*73880	Back—Cabinet back—burgundy—for mahogany or walnut instruments
*73881	Back—Cabinet back—tan—for blonde instruments
71599	Bracket—Jewel lamp bracket
73626	Bumper—Rubber bumper for carriage actuating link
72437	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Jewel lamp cap
*73613	Carriage—Record changer mounting carriage complete with runners
71892	Catch—Bullet catch and strike for speaker compartment or record storage compartment door
*73623	Check—Radio compartment door check
X1898	Cloth—Grille cloth for blonde instruments
X1897	Cloth—Grille cloth for mahogany or walnut instruments
*73764	Decal—Control panel decal for mahogany or walnut instruments
*73765	Decal—Control panel decal for blonde instruments
71984	Decal—Trade mark decal (RCA-Victor)
71966	Decal—Trade mark decal (Victrola)
*73628	Dial—Glass dial scale
*73627	Escutcheon—Dial scale escutcheon
11889	Grommet—Rubber grommet for front apron of chassis
*73614	Grommet—Rubber grommet to mount record changer (3 required)
37396	Grommet—Rubber grommet to mount speaker (3 required)
73735	Hinge—Hinge for phono compartment or radio compartment door (2 required for each door)
36817	Hinge—Record storage compartment door hinge (1 set)
36610	Hinge—Speaker compartment door hinge (1 set)
71822	Knob—Tone control or range switch knob—maroon—for mahogany or walnut instruments
72824	Knob—Tone control or range switch knob—brown—for blonde instruments
71821	Knob—Tuning or volume control knob—maroon—for mahogany or walnut instruments
72800	Knob—Tuning or volume control knob—brown—for blonde instruments
11765	Lamp—Dial or jewel lamp—Mazda 51
73616	Link—Actuating link assembly for record changer carriage—R. H.
73617	Link—Actuating link assembly for record changer carriage—L. H.
*73611	Loop—Antenna loop complete
*73869	Nut—Speed nut for "MM" plate
73109	Nut—Tee nut to mount record changer (3 required)
*73868	Plate—"Magic Monitor" nameplate
71819	Plate—Radio compartment door check mounting
30868	Plug—2 contact female plug for record changer power cable
31048	Plug—Pin plug for shielded pickup cable
72937	Pull—Phono compartment or radio compartment door pull (2 required for each door)
*73909	Pull—Speaker compartment or record storage compartment door pull
*73615	Screw—¼-20 x 1½" fillister head machine screw to mount record changer (3 required)
73618	Spring—Connecting spring between actuating link and record changer carriage
71818	Spring—Radio compartment door check spring
30900	Spring—Retaining spring for knobs
73185	Stop—Carriage mechanism stop (2 required)
70164	Stop—Stop for phono compartment, speaker compartment or record storage compartment door
73612	Track—Carriage mechanism track complete with mounting plate (2 required)

*This is the first time that this Stock No. has appeared in Service Data.
†Stock No. 72953 is a reel containing 250 feet of cord.

RADIO CORP. OF AMERICA

MODEL 8V151, CHASSIS RK 121C, RS-123D



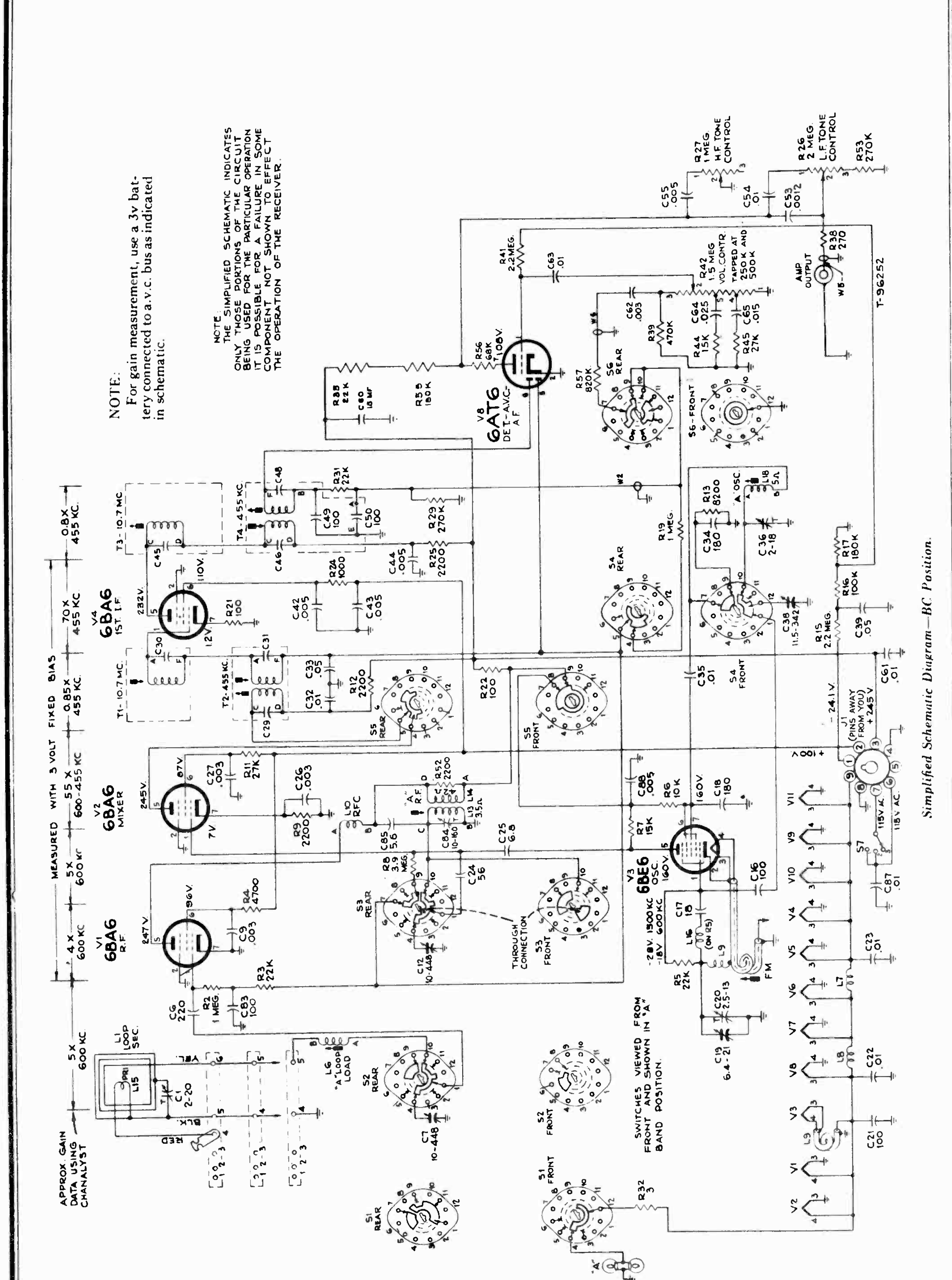
Complete Schematic Diagram RK-121C — Range Switch shown in FM position.

CLARI-SKEMATIX

Registered Trademark

MODEL 8V151

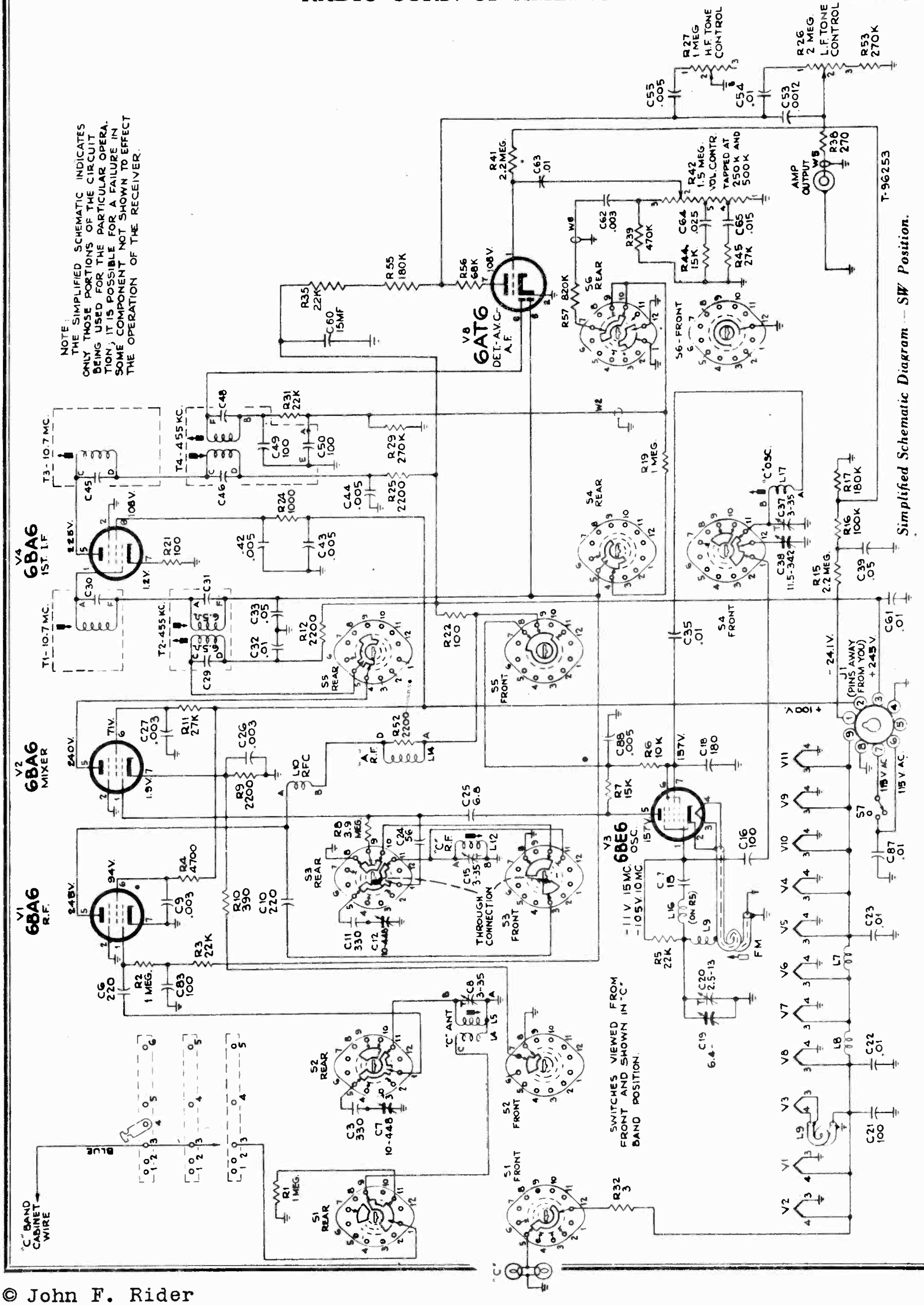
RADIO CORP. OF AMERICA



Simplified Schematic Diagram—BC Position.

RADIO CORP. OF AMERICA

MODEL 8V151

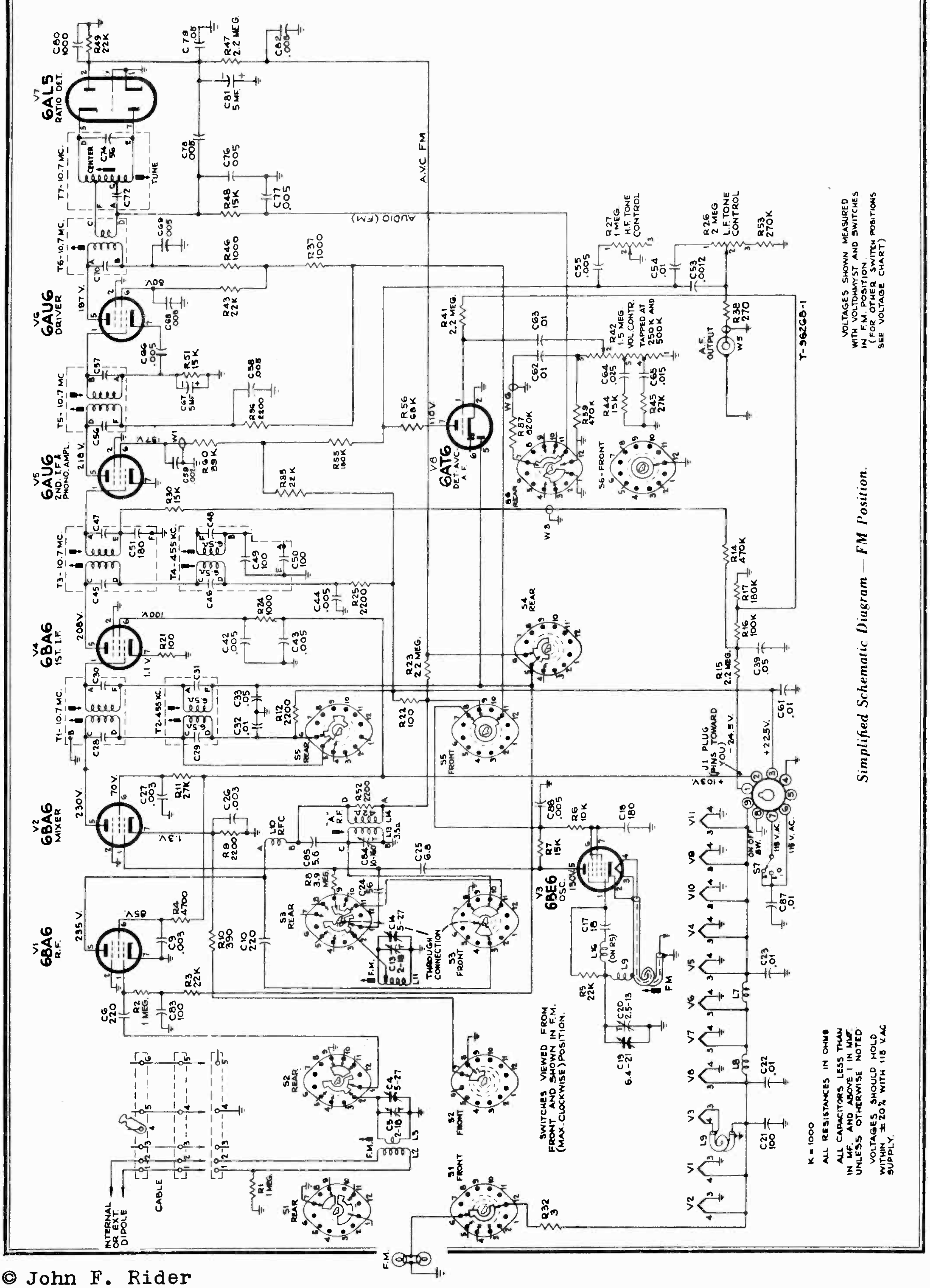


CLARI-SKEMATIX

Registered Trademark

MODEL 8V151

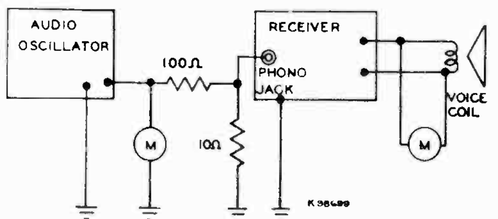
RADIO CORP. OF AMERICA



Simplified Schematic Diagram — FM Position.

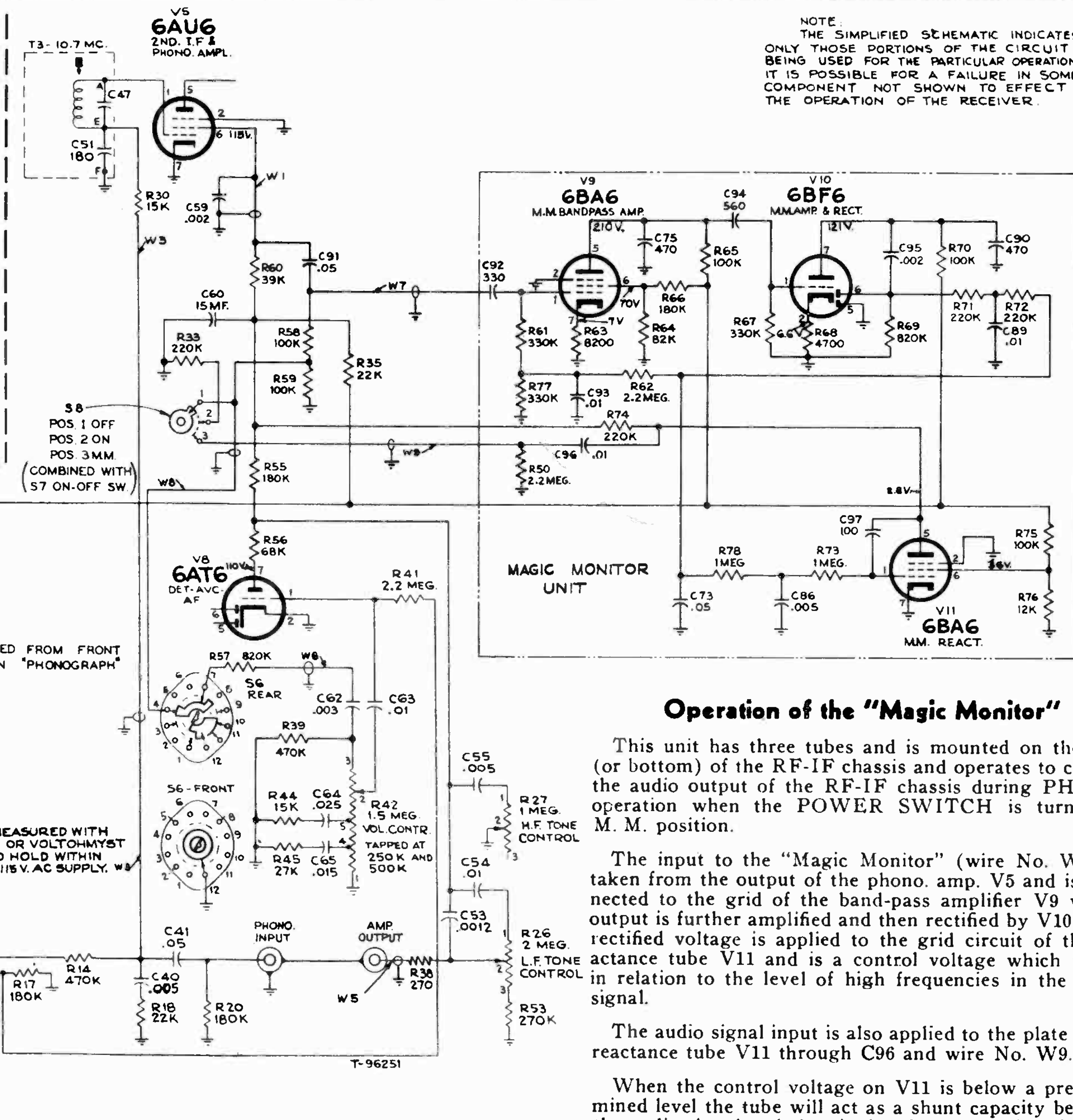
RADIO CORP. OF AMERICA

MODEL 8V151



Magic Monitor Test Set-up.

Resistors of different values may be used but should be selected to give the same ratio and approximate the output impedance of the audio oscillator. The two resistors in series should not exceed 500 ohms.



Simplified Schematic Diagram — PH Position.

Operation of the "Magic Monitor"

This unit has three tubes and is mounted on the rear (or bottom) of the RF-IF chassis and operates to control the audio output of the RF-IF chassis during PHONO operation when the POWER SWITCH is turned to M. M. position.

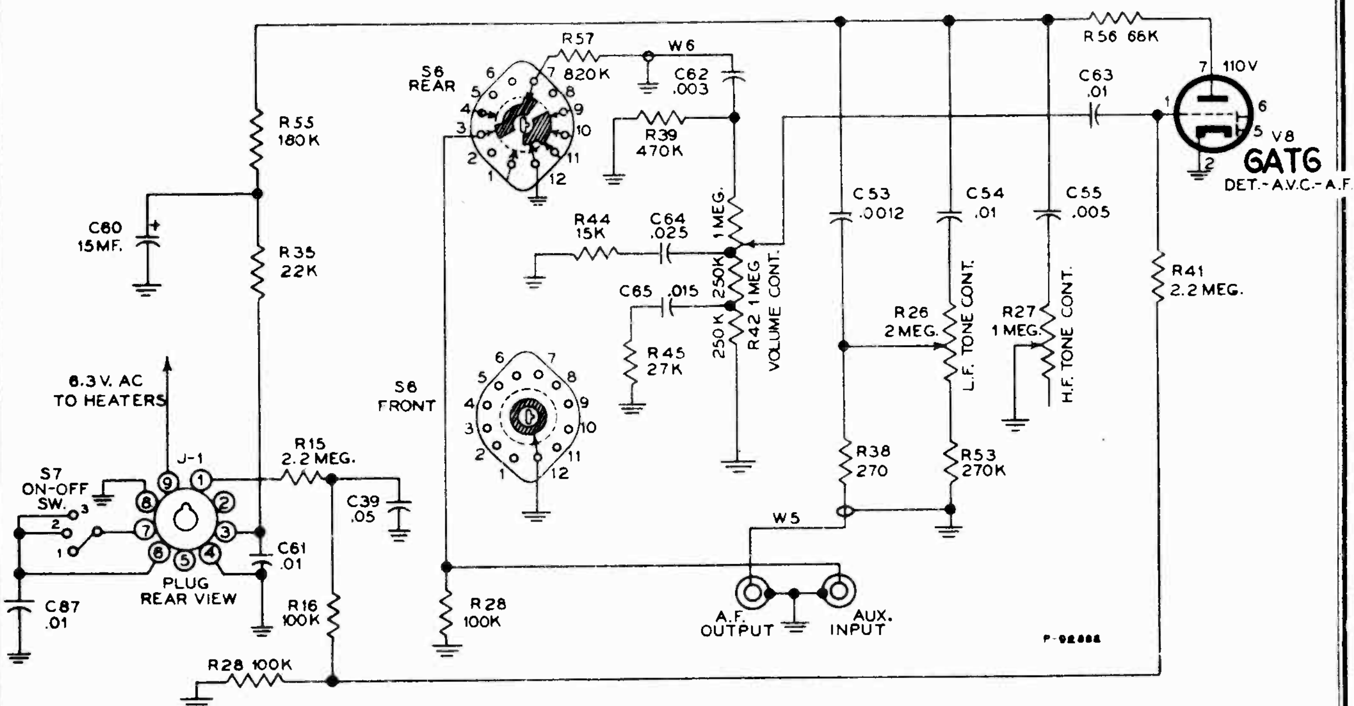
The input to the "Magic Monitor" (wire No. W7) is taken from the output of the phono. amp. V5 and is connected to the grid of the band-pass amplifier V9 whose output is further amplified and then rectified by V10. This rectified voltage is applied to the grid circuit of the reactance tube V11 and is a control voltage which varies in relation to the level of high frequencies in the audio signal.

The audio signal input is also applied to the plate of the reactance tube V11 through C96 and wire No. W9.

When the control voltage on V11 is below a predetermined level the tube will act as a shunt capacity between the audio signal and chassis thereby attenuating the high frequency portion of the audio signal.

MODEL 8V151

RADIO CORP. OF AMERICA



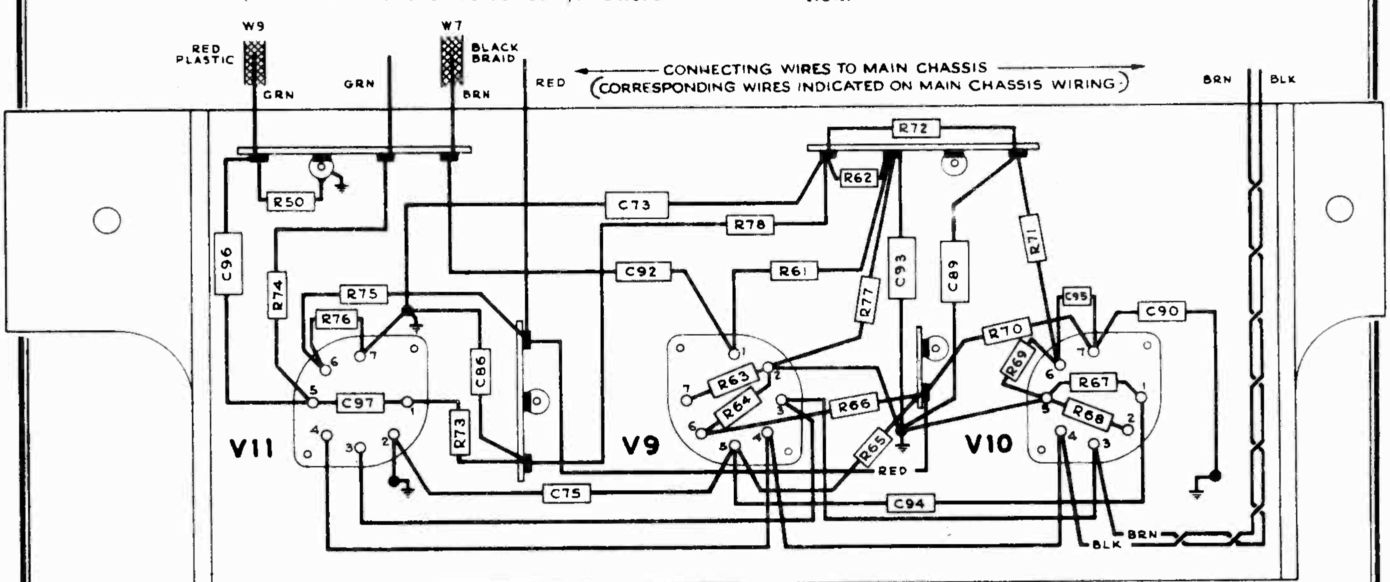
Simplified Schematic Diagram — ● Position. (AUX.).

Testing the Magic Monitor:

Any serious defects in Magic Monitor operation will be made evident by the following tests. An audio oscillator and an a-c voltmeter flat to 3,000 cycles are needed for the tests.

Procedure:

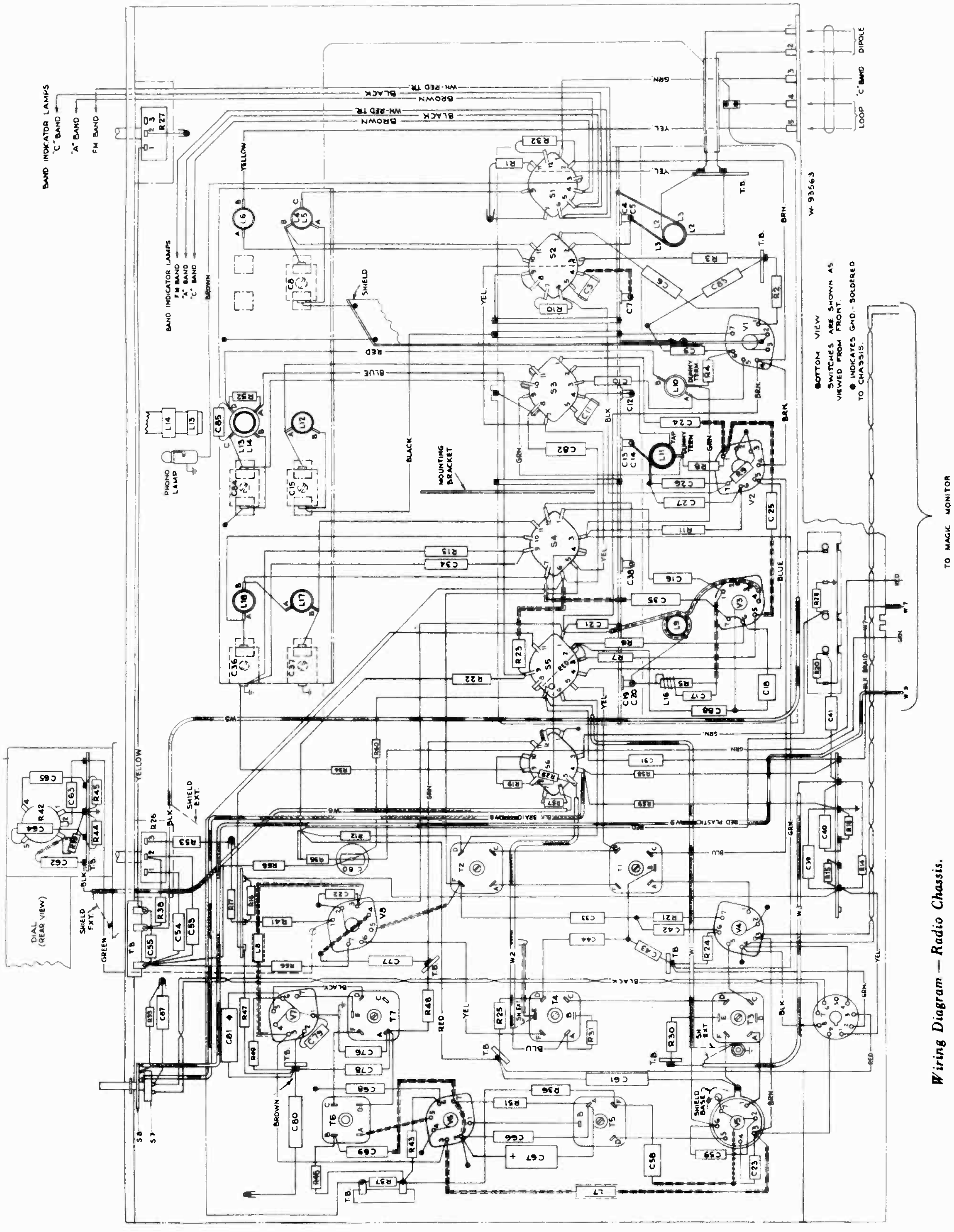
1. Set up the equipment as shown in Fig. 10. Although two voltmeters are shown, one can be used in both positions.
2. Turn the receiver function switch to PHONO and turn S8 to ON position. Set the audio oscillator to 400 cycles and adjust its output to 0.2 volt (measured across the oscillator output terminals). Adjust the receiver volume control for a reading of 1 volt (measured at the voice coil). There should be little or no change in receiver output when S8 is turned to "M.M." position.
3. Repeat Step 2 except using oscillator output of .1 volt, 400 cycles. There should be little or no change in receiver output when S8 is turned to "M.M." position.
4. Repeat Step 2 except using oscillator output of 1 volt, 3,000 cycles. There should be little or no change in receiver output when S8 is turned to "M.M." position.
5. Repeat Step 2 except using oscillator output of 0.2 volt, 3,000 cycles. When S8 is turned to "M.M." position the output should decrease to approximately 1/5 of that obtained with S8 in ON position.



Wiring Diagram — Magic Monitor Unit.

RADIO CORP. OF AMERICA

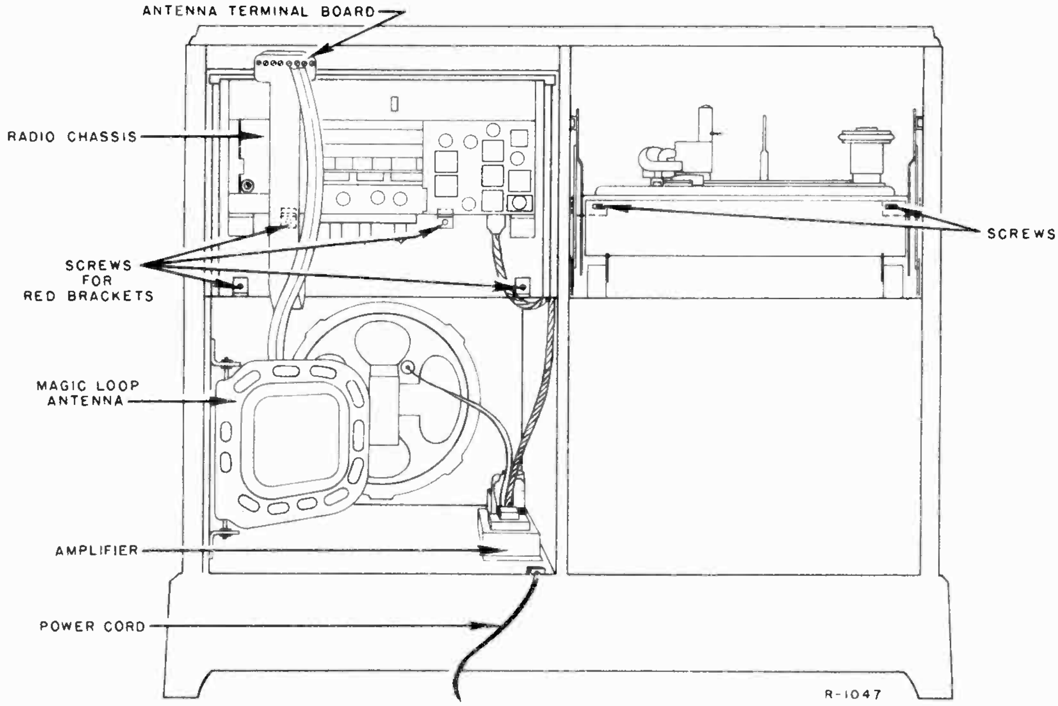
MODEL 8V151



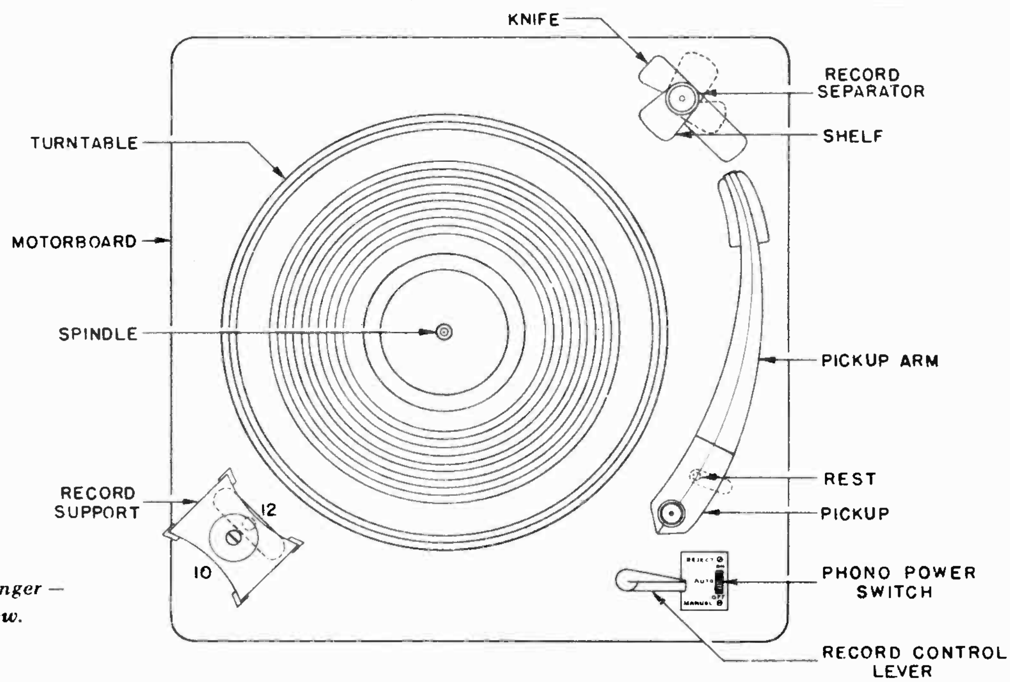
Wiring Diagram — Radio Chassis.

MODEL 8V151

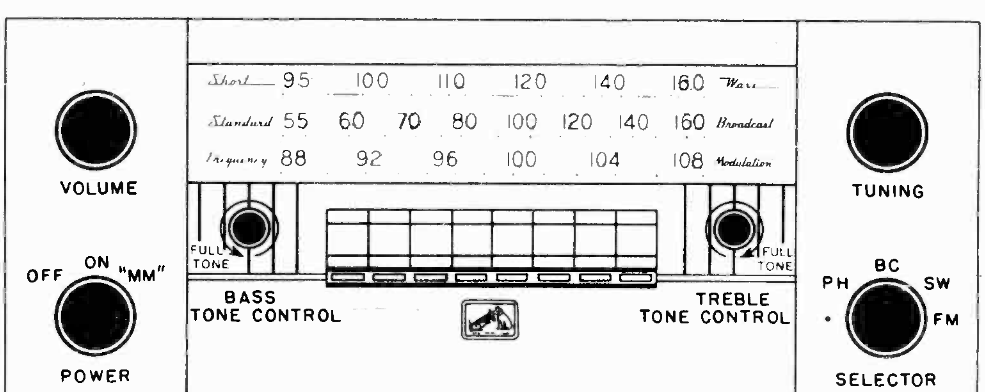
RADIO CORP. OF AMERICA



Back View.



Record Changer — Top View.



Control Panel.

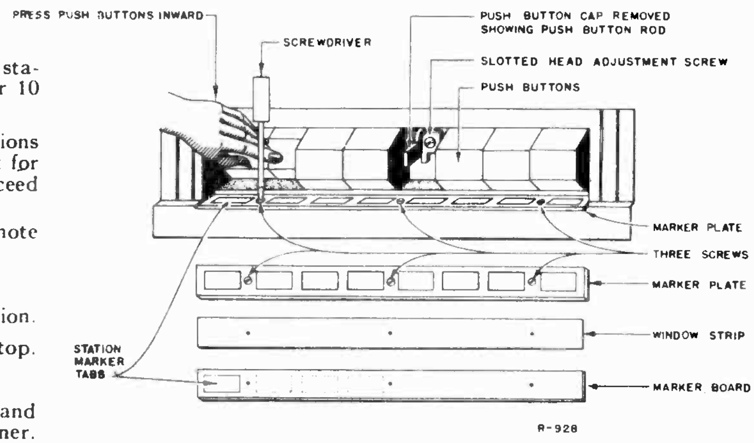
RADIO CORP. OF AMERICA

Push-Button Adjustment

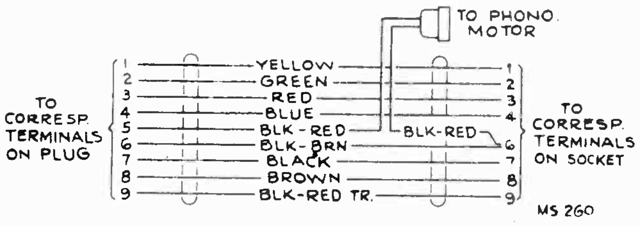
The push-buttons should be adjusted for eight favorite stations after the receiver is operating, and has had a 5 or 10 minute warm-up period.

Any standard broadcast or frequency modulation stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

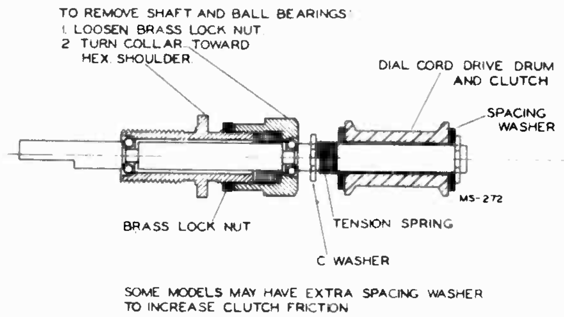
1. Remove the first PUSH-BUTTON (Just pull) and note the adjustment screw beneath.
2. Loosen the adjustment screw.
3. Manually tune very accurately for the desired station.
4. Push the PUSH-BUTTON rod in till it is against stop.
5. Tighten adjustment screw.
6. Make adjustment for the other buttons, setting up and checking each for the chosen station in a similar manner.
7. Recheck all PUSH-BUTTONS and reset if found necessary.



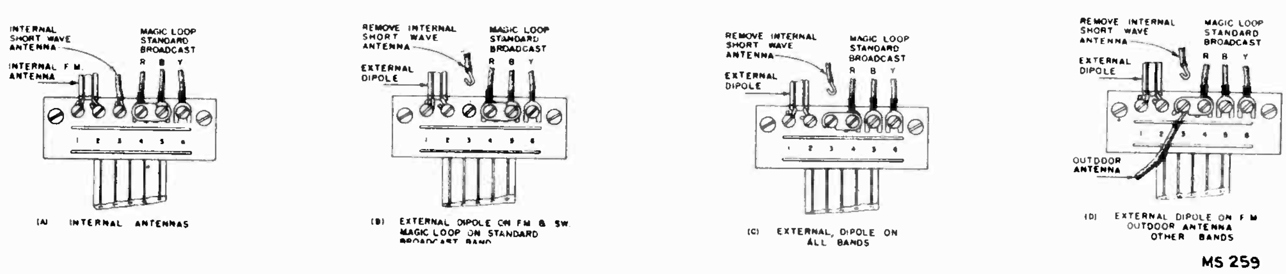
Push-Button set-up



Power Cable.
Some may not have the color code indicated.



Tuning Shaft and Clutch Assembly.



Antenna Terminal Board Connections

EXTERNAL ANTENNAS—If reception is not satisfactory on one or more of the three bands, using the built-in cabinet antennas, an external antenna may be used. The Magic Loop Antenna will usually provide sufficient pickup on the Standard Broadcast band, but if an external dipole is installed to improve reception on Frequency Modulation it may be used for Standard Broadcast and Short Wave as well. Connections are made to the antenna terminal board in the back of the cabinet. External antennas may be erected indoors or outdoors and should be oriented in direction for requirements of best reception. RCA Television Antenna, Stock No. 225 or 226, or the equivalent with 300-ohm transmission line is recommended for an external antenna.

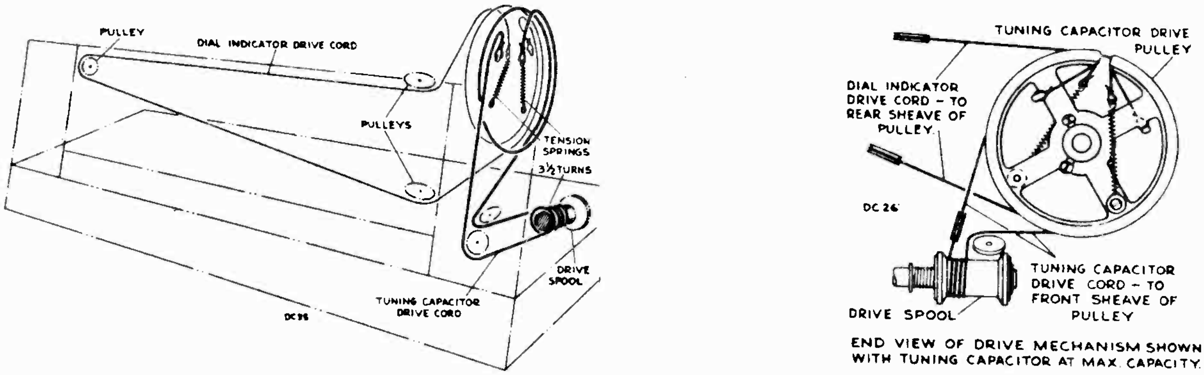
Figure 21 (A) shows the *Antenna Terminal Board* with connections for *internal* cabinet *antennas*.

Figure 21 (B) shows connections for the RCA Television Antenna replacing those for the *internal FM antenna* on terminals 1 and 2, and the *internal SW antenna* disconnected at terminal 3. The external dipole antenna is now the antenna for FM and SW bands.

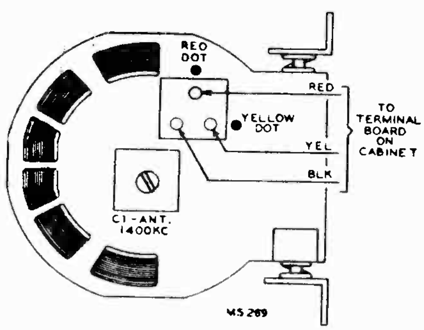
Figure 21 (C) shows the additional change for connecting the Standard Broadcast band to make use of the external RCA Television Antenna. The link across terminals 4 and 5 is changed to terminals 4 and 3. The external antenna is now effective on all bands. Tighten terminals and be sure that the red, black and yellow leads (R.B.Y.) to terminals 4, 5 and 6 are still in place and securely connected.

Figure 21 (D) shows connections for a separate outdoor antenna on SW and SB reception, and the external dipole on FM. This outdoor antenna should consist of a wire 30 to 60 feet or so in length mounted in a convenient location as high as possible. Connect lead-in from the antenna to terminal 3 on the antenna terminal board. This outdoor antenna is effective on SB and SW bands. If this connection makes the SB signal too strong, causing overload and distortion, replace the link across terminals 4 and 5 as in Figure 21 (A) and (B). This outdoor antenna is now effective on SW only

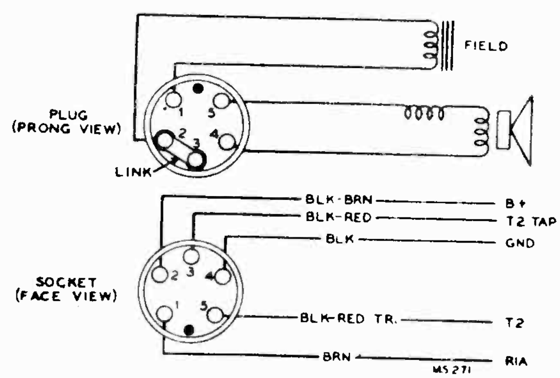
MODEL 8V151 RADIO CORP. OF AMERICA



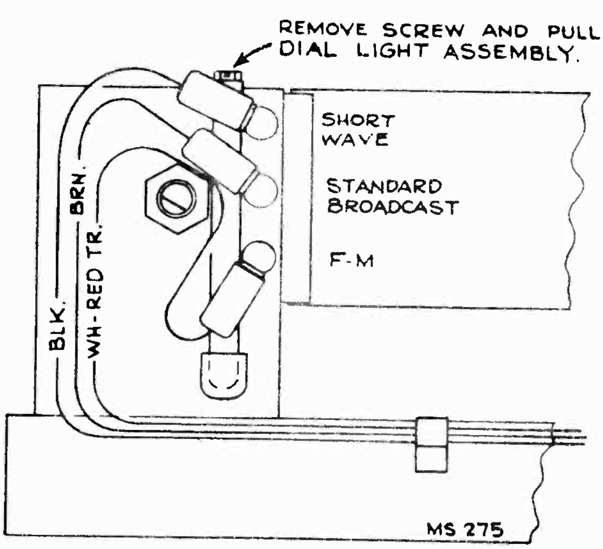
Dial Cord Assembly.



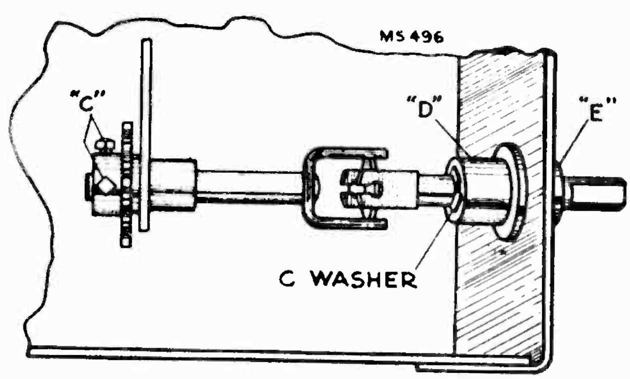
Loop Antenna.



Speaker Connections.



Dial Lamp Assembly.



Range Switch Coupling Shaft.

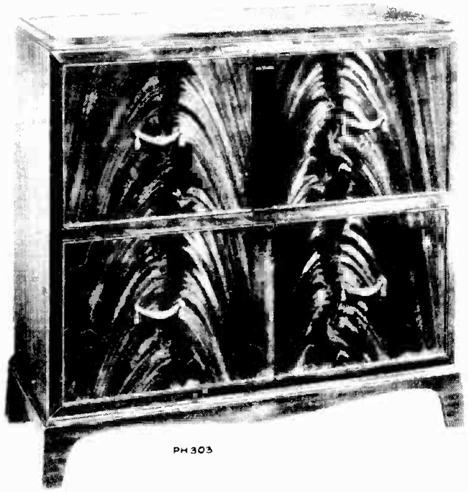
Removal of Dial Lamps

1. Remove the six control knobs.
2. Remove the four "T" bushings which hold the escutcheon to the control shafts—remove escutcheon.
3. Remove the screw which holds the dial light assembly to the chassis (accessible from back with radio compartment closed)—pull the assembly out of its retaining slot. (See Fig. 25.)

To Remove Shaft: Loosen square head set screws "C" in collar of gear. Remove nut "E" (on front apron of chassis) from bushing "D." Push shaft and bushing to the rear so that shaft and bushing are clear of the chassis apron. Flex the shaft and pull forward.

To Remove Bushing from Shaft: Remove "C" washer from shaft at inside end of bushing, push shaft through bushing to permit removal of "C" washer normally recessed inside bushing. Pull shaft through bushing to inside of chassis.

Specifications



Tuning Ranges
Broadcast .... 540-1600 kc
Shortwave "C" Band .... 9.2-16.0 mc
Frequency Modulation .... 88-108 mc

Intermediate Frequency AM .... 455 kc

Intermediate Frequency FM .... 10.7 mc

Tube Complement of RK-121C
1. RCA-6BA6 .... RF Amplifier
2. RCA-6BA6 .... Mixer
3. RCA-6BE6 .... Oscillator
4. RCA-6BA6 .... 1st IF
5. RCA-6AU6 .... 2nd IF and Phono. Amp.
6. RCA-6AU6 .... Driver
7. RCA-6AL5 .... Ratio Detector
8. RCA-6AT6 .... AM-DET-AVC-AF
9. RCA-6BA6 .... M. M. Band-Pass Amp.
10. RCA-6BF6 .... M. M. Amp. and Rect.
11. RCA-6BA6 .... M. M. Reactor

Tube Complement of RS-123D
1. RCA-5U4G .... Rectifier
2. RCA-6SN7GT .... Amp. and Phase Inverter
3. RCA-6F6G .... Output
4. RCA-6F6G .... Output

Record Changer (RP-177B)
Turntable Speed .... 78 r.p.m.
Record Capacity .... Ten 12" or twelve 10" records

Undistorted Power Output .... 10 watts

Maximum Power Output .... 14 watts

Loudspeaker (92567-2)
Type .... 12 inch Electrodynamic
Voice Coil Impedance .... 2.2 ohms at 400 cycles

Dial Lamps (6) .... Type No. 51, 6-8 volts, 0.2 amp.

Victrola Indicator Lamp. Type No. 44, 6-8 volts, 0.25 amp.

Jewel Lamp .... Type No. 51, 6-8 volts, 0.2 amp.

Cabinet Dimensions
Height.....36 7/16" Width.....40 1/8" Depth.....17 15/16"

Tuning Drive Ratio .... 18.4:1 (4.6 turns of knob)

Power Supply Rating ...... 115 volts, 60 cycles, 180 watts

Circuit Description

Built-in antennas are provided for Standard Broadcast ("A" Band), Short Wave ("C" Band) and Frequency Modulation ("FM"); connected through the range switch to the R.F. amplifier tube (V1). The output of the R.F. amplifier and the oscillator (V3) is fed into the grid of the mixer tube (V2). The intermediate frequency output of the mixer is coupled through transformers T1 (10.7 mc.) and T2 (455 kc.) (series connected) to the 1st I.F. amplifier tube. The output of the I.F. amplifier is coupled through trans. T3 (10.7 mc.) and T4 (455 kc.) whose secondaries are connected to the grid of V5 (2nd I.F.) and the detector diode of V8 (AM Det.) respectively. The 10.7 mc. output of V5 is coupled through trans. T5 to the grid of the driver tube (V6) whose output is coupled through the driver trans. (T6) and the ratio detector trans. to the ratio detector tube (V7).

Simple A.V.C. is used on "A" and "C" bands, delayed A.V.C. is used on FM.

The audio voltages developed in the detector circuits of V7 (FM) and V8 (AM) are coupled through the range switch and volume control to V8 (AF amp.)

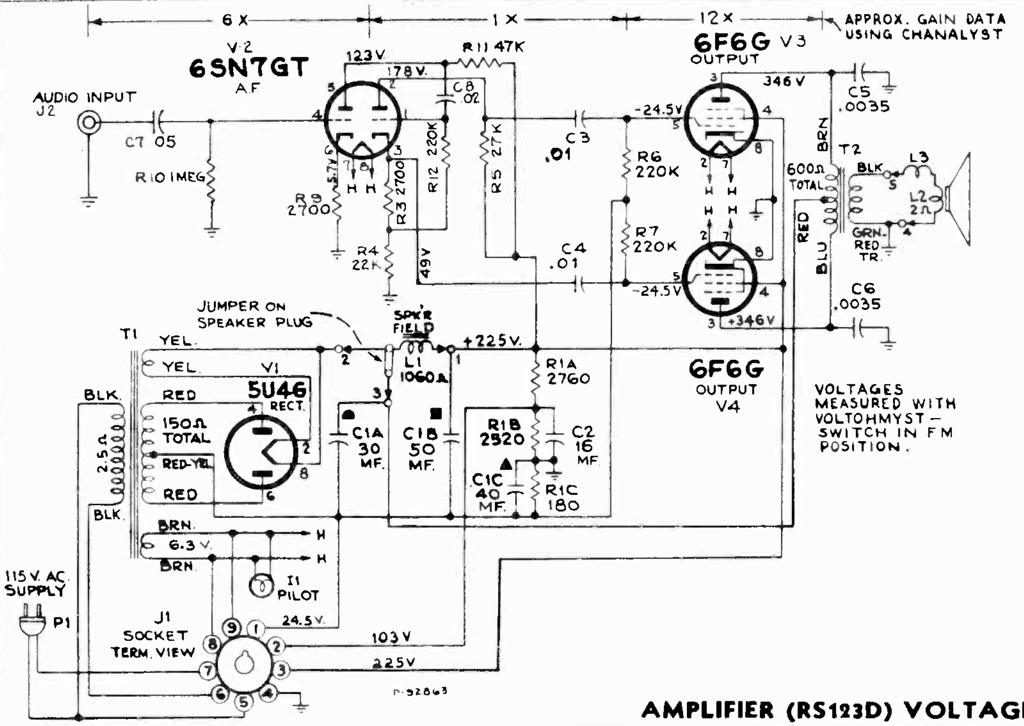
When the range switch is turned to PHONO position the input from the PHONO input jack is fed into the grid of V5 (this tube serves as 2nd I.F. on FM); the output of V5 (as phono. amp) is the screen grid (pin No. 6) and is coupled through the range switch and volume control to V8 (A.F. amp.) and also to the "Magic Monitor" which varies the audio output during phono operation. The audio output of V8 is coupled to the AMP output jack.

When the selector switch is turned to max. counterclockwise position this instrument may be used as an audio amplifier. The audio input for this purpose is connected to the AUX jack (middle) at the rear (or bottom) of the chassis. The input from this jack is coupled through the range switch and volume control to the grid of V8.

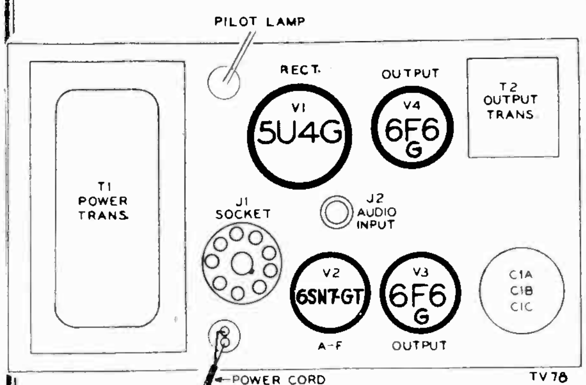
Note: Plate voltage supplied to V5 (2nd I.F.) on FM only. Plate and screen voltages supplied to V6 (driver) on FM only. Plate and screen voltages supplied to V3 (osc.) on FM, A and C bands only.

The circuit of the A.F. amplifier chassis is conventional consisting of a 6SN7GT which serves as audio amplifier and phase inverter feeding into two 6F6G tubes connected in push-pull. A 5U4G rectifier supplies B+ voltage for both chassis (RK-121C and RS-123D).

RADIO CORP. OF AMERICA



Schematic Diagram RS-123D.



Top View RS-123D.

AMPLIFIER (RS123D) VOLTAGE CHART

Tube	Type	Terminal	Aux or PH	BC or SW	FM
V1	5U4G Rect.	Fil. No. 8	360	355	350
V2	6SN7 A. F. & Ph. Inv.	Plate No. 2 Plate No. 5 Cathode No. 3 Cathode No. 6	201 142 56 6.4	190 134 53 6.1	178 123 49 5.7
V3	6F6G Output	Plate No. 3 Screen No. 4 Grid No. 5	353 268 –24	351 245 –24.1	346 225 –24.5
V4	6F6G Output	Same as V3			

AMPLIFIER CATHODE CURRENTS (MA)

V1	5U4G	†	133	137	141
V2	6SN7	No. 3	2.1	2.0	1.9
		No. 6	2.3	2.2	2.0
V3	6F6G	No. 8	23	19	13.5
V4	6F6G	No. 8	23	19	13.5

†Measured at No. 2 terminal of speaker plug.

RADIO CHASSIS (RK-121C) VOLTAGE CHART

Tube	Type	Terminal	Aux or PH	BC	SW	FM
V1	6BA6 R.F.	Plate No. 5 Screen No. 6	260 100	247 96	245 94	225 87
V2	6BA6 Mixer	Plate No. 5 Screen No. 6 Cathode No. 7	260 96 6.1	245 87 7	240 71 1.9	222 68 1.6
V3	6BE6 Osc.	Plate No. 5 Screen Nos. 6 & 7 *Grid No. 1 †Grid No. 1	.. ..	160 160 –28 –18	157 157 –11 –10.5	130 130 –4.1 –6
V4	6BA6 1st I.F.	Plate No. 5 Screen No. 6 Cathode No. 7	240 118 1.2	232 110 1.2	225 108 1.2	208 100 1.1
V5	6AU6 2nd I.F.	Plate No. 5 Screen No. 6	.. 115	.. 112	.. 112	218 137
V6	6AU6 Driver	Plate No. 5 Screen No. 6	.. ..	.. ..	.. ..	197 80
V7	6AL5 R. Det.	......	..	..	..	..
V8	6AT6 Det.-AF.	Plate No. 7	110	108	108	110
V9	6BA6 M.M. Amp.	Plate No. 5 Screen No. 6 Cathode No. 7	210 70 7	200 68 6.6	200 68 6.6	184 63 6
V10	6BF6 M.M. Amp.&Rect.	Plate No. 7 Cathode No. 2	121 6.6	117 6.4	117 6.4	107 5.8
V11	6BA6 Reactor	Plate No. 5 Screen No. 6	2.6 36	2.6 35	2.6 35	3.1 45

*Tuning condenser at high frequency end.
†Tuning condenser at low frequency end.

RADIO CHASSIS CATHODE CURRENTS (MA)

V1	6BA6	No. 7	16.9	16.5	16.5	14
V2	6BA6	No. 7	3.1	3.2	3.8	4.9
V3	6BE6	No. 2	0	14.1	14.1	15.8
V4	6BA6	No. 7	14	13.8	13.8	*13.2
V5	6AU6	No. 7	1.8	1.8	1.8	3.9
V6	6AU6	No. 7	0	0	0	18.3
V7	6AL5	....	0	0	0	0
V8	6AT6	No. 2	.25	.25	.25	.25
V9	6BA6	No. 7	.9	.9	.9	.88
V10	6BF6	No. 2	1.3	1.3	1.3	1.2
V11	6BA6	No. 7	1.36	1.35	1.35	1.3

Voltages measured with Chanalyst or VoltOhmyst and should hold within ± 20% with rated power supply. No signal. Tuning condenser closed except as stated.

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart. Any adjustments made on the FM 10.7 mc. IF's make it necessary to realign the AM 455 kc. IF's.

For "A" and "C" band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Lead from pin 5, tube V2, to terminal "C" on transformer T1 should be dressed close to chassis.
2. Leads to terminals "C" and "D" on transformer T2 should be dressed close together.
3. The following capacitors must be dressed close to the chassis with leads kept as short as possible: C32, C33, C66, C69, C79, and C80.
4. All FM coil connections must be soldered in exact place as the original. (One-sixteenth inch difference in length may be excessive).
5. Lead from pin 7, tube V8, must be dressed away from lead to terminal "D" of transformer T7.
6. ALL wiring in the receiver is critical as to length and placement. It is therefore important when servicing, that extreme care should be taken so as not to disturb more of the wiring than absolutely necessary.

Note: Keep tuning capacitor rotor grounding brushes clean and making good contact.

FM RATIO DETECTOR ALIGNMENT

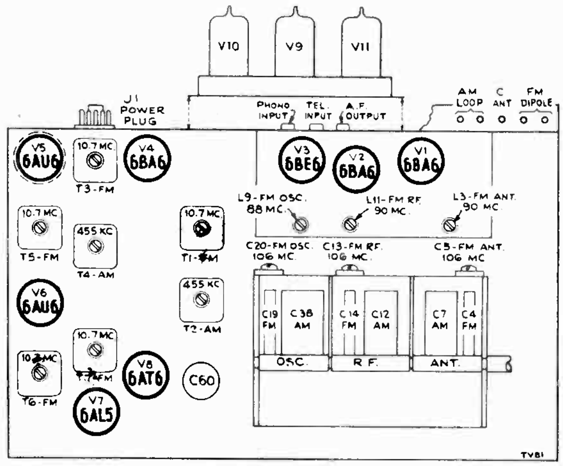
SET RANGE SWITCH TO FM POSITION

Steps	Connect High Side of Test Osc. To—	Tune the Osc. To—	Turn Vol. Cont. To—	Adjust
1.	Connect a 680 ohm Resistor between lugs D and E of the ratio detector transformer T7. Connect DC probe of a voltohmyst to the negative lead of the 5 mfd. Electrolytic capacitor C81. The common lead of the meter to chassis.			
2.	Driver grid pin 1, of 6AU6 (V6) in series with a .01 MFD capacitor.	10.7 MC 30% Mod. 400 Cycles AM	Maximum Volume	Driver transformer T6 for maximum DC voltage across C-81
3.	Remove Meter Leads and disconnect the 680 ohm resistor from D and E on T7. Connect two 68,000 ohm resistors (within 1% of each other) in series, across C81. Connect the common lead of the Voltohmyst to the center point of the 68,000 ohm resistors and the DC probe to contact No. 7 on rear of Switch wafer S6. Use the 30 volt scale.			
4.	Same as Step 2	Same as Step 2	Volume Control Maximum	†T7 Bottom core for Zero DC Balance on Voltohmyst ††T7 top core for minimum audio output. (Output meter across voice coil)
5.	Reconnect voltohmyst as in step 1, omitting the 680 ohm resistor.			
6.	Repeat step 2 omitting 680 ohms.			
7.	Remove all connections.			

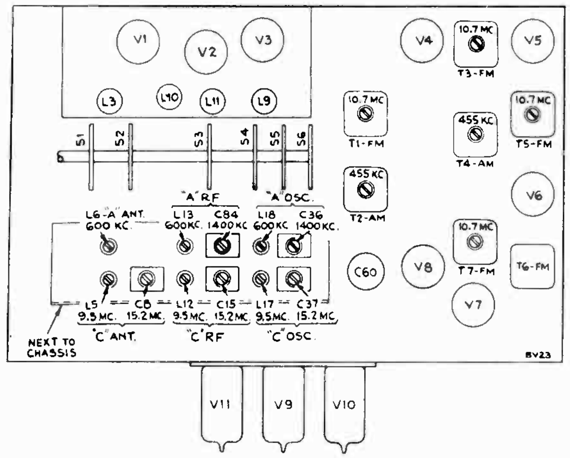
†Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction.

††The zero DC balance and the minimum AF output should occur at the same point: if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the voltohmyst, and an output meter connected across the voice coil for the point at which both zero DC and minimum output occurs.

Note:—Two or more points may be found which will satisfy the condition required in step 4. T7 top core should be correctly adjusted when approximately ⅛ inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum AF and minimum DC is reached.



Tube and Trimmer Locations — Top View.



Tube and Trimmer Locations — Bottom View.

ANT.—RF.—IF. ALIGNMENT

"FM" IF Alignment

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
1.	Connect the DC probe of a voltohmyst to the negative lead of the 5 MFD electrolytic capacitor C 81, and the common lead of the meter to chassis ground				
2.	Mixer grid pin #1 of 6BA6, (V2) in series with a .01 MFD capacitor (Adjust test osc. output for 6-10 volts developed across C81) (Range switch in FM position) (Use very short lead)	To RF Tube shelf ground near mixer tube(use very short leads)	10.7 MC 30% modulated at 400 cycles AM.	Max. cap. (Fully meshed)	*T5, T3, T1 top and bottom cores alternately loading primary & secondary of each transformer with 680 ohms while the opposite side of the same transformer is being adjusted. Adjust all transformers for maximum voltage across C81.

*This method is known as alternate loading which involves the use of a 680 ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 680 ohm resistor while the plate winding is being peaked.

When the windings are loaded, it is necessary to increase the 10.7 MC input since the gain will decrease and the voltage across C81 will be less.

MODEL 8V151

RADIO CORP. OF AMERICA

ANT—RF—IF—ALIGNMENT (Continued)

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust

"AM" IF Alignment

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
3.	Mixer grid pin #1 of (V2) in series with a .01 MFD Capacitor. (Turn band switch to "A" or "C" band)	To chassis ground	455KC	High Freq. end of Dial	**Top and bottom Cores of T2 and T4. (For maximum voltage across voice coil)

"C" Band OSC.—RF.—ANT. Alignment

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
4.	"C" Band Ant. Terminal #3 Through a dummy Ant. comprising a 150 ohm resistor in series with a 25 to 30 mmf capacitor	To Chassis ground	15.5 MC	15.5 MC	Osc.—C37*** RF.—C15 Ant.—C8 (For maximum voltage across voice coil)
5.			9.5 MC	9.5 MC	Osc.—L17*** RF—L12 Ant.—L5 (For maximum voltage across voice coil)
6.	Repeat steps 4 and 5 for accurate alignment				

"A" Band OSC.—RF.—ANT.

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
7.	High Side (Red Lead) of Loop Primary with link open through a Dummy Ant. comprising a 200 mmf. Capacitor	To Chassis ground	1400 KC	1400 KC	Osc.—C36 RF.—C84 Ant.—C1 (For maximum voltage across voice coil)
8.			600 KC	600 KC	Osc.—L18 RF—L13 Ant.—L6 (For maximum voltage across voice coil)
9.	Repeat steps 7 and 8 for Max. output.				

**It is necessary to alternately load the primary and secondary of each 455 KC I. F. transformer with 10,000 ohms while the opposite side of the same transformer is being adjusted.

***To guard against the possibility of alignment of L17 and C37 to image frequencies, tune the test oscillator to 15.5 MC and turn the radio dial to 15.5 MC. Then adjust the test oscillator to 16.41 MC (image frequency). By increasing the test oscillator output, a signal should be heard.

Tune the test oscillator to 9.5 MC and turn the radio dial to 9.5 MC, then adjust the test oscilliator to 10.41 MC (image frequency). By increasing the test oscillator output, a signal should be heard.

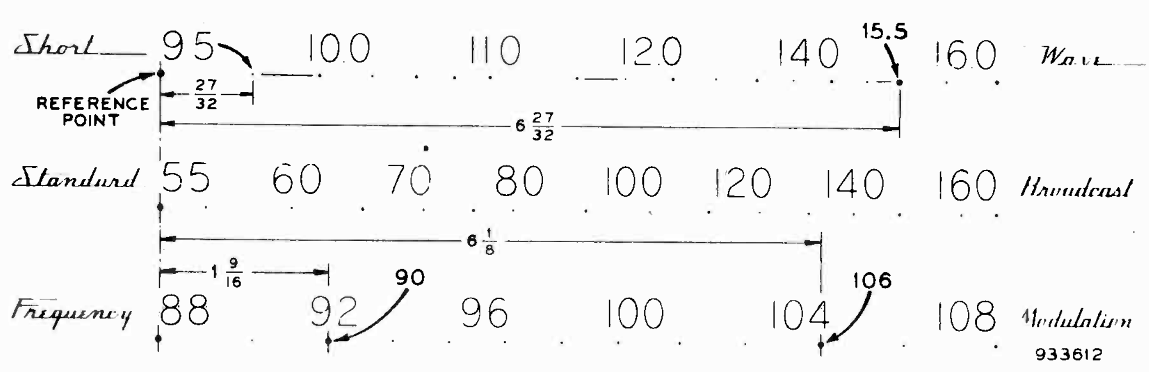
(If these image frequencies cannot be heard, the set is incorrectly aligned, therefore repeat steps 4 and 5)).

"FM" Band OSC.—RF.—ANT. Alignment

Steps	Connect the High Side of the Test Osc. to—	Connect Ground Side of the Test Osc.	Tune the Osc. To—	Radio Dial Tuned to—	Adjust
10.	FM antenna terminal #1 in series with a 120 ohm resistor	To FM antenna terminal #2 in series with a 120 ohm resistor	106 MC	106 MC	Osc.—C20 for maximum voltage across C81.
11.			88 MC	88 MC	**** Osc.—L9 for maximum voltage across C81.
12.	Repeat steps 10 and 11 for exact calibration.				
13.	Remove or turn test oscillator off.			106 MC No Carrier	***** RF, C13 for maximum voltage across C81 (Noise Voltage)
14.				90 MC No Carrier	**** RF, L11 for maximum voltage across C81. (Noise Voltage)
15.	Repeat steps 13 and 14 for maximum output.				
16.	Same as step 10	Same as step 10	106 MC	106 MC	Ant. C5 for maximum voltage across C81.
17.	Same as step 10	Same as step 10	90 MC	90 MC	Ant. L3 for maximum voltage across C81.
18.	Repeat steps 16 and 17 for maximum output.				
19.	Disconnect dummy antenna and adjust Ant. trimmer C1 on loop when set is installed in cabinet.				

****Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.

*****Two points can be found having the greatest noise voltage developed Use the one with the greater capacity (tighter adjustment).



Dial Scale Drawing.

