VOLUME XIX

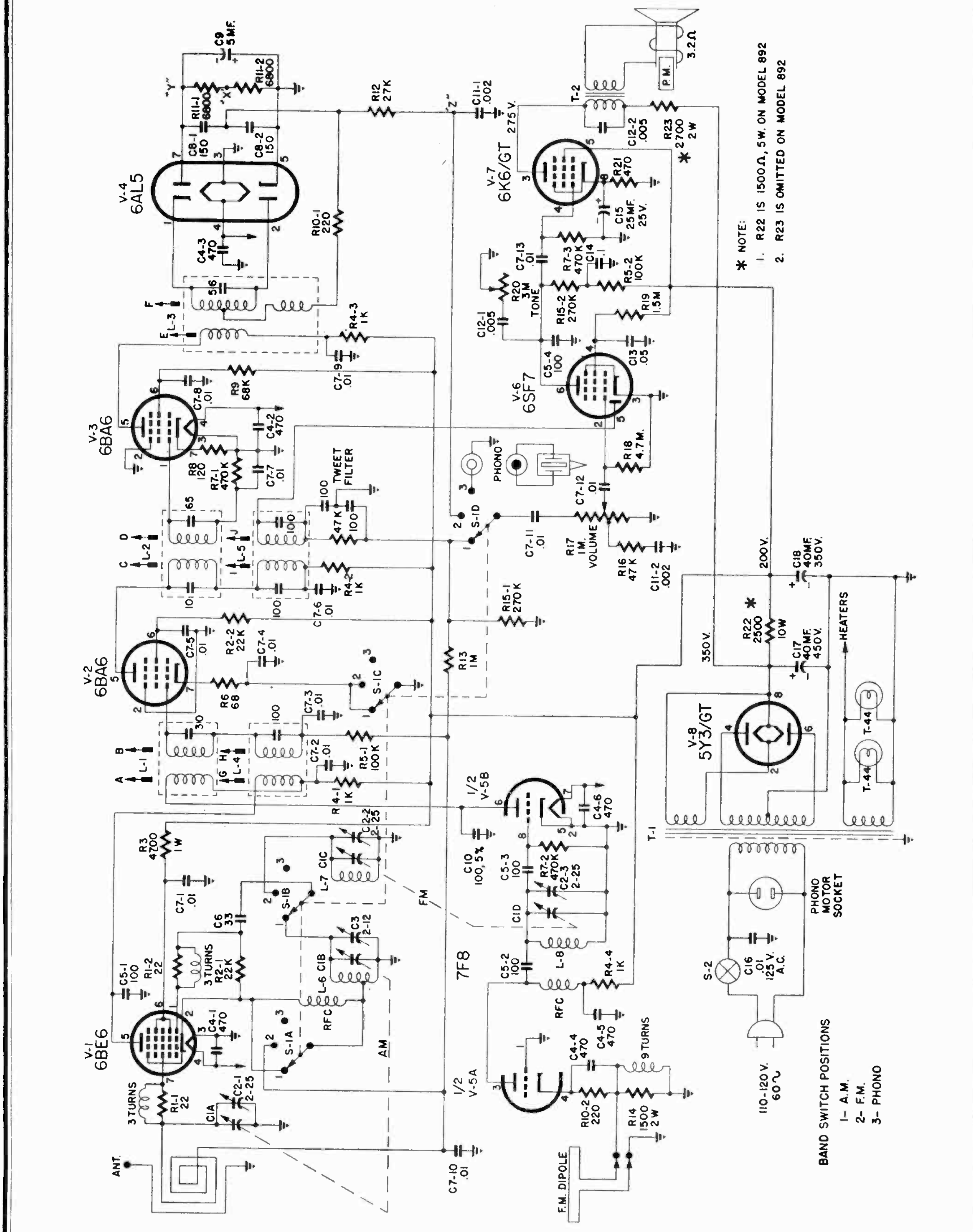
PERPETUAL TROUBLE SHOOTER'S MANUAL

REG. U.S. PAT. OFF.

JOHN F. RIDER

PACKARD-BELL CO.

MODEL 884, 892



MODEL 884, 892 PACKARD-BELL CO.

SPECIFICATIONS

Overall Dimensions:

	884	892		884	892
Height	12⅛"	34¼"	Depth	16¼"	21½"
Width	18¼"	21¼"	Weight	35 Lbs.	85 Lbs.

Electrical Rating:

Line Voltage . . . . 110-120 volts, 50-60 cycle, A.C.
Power Consumption . . 75 watts

Tuning Frequency Range:

AM . . . . 540 to 1620 KC
FM . . . . 87.5 to 108.5 MC

Intermediate Frequency:

AM . . . . 455 KC
FM . . . . 10.7 MC

Electrical Output:

Maximum . . . . . 2 watts

Loudspeaker:

	884	892
Type	Permanent Magnet	
Outside Cone Dia. . .	6½"	10"
Voice Coil Impedance .	3.2 ohms at 400 cycles	
Magnet Rating .	2.15 Oz. Alnico V	3.16 Oz. Alnico V

Tubes:

Tube	No.	Function
6BE6	V-1	Oscillator & AM Converter
6BA6	V-2	I-F Amplifier
6BA6	V-3	FM Driver
6AL5	V-4	FM Detector
7F8	V-5A, B	FM R-F Amplifier & Converter
6SF7	V-6	AM Detector & Audio
6K6/GT	V-7	Power Amplifier
5Y3/GT	V-8	Rectifier

GENERAL INFORMATION

Models 884 and 892 are combination AM-FM radio phonograph receivers. Model 884 is housed in a wooden table model cabinet, and model 892 in a wooden consolette cabinet. The chassis wiring in each model is the same except as noted in the schematic diagram. Both models employ a specially designed "Hi-Q" loop antenna and a permanent magnet dynamic speaker.

For information concerning the record changer, refer to Webster Model 148 Automatic Record Changer Service Manual.

SPECIAL SERVICE INFORMATION

Stage Gain Measurements — AM

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

Standard Output . . . . 50 milliwatts
Dummy Antenna . . . . 200 Mmf.
Antenna to Converter Grid . . . . 4X at 1000 KC
Converter Grid to 1st I-F Grid . . 40X at 455 KC
1st I-F Grid to 2nd Detector . . . 125X at 455 KC
Overall Audio Gain . . 18 MV into phono socket for 50 MW output at 1000 cycles

Stage Gain Measurements — FM

Dummy Antenna . . . 270 ohms
Dipole to Converter Grid . . . . 5X at 98 MC
Converter Grid to 1st I-F Grid . . 70X at 10.7 MC
I-F Grid to Driver Grid . . . . . 33X at 10.7 MC

Oscillator Cathode Voltages:

AM		FM	
1500 KC	3.5 volts AC	108 MC	1.4 volts AC
1000 KC	3.0 volts AC	98 MC	1.4 volts AC
600 KC	2.9 volts AC	88 MC	1.8 volts AC

D.C. Resistance Measurements:

AM 1st & 2nd I-F Coils
Primary . . . . . . 20 ohms
Secondary . . . . . 20 ohms
FM I-F windings about 1.0 ohm.
Oscillator Coil
Ground to Tap . . . 1.0 ohm
Ground to Finish . . . 9.0 ohms

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

ALIGNMENT PROCEDURE — AM

Alignment procedure consists of the 3 steps outlined in the Alignment Chart. Connect the test oscillator leads to the mixer grid and ground in series with an .01 Mfd. Capacitor for step No. 1, I-F Alignment.

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.

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

ALIGNMENT CHART — AM

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	6BE6 Grid & Gnd. .01 Mfd. Capac.	455 KC	540 KC	Trimmers G, H, I, J
2	Standard Test Loop	1620 KC	1620 KC	Trimmer L to 1620
3	Standard Test Loop	1500 KC	1500 KC	Trimmer K

ALIGNMENT PROCEDURE — FM

Connect a Vacuum Tube Voltmeter between points X and Y on schematic diagram, and a Center-Zero meter between points X and Z on schematic diagram.

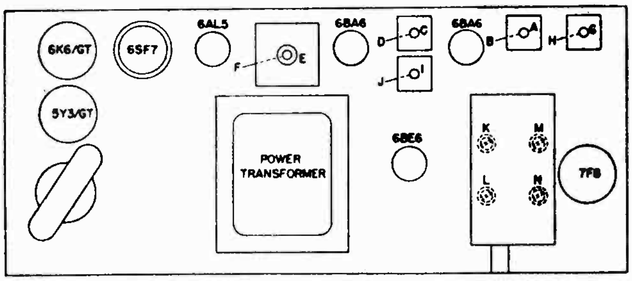
ALIGNMENT CHART — FM

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST
1	Terminals 1 & 8 of 7F8	10.7 MC	88 MC	A, B, C, D, E for max. on V.T.V.M. & F for zero on Center-Zero meter
2	Repeat Step No. 1			
3	Dipole Terminals thru 300 ohms	108 MC	108 MC	N & M for max. on V.T.V.M.

NOTE: 1. Rock the variable condenser when adjusting M, step 3.
2. Reset F for zero if necessary, to coincide with max. on V.T.V.M. after step 3.

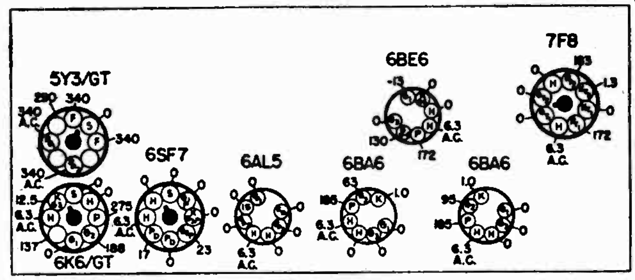
PACKARD-BELL CO.

MODEL 884, 892



TRIMMER LOCATIONS

A—Primary, 1st FM I-F
B—(bottom) Secondary, 1st FM I-F
C—Primary, 2nd FM I-F
D—(bottom) Secondary, 2nd FM I-F
E—Primary, FM Ratio Detector
F—(bottom) Secondary, FM Ratio Detector
G—Primary, 1st AM I-F
H—(bottom) Secondary, 1st AM I-F
I—Primary, 2nd AM I-F
J—(bottom) Secondary, 2nd AM I-F
K—AM R-F Trimmer M—FM R-F Trimmer
L—AM Oscillator Trimmer N—FM Oscillator Trimmer



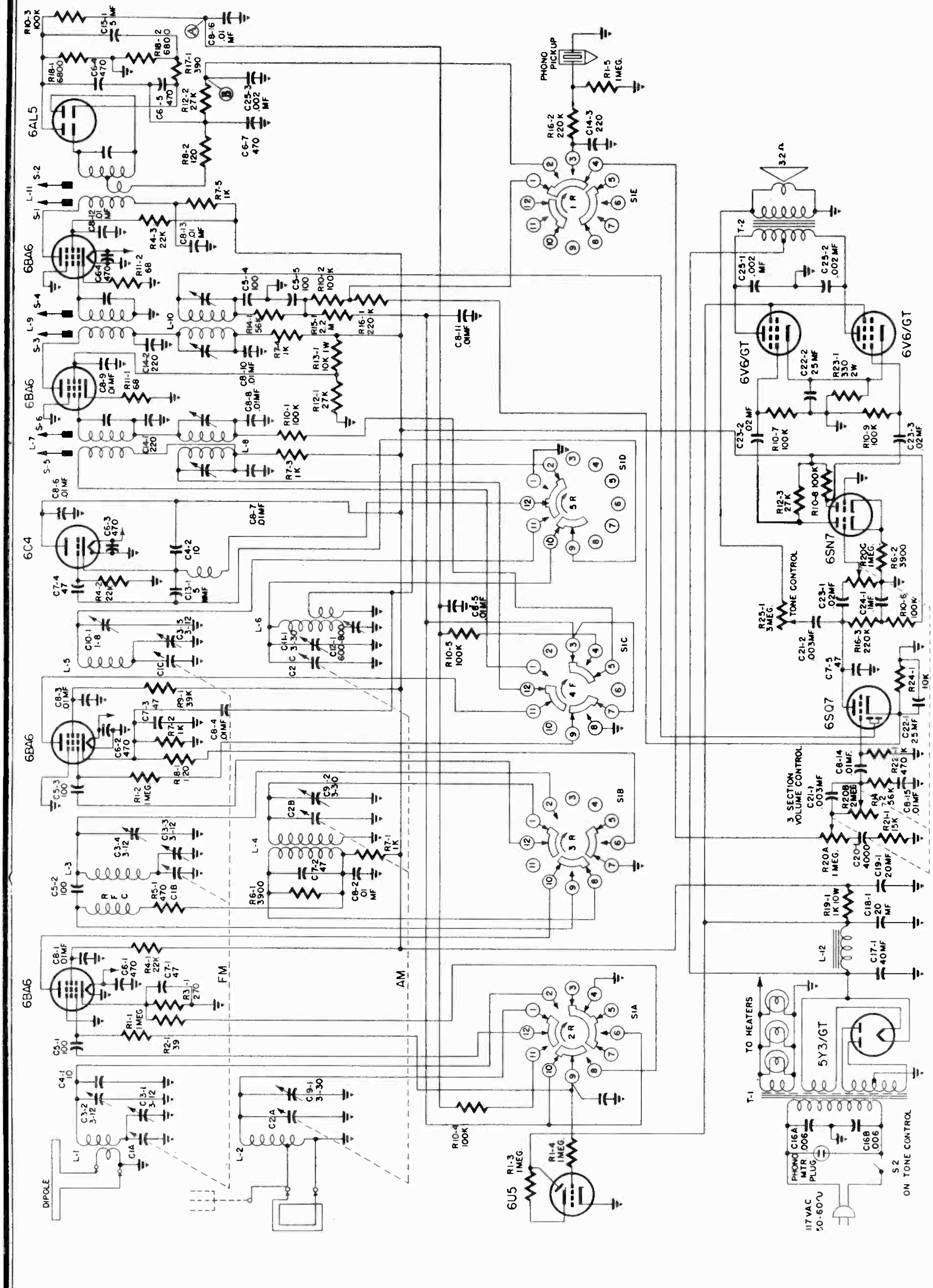
SOCKET VOLTAGES

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

TABLE OF REPLACEMENT PARTS

Part No.	Ref. Sym.	Description
21073		Cabinet (884)
21077		Cabinet (892)
23526A	C1A,B,C,D	Condenser, variable, with pulley
23916	C4-1 to 6	Capacitor, ceramic, 470 Mmf. 20%
23914	C5-1 to 4	Capacitor, ceramic, 100 Mmf. 20%
23940	C6	Capacitor, ceramic, 33 Mmf. N750 10%
23023-1	C7-1 to 13	Capacitor, tubular, .01 Mf. 500 V.
23942	C8-1 to 2	Capacitor, ceramic, 150 Mmf. 10%
24038	C9	Capacitor, electrolytic, 5 Mf. 50 V.
23941	C10	Capacitor, ceramic, 100 Mmf. NPO 5%
23002	C11-1 to 2	Capacitor, tubular, .002 Mf. 600 V.
23004	C12-1 to 2	Capacitor, tubular, .005 Mf. 600 V.
23009	C13	Capacitor, tubular, .05 Mf. 400 V.
23011	C14	Capacitor, tubular, .1 Mf. 400 V.
24006	C15	Capacitor, electrolytic, 25 Mf. 25 V.
23932	C16	Capacitor, tubular, .01 Mf. 125 V.A.C.
24030	C17	Capacitor, electrolytic, 40 Mf. 450 V.
24004-1	C18	Capacitor, electrolytic, 40 Mf. 350 V.
29032	L-1	Coil, 1st FM I-F
29022A	L-2	Coil, 2nd FM I-F
29037	L-3	Coil, FM Ratio Detector
29033	L-4	Coil, 1st AM I-F
29034	L-5	Coil, 2nd AM I-F
29202	L-6	Coil, AM Oscillator
29214	L-7	Coil, FM Oscillator
29111	L-8	Coil, FM R-F
29325		Loop, broadcast
29326		Dipole, FM
29104		Choke, R-F
32007-1		Cord, A.C. 8′
38104		Dial, stationized (884)
38105		Dial, stationized (892)
52008-AS		Knob, Dark Brown (884)
52008-BY		Knob, Oak (884)
52008-AL		Knob, Ivory (892)
52008-BM		Knob, Light Mahogany (892)
54001		Lamp, dial #44 0.250 Amp.
58029		Record changer, Webster Model 148
63026		Cartridge, pickup, Shure P-30
66004		Plug, pin
67033		Pointer, dial (884)
67015		Pointer, dial (892)
69003C		Pulley
73005	R1-1 to 2	Resistor, 22 ohm, ½w. 10%
73041	R2-1 to 2	Resistor, 22,000 ohm, ½w. 10%
73075	R3	Resistor, 4700 ohm, 1w. 10%
73025	R4-1 to 4	Resistor, 1000 ohm, ½w. 10%
73047	R5-1 to 2	Resistor, 100,000 ohm, ½w. 20%
73011	R6	Resistor, 68 ohm, ½w. 10%
73051	R7-1 to 3	Resistor, 470,000 ohm, ½w. 20%
73080	R8	Resistor, 120 ohm, 1w. 10%
73046	R9	Resistor, 68,000 ohm, ½w. 10%
73017	R10-1 to 2	Resistor, 220 ohm, ½w. 10%
73035	R11-1 to 2	Resistor, 6800 ohm, ½w. 10%
73042	R12	Resistor, 27,000 ohm, ½w. 10%
73073	R13	Resistor, 1 megohm, 1w. 10%
73126	R14	Resistor, 1500 ohm, 2w. 10%
73049-3	R15-1 to 2	Resistor, 270,000 ohm, ½w. 20%
73045	R16	Resistor, 47,000 ohm, ½w. 10%
25010	R17	Control, volume, with switch, 1 megohm
73057	R18	Resistor, 4.7 megohm, 1w. 10%
73054	R19	Resistor, 1.5 megohm, 1w. 10%
25509	R20	Control, tone, 3 megohm
73078	R21	Resistor, 470 ohm, 1w. 10%
73917	R22	Resistor, 2500 ohm, 10w. 10% w.w. (884) 1500 ohm, 5w. 10% w.w. (892)
73128	R23	Resistor, 2700 ohm, 2w. 10% (884 only)
78048		Shield, tube
79002-2		Socket, tube, 8 prong
79005		Socket, phono
79012		Socket, tube, miniature
79007		Socket, phono motor
79056		Socket, tube, lock-in (7F8)
79058A		Socket, lamp
79061		Socket, tube, miniature shock
83302		Speaker, 6½″ P.M. (884)
83705		Speaker, 10″ P.M. (892)
86022A	S1A,B,C,D	Switch, band
89006	T-1	Transformer, power
89402	T-2	Transformer, output, 8,000 to 3.2 ohms

MODEL 1272 PACKARD-BELL CO.



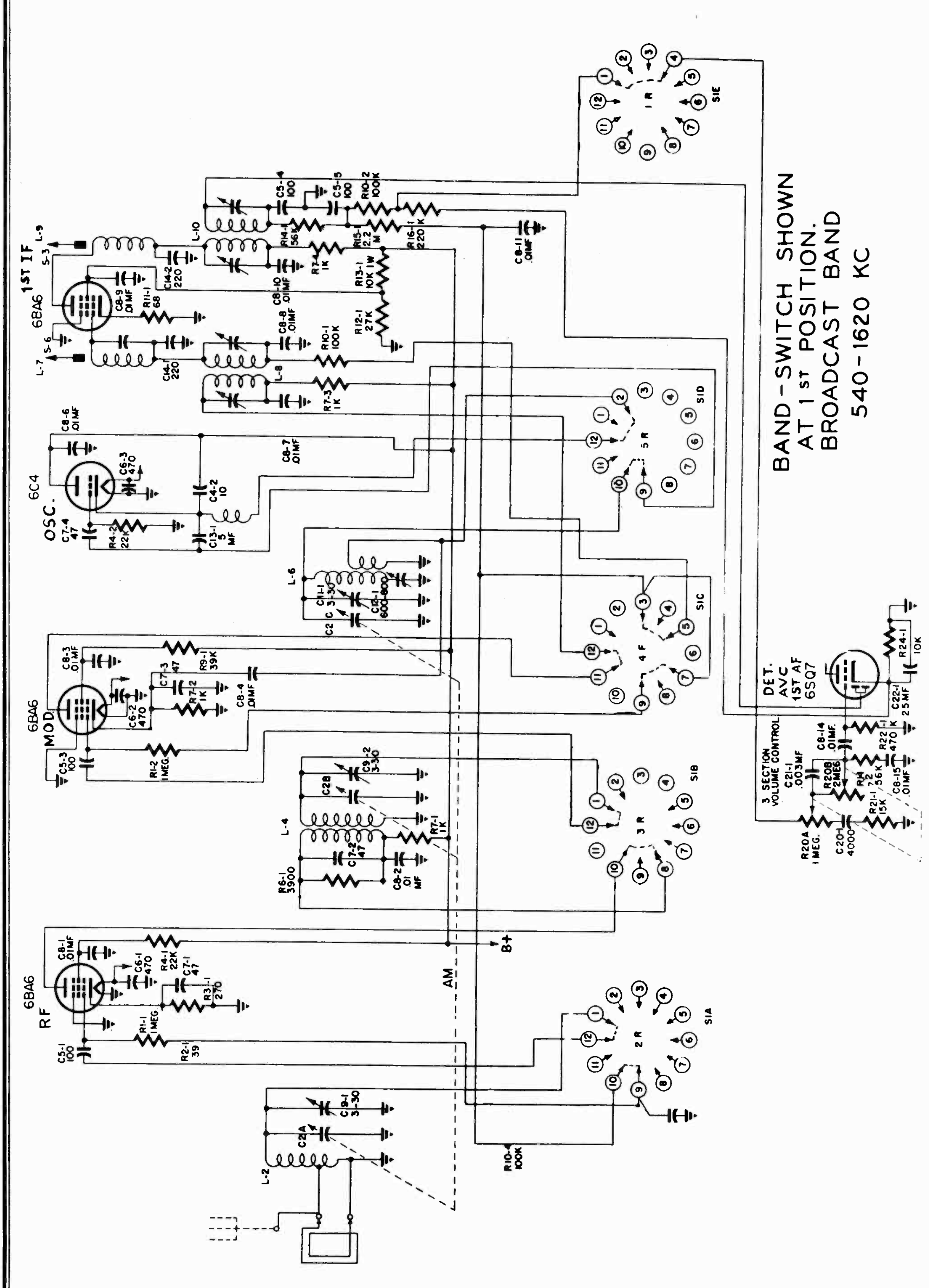
SCHEMATIC NOTES: 1. Switch is shown in broadcast position.
2. Switching from left to right is broadcast, frequency modulation and phono.

Tuning Frequency Range:
Standard Broadcast ....540 to 1620 Kc
Frequency Modulation ....87.5 to 108.5 Mc

Intermediate Frequency:
AM ....455 Kc
FM ....10.7 Mc

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

PACKARD-BELL CO. MODEL 1272



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MODEL 1272

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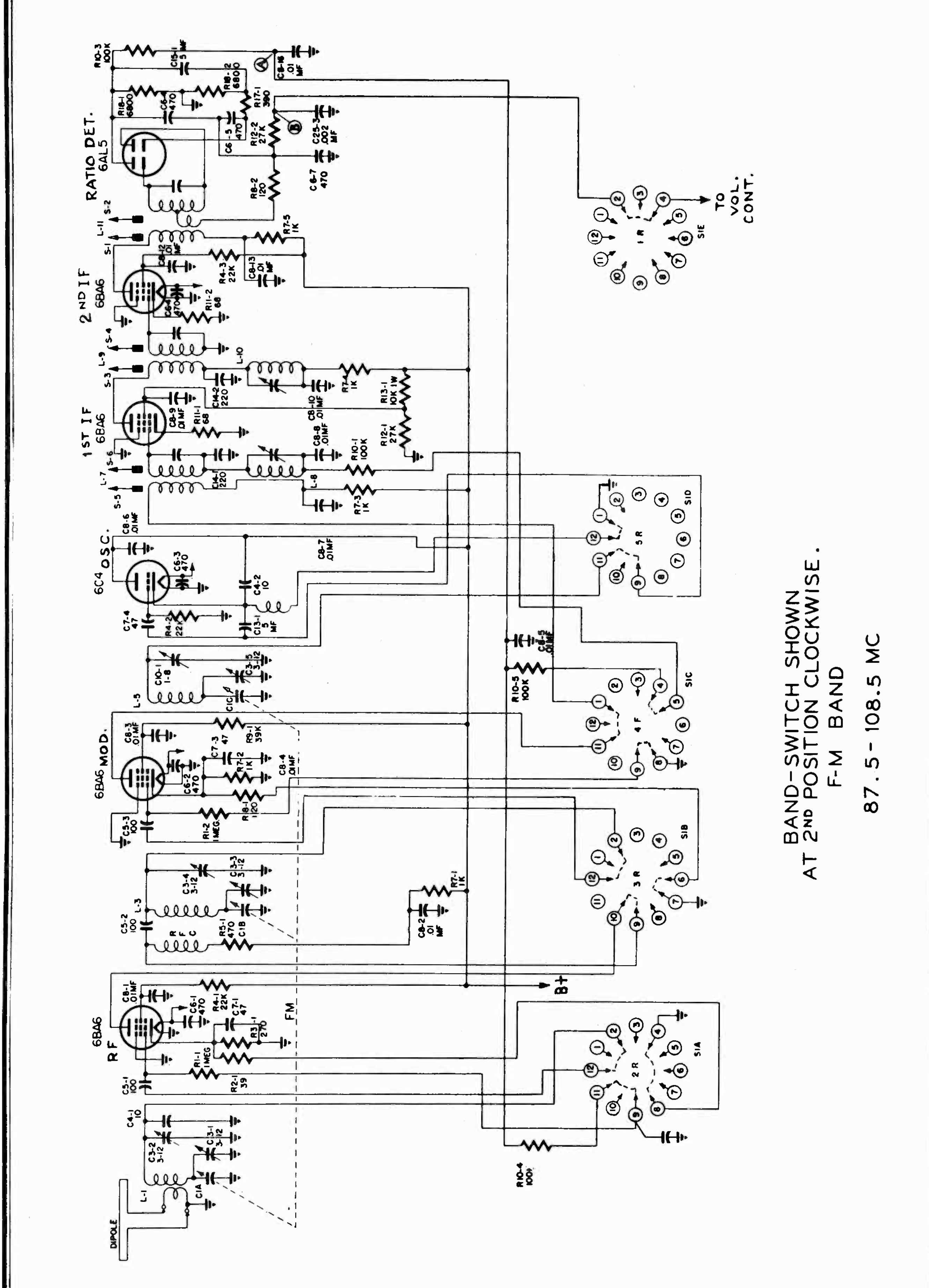


GENERAL INFORMATION

Model 1272 is a 2 band console radio phonograph combination with Standard Broadcast and Frequency Modulation. It has 12 tubes including the rectifier and tuning eye, and employs a 12 inch permanent magnet speaker.

Listed below are some of the features included in this model:

1. Standard Broadcast and Frequency modulation bands
2. Phonograph with automatic record changer.
3. Tuning eye for accurate tuning of stations.

NOTE: R-23 which is called out 330 ohms, 2 watts in the schematic may be two 680 ohm, 1 watt resistors in parallel. Either is satisfactory.

SPECIAL SERVICE INFORMATION

Stage Gain Measurements: A M

Measurements taken with volume and tone controls maximum. Band Switch in Standard Broadcast position.

AVC shorted out.

Standard Output....................50 milliwatts
Dummy Antenna......................200 Mmf.
Antenna Post to R.F. Grid.........12X at 1000 Kc
R.F. Grid to Converter Grid........6X at 1000 Kc
Converter Grid to 1st I.F. Grid......30X at 455 Kc
1st I.F. Grid to 2nd Detector......100X at 455 Kc
Overall Audio Gain.....5000X at 1 watt 400 cycles

Stage Gain Measurements: F M

Measurements taken with volume and tone controls maximum. Band Switch in Frequency Modulation position.

AVC shorted out.

Dummy Antenna..........................270 ohms
Dipole Terminal to R.F. Grid.........9X at 98 Mc
R.F. Grid to Converter Grid..........7X at 98 Mc
Converter Grid to 1st I.F. Grid.....49X at 10.7 Mc
1st I.F. Grid to Driver Grid........35X at 10.7 Mc

OSCILLATOR CATHODE VOLTAGES:

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

1620 KC..........................3.5 volts AC
1300 KC..........................3.3 volts AC
750 KC..........................2.5 volts AC
550 KC..........................2.2 volts AC

OSCILLATOR GRID CURRENT: FM

Measured at 117 volt line voltage with DC microammeter connected in series with ground end of the 22,000 ohm grid resistor.

108 MC........................180 microamps
98 MC........................300 microamps
88 MC........................440 microamps

D.C. RESISTANCE MEASUREMENTS:

I.F. COILS

1st I.F.		2nd I.F.	
Primary	17 ohms	Primary	10 ohms
Secondary	10 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 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..................................5.8 ohms
Secondary................................4.2 ohms

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

Loudspeaker:

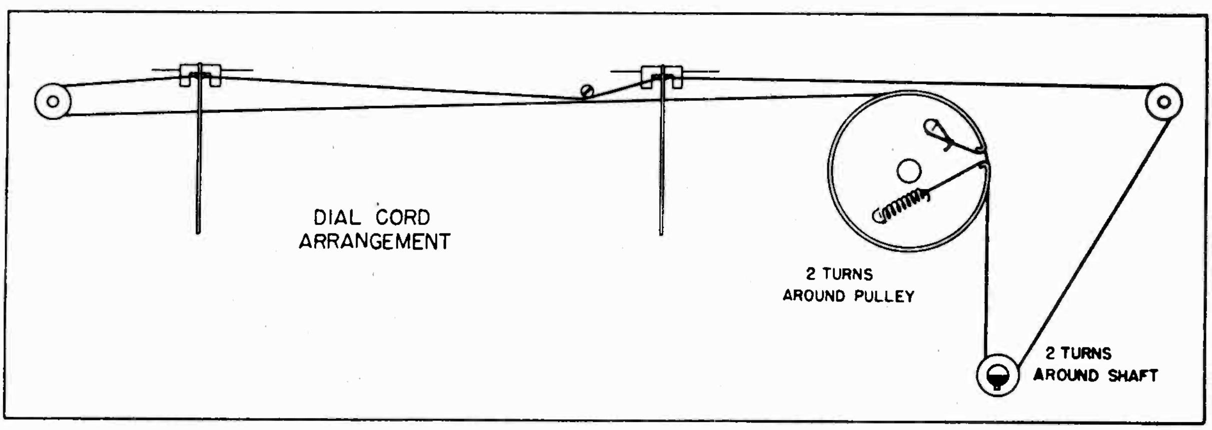
Type........................Permanent magnet
Outside Cone Diameter......................12"
Voice Coil Impedance.......3.2 ohms at 400 cycles
Magnet Rating..................6.8 oz. Alnico 5

Tubes:

Tube	No.	Function
6BA6	V-1	R.F. Amplifier
6BA6	V-2	Modulator
6C4	V-3	Oscillator
6BA6	V-4	1st I.F. Amplifier
6BA6	V-5	2nd I.F. Amplifier
6AL5	V-6	Detector
6SQ7	V-7	Audio Amplifier
6SN7-GT	V-8	Inverter
6V6-GT	V-9	Power Amplifier
6V6-GT	V-10	Power Amplifier
5Y3-GT	V-11	Rectifier
6U5-6G5	V-12	Tuning Eye

Electrical Rating:

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



Dial Cord Arrangement

MODEL 1272 PACKARD-BELL CO.

ALIGNMENT PROCEDURE

Alignment procedure consists of the steps outlined in the Alignment Chart. Make certain that each allignment step is done with a minimum input signal.

ALIGNMENT CHART AM

Step	Connect Test Osc. to	Test Osc. Setting	Pointer Setting	Adjust for Max. Output
Step	Connect Test Osc. to	Test Osc. Setting	Pointer Setting	Adjust for Max. Output
1	Mixer grid & ground	455 Kc	540 Kc	Trimmers A,B,C,D
2	R.F. grid & ground	1500 Kc	1500 Kc	Trimmers F & G
3	R.F. grid & ground	600 Kc	600 Kc	Trimmer E
4	Repeat Step No. 2			
5	Standard Test loop	1500 Kc	1500 Kc	Trimmer H
6	Check stationizing. Slide pointer on string if stations are uniformily off in one direction.			

NOTE: 1. Rock variable condenser for step 3.
2. Standard Test Loop is Hazeltine #1150 or a reasonable substitue.

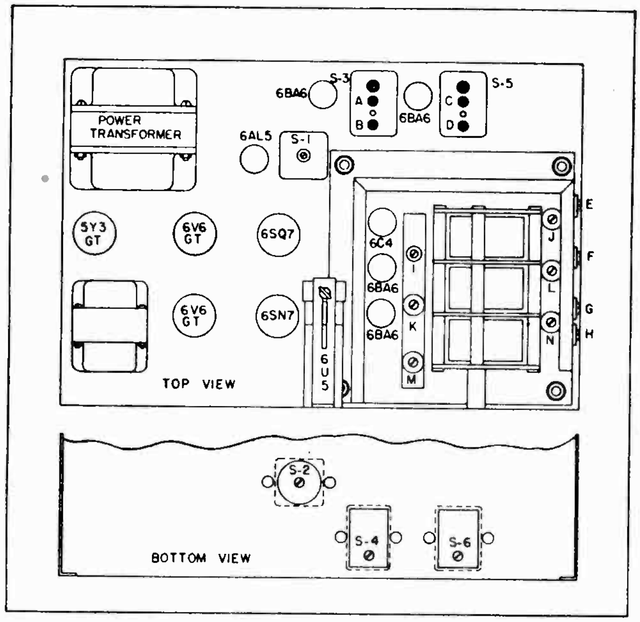
EQUIPMENT REQUIRED FOR FM ALIGNMENT

1. Signal generator capable of generating signals at 10.7 Mc, and from 88 to 108 Mc.
2. Vacuum tube voltmeter connected to point "A" (on schematic).
3. Center-zero D.C. voltmeter connected to point "B" (on schematic).

ALIGNMENT CHART FM
ALIGNMENT PROCEDURE

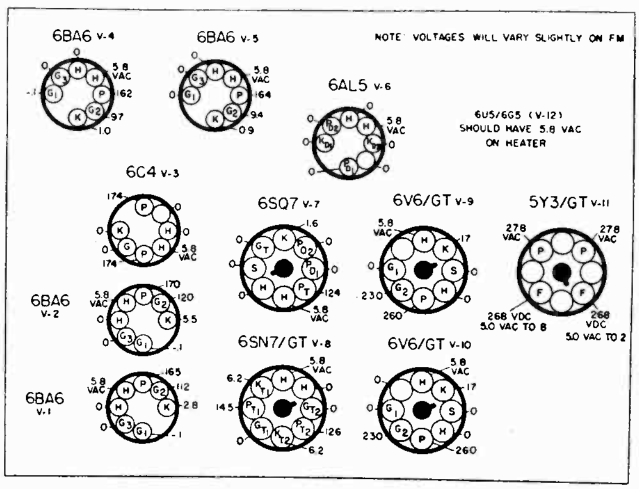
Step	Connect Test Osc. to	Test Osc. Setting	Pointer Setting	Adjust for Max. Output
1	R.F. grid & ground	10.7 Mc	88 Mc	S-1,S-3,S-4 S-5,S-6
2	Adjust S-2 for zero on zero-center meter.			
3	Repeat Steps 1 and 2.			
4	Doublet Terminals thru 270 ohms	88 Mc	88 Mc	Trimmers I, K, M
5	Doublet Terminals thru 270 ohms	108 Mc	108 Mc	Trimmers J, L, M
6	Repeat Step No. 4.			

NOTE: 1. Rock variable condenser for step 4.



Trimmer Locations

A I.F. Trimmer
B I.F. Trimmer
C I.F. Trimmer
D I.F. Trimmer
E B.C. Oscillator Padder
F B.C. Oscillator Trimmer
G B.C. R.F. Trimmer
H B.C. Antenna Trimmer
I F.M. Oscillator Low Frequency Trimmer
J F.M. Oscillator High Frequency Trimmer
K F.M. R.F. Low Frequency Trimmer
L F.M. R.F. High Frequency Trimmer
M F.M. Antenna Low Frequency Trimmer
N F.M. Antenna High Frequency Trimmer



Voltage Chart

No signal
117 volts A.C. line voltage.
Switch in Standard Broadcast position.

All voltages shown are positive D.C. except heater voltages which are all 5.8 V.A.C.
A.C. voltages measured with a 1000 ohm per volt A.C. meter. Volume and tone controls maximum.

PACKARD-BELL CO. MODEL 1272

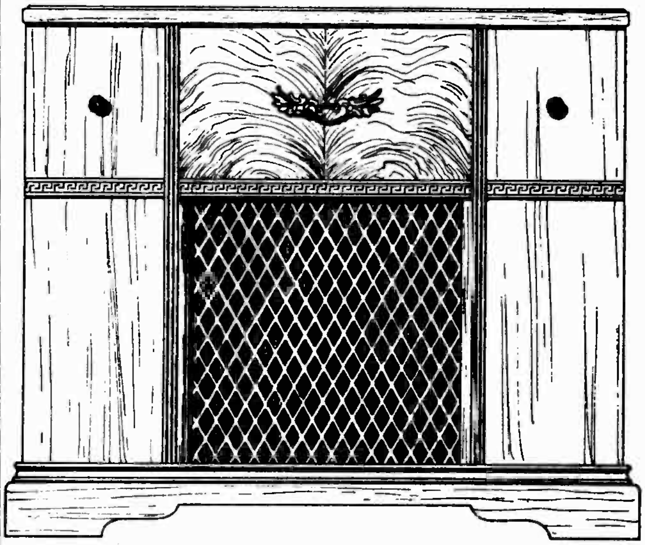
PART NO.	REF. SYMBOL	DESCRIPTION
18088		Bracket, tuning eye
21045BN		Cabinet, dark Mahogany
21045BG		Cabinet, Walnut
21045CU		Cabinet, Natural Mahogany
21045BC		Cabinet, Bleached
21045-1		Cabinet back, right
21045-2		Cabinet back, left
21057A		Cabinet motorboard
23515	C1A to C2C	Capacitor, Variable
23408	C3-1 to 5	Capacitor, trimmer, Single 3-12 Mmf.
23909	C4-1 to 2	Capacitor, ceramic, 10 Mmf. 500 V.
23227	C5-1 to 5	Capacitor, ceramic, 100 Mmf. 500 V.
23229	C6-1 to 7	Capacitor, mica, 470 Mmf. 500 V.
23912	C7-1 to 5	Capacitor, ceramic, 47 Mmf. 500V.
23022	C8-1 to 15	Capacitor, tubular, .01 Mf. 400 V.
23400A	C9-1	Capacitor, trimmer, Dual 3-30 Mmf.
23409	C10-1	Capacitor, trimmer, Single 1-8 Mmf.
23406	C11-1	Capacitor, trimmer, Single 3-30 Mmf.
23402	C12-1	Capacitor, trimmer, Single 600-800 Mmf.
24038	C13-1	Capacitor, electrolytic, 5Mmf50 V.
23206	C14-1 to 3	Capacitor, mica, 220 Mmf. 500 V.
23908	C15-1	Capacitor, ceramic, 5 Mmf 500 V.
23901	C16-1	Capacitor, trimmer, Dual .006-.006 Mmf. (metal case)
24030	C17-1	Capacitor, electrolytic, 40 Mf. 450 V.
24001	C18-1	Capacitor, electrolytic, 20 Mf. 450 V.
24003	C19-1	Capacitor, electrolytic, 20 Mf. 350 V.
23208	C20-1	Capacitor, mica, 4000 Mfm. 500 V.
23016	C21-1 to 2	Capacitor, tubular, .003 Mf. 600 V.
24006	C22-1	Capacitor, electrolytic, 25 Mf. 25 V.
23007	C23-1 to 3	Capacitor, tubular, .02 Mf. 600 V.
23011	C24-1	Capacitor, tubular, .1 Mf. 400 V.
23002	C25-1 to 3	Capacitor, tubular, .002 Mf. 600 V.
27001		Choke, filter
28005A		Clip, antenna
28020		Clip, tuning eye.
29406	L1	Coil, FM antenna
29400	L2	Coil, BC antenna
29104	L3	Coil, Choke R.F.
29102F	L4	Coil, B.C. R.F.
29106	L5	Coil, F.M. R.F. Oscillator
29205C	L6	Coil, B.C. Oscillator
29011	L7, L8	Coil, 1st I.F. AM, FM.
20912	L9, L10	Coil, 2nd I.F. AM, FM
29018	L11	Coil, Ratio detector, FM
29315		Antenna, B.C. Loop
29321		Antenna, F.M. Dipole
32003C		Cord, AC
38069		Dial, stationized
38070		Dial, Eastern
40003		Dial cord
40101C		Drive, planetary
52019BG		Knob, control, Walnut
52019BN		Knob, control, dark mahogany
52019CU		Knob, control, natural mahogany
52019BC		Knob, control, bleached
52020BC		Knob, Control, Bleach
52020BN		Knob, Control, Dark Mahogany
520201CU		Knob, Control, Natural Mahogany
52020BG		Knob, Control, Walnut
54002		Lamp, dial, #47
58022A		Changer, Record, Webster #56

MODEL 1272

PACKARD-BELL CO.

PART NO.	REF. SYMBOL	DESCRIPTION
63026		Pickup Cartridge, Sure Bros. P-30
69003C		Pulley, idler
69006A		Pulley, variable capacitor
73053	R1-1 to 5	Resistor, 1 megohm, ½ w, 10%
73008	R2-1 to 2	Resistor, 39 ohm, ½ w,10%
73018	R3-1	Resistor, 270 ohm, ½ w, 10%
73041	R4-1 to 4	Resistor, 22,000 ohms, ½ w, 10%
73021	R5-1	Resistor, 470 ohm, ½ w, 10%
73032	R6-1 to 2	Resistor, 3900 ohm, ½ w, 10%
73025	R7-1 to 5	Resistor, 1,000 ohm, ½ w, 10%
73014	R8-1 to 2	Resistor, 120 ohm, ½w, 10%
73073	R13-1	Resistor, 10,000 ohm ½ w, 10%
73060	R14-1	Resistor, 56,000 ohm, ½ w, 10%
73055	R15-1	Resistor, 2.2 megohm, ½w, 20%
73049	R16-1 to 3	Resistor, 220,000 ohm, ½ w, 20%
73020	R17-1	Resistor, 390 ohm, ½ w, 10%
73035	R18-1 to 2	Resistor, 6800 ohm, ½ w, 10%
73919	R19-1	Resistor, 1000 ohm 10 w, 10%

PART NO.	REF. SYMBOL	DESCRIPTION
25008	R20-1	Control, volume, 3 section
73044	R9-1	Resistor, 39,000 ohm ½ w, 10%
73047	R10-1 to 9	Resistor, 100,000 ohm, ½ w, 20%
73011	R11-1	Resistor, 68 ohm, ½ w, 10%
73042	R12-1 to 2	Resistor, 27,000 ohm, ½ w, 10%
73039	R21-1	Resistor, 15,000 ohm, ½ w, 10%
73045	R22-1 to 3	Resistor, 47,000 ohm, ½ w, 10%
73131	R23-1	Resistor, 330 ohm, ½w, 10%
73037	R24-1	Resistor, 10,000 ohm, ½ w, 10%
50202A	R25-1	Control, tone, with switch
79002		Socket, tube, 8 prong
79007		Socket, phono motor, A.C.
79010B		Socket, lamp
79018		Socket, speaker
79033		Socket, compartment lamp
79035		Socket, tube, miniature
79045		Socket, antenna
79041		Socket, tunning eye
83802		Speaker, 12″ PM
84028		Spring, dial
86016B	S1A to S1E	Switch, band
89013	T1	Transformer, power
89404	T2	Transformer, output



Electrical Rating:

Line Voltage	110–120 volts 50–60 cycle AC
Power Consumption	110 watts including phonograph

Tuning Frequency Range:

Standard Broadcast	540 to 1620 Kc
Frequency Modulation	87.5 to 108.5 Mc.

Intermediate Frequency:

AM	455 Kc
FM	10.7 Mc

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:	No.:	Function:
6BA6	V-1	R.F. Amplifier
6BA6	V-2	Mixer
6BA6	V-3	I.F. Amplifier
6BA6	V-4	Driver
6AL5	V-5	F.M. Detector
6H6	V-6	A.M. Detector—AVC
6SF7	V-7	Audio Amplifier
6SN7-GT	V-8	Phase Inverter
6C4	V-9	Oscillator
6V6-GT	V-10	Output
6V6-GT	V-11	Output
5Y3-GT	V-12	Rectifier
6U5-6G5	V-13	Tuning Eye

GENERAL INFORMATION

Model 1273 is a 2 band console PhonOcord. It has 13 tubes including the rectifier and tuning eye, and employes a 12-inch speaker.

Listed below are some of the features included in this model:

1. Standard Broadcast from 540 to 1620 Kc.
2. Frequency Modulation from 87.5 to 108.5 Mc.
3. Tuning Eye for accurate tuning of stations.
4. Home recording combined with an automatic record changer.

In an early run of this model, R-4 connected to the Plate of the 6C4 instead of to R-5. Also you may find two 680 ohm resistors in place of the 330 ohm 2 watt resistor. Either is satisfactory.

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 2 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 2.5 volts.

SPECIAL SERVICE INFORMATION

STAGE GAIN MEASUREMENTS, AM:

Measurements taken with volume and tone controls maximum. Band Switch in Standard Broadcast position.

AVC shorted out.

Standard Output	50 milliwatts
Dummy Antenna	200 Mmf.
Antenna Post to R.F. grid	12X at 1000 KC
R.F. grid to Converter grid	9X at 1000 Kc
Converter grid to 1st I.F. grid	20X at 455 Kc
1st R.F. grid to 2nd Detector	40X at 455 Kc
Overall Audio Gain	4600X at 1 watt 400 cycles

STAGE GAIN MEASUREMENTS, FM:

Measurements taken with volume and tone controls maximum. Band switch in Frequency Modulation position.

AVC shorted out.

Dummy Antenna	270 ohms
Dipole Terminal to R.F. grid	0.9X at 98 Mc
Converter grid to 1st I.F. grid	12X at 10.7 Mc
1st I.F. grid to Driver grid	45X at 10.7 Mc

OSCILLATOR CATHODE VOLTAGES:

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

1620 KC	8.5 volts AC
1200 KC	8.2 volts AC
800 KC	5.5 volts AC
540 KC	2.5 volts AC

OSCILLATOR GRID CURRENT, FM:

Measured at 117 volts line voltage with DC microammeter connected in series with ground end of the 22,000 ohm grid resistor.

108 MC	190 Microamps
98 MC	200 Microamps
88 MC	220 Microamps

MODEL 1273 PACKARD-BELL CO.

ALIGNMENT PROCEDURE

Alignment procedure consists of the steps outlined in the Alignment Chart. Make certain that each alignment step is done with a minimum input signal.

ALIGNMENT CHART A M

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer grid & ground	455 Kc	540 Kc	Trimmers A, B, C, D
2	R.F. grid & ground	1500 Kc	1500 Kc	Trimmers G & H
3	R.F. grid & ground	600 Kc	600 Kc	Trimmer E
4	Repeat Step No. 2			
5	Standard Test Loop	1500 Kc	1500 Kc	Trimmer F
6	Check stationizing Slide pointer on string if stations are uniformly off in one direction.			

NOTE: 1. Rock variable condenser for Step No. 3.
2. Standard Test Loop is Hazeltine No. 1150 or a reasonable substitute.

EQUIPMENT REQUIRED FOR FM ALIGNMENT

1. Vacuum tube type voltmeter connected to point "A" (on schematic) for Step No. 1.
2. Center-zero D.C. voltmeter connected to point "B" (on schematic) for step No. 2.

ALIGNMENT CHART F M

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	R.F. grid & ground	10.7 Mc	88 Mc	S-1, S-3, S-4, S-5, S-6
2	Adjust S-2 for zero on zero-center meter.			
3	Repeat steps 1 and 2.			
4	Doublet terminals thru 270 ohms	108 Mc	108 Mc	Trimmers J, I, K
5	Doublet terminals thru 270 ohms	88 Mc	88 Mc	S-7, S-8
6	Repeat step No. 4.			

NOTE: Rock variable condenser for step No. 4.

D.C. RESISTANCE MEASUREMENTS:

I.F. COILS:

1st I.F.
Primary . . 17 ohms
Secondary . 10 ohms

2nd I.F.:
Primary . . . 10 ohms
Secondary . . 17 ohms*

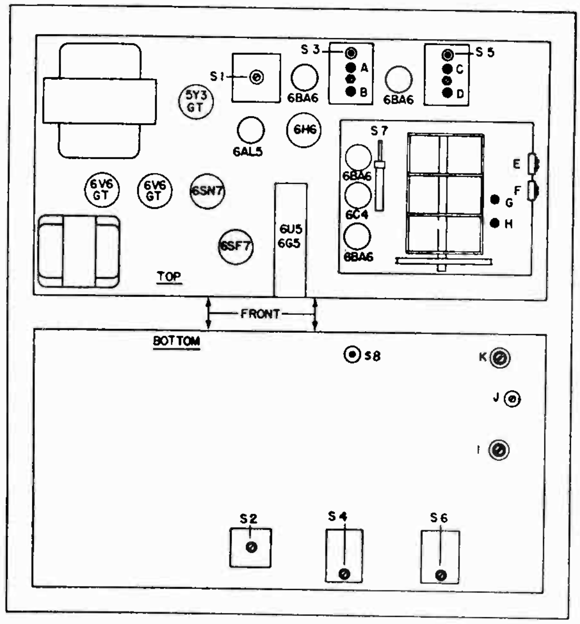
*NOTE: To obtain the true reading of the secondary of the 2nd I.F. coil, it must be removed from the can. This is true because of the 56,000 ohm resistor in series with the AVC lead inside the can.

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 . . . . . . 5.8 ohms
Secondary . . . . . 4.2 ohms

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

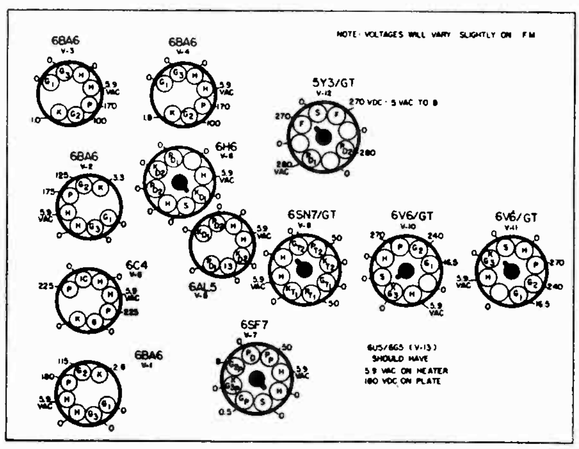


TRIMMER LOCATION

A—I.F. trimmer
B—I.F. trimmer
C—I.F. trimmer
D—I.F. trimmer
E—B.C. padder
F—Antenna trimmer
G—B.C. osc. trimmer
H—B.C. R.F. trimmer
I—F.M. R.F. trimmer
J—F.M. osc. trimmer
K—F.M. antenna trimmer

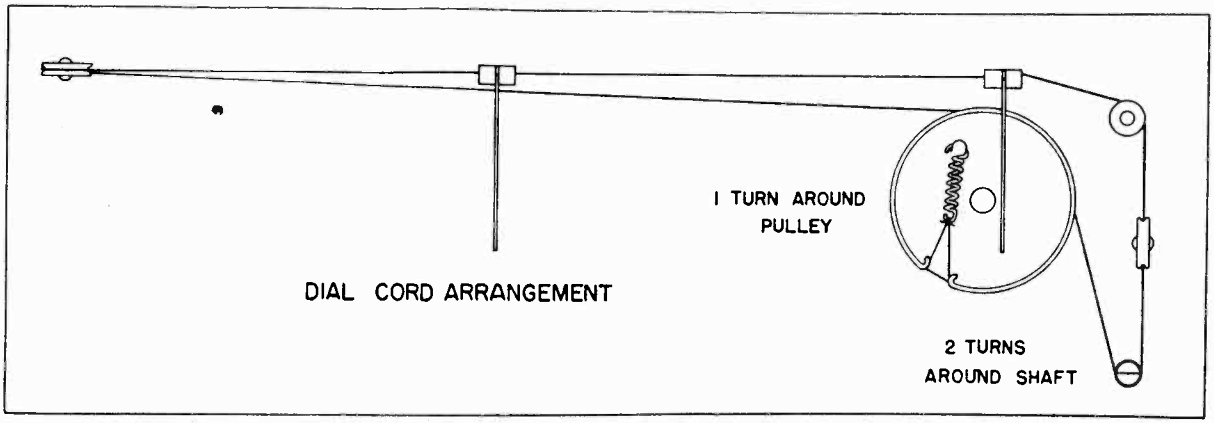
SOCKET VOLTAGES

All D.C. voltages measured with a vacuum tube voltmeter from socket contacts to chassis.—A.C. voltage 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 VOLTAGE

PACKARD-BELL CO. MODEL 1273

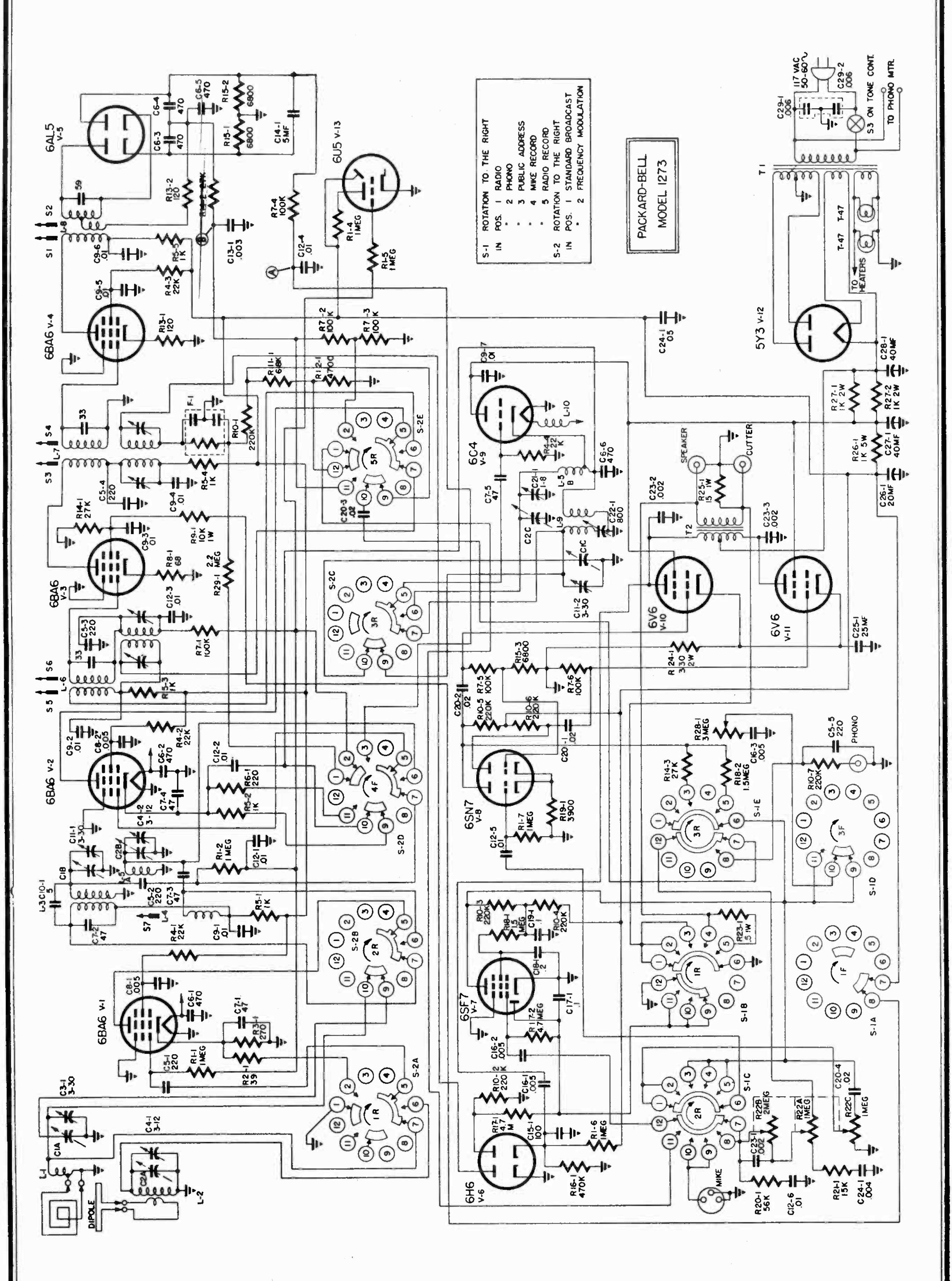


Dial Cord Diagram

TABLE OF REPLACEABLE PARTS

PART NO.	REF. SYMBOL	DESCRIPTION
21058		Cabinet
23525	C1,A,B,C	Capacitor, variable
23406	C3-1	Capacitor, trimmer, single 3-30 Mmf.
23408	C4-1 to 2	Capacitor, trimmer, single 3-12 Mmf.
23915	C5-1 to 5	Capacitor, ceramic, 220 Mmf. 20%
23916	C6-1 to 6	Capacitor, ceramic, 470 Mmf. 20%
23912	C7-1 to 5	Capacitor, ceramic, 47 Mmf. 20%
23931	C8-1 to 2	Capacitor, tubular, .005 Mmf. "HI-KAP"
23023	C9-1 to 7	Capacitor, tubular, .01 Mf. 500 V.
23908	C10-1	Capacitor, ceramic, 5 Mmf. 20%
23401	C11-1 to 2	Capacitor, trimmer, dual 3-30 Mmf.
23022	C12-1 to 6	Capacitor, tubular, .01 Mf. 400 V.
23016	C13-1	Capacitor, tubular, .003 Mf. 600 V.
24038	C14-1	Capacitor, electrolytic, 5 Mf. 50 V.
23914	C15-1	Capacitor, ceramic, 100 Mmf. 500 V.
23004	C16-1 to 3	Capacitor, tubular, .005 Mf. 600 V.
23019	C17-1	Capacitor, tubular, .1 Mf. 200 V.
23020	C18-1	Capacitor, tubular, .2 Mf. 400 V.
23011	C19-1	Capacitor, .1 Mf. 400 V.
23007	C20-1 to 4	Capacitor, tubular, .02 Mf. 600 V.
23409	C21-1	Capacitor, trimmer, single 1-8 Mmf.
23402	C22-1	Capacitor, padder, 800 Mmf.
23002	C23-1 to 3	Capacitor, tubular, .002 Mf. 600 V.
23208	C24-1	Capacitor, mica, 4000 Mmf.
24006	C25-1	Capacitor, electrolytic, 25 Mf. 25 V.
24012	C26-1	Capacitor, electrolytic, 20 Mf. 350 V.
24004B	C27-1	Capacitor, electrolytic, 40 Mf. 350 V.
24030	C28-1	Capacitor, electrolytic, 40 Mf. 450 V.
23901	C29-1	Capacitor, dual .006 in can
23930	F1	Capacitor, tweet filter
29400	L1	Coil, B.C. antenna
29409	L2	Coil, F.M. antenna
29102F	L3	Coil, B.C. R.F.
29104	L4	Coil, R.F. choke
29109	L5-A & B	Coil, F.M. R.F. oscillator
29011	L6	Coil, 1st I.F. A.M., F.M.
29012	L7	Coil, 2nd I.F. A.M., F.M.
29018	L8	Coil, F.M. ratio detector
29205C	L9	Coil, B.C. oscillator
29104	L10	Coil, R.F. choke
29321		F.M. dipole
32003C		Cord, A.C.
36024		Cartridge, cutter
38073		Dial, stationized
38074		Dial, export
41017		Escutcheon
52001A-BG		Knob, control
52014BG		Knob, bar type
54001		Lamp, pilot, 0.250 Amp.
57004		Microphone with cable
57005		Microphone handle
57006		Microphone base
58004E		Recorder, changer
59002		Needle, cutter
63026		Cartridge, pickup, Shure P-30
65065G		Plate, dial
65066A		Plate, rear
66001		Plug, pin
66004		Plug, speaker
66013		Plug, microphone
67030		Pointer assembly
68163		Instruction book
69001		Pulley
69013A		Pulley
69006A		Pulley, variable
73053	R1-1 to 7	Resistor, carbon, 1 Meg. ½ w. 20%
73008	R2-1	Resistor, carbon, 39 ohm, ½ w. 10%
73018	R3-1	Resistor, carbon, 270 ohm, ½ w. 10%
73041	R4-1 to 4	Resistor, carbon, 22,000 ohm, ½ w. 10%
73025	R5-1 to 5	Resistor, carbon, 1,000 ohm, ½ w. 10%
73017	R6-1	Resistor, carbon, 220 ohm, ½ w. 10%
73047	R7-1 to 7	Resistor, carbon, 100,000 ohm, ½ w. 20%
73011	R8-1	Resistor, carbon, 68 ohm, ½ w. 10%
73073	R9-1	Resistor, carbon, 10,000 ohm, 1 w. 10%
73049	R10-1 to 7	Resistor, carbon, 220,000 ohm, ½ w. 20%
73046	R11-1	Resistor, carbon, 68,000 ohm, ½ w. 10%
73033	R12-1	Resistor, carbon, 4700 ohm, ½ w. 10%
73014	R13-1 to 2	Resistor, carbon, 120 ohm, ½ w. 10%
73042	R14-1 to 3	Resistor, carbon, 27,000 ohm, ½ w. 10%
73035	R15-1 to 3	Resistor, carbon, 6800 ohm, ½ w. 10%
73051	R16-1	Resistor, carbon, 470,000 ohm, ½ w. 20%
73057	R17-1 to 2	Resistor, carbon, 4.7 meg. ½ w. 20%
73054	R18-1 to 2	Resistor, carbon, 1.5 meg. ½ w. 20%
73032	R19-1	Resistor, carbon, 3900 ohm, ½ w. 10%
73060	R20-1	Resistor, carbon, 56,000 ohm, ½ w. 10%
73039	R21-1	Resistor, carbon, 15,000 ohm, ½ w. 10%
25016	R22-A,B,C	Control, volume, 3 section
73910	R23-1	Resistor, wire wound, ½ ohm, 1 w.
73131	R24-1	Resistor, carbon, 330 ohm, 2 w. 10%
73903	R25-1	Resistor, wire wound, 15 ohm, 1 w.
73915	R26-1	Resistor, carbon, 1,000 ohm, 5 w. 10%
73120	R27-1 to 2	Resistor, carbon, 1,000 ohm, 2 w. 10%
25510	R28-1	Control, tone
73055	R29-1	Resistor, carbon, 2.2 meg. ½ w. 20%
77020		Shaft, dial
79002		Socket, tube, 8 prong
79035		Socket, tube miniature
79004		Socket, microphone
79005		Socket, pickup
79018		Socket, speaker and cutter
79041		Socket, tuning eye
79007		Socket, A.C.
79010B		Socket, lamp
79045		Socket, antenna terminal strip
83802		Speaker, 12" PM
86009A	S1	Switch, phono, etc.
86017B	S2	Switch, band
89013	T1	Transformer, power
89404	T2	Transformer, output, 10,000 ohm to 3.2 ohms

MODEL 1273 PACKARD-BELL CO.



PACKARD-BELL CO.

MODEL 1472

PART NO.	REF. SYMBOL	DESCRIPTION
19018		Bushing, knob
21059		Cabinet
21059-7		Cabinet drawer panel
21059-1		Cabinet back, left upper
21059-3		Cabinet back, left lower
21059-2		Cabinet back, right
23515A	C1 A,B,C C2 A,B,C	Capacitor, variable, 3 gang with F. M. sections
23408	C3-1 to 5	Capacitor, trimmer, Single 3-12 Mmf.
23923	C4-1	Capacitor, ceramic, 10 Mmf. 500 V. NPO
23406	C5-1 to 3	Capacitor, trimmer, Single 3-30 Mmf.
23914	C6-1 to 7	Capacitor, ceramic, 100 Mmf. 500 V.
23912-1	C7-1 to 4	Capacitor, ceramic, 47 Mmf. 500 V.
23916	C8-1 to 4	Capacitor, ceramic, 470 Mmf. 500 V.
23023	C9-1 to 19	Capacitor, tubular, .01 Mf. 500 V.
23410	C10-1	Capacitor, trimmer, Single 1-8 Mmf.
23402	C11-1	Capacitor, trimmer, Single 300-800Mmf
23917	C12-1	Capacitor, ceramic, 5 Mmf. 500 V. N 1400
23918	C13-1	Capacitor, ceramic, 10 Mmf. 500 V. N 1400
23208	C14-1 to 4	Capacitor, mica, 4000 Mmf. 500 V.
24038	C15-1	Capacitor, electrolytic, 5 Mf. 50 V.
23016	C16-1 to 3	Capacitor, tubular, .003 Mf. 600 V.
23002	C17-1 to 4	Capacitor, tubular, .002 Mf. 600 V.
23019	C18-1	Capacitor, tubular, .1 Mf. 200 V.
24006	C19-1 to 3	Capacitor, electrolytic, 25 Mf. 25 V
23020	C20-1 to 2	Capacitor, tubular, .2 Mf. 400 V.
23011	C21-1	Capacitor, tubular, .1 Mf. 400 V.
23007	C22-1 to 3	Capacitor, tubular, .02 Mf. 600 V.
23017	C23-1 to 2	Capacitor, tubular, .05 Mf. 200 V.
23021	C24-1	Capacitor, tubular, .25 Mf. 200 V.
24004-2	C25-1	Capacitor, electrolytic, 40 Mf. 350 V.
24001	C26-1	Capacitor, electrolytic, 20 Mf. 450 V.
24014	C27-1	Capacitor, electrolytic, 40 Mf. 450 V.
23004	C28-1 to 2	Capacitor, tubular, .005 Mf. 600 V.
23915	C29-1	Capacitor, ceramic, 220 Mmf. 500 V.
23932	C30A, B	Capacitor, ceramic, .01 Mf. 125 VAC
23001	C31-1	Capacitor, tubular, .001 Mf. 600 V.
28004A		Clip, turntable
28005A		Clip, antenna
28020		Clip, tuning eye
29406	L-1	Coil, F. M. Antenna
29400B	L-2	Coil, B. C. Antenna
29104	L-3	Coil, R. F. Choke
29106	L-4AB	Coil, F. M. R. F. Oscillator
29102F	L-5	Coil, B. C. R. F.
29205C	L-6	Coil, B. C. Oscillator
29020	L-7	Coil, 1st I. F. F. M.
29021	L-8	Coil, 1st I. F. A. M.
29022A	L-9	Coil, 2nd I. F. F. M.
29023	L-10	Coil, 2nd I. F. A. M.
29018	L-11	Coil, Ratio Detector, F. M.
32020		Cord, AC 8' 3 Conductor
32006B		Cord, AC 1½'
36019		Cutter, Assembly
36021		Cutter Cartridge-Universal Magnetic-3.2 ohms
38077		Dial, stationized
38078		Dial, Eastern
40003		Cord, Dial

PART NO.	REF. SYMBOL	DESCRIPTION
40101C		Drive, Planetary
52019Y		Knob, Control—Gold (2)
52019CU		Knob, Control—Mahogany (2)
52019BG		Knob, Control—Walnut (2)
52020BG		Knob, Control—Walnut (2)
52020Y		Knob, Control—Gold (2)
52020CU		Knob, Control—Mahogany (2)
52023CU		Knob, Push Button—Mahogany (6)
52023BG		Knob, Push Button—Walnut (6)
52023Y		Knob, Push Button—Gold (6)
52035A-S		Knob, Dual Control—Statuary Bronze (1)
52035A-K		Knob, Dual Control—Brass (1)
52035A-Y		Knob, Dual Control—Gold (1)
54001		Lamp, Dial—T-44 (0.25 amp.)
58022A		Changer—Webster 56
57008		Microphone, Dynamic Universal
57008-2		Microphone, base and handle
57008-1		Microphone Cable with Connector
58001-5		Recording Motor
58006		Turntable Recorder
59002		Needle, cutter
59001		Needle, pickup playback
63005B		Pickup, assembly
63027-2		Pickup, clip
63005-1		Pickup Arm Rest
63003		Pickup Cartridge Astatic L-71A (Playback)
63026		Pickup Cartridge, Shure P-30 (Phono)
66004		Plug, Phono Playback
66021		Plug, Phono AC
66019		Plug, Mike
66020		Plug, Speaker
69003C		Pulley, Idler-Recorder
69006A		Pulley, dial
73053	R1-1 to 5	Resistor carbon, 1 megohm ½W 20%
73008	R2-1	Resistor carbon, 39 ohm ½W 10%
73018-1	R3-1	Resistor carbon, 270 ohm ½W 10%
73041	R4-1 to 3	Resistor carbon, 22,000 ohm ½W 10%
73021	R5-1	Resistor carbon, 470 ohm ½W 10%
73032	R6-1	Resistor carbon, 3900 ohm ½W 10%
73025	R7-1 to 5	Resistor carbon, 1000 ohm ½W 10%
73014	R8-1 to 2	Resistor carbon, 120 ohm ½W 10%
73044-1	R9-1	Resistor carbon, 39,000 ohm ½W 10%
73047	R10-1 to 11	Resistor carbon, 100,000 ohm ½W 20%
73010-1	R11-1	Resistor carbon, 62 ohm ½W 10%
73042	R12-1 to 2	Resistor carbon, 27,000 ohm ½W 10%

PART NO.	REF. SYMBOL	DESCRIPTION
73073	R13-1	Resistor carbon, 10,000 ohm 1W 10%
73011	R14-1	Resistor carbon, 68 ohm ½W 10%
73035	R15-1 to 2	Resistor carbon, 6800 ohm ½W 10%
73051	R16-1 to 7	Resistor carbon, 470,000 ohm ½W 20%
73055	R17-1 to 2	Resistor carbon, 2.2 megohm ½W 20%
73060	R18-1 to 2	Resistor carbon, 56,000 ohm ½W 20%
73049	R19-1 to 10	Resistor carbon, 220,000 ohm ½W 20%
73036	R20-1	Resistor carbon, 8200 ohm ½W 10%
73043	R21-1 to 2	Resistor carbon, 33,000 ohm ½W 10%
Part of 25508B	R22-1	Control, bass, 3 megohm
25008	R23-A,B,C	"Volume", 1 megohm-2 megohm-1 megohm
73039	R24-1 to 2	Resistor carbon, 15,000 ohm ½W 10%
73057	R25-1 to 3	Resistor carbon, 4.7 megohm ½W 20%
73054	R25-1 to 3	Resistor carbon, 1.5 megohm ½W 20%
73076	R27-1	Resistor carbon, 56,000 ohm ½W 20%
25800	R28-1 to 3	Controls, Mixer 500,000 ohms
73030	R29-1 to 2	Resistor carbon, 2700 ohm ½W 10%
73920	R30-1	Resistor, 2000 ohm 2W Wire Wound
73130	R31-1	Resistor carbon, 220 ohm 2W 10%
73903	R32-1	Resistor, 15 ohm 1W Wire Wound
73052	R33-1 to 2	Resistor carbon, 680,000 ohm ½W 20%
73017	R34-1	Resistor carbon, 220 ohm ½W 10%
25802	R35-1	Control—P.A. 10,000 ohm
73022	R36-1	Resistor carbon, 560 ohm ½W 10%
73910	R37-1	Resistor, ½ohm 1W Wire Wound
Part of 25508B	R38-1	Control Treble, 1 megohm
79002		Socket, tube 8 prong
79004		Socket, Wire record 3 prong
79005		Socket, Compartment light
79007		Socket, Phono AC
79010B		Socket, Lamp
79017		Socket, Microphone
79018		Socket, Phono
79051		Socket, Tube miniature
79048		Socket, Speaker with cable
79041		Socket, Tuning eye
79045		Socket, Loop
79046		Socket, Cutter
79049		Socket, Electrolytic Mounting
83803A		Speaker, 12" Electro-Dynamic
86016B	S2A,B,C,D	Switch, Band
86301A	S1	Switch, Push Button
86701A		Switch, Slide
88106		Terminal Test
89023	T-1	Transformer, power
89416A	T-2	Transformer, output, 8,000 to 3.2 ohms

PHILCO CORP.

MODEL C4608, Code 121; Mopar MODEL 802, Chrysler

CIRCUIT DESCRIPTION

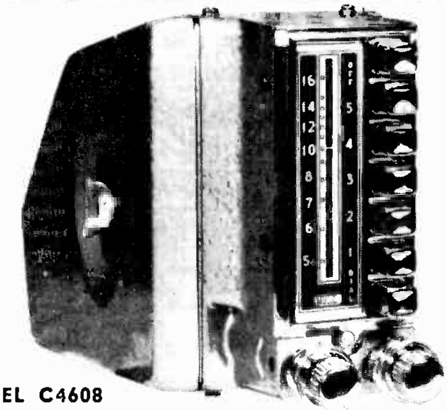
The circuit of the Model C4608 custom-built auto radio consists of a 7A7 r-f stage, a 7B8 converter, a 7A7 i-f stage, a 7B6 second detector and first audio, a 7A4 phase inverter, and two 7C5 tubes in push-pull in the output. The power supply is of the six-volt non-synchronous vibrator type, using a 7Y4 full-wave rectifier.

An unusually high signal-to-noise ratio is achieved in this set by the use of a permeability-tuned r-f stage, coupled to the converter by a band-pass r-f transformer. This transformer is designed to give maximum transfer of signals in the broadcast band, while greatly attenuating all other frequencies. Permeability tuning of both r-f and oscillator stages provides the best possible sensitivity, selectivity, and stability. Both push-button and manual tuning utilize this markedly superior method.

Automatic volume control is provided by filtering the rectified voltage from the diode section of the second detector-first audio tube, and applying it to the grids of the r-f and converter stages.

A feature of the audio system is the continuously variable tone control, which consists of an inverse feed-back circuit built around the first audio stage.

The phase-inverter stage provides push-pull drive for the output tubes, by means of equal load resistances in the plate and cathode circuits of the inverter tube. One signal is taken from the plate, and the other, equal in amplitude but opposite in phase, is taken from the cathode. The push-pull output stage delivers a full five watts of audio power through the output transformer to the electro-dynamic speaker.



MODEL C4608

SPECIFICATIONS

CIRCUIT .... **Eight-tube, superheterodyne**
FREQUENCY RANGE .... **540 to 1600 kc.**
INTERMEDIATE FREQUENCY .... **455 kc.**
PHILCO TUBES **7A4, 7A7 (2), 7B6, 7B8, 7C5 (2) 7Y4**
POWER INPUT .... **6.3 volts, 9.2 amps.**
ANTENNA ..... **Retractable-tip, Philco Part No. 91-0484**

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

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

100-series components are in section 1—the power supply.
200-series components are in section 2—the audio system.
300-series components are in section 3—the i-f and second detector.
400-series components are in section 4—the r-f and first detector.

PHILCO TROUBLE-SHOOTING PROCEDURE

In this manual, the circuit is divided into four sections, with a schematic and chassis layout, showing test points, for each section. The trouble-shooting procedure for each section is outlined in a chart. Tests indicated by a large asterisk (*) provide sectional master checks, making it possible to eliminate each section as a source of trouble without going through its entire test chart. Wherever trouble is found (indicated by failure to get a "Normal Indication" on any test) it should be isolated by voltage and resistance checks of the parts associated with the point under test, and remedied before testing further.

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

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

2. Connect the receiver to the power source (6.3 volts, d. c.), and ascertain that all the tube filaments are lighted. If the 7Y4 rectifier is observed to be defective, check the filter condensers (C100 A, B, and C) for short circuits before inserting a new tube.

3. Turn the volume control fully on and set the sensitivity control (shown in Figure 9, page 6) at maximum. Connect an antenna or a signal generator to the antenna receptacle, and ascertain that the receiver definitely does not operate properly.

MODEL C4608, Code 121;
Mopar MODEL 802,
Chrysler

PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN

SECTION 1

With the exception of the first, make all measurements for this section with a high-quality volt-ohmmeter, using the applicable d-c range. All voltages given in this manual are average, and were measured with the volume control set at minimum.

NOTE: If the vibrator (VB100) is found to be defective, check C101 and C100 for shorts before inserting a new vibrator.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
Ammeter (0-30 amps, d-c) in series with power souurce.	9.2 amps	Defective power-supply components (isolate by following tests)
A to B–	215 volts	Defective 7Y4, VB100, C100, C101, T100.
C to B–	195 volts	Open R101, leaky C100B, C100C.
D to B–	180 volts	Open R102, leaky C100C.

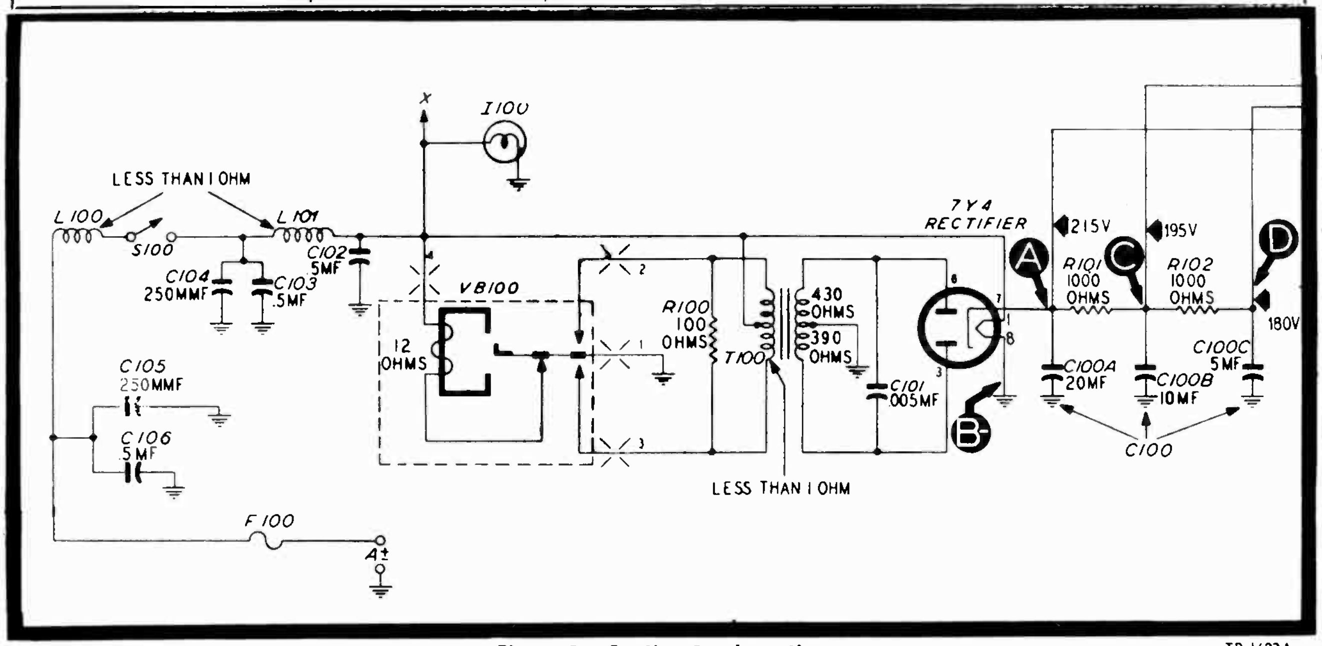


Figure 1. Section 1 schematic.

TP-1623A

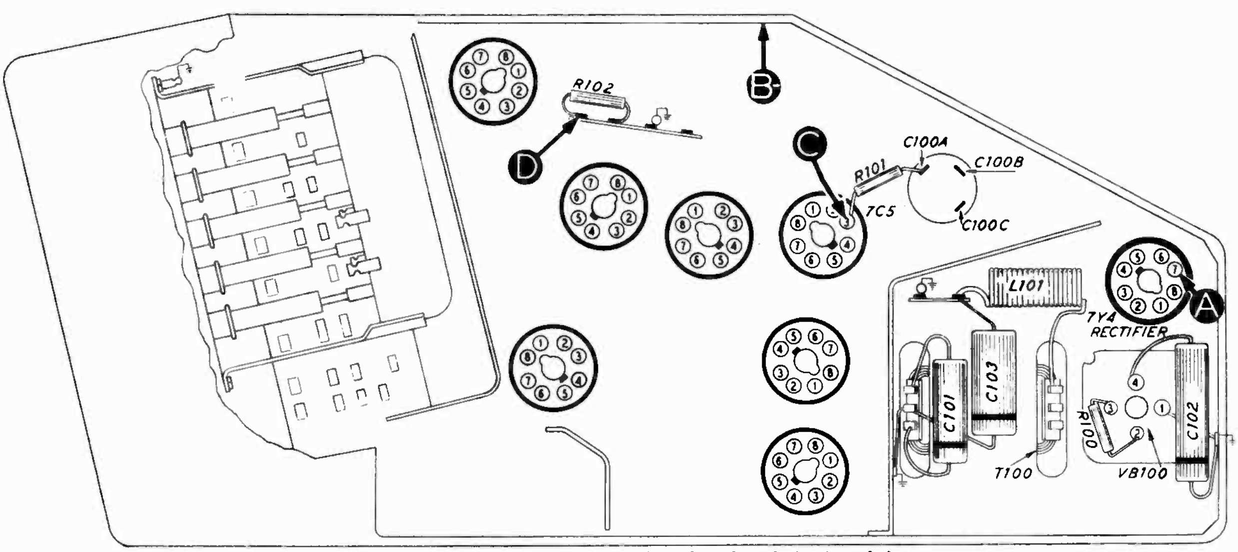


Figure 2. Bottom view, showing Section 1 test points.

TP-1623E

Mopar MODEL 802, Chrysler — PHILCO CORP. — MODEL C4608, Code 121;

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 generator 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 on the first test.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
E to B– (Remove 7A4)	Loud, clear signal from speaker.	Defective 7C5, T200, LS200; open R205; leaky C201.
F to B– (7A4 removed)	Loud, clear signal, same as previous test.	Defective 7C5, T200; leaky C202.
G to B– (7A4 removed)	Loud, clear signal.	Open C201.
H to B– (7A4 removed)	Loud, clear signal.	Open C202.
J to B– (Replace 7A4)	Clear signal, louder than previous tests.	Defective 7A4, C200; open R202, R201.

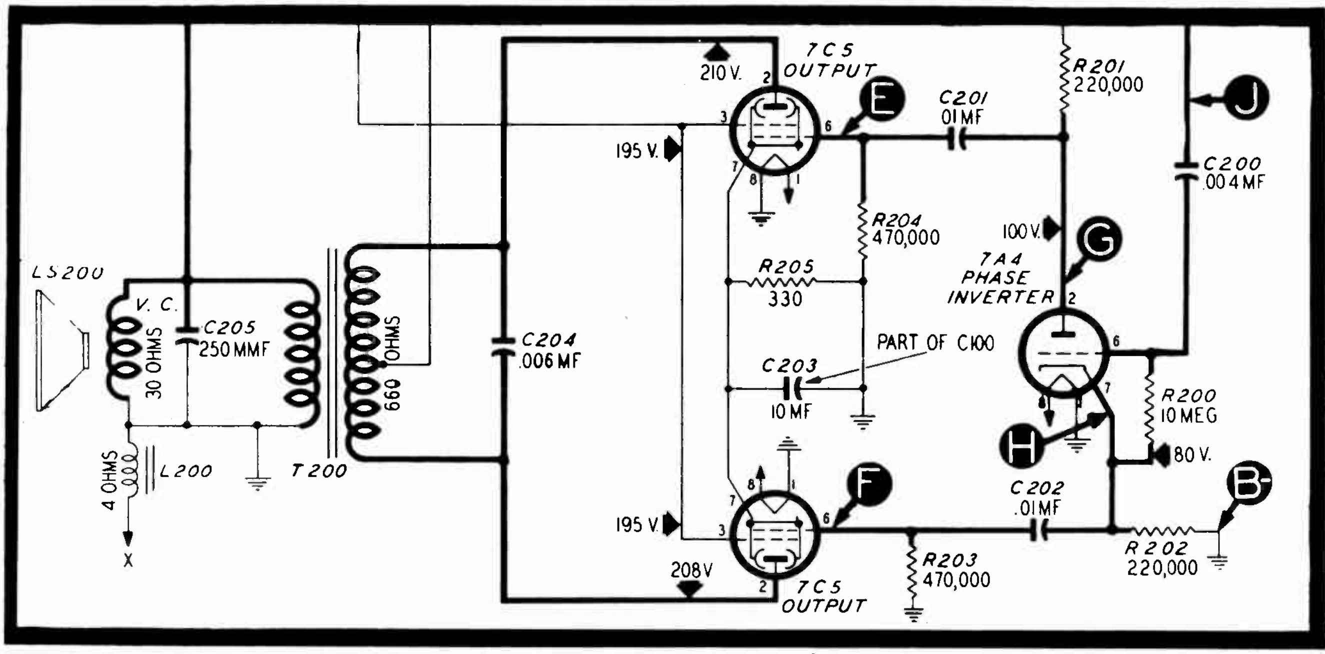


Figure 3. Section 2 schematic. TP-1623B

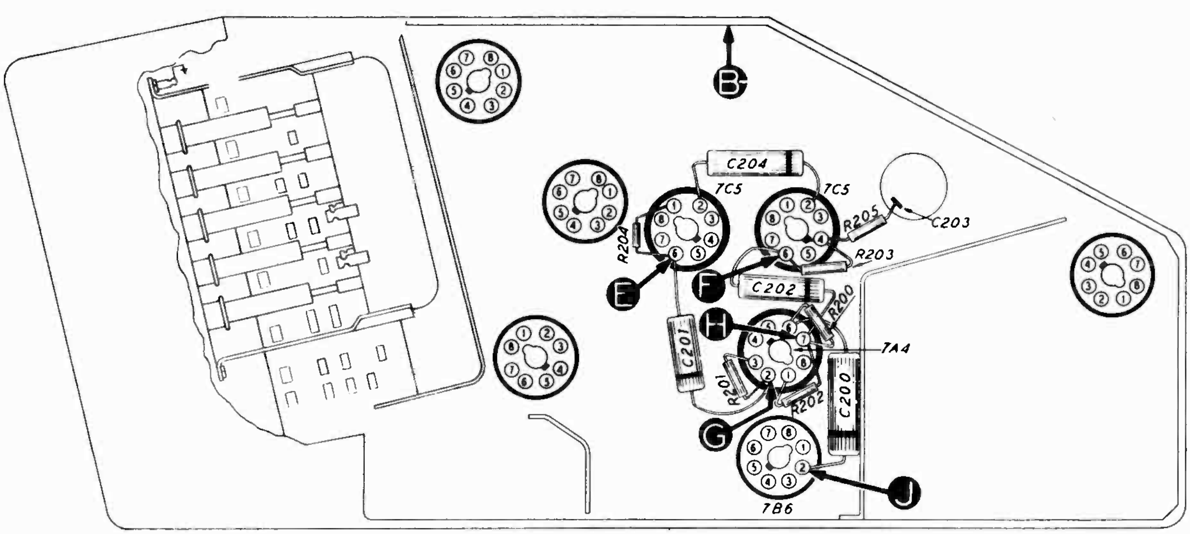


Figure 4. Bottom view, showing Section 3 test points. TP-1623F

MODEL C4608, Code 121;
Mopar MODEL 802,
Chrysler

PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN

SECTION 3

For the first two tests in this section, use an audio signal. For the last two, use a modulated 455-kc signal. Connect the signal-generator output lead through a condenser (.01 to .25 mf.) to the test points indicated; connect the generator 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 on the first test.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
K to B– (audio sig.)	Loud, clear signal.	Defective 7B6; open R306, C304; shorted C305.
L to B– (audio sig.)	Loud, clear signal.	Open R307, C303; defective volume control (rotate through entire range for complete check.)
M to B– (455-kc. sig.)	Loud, clear signal.	Defective 7A7, Z301; open R302, R304; shorted C403 (see Section 4 for location.)
N to B– (455-kc. sig.)	Loud, clear signal.	Defective Z300.

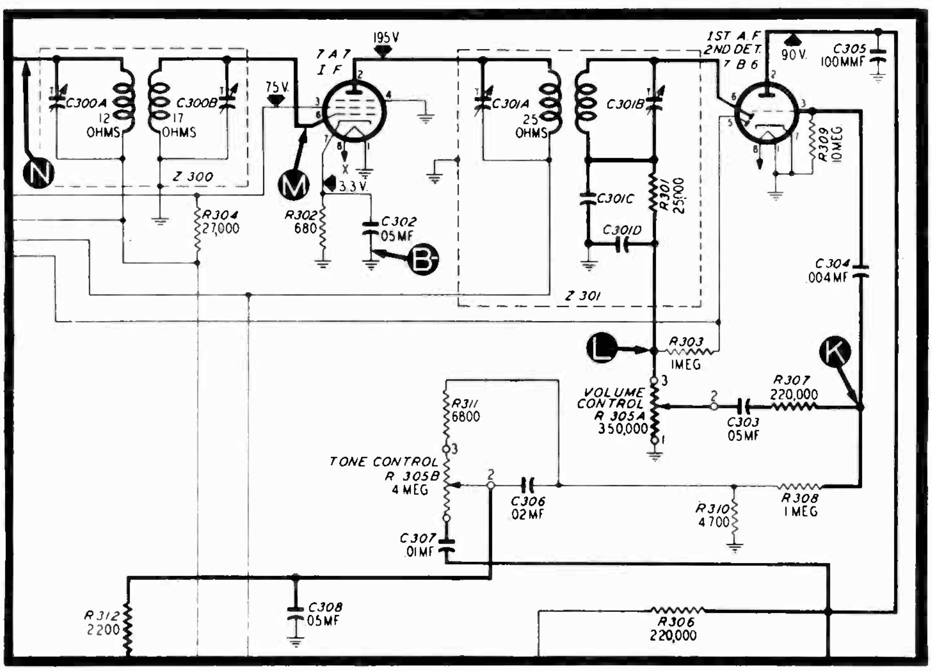


Figure 5. Section 3 schematic. TP-1623C

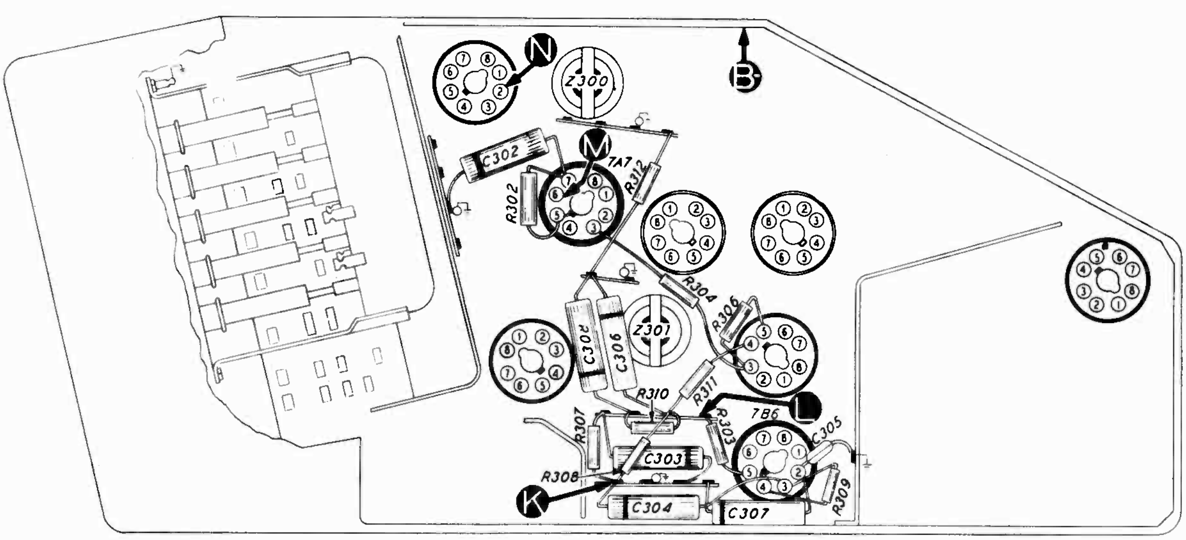


Figure 6. Bottom view, showing Section 3 test points. TP-1623G

PHILCO CORP.

MODEL C4608, Code 121; Mopar MODEL 802, Chrysler

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 S. Set the meter on a 10-volt or similar range. Depress the "Dial" push-button, and rotate the tuning control through its entire range. 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 below.

2. Set the volume and sensitivity controls at maximum. Proceed through the chart tests below, connecting the signal-generator output lead through a condenser (.01 to .25 mf.) to the test points indicated. The "NORMAL INDICATION" in each test will be a loud, clear signal when the signal generator is tuned to the same frequency as the receiver.

TEST POINTS	PUSH-BUTTON SETTING	POSSIBLE CAUSE OF ABNORMAL INDICATION
P to B—	"DIAL"	Defective 7B8, L403, L404A, or push-button switch; open R404, C405, C407, C408, C409.
P to B—	pre-tuned, 1 to 5	Defective oscillator coils L401E to K, or push-button switches.
Q to B—	"DIAL"	Defective 7A7, Z400, L404A, L404C, or push-button switch; open R402, R401 (rotate R401 through its entire range for complete check.)
Q to B—	pre-tuned, 1 to 5	Defective r-f coils L401 A to E, or push-button switches.
R to B—	"DIAL"	Defective L402, C404, L404A, L404C, or push-button switch.
R to B—	pre-tuned, 1 to 5	Defective r-f coils L401A to E, or push-button switches.

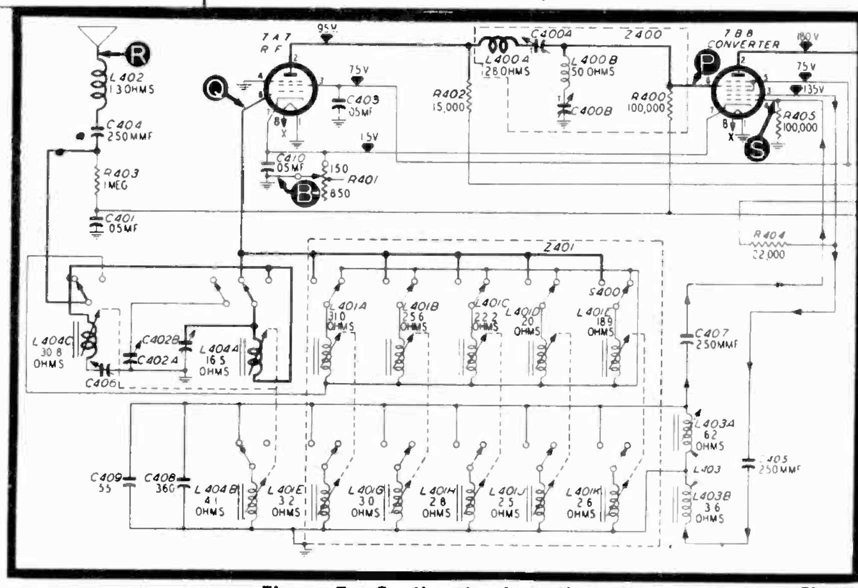


Figure 7. Section 4 schematic. TP-1623D

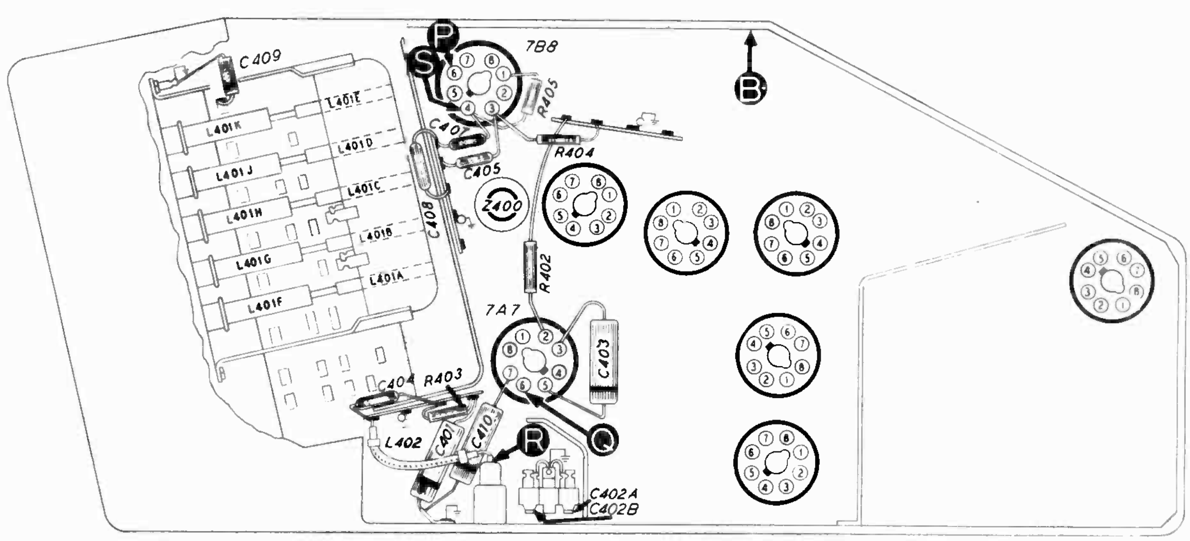


Figure 8. Bottom view, showing Section 4 test points. TP-1623H

MODEL C4608, Code 121; PHILCO CORP. Mopar MODEL 802, Chrysler

ALIGNMENT PROCEDURE

CONNECT THE OUTPUT METER between the voice-coil lug on the speaker and ground.

CONNECT THE SIGNAL-GENERATOR output lead as follows: For the i-f alignment (the first step in the chart), connect through a 20-mmf. condenser to pin 6 of the 7B8 converter. For the r-f alignment (all steps after the first), connect through a 20-mmf. condenser in series with an antenna lead (Part No. 95-0181) to the antenna receptacle. If the antenna lead is not available, connect a 30-mmf. condenser from the antenna receptacle to ground.

CALIBRATE THE DIAL as follows: Turn the tuning control to its maximum clockwise position. The pointer should then be at 1600 kc. If not, insert a stiff rod 2¼" into the small hole on the left side of the control head, near the number 8 on the dial scale. Rotate the tuning control until the pointer mechanism is stopped by the rod, and continue rotating the control for a fraction of a turn, to slide the pointer mechanism a short distance along the drive cord. Repeat this operation until the pointer coincides with the 1600-kc. mark on the dial when the tuning control is fully clockwise.

SET THE RECEIVER CONTROLS as follows: Set the tone control at "VOICE" (maximum high position). Set the volume and sensitivity controls at maximum. Adjust the signal-generator output as alignment progresses to keep the meter needle near center scale.

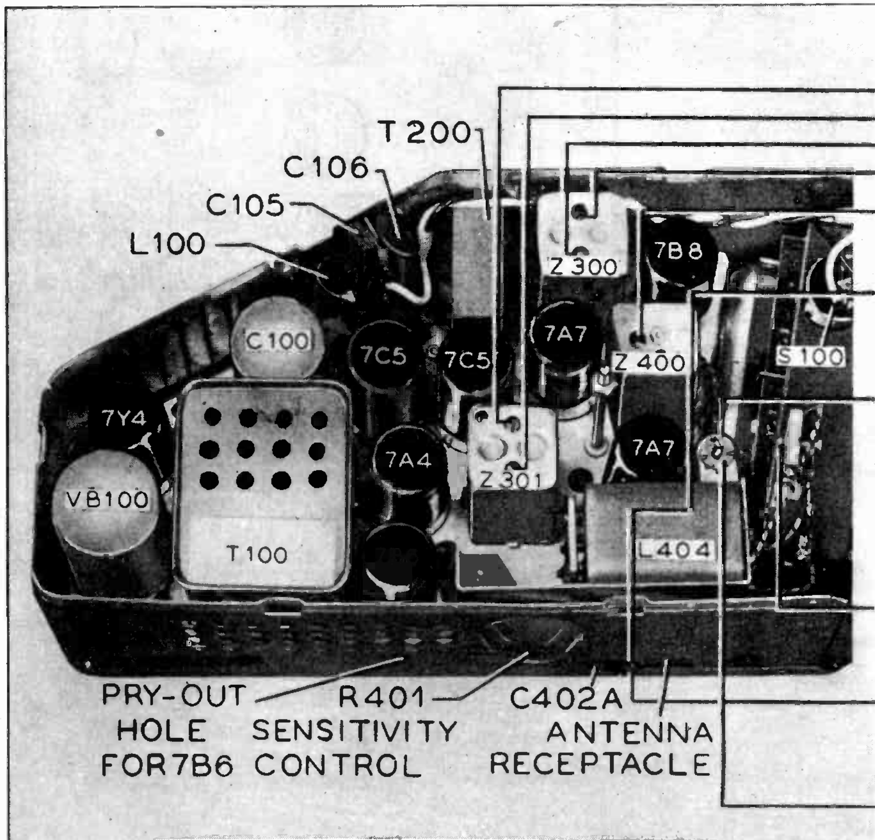


Figure 9. Chassis view, showing trimmer locations.

ADJUST IN ORDER	SPECIAL INSTRUCTIONS	DIAL SETTINGS SIG. GEN.	DIAL SETTINGS RECEIVER
C301B Max. C301A Max. C300B Max. C300A Max. C400B Min.	Ground pin 4 of the 7B8. Adjust the i-f trimmers for maximum in the order listed. Then adjust the i-f trap condenser (C400B) for minimum output.	455 kc.	1600 kc.
C402B Max.	Remove the ground from pin 4 of the 7B8. Adjust for maximum output.	1500 kc.	1500 kc.
L403A Max.	Adjust for overall maximum while rocking the tuning control.	580 kc.	580 kc.
	Tune the receiver for maximum output with the tuning control set at 550 kc.	550 kc.	550 kc. (approx.)
C406 Min.	Adjust for minimum output.	1460 kc.	550 kc.
C402B Max.	Adjust for maximum output. Final adjustment to be made after re-installing the set in the car.	1500 kc.	Tune in 1500 kc. signal
L403A Max.	Adjust for overall maximum while rocking the tuning control.	580 kc.	580 kc.

PHILCO CORP.

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Chrysler

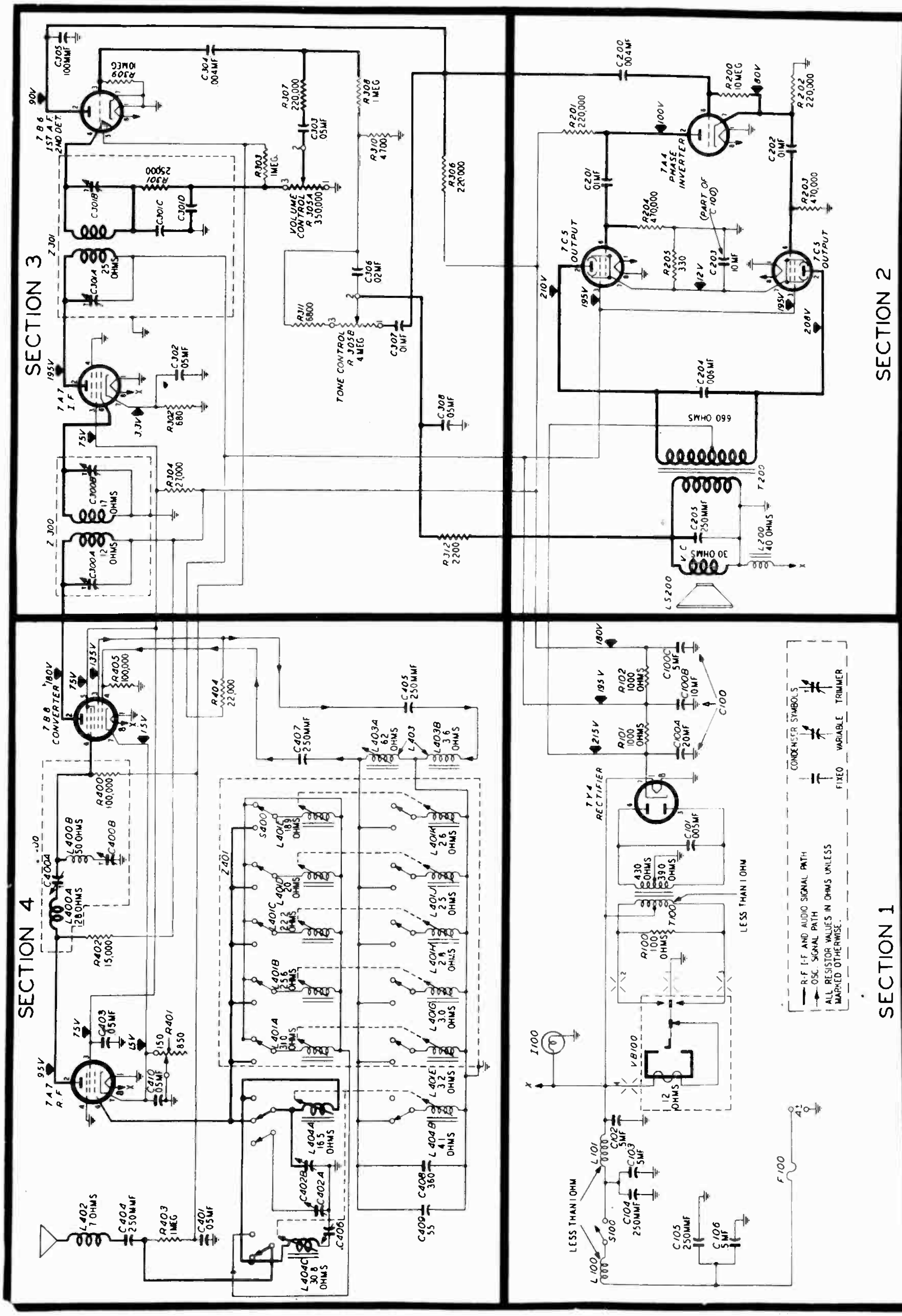


Figure 10. Complete schematic.

NOTE: All voltage, capacity, and resistance values shown are average. The voltages between B- (chassis) and other points indicated were measured with a 20,000 ohms-per-volt meter, with the volume control at minimum and the tuning control at 550 kc.

MODEL C4608, Code 121; PHILCO CORP. Mopar MODEL 802, Chrysler

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items, and the 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.

SECTION 1

Reference	Description	Service Part No.
C100	Condenser, electrolytic	61-0150*
	C100A: condenser, 20 mf.	Part of C100
	C100B: condenser, 10 mf.	Part of C100
	C100C: condenser, 5 mf.	Part of C100
C101	Condenser, .005 mf.	61-0153*
C102	Condenser, .5 mf.	61-0134*
C103	Condenser, .5 mf.	61-0137*
C104	Condenser, 250 mmf.	60-10255007*
C105	Condenser, 250 mmf.	60-10255007*
C106	Condenser, .5 mf.	61-0137*
F100	Fuse	45-2559
I100	Lamp, pilot	34-2064*
L100	Choke, "A"	32-1644
L101	Choke, vibrator	65-0389
R100	Resistor, 100 ohms	66-1104340*
R101	Resistor, 1,000 ohms	66-2104340*
R102	Resistor, 1,000 ohms	66-2104340*
S100	Switch, on-off	67-0046*
T100	Transformer, power	65-0347*
VB100	Vibrator	83-0026*

SECTION 2

Reference	Description	Service Part No.
C200	Condenser, .004 mf.	61-0179*
C201	Condenser, .01 mf.	61-0120*
C202	Condenser, .01 mf.	61-0169*
C203	Condenser, 10 mf.	Part of C100
C204	Condenser, .006 mf.	61-0105*
C205	Condenser, 250 mmf.	60-10255007*
L200	Coil, field	Part of LS200
LS200	Speaker unit	73-0042*
	Replacement cone	91-0164
R200	Resistor, 10 megs.	66-6101540*
R201	Resistor, 220,000 ohms	66-4221540*
R202	Resistor, 220,000 ohms	66-4221540*
R203	Resistor, 470,000 ohms	66-4471540*
R204	Resistor, 470,000 ohms	66,4471540*
R205	Resistor, 330 ohms	66-1334340*
T200	Transformer, output	65-0363*

SECTION 3

Reference	Description	Service Part No.
C302	Condenser, .05 mf.	61-0101*
C303	Condenser, .05 mf.	61-0101*
C304	Condenser, .004 mf.	61-0179*
C305	Condenser, 100 mmf.	60-10145307*
C306	Condenser, .02 mf.	61-0154*
C307	Condenser, .01 mf.	60-10105007*
C308	Condenser, .05 mf.	61-0101*
R302	Resistor, 680 ohms	66-1683340*
R303	Resistor, 1 meg.	66-5101540*
R304	Resistor, 27,000 ohms	66-3274340*
R305	Control, volume	67-0040*
	R305A: control, volume, 350,000 ohms	Part of R305
	R305B: control, tone, 4 meg.	Part of R305
R306	Resistor, 220,000 ohms	66-4221540*
R307	Resistor, 220,000 ohms	66-4221540*
R308	Resistor, 1 meg.	66-5101540*
R309	Resistor, 10 megs.	66-6101540*
R310	Resistor, 4,700 ohms	66-2471340*
R311	Resistor, 6,800 ohms	66-2681540*
R312	Resistor, 2,200 ohms	66-2221540*
Z300	Transformer, 1st i-f	65-0365
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
Z301	Transformer, 2nd i-f	65-0366
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, trimmer	Part of Z301
	C301C: condenser	Part of Z301
	C301D: condenser	Part of Z301
	R301: resistor	Part of Z301

SECTION 4

Reference	Description	Service Part No.
C401	Condenser, .05 mf.	61-0101*
C402	Condenser, antenna assembly	77-0788
	C402A: condenser, trimmer	Part of C402
	C402B: condenser, trimmer	Part of C402
C403	Condenser, .05 mf.	61-0111*
C404	Condenser, 250 mmf.	60-10255007*
C405	Condenser, 250 mmf.	60-10255007*
C406	Condenser, trimmer	63-0069
C407	Condenser, 250 mmf.	60-10255007*
C408	Condenser, 360 mmf.	30-1220-13*
C409	Condenser, 55 mmf.	61-0149*
C410	Condenser, .05 mf.	61-0101*
L402	Choke, antenna	65-0437
L403	Coil, oscillator shunt	65-0440
	Iron core and screw assembly	57-2325
	Mounting nut	218-1341
L404	Manual tuning unit assembly	77-0962
	Coil assembly, antenna	65-0449
	Coil assembly, oscillator	65-0439
	Coil, assembly, image trap	65-0382

SECTION 4 (Continued)

Reference	Description	Service Part No.
	Control, sensitivity, 1,000 ohms (R401)	67-0025*
	Core assembly, iron, image trap	77-0677
	Core, iron, antenna	57-1702
	Core, iron, oscillator	57-1703
	Guide assembly, core	77-0678
	Nut, backlash	57-1706
	Pin, hair	57-1868FA1
	Shaft, core guide	57-1672FA3
	Shaft, manual tuning	77-0767
	Spring, backlash nut	57-1705FA1
	Spring, coil retaining	57-1673
	Spring, core guide	57-1708
R401	Control, sensitivity (Part of L404)	67-0025*
R402	Resistor, 15,000 ohms	66-3153340*
R403	Resistor, 1 meg.	66-5101540*
R404	Resistor, 22,000 ohms	66-3223340*
R405	Resistor, 100,000 ohms	66-4101540*
Z400	Transformer, r-f and i-f wave trap	65-0421
	C400A: condenser, trimmer	Part of Z400
	C400B: condenser, trimmer	Part of Z400
	L400A: coil, r-f plate	Part of Z400
	L400B: coil, i-f trap	Part of Z400
	R400: resistor, 100,000 ohms	Part of Z400
Z401	Tuning unit assembly, push-button (complete)	77-0943
	Condenser, ceramicon	61-0149*
	Condenser, padder	63-0069
	Coupling, push-button link	57-1700
	S400: switch, push-button	Part of Z401

MISCELLANEOUS

Description	Service Part No.
Front housing assembly	77-0941FC64
Cover, tube side	77-0879
Cover, wiring side	57-2186FC64
Receptacle, antenna	57-0591FA3
Socket, tube	27-6151*
Socket, vibrator	27-6044*
Tuning unit	77-0943
Front, housing	57-2211FC64
Push-button assembly (Dodge)	76-1910
Push-button assembly (Plymouth, De Soto, Chrysler)	76-1851
Cord, pointer drive (25-foot spool)	45-1459
Core and key assembly, push-button (off)	76-1955
Core and key assembly, push-button No. 2	76-1956
Core and key assembly, push-button No. 3	76-1957
Core and key assembly, push-button No. 4	76-1958
Core and key assembly, push-button No. 5	76-1959
Core and key assembly, push-button No. 6	76-1960
Core and key assembly, push-button (dial)	76-1961
Cover, nut (Chrome)	57-1683FA8
Cover, push-button (MoPar, Dodge)	56-3386
Dial, glass (Dodge)	27-5898
Dial, glass (Plymouth, MoPar)	27-5897
Bezel (Dodge)	57-2220FA8
Bezel (Plymouth, De Soto, Chrysler)	57-2221FA8
Bracket, diffusing screen	57-2242FA3
Pointer, dial	55-1366
Screen, diffusing	55-1428
Socket assembly, pilot lamp	76-1678
Spring, dial mounting	57-2218FA1
Drum assembly, tone indicator	77-0914
Cord, tone drum drive (25-foot spool)	45-1459
Shaft assembly, color cup	76-1855
Spring, tone indicator color drum	57-1693
Washer, "U", tone drum shaft	28-5990FE12
Fuse lead assembly	77-0052
Contact	54-4344
Housing, fuse	56-3595FA3
Spring	56-3593FA1
Tube, insulating	54-7192
Washer, fibre	54-7191
Set mounting	
Bolt	1W16167FA3
Grille spacer	57-2358FA8
Knob, manual-volume	77-0688
Knob (nut cover)	57-1683FA8
Knob, tone	57-1682FA8
Nut	1W19996FA3
Shaft, tuning	57-2217FA3
Spacer	57-1042FA3
Washer	97-0073FA1
Washer	W417FA3
Speaker mounting	
Nut	1W19988FA3
Stud and bushing assembly	77-0400
Suppressor kit	
Braid, bonding	95-0073
Clip	56-6276
Condenser, generator	61-0156*
Condenser, ignition switch	61-0177*
Filter assembly, fuel guage	67-0050*
Suppressor, distributor	33-1196*

PHILCO CORP. MODEL C4608, Code 122; Chrysler

Functionally, both sets are identical, but there have been several parts changes in Code 122 which, because of their effect upon the characteristics and adjustment of the set, definitely require the correct substitution. These changes involve the parts listed below.

In Code 122, the sensitivity control is replaced by a fixed resistor; also, the i-f transformers and wave trap are replaced by units which use permeability tuning instead of trimmer-condenser tuning.

Physically, the alignment procedure remains the same, except that the transformers are of the K type; therefore, the primary must be adjusted from the bottom of the can, while the secondary is adjusted from the top.

We suggest that you examine the list below and order the new parts. We feel that these parts may be required in the course of warranty service.

SECTION 1

Reference Symbol	Description	Service Part No. (Code 122)	Service Part No. (Code 121)
L101	Choke, vibrator	32-4170	65-0389

SECTION 2

C200	Condenser, grid blocking, .005 mf.	45-3502	61-0179
C201	Condenser, grid blocking, .01 mf.	61-0120	61-0105
C202	Condenser, grid blocking, .01 mf.	61-0120	61-0105
C204	Condenser, plate by-pass, .007 mf.	61-0127	61-0105
T200	Transformer, output	32-8316-1	65-0363

SECTION 3

Reference Symbol	Description	Service Part No. (Code 122)	Service Part No. (Code 121)
C304	Condenser, grid blocking, .005 mf.	45-3502	61-0179
C307	Condenser, tone compensation, .01 mf.	61-0120	61-0105
R302	Resistor, cathode bias, 470 ohms	66-1473340	61-1683340
Z300	Transformer, 1st i-f	32-4160	65-0365
Z301	Transformer, 2nd i-f	32-4161	65-0366

SECTION 4

L404	Manual-tuning-unit assembly	77-0666-2	77-0962
R401	Resistor, cathode bias, 220 ohms (replaces sensitivity control in Code 121)	66-1223340	67-0025
Z400	Transformer, r-f and i-f wave trap	32-4162	65-0421
Z401	Tuning-unit assembly, push-button (complete)	77-0657-1	77-0943

NOTE: On a small percentage of the first sets made, some difficulty may be encountered in keeping the i-f transformers aligned. If the radio is weak or the i-f transformers are far out of alignment, adjust the cores. If they seem to turn very easily, it will be necessary to replace the entire i-f transformer. This condition may occur only on some sets made prior to run #4, for Model C-4608, Code 122 only.

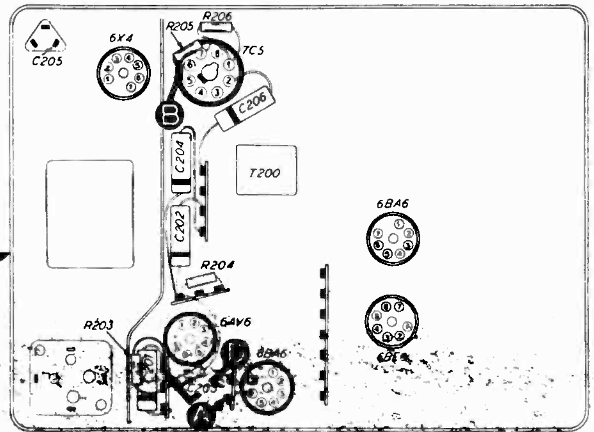
TROUBLE SHOOTING

Section 2

For the tests in this section, 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.

Turn the volume control to maximum, and the tone control fully 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.



TP-4049B

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	B	Loud, clear signal with strong signal input.	Defective: 7C5. Open: R206, T200, LS200. Shorted: C203, C206, T200. Leaky: C206, C203.
3	D	Loud, clear signal with weak signal input.	Defective: 6AV6. Open: C204, R204. Shorted or leaky: C204, C202 (rotate R202).
4	A	Loud, clear signal with weak signal input.	Open: C201, R203. Shorted: C304*. Leaky: C304*.

Listening Test: Distortion may be caused by shorted or leaky C201, C204, or C205, or by open R203 or R205.

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

TROUBLE SHOOTING

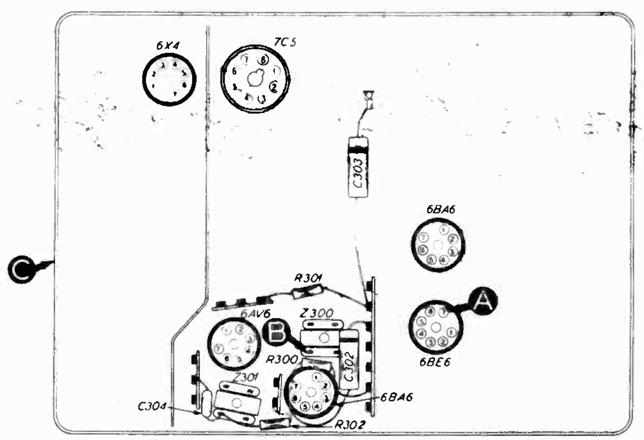
Section 3

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 chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Depress manual-tuning push button.

Turn the volume control to maximum, and 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-4049C

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 B 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	B	Loud, clear signal with moderate signal input.	Defective: 6BA6, Z301. Misaligned: Z301. Open: R300, R301, R302. Shorted: C302, C303, C304.
3	A	Loud, clear signal with weak signal input.	Defective: 6BE6*, Z300. Misaligned: Z300. Open: L403*.

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

TROUBLE SHOOTING

Section 4

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 chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Turn the radio volume control to maximum, and the tone control fully counterclockwise.

If the "NORMAL INDICATION" is not obtained in step 1 (a), isolate and correct the trouble before making the test in step 1 (b).

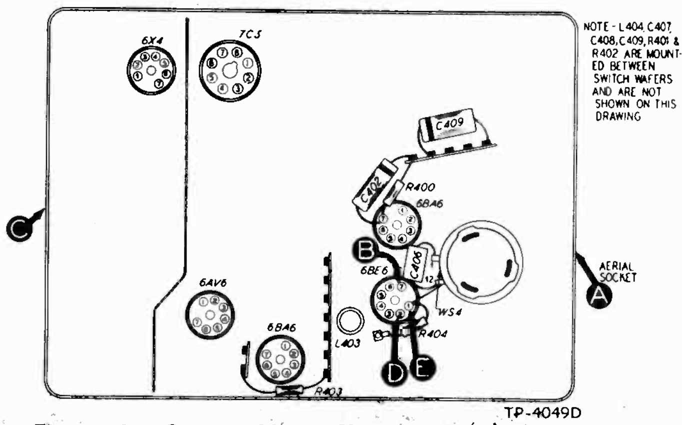


Figure 4. Bottom View, Showing Section 4 Test Points (locations of C404, WS1, 2, 3, 4, Z401, and Z402 are shown in figure 6)

STEP	TEST-POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (a)	A	1000 kc.	Manual. Tune to signal.	Loud, clear signal with weak signal input.	Trouble in manual-tuning circuits; isolate by steps 2, 3, and 4, and correct trouble before proceeding.
1 (b)	A	Tune to freq. of each button.	Push button. Depress each button.	Loud, clear signal with weak signal input.	Trouble in push-button-tuning circuits; isolate by steps 5, 6, and 7.
MANUAL-TUNING TESTS					
2	B	1000 kc.	Manual. Tune to signal.	Loud, clear signal with moderate signal input.	Defective: 6BE6. Open: R402. Trouble in oscillator circuit (step 3).
3	E to D Osc. Test (see note below).		Manual. Tune through range.	Negative 2 to 4 volts.	Defective: 6BE6, WS2(F). Open: L403, L402C, C406, C407, C408, R404. Shorted or leaky: C406, C407, C408.
4	A	1000 kc.	Manual. Tune to signal.	Loud, clear signal with weak signal input.	Defective: 6BA6, WS3(R), WS3(F), WS1(F), WS1(R), WS2(R). Open: L405, L402B, L402A, R400, R401, R402, R403, R405, C409, C404. Shorted or leaky: C409, C405, C404, C401.
PUSH-BUTTON-TUNING TESTS					
5	B	Tune to freq. of each button.	Push button. Depress each button.	Loud, clear signal with moderate signal input.	Defective: WS1(F), WS1(R). Trouble in oscillator circuit (step 6).
6	E to D Osc. Test (see note below).		Push button. Depress each button.	Negative 2 to 4 volts.	Defective: WS2(F). Open or shorted: L401F, L401G, L401H, L401I, L401J.
7	A	Tune to freq. of each button.	Push button. Depress each button.	Loud, clear signal with weak signal input.	Defective: WS3(R), WS3(F), WS1(F), WS1(R), WS2(R), Z400. Open: L401A, L401B, L401C, L401D, L401E. Misaligned: Z400.

OSCILLATOR TESTS (steps 3 and 6)

Connect positive lead of high-resistance voltmeter to test point D (pin 2, cathode of 6BE6); connect prod end of negative lead through 100,000-ohm isolating resistor to test point E (pin 1, osc. grid of 6BE6). Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage, 2 to 4 volts (measured with 20,000-ohms-per-volt meter), throughout range of manual tuning, step 3, and of push-button tuning, step 6.

SETTING PUSH BUTTONS

Each adjusting rod controls ganged tuning cores for both aerial and oscillator circuits, so that only a single adjustment is required for a given frequency. The ganged tuning cores are adjusted by turning the small plastic knobs, numbered 1, 2, 3, 4, and 5, on the front of the radio.

1. Use an r-f signal generator to furnish test signals at the approximate frequencies of the desired stations. Connect the generator ground lead to the chassis. Connect the output lead through a 30-mmf. condenser to the aerial receptacle; connect another 30-mmf. condenser between the aerial receptacle and the chassis.

2. Turn on the power, set the volume control to maximum, and turn the tone control fully counterclockwise.

3. Starting with the lowest frequency desired, set the signal generator, depress button No. 1 and adjust knob No. 1 for maximum output. Repeat the procedure for buttons 2, 3, 4, and 5.

4. After the radio is installed in the car, and the aerial connected, allow a fifteen-minute warm-up period, then readjust the tuning for each button while listening to the station for which the adjustment is being made.

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, r-f by-pass, 330 mmf.	62-133001001
C101	Condenser, by-pass, .5 mf.	61-0137*
C102	Condenser, by-pass, 330 mmf.	62-133001001
C103	Condenser, by-pass, .5 mf.	61-0137*
C104	Condenser, buffer, .005 mf.	61-0153*
C105	Condenser, electrolytic, 2-section	61-0089
C105A	Condenser, filter, 15 mf., 350v	Part of C105
C105B	Condenser, filter, 10 mf., 350v	Part of C105
C106	Condenser, by-pass, .25 mf.	61-0125
C107	Condenser, by-pass, .05 mf.	30-4590
I100	Pilot lamp	34-2040
I101	Pilot lamp	34-2040
I102	Pilot lamp	34-2040
I103	Pilot lamp	34-2040
I104	Pilot lamp	34-2040
I105	Pilot lamp	34-2040
J100	Socket, control plug	27-6234
J101	Socket, foot control	27-6186*
L100	Choke, "A"	65-0037
L101	Choke, "A"	32-4170
L102	Solenoid	Part of Z100
PB1	Push-button switch	Part of Z101
PB2	Push-button switch	Part of Z101
PB3	Push-button switch	Part of Z101
PB4	Push-button switch	Part of Z101
PB5	Push-button switch	Part of Z101
PB6	Push-button switch	Part of Z101
PL100	Plug, control head	76-3124
R100	Resistor, damping, 100 ohms	66-1104340*
R101	Resistor, damping, 100 ohms	66-1104340*
R102	Resistor, filter, 1000 ohms	66-2104340*
R103	Resistor, filter, 4700 ohms	66-2473340*
S100	Switch, off-on	Part of R200
S101	Switch, muting	Part of Z101
S102	Switch, solenoid interrupter	Part of Z100
T100	Transformer, power	32-8313
VB100	Vibrator	45-6307*
WS4(F)	Wafer section, homing	Part of Z100
WS4(R)	Wafer section, homing	Part of Z100
Z100	Solenoid-and-wafer-switch assembly	76-2945
Z101	Switch-and-lamp-housing assembly	76-2957

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, tone compensation, .01 mf. (in control head)	61-0120*
C201	Condenser, d-c blocking, .004 mf.	61-0179*
C202	Condenser, tone compensation, .01 mf. (in control head)	61-0120*
C203	Condenser, r-f by-pass, 100 mmf.	30-1224-18
C204	Condenser, d-c blocking, .01 mf.	61-0120*
C205	Condenser, cathode by-pass, 20 mf., 25v	Part of C105
C206	Condenser, tone compensation, .006 mf.	61-0105*
LS200	Loud-speaker	36-1609-6
R200	Volume control	
	Universal	33-5557
	Buick, special	33-5557-1
R201	Resistor, tone compensation, 15,000 ohms (in control head)	66-3153340*
R202	Tone control, 5 megohms (in control head)	Part of R200
R203	Resistor, grid return, 10 megohms	66-6103340*
R204	Resistor, plate load, 220,000 ohms	66-4223340*
R205	Resistor, grid return, 470,000 ohms	66-4473340*
R206	Resistor, cathode bias, 220 ohms	66-1224340*
T200	Transformer, output	32-8315

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed trimmer, 107 mmf.	Part of Z300
C300B	Condenser, fixed trimmer, 86 mmf.	Part of Z300
C301A	Condenser, fixed trimmer, 131 mmf.	Part of Z301
C301B	Condenser, fixed trimmer, 106 mmf.	Part of Z301
C302	Condenser, cathode by-pass, .05 mf.	61-0122*
C303	Condenser, screen grid by-pass, .05 mf.	61-0122*

SECTION 3 (Continued)

Reference Symbol	Description	Service Part No.
C304	Condenser, r-f by-pass, 100 mmf.	30-1224-18
R300	Resistor, cathode bias, 2200 ohms	66-2223340*
R301	Resistor, screen dropping, 27,000 ohms	66-3274340*
R302	Resistor, r-f filter, 27,000 ohms	66-3273340*
Z300	Transformer, 1st i-f	32-4160
Z301	Transformer, 2nd i-f	32-4161

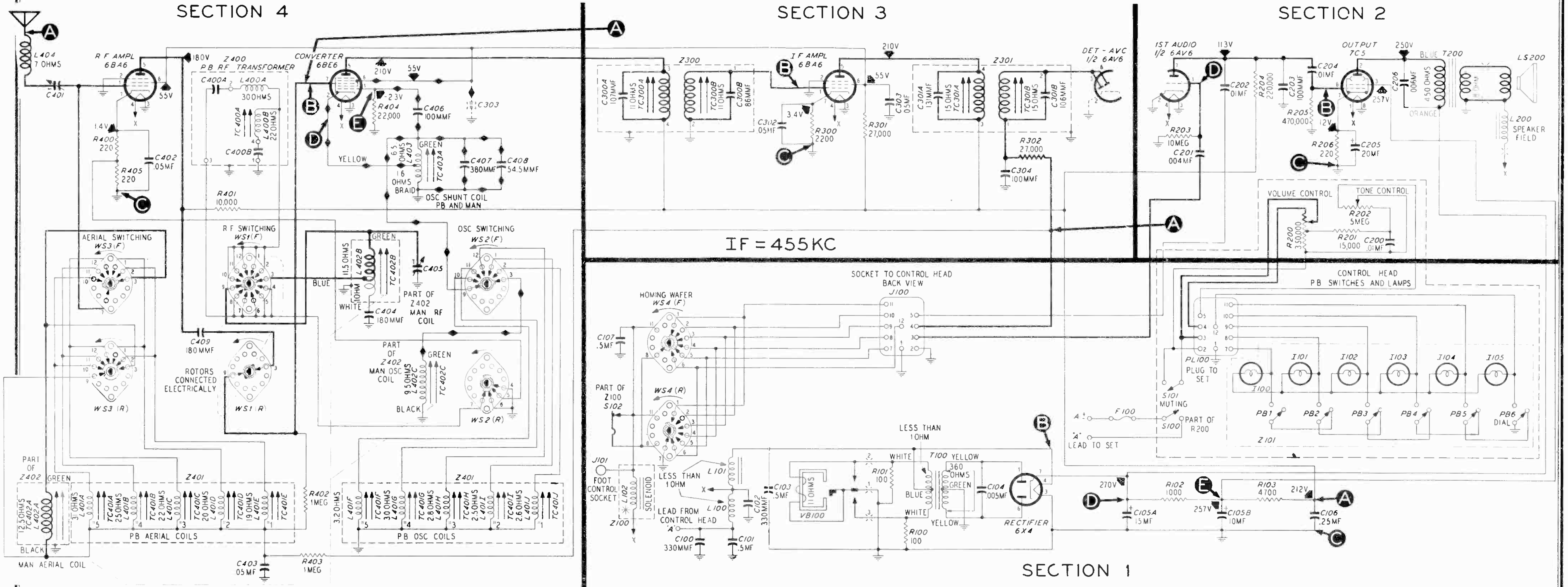
SECTION 4

Reference Symbol	Description	Service Part No.
C400A	Condenser, d-c blocking	Part of Z400
C400B	Condenser, fixed padder	Part of Z400
C401	Condenser, aerial padder	63-0055
C402	Condenser, cathode by-pass, .05 mf.	61-0122*
C403	Condenser, a-v-c filter, .05 mf.	61-0122*
C404	Condenser, fixed padder, 180 mmf.	60-10205307*
C405	Condenser, r-f trimmer	63-0055
C406	Condenser, grid blocking, 100 mmf.	30-1224-18
C407	Condenser, shunt, 380 mmf.	30-1220-37
C408	Condenser, shunt, 54.5 mmf.	61-0149
C409	Condenser, d-c blocking, 180 mmf.	60-10205307*
L400A	Coil, i-f trap	Part of Z400
L400B	Coil, i-f trap	Part of Z400
L401A	Coil, aerial, push-button	Part of Z401
L401B	Coil, aerial, push-button	Part of Z401
L401C	Coil, aerial, push-button	Part of Z401
L401D	Coil, aerial, push-button	Part of Z401
L401E	Coil, aerial, push-button	Part of Z401
L401F	Coil, osc. tuning, push-button	Part of Z401
L401G	Coil, osc. tuning, push-button	Part of Z401
L401H	Coil, osc. tuning, push-button	Part of Z401
L401I	Coil, osc. tuning, push-button	Part of Z401
L401J	Coil, osc. tuning, push-button	Part of Z401
L402A	Coil, aerial, manual (part of Z402)	65-0443-4
L402B	Coil, r-f, manual (part of Z402)	65-0443-5
L402C	Coil, oscillator, manual (part of Z402)	65-0443-6
L403	Coil, oscillator shunt	32-4110
L404	Coil, aerial	65-0437
R400	Resistor, cathode bias, 220 ohms	66-1223340*
R401	Resistor, plate dropping, 10,000 ohms	66-3103340*
R402	Resistor, grid return, 1 megohm	66-5103340*
R403	Resistor, a-v-c filter, 1 megohm	66-5103340*
R404	Resistor, grid return, 22,000 ohms	66-3223340*
R405	Resistor, cathode bias, 220 ohms	66-1223340*
Z400	Trap assembly, i.f.	32-4162
Z401	Coil assembly, push-button	76-2715
Z402	Coil assembly, push-button	76-2919
WS1(F)	Wafer section, r.f.	Part of Z100
WS1(R)	Wafer section, r.f.	Part of Z100
WS2(F)	Wafer section, osc.	Part of Z100
WS2(R)	Wafer section, osc.	Part of Z100
WS3(F)	Wafer section, aerial	Part of Z100
WS3(R)	Wafer section, aerial	Part of Z100

MISCELLANEOUS

Description	Service Part No.
"A"-lead assembly	41-3187-1
Braid, bonding	95-0073
Cap, lamp-housing	54-4408
Clip, anti-rattle spring	28-2488FA1
Clip, spring, cover grounding	57-1335
Cover, tube side	76-3015FJ21
Cover, wiring side	56-4421FJ21
Driver-and-shaft assembly	76-2716
Housing assembly	76-2879FJ21
Knob, push-button	56-4406
Plate, speaker mtg.	56-4557FA3
Screen, speaker	57-4557FA3
Slider assembly, manual tuner	76-2730
Socket, Loktal	27-6138
Socket, miniature	27-6226
Socket, speaker	55-0438-1
Spring, back-lash nut, manual tuner	57-1705FA1
Spring, core guide, manual tuner	57-1708

PHILCO CORP.



SWITCH WAFERS NUMBERED FROM TOP OF SET

FRONT CONTACTS SHOWN AS VIEWED FROM FRONT

REAR CONTACTS, LOOKING THROUGH FROM FRONT

SWITCH WAFERS SHOWN IN MANUAL POSITION

✳ L102 AND WAFER SWITCH ASSEMBLY ARE PART OF Z100.

>< DESIGNATES SOCKET OR PLUG CONNECTIONS

MANUAL TUNER Z402

WHITE, BLUE-GREEN — L402B MAN RF TUNING COIL

BLACK, GREEN — L402C MAN OSC TUNING COIL

BLACK, GREEN — L402A MAN AERIAL TUNING COIL

BRAID, YELLOW, GREEN — L403 OSC SHUNT COIL

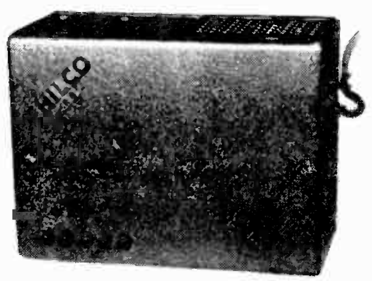
—— RF IF AND AUDIO SIGNAL PATH

—◆— OSC SIGNAL PATH

ALL RESISTOR VALUES IN OHMS UNLESS MARKED OTHERWISE.

CONDENSER SYMBOLS: FIXED, VARIABLE, TRIMMER, ELECTROLYTIC

Sectionalized Schematic Diagram, Showing Test Points



SPECIFICATIONS

CIRCUIT	Six-tube superheterodyne
FREQUENCY RANGE	535—1600 kc.
PUSH BUTTONS	Six: five for station selection; one for manual tuning
AUDIO OUTPUT	3 watts
POWER INPUT	8 amperes at 6.6 volts, d.c.
AERIAL	Any Philco auto-radio aerial
PHILCO TUBES (6)	6BA6 (2), 6BE6, 6AV6, 7C5, 6X4

Circuit Description

Philco Auto Radio Model CR-8 is a six-tube superheterodyne radio of the universal-mounting type. The speaker and control head are separately mounted.

The aerial input circuit is designed for maximum reduction of signal interference without loss of signal strength. Permeability tuning is used for all main circuits. Of the six push buttons, located on the control head, five are used for automatic station selection, and one selects manual tuning. A foot switch and cable assembly (Foot Control Kit, Philco Part No. 45-1545) is available, for automatic tuning of stations by foot control; the switch cable is connected by plugging it into the pin jack, J101. The pilot lamps are connected, through the switch wafers, in a series-parallel circuit; the wiring is so arranged that the lamp which glows above the push button in use is in series with the parallel combination of the other five lamps.

A tuned r-f amplifier stage, incorporating a 6BA6 pentode, provides good sensitivity and selectivity. The converter, a 6BE6, works into a 6BA6 i-f amplifier, which operates at 455 kc.

The 6AV6 duo-diode, triode tube provides detection and a-v-c voltage in the diode section; the triode section functions as the first audio amplifier. The first audio stage is resistance-coupled to the 7C5 beam-power output amplifier. Approximately three watts of audio power is supplied to the electrodynamic speaker.

The power supply includes a non-synchronous vibrator and a type 6X4 rectifier.

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 B+ (pin 7 of 6X4 rectifier tube) and the radio chassis, test point C, with the ohmmeter polarity such that the highest resistance reading is obtained. If the reading is lower than 5,000 ohms, check condensers C105A, C105B, and C106 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.

PHILCO CORP.

ALIGNMENT PROCEDURE

NOTE: THE CONTROL UNIT SHOULD BE PLUGGED INTO THE RADIO.

DIAL POINTER—With tuning cable disengaged, set tuning-core gang to full-mesh position; turn dial of tuning control to low-frequency end until pointer stops, then engage tuning cable.

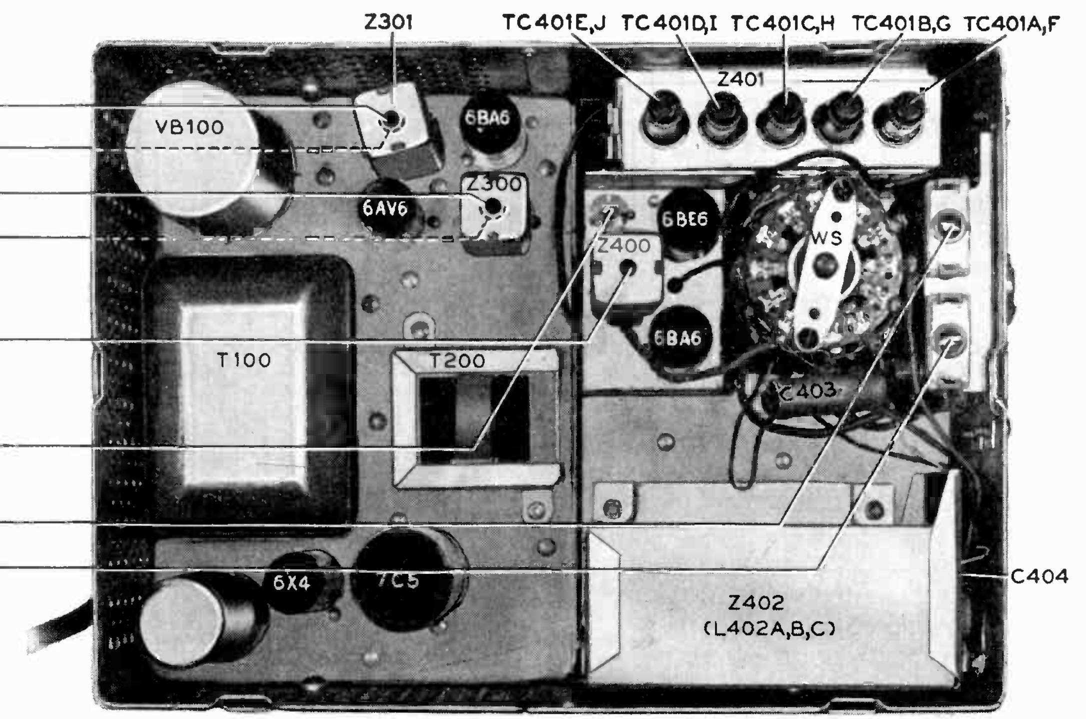
OUTPUT METER—Connect across voice-coil terminals.
SIGNAL GENERATOR—Connect ground lead to chassis; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS—Turn volume control to maximum, and tone control fully counterclockwise; use push buttons as directed 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	FREQUENCY	TUNING	SPECIAL INSTRUCTIONS	
1	Through .05-mf. condenser to aerial receptacle.	455 kc.	Manual. 1600 kc.	Adjust, in order given, for maximum output.	TC301B TC301A TC300B TC300A
2	Same as step 1.	455 kc.	Any push button except manual tuning.	Adjust for minimum output.	TC400A
3	Dummy aerial (see note below).	580 kc.	Manual. 580 kc.	Adjust for maximum output while rocking tuning control.	TC403A
4	Same as step 3.	1600 kc.	Manual. Tune to signal.	Adjust for maximum output.	C405 C401
5	Same as step 3.	1400 kc.	Manual. Tune to signal.	Re-engage tuning cable for correct calibration.	
6	Repeat steps 3, 4, and 5 until no further improvement is obtained.				
7	After reinstalling radio in car, adjust C401 for maximum output from weak station near 1400 kc. Re-engage tuning control for correct dial calibration.				

DUMMY AERIAL: Connect generator output lead through 30-mmf. condenser to aerial receptacle; connect another 30-mmf. condenser between aerial receptacle and chassis.



Top View, Showing Trimmer and Tuning-Core Locations (dotted lines indicate tuning screws located at bottom of chassis)

TROUBLE SHOOTING

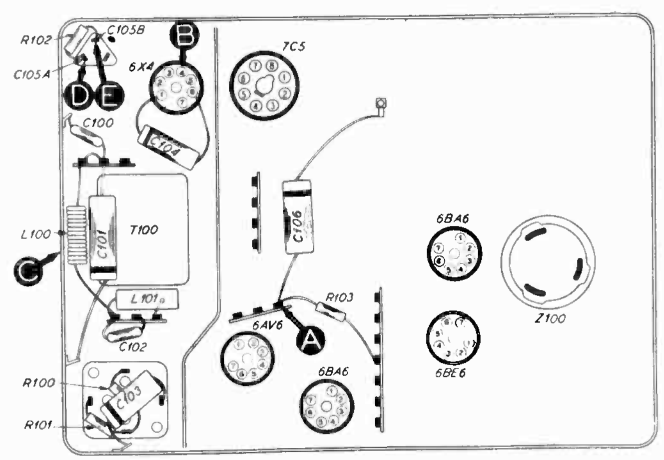
Section 1

NOTE: For all trouble-shooting tests given in this manual, the control unit should be plugged into the radio.

Make the tests for this section with a d-c voltmeter, connecting the leads between test point C (chassis) and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, with an "A" supply voltage of 6.6 volts, d.c.

Turn on the power and depress the manual-tuning button. Turn the volume control to minimum, and the tone control fully counterclockwise.

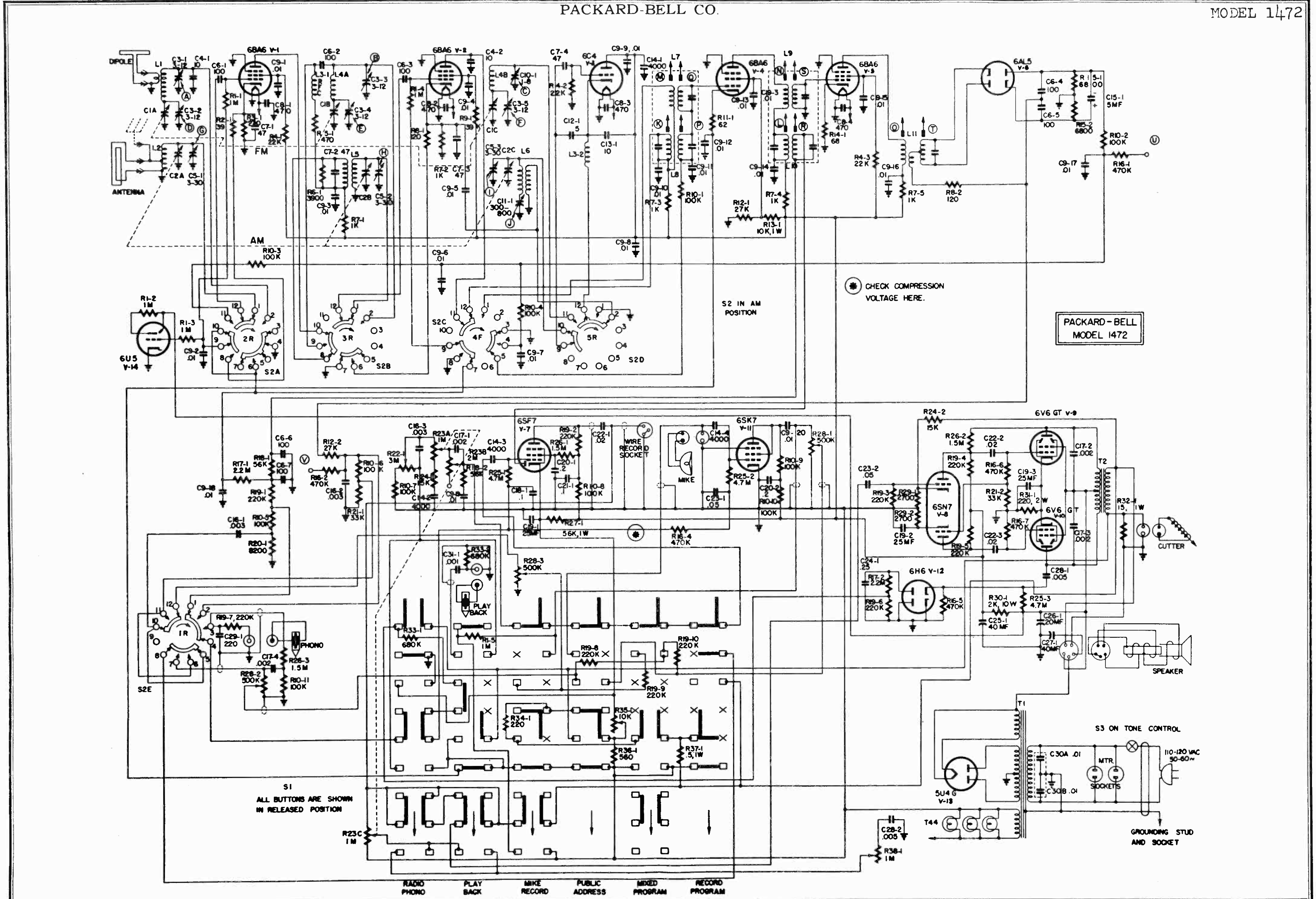
If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2; if not, isolate and correct the trouble in this section.



Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A B	212v 6.6v		Trouble in this section. Isolate by the following tests.
2	B	6.6v	No voltage Low voltage	Open: F100, S100, L100, L101. Weak battery. Leaky: C100, C101, C102. Defective: VB100.
3	D	270v	No voltage Low voltage	Open: T100. Shorted: C100, C101, C102, C103, T100, C105A, C104. Defective: VB100, 6X4. Leaky: C105A. Defective: 6X4.
4	E	257v	No voltage Low voltage	Open: R102. Shorted: C105B. Leaky: C105B. Changed resistance: R102.
5	A	212v	No voltage Low voltage	Open: R103. Shorted: C106. Leaky: C106. Changed resistance: R103.

PACKARD-BELL CO.



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

GENERAL INFORMATION

Model 1472 is a two band dual turntable, console PhonOcord. It has 12 tubes, plus a tuning eye and power rectifier, and employs a 12-inch electro dynamic speaker.

Listed below are some of the features included in this model:

1. Standard Broadcast—540 to 1620 KC.
2. Frequency Modulation—87.5 to 108.5 MC.
3. Cathode Ray tuning indicator.
4. Push-button home recording and automatic record changer.

Electrical Rating:
Line Voltage . 110–120 volts, 50–60 cycles A.C.
Power Consumption . . . . 188 watts

Tuning Frequency Range:
Standard Broadcast . . . 540 to 1620 KC.
Frequency Modulation . 87.5 to 108.5 MC.

Intermediate Frequency:
AM . . . . 455 KC
FM . . . . 10.7 MC

Loudspeaker:
Type . . . . Electro Dynamic
Outside Cone Diameter . 12"
Voice Coil Impedance . . 3.2 ohms at 400 cycles
Field Coil . . . . 500 ohms D.C.

Eletrical Power Output:
Maximum . . . . 15 watts
Undistorted . . . . 10 watts

Tubes:

Tube	No.	Function
6BA6	V-1	R.F. Amplifier
6BA6	V-2	Mixer
6C4	V-3	Oscillator
6BA6	V-4	1st I.F. Amplifier
6BA6	V-5	Driver
6AL5	V-6	F.M. Detector
6SF7	V-7	Audio Amplifier, A.M. Detector
6SN7-GT	V-8	Phase Inverter
6V6-GT	V-9	Power Amplifier
6V6-GT	V-10	Power Amplifier
6SK7	V-11	Microphone Amplifier
6H6	V-12	Compressor Rectifier
5U4-G	V-13	Power Rectifier
6U5-6G5	V-14	Tuning Eye

NOTE: R26-2 shown as 1.5 M was replaced by 680 K in some instances to compensate for variations in recording level. See Special Service Information for method of checking for proper recording level.

SPECIAL SERVICE INFORMATION

Recording Head Pressure:

The proper recording head pressure is 1¼ ounces and is indicated by a small red dot on the indicator located on the cutter arm. In the event this has varied due to shipping vibrations it may be re-set with the aid of an ordinary pocket type postage scale. To increase pressure turn indicator wheel clock-wise. Turn counter-clockwise to decrease pressure.

Brief Description of Compression Circuit:

One diode section of the 6H6 serves as the compressor rectifier. Delay is accomplished by applying a positive potential to the cathode of the 6H6. A portion of the output voltage is rectified by the 6H6 and varies the grid bias of the 1st audio tube 6SF7.

How to Check Compression Voltage:

Turn the Selector Switch to BC position and press the push-button labeled Record Program. Feed a 2 volt (RMS) 1000 cycle signal into the 2nd detector diode return between the 56K and 220K ohm resistors. Connect a V.T.V.M. to the termination of the 4.7 megohm resistor and .1 mfd. condenser in the control grid circuit of the 6SF7. This should read between 2.5 to 3.5 volts negative.

How to Check Recording Level (Radio Record):

Substitute a 3 ohm resistor in place of the cutting head and with the same test setup as outlined in the preceding paragraph the voltage across this resistor should be between 1.1 and 1.5 volts A.C.

How to Check Recording Level (Record Phono):

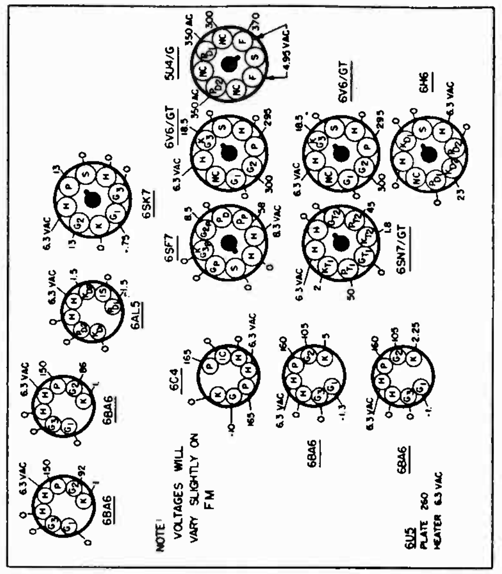
Turn the Selector Switch to Phono position, press Record Program pushbutton and feed a 1000 cycle signal of 0.8 volts into the Phono input socket. Substitute a 3 ohm resistor in place of the cutting head. The voltage across the cutter should read between 1.1 and 1.5 volts A.C.

Socket Voltages:

All voltages shown are positive D.C. unless otherwise noted. Heater voltages are 6.3 volts A.C.

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.



SOCKET VOLTAGES

Stage Gain Measurements: AM

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

Standard Output . . . . 50 milliwatts
Dummy Antenna . . . . 200 Mmf.
Antenna Post to R.F. Grid . . . 12X at 1000 KC
R.F. Grid to Converter Grid . . 6X at 1000 KC
Converter Grid to 1st I.F. Grid . 30X at 455 KC
1st I.F. Grid to 2nd Detector . .100X at 455 KC
Overall Audio Gain . . 0.1 volt into phono socket for 1.0 watt output at 400 cycles

Stage Gain Measurements: FM

Measurements taken with volume and tone controls maximum. Band Switch in Frequency Modulation position. AVC shorted out.

Dummy Antenna . . . . 270 ohms
Dipole Terminal to R.F. Grid . 1.0X at 98 MC
R.F. Grid to Converter Grid . . 7X at 98 MC
Converter Grid to 1st I.F. Grid . 49X at 10.7 MC
1st I.F. Grid to Driver Grid . . 35X at 10.7 MC

Alignment Procedure:

Alignment procedure consists of the steps outlined in the two alignment charts. A.M. alignment is carried out with minimum signal input. F.M. alignment signal should be strong enough to produce 3 volts A.V.C. voltage.

ALIGNMENT CHART AM

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. OUTPUT
1	Mixer Grid & Ground	455 KC	540 KC	Trimmers R. L. P. K
2	R.F. Grid & Ground	1500 KC	1500 KC	Trimmers I & H
3	R.F. Grid & Ground	600 KC	600 KC	Trimmer J
4	Repeat Step No. 2			
5	Standard Test Loop	1500 KC	1500 KC	Trimmer G
6	Check stationizing. Slide pointer on string if stations are uniformly off in one direction.			

NOTE: 1. Rock variable condenser for step 3.
2. Standard Test Loop is Hazeltine No. 1150 or a reasonable substitute.

Equipment Required for F.M. Alignment

1. Signal generator capable of generating signals at 10.7 MC and from 88 to 108 MC.
2. Vacuum tube voltmeter connected to point "A" (on Schematic).
3. Center-zero D.C. voltmeter connected to point "B" (on Schematic).

ALIGNMENT CHART FM

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX. A.V.C.
1	R.F. Grid & Ground	10.7 MC	88 MC	O, S, N, Q, M
2	Adjust T for zero on zero-center meter.			
3	Repeat Steps 1 and 2.			
4	Doublet Terminals thru 270 Ohms	88 MC	88 MC	Trimmers F, E, D
5	Doublet Terminals thru 270 Ohms	108 MC	108 MC	Trimmers C, B, A
6	Repeat Step No. 4.			

NOTE: 1. Rock variable condenser for step 4.

Oscillator Cathode Voltages:

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

1620 KC . . . . 3.8 volts A.C.
1300 KC . . . . 3.6 volts A.C.
750 KC . . . . 2.8 volts A.C.
550 KC . . . . 2.5 volts A.C.

Oscillator Grid Current: FM

Measured at 117 volts A.C. line voltage with a D.C. microammeter connected in series with ground end of the 22,000 ohm grid resistor.

108 MC . . . . 200 Microamps
98 MC . . . . 330 Microamps
88 MC . . . . 480 Microamps

D.C. Resistance Measurements:

A.M. I.F. Coils

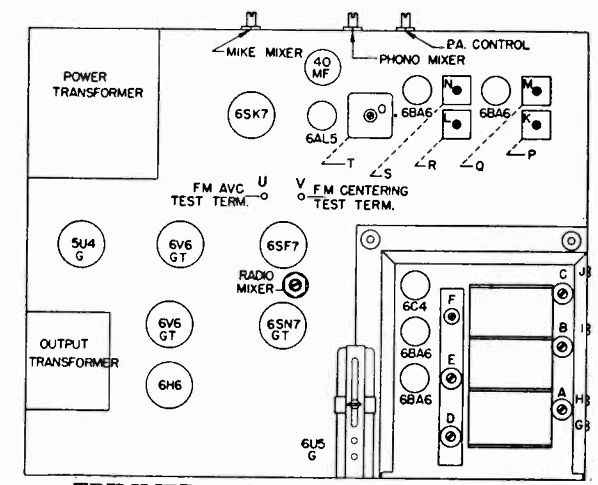
1st I.F.		2nd I.F.	
Primary . .	9.0 ohms	Primary . .	9.0 ohms
Secondary .	9.0 ohms	Secondary .	9.0 ohms

A.M. Oscillator Coil
Primary . . . . 1.0 ohms
Secondary . . . . 6.0 ohms

A.M. Antenna Coil
Start to Finish . . . . 12.2 ohms
Start to Tap . . . . . 10.5 ohms

A.M. R.F. Coil
Primary . . . . 5.8 ohms
Secondary . . . . 4.2 ohms

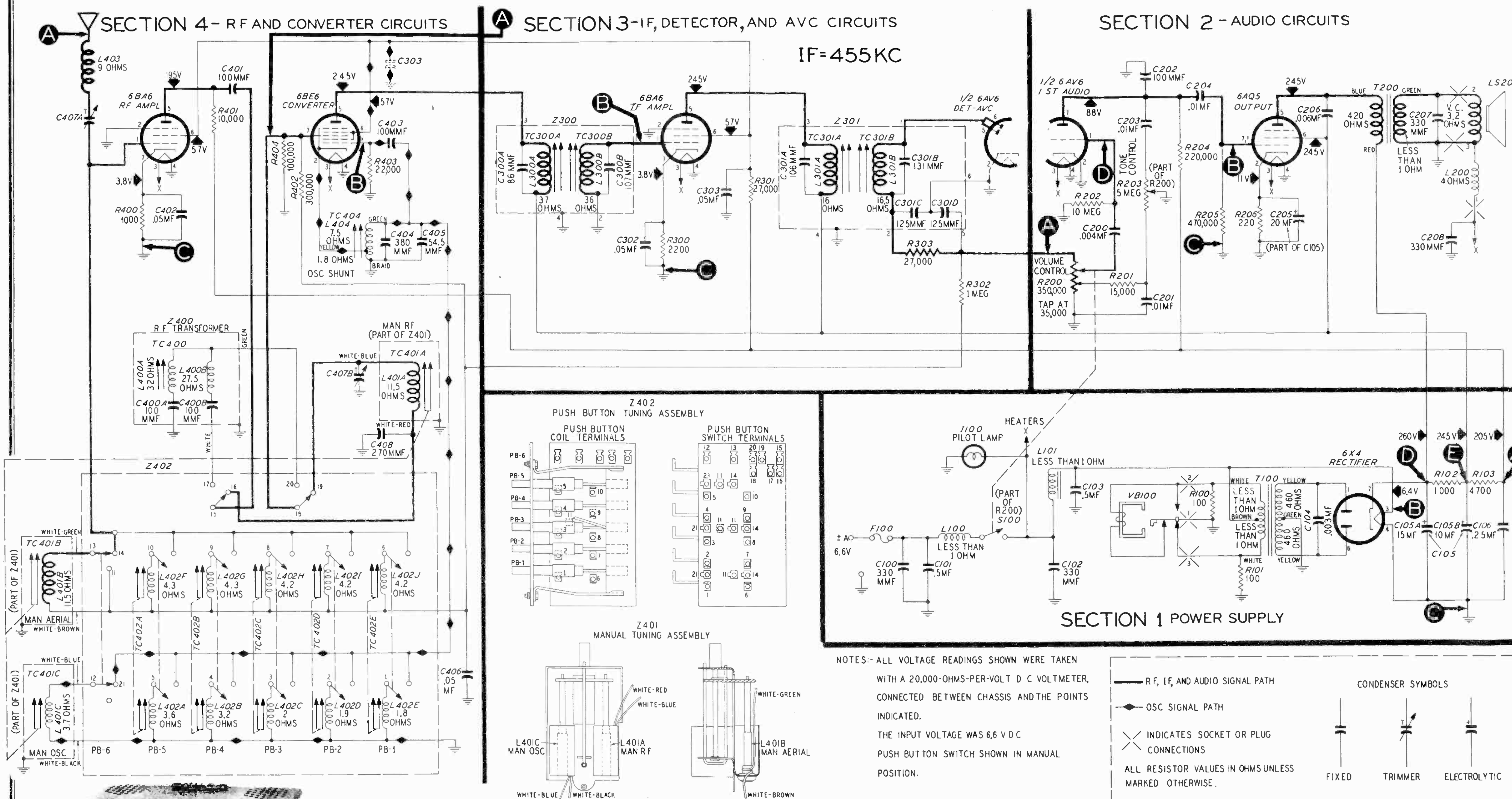
NOTE: Due to the variation in winding methods, the D.C. resistance on all coils is subject to a 20% tolerance.

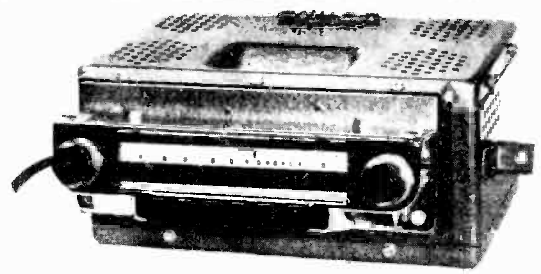


TRIMMER LOCATIONS

A—F.M. Antenna High Frequency Trimmer
B—F.M. R.F. High Frequency Trimmer
C—F.M. Oscillator High Frequency Trimmer
D—F.M. Antenna Low Frequency Trimmer
E—F.M. R.F. Low Frequency Trimmer
F—F.M. Oscillator Low Frequency Trimmer
G—A.M. Antenna Trimmer
H—A.M. R.F. Trimmer
I—A.M. Oscillator High Frequency Trimmer
J—A.M. Oscillator Low Frequency Trimmer
K—A.M. 1st I.F. Primary
L—A.M. 2nd I.F. Primary
M—F.M. 1st I.F. Primary
N—F.M. 2nd I.F. Primary
O—F.M. Ratio Detector Primary
P—(Bottom) A.M. 1st I.F. Secondary
Q—(Bottom) F.M. 1st I.F. Secondary
R—(Bottom) A.M. 2nd I.F. Secondary
S—(Bottom) F.M. 2nd I.F. Secondary
T—(Bottom) F.M. Centering Adjustment

PHILCO CORP.





SPECIFICATIONS

CIRCUIT .... Six-tube superheterodyne

FREQUENCY RANGE ..535—1600 kc.

PUSH BUTTONS .... Six: five for station selection; one for manual tuning

INTERMEDIATE FREQUENCY .... 455 kc.

AUDIO OUTPUT .... 2.5 watts

POWER INPUT .... 7.3 amperes at 6.6 volts, d.c., with p-m speaker; 8.9 amperes at 6.6 volts, d.c., with electro-dynamic speaker

AERIAL .... Any Philco Auto-Radio Aerial

PHILCO TUBES (6) .... 6BA6(2), 6BE6, 6AV6, 6AQ5, 6X4

Circuit Description

Philco Model CR-9 is an auto radio of the custom-mounting type. The speaker is separately mounted. Permeability tuning is used in all r-f and i-f circuits. Of the six push buttons, five are used for instant automatic tuning of stations, and one for selecting manual tuning. In manual tuning, three tuned circuits are used. In push-button tuning, two tuned circuits are used, plus a broad-band r-f transformer (Z400) containing an i-f wave trap.

The circuit includes a 6BA6 r-f amplifier, a 6BE6 converter, a 6BA6 i-f amplifier, a 6AV6 detector, a.v.c., and first audio amplifier, and a 6AQ5 output amplifier. The power supply has a non-synchronous vibrator and a 6X4 rectifier. An iron-core choke (L101) is used for hash elimination.

The radio may come equipped with either an electro-dynamic or a permanent-magnet speaker. Replacement speakers of either type are available; the speaker socket connections for both types are shown in the schematic diagram.

ALIGNMENT PROCEDURE

DIAL POINTER — Set tuning-core gang to full-mesh position. Adjust dial pointer to coincide with index mark, to left of "55."

OUTPUT METER — Connect across voice-coil circuit.

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

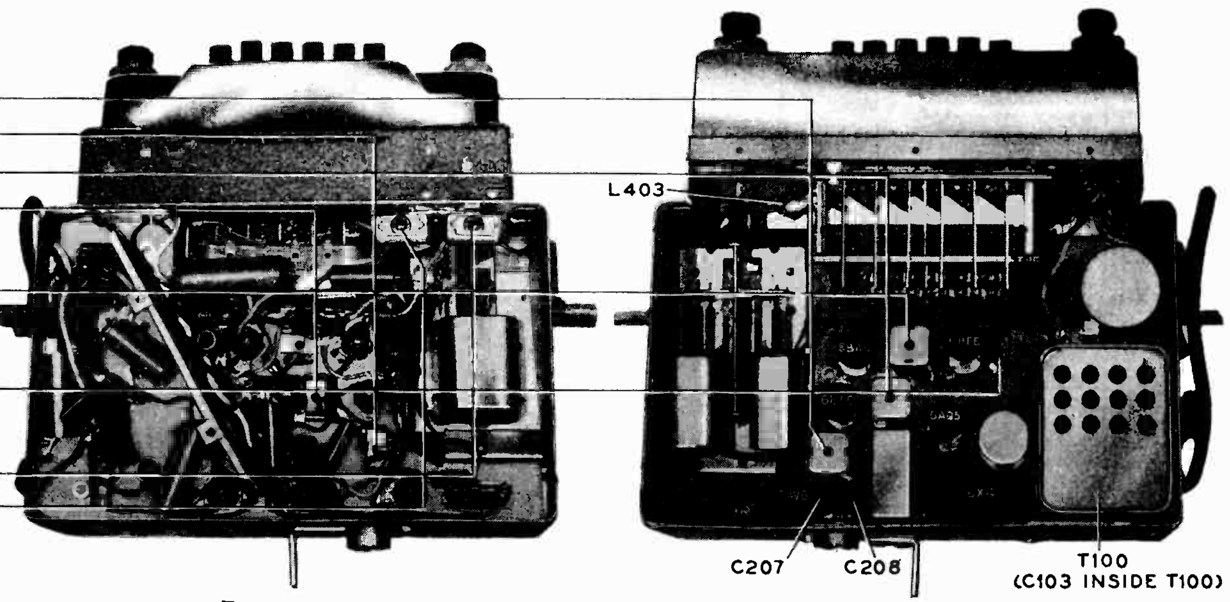
RADIO CONTROLS — Set volume control to maximum, and tone control fully clockwise. Set tuning control and push buttons as directed in chart.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	PUSH BUTTON AND DIAL	SPECIAL INSTRUCTIONS	
1	Through .05 mf. condenser to mixer grid (pin 7) of 6BE6.	455 kc.	Manual. 1600 kc.	Adjust, in order given, for maximum output. (TC301A and TC300A are reached through holes in bottom of i-f transformers.)	TC301B — 2nd i-f sec. TC301A — 2nd i-f pri. TC300B — 1st i-f sec. TC300A — 1st i-f pri.
2	Through .05 mf. condenser to aerial receptacle.	455 kc.	Any push button except manual.	Adjust for minimum output.	TC400 — i-f trap
3	Through dummy aerial to aerial receptacle.	580 kc.	Manual. 580 kc.	Adjust for maximum, while rocking tuning control.	TC404 — osc. padding
4	Same as step 3.	1400 kc.	Manual. Tune to signal.	Adjust, in order given, for maximum output.	C407A — aerial (series) C407B — r-f (shunt)
5	Repeat steps 3 and 4 until no further improvement is obtained.				
6	After reinstalling radio in car, with aerial connected, depress manual push button, and tune in weak station near 1400 kc.; then adjust aerial series trimmer, C407A, for maximum output.				

OUTPUT LEVEL — During alignment, adjust signal-generator output to maintain output-meter indication below 1.5 volts.

DUMMY AERIAL — For steps 3, 4, and 5, connect signal-generator output lead through 30-mmf. condenser to aerial receptacle; connect another 30-mmf. condenser from receptacle to chassis.

IMPORTANT! These instructions for the use of a dummy aerial must be carefully followed if the radio is to perform at its best after being reinstalled in the car.



Top and Bottom Views, Showing Trimmer and Tuning-Core Locations

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 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, blown fuse, or other obvious indications of trouble.

2. Measure the resistance between B+ (pin 7 of 6X4 rectifier) and the 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 2775 ohms, check condensers C105A and C105B for leakage or shorts.

NOTE: 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.

3. If the fuse is blown, check the vibrator before installing a new fuse; if the vibrator is defective, check the buffer condenser, C104, before installing a new vibrator.

SETTING PUSH BUTTONS

The adjustments are made by removing the push-button caps and turning each of the adjusting rods. Each rod controls ganged tuning cores for both aerial and oscillator circuits, so that only a single adjustment is required for a given frequency.

Use an r-f signal generator to furnish test signals at the approximate frequencies of the desired stations. Connect the dummy aerial described in the alignment procedure.

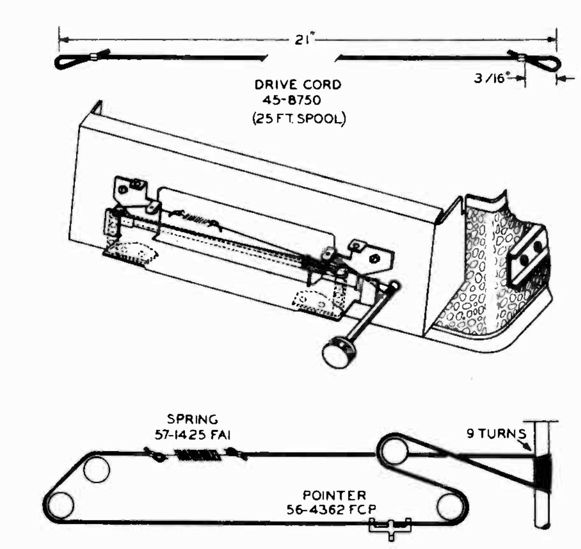
1. Turn on the power, and allow the radio to warm up for 15 minutes. Set the volume control for a moderate level, and the tone control fully clockwise.

2. Starting with the lowest frequency desired, set the signal generator, depress PB-5 (fifth from left), and adjust the rod for maximum output. Repeat the procedure for each remaining button, working from right to left.

The frequency ranges of the buttons are as follows:

PUSH BUTTON (Left to right, from front)	FREQUENCY RANGE
PB-1	850—1600 kc.
PB-2	750—1400 kc.
PB-3	700—1300 kc.
PB-4	650—1150 kc.
PB-5	540—1000 kc.

3. With the radio in the car, and the aerial connected, make a final adjustment of each rod while listening to the station for which the adjustment is being made.



TP-4734E

Drive-Cord Installation Details

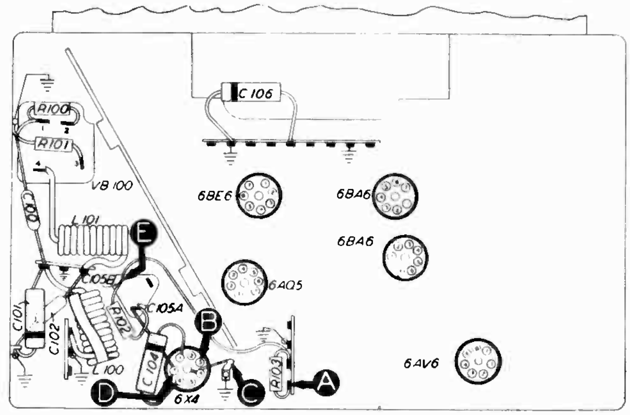
Section 1 — Power Supply

TROUBLE SHOOTING

Make the tests for this section with a d-c voltmeter, connecting the leads between the chassis and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, with an input voltage of 6.6v, d.c. to the radio.

Depress the manual push button; set the volume control to minimum, and 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.



TP-4734A
Bottom View, Showing Section 1 Test Points (location of C103 shown in figure 6)

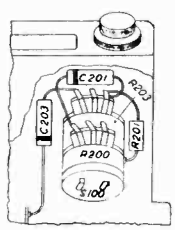
STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	205v		Trouble in this section. Isolate by the following tests.
2	B	6.4v	No voltage Low voltage	Open: F100, L100, S100, L101. Leaky: C100, C101, C102, C103. Weak battery.
3	D	260v	No voltage Low voltage High voltage	Defective: VB100†, 6X4. Open: T100. Shorted: T100, C104, C105A. Defective: 6X4, VB100†. Leaky: C105A, C104. Shorted: C105B, T100. Open: C105A, T100. Open: R102, T200*, R207*.
4	E	245v	No voltage Low voltage High voltage	Open: R102. Shorted: C105B. Leaky: C105B. Changed resistance: R102. Open: R103, R207*.
5	A	205v	No voltage Low voltage	Shorted: C106. Open: R103. Leaky: C106. Changed resistance: R103.
Listening Test: Abnormal hum may be caused by open C105A, C105B, or C104.				

*This part, located in another section, may cause abnormal indication in this section.
†If the vibrator is defective, check the buffer condenser, C104, before installing a new vibrator.

Section 2 — Audio Circuits

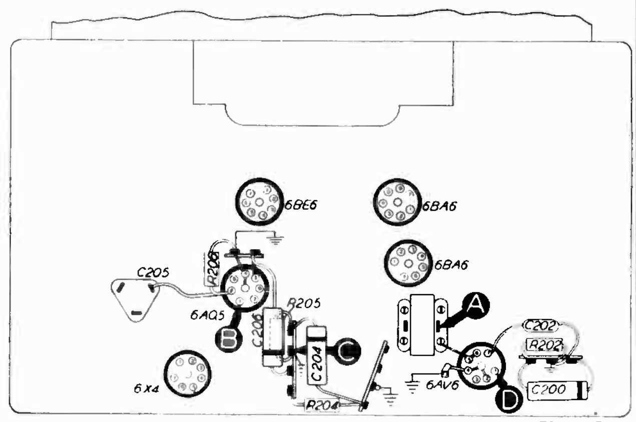
TROUBLE SHOOTING

For the tests in this section, 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.



Depress the manual push button; 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.



TP-4734B
Bottom View, Showing Section 2 Test Points (locations of C207 and C208 shown in figure 6)

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	B	Clear signal with strong signal input.	Defective: 6AQ5. Open: T200, LS200, L200, R206. Shorted: T200, C206, C207, C204, C202.
3	D	Loud, clear signal with weak signal input.	Defective: 6AV6 (triode section). Open: C204, R204. Shorted or leaky: C203 (rotate R203 through range).
4	A	Loud, clear signal with weak signal input.	Open: R200 (rotate through range), C200.
Listening Test: Distortion may be caused by shorted or leaky C200, C204, C205, or open R202, R205.			

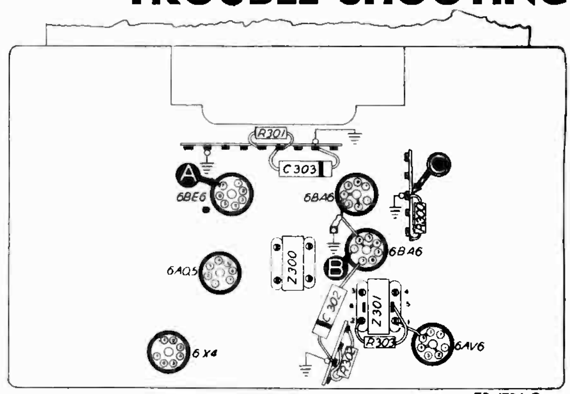
Section 3 — I-F, Detector, and A-V-C Circuits TROUBLE SHOOTING

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 the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Depress the manual push button; 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 4 (r-f and converter circuits); if not, isolate and correct the trouble in this section.

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."



TP-4734-C

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	B	Clear signal with weak signal input.	Defective: 6AV6 (diode section), 6BA6. Misaligned: Z301. Open: L301A, L301B, R301, R300, C301A, C301B, R303. Shorted: C301C, C303, C301A, C301B, C301D, C300B.
3	A	Same as step 1.	Defective: 6BE6*. Misaligned: Z300. Open: L300A, L300B, L404*, C407B*. Shorted: C300A, C300B.

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

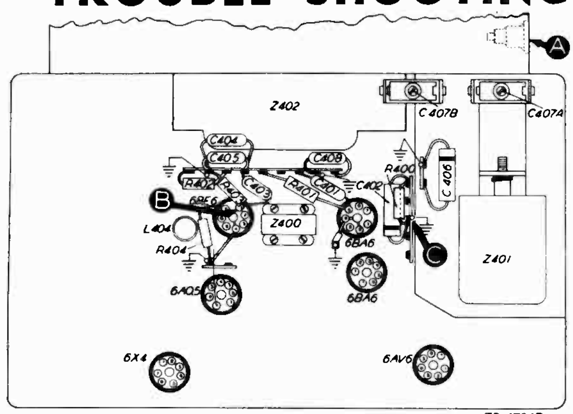
Section 4 — R-F and Converter Circuits TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator 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.

Set the volume control to maximum, and the tone control fully clockwise.

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

If the "NORMAL INDICATION" is not obtained in step 1(a) and (b), isolate the trouble by following the remaining steps.



TP-4734D

Bottom View, Showing Section 4 Test Points (location of L403 shown in figure 6)

STEP	TEST POINT	SIGNAL GEN. FREQUENCY	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (a)	A	1000 kc.	Manual. Tune to signal.	Loud, clear signal with weak signal input.	Trouble in manual-tuning circuits. Isolate by steps 2 and 3, and correct trouble before proceeding.
1 (b)	A	Tune to freq. of each push button	Depress each station push button.	Same as step 1 (a).	Trouble in push-button-tuning circuits. Isolate by steps 4 and 5.
2	B (Osc. test; see note below.)		Manual. Tune through range.	Negative .8 to 1.4 volts.	Defective: 6BE6 (osc. section). Open: R403, C403, L404, L401C, C404, C405, PB-6. Shorted: L404, L401C, C404, C405.
3	A	1000 kc.	Manual. Tune to signal.	Same as step 1 (a).	Defective: 6BA6. Open: L403, L401A, L401B, R400, R401, C401, PB-6, C408. Shorted: C408, C401, L401A, L401B.
4	B (Osc. test; see note below.)		Depress each station push button.	Negative 1.1 to 1.4 volts.	Open: Osc. coil or switch associated with any push button. Shorted: Osc. coil associated with any push button.
5	A	Tune to freq. of each push button	Depress each station push button.	Loud, clear signal with weak signal input.	Open: L400B, C400B, C407B, ant. coil associated with any push button. Shorted: L400B, C407A, ant. coil associated with any push button.

OSCILLATOR TEST

Connect the positive lead of a high-resistance voltmeter to the chassis, test point C; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 1) of the 6BE6, test point B. 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.

PHILCO CORP. MODEL CR-9

SECTION 1
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, 330 mmf.	60-10335407*
C101	Condenser, line filter, .5 mf.	61-0137*
C102	Condenser, spark filter, 330 mmf.	60-10335407*
C103	Condenser, "A" filter, .5 mf.	61-0137*
C104	Condenser, buffer, .003 mf.	61-0115
C105	Condenser, electrolytic, 3-section	61-0089
C105A	Condenser, filter, 15 mf., 350v	Part of C105
C105B	Condenser, filter, 10 mf., 350v	Part of C105
C106	Condenser, plate filter, .25 mf.	61-0125
F100	Fuse, line, 14 amperes	45-2559
I100	Pilot lamp	34-2064
L100	Choke, "A"	65-0037
L101	Choke, "A", iron core	32-4170
R100	Resistor, damping, 100 ohms	66-1104340*
R101	Resistor, damping, 100 ohms	66-1104340*
R102	Resistor, filter, 1000 ohms	66-2104340*
R103	Resistor, filter, 4700 ohms	66-2473340*
S100	Switch, on-off	Part of R200
VB100	Vibrator	83-0026
T100	Transformer, power	32-8314-2

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .004 mf.	45-3502*
C201	Condenser, tone compensation, .01 mf.	30-4650-24
C202	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C203	Condenser, tone control, .01 mf.	61-0120*
C204	Condenser, d-c blocking, .01 mf.	61-0120*
C205	Condenser, cathode by-pass, 20 mf., 25v	Part of C105
C206	Condenser, tone compensation, .006 mf.	61-0127*
C207	Condenser, hash filter, 330 mmf.	60-10335407*
C208	Condenser, hash filter, 330 mmf.	60-10335407*
L200	Speaker, field	Part of LS200 (electrodynamic)
LS200	Speaker	
	Electrodynamic	36-1622-1
	Permanent magnet	36-1622-2
R200	Volume control (with on-off switch and tone control), 350,000 ohms (tap at 35,000 ohms)	33-5537-3
R201	Resistor, tone compensation, 15,000 ohms	66-3153340*
R202	Resistor, grid return, 10 megohms	66-6103340*
R203	Tone control, 5 megohms	Part of R200
R204	Resistor, plate load, 220,000 ohms	66-4223340*
R205	Resistor, grid return, 470,000 ohms	66-4473340*
R206	Resistor, cathode bias, 220 ohms	66-1224340*
T200	Transformer, output	65-0317

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

Reference Symbol	Description	Service Part No.
C300A	Condenser, shunt, 86 mmf.	Part of Z300
C300B	Condenser, shunt, 107 mmf.	Part of Z300
C301A	Condenser, shunt, 106 mmf.	Part of Z301
C301B	Condenser, shunt, 131 mmf.	Part of Z301
C301C	Condenser, i-f filter, 125 mmf.	Part of Z301
C301D	Condenser, i-f filter, 125 mmf.	Part of Z301
C302	Condenser, catohde by-pass, .05 mf.	61-0122*
C303	Condenser, screen by-pass, .05 mf.	61-0122*
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
L301B	Transformer, secondary, 2nd i-f	Part of Z301
R300	Resistor, cathode bias, 2200 ohms	66-2224340*
R301	Resistor, screen dropping, 27,000 ohms	66-3273350*
R302	Resistor, a-v-c filter, 1 megohm	66-5103340*
R303	Resistor, i-f filter, 27,000 ohms	66-3273340*
TC300A	Tuning core, primary,1st i-f	Part of Z300
TC300B	Tuning core, secondary, 1st i-f	Part of Z300
TC301A	Tuning core, primary, 2nd i-f	Part of Z301
TC301B	Tuning core, secondary, 2nd i-f	Part of Z301
Z300	Transformer, 1st i-f	32-4160
Z301	Transformer, 2nd i-f	32-4240

SECTION 4
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400A	Condenser, i-f trap, 100 mmf.	Part of Z400
C400B	Condenser, d-c blocking, 100 mmf.	Part of Z400
C401	Condenser, d-c blocking, 100 mmf.	60-10105407*
C402	Condenser, cathode by-pass, .05 mf.	61-0122*
C403	Condenser, d-c blocking, 100 mmf.	62-10105407*
C404	Condenser, shunt, 380 mmf.	40-1220-37
C405	Condenser, shunt, 54.5 mmf.	61-0149
C406	Condenser, a-v-c filter, .05 mf.	61-0122*
C407	Condenser, trimmer, 2-section	63-0035-6
C407A	Condenser, aerial trimmer	Part of C407
C407B	Condenser, r-f trimmer	Part of C407
C408	Condenser, series, 270 mmf.	60-10275407*
L400A	Coil, i-f trap	Part of Z400
L400B	Coil, band pass	Part of Z400
L401A	Coil, r-f, manual	Part of Z401
L401B	Coil, aerial, manual	Part of Z401
L401C	Coil, oscillator, manual	Part of Z401
L402A	Coil, oscillator, PB-5	Part of Z402
L402B	Coil, oscillator, PB-4	Part of Z402
L402C	Coil, oscillator, PB-3	Part of Z402
L402D	Coil, oscillator, PB-2	Part of Z402
L402E	Coil, oscillator, PB-1	Part of Z402
L402F	Coil, aerial, PB-5	Part of Z402
L402G	Coil, aerial, PB-4	Part of Z402
L402H	Coil, aerial, PB-3	Part of Z402
L402I	Coil, aerial, PB-2	Part of Z402
L402J	Coil, aerial, PB-1	Part of Z402
L403	Choke, spark	65-0439
L404	Coil, oscillator shunt	32-4110
PB-1	Push button No. 1	Part of Z402
PB-2	Push button No. 2	Part of Z402
PB-3	Push button No. 3	Part of Z402
PB-4	Push button No. 4	Part of Z402
PB-5	Push button No. 5	Part of Z402
PB-6	Push button, manual	Part of Z402
R400	Resistor, cathode bias, 1000 ohms	66-2103340*
R401	Resistor, plate load, 10,000 ohms	66-3104340*
R402	Resistor, grid return, 330,000 ohms	66-4333340*
R403	Resistor, grid bias, 22,000 ohms	66-3223340*
R404	Resistor, grid return, 100,000 ohms	66-4103340*
TC400	Tuning core, i-f trap	Part of Z400
TC401A	Tuning core, r-f, manual	Part of Z401
TC401B	Tuning core, aerial, manual	Part of Z401
TC401C	Tuning core, oscillator, manual	Part of Z401
TC402A	Tuning core, aerial and osc., PB-5	Part of Z402
TC402B	Tuning core, aerial and osc., PB-4	Part of Z402
TC402C	Tuning core, aerial and osc., PB-3	Part of Z402
TC402D	Tuning core, aerial and osc., PB-2	Part of Z402
TC402E	Tuning core, aerial and osc., PB-1	Part of Z402
T404	Tuning core, osc. padding	Part of L404
Z400	Transformer, r-f	32-4162
Z401	Manual-tuning assembly	76-3348
Z402	Push-button assembly	76-3349

MISCELLANEOUS

Description	Service Part No.
Background-plate-and-bracket assembly	76-3351
Bezel	56-4459-2FA8
Cable, speaker (electrodynamic)	41-3801-2
Cable, speaker (permanent magnet)	41-3801-3
Clip, dial mtg.	56-4456FA1
Cord, drive, (25-ft. spool)	45-8750
Cover-and-button assembly	76-3639FJ21
Cover, push button	56-3386-1FJ39
Cover, tube side	76-3355FJ21
Dial scale	27-5983
Fuse-lead assembly	76-2070-91
Gasket, speaker	55-1482
Grommet, "A" lead	27-4596
Hairpin (manual-tuner shaft)	57-1868FA11
Housing-and-bracket assembly	76-3354FJ21
Knob, adjusting	27-4687-5
Knob, tone control	77-1025-3
Knob, dummy	77-1026
Pointer	56-4362FCP
Push-button assembly	
Link	56-4034FCP
Core-and-key-assembly, push button	77-0915-1
Set-Mounting Kit	
Bracket	56-4767-2FA3
Screw, 12—24 x 5/8"	1W10677FA3
Washer, flat	1W52420FA3
Lock washer, ext.	1W24259FA1
Nut	1W19992FA3
Bolt, hook	57-2468FA3
Shaft (manual tuner)	56-5124FA3
Socket assembly, pilot lamp	76-1677-1
Socket, aerial	57-0590-1FA3
Socket, speaker	55-0438-1FA3
Socket, tube	27-6226
Socket, vibrator	27-6153
Spring, drive cord	57-1425FA1
Suppression kit	40-7486
Condenser, interference filter	30-4007
Resistor, distributor	33-1196

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TROUBLE SHOOTING

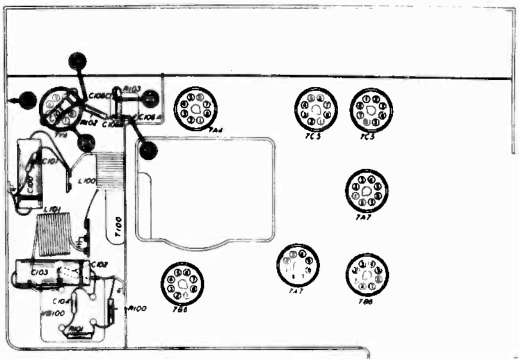
Section 1

Make the tests for this section with a d-c voltmeter, connecting the leads between test point B (B–) and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, with an "A"-supply voltage of 6.6 volts, d.c.

Turn on the power, and set the sensitivity control to maximum (clockwise).

Turn the volume control to minimum, and the tone control fully 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.



Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A B	165v 6.6v		Trouble in this section. Isolate by the following tests.
2	B	6.6v	No voltage Low voltage	Open: F100, L100, L101, S100. Shorted: C100, C101, C102, C103, C104. Weak battery.
3	D	220v	No voltage Low voltage High voltage	Defective: VB100, 7Y4. Shorted: C105, C106A, T100. Open: T100. Defective: 7Y4. Open: C106A. Leaky: C105, C106A. Open: T200*, R102, R211*.
4	E	200v	No voltage Low voltage	Shorted: C106B, R102. Changed value: R102. Leaky: C106B.
5	A	165v	No voltage Low voltage	Open: R103. Shorted: C106C. Leaky: C106C. Changed value: R103.

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

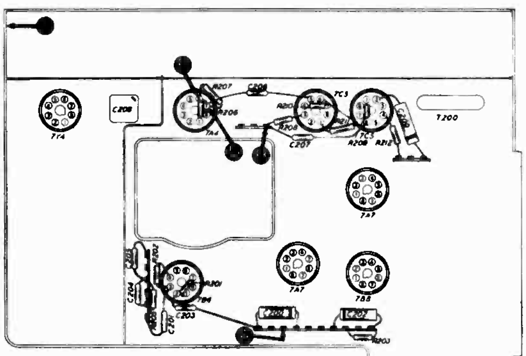
TROUBLE SHOOTING

Section 2

For the tests in this section, 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.

Turn the volume control to maximum, and the tone control fully 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.



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	B (Remove 7A4)	Clear signal with strong signal input.	Defective: 7C5, LS200. Shorted or leaky: C209, T200. Open: R211, R209, T200, C207.
3	D	Same as step 2.	Defective: 7C5. Open: T200. Shorted: T200, C206.
4	E (Replace 7A4)	Loud, clear signal with moderate signal input.	Open: R207, R206, R208. Shorted or leaky: C204, C205, C203 (rotate R204). Defective: 7A4.
5	A	Same as step 1.	Defective: 7B6, R200 (rotate through range). Open: R200, R201, C201, R205.

Listening Test: Rotate tone control, R204, through range; lack of treble attenuation may be caused by open C203 or R204; lack of bass accentuation may be caused by open R212, R204, R203, or C202, or by shorted or leaky C202. Distortion may be caused by leaky C201, C205, C206, or C207.

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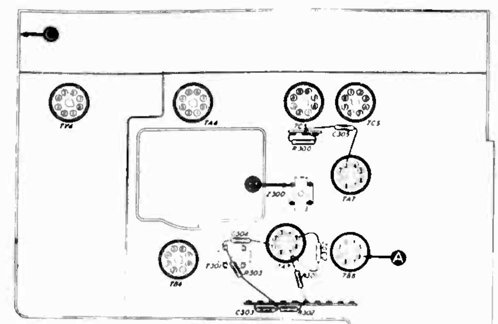
TROUBLE SHOOTING

Section 3

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 the chassis, test point C; connect the 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 sensitivity 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.



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 B 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."

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	B	Loud, clear signal with moderate signal input.	Defective: 7A7, 7B6 (diode section). Misaligned: Z301. Open: Z301 pri. or sec., C301A, C301B, R301, R300, R406* (rotate through range), R303. Shorted: Z301 pri. or sec., C301A, C301B, C300B, C303, C304, C305.
3	C	Loud, clear signal with weak signal input.	Defective: 7B8.* Misaligned: Z300. Open: Z300 pri. or sec., C300A, C300B. Shorted: C405,* Z300 pri., C300A, C300B.

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

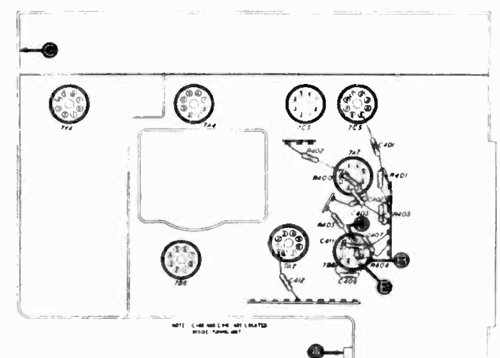
TROUBLE SHOOTING

Section 4

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 chassis, test point C; connect the 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 sensitivity control to maximum.

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



Bottom View, Showing Section 4 Test Points (locations of C404, L401, R406, and Z400 are shown in figure 6)

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	B	1000 kc.	Tune to signal.	Loud, clear signal with moderate signal input.	Defective: 7B8. Shorted: L400B, C404, C405. Trouble in oscillator circuit (step 3).
3	D to E Osc. Test (see note below)		Tune through range.	Negative 2 to 4 volts.	Shorted or leaky: C411, C410, C407, C408, C409. Open: C411, L400D, C407, R404, R405, R406, L400C, C408, C410. Shorted: L400C, L400D.
4	A	1000 kc.	Tune to signal.	Loud, clear signal with weak signal input.	Defective: 7A7. Open: L401, R400, R401, R402, C403, R403, L400B, L400A. Shorted or leaky: C403, C412, C404.

OSCILLATOR TEST

Connect positive lead of high-resistance voltmeter to test point E (pin 7, cathode of 7B8); connect prod end of negative lead through 100,000-ohm isolating resistor to test point D (pin 4, osc. grid of 7B8). Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage, 2 to 4 volts (measured with 20,000-ohms-per-volt meter), throughout tuning range.

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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, .5 mf.	61-0137*
C101	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C102	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C103	Condenser, by-pass, .5 mf.	61-0137*
C104	Condenser, r-f by-pass 220 mmf.	60-10205307*
C105	Condenser, buffer, .003 mf.	61-0115
C106	Condenser, electrolytic, 4-section	61-0150
C106A	Condenser, input filter, 20 mf., 350v	Part of C106
C106B	Condenser, filter, 10 mf., 350v	Part of C106
C106C	Condenser, filter, 5 mf., 300v	Part of C106
C208	Condenser (see Section 2)	Part of C106
F100	Fuse	45-2559
I100	Lamp, pilot	34-2039
I101	Lamp, pilot	34-2039
L100	Choke, "A"	32-1644
L101	Choke, vibrator	65-0151
R100	Resistor, damping, 100 ohms	66-1104340*
R101	Resistor, damping, 100 ohms	66-1104340*
R102	Resistor, filter, 1000 ohms	66-2104340*
R103	Resistor, filter, 4700 ohms	66-2474340*
S100	Switch, on-off	Part of R200
T100	Transformer, power	32-8314-1
VB100	Vibrator	83-0026

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, cathode by-pass, .25 mf.	61-0125*
C201	Condenser, d-c blocking, .0047 mf.	45-3502*
C202	Condenser, feedback, .068 mf.	45-3501*
C203	Condenser, tone compensation, .0082 mf.	61-0174*
C204	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C205	Condenser, d-c blocking, .0047 mf.	45-3502*
C206	Condenser, d-c blocking, .01 mf.	61-0120*
C207	Condenser, d-c blocking, .01 mf.	61-0120*
C208	Condenser, cathode by-pass, 10 mf., 25v	Part of C106
C209	Condenser, tone compensation .0068 mf.	45-3501*
L200	Speaker field	Part of LS200
LS200	Speaker	36-1609-4
R200	Volume control, 350,000 ohms	33-5557-2
R201	Resistor, cathode bias, 470 ohms	66-1473340*
R202	Resistor, grid return, 10 megohms	66-6103340*
R203	Resistor, feedback, 2200 ohms	66-2223340*
R204	Potentiometer, tone control, 4 megohms	Part of R200
R205	Resistor, plate load, 220,000 ohms	66-4223340*
R206	Resistor, cathode load, 220,000 ohms	66-4223340*
R207	Resistor, grid return, 10 megohms	66-6103340*
R208	Resistor, plate load, 220,000 ohms	66-4223340*
R209	Resistor, grid return, 470,000 ohms	66-4473340*
R210	Resistor, grid return, 470,000 ohms	66-4473340*
R211	Resistor, cathode bias, 330 ohms	66-1334340*
R212	Resistor, feedback, 1500 ohms	66-2153340
T200	Transformer, output	32-8325

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed trimmer, 107 mmf.	Part of Z300
C300B	Condenser, fixed trimmer, 86.6 mmf.	Part of Z300
C301A	Condenser, fixed trimmer, 107 mmf.	Part of Z301
C301B	Condenser, fixed trimmer, 86.6 mmf.	Part of Z301
C302	Condenser, cathode by-pass, .047 mf.	61-0122*
C303	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C304	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C305	Condenser, screen by-pass, .047 mf.	61-0122*
R300	Resistor, screen dropping, 27,000 ohms	66-3273340*
R301	Resistor, cathode bias, 1500 ohms	66-2153340*
R302	Resistor, a-v-c filter, 1 megohm	66-5103340*

SECTION 3 (Continued)

Reference Symbol	Description	Service Part No.
R303	Resistor, i-f filter, 27,000 ohms	66-3273340*
Z300	Transformer, 1st i-f	32-4160-2
Z301	Transformer, 2nd i-f	32-4161-2

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, trimmer (ant. comp.)	31-6472
C401	Condenser, a-v-c by-pass, .047 mf.	61-0122*
C402	Condenser, cathode by-pass, .047 mf.	61-0122*
C403	Condenser, d-c blocking, 220 mmf.	60-10205307*
C404	Condenser, series, 100 mmf.	60-10105237
C405	Condenser, r-f trimmer	63-0052
C406	Condenser, cathode by-pass, .047 mf.	61-0122*
C407	Condenser, d-c blocking, 100 mmf.	60-10105407*
C408	Condenser, shunt, 215 mmf.	30-1220-4*
C409	Condenser, osc. trimmer	63-0055
C410	Condenser, shunt, 54.5 mmf.	62-056409001*
C411	Condenser, d-c blocking, 220 mmf.	30-1220-4*
C412	Condenser, a-v-c filter, .047 mf.	61-0122*
L400A	Coil, aerial tuning (part of Z400)	65-0349
L400B	Coil, r-f tuning (part of Z400)	65-0359
L400C	Coil, osc. tuning (part of Z400)	65-0350
L400D	Coil, osc. shunt (part of Z400)	65-0351
L401	Choke, aerial	65-0437
R400	Resistor, cathode bias, 820 ohms	66-1823340*
R401	Resistor, a-v-c decoupling, 68,000 ohms	66-3683340*
R402	Resistor, plate load, 10,000 ohms	66-3103340*
R403	Resistor, grid return, 68,000 ohms	66-3683340*
R404	Resistor, grid bias, 100,000 ohms	66-4103340*
R405	Resistor, plate feed, 22,000 ohms	66-3223340*
R406	Resistor, sensitivity control, 900 ohms (200-ohm minimum)	67-0036
Z400	Tuner assembly	77-0588-2

MISCELLANEOUS

Description	Service Part No.
Bezel Assembly	
Bezel	56-4693FA8
Dial	27-5962
Knob, manual tuning	56-4729FA8
Bumper support	54-4475
Cap, push-button	56-4747FA8
Cap, push-button (ends)	56-4746FA8
Connector, aerial	57-1243FA3
Cover-and-button assembly, tube side	76-3069FJ41
Cover, wiring side	56-4696FJ41
Fuse-lead assembly	76-3067
Housing-and-bracket assembly	76-3041FJ41
Knob, tone control	56-4699FA3
Knob, volume control	27-4687-6
Lead, "A"	76-3067-1
Shield, power-transformer	57-0875-1
Socket, Loktal	27-6207
Socket, vibrator	27-6153
Tuning-Unit Hardware	
Background assembly, dial	76-3126
Core, iron	57-1659
Core (oscillator), iron	57-1542
Core (r.f.), iron	57-1542
Filter, pilot lamp	54-7393
Insert assembly, push-button (center)	76-3074
Insert assembly, push-button (end)	76-3074-1
Insert assembly, push-button (manual)	76-3074-2
Lamp-socket assembly	41-3737-3

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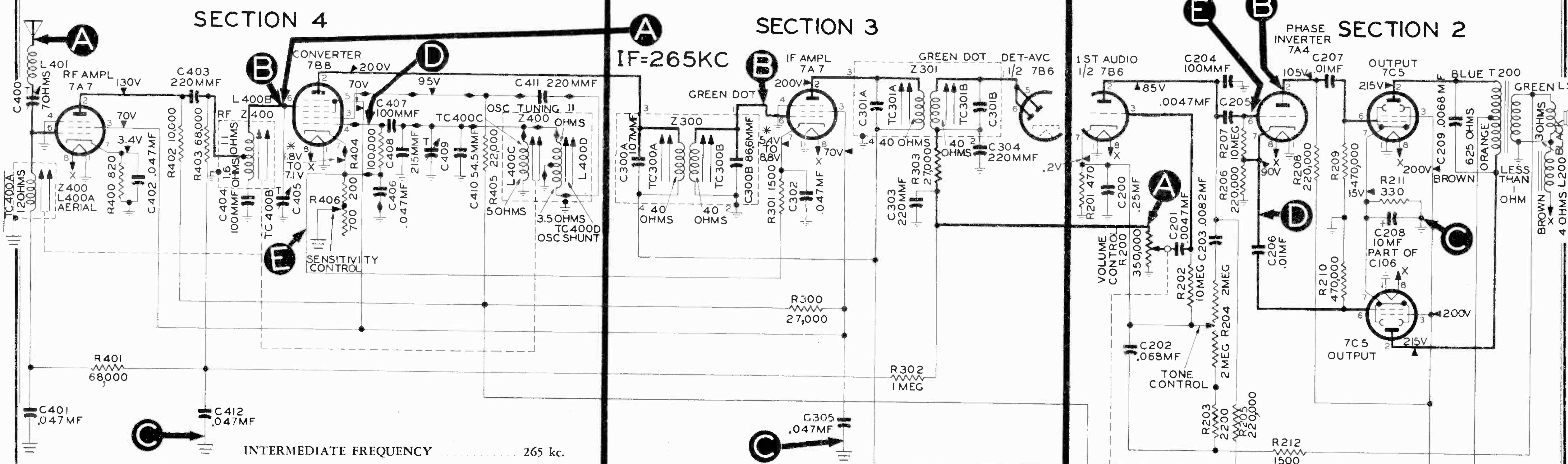


INTERMEDIATE FREQUENCY .... 265 kc.

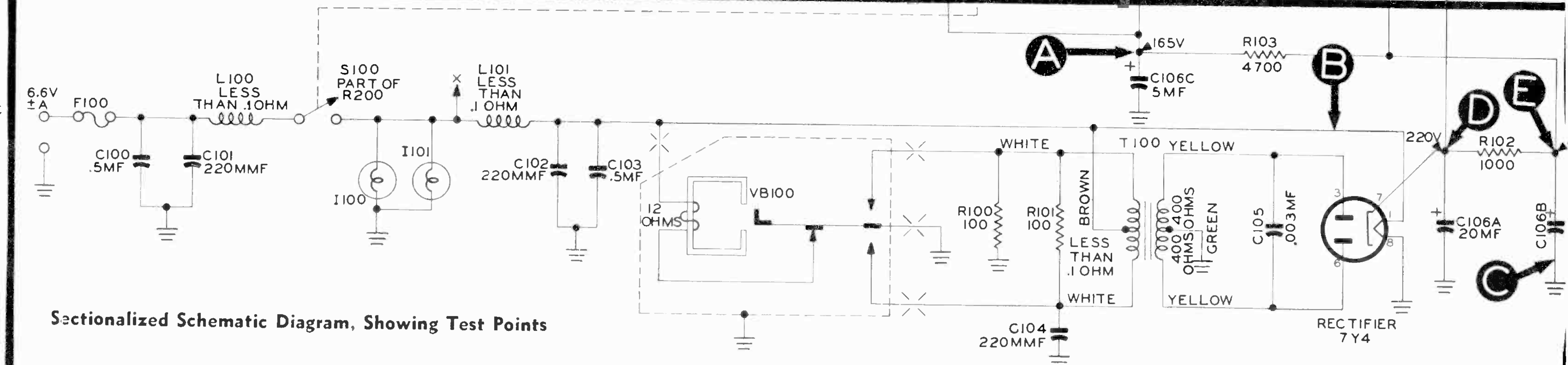
NOTES

ALL RESISTOR VALUES IN OHMS UNLESS MARKED OTHERWISE.

CONDENSER SYMBOLS

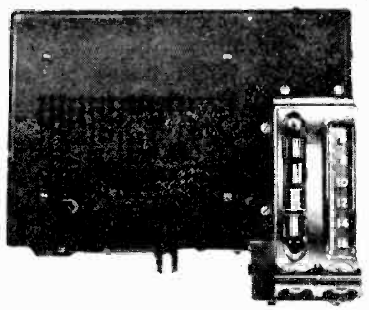
FIXED VARIABLE TRIMMER ELECTROLYTIC

- RF IF AND AUDIO SIGNAL PATH
- OSC SIGNAL PATH
- INDICATES SOCKET OR PLUG CONNECTIONS
- ✱ VOLTAGES AT BOTH MAXIMUM AND MINIMUM SETTINGS OF SENSITIVITY CONTROL



Sectionalized Schematic Diagram, Showing Test Points

SECTION 1



CIRCUIT	Eight-tube superheterodyne
FREQUENCY RANGE	540—1600 kc.
PUSH BUTTONS	Six: five for station selection; one for manual tuning
AUDIO OUTPUT	5.9 watts
POWER INPUT	8.8 amperes at 6.6 volts, d.c.
AERIAL	Retractable-tip, Philco Part No. 45-1468-1
PHILCO TUBES (8)	7A7 (2), 7B8, 7B6, 7A4, 7C5 (2), 7Y4

Circuit Description

The circuit is an eight-tube superheterodyne, using permeability tuning. Of the six push buttons, five are used for automatic station selection, and one selects manual tuning. The ganged tuning cores of the aerial, r-f, and oscillator circuits are mechanically actuated (by pantograph drive) for either push-button or manual operation.

The tuned-r-f amplifier stage employs a 7A7. The converter, a 7B8, works into a 7A7 i-f amplifier, which operates at 265 kc.

The 7B6 duo-diode, triode tube provides detection and a-v-c voltage in the diode section; the triode section functions as the first audio amplifier. A 7A4 plate-and-cathode-loaded phase inverter drives the two 7C5 push-pull output amplifiers, which, at full output, provide 5.9 watts of audio power to the electrodynamic speaker.

The power-supply circuit incorporates a non-synchronous vibrator and a 7Y4 full-wave rectifier.

A variable sensitivity control, R406, is connected in the common cathode circuit of the converter and i-f tubes. This control is mounted on the chassis as shown in figure 6, and may be adjusted with a screwdriver, inserted through a hole in the back of the radio; in areas where most reception is from local stations, the control should be set for lower sensitivity, to permit quieter operation of the radio.

The tone control is part of a feed-back circuit in which the feedback to the first audio stage is degenerative at high audio frequencies and regenerative at the lower frequencies.

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ALIGNMENT PROCEDURE

DIAL POINTER—Turn manual tuning knob until pointer stops at high-frequency end of dial; if pointer does not coincide with index mark at 1600 kc., carefully bend it to the correct position.

OUTPUT METER—Connect across voice-coil terminals.

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

RADIO CONTROLS—Set volume and sensitivity controls to maximum. Set tone control for maximum signal (approximate center of range).

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

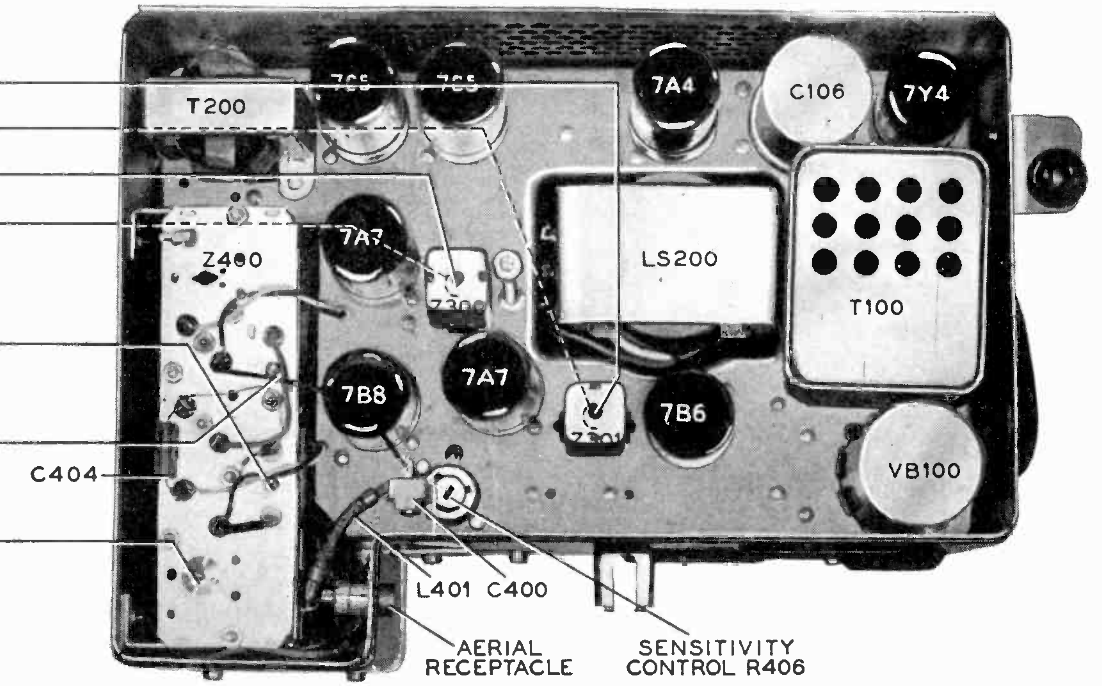
DUMMY AERIAL—For steps 2, 3, and 4, either of two dummy-aerial connections should be used: (1) connect generator output lead through 22-mmf. condenser to shielded aerial lead (Philco Part No. 45-1468-1) plugged into aerial receptacle; (2) connect output lead through 22-mmf. condenser to aerial receptacle, then connect 30-mmf. condenser from receptacle to chassis.

IMPORTANT: The above instructions for the dummy aerial must be carefully followed if the radio is to perform at its best after being reinstalled in the car.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to aerial receptacle.	265 kc.	540 kc.	Adjust trimmers, in order given, for maximum output.	TC301B TC301A TC300B TC300A
2	Through dummy aerial.	1600 kc.	Tune to signal.	Adjust for maximum.	C405
3	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum.	C409
4	Same as step 2.	580 kc.	Tune to signal.	Adjust for maximum while rocking tuning control.	TC400D
5	Repeat steps 2, 3, and 4 until no further improvement is obtained.				
6	After reinstalling radio in car, with aerial connected, adjust C401 for maximum output from weak station near 1400 kc. If the radio is to be used in an area having local broadcasting stations, the sensitivity control may be adjusted for somewhat lower sensitivity, to permit quieter operation.				

Top View, Trimmer and Tuning-Core Locations

(dotted lines indicate tuning screws located at bottom of chassis)



SETTING PUSH BUTTONS

Any one of the five station push buttons may be set for any frequency within the broadcast band.

1. Turn on the power, and allow the radio to warm up for fifteen minutes.
2. Pull off the five uppermost push-button knobs (the lower knob selects manual tuning), thus exposing the shafts which operate the tuning mechanism.
3. Depress one of the shafts until it locks in, then rotate the shaft to tune in the desired station; turning the shaft causes the dial pointer to move, indicating the frequency to which the circuits are tuned.
4. Repeat the procedure for each button. Replace the knobs.

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

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 B+ (pin 7 of 7Y4 rectifier tube) and the radio chassis, test point C, with the ohmmeter polarity such that the highest resistance reading is obtained. If the reading is lower than 2700 ohms, check condensers C106A and C106B 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.

If the fuse is open, check the vibrator before installing a new fuse; if the vibrator is defective, check the buffer condenser, C105, for leak or short.

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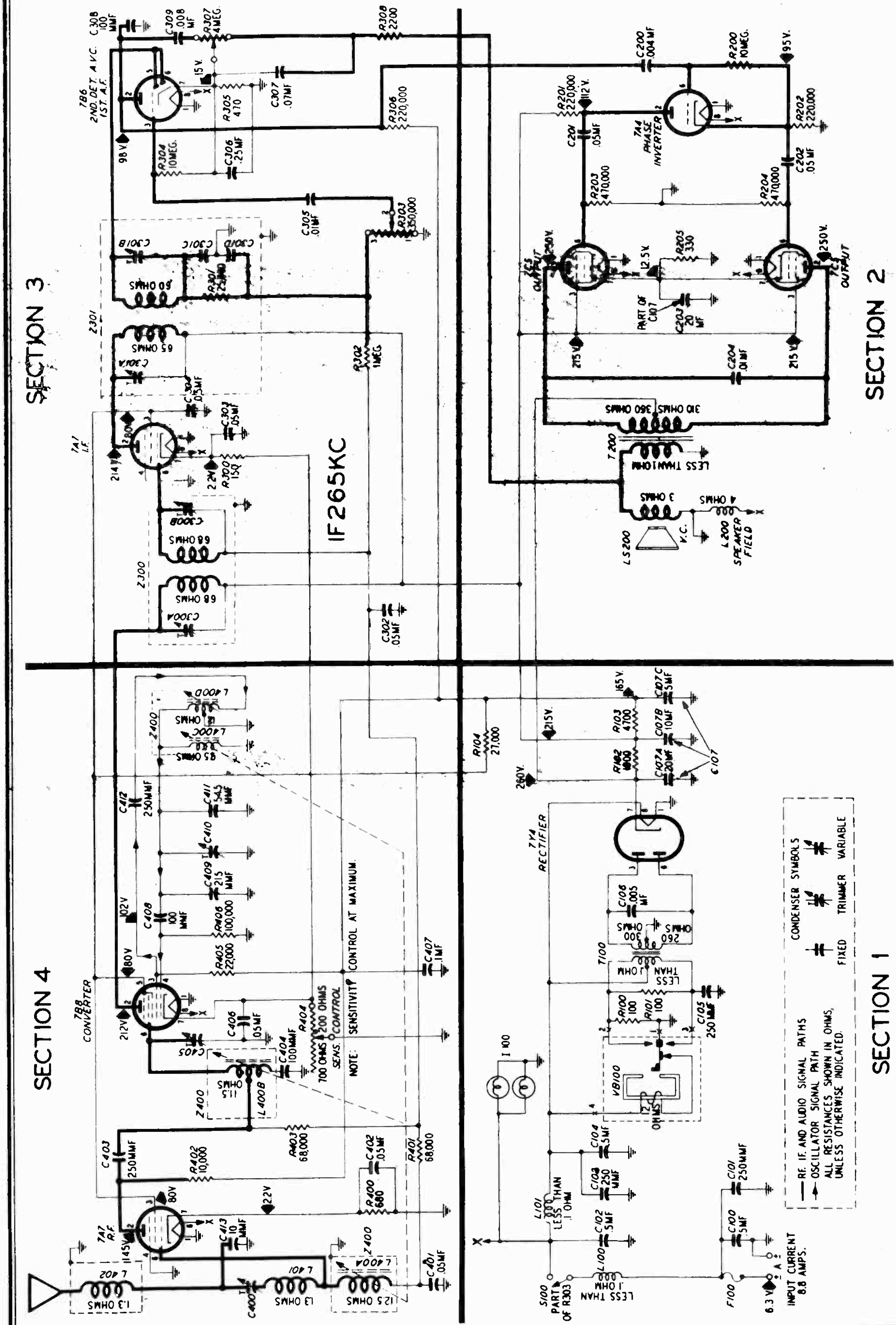
MODELS S-4626, S-4627, Studebaker



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 control at 540 kc.

ALIGNMENT PROCEDURE

CONNECT THE SIGNAL-GENERATOR output lead as follows:

For the i-f alignment (the first step in the chart), connect through a .05-mf. condenser to the aerial connector.

For the r-f alignment (all steps after the first), inject the signal through a dummy aerial consisting of a 20-mmf. condenser in series with an aerial lead (Part No. 95-0181) plugged in to the aerial receptacle. If an aerial lead is not available, connect a 30-mmf. condenser from the aerial receptacle to ground, and inject the signal through the 20-mmf. condenser alone. **The foregoing instruction must be carefully followed if the receiver is to give its best performance after being reinstalled in the car.**

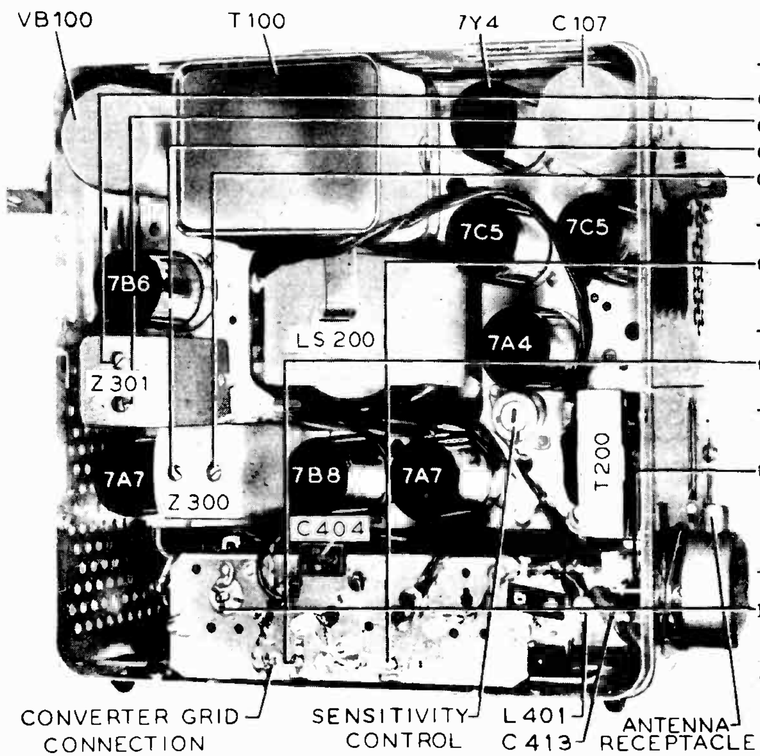
CONNECT THE OUTPUT METER between the voice-coil lug on the speaker and the receiver chassis.

ADJUST THE RECEIVER CONTROLS as follows:

Set the volume and sensitivity controls at maximum. Set the tone control for maximum signal output (approximately the center of its range).

ADJUST THE SIGNAL-GENERATOR OUTPUT as alignment progresses to keep the meter needle near center scale, using the lowest range on the output meter.

AFTER REINSTALLING THE RECEIVER in the car and connecting the aerial, make the following adjustments: Set the aerial trimmer for maximum signal strength on a weak station near 1400 kc. Set the sensitivity control for low sensitivity, if the receiver is to be used mainly for local-station reception, or higher sensitivity depending on the degree of distant-station reception desired. The lower the sensitivity can be set, the less will be the noise and interference pickup.



ADJUST IN ORDER	SPECIAL INSTRUCTIONS	DIAL SETTINGS SIG. GEN.	RECEIVER
C301B C301A C300B C300A	Ground pin 4 of the 7B8. Adjust for maximum in order as numbered, and then repeat procedure.	265 kc.	540 kc.
C410	Remove the ground from pin 4 of the 7B8. Adjust for maximum.	1600 kc.	1600 kc.
C405	Adjust for maximum.	1400 kc.	1400 kc.
C400	Adjust for maximum. Final adjustment to be made after installation in car, with aerial connected.	1400 kc.	1400 kc.
L400D	Adjust for maximum while rocking tuning control back and forth across signal.	580 kc.	580 kc.
	Repeat all steps after the first.		

Chassis view, showing trimmer locations.

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TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

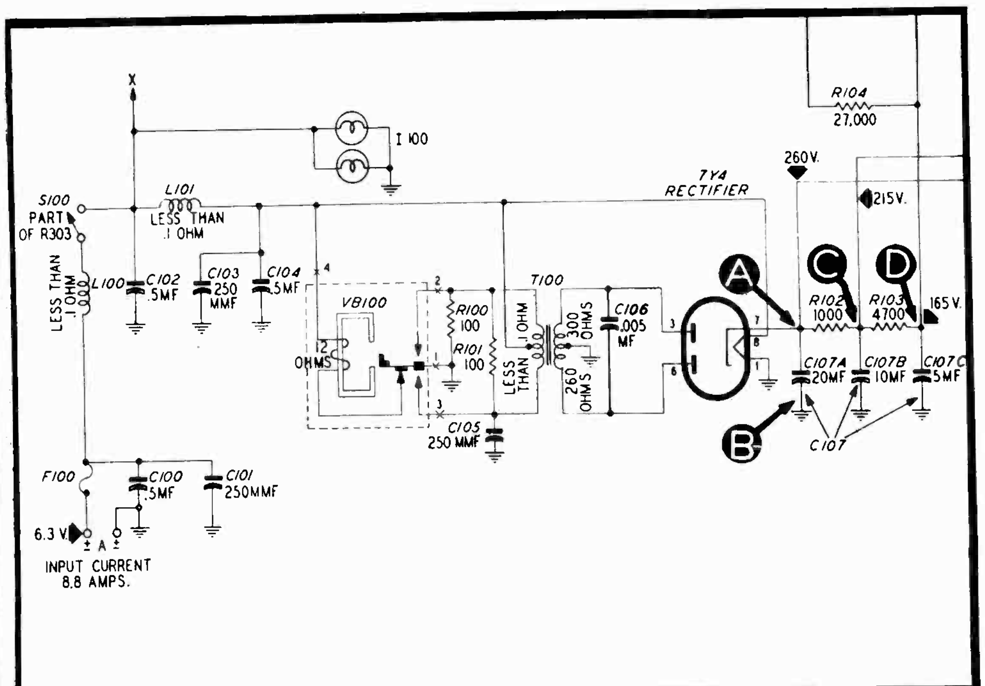
MAKE TEST NO. 1 FIRST!

If the "NORMAL INDICATION" for this test is obtained, proceed to Test No. 1 in the next section. If not, continue through the chart to isolate and remedy the trouble in this section.

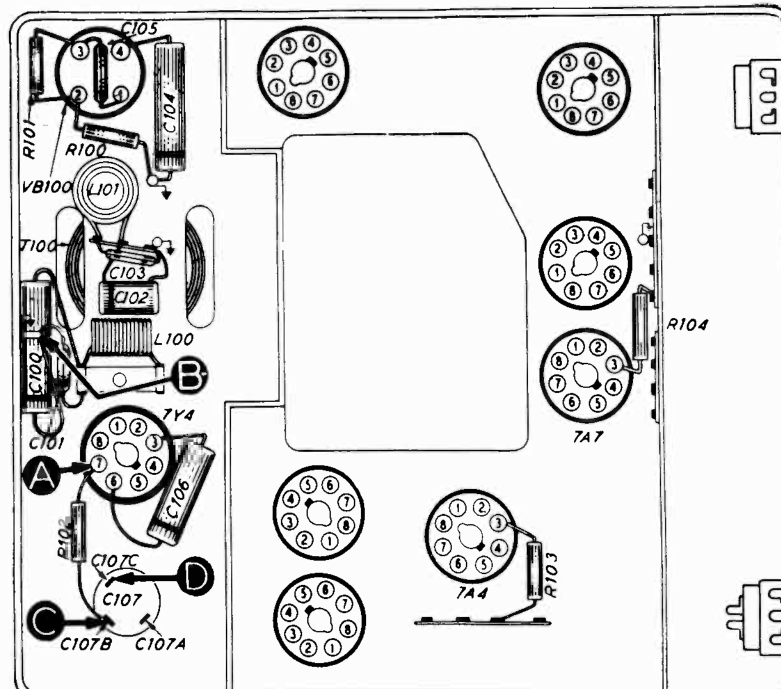
Make all measurements for this section with a volt-ohmmeter, using the applicable d-c range. All voltages given in this manual are average, and were taken with a 20,000 ohms-per-volt meter, with 6.3 volts d-c input; the volume control was set at minimum, and the tuning control at 540 kc.

WARNING: If the 7Y4 rectifier is found to be defective, check the main filter condenser, C107, for shorts before inserting a new tube. If the vibrator is found to be defective, check C106 for a short before inserting a new vibrator.

	TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1.	D to B–	165 volts	Trouble within Section 1. Isolate by following tests.
2.	A to B–	260 volts	Defective 7Y4, VB100, T100, C105, C106, C107A, or C107B.
3.	C to B–	215 volts	Defective R102, C107B or C107C.
4.	D to B–	165 volts	Defective R103, C107C or C407 (see Section 4 for location).



Section 1 schematic.



Bottom view, showing Section 1 test points.

MODELS S-4626, S-4627, Studebaker

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MAKE TEST NO. 1 FIRST !

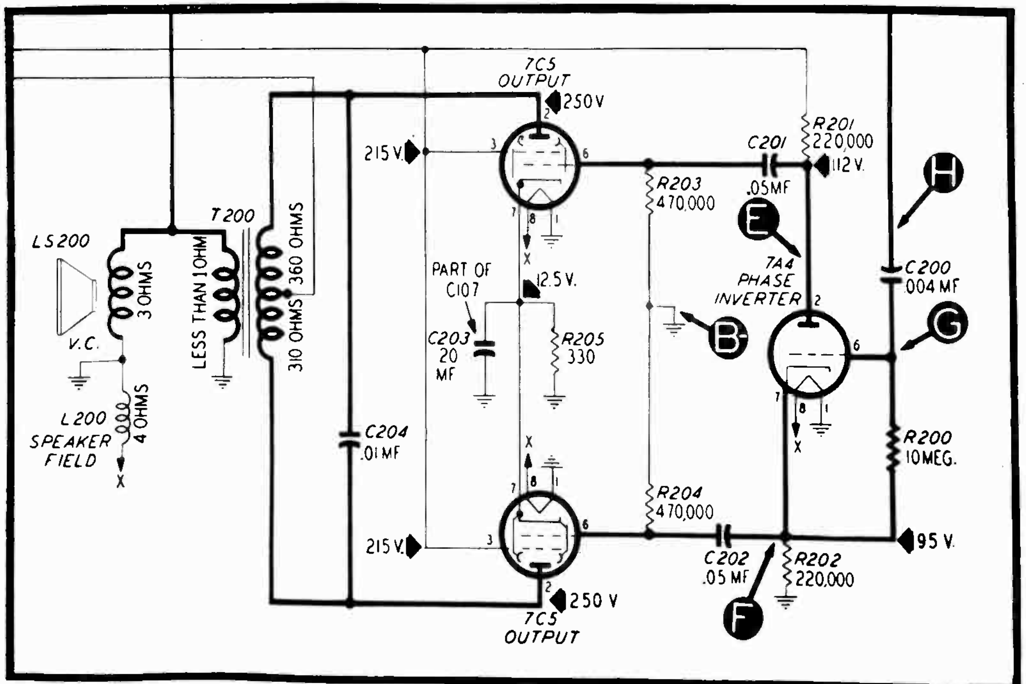
If the "NORMAL INDICATION" for this test is obtained, proceed to Test No. 1 in the next section. If not, continue through the chart to isolate and remedy the trouble in this section.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

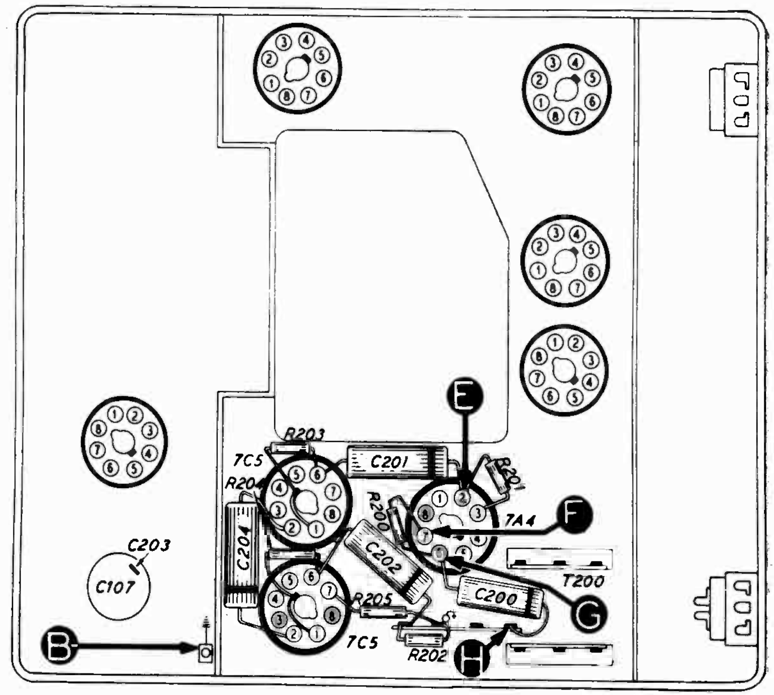
For all tests in this section, use an audio signal. Connect the generator output lead through a condenser (.01 to .25 mf.) to the test points indicated; connect the ground lead to the receiver chassis (B–).

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
1.	H to B–	Loud, clear signal.	Trouble within Section 2. Isolate by following tests.
2.	E to B– (Remove 7A4)	Loud, clear signal.	Defective 7C5, T200, LS200, R203, R205, C201, C203, or C204.
3.	F to B– (7A4 removed)	Loud, clear signal, same as preceding test.	Defective 7C5, T200, R204, or C202.
4.	G to B– (Replace 7A4)	Clear signal, louder than preceding test.	Defective 7A4, R202, R201, R200, or C200.
5.	H to B–	Loud, clear signal, same as preceding test.	Defective C200, R200, or C308 (see Section 3 for location).



Section 2 schematic.



Bottom view, showing Section 2 test points.

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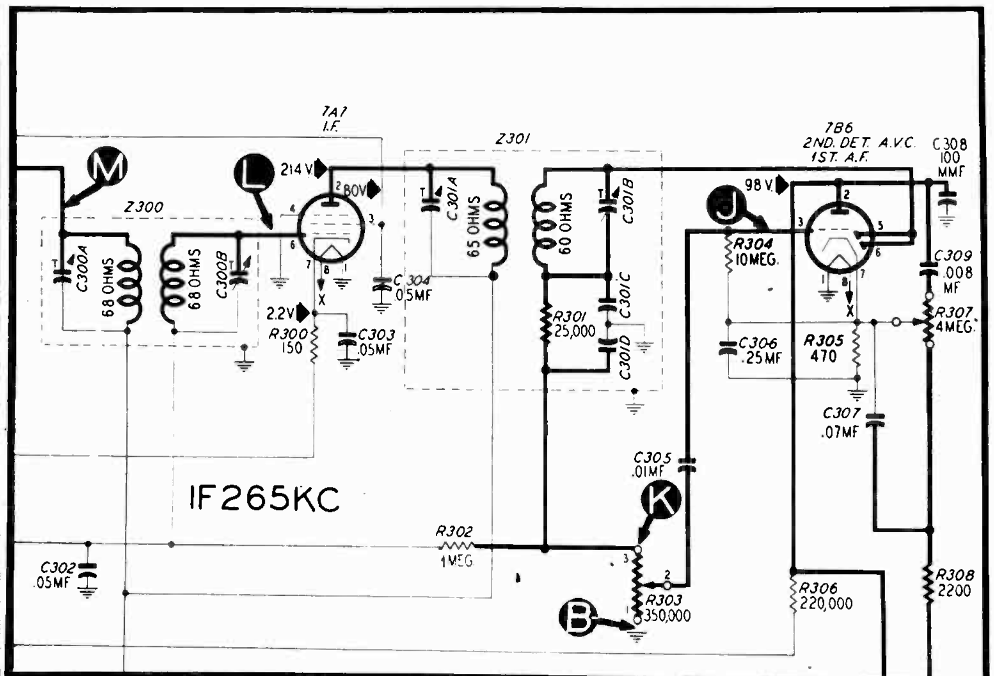
MAKE TEST NO. 1 FIRST!

If the "NORMAL INDICATION" for this test is obtained, proceed to Test No. 1 in the next section. If not, continue through the chart to isolate and remedy the trouble in this section.

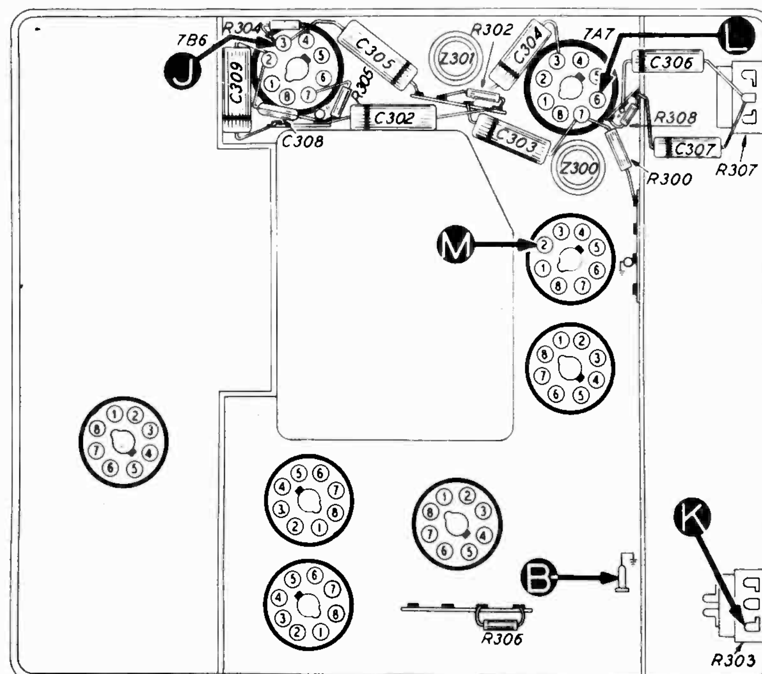
TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

For the second and third tests in the chart for this section, use an audio signal. For the first, and the last two, use a modulated 265-kc. 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 (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
1.	M to B– (265-kc. signal)	Loud, clear signal.	Trouble within Section 3. Isolate by following tests.
2.	J to B– (audio signal)	Loud, clear signal.	Defective 7B6, R306, R305, R304, C306, or C308.
3.	K to B– (audio signal)	Loud, clear signal.	Defective C305 or R303 (rotate R303 through its entire range for complete check).
4.	L to B– (265-kc. signal)	Loud, clear signal.	Defective 7A7, C303, C304, R104 (shown in Section 1), R300, R404 (shown in Section 4), or Z301.
5.	M to B– (265-kc. signal)	Loud, clear signal.	Defective R302, C302, or Z300.



Section 3 schematic.



Bottom view, showing Section 3 test points.

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TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

MAKE TEST NO. 1 FIRST !

If the "NORMAL INDICATION" for this test is not obtained, continue through the chart to isolate and remedy the trouble in this section.

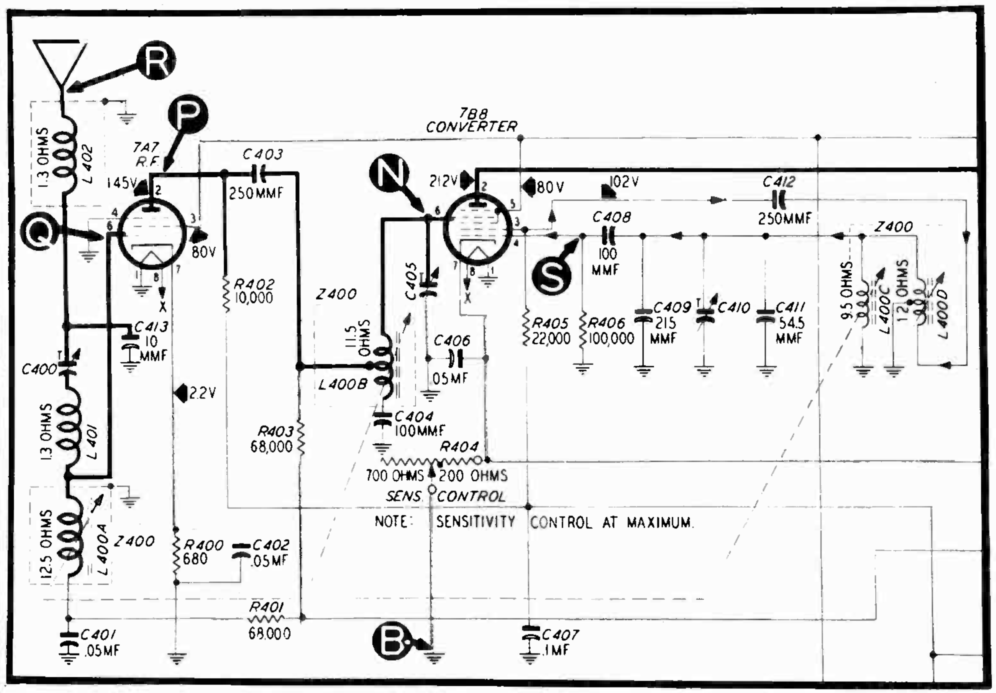
PRELIMINARY OSCILLATOR CHECK:

Attach the positive lead of a 20,000-ohms-per-volt meter (10-volt range) to the receiver chassis, and the prod end of the negative lead through 50,000 ohms to point S. Rotate the tuning control; absence of voltage indicates that the oscillator is not functioning. If this is the case, check the components listed in the second test below.

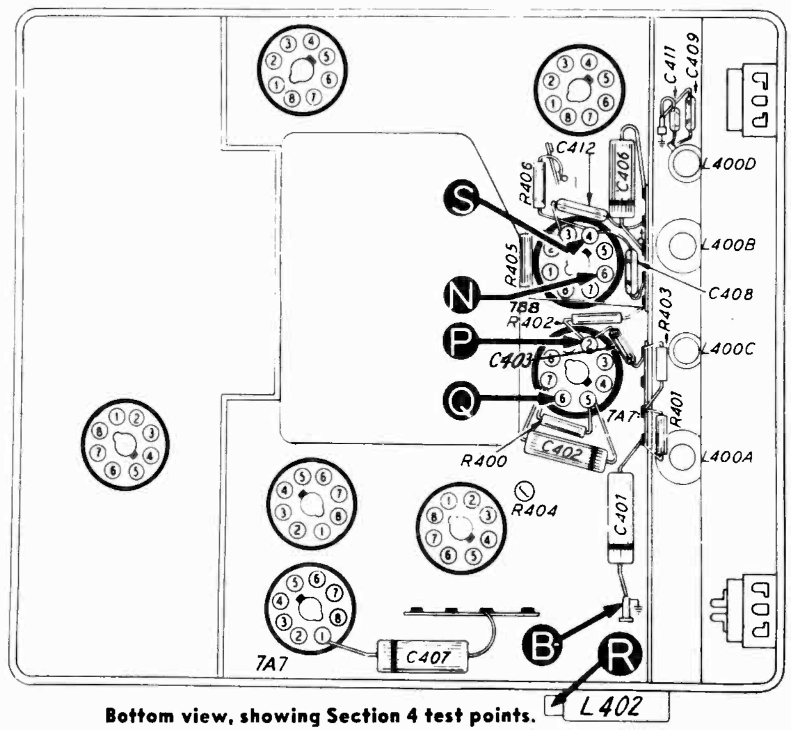
FOR CHART TESTS 1 - 5:

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, tune the signal generator and receiver to 1000 kc., and adjust the generator output for a loud, clear signal.

	TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1.	R to B–	Loud, clear signal.	Trouble within Section 4. Isolate by following tests.
2.	N to B–	Loud, clear signal.	Defective 7B8, L400C, L400D, R403, R404, R405, R406, C403, C405, C408, C409, C410, C411, or C412.
3.	P to B–	Loud, clear signal.	Defective C403, C404, R403, or L400B.
4.	Q to B–	Clear signal, louder than preceding test.	Defective 7A7, L400A, R400, R402, or C402.
5.	R to B–	Loud, clear signal.	Defective L401, L402, C400, C401, C413, or R401.



Section 4 schematic.



Bottom view, showing Section 4 test points.

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CIRCUIT DESCRIPTION

The circuit of the S4626 consists of a 7A7 r-f amplifier, a 7B8 converter, a 7A7 i-f amplifier, a 7B6 second detector–first audio, and an audio power amplifier using two 7C5's in push-pull, driven by a 7A4 phase inverter. The power supply is of the six-volt non-synchronous vibrator type, using a 7Y4 rectifier.

The aerial input circuit is designed for maximum interference elimination, without sacrifice of signal strength. Permeability tuning, controlled by a pantograph tuning unit, is used for both the r-f and oscillator stages. This method of tuning assures maximum sensitivity, selectivity, and stability for this type of receiver. A sensitivity control is provided (identified in figure 9, page 6), which consists of a variable resistor in the common cathode circuit of the converter and i-f stages. This should be adjusted for lower sensitivity in areas where most reception is from local stations, in order to minimize noise pickup.

The S4626 uses an intermediate frequency of 265 kc.

Two features of the audio system are the tone control, which is an inverse feed-back circuit built around the first audio amplifier, and the push-pull output stage, which delivers a full five watts of audio power to the dynamic speaker.

SECTION 1

Reference No.	Description	Service Part No.
C100	Condenser, .5 mf.	61-0137*
C101	Condenser, 250 mmf.	60-10245307*
C102	Condenser, .5 mf.	61-0137*
C103	Condenser, 250 mmf.	60-10245307*
C104	Condenser, .5 mf.	61-0137*
C105	Condenser, 250 mmf.	60-10245307*
C106	Condenser, .005 mf.	61-0153*
C107	Condenser, electrolytic	61-0150*
	C107A: condenser, 20 mf.	Part of C107
	C107B: condenser, 10 mf.	Part of C107
	C107C: condenser, 5 mf.	Part of C107
F100	Fuse	45-2559
I100	Lamp, pilot	34-2064*
L100	Choke, "A"	32-1644
L101	Choke, vibrator	65-0151
R100	Resistor, 100 ohms	66-1104340*
R101	Resistor, 100 ohms	66-1104340*
R102	Resistor, 1,000 ohms	66-2104340*
R103	Resistor,, 4,700 ohms	66-2474340*
R104	Resistor, 27,000 ohms	66-3274340*
S100	Switch, off-on	Part of R303
T100	Transformer, power	65-0358*
VB100	Vibrator	83-0026*

SECTION 2

Reference No.	Description	Service Part No.
C200	Condenser, .004 mf.	61-0129*
C201	Condenser, .05 mf.	61-0170*
C202	Condenser, .05 mf.	61-0170*
C203	Condenser, 20 mf.	Part of C107
C204	Condenser, .01 mf.	61-0124*
L200	Field, speaker	Part of LS200
LS200	Speaker	73-0068*
R200	Resistor, 10 megs	66-6103340*
R201	Resistor, 220,000 ohms	66-4223340*
R202	Resistor, 220,000 ohms	66-4223340*
R203	Resistor, 470,000 ohms	66-4473340*
R204	Resistor, 470,000 ohms	66-4473340*
R205	Resistor, 330 ohms	66-1334340*
T200	Transformer, output	65-0409*

SECTION 3

Reference No.	Description	Service Part No.
C302	Condenser, .05 mf.	61-0122*
C303	Condenser, .05 mf.	61-0122*
C304	Condenser, .05 mf.	61-0122*
C305	Condenser, .01 mf.	61-0120*
C306	Condenser, .25 mf.	61-0125*
C307	Condenser, .07 mf.	61-0152*
C308	Condenser, 100 mmf.	60-10105407*
C309	Condenser, .008 mf.	61-0174*
R300	Resistor, 150 ohms	66-1153340*
R302	Resistor, 1 meg.	66-5103340*
R303	Control, volume, 350,000 ohms	33-5522*
R304	Resistor, 10 megs.	66-6103340*
R305	Resistor, 470 ohms	66-1473340*
R306	Resistor, 220,000 ohms	66-4223340*
R307	Control, tone, 4 megs.	33-5521*
R308	Resistor, 2,200 ohms	66-2223340*
Z300	Transformer, 1st i-f	65-0352
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
Z301	Transformer, 2nd i-f	65-0410
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, trimmer	Part of Z301
	C301C: condenser	Part of Z301
	C301D: condenser	Part of Z301
	R301: resistor, 25,000 ohms	Part of Z301

SECTION 4

Reference No.	Description	Service Part No.
C400	Condenser, trimmer aerial	63-0053
C401	Condenser, .05 mf.	61-0122*
C402	Condenser, .05 mf.	61-0122*
C403	Condenser, 250 mmf.	60-10245307*
C404	Condenser, 100 mmf.	60-10105407*
C405	Condenser, trimmer	Part of Z400*
C406	Condenser, .05 mf.	61-0122*

SECTION 4 (Continued)

Reference No.	Description	Service Part No.
C407	Condenser, .1 mf.	61-0113*
C408	Condenser, 100 mmf.	60-10105407*
C409	Condenser, 215 mmf. (silver mica) (Part of Z400)	61-0148
C410	Condenser, trimmer	Part of Z400
C411	Condenser, 54.5 mmf. (silver mica) (Part of Z400)	61-0149
C412	Condenser, 250 mmf.	60-10245307*
C413	Condenser, 10 mmf.	60-00105407
L401	Choke, antenna	65-0428
L402	Choke, antenna spark	65-0459
R400	Resistor, 680 ohms	66-1683340*
R401	Resistor, 68,000 ohms	66-3683340*
R402	Resistor, 10,000 ohms	66-3103340*
R403	Resistor, 68,000 ohms	66-3683340*
R404	Control, sensitivity	67-0036*
R405	Resistor, 22,000 ohms	66-3223340*
R406	Resistor, 100,000 ohms	66-4103340*
Z400	Pantograph tuning assembly	76-1990
	L400A: coil, r-f grid tuning (Part of Z400)	65-0349
	L400B: coil, converter grid tuning (Part of Z400)	65-0359
	L400C: coil, oscillator grid tuning (Part of Z400)	65-0350
	L400D: coil, oscillator tracking (Part of Z400)	65-0351

MISCELLANEOUS

Description	Service Part No.
"A" lead assembly (fuse-to-set)	77-0638
Cable and clamp assembly	77-0639
Cap, fuse, male	56-3594FA3
Clamp, "A" lead	28-1644FA3
Contact	54-4344
"A" lead assembly (fuse-to-ign. sw.)	77-0052
Contact	54-4344
Grommet	27-4676
Housing, fuse	28-5610
Spring, fuse housing	28-8841
Washer, fuse housing (fibre)	27-9049
Washer, fuse housing (rubber)	4169
Bezel assembly	
Back plate, dial	57-1487FA3
Bezel and stud assembly	76-2156
Dial	27-5905
Felt, dial	54-4267
Spring, dial retaining	28-9007FA1
Housing parts	
Button, plug	57-2646FA1
Button, plug (chrome)	2W15748FA8
Choke housing and connector assembly	65-0459
Cover, tube side	57-2415FC59
Cover, wiring side	57-1548FC59
Gasket, speaker (side cover)	55-1045
Housing assembly	77-1039FC59
Knobs	
Control knob assembly (tone and volume)	77-1043
Nut-cover assembly	76-2171
Manual-tuning knob assembly	57-2379
Extension, manual knob	56-3867
Spacer, manual knob	57-1669
Spring, manual knob	57-1628FA1
Push-button knob assembly	76-1984
Spring, push-button	57-1651
Pilot lamp socket assembly, left-hand	76-2157
Bracket, left-hand	57-2342FA3
Pilot lamp socket assembly, right-hand	76-2158
Bracket, right-hand	57-2343FA3
Set mounting parts	
Bolt, hook	97-0135FA3
Nut, wing	1W23750FA3
Nut	97-0229
Socket, tube (loktal)	27-6138*
Socket, vibrator (4-pin)	27-6153*
Speaker mounting parts	
Nut, speaker mounting	1W19988FA3
Screw, speaker mounting	W1582FA3
Washer, lock	1W24257FA1
Suppression parts	
Braid, copper	95-0073
Condenser, generator	30-4632
Distributor filter assembly	77-0947
Nipple, distributor cable	54-7159
Resistor, distributor	33-1333
Strap, fender ground	77-0966
Strap, ground	77-0336
Tuning unit parts	
Core, iron (antenna)	57-1540
Core, iron (oscillator)	57-1542
Core, iron (shunt oscillator tracking)	57-1659
Core, iron (r-f)	57-1541
Pointer and cam assembly	76-2079
Spring, tuning core draw bar	57-1649
Spring, latch bar	57-1650
Spring, pointer	57-1653

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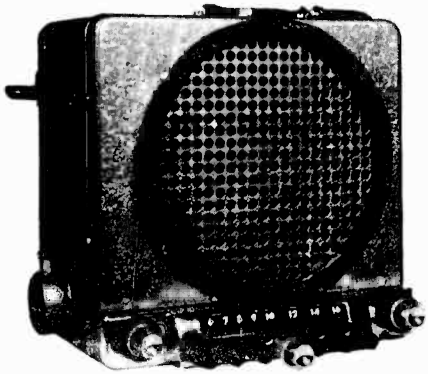
PHILCO CORP.



SPECIFICATIONS

CIRCUIT .... **Eight-tube, superheterodyne**
FREQUENCY RANGE .... **540 to 1600 kc.**
INTERMEDIATE FREQUENCY .... **265 kc.**
POWER INPUT .... **6.3 volts, 8.8 amperes, d.c.**
PHILCO TUBES ...... **7A7(2), 7B8, 7B6, 7A4, 7C5(2), 7Y4**
AERIAL .... **Retractable-tip, Philco Part No. 91-0230**

The dial scale on the S-4627 is a fluorescent type to match the panel indicators of the 1947 cars. The dial pointer and cam assembly is different thus giving a new part number to the tuning assembly which otherwise is the same. The "A" lead is dressed to the left side of the radio case instead of the right side for convenience to the new position of the ignition switch. A clip is provided on the side of the case to hold the fuse holder and prevent it from rattling against the set. The receiver is mounted in the same position as in the 1946 car, but hook bolts of a new design are provided to fit the installation.

The suppression material is different and complete information on the suppression of ignition interference is given in the installation instructions with the radio.

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.

TROUBLE-SHOOTING PROCEDURE

This service manual provides a logical trouble-shooting procedure for the S4626, which will facilitate the isolation of most of the faults that may be encountered. The circuit is divided into four sections, with a schematic and chassis layout, showing test points, for each section. The trouble-shooting procedure is outlined in a chart for each section. The first test in each chart is a sectional master check, making it possible to eliminate the section under test as a source of trouble without going through its entire chart procedure.

Wherever trouble is indicated (by failure to get a "Normal Indication" on any one test) it should be isolated by voltage and resistance checks of the parts associated with the point under test, and remedied before testing further.

PRELIMINARY CHECKS

The following preliminary checks are recommended:

1. Carefully inspect both sides of the chassis. Make sure that all the tubes are secure, and look for bad connections, burned resistors, or other mechanical faults.

2. Check the fuse, and connect the receiver to a source of power (6.3 volts, d.c.). Look for unlighted tube filaments, overheated resistors (smoke, sweating, etc.), and listen for the hum of the vibrator.

3. Check the tubes and the vibrator. WARNING: If the 7Y4 is defective, check C107 for shorts before inserting a new tube. If the vibrator is defective, check C106 for a short before inserting a new vibrator.

New part numbers have been given to the following items and apply only to the S-4627 receivers.

SECTION 4

Reference Number	Description	Model S-4627 Service Part No.
C400	Condenser, trimmer	31-6472
Z400	Pantograph tuning assembly	77-0970-1

MISCELLANEOUS

Bezel assembly
- Dial 27-5923

Set mounting parts
- Bolt, hook 56-3740

Tuning-unit parts
- Pointer and cam assembly 76-2482

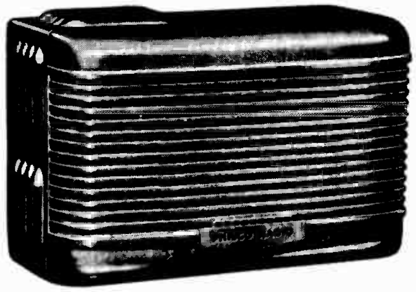
The following additional parts are supplied with the Model S-4627:

Set mounting parts
- Nut, hex mounting 97-0229FA3

Suppression parts
- Condenser, ignition-coil 30-4007-1
- Ground strap, heater-cable 76-2505
- Bolt, heater-cable-clamp 1W10636FA3
- #8 lock washer 1W35046FA1
- Nut, heater-cable clamp-bolt 1W19988FA3
- Ground strap, battery-cable 76-2557
- Ground strap, windshield-wiper-motor 76-2556

Suppression parts in the Model S-4626 list that are not used in Model S-4627 are:
- Distributor filter assembly 77-0947
- Strap, fender-ground 77-0966
- Strap, ground 77-0336

PHILCO AUTO RADIO



Model UN6-400

SPECIFICATIONS

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

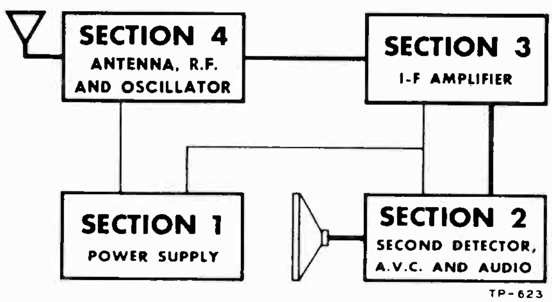


Figure 1. Block diagram (Heavy lines indicate signal path.)

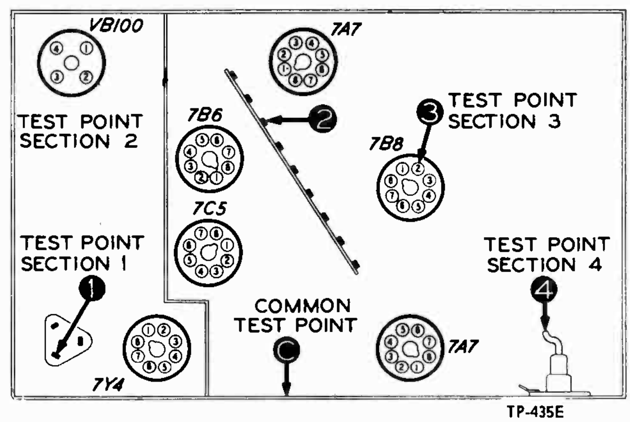


Figure 2. Bottom view, showing test points.

PHILCO 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, an ammeter (0-30 amperes, d.c.), 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.

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Place ammeter in series with power source and check current drain. Measure voltage between point 1 and chassis (C).	Approximately 8.3 amps. 235 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 weak, 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 weak, 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.

MODEL UN6-400 PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

With the exception of the first, make all measurements for this section with a volt-ohmmeter, using the applicable d-c range. The voltages given were taken with the set operating and the volume control set at minimum.

TEST POINTS	NORMAL READING	POSSIBLE CAUSE OF ABNORMAL READING
Connect ammeter (0-30) in series with power source.	8.3 amps.	Excessively high or low current indicates defective VB100, T100, C103, or 7Y4.
A to C	250 volts	Defective 7Y4 or C104.
B to C	235 volts	Defective C104, open R102, or shorted C202 (see Section 2 for location).

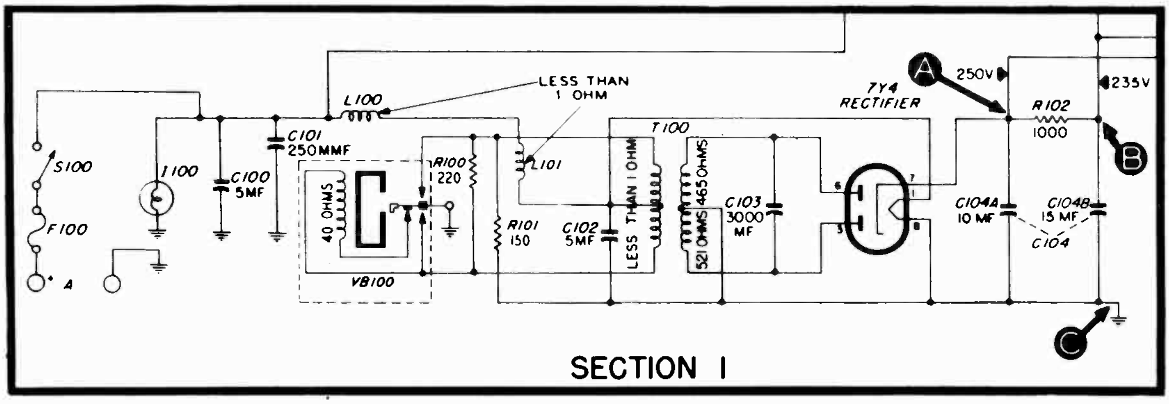


Figure 3. Section 1 schematic. TP-435A

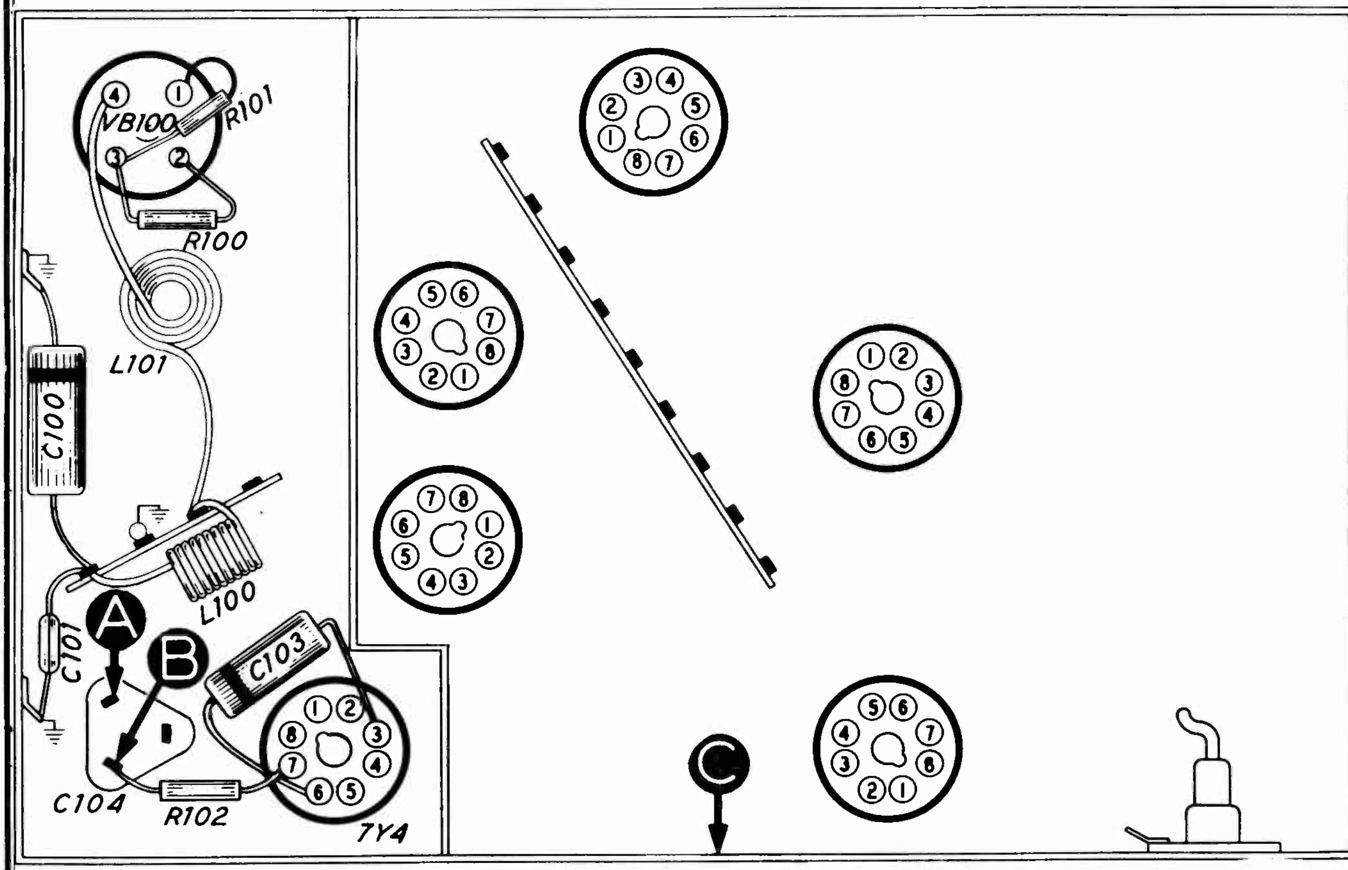


Figure 4. Bottom view, showing Section 1 test points. TP-435F

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 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, C205, or C206.
E to C	Loud, clear signal.	Open C205.
F to C	Clear signal, noticeably louder than preceding test.	Defective 7B6, or open R203, R202, or R406.
G to C	Loud, clear signal, same as preceding test.	Open C200, or defective R200 (rotate R200 through its entire range for complete check).

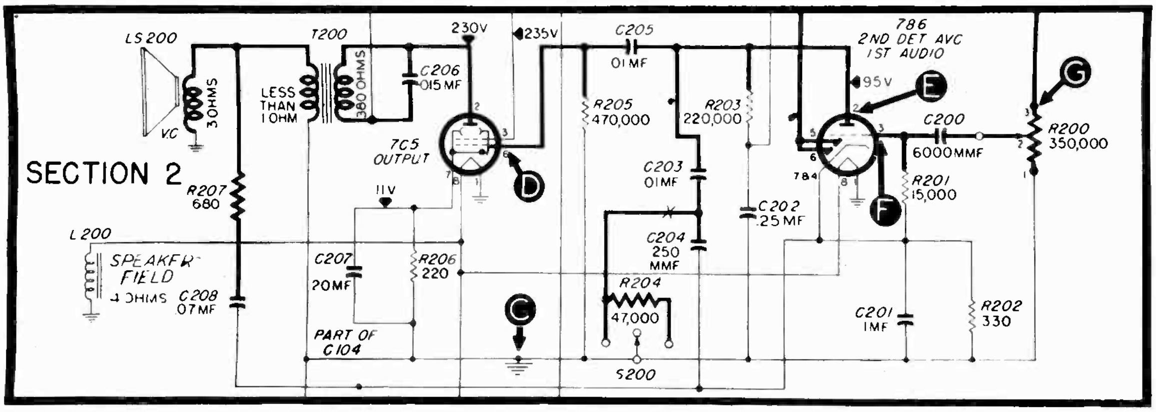


Figure 5. Section 2 schematic. TP-435B

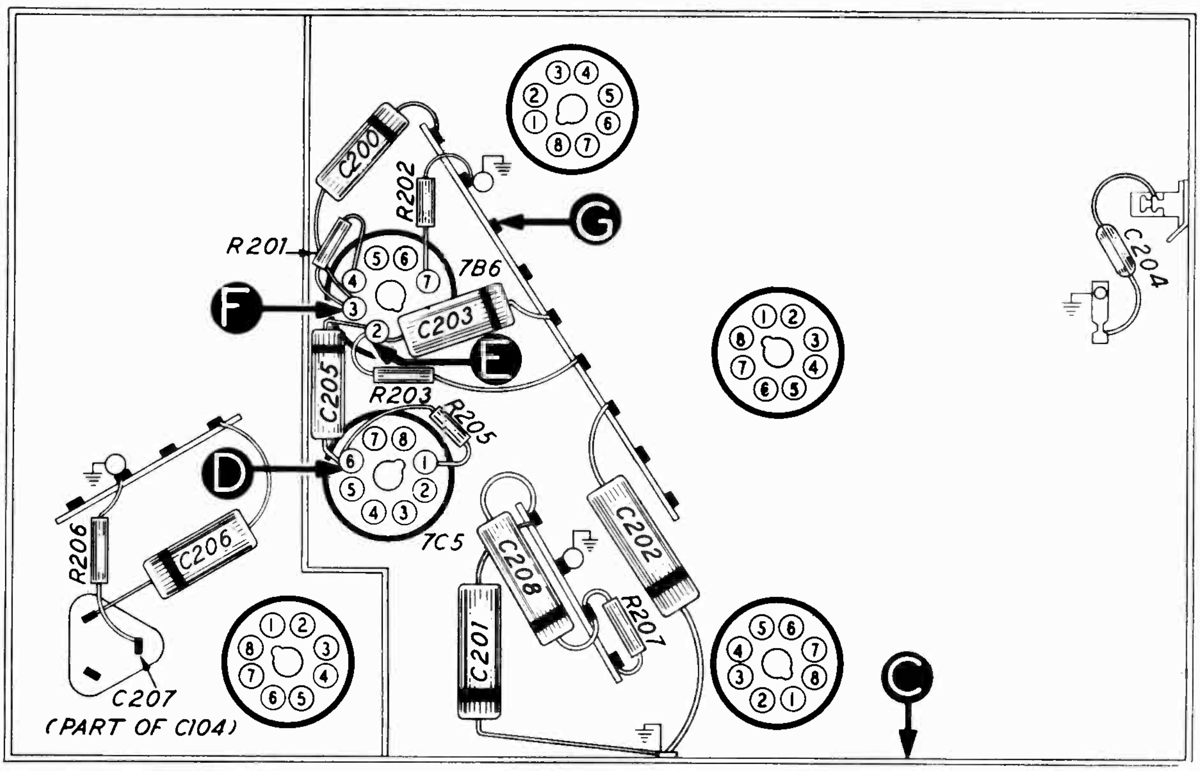


Figure 6. Bottom view, showing Section 2 test points. TP-435G

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 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 or Z301, open R300, R302, or R404, or shorted C406.
J to C	Loud, clear signal.	Defective or misaligned Z300.

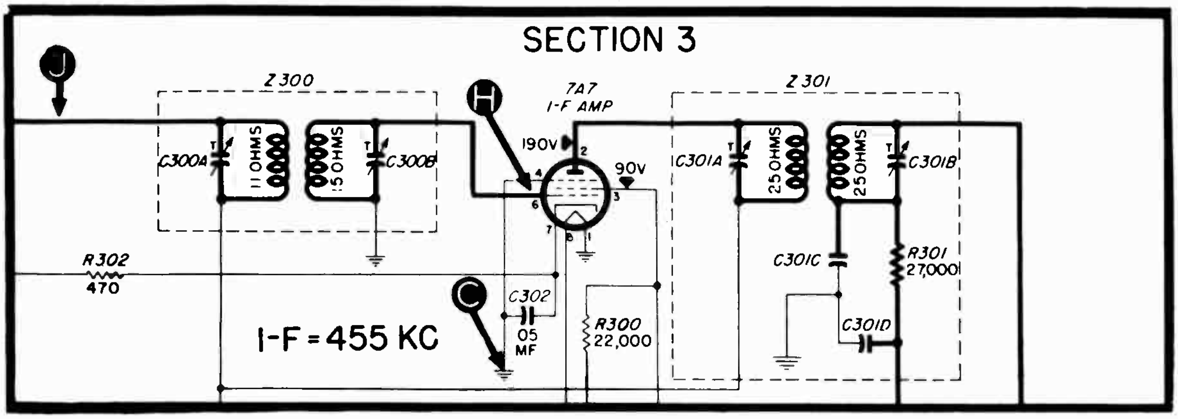


Figure 7. Section 3 schematic. TP-435C

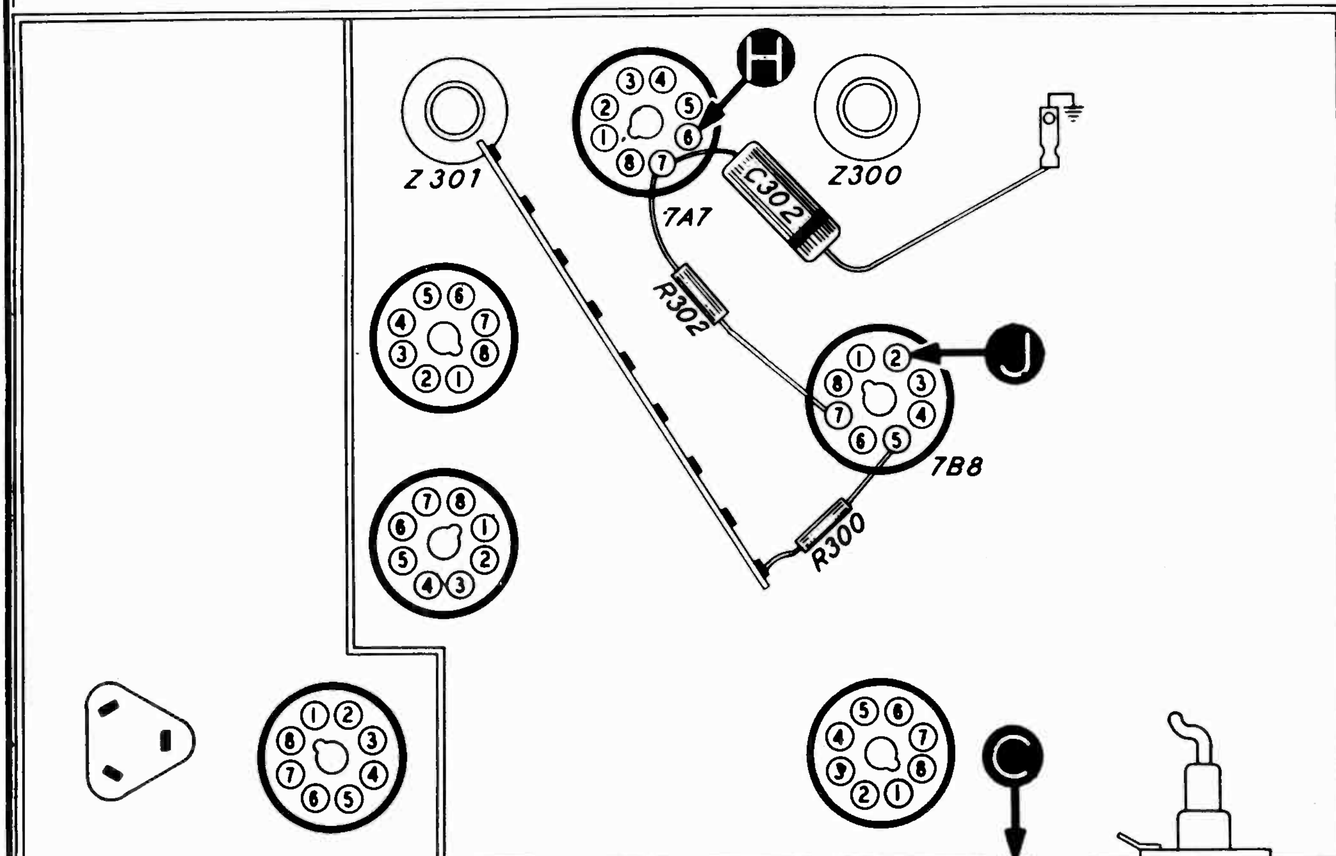


Figure 8. Bottom view, showing Section 3 test points. TP-435H

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 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. Absence of voltage at any point indicates that the oscillator is not functioning. If so, check the components listed in the first test below.

3. Connect the signal generator as for previous tests, tune the generator and receiver to 1000 kc., and proceed as below.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
K to C (chassis)	Loud, clear signal from speaker.	Defective 7B8, L402, C407, or open R407, R403 or C411.
L to C	Loud, clear signal.	Open C407.
M to C	Loud, clear signal.	Defective 7A7, or open R400 or R401.
N to C	Loud, clear signal.	Defective L400, C400, or L401.

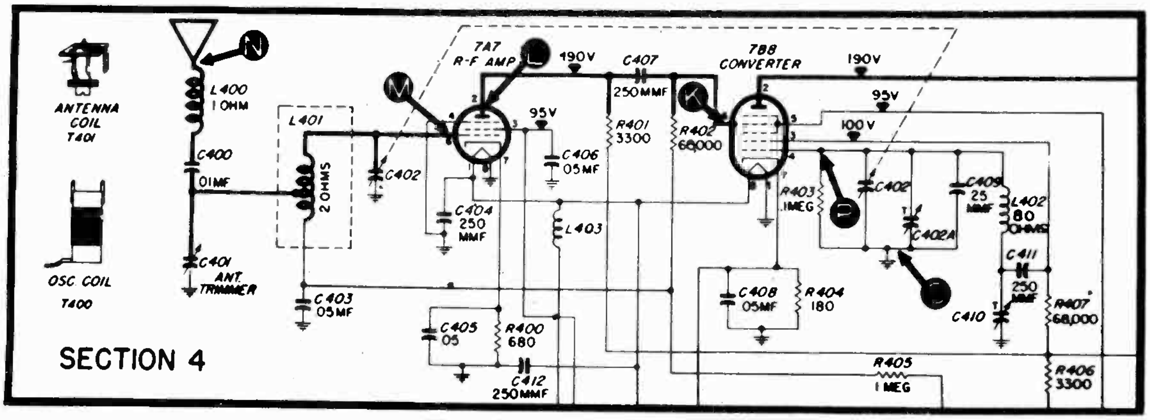


Figure 9. Section 4 schematic. TP-435D

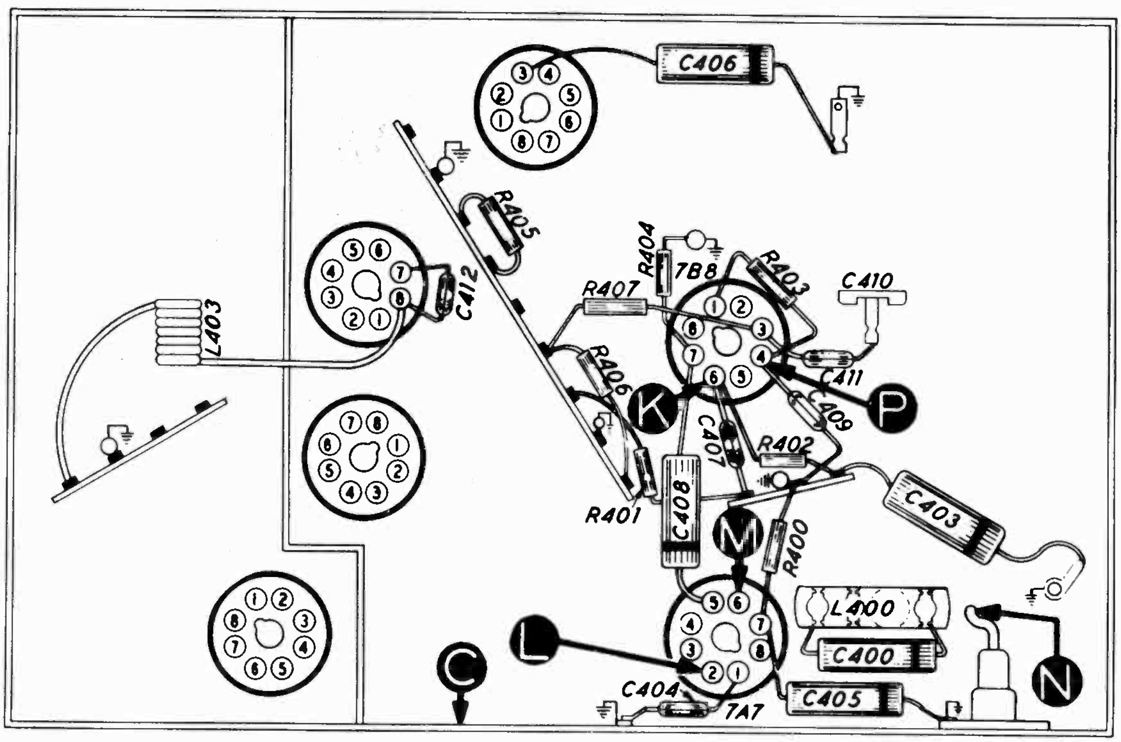


Figure 10. Bottom view, showing Section 4 test points. TP-435J

MODEL UN6-400

PHILCO CORP.

PRELIMINARY INSTRUCTIONS

Remove the top chassis cover to reach adjustments.

OUTPUT METER:

Connect to the voice-coil lugs on the speaker.

SIGNAL GENERATOR:

Set the receiver volume control at maximum. Adjust the signal-generator output to give a readable deflection on the output meter, using a 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. Adjust all trimmers listed for maximum output.

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.

ALIGNMENT CHART

	SIGNAL GENERATOR		RECEIVER		
	Connections to Receiver	Dial Setting	Tuning-Condenser Setting	Special Instructions	Adjust Trimmers
1	Through a .05 mf. condenser to stator of antenna section of tuning gang.	455 kc.	Fully meshed.	Ground stator of oscillator section of gang. Adjust in given order, and then repeat adjustment.	C301B C301A C300B C300A
2	Through a 10-mmf. condenser in series with antenna lead, Philco Part No. 95-0185, to antenna connector.	1580 kc.	Fully open.	Remove ground from oscillator section of gang. Adjust for maximum.	C402A
3	Same as 2.	1400 kc.	Tune in 1400 kc. signal.	Adjust for maximum. (Final adjustment should be made with receiver in car, connected to car antenna.)	C401
4	Same as 2.	580 kc.	Tune to maximum.	Adjust while rocking tuning condenser.	C410
5	Same as 2.			Repeat steps 2, 3, and 4.	

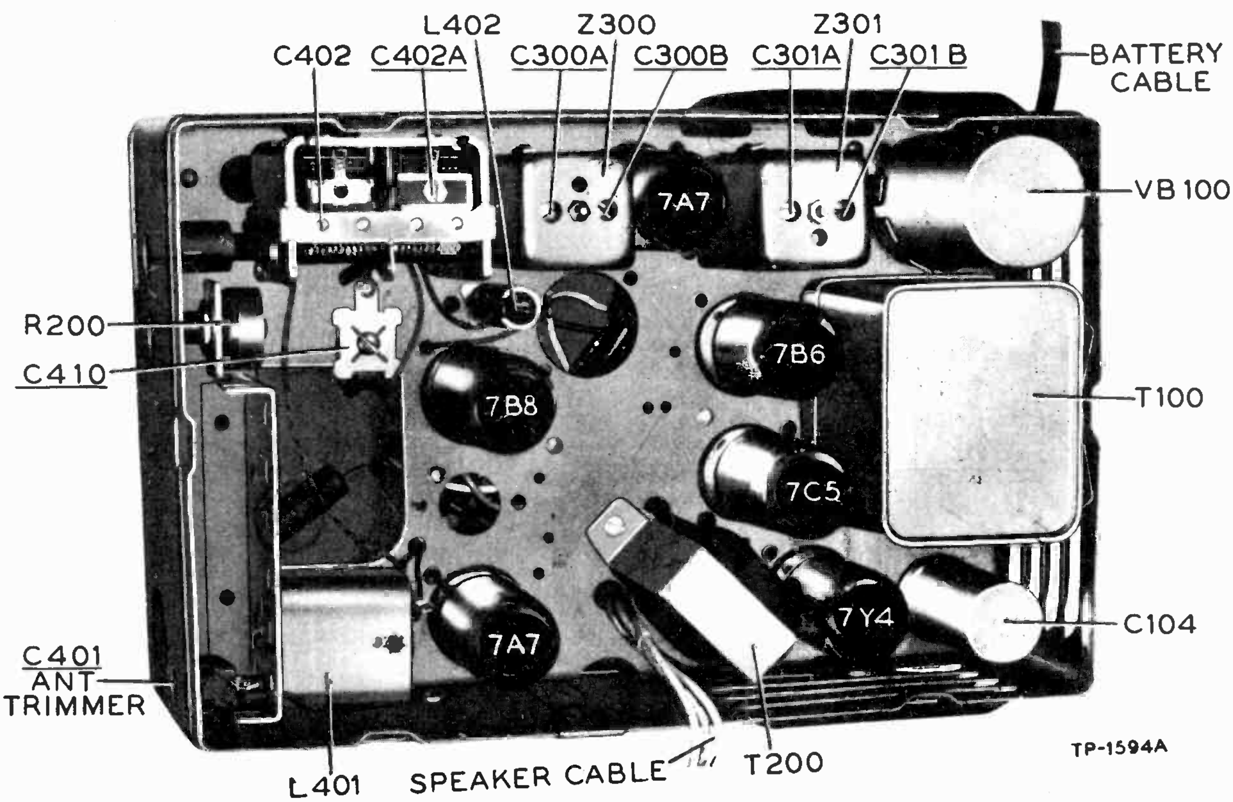


Figure 11. Top view, showing trimmer-condenser locations.

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MODEL UN6-400

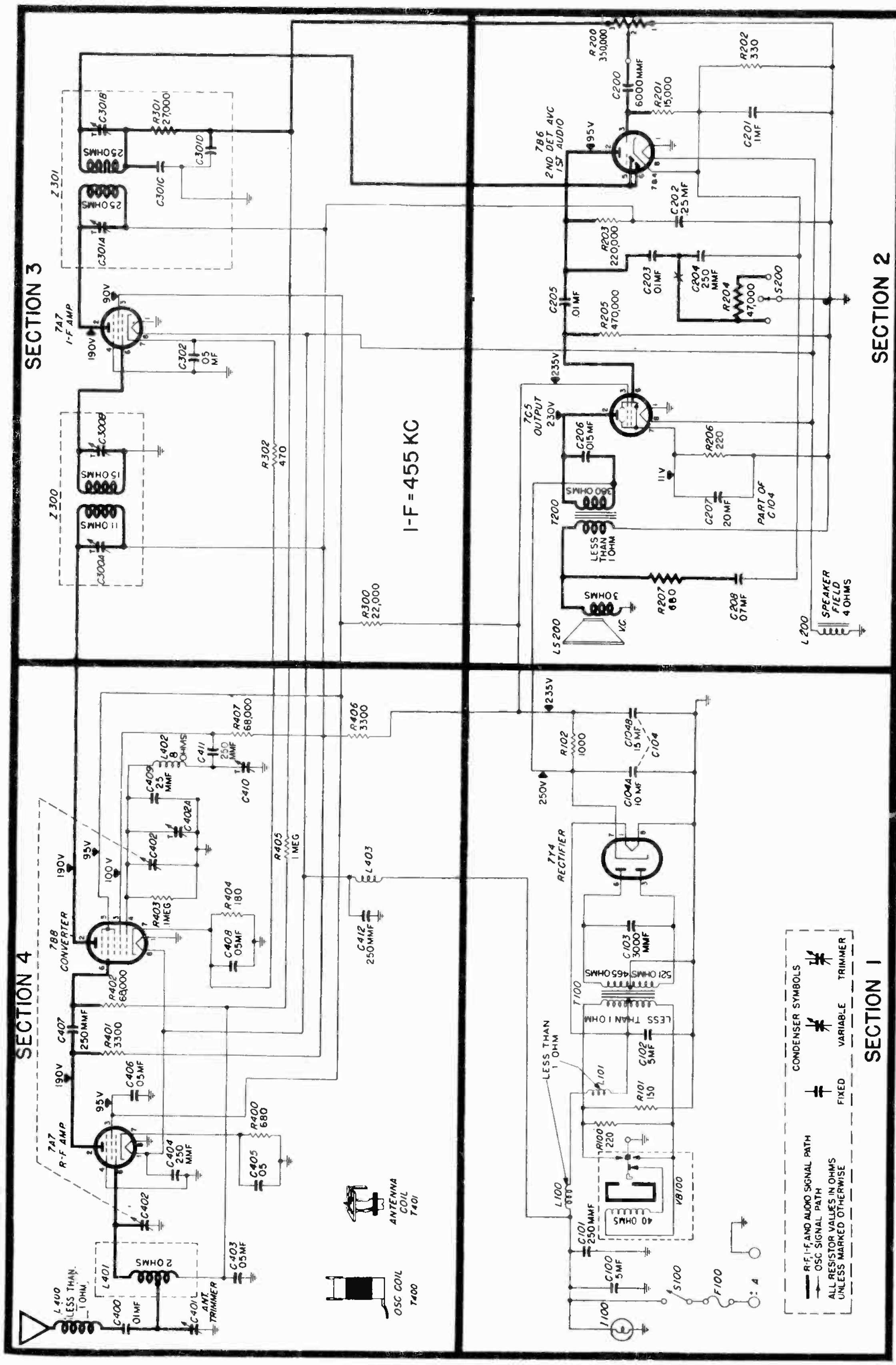


Figure 12. Complete schematic.

NOTE: All voltage, capacity, and resistance values shown are average. The voltages were measured with a 20,000-ohms-per-volt meter between the indicated test points and chassis (C).

REPLACEMENT PARTS LIST — Model UN6-400

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

LA—loop antenna
LS—loudspeaker
R—resistor
C—condenser
I—pilot lamp
L—choke or coil
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 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.

SECTION 1

Reference	Description	Service Part No.
C100	Condenser, .5 mf.	61-0137*
C101	Condenser, 250 mmf.	60-1024037
C103	Condenser, 3,000 mmf.	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
I100	Lamp, pilot	34-2039
L100	Choke, "A"	65-0037
L101	Choke, vibrator	65-0433
R100	Resistor, 220 ohms	66-1223340
R101	Resistor, 150 ohms	66-1153340
R102	Resistor, 1,000 ohms	66-2104340
S100	Switch	85-0112
T100	Transformer, power	65-0234*
VB100	Vibrator	83-0026*

SECTION 2

Reference	Description	Service Part No.
C200	Condenser, 6,000 mmf.	30-4504*
C201	Condenser, .1 mf.	30-4527*
C202	Condenser, .25 mf.	61-0125
C203	Condenser, .01 mf.	61-0120
C204	Condenser, 250 mmf.	60-10245307*
C205	Condenser, .01 mf.	61-0120
C206	Condenser, .015 mf.	61-0138
C207	Condenser, 20 mf.	Part of C104
C208	Condenser, .07 mf.	61-0152
LS200	Speaker	73-0059
	L200: coil, field	Part of LS200
R200	Control, volume, 350,000 ohms	67-0043
R201	Resistor, 15 megs.	66-6151540
R202	Resistor, 330 ohms	66-1333340
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	66-1224360
R207	Resistor, 680 ohms	66-2153340
S200	Switch, tone-control	77-0733
T200	Transformer, output	65-0419

SECTION 3

Reference	Description	Service Part No.
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, a-v-c filter	Part of Z301
	C301D: condenser, a-v-c filter	Part of Z301
	R301: Resistor, 27,000 ohms	Part of Z301
C302	Condenser, .05 mf.	30-4518*
R300	Resistor, 22,000 ohms	66-3224340
R302	Resistor, 470 ohms	66-1474360*

SECTION 4

Reference	Description	Service Part No.
C400	Condenser, .01 mf.	61-0120*
C401	Condenser, trimmer (antenna)	77-0545
C402	Condenser, tuning	63-0077
	C402A: condenser, trimmer	Part of C402
C403	Condenser, .05 mf.	30-4518*
C404	Condenser, 250 mmf.	60-10245307*

SECTION 4 (Continued)

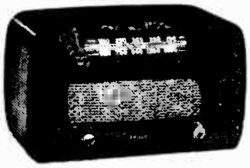
Reference	Description	Service Part No.
C405	Condenser, .05 mf.	30-4518*
C406	Condenser, .05 mf.	30-4518*
C407	Condenser, 250 mmf.	60-10245307*
C408	Condenser, .05 mf.	30-4518*
C409	Condenser, 25 mmf.	60-00245307*
C410	Condenser, trimmer	63-0048
C411	Condenser, 250 mmf.	60-10245307*
C412	Condenser, 250 mmf.	60-10245307*
R400	Resistor, 680 ohms	66-1684360*
R401	Resistor, 3,300 ohms	66-2333340*
R402	Resistor, 68,000 ohms	66-3683340*
R403	Resistor, 100,000 ohms	66-4103340*
R404	Resistor, 180 ohms	66-1184360*
R405	Resistor, 1 meg.	66-5103340*
R406	Resistor, 3,300 ohms	66-2334340
R407	Resistor, 68,000 ohms	66-3683340*
L400	Choke, antenna	65-0168
L401	Coil, antenna-transformer	65-0323
L402	Coil, oscillator	65-0420
L403	Choke, "A"	65-0452

MISCELLANEOUS

Description	Service Part No.
Control assembly	42-5866
Cord, drive (25-foot spool)	45-1459
Dial	55-1194
Lead, "A" (control to set)	38-8221
Lead, "A" (control to fuse)	41-3387
Lead, "A" (fuse to ammeter)	77-0235
Lead, tone-control	95-0135
Plate, dial background	57-1888
Pointer	57-1889
Shaft assembly, tuning	57-1385
Shaft assembly, volume	57-1384
Sleeve, knob	57-1324FA3
Socket assembly, pilot-lamp	77-0541
Housing assembly	77-0751FJ20
Cover, tube-and-speaker side	57-1943FJ20
Cover, wiring side	57-1345FJ20
Screw, cover mounting	1W21813FA26
Set mounting kit	40-8536
Bolt, hook, set mounting	57-1340FA3
Clamp, cable	57-1463FA1
Lockwasher, set mounting	1W57223FA1
Nut, set mounting	1W21291FA3
Speaker mounting hardware	
Cloth, grille	89-0013
Lockwasher, speaker mounting	1W24257FA1
Screw, speaker mounting	1W19672FA3
Suppressor kit	40-9102
Condenser, interference	30-4007
Resistor, distributor	33-1196
Clamp, "A" lead	57-1429
Clamp, vibrator	57-1637FA3
Clip, coil-mounting	28-5002FA1
Connector, antenna	57-0591
Grommet, tuning-condenser mounting	27-4596
Screw, tuning-coil and volume-control assembly	1W19670FA3
Shield, power	57-1744FA3
Socket, tube	27-6128*
Socket, vibrator	27-6153*

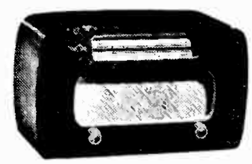
PHILCO CORP.

MODELS 46-421, 46-421-I



MODEL 46-421

MODEL 46-421-I



SPECIFICATIONS

CABINET.........Model 46-421, walnut finish
Model 46-421-I, ivory finish
CIRCUIT.........Six tube superheterodyne
FREQUENCY RANGE.........540 to 1620 kc.

POWER INPUT
A.C. or D.C., 105 to 120 volts
POWER CONSUMPTION
30 watts at 117 volts
AERIAL......Loop fastened to chasis; terminal also provided for outside aerial

INTERMEDIATE FREQUENCY.........455 kc.
PHILCO TUBES USED......7C7, 7A8, 7B7, 7C6, 50L6GT, 35ZGT/G
PILCT LAMP.........6-8-volt bayonet base, Part No. 34-2068

PHILCO TROUBLE-SHOOTING PROCEDURE

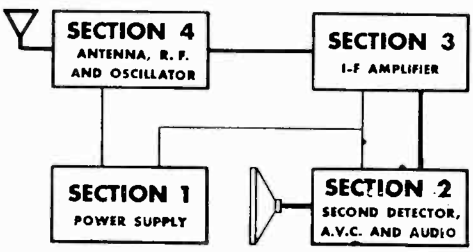


Figure 1. Block diagram (Heavy lines indicate signal path).

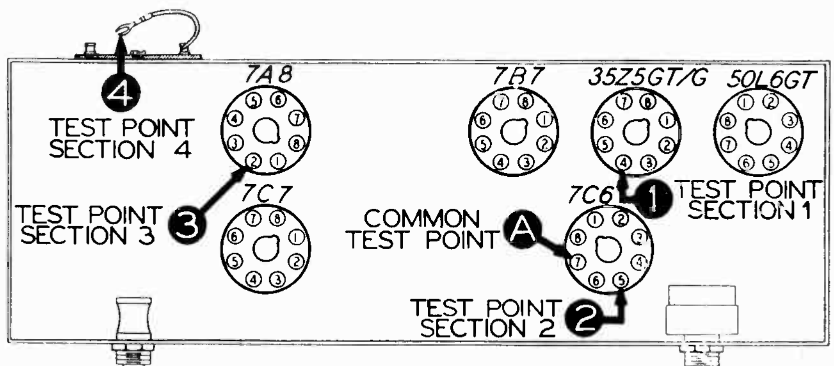


Figure 2. Bottom view showing test points.

In this bulletin, the receiver circuit is divided into four sections, as shown in figure 1. One test point is designated for each section, see figure 2, and tests made at these points localize the troublo to one section. After the trouble has been localized to one section by the tests given below, proceed with the tests outlined for that section. The equipment required for all tests outlined in this bulletin is a quality signal generator and a volt-ohm-meter. Voltage readings shown in this bulletin were measured with a 20,000-ohm-per-volt meter. Connect the receiver to the power line, turn the volume control full on, and see that all tube filaments are lighted. Proceed with the section tests given in the following chart. If a normal result is not obtained at any test point, the trouble is in the section under test.

TESTS TO LOCALIZE TROUBLE TO ONE SECTION

SECTION	TEST	NORMAL RESULTS
1	Measure voltage between points 1 (+) and A (B–).	90 volts*.
2**	Apply audio signal between points 2 and A.	Loud, clear signal.
3**	Apply a weak, modulated r-f signal (455 kc.) between points 3 and A.	Loud, clear signal.
4**	Apply a weak, modulated r-f signal (frequency to which set is tuned) between points 4 and A.	Loud, clear signal.

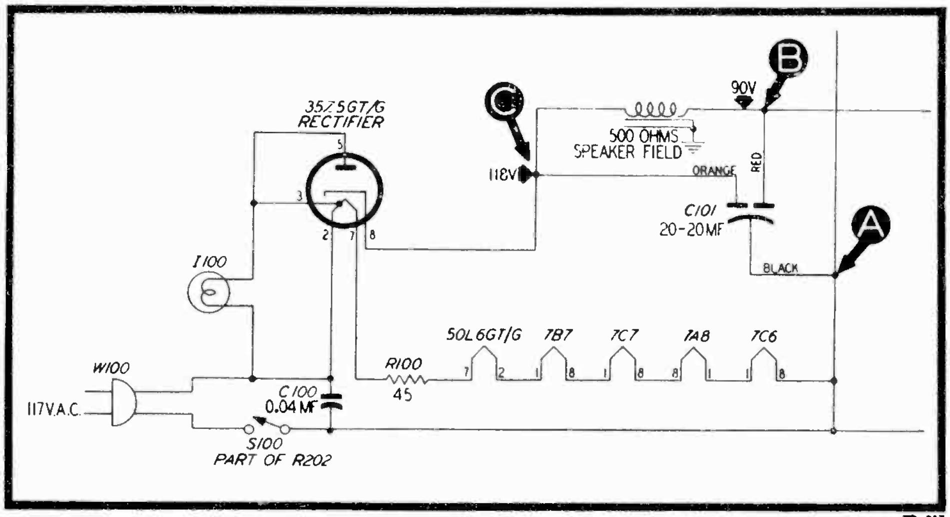
*For 117-volt a-c input. When operating from a d-c power line and no voltage is measured, reverse the power plug.
**Connect signal generator output lead through a condenser (.01 to .25 mf.).

MODELS 46-421, 46-421-I

PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 1

Test Points	Normal Reading	Possible Cause of Abnormal Reading
B to A	90 volts	No voltage indicates defective 35Z5GT/G tube, shorted condenser C101, or open speaker field. Low voltage indicates defective 35Z5GT/G tube, or leaky condenser C101, or shorted condenser C203.
C to A	118 volts	No voltage indicates defective 35Z5GT/G tube, or shorted condenser C101. Low voltage indicates defective 35Z5GT/G tube, or open condenser C101, or shorted condenser C203.



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.

Figure 3. Section I schematic.

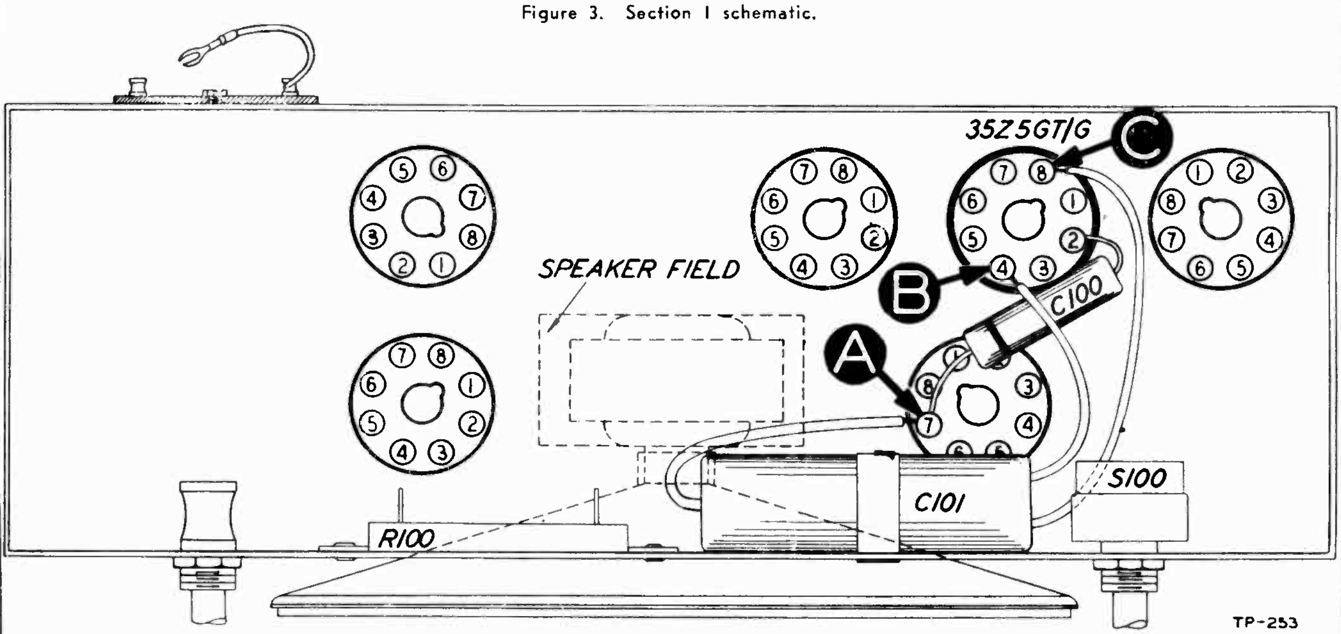


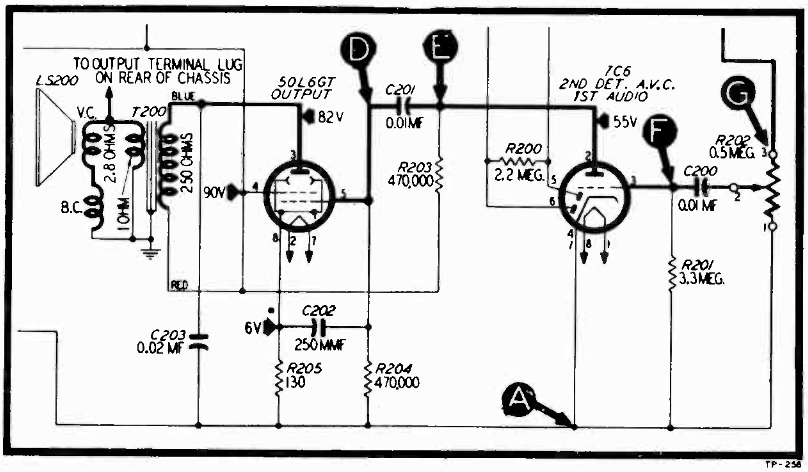
Figure 4. Bottom view showing section I test points.

PHILCO CORP.

MODELS 46-421, 46-421-I

TESTS TO ISOLATE TROUBLE WITHIN SECTION 2

Test Points	Normal Indication	Possible Cause of Abnormal Indication
D to A	Audible signal from speaker.	No signal indicates defective 50L6GT tube, defective output transformer T200, defective speaker LS200, shorted condenser C202 or C203, or open resistor R205.
E to A	Audible signal, same as previous test.	No signal indicates open condenser C201.
F to A	Noticeable increase of audible signal.	No signal indicates defective 7C6 tube, or open resistor R203.
G to A	With volume control full on, audible signal, same as previous test.	No signal indicates open condenser C200, or open volume control R202.



For all tests in this section, use the audio range of a signal generator. Connect the output lead through a condenser (.01 to .25 mf.); ground lead to point A.

Figure 5. Section 2 schematic.

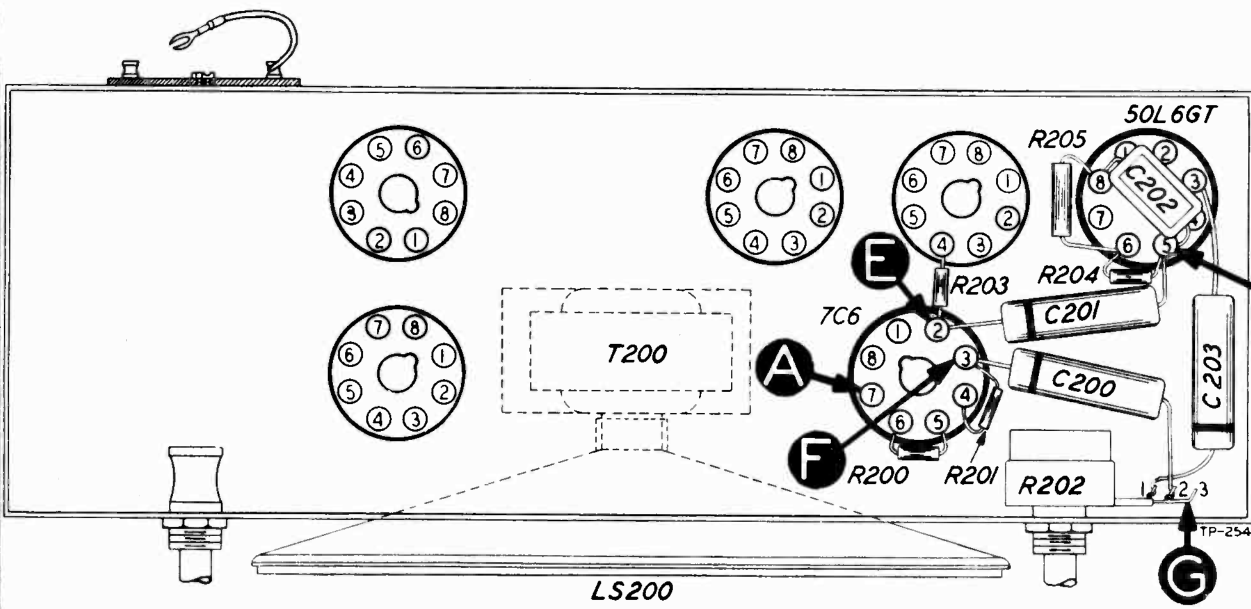


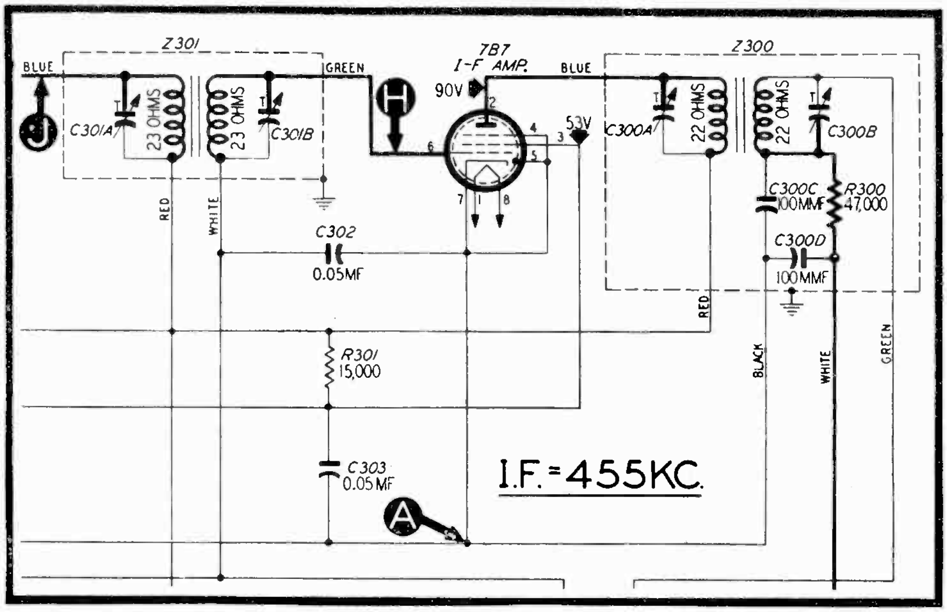
Figure 6. Bottom view showing section 2 test points.

MODELS 46-421,
46-421-I

PHILCO CORP.

TESTS TO ISOLATE TROUBLE WITHIN SECTION 3

Test Points	Normal Indication	Possible Cause of Abnormal Indication
H to A	Audible signal from speaker.	No signal indicates defective 7B7 tube, defective i-f transformer Z300, defective 7C6 tube, defective resistor R301, or shorted condenser C303.
J to A	Audible signal from speaker.	No signal indicates defective i-f transformer Z301.



For all tests in this section, set the signal generator to 455 kc., modulation on. Connect the output lead through a condenser (.01 to .25 mf.); ground lead to point A.

Figure 7. Section 3 schematic.

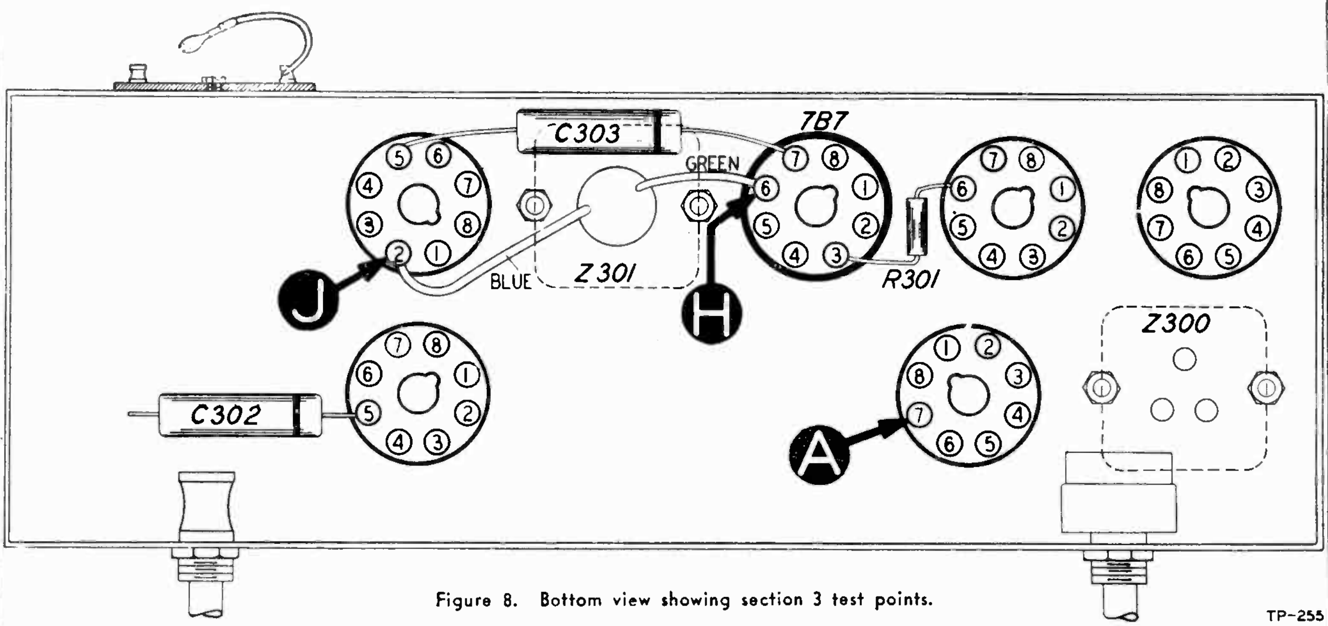


Figure 8. Bottom view showing section 3 test points.

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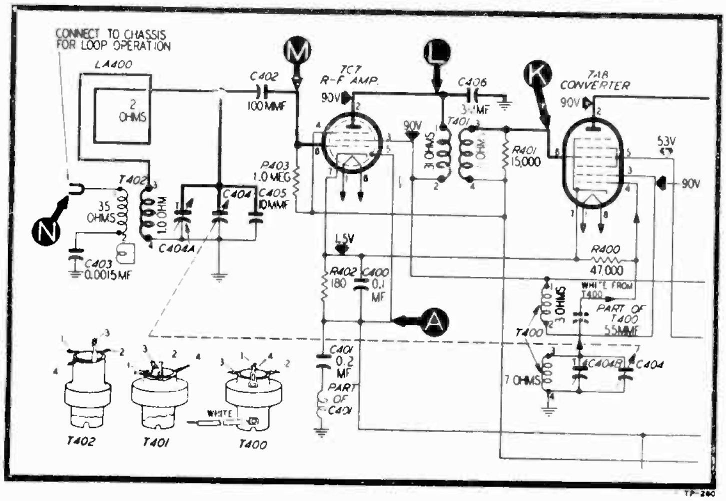
MODELS 46-421, 46-421-I

TESTS TO ISOLATE TROUBLE WITHIN SECTION 4

Test Points	Normal Indication	Possible Cause of Abnormal Indication
K to A	Audible signal from speaker.	No signal indicates defective 7A8 tube, defective oscillator transformer T400, defective resistors R400 or R402, defective condenser C400, or shorted plates of condenser C404.
L to A	Audible signal from speaker.	No signal indicates defective r-f transformer T401.
M to A	Increase in audible signal from speaker.	No signal indicates defective 7C7 tube.
N to A	Same signal output as previous step.	No signal indicates defective antenna transformer T402, loop LA400, coupling condenser C402, or shorted plates of condenser C404.



For all tests in this section, set the signal generator and the receiver to 540 kc. Connect the output lead of the signal generator through a condenser (.01 to .25 mf.); ground lead to point A.

Figure 9. Section 4 schematic.

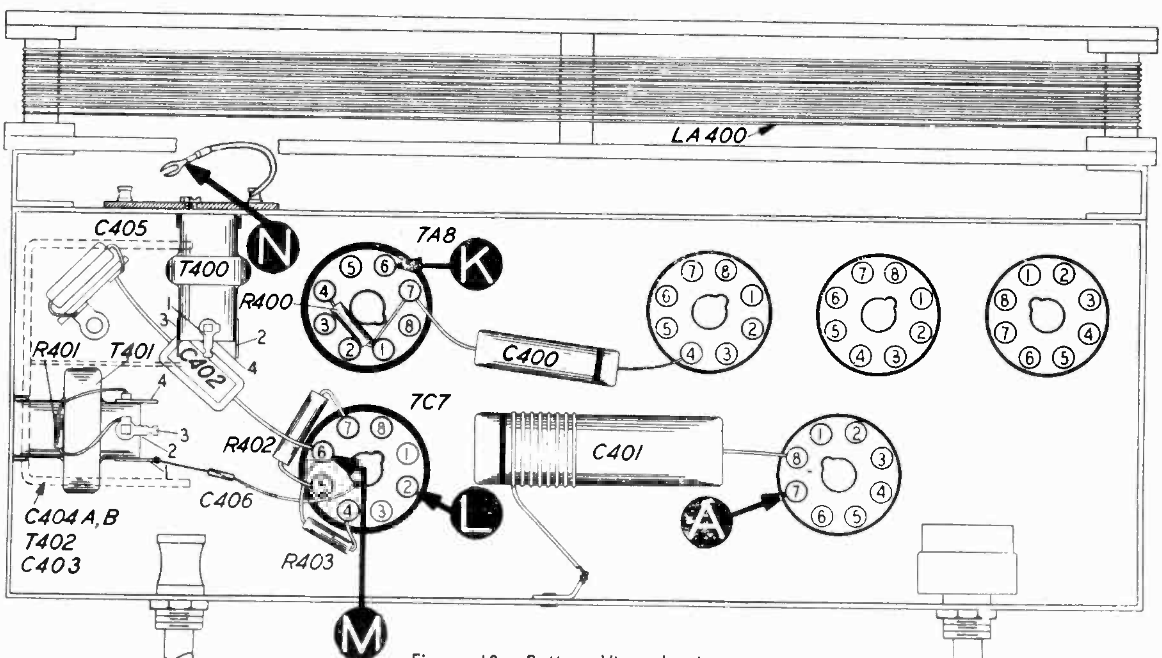


Figure 10. Bottom View showing section 4 test points. TP-256

MODELS 46-421, 46-421-I

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CONNECTING ALIGNING EQUIPMENT

OUTPUT METER. Connect to output (left hand) and ground (center) lugs of terminal panel on rear of chassis as shown in figure 11.

SIGNAL GENERATOR. Use a 100-mmf. condenser to couple the signal-generator output lead to the receiver. Adjust the output of the signal generator to give a signal strength sufficient to cause a readable deflection of the output meter, using the range on the meter which best indicates small variations in output. Reduce the output of the signal generator if the pointer of the output meter goes off scale as alignment progresses.

Make all adjustments in the order listed.

ALIGNMENT CHART

SIGNAL GENERATOR		RECEIVER				
Connections to Receiver	Dial Setting (kc.)	Dial Setting (kc.)	Volume Control Setting	Special Instructions	Adjust Trimmers in Given Order	Adjust Trimmers For
Stator plate terminal, antenna section of tuning condenser, and B–.	455	540	Max	Turn C-301B down tight. Turn tuning condenser plates to full-meshed position. Make sure that dial pointer is set to the left index line (small mark stamped on lower left side of scale plate reflector). This setting corresponds to a dial setting of 540 KC.	C300A C300B C301A C301B	Maximum output
Aerial lead and B–.	1600	1600	Max	Turn tuning condenser until dial pointer is on the first small index line (from right side) stamped on the scale plate reflector. This setting corresponds to a dial setting of 1600 KC.	C404B	Maximum output
Aerial lead and B–.	1500	1500	Max	Turn tuning condenser until dial pointer is on the second small index line (from right side) stamped on the scale plate reflector. This setting corresponds to a dial setting of 1500 KC.	C404A	Maximum output

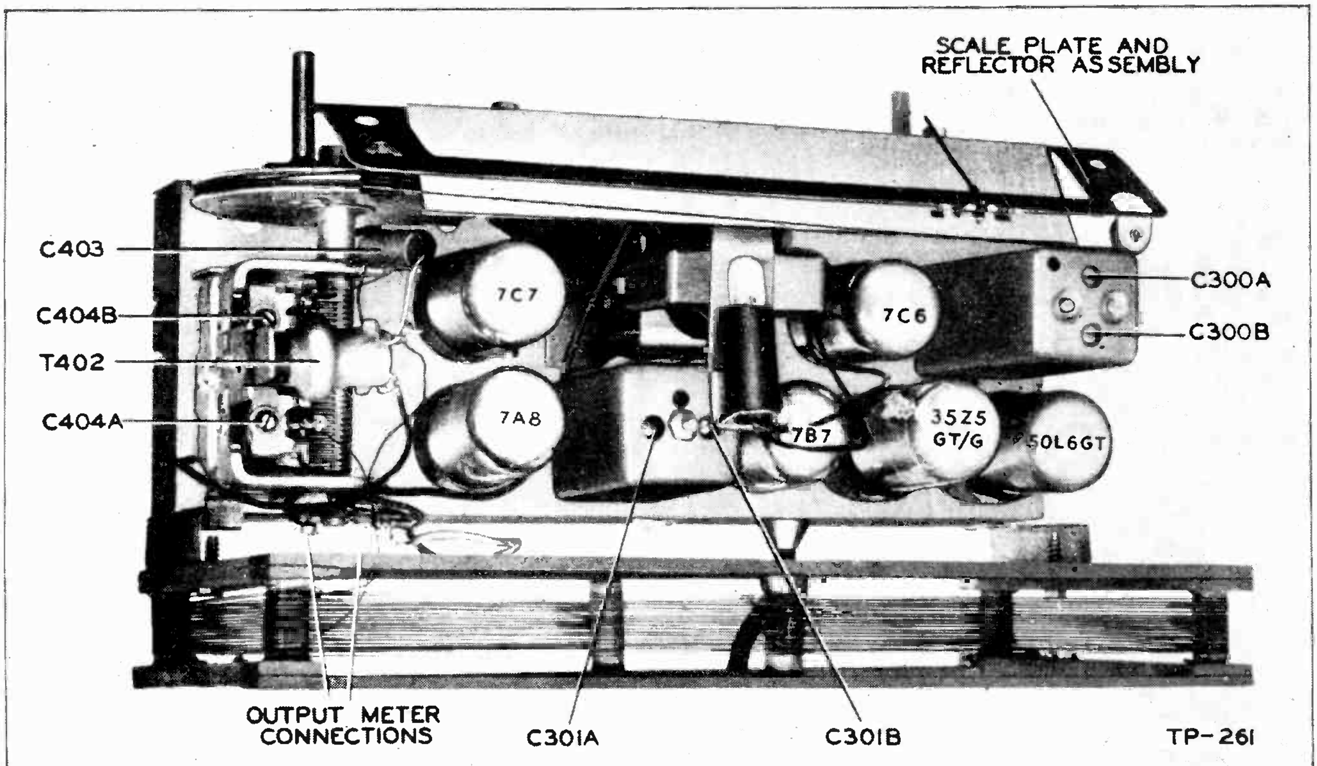

Figure 11. Top view showing trimmer condenser locations.

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MODELS 46-421, 46-421-I

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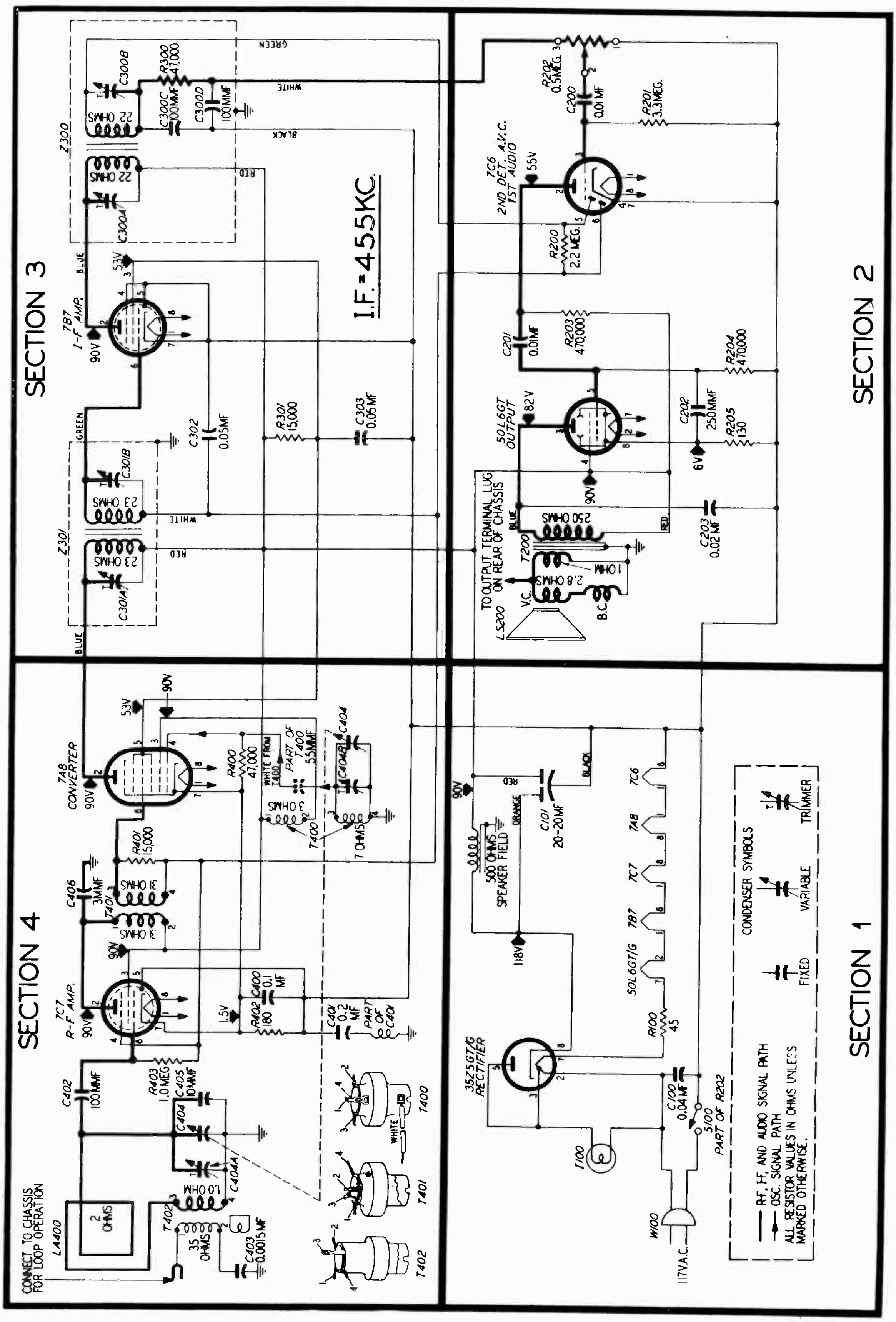

Figure 12. Complete schematic.

NOTE: *All voltages and all capacity and resistance values shown are average. Voltages were measured between B- and the points indicated with a 20,000-ohm-per-volt meter; volume control at minimum, tuning condenser plates fully meshed.*

MODELS 46-421,
46-421-I

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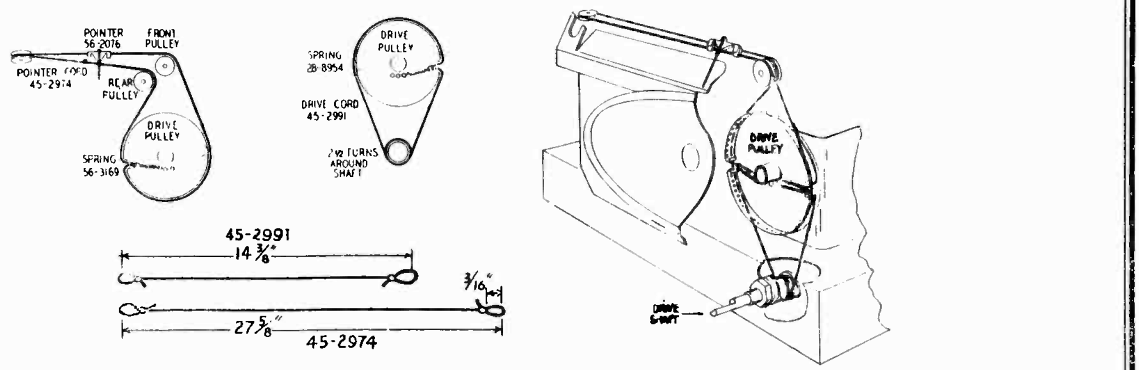


Figure 13. Drive cord installation details.

NOTE: Parts marked with an asterisk (*) are general replacement items and the numbers will not be identical with those used on factory assemblies. ALWAYS USE THE PART NUMBERS SHOWN IN THIS PARTS LIST WHEN ORDERING.

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

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

SECTION 1

Reference Number	Description	Service Part No.
C100	Condenser, .04 mf., 400V	30-4119
C101	Condenser, 20-20 mf., 150 V.	30-2547*
I100	Pilot Lamp, 6-8V., 150 ma.	34-2068
R100	Resistor, 50 ohms	33-3432
S100	Switch, Power	Part of R-202
W100	Power Cord and Plug	L-3199

SECTION 2

C200	Condenser, .01 mf., 400V.	61-0120*
C201	Condenser, .01 mf., 400V.	61-0120*
C202	Condenser, 250 mmf.	60-10245307*
C203	Condenser, .02 mf., 400V.	30-4599*
LS200	Speaker (with output transformer)	36-1591
R200	Resistor, 2.2 meg.	66-5223340*
R201	Resistor, 3.3 meg.	66-5333340*
R202	Volume Control, .5 meg.	33-5469
R203	Resistor, 470,000 ohms	66-4473340*
R204	Resistor, 470,000 ohms	66-4473340*
R205	Resistor, 130 ohms	66-1133340
T200	Transformer, Output	Part of LS-200

SECTION 3

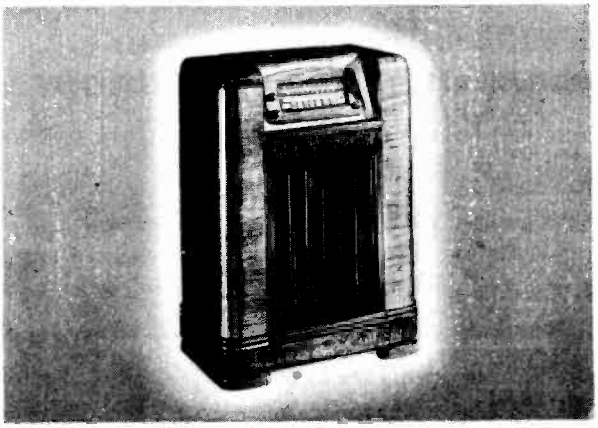
C300A	Condenser, Trimmer	Part of Z-300
C300B	Condenser, Trimmer	Part of Z-300
C300C	Condenser, 100 mmf.	Part of Z-300
C300D	Condenser, 100 mmf.	Part of Z-300
C301A	Condenser, Trimmer	Part of Z-301
C301B	Condenser, Trimmer	Part of Z-301
C302	Condenser, .05 mf., 200V.	30-4518*
C303	Condenser, .05 mf., 200V.	30-4518*
R300	Resistor, 47,000 ohms	Part of Z-300
R301	Resistor, 15,000 ohms	66-3153340
Z300	Transformer, 2nd I-F	32-4014
Z301	Transformer, 1st I-F	32-3962

SECTION 4

Reference Number	Description	Service Part No.
C400	Condenser, .1 mf., 200V.	30-4527*
C401	Condenser and Choke Assy	76-1198
C402	Condenser, 100 mmf.	60-10105407*
C403	Condenser, .0015 mf., 600V.	30-4621
C404	Condenser, 2-Section Tuning	31-2659
C404A	Condenser, Trimmer	Part of C-404
C404B	Condenser, Trimmer	Part of C-404
C405	Condenser, 10 mmf.	60-00105407
C-406	Condenser, 3 mmf.	30-1221
LA400	Loop Aerial	76-1877
R400	Resistor, 47,000 ohms	66-3473340*
R401	Resistor, 15,000 ohms	Part of T-401
R402	Resistor, 180 ohms	66-1184360*
R403	Resistor, 1 meg.	66-5103340*
T400	Transformer, Oscillator	32-3613
T401	Transformer, R-F	32-3595
T402	Transformer, Antenna	32-3394

MISCELLANEOUS

Baffle and cloth assembly, Model 46-421	40-6745
Model 46-421-I	40-6747
Backing plate, tuning condenser mounting	56-2105FA3
Bracket, antenna coil mounting	56-2058FA3
Cabinet, Model 46-421	10630
Model 46-421-I	10630A
Clamp, dial scale mounting	56-2068
Clamp, electrolytic condenser mounting	56-1346FA5
Clip, coil mounting	28-5002FE7
Dial scale, Model 46-421	27-5849
Model 46-421-I	27-5845
Drive cord, tuning condenser (25 ft. Spool)	45-2991*
Drive cord, pointer (25 ft. Spool)	45-2974*
Foot, felt	W-2190
Grommet, rubber, tuning condenser mounting	27-4610
Knob and spring assembly, Model 46-421	54-4227
Model 46-421-I	54-4228
Pointer, dial scale	56-2076FCP
Rubber band, dial scale mounting	54-4176
Scale plate and light reflector assembly	76-1476
Light reflector	27-9816
Screw-washer combination, chassis mounting	1W37656FA3
Shaft, tuning drive	31-2664
Shield, loctal tube	56-2731*
Socket, loctal	27-6138*
Socket octal	27-6199*
Socket assembly, pilot lamp	76-2142
Spring, tuning condenser drive cord	28-8954
Spring, pointer drive cord	56-3167
Wiring panel, 2 lug	12W45646
Wiring panel, 3 lug	76-2148



TP-1442

MODEL 47-1227 SPECIFICATIONS

CABINET	Wood, walnut finish
CIRCUIT	Nine-tube superheterodyne
FREQUENCY RANGES:	
Broadcast	540 to 1720 kc
Frequency Modulation	88 to 108 mc
AUDIO OUTPUT	6 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	110 watts
AERIALS	Built-in low-impedance loop and FM dipole. Provision for external aerial.
INTERMEDIATE FREQUENCIES:	
AM	455 kc
FM	9.1 mc
RECORD PLAYER	Philco Automatic Record Changer, Model D-10
SPEAKER	12" electrodynamic
PHILCO TUBES (9)	6AG5, 7F8, 6BA6, 7R7, 7X7, 6J5GT, 6K6GT (2), 5AZ4
PANEL LAMPS (2)	6—8-volt, Part No. 34-2040
BIN LAMP	6—8-volt, Part No. 34-2039

CIRCUIT DESCRIPTION

The Philco Model 47-1227 is a nine-tube superheterodyne radio-phonograph combination providing reception on the standard broadcast band, 540—1720 kc and the FM band, 88—108 mc.

A low-impedance loop within the cabinet provides adequate signal pickup on the broadcast band. Satisfactory FM reception usually requires the use of an outdoor dipole aerial (Philco Part No. 45-1462). In areas of high signal strength, however, the dipole built into the cabinet is sufficient for FM operation.

A tuned r-f stage, using a type 6AG5 high-frequency pentode tube, functions on the FM band. The converter stage employs a 7F8 high-frequency double triode. The converter and r-f stages are built on a separate chassis, to insure reliable performance at high frequencies. These stages provide high signal-to-noise ratio, high conversion efficiency, and good image rejection.

Two transformer-coupled i-f stages are used. The i-f transformers have two sets of windings; one set is tuned to 455 kc for AM operation, the other to 9.1 mc for FM operation. Switching of the windings to attenuate undesired beat frequencies is necessary only in the first i-f transformer. The large difference between intermediate frequencies makes further switching unnecessary.

The first i-f stage employs a 6BA6 (miniature type) high-frequency pentode amplifier; the pentode section of a 7R7 double-diode-pentode tube functions as the second i-f amplifier. One diode of the 7R7 tube is used for AM detection, while the other diode develops a-v-c voltage.

The ratio-detector circuit used for FM detection operates through the two diodes of the 7X7 tube; this circuit has good noise-reducing properties and a superior tuning characteristic. The triode section of the 7X7 tube is used as a first audio and phono amplifier stage. The output of the AM detector, FM detector, or phono pickup is switched into this circuit by the operation of the function switch.

A type 6J5GT triode tube operates as a phase inverter, driving the two 6K6GT output tubes in push-pull operation.

A more uniform frequency response is obtained by the use of inverse feedback. The inverse-feedback voltage is taken from the secondary of the output transformer, and applied through resistor R211 to the junction of R204 and the volume control.

The TONE control is continuously variable; with clockwise rotation, the bass is increased, and as rotation is continued, the high frequencies are attenuated.

The 12-inch electrodynamic speaker provides excellent bass reproduction.

PHILCO TROUBLE-SHOOTING PROCEDURE

In this manual, the circuit is divided into four sections, with individual chassis base layouts and a complete schematic showing test points for each section. The first step in each trouble-shooting chart is a master check, which makes it possible to determine whether trouble exists in that section without going through the entire test procedure. Failure to secure the "Normal Indication" in a given step indicates trouble, which should then be located by voltage, resistance, or capacitance checks of the parts associated with the point under test, and remedied before testing further.

For service information on the record changer, refer to the service manual PR-1156 for the Philco Automatic Record Changer, Models D-10 and D-10A.

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—loudspeaker	T—transformer
L—choke or coil	R—resistor	Z—electrical ass'y

100-series components are in Section 1 — power supply

200-series components are in Section 2 — audio amplifier

300-series components are in Section 3 — i-f amplifier, second detector and/or discriminator, and a.v.c.

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

The main switch assembly, commonly referred to in the past as the "Band Switch", is used, in many instances, for various purposes in addition to band switching. Therefore, in this manual, the main wafer-switch assembly is designated as the "Function Switch".

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 positions. Look for bad connections, burnt resistors, or other obvious faults.

2. Measure the resistance between B+ (pin no. 8 of the 5AZ4 rectifier tube) and the radio chassis, with the ohmmeter polarity such that it gives the highest resistance reading; if the reading is lower than 50,000 ohms, check condensers C102, and C103 (A and B) for leakage or shorts.

CALIBRATING DIAL BACKPLATE

When the radio chassis is removed from the cabinet, dial calibration and alignment points may be marked by small pencil dots made on the dial-backplate assembly below the pointer.

The method of measuring for these points is illustrated in figure 1, which shows the relationship between dial marking and scale backplate.

Hold a ruler against the scale backplate in the position shown. Make dots at the proper points for the desired frequency settings. When the ruler is correctly placed, the index point is 1-9/16 inches from the reference point, as shown 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.

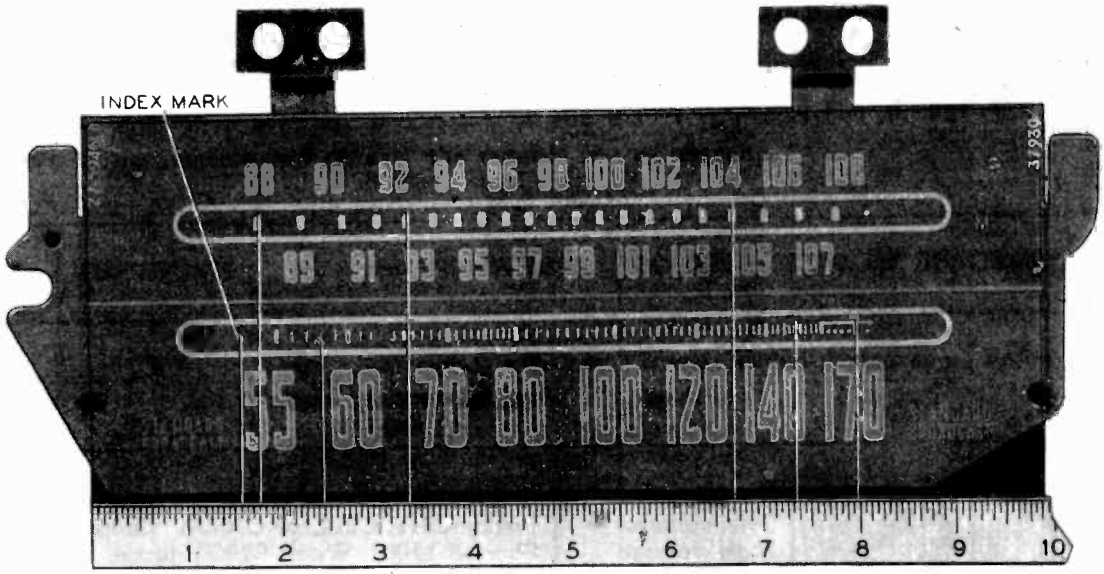


FIGURE 1. DIAL-BACKPLATE CALIBRATION MEASUREMENTS. TP-2827

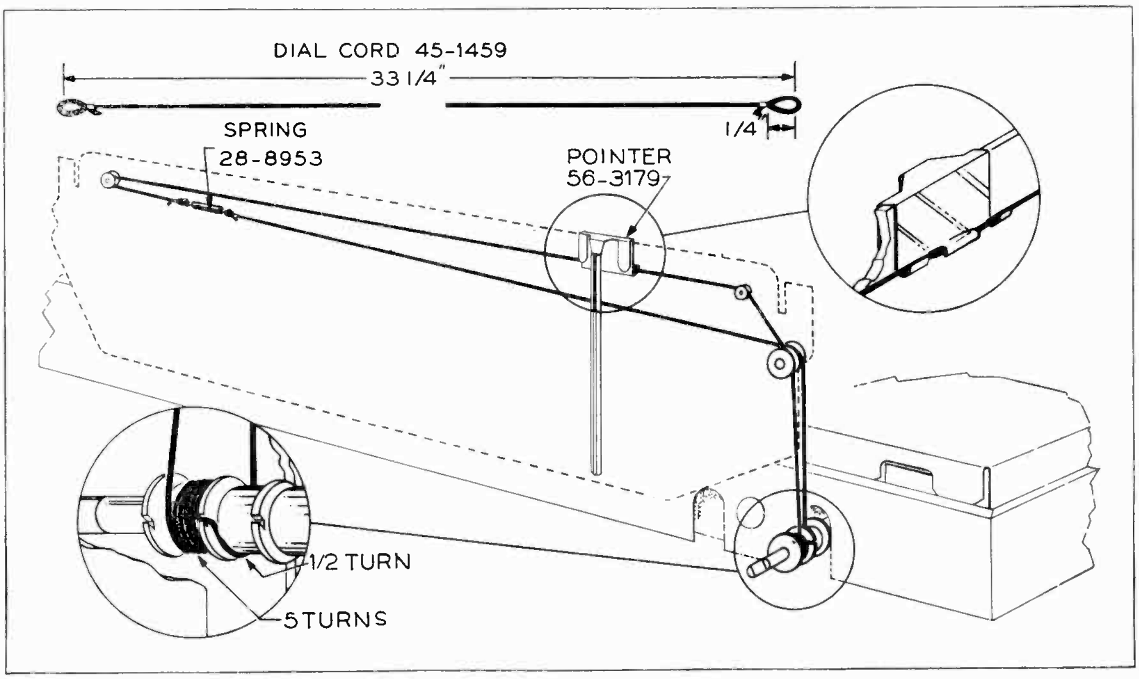


FIGURE 2. POINTER-DRIVE-CORD INSTALLATION DETAILS.