RADIO CORP. OF AMERICA

MODEL 8V151

Replacement Parts

Stock No.	DESCRIPTION
	HEAD END UNIT
	RK 121C
71964	Arm—Push arm and cam for tuning capacitor
71651	Ball—Steel ball (3/32" dia.) for manual tuning shaft
3658	Ball—Steel ball (3/32" dia.) for tuning capacitor
10705	Ball—Steel ball (5/32" dia.) for tuning capacitor
71638	Board—5 contact terminal board for antenna lead-in
71811	Bracket—Idler bracket less pulley
71642	Bracket—Dial plate support bracket R.H.
71643	Bracket—Dial plate support bracket L.H.
72986	Bushing—Threaded bushing for knob end of switch coupling shaft
71809	Capacitor—Adjustable, 1.6-18 mmf. (C36)
71804	Capacitor—Adjustable, 1.6-18 mmf. (C5, C13)
71803	Capacitor—Adjustable, 2.5-13 mmf. (C20)
71808	Capacitor—Adjustable, 3-35 mmf. (C37, C84)
71930	Capacitor—Ceramic, 5.6 mmf. (C85)
39043	Capacitor—Ceramic, 6.8 mmf. (C25)
71807	Capacitor—Adjustable, 10-160 mmf. (C8, C15)
71924	Capacitor—Ceramic, 56 mmf. (C24)
39396	Capacitor—Ceramic, 100 mmf. (C16, C21, C83, C97)
71922	Capacitor—Ceramic, 180 mmf. (C34)
71933	Capacitor—Mica, 180 mmf. (C18)
71920	Capacitor—Ceramic, 220 mmf. (C6, C10)
71919	Capacitor—Ceramic, 330 mmf. (C3, C11)
39640	Capacitor—Mica, 330 mmf. (C92)
39644	Capacitor—Mica, 470 mmf. (C75, C90)
39646	Capacitor—Mica, 560 mmf. (C94)
71929	Capacitor—Ceramic, 1000 mmf. (C80)
72117	Capacitor—Tubular, .0012 mfd., 400 v. (C53)
71927	Capacitor—Tubular, .002 mfd., 400 v. (C59, C95)
71921	Capacitor—Tubular, .003 mfd., 200 v. (C9, C26, C27, C62, C82)
71926	Capacitor—Tubular, .005 mfd., 200 v. (C40, C42, C43, C66, C76, C77, C78, C86)
72791	Capacitor—Tubular, .005 mfd., 400 v. (C44, C55, C58, C68, C69, C88, C91)
72120	Capacitor—Tubular, .015 mfd., 200 v. (C65)
70612	Capacitor—Tubular, .025 mfd., 200 v. (C64)
71923	Capacitor—Tubular, .01 mfd., 200 v. (C22, C23, C63, C93)
72827	Capacitor—Tubular, .01 mfd., 400 v. (C32, C35, C54, C89, C96)
70631	Capacitor—Tubular, .01 mfd., 600 v. (C61)
71588	Capacitor—Moulded paper, .01 mfd., 600 v. (C87)
72596	Capacitor—Tubular, .05 mfd., 200 v. (C33, C39, C41, C73, C79)
72121	Capacitor—Electrolytic, 5 mfd., 50 v. (C67, C81)
32223	Capacitor—Electrolytic, 15 mfd., 300 v. (C60)
71646	Clamp—Dial clamp (2 required)
71940	Coil—Antenna coil—F.M.—Complete with adjustable core and stud (L2, L3)
71856	Coil—Antenna coil—"C" band—complete with adjustable core and stud (L4, L5)
71942	Coil—Filament choke coil (L7, L8)
71855	Coil—Loop loading coil—"A" band—complete with adjustable core and stud (L6)
71937	Coil—Oscillator coil—F.M.—complete with adjustable core and stud (L9)
71853	Coil—Oscillator coil—"C" band—complete with adjustable core and stud (L17)
71852	Coil—Oscillator coil—"A" band—complete with adjustable core and stud (L18)
71854	Coil—R. F. coil—"C" band—complete with adjustable core and stud (L12)
71939	Coil—R. F. choke coil (L10)
71857	Coil—R. F. coil—"A" band—Complete with adjustable core and stud (L13, L14)
71938	Coil—R. F. coil—F.M.—complete with adjustable core and stud (L11)
38405	Control—Tone control—H.F. (R27)
38401	Control—Tone control—L.F. (R26)
71596	Control—Volume control (R42)
†72987	Cord—Manual drive cord (approx. 42" overall required) or indicator drive cord (approx. 30" overall required)
71941	Coupling—F.M. coupling unit (L16, C17, R5)
71654	Dial—Glass dial scale—F.M.
71653	Dial—Glass dial scale—Standard Broadcast
71652	Dial—Glass dial scale—Short Wave
71805	Drum—Tuning condenser drive drum
71800	Gear—12 tooth gear fastened to selector switch coupling shaft
71801	Gear—18 tooth gear fastened to selector switch shaft
35844	Gear—Scissor gear for tuning capacitor
71799	Grommet—Rubber grommet to mount R.F. unit cradle (6 required)
70429	Grommet—Rubber grommet to mount tube socket (4 required)
72674	Grommet—Rubber grommet for chassis front mounting (2 required)
72069	Grommet—Rubber grommet for chassis rear mounting (2 required)
71647	Guide—Indicator slide guide
71832	Indicator—Station selector indicator
11765	Lamp—Dial lamp—Mazda 51

Stock No.	DESCRIPTION
11891	Lamp—Pilot lamp—Mazda 44
71962	Pinion—Pinion and shaft for tuning capacitor
71963	Plate—Bearing plate for tuning capacitor pinion
72984	Plate—Connecting plate for selector switch extension shafts
71644	Plate—Dial back plate only, less dial window, dials, supports, indicator slide, indicator and pulleys
71648	Pulley—Idler pulley (2 required) or indicator cord pulleys
71650	Pulley—Manual tuning shaft cord pulley
71636	Receptacle—9 prong male plug for power cable (J1)
71637	Receptacle—AMP-AUX-PHONO jacks
72323	Resistor—Wire wound, 3 ohms, ½ watt (R32)
	Resistor—Fixed, composition, 10 ohms, ±20%, ½ watt (R54)
	Resistor—Fixed, composition, 100 ohms, ±10%, ½ watt (R21, R22)
	Resistor—Fixed, composition, 270 ohms, ±10%, ½ watt (R38)
	Resistor—Fixed, composition, 390 ohms, ±10%, ½ watt (R10)
	Resistor—Fixed, composition, 1,000 ohms, ±20%, ½ watt (R24, R37, R46)
	Resistor—Fixed, composition, 2,200 ohms, ±20%, ½ watt (R12, R25, R36)
	Resistor—Fixed, composition, 2,200 ohms, ±10%, ½ watt (R9, R52)
	Resistor—Fixed, composition, 4,700 ohms, ±20%, ½ watt (R4, R68)
	Resistor—Fixed, composition, 8,200 ohms, ±10%, ½ watt (R13, R63)
	Resistor—Fixed, composition, 10,000 ohms, ±10%, 1 watt (R6)
	Resistor—Fixed, composition, 12,000 ohms, ±10%, ½ watt (R76)
	Resistor—Fixed, composition, 15,000 ohms, ±20%, ½ watt (R30, R51)
	Resistor—Fixed, composition, 15,000 ohms, ±10%, ½ watt (R44, R48)
	Resistor—Fixed, composition, 15,000 ohms, ±10%, 1 watt (R7)
	Resistor—Fixed, composition, 22,000 ohms, ±20%, ½ watt (R3, R31, R35, R49)
	Resistor—Fixed, composition, 22,000 ohms, ±10%, ½ watt (R18)
	Resistor—Fixed, composition, 22,000 ohms, ±20%, 1 watt (R43)
	Resistor—Fixed, composition, 27,000 ohms, ±10%, ½ watt (R11, R45)
	Resistor—Fixed, composition, 39,000 ohms, ±10%, ½ watt (R60)
	Resistor—Fixed, composition, 68,000 ohms, ±20%, ½ watt (R56)
	Resistor—Fixed, composition, 82,000 ohms, ±10%, ½ watt (R29, R64)
	Resistor—Fixed, composition, 100,000 ohms, ±20%, ½ watt (R28, R58, R59, R65, R70)
	Resistor—Fixed, composition, 100,000 ohms, ±10%, ½ watt (R16)
	Resistor—Fixed, composition, 100,000 ohms, ±10%, 1 watt (R75)
	Resistor—Fixed, composition, 180,000 ohms, ±10%, ½ watt (R17, R20, R34, R55, R66)
	Resistor—Fixed, composition, 220,000 ohms, ±20%, ½ watt (R33, R71, R72, R74)
	Resistor—Fixed, composition, 270,000 ohms, ±10%, ½ watt (R53)
	Resistor—Fixed, composition, 330,000 ohms, ±20%, ½ watt (R61, R67)
	Resistor—Fixed, composition, 330,000 ohms, ±10%, ½ watt (R77)
	Resistor—Fixed, composition, 470,000 ohms, ±20%, ½ watt (R14, R39)
	Resistor—Fixed, composition, 820,000 ohms, ±10%, ½ watt (R57, R69)
	Resistor—Fixed, composition, 1 megohm, ±20%, ½ watt (R1, R2, R19, R73, R78)
	Resistor—Fixed, composition, 2.2 megohm, ±10%, ½ watt (R15, R41, R47, R50, R62)
	Resistor—Fixed, composition, 3.9 megohm, ±10%, ½ watt (R8)
	Resistor—Fixed, composition, 22 megohm, ±20%, ½ watt (R23)
71798	Screw—No. 8—32 x 5/32" set screw
71965	Screw—Push arm locking screw
71812	Shaft—Manual tuning shaft less spring and pulley
*73726	Shaft—Selector switch coupling shaft—switch end
*73727	Shaft—Selector switch coupling shaft—knob end—less threaded bushing
72951	Shield—Lead tube shield
71833	Socket—Dial lamp socket—R.H.
71834	Socket—Dial lamp socket—L.H.
71931	Socket—Pilot lamp socket
71850	Socket—Tube socket complete with base and shield
73117	Socket—Tube socket
72516	Socket—Tube socket, miniature
71649	Spring—Coil spring for manual tuning shaft

MODEL 8V151 RADIO CORP. OF AMERICA

Replacement Parts (Continued)

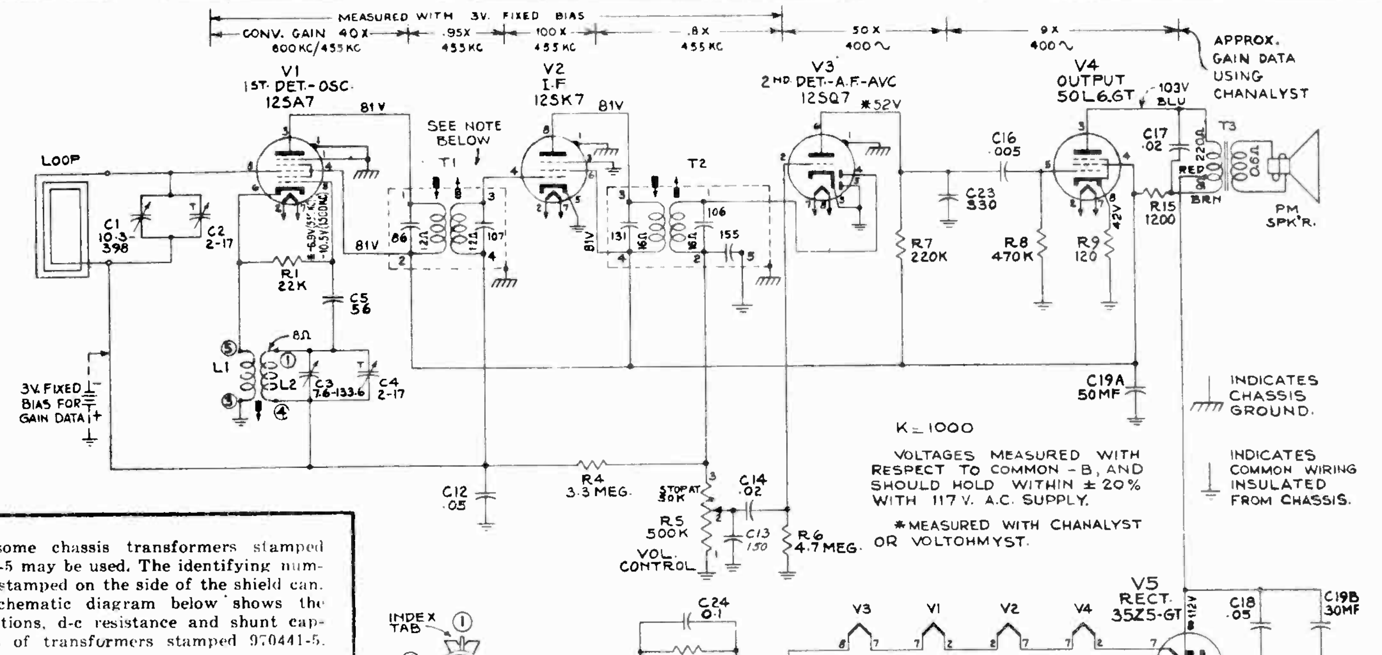
Stock No.	DESCRIPTION
71936	Spring—Drive cord spring
33622	Spring—Push button arm return spring
*73658	Switch—"Magic Monitor" and power switch (S7, S8)
71802	Switch—Selector switch (S1, S2, S3, S4, S5, S6)
71645	Support—Glass support (rubber) (2 required)
71845	Transformer—First I.F. transformer — F.M. (T1) (C28, C30)
71846	Transformer—First I.F. transformer — A.M. (T2) (C29, C31)
71847	Transformer—Second I.F. transformer — F.M. (T3) (C45, C47, C51)
71848	Transformer—Second I.F. transformer — A.M. (T4) (C46, C48, C49, C50)
71849	Transformer—Third I.F. transformer — F.M. (T5) (C56, C57)
71935	Transformer—Driver transformer (T6) (C70)
71934	Transformer—Ratio detector transformer (T7) (C72, C74)
37435	Washer—"C" washer for holding threaded bushing to selector switch shaft
31608	Washer—Spring washer for drive cord pulleys or idler pulley
71875	Washer—Spring washer for chassis front mounting
2917	Washer—Spring washer for selector switch coupling shaft and bushing (knob-end) or manual tuning shaft
71810	Window—Dial window (clear glass)
	AMPLIFIER ASSEMBLIES RS 123D
70646	Capacitor—Tubular, .0035 mfd., 1,000 volts (C5, C6)
70631	Capacitor—Tubular, .01 mfd., 600 volts (C3, C4)
70632	Capacitor—Tubular, .02 mfd., 600 volts (C8)
72596	Capacitor—Tubular, .05 mfd., 200 volts (C7)
31323	Capacitor—Electrolytic, 16 mfd., 150 volts (C2)
72955	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 450 volts; 1 section of 50 mfd., 400 volts; and 1 section of 40 mfd., 25 volts (C1A, C1B, C1C)
11765	Lamp—Jewel lamp—Mazda 51
18469	Plate—Mounting plate (bakelite) for electrolytic capacitor
12493	Plug—5 contact female plug for speaker cable
	Resistor—Fixed, composition, 2,700 ohms, ±10%, ½ watt (R3, R9)
	Resistor—Fixed, composition, 22,000 ohms, ±10%, ½ watt (R4)
	Resistor—Fixed, composition, 27,000 ohms, ±10%, ½ watt (R5)
	Resistor—Fixed, composition, 47,000 ohms, ±20%, ½ watt (R11)
	Resistor—Fixed, composition, 220,000 ohms, ±20%, ½ watt (R6, R7, R12)
71660	Resistor—Voltage divider, comprising 1 section of 180 ohms, 3.5 watts, 1 section of 2,520 ohms, 3.97 watts, and 1 section of 2,760 ohms, 9.3 watts (R1a, R1b, R1c)
	Resistor—Fixed, composition, 1 megohm, ±20%, ½ watt (R10)
35787	Socket—Audio input socket
71659	Socket—9 prong power socket (J1)
31364	Socket—Jewel lamp socket
31319	Socket—Tube socket
37048	Transformer—Power transformer, 115 volts, 60 cycle (T1)
71661	Transformer—Output transformer (T2)
	SPEAKER ASSEMBLIES 92567-2W RL 70R1
13867	Cap—Dust cap
71147	Clamp—Clamp to hold metal cone suspension (2 required)
71146	Coil—Field coil—1,060 ohms
11469	Coil—Neutralizing coil
36145	Cone—Cone complete with voice coil
31539	Plug—5 prong male plug for speaker
71144	Speaker—12" EM speaker complete with cone and voice coil less plug
71145	Suspension—Metal cone suspension
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
72555	Antenna—Dipole antenna
*73714	Back—Cabinet back—burgundy—for mahogany or walnut instruments
*73715	Back—Cabinet back—tan—for blonde instruments
71599	Bracket—Jewel lamp bracket
71874	Bushing—Bushing and washer for large knobs
*73626	Bumper—Rubber bumper for record changer carriage actuating link
71884	Button—Push button
71863	Cable—5 wire moulded lead-in cable
72583	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Pilot lamp jewel
38684	Capacitor—Mica trimmer, 2-20 mmf. (C1)
*73695	Carriage—Record changer mounting carriage complete with runners
71892	Catch—Bullet catch and strike for lower doors
72434	Check—Radio compartment door check
X1813	Cloth—Grille cloth for mahogany or walnut instruments
X1666	Cloth—Grille cloth for blonde instruments
71966	Decal—Trade mark decal (Victrola)
71910	Decal—Trade mark decal (RCA-Victor)
*73716	Escutcheon—Escutcheon only less window, screen and marker strips for mahogany instruments
*73717	Escutcheon—Escutcheon only less window, screen and marker strips for walnut instruments
*73718	Escutcheon—Escutcheon only less window, screen and marker strips for blonde instruments
*73712	Gasket—Rubber gasket—tan—for under escutcheon for blonde instruments
*73713	Gasket—Rubber gasket—black—for under escutcheon for mahogany or walnut instruments
*73870	Grille—Metal grille for mahogany or walnut instruments
*73873	Grille—Metal grille for blonde instruments
*73699	Grommet—Rubber grommet for mounting record changer (4 required)
*73702	Grommet—Rubber grommet for loop mounting (2 required)
16058	Grommet—Rubber grommet for speaker mounting (3 required)
*73871	Hinge—Speaker compartment door or record storage compartment door hinge (2 required for each door)
73735	Hinge—L.H. hinge for phono compartment door or R.H. hinge for radio compartment door
*73751	Hinge—R.H. hinge for phono compartment door or L.H. hinge for radio compartment door
*73711	Knob—Selector switch or power switch knob—brown—for blonde instruments
71822	Knob—Selector switch or power switch knob—maroon—for mahogany or walnut instruments
72761	Knob—Tone control knob—brown—for blonde instruments
71883	Knob—Tone control knob—maroon—for mahogany or walnut instruments
72118	Knob—Volume control or tuning knob—brown—for blonde instruments
71821	Knob—Volume control or tuning knob—maroon—for mahogany or walnut instruments
*73616	Link—Actuating link assembly for record changer carriage—R.H.
*73617	Link—Actuating link assembly for record changer carriage—L.H.
71862	Loop—Antenna loop complete (L1, L15, C1)
71969	Marker—Station markers
72765	Nut—Speed nut to fasten transparent screen to escutcheon (2 required)
71879	Plate—Backing plate for transparent screen
71881	Plate—Call letter marker plate
71819	Plate—Radio compartment door check mounting plate
30868	Plug—2 contact female plug for power cable
30870	Plug—2 prong male plug for power cable
32641	Plug—3 prong male plug for loop cable
31048	Plug—Pin plug for shielded pickup cable
*73872	Pull—Door pull
71878	Screen—Transparent screen (Victrola indicator)
36422	Socket—3 contact socket for loop cable
*73618	Spring—Connecting spring between link and record changer carriage
*73697	Spring—Conical spring for mounting record changer
71818	Spring—Radio compartment door check spring
30900	Spring—Retaining spring for knobs
71867	Spring—Retaining spring for push button
73185	Stop—Metal stop for record changer carriage
72936	Stop—Stop for lower doors
70164	Stop—Stop for phono compartment door
71880	Strip—Backing strip for call letter marker plate
*73612	Track—Record changer carriage mechanism track complete with mounting plate (2 required)
71814	Washer—Rubber washer for radio compartment door check
71882	Window—Window for call letter markers

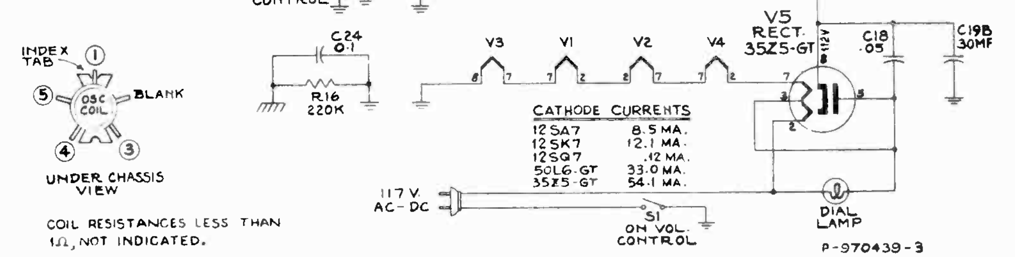
†Stock No. 72967 is a spool containing 150 feet of cord.

*This is the first time that this Stock No. has appeared in Service Data.

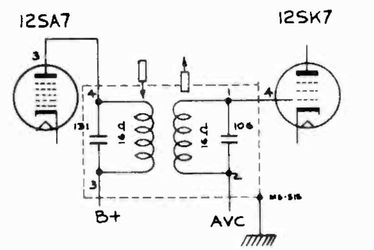
RADIO CORP. OF AMERICA

MODEL 8X53, CHASSIS RC 1064





In some chassis transformers stamped 970441-5 may be used. The identifying number is stamped on the side of the shield can. The schematic diagram below shows the connections, d-c resistance and shunt capacitors of transformers stamped 970441-5.



Frequency Range .... 540-1600 kc

Intermediate Frequency .... 455 kc

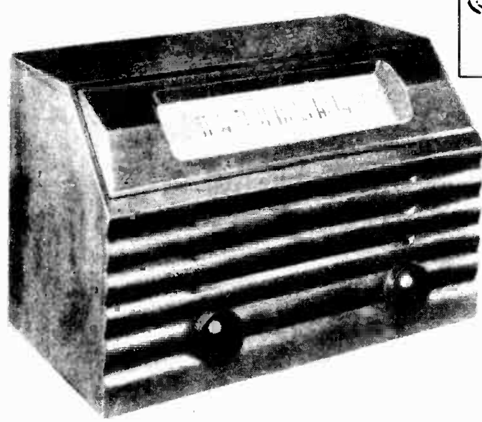
Power Output
Undistorted .... 1.0 watt
Maximum .... 1.5 watts

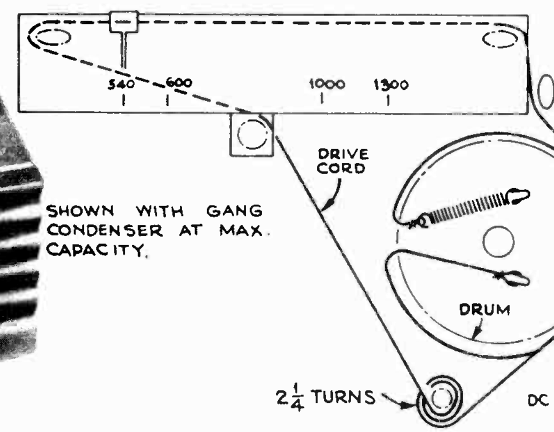
Tube Complement
(1) RCA-12SA7 .... Converter
(2) RCA-12SK7 .... I.F. Amplifier
(3) RCA-12SQ7 .... 2nd Det., A.V.C., and A.F. Amplifier
(4) RCA-50L6GT .... Power Output
(5) RCA-35Z5GT .... Rectifier

Pilot Lamp .... Mazda No. 51, 6-8 volts, 0.2 amp.

Loudspeaker
Type .... 4" x 6" PM
V. C. Impedance .... 3.4 ohms at 400 cycles

Power Supply Rating
105-125 volts, AC, 50 or 60 cycles, or DC .... 30 watts





Dial-Indicator and Drive Mechanism

Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn receiver the volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Scale.—The glass tuning dial may be removed from the cabinet and mounted above the pointer for reference during alignment. The extreme left hand mark of the Standard Broadcast scale must be in line with the left hand mark on the dial backing plate.

Dial Backing Plate.—In the event that only the chassis is returned for service, the marks on the dial backing plate may be used during alignment; refer to the Dial Indicator and Drive Mechanism drawing for corresponding frequencies.

Dial Pointer.—With the gang condenser in full mesh the dial pointer should be set to the left hand reference mark on the dial backing plate.

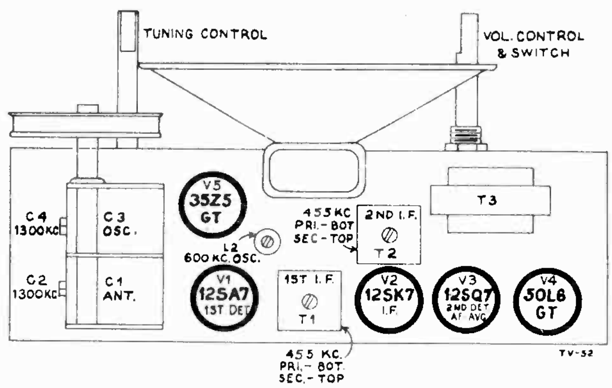
For additional information refer to booklet, "RCA Victor Receiver Alignment."

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	12SK7 I-F grid through 0.1 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 Top & bottom 2nd. I-F trans.
2	Stator of C1 through 0.1 mfd.			*T1 Top & bottom 1st. I-F trans.
3	Short wire placed near loop antenna	1,300 kc	1,300 kc	C4 (osc.) C2 (ant.)
4		600 kc	600 kc "A" Band	L2 (osc.) Rock gang
5	Repeat steps 3 and 4			

*Do not readjust T2 when test oscillator is connected to C1.

Critical Lead Dress

1. Dress all heater leads next to chassis.
2. Dress power cord away from volume control and audio circuits.
3. Dress capacitor (C14) toward switch and parallel to chassis length.
4. Dress capacitor (C16) back against rear chassis apron.
5. Dress capacitor (C17) over and towards 50L6 socket perpendicular to capacitor (C14) and (C16).
6. Dress pilot lamp leads over second I-F transformer and away from tubes.
7. Dress blue lead from output transformer against front apron and away from I-F leads.



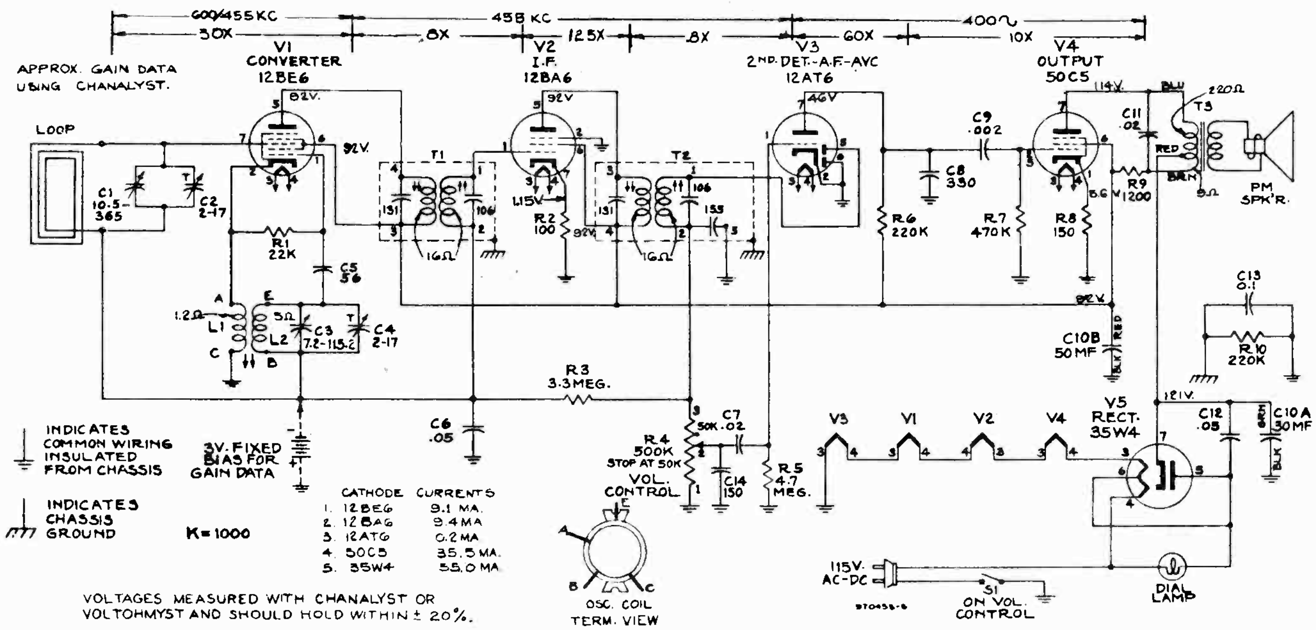
Tube and Trimmer Locations

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLY RC-1064
39622	Capacitor—Mica, 56 mmf. (C5)
39632	Capacitor—Mica, 150 mmf. (C13)
72571	Capacitor—Mica, 330 mmf. (C23)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C16)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C14, C17)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C12, C18)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C24)
70408	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C19A, C19B)
73048	Coil—Oscillator coil (L1, L2)
73047	Condenser—Variable tuning condenser complete with drive drum (C1, C2, C3, C4)
70322	Control—Volume control and power switch (R5, S1)
72913	Cord—Drive cord (approx. 40" overall length required)
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
70469	Indicator—Station selector indicator
11765	Lamp—Dial lamp—Mazda No. 51
73049	Loop—Antenna loop complete
70462	Plate—Dial back plate complete with drive cord pulleys less dial
36230	Pulley—Drive cord pulley
	Resistor—Fixed composition, 120 ohms, ±10%, ½ watt (R9)
	Resistor—Fixed composition, 1200 ohms, ±10%, 1 watt (R15)
	Resistor—Fixed composition, 22,000 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R7, R16)
	Resistor—Fixed composition, 470,000 ohms, ±20%, ½ watt (R8)
	Resistor—Fixed composition, 3.3 megohms, ±20%, ½ watt (R4)
	Resistor—Fixed composition, 4.7 megohms, ±20%, ½ watt (R6)
70467	Shaft—Tuning knob shaft
34449	Socket—Lamp socket
37605	Socket—Tube socket, molded
70390	Spring—Drive cord tension spring
73036	Transformer—First I.F. transformer (T1)
73037	Transformer—Second I.F. transformer (T2)
72296	Transformer—Output transformer (T3)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLY 922258-1
70470	Speaker—4" x 6" elliptical speaker complete with cone and voice coil
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order by referring to model number of instrument, and number stamped on speaker.
	MISCELLANEOUS
*73209	Back—Cabinet back
70398	Clamp—Dial clamp (1 set)
*X1660	Cloth—Grille cloth
70476	Dial—Glass dial scale
11771	Foot—Rubber foot (4 required)
71821	Knob—Control knob—maroon
30900	Spring—Retaining spring for knobs

*THIS IS THE FIRST TIME THIS STOCK NUMBER HAS APPEARED IN SERVICE DATA

RADIO CORP. OF AMERICA MODELS 8X521, 8X522, CHASSIS RC 1066, 1066A



Alignment Procedure

Cathode Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

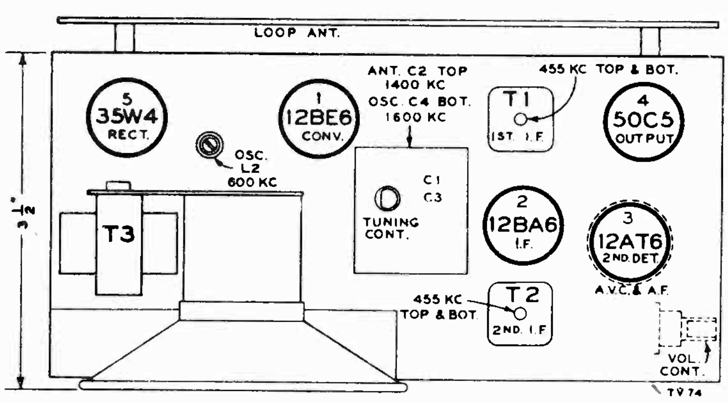
On AC operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also AC operated.

For additional information refer to booklet "RCA Victor Receiver Alignment."

NOTE.—If the speaker should be removed in servicing, its position should be checked when re-assembling. The distance between the front of the speaker and the rear chassis apron should be maintained at 3½ inches.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through 0.1 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T-2 (top and bottom) 2nd I-F trans.
2	Stator of C1 through 0.1 mfd.	455 kc	Quiet-point 1,600 kc end of dial	T-1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal.	1,600 kc	1,600 kc	C4 (osc.)
4	Short wire placed near loop to radiate signal.	1,400 kc	1,400 kc	C2 (ant.)
5	Short wire placed near loop to radiate signal.	600 kc	600 kc	L2 (osc.) Rock gang
6		Repeat steps 3, 4 and 5.		

*Do not readjust T-2 when test oscillator is connected to C1.



Tube and Trimmer Locations

MODELS 8X521, 8X522,
CHASSIS RC-1066, 1066A

RADIO CORP. OF AMERICA

Specifications

Tuning Range .... 540-1600 kc
Intermediate Frequency .... 455 kc

Power Output
Undistorted .... 1.0 watt
Maximum .... 1.4 watts

Tube Complement
(1) RCA-12BE6 .... Converter
(2) RCA-12BA6 .... I.F. Amplifier
(3) RCA-12AT6...2nd Det., A.V.C., and A.F. Amplifier
(4) RCA-50C5 .... Output
(5) RCA-35W4 .... Rectifier

Pilot Lamp .... Mazda No. 51, 6-8 volts, 0.2 amp.

Loudspeaker (92577-1)
Type .... 4-inch PM
V. C. Impedance .... 3.2 ohms at 400 cycles

Cabinet Dimensions
Height...... 5⅝" Width...... 7⅞" Depth...... 5"

Power Supply Rating
115 volts, AC, 50 or 60 cycles, or DC .... 30 watts

POWER SUPPLY POLARITY.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Critical Lead Dress

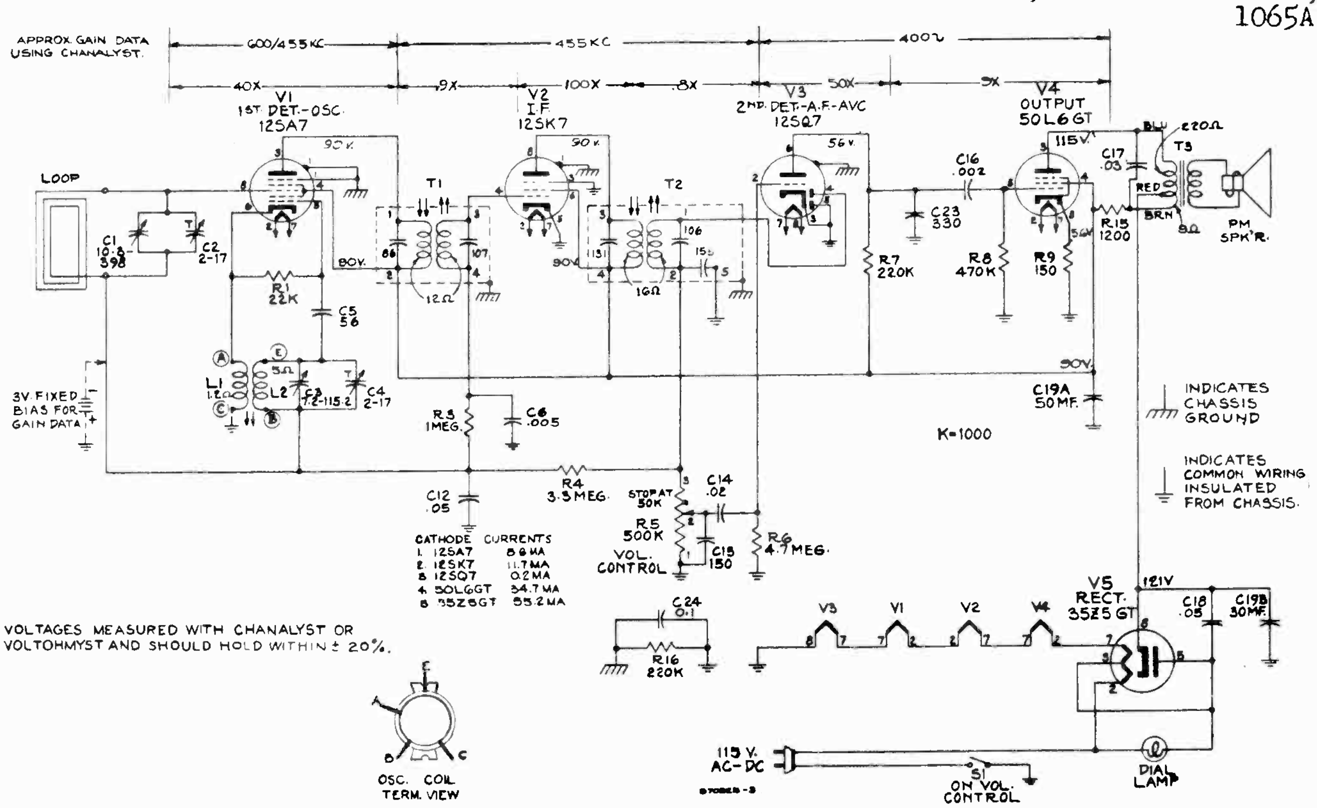
1. Dress all heater leads close to chassis.
2. Dress output plate bypass capacitor C11 inside of terminal board.
3. Dress all exposed leads away from each other and away from chassis.

Replacement Parts

Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1066—8X521 RC 1066A—8X522
73499	Capacitor—Ceramic, 56 mmf. (C5)
*73501	Capacitor—Ceramic, 150 mmf. (C14)
72571	Capacitor—Mica, 330 mmf. (C8)
70601	Capacitor—Tubular, .002 mfd., 400 volts (C9)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C7, C11)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C6, C12)
70617	Capacitor—Tubular, 0.1 mfd., 400 Volts (C13)
*73500	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C10A, C10B)
*73935	Clip—Spring clip for mounting I.F. transformers (2 required)
70133	Coil—Oscillator coil (L1, L2)
*73495	Condenser—Variable tuning condenser (C1, C2, C3, C4)
*73498	Control—Volume control and power switch (R4, S1)
*73496	Loop—Antenna loop and back cover—for Model 8X521
*73497	Loop—Antenna loop and back cover—for Model 8X522
	Resistor—Fixed, composition, 100 ohms, ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 150 ohms, ±10%, ½ watt (R8)
	Resistor—Fixed, composition, 1,200 ohms, ±10%, 1 watt (R9)
	Resistor—Fixed, composition, 22,000 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed, composition, 220,000 ohms, ±20%, ½ watt (R6, R10)
	Resistor—Fixed, composition, 470,000 ohms, ±20%, ½ watt (R7)
	Resistor—Fixed, composition, 3.3 megohm, ±20%, ½ watt (R3)
	Resistor—Fixed, composition, 4.7 megohm, ±20%, ½ watt (R5)
34449	Socket—Lamp socket
73117	Socket—Tube socket
*73488	Transformer—First I.F. transformer (T1)
73037	Transformer—Second I.F. transformer (T2)
72296	Transformer—Output transformer (T3)
	SPEAKER ASSEMBLY 92577-1W
73123	Speaker—4" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
*73502	Bezel—Decorative bezel
Y2001	Cabinet—Ivory plastic cabinet complete with dial back plate, indicator, escutcheon and wire trim for Model 8X522
Y1499	Cabinet—Maroon plastic cabinet complete with dial back plate, indicator, escutcheon and wire trim for Model 8X521
*73508	Clip—Spring clip to fasten dial knob
*73507	Dial—Calibrated dial knob
*73511	Fastener—Push fastener to hold dial back plate (3 required)
*73510	Fastener—Push fastener to hold loop (2 required)
*73504	Indicator—Station selector indicator
*73506	Knob—Volume control and power switch knob—ivory—for Model 8X522
*73505	Knob—Volume control and power switch knob—maroon—for Model 8X521
11765	Lamp—Dial lamp—Mazda 51
71095	Nut—Speed nut to fasten wire trim (2 required)
*73509	Plate—Dial back plate
*73503	Rod—Wire trim rod
30900	Spring—Retaining spring for knobs

RADIO CORP. OF AMERICA

MODELS 8X541, 8X542, 8X547; CHASSIS RC-1065, 1065A



Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscilloscope are shown in the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

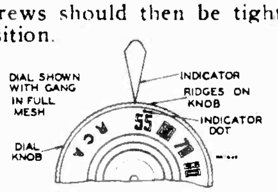
Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

On AC operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also AC operated.

Dial Centering:

If the mounting of the tuning condenser has been disturbed, it may be necessary to adjust its position after replacing the chassis in the cabinet. This may be done in the following manner:

1. Install chassis and tighten the three mounting screws.
2. Replace tuning knob.
3. Loosen the two screws which hold the tuning condenser mounting bracket to the chassis.
4. Adjust the position of the tuning condenser mounting bracket so that the tuning knob may be rotated without binding on the cabinet. With tuning condenser plates fully meshed the dial should be in the position indicated below.
5. The two screws should then be tightened to maintain this position.

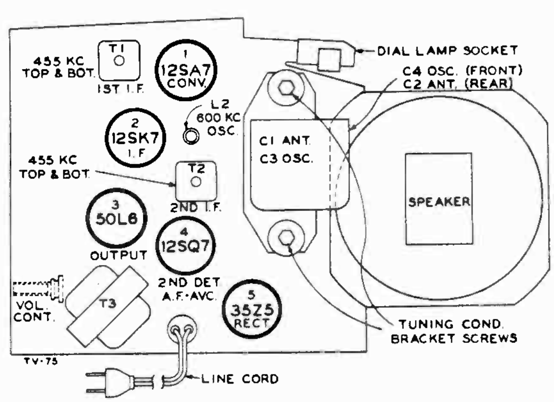


Dial and Indicator

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12SK7 I-F grid through 0.1 mfd. capacitor	455 kc	Quiet-point 1600 kc end of dial	T2 (Top and bottom) 2nd I-F trans.
2	Stator of C1 through 0.1 mfd.			*T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1600 kc	1600 kc	C4 (osc.)
4		1400 kc	1400 kc	†C2 (ant.)
5		600 kc	600 kc	L2 (osc.) Rock gang
6		Repeat steps 3, 4 and 5.		

*Do not readjust T2 when test oscillator is connected to C1.

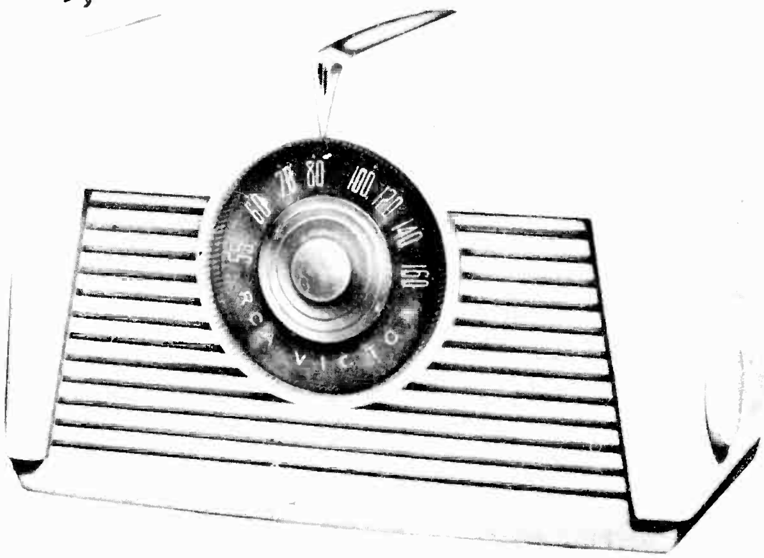
†When adjusting C2 (ant. trimmer) it is necessary to have the loop in the same position and spacing as it will have when assembled in the cabinet. This spacing is 3¼" from chassis to loop.



Tube and Trimmer Locations

MODELS 8X541, 8X542, 8X547; CHASSIS RC-1065, 1065A

RADIO CORP. OF AMERICA



Specifications

Tuning Range ....540-1600 kc

Intermediate Frequency .... 455 kc

Power Output
Undistorted...................................1.0 watt
Maximum ....1.5 watts

Tube Complement
(1) RCA-12SA7............................ Converter
(2) RCA-12SK7..........................I.F. Amplifier
(3) RCA-12SQ7....2nd Det., A.V.C., and A.F. Amplifier
(4) RCA-50L6GT ....Output
(5) RCA-35Z5GT............................ Rectifier

Pilot Lamp...........Mazda No. 47, 6-8 volts, 0.15 amp.

Loudspeaker (92577-5)
Type......................................4-inch PM
V. C. Impedance.............. ..3.2 ohms at 400 cycles

Cabinet Dimensions
Height......7" Width.......10¾" Depth.......5⅞"

Power Supply Rating
115 volts, AC, 50 or 60 cycles, or DC...........30 watts

POWER SUPPLY POLARITY.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Critical Lead Dress
1. Dress all heater leads close to chassis.
2. Dress pilot light leads away from speaker cone.
3. Dress lead to low side of loop between the two gang condenser leads.
4. Dress C5 (AVC by-pass) close to the bend in the base and clear of the 2nd I.F. transformer.

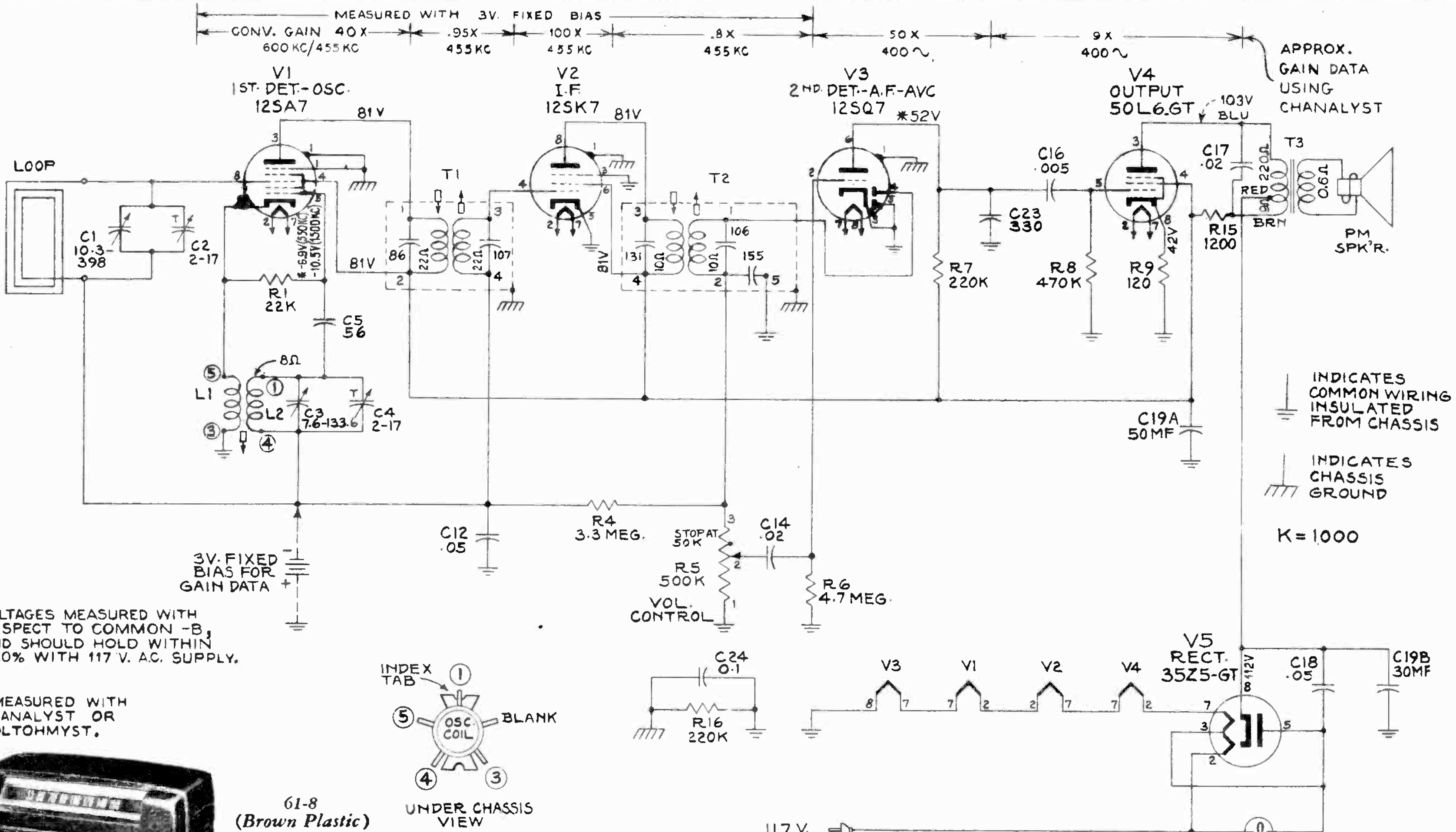
Replacement Parts

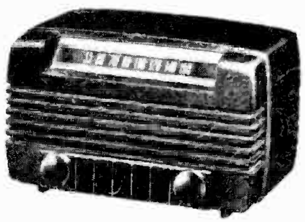
Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1065—8X541 RC 1065A—8X542, 8X547
73499	Capacitor—Ceramic, 56 mmf. (C5)
73501	Capacitor—Ceramic, 150 mmf. (C13)
72571	Capacitor—Mica, 330 mmf. (C23)
70601	Capacitor—Tubular, .002 mfd., 400 volts (C16)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C6)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C14)
70613	Capacitor—Tubular, .03 mfd., 400 volts (C17)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C12, C18)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C24)
73500	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts and 1 section of 30 mfd., 150 volts (C19a, C19b)
73935	Clip—Spring clip for mounting I.F. transformers (2 required)
70133	Coil—Oscillator coil (L1, L2)
*73485	Condenser—Variable tuning condenser (C1, C2, C3, C4)
38410	Control—Volume control and power switch (R5, S1)
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
*73486	Loop—Loop and back cover assembly for Model 8X541
*73487	Loop—Loop and back cover assembly for Models 8X542 or 8X547
	Resistor—Fixed, composition, 150 ohms, ±10%, ½ watt (R9)
	Resistor—Fixed, composition, 1,200 ohms, ±10%, 1 watt (R15)
	Resistor—Fixed, composition, 22,000 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed, composition, 220,000 ohms, ±20%, ½ watt (R7, R16)
	Resistor—Fixed, composition, 470,000 ohms, ±20%, ½ watt (R8)
	Resistor—Fixed, composition, 1 megohm, ±20%, ½ watt (R3)

Stock No.	DESCRIPTION
	Resistor—Fixed, composition, 3.3 megohm, ±20%, ½ watt (R4)
	Resistor—Fixed, composition, 4.7 megohm, ±20%, ½ watt (R6)
34449	Socket—Lamp socket
54414	Socket—Tube socket
73036	Transformer—First I-F transformer (T1)
73037	Transformer—Second I-F transformer (T2)
71111	Transformer—Output transformer (T3)
	SPEAKER ASSEMBLY 92577-5W
73919	Speaker—4" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
Y1495	Cabinet—Plastic cabinet — maroon — complete with station indicator and dial backing disc for Model 8X541
*Y1496	Cabinet—Plastic cabinet — ivory — complete with station indicator and dial backing disc for Model 8X542
*Y2053	Cabinet—Plastic cabinet—white—complete with station indicator and dial backing disc—for Model 8X547
73494	Clip—Spring clip to hold cabinet back and loop assembly to cabinet (4 required)
73489	Dial—Dialing knob
*73493	Disc—Dial backing disc
*73492	Indicator—Station selector indicator
*73490	Knob—Volume control and power switch knob—maroon—for Model 8X541
*73491	Knob—Volume control and power switch knob—ivory—for Model 8X542
74007	Knob—Volume control and power switch knob — white — for Model 8X547
31480	Lamp—Dial lamp—Mazda 47
38458	Nut—Speed nut to fasten indicator to cabinet (2 required)
*73914	Spring—Retaining spring for dial knob
14270	Spring—Retaining spring for volume control knob

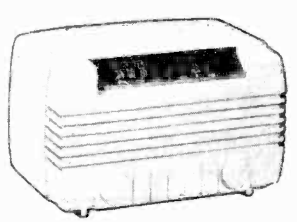
RADIO CORP. OF AMERICA

MODELS 61-8, 61-9, CHASSIS RC-1064





61-8
(Brown Plastic)



61-9
(Ivory Plastic)

Specifications

Frequency Range .... 540-1600 kc

Intermediate Frequency .... 455 kc

Power Output
Undistorted .... 1.0 watt
Maximum .... 1.5 watts

Tube Complement
(1) RCA Radiotron 12SA7 .... Converter
(2) RCA Radiotron 12SK7 .... I-F Amplifier
(3) RCA Radiotron 12SQ7 .... 2nd Det., A.V.C., and A-F Amplifier
(4) RCA Radiotron 50L6GT .... Power Output
(5) RCA Radiotron 35Z5GT .... Rectifier

Pilot Lamp .... Mazda No. 51, 6-8 volts, 0.2 amp.

POWER SUPPLY POLARITY.—For operation on DC, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On AC, reversal of the plug may reduce hum.

Loudspeaker (922258-1)
Type .... 4" x 6" PM
V. C. Impedance .... 3.4 ohms at 400 cycles

Cabinet Dimensions	**Height**	**Width**	**Depth**
Cabinet (Outside)	7"	11¾"	7½"

Shipping Weight .... 9 lbs.
Tuning Drive Ratio 20:1

Power Supply Rating
105-125 volts, AC, 50 or 60 cycles, or DC .... 30 watts

Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn receiver the volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Scale.—The glass tuning dial may be removed from the cabinet and mounted above the pointer for reference during alignment. The extreme left hand mark of the Standard Broadcast scale must be in line with the left hand mark on the dial backing plate.

Dial Backing Plate.—In the event that only the chassis is returned for service, the marks on the dial backing plate may be used during alignment; refer to the Dial Indicator and Drive Mechanism drawing for corresponding frequencies.

Dial Pointer.—With the gang condenser in full mesh the dial pointer should be set to the left hand reference mark on the dial backing plate.

For additional information refer to booklet, "RCA Victor Receiver Alignment."

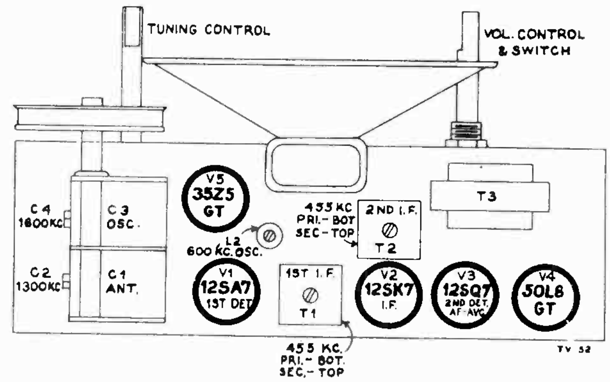
ALIGNMENT TABULATION RC-1064

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	12SK7 I-F grid through 0.1 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 Top & bottom 2nd. I-F trans.
2	Stator of C1 through 0.1 mfd.			*T1 Top & bottom 1st. I-F trans.
3	Short wire placed near loop antenna	1,300 kc	1,300 kc	C4 (osc.) C2 (ant.)
4		600 kc	600 kc "A" Band	L2 (osc.) Rock gang
5	Repeat steps 3 and 4			

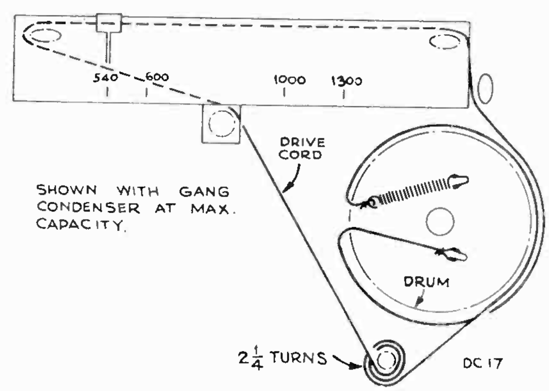
* Do not readjust T2 when test oscillator is connected to C2.

Critical Lead Dress

1. Dress blue and green leads of both I-F transformers back in shield cans, leaving them as short as possible.
2. Dress all heater leads next to chassis.
3. Dress power cord toward output transformer away from volume control and audio circuits.
4. Dress capacitor (C14) toward switch and parallel to chassis length.
5. Dress capacitor (C16) back against rear chassis apron.
6. Dress capacitor (C17) over and towards 50L6 socket perpendicular to capacitor (C14) and (C16).
7. Dress pilot lamp leads over second I-F transformer and away from tubes.
8. Dress blue leads from output transformer against front apron and away from I-F leads.
9. Dress contact on oscillator section of gang condenser back away from oscillator coil adjustment.



TUBE AND TRIMMER LOCATIONS RC-1064



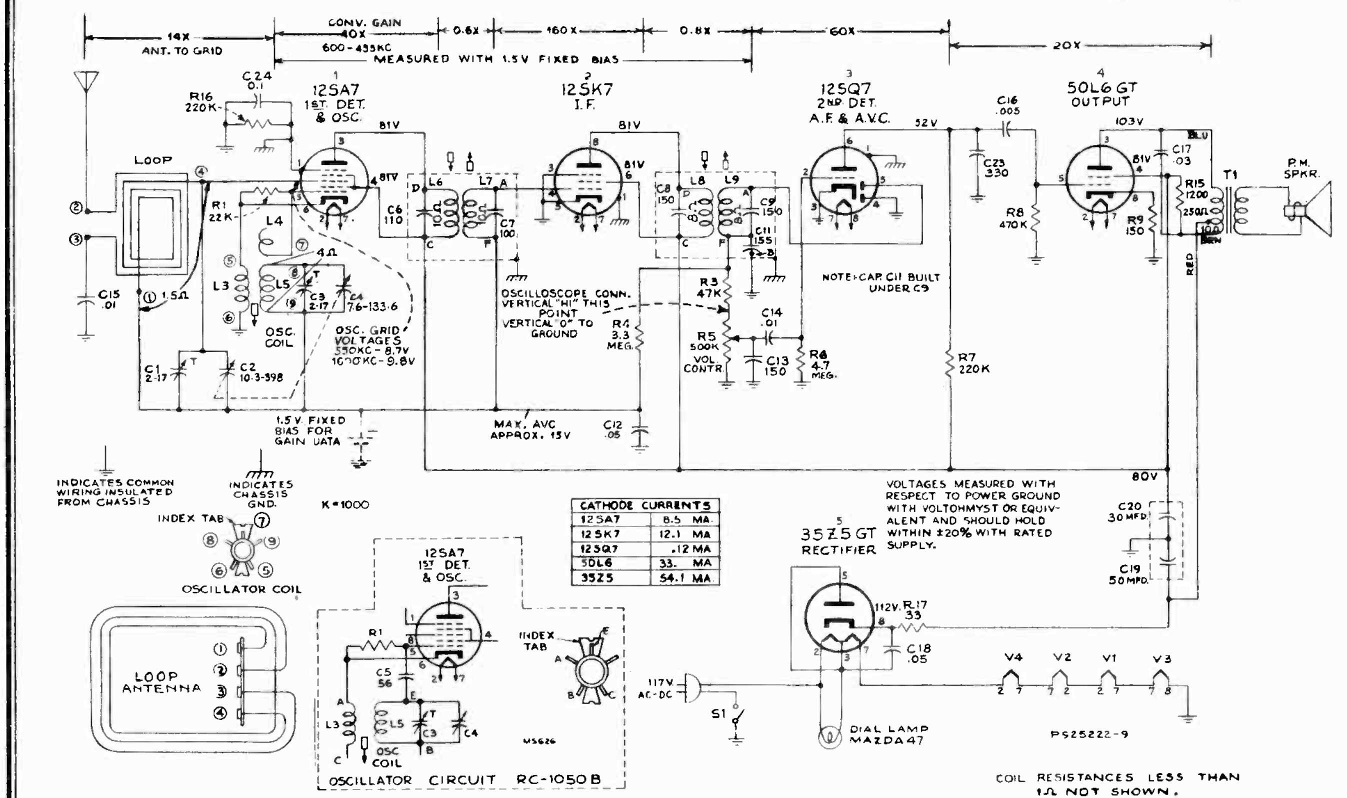
Dial-Indicator and Drive Mechanism

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1034—RC 1064
39622	Capacitor—Mica, 56 mmf. (for RC-1064 & some RC-1034) (C5)
72571	Capacitor—Mica, 330 mmf. (C23)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C16)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C14, C17)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C12, C18)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C24)
70408	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C19A, C19B or C19, C20)
70477	Coil—Oscillator coil (for some RC-1034) (L3, L4, L5)
71406	Coil—Oscillator coil (for some RC-1034) (L3, L4)
73048	Coil—Oscillator coil (for RC-1064) (L1, L2)
70643	Condenser—Variable tuning condenser complete with drive drum (for RC-1034) (C1, C2, C3, C4)
73047	Condenser—Variable tuning condenser complete with drive drum (for RC-1064) (C1, C2, C3, C4)
70322	Control—Volume control and power switch (R-5, S-1)
72913	Cord—Drive cord (approx. 40" overall length)
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
70469	Indicator—Station selector indicator
11765	Lamp—Dial lamp—Mazda #51
70468	Loop—Antenna loop (for RC-1034) (L1, L2)
73049	Loop—Antenna loop complete (for RC-1064)
70462	Plate—Dial back plate complete with drive cord pulleys less dial
36230	Pulley—Drive cord pulley
	Resistor—Fixed composition, 120 ohms ±10%, ½ watt (R9)
	Resistor—Fixed composition, 1200 ohms ±10%, 1 watt (R15)
	Resistor—Fixed composition, 22,000 ohms ±20%, ½ watt (R1)
	Resistor—Fixed composition, 220,000 ohms ±20%, ½ watt (R7, R16)
	Resistor—Fixed composition, 470,000 ohms ±20%, ½ watt (R8)

STOCK No.	DESCRIPTION
	Resistor—Fixed composition, 3.3 megohms ±20%, ½ watt (R4)
	Resistor—Fixed composition, 4.7 megohms ±20%, ½ watt (R6)
70467	Shaft—Tuning knob shaft
34449	Socket—Lamp socket
37605	Socket—Tube socket, molded
70390	Spring—Drive cord tension spring
70465	Transformer—First I.F. transformer (for RC-1034) (L6, L7, C6, C7)
73036	Transformer—First I.F. transformer (for RC-1064) (T1)
70466	Transformer—Second I.F. transformer (for RC-1034) (L8, L9, C8, C9)
73037	Transformer—Second I.F. transformer (for RC-1064) (T2)
70385	Transformer—Output transformer (for RC-1034) (T1)
72296	Transformer—Output transformer (for RC-1064) (T3)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLY 922258-1
70470	Speaker—4" x 6" elliptical speaker complete with cone and voice coil
	MISCELLANEOUS
71794	Back—Cabinet back for Radiola 61-8
71795	Back—Cabinet back for Radiola 61-9
X1365	Cabinet—Brown plastic cabinet for Radiola 61-8
Y1366	Cabinet—Ivory plastic cabinet for Radiola 61-9
70475	Clamp—Dial clamp (1 set)
71796	Dial—Glass dial scale
37831	Fastener—Push fasteners (1 set) for cabinet back
70473	Knob—Control knob—red-brown—for Radiola 61-8
70474	Knob—Control knob—ivory—for Radiola 61-9
30900	Spring—Retaining spring for knob

CHASSIS RC-1050, RC-1050A, RC-1050B RADIO CORP. OF AMERICA MODELS 75X11, 75X12, 75X14, 75X15, 75X16



Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

On AC operation an isolation transformer (117v./117v.) may be necessary for the receiver if the test oscillator is also AC operated.

Dial Pointer.—With the tuning condenser in full mesh the dial pointer should be adjusted to approx. 17.0° counterclockwise from the vertical position. It should be adjusted before re-assembling the bezel to the cabnet. Check on actual reception of stations.

Dis-assembly.—To remove bezel assembly:

Remove the two knobs and the four hex head screws in the feet, pull the bottom of the bezel outward and upward.

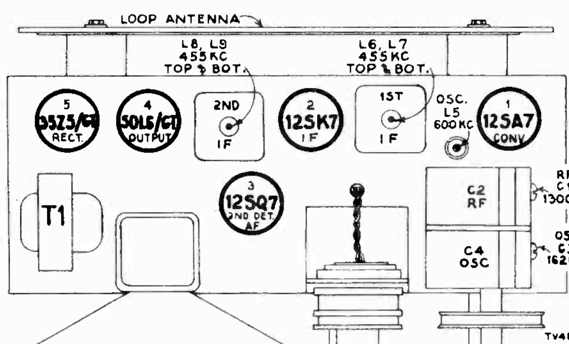
To remove chassis from cabinet:

Remove bezel assembly as described above, remove the dial by prying assembly outward on the bottom edge, remove the pointer by pulling straight to the front, remove the dial lamp, remove the round head screws which hold the chassis to the cabinet.

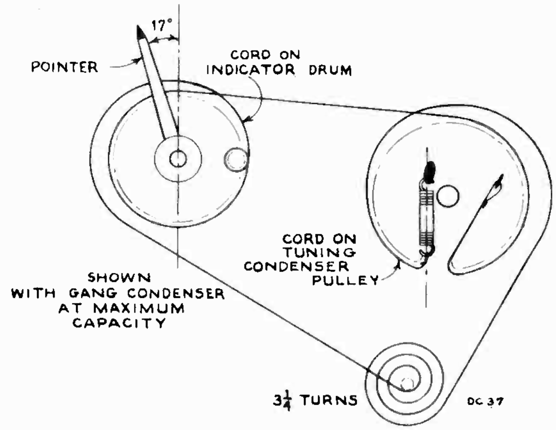
For additional information refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	12SK7 I-F grid through 0.1 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	L8 and L9 2nd I-F transformer
2	Stator of C2 through 0.1 mfd.			L6 and L7 1st I-F transformer
3	Ant. lead in series with 200 mmfd.	1,620 kc	full clock-wise	C3 (osc.)
4		1,400 kc	1,400 kc signal	C1 (ant.)
5		600 kc	600 kc signal	L5 (osc.) Rock gang
6	Repeat steps 3, 4 and 5.			

* Do not readjust L8 or L9 when test oscillator is connected to C2.



Tube and Trimmer Locations



Dial-Indicator and Drive Mechanism

MODELS 75X11, 75X12, 75X14, 75X15, 75X16

RADIO CORP. OF AMERICA

Specifications

Frequency Range .... 540-1600 kc
Intermediate Frequency .... 455 kc

Power Output
Undistorted .... 1.0 watt
Maximum .... 1.5 watts

Tube Complement
(1) RCA-12SA7 .... Converter
(2) RCA-12SK7 .... I.F. Amplifier
(3) RCA-12SQ7 .... 2nd Det., A.V.C., and A.F. Amplifier
(4) RCA-50L6GT .... Power Output
(5) RCA-35Z5GT .... Rectifier

Pilot Lamp .... Mazda No. 47, 6-8 volts, 0.15 amp.

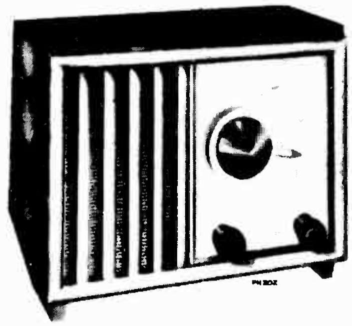
Loudspeaker (92572-2)
Type .... 5-inch PM
V. C. Impedance .... 3.2 ohms at 400 cycles

Cabinet Dimensions
Height, 7-1/4"; Width, 10"; Depth, 7-3/16"

Tuning Drive Ratio .... 10:1 (5 turns of knob)

Power Supply Rating
105-125 volts, AC, 50 or 60 cycles, or DC .... 30 watts

POWER SUPPLY POLARITY.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.



75X11 Maroon
75X12 Ivory
75X14 Mahogany
75X15 Walnut
75X16 Blonde

Critical Lead Dress

1. Dress all heater leads close to chassis.
2. Dress AVC resistor R4 away from 12SK7 tube socket.
3. Dress diode-load resistor R3 away from 12SQ7 tube socket.
4. Dress 12SQ7 plate resistor R7 over 2nd IF transformer terminal.
5. Dress output plate bypass capacitor C17 close to rear of chassis.
6. Dress power cord lead along rear and bottom of chassis between 35Z5GT and 50L6GT tubes.
7. Dress audio coupling capacitor C14 close to bottom of chassis.

Replacement Parts

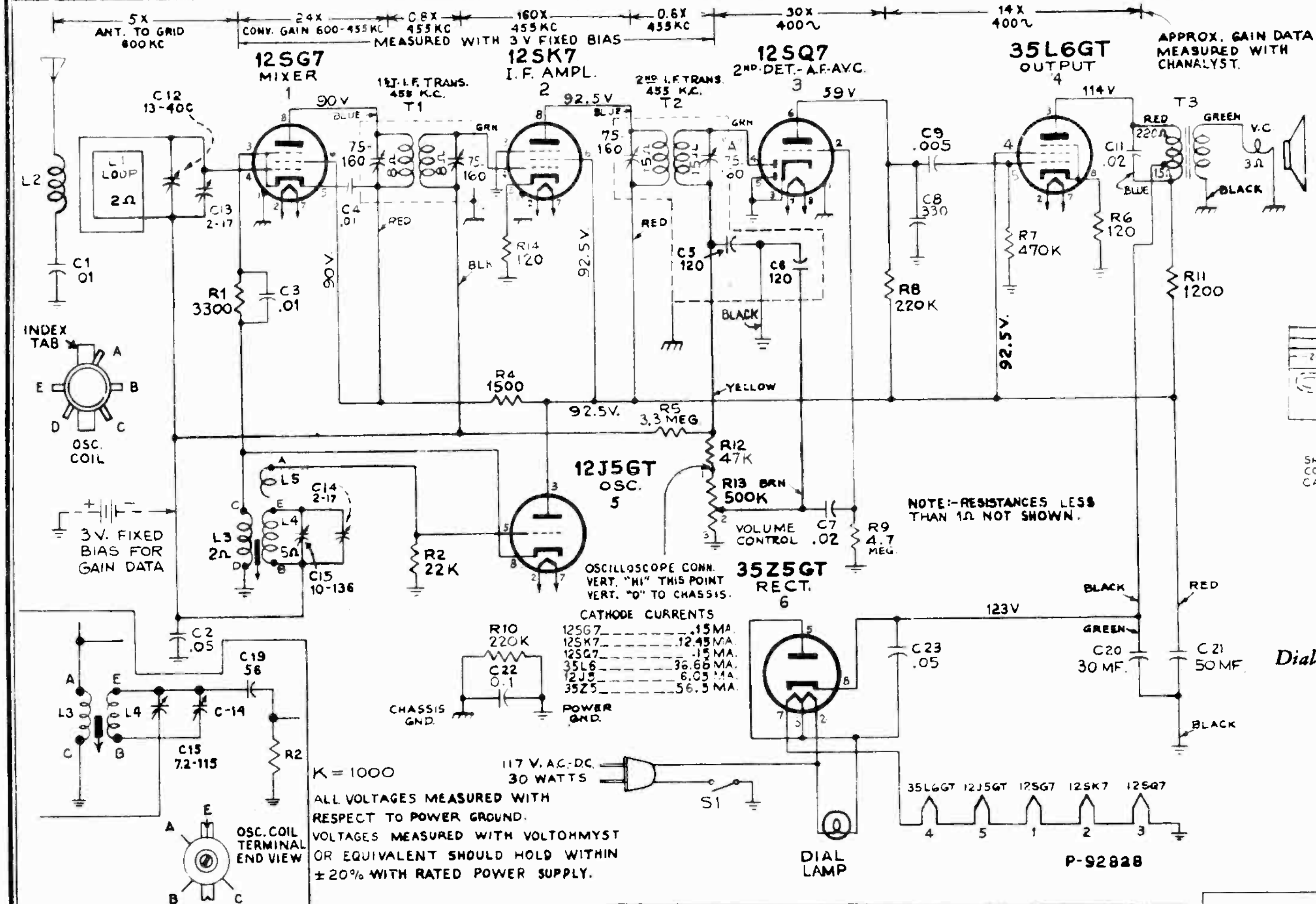
STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-1050, RC-1050A, RC-1050B
72880	Bracket—Dial lamp bracket
72878	Bracket—Mounting bracket for indicator pulley assembly
*73499	Capacitor—Ceramic, 56 mmf., for RC-1050B (C5)
39632	Capacitor—Mica, 150 mmfd. (C13)
39640	Capacitor—Mica, 330 mmf. (C23)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C16)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C14, C15)
70613	Capacitor—Tubular, .03 mfd., 400 volts (C17)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C12, C18)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C24)
70408	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts and 1 section of 30 mfd., 150 volts (C19, C20)
70477	Coil—Oscillator coil (L3, L4, L5) for RC-1050 & RC-1050A
73048	Coil—Oscillator coil (L3, L5) for RC-1050B
72992	Condenser—Variable tuning condenser complete with drive pulley (C1, C2, C3, C4)
38410	Control—Volume control and power switch (R5, S1)
†72953	Cord—Drive cord (approx. 29" required)
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
72867	Loop—Antenna loop complete (L1, L2) for RC-1050 & RC-1050A
*73706	Loop—Antenna loop complete (L1, L2) for RC-1050B
72882	Pulley—Dial indicator pulley
72313	Resistor—Wire wound, fuse type, 33 ohms (R17)
	Resistor—Fixed composition, 150 ohms, ±10%, ½ watt (R9)
	Resistor—Fixed composition, 1200 ohms, ±10%, 1 watt (R15)
	Resistor—Fixed composition, 22,000 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed composition, 47,000 ohms, ±20%, ½ watt (R3)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R7, R16)
	Resistor—Fixed composition, 470,000 ohms, ±20%, ½ watt (R8)
	Resistor—Fixed composition, 3.3 megohms, ±20%, ½ watt (R4)
	Resistor—Fixed composition, 4.7 megohms, ±20%, ½ watt (R6)

STOCK No.	DESCRIPTION
72881	Ring—Retaining ring for indicator pulley assembly
72877	Shaft—Tuning knob shaft
72879	Socket—Dial lamp socket
32299	Socket—Tube socket—wafer—for RC-1050 & RC-1050A
54414	Socket—Tube socket—molded—for RC-1050B
72540	Spring—Drive cord spring
71558	Transformer—First I. F. transformer (L6, L7, C6, C7) for RC-1050
71631	Transformer—Second I. F. transformer (L8, L9, C8, C9, C11) for RC-1050
70128	Transformer—First I. F. transformer (L6, L7, C6, C7) for RC-1050A & RC-1050B
70129	Transformer—Second I. F. transformer (L8, L9, C8, C9, C11) for RC1050A & RC-1050B
72296	Transformer—Output transformer (T1)
33726	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLY 92572-2W RL 101-3
72201	Speaker—5" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
72884	Baffle—Speaker baffle board and grille cloth
72883	Bezel—Dial scale bezel only—less dial
Y1428	Cabinet—Maroon plastic cabinet for 75X11
Y1431	Cabinet—Ivory plastic cabinet for 75X12
*Y2013	Cabinet—Mahogany plastic cabinet for 75X14
*Y2014	Cabinet—Walnut plastic cabinet for 75X15
*Y2015	Cabinet—Blonde plastic cabinet for 75X16
72871	Cover—Bottom cover
72868	Dial—Dial scale complete with dial lamp shield
72885	Foot—Mounting foot (bakelite) (2 required)
72869	Indicator—Station selector indicator
72870	Knob—Control knob (maroon) for 75X11, 75X14 & 75X15
72890	Knob—Control knob (ivory) for 75X12
*73707	Knob—Control knob (tan) for 75X16
31480	Lamp—Indicator lamp—Mazda #47
*73728	Screen—Ventilating screen for back of cabinet for 75X11, 75X14 & 75X15
*73729	Screen—Ventilating screen for back of cabinet for 75X12 & 75X16
14270	Spring—Retaining spring for knobs

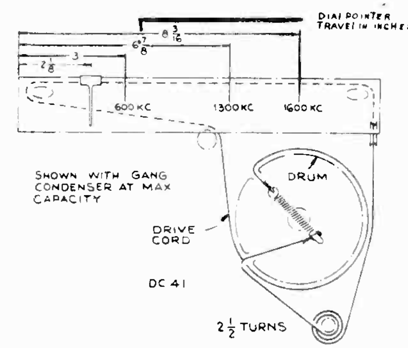
* THIS IS THE FIRST TIME THAT THIS STOCK NO. HAS APPEARED IN SERVICE DATA.
† STOCK NO. 72953 IS A REEL CONTAINING 250 FEET OF CORD.

RADIO CORP. OF AMERICA

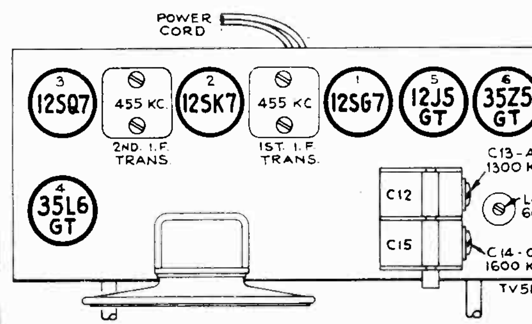
MODELS 76ZX11, 76ZX12, CHASSIS RC-1058, 1058A



Oscillator Circuit—
Chassis No. RC-1058A
Otherwise identical to Chassis No. RC-1058, except C12 (10-398)



Dial-Indicator and Drive Mechanism



Tube and Trimmer Locations

Alignment Procedure

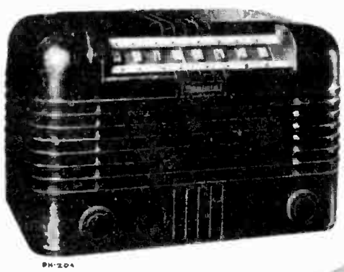
Test Oscillator.—Connect high side of test oscillator as shown in chart. Connect low side through a .01 mf capacitor to common "—B." Keep the output signal as low as possible to avoid AVC action.

Output Meter.—Connect leads between speaker voice coil and chassis. Turn volume control to maximum.

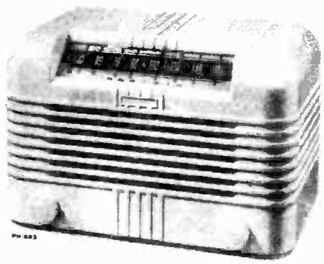
Dial Pointer Adjustment.—Rotate tuning condenser fully counter-clockwise (plates closed). Adjust indicator to 2⅛" from left hand edge of dial back plate.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	Stator of C-12 in series with .01 mfd.	455 kc	Quiet-point 1,600 kc end of dial	Sec. and pri. 2nd I-F trans.
2				Sec. and pri. 1st I-F trans.
3	Ant. lead in series with 200 mmfd.	1,600 kc	1,600 kc	C14 (osc.)
4		1,300 kc	1,300 kc	C13 ant.
5		600 kc	600 kc	L4 (osc.) Rock in
6	Repeat steps 3, 4 and 5.			

MODELS 76ZX11, 76ZX12 RADIO CORP. OF AMERICA



76ZX11
(Walnut)



76ZX12
(Ivory)

Critical Lead Dress

1. Dress output plate bypass capacitor (C-11 .02 mf) against chassis.
2. Dress 35L6GT plate lead (red) against chassis and away from volume control, leads and terminals.
3. Dress audio coupling capacitor (C-7 .02 mf) away from 35L6GT heater leads.
4. Dress 2nd i-f yellow and brown leads away from output plate bypass capacitor (C-11, .02 mf) and away from all heater leads.
5. Dress blue and green leads of both i-f transformers back in shields leaving exposed lengths as short as possible.