MODEL 47-1227 PHILCO CORP.

SECTION 1 – TROUBLE SHOOTING

CAUTION: Do not turn on power with speaker disconnected, as this may cause damage to the radio.

Make all tests for this section with a volt-ohmmeter, using the applicable d-c ranges. Voltages were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c. The VOLUME control was set at minimum and the TONE control fully counterclockwise; the function switch was set in BC (broadcast) position. See figure 3 for location of test points. Follow steps in proper sequence; if the "Normal Indication" is obtained in step 1, proceed with tests for Section 2; if not, isolate and remedy the trouble in this section. It will be noted that certain parts in other sections of the radio are listed under "Possible Cause of Abnormal Indication" because they may produce abnormal indication in Section 1.

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	D to C E to C	208 volts 290 volts	No voltage or incorrect voltage	Trouble in this section. Isolate by the following tests.
2	A to C	350 volts	No voltage	Defective 5AZ4 tube, T100, S100 or W100. Shorted C102. Open R100.
			Low voltage	Defective 5AZ4 tube. Shorted or leaky C102, C308, C311, C322, C309, C408 or C409. Shorted or leaky C103A or C103B.
			High voltage	Open L100, R101 or T200.
3	B to C	Negative 20 volts	High voltage	Open R100.
			Low or no voltage	Shorted R100. Weak 6K6GT tubes.
4	D to C	208 volts	No voltage	Shorted C103B. Open R101.
			Low voltage	Leaky C103B, C319, C307 or C310.
			High voltage	Open R300 or R303.
5	E to C	290 volts	No voltage	Shorted C103A. Open L100.
			Low voltage	Leaky C211, C212, or C103A. Grounded T200.
			High voltage	Shorted L100. Weak 6K6GT tubes.
Listening Test			Abnormal hum may be caused by open C100, C101, C102 or C103A.	

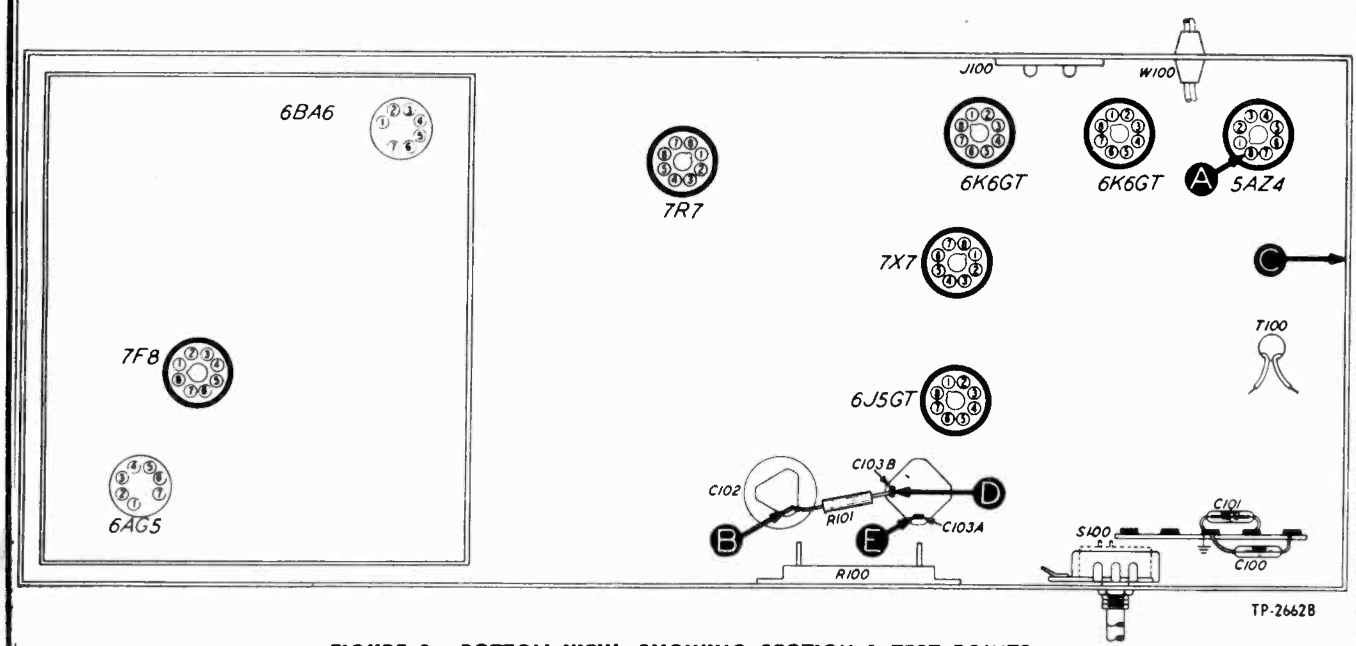


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS.

SECTION 2 – TROUBLE SHOOTING

Connect the audio-signal generator ground lead to test point "C" (chassis); 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 adjust the signal-generator output as indicated in the chart. If the "Normal Indication" is obtained in step 1, proceed to Section 3; if not, isolate and remedy the trouble in this section.

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	B (Remove 6J5GT tube)	Loud, clear signal with high signal-generator output.	Defective 6K6GT tube, T200 or LS200. Open R214. Shorted or leaky C212 or C214.
3	D (Remove 6J5GT tube)	Same as step 2.	Defective 6K6GT tube. Shorted or leaky C211. Open R215.
4	E (Replace 6J5GT tube)	Loud, clear signal with moderate signal-generator output.	Defective 6J5GT tube. Open R212, R209 or R210. Leaky or shorted C210.
5	F	Loud, clear signal with low signal-generator output.	Defective 7X7 tube. Open R207 or C210. Shorted C206.
6	A	Same as step 5.	Shorted C202, C201 or C326. Open R201, C203, R203 or C208.
7	PL200 (Function switch on PHONO)	Same as step 5.	Defective PL200 or FS2 (R).
Listening Test		Distortion may be caused by leaky C210, C212, C211, C213 or C214. Hum will result if C213 is open.	

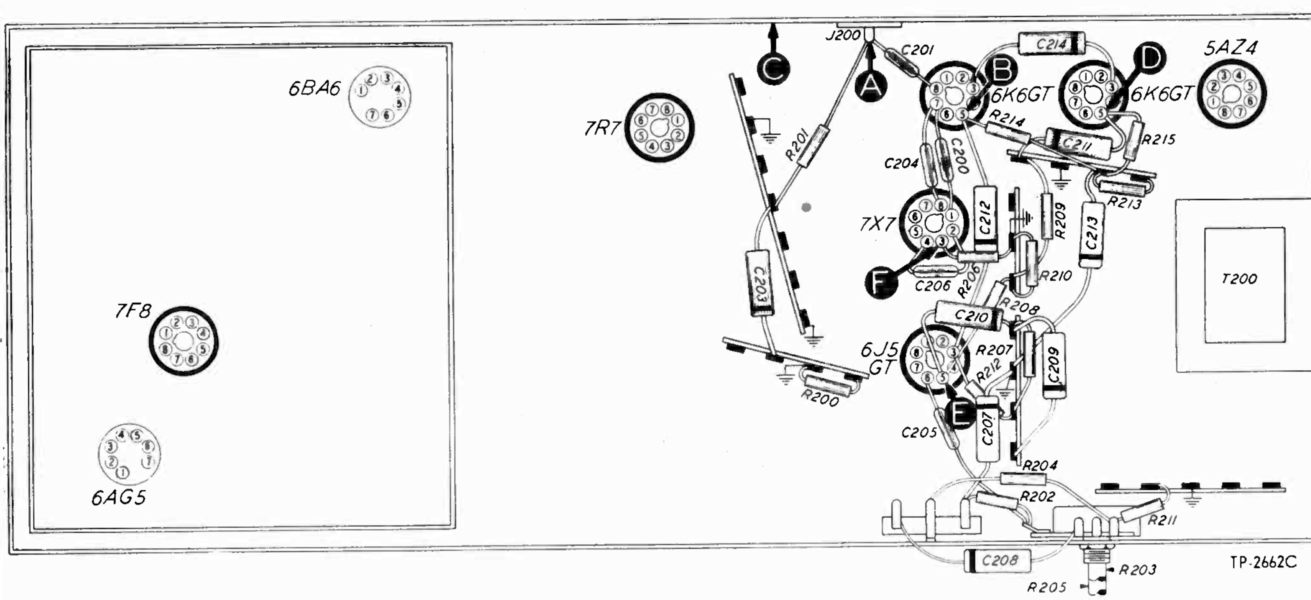


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS.

SECTION 3 – TROUBLE SHOOTING

AM TESTS

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.

Turn the radio VOLUME control to maximum, function switch to BC (broadcast) position, and TONE control fully counterclockwise.

If the "Normal Indication" is obtained in the first step, proceed to the FM tests, or to the tests in Section 4; if not, isolate and remedy the trouble in this section.

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	B	Loud, clear signal with high signal-generator output.	Defective 7R7 tube or Z302. Improperly aligned Z302. Open R313 or R314. Leaky or shorted C322, C321 or C326. Defective switch FS3 (R) or FS2 (R).
3	D	Loud, clear signal with moderate signal-generator output.	Defective or misaligned Z301. Defective 6BA6 tube. Open R306, R304, R305 or C307. Shorted or leaky C308, C309, C307, C311, or C310.
4	A	Loud, clear signal with low signal-generator output.	Defective or misaligned Z300. Shorted or leaky C303, C304, C305. Defective FS4 (R) or FS4 (F). Open R301.
Listening Test		Distorted signal with hum, may be caused by open C307, or C319.	

FM TESTS

Follow the instructions preliminary to the AM test chart, except set the signal-generator frequency to 9.1 mc, and detune to one side or the other until a satisfactory test signal is obtained; set function switch to FM position.

SECTION 3 — *Continued*

The most satisfactory check on the operation of the discriminator circuit is the ability to make proper alignment, as described on pages 14, 15 and 16.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B	Loud, clear signal with high signal-generator output.	Defective 7X7 tube or C325. Open R318. Leaky or shorted C324, C328 or C323. Defective or misaligned Z302.
2	D	Same as step 1.	Same parts as listed in AM tests, step 3.
3	A	Loud, clear signal with low signal-generator output.	Same parts as listed in AM tests, step 4.

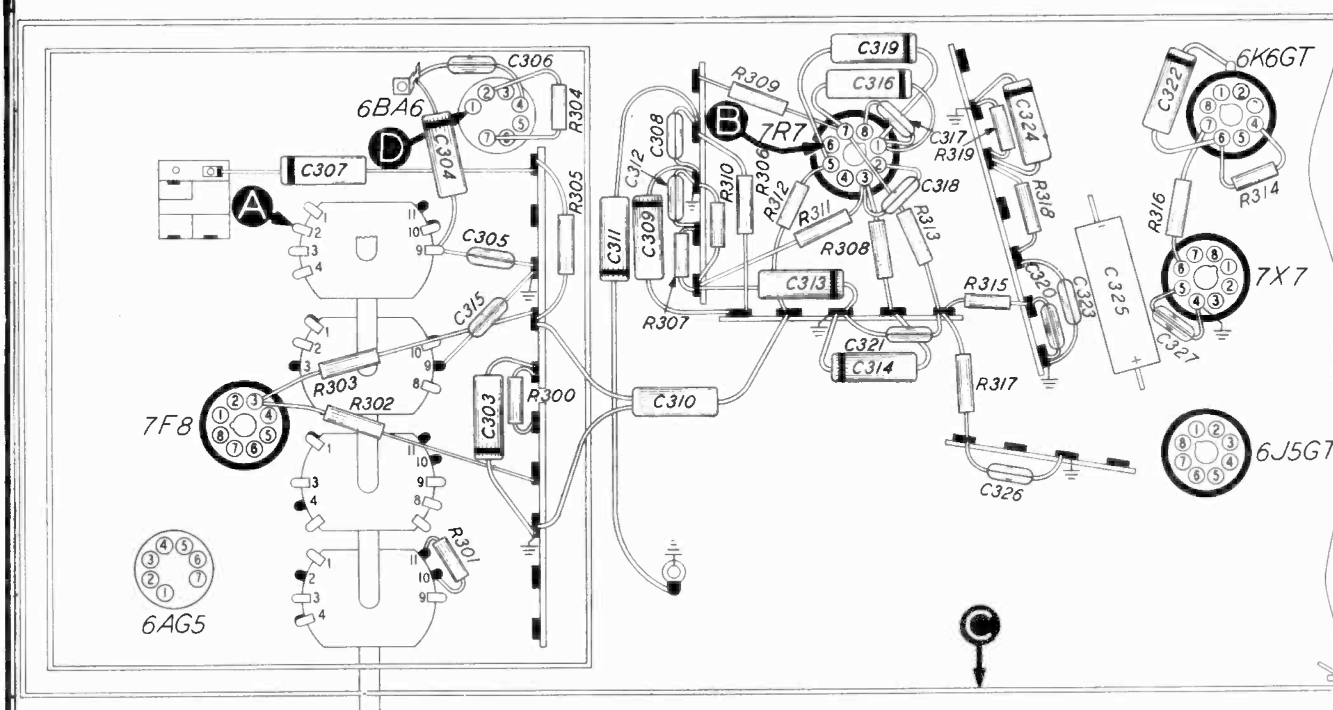


FIGURE 5. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS.

SECTION 4 – TROUBLE SHOOTING

For tests indicated in this section with the exception of oscillator test, use an r-f signal generator with modulated output. 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.

Turn the VOLUME control to maximum and the TONE control to nearly OFF position.

Set the function switch, TUNING control, and signal-generator frequency as indicated in chart.

Oscillator test: (AM tests, step 3, FM tests, step 3). Attach the positive lead of a high-resistance voltmeter to the 7F8 oscillator cathode (pin 4). Connect the negative lead through a 100,000-ohm isolating resistor to the 7F8 oscillator grid (pin 1) test point "D". Use a suitable meter range (0-10 to 0-50 volts).

Absence of negative grid voltage in either AM or FM position of function switch indicates that the oscillator is not functioning; check the parts listed in the chart for the oscillator tests.

AM TESTS

STEP	TEST POINT	SIG. GEN. FREQUENCY	FUNCTION SWITCH AND TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc	BC. Tune to signal from generator.	Loud, clear signal with low generator input.	Trouble in this section. Isolate by the following tests.
2	B	1000 kc	Same as step 1.	Same as step 1.	Defective 7F8 tube, Z300, C400, L406 or R408. Open C303, C402B, R405, R406, R303 or R300. Misaligned Z300. Trouble in oscillator section (step 3).
3	D (Osc. test)	Not used	BC. Rotate 540-1720 kc	Negative 2 to 3 volts.	Defective 7F8 tube, FS3 (F), FS2 (F), C411, C412, C413, C402B, L404 or C400.
4	A	1000 kc	BC. Tune to signal from generator.	Loud, clear signal with low generator input.	Defective L400, C400, C401 or FS1 (R). Open R404 or C410.

FM TESTS

1	E	95 mc	FM. Tune to signal from generator.	Loud, clear signal with low generator input.	Trouble in this section. Isolate by the following tests.

SECTION 4 — *Continued*

STEP	TEST POINT	SIG. GEN. FREQUENCY	FUNCTION SWITCH AND TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
2	B	95 mc	Same as step 1.	Same as step 1.	Same troubles as in AM tests, step 2.
3	D (Osc. test)	Not used	FM. Rotate 88 to 108 mc.	Negative Voltage. Approx. 1 volt.	Defective 7F8 tube, FS3 (R), FS2 (R), C411, C412, C413, C400 or L405.
4	F	95 mc	FM. Tune to signal from generator.	Loud, clear signal with low generator input.	Defective C407, L403, C400, C400B, or FS1 (R).
5	E	95 mc	FM. Tune to signal from generator.	Loud, clear signal with low generator input.	Defective 6AG5 tube, C400, L401 or C400A. Open R400, R401, R402, R403, L402 or C403. Shorted or leaky C408 or C409.

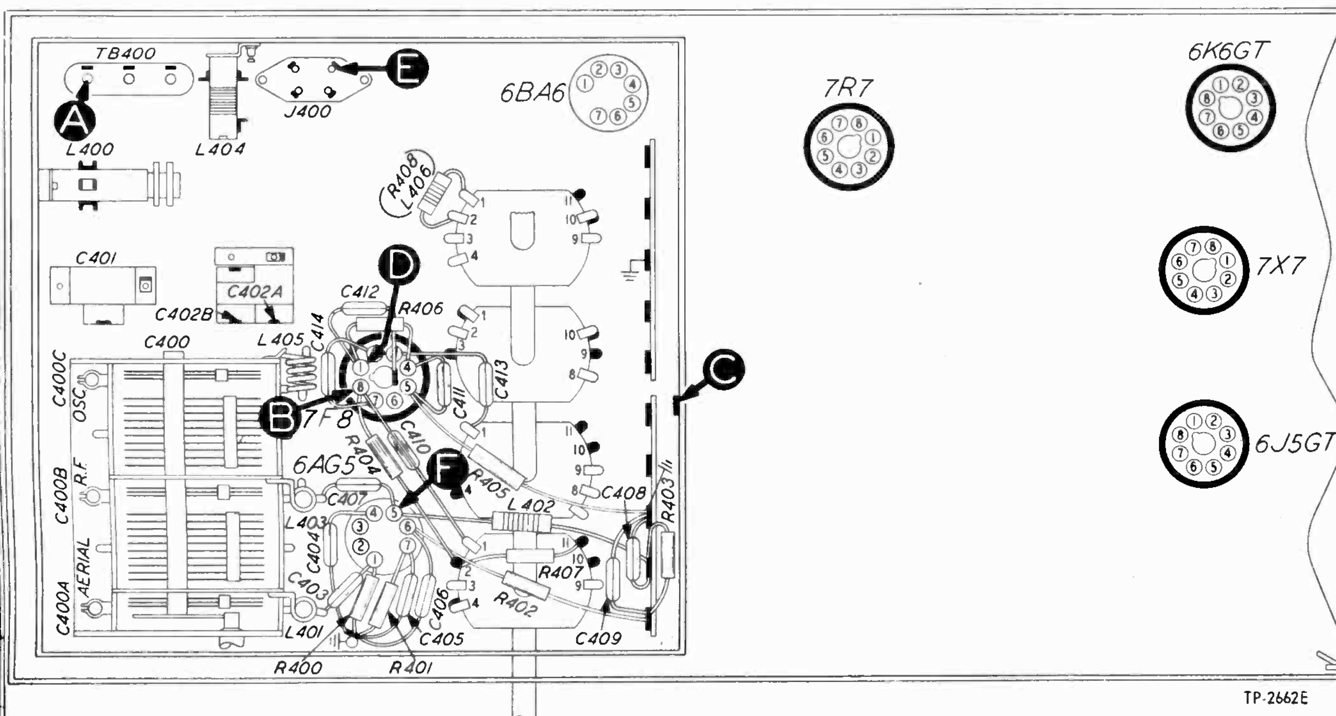


FIGURE 6. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS.

MODEL 47-1227 PHILCO CORP.

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items, and the numbers 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

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 20 mf, high-voltage filter	30-2555*
C103	Condenser, electrolytic	30-2556*
	C301A: condenser, 25 mf, high-voltage filter	Part of C103
	C103B: condenser, 10 mf, isolating filter	Part of C103
I100	Lamp, bin	34-2039*
I101	Lamp, panel	34-2040*
I102	Lamp, panel	34-2040*
J100	Socket, a-c phono power	27-6200
L100	Field, speaker	Part of LS200
R100	Resistor, 165 ohms, 6K6 bias	33-3435-1
R101	Resistor, 15,000 ohms, voltage-dropping	66-3155340*
S100	Switch, power ON-OFF	Part of R205
S101	Bin-light switch	42-1702
S102	Switch, phono a-c power	Part of 42-1803
T100	Transformer, power	32-8248
W100	Cord, line	L-3199

SECTION 2

C200	Condenser, 100 mmf, filament by-pass	60-10105407*
C201	Condenser, 100 mmf, r-f by-pass	60-10105407*
C202	Condenser, 100 mmf, r-f by-pass	60-10105407*
C203	Condenser, .006 mf, audio coupling	45-3500-7*
C204	Condenser, 100 mmf, filament by-pass	60-10105407*
C205	Condenser, 100 mmf, audio by-pass	60-10105407*
C206	Condenser, 100 mmf, plate by-pass	60-10105407*
C207	Condenser, .01 mf, bass compensation	61-0120*
C208	Condenser, .006 mf, audio coupling	45-3500-7*
C209	Condenser, .01 mf, audio by-pass	61-0120*
C210	Condenser, .006 mf, audio coupling	45-3500-7*
C211	Condenser, .006 mf, audio coupling	45-3500-7*
C212	Condenser, .006 mf, audio coupling	45-3500-7*
C213	Condenser, .1 mf, grid phasing	61-0113*
C214	Condenser, .003 mf, audio by-pass	61-0117*
J200	Socket—FM TEST	27-6180
LS200	Speaker	36-1595
PL200	Cable and plug assembly, phono-input	41-3735-2
R200	Resistor, 150,000 ohms, phono grid load	66-4153340*
R201	Resistor, 100,000 ohms, r-f decoupling	66-4103340*
R202	Resistor, 33,000 ohms, bass compensating	66-3333340
R203	Control, VOLUME, 2 meg. (tap at 1 meg.)	33-5535-1
R204	Resistor, 4.7 ohms, audio inverse feedback	66-9473340
R205	Control, TONE, 6 meg.	33-5538-1
R206	Resistor, 10 meg., grid leak, first audio	66-6103340*
R207	Resistor, 220,000 ohms, plate load 7X7	66-4223340*
R208	Resistor, 1 meg., grid load	66-5103340*
R209	Resistor, 4700 ohms, cathode bias	66-2473340*
R210	Resistor, 47,000 ohms, cathode bias	66-3473340*
R211	Resistor, 68 ohms, audio feedback	66-0683340*
R212	Resistor, 56,000 ohms, plate load 6J5	66-356340*
R213	Resistor, 150,000 ohms, grid phasing	66-4153340*
R214	Resistor, 330,000 ohms, grid load	66-4333340*
R215	Resistor, 330,000 ohms, grid load	66-4333340*
T200	Transformer, output	32-8274

SECTION 3

Reference No.	Description	Service Part No.
C303	Condenser, .01 mf, plate decoupling	61-0120*
C304	Condenser, .01 mf, a-v-c decoupling	61-0120*
C305	Condenser, 100 mmf, a-v-c decoupling	60-10105407*
C306	Condenser, 100 mmf, filament by-pass	60-10105407*
C307	Condenser, .01 mf, screen by-pass	61-0120*
C308	Condenser, 100 mmf., plate decoupling	60-10105407*
C309	Condenser, .01 mf, plate decoupling	61-0120*
C310	Condenser, .01 mf, by-pass plate decoupling	30-4641
C311	Condenser, .01 mf, plate decoupling	61-0120*
C312	Condenser, 250 mmf, a-v-c decoupling	60-10255237*
C313	Condenser, .01 mf, a-v-c decoupling	61-0120*
C314	Condenser, .01 mf, a-v-c filter	61-0120*
C315	Condenser, 100 mmf, a-v-c decoupling	60-10105407*
C316	Condenser, .05 mf, cathode by-pass	61-0122*
C317	Condenser, 100 mmf, filament by-pass	60-10105407*
C318	Condenser, 100 mmf, a-v-c coupling	60-10105407*
C319	Condenser, .01 mf, screen by-pass	61-0120*
C320	Condenser, 100 mmf, r-f by-pass	60-10105407*
C321	Condenser, 100 mmf, r-f by-pass	60-10105407*
C322	Condenser, .05 mf, plate decoupling	61-0122*
C323	Condenser, 100 mmf, r-f by-pass	60-10105407*
C324	Condenser, .008 mf, r-f by-pass	61-0174*
C325	Condenser, 5 mf, noise limiter	30-2417*
C326	Condenser, 100 mmf, r-f by-pass	60-10105407*
C327	Condenser, 6 mmf, r-f by-pass	30-1224-9
C328	Condenser, 100 mmf, r-f by-pass	66-10105407*
R300	Resistor, 47,000 ohms, plate load, 7F8	66-3473340*
R301	Resistor, 2.2 meg., a-v-c decoupling	66-5223340*
R302	Resistor, 4700 ohms, plate load	66-2473340*
R303	Resistor, 33,000 ohms, plate load	66-3333340*
R304	Resistor, 68 ohms, cathode bias	66-0683340*
R305	Resistor, 10,000 ohms, screen dropping	66-3103340*
R306	Resistor, 1,000 ohms, plate load	66-2103340*
R307	Resistor, 2.2 meg., a-v-c decoupling	66-5223340*
R308	Resistor, 3.3 meg., a-v-c filter	66-5333340*
R309	Resistor, 150 ohms, cathode bias	66-1153340*
R310	Resistor, 220,000 ohms, a-v-c load	66-4223340*
R311	Resistor, 820,000 ohms, a-v-c load	66-4823340*
R312	Resistor, 33,000 ohms, screen dropping	66-3333340*
R313	Resistor, 330,000 ohms, r-f return	66-4333340*
R314	Resistor, 1000 ohms, plate load	66-2103340*
R315	Resistor, 47,000 ohms, diode decoupling	66-3473340*
R316	Resistor, 47,000 ohms, noise limiter	66-3473340*
R317	Resistor, 100,000 ohms, diode decoupling	66-4103340*
R318	Resistor, 100,000 ohms, FM decoupling	66-4103340*
R319	Resistor, 6.8 meg., discriminator load	66-5683340*
Z300	Transformer, 1st i-f	32-4146*
	C300A: condenser, FM trimmer	Part of Z300
	C300B: condenser, 3000 mmf, AM tuning	Part of Z300
	C300C: condenser, 6 mmf, i-f coupling	Part of Z300
	C300D: condenser, FM trimmer	Part of Z300
	C300E: condenser, AM trimmer	Part of Z300
	TC300, tuning core, AM	Part of Z300
Z301	Transformer, 2nd i-f	32-4156*
	C301A: condenser, FM trimmer	Part of Z301
	C301B: condenser, 300 mmf, AM tuning	Part of Z301
	C301C: condenser, FM trimmer	Part of Z301
	C301D: condenser, AM trimmer	Part of Z301

PHILCO CORP.

MODEL 47-1227

REPLACEMENT PARTS LIST — Continued

SECTION 3 — Continued

Reference No.	Description	Service Part No.
Z302	Transformer, 3rd i-f	32-4147*
	C302A: condenser, 470 mmf, AM tuning	Part of Z302
	C302B: condenser, AM trimmer	Part of Z302
	C302C: condenser, 27 mmf, FM coupling	Part of Z302
	C302D: condenser, FM trimmer	Part of Z302
	C302E: condenser, 25 mmf, FM tuning	Part of Z302
	C302F: condenser, 15 mmf, FM tuning	Part of Z302
	TC302: tuning core, FM tuning	Part of Z302

SECTION 4

Reference No.	Description	Service Part No.
C400	Condenser, tuning gang	31-2703-2
	C400A: condenser, FM aerial trimmer	Part of C400
	C400B: condenser, FM mixer trimmer	Part of C400
	C400C: condenser, FM oscillator trimmer	Part of C400
C401	Condenser, 1500-kc trimmer	31-6473
C402	Condenser trimmer assembly, two-section	31-6475-5
	C402A: condenser, shunt trimmer, BC osc.	Part of C402
	C402B: condenser, series trimmer, BC osc.	Part of C402
C403	Condenser, 51 mmf, FM coupling	60-00515307*
C404	Condenser, 100 mmf, filament by-pass	60-10105407*
C405	Condenser, 100 mmf, cathode by-pass	60-10105407*
C406	Condenser, 100 mmf, screen by-pass	60-10105407*
C407	Condenser, 33 mmf, FM coupling	60-00305307*
C408	Condenser, 1500 mmf, plate by-pass 6AG5	60-20155404*
C409	Condenser, 1500 mmf, screen by-pass 6AG5	60-20155404*
C410	Condenser, 220 mmf, converter coupling	60-10245307*
C411	Condenser, 750 mmf, cathode coupling	60-10755301*
C412	Condenser, 100 mmf, grid by-pass	60-10105407*
C413	Condenser, 220 mmf, osc. coupling	60-10245307*
C414	Condenser, 100 mmf, filament by-pass	60-10105407*
J400	Socket, 4-prong, external aerial	27-6214-1
L400	Coil, BC aerial	32-4033-2
L401	Coil, FM aerial	32-4158
L402	Choke, plate choke	32-4061
L403	Coil, FM r-f	32-4159
L404	Coil, BC oscillator	32-4019-4
L405	Coil, FM oscillator	32-4018-2
L406	Choke, parasitic oscillation suppressor	32-4157
LA400	Loop assembly, broadcast	76-1989
R400	Resistor, 2.2 meg., grid load	66-5223340*
R401	Resistor, 150 ohms, cathode bias	66-1151540
R402	Resistor, 47,000 ohms, screen dropping	66-3473340*
R403	Resistor, 1000 ohms, plate decoupling	66-2103340*
R404	Resistor, 2.2 meg., a-v-c decoupling	66-5223340*
R405	Resistor, 1500 ohms, cathode bias	66-2153340*
R406	Resistor, 15,000 ohms, grid leak	66-3153340*
R407	Resistor, 470,000 ohms, a-v-c decoupling	66-4473340*
R408	Resistor, 1500 ohms, a-v-c parasitic oscillation suppressor	Part of L406
FS	Function switch	42-1803
	FS1, section, function switch	Part of 42-1803
	FS2, section, function switch	Part of 42-1803
	FS3, section, function switch	Part of 42-1803
	FS4, section, function switch	Part of 42-1803
TB400	Terminal panel, aerial	38-9942

MISCELLANEOUS

Description	Service Part No.
Bin-Light Parts:	
Bin-light cable, socket and switch assembly	76-2728
Cord, pull (25-ft. spool)	45-1420*
Lamp, bin-light	34-2039*
Spring, pull-cord	28-8991
Cable assembly	41-3754-5
Cable, shielded	41-3754-11
Cabinet and Cabinet Hardware:	
Loop assembly, BC	76-1989
Spring washer (loop mtg.)	28-4186
Loop assembly, FM	76-2029-9
Washer (2 reqd.)	1W52540FA3
Bin mechanism, left hand	76-2176
Bin mechanism, right-hand	76-2174
Cabinet	10643C
Baffle, wood	219041
Baffle and cloth assembly	40-6770
Bezel, wood	16602
Bolt, speaker-mounting	W1587
Dial-scale plate assembly	76-2005
Frame, mounting assembly	76-2199
Hinge, baffle	45-6200
Lamp bracket	56-2332
Grommet (superstructure mounting)	27-4596
Capacitor mounting wafer	45-6409*
Chassis Mounting Hardware:	
Foot assembly, (4) mounting grommet	54-4122
Nut, "T"	W2502FA3
Washer	W2271FA3
Clip, aerial	28-5002FA1
Clip, BC oscillator	56-4303FA1
Dial-Scale Hardware:	
Cord, pointer-drive (25-ft. spool)	45-1459*
Pointer	56-3179
Scale and backplate assembly	76-2226-3
Mounting screws (4)	1W24894FE11
Spacer (2), scale backplate	56-3279FA3
Rubber band	54-4234
Spring, pointer-drive-cord	28-8953
Grommet (2), superstructure mtg. — sub. and plate assy.	27-4596
Spacer (2), superstructure mtg. — sub. and plate assy.	1W29184FA3
Washer (2)	1W52116FA3
Screw (2)	1W25349FA3
Function switch	42-1803
Function-Switch Hardware:	
Link assembly	76-2186
Phono OFF-ON switch	Part of 42-1803
Shaft	56-3298FA11
Washer, "C"	1W42535FA3
Grommet (3), r-f chassis mounting	54-4295
Knob (4)	54-4105
Lamp, panel (2)	34-2040*
Lamp-socket assembly, panel (2)	76-2109
Washer	1W52237FA3
Record Changer Mounting Parts:	
Bolt (4), changer-mounting	56-3295
Grommet (4), changer-mounting	54-4313
Nut, "T" (4), changer-mounting	1W56643FA3
Palnut (4), changer-mounting	1W29061FA3
Spring (8), changer-mounting	56-3043
Socket (3), Loktal	27-6138*
Socket (1), Loktal (7F8)	27-6213*
Socket (1), Miniature (6BA6)	27-6203-4
Socket (3), octal	27-6199*
Socket (1), Miniature (6AG5)	27-6203-3
Speaker Hardware:	
Bolt, mounting	W1587FA3
Cable and plug assembly	41-3701
Nut (4), speaker-mounting	1W19988FA3
Plug, speaker-cable	27-4419-2

AM ALIGNMENT PROCEDURE

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

RADIO DIAL POINTER: With tuning-condenser plates fully meshed, adjust pointer to coincide with index mark at low-frequency end of scale.

VOLUME CONTROL: Maximum clockwise.

TONE CONTROL: Maximum counterclockwise.

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

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

OUTPUT LEVEL: During alignment, the input signal must be attenuated to hold the output-meter reading below 1.5 volts.

RADIO FUNCTION SWITCH, RADIO DIAL and SIGNAL GENERATOR: Set as indicated in chart.

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

FM ALIGNMENT PROCEDURE

NOTE: Make AM alignment first.

D-C METER: Connect the negative lead of a 20,000-ohms-per-volt meter to pin 6 of the 7X7 tube and the positive lead to chassis (across the 5-mf condenser, C325, in the discriminator circuit). Use 10-volt meter range.

AM SIGNAL GENERATOR: Use modulated output for the entire alignment. The generator must have sufficient output to give a reading of approximately 9 volts on the d-c meter and the signal should be attenuated during the alignment to keep the meter at this value. Connect the generator ground lead to chassis and the output lead as indicated in the chart.

RADIO FUNCTION SWITCH, RADIO DIAL and SIGNAL GENERATOR: Set as indicated in chart. Allow the radio and generator to warm up for 15 minutes before starting the alignment.

NOTE 1: The resonance of the circuits using coils L401, L403, and L405 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 inserted in the coil, compress the turns slightly. If the signal increases when the threaded brass end is inserted, spread the turns. Do not compress or spread the turns excessively; only a small change is required at these frequencies.

NOTE 2: Oscillator coil L405 — Adjust coil for maximum meter reading.

NOTE 3: R-F coil L403 — Adjust coil for maximum meter reading while rocking tuning control.

NOTE 4: Aerial coil L401 — Adjust coil for maximum meter reading.

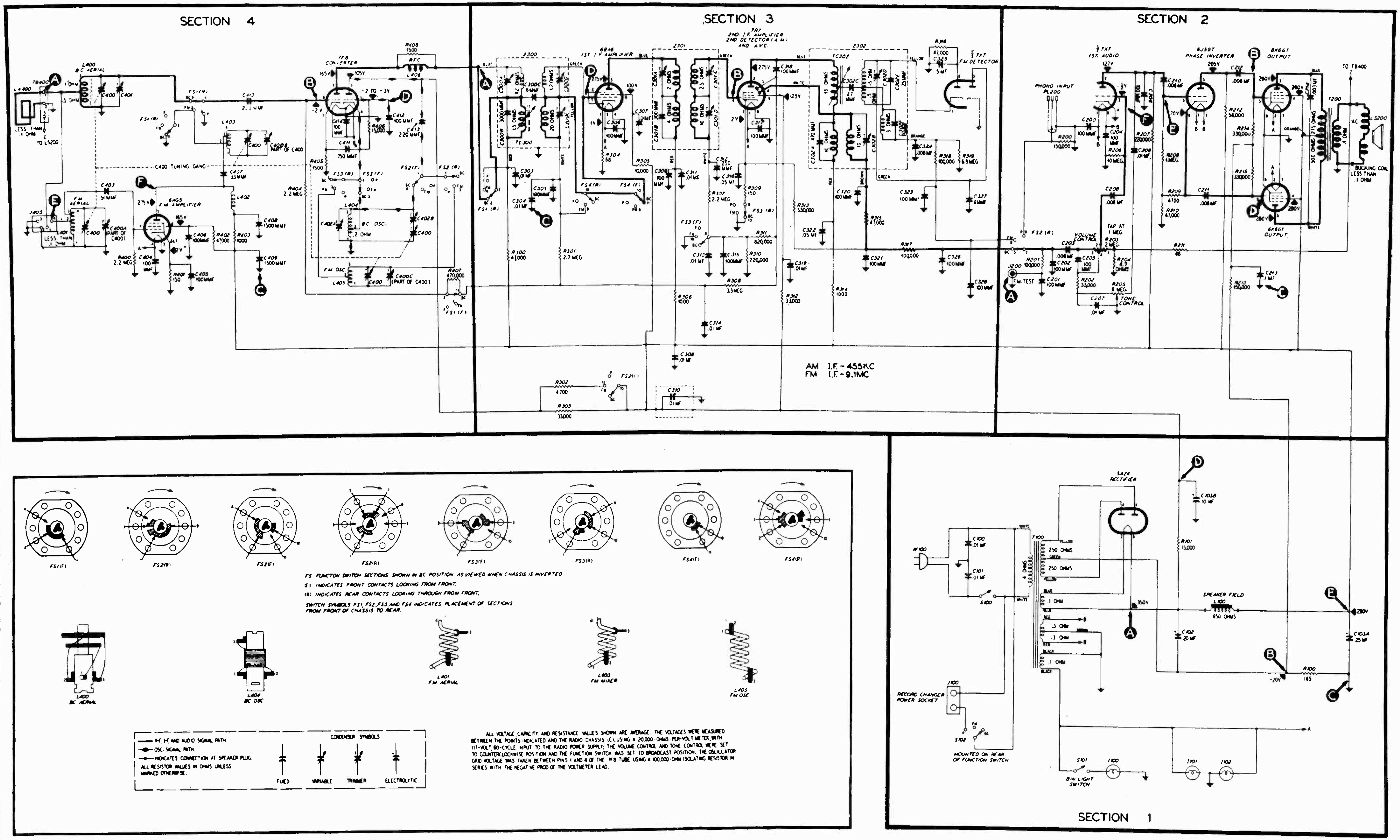


FIGURE 7. PHILCO RADIO-PHONOGRAPH MODEL 47-1227 — COMPLETE SECTIONALIZED SCHEMATIC, SHOWING TEST POINTS.

TP-2662

PHILCO CORP.

AM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	DIAL	FUNCTION SWITCH	DIAL	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf condenser to terminal 1 of TB400	455 kc	BC	540 kc	Adjust for maximum once only in order.	C302B C301D C300E TC300
2	6" coil loosely coupled to loop. See note*	580 kc	BC	580 kc	Adjust for maximum.	C402B
3	Same as step 2	1700 kc	BC	1700 kc	Adjust for maximum.	C402A
4	Same as step 2	1500 kc	BC	1500 kc	Adjust for maximum.	C401
5	Same as step 2	580 kc	BC	580 kc (approx.)	Rock tuning condenser while adjusting for maximum.	C402B
6	Repeat steps 3, 4, 5 and 4 in order until no improvement results.					

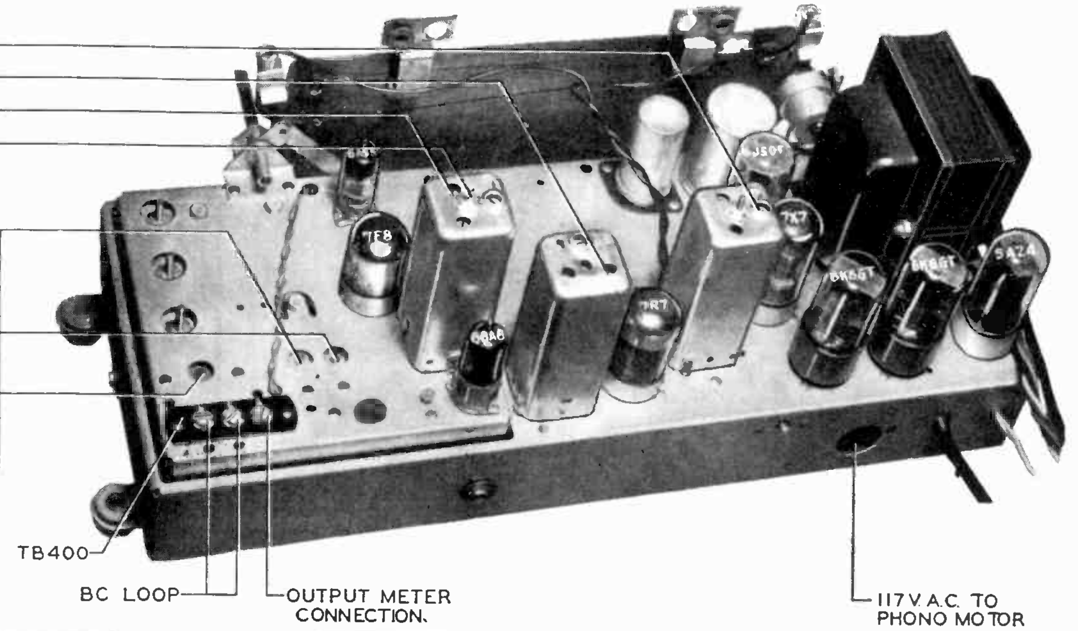


FIGURE 8. CHASSIS VIEW, SHOWING AM TRIMMER LOCATIONS.

TP

FM ALIGNMENT CHART

SIGNAL GENERATOR			RADIO			
STEP	CONNECTIONS TO RADIO	DIAL	FUNCTION SWITCH	DIAL	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf condenser to (pin 1) 6BA6 (test point E)	9.1 mc	FM	88 mc	Attenuate signal to give approximately 9-volt meter reading. Adjust for maximum. Repeat until no further improvement is noticed. After this step, do not touch any of these trimmers except C302D in step 3.	C302D TC302 C301C C301A
2	Through a .1-mf condenser to (pin 8) 7F8 (test point B)	9.1 mc	FM	88 mc	Attenuate signal to give approximately 9-volt meter reading. Adjust for maximum. Repeat until no further improvement is noticed. After this step, do not touch any of these trimmers.	C300D C300A
3	Same as step 2	9.1 mc	FM	88 mc	Double check the adjustment of C302D to make sure that minimum audio output is obtained from the speaker. This is a critical adjustment. Turn trimmer very slowly.	
4	Connect signal generator to terminal 4, J400	105 mc	FM	105 mc	Maximum meter reading. This is the oscillator high-frequency padder adjustment.	C400C
5	Same as step 4	105 mc	FM	105 mc	Max. — rock tuning control.	C400B
6	Same as step 4	105 mc	FM	105 mc	Maximum meter reading.	C400A
7	Same as step 4	92 mc	FM	92 mc	Adjust L405. See notes 1 and 2.	
8	Same as step 4	92 mc	FM	92 mc	Adjust L403. See notes 1 and 3.	
9	Same as step 4	92 mc	FM	92 mc	Adjust L401. See notes 1 and 4.	
10	Repeat steps 4 through 10 until no further increase is obtained.					

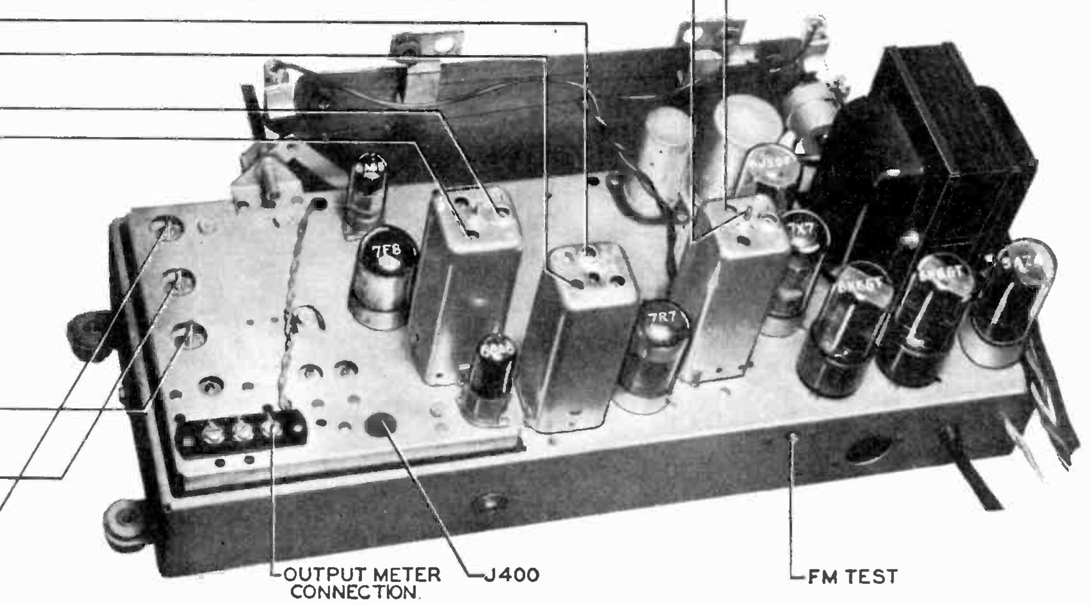
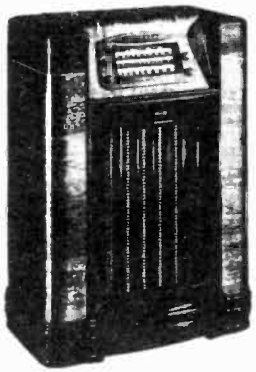


FIGURE 9. CHASSIS VIEW, SHOWING FM TRIMMER LOCATIONS.



CIRCUIT	Nine-tube superheterodyne
FREQUENCY RANGES:	
BROADCAST	540 to 1720 kc.
SHORT WAVE	9.3 to 15.5 mc.
FM	88 to 108 mc.
AUDIO OUTPUT	10 watts
PUSH BUTTONS	Six: Five for broadcast-station selection, one for phono operation
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	110 watts
AERIALS	Built-in cabinet loop, dipole, or external aerial
INTERMEDIATE FREQUENCIES:	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES USED (9)	6AG5, 7F8, 6BA6, 7R7, 7X7, 7AF7, 6V6GT (2), 5Y3GT
RECORD PLAYER	Philco Automatic Record Changer, Model D-10A
PANEL LAMPS (2)	6—8-volt, Part No. 34-2040
BIN LAMP	6—8-volt, Part No. 34-2039

PRELIMINARY CHECKS

Before connecting the radio to a source of power, the following steps are recommended:

1. Inspect both top and bottom of the chassis. Make sure that all tubes are secure in their 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. 8 of 5Y3GT rectifier tube) and the radio chassis. When the ohmmeter test leads are connected in proper polarity, the highest resistance reading will be obtained. If the reading is lower that 50,000 ohms, check condensers C102 and C103 for leakage or shorts.

SYMBOLIZATION AND TERMINOLOGY

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

C—condenser	LA—loop antenna	S—switch
I—pilot lamp	LS—loudspeaker	T—transformer
L—choke or coil	R—resistor	Z—electrical ass'y

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, second detector and/or discriminator, and a.v.c.

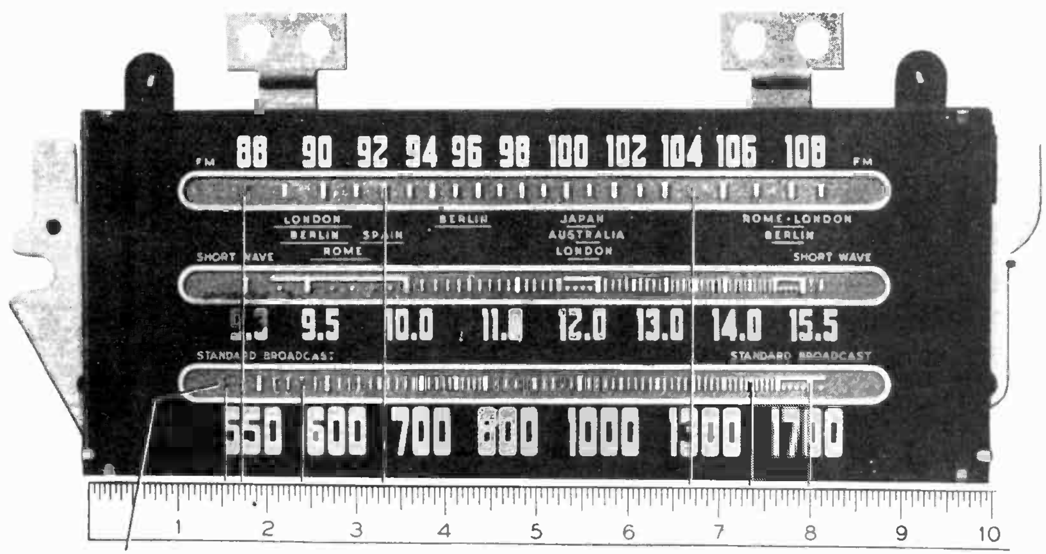
400-series components are in section 4 — the antenna, r-f and oscillator.

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 1. Hold a ruler against the scale 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. When the ruler is correctly placed, the index mark is $1\frac{1}{2}$ inches from the reference point indicated 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.



DIAL-BACKPLATE CALIBRATION MEASUREMENTS

CIRCUIT DESCRIPTION

The radio is designed with three tuning ranges, covering the standard broadcast, short-wave and FM bands by manual tuning. In addition, six push buttons are provided, one for phono-radio switching and five for automatic instant tuning of stations in the broadcast band. The function switch selects manual tuning on the broadcast, short-wave or FM bands, or push-button tuning. The ON-OFF switch is combined with the tone control.

A low-impedance loop within the cabinet provides adequate signal pickup for the broadcast and short-wave bands. In most locations, the built-in FM aerial provides satisfactory reception on the FM band. In areas where FM signals are weak, an outdoor dipole aerial (Philco Part No. 45-1462) will provide additional pickup.

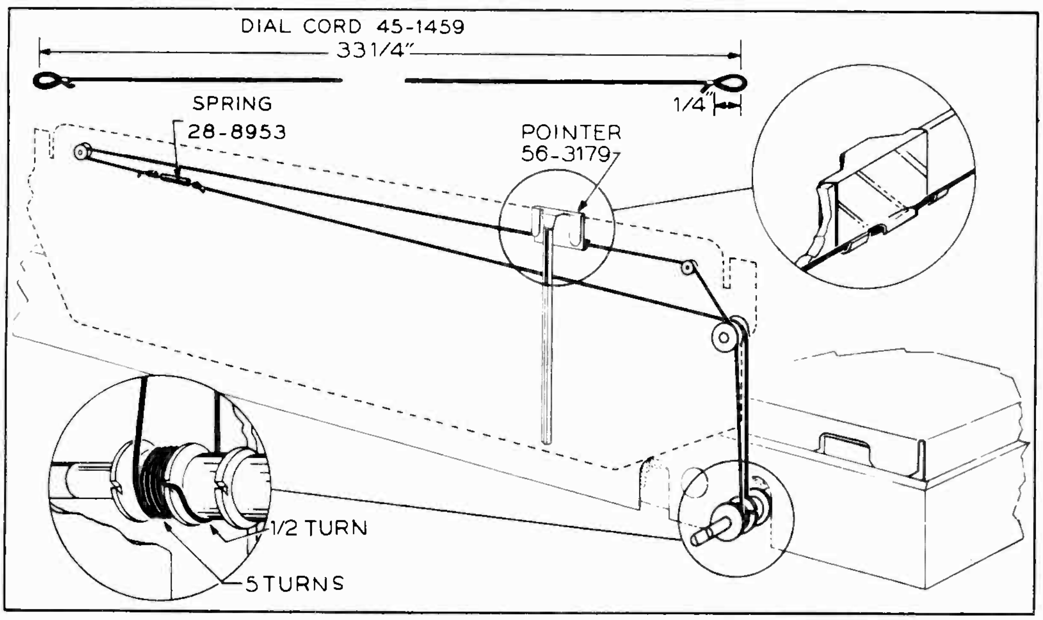
A high-frequency r-f pentode, type 6AG5, is used in the r-f stage (FM only) and a type 7F8 high-frequency dual-triode is employed as a converter. These stages provide high signal-to-noise ratio, high conversion efficiency and good image rejection.

Two transformer-coupled i-f stages are used. The transformers have two sets of windings; one set is tuned to 455 kc for AM reception, the other to 9.1 mc for FM operation. Both primary and secondary FM windings are tuned to provide additional gain at 9.1 mc. A 6BA6 high-frequency pentode is used in the first i-f amplifier stage and the pentode section of a 7R7 high-gain r-f amplifier is used in the second i-f stage. The diode section of the 7R7 is used for AM detection. The high gain achieved in the i-f amplifier at 9.1 mc gives improved FM reception by providing ample signal for proper operation of the FM detector.

A discriminator circuit having improved noise-reducing properties and a superior tuning characteristic is used for FM reception. Greater noise reduction on FM is achieved by preventing short-time amplitude variations across the secondary of the discriminator transformer. The two diodes of a 7X7 tube are connected in series with the secondary, with a large condenser (5 mf) connected across the output circuit of the diodes. As a result of the high current which flows to this condenser whenever the diodes conduct in series, amplitude variations across the secondary are dissipated.

The high-mu triode section of the 7X7 tube is used in the first audio stage. The output of this stage is applied to one section of a dual-triode 7AF7 tube which operates as a phase inverter to drive the two 6V6GT push-pull output tubes. When the PHONO push button is depressed, the cathode circuit of the second i-f amplifier is opened and the other section (phono preamplifier) of the 7AF7 tube is connected to the volume-control circuit in the input of the 7X7 tube.

The push-pull audio-output stage furnishes approximately 10 watts output to the 12-inch electrodynamic loudspeaker.



POINTER-DRIVE-CORD INSTALLATION DETAILS.

SECTION 1 – TROUBLE SHOOTING

CAUTION: Do not turn on power with speaker disconnected, as this may cause damage to the set.

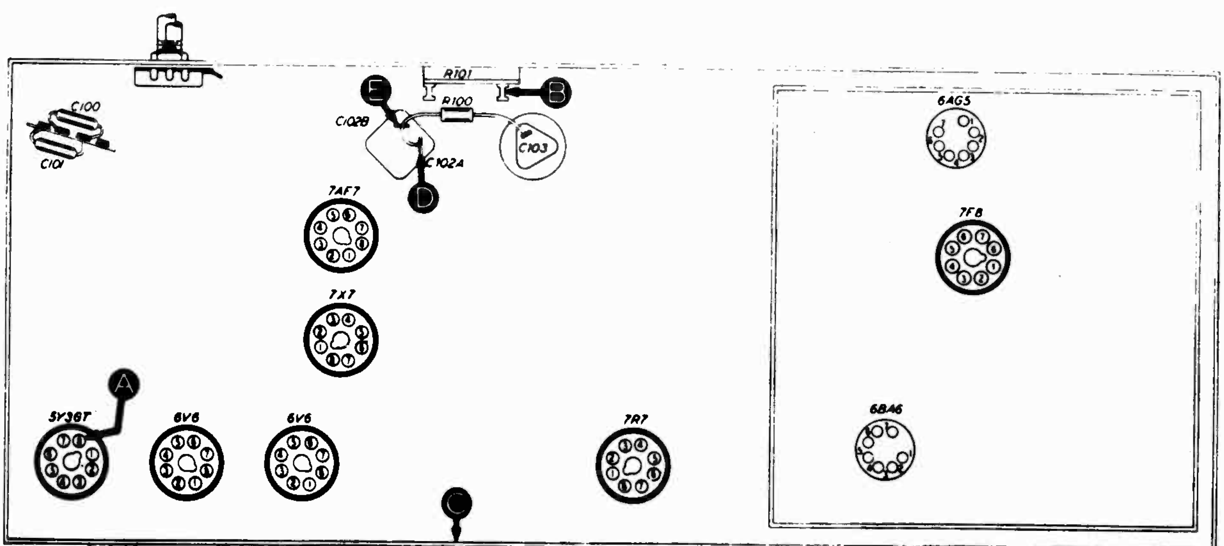
Make the tests for this section with a d-c voltmeter, connecting the leads to the test points indicated in the chart and in figure 3. The voltages given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts a.c.

With function switch set to push-button position, turn volume control to minimum and tone control to nearly off position.

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

It will be noted that certain parts in other sections of the radio are listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION", since they may produce abnormal voltage readings in Section 1.

STEP	TEST POINTS	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E to C D to C	240 volts 190 volts	No voltage or incorrect voltage	Trouble in this section. Isolate by the following tests.
2	A to C	310 volts	No voltage Low voltage High voltage	Defective 5Y3GT; T100, S100, W100, L100. Shorted C103. Open R100. Defective 5Y3GT, C103, C102A, C419, C314. Open R100, L100, or T200.
3	B to C	Negative 16 volts	Low or no voltage High voltage	Shorted R101. Open R101.
4	D to C	190 volts	No voltage Low voltage High voltage	Open R100. Shorted C102A. Leaky C102A, C103. Defective C419. Open L100, T200.
5	E to C	240 volts	No voltage Low voltage High voltage	Open L100. Shorted C103. Shorted or leaky C102B, C216. Shorted L100. Open R100, T200.
Listening test			Abnormal hum may be caused by open C102A or C103.	



BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS.

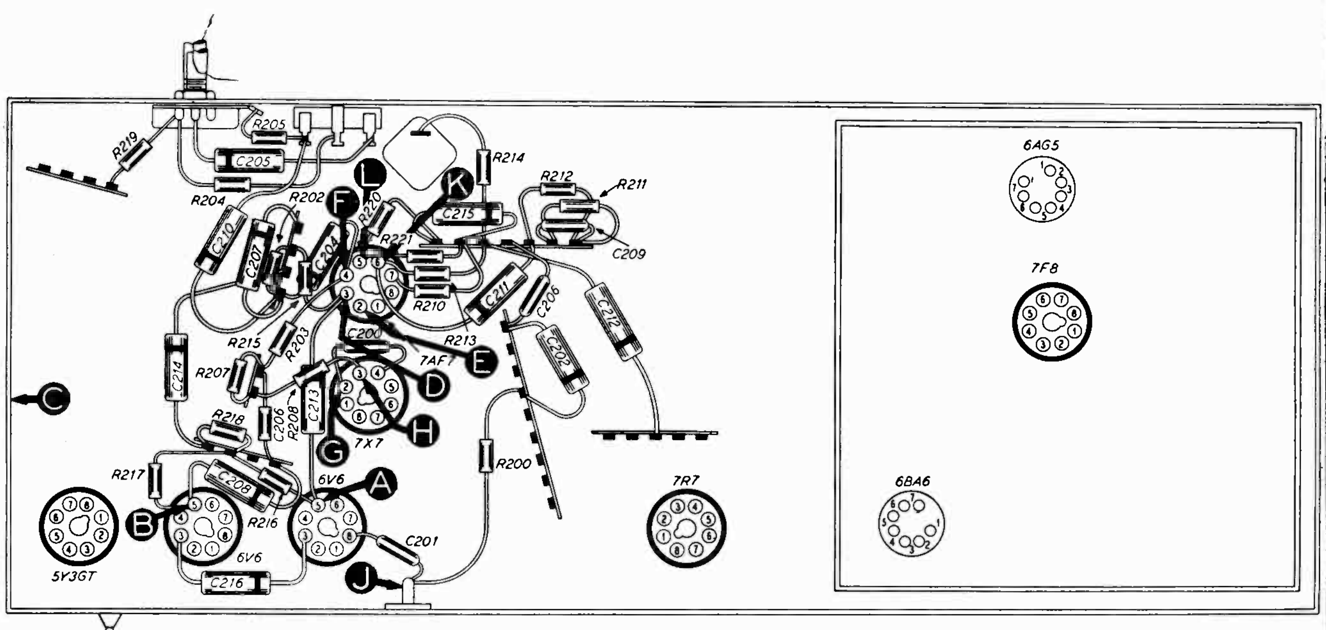
SECTION 2 – TROUBLE SHOOTING

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 radio volume control at maximum, tone control at nearly off position and depress the PHONO push button. 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 remedy the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	L J	Loud, clear signal with weak signal input	Trouble within this section. Isolate by the following tests.
2	A (7AF7 tube removed)	Loud, clear signal with strong signal input	Defective 6V6GT tube, T200 or LS200. Shorted or leaky C216 or C213.
3	B	Loud, clear signal with strong signal input	Defective 6V6GT tube. Shorted or leaky C208.
4	D	Loud, clear signal with strong signal input	Open C213, R215, R216.
5	E	Loud, clear signal with strong signal input	Open C208 or R217.
6	F (7AF7 tube replaced)	Clear signal, louder than preceding test	Defective 7AF7 tube, C204, R203, R206, R207.
7	G	Clear signal, same volume as step 6	Defective C200, R202. Open C204.
8	H	Loud, clear signal with moderate signal input	Defective 7X7 tube, C205, C308. Open R208.
9	J	Loud, clear signal with moderate signal input	Open R200, C202. Shorted C201, C203. Defective R201 (rotate through entire range).
10	K	Loud, clear signal with moderate signal input	Defective C211, C212.
11	L	Loud, clear signal with weak signal input	Defective 7AF7 tube, push button PB1. Shorted C215.



BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS.

SECTION 3 – TROUBLE SHOOTING

AM TESTS

For the following tests us an r-f signal generator with modulated output set at 455 kc. Connect the generator ground lead to the radio chassis, test point "C", and connect the output lead through a .1-mf condenser to the test points indicated.

Turn the radio volume control to maximum, tone control to nearly off position and set function switch to push-button position.

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

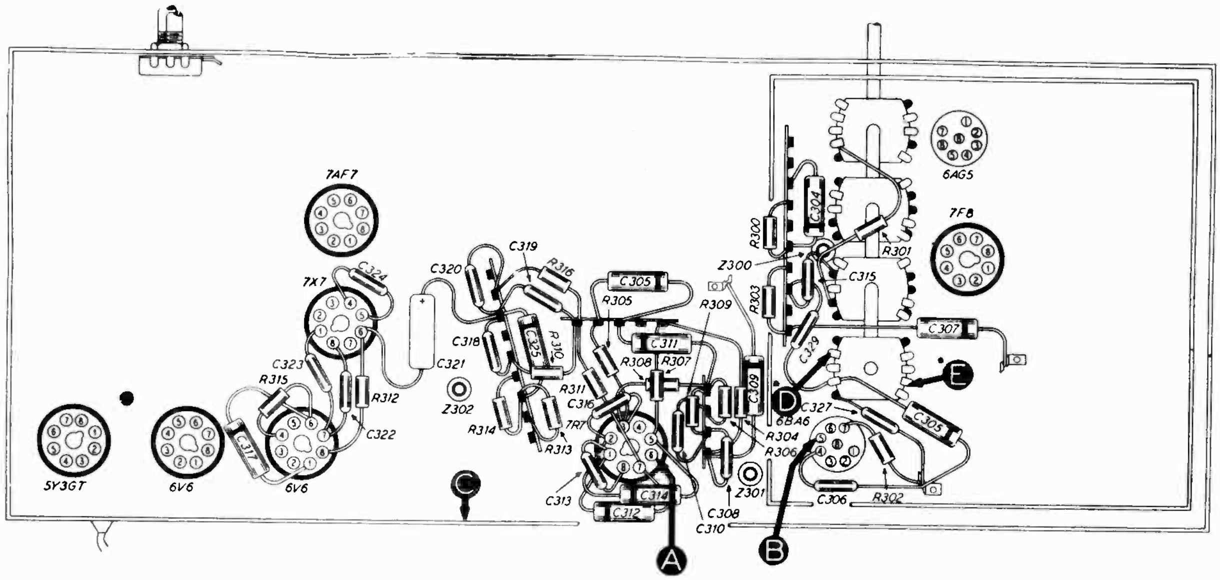
STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	Loud, clear signal with low signal-generator input	Trouble within this section. Isolate by the following tests.
2	A	Normal signal with moderate input	Defective 7R7 tube, 7X7 tube, Z302. Improperly aligned Z302. Defective C314, C419, C317, C310, C311, C315, C312, C314, C328, FS4 (F).
3	B	Same as step 2.	Defective C308, C309. Defective or improperly aligned Z301.
4	D	Much stronger signal than in step 3; decrease input to obtain normal signal	Defective 6BA6 tube, C307. Open R303, R302, FS4 (R), C303, C305.
5	E	Approximately the same strength signal as in step 4	Defective C304, FS4 (R). Defective or improperly aligned Z300.
	Listening test with station tuned in	Normal, clear reception	Distorted signal with hum: defective R316 or FS4 (F). Intense hum or motorboating: open C419 or C328.

NOTE: Test points marked with an asterisk (*) on the base view are physically located in a different position from the same test points on the corresponding section of the main schematic. However, both test points are electrically identical, but the one shown on the base view has been chosen for greatest accessability during servicing procedure.

FM TESTS

Set the function switch to FM position and follow the instructions preliminary to the AM tests 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.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Normal signal with moderate input	Defective or improperly aligned Z302. Defective FS4 (F).
2	B	Same strength signal as in step 1	Defective Z301.
3	D	Much stronger signal than in step 2; decrease input to obtain normal signal	Same parts listed in AM section, step 4.
4	E	Approximately the same strength signal as in step 3	Defective Z300 or any other part listed in AM section, step 5.



BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS.

SECTION 4 – TROUBLE SHOOTING

For tests indicated in this section, with the exception of oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to the radio chassis, test point "C", and connect the output lead through a .1-mf condenser to the test points indicated.

Turn the radio volume control to maximum and tone control to nearly off position.

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

For oscillator tests (AM test chart, step 3; FM test chart, step 3) attach the positive lead of a high-resistance voltmeter to the 7F8 oscillator cathode, test point "E" (pin 4). Connect the negative lead through a 100,000-ohm isolating resistor to the 7F8 oscillator grid (pin 1), test point "F". Use a suitable meter range (0—10 volts).

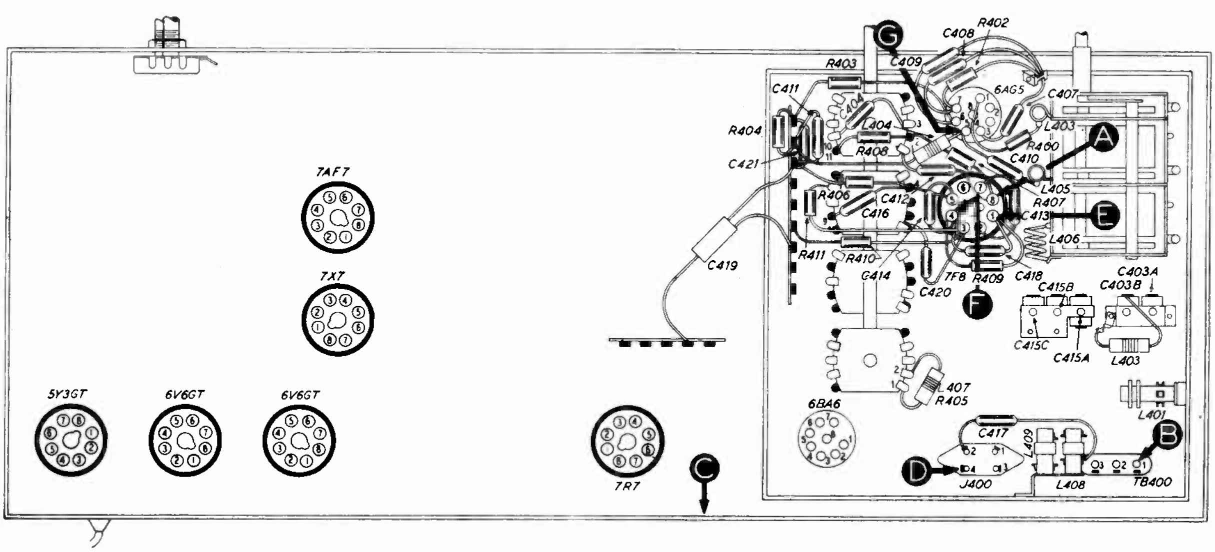
Absence of negative grid voltage in either AM or FM position of function switch indicates that the oscillator is not working; check the parts listed in the chart for the oscillator tests.

FM TESTS

STEP	TEST POINT	SIG. GEN. SETTING	FUNCTION SWITCH AND TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	D	95 mc	FM. Tune to signal from generator	Loud, clear signal with low signal input.	Trouble in this section. Isolate by the following tests.
2	A	95 mc	Same as step 1	Same as step 1	Defective 7F8 tube, C412, C414, C413, FS4 (R), R406. Defective or misaligned Z300. Trouble in FM oscillator circuit (step 3).
3	E to F (osc. test)	Not used	FM. Tune through range	Negative approx. 3 volts	Defective 7F8 tube, FS2 (F), FS2 (R), FS3 (R), L406
4	G	95 mc	FM. Tune to signal from generator	Loud, clear signal with moderate signal input	Defective FS1 (R), C410, C411, C421, L404, L405.
5	D	95 mc	FM. Tune to signal from generator	Loud, clear signal with low signal input	Defective 6AG5 tube, C406, C408, C409, L403.

AM TESTS

STEP	TEST POINT	SIG. GEN. SETTING	FUNCTION SWITCH AND TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	B	1000 kc	BC (dial). Tune to signal from generator	Loud, clear signal with low generator input	Trouble in this section. Isolate by the following tests.
2	A	1000 kc	Same as step 1	Same as above	Defective 7F8 tube, C412, C414, C413, FS4 (R), R406. Open R300, R405. Shorted or leaky C304. Defective or misaligned Z300. Trouble in oscillator circuit (step 3).
3	E to F (osc. test)	Not used	BC. Tune through range	Negative approx. 3 volts	Defective 7F8 tube, C413, C414, C417, FS2 (F), FS2 (R), FS3 (R), R409. Shorted or leaky C419. Defective L408, C420.
4	B	1000 kc	BC (dial). Tune to signal from generator	Loud, clear signal with low generator input	Defective L401, FS3 (R), FS1 (R), C412.
5	B	Through range of each push button	PB. Operate each push button	Same as above	Defective FS3 (R), FS1 (R), PB 2, 3, 4, 5, 6. Trouble in push-button oscillator circuit (step 6).
6	E to F (osc. test)	Not used	PB. Operate each button		Defective 7F8 tube, FS2 (F), FS2 (R), L400 A, B, C, D, E or PB 2, 3, 4, 5, 6. C401, C402 or R400.
7	B	12 mc	SW. Tune to signal from generator		Defective FS1 (R), FS3 (R), L402, C404 or trouble in short-wave oscillator circuit (step 8).
8	E to F (osc. test)	Not used	SW. Tune through range	Negative approx. 3 volts	Defective 7F8 tube, FS2 (F), FS2 (R), FS3 (R), L408.



BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS.

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AM ALIGNMENT PROCEDURE

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.

CONNECT OUTPUT METER between terminal 3 (voice-coil connection) of aerial terminal board and chassis.

ADJUST RADIO DIAL POINTER, with tuning-condenser plates fully meshed, to make pointer coincide with index mark at low-frequency end of scale.

CONNECT AM SIGNAL GENERATOR ground lead to radio chassis; connect output lead as indicated in chart.

SET VOLUME CONTROL at maximum and TONE CONTROL at nearly off position.

SET SIGNAL GENERATOR, RADIO FUNCTION SWITCH and RADIO DIAL as indicated in chart.

OUTPUT LEVEL: During alignment, the input signal must be attenuated to hold the output-meter reading below 1.5 volts.

NOTE: Make up a coil of wire, using 6 or 8 turns, about 6 inches in diameter; connect the signal-generator leads and suspend near the radio broadcast loop.

FM ALIGNMENT PROCEDURE

NOTE: Make AM alignment first.

Connect the negative lead of a 20,000-ohms-per-volt, d-c meter, to pin 6 of the 7X7 tube and the positive lead to ground (across the 5-mf condenser, C321, in the discriminator circuit). Use 10-volt range.

Use an r-f signal generator with MODULATED output for the entire alignment. The generator must have sufficient output to give a meter reading greater than 8.5 volts; the reading on the meter should be kept at approximately 9 volts throughout the alignment. Connect the generator ground lead to chassis and the output lead as indicated in the chart.

Set the function switch to FM position. Allow the radio and generator to warm up 15 minutes before starting the alignment.

NOTE: The resonance of the circuits using coils L403, L405 and L406 may be checked by the use of a powdered-iron tuning core, such as Philco Part No. 56-6100. If the signal strength (meter reading) increases when the iron end is inserted in the coil, compress the turns slightly. If the signal increases when the threaded brass end is inserted, spread the turns.

Do not spread or compress turns excessively, since only a small change is required at these frequencies.
Oscillator coil L406: Adjust coil for maximum meter reading.
R-F coil L405: Adjust coil for maximum meter reading while rocking tuning control.
Aerial coil L403: Adjust coil for maximum meter reading.

SETTING THE PUSH BUTTONS

1. Connect the output meter between terminal no. 3 on aerial terminal board and radio chassis.
2. Turn the radio volume control to maximum and the tone control counterclockwise to nearly OFF position.
3. Turn the radio function switch to PB position.
4. Couple the signal generator loosely through a coil of wire to the radio loop aerial, as described in AM alignment Procedure above.
5. Turn on the power and allow the radio to warm up for 15 minutes before starting the adjustments.
6. Starting with the lowest frequency desired, set the signal-generator frequency, push the button, and adjust the associated oscillator tuning core and aerial trimmer 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.
7. Reset the signal-generator frequency and repeat the procedure for each remaining push button.
8. 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.

PUSH-BUTTON (Left to right from front)	FREQUENCY RANGE	OSCILLATOR TUNING CORE	AERIAL TRIMMER
Phono	....	....	....
PB1	540-1000 kc	L400A	C400A
PB2	600-1200 kc	L400B	C400B
PB3	650-1300 kc	L400C	C400C
PB4	850-1500 kc	L400D	C400D
PB5	900-1600 kc	L400E	C400E

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NOTE: Parts marked with an asterisk (*) are general replacement items, and the numbers 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 radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No." in this parts list.

SECTION 1

Reference No.	Description	Service Part No.
C100	Condenser, .01 mf, line filter	61-0120*
C101	Condenser, .01 mf, line filter	61-0120*
C102	Condenser, two section, electrolytic	30-2570-11
	C102A: condenser, 25 mf, electrolytic, power-supply filter	Part of C102
	C102B: condenser, 25 mf, electrolytic, power-supply filter	Part of C102
C103	Condenser, 20 mf, electrolytic, screen-supply filter	30-2555
C104	Condenser, 100 mmf, r-f by-pass	60-10105237*
I100	Lamp, panel	34-2040
I101	Lamp, panel	34-2040
I102	Lamp, bin-light	30-2039
L100	Field, speaker	Part of LS200
R100	Resistor, 15,000 ohms, isolating	66-3155340
R101	Resistor, 135 ohms, bias	33-3435-2
T100	Transformer, power	32-8248
S100	Switch, power on-off	Part of R209
S101	Switch, bin light	42-1702
W100	Cord, line	L3351

SECTION 2

Reference No.	Description	Service Part No.
C200	Condenser, 100 mmf, plate r-f by-pass	60-10105237*
C201	Condenser, 100 mmf, r-f by-pass	60-10105237*
C202	Condenser, .006 mf, audio coupling	45-3500-7*
C203	Condenser, 100 mmf, r-f by-pass	60-10105237*
C204	Condenser, .006 mf, audio coupling	45-3500-7*
C205	Condenser, .006 mf, audio coupling	45-3500-7*
C206	Condenser, 100 mmf, r-f by-pass	60-10105237*
C207	Condenser, .01 mf, audio by-pass	61-0120*
C208	Condenser, .006 mf, cathode by-pass	45-3500-7*
C209	Condenser, 100 mmf, r-f by-pass	60-10105237*
C210	Condenser, .01 mf, audio by-pass	61-0120*
C211	Condenser, .01 mf, audio by-pass	61-0120*
C212	Condenser, .2 mf, audio by-pass	45-3500-3*
C213	Condenser, .006 mf, audio coupling	45-3500-7*
C214	Condenser, .2 mf, audio by-pass	45-3500-3*
C215	Condenser, .001 mf, r-f by-pass	45-3500-5*
C216	Condenser, .003, high-frequency cut	61-0117*
J200	Socket, FM test	27-6180*
R200	Resistor, 100,000 ohms, decoupling	66-4103340*
R201	Control, volume, 2 megohms	33-5535-1
R202	Resistor, 220,000 ohms, plate dropping	66-4223340*
R203	Resistor, 1 megohm, grid	66-5103340*
R204	Resistor, 4.7 ohms, degeneration	66-9473340*
R205	Resistor, 33,000 ohms, bass compensation	66-3333340*
R206	Resistor, 4700 ohms, cathode	66-2473340*
R207	Resistor, 47,000 ohms, decoupling	66-3473340*
R208	Resistor, 2 megohms, grid	66-6103340*
R209	Control, tone, 4 megohms	33-5538-1
R210	Resistor, 6800 ohms, cathode	66-2683340*
R211	Resistor, 150,000 ohms, decoupling	66-4153340*
R212	Resistor, 220,000 ohms, decoupling	66-4223340*
R213	Resistor, 150,000 ohms, plate dropping	66-4153340*
R214	Resistor, 47,000 ohms, decoupling	66-3473340*
R215	Resistor, 56,000 ohms, plate dropping	66-3563340*
R216	Resistor, 330,000 ohms, grid	66-4333340*
R217	Resistor, 330,000 ohms, grid	66-4333340*
R218	Resistor, 150,000 ohms, bias filter	66-4153340*
R219	Resistor, 68 ohms, degeneration	66-0683340*
R220	Resistor, 220,000 ohms, decoupling	66-4223340*
R221	Resistor, 4.7 megohms, decoupling	66-5473340*

SECTION 2 (Continued)

Reference No.	Description	Service Part No.
T200	Transformer, output	32-8274
LS200	Loudspeaker	36-1595

SECTION 3

Reference No.	Description	Service Part No.
C303	Condenser, .01 mf, r-f by-pass	61-0120*
C304	Condenser, .01 mf, plate r-f by-pass	61-0120*
C305	Condenser, .01 mf, a-v-c filter	61-0120*
C306	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C307	Condenser, .01 mf, screen r-f by-pass	61-0120*
C308	Condenser, 100 mmf, plate r-f by-pass	60-10105237*
C309	Condenser, .01 mf, plate r-f by-pass	61-0120*
C310	Condenser, 250 mmf, r-f by-pass	60-10255237*
C311	Condenser, .01 mf, a-v-c filter	61-0120*
C312	Condenser, .05 mf, cathode by-pass	61-0170*
C313	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C314	Condenser, .01 mf, screen r-f by-pass	61-0120*
C315	Condenser, 100 mmf, a-v-c r-f by-pass	60-10105237*
C316	Condenser, 100 mmf, plate r-f by-pass	60-10105237*
C317	Condenser, .05 mf, plate r-f by-pass	61-0170*
C318	Condenser, 100 mmf, r-f by-pass	60-10105237*
C319	Condenser, 100 mmf, r-f by-pass	60-10105237*
C320	Condenser, 100 mmf, r-f by-pass	60-10105237*
C321	Condenser, 5 mf, electrolytic, discriminator	30-2417
C322	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C323	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C324	Condenser, 6 mmf, discriminator	30-1224-9
C325	Condenser, .008 mf, r-f by-pass	61-0174*
C326	Condenser, 100 mmf, r-f by-pass	60-10105237*
C327	Condenser, 100 mmf, r-f by-pass	60-10105237*
C328	Condenser, .01 mf, B bus by-pass	61-0120*
C329	Condenser, 100 mmf, r-f by-pass	60-10105237*
R300	Resistor, 47,000 ohms, plate dropping	66-3473340*
R301	Resistor, 2.2 megohms, decoupling	66-5223340*
R302	Resistor, 68 ohms, cathode	66-0683340*
R303	Resistor, 27,000 ohms, screen dropping	66-3273340*
R304	Resistor, 1000 ohms, decoupling	66-2103340*
R305	Resistor, 3.3 megohms, a-v-c filter	66-5333340*
R306	Resistor, 150 ohms, cathode	66-1153340*
R307	Resistor, 68,000 ohms, screen dropping	66-3683340*
R308	Resistor, 820,000 ohms, a.v.c.	66-4823340*
R309	Resistor, 220,000 ohms, a.v.c.	66-4223340*
R310	Resistor, 47,000 ohms, diode load	66-3473340*
R311	Resistor, 330,000 ohms, diode load	66-4333340*
R312	Resistor, 47,000 ohms, discriminator	66-3473340*
R313	Resistor, 6.8 megohms, discriminator	66-5683340*
R314	Resistor, 100,000 ohms, discriminator	66-4103340*
R315	Resistor, 1000 ohms, decoupling	66-2103340*
R316	Resistor, 100,000 ohms, decoupling	66-4103340*
Z300	Transformer, 1st i-f	32-4146
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
	C300C: condenser, 3000 mmf	Part of Z300
	C300D: condenser, trimmer	Part of Z300
	C300E: condenser, 6 mmf, coupling	Part of Z300
Z301	Transformer, 2nd i-f	32-4156
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, trimmer	Part of Z301
	C301C: condenser, 300 mmf	Part of Z301
	C301D: condenser, trimmer	Part of Z301
Z302	Transformer, AM detector/FM discriminator	32-4147
	C302A: condenser, 27 mmf	Part of Z302
	C302B: condenser, trimmer	Part of Z302
	C302C: condenser, 25 mmf	Part of Z302
	C302D: condenser, 470 mmf	Part of Z302
	C302E: condenser, trimmer	Part of Z302

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SECTION 4

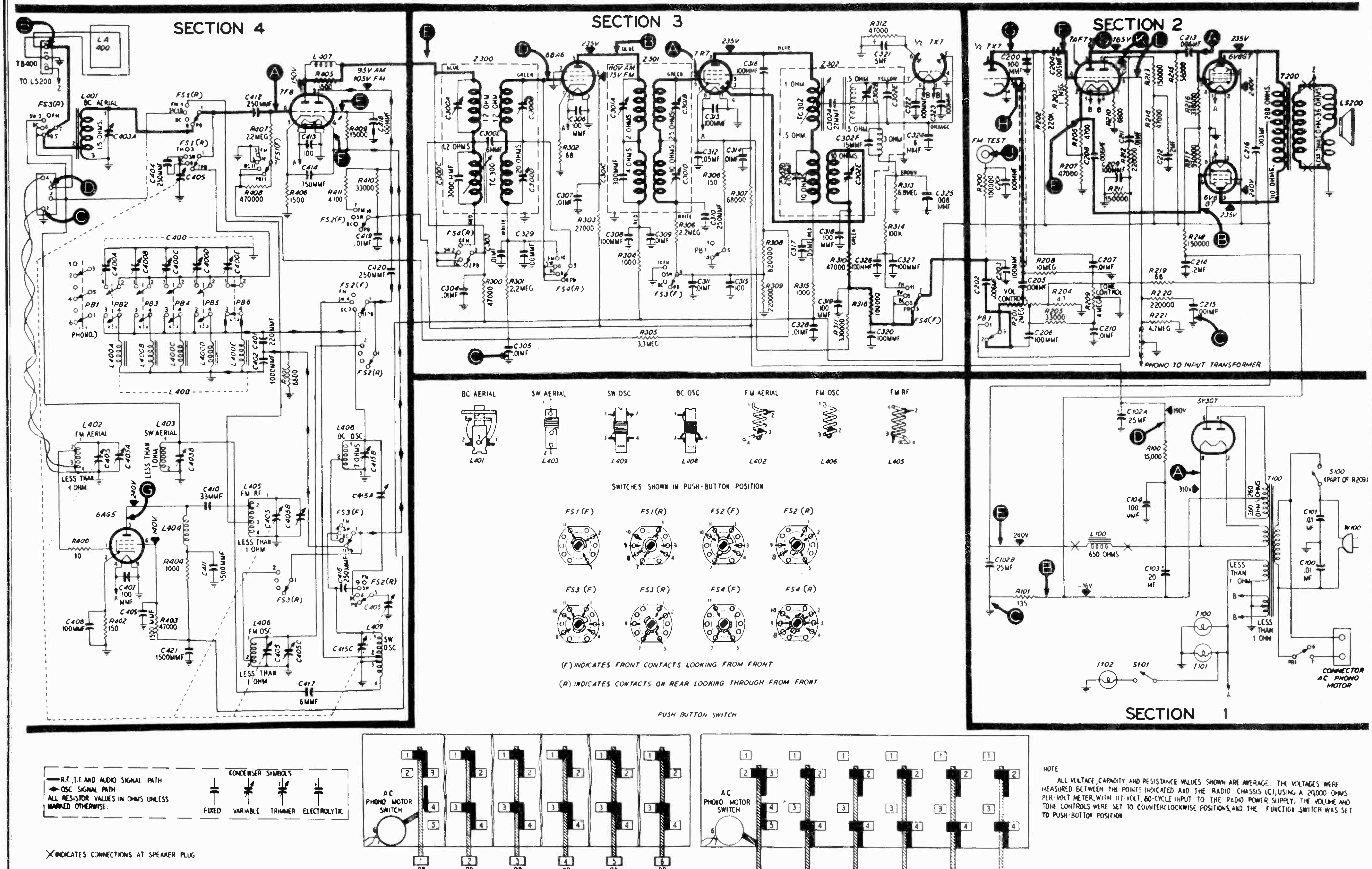
Reference No.	Description	Service Part No.
C400	Push-button padder-strip assembly	31-6479-1
	C400A, B, C, D, and E: condensers	Part of C400
C401	Condenser, 220 mmf, r-f voltage divider	30-1224-4
C402	Condenser, 1000 mmf, r-f voltage divider	30-1224-15
C403	Condenser, 2-section, trimmer	31-6476
	C403A: condenser, shunt trimmer, BC aerial	Part of C403
	C403B: condenser, shunt trimmer, SW aerial	Part of C403
C404	Condenser, 250 mmf, spread tuning, SW aerial coil	60-10255237*
C405	Condenser, main tuning gang	31-2703-2
	C405A: condenser, FM aerial coil trimmer	Part of C405
	C405B: condenser, FM r-f coil trimmer	Part of C405
	C405C: condenser, FM osc. coil trimmer	Part of C405
C407	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C408	Condenser, 100 mmf, r-f by-pass	60-10105237*
C409	Condenser, 1500 mmf, screen r-f by-pass	60-20155404*
C410	Condenser, 33 mmf, r-f coupling SW osc. coil	30-1223-6* 60-10255237*
C411	Condenser, 1500 mmf, r-f by-pass	60-20155404*
C412	Condenser, 250 mmf, mixer grid, blocking	60-10255237*
C413	Condenser, 100 mmf, filament r-f by-pass	60-10105237*
C414	Condenser, 750 mmf, cathode coupling	60-10755301*
C415	Condenser, trimmer and padder assembly, 3-section	31-6464
	C415A: BC osc. series padder	Part of C415
	C415B: BC osc. shunt trimmer	Part of C415
	C415C: SW osc. shunt trimmer	Part of C415
C416	Condenser, 250 mmf, spread tuning,	
C417	Condenser, 6 mmf, neutralizing (SW)	30-1224-9
C418	Condenser, 100 mmf, osc. grid feedback	60-10105237*
C419	Condenser, .01 mf, B - by-pass	61-0120*
C420	Condenser, 250 mmf, osc. plate feedback	60-10255237*
C421	Condenser, 1500 mmf, B - bus r-f by-pass	60-20155404*
J400	Socket, external aerial	27-6214-1
L400	Push-button coils	
	L400A, B, C: coil, push-button	32-4059-2
	L400D, E: coil, push-button	32-3779
L401	Coil, broadcast aerial	32-4033-2
L402	Coil, FM aerial	32-4158
L403	Coil, short-wave aerial	32-4050-6
L404	Coil, r-f choke	32-4061
L405	Coil, FM r-f	32-4159
L406	Coil, FM oscillator	32-4018-2
L407	Coil, choke, parasitic suppressor	32-4157
L408	Coil, broadcast oscillator	32-4019-4
L409	Coil, short-wave oscillator	32-4113
LA400	Broadcast-loop assembly	76-1989
R400	Resistor, 10 ohms, FM grid	66-0103340*
R401	Resistor, 6800 ohms, push-button oscillator cathode	66-2683340*
R402	Resistor, 150 ohms, FM r-f cathode	66-1153340*
R403	Resistor, 47,000 ohms, FM r-f screen dropping	66-3473340*
R404	Resistor, 1000 ohms, FM r-f plate decoupling	66-2103340*
R405	Resistor, 1500 ohms, mixer plate parasitic suppressor	Part of C407
R406	Resistor, 1500 ohms, mixer cathode	66-2153340*
R407	Resistor, 2.2 megohms, mixer grid	66-5223340*
R408	Resistor, 470,000 ohms, isolating	66-4473340*
R409	Resistor, 15,000 ohms, oscillator grid	66-3153340*
R410	Resistor, 33,000 ohms, plate dropping	66-3333340*
R411	Resistor, 47,000 ohms, dropping	66-3473340*
R412	Resistor, 6800 ohms, push-button oscillator grid	66-2683340*

SECTION 4 (Continued)

Reference No.	Description	Service Part No.
S400	Switch, function	42-1801
TB400	Terminal board, aerial	38-9942

MISCELLANEOUS

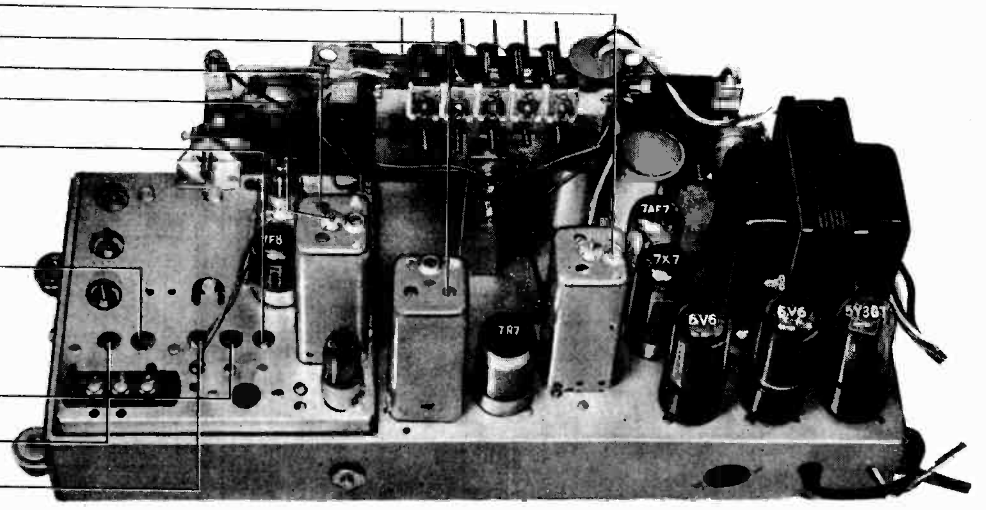
Description	Service Part No.
Bin-Light Parts:	
Bin-light cable, socket and switch assembly	76-2728
Bracket, bin-light	56-2332
Bracket, switch	56-3373
Cord, pull (25-ft. spool)	45-1420
Socket assembly, bin-light lamp	41-3742
Spring, pull-cord	28-8991
Cabinet and Cabinet Hardware:	
Back, cardboard	40-6825
Baffle, wood	219054
Baffle and cloth assembly	40-6772
Bezel, wood	16601
Bin mechanism, left-hand	76-2176
Bin mechanism, right-hand	76-2174
Cabinet	10645D
Dial scale and backplate assembly	76-2226-2
Foot, glide	45-6042
Frame, mounting assembly	76-2199
Front, tilt	45-6308
Hinge	45-6200
Stud, back cardboard	W2235FA9
Clip, BC aerial coil	28-5002FA1
Clip, BC or SW oscillator coil	56-4303FA1
Dial-Scale Hardware:	
Cord, pointer drive (25-ft. spool)	45-1459
Pointer	56-3179
Scale backplate and pulley assembly	76-2005
Spacer, scale backplate	56-3279
Spring, pointer-drive-cord	28-8953
Function-Switch Hardware:	
Bracket assembly, shaft	76-2187FA3
Link assembly	76-2186
Shaft, link assembly	56-3271FA11
Washer, "C"	1W42535FA3
Grommet, r-f chassis mounting	54-4295
Knob, tuning	54-4105
Lamp, panel	34-2040
Lamp-socket-assembly, panel	54-7278
Loop assembly, BC	76-1989
Push-Button-Assembly Hardware:	
Bracket and lug assembly, rear mounting	76-2214
Core, push-button tuning	56-6100
Cover, push-button switch assembly	76-1343
Grommet, push-button switch mounting	27-4596
Knob, push-button	54-4217
Screw, mounting bracket	1W19670FA3
Sleeve, push-button switch mounting	28-5665FA3
Spring strip, tuning-core stabilizer	56-2249
Switch, a.c., phono motor	42-1756
Tab kit	40-6766
Tab cover	27-5737
Terminal strip, push-button coil mounting	56-2250
Record Changer Mounting Parts, etc.:	
Bolt, changer-mounting	56-3295
Grommet, changer-mounting	54-4313
Nut, T, changer-mounting	1W56643FA3
Palnut, changer-mounting	1W29061FA3
Spring, changer-mounting	56-3043
Cable and plug assembly, phono input	41-3735-2
Transformer, phono input	32-8256
Shield, panel lamp	54-7278
Scale backplate and pulley assembly	76-2005
Socket, external aerial	27-6214-1
Socket, Loktal	27-6177
Socket, Loktal	27-6213
Socket, miniature 7-pin (mica-filled)	27-6203-1
Socket, octal	27-6174
Socket, phono power	27-6200
Speaker Hardware:	
Bolt, mounting	W1587
Cable and plug assembly	41-3701
Nut, speaker-mounting	1W19988FA3
Plug, speaker-cable	27-4419-2
Wafer, capacitor-mounting	54-7101



COMPLETE SECTIONALIZED SCHEMATIC, SHOWING TEST POINTS.

AM ALIGNMENT CHART

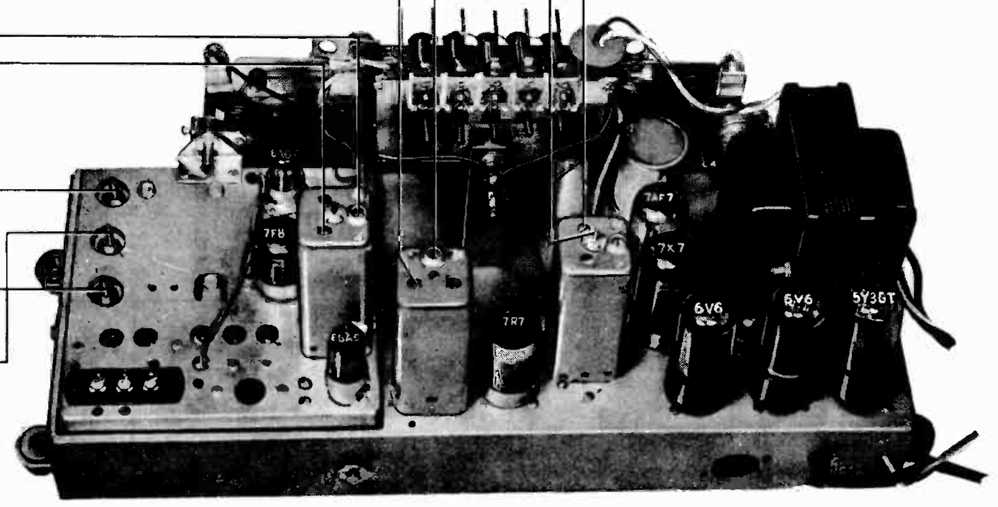
	SIGNAL GENERATOR		RADIO			
STEP	CONNECTIONS TO RADIO	FRE-QUENCY	FUNCTION SWITCH	FRE-QUENCY	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf condenser to terminal 3 of TB400	455 kc	BDCST	540 kc	Adjust trimmers for maximum output-meter reading. Align ONCE ONLY in the order given.	C302E C301D C300D TC300
2	Loosely coupled to radio loop. (See Note *)	15 mc	SW	15 mc	Start with loose trimmer screw and adjust for maximum on FIRST signal heard. Image should be heard at 14.1 mc.	C415C
3	Same	15 mc	SW	15 mc	Adjust for maximum while rocking tuning control.	C403B
4	Same		BDCST		Preset C415A by tightening then backing off 1/4 turn.	C415A
5	Same	1700 kc	BDCST	1700 kc	Adjust for maximum.	C415B
6	Same	1500 kc	BDCST	1500 kc	Adjust for maximum.	C403A
7	Same	580 kc	BDCST	580 kc	Adjust for maximum while rocking tuning control.	C415A
8	Repeat steps 5, 6 and 7 until no further increase is noted.					



CHASSIS VIEW, SHOWING AM TRIMMER LOCATIONS.

FM ALIGNMENT CHART

	SIGNAL GENERATOR		RADIO			
STEP	CONNECTIONS TO RADIO	FRE-QUENCY	FUNCTION SWITCH	FRE-QUENCY	SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf condenser to pin 1 of 6BA6 (test point D)	9.1 mc	FM	88 mc	Attenuate signal to give approximately a 10-volt meter reading. Adjust for maximum. Repeat until no further improvement is noted. After this step do not touch any of these trimmers except C302B (in step 3).	C302B TC302 C301B C301A
2	Through .1-mf condenser to pin 8 of 7F8 (test point A)	9.1 mc	FM	88 mc	Attenuate signal to give approximately a 10-volt reading. Adjust for maximum. Repeat until no further improvement is noted. After this step do not touch these trimmers.	C300B C300A
3	Same	9.1 mc	FM	88 mc	Double check adjustment of C302B to make certain that minimum audio output is obtained from speaker. This is a critical adjustment; turn trimmer very slowly.	C302B
4	Connect to pin 4, J400	105 mc	FM	105 mc	Maximum meter reading. This is the oscillator high-frequency padder adjustment.	C405C
5	Same	105 mc	FM	105 mc	Adjust for maximum while rocking tuning control.	C405B
6	Same	105 mc	FM	105 mc	Adjust for maximum.	C405A
7	Same	92 mc	FM	92 mc	Adjust L406. (See note **).	
8	Same	92 mc	FM	92 mc	Adjust L405. (See note **).	
9	Same	92 mc	FM	92 mc	Adjust L403. (See note **).	
10	Repeat steps 4 through 10 until no further increase is obtained.					



CHASSIS VIEW, SHOWING FM TRIMMER LOCATIONS.

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.

MODEL 48-1253

SPECIFICATIONS

CABINET	Wood, walnut finish
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540—1600 kc.
AUDIO OUTPUT	2.2 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	
Radio	60 watts
Phonograph	30 watts
AERIAL	Built-in high-impedance loop; terminal provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8, 7B7, 7C6, 50A5, 50X6
PHONOGRAPH	Philco Automatic Record Changer Model M-8 (for service information, see manual PR-1478)

TP-3632

Circuit Description

Philco Model 48-1253 is a table-model radio-phonograph combination consisting of a five-tube superheterodyne radio and a Philco Model M-8 Automatic Record Changer, operating on a.c. only. The tuning range is 540—1600 kc. The built-in high-impedance loop aerial is adequate in most areas; where greater pickup is required, an external aerial may be connected. When the external aerial is not in use, the aerial lead on the radio should be connected to the chassis.

The converter stage employs a 7A8 pentagrid converter. The i-f amplifier is a 7B7 high-transconductance tube, followed by a 7C6 duo-diode, triode, operating as detector, a.v.c., and first-audio amplifier. The 50A5 output tube works into a permanent-magnet dynamic speaker.

In the power supply, a 50X6 operates in a voltage-doubler circuit. A resistance-capacitance type of filter is used.

For service information on the record changer, refer to service manual PR-1478, Philco Automatic Record Changer Model M-8.

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 B+ (pin 2 of 50X6 rectifier tube) and the B– bus, 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 3700 ohms, check condensers C101, C102, and C103A 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.

MODEL 48-1253 PHILCO CORP.

TROUBLE SHOOTING

Section 1

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 radio-phono switch to RADIO, and 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.

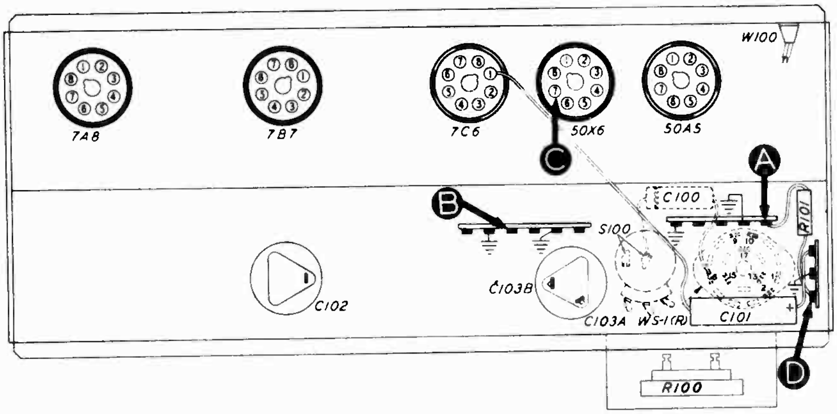


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	96v	Trouble in this section. Isolate by the following tests.
2	C	220v	Defective: 50X6. Shorted or leaky: C101, C102. Open: R100, C101, C102, S100, WS-1(R).
3	D	207v	Shorted or leaky: C103A. Open: C103A, R101, T200*, R204*.
4	A	96v	Shorted or leaky: C103B. Open: R204*.
Listening test: Abnormal hum may be caused by open C101, C102, C103A, or C103B.			

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

TROUBLE SHOOTING

Section 2

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. For all the tests except step 5, set the radio-phono switch to RADIO.

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.

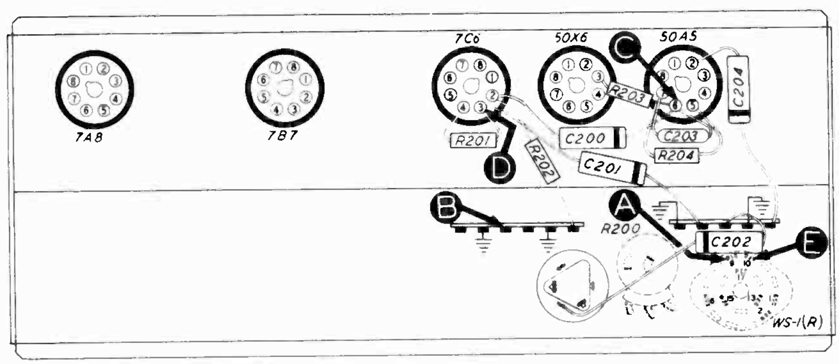


Figure 2. Bottom View, Showing Section 2 Test Points

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: 50A5. Open: LS200, T200, R204, R203. Shorted: LS200, T200, C200, C204, C203. Leaky: C200, C203, C204.
3	D	Same as step 1.	Defective: 7C6. Open: R202, R203, C200. Shorted: C200.
4	A	Same as step 1.	Open: WS-1(R), C201, R200 (rotate through range).
5*	E	Same as step 1.	Open: WS-1(R).
Listening Test: Distortion may be caused by open R201 or R203, or by shorted or leaky C201. Hum in phono operation may be caused by open C202.			

* Radio-phono switch in PHONO position.

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-phono switch to RADIO, and 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 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."

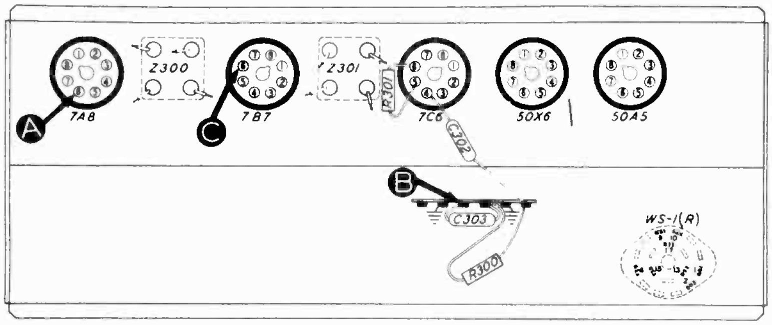


Figure 3. Bottom View, Showing Section 3 Test Points

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: 7B7, 7C6 (diode section). Open or shorted: Z301 pri. or sec., C301A, C301B. Misaligned: Z301. Open: R404*, R300, WS-1(R). Shorted: C302, C303. Shorted or leaky: C405*.
3	A	Same as step 1.	Defective: 7A8*. Open or shorted: Z300 pri. or sec., C300A, C300B. 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 B–, test point B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the radio-phono switch to RADIO, and the volume control to maximum.

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

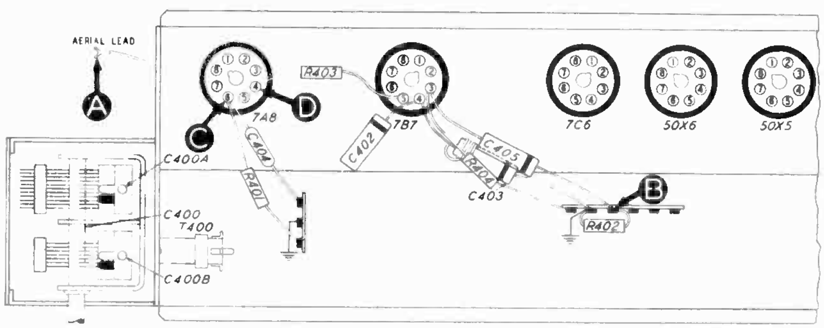


Figure 4. Bottom View, Showing Section 4 Test Points

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. Trouble in oscillator circuit (step 3).
3	D to B Osc. Test (see note below).		Tune through range.	Negative 2.4 to 3 volts.	Defective: 7A8. Open or shorted: T400 pri. or sec., C400B. Shorted: C400.
4	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C401, C404, LA400, C400A. Shorted: C400A.

Listening Test: Hum may be caused by open R401 or C402.

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 7A8 oscillator grid (pin 4), test point D. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by a negative voltage, 2.4 to 3 volts (measured with a 20,000 ohms-per-volt meter), throughout the tuning range.

MODEL 48-1253 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

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .05 mf.	61-0122*
C101	Condenser, electrolytic, voltage doubler, 15 mf., 200v	30-2568-13
C102	Condenser, electrolytic, voltage doubler, 15 mf., 200 v	30-2575-11
C103	Condenser, electrolytic, 2-section	30-2568-14
C103A	Condenser, filter, 40 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, 15,000 ohms	66-3154340*
S100	Switch, off-on	Part of R200
W100	Line cord and plug	41-3755-16
WS	Wafer switch (single wafer), radio-phono	42-1824
WS-1(R)	Wafer-switch section	Part of WS

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .006 mf.	45-3500-7*
C201	Condenser, d-c blocking, .01 mf.	61-0120*
C202	Condenser, by-pass, .2 mf.	45-3500-3*
C203	Condenser, by-pass, 220 mmf.	60-10205307*
C204	Condenser, tone compensation, .05 mf.	61-0122*
LS200	Speaker	36-1625
R200	Volume control, .5 megohm	33-5558
R201	Resistor, grid bias, 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, 130 ohms	66-1133340*
T200	Transformer, output	32-8329
WS-1(R)	Wafer-switch section (see WS, Section 1)	Part of WS

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
C302	Condenser, i-f filter, 100 mmf.	60-10105407*
C303	Condenser, i-f filter, 100 mmf.	60-10105407*
R300	Resistor, i-f filter, 47,000 ohms	66-3473340*
R301	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
WS-1(R)	Wafer-switch section (see WS, Section 1)	Part of WS
Z300	Transformer, 1st i-f	32-3962-3
Z301	Transformer, 2nd i-f	32-3948-11

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2727-1
C400A	Condenser, r-f trimmer	Part of C400
C400B	Condenser, oscillator trimmer	Part of C400
C401	Condenser, blocking, 5 mmf.	30-1221-5*
C402	Condenser, a-v-c filter, .05 mf.	61-0122*
C403	Condenser-and-choke assembly, r-f by-pass, .2 mf.	76-1161
C404	Condenser, d-c blocking, 100 mmf.	60-10105407*
C405	Condenser, screen by-pass, .05 mf.	61-0122*
LA400	Loop aerial	76-2127-5
R400	Resistor, aerial discharge, 150,000 ohms	66-4153340*
R401	Resistor, grid load, 1 megohm	66-5103340*
R402	Resistor, leakage, 120,000 ohms	66-4123340*
R403	Resistor, grid return, 120,000 ohms	66-4123340*
R404	Resistor, screen dropping, 47,000 ohms	66-3473340*
T400	Transformer, oscillator	32-4095-2

MISCELLANEOUS

Description	Service Part No.
Backplate Assembly and Hardware	
Backplate assembly	76-3228
Drive cord (25-foot spool), tuning gang	45-8750*
Drive cord (25-foot spool), pointer	45-8750*
Panel, diffusing	76-3203
Pointer, dial	56-4992
Spring, gang drive	56-2617
Spring, diffusing panel	56-4989FA3
Spring, pointer	28-8953
Cabinet and Hardware	
Baffle and cloth	40-6956
Cabinet	10684
Foot, rubber	54-4377
Hinge	45-6067
Lid support	45-6061
Scale, dial	27-5976
Scale trim, bottom	56-4998
Scale trim, top	56-4999
Strap, scale mounting	56-2068
Changer Mounting Hardware	
Grommet	54-4313
Plate, corner	56-3103
Nut	1W56643FA3
Spring	56-3043FA15
Cable, pickup	41-3735-11
Knob, radio-phono	54-4484
Knob, tuning	76-3138
Knob, volume	76-3138-1
Link assembly, radio-phono switch	76-3229
Palnut	1W29061FA3
Pilot-lamp-socket assembly	27-6233-9
Pulley and shaft	76-3204
Socket, loktal	27-6138*
Shield, tube	56-2731

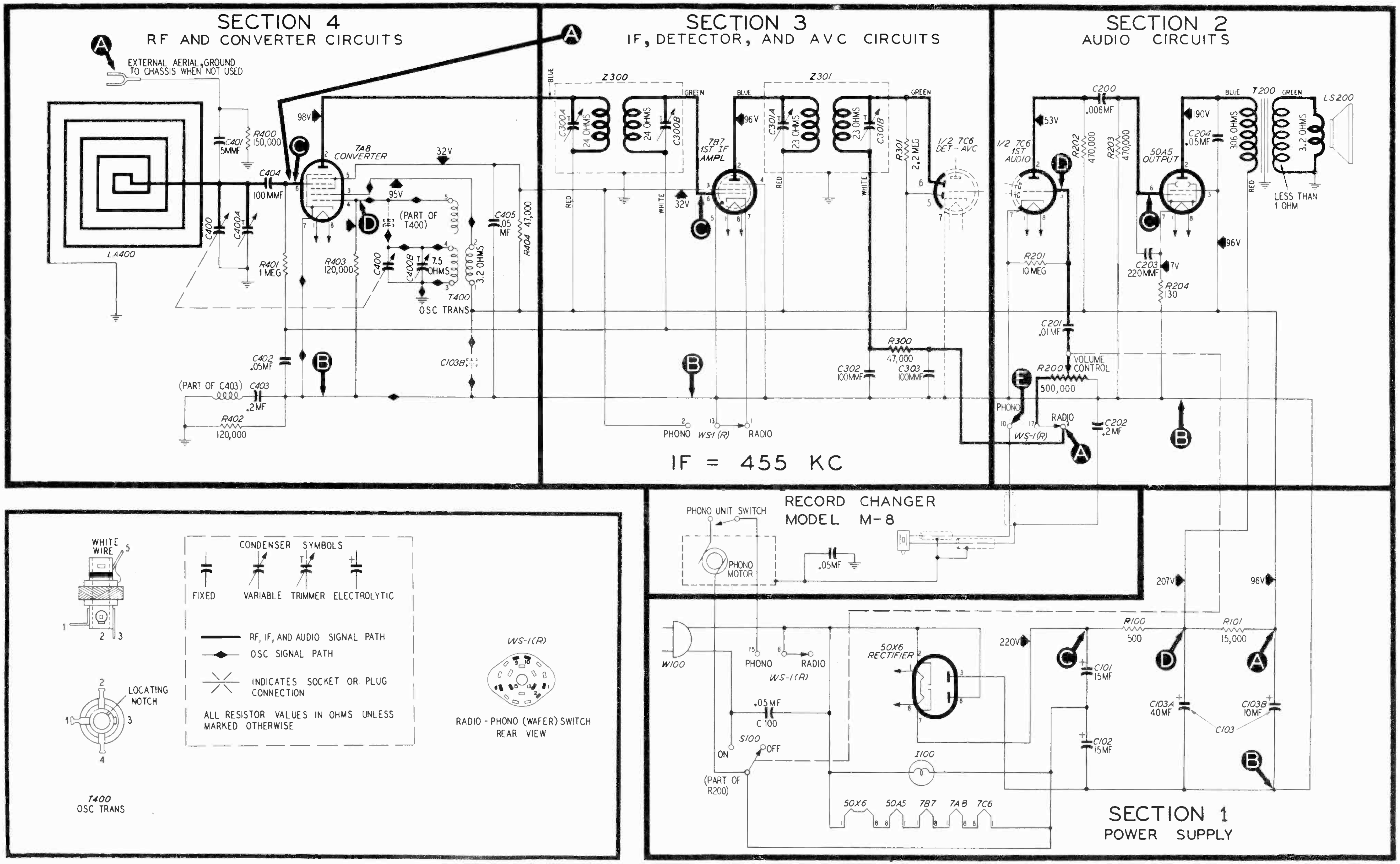


Figure 5. Philco Radio Model 48-1253, Sectionalized Schematic Diagram, Showing Test Points

TP-4091

PHILCO CORP.

ALIGNMENT PROCEDURE

The radio may be aligned with the chassis in the cabinet. To connect the signal generator, it is necessary to remove the bottom plate from the chassis.

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

OUTPUT METER—Connect between right-hand (output) lug and center (chassis) lug of terminal panel shown in figure 6.

SIGNAL GENERATOR—Connect as indicated in chart.

OUTPUT LEVEL—During alignment, input signal must be attenuated to hold output-meter reading below .5 volt.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1				Turn C301B (copper screw) down tight.	
2	Ground lead to B–; output lead through .05-mf. condenser to pin 6 of 7A8 (test point C of Section 4).	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: Make up a coil of insulated wire consisting of 6 to 8 turns, about 6 inches in diameter. Connect coil ends to signal-generator leads, and suspend coil near radio loop.

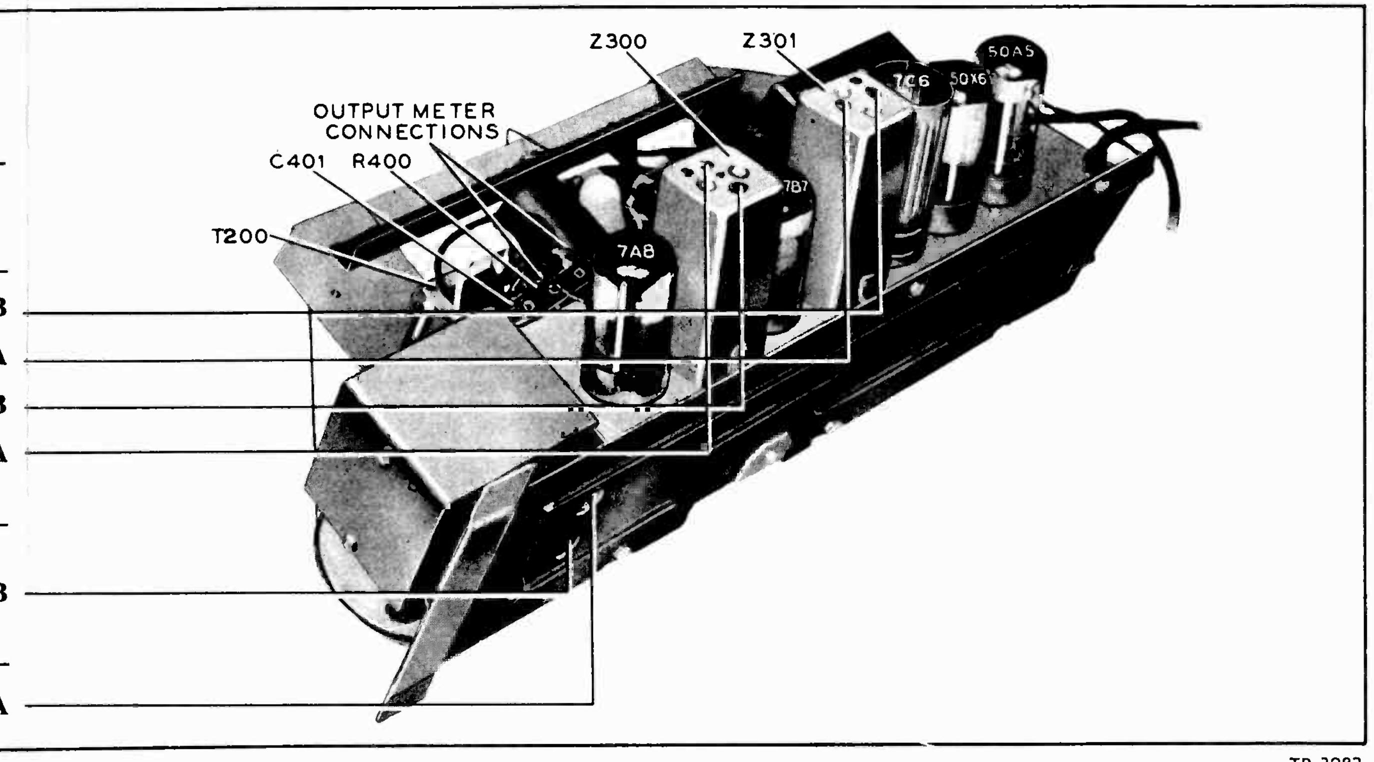


Figure 6. Chassis View, Showing Trimmer Locations

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	R—resistor
I—pilot 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 a-v-c circuits.
400-series components are in Section 4—the aerial and oscillator 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.

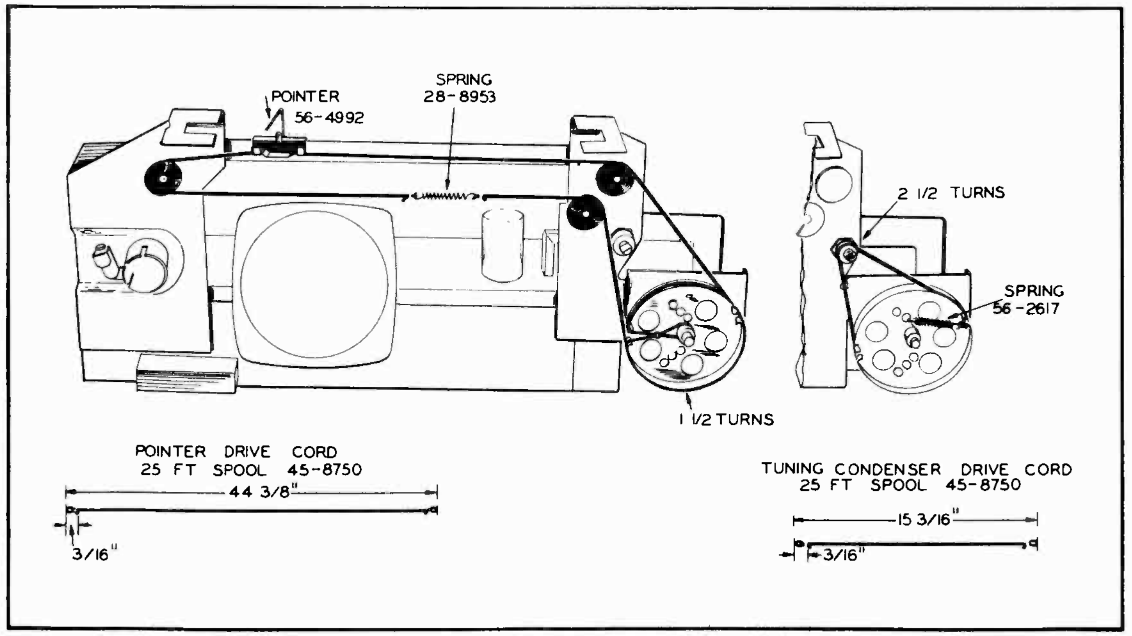


Figure 7. Drive-Cord Installation Details

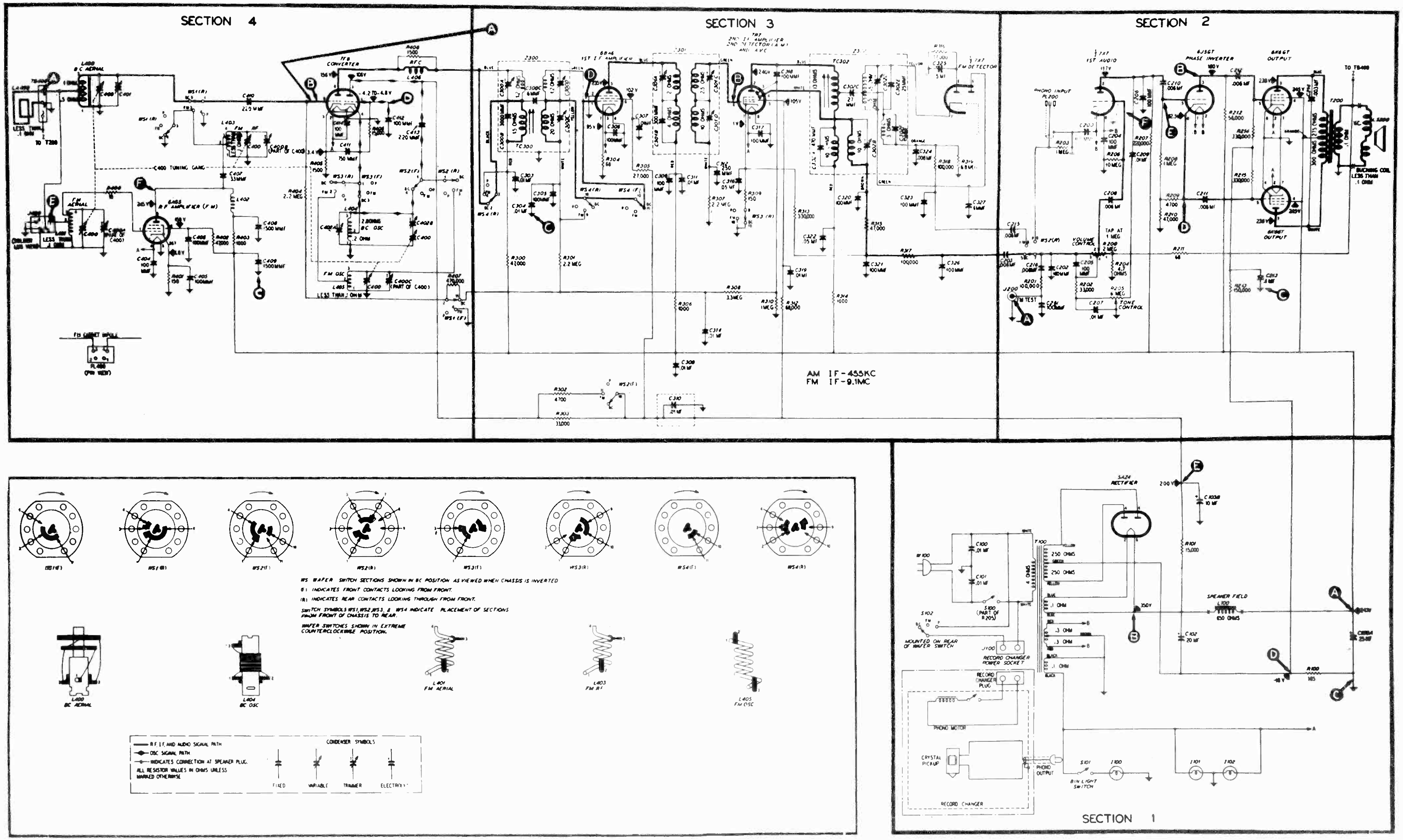


Figure 7. Philco Radio-Phonograph Model 48-1264, Sectionalized Schematic Diagram, Showing Test Points

MODEL 48-1264 PHILCO CORP.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL	RADIO: WAFER SWITCH	RADIO: DIAL	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to terminal 1 of TB400.	455 kc.	BC	540 kc.	Adjust for maximum, once only, in order.	C302B C301D C300E TC300A
2	Radiating loop (see note below).	580 kc.	BC	580 kc.	Adjust for maximum.	C402B
3	Same as step 2.	1700 kc.	BC	1700 kc.	Adjust for maximum.	C402A
4	Same as step 2.	1500 kc.	BC	1500 kc.	Adjust for maximum.	C401
5	Same as step 2.	580 kc.	BC	580 kc. (approx.)	Rock tuning condenser while adjusting for maximum.	C402B
6	Repeat steps 3, 4, 5, and 4, in order, until no further improvement is obtained.					

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 broadcast loop.

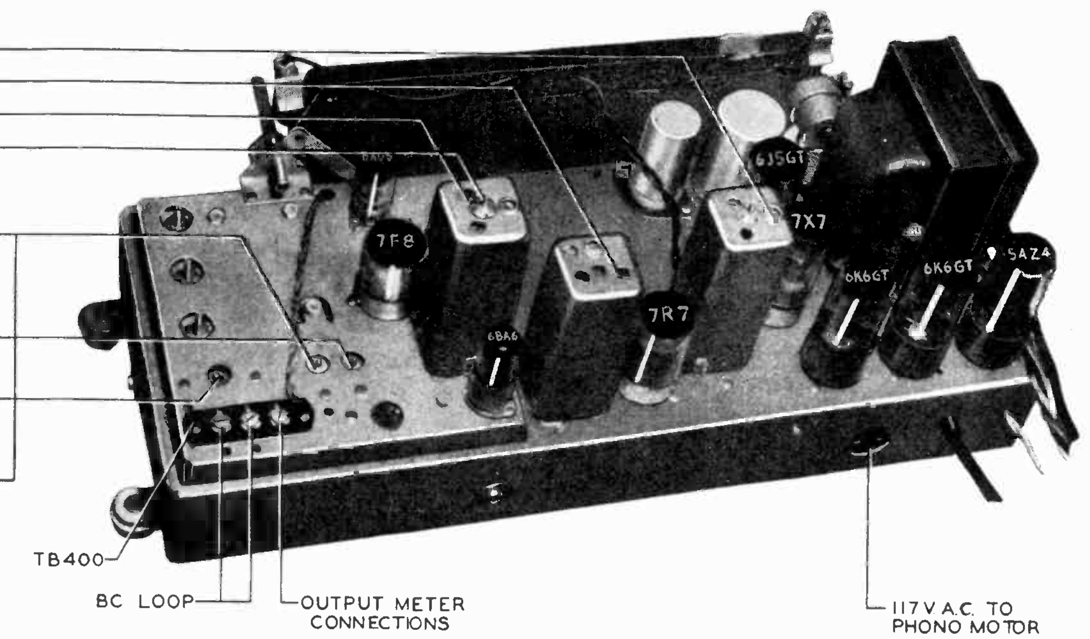


Figure 8. Top View, Showing AM Trimmer Locations

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR: CONNECTIONS TO RADIO	SIGNAL GENERATOR: DIAL	RADIO: WAFER SWITCH	RADIO: DIAL	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to pin 1 of 6BA6 (test point D, figure 5).	9.1 mc.	FM	88 mc.	Adjust for maximum. Repeat until no further improvement is noticed. After this step, do not touch any of these trimmers except C302D (step 3).	C302D TC302 C301C C301A
2	Through .1-mf. condenser to pin 8 of 7F8 (test point A, figure 5).	9.1 mc.	FM	88 mc.	Adjust for maximum. Repeat until no further improvement is noticed. After this step, do not touch either of these trimmers.	C300D C300A
3	Same as step 2.	9.1 mc.	FM	88 mc.	Double-check the adjustment of C302D to make sure that minimum audio output is obtained from the speaker. Use output meter. This is a critical adjustment; turn trimmer very slowly.	
4	Connect signal generator to terminal 4 of J409.	105 mc.	FM	105 mc.	Maximum meter reading. This is the oscillator high-frequency padder adjustment.	C400C
5	Same as step 4.	105 mc.	FM	105 mc.	Maximum — Rock tuning control.	C400B
6	Same as step 4.	105 mc.	FM	105 mc.	Maximum.	C400A
7	Same as step 4.	92 mc.	FM	92 mc.	Adjust L405. See notes 1 and 2.	
8	Same as step 4.	92 mc.	FM	92 mc.	Adjust L403. See notes 1 and 3.	
9	Same as step 4.	92 mc.	FM	92 mc.	Adjust L401. See notes 1 and 4.	
10	Repeat steps 4 through 9 until no further increase is obtained.					

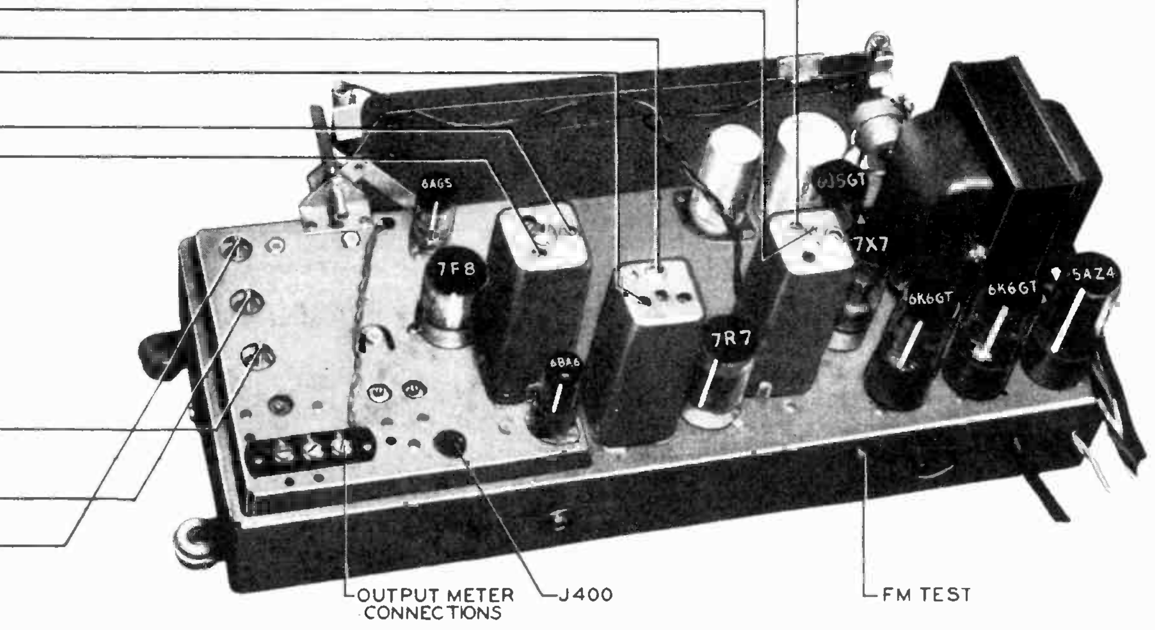


Figure 9. Top View, Showing FM Trimmer Locations

AM ALIGNMENT PROCEDURE

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

DIAL POINTER: With tuning-condenser plates fully meshed, adjust pointer to coincide with index mark at low-frequency end of scale. See "CALIBRATING DIAL BACKPLATE," page 2.

VOLUME CONTROL: Set to maximum.

TONE CONTROL: Set to maximum counterclockwise, near the "off" position.

AM R-F SIGNAL GENERATOR: Connect ground lead to radio chassis, and output lead as indicated in chart. Use modulated output.

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

OUTPUT LEVEL: During alignment input signal must be attenuated to hold output-meter reading below 1.5 volts.

RADIO WAFER SWITCH, RADIO DIAL, and SIGNAL-GENERATOR DIAL: Set as indicated in chart.

FM ALIGNMENT PROCEDURE

MAKE AM ALIGNMENT FIRST

OUTPUT METER: Connect as for AM alignment (this meter is used only in step 3).

D-C METER: Connect a 20,000-ohms-per-volt meter across the 5-mf. condenser, C325, in the FM detector circuit —the negative lead to pin 6 of the 7X7 tube and the positive lead to the chassis. Use the 10-volt meter range.

AM R-F SIGNAL GENERATOR: Use modulated output for the entire alignment. The generator must have sufficient output to give a reading of approximately 9 volts on the d-c meter, and the signal should be attenuated during the alignment to keep the meter at this value. Connect the generator ground lead to the chassis, and the output lead as indicated in the chart.

RADIO WAFER SWITCH, RADIO DIAL, and SIGNAL-GENERATOR DIAL: Set as indicated in chart. Allow the radio and generator to warm up for 15 minutes before starting the alignment.

NOTE 1: The resonance of the circuits using coils L401, L403, and L405 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 inserted in the coil, compress the turns slightly. If the signal increases when the threaded brass end is inserted, spread the turns. Do not compress or spread the turns excessively; only a small change is required at these frequencies.

NOTE 2: Oscillator coil L405—Adjust coil for maximum meter reading.

NOTE 3: R-F coil L403—Adjust coil for maximum meter reading while rocking tuning control.

NOTE 4: Aerial coil L401—Adjust coil for maximum meter reading.

MODEL 48-1264 PHILCO CORP.

Model 48-1264, Code 122, is identical to Model 48-1264, Code 121, with the following exceptions:

1. The FM r-f amplifier tube, type 6AG5, was changed to a type 6AU6 tube. In making this change, the suppressor grid (pin 2) of the 6AU6 was connected to ground (pin 3).
2. Resistor R402, 47,000 ohms, was changed to 33,000 ohms, Part No. 66-3333340.
3. Condenser C325, 5 mf., 50v (noise suppressor), was changed to 2 mf., 50v, Part No. 30-2417-7.
4. Condenser C202, 100 mmf., was removed.

Circuit Description

Philco Model 48-1264 is a nine-tube superheterodyne radio-phonograph combination providing reception on the standard broadcast band, 540—1720 kc., and the FM band, 88—108 mc.

A low-impedance loop within the cabinet provides adequate signal pickup on the broadcast band. Satisfactory FM reception usually requires the use of an outdoor dipole aerial (Philco Part No. 45-1462). In areas of high signal strength, however, the dipole built into the cabinet is sufficient for FM operation.

A tuned r-f stage, using a type 6AG5 high-frequency pentode, functions on the FM band. The converter stage employs a 7F8 high-frequency double triode. The converter and r-f stages are built on a separate chassis, to insure reliable performance at high frequencies. These stages provide high signal-to-noise ratio, high conversion efficiency, and good image rejection.

Two transformer-coupled i-f stages are used. The 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 first i-f stage employs a 6BA6 (miniature type) high-frequency pentode amplifier; the pentode section of a 7R7 double-diode pentode functions as the second i-f amplifier. One diode of this tube is used for AM detection, while the other diode develops a-v-c voltage.

The ratio-detector circuit used for FM detection operates through the two diodes of the 7X7 tube; this circuit has good noise-reducing properties and a superior tuning characteristic. The triode section of the 7X7 is used as a first-audio and phono-amplifier stage. The output of the AM detector, FM detector, or phono pickup is switched into this circuit by the wafer switch.

A type 6J5GT triode operates as a phase inverter, driving the two 6K6GT output tubes in push-pull operation.

A more uniform frequency response is obtained by the use of inverse feedback. This feed-back voltage is taken from the secondary of the output transformer, and applied through resistor R211 to the junction of R204 and the volume control.

The 12-inch electrodynamic speaker provides excellent bass reproduction.

MODEL 48-1264

SPECIFICATIONS

CABINET	Wood, light mahogany or walnut finish
CIRCUIT	Nine-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	110 watts
AERIALS	Built-in low-impedance loop, and FM dipole; provision for external aerial
INTERMEDIATE FREQUENCIES:	
AM	455 kc.
FM	9.1 mc.
PHONOGRAPH	Philco Automatic Record Changer, Model D-10 (for service information, see manual PR-1156)
SPEAKER	12" electrodynamic
PHILCO TUBES (9)	6AG5, 7F8, 6BA6, 7R7, 7X7, 6J5GT, 6K6GT (2), 5AZ4

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

2. Measure the resistance between B+ (pin 8 of the 5AZ4 rectifier) and the radio chassis, with the ohmmeter polarity such that it gives the highest resistance reading; if the reading is lower than 3500 ohms, check condensers C102, C103A, and C103B for leakage or shorts.

The above 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.

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 measurements for these points are shown in figure 1. Hold a ruler against the scale 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. When the ruler is correctly placed, the index mark is approximately 1-9/16" from the edge of the backplate.

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

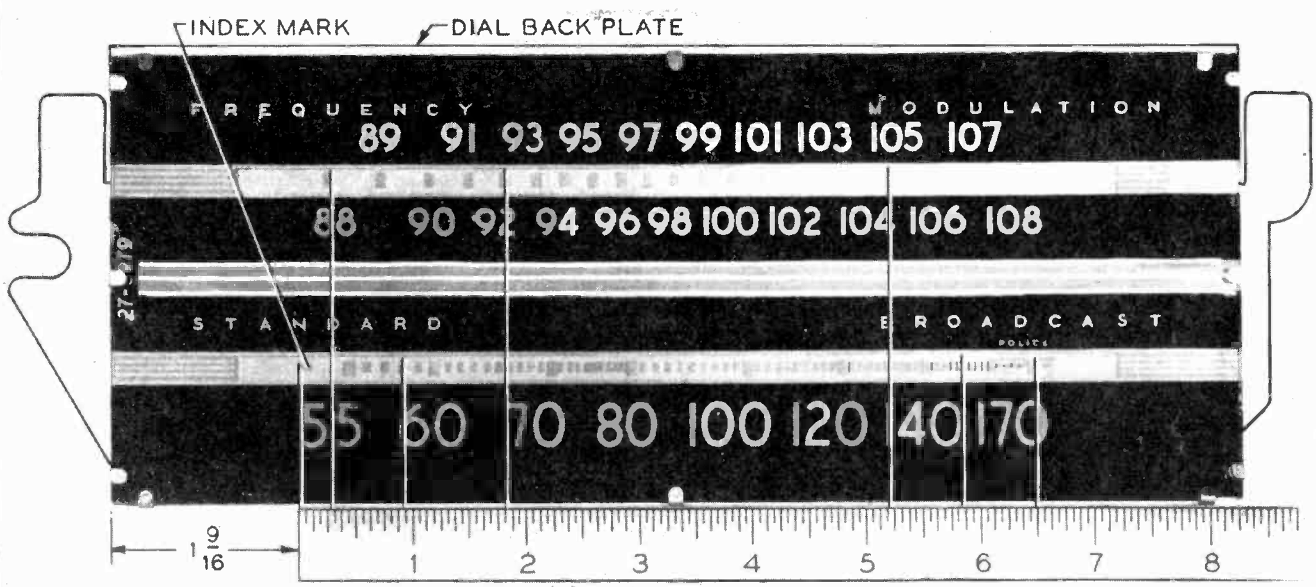


Figure 1. Dial-Backplate Calibration Measurements

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
- I—pilot lamp
- L—choke or coil
- LA—loop aerial
- LS—loud speaker
- R—resistor
- S—switch
- T—transformer
- WS—wafer switch
- 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 component of the assembly which bears an identical number without a suffix letter, and with perhaps a different prefix letter.

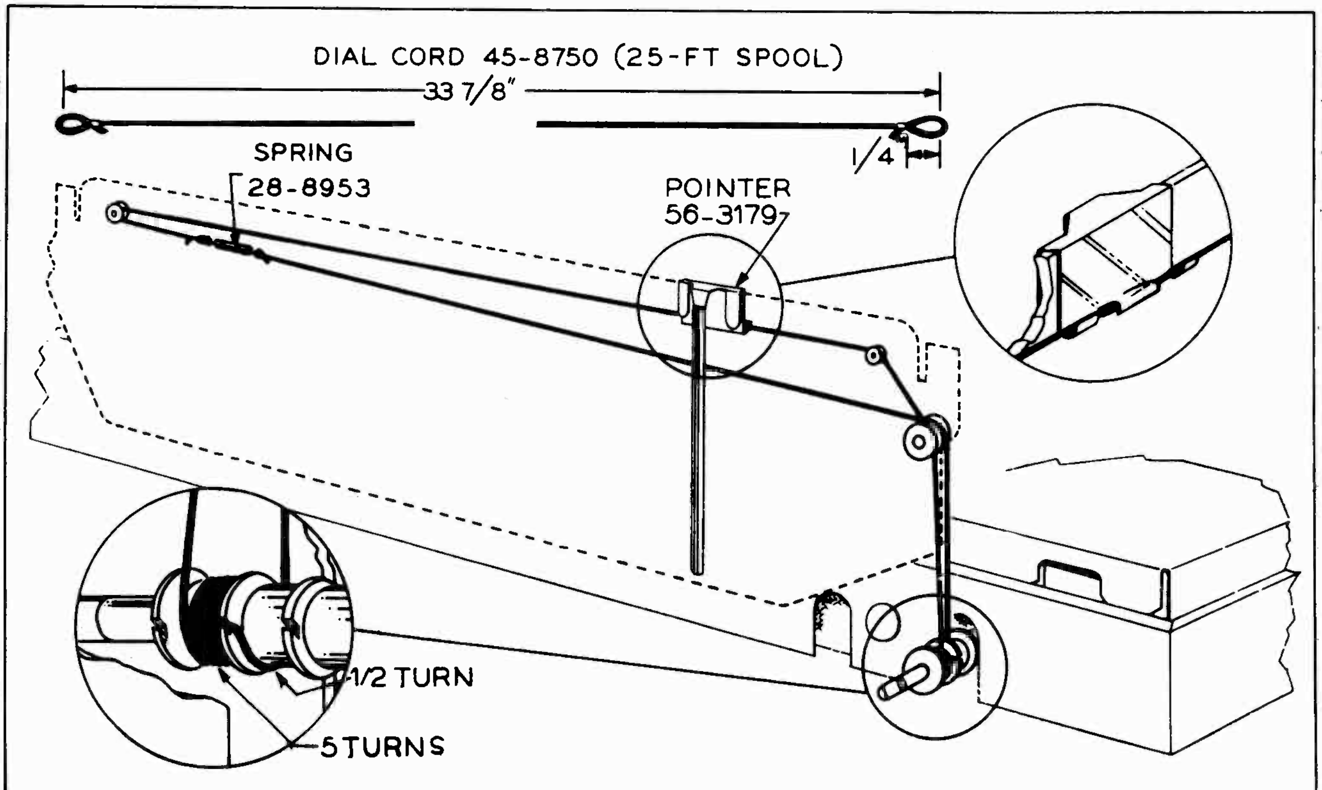


Figure 2. Pointer-Drive-Cord Installation Details

PHILCO CORP. MODEL 48-1264

Section 1 TROUBLE SHOOTING

CAUTION: Do not turn on the power with the speaker disconnected, as this may cause damage to the radio.

For the tests in this section, use a d-c voltmeter. Connect the voltmeter 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 near the "off" position. Set the wafer switch to the broadcast (BC) position.

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	E A	200v 245v		Trouble within this section. Isolate by the following tests.
2	B	350v	No voltage Low voltage High voltage	Defective: 5AZ4, T100, S100, W100. Shorted: C102. Open: R100. Defective: 5AZ4. Shorted or leaky: C102, C308*, C311*, C322*, C309* C408*, C409*, C103A, C103B. Open: L100, R101, T200*.
3	D	Negative 18v	Low or no voltage High voltage	Shorted: R100. Weak 6K6GT tubes. Open: R100.
4	E	200v	No voltage Low voltage	Shorted: C103B. Open: R101. Leaky: C103B, C319*, C307*, C310*.
5	A	245v	No voltage Low voltage High voltage	Shorted: C103A. Open: L100. Leaky: C103A. Grounded T200*. Shorted: L100. Weak 6K6GT tubes.

Listening Test: Abnormal hum may be caused by open C100, C101, C102, or C103A.

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

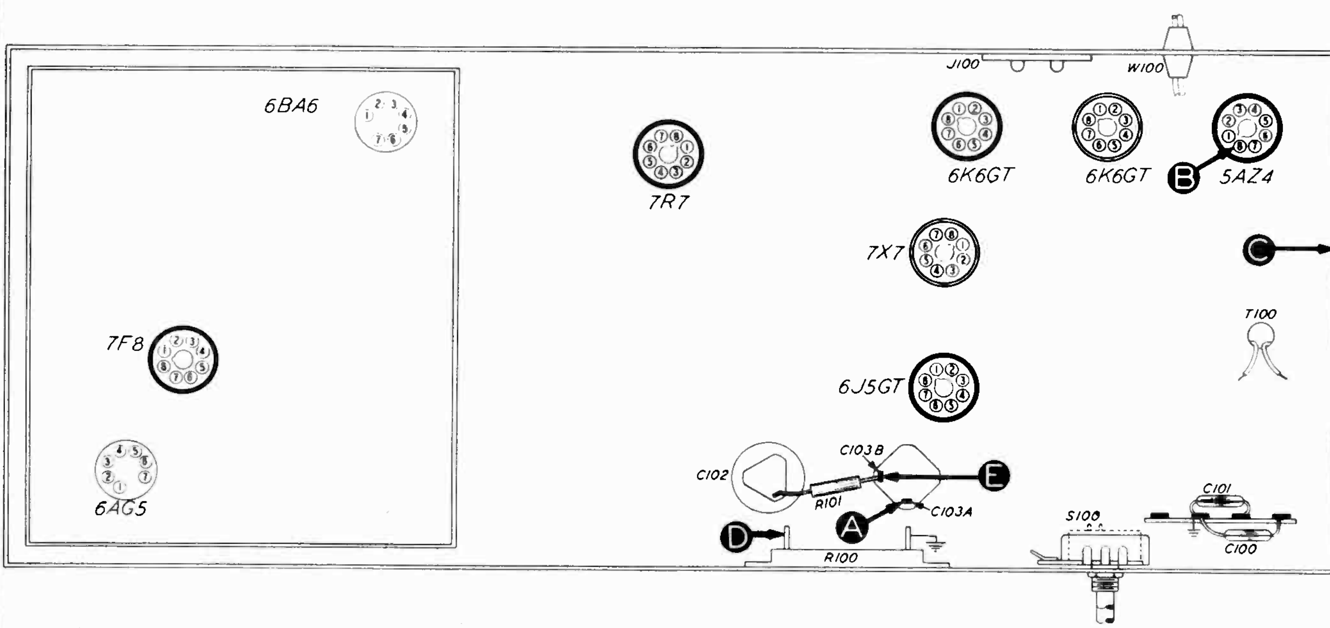


Figure 3. Bottom View, Showing Section 1 Test Points

Section 2

TROUBLE SHOOTING

For the tests in this section, 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 tone control near the "off" position. 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.

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 tube)	Clear signal with strong signal input.	Defective: 6K6GT, T200, LS200. Open: C212, R214. Shorted or leaky: C212, C214.
3	D (6J5GT removed)	Same as step 2.	Defective: 6K6GT. Shorted or leaky: C211. Open: R215, C211, T200.
4	E (Replace 6J5GT tube)	Loud, clear signal with moderate signal input.	Defective: 6J5GT. Open: R212, R209, R210. Shorted or leaky: C210, C206.
5	F	Loud, clear signal with weak signal input.	Defective: 7X7. Open: R207, C210.
6	A	Same as step 5.	Shorted: C202, C201, C326*. Open: C208, C216, R201, R200 (rotate through range).
7	PL200 (Wafer switch on PHONO)	Same as step 5.	Defective: PL200, WS2(R).

Listening Test: Distortion may be caused by leaky C210, C211, C212, C213, or C214. Hum will result if C213 is open.

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

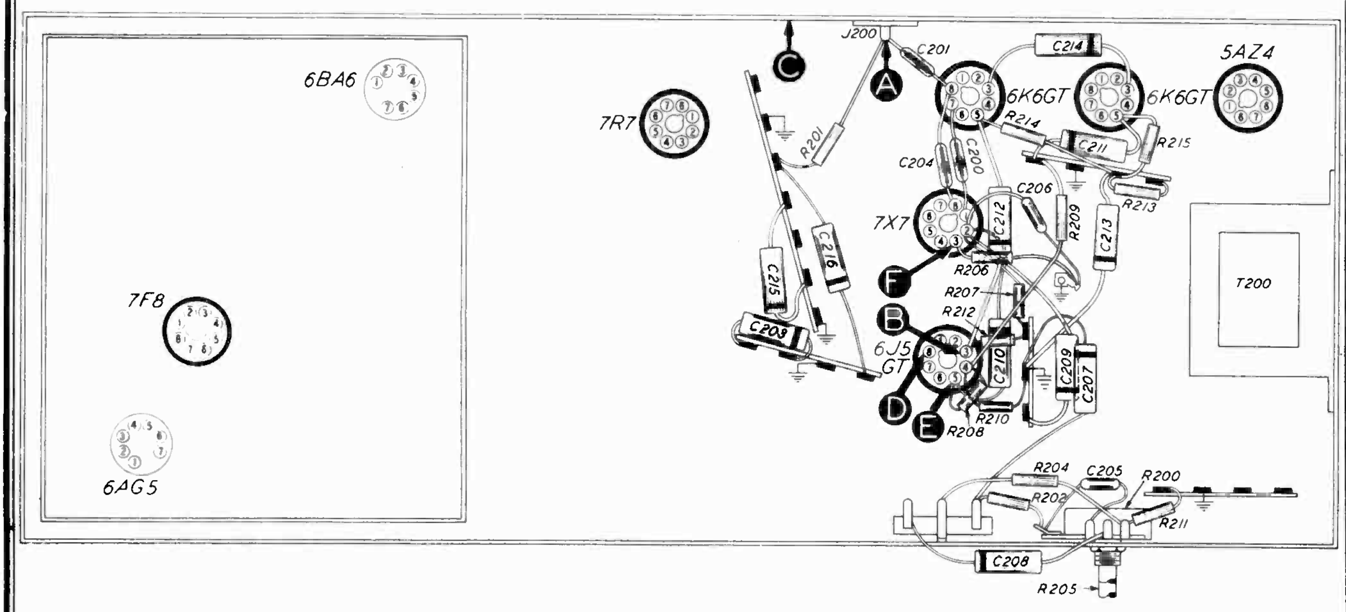


Figure 4. Bottom View, Showing Section 2 Test Points

PHILCO CORP. MODEL 48-1264

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 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, the wafer switch to the broadcast (BC) position, and the tone control near the "off" position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits, or to the tests in Section 4; 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 B 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."

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, Z302, WS3(R), WS2(R). Shorted or leaky: C320, C321, C322. Open: R309, R312, R313, R314, R315, R317. Misaligned: Z302.
3	D	Loud, clear signal with moderate signal input.	Defective: 6BA6, Z301. Shorted or leaky: C307, C308, C309, C311. Open: R306, R304, R305, C307. Misaligned: Z301.
4	A	Loud, clear signal with weak signal input.	Defective: 7F8*, Z300, WS4(R), WS4(F). Shorted or leaky: C303, C304, C305. Open: R300, R301, R405*. Misaligned: Z300.
Listening Test: Distortion, with hum, may be caused by open C307 or C319.			

*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. Observe the instructions preliminary to the tests for the AM circuits, with the following exceptions: set the wafer 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 14).

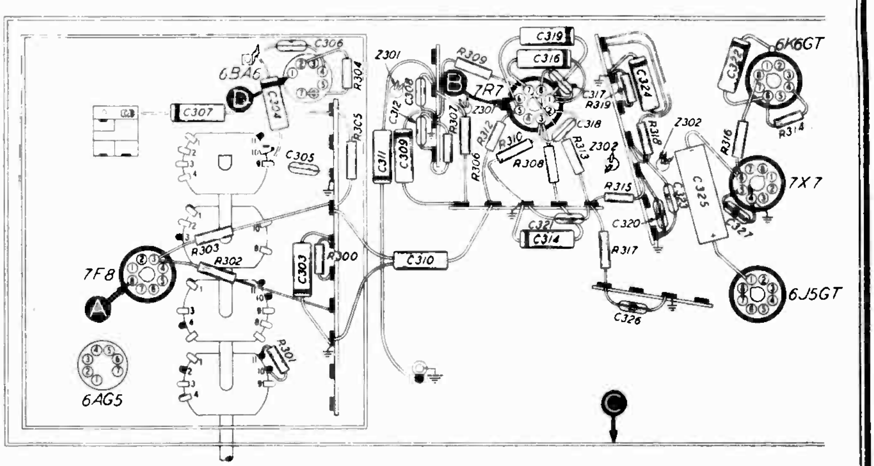


Figure 5. Bottom View, Showing Section 3 Test Points

Step	Test Point	Normal Indication	Possible Cause of Abnormal Indication
1	B	Loud, clear signal with strong signal input.	Defective: 7R7, 7X7 (diode section), C325, Z302. Shorted or leaky: C323, C324, C205*. Open: R318, R319. Misaligned: Z302.
2	D	Loud, clear signal with moderate signal input.	Same parts listed in AM test chart, step 3.
3	A	Loud, clear signal with weak signal input.	Same parts listed in AM test chart, step 4 and WS4(R), WS4(F).

Section 4 TROUBLE SHOOTING

For the tests in this section, 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; connect the output lead through a .1-mf. condenser to the test points indicated in the charts.

Set the volume control to maximum, and the tone control near the "off" position.

For the AM-circuit tests, set the wafer switch to the BC position, and set the signal-generator and radio dials to 1000 kc.

For the FM-circuit tests, set the wafer switch to the FM position, and set the signal-generator and radio dials to 95 mc. (detune the generator to one side or the other until a satisfactory test signal is obtained).

OSCILLATOR TESTS: For the oscillator tests (step 3 in each chart), connect the positive lead of a high-resistance voltmeter to the 7F8 oscillator cathode (pin 4); connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the 7F8 oscillator grid (pin 1), test point D. Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator for either AM or FM is indicated by a negative voltage throughout the range of the tuning condensers (the normal oscillator voltages given in the charts were measured with a 20,000-ohms-per-volt meter).

AM CIRCUITS

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	Same as step 1.	Defective: 7F8. Shorted: C400. Open: L406, R408, C411. Trouble in oscillator circuit (step 3).
3	D Osc. Test	Negative 2 to 3 volts (turn tuning control through range.)	Defective: 7F8, WS3(F), WS2(F). Shorted: C411, C412, C413, C402B, C402A, C400, L404. Open: R406, R303*, L404, C412, C413.
4	A	Same as step 1.	Defective: WS1(R). Shorted: L400, C401. Open: L400, R404, C410.

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

FM CIRCUITS

Step	Test Point	Normal Indication	Possible Cause of Abnormal Indication
1	E	Loud, clear signal with weak signal input.	Trouble in FM circuits. Isolate by the following tests.
2	B	Loud, clear signal with moderately weak signal input.	Same parts listed in AM test chart, step 2.
3	D Osc. Test	Negative. 1 volt (approx.).	Defective: 7F8, WS3(R), WS2(R), C400, C400C. Open: L405.
4	F	Loud, clear signal with moderately weak signal input.	Defective: WS1(R). Open: C407.
5	E	Loud, clear signal with weak signal input.	Defective: 6AG5. Shorted: C400, C400A. Shorted or leaky: C408, C406, C407. Open: R400, R401, R402, R403, L402.

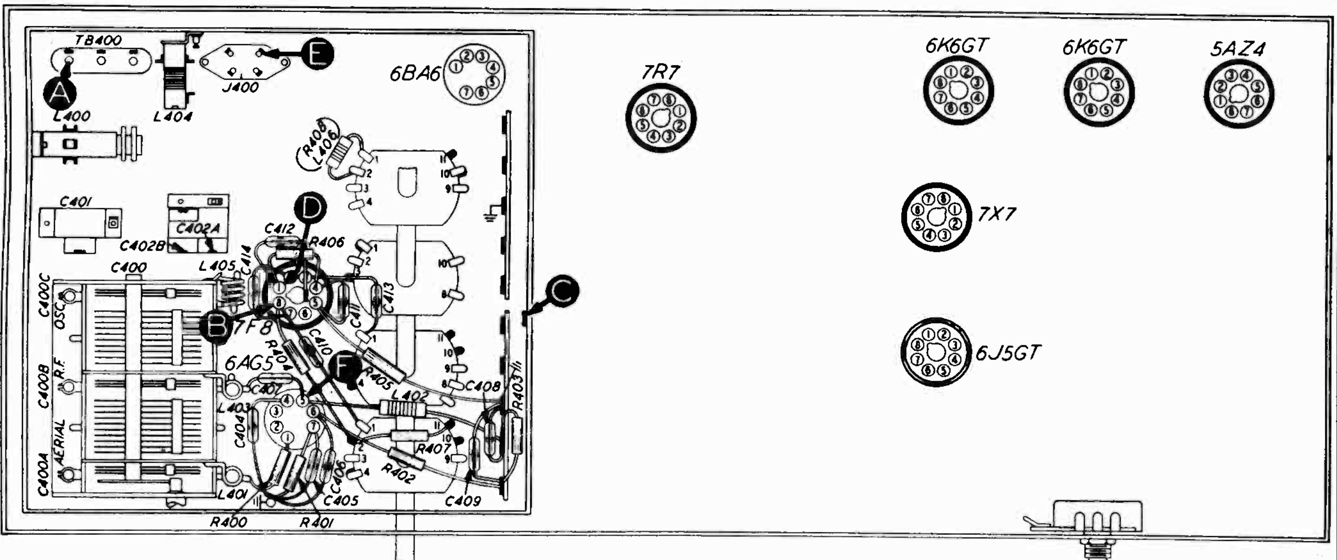


Figure 6. Bottom View, Showing Section 4 Test Points

PHILCO CORP. MODEL 48-1264

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 value 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, high-voltage, filter, 20 mf.	30-2555*
C103	Condenser, electrolytic, 2-section	30-2556*
C103A	Condenser, high-voltage filter, 25 mf.	Part of C103
C103B	Condenser, isolating filter, 10 mf.	Part of C103
I100	Lamp, bin	34-2039*
I101	Lamp, panel	34-2064*
I102	Lamp, panel	34-2064*
J100	Socket, a-c phono power	27-6200
L100	Field, speaker	Part of LS200
R100	Resistor, bias, 165 ohms	33-3435-1
R101	Resistor, voltage dropping, 15,000 ohms	66-3155340*
S100	Switch, power on-off	Part of R205
S101	Switch, bin lamp	42-1702
S102	Switch, a-c phono power	Part of 42-1803
T100	Transformer, a-c power	32-8248
W100	Line cord and plug	L3339

SECTION 2

Reference Symbol	Description	Service Part No.
C200	Condenser, filament by-pass, 100 mmf.	60-10105407*
C201	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C202	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C203	Condenser, d-c blocking, .006 mf.	45-3500-7*
C204	Condenser, filament by-pass, 100 mmf.	60-10105407*
C205	Condenser, audio by-pass, 100 mmf.	60-10105407*
C206	Condenser, plate by-pass, 100 mmf.	60-10105407*
C207	Condenser, bass compensation, .01 mf.	61-0120*
C208	Condenser, d-c blocking, .006 mf.	45-3500-7*
C209	Condenser, tone compensation, .01 mf.	61-0120*

SECTION 2 (Cont.)

Reference Symbol	Description	Service Part No.
C210	Condenser, d-c blocking, .006 mf.	45-3500-7*
C211	Condenser, d-c blocking, .006 mf.	45-3500-7*
C212	Condenser, d-c blocking, .006 mf.	45-3500-7*
C213	Condenser, audio by-pass, .1 mf.	61-0113*
C214	Condenser, tone compensation, .003 mf.	61-0117*
C215	Condenser, d-c blocking, .006 mf.	45-3500-7*
C216	Condenser, coupling, .006 mf.	45-3500-7*
J200	Socket, FM test	27-6180
LS200	Speaker	36-1595
PL200	Cable-and-plug assembly, phono input	41-3735-2
R200	Volume control, 2 meg. (tap at 1 meg.)	33-5535-1
R201	Resistor, r-f decoupling, 100,000 ohms	66-4103340*
R202	Resistor, bass compensation, 33,000 ohms	66-3333340
R203	Resistor, phono grid load, 1 megohm	66-5103340
R204	Resistor, inverse feedback, 4.7 ohms	66-9473340
R205	Tone control, 6 megohms	33-5538-1
R206	Resistor, grid leak, 1st audio, 10 megohms	66-6103340*
R207	Resistor, plate load, 220,000 ohms	66-4223340*
R208	Resistor, grid load, 1 megohm	66-5103340*
R209	Resistor, cathode bias, 4700 ohms	66-2473340*
R210	Resistor, cathode load, 47,000 ohms	66-3473340*
R211	Resistor, inverse feedback, 68 ohms	66-0683340*
R212	Resistor, plate load, 56,000 ohms	66-3563340*
R213	Resistor, filter, 150,000 ohms	66-4153340*
R214	Resistor, grid load, 330,000 ohms	66-4333340*
R215	Resistor, grid load, 330,000 ohms	66-4333340*
T200	Transformer, output	32-8274

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, FM trimmer	Part of Z300
C300B	Condenser, AM tuning, 3000 mmf.	Part of Z300
C300C	Condenser, i-f coupling, 6 mmf.	Part of Z300

MODEL 48-1264 PHILCO CORP.

REPLACEMENT PARTS LIST (Continued)

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
C300D	Condenser, FM trimmer	Part of Z300
C300E	Condenser, AM trimmer	Part of Z300
C301A	Condenser, FM trimmer	Part of Z301
C301B	Condenser, AM tuning, 300 mmf.	Part of Z301
C301C	Condenser, FM trimmer	Part of Z301
C301D	Condenser, AM trimmer	Part of Z301
C302A	Condenser, AM tuning, 470 mmf.	Part of Z302
C302B	Condenser, AM trimmer	Part of Z302
C302C	Condenser, FM coupling, 27 mmf.	Part of Z302
C302D	Condenser, FM trimmer	Part ofZ302
C302E	Condenser, FM tuning, 25 mmf.	Part of Z302
C302F	Condenser, FM tuning, 15 mmf.	Part of Z302
C303	Condenser, plate by-pass, .01 mf.	61-0120*
C304	Condenser, a-v-c- by-pass, .01 mf.	61-0120*
C305	Condenser, a-v-c by-pass, 100 mmf.	60-10105407*
C306	Condenser, filament by-pass, 100 mmf.	60-10105407*
C307	Condenser, screen by-pass, .01 mf.	61-0120*
C308	Condenser, plate by-pass, 100 mmf.	60-10105407*
C309	Condenser, plate decoupling, .01 mf.	61-0120*
C310	Condenser, plate by-pass, .01 mf.	30-4641
C311	Condenser, plate by-pass, .01 mf.	61-0120*
C312	Condenser, a-v-c by-pass, 250 mmf.	60-10255237*
C313	Not used	
C314	Condenser, a-v-c- filter, .01 mf.	61-0120*
C315	Not used	
C316	Condenser, cathode by-pass, .05 mf.	61-0122*
C317	Condenser, filament by-pass, 100 mmf.	60-10105407*
C318	Condenser, d-c blocking, 100 mmf.	60-10105407*
C319	Condenser, screen by-pass, .01 mf.	61-0120*
C320	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C321	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C322	Condenser, plate decoupling, .05 mf.	61-0122*
C323	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C324	Condenser, r-f by-pass, .008 mf.	61-0174*
C325	Condenser, noise suppressor, 5 mf.	30-2417*
C326	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C327	Condenser, coupling, 6 mmf.	30-1224-9
C328	Not used	
R300	Resistor, plate dropping, 47,000 ohms	66-3473340*
R301	Resistor, a-v-c decoupling, 2.2 megohms	66-5223340*
R302	Resistor, plate dropping, 4700 ohms	66-2473340*
R303	Resistor, plate dropping, 33,000 ohms	66-3333340*

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
R304	Resistor, cathode bias, 68 ohms	66-0683340*
R305	Resistor, screen dropping, 27,000 ohms	66-3273340*
R306	Resistor, plate decoupling, 1000 ohms	66-2103340*
R307	Resistor, grid return, 2.2 megohms	66-5223340*
R308	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R309	Resistor cathode bias, 150 ohms	66-1153340*
R310	Resistor, a-v-c load, 1 megohm	66-5103340*
R311	Not used	
R312	Resistor, screen dropping, 68,000 ohms	66-3683340*
R313	Resistor, diode load, 330,000 ohms	66-4333340*
R314	Resistor, plate decoupling, 1000 ohms	66-2103340*
R315	Resistor, diode decoupling, 47,000 ohms	66-3473340*
R316	Resistor, noise suppressor, 47,000 ohms	66-3473340*
R317	Resistor, diode decoupling, 100,000 ohms	66-4103340*
R318	Resistor, FM decoupling, 100,000 ohms	66-4103340*
R319	Resistor, FM-detector load, 6.8 megohms	66-5683340*
TC300A	Tuning core, AM tuning	Part of Z300
TC302A	Tuning core, FM tuning	Part of Z302
Z300	Transformer, 1st i-f, including C300A, C300B, C300C, C300D, C300E, and TC300A	32-4146*
Z301	Transformer, 2nd i-f, including C301A, C301B, C301C, and C301D	32-4156*
Z302	Transformer, 3rd i-f, including C302A, C302B, C302C, C302D, C302E, C302F, and TC302A	32-4147*

SECTION 4

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2703-2
C400A	Condenser, FM aerial trimmer	Part of C400
C400B	Condenser, FM r-f trimmer	Part of C400
C400C	Condenser, FM oscillator trimmer	Part of C400
C401	Condenser, 1500-kc. trimmer	31-6473
C402	Condenser, trimmer assembly, 2-section	31-6476-5
C402A	Condenser, shunt trimmer, BC oscillator	Part of C402
C402B	Condenser, series trimmer, BC oscillator	Part of C402
C403	Not used	
C404	Condenser, filament by-pass, 100 mmf.	60-10105407*
C405	Condenser, cathode by-pass, 100 mmf.	60-10105407*

PHILCO CORP. MODEL 48-1264

REPLACEMENT PARTS LIST (Continued)

SECTION 4 (Cont.)