Specifications

Frequency Range .... 540-1600 kc
Intermediate Frequency .... 455 kc

Power Output
Undistorted .... 1.0 watt
Maximum .... 1.5 watts

Tube Complement
(1) RCA Radiotron 12SG7 .... Mixer
(2) RCA Radiotron 12SK7 .... I.F. Amplifier
(3) RCA Radiotron 12SQ7 .... 2nd Det., A.V.C., and A.F. Amplifier
(4) RCA Radiotron 35L6GT .... Power Output
(5) RCA Radiotron 12J5GT .... Oscillator
(6) RCA Radiotron 35Z5GT .... Rectifier

Loudspeaker (92572-2)
Type .... 5-inch PM
V. C. Impedance .... 3.2 ohms at 400 cycles
Cabinet Dimensions .... Height, 7¾; Width, 12⅛; Depth, 6¾

Power Supply Rating
105-125 volts, AC, 50 or 60 cycles, or DC .... 30 watts
Pilot Lamp .... type 51, 6-8 volts, 0.20 amp.
Tuning Drive Ratio 14.5:1

POWER SUPPLY POLARITY.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

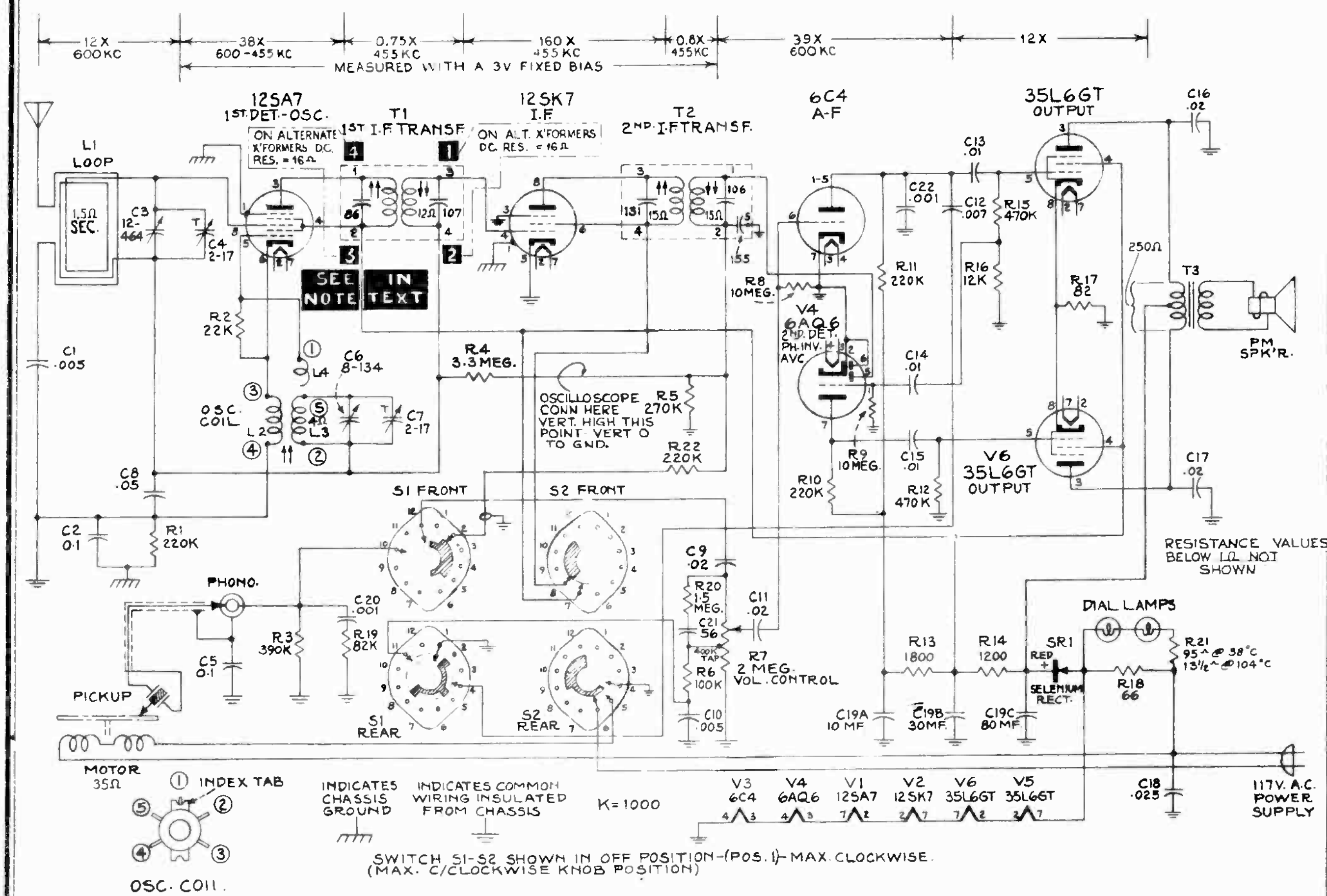
Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-1058—RC-1058A
*73172	Capacitor—Ceramic, 56 mmfd., (C19)—for RC-1058A
72571	Capacitor—Mica, 330 mmfd. (C8)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C9)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C1, C3, C4)
70611	Capacitor—Tubular, .01 mfd., 400 volts (C7, C11)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C2, C23)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C22)
39152	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C20, C21)
*73704	Coil—Oscillator coil (L3, L4, L5)—for RC-1058
*73163	Coil—Oscillator coil (L3, L4)—for RC-1058A
*72991	Condenser—Variable tuning condenser complete with drive pulley (C12, C13, C14, C15)—for RC-1058
*73171	Condenser—Variable tuning condenser, complete with drive pulley (C12, C13, C14, C15)—for RC-1058A
38410	Control—Volume control and power switch (R13, S1)
72953	Cord—Drive cord (approx. 50" overall length)
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
37068	Indicator—Station selector indicator
*73030	Loop—Antenna loop complete (L1, L2)
*72872	Plate—Dial back plate complete with drive cord pulleys
72602	Pulley—Drive cord pulley
	Resistor—Fixed composition, 120 ohms, ±10%, ½ watt (R6, R14)
	Resistor—Fixed composition, 1200 ohms, ±10%, 1 watt (R11)
	Resistor—Fixed composition, 1500 ohms, ±20%, ½ watt (R4)
	Resistor—Fixed composition, 3300 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed composition, 22,000 ohms, ±10%, ½ watt (R2)
	Resistor—Fixed composition, 47,000 ohms, ±20%, ½ watt (R12)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R8, R10)
	Resistor—Fixed composition, 470,000 ohms, ±20%, ½ watt (R7)
	Resistor—Fixed composition, 3.3 megohms, ±20%, ½ watt (R5)
	Resistor—Fixed composition, 4.7 megohms, ±20%, ½ watt (R9)
*72886	Shaft—Tuning knob shaft
34449	Socket—Lamp socket
37605	Socket—Tube socket, moulded
32299	Socket—Tube socket—wafer
31418	Spring—Drive cord tension spring
70411	Transformer—First I. F. transformer (T1)
70412	Transformer—Second I. F. transformer (T2, C5, C6)
36800	Transformer—Output transformer (T3)
35969	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLY 92572-2W RL 101-3
72201	Speaker—5" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
39953	Back—Cabinet back for 76ZX11
70409	Back—Cabinet back for 76ZX12
Y1429	Cabinet—Brown plastic cabinet for 76ZX11
Y1430	Cabinet—Ivory plastic cabinet for 76ZX12
36890	Clamp—Dial clamp—L.H.
36891	Clamp—Dial clamp—R.H.
*72903	Dial—Glass dial scale
37831	Fastener—Push fastener to hold cabinet back (1 set)
36886	Knob—Control knob—ivory—for 76ZX12
*72981	Knob—Control knob—maroon—for 76ZX11
11765	Lamp—Dial lamp—Mazda #51
30900	Spring—Retaining spring for knobs

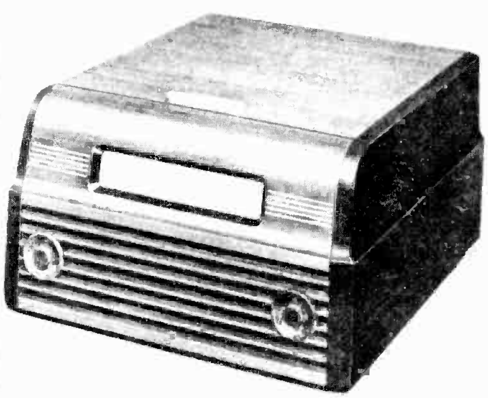
* THIS IS THE FIRST TIME THAT THIS STOCK NO. HAS APPEARED IN SERVICE DATA.

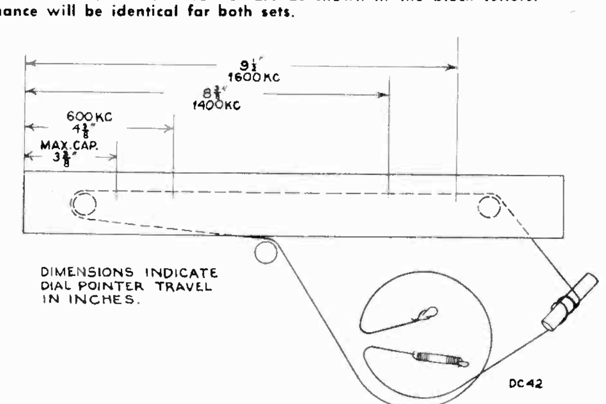
RADIO CORP. OF AMERICA

MODEL 77U, CHASSIS RC-1057A



The first I-F transformer shown in the schematic is stamped 970441-1. Some chassis will have a first I-F transformer stamped 970441-5. Connections to this alternate transformer are as shown in the block letters. Performance will be identical for both sets.





Dial-Indicator and Drive Mechanism

Electrical and Mechanical Specifications

Six-Tube, Single-Band, Superheterodyne Receiver

Frequency Range .... 540-1,600 kc

Intermediate Frequency .... 455 kc

Power Output

Undistorted .... 2.2 watts

Maximum .... 3 watts

Loudspeaker "PM"

Size .... 5x7 inch elliptical

V.C. Impedance .... 3.4 ohms at 400 cycles

Power Supply Rating

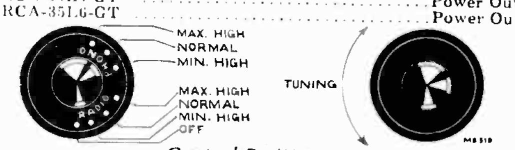
105-125 volts, AC, 60 cycles with RP-178 record changer .... 60 watts

IMPORTANT—Do not plug chassis into a d-c power supply.

	Height	Width	Depth
Cabinet dimensions (inches)	10¾"	15⅝"	18¾"

Tube Complement

(1) RCA-12SA7 .... 1st Det.—Osc.
(2) RCA-12SK7 .... I-F Amplifier
(3) RCA-6C4 .... A-F Amplifier
(4) RCA-6AQ6 .... 2nd Det., AVC, Ph. Inv.
(5) RCA-35L6-GT .... Power Output
(6) RCA-35L6-GT .... Power Output



Control Positions

MODEL 77U, CHASSIS RC-1057A

RADIO CORP. OF AMERICA

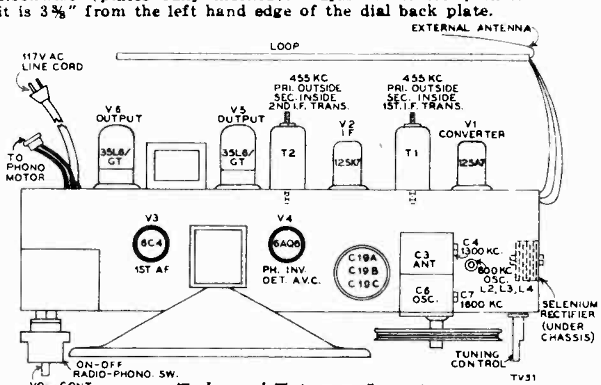
Alignment Procedure

CAUTION.—CLOSE TUNING CONDENSER PLATES COMPLETELY (C-C-W) BEFORE REMOVING CHASSIS FROM CABINET.
Take off both wooden strips on bottom of cabinet by removing wood-screws before loosening chassis bolts.

CRITICAL LEAD DRESS.—

1. Dress output plate bypasses as near chassis as possible.
2. Dress all filament leads down to chassis.
3. Dress all exposed leads away from each other and away from chassis to prevent short circuits.
4. Dress R-6 away from shield.
5. Dress AVC resistor away from R-13 and R-14.
6. Dress output plate leads down to chassis.
7. Dress R-18 away from R-15.
8. Dress R-16 away from V4 socket.
9. Dress R-10 away from V4 socket.
10. Dress high side of line cord down to front apron.
11. Dress lead of C-5 which connects to phono input away from side of chassis.

Dial Pointer Adjustment.—Rotate tuning condenser fully counter-clockwise (plates fully meshed). Adjust indicator pointer so that it is 3⅜" from the left hand edge of the dial back plate.



Tube and Trimmer Locations

Tubes 6C4 and 6AQ6 may be replaced by removing the sloping panel (remove four wood screws) in the front of the record changer compartment. Before removing the chassis from the cabinet it is advisable to loosen the two hex screws holding the speaker horizontally. This will allow the chassis to be removed and replaced easily. When the chassis is replaced the dial lights should be adjusted so as not to be visible from the front of the cabinet, and yet to give correct dial lighting. Move the speaker so it is flush against the baffle before retightening the hex nuts. The chassis mounting board should be flush against the front of the cabinet, and the chassis mounting holes should be centered over the holes in the board.

Output Meter.—Connect meter across speaker voice coil. Turn volume control clockwise to radio maximum high position (3) for alignment.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	I.F. grid, in series with .01 mfd.	455 kc	Quiet point 1,600 kc end of dial	Pri. & Sec. 2nd I.F. transformer
2	1st Det. grid in series with .01 mfd.	455 kc	Quiet point 1,600 kc end of dial	Pri. & Sec. 1st I.F. transformer
NOTE.—ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET				
3	Antenna terminal in series with 220 mmfd.	1,600 kc	1,600 kc	C7 (osc.)
4	Antenna terminal in series with 220 mmfd.	1,400 kc	1,400 kc	C4 (ant.)
5	Antenna terminal in series with 220 mmfd.	600 kc	600 kc	Osc. Coil L2, L3 Rock gang
6	Repeat steps 3, 4, & 5 if necessary			

Test Oscillator.—Connect high side of test oscillator as shown in chart. Connect low side through a .01 mf capacitor to common "—B". Keep the output signal as low as possible to avoid a-v-c action.

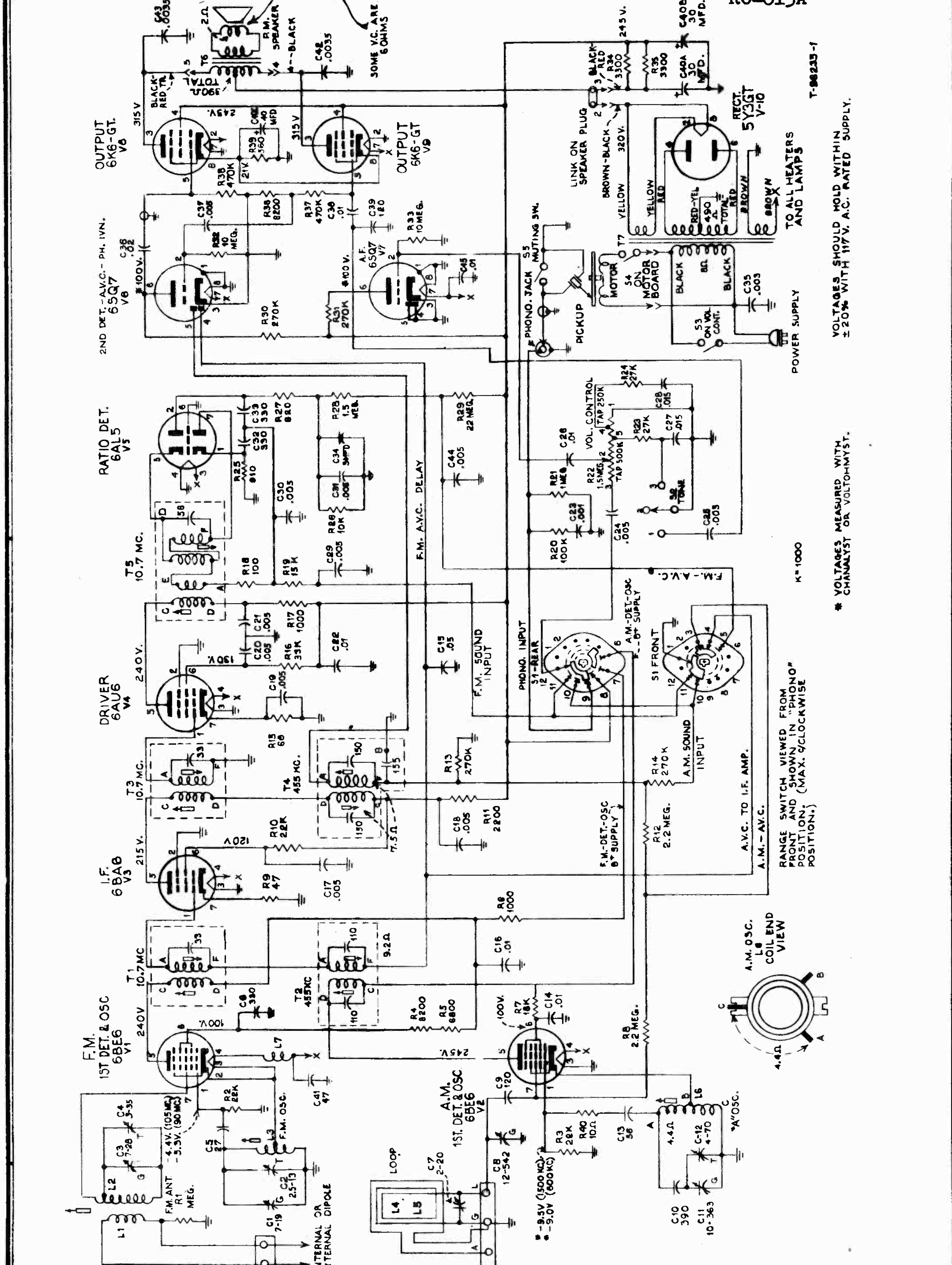
STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1057A
70407	Button—Plug button to cover holes for I. F. transformers' adjustment
39622	Capacitor—Mica, 56 mmf. (C21)
70600	Capacitor—Tubular, .001 mfd., 400 volts (C20, C22)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C1)
72791	Capacitor—Tubular, .005 mfd., 400 volts (C10)
70608	Capacitor—Tubular, .007 mfd., 400 volts (C12)
70612	Capacitor—Tubular, .025 mfd., 400 volts (C18)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C13, C14, C15)
71928	Capacitor—Tubular, .02 mfd., 400 volts (C9)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C11, C16, C17)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C8)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C2, C5)
*73013	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 150 volts; 1 section of 30 mfd., 150 volts; and 1 section of 10 mfd., 150 volts (C19A, C19B, C19C)
38201	Clamp—Drive cord clamp
70477	Coil—Oscillator coil (L2, L3)
*73007	Condenser—Variable tuning condenser (C3, C4, C6, C7)
38403	Control—Volume control (R7)
72953	Cord—Drive cord (approx. 52" overall length)
70392	Cord—Power cord and plug
70397	Gear—Power, radio and phono switch gear
73014	Gear—Volume control gear—less spring
72283	Grommet—Rubber grommet to mount tuning condenser (3 required)
*73015	Indicator—Station selector indicator
73010	Loop—Antenna loop complete (L1)
*73006	Plate—Dial back plate complete with (3) pulleys
30868	Plug—2 contact female plug for motor cable
*73009	Rectifier—Selenium rectifier (SR1)
*73038	Resistor—Normal value 66 ohms with positive temperature coefficient (R18)
	Resistor—Fixed composition, 82 ohms ±10%, 1 watt (R17)
*73072	Resistor—Normal value 95 ohms @ 38°C with negative temperature coefficient (R21)
	Resistor—Fixed composition, 1200 ohms, ±10%, 1 watt (R14)
	Resistor—Fixed composition, 1800 ohms, ±10%, ½ watt (R13)
	Resistor—Fixed composition, 12,000 ohms, ±10%, ½ watt (R16)
	Resistor—Fixed composition, 22,000 ohms, ±20%, ½ watt (R2)
	Resistor—Fixed composition, 82,000 ohms, ±10%, ½ watt (R19)
	Resistor—Fixed composition, 100,000 ohms, ±10%, ½ watt (R6)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R1, R10, R11, R22)
	Resistor—Fixed composition, 270,000 ohms, ±10%, ½ watt (R5)
	Resistor—Fixed composition, 390,000 ohms, ±10%, ½ watt (R3)

STOCK No.	DESCRIPTION
	Resistor—Fixed composition, 470,000 ohms, ±20%, ½ watt (R12)
	Resistor—Fixed composition, 470,000 ohms, ±10%, ½ watt (R15)
	Resistor—Fixed composition, 1.5 megohms, ±10%, ½ watt (R20)
	Resistor—Fixed composition, 3.3 megohms, ±20%, ½ watt (R4)
	Resistor—Fixed composition, 10 megohms, ±20%, ½ watt (R8, R9)
*73012	Shaft—Tuning knob shaft
*73103	Shield—Tube shield for miniature tubes (2 required)
*72998	Socket—Dial lamp socket and lead assembly
35787	Socket—Phono input socket
72516	Socket—Tube Socket, miniature
37605	Socket—Tube socket, molded
70390	Spring—Drive cord tension spring
70396	Spring—Volume control gear tension spring
*73011	Switch—Power, radio and phono switch (S1, S2)
73036	Transformer—First I. F. transformer (T1)
73037	Transformer—Second I. F. transformer (T2)
*73008	Transformer—Output transformer (T3)
33726	Washer—"C" washer for tuning knob shaft
34457	Washer—Spring washer for tuning knob shaft
	SPEAKER ASSEMBLIES 92573-1K
72728	Cone—Cone and voice coil assembly
72727	Speaker—5"x7" PM speaker complete with cone and voice coil
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
71105	Cable—Shielded pickup cable
73017	Clamp—Dial clamp (2 required)
X1660	Cloth—Grille cloth
*73051	Decal—Styling line decal (2 required)
71966	Decal—Trade mark decal (Victrola)
71984	Decal—Trade mark decal (RCA Victor)
*73039	Dial—Glass dial scale
72894	Foot—Rubber mounting foot (4 required)
72856	Grommet—Rubber grommet to mount record changer (3 required)
*73052	Handle—Cabinet lid handle
72692	Hinge—Cabinet lid hinge (2 required)
*73016	Knob—Power, radio and phono switch knob
73065	Knob—Tuning knob
73078	Knob—Volume control knob
11765	Lamp—Dial lamp
14270	Spring—Retaining spring for knobs
71824	Stud—Stud and screw to mount lid hinge (1 set)
*73050	Support—Cabinet lid support

*THIS IS THE FIRST TIME THIS STOCK NUMBER HAS APPEARED IN SERVICE DATA

RADIO CORP. OF AMERICA

MODEL 710V2, CHASSIS RC-613A

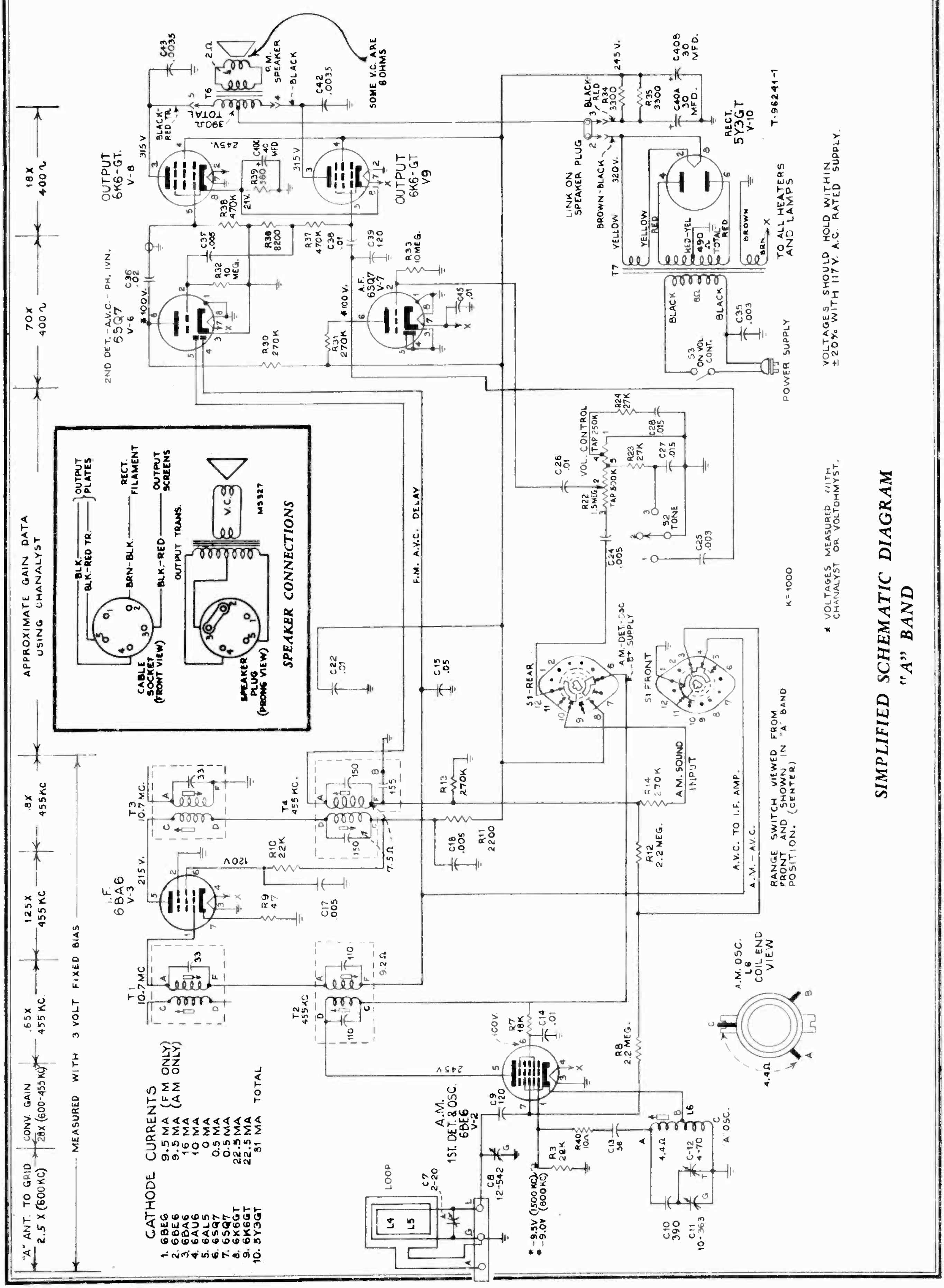


CLARI-SKEMATIX

Registered Trademark

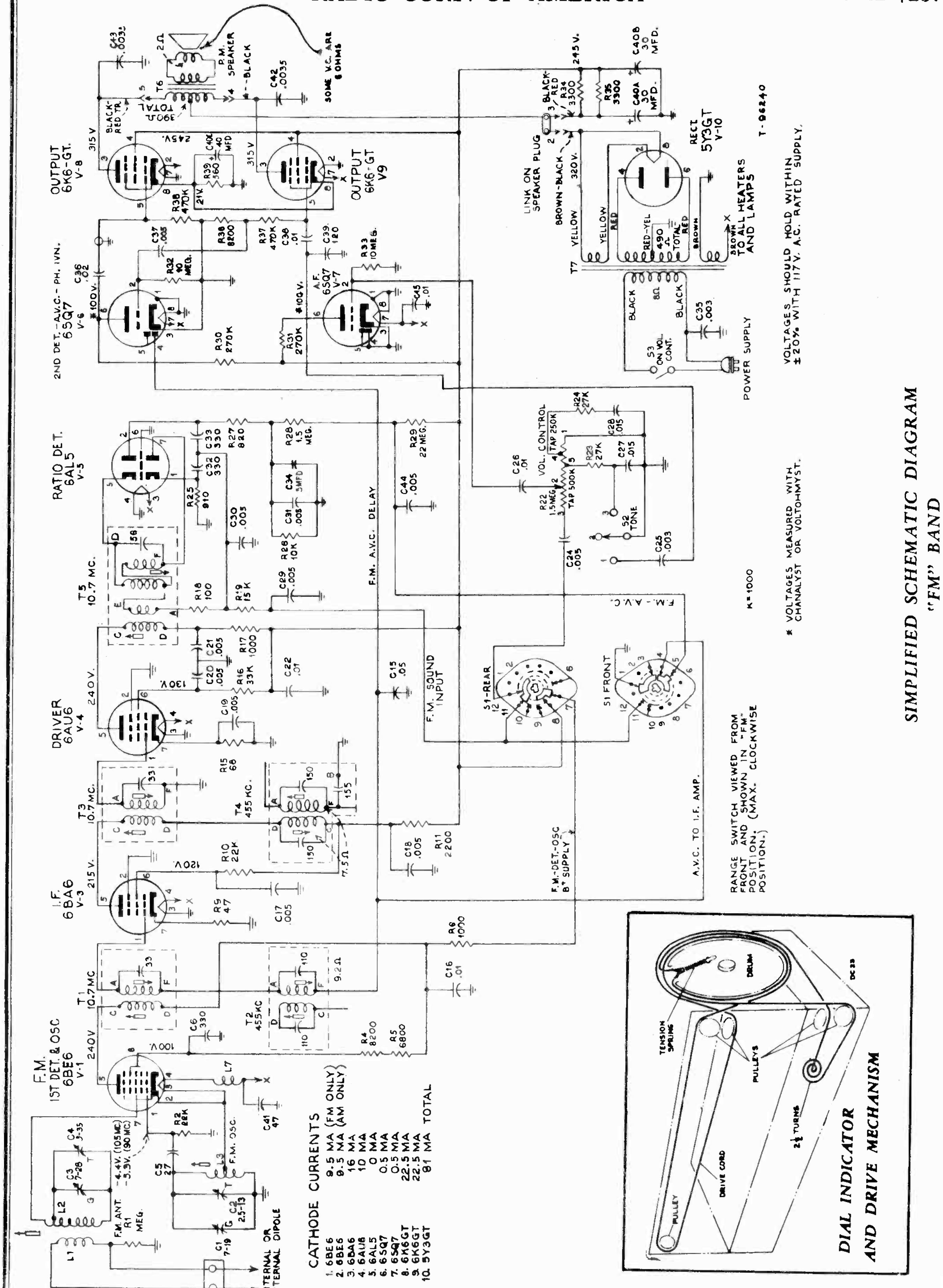
MODEL 710V2

RADIO CORP. OF AMERICA



RADIO CORP. OF AMERICA

MODEL 710V2



SIMPLIFIED SCHEMATIC DIAGRAM
"FM" BAND

DIAL INDICATOR AND DRIVE MECHANISM

RADIO CORP. OF AMERICA

Alignment Procedure

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation below. An output meter is also necessary to indicate minimum audio output during alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations, except as stated in FM alignment, connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Calibration Scale.—The dial scale printed in this service note may be temporarily attached to the chassis for quick reference during alignment.

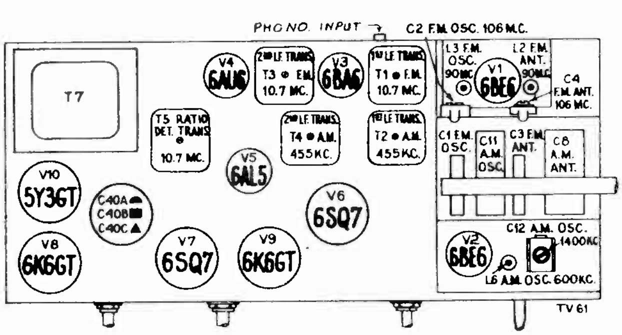
Using Printed Dial Scale.—

1. Cut out the printed dial scale, or, make a tracing of the scale.
2. With gang at full mesh the pointer should be set to the first reference mark from the left hand end of the dial backing plate.
3. Place the printed dial scale or the tracing under the pointer so that the extreme left scale graduations coincide with the pointer. Use scotch tape to hold the dial scale in place.

Note.—It is not recommended that the glass dial scale in the cabinet be removed as an alignment reference. This glass dial scale is fastened to the bezel with sheet metal lugs bent over the scale to hold it in place. Removing the glass dial scale will necessitate bending the lugs, resulting in their weakening and subsequent breakage.

Critical Lead Dress

1. Dress capacitor C5 near chassis base.
2. Dress lead from pin 5, V-1, to terminal C, of transformer T1, as near bottom of FM shelf as possible.
3. The lead from capacitor C24 to the high side of the volume control must be dressed next to chassis along front apron.
4. Dress resistors R32 & R33 near chassis base.
5. Dress all A.C. leads away from volume control.
6. Solder FM antenna coil primary leads to terminal board with as short a lead length as is practical.
7. Make all FM leads as short as possible.
8. The lead from pin 2, V-3, to chassis ground must be dressed as close to base and as near to the back apron as possible. This lead provides degeneration for the IF stage and neither its length nor the point at which it is grounded to the chassis should be changed.
9. Dress all leads away from the 3300 ohm resistors R34 and R35.



TOP VIEW OF CHASSIS

The FM i-f alignment may be checked by means of an FM sweep generator and cathode ray oscilloscope. Connect the output from the sweep generator, which is set to 10.7 mc., to the FM 1st Det.-Osc. grid (6BE6 Pin No. 7) low side to chassis. Disconnect the 5 mfd. capacitor C34 from the Ratio Detector circuit.

Connect the high side of the oscilloscope to the junction of R27 and R28, low side to chassis. Adjust the sweep generator and oscilloscope to obtain the response curve.

The Ratio Detector characteristic may be viewed by connecting the oscilloscope across the volume control R22. Capacitor C34 should be re-connected before checking the Ratio Detector characteristic.

FM Alignment

RANGE SWITCH IN FM POSITION—VOLUME CONT. MAXIMUM

Steps	Connect sig. gen.	Sig. gen. output	Turn radio dial to—	Adjustment for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 5 mfd. capacitor C34 and the common lead to chassis. Turn gang condenser to max. capacity (fully meshed).			
2	High side to Pin 1 of driver tube 6AU6 in series with .01 mfd. low side to chassis	10.7 mc. modulated 30% 400 cycles AM (Approx. .1 volt)		T5 top core for max. d-c voltage across C34. T5 bottom core for min. audio output
3	High side to one FM ant. term. in series with .01 mfd. Low side to the other FM ant. term.	10.7 mc. 30% modulation, 400 cycles AM. Adjust to provide 2 to 3 volts indication on VoltOhmyst during alignment.	Max. capacity (fully meshed)	†Using alternate loading: T3 bottom core (sec.) T3 top core (pri.) T1 bottom core (sec.) T1 top core (pri.)
4	High side to one FM ant. term. in series with a 120 ohm resistor. Low side to the other FM ant. term in series with a 120 ohm resistor.	106 mc	106 mc	C2 osc. C4 ant.
5		90 mc	90 mc	L3 osc. L2 ant.
6	Repeat Steps 4 and 5 until further adjustment does not improve calibration.			

†Alternate loading involves the use of a 680 ohm resistor to load the plate winding while the grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 680 ohm resistor after T3 and T1 have been aligned.

AM Alignment

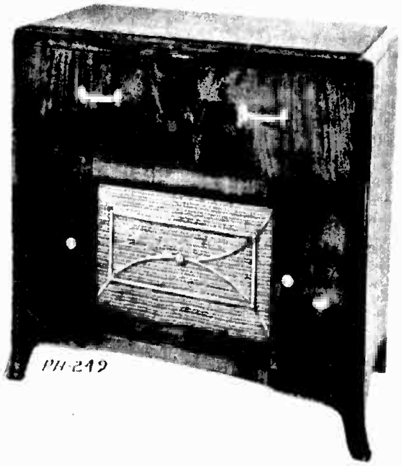
(Correct alignment of the 455 kc. IF requires that the 10.7 mc. IF be aligned previously)

RANGE SWITCH IN BC POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	AM converter grid 6BE6 V-2 in series with .01 mfd.	455 kc	Quiet point at low freq. end.	†T4 top core (sec.) †T4 bottom core (pri.)
2				†T2 bottom core (sec.) †T2 top core (pri.)
3	"A" terminal of terminal board at rear of chassis in series with 200 mmf. (link open)	1400 kc	1400 kc	C12 osc. C 7 ant. (loop)
4		600 kc	600 kc	L6 osc. (Rock gang)
5	Repeat Step 3.			
6	After chassis and loop have been installed in cabinet, adjust C7 for max. output on a weak station near 1400 kc.			

†Align T4 and T2 by means of alternate loading as explained under FM alignment. Use a 47,000 ohm resistor instead of a 680 ohm resistor.

Oscilator frequency is above signal frequency on both AM and FM.



Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast (BC)	540-1600 kc.
Frequency Modulation (FM)	88-108 mc.
Intermediate Frequency (AM)	455 kc.
Intermediate Frequency (FM)	10.7 mc.

TUBE COMPLEMENT

(1) RCA 6BE6	FM 1st Det.-Osc.
(2) RCA 6BE6	AM 1st Det.-Osc.
(3) RCA 6BA6	IF Amplifier
(4) RAC 6AU6	Driver
(5) RCA 6AL5	FM Ratio Detector
(6) RCA 6SQ7	AM 2nd Det.-AVC-Phase Inverter
(7) RCA 6SQ7	AF Amplifier
(8) RCA 6K6GT	Output
(9) RCA 6K6GT	Output
(10) RCA 5Y3GT	Rectifier
Pilot Lamps (3)	Mazda No. 51 6-8 volts 0.2 amp.
Tuning Drive Ratio	16.25:1

CABINET DIMENSIONS

Height, ...35" Width ....37½" Depth ....16⅝"

POWER OUTPUT

Undistorted	5 watts
Maximum	6.5 watts

LOUDSPEAKER

Type (92569-1)	12 inch PM
Voice Coil Impedance	2.2 ohms at 400 cycles

(Speakers stamped 92569-1W2 are 6 ohms)

POWER SUPPLY RATING (including phono motor)

105-125 volts, 60 cycles ....max. 110 watts

AUTOMATIC RECORD CHANGER—RP-177

Type Pickup	Crystal
Record Capacity	Twelve 10-in., Ten 12-in.

Circuit Description

Model 710V2 has individual built-in antennas for FM and AM coupled to individual 1st Det.-Osc. tubes (6BE6 V1 and V2). The outputs of these two tubes are connected to separate IF transformers (T1 and T2) whose secondaries are in series and connected to the IF amplifier tube (6BA6 V3). The output of V3 is connected to separate IF transformers (T3 and T4) whose primaries are in series. The secondary of T3 (FM IF) is connected to the driver tube (6AU6 V4). The secondary of T4 (AM IF) is connected to the AM second detector (6SQ7 V6). The output of the driver tube (V4) is coupled thru the ratio detector transformer (T5) to the FM ratio detector tube (6AL5 V5).

The audio outputs of the AM second detector and the FM ratio detector are connected thru a section of the range switch to the volume control input.

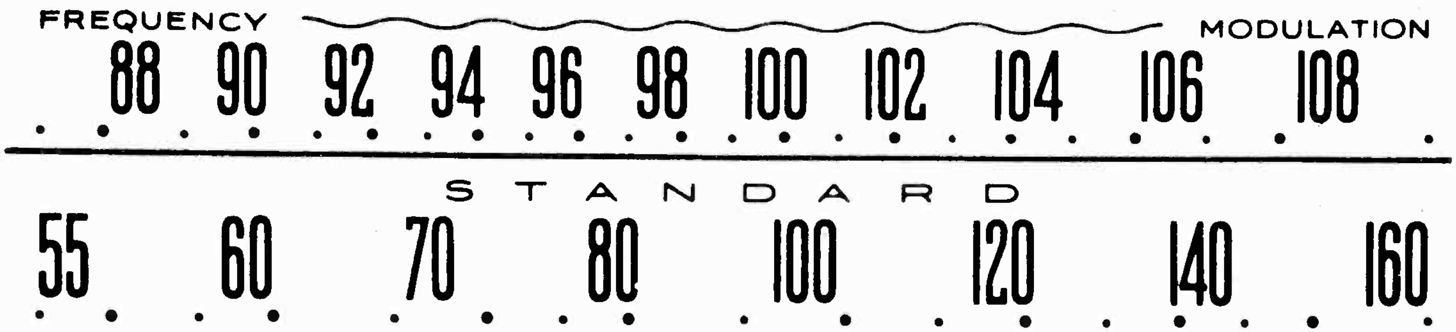
The B+ supply (+245 V) to the plates and screen grids of V1 and V2 is controlled thru a section of the range switch.

Simple AVC is used on AM and is applied to both the IF amplifier (V3) and the AM 1st detector (V2). Delayed AVC is used on FM and is applied only to the IF amplifier (V3). The AVC distribution is controlled thru a section of the range switch.

Antennas

Under conditions of normal field strength and interference, the RCA Victor antennas installed inside the cabinet will be effective for Frequency Modulation and Standard Broadcasts.

If reception is not satisfactory on one or both of the bands using the built-in cabinet antennas, one or two external antennas may be used. Connections are made to the antenna terminal boards in the back of the cabinet. External antennas may be erected indoors or outdoors and should be oriented in direction for requirements of best reception. RCA Television Antenna Stock No. 225 or 226 or the equivalent with 300 ohm transmission line is recommended for an FM external antenna. In this case, disconnect the two leads at the two terminals marked "FM" and attach the ends of the two lead wires from the RCA Television Antenna transmission line in their places. To replace the Standard Broadcast antenna, connect the lead-in from the antenna to terminal A. This antenna should consist of a wire 30 to 60 feet or so in length, mounted in a convenient location as high as possible. A ground connection to G should not be necessary but a flexible wire to a waterpipe or other good ground may be used.



DIAL SCALE

The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

MODEL 710V2

RADIO CORP. OF AMERICA

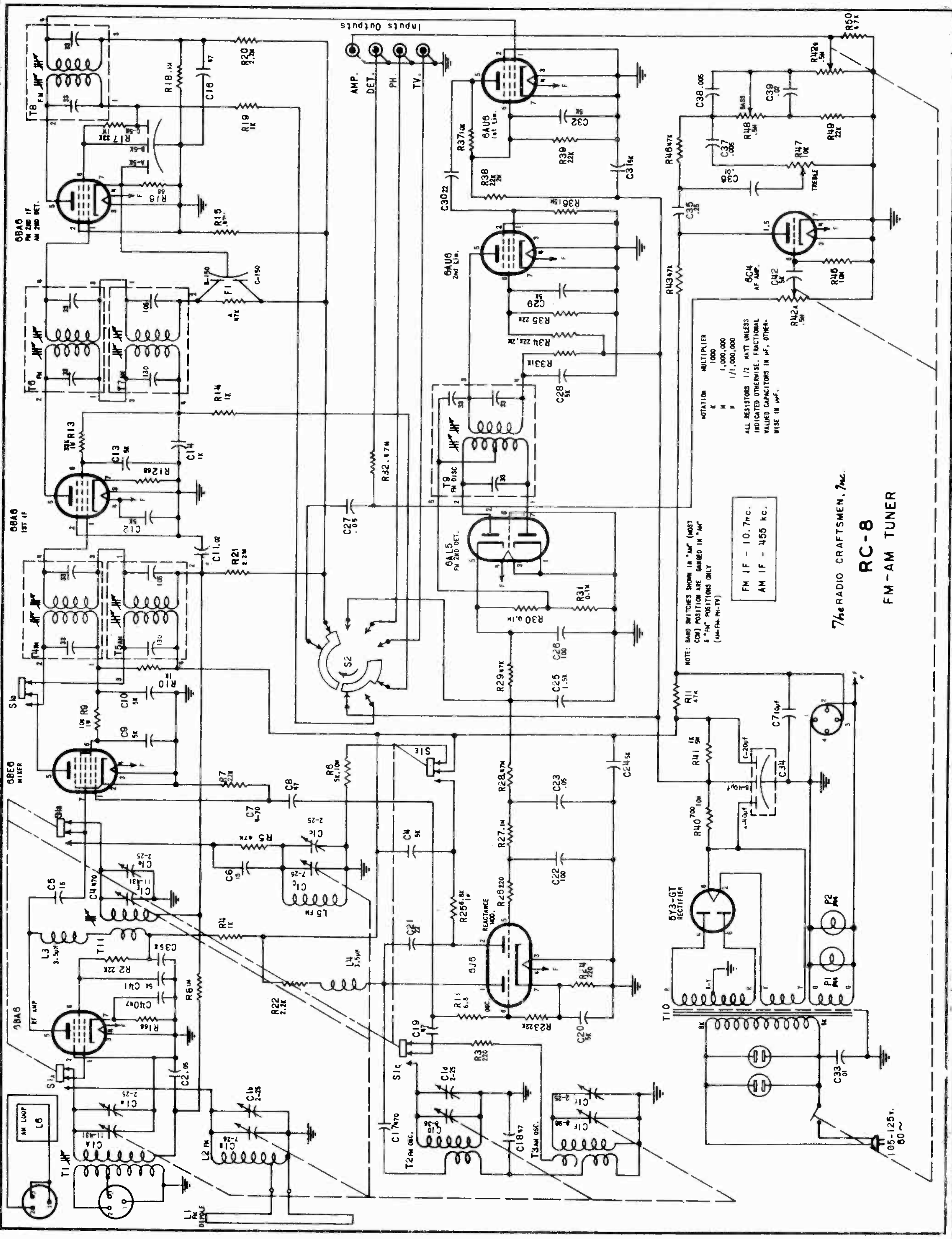
Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 613A
*73107	Board—"F.M." board—antenna end
*73106	Board—Two (2) contact terminal board for transmission line—chassis end
72046	Capacitor—Mica trimmer, 2.5-13mmf. (C2)
71808	Capacitor—Adjustable, 3-35 mmf. (C4)
72334	Capacitor—Adjustable, 4-70 mmf. (C12)
72570	Capacitor—Ceramic, 27 mmf. (C5)
39042	Capacitor—Ceramic, 47 mmf. (C41)
71924	Capacitor—Ceramic, 56 mmf. (C13)
71614	Capacitor—Ceramic, 120 mmf. (C9, C39)
39640	Capacitor—Mica, 330 mmf. (C6, C32, C33)
39642	Capacitor—Mica, 390 mmf. (C10)
70646	Capacitor—Tubular, .0035 mfd., 1000 volts (C42, C43)
73186	Capacitor—Tubular, .001 mfd., 400 volts (C23)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C25)
72874	Capacitor—Moulded paper, .003 mfd., 600 volts (C35)
72490	Capacitor—Tubular, .005 mfd., 200 volts (C19, C29, C30, C31, C44)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C17, C18, C20, C21)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C24, C37)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C27, C28)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C26, C45)
71925	Capacitor—Tubular, .01 mfd., 400 volts (C14, C16, C22)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C38)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C36)
71551	Capacitor—Tubular, .05 mfd., 200 volts (C15)
72121	Capacitor—Electrolytic, 5 mfd., 50 volts (C34)
72052	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 450 volts, 1 section of 30 mfd., 350 volts and 1 section of 40 mfd., 25 volts (C40A, C40E, C40C)
72335	Coil—Antenna coil—F.M.—complete with adjustable core and stud (L1, L2)
72336	Coil—Oscillator coil—F.M.—complete with adjustable core and stud (L3)
72333	Coil—Oscillator coil—"A" band—complete with adjustable core and stud (L6)
72574	Coil—Filament choke coil (L7)
72059	Condenser—Variable tuning condenser (C1, C3, C8, C11)
70342	Control—Volume control and power switch (R22, S3)
†72953	Cord—Drive cord (approx. 82" overall required)
70392	Cord—Power cord and plug
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
71799	Grommet—Rubber grommet to mount R.F. shelf (3 required)
71608	Indicator—Station selector indicator
71607	Plate—Dial back plate
30868	Plug—2 contact female plug for motor cable
12493	Plug—5 contact female plug for speaker cable
72602	Pulley—Drive cord pulley
	Resistor—Fixed composition, 10 ohms, ½ watt (R40)
	Resistor—Fixed composition, 47 ohms, ±10%, ½ watt (R9)
	Resistor—Fixed composition, 68 ohms, ±10%, ½ watt (R15)
	Resistor—Fixed composition, 100 ohms, ±5%, ½ watt (R18)
72865	Resistor—Wire wound, 560 ohms, 2 watt (R39)
	Resistor—Fixed composition, 820 ohms, ±5%, ½ watt (R27)
	Resistor—Fixed composition, 910 ohms, ±5%, ½ watt (R25)
	Resistor—Fixed composition, 1000 ohms, ±20%, ½ watt (R6, R17)
	Resistor—Fixed composition, 2200 ohms, ±20%, 1 watt (R11)
	Resistor—Fixed composition, 3300 ohms, ±10%, 2 watt (R34, R35)
	Resistor—Fixed composition, 6800 ohms, ±10%, 1 watt (R5)
	Resistor—Fixed composition, 8200 ohms, ±10%, ½ watt (R36)
	Resistor—Fixed composition, 8200 ohms, ±10%, 1 watt (R4)
	Resistor—Fixed composition, 10,000 ohms, ±10%, ½ watt (R26)
	Resistor—Fixed composition, 15,000 ohms, ±10%, ½ watt (R19)
	Resistor—Fixed Composition, 18,000 ohms, ±10%, 2 watt (R7)
	Resistor—Fixed composition, 22,000 ohms, ±10%, ½ watt (R2, R3)
	Resistor—Fixed composition, 22,000 ohms, ±10%, 1 watt (R10)
	Resistor—Fixed composition, 27,000 ohms, ±10%, ½ watt (R23, R24)
	Resistor—Fixed composition, 33,000 ohms, ±10%, ½ watt (R16)
	Resistor—Fixed composition, 100,000 ohms, ±10%, ½ watt (R20)
	Resistor—Fixed composition, 270,000 ohms, ±10%, ½ watt (R13, R14, R30, R31)
	Resistor—Fixed composition, 470,000 ohms, ±10%, ½ watt (R37, R38)
	Resistor—Fixed composition, 1 megohm, ±20%, ½ watt (R1)
	Resistor—Fixed composition, 1 megohm, ±10%, ½ watt (R21)
	Resistor—Fixed composition, 1.5 megohm, ±20%, ½ watt (R28)
	Resistor—Fixed composition, 2.2 megohm, ±20%, ½ watt (R8, R12)
	Resistor—Fixed composition, 10 megohm, ±20%, ½ watt (R32, R33)
	Resistor—Fixed composition, 22 megohm, ±20%, ½ watt (R29)
72055	Shaft—Tuning knob shaft
31364	Socket—Lamp socket
35787	Socket—Phono input socket
72516	Socket—Tube socket—miniature
31251	Socket—Tube socket—octal
31418	Spring—Drive cord tension spring
*73104	Support—Dial back plate support—R.H.—complete with four (4) drive cord pulleys
*73105	Support—Dial back plate support—L.H.—complete with one (1) drive cord pulley
72060	Switch—Rang switch (S1)
71603	Switch—Tone control switch (S2)
72887	Transformer—First I.F. transformer—F.M. (T1)
71625	Transformer—First I.F. transformer—A.M. (T2)
72888	Transformer—Second I.F. transformer—F.M (T3)
71631	Transformer—Second I.F. transformer—A.M. (T4)
72889	Transformer—Ratio detector transformer (T5)
71975	Transformer—Power transformer—117 volt, 60 cycle (T7)
35969	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES 92569-1W or 92569-1W1
13867	Cap—Dust cap
36145	Cone—Cone and voice coil assembly—(2.2 ohm voice coil)
71560	Plug—5 prong male plug for speaker
71961	Speaker—12" PM speaker complete with cone and voice coil less output transformer and plug (92569-1W)
71145	Suspension—Metal cone suspension
37899	Transformer—Output transformer (T6)
	SPEAKER ASSEMBLIES 92569-1W2
13867	Cap—Dust cap
72828	Cone—Cone and voice coil assembly—(6 ohm voice coil)
71560	Plug—5 prong male plug for speaker
71145	Suspension—Metal cone suspension
*73242	Transformer—Output transformer (T6)
	NOTE: If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
72555	Antenna—Di-pole antenna
71599	Bracket—Pilot lamp bracket
72583	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Pilot lamp jewel
71892	Catch—Record storage compartment door catch and strike
71820	Check—Radio compartment door check
X1752	Cloth—Grille cloth
73088	Decal—Control panel decal
71910	Decal—Trade mark decal (RCA Victor)
71966	Decal—Trade mark decal (Victrola)
72682	Dial—Glass dial scale
72861	Escutcheon—Dial escutcheon less dial
*73181	Grille—Metal grille
11889	Grommet—Rubber grommet for radio chassis mounting strap (2 required)
73024	Hinge—Radio compartment door hinge (2 required)
36817	Hinge—Record storage compartment door hinge—L.H. (1 set)
36610	Hinge—Record storage compartment door hinge—R.H. (1 set)
71821	Knob—Control knob
11765	Lamp—Dial or jewel lamp—Mazda 51
*73108	Loop—Antenna loop complete (L4, L5, C7)
70546	Mounting—One set of hardware to mount record changer consisting of four (4) upper springs and four (4) lower springs
71819	Plate—Mounting plate for door check
30870	Plug—2 prong male plug
73034	Pull—Record storage compartment door pull (2 required)
72556	Pull—Record changer compartment or radio compartment door pull (2 required)
*73184	Runner—Record changer motor board runner—R.H.
*73183	Runner—Record changer motor board runner—L.H.
*73185	Stop—Metal stop for motor board runners (2 required)
72936	Stop—Record storage compartment door stop
71818	Spring—Radio compartment door check spring
30900	Spring—Retaining spring for knob
*73182	Track—Record changer compartment track (2 required)
*73248	Washer—Flat washer (1" square) to mount record changer (4 required)

*This is the first time this Stock No. has appeared in Service Data.
†This is a reel containing 250 ft. of cord, order from your distributor by specifying Stock No. and length required.

THE RADIO CRAFTSMEN INC.

MODEL RC-8



ALIGNMENT PROCEDURE

To set pointer, completely mesh tuning capacitor and align pointer with last reference mark at low frequency end of dial. Volume control should be in maximum clockwise position. Bass and treble controls should be in maximum counter-clockwise position. Output of signal generator should be no higher than necessary to obtain an output reading. Low side of signal generator and indicating meter should be connected directly to chassis at all times. Use an insulated screw driver with 1/16" thick blade for adjusting IF transformers.

Operation	Signal Generator			Band Switch Position	Dial Setting	Indicating Meter	Adjust	Indication
	Coupling	Freq.	Modulation					
1.	.01µf to pin 7 (grid) 6BE6	455kc	400cps AM	AM (most CCW)	point of no interference	AC voltmeter across audio output	T7,T5 top & bottom	maximum deflection
2.	220µµf to loop ant. socket pin 2.	1500kc	400cps AM	AM (most CCW)	1500kc	AC voltmeter across audio output	Cla,Cle,Clf	maximum deflection
3.	220µµf to loop ant. socket pin 2.	600kc	400cps AM	AM (most CCW)	tune for maximum response	AC voltmeter across audio output	T1, T11	maximum deflection
4.	Repeat steps 2 and 3							
5.	.01µf to pin 7 (grid) 6BE6	10.7mc	none	FM (1 pos. CW from most CCW)	point of no interference	neg. DC VTVM to output of diode filter (F1)	T8,T6,T4 top & bottom	maximum deflection
6.	.01uf to pin 7 (grid) 6BE6	10.7mc	none	FM (1 pos. CW from most CCW)	point of no interference	neg. DC VTVM across C25	T9 top	zero volts
7.	300 Ω (carbon) to top FM ant. post	104mc	400cps FM	FM (1 pos. CW from most CCW)	104mc	AC voltmeter across audio output	Cld,Clc,Clb, T9 bottom	maximum deflection

ELECTRICAL SPECIFICATIONS

Power supply . . . . 105-125 V., 60 cycle AC

Power Consumption . . . . 100 watts

Tuning Range . . . . (AM) 535 - 1620 kc.
(FM) 88 - 108 mc

Intermediate Frequency . . . . . . (AM) 455 kc.
(FM) 10.7 mc

Antennas . . . . (AM) low-impedance loop
(FM) 300-ohm folded dipole

Output Impedance . . . . 47,000 ohms

Sensitivity . . . . (AM) 5 microvolts
(30% mod., 0.5 V. output) . . . . . (FM) 8 microvolts

STAGE GAIN MEASUREMENTS

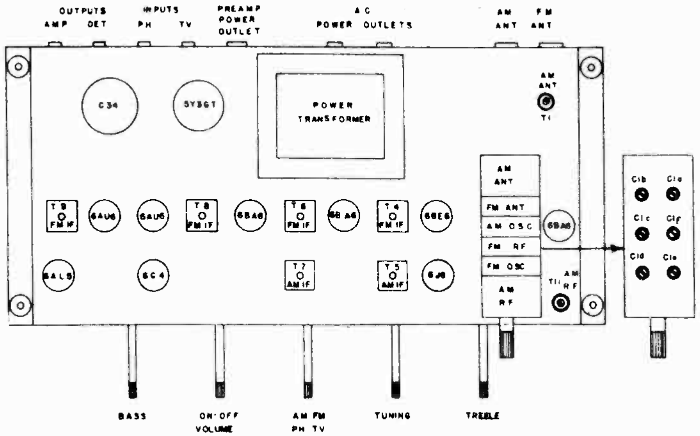
Location	AM		FM	
Ant. to RF grid	600 kc.	2X	100 mc.	1.2X
RF grid to Conv. grid	600 kc.	10X	100 mc.	20X
Conv. grid to 1st IF grid	600 - 455 kc.	50X	100 - 10.7 mc.	
1st IF grid to 2nd IF grid	455 kc.	110X	10.7 mc.	30X
2nd IF grid to 3rd IF grid			10.7 mc.	25X
Audio grid to output plug	400 cps.	1.5X	400 cps.	1.5X

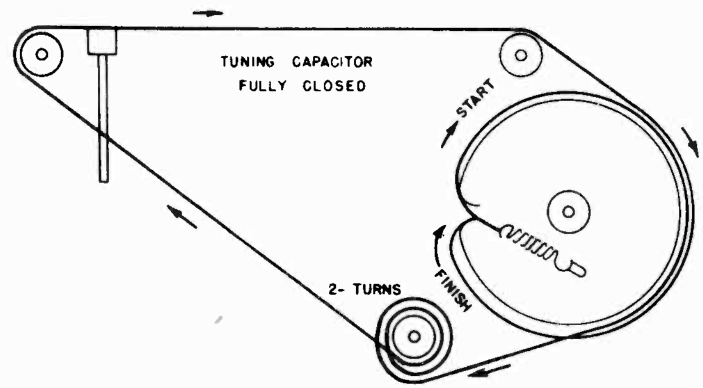
VOLTAGE READINGS

TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
6BA6 R.F.	-0.6DC *0*	0 *0*	0 *0*	6.3AC *6.3AC*	140DC *160DC*	85DC *85DC*	0.7DC *0.9DC*	—
6BE6 Mixer	-6 DC *-5 DC*	0 *0*	0 *0*	6.3AC *6.3AC*	155DC *165DC*	85DC *95DC*	-0.6DC *-0.5DC*	—
6BA6 1st I.F.	-0.6DC *-0.1DC*	0 *0*	0 *0*	6.3AC *6.3AC*	210DC *205DC*	100DC *95DC*	0.9DC *0.9DC*	—
6BA6 2nd I.F.	-0.9DC *-0.1DC*	0 *0*	0 *0*	6.3AC *6.3AC*	0 *210DC*	0 *95DC*	0 *0.9DC*	—
6AU6 1st. Lim.	-0.6DC *-0.6DC*	0 *0*	0 *0*	6.3AC *6.3AC*	25DC *25DC*	50DC *50DC*	0 *0*	—
6AU6 2nd. Lim.	-0.7DC *-0.7DC*	0 *0*	0 *0*	6.3AC *6.3AC*	210DC *210DC*	85DC *85DC*	0 *0*	—
6AL5 Disc.	0 *0*	-0.6DC *-4DC*	0 *0*	6.3AC *6.3AC*	0 *-0.3DC*	0 *0*	-0.8DC *-4DC*	—
6J6 Osc.	130DC *160DC*	0 *150DC*	0 *0*	6.3AC *6.3AC*	0 *-0.6DC*	-5 DC *-1.5DC*	2DC *3DC*	—
6C4 Audio	30DC *35DC*	0 *0*	0 *0*	6.3AC *6.3AC*	30DC *35DC*	-0.6DC *-0.6DC*	0 *0*	—
5Y3-GT Rect.	0 *0*	280DC *290DC*	0 *0*	285AC *285AC*	0 *0*	285 AC *285AC*	0 *0*	280DC *290DC*
C34	(A) 280DC *290DC*	(B) 210DC *220DC*	(C) 145DC *175DC*		Phono Socket #3 100 DC			

MODEL RC-8

THE RADIO CRAFTSMEN INC.



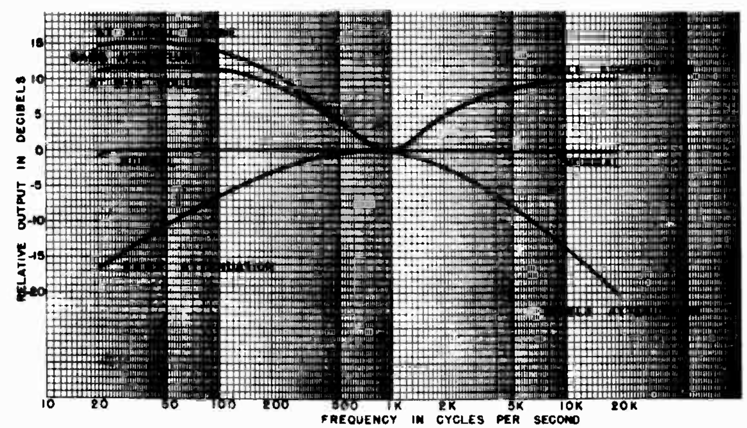


Dial Cord Drive

Top reading in AM position, bottom italic reading in FM
DC Voltages measured with vacuum-tube voltmeter
AC Voltages measured at 1,000 ohms per volt.
Socket connections are shown as bottom views.
Measured values are from socket pin to common negative.
Line voltage maintained at 117 volts for voltage readings.
Nominal tolerance on component values makes possible a variation of ± 10% in voltage.
Voltage measurements are with no signal applied.

AUDIO

CHARACTERISTIC



THE RADIO CRAFTSMEN INC. MODEL RC-8

REPLACEMENT PARTS LIST

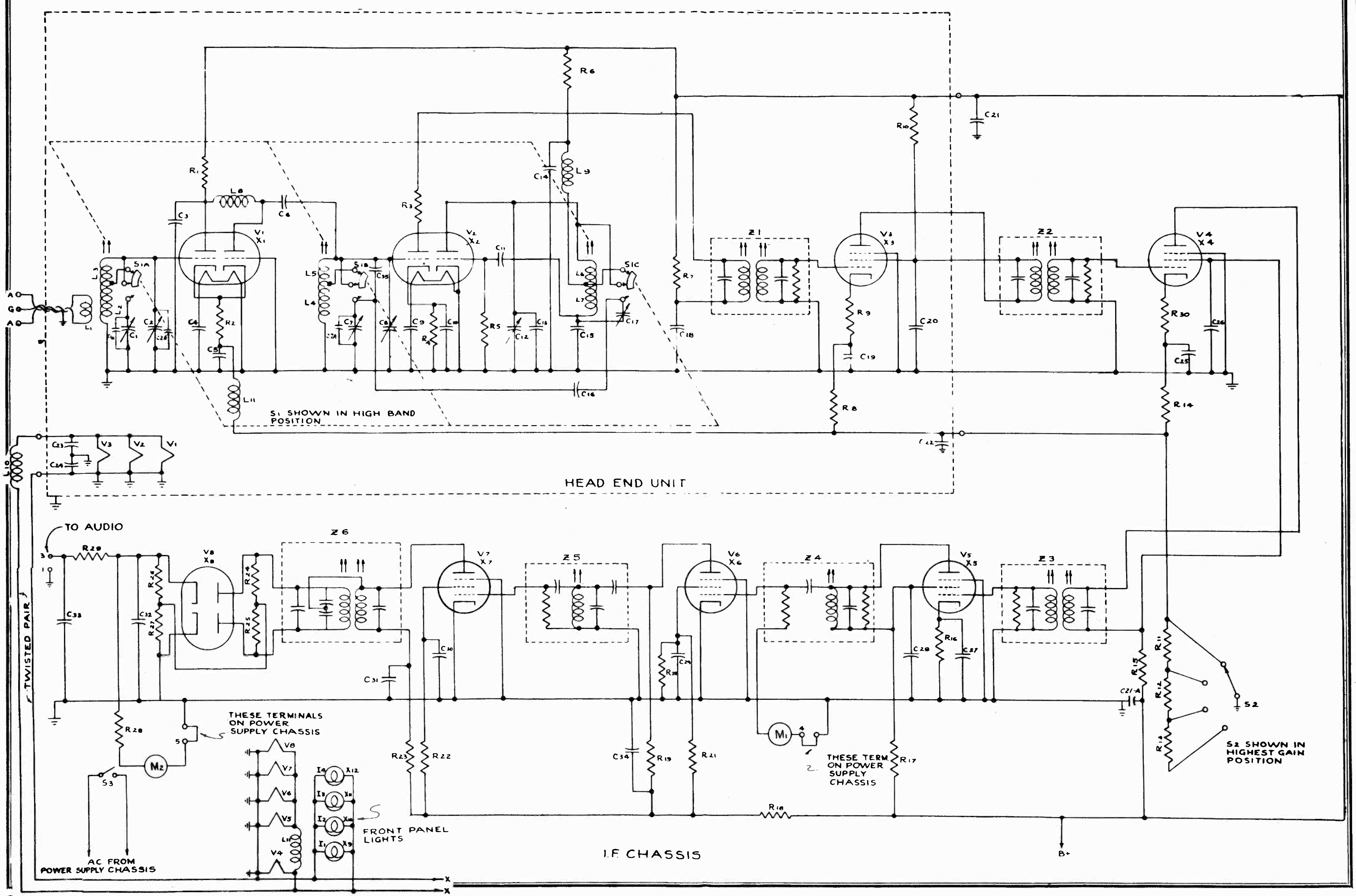
Ref. No.	Part No.	Description	Function
		TUBES	
	6BA6	glass 7 pin miniature	RF amplifier
	6BE6	glass 7 pin miniature	mixer
	6BA6	glass 7 pin miniature	1st IF amplifier
	6BA6	glass 7 pin miniature	FM 2nd IF amp. AM 2nd det.
	6AU6	glass 7 pin miniature	FM 1st lim.
	6AU6	glass 7 pin miniature	FM 2nd lim.
	6AL5	glass 7 pin miniature	FM 2nd det.
	6J6	glass 7 pin miniature	osc.-reactance mod.
	6C4	glass 7 pin miniature	AF amplifier
	5Y3-GT	glass octal	rectifier
		CAPACITORS	
C1A	17B005	11-431 μμf 300v ganged air	AM ant. tuning
B		7-26 μμf 300v ganged air	FM ant. tuning
C		7-26 μμf 300v ganged air	FM RF tuning
D		8-36 μμf 300v ganged air	FM osc. tuning
E		11-431 μμf 300v ganged air	AM RF tuning
F		8-98 μμf, 300v ganged air	AM osc. tuning
a		2-25 μμf 300v var. mica.	AM ant. trimmer
b		2-25 μμf 300v var. mica.	FM ant. trimmer
c		2-25 μμf 300v var. mica.	FM RF trimmer
d		2-25 μμf 300v var. mica.	FM osc. trimmer
e		2-25 μμf 300v var. mica	AM RF trimmer
f		2-25 μμf, 300v var. mica	AM osc. trimmer
C2	18X206	0.05 μf. 400v paper	AVC filter
C3	18X608	5K μμf 400v ceramic	RF plate dec.
C4	18X608	5K μμf 400v ceramic	reac. mod. bypass
C5	18X602	15 μμf 500v ceramic	FM RF coupling
C6	18X602	15 μμf 500v ceramic	FM RF coupling
C7	18X005	10 μf, 300v dry electrolytic	filter
C8	18X603	22 μμf 500v ceramic	osc. coupling
C9	18X608	5K μμf 400v ceramic	mix. screen bypass
C10	18X608	5K μμf 400v ceramic	FM mix. plate dec.
C11	18X202	0.02 μf 400v paper	AVC filter
C12	18X608	5K μμf 400v ceramic	filter bypass
C13	18X608	5K μμf 400v ceramic	1st IF screen bypass
C14	18X608	5K μμf 400v ceramic	1st IF plate dec.
C15A	18X610	5K μμf 400v ceramic	2nd IF cathode bypass
B		5K μμf 400v	2nd IF screen bypass
C		5K μμf 400V	2nd IF plate dec.
C16	18X604	47 μμf 500v ceramic	lim. grid filter
C17	18X606	470 μμf 500v ceramic	osc. plate coupling
C18	18X604	47 μμf 500v ceramic	FM osc. grid filter
C19	18X604	47 μμf 500v ceramic	osc. grid coupling
C20	18X608	5K μμf 400v ceramic	osc. cathode bypass
C21	18X603	22 μμf 500v ceramic	reac. mod. coupling
C22	18X605	100 μμf 500v ceramic	RF bypass
C23	18X206	0.05 μf 400v paper	AF bypass
C24	18X608	5K μμf 400v ceramic	B+IF bypass
C25	18X607	1.5K μμf 350v ceramic	FM de-emphasis
C26	18X605	100 μμf 500v ceramic	IF filter
C27	18X206	0.05 μf 400v paper	AF coupling
C28	18X608	5K μμf 400v ceramic	2nd lim. plate decoupling
C29	18X608	5K μμf 400v ceramic	2nd lim. screen bypass
C30	18X603	22 μμf 500v ceramic	lim. coupling
C31	18X608	5K μμf 400v ceramic	B+IF bypass
C32	18X608	5K μμf 400v ceramic	1st lim. screen bypass
C33	18X210	0.01 μf 600v paper	line bypass
C34A	18S003	40 μf 400v dry electrolytic	filter
B		40 μf 400v	filter
C		20 μf 300v	filter
C35	18X209	0.25 μf 200v paper	AF coupling
C36	18X208	0.01 400v paper	tone compensation
C37	18X211	0.005 400v paper	tone compensation
C38	18X211	0.005 400v paper	tone compensation
C39	18X202	0.02 400v paper	tone compensation
C40	18X604	47 μμf 500v ceramic	RF cathode bypass
C41	18X608	5K μμf 400v ceramic	RF screen bypass
		FILTER	
F1A	18X609	47K 1/2 watt carbon resistor	AM det. filter
B		150 μμf 400v ceramic cap.	
C		150 μμf 400v ceramic cap.	
		RF COILS	
L1	7X401	300Ω polyethylene twin lead	FM dipole Ant.
L2	5A210	RF auto transformer	FM ant. coil
L3	5S402	3.5 μh RF choke	FM RF plate load
		RF COILS - Continued	
L4	5S402	3.5 μh RF choke	FM osc. choke
L5	5A209	RF coil	FM RF inductor
L6	5B603	Low impedance loop	AM antenna
		PILOT LITES	
P1	15X003	#44 6-8v, 0.15a, bayonet	blue bead
P2	15X003	#44 6-8v, 0.15a, bayonet	blue bead

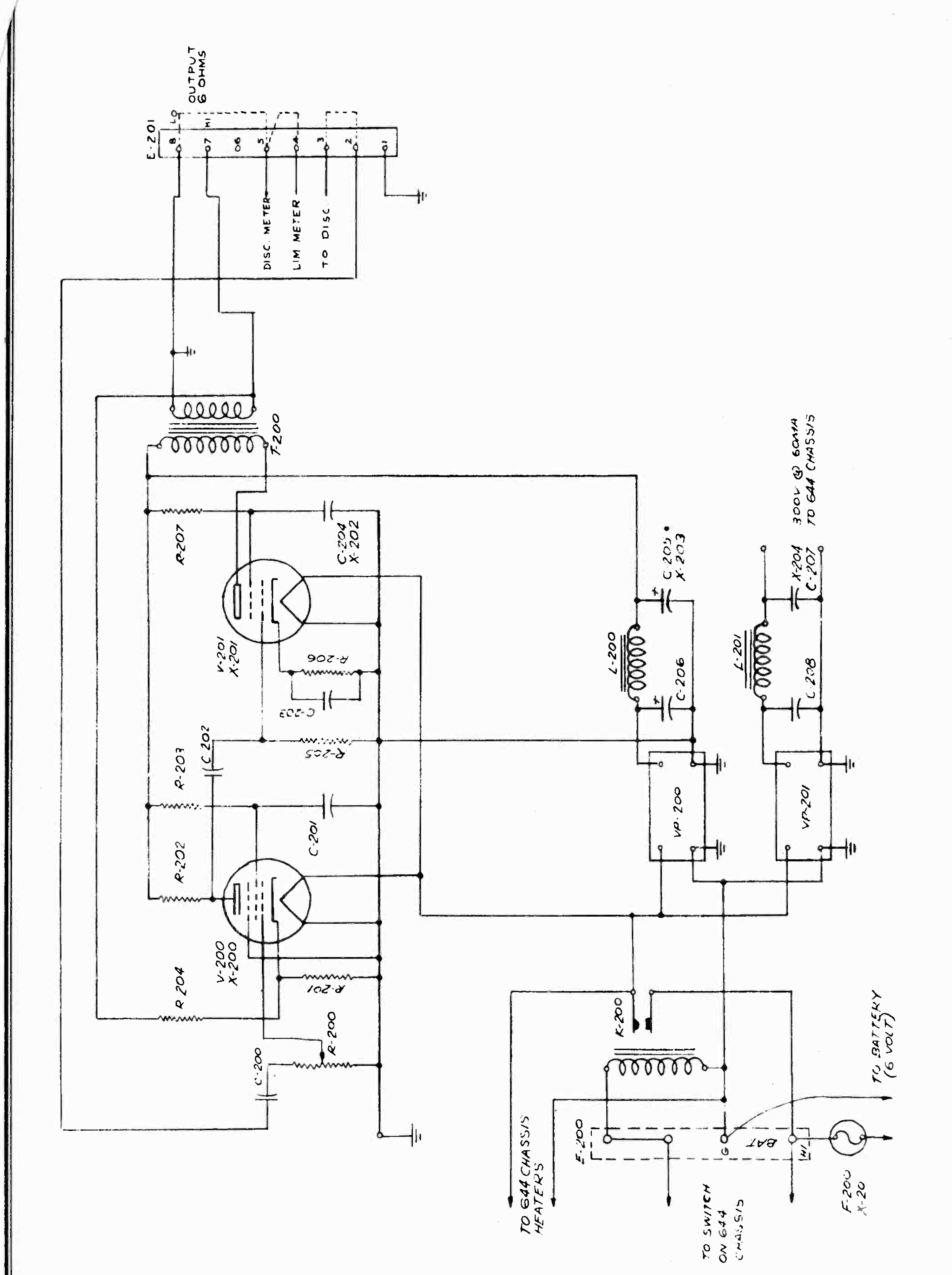
RESISTORS

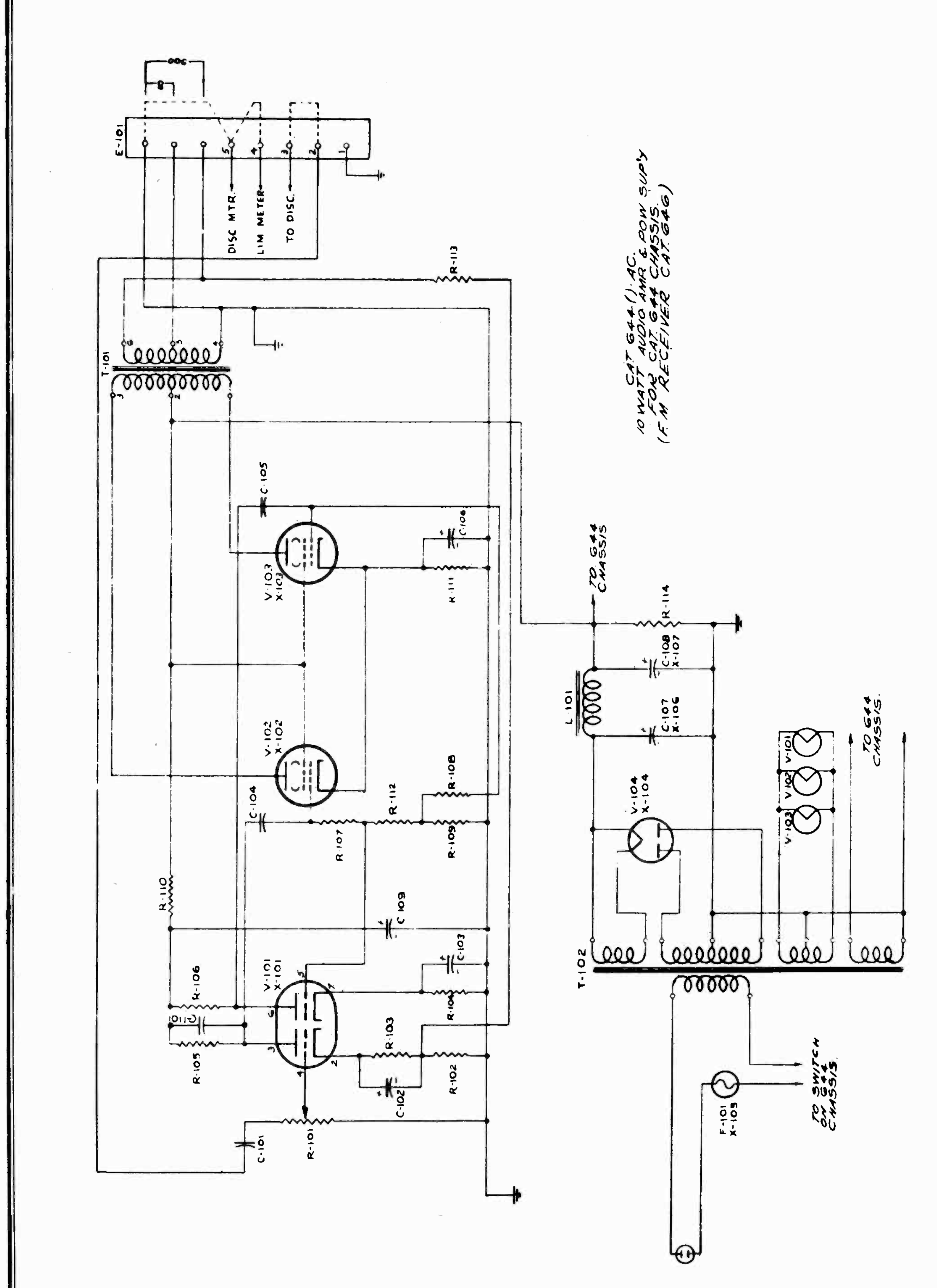
Ref. No.	Part No.	ohms	watts	Function
R1	23X016	68	1/2 carbon	Cathode bias
R2	23X021	22K	1/2 carbon	screen dropping
R3	23X017	220	1/2 carbon	parasitic suppressor
R4	23X019	1K	1/2 carbon	RF plate decoupling
R5	23X022	47K	1/2 carbon	FM mixer grid
R6	23X606	5K	10 wire-wound	voltage regulation
R7	23X021	22K	1/2 carbon	mixer osc. grid
R8	23X026	1M	1/2 carbon	AVC decoupling
R9	23X203	10K	1 carbon	screen dropping
R10	23X019	1K	1/2 carbon	FM mixer plate decoupling
R11	23X022	47K	1/2 carbon	filter
R12	23X016	68	1/2 carbon	cathode bias
R13	23X206	33K	1 carbon	screen dropping
R14	23X019	1K	1/2 carbon	1st IF plate decoupling
R15	23X025	0.47M	1/2 carbon	AM det. load
R16	23X016	68	1/2 carbon	cathode bias
R17	23X206	33K	1 carbon	screen dropping
R18	23X023	0.1M	1/2 carbon	1st lim. grid
R19	23X019	1K	1/2 carbon	2nd IF plate decoupling
R20	23X027	2.2M	1/2 carbon	AVC decoupling
R21	23X027	2.2M	1/2 carbon	AVC decoupling
R22	23X011	2.2K	1/2 carbon	osc. plate load
R23	23X021	22K	1/2 carbon	osc. grid
R24	23X017	220	1/2 carbon	cathode bias
R25	23X201	6.8K	1 carbon	reac. mod. plate load
R26	23X017	220	1/2 carbon	phase-shifter
R27	23X023	0.1M	1/2 carbon	AFC isolation
R28	23X025	0.47M	1/2 carbon	AFC audio filter
R29	23X022	47K	1/2 carbon	FM de-emphasis
R30	23X028	0.1M	1/2 carbon	FM det. load
R31	23X028	0.1M	1/2 carbon	FM det. load
R32	23X025	0.47M	1/2 carbon	AF isolation
R33	23X019	1K	1/2 carbon	2nd lim. plate decoupling
R34	23X401	22K	2 carbon	screen dropping
R35	23X021	22K	1/2 carbon	screen supply bleeder
R36	23X024	0.15M	1/2 carbon	2nd lim. grid
R37	23X020	10K	1/2 carbon	1st lim. plate load
R38	23X401	22K	2 carbon	screen dropping
R39	23X021	22K	1/2 carbon	screen supply bleeder
R40	23X603	500	10 wire-wound	filter
R41	23X602	1K	5 wire-wound	filter
R42A	23S704	0.5M	1/4 carbon	vol. control
B		0.5M	1/4 carbon	vol. control
R43	23X022	47K	1/2 carbon	AF plate load
R44	23X404	33K	2 carbon	cathode bias
R45	23X018	330	1/2 carbon	cathode bias
R46	23X022	47K	1/2 carbon	tone compensation
R47	23S702	10K	1/4 carbon	treble control
R48	23S703	0.5M	1/4 carbon	bass control
R49	23X021	22K	1/2 carbon	tone compensation
R50	23X032	6.8	1/2 carbon	parasitic suppressor

Ref. No.	Part No.	Description	Function
		SWITCHES	
S1	4B002	5P2T slide	AM-FM
S2	4S003	2P4T rotary	AM-FM-PH-TV
		TRANSFORMERS	
T1	5A212	slug-tuned	AM antenna
T2	5A208		FM osc.
T3	5A211	oscillator coil	AM osc.
T4	5X004	10.7 mc slug-tuned	FM IF
T5	5X003	455kc slug-tuned	AM IF
T6	5X004	10.7 mc slug-tuned	FM IF
T7	5X003	455 kc slug-tuned	AM IF
T8	5X004	10.7 mc slug-tuned	FM IF
T9	5X005	10.7 mc slug-tuned	FM discriminator
T10	19S201	600v CT @125a, 6.3v @3.5a, 5v @2a	power
T11	5B214	slug-tuned	AM RF

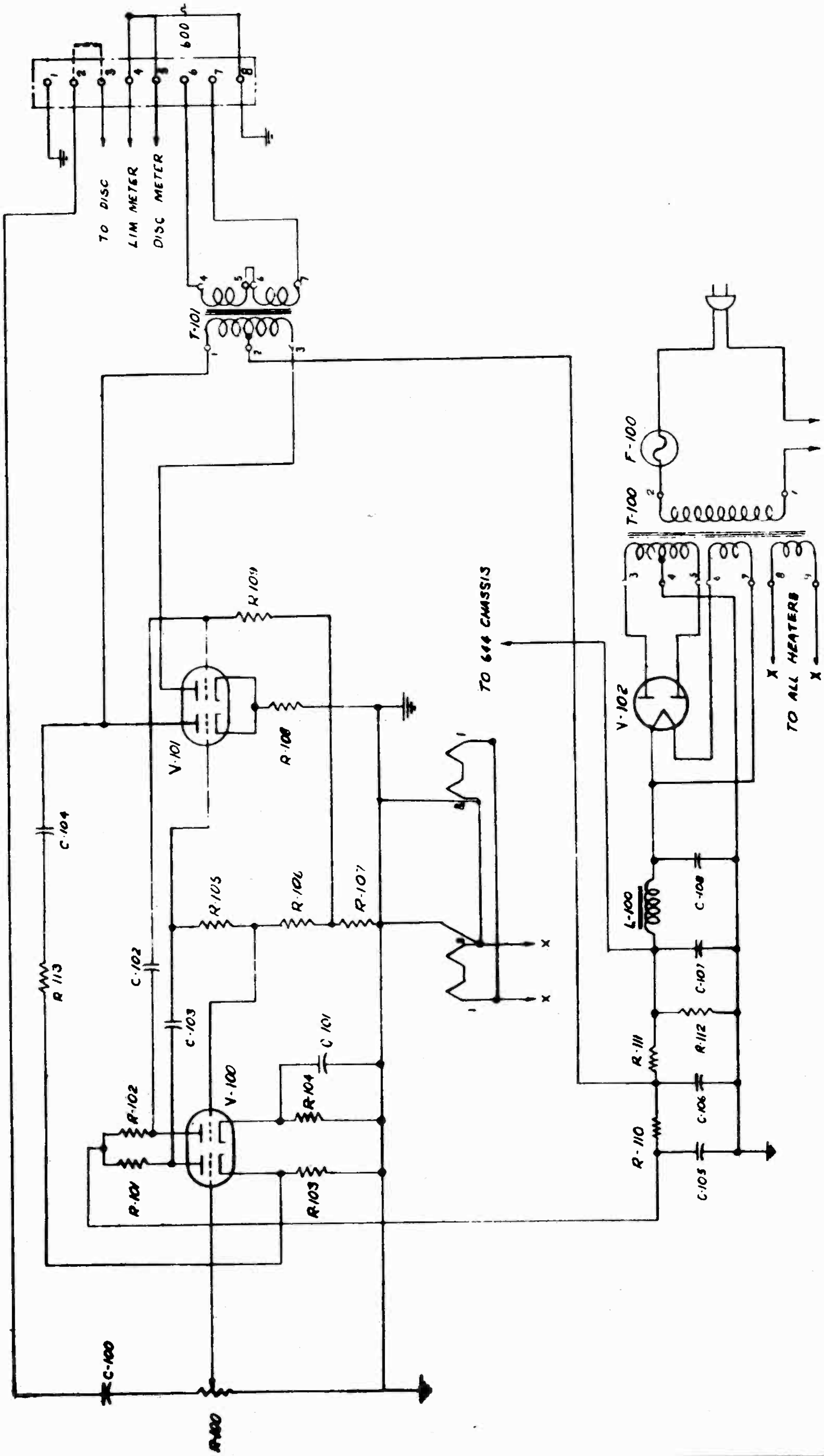
RADIO ENGINEERING LABS., INC.