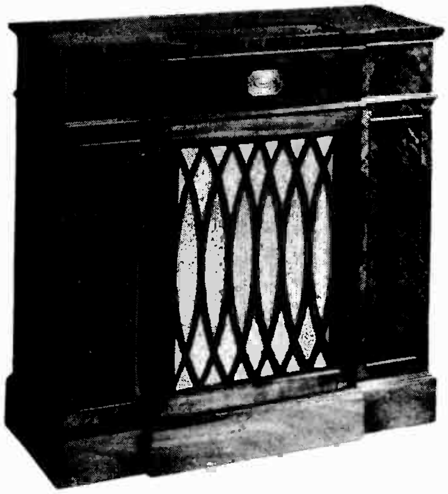
Reference Symbol	Description	Service Part No.
C406	Condenser, screen by-pass, 100 mmf.	60-10105407*
C407	Condenser, d-c blocking, 33 mmf.	60-00305307*
C408	Condenser, plate by-pass, 1500 mmf.	60-20155404*
C409	Condenser, screen by-pass, 1500 mmf.	60-20155404*
C410	Condenser, d-c blocking, 220 mmf.	60-10245307*
C411	Condenser, d-c blocking, 750 mmf.	60-10755301*
C412	Condenser, grid return, 100 mmf.	60-10105407*
C413	Condenser, d-c blocking, 220 mmf.	60-10245307*
C414	Condenser, filament by-pass, 100 mmf.	60-10105407*
J400	Socket, 4-prong, external aerial	27-6214-1
L400	Coil, BC aerial	32-4033-2
L401	Coil, FM aerial	32-4158
L402	Choke, plate	32-4061
L403	Coil, FM r-f	32-4159
L404	Coil, BC oscillator	32-4019-4
L405	Coil, FM oscillator	32-4018-2
L406	Choke, parasitic suppressor, including R408	32-4157
LA400	Loop assembly, broadcast	76-2262-1
R400	Resistor, parasitic suppressor, 10 ohms	66-0103340*
R401	Resistor, cathode bias, 150 ohms	66-1151540*
R402	Resistor, screen dropping, 47,000 ohms	66-3473340*
R403	Resistor, plate decoupling, 1000 ohms	66-2103340*
R404	Resistor, grid return, 2.2 megohms	66-5223340*
R405	Resistor, cathode bias, 1500 ohms	66-2153340*
R406	Resistor, grid leak, 15,000 ohms	66-3153340*
R407	Resistor, grid return, 470,000 ohms	66-4473340*
R408	Resistor, parasitic suppressor, 1500 ohms	Part of L406
TB400	Aerial terminal panel	38-9942
WS	Wafer switch	42-1803
WS1	1st section, wafer switch	Part of WS
WS2	2nd section, wafer switch	Part of WS
WS3	3rd section, wafer switch	Part of WS
WS4	4th section, wafer switch	Part of WS

MISCELLANEOUS

Description	Service Part No.
Bin Hardware	
Cable-socket-and-switch assembly, bin light	76-2728-5
Door, bin, changer 48-1264W	45-6396
Door, bin, changer 48-1264L	45-6397
Cabinet and Cabinet Hardware	
Baffle and cloth	40-6932
Baffle, wood	219087
Bezel, metal	56-4878
Cabinet, walnut, less scale	10683
Cabinet, light mahogany, less scale	10683A
Frame assembly	76-3222
Grille, wire	56-4985
Loop assembly, FM cabinet dipole	76-2029-10
Scale, dial	76-3187-1
Strap, dial-scale mounting	56-4916
Cable, shielded	41-3754-11
Cable, speaker	41-3734-7
Dial Backplate and Associated Hardware	
Backplate and pulley assembly	76-2005-3
Cord, pointer drive (25-ft. spool)	45-8750*
Pointer	56-3179
Spring, pointer-drive-cord	28-8953
Knob	54-4486
Lamp-socket assembly, pilot	76-2109
Plug, speaker	27-4419-2
Record-Changer Mounting Hardware	
Bolt	56-3295-1FA15
Grommet	54-4313
Nut	1W56643FA3
Palnut	1W29061FA3
Spring	56-3043-FA15
Socket, loktal (7F8 only)	27-6213
Socket, loktal	27-6138*
Socket, miniature (6AG5)	27-6203-1
Socket, miniature (6BA6)	27-6226
Socket, octal	27-6174
Wafer-Switch Hardware	
Link assembly	76-2186-3
Shaft	56-3298FA11
Washer, "C"	1W42535FA3

MODELS 48-1274, 48-1276

PHILCO CORP.



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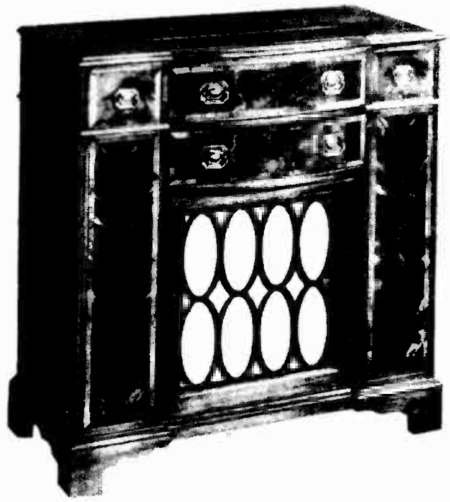
MODEL 48-1274



TP-1401

MODEL 48-1276

SPECIFICATIONS

CABINET
- Model 48-1274 .... Wood, mahogany or walnut finish
- Model 48-1276 .... Wood, mahogany finish

CIRCUIT .... Sixteen-tube superheterodyne

FREQUENCY RANGES
- Broadcast .... 540—1720 kc.
- Short Wave .... 9.25—15.5 mc.
- Frequency Modulation .... 88—108 mc.

AUDIO OUTPUT .... 15 watts

PUSH BUTTONS .... Ten: One for power OFF; one for phono operation; three for manual-tuning band selection (BC, SW, or FM); five for automatic (motor-driven) station and band selection (BC or FM)

OPERATING VOLTAGE .... 105—125 volts, 60 cycles, a.c.

POWER CONSUMPTION
- Radio .... 175 watts
- Phonograph .... 20 watts

AERIALS .... Built-in loop for broadcast and short wave; cabinet dipole for FM; provision for external aerial

INTERMEDIATE FREQUENCIES
- AM .... 455 kc.
- FM .... 9.1 mc.

PHILCO TUBES (16) .... 6AU6, 7E5, 7H7(2), 7B7, 7F8, FM1000, 6J5GT(3), 7E6, 6L6GA(2), 7F7, 7E7, 5U4G

PHONOGRAPH .... Philco Automatic Record Changer, Model M-4 (for service information, see manual PR-1157)

MOTOR-DRIVEN TUNING MECHANISM ..... Philco Electromechanical Push-Button Tuner (for service information, see manual PR-1481)

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MODELS 48-1274, 48-1276

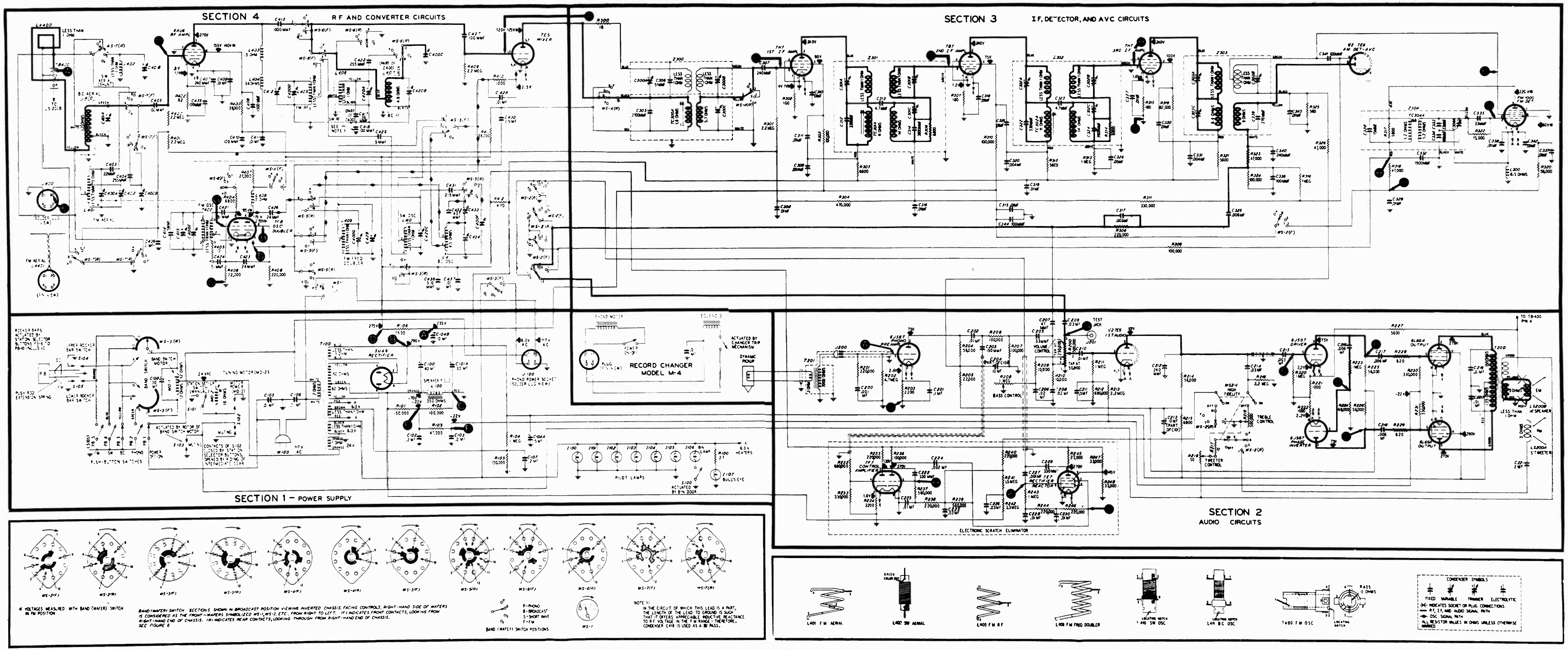

FIGURE 8. PHILCO RADIO-PHONOGRAPH MODELS 48-1274 AND 48-1276, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

MODELS 48-1274, 48-1276

PHILCO CORP.

SETTING PUSH BUTTONS

NOTE: Before setting the push buttons, allow the radio to warm up for about 15 minutes.

1. Depress the BC push button, and rotate the tuning control until the Allen setscrew in the main camshaft is accessible from the rear of the chassis, as shown in figure 9.

2. Loosen the setscrew four turns.

CAUTION: Remove the wrench before proceeding with the next step.

3. Determine the dial positions of the desired stations (both FM and broadcast) in order, from left to right, and place the station tabs of these stations, in the same order, in the station-selector buttons.

4. Position the push-rod extension spring of the station-selector button so that it will engage the correct rocker bar (upper bar for broadcast, and lower bar for FM).

5. Depress the button for the band of the station to be set up on the left-hand station-selector button. Manually tune the radio to this station, and, while holding the manual-tuning control, depress the station-selector button.

6. After the tuning motor stops, operate the set-up switch (see figure 9); hold the set-up switch closed until the motor stalls, then release it.

7. Set the remaining four station-selector buttons, from left to right, in the same manner.

8. Depress the BC button, and again rotate the tuning control until the Allen setscrew is accessible; tighten the setscrew and remove the wrench.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO			ADJUST
	CONNECTION TO RADIO	DIAL SETTING	BAND	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to stator of ant. section of tuning gang.	455 kc.	BC	1700 kc.	Adjust trimmers, in order given, for maximum output. Do not repeat adjustments.	C303C — 4th i-f pri. C302C — 3rd i-f sec. TC302A — 3rd i-f pri. C301C — 2nd i-f sec. TC301A — 2nd i-f pri. C300C — 1st i-f sec. TC300A — 1st i-f pri.
2	Radiating loop (See note below.)	15 mc.	SW	15 mc.	Adjust for maximum. (Image should be heard with generator tuned to 14.1 mc.)	C420C — S-w osc.
3	Same as step 2.	15 mc.	SW	15 mc.	Adjust for maximum while rocking tuning control.	C420A — S-w r.f. C401B — S-w aerial
4	Same as step 2.	1720 kc.	BC	1720 kc.	Adjust for maximum.	C434 — Bc. osc. (shunt)
5	Same as step 2.	580 kc.	BC	580 kc.	Adjust for maximum.	C433 — Bc. osc. (series)
6	Same as step 2.	1500 kc.	BC	1500 kc.	Adjust for maximum.	C420B — Bc. r.f.
7	Same as step 2.	1500 kc.	BC	1500 kc.	Adjust for maximum.	C401A — Bc. aerial
8	Repeat steps 4, 5, 6, and 7 until no further increase is obtained.					

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-broadcast loop.

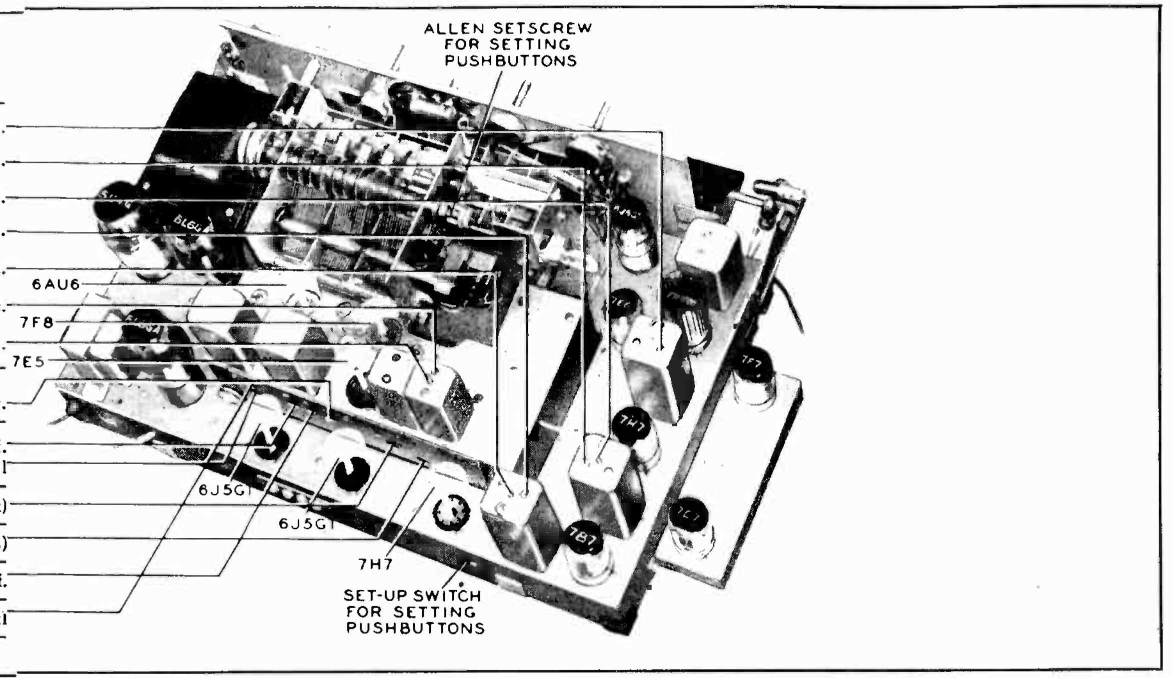

FIGURE 9. TOP VIEW, SHOWING AM TRIMMER LOCATIONS

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FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	To control grid (pin 5) of 7E5 (through hole in side of r-f chassis).	9.1 mc. (Mod. on)	Tuning gang fully closed.	Connect jumper between pin 2 (oscillator grid) of FM1000 and chassis (see note 1). Connect loading network (see note 2) between top of trimmer C303B and chassis (see note 3). Adjust for maximum.	C303A — 4th i-f pri.
2	Same as step 1.	9.1 mc. (Mod. on)	Same as step 1.	Connect loading network between pin 2 (blue lead) of 7H7 third i.f. and chassis. Adjust for maximum.	C303B — 4th i-f sec.
3	Same as step 1.	9.1 mc. (Mod. on)	Same as step 1.	Connect loading network between pin 6 (green lead) of 7H7 third i.f. and chassis. Adjust for maximum.	C302A — 3rd i-f pri.
4	Same as step 1.	9.1 mc. (Mod. on)	Same as step 1.	Connect loading network between pin 2 (blue lead) of 7B7 second i.f. and chassis. Adjust for maximum.	C302B — 3rd i-f sec.
5	Same as step 1.	9.1 mc. (Mod. on)	Same as step 1.	Connect loading network between pin 6 (green lead) of 7B7 second i.f. and chassis. Adjust for maximum.	C301A — 2nd i-f pri.
6	Same as step 1.	9.1 mc. (Mod. on)	Same as step 1.	Connect loading network between pin 2 (blue lead) of 7H7 first i.f. and chassis. Adjust for maximum.	C301B — 2nd i-f sec.
7	Same as step 1.	9.1 mc. (Mod. on)	Same as step 1.	Leave loading network connected as in step 6. Adjust for maximum.	C300B — 1st i-f sec. C300A — 1st i-f pri.
8	To control grid (pin 6) of 7H7 third i.f.	9.1 mc. (Mod. 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 test point H (Section 3). Adjust for zero beat.	C304A — Det. osc.
9	Same as step 8.	9.1 mc. (Mod. off)	Same as step 1.	Remove jumper used in step 8. Adjust for zero beat (see note 4).	TC304A — Det. plate
10	To terminal 2 of J400 (see note 5).	105 mc. (Mod. on)	105 mc.	Connect jumper between pin 2 of FM1000 and chassis. Adjust for maximum.	C415 — H-f osc.
11	Same as step 10.	105 mc. (Mod. on)	105 mc.	Same as step 10.	C429 — Freq. doubler
12	Same as step 10.	92 mc. (Mod. on)	92 mc.	Adjust coil L409 for maximum (see note 6).	Freq-doubler tracking
13	Repeat steps 10 and 11 until no further increase is obtained.				
14	Same as step 10.	105 mc. (Mod. on)	105 mc.	Adjust for maximum while rocking tuning control.	C412 — R.f.
15	See note 7.	105 mc. (Mod. on)	105 mc.	Adjust for maximum.	C402 — Aerial
16	Same as step 13.	92 mc. (Mod. on)	92 mc.	Adjust coils L405 and L401 for maximum (see note 6).	R-f and aerial tracking
17	Repeat steps 14, 15, and 16 until no further increase is obtained.				

FIGURE 10. TOP VIEW, SHOWING FM TRIMMER LOCATIONS

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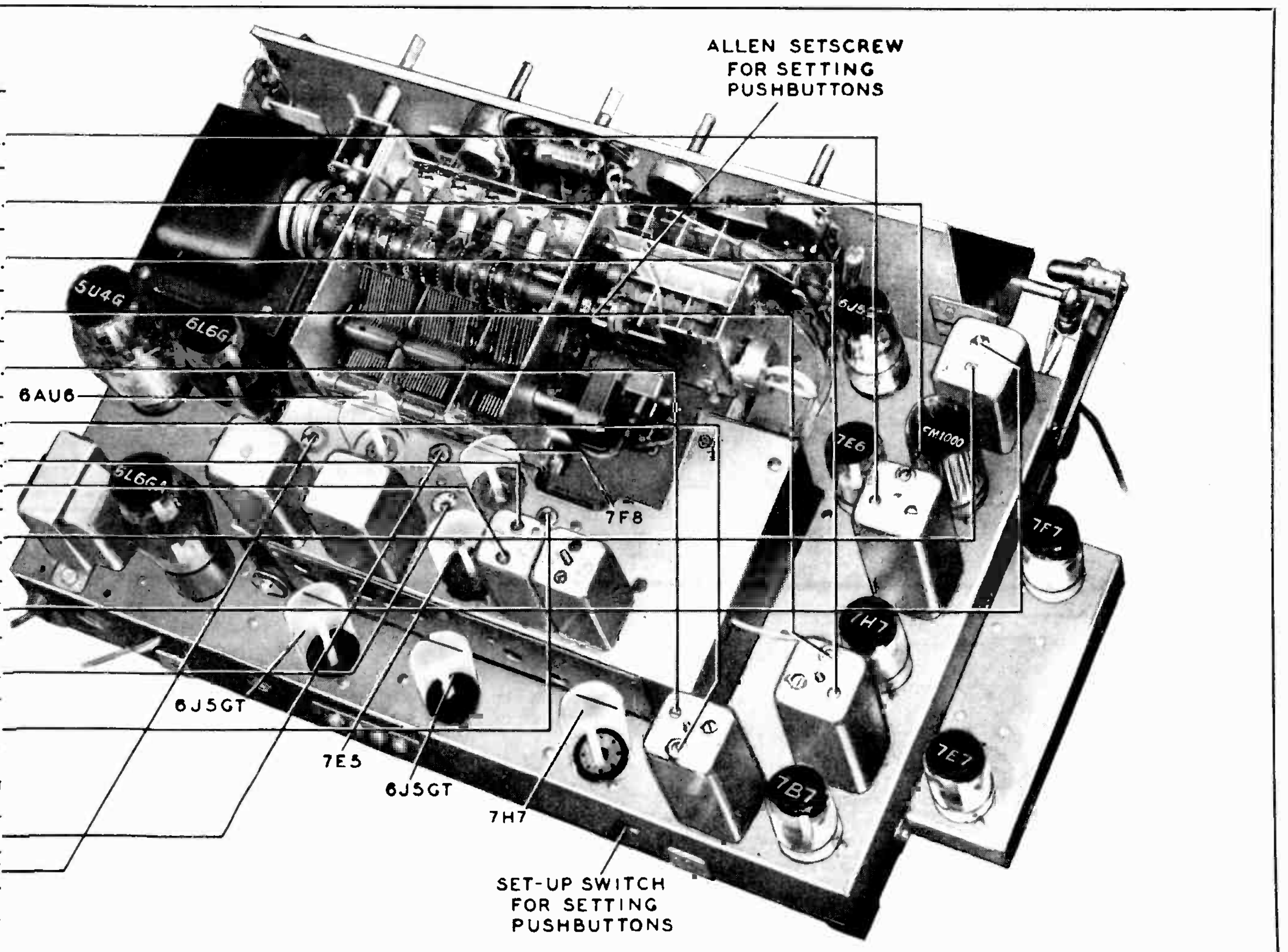

AM ALIGNMENT PROCEDURE

CAUTION: Do not turn on the power with the speaker disconnected, or the radio may be damaged.

When the complete AM and FM alignments are to be made, the AM alignment should be made first; if AM alignment is not required, the FM alignment alone may be made. Before starting the alignment, allow the radio to warm up for about 15 minutes.

DIAL POINTER: With the tuning-condenser plates fully meshed, adjust the pointer to coincide with the index mark at the low-frequency end of the scale. See CALIBRATING DIAL BACKPLATE, page 12.

RADIO CONTROLS: Set the volume control to maximum. Turn the bass control fully counterclockwise, and the treble control fully clockwise.

AM R-F SIGNAL GENERATOR: Connect the ground lead to the radio chassis, and the output lead as indicated in the chart. Use modulated output.

OUTPUT METER: Connect between terminal 4 (voice-coil connection) of the aerial terminal panel and the chassis.

OUTPUT LEVEL: During the alignment, the input signal must be attenuated to hold the output-meter reading below 1.5 volts.

BAND PUSH BUTTONS, RADIO DIAL, AND SIGNAL-GENERATOR DIAL: Set as indicated in the chart.

FM ALIGNMENT PROCEDURE

MAKE AM ALIGNMENT FIRST

Follow the instructions preliminary to the AM alignment chart, except for the band selection; depress the FM push button. Use an AM r-f signal generator, with or without modulation, as indicated in the chart.

FM ALIGNMENT NOTES

1. When pin 2 of the FM1000 tube is shorted to the chassis, the detector oscillator is made inoperative, and the circuit is converted 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. This network, when connected across the primary or secondary of an overcoupled i-f transformer, loads the circuit so that the transformer coupling is effectively below the critical value; the unloaded winding may then be correctly tuned to the center intermediate frequency.
3. The top of trimmer, C303B, 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 of the generator be kept below the level at which the detector oscillator locks in, or an erroneous zero beat will be obtained. When a single very sharp zero-beat point in obtained, the adjustment is correct.
5. The use of a signal generator for steps 10 to 16, inclusive, is recommended only if the available generator is sufficiently accurate to insure correct frequency settings; otherwise, an alternate procedure employing FM broadcast-station signals instead of a signal generator is recommended. For adjustments at the high-frequency end of the band, use the station nearest 105 mc.; for the low-frequency adjustments, use the station nearest 92 mc. If the circuits are 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.
6. Check circuit resonance with a tuning wand. If the brass end, when placed in or near the coil, increases the output-meter reading, spread the coil turns; if the powdered-iron end increases the 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. To feed signals from the signal generator into the aerial circuit of the radio, make two simple dipole aerials. Each 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. Connect the other to the signal-generator leads. Arrange the two aerials several feet apart.

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	PB—push-button switch	T—transformer
I—pilot lamp	LS—loud-speaker	R—resistor	WS—wafer switch
L—choke or coil	MO—motor	S—switch	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, 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.

MODELS 48-1274, 48-1276

PHILCO CORP.

CIRCUIT DESCRIPTION

Philco Models 48-1274 and 48-1276 are 16-tube radio-phonograph combinations incorporating a sensitive superheterodyne radio and a Philco Automatic Record Changer, Model M-4. The two models are essentially identical except for the cabinets and cabinet hardware, as indicated in the Replacement Parts List.

Aerial System

A built-in, low-impedance loop provides signal pickup on the broadcast and short-wave bands. The cabinet dipole aerial gives satisfactory FM reception in areas of moderately high signal strength. For greater pickup on the FM band, the Philco Dipole Outdoor Aerial, Part No. 45-1462, should be used. To increase the pickup on all three bands, use the Philco Aerial Coupler, Part No. 76-2353, with the outdoor dipole. Information on aerial and coupler connections is given in external-aerial bulletin PR-1200.

Push Buttons

Nine of the ten push buttons are used for the selection of band, phono operation, or automatic station tuning; any one of these turns on the power. The OFF button turns off the power.

Push-Button Band Selectors

Any one of three push buttons (BC, SW, FM) selects the band for manual tuning by operating a motor-driven band switch. A muting switch, shorting out the speaker voice-coil circuit, operates simultaneously.

Push-Button Phono Switch

The PHONO push button operates the motor-driven band switch to select phono operation, and applies the power to the phonograph control on the record changer. The muting switch operates simultaneously.

Push-Button Station Selectors

Five push buttons are used for selecting any one of five standard-broadcast or FM stations. These buttons operate the motor-driven tuning mechanism, and, in addition, automatically actuate the motor-driven band switch whenever a band change is required. The muting switch operates simultaneously.

Radio Circuit

A 6AU6 r-f pentode is used as a tuned-r-f amplifier on all bands. See figure 8. Frequency conversion is accomplished by separate mixer and oscillator tubes. A 7E5, arranged for cathode injection, functions as the mixer on all bands. The oscillator system employs a 7F8 double triode. One section of this tube is employed as the oscillator for broadcast and short-wave reception. For FM reception, the second section of the tube, functioning as the oscillator, operates on frequencies of one-half those usually employed, while the first section of the tube functions as a frequency doubler, the tuning circuit being tracked with that of the oscillator. Another unique feature of the FM oscillator is the separate tuned circuit, which is inductively coupled to the untuned feed-back circuit. These oscillator design features achieve unusual stability.

The three stages of i-f amplification employ two 7H7's and one 7B7. In the i-f transformers the FM windings (9.1 mc.) are in series with the AM windings (455 kc.). The windings of the first i-f transformer are switched, to provide additional image rejection and conversion efficiency. No switching is required for the other i-f transformers.

The diode sections of the 7E6 provide AM detection and a.v.c.; the triode section of this tube functions as the first audio amplifier. For FM reception, the Philco Advanced FM Detector, using an FM1000, provides good sensitivity and noise rejection.

A positive voltage taken from a voltage divider (R104 and R105) is applied, through the center tap of the filament winding, to the first-audio and phono-preamplifier tubes; by making the filaments positive with respect to the cathodes and grids, emission from the filaments to these elements is prevented, and a-c hum is reduced in both radio and phono operation.

The first audio amplifier is resistance-coupled to a 6J5GT driver, which is resistance-coupled to one of the 6L6GA output tubes and, through a voltage divider (R223 and R224), to a 6J5GT phase inverter; the phase inverter drives the other 6L6GA output tube. Inverse feed-back voltage, taken from the secondary of the output transformer, is applied through a voltage divider (R221 and R227) to the 6J5GT driver, thus improving the fidelity of the audio system.

Both the tweeter and the large reproducer of the coaxial speaker system are used for FM reception. The tweeter is disconnected for broadcast and short-wave reception, and also for phono operation.

Phono Preamplifier

A 6J5GT is used in the phono-preamplifier stage. In phono operation, this stage is resistance-coupled to the first audio amplifier (triode section of the 7E6).

Scratch Eliminator

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 double diode, pentode as a half-wave rectifier and a reactance tube. The latter functions as a variable capacitance (at 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, amplified by the 7F7, and rectified by the diode section of the 7E7.

High-Fidelity Switch

The high-fidelity switch, operating in conjunction with a band-switch section, WS-2(R), performs the following functions:

For broadcast and short-wave operation, the fidelity switch in the OFF position switches the treble control into the circuit, and in the ON position disconnects the treble control.

For FM operation, the fidelity switch in the ON position connects the tweeter speaker into the circuit, and also connects that section of the treble control which controls the output of the tweeter; in the OFF position the fidelity switch disconnects the tweeter, and connects the treble control into the circuit.

For phono operation, the fidelity switch in the OFF position turns on the scratch eliminator, and switches the treble control into the circuit; in the ON position the switch disconnects the treble control, and turns off the scratch eliminator.

Treble Control

The treble control has two variable-resistance sections; the .5-megohm potentiometer operates in conjunction with a .05-mf. condenser for treble-attenuation control, and is in the circuit whenever the high-fidelity switch is in the OFF position; the 50-ohm potentiometer controls the output of the tweeter speaker for FM high-fidelity operation, and is in the circuit when the high-fidelity switch is in the ON position (with the FM push button depressed).

Bass Control

The bass control is in the circuit for both radio and phono operation. This control, a 1-megohm potentiometer, is combined with C206 and R209 to furnish any desired degree of bass accentuation.

PHILCO AUTOMATIC BAND SELECTOR

The Philco Automatic Band Selector consists of a motor-driven band switch (figure 5), operated by the various push buttons. The position of the switch is selected manually, by the BC, SW, FM, or PHONO push-button, or automatically, by any of the five station-selector push buttons.

The motor is a reversible, shaded-pole, induction motor, operating on 24 volts a.c. The operation of the motor is controlled through the contacts on the "homing" wafer, WS-3(F) and WS-3(R), which is a section of the band switch; the contacts on both sides of this wafer are shown schematically in figure 8. The direction of motor rotation depends upon which section of the center-tapped field is energized; therefore, the direction in which the band switch is driven is determined by the position of the homing-wafer rotor when a given band-selector switch is closed. In manual band selection, motor power is applied to the homing wafer by the contacts of the BC, SW, FM, or PHONO push button. In automatic band selection, the power is applied by either S104 for the standard broadcast band, or by S105 for the FM band. Switches S104 and S105 are combined with the upper and lower rocker bars, respectively, located on the front of the Philco Electro-mechanical Push-Button Tuner. Either bar is mechanically actuated, when a given station-selector button is depressed, by the individual push-rod extension spring, which is positioned so as to strike the rocker bar for the band in which the station is located.

When any one of the push-button switches is closed, power is supplied to the motor until the moving rotor of the homing wafer breaks that circuit. Over-shooting is prevented by the use of a clutch, mounted on the motor shaft. When the motor is idle, a spring holds its rotor off-center with respect to the electromagnetic field, and keeps the motor disengaged from the gear train. When power is applied to the motor, the rotor attempts to center itself in the field, thus engaging the clutch in the gear train. When the power is removed, the clutch is immediately disengaged by the action of the spring.

As the clutch is disengaged, the muting switch (leaf type) is pushed open by the motor shaft. When the motor operates, the muting switch is allowed to close.

For an example of the band-changing operation, assume that the idle condition is as indicated in the schematic diagram, showing the BC push button, PB-3, depressed. Now, if PB-5 is depressed, the motor circuit is completed through contact 11 and the rotor of WS-3(R), thence through the upper section of the motor field winding. Power is supplied to the motor until the band switch is rotated sufficiently to break the circuit between contact 11 and the rotor of WS-3(R). At this instant, the rotor of the motor is thrown outward, disengaging the clutch from the gear train.

From the idle position shown, if PB-2, instead of PB-5, is depressed, the motor circuit is completed through contact 8 and the rotor of WS-3(F), thence through the lower section of the motor field winding, thus causing motor rotation in the direction opposite to that of the instance cited above.

PHILCO ELECTROMECHANICAL PUSH-BUTTON TUNER

As previously mentioned, the Philco Electromechanical Push-Button Tuner provides both automatic tuning and band selection, for five stations in the standard broadcast and FM bands, by the operation of push buttons. The five station-selector buttons operate the motor-driven tuning mechanism.

Band selection is determined by the position of the push-rod extension spring, one of these being attached to each of the five push rods; the push-rod extensions facing upward lock in the upper rocker bar (standard broadcast) when the buttons are depressed; the extensions facing downward lock in the lower rocker bar (FM).

The tuning-condenser gang is rotated to the correct position by the motor-driven tuning mechanism, which is operated by a 24-volt, a-c, series-wound motor. A 4-contact leaf switch (S102), located at the rear of the push rods, applies the motor power and closes the muting circuit when any of the five station-selector buttons is depressed; this switch is locked in the closed position by a small latch on the push rod, which hooks onto the actuator bar. When the tuning gang locks in the preset position, the intermediate gear of the gear train rides upward and trips the actuator bar, to release the small latch, thus removing the motor power and opening the muting switch.

The set-up switch (S101), which is used for setting the station-selector buttons, is connected in parallel with the motor power switch, and is operated by a small button located on the rear of the chassis.

Since the functioning of the tuning mechanism itself is somewhat complex, a detailed description of the tuner, with illustrations and complete service information, is presented in a separate manual, PHILCO ELECTROMECHANICAL PUSH-BUTTON TUNER, PR-1481.

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.

Important

To avoid the possibility of 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.

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 sources of trouble.

2. Measure the resistance across condenser C100 (see figure 1). 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 C100, C101A, C104A, C436, C437, C410, and C411 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.

PHILCO CORP.

MODELS 48-1274, 48-1276

Section 1 — Power Supply

TROUBLE SHOOTING

CAUTION: *Do not turn on the power with the speaker disconnected, or the radio may be damaged.*

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.

Depress the BC push button, PB-3; set the volume control to minimum, and the bass and treble controls 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.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	255v		Trouble in this section. Isolate by the following tests.
2	B	290v	Low voltage	Defective: 5U4G. Leaky: C100, C101A, C436*, C437*, C104A, C319*. Open: L100, T100, C100. Shorted: T100.
			No voltage	Defective: 5U4G. Open: PB-1, T100. Shorted: C101A, C104A, C319*.
			High voltage	Open: T200.
3	D	270v	Low voltage	Increased resistance: R412*. Leaky: C436*, C437*, C411*, C410*, C413*.
			No voltage	Open: R412*, WS-3(R). Shorted: C436*, C437*, C416*, C419*, C411*, C410*, C413*.
4	A	255v	Low voltage	Increased resistance: R106. Leaky: C104B, C315*, C344*, C329* (in FM operation only).
			No voltage	Open: R106. Shorted: C104B, C315*, C344*.
5	E	Negative 22v	Low voltage	Increased resistance: R101. Decreased resistance: R102.
			No voltage	Open: R101. Shorted: C102.
			High voltage	Open: R102, L100.
6	F	Negative 22v	No voltage	Open: R103. Shorted: C103.
Listening Test: Abnormal hum may be caused by open C101A, C104A, or C104B.				

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

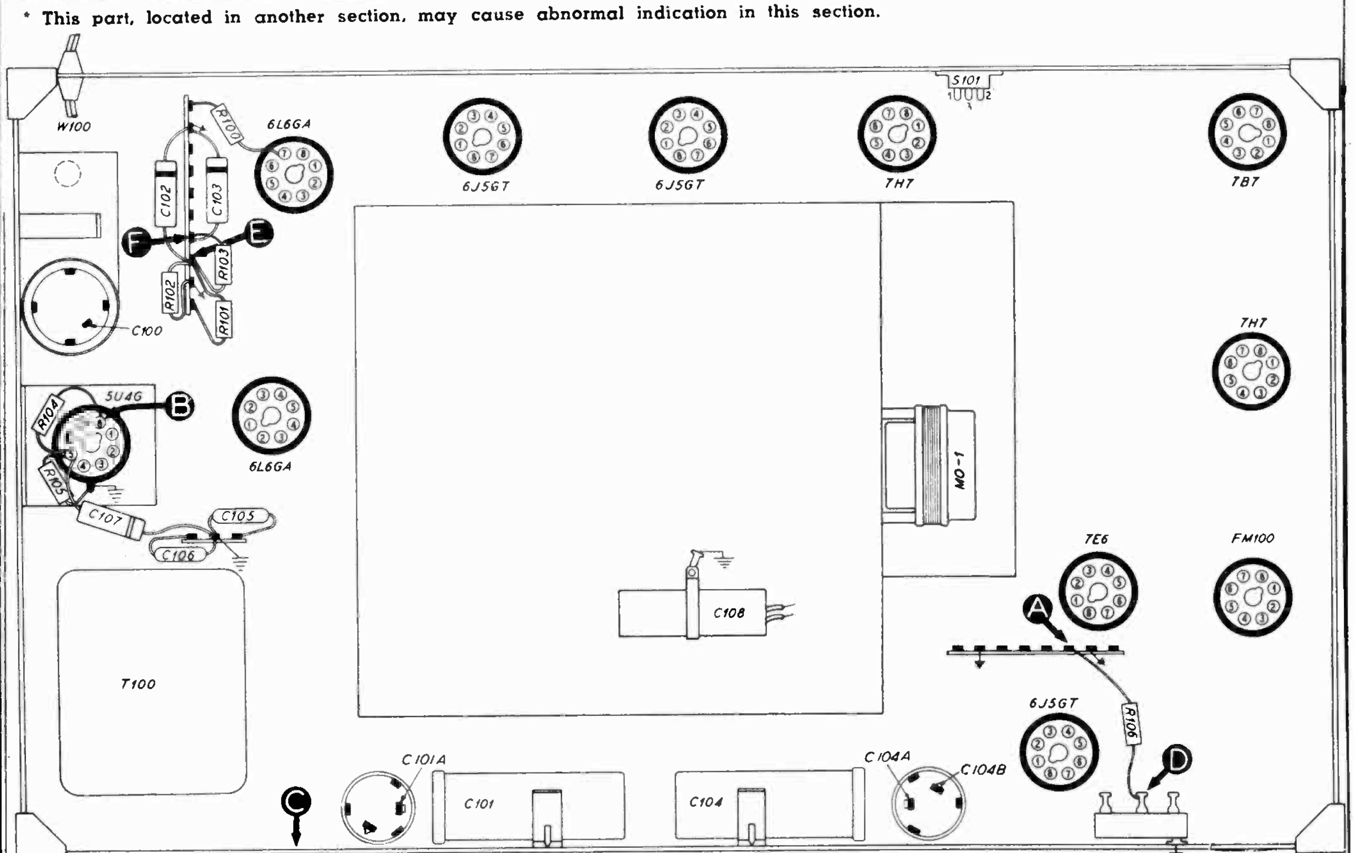

FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

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MODELS 48-1274,
48-1276

PHILCO CORP.

Section 2 — Audio Circuits

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 clockwise. Depress the phono push button, PB-2.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the scratch-eliminator tests; if not, isolate and correct the trouble in the audio-amplifier or phono-preamplifier circuits.

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	B (Remove 6J5GT phase inverter.)	Loud, clear signal with strong signal input.	Defective: 6L6GA. Open: LS200, T200, R230, C217, R228. Shorted or leaky: C217, C219.
3	D (Phase inverter removed.)	Loud, clear signal with strong signal input.	Defective: 6L6GA. Open: T200, R231, C218, R229. Shorted or leaky: C218, C220.
4	F (Phase inverter removed.)	Loud, clear signal with strong signal input.	Defective: 6J5GT driver. Open: R225, R221. Shorted or leaky: C215, C212.
5	E (Replace 6J5GT phase inverter.)	Loud, clear signal with strong signal input.	Defective: 6J5GT phase inverter. Open: R226, R222, R224. Shorted: C216.
6	G	Loud, clear signal with moderate signal input.	Defective: 7E6. Open: R200 (rotate through range), R214, R211, R212, C210, C215, R215. Shorted: C213. Leaky: C215, C213.
7	A	Loud, clear signal with weak signal input.	Defective: 6J5GT phono preamplifier. Open: R204, R205, C202, WS-2(F), R203, R202. Shorted or leaky: C204, C202.
Listening Test: Distortion may be caused by open R211 or R202, or by leaky C210 or C209.			

SCRATCH-ELIMINATOR TESTS

Except for the volume control, set the radio controls as directed for the audio-amplifier and phono-preamplifier tests; set the volume control to maximum for all steps except 1(b); for this step, adjust the volume control as indicated in the chart.

Turn the scratch eliminator on or off as indicated in the chart. (The scratch eliminator is on when the high-fidelity switch is in the OFF position.)

Connect an output meter between terminal 4 (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 "VOLTMETER" test points indicated in the chart.

STEP	TEST POINT	SIGNAL GENERATOR OUTPUT	VOLT-METER	SPECIAL INSTRUCTIONS	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (a)	A	Adjust for 6v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 2.5v (approx.).	

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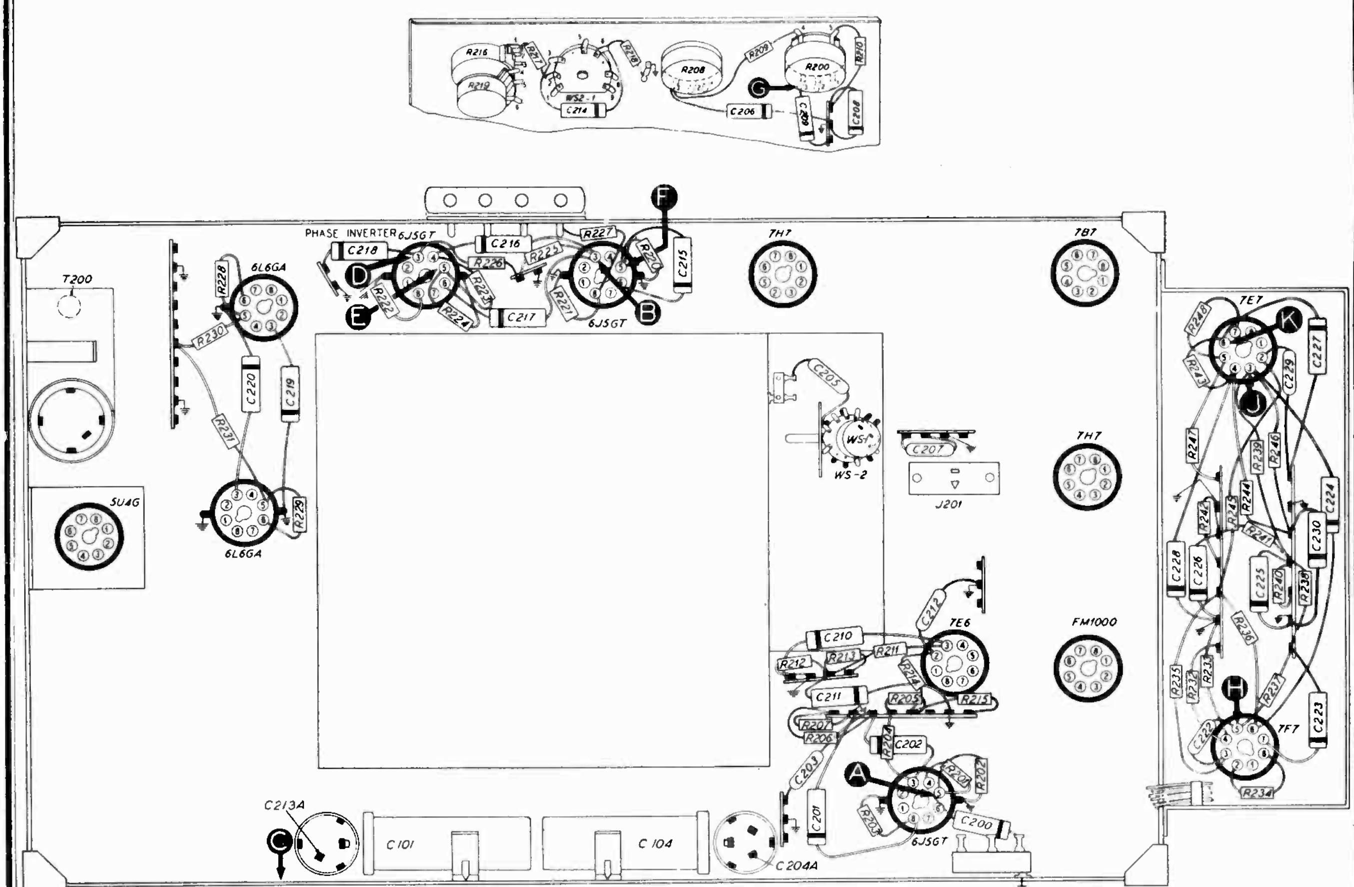
MODELS 48-1274, 48-1276

Section 2 — Audio Circuits (Cont.)

TROUBLE SHOOTING

STEP	TEST POINT	SIGNAL GENERATOR OUTPUT	VOLT-METER	SPECIAL INSTRUCTIONS	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (b)	A	Same as for step 1 (a).		Reduce volume control to obtain output-meter reading of 1v. Increase generator output to obtain output-meter reading of 6v. Turn scratch eliminator on; output voltage should not drop more than 1.5v (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: R236, C224, R239, R240. Shorted or leaky: C224, C225.
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: R243, R244, R246. Shorted or leaky: C228, C230, C227.
4	A	Same setting which produced 11v reading in step 2, with scratch eliminator on.	J	With scratch eliminator on, voltage at point J should be approx. 28v, negative.	Defective: 7F7. Open: R235, C222, R237, R234, R233, R232, C203. Shorted or leaky: C203, C222, C223.
5	A	Adjust for 6v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 2.5v (approx.).	Defective: 7E7 (pentode section). Open: R245, R247, R248, C227, C229. Shorted or leaky: C229.



TP-4723B

FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

MODELS 48-1274,
48-1276

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Section 3 — I-F, Detector, and A-V-C Circuits TROUBLE SHOOTING

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 clockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits, or the tests for Section 4; 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: 7H7. Misaligned: Z303. Open: R315, Z303 pri. or sec., R323, C325, WS-2(F), R321, R319, R324, C339. Shorted: C330, C331, C340, C336, C323, Z302 sec.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7. Misaligned: Z302. Open: R307, R310, R312, R313, Z302 pri. or sec., C322, C302C, C324, C321, C320. Shorted: Z302 pri. or sec., C322, C302C, C313, C324, C320.
4	E	Loud, clear signal with weak signal input.	Defective: 7H7. Misaligned: Z301. Open: R301, R302, R303, R304, R311, R305, Z301 pri. or sec., C312, C313, C314, C309, C311. Shorted: C309, C312, C301C, C314, Z301 pri. or sec.
5	A	Loud, clear signal with less signal input than in step 4.	Defective: 7E5. Misaligned: Z300. Open: Z300 pri. or sec. (AM), WS-5(F), WS-4(R), R411*, R410*, C307, C305. Shorted: Z300 pri. or sec. (AM), C305, C300C, C430*.

* 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, and making it possible to use an AM signal for testing the i-f amplifiers and a section of the detector; the remaining section of the detector is tested by steps 1(b), 2, and 3.

In step 1(b), an unmodulated r-f signal is used to check the FM response of the detector; the test is made by observing the d-c voltage drops across the audio load resistor (R318) 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, respectively, are used to check the oscillator action in the FM detector.

Set the volume control to maximum, and turn the bass and treble controls fully clockwise. Depress the FM push button, PB-5, and turn the high-fidelity switch on. 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 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 tests for Section 4; if not, isolate and correct the trouble in the FM circuits.

Since the circuit location of test point A for this section is in Section 4, the effectiveness of step 1(a), 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.

MODELS 48-1274, 48-1276

Section 3 — I-F, Detector, and A-V-C Circuits (CONTINUED) 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 FM 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 H, and negative lead to test point J. 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 d-c voltmeter to chassis; connect prod end of negative lead through 100,000-ohm isolating resistor to test point G. Use 10-volt range.	Negative 2.5 volts (approx.).	Defective: FM1000. Open: C335, R322, Z304 sec., C333, C334. Shorted: C335, C333, C334, C301A, Z304 sec.
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: Z304 pri. or sec. Changed value: C333, C334. Open: C301A, C338.
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: L300, Z304 pri., R318, R320, WS-2(F). Shorted or leaky: C337, C332, C329, C303B.
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: 7H7 (3rd i.f.). Shorted or leaky: C303A. Open: Z303 sec. (FM), R325, R326. 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: 7B7. Misaligned: Z302. Shorted: C302A, C302E.
7	E	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with weak signal input.	Defective: 7H7 (1st i.f.). Misaligned: Z301. Shorted: C301A, C301B.
8	A	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with very weak signal input.	Defective: 7E5*. Misaligned: Z300. Open: WS-4(R), Z300 pri. or sec., L401*. Shorted: C306, C300A, C300B.

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

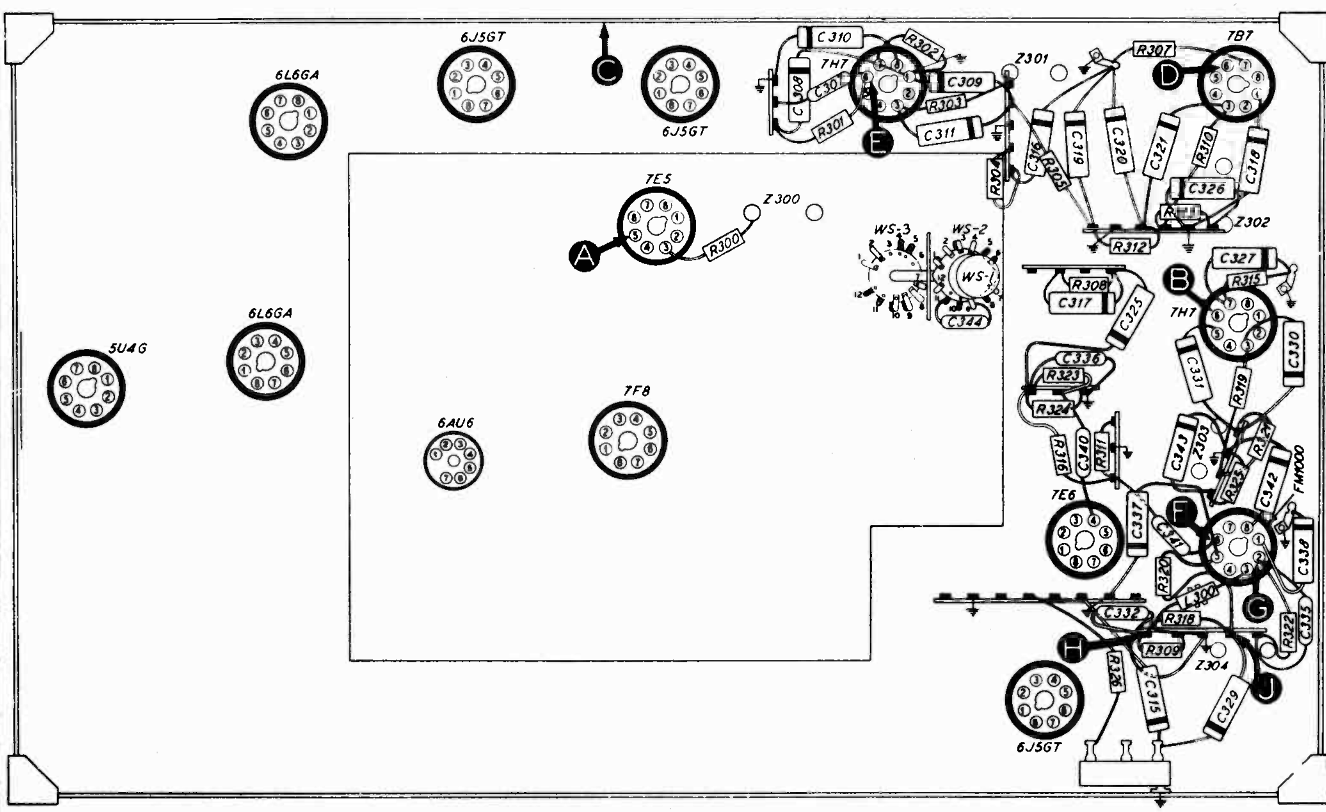


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

MODELS 48-1274, 48-1276

PHILCO CORP.

Section 4 — R-F and Converter Circuits

TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator and frequency-doubler tests, use an AM r-f signal generator, with modulated output. Connect the generator ground lead to the chassis, test point C; connect the output lead as indicated in the chart. Set the volume control to maximum, and turn the bass and treble controls fully clockwise. Depress the push buttons indicated in the chart.

OSCILLATOR AND FREQUENCY-DOUBLER TESTS: For the broadcast and short-wave oscillator tests (steps 2 and 5), and the FM frequency-doubler test (step 9), connect the positive lead of a 20,000-ohms-per-volt meter to test point D; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to test point B. For the FM oscillator test (step 8), transfer the negative lead and isolating resistor to test point G. The negative grid-voltage readings given in the chart are those obtained when operation is normal. Absence of negative grid voltage at any dial position indicates that the oscillator (or the frequency doubler) is not operating properly.

STEP	TEST POINT	SIGNAL GENERATOR	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	A	1000 kc. Through .1-mf. condenser.	BC (PB-3). Tune to signal.	Loud, clear signal with weak signal input.	Trouble in broadcast circuits. Isolate by steps 2, 3, and 4.
1(b)	A	11 mc. Through .1-mf. condenser.	SW (PB-4). Tune to signal.	Loud, clear signal with weak signal input.	Trouble in short-wave circuits. Isolate by steps 5, 6, and 7.
1(c)	F	98 mc. Through 100-mmf. condenser.	FM (PB-5). Short test point G, Section 3, to chassis. Tune to signal.	Loud, clear signal with weak signal input.	Trouble in FM circuits. Isolate by steps 8, 9, 10, and 11.
2	B to D Osc. Test.		BC (PB-3). Tune through range.	Negative 1.5 to 4 volts.	Defective: 7F8. Open: WS-5(F), WS-5(R), L411, C432, L408, R408, C423, C426, R407. Shorted or leaky: C423, C426, C434, C432, C433, L411. Shorted: C400F.
3	E	1000 kc. Through .1-mf. condenser.	BC (PB-3). Tune to signal.	Loud, clear signal with moderate signal input.	Defective: 6AU6. Open: R402, R403, L404, L403, C413, WS-6(F), WS-6(R), L407, C427, R409. Shorted or leaky: C410, C411. Shorted: L407, C400C.
4	A	1000 kc. Through .1-mf. condenser.	BC (PB-3). Tune to signal.	Loud, clear signal with weak signal input.	Open: WS-7(R), WS-7(F), L400, C405, R400, LA400. Shorted or leaky: C401A, C400B, C405.
5	B to D Osc. Test.		SW (PB-4). Tune through range.	Negative 1.5 to 2 volts.	Defective: 7F8. Open: WS-5(R), WS-5(F), L410, C431. Shorted or leaky: C420C, C431. Shorted: L410.
6	E	11 mc. Through .1-mf. condenser.	SW (PB-4). Tune to signal.	Loud, clear signal with moderate signal input.	Open: WS-6(F), WS-6(R), L406, C422, C417. Shorted or leaky: C422, C420A, C417. Shorted: L406.
7	A	11 mc. Through .1-mf. condenser.	SW (PB-4). Tune to signal.	Loud, clear signal with weak signal input.	Open: WS-7(R), WS-7(F), L402, C404. Shorted or leaky: C401B, C404.
8	G Osc. Test.		FM (PB-5). Tune through range.	Negative 3.5 to 4 volts.	Defective: 7F8. Open: WS-6(F), R404, C421, C424, R406, R405, T400. Shorted or leaky: C421, C424, C414, C415. Shorted: C400E.
9	B to D Frequency Doubler Test.		FM (PB-5). Tune through range.	Negative 2.5 to 3.5 volts.	Defective: 7F8. Open: WS-5(F), WS-5(R), L409. Shorted: C400G, C429.
10	E	98 mc. Through 100-mmf. condenser.	FM (PB-5). Short test point G, Section 3, to chassis. Tune to signal.	Loud, clear signal with moderate signal input.	Open: WS-6(F), WS-6(R), L405, C412, C418. Shorted or leaky: C412. Shorted: C400D.
11	F	98 mc. Through 100-mmf. condenser.	FM (PB-5). Test point G shorted. Tune to signal.	Loud, clear signal with slightly less input than in step 9.	Open: WS-7(F), L401, C403, C402. Shorted or leaky: C402, C403. Shorted: C400M.

Section 4 — R-F and Converter Circuits (CONTINUED)

TROUBLE SHOOTING

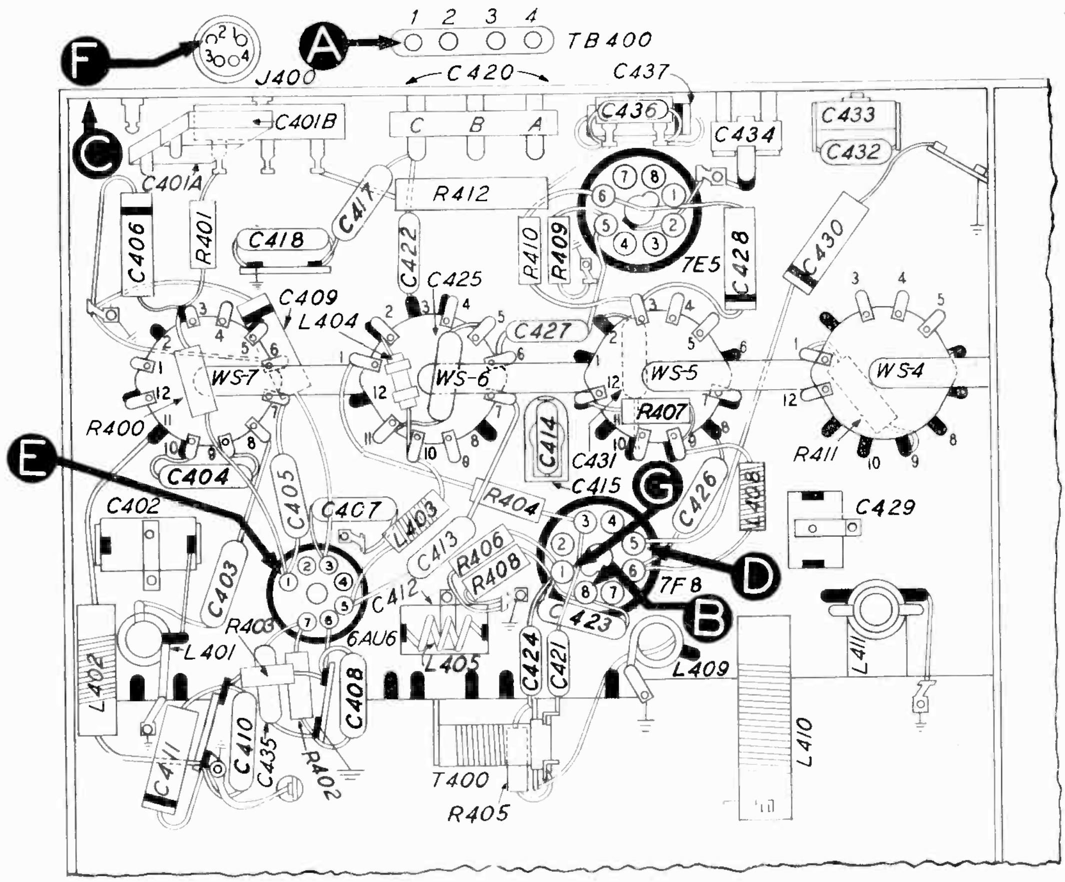


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS TP 4723D

SERVICING PHILCO AUTOMATIC BAND SELECTOR

To make the motor-driven band switch accessible for repairs, remove the four self-tapping screws holding the r-f chassis, and unsolder a sufficient number of connecting wires to allow the r-f chassis to drop away from the main chassis about six inches.

To obtain access to the band-switch components, unsolder the wires and parts connected to the rear plate on the r-f chassis, and remove the plate.

To replace individual switch wafers, loosen the two Allen setscrews locking the drive gear to the switch shaft, and remove the two nuts from the tie rods, at the motor end. See figure 5. Then slide the tie rods and switch shaft through the holes in the side of the r-f chassis.

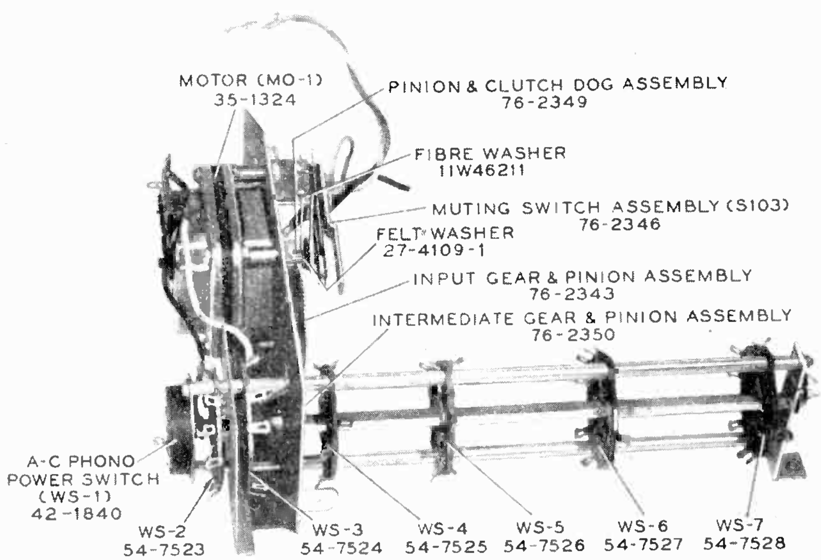


FIGURE 5. PHILCO AUTOMATIC-BAND-SELECTOR MECHANISM TP 4406

CALIBRATING DIAL BACKPLATE

With the radio out of the cabinet, dial calibration points should be located by making pencil marks on the backplate, below the pointer. Figure 6 shows the measurements for these points with respect to the left-hand edge of the backplate.

NOTE: The dial scale shown in figure 6 is for Model 48-1274. Although this scale is shorter than that for Model 48-1276, the calibration of the two scales is identical, and the relationship between the backplate and the calibration points is the same for both models.

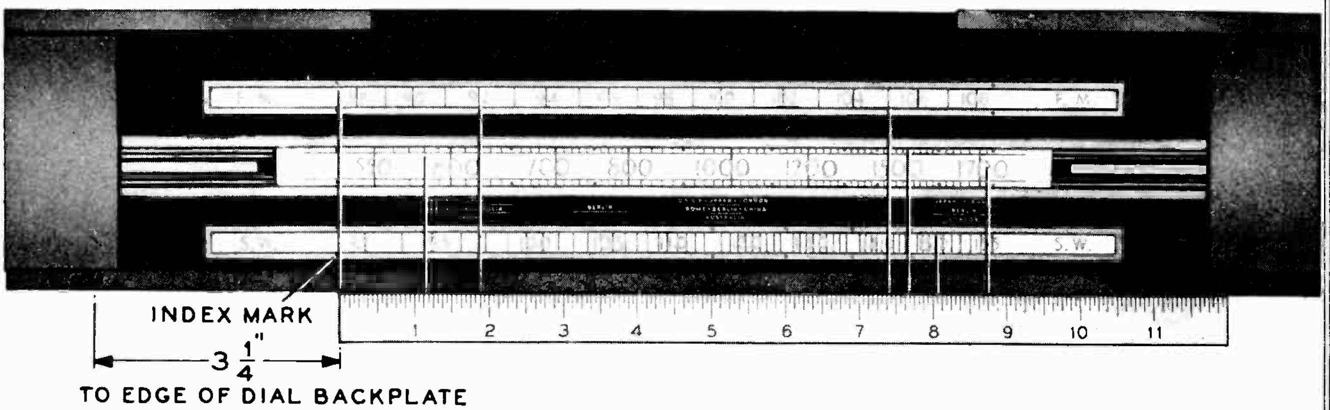


FIGURE 6. DIAL-BACKPLATE CALIBRATION MEASUREMENTS TP-4291

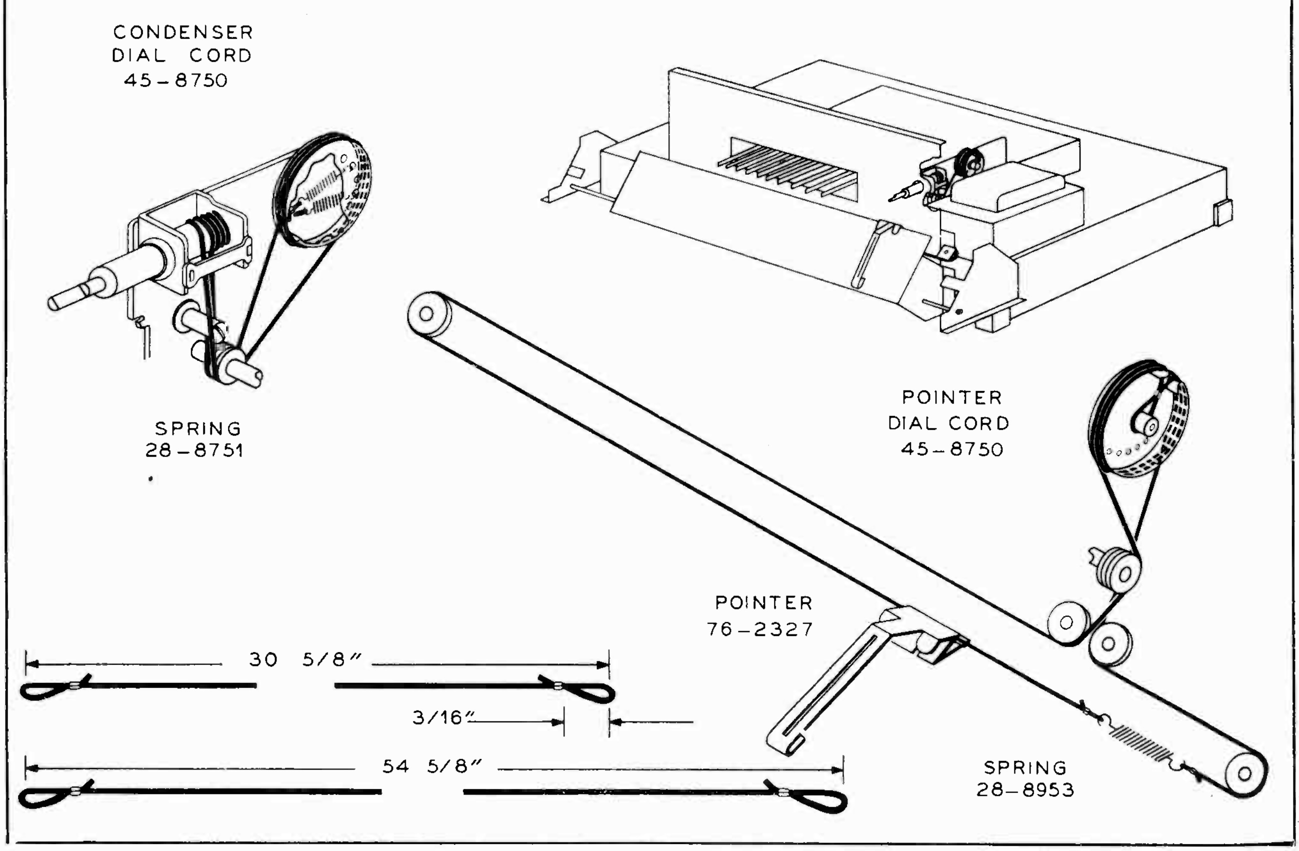


FIGURE 7. DRIVE-CORD INSTALLATION DETAILS TP-4723E

PHILCO CORP.

MODELS 48-1274, 48-1276

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, input filter, 40 mf., 450v	30-2568-20
C101	Condenser, electrolytic, 2-section	30-2570-3*
C101A	Condenser, filter, 30 mf., 450v	Part of C101
C102	Condenser, bias filter, .2 mf.	45-3500-3*
C103	Condenser, bias filter, .2 mf.	45-3500-3*
C104	Condenser, electrolytic, 2-section	30-2570-6*
C104A	Condenser, filter, 15 mf., 450v	Part of C104
C104B	Condenser, filter, 10 mf., 450v	Part of C104
C105	Condenser, line filter, .01 mf.	30-1226-1
C106	Condenser, line filter, .01 mf.	30-1226-1
C107	Condenser, by-pass, .2 mf.	45-3500-3*
C108	Condenser, a-c electrolytic, 30 mf., 30v, 60 cycles	30-2572
I100 to I105	Lamp, pilot	34-2064
I106	Lamp, bin	34-2039
I107	Lamp, bull's-eye	34-2040
J100	Socket, phono power	27-6182
L100	Coil, speaker field	Part of LS200
MO-1	Motor, band switching (part of 76-2333-1)	35-1324
MO-2	Motor, push-button tuning (part of 76-2150)	76-2428
PB-1	Push-button switch, master power off-on (part of 76-2150)	42-1789
PB-2	Push-button switch, PHONO	Part of 76-2150
PB-3	Push-button switch, BC	Part of 76-2150
PB-4	Push-button switch, SW	Part of 76-2150
PB-5	Push-button switch (rod actuating S105), FM	Part of 76-2150
PB-6 to PB-10	Push-button rod	Part of 76-2150
R100	Resistor, bull's-eye dropping, 27 ohms	66-0273340*
R101	Resistor, voltage divider, 150,000 ohms	66-4153340*
R102	Resistor, voltage divider, 100,000 ohms	66-4103340*
R103	Resistor, filter, 47,000 ohms	66-3473340*
R104	Resistor, voltage divider, 1 megohm	66-5103340*
R105	Resistor, voltage divider, 100,000 ohms	66-4103340*
R106	Resistor, filter, 5600 ohms	66-2564340*
S100	Switch, bin lamp	76-2140-2
S101	Switch, set-up	42-1702
S102	Switch, tuning motor	Part of 76-2150
S103	Switch, muting (part of 76-2333)	76-2346
S104	Switch, AM	Part of 76-2150
S105	Switch, FM	Part of 76-2150
T100	Transformer, power	32-8286
WS-3 (F, R)	Switch, wafer (part of 76-2333-1)	54-7524
W100	Power cord and plug	L3351

SECTION 2 — AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, tone compensation, .001 mf.	45-3500-5*
C201	Condenser, cathode by-pass, .1 mf.	61-0113*
C202	Condenser, d-c blocking, .01 mf.	61-0120*
C203	Condenser, d-c blocking, 150 mmf.	60-10155407*
C204	Condenser, audio by-pass, 10 mf.	Part of C104
C205	Condenser, tone compensation, 33 mmf.	60-00365307*
C206	Condenser, tone compensation, .02 mf.	61-0108*
C207	Condenser, tone compensation, 47 mmf.	60-00515307*
C208	Condenser, tone compensation, .02 mf.	61-0108*
C209	Condenser, d-c blocking, .03 mf.	45-3500-1*
C210	Condenser, d-c blocking, .01 mf.	61-0120*
C211	Condenser, audio by-pass, .5 mf.	61-0133*
C212	Condenser, r-f by-pass, 240 mmf.	60-10245307*
C213	Condenser, audio by-pass, 10 mf., 450v	Part of C101
C214	Condenser, tone compensation, .03 mf.	45-3500-1*
C215	Condenser, d-c blocking, .003 mf.	61-0109*
C216	Condenser, d-c blocking, .006 mf.	61-0105*
C217	Condenser, d-c blocking, .006 mf.	61-0105*
C218	Condenser, d-c blocking, .006 mf.	61-0105*
C219	Condenser, tone compensation, .01 mf.	61-0120
C220	Condenser, tone compensation, .01 mf.	61-0120
C221	Condenser, frequency cross-over filter, 2 mf.	45-3030
C222	Condenser, d-c blocking, 330 mmf.	60-10335407*
C223	Condenser, audio by-pass, .01 mf.	61-0120*
C224	Condenser, d-c blocking, .002 mf.	61-0062*
C225	Condenser, filter, .02 mf.	61-0108*
C226	Condenser, filter, .03 mf.	45-3500-1*
C227	Condenser, coupling, .001 mf.	45-3500-5*
C228	Condenser, filter, .01 mf.	61-0120*
C229	Condenser, d-c blocking, 330 mmf.	60-10335407*
C230	Condenser, filter, .01 mf.	61-0120*
J200	Jack and cable, phono input	41-3735-1
J201	Test jack	27-6180
LS200	Speaker, coaxial	36-1612
LS200A	Speaker, tweeter (part of 36-1612)	36-1612-1
LS200B	Speaker, woofer	Part of 36-1612
R200	Volume control, .5 megohm (taps at 50,000 ohms and 250,000 ohms)	33-5535-6
R201	Resistor, tone compensation, 220,000 ohms	66-4223340*
R202	Resistor, grid return, 4.7 megohms	66-5473340*
R203	Resistor, cathode bias, 2200 ohms	66-2223340*
R204	Resistor, plate load, 56,000 ohms	66-3563340*
R205	Resistor, plate decoupling, 22,000 ohms	66-3223340*
R206	Resistor, voltage divider, 100,000 ohms	66-4103340*
R207	Resistor, voltage divider, 100,000 ohms	66-4103340*
R208	Bass control, 1 megohm	33-5539-9
R209	Resistor, tone compensation, 10,000 ohms	66-3103340*
R210	Resistor, tone compensation, 10,000 ohms	66-3103340*
R211	Resistor, grid return, 1 megohm	66-5103340*
R212	Resistor, voltage divider, 680,000 ohms	66-4683340*
R213	Resistor, voltage divider, 2.2 megohms	66-5223340*
R214	Resistor, plate load, 56,000 ohms	66-3564340*
R215	Resistor, plate decoupling, 6800 ohms	66-2683340*
R216	Tweeter control (variable), 50 ohms	Part of R219
R217	Resistor, voltage dropping, 10 ohms	66-0103340*
R218	Resistor, tone compen., 2.2 megohms	66-5223340*
R219	Treble control, .5 megohm	33-5543
R220	Resistor, grid return, 1 megohm	66-5103340*
R221	Resistor, cathode bias, 1000 ohms	66-2103340*
R222	Resistor, cathode bias, 1000 ohms	66-2103340*
R223	Resistor, phase-inverter voltage divider, 1 megohm	66-5103340*
R224	Resistor, phase-inverter voltage divider, 68,000 ohms	66-3683340*
R225	Resistor, plate load, 56,000 ohms	66-3564340*
R226	Resistor, plate load, 56,000 ohms	66-3564340*
R227	Resistor, inverse-feedback voltage divider, 5600 ohms	66-2563340*
R228	Resistor, parasitic suppressor, 820 ohms	66-1823340*
R229	Resistor, parasitic suppressor, 820 ohms	66-1823340*
R230	Resistor, grid return, 330,000 ohms	66-4333340*
R231	Resistor, grid return, 330,000 ohms	66-4333340*
R232	Resistor, voltage divider, 680,000 ohms	66-4683340*
R233	Resistor, grid return, 330,000 ohms	66-4333340*
R234	Resistor, cathode bias, 2200 ohms	66-2223340*
R235	Resistor, plate load, 220,000 ohms	66-4223340*
R236	Resistor, plate load, 100,000 ohms	66-4103340*
R237	Resistor, grid return, 560,000 ohms	66-4563340*
R238	Resistor, bias filter, 220,000 ohms	66-4223340*
R239	Resistor, bias filter, 560,000 ohms	66-4563340*
R240	Resistor, bias volt. div., 220,000 ohms	66-4223340*
R241	Resistor, bias volt. div., 1.5 megohms	66-5153340*
R242	Resistor, bias decoupling, 3.3 megohms	66-5333340*
R243	Resistor, grid return, 1 megohm	66-5103340*
R244	Resistor, filter, 220,000 ohms	66-4223340*
R245	Resistor, plate load, 27,000 ohms	66-3273340*
R246	Resistor, filter, 220,000 ohms	66-4223340*
R247	Resistor, voltage divider, 33,000 ohms	66-3333340*
R248	Resistor, voltage divider, 33,000 ohms	66-3333340*
T200	Transformer, output	32-8287
T201	Transformer, phono input	32-8256
WS-2 (R)	Switch-wafer section (part of 76-2333-1)	54-7523
WS2-1	High-fidelity switch	42-1785

Parts list changes:

C108	Condenser, electrolytic, 45 mf., 30v, 60 cycles	30-2355-2
LA401	Loop, FM Aerial	76-2029-13 or 76-2381-3
MO2	Motor, Pushbutton tuning, part of 76-2150	35-1336
R412	Resistor, filter, 470 ohms	66-1474340
	Bin mechanism, left hand	76-3223-7
	Bin mechanism, right hand	76-3223-8

NOTE: Above listed bin mechanisms are not interchangeable with those listed in the Service Manual. When replacing mechanisms with these part numbers, replace both sides.

Cabinet top, 48-1274-M	45-6429
Two section lid, 48-1274-M	45-6426
Tilt front, 48-1274-M	45-6427
Instrument panel, 48-1274-M	45-6428
Cabinet, 48-1276	10657A
Two section lid, 48-1276	45-6430
Tilt front, 48-1276	45-6431
Instrument panel, 48-1276	45-6432
Cabinet top, 48-1276	45-6433
Escutcheon, High Fidelity, 48-1276	56-4403FA30

MODELS 48-1274, 48-1276

PHILCO CORP.

REPLACEMENT PARTS LIST

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, shunt (part of Z300), 2700 mmf.	60-20275404*
C306	Condenser, shunt (part of Z300), 51 mmf.	60-00515237*
C307	Condenser, d-c blocking, 240 mmf.	60-10245307*
C308	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C309	Condenser, plate by-pass, .004 mf.	61-0179*
C310	Condenser, filament by-pass, .01 mf.	61-0120*
C311	Condenser, screen by-pass, .01 mf.	61-0120*
C312	Condenser, shunt (part of Z301), 330 mmf.	60-10335407*
C313	Condenser, d-c block. (part of Z301), 4.7 mmf.	30-1224-5*
C314	Condenser, shunt (part of Z301), 3900 mmf.	60-20395404*
C315	Condenser, r-f by-pass, .01 mf.	61-0120*
C316	Condenser, a-v-c filter, .01 mf.	61-0120*
C317	Condenser, tone compensation, .003 mf.	61-0109*
C318	Condenser, filament by-pass, .01 mf.	61-0120*
C319	Condenser, r-f by-pass, .01 mf.	61-0120*
C320	Condenser, plate by-pass, .004 mf.	61-0179*
C321	Condenser, screen by-pass, .01 mf.	61-0120*
C322	Condenser, shunt (part of Z302), 330 mmf.	60-10335407*
C323	Condenser, d-c blocking (part of Z302), 4.7 mmf.	30-1224-5*
C324	Condenser, shunt (part of Z302), 3900 mmf.	60-20395404*
C325	Condenser, d-c blocking, .006 mf.	61-0105*
C326	Condenser, r-f by-pass, .05 mf.	61-0122*
C327	Condenser, cathode by-pass, .01 mf.	61-0120*
C328	Condenser, shunt (part of Z304), 15 mmf.	30-1223-3*
C329	Condenser, r-f by-pass, .01 mf.	61-0120*
C330	Condenser, screen by-pass, .01 mf.	61-0120*
C331	Condenser, plate by-pass, .004 mf.	61-0179*
C332	Condenser, r-f by-pass, 1500 mmf.	60-20155404*
C333	Condenser, r-f voltage divider (part of Z304), 33 mmf.	30-1223-6*
C334	Condenser, r-f voltage divider (part of Z304), 68 mmf.	60-00685237*
C335	Condenser, d-c blocking, 33 mmf.	60-00365307*
C336	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C337	Condenser, screen by-pass, .01 mf.	61-0120*
C338	Condenser, filament by-pass, .01 mf.	61-0120*
C339	Condenser, shunt (part of Z303), 270 mmf.	30-1220-5*
C340	Condenser, r-f by-pass, 240 mmf.	60-10245307*
C341	Condenser, d-c blocking, 100 mmf.	60-10105407*
C342	Condenser, filament by-pass, .01 mf.	61-0120*
C343	Condenser, r-f by-pass, .01 mf.	61-0120*
C344	Condenser, r-f by-pass, 100 mmf.	60-10105407*
L300	Choke, r-f	32-3352
R300	Resistor, parasitic suppressor, 10 ohms	66-0103340*
R301	Resistor, grid return, 2.2 megohms	66-5223340*
R302	Resistor, cathode bias, 180 ohms	66-1183340*
R303	Resistor, screen dropping, 100,000 ohms	66-4103340*
R304	Resistor, a-v-c decoupling, 470,000 ohms	66-4473340*
R305	Resistor, plate decoupling, 6800 ohms	66-2683340*
R306	Resistor, loading (part of Z301), 6800 ohms	66-2683340*
R307	Resistor, cathode bias, 180 ohms	66-1183340*
R308	Resistor, tone compensation, 220,000 ohms	66-4223340*
R309	Resistor, decoupling, 100,000 ohms	66-4103340*

SECTION 3 (Continued)

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

Reference Symbol	Description	Service Part No.
R310	Resistor, screen dropping, 100,000 ohms	66-4103340*
R311	Resistor, a-v-c filter, 330,000 ohms	66-4333340*
R312	Resistor, plate decoupling, 5600 ohms	66-2563340*
R313	Resistor, grid return, 1 megohm	66-5103340*
R314	Resistor, loading (part of Z302), 6800 ohms	66-2683340*
R315	Resistor, cathode bias, 180 ohms	66-1183340*
R316	Resistor, a-v-c diode load, 1 megohm	66-5103340*
R317	Resistor, loading (part of Z304), 5600 ohms	66-2563340*
R318	Resistor, audio load, FM detector, 47,000 ohms	66-3473340*
R319	Resistor, screen dropping, 82,000 ohms	66-3823340*
R320	Resistor, screen dropping, 56,000 ohms	66-3563340*
R321	Resistor, plate decoupling, 5600 ohms	66-2563340*
R322	Resistor, grid leak, 15,000 ohms	66-3153340*
R323	Resistor, filter, 47,000 ohms	66-3473340*
R324	Resistor, diode load, 100,000 ohms	66-4103340*
R325	Resistor, voltage divider, 560 ohms	66-1563340*
R326	Resistor, voltage divider, 47,000 ohms	66-3473340*
WS-4 (R)	Switch-wafer section (part of 76-2333-1)	54-7525
WS-2 (F)	Switch-wafer section (part of 76-2333-1)	54-7523
Z300	Transformer, 1st i-f	32-4072
Z301	Transformer, 2nd i-f	32-4060
Z302	Transformer, 3rd i-f	32-4060
Z303	Transformer, 4th i-f	32-4003-1
Z304	Transformer, FM detector	32-4004

SECTION 4

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang (See Note, Page 15)	Part of 76-2150
C400A	Condenser, tuning-gang section	Part of C400
C400B	Condenser, tuning-gang section	Part of C400
C400C	Condenser, tuning-gang section	Part of C400
C400D	Condenser, tuning-gang section	Part of C400
C400E	Condenser, tuning-gang section	Part of C400
C400F	Condenser, tuning-gang section	Part of C400
C400G	Condenser, tuning-gang section	Part of C400
C401	Condenser, trimmer, 2-section	31-6476-3
C401A	Condenser, trimmer, bc aerial	Part of C401
C401B	Condenser, trimmer, s-w aerial	Part of C401
C402	Condenser, trimmer, FM aerial	31-6473-4
C403	Condenser, blocking, FM, 22 mmf.	62-022009001
C404	Condenser, series tracking, s-w aerial, 255 mmf.	30-1220-24
C405	Condenser, d-c blocking, 100 mmf.	60-10105407*
C406	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C407	Condenser, filament by-pass, 240 mmf.	60-10245307*
C408	Condenser, screen by-pass, 1500 mmf.	30-1225-1*
C409	Condenser, filament by-pass, .01 mf.	61-0120*
C410	Condenser, plate by-pass, 100 mmf.	60-10105407*
C411	Condenser, plate by-pass, .01 mf.	61-0120*
C412	Condenser, trimmer, FM r-f	31-6473-4
C413	Condenser, d-c blocking, 1000 mmf.	30-1225*
C414	Condenser, shunt, FM osc., 5 mmf.	60-90505007*
C415	Condenser, trimmer, FM osc.	31-6480
C416	Not used	
C417	Condenser, s-w r-f shunt, 36 mmf.	30-1224
C418	Condenser, r-f by-pass, 100 mmf.	60-10105407*
C419	Not used	
C420	Condenser, trimmer, 3-section	31-6477-1
C420A	Condenser, trimmer, s-w r-f	Part of C420
C420B	Condenser, trimmer, bc. r-f	Part of C420
C420C	Condenser, trimmer, s-w osc.	Part of C420
C421	Condenser, d-c blocking, 51 mmf.	30-1224-2
C422	Condenser, series tracking, s-w r-f, 255 mmf.	30-1220-24
C423	Condenser, d-c blocking, 24 mmf.	30-1224-4
C424	Condenser, d-c blocking, 51 mmf.	30-1224-2
C425	Condenser, neutralizing, s-w, 5 mmf.	60-90505007*
C426	Condenser, d-c blocking, 24 mmf.	30-1224-4
C427	Condenser, d-c blocking, 100 mmf.	60-10105407*
C428	Condenser, cathode by-pass, .01 mf.	61-0120*

PHILCO CORP.

MODELS 48-1274, 48-1276

REPLACEMENT PARTS LIST

SECTION 4 (Continued)

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C429	Condenser, trimmer, freq. doubler	31-6473-4
C430	Condenser, r-f by-pass, .05 mf.	61-0122*
C431	Condenser, series tracking, s-w osc., 215 mmf.	30-1220-4
C432	Condenser, series-padder shunt, bc. osc., 437 mmf.	30-1220-22
C433	Condenser, series padder, bc. osc.	31-6473-4
C434	Condenser, shunt trimmer, bc. osc.	31-6480-1
C435	Condenser, cathode by-pass, 100 mmf.	60-10105407*
C436	Condenser, by-pass, 510 mmf.	60-10515307*
C437	Condenser, by-pass, .01 mf.	61-0120*
L400	Coil, bc. aerial	32-4141
L401	Coil, FM aerial	32-4235
L402	Coil, shunt, s-w aerial	32-4050-5
L403	Coil, 6AU6 plate choke, FM	32-4061
L404	Coil. 6AU6 plate choke, AM	32-4189
L405	Coil, FM r-f	32-4067
L406	Coil, s-w r-f	Part of Z400
L407	Coil, bc. r-f	Part of Z400
L408	Coil, plate choke, osc.-doubler	32-4061
L409	Coil, frequency doubler	32-4071
L410	Coil, s-w osc.	32-4069
L411	Coil, bc. osc.	32-4188
LA400	Loop aerial	76-2344
LA401	FM aerial	76-2029-12
J400	Jack, FM aerial	27-6214-1
R400	Resistor, grid return, 2.2 megohms	66-5223340*
R401	Resistor, a-v-c volt. div., 2.2 megohms	66-5223340*
R402	Resistor, cathode bias, 82 ohms	66-0823340*
R403	Resistor, screen dropping, 39,000 ohms	66-3393340*
R404	Resistor, plate load, 6800 ohms	66-2683340*
R405	Resistor, parasitic suppressor, 10 ohms	66-0103340*
R406	Resistor, grid bias, 22,000 ohms	66-3223340*
R407	Resistor, plate load (AM), 27,000 ohms	66-3273340*
R408	Resistor, grid bias, 220,000 ohms	66-4223340*
R409	Resistor, grid return, 2.2 megohms	66-5223340*
R410	Resistor, cathode bias, 1000 ohms	66-2103340*
R411	Resistor, plate decoupling, 56,000 ohms	66-3563340*
R412	Resistor, filter, 470 ohms	66-3564340*
T400	Transformer, FM osc.	32-4070
TB400	Terminal panel, loop aerial	38-9870
WS-1	A-c switch, phono power off-on (part of 76-2333-1)	42-1840
WS-2 (F, R)	Switch-wafer (part of 76-2333-1)	54-7523
WS-3 (F, R)	Switch-wafer (part of 76-2333-1)	54-7524
WS-5 (F, R)	Switch-wafer (part of 76-2333-1)	54-7526
WS-6 (F, R)	Switch-wafer (part of 76-2333-1)	54-7527
WS-7 (F, R)	Switch-wafer (part of 76-2333-1)	54-7528
Z400	Transformer assembly, bc. and s-w r-f	32-4187

MISCELLANEOUS

Description	Model	Service Part No.
Bin lamp switch-and-cable assembly	48-1274, 76	76-2429-2
Bin lamp	48-1274, 76	34-2039
Cable and plug, speaker	48-1274, 76	41-3734-2
Cabinet Parts and Hardware		
Baffle, speaker	48-1274	219049
Baffle, speaker	48-1276	219048
Baffle and cloth	48-1274	40-6786
Baffle and cloth	48-1276	40-6820
Bin mechanism, l.h.	48-1274, 76	76-3223-2
Bin mechanism, r.h.	48-1274, 76	76-3223-3
Bracket, pilot lamp, l.h.	48-1274	56-3550-1FA3
Bracket, pilot lamp, r.h.	48-1274	56-3550-FA3
Bracket and cradle	48-1274	76-2188
Cabinet	48-1274 (mahogany)	10658B
Cabinet	48-1276	10657
Cabinet back	48-1274	40-6830
Cabinet back	48-1276	40-6831
Dome	48-1274, 76	45-6042
Hinge, continuous	48-1274	56-3627
Hinge, continuous	48-1276	56-3627-2
Hinge, lid separator	48-1274, 76	45-6301
Hinge, lid	48-1276	56-3837

MISCELLANEOUS (Continued)

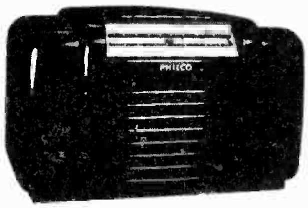
Description	Model	Service Part No.
Hinge, pivot (2 req.)	48-1274, 76	45-6036
Lamp bracket	48-1274, 76	56-2332
Plate, high fidelity	48-1274, 76	56-4403FA30
Pull, door, brass	48-1274	56-3927
Pull, door, brass (2 req.)	48-1276	56-3928
Pull, door, brass (4 req.)	48-1276	56-3972
Chassis Mtg. Hardware		
Grounding spring	48-1274, 76	57-2140
Foot, rubber	48-1274, 76	54-4040
Dial Backplate and Hardware		
Backplate-and-pulley assembly	48-1274, 76	76-2326
Collar and pulley	48-1274, 76	76-2343
Dial backplate	48-1274, 76	56-3544
Drive cord, pointer (25-ft. spool)	48-1274, 76	45-8750*
Drive cord, tuning condenser (25-ft. spool)	48-1274, 76	45-8750*
Light conductor (plexiglass)	48-1274, 76	54-7279
Pointer	48-1274, 76	76-2327
Spring, pointer drive	48-1274, 76	28-8953
Spring, tuning-condenser drive	48-1274, 76	28-8751
Dial Scale and Hardware		
Dial-scale-and-rubber-shim assembly	48-1274 (mahogany)	76-3202
Dial-scale-and-rubber-shim assembly	48-1274 (walnut)	76-3202-1
Dial-scale-and-rubber-shim assembly	48-1276	76-3202-2
Scale bracket	48-1274, 76	56-3833
Scale bracket	48-1274, 76	56-3832
Knob	48-1274 (mahogany), 76	54-4329
Knob, high-fidelity	48-1274 (mahogany), 76	54-4338
Knob, push button	48-1274, 76	54-4292-1
Lamp brace (pilot)	48-1276	56-3628FA3
Lamp-socket assembly, pilot	48-1274, 76	76-2109-3
Lamp-socket assembly, telltale	48-1274, 76	41-3737-1
Mtg. frame	48-1276	76-2198
Pilot-lamp assembly	48-1274, 76	76-2109-3
Push-button cap	48-1274, 76	54-4294
Socket, loktal (1 req.)	48-1274, 76	27-6207-1
Socket, loktal (8 req.)	48-1274, 76	27-6138*
Socket, octal	48-1274, 76	27-6174
Socket, miniature	48-1274, 76	27-6203-1
Shield, 6AU6 tube	48-1274, 76	56-3978-1FA3
Shield, pilot lamp	48-1274, 76	56-3549
Tab, OFF	48-1274, 76	54-4317-1
Tab, BC	48-1274, 76	54-4317-2
Tab, SW	48-1274, 76	54-4317-3
Tab, FM	48-1274, 76	54-4317-4
Tab, PHONO	48-1274, 76	54-4317-5
Tab kit (station call letters)	48-1274, 76	40-6943
Telltale jewel	48-1274, 76	54-4304
Tuner assembly (Philco Electromechanical Push-Button Tuner)	48-1274, 76	76-2150
Wrench, push-button setting	48-1274, 76	W2524

NOTE: Tuning-condenser gang is not separately replaceable. Order "Tuner assembly (Philco Electromechanical Push-Button Tuner), 76-2150."

PHILCO AUTOMATIC BAND SELECTOR

Description	Service Part No.
A-c switch (WS-1), phono power	42-1840
Gear-and-switch assembly	76-2333-1
Gear-and-pinion assembly (input)	76-2348
Gear-and-pinion assembly (intermediate)	76-2350
Switch wafer WS-2, (F, R)	54-7523
Switch wafer WS-3, (F, R)	54-7524
Switch wafer WS-4, (F, R)	54-7525
Switch wafer WS-5, (F, R)	54-7526
Switch wafer WS-6, (F, R)	54-7527
Switch wafer WS-7, (F, R)	54-7528
Motor	35-1324
Muting-switch assembly (S103)	76-2346
Pinion-and-clutch-dog assembly	76-2349
Washer, felt	27-4109-1
Washer, fibre	11W46211

MODEL 49-100 PHILCO CORP.



MODEL 49-100

SPECIFICATIONS

CABINET	Plastic, brown finish
CIRCUIT	Four-tube superheterodyne
FREQUENCY RANGE	540 to 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

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.

Circuit Description

Philco Model 49-100 is a four-tube, battery-operated superheterodyne, providing reception on the standard broadcast band, 540-1720 kc. Manual tuning is employed. A 100-foot (overall), outdoor aerial, such as Philco Part No. 45-1469, is recommended.

The converter stage employs a type 1LA6 penta-grid 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.

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

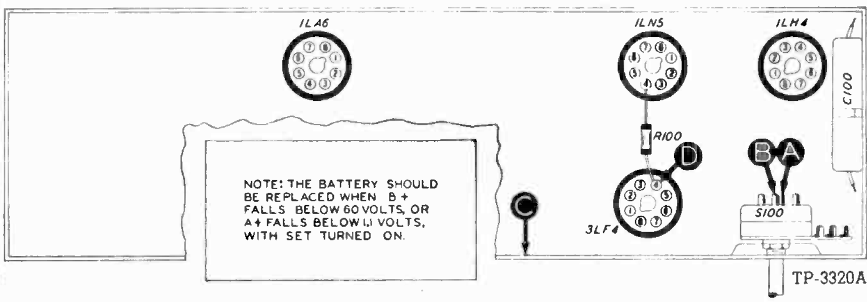


Figure 1. Bottom View, Showing Section 1 Test Points

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.

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

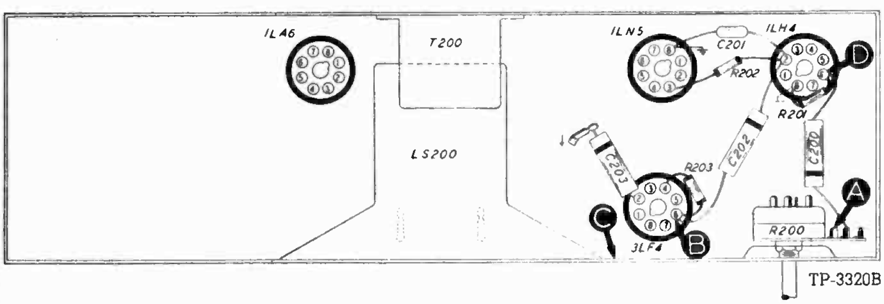


Figure 2. Bottom View, Showing Section 2 Test Points

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.

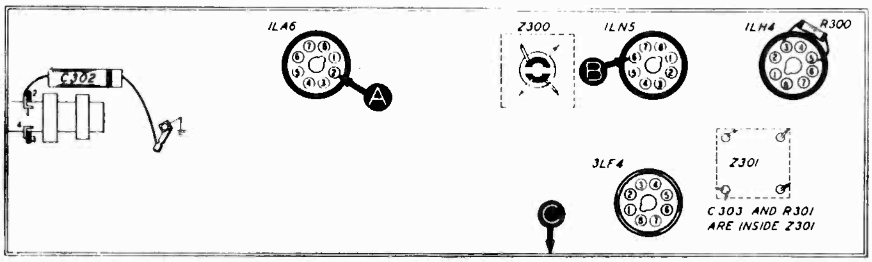
If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 3; if not, isolate and correct the trouble in this section.

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.			

MODEL 49-100 PHILCO CORP.

TROUBLE SHOOTING

Section 3



TP-3320C

Figure 3. Bottom View, Showing Section 3 Test Points

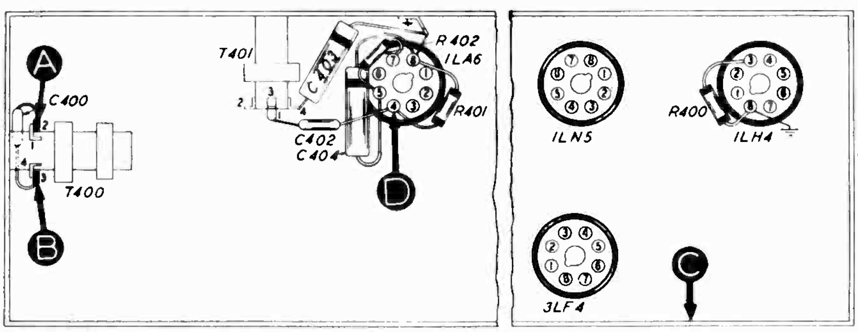
For the tests in this section, use an r-f signal generator with frequency set at 455 kc. (modulated output). Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the radio volume control to maximum.

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



TP-3320D

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).

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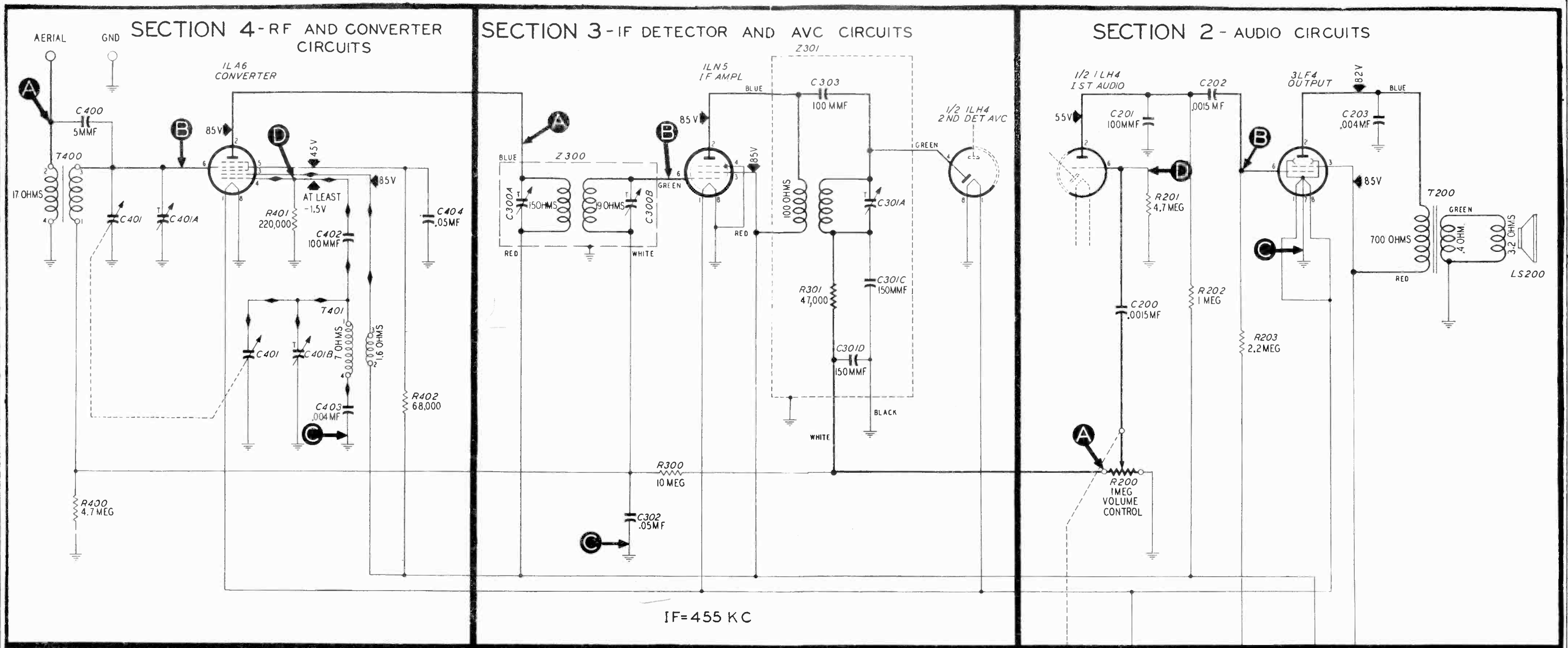
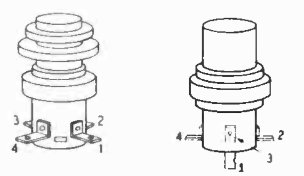




NOTE: THE VOLTAGES INDICATED ON THE SCHEMATIC DIAGRAM ARE AVERAGE VALUES. THE VOLTAGES WERE MEASURED BETWEEN THE POINTS INDICATED AND THE CHASSIS, USING A 20,000-OHMS-PER-VOLT METER, WITH A FRESH BATTERY.

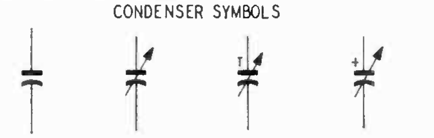
OSCILLATOR GRID VOLTAGE WAS MEASURED BETWEEN THE CHASSIS AND OSC. GRID (PIN 4) OF THE 1LA6 TUBE, USING A 100,000-OHM ISOLATING RESISTOR IN SERIES WITH THE PROD END OF THE NEGATIVE VOLTMETER LEAD.

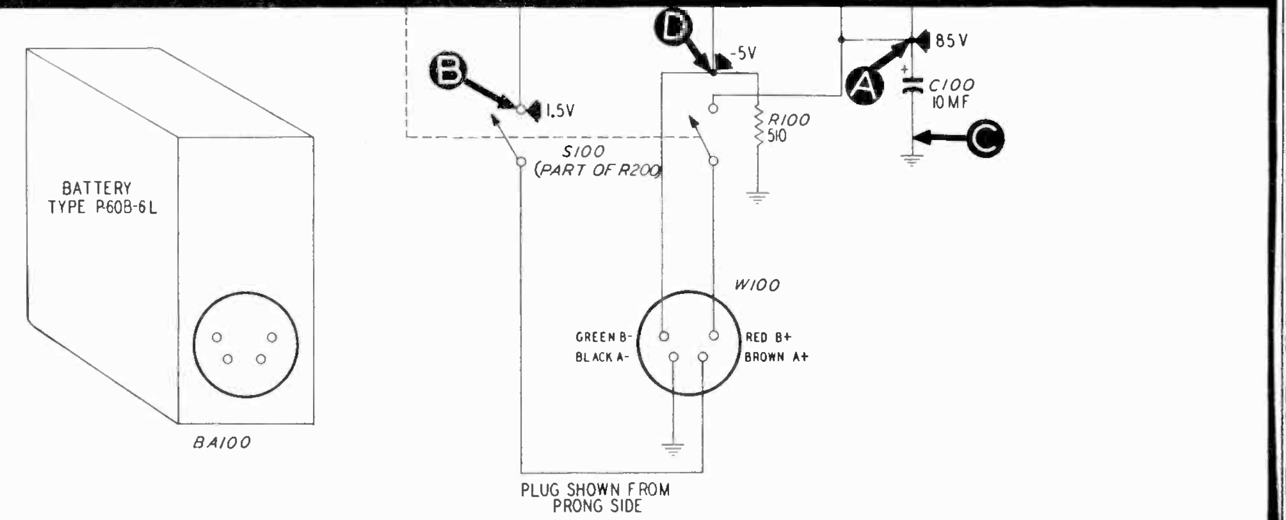
—— R.F., I.F. AND AUDIO SIGNAL PATH

—◆— OSC SIGNAL PATH

ALL RESISTOR VALUES IN OHMS UNLESS MARKED OTHERWISE

CONDENSER SYMBOLS





SECTION 1 - POWER SUPPLY

FIGURE 5. PHILCO RADIO MODEL 49-100, COMPLETE SECTIONALIZED SCHEMATIC, SHOWING ALL TEST POINTS

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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

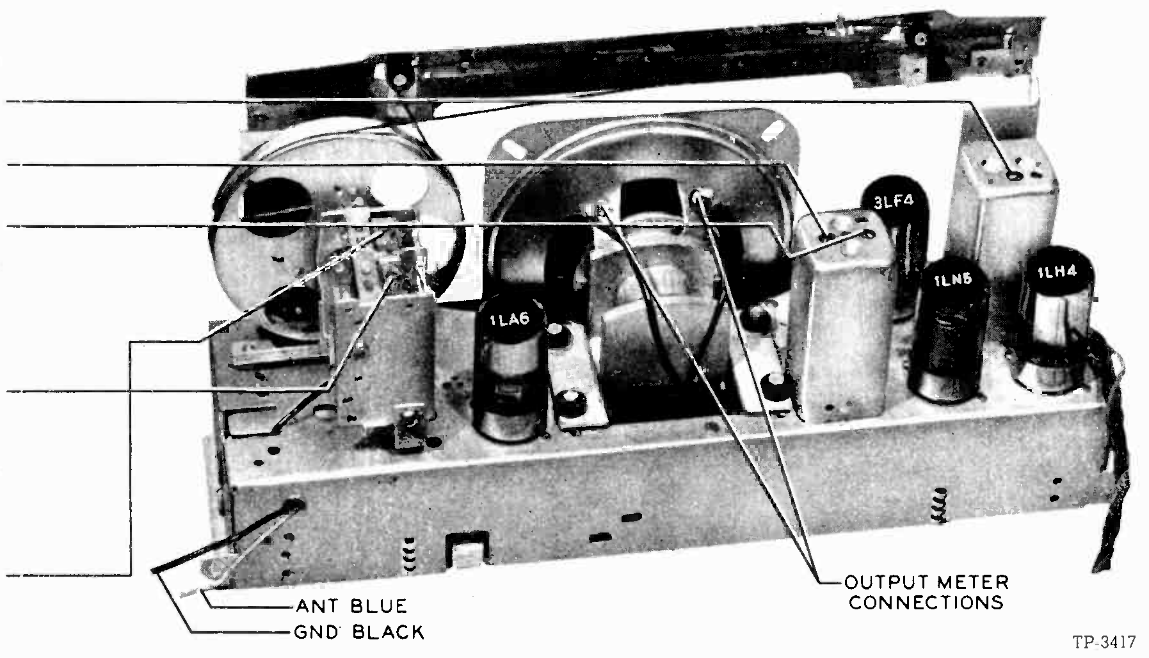


Figure 6. Top View, Showing Trimmer Locations

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 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.

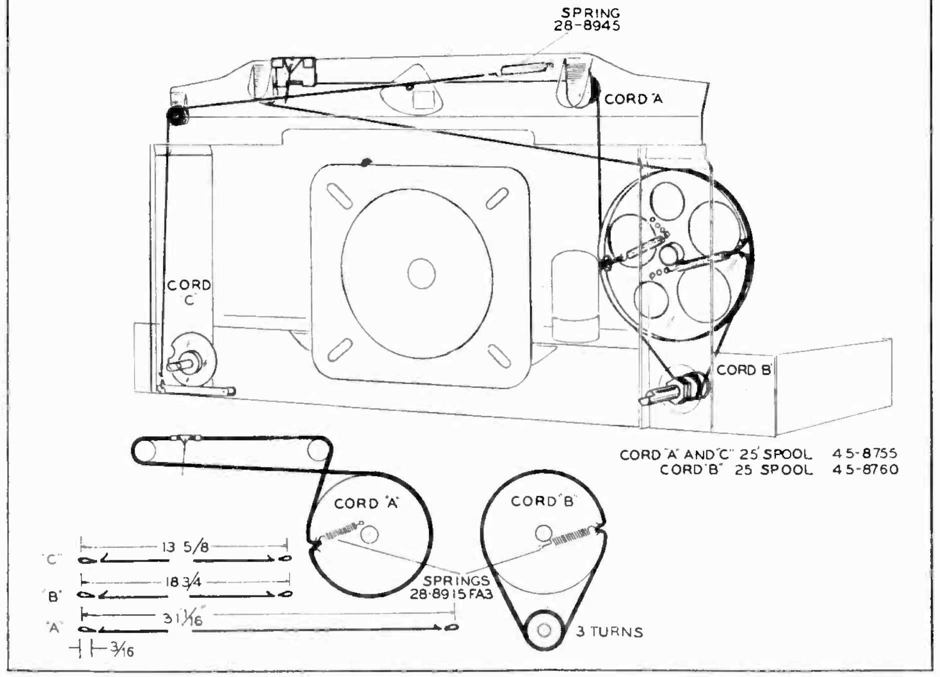


Figure 7. Drive-Cord Installation Details

TP-3320E

PHILCO CORP. MODEL 49-100

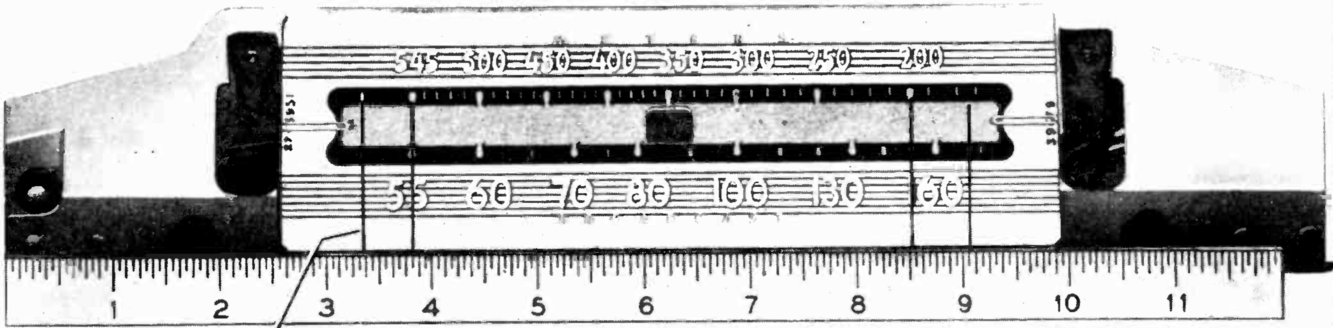


Figure 8. Composite Dial and Backplate, Calibration Details

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	30-4621*
C201	Condenser, 100 mmf., r-f by-pass	60-10105407*
C202	Condenser, .0015 mf., d-c blocking	30-4621*
C203	Condenser, .004 mf., tone compensation	30-4623*
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	30-4518*
C303	Condenser, 100 mmf., coupling, part of Z301	30-1225-2*
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	60-90505007
C401	Condenser, main tuning	31-2721-1
C401A:	Condenser, trimmer, aerial coil	Part of C401
C401B:	Condenser, trimmer, osc. coil	Part of C401
C402	Condenser, 100 mmf., osc. grid	30-1225-2*
C403	Condenser, .004 mf., osc. tracking	30-4623*
C404	Condenser, .05 mf., r-f by-pass	30-4518*
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	32-3385-4

MISCELLANEOUS

Description	Service Part No.
Cabinet, Less Dial Scale	10618A
Cabinet Hardware	
Baffle and cloth assembly	40-6910
Dial Scale	27-5951
Dial-Scale Hardware	
Screw, strap mtg.	1W23129FA3
Strap, scale mtg., r.h.	56-2672FA3
Strap, scale mtg., l.h.	56-2671FA3
Knob (2)	54-4323
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	28-8945FA3
Spring, cam plate, flag drive	57-0701FA1
Spring, retaining	57-1468FA1
Transfer-lever assembly	76-1655-2
Socket, Loktal	27-6207
Tuning-Condenser Hardware	
Cord, drive (25-ft. spool), for tuning condenser	45-8760
Spring, tuning-condenser drive	28-8913FA3
Tuning-shaft assembly	31-2640

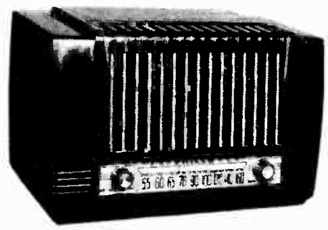
Circuit Description

Philco Model 49-101 is a four-tube superheterodyne operating on a.c., d.c., or battery, and providing reception on the standard-broadcast band. A 100-foot (overall length), outdoor aerial, such as Philco Part No. 45-1469, is recommended.

The aerial is transformer-coupled to the 1R5 converter, where the incoming signal is converted to the 455-kc. intermediate frequency. A 1T4 is used in a single high-gain stage of i-f amplification, which employs neutralization to suppress oscillation. A 1.5-mmf. condenser, C304, feeds part of the i-f voltage, of the proper phase, back to the 1T4 grid through the tube-socket capacitance.

A 1U5 diode-pentode is used in the detector, a-v-c, and first audio circuits. The pentode section is resistance-coupled to a 3V4 pentode output amplifier, which works into a p-m speaker.

The d-c operating voltages are obtained from either a battery pack, Philco type P-326, or from a 105—120 volt, a-c or d-c power line. For power-line operation, the plate, screen, and filament voltages are provided by a power supply using a selenium rectifier (CR100).



MODEL 49-101

SPECIFICATIONS

CABINET	Molded Polystyrene (dark brown)
CIRCUIT	Four-tube superheterodyne
FREQUENCY RANGE	540—1600 kc.
AUDIO OUTPUT	160 milliwatts
OPERATING VOLTAGES	Battery: "B", 90 volts; "A", 7.5 volts. A.c./d.c.: 105—120 volts
POWER CONSUMPTION	Battery: "B", 13 ma. at 90 volts; "A", 50 ma. at 7.5 volts. A.c./d.c.: 25 watts
AERIAL	Terminal provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (4)	1R5, 1T4, 1U5, 3V4
BATTERY TYPE	Philco P-326

TP-6524

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 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. Check the total filament resistance, with the power switch turned on, the battery 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 plug is higher than 100 ohms, one of the tube filaments is probably open.

NOTE: If the 3V4 filament is open, check condenser C202 before replacing the tube.

3. Measure the resistance between B+ (output of selenium rectifier), test point D, and B–, test point B. See figure 1. When the ohmmeter leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 2000 ohms, check condensers C101A and C101B for leakage or shorts.

The resistance value above, 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.

Section 1—Power Supply

TROUBLE SHOOTING

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.

The battery pack should be replaced when the "A" voltage drops below 5 volts, or the "B" voltage drops below 60 volts.

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.

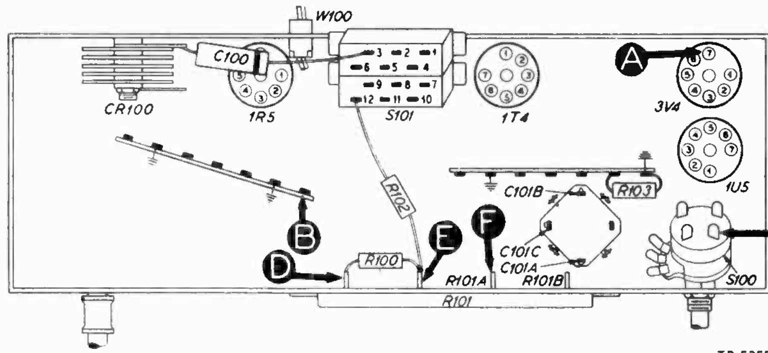


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a) 1(b)	A C	7.5v 90v		Trouble in this section. Isolate by the following tests.
2	D	125v	Low voltage No voltage	Defective: CR100. Open: C101A. Defective: CR100. Open: S100, S101.
3	E	120v	Low voltage No voltage	Changed resistance: R100. Leaky: C101A. Open: R100. Shorted: C101A.
4	F	65v	Low voltage No voltage	Changed resistance: R101A. Leaky: C101B. Open: R101A. Shorted: C101B.
5	A	7.5v	Low voltage High voltage No voltage	Changed resistance: R101B. Open: One or more filaments, R205*. Open: R101B, S101.
6	C	90v	Low voltage High voltage No voltage	Changed resistance: R102. Leaky: C101C. Open: R205*, T200*, S100. Open: R102, S101. Shorted: C101C.
Listening Test: Abnormal hum may be caused by open C101B, C101C, or C202*.				

*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 radio volume control 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.

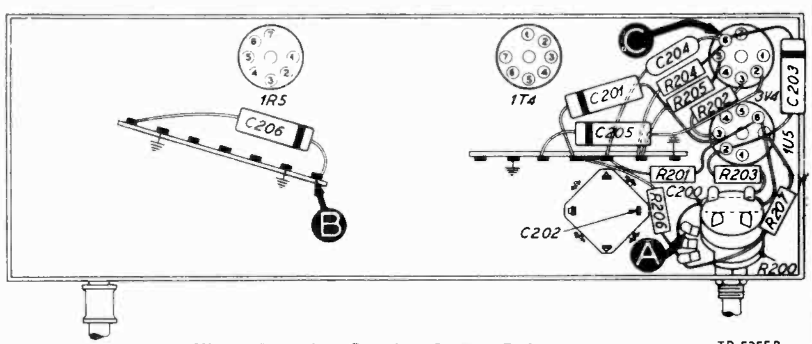


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	C	Clear speaker output with strong generator input.	Defective: 3V4, LS200. Open: R204, T200. Shorted: C203, C204, C205, T200.
3	A	Same as step 1.	Defective: 1U5, R200 (rotate). Open: C200, R201, R202, R203, C203. Shorted: C201, C301C*.
Listening Test: Distortion may be caused by leaky or shorted C203, or by changed resistance of R202. Distortion or strong signals may be caused by leaky or shorted C200.			

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

MODEL 49-101 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 radio volume control 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.

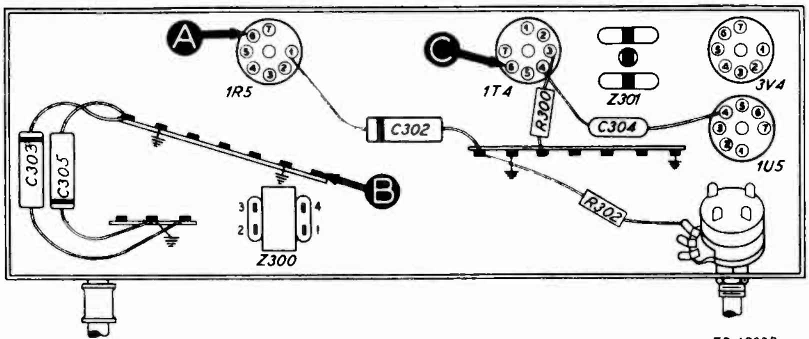


Figure 3. Bottom View, Showing Section 3 Test Points TP-6983B

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."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with moderate input.	Defective: 1T4, 1U5 (diode section). Misaligned: Z301. Open: R300, C303, L301A, R301, L301B, C301A. Shorted: C300B, C303, L301A, L301B, C301A, C301B.
3	A	Same as step 1.	Defective: 1R5*. Misaligned: Z300. Open: C300A, L300A, L300B, C300B, T400*. Shorted: C400A*, C400B*, C300A, L300A, L300B, C300B.

*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 radio volume control to maximum. Set the tuning control and signal-generator frequency as indicated in the chart.

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

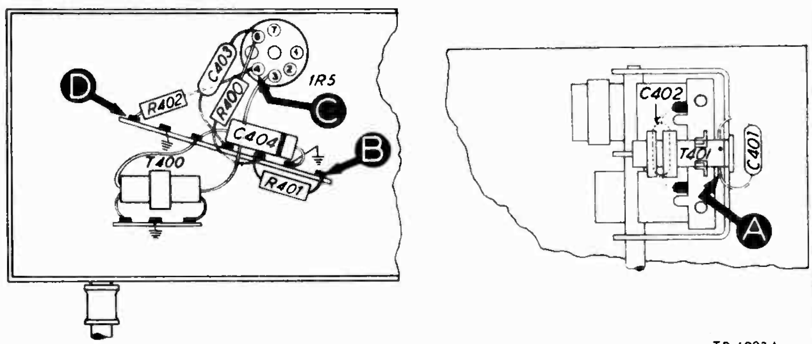


Figure 4. Bottom View, Showing Section 4 Test Points TP-6983A

STEP	TEST POINT	SIGNAL 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 this section. Isolate by the following tests.
2	C to D (Osc. test; see note below.)		Rotate through range.	Negative 5 to 10 volts.	Defective: 1R5. Open: R402, T400, C404. Shorted: C402, C400, C400A.
3	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C401, C403, R401, R400, T400. Shorted: C400, C400B.

PHILCO CORP.

MODEL 49-101

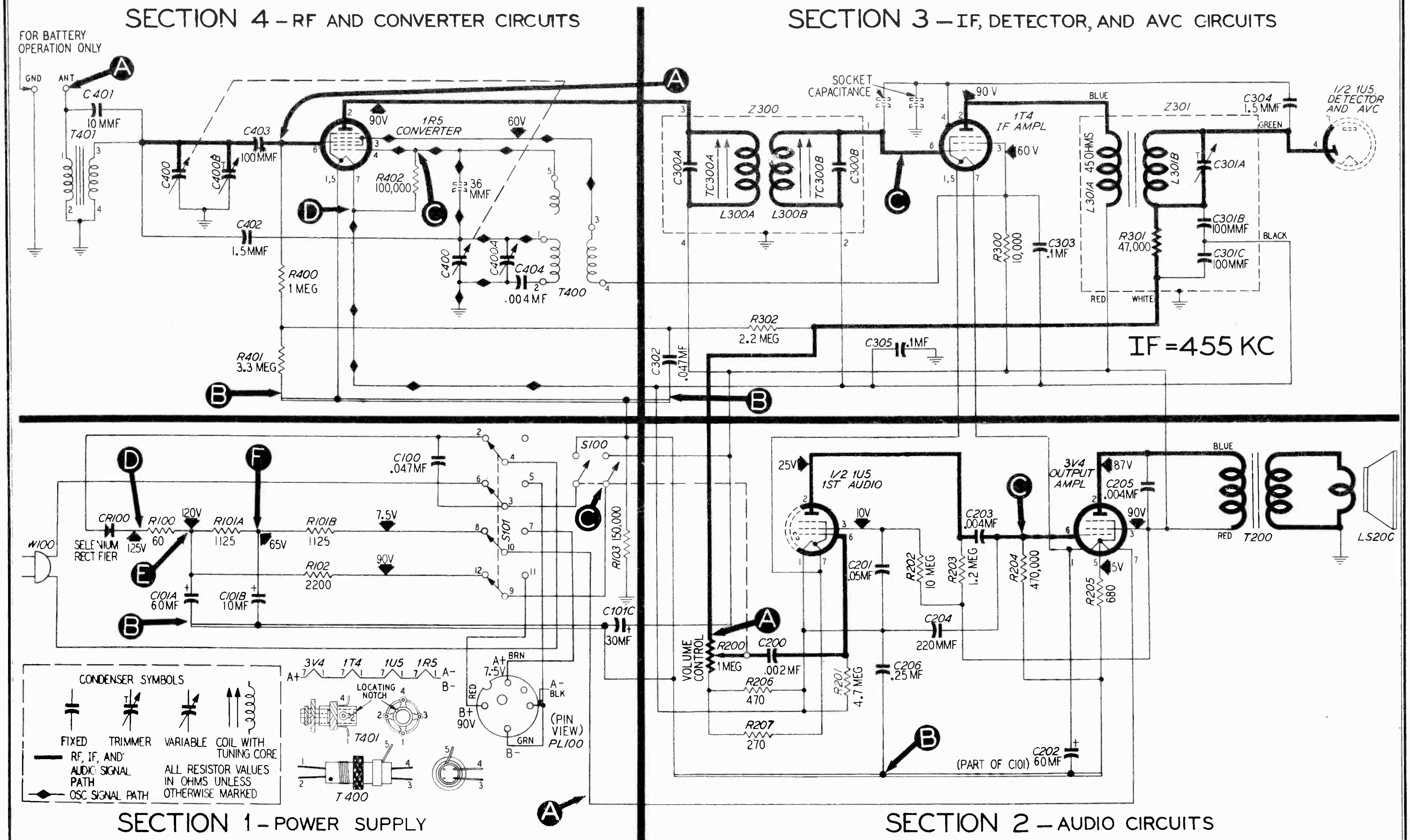


Figure 5. Philco Model 49-101, Sectionalized Schematic Diagram, Showing Test Points

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to test point D; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 4 of the 1R5), test point C. 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.

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ALIGNMENT PROCEDURE

DIAL—Calibration and pointer-index measurements are shown in figure 7. With tuning condenser fully meshed, set pointer to index mark.

RADIO CONTROLS—Set volume control to maximum.

OUTPUT METER—Connect across voice-coil terminals.

SIGNAL GENERATOR—Use modulated output.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below .5 volt.

SPECIAL NOTE—The orientation of the loop with respect to the chassis is critical for correct tracking. During alignment, with the cabinet back (containing the loop) laid down on the bench, the chassis should be laid on its back, in approximately its normal relation to the loop.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B– (test point B in figure 4). Positive lead through .05-mf. condenser to external-aerial lead. Make sure that radio loop aerial is connected to radio.	455 kc.	Tuning condenser fully meshed.	Adjust, in order given, for maximum output.	C301A—2nd i-f sec. TC300B—1st i-f sec. TC300A—1st i-f pri.
2	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust for maximum output.	C400A—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output while rocking tuning condenser.	C400B—aerial

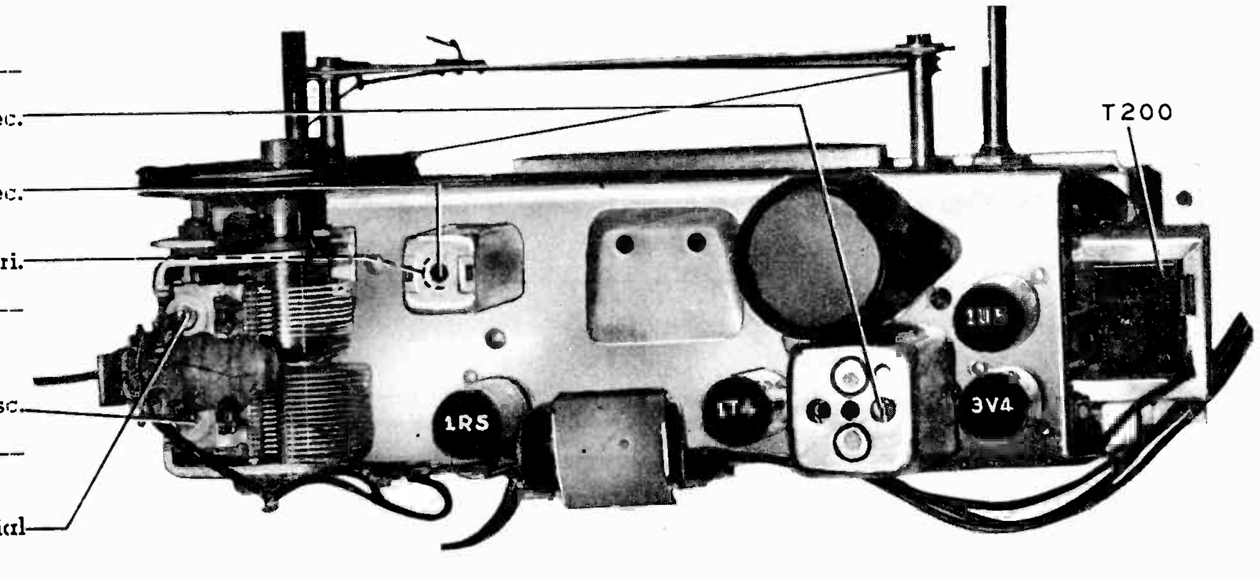


Figure 6. Top View, Showing Trimmer Locations

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. Make sure that radio loop aerial is connected to radio.

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 7.

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

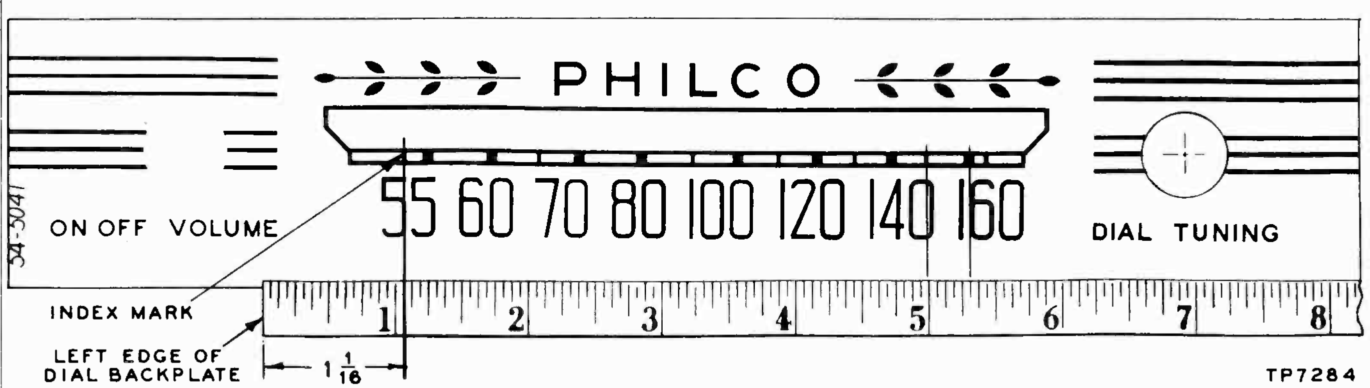


Figure 7. Dial-Backplate Calibration Measurements

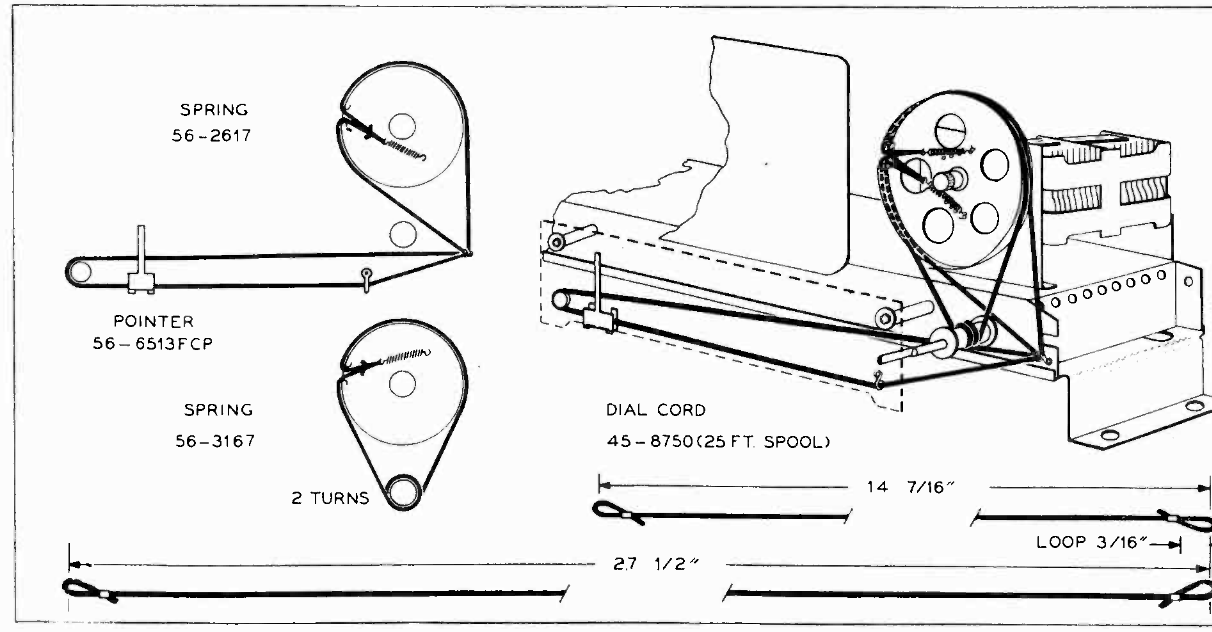


Figure 8. Drive-Cord Installation Details

TP-6983C

PHILCO CORP.

MODEL 49-101

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
I —pilot lamp
L —choke or coil
LA—loop aerial
LS—loud-speaker
R —resistor
S —switch
T —transformer
W—line cord
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, 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.

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by 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.	61-0122*
C101	Condenser, electrolytic, filter, 4-section	30-2568-26
C101A	Condenser, filter, 60 mf., 150v	Part of C101
C101B	Condenser, filter, 10 mf., 150v	Part of C101
C101C	Condenser, filter, 30 mf., 150v	Part of C101
CR100	Rectifier, selenium	34-8003
PL100	Battery-cable-and-plug assembly	41-3712-4
R100	Resistor, current-limiting, 60 ohms, 1w	33-1334
R101	Resistor, 2-section	33-3431-5
R101A	Resistor, filament dropping, 1125 ohms	Part of R101
R101B	Resistor, filament dropping, 1125 ohms	Part of R101
R102	Resistor, filter, 2200 ohms	66-2223340*
R103	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, on-off	Part of R200
S101	Switch, change-over	42-1821
W100	Line-cord-and-plug assembly	L-2183*

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .002 mf.	61-0108*
C201	Condenser, screen by-pass, .05 mf.	61-0122*
C202	Condenser, filter, 60 mf., 25v	Part of C101
C203	Condenser, d-c blocking, .004 mf.	61-0179*
C204	Condenser, r-f by-pass, 220 mmf.	30-1224-20*
C205	Condenser, tone compensation, .004 mf.	61-0179*
C206	Condenser, by-pass, .25 mf.	61-0125*
LS200	Speaker, p-m	36-1629-1
R200	Volume control (with on-off switch), 1 megohm	33-5538-28
R201	Resistor, grid return, 4.7 megohms	66-5473340*
R202	Resistor, screen dropping, 10 megohms	66-6103340*
R203	Resistor, plate load, 1.2 megohms	66-5123340*
R204	Resistor, grid return, 470,000 ohms	66-4473340*
R205	Resistor, bias, 680 ohms	66-1683340*
R206	Resistor, diode return, 470 ohms	66-1473340*
R207	Resistor, diode return, 270 ohms	66-1273340*
T200	Transformer, output	32-8259-3

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

Reference Symbol	Description	Service Part No.
C300A	Condenser, shunt, fixed trimmer	Part of Z300
C300B	Condenser, shunt, fixed trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, filter	Part of Z301
C301C	Condenser, filter	Part of Z301
C302	Condenser, a-v-c filter, .047 mf.	61-0122*
C303	Condenser, screen by-pass, .1 mf.	61-0113*

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

Reference Symbol	Description	Service Part No.
C304	Condenser, neutralizing, 1.5 mmf.	30-1221-3
C305	Condenser, i-f by-pass, .1 mf.	61-0113*
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
L301B	Transformer secondary, 2nd i-f	Part of Z301
R300	Resistor, screen dropping, 10,000 ohms	66-3103340*
R301	Resistor, filter, 47,000 ohms (part of Z301)	66-3473340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
TC300A	Tuning core, 1st i-f pri.	Part of Z300
TC300B	Tuning core, 1st i-f sec.	Part of Z300
Z300	Transformer, 1st i-f	32-4160-4
Z301	Transformer, 2nd i-f	32-3987-3

SECTION 4
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2727-2
C400A	Condenser, trimmer, oscillator	Part of C400
C400B	Condenser, trimmer, aerial	Part of C400
C401	Condenser, isolating, 10 mmf.	30-1224-26*
C402	Condenser, neutralizing, 1.5 mmf.	30-1221-3
C403	Condenser, d-c blocking, 100 mmf.	62-110009001
C404	Condenser, fixed padder, .004 mf.	61-0179*
R400	Resistor, a-v-c divider, 1 megohm	66-5103340*
R401	Resistor, grid return, 3.3 megohms	66-5333340*
R402	Resistor, oscillator grid bias, 100,000 ohms	66-4103340*
T400	Transformer, oscillator	32-4282-1
T401	Transformer, aerial	32-3919-4

MISCELLANEOUS

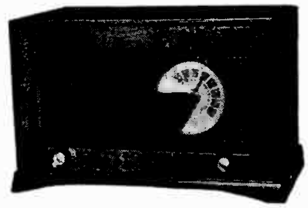
Description	Service Part No.
Cabinet and Cabinet Parts	
Baffle-and-cloth assembly	40-7600
Back	54-7695
Cabinet	10732
Dial Hardware	
Dial-backplate assembly	76-4357
Drive cord (25-ft. spool)	45-8750*
Pointer	56-6513FCP
Scale	54-5041
Knob (2 required)	54-4227-5
Shaft-and-pulley assembly	76-3671-1
Socket, miniature (4 required)	27-6203
Spring, drive cord	56-2617
Switch-lever assembly	76-3666

MODELS 49-500, 49-500-I, 49-506

PHILCO CORP.

GENERAL INFORMATION

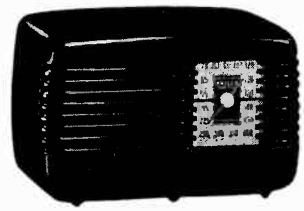
Philco Model 49-506 is a 5-tube superheterodyne. This set employs the same chassis as that used in Models 49-500 and 49-500-I, but is housed in a new-style cabinet which is supplied in either of two finishes, walnut or mahogany.



MODEL 49-506

SPECIFICATIONS

CABINET	Wood, with plastic grille; walnut or mahogany finish



MODEL 49-500 (Walnut)

MODEL 49-500-I (Ivory)

SPECIFICATIONS

CABINET	Bakelite
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, 50A5, 35Z5GT

TP-2667

Circuit Description

The Philco Models 49-500 and 49-500-I are 5-tube, table-model superheterodyne radios, providing reception in the standard broadcast band.

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 50A5 output tube. The output tube is transformer coupled to a permanent-magnet dynamic speaker.

D-c operating voltages are obtained from a 35Z5GT half-wave rectifier, the output of which is filtered by a two-section resistor-condenser filter.

Condenser C304 in Section 3 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.

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

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

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, burned resistors, or other obvious sources of trouble.
2. Measure the resistance between B+ and B– (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. 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 tests of Section 1 (power supply) are performed.

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MODELS 49-500, 49-500-I, 49-506

Section 1 — Power Supply

TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter; connect 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.

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

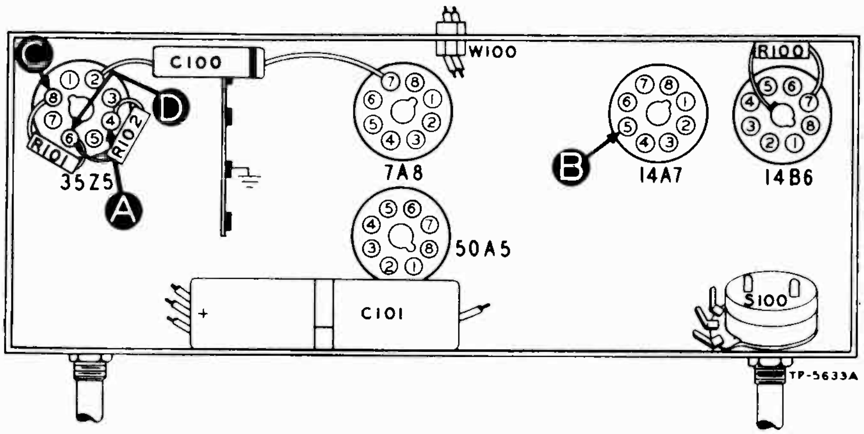

FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A to B	90v		Trouble within this section; isolate by the following tests.
2	C to B	115v	No voltage Low voltage High voltage	Defective 35Z5GT. Shorted: C101A. Defective: 35Z5GT. Open: C101A or I100. Leaky: C101A. Open: R101.
3	D to B	105v	No voltage Low voltage High voltage	Shorted: C101B. Open: C101B. Leaky: C101B 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.

Section 2 — Audio Circuits

TROUBLE SHOOTING

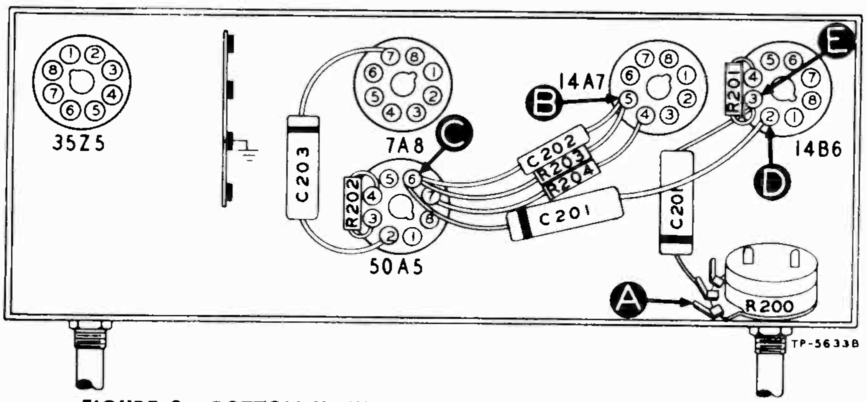

FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

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

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal-generator input.	Trouble within this section; isolate by the following tests.
2	C	Clear signal with weak signal-generator input.	No signal — Open or shorted: LS200 or T200. Shorted: C203. Open: R204. Defective: 50A5. Weak or distorted signal — Defective: 50A5 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. Weak or distorted signal — Shorted: C200. Open: R201. Defective: 14B6.
5	A	Same as step 1.	No signal — Open: C200. Shorted: C300D. Weak or distorted signal — Open: R200 (rotate through range).

MODELS 49-500,
49-500-I, 49-506

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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 to 455 kc. Connect the ground lead of the signal generator to B; connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the volume control at 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 within this section.

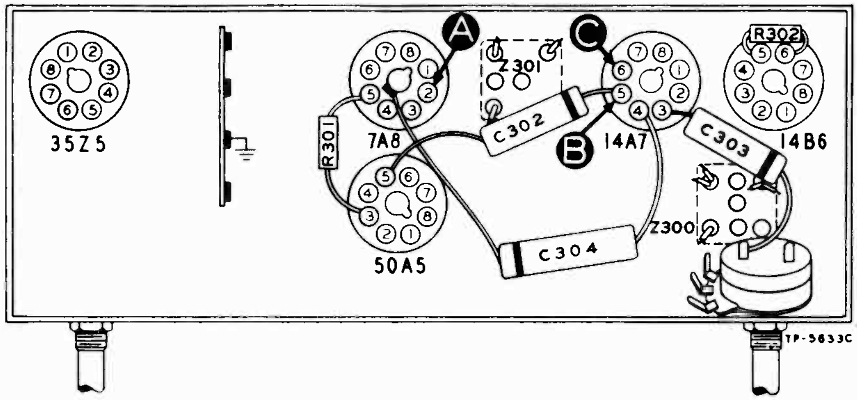

FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Clear signal with weak signal-generator input.	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. Open: R301. Shorted: C303. Weak or distorted signal — Leaky: C303. Open: C303 or C304. Defective: 14B6 or 14A7. Misaligned: Z300. Leaky or open: C302.
3	A	Same as step 1.	No signal — Open or shorted: Z301. Weak or distorted signal — Misaligned: Z301.

Section 4 — R-F and Converter Circuits TROUBLE SHOOTING

For the tests in this section, use an r-f signal generator, with modulated output. Connect the generator ground lead to B; 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 or all of these will cause noise. If the "NORMAL INDICATION" is not obtained in step 1, isolate the trouble by following the remaining steps.

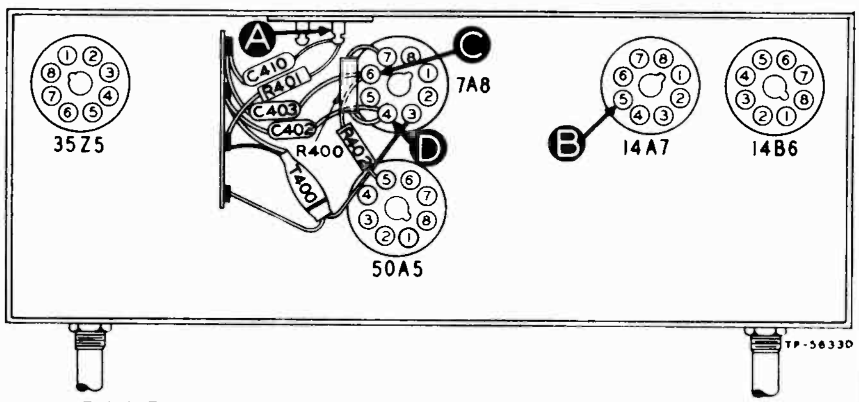

FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS

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-generator input.	Trouble within this section; isolate by the following tests.
2	D (Osc. test; see note below.)		540 to 1620 kc.	Negative 9 to 12 volts.	Open or shorted: T400, C402, or R400. Shorted: C400 or C400B. Defective: 7A8.
3	C	540 kc.	540 kc.	Same as step 1.	No signal — Open or shorted: Z301. Shorted: C400 or C400A. Defective 7A8. Weak or distorted signal — Shorted or open: LA400. Defective: 7A8.
4	A	540 kc.	540 kc.	Same as step 1.	Weak signal — Open: C401.

OSCILLATOR-TEST NOTE: Connect positive lead of a 20,000-ohms-per-volt meter to B; connect 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.

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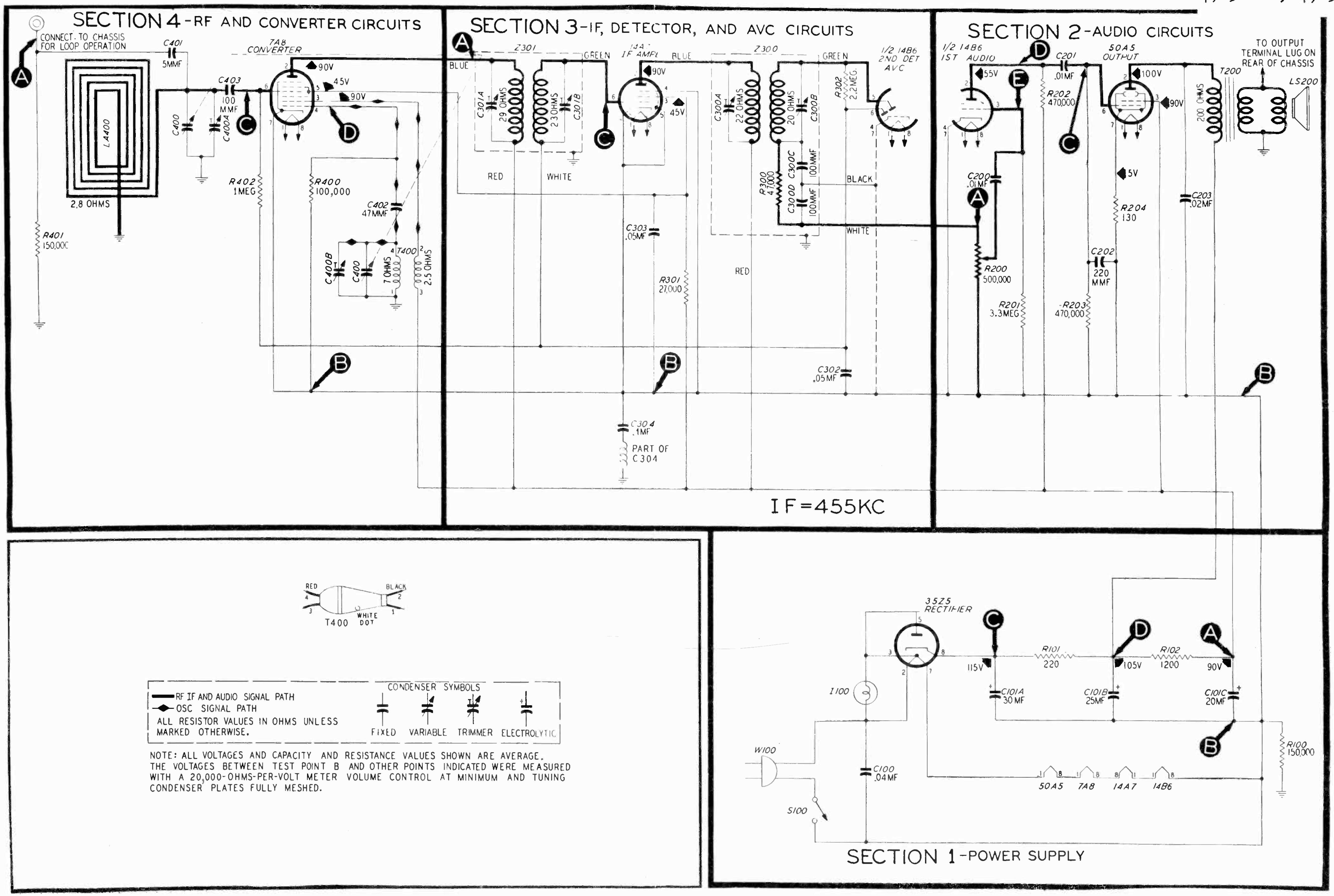
MODELS 49-500, 49-500-I, 49-506



SECTION 5. PHILCO RADIO MODELS 49-500 AND 49-500-I, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

MODELS 49-500, 49-500-I, 49-506

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ALIGNMENT PROCEDURE

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

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 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				Turn C301B (copper screw) down tight.	
2	Through .1-mf. condenser to pin 6 of 7A8 converter.	455 kc.	540 kc.	Adjust trimmers, in 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 as step 3.	1500 kc.	1500 kc.	Adjust for maximum output.	C400A

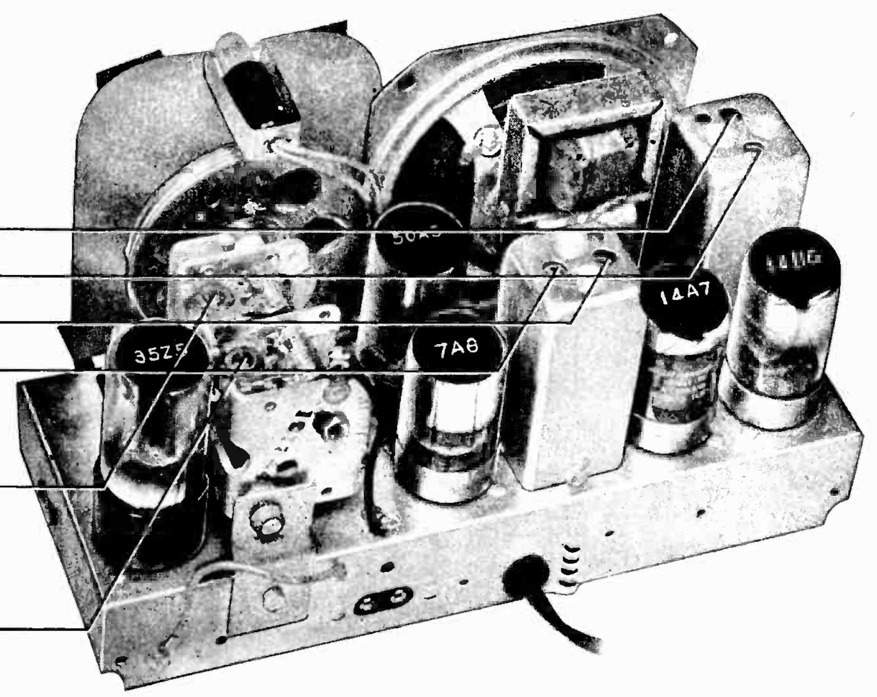

FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS

TP 6000

MISCELLANEOUS

Description	Service Part No.
Cabinet	
Walnut	10728
Mahogany	10728A
Cabinet Hardware	
Back	54-7682
Baffle-and-cloth assembly	
Walnut	40-6945
Mahogany	40-6945-1
Fastener, acetate window (4)	56-6161FE7
Knob	
Walnut	54-4527-11
Mahogany	54-4527-10
Window, acetate	54-4504

Description	Service Part No.
Dial-Scale Hardware	
Cord, drive (25-ft. spool)	45-8750*
Pointer	54-4505
Scale, dial	27-5978-2
Spring, (drive cord)	56-2617
Pilot-lamp assembly	76-1280
Shaft assembly, drive	31-2718
Socket, Loktal	27-6138*
Socket, octal	27-6174*

REPLACEMENT PARTS LIST

Replacement parts are the same as those in Models 49-500 and 49-500-I, with the exceptions listed below.

SECTION 1

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .04 mf.	30-1226-17

SECTION 4

Reference Symbol	Description	Service Part No.
LA400	Loop aerial	32-4052-28

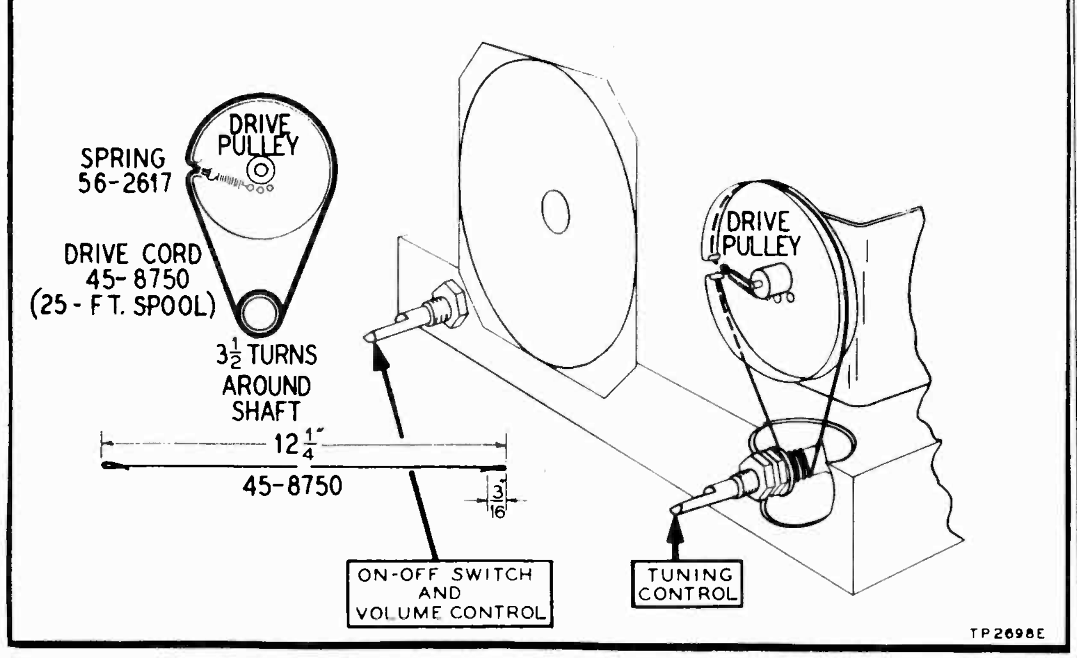

FIGURE 7. DRIVE-CORD INSTALLATION DETAILS

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MODELS 49-500, 49-500-I, 49-506

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 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, 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
I100	Panel lamp	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	L2183*

SECTION 2

AUDIO CIRCUITS

Reference 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.	62-122001001
C203	Condenser, by-pass, .02 mf.	61-0108*
LS200	Speaker	36-1614
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*
T200	Output transformer	Part of LS200

SECTION 3

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

Reference Symbol	Description	Service Part No.
C302	Condenser, a-v-c by-pass, .05 mf.	61-0122
C303	Condenser, screen by-pass, .05 mf.	61-0122*
C304	Condenser, special i-f by-pass, .1 mf.	30-4644-1
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	45-6365*
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	45-6365
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301

SECTION 4

R-F AND CONVERTER CIRCUITS

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
C401	Condenser, coupling, 5 mmf.	60-90505007*
C402	Condenser, isolating, 47 mmf.	60-00515307*
C403	Condenser, blocking, 100 mmf.	60-10105407*
LA400	Loop aerial	32-4052-5
R400	Resistor, osc., grid, 100,000 ohms	66-4103340*
R401	Resistor, aerial discharge, 150,000 ohms	66-4153340*
R402	Resistor, grid return, 1 megohm	66-5103340*
T400	Transformer, oscillator	32-4263

MISCELLANEOUS

Description	Service Part No.
Cabinet	
Model 49-500	10542D
Model 49-500-I	10542E
Cabinet Hardware	
Back	
Model 49-500	27-9879
Model 49-500-I	27-9922
Fastener, acetate window (6)	28-4279FA1
Foot, felt	W2190
Knob	
Model 49-500	27-4820
Model 49-500-I	54-4118
Window, acetate	54-4088
Dial-Scale Hardware	
Cord, drive (25-ft. spool)	45-8750
Pointer	27-4891-1
Scale, dial	
Model 49-500	27-5965
Model 49-500-I	27-5965-1
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*

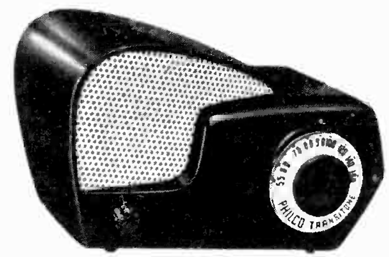
PHILCO CORP.

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.	30-4119*
C101	Condenser, electrolytic, 3-section	30-2575-10*
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, 6.3v	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	L-2183*



MODEL 49-501 (Brown)
MODEL 49-501-I (Ivory)

SPECIFICATIONS

CABINET	
Model 49-501	Phenolic plastic, brown
Model 49-501-I	Phenolic plastic, ivory
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	117 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	Loop fastened to cabinet; terminal provided for external aerial.
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8, 14A7, 14B6, 50A5, 35Y4

TP-5859

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MODELS 49-501, 49-501-I

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.

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.

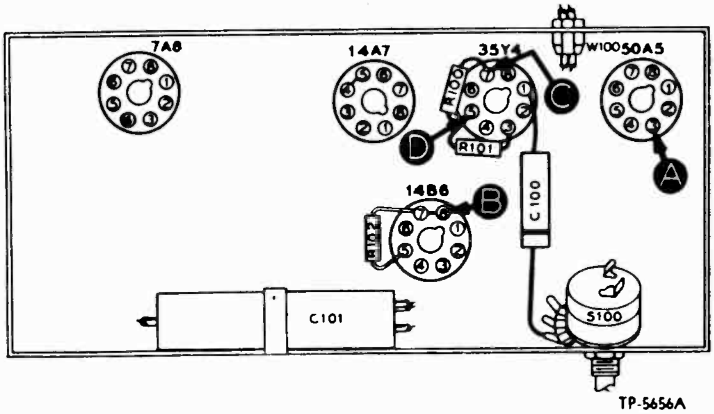


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	92v		Trouble within this section. Isolate by the following tests.
2	C	105v	No voltage Low voltage High voltage	Defective: 35Y4. Open: S100, W100. Shorted: C101A. Open: C101A. Defective: 35Y4. Leaky: C101A. Open: R100.
3	D	116v	No voltage Low voltage High voltage	Shorted: C101B. Open: R100. Open: C101B. Leaky: C101B, C202*. Open: R101, T200*, R203*.
4	A	92v	No voltage Low voltage	Shorted: C101C. Open: R101. 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 control 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.

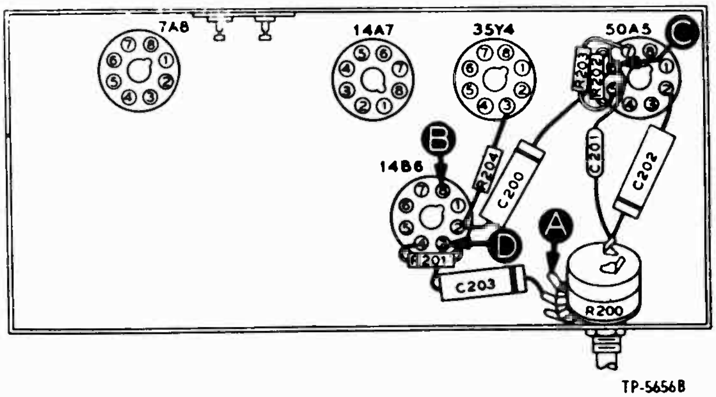


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal-generator input.	Trouble within this section. Isolate by the following tests.
2	C	Clear output with strong input.	Defective: 50A5, LS200. Shorted: C201, C202. Open: R203, T200.
3	D	Same as step 2.	Defecive: 14B6. Shorted: C200. Open: R204, R202, C200.
4	A	Same as step 1.	Shorted: C301D*. Open: R200, R201, C203.
Listening Test: Distortion may be caused by shorted or leaky C200.			

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

MODELS 49-501, 49-501-I

PHILCO CORP.

TROUBLE SHOOTING

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 control 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 converter in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the converter circuit. These parts are listed below under the "POSSIBLE CAUSE OF ABNORMAL INDICATION."

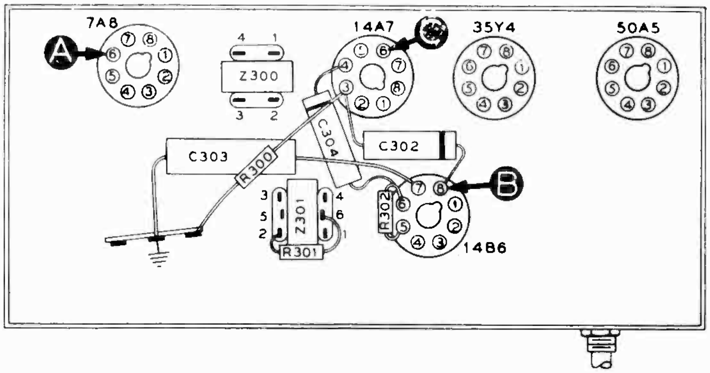


Figure 3. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal-generator input.	Trouble within this section. Isolate by the following tests.
2	C	Same as step 1.	Defective: 14A7, 14B6. Shorted: L300B, C300B, L301A, L301B, C301A, C301B, C301C, C301D. Open: L301A, L301B, C301A, C301B, C302, R300, R301. Misaligned: Z301.
3	A	Same as step 1.	Defective: 7A8*. Shorted: C400*, C400A*, L300A, C300A. Open: L300A, L300B, C300A, C300B. 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 control to maximum. 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 this section. If the trouble is not revealed by the tests for this section, check the alignment.

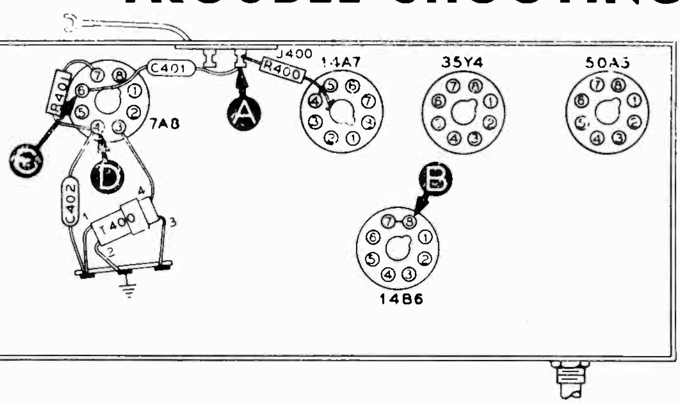
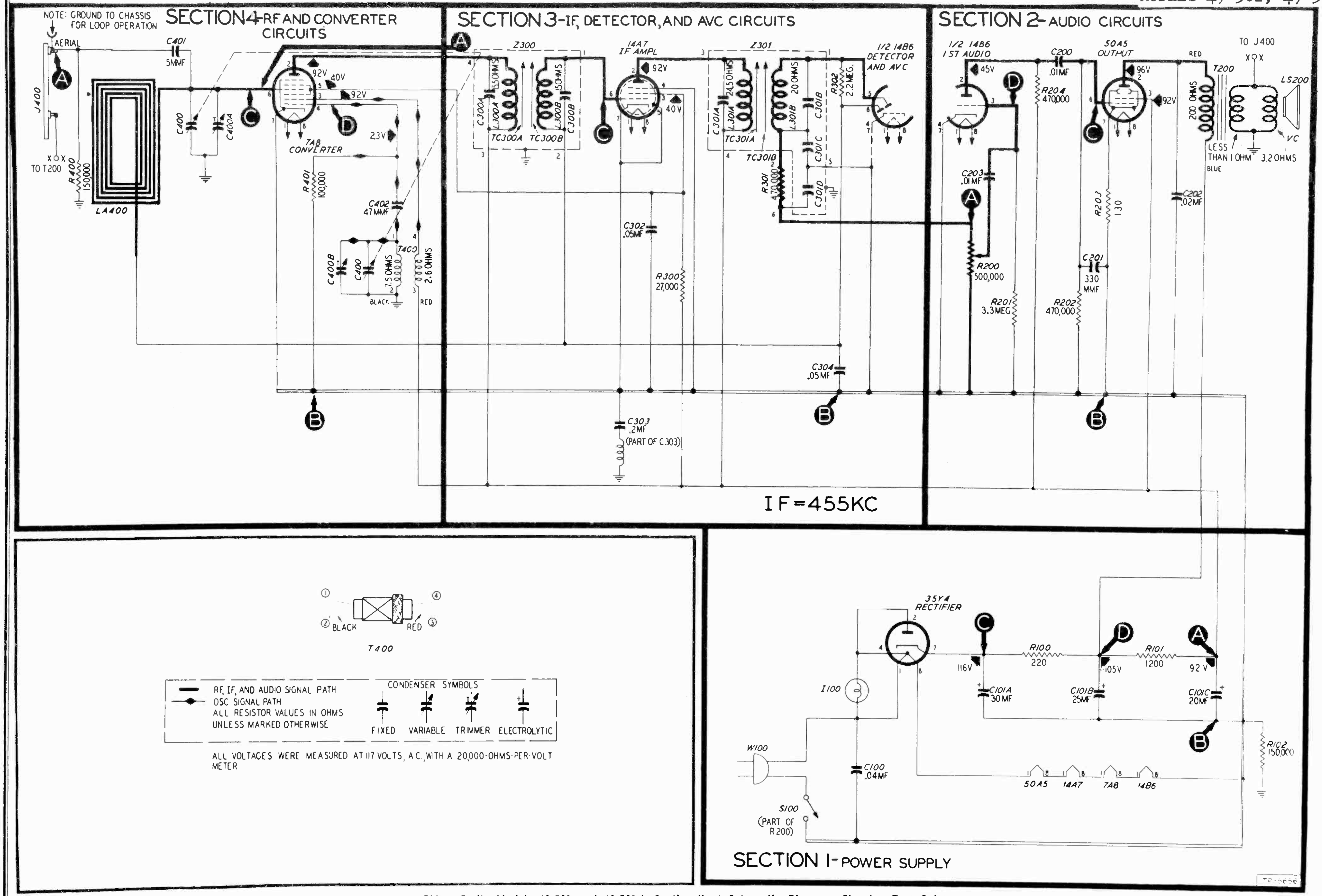


Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	1000 kc.	Clear speaker output with weak signal-generator input.	Trouble within this section. Isolate by the following tests.
2	D (Osc. test; see note below.)		Rotate through range.	Negative 8 to 10 volts.	Shorted: T400, C400, C400B. Open: C402, R401, T400. Defective: 7A8.
3	C	1000 kc.	1000 kc.	Same as step 1.	Defective: 7A8. Shorted: C400, C400A, LA400. Open: LA400.
4	A	1000 kc.	1000 kc.	Same as step 1.	Open: C401.