E-201
OUTPUT 6 OHMS
DISC. METER
LIM METER
TO DISC
T-200
R207
C-204 X-202
V-201 X-201
R-206
C-203
R-205
R-203
C 202
C-201
R-202
V-200 X-200
R-201
R 204
R-200
C-200
L-200
C 205 X 203
C-206
VP-200
L-201
X-204 C-207
C 208
VP-201
300V @ 60MA TO 644 CHASSIS
K-200
E-200
BAT
TO 644 CHASSIS HEATERS
TO SWITCH ON 644 CHASSIS
TO BATTERY (6 VOLT)
F-200 X-20


E-101
DISC MTR.
LIM METER
TO DISC
R-113
T-101
C-105
C-106
V-103 X-103
R-111
TO 644 CHASSIS
R-114
C-108 X-107
L 101
C-107 X-106
V-102 X-102
C-104
R-112
R-108
R-107
R-109
R-110
C 109
V-104 X-104
V-101
V-102
V-103
TO 644 CHASSIS
T-102
R-106
V-101 X-101
C-110
R-105
R-103
C-103
R-104
R-102
C-102
C-101
R-101
F-101 X-103
TO SWITCH ON 644 CHASSIS
CAT 644(-) AC
10 WATT AUDIO AMP & POW SUPY
FOR CAT 644 CHASSIS
(F.M RECEIVER CAT 646)

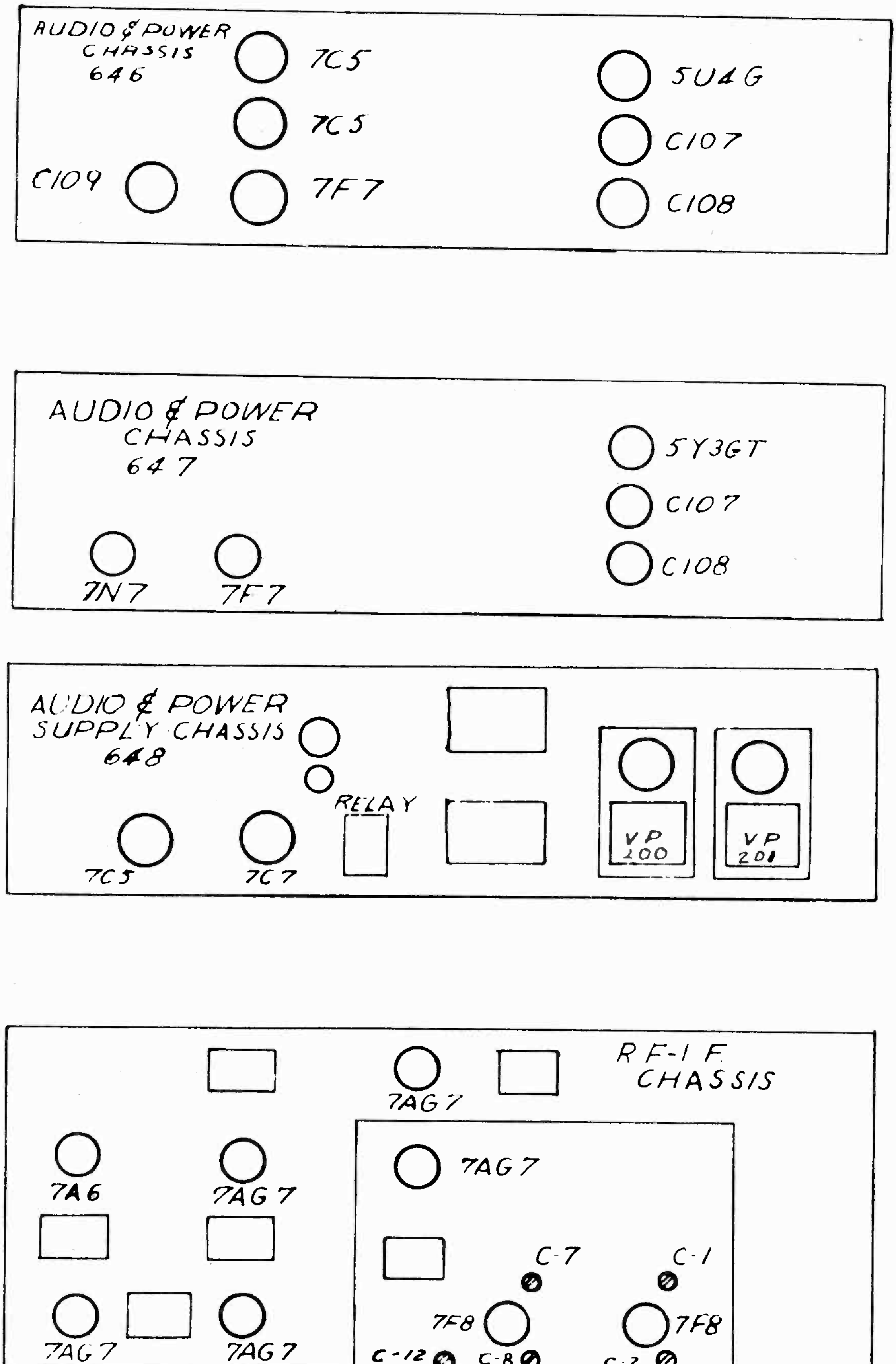
RADIO ENGINEERING LABS., INC. MODELS 646,647,648



CAT 644 SP
POWER SUPPLY & AUDIO

RADIO ENGINEERING LABS., INC.

CHASSIS TUBE AND TRIMMER LAYOUT



These receivers are single superheterodyne units of orthodox circuit and design. As with all VHF receiving equipment, performance is dependent on correct installation, particularly the associated antenna and lead-in system.

The nominal impedance at the antenna terminals (marked A - A) is 150 ohms, Both 70 and 300 ohm lines may be used here without serious mismatch consequences. Whether or not the ground terminal (marked G) is used depends on local conditions. Because of uncertainties in this connection and because the input circuit coupling is fairly tight, the latter is not precisely tracked at the factory. For very weak signals or for technical use at any one frequency, these circuits may be trimmed up by adjusting C2, for the 88 to 108 band, and C1 for the 44 to 50 band. These are accessible at the top of the chassis and are located as shown in the tube layout sketch.

For convenience in tuning and rough measuring the circuits are adjusted so that one small division of the TUNE meter corresponds to a frequency shift of about 20 kilocycles, and so that the steps of the RF GAIN control are roughly ten to 1 each. Indications on the SIGNAL meter are approximately linear, Both these meters may be supplemented externally by use of the connections on the rear terminal board. The TUNE meter is 25-0-25 microamperes, and the SIGNAL is 0-1 milliampere.

To use external meters, remove the strap between terminals 4 and 5 and the ground bus from terminal 5, then connect the TUNE meter between terminals 5 and 1 (ground) and the SIGNAL meter between terminal 4 and 1. If only one of these meters are connected externally, the terminal for the second meter must be connected to terminal 1.

The output of the detector is directly available at the rear at terminals 3 (high) and 1 (ground). This is at a fairly high impedance and not more than 50 micro-microfarads should be placed across this pair unless C33 (part of the standard de-emphasis network) is reduced correspondingly. The audio amplifier may be used by connecting to 2 (high) and 1 (ground). The terminals present to AC about one megohm and 30 micro-microfarads. For the 646, about 2.0 volts R.M.S. at these terminals gives full output of the audio amplifier.

The 646 and 647 receivers are designed for operation at 115 volts. They should not be operated permanently on lines higher than 125 volts. The 648 receiver requires at least 5.8 volts DC at the indicated terminals. They are connected for negative ground. If the vehicle has a positive ground system the vibrators <u>must</u> be reoriented according to the legend on the top of the Vibrapacks.

The maximum audio output of the 646 receiver is ten watts into either 500 or 8 ohms (mismatch up to 2 to 1 here is not generally aurally serious). The maximum output of the 647 receiver is + 18 DBM into 600 or 150 ohms. This receiver is connected for 600 ohm load; to use with 150 ohm load the output transformer should be restrapped by replaceing strap from 5 to 6 by a strap from 4 to 6 and another from 5 to 7. The maximum audio output of the 648 receiver is 4 watts into 6 ohms.

SYMBOL REF.	DESCRIPTION
R7	Resistor, 220,000 ohms ± 10%, 1/2 watt
R8	Resistor, 150 ohms, ± 10%, 1/2 watt
R9	Resistor, 47 ohms, ± 10%, 1/2 watt
R10	Resistor, 1000 ohms, ± 20%, 1/2 watt
R11	Resistor, 330 ohms, ± 10%, 1/2 watt
R12	Resistor, 560 ohms, ± 10%, 1/2 watt
R13	Resistor, 820 ohms, ± 10%, 1/2 watt
R14	Same as R8
R15	Same as R10
R16	Resistor, 220 ohms, ± 10%, 1/2 watt
R17	Same as R10
R18	Same as R10
R19	Resistor, 100000 ohms, ± 10%, 1 watt
R20	Resistor, 47000 ohms, ± 10%, 1 watt
R21	Same as R20
R22	Resistor, 47000 ohms, ± 10%, 1/2 watt
R23	Resistor, 68000 ohms, ± 10%, 1 watt
R24	Resistor, 10000 ohms, ± 10%, 1/2 watt
R25	Same as R24
R26	Resistor, 33000 ohms, ± 10%, 1/2 watt
R27	Same as R26
R28	Resistor, 470,000 ohms, ± 10%, 1/2 watt
R29	Resistor, 150,000 ohms, ± 10%, 1/2 watt
R30	Same as R9
S1	Switch, ceramic, 3 wafer, 2 position, 3 pole
S2	Switch, tap, 3 pole, 4 position
S3	Switch, single pole, single throw, rotary
V1	Type 7F8 tube
V2	Same as V1

SYMBOL REF.	DESCRIPTION
V3	Type 7AG7 tube
V4) V5) V6) V7)	Same as V3
V8	Type 7A6 tube
X1	Socket, octal, mica filled bakelite
X2	Same as X1
X3	Same as X1
X4	Same as X1
X5	Same as X1
X6	Same as X1
X7	Same as X1
X8	Same as X1
X9	Miniature, bayonet type socket
X10	Same as X9
X11	Same as X9
X12	Same as X9
Z1	Interstage coupling unit, 10.7 mc.
Z2	Interstage coupling unit, 10.7 mc.
Z3	Same as Z1
Z4	Interstage coupling units, 10.7 mc.
Z5	Interstage coupling unit, 10.7 mc.
Z6	Discriminator assembly unit 10.7 mc.

CAT. 646, 647, and 648 FM RECEIVER PARTS LIST FOR RF AND IF CHASSIS.
SCHEMATIC WIRING DIAGRAM DWG. S-615.

SYMBOL REF.	DESCRIPTION
C1	Capacitor, glass, variable 1-12 mmfd. 500 V.D.C.W.
C1A	Capacitor, ceramic 27 mmfd.
C2	Same as C1
C2A	Capacitor, ceramic 4.7 mmfd.
C3	Capacitor, 500 mmfd, $\pm$20%, 500 V.D.C.W.
C4	Capacitor, 1200 mmfd., $\pm$20%, 300 V.D.C.W.
C5	Same as C4
C6	Capacitor, 47 mmfd. $\pm$10%, 500 V.D.C.W.
C7	Same as C1
C7A	Capacitor, ceramic 27 mmfd.
C8	Same as C1
C9	Same as C4
C10	Same as C4
C11	Capacitor, 22 mmfd. $\pm$10%, 500 V.D.C.W.
C12	Same as C1
C13	Capacitor, 20 mmfd. $\pm$10%, 500 V.D.C.W. N750
C14	Same as C3
C15	Same as C11
C16	Capacitor, 4.7 mmfd. $\pm$5%, mmfd. 500 V.D.C.W.
C17	Same as C12.
C18	Capacitor, .005 mfd. 600 V.D.C.W.
C19) C20) C21)	Same as C18
C21A	Capacitor, 500 mmfd.
C22) C23) C24)	Same as C4
C25) C26) C27) C28) C29) C30) C31)	Same as C18
C32	Same as C6
C33	Capacitor, 470 mmfd. $\pm$10%, 500 V.D.C.W.
C34	Same as C18
C35	Capacitor, 1.0 mmfd. $\pm$20%
I1	Pilot light, miniature bayonet base, 6-8 volts, .15 amps.
I2) I3) I4)	Same as I1
L1) L2) L3)	Antenna and first grid coil assembly
L4) L5)	Mixer grid coil
L6) L7)	Oscillator coil
L8)	Choke, 3 microhenries $\pm$25%
L9) L10) L11)	Same as L8
M1	Signal strength meter, 0-1 m.a.
M2	Tuning meter, 25-0-25 microamps.
R1	Resistor, 4700 ohms $\pm$ 10%, 1 watt
R2	Resistor, 270 ohms $\pm$ 10%, 1/2 watt
R3	Resistor, 100 ohms, $\pm$ 10%, 1/2 watt
R4	Resistor, 1500 ohms, $\pm$10%, 1/2 watt
R5	Resistor, 15000 ohms, $\pm$10%, 1/2 watt
R6	Resistor, 39000 ohms, $\pm$10%, 1 watt

CAT. 646 COMBINED AUDIO & POWER SUPPLY
CHASSIS, SCHEMATIC WIRING DIAGRAM DWG. B-685

SYMBOL REF.	DESCRIPTION	SYMBOL REF.	DESCRIPTION
C101	Capacitor, fixed, paper, tubular, .05 mfd. 600 volts D.C. WkG. plug/minus 20%.	R110	Resistor, 4700 ohms, 1 watt, plus/minus 10%
		R111	Resistor, 200 ohms, 10 watt, plus/minus 5%
C102	Capacitor, fixed, dry electrolytic, 25 mfd., 25 volts D.C. wkg.	R112	Same as R110
		R113	Resistor, 10,000 ohms, plus/minus 10%, 1 watt
C103	Same as C102	R114	Resistor, 150,000 ohms, 2 watt, plus/minus 10%
C104	Same as C101		
C105	Same as C101	T101	Transformer, output, Pri. 10,000 ohms CT, 12 MA DC unbalance, push-pull windings, balanced at high audio frequencies, Sec. 8/500 ohms, Max. operation level 10 watts
C106	Capacitor, fixed, dry electrolytic, 25 mfd., 50 volts D.C. Wkg.		
C107	Capacitor, fixed, electrolytic, 20 mfd., 475 volts D.C. Wkg.		
C108	Capacitor, fixed, electrolytic, 40 mfd., 475 volts D.C. Wkg.	T102	Transformer, power, Pri. 115 volts, 50-60 cycles, single phase, Sec. #1, 320-0-320 volts RMS at 0.160 amp. Sec. #2, 5 volts at 3 amp. Sec. #3, 6.3
C109	Capacitor, fixed, electrolytic, 10 mfd., 475 volts D.C. Wkg.		
C110	Capacitor, fixed, mica 300 mmfd., plus/minus 20%, 500 volts D.C. Wkg.		#4, 6.3 volts C.T. at 1.5 amp.
F101	Fuse, 2 ampere, 250 volts	V101	Tube, Type 7F7
L101	Choke, 10 henries, 0.160 amps	V102	Tube, Type 7C5
		V103	Tube, Same as V102
R101	Resistor, variable, composition, 1 megohm, Z taper, standard shaft	V104	Tube, Type 5U4G
		X101	Socket, loctal, mica-filled bakelite
R102	Resistor, 220 ohms, 1/2 watt, plus/minus 10%.	X102	Same as X101
		X103	Same as X101
R103	Resistor, 2700 ohms, 1/2 watt, plus/minus 10%	X104	Socket, octal, mica-filled bakelite
R104	Same as R103	X105	Fuse holder, molded black bakelite, finger operated.
R105	Resistor, 180,000 ohms, 1/2 watt, plus/minus 10%		
R106	Same as R105		
R107	Resistor, 330,000 ohms, 1/2 watt, plus/minus 10%		
R108	Same as R107		
R109	Resistor, 100,000 ohms, 1/2 watt, plus/minus 10%		

CAT. 647 COMBINED AUDIO & POWER SUPPLY
CHASSIS: SCHEMATIC WIRING DIAGRAM DWG. B-709

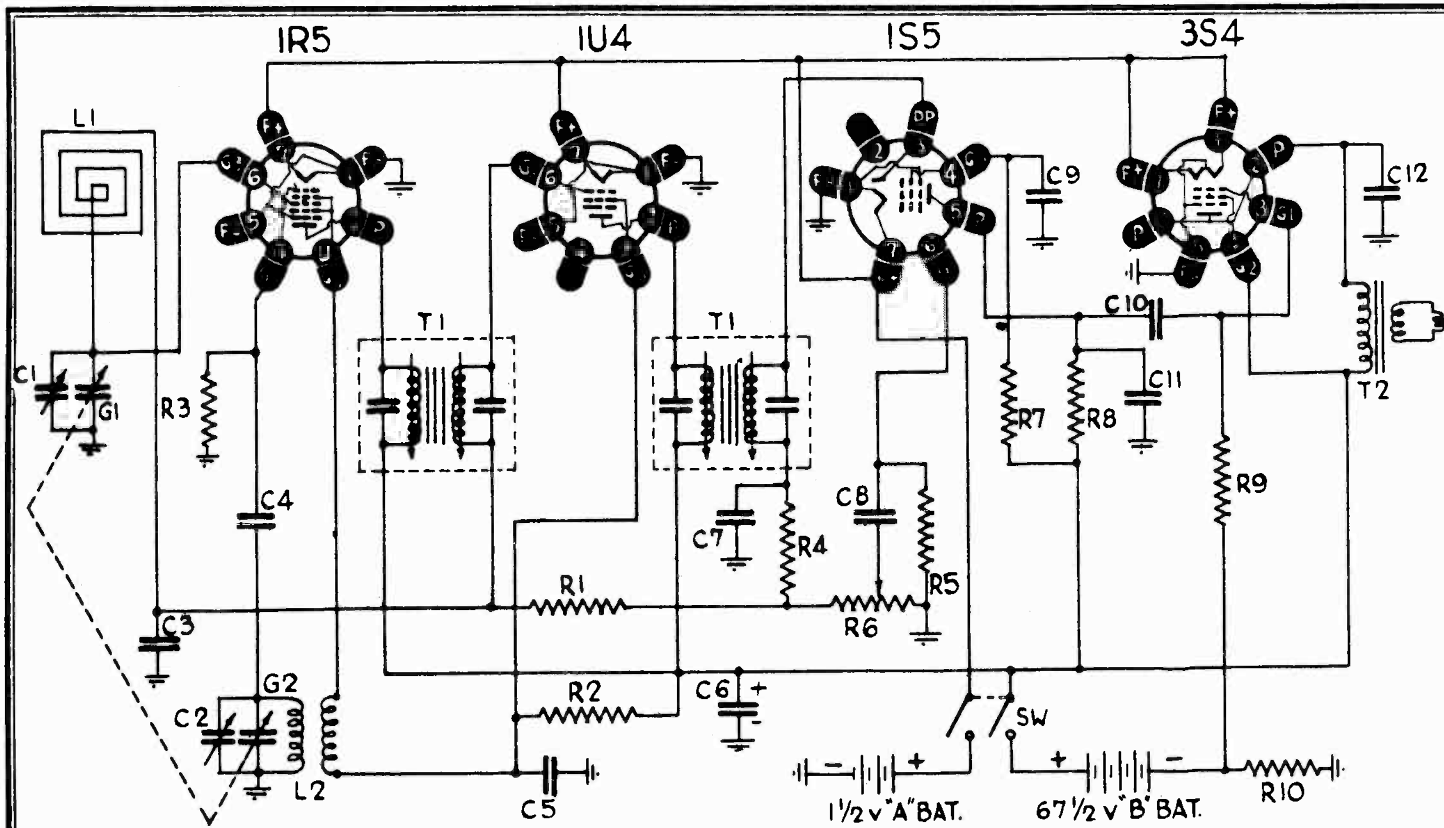
SYMBOL REF.	DESCRIPTION	SYMBOL REF.	DESCRIPTION
C100	Capacitor, .05 mfd., 600 v.D.C.W.	R109	Same as R105
C101	Capacitor, Electrolytic 50 mfd., 25v. D.C.w.	R110	Resistor, 27,000 ohms ±10%, 1/2 watt
		R111	Resistor, 1500 ohms ±10%, 1 watt
C102	Same as C100	R112	Resistor, 100,000 ohms, ±10%, 2 watts
C103	Same as C100		
C104	Capacitor, .25 mfd. 600 v. D.C.w.	R113	Resistor, 68,000 ohms, ±10%, 1/2 watt
C105	Capacitor, electrolytic, dual 20 mfd. 450 v. D.C.w.	T100	Transformer, power, Pri. 115 volts, 50-60 cycles, single phase, Sec. #1, 310-0-310 volts RMS at 0.1 amp., Sec. #2, 5 volts at 2.0 amp Sec. #3, 6.3 volts @ 2.5 amps
C106	Part of C105		
C107	Capacitor, electrolytic, 40 mfd. 475 v. D.C.w.		
C108	Capacitor, electrolytic, 20 mfd. 475 v. D.C.w.	T101	Transformer, output, Pri. 16,000 ohms CT; 6 ma. D.C. unbalance, push-pull windings balanced for high audio frequencies, Sec. 600/150 ohms Max. operation level +26 d b m
F100	Fuse, glass, 1 amp. 250V.		
L100	Choke, 10 henries, at 0.100 amp.		
R100	Resistor, variable, 1 megohm, ±10%, 1/2 watt, "Z" taper, clarostat 37		
R101	Resistor, 100,000 ohms ±10%, 1/2 watt	V100	Type 7F7
		V101	Type 7N7
R102	Same as R101	V102	Type 5Y3GT
R103	Resistor, 2200 ohms, ±10%, 1/2 watt	X100	Socket, loctal, mica filled, bakelite
R104	Same as R103	X101	Same as X100
R105	Resistor, 330,000 ohms, ±10%, 1/2 watt	X102	Socket, loctal, mica filled bakelite
R106	Resistor, 4,700 ohms ±10%, 1/2 watt	X105	Fuse holder, molded black bakelite, finger operated.
R107	Same as R101		
R108	Resistor, 680 ohms, ±10%, 1/2 watt		

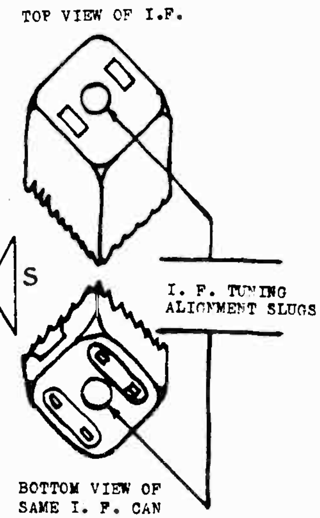
DC AUDIO AND POWER SUPPLY FOR 6 V. DC. USED WITH CAT.648. SCHEMATIC WIRING DIAGRAM DWG.B-684

SYMBOL REF.	DESCRIPTION
C200	Capacitor, .05 mfd. 600 volts DC Wkg. ± 20%
C201	Capacitor, 0.1 mfd. 600 volts DC Wkg. ± 20%
C202	Capacitor - Same as C200
C203	Capacitor - 50 mfd. 50 volts, D.C. Wkg.
C204	Capacitor - 3 section 10-10-10-mfd. 450 volts DC Wkg.
C205	Capacitor - dual, 40-40 mfd. 450 volts DC Wkg.
C206	Capacitor - Part of C-204 (10 mfd. section)
C207	Capacitor - Part of C-205 (40 mfd. section)
C208	Capacitor - Part of C-204 (10 mfd. section)
F200	Fuse, 20 amp. *Littlefuse type 4AG
K200	Relay, filament - single pole, normally open, DC operation
L200	Choke, filter, smooth - 10 henries
L201	Choke - Same as L-1
R200	Resistor, variable, .5 megohm, 20% accuracy, 1/2 watt
R201	Resistor, 560 ohms, 1/2 watt, ±10%
R202	Resistor, 100,000 ohms, 1 watt, ± 10%
R203	Resistor, 680,000 ohms, 1/2 watt, ± 10%
R204	Resistor, 1,000 ohms, 1/2 watt, ± 10%
R205	Resistor, 390,000 ohms, 1/2 watt, ± 10%
R206	Resistor, 330 ohms, 1 watt, ± 10%
R207	Resistor, 15,000 ohms, 1 watt, ±10%
T200	Transformer, output, single 7C5 to loudspeaker
V201	Tube, type 7C5
VP-200	Vibrapack, audio supply.
VP-201	Vibrapack -(receiver supply) Same as VP-200
X200	Socket - loctal, mica-filled bakelite
X201	Socket - Same as X-200
X202	Fuse holder,

RADIO KITS, INC.

MODEL B4





The "A" batteries are size D flashlight cells and are made by all battery mfgs.
The "B" battery is a 67½ V and are made by the following mfgs.

Eveready 67½ Vlt. #467
Burgess 67½ Vlt. #XX45
General 67½ Vlt. #W45A
Ray O-Vac 67½ Vlt. #4367

PARTS LIST FOR MODEL B-4

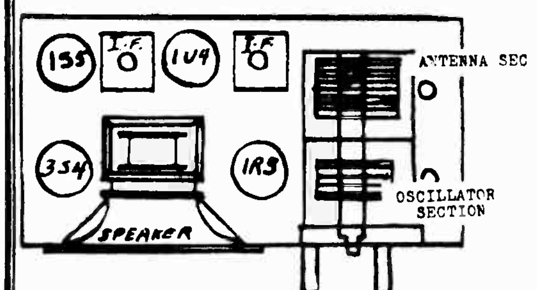
C12 - .002 MF
G1 - Ant. Trimmer } on Var. Cond.
G2 - Osc. Trimmer } on Var. Cond.
L1 - Loop Ant.

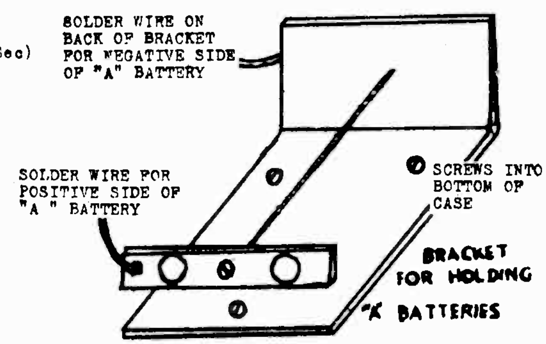
R1 - 3 megs ½ watt
R2 - 10K
R3 - 240
R4 - 100K
R5 - 10 megs
R6 - 500K (Vol. Cont.)
R7 - 3.3 megs
R8 - 1 meg
R9 - 2 megs
R10- 270 ohms

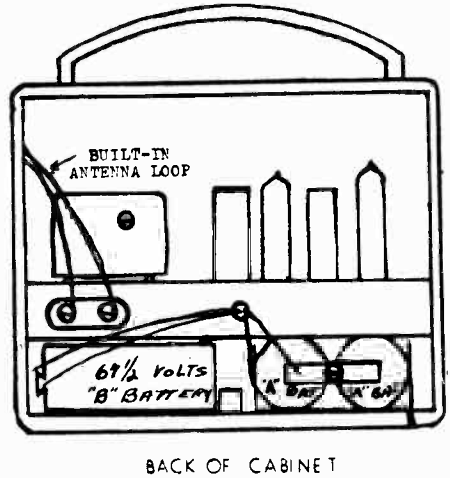
C1 - Variable Cap. (Ant)
C2 - Variable Cap. (Osc)
C3 - .02 MFD
C4 - 100 MMF (.0001 MFD)
C5 - .02 MFD
C6 - .20 MF @ 150V
C7 - .100 MMF (.0001 MFD)
C8 - .002 MF
C9 - .02 MF
C10- .002 MF
C11- .100 MF

L2 - Osc. coil
T1 - IF Trans.
T2 - Output Trans.
C1 - Var. Cond. (Ant. Sec)

C2 - Var. Cond. (Osc. Sec)
S - P.M. Speaker
Sw - DPST Switch
Tubes-1R5-1U4-1S5-3S4

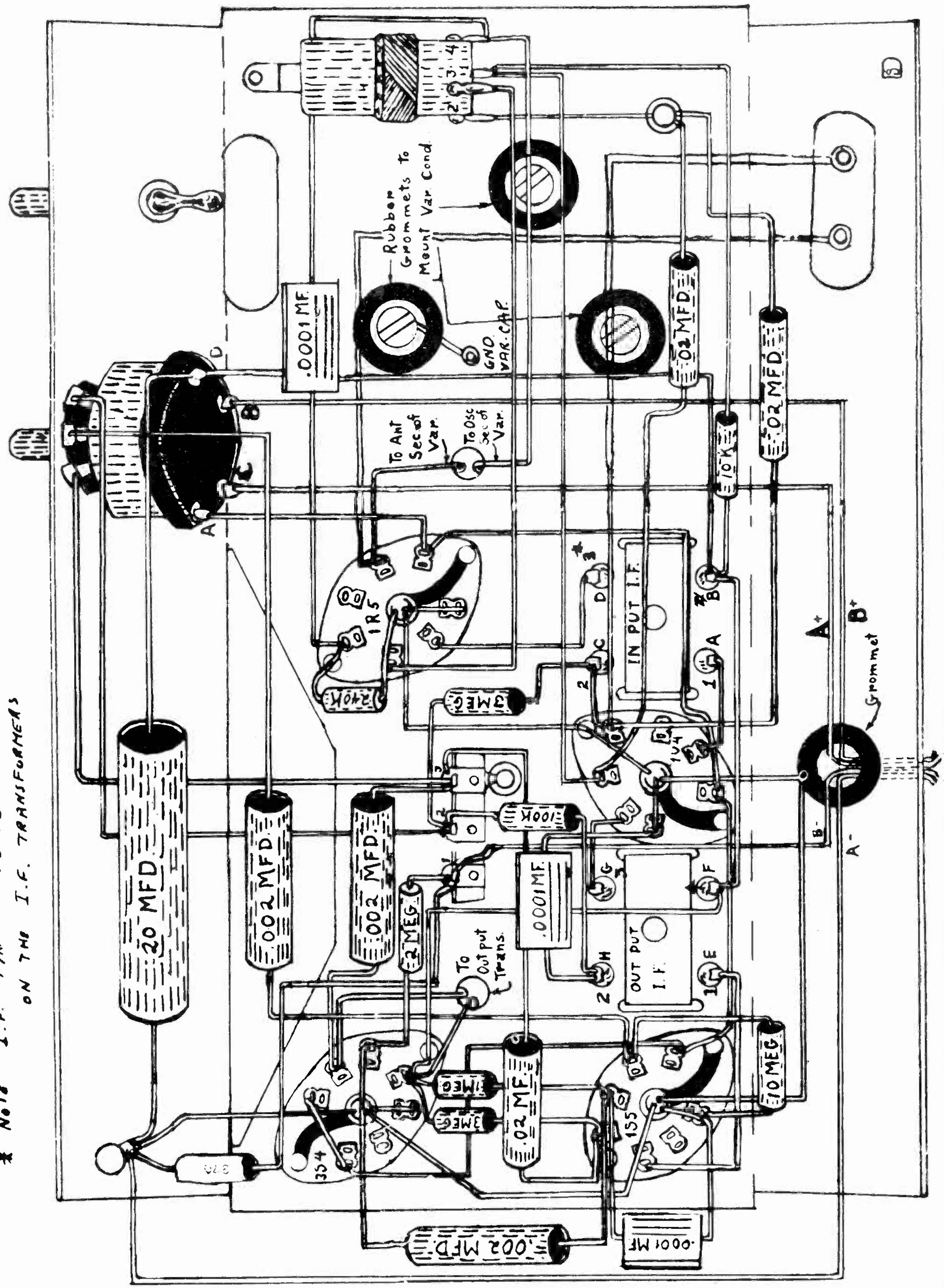




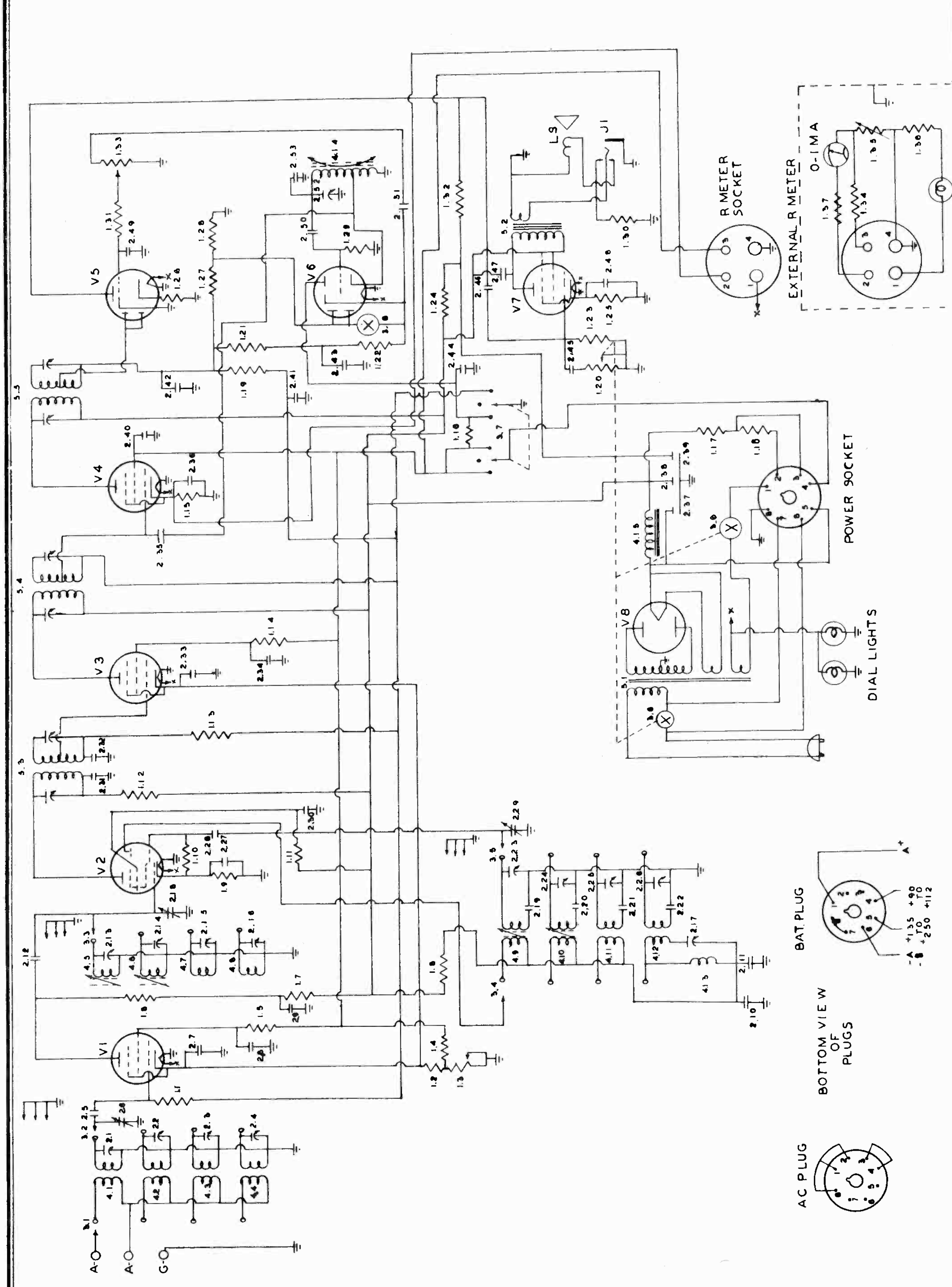


MODEL B4

RADIO KITS, INC.



RADIO MFG. ENGINEERS INC.

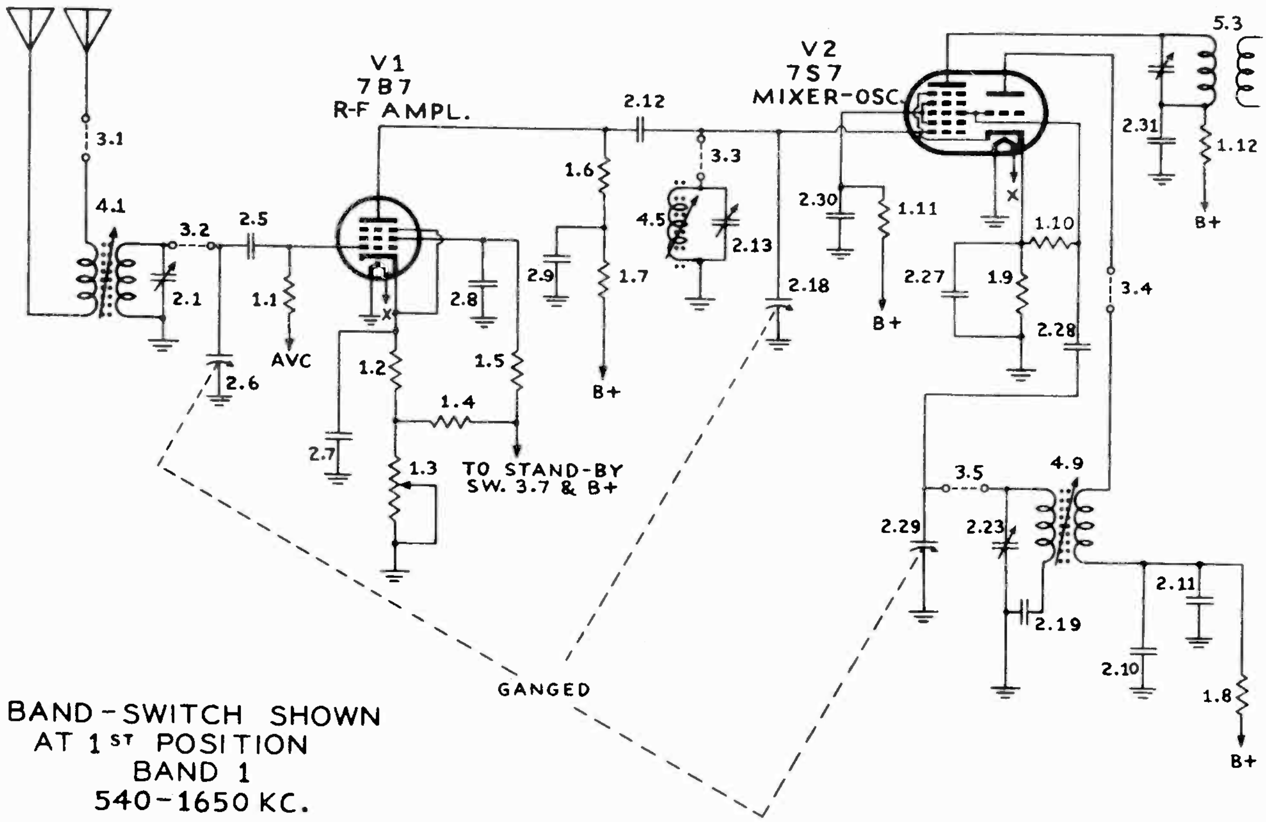


CLARI-SKEMATIX

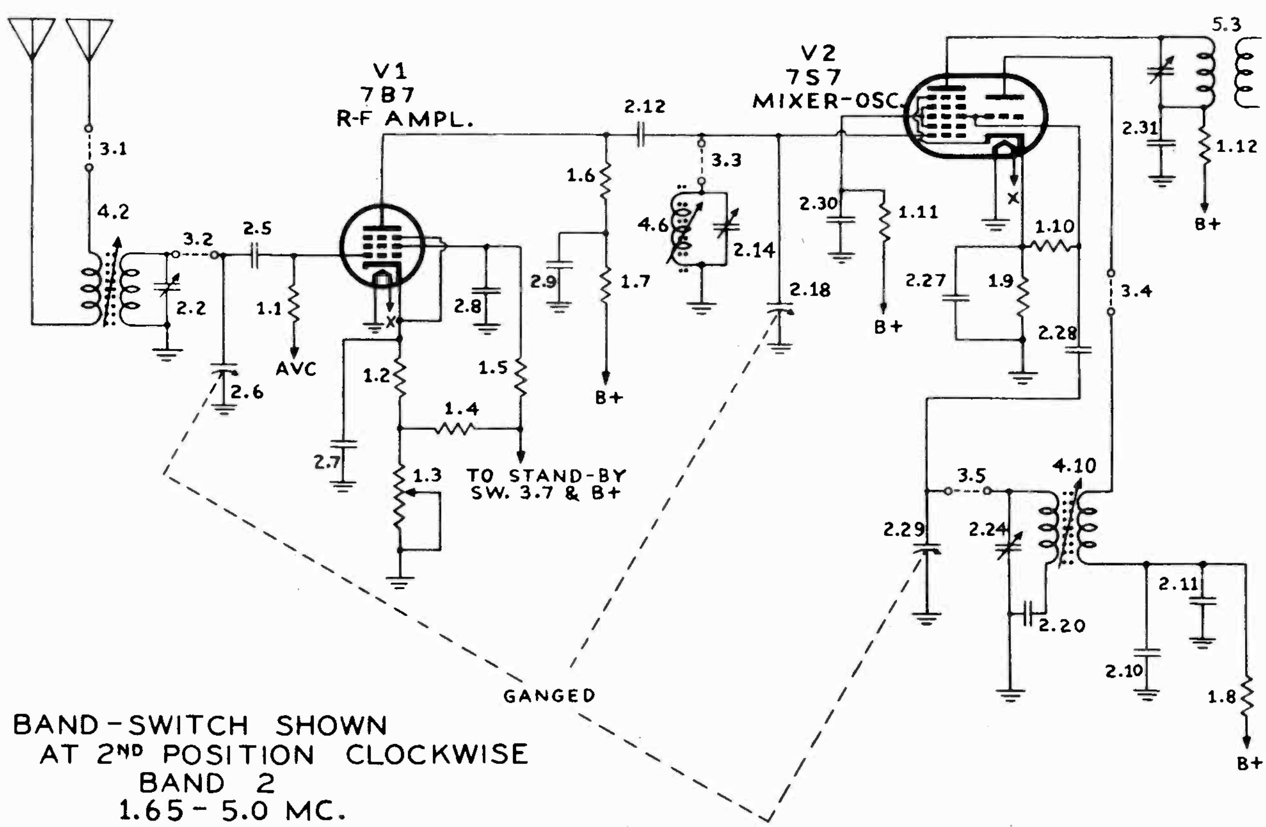
Registered Trademark

MODELS 84, 84A

RADIO MFG. ENGINEERS INC.

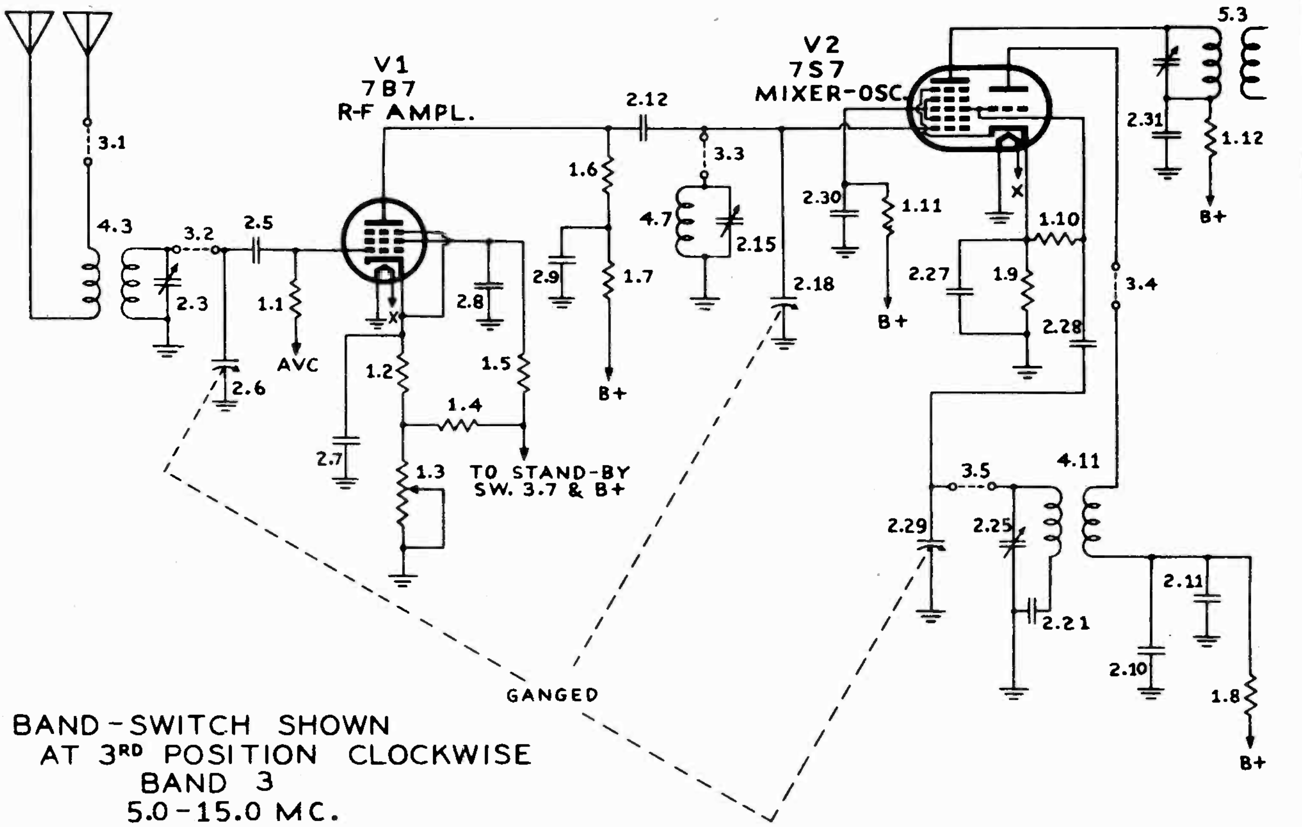


BAND-SWITCH SHOWN
AT 1ST POSITION
BAND 1
540-1650 KC.

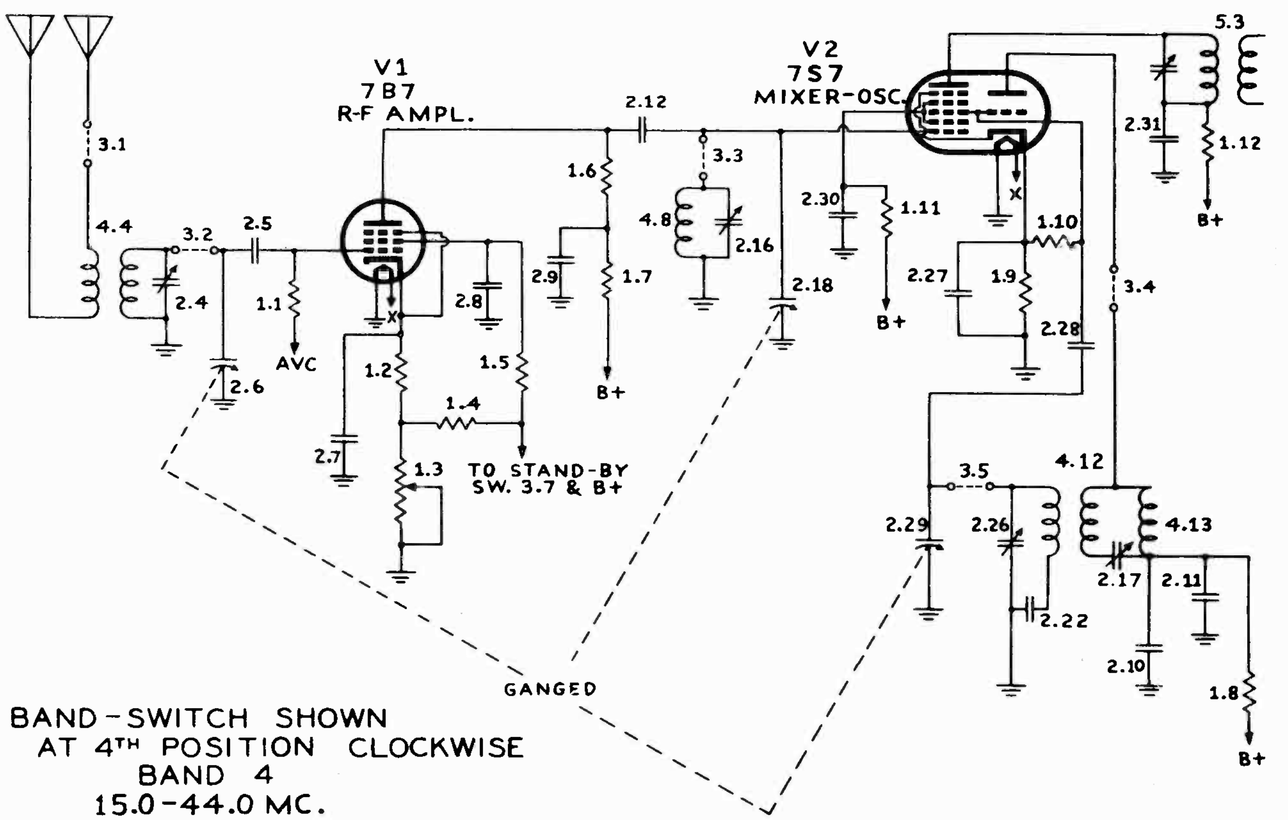


BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
BAND 2
1.65-5.0 MC.

RADIO MFG. ENGINEERS INC.



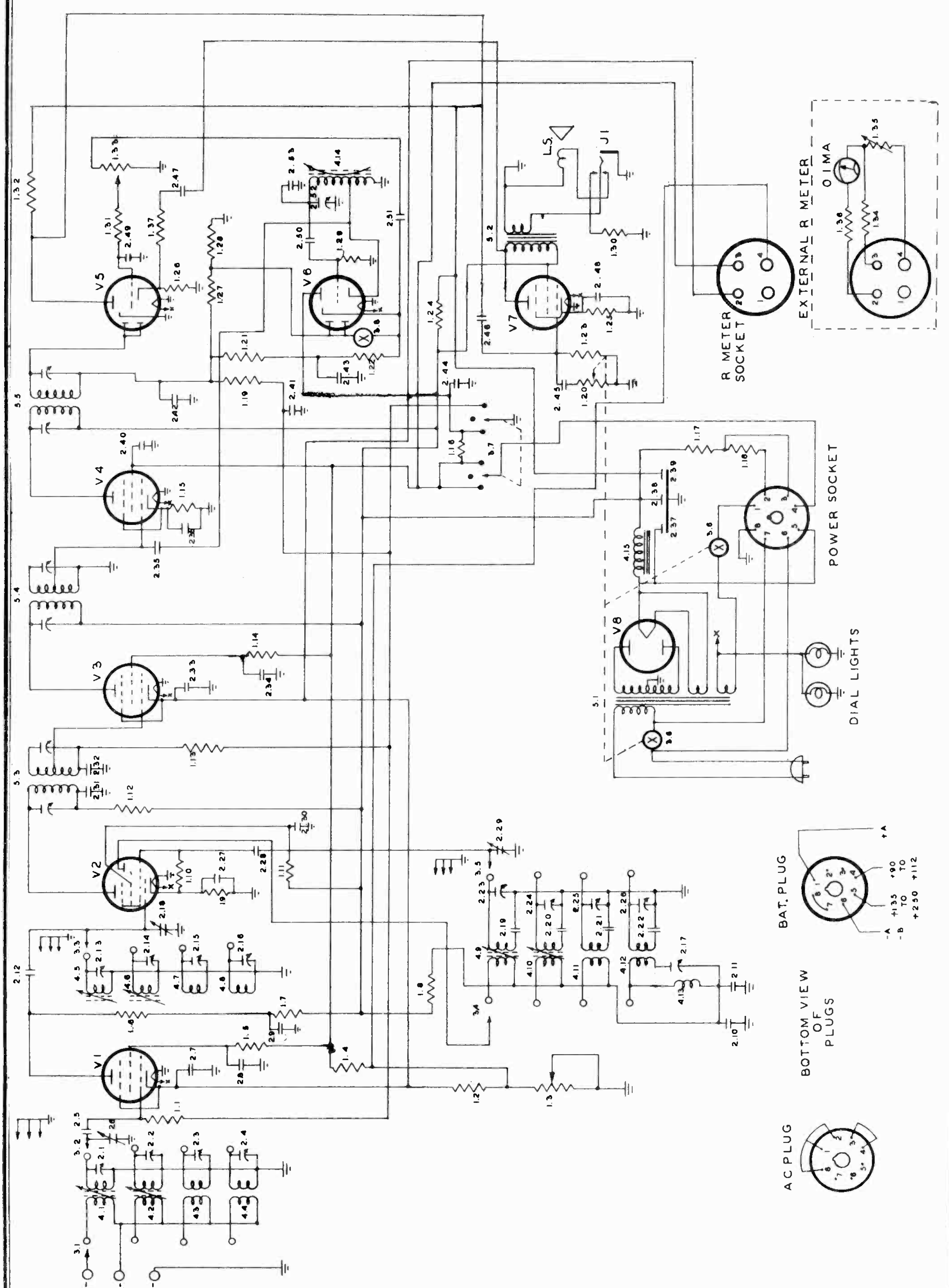
BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE
BAND 3
5.0-15.0 MC.



BAND-SWITCH SHOWN AT 4TH POSITION CLOCKWISE
BAND 4
15.0-44.0 MC.

MODEL 84A

RADIO MFG. ENGINEERS INC.



RADIO MFG. ENGINEERS INC.

The RME-84 is an eight tube superheterodyne communication type receiver. It has a continuous tuning range from .54 megacycles to 44 megacycles in four overlapping bands. The bandspread dial provides 1000 arbitrary divisions on each range.

Specifications

Power Supply: 115 volts, 60 cycle, single phase
Power Consumption: 62 watts at 117 volts
Audio Output: 1.1 watts
Audio Frequency Responses 100 to 3,500 cycles ± 3db
Overall Cabinet Dimensions:

Height	Depth	Length
9-3/8"	9-3/4"	18"

Weight: 28 pounds

Tube Complement

	Type	Use	Schematic Circuit Symbol
1.	7B7	R.F. Amplifier	V1
2.	7S7	Mixer and Oscillator	V2
3.	7B7	1st I.F. Amplifier	V3
4.	7B7	2nd I.F. Amplifier	V4
5.	7K7	Detector, AVC, and 1st Audio	V5
6.	7K7	Noise Limiter and Beat Freq. Osc.	V6
7.	6G6G	Output Amplifier	V7
8.	5Y3G	Rectifier	V8

Antenna

The terminals on the rear apron marked "A-A-G" are for the antenna and ground connections. When the receiver leaves the factory there is a jumper between the ground post (Marked G) and the adjacent antenna post. Good results may be obtained by connecting a wire 50 to 75 feet long to the other "A" post. If a 2 wire feeder system is used the jumper is removed and the two feeders are connected to "A" and "A". The input impedance between these points is approximately 300 ohms. A ground may be connected to the "G" post if it improves reception.

OPERATION AND CIRCUIT DETAILS

Introduction

The purpose of this book is to familiarize the operator with the RME-84, that he may realize the maximum results and enjoyment from his receiver. Each control on the RME-84 has a definite function. The following paragraphs briefly describe them.

Tuning Dial

The RME-84 tuning mechanism features a spring loaded gear, engaged by a planetary driven pinion. The pre-loading eliminates backlash. Bandspread logging is obtained by using the figures on the illuminated translucent dial visible through the window in the center of the megacycle scale. The 200 divisions on this dial are calibrated from zero to 100. The dial makes 5 complete revolutions as the megacycle pointer travels from one end of the scale to the other. This dial is used in conjunction with the innermost half circle, calibrated from 0 to 4, on the megacycle scale. While the red pointer is covering one of the megacycle scale sections the bandspread dial makes one complete revolution. After a station has been heard it can be logged accurately by using the two sets of figures.

For example, if a station is heard on band II with the pointer in section 3 of the megacycle scale and with the bandspread dial at 28, that station is definitely logged as 328 because it will always be found at 328 on band II. Or, if a station is logged at 173 on band III, it is always tuned in on band III by turning the tuning knob until the red pointer is section I of the megacycle scale and until 73 comes upon the bandspread dial.

Elimination of the bandspread condenser necessary in an electrical bandspread system lowers the losses in the R.F. circuit and gives greater gain and stability.

Standby Switch

The second control from the left is the standby switch, used to make the receiver inoperative without turning off the line switch. It also turns on the beat frequency oscillator for CW reception.. There are three positions and reading clockwise they are marked CW, TR, and PH. The first position makes both receiver and beat frequency oscillator operative for CW reception. The second position makes the set inoperative while leaving it warmed up, as during a transmitting period, by disabling the RF and IF stages of the receiver. The third position provides for phone reception without the beat frequency oscillator.

Beat Oscillator PITCH Control.

The pitch of the beat frequency may be varied by means of the control labeled B.O. Pitch. The beat frequency oscillator is indispensible in the reception of CW signals and is an aid in locating weak phone carriers.

AUDIO GAIN

The AUDIO GAIN Control in the center of the control panel adjusts the audio volume to the desired level.

Best CW reception is usually obtained with this control well advanced (clockwise) and the gain of the receiver controlled by the RF gain control.

LINE Switch and TONE Control

The LINE TONE Control turns the receiver on and off. As the control is turned clockwise the line switch will close. Continued turning of the knob controls the tone by increasing the high frequency response.

Band Selector Switch

The BAND SELECTOR Switch selects the frequency range desired. The range of the receiver is divided into 4 bands. The range covered by each band is as follows:

Band I	.540	to	1.65	MC	(American Broadcast)
Band II	1.65	to	5.	MC	
Band III	5.	to	15.	MC	
Band IV	15.	to	44.	MC	

Actually these figures do not represent the full range of each band since there is considerable overlap between the end of one band and the start of the next.

Radio Frequency GAIN Control

Counter clockwise rotation of this control reduces the gain of the receiver manually. Automatic control of the receiver gain is fully effective only when the R.F. GAIN control knob is rotated to and set at its maximum clockwise position.

Noise Limiter

An AUTOMATIC NOISE LIMITER is incorporated in the receiver circuit. No adjustment is required. The circuit is of a type that automatically adjusts itself to maximum effectiveness.

IMPORTANT

The action of the noise limiter is such that a slight amount of distortion is introduced on the signal. Therefore when it is desirable to do so the noise limiter may be switched out of the circuit. This is controlled by the slide switch just below the control panel. When the switch is to the left the limiter is out of the circuit.

Automatic Volume Control

AVC is obtained by feeding a portion of the signal rectified by the 7K7 tube back to the grids of the RF and IF tubes. As the RF gain is rotated counterclockwise the AVC action becomes subordinate to the bias developed in the cathodes by this control. The AVC is fully effective only when the RF gain control is in the extreme clockwise position. AVC is removed when the standby switch (3.4) is turned to CW.

Power Supply

The RME-84 is provided with very flexible power requirements. The standard receiver operates from 115 volts AC, 50-60 cycles. On special order it may be had for 115 or 230 volts, 25 to 60 cycle operation. All models may be operated from A and B batteries, or vibropack. The octal plug on the rear apron must be in place for AC operation. It is removed and replaced by a battery cable for battery operation. The 5Y3G rectifier supplies current through pi-section filter. This filter is also in the circuit when the battery cable is used, simplifying converter or vibropack requirements.

Battery Operation

The RME-84 is designed for econimical battery operation. The standard RME-84 has an octal socket on the rear apron into which is inserted a shorting plug when operating on AC. For battery operation the shorting plug is removed and battery cable is plugged into the socket. The battery cable is not supplied with the 84 but may be purchased separately or made up from the schematic diagram.

Battery requirements are as follows: "A" battery 6V at 1.5 amperes. "B" battery, 135 volts with a tap at 90 volts. The "B" battery drain is 32 milliamperes. The "A" battery drain may be reduced to 1.2 amperes by removing the dial lamps.

When operating on batteries all of the controls function normally. The receiver is turned on and off by means of the power switch on the LINE TONE CONTROL.

IMPORTANT

THE LINE CORD MUST BE DISCONNECTED FROM THE AC SUPPLY BEFORE ATTEMPTING TO CONNECT FOR BATTERY OPERATION.

MAINTENANCE AND SERVICE

No maintenance work of importance is required on this unit. It is suggested that periodic cleaning of the equipment be done, including blowing out any accumulated dust with a suitable air stream.

UNLESS IT IS DEFINITELY ESTABLISHED THAT ALIGNMENT IS INCORRECT, NO ADJUSTMENTS OF THE TUNED CIRCUITS SHOULD BE MADE.

Equipement required is a signal generator, an INSULATED screwdriver, and an output meter unless the receiver has an "R" meter.

In this paragraph, and following paragraphs on alignment the "meter" referred to is either the output meter or the "R" meter, whichever is used. A difference in procedure required is as follows:

When the R meter is used, the R.F. gain is turned full clockwise, all other operating conditions are normal.

When using an audio output meter it is necessary to ground the AVC line, and it may be necessary to reduce the R.F. gain control setting to avoid overloading the first stages of the receiver with strong signal inputs. The meter may be clipped across the voice coil windings of the speaker, both terminals of which are accessible through the lid of the cabinet. The AVC may be removed from the receiver by turning the STANDBY switch to CW. This will also turn on the beat frequency oscillator. Since it is undesirable to have the BFO on while aligning the receiver, the BFO tube (V6) should be removed from the socket. It must, of course, be replaced while aligning the BFO.

I.F. Alignment

The I.F. frequency of the RME-84 is 455 KC. The bandswitch should be turned to band I. The tuning dial should be turned to the low frequency end (.55 MC) and the hot lead from the signal generator clipped to the lug on the detector (center) section of the tuning condenser. With the signal generator set at 455 KC each padder on the 1st, 2nd and 3rd I.F. transformers is carefully adjusted for maximum response as indicated on the meter.

B.F.O. Alignment

With the signal generator connected as for aligning I.F. circuits, turn the stand-by switch to CW and set "B.O. PITCH" control pointer vertical. With an insulated screwdriver adjust BFO padder until zero beat is obtained.

R.F. Alignment

Alignment of the radio frequency section of the receiver will affect, principally, the calibration of the receiver. Within certain limits this, of course, will also affect the sensitivity. Small variations in frequency (up to 2%) will not materially reduce the sensitivity of the receiver although they will, of course, show up as variations in the calibration as indicated by the setting of the MAIN TUNING DIAL. Correction of any variation of calibration can be made by following the suggestions outlined in the following paragraphs.

All adjustments are made from the top of the chassis. The proper points for each band are marked on figure 3. There are 18 of them, plus one used only on band IV and accessible from the rear apron.

High frequency beat is used on all bands, that is, the oscillator is 455 KC higher in frequency than the signal received.

If sufficient input is used, a given signal can be received at two points on the tuning dial. There is 910 KC difference in frequency between these points. The true signal is the one received at the higher frequency dial reading while the image or "Low-beat" signal is received with the dial reading 910 KC lower in frequency. The circuits must be aligned to the true signal.

When using a signal generator or test oscillator to align the receiver, a resistor of about 300 ohms should be inserted between the signal generator and the antenna terminal. This will prevent misaligning of the RF stage caused by connecting the receiver input, the low impedance output of the signal generator.

Band I includes frequencies between 540 and 1650 KC. For Band I there are two frequency adjustments for adjusting the dial to the proper calibration.

The first step is to choose a station or a signal of accurately known frequency on the low frequency end of the range (for example 600 KC) and set the main tuning scale to read this frequency. If the signal is not tuned in when the scale indicates its frequency it may be brought in by adjusting the oscillator coil core. This may be done with a small screwdriver at the point marked "BAND I OSC. Lo". Another station or signal is now selected near the high frequency end of the range (for example 1400 KC). If this signal is not heard when the dial is accurately set to its frequency it may be brought in by adjusting the padder under the large hole marked "BAND I OSC. Hi" by means of an insulated trimmer tool. When this signal is accurately brought in as indicated by a maximum reading on the meter, the low frequency test point should be readjusted if it has changed. It may be necessary to go back and forth several times until both frequencies are accurately calibrated.

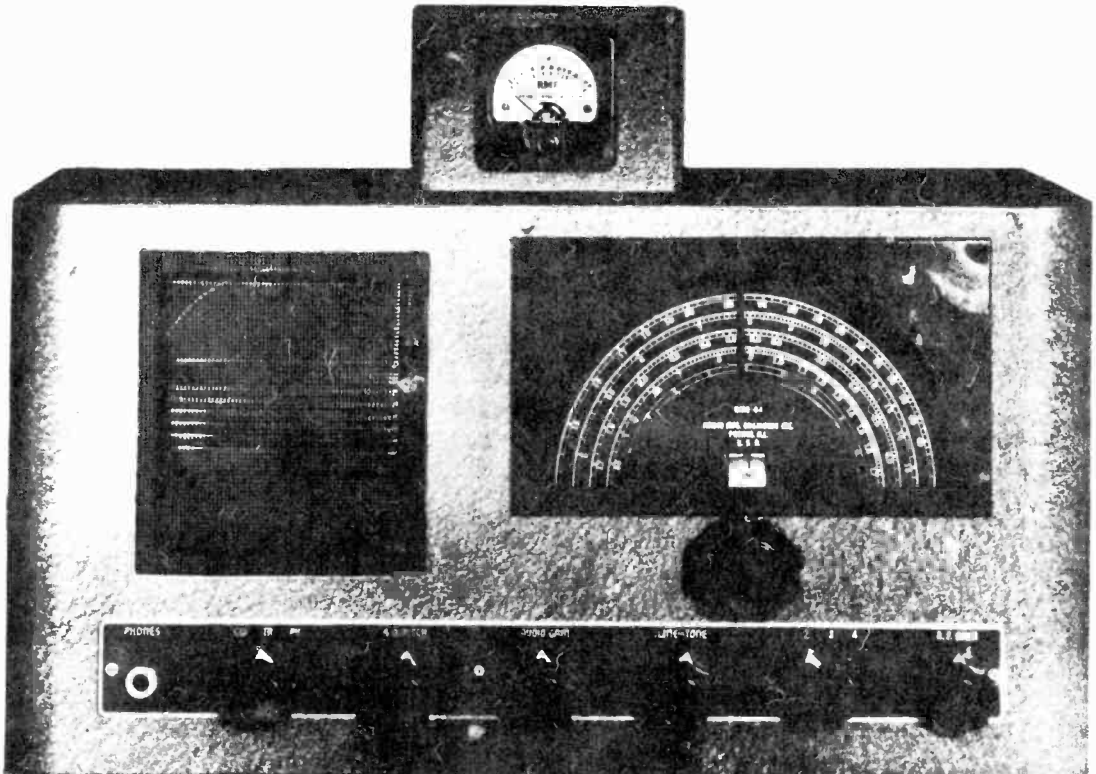
When the calibration is correct the R.F. circuits can be aligned. The two marked "Band I Mixer Lo" and "Band I RF Lo" are adjusted for maximum meter reading on the low frequency end of the band (such as 600 KC); and the trimmers marked "Band I Mixer Hi" and "Band I RF Hi" are used to obtain maximum output at the high frequency end, such as 1400 KC. It may be necessary to repeat these adjustments for perfect alignment. The oscillator calibration of any band <u>must</u> be done first, and should not be changed while making the other adjustments.

The procedure on Band II is the same as for Band I. Adjust "Band II Osc.Lo" at approximately 1.9 MC and "Band II Osc. Hi" around 4.5 to 5 MC; then tune the mixer and RF stages.

Band III and IV differ in that there is no "Lo" end adjustment, the inductance of the coils being accurately adjusted at the factory. Band III is therefore set at only one frequency, preferably at the high end. Band IV may be adjusted at about 30 MC.

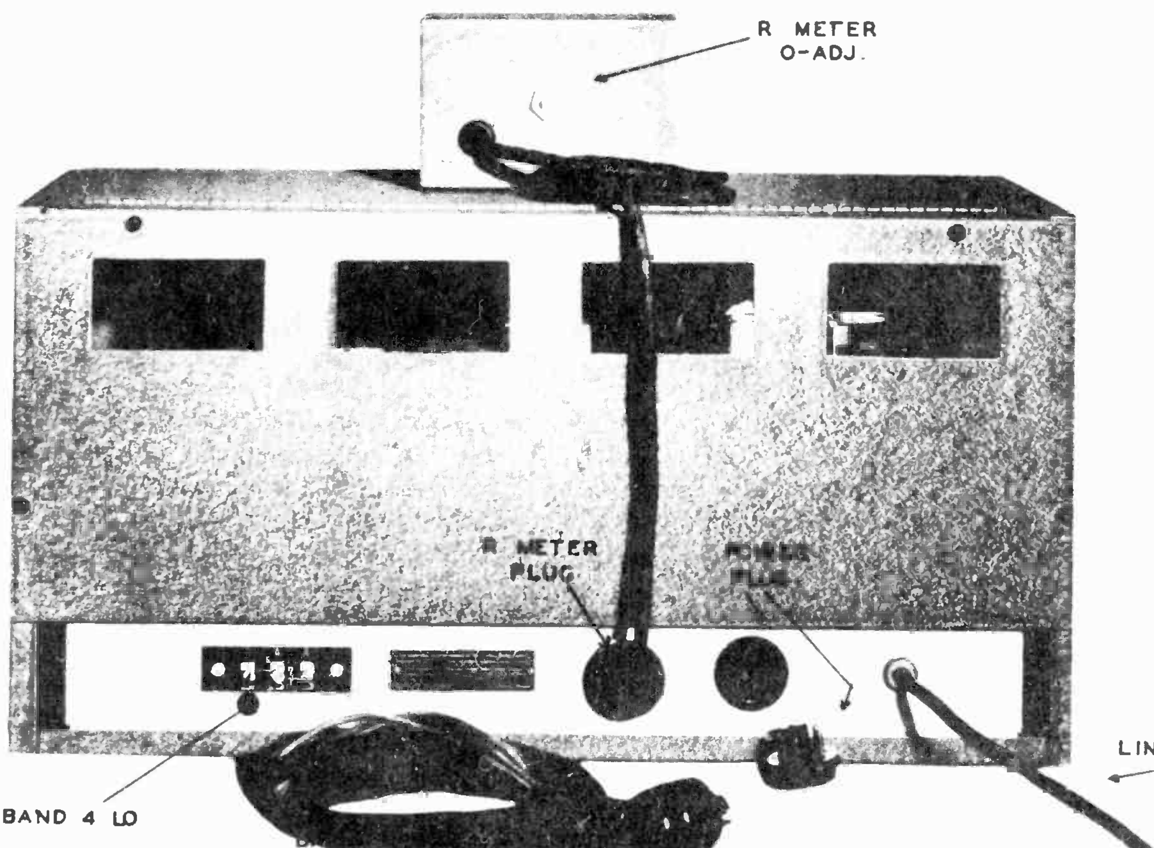
The trimmer accessible through the hole in the rear of the chassis affects only the extreme low end of Band IV and should not be disturbed unless absolutely necessary. It will determine calibration only between 14 and 17 MC, and will also affect sensitivity of the set through that region of Band IV.

RADIO MFG. ENGINEERS INC.



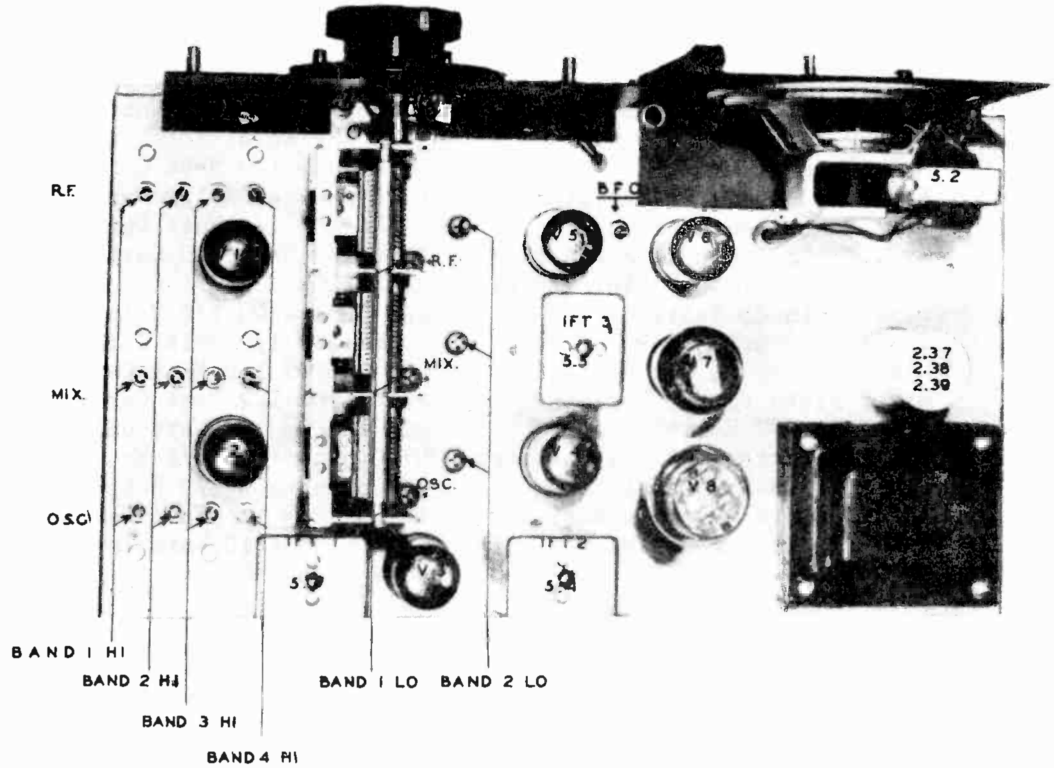
NOISE LIMITER SWITCH
ON ←——→ OFF

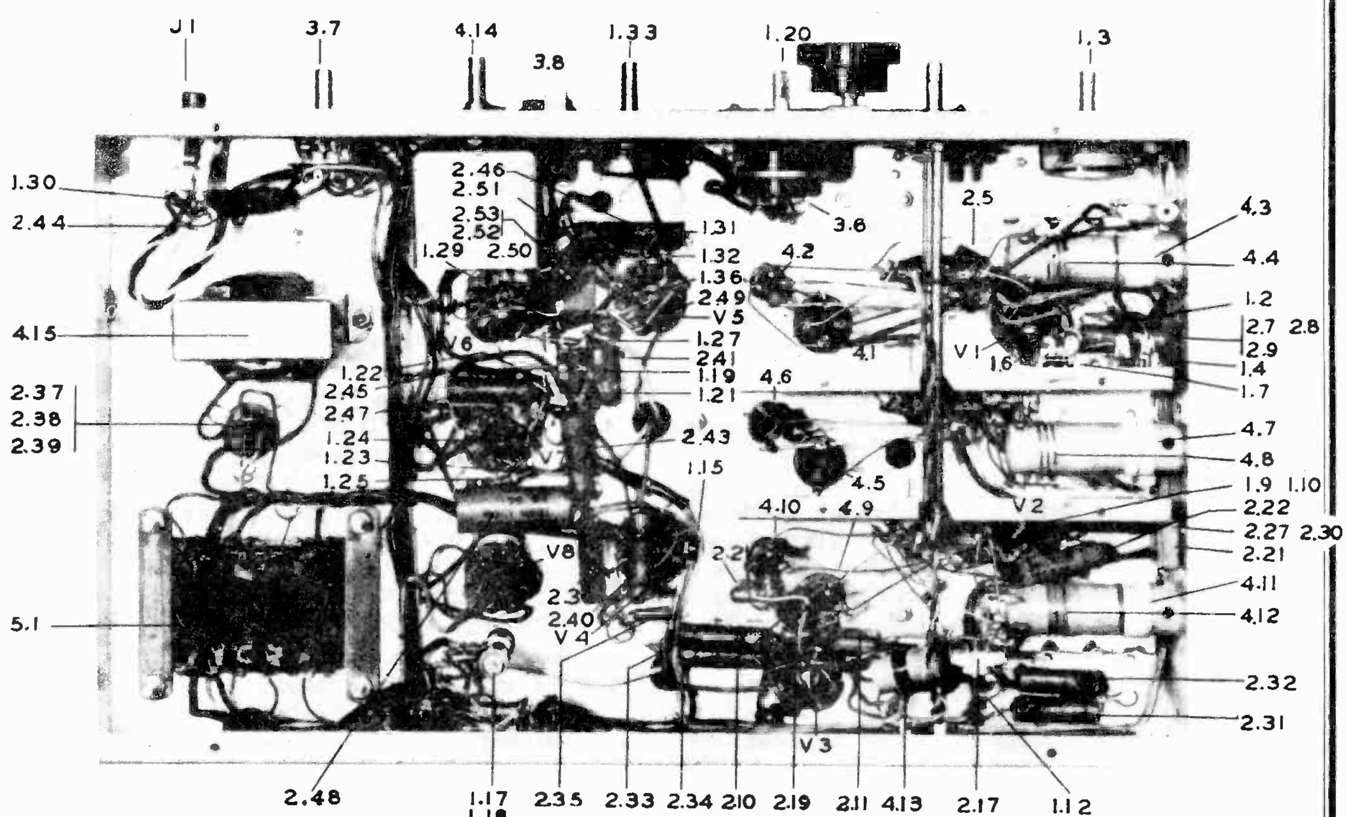
R METER
0-ADJ.



LINE CORD

BAND 4 LO


R.F.
MIX.
OSC.
BFO
5.2
R.F.
MIX.
OSC.
IFT 3
5.3
2.37
2.38
2.39
IFT 2
5.4
5.5
BAND 1 HI
BAND 2 HI
BAND 3 HI
BAND 4 HI
BAND 1 LO
BAND 2 LO


J1
3.7
4.14
3.8
1.33
1.20
1.3
1.30
2.44
2.46
2.51
2.53
2.52
1.29
2.50
1.31
1.32
1.36
2.49
V5
1.27
2.41
1.19
1.21
3.6
2.5
4.2
4.3
4.4
1.2
2.7
2.8
2.9
1.4
1.7
V1
1.6
4.1
4.15
V6
1.22
2.45
2.47
1.24
1.23
1.25
2.37
2.38
2.39
V7
2.43
1.15
4.6
4.5
4.10
4.9
4.7
4.8
1.9
1.10
V2
2.22
2.27
2.30
2.21
4.11
4.12
V8
2.2
2.3
2.40
V4
5.1
2.32
2.31
V3
2.48
1.17
1.18
2.35
2.33
2.34
2.10
2.19
2.11
4.13
2.17
1.12

MODEL 84

RADIO MFG. ENGINEERS INC.

Schematic Symbol	Function	Specification
1.1	R.F. Grid Resistor	220 K ±20% 1/2 Watt Carbon
1.2	R.F. & 1st I.F. Cathode Resistor	150 ohms ±20% 1/2 Watt Carbon
1.3	R.F. Gain Control	30 K Variable
1.4	R.F. Gain Bleeder	47 K ±20% 1/2 Watt Carbon
1.5	R.F. Screen Filter Resistor	4700 ohms ±20% 1/2 Watt Carbon
1.6	R.F. Plate Resistor	22 K ±20% 1/2 Watt Carbon
1.7	R.F. Plate Decoupling Resistor	4700 1/2 Watt 20% Carbon
1.8	Oscillator Plate Filter Resistor	22 K ±20%
1.9	Mixer Cathode Resistor	220 ohms ±20% 1/2 Watt Carbon
1.10	Oscillator Grid Leak	47 K ±20% 1/2 Watt Carbon
1.11	Mixer Screen Filter Resistor	220 K ±20% 1/2 Watt Carbon
1.12	Mixer Plate Filter Resistor	22 K ±20% 1/2 Watt Carbon
1.13	1st I.F. AVC Resistor	220 K ±20% 1/2 Watt Carbon
1.14	1st I.F. Screen Filter Resistor	4700 ohms ±20% 1/2 Watt Carbon
1.15	2nd I.F. Cathode Resistor	470 ohms ±20% 1/2 Watt Carbon
1.16	B.F.O. Plate Dropping Resistor	100 K ±20% 1/2 Watt Carbon
1.17	Part of Bleeder Resistor	10,000 ohms 10 Watt Tapped at 5500 wire wound
1.18	Part of Bleeder Resistor	
1.19	AVC Filter Resistor	1 meg ±20% 1/2 Watt Carbon
1.20	Tone Control	1 meg Variable with switch
1.21	ANL Decoupling Resistor	1 meg. ±20% 1/2 Watt
1.22	Noise Limiter Bias Resistor	680 K ±10% 1/2 Watt Carbon
1.23	Output Amp. Grid Resistor	220 K ±20% 1/2 Watt Carbon
1.24	First AF Plate Filter Resistor	22 K ±20% 1/2 Watt Carbon
1.25	Output Amp. Cathode Resistor	470 ohms ±20% 1/2 Watt Carbon
1.26	1st Audio Cathode Resistor	820 ohms ±10% 1/2 Watt Carbon
1.27	Part of Diode Load	220 K ±20% 1/2 Watt Carbon
1.28	Part of Diode Load	220 K ±20% 1/2 Watt Carbon
1.29	B.F.O. Grid Leak	47 K ±20% 1/2 Watt Carbon
1.30	Phone Shunt Resistor	33 ohms ±20% 1/2 Watt Carbon
1.31	1st AF Grid Filter Resistor	22 K ±20% 1/2 Watt Carbon
1.32	1st AF Plate Resistor	100 K ±20% 1/2 Watt Carbon
1.33	Audio Gain Control	250 K Variable
1.34	Meter Bleeder	68 K ±20% 1/2 Watt Carbon
1.35	Meter Zero Adjustment	5 K Variable WW Screw Driver Slot
1.36	Pilot Lamp Dropping Resistor	18 ohms ±20% 1/2 Watt Carbon
2.1	Band I RF Trimmer	40 mmfd Mica Variable
2.2	Band II RF Trimmer	40 mmfd Mica Variable
2.3	Band III RF Trimmer	40 mmfd Mica Variable
2.4	Band IV RF Trimmer	40 mmfd Mica Variable
2.5	RF Grid Blocking Condenser	250 mmfd ±20% 600 V Mica
2.6	RF Tuning Condenser	Part of Gang Condenser
2.7	RF Cathode Bypass Condenser	.01 mfd ±20% 600 V Paper
2.8	RF Screen Bypass Condenser	.01 mfd. ±20% 600 V Paper
2.9	RF Plate Decoupling Condenser	.01 mfd ±20% 600 V Paper
2.10	Oscillator Plate Bypass Cond.	.01 mfd ±20% 600 V Paper
2.11	Oscillator Plate Filter Cond.	.001 mfd ±20% 600 V Mica
2.12	RF Plate Coupling Condenser	250 mfd ±20% 600 V Mica
2.13	Band I Mixer Trimmer	40 mmfd Mica Variable
2.14	Band II Mixer Trimmer	40 mmfd Mica Variable
2.15	Band III Mixer Trimmer	40 mmfd Mica Variable
2.16	Band IV Mixer Trimmer	40 mmfd Mica Variable
2.17	Band IV Osc. Series Trimmer	70 mmfd Mica Variable
2.18	Mixer Tuning Condenser	Part of Gang Condenser
2.19	Band 1 Series Pad	.0005 mfd ±5% 600 Volt Mica
2.20	Band II Series Pad	.0015 mfd ±5% 600 Volt Mica
2.21	Band III Series Pad	.004 mfd 5% 600 Volt Mica
2.22	Band IV Series Pad	.015 600 Volt Paper

Schematic Symbol	Function	Specification
2.23	Band I Osc. Trimmer	40 mmfd Mica Variable
2.24	Band II Osc. Trimmer	40 mmfd Mica Variable
2.25	Band III Osc. Trimmer	40 mmfd Mica Variable
2.26	Band IV Osc. Trimmer	40 mmfd Mica Variable
2.27	Mixer Cathode Bypass Condenser	.01 mfd ±20% 600 V Paper
2.28	Osc. Grid Condenser	50 mmfd ±20% 600 V Mica
2.29	Osc. Tuning Condenser	Part of Gang Condenser
2.30	Mixer Screen Bypass Condenser	.01 mfd ±20% 600 V Paper
2.31	Mixer Plate Filter Condenser	.01 mfd ±20% 600 V Paper
2.32	First I.F. Grid Filter Condenser	.01 mfd ±20% 600 V Paper
2.33	1st I.F. Cathode Bypass Condenser	.01 mfd ±20% 600 V Paper
2.34	1st I.F. Screen Bypass Condenser	.01 mfd ±20% 600 V Paper
2.35	B.F.O. Coupling Condenser	5 mmfd ±20% Mica
2.36	2nd I.F. Cathode Bypass Cond.	.01 mfd ±20% 600 V Paper
2.37		
2.38	Power Supply Filter Condenser	10-10-15 mfd Electrolytic
2.39		
2.40	2nd I.F. Screen Bypass Cond.	.01 mfd ±20% 600 V Paper
2.41	AVC Bypass Condenser	.01 mfd ±20% 600 V Paper
2.42	Diode Lead Filter Condenser	50 mmfd ±20% 600 V Mica
2.43	A.L. Bias Filter Condenser	.01 mfd ±20% 600 V Paper
2.44	B.F.O. Plate Bypass Condenser	.01 mfd ±20% 600 V Paper
2.45	Tone Control Condenser	.01 mfd ±20% 600 V Paper
2.46	First Audio Plate Coupling Cond.	.01 mfd ±20% 600 V Paper
2.47	Output Plate Leading Condenser	.01 mfd ±20% 600 V Paper
2.48	Output Cathode Bypass Condenser	20 mfd 25 V Tubular Electrolytic
2.49	1st Audio Grid Decoupling Cond.	250 mmfd ±20% 600 V Mica
2.50	B.F.O. Grid Condenser	100 mmfd ±20% 600 V Mica
2.51	1st Audio Grid Coupling Cond.	.01 mfd ±20% 600 V Paper
2.52	B.F.O. Trimmer Condenser	70 mmfd Mica Variable
2.53	B.F.O. Grid Condenser	100 mmfd ±20% 600 V Mica
3.1	RF Coil Switch	Primary Sectioh, part of Bandswitch
3.2	RF Coil Switch	Grid Section, part of Bandswitch
3.3	Mixer Coil Switch	Part of Bandswitch
3.4	Osc. Coil Switch	Plate Section, part of Bandswitch
3.5	Osc. Coil Switch	Grid Section, part of Bandswitch
3.6	Off-On Switch	2 pole, single throw on tone control
3.7	Stand-by Switch	2 pole, 3 throw rotary
3.8	Noise Limiter Switch	SPST Slide Switch
4.1	Band I R.F. Coil Assembly	
4.2	Band II R.F. Coil Assembly	
4.3	Band III R.F. Coil Assembly)	Wound on same form
4.4	Band IV R.F. Coil Assembly)	
4.5	Band I Mixer Coil Assembly	
4.6	Band II Mixer Coil Assembly	
4.7	Band III Mixer Coil Assembly)	Wound on same form
4.8	Band IV Mixer Coil Assembly)	
4.9	Band I Osc. Coil Assembly	
4.10	Band II Osc. Coil Assembly	
4.11	Band III Osc. Coil Assembly)	Wound on same form
4.12	Band IV Osc. Coil Assembly)	
4.13	Band IV Oscillator Series Coil	
4.14	B.F.O. Coil	
4.15	Filter Choke	
5.1	Power Transformer	
5.2	Output Transformer	
5.3	1st I.F. Transformer	
5.4	2nd I.F. Transformer	
5.5	3rd I.F. Transformer	

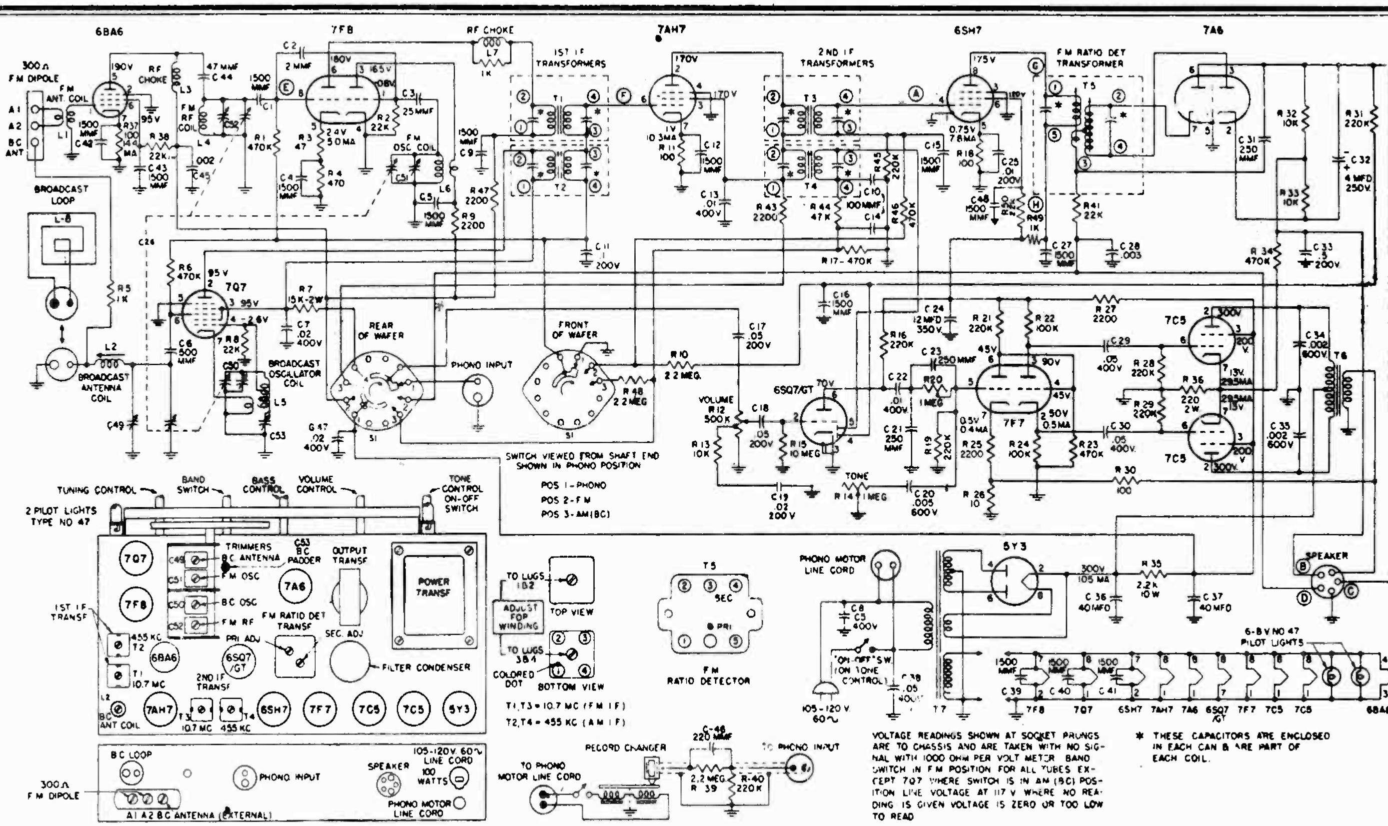
RADIO MFG. ENGINEERS INC.

Schematic Symbol	Function	Specification
1.1	R.F. Grid Resistor	220 K ±20% 1/2 Watt Carbon
1.2	R.F. & 1st I.F. Cathode Resistor	150 ohms ±20% 1/2 Watt Carbon
1.3	R.F. Gain Control	30 K Variable
1.4	R.F. Gain Bleeder	47 K ±20% 1/2 Watt Carbon
1.5	R.F. Screen Filter Resistor	4700 ohms ±20% 1/2 Watt Carbon
1.6	R.F. Plate Resistor	22 K ±20% 1/2 Watt Carbon
1.7	R.F. Plate Decoupling Resistor	4700 1/2 Watt 20% Carbon
1.8	Oscillator Plate Filter Resistor	22 K ±20%
1.9	Mixer Cathode Resistor	220 ohms ±20% 1/2 Watt Carbon
1.10	Oscillator Grid Leak	47 K ±20% 1/2 Watt Carbon
1.11	Mixer Screen Filter Resistor	220 K ±20% 1/2 Watt Carbon
1.12	Mixer Plate Filter Resistor	22 K ±20% 1/2 Watt Carbon
1.13	1st I. F. AVC Resistor	220 K ±20% 1/2 Watt Carbon
1.14	1st I. F. Screen Filter Resistor	4700 ohms ±20% 1/2 Watt Carbon
1.15	2nd I.F. Cathode Resistor	470 ohms ±20% 1/2 Watt Carbon
1.16	B.F.O. Plate Dropping Resistor	100 K ±20% 1/2 Watt Carbon
1.17	Part of Bleeder Resistor	10,000 ohms 10 Watt Tapped at 5500 wire wound
1.18	Part of Bleeder Resistor	
1.19	AVC Filter Resistor	1 meg ±20% 1/2 Watt Carbon
1.20	Tone Control	1 meg Variable with switch
1.21	ANL Decoupling Resistor	1 meg ±20% 1/2 Watt
1.22	Noise Limiter Bias Resistor	680 K ±10% 1/2 Watt Carbon
1.23	Output Amp. Grid Resistor	220 K ±20% 1/2 Watt Carbon
1.24	First AF Plate Filter Resistor	22 K ±20% 1/2 Watt Carbon
1.25	Output Amp. Cathode Resistor	470 ohms ±20% 1/2 Watt Carbon
1.26	1st Audio Cathode Resistor	820 ohms ±10% 1/2 Watt Carbon
1.27	Part of Diode Load	220 K ±20% 1/2 Watt Carbon
1.28	Part of Diode Load	220 K ±20% 1/2 Watt Carbon
1.29	B.F.O. Grid Leak	47 K ±20% 1/2 Watt Carbon
1.30	Phone Shunt Resistor	33 ohms ±20% 1/2 Watt Carbon
1.31	1st AF Grid Filter Resistor	22 K ±20% 1/2 Watt Carbon
1.32	1st AF Plate Resistor	100 K ±20% 1/2 Watt Carbon
1.33	Audio Gain Control	250 K Variable
1.34	Meter Bleeder	68 K ±20% 1/2 Watt Carbon
1.35	Meter Zero Adjustment	2 K Variable WW Screw Driver Slot
1.36	Feedback Resistor	250 K ±20% 1/2 Watt Carbon
2.1	Band I RF Trimmer	40 mmfd Mica Variable
2.2	Band II RF Trimmer	40 mmfd Mica Variable
2.3	Band III RF Trimmer	40 mmfd Mica Variable
2.4	Band IV RF Trimmer	40 mmfd Mica Variable
2.5	RF Grid Blocking Condenser	250 mmfd ±20% 600 V Mica
2.6	RF Tuning Condenser	Part of Gang Condenser
2.7	RF Cathode Bypass Condenser	.01 mfd ±20% 600 V Paper
2.8	RF Screen Bypass Condenser	.01 mfd. ±20% 600 V Paper
2.9	RF Plate Decoupling Condenser	.01 mfd ±20% 600 V Paper
2.10	Oscillator Plate Bypass Cond.	.01 mfd ±20% 600 V Paper
2.11	Oscillator Plate Filter Cond.	.001 mfd ±20% 600 V Mica
2.12	RF Plate Coupling Condenser	250 mfd ±20% 600 V Mica
2.13	Band I Mixer Trimmer	40 mmfd Mica Variable
2.14	Band II Mixer Trimmer	40 mmfd Mica Variable
2.15	Band III Mixer Trimmer	40 mmfd Mica Variable
2.16	Band IV Mixer Trimmer	40 mmfd Mica Variable
2.17	Band IV Osc. Series Trimmer	70 mmfd Mica Variable
2.18	Mixer Tuning Condenser	Part of Gang Condenser
2.19	Band I Series Pad	.0005 mfd ±5% 600 Volt Mica
2.20	Band II Series Pad	.0015 mfd ±5% 600 Volt Mica
2.21	Band III Series Pad	.004 mfd 5% 600 Volt Mica
2.22	Band IV Series Pad	.015 600 Volt Paper

RADIO MFG. ENGINEERS INC.

Schematic Symbol	Function	Specification
2.23	Band I Osc. Trimmer	40 mmfd Mica Variable
2.24	Band II Osc. Trimmer	40 mmfd Mica Variable
2.25	Band III Osc. Trimmer	40 mmfd Mica Variable
2.26	Band IV Osc. Trimmer	40 mmfd Mica Variable
2.27	Mixer Cathode Bypass Condenser	.01 mfd ±20% 600 V Paper
2.28	Osc. Grid Condanser	50 mmfd ±20% 600 V Mica
2.29	Osc. Tuning Condenser	Part of Gang Condenser
2.30	Mixer Screen Bypass Condenser	.01 mfd ±20% 600 V. Paper
2.31	Mixer Plate Filter Condenser	.01 mfd ±20% 600 V Paper
2.32	First I.F. Grid Filter Condenser	.01 mfd ±20% 600 V Paper
2.33	1st I.F. Cathode Bypass Condenser	.01 mfd ±20% 600 V Paper
2.34	1st I.F. Screen Bypass Condenser	.01 mfd ±20% 600 V Paper
2.35	B.F.O. Coupling Condenser	5 mmfd ±20% Mica
2.36	2nd I.F. Cathode Bypass Cond.	.01 mfd ±20% 600 V Paper
2.37		
2.38	Power Supply Filter Condenser	10-10-15 mfd Electrolytic
2.39		
2.40	2nd I.F. Screen Bypass Cond.	.01 mfd ±20% 600 V Paper
2.41	AVC Bypass Condenser	.01 mfd ±20% 600 V Paper
2.42	Diode Lead Filter Condenser	50 mmfd ±20% 600 V Mica
2.43	ANL Bias Filter Condenser	.01 mfd ±20% 600 V Paper
2.44	B.F.O. Plate Bypass Condenser	.01 mfd ±20% 600 V Paper
2.45	Tone Control Condenser	.01 mfd ±20% 600 V Paper
2.46	First Audio Plate Coupling Cond.	.01 mfd ±20% 600 V Paper
2.47	Feed Back Blocking Condenser	.01 mfd ±20% 600 V Paper
2.48	Output Cathode Bypass Condenser	20 mfd 25 V Tubular Electrolytic
2.49	1st Audio Grid Decoupling Cond.	250 mmfd ±20% 600 V Mica
2.50	B.F.O. Grid Condenser	100 mmfd ±20% 600 V Mica
2.51	1st Audio Grid Coupling Cond.	.01 mfd ±20% 600 V Paper
2.52	B.F.O. Trimmer Condenser	70 mmfd Mica Variable
2.53	B.F.O. Grid Condenser	100 mmfd ±20% 600 V Mica
3.1	RF Coil Switch	Primary Section, part of Bandswitch
3.2	RF Coil Switch	Grid Section, part of Bandswitch
3.3	Mixer Coil Switch	Part of Bandswitch
3.4	Osc. Coil Switch	Plate Section, part of Bandswitch
3.5	Osc. Coil Switch	Grid Section, part of Bandswitch
3.6	Off-On Switch	2 pole, single throw on tone control
3.7	Stand-by Switch	2 pole, 3 throw rotary
3.8	Noise Limiter Switch	SPST Slide Switch
4.1	Band I R.F. Coil Assembly	
4.2	Band II R.F. Coil Assembly	
4.3	Band III R.F. Coil Assembly)	Wound on same form
4.4	Band IV R.F. Coil Assembly)	
4.5	Band I Mixer Coil Assembly	
4.6	Band II Mixer Coil Assembly	
4.7	Band III Mixer Coil Assembly)	Wound on same form
4.8	Band IV Mixer Coil Assembly)	
4.9	Band I Osc. Coil Assembly	
4.10	Band II Osc. Coil Assembly	
4.11	Band III Osc. Coil Assembly)	Wound on same form
4.12	Band IV Osc. Coil Assembly)	
4.13	Band IV Oscillator Series Coil	
4.14	B.F.O. Coil	
4.15	Filter Choke	
5.1	Power Transformer	
5.2	Output Transformer	
5.3	1st I.F. Transformer	
5.4	2nd I.F. Transformer	
5.5	3rd I.F. Transformer	

RADIO & TELEVISION INC. MODELS T4400, T4400½



This receiver features the latest in post-war engineering design. It employs 10 tubes plus a rectifier in an AM-FM superheterodyne circuit. Four of the tubes are the dual-purpose type giving the set 15-tube performance. The tuning ranges are:

A.M. — 540 Kc. to 1700 Kc.
F.M. — 88 Mc. to 108 Mc.

The receiver has two built-in antennas; a loop antenna for the AM broadcast band and a folded dipole for the FM broadcast band. Provisions are made for external antenna connections. The easy-to read "slide-rule" type dial is illuminated when the set is on; a dial pointer of red plastic reflects illumination from the two pilot lights. A high ratio drive on the tuning condenser provdies smooth tuning. High Fidelty reproduction on FM and AM is the result of well-engineered circuits and the use of high quality parts.

Tube Complement:

1 Type 6BA6—FM RF Amplifier.
1 Type 7F8—FM Mixer, Oscillator.
1 Type 7AH7—1st IF Amplifier.
1 Type 6SH7—FM Detector Driver.
1 Type 7A6—FM Detector.
1 Type 6SQ7/GT—AM Det., A.V.C. and 1st Audio Amplifier.
1 Type 7F7—2nd Audio, Phase Inverter.
2 Type 7C5—Push-pull Power Amplifiers.
1 Type 5Y3—Rectifier.
1 Type 7Q7—AM Mixer Oscillator.

Power:

This receiver operates on 105-125 volts, 60 cycle, AC. Do not plug this radio receiver into a direct current socket. Power consumption is 80 watts.

ALIGNMENT PROCEDURE FOR A.M.:

Equipment Required:
- a) Broadcast Band Signal Generator.
- b) Output Meter.

1. Set band switch to AM. Advance volume control to full volume setting.
2. Connect output meter across voice coil.
3. Connect the Signal Generator across the broadcast band antenna section of the variable condenser. The "high" side of the Generator should connect to the stator section and the "ground" side to the frame or chassis. Adjust the Signal Generator to 455 kc and with the receiver switched on, adjust the first and second I.F. transformers for peak output as shown on the output meter. The signal injected into the receiver should be as small in magnitude as possible, consistent with a useful deflection on the output meter.
4. Connect the "high" side of the Generator to the antenna terminal with a 200 mmf condenser inserted in series. Connect the "ground" side of the Generator to the chassis. Tune receiver to 60 on the dial, adjust Signal Generator to 600 kc. Adjust the BC padder and the BC antenna coil for maximum deflection on the output meter. Use a weak signal.
5. Tune receiver to 160 on the dial. Adjust Signal Generator to 1600 kc. Adjust BC oscillator and BC antenna trimmers for maximum output.
6. Repeat operations 4 and 5.

V ALIGNMENT PROCEDURE FOR F.M.:

Note: Points A, B, C, D, E, F, G, and H are noted on circuit diagram.

Points B, C, and D have been brought out to the unused contacts of the speaker socket at the rear of the chassis.

Equipment Required:
- a) High frequency Signal Generator with 88-108 Mc tuning range.
- b) Signal Generator capable of delivering .1V at 10.7 mc.
- c) Audio output meter.
- d) D.C. vacuum tube voltmeter with zero center scale.

a. Ratio Detector Alignment:

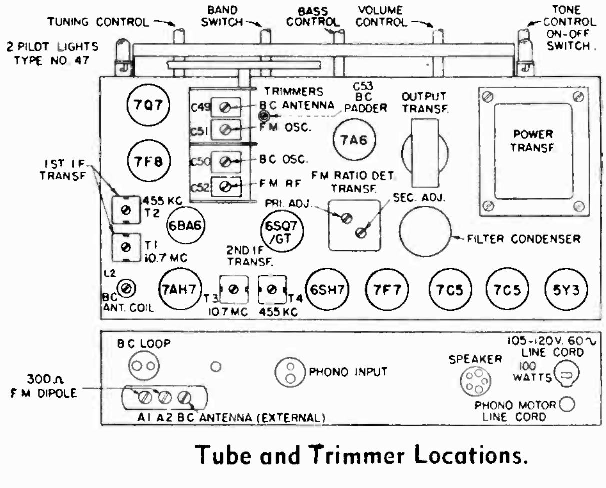
1. Connect V.T.V.M. across points "B" and "C" (A.V.C. Voltage).
2. Feed 10.7 mc unmodulated R.F. signal into 6SH7 grid (point A) through .01 μfd. condenser. This signal should be .1 volt.
3. Adjust primary of Ratio Detector (T-5) for maximum voltage indication on V.T.V.M.
4. Connect zero centered V.T.V.M. across points "B" and "D".
5. Adjust secondary of Ratio Detector (T-5) for zero indication.
6. Tune 10.7 mc Signal Generator higher in frequency (about 200 kc) until maximum voltage reading is obtained on V.T.V.M.; note this voltage, then tune signal generator lower in frequency until maximum voltage of the opposite polarity is obtained. Note this voltage, then if necessary re-adjust primary of the Det. (T-5) until the detector voltages are about equal on either the high or low side of 10.7 mc.

b. 10.7 I.F. Alignment:

1. Shunt a 1,000-ohm carbon resistor across the primary of the detector (T-5) (Points G and H).
2. Connect output meter across speaker voice coil.
3. Volume and tone controls at maximum clockwise position.
4. Connect 10.7 mc (modulated 30% signal generator through .01 μfd. condenser across point "F" and ground.
5. Adjust secondary, then primary of (T-3) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)
6. Connect 10.7 mc 30% modulated signal generator across point "E" and ground.
7. Adjust secondary, then primary of (T-1) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)
8. Remove 1000-ohm shunting resistor from across primary of (T-5).

c. Oscillator and R.F. Alignment:

1. Connect V.T.V.M. across "B" and "C" (A.V.C. voltage).
2. Connect 108 mc signal generator to FM antenna terminals. If generator impedance is low, put one 150-ohm carbon resistor in series with each of the generator leads. Tune receiver dial to 108 mc.
3. Adjust FM oscillator trimmer (C-51) for maximum V.T.V.M. reading.
4. Adjust FM R.F. trimmer (C-52) for maximum V.T.V.M. reading. During alignment reduce input signal to maintain A.V.C. voltage at 2 V.
5. Repeat steps 3 and 4.
6. Feed a 90 mc signal into antenna terminals (as in C-2), tune receiver dial to signal.
7. Adjust spacing of FM R.F. coil (L-4) for maximum V.T.V.M. reading at 90 mc. During alignment reduce input signal to maintain A.V.C. voltage at 2 V.
8. Repeat steps 2 and 4 if necessary.



Tube and Trimmer Locations.

RADIO & TELEVISION INC.

C 1—1,500 mmfd., ±300 mmfd.
C 2—2 mmfd., 20%
C 3—25 mmfd., 10%
C 4—1,500 mmfd., ±300 mmfd.
C 5—1,500 mmfd., ±300 mmfd.
C 6—500 mmfd., 20%
C 7—.02 mfd., 400 V.
C 8—.05 mfd., 400 V.
C 9—1,500 mmfd., ±300 mmfd.
C10—100 mmfd., 20%
C11—.1 mfd., 400 V.
C12—1,500 mmfd., ±300 mmfd.
C13—.01 mfd., 400 V.
C14—100 mmfd., 20%
C15—1,500 mmfd., ±300 mmfd.
C16—1,500 mmfd., ±300 mmfd.
C17—.05 mfd., 200 V.
C18—.05 mfd., 200 V.
C19—.02 mfd., 200 V.
C20—.005 mfd., 600 V.
C21—250 mmfd., 20%
C22—.01 mfd., 400 V.
C23—250 mmfd., 20%
C24—12 mfd., 350 V.
C25—.01 mfd., 200 V.
C26—Var. cond. (AM-FM) *C-6.042
C27—1,500 mmfd., ±300 mmfd.
C28—.003 mfd., 20%
C29—.05 mfd., 400 V.
C30—.05 mfd., 400 V.
C31—250 mmfd., 20%
C32—4 mfd., 250 V.
C33—.5 mfd., 200 V.
C34—.002 mfd., 600 V.
C35—.002 mfd., 600 V.
C36 & C37—40 mfd. x 40 mfd., electrolytic, 400 V.
C38—.05 mfd., 400 V.
C39—1,500 mmfd., ±300 mmfd.
C40—1,500 mmfd., ±300 mmfd.
C41—1,500 mmfd., ±300 mmfd.
C42—1,500 mmfd., ±300 mmfd.
C43—1,500 mmfd., ±300 mmfd.
C44—47 mmfd., 10%
C45—.002 mfd., 400 V.
C46—100 mmfd., 20%
C47—.02 mfd., 400 V.
C48—1,500 mmfd., ±300 mmfd.
C49—Trimmer, compression, 3-35 mmfd.
C50—Trimmer, compression, 3-35 mmfd.
C51—Trimmer, ceramic, 1.5-7 mmfd.
C52—Trimmer, compression, 1.6-18 mmfd.
C53—Padder condenser, 275-1,000 mmfd.
R 1—470KΩ, ¼W., 20%
R 2—22KΩ, ¼W., 20%
R 3—47Ω, ¼W., 20%
R 4—470Ω, ¼W., 20%
R 5—1KΩ, ¼W., 20%
R 6—470KΩ, ¼W., 20%
R 7—15KΩ, ¼W., 20%
R 8—22KΩ, ¼W., 20%
R 9—2,200Ω, ¼W., 20%
R10—2.2 Meg.Ω, ¼W., 20%
R11—100Ω, ¼W., 20%
R12—.5 Meg.Ω Volume Control (Audio Taper) tapped at 50KΩ *RA-9.069
R13—10KΩ, ¼W., 20%
R14—1 Meg.Ω Tone Control, with power switch *RA-9.070
R15—10 Meg.Ω, ¼W., 20%
R16—220KΩ, ¼W., 20%
R17—470KΩ, ¼W., 20%
R18—100Ω, ¼W., 20%
R19—220KΩ, ¼W., 20%
R20—1 Meg.Ω Bass Control *RA-9.112
R21—220KΩ, ¼W., 20%
R22—100KΩ, ¼W., 20%
R23—470KΩ, ¼W., 20%
R24—100KΩ, ¼W., 20%
R25—2,200Ω, ¼W., 20%
R26—10Ω, ¼W., 20%
R27—2,200Ω, ¼W., 20%
R28—220KΩ, ¼W., 20%
R29—220KΩ, ¼W., 20%
R30—100Ω, ¼W., 20%
R31—220KΩ, ¼W., 20%
R32—10KΩ, ¼W., 20%
R33—10KΩ, ¼W., 20%
R34—470KΩ, ¼W., 20%
R35—2,200Ω, 10W., wirewound, 10%
R36—220Ω, 2W., 20%
R37—100Ω, ¼W., 20%
R38—22KΩ, 1W., 20%
R39—2.2 Meg.Ω, ¼W., 20%
R40—47KΩ, ¼W., 20%
R41—22KΩ, ¼W., 20%
R42—100KΩ, ¼W., 20%
R43—2,200KΩ, ¼W., 20%
R44—47KΩ, ¼W., 20%
R45—220KΩ, ¼W., 20%
R46—470KΩ, ¼W., 20%
R49—1KΩ, ¼W., 20%
R50—22KΩ, ½W., 20%
T 1—FM I.F. Trans., 10.7 Mc. *ZB-2.276
T 2—AM I.F. Trans., 455 Kc *ZB-2.275
T 3—FM I.F. Trans., 10.7 Mc. *ZB-2.276
T 4—AM I.F. Trans., 455 Kc. *ZB-2.275
T 5—FM Ratio Detector Transformer, 10.7 Mc. *ZC-2.278
T 6—Output Trans. *ZB-15.019
T 7—Power Trans. *TA-18.053
S 1—Band Switch *SA-12.060
L 1—FM Antenna Coil *LA-2.241
L 2—Antenna Coil, Broadcast *LA-2.273
L 3—R.F. Plate Choke *LA-2.279
L 4—R.F. Coil, FM *LA-2.243
L 5—Oscillator Coil, Broadcast *LA-2.221
L 6—Oscillator Coil, FM *LA-2.222
L 7—R.F. Choke, Conv. Plate *LA-2.242
L 8—Loop, Broadcast *LC-5.018
Antenna, FM, Folded Dipole (300Ω) *LA-5.010
Pilot Lamp, No. 47, 6-8 V.

Part No. GN-559 *Mfg. Part No.

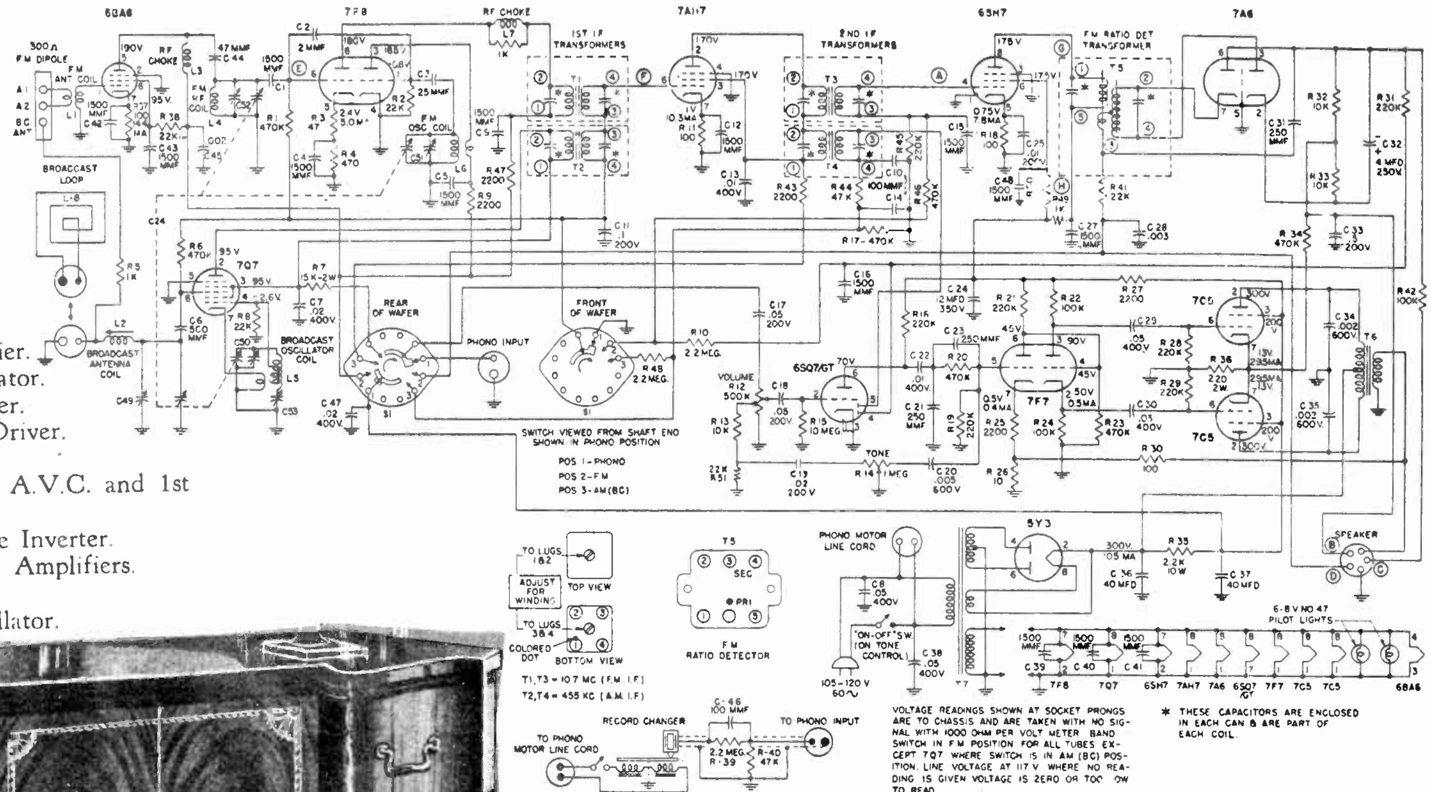
MODELS T4400, T4400½

C 1—1,500 mmfd., ± 300 mmfd.
C 2—2 mmfd., 20%
C 3—25 mmfd., 10%
C 4—1,500 mmfd., ±300 mmfd.
C 5—1,500 mmfd., ±300 mmfd.
C 6—500 mmfd., 20%
C 7—.02 mfd., 400 V.
C 8—.05 mfd., 400 V.
C 9—1,500 mmfd., ±300 mmfd.
C10—100 mmfd., 20%
C11—.1 mfd., 200 V.
C12—1,500 mmfd., ±300 mmfd.
C13—.01 mfd., 400 V.
C14—100 mmfd., 20%
C15—1,500 mmfd., ±300 mmfd.
C16—1,500 mmfd., ±300 mmfd.
C17—.05 mfd., 200 V.
C18—.05 mfd., 200 V.
C19—.02 mfd., 200 V.
C20—.005 mfd., 600 V.
C21—250 mmfd., 20%
C22—.01 mfd., 400 V.
C23—250 mmfd., 20%
C24—12 mfd., 350 V.
C25—.01 mfd., 200 V.
C26—Var. cond. (AM-FM) *C-6.042
C27—1,500 mmfd., ±300 mmfd.
C28—.003 mfd., 20%
C29—.05 mfd., 400 V.
C30—.05 mfd., 400 V.
C31—250 mmfd., 20%
C32—4 mfd., 250 V.
C33—.5 mfd., 200 V.
C34—.002 mfd., 600 V.
C35—.002 mfd., 600 V.
C36 & C37—40 mfd. x 40 mfd., electrolytic, 400 V.
C38—.05 mfd., 400 V.
C39—1,500 mmfd., ±300 mmfd.
C40—1,500 mmfd., ±300 mmfd.
C41—1,500 mmfd., ±300 mmfd.
C42—1,500 mmfd., ±300 mmfd.
C43—1,500 mmfd., ±300 mmfd.
C44—47 mmfd., 10%
C45—.002 mfd., 400 V.
C46—100 mmfd., 20%
C47—.02 mfd., 400 V.
C48—1,500 mmfd., ±300 mmfd.
C49—Trimmer, compression, 3-35 mmfd.
C50—Trimmer, compression, 3-35 mmfd.
C51—Trimmer, ceramic, 1.5-7 mmfd.
C52—Trimmer, compression, 1.6-18 mmfd.
C53—Padder condenser, 275-1,000 mmfd.
R 1—470KΩ, ¼W., 20%
R 2—22KΩ, ¼W., 20%
R 3—47Ω, ¼W., 20%
R 4—470Ω, ¼W., 20%
R 5—1KΩ, ¼W., 20%
R 6—470KΩ, ¼W., 20%
R 7—15KΩ, 2W., 20%
R 8—22KΩ, ¼W., 20%
R 9—2,200Ω, ¼W., 20%
R10—2.2 Meg.Ω, ¼W., 20%
R11—100Ω, ¼W., 20%
R12—.5 Meg.Ω Volume Control (Audio Taper) tapped at 50KΩ *RA-9.069
R13—10KΩ, ¼W., 20%
R14—1 Meg.Ω Tone Control, with power switch *RA-9.070
R15—10 Meg.Ω, ¼W., 20%
R16—220KΩ, ¼W., 20%
R17—470KΩ, ¼W., 20%
R18—100Ω, ¼W., 20%
R19—220KΩ, ¼W., 20%
R20—470KΩ, ¼W., 20%
R21—220KΩ, ¼W., 20%
R22—100KΩ, ¼W., 20%
R23—470KΩ, ¼W., 20%
R24—100KΩ, ¼W., 20%
R25—2,200Ω, ¼W., 20%
R26—10Ω, ¼W., 20%
R27—2,200Ω, ¼W., 20%
R28—220KΩ, ¼W., 20%
R29—220KΩ, ¼W., 20%
R30—100Ω, ¼W., 20%
R31—220KΩ, ¼W., 20%
R32—10KΩ, ¼W., 20%
R33—10KΩ, ¼W., 20%
R34—470KΩ, ¼W., 20%
R35—2,200Ω, 10W., wirewound, 10%
R36—220Ω, 2W., 20%
R37—100Ω, ¼W., 20%
R38—22KΩ, 1W., 20%
R39—2.2 Meg.Ω, ¼W., 20%
R40—47KΩ, ¼W., 20%
R41—22KΩ, ¼W., 20%
R42—100KΩ, ¼W., 20%
R43—2,200Ω, ¼W., 20%
R44—47KΩ, ¼W., 20%
R45—220KΩ, ¼W., 20%
R46—470KΩ, ¼W., 20%
R47—2,200Ω, ¼W., 20%
R48—2.2 Meg.Ω, ¼W., 20%
R49—1KΩ, ¼W., 20%
R 50—22KΩ, ½W., 20%
T 1—FM I.F. Trans., 10.7 Mc. *ZB-2.276
T 2—AM I.F. Trans., 455 Kc. *ZB-2.275
T 3—FM I.F. Trans., 10.7 Mc. *ZB-2.276
T 4—AM I.F. Trans., 455 Kc. *ZB-2.275
T 5—FM Ratio Detector Transformer, 10.7 Mc. *ZC-2.278
T 6—Output Trans. *ZB-15.019
T 7—Power Trans. *TA-18.053
S 1—Band Switch *SA-12.060
L 1—FM Antenna Coil *LA-2.241
L 2—Antenna Coil, Broadcast *LA-2.273
L 3—R.F. Plate Choke *LA-2.279
L 4—R.F. Coil, FM *LA-2.243
L 5—Oscillator Coil, Broadcast *LA-2.221
L 6—Oscillator Coil, FM *LA-2.222
L 7—R.F. Choke, Conv. Plate *LA-2.242
L 8—Loop, Broadcast *LC-5.018
Antenna, FM, Folded Dipole (300Ω) *LA-5.010
Pilot Lamp, No. 47, 6-8 V.

Part No. GN-569—Rev. 2-5-48 * Mfg. Part No.

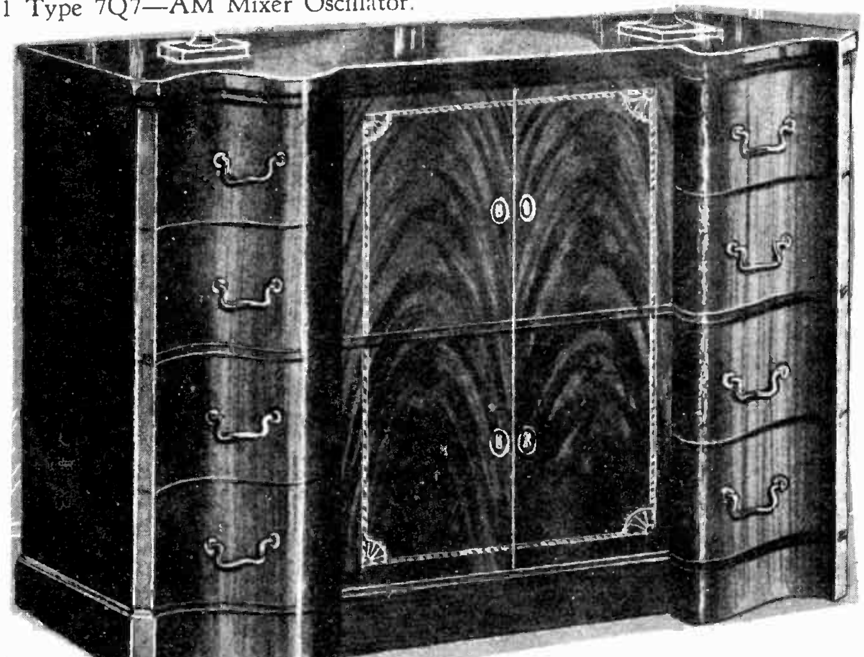
MODEL T5000

MODEL T5000 RADIO & TELEVISION INC.



Tube Complement:

1 Type 6BA6—FM RF Amplifier.
1 Type 7F8—FM Mixer, oscillator.
1 Type 7AH7—1st IF Amplifier.
1 Type 6SH7—FM Detector Driver.
1 Type 7A6—FM Detector.
1 Type 6SQ7/GT—AM Det., A.V.C. and 1st Audio Amplifier.
1 Type 7F7—2nd Audio, Phase Inverter.
2 Type 7C5—Push-pull Power Amplifiers.
1 Type 5Y3—Rectifier.
1 Type 7Q7—AM Mixer Oscillator.



This receiver features the latest in post-war engineering design. It employs 10 tubes plus a rectifier in an AM-FM superheterodyne circuit. Four of the tubes are the dual-purpose type giving the set 15-tube performance. The tuning ranges are:

A.M. — 540 Kc. to 1700 Kc.
F. M. — 88 Mc. to 108 Mc.

The receiver has two built in antennas; a loop antenna for the AM broadcast band and a folded dipole for the FM broadcast band. Provisions are made for external antenna connections. The easy-to-read "slide-rule" type dial is illuminated when the set is on; a dial pointer of red plastic reflects illumination from the two pilot lights. A high ratio drive on the tuning condenser provides smooth tuning. High Fidelity reproduction on FM and AM is the result of well-engineered circuits and the use of high quality parts.

ALIGNMENT PROCEDURE FOR A.M.:

Equipment Required:
a) Broadcast Band Signal Generator.
b) Output Meter.

1. Set band switch to AM. Advance volume control to full volume setting.

2. Connect output meter across voice coil.

3. Connect the Signal Generator across the broadcast band antenna section of the variable condenser. The "high" side of the Generator should connect to the stator section and the "ground" side to the frame or chassis. Adjust the Signal Generator to 455 kc and with the receiver switched on, adjust the first and second I.F. transformers for peak output as shown on the output meter. The signal injected into the receiver should be as small in magnitude as possible, consistent with a useful deflection on the output meter.

4. Connect the "high" side of the Generator to the antenna terminal with a 200 mmf condenser inserted in series. Connect the "ground" side of the Generator to the chassis. Tune receiver to 60 on the dial, adjust Signal Generator to 600 kc. Adjust the BC padder and the BC antenna coil for maximum deflection on the output meter. Use a weak signal.

5. Tune receiver to 160 on the dial. Adjust Signal Generator to 1600 kc. Adjust BC oscillator and BC antenna trimmers for maximum output.

6. Repeat operations 4 and 5.

ALIGNMENT PROCEDURE FOR F.M.:

Note: Points A. B. C. D. E. F. G. and H are noted on circuit diagram.

Points B, C, and D have been brought out to the unused contacts of the speaker socket at the rear of the chassis.

Equipment Required:
a) High frequency Signal Generator with 88-108 Mc tuning range.
b) Signal Generator capable of delivering .1 V at 10.7 mc.
c) Audio output meter.
d) D.C. vacuum tube voltmeter with zero center scale.

a. Ratio Detector Alignment:

1. Connect V.T.V.M. across points "B" and "C" (A.V.C. Voltage).

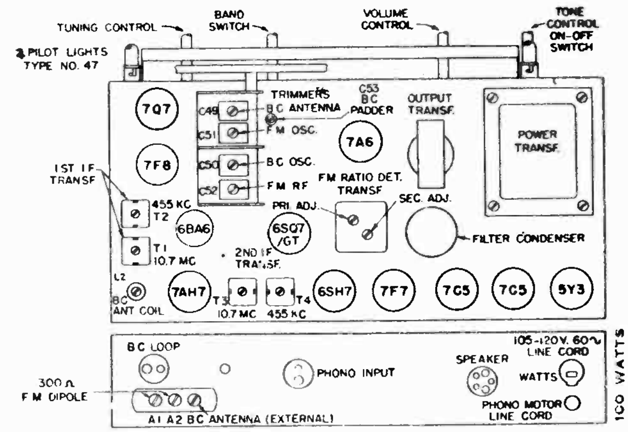
2. Feed 10.7 mc unmodulated R.F. signal into 6SH7 grid (point A) through .01 μfd. condenser. This signal should be .1 volt.

3. Adjust primary of Ratio Detector (T-5) for maximum voltage indication on V.T.V.M.

4. Connect zero centered V.T.V.M. across points "B" and "D".

5. Adjust secondary of Ratio Detector (T-5) for zero indication.

6. Tune 10.7 mc Signal Generator higher in frequency (about 200 kc) until maximum voltage reading is obtained on V.T.V.M.; note this voltage, then tune signal generator lower in frequency until maximum voltage of the opposite polarity is obtained. Note this voltage, then if necessary re-adjust primary of the Det. (T-5) until the detector voltages are about equal on either the high or low side of 10.7 mc.



Tube and Trimmer Locations.

b. 10.7 I.F. Alignment:

1. Shunt a 1,000-ohm carbon resistor across the primary of the detector (T-5) (Points G and H).

2. Connect output meter across speaker voice coil.

3. Volume and tone controls at maximum clockwise position.

4. Connect 10.7 mc (modulated 30% signal generator through .01 μfd. condenser across point "F" and ground.

5. Adjust secondary, then primary of (T-3) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)

6. Connect 10.7 mc 30% modulated signal generator across point "E" and ground.

7. Adjust secondary, then primary of (T-1) for maximum audio output. (Reduce input signal to maintain output at .5-watt level.)

8. Remove 1000-ohm shunting resistor from across primary of (T-5).

c. Oscillator and R.F. Alignment:

1. Connect V.T.V.M. across "B" and "C" (A.V.C. voltage).

2. Connect 108 mc signal generator to FM antenna terminals. If generator impedance is low, put one 150-ohm carbon resistor in series with each of the generator leads. Tune receiver dial to 108 mc.

3. Adjust FM oscillator trimmer (C-51) for maximum V.T.V.M. reading.

4. Adjust FM R.F. trimmer (C-52) for maximum V.T.V.M. reading. During alignment reduce input signal to maintain A.V.C. voltage at 2 V.

5. Repeat steps 3 and 4.

6. Feed a 90 mc signal into antenna terminals (as in C-2), tune receiver dial to signal.

7. Adjust spacing of FM R.F. coil (L-4) for maximum V.T.V.M. reading at 90 mc. During alignment reduce input signal to maintain A.V.C. voltage at 2 V.

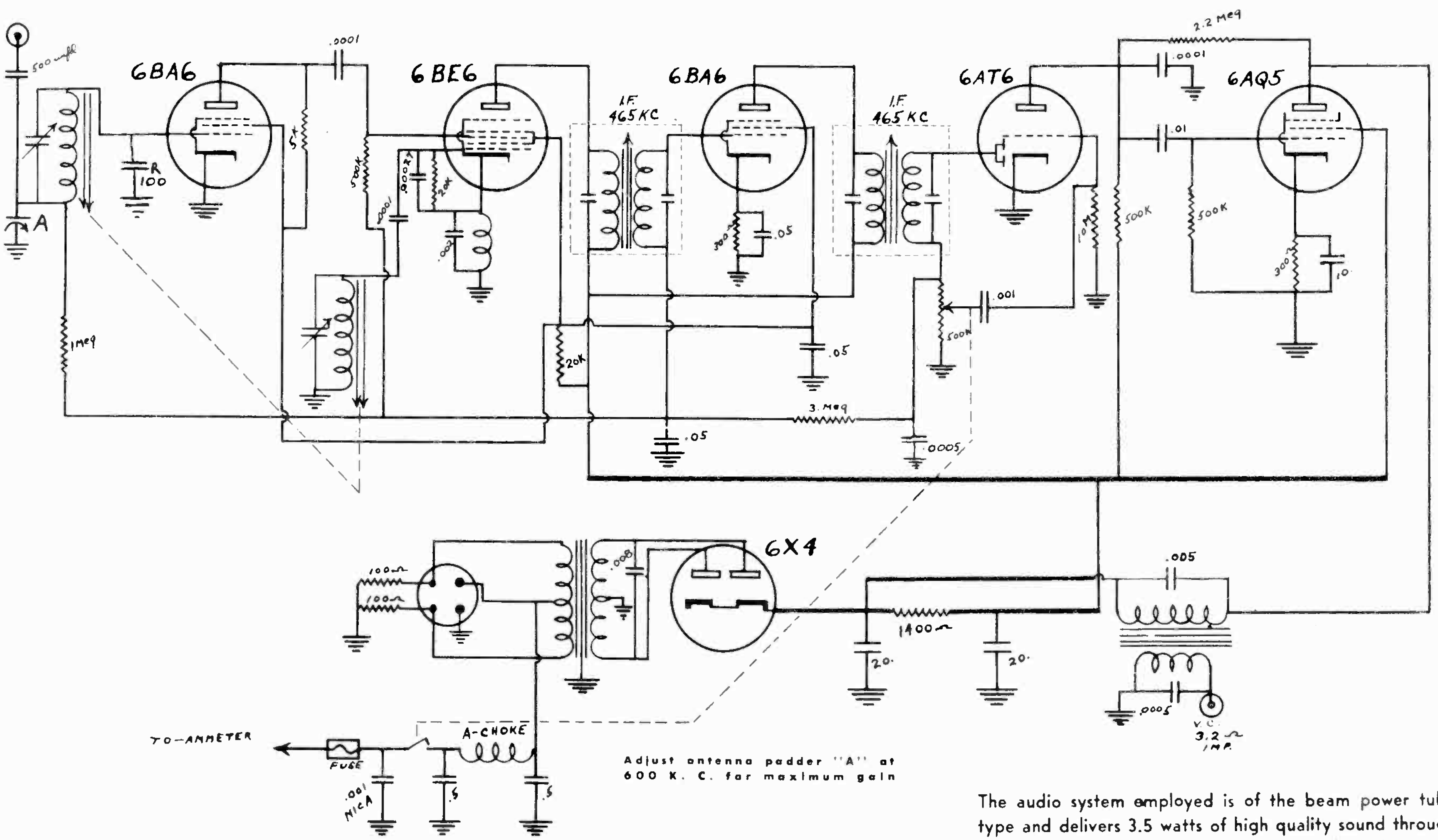
8. Repeat steps 2 and 4 if necessary.

Power:

This receiver operates on 105-125 volts, 60 cycle, AC. Do not plug this radio receiver into a direct current socket. Power consumption is 80 watts.

RADIO & TELEV. PRODUCTS CO.

MODEL 47602



The circuit employed in the 47602 is of the Superheterodyne type, foremost in the radio world of today. It consists of a 6 miniature tube radio chassis featuring: High sensitivity, permeability tuning and high fidelity in an efficient compact size.

The audio system employed is of the beam power tube type and delivers 3.5 watts of high quality sound through a 6 inch Alnico V-PM speaker which is supplied along with the necessary mounting hardware and baffle for most automobiles.

This auto radio can be mounted in practically all widely sold automobiles.

ANTENNA

A shielded antenna cable (30 mmf. capacity) with bayonet connector plug is required.

The plug on the antenna cable is inserted in the socket at the side of the radio case. The wire at the other end of the cable is connected to the antenna.

Low Capacity Antenna

This radio is designed for a low capacity car antenna. The total capacity of antenna and shielded cable should be 40 to 70 mmf.

The following procedure has been found to be effective in reducing motor noise to a satisfactory level in most cars. Follow the steps in the order given. Additional procedure, which may be required in exceptional cases of motor noise, is not covered here and will be found by referring to current literature on this subject.

GENERATOR CONDENSER—A generator condenser is required in all cases. Connect the condenser lead to the battery terminal of the generator. The case and mounting strap connect the other side of the condenser to ground. This unit must, therefore, be well grounded at its mounting.

CAUTION—In cars with automatic regulators, it is important not to connect the condenser across the field terminal. Most manufacturers at the present time have a recommendation for the proper post at which to connect the condenser.

DISTRIBUTOR SUPPRESSOR—A distributor suppressor will be required in most cases. Remove the high tension lead to the distributor. Insert a distributor suppressor and connect the wire to the other end of the suppressor. If this is not practical, cut the high tension lead close to the distributor and use a wood screw end type distributor suppressor in this line.

Withdraw Antenna Cable Plug

Turn on the radio and start the motor.

If motor noise is heard, proceed as follows:

BONDING CABLES, STEERING COLUMN, ETC.—Try grounding to the fire wall all cables and tubing which pass through it such as oil lines, gas lines, etc. It is also possible for the steering column, foot pedals, and brake lever to carry interference to the back of the fire wall at which point it may affect the radio. By means of a file, contact can be established between any of these parts and the fire wall or frame in order to determine whether such a ground will reduce the noise. To bond the parts to the fire wall or frame, clean the point of contact, wrap a length of one inch braided shielding around the part, and solder the connection. Then solder the end of the shielding to the fire wall or frame or ground it under a screw head if one is convenient.

Sufficient play should be left in the bonding shielding so that movement of the parts will not loosen this shielding.

Then Reinsert Antenna Cable Plug

If motor noise is heard when the antenna cable is reconnected, proceed as follows until the noise is satisfactorily reduced:

BYPASS CONDENSERS—Try a .5 mfd. bypass condenser from the ammeter to ground and see if interference is reduced. Install this condenser permanently if there is an improvement.

In like manner, try a .5 mfd. condenser from car fuse to ground, switch to ground, tail light and stop light connections to ground, windshield wiper and various other 6 volt connections to ground, noting what effect these condensers have on the noise pickup.

Try a .5 mfd. condenser between the point at which the dome light lead leaves the pillar post and ground.

Try a .5 mfd. condenser from the "Hot" side of the coil primary to ground.

The electric gauges used for oil, water, and gas are often a source of interference and bypass condensers should be tried. The condenser should usually be connected to the end of the line nearest the measuring device rather than at the instrument panel.

HIGH AND LOW TENSION LEADS—In some cases, the high and low tension leads between the coil and distributor are run close together. In some cars, they are in the same conduit. If this is the case, remove the low tension lead from this conduit. In any event, keep the high and low tension leads as far apart from each other as possible.

If separating the two leads is not sufficient, shield and ground the shield of the low tension lead.

GROUNDING MOTOR AND OTHER PARTS — The motor must, in every case, be well grounded to the frame of the car. If it is not, use a very heavy braided lead for this purpose, similar to a storage battery ground lead. In like manner, it may be necessary to check the grounding of the metal fire wall, instrument panel, transmission, radiator, hood, and muffler to the frame of the automobile. To obtain a good electrical connection, scrape off the paint, if necessary, at the point where ground contact is made.