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 D. Proper operation of the oscillator is indicated by a negative voltage of the value given in the chart (measured with a 20,000-ohms-per-volt meter) throughout the tuning range.



Philco Radio Models 49-501 and 49-501-I, Sectionalized Schematic Diagram, Showing Test Points

MODELS 49-501,
49-501-I

PHILCO CORP.

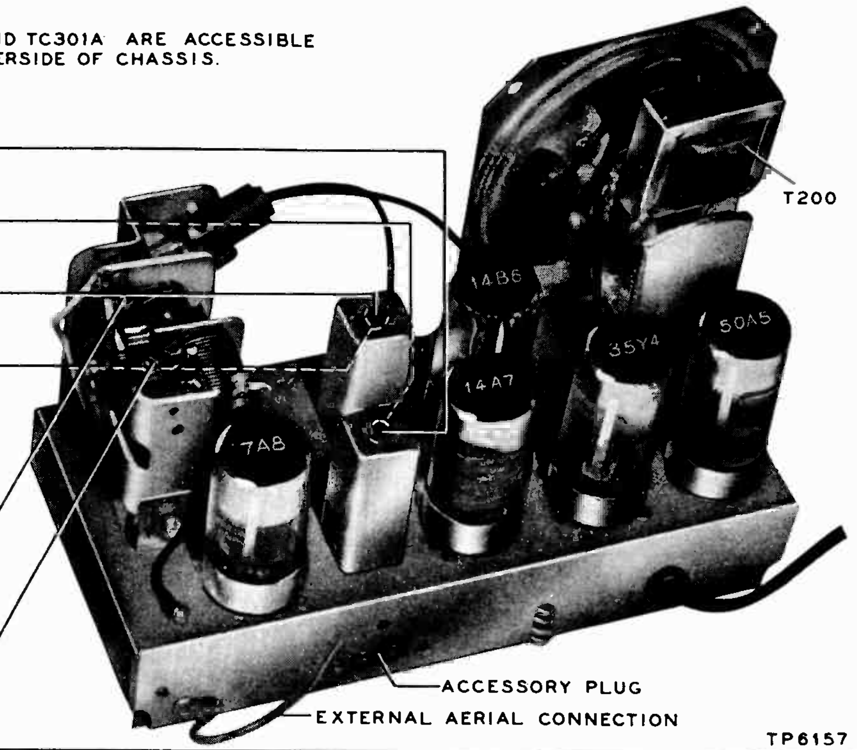
ALIGNMENT PROCEDURE

OUTPUT METER — Connect across voice-coil terminals.

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

RADIO CONTROLS—Set volume control to maximum, and rotate tuning control until tuning condenser is fully meshed.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	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.	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—Oscillator
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C400A—Aerial



RADIATING LOOP: Make up a 6 to 8 turn, 6-inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop aerial. The loop aerial must be connected.

Figure 6. Top View, Showing Trimmer Locations

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

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
I—pilot lamp
L—choke or coil
LA—loop aerial
LS—loud-speaker
R—resistor
S—switch
T—transformer
W—line-cord-and-plug assembly
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, detector, and a-v-c circuits.

400-series components are in Section 4—the r-f and converter circuits.

Circuit Description

Philco Radio Models 49-501 and 49-501-I are 5-tube, table-model superheterodynes, providing reception in the standard broadcast band.

A high-impedance loop aerial normally provides adequate signal pickup. An external aerial may be connected, if desired, by detaching the aerial lead from the chassis, and connecting it to the external aerial lead-in. Do not use a ground.

The loop aerial is coupled to the 7A8 converter. The aerial and oscillator circuits are tuned by ganged, variable condensers, and the oscillator rotor-section plates are properly shaped to obtain tracking, thus eliminating the necessity for a series padding condenser.

The 7A8 converter is transformer-coupled to the 14A7 i-f amplifier, which is also transformer-coupled to the diodes of the 14B6 second detector—first audio amplifier. A-v-c voltage is applied to the control grids of both the i-f amplifier and converter tubes. The triode section of the 14B6 is the first audio stage, and is resistance-coupled to the 50A5 output tube. The output tube is transformer-coupled to a permanent-magnet speaker.

D-c operating voltages are supplied from a 35Y4 half-wave rectifier, and filtered by a three-section resistor-condenser network.

Condenser C303 is a special condenser inductively wound to form a series-tuned circuit, resonant at the intermediate frequency. This condenser offers less impedance at this frequency than a conventional condenser, and thus permits higher i-f gain, with no tendency toward instability.

The 150,000-ohm resistor, R102, prevents hum which might otherwise occur under conditions of high humidity.

PHILCO CORP.

MODELS 49-501, 49-501-I

REPLACEMENT PARTS LIST—Continued

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .01 mf.	61-0120*
C201	Condenser, r-f by-pass, 330 mmf.	60-10335407*
C202	Condenser, tone compensation, .02 mf.	30-4599*
C203	Condenser, d-c blocking, .01 mf.	61-0120*
LS200	Speaker	36-1627
R200	Volume control, .5 megohm	45-5019*
R201	Resistor, grid return, 3.3 megohms	66-5333340*
R202	Resistor, grid return, 470,000 ohms	66-4473340*
R203	Resistor, cathode bias, 130 ohms	66-1123340*
R204	Resistor, plate load, 470,000 ohms	66-4473340*
T200	Transformer, output	Part of LS200

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

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed trimmer, primary, 1st i-f	Part of Z300
C300B	Condenser, fixed trimmer, secondary, 1st i-f	Part of Z300
C301A	Condenser, fixed trimmer, primary, 2nd i-f	Part of Z301
C301B	Condenser, fixed trimmer, secondary, 2nd i-f	Part of Z301
C301C	Condenser, a-v-c filter	Part of Z301
C301D	Condenser, a-v-c filter	Part of Z301
C302	Condenser, screen by-pass, .05 mf.	30-4519*
C303	Condenser, special i-f by-pass, .2 mf.	30-4644
C304	Condenser, a-v-c filter, .05 mf.	30-4519*
L300A	Coil, primary, 1st i-f	Part of Z300
L300B	Coil, secondary, 1st i-f	Part of Z300
L301A	Coil, primary 2nd i-f	Part of Z301
L301B	Coil, secondary, 2nd i-f	Part of Z301
R300	Resistor, screen dropping, 27,000 ohms	66-3273340*
R301	Resistor, diode load, 47,000 ohms	66-3473340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
TC300A	Tuning core, primary 1st i-f	Part of Z300
TC300B	Tuning core, secondary, 1st i-f	Part of Z300

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

Reference Symbol	Description	Service Part No.
TC301A	Tuning core, primary 2nd i-f	Part of Z301
TC301B	Tuning core, secondary, 2nd i-f	Part of Z301
Z300	Transformer, 1st i-f	32-4160-6*
Z301	Transformer, 2nd i-f	32-4240*

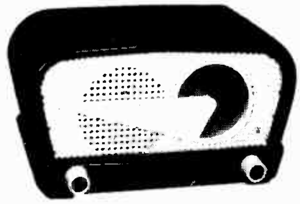
SECTION 4
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2731*
C400A	Condenser, trimmer, aerial	Part of C400
C400B	Condenser, trimmer, osc.	Part of C400
C401	Condenser, isolating, 5 mmf.	30-1223*
C402	Condenser, isolating, 47 mmf.	30-1224-2*
LA400	Aerial, loop	32-4052-19
R400	Resistor, isolating, 150,000 ohms	66-4153340*
R401	Resistor, grid return, 100,000 ohms	66-4103340*
T400	Coil, oscillator	32-4263

MISCELLANEOUS

Description	Service Part No.
Bracket, speaker	56-5653FA3
Cabinet (less scale)	
Model 49-501	10710
Model 49-501-I	10710A
Cabinet Hardware	
Back	
Model 49-501	54-7619
Model 49-501-I	54-7619-1
Baffle, speaker	54-4586
Fastener, cabinet back	2W2235-2FA9
Grille, metal	
Model 49-501	56-5769-FCP
Model 49-501-I	56-5769-1FCP
Knob	
Model 49-501	27-4815-3
Model 49-501-I	54-4118
Knob assembly	
Model 49-501	54-4581
Model 49-501-I	54-4581-1
Pilot-light assembly	27-6233-18
Scale, dial	
Model 49-501	54-5008
Model 49-501-I	54-5008-1
Speed fastener, baffle mounting	56-5857FE7
Speed fastener, baffle mounting	1W60211FE7
Socket, Loktal	27-6138*

MODEL 49-503 PHILCO CORP.



MODEL 49-503

SPECIFICATIONS

CABINET .... Plastic, ebony or green
CIRCUIT .... Five-tube superheterodyne
FREQUENCY RANGE .... 540 to 1620 kc.
AUDIO OUTPUT .... 1 watt
OPERATING VOLTAGE...... 105 to 125 volts, a.c./d.c.
POWER CONSUMPTION .... 30 watts
AERIAL............... Built-in high-impedance loop; provision for connecting an external aerial
INTERMEDIATE FREQUENCY .... 455 kc.
PHILCO TUBES (5).... 7A8, 14B6, 14A7, 50A5, 35Z5GT

Circuit Description

Philco Radio Model 49-503 is a five-tube superheterodyne, providing reception in the standard broadcast band. A built-in 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 this lead to an external aerial lead-in. Do not use a ground.

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

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

The triode section of the 14B6 is the first audio stage, and is resistance-coupled to a 50A5 output tube. The output tube is transformer-coupled to a permanent-magnet speaker.

D-c operating voltages are obtained from a 35Z5GT half-wave rectifier, the output of which is filtered by a two-section, resistor-condenser filter.

Condenser C304 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 high i-f gain with no tendency toward instability.

The 150,000-ohm resistor, R100, 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 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 shorter connections, burned resistors, or other obvious sources of trouble.

2. Measure the resistance between B+ (pin 7 of 35Z5GT) 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.

PHILCO CORP.

MODEL 49-503

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.

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.

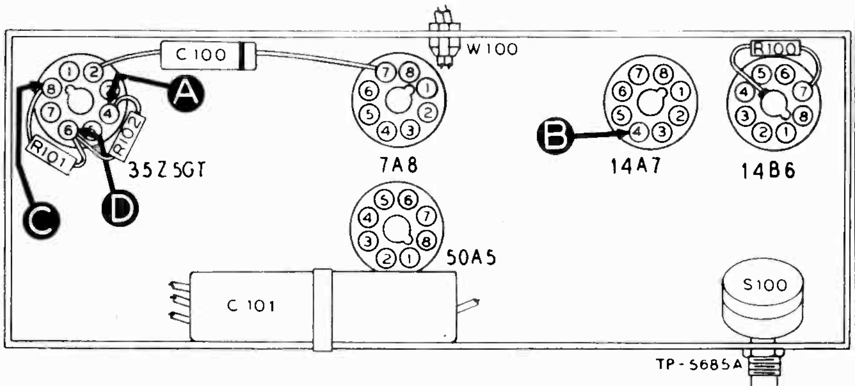


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	90 v.		Trouble within this section. Isolate by the following tests.
2	C	115 v.	No voltage. Low voltage. High voltage.	Defective: 35Z5GT. Open: S100, W100. Shorted: C101A. Leaky: C101A. Open: R101.
3	D	105 v.	No voltage. Low voltage. High voltage.	Shorted: C101B. Open: R101. Leaky: C101B. Shorted: C203.* Open: R102.
4	A	90 v.	No voltage. Low voltage. High voltage.	Shorted: C101C. Open: R102. Leaky: C101B, C101C. Open: R204.*
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.

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.

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.

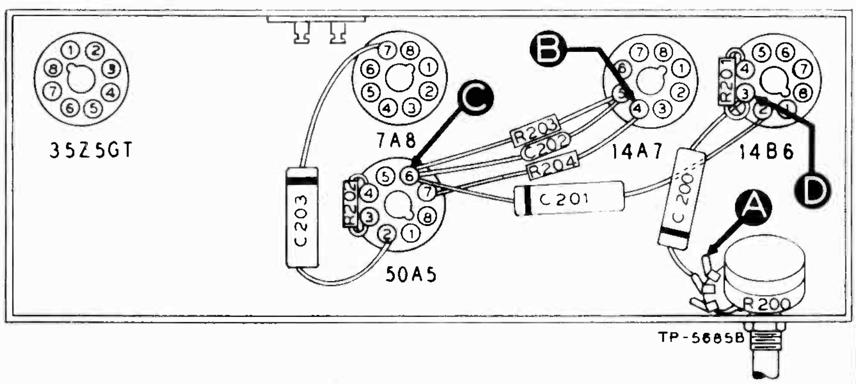


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 50A5, LS200. Shorted: C202, C203. Open: R204, T200.
3	D	Same as step 1.	Defective: 14B6. Shorted: C201. Open: R201, R202, C201.
4	A	Same as step 1.	Shorted: C200, C301D.* Open: R200 (rotate through range).

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

MODEL 49-503 PHILCO CORP.

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 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.

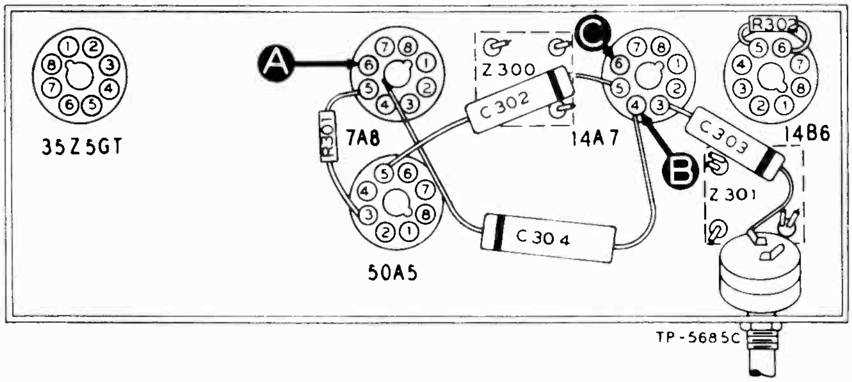


Figure 3. Bottom View, Showing Section 3 Test Points

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 weak generator input.	Trouble within this section. Isolate by the following tests.
2	C	Same as step 1.	Defective: 14A7, 14B6. Shorted: C303, Z300, Z301. Open: R301, Z300, Z301. Misaligned: Z301.
3	A	Same as step 1.	Defective: 7A8.* 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, 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 this section. If the trouble is not revealed by the tests for this section, check the alignment.

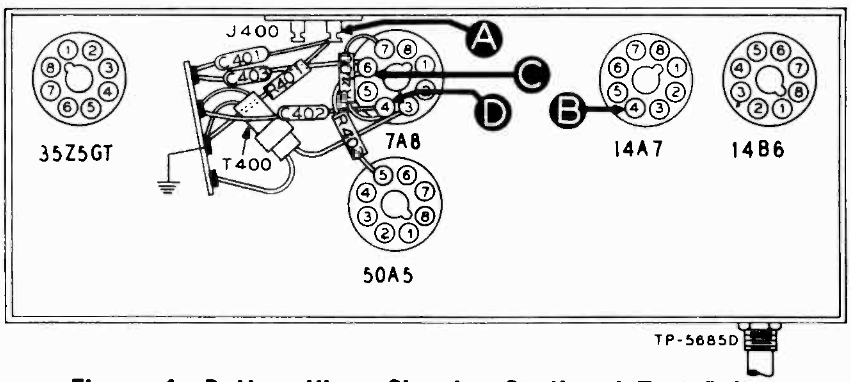


Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIG. GEN. FREQ.	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	1000 kc.	Loud, clear speaker output with weak generator input.	Trouble within this section. Isolate by the following tests.
2	D (Osc. test; see note below.)		Rotate through range.	Negative 7 to 10 volts.	Defective: 7A8. Shorted: C400, C402, C400B. Open: T400, C402, R400.
3	C	1000 kc.	1000 kc.	Same as step 1.	Defective: 7A8. Shorted: C400, C400A, C403.
4	A	1000 kc.	1000 kc.	Same as step 1.	Open: C401, C403. Shorted: 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 4 of 7A8), test point D. 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.

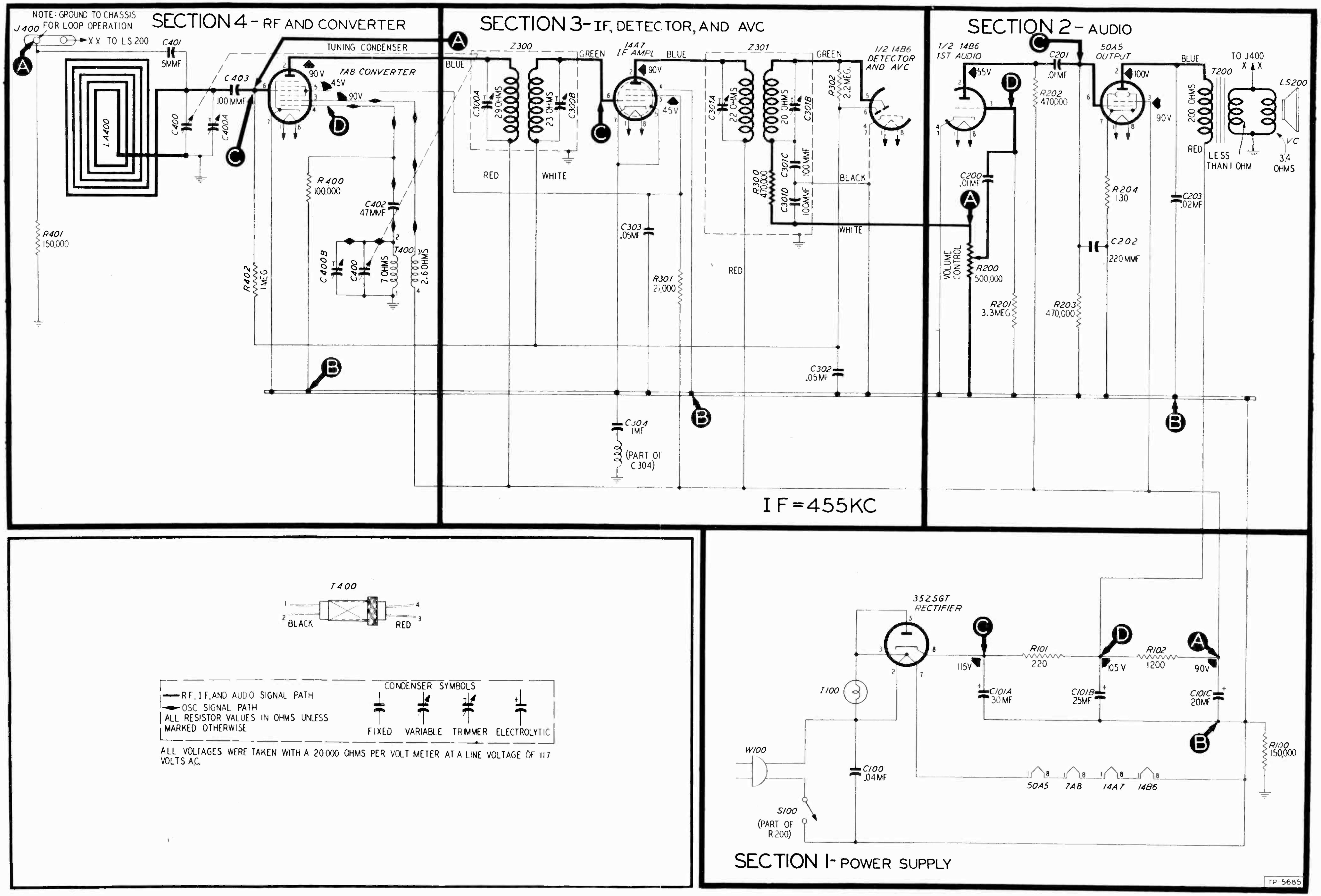


Figure 5. Philco Radio Model 49-503, Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

DIAL—With tuning condenser fully meshed, set pointer to index dot located to left of 55.

OUTPUT METER—Connect one lead to pin on left-hand side of plug at rear of chassis; connect other lead to B—.

SIGNAL GENERATOR—Connect generator ground lead to B—; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS—Set volume control to maximum.

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

STEP	SIGNAL GENERATOR: CONNECTION TO RADIO	SIGNAL GENERATOR: DIAL SETTING	RADIO: DIAL SETTING	RADIO: SPECIAL INSTRUCTIONS	ADJUST
1	Through .1-mf. condenser to pin 6 of 7A8.	455 kc.	540 kc.	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.
2	Through 100-mmf. condenser to external aerial connector. (External aerial connector must be disconnected from chassis.)	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

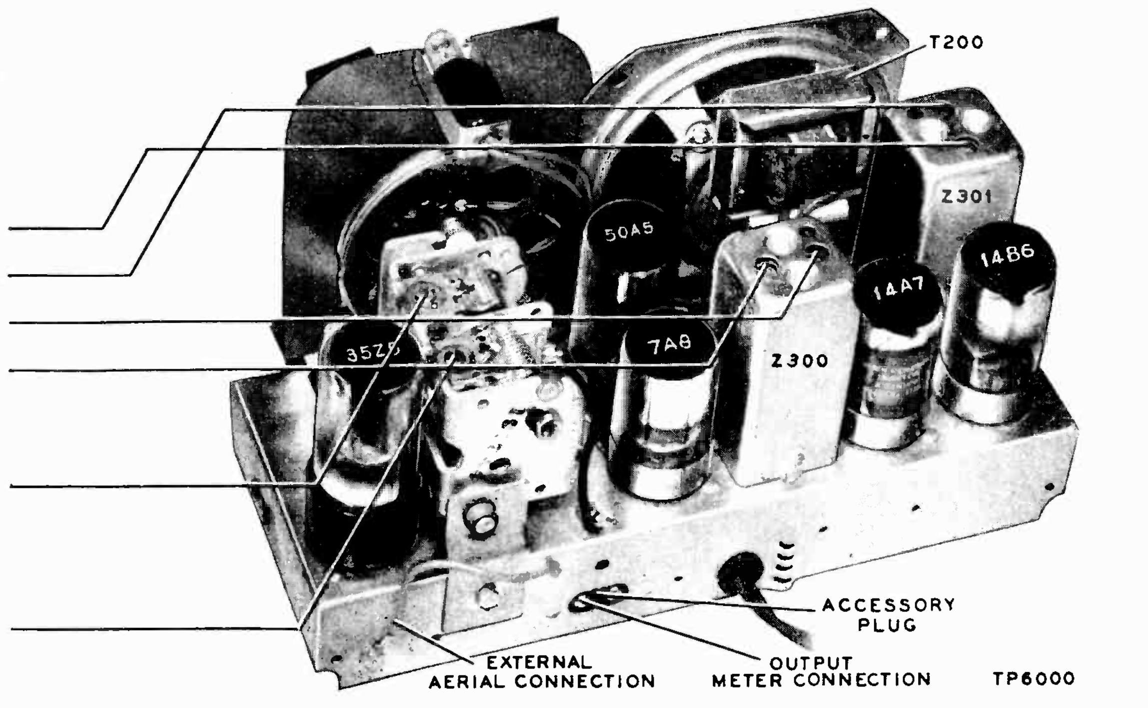


Figure 6. Top View, Showing Trimmer Locations

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	W—line cord
	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, detector, and a-v-c circuits.

400-series components are in Section 4—the r-f and converter circuits.

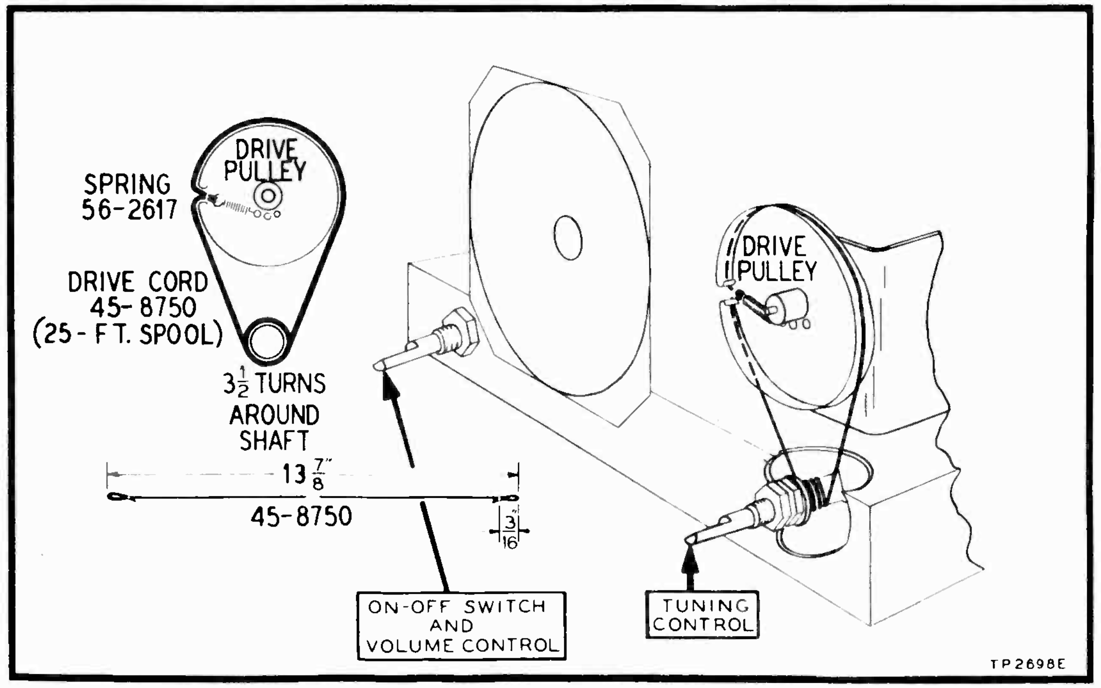


Figure 7. Drive-Cord Installation Details

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	30-2573
C101A:	Condenser, filter, 30 mf., 150 v.	Part of C101
C101B:	Condenser, filter, 25 mf., 150 v.	Part of C101
C101C:	Condenser, filter, 20 mf., 150 v.	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, on-off	Part of R200
W100	Line cord and plug	L-2183*

SECTION 2—AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, blocking, .01 mf.	61-0120*
C201	Condenser, d-c blocking, .01 mf.	61-0120*
C202	Condenser, parasitic suppressor, 220 mmf.	62-122001001*
C203	Condenser, tone compensation, .02 mf.	61-0108*
LS200	Speaker	36-1614
R200	Volume control (with power switch), 500,000 ohms	33-5429
R201	Resistor, grid return, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*
R204	Resistor, cathode bias, 130 ohms	66-1133340*
T200	Output transformer	Part of LS200

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

Reference Symbol	Description	Service Part No.
C300A	Condenser, trimmer, 1st i-f primary	Part of Z300
C300B	Condenser, trimmer, 1st i-f secondary	Part of Z300
C301A	Condenser, trimmer, 2nd i-f primary	Part of Z301
C301B	Condenser, trimmer, 2nd i-f secondary	Part of Z301
C301C	Condenser, by-pass, 100 mmf.	Part of Z301
C301D	Condenser, by-pass, 100 mmf.	Part of Z301
C302	Condenser, a-v-c by-pass, .05 mf.	61-0122*
C303	Condenser, screen by-pass, .05 mf.	61-0122*
C304	Condenser-and-choke assembly, .1 mf.	30-4644-1
R300	Resistor, diode load, 470,000 ohms	66-4473340*
R301	Resistor, screen dropping, 27,000 ohms	66-3273340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
Z300	Transformer, 1st i-f	32-3967
Z301	Transformer, 2nd i-f	32-3952

SECTION 4—R-F AND CONVERTER CIRCUITS

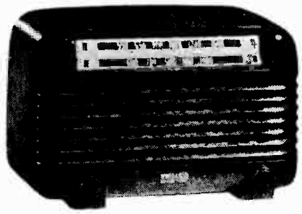
Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2727-1
C400A:	Condenser, trimmer, aerial	Part of C400
C400B:	Condenser, trimmer, oscillator	Part of C400
C401	Condenser, aerial isolating, 5 mmf.	30-1224-5
C402	Condenser, isolating, 47 mmf.	30-1224-2
C403	Condenser, blocking, 100 mmf.	60-10105407*
LA400	Aerial, high-impedance loop	32-4052-11
R400	Resistor, grid return, 100,000 ohms	66-4103340*
R401	Resistor, aerial discharge, 150,000 ohms	66-4153340*
R402	Resistor, grid return, 1 megohm	66-5103340*
T400	Transformer, oscillator	32-4263

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Parts	
Back-and-clip assembly	76-4268
Baffle and cloth	40-6945
Cabinet, ebony	10690B
Cabinet, green	10690A
Grille, plastic	54-4506-3
Knob assembly, ebony (2 required)	54-4486-4
Knob assembly, green (2 required)	54-4486-3
Shaft assembly	31-2718
Window, acetate	54-4504
Window fastener (4 required)	56-6161FE7
Dial-Scale Hardware	
Drive cord (25-ft. spool)	45-8750*
Fastener, speed	56-5028FA9
Pointer	54-4505
Scale	27-5978-2
Spring	56-2617
Pilot-lamp-socket assembly	76-1280
Socket, Loktal	27-6138
Socket, octal	27-6174

MODELS 49-504,
49-504-I

PHILCO CORP.



MODEL 49-504 (Walnut)
MODEL 49-504-I (Ivory)

Circuit Description

The Philco Radio Model 49-504 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 need 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 50A5 output stage. The output tube is transformer-coupled to the permanent-magnet dynamic speaker.

D-c operating voltages are obtained from the 35Z5GT 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 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.

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, 50A5, 35Z5GT

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 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 8 of the 35Z5GT 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 C101C for leakage or shorts. The 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 (power supply) are performed.

PHILCO CORP.

MODELS 49-504, 49-504-I

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.

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.

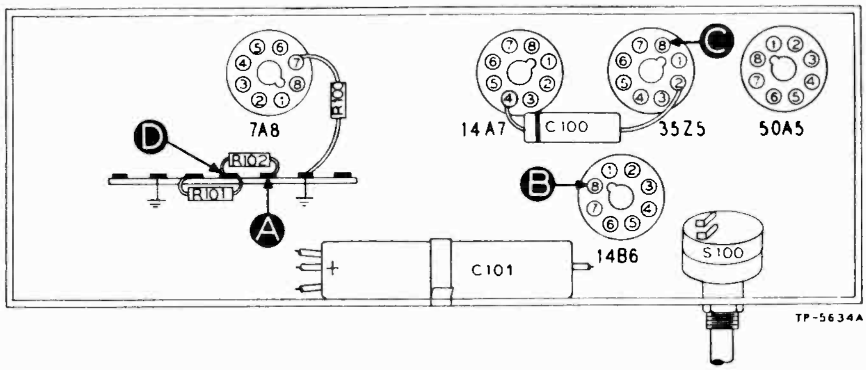


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	107v		Trouble within this section. Isolate by the following tests.
2	C	130v	No voltage Low voltage High voltage	Defective: 35Z5GT, S100, W100. Shorted: C101A. Defective: 35Z5GT. 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 — Audio Circuits

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 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

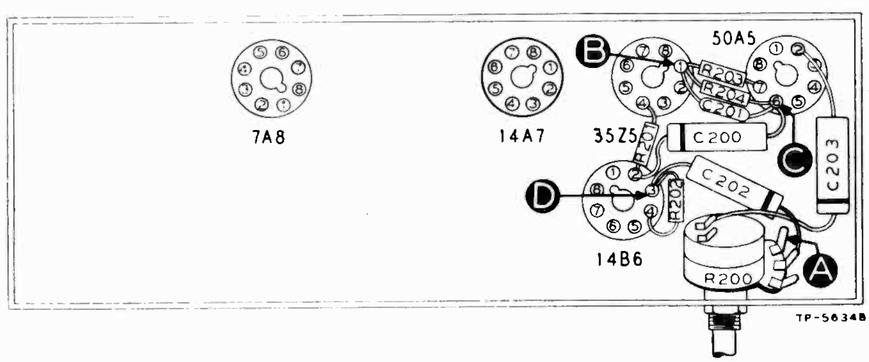


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble 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: 50A5.
3	D	Same as step 1.	Open: R201, R202, R204. Open, shorted, or leaky: C200. Defective: 14B6.
4	A	Same as step 1.	Open: R200 (rotate through entire range). Open, shorted, or leaky: C202. Shorted: C301D*.

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

MODELS 49-504, 49-504-I

PHILCO CORP.

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.

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.

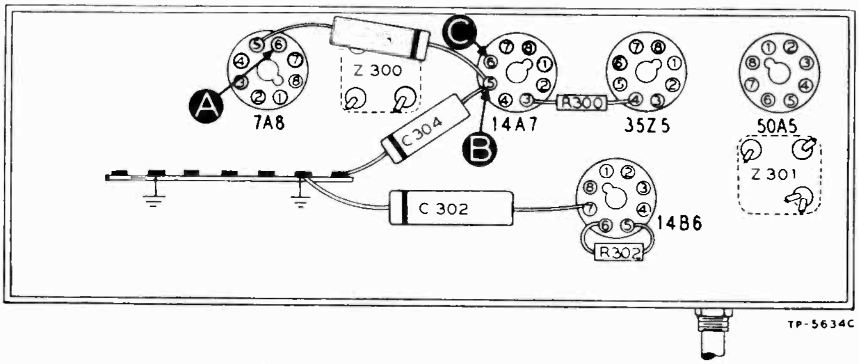


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

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 — 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 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.

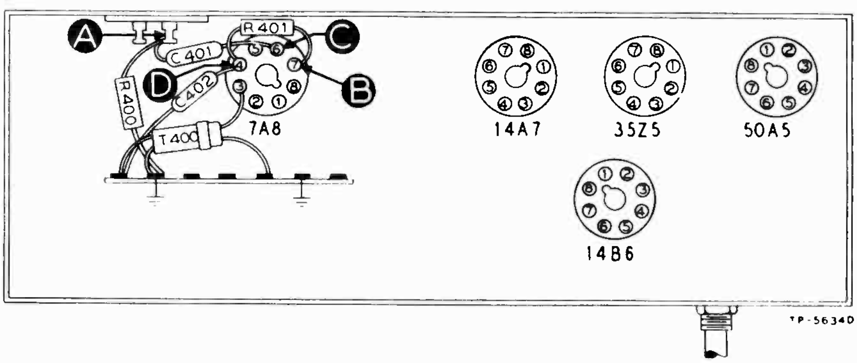


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS

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	D (Osc. 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.

PHILCO CORP.

MODELS 49-504, 49-504-I

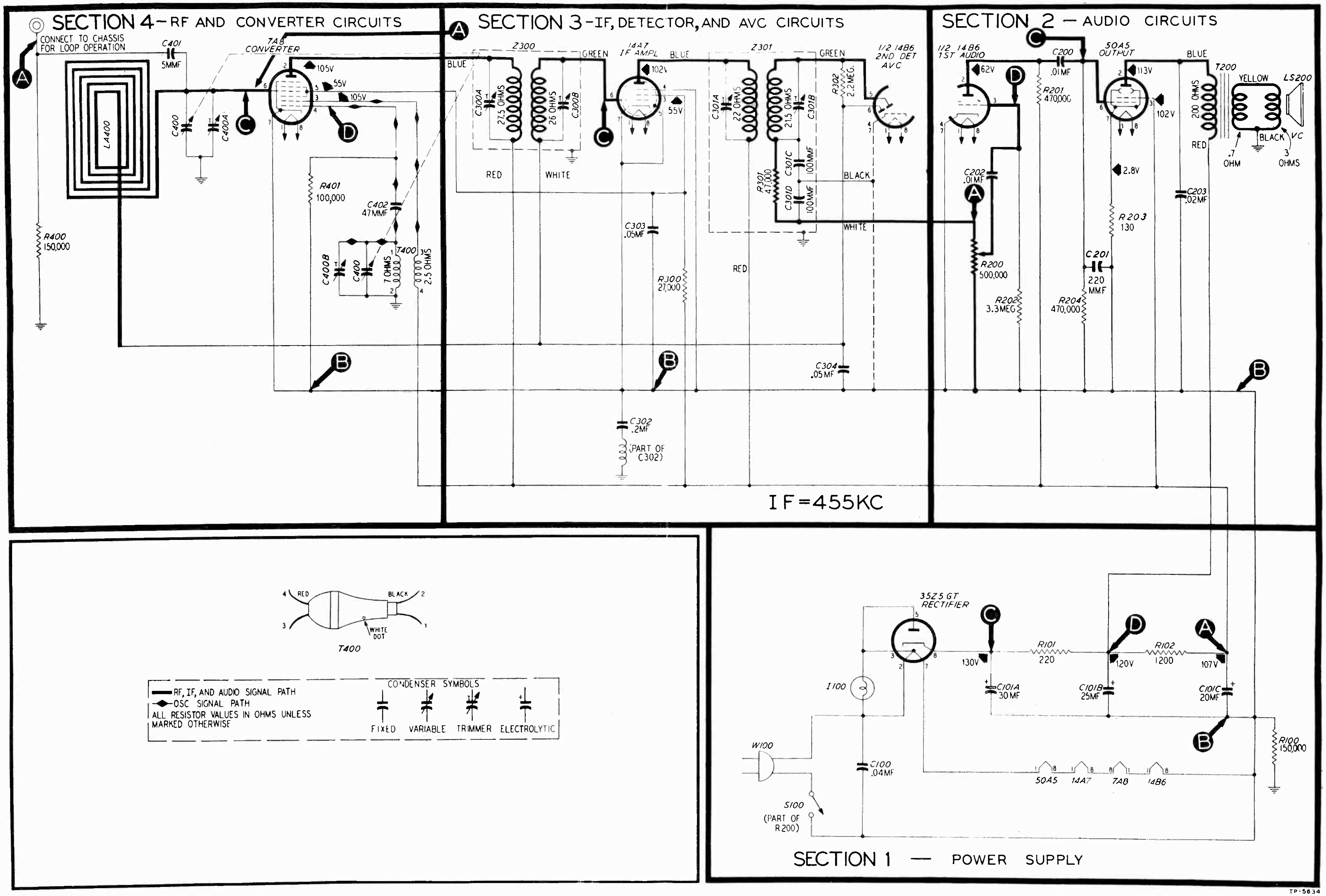


FIGURE 5. PHILCO RADIO MODELS 49-504 AND 49-504-I, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

MODELS 49-504,
49-504-I

PHILCO CORP.

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) plug of terminal jack and chassis, as 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 pin 6 of 7A8 converter.	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.	C400B
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.

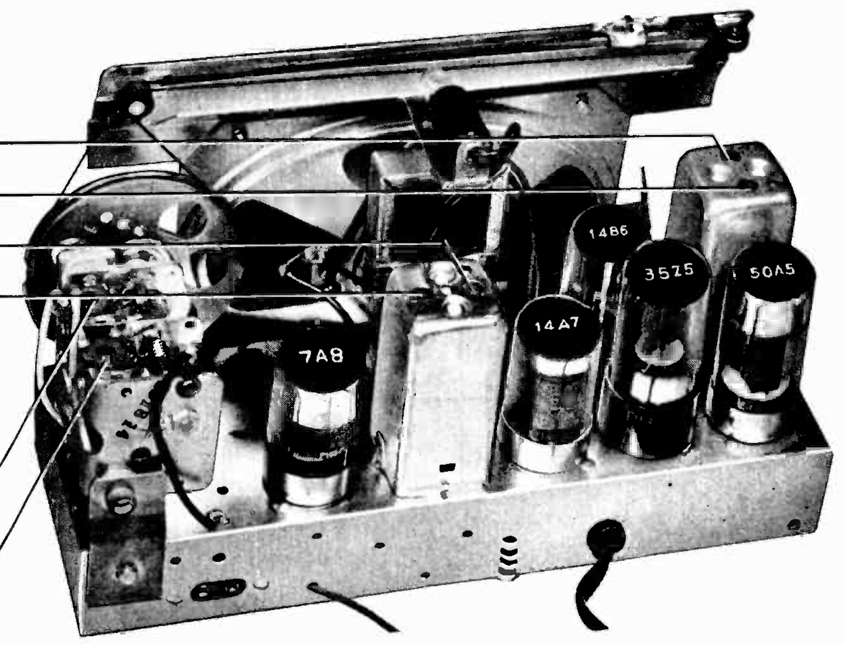


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FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS

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, detector, and a-v-c circuits.

400-series components are in Section 4—the r-f and converter circuits.

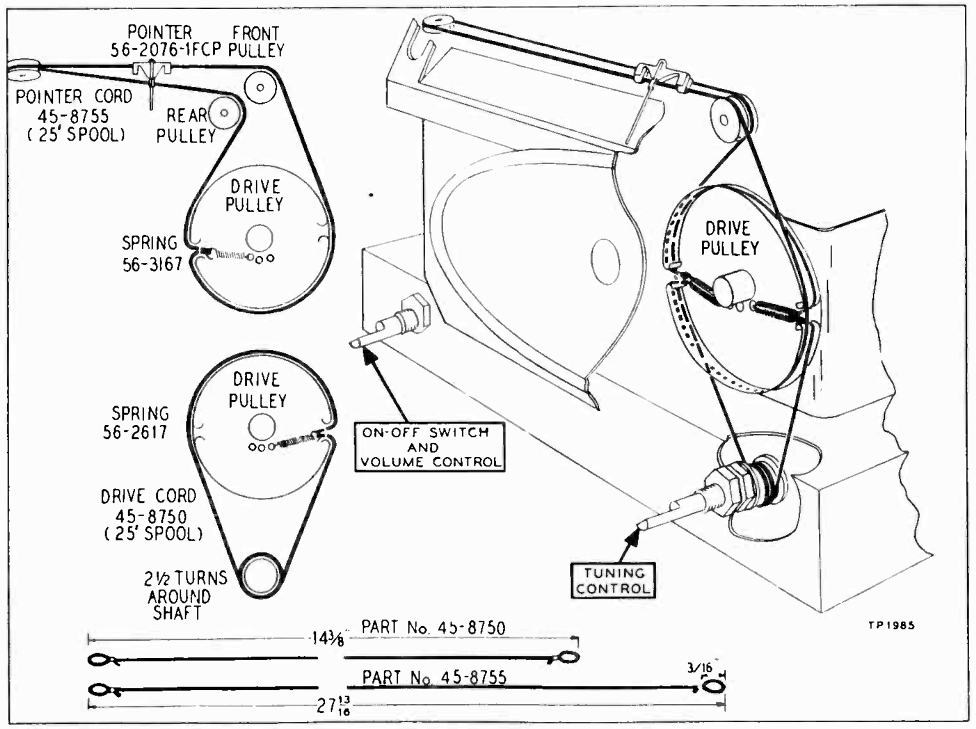


FIGURE 7. DRIVE-CORD INSTALLATION DETAILS

PHILCO CORP.

MODELS 49-504, 49-504-I

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, 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

AUDIO CIRCUITS

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	45-5019*
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

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
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 C300B	32-3968
Z301	Transformer, 2nd i-f, including C301A, C301B, C301C, C301D, and R301	45-6365*

SECTION 4

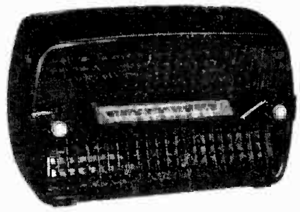
R-F AND CONVERTER CIRCUITS

Reference 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*
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	32-4263

MISCELLANEOUS

Description	Service Part No.
Cabinet	
Model 49-504 (less scale)	10524P
Model 49-504-I (less scale)	10524R
Cabinet Hardware	
Back	
Model 49-504	27-9817
Model 49-504-I	27-9870
Knob assembly	
Model 49-504	54-4052
Model 49-504-I	27-4805
Scale, dial	
Model 49-504	27-5907
Model 49-504-I	27-5908
Scale strap	56-2059FA3
Screw	1W23129FA3
Stud, back mounting (4)	W2235FA9
Dial Backplate and Associated Hardware	
Cord, drive (pointer)	45-8755
Cord, drive (gang)	45-8750
Dial-backplate assembly	
Model 49-504	76-1476
Model 49-504-I	76-1192
Diffusing panel, Model 49-504-I	54-4343
Light reflector, Model 49-504	27-9816-1*
Pointer	56-2076-1
Spring	
Gang drive cord	56-2617
Pointer drive cord	56-3167
Spring clip, diffusing screen, Model 49-504-I	56-3587
Pilot-lamp assembly	76-2142
Shaft, assembly	31-2663
Socket, tube	
Loktal	27-6138*
Octal	27-6174

MODEL 49-505 PHILCO CORP.



MODEL 49-505

Circuit Description

The Philco Radio, Model 49-505, 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 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 50A5 output stage. The output tube works into a 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 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. 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.

SPECIFICATIONS

CABINET	Plastic (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; connection also provided for outside aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8, 14A7, 14B6, 50A5, 35Y4

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 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 condensers C101A, C101B, and C101C for leakage or shorts.

The 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 (power supply) are performed.

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.

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.

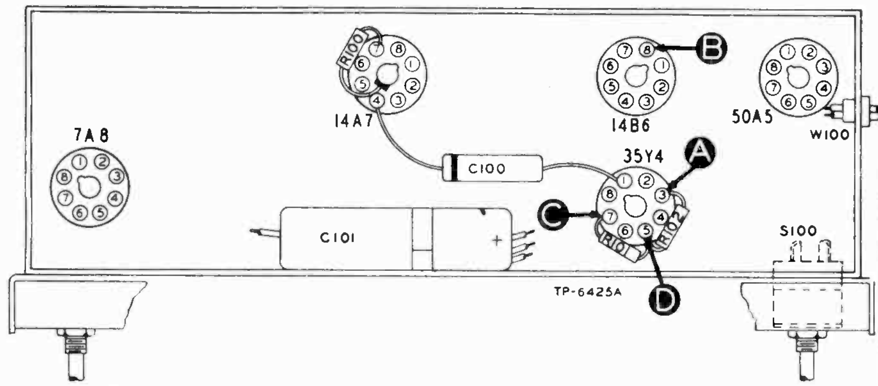


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	107 volts		Trouble within this section. Isolate by the following tests.
2	C	130 volts	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	120 volts	No voltage Low voltage High voltage	Shorted: C101B. Open: R101. Shorted: C203*. Leaky: C101B, C203*. Open: R102, R203*, T200*.
4	A	107 volts	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—Audio Circuits

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 (i-f, detector, and a-v-c circuits). If not, isolate and correct the trouble in this section.

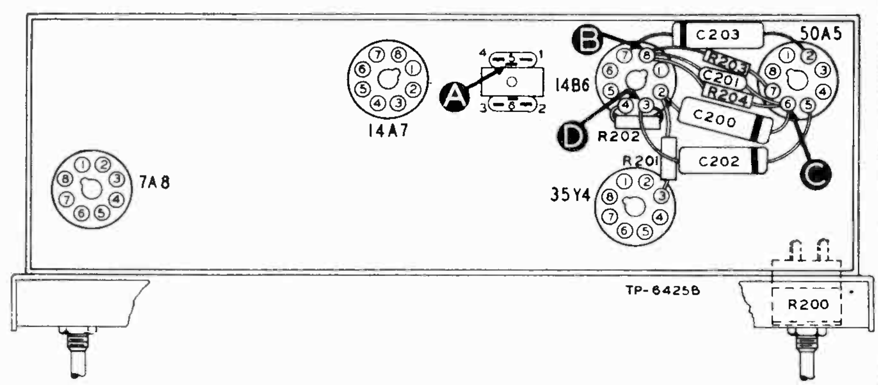


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Open or shorted: LS200, T200. Shorted: C201, C203. Open: R203. Defective: 50A5.
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 abnormal indication in this section.

MODEL 49-505 PHILCO CORP.

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 radio volume control 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.

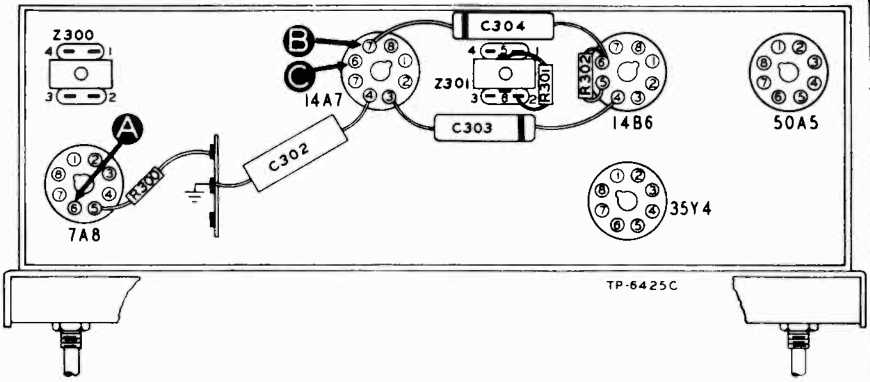


Figure 3. Bottom View, Showing Section 3 Test Points

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.	Misaligned: Z301. Defective: 14B6 (diode section), 14A7. Open: R300, C302. Shorted, leaky, or open: C303, Z301.
3	A	Same as step 1.	Defective or misaligned: Z300. Defective: 7A8*. Open: C302, LA400*, Z300. Shorted: 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 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.

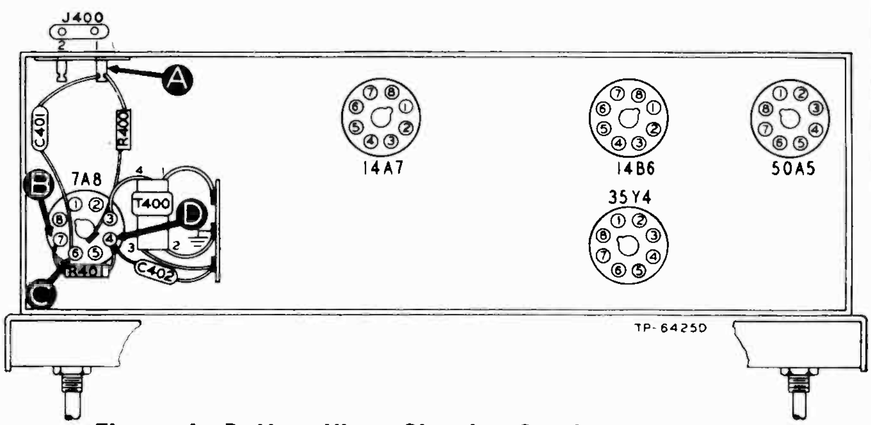


Figure 4. Bottom View, Showing Section 4 Test Points

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: 7A8. Open or shorted: C402, T400. 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.

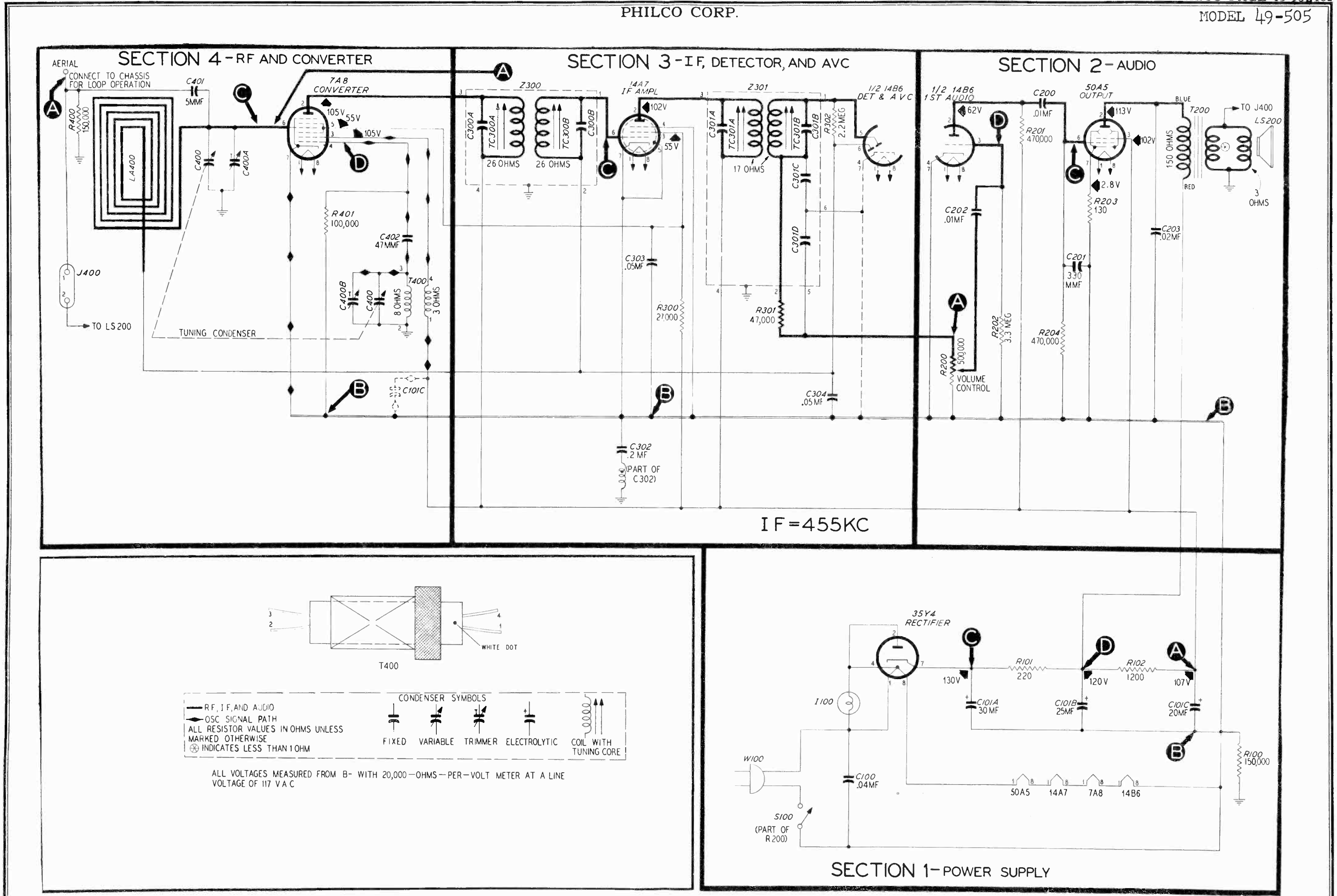


Figure 5. Philco Radio Model 49-505, Sectionalized Schematic Diagram, Showing Test Points

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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; see figure 7.

OUTPUT METER—Connect to left (output) terminal of J400 and chassis.

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

OUTPUT LEVEL—During alignment, adjust signal-generator output to hold 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	Ground lead to B−; output lead through .1-mf. condenser to test point C of Section 4.	455 kc.	540 kc.	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 for maximum.	C400B—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C400A—aerial

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.

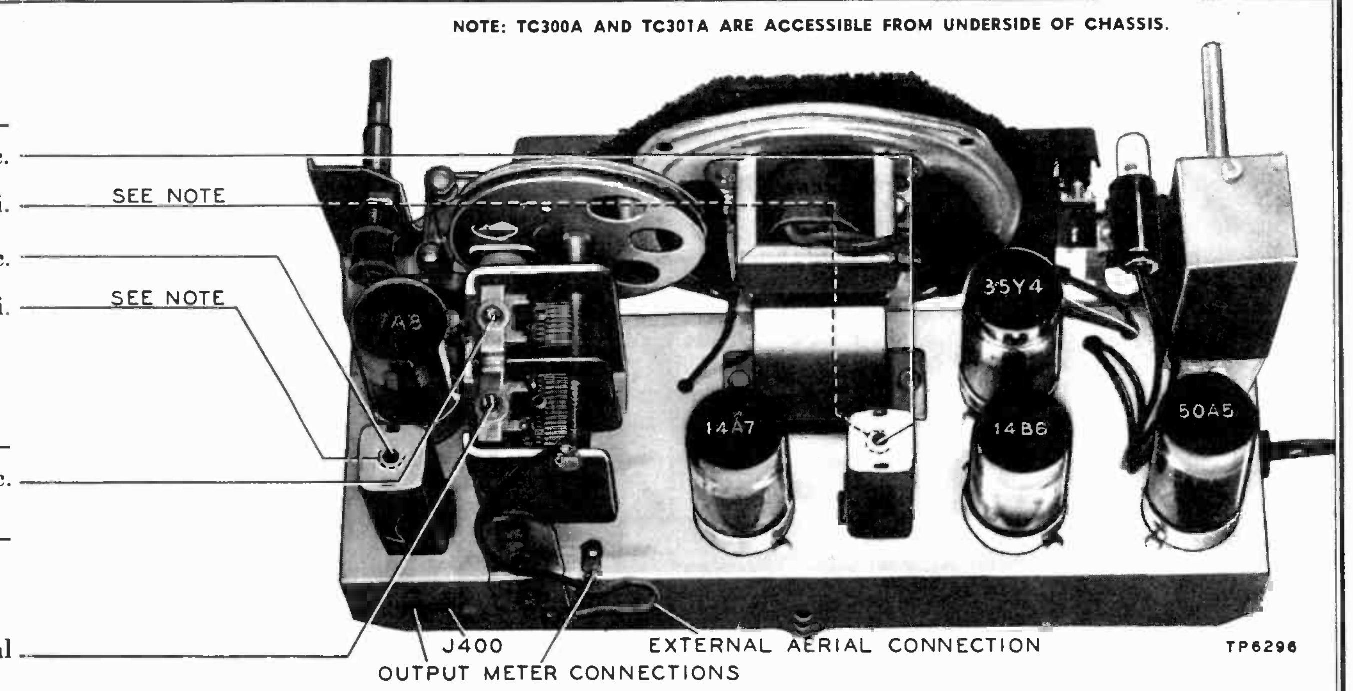

Figure 6. Top View, Showing Trimmer Locations

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, detector, and a-v-c circuits.
400-series components are in Section 4—the r-f and converter circuits.

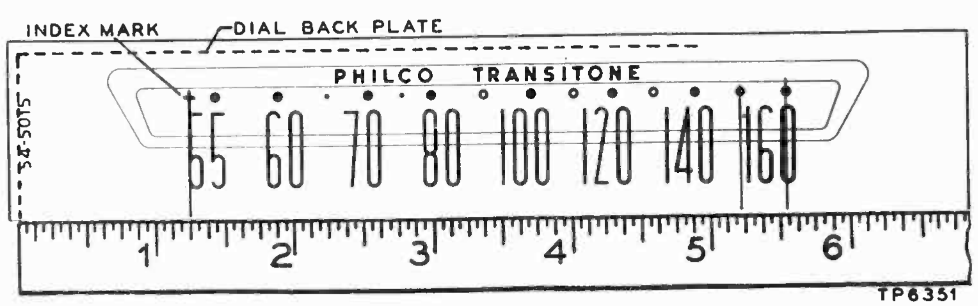

Figure 7. Calibration Measurements for Dial Backplate

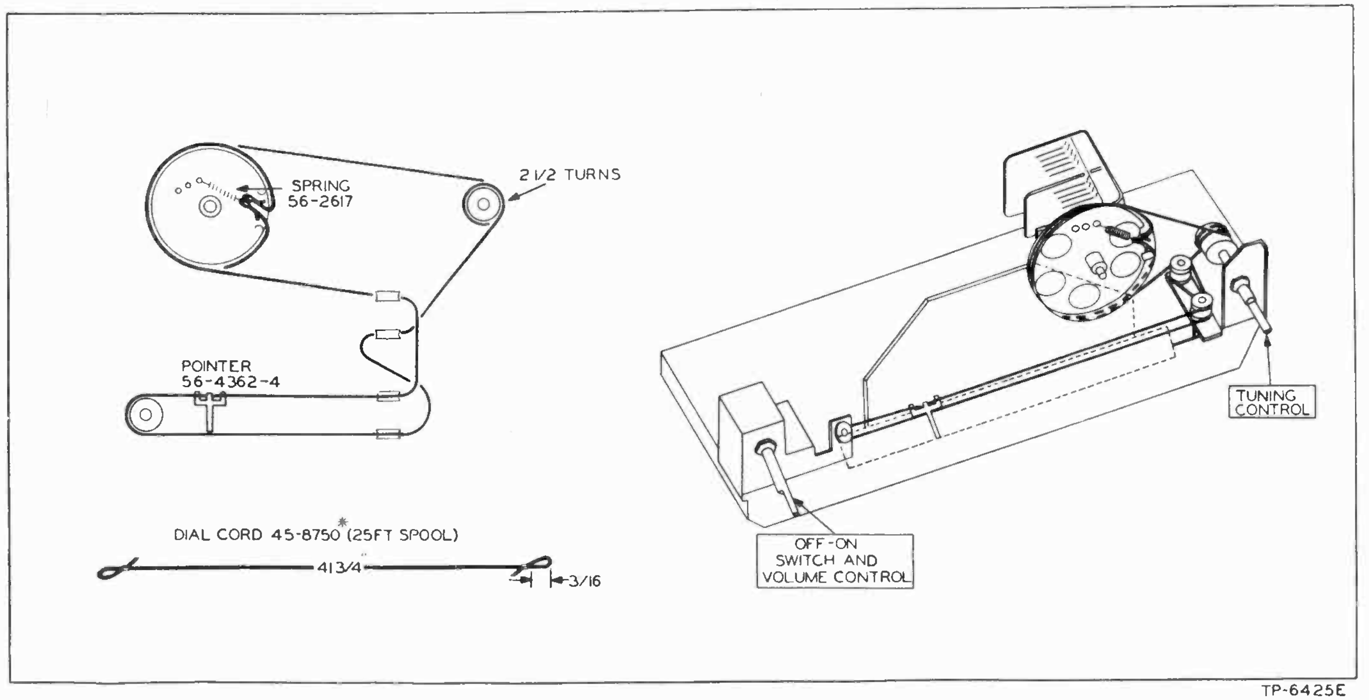

Figure 8. Drive-Cord Installation Details

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MODEL 49-505

REPLACEMENT PARTS LIST

NOTE: An asterisk (*) indicates a general replacement item. The part numbers of these items may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values given 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, 3-section	30-2574*
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	66-2124340
S100	Switch, power	Part of R200
W100	Power cord and plug	L-2183*

SECTION 2—AUDIO

Reference Symbol	Description	Service Part No.
C200	Condenser, blocking, .01 mf	61-0120*
C201	Condenser, by-pass, 330 mmf	62-133001001*
C202	Condenser, blocking, .01 mf	61-0120*
C203	Condenser, tone compensating, .02 mf	61-0108*
LS200	Speaker	36-1625-6
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—I-F, DET., AND A-V-C

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
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	66-3473340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
TC300A	Tuning core	Part of Z300

SECTION 3—I-F, DET., AND A-V-C (Continued)

Reference Symbol	Description	Service Part No.
TC300B	Tuning core	Part of Z300
TC301A	Tuning core	Part of Z301
TC301B	Tuning core	Part of Z301
Z300	Transformer, 1st i-f, including TC300A, TC300B, C300A, and C300B	32-4160-6
Z301	Transformer, 2nd i-f, including TC301A, TC301B, C301A, C301B, C301C, and C301D	32-4240

SECTION 4—R-F AND CONVERTER

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
C401	Condenser, coupling, 5 mmf	30-1224-5*
C402	Condenser, isolating, 47 mmf	30-1224-2*
LA400	Loop aerial	32-4052-24
R400	Resistor, aerial discharge, 150,000 ohms	66-4153340*
R401	Resistor, oscillator grid, 100,000 ohms	66-4103340*
T400	Transformer, oscillator	32-4263

MISCELLANEOUS

Description	Service Part No.
Baffle-and-cloth assembly	40-7525
Bracket, rear condenser mounting	56-5701FA3
Bracket, scale	56-5698FA3
Cabinet	10717
Cord, drive (25-foot spool)	45-8750*
Cover, bottom	56-5706FA3
Cover, handle	54-4596
Cover, volume control	56-5699FA3
Knob	54-4609
Pilot-lamp-socket assembly	27-6233-12
Plate, guard	54-7709
Pointer	56-4362-4FCP
Rail, pointer	56-5697FCP
Rubber mount	27-4771-1
Scale-and-backplate assembly	76-4167
Shaft assembly, drive	78-4075
Socket, tube	27-6177
Spring	56-2617
Stud, baffle	W2235-1FA9

Circuit Description

Philco Model 49-602 is a portable four-tube superheterodyne providing reception on the standard-broadcast band. A high-impedance loop within the cabinet normally provides adequate signal pickup. However, provisions have been made for connecting an external aerial, if required.

The aerial circuit works directly into a 1R5 converter, where the incoming signal is converted to the 455-kc. intermediate frequency. A 1T4 is used in a single high-gain stage of i-f amplification, which employs neutralization to suppress oscillation. A 1.5-mmf. condenser, C304, feeds part of the i-f voltage, of the proper phase, back to the 1T4 grid through the tube-socket capacitance.

A 1U5 diode-pentode is used in the detector, a-v-c, and first audio circuits. The pentode section is resistance-coupled to a 3V4 pentode output amplifier, which works into a p-m speaker.

The d-c operating voltages are obtained from either a battery pack, Philco type P-361, or from a 105—120 volt, a-c or d-c power line. For power-line operation, the plate, screen, and filament voltages are provided by a power supply using a selenium rectifier, CR100.

SPECIFICATIONS

CABINET	Molded Polystyrene (maroon, tan, ivory or green)
CIRCUIT	Four-tube superheterodyne
FREQUENCY RANGE	540—1600 kc.
AUDIO OUTPUT	160 milliwatts
OPERATING VOLTAGES	Battery: "B", 90 volts; "A", 7.5 volts. A.c./d.c.: 105—120 volts
POWER CONSUMPTION	Battery: "B", 13 ma. at 90 volts; "A", 50 ma. at 7.5 volts. A.c./d.c.: 25 watts
AERIAL	Built-in high-impedance loop: terminal also provided for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (4)	1R5, 1T4, 1U5, 3V4
BATTERY TYPE	Philco P-361

TP-4523

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 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. Check the total filament resistance, with the power switch turned on, the battery 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 plug is higher than 100 ohms, one of the tube filaments is probably open.

NOTE: If the 3V4 filament is open, check condenser C202 before replacing the tube.

3. Measure the resistance between B+ (output of selenium rectifier), test point D, and B—, test point B. See figure 1. When the ohmmeter leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 2000 ohms, check condensers C101A and C101B for leakage or shorts.

The resistance value above, 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.

TROUBLE SHOOTING

Section 1—Power Supply

Make the tests for this section wi h 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.

The battery pack should be replaced when the "A" voltage drops below 5 volts, or the "B" voltage drops below 60 volts.

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.

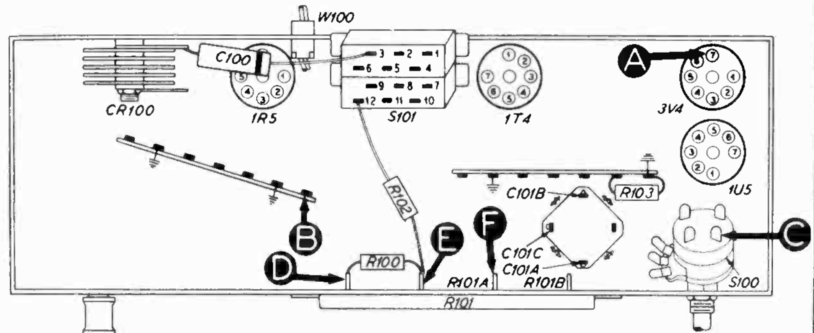


Figure 1. Bottom View, Showing Section 1 Test Points TP-5355A

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a) 1(b)	A C	7.5v 90v		Trouble in this section. Isolate by the following tests.
2	D	125v	Low voltage No voltage	Defective: CR100. Open C101A. Defective: CR100. Open: S100, S101.
3	E	120v	Low voltage No voltage	Changed resistance: R100. Leaky: C101A. Open: R100. Shorted: C101A.
4	F	65v	Low voltage No voltage	Changed resistance: R101A. Leaky: C101B. Open: R101A. Shorted: C101B.
5	A	7.5v	Low voltage High voltage No voltage	Changed resistance: R101B. Open: One or more filaments, R205*. Open: R101B, S101.
6	C	90v	Low voltage High voltage No voltage	Changed resistance: R102. Leaky: C101C. Open: R205*, T200*, S100. Open: R102, S101. Shorted: C101C.
Listening Test: Abnormal hum may be caused by open C101B, C101C, or C202*.				

*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 radio volume control 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.

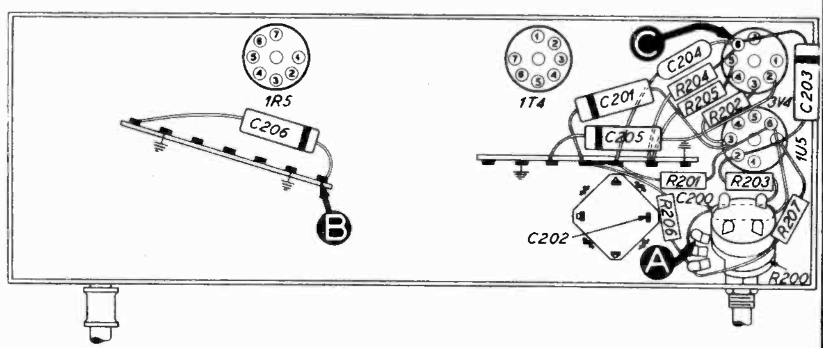


Figure 2. Bottom View, Showing Section 2 Test Points TP-5355B

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	Clear speaker output with strong generator input.	Defective: 3V4, LS200. Open: R204, T200. Shorted: C203, C204, C205, T200.
3	A	Same as step 1.	Defective: 1U5, R200 (rotate). Open: C200, R201, R202, R203, C203. Shorted: C201, C301C*.
Listening Test: Distortion may be caused by leaky or shorted C203, or by changed resistance of R202. Distortion or strong signals may be caused by leaky or shorted C200.			

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

MODEL 49-602 PHILCO CORP.

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 radio volume control 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.

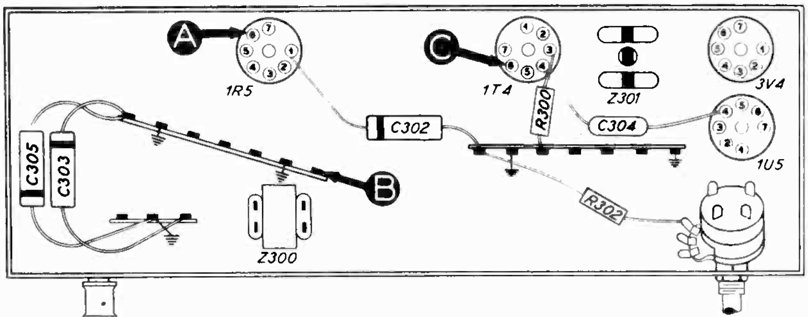


Figure 3. Bottom View, Showing Section 3 Test Points TP-5355C

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."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with moderate input.	Defective: 1T4, 1U5 (diode section). Misaligned: Z301. Open: R300, C303, L301A, R301, L301B, C301A. Shorted: C300B, C303, L301A, L301B, C301A, C301B.
3	A	Same as step 1.	Defective: 1R5*. Misaligned: Z300. Open: C300A, L300A, L300B, C300B, T400*. Shorted: C400A*, C400B*, C300A, L300A, L300B, C300B.

*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 radio volume control to maximum. Set the tuning control and signal-generator frequency as indicated in the chart.

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

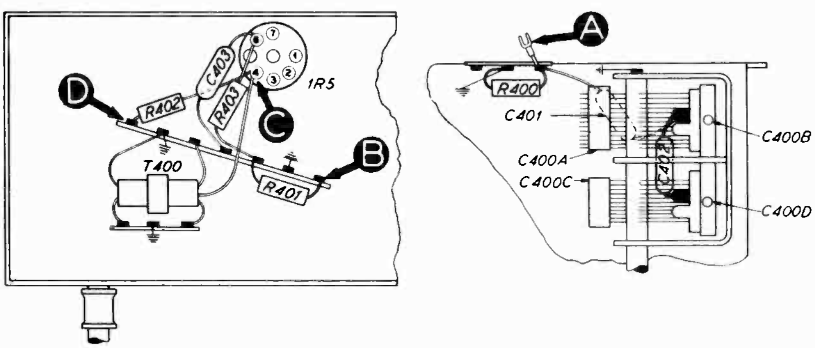


Figure 4. Bottom View, Showing Section 4 Test Points TP-5355D

STEP	TEST POINT	SIGNAL 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 this section. Isolate by the following tests.
2	C to D (Osc. test; see note below.)		Rotate through range.	Negative 5 to 10 volts.	Defective: 1R5. Open: R402, T400. Shorted: C402, C400C, C400D.
3	A	1000 kc.	Tune to signal.	Same as step 1.	Open: C401, C403, R401, R403, LA400.

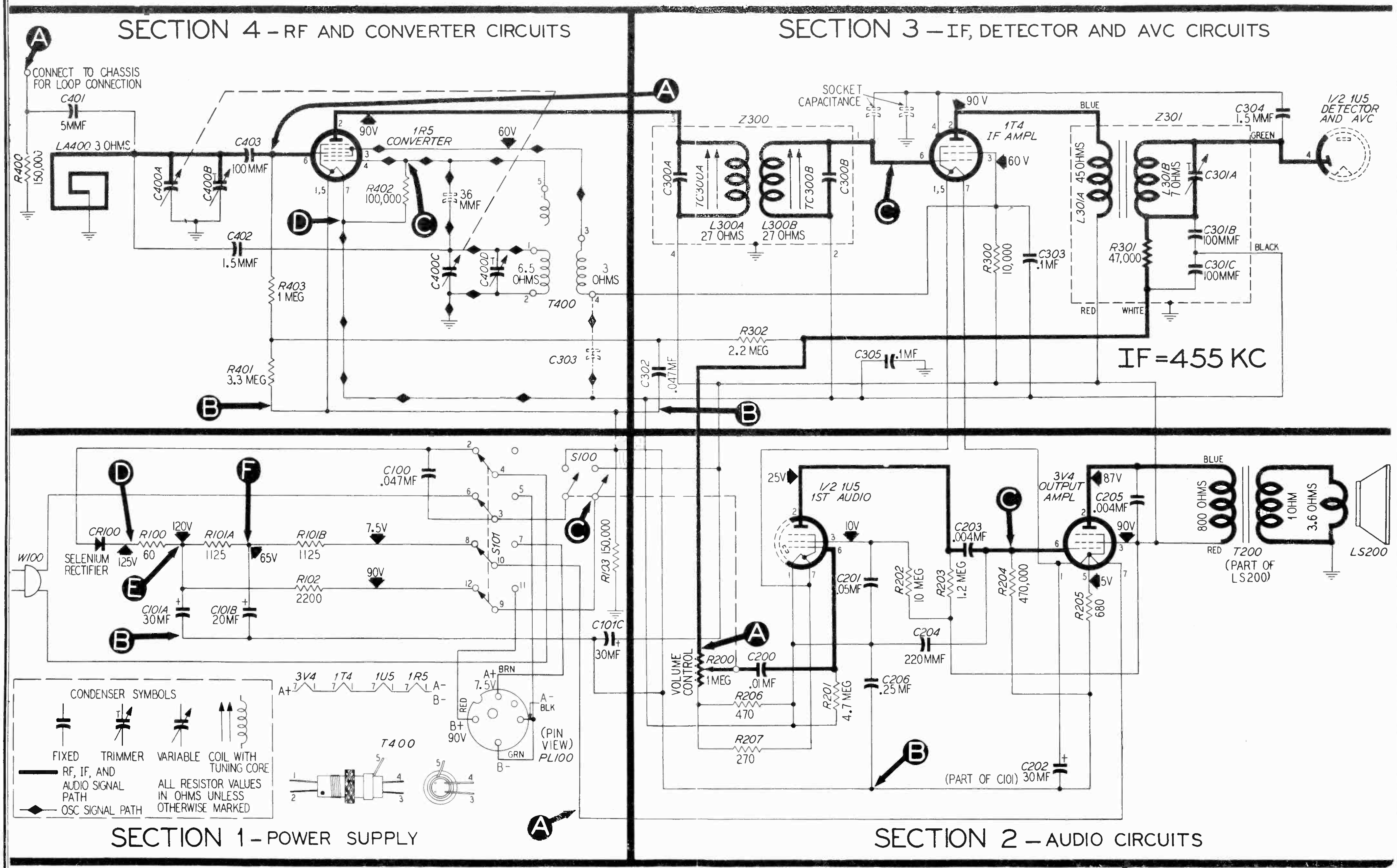


Figure 5. Philco Model 49-602, Sectionalized Schematic Diagram, Showing Test Points

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to test point D; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 4 of the 1R5), test point C. 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.

 PHILCO CORP.

ALIGNMENT PROCEDURE

DIAL—Calibration and pointer-index measurements are shown in figure 7. With tuning condenser fully meshed, set pointer to index mark.

RADIO CONTROLS—Set volume control to maximum.

OUTPUT METER—Connect across voice-coil terminals.

SIGNAL GENERATOR—Use modulated output.

OUTPUT LEVEL—During alignment, adjust signal-generator output to maintain output-meter indication below .5 volt.

SPECIAL NOTE—The orientation of the loop with respect to the chassis is critical for correct tracking. During alignment, with the cabinet back (containing the loop) laid down on the bench, the chassis should be laid on its back, in approximately its normal relation to the loop.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B— (test point B in figure 4). Positive lead through .05-mf. condenser to external-aerial lead. Make sure that radio loop aerial is connected to radio.	455 kc.	Tuning condenser fully meshed.	Adjust, in order given, for maximum output.	C301A—2nd i-f sec. TC300B—1st i-f sec. TC300A—1st i-f pri.
2	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust for maximum output.	C400D—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output while rocking tuning condenser.	C400B—aerial

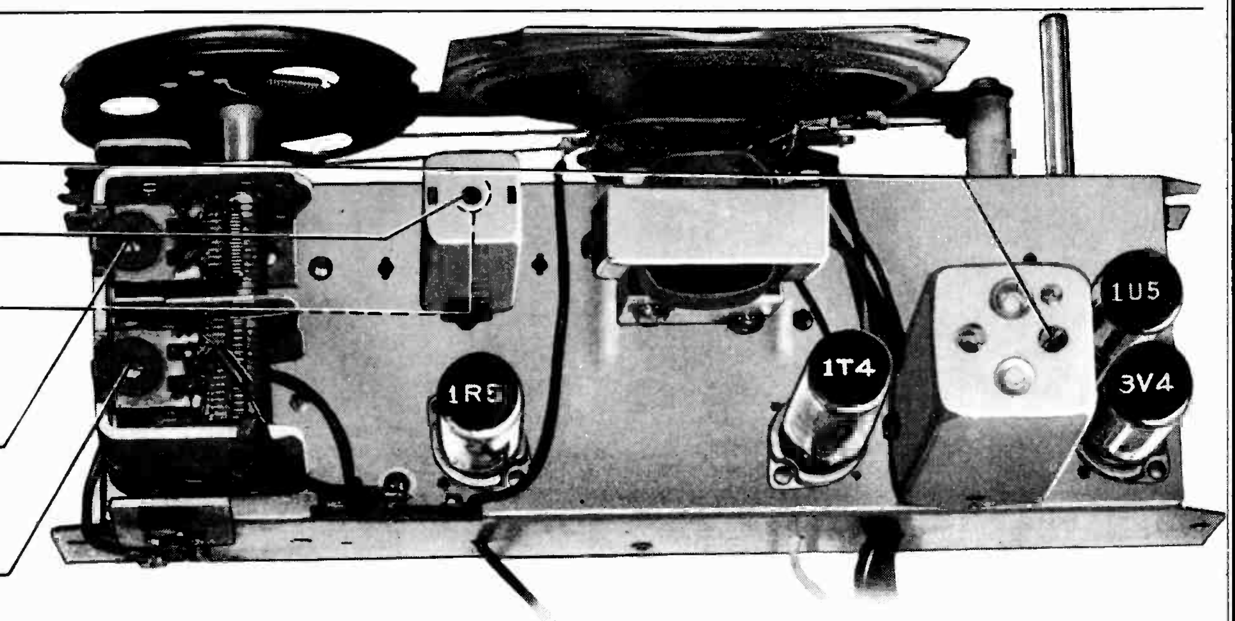


Figure 6. Top View, Showing Trimmer Locations

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. Make sure that radio loop aerial is connected to radio.

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 7.

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

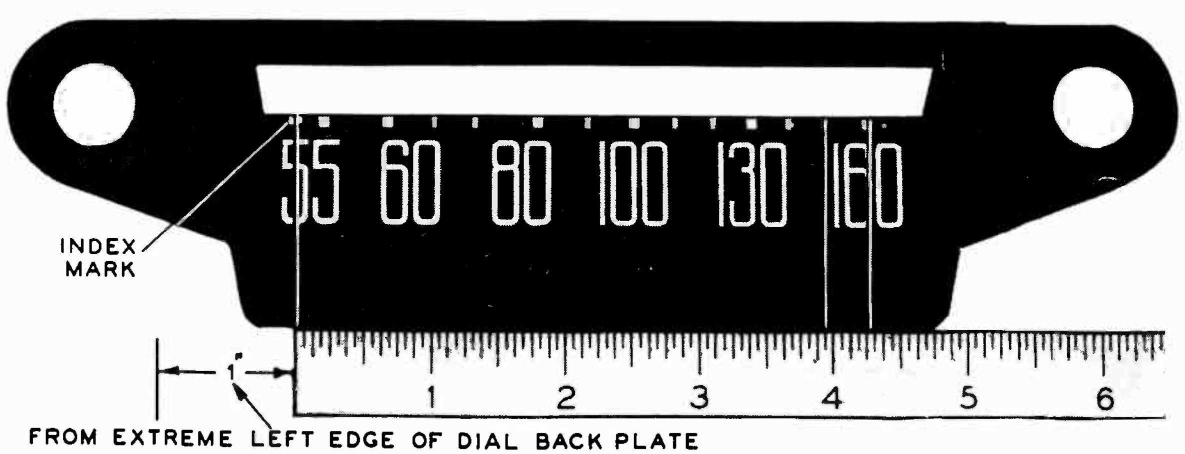


Figure 7. Dial-Backplate Calibration Measurements TP-5776

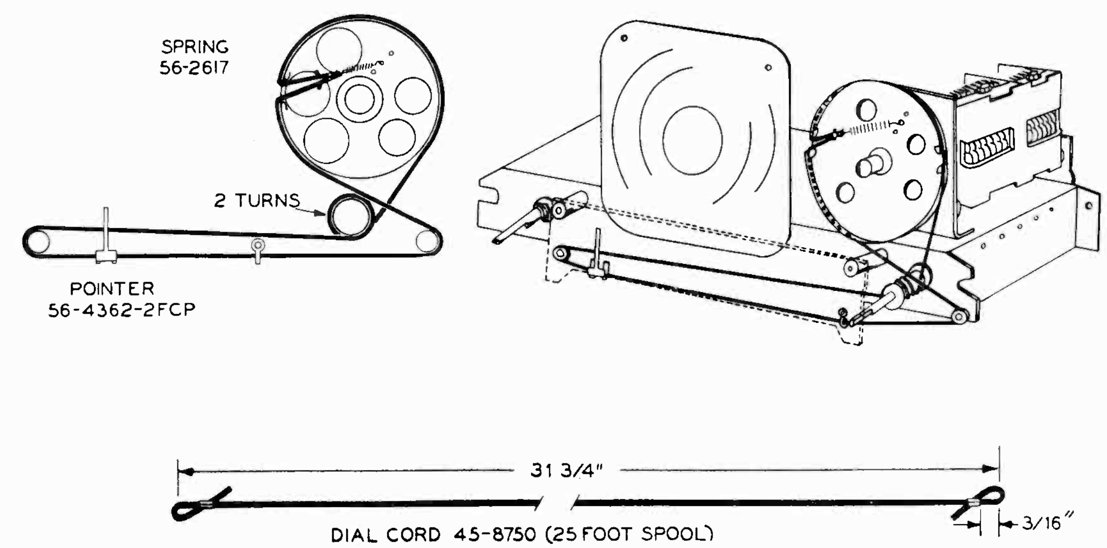


Figure 8. Drive-Cord Installation Details TP-535

PHILCO CORP. MODEL 49-602

REPLACEMENT PARTS LIST

SECTION 1
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .047 mf.	61-0122*
C101	Condenser, electrolytic, 4-section	30-2568-21
C101A	Condenser, filter, 30 mf., 150v	Part of C101
C101B	Condenser, filter, 20 mf., 150v	Part of C101
C101C	Condenser, filter, 30 mf., 150v	Part of C101
CR100	Rectifier, selenium	34-8003-1
PL100	Battery-cable-and-plug assembly	41-3712-3
R100	Resistor, current limiting, 60 ohms, 1 watt	33-1334
R101	Resistor, 2-section	33-3431-5
R101A	Resistor, filament-dropping, 1125 ohms, 3 watts	Part of R101
R101B	Resistor, filament-dropping, 1125 ohms, 3 watts	Part of R101
R102	Resistor, filter, 2200 ohms	66-2223340*
R103	Resistor, leakage 150,000 ohms	66-4153340*
S100	Switch, on-off	Part of 33-5538-28
S101	Switch, change-over	42-1821
W100	Line-cord-and-plug assembly	L2183*

SECTION 2
AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .01 mf.	61-0120*
C201	Condenser, screen by-pass, .05 mf.	61-0122*
C202	Condenser, filter, 30 mf., 25v	Part of 30-2568-21
C203	Condenser, d-c blocking, .004 mf.	61-0179*
C204	Condenser, r-f by-pass, 220 mmf.	62-122001001*
C205	Condenser, tone compensation, .004 mf.	61-0179*
C206	Condenser, by-pass, .25 mf.	61-0125*
LS200	Loud-speaker, p-m	36-1627-1
R200	Volume control, 1 megohm	33-5538-28
R201	Resistor, grid return, 4.7 megohms	66-5473340*
R202	Resistor, screen dropping, 10 megohms	66-6103340*
R203	Resistor, plate load, 1.2 megohms	66-5123340*
R204	Resistor, grid return, 470,000 ohms	66-4473340*
R205	Resistor, bias, 680 ohms	66-1683340*
R206	Resistor, diode return, 470 ohms	66-1473340*
R207	Resistor, diode return, 270 ohms	66-1273340*
T200	Transformer, output	Part of LS200

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, trimmer	Part of Z301
C301B	Condenser, filter	Part of Z301
C301C	Condenser, filter	Part of Z301
C302	Condenser, a-v-c filter, .047 mf.	61-0122
C303	Condenser, screen by-pass, .1 mf.	61-0113*
C304	Condenser, neutralizing, 1.5 mmf.	30-1221-3

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

Reference Symbol	Description	Service Part No.
C305	Condenser, i-f by-pass, .1 mf.	30-4527
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
L301B	Transformer secondary, 2nd i-f	Part of Z301
R300	Resistor, screen dropping, 10,000 ohms	66-3103340*
R301	Resistor, filter, 47,000 ohms (Part of Z301)	66-3473340*
R302	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
Z300	Transformer, 1st i-f	32-4160-4
Z301	Transformer, 2nd i-f	32-3987-2*

SECTION 4
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2727-2
C400A	Condenser, tuning, aerial section	Part of C400
C400B	Condenser, trimmer, aerial	Part of C400
C400C	Condenser, tuning, oscillator section	Part of C400
C400D	Condenser, trimmer, oscillator	Part of C400
C401	Condenser, isolating, 5 mmf.	30-1224-5*
C402	Condenser, neutralizing, 1.5 mmf.	30-1221-3
C403	Condenser, d-c blocking, 100 mmf.	60-10105407*
LA400	Loop aerial	32-4274
R400	Resistor, leakage, 150,000 ohms	66-4153340*
R401	Resistor, grid return, 3.3 megohms	66-5333340*
R402	Resistor, oscillator bias, 100,000 ohms	66-4103340*
R403	Resistor, a-v-c divider, 1 megohm	66-5103340*
T400	Transformer, oscillator	32-4282

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Parts	
Cabinet (M), maroon	10703
Cabinet (T), tan	10703A
Cabinet (I), ivory	10703B
Cabinet (G), green	10703C
Handle	76-3742
Lever assembly, switch	76-3666
Terminal, aerial strip	76-3674
Dial-Scale Hardware	
Dial-backplate assembly	56-5425FCP
Drive cord, 25-foot spool	45-8750*
Pointer	56-4362-2FCP
Spring, drive-cord	56-2617
Knob (M)	54-4557
Knob (T)	54-4557-1
Knob (I)	54-4557-2
Knob (G)	54-4557-3
Socket, tube, miniature	27-6203
Spring, voltage change-over switch	28-9010FA1—Part of 76-3666

Circuit Description

Philco Model 49-605 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.

MODEL 49-605

SPECIFICATIONS

CABINET	2-piece plastic, metal frame
CIRCUIT	6-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-5854A

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:

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. 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 (power supply) are performed.

PHILCO CORP.

MODEL 49-605

Section 1

POWER SUPPLY

TROUBLE SHOOTING

For the tests in this section, use a d-c volt meter. 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 (audio circuits); if not, isolate and correct the trouble in this section.

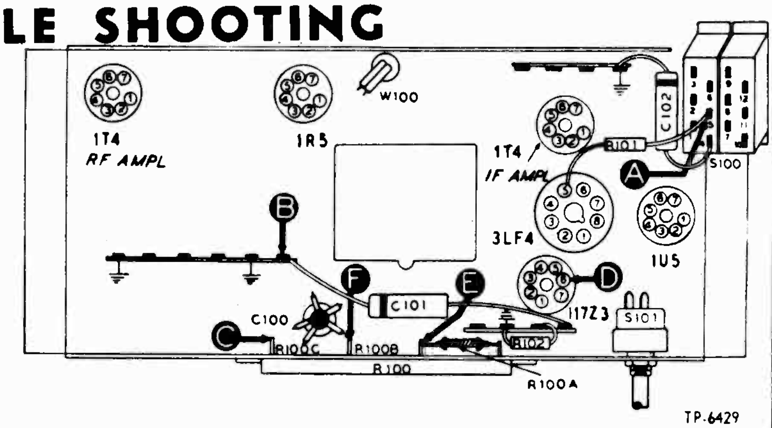


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A 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

AUDIO

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 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in this section.

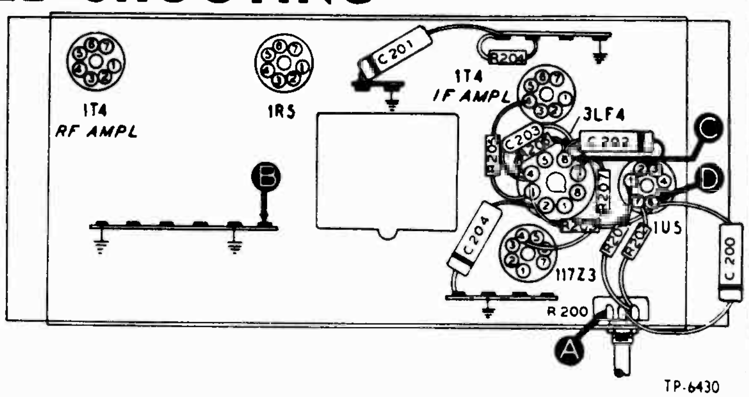


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

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.	Defective: 3LF4, LS200. Open: T200, R207, R206. Shorted: C203, C204.
3	D	Loud, clear signal with weak signal input.	Defective: 1U5. Open: C202, C201, R205, R204, R203. 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

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

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 (r-f and converter 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 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."

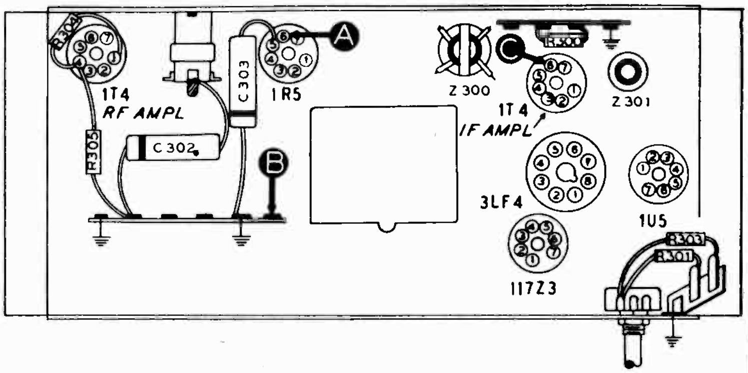


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

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. Misaligned: Z301. Open: R300, C302, Z301. Shorted or leaky: C302. Shorted: Z301.
3	A	Loud, clear signal with weak signal input.	Defective: 1R5*. Misaligned: Z300. Shorted: C406*, Z300. Open: Z300.

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

Section 4 TROUBLE SHOOTING

R-F AND CONVERTER

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.

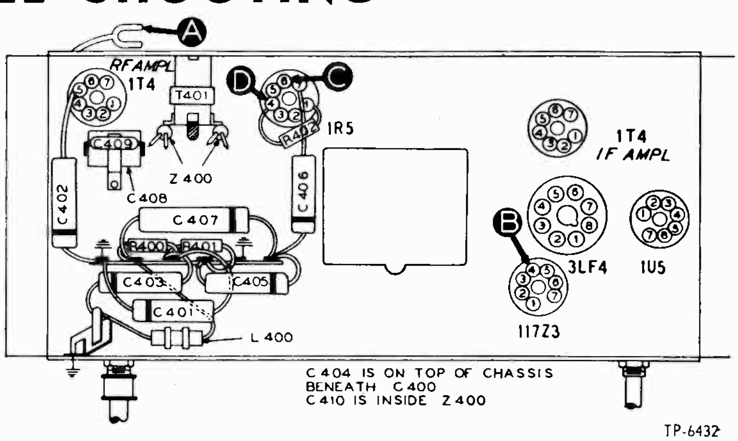


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS
(Location of T400 shown in figure 6.)

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 in this section. Isolate by the following tests.
2	C	1000 kc.	1000 kc.	Clear signal with strong signal input.	Defective: 1R5. Open: C405, C406. Trouble in oscillator circuit.
3	B to D (Osc. test; see note below.)		Rotate tuning control.	Negative 4 to 8 volts.	Defective: 1R5 (osc. section). Open: R402, T400. Shorted: C408, C409, C404, C400, C400C, T400.
4	A	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Defective: 1T4. Shorted: C400, C400A, C400B, T400, Z400, C401, C402, C403. Open: R400, R401, T400, Z400.

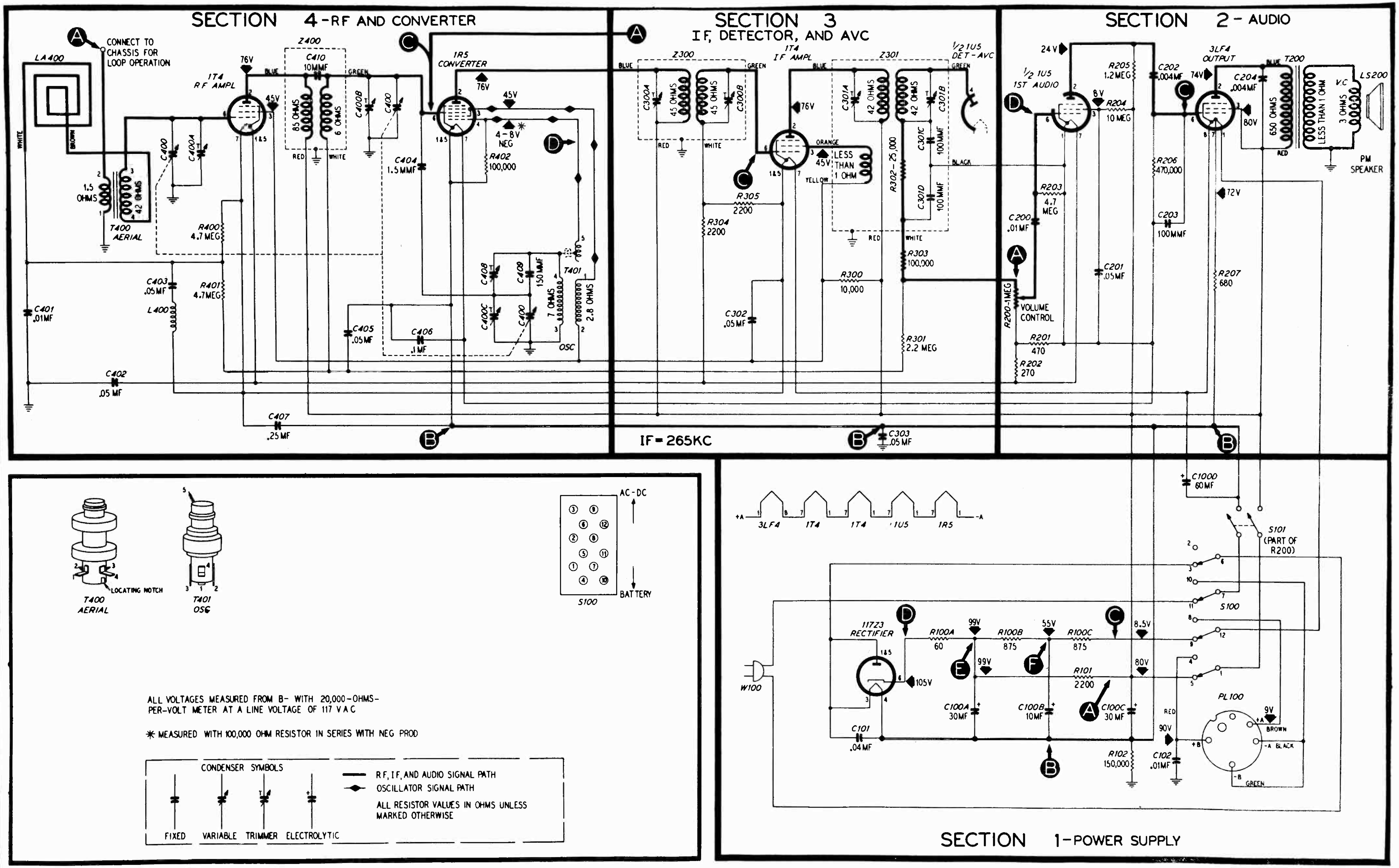


FIGURE 5. PHILCO RADIO MODEL 49-605, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

MODEL 49-605

PHILCO CORP.

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 (see figure 7).

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.	C408
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.				

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.

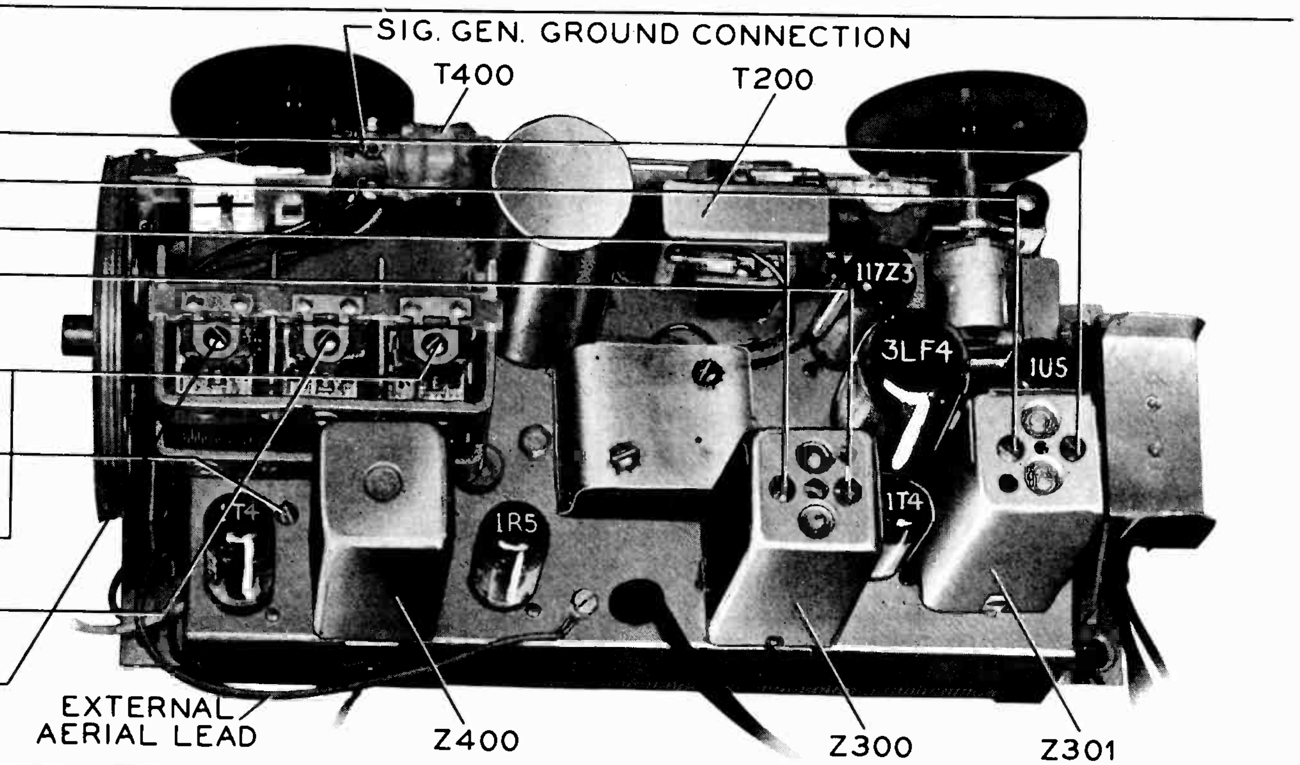


FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS

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 r-f and converter circuits

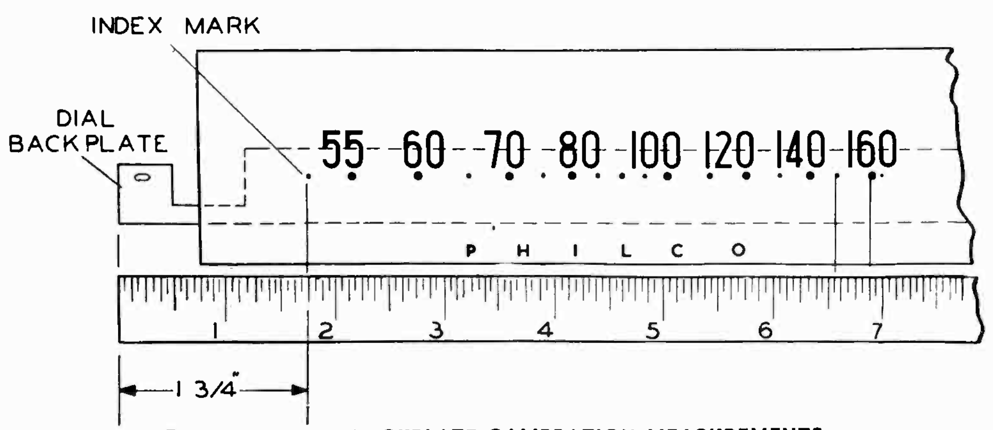


FIGURE 7. DIAL-BACKPLATE CALIBRATION MEASUREMENTS

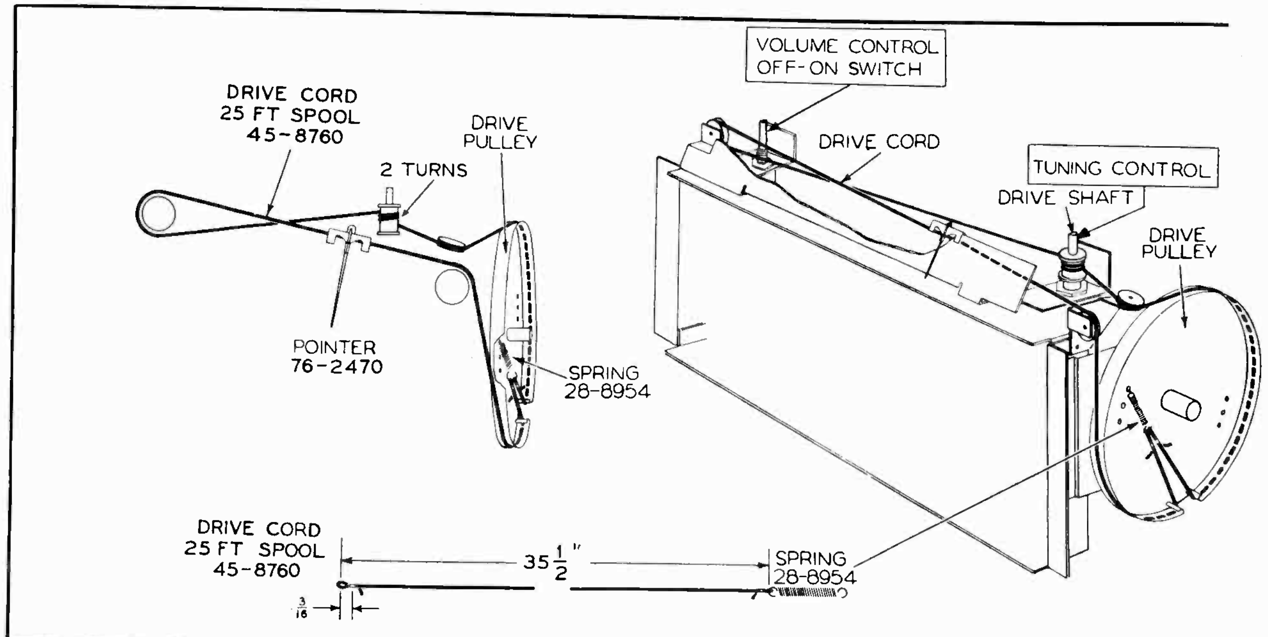


FIGURE 8. DRIVE-CORD INSTALLATION DETAILS

PHILCO CORP.

MODEL 49-605

REPLACEMENT PARTS LIST

NOTE: An asterisk (*) indicates a general replacement item. The part numbers of these items may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values given 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 CIRCUIT

Reference Symbol	Description	Service Part No.
C100	Condenser, electrolytic, 4-section	30-2560-4
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, 60 mf.	Part of C100
C101	Condenser, line filter, .04 mf.	45-3500-2*
C102	Condenser, by-pass, .01 mf.	61-0120*
PL100	Battery cable and plug	41-3712-1
R100	Resistor, 3-section	33-5431-4
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	42-1821
S101	Switch, on-off	Part of R200
W100	Power cord and plug	41-3755-17

SECTION 2
AUDIO CIRCUITS

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	36-1598-1
R200	Volume control (with on-off switch), 1 megohm	33-5538-43
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, 10 megohms	66-6103340*
R205	Resistor, plate load, 1.2 megohms	66-5123340*
R206	Resistor, grid return, 470,000 ohms	66-4473340*
R207	Resistor, bias, 680 ohms	66-1683340*
T200	Output transformer	32-8259

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

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, .05 mf.	61-0122*
R300	Resistor, screen dropping, 10,000 ohms	66-3103340*
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
R304	Resistor, grid return, 2200 ohms	66-2223340*
R305	Resistor, grid return, 2200 ohms	66-2223340*
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
R-F AND CONVERTER CIRCUITS

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, i-f by-pass, .01 mf.	61-0120*
C402	Condenser, by-pass, .05 mf.	61-0122*
C403	Condenser, by-pass, .05 mf.	61-0122*
C404	Condenser, neutralizing, 1.5 mmf.	30-1221-3
C405	Condenser, by-pass, .05 mf.	61-0122*
C406	Condenser, by-pass, .1 mf.	61-0113*
C407	Condenser, by-pass, .25 mf.	61-0125
C408	Condenser, oscillator series padder	31-6410
C409	Condenser, tracking, 150 mmf.	60-10155407*
C410	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*
R402	Resistor, osc. grid leak, 100,000 ohms	66-4103340
T400	Aerial transformer	32-3972
T401	Oscillator transformer	32-4095-1
Z400	R-f transformer, including C410	32-4210

MISCELLANEOUS

Description	Service Part No.
Cabinet (whole)	10726
Cabinet back half	54-4626
Cabinet front half	54-4625
Back catch assembly	76-2273
Casting, frame	56-5835
Foot, rubber	54-4650
Grille	56-6365
Fasteners	W-2543FE7
Handle, plastic	54-4646
Hinge	56-6419
Clip, coil mounting	28-5002FCP
Dial backplate	56-5833FCP
Cord, drive (25-ft. spool)	45-8750*
Pointer	56-5630-4FCP
Pulley-and-bracket assembly	76-4115
Scale, dial, plastic	54-5031
Spring, drive cord	28-8954
Cover switch (volume control)	56-5834-FA3
Grommet, tuning-condenser mounting (3 required)	27-4596
Knob (2 required)	54-4627
Shaft and pulley	76-2028
Socket, Loktal	27-6138
Socket, miniature	27-6226
Switch-plunger assembly	76-3061

MODEL 49-902 PHILCO CORP.

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 control 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.

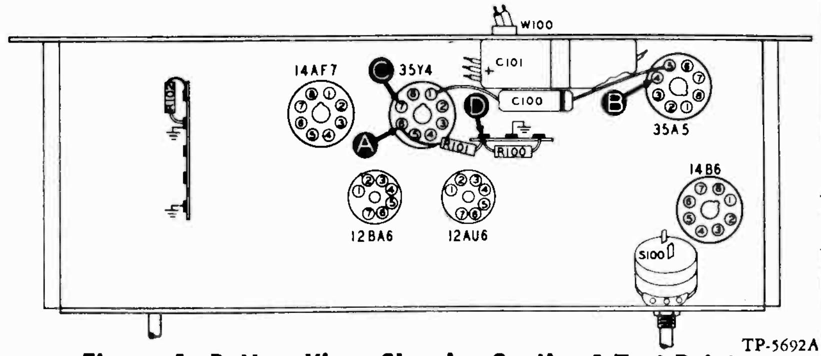


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	90 volts		Trouble in this section. Isolate by the following tests.
2	C	105 volts	No voltage Low voltage High voltage	Defective: 35Y4. Shorted: C100, C101A. Open: S100, W100. Defective: 35Y4. Leaky: C101A. Shorted: C101B. Open: C101A. Open: R100.
3	D	115 volts	No voltage Low voltage High voltage	Shorted: C101B. Open: C101A. Leaky: C101B. Shorted: C101C, C203*. Open: R101.
4	A	90 volts	No voltage Low voltage	Shorted: C101C. Open: R101. Leaky: C101C. Shorted: C203*, C306*, C408*.
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 control 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.

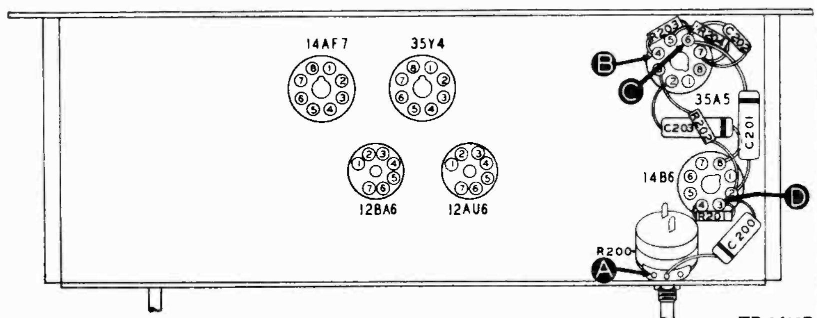


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak generator input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with strong input.	Defective: 35A5, LS200. Shorted: C202, C203. Open: T200, R204, R203.
3	D	Loud, clear output with weak input.	Defective: 14B6. Shorted: C201. Open: C201, R201, R202.
4	A	Loud, clear output with weak input.	Shorted: C200, C301D*. Open: C200. R200.
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.

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.

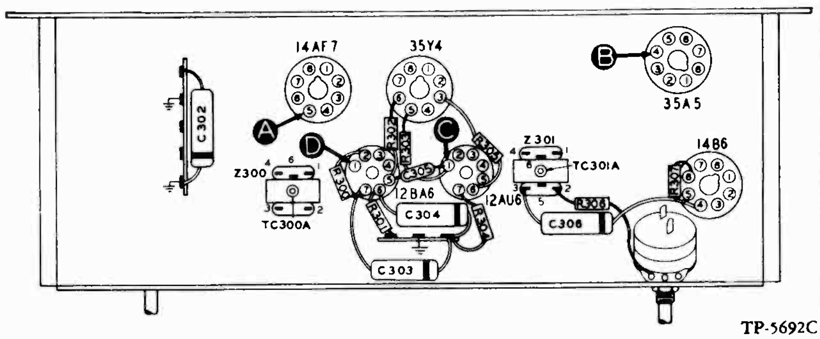


Figure 3. Bottom View, Showing Section 3 Test Points

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."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	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: 12AU6. Shorted: C306, Z301, C305. Open: R303, R304, R305, R306, Z301. Misaligned: Z301.
3	D	Loud, clear output with moderate input.	Defective: 12BA6. Shorted: C304. Open: C305, R301, R302.
4	A	Loud, clear output with weak input.	Defective: 14AF7. Shorted: C408*, Z300. Open: R401*, R404*, 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.

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.

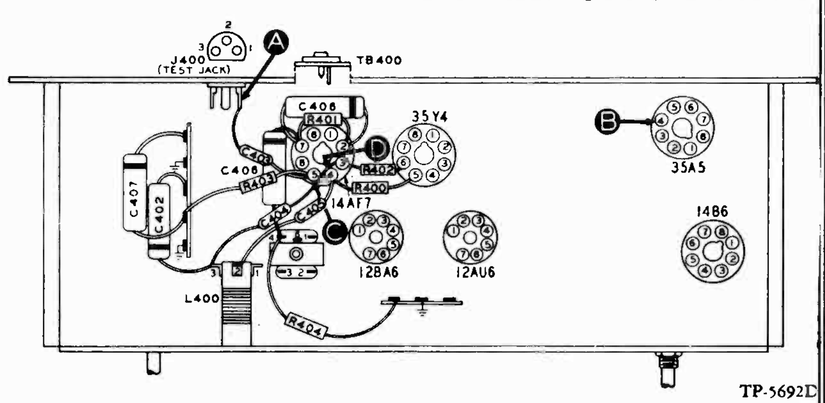


Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIG. GEN. FREQ.	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	1000 kc.	1000 kc.	Loud, clear output with weak input.	Defective: 14AF7. Shorted: C406, C407, C408. Open: R401, R403, R404.
3	D (Osc. Test: see note on p. 4.)			—1.5v to —2v	Defective: 14AF7. Shorted: C400, C400B, C402, C404, C405, L400. Open: C402, C404, R400, R402, L400.
4	A	1000 kc.	1000 kc.	Loud, Clear output with weak input.	Shorted: C400, C400A. Open: LA400.

MODEL 49-902 PHILCO CORP.

REPLACEMENT PARTS LIST

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

Reference Symbol	Description	Service Part No.
C100	Condenser, line by-pass, .04 mf.	45-3500-2*
C101	Condenser, electrolytic, 3-section	30-2575-27
C101A	Condenser, filter, 40 mf., 150v	Part of C101
C101B	Condenser, filter, 30 mf., 150v	Part of C101
C101C	Condenser, filter, 30 mf., 150v	Part of C101
I100	Pilot lamp	34-2068*
R100	Resistor, filter, 220 ohms	66-1225340*
R101	Resistor, filter, 1200 ohms	66-2124340*
R102	Resistor, isolating, 150,000 ohms	66-4153340*
S100	Switch, power on-off	Part of 45-5019†
W100	Line cord and plug assembly	L2183*

SECTION 2
AUDIO CIRUITS

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.	62-122001001*
C203	Condenser, tone compensation, .02 mf.	61-0108*
LS200	Loud-speaker, p-m	36-1625
R200	Volume control (with on-off switch), 500,000 ohms	45-5019*
R201	Resistor, grid return, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid return, 470,000 ohms	66-4473340*
R204	Resistor, cathode bias, 130 ohms	66-1133340*
T200	Transformer, output	32-8310-3

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

Reference Symbol	Description	Service Part No.
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, i-f by-pass (inductively wound), .1 mf.	30-4644-1
C303	Condenser, cathode by-pass, .001 mf.	45-3500-5*
C304	Condenser, screen by-pass, .05 mf.	61-0122*
C305	Condenser, d-c blocking, 220 mmf.	62-122001001*
C306	Condenser, screen by-pass, .05 mf.	61-0122*
R300	Resistor, cathode bias, 220 ohms	66-1223340*
R301	Resistor, screen dropping, 47,000 ohms	66-3473340*
R302	Resistor, plate load, 15,000 ohms	66-3153340*
R303	Resistor, grid return, 150,000 ohms	66-4153340*
R304	Resistor, cathode bias, 120 ohms	66-1123340*
R305	Resistor, decoupling, 1000 ohms	66-2103340*
R306	Resistor, i-f filter, 47,000 ohms	66-3473340*
R307	Resistor, a-v-c filter, 1 megohm	66-5103340*
TC300A	Tuning core, 1st i-f primary	Part of Z300
TC300B	Tuning core, 1st i-f secondary	Part of Z300

†45-5019 Volume control with a-c switch.

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
TC301A	Tuning core, 2nd i-f primary	Part of Z301
TC301B	Tuning core, 2nd i-f secondary	Part of Z301
Z300	Transformer, 1st i-f	32-4258
Z301	Transformer, 2nd i-f	32-4240-3

SECTION 4
R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang, 2-section	31-2727-1
C400A	Condenser, trimmer, aerial section	Part of C400
C400B	Condenser, trimmer, osc. section	Part of C400
C401	Condenser, isolating, .0015 mf.	45-3500-6*
C402	Condenser, isolating, .05 mf.	61-0122*
C403	Condenser, blocking, 220 mmf.	62-122001001*
C404	Condenser, d-c blocking, 220 mmf.	62-122001001*
C405	Condenser, osc. grid, 220 mmf.	62-122001001*
C406	Condenser, cathode by-pass, .05 mf.	61-0122*
C407	Condenser, a-v-c filter, .1 mf.	61-0113*
C408	Condenser, plate decoupling, .01 mf.	61-0120*
LA400	Loop aerial	32-4052-25
L400	Coil, osc.	45-7502*
R400	Resistor, grid return, 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*
R404	Resistor, decoupling, 2200 ohms	66-2223340*

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Parts	
Baffle-and-cloth assembly	40-7546
Baffle-assembly fastener (4)	1W56920FE7
Cabinet	10693A
Cabinet back	54-7492-1
Grille	54-4600
Grille fastener (7)	1W56913FE7
Stud, back mtg. (4)	W2235FA9
Window	54-4608
Window fastener (5)	56-6161FE7
Dial-Scale Hardware	
Cord, drive (25-ft. spool)	31-2695-33
Drive-cord spring	56-2617
Pointer	54-4617
Scale	54-5018
Tuning shaft	56-5688FA11
Tuning-shaft bushing	27-9437
Knob (2)	54-4527-8
Pilot-lamp assembly	76-1280
Speaker bracket	56-5690FA3
Socket, miniature (2)	27-6203
Socket, octal (4)	27-6138

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 tube) and the B− bus, 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, C101C, 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	Plastic
CIRCUIT	6-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	105—125 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	Built-in loop; also connector for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (6)	14AF7, 12BA6, 12AU6, 14B6, 35A5, 35Y4

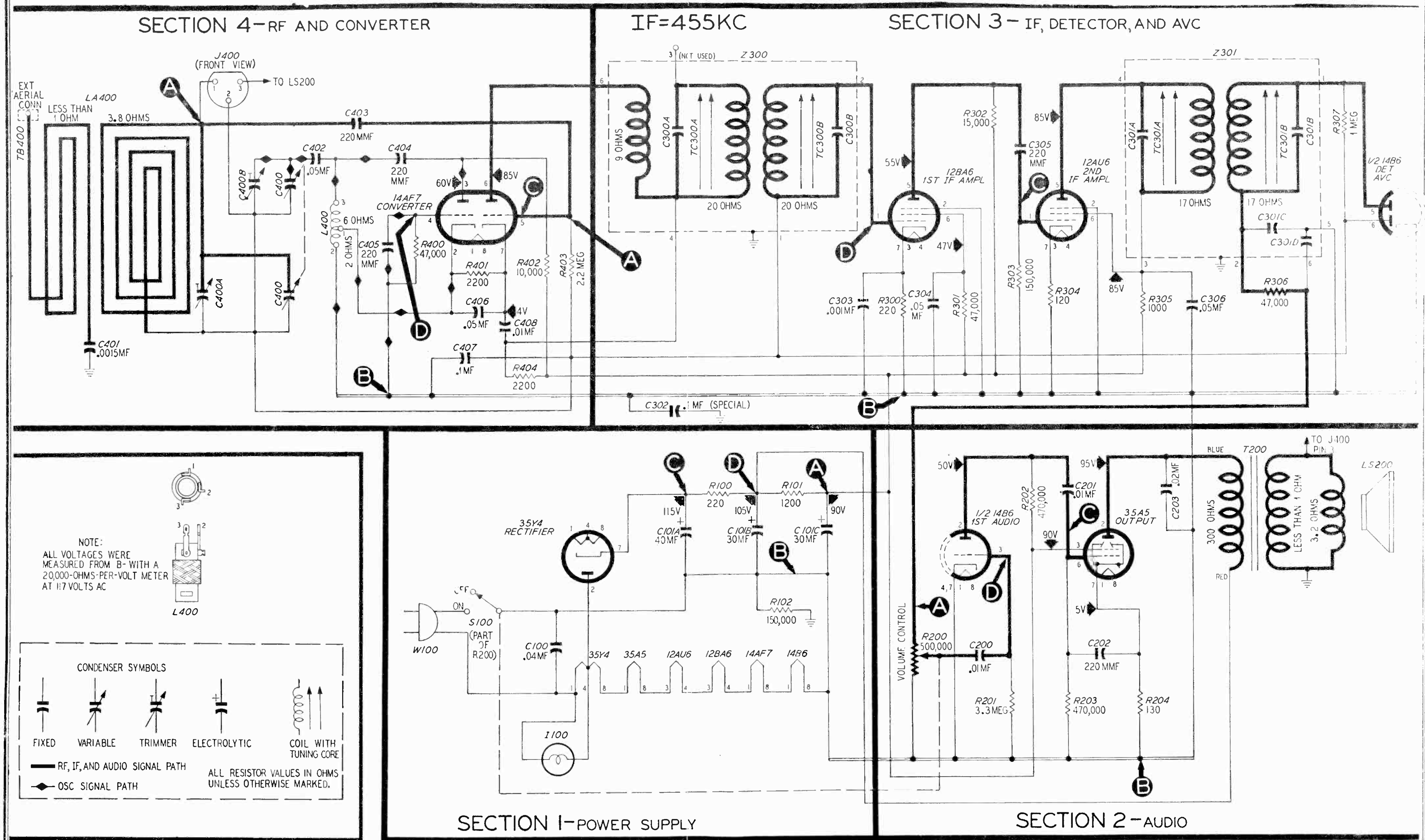


Figure 5. Philco Radio Model 49-902, Sectionalized Schematic Diagram, Showing Test Points

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 14AF7), test-point D. 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 49-902

PHILCO CORP.

ALIGNMENT PROCEDURE

NOTE: The loop should be connected to the radio during alignment.

RADIO CONTROLS—Set volume control to maximum. Set tuning control as indicated in chart.

SIGNAL GENERATOR—Use modulated output. Connect leads and set frequency as indicated in chart.

OUTPUT METER—Connect across speaker voice-coil terminals (figure 6).

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

STEP	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST TRIMMER
1	Ground lead to B—; output lead through .1-mf. condenser to external aerial terminal.	455 kc.	Tuning gang fully meshed	Adjust, 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 for maximum.	C400B—Osc.
3	Radiating loop. (See note below.)	1500 kc.	1500 kc.	Adjust for maximum.	C400A—Aerial

RADIATING LOOP: Make up a 6-to-8 turn, 6-inch-diameter loop, using insulated wire; connect to signal generator leads and place near radio loop.

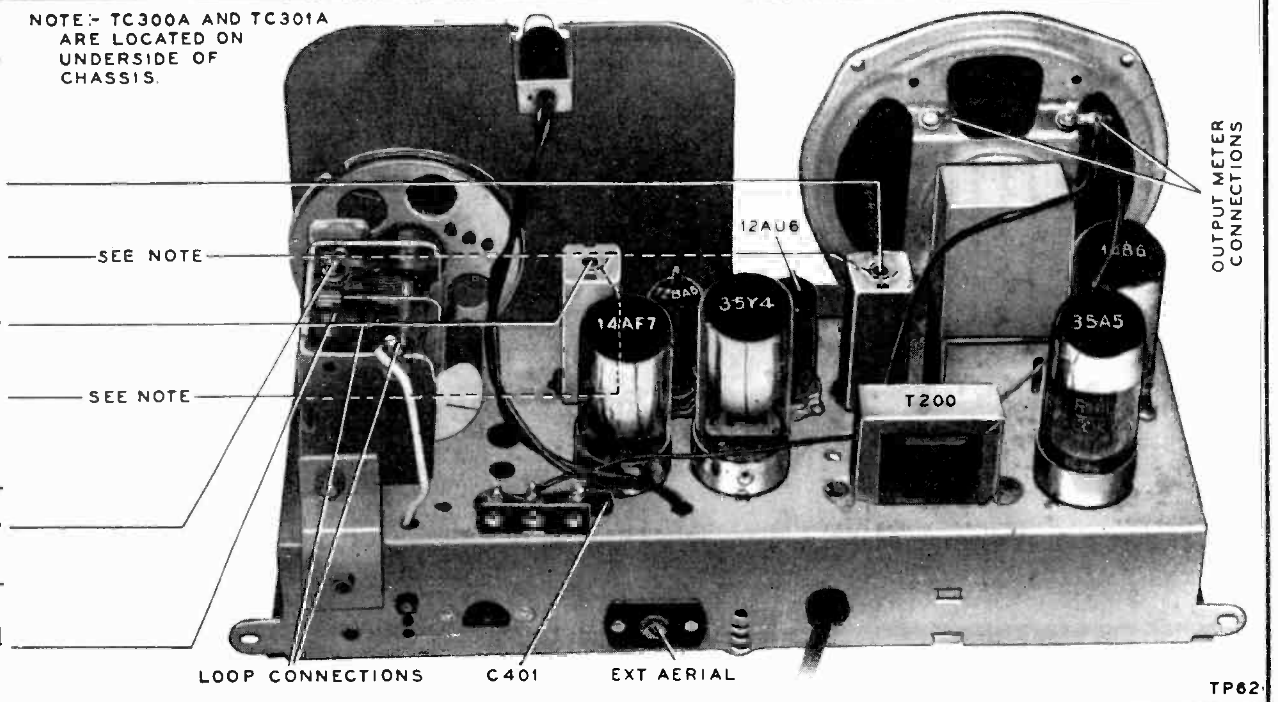


Figure 6. Top View of Chassis, Showing Trimmer Locations

Circuit Description

Philco Model 49-902 is a 6-tube table-model superheterodyne radio, providing reception in 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. Condenser tuning is used. The two i-f stages employ two pentode tubes, a 12BA6 and a 12AU6. To obtain stability, resistance coupling is employed between the first and second i-f tubes. One diode (pin 5) of the 14B6 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 35A5 output tube. The speaker is a permanent-magnet dynamic. The power supply employs a 35Y4 rectfier, working into a resistance-capacitance filter system.

The 150,000-ohm resistor, R102, connected between B- and chassis, prevents hum which might otherwise occur under conditions of high humidity.

The i-f by-pass condenser, C302, is a specially designed, inductively wound condenser, which is series-resonant at the intermediate frequency, 455 kc., thereby functioning as a by-pass of exceptionally low impedance at this frequency.

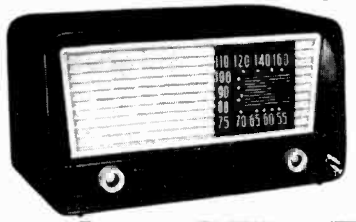
Philco TROUBLE-SHOOTING *Procedure*

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.



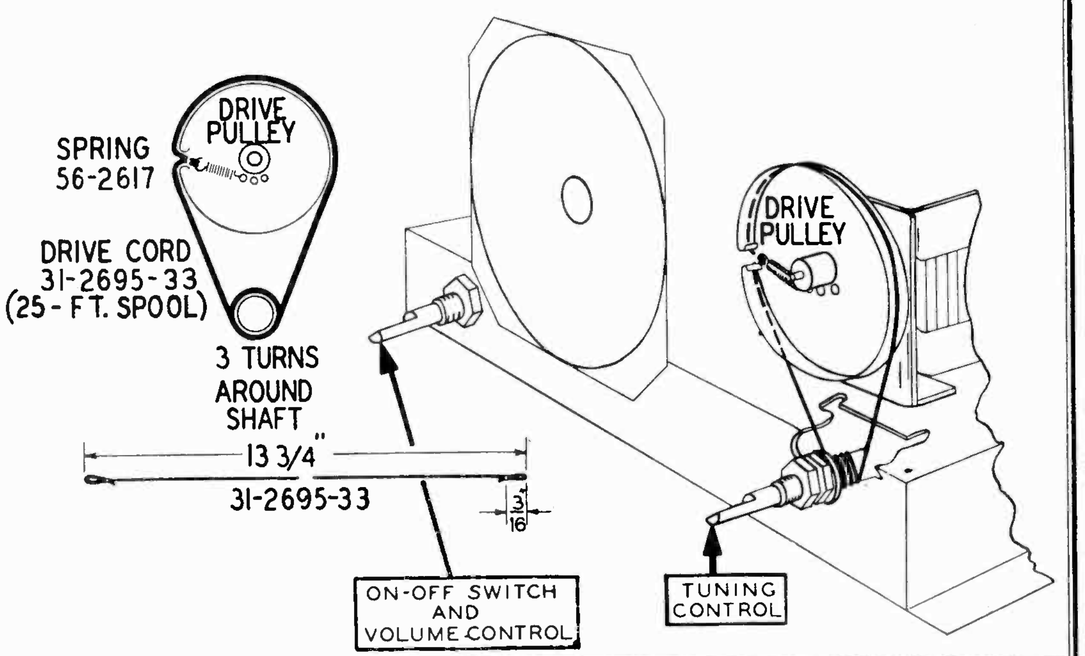


Figure 7. Drive-Cord-Installation Details

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MODEL 49-904

Circuit Description

Philco Model 49-904 is a six-tube, manually tuned superheterodyne radio, providing reception on the standard broadcast band, 540—1620 kc., and on the short-wave range between 5.8 mc. and 15.5 mc. A low-impedance loop within the cabinet normally provides adequate signal pickup. Where additional pickup is required, an external aerial may be used. Do not use a ground.

The converter, employing a type 14AF7 twin triode, provides high signal-to-noise ratio and high conversion efficiency. The oscillator section of the tuning-condenser gang is shaped for correct tracking on the short-wave band. An adjustable series tracking padder is used for tracking on the broadcast band.

The i-f circuit employs two tubes; a 12BA6 1st i-f amplifier is resistance-coupled to a 12AU6 2nd i-f amplifier. Both i-f transformers have permeability-tuned primary and secondary windings.

The diode section of the 14B6 provides detection and a-v-c voltage, the triode section functions as the first audio amplifier, which is resistance-coupled to the type 35A5 audio output tube. A tone control is connected across the plate circuit of the 14B6 triode section.

The d-c operating voltages are furnished by a 35Y4 half-wave rectifier, working into a resistance-capacitance filter system. A 150,000-ohm resistor is connected between the B– bus and the chassis, to prevent hum which might otherwise occur under conditions of high humidity.

C306 is a special condenser, inductively wound to act as a series-resonant circuit at the intermediate frequency (455 kc.). This condenser provides an exceptionally low-impedance i-f by-pass between B– and the chassis.

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+ (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 C102, C101A, C101B, and C204 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	Plastic, brown
CIRCUIT	6-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1620 kc.
Short Wave	5.8—15.5 mc.
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, 12BA6, 12AU6, 14B6, 35A5, 35Y4

TP-6153A

MODEL 49-904

PHILCO CORP.

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. 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.

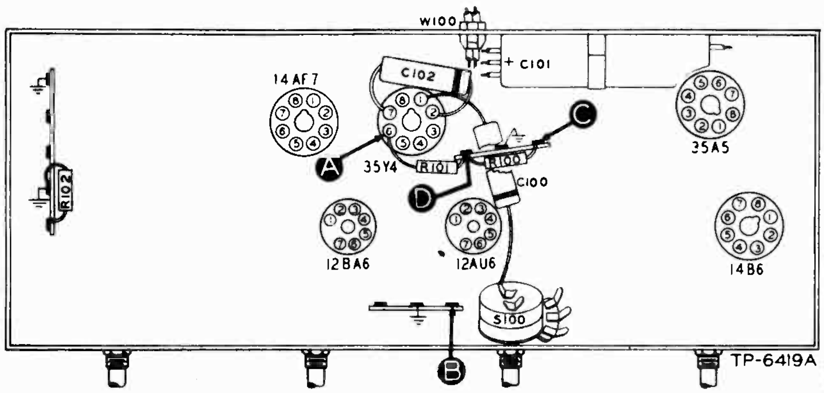

Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	85 volts		Trouble in this section. Isolate by the following tests.
2	C	115 volts	No voltage	Defective: 35Y4. Open: W100, S100. Shorted: C102, C101A.
			Low voltage	Defective: 35Y4. Leaky: C102, C101A. Shorted: C101B, C101C, C204*. Open: C101A.
			High voltage	Open: R100, R101.
3	D	105 volts	No voltage	Open: R100. Shorted: C101B.
			Low voltage	Leaky: C101B, C101C. Shorted: C204*, C101C.
			High voltage	Open: R101, T200*, R205*.
4	A	85 volts	No voltage	Open: R101. Shorted: C101C.
			Low voltage	Leaky: C101C. Shorted: C310*.

Listening Test: Abnormal hum may be caused by open or leaky C100, C101A, C101B, C101C.

* 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 set the tone control for maximum treble response (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.

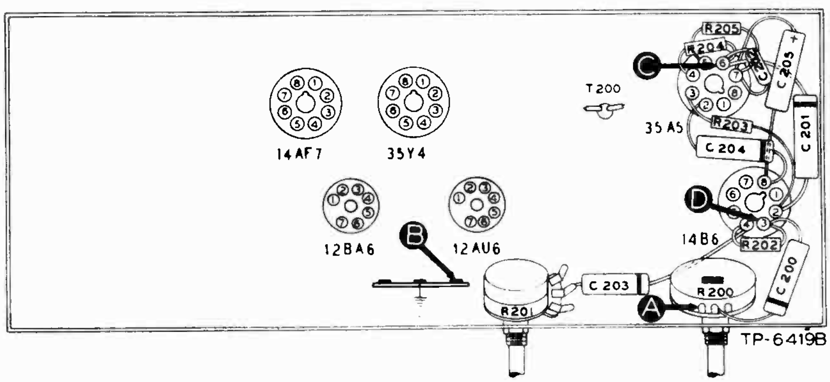

Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
2	C	Clear output with strong input.	Defective: LS200, 35A5. Shorted: T200, C204, C201, C202, C205. Open: T200, R205, R204, C205. Leaky: C204, C201.
3	D	Same as step 1.	Defective: 14B6. Open: C201, R202, R203. Shorted: C203 (rotate tone control).
4	A	Same as step 1.	Defective: R200 (rotate). Open: C200. Shorted: C301D*.

Listening Test: Distortion may be caused by shorted or leaky C200 or 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, and set 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 Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in this section.

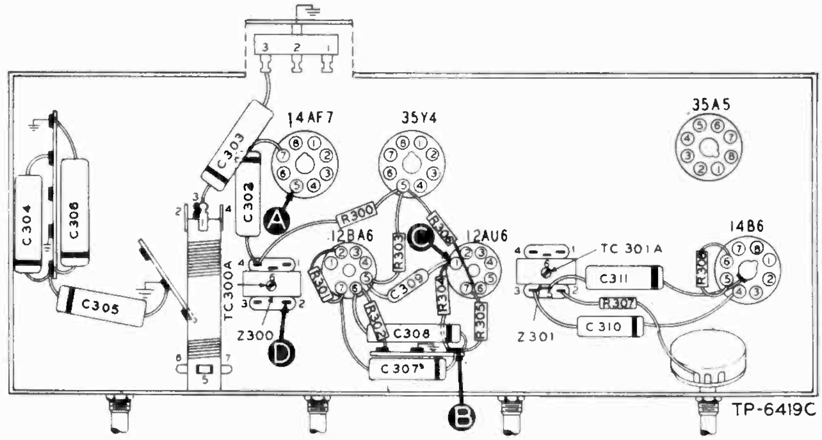

Figure 3. Bottom View, Showing Section 3 Test Points

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."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	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: 14B6, 12AU6. Open: R304, R305, R306, R307, Z301. Shorted: C309, C310, C301C, Z301. Misaligned: Z301.
3	D	Loud, clear output with moderate input.	Defective: 12BA6. Open: R301, R302, R303, C309, Z300. Shorted: C308, C309, Z300.
4	A	Loud, clear output with weak input.	Defective: 14AF7. Open: R401*, R403*, R300, Z300. Shorted: C409*, C302, 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, and set the tone control for maximum treble response (fully counterclockwise). Set the band switch, 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 this section. If the trouble is not revealed by the tests for this section, check the alignment.

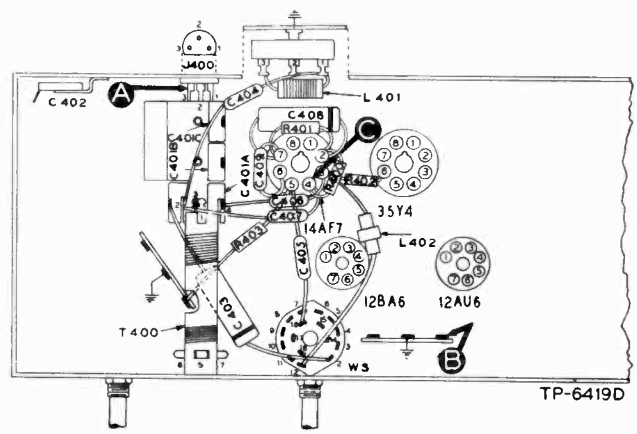

Figure 4. Bottom View, Showing Section 4 Test Points

BC CIRCUITS

STEP	TEST POINT	SIG. GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	1000 kc.	BC	1000 kc.	Loud, clear speaker output with weak generator input.	Trouble in BC circuits. Isolate by steps 2 and 3.
2	C Osc. test; (see note on p. 5)		BC	Rotate through range.	–.8v to –1v	Defective: 14AF7. Open: C401A, C406, C407, R400, R402, T400, WS. Shorted: C406, C407, C401B, C400, T400, WS.
3	A	1000 kc.	BC	1000 kc.	Same as step 1.	Defective: 14AF7. Open: L400, LA400, WS, C405, R403, R401, C408. Shorted: C400A, C402, C400, L400, WS.

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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

Reference Symbol	Description	Service Part No.
C100	Condenser, by-pass, .04 mf	45-3500-2*
C101	Condenser, electrolytic, 3-section	30-2575-24
C101A:	Condenser, filter, 40 mf	Part of C101
C101B:	Condenser, filter, 30 mf	Part of C101
C101C:	Condenser, filter, 30 mf	Part of C101
C102	Condenser, by-pass, .04 mf	45-3500-2*
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 R201
W100	Line-cord and plug	L2183*

SECTION 2—AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
C200	Condenser, d-c blocking, .01 mf	61-0121*
C201	Condenser, d-c blocking, .01 mf	61-0120*
C202	Condenser, parasitic suppressor, 220 mmf	30-1224-20*
C203	Condenser, tone control, .006 mf	45-3500-7*
C204	Condenser, tone compensation, .02 mf	61-0108*
C205	Condenser, electrolytic, cathode by-pass, 25 mf	45-3001*
LS200	Loud-speaker, PM	36-1625
R200	Volume control, .5 megohm	33-5539-46
R201	Tone control (including a-c switch), .5 megohm	33-5538-35
R202	Resistor, grid return, 3.3 megohms	66-5333340*
R203	Resistor, plate load, 470,000 ohms	66-4473340*
R204	Resistor, grid return, 470,000 ohms	66-4473340*
R205	Resistor, cathode bias, 130 ohms	66-1133340*
T200	Transformer, output	32-8310-5

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

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed	Part of Z300
C300B	Condenser, fixed	Part of Z300
C301A	Condenser, fixed	Part of Z301
C301B	Condenser, fixed	Part of Z301
C301C	Condenser, i-f filter	Part of Z301
C301D	Condenser, i-f filter	Part of Z301
C302	Condenser, r-f by-pass, .05 mf	61-0122*
C303	Condenser, r-f by-pass, .01 mf	61-0120*
C304	Condenser, a-v-c filter, .1 mf	61-0113*
C305	Condenser, r-f by-pass, .01 mf	61-0120*
C306	Condenser (inductively wound), i-f by-pass, .1 mf	30-4644-1
C307	Condenser, cathode by-pass, .001 mf	45-3500-5*
C308	Condenser, screen by-pass, .05 mf	61-0122*
C309	Condenser, d-c blocking, 220 mmf	30-1224-20*
C310	Condenser, screen by-pass, .05 mf	61-0122*
C311	Condenser, r-f by-pass, .05 mf	61-0122*
R300	Resistor, plate decoupling, 2200 ohms	66-2223340*
R301	Resistor, cathode bias, 220 ohms	66-1223340*
R302	Resistor, screen dropping, 47,000 ohms	66-3473340*
R303	Resistor, plate load, 15,000 ohms	66-3153340*
R304	Resistor, grid return, 150,000 ohms	66-4153340*
R305	Resistor, cathode bias, 220 ohms	66-1223340*
R306	Resistor, plate and screen decoupling, 1000 ohms	66-2103340*
R307	Resistor, i-f filter, 47,000 ohms	66-3473340*

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
R308	Resistor, a-v-c load, 1 megohm	66-5103340*
TC300A	Tuning core, 1st i-f primary	Part of Z300
TC300B	Tuning core, 1st i-f secondary	Part of Z300
TC301A	Tuning core, 2nd i-f primary	Part of Z301
TC301B	Tuning core, 2nd i-f secondary	Part of Z301
Z300	Transformer, 1st i-f	32-4258
Z301	Transformer, 2nd i-f	32-4240-3

SECTION 4—R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning, 2-gang	31-2727-4
C400A:	Condenser, trimmer, SW aerial	Part of C400
C401	Condenser strip, trimmer, 3-section	31-6477-2
C401A:	Condenser, series padder, BC osc	Part of C401
C401B:	Condenser, trimmer, BC osc	Part of C401
C401C:	Condenser, trimmer, SW osc	Part of C401
C402	Condenser, trimmer, BC aerial	31-6474
C403	Condenser, isolating, .02 mf	61-0108*
C404	Condenser, blocking, 10 mmf	30-1224-26*
C405	Condenser, isolating, 100 mmf	30-1225-2
C406	Condenser, d-c blocking, 220 mmf	30-1224-20
C407	Condenser, d-c blocking, 220 mmf	30-1224-20
C408	Condenser, cathode by-pass, .05 mf	61-0122*
C409	Condenser, r-f by-pass, 100 mmf	30-1225-2
J400	Jack, external aerial connector	27-6126
L400	Coil, BC aerial	32-4033-8
L401	Coil, shunt, SW aerial	32-3858
L402	Coil, choke, SW plate	32-4143-4
LA400	Loop-aerial assembly	Part of Cabinet
R400	Resistor, grid return, 10,000 ohms	66-3103340*
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	Coils, BC and SW oscillator	32-4311
WS	Wafer (band) switch	42-1869

MISCELLANEOUS

Description	Service Part No.
Baffle, speaker	54-4585
Bracket, pointer support rivet assembly	76-4027
Bracket, speaker	56-5690FA3
Cabinet-and-loop assembly	76-4026
Cabinet back	54-7639
Cord, drive (25-ft. spool)	45-8750*
Fastener (7)	1W56913FA3
Grille (ornamental)	56-5694FCP
Knob, SW—BC	54-4527-7
Knob, tone—on-off	54-4527-5
Knob, tuning	54-4527-1
Knob, volume	54-4527-6
Pilot-lamp-socket assembly	76-1280
Pointer	76-3972
Scale, dial	54-5012
Shaft, tuning	56-5688FA11
Bushing, tuning shaft	27-9437
Socket, loktal	27-6177
Socket, miniature	27-6203
Spring, pointer drive	28-8953
Spring, tuning-condenser drive	56-2617
Stud (4)	W2235FA9
Stud, trimount (4)	W2235-1FA9

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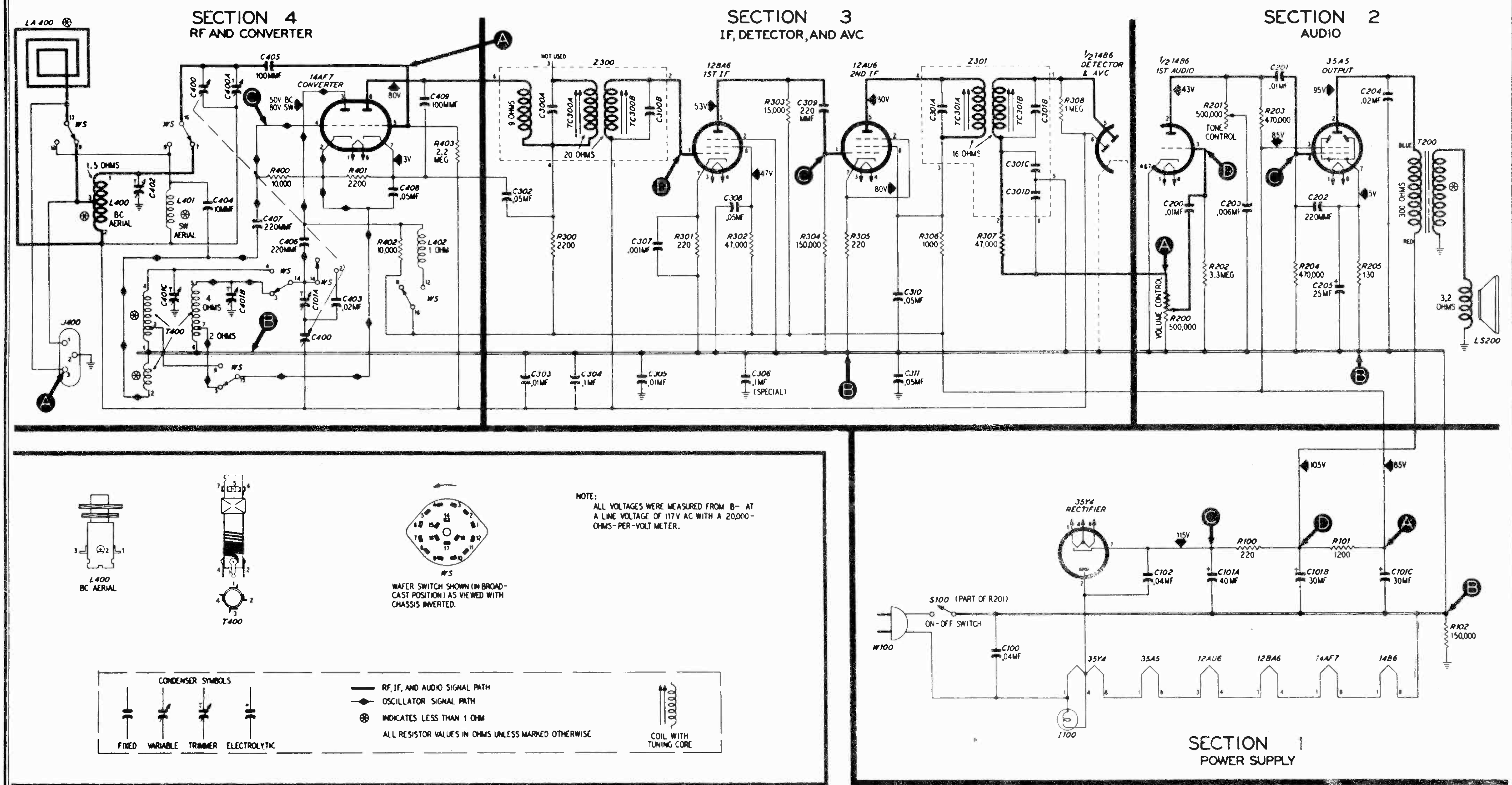

Figure 5. Philco Radio Model 49-904, Sectionalized Schematic Diagram, Showing Test Points

SW CIRCUITS

STEP	TEST POINT	SIG. GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
4	A	15 mc.	SW	15 mc.	Same as step 1.	Trouble in SW circuits. Isolate by steps 5 and 6.
5	C Osc. test; (see note on p. 5)		SW	Rotate through range.	–.8v to –2v	Defective: 14AF7. Open: C403, L402, T400, WS. Shorted: C401C, T400, WS.

SW CIRCUITS

STEP	TEST POINT	SIG. GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
6	A	15 mc.	SW	15 mc.	Same as step 1.	Defective: 14AF7. Open: L401, C404, WS. Shorted: WS, 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 4 of 14AF7), 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.

MODEL 49-904

PHILCO CORP.

ALIGNMENT PROCEDURE

DIAL—Calibration and pointer-index measurements are shown in figure 8. With tuning condenser fully meshed, set pointer to index mark.

OUTPUT METER—Connect to terminals indicated in figure 7.

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

RADIO CONTROLS—Set volume control to maximum, and tone control fully counterclockwise (treble). Set band switch and tuning control as indicated in chart.

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

STEP	SIGNAL GENERATOR		RADIO			ADJUST
	CONNECTION TO RADIO	DIAL SETTING	BAND SWITCH	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B−; output lead through .1-mf. condenser to tuning-condenser stator (aerial section).	455 kc.	BC	540 kc.	Adjust, 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).	580 kc.	BC	580 kc.	Adjust for maximum.	C401A—BC osc. (series)
3	Same as step 2.	1600 kc.	BC	1600 kc.	Adjust for maximum.	C401B—BC osc. (shunt)
4	Same as step 2.	15 mc.	SW	15 mc.	Adjust for maximum on first peak from loose position. Image should be heard with signal generator set at 14.1 mc.	C401C—SW osc.
5	Same as step 2.	15 mc.	SW	15 mc.	Adjust for maximum from tight position.	C400A—SW aerial
6	Same as step 2.	1500 kc.	BC	1500 kc.	Adjust for maximum.	C402—BC aerial
7	Same as step 2.	580 kc.	BC	580 kc.	Adjust for maximum while rocking tuning control.	C401A—BC osc. (series)
8	Same as step 2.				Repeat steps 3 and 7 until no further improvement is noted, then repeat step 3.	

RADIATING LOOP: Make up a 6—8 turn, 6-inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop aerial. Make sure that loop aerial is connected to radio.

NOTE:- TC300A AND TC301A ARE LOCATED ON UNDERSIDE OF CHASSIS.

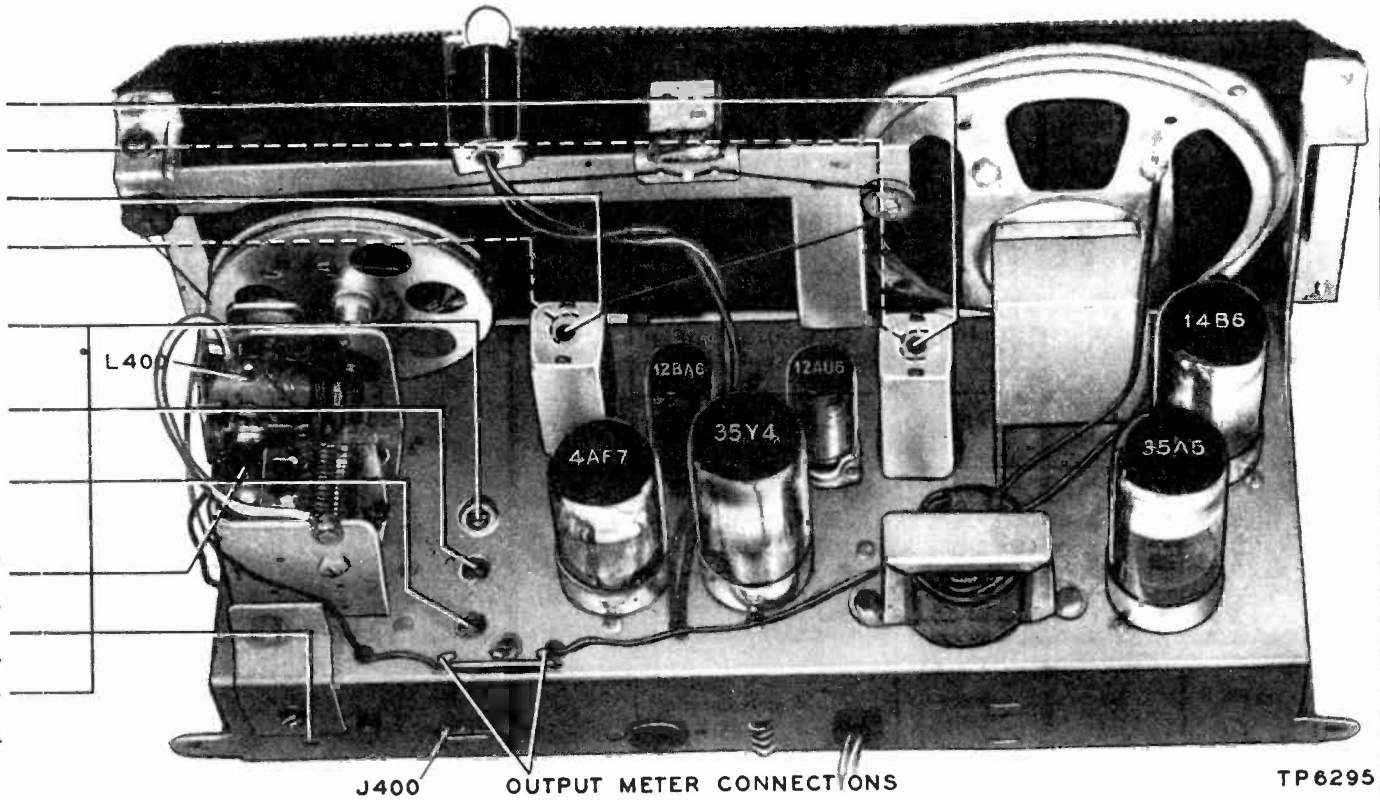

Figure 6. Top View, Showing Trimmer Locations

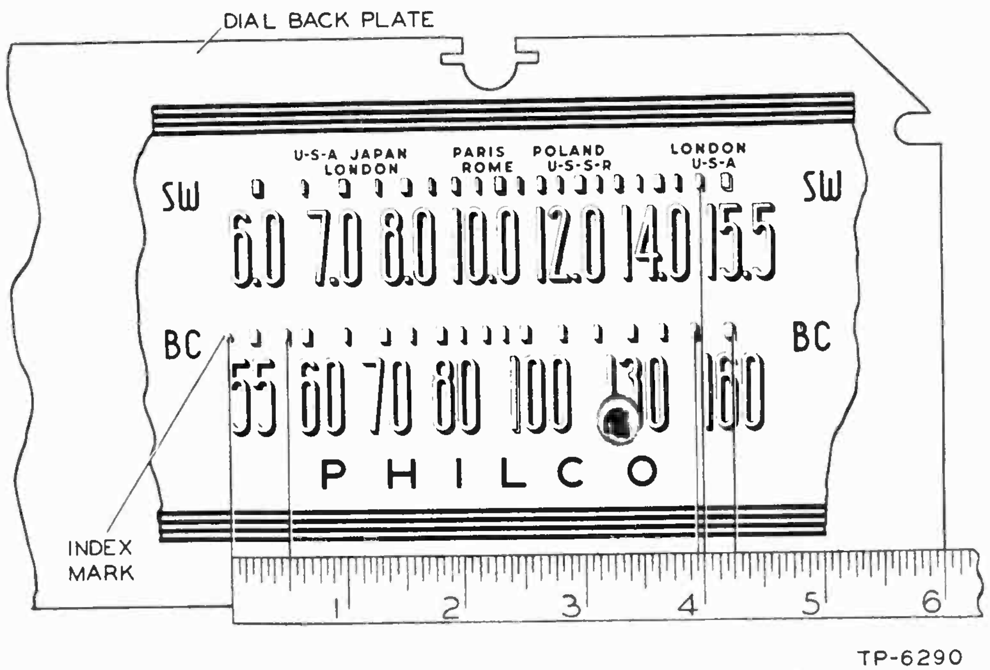

Figure 7. Calibration Measurements for Dial Backplate

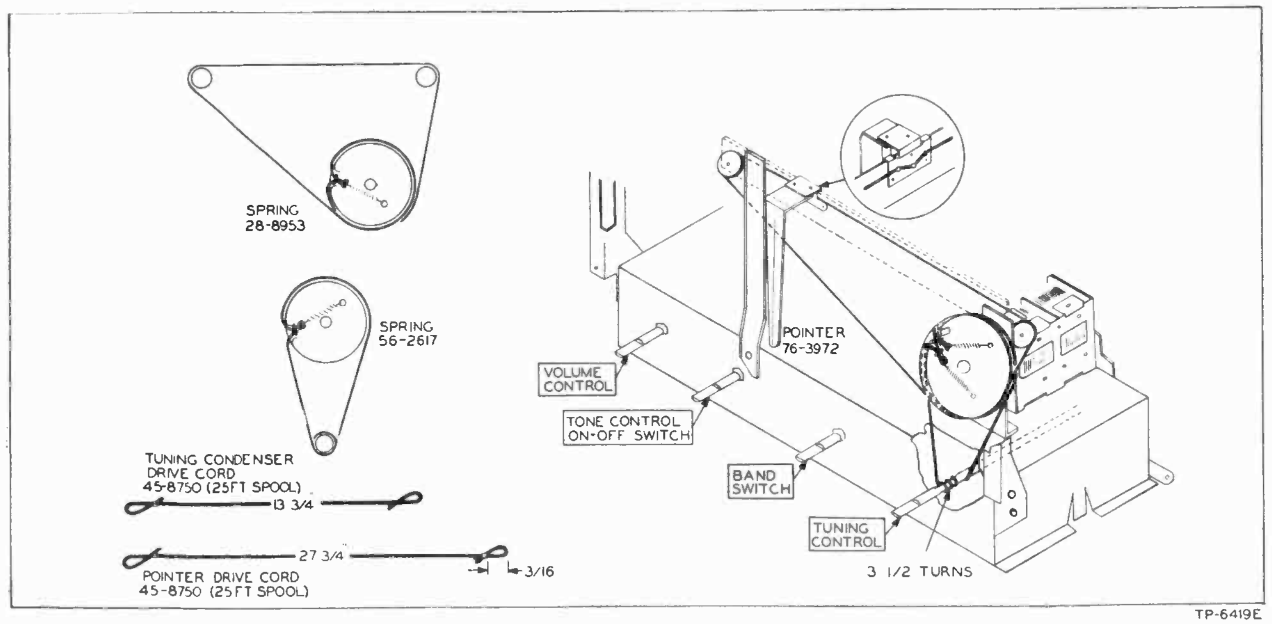

Figure 8. Drive-Cord Installation Details

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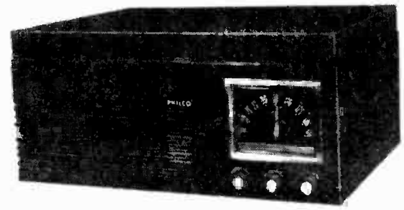


MODEL 49-1405

SPECIFICATIONS

CABINET .... Wood, mahogany finish
RADIO CIRCUIT .... Five-tube superheterodyne
FREQUENCY RANGE .... 540—1600 kc.
AUDIO OUTPUT .... 2 watts
OPERATING VOLTAGES .. 105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION
Radio only .... 35 watts
Radio-phonograph .... 50 watts
AERIAL .... Built-in loop; terminal also provided for external aerial
INTERMEDIATE FREQUENCY .... 455 kc.
PHILCO TUBES (5) 12BE6, 12BA6, 6AQ6, 35L6GT, 50Y7GT
PHONOGRAPH .... Philco Automatic Record Player Model M-9C (for service information see manual PR-1599)

Circuit Description

Philco Radio-Phonograph Model 49-1405 is a table-model 5-tube superheterodyne radio with a Model M-9C Automatic Record Changer. For service information on the record changer, refer to the Service Manual (PR-1599) for Model M-9C Automatic Record Changer.

Reception is provided on the standard broadcast band.

The built-in loop aerial normally provides adequate signal pickup; however, a terminal is provided for an external aerial, if additional pickup is required.

The loop works directly into a 12BE6 converter; no series padder is required for the oscillator, as the tuning-condenser plates are shaped for tracking.

The i-f stage employs a 12BA6, operating at 455 kc. Both transformers are permeability-tuned in both primary and secondary windings.

The diode section of a 6AQ6 provides detection and a-v-c voltage; the triode section is the 1st audio amplifier, and is resistance-coupled to a 35L6GT beam-power output amplifier, which works into a PM speaker.

The d-c operating voltages are supplied by a voltage-doubling circuit using a 50Y7GT rectifier and a resistance-capacitance filter.

The 120,000-ohm resistor, R103, is connected between B— and the chassis, to prevent hum due to condenser leakage under high-humidity conditions.

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 indications of trouble.

2. Measure the resistance between B+ (pin 4 of the 50Y6GT) 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 2000 ohms, check condenser C102A for leakage or a short. This resistance value, which is much lower than normal, does not represent a quality check of this condenser; it is the lowest value which will permit the rectifier to operate safely while the voltage checks of Section 1 (power supply) are performed.

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.

TROUBLE SHOOTING

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 (audio circuits); if not, isolate and correct the trouble in this section.

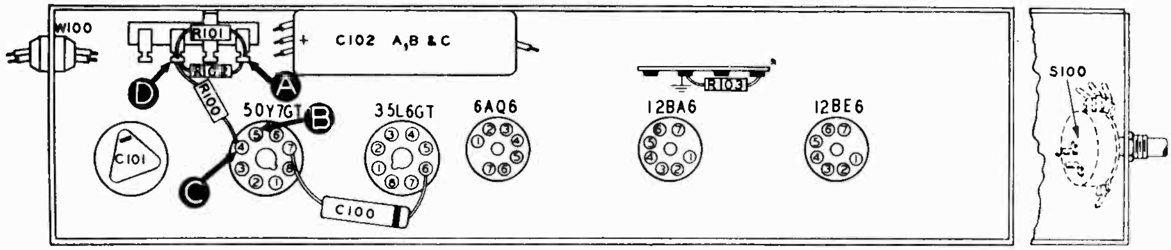


Figure 1. Bottom View, Showing Section 1 Test Points

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	212 volts	No voltage	Defective: 50Y7GT, I100. Shorted: C100, C101, C102A.
			Low voltage	Leaky: C100, C101, C102A.
			High voltage	Open: R100.
3	D	205 volts	No voltage	Defective: 50Y7GT. Shorted: C102B. Open: R100.
			Low voltage	Leaky: C102B.
			High voltage	Open: R101, R102, T200*.
4	A	120 volts	No voltage	Shorted: C102C. Open: R101 and R102 (in parallel).
			Low voltage	Leaky: C102C.

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

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.

TROUBLE SHOOTING

Set the radio volume control to maximum, and the radio-phono switch as indicated in the chart.

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.

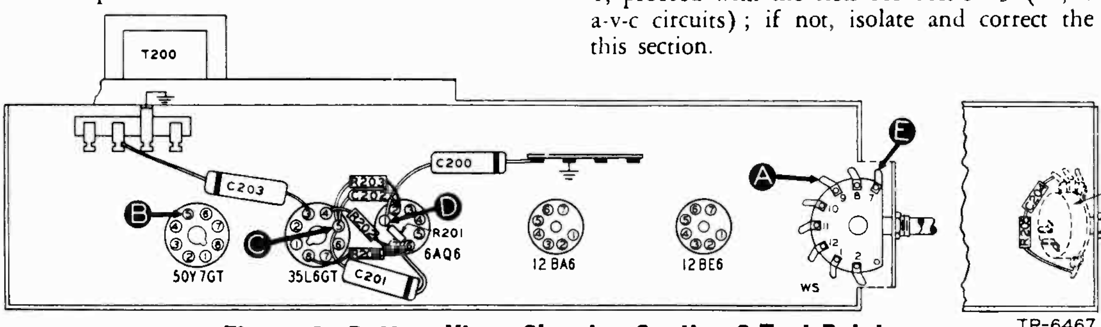


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	RADIO-PHONO SWITCH	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (a)	A	Radio	Loud, clear speaker output with moderate generator input.	Trouble in this section. Isolate by the following tests.
1 (b)	E	Phono		
2	C	Radio	Clear output with strong input.	Defective: LS200, 35L6GT. Shorted: T200, C203, C201, C204, C202. Open: T200, R204, R205, R203. Leaky: C203.
3	D	Radio	Loud, clear output with moderate input.	Defective: 6AQ6. Shorted: C200. Open: C201, R202, R201. Leaky: C201.
4	A	Radio	Loud, clear output with moderate input.	Open: R200 (rotate), C200, WS. Shorted: WS.
5	E	Phono	Same as step 4.	Open or shorted: WS.

Listening Test: Distortion may be caused by leaky C201. Distortion on strong signals may be caused by shorted or leaky C200.

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 radio volume control to maximum, and the radio-phono switch to the radio position. Rotate the tuning control until the tuning condenser is fully meshed.

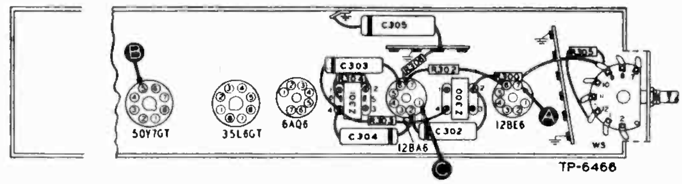


Figure 3. Bottom View, Showing Section 3 Test Points

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 "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	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: 12BA6, 6AQ6. Shorted: C300B, C301A, C301B, C301C, C301D, C303, C304, WS, L300B, L301A, L301B. Open: R302, R303, R304, R305, L300B, L301A, L301B, R301, C301A, C301B. Leaky: C303, C304. Misaligned: Z301.
3	A	Loud, clear output with weak input.	Defective: 12BE6*. Shorted: C400A*, C400B*, C300A, L300A, L300B, C302. Open: L300A, R300, C300A, C300B. 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 radio volume control to maximum, and the radio-phono switch to the radio position. Set the tuning control and signal-generator frequency as indicated in the chart.

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

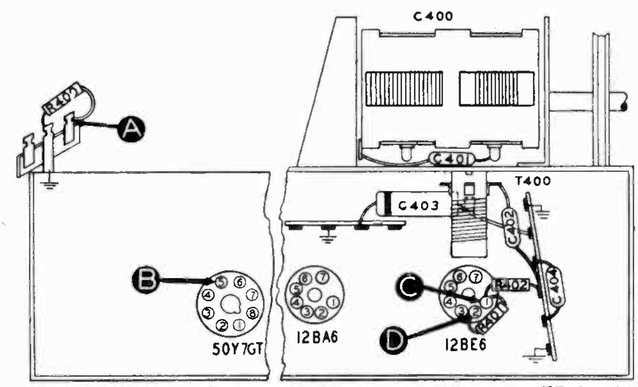


Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	SIG. GEN. FREQ.	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 this section. Isolate by the following tests.
2	C—D Osc. Test (see note below).		Rotate through range.	Negative	Defective: 12BE6. Shorted: C400, C400B, C402, C401, L400A, L400B. Open: C402, L400A, L400B, R401, R402.
3	A	1000 kc.	Tune to signal.	Same as step 1.	Shorted: LA400, C400, C400A. Open: LA400, C404.

OSCILLATOR TEST: Connect the positive lead of a high-resistance voltmeter to the oscillator cathode (pin 2 of 12BE6), test point D; 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 within the range given in a chart (measured with a 20,000-ohms-per-volt meter) throughout the tuning range.

MODEL 49-1405

PHILCO CORP.

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) indicates a general replacement item. The part numbers of these items may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values given 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.	61-0107*
C101	Condenser, electrolytic, filter, 20 mf.	30-2568-22
C102	Condenser, electrolytic, 3-section	30-2575-26
C102A:	Condenser, filter, 40 mf.	Part of C102
C102B:	Condenser, filter, 40 mf.	Part of C102
C102C:	Condenser, filter, 20 mf.	Part of C102
I100	Pilot lamp	34-2605
R100	Resistor, filter, 180 ohms	66-1184340*
R101	Resistor, filter, 10,000 ohms	66-3103340*
R102	Resistor, filter, 10,000 ohms	66-3103340*
R103	Resistor, isolating, 120,000 ohms	66-4123340*
S100	Switch, power on-off	Part of R200
W100	Line cord and plug	L2183*
WS-A	Switch-wafer section	Part of 42-1847-1†

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, r-f by-pass, 220 mmf.	66-122001001*
C203	Condenser, tone compensation, .004 mf.	30-4623*
C204	Condenser, tone compensation, .01 mf.	61-0120*
R200	Volume control (with power on-off witch), 2 megohms, tapped at 1 megohm	33-5535-15
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, 180 ohms	66-1183340*
R205	Resistor, tone compensation, 47,000 ohms	66-3473340*
LS200	Loud-speaker, PM	36-1629
T200	Transformer, output	32-8242-2
WS-B	Switch-wafer section	Part of 42-1847-1†

† 42-1847-1 Wafer switch, single wafer, radio-phono (includes WS-A, WS-B, WS-C).

SECTION 3

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

Reference Symbol	Description	Service Part No.
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, fixed, i-f filter	Part of Z301
C301D	Condenser, fixed, i-f filter	Part of Z301
C302	Condenser, a-v-c filter, .05 mf.	61-0122*
C303	Condenser, screen by-pass, .01 mf.	61-0120*
C304	Condenser, plate by-pass, .003 mf.	61-0109*
C305	Condenser, r-f by-pass, .1 mf.	61-0113*
R300	Resistor, a-v-c filter, 22,000 ohms	66-3223340*
R301	Resistor, a-v-c filter, 2.2 megohms	66-5223340*
R302	Resistor, screen dropping, 100,000 ohms	66-4103340*
R303	Resistor, plate dropping, 1000 ohms	66-2103340*
R304	Resistor, a-v-c filter, 47,000 ohms	66-3473340*

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
R305	Resistor, diode load, 470,000 ohms	66-4473340*
R306	Resistor, bias, 100 ohms	66-1103340*
TC300A	Tuning core, 1st i-f primary	Part of Z300
TC300B	Tuning core, 1st i-f secondary	Part of Z300
TC301A	Tuning core, 2nd i-f primary	Part of Z301
TC301B	Tuning core, 2nd i-f secondary	Part of Z301
WS-C	Switch-wafer section	Part of 42-1847-1†
Z300	Transformer, 1st i-f	32-4160
Z301	Transformer, 2nd i-f	32-4240

SECTION 4

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang	31-2727
C400A:	Condenser, trimmer, aerial	Part of C400
C400B:	Condenser, trimmer, oscillator	Part of C400
C401	Condenser, ceramic, 10 mmf.	30-1224-6
C402	Condenser, ceramic, 56 mmf.	60-00515307*
C403	Condenser, r-f by-pass, .03 mf.	45-3500-1*
C404	Condenser, aerial coupling, 5 mmf.	60-90505007*
LA400	Loop aerial	76-2127-9
R400	Resistor, leakage, 150,000 ohms	66-4153340*
R401	Resistor, grid return, 22,000 ohms	66-3223340*
R402	Resistor, parasitic suppressor, 33 ohms	66-0333340*
T400	Transformer, oscillator	32-4190-2

† 42-1847-1 Wafer switch, single wafer, radio-phono (includes WS-A, WS-B, WS-C).

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Parts	
Bezel	56-5931
Cabinet	10727
Knob (3)	54-4527-9
Phonograph cover	45-6454
Window, acetate	54-4630
Dial Scale and Hardware	
Dial cord (25-ft. spool)	45-8750*
Pointer	56-5956FCP
Spring, pointer	56-6299
Scale	54-5022
Shaft assembly, drive	76-3731-1
Spring, drive cord	56-2617
Pilot-lamp-socket assembly	27-6233-1
Bracket-and-clip assembly	76-4164
Bracket	56-5928FA3
Clip	56-3545-6FA3
Bracket, rear	27-9508
Socket, octal	27-6174
Socket, miniature	27-6226
Wafer, condenser mounting	27-9508
Crystal pickup cartridge, P-30	35-2671-1
Needle for P-30 crystal	35-2670
Pickup cartridge and needle assembly	45-1609

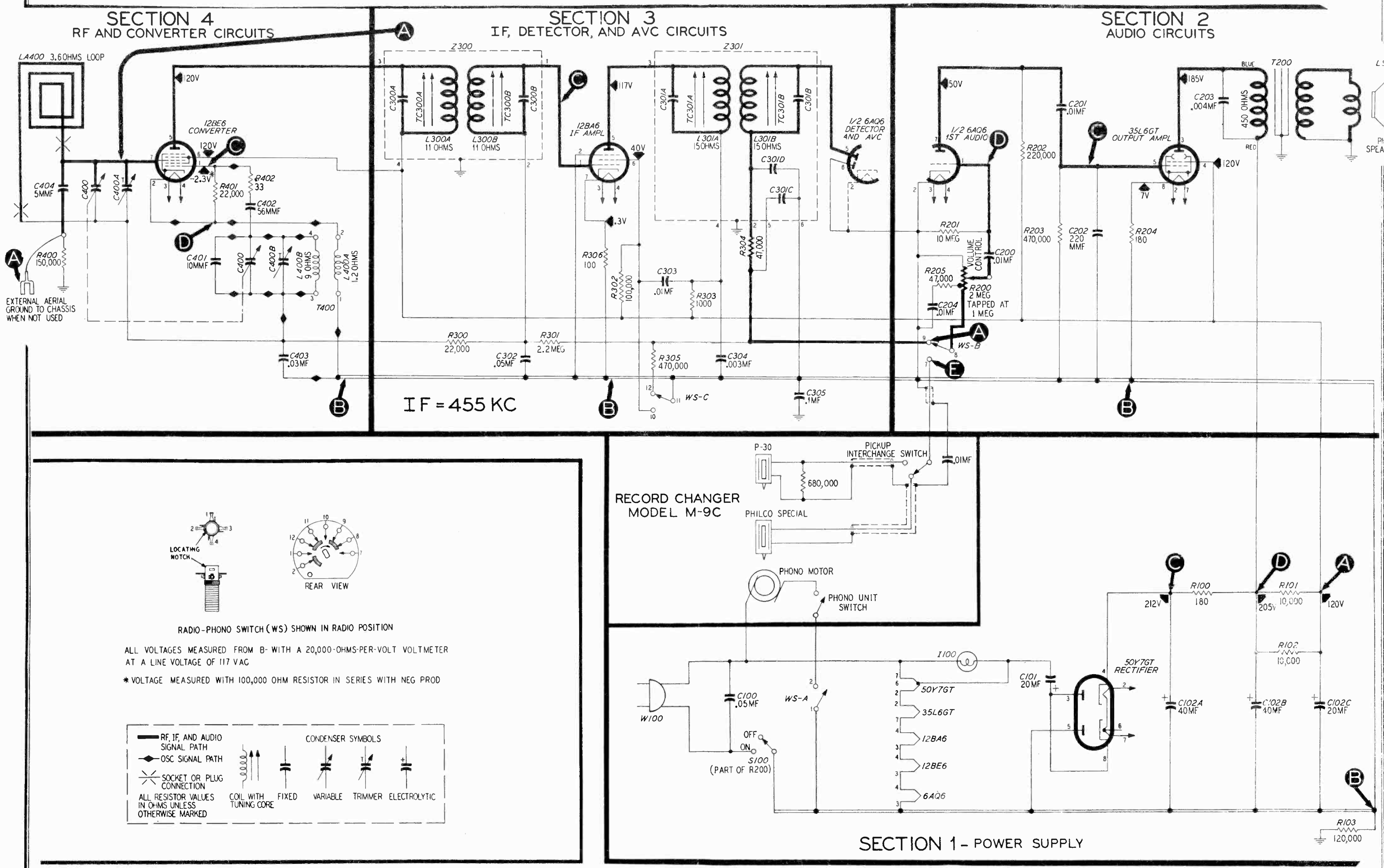


Figure 5. Philco Model 49-1405, Sectionalized Schematic Diagram, Showing Test Points

ALIGNMENT PROCEDURE

DIAL—With tuning condenser fully meshed, set pointer to index mark at low-frequency end of dial, beyond "55".

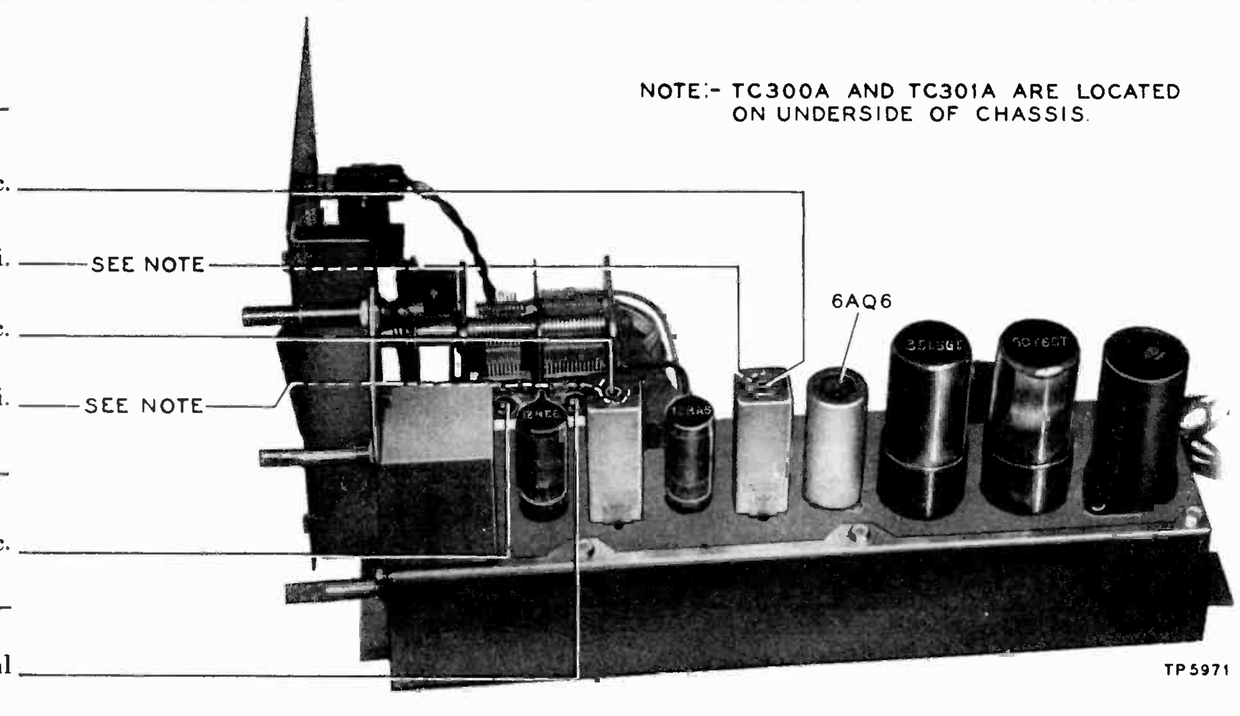
RADIO CONTROLS—Set volume control to maximum, and radio-phono switch to radio position.

OUTPUT METER—Connect to terminals indicated in figure 6.

SIGNAL GENERATOR—Connect ground lead to B—, test point B in figure 4, and connect output lead as indicated in chart. Use modulated output.

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

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-mf. condenser to external-aerial lead. Make sure that radio loop aerial is connected to radio.	455 kc.	Tuning condenser fully meshed.	Adjust, 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 for maximum output.	C400B—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C400A—aerial



RADIATING LOOP: Make up a 6—8-turn, 6-in-diameter loop, using insulated wire; connect to signal-generator leads and place near radio loop aerial.

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	LS—loud-speaker	W—wire or cable
I—pilot lamp	R—resistor	WS—wafer switch
L—choke or coil	S—switch	Z—electrical assembly
LA—loop aerial	T—transformer	

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, detector, and a-v-c circuits
400-series components are in Section 4—the r-f and converter circuits

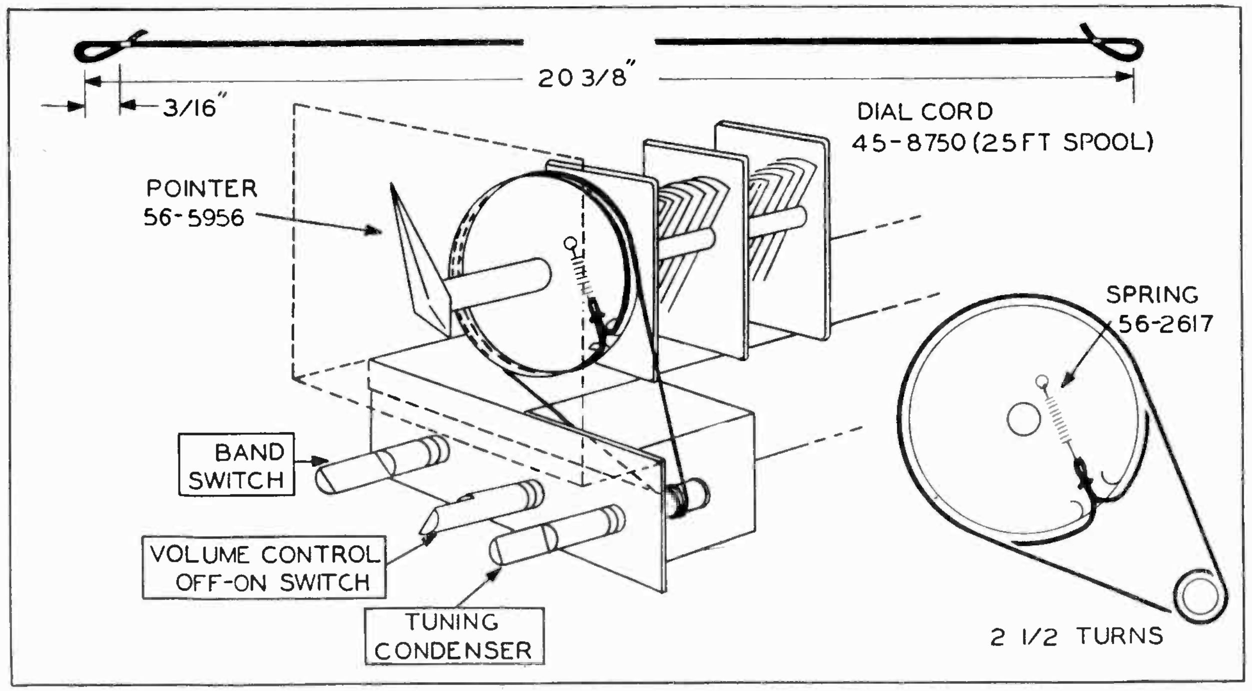
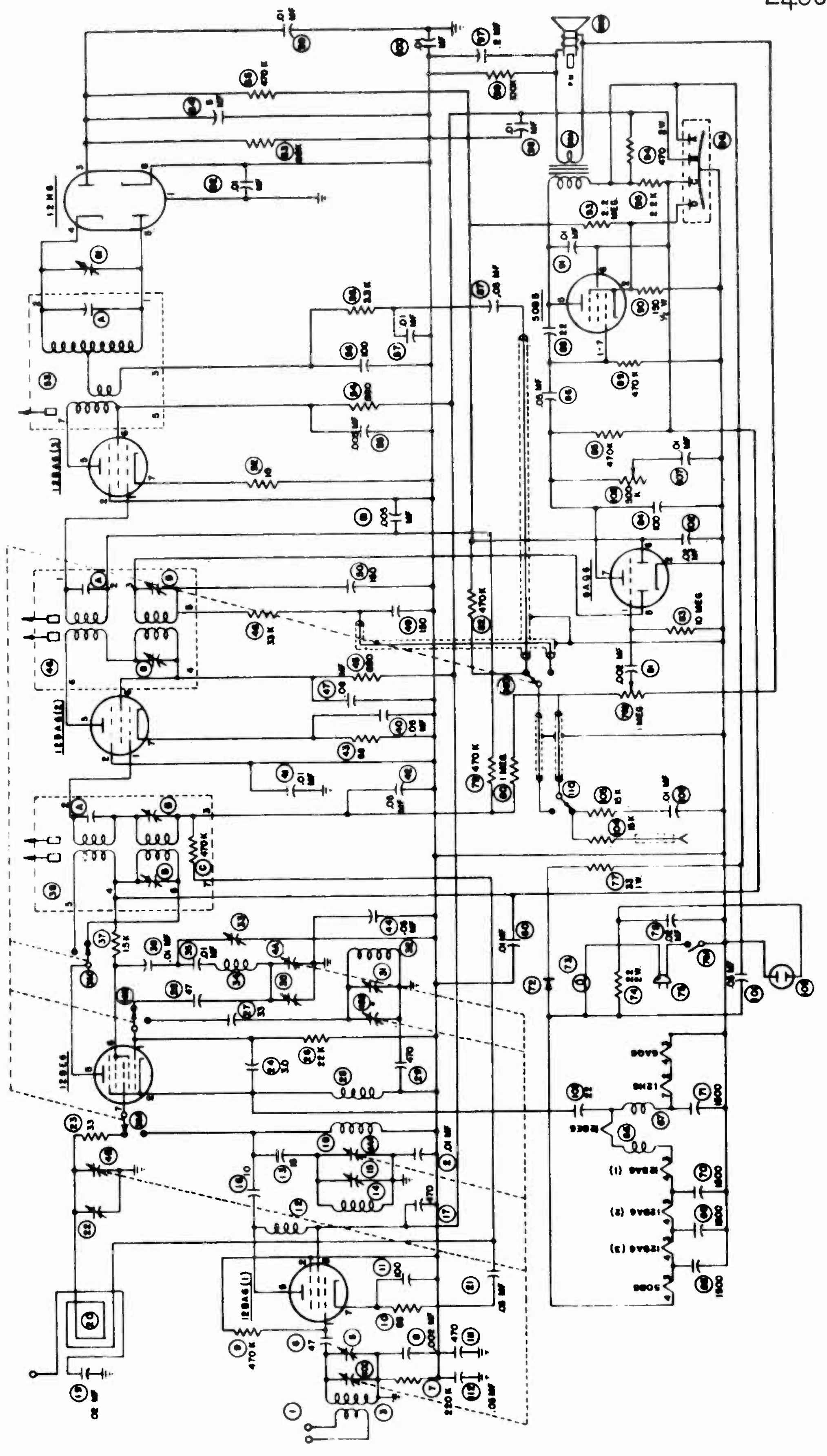


Figure 7. Drive-Cord Installation Details TP-6471

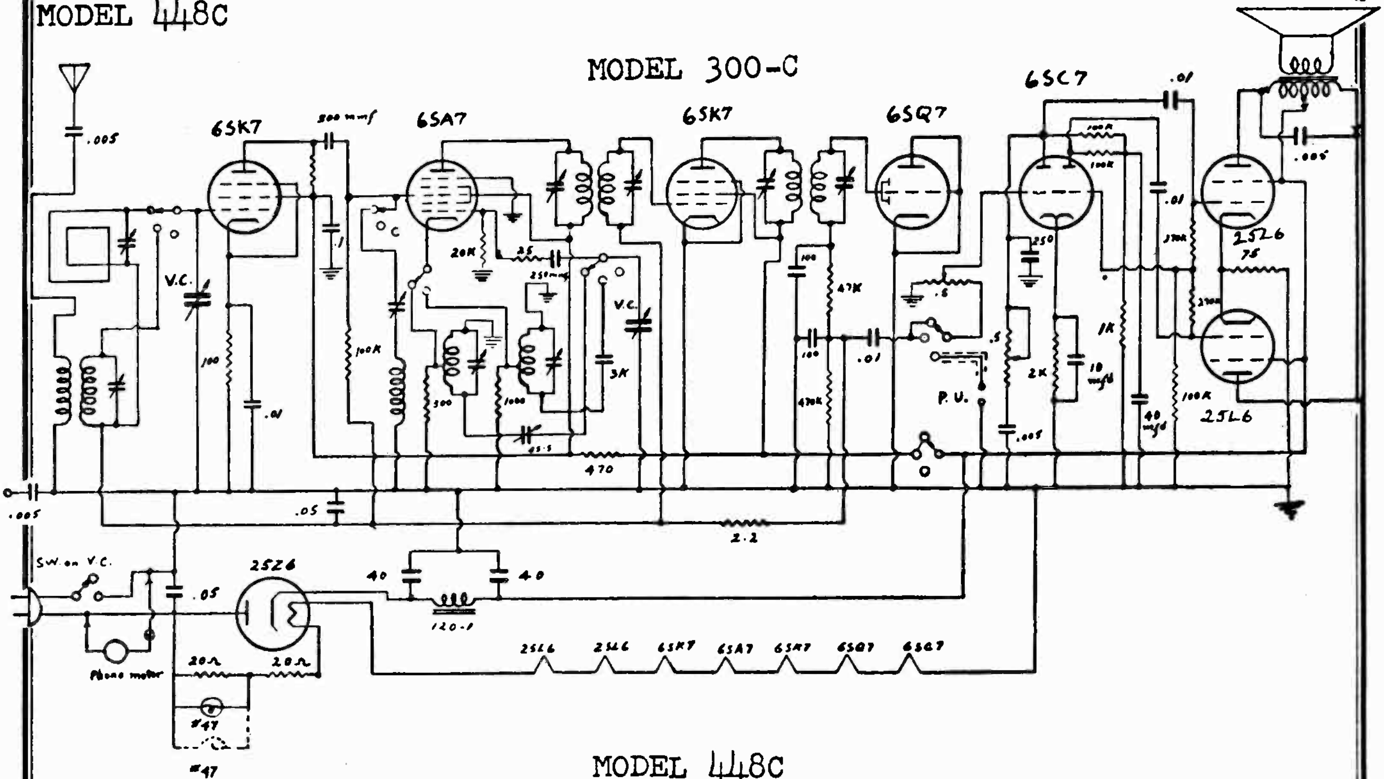
PHILHARMONIC RADIO CORP.

MODELS 248C, 248CB



MODEL 300-C
MODEL 448C

PHILHARMONIC RADIO CORP.



MODEL 448C

TYPE: Twelve-tube FM-AM superheterodyne.

FREQUENCY RANGES: FM, 88-108 Mc.
AM, 540-1600 Kc.

INTERMEDIATE FREQUENCIES: FM, 10.7 Mc. AM, 456 Kc.

POWER SOURCE: 105-125 volts, 60 cycles.

POWER CONSUMPTION:
Radio, 80 watts.
Radio and Phonograph, 102 watts.

INSTALLATION.

ANTENNAS.— For AM operation, the loop antenna attached to the rear of the chassis is generally the most satisfactory. However, terminals marked **A** and G are provided on the loop for the connection of an external antenna and ground, which may be used if desired.

For the reception of local FM stations, a folded-dipole antenna is provided in the cabinet. If reception of other than strictly local FM stations is desired, a good external FM antenna should be installed and connected with a 300-ohm balanced line to the input terminals on the rear of the chassis next to the phonograph input jack 124. The internal dipole must be disconnected when using the external antenna, and vice-versa.

POWER CONNECTIONS.— Connect the power cord to an alternating-current supply of 105-125 volts, 60 cycles. Be sure that the phonograph-motor cord is plugged into receptacle 121, the speaker plug 123 into receptacle 122, and the phonograph-pickup cord into phonograph jack 124.

CONTROLS.— The control knobs on the front panel perform the following functions. The numbers are from left to right.

1. Power switch and volume control.
2. Tone control. Clockwise rotation gives more high-frequency response.
3. Selector switch. Left position, AM radio; center, FM radio; right, phonograph.
4. Tuning control.

OPERATION.

RADIO.— Start the set by turning the volume control clockwise about one-third of the way.

Set the selector switch on **AM** or **FM** as desired.

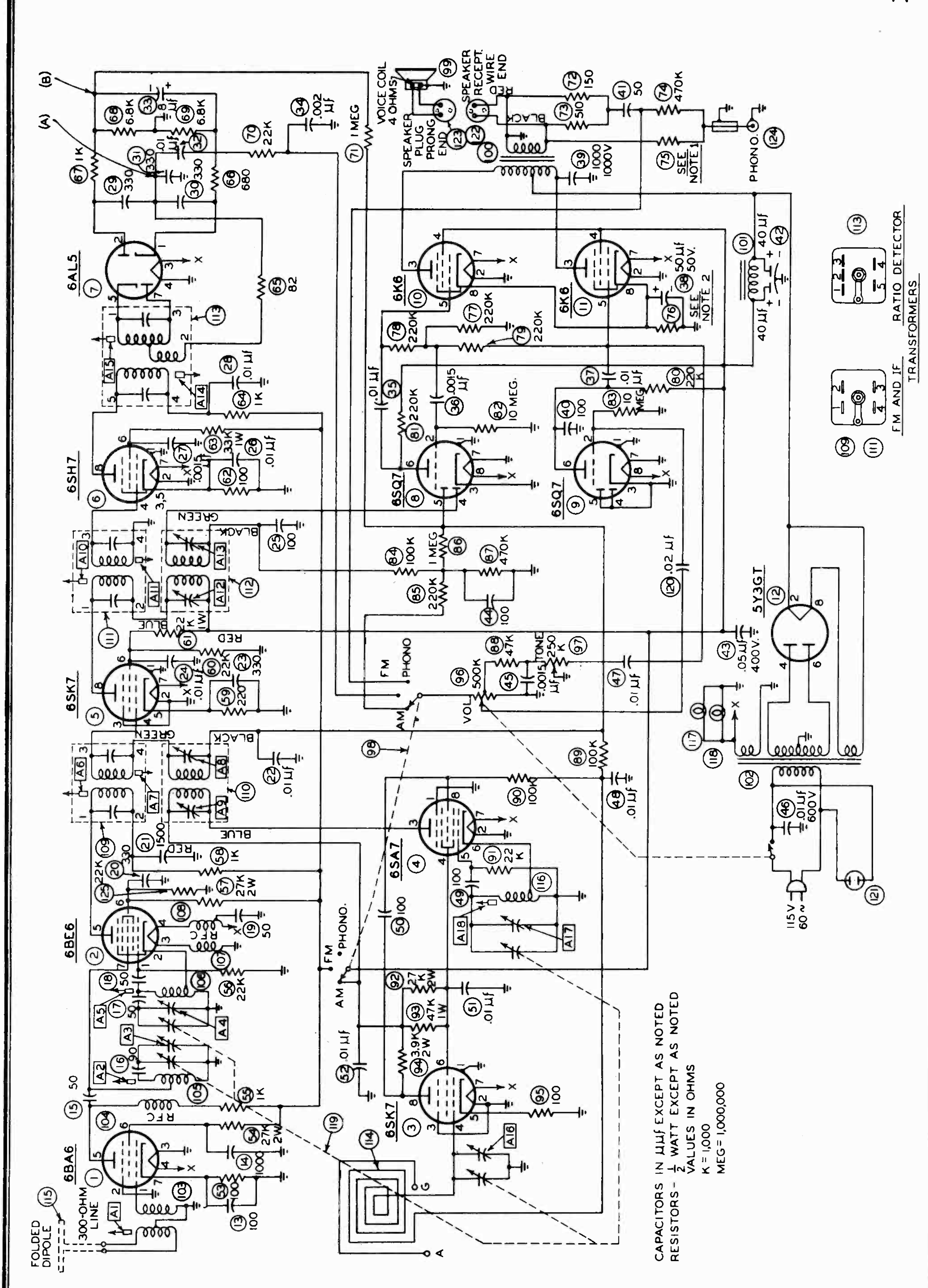
Turn the tuning control until the pointer indicates the frequency of the desired station. When the station comes in, slowly rotate the knob back and forth and determine the exact center position, where the background noise disappears or is sharply reduced, and the signal comes in clearly with the greatest volume. This is the correct tuning position, and careful adjustment is required, especially on FM, if the full rich-tone capability of the receiver is to be realized. A strong **FM** station may also be received, with considerable distortion, at positions slightly above and below the correct center position. This condition is quite normal.

Adjust the tone control for the most pleasing operation.

PHONOGRAPH.— Set the selector switch on the right-hand position. Operate the record changer in accordance with the accompanying instructions.

PHILHARMONIC RADIO CORP.

MODEL 448C



MODEL 448C

PHILHARMONIC RADIO CORP.

ALIGNMENT PROCEDURE
Read Carefully before Attempting Alignment

A-M ALIGNMENT

1. TUNING CAPACITOR fully meshed. Adjust dial pointer to reference dot at the low-frequency end of the scale.
2. VOLUME CONTROL maximum clockwise.
3. TONE CONTROL maximum clockwise.
4. SELECTOR SWITCH on AM (left-hand position).
5. SIGNAL GENERATOR.— Use standard A-M Signal Generator with approximately 30 per cent modulation at 400 cycles.
6. SIGNAL-GENERATOR COUPLING.-Low side grounded to chassis. High side connected through 0.01 mfd capacitor to coupling point.
7. LOOP COUPLING.— For loop coupling, use a Standard Signal Injection Loop according to specifications. If a standard loop is not available, make a loop with 5 or 6 turns of insulated wire, close-wound on a 3" to 4" diam form. Place the loop coaxially with and at least 10 inches back of the receiver loop. Connect to the signal generator through a resistor of from 100 to 400 ohms.
8. RECEIVER OUTPUT.

   (A) Use a d-c electronic voltmeter similar to the VoltOhmyst, low side to chassis, high side to AVC terminal of loop.
   (B) Use a rectifier-type a-c voltmeter or a standard output meter across the speaker voice coil.

	SIGNAL GENERATOR			RECEIVER	RECEIVER OUTPUT		ADJUST	REMARKS
	FREQ, KC	APPROX. SIGNAL LEVEL	COUPLE TO	DIAL SETTING	(A) AVC VOLTS INCREASE	(B) VOICE COIL, WATTS		
1.	455	800 uv	Pin 8, 6SA7	Near 600	-0.6	2.0	A-12, A-13, A-8, A-9	Adjust for maximum watts or AVC. Check for smooth round-top selectivity curve.
2.	1600	400 uv/m	Loop	1600 (Capacitor wide open)	-0.6	2.0	A-17, A-16	Adjust for maximum output.
3.	1400	400 uv/m	Loop	Near 1400	-0.6	2.0	A-16	Tune to signal and adjust A-16 for maximum output.
4.	600	400uv/m	Loop	Near 600	-0.6	2.0	A-18	Rock tuning control and simultaneously adjust A-18 for maximum output.
5.	Repeat steps 2, 3, and 4 in order until no further improvement can be made.							

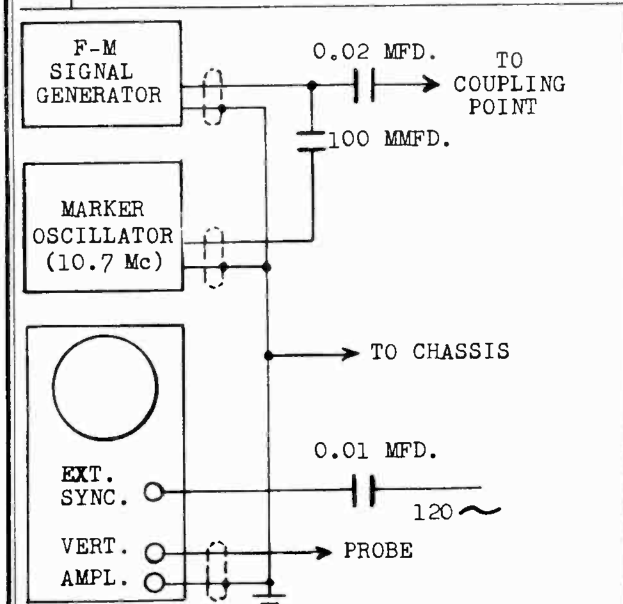


DIAGRAM I. F-M I-F ALIGNMENT.

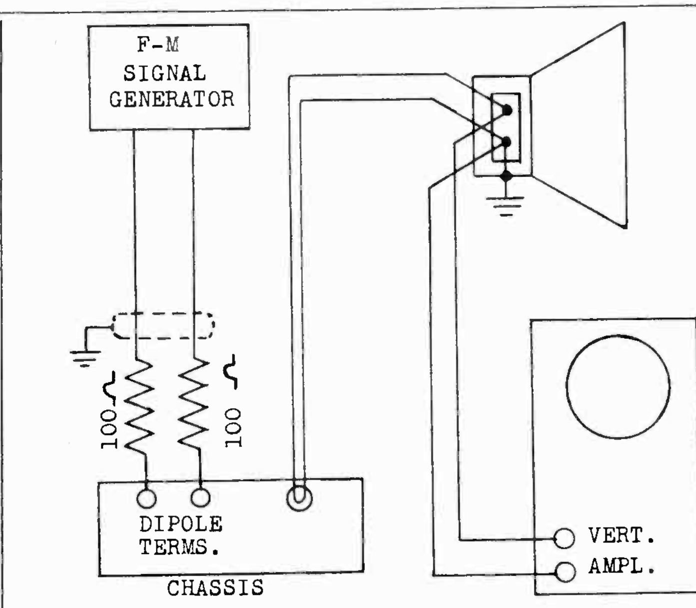


DIAGRAM II. F-M R-F ALIGNMENT.

PHILHARMONIC RADIO CORP. MODEL 448C

F-M ALIGNMENT
Using Frequency-Modulated Signal Generator and Oscilloscope

ALIGNMENT OF I-F STAGES

GENERAL.— When the designated F-M signal from the signal generator is applied to the I-F amplifier or ratio detector, the output at point (A) viewed on an oscilloscope with a 60-cycle linear horizontal sweep is represented by pattern A. Pattern B shows the output at point (B) with the 8 mfd capacitor 33 disconnected. Patterns more useful for alignment purposes are obtained by operating the horizontal linear sweep of the scope at twice the modulation frequency or 120 cycles per second. This gives a double trace on each pattern, one trace representing the increasing-frequency half of the modulation cycle and the other representing decreasing frequencies, patterns I and V. When properly aligned, the two traces of pattern V coincide.

CENTER-FREQUENCY MARKER.— An additional requirement for proper alignment is that the signal generator must operate at the correct center frequency. The 10.7 Mc signal of the marker oscillator is used to check the center frequency. As the F-M signal sweeps its band, it produces a beat frequency with the marker signal, which decreases as the center point is approached and increases on the other side of center. These markers are shown properly centered in patterns II and VI. Because of the amplitude rejection of the ratio detector, it is difficult to determine the center point of the markers in pattern II, but they can readily be located by temporarily shorting terminals 1 and 2 or 2 and 3 of ratio-detector transformer 113. The resulting effect is shown in patterns III and IV. It is advisable to remove the marker signal when adjusting for coincidence of patterns or straightness of crossover lines, but checks should be made with the marker to make sure that the signal generator has not drifted from the correct center frequency. Pattern VII shows the effect when the signal generator is off center. The markers may be entirely separated or partially overlap. To correct this condition, readjust the center frequency of the signal generator until the markers come together and the combined marker length is a minimum, as in pattern VIII. Then realign to give pattern V or VI.

PROCEDURE

F-M SIGNAL GENERATOR, center frequency 10.7 Mc/sec, 225 Kc deviation, 450 Kc total sweep, at 60 cycles/sec. Use only enough output for satisfactory wave forms.

MARKER OSCILLATOR, 10.7 Mc/sec fixed, crystal-controlled or accurately calibrated. Use no more output than necessary. Excessive amplitude will distort the patterns.

COUPLING OF SIGNAL GENERATOR AND MARKER OSCILLATOR.— See Diagram I. Low side to chassis. Combined output through 0.002 mfd to coupling point.

OSCILLOSCOPE.— Vertical amplifier at maximum gain. Linear horizontal sweep synchronized at 120 cycles per second by ripple voltage from pin 2 of rectifier 5Y3GT of the receiver. Do not use internal Y-signal synchronization. This will result in off-center alignment.

SELECTOR SWITCH on FM (center position).

VOLUME AND TONE CONTROLS, maximum clockwise.

HOOKUP, as in Diagram I.

NOTE. Unless receiver is seriously misaligned, omit steps 1 and 2.

	SIGNAL GENERATOR		RADIO DIAL	OSCILLOSCOPE		ADJUST	REMARKS
	CENTER FREQ.	COUPLING POINT		VERTICAL INPUT	PATTERN NO.		
1	10.7 Mc	Pin 4 6SH7	Near 90 Mc. Tune off stations.	High side to point (A). Low side to chassis.	I, II III, IV	A-14 A-15 alternately	Adjust for maximum amplitude, symmetry, and straightness of crossover, as in patterns I and II. Verify position of center-frequency marker as in patterns III and IV.
2	10.7 Mc	Pin 7 6BE6	Near 90 Mc. Tune off stations.	High side to point (B). Low side to chassis.	V, VI	A-11 A-10 A-7 A-6 A-14	Disconnect 8 mfd capacitor 33 from point (B). Adjust for maximum amplitude, symmetry, and coincidence, as in pattern V, maintaining markers in center as in pattern VI.
3	10.7 Mc	Pin 7 6BE6	Near 90 Mc. Tune off stations.	High side to point (A). Low side to chassis.	I, II	A-6 A-7 A-10 A-11 A-14 A-15	Reconnect capacitor 33 to point (B). Recheck adjustments for maximum amplitude, symmetry and straightness of crossover, as in patterns I and II. Check marker positions as in patterns III, IV.

MODEL 448C

PHILHARMONIC RADIO CORP.

F-M ALIGNMENT (Continued)

Alignment of R-F Section

HOOKUP, as in Diagram II.

SELECTOR SWITCH on FM.

VOLUME AND TONE CONTROLS, maximum clockwise.

F-M SIGNAL GENERATOR, 50 Kc deviation, 100 Kc total sweep at any rate from 60 to 400 cycles per second.

OSCILLOSCOPE.— Adjust horizontal sweep to the modulation frequency of the signal generator and lock it into step with the internal (Y-signal) synchronizing control.

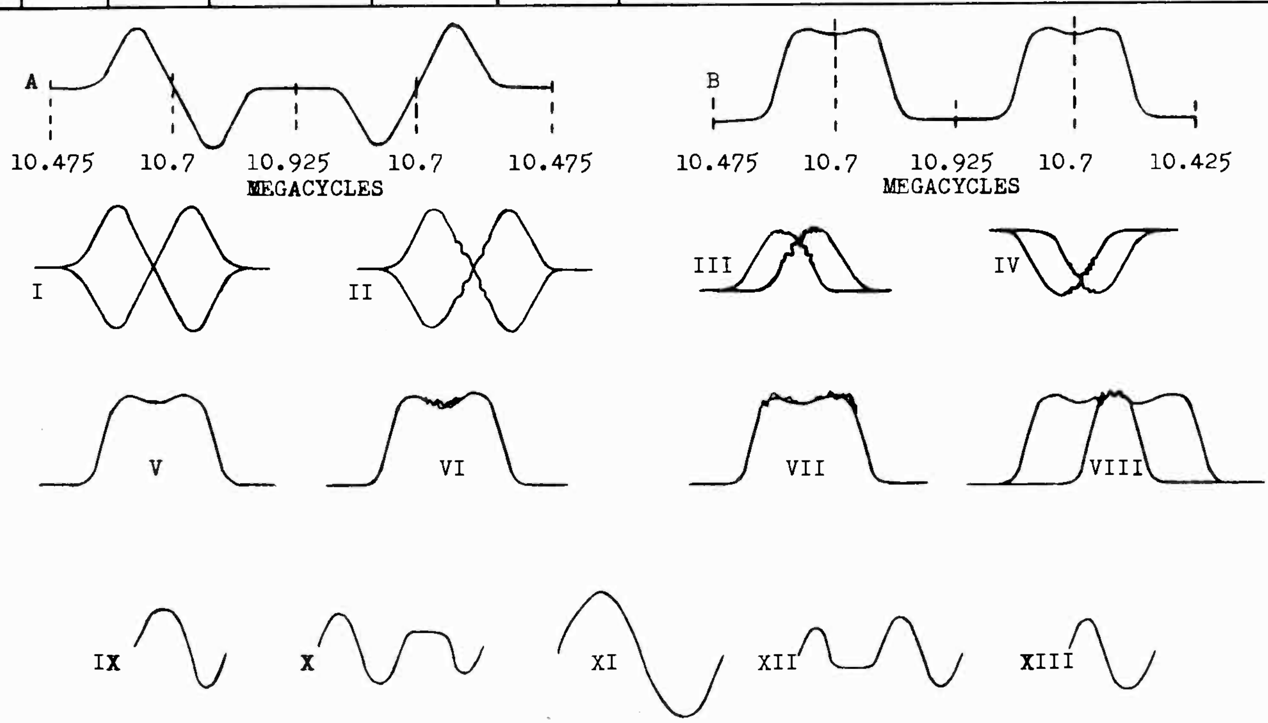
TUNING.— Patterns IX through XIII are wave forms that will show on the oscilloscope as the tuning control is tuned through the F-M signal. Pattern XI represents the correct tuning position; the pattern is a pure sine wave of greater amplitude than the side patterns.

Patterns IX and XIII represent the two side positions where the signal is also received, but distorted and with less amplitude.

CAUTION

When aligning, do not confuse the correct position, Pattern XI, with either side position, Patterns IX and XIII. When tuned correctly, a slight movement of the tuning control to either side will give the highly distorted double-frequency patterns X and XII.

	SIGNAL GENERATOR		RADIO DIAL	ADJUST	TO GIVE SCOPE PATTERN	REMARKS
	FREQ.	DEVIATION				
4	108 Mc	50 Kc	108 (Capacitor open)	A-4 (A-3 tight)	XI	Tighten A-3, then adjust A-4 to produce Pattern XI. If two positions of A-4 are found giving the same amplitude of Pattern XI, use the one of higher frequency (A-4 backed out).
5	87.8 Mc	50 Kc	Capacitor closed.	A-5 (A-3 tight)	XI	Adjust to produce Pattern XI. Repeat steps 4 and 5 until no further adjustment is necessary.
6	105 Mc	50 Kc	Near 105	A-3	XI	Rock tuning control and simultaneously adjust A-3 for maximum amplitude of Pattern XI.
7	90 Mc	50 Kc	Near 90	A-2	XI	Rock tuning control and simultaneously adjust A-2 for maximum amplitude of Pattern XI. Repeat steps 6 and 7 until there is no further improvement.
8	100 Mc	50 Kc	Near 100	A-1	XI	Tune to pattern XI. Adjust A-1 for maximum amplitude.



OSCILLOSCOPE PATTERNS

PHILHARMONIC RADIO CORP. MODEL 448C

F-M ALIGNMENT. MILLER-RESISTOR METHOD

Using An Unmodulated Signal Generator and D-C Electronic Voltmeter.

GENERAL.— For this receiver, the Miller-resistor method, which takes its name from Dr. John M. Miller, is the most satisfactory of the alignment procedures which do not require the use of an F-M signal generator. With this method, resistance loading is applied to all the secondary circuits in the amplifier while the primary circuits are tuned to the desired center frequency. Then the primary circuits are loaded with the proper resistors while the secondary circuits are tuned.

The resistor across the primary reduces the Q of the transformer sufficiently to produce a single-peak response curve so that the secondary can be tuned to frequency. Its removal does not detune the secondary circuit appreciably. A similar effect is produced when the resistor is across the secondary, permitting accurate tuning of the primary. Small half-watt carbon resistors must be used with the shortest possible leads, to avoid over-all regeneration. Solder-tack the resistor across the transformer terminals.

SELECTOR SWITCH, on F-M (center position).

VOLUME AND TONE CONTROLS, maximum clockwise.

SIGNAL GENERATOR, unmodulated, accurately calibrated. Ranges 10 to 11 Mc and 87.5 to 108 Mc. Output adjustable from 100 to 100,000 microvolts. Connect low side to chassis, for steps 1-5.

OUTPUT INDICATOR.— D-C electronic voltmeter, preferably zero center, with input resistance of at least one megohm on low range, which should not exceed five volts full scale.

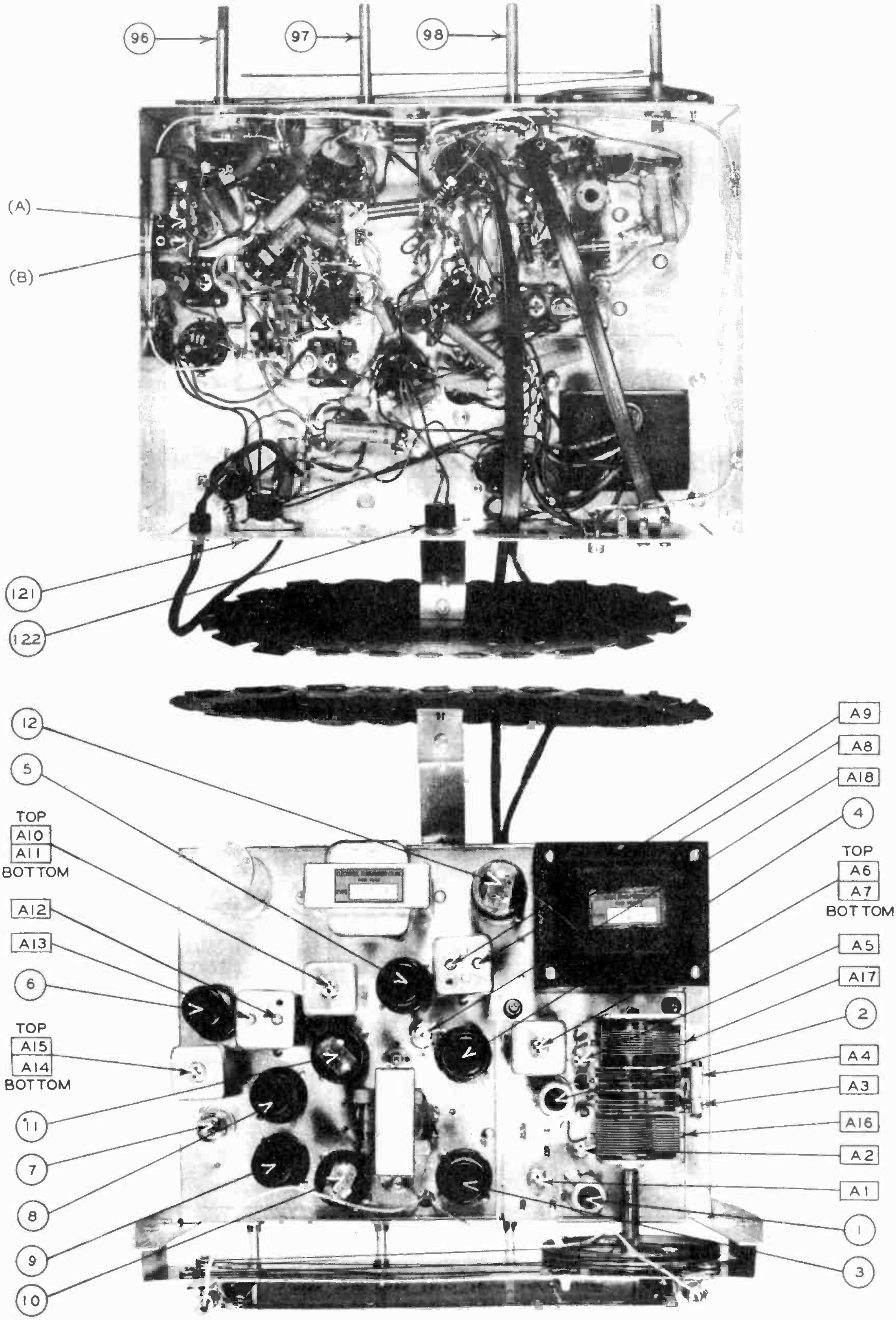
OUTPUT METER CONNECTIONS.— Probe to point (A), ratio-detector output, zero volts to chassis when correctly adjusted. Probe to point (B), F-M AVC source, reading the increase in negative voltage above the value obtained when no signal is applied. The reading with no signal is caused by the diode and amplifier-tube contact potentials, and will usually be about -0.5 to -0.7 volts.

	SIGNAL GENERATOR		RADIO DIAL.	VTVM TO POINT	MILLER RESISTORS		ADJUST	REMARKS
	FREQ. Mc	COUPLING	TUNE OFF STATIONS		OHMS	ACROSS		
1	10.7	0.002 mfd to pin 4 6SH7	Near 90 Mc	(B)	6800	1 and 3 of 113	A-14	Adjust for maximum deflection.
2	10.7	"	"	(A)	"	"	A-15	Adjust for zero deflection, between points of sharp polarity reversal. If approach to zero is slow with no reversal, turn A-15 in opposite direction.
3	10.7	0.002 mfd to pin 7 6BE6	"	(B)	6800 6800	3 and 4 of 111 3 and 4 of 109	A-10 A-6	Adjust for maximum deflection.
4	10.7	"	"	(B)	22000 22000	1 and 2 of 111 1 and 2 of 109	A-11 A-7	Adjust for maximum deflection.
5	10.7	"	"	(B)	None	--	--	Move input signal from 10 Mc through 11.5 Mc. Response curve should be flat-topped, symmetrical, and centered at 10.7 Mc. If not, repeat steps 1, 2, 3, 4 carefully.
6	108	See Remarks	108 Mc (Capacitor open)	(B)	None	--	A-4 (A-3 tight)	Signal generator across F-M dipole input terminals with 100-ohm 1/2-watt carbon resistor in each side. Tighten A-3, then adjust A-4 for maximum deflection. See note 1.
7	87.8	"	Near 88 Mc (Capacitor closed)	(B)	--	--	A-5	Adjust for maximum deflection. Repeat steps 6 and 7 until no change in adjustment is required.
8	105	"	Near 105 Mc	(B)	--	--	A-3	Rock tuning control and adjust A-3 for maximum deflection.
9	90	"	Near 90 Mc	(B)	--	--	A-2	Rock tuning control and adjust A-2 for maximum deflection. Repeat 8 and 9.
10	100	"	Near 100 Mc	(B)	--	--	A-1	Rock tuning control and adjust A-1 for maximum deflection.

NOTE 1. If two peaks are found, use position with A-4 backed out (higher frequency).

MODEL 448C

PHILHARMONIC RADIO CORP.



PHILHARMONIC RADIO CORP.

MODEL 448C

PARTS LIST

TUBES

No.	Type	Function
1	6BA6	R-F Amplifier (FM)
2	6BE6	Pentagrid Converter (FM)
3	6SK7	R-F Amplifier (AM)
4	6SA7	Pentagrid Converter (AM)
5	6SK7	First I-F Amplifier (AM-FM)
6	6SH7	Second I-F Amplifier (FM)
7	6AL5	Ratio Detector (FM)
8	6SQ7	Detector-Phase Inverter
9	6SQ7	First Audio Amplifier
10	6K6	Power Amplifier
11	6K6	Power Amplifier
12	5Y3GT	Full-Wave Rectifier

CAPACITORS

No.	Part	uf	uuf	Volts	
13	CD-1071-22		100	500	Mica
14	CD-1085-20		1000	300	Mica
15	CD-1254-2		50	500	Ceramic
16	CD-1107-100		90	500	Ceramic
17	CD-1106-110		50	500	Ceramic
18	CD-1254-2		50	500	Ceramic
19	CD-1254-2		50	500	Ceramic
20	CD-1259-40		330	350	Ceramic
21	CD-1259-49		1500	350	Ceramic
22	CD-1227-8	.01		400	Paper
23	CD-1259-40		330	350	Ceramic
24	CD-1227-8	.01		400	Paper
25	CD-1071-22		100	500	Mica
26	CD-1227-8	.01		400	Paper
27	CD-1227-2	.0015		400	Paper
28	CD-1227-8	.01		400	Paper
29	CD-1259-40		330	350	Ceramic
30	CD-1259-40		330	350	Ceramic
31	CD-1259-40		330	350	Ceramic
32	CD-1227-8	.01		400	Paper
33	CD-1252	8		100	Electr.
34	CD-1227-3	.002		400	Paper
35	CD-1227-8	.01		400	Paper
36	CD-1227-2	.0015		400	Paper
37	CD-1227-8	.01		400	Paper
38	CD-1246	50		50	Electr.
39	CD-1283		1000	1000	Mica
40	CD-1071-22		100	500	Mica
41	CD-1254-2		50	500	Mica
42	CD-1248	40-40		450	Electr.
43	CD-1227-13	.05		400	Paper
44	CD-1071-22		100	500	Mica
45	CD-1227-2	.0015		400	Paper
46	CD-1265-15	.01		600	Paper
47	CD-1227-8	.01		400	Paper
48	CD-1227-8	.01		400	Paper
49	CD-1071-22		100	500	Mica
50	CD-1071-22		100	500	Mica
51	CD-1227-8	.01		400	Paper
52	CD-1227-8	.01		400	Paper
120	CD-1227-10	.02		400	Paper

RESISTORS, FIXED. K = 1000.

No.	Part	Ohms	Watts
53	RE-1139-104	100	1/2
54	RE-1046-276	27K	2
55	RE-1139-105	1K	1/2
56	RE-1139-226	22K	1/2
57	RE-1046-276	27K	2
58	RE-1139-105	1K	1/2
59	RE-1147-224	220	1/2
60	RE-1139-226	22K	1/2
61	RE-1168-226	22K	1
62	RE-1139-104	100	1/2
63	RE-1168-336	33K	1

RESISTOR, FIXED. - Continued

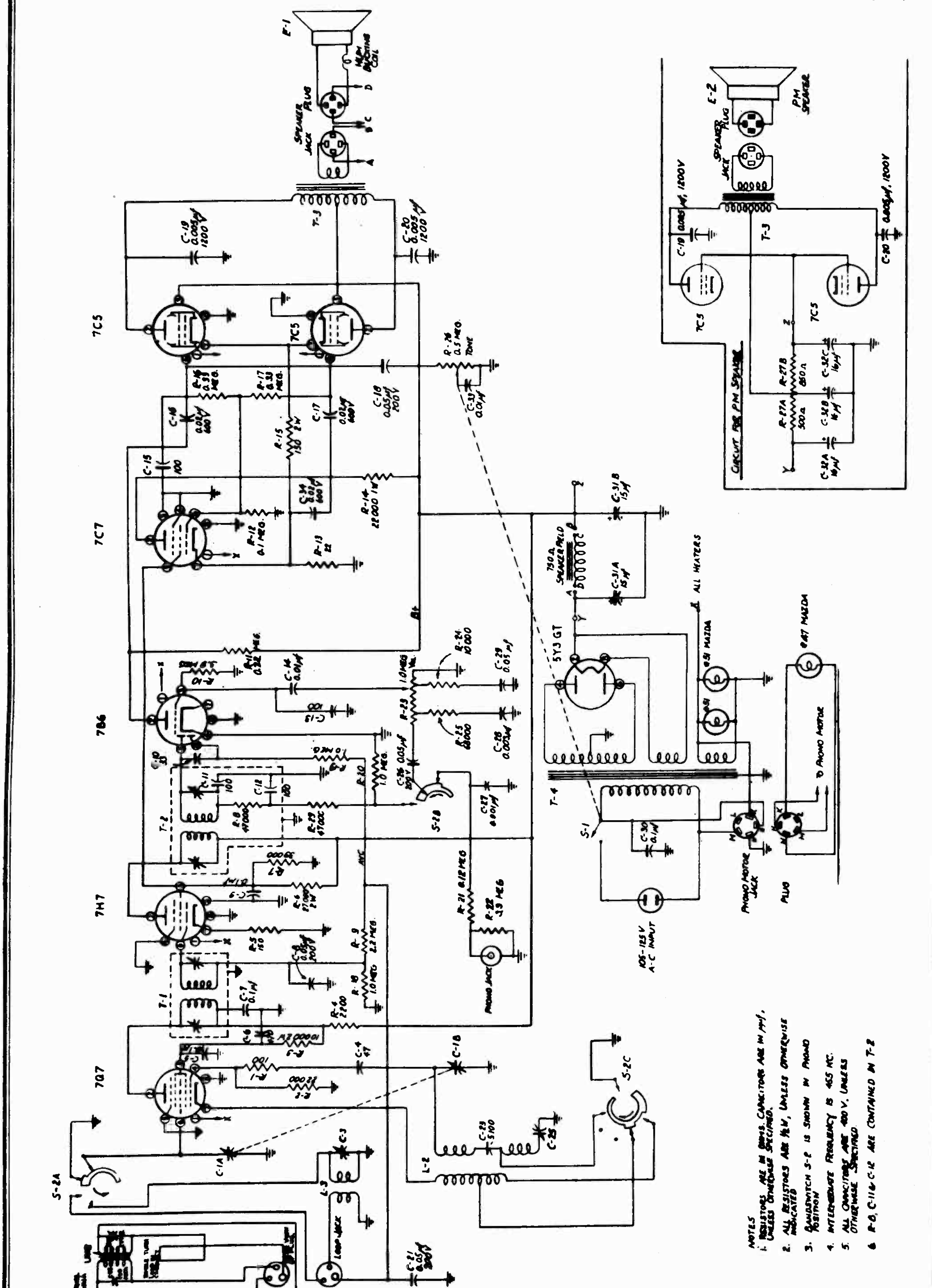
No.	Part	Ohms	Watts
64	RE-1139-105	1K	1/2
65	RE-1062-823	82	1/2
66	RE-1130-684	680	1/2
67	RE-1139-105	1K	1/2
68	RE-1015-685	6.8K	1/2
69	RE-1015-685	6.8K	1/2
70	RE-1139-226	22K	1/2
71	RE-1139-108	1 meg.	1/2
72	RE-1139-154	150	1/2
73	RE-1139-514	510	1/2
74	RE-1166-477	470K	1/2
75*	See Note.	470K or 1.5 meg.	1/2
76*	See Note.	680, 2 w. or 470, 1w.	Note
77	RE-1139-227	220K	1/2
78	RE-1139-227	220K	1/2
79	RE-1139-227	220K	1/2
80	RE-1139-227	220K	1/2
81	RE-1139-227	220K	1/2
82	RE-1139-109	10 meg.	1/2
83	RE-1139-109	10 meg.	1/2
84	RE-1166-107	100K	1/2
85	RE-1139-227	220K	1/2
86	RE-1139-108	1 meg.	1/2
87	RE-1166-477	470K	1/2
88	RE-1166-476	47K	1/2
89	RE-1166-107	100K	1/2
90	RE-1166-107	100K	1/2
91	RE-1139-226	22K	1/2
92	RE-1046-276	27K	2
93	RE-1153-476	47K	1
94	RE-1046-395	3.9K	2
95	RE-1139-104	100	1/2

MISCELLANEOUS

No.	Part	Name
96	RE-1181	Volume Control and Switch, 500K
97	RE-1182	Tone Control, 250K
98	SW-1069	Switch, AM-FM-Phono
99	SK-1020	Speaker
100	TR-1075	Transformer, P.P. Output
101	CK-1040	Choke, Filter
102*	See Note.	
103	TR-1064	Transformer, Antenna (FM)
104	CK-1043	R-F Choke
105	CI-1057	R-F Coil (FM)
106	CI-1058	Oscillator Coil (FM)
107	CK-1043	R-F Choke
108	CK-1043	R-F Choke
109	TR-1065	Transformer, First I-F (FM)
110	TR-1052	Transformer, First I-F (AM)
111	TR-1065	Transformer, Second I-F (FM)
112	TR-1051	Transformer, Second I-F (AM)
113	TR-1066	Transformer, Ratio Detector (FM
114	AT-1019	Antenna, Loop (AM)
115	AS-3599	Antenna (FM), Folded Dipole
116	CI-1059	Oscillator Coil (AM)
117	LA-1014-32	Pilot Light, Mazda 47
118	LA-1014-32	Pilot Light, Mazda 47
119	CD-W7000	Capacitor, Variable Tuning
121	SO-1059	Phono-Motor AC Receptacle
122	SO-1069	Speaker Receptacle
123	PL-1068	Speaker Plug
124	CC-1113	Phono Input Jack

PHILLIPS PETROLEUM CO.

MODEL 3-70A



NOTES

1. RESISTORS ARE IN OHMS. CAPACITORS ARE IN μμf, UNLESS OTHERWISE SPECIFIED.
2. ALL RESISTORS ARE ½ W, UNLESS OTHERWISE INDICATED.
3. BANDSWITCH S-2 IS SHOWN IN PHONO POSITION
4. INTERMEDIATE FREQUENCY IS 455 KC.
5. ALL CAPACITORS ARE 400 V, UNLESS OTHERWISE SPECIFIED.
6. R-8, C-11 & C-12 ARE CONTAINED IN T-2

MODEL 3-70A PHILLIPS PETROLEUM CO.

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 Signal Generator may be connected through a 0.01 mf capacitor (used as a dummy antenna) to the lug on R. F. section (A) of tuning capacitor. Connect ground clip of generator directly to chassis. Align the I. F. trimmers to 455 K.C., using least possible input from the Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad. An output meter may be clipped across the voice coil lugs.

To align broadcast R. F. trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads to two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning plates completely out of mesh and the pointer at the extreme right end of travel, adjust the broadcast oscillator trimmer, on the under side of the chassis, to 1650 K.C. With tuning capacitor fully meshed adjust the padder on the chassis deck to 535 K.C. Readjust both Signal Generator and tuning capacitor to 1550 K.C. and adjust the R. F. trimmer on the loop for maximum response.

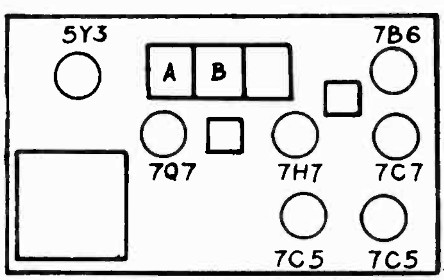
To align the short wave band connect the Signal Generator through a 0.01 mf capacitor and a 400 ohm resistor in series (used as a dummy antenna) to the antenna connection on the loop antenna. With the tuning capacitor plates completely out of mesh, and pointer at the extreme right end of travel, adjust the short wave oscillator trimmer (on the under side of the chassis) to 18.25 magacycles. Readjust both Signal Generator and tuning capacitor to 16 megacycles and adjust short wave antenna coil trimmer for maximum response. With tuning capacitor fully meshed, the receiver should tune to 5.75 megacycles, however no adjustment is required at this point.

For checking purposes five marks are engraved on the front of the dial plate. These represent, in order, the pointer position with the capacitor plates fully meshed and the pointer settings for 600 kc, 8 mc, 16 mc, and 1550 kc.

Pushbuttons: To set pushbuttons remove pushbutton knobs. This will expose a set screw on the shaft of each pushbutton. Starting at one end push a pushbutton down and loosen its set screw. Set the bandswitch to the broadcast position. Hold the pushbutton down and tune the manual tuning control to the station to which the pushbutton is to be set. Still holding the pushbutton down tighten its set screw. The pushbutton may now be released and its knob replaced. It will now select the station to which it was set. The other pushbuttons may be set in a similar manner.

REPLACEMENT PARTS LIST

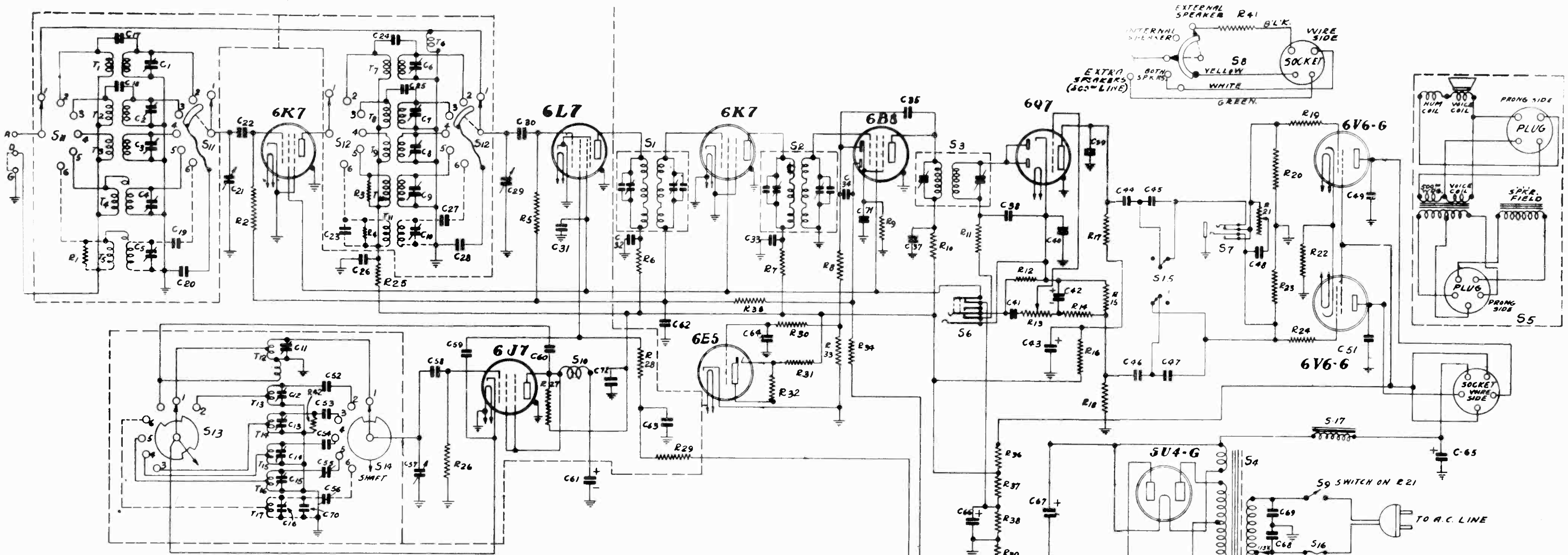
Circuit Symbol	Part Number	Item	Description
C-1 A & B	CV-9	Capacitor	Variable 2-gang, Push-button
C-2	CT1-1	Capacitor	Trimmer 1.5—15 MMF
C-3	CT1-2	Capacitor	Trimmer 2.2—40 MMF
C-22	CT1-2	Capacitor	Trimmer 2.2—40 MMF
C-23	CT1-2	Capacitor	Trimmer 2.2—40 MMF
C-25	CX2-1	Capacitor	Padder
E-1	EH-9	Speaker	10″ Electrodynamic
E-2	EH-14	Speaker	10″ P.M.
L-1	LL-9	Loop Antenna	
L-2	LO-4	Oscillator Coil Assembly	Broadcast & S.W. Osc. Coils
L-3	LR-4	S.W. Antenna Coil	
R-23	RP8-105	Potentiometer	1 Meg. with 2 taps, Volume Control
R-26	RP5-2	Potentiometer	0.5 Meg. with switch, Tone Control
R-27 A & B	RW3-1	Resistor	Wirewound 1350 Ohms 17 watt tapped at 500 Ohms
S-2 A, B & C	SR-9	Bandswitch	
T-1	TM2-4	Transformer	I. F. Input
T-2	TM2-5	Transformer	I. F. Output
T-3	TA-8	Transformer	Push-pull speaker output
T-4	TP-9	Transformer	Power



TUBE LOCATION

PILOT RADIO CORP.

MODELS G-508, G-509



MISC. FOR G-508 - G-509		
S1	73071	1ST. I.F. TRANS. ASS'Y.
S2	73071	2ND I.F. TRANS. ASS'Y.
S3	73072-B	3RD I.F. TRANS. ASS'Y.
S4	79596	PWR. TRANS. ASS'Y. UNIV. 50-60~
S4	79630	PWR. TRANS. ASS'Y. 220-240V. 25~
S5	40839	10" A.C. SPEAKER
S6	79179	PHONO JACK
S7	72198	HEADPHONE JACK
S8	79210	EXTRA SPKR. SWITCH ASS'Y.
S9		SWITCH ON R21
S10	73073	R.F. CHOKE
S11	79192 (G-508)	ANT. SEC. BAND SWITCH
S12		DET. SEC. BAND SWITCH
S13	79193 (G-509)	OSC. CATHODE SEC. BAND SWITCH
S14		OSC. GRID SEC. BAND SWITCH
S15	79359-B	BASS ACCENTUATOR SWITCH ASS'Y.
S16	78053-E	3 AMP. FUSE
S5	40845	12" SPEAKER
S-17	79858	3H. 100-OHMS FILTER CHOKE

R.F. COILS FOR MODEL G-509		
T1	73074	ANT. COIL ASS'Y. FOR BAND 2
T2 T4	73077	ANT. COIL ASS'Y. FOR BANDS 3 & 5
T3 T5	73080	ANT. COIL ASS'Y. FOR BANDS 4 & 6
T6 T7	73075	DET. COIL ASS'Y. FOR BANDS 1 & 2
T8 T10	73078	DET. COIL ASS'Y. FOR BANDS 3 & 5
T9 T11	73081	DET. COIL ASS'Y. FOR BANDS 4 & 6
T12 T13	73076	OSC. COIL ASS'Y. FOR BANDS 1 & 2
T14 T16	73079	OSC. COIL ASS'Y. FOR BANDS 3 & 5
T15 T17	73082	OSC. COIL ASS'Y. FOR BANDS 4 & 6

R.F. COILS FOR MODEL G-508 SAME AS FOR G-509 EXCEPT FOR BAND 6 WICH DROPS OUT; COILS FOR BD. 4 ARE		
T3	73083	ANT. COIL ASS'Y. FOR BAND 4
T9	73084	DET. COIL ASS'Y. FOR BAND 4
T15	73085	OSC. COIL ASS'Y. FOR BAND 4

CONDENSERS FOR MODEL G-508		
C1 C2 C3 C4	72226	TRIMMER STRIP ASS'Y.
C6 C7 C8 C9	72226	TRIMMER STRIP ASS'Y.
C11 C12 C13 C14 C15	72227	TRIMMER STRIP ASS'Y.
C17 C24	27737-0	10 MMFD. MICA
C18 C26 C35 C34	27736-0	25 MMFD. MICA
C20 C28	22055-A	.01 MFD. 600V. PAPER
C21 C29 C57	72146	10-450 MMFD. VAR. COND.
C22 C30	27701-0	250 MMFD. MICA
C26 C32 C33 C37 C44 C60	22055-AC	.02 MFD. 600V. PAPER
C31	22055-Z	.02 MFD. 400V. PAPER
C58 C38 C40	28016-0	100 MMFD. MICA
C39	28016-0	100 MMFD. MICA
C41	22055-I	.05 MFD. 200V. PAPER
C42	22981	10 MFD. 25V. TUBULAR ELEC.
C43	85028	4 MFD. 450V. ELEC.
C61		4 MFD. 450V. ELEC.
C65		8 MFD. 450V. ELEC.
C66		8 MFD. 250V. ELEC.
C45 C47	22055-AT	.002 MFD. 200V. PAPER
C46 C64 C62	22055-H	.02 MFD. 200V. PAPER
C48	22055-W	.01 MFD. 400V. PAPER
C49 C51	22055-AA	.005 MFD. 1600V. PAPER
C52	28106-W	3250 MMFD. MICA
C53	27747-W	2670 MMFD. MICA
C54	27748-W	1300 MMFD. MICA
C55	71503-D	300-700 MMFD. PADDER
C68 C69	78503	.01-.01 MFD. ~~1000V.~~ PAPER (SHIELDED)
C67	85080	20 MFD. 475V. ELEC.
C63 C71	22055-M	.1 MFD. 200V. PAPER
C59	27728-0	50 MMFD. MICA
C-72	22055-AB	.1 MFD. 600V. PAPER

CONDENSERS FOR MODEL G-509 SAME AS G-508 EXCEPT FOLLOWING		
C1 C2 C3 C4 C5	72227	TRIMMER STRIP ASS'Y.
C6 C7 C8 C9 C10	72227	TRIMMER STRIP ASS'Y.
C11 C12 C13 C14 C15 C16	79191	TRIMMER STRIP ASS'Y.
C19 C27	22055-A	.01 MFD. 600V. PAPER
C23	28105-0	150 MMFD. MICA
C56 C55	71577 J	50-175 & 250-500 MMFD. DUAL PADDER
C70	27736-0	25 MMFD. MICA

RESISTORS FOR MODEL G-508		
R2 R5	72213	500,000 OHMS 1/4 WATT I.R.C.
R3	13019	2,000 OHMS 1/4 WATT I.R.C.
R6 R7 R10 R25	13028	1000 OHMS 1/4 WATT CARBON
R8 R33 R34 R32 R35 R30	13001	1 MEGOHM 1/4 WATT CARBON
R9	13131	600 OHMS 1/4 WATT CARBON
R28	13148	30,000 OHMS 1/4 WATT CARBON
R12 R14 R20 R23	13171	250,000 OHMS 1/4 WATT CARBON
R13	79171	750,000 OHMS VOLUME CONTROL

R15	13195	2,500 OHMS 1/4 WATT CARBON
R16 R31	13074	20,000 OHMS 1/4 WATT CARBON
R17 R18 R11	13164	50,000 OHMS 1/4 WATT CARBON
R19 R24	13115	400 OHMS 1/4 WATT CARBON
R26	72207	50,000 OHMS 1/4 WATT I.R.C.
R27	72219	10,000 OHMS 1 WATT I.R.C.
R29	13116	12,000 OHMS 1/4 WATT CARBON
R36 R37 R38	83031	380 OHMS 3060 OHMS 2360 OHMS
R39 R40		19 OHMS 10 OHMS WIRE WOUND VOL. DIVIDER
R41	83025	10 OHMS 20 WATTS WIRE WOUND
R21	79518	750,000 OHM TONE CONTROL & SWITCH
R22	85033	300 OHMS 3 WATTS WIRE WOUND
R42	13147	300,000 OHMS 1/4 WATT CARBON

RESISTORS FOR MODEL G-509 SAME AS G-508 EXCEPT FOLLOWING		
R1	72211	5000 OHMS 1/4 WATT I.R.C.
R4	72216	2000 OHMS 1/4 WATT I.R.C.

NOTE: ADDITIONAL WIRING FOR MODEL G-509 SHOWN IN DOTTED LINES.

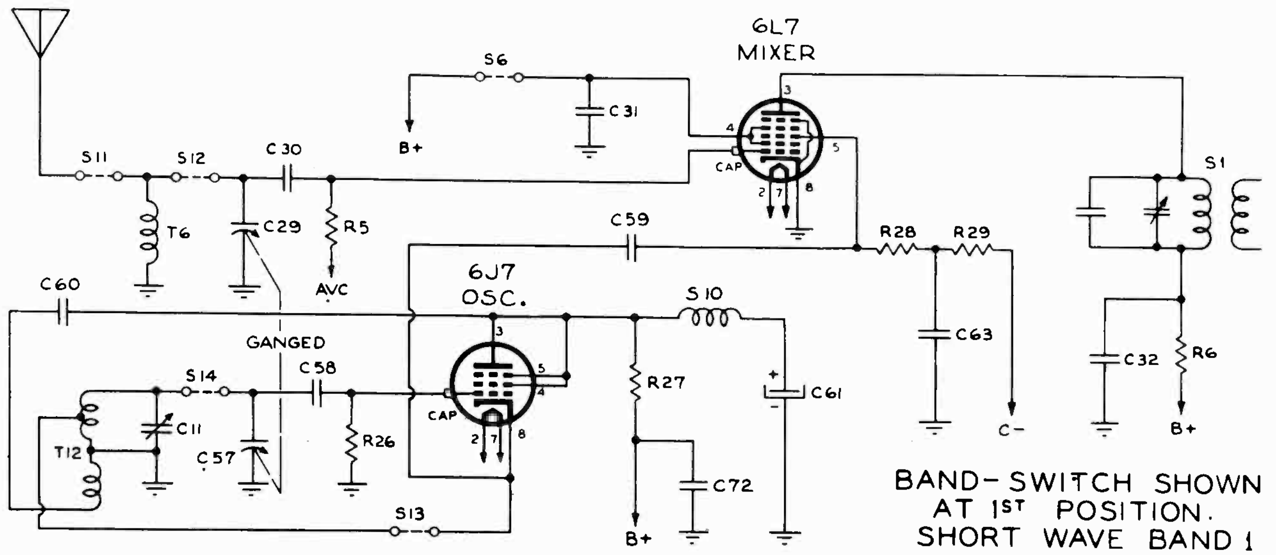
INTERMEDIATE FREQUENCY—456 KC.

ALIGNING FREQUENCY

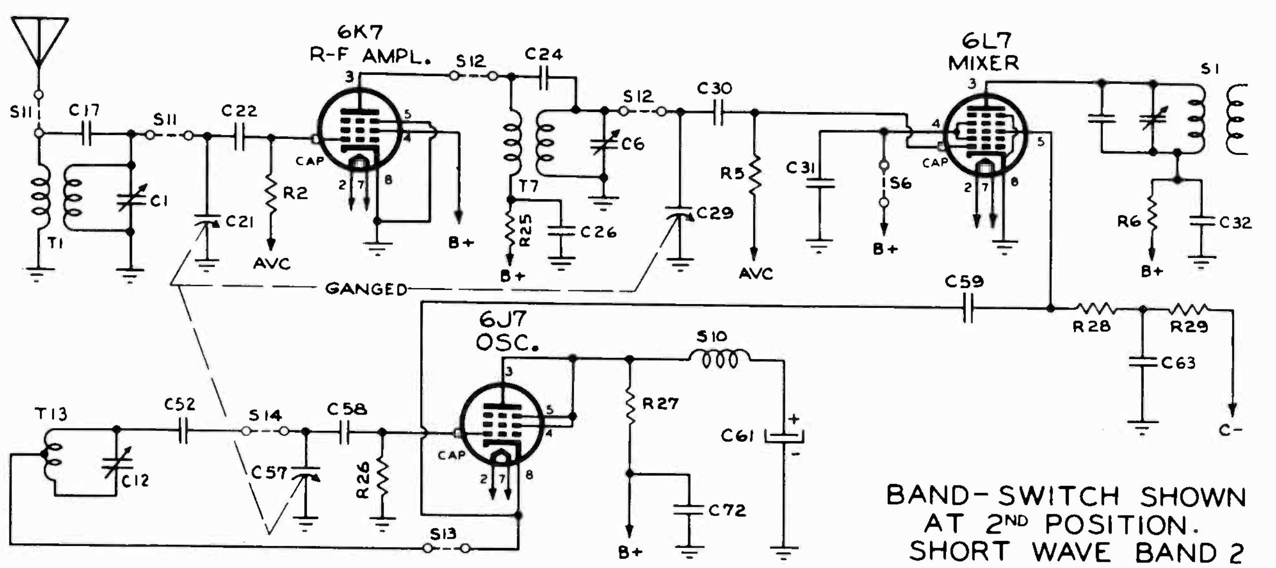
B.C.(B_5)	600 to 1500 KC.
B_1	69 MC.
B_2	23 MC.
B_3	11 MC.
B_4	4.3 MC.
L.W.(B_6)	150 KC. to 375 KC.

PILOT RADIO CORP.

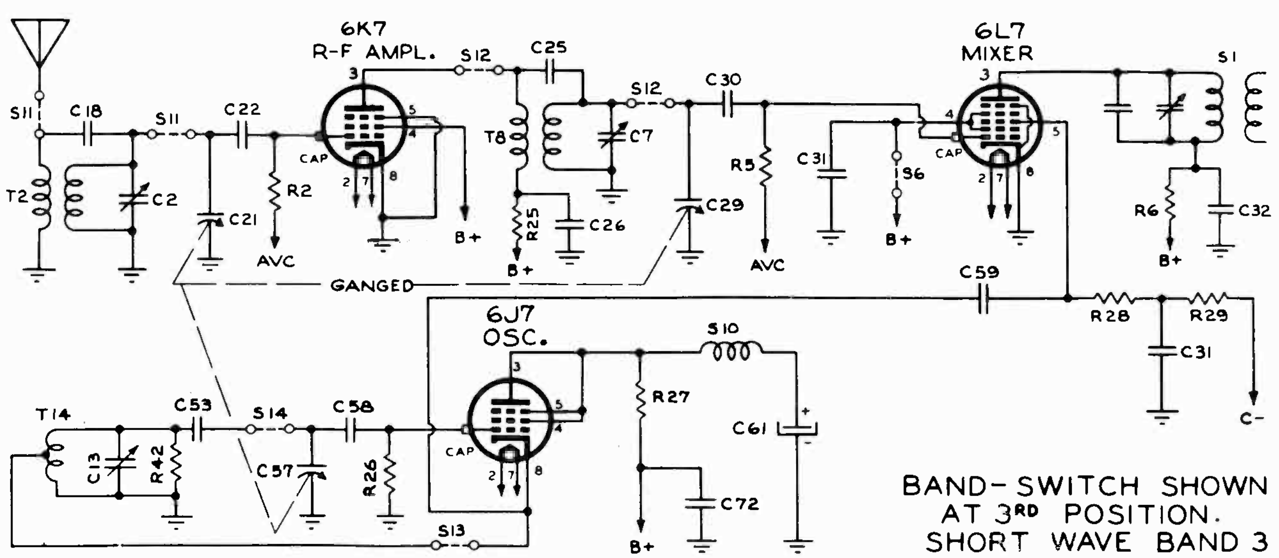
MODELS G-508, G-509



BAND-SWITCH SHOWN AT 1ST POSITION. SHORT WAVE BAND 1



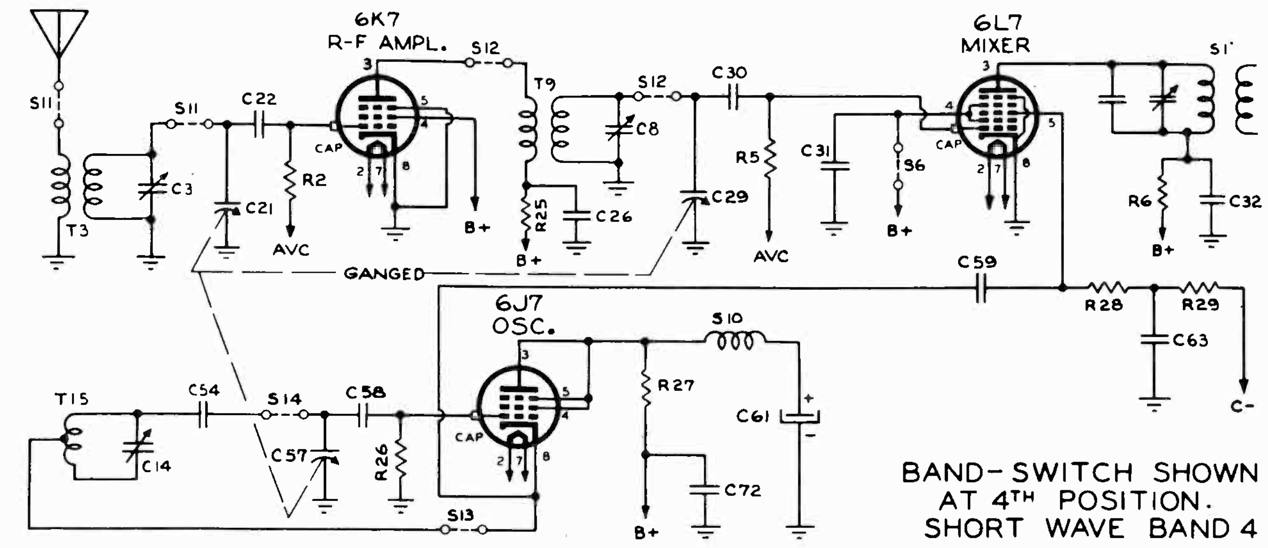
BAND-SWITCH SHOWN AT 2ND POSITION. SHORT WAVE BAND 2



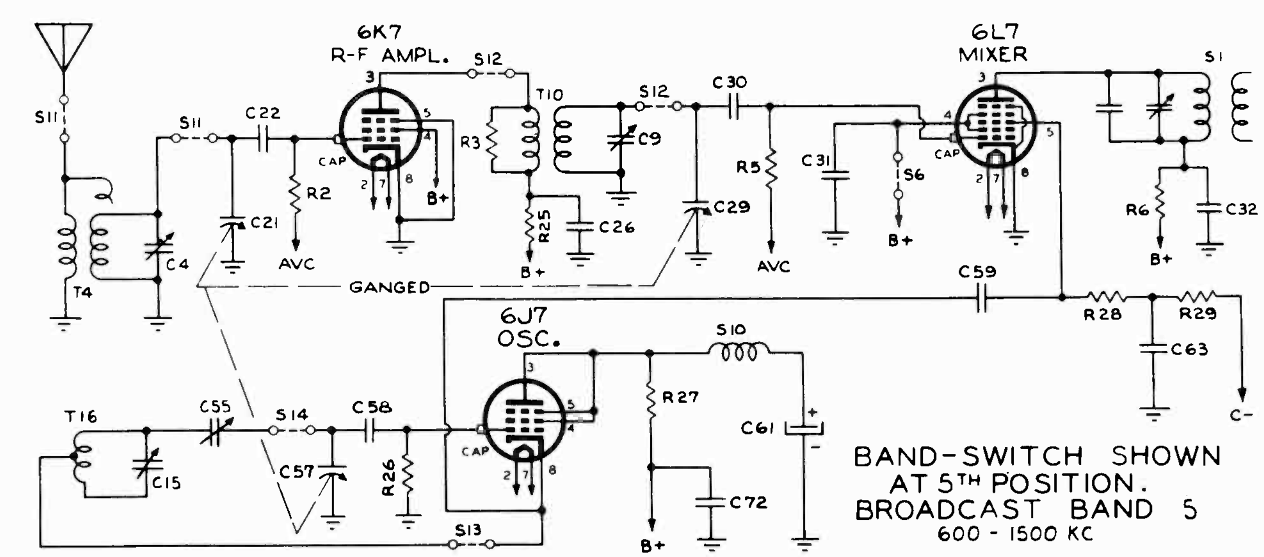
BAND-SWITCH SHOWN AT 3RD POSITION. SHORT WAVE BAND 3

MODELS G-508, G-509

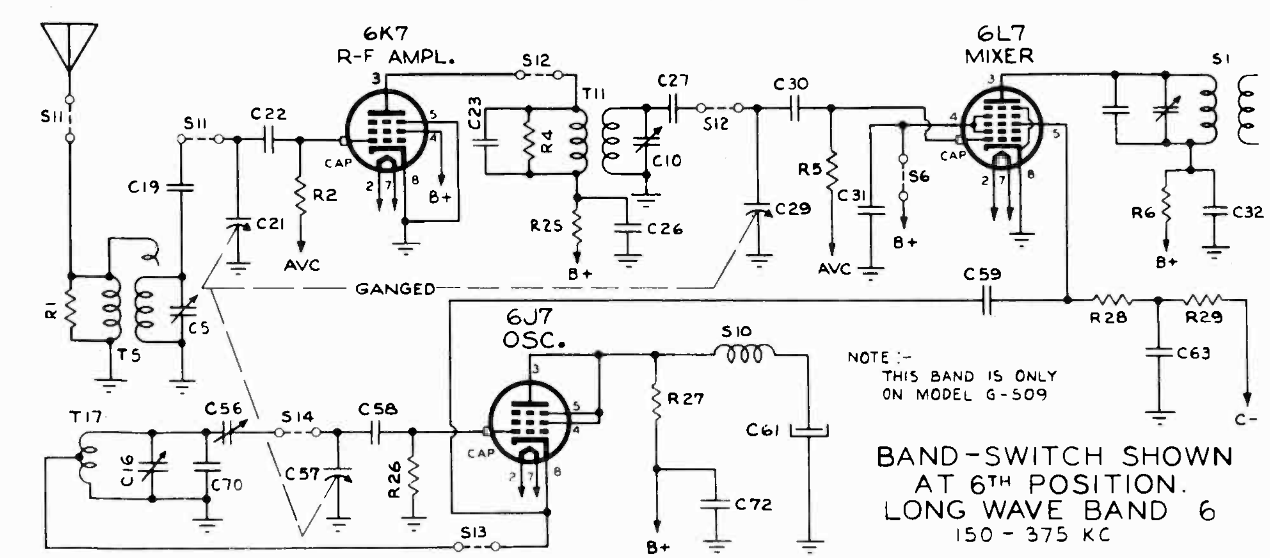
PILOT RADIO CORP.



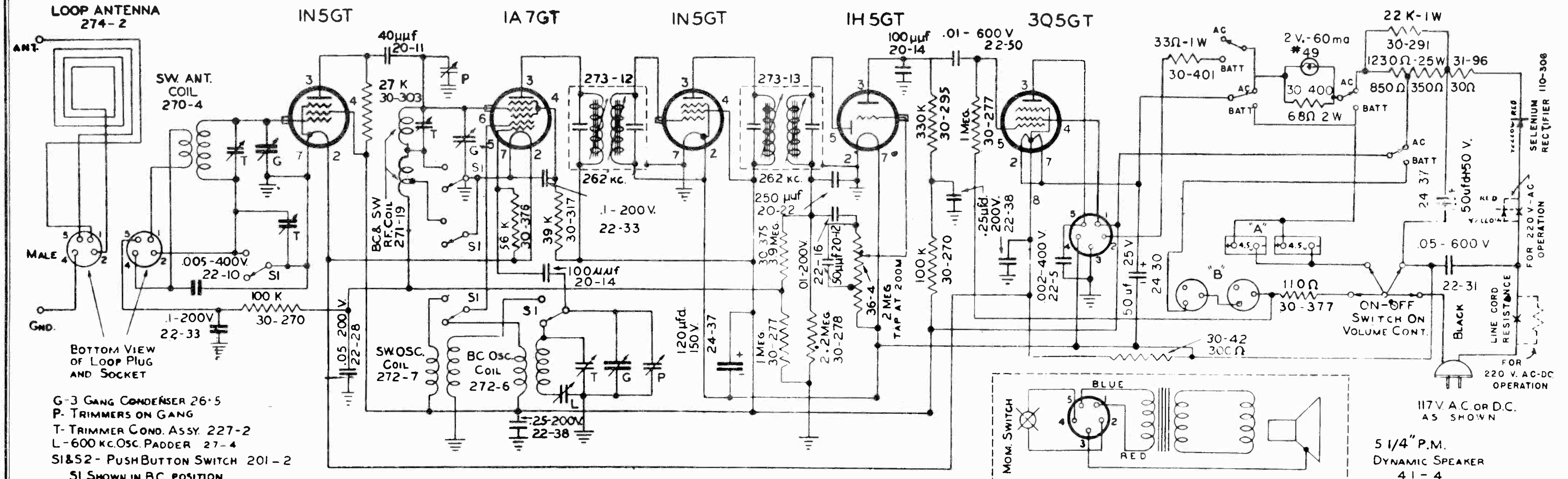
BAND-SWITCH SHOWN AT 4TH POSITION. SHORT WAVE BAND 4



BAND-SWITCH SHOWN AT 5TH POSITION. BROADCAST BAND 5
600 - 1500 KC



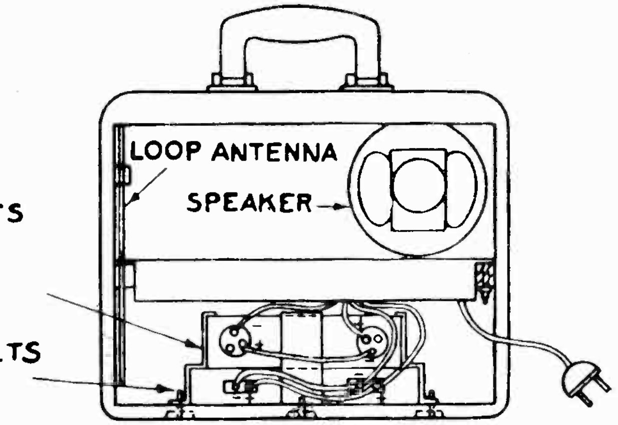
BAND-SWITCH SHOWN AT 6TH POSITION. LONG WAVE BAND 6
150 - 375 KC



G-3 Gang Condenser 26-5
P- Trimmers on Gang
T- Trimmer Cond. Assy. 227-2
L-600 KC. Osc. Padder 27-4
S1&S2- PushButton Switch 201-2
S1 Shown in BC position
S2 Shown in AC-DC position

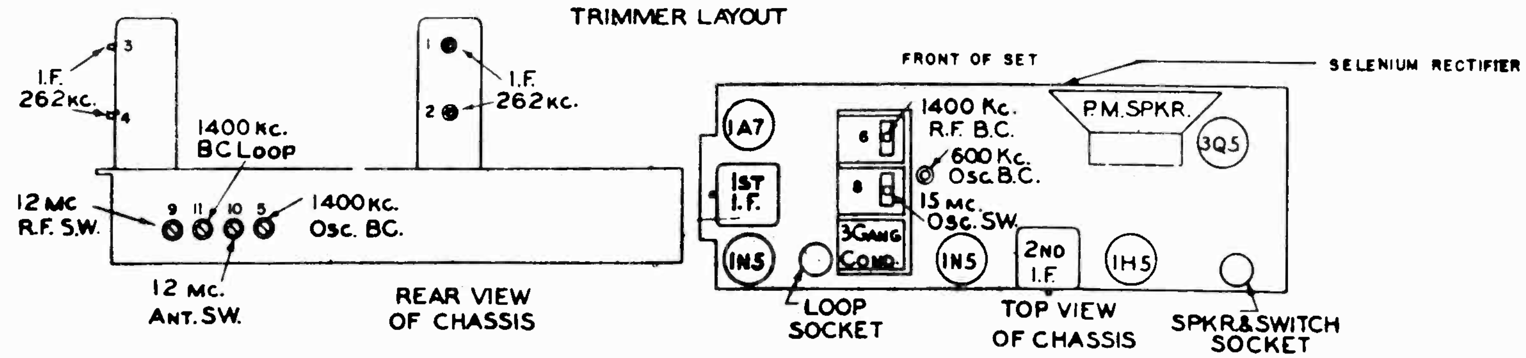
ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED

UPPER BATTERIES
2 "B" BATTERIES 45 VOLTS
EVEREADY NO. 482
OR EQUIVALENT
LOWER BATTERIES
2 "A" BATTERIES 4.5 VOLTS
EVEREADY NO. 746
OR EQUIVALENT



REAR VIEW OF CABINET SHOWING BATTERIES IN PLACE

TRIMMER LAYOUT



FOR BATTERY OPERATION

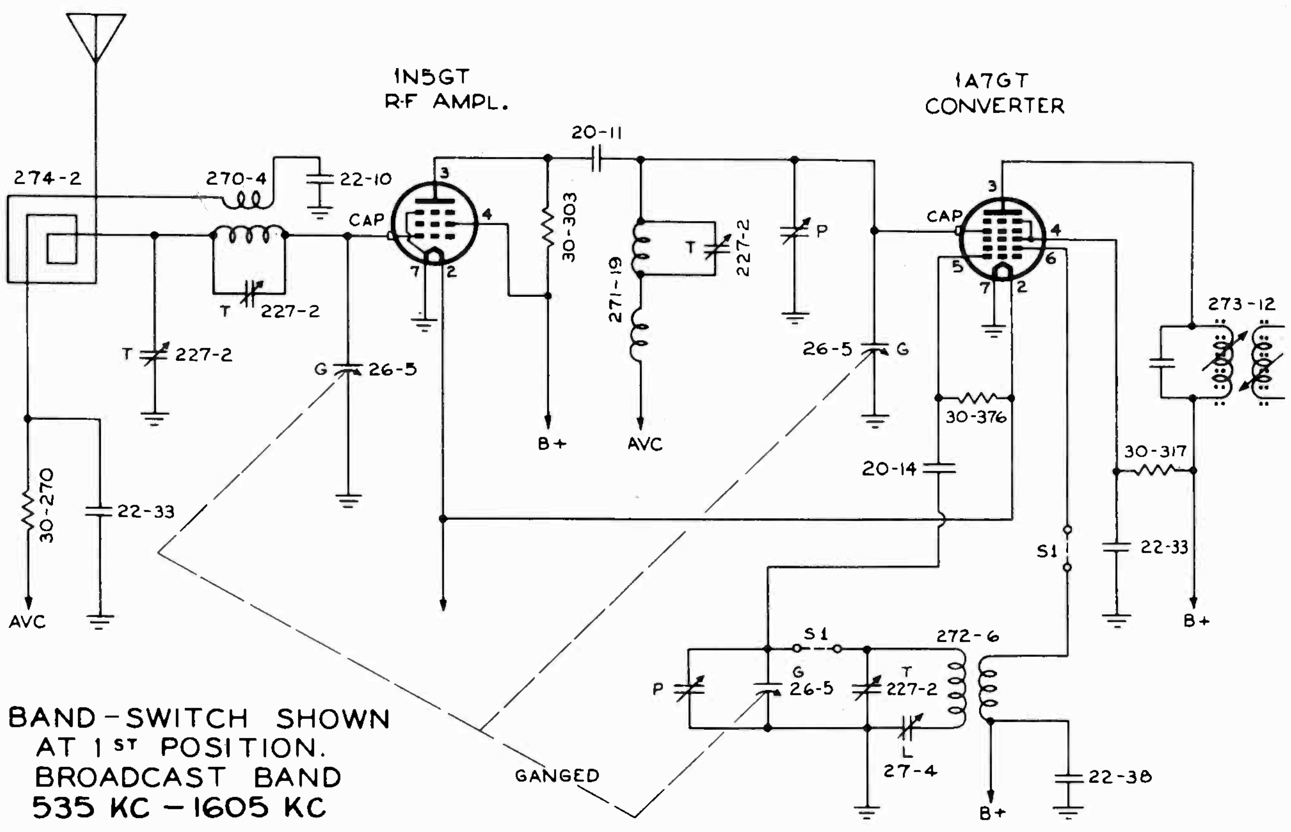
Do not plug the electric cord into the light socket. Push the button marked BATT and the SW or BC button for Shortwave or Broadcast reception, respectively. Rotate the volume control clockwise well past the point where the red flag appears in the dial window. The receiver will become operative immediately.

In order to light the pilot bulb for the dial ON BATTERY OPERATION, the switch button on the lower left-hand ledge inside the front door must be pressed down. When the button is released the light is automatically switched off in order to prolong the life of the batteries.

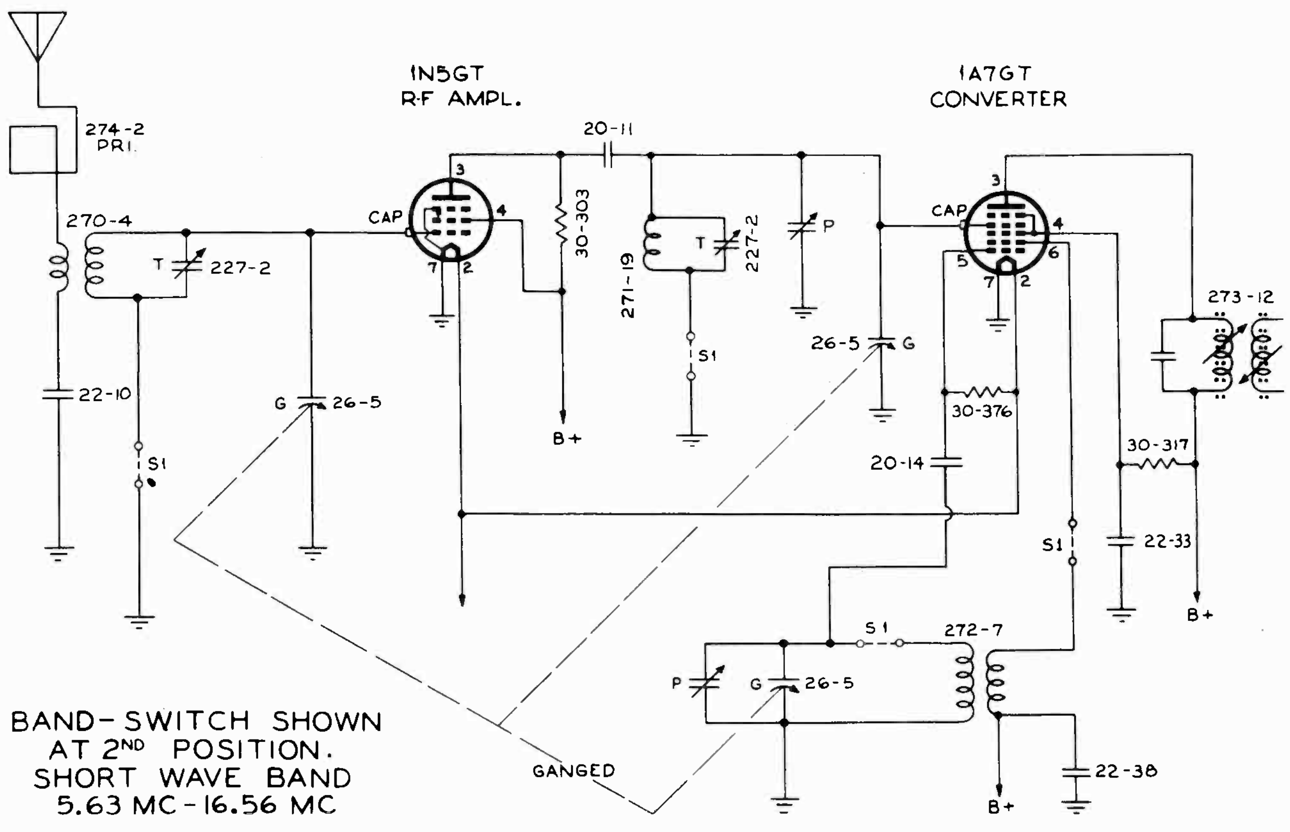
To turn off the receiver it is necessary only to turn the left-hand knob to the left until the red indicator disappears, regardless of the position of the buttons.

LINE	LINE CORD#	CHARACTERISTICS
117 V. AC-DC	103-14	REGULAR WITHOUT RESISTANCE
220 V. DC	103-21	850Ω 25 W SERIES
220 V. AC	103-20	300Ω 40 W.-ADDITIONAL RECTIFIER IN SERIES.

PILOT RADIO CORP. MODEL T-570



BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND 535 KC – 1605 KC



BAND-SWITCH SHOWN AT 2ND POSITION. SHORT WAVE BAND 5.63 MC - 16.56 MC

MODEL T-570 PILOT RADIO CORP.

ALIGNMENT CHART

STEP	RECEIVER: CIRCUIT ALIGNED	RECEIVER: BAND SWITCH	RECEIVER: DIAL POINTER	SIGNAL GENERATOR: FREQUENCY	SIGNAL GENERATOR: CONNECTION	SIGNAL GENERATOR: DUMMY ANTENNA	ADJUSTMENTS (All maximum output)
1	IF	BC	Low end of dial	262 KC	Grid of 1A7GT conv.	0.1 mfd.	#1, 2, 3, 4
2	BC	BC	1400 KC	1400 KC	Antenna Post	200 mmfd. mica cap.	First #5 Then #6
3	BC	BC	600 KC	600 KC	Antenna Post	200 mmfd. mica cap.	#7
4	Repeat steps 2 and 3						
5	SW	SW	15 MC	15 MC	Antenna Post	400 ohm carbon resistor	#8
6	SW	SW	Tune in generator	12 MC	Antenna Post	400 ohm carbon resistor	First #9 Then #10
7	Repeat step 2, trimmer #5 only						
8	BC	BC	Tune in broadcast station near 1400 KC				#11

NOTE: Align step 1 to 7 with chassis out of cabinet, but loop plugged in. Step 8 must be taken with set properly placed in cabinet, and batteries and loop in the normal position.

Alignment should be attempted only if a low range A.C. meter, a signal generator, and insulated alignment tools are at your disposal. The A.C. meter is used as an output-meter. The signal generator must cover a frequency range from 450 kc to 16 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 connection between the groundpost of the signal generator and the chassis, is necessary. DO NOT connect chassis or generator to an external ground.

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.

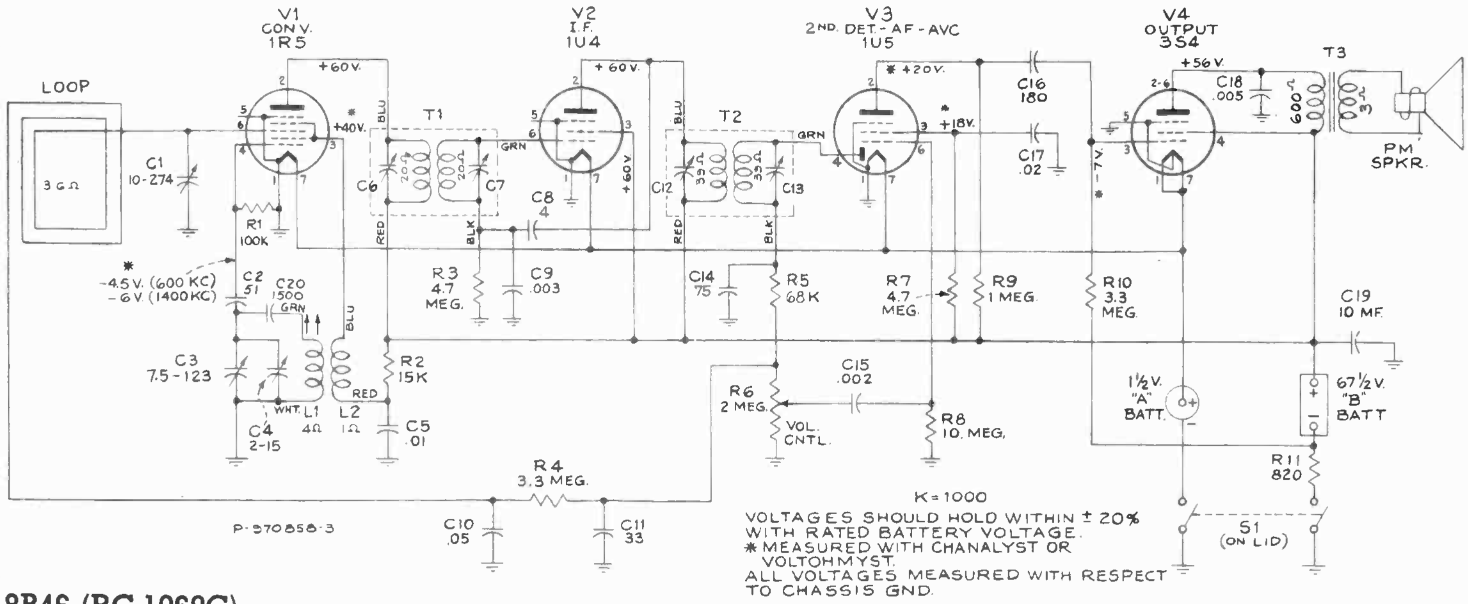
The locations of adjustment screws are indicated clearly on the schematic diagram. Alignment adjustments should be made only in the sequence given in the chart.

For all alignments, connect the outputmeter across the voice coil. With the volume control turned fully clockwise tune for a maximum reading.

MODELS 8B43, CHASSIS RC-1069B; 8B46, CHASSIS RC-1069C

RADIO CORP. OF AMERICA

MODELS 8B41, CHASSIS RC-1069; 8B42 CHASSIS RC-1069A



8B46 (RC-1069C)

Service Data:

The Service Data previously published for Models 8B41, 8B42 and 8B43 will apply to Model 8B46 except for color and the replacement parts listed below.

REPLACEMENT PARTS

CHASSIS ASSEMBLY

RC-1069C

Same as listed for RC-1069, RC-1069A, RC-1069B EXCEPT

74366 Fastener—Push fastener to hold loop, (2 required) for Model 8B46—tan

74363 Lid—Case top lid complete with lid support and hinges—less loop—Model 8B46—ivory

74365 Loop—Antenna loop complete with connectors—less lid—Model 8B46—ivory

74367 Nameplate—"RCA" nameplate for top lid—Model 8B46

SPEAKER ASSEMBLIES

Same as listed for Models 8B41, 8B42, 8B43

MISCELLANEOUS ASSEMBLIES

74368 Bottom—Case bottom—Model 8B46—ivory

70457 Catch—Spring catch assembly

74016 Center—Case center complete with spring catch

74369 Handle—Carrying handle—Model 8B46—tan

73970 Link—Handle link (2 required)

73943 Screw—#4-40 x 3/16" binder head screw to hold case center

Specifications

Tuning Range .... 540-1600 kc

Intermediate Frequency .... 455 kc

Tube Complement:

1. RCA 1R5 .... Converter
2. RCA 1U4 .... I.F. Amplifier
3. RCA 1U5 .... 2nd Det.-A.F. Amp.-A.V.C.
4. RCA 3S4 .... Output

Loudspeaker (92523-4W):

Size and type .... 2" x 3" P.M.

Voice coil impedance .... 1¾ ohms at 1000 cycles

Batteries Required:

Type of Battery	Current Consumption	Approx. Life (Intermittent Service)
"A"—1.5 volt RCA VS 036 or VS 001	0.25 amp.	7 to 10 hrs.
"B"—67.5 volts RCA VS 016	8.5 ma.	40 to 60 hrs.

Power Output:

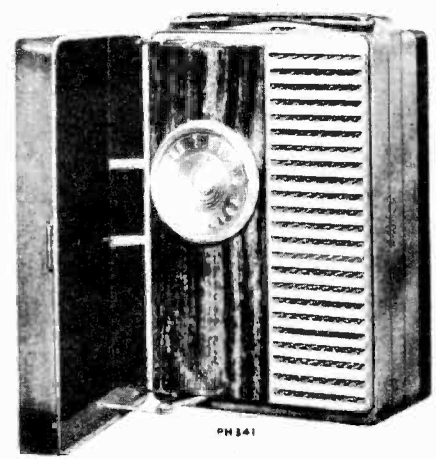
Undistorted .... 0.05 watt

Maximum .... 0.10 watt

Dimensions (overall) .... 6¼" x 4⅜" x 3⅜"

Weight (with batteries) .... 3½ lbs.

8B41 .... Black
8B42 .... Brown
8B43 .... Red



Model 8B46 (Ivory)

MODELS 8B41, CHASSIS RC-1069; 8B42 CHASSIS RC-1069A

RADIO CORP. OF AMERICA

Alignment Procedure

MODELS 8B43, CHASSIS RC-1069B; 8B46 CHASSIS RC-1069C

Output Meter.—Connect meter from top lug of TB5 (plate of 3S4) to ground. Turn volume control to maximum position.

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.

Alignment Shield.—It is necessary to use a shield during oscillator alignment.

Fig. 3 shows the modifications necessary to convert the center strip portion of a case into a convenient shield to be used as a substitute for the regular case center strip during oscillator alignment.

If a substitute case is not available, a shield may be improvised using a sheet of aluminum (DO NOT USE STEEL) to approximate the shielding effect of the case on the 1R5 tube, tuning condenser and oscillator coil.

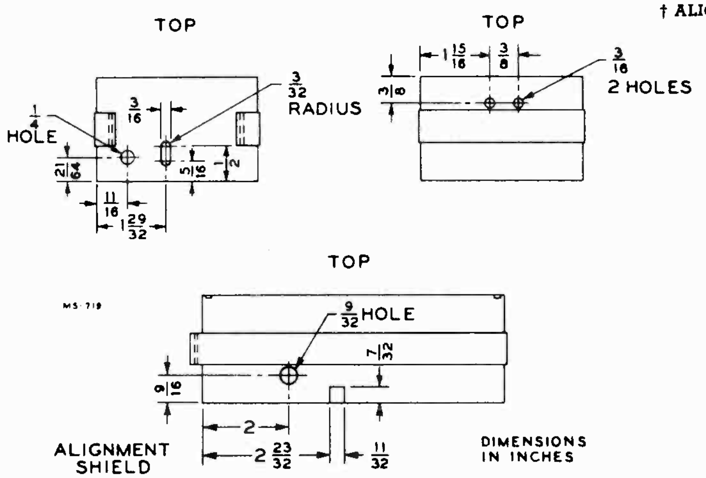
CRITICAL LEAD DRESS

1. Dress blue, green, and black leads of second I.F. transformer as direct as possible. If excess lead exists, dress down side of socket and flat against chassis to transformer opening.
2. Dress audio screen bypass capacitor (C17), and the lead to the volume control, up and underneath the shelf supporting the output transformer.
3. Dress audio coupling capacitor (C15), directly in front of C17, and against the side of the 1st I.F. transformer.
4. Wire in the three capacitors pyramided behind the speaker with enough space at the end of battery holder to allow holder to move when battery is replaced. Dress the ground leads of these capacitors to keep from shorting "+A" to chassis ground.
5. Observe the outside foil connections on all paper capacitors, also the polarity of the electrolytic capacitor, C19.
6. Keep blue and red leads of output transformer above the mounting shelf.
7. Dress leads to gang as far as possible from all metal parts.
8. Dress neutralization bypass capacitor, C9, as near metal chassis as possible.
9. Dress bypass C5 over bottom end of V2 (1U4), tube socket.
10. Dress neutralization capacitor, C8, as near metal chassis as possible.

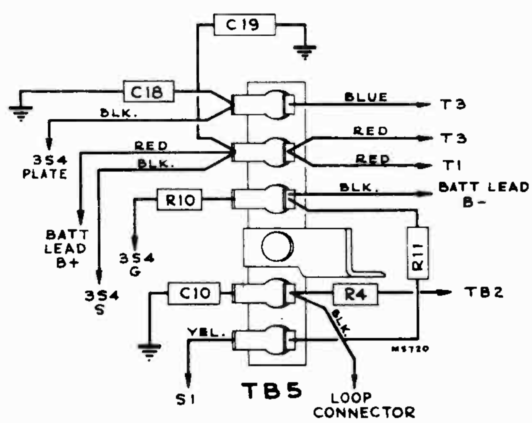
Steps	Connect the high side of test osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Connection lug of C1 located on rear of gang in series with .01 mf.	455 kc	Quiet point near 1,600 kc	C12, C13 2nd I-F trans.
2				C6, C7 1st I-F trans.
3		Repeat steps 1 and 2		
4	*Antenna coupling loop	1,400 kc	14 Rock gang	C4 (osc.) †
5		600 kc	60 Rock gang	L1 (osc.) †
6		Repeat steps 4 and 5		

* Steps 4 and 5 require a coupling loop from the signal generator to feed a signal into the receiver loop located in the lid. This loop should be loosely coupled to the receiver loop antenna so as not to disturb the receiver loop inductance.

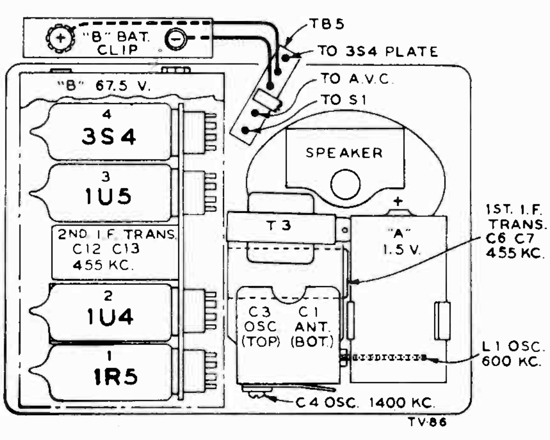
† ALIGNMENT SHIELD MUST BE USED. (See text.)



Alignment Shield



Terminal Board Wiring



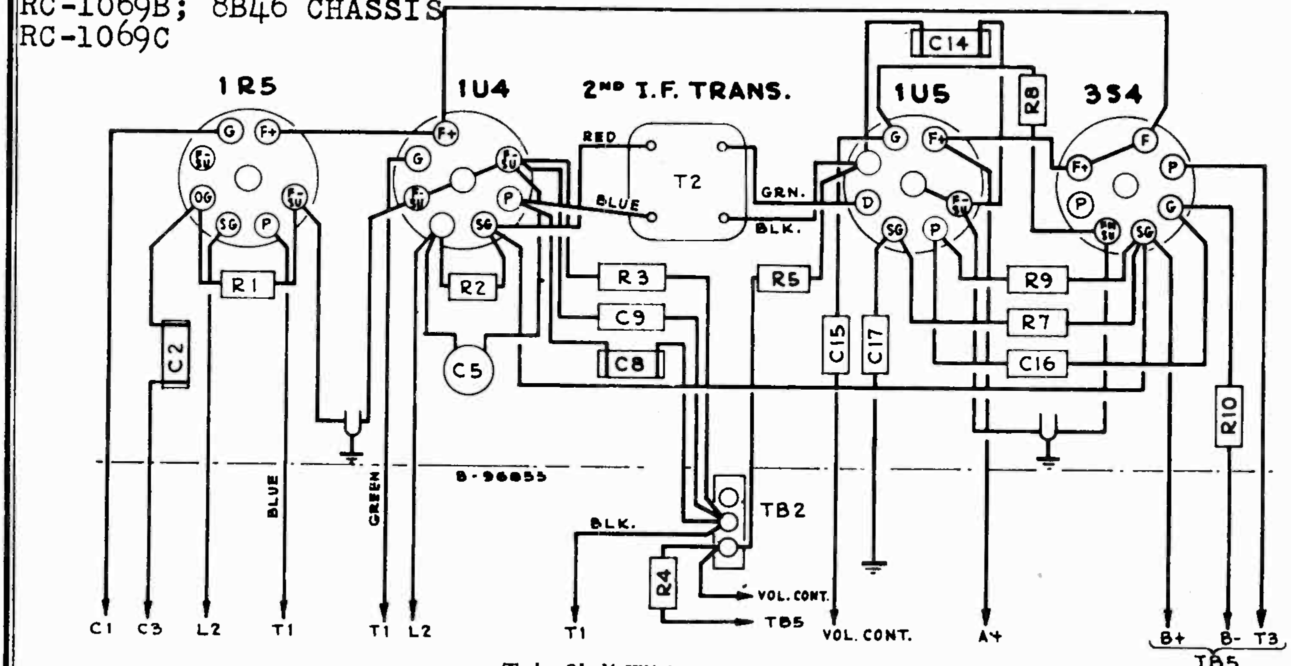
A rubber band should be placed around each tube for cushioning.

Tube and Trimmer Locations

MODELS 8B42 CHASSIS RC-1069A; 8B43 CHASSIS RC-1069B; 8B46 CHASSIS RC-1069C

RADIO CORP. OF AMERICA

MODELS 8B41, CHASSIS RC-1069



Tube Shelf Wiring Diagram

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC 1069—8B41, RC 1069A—8B42, RC 1069B—8B43
*73937	Baffle—Speaker baffle and grille cloth
70444	Board—Terminal board (5 contact)
70445	Board—Terminal board (1 contact)
*73947	Capacitor—Variable tuning capacitor (C1, C3, C4)
73153	Capacitor—Ceramic, 4 mmf. (C8)
*73962	Capacitor—Ceramic, 33 mmf. (C11)
73901	Capacitor—Ceramic, 51 mmf. (C2)
*73963	Capacitor—Ceramic, 75 mmf. (C14)
56653	Capacitor—Ceramic, 180 mmf. (C16)
*74093	Capacitor—Ceramic, 1500 mmf. (C20)
*73960	Capacitor—Ceramic, .01 mf. (C5)
72315	Capacitor—Tubular, .002 mf., 200 volts (C15)
*73961	Capacitor—Tubular, .003 mf., 200 volts (C9)
70606	Capacitor—Tubular, .005 mf., 400 volts (C18)
71928	Capacitor—Tubular, .02 mf., 200 volts (C17)
70615	Capacitor—Tubular, .05 mf., 400 volts (C10)
*73964	Capacitor—Electrolytic, 10 mf., 70 volts (C19)
70425	Clip—Spring clip for tuning knob
70443	Coil—Oscillator coil (L1, L2)
70452	Connector—Loop connectors (1 set) complete with eyelets
*73948	Control—Volume control (R6)
*73957	Fastener—Push fastener to hold loop (2 required) for Model 8B41—black
*73958	Fastener—Push fastener to hold loop (2 required) for Model 8B42—brown
*73959	Fastener—Push fastener to hold loop (2 required) for Model 8B43—red
70429	Grommet—Rubber grommet to mount tube support shelf (2 required)
*73950	Hinge—Lid hinge—L.H.—less mounting studs
*73951	Hinge—Lid hinge—R.H.—less mounting studs
72229	Holder—"A" battery holder
*73941	Insulator—Loop connector insulator
*73936	Knob—Calibrated tuning knob
*73946	Knob—Volume control knob
70708	Lead—"B" Battery lead complete
*73924	Lid—Case top lid complete with lid support and hinges —less loop—Model 8B41—black
*73925	Lid—Case top lid complete with lid support and hinges —less loop—Model 8B42—brown
*73926	Lid—Case top lid complete with lid support and hinges —less loop—Model 8B43—red
*73954	Loop—Antenna loop complete with connectors—less lid —Model 8B41—black
*73955	Loop—Antenna loop complete with connectors—less lid —Model 8B42—brown
*73956	Loop—Antenna loop complete with connectors—less lid —Model 8B43—red
*73949	Nameplate—"RCA" nameplate for top lid
*73940	Nut—Speed nut to lock screw clamping speaker to face panel

STOCK No.	DESCRIPTION
*73938	Panel—Chrome and mahogany face panel
	Resistor—Fixed, composition, 820 ohms ±10%, ½ watt (R11)
	Resistor—Fixed, composition, 15,000 ohms ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 68,000 ohms ±20%, ½ watt (R5)
	Resistor—Fixed, composition, 100,000 ohms ±10%, ½ watt (R1)
	Resistor—Fixed, composition, 1 megohm ±20%, ½ watt (R9)
	Resistor—Fixed, composition, 3.3 megohms ±20%, ½ watt (R4, R10)
	Resistor—Fixed, composition, 4.7 megohms ±20%, ½ watt (R3, R7)
	Resistor—Fixed, composition, 10 megohms ±20%, ½ watt (R8)
*73944	Screw—#2-56 x 3/16" machine screw to hold lid hinges to face panel (2 required)
*73939	Screw—#4-40 x 5/16" binder head machine screw to clamp speaker to face panel
*73943	Screw—#4-40 x 3/16" binder head screw to fasten face panel to chassis (3 required)
70446	Screw—#6 x ¼" hex head self-tapping screw to mount battery holder
70436	Socket—Tube socket
70423	Spacer—Rubber shock spacer (cemented to case center strip)
*73942	Stud—Lid support stud (face panel end)
*73952	Stud—L.H. lid hinge mounting stud
*73953	Stud—R.H. lid hinge mounting stud
70451	Support—Lid support complete with lid end mounting stud
72230	Support—Tube support shelf less tube sockets and transformer
*73945	Switch—Power switch (S1)
70442	Transformer—First I.F. transformer (T1 [C6, C7])
70437	Transformer—Second I.F. transformer (T2 [C12, C13])
70440	Transformer—Output transformer (T3)
	SPEAKER ASSEMBLIES
	92523-4W
70428	Speaker—2" x 3" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
*73965	Bottom—Case bottom—Model 8B41—black
*73966	Bottom—Case bottom—Model 8B42—brown
*73967	Bottom—Case bottom—Model 8B43—red
70457	Catch—Spring catch assembly
*74016	Center—Case center complete with spring catch
*73968	Handle—Carrying handle—Model 8B41—black
*74022	Handle—Carrying handle—Model 8B42—brown
*73969	Handle—Carrying handle—Model 8B43—red
*73970	Link—Handle link (2 required)
73943	Screw—#4-40 x 3/16" binder head screw to hold case center

* This is the first time that this Stock No. has appeared in Service Data.

MODELS 8B41, CHASSIS RC-1069; 8B42 CHASSIS RC-1069A

RADIO CORP. OF AMERICA
Replacement of Component Parts

MODELS 8B43, CHASSIS RC-1069B; 8B46 CHASSIS RC-1069C

I. **To remove bottom cover:**
- a. Depress locking spring clip through hole in top of case.
- b. With spring clip depressed, pull cover carefully out and up off the retaining lugs in the bottom of the case center strip.

II. **To replace batteries:**
- a. Remove bottom cover.
- b. Remove, either or both, the "A" and "B" battery as may be necessary. The "B" battery snap fasteners can best be removed by inserting a screwdriver under the snap fastener strip and prying upward.

III. **To remove the case center strip:**
- a. Remove bottom cover.
- b. Remove one screw (A) on the inside at the handle end.
- c. Tilt case center strip and lift.

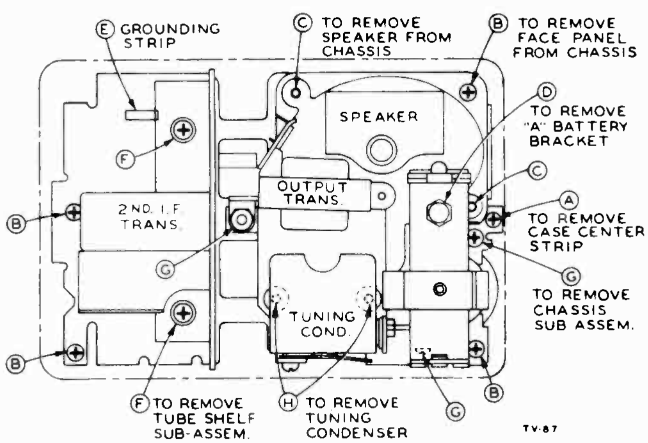
IV. **To replace tubes:**
- a. Remove bottom cover.
- b. Remove "B" battery.
- c. Remove case center strip.
- d. Remove and replace tubes as required.

V. **To remove face panel from chassis plate:**
- a. Remove dial knob (pull off).
- b. Remove bottom cover (I), batteries (II) and case center strip (III).
- c. Unsolder leads to loop connectors.
- d. Remove the four Phillips head screws (B) located at three corners and end close to 2nd I.F. transformer, which hold the chassis to face panel.
- e. The face panel may now be folded back into the case top lid.

VI. **To remove speaker:**
- a. Remove face panel (see item V).
- b. Unsolder voice coil leads.
- c. Remove two Phillips head screws (C) on chassis plate holding speaker.

VII. **To remove output transformer:**
- a. Remove speaker (see item VI).
- b. Unsolder transformer leads.
- c. Remove rivet (use bolt for replacement).
- d. Unsolder mounting lug.

VIII. **To remove chassis subassemblies from chassis plate:**
- a. Remove tubes (see item IV).
- b. Unsolder grounding strap (E) which connects tube shelf to chassis plate.
- c. Unsolder two wires which connect to speaker.
- d. Unsolder two wires attached to switch.
- e. Unsolder leads to loop connectors.
- f. Remove dial knob (pull off).
- g. Remove two screws (F) holding tube shelf to chassis plate.
- h. Remove nut (G) between I.F. transformers.
- i. Remove screw (G) beneath the negative terminal of "A" battery holder, and also screw (G) adjacent to volume control below "A" battery holder.



Chassis Disassembly

IX. **To remove volume control:**
- a. Remove chassis subassembly from chassis plate (see item VIII).
- b. Unsolder the two leads to the "A" battery holder.
- c. Lift up the "A" battery holder by removing the one screw (C) in its base. This holder has a hinge action and must be lifted up and back to remove.
- d. Unsolder volume control leads.
- e. Remove volume control knob (attached to shaft with set screw)
- f. Remove volume control assembly by bending back four lugs.

X. **To remove oscillator coil:**
- a. Same procedure and steps as covered in item VIII for removal of chassis subassembly plus the following.
- b. Unsolder oscillator coil leads.
- c. Remove coil by unsnapping spring mounting clips from angle bracket,

XI. **To remove tuning condenser:**
- a. Remove case center strip (III).
- b. Unsolder two leads and two ceramic capacitors (C2, C20) from tuning condenser.
- c. Remove tuning knob (pull off).
- d. Remove the two screws (H) (accessible through dial knob opening) which hold the tuning condenser to the chassis subassembly.

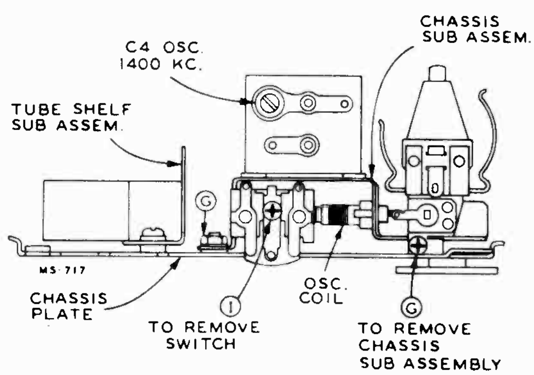
XII. **To remove 1st I-F transformer:**
- a. Remove chassis subassemblies (see item VIII).
- b. Unsolder four leads from 1st I-F transformer.
  1. Blue to screen of 1R5 tube.
  2. Green to grid of 1U4 tube.
  3. Red to B+ terminal of 5 lug terminal board TB5.
  4. Black to terminal board TB2.
- c. Unsolder and bend mounting lugs straight on the I-F transformer can.

XIII. **To remove 2nd I-F transformer:**
- a. Remove chassis subassemblies (see item VIII).
- b. Unsolder four leads from 2nd I-F transformer.
- c. Unsolder and bend mounting lugs straight on the I-F transformer can.

XIV. **To remove loop assembly:**
- a. Remove case center strip (see item III).
- b. Unsolder leads to loop connectors.
- c. Remove snap fasteners holding loop in cover.
- d. Carefully pry out on edge next to catch (opposite hinges).
- e. When reassembling press loop assembly into top lid on the side next to the connectors to cause the plastic projections on the loop assembly to engage in the detents in the top lid.

XV. **To remove switch:**
- a. Remove case center strip (III).
- b. Remove screw (I) which holds switch to chassis plate.
- c. Unsolder the two wires which connect to the switch.
- d. Unsolder switch from chassis plate.

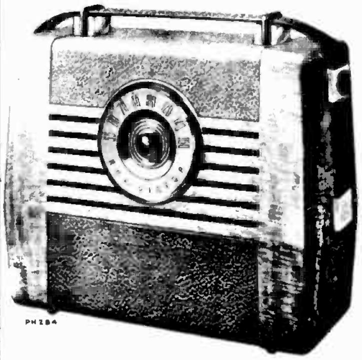
XVI. **To adjust latching of top lid:**
- a. The hinges are attached to the face panel with Phillips head screws (one to each hinge). The mounting holes of the hinges are sufficiently large to permit adjustment of the hinges when the mounting screws are loosened. Tighten screws after adiustment.



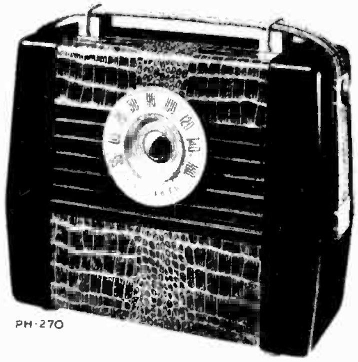
Chassis Disassembly

RADIO CORP. OF AMERICA

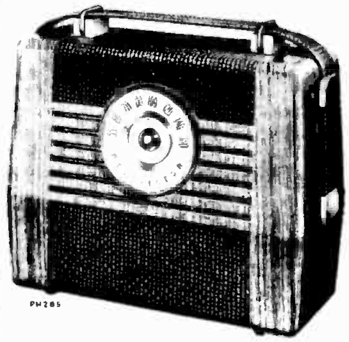
MODELS 8BX5, 8BX54, 8BX55, CHASSIS RC-1059A



Model 8BX54



Model 8BX5



Model 8BX55

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 VS050

Tube Complement
(1) RCA—1R5 .... Converter
(2) RCA—1T4 .... I. F.-Amplifier
(1U4 in RC-1059A)
(3) RCA—1U5 ...... 2nd Det. AVC. & A.F.-Amplifier
(4) RCA—3V4 .... Power Output
(5) RCA—117Z3 .... Rectifier

Current Consumption
Battery Operation .... "A" 60 ma., "B" 10 ma.
(Average life of RCA VS050 Battery
100 hrs. intermittent service.)
Total Rect. Current (117 volt, 60 cycle) .... 60 ma.

Power Output (AC Operation)
Undistorted .... .15 watt
Maximum .... .25 watt
(Output is slightly lower on battery operation)

Loudspeaker .... 4 in. P.M. 3.4 ohms at 400 cycles

Cabinet Dimensions
Height ..... 9½ in. Width ..... 11 in. Depth ..... 5 in.

Critical Lead Dress

1. Dress output plate bypass C20 capacitor against chassis
2. Dress output plate lead to output transformer against chassis.
3. Dress audio coupling capacitor C14 (volume control to grid of 1U5) away from chassis, away from audio limiting resistor R8 and to permit adjustment of second I.F. Transformer.
4. Dress all exposed leads away from each other, and away from chassis to prevent short circuits.
5. Dress all filament and ground leads against chassis.
6. Dress filament bypass capacitor C23 and accompanying compensating resistor R15 (volume control to IT4 [or 1U4] socket) against volume control.
7. Dress power line cord away from line-battery switch mechanism.
8. Dress all capacitors and wiring away from oscillator coil.
9. Dress 4 mmf. neutralizing capacitor C7 against A.V.C. bypass capacitor C8 (IT4 [or 1U4] filament to first I.F. trans.).

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.

NOTE: Battery or substitute must be in place for ant. alignment (step 5).

Alignment Tabulation

Step	Connect high side of test oscillator to—	Test oscillator output—	Turn receiver dial to—	Adjust for maximum peak output
1	Disconnect loop—remove chassis—remove bottom plate, connect a 10,000 ohm resistor from C1 stator terminal to tuning condenser frame.			
2	Stator terminal of C1 thru .01 mf. capacitor	455 kc	55	*Top and bottom T2 (2nd. I-F trans.) *Top and bottom T1 (1st. I-F trans.)
3	Remove the 10,000 ohm resistor. Replace bottom cover and install chassis in cabinet. Re-connect loop.			
4	Short wire placed near receiver (for radiated signal)	1600 kc	160	†C5 (osc.)
5		1400 kc	140	†C2 (ant.)
6		600 kc	60	*L2 (osc.) while rocking gang
7		Repeat steps 4, 5 and 6		

NOTES:
*The magnetite cores of L2 and some T2 and T1 do not have visible adjusting screws. The cores have screw driver slots to permit adjustment (use non-metallic screwdriver).
†Adjustable thru hole in side of case which is accessible after unfastening one end of the carrying handle.

MODELS 8BX5, 8BX54, 8BX55, CHASSIS RC-1059A

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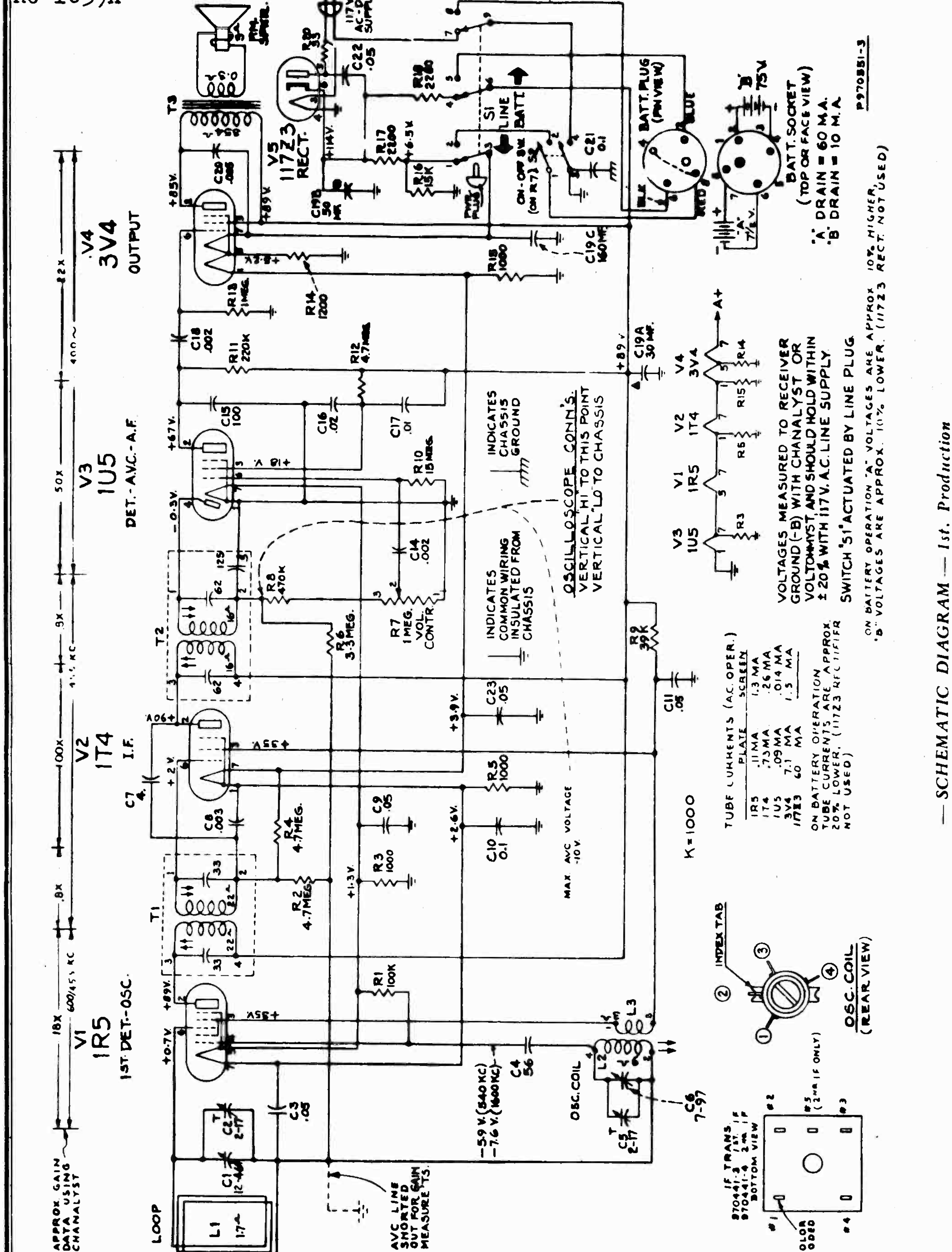
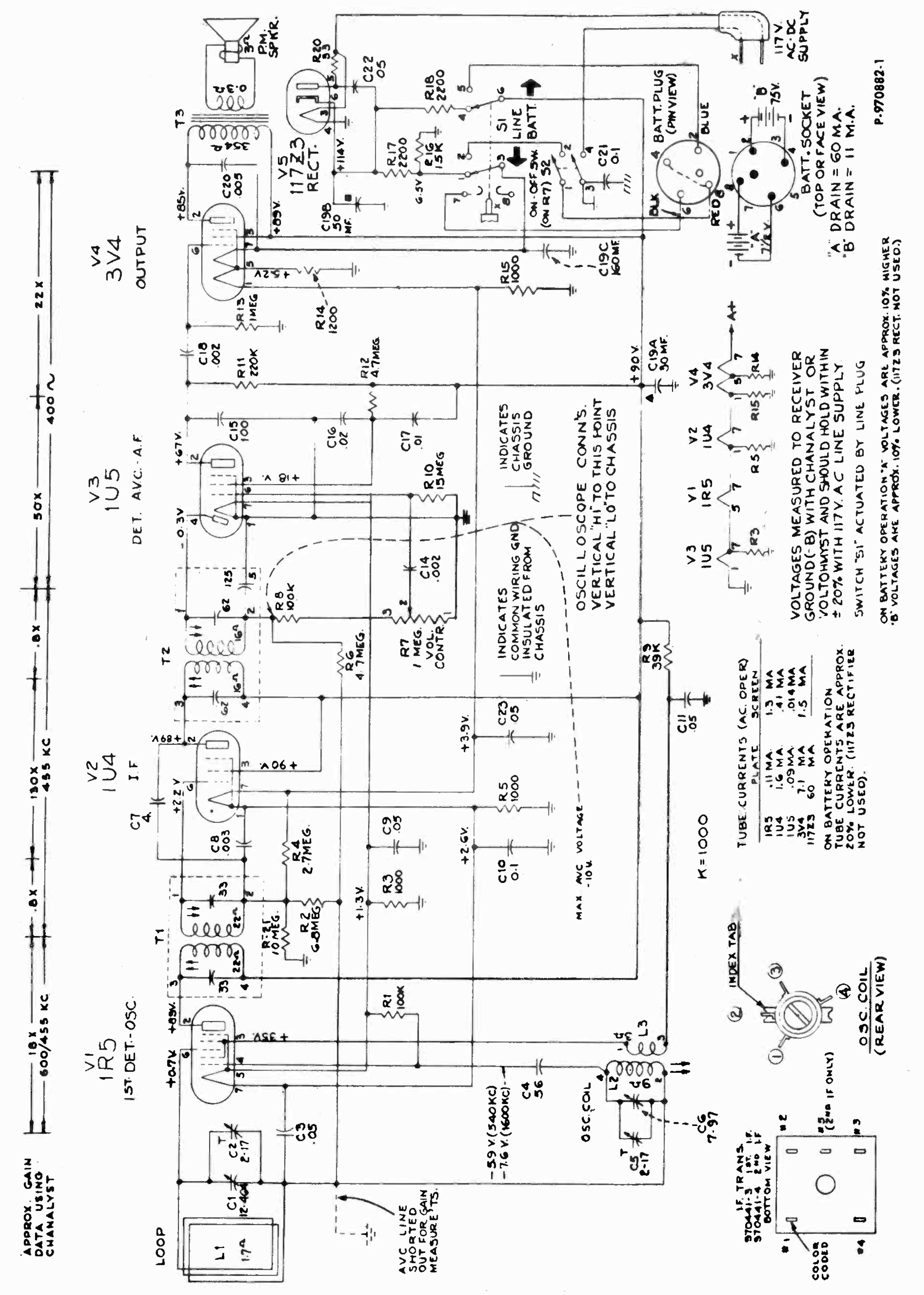


— SCHEMATIC DIAGRAM — 1st. Production

RADIO CORP. OF AMERICA

MODELS 8BX5, 8BX54, 8BX55, CHASSIS RC-1059A



— SCHEMATIC DIAGRAM — 2nd. Production

MODELS 8BX5, 8BX54, 8BX55 — RADIO CORP. OF AMERICA — CHASSIS RC-1059, RC-1059A

To Remove Carrying Handle

1. Pull off the volume control knob.
2. Insert a small knife blade between one side of a spring clip and the cabinet as shown below, push upward on the slip shield to disengage the locking of the slip shield to the spring clip. Repeat this procedure on the other side of the spring clip. The slip shield may then be removed by pushing it upward thus disengaging it from the spring clip.
3. Repeat step 2 for each slip shield.
4. Remove the four screws (2 on each side) which hold the carrying handle to the case.

Caution: When re-assembling—make certain that the slip shield and the spring clip is assembled with their locks in the correct relation to each other.

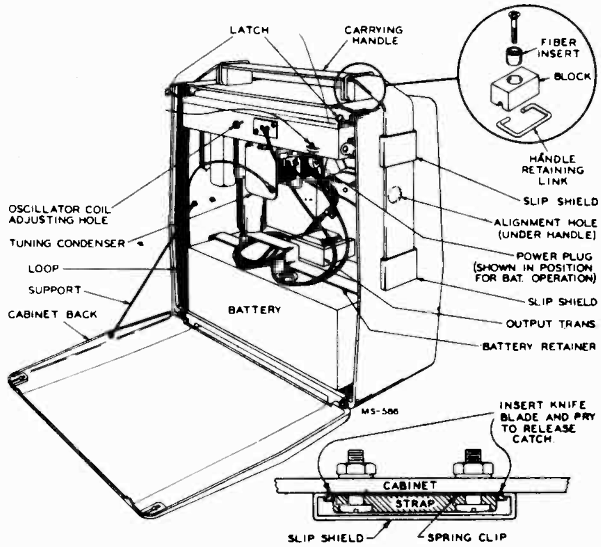
To Remove Chassis

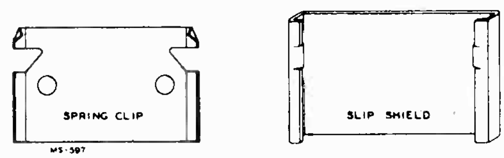
1. Pull off the volume control knob.
2. Close tuning condenser (dial at 55) to prevent possible damage to tuning condenser.
3. Remove dial knob by grasping both sides with the tips of the fingers of both hands and pull to the front —or—close the tuning condenser, open the back, reach in and push outward on the hub of the dial knob.

NOTE: When re-assembling—press inward on the back of the tuning condenser and on the front of the knob to properly seat the hub on the shaft.

4. Remove the two slip shields on the R.H. side of the cabinet (opposite the volume control) and unfasten the end of the carrying handle using the procedure described under, "To Remove Carrying Handle."
5. Unsolder the loop leads.
6. Remove the two screws holding the bottom edge of the speaker to the cabinet.
7. Remove the plug from the battery.
8. Remove the two screws at the top of the cabinet while supporting the chassis with one hand.

NOTE: When re-installing—replace speaker holding screws first but do not securely tighten until the two screws at the top of the cabinet have been tightened.





Cabinet Hinges

The cabinet hinges may be readily removed, they are secured to the cabinet and back by force fit. To remove back from cabinet—pull straight outward on both hinges at the same time.

Replacement Parts—1st. Production

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1059
73153	Capacitor—Ceramic, 4 mmf. (C7)
71924	Capacitor—Ceramic, 56 mmf. (C4)
73152	Capacitor—Ceramic, 100 mmf. (C15)
72315	Capacitor—Tubular, .002 mfd., 200 volts (C14, C18)
71921	Capacitor—Tubular, .003 mfd., 200 volts (C8)
72791	Capacitor—Tubular, .005 mfd., 400 volts (C20)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C17)
71928	Capacitor—Tubular, .02 mfd., 200 volts (C16)
72596	Capacitor—Tubular, .05 mfd., 200 volts (C9, C23)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C3, C11, C22)
54788	Capacitor—Tubular, 0.1 mfd., 200 volts (C10)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C21)
73127	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts; 1 section of 30 mfd., 150 volts and 1 section of 160 mfd., 25 volts (C19A, C19B, C19C)
73114	Coil—Oscillator coil complete with core and stud (L2, L3)
73126	Condenser—Variable tuning condenser (C1, C2, C5, C6)
73125	Control—Volume control and power switch (R7, S2)
73128	Cord—Power cord and plug (72" long)
73482	Insulator—Mounting insulator for tuning condenser
73275	Plug—5 prong male plug for battery cable
73237	Resistor—Wire wound, 33 ohms, 150 MA (R20)
	Resistor—Fixed composition, 1000 ohms, ±10%, ½ watt (R3, R5, R15)
	Resistor—Fixed composition, 1200 ohms, ±10%, ½ watt (R14)
73132	Resistor—Voltage divider, 2200 ohms, 7 watt (R17)
	Resistor—Fixed composition, 2200 ohms, ±10%, ½ watt (R18)
	Resistor—Fixed composition, 15,000 ohms, ±10%, ½ watt (R16)
	Resistor—Fixed composition, 39,000 ohms, ±10%, ½ watt (R9)
	Resistor—Fixed composition, 100,000 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R11)
	Resistor—Fixed composition, 470,000 ohms, ±20%, ½ watt (R8)
	Resistor—Fixed composition, 1 megohm, ±20%, ½ watt (R13)
	Resistor—Fixed composition, 3.3 megohms, ±10%, ½ watt (R6)
	Resistor—Fixed composition, 4.7 megohms, ±10%, ½ watt (R2, R4)
	Resistor—Fixed composition, 4.7 megohms, ±20%, ½ watt (R12)
	Resistor—Fixed composition, 15 megohms, ±20%, ½ watt (R10)

STOCK No.	DESCRIPTION
73103	Shield—Tube shield for 1U5
73117	Socket—Tube socket
73133	Switch—"Line Battery" change switch T.P.D.T. (S1)
73129	Transformer—First I-F transformer (T1)
73130	Transformer—Second I-F transformer (T2)
71047	Transformer—Output transformer (T3)
73131	Washer—Insulating washer—extruded—to mount tuning condenser (3 required)
	SPEAKER ASSEMBLIES 92577-1
71059	Gasket—Speaker gasket (black tubing)
73123	Speaker—4" PM speaker complete with cone and voice coil
	MISCELLANEOUS
73134	Back—Cabinet back—less hinges—for Model 8BX5
73721	Back—Cabinet back—blonde—less hinges—for Model 8BX54
73723	Back—Cabinet back—walnut—less hinges—for Model 8BX55
73147	Ball—Metal ball with groove for back cover latch mechanism
73137	Block—Chassis mounting block (with groove for link)—less fiber insert (2 required)—fits on top of cabinet
73136	Button—Center button for dial knob
73142	Button—Station selector indicator button
Y1464	Case—Carrying case with loop—less hinges, latch mechanism, back cover and carrying handle—for Model 8BX5
Y2016	Case—Carrying case—blonde—with loop—less hinges, latch mechanism, back cover and carrying handle—for Model 8BX54
Y2017	Case—Carrying case—walnut—with loop—less hinges, latch mechanism, back cover and carrying handle—for Model 8BX55
73195	Clip—Spring clip for slip shield (3 required)
70425	Clip—Spring clip for volume control and power switch knob
73143	Handle—Carrying handle—for Model 8BX5
73724	Handle—Carrying handle—tan—for Model 8BX54
73725	Handle—Carrying handle—light brown—for Model 8BX55
73144	Hinge—Cabinet hinge (2 required)
73149	Insert—Fibre insert for chassis mounting block (2 required)
73135	Knob—Dial knob complete with center button and calibrations
73138	Knob—Volume control and power switch knob
73459	Link—Carrying handle retaining link (2 required)
73141	Loop—Antenna loop (L1)
73145	Nut—Hex nut with groove for back cover latch mechanism
73139	Shield—Slip shield for carrying strap—(bottom R. H. and L.H. and upper L. H.)
73140	Shield—Slip shield for carrying strap—with hole for volume control knob shaft (upper R. H.)
73146	Spring—Extension spring for back cover latch mechanism—R. H.
73148	Spring—Extension spring for back cover latch mechanism—L. H.
30900	Spring—Retaining spring for dial knob
73483	Support—Flexible drop support for back cover

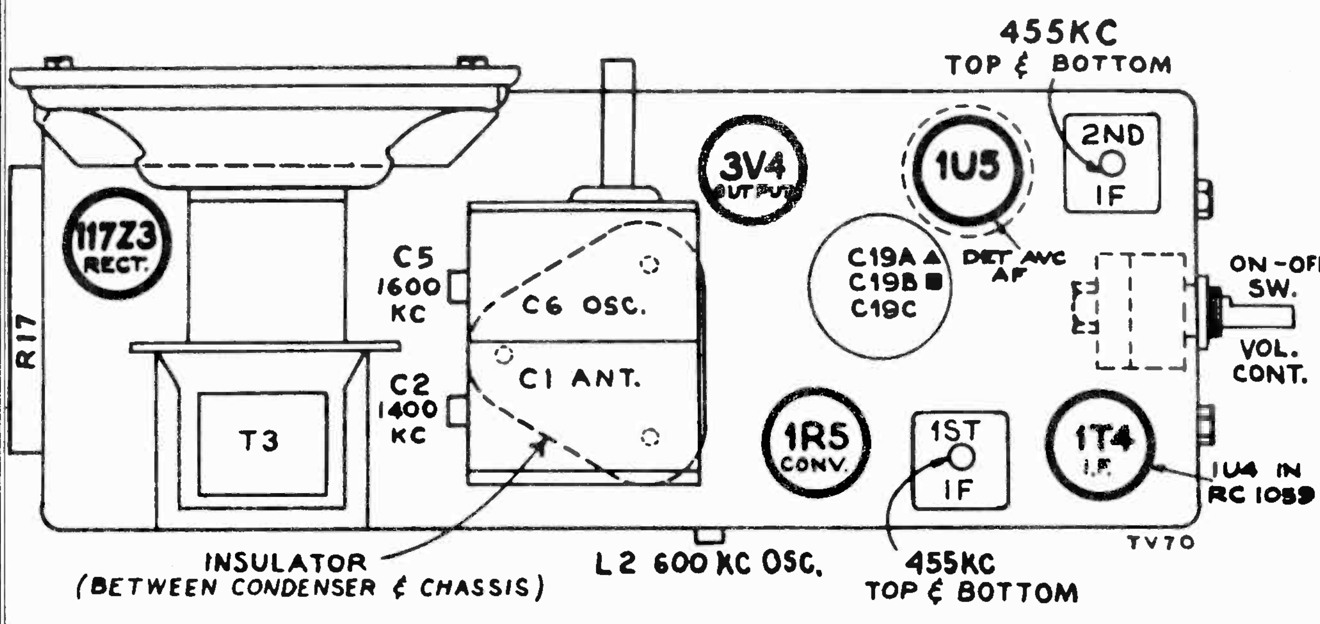
RADIO CORP. OF AMERICA MODELS 8BX5, 8BX54, 8BX55, CHASSIS RC-1059, RC-1059A

Replacement Parts—2nd. Production

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1059A
73153	Capacitor—Ceramic, 4 mmf. (C7)
71924	Capacitor—Ceramic, 56 mmf. (C4)
73152	Capacitor—Ceramic, 100 mmf. (C15)
72315	Capacitor—Tubular, .002 mfd., 200 volts (C14, C18)
71921	Capacitor—Tubular, .003 mfd., 200 volts (C8)
72791	Capacitor—Tubular, .005 mfd., 400 volts (C20)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C17)
71928	Capacitor—Tubular, .02 mfd., 200 volts (C16)
72596	Capacitor—Tubular, .05 mfd., 200 volts (C9, C23)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C3, C11, C22)
*73784	Capacitor—Tubular, 0.1 mfd., 200 volts (C10)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C21)
73127	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts; 1 section of 30 mfd., 150 volts and 1 section of 160 mfd., 25 volts (C19A, C19B, C19C)
*73935	Clip—Mounting clip for I.F. transformers
73114	Coil—Oscillator coil complete with core and stud (L2, L3)
73126	Condenser—Variable tuning condenser (C1, C2, C5, C6)
73125	Control—Volume control and power switch (R7, S2)
70022	Cord—Power cord and plug
72283	Grommet—Rubber grommet for mounting tuning condenser (3 required)
73275	Plug—5 prong male plug for battery cable
73237	Resistor—Wire wound, 33 ohms, 150 MA (R20)
	Resistor—Fixed composition, 1000 ohms, ±10%, ½ watt (R3, R5, R15)
	Resistor—Fixed composition, 1200 ohms, ±10%, ½ watt (R14)
	Resistor—Fixed composition, 2200 ohms, ±10%, ½ watt (R18)
73132	Resistor—Voltage divider, 2200 ohms, 7 watts (R17)
	Resistor—Fixed composition, 15,000 ohms, ±10%, ½ watt (R16)
	Resistor—Fixed composition, 39,000 ohms, ±10%, ½ watt (R9)
	Resistor—Fixed composition, 100,000 ohms, ±20%, ½ watt (R1)
	Resistor—Fixed composition, 100,000 ohms, ±10%, ½ watt (R8)
	Resistor—Fixed composition, 220,000 ohms, ±20%, ½ watt (R11)
	Resistor—Fixed composition, 1 megohm, ±20%, ½ watt (R13)
	Resistor—Fixed composition, 2.7 megohms, ±10%, ½ watt (R4)
	Resistor—Fixed composition, 4.7 megohms, ±20%, ½ watt (R12)
	Resistor—Fixed composition, 4.7 megohms, ±10%, ½ watt (R6)
	Resistor—Fixed composition, 6.8 megohms, ±10%, ½ watt (R2)

STOCK No.	DESCRIPTION
	Resistor—Fixed composition, 10 megohms, ±10%, ½ watt (R21)
	Resistor—Fixed composition, 15 megohms, ±20%, ½ watt (R10)
73103	Shield—Shield for 1U5 tube
73117	Socket—Tube socket
71039	Switch—"Line-Battery" change switch (S1)
73129	Transformer—First I.F. transformer (T1)
73130	Transformer—Second I.F. transformer (T2)
71047	Transformer—Output transformer (T3)
	SPEAKER ASSEMBLY 92577-1
71059	Gasket—Speaker gasket (black tubing)
73123	Speaker—4" PM speaker complete with cone and voice coil
	MISCELLANEOUS
73134	Back—Cabinet back—less hinges—Model 8BX5
73721	Back—Cabinet back—less hinges—Model 8BX54
73723	Back—Cabinet back—less hinges—Model 8BX55
73147	Ball—Metal ball with groove for back cover latch mechanism
73137	Block—Chassis mounting block (with groove for link)—less fiber insert (2 required)—fits on top of cabinet
73136	Button—Center button for dial knob
73142	Button—Station selector indicator button
Y1464	Case—Carrying case complete with loop—less hinges, latch mechanism, back cover and carrying handle—Model 8BX5
Y2016	Case—Carrying case complete with loop—less hinges, back cover, latch mechanism and carrying handle
Y2017	Case—Carrying case complete with loop—less hinges, back cover, latch mechanism and carrying handle
70425	Clip—Spring clip for volume control and power switch knob
73195	Clip—Spring clip for slip shield (4 req'd)
73143	Handle—Carrying handle—Model 8BX5
73724	Handle—Carrying handle—Model 8BX54
73725	Handle—Carrying handle—Model 8BX55
*74180	Hinge—Cabinet hinge (2 required)
73149	Insert—Fibre insert for chassis mounting block (2 required)
73135	Knob—Dial knob complete with center button and calibrations
73138	Knob—Volume control and power switch knob
73459	Link—Carrying handle retaining link (2 required)
73141	Loop—Antenna loop (L1)
73145	Nut—Hex nut with groove for back cover latch mechanism
73139	Shield—Slip shield for carrying strap (bottom R.H. and L.H. and upper L.H.)
73140	Shield—Slip shield for carrying strap—with hole for volume control shaft (upper R.H.)
30900	Spring—Retaining spring for dial knob
73146	Spring—Extension spring for back cover latch mechanism—R.H.
73148	Spring—Extension spring for back cover latch mechanism—L.H.
73483	Support—Flexible drop support for back cover

* This is the first time that this Stock No. has appeared in Service Data.

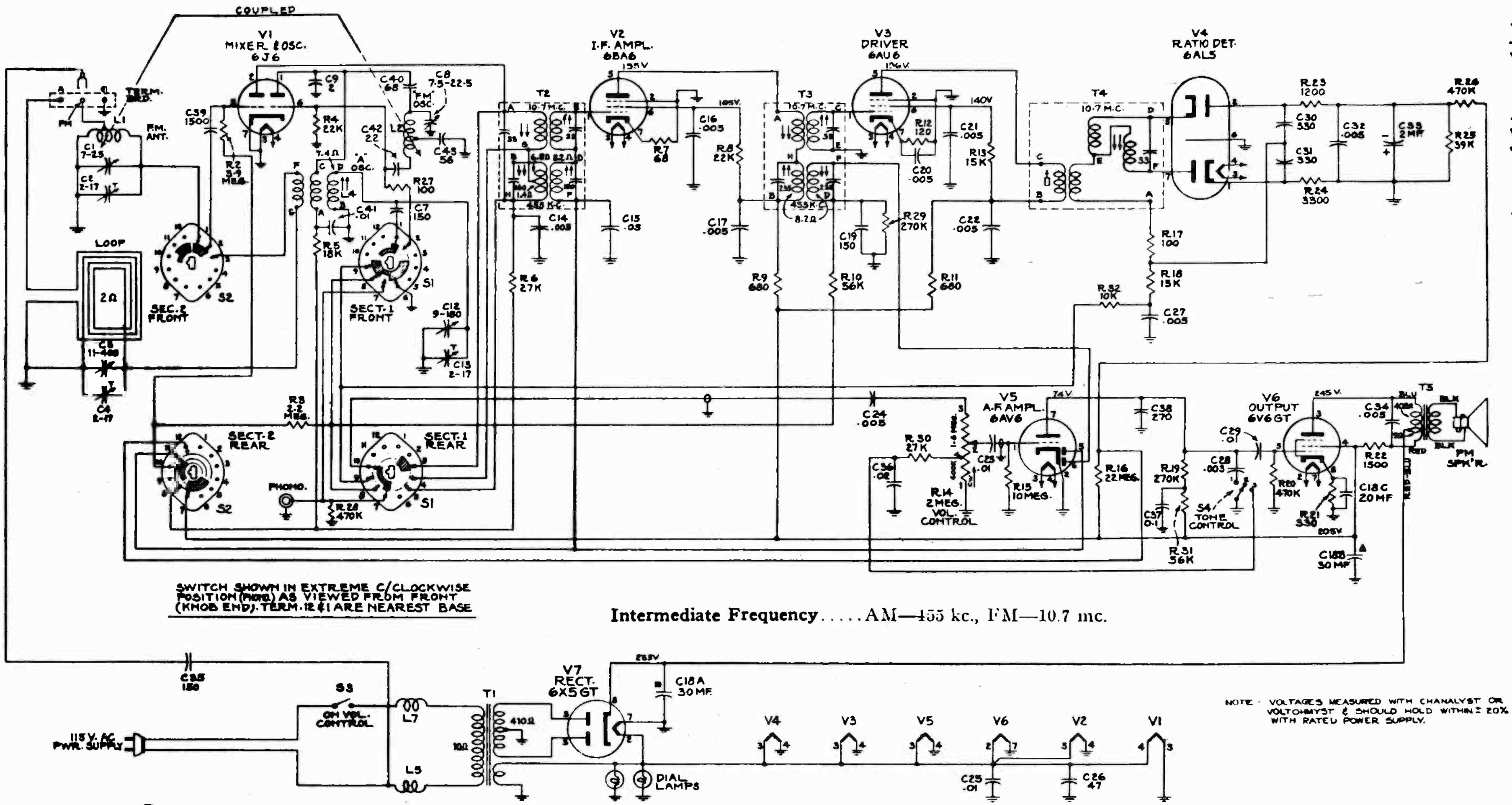


Tube and Trimmer Locations

MODELS 8R71, 8R72, 8R74, 8R75, 8R76

RADIO CORP. OF AMERICA

CHASSIS RC-1060, RC-1060A



Intermediate Frequency..... AM—455 kc., FM—10.7 mc.

Tuning Ranges

Standard Broadcast (AM)............ 540-1,600 kc.
Frequency Modulation (FM) .... 88-108 mc.

Tube Complement

(1) 6J6...................... Mixer and Oscillator
(2) 6BA6.......................... I.F. Amplifier
(3) 6AU6 .... Driver
(4) 6AL5 .... Ratio Detector
(5) 6AV6............ AM Det.—AVC—A. F. Amp.
(6) 6V6GT .... Output
(7) 6X5GT............................ Rectifier

Power Supply Rating...... 115 volts, 60 cycles, 50 watts

Loudspeaker

Type 92572-2........................... 5 in. P.M.
Voice coil impedance at 400 cycles......... 3.2 ohms

Tuning Drive Ratio............ 7½:1 (3⅜ turns of knob)

Dial Lamps (2)........ Type No. 44, 6-8 volts, 0.25 amp.