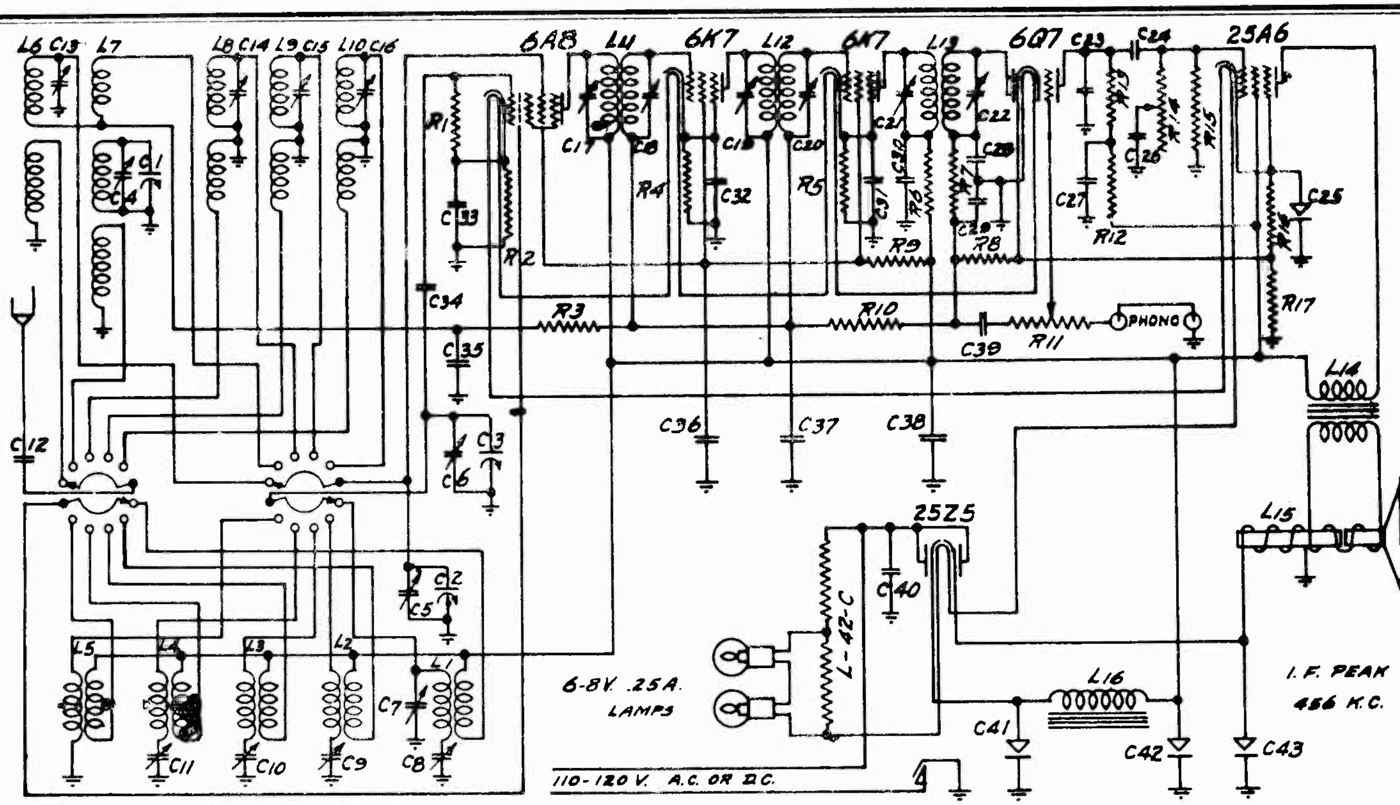
PEENING ROTOR ARM—In extreme cases of motor noise, it is advisable to peen the distributor rotor arm, that is, increase the length of the arm by using a small machinist's hammer. This will lessen the gap between the rotor arm and the stationary contacts thus reducing the spark. Be sure, after peening the arm, that it does not strike the stationary contacts.

SPARK PLUG SUPPRESSORS—If motor noise persists, spark plug suppressors must be installed. One suppressor is put on each plug. These are not regularly supplied with the radio and must be purchased extra. Ninety-five per cent of all cars will not require spark plug suppressors. Care should be taken that a good mechanical and electrical connection is made between the spark plugs, suppressors, and plug wires.

WHEEL OR BRAKE STATIC—To determine if noise is being caused from this source, set the car in motion; then with the motor shut off and the clutch disengaged, apply the brakes. If the noise stops, the source of the static is in the wheels. The use of a front or rear wheel static eliminator will generally end the trouble.

RADIO WIRE TELEVISION

MODEL A-23



CODE	PART NO.	RESISTORS
R1	53-898	50,000 Ohm Oscillator Grid Resistor
R2	53-1062	250 Ohm Oscillator Cathode Resistor
R3	53-923	100,000 Ohm A.V.C. Network Resistor
R4	53-1063	500 Ohm First I.F. Cathode Resistor
R5	53-1063	500 Ohm Second I.F. Cathode Resistor
R6	53-919	5,000 Ohm Second I.F. Plate Isolation Resistor
R7	53-898	50,000 Ohm Diode Filter Resistor
R8	53-925	500,000 Ohm Diode Load Resistor
R9	53-921	40,000 Ohm Screen Feed Resistor
R10	53-926	1 Meg Ohm A.V.C. Network Resistor
R11	19-1291	500,000 Ohm Volume Control & Switch
R12	53-898	50,000 Ohm Second Detector Plate Hum Resistor
R13	53-924	250,000 Ohm Second Detector Plate Resistor
R14	19-1317	250,000 Ohm Tone Control
R15	53-925	500,000 Ohm Output Grid Resistor
R16	53-1426	750 Ohm Output Cathode Resistor
R17	53-1122	40 Ohm Second Detector Cathode Resistor
		INDUCTANCES
L1	17-1648	No. 5 Band Oscillator Coil Assembly
L2	17-1646	No. 4 Band Oscillator Coil Assembly
L3	17-2083	No. 3 Band Oscillator Coil Assembly
L4	17-1665	No. 2 Band Oscillator Coil Assembly
L5	17-2084	No. 1 Band Oscillator Coil Assembly
L6	17-2085	No. 5 Band Preselector Coil Assembly
L7	17-2080	No. 4 Band Preselector Coil Assembly
L8	17-2082	No. 3 Band Preselector Coil Assembly
L9	17-1666	No. 2 Band Preselector Coil Assembly
L10	17-1664	No. 1 Band Preselector Coil Assembly
L11	68-2014	First I.F. Transformer Assembly
L12	68-2014	Second I.F. Transformer Assembly
L13	68-2021	Third I.F. Transformer Assembly
L14	64-2026	8" Speaker 25A6 Output Trans. on L15
L15	64-2026	8" Speaker 3000 Ohm Field
L16	14-940	20 Henry Filter Choke

CODE	PART NO.	CONDENSERS
C1	77-1581	1st. Preselector Section of 3 Gang Condenser
C2	77-1581	2nd. Preselector Section of 3 Gang Condenser
C3	77-1581	Oscillator Section of 3 Gang Condenser
C4		C1 Reciprocal Trimmer
C5		C2 Reciprocal Trimmer
C6		C3 Reciprocal Trimmer
C7	78-2010	3-30 MMFD. No. 5 Band Oscillator Trimmer
C8	78-1569	1[illegible]0 MMFD. No. 5 Band Oscillator Series Trimmer
C9	78-1569	450 MMFD. No. 4 Band Oscillator Series Trimmer
C10	78-1572	600 MMFD. No. 3 Band Oscillator Series Trimmer
C11	78-1572	1600 Mfd. No. 2 Band Oscillator Series Trimmer
C12	75-2003	.01 Mfd. Antenna Series Condenser
C13	78-2010	3-30 MMFD. No. 5 Band Preselector Coil Parallel Trimmer
C14	78-2010	3-30 MMFD. No. 3 Band Preselector Coil Parallel Trimmer
C15	78-2010	3-30 MMFD. No. 2 Band Preselector Coil Parallel Trimmer
C16	78-2010	3-30 MMFD. No. 1 Band Preselector Coil Parallel Trimmer
C17	78-1561	70-120 MMFD. 1st. I.F. Primary Trimmer
C18	78-1561	70-120 MMFD. 1st. I.F. Secondary Trimmer
C19	78-1561	70-120 MMFD. 2nd. I.F. Primary Trimmer
C20	78-1561	70-120 MMFD. 2nd. I.F. Secondary Trimmer
C21	78-1561	70-120 MMFD. 3rd. I.F. Primary Trimmer

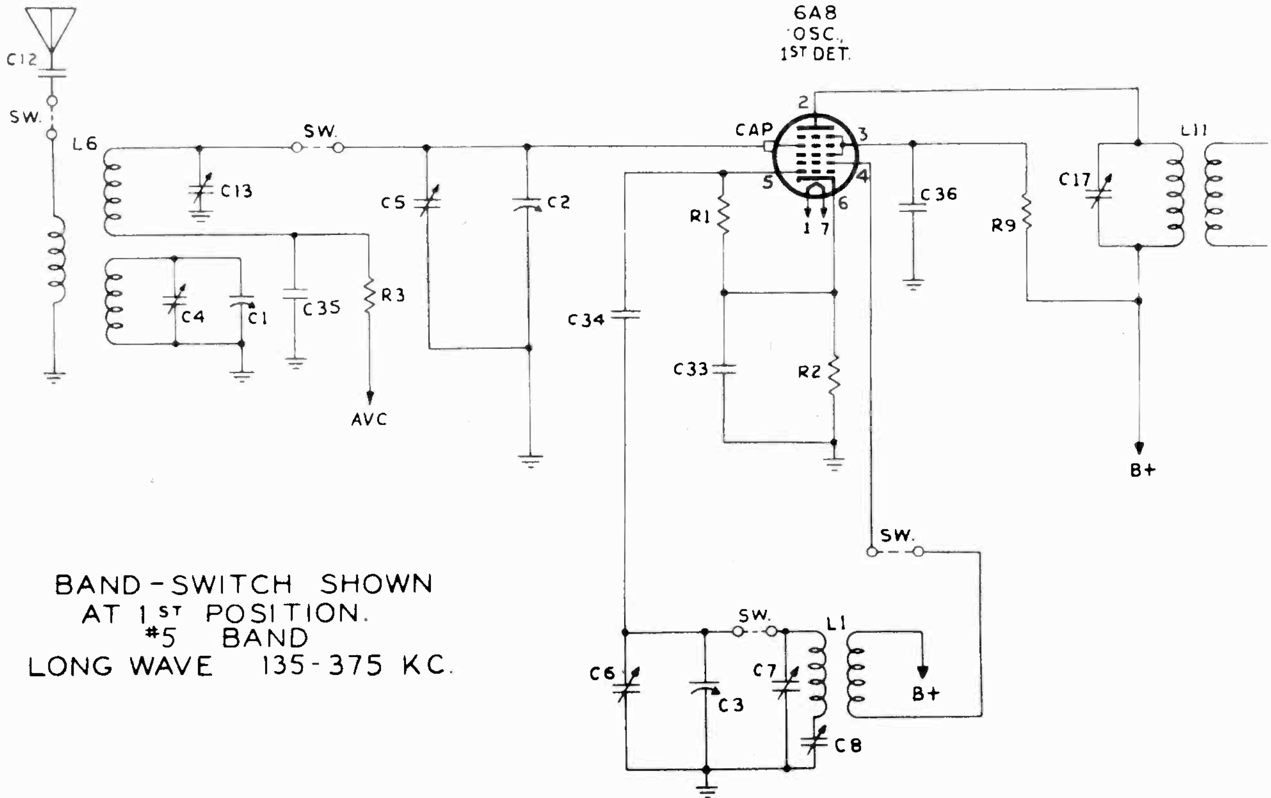
CODE	PART NO.	CONDENSERS (Cont.)
C22	78-1561	70-120 MMFD. 3rd. I.F. Secondary Trimmer
C23	76-265	.001 Mfd. Second Detector Plate Filter
C24	75-2003	.01 Mfd. Audio Feed Condenser
C25	18-928	25 Mfd. Electrolytic Condenser 25A6 Cathode By-Pass
C26	75-2003	.01 Mfd. Tone Control Condenser
C27	75-2005	.1 Mfd. 200 Volt Paper Second Detector Plate Hum Filter
C28	76-2001	.0001 Mfd. Mica Diode Filter Condenser
C29	76-2001	.0001 Mfd. Mica Diode Filter Condenser
C30	75-2003	.01 Mfd. 400 V. Paper 2nd. I.F. Plate Isolation Cond.
C31	75-2005	.1 Mfd. 200 Volt Paper 2nd. I.F. Cathode Resistor
C32	75-2005	.1 Mfd. 200 Volt Paper 1st. I.F. Cathode Resistor
C33	75-2005	.1 Mfd. 200 Volt Paper Osc. & 1st. Det. Cathode Resistor
C34	76-268	.00025 Mfd. Mica Oscillator Grid Condenser
C35	75-2005	.1 Mfd. 200 Volt Paper A.V.C. By-Pass Condenser
C36	75-2011	.5 Mfd. 200 Volt Paper Screen Grid By-Pass Condenser
C37	75-2005	.1 Mfd. 200 Volt Paper A.V.C. By-Pass Condenser
C38	75-2013	1. Mfd. 400 Volt Paper B Supply By-Pass Condenser
C39	75-2003	.01 Mfd. 400 Volt Paper Audio Feed Condenser
C40	75-2005	.1 Mfd. 200 Volt Paper Line By-Pass Condenser
C41	18-2003	11 Mfd. Dry Electrolytic Condenser 150 W.V.
C42	18-2003	4 Mfd. Dry Electrolytic Condenser 150 W.V.
C43	18-2003	4 Mfd. Dry Electrolytic Condenser 150 W.V.

CLARI-SKEMATIX

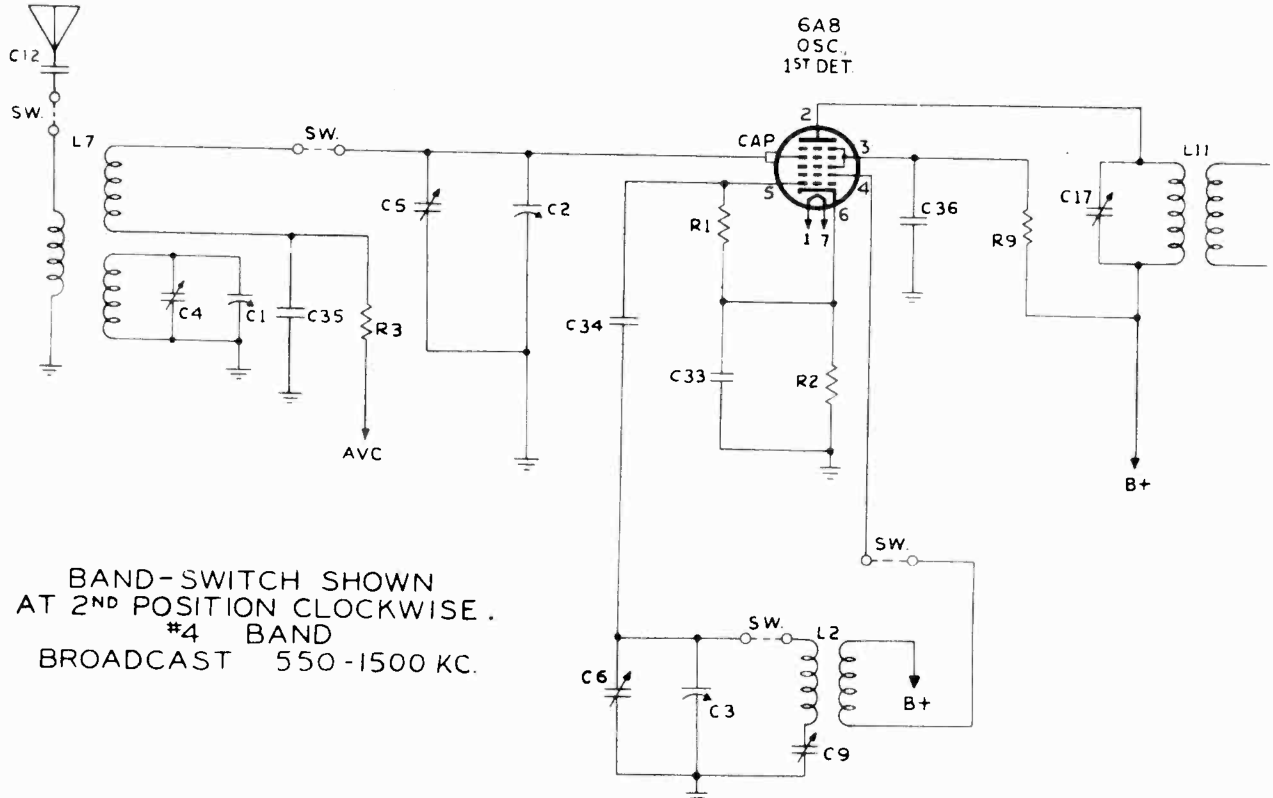
Registered Trademark

MODEL A-23

RADIO WIRE TELEVISION



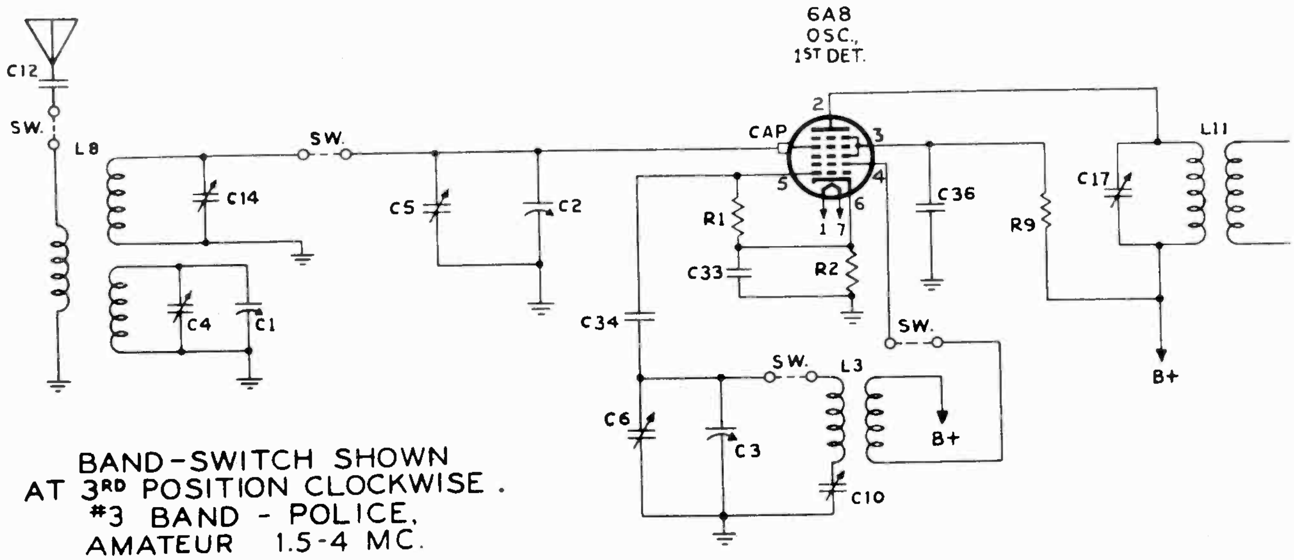
BAND-SWITCH SHOWN
AT 1ST POSITION.
#5 BAND
LONG WAVE 135-375 KC.



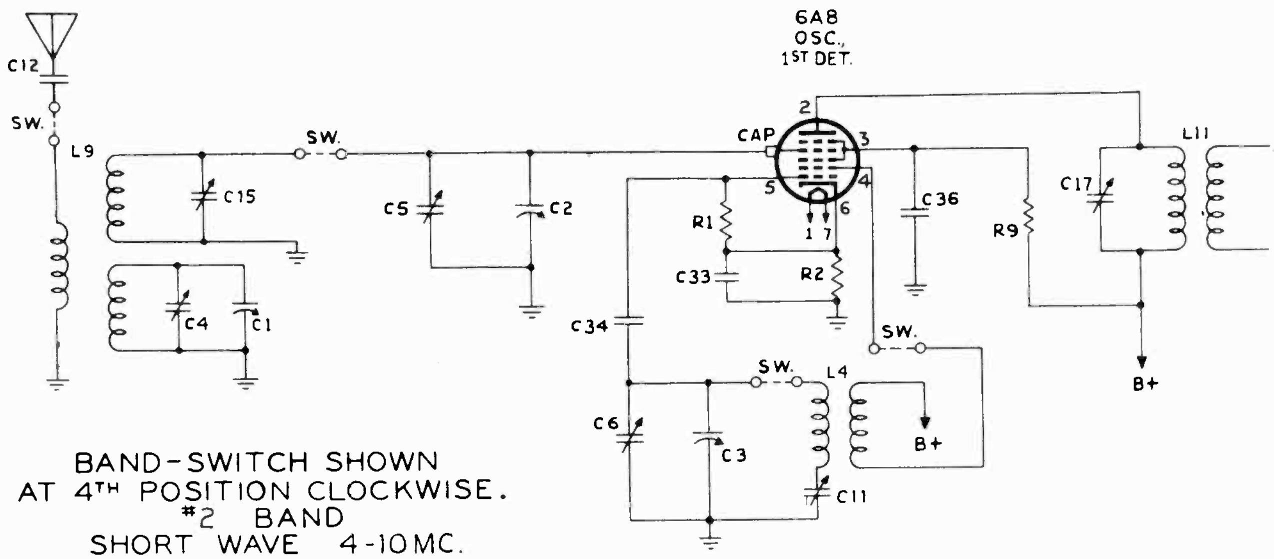
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE.
#4 BAND
BROADCAST 550-1500 KC.

RADIO WIRE TELEVISION

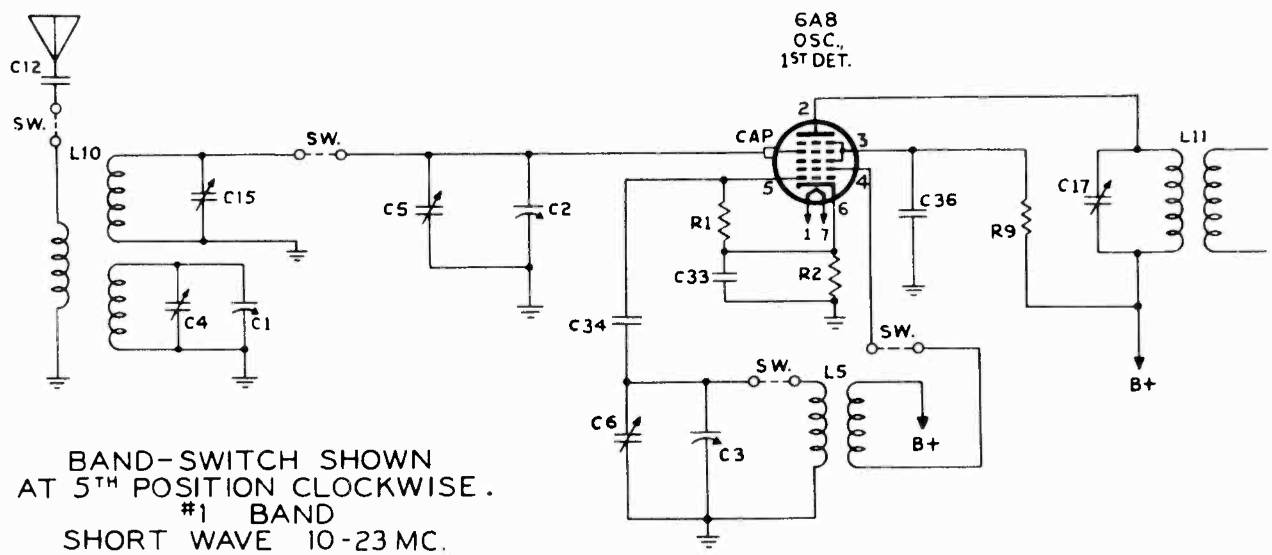
MODEL A-23



BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE.
#3 BAND - POLICE,
AMATEUR 1.5-4 MC.



BAND-SWITCH SHOWN
AT 4TH POSITION CLOCKWISE.
#2 BAND
SHORT WAVE 4-10MC.



BAND-SWITCH SHOWN
AT 5TH POSITION CLOCKWISE.
#1 BAND
SHORT WAVE 10-23 MC.

MODEL A-23 RADIO WIRE TELEVISION

GANGING OF AC-DC SEVEN TUBE SUPERHETERODYNE

APPARATUS:

Signal Generator having output frequencies from 20 megacycles to 150 kilocycles.
Output Meter.
Small tools such as screwdriver, 1/4" wrench, etc.

GANGING OF THE I.F. AMPLIFIER:

The signal generator should be adjusted to 456 kilocycles, its output should be adjusted to some medium value and connected directly (no dummy antenna being used) to the grid of the first detector which is the first tube on the left hand side of the receiver when facing the front of the receiver. With this connection made and the volume control turned on a signal should be indicated on the output meter. This should be adjusted to approximate half scale reading and the adjustments of the trimming condensers in the I.F. transformers made. The last intermediate frequency transformer, which is the transformer furthest to the rear of the receiver on the right hand side. These two circuits should be ganged for maximum amplitude as indicated by the output meter and output of the signal generator should be decreased from time to time as the ganging operation progresses so that it is not over loaded. After carefully ganging the last transformer the second transformer should be ganged. The ganging operation should be carried on as before and then the first transformer, which is the transformer on the right hand front corner of chassis, should be ganged. It is often desirable to go over this procedure a second time because slight variations of one circuit tend to detune other circuits and the operation will be found to have been more accurately made if the whole ganging sequence pertaining to the I.F. amplifier is gone over a second time.

The sensitivity of the I.F. amplifier after it is correctly ganged should be in the neighborhood of 8 to 10 microvolts.

GANGING OF OSCILLATOR AND PRESELECTOR CIRCUITS:

(Broadcast Band)

The output of the signal generator should now go through a standard dummy antenna and be connected to antenna and ground posts of the radio chassis. The signal generator should be set at 1400 kilocycles, the wave change switch should be set on its fourth position and the dial set so that No. 4 band reads 1400 kilocycles. At this point the trimming condenser on the first section of the variable condenser should be trimmed until a signal is indicated on the output meter. After correctly peaking this signal, the two preselector trimming condensers occurring on the second and rear sections of the variable condenser should be trimmed, for maximum output. The dial reading of the receiver and the signal generator should now be changed to 600 kilocycles and the reciprocal trimmer for the broadcast band, which is the trimming adjustment occurring at the left upper position of the four trimmers on the front of the chassis, should be varied until the 600 kilocycle signal is indicated on the output meter. The signal generator and the receiver should again be tuned to 1400 kilocycles and the trimming adjustment on the first section of the variable condenser retuned for maximum amplitude at 1400 kilocycles. The signal generator and receiver should now be tuned to 1000 kilocycles and the sensitivity at this point checked. This completes the ganging for the broadcast band.

(Police Band No. 3)

The signal generator should be set at 4 megacycles, the wave change switch changed to the No. 3 position and the receiver tuned in the vicinity of the dial reading on the No. 3 band of 4 megacycles where the signal will be found. After peaking this signal on the output meter by means of dial tuning, the No. 3 band preselector adjustment should be peaked - this will be found on the under side of the receiver and it will be that adjustment mounted on the small coil which is nearest the rear of the receiver. In making these preselector adjustments on the higher frequencies, it is often desirable to continuously sweep the tuning of the receiver back and forth across the receiver and note the amplitude of the output meter, continuously trimming the preselector circuit because at these higher frequencies a change in preselector tuning will affect the oscillator tuning to some extent. After this adjustment is made the signal generator and receiver should be adjusted to 1.5 megacycles and the left lower adjustment to the left of the wave change switch should be adjusted until the signal peaks on the output meter. The signal generator and receiver should again be set to the 4 megacycle reading then checked for amplitude.

(No. 2 Band)

The signal generator should now be adjusted to 10 megacycles and the wave change switch be in the No. 2 position and the tuning adjustment of the radio receiver swept back and forth in the vicinity of ten megacycles until the signal peaks on the output meter. The center adjustment of the three adjusting trimmers underneath the chassis should now be adjusted for maximum amplitude on the output meter after which the signal and receiver should be tuned to 4 megacycles and the left lower adjustment on the left hand side of the wave change switch should be adjusted until the signal peaks on the output meter.

(No. 1 Band)

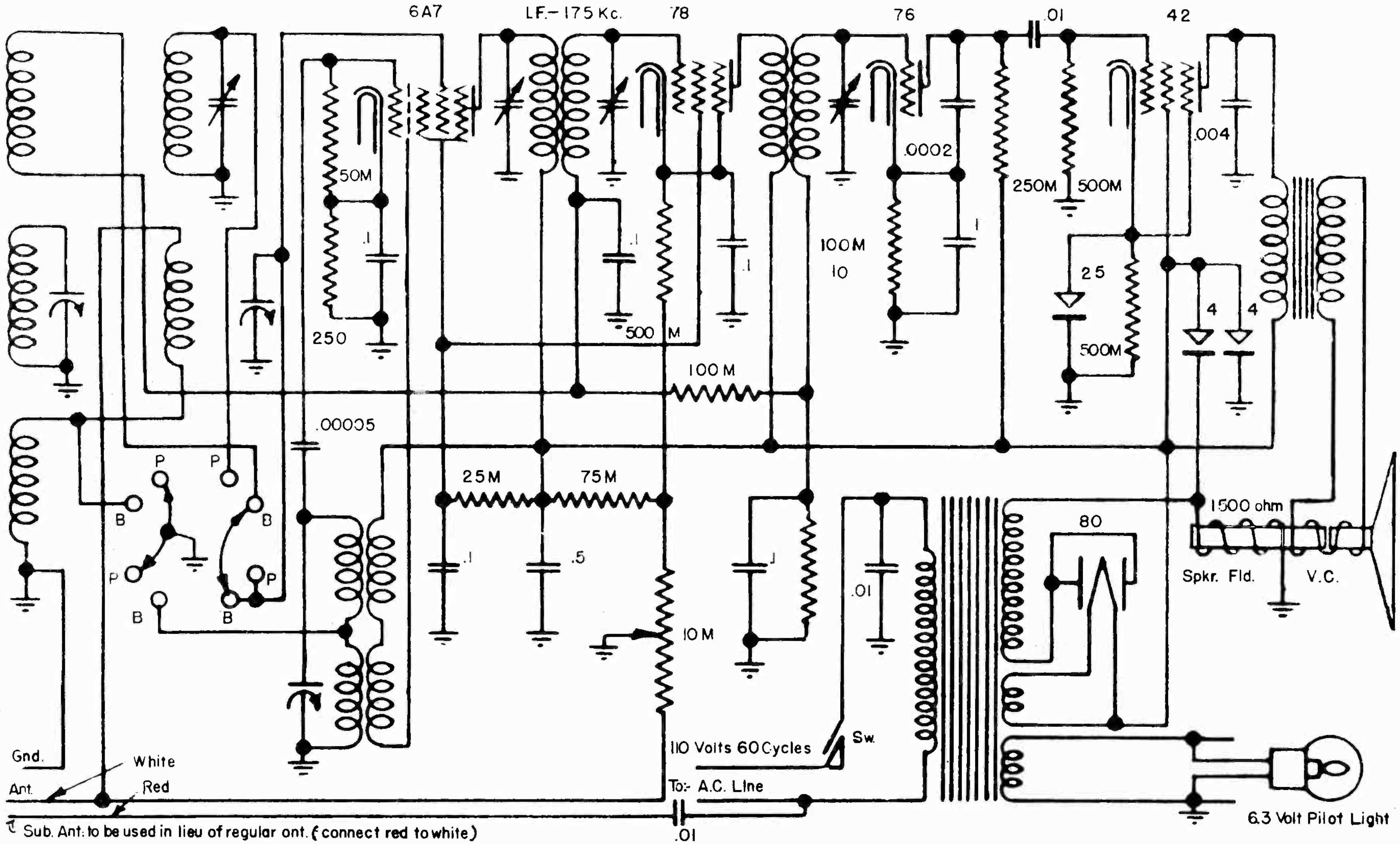
The signal generator should be adjusted to a frequency of 20 megacycles and the wave change switch placed in its No. 1 position. The tuning adjustment of the radio receiver should be swept back and forth in the vicinity of 20 megacycles until the signal peaks on the output meter after which the adjusting trimmer nearest the front chassis skirt should be adjusted for maximum amplitude.

(No. 5 Long Wave Band)

The signal generator and tuning adjustment on the radio should be adjusted to 350 kilocycles and the wave change switch be in its No. 5 position and the adjustment located underneath the chassis near the left hand front corner should be adjusted until the signal is indicated on the output meter, after which the adjustment on the coil on top of the receiver chassis immediately to the left of the variable condenser should be adjusted for maximum amplitude. The signal generator and the tuning adjustment on the radio chassis should be adjusted to 150 kilocycles and the adjustment furthest to the left above and to the left of the wave change switch should now be adjusted until the signal peaks on the output meter. The signal generator and radio chassis should again be adjusted to 350 kilocycles and the first adjustment compensated for any change that the last adjustments may have had on it.

MODEL A-41

RADIO WIRE TELEVISION



WAVE BAND SWITCH

This receiver affords operation on the broadcast band and also on the policy band, extending from 4 megacycles to 1.5 megacycles. With the switch turned to the left, operation will be afforded on the broadcast band. When it is turned to the right, or clockwise, the police band is connected and all police stations, commercial phone stations and amateur stations operating on the 80 meter and 150 meter band will be received.

RADIO WIRE TELEVISION

MODEL A-41

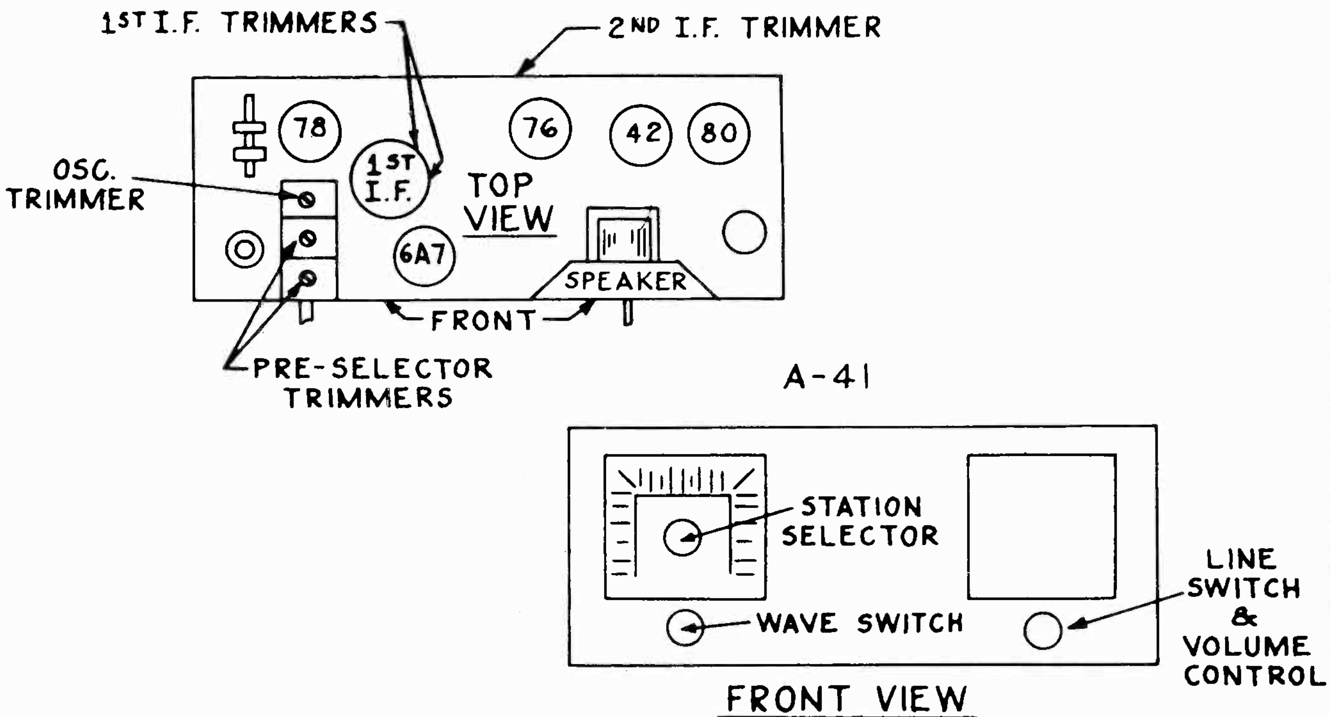
ALIGNMENT PROCEDURE

Do not attempt the following adjustments unless thoroughly familiar with the alignment procedure of modern superheterodyne circuits and in possession of all necessary equipment.

To align the Model A-41

Short antenna to ground. Short oscillator section of 3 gang tuning condenser. Connect a signal generator tuned to 175 K.C. thru a .00025 mfd. condenser to grid of first detector tube. Signal generator and receiver grounds should be connected together. Connect output meter to output of amplifier tube. With volume control at maximum, adjust signal generator attenuator for minimum visible deflection on output meter. Adjust I.F. trimmer condensers for maximum deflection on output meter. When I.F. is aligned, remove shorts from oscillator condenser and antenna. Using same procedure as in aligning I.F.'s, now connect signal generator tuned to 1400 K.C. to antenna lead. Adjust trimmer condensers on three gang condenser for correct calibration and maximum output.

To align receiver on policy band, tune three gang condenser to a 4000 K.C. signal from generator, and adjust police band trimmer till maximum sensitivity is noted on output meter. Band Switch is on "Police Band" position during this alignment.

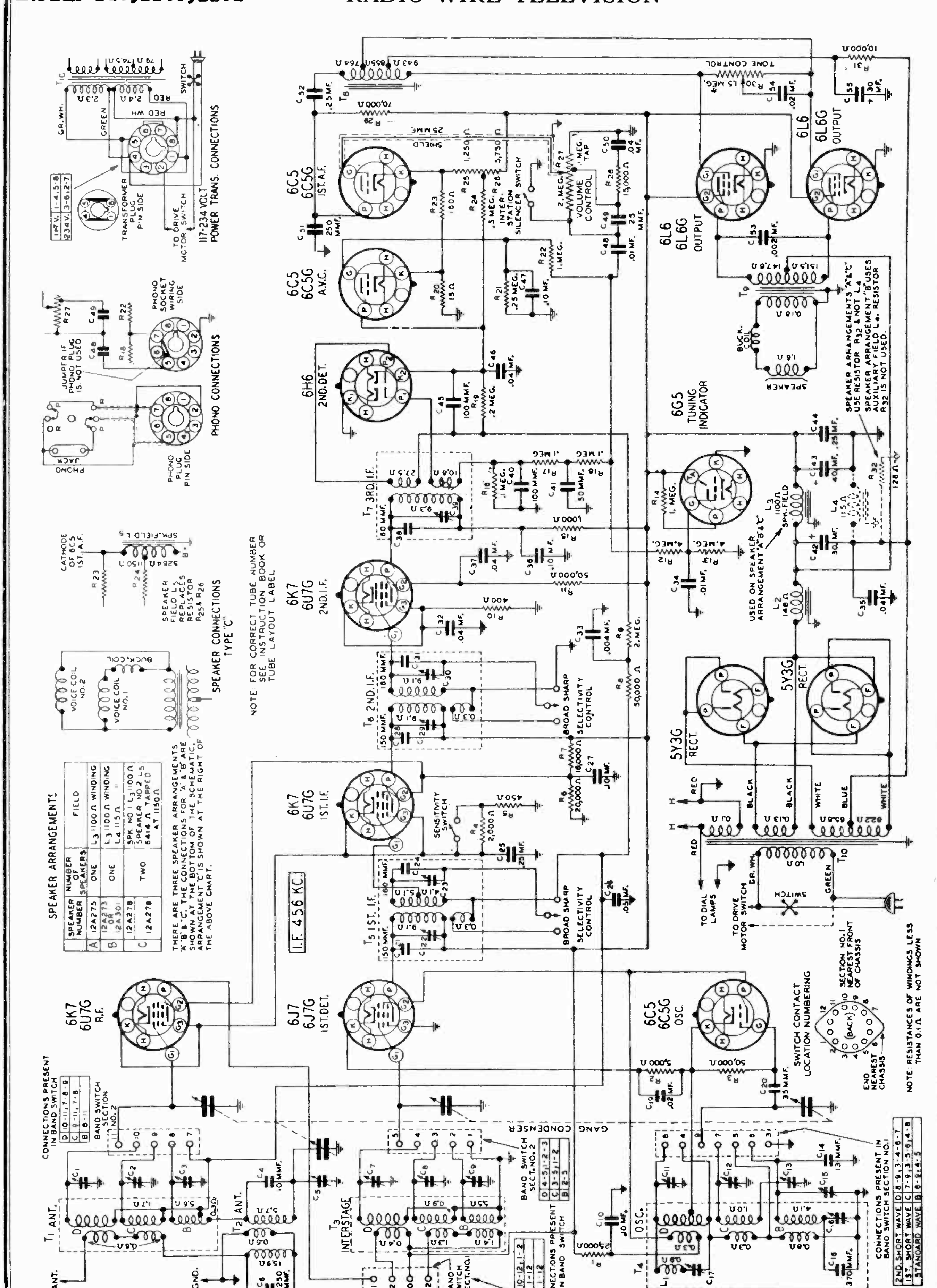


D.C. VOLTAGES TO CHASSIS

TUBE	FILAMENT	CATHODE	SCREEN GRID	PLATE	OSC. GRID	OSC. PLATE
78	5.3	2.65	69	170	----	----
76	5.3	----	--	93	----	----
42	5.3	9.6	178	168	----	----
80	4.2	(Fil. to chassis)- 178 volts				
6A7	5.3	2.6	97	178	5.3	178

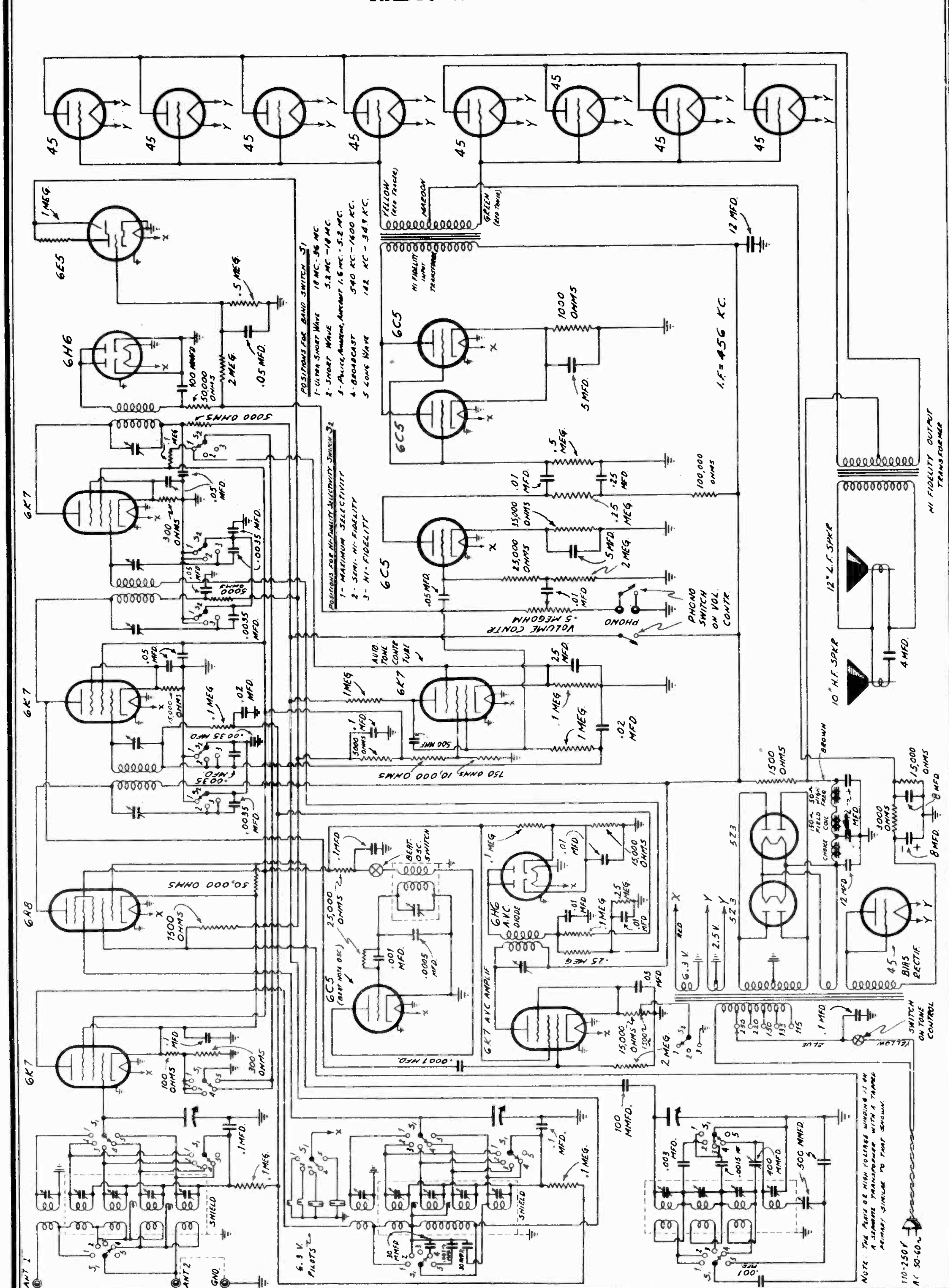
MODELS B43,BB60,BB61

RADIO WIRE TELEVISION



RADIO WIRE TELEVISION

MODEL C-95

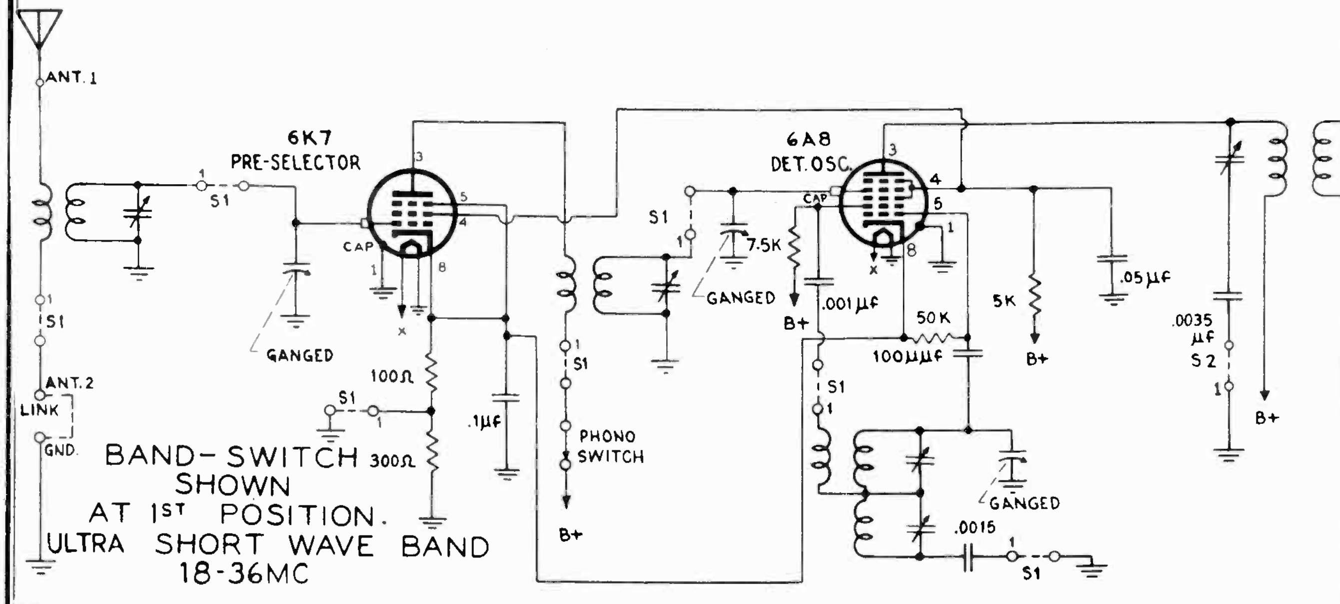


CLARI-SKEMATIX

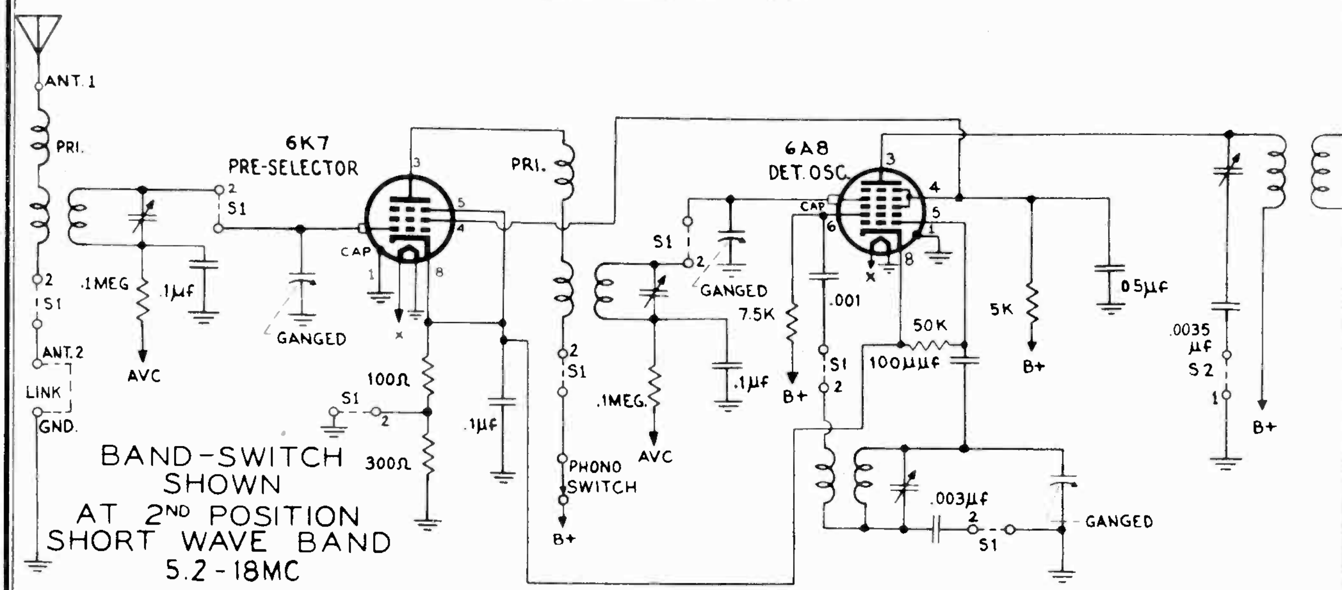
Registered Trademark

MODEL C-95

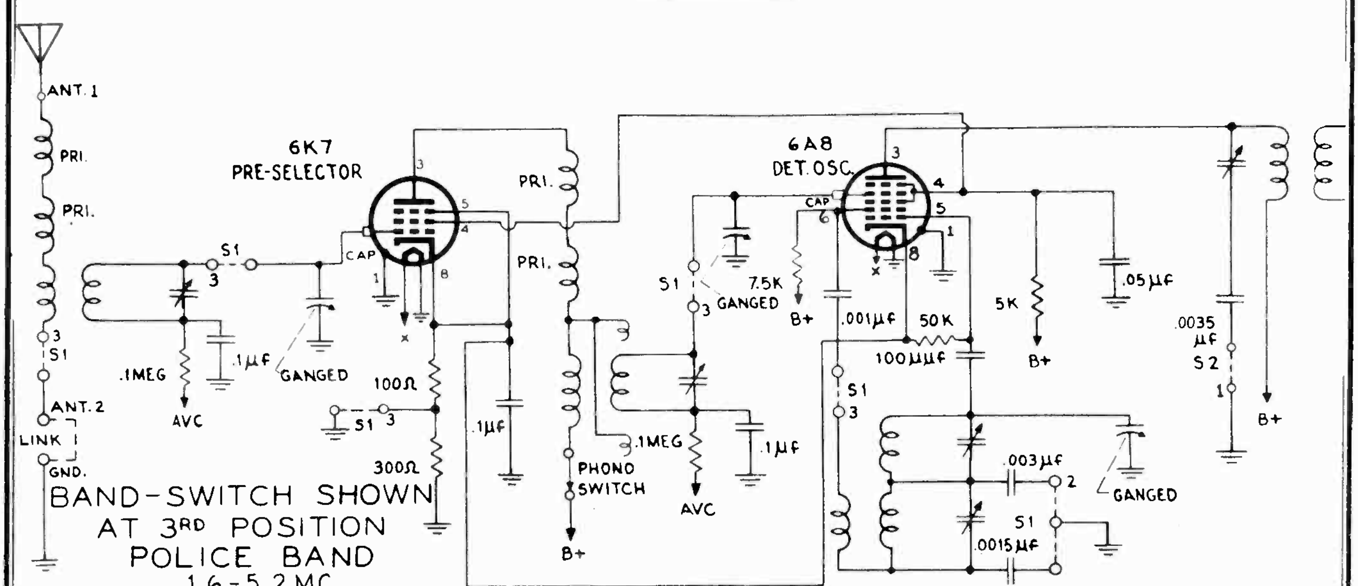
RADIO WIRE TELEVISION



BAND-SWITCH SHOWN AT 1ST POSITION. ULTRA SHORT WAVE BAND 18-36MC



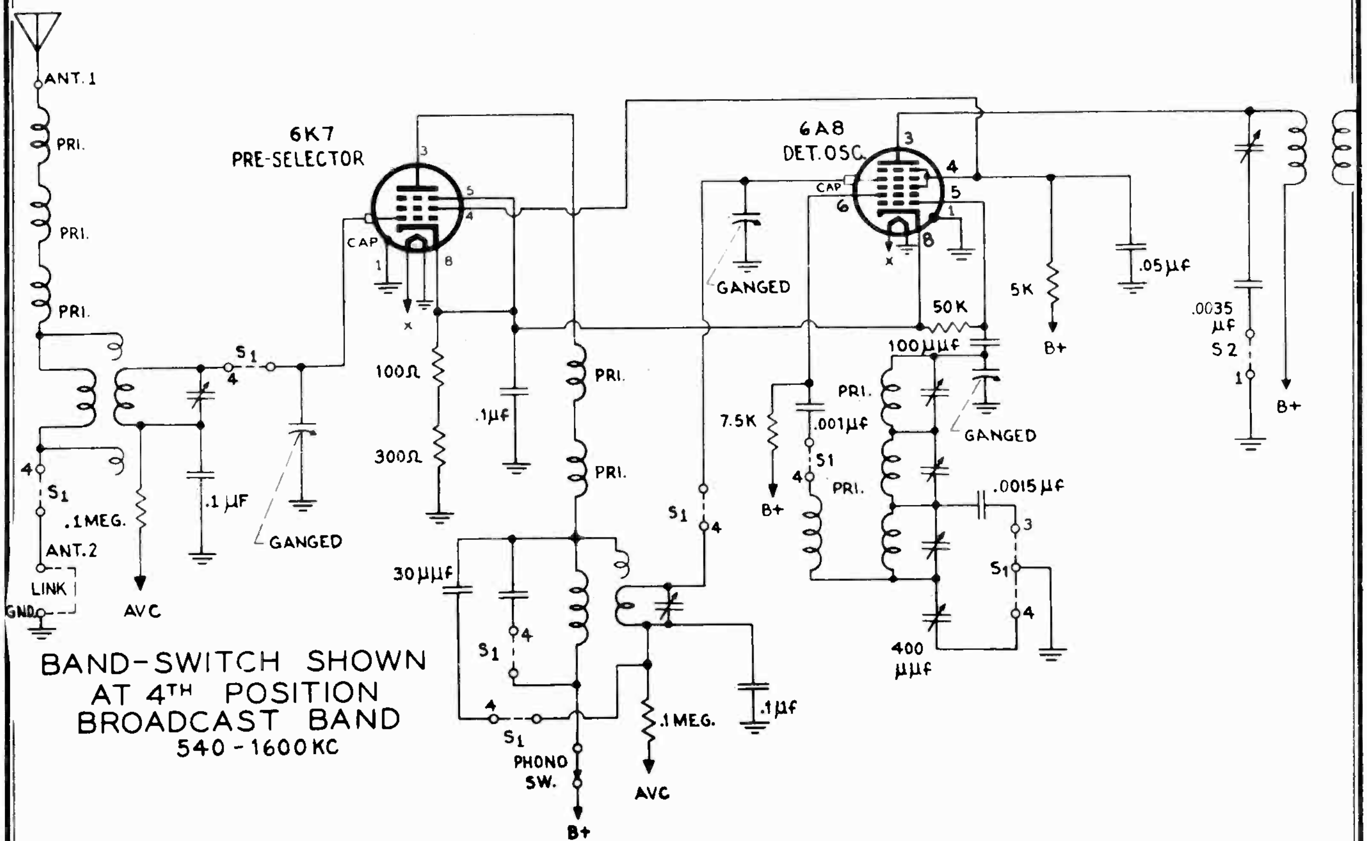
BAND-SWITCH SHOWN AT 2ND POSITION SHORT WAVE BAND 5.2-18MC



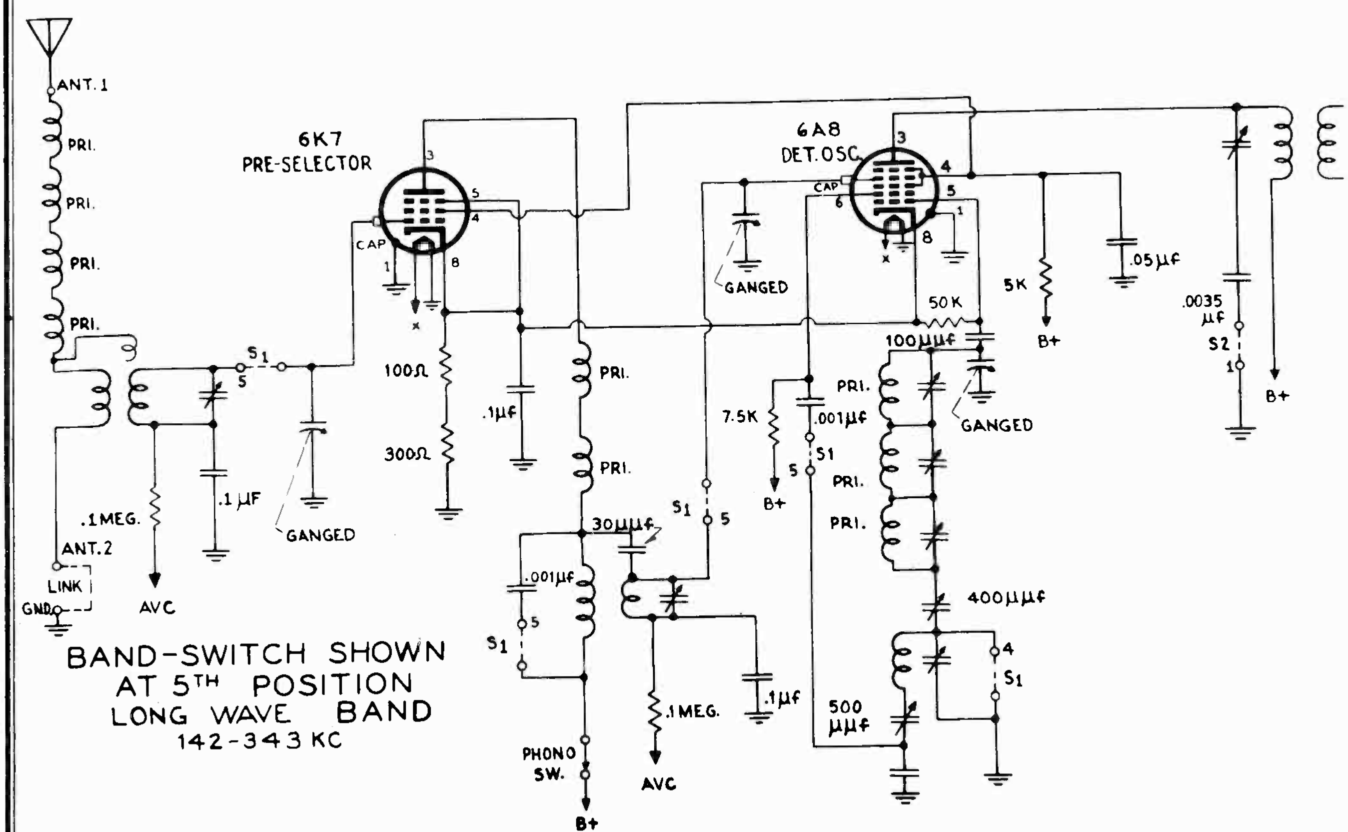
BAND-SWITCH SHOWN AT 3RD POSITION POLICE BAND 1.6-5.2 MC

RADIO WIRE TELEVISION

MODEL C-95



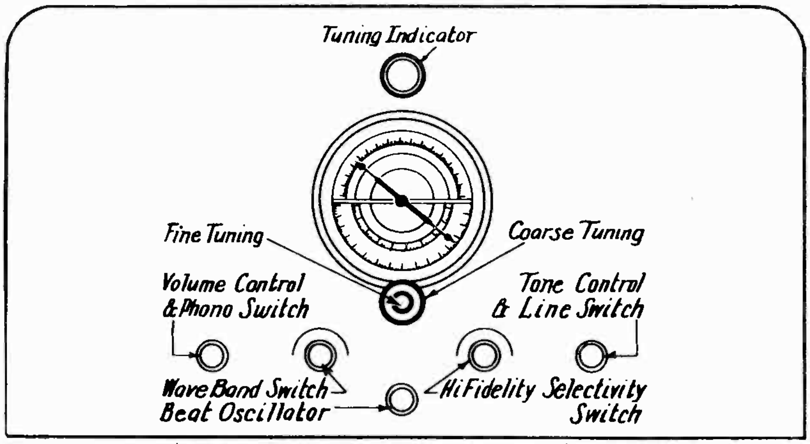
BAND-SWITCH SHOWN
AT 4TH POSITION
BROADCAST BAND
540-1600 KC



BAND-SWITCH SHOWN
AT 5TH POSITION
LONG WAVE BAND
142-343 KC

MODEL C-95

RADIO WIRE TELEVISION



INSTRUCTIONS FOR INSTALLATION AND OPERATION

CURRENT: This receiver operates on AC (Alternating Current) only on frequencies from 40 to 60 cycles.

VOLTAGE: Any line voltage from 105 to 260 volts may be used. This model is equipped with 2 Universal Transformers for filament and plate supply, with five taps marked as follows:- 115, 135, 150, 220, 250. Access to this tap changer is obtained by lifting off the box-like black cover on top of the transformer. The lug attached to the flexible lead is then moved to the point which corresponds most nearly to the line voltage available. The cover is then snapped back into place. Unless otherwise specified, the receiver is always connected to the 115 volt tap (suitable for 105 to 125 volts). Before inserting the line plug, be sure to ascertain what the line voltage is and connect to the correct tap. Be sure to set both transformers for the corrected voltage..

ANTENNA:- While this receiver will operate extremely well with almost any kind of antenna, it is desirable to have a good antenna installation in order to obtain best results on all bands. The exact length is not of any great importance. A short well insulated antenna with properly soldered connections may give results much better than a longer antenna which is poorly installed. Best results will be obtained with an All-Wave Doublet Antenna which has been especially designed for this receiver, and which can be obtained from your dealer. Detailed instructions for the antenna installation are enclosed with this kit. Proper installation will result in reduction of noise and more consistent and dependable short-wave reception.

ANTENNA CONNECTION:- Three antenna terminals are provided marked A-1-A-2 and G. If a doublet antenna is used, the two lead-in wires or the two leads from the transformer are connected to A-1 and A-2, and a ground to G. (This ground may be unnecessary in certain cases.) If however, the usual type of antenna with only one lead-in is used, this is connected to A-1. A2 and G are connected together by a wire and both to a ground connection.

WAVE BANDS:- The wave bands covered by this receiver are as follows:

	Kilocycles or	Megacycles	Meters
(1) Ultra Short Wave	36.25	18	8.125-16.6
(2) Foreign & American Short Wave, Airplanes	18	5.2	16.6 57.5
(3) Police, Amateur, Airplanes	5.2	1.6	57.5- 18.7.5
(4) Broadcast	1600-540		187.5- 554
(5) Long Wave	343-142		872 - 2100

ALIGNMENT PROCEDURE

Realignment of this receiver should not be attempted except by an experienced serviceman and only after all other possible causes of faulty operation have first been thoroughly investigated. An accurately calibrated signal generator which will cover the necessary wave bands is required. Either a suitable output meter or the cathode-ray tuning indicator may be used for indicating the effects of adjustments. It is necessary, in all of the ensuing procedure, that the signal generator be attenuated as much as possible.

I.F. ADJUSTMENT - The i.f. transformers are housed in the polished metal shield on the chassis. The location of these transformers is indicated in the accompanying diagram. The trimmers are on the tops of the transformer cans. The first and second i.f. transformers have two trimmers each and the detector coupling transformer has only one trimmer. These trimmers are adjusted at 456 kc. for maximum gain. In making this adjustment, the oscillator (rear) section of the tuning condenser should be short-circuited. and the signal generator connected between the grid cap of the 6A8 and the ground post of the receiver. The selectivity switch should of course be in the high selectivity position.

SHORT WAVE BAND - With the output from the signal generator connected across the aerial and ground terminals of the receiver, and the volume control in position for maximum volume, the oscillator trimmer for this band is adjusted for maximum response as indicated by the 6E5. This adjustment must be made with the dial set at exactly 17 mc., otherwise the calibration will be off. The series padder for this band should then be adjusted by setting the signal generator at a frequency of 5.5 megacycles and tuning the signal in on the receiver. The tuning condenser is rotated slightly back and forth as the padder screw is adjusted for maximum output. The 17 mc. adjustment should then be rechecked. If the dial calibration is off, the procedure should be repeated again.

ULTRA SHORT WAVE BAND - The trimmers for this band are adjusted at 36 megacycles in the manner described above. They are located on the under side of the chassis and are not shown on the chassis layout diagram. There are only two trimmers for this band, the oscillator operating on a harmonic of another band.
POLICE BAND ADJUSTMENT - The trimmers for this band are adjusted at 4.8 megacycles in the manner described and the series padder at 1.7 mc. exactly as indicated in the SHORT WAVE BAND ADJUSTMENT procedure.
BROADCAST BAND - The adjustments for this band are as described above. The trimmers are adjusted at 1400 kc. and the padder at 600 kc.
LONG WAVE BAND - The adjustments for this band are made in the prescribed manner. the trimmers being adjusted at 340 kc. and the padder at approximately 150 kc.
A.V.C. AMPLIFIER ADJUSTMENT - The a.v.c. has a separate amplifier which is tuned as follows: The signal generator is set at 1400 kc. and the signal tuned in on the receiver, as indicated by the minimum opening in the 6E5 beam. The a.v.c. trimmer is then adjusted to give the WIDEST opening in the beam. The receiver is then carefully retuned and the adjustment repeated.
BEAT NOTE OSCILLATOR ADJUSTMENT - A weak signal from the signal generator is tuned in on the receiver as indicated by the minimum opening in the 6E5 beam. The beat oscillator switch is then turned on. An audible note should be heard whose pitch may be varied by adjusting the screw on the small square can on the left side of the chassis. This should be so adjusted that when the station is tuned in exactly, no beat is heard (zero beat). If no beat note is audible when first turned on, rotation of this same screw should bring in the note.

VOLTAGE TABLE

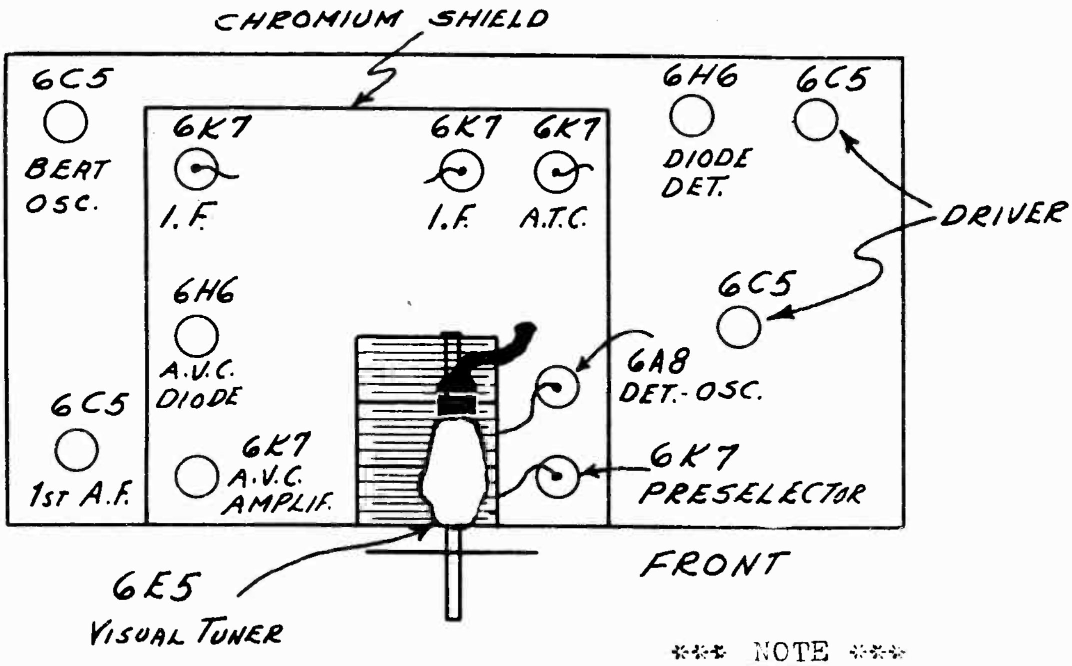
All voltages are measured between socket terminals and chassis: set in operation: volume control full on; antenna disconnected. voltmeter sensitivity - 1000-ohms-per volt. Line voltage measured:- 115.0 Power Consumption: 250 watts

TUBE	FUNCTION	H'T'R	PLATE	SCR.GR.	SUPPR.GR.	CATH.	OSC.PL.
6K7	preselector	6.0	200.0	85.0	1.0	1.0	---
6A8	det.-osc.	6.0	200.0	100.0	---	5.2	175.0
6K7	i.f. amplif.	6.0	175.0	85.0	----	2.2	----
6K7	i.f. amplif.	6.0	175.0	85.0	12.0	12.0	----
6H6	diode det.	6.0	-----	----	----	----	----
6C5	1st audio	6.0	120.0	----	----	7.0	----
6C5) 6C5)	2nd audio	6.0	200.0	----	----	7.0	----
45's	audio output	2.2	240.0	----	----	----	----
6K7	A.T.C.	6.0	200.0	85.0	9.0	9.0	----
6C5	beat osc.	6.0	58.0	----	----	7.0	----
6H6	a.v.c.-diode	6.0	9.0	----	----	10.0	----
6K7	a.v.c. amplif.	6.0	140.0	8.0	40.0	40.0	----
6E5	tuning indicator	6.0	-----	200.0(target)	----	145.0	----
5Z3) 5Z3)	rectifier	4.5	340.0	-----	----	-----	----
45	grid bias rectifier	2.2	75.0	-----	----	-----	----

MODEL C-95

RADIO WIRE TELEVISION

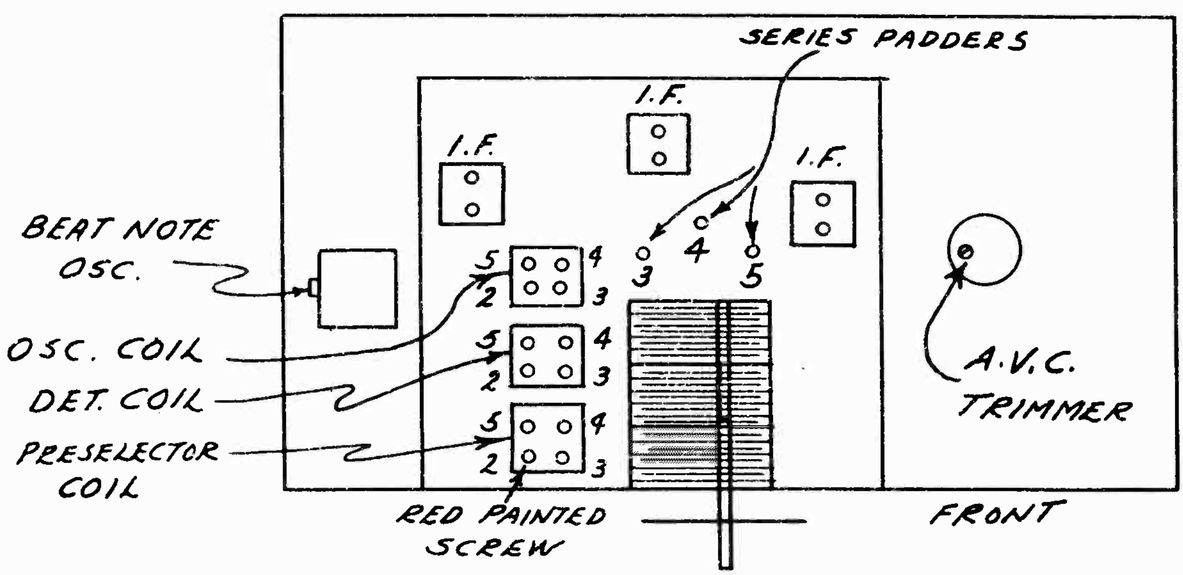
TOP VIEW OF CHASSIS SHOWING LOCATION OF TUBES



*** NOTE ***

AUDIO OUTPUT AND RECTIFIER TUBES ARE IN POWER SUPPLY CHASSIS.

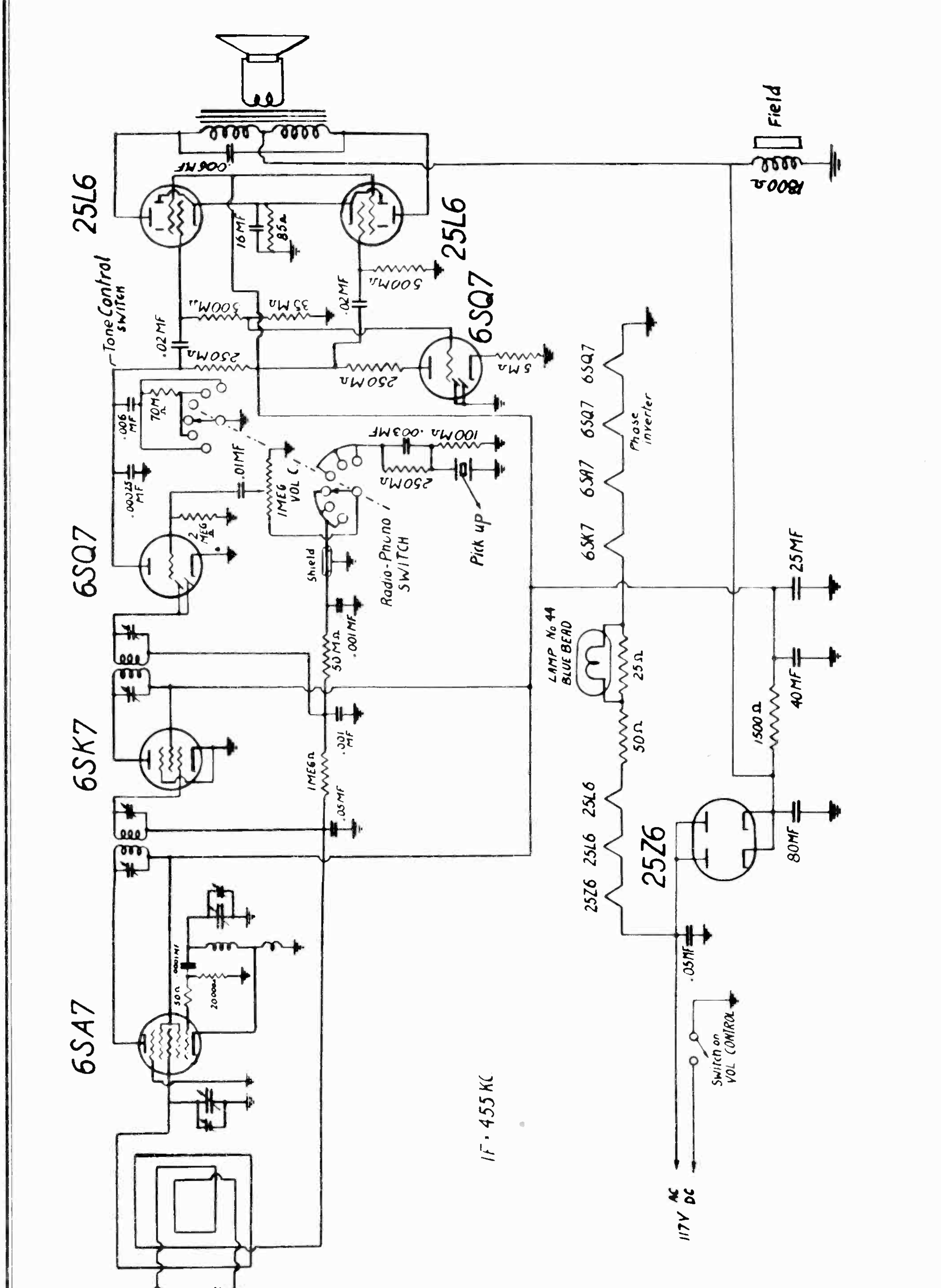
TOP VIEW OF CHASSIS SHOWING LOCATION OF ALIGNING TRIMMERS



1 BAND TRIMMERS UNDER CHASSIS

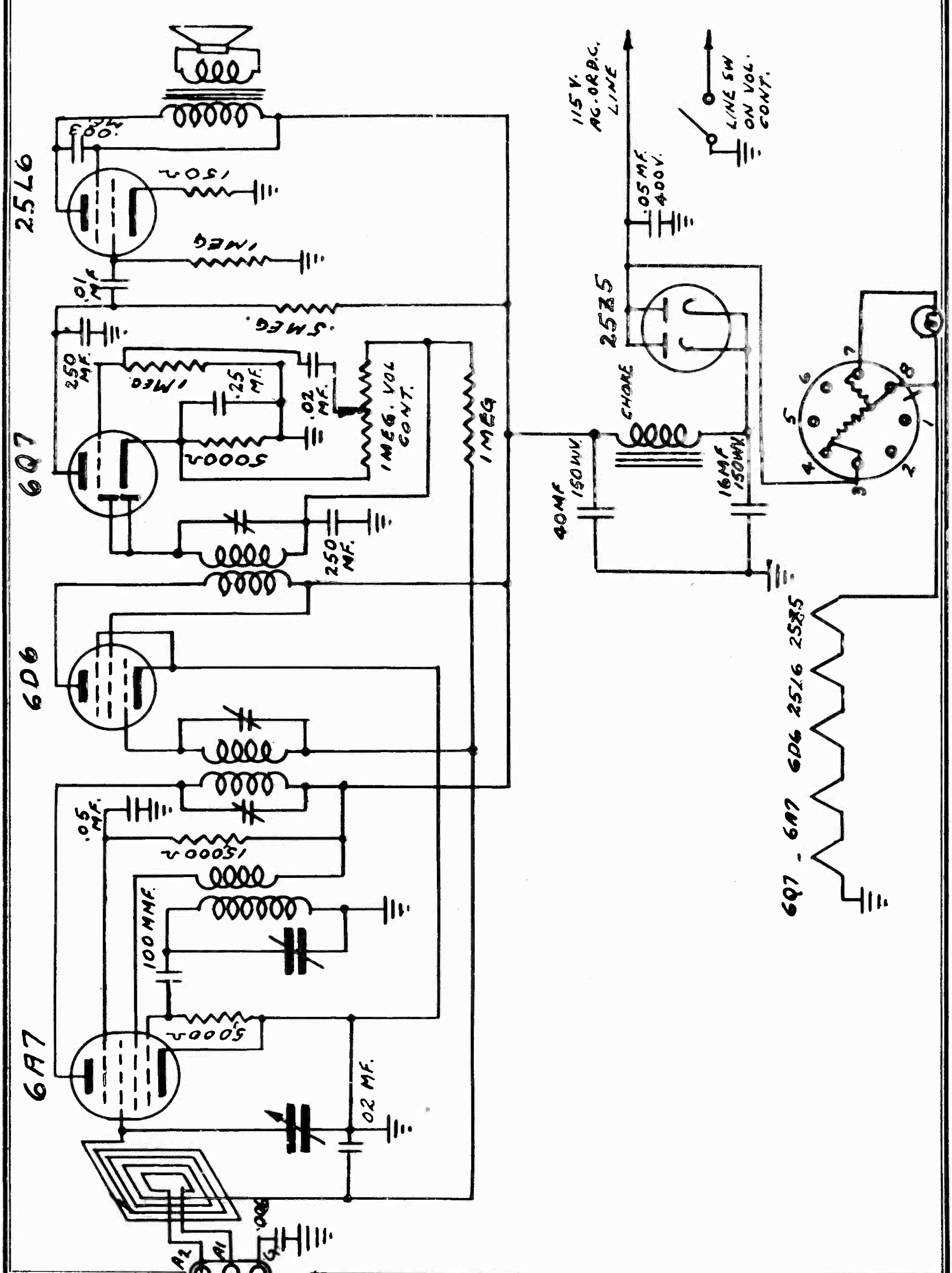
RADIO WIRE TELEVISION

MODEL C104



MODELS CC24, CC25

RADIO WIRE TELEVISION



SERVICE INSTRUCTIONS

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 wave 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:

1) Line voltage as indicated on instruction sheet.

2) Volume and Tone control at maximum volume positions.

3) Minimum Input from signal generator.

If this procedure is not adhered to, all adjustments will appear very broad. This is due to the action of the automatic volume control.

I.F. ADJUSTMENT

The signal generator is set at 456KC and is connected to the grid of the converter tube (6A7) through a .5 MFD condenser. Be sure to connect a resistor of approximately 25,000 OHMS between the converter grid and ground so that the grid circuit is at ground potential for D.C.

The Input I.F. transformer trimmers are adjusted for maximum output as indicated by the output meter connected across either the voice coil or the primary coil of the loud speaker.

The Output I.F. transformer trimmer is located underneath the chassis. Adjust the trimmer for maximum output as indicated on the output meter. The Input I.F. should now be re-checked for maximum output.

BROADCAST BAND ALIGNMENT

Connect the output of the signal generator to a loop antenna consisting of about five turns of "bell" wire making a circle a foot in diameter. This loop should be VERY LOOSELY coupled to the receiver loop and should not be less than one foot from the receiver.

Set the signal generator at 1500KC and tune the receiver until a response is indicated on the output meter with signal generator set at 1500KC. Rock the gang condenser while adjusting the oscillator trimmer condenser for maximum output.

The dial pointer should co-incide with the 1500KC mark on the dial. If it does not, check other calibration points at both ends of the scale before re-setting the pointer.

OPERATING INSTRUCTIONS

This receiver is designed for operation on 117-125V, AC or DC, unless otherwise noted on the back of the cabinet. Serious damage to the receiver may result from attempts to operate it from any other source.

RANGE

540-1550 Kilocycles (or 555-162 Meters)

Consult radio publications and newspapers for listings of stations.

DIAL

The scale on the dial is calibrated in kilocycles.

CONTROLS

There are two control knobs on the front of the cabinet:

1. Power-Volume Control- This is the knob at the left-hand side of the cabinet. A twist to the right (clockwise) turns on the current. Turning the knob further increases the volume.

2. The tuning Control - The right-hand knob operates the tuning pointer and selects stations.

TUNING

Turn the Power-Volume Control on and advance half way. Allow the tubes to warm up for about a minute. Then select your station on the dial by means of the tuning control knob. Carefully regulate both knobs until best reception is obtained. Turn the receiver to its best position for intercepting the signals.

ANTENNA

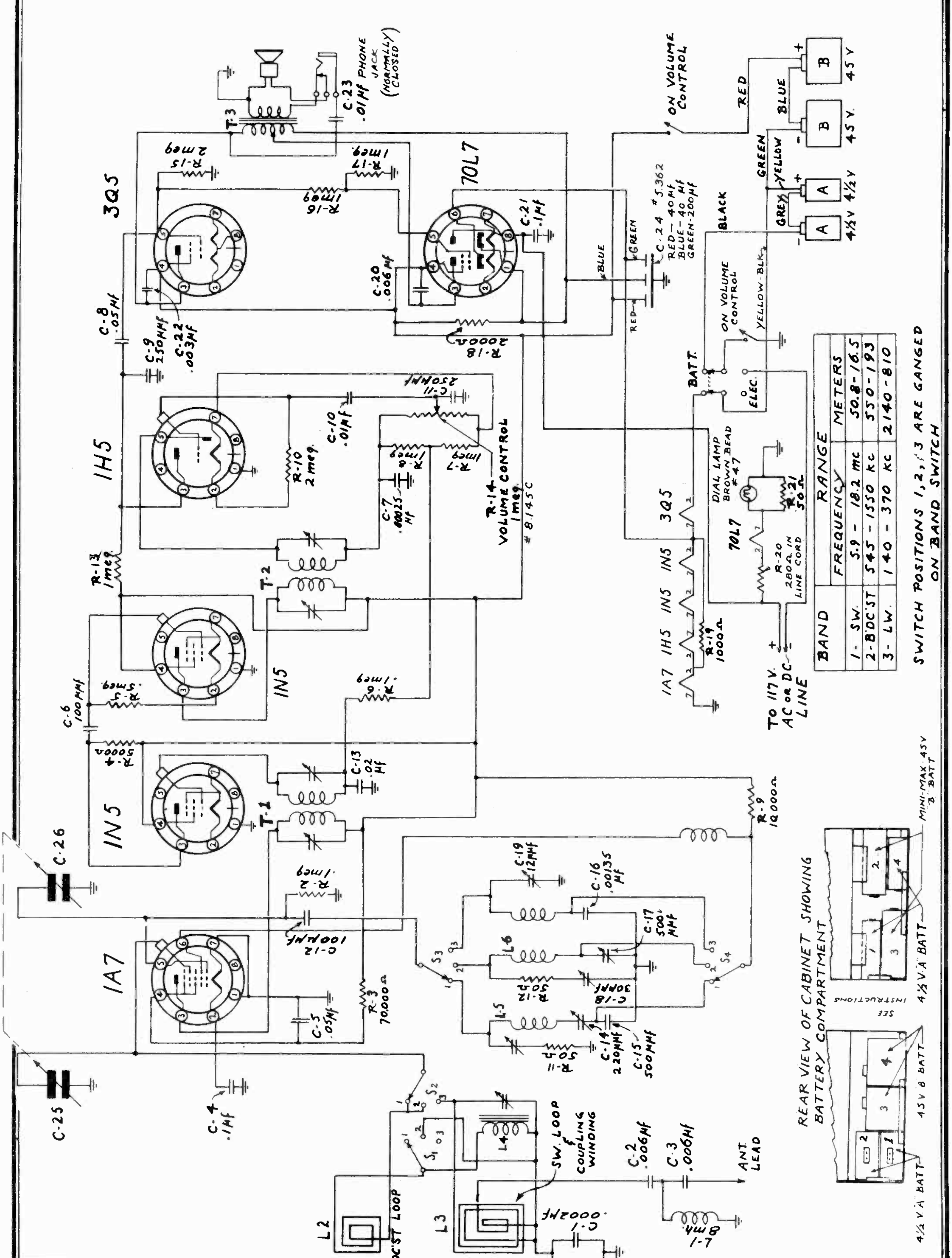
The enclosed loop antenna gives best pick-up of the waves from a direction at right angles to the plane of the loop. It may be advantageous to turn the set end-on to interfering stations and the front and back in line of desired stations. By slowly twisting the receiver round, a best position for reception may always be found.

On the back of the cabinet there is an oval-shaped terminal board for attachment of an external antenna. If you use the set in a "stationary" position, and where station signal intensities are low, it is advisable to connect the A-1 and G binding posts to ground and a small antenna wire to the A-2 post. If too large an antenna is used, excessive signal intensities will be fed into the receiver. The resulting overload will manifest itself as a "gargling" sound when a station is tuned in.

If a "doublet" type of antenna is used, connect the leads to the A-1 and A-2 posts and the G post to ground.

MODEL CC58-A

RADIO WIRE TELEVISION

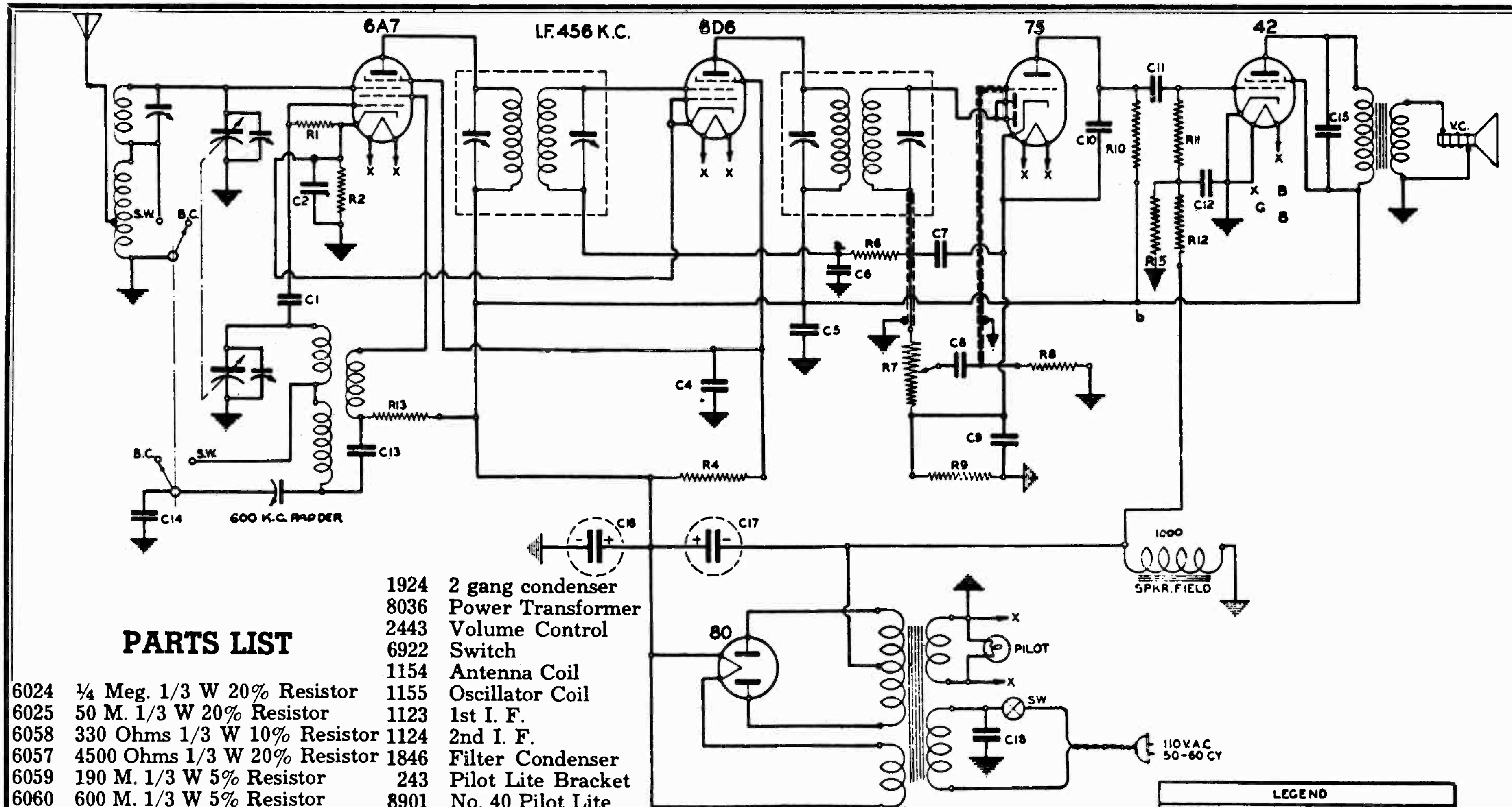


BAND	RANGE FREQUENCY	METERS
1- SW.	5.9 - 18.2 mc	50.8-16.5
2- B'DC'ST	545 - 1550 kc	550-193
3- LW.	140 - 370 kc	2140-810

SWITCH POSITIONS 1, 2, & 3 ARE GANGED ON BAND SWITCH

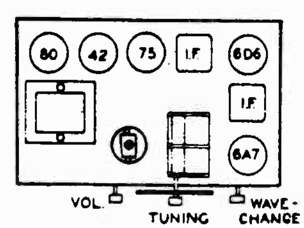
RADIO WIRE TELEVISION

MODEL D-13



PARTS LIST

6024	¼ Meg. 1/3 W 20% Resistor
6025	50 M. 1/3 W 20% Resistor
6058	330 Ohms 1/3 W 10% Resistor
6057	4500 Ohms 1/3 W 20% Resistor
6059	190 M. 1/3 W 5% Resistor
6060	600 M. 1/3 W 5% Resistor
6105	10 M. ½ W 20% Resistor
6117	25 M. ½ W 20% Resistor
1600	.1—200 V Bypass Condenser
1601	.1—400 V. Bypass Condenser
1628	.01—200 V. Bypass Condenser
1604	.01—600 V. Bypass Condenser
1614	.25—200 V. Bypass Condenser
1622	.05—200 V. Bypass Condenser
1602	.1—600 V. Bypass Condenser
1651	.004—600 V. Bypass Condenser
Dial	(order by name and description)
7946A	Speaker
5218	Knobs
1924	2 gang condenser
8036	Power Transformer
2443	Volume Control
6922	Switch
1154	Antenna Coil
1155	Oscillator Coil
1123	1st I. F.
1124	2nd I. F.
1846	Filter Condenser
243	Pilot Lite Bracket
8901	No. 40 Pilot Lite
6850	4 Prong Socket
6852	6 Prong Socket
6853	7 Prong Socket
2006	Padder
2052	Trimmer
7104	Tube Shield Base
7105	Tube Shield
1500	.001—20%
1501	.0001—20%
1509D	.002—5%
1504	.00025—20%
6016	5 M. 1/3 20% Resistor
6017	1 Meg. 1/3 W 20% Resistor
6018	½ Meg. 1/3 W 20% Resistor



TUBE LOCATION

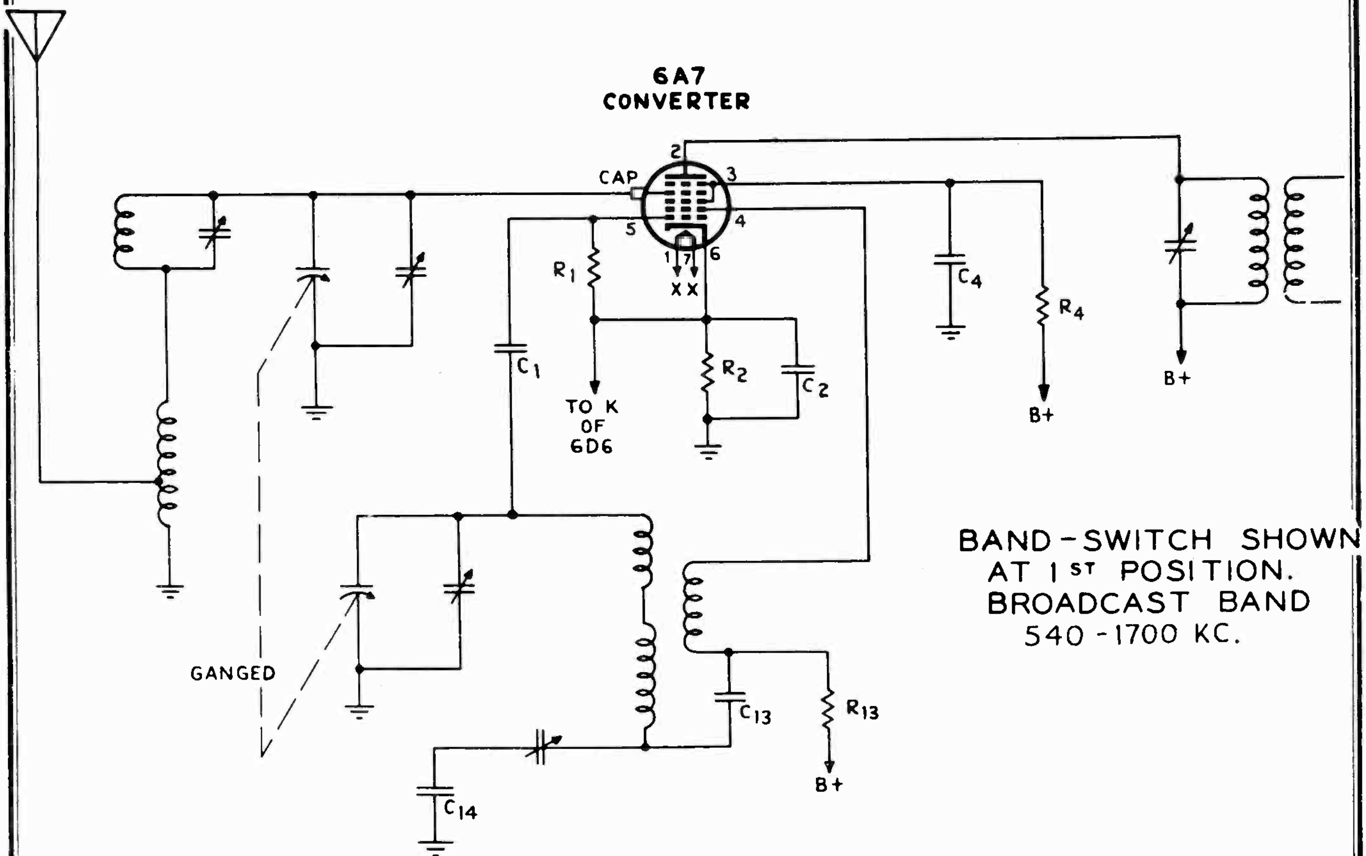
LEGEND

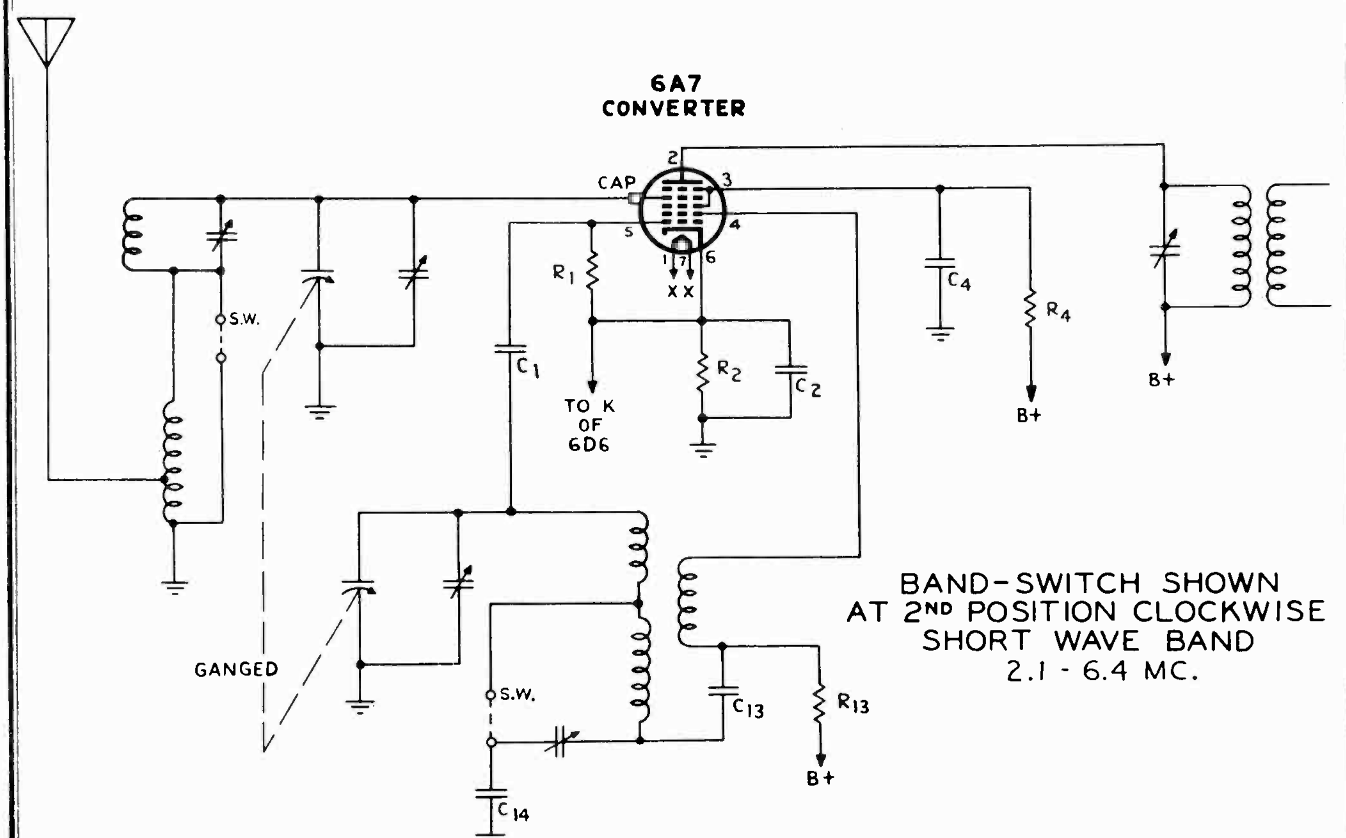
C1	.0001	MFD.	R1	50M	OHMS	⅓W
C2	.25	-200V	R2	330	"	"
		"	R3	5M	"	"
C4	.1	-400V	R4	25M	"	1W
C5	.1	-600V	R5	250M	"	⅓W
C6	.05	-200V	R6	1MEG.	"	"
C7	.00025	-MICA	R7	500M	"	"
C8	.01	-600V	R8	1MEG.	"	"
C9	1	-200V	R9	4500	"	"
C10	.00025	-MICA	R10	250M	"	"
C11	.01	-600V	R11	500M	"	"
C12	.01	-200V	R12	1MEG.	"	"
C13	.001	-MICA	R13	10M	"	⅓W
C14	.002	-MICA				
C15	.004	-600V				
C16	8	-450V				
C17	8	-450V				
C18	.1	-400V				

CLARI-SKEMATIX
Registered Trademark

MODEL D-13

RADIO WIRE TELEVISION





RADIO WIRE TELEVISION MODEL D-13

SERVICE INSTRUCTIONS

In case of faulty operation of the receiver, first make sure that the antenna and ground are in good condition and properly attached to the receiver. Then determine if any of the tubes are faulty. In case of trouble within the receiver itself, the circuit diagram shown on the opposite page will be useful to the service man in locating and correcting the trouble.

I. F. Alignment:

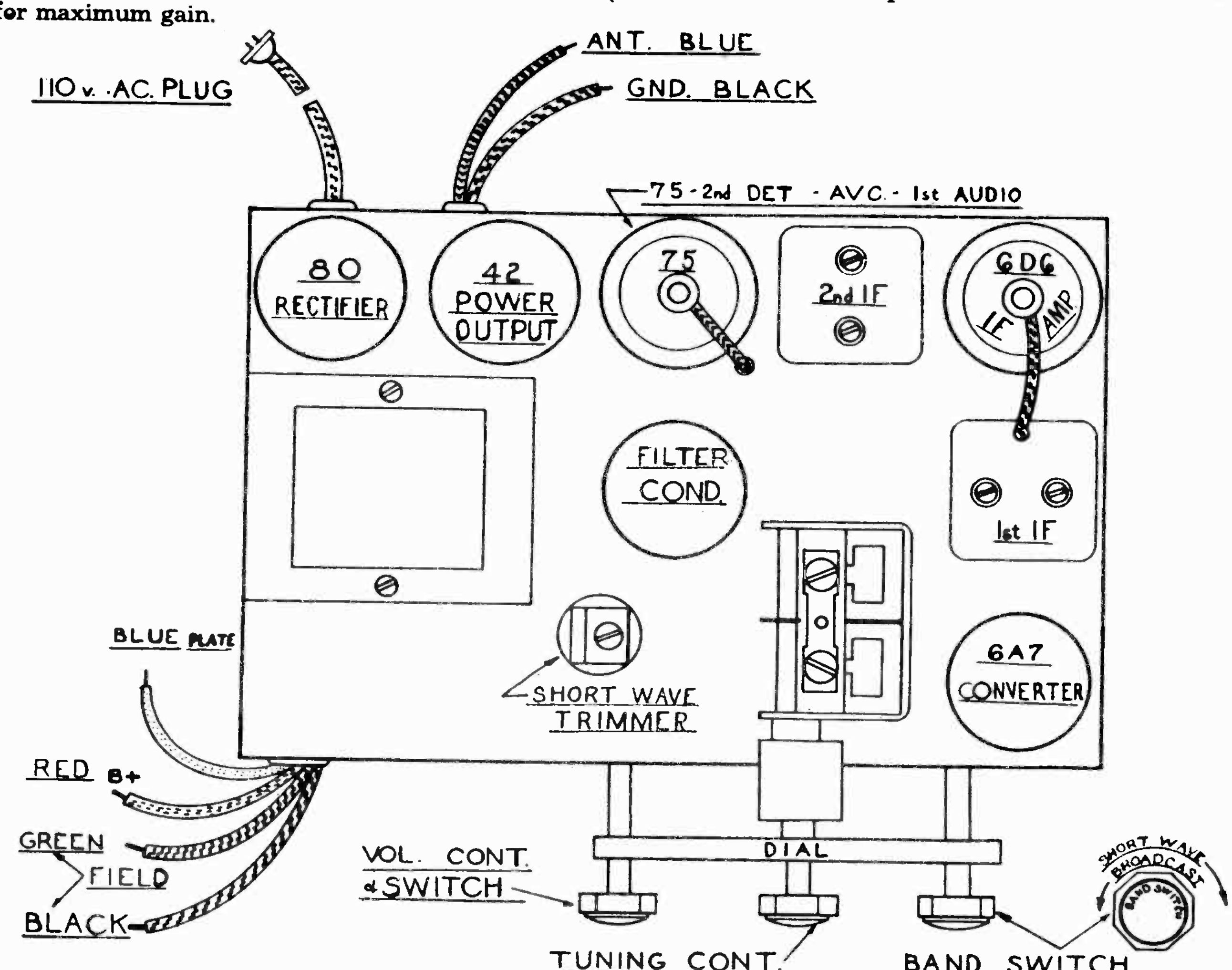
Connect a test oscillator or signal generator through a .1 mfd. condenser to the grid of the 6A7 tube and set the oscillator to 456 KC. Use an output meter connected to the speaker if possible, to obtain the most accurate adjustments. Peak each I.F. stage to maximum response, reducing the output of the oscillator as far as possible for final adjustments.

R. F. Alignment:

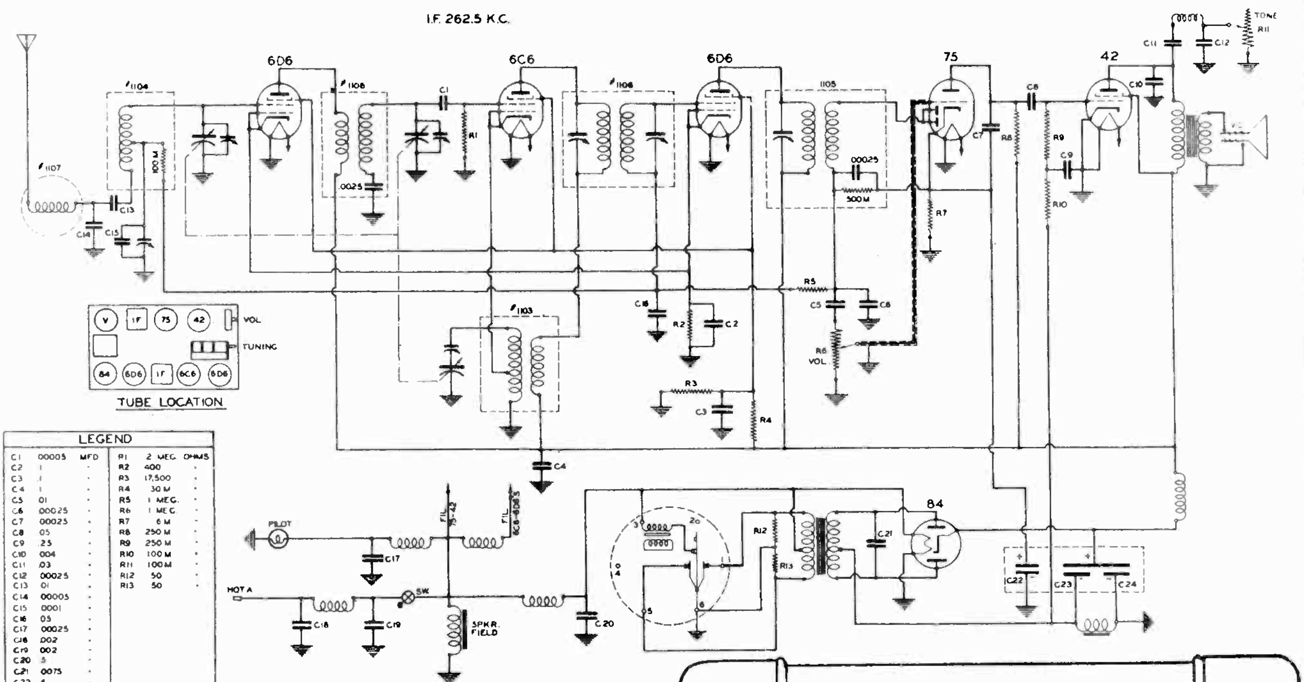
With the test oscillator set to 1720 KC and connected to the antenna wire of the receiver through a .00025 mfd condenser, switch the receiver to the broadcast band and set the pointer at the end of travel on the right (at the 1700 KC end). Adjust the rear trimmer on the top of the variable condenser, for maximum gain. Then set the test oscillator at 1400 KC and tune in this signal on the receiver as though tuning a station. If an adjustment at this point is necessary on your set, you will have a trimmer condenser to adjust on top of the variable condenser at the front; this is adjusted for maximum gain.

Now adjust the test oscillator to 600 KC and tune in this signal. Adjust the padder condenser (which is adjusted through the right hand end of the chassis) in the following manner: turn the dial slowly and repeatedly back and forth across the signal while adjusting the padder. Adjust for maximum gain.

Now switch the receiver to short wave. With the test oscillator set at 6 megacycles, tune in this signal on the receiver. Then adjust the short wave trimmer (which is located on top of the coil above the chassis) for maximum gain.



MODELS D45, D46 RADIO WIRE TELEVISION



LEGEND					
C1	00005	MFD	R1	2 MEG.	OHMS
C2	1	"	R2	400	"
C3	.1	"	R3	17,500	"
C4	1	"	R4	30 M	"
C5	01	"	R5	1 MEG.	"
C6	00025	"	R6	1 MEG.	"
C7	00025	"	R7	6 M	"
C8	05	"	R8	250 M	"
C9	.25	"	R9	250 M	"
C10	004	"	R10	100 M	"
C11	.03	"	R11	100 M	"
C12	00025	"	R12	50	"
C13	01	"	R13	50	"
C14	00005	"			
C15	0001	"			
C16	05	"			
C17	00025	"			
C18	.002	"			
C19	002	"			
C20	.5	"			
C21	0075	"			
C22	4	"			
C23	4.	"			
C24	8.	"			

I. F. ALIGNMENT:

With volume control on full and variable gang condenser at maximum capacity, attach test oscillator lead in series with a .1 mfd. condenser to stator of R. F. section of gang condenser (center section). Set test oscillator at 262.5 KC and adjust I.F. trimmers for maximum output as indicated on an output meter connected across voice coil of speakers or from plate and screen of 42 tube.

Set test oscillator to 600 KC and adjust oscillator padding (located on bakelite strip, 2nd from front). Also adjust 600 KC antenna padding condenser (located on bakelite strip, 1st condenser). Reset test oscillator to 1400 KC and readjust antenna and R. F. trimmers.

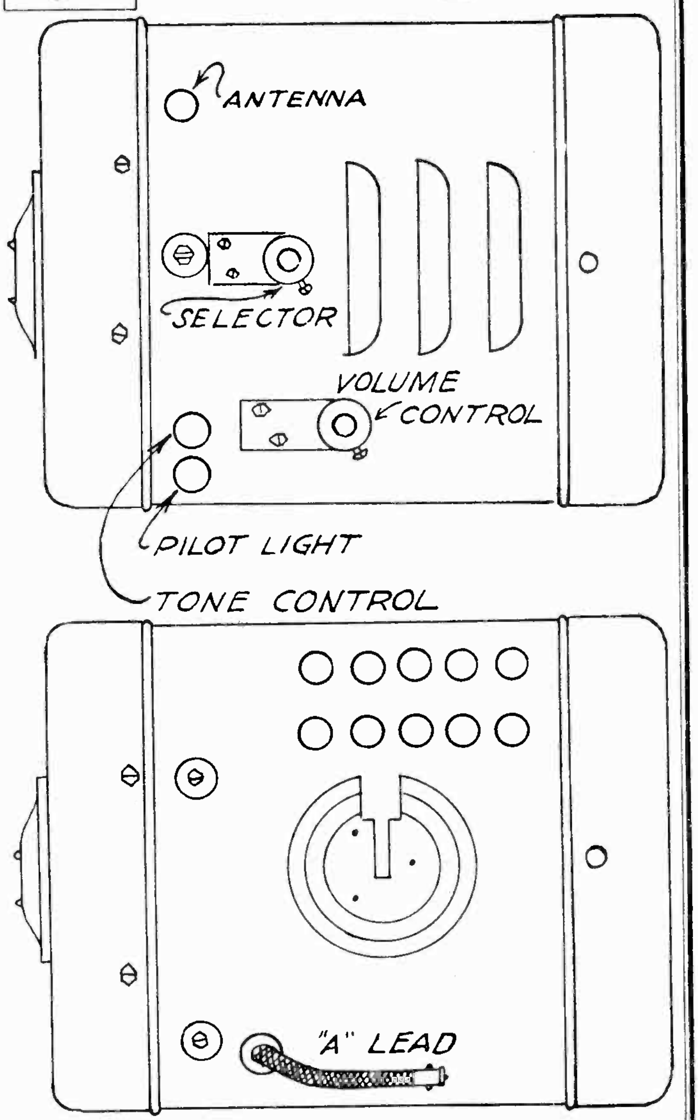
R. F. ALIGNMENT:

Set test oscillator at 1550 KC and connect through a 150 mmf. condenser to antenna of reciever. Rotate variable gang condenser to minimum capacity and back off slightly. Adjust trimmer on oscillator section of gang condenser (third section from shaft end) to resonance indicated by maximum output. Re-set test oscillator of 1400 KC and rotate variable condenser until oscillator signal is picked up. Adjust antenna trimmer (front section) and R. F. trimmer (center section) to resonance.

ANTENNA ADJUSTMENT:

When set is in operation, tune to a station on or about 1400 KC and adjust antenna trimmer to maximum volume. This trimmer is accessable by removing the plug button on the front cover of the receiver.

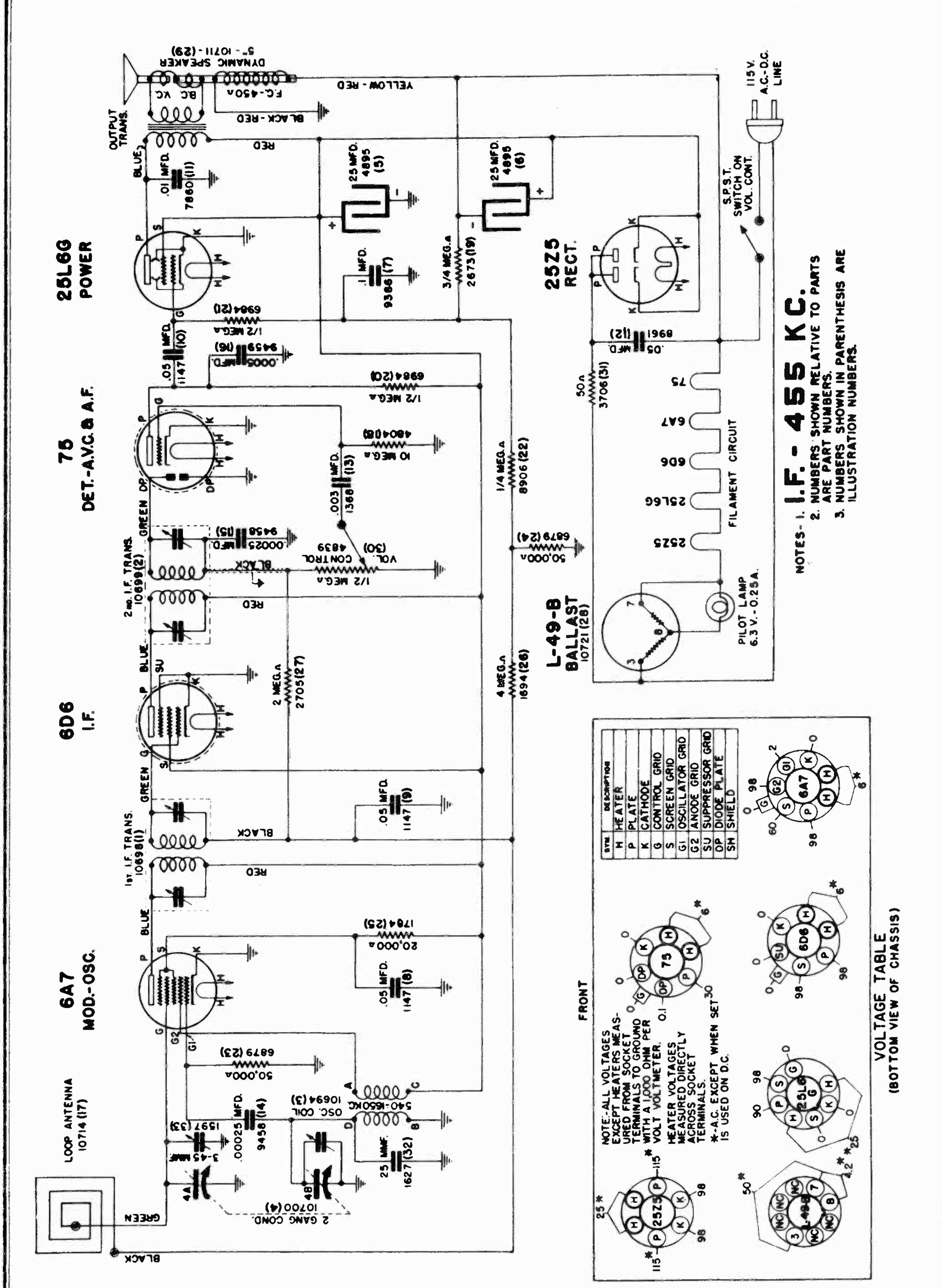
Proper adjustment of this trimmer matches the particular antenna used in the auto to the receiver which increases the sensitivity of the receiver.



END. VIEWS

RADIO WIRE TELEVISION

MODELS E76,E77



RADIO WIRE TELEVISION

ALIGNMENT PROCEDURE IN TABULATED FORM

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME APPROXIMATE POSITION IN THE BACK OF CHASSIS IT WILL BE IN WHEN THE SET IS IN THE CABINET AND THE BACK ATTACHED.

When adjusting 1650 K.C. oscillator trimmer and 1400 K.C. antenna trimmer, couple test oscillator to set loop by placing lead from high side of test oscillator on top of or near set loop. Be sure that neither the loop or test oscillator lead moves during alignment.

DO NOT ATTACH LOW SIDE OF TEST OSCILLATOR TO RECEIVER—LEAVE UNCONNECTED.

Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below—and:
I. F. Any point where no interfering signal is received	455 K. C.	.02 MFD condenser	High side to grid terminal of 6A7 tube DO NOT REMOVE CAP.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
(1) Exactly 1650 K. C.	Exactly 1650 K. C.	None	Lay lead on top of or close to loop	Adjust 1650 K. C. oscillator trimmer for maximum output.
(2) Approx. 1400 K. C.	Exactly 1400 K. C.	None	Lay lead on top of or close to loop	Adjust 1400 K. C. antenna trimmer for maximum output.

PARTS LIST

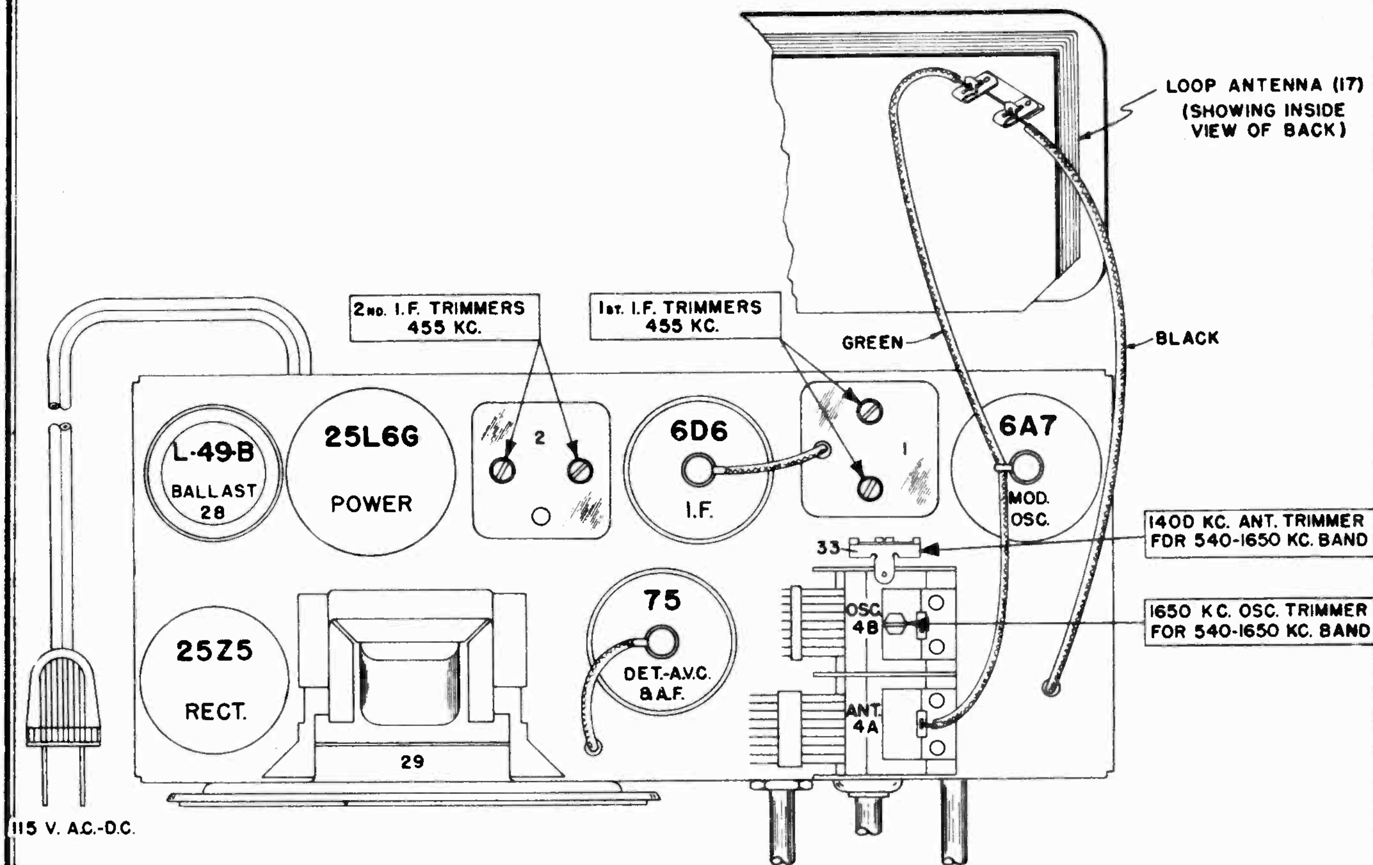
Illus. No.	Part No.	Part Name	Description
1	10698	Coil	1st I.F. Transformer
2	10699	Coil	2nd I.F. Transformer
3	10694	Coil	Oscillator
4	10700	Condenser	Tuning Two Gang
5	4895	Condenser	Tubular Dry Electrolytic 25 Mfd. 200 Volt
6	4895	Condenser	Tubular Dry Electrolytic 25 Mfd. 200 Volt
7	9386	Condenser	Tubular .1 Mfd. 200 Volts
8	1147	Condenser	Tubular .05 Mfd. 200 Volts
9	1147	Condenser	Tubular .05 Mfd. 200 Volts
10	1147	Condenser	Tubular .05 Mfd. 200 Volts
11	7860	Condenser	Tubular .01 Mfd. 400 Volts
12	8961	Condenser	Tubular .05 Mfd. 400 Volts
13	1368	Condenser	Tubular .003 Mfd. 400 Volts
14	9458	Condenser	Mica .00025 Mfd.
15	9458	Condenser	Mica .00025 Mfd.
16	9459	Condenser	Mica .0005 Mfd.
17	10714	Loop Antenna	Cabinet Back with Loop Aerial
18	4804	Resistor	Carbon 10 Meg Ohm ⅓ Watt
19	2673	Resistor	Carbon 750,000 Ohm ⅓ Watt
20	6984	Resistor	Carbon 500,000 Ohm ⅓ Watt
21	6984	Resistor	Carbon 500,000 Ohm ⅓ Watt
22	8906	Resistor	Carbon 250,000 Ohm ⅓ Watt
23	6879	Resistor	Carbon 50,000 Ohm ⅓ Watt
24	6879	Resistor	Carbon 50,000 Ohm ⅓ Watt
25	1784	Resistor	Carbon 20,000 Ohm ⅓ Watt
26	1694	Resistor	Carbon 4 Meg Ohm ⅓ Watt
27	2705	Resistor	Carbon 2 Meg Ohm ⅓ Watt
28	10721	Resistor	Line Ballast Type L-55-B
29	10711	Speaker	Electro Dynamic 5"
30	4839	Volume Control	With Switch
31	3706	Resistor	Carbon 50 Ohm ⅓ Watt
32	1627	Condenser	Mica .000025 Mfd.
33	1597	Condenser	Trimmer 3-45 Mmf.

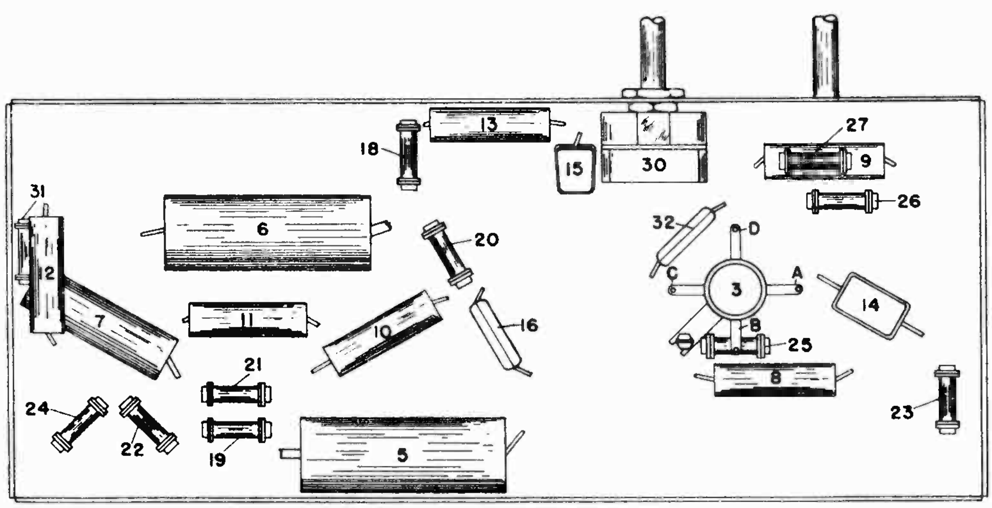
MISCELLANEOUS PARTS

Illus. No.	Part No.	Part Name	Description
	10292	Bulb	6-8 Volt .250 Ampere Dial Light
	10707	Dial Scale	Calibrated Glass Scale
	3814	Dial Cord	Dial Drive Cord
	4975	Dial Shaft	Dial Drive Shaft
	4762	Dial Pulley	With Bushing
	10654	Dial Pointer	For Dial
	10650	Escutcheon	For Dial Used With Wood Cabinet Only
	10208	Knob	For Use With Wood Cabinet Only
	4784	Knob	Walnut Finish
	10207	Knob	Ivory Finish
	8117	Shaft Clamp	"C" Retainer Washer for Drive Shaft
		Cabinet	Walnut Plastic
		Cabinet	Ivory Plastic
	10712	Cabinet Handle	Mention Required Finish

RADIO WIRE TELEVISION

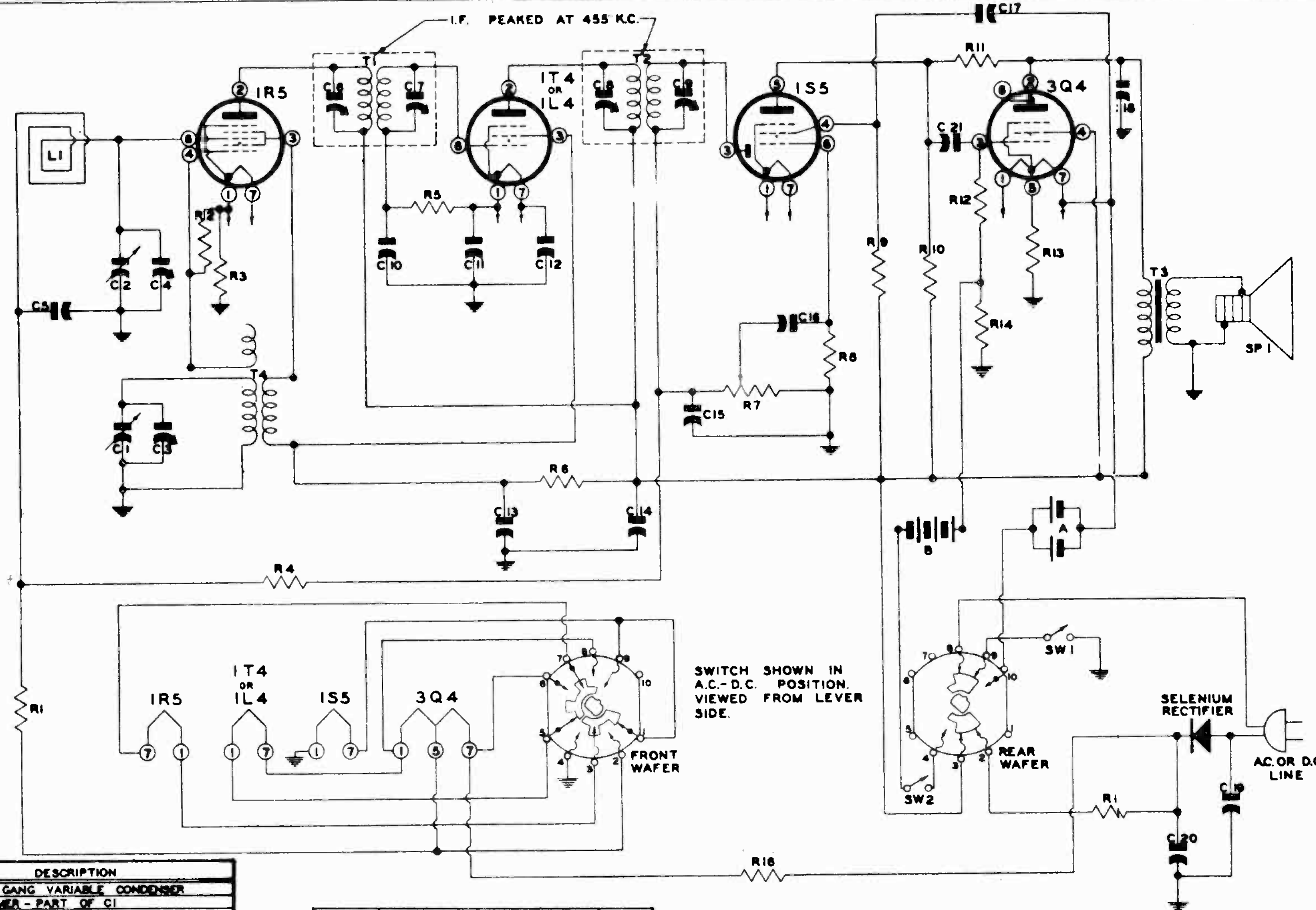
MODELS E76,E77





MODEL J4

RADIO WIRE TELEVISION



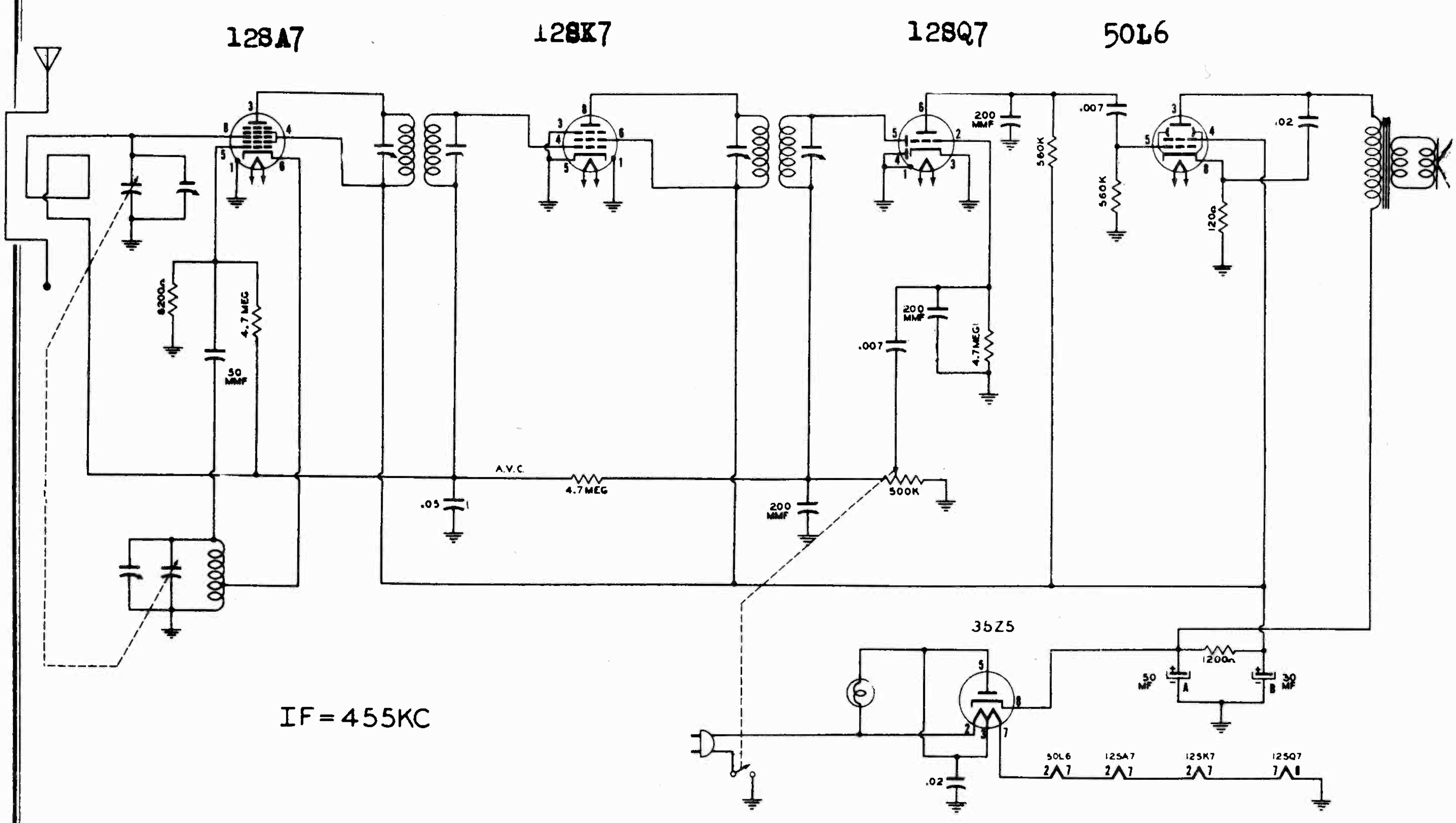
ITEM	DESCRIPTION
C1, C2	TWO GANG VARIABLE CONDENSER
C3	TRIMMER - PART OF C1
C4	TRIMMER - PART OF C2
C5	.05 MF 150 VOLTS
C6, C7	TRIMMERS - PART OF T1
C8, C9	TRIMMERS - PART OF T2
C10	.01 MF 150 VOLTS
C11	.1 MF 150 VOLTS
C12	200 MF 10 VOLTS - SECTION OF ELECT.
C13	.01 MF 150 VOLTS
C14	20 MF 150 VOLTS - SECTION OF ELECT.
C15	50 MMF MICA
C16	.002 MF 150 VOLTS
C17	.002 MF 150 VOLTS
C18	.004 MF 200 VOLTS
C19	.05 MF 400 VOLTS
C20	45 MF 150 VOLTS - SECTION OF ELECT.
C21	.004 MF 150 VOLTS
L1	LOOP ANTENNA

R1	10 MEG. OHMS 1/4 WATT
R2	100000 OHMS 1/4 WATT
R3	820 OHMS 1/4 WATT
R4	4.7 MEG. OHMS 1/4 WATT
R5	4.7 MEG. OHMS 1/4 WATT
R6	10000 OHMS 1/4 WATT
R7	1 MEG. VOLUME CONTROL
R8	4.7 MEG. OHMS 1/4 WATT
R9	4.7 MEG. OHMS 1/4 WATT
R10	1 MEG. OHMS 1/4 WATT
R11	4.7 MEG. OHMS 1/4 WATT
R12	4.7 MEG. OHMS 1/4 WATT
R13	470 OHMS 1/4 WATT
R14	330 OHMS 1/4 WATT
R15	2700 OHMS 1 WATT
R16	2600 OHMS 10 WATTS
SP1	3 P.M. SPEAKER

SW1, SW2	ON-OFF SWITCH ON VOLUME CONTROL
T1	FIRST I.F. TRANSFORMER
T2	SECOND I.F. TRANSFORMER
T3	OUTPUT TRANSFORMER
T4	OSCILLATOR COIL
A	TWO 1 1/2 VOLT TYPE "D" CELLS
B	67 1/2 VOLTS NO. 467 MINIMAX BAT.

RADIO WIRE TELEVISION

MODEL J5



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	OV.	38VAC	94VAC	94VAC	-7.3VDC	OV.	25VAC	-.7VDC
2	12SK7GT	OV.	25VAC	OV.	-.7VDC	OV.	94VDC	13VAC	94VDC
3	12SQ7GT	OV.	-.6VDC	OV.	OV.	-.6VDC	55VDC	13VAC	OV.
4	50L6GT	OV.	85VAC	117VDC	94VDC	OV.	OV.	36VAC	5.4VDC
5	35Z5GT	OV.	117VAC	112VAC	OV.	112VAC	OV.	85VAC	122VDC

RESISTANCE READINGS

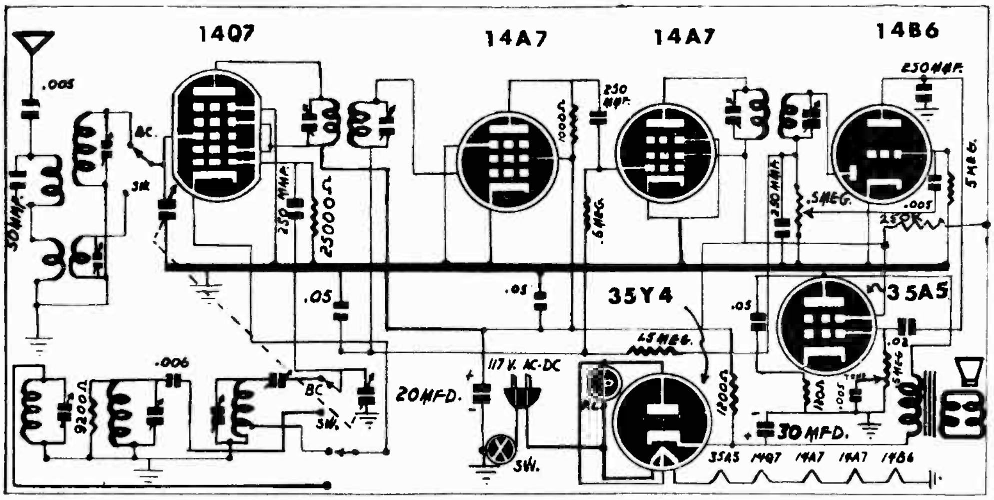
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0Ω	38Ω	70KΩ	70KΩ	8KΩ	1Ω	25Ω	2.5 Meg
2	12SK7GT	0Ω	25Ω	0Ω	2.5 Meg.	0Ω	70KΩ	12Ω	70KΩ
3	12SQ7GT	0Ω	5 Meg.	0Ω	0Ω	500KΩ	630KΩ	12Ω	0Ω
4	50L6GT	INF.	90Ω	70KΩ	70KΩ	560KΩ	INF.	38Ω	120Ω
5	35Z5GT	INF.	120Ω	115Ω	INF.	115Ω	INF.	90Ω	70KΩ

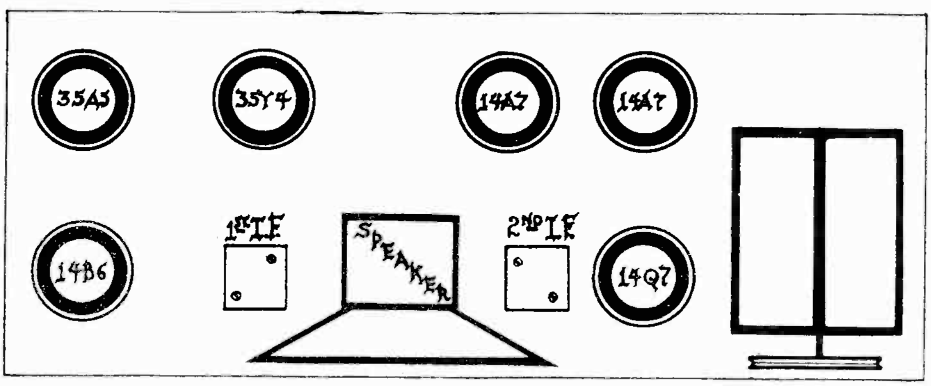
MODELS J62, J62C

RADIO WIRE TELEVISION

ALIGNMENT: The Intermediate Frequency is 455 KC. To align the broadcast band, set the oscillator to 550 and 1650 KC., aligning the RF at 1500 KC. To align the SW, set the oscillator to 21 MC. Align the RF at 18.5MC.

WARNING: USE NO GROUND CONNECTIONS! If set is inoperative on DC, reverse the line plug.





PHONO OPERATION: The J62C has a single-post record changer, which plays ten 12-inch or twelve 10-inch records without reloading. It has a single-button control for Start, Stop or Reject. Pickup is of the crystal type having an excellent response over the entire audible range.

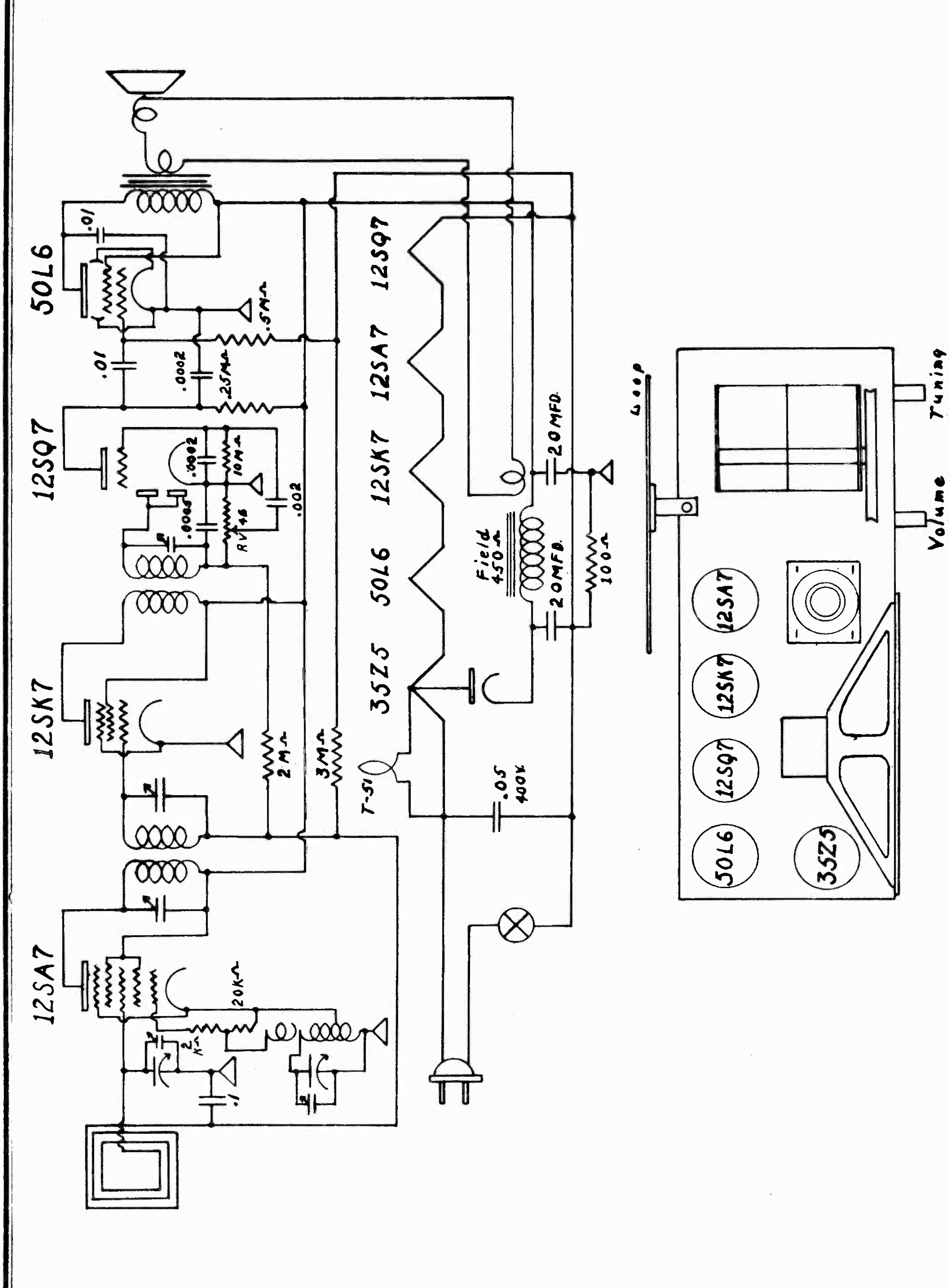
WARNING: PHONO FOR AC ONLY! THE PHONOGRAPH WILL NOT OPERATE ON DC. MOTOR WILL BE DAMAGED BEYOND REPAIR IF IT IS CONNECTED TO A DC POWER SOURCE!

INTRODUCTION: This six-tube superheterodyne is designed to operate on 105-125 volts AC or DC.

The tuning range, from 550 to 1650 kilocycles, covers the regular broadcast and high-fidelity broadcast experimental stations. Band number 2 covers from 6 to 21 megacycles, for European, Amateur, Police, Aircraft and Government stations.

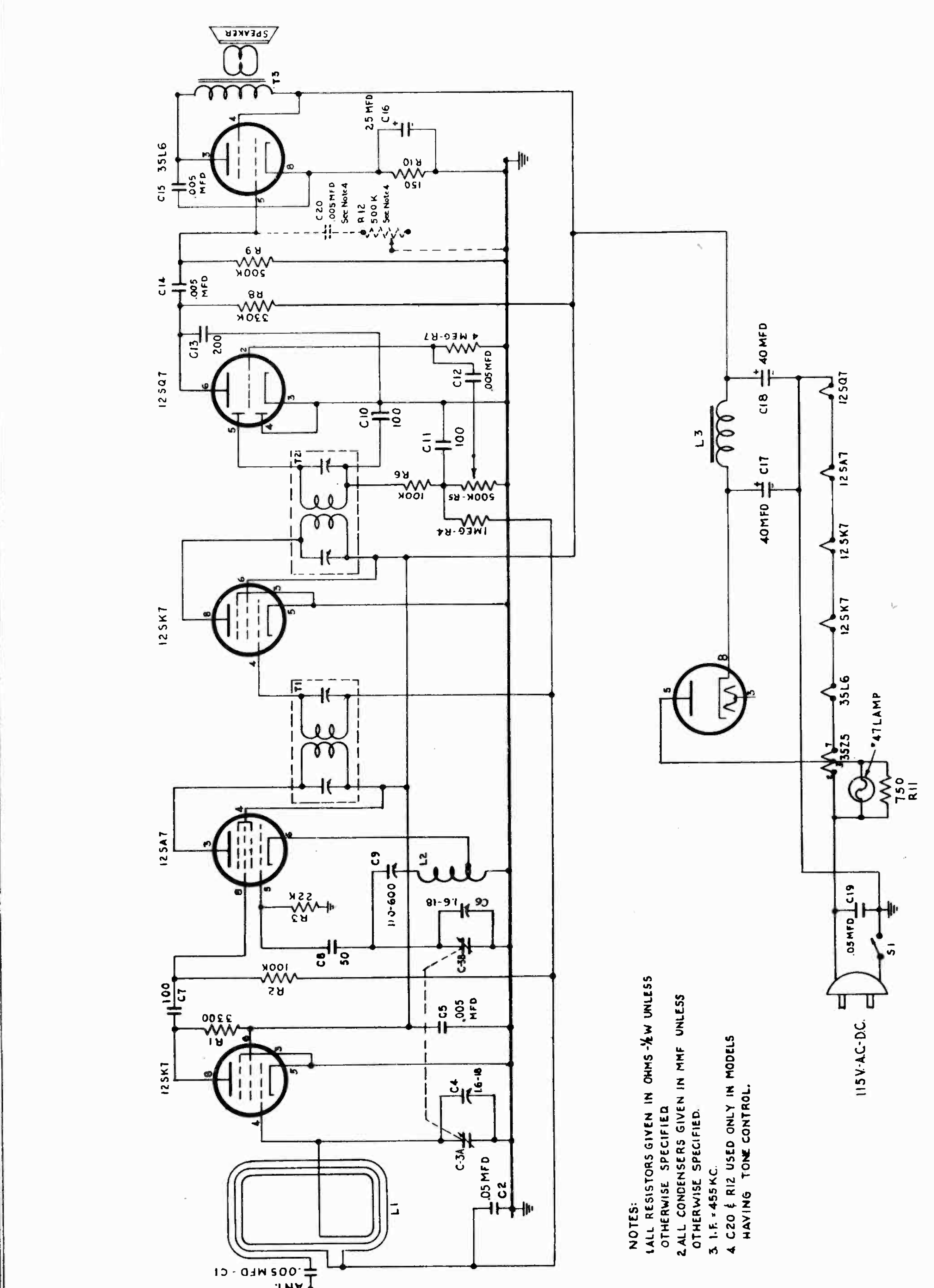
RADIO WIRE TELEVISION

MODEL JA-328

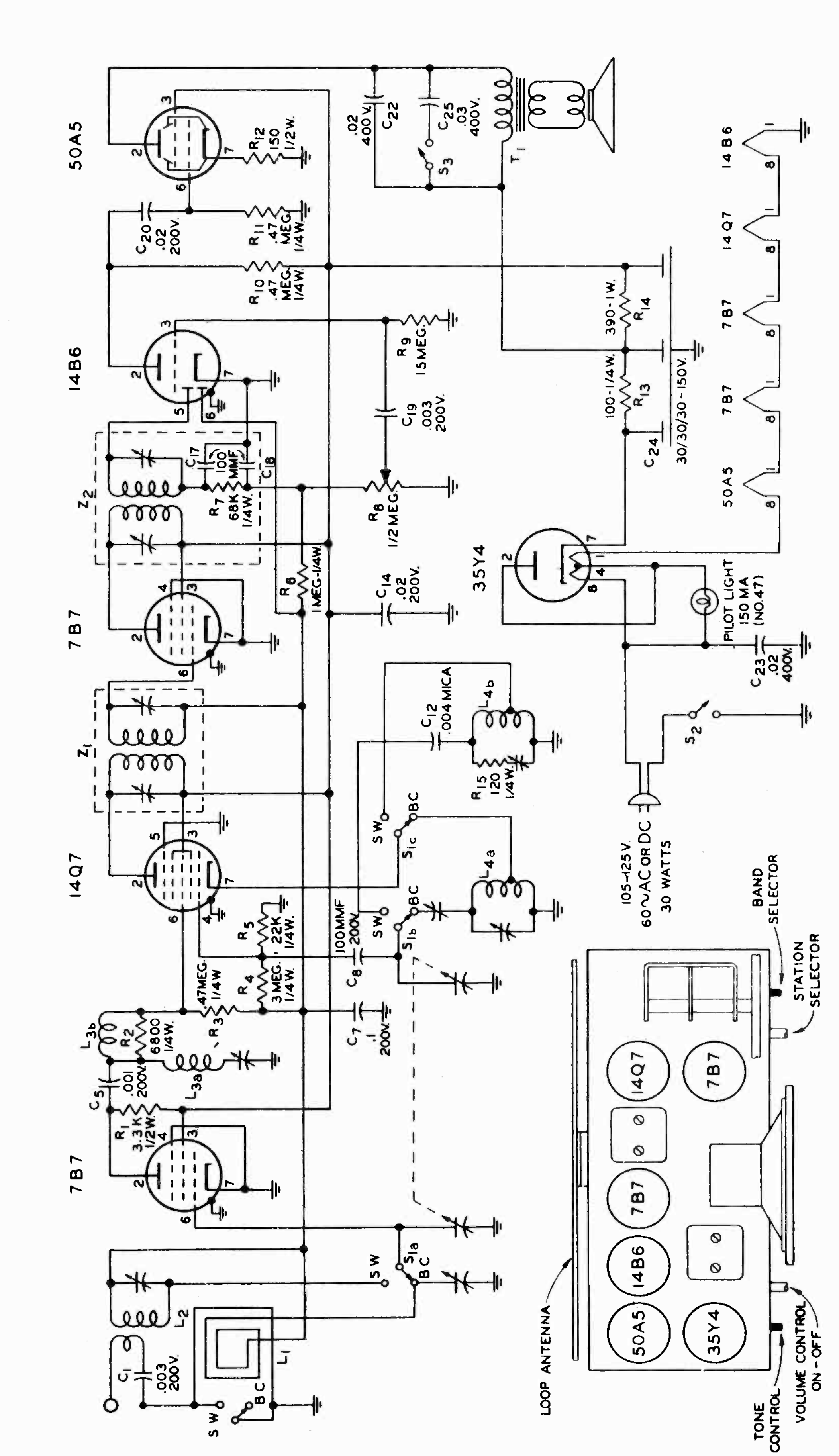


MODEL JL5

RADIO WIRE TELEVISION



RADIONIC EQUIPMENT CO.