Power Output

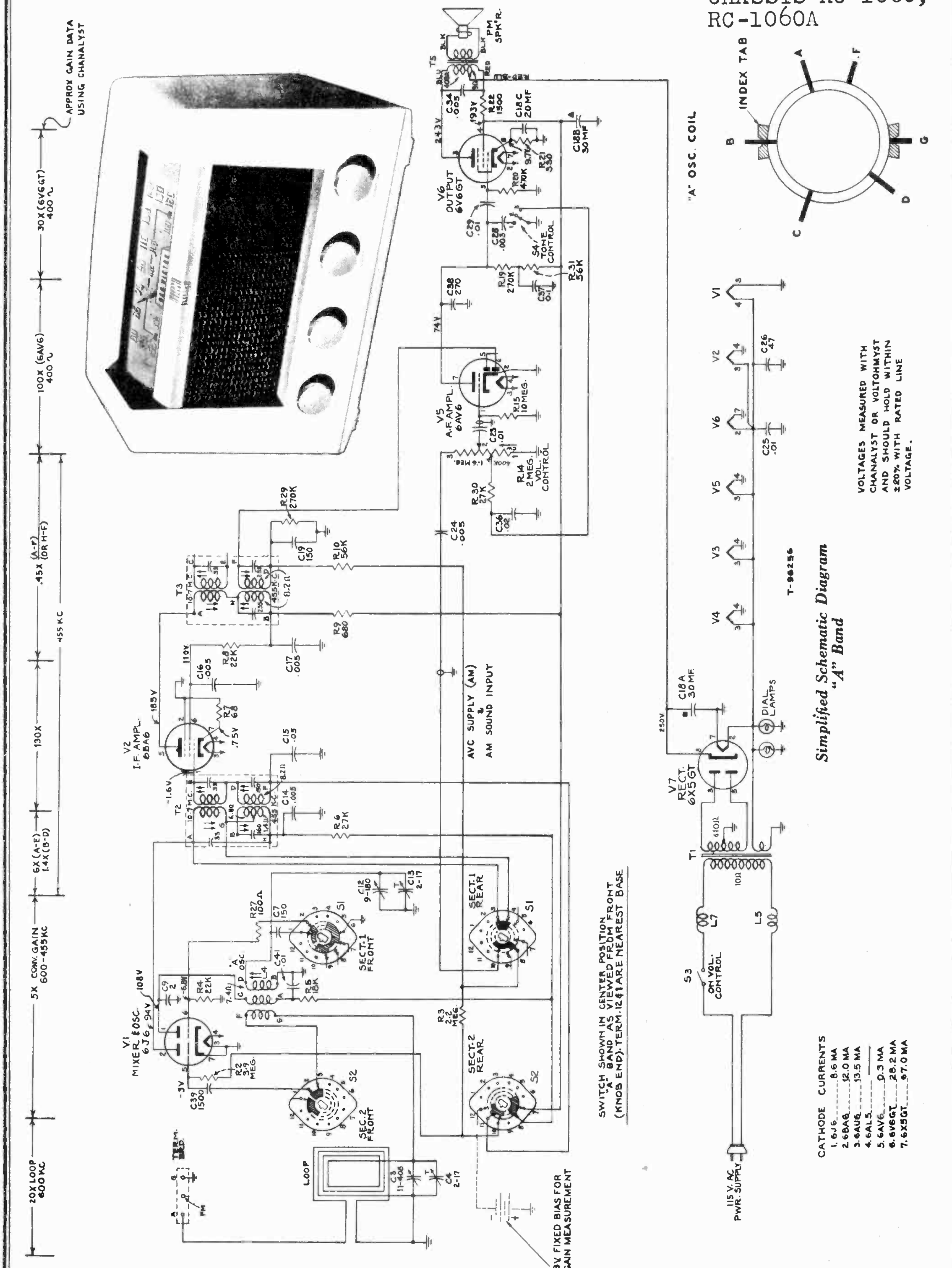
Maximum................................ 3 watts
Undistorted .... 2 watts

CLARI-SKEMATIX

Registered Trademark

RADIO CORP. OF AMERICA

MODELS 8R71, 8R72, 8R74, 8R75, 8R76, CHASSIS RC-1060, RC-1060A



Simplified Schematic Diagram "A" Band

CLARI-SKEMATIX

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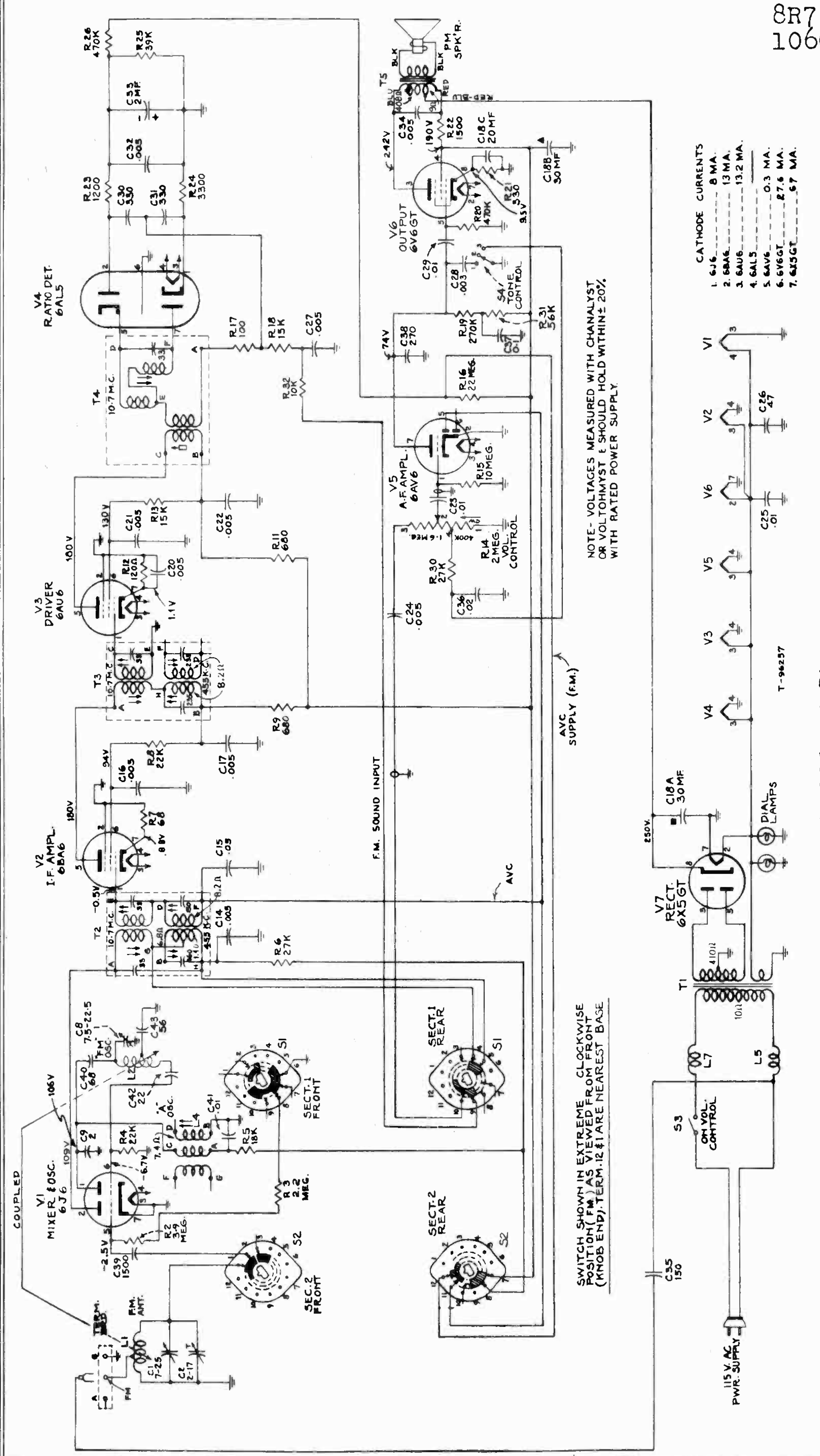
MODELS 8R71, 8R72

RADIO CORP. OF AMERICA

MODELS 8R74, 8R75, 8R76, CHASSIS RC-1060, RC-1060A



Simplified Schematic Diagram "FM" Band

AM Antenna: Connect a single wire antenna to terminal "A."

FM Antenna: Connect the transmission line from an external FM dipole antenna to "FM" and "G" terminals. Remove the internal FM antenna wire from terminal "FM."

NOTE: *For satisfactory reception on FM—when using the built-in FM antenna—the power cord must be fully extended and must not be coiled or hanked up.*

Antennas:

These receivers have built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

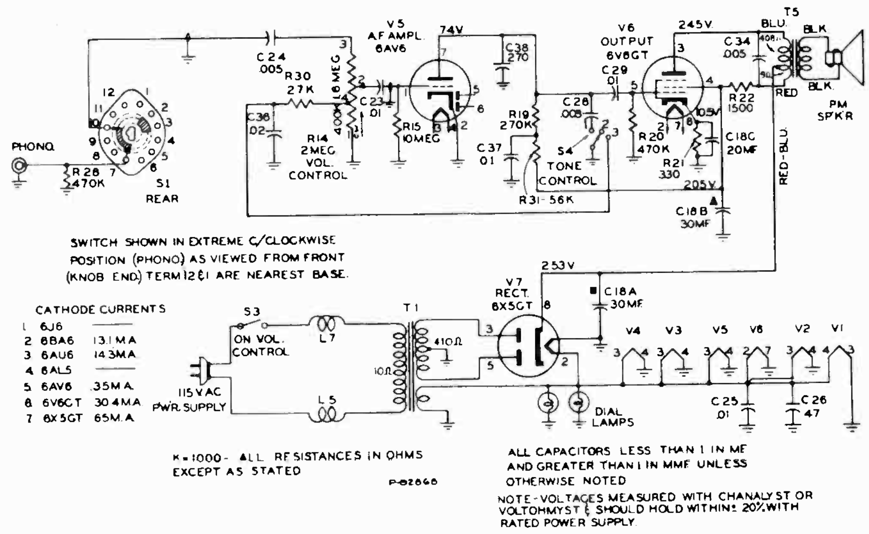
Under average conditions these antennas will provide satisfactory reception. However, provision is made for the use of external antennas if desired — connect as indicated below:

Ground: Connect external ground to "G" terminal.

CHASSIS RC-1060, RC-1060A

RADIO CORP. OF AMERICA

MODELS 8R71, 8R72, 8R74, 8R75, 8R76



Simplified Schematic Diagram "Phono" Position

VOLTAGE CHART

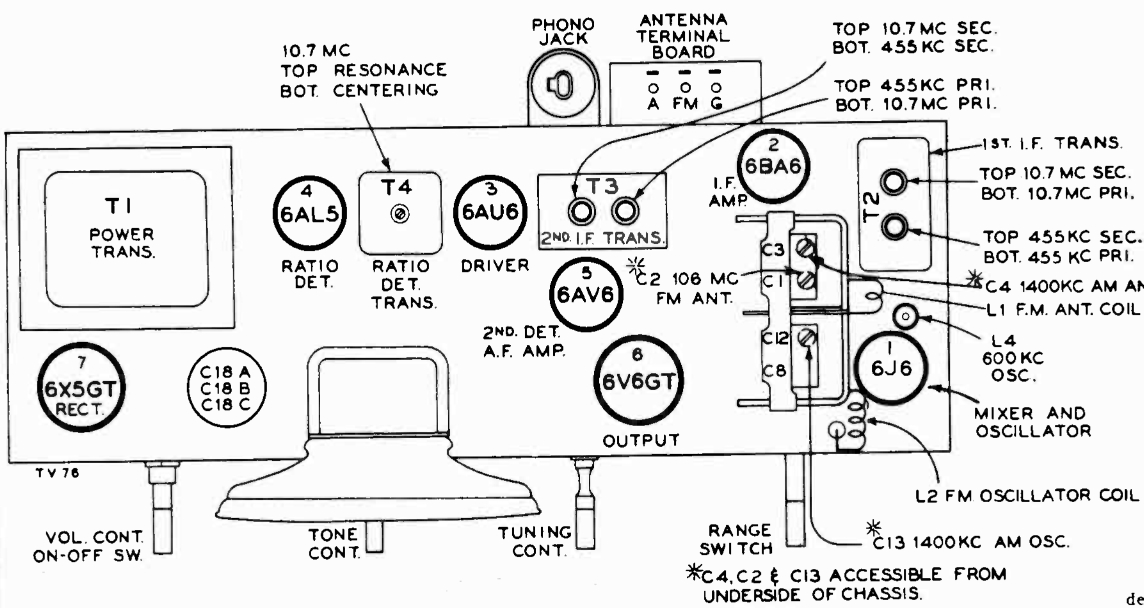
Tube	Type		Pin No.	"A"	"FM"	Phono
1	6J6	Plate Plate Grid Grid	1 2 6 5	108 94 −6.8 −3.0	106 109 −6.7 −2.5	— — — −1.0
2	6BA6	Plate Screen Cathode Grid	5 6 7 1	185 110 0.75 −1.6	180 94 0.88 −0.5	195 105 0.94 −0.8
3	6AU6	Plate Screen Cathode	5 6 7	184 132 1.1	180 130 1.1	195 140 1.2
4	6AL5	—	—	—	—	—
5	6AV6	Plate Grid	7 1	74 −0.8	74 −0.8	76 −0.8
6	6V6GT	Plate Screen Cathode	3 4 8	243 193 9.7	242 190 9.5	245 205 10.5
7	6X5GT	Cathode	8	250	250	253

CATHODE CURRENTS (MA)

Tube	Type		Pin No.	"A"	"FM"	Phono
1	6J6		7	8.6	8	—
2	6BA6		7	12	13	13.1
3	6AU6		7	13.5	13.2	14.3
4	6AL5		1 & 2	—	—	—
5	6AV6		2	0.3	0.3	0.35
6	6V6GT		8	28.2	27.6	30.4
7	6X5GT		8	67	67	65

Voltages and currents measured with tuning condenser closed and no signal input should hold within ±20% with rated line voltage.

Note: Plate voltage removed from 6J6 mixer and oscillator tube during "Phono" operation.



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").

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.

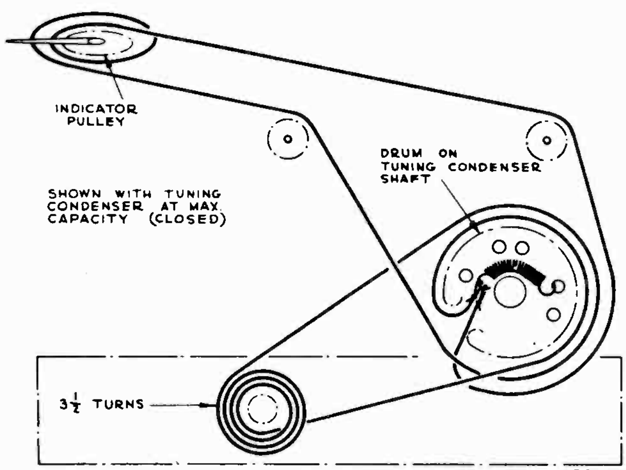
The FM i-f alignment may be checked by means of an FM sweep generator and cathode ray oscilloscope. Connect the output from the sweep generator, which is set to 10.7 mc., to the mixer grid (6J6 Pin No. 5), low side to chassis. Disconnect the 2 mfd. capacitor C33 from the Ratio Detector circuit.

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 on front apron side of the output transformer.
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 run around the outside of the 1st I. F. transformer and away from V2.
14. The taps on L1 and L2 are critical. L1 tap should be ½ turn from the ground end. L2 tap should be 2½ turns from the gang condenser C8.
15. The lead from R32 to terminal No. 9 of S1 should be dressed away from the output transformer.
16. Dress C25 and C26 against the chassis with the shortest lead length possible.
17. 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 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.

CHASSIS RC-1060, RC-1060A

RADIO CORP. OF AMERICA

MODELS 8R71, 8R72, 8R74, 8R75, 8R76

Circuit Description

The chassis used in these receivers have 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 range 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 range switch has four functions:

(1) Selection of AM or FM ranges.

(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 the plate circuits of V1 (disconnected for PHONO operation).

(4) Controls audio input to volume control.

The driver V3 (6AU6) and ratio detector V4 (6AL5) circuits are similar to those used in other RCA Victor AM-FM receivers.

The audio voltage controlled by the volume control is amplified by V5 (6AV6) and V6 (6V6GT).

The rectifier V7 is type 6X5GT.

Replacement Parts

Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC 1060—Models 8R71, 8R74, 8R75
	RC 1060A—Models 8R72, 8R76
*73369	Board—"Antenna - FM - Ground" board
*73866	Capacitor—Ceramic, 2 mmf. (C9)
33101	Capacitor—Ceramic, 22 mmf. (C42)
39042	Capacitor—Ceramic, 47 mmf. (C26)
*73867	Capacitor—Ceramic, 56 mmf. (C43)
33103	Capacitor—Ceramic, 68 mmf. (C40)
48125	Capacitor—Ceramic, 150 mmf. (C7, C19)
39632	Capacitor—Mica, 150 mmf. (C35)
47617	Capacitor—Ceramic, 270 mmf. (C38)
39640	Capacitor—Mica, 330 mmf. (C30, C31)
*73748	Capacitor—Ceramic, 1,500 mmf. (C39)
72573	Capacitor—Tubular, .003 mfd., 400 v. (C28)
71553	Capacitor—Tubular, .005 mfd., 400 v. (C14, C16, C17, C21, C22)
72791	Capacitor—Tubular, .005 mfd., 400 v. (C34)
71926	Capacitor—Tubular, .005 mfd., 200 v. (C20, C24, C27, C32)
71923	Capacitor—Tubular, .01 mfd., 200 v. (C23, C25)
71925	Capacitor—Tubular, .01 mfd., 400 v. (C29, C41)
71928	Capacitor—Tubular, .02 mfd., 200 v. (C36)
72596	Capacitor—Tubular, .05 mfd., 200 v. (C15)
70617	Capacitor—Tubular, 0.1 mfd., 400 v. (C37)
*73747	Capacitor—Electrolytic, 2 mfd., 50 v. (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)
*73916	Coil—FM oscillator coil—No. 16 tinned bus wire, 7 turns per inch, 4¾ turns R. H., 15/32" I. D. (L2)
*73918	Coil—FM antenna coil—No. 16 tinned bus wire, 8 turns per inch, 1¾ turns L. H., 15/32" I. D. (L1)
	Coil—Line choke coil—No. 18 gauge solid hook-up wire, 1/32" plastic insulation, 10 turns (close wind), ¼" I. D. (L5, L7)
*73744	Coil—AM oscillator coil complete with adjustable core and stud (L4)
*73375	Condenser—Variable tuning condenser (C1, C2, C3, C4, C8, C12, C13)
*73373	Control—Tone control (S4)
38404	Control—Volume control and power switch (R14, S3)
†72953	Cord—Drive cord (approx. 40" overall length required)
*73365	Dial—Dial scale
16058	Grommet—Rubber grommet for mounting R-F shelf (4 required)
*73366	Indicator—Station selector indicator
11891	Lamp—Dial lamp—Mazda 44
*73357	Loop—Antenna loop complete
*73364	Plate—Dial back plate complete with lamp bracket and drive cord pulleys for Models 8R71, 8R74 and 8R75
*73371	Plate—Dial back plate complete with lamp bracket and drive cord pulleys for Models 8R72 and 8R76
*73368	Pulley—Station selector indicator drive pulley and shaft
	Resistor—Fixed, composition, 68 ohms, ±10%, ½ watt (R7)
	Resistor—Fixed, composition, 100 ohms, ±10%, ½ watt (R17, R27)
	Resistor—Fixed, composition, 120 ohms, ±10%, ½ watt (R12)
	Resistor—Fixed, composition, 330 ohms, ±10%, ½ watt (R21)
	Resistor—Fixed, composition, 680 ohms, ±20%, ½ watt (R9, R11)
	Resistor—Fixed, composition, 1,200 ohms, ±5%, ½ watt (R23)
52436	Resistor—Wire wound, 1,500 ohms, 5 watt (R22)
	Resistor—Fixed, composition, 3,300 ohms, ±5%, ½ watt (R24)

Stock No.	DESCRIPTION
	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%, 1 watt (R5)
	Resistor—Fixed, composition, 22,000 ohms, ±20%, ½ watt (R4)
	Resistor—Fixed, composition, 22,000 ohms, ±10%, ½ watt (R8)
	Resistor—Fixed, composition, 27,000 ohms, ±10%, ½ watt (R6, R30)
	Resistor—Fixed, composition, 39,000 ohms, ±10%, ½ watt (R25)
	Resistor—Fixed, composition, 56,000 ohms, ±10%, ½ watt (R10, R31)
	Resistor—Fixed, composition, 270,000 ohms, ±10%, ½ watt (R19, R29)
	Resistor—Fixed, composition, 470,000 ohms, ±10%, ½ watt (R20, R26, R28)
	Resistor—Fixed, composition, 2.2 megohm, ±20%, ½ watt (R3)
	Resistor—Fixed, composition, 3.9 megohm, ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 10 megohm, ±20%, ½ watt (R15)
	Resistor—Fixed, composition, 22 megohm, ±20%, ½ watt (R16)
*73370	Ring—Retaining ring for indicator pulley and shaft
*73367	Shaft—Tuning knob shaft
31364	Socket—Dial lamp socket
*73374	Socket—Phono input socket
72516	Socket—Tube socket, 7 prong, miniature
*73606	Socket—Tube socket, 7 prong, miniature, mica filled rubber
31251	Socket—Tube socket, octal
72540	Spring—Drive cord spring
*73377	Switch—Range switch (S1, S2)
70127	Transformer—Power transformer, 115 volt, 60 cycle (T1)
*73745	Transformer—First I. F. transformer, dual (T2)
*73363	Transformer—Second I. F. transformer, dual (T3)
*73743	Transformer—Ratio detector transformer (T4)
*73415	Transformer—Output transformer (T5)
33726	Washer—"C" washer for tuning knob shaft
71033	Washer—Insulating washer—extruded—for mounting output transformer (2 required)
71034	Washer—Insulating washer—flat—for mounting output transformer (2 required)
	SPEAKER ASSEMBLIES
	92572-2
72201	Speaker—5" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
*73380	Baffle—Speaker baffle board and grille cloth
*73381	Bottom—Bottom cover for cabinet
*Y1485	Cabinet—Maroon plastic cabinet for Model 8R71
*Y1486	Cabinet—Ivory plastic cabinet for Model 8R72
*Y2030	Cabinet—Mahogany plastic cabinet for Model 8R74
*Y2031	Cabinet—Walnut plastic cabinet for Model 8R75
*Y2032	Cabinet—Blonde plastic cabinet for Model 8R76
*73382	Clamp—Clamp for fastening baffle board (3 required)
*73384	Decal—Control panel decal
*73378	Knob—Control knob — maroon — for Models 8R71, 8R74 and 8R75
*73379	Knob—Control knob—ivory—for Model 8R72
*73742	Knob—Control knob—tan—for Model 8R76
72649	Motif—Decorative motif for cabinet
72765	Nut—Speed nut to fasten motif
14270	Spring—Retaining spring for knobs

*This is the first time that this Stock No. has appeared in Service Data.

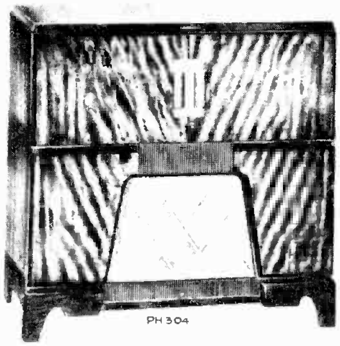
†Stock No. 72953 is a reel containing 250 feet of cord.

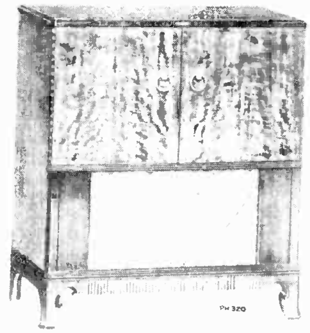
MODEL 8V90, CHASSIS RC-618, RC-618A

RADIO CORP. OF AMERICA

MODEL 8V91, CHASSIS RC-616A, RC-616H

Model 8V91





Model 8V90

Specifications

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

Tuning Drive Ratio .... 18:1 (9 turns of knob)

Record Changer (RP-178)

Record Capacity .... Twelve 10-in. or ten 12-in.
Turntable Speed .... 78 r.p.m.

Power Supply Rating ..... 115 volts, 60 cycles, 90 watts

Circuit Description

The chassis used in these receivers have 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 range 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 range switch has four 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.
(4) Controls audio input to volume control.

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).

Loudspeaker

Type 92579-2W (8V90 1st Prod.) .... 8-in. P.M.
Type 92569-5W (8V90 2nd Prod.) .... 12 in. P.M.
Type 92569-1KX or 92569-5W (8V91) .... 12 in. P.M.

Voice coil impedance—

92579-2W .... 3.2 ohms at 400 cycles
92569-1KX .... 2.2 ohms at 400 cycles
92569-5W .... 3.2 ohms at 400 cycles

Cabinet Dimensions

	Height	Width	Depth
Model 8V90	33¼ in.	31$\frac{11}{16}$ in.	16⅜ in.
Model 8V91	34⅜ in.	36$\frac{7}{16}$ in.	18 in.

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

Antennas:

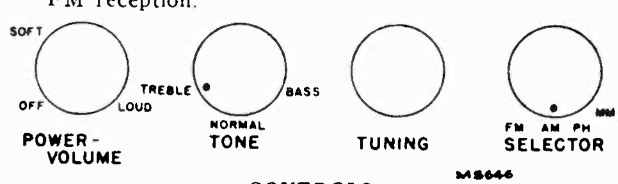
These receivers have built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

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:

AM Antenna: Connect a single wire antenna to terminal "A" (used on Model 8V91 only).

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.

Ground: Connect external ground to "G" terminal (used on Model 8V91 only). Under certain conditions the use of an external ground is detrimental to FM reception.



CONTROLS

MODEL 8V91, CHASSIS RC-616A, RC-616H — RADIO CORP. OF AMERICA — MODEL 8V90, CHASSIS RC-618, RC-618A

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 he 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.

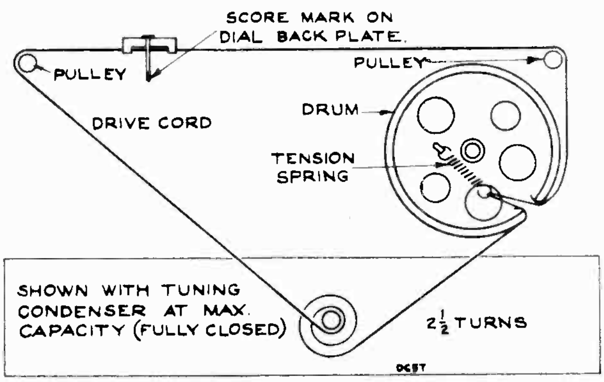
CRITICAL LEAD DRESS

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 reference mark on the dial back plate.

Refer to the dial scale reproductions on page 7.



Dial Indicator and Drive Mechanism — Model 8V90

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.

* "A" terminal used on Model 8V91 only. Use radiated signal for Model 8V90.

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.

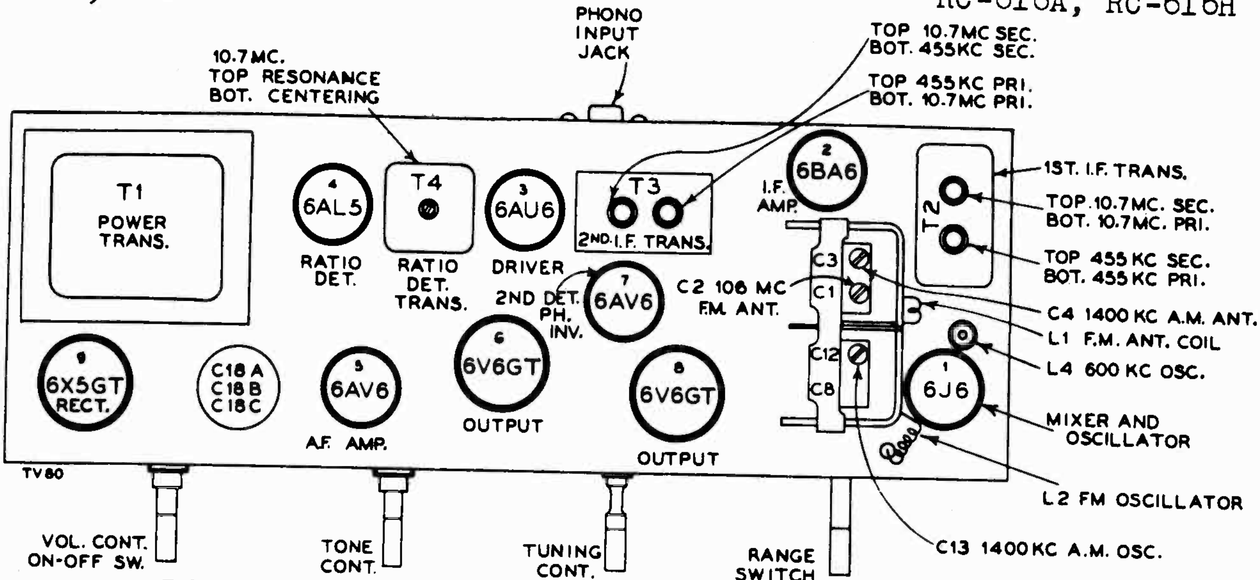
†† Align T3 and T2 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 47,000 ohm resistor and load the FM windings.

** L1 and L2 are adjustable by increasing or decreasing the spacing between turns.

MODEL 8V90, CHASSIS RC-618, RC-618A

RADIO CORP. OF AMERICA

MODEL 8V91, CHASSIS RC-616A, RC-616H



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").

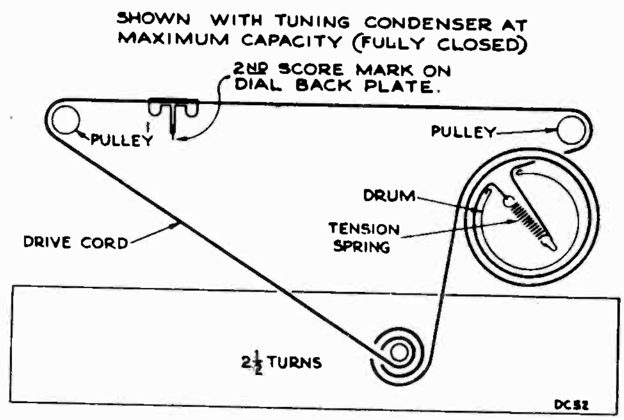
SOCKET VOLTAGES

Voltages measured with Chanalyst or VoltOhmyst and should hold within ±20% with rated line voltage. Tuning condenser closed—no signal input.

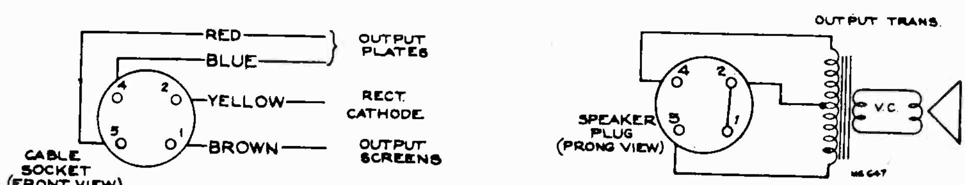
Tube	Terminal		Voltage Phono	A.M.	F.M.
(1) 6J6	Plate	1	—	102	98
	Grid	6	−0.4	−6.8	−6.0
	Plate	2	—	96	110
	Grid	5	−0.8	−2.7	−2.5
(2) 6BA6	Plate	5	—	196	192
	Screen	6	—	100	83
	Cathode	7	—	0.7	0.84
	Grid	1	−0.9	−1.3	−0.2
(3) 6AU6	Plate	5	—	190	185
	Screen	6	—	145	141
	Cathode	7	—	1.25	1.21
(4) 6AL5	——	—	—	—	—
(5) 6AV6	Plate	7	125	85	84
	Grid	1	−0.6	−0.6	−0.6
(6) 6V6GT	Plate	3	299	282	280
	Screen	4	295	220	217
	Cathode	8	21.4	15.5	15.4
(7) 6AV6	Plate	7	168	125	125
	Grid	1	−0.5	−0.5	−0.5
(8) 6V6GT	Plate	3	299	282	280
	Screen	4	295	220	217
	Cathode	8	21.4	15.5	15.4
(9) 6X5GT	Cathode	8	313	300	299

CATHODE CURRENTS (MA)

Tube	Terminal	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	0.75	0.5	0.5
(6) 6V6GT	8	25.1	19.1	18.5
(7) 6AV6	2	1.7	1.1	1.1
(8) 6V6GT	8	25.1	19	18.5
(9) 6X5GT	8	53	70	70.5



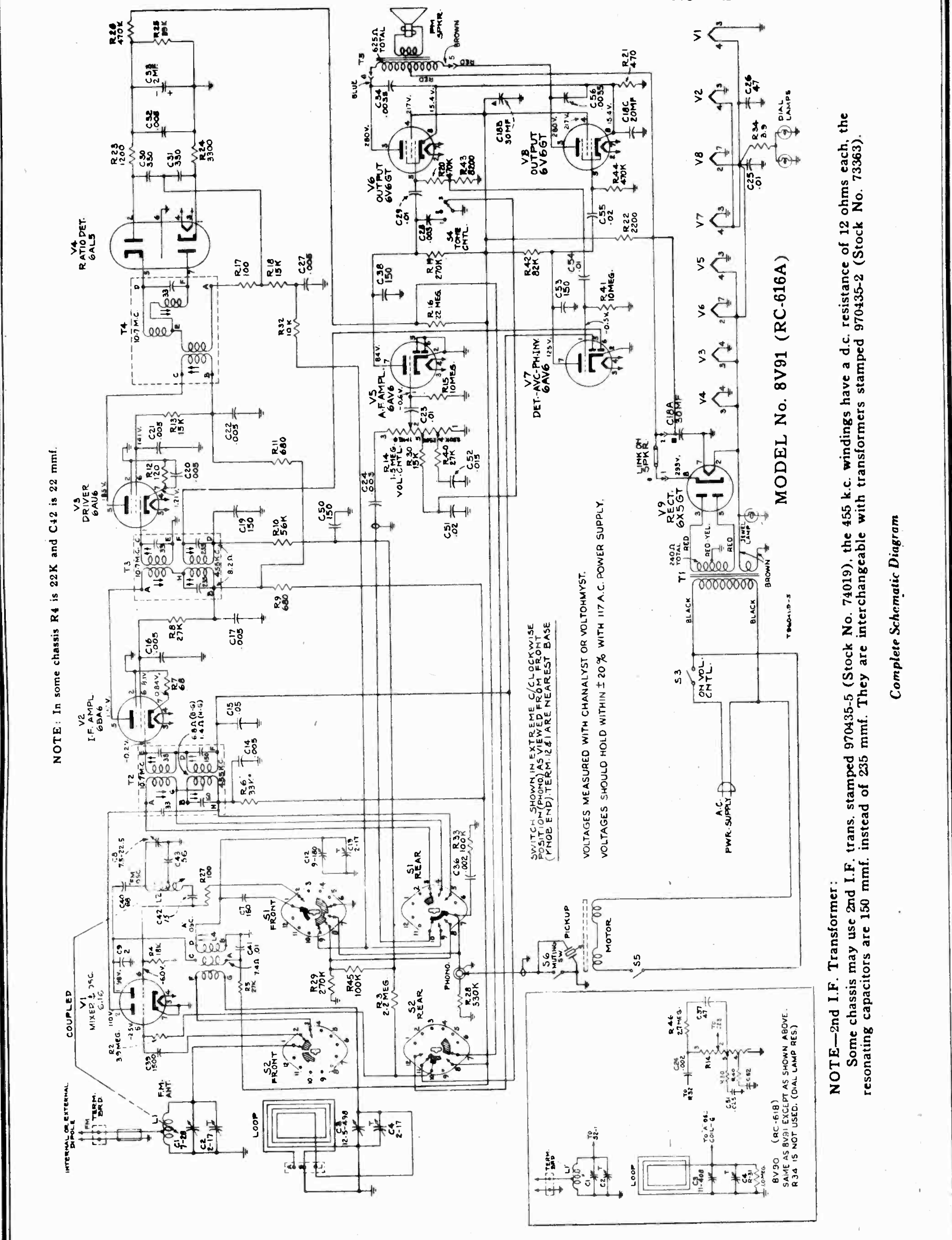
Dial Indicator and Drive Mechanism — Model 8V91



Speaker Connections

RADIO CORP. OF AMERICA

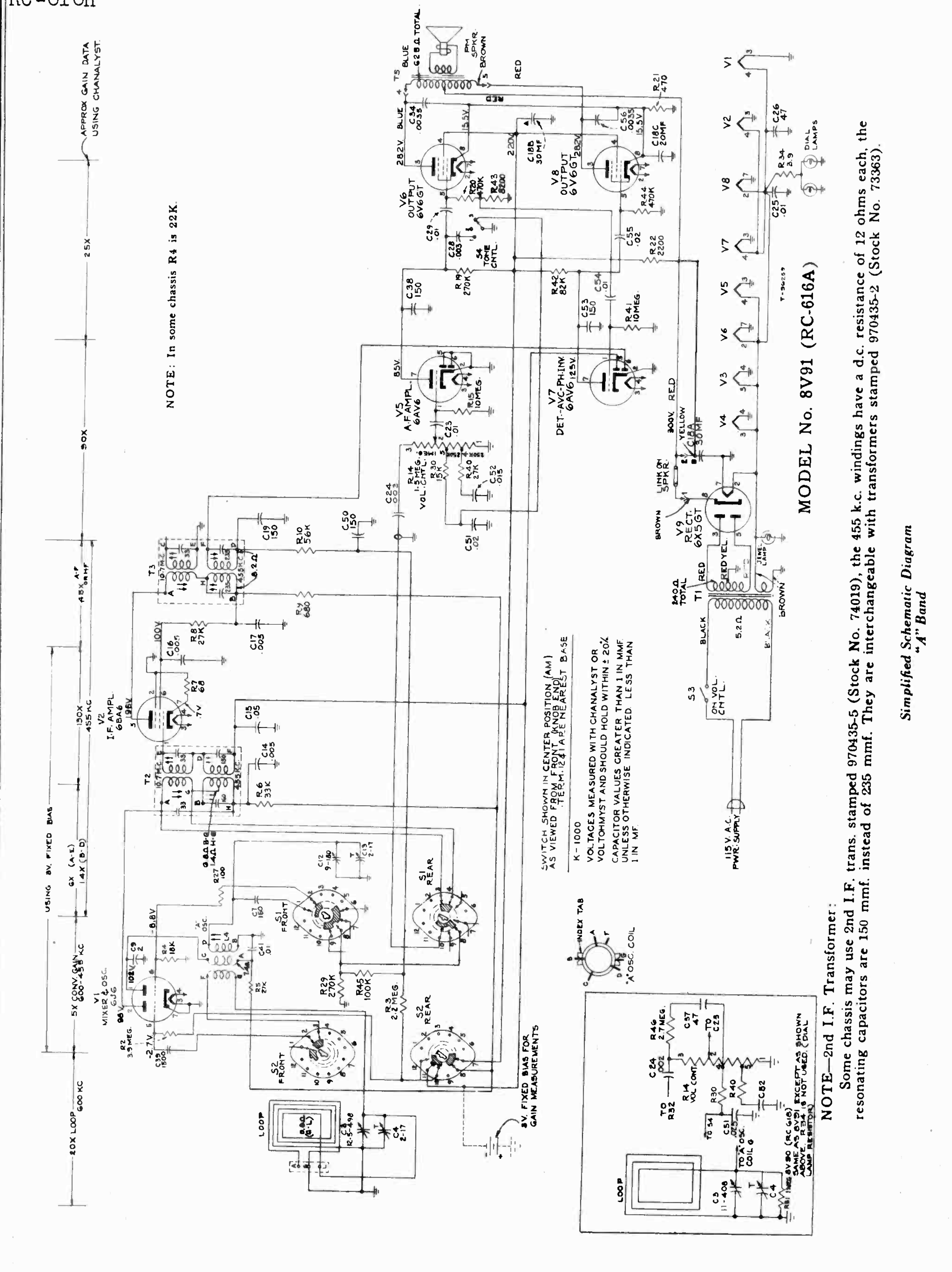
MODELS 8V90, CHASSIS RC-618, RC-618A;
8V91, CHASSIS RC-616A, RC-616H



Complete Schematic Diagram

MODELS 8V90, CHASSIS RC-618, RC-618A; 8V91, CHASSIS RC-616A, RC-616H

RADIO CORP. OF AMERICA



MODEL No. 8V91 (RC-616A)

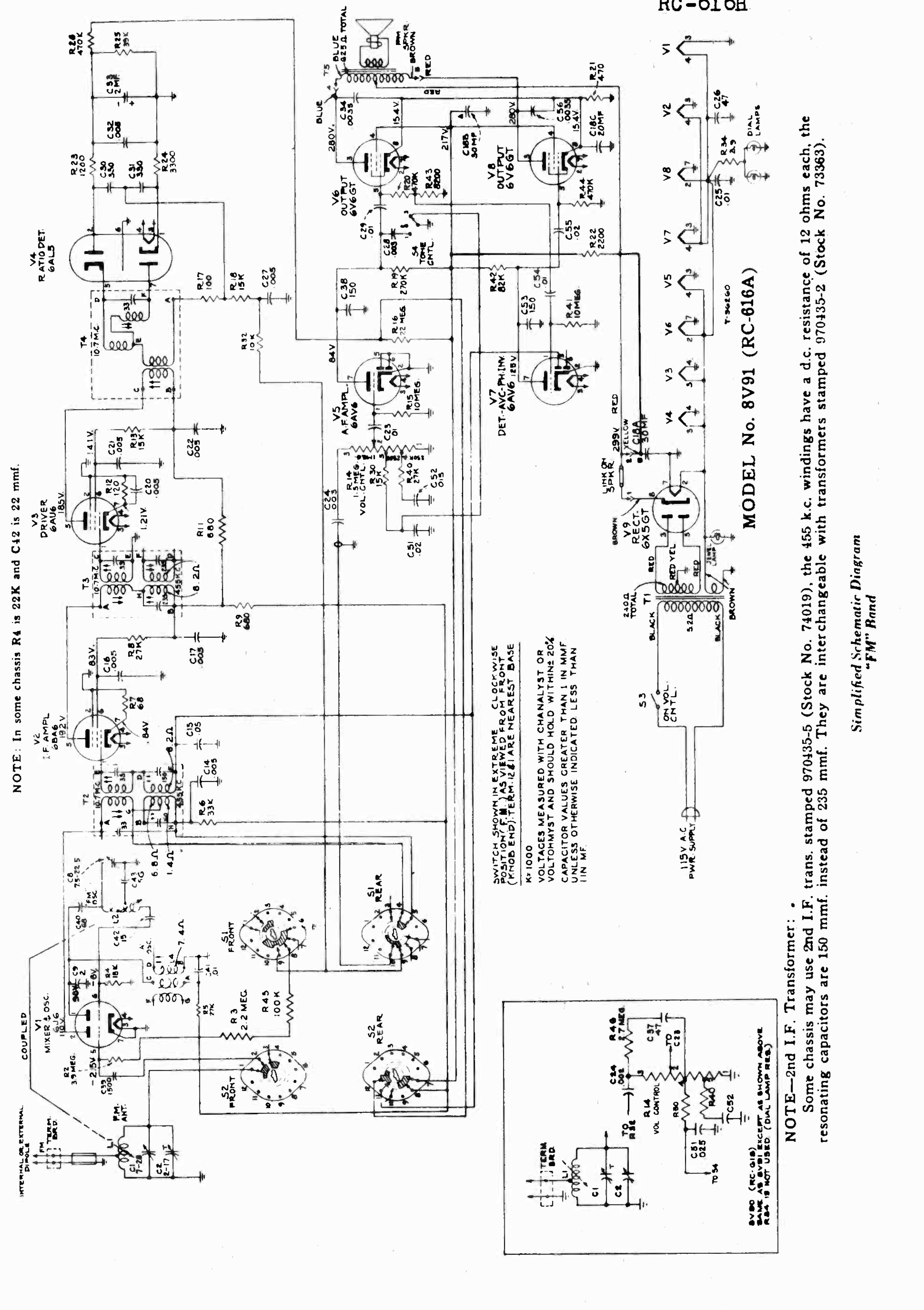
NOTE—2nd I.F. Transformer:

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

MODELS 8V90, CHASSIS RC-618, RC-618A; 8V91, CHASSIS RC-616A, RC-616H

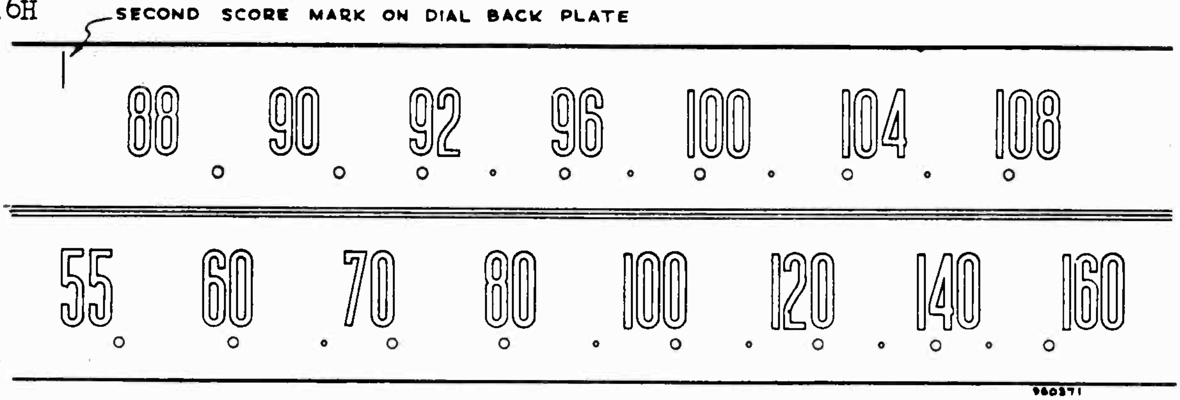


NOTE—2nd I.F. Transformer: Some chassis may use 2nd I.F. trans. stamped 970435-5 (Stock No. 74019), the 455 k.c. windings have a d.c. resistance of 12 ohms each, the resonating capacitors are 150 mmf. instead of 235 mmf. They are interchangeable with transformers stamped 970435-2 (Stock No. 73363).

Simplified Schematic Diagram "FM" Band

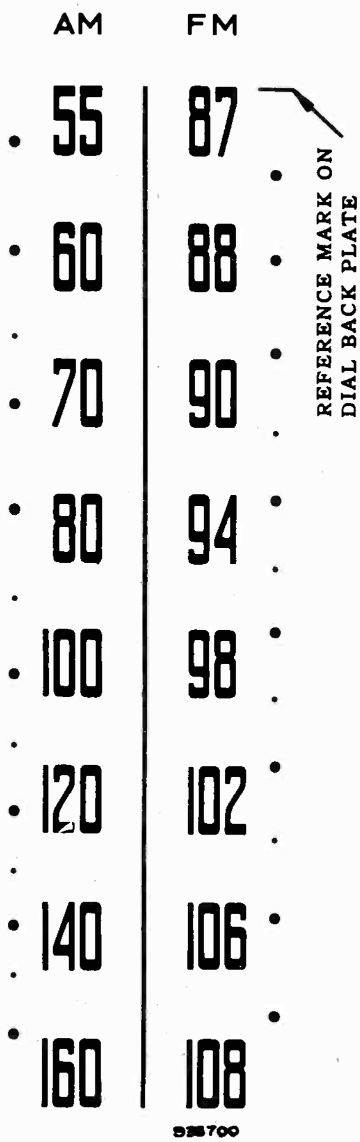
MODELS 8V90, CHASSIS RC-618, RC-618A; 8V91, CHASSIS RC-616A, RC-616H

RADIO CORP. OF AMERICA



The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

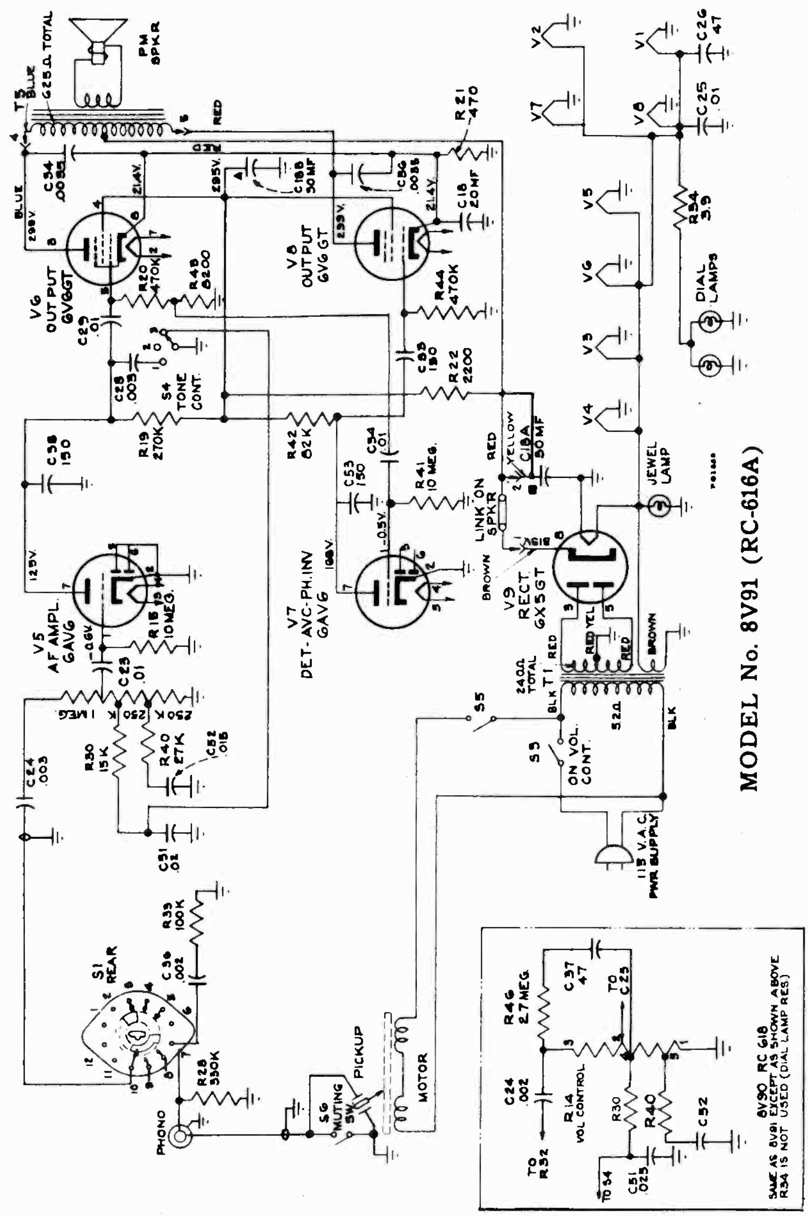
Dial Scale — Model 8V91



RCA VICTOR

Dial Scale—Model 8V90

The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.



MODEL No. 8V91 (RC-616A)

Simplified Schematic Diagram Phono Position

Model 8V90 2nd Production Chassis No. RC-618A

1ST PRODUCTION RC-616A and RC-618	2ND PRODUCTION RC-616H and RC-618A
Three position selector switch (PHONO—AM-FM)	Four position selector switch (AUX.-PHONO—AM-FM)
AUX. input jack is not used	AUX. input jack is used
RC-618 only	RC-618A only
8-in. speaker (92579-2)	12-in. speaker (92569-5)
C37 and R46 are used	C37 and R46 are not used
C24 is .002 mfd	C24 is .003 mfd
C51 is .025 mfd	C51 is .02 mfd

Replacement Parts — 8V91 — 2nd Prod.
Identical to those listed for 1st Prod.

EXCEPT

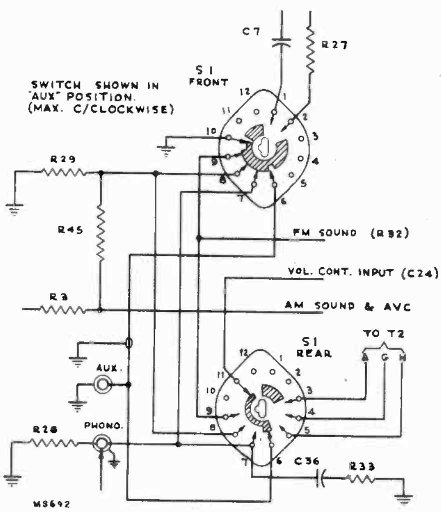
Stock No.	DESCRIPTION
Add:	CHASSIS ASSEMBLIES (RC-616H)
*74173	Switch—Selector switch (S1, S2)
Delete:	
73609	Switch
Add:	MISCELLANEOUS
*74175	Decal—Control panel decal for mahogany or walnut instruments
*74176	Decal—Control panel decal for blonde instruments
Delete:	
73755 and 73756 Decals	

Model 8V91 2nd Production Chassis No. RC-616H

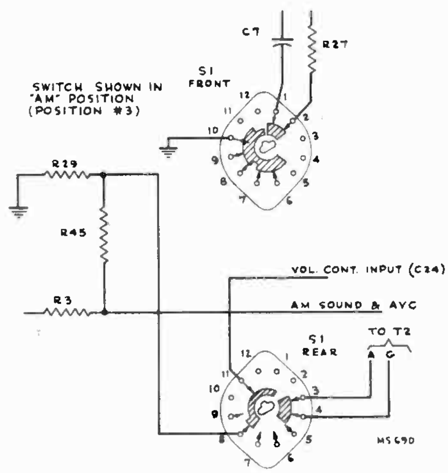
Replacement Parts — 8V90 — 2nd Prod.
Identical to those listed for 1st Prod.

EXCEPT

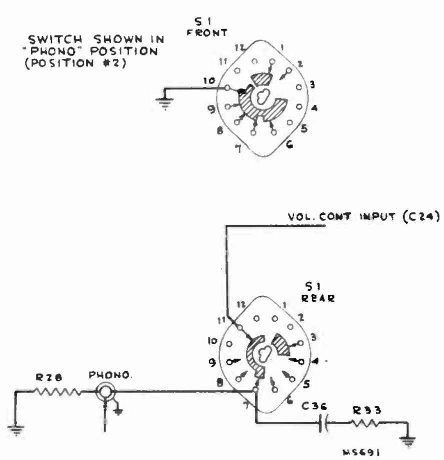
Stock No.	DESCRIPTION
Add:	CHASSIS ASSEMBLIES (RC-618A)
73659	Capacitor—Tubular, .003 mfd., 200 volts (C24)
71928	Capacitor—Tubular, .02 mfd., 200 volts (C51)
*74129	Switch—Selector switch (S1, S2)
Delete:	C24, C37, C51, R46, S1, S2
Add:	SPEAKER ASSEMBLIES
	92569-5W RL 103 B5 As listed for Model 8V91
Delete:	SPEAKER ASSEMBLIES
	92579-2W RL 105 A1
Add:	MISCELLANEOUS
*74130	Decal—Control panel decal for mahogany finish or walnut instruments
*74131	Decal—Control panel decal for blonde instruments
Delete:	73904 and 73905 Decals.



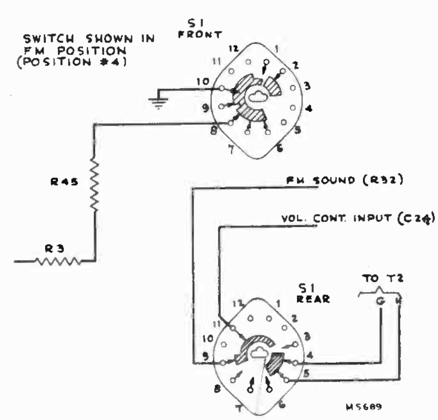
SWITCH WIRING RC-616H & RC-618A



AM SIMPLIFIED SCHEMATIC



PHONO SIMPLIFIED SCHEMATIC



FM SIMPLIFIED SCHEMATIC

The schematic diagrams above show the selector switch (S1) used in RC-616H and RC-618A. The connections to S2 are identical in all chassis — note that position No. 2 (PHONO) of RC-616H and RC-618A corresponds to position No. 1 (PHONO) of RC-616A and RC-618. No connections are made through S2 when in AUX. position.

MODELS 8V90, CHASSIS RC-618, RC-618A; 8V91, CHASSIS RC-616A, RC-616H

RADIO CORP. OF AMERICA

NOTE:
In early RC 616A chassis C42 is 22 mmf., R4 is 22,000 ohms.

Replacement Parts—Model 8V90—First Prod.

Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 618
*73893	Board—"FM" antenna board
*73889	Capacitor—Variable tuning capacitor (C1, C2, C3, C4, C8, C12, C13)
73866	Capacitor—Ceramic, 2 mmf. (C9)
31353	Capacitor—Ceramic, 15 mmf. (C42)
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)
39640	Capacitor—Mica, 330 mmf. (C30, C31)
73748	Capacitor—Ceramic, 1500 mmf. (C39)
73750	Capacitor—Tubular, .002 mfd., 200 volts (C24, C36)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C28)
70646	Capacitor—Tubular, .0035 mfd., 1000 volts (C34, C56)
71926	Capacitor—Tubular, .005 mfd., 200 volts (C20, C27, C32)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C14, C16, C17, C21, C22)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C23, C25)
71925	Capacitor—Tubular, .01 mfd., 400 volts (C29, C41, C54)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C52)
73638	Capacitor—Tubular, .02 mfd., 400 volts (C55)
70612	Capacitor—Tubular, .025 mfd., 400 volts (C51)
72596	Capacitor—Tubular, .05 mfd., 200 volts (C15)
73747	Capacitor—Electrolytic, 5 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—Antenna coil—F.M. (No. 16 tinned bus wire, 8 turns per inch, 1¾ turns L. H.—.469 in. I. D.) (L1)
73916	Coil—Oscillator coil—F.M. (No. 16 tinned bus wire, 7 turns per inch, 4¾ turns R. H.—.469 in. I. D.) (L2)
73744	Coil—Oscillator coil—"A" band (L4)
70342	Control—Volume control and power switch (R14, S3)
†72953	Cord—Drive cord (approx. 48" overall length required)
70392	Cord—Power cord and plug
16058	Grommet—Rubber grommet to mount R.F. shelf (4 required)
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
*73895	Indicator—Station selector indicator
*73892	Plate—Dial back plate complete with two (2) drive cord pulleys, less dial
30868	Plug—2 contact female plug for motor cable
5040	Plug—4 contact female plug for speaker cable
	Resistor—Fixed, composition, 68 ohms, ±10%, ½ watt (R7)
	Resistor—Fixed, composition, 100 ohms, ±10%, ½ watt (R17, R27)
	Resistor—Fixed, composition, 120 ohms, ±10%, ½ watt (R12)
	Resistor—Fixed, composition, 470 ohms, ±10%, 2 watts (R21)
	Resistor—Fixed, composition, 680 ohms, ±20% ½ watt (R9, R11)
	Resistor—Fixed, composition, 1200 ohms, ±5%, ½ watt (R23)
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R22)
	Resistor—Fixed, composition, 3300 ohms, ±5%, ½ watt (R24)
	Resistor—Fixed, composition, 8200 ohms, ±10%, ½ watt (R43)
	Resistor—Fixed, composition, 10,000 ohms, ±10%, ½ watt (R32)
	Resistor—Fixed, composition, 15,000 ohms, ±10%, ½ watt (R13, R18, R30)
	Resistor—Fixed, composition, 18,000 ohms, ±10%, 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)
	Resistor—Fixed, composition, 56,000 ohms, ±10%, 1 watt (R10)
	Resistor—Fixed, composition, 82,000 ohms, ±10%, ½ watt (R42)
	Resistor—Fixed, composition, 100,000 ohms, ±10%, ½ watt (R33, R45)
	Resistor—Fixed, composition, 270,000 ohms, ±10%, ½ watt (R19, R29)
	Resistor—Fixed, composition, 330,000 ohms, ±10%, ½ watt (R28)
	Resistor—Fixed, composition, 470,000 ohms, ±10%, ½ watt (R20, R26, R44)
	Resistor—Fixed, composition, 1 megohm, ±20%, ½ watt (R31)
	Resistor—Fixed, composition, 2.2 megohm, ±20%, ½ watt (R3)
	Resistor—Fixed, composition, 2.7 megohm, ±10%, ½ watt (R46)
	Resistor—Fixed, composition, 3.9 megohm, ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 10 megohms, ±20%, ½ watt (R15, R41)
	Resistor—Fixed, composition, 22 megohms, ±20%, ½ watt (R16)
*73894	Shaft—Tuning knob shaft
31364	Socket—Dial lamp socket
35787	Socket—Phono input socket
73606	Socket—Tube socket, miniature, for tubes V1, V2 and V3
72516	Socket—Tube socket, miniature, for tubes V4, V5 and V7
31251	Socket—Tube socket, wafer, octal, for tubes V6, V8 and V9
31418	Spring—Drive cord spring
*73890	Switch—Selector switch (S1, S2)
*73891	Switch—Tone control switch (S4)
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 92579-2W RL 105A1
*74181	Cap—Dust cap
*73912	Cone—Cone and voice coil assembly
5039	Plug—4 prong male plug for speaker
*73911	Speaker—8" P.M. speaker complete with cone and voice coil—less output transformer and plug
73636	Transformer—Output transformer (T5)
	MISCELLANEOUS
72555	Antenna—F.M. antenna
71599	Bracket—Pilot lamp bracket
72437	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Pilot lamp jewel
71892	Catch—Bullet catch and strike for doors
*73897	Clamp—Dial clamp (2 required)
X1894	Cloth—Grille cloth for blonde instruments
X1893	Cloth—Grille cloth for mahogany finish or walnut instruments
*73904	Decal—Control panel decal for mahogany finish or walnut instruments
*73905	Decal—Control panel decal for blonde instruments
71984	Decal—Trade mark decal (RCA Victor)
71966	Decal—Trade mark decal (Victrola)
*73898	Dial—Glass dial scale
11889	Grommet—Rubber grommet for front apron of chassis (2 required)
72856	Grommet—Rubber grommet for mounting record changer (3 required)
73903	Hinge—Phono compartment door or radio compartment door hinge (1 set)
71822	Hinge—Selector switch or tone control knob—maroon—for mahogany finish or walnut instruments
72824	Knob—Selector switch or tone control knob—brown—for blonde instruments
71821	Knob—Tuning or volume control knob—maroon—for mahogany finish or walnut instruments
72800	Knob—Tuning or volume control knob—brown—for blonde instruments
11765	Lamp—Dial lamp—Mazda 51
*73896	Loop—Antenna loop complete
73109	Nut—Tee nut for mounting record changer (3 required)
*73902	Pull—Phono compartment or radio compartment door pull
73110	Screw—¼-20 x 1¾ fillister head machine screw for mounting record changer (3 required)
30900	Spring—Retaining spring for knob
72936	Stop—Phono compartment or radio compartment door stop

*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 8V90, CHASSIS RC-618, RC-618A; 8V91, CHASSIS RC-616A, RC-616H

Replacement Parts—Model 8V91—First Prod.

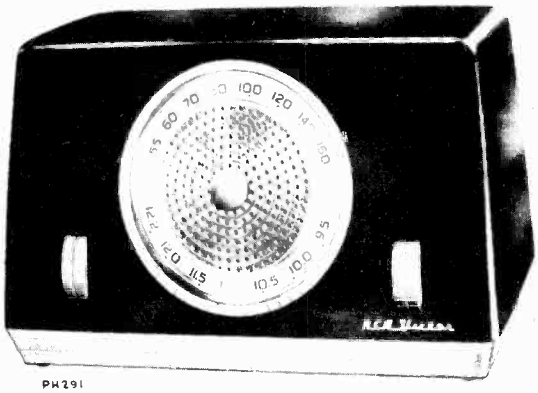
Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 616A
73610	Board—Terminal board (F.M.-G) with link
73866	Capacitor—Ceramic, 2 mmf. (C9)
31353	Capacitor—Ceramic, 15 mmf. (C42)
39042	Capacitor—Ceramic, 47 mmf. (C26)
73867	Capacitor—Ceramic, 56 mmf. (C43)
33103	Capacitor—Ceramic, 68 mmf. (C40)
48125	Capacitor—Ceramic, 150 mmf. (C7, C19, C38, C50, C53)
39640	Capacitor—Mica, 330 mmf. (C30, C31)
73748	Capacitor—Ceramic, 1500 mmf. (C39)
*73750	Capacitor—Tubular, .002 mfd., 200 volts (C36)
70646	Capacitor—Tubular, .0035 mfd., 1000 v. (C34, C56)
73659	Capacitor—Tubular, .003 mfd., 200 volts (C24)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C28)
71926	Capacitor—Tubular, .005 mfd., 200 volts (C20, C27, C32)
72791	Capacitor—Tubular, .005 mfd., 400 volts (C14, C16, C17, C21, C22)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C52)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C23, C25)
72827	Capacitor—Tubular, .01 mfd., 400 volts (C29, C41, C54)
71928	Capacitor—Tubular, .02 mfd., 200 volts (C51)
73638	Capacitor—Tubular, .02 mfd., 400 volts (C55)
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 (C16A, C18B, C16C)
73918	Coil—Antenna coil—F.M. (No. 16 tinned bus wire—8 turns per inch—1¾ turns L. H.—.469 in. I. D.) (L1)
73916	Coil—Oscillator coil—F.M. (No. 16 tinned bus wire—8 turns per inch—4¾ turns R. H.—.469 in. I. D.) (L2)
73744	Coil—Oscillator coil—"A" band (L4)
73607	Condenser—Variable tuning condenser (C1, C2, C3, C4, C8, C12, C13)
70342	Control—Volume control and power switch (R14, S3)
†72953	Cord—Drive cord (approx. 38" overall length required)
73690	Cord—Power cord and plug
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
16058	Grommet—Rubber grommet to mount R-F shelf (4 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)
	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, 1200 ohms ± 5%, ½ watt (R23)
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R22)
	Resistor—Fixed, composition, 3300 ohms ± 5%, ½ watt (R24)
	Resistor—Fixed, composition, 8200 ohms ± 10%, ½ watt (R43)
	Resistor—Fixed, composition, 10,000 ohms ± 10%, ½ watt (R32)
	Resistor—Fixed, composition, 15,000 ohms ± 10%, ½ watt (R13, R18, R30)
	Resistor—Fixed, composition, 18,000 ohms ±10%, 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)
	Resistor—Fixed, composition, 56,000 ohms ± 10%, ½ watt (R10)
	Resistor—Fixed, composition, 82,000 ohms ± 10%, ½ watt (R42)
	Resistor—Fixed, composition, 100,000 ohms ± 10%, ½ watt (R33, R45)
	Resistor—Fixed, composition, 270,000 ohms ± 10%, ½ watt (R19, R29)
	Resistor—Fixed, composition, 330,000 ohms ± 10%, ½ watt (R28)
	Resistor—Fixed, composition, 470,000 ohms ± 10%, ½ watt (R20, R26, R44)
	Resistor—Fixed, composition, 2.2 megohm ± 20%, ½ watt (R3)
	Resistor—Fixed, composition, 3.9 megohm ± 10%, ½ watt (R2)
	Resistor—Fixed, composition, 10 megohms ± 20%, ½ watt (R15, R41)
	Resistor—Fixed, composition, 22 megohms ± 20%, ½ watt (R16)
73605	Shaft—Tuning knob shaft
31364	Socket—Lamp socket

Stock No.	DESCRIPTION
35787	Socket—Phono input socket
72516	Socket—Tube socket, miniature, for tubes V4, V5 and V7
73606	Socket—Tube socket, miniature, for tubes V1, V2 and V3
31251	Socket—Tube socket, octal, for tubes V6, V8 and V9
74305	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.
*73609	Switch—Range switch (S1, S2)
73602	Switch—Tone control switch (S4)
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
13867	Cap—Dust cap
*73934	Cone—Cone complete with voice coil
5039	Plug—4 prong male plug for speaker
*73635	Speaker—12" P.M. speaker complete with cone and voice coil—less output transformer and plug
71145	Suspension—Metal cone suspension
*73636	Transformer—Output transformer (T5)
	SPEAKER ASSEMBLIES 92569-1KX
70574	Cone—Cone and voice coil assembly
5039	Plug—4 prong male plug for speaker
37899	Transformer—Output transformer
	NOTE: When replacing complete speaker, order RCA 73635 (92569-5W)
	MISCELLANEOUS
71864	Antenna—F.M. antenna
*73622	Back—Back cover for blonde instruments
*73621	Back—Back cover for mahogany or walnut instruments
71599	Bracket—Pilot lamp bracket
73626	Bumper—Rubber bumper for actuating link
72437	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Pilot lamp jewel
73613	Carriage—Record changer mounting carriage complete with runners
71892	Catch—Bullet catch and strike for radio or phono compartment doors
71820	Check—Radio compartment door check
X1815	Cloth—Grille cloth for blonde instruments
X1814	Cloth—Grille cloth for mahogany instruments
X1816	Cloth—Grille cloth for walnut instruments
*73755	Decal—Control panel decal for mahogany or walnut instruments
*73756	Decal—Control panel decal for blonde instruments
71966	Decal—Trade mark decal (Victrola)
71910	Decal—Trade mark decal (RCA Victor)
73628	Dial—Glass dial scale
73627	Escutcheon—Dial escutcheon less dial
*73757	Grille—Metal grille
11889	Grommet—Rubber grommet for front apron of chassis
73614	Grommet—Rubber grommet to mount record changer (3 required)
16058	Grommet—Rubber grommet to mount speaker (3 required)
73751	Hinge—Radio or phono compartment door hinge (2 required for each door)
71945	Hinge—Record storage compartment door hinge (2 required for each door)
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 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
73109	Nut—Tee nut to mount record changer (3 required)
71819	Plate—Radio compartment door check mounting plate
31048	Plug—Pin plug for shielded pickup cable
30868	Plug—2 contact female plug for power cable
*73752	Pull—Door pull (2 required) for walnut instruments
*73753	Pull—Door pull (2 required) for mahogany or blonde instruments
73615	Screw—¼-20 x 1½" fillister head machine screw to mount record changer (3 required)
73618	Spring—Connecting spring between 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)
73612	Track — Carriage mechanism track complete with mounting plate (2 required)
71814	Washer—Rubber washer for radio compartment door check

*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.

MODELS 8X681, 8X682, CHASSIS RC-1061

RADIO CORP. OF AMERICA



8X681—(Maroon Plastic) *8X682—(Ivory Plastic)*

Specifications

Tuning Ranges

Standard Broadcast ("A" Band) .... 540-1600 kc
Short Wave ("C" Band) .... 9.4-12 mc

Intermediate Frequency .... 455 kc

Tube Complement

(1) RCA 12BA6 .... R. F. Amplifier
(2) RCA 12BE6 .... Converter
(3) RCA 12BA6 .... I. F. Amplifier
(4) RCA 12AT6 .... Det. - A.F. - A.V.C.
(5) RCA 35C5 .... Output
(6) RCA 35W4 .... Rectifier

Dial Lamp .... Type 47, 6.3 volts, 0.15 amp.

Power Supply Rating

115 volts, D.C. or 50 to 60 cycles, A.C. .... 30 watts

Loudspeaker

Type 92572-5 .... 5 in. P.M.
V. C. Impedance .... 3.2 ohms at 400 cycles

Power Output

Undistorted .... 0.7 watts
Maximum .... 1.1 watts

Cabinet Dimensions

Height.... 8 in. Width.....12¾ in. Depth.....7¼ in.

Tuning Drive Ratio .... 7½:1 (3¾ turns of knob)

NOTE: If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.

To Remove Chassis from Cabinet

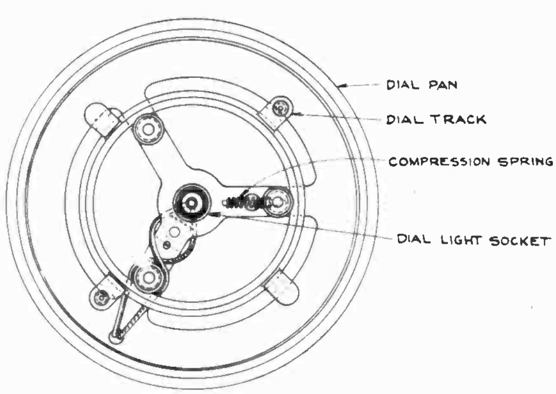
Remove the four screws at the corners of the bottom cover (accessible through holes in the cabinet base). Do not remove the hex head screws which hold the base to the bottom cover. The cabinet may now be lifted off the cabinet base.

Dial Positioning

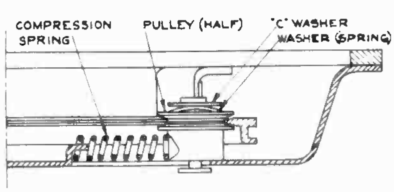
If the speaker should be replaced, it will be necessary to readjust the speaker mounting bracket position so that the dial pan will fit against the cabinet when the chassis is re-installed in the cabinet.

Insulating Washers

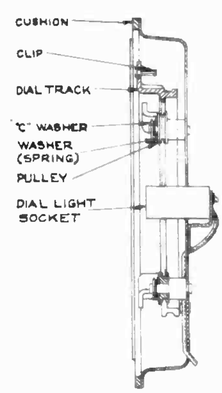
The cabinet base is insulated from the chassis bottom cover. When servicing make certain that the insulating washers are in place and properly positioned.



FRONT VIEW



DETAIL OF COMPRESSION SPRING



SIDE VIEW

NOTE: See page 4 regarding changes in late production pan and track assembly.

Dial Pan and Track Assembly

RADIO CORP. OF AMERICA

MODELS 8X681, 8X682, CHASSIS RC-1061

Alignment Procedure

Test Oscillator.—Connect high side of test oscillator as shown in chart. Connect low side to chassis. Keep the output low to avoid A.V.C. action.

Note.—If the test oscillator is AC operated it may be necessary to use an isolation transformer (115v./115 v.) for the receiver during alignment, and the low side of the test oscillator connected to common wiring at pin No. 2 of 12AT6 socket—reverse line plug if hum is excessive.

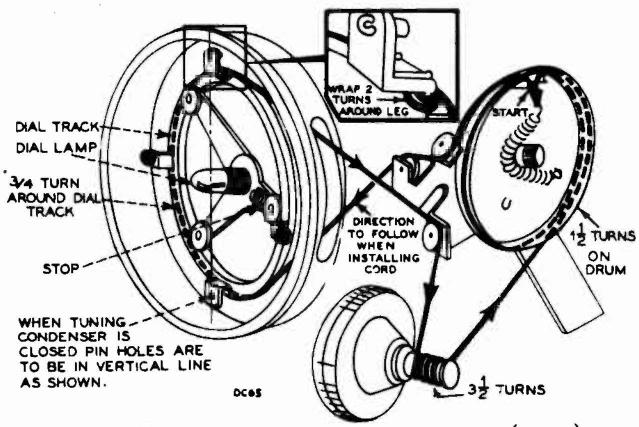
Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum.

Dial Pointer Adjustment.—Rotate tuning condenser to maximum capacity position (plates fully meshed). Adjust dial to position indicated in drawing.

With the dial adjusted as described above mark the dial pan assembly with a pencil to provide a tuning indicator during alignment.

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Range switch	Turn radio dial to—	Adjust for max. output
1	Pin No. 1 of 12BA6 I.F. amp. tube in series with 0.1 mfd.	455 kc	"A"	Quiet point 1600 kc end of dial	Top and bottom T2 2nd I. F. trans.
2	Pin No. 7 of 12BE6 converter tube in series with 0.1 mfd.	455 kc	"A"	Quiet point 1600 kc end of dial	Top and bottom T1* 1st I. F. trans.
3	Antenna lead in series with 100 mmfd.	1600 kc	"A"	1600 kc	C14 "A" osc.
4	Antenna lead in series with 100 mmfd.	1400 kc	"A"	1400 kc	C2 "A" ant. C10 "A" R. F.
5	Antenna lead in series with 100 mmfd.	600 kc	"A"	600 kc	†L8 "A" osc. †L3 "A" R. F.
6	Repeat Steps 3, 4 and 5.				
7	Pin No. 7 of 12BE6 converter in series with 0.1 mfd. capacitor	11.8 mc	"C"	11.8 mc	**C16 "C" osc.
8	Pin No. 7 of 12BE6 converter in series with 0.1 mfd. capacitor	9.5 mc	"C"	9.5 mc	†L6 "C" osc.
9	Repeat Steps 7 and 8.				
10	Antenna lead in series with 50 mmfd.	11.8 mc	"C"	11.8 mc	**C3 "C" ant.
11	Antenna lead in series with 50 mmfd.	9.5 mc	"C"	9.5 mc	†L4 "C" ant.
12	Repeat Steps 10 and 11.				

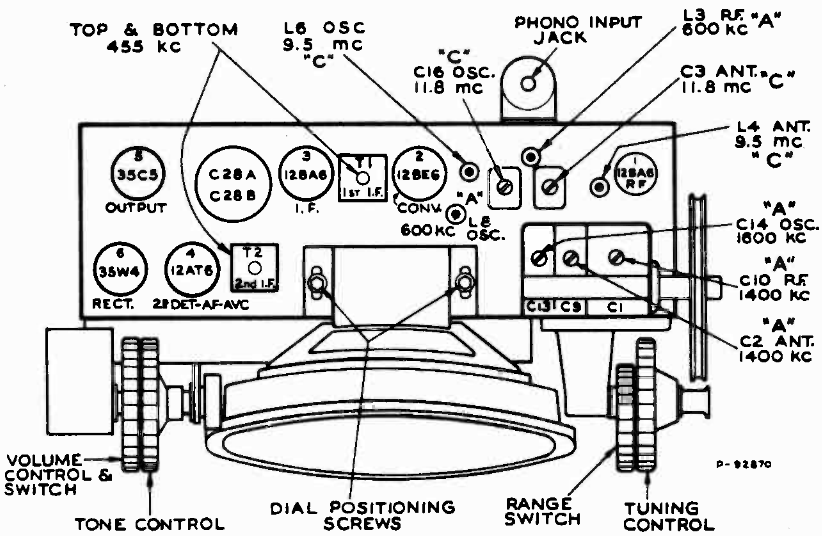
*Do not readjust T2.
†Rock gang.
**If two peaks are found use minimum capacity peak on C16 (osc.) and maximum capacity peak on C3 (ant.).



Dial-Indicator and Drive Mechanism

Lead Dress

1. Dress all heater leads down to chassis and as far as possible from all audio grid and plate wiring.
2. Dress power cord to side apron away from coupling capacitors.
3. Dress pilot lamp leads toward chassis bottom and away from audio coupling capacitor.
4. Dress all leads and components away from all coils.
5. Dress lead from range switch to phono socket against switch shield and chassis apron.
6. The antenna lead should be taped up when not in use.



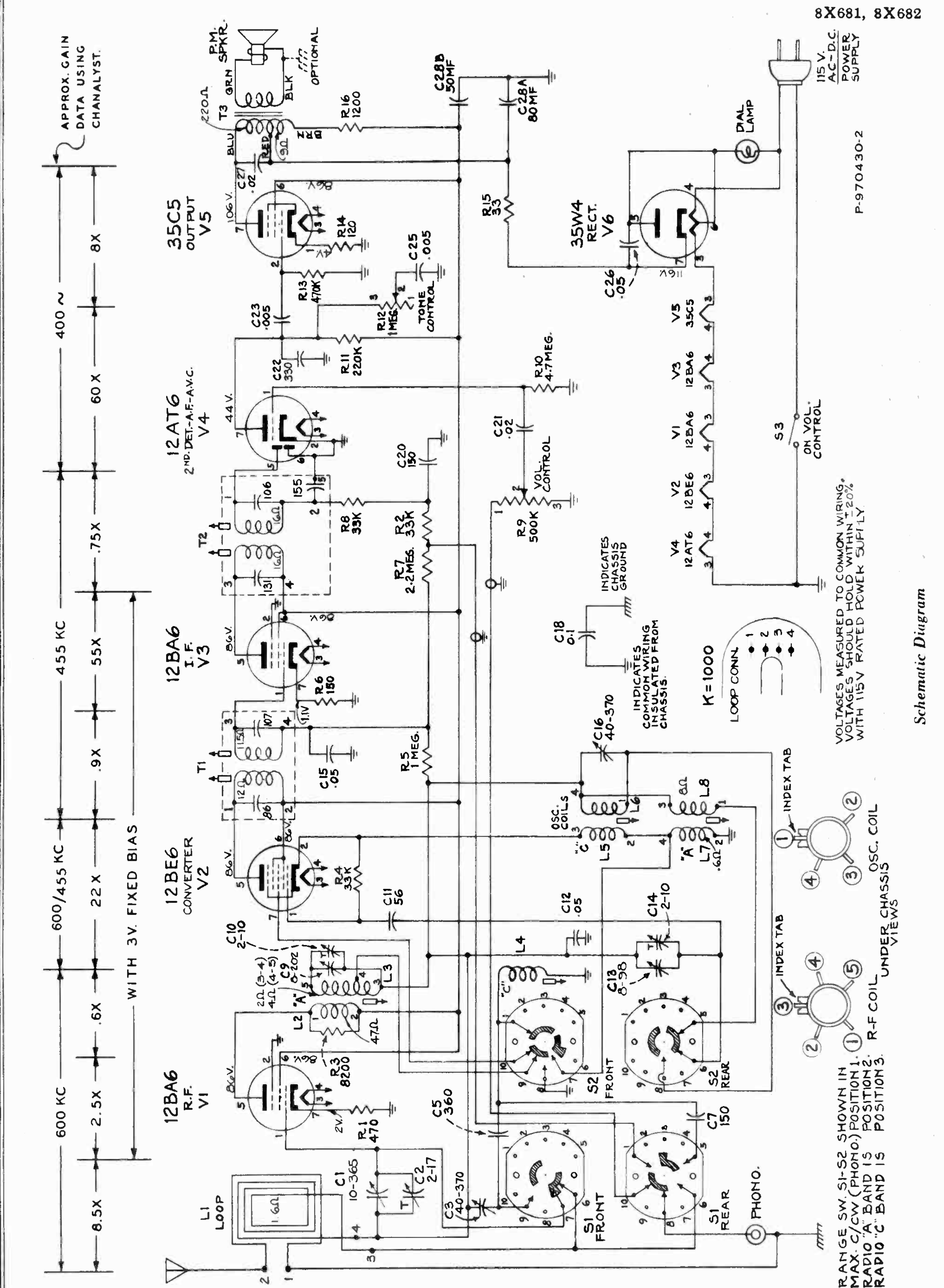
Tube and Trimmer Locations

Cathode Currents

		"A" Band	"C" Band
(1)	12BA6	4.1 ma	6.9 ma
(2)	12BE6	7.3 ma	7.2 ma
(3)	12BA6	6.7 ma	7.4 ma
(4)	12AT6	0.2 ma	0.2 ma
(5)	35C5	34.7 ma	33.5 ma
(6)	35W4	52 ma	53 ma

MODELS 8X681, 8X682, CHASSIS RC-1061

RADIO CORP. OF AMERICA



Schematic Diagram

RADIO CORP. OF AMERICA

MODELS 8X681, 8X682,
CHASSIS RC-1061

Replacement Parts

Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-1061
*73536	Arm—Range switch actuating arm and hub
71924	Capacitor—Ceramic, 56 mmf. (C11)
39632	Capacitor—Mica, 150 mmf. (C7, C20)
72571	Capacitor—Mica, 330 mmf. (C22)
64641	Capacitor—Mica, 360 mmf. (C5)
73075	Capacitor—Adjustable, 40-370 mmf. (C3, C16)
72791	Capacitor—Tubular, .005 mfd., 400 volts (C23, C25)
71928	Capacitor—Tubular, .02 mfd., 200 volts (C21)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C27)
72596	Capacitor—Tubular, .05 mfd., 200 volts (C12, C15)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C26)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C18)
*73520	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C28A, C28B)
*73526	Clip—Tubular clip for fastening dial—located on dial mounting track (2 required)
*73518	Coil—R-F coil—"A" band—complete with adjustable core and stud (L2, L3)
*73519	Coil—Antenna coil—"C" band—complete with adjustable core and stud (L4)
*73517	Coil—Oscillator coil—"C" band—complete with adjustable core and stud (L5, L6)
*73516	Coil—Oscillator coil—"A" band—complete with adjustable core and stud (L7, L8)
*73513	Condenser—Variable tuning condenser (C1, C2, C9, C10, C13, C14)
*73544	Control—Tone control (R12)
*73543	Control—Volume control and power switch (R9, S3)
†72913	Cord—Drive cord (approx. 48" overall length required)
28451	Cover—Insulating cover for electrolytic capacitor
*73522	Dial—Dial and screen assembly
72283	Grommet—Rubber grommet for mounting tuning condenser (3 required) or for mounting capacitor (C3, C16) and bracket (1 required)
33139	Grommet—Rubber grommet for range switch connecting rod (2 required)
*73538	Knob—Range switch knob (thumb wheel type)
*73541	Knob—Tone control knob (thumb wheel type)
*73537	Knob—Tuning knob (thumb wheel type)
*73542	Knob—Volume control and power switch knob (thumb wheel type)
*73512	Loop—Antenna loop complete (L1)
*73484	Pan—Dial pan and cushion—less track, pulleys and lamp socket
*73530	Pulley—Dial track drive pulley (2 required)
*73531	Pulley—Dial track idler pulley (2 half pulleys)
73237	Resistor—Wire wound, 33 ohms, 150 MA (R15)
	Resistor—Fixed, composition, 120 ohms ± 10%, ½ watt (R14)
	Resistor—Fixed, composition, 150 ohms ± 10%, ½ watt (R6)
	Resistor—Fixed, composition, 470 ohms ± 10%, ½ watt (R1)
	Resistor—Fixed, composition, 1200 ohms ± 10%, 1 watt (R16)
	Resistor—Fixed, composition, 8200 ohms ± 10%, ½ watt (R3)
	Resistor—Fixed, composition, 33,000 ohms ± 10%, ½ watt (R2, R4, R8)
	Resistor—Fixed, composition, 220,000 ohms ± 20%, ½ watt (R11)
	Resistor—Fixed, composition, 470,000 ohms ± 20%, ½ watt (R13)
	Resistor—Fixed, composition, 1 megohm ± 20%, ½ watt (R5)
	Resistor—Fixed, composition, 2.2 megohm ± 20%, ½ watt (R7)
	Resistor—Fixed, composition, 4.7 megohm ± 20%, ½ watt (R10)
*73539	Rod—Connecting rod between range switch knob and actuating arm
*73545	Screen—Dial screen only
*73534	Shaft—Range switch and tuning knobs mounting shaft
*73521	Shield—Tube shield
*73529	Socket—Dial lamp socket
73374	Socket—Phono input socket
36069	Socket—Tube socket—for tubes V1, V2, V3, V4
9914	Socket—Tube socket—for tubes V5, V6
*74038	Spring—Drive cord spring
*73527	Spring—Pressure spring for dial track idler pulley
*73528	Stud—Dial track idler pulley mounting stud
*73514	Support—Drive cord pulley support complete with three (3) pulleys
*73535	Switch—Selector switch (S1, S2)
*73525	Track—Die cast pulley track and dial mounting ring less fastener clip
73036	Transformer—First I-F transformer (T1)
73037	Transformer—Second I-F transformer (T2)
72296	Transformer—Output transformer (T3)
33726	Washer—"C" washer to hold pulleys
2917	Washer—"C" washer to hold range switch and tuning knobs shaft
*73524	Washer—Insulating washer for mounting chassis bottom cover to cabinet base (4 required)
*73533	Washer—Spring washer to prevent pulleys from rattling or to prevent rattle in range switch and tuning knobs shaft
*73540	Washer—Spring washer between tuning knob and mounting bracket
	SPEAKER ASSEMBLY 92572-5W
*74103	Speaker—5" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
*73515	Base—Metal base for cabinet—less chassis bottom cover or rubber feet
*73547	Button—Dial crystal button to diffuse dial lamp light
*Y2002	Cabinet—Maroon plastic cabinet only for Model 8X681—less emblem, bezel ring or metal base
*Y2003	Cabinet—Ivory plastic cabinet only for Model 8X682—less emblem, bezel ring or metal base
*73546	Crystal—Dial crystal
*73549	Emblem—"RCA-Victor" emblem
*73523	Foot—Rubber foot (4 required)
31480	Lamp—Dial lamp—Mazda 47
*73548	Ring—Bezel ring for dial crystal
*73971	Screen—Ventilating screen—black—for back of cabinet for Model 8X681
*73972	Screen—Ventilating screen—ivory—for back of cabinet for Model 8X682

†Stock No. 72953 is a spool containing 250 ft. of cord.

*This is the first time this Stock No. has appeared in service data.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

DIAL PAN AND TRACK ASSEMBLY
(Late Production)

In late production the dial pan and track assembly is changed as follows:

(1) The studs (fixed and idler) are shorter — 19/32" vs. 5/8" overall length.

(2) The two half pulleys are replaced by 1 full pulley (Stock No. 73530).

(3) Spring washers are not used.

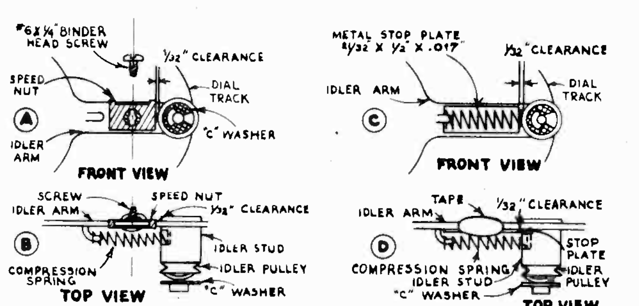
The parts are interchangeable as follows:

(1) Original stud or original pan using 5/8" studs — USE SPRING WASHER — original idler stud (Stock No. 73528) is carried in stock.

(2) Short stud or new pan using 19/32" studs — OMIT SPRING WASHER—new pan (Stock No. 73484) is carried in stock.

(3) The two half pulleys may be replaced by one full pulley—both are carried in stock.

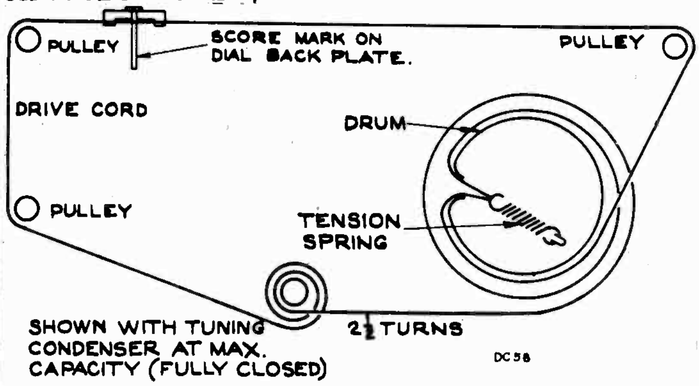
A stop is used to limit the movement of the idler stud, thus preventing the pulleys from jumping off the dial track due to rough handling during shipment. This stop may be either a speed nut and screw (A & B) or a plate taped to the idler arm (C & D).



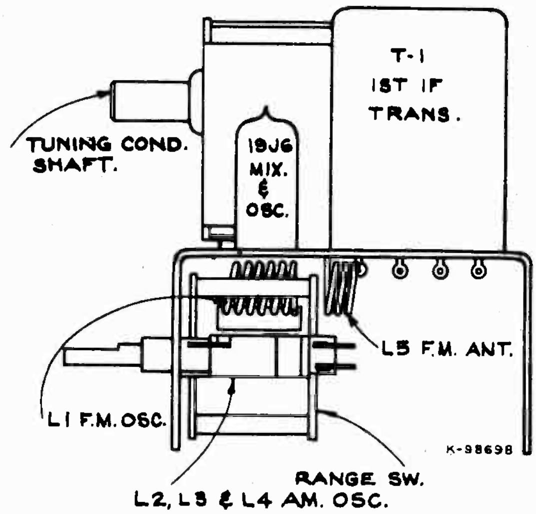
ALL PULLEYS MUST BE ON TRACK

MODELS 8X71, 8X72, CHASSIS RC-1070

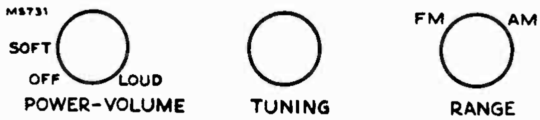
RADIO CORP. OF AMERICA



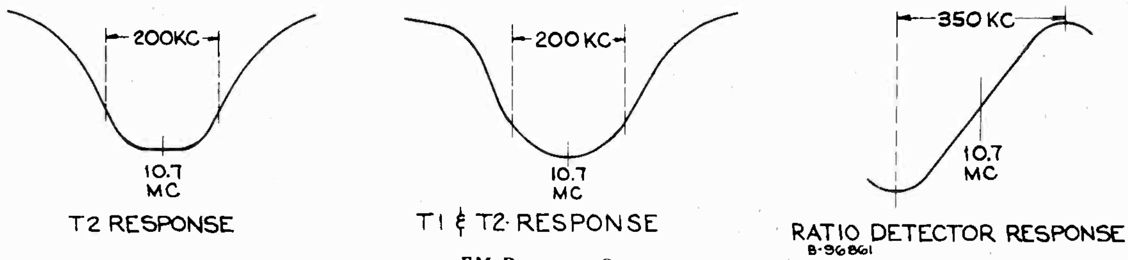
Dial Indicator and Drive Mechanism



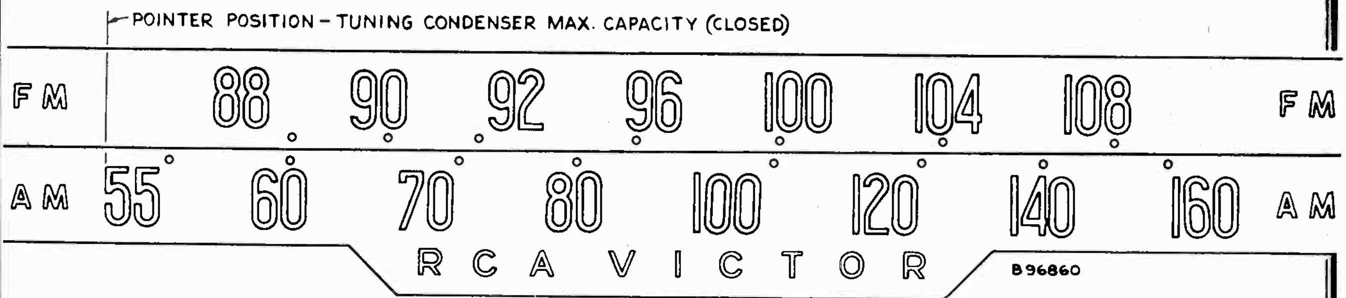
Ant. and Osc. Coil Locations (Side View)



Controls

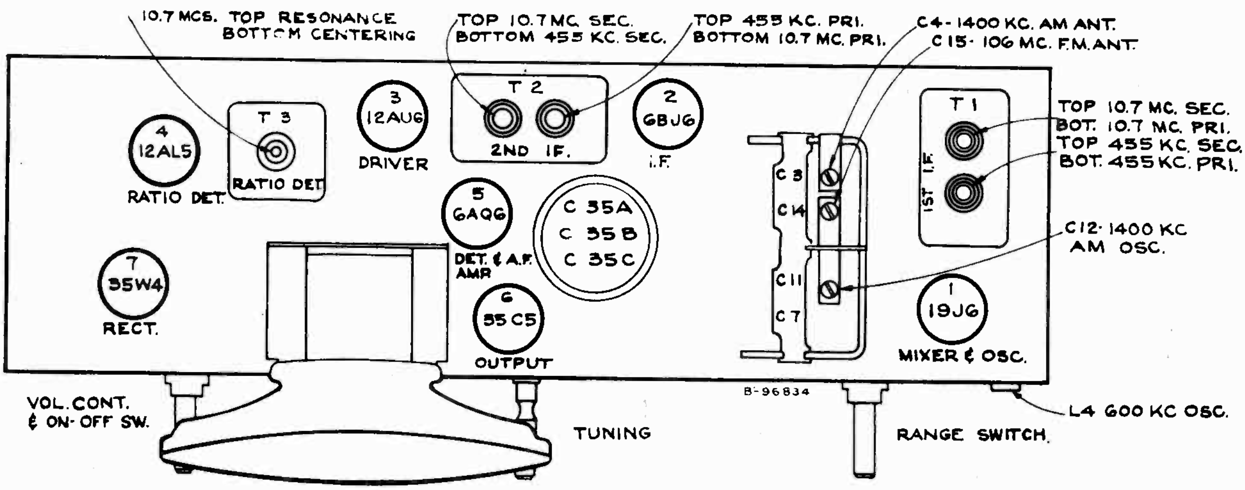


FM Response Curves



Dial Scale

The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.



Tube and Trimmer Locations (Top View)

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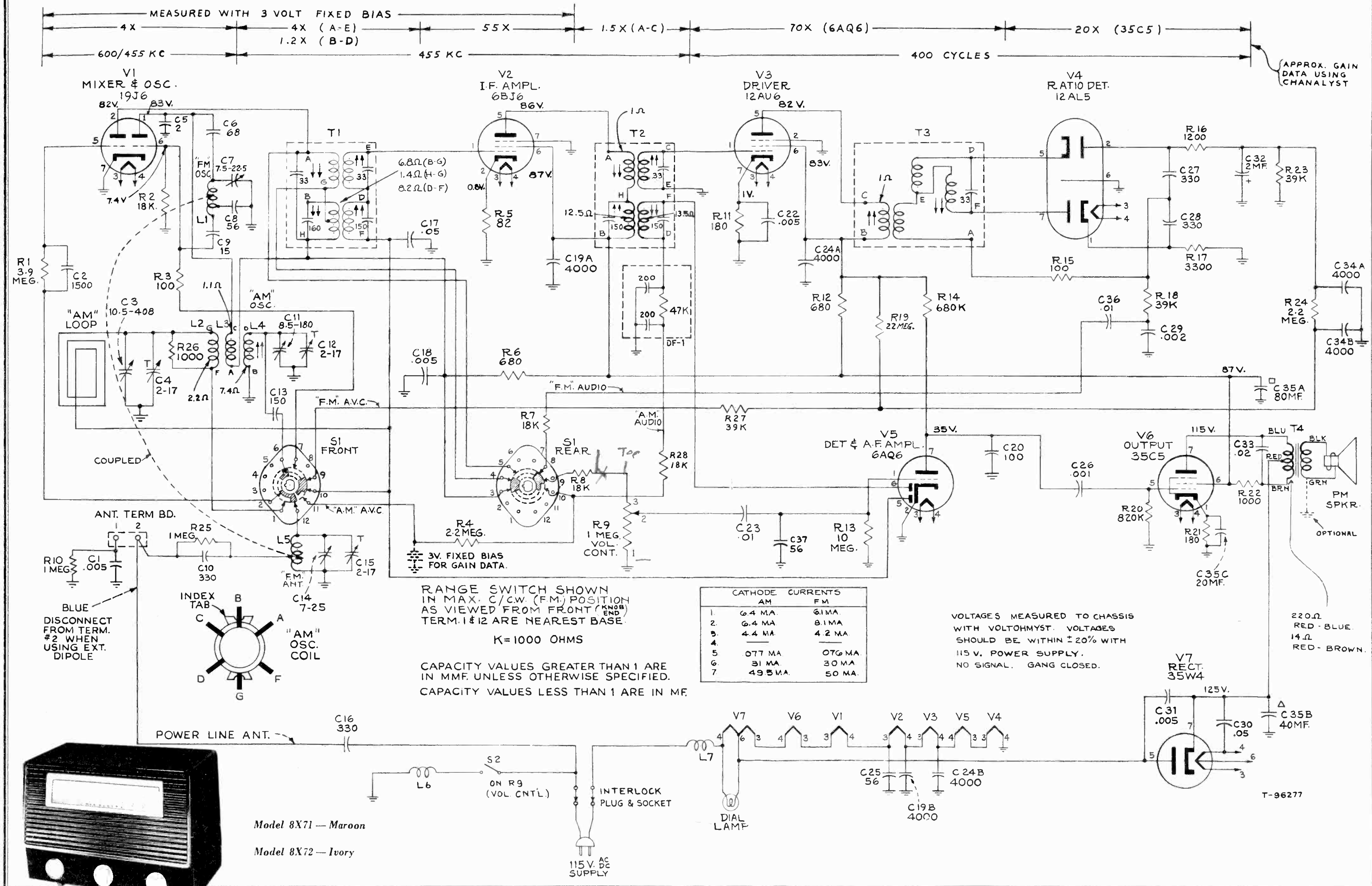
MODELS 8X71, 8X72, CHASSIS RC-1070



CATHODE CURRENTS

	AM	FM
1.	6.4 MA.	6.1 MA.
2.	6.4 MA.	8.1 MA.
3.	4.4 MA.	4.2 MA.
4.	—	—
5.	.077 MA.	.076 MA.
6.	.31 MA.	.30 MA.
7.	49.5 MA.	50 MA.

Model 8X71 — Maroon

Model 8X72 — Ivory

RADIO CORP. OF AMERICA

MODELS 8X71, 8X72,
CHASSIS RC-1070

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Output 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 except as stated in the tabulation 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.

CAUTION:

The chassis is connected to one side of the power supply. On a.c. operation it is recommended that an isolation transformer (115 v./115 v.) be used for the receiver when servicing.

Oscilloscope Alignment:

The FM I. F. alignment may be checked using a sweep generator and an oscilloscope. Shunt terminals B and C of T3 with a 1,200 ohm resistor. Connect the high side of the oscilloscope to terminal C of T3 in series with a diode probe. Apply the output of the sweep generator (10.7 mc with ±250 kc. sweep) to pin No. 1 of V2 (6BJ6) in series with .01 mf. Low side of the oscilloscope and sweep generator to chassis. This will show the response of T2.

To check the combined response of T1 and T2; connect the sweep generator to the antenna terminal board—high side to No. 2 terminal in series with 300 ohms and low side to No. 1 terminal. Oscilloscope connections as previously connected.

To check the ratio detector response; connect the high side of the oscilloscope direct to terminal No. 8 of S1 rear, low side to chassis, apply the output of the sweep generator to pin No. 1 of V3 (12AU6) in series with .01 mf. Driver plate circuit connected for normal operation (1230 ohm resistor removed). Note: It is difficult to observe marker signals in this step—center frequency and sweep width should be previously observed.

Alignment Indicator:

The dial and dial back plate are not attached to the chassis. During alignment a substitute frequency indication must be used. We suggest attaching a paper clip to the dial drive cord so that its movement may be measured—refer to the "Dial Scale" illustration on page 5.

CRITICAL LEAD DRESS

1. All connections in the mixer-oscillator circuit are extremely critical both in regard to lead length and lead dress. Do not disturb unless necessary—make careful notation before servicing if it becomes necessary to disturb this wiring.
2. The ground lead from pin No. 2 of V3 (12AU6 Driver) is critical in length and must be dressed down against chassis.
3. Dress audio coupling capacitor C23 away from output transformer.
4. Dress diode filter unit away from alignment hole in T-2.
5. Dress grid lead of V3 (pin No. 1 of 12AU6) against chassis apron.
6. Dress plate lead of V1 (pin No. 2 of 19J6) against chassis.
7. Dress loop antenna leads so as to prevent contact with external antenna terminal board.
8. All ground connections to chassis should be restored to the original places of connection if disturbed.
9. Dress capacitor C13 down close to range switch so as to clear the projection on the bottom of the cabinet.
10. The FM ant. and osc. coils must be cemented to the coil support to prevent microphonic howl on FM. Amphenol No. 912 cement is recommended for this purpose. Amphenol No. 916 solvent is recommended as solvent if it becomes necessary to loosen the windings.

AM Alignment

RANGE SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	AM ant. section (C3) of tuning cond. in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings.† T2 bottom core (sec.). T2 top core (pri.).
2	AM ant. section (C3) of tuning cond. in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings.† T1 top core (sec.). T1 bottom core (pri.).
3	Short wire placed near loop antenna for radiated signal.	1620 kc.	Extreme high frequency end.	C12 osc.
4	Short wire placed near loop antenna for radiated signal.	1400 kc.	1400 kc.	C4 ant.
5	Short wire placed near loop antenna for radiated signal.	600 kc.	600 kc.	L4 osc. (Rock gang.)
6	Repeat Steps 3, 4 and 5.			

† Use alternate loading.

Alternate loading involves the use of a 10,000 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 10,000 ohm resistor after T2 and T1 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 C32 and the common lead to chassis. Adjust sig. gen. output to provide approx. —3 v. indication during alignment.			
2	Pin 1 of 12AU6 in series with .01 mfd.	10.7 mc. modulated 30% 400 cycles AM.	Max. capacity (fully meshed).	T3 top core for max. d-c voltage across C32. T3 bottom core for min. audio output.*
3	No. 2 ant. term in series with a 300 ohm resistor. Connect low side to No. 1 terminal. (Remove ant. lead from No. 2 term.)	10.7 mc. modulated 30% 400 cycles AM.	Max. capacity (fully meshed).	FM windings.†† T2 top core (sec.). T2 bottom core (pri.).
4	No. 2 ant. term in series with a 300 ohm resistor. Connect low side to No. 1 terminal. (Remove ant. lead from No. 2 term.)	10.7 mc. modulated 30% 400 cycles AM.	Max. capacity (fully meshed).	FM windings.†† T1 top core (sec.). T1 bottom core (pri.).
5	No. 2 ant. term in series with a 300 ohm resistor. Connect low side to No. 1 terminal. (Remove ant. lead from No. 2 term.)	106 mc.	106 mc.	L1 osc.** C15 ant.
6		90 mc.	90 mc.	L5 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 T2 and T1 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 10,000 ohm resistor and load the FM windings.

** L1 and L5 are adjustable by increasing or decreasing the spacing between turns.

MODELS 8X71, 8X72,
CHASSIS RC-1070

RADIO CORP. OF AMERICA

Power Supply:

This instrument will operate on 115 volts d.c. or 50 to 60 cycles a.c.

If the receiver does not operate on d.c., reverse the power cord. On a.c., *reversal of the cord may reduce hum or improve* FM reception.

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 an external antenna for FM reception if desired.

To use external FM antenna:

1. Remove the wire from under the No. 2 terminal screw of the antenna terminal board. The bare end of this wire should be taped to prevent contact with the antenna terminal screws.
2. Connect the transmission line from an external FM dipole antenna to the No. 1 and No. 2 terminals of the antenna terminal board.

To use built-in FM antenna:

1. The wire extending thru the back of the cabinet must be connected to No. 2 terminal of the antenna terminal board.
2. The power cord should be fully extended and must not be coiled or hanked up.
3. Reversal of the line cord plug may improve reception.

DO NOT USE EXTERNAL GROUND.

CAUTION:

THE CHASSIS IS CONNECTED TO ONE SIDE OF THE POWER SUPPLY. Use caution to prevent contact with pipes, radiators, etc. when servicing with chassis removed from cabinet.

Specifications

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) RCA 19J6 .... Mixer and Oscillator
(2) RCA 6BJ6 .... I. F. Amplifier
(3) RCA 12AU6 .... Driver
(4) RCA 12AL5 .... Ratio Detector
(5) RCA 6AQ6 .... AM Det.—A. F. Amp.
(6) RCA 35C5 .... Output
(7) RCA 35W4 .... Rectifier

Dial Lamp .... Type No. 47, 6-8 volts, 0.15 amp.

Loudspeaker

Type 92572-4W .... 5 inch P.M.
Voice coil impedance .... 3.2 ohms at 400 cycles

Tuning Drive Ratio .... 11½:1 (5¾ turns of knob)

Replacement Parts

Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1070
*73973	Capacitor—Variable tuning capacitor (C3, C4, C7, C11, C12, C14, C15)
73866	Capacitor—Ceramic, 2 mmf. (C5)
31353	Capacitor—Ceramic, 15 mmf. (C9)
73867	Capacitor—Ceramic, 56 mmf. (C8)
73499	Capacitor—Ceramic, 56 mmf. (C25, C37)
33103	Capacitor—Ceramic, 68 mmf. (C6)
39628	Capacitor—Mica, 100 mmf. (C20)
48125	Capacitor—Ceramic, 150 mmf. (C13)
39640	Capacitor—Mica, 330 mmf. (C10, C16, C27, C28)
71501	Capacitor—Ceramic, 1,500 mmf. (C2)
*74009	Capacitor—Ceramic, .004 mf., dual (C19A, C19B) (C24A, C24B) (C34A, C34B)
73473	Capacitor—Ceramic, .005 mf. (C1, C18, C31)
73186	Capacitor—Tubular, .001 mf., 400 volts (C26)
73750	Capacitor—Tubular, .002 mf., 200 volts (C29)
71926	Capacitor—Tubular, .005 mf., 200 volts (C22)
71923	Capacitor—Tubular, .01 mf., 200 volts (C23, C36)
*74010	Capacitor—Tubular, .02 mf., 400 volts (C33)
70615	Capacitor—Tubular, .05 mf., 400 volts (C17, C30)
73747	Capacitor—Electrolytic, 2 mf., 50 volts (C32)
*73975	Capacitor—Electrolytic, comprising 1 section of 80 mf., 150 volts, 1 section of 40 mf., 150 volts, and 1 section of 20 mf., 25 volts (C35A, C35B, C35C)
*74012	Coil—Oscillator coil—F.M. (No. 16 tinned buss wire, 9 turns per inch, 4⅞ turns L.H. .469 I.D.) (L1)
73744	Coil—Oscillator coil—A.M. (L2, L3, L4)
*74013	Coil—Antenna coil—F.M. (No. 16 tinned buss wire, 7 turns per inch, 2¾ turns L.H. .375 I.D.) (L5)
	Coil—Line choke coil (No. 18 gauge solid wire, 1/32" plastic insulation, standard hook-up wire, 10 turns, close wind) (L6, L7)
38406	Control—Volume control and power switch (R9, S2)
†72953	Cord—Drive cord (approx. 50" overall length required)
*74011	Filter—Diode filter, consisting of two 200 mmf. capacitors and one 47,000 ohm resistor (DF1)
72283	Grommet—Rubber grommet to mount tuning capacitor (4 required)
*73981	Plug—Power input plug (2 prong male)
	Resistor—Fixed, composition, 82 ohms, ±10%, ½ watt (R5)
	Resistor—Fixed, composition, 100 ohms, ±20%, ½ watt (R3)
	Resistor—Fixed, composition, 100 ohms, ±5%, ½ watt (R15)
	Resistor—Fixed, composition, 180 ohms, ±10%, ½ watt (R11, R21)
	Resistor—Fixed, composition, 680 ohms, ±20%, ½ watt (R5, R12)
	Resistor—Fixed, composition, 680 ohms, ±10%, ½ watt (R14)
	Resistor—Fixed, composition, 820 ohms, ±10%, ½ watt (R20)
	Resistor—Fixed, composition, 1,000 ohms, ±10%, 1 watt (R22)
	Resistor—Fixed, composition, 1,000 ohms, ±20%, ½ watt (R26)
	Resistor—Fixed, composition, 1,200 ohms, ±5%, ½ watt (R16)
	Resistor—Fixed, composition, 3,300 ohms, ±5%, ½ watt (R17)
	Resistor—Fixed, composition, 18,000 ohms, ±10%, ½ watt (R2, R7, R8, R28)
	Resistor—Fixed, composition, 39,000 ohms, ±10%, ½ watt (R18, R27)
	Resistor—Fixed, composition, 39,000 ohms, ±5%, ½ watt (R23)
	Resistor—Fixed, composition, 1 megohm, ±20%, ½ watt (R10, R25)
	Resistor—Fixed, composition, 2.2 megohm, ±20%, ½ watt (R4, R24)
	Resistor—Fixed, composition, 3.9 megohm, ±10%, ½ watt (R1)
	Resistor—Fixed, composition, 10 megohms, ±20%, ½ watt (R13)
	Resistor—Fixed, composition, 22 megohms, ±20%, ½ watt (R19)
*73978	Shaft—Tuning knob shaft
*74014	Socket—Dial lamp socket
73117	Socket—Tube socket for V2, V3, V4, V5, V6, V7
*74179	Socket—Tube socket for V1
74038	Spring—Drive cord spring
*73979	Support—Dial drive cord pulley support complete with two (2) pulleys—L. H.
*73980	Support—Dial drive cord pulley support complete with pulley—R. H.
*73977	Switch—Range switch (S1)
73745	Transformer—First I.F. transformer—dual (T1)
*73974	Transformer—Second I.F. transformer—dual (T2)
73743	Transformer—Ratio detector transformer (T3)
*73976	Transformer—Output transformer (T4)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLY 92572-4W
73900	Speaker—5" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
*73984	Back—Cabinet back—maroon—complete with loop, terminal boards, power socket and power cord for Model 8X71
*73985	Back—Cabinet back—ivory—complete with loop, terminal boards, power socket and power cord for Model 8X72
*73988	Bezel—Dial bezel less dial
*74104	Board—FM antenna terminal board
Y2051	Cabinet—Maroon plastic cabinet for Model 8X71
Y2052	Cabinet—Ivory plastic cabinet for Model 8X72
*73990	Dial—Polystyrene dial scale
*73991	Indicator—Station selector indicator
*73982	Knob—Control knob—brown—for Model 8X71
*73983	Knob—Control knob—ivory—for Model 8X72
31480	Lamp—Dial lamp—Mazda 47
*73986	Loop—Antenna loop (winding only)
72765	Nut—Speed nut for bezel and dial scale
*73989	Plate—Dial back plate
*73992	Retainer—Knob retainer (knob to cabinet)
*73987	Socket—2 contact power input socket (part of back cover and loop assembly)
14270	Spring—Retaining spring for knobs (knob to shaft)

*This is the first time that this Stock No. has appeared in Service Data.

Power Supply Rating

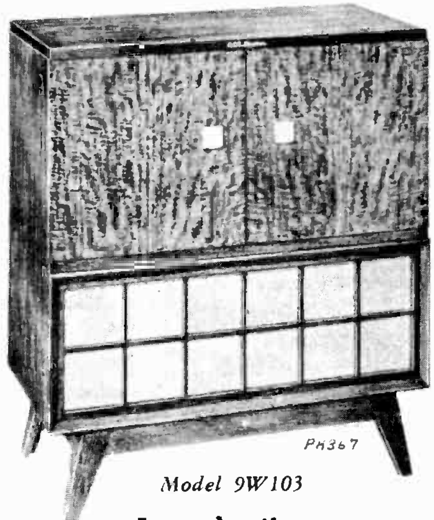
115 volts d.c. or 50 to 60 cycles a.c. .... 30 watts

Power Output

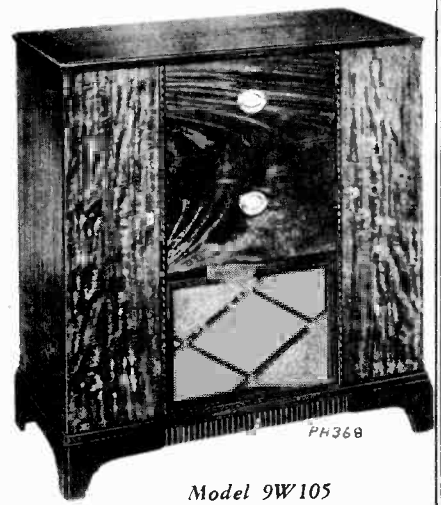
Maximum .... 1.65 watts
Undistorted .... 1.0 watt

RADIO CORP. OF AMERICA MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C

Model 9W101



Model 9W103



Model 9W105

Introduction

All three of these instruments have the new Model RP-168A-1 record changer designed for use with the new Victor seven-inch long playing records. Model 9W105 also has a Model RP-178 record changer for use with the conventional ten- and twelve-inch records.

An auxiliary phono input jack on the back of the chassis of Models 9W101 and 9W103 (input controlled by the selector switch) is provided to permit the use of an auxiliary record player if desired.

Antennas

These receivers have built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Provision is made for the use of an external antenna for FM reception if desired. To use external FM antenna—remove the built-in FM antenna lead from the "FM" terminals of the antenna terminal board Connect the transmission line of an external FM dipole antenna to these two "FM" terminals.

FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-168 SERIES SERVICE DATA AND RP-178 SERIES SERVICE DATA.

Specifications

Tuning Range

Standard Broadcast (AM) .... 540-1600 kc.
Frequency Modulation (FM) .... 88-108 mc.
Intermediate Frequencies .... AM—455 kc., FM—10.7 mc.

Tube Complement

(1) RCA 6J6 .... Mixer and Oscillator
(2) RCA 6BA6 .... I-F Amplifier
(3) RCA 6AU6 .... Driver
(4) RCA 6AL5 .... Ratio Detector
(5) RCA 6AV6 .... A-F Amplifier
(6) RCA 6V6GT .... Output
(7) RCA 6AV6 .... AM Det.—AVC—Ph. Inv.
(8) RCA 6V6GT .... Output
(9) RCA 6X5GT .... Rectifier
(10) RCA 6BF6 .... Phono Pre-amplifier

Dial Lamps (2) .... Type No. 51, 6-8 volts, 0.2 amp.
Jewel Lamp .... Type No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio .... 18:1 (9 turns of knob)

Power Supply Rating .... 115 volts, 60 cycles, 90 watts

Loudspeaker (92569-5W)

Size and type .... 12 in. PM
Voice coil impedance .... 3.2 ohms at 400 cycles

Power Output

Undistorted 6 watts .... Maximum 7 watts

Record Changer (RP-168A-1)
Used in all three models

Turntable speed .... 45 r.p.m.
Record capacity .... Eight 7 in.—long playing
Pickup .... Crystal (medium output)

Record Changer (RP-178)
Used in Model 9W105 only

Turntable speed .... 78 r.p.m.
Record capacity .... Twelve 10 in or ten 12 in.
Pickup .... Crystal (standard output)

Cabinet Dimensions	Height	Width	Depth
Model 9W101	34 in.	31⅞ in.	15 15/16 in.
Model 9W103	34 in.	30¼ in.	15¾ in.
Model 9W105	35 in.	34⅝ in.	16⅜ in.

Circuit Description

These instruments have a ten-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

(1) Selection of tuning range.
(2) Selection and distribution of a.v.c. voltages.
(3) Application of B+ voltage to tubes V1, V2 and V3.
(4) Selection of audio input applied to the volume control.
(5) Application of a.c. power to the record changer motors.

A one-tube pre-amplifier (6BF6 tube No. V10) is used with the input from the RP-168A-1 record changer.

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.

Oscilloscope Alignment:

The FM I-F alignment may be checked using a sweep generator and an oscilloscope. Shunt terminals B and C of T3 with a 1200 ohm resistor. Connect the high side of an oscilloscope to terminal C of T3 in series with a diode probe. Apply the output of the sweep generator (10.7 mc. with ±250 kc. sweep) to pin No. 1 of V2 (6BA6) in series with .01 mf. Low side of the oscilloscope and sweep generator to chassis. This will show the response of T2.

To check the combined response of T1 and T2; connect the sweep generator to the FM antenna terminals (remove FM antenna lead) in series with 300 ohms. Note: One FM terminal is grounded—it may be necessary to reverse the sweep generator connections. Oscilloscope connections remain as connected.

To check the ratio detector response; connect the high side of the oscilloscope direct to terminal No. 9 of S1, low side to chassis. Apply the output of the sweep generator to pin No. 1 of V3 (6AU6) in series with .01 mf. Driver plate circuit connected for normal operation (1200 ohm resistor removed). **Note:** It is difficult to observe marker signals in this step—center frequency and sweep width should be previously observed.

Response curves illustrated on page 5.

CRITICAL LEAD DRESS

1. Keep leads of C7 short.
2. Dress R27 away from range switch and pin No. 5 of V1.
3. The round 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.
17. Capacitor C41 should be secured to the chassis apron with melted wax or cement.
18. FM oscillator coil L2 must be cemented to its support. Amphenol No. 912 cement is recommended for this purpose.

Dial Indicator

With the tuning condenser fully meshed (closed) the indicator should be set to the reference mark on the dial back plate.

Refer to the dial scale reproductions on page 8.

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	Short wire placed near loop for radiated signal	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.			

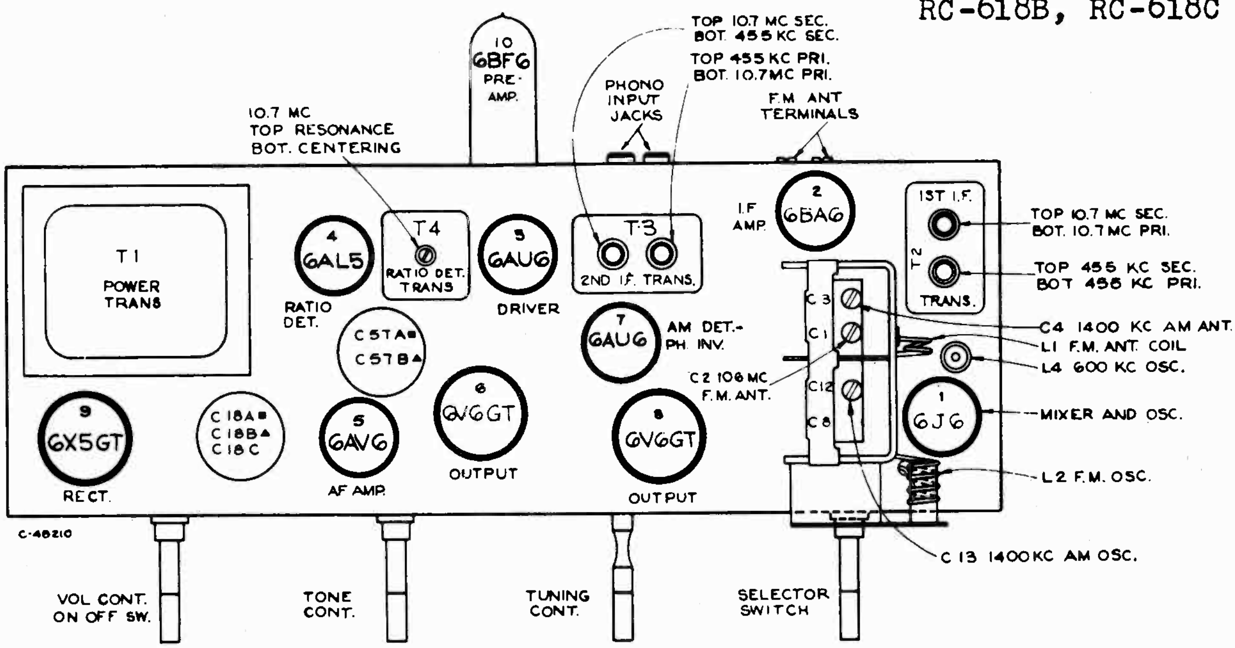
* Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

†† 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.

RADIO CORP. OF AMERICA

MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C



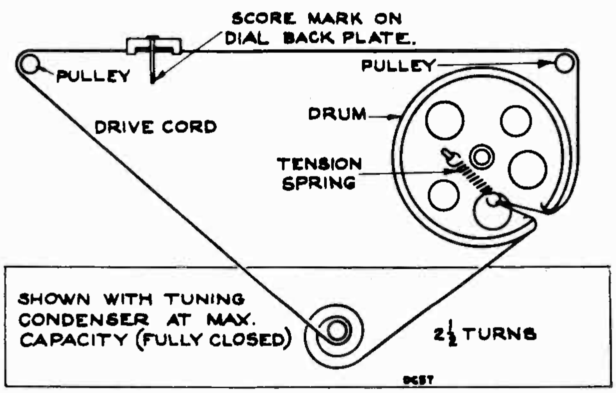
Tube and Trimmer Locations

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		
			Phono	A.M.	F.M.
(1) 6J6	Plate	1	—	102	98
	Grid	6	−0.4	−6.8	−6.0
	Plate	2	—	96	110
	Grid	5	−0.8	−2.7	−2.5
(2) 6BA6	Plate	5	—	196	192
	Screen	6	—	100	83
	Cathode	7	—	0.7	0.84
	Grid	1	−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	125	85	84
	Grid	1	−0.6	−0.6	−0.6
(6) 6V6GT	Plate	3	299	282	280
	Screen	4	295	220	217
	Cathode	8	21.4	15.5	15.4
(7) 6AV6	Plate	7	168	125	125
	Grid	1	−0.5	−0.5	−0.5
(8) 6V6GT	Plate	3	299	282	280
	Screen	4	286	214	211
	Cathode	8	21.4	15.5	15.4
(9) 6X5GT	Cathode	8	313	300	299
(10) 6BF6	Plate	7	129	89	88
	Cathode	2	7.2	5.4	5.4



Dial Indicator and Drive Mechanism

Cathode Currents (MA)

Tube	Terminal	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	0.75	0.5	0.5
(6) 6V6GT	8	25.1	19.1	18.5
(7) 6AV6	2	1.7	1.1	1.1
(8) 6V6GT	8	24.1	18.5	18
(9) 6X5GT	8	54	70.5	71
(10) 6BF6	2	0.77	0.55	0.55

MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C

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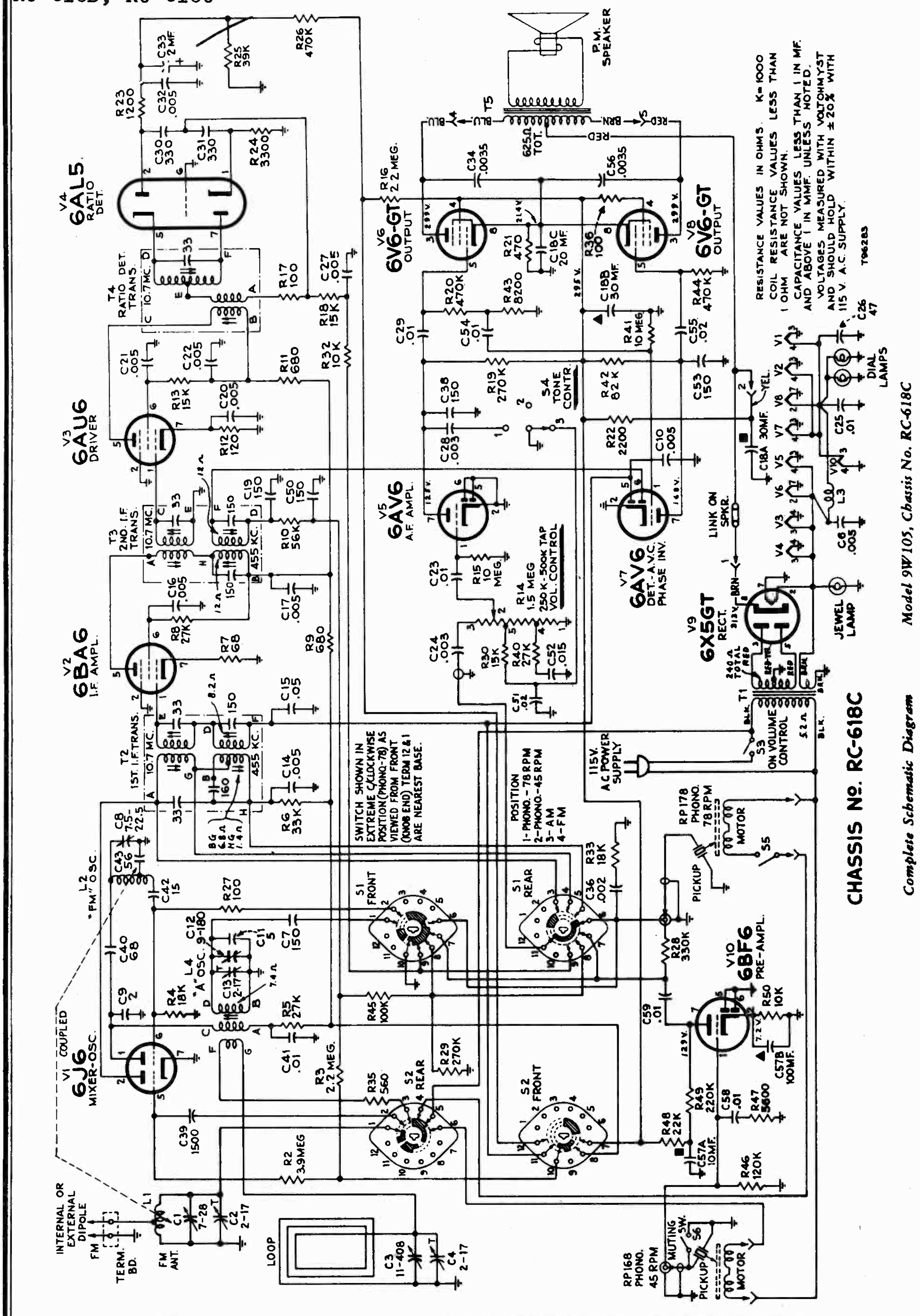

CHASSIS No. RC-618C

Complete Schematic Diagram

Model 9W105, Chassis No. RC-618C

The RP-178 record changer is used only with Model 9W105. In Models 9W101 and 9W103 the RP-178 record changer and connecting cables are not used; C36 and R33 are omitted.

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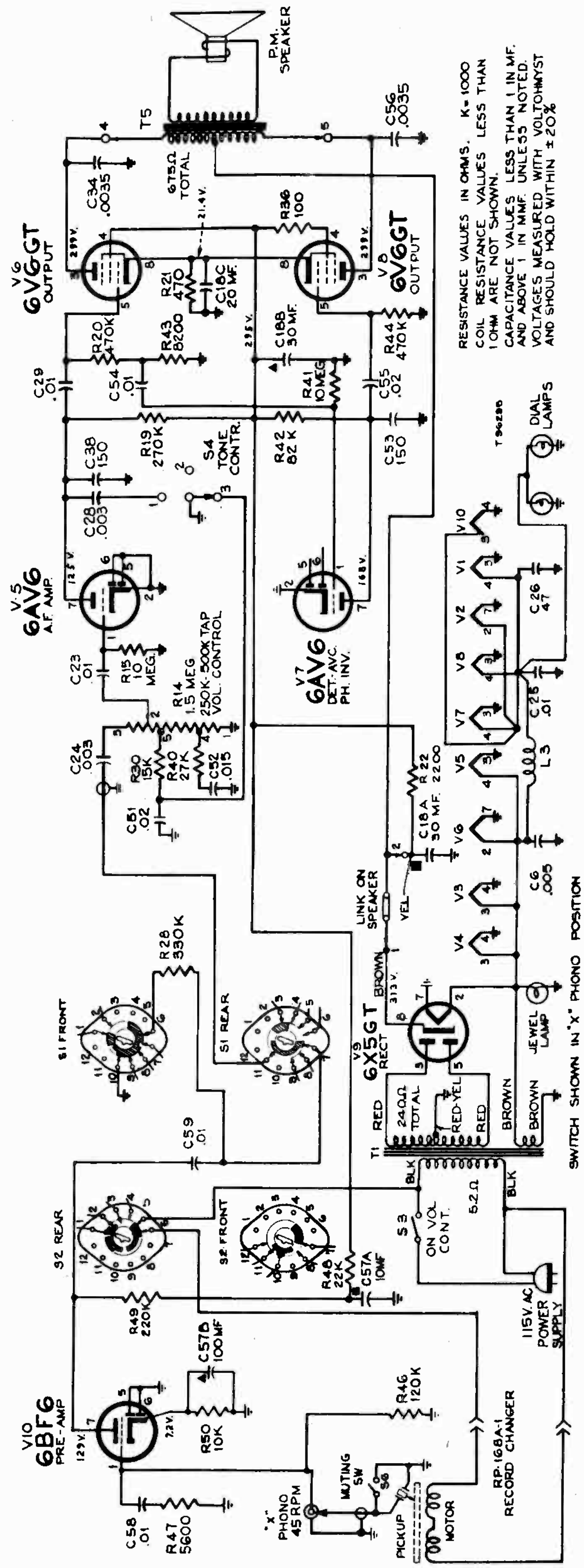
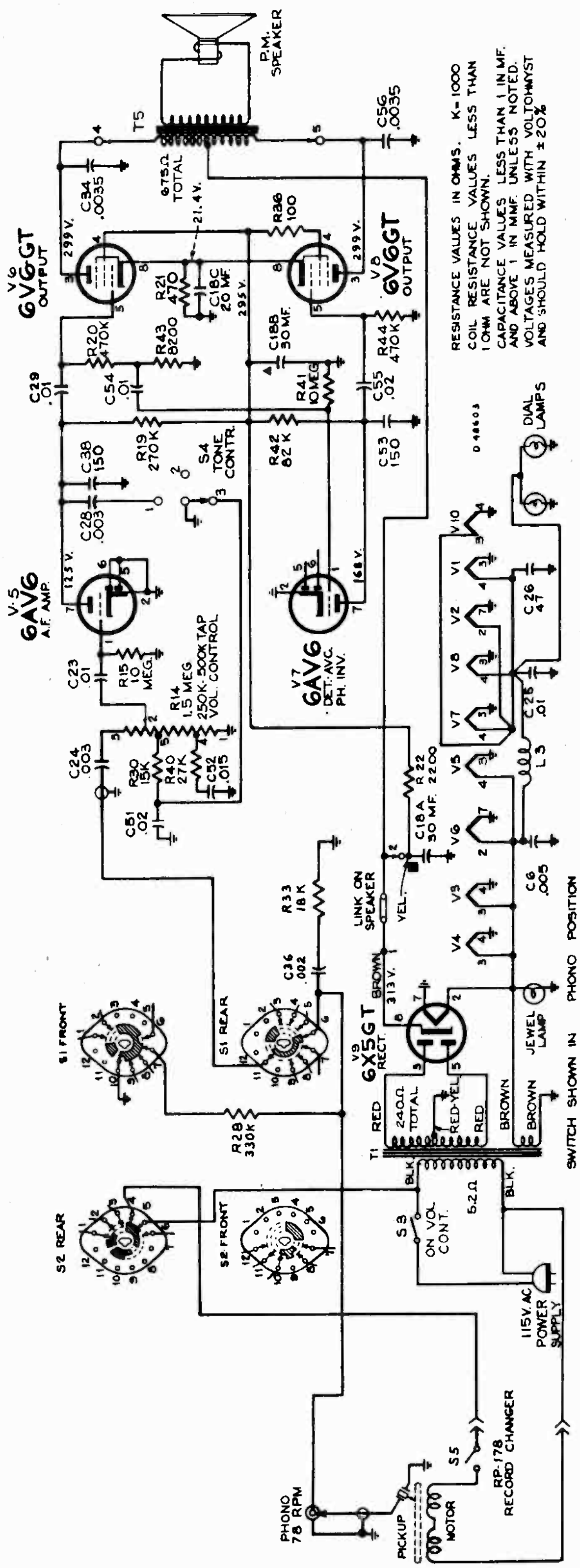
MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C



Simplified Schematic Diagram
"Aux." (9W101, 9W103) or "X PH" (9W105) Position



Simplified Schematic Diagram
"PH" Position

In Models 9W101 and 9W103 the RP-178 record changer and connecting cables are not used; C36 and R33 are omitted.

MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C

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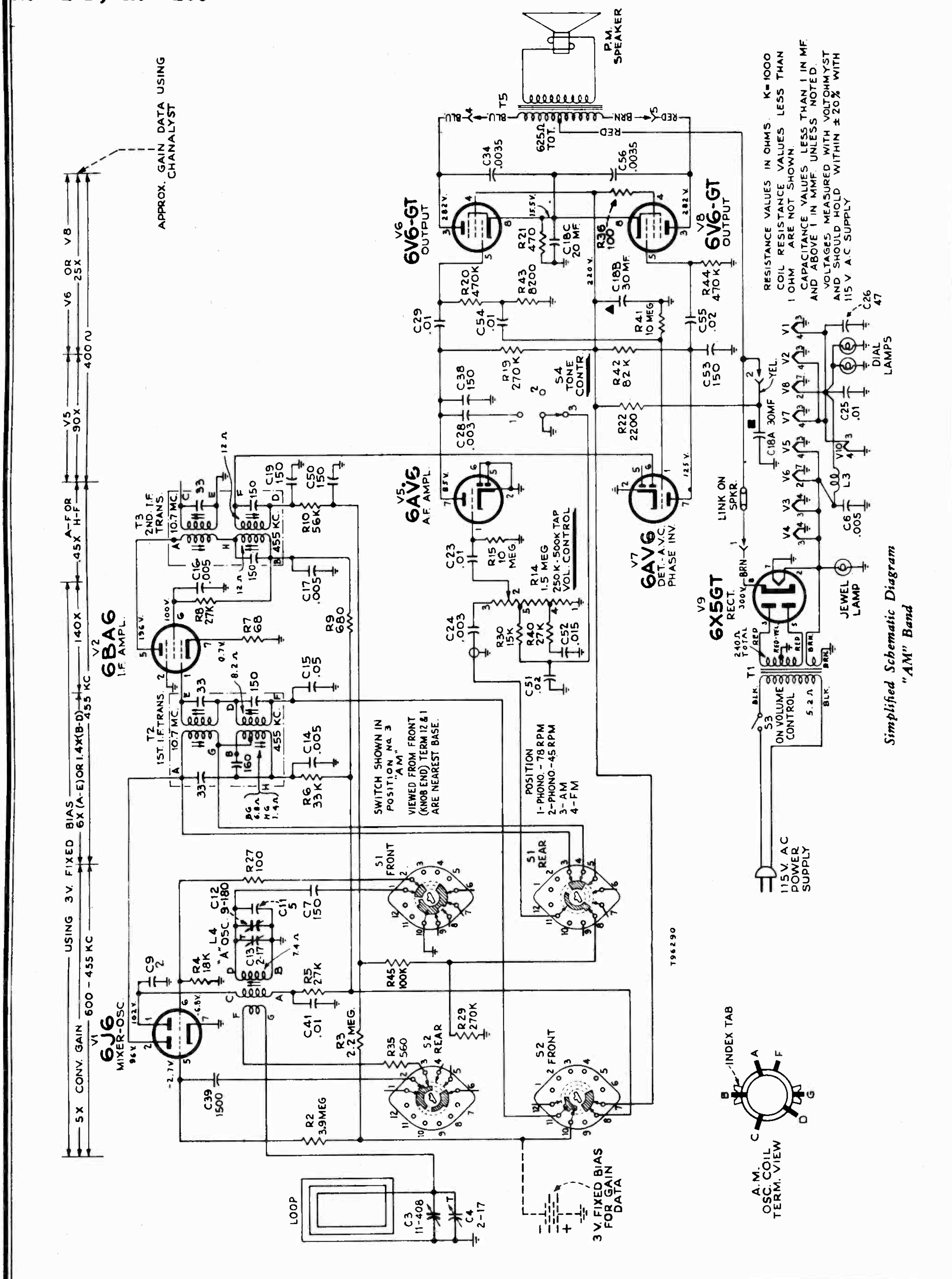

Simplified Schematic Diagram "AM" Band

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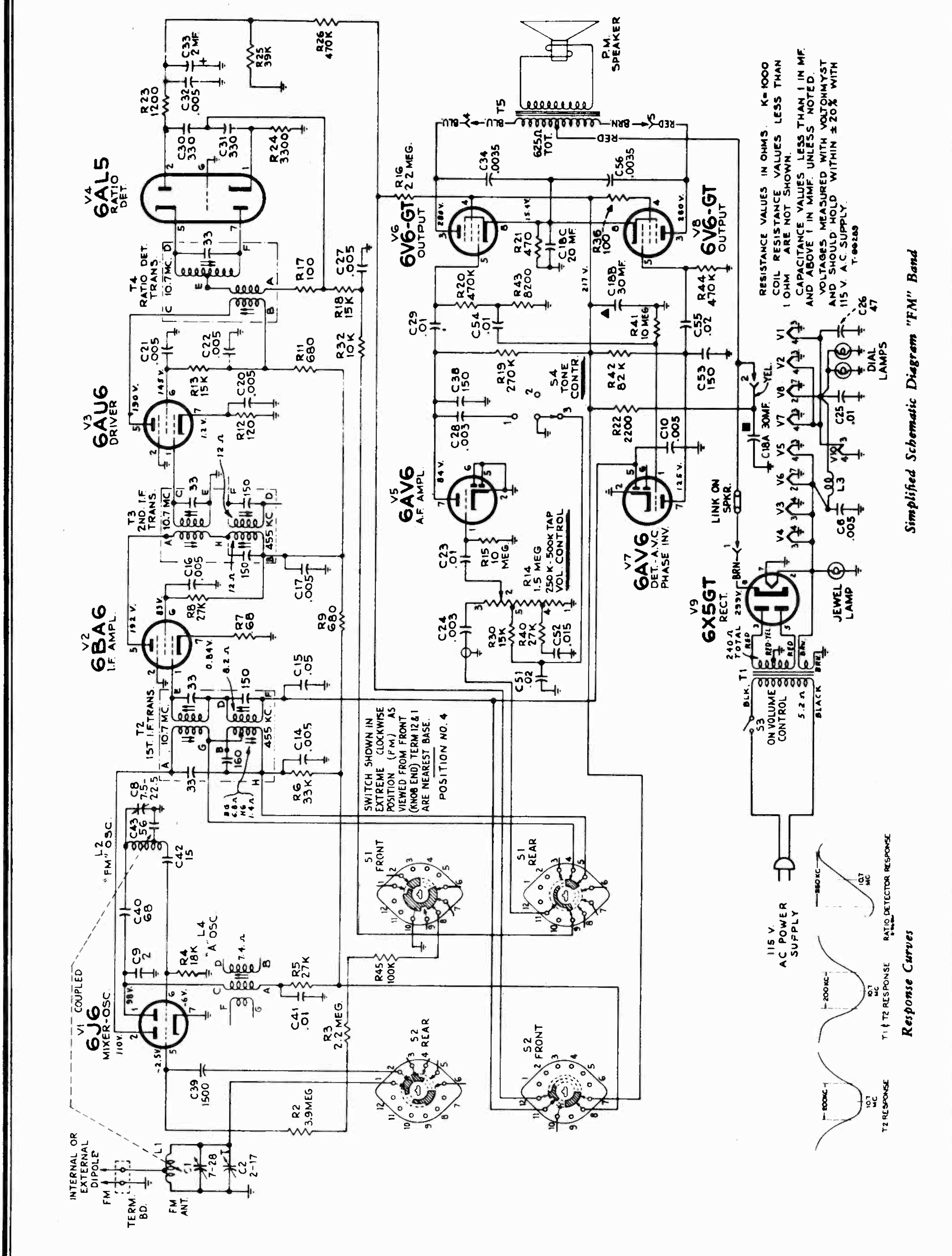
MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C



Simplified Schematic Diagram "FM" Band

Response Curves

MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C

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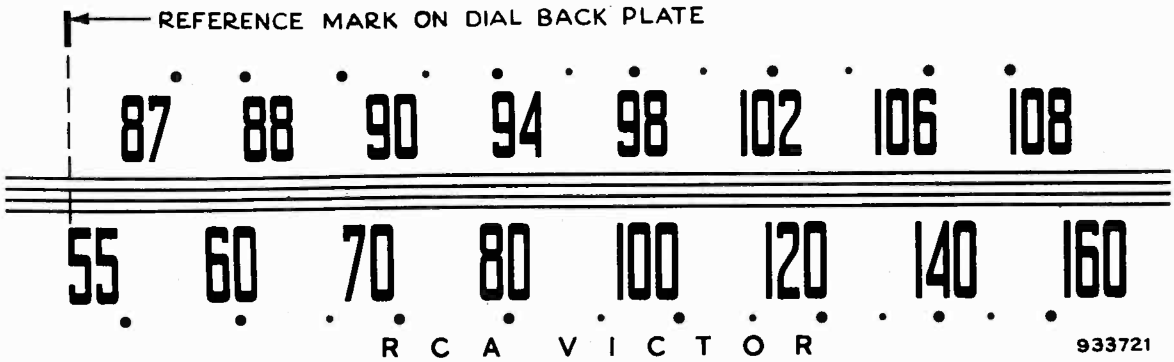
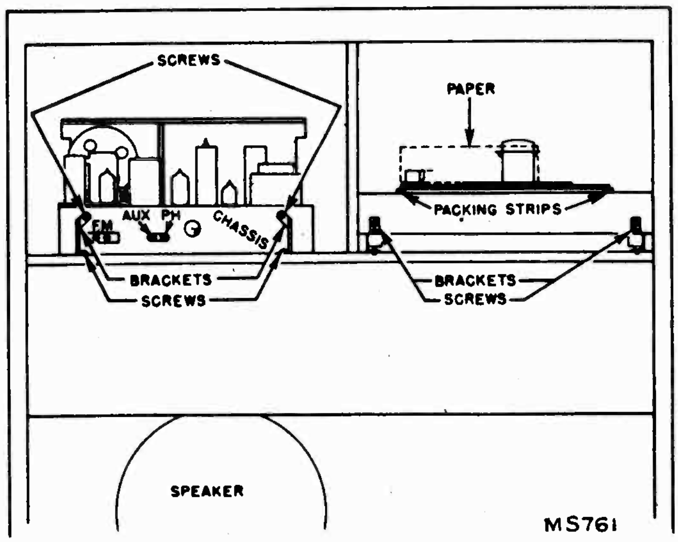
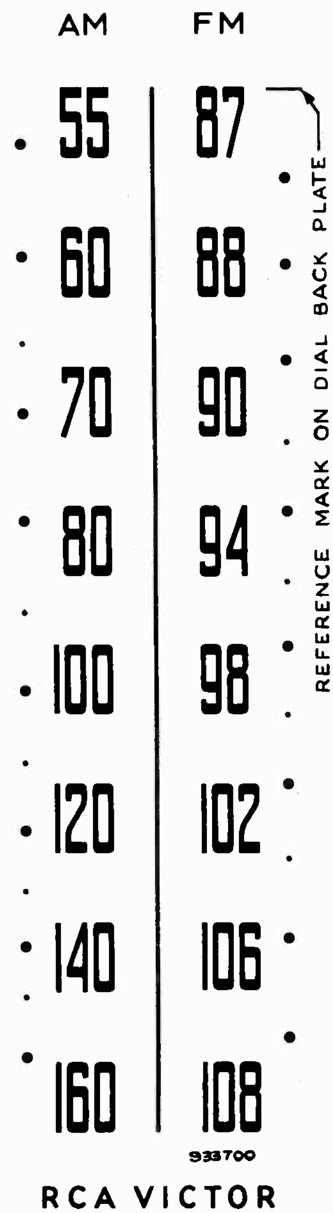


The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

Dial Scale—Models 9W101 and 9W103

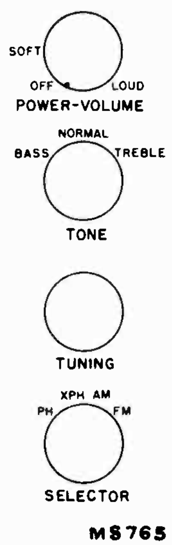


Back View—Models 9W101 and 9W103

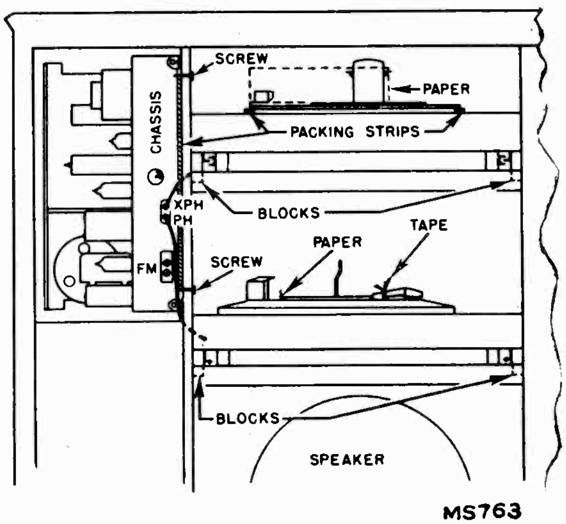


The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

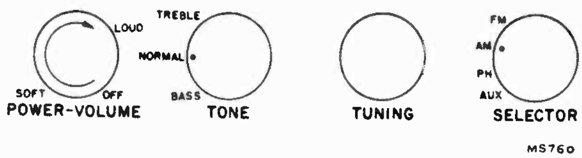
Dial Scale—Model 9W105



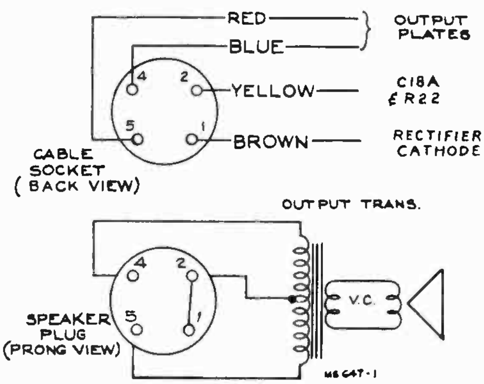
Controls—Model 9W105



Back View—Model 9W105



Controls—Models 9W101 and 9W103



Speaker Connections

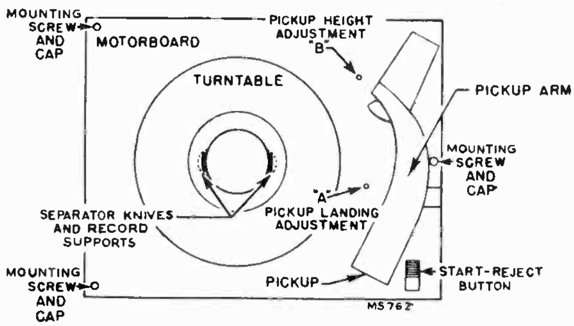
SHIPPING SCREWS

The radio chassis of these instruments is secured to the cabinet with shipping screws (painted red) which, together with wood spacing strips, should be REMOVED at the time of installation.

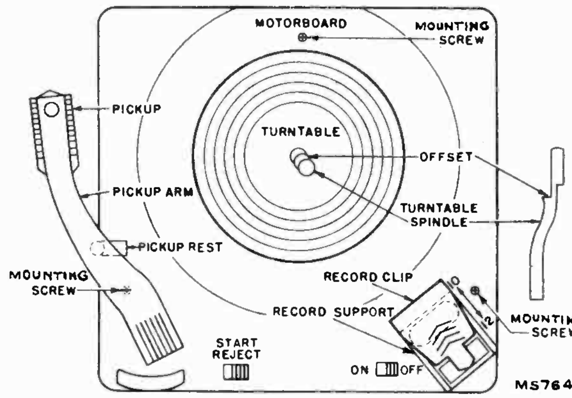
The record changers are each mounted with three screws which should be LOOSENED at the time of installation.

On the RP-168A-1 record changer decorative caps cover the mounting screws, unscrew the caps for access to the screws.

REFER TO ILLUSTRATIONS ON PAGES 8 AND 9.



Top View—RP-168A-1 Record Changer



Top View—RP-178 Record Changer

RP-168A-1 RECORD CHANGER

Pickup Landing Adjustment "A"

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves—turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of eight records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of eight records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

Record Separators

During service work the position of the star wheel on the underside of the record changer may be accidently shifted; this may cause the record separator knives to be extended when in the out of cycle position.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, gently press fingers against the extended knives until they disappear inside the center post—DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.

CARE OF SAPPHIRE

The sapphire point on the pickup is protected with a permanent metal guard. Lint may collect to clog the opening in the guard at the sapphire point and cause poor record reproduction. Occasional cleaning may be necessary; brush carefully with a small soft brush.

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 618B—9W101, 9W103 RC 618C—9W105
73893	Board—"F.M." antenna board
73889	Capacitor—Variable tuning capacitor (C1, C2, C3, C4, C8, C12, C13)
73866	Capacitor—Ceramic, 2 mmf. (C9)
93056	Capacitor—Ceramic, 5 mmf. (C11)
31353	Capacitor—Ceramic, 15 mmf. (C42)
39042	Capacitor—Ceramic, 47 mmf. (C26)
73867	Capacitor—Ceramic, 56 mmf. (C43)
33103	Capacitor—Ceramic, 68 mmf. (C40)
48125	Capacitor—Ceramic, 150 mmf. (C7, C19, C38, C50, C53)
39640	Capacitor—Mica, 330 mmf. (C30, C31)
73748	Capacitor—Ceramic, 1500 mmf. (C39)
73473	Capacitor—Ceramic, .005 mfd. (C6, C10)
73750	Capacitor—Tubular, .002 mfd., 200 volts (C36 for 9W105)
73659	Capacitor—Tubular, .003 mfd., 200 volts (C24)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C28)
70646	Capacitor—Tubular, .0035 mfd., 1000 v. (C34, C56)
71926	Capacitor—Tubular, .005 mfd., 200 volts (C20, C27, C32)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C14, C16, C17, C21, C22)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C52)
71928	Capacitor—Tubular, .02 mfd., 200 volts (C51)
73638	Capacitor—Tubular, .02 mfd., 400 volts (C55)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C23, C25)
73561	Capacitor—Tubular, .01 mfd., 400 volts (C58, C59)
71925	Capacitor—Tubular, .01 mfd., 400 volts (C29, C41, C54)
71551	Capacitor—Tubular, .05 mfd., 200 volts (C15)
73747	Capacitor—Electrolytic, 2 mfd., 50 volts (C33)
*74200	Capacitor—Electrolytic, comprising 1 section of 10 mfd., 300 volts and 1 section of 100 mfd., 10 volts (C57A, C57B)
73372	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 350 volts, 1 section of 30 mfd., 300 volts and 1 section of 20 mfd., 250 volts (C18A, C18B, C18C)
73918	Coil—Antenna coil—F.M. (#16 tinned bus wire, 8 turns per inch, 1¾ turns L.H.—.469 I. D.) (L1)
73916	Coil—Oscillator coil—F.M. (#16 tinned bus wire, 7 turns per inch, 4¾ turns R.H.—.469 I. D.) (L2)

(Continued on following page)

MODELS 9W101, 9W103, 9W105, CHASSIS RC-618B, RC-618C

RADIO CORP. OF AMERICA

Replacement Parts (Continued)

STOCK No.	DESCRIPTION
71942	Coil—Filament choke coil (L3)
73744	Coil—Oscillator coil—A.M. (L4)
70342	Control—Volume control and power switch (R14, S3)
†72953	Cord—Drive cord (approx. 48" overall length required)
73690	Cord—Power cord and plug
16058	Grommet—Rubber grommet to mount R.F. shelf
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
73895	Indicator—Station selector indicator
30868	Plug—2 contact female plug for motor cables
5040	Plug—4 contact female plug for speaker cable
*74297	Plate—Dial back plate complete with two (2) drive cord pulleys less dial
	Resistor—Fixed, composition, 68 ohms ±10%, ½ watt (R7)
	Resistor—Fixed, composition, 100 ohms ±10%, ½ watt (R17, R27, R36)
	Resistor—Fixed, composition, 120 ohms ±10%, ½ watt (R12)
	Resistor—Fixed, composition, 470 ohms ±10%, 2 watts (R21)
	Resistor—Fixed, composition, 560 ohms ±10%, ½ watt (R35)
	Resistor—Fixed, composition, 680 ohms ±20%, ½ watt (R9, R11)
	Resistor—Fixed, composition, 1200 ohms ±5%, ½ watt (R23)
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R22)
	Resistor—Fixed, composition, 3300 ohms ±5%, ½ watt (R24)
	Resistor—Fixed, composition, 5600 ohms ±10%, ½ watt (R47)
	Resistor—Fixed, composition, 8200 ohms ±10%, ½ watt (R43)
	Resistor—Fixed, composition, 10,000 ohms ±10%, ½ watt (R32, R50)
	Resistor—Fixed, composition, 15,000 ohms ±10%, ½ watt (R13, R18, R30)
	Resistor—Fixed, composition, 18,000 ohms ±10%, ½ watt (R4 for 9W101, 9W103 & 9W105) (R33 for 9W105)
	Resistor—Fixed, composition, 22,000 ohms ±10%, ½ watt (R48)
	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)
	Resistor—Fixed, composition, 56,000 ohms ±10%, 1 watt (R10)
	Resistor—Fixed, composition, 82,000 ohms ±10%, ½ watt (R42)
	Resistor—Fixed, composition, 100,000 ohms ±10%, ½ watt (R45)
	Resistor—Fixed, composition, 120,000 ohms ±10%, ½ watt (R46)
	Resistor—Fixed, composition, 220,000 ohms ±10%, ½ watt (R49)
	Resistor—Fixed, composition, 270,000 ohms ±10%, ½ watt (R19, R29)
	Resistor—Fixed, composition, 330,000 ohms ±10%, ½ watt (R28)
	Resistor—Fixed, composition, 470,000 ohms ±10%, ½ watt (R20, R26, R44)
	Resistor—Fixed, composition, 2.2 meg. ±20%, ½ watt (R3)
	Resistor—Fixed, composition, 3.9 meg. ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 10 megohms ±20%, ½ watt (R15, R41)
	Resistor—Fixed, composition, 22 megohms ±20%, ½ watt (R16)
73894	Shaft—Tuning knob shaft
31364	Socket—Dial or jewel lamp socket
33514	Socket—Phono input socket (double)
31251	Socket—Tube socket, wafer, octal
73606	Socket—Tube socket, miniature, for tubes V1, V2, V3, V4, V5, V7
73117	Socket—Tube socket, miniature, for 6BF6 tube
31418	Spring—Drive cord spring
74202	Support—Polystyrene support for F.M. osc. coil complete with mounting bracket
73891	Switch—Tone control switch (S4)
*74201	Switch—Selector switch (S1, S2)
73601	Transformer—Power transformer, 115 volt 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
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)

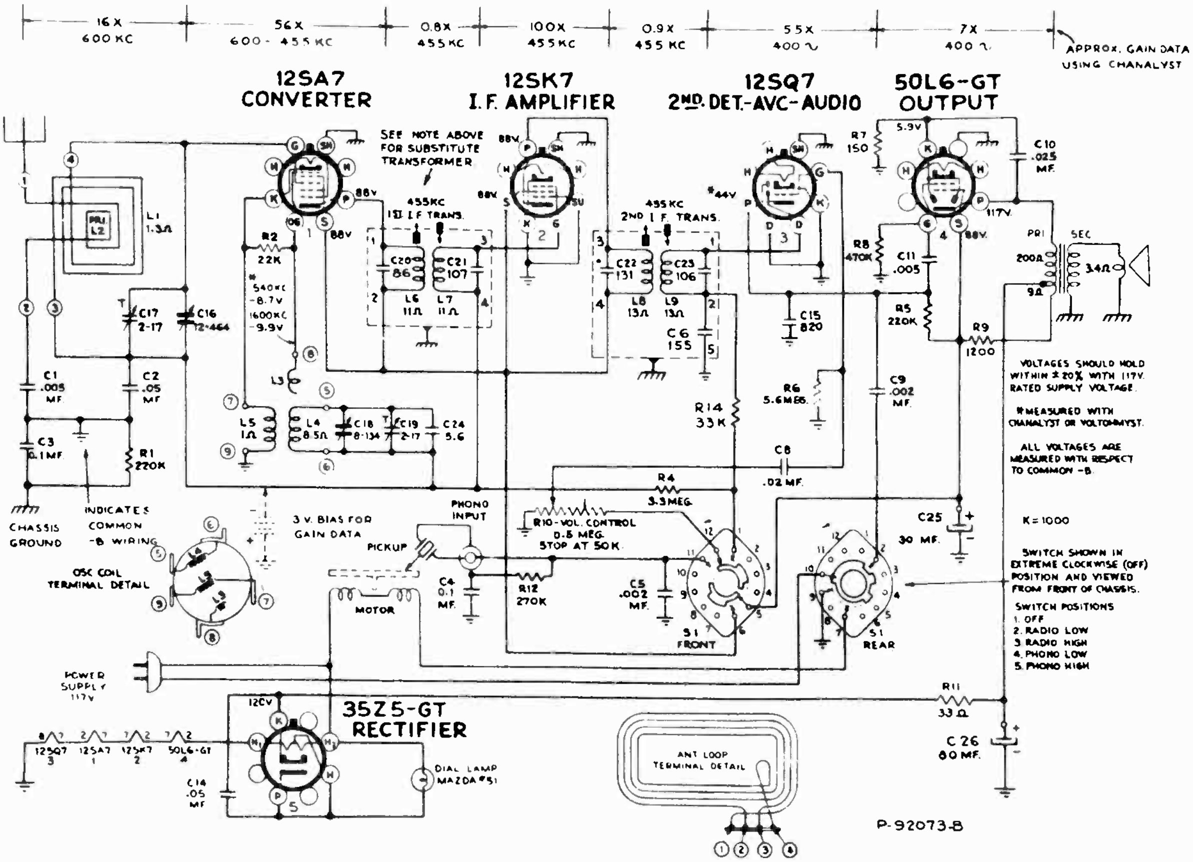
STOCK No.	DESCRIPTION
	MISCELLANEOUS
72555	Antenna—F.M. antenna
*74205	Bezel—Dial scale bezel less dial
74299	Bracket—Jewel lamp bracket for Model 9W105
71599	Bracket—Jewel lamp bracket for Models 9W101 and 9W103
*74268	Button—Rosette button (nail) for grille for Model 9W101
72437	Cable—Shielded pickup cable complete with pin plug (2 required) for Model 9W105
72583	Cable—Shielded pickup cable complete with pin plug for Models 9W101 and 9W103
13103	Cap—Jewel lamp cap
71892	Catch—Bullet catch and strike for doors
74298	Clamp—Dial clamp (2 required)
X1968	Cloth—Grille cloth for Model 9W101
X1973	Cloth—Grille cloth for Model 9W103
X1953	Cloth—Grille cloth for blonde instruments for Model 9W105
X1897	Cloth—Grille cloth for mahogany or walnut instruments for Model 9W105
74209	Cover—Mounting screw cover for RP168A record changer (3 required)
*74275	Decal—Control panel decal for limed oak instruments for Model 9W103
*74274	Decal—Control panel decal for mahogany or walnut instruments for Models 9W101 & 9W103
*74281	Decal—Control panel decal for blonde instruments for Model 9W105
*74280	Decal—Control panel decal for mahogany or walnut instruments for Model 9W105
71768	Decal—Trade mark decal (RCA Victor) for Model 9W101
74273	Decal—Trade mark decal (Victrola) for Models 9W101 and 9W103
71910	Decal—Trade mark decal (RCA Victor) for Model 9W105
71966	Decal—Trade mark decal (Victrola) for Model 9W105
*74203	Dial—Glass dial scale for Models 9W101 and 9W103
*74204	Dial—Glass dial scale for Model 9W105
73180	Emblem—"RCA Victor" emblem for Model 9W103
11889	Grommet—Rubber grommet for front apron chassis (2 required)
72856	Grommet—Rubber grommet for mounting RP178 record changer (3 required)
73903	Hinge—Cabinet door hinge (1 set)
72824	Knob—Tone control or selector switch knob—brown—for blonde or limed oak instruments
71822	Knob—Tone control or selector switch knob—maroon—for mahogany or walnut instruments
72800	Knob—Tuning or volume control knob—brown—for blonde or limed oak instruments
71821	Knob—Tuning or volume control knob—maroon—for mahogany or walnut instruments
11765	Lamp—Dial or jewel lamp—Mazda 51
*74300	Loop—Antenna loop complete for Model 9W105
73896	Loop—Antenna loop complete for Models 9W101 and 9W105
73109	Nut—Tee nut for mounting RP178 record changer (3 required)
74208	Nut—Tee nut for mounting RP-168A-1 record changer (3 required)
73771	Pull—Door pull for record storage compartment door or radio compartment door for Model 9W105
*74276	Pull—Door pull for Model 9W103
*74239	Pull—Door pull for Model 9W101
*74277	Pull—Record changers' drawer pull for Model 9W105
30868	Plug—2 contact female plug for motor cable
30870	Plug—2 prong male plug for motor cable
73184	Runner—Record changer motorboard runner—R.H.—for RP178 changer—Model 9W105
73183	Runner—Record changer motorboard runner—L.H.—for RP178 changer—Model 9W105
*74271	Runner—Record changer motorboard runner—R.H.—for RP168A-1 changer
*74272	Runner—Record changer motorboard runner—L.H.—for RP168A-1 changer
73110	Screw—#¼-20 x 1¾" fillister head screw for mounting RP178 record changer—Model 9W105
*74278	Screw—#8-30 x ¾" trimit head screw for record changers' drawer pull for Model 9W105
*74424	Screw—#8-32 x 1¾" special screw for mounting RP-168A-1 record changer (3 required)
*74269	Screw—#8-32 x ¾" trimit head screw for door pull (2 required) for Model 9W101
74113	Screw—#8-32 x 1" trimit head screw for door pull for Model 9W103
*74279	Screw—#8-32 x ⅞" trimit head screw for door pull for record storage compartment door and radio compartment door for Model 9W105
*74421	Spring—Conical spring for mounting RP-168A-1 record changer—upper—R.H. side (1 required)
*74422	Spring—Conical spring for mounting RP-168A-1 record changer—upper—L.H. side (2 required)
*74423	Spring—Conical spring for mounting RP-168A-1 record changer—lower (3 required)
30900	Spring—Retaining spring for knobs
72936	Stop—Door stop
73185	Stop—Metal stop for motorboard runners (2 required)
73182	Track—Record changer compartment track (for RP-168A-1 record changer) (2 required)

† Stock No. 72953 is a reel containing 250 feet of cord.

* This is the first time that this Stock No. has appeared in Service Data.

RADIO CORP. OF AMERICA

MODEL 75ZU, CHASSIS RC-1063A



Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1063A
70407	Button—Plug button to cover holes for i-f transformers adjustment
70997	Capacitor—Ceramic, 5.6 mmf. (C24)
39650	Capacitor—Mica, 820 mmf. (C15)
70601	Capacitor—Tubular, .002 mfd., 400 volts (C5, C9)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C1, C11)
70612	Capacitor—Tubular .025 mfd. 400 volts (C10)
70611	Capacitor—Tubular .02 mfd. 400 volts (C8)
70615	Capacitor—Tubular .05 mfd. 400 volts (C2, C14)
70617	Capacitor—Tubular, 0.1 mfd., 400 volts (C3, C4)
72312	Capacitor—Electrolytic, comprising 1 section of 30 mfd., 150 volts, and 1 section of 80 mfd., 150 volts (C25, C26)
70403	Coil—Oscillator coil (L3, L4, L5)
*73056	Condenser—Variable tuning condenser and drive drum (C16, C17, C18, C19)
*73057	Control—Volume control (R10)
70392	Cord—Power cord and plug
72953	Cord—Drive cord (approx. 38" overall length required)
*73063	Dial—Dial scale
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)
*73059	Indicator—Station selector indicator
*73010	Loop—Antenna loop complete (L1, L2)
*73055	Plate—Dial back plate less dial
30868	Plug—2 contact female plug for motor cable
*73060	Pulley—Station selector indicator pulley
72313	Resistor—Wire wound, 33 ohms, 1/4 watt (R11)
	Resistor—Fixed composition, 150 ohms, ±10%, 1/2 watt (R7)
	Resistor—Fixed composition, 1200 ohms ±10%, 1 watt (R9)
	Resistor—Fixed composition, 22,000 ohms ±20%, 1/2 watt (R2)
	Resistor—Fixed composition, 33,000 ohms ±20%, 1/2 watt (R14)
	Resistor—Fixed composition, 220,000 ohms ±20%, 1/2 watt (R1, R5)
	Resistor—Fixed composition, 470,000 ohms ±20%, 1/2 watt (R8)
	Resistor—Fixed composition, 3.3 megohms ±20%, 1/2 watt (R4)

STOCK No.	DESCRIPTION
	Resistor—Fixed composition, 5.6 megohms ±10%, 1/2 watt (R6)
*73058	Shaft—Tuning knob shaft
*73062	Socket—Lamp socket
35787	Socket—Phono input socket
37605	Socket—Tube socket
70390	Spring—Drive cord tension spring
*73061	Spring—Station selector indicator pulley retaining spring
70396	Spring—Volume control gear tension spring
70394	Switch—Power, radio and phono switch (S1)
73036	Transformer—First I.F. transformer (L6, L7, C20, C21)
73037	Transformer—Second I.F. transformer (L8, L9, C6, C22, C23)
72296	Transformer—Output transformer (T1)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES 922258-2
71058	Speaker—4" x 6" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
71105	Cable—Shielded pickup cable for use with RP-178 record changer
72437	Cable—Shielded pickup cable for use with 960276 record changer
*73077	Crystal—Vinylite dial crystal
X1661	Cloth—Grille cloth
*72894	Foot—Rubber foot (4 required)
*72856	Grommet—Rubber grommet to mount record changer (3 required for RP-178) (4 required for 960276)
72692	Hinge—Lid hinge
*73064	Knob—Power, radio and phono switch knob
*73065	Knob—Tuning knob
*73078	Knob—Volume control knob
11765	Lamp—Dial lamp
73109	Nut—T nut for mounting record changer (3 required for RP-178) (4 required for 960276)
73110	Screw—1/4-20 x 1 3/4 fillister head machine screw for mounting RP-178 record changer (3 required)
73234	Screw—1/4-20 x 1 1/2 oval head machine screw for mounting 960276 record changer (4 required)
14270	Spring—Retaining spring for knobs
71824	Stud—Stud and screw to mount one lid hinge
*73067	Support—Lid support

* THIS IS THE FIRST TIME THIS STOCK NUMBER HAS APPEARED IN SERVICE DATA.

RECORD CHANGERS: Model RP-178, RCD.CH. 18-14, or Model 960276, RCD.CH. 19-13

MODEL 75ZU,
CHASSIS RC-1063A

RADIO CORP. OF AMERICA

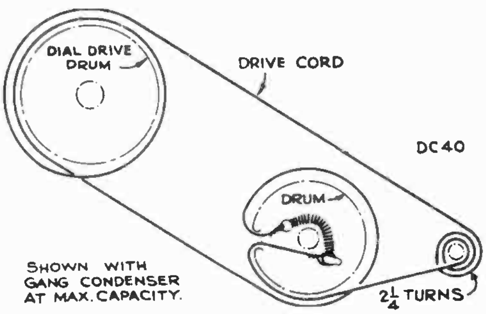
Alignment Procedure

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. All heater wires should be dressed close to chassis.
2. Dress lead from switch to phono jack close to chassis and away from power cord.
3. Dress capacitor between 12SQ7 grid and terminal board away from chassis and away from other parts.
4. Dress lead from arm of volume control to terminal board against front apron and away from other leads.
5. In instrument assembly the lead from the rear section of gang to loop shall be dressed away from chassis and other wires to loop.



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.

Speaker and Dial Adjustment.—If the speaker should require replacement or if the position of the speaker mounting bracket is disturbed, reposition as follows:

Mount speaker on bracket, adjust bracket so that front edge of speaker extends ¾ inch in front of chassis base and tighten bracket screws.

Mount chassis on wood base with mounting screws loose, install in cabinet and push chassis forward until speaker contacts grille and then tighten chassis mounting screw. Adjust dial back plate mounting bracket so that the plate is parallel with cabinet.