CAUTION:

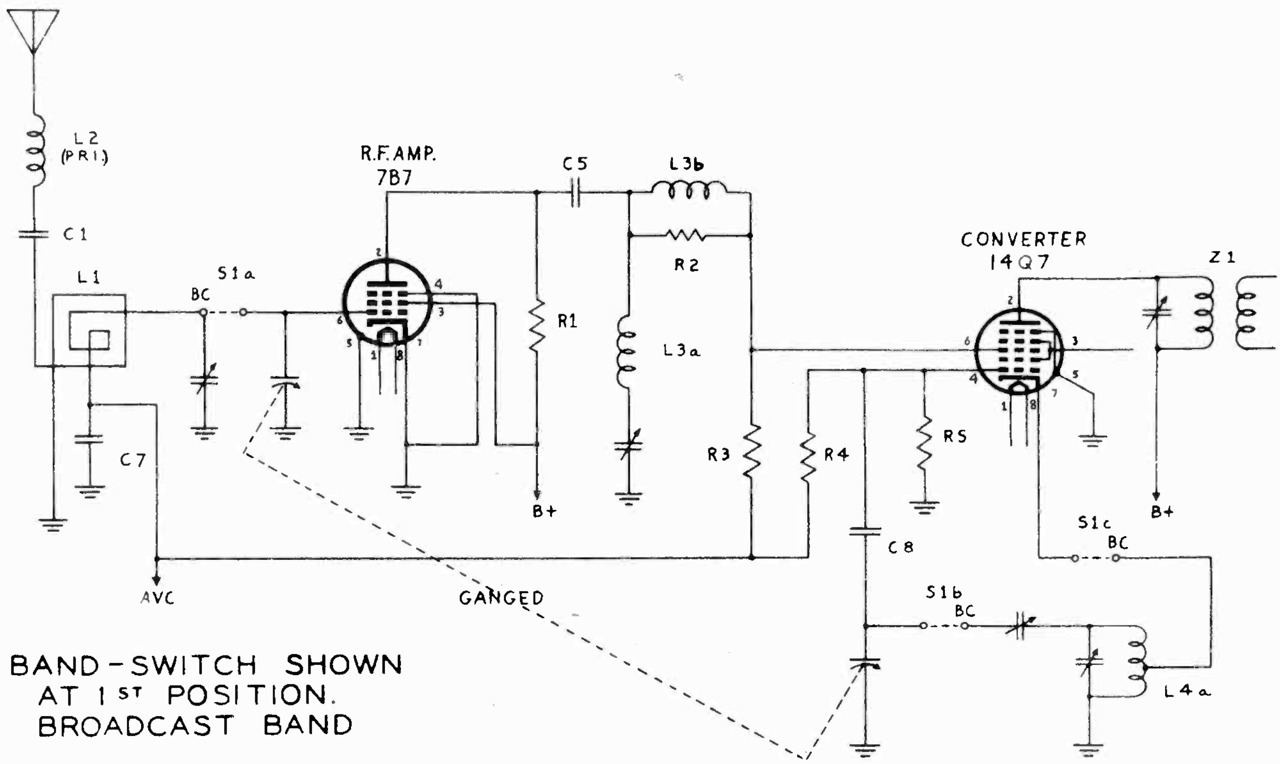
TO REPLACE TUBES, REMOVE SCREW & WASHER AT CENTER OF LOOP ANTENNA, AFTER FIRST REMOVING PLUG FROM CURRENT OUTLET

CLARI-SKEMATIX

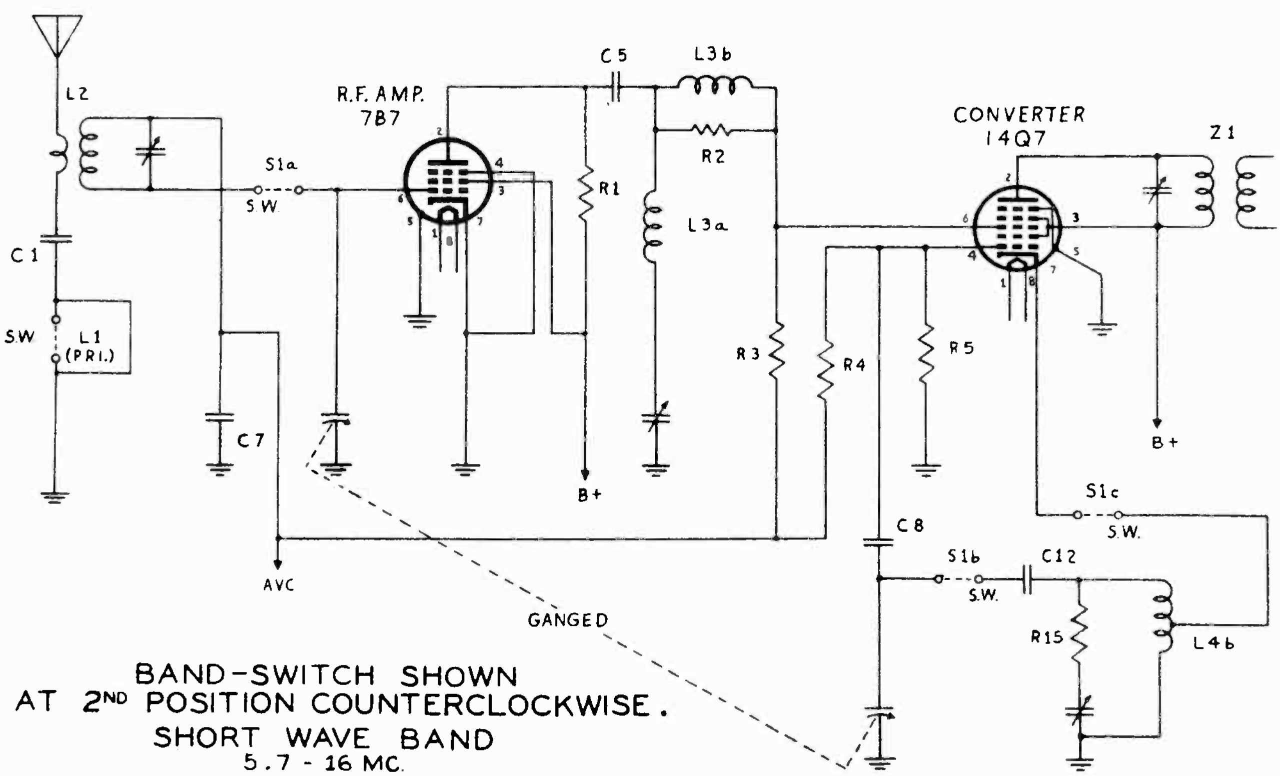
Registered Trademark

MODEL Y62W

RADIONIC EQUIPMENT CO.

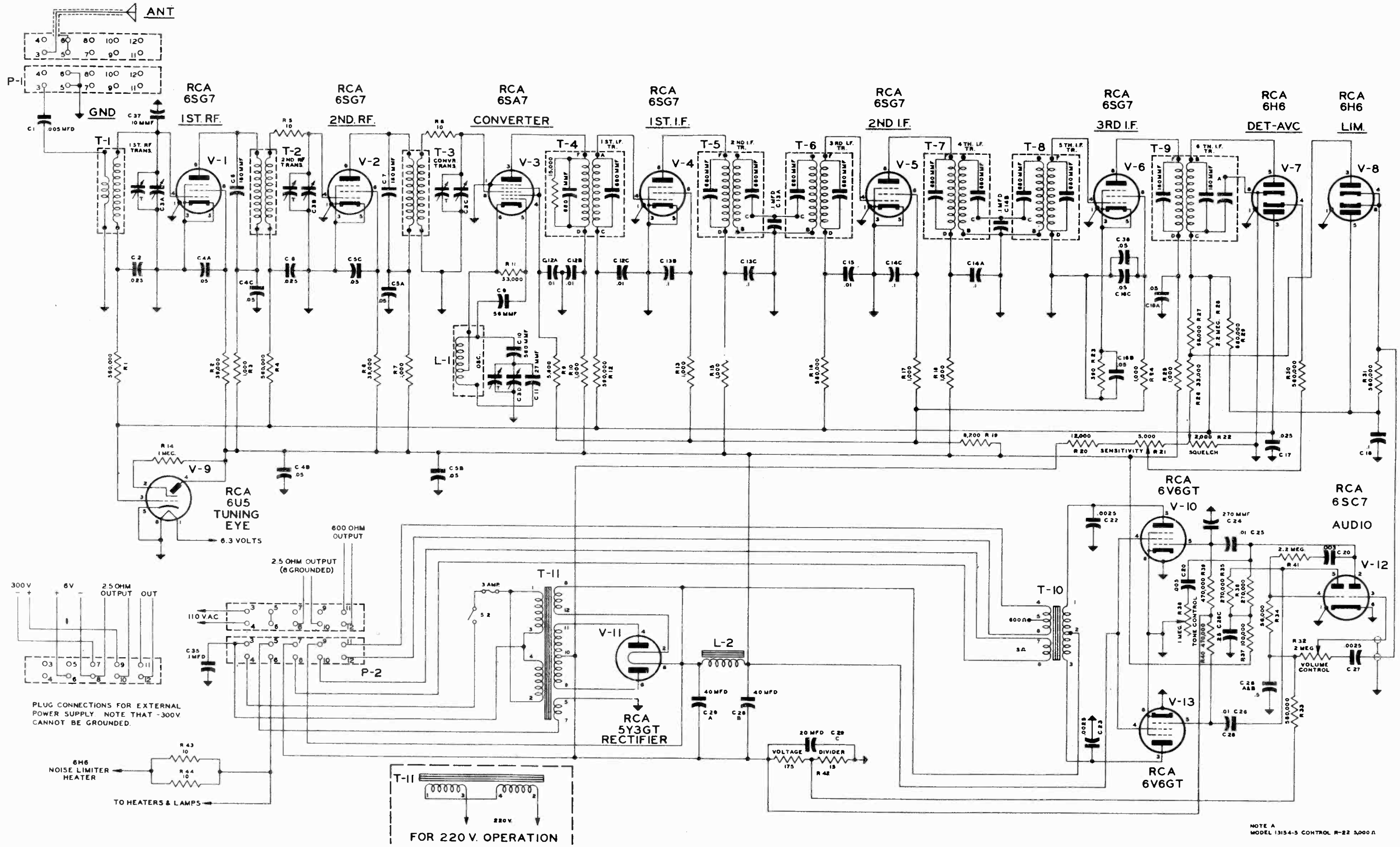


BAND-SWITCH SHOWN
AT 1ST POSITION.
BROADCAST BAND



BAND-SWITCH SHOWN
AT 2ND POSITION COUNTERCLOCKWISE.
SHORT WAVE BAND
5.7 - 16 MC.

RAYMOND ROSEN & CO.



CHANGES

1. SENSITIVITY CONTROL CHANGE

a. For improved squelch action and greater sensitivity control on early models change R-21 to 10,000 ohms and R-20 to 6800 ohms 1/2 watt. (MI-13154-10 receivers incorporate the above.)

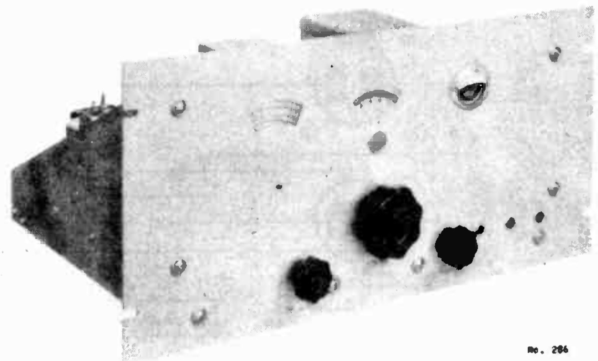
b. In actual operation set the squelch control full on (counter-clockwise) and then reduce sensitivity control (counter-clockwise) until noise level drops to an acceptable point. This adjustment should be accomplished with the receiver not tuned to any station.

c. For improved TUNING EYE operation move yellow lead from juncture of R-1 and pin A of T-6 to pin 5 of tube V8.

The MI-13154 radio features a circuit design utilizing over coupled i.f.transformers. Certain alignment procedures must be followed to insure proper adjustment of the r.f. and i.f. stages.

A. I.F. ALIGNMENT

1. Full mesh on gang condenser.
2. V.T.V.M. connected at juncture of R-27 and R-28.
3. Connect signal generator in series with .02 mfd. condenser to pin 4 of V-6. Set generator at 455 k.c.
4. Tune T-9 top and bottom for maximum signal on V.T.V.M.
5. Move signal generator connection to pin 4 of V-5.
6. Now shunt terminals B and D (top of T8) with a 3900 ohm ½ watt resistor and tune the primary (bottom slug) of T8. Remove 3900 ohm resistor.
7. Now shunt terminals F and G (bottom of T8 and tune the secondary (top slug) of T8. Remove 3900 ohm resistor.
8. Follow the same procedure for T-7.
9. Move signal generator to pin 4 of V-4 and follow same procedure for T-6 and T-5.
10. Move signal generator to pin 8 of V-3 and tune for maximum signal on V.T.V.M.

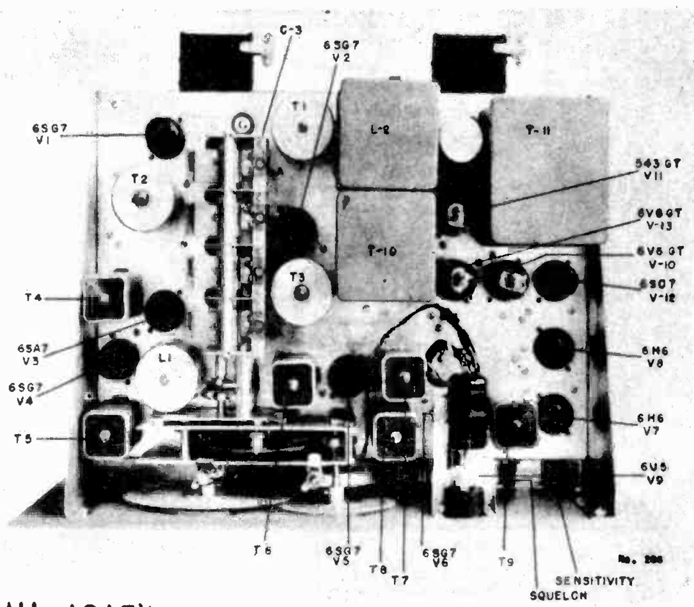


B. R.F. ALIGNMENT

"Connect signal generator in series with 500 mmfd. condenser to pin 3 of plug P-1 and then follow procedures 1 through 5.

1. Turn oscillator L-1 to 535 k.c. (Condenser full mesh.)
2. Move condenser full out and tune C-3D to 1600 k.c.
3. Return condenser to 550 k.c. and tune C-1, T-1, T-2, and T-3 for maximum.
4. Move condenser to 1400 k.c. and tune C-3A, C-3B, and C-3C for maximum.
5. Return condenser to 535 k.c. and retune L-1.

This completes alignment. Check receiver on local signal with 70' antenna. Normal receiver should develop 18-20 volts on V.T.V.M.



MI-13154 - Tube and Parts Location

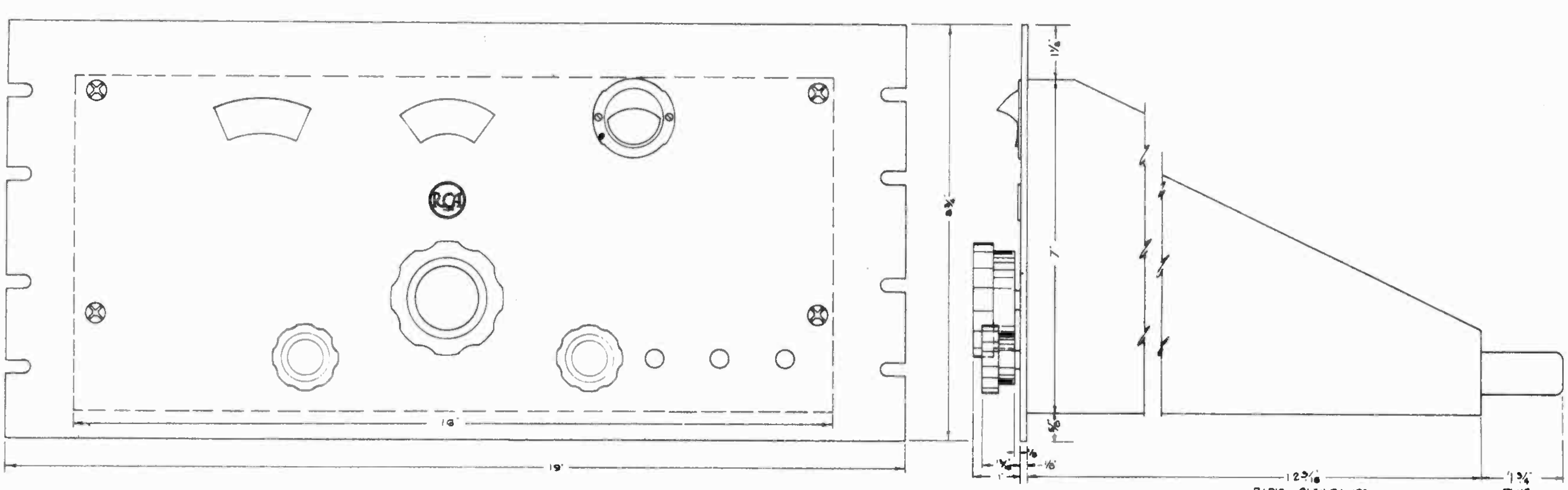
APPLICATION — RAILROAD AND SPECIAL SERVICE

Voltage Rating . . . . 110/220 volts, 50/60 cycle
Power Consumption . . . . 115 watts
Fuse Rating . . . . 3 amps.
Power Output 2% RMS Harmonic Distortion . . . . 12 watts
Power Output (maximum) . . . . 15 watts
Sensitivity . . . . 1.5-2.0 microvolts
Antenna input . . . . 70 ohms, 250-800 mmfd.

TUBE COMPLEMENT:

1	RCA-6SG7	1st RF	1	RCA-6H6	Detector AVC
1	RCA-6SG7	2nd RF	1	RCA-6H6	Limiter
1	RCA-6SA7	converter	1	RCA-6SC7	audio driver
1	RCA-6SG7	1st IF	2	RCA-6V6	power output
1	RCA-6SG7	2nd IF	1	RCA-6U5	turning indicator
1	RCA-6SG7	3rd IF	1	RCA-5Y3GT	rectifier

The MI-13154 Radio Receiver is primarily designed for operation under adverse operating conditions and varying signal levels such as encountered in train radio operation. Excellent sensitivity and improved automatic volume control are featured plus peak noise squelch control.



MI-13154 - Train Radio Panel

REPLACEMENT PARTS

MI-13154

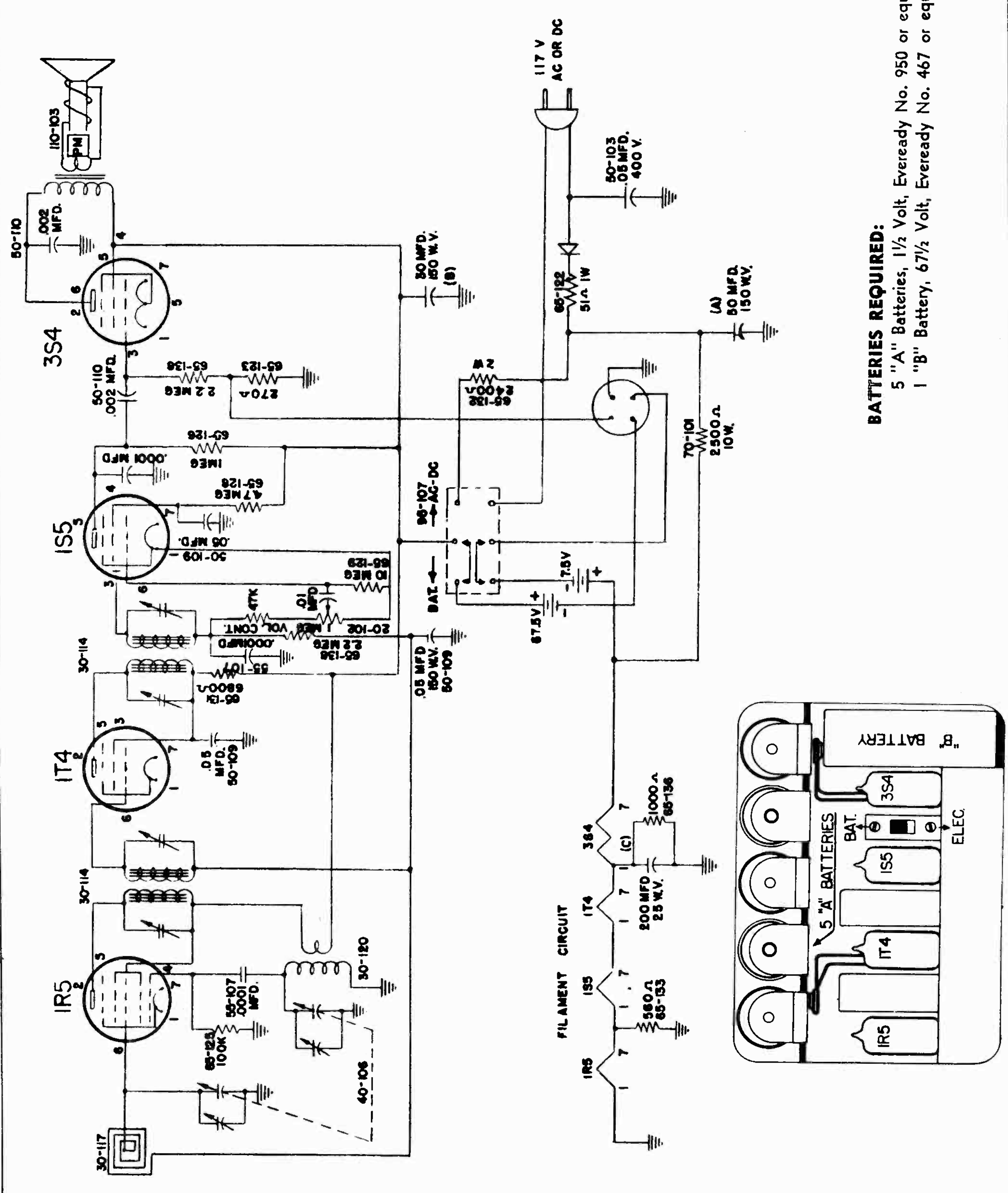
Train Radio Receiver

Stock No.		
TR 101	R1, R4, R12, R16, R30, R31, R33	560,000 ohm 1/2 w
TR 102	R2, R6	39,000 ohm 1/2 w
TR 103	R3, R7, R10, R13, R15, R17, R18, R24, R25	1,000 ohm 1/2 w
TR 104	R5, R8, R43, R44	10 ohm 1/2 w
TR 105	R9	5,600 ohm 1/2 w
TR 106	R11, R26	33,000 ohm 1/2 w
TR 107	R19	8,200 ohm 2 w
TR 108	R20	12,000 ohm 1/2 w
TR 109	R23	390 ohm 1/2 w
TR 110	R27	68,000 ohm 1/2 w
TR 111	R28, R41	2.2 meg 1/2 w
TR 112	R29	680,000 ohm 1/2 w
TR 113	R34	56,000 ohm 1/2 w
TR 114	R35, R36	270,000 ohm 1/2 w
TR 115	R37	100,000 ohm 1/2 w
TR 116	R39, R40	470,000 ohm 1/2 w
TR 117	R21	5,000 ohm potentiometer
TR 118	R22	2,000 ohm potentiometer
TR 119	R38	1 meg potentiometer
TR 120	R32	2 meg potentiometer
TR 121	R42	190 ohm tapped at 15 ohm - 20w
TR 122	C1, C21	.005 mfd. 600 V paper
TR 123	C2, C8, C17	.025 mfd. 600 V paper
TR 124	C4, C5, C16	.05 mfd. 600 V paper 3 section metal can
TR 125	C6, C7,	180 mmf mica
TR 126	C9	56 mmf mica
TR 127	C10	560 mmf mica
RR 128	C11	27 mmf ceramic
TR 129	C12	.01 mfd 3 section metal can 600 V
TR 130	C13, C14	.1 mfd 3 section metal can 600 V
TR 131	C15, C25, C26	.01 mfd 600 V
TR 132	C19, C36	.1 mfd 600 V
TR 133	C20	.003mfd 600 V
TR 134	C22, C23, C27	.0025mfd 600 V
TR 135	C24	270 mmf mica
TR 136	C28	.25 mfd 3 section metal can 600 V
TR 137	C35	.05 mfd 600 V
TR 138	C37	10 mmf mica
TR 139	C3A, B, C, D	4 section tuning capacitor
TR 140	T-1	antenna coil (#95520-509)
TR 141	T-2, T-3	2nd RF and converter coils (#95520-501)
TR 142	L-1	oscillator coil (#95520-510)
TR 143	T-4	1st IF (#92430-501)
TR 144	T-5k T-6, T-7, T-8,	IF 2nd, 3rd, 4th, 5th coils (#92430-503)
TR 145	T-9	IF 6th coil (#92430-502)
TR 146	V-1, V-2, V-4, V-5, V-6,	RCA 6SG7 tube
TR 147	V-3	RCA 6SA7 tube
TR 148	V-7, V-8	RCA 6H6 tube
TR 149	V-12	RCA 6SC7 tube
TR 150	V-10, V-13	RCA 6V6 tube
TR 151	V-11	RCA 5Y3 tube
TR 152	V-9	RCA 6U5 tube
TR 153	T-10	output transformer (#14329 F)
TR 154	T-11	power transformer (#14300 F)
TR 155	L-2	filter choke (#14299 F)
TR 156	F-1	fuse holder HKM fuse type 3AG 3 amp.
TR-157		* 10,000 ohm potentiometer
TR-158		* 6,800 ohm 1/2 w

* Model 13154-10 only

MODEL 777

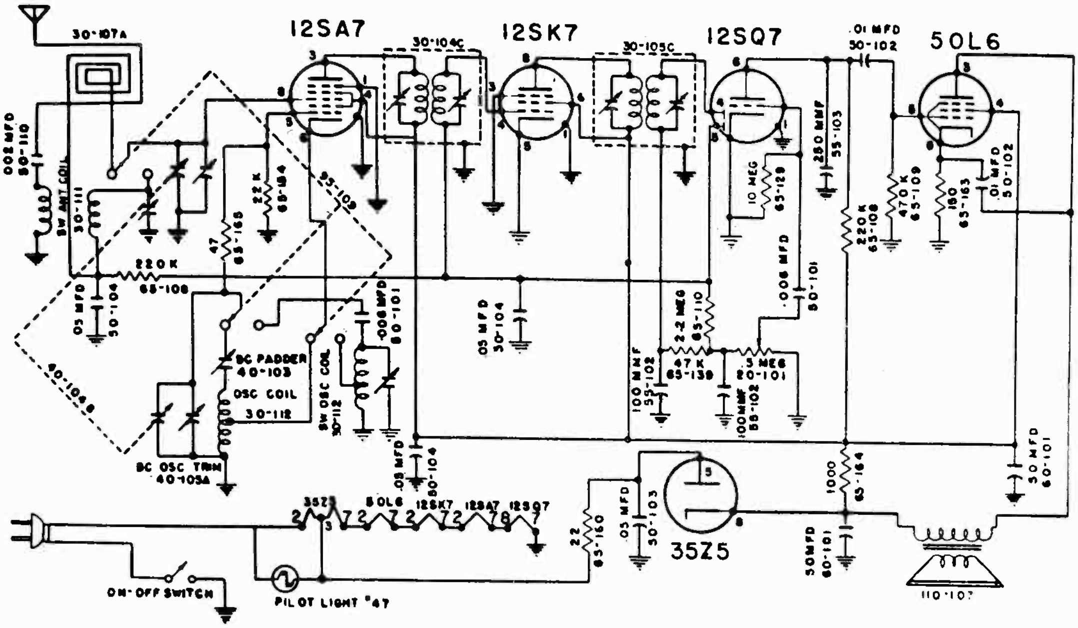
REGAL ELECTRONICS CORP.



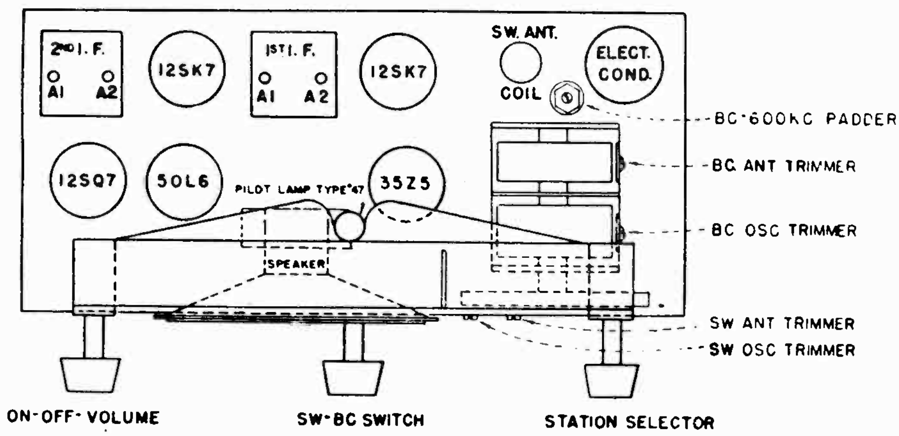
BATTERIES REQUIRED:
5 "A" Batteries, 1½ Volt, Eveready No. 950 or equivalent
1 "B" Battery, 67½ Volt, Eveready No. 467 or equivalent.

MODEL 7152

REGAL ELECTRONICS CORP.



BAND SWITCH SHOWN IN BC (CONTER CLOCKWISE) POSITON



This Model is a 5 tube 2 band superheterodyne which will give reception over a wide range, including standard broadcast and foreign shortwave. The tuning range of the broadcast frequency is 540 to 1650 kilocycles, or 560 to 182 meters. The short wave frequency is 5.8 to 18.3 megacycles, or 16 to 49 meters, which includes the following: 16, 19, 25, 31, 39 and 49 meter bands.
This radio is designed for convenient use in any location within range of a standard outlet receptacle. It will operate on 105 to 125 volts, 50 to 60 cycles alternating current, or on 105 to 125 volts direct current.

ELECTRICAL SPECIFICATIONS

The circuit is a superheterodyne employing 9 tuned circuits for maximum sensitivity and selectivity, with automatic volume control (AVC), beam power output system. The tube complement consists of (1) 12SA7 as a converter, (1) 12SK7 if amplifier, (1) 12SQ7 detector AVC and first audio amplifier, (1) 50L6 beam power amplifier and (1) 35Z5 rectifier.

(See diagram on back for location of tubes)

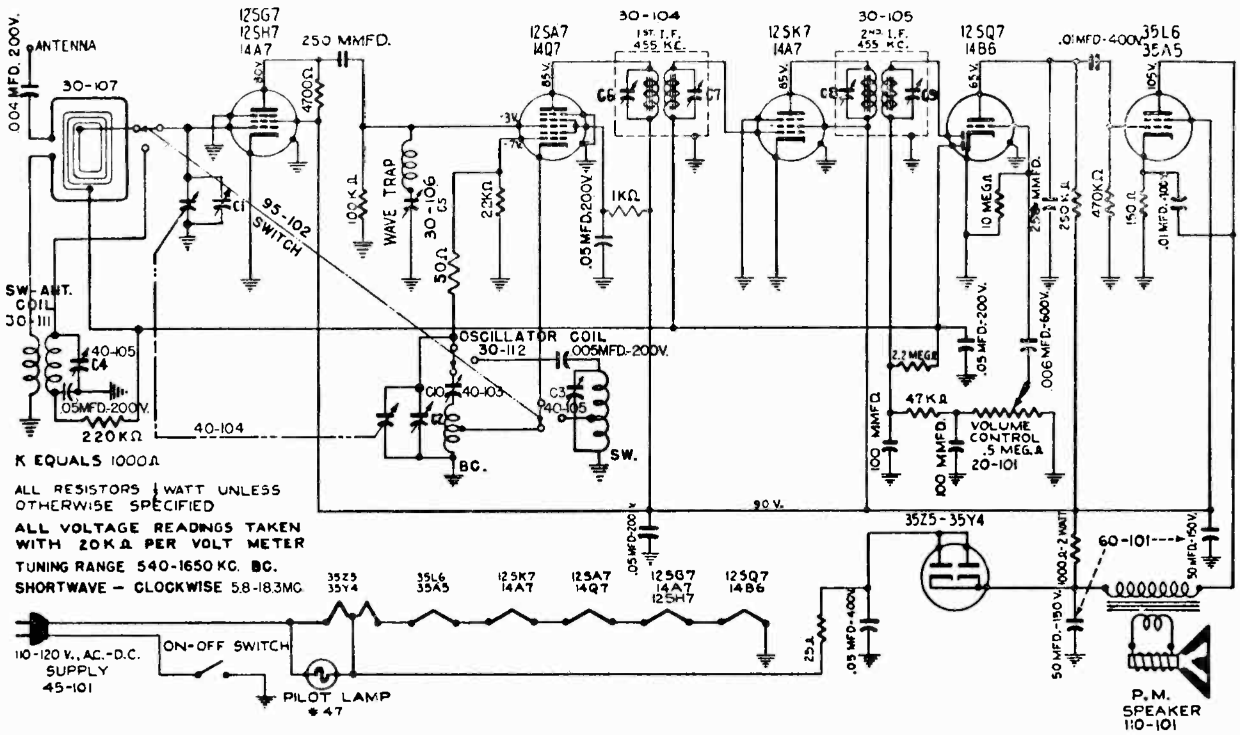
If your set does not work check your tubes. Make sure each tube is in its socket and also make sure the pilot light works.

INSTALLATION

Antenna

The loop Antenna in this receiver will give good reception under normal conditions. It is directional and the best position may be obtained by slowly rotating the receiver in different directions until the signal volume is at its strongest. For better results on weak signals and for foreign reception connect a good outside Antenna. A connection is provided at the rear of the receiver for connecting an outdoor Antenna.

REGAL ELECTRONICS CORP. MODEL 7162



The Model 7162 is a 6 tube 2 band superheterodyne which will give reception over a wide range, including standard broadcast and foreign shortwave. The tuning range of the broadcast frequency is 540 to 1650 kilocycles, or 560 to 182 meters. The short wave frequency is 5.8 to 18.3 megacycles, or 16 to 49 meters, which includes the following: 16, 19, 25, 31, 39 and 49 meter bands.

This radio is designed for convenient use in any location within range of a standard outlet receptacle. It will operate on 105 to 125 volts, 50 to 60 cycles, alternating current, or on 105 to 125 volts direct current.

ELECTRICAL SPECIFICATIONS

The circuit used is a superheterodyne employing 9 tuned circuits for maximum sensitivity and selectivity, with automatic volume control (AVC), beam power output system, IF wave trap, and a URF stage (untuned radio frequency stage). The tube complement consists of (1) 12SG7, 12SH7, or 12SK7 in the RF stage, (1) 12SA7 as a converter, (1) 12SK7 if amplifier, (1) 12SQ7 detector AVC and first audio amplifier, (1) 35L6 or 50L6 beam power amplifier and (1) 35Z5 rectifier.

Antenna

The loop Antenna in this receiver will give good reception under normal conditions. It is directional and the best position may be obtained by slowly rotating the receiver in different directions until the signal volume is at its strongest. For better results on weak signals and for foreign reception connect a good outside Antenna. A connection is provided at the rear of the receiver for connecting an outdoor Antenna.

MODEL 7162

REGAL ELECTRONICS CORP.

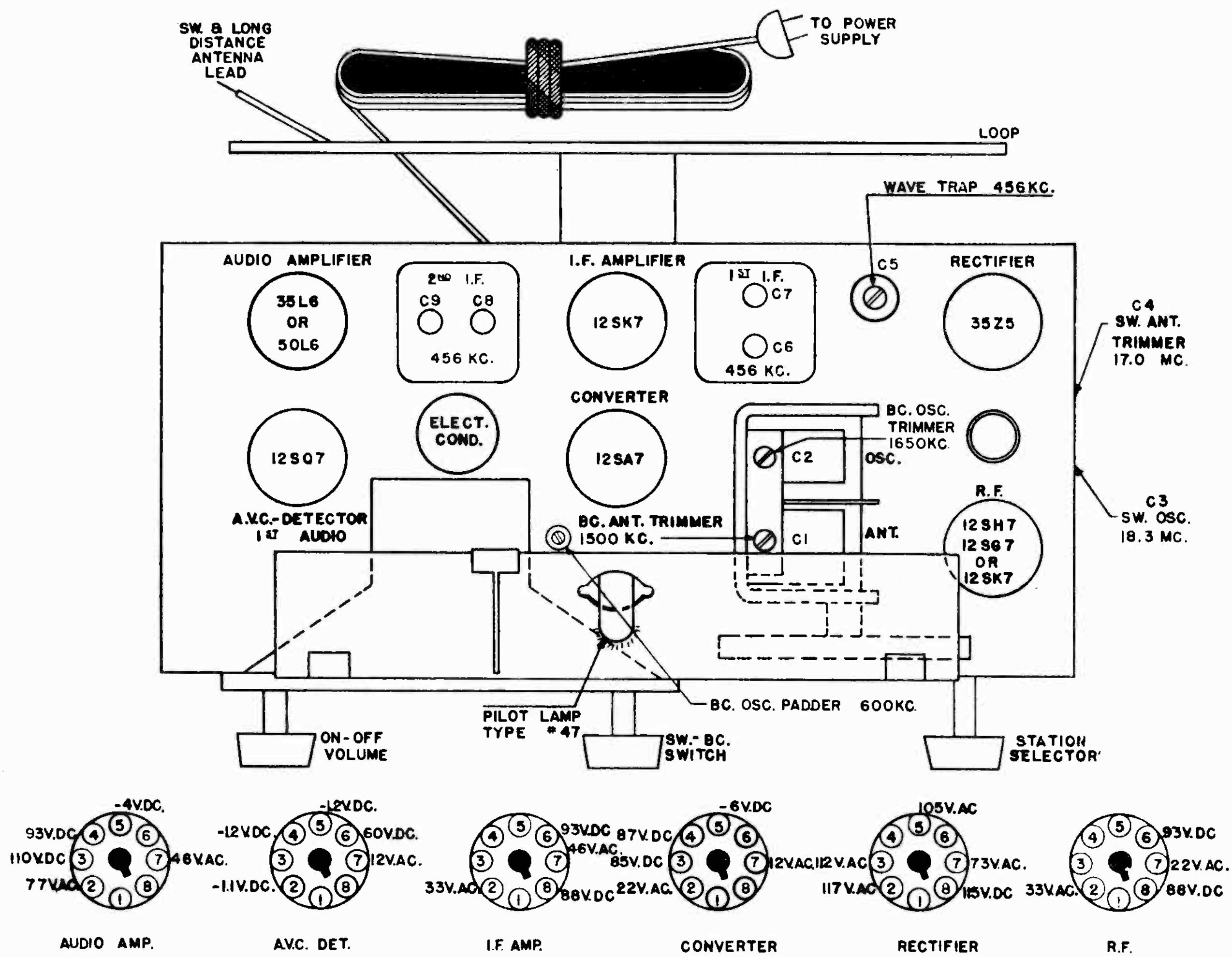
ALIGNMENT INSTRUCTIONS

SET VOLUME CONTROL AT MAXIMUM VOLUME AND OUTPUT FROM SIGNAL GENERATOR NO HIGHER THAN IS NECESSARY TO OBTAIN OUTPUT READING.

TUNING RANGE: BROADCAST 540-1650KC. SHORTWAVE 5.8-18.3MC.

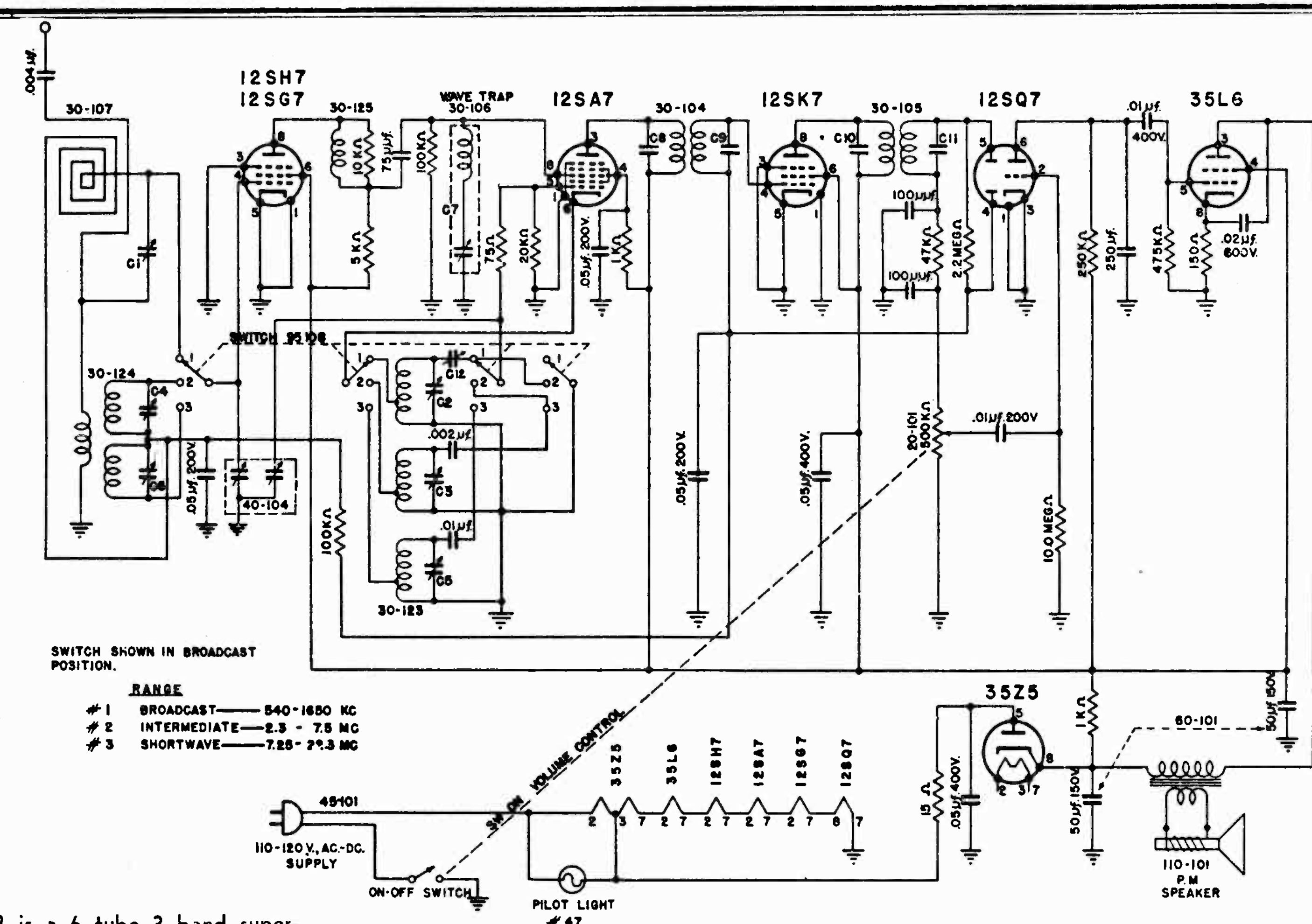
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	BAND SWITCH POSITION	SIGNAL GEN. FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	R.F. SECTION OF VARIABLE CONDENSER	BC.	455 KC.	1650 KC.	ACROSS VOICE COIL	C9, C8, C7, C6	ADJUST FOR MAXIMUM
.1 MFD.	" "	BC.	455 KC.	1650 KC.	" "	C5	" " MINIMUM
.1 MFD.	" "	BC.	1650 KC.	1650 KC.	" "	C2	" " MAXIMUM
.1 MFD.	" "	BC.	600 KC.	600 KC.	" "	C10	" " "
200 MFD.	ANTENNA LEAD	BC.	1500 KC.	1500 KC.	" "	C1	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT
.1 MFD.	R.F. SECTION OF VARIABLE CONDENSER	SW.	18.3 MC.	18.3 MC.	" "	C3	ADJUST FOR MAXIMUM
400Ω	ANTENNA LEAD	SW.	17 MC.	17 MC.	" "	C4	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT

IF TWO PEAKS CAN BE OBTAINED, USE ONE WITH TRIMMER SCREW FURTHER OUT.



VOLTAGES TAKEN WITH 20KΩ PER VOLT METER WITH CHASSIS GROUND, AT 1000KC.

REGAL ELECTRONICS CORP.



The Model 7163 is a 6 tube 3 band superheterodyne which will give reception over a wide range, including standard broadcast, intermediate short wave, and foreign short wave. The tuning range of the broadcast frequency is 540 to 1650 kilocycles, or 560 to 182 meters. The intermediate short wave frequency is 2.3 to 7.5 megacycles, or 130.0 to 40.0 meters, and the foreign short wave frequency is 7.25 to 22.3 megacycles or 41.5 to 13.5 meters. This receiver covers the following meter bands, 13, 16, 19, 25, 31, 49, 60, 90, and 125.

This radio is designed for convenient use in any location with range of a standard outlet receptacle. It will operate on 105-125 volts, 50-60 cycles, alternating current, or 105-125 volts direct current.

ELECTRICAL SPECIFICATIONS

The circuit of the 7163 is a superheterodyne employing 11 tuned circuits for maximum sensitivity and selectivity, with automatic volume control (AVC) beam power output system, IF wave trap, and a URF stage (untuned radio frequency stage). The tube complement consists of (1) 12SG7 or 12SH7 in the RF stage, (1) 12SA7 as a converter, (1) 12SK7 amplifier, (1) 12SQ7 detector AVC and first audio amplifier, (1) 35L6 beam power amplifier and (1) 35Z5 rectifier.

MODEL 7163

REGAL ELECTRONICS CORP.

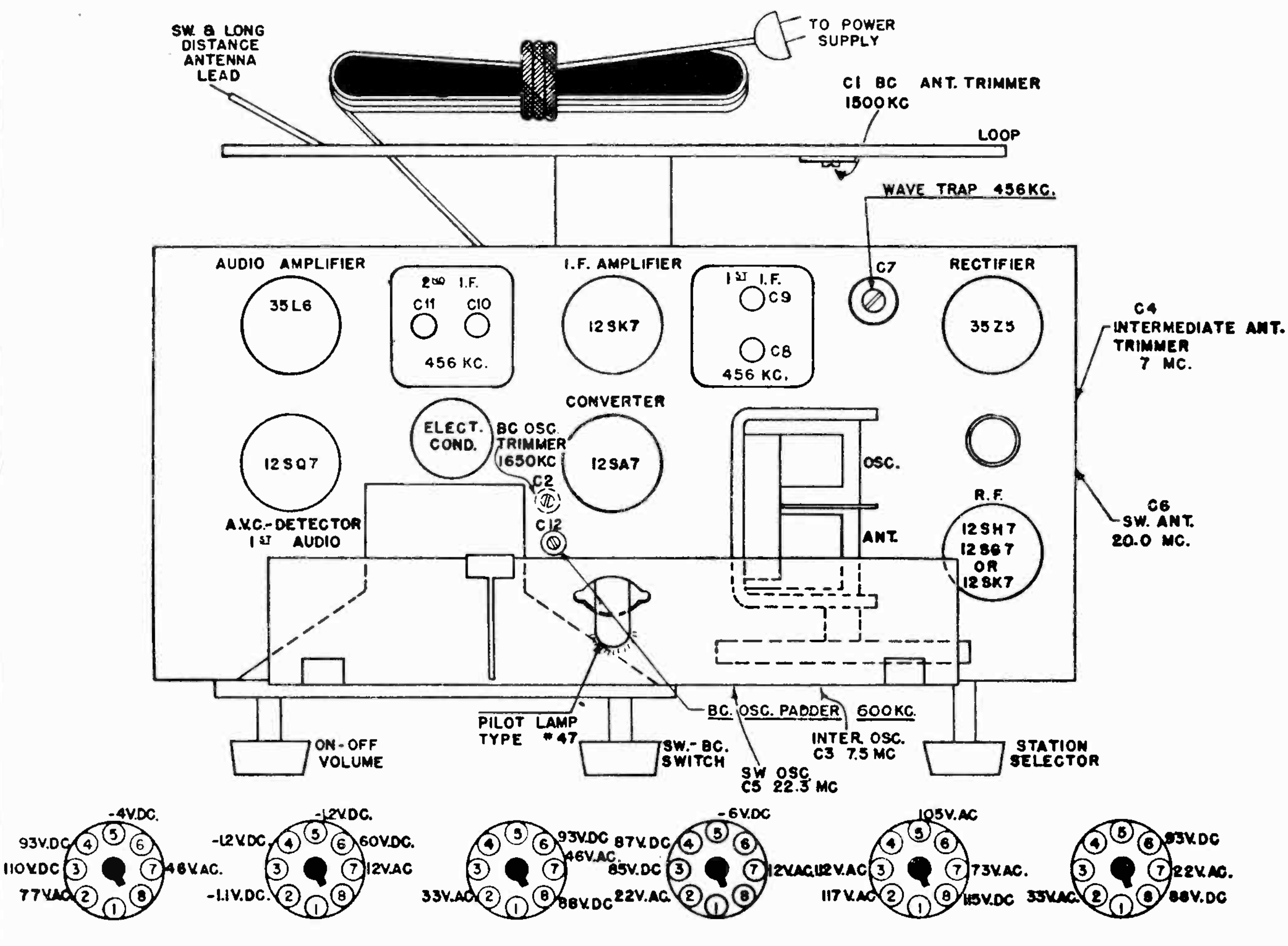
ALIGNMENT INSTRUCTIONS

SET VOLUME CONTROL AT MAXIMUM VOLUME AND OUTPUT FROM SIGNAL GENERATOR NO HIGHER THAN IS NECESSARY TO OBTAIN OUTPUT READING

TUNING RANGE BROADCAST 540 - 1650 INTERMEDIATE 2.25 - 7.5 SHORTWAVE 7.25 - 22.3

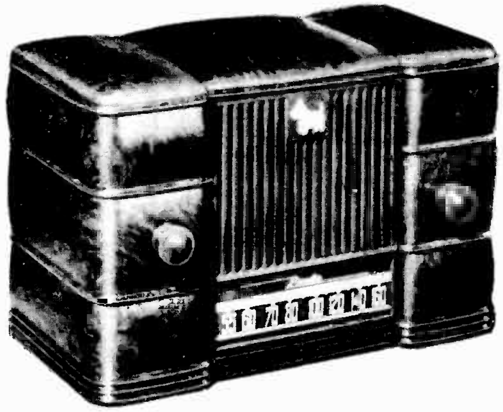
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	BAND SWITCH POSITION	SIGNAL GEN FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD	RF SECTION OF VARIABLE CONDENSER	BC	455 KC	1650 KC	ACROSS VOICE COIL	C8, C9 C10, C11	ADJUST FOR MAXIMUM
.1 MFD	" "	BC	455 KC	600 KC	" "	C7	" " MINIMUM
200 MMFD	ANTENNA LEAD	BC	1650 KC	1650 KC	" "	C2	" " MAXIMUM TRIMMER UNDER CHASSIS
200 MMFD	" "	BC	1500 KC	1500 KC	" "	C1	" " "
200 MMFD	" "	BC	600 KC	600 KC	" "	C12	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT RECHECK C1 & C2 ADJUSTMENTS AS GIVEN
400 Ω	" "	INTERMEDIATE	7.5 MC	7.5 MC	" "	C3	ADJUST FOR MAXIMUM
400 Ω	" "	INTERMEDIATE	7.0 MC	7 MC	" "	C4	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT
400 Ω	" "	SW	22.3 MC	22.3 MC	" "	C5	ADJUST FOR MAXIMUM
400 Ω	" "	SW	20 MC	20 MC	" "	C6	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT

IF TWO PEAKS CAN BE OBTAINED USE ONE WITH TRIMMER SCREW FURTHER OUT



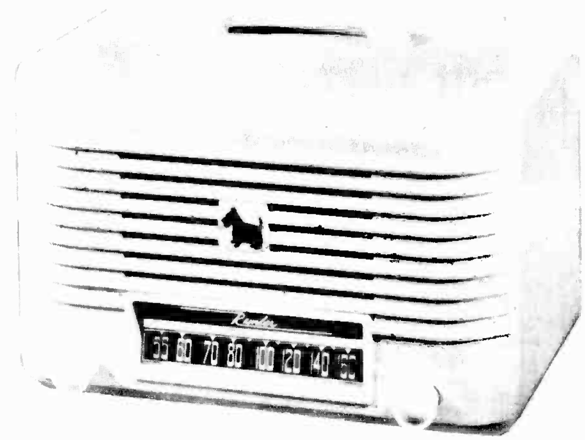
VOLTAGES TAKEN WITH 20KΩ PER VOLT. METER WITH CHASSIS GROUND, AT 1000KC.

REMLER COMPANY LTD. All Models, Cabinets



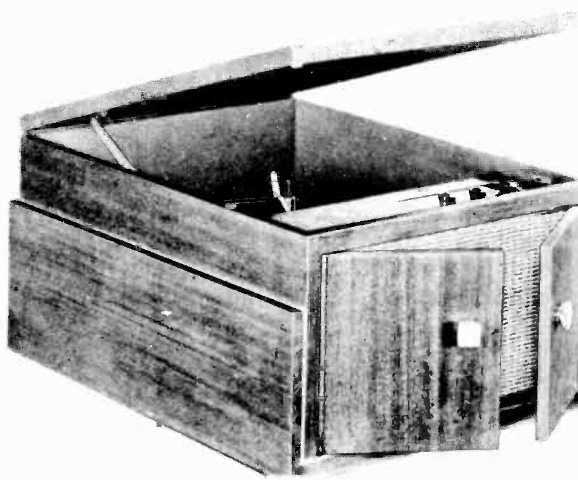
REMLER Scottie Junior

#5520 — De Luxe — Walnut
#5530 — De Luxe — White



REMLER Scottie Pup

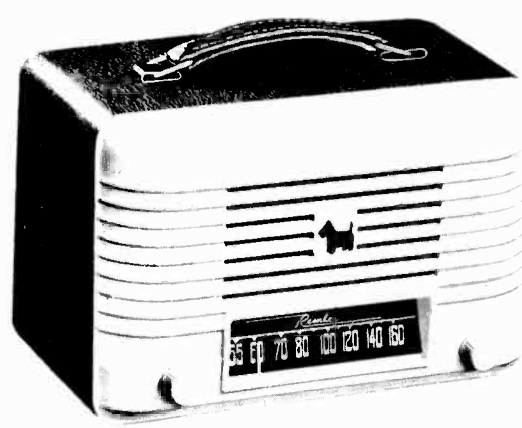
#5500 — Walnut Plastic
#5505 — Ebony with White Grille and Knobs
#5510 — White Plastic
#5515 — Red with White Grille and Knobs
#5535 — Red with White Grille and Knobs



REMLER AUTOMATIC Table Combination

#5310 M — Mahogany
#5310 BL — Blonde

Base and Record Cabinet
#110 — Mahogany
#111 — Blonde

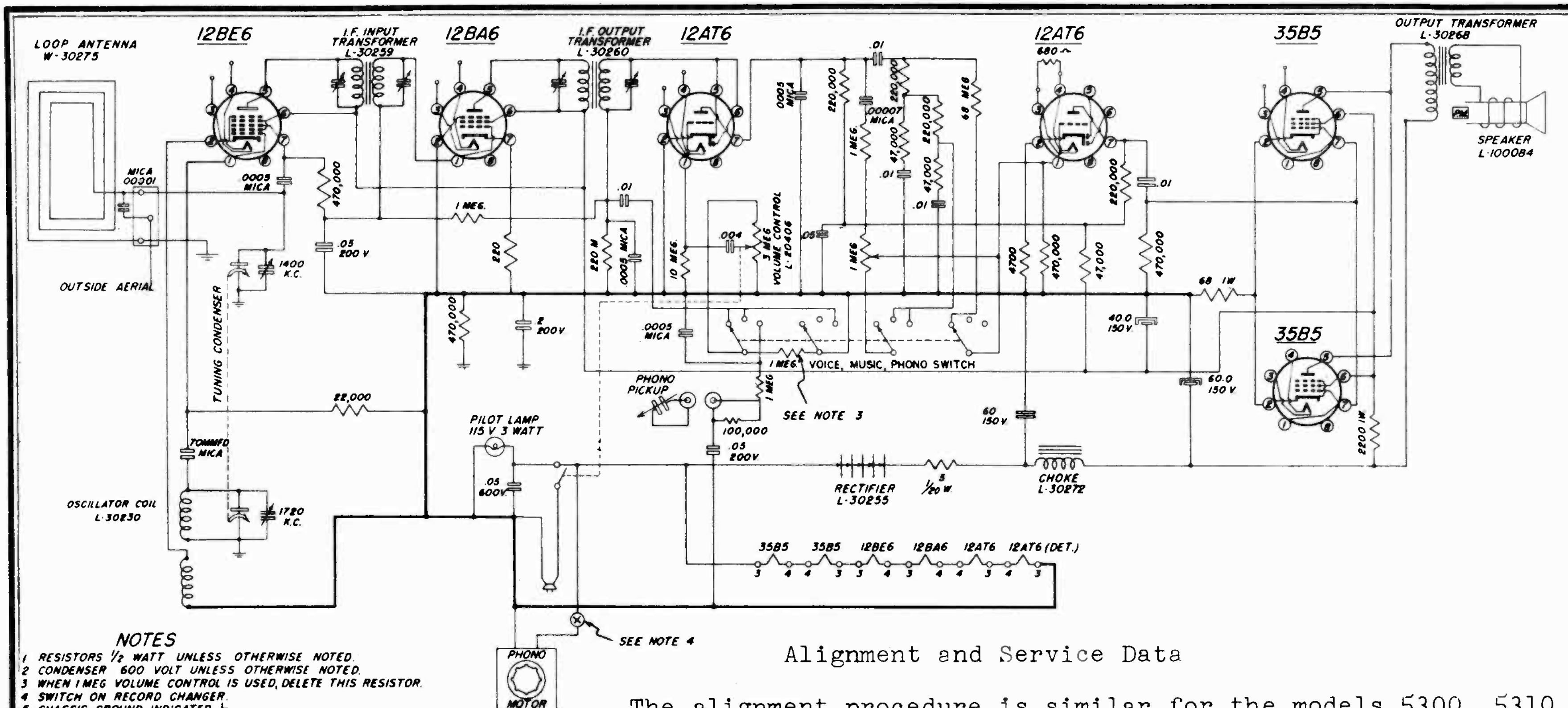


REMLER AC-DC Battery Portable

#5400 — Walnut with matching leatherette
#5410 — White with brown leatherette

MODEL 5310 EARLY

REMLER COMPANY LTD.



NOTES

1. RESISTORS 1/2 WATT UNLESS OTHERWISE NOTED.
2. CONDENSER 600 VOLT UNLESS OTHERWISE NOTED.
3. WHEN 1 MEG VOLUME CONTROL IS USED, DELETE THIS RESISTOR.
4. SWITCH ON RECORD CHANGER.
5. CHASSIS GROUND INDICATED ⏚

110-120 VOLTS A.C. 50-60 CYCLES
50 WATTS

Alignment and Service Data

The alignment procedure is similar for the models 5300, 5310 5400 and 5500 series. Intermediate frequency is 450 KC.

The oscillator should track at 545 KC (closed gang) and 1635 KC (open gang). The voltage across the grid resistor should run within limits of 4 to 8 volts negative throughout the dial.

Tune R.F. at 590 KC, 1090 KC and 1500 KC. The position of the loop with respect to the chassis must be maintained as within the cabinet for all alignment. If sensitivity is low on low end of dial, increase the oscillator 70 mmf to 100 or 150 mmf.

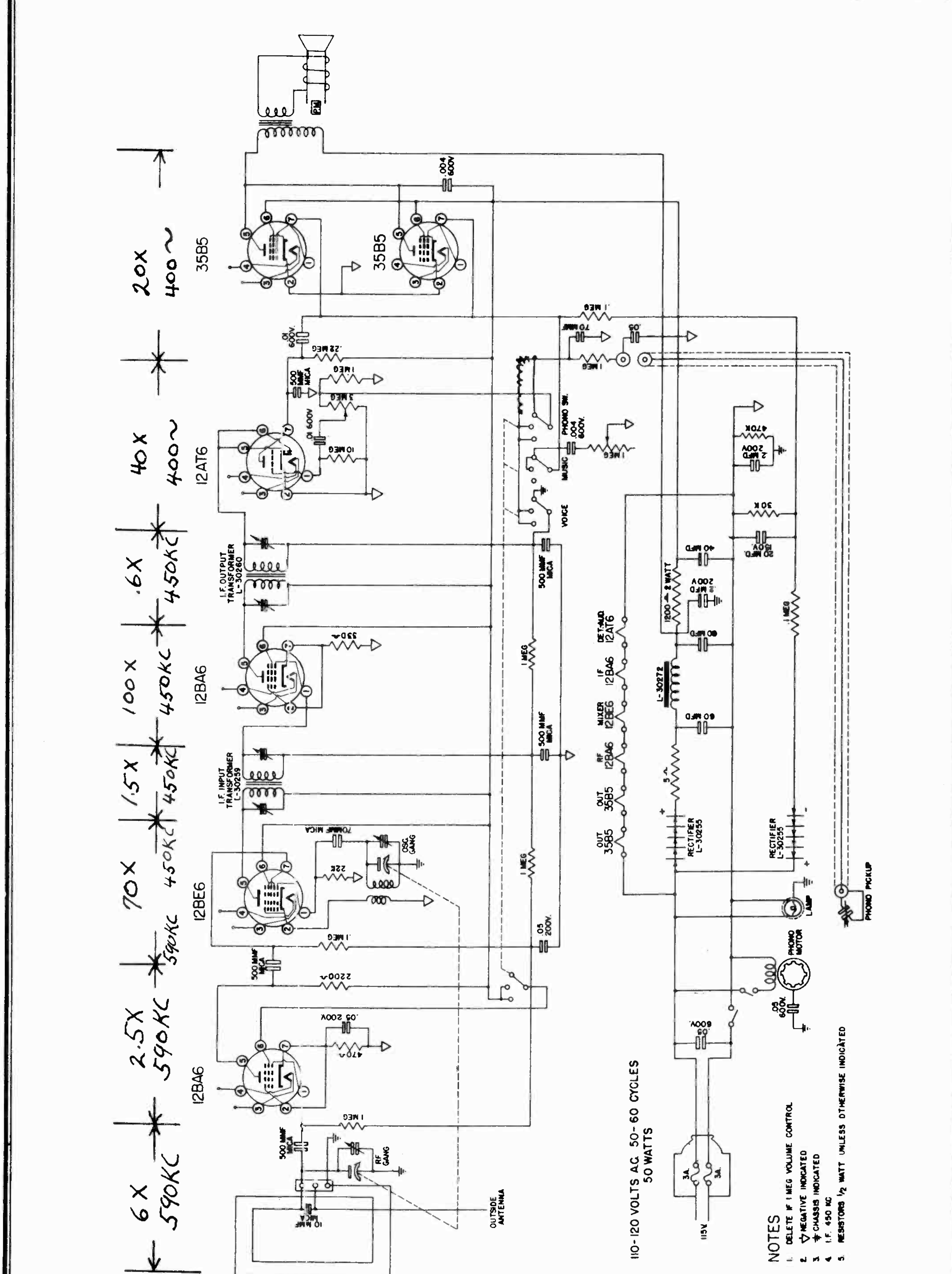
For I.F. Oscillation, check for 100 ohms I.F. Cathode resistance. This may be increased if found necessary.

On the 5500 series, if the residual hum level is too high, dress volume control loads away from A.C.

On the 5310, to decrease residual hum, increase the 30 K bias filter resistor.

REMLER COMPANY LTD.

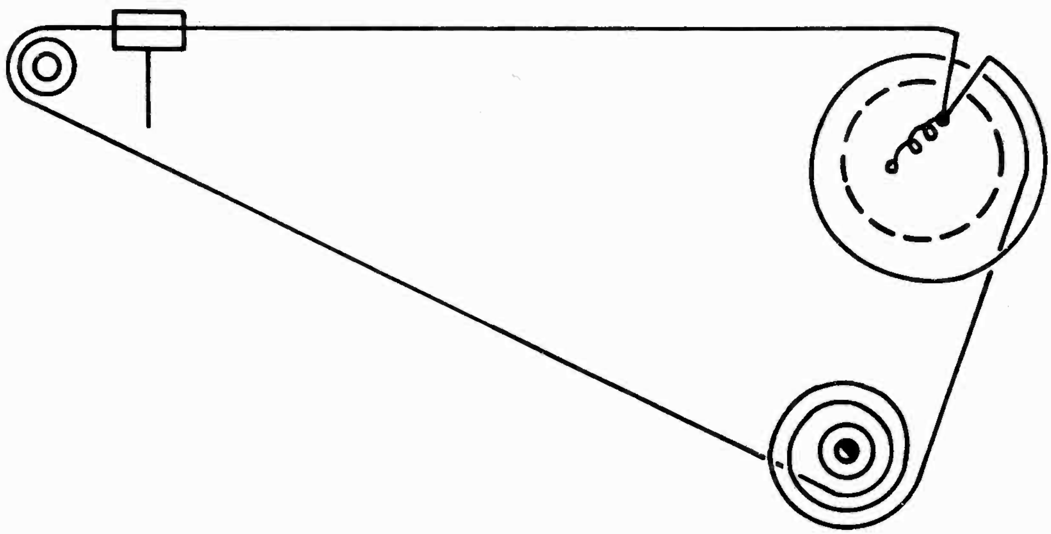
MODEL 5310 LATE



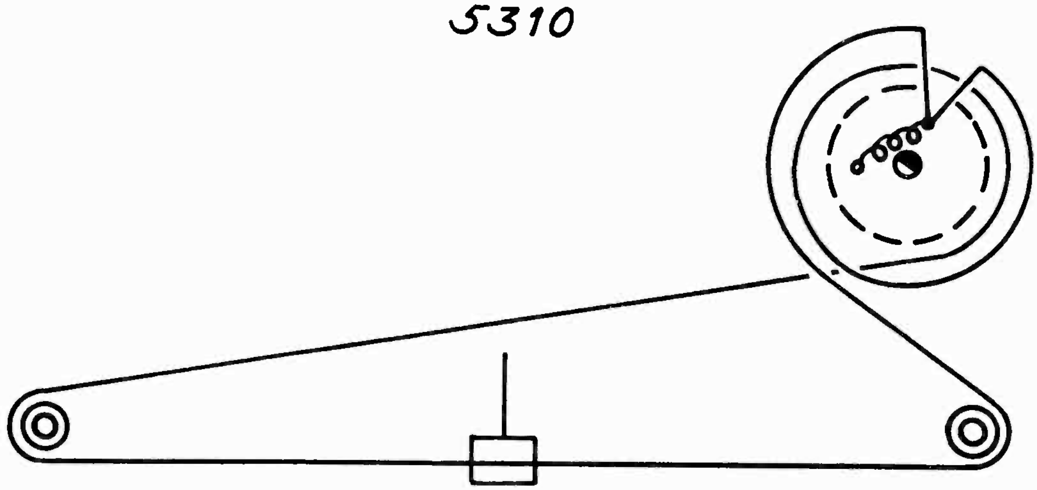
MODELS 5310, 5400, 5500, 5520, 5530, 5560, 5565

REMLER COMPANY LTD.

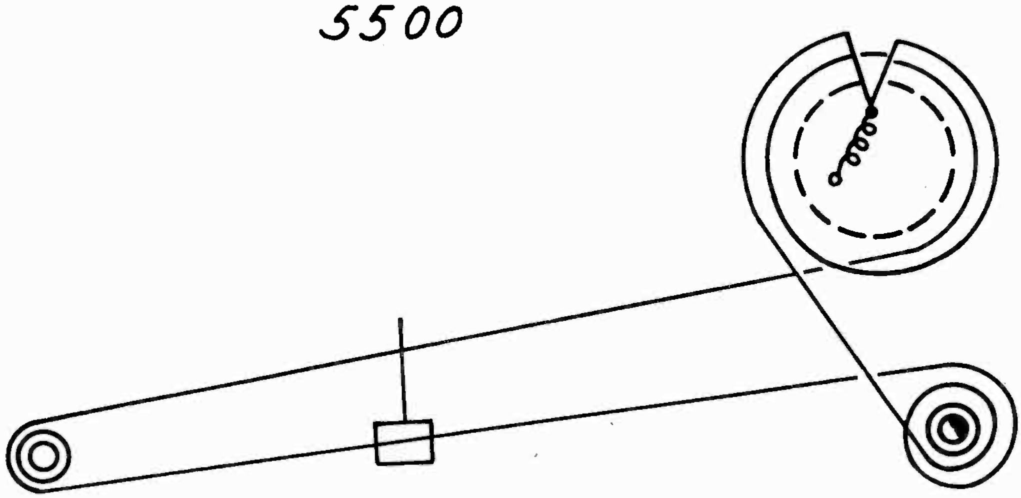
DIAL CORD DRIVES



5310



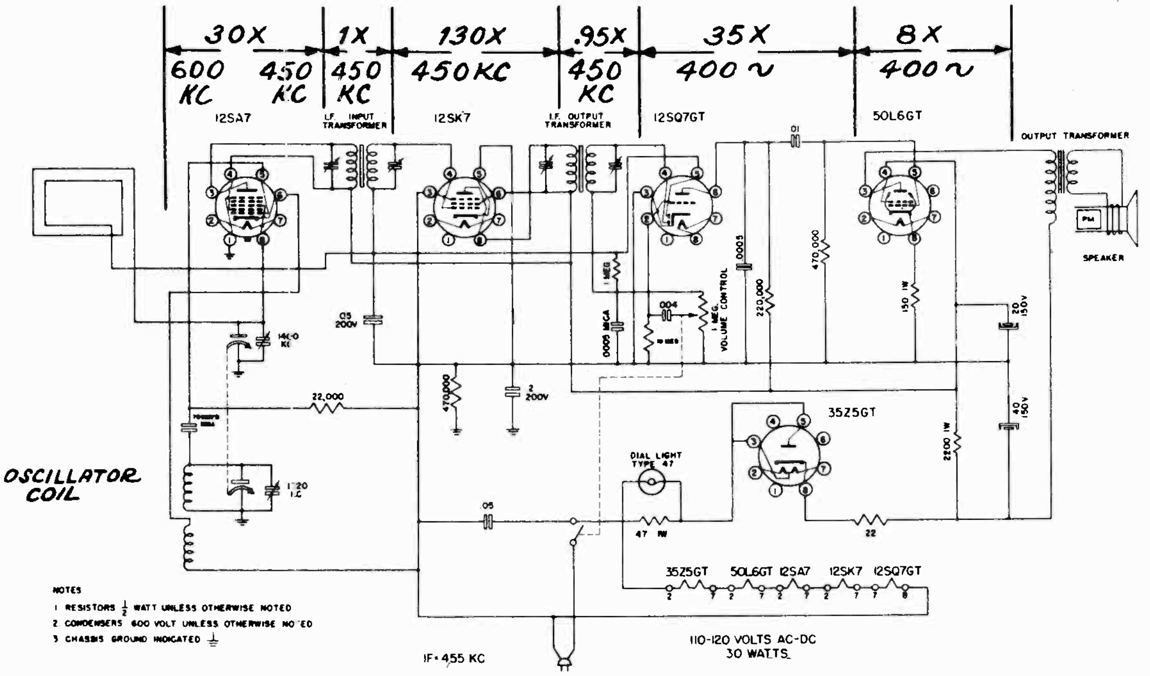
5500



5400-5520-30-60-65

REMLER COMPANY LTD. MODELS 5500, 5505, 5510, 5515, 5520, 5530, 5535, 5560, 5565
MODELS 5400, 5410

MODELS 5500, 5505, 5510, 5515, 5520, 5530, 5535, 5560, 5565



MODELS 5400, 5410