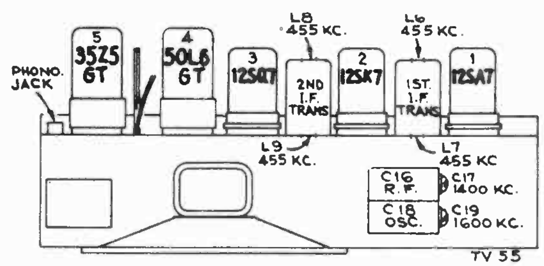
The two wood buttons at the top of the dial back plate should be adjusted to provide the best illumination of the dial and pointer.

Output Meter.—Connect meter across speaker voice coil. Turn volume control clockwise to radio maximum high position (3) for alignment.

Dial Pointer Adjustment.—Rotate tuning condenser fully counter-clockwise (plates fully meshed). Adjust indicator pointer to position illustrated on front page.

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 600 kc end of dial	L8 and L9 2nd I.F. transformer
2	1st Det. grid in series with .01 mfd.			L6 and L7 *1st I.F. transformer
NOTE.—ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET FOR STEPS 3, 4 AND 5				
3	Antenna terminal in series with 220 mmfd.	1600 kc	160	C19 (osc.)
4	Radiated signal	1400 kc	Signal frequency	C17 (ant.)
5	Repeat steps 3 and 4.			

* Do not readjust L8 or L9 when test oscillator is connected to 1st Det.



1st I.F. Trans. Substitution.—The first I.F. transformer may differ from that snown in the schematic diagram. Transformers stamped 970441-1 are as shown in the schematic. Transformers stamped 970441-5 are connected as follows: term. #4 to plate of 12SA7, term. #3 to B+, term. #1 to grid of 12SK7, term. #2 to A.V.C. The d-c resistance of each winding is 16 ohms. The primary capacitor C20 is 131 mmf., the secondary capacitor is 106 mmf.

Electrical and Mechanical Specifications

Frequency Range .... 540-1,600 kc
Intermediate Frequency .... 455 kc
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 Output
Undistorted .... 1.5 watts
Maximum .... 2.4 watts
Loudspeaker
Type 922258-2 ...."PM" 4 x 6 inch elliptical
V.C. Impedance ....3.4 ohms at 400 cycles
Power Supply Rating
105-125 volts, A-C, 60 cycles .... 60 watts

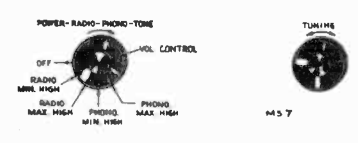
IMPORTANT: Do not plug instrument into a d-c supply.

Access to dial lamp may be obtained by removing sloping panel in record changer compartment.

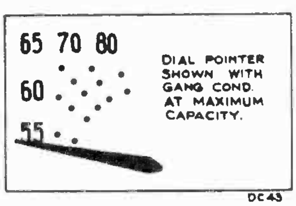
	Height	Width	Depth
Cabinet dimensions (inches)	10¼	17¼	19
Chassis overall (inches)	9	14	6¼
Chassis base (inches)	1⅝	14	3¾

Tuning Drive Ratio 11:1

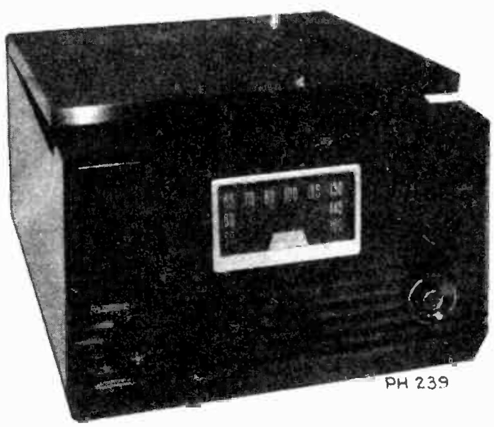
Phonograph
Type .... RP-178 or Type 960276-1
Record Capacity .... Twelve 10-in., Ten 12-in.
Turntable Speed .... 78 r.p.m.
Type Pickup .... Crystal



Control Positions



DC43



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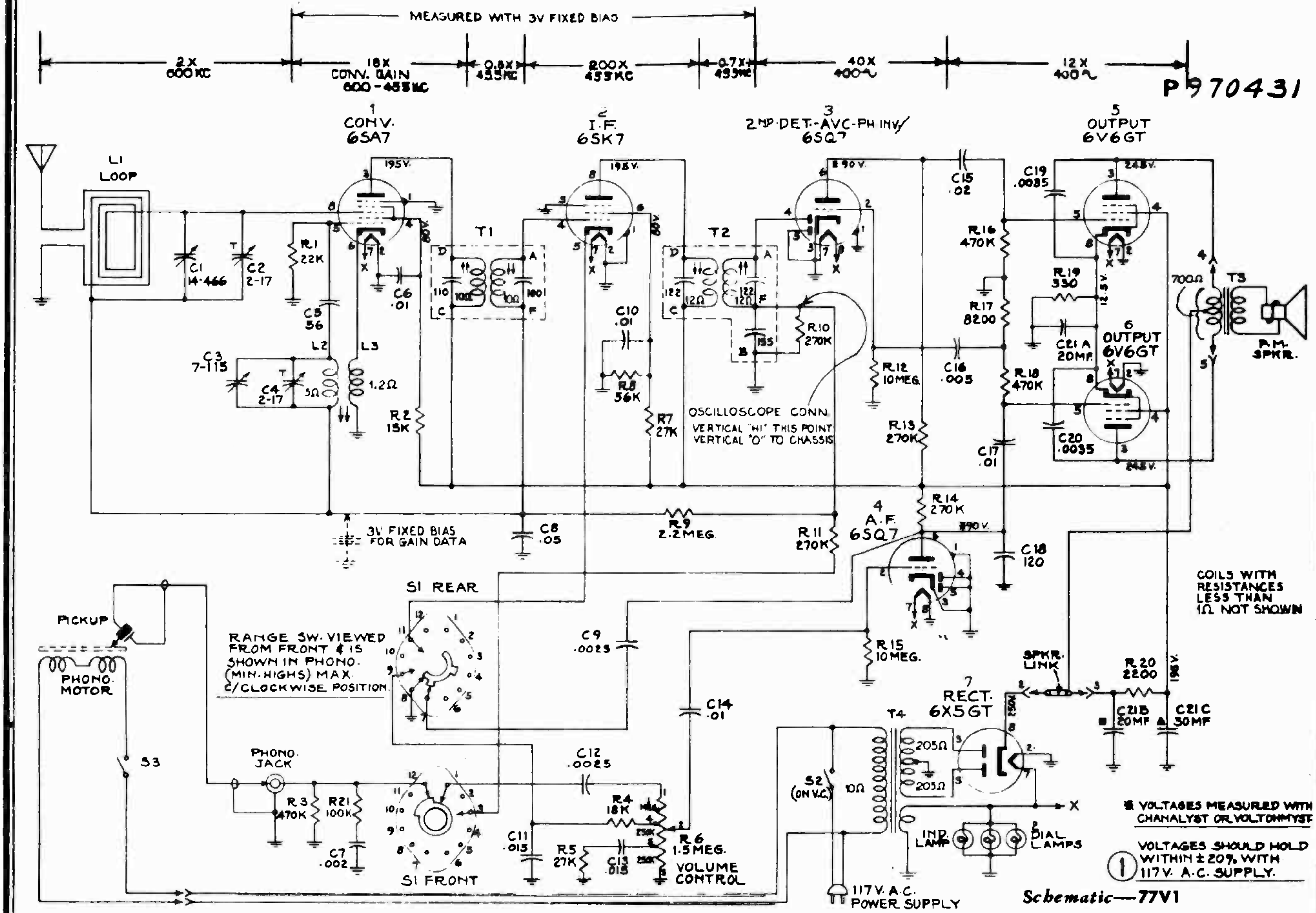
RADIO CORP. OF AMERICA

MODEL 77V1, CHASSIS RC-615



Schematic—77V1

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)
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, 470,000 ohms, ±10%, ½ watt (R3, R16, R18)
	Resistor—Fixed composition, 2.2 megohms, ±20%, ½ watt (R9)
	Resistor—Fixed composition, 10 megohms, ±20%, ½ watt (R12, R15)

STOCK No.	DESCRIPTION
*70135	Shaft—Tuning knob shaft
31364	Socket—Lamp socket
35787	Socket—Phono input socket
31251	Socket—Tube socket
31418	Spring—Drive cord tension spring
*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—Lamp bracket
13103	Cap—Pilot lamp jewel
*70142	Clamp—Dial clamp (1 set)
X1668	Cloth—Grille cloth
*73084	Decal—Control panel decal
71966	Decal—Trade mark decal (Victrola)
71910	Decal—Trade mark decal (RCA-Victor)
*70141	Dial—Glass dial scale
71764	Hinge—Cabinet lid hinge
71822	Knob—Range switch knob
71821	Knob—Tuning or volume control knob
11765	Lamp—Dial or pilot lamp
*70140	Loop—Antenna loop complete (L1)
71815	Mounting—One set of hardware consisting of four (4) springs, two (2) "C" washers and two (2) rubber washers to mount record changer
30900	Spring—Retaining spring for knobs
*73080	Support—Cabinet lid support—L.H.
*73083	Support—Cabinet lid support—R.H.

MODEL 77V1,
CHASSIS RC-615

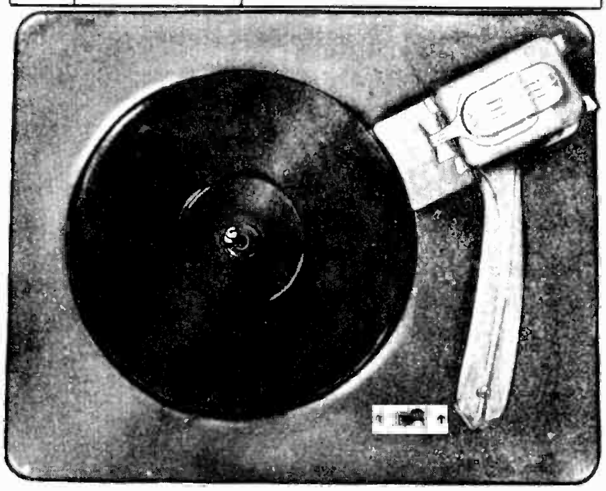
RADIO CORP. OF AMERICA

Alignment Procedure

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.	Broadcast Quiet Point at 550 kc. end of dial	Pri. and Sec. (2nd I-F Trans.)
2	6SA7 grid in series with .01 mfd.			Pri. and Sec. (1st I-F Trans.)
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		



Automatic Record Changer

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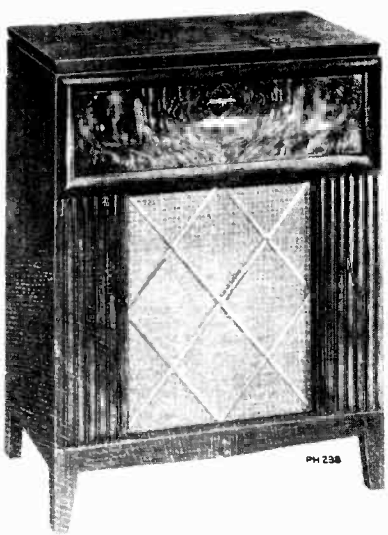


Model 77V1

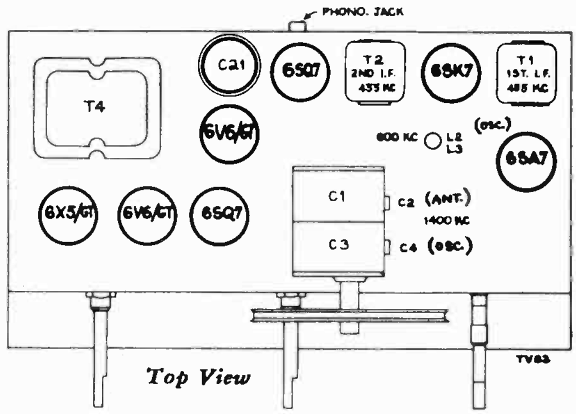
Controls

Circuit Description

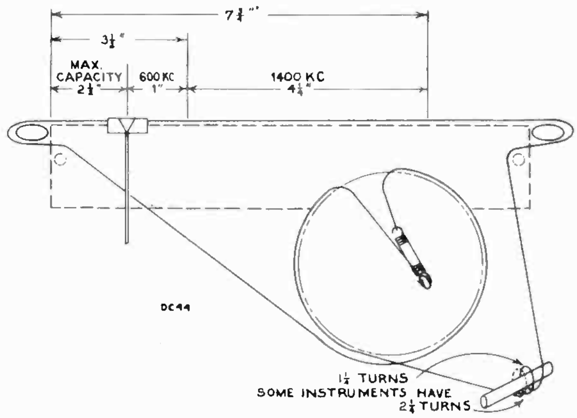
The receiver is a seven tube superheterodyne employing push-pull power unit. AVC is applied to the converter and i-f tubes. The broadcast band utilizes a standard loop antenna.

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.



Top View



Dial Indicator and Drive Mechanism

Frequency Ranges
Standard Broadcast "A" .... 540-1,600 kc

Intermediate Frequency .... 455 kc

Tube Complement
(1) RCA-6SA7 .... 1st Det., Oscillator
(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 .... Power Output
(6) RCA-6V6GT .... Power Output
(7) RCA-6X5GT .... Rectifier

Power Supply Rating (including Phono Motor)
105-125 volts, 60 cycles .... 95 watts

Pilot Lamps .... (2) Mazda No. 51, 6-8 volts, 0.2 amp.

Compartment Lamp .... (1) Mazda No. 51, 6-8 volts, 0.2 amp.

Loudspeaker
Electrodynamic 92569-1W
Size 12-inch
V. C. impedance at 400 cycles .... 2.2 ohms

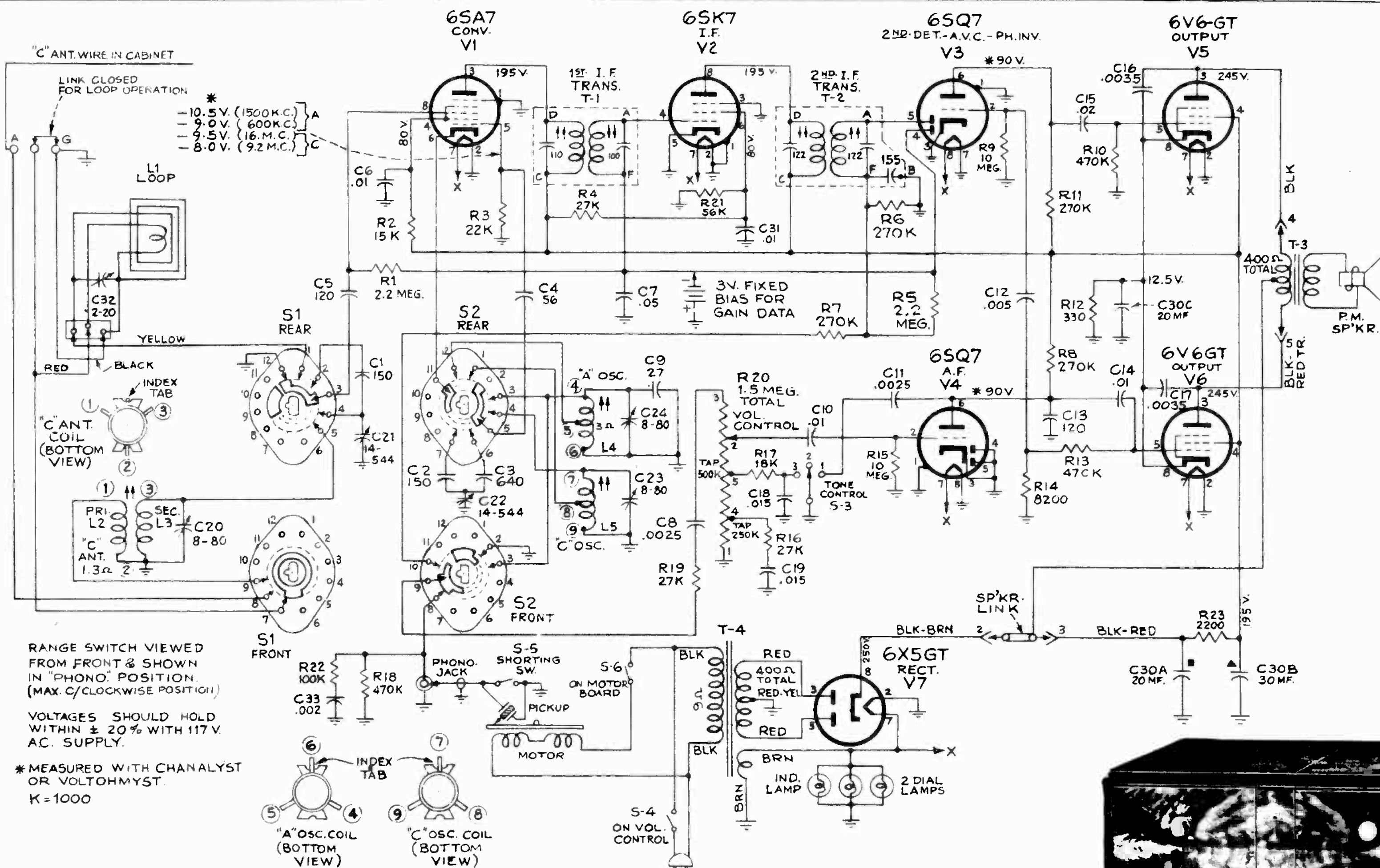
Power Output Rating
Undistorted .... 5 watts
Maximum .... 5.5 watts

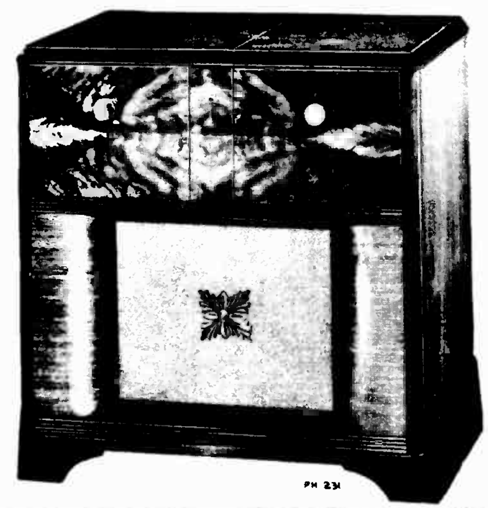
Phonograph
Type .... Automatic 960260-1
Record Capacity .... Twelve 10-in., Ten 12-in.
Turntable .... 78 r.p.m. type
Type Pickup .... Crystal
Motor Power consumption (115 v., 60 cycles) .... 30 watts

Tuning Drive Ratio 16:1

RADIO CORP. OF AMERICA

MODEL 77V2,
CHASSIS RC-606C





Circuit Description

The receiver is a seven tube superheterodyne employing push-pull power output. AVC is applied to the converter and i-f tubes. The broadcast band utilizes a standard loop antenna, and the short wave antenna is a wire tacked in the cabinet.

Frequency Ranges

Standard Broadcast "A" .... 540-1,600 kc
Short Wave "C" .... 9.2-16 mc

Intermediate Frequency .... 455 kc

Tube Complement

(1) RCA-6SA7 .... 1st Det., Oscillator
(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-6V6-GT .... Power Output
(6) RCA-6V6-GT .... Power Output
(7) RCA-6X5-GT .... Rectifier

Power Supply Rating (including Phono Motor)

105-125 volts, 60 cycles .... 85 watts

Pilot Lamps .... (2) Mazda No. 51, 6-8 volts, 0.2 amp.

Compartment Lamp .... (1) Mazda No. 55, 6-8 volts, 0.4 amp.

Loudspeaker

92569-1 .... 12 in. P. M.
V. C. impedance at 400 cycles .... 2.2 ohms

Power Output Rating

Undistorted .... 5 watts
Maximum .... 5.5 watts

Record Changer

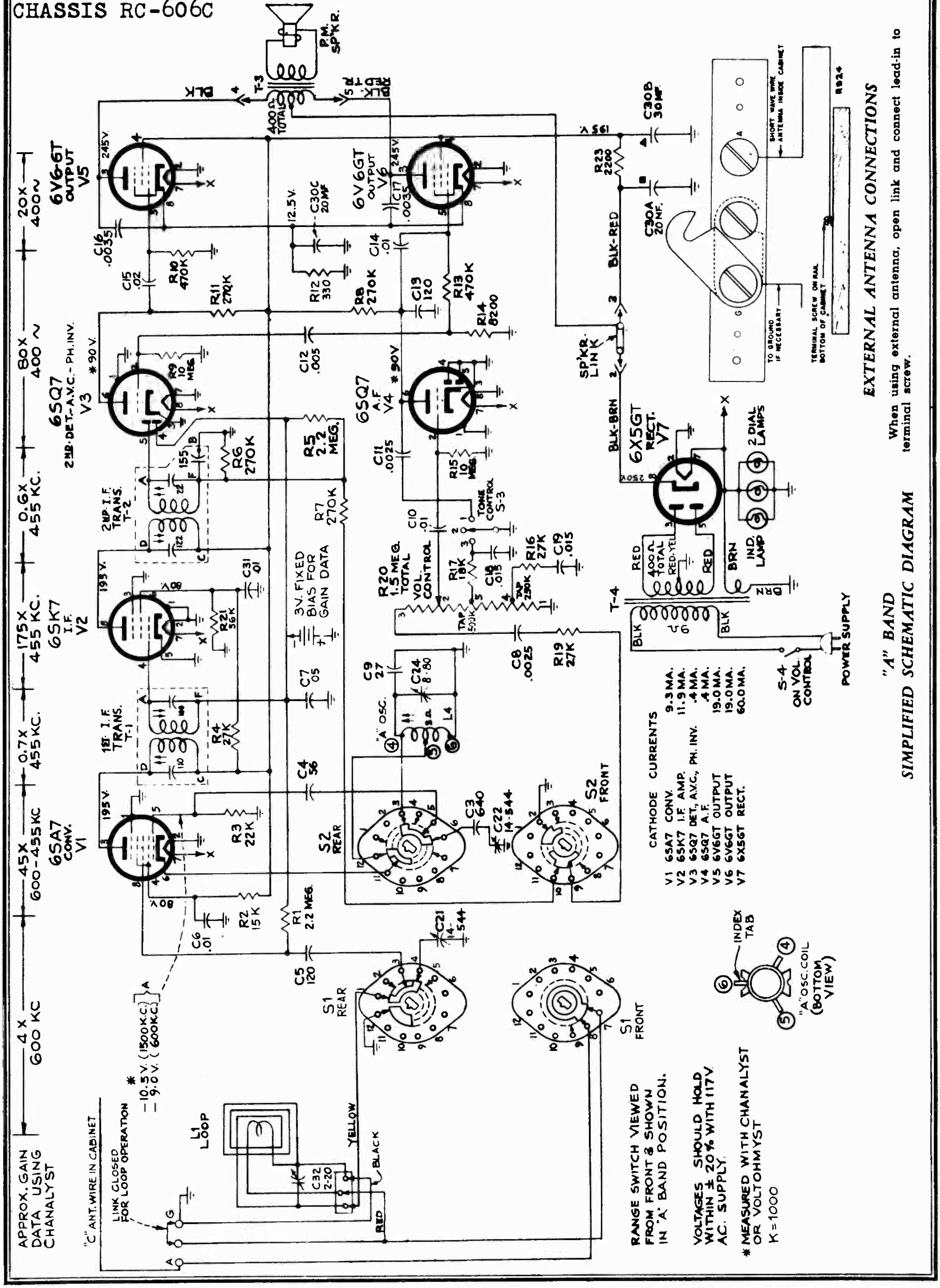
Type 960260-1
Record Capacity .... Twelve 10-in., Ten 12-in.
Turntable Speed .... 78 r.p.m.
Type Pickup .... Crystal

CLARI-SKEMATIX

Registered Trademark

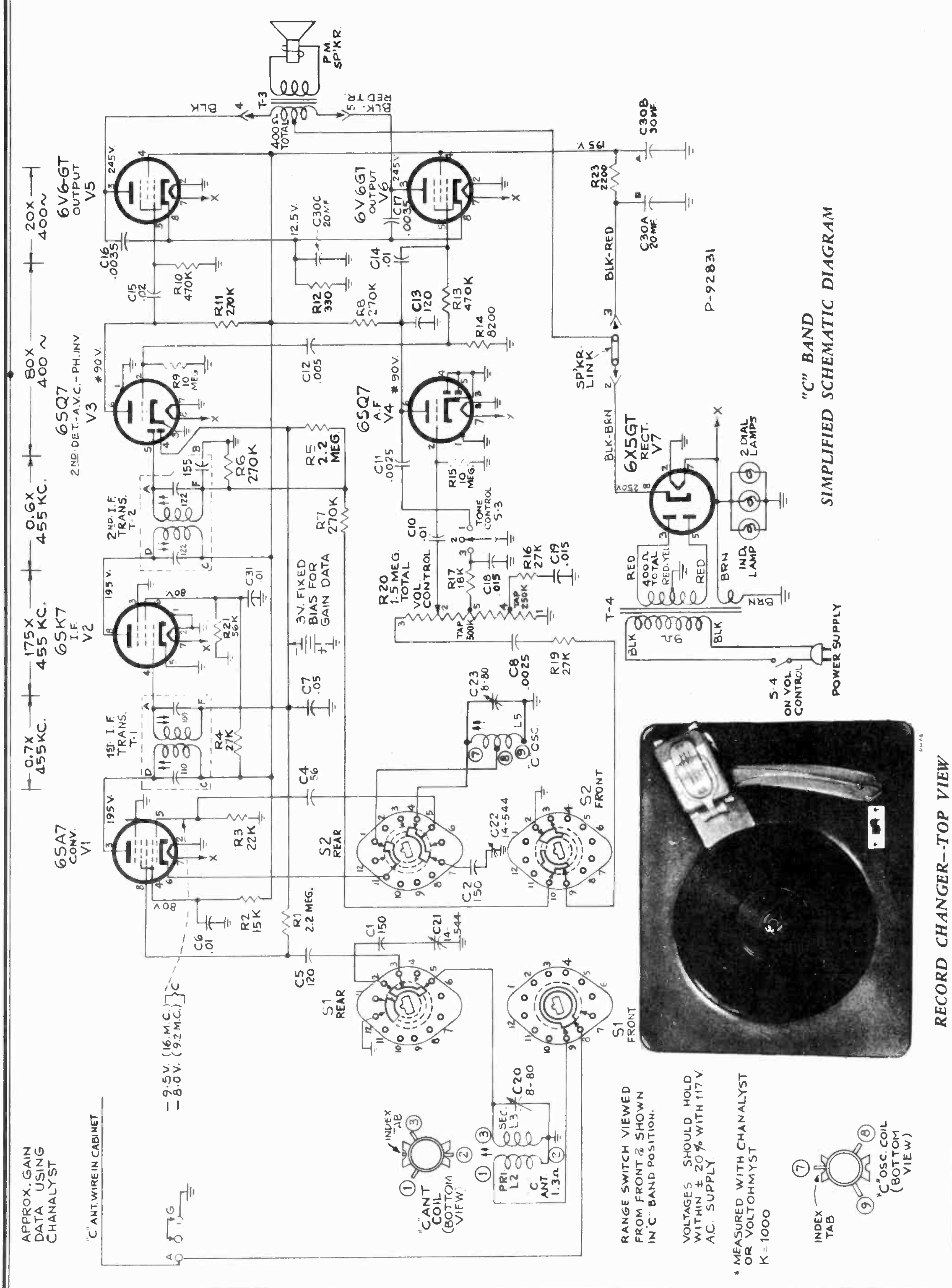
MODEL 77V2,
CHASSIS RC-606C

RADIO CORP. OF AMERICA



RADIO CORP. OF AMERICA

MODEL 77V2,
CHASSIS RC-606C



MODEL 77V2,
CHASSIS RC-606C

RADIO CORP. OF AMERICA

Alignment Procedure

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.—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 second 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.

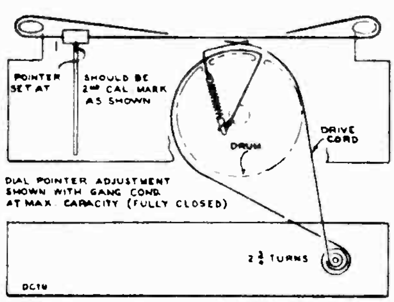
"C" Band Reception.—For best reception on "C" band with an outside antenna, adjust the trimmer screw of C20 on the antenna coil. Turn screw carefully with an insulated screwdriver (RCA Stock No. 31031) while the receiver is tuned to a station in the 31-meter band. If returning to internal antenna at any time, close the link on the center terminal and readjust "C" band antenna trimmer C20 for best reception on 31-meter band.

For additional information, refer to booklet, "RCA Victor Receiver Alignment."

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.	Broadcast Quiet Point at 550 kc. end of dial	Top and bottom T-1 (2nd I-F Trans.)
2	6SA7 grid in series with .01 mfd.			Top and bottom T-2 (1st I-F Trans.)
3	Yellow lead on loop in series with 200 mmfd. (link closed)	1,400 kc.	Broadcast 1400 kc.	C24 (osc.)
4		600 kc.	Broadcast 600 kc.	L4 (osc.) Rock gang
5		Repeat steps 3 and 4.		
6	Antenna terminal in series with 47 mmfd.	15.2 mc.	Short Wave 15.2 mc.	C23 (osc.)* C20 (ant.)
7		9.5 mc.	Short Wave 9.5 mc.	L5 (osc.) L3 (ant.)
8		Repeat steps 6 and 7		
9	Install and connect chassis in cabinet with link closed. Tune in a radiated signal of 1400 kc. on broadcast band and peak C32 on loop.			

* Use minimum capacity peak if two can be obtained. Check for selection of correct peak by tuning the receiver to approximately 14.3 mc., where a weaker signal should be received.

Oscillator tracks 455 kc. above signal on both bands.

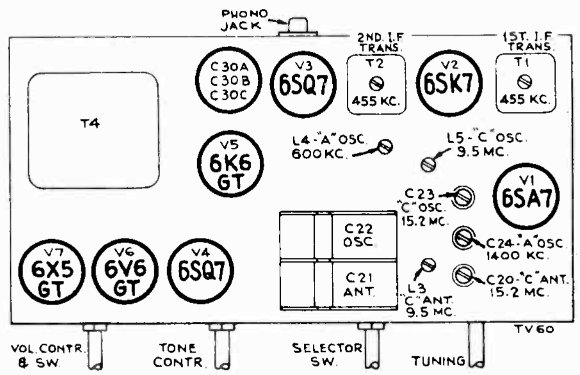


DIAL INDICATOR AND DRIVE MECHANISM

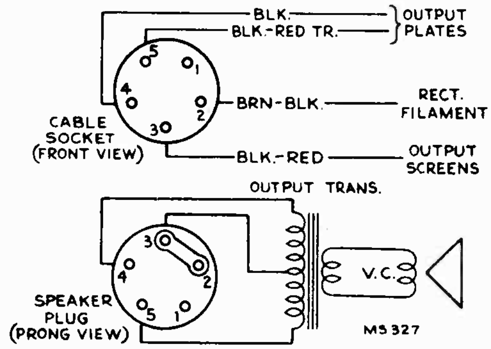
Critical Lead Dress:

1. Dress all A. C. leads away from volume control.
2. Dress lead from top tap of volume control to tone switch along front apron of chassis.
3. Dress R9 and R15 down near chassis base.

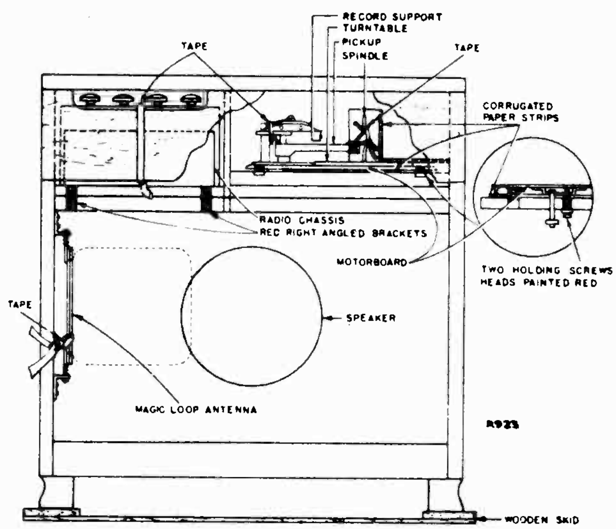
Note.—In order to remove the chassis from the cabinet, remove the knobs and the connecting cables, then unscrew the four slotted hex head screws from the two "L" brackets bolted to the rear of the chassis. The chassis may then be slid out toward the bottom rear of the cabinet. Do not remove the hinge screws or the two large nuts in the rear of the chassis. When replacing the chassis, make sure that the tapered pins on the front of the chassis fit into the holes on the metal runners attached to the cabinet door.



TOP VIEW



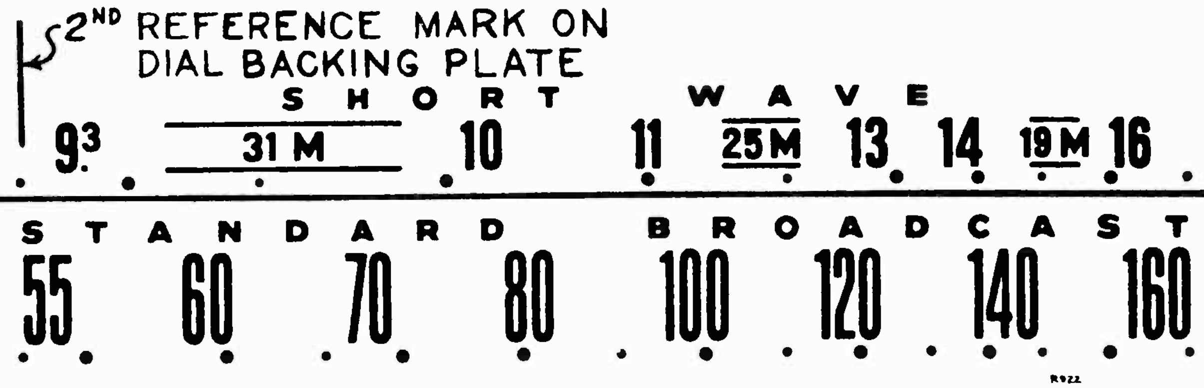
SPEAKER CONNECTIONS



BACK VIEW

RADIO CORP. OF AMERICA

MODEL 77V2, CHASSIS RC-606C



The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

Replacement Parts

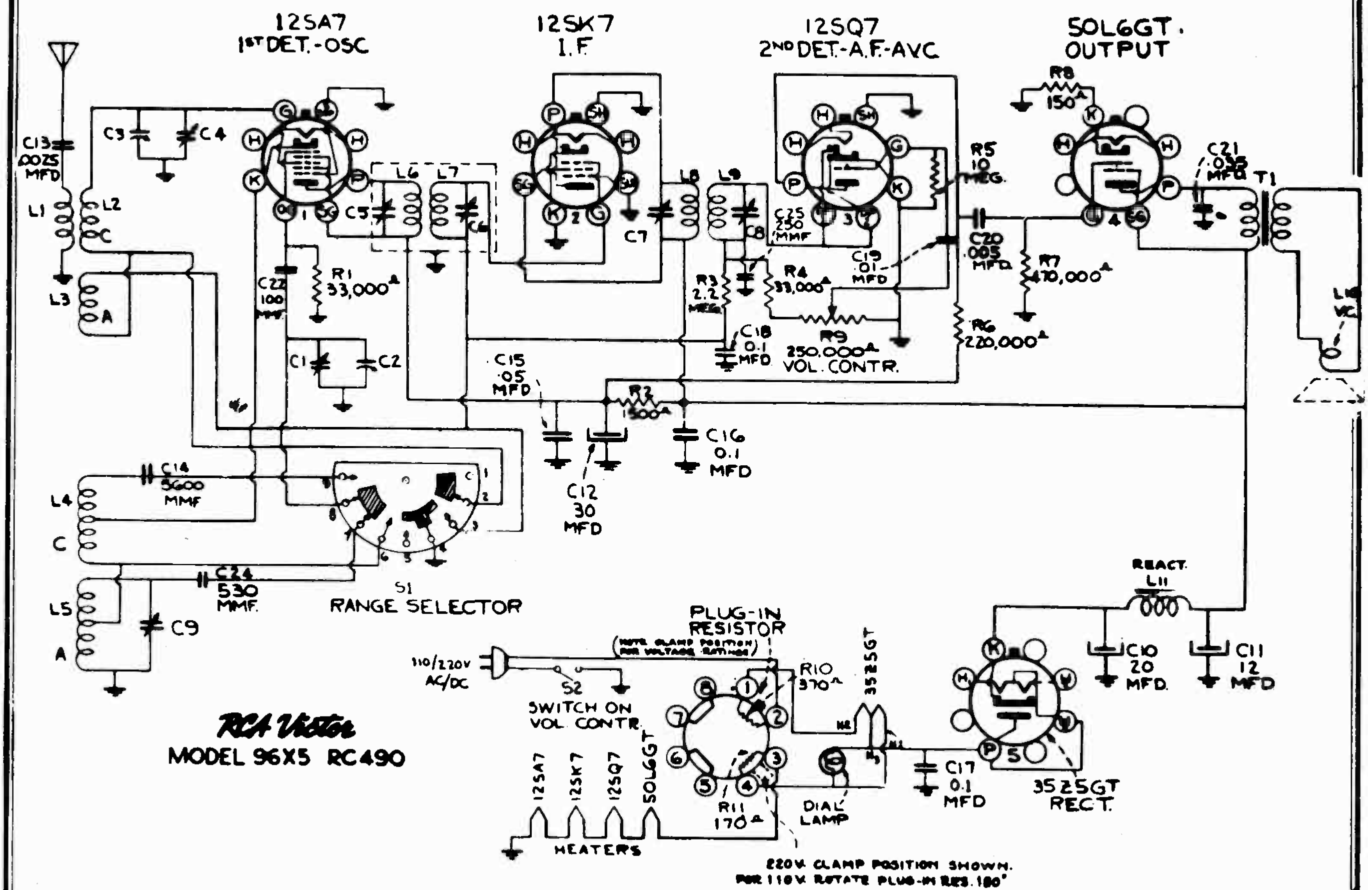
For Record Changer Parts refer to Service Data for Model 960260-1

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-606C)
71601	Board—"Ant. ground" board
71606	Bracket—Dial bracket with drive cord pulley (L. H.)
71605	Bracket—Dial bracket with drive cord pulley (R. H.)
71615	Capacitor—Ceramic, 27 mmf. (C9)
71924	Capacitor—Ceramic, 56 mmf. (C4)
71810	Capacitor—Mica trimmer, 3 sections 8-80 mmf. (C20, C23, C24)
71814	Capacitor—Ceramic, 120 mmf. (C5, C13)
39632	Capacitor—Silvered mica, 150 mmf. (C1, C2)
71613	Capacitor—Mica, 640 mmf. (C3)
70601	Capacitor—Tubular, .002 mfd., 400 volts (C33)
70602	Capacitor—Tubular, .0025 mfd., 400 volts (C8, C11)
70646	Capacitor—Tubular, .0035 mfd., 1000 volts (C16, C17)
70606	Capacitor—Tubular, .005 mfd., 400 volts (C12)
70610	Capacitor—Tubular, .01 mfd., 400 volts (C6, C10, C14, C31)
70572	Capacitor—Tubular, .015 mfd., 400 volts (C18, C19)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C15)
70615	Capacitor—Tubular, .05 mfd., 400 volts (C7)
71976	Capacitor—Comprising 1 section 20 mfd. 450 volts, 1 section 30 mfd. 350 volts and 1 section 20 mfd. 25 volts (C30A, C30B, C30C)
71633	Coil—"A" band oscillator coil (L4)
71632	Coil—"C" band antenna coil (L2, L3)
71634	Coil—"C" band oscillator coil (L5)
71600	Condenser—Variable tuning condenser (C21, C22)
70342	Control—Volume control and power switch (R20, S4)
72953	Cord—Drive cord (approx. 45" overall length)
71609	Drum—Drive drum
72069	Grommet—Rubber grommet for rear mounting feet
70930	Grommet—Rubber grommet for mounting tuning condenser
71608	Indicator—Station selector indicator
71607	Plate—Dial back plate
38832	Plug—Pin plug for loop lead
12493	Plug—Speaker cable plug, 5 contact (female)
72602	Pulley—Drive cord pulley mounted on dial bracket
	Resistor—330 ohms, 1 watt (R12)
	Resistor—2,200 ohms, 2 watt (R23)
	Resistor—8,200 ohms, ½ watt (R14)
	Resistor—15,000 ohms, 2 watt (R2)
	Resistor—18,000 ohms, ½ watt (R17)
	Resistor—22,000 ohms, ½ watt (R3)
	Resistor—27,000 ohms, ½ watt (R4, R16, R19)
	Resistor—56,000 ohms, ½ watt (R21)
	Resistor—100,000 ohms, ½ watt (R22)
	Resistor—270,000 ohms, ½ watt (R6, R7, R8, R11)
	Resistor—470,000 ohms, ½ watt (R10, R13, R18)
	Resistor—2.2 megohms, ½ watt (R1, R5)
	Resistor—10 megohms, ½ watt (R9, R15)
71604	Shaft—Tuning shaft
35787	Socket—Input socket
30868	Socket—Motor cable socket, 2 contact (female)
31364	Socket—Pilot lamp socket
31251	Socket—Tube socket
31418	Spring—Indicator cord tension spring
71602	Switch—Range switch (S1, S2)
71603	Switch—Tone control switch (S3)

STOCK No.	DESCRIPTION
*70128	Transformer—First I-F transformer (T1)
*70129	Transformer—Second I-F transformer (T2)
*70127	Transformer—Power transformer, 117 volts, 60 cycles (T4)
35969	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES 92569-1W—RL103-1
13867	Cap—Dust cap
36145	Cone—Cone and voice coil assembly
71560	Plug—5 prong male plug for speaker
71961	Speaker—12" PM 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
71819	Bracket—Door check mounting bracket
36461	Button—Plug button
38684	Capacitor—Mica trimmer, 2-20 mmf. (C32)
71820	Check—Radio compartment door check assembly less spring
X1638	Cloth—Grille cloth for walnut instruments
X1639	Cloth—Grille cloth for mahogany instruments
70547	Cover—Compartment lead cover
71769	Decal—Control function decal for walnut or mahogany instruments
71910	Decal—Trade mark decal (RCA Victor)
71966	Decal—Trade mark decal (Victrola)
71817	Dial—Glass dial scale
71816	Escutcheon—Dial scale escutcheon less dial
11889	Grommet—Rubber grommet to cushion chassis front apron (2 required)
72069	Grommet—Rubber grommet for mounting loop
71764	Hinge—Cabinet door hinge (2 required)
13103	Jewel—Pilot lamp cap
71822	Knob—Range switch or tone switch knob
71821	Knob—Volume control or tuning knob
5117	Lamp—Compartment lamp
11765	Lamp—Dial lamp
71813	Loop—Antenna loop complete (L1, C32)
71815	Mounting—One set of hardware to mount record changer —consisting of four springs, two spring washers and two rubber washers
*73187	Pull—Door pull
72324	Shade—Compartment lamp shade
36422	Socket—3 contact socket (female) for loop leads
71818	Spring—Door check spring
30900	Spring—Retaining spring for knobs
71765	Support—Cabinet lid support and hinge
71814	Washer—Rubber washer for door check

MODEL 96X5,
CHASSIS RC-490

RADIO CORP. OF AMERICA



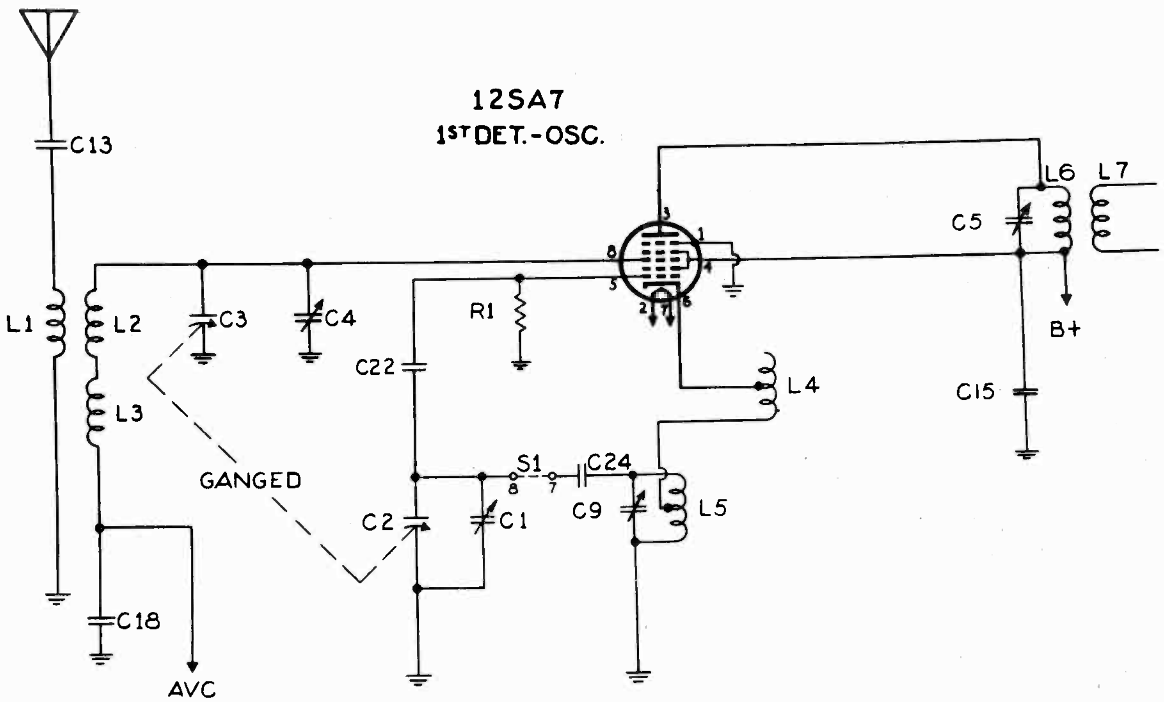
Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

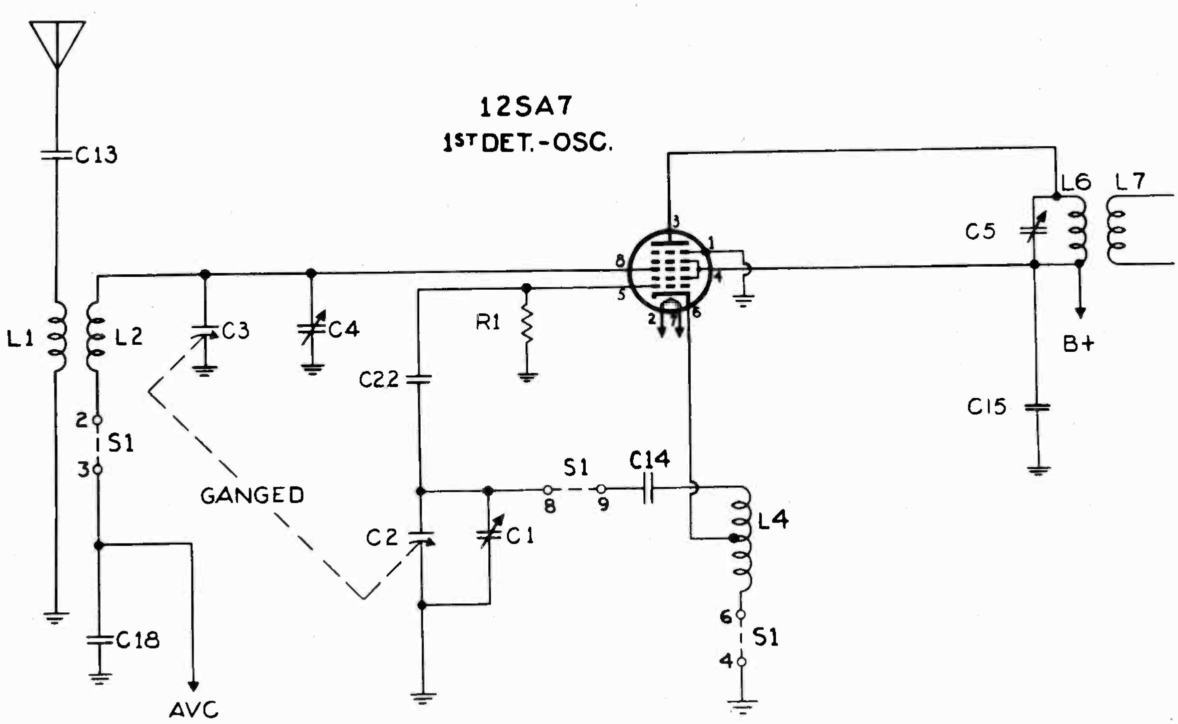
STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-490)
34458	Ballast—Ballast resistor tube
34461	Capacitor—Electrolytic—comprising 1 section of 20 mfd. and 1 section of 12 mfd. (C10, C11)
31379	Capacitor—Trimmer — comprising 1 section of 3-30 mmfd. and 1 section of 2-15 mmfd.
12720	Capacitor—100 mmfd. (C22)
12488	Capacitor—270 mmfd. (C25)
32492	Capacitor—530 mmfd. (C24)
13895	Capacitor—5,600 mmfd. (C14)
34459	Capacitor—.0025 mfd. (C13)
33584	Capacitor—.005 mfd. (C20)
4937	Capacitor—.01 mfd. (C19)
5196	Capacitor—.035 mfd. (C21)
32787	Capacitor—.05 mfd. (C15)
4839	Capacitor—0.1 mfd. (C16, C17, C18)
34460	Capacitor—Electrolytic—comprising 1 section of 30 mfd. (C12)
31378	Coil—Antenna coil
34452	Coil—Oscillator coil
32536	Condenser—Variable tuning condenser
32545	Control—Volume control and power switch
32634	Cord—Indicator pointer drive cord
32266	Drum—Variable tuning condenser drive drum
32711	Indicator—Station selector pointer
11765	Lamp—Dial lamp
34497	Plate—Dial plate and pulleys assembled
32541	Pulley—Drive pulley
34458	Resistor—Ballast resistor tube
13428	Resistor—150 ohms, ½ watt (R8)
14499	Resistor—1,500 ohms, ½ watt (R2)
12454	Resistor—33,000 ohms, ½ watt (R1, R4)
12264	Resistor—220,000 ohms, ½ watt (R6)
12285	Resistor—470,000 ohms, ½ watt (R7)
12679	Resistor—2.2 megohm, ½ watt (R3)
13601	Resistor—10 megohm, ½ watt (R5)
4669	Screw—No. 8-32 square head set screw for drum, Stock No. 32266
31482	Screw—No. 8-32 square head set screw for pulley, Stock No. 32541
34454	Shaft—Tuning condenser drive shaft
31365	Socket—Dial lamp socket
31319	Socket—Tube socket
31418	Spring—Pointer drive cord spring
31615	Spring—Tuning condenser drive cord spring
34451	Switch—Range switch
34453	Transformer—First i-f transformer
32534	Transformer—Second i-f transformer
34458	Tube—Ballast resistor tube
2917	Washer—"C" washer for shaft, Stock No. 34454
34457	Washer—Spring washer for shaft, Stock No. 34454
	MISCELLANEOUS ASSEMBLIES
34463	Dial—Glass dial scale
31667	Escutcheon—Station selector escutcheon
31659	Knob—Tuning, range switch or volume control and power switch
31646	Spring—Retaining spring for knob, Stock No. 31659

RADIO CORP. OF AMERICA

MODEL 96X5, CHASSIS RC-490



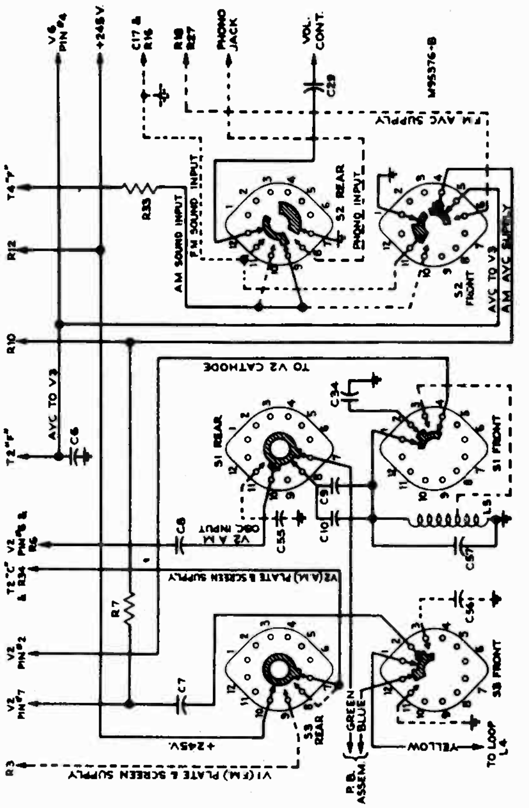
BAND-SWITCH SHOWN AT 1ST POSITION. BAND A



BAND-SWITCH SHOWN AT 2ND POSITION. BAND C

MODELS 610V, 610V2

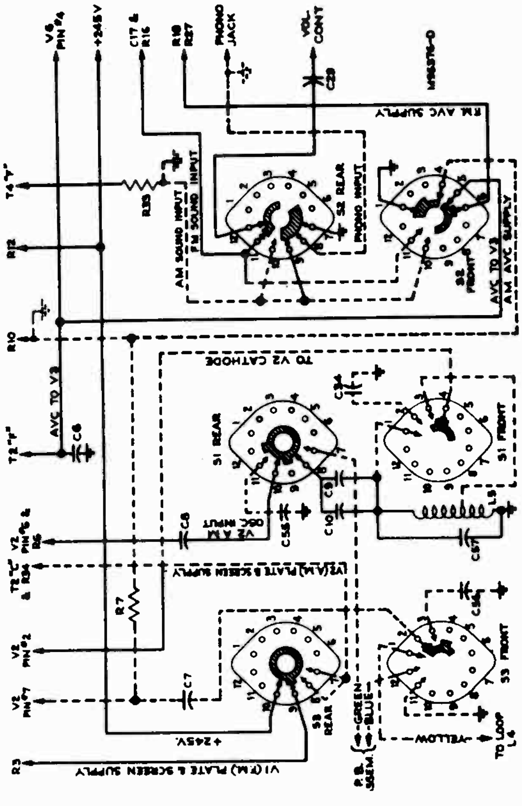
RADIO CORP. OF AMERICA



PUSH BUTTON

Simplified schematic diagram of band switch

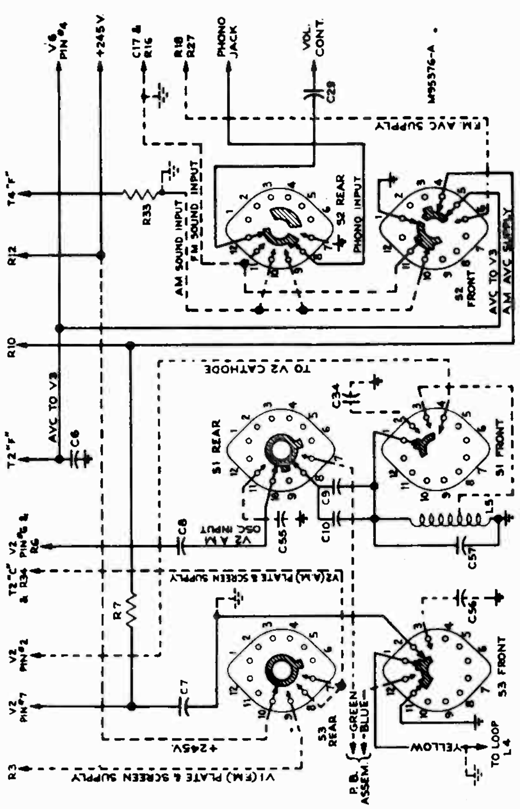
Broken lines (- - -) indicate circuits not in use, some of which may be grounded (indicated by dashed ground symbols) through range switch contacts.



FM

Simplified schematic diagram of band switch

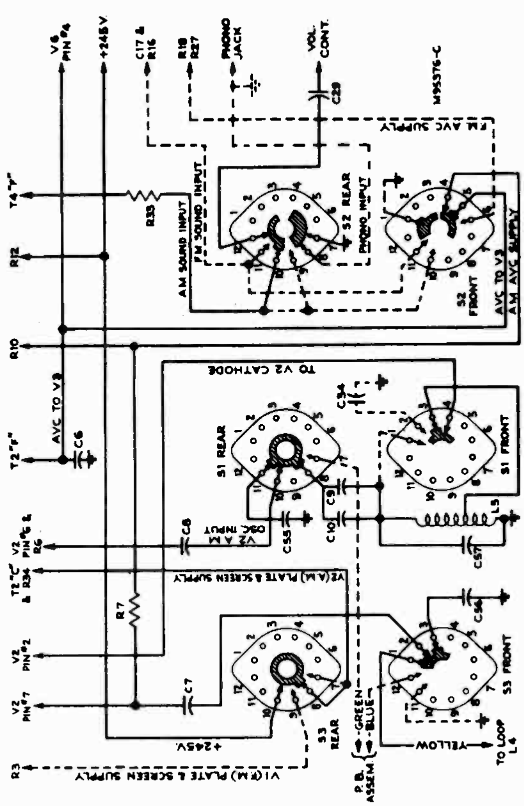
Broken lines (- - -) indicate circuits not in use, some of which may be grounded (indicated by dashed ground symbols) through range switch contacts.



PHONO

Simplified schematic diagram of band switch

Broken lines (- - -) indicate circuits not in use, some of which may be grounded (indicated by dashed ground symbols) through range switch contacts.



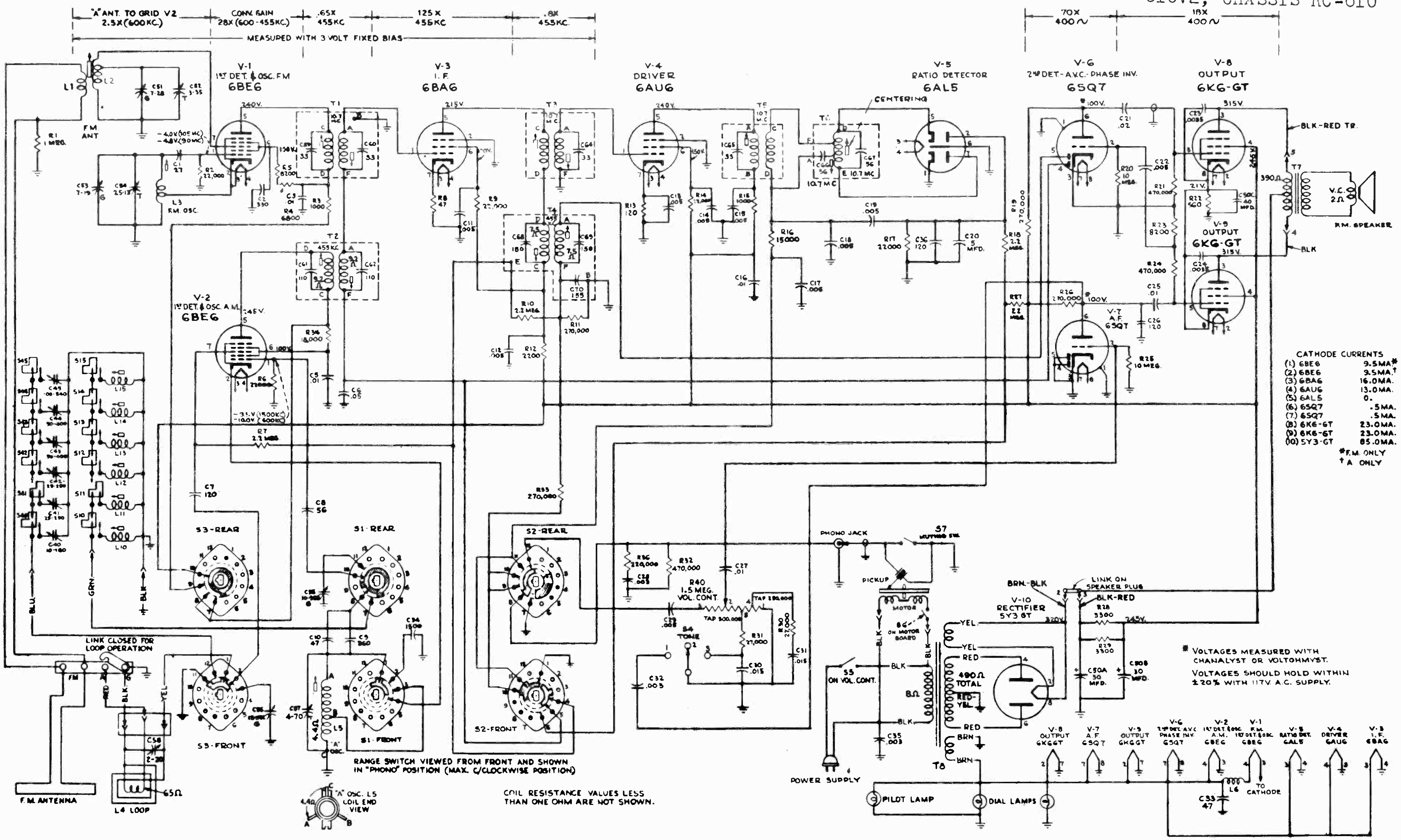
DIAL TUNING (BC)

Simplified schematic diagram of band switch

Broken lines (- - -) indicate circuits not in use, some of which may be grounded (indicated by dashed ground symbols) through range switch contacts.

RADIO CORP. OF AMERICA

MODELS 610V1, CHASSIS RC-610C; 610V2, CHASSIS RC-610



FREQUENCY MODULATION

88 90 92 94 96 98 100 102 104 106 108

S T A N D A R D

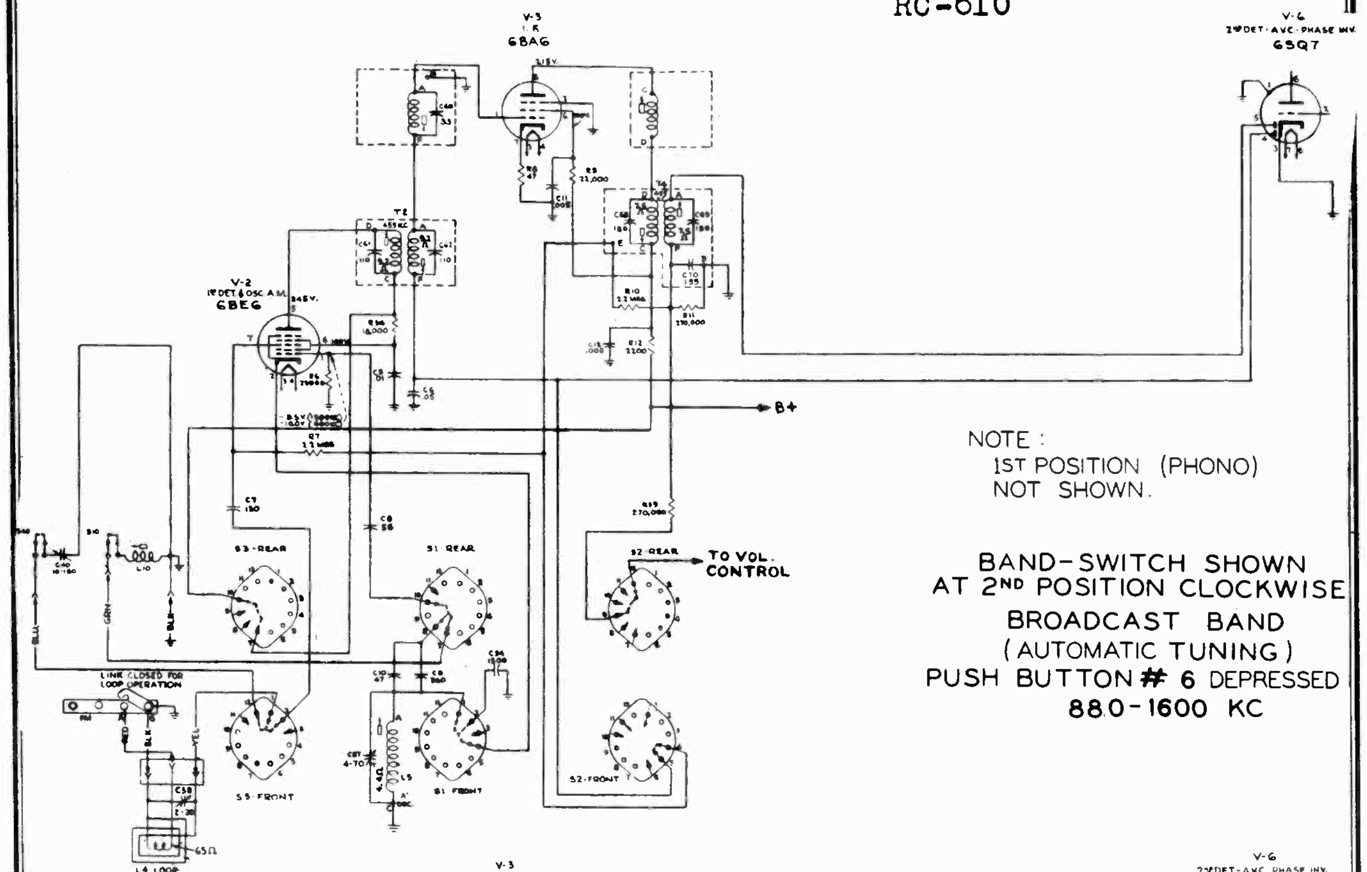
55 60 70 80 100 120 140 160

The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.

Model 610V1 (RC-610C)

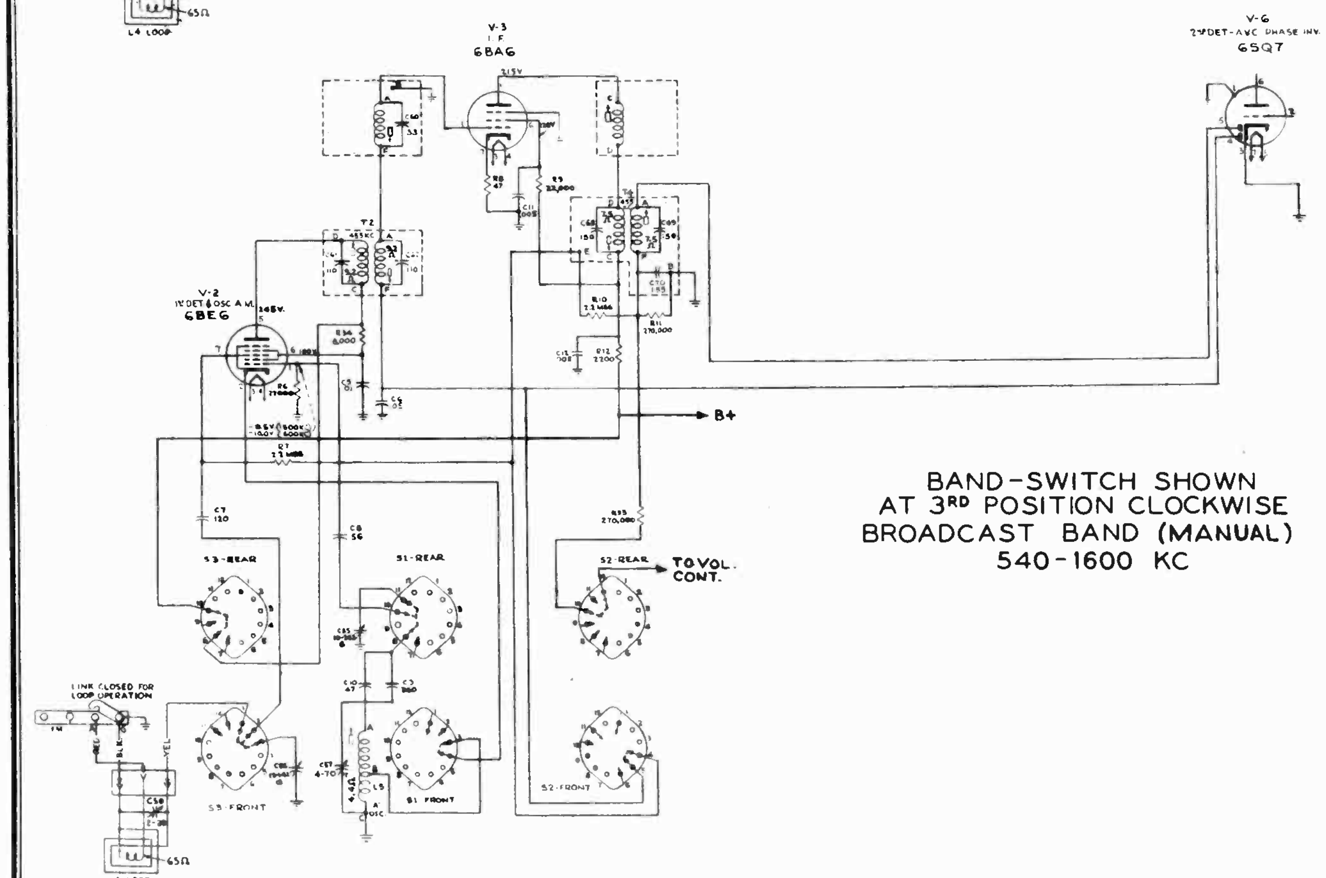
The schematic diagram of RC-610C chassis is similar to that shown above, the major difference being in the ratio detector circuit the schematic diagram of which is shown on page 3, in addition C59 of T1 (1st I.F. FM) is omitted, R13 is 68 ohms, R14 is 33,000 ohms, R18 is 1.5 megohms and C36 is .005 mfd.

RADIO CORP. OF AMERICA MODELS 610V1, CHASSIS RC-610C; 610V2, CHASSIS RC-610



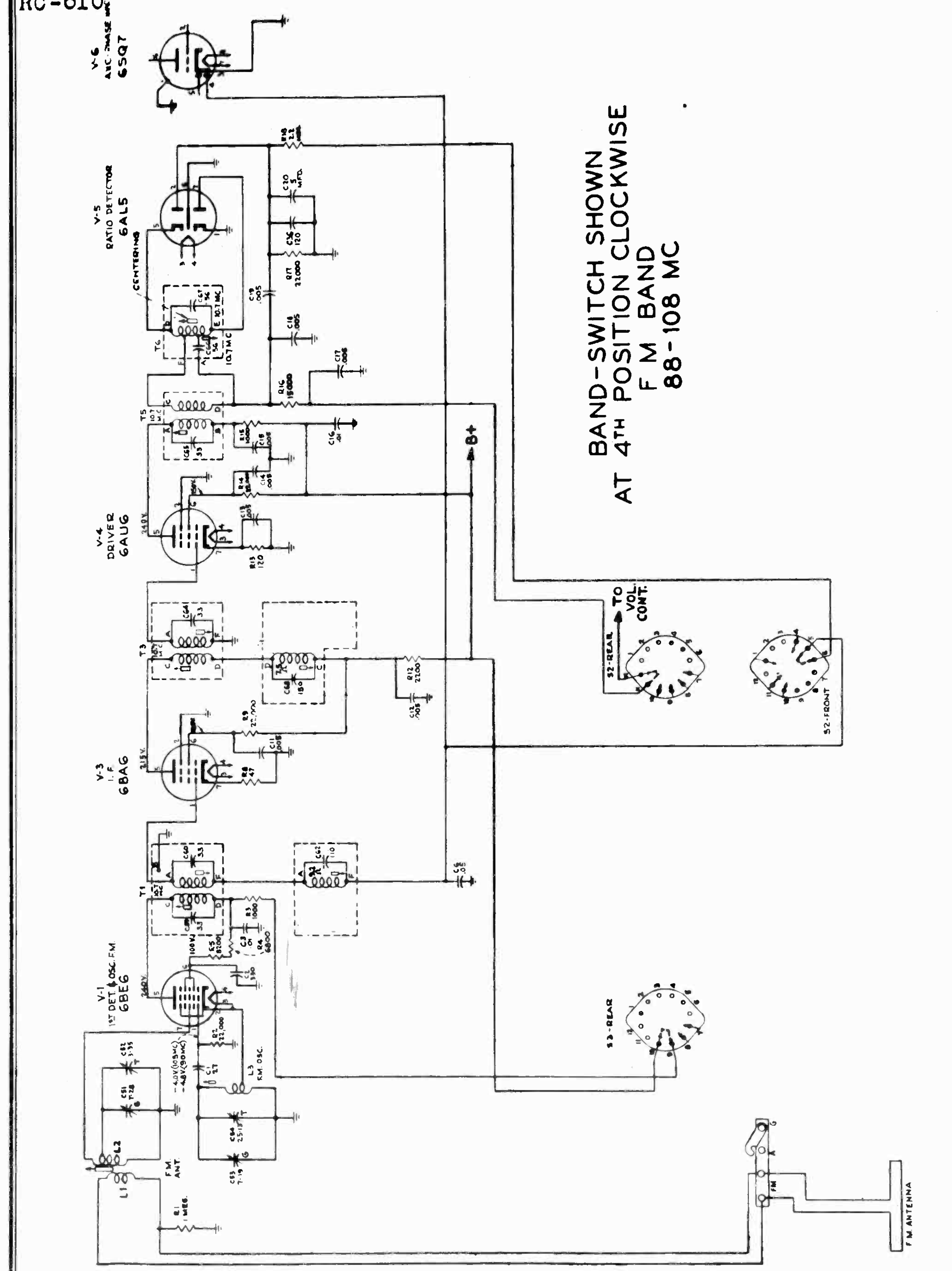
NOTE:
1ST POSITION (PHONO) NOT SHOWN.

BAND-SWITCH SHOWN AT 2ND POSITION CLOCKWISE
BROADCAST BAND
(AUTOMATIC TUNING)
PUSH BUTTON # 6 DEPRESSED
880-1600 KC



BAND-SWITCH SHOWN AT 3RD POSITION CLOCKWISE
BROADCAST BAND (MANUAL)
540-1600 KC

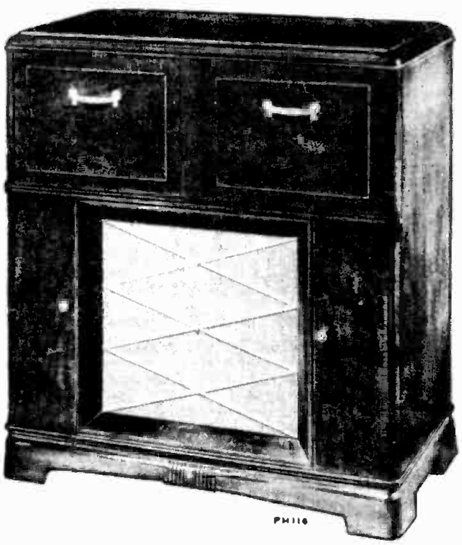
MODELS 610V1, CHASSIS RC-610C; 610V2, CHASSIS RC-610
RADIO CORP. OF AMERICA



BAND-SWITCH SHOWN AT 4TH POSITION CLOCKWISE
F M BAND
88-108 MC

RADIO CORP. OF AMERICA MODELS 610V1, CHASSIS RC-610C; 610V2, CHASSIS RC-610

Model 610V1



Model 610V2

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast (BC)	540-1600 kc.
Frequency Modulation (FM)	88-108 mc.
Push Button Tuning (PB)	6 stations
1 Station	540-1030 kc.
2 Stations	610-1250 kc.
2 Stations	740-1430 kc.
1 Station	880-1600 kc.
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) RCA 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

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

POWER SUPPLY RATING (including phono motor)

105-125 volts, 60 cycles .... max. 116 watts

(This instrument can be converted to operate on 50 cycles.)

Pilot Lamps (3) .... Mazda No. 51 6-8 volts 0.2 amp.

Tuning Drive Ratio 16.25:1

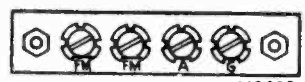
CABINET DIMENSIONS

	Height	Width	Depth
610V1	36"	35-1/16"	18"
610V2	36"	34-9/16"	17-5/8"

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 board** in the back of the cabinet. External antennas may be



MS328

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, open the link across the terminals A-G and 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.

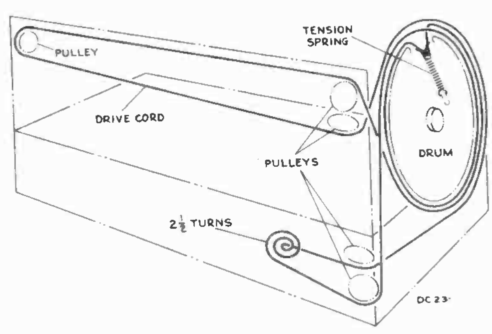
Circuit Description

Models 610V1 and 610V2 have 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 driver transformer (T5) and ratio detector transformer (T6) to the FM ratio detector tube (6AL5 V5). [In 610V1 the functions of both T5 and T6 are combined in one unit (T5).]

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.



DIAL INDICATOR AND DRIVE MECHANISM

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 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, except FM IF-RF, 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.—

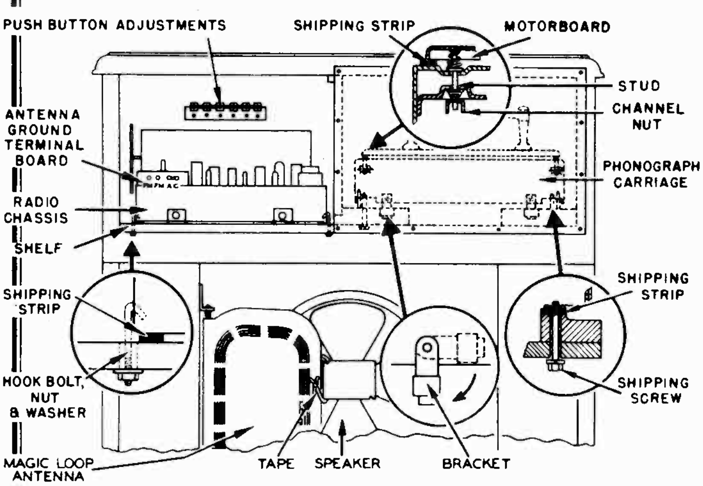
1. Cut out the printed dial scale, or, better still, make a tracing of the scale.
2. With gang at full mesh the pointer should be set to the first reference mark from the left hand end of the dial backing plate.
3. Place the printed dial scale or the tracing under the pointer so that the extreme left 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 a nalignment 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.

610V1 (RC-610C) FM Ratio Detector Alignment

RANGE SWITCH IN FM POSITION—VOL. CONT. MAXIMUM

Steps	Connect high side of sig. gen. to—	Signal generator output	Adjustments and indications
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 5 mfd. capacitor, C20, the common lead of the VoltOhmyst to chassis.		
2	Pin 1 of driver tube 6AU6 in series with .01 mfd.	10.7 mc. modulated 30% 400 cycles AM (Approx. .1 volt)	Top core T5 for max. d-c across C20 (Approx. 4 volts) Bottom core T5 for minimum audio output
3	Repeat Step 2 until further adjustment does not improve alignment.		



Back View

610V2 (RC-610) FM Ratio Detector Alignment

RANGE SWITCH IN FM POSITION—VOL. CONT. MAXIMUM

Steps	Connect high side of sig. gen. to—	Signal generator output	Adjustments and indications
1	Connect a 680 ohm resistor between pins 5 and 7 of the ratio detector tube 6AL5. Connect the d-c probe of a VoltOhmyst to the negative lead of the 5 mfd. capacitor, C20, the common lead of the VoltOhmyst to chassis.		
2	Pin 1 of driver tube 6AU6 in series with .01 mfd.	10.7 mc. modulated 30% 400 cycles AM (Approx. .25 volt)	Driver trans. T5, for max. d-c across C20 (Approx. 14.5 volts)
3	Disconnect the VoltOhmyst and the 680 ohm resistor from the 6AL5. Connect two 68,000 ohm resistors (within 1% of each other) in series across the 22,000 ohm resistor R17. Connect the common lead of the VoltOhmyst to the center point of the 68,000 ohm resistors and the d-c probe to terminal "A" of the ratio detector trans. T6. Use 30 volt scale of VoltOhmyst first, reducing to lower scale as required.		
4	Same as Step 2	Same as Step 2	†T6 bottom core for zero d-c balance. †T6 top core for min. audio output.
5	Reconnect VoltOhmyst as in Step 1, omitting 680 ohm resistor.		
6	Repeat Step 2.		
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 d-c balance and the minimum a-f 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, hooked across the voice coil for the point at which both zero d-c and minimum a-f output occur.

FM IF-RF Alignment

(FM Ratio Detector must be aligned first.)

RANGE SWITCH IN FM POSITION

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 C20 and the common lead to chassis. Turn gang condenser to max. capacity (fully meshed).			
2	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.)
3	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	C54 osc. C52 ant.
4	Same as Step 3.	90 mc	90 mc	L3 osc. L2 ant.
5	Repeat Steps 3 and 4 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.

RADIO CORP. OF AMERICA

MODELS 610V1, CHASSIS RC-610C; 610V2, CHASSIS RC-610

AM Alignment

(Correct alignment of the 455 kc. IF requires that the 10.7 mc. IF be aligned previously.)

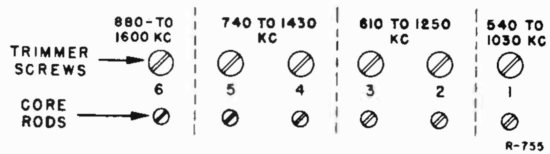
RANGE SWITCH IN BC POSITION

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	C57 osc. C58 ant. (loop)
4		600 kc	600 kc	L5 osc. (Rock gang)
5	Repeat Step 3.			
6	After chassis and loop have been installed in cabinet, adjust C58 for max. output on a weak station near 1400 kc.			

*Align T4 and T2 by means of alternate loading as explained under FM IF-RF alignment. Use a 47,000 ohm resistor instead of a 680 ohm resistor.

Oscillator frequency is above signal frequency on both AM and FM.

Push Button Adjustment



The push buttons connect to separate magnetite-core oscillator coils and separate loop circuit trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow about five minutes warm-up period before making adjustments.

The procedure is as follows:

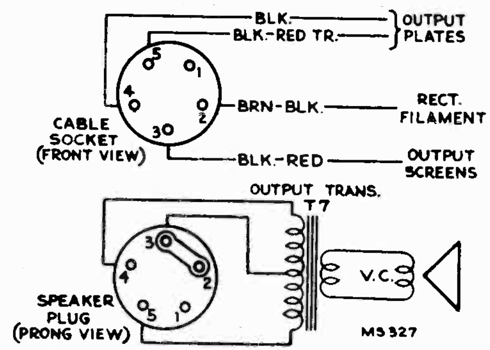
1. Make a list of the desired stations, arranged in order from low to high frequencies.
2. Turn the range switch to the broadcast position and manually tune in the first station on the list.
3. Turn range switch to push-button position and press in the left-hand button.
4. Adjust core rod No. 1 to receive the first station. To secure the best adjustment, rotate the loop for least pickup, and adjust core rod No. 1 for peak output.
5. Adjust trimmer screw No. 1 for peak output on the first station.
6. Proceed in the same manner to adjust for the remaining stations.
7. Repeat adjustments for best results.

On the 880 to 1,600 kc push-button, the higher frequency stations may be received with core rod No. 6 either in or out (oscillator frequency either 455 kc below or 455 kc above the station frequency). The adjustment with this core in its out position (oscillator frequency 455 kc above the station frequency) is the correct one.

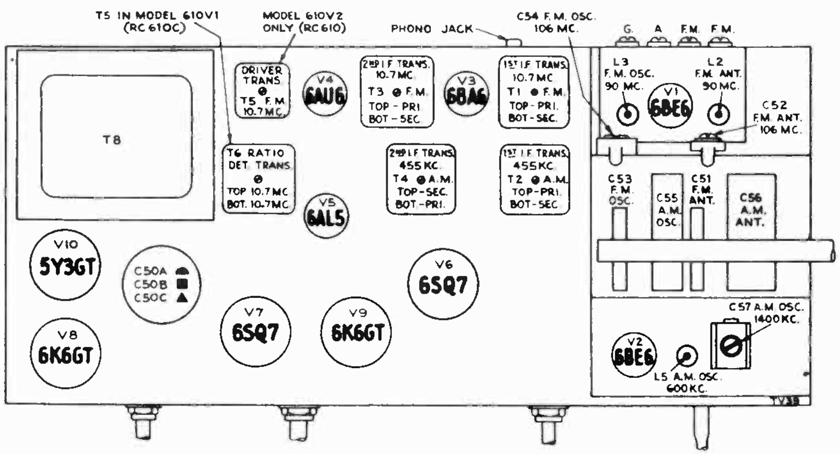
NOTE: Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.

Critical Lead Dress

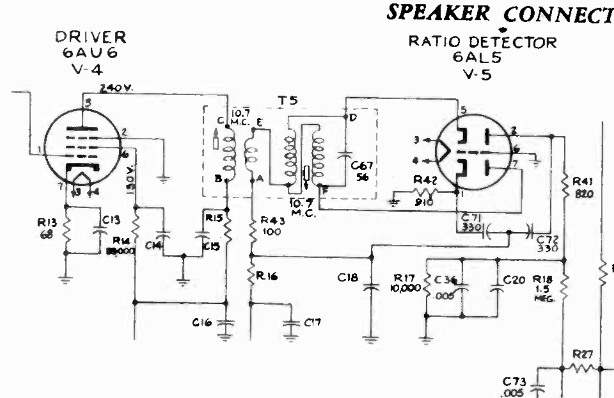
1. Dress capacitor C1 near chassis base.
2. Dress lead from pin 5, V-1, to terminal C, of transformer T1, as near bottom of FM shelf as possible.
3. The lead from capacitor C23 to the high side of the volume control must be dressed next to chassis along front apron.
4. Dress resistor R20 near chassis 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 R28 and R29.



SPEAKER CONNECTIONS



Top View Chassis



RATIO DETECTOR CIRCUIT 610V1 (RC-610C)

Schematic Diagram otherwise same as 610V2 (RC-610), except C59 of 1st I.F. Trans (FM) is omitted.

MODELS 610V1, CHASSIS RC-610C; 610V2, CHASSIS RC-610

RADIO CORP. OF AMERICA

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC-610
70258	Board—"FM-Antenna-Ground" board
72046	Capacitor—Mica trimmer, 2.5-13 mmf. (C54)
71808	Capacitor—Mica trimmer, 3-35 mmf. (C52)
72334	Capacitor—Mica trimmer, 4-70 mmf. (C57)
72570	Capacitor—Ceramic, 27 mmf. (C1)
39042	Capacitor—Ceramic, 47 mmf. (C10, C33)
71924	Capacitor—Ceramic, 56 mmf. (C8)
71614	Capacitor—Ceramic, 120 mmf. (C7, C26, C36)
72571	Capacitor—Mica, 330 mmf. (C2)
*72572	Capacitor—Mica, 360 mmf. (C9)
39656	Capacitor—Mica, 1500 mmf. (C34)
70646	Capacitor—Tubular, .0035 mfd., 1000 volts (C23, C24)
72573	Capacitor—Tubular, .003 mfd., 400 volts (C28, C32)
71087	Capacitor—Molded paper, .003 mfd., 1000 volts (C35)
72490	Capacitor—Tubular, .005 mfd., 200 volts (C17, C18, C19, C22, C29)
71553	Capacitor—Tubular, .005 mfd., 400 volts (C11, C12, C13, C14, C15)
72120	Capacitor—Tubular, .015 mfd., 200 volts (C30, C31)
71925	Capacitor—Tubular, .01 mfd., 400 volts (C3, C5, C16, C25, C27)
70611	Capacitor—Tubular, .02 mfd., 400 volts (C21)
71551	Capacitor—Tubular, .05 mfd., 200 volts (C6)
72121	Capacitor—Electrolytic, 5 mfd., 50 volts (C20)
*72052	Capacitor—Electrolytic, consisting of 1 section of 30 mfd., 450 volts, 1 section of 30 mfd., 350 volts and 1 section of 40 mfd., 25 volts (C50A, C50B, C50C)
72335	Coil—F.M. antenna coil (L1, L2)
72336	Coil—F.M. oscillator coil (L3)
72574	Coil—Filament choke coil (L6)
72333	Coil—Oscillator coil—"A" band (L5)
72059	Condenser—Variable tuning condenser less mounting bracket and trimmers (C51, C53, C55, C56)
70342	Control—Volume control and power switch (R40, S5)
34662	Cord—Drive cord (approx. 83" overall length) NOTE: Before assembling, stretch to full length.
71799	Grommet—Rubber grommet for mounting R.F. shelf (3 required)
72069	Grommet—Rubber grommet for rear mounting feet (2 required)
71608	Indicator—Station selector indicator
71607	Plate—Dial back plate less dial
30868	Plug—2 contact female plug for motor cable
12493	Plug—5 contact female plug for speaker cable
32641	Plug—3 prong male plug for selector cable or loop cable
36230	Pulley—Drive cord pulley
30732	Resistor—47 ohms, ½ watt (R8)
30189	Resistor—120 ohms, ½ watt (R13)
44632	Resistor—560 ohms, 2 watts (R22)
34766	Resistor—1000 ohms, ½ watt (R3, R15)
71991	Resistor—2200 ohms, 1 watt (R12)
19525	Resistor—3300 ohms, 2 watts (R28, R29)
38887	Resistor—6800 ohms, 1 watt (R4)
14250	Resistor—8200 ohms, ½ watt (R23)
38888	Resistor—8200 ohms, 1 watt (R5)
36714	Resistor—15,000 ohms, ½ watt (R16)
39158	Resistor—18,000 ohms, 2 watts (R34)
30492	Resistor—22,000 ohms, ½ watt (R2, R6, R14, R17)
71989	Resistor—22,000 ohms, 1 watt (R9)
30409	Resistor—27,000 ohms, ½ watt (R30, R31)
14583	Resistor—220,000 ohms, ½ watt (R36)
30651	Resistor—270,000 ohms, ½ watt (R11, R19, R26, R33)
30648	Resistor—470,000 ohms, ½ watt (R21, R24, R32)
30652	Resistor—1 megohm, ½ watt (R1)
30649	Resistor—2.2 megohms, ½ watt (R7, R10, R18)
30992	Resistor—10 megohms, ½ watt (R20, R25)
71917	Resistor—22 megohms, ½ watt (R27)
72055	Shaft—Tuning knob shaft
35787	Socket—Phono input socket
31364	Socket—Lamp socket
72516	Socket—Tube socket, miniature
31251	Socket—Tube socket, octal
31418	Spring—Tension spring for drive cord
*72056	Support—Dial support and pulley bracket complete with four pulleys—R.H.
*72057	Support—Dial support and pulley bracket complete with one pulley—L.H.
*72054	Switch—Range switch (S1, S2, S3)
71603	Switch—Tone switch (S4)
72593	Transformer—First I.F. transformer—F.M. (T1, C59, C60)
71625	Transformer—First I.F. transformer—A.M. (T2, C61, C62)
72723	Transformer—Second I.F. transformer—F.M. (T3, C64)
71631	Transformer—Second I.F. transformer—A.M. (T4, C68, C69, C70)
71935	Transformer—Driver transformer (T5, C65)
71934	Transformer—Ratio detector transformer (T6, C66, C67)
71975	Transformer—Power transformer, 117 volts, 50/60 cycle (T8)
35969	Washer—"C" washer for tuning shaft
	CHASSIS ASSEMBLIES
	RC-610C
	Same as RC-610 except:
72571	Capacitor—Mica, 330 mmf. (C71, C72)
72490	Capacitor—Tubular, .005 mfd., 200 volts (C36, C73)
34763	Resistor—68 ohms, ½ watt (R13)
34765	Resistor—100 ohms, ½ watt (R43)
30158	Resistor—820 ohms, ½ watt (R41)
12531	Resistor—910 ohms, ½ watt (R42)
3078	Resistor—10,000 ohms, ½ watt (R17)
30685	Resistor—33,000 ohms, ½ watt (R14)
31449	Resistor—1.5 megohms, ½ watt (R18)

STOCK No.	DESCRIPTION
*72887	Transformer—1st I.F. transformer—F.M. (T1)
*72888	Transformer—2nd I.F. transformer—F.M. (T3)
*72889	Transformer—Ratio detector transformer (T5) Stock Nos. 71614—(120 mmf., C36), 72490 Capacitor, .005 mfd. (C19), 30189—(120 ohms, R13), 30492—(22,000 ohms, R14, R17), 30649—(2.2 meg., R18), 72593 Trans. (T1), 72723 Trans. (T3), 71935 Trans. (T5), 71934 Trans. (T6)—Not used in RC-610C.
	SPEAKER ASSEMBLIES
	92569-1W—RL103-1
13867	Cap—Dust cap
36145	Cone—Cone and voice coil assembly
71560	Plug—5 prong male plug for speaker
71961	Speaker—12" PM speaker complete with cone and voice coil less output transformer and plug
71145	Suspension—Metal cone suspension
37899	Transformer—Output transformer (T7)
	MISCELLANEOUS
*72555	Antenna—Di-pole antenna
*72750	Back—Cabinet back for walnut instruments
*72751	Back—Cabinet back for mahogany instruments
*72907	Back—Cabinet back for blonde instruments
72146	Bezel—Push button bezel—walnut or mahogany instruments
*72906	Bezel—Push button bezel—blonde instruments
71599	Bracket—Pilot lamp bracket
70556	Bumper—Rubber bumper for tray—walnut or mahogany instruments
*72908	Bumper—Rubber bumper for tray—blonde instruments
*72144	Button—Push button
*72583	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Pilot lamp cap
38684	Capacitor—Mica trimmer, 2-20 mmf. (C58)
36424	Capacitor—Mica trimmer, comprising 1 section of 10-160 mmf., 2 sections of 25-250 mmf., 2 sections of 50-400 mmf., and 1 section of 100-540 mmf. (C40, C41, C42, C43, C44, C45)
71892	Catch—Door catch
72157	Clip—Push button bezel spring clip
72050	Coil—P.B. oscillator coil—H.F. (L10, L11, L12)
72051	Coil—P.B. oscillator coil—L.F. (L13, L14, L15)
*72558	Decal—Control marker decal—walnut or mahogany instruments
*72910	Decal—Control marker decal—blonde instruments
71966	Decal—Trade mark decal (Victrola)
71984	Decal—Trade mark decal (RCA Victor)
*72682	Dial—Glass dial scale
*72513	Escutcheon—Dial escutcheon less dial
X1632	Grille—Grille cloth for walnut cabinet for Model 610V2
X1633	Grille—Grille cloth for mahogany cabinet for Model 610V2
X1649	Grille—Grille cloth for blonde cabinet for 610V2
X1643	Grille—Grille cloth for Model 610V1
*72808	Grille—Metal grille for Model 610V1
*72557	Grille—Metal grille for Model 610V2
72441	Guide—Carriage guide, R.H.—walnut or mahogany instruments
*72904	Guide—Carriage guide, R.H.—blonde instruments
72442	Guide—Carriage guide, L.H.—walnut or mahogany instruments
*72905	Guide—Carriage guide, L.H.—blonde instruments
39352	Hinge—Cabinet door hinge—walnut or mahogany instruments
*72911	Hinge—Cabinet door hinge—blonde instruments
71821	Knob—Control knob—walnut or mahogany instruments
72800	Knob—Control knob—blonde instruments
*72807	Knob—Record storage compartment door knob for Model 610V1
71890	Knob—Record storage compartment door knob for Model 610V2
11765	Lamp—Dial lamp—Mazda 51
70544	Loop—Antenna loop (L4, C58)
72563	Marker—Call letter marker
70546	Mounting—One set of hardware to mount record changer
30868	Plug—2 contact female plug for extension cable
30870	Plug—2 prong male plug for extension cable
31048	Plug—Pin plug for pickup cable
*72556	Pull—Door pull for record changer compartment or radio compartment door for Model 610V2
*72806	Pull—Door pull for record changer compartment or radio compartment door for Model 610V1
70551	Retainer—Tray roller retaining strip—L.H.
70552	Retainer—Tray roller retaining strip—R.H.
70554	Roller—Record changer tray roller (6 required)
36422	Socket—3 contact female socket for loop leads or for selector switch cable
72156	Spring—Push button bezel spring
34053	Spring—Push button retaining spring
30900	Spring—Retaining spring for knob
*72582	Stop—Mechanism tray stop
39360	Support—Drop support for record changer compartment door—walnut or mahogany instruments
*72912	Support—Drop support for record changer compartment door—blonde instruments
70545	Support—Loop support bracket (2 required)
*72512	Switch—Push button switch only (S10, S11, S12, S13, S14, S15, S40, S41, S42, S43, S44, S45)
70555	Tire—Rubber tire for record changer tray roller
70553	Tray—Record changer tray—walnut or mahogany instruments
*72909	Tray—Record changer tray—blonde instruments
2917	Washer—"C" washer to fasten rollers

RADIO CORP. OF AMERICA MODEL AC3689, CHASSIS RC-368, Nash

Electrical Specifications

TUBES AND FUNCTIONS
(1) RCA-6K7.......................... R-F Amplifier
(2) RCA-6A8................ First Detector—Oscillator
(3) RCA-6K7.......................... I-F Amplifier
(4) RCA-6R7-G..... Second Det., A-F Amp., and A.V.C.
(5) RCA-6V6-G.......................... Power Output
(6) RCA-6V6-G.......................... Power Output
Dial Light.......... Mazda No. 51, 7.5 volts, 0.2 ampere

FREQUENCY RANGE.. 550-1,500 kc

ALIGNMENT FREQUENCIES
260 kc.................................. I-F Amplifier
600 kc.................................. Osc.
1,400 kc.......................... Osc., Det., Ant.

POWER OUTPUT
Undistorted.............................. 6 watts
Maximum.................................. 8 watts

POWER SUPPLY RATING
Supply Voltage........................... 6.3 volts
Current Drain............................ 9 amperes
Fuse Protection.......................... 15 amperes

LOUDSPEAKER
Type.......................... 8-inch Electrodynamic
Voice Coil Impedance............ 3.5 ohms at 400 cycles

Operating Controls.............................. Left, Manual tuning; Center, Six station push buttons; Right, Power switch—Volume control (small), Tone control (wing knob)

General Description

The Nash—RCA Model AC-3689 is a six-tube, deluxe, custom-built, superheterodyne automobile radio receiver consisting of three units. (1) The control unit containing the tuning mechanism and radio-frequency circuits; (2) the power unit containing the i-f, audio, and power-supply circuits; and (3) the loudspeaker. The i-f signal output of the first-detector — oscillator tube in the control unit is fed through a shielded cable to the power unit. The capacity of the shielded cable is such as to provide the correct shunt fixed capacity for the first i-f transformer primary, and alignment is made by magnetite cores in the i-f transformers.

Among the many features of this receiver are: Mechanical push button tuning for six stations; r-f amplifier stage; automatic volume control; magnetite core antenna, oscillator, and i-f transformers; ignition suppression filters in the antenna and power-supply circuits; push-pull beam power output stage; continuously variable high-frequency tone control; and an eight-inch, dust-proof electrodynamic loudspeaker.

Manual Tuning Mechanism

The manual tuning shaft is connected by a drive cord to the condenser drive-cord drum and the dial-scale pulley (located under dial scale). The "Drive-cord Hookup" shows the cord arrangement and number of turns around shafts. A three-position spring-tension adjustment is provided on the drive-cord drum to permit adjustment of the drive cord tension. Sufficient tension should be used to ensure freedom from backlash or cord slippage without causing excessive push button friction (spring stretched approximately 1/16 inch). The dial scale may be adjusted by loosening the dial nut and turning the scale until the extreme low-frequency end mark on the scale is aligned to the pointer in the escutcheon, or exactly in the center of the dial opening, while the gang condenser is in full-mesh position. See "Adjustments of push-button mechanism" for mechanical adjustments affecting both manual and push-button tuning.

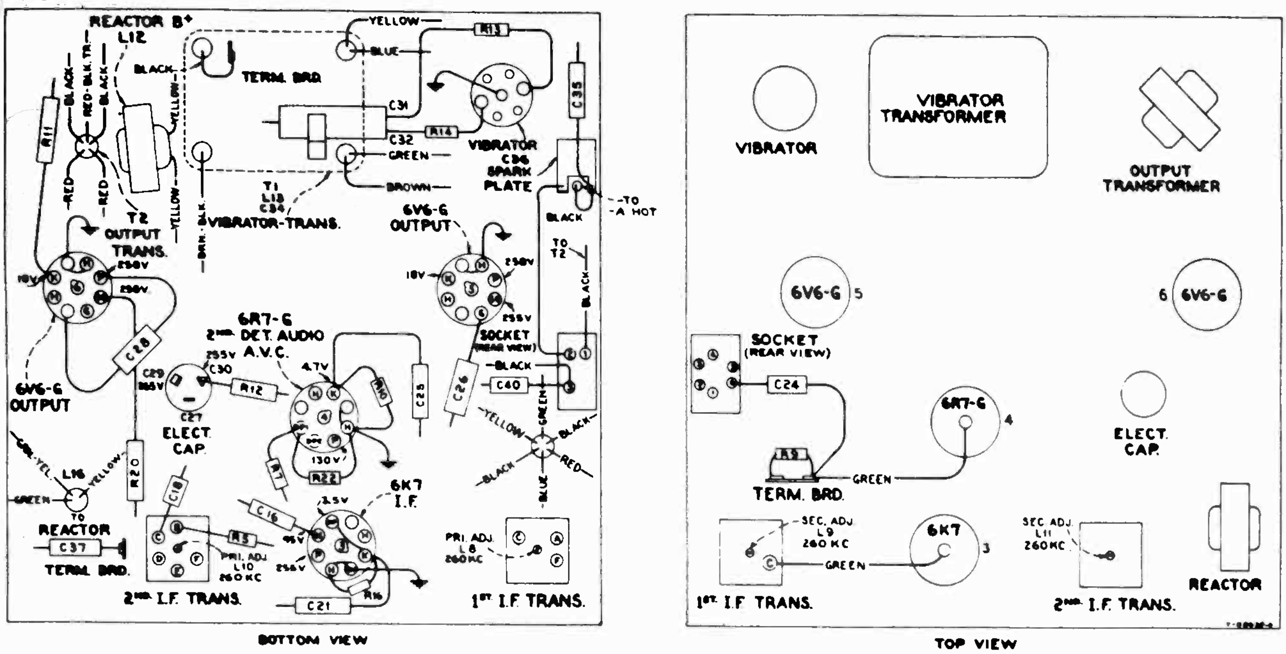
Push-Button Tuning Mechanism

The push-button tuning mechanism is of the mechanical type wherein the movement of a push button actually turns the tuning condenser to any predetermined setting. The movement is actuated through a push arm, cam, rocker plate, and sector gear, which meshes with a scissor gear directly fastened to the tuning-condenser shaft. The scissor gear prevents backlash between the sector gear and tuning condenser. Since the sector gear is mounted directly on the rocker-plate shaft, the position of the rocker plate will accurately determine the position of the tuning condenser.

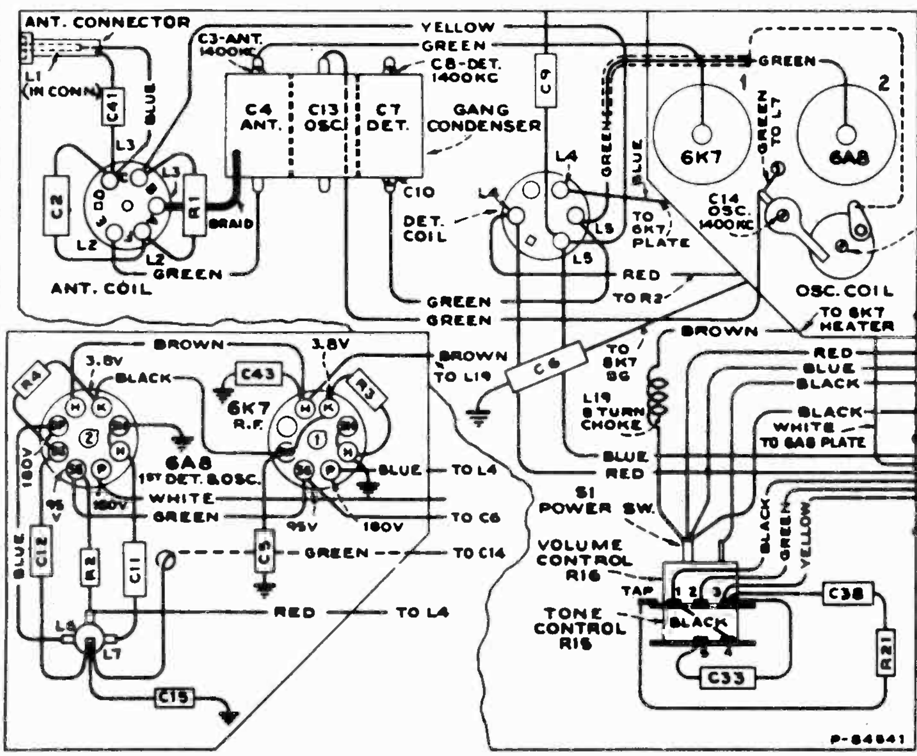
The cams, which determine the condenser stop position for each button, are mounted on the push arms and are locked in place by the push buttons and lock shoes, which press firmly against the cams when the push buttons are tightened. The push buttons should be tightened by hand and never forced with pliers or other tools.

MODEL AC3689,
CHASSIS RC-368,
Nash

RADIO CORP. OF AMERICA



Power Unit Parts, Socket Voltages, and Trimmers



Control Unit Parts, Socket Voltages, and Trimmers

RADIO CORP. OF AMERICA

MODEL AC3689,
CHASSIS RC-368,
Nash

ALIGNMENT PROCEDURE

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the output signal as low as possible to avoid a-v-c action.

Output Meter.—Connect the output meter across the speaker voice-coil and turn the receiver volume control and tone control to maximum (fully clockwise).

Dial Calibration.—Rotate the gang condenser to its full-mesh (maximum-capacity) position and then adjust dial scale so that the last calibration mark at the low-frequency end of dial is aligned to the pointer in the escutcheon.

Note 1.—The control unit and power unit (forming a complete receiver) must be aligned together, as proper alignment of the first i-f transformer is dependent upon the capacity of the interconnecting cable.

* Note 2.—The total series capacity for steps 3 to 6 must be 60 mmfd. ±10%. This capacitor must be inserted at the antenna connector of the receiver. The lead from the test oscillator to the 60 mmfd. capacitor may be shielded if desired, but no shielding should be used between capacitor and antenna connector.

† Note 3.—Install top cover of control unit, leaving tube cover off for steps 3 to 6.

Note 4.—The negative terminal of battery connects to the "A" lead and the positive terminal to receiver case.

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap in series with .01 mfd.	260 kc	No Signal 550-750 kc	L10 and L11 (2nd I-F Trans.)
2	6A8 Det. grid cap in series with .01 mfd.	260 kc		L8 and L9 (1st I-F Trans.)
3†	*Ant. connector in series with 60 mmfd.	600 kc	600 kc	L7 (osc.)
4†	*Ant. connector in series with 60 mmfd.	1,400 kc	1,400 kc	C14 (osc.) C8 (det.) C3 (ant.)
5†	*Ant. connector in series with 60 mmfd.	600 kc	600 kc (rock)	L7 (osc.)
6†	*Ant. connector in series with 60 mmfd.	1,400 kc	1,400 kc	C14 (osc.) C8 (det.) C3 (ant.)

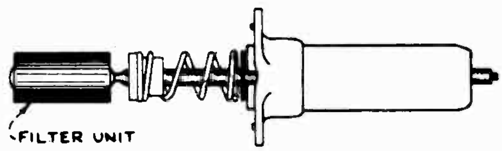
* See Note 2.
† See Note 3.

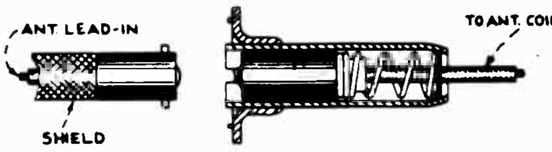
Precautionary Lead Dress

1. All ground leads and leads from C35 and C41 should be as short as possible.
2. Black lead from contact 4 on six-contact socket to terminal "D" on second I-F transformer should be dressed close to chassis and near case.
3. One lug of electrolytic capacitor can must be soldered to chassis.
4. Heater lead from 6K7 I-F to 6R7G should be dressed away from diode terminals.
5. Dress shielded lead from 3-contact socket to terminal board along edge of case, over C35, and away from vibrator socket.
6. Green lead from gang to 6K7 R-F grid must pass through shield clamps to rear of gang and dressed to rear of 6K7 R-F tube.
7. Dress green lead from center section of gang to C14 away from 6K7 R-F grid lead and in front of C9.
8. Dress heavy rubber covered lead from connector cable to 6A8 plate through hole between triangular chassis and case and away from oscillator coil.
9. Dress parts and leads under triangular chassis close to this chassis to prevent possibility of cutting through insulation paper.
10. Yellow lead from antenna to detector coil must be dressed over top of gang.
11. Leads to volume control must be dressed to front of control and away from "A" leads to power switch.
12. Dress all leads clear of gang rotor and push arms.

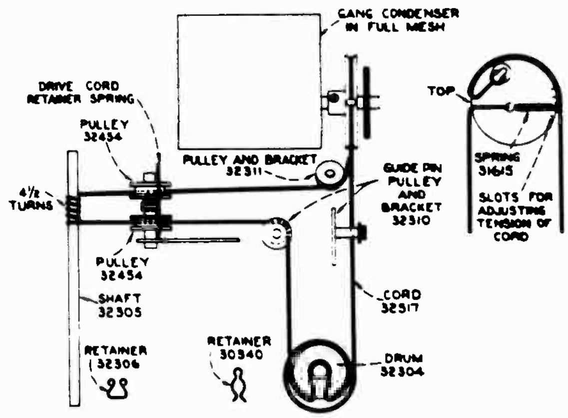
Loudspeaker

The loudspeaker cone may be centered in the usual manner with three celluloid or paper feelers after gently cutting away the front dust cover. A new cover should be cemented in place upon completion of the adjustment.





Antenna Filter



Drive Cord Hookup

MODEL AC3689,
CHASSIS RC-368,
Nash

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Adjustments of Push-Button Mechanism

The mechanism should be so adjusted that when using either manual tuning or push-button tuning, it operates positively and without bind or backlash. The complete sequence of adjustments are outlined below, however, inspection will generally enable the particular trouble to be located and then only that adjustment and the ones which follow will be necessary without disturbing other adjustments found to be correct. Proceed as follows in the sequence given:

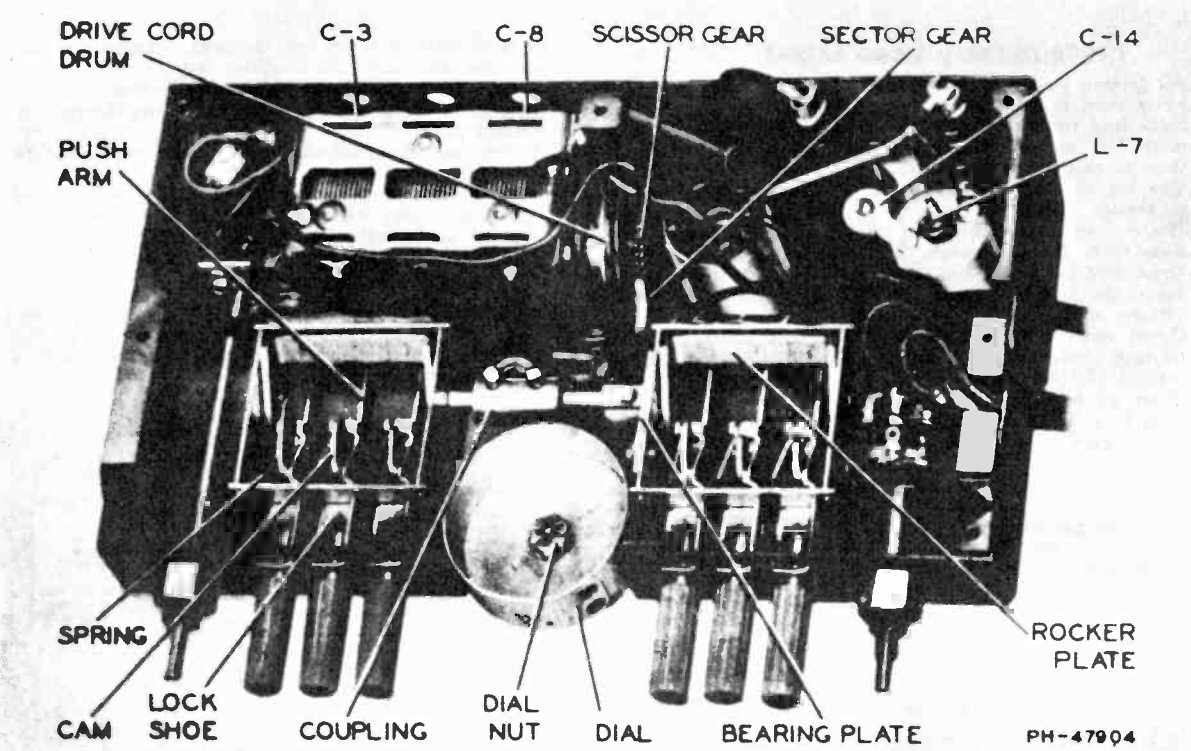
1. Remove dial scale. Loosen coupling set-screws, sector gear set-screws, gang-condenser mounting screws, and bearing-plate screws.
2. Place escutcheon in place and check for proper centering of push buttons in escutcheon. If push buttons are not properly centered, loosen the push-button-unit nuts (underneath) and adjust position of each unit until properly centered. Tighten mounting nuts. The coupling and sector gear must be on rocker-plate shafts but not tightened.
3. Align rocker plates with each other and tighten coupling screws. The position of the set-screws should be such that they definitely clear dial when gang is out of mesh and definitely clear pulley when gang is in full mesh.
4. Rotate rocker-plate shaft to obtain normal position of bearing plate and then tighten screws holding bearing plate.
5. Rotate gang condenser to full mesh, move free (inner) scissor gear one tooth from its free position and then mesh the sector gear with the scissor gear with two end teeth of the sector gear fully meshed. See photograph. Tighten condenser mounting screws. Slide sector gear along shaft until it is correctly aligned with the scissor gear, and with top of rocker plates 1/16 inch from frame tighten screws of sector gear.
6. Adjust mesh of scissor gear with sector gear by shifting gang condenser position. Adjust for minimum backlash without binding.
7. Adjust drive-cord drum on condenser shaft for correct alignment with drive cord, and so that the cord hole is at the top when gang is in full mesh.
8. Lubricate the push arms, rocker-plate shafts, and pulley shafts with light grease or heavy oil (sparingly) to provide free operation, being careful to keep lubricant off of drive cord.
9. With gang condenser fully meshed and drive cord properly installed, adjust dial scale so that the extreme low-frequency end calibration mark is aligned to the pointer in the escutcheon, or exactly in the center of the dial opening.

Adjusting Push Buttons for Stations

The six push buttons should be adjusted for six favorite stations after the receiver is installed and operating.

Any six standard broadcast 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. Loosen the push buttons one-half turn.
2. Using the tuning control, accurately tune in the first station.
3. With station accurately tuned in, press the first push button fully in and then gently release so as not to jar mechanism.
4. Tighten the push button securely with fingers. Do not force with pliers.
5. Proceed in same manner to adjust the other five push buttons.



Photograph of Control Unit

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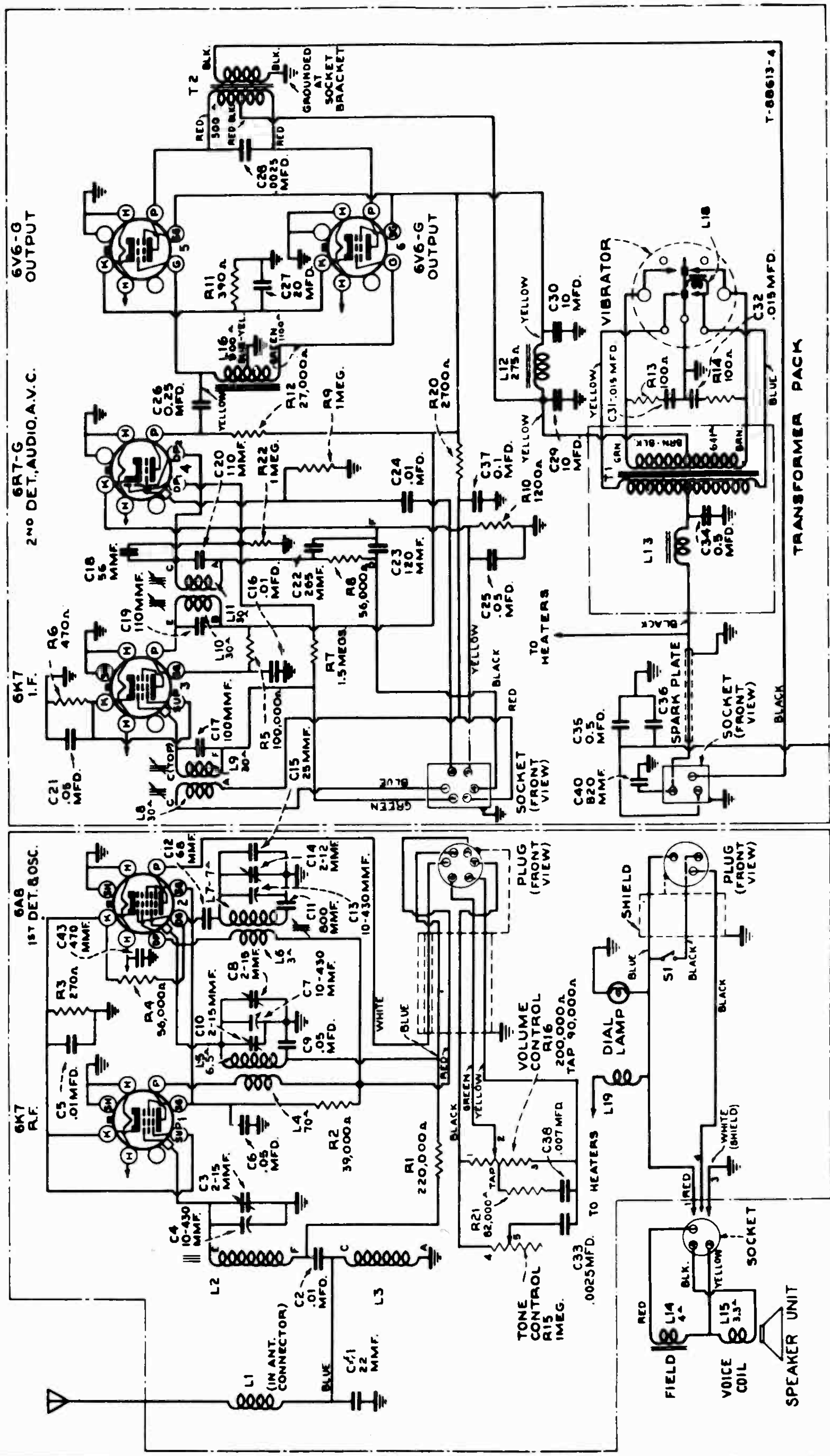
MODEL AC3689, CHASSIS RC-368, Nash



Schematic Circuit Diagram

MODEL AC3689,
CHASSIS RC-368,
Nash

RADIO CORP. OF AMERICA

REPLACEMENT PARTS

STOCK No.	DESCRIPTION
	CONTROL UNIT ASSEMBLIES
32307	Bushing—Station selector knob shaft bushing..
32876	Cable—3-conductor shielded speaker cable complete with male plug
32374	Cable—6-conductor shielded volume control cable complete with male plug
32300	Capacitor—Trimmer 2-15 mmfd. (C14)
14021	Capacitor—22 mmfd. (C41)
31707	Capacitor—25 mmfd. (C15)
13057	Capacitor—68 mmfd. (C12)
30433	Capacitor—470 mmfd. (C43)
32362	Capacitor—800 mmfd. (C11)
5148	Capacitor—.007 mfd., 500 volts (C38)
5107	Capacitor—.0025 mfd., 700 volts (C33)
14393	Capacitor—.01 mfd., 300 volts (C2, C5)
4886	Capacitor—.05 mfd., 400 volts (C6, C9)
32308	Case—Control unit case complete with all riveted and welded parts
31977	Coil—Antenna filter (L1)
32301	Coil—Antenna coil—less shield (L2, L3)
32297	Coil—Oscillator and shield (L6, L7)
31600	Coil—R-f coil—less shield (L4, L5)
32292	Condenser—3-gang variable tuning condenser complete with scissors gear, and drive cord drum (C3, C4, C7, C8, C10, C13)
32294	Control—Volume control, tone control, and power switch (R15, R16, S1)
32517	Cord—Dial drive cord
32291	Coupling—R.h. and l.h. tuning mechanisms coupling with screws
32304	Drum—Dial drive drum
32296	Dial—Dial scale and holder
32290	Gear—Tuning mechanism gear sector
11765	Lamp—Dial lamp—Mazda No. 51
32288	Mechanism—L.h. push button tuning mechanism less push buttons (short cam shaft)
32287	Mechanism—R.h. push button tuning mechanism less push buttons (long cam shaft)
32378	Pin—Contact pin for speaker cable
32377	Plug—3-contact male plug and shell for speaker and "A" lead cable
32375	Plug—6-contact male plug and shell for volume control cable
32311	Pulley—Drive cord intermediate pulley on bracket
32310	Pulley—Drive cord intermediate pulley and guide pin on bracket
32454	Pulley—Drive cord pulley on L.H.P.B. mechanism (11/16-in. dia.)
13454	Resistor—270 ohms, ½ watt (R3)
12266	Resistor—39,000 ohms, ½ watt (R2)
12286	Resistor—56,000 ohms, ½ watt (R4)
14023	Resistor—82,000 ohms, ½ watt (R21)
12264	Resistor—220,000 ohms, ½ watt (R1)
30340	Retainer—Retainer for drive cord pulley, Stock No. 32454, and dial Stock No. 32296
32306	Retainer—Retainer for station selector knob shaft, Stock No. 32305
13471	Ring—Retaining ring for antenna coil
3584	Ring—Retaining ring for r.f. coil
14350	Screw—No. 8-32 x 11/64-in. square head set screw for coupling, Stock No. 32291
31482	Screw—No. 8-32 x 5/16-in. square head set screw for gear sector, Stock No. 32290
31611	Screw—No. 8-32 x ½-in. square head set screw for drive cord drum on condenser shaft
12252	Screw—No. 8 x ½-in. S.T. screws for control case
32305	Shaft—Station selector knob shaft
32303	Shield—Antenna coil shield
3623	Shield—R.f. coil shield
32453	Socket—Dial lamp socket and lead
32299	Socket—Octal base tube socket
31615	Spring—Drive cord tension spring
30585	Spring—Push button arm tension spring
	DASH POWER UNIT ASSEMBLIES
12723	Capacitor—56 mmfd. (C18)
32239	Capacitor—110 mmfd. (C19, C20, C23)
32238	Capacitor—110 mmfd. (C17)
13618	Capacitor—265 mmfd. (C22)
12536	Capacitor—820 mmfd. (C40)
5107	Capacitor—.0025 mfd., 700 volts (C28)
14393	Capacitor—.01 mfd., 300 volts (C24)
4858	Capacitor—.01 mfd., 500 volts (C16)
32235	Capacitor—2-sections .015 mfd., 1,000 volts (C31, C32)
4886	Capacitor—.05 mfd., 400 volts (C21, C25)
4839	Capacitor—0.1 mfd., 400 volts (C37)
12484	Capacitor—0.25 mfd., 300 volts (C26)
12741	Capacitor—0.5 mfd., 150 volts (C35)
32240	Capacitor—Comprising 2-sections 10 mfd., 400 volts, and 1-section 20 mfd., 25 volts (C27, C29, C30)
32284	Case—Complete dash power unit case
4288	Connector—"A" lead male connector cap
4286	Ferrule—"A" lead connector ferrule and bushing
5066	Reactor—"B" filter reactor (L12)
30540	Resistor—100 ohms, ½ watt (R13, R14)
30547	Resistor—390 ohms, 2 watts (R11)
30546	Resistor—470 ohms, ½ watt (R6)
12267	Resistor—1,200 ohms, ½ watt (R10)
13204	Resistor—8,200 ohms, 2 watts (R20)
13477	Resistor—27,000 ohms, 1 watt (R12)
11282	Resistor—56,000 ohms, 1/10 watt (R8)
14560	Resistor—100,000 ohms, ½ watt (R5)
13730	Resistor—1 meg., ½ watt (R9, R22)
12201	Resistor—1.5 meg., ½ watt (R7)
5129	Ring—Tube shield ring
12252	Screw—No. 8 x ½-in. S.T. screw for dash power unit case
32286	Shield—Tube shield comprising 2-halves and 1-ring
32245	Socket—3-contact socket and mounting plate for "A" lead and speaker cable
32244	Socket—6-contact socket and mounting plate for volume control cable
31251	Socket—Octal base tube socket
12241	Socket—6-contact vibrator socket
32236	Transformer—First i-f transformer (L8, L9, C17)
32237	Transformer—Second i-f transformer (L10, L11, C19, C20, C22, C23, R8)
32243	Transformer—Input transformer (L16)
32241	Transformer—Output transformer (T2)
32233	Transformer—Vibrator transformer (T1, L13, C34)
12236	Vibrator—(L18)
	SPEAKER ASSEMBLIES
32315	Cap—Cone center dust cap
32314	Coil—Speaker field coil (L14)
32313	Cone—8-in. speaker cone and voice coil (L15)
32312	Speaker—8-in. dynamic, complete
	MISCELLANEOUS ASSEMBLIES
12291	Body—Fuse holder body (female portion only)
32320	Button—Station selector push button and screw
9829	Cable—Antenna cable approx. 36-in. long, with connector
32438	Capacitor—Ignition coil capacitor
32439	Capacitor—Generator capacitor
4291	Clip—Ammeter clip
32321	Escutcheon—Control panel escutcheon less small dial escutcheon
32322	Escutcheon—Dial escutcheon (small)
4286	Ferrule—Center contact ferrule and bushing for fuse holder
5023	Fuse—15 amp.
4290	Insulator—Fuse holder insulating sleeve
32318	Knob—Dummy knob (1 required)
32316	Knob—Station selector or volume control knob
32319	Knob—Tone control wing knob
32323	Lead—Ammeter "A" lead and clip, complete with female section of fuse holder
13193	Nut—Control unit mounting nut
32317	Screw—No. 8-32 x 7/32-in. headless set screw for knob, Stock No. 32316
32324	Screw — Speaker mounting screws, spacers, washer, and nuts
4284	Spring—Tension spring for fuse holder
12448	Stud—Dash power unit mounting stud, nut, and washers
32437	Suppressor — Distributor suppressor (10,000 ohms)
4285	Washer—Insulating washer for fuse holder
13192	Washer—Felt washer for under control knobs

RADIO DISPLAYS CO.

MODEL Beer
Bottle Type

Sparkling Champaign Music, Metz Beer, Melody Beer, Red Top Beer, Imperial Beer, Hyde Park Beer, Gold Star Beer, Country Club Beer, Barbarossa Beer, Mitchell's Beer, Webster Coffee, Pepsi-Cola

TUBE COMPLEMENT

1—12BE6 Oscillator and Mixer tube.
1—12BA6 IF Amplifier tube.
1—50B5 Power Output tube.
1—35W4 Rectifier tube.
1—12AT6 Second Detector and First Audio tube.

ALIGNMENT PROCEDURE

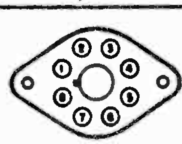
The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: —.1 mfd., — 10 mmf.

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TO TUNE TRIMMERS	REMARKS
IF 455 kc.	12BE6 Grid	.1 mfd.	HF end	IF trimmers C D E F	Tune to max.
535 kc.	12BE6 Grid	10 mmf.	LF end	Osc. trimmer B	Set limit of band
1400 kc.	12BE6 Grid	10 mmf.	1400 kc.	Ant. trimmer A	Tune to max.

SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
12BE6	Osc. and Mixer	0	37.5 AC	99	99	—4.2	0	24.5 AC	0
12BA6	IF Amplifier	0	24.5 AC	0	0	0	99	12.5 AC	99
12AT6	2nd Det.—1st Audio	0	0	0	0	0	16	12.5 AC	0
50B5	Power Output	0	85 AC	91.5	99	0	0	37.5 AC	5.9
35W4	Rectifier	0	117 AC	112 AC	0	112 AC	0	85 AC	112



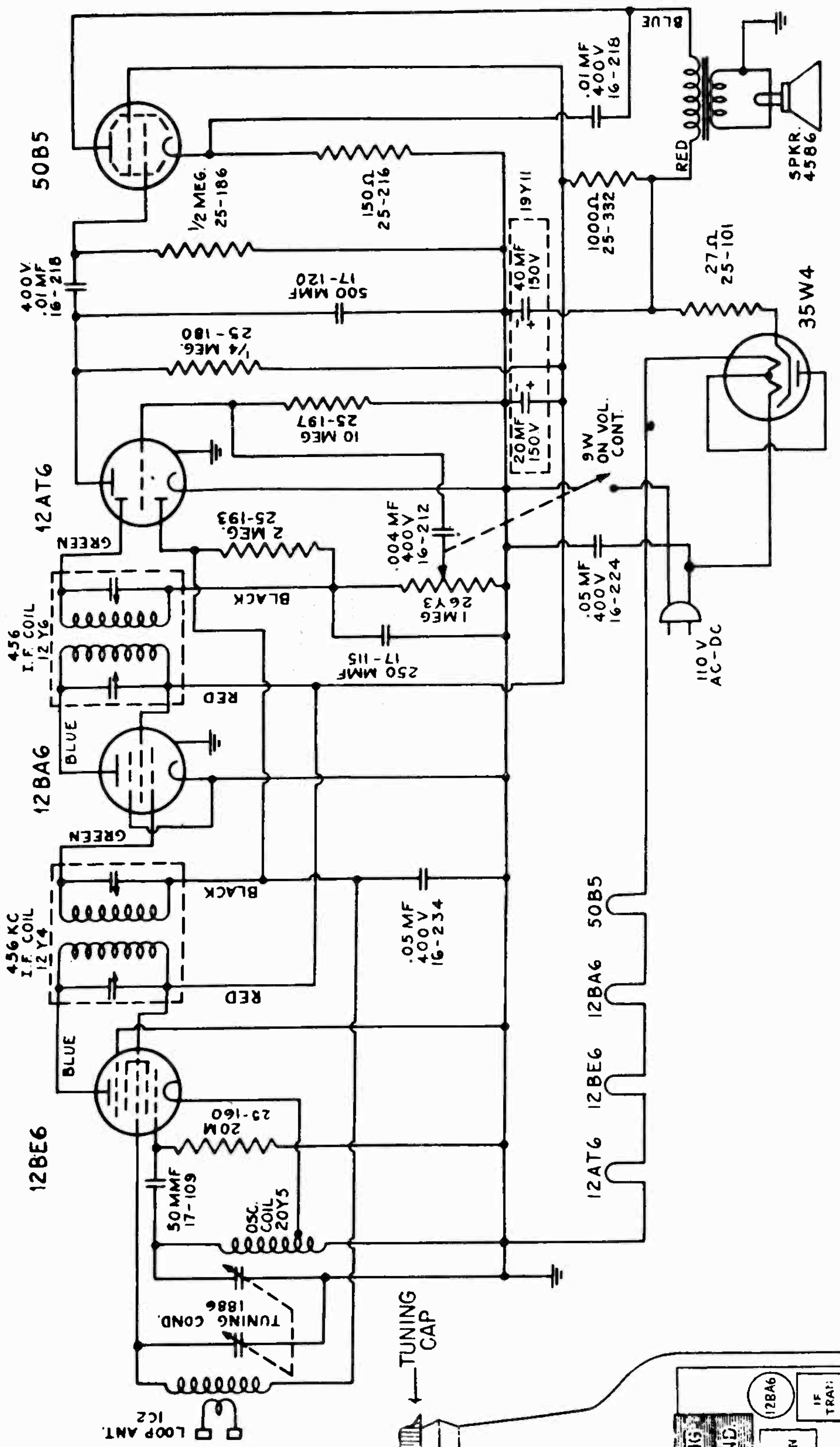
NOTE: All DC voltages measured with a 1000 ohm per volt meter from ON-OFF switch (—B) to socket contact indicated. All AC voltages are measured from ON-OFF switch (—B) to socket contact indicated.
All voltages are positive DC unless otherwise marked.
Volume control full on.
Line voltage 117 volts AC.

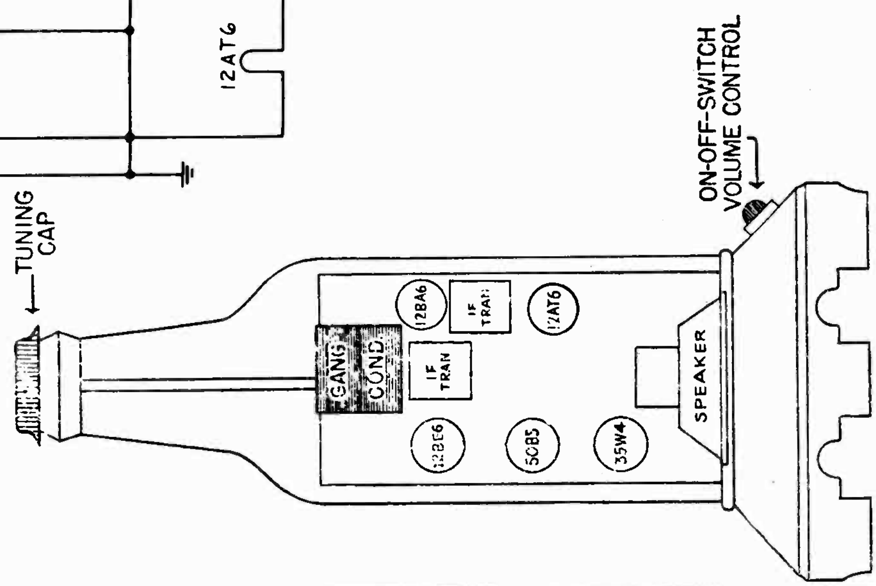
PARTS LIST

PART No.	DESCRIPTION	PART No.	DESCRIPTION
1C2	Loop antenna assembly.	15Y11	Two section electrolytic condenser.
18B6	Tuning gang condenser.	26Y3	Vol. control and switch 1 megohm
12Y4	1st I.F. transformer 456 kc.	20Y5	Oscillator coil.
12Y8	2nd I.F. transformer 456 kc.	45B6	4" PM dynamic speaker.

MODEL Beer
Bottle Type

RADIO DISPLAYS CO.

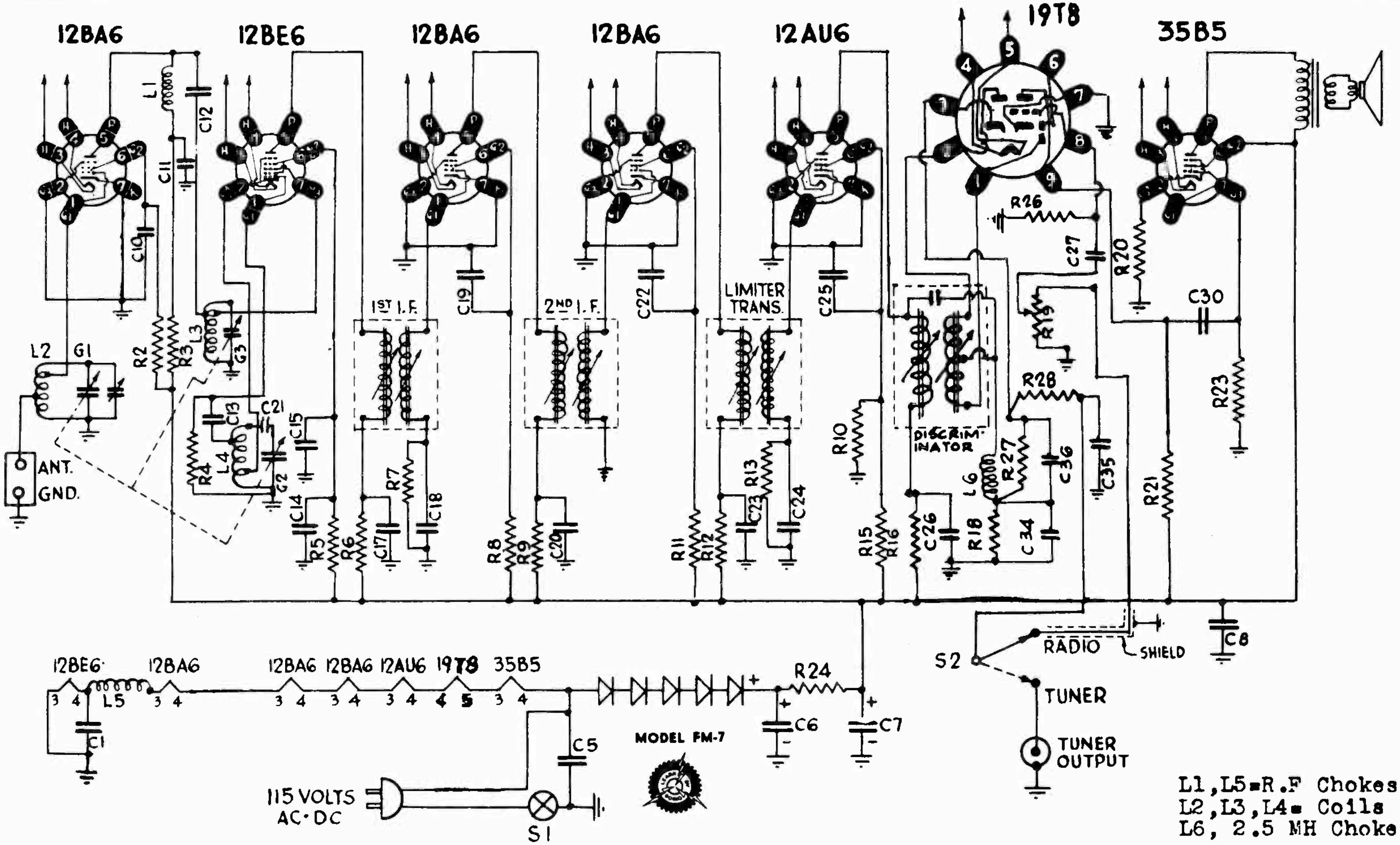




Electrical and Mechanical Specifications

Frequency Range..........540-1700 kc.
Intermediate Frequency..........455 kc.
Power Supply..........105-125 volts AC-DC
Loudspeaker..........4 inch Dynamic
V.C. Impedance..........3.5 ohms at 400 cycles
Power Output (Undistorted)..........75 watts
Power Output (Maximum)..........1.5 watts
Tuning Drive Ratio..........1 to 1
Rated Power Input..........32 watts

RADIO KITS, INC.



L1,L5=R.F Chokes
L2,L3,L4= Coils
L6, 2.5 MH Choke

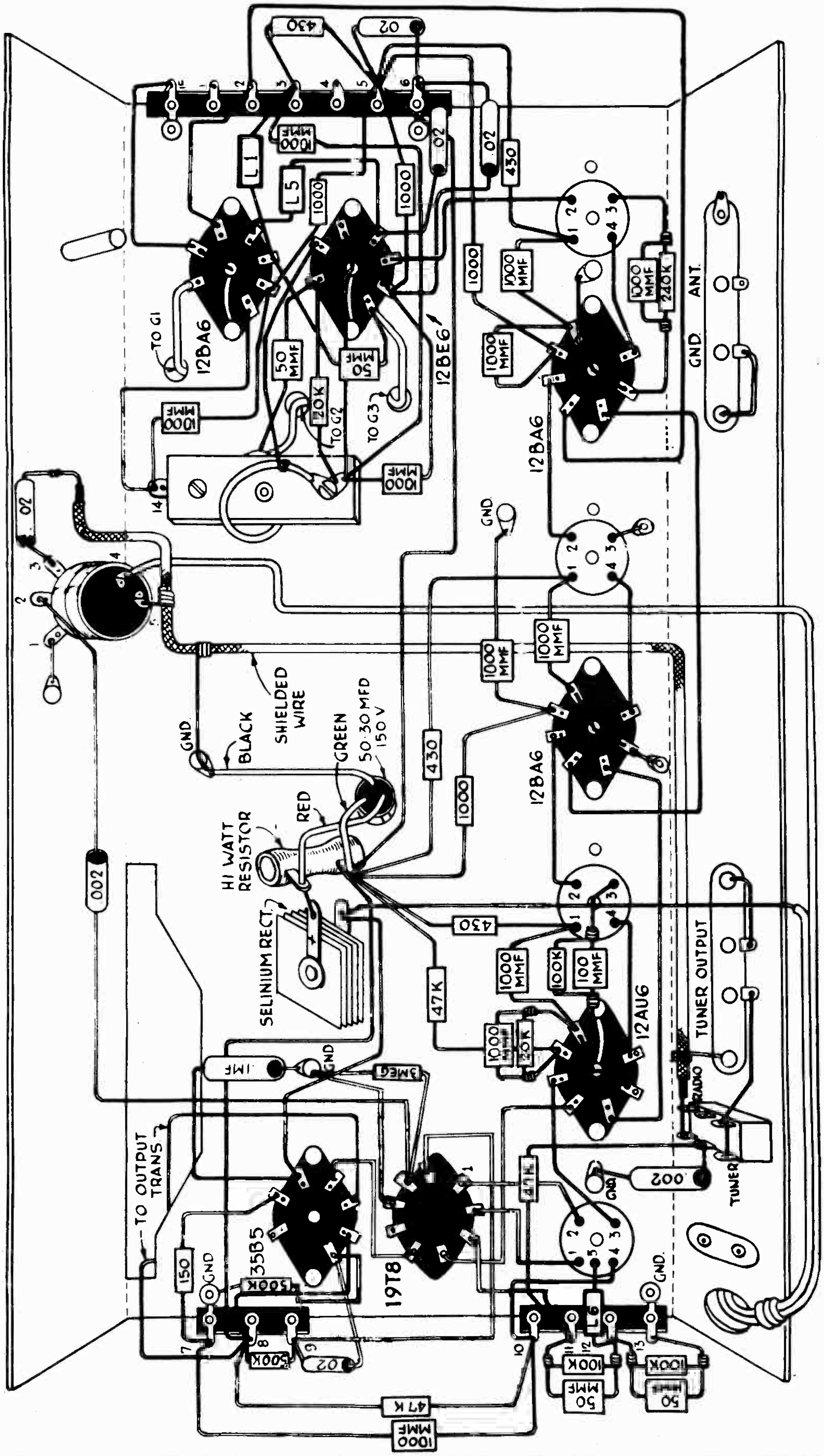
R2-1000	R10-20 K	R19-500 K PoT.	C1-.02	C13-50 mmf#	C22-.001 mf
R3-430	R11-1000	R20-150	C5-.1	C14-1000 mmf*	C23-.001 mf
R4-20 K	R12-430	R21-240 K	C6} 50+30 @ 150V	C15-.02	C24-100 mmf
R5-1000	R13-100 K	R23-500 K	C7}	C17-.001	C25-.001 mf
R6-430	R15-47 K	R24-625 10 watt	C8-.02	C18-1000mmf*	C26-.001 mf
R7-240 K	R16-47 K	R26-3 megs.	C10-1000 mmf*	C19-.001 mf	C27-.002
R8-1000	R18-100 K	R27-100 K	C11-1000 mmf*	C20-.001	C30-.02
R9-430		R28-47 K	C12-50 mmf*	C21-100 mmf#	C34-50 mmf
					C35-.002
					C36-50mmf*

Note: Letter K denotes that the value before it is multiplied by 1000
Example: 20K=20,000

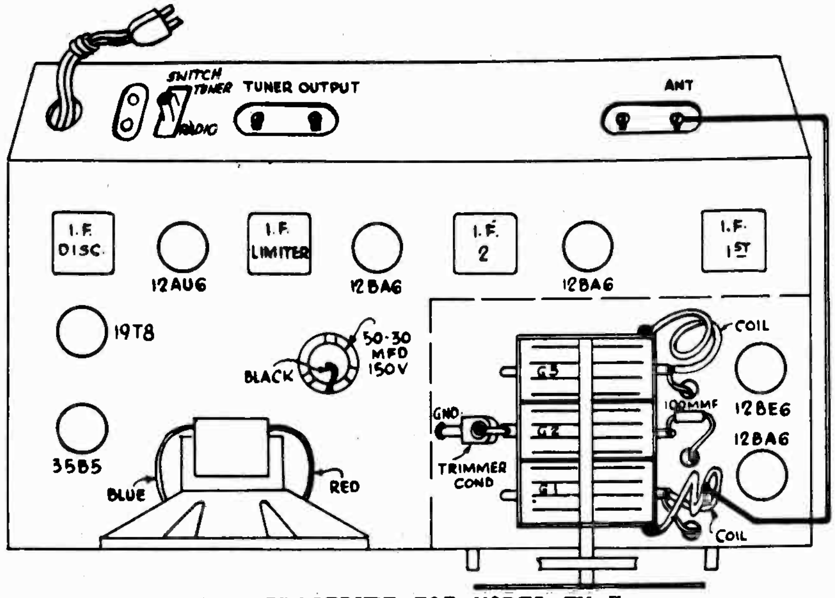
* Use ceramic condensers only
\# Already mounted

MODEL FM-7

RADIO KITS, INC.



RADIO KITS, INC. MODEL FM-7



ALIGNMENT PROCEDURE FOR MODEL FM-7

Alignment Procedure without the Use of Instruments

The I.F. and discriminator transformers are pretracked at the factory and will require only to be peaked to compensate for the additional capacities that are introduced when the set is wired. A signal should be tuned in and each I.F. transformer starting from the limiter and working to the first I.F. should be aligned for maximum signal.

R.F. Alignment

Set the dial pointer to correspond with the station transmitting on the high-frequency end of the dial (make certain that the station desired to be received is transmitting at the time alignment is attempted). Adjust osicllator trimmer until the station to be received is tuned in at the proper dial setting. Adjust the spacing on the antenna coil for maximum response at the high-frequency end of the dial. A station is then tuned in at the low-frequency end of the band and the spacing of the R.F. coil is then adjusted for maximum response. Spacing of the coil is accomplished with the aid of an insulated fibre tool or a small wooden wedge.

Discriminator Alignment

The bottom slug of the discriminator coil should be adjusted for maximum output.

The top slug of discriminator should be adjusted for clear, undisturbed reception. This adjustment is critical and should be adjusted very slowly, until the proper point is reached. It will be noted as a clear spot between two distorted points one above and the other below resonance.

ALIGNMENT WITH THE USE OF INSTRUMENTS

If instruments are available they should be used for proper alignment. Insert a high sensitivity micro-ammeter in series with the limiter grid resistor at the grounded end (R-13). Set the signal generator at 10.7 mc. Apply this signal to the grid of the limiter and adjust I.F. to the maximum meter reading. The signal generator should be applied on the grid of each preceeding stage and the meter left in the limiter grid circuit and each I.F. adjusted for maximum response. Always reduce the input as the sensitivity increases. When the alignment is completed it should be rechecked by placing the signal generator on the grid of the 12BE6 and each transformer should be repeaked for maximum meter deflection. The I.Fs. are now aligned.

The R.F. Section

Apply a 106 mc signal to the antenna terminal. Adjust oscillator trimmer for maximum response on meter. Then adjust antenna coil spacing for maximum response. Reset the signal generator for 90 megacycles. Set dial to 90 megacycles. Adjust spacing of R.F. coil for maximum response. The R.F. alignment is now completed.

The Discriminator Alignment

Remove the meter from the limiter grid circuit and place a high-sensitivity volt meter in the order of 20,000 ohms per volt or a DC vacumm tube volt meter from R-18 to ground. Apply a 10.7 mc signal to grid of limiter tube. Adjust bottom slug on discriminator I.F. for maximum deflection. Then adjust top slug on the discriminator I.F. for zero (minimum deflection). This completes alignment of the receiver.

MODEL 3W10A

RADIO KITS, INC.

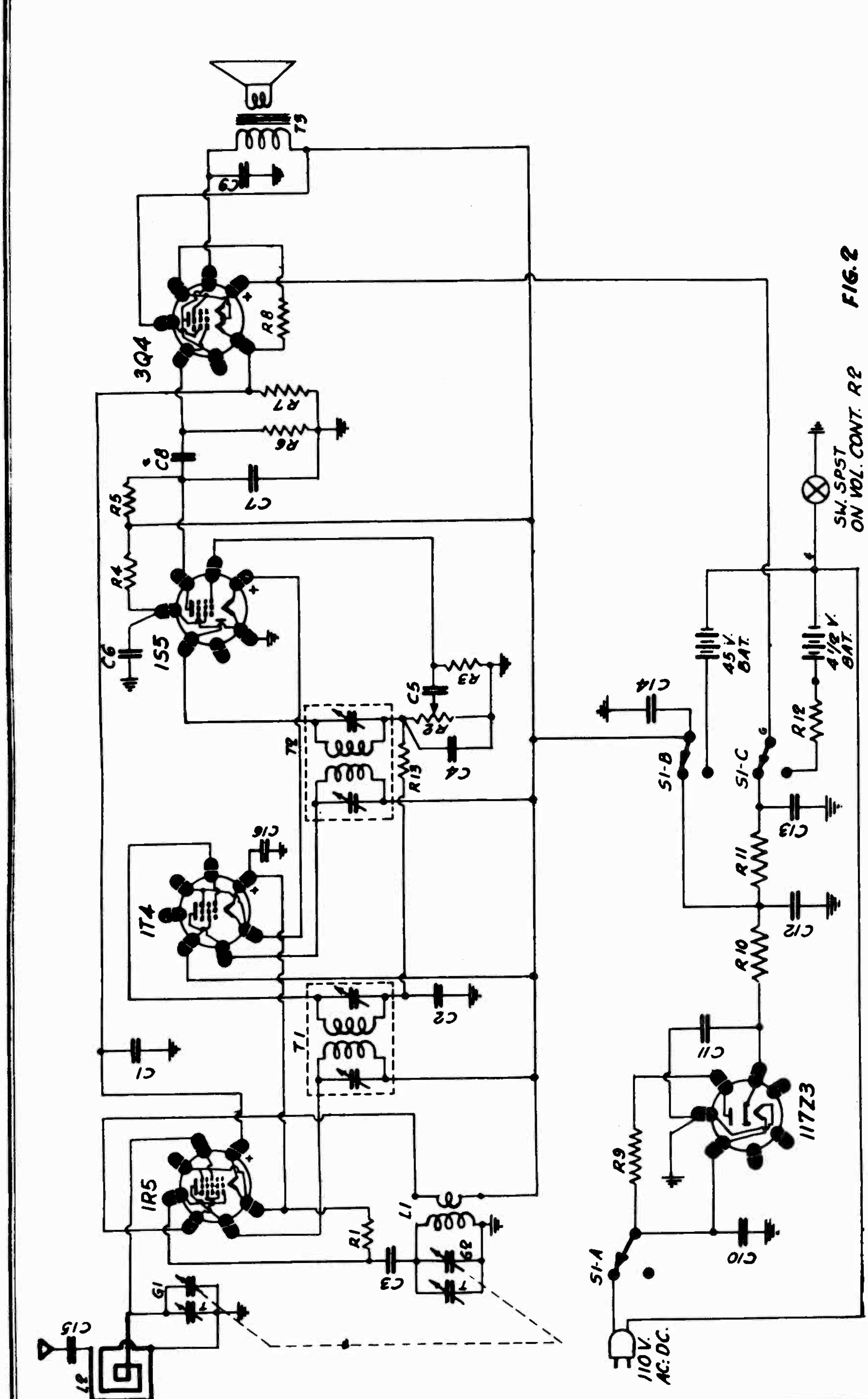


FIG. 2

SYMBOL	VALUE
R 1	100K
R 2	500K Pot
R 3	10M
R 4	3M
R 5	1M
R 6	500K
R 7	1K
R 8	270 ohm
R 9	33 ohm
R 10	(700 10 watts
R 11	(1550
R 12	33 ohm
R 13	2 meg

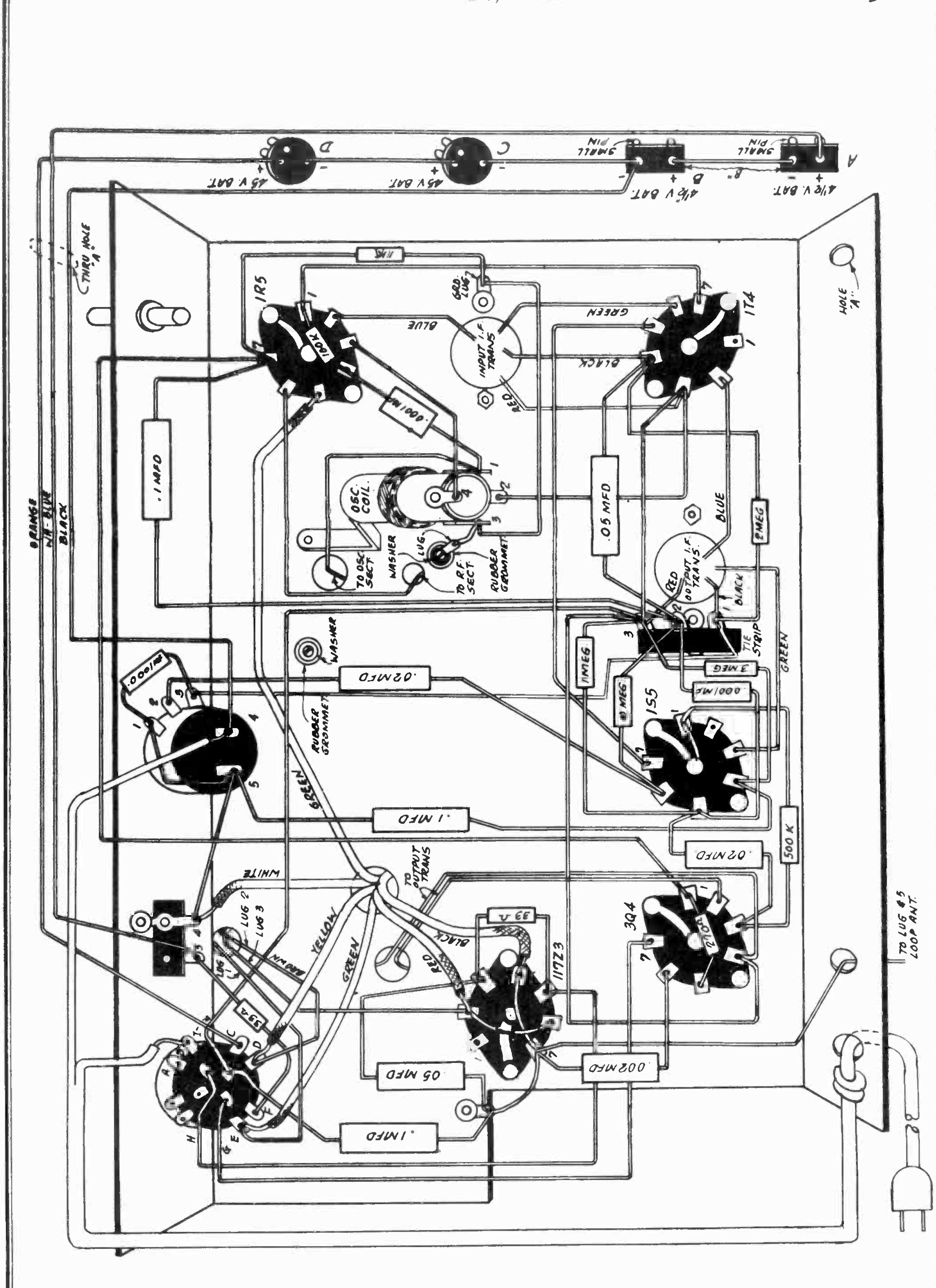
All resistors ½ watt unless otherwise specified

SYMBOL	VALUE
C 1	.1 MF
C 2	.05 MF
C 3	.0001MF
C 4	.0001MF (100 MMF)
C 5	.02 MF
C 6	.1 MF
C 7	.0001MF (100 MMF)
C 8	.02 MF
C 9	.002 MF
C 10	.05 MF
C 11	80 MF @ 150V
C 12	40 MF @ 150V
C 13	100MF @ 25V
C 14	.1 MF
C 15	.02 MF
C 16	100 MF @ 25V

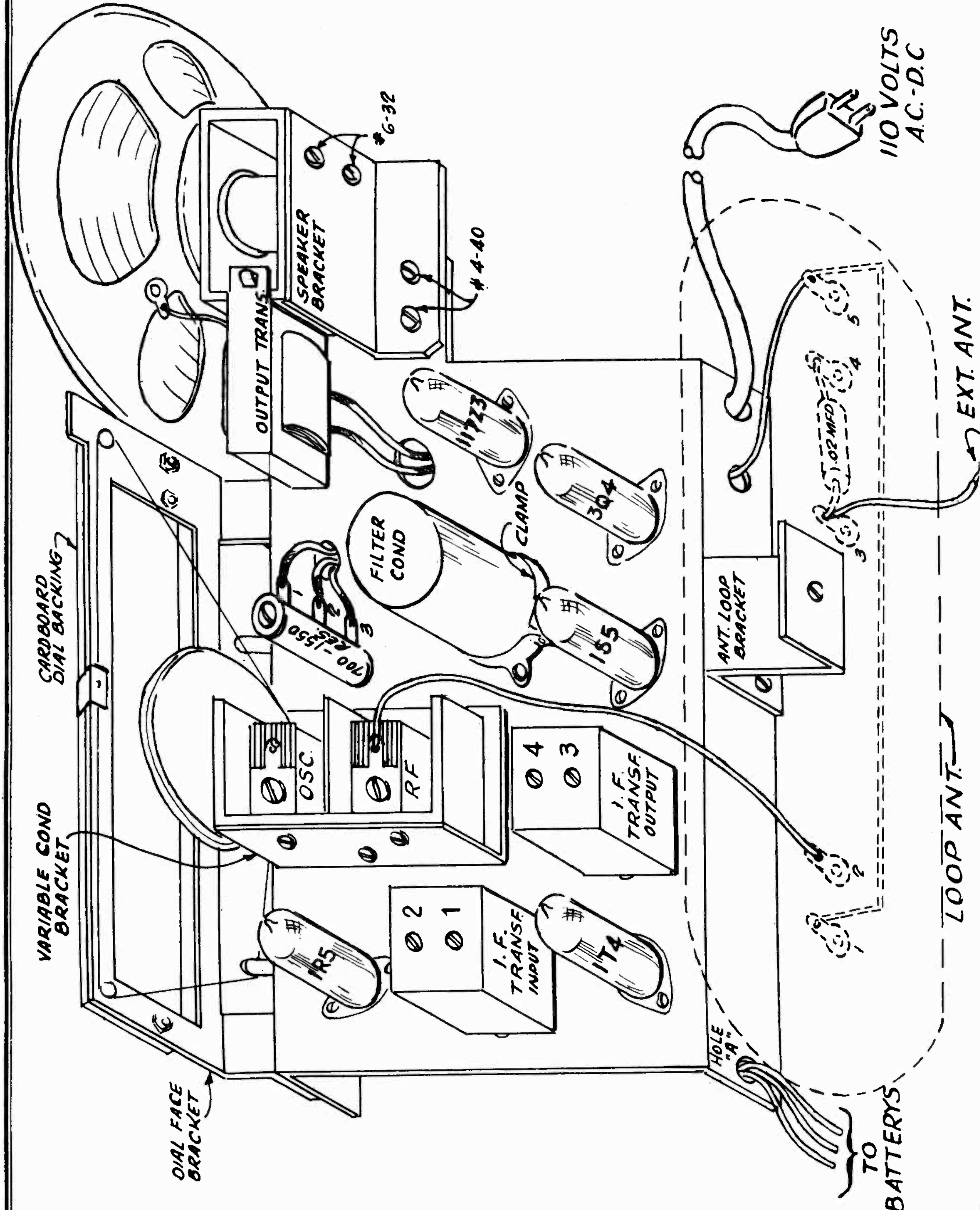
SYMBOL	VALUE
L 1	Osc. coil
L 2	Loop antenna
S 1A, S 1B, S 1C	Selector switch
T 1	Input IF trans.
T 2	Output IF trans.
T 3	Output trans. (speaker)

RADIO KITS, INC.

MODEL 3W10A



MODEL 3W10A RADIO KITS, INC.



RADIO KITS, INC. MODEL 3W10A

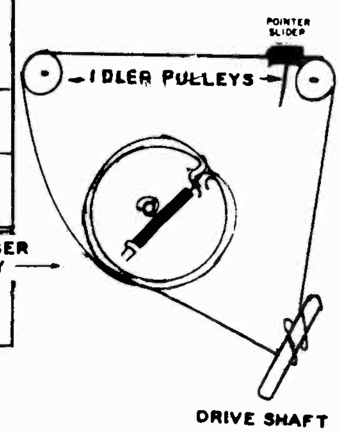
SERVICING NOTES

All specifications and measurements based on 117 volts, 60 cycles, and all readings based on a 20,000 ohms per volt meter. All readings are taken with volume control (switch No. 2) in maximum clockwise position. Apply the lowest signallevel from the signal generator.
Output: 50 mw into a 3.2 ohm voice coil impedance.
Approximate reading 0.4 volt.

I.F. ALIGNMENT: With signal generator, set a 455 KC, apply signal through a .1 MFD condenser dummy to R.F. grid of convertor (1R5) or the stator of RF section of the variable condenser (condenser must be fully meshed). Peak I.F. trimmers 1,2,3,4, (top view diagram) to give maximum reading on output meter connected across voice coil. (Note: If for any possible reason the signal does not come through indicating the receiver is way out of alignment, apply the signal to the grid of the I.F. Amplifier (1T4) and tune signal in by trimmers 3,4 of second IF. transformer. Peak for maximum and once this stage is tuned, repeat above procedure).

R.F. ALIGNMENT: With signal generator, set at 1400 KC, apply signal through a dummy antenna (200 mmf condenser) to the antenna loop wire. Set dial of receiver to 1400 KC and peak trimmers 5 & 6 to give maximum reading of output meter. Then set signal generator at 600 KC and tune receiver to 600 KC mark on dial. This setting should fall on calibrated point.

Generator Connection	Dummy Ant.	Freq.	Adj. Trimmers	Output	Sensitivity uv.
Stator large section gang open	.1 MFD cond.	455 KC	1,2,3,4,	Max.	120
Antenna loop wire	200 mmf cond.	1400 KC	5 & 6	Max.	50
Antenna loop wire	200 mmf	600 KC	Variable plates	Max.	150
Battery Complement: 2—4½ Volt "A" Batteries Eveready No. 746 or equivalent; 2—45 Volt "B" Batteries Eveready No. 482 or equivalent					



VOLTAGE MEASUREMENT

All reading in AC-DC position of power selector switch with 20,000 ohms per meter. Readings taken are referred to ground.

117Z3

PIN	AC	DC	RESISTANCE IN OHMS
1	117V	--	540
2		120V	2000
3	117V	--	500
4	—	--	---
5	117V	--	500
6	120V	--	2000
7	—	--	---

3Q4

PIN	DC	RESISTANCE IN OHMS
1	4.8V	50
2	86V	2000
3	——	500,000
4	88V	1500
5	6V	50
6	86V	2000
7	7.6V	70

1S5

PIN	DC	RESISTANCE IN OHMS
1	--	---
2	--	---
3	--	400,000
4	19V	3,000,000
5	7.8V	1,500,000
6	--	10,000,000
7	1.5V	260

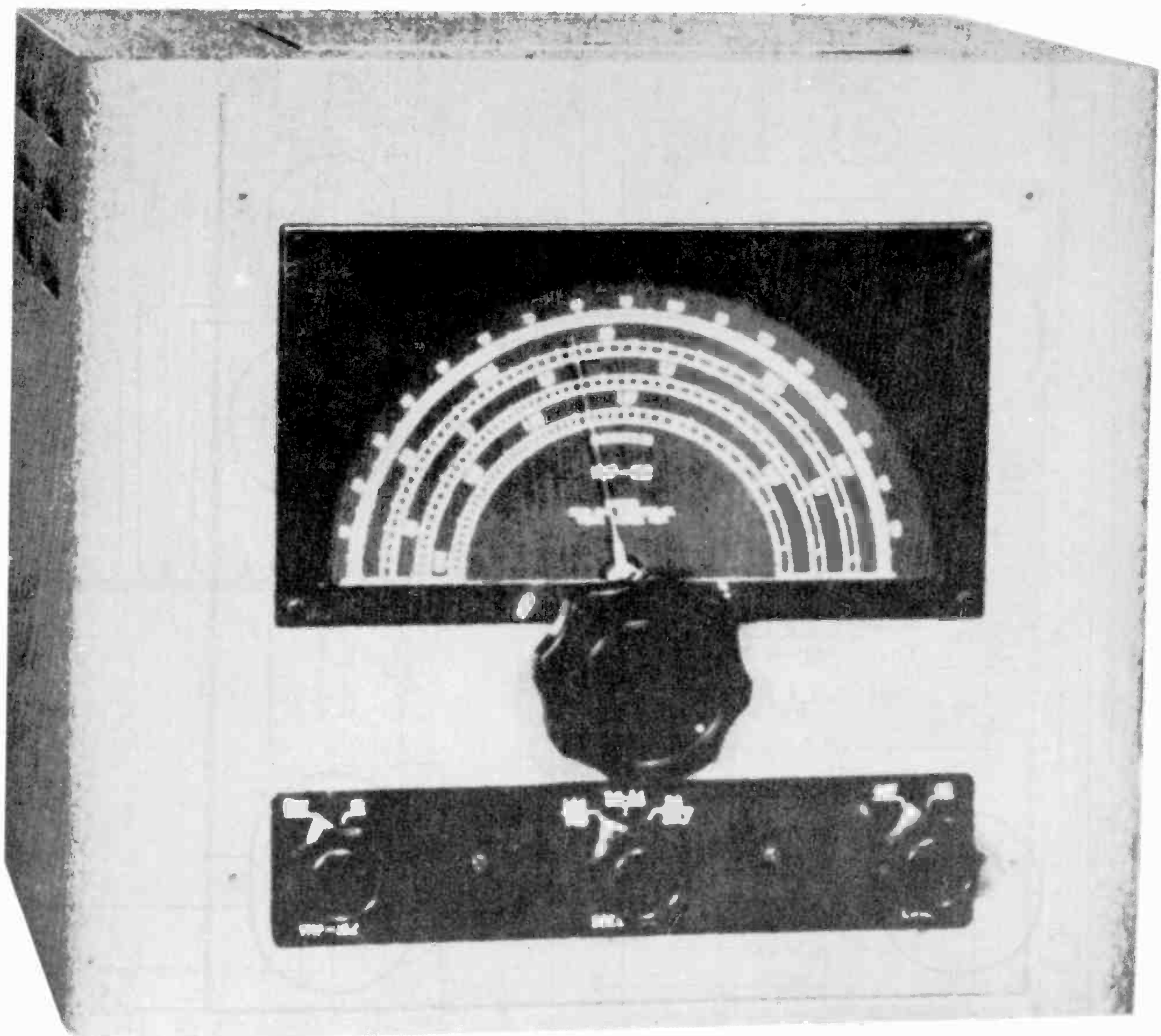
1T4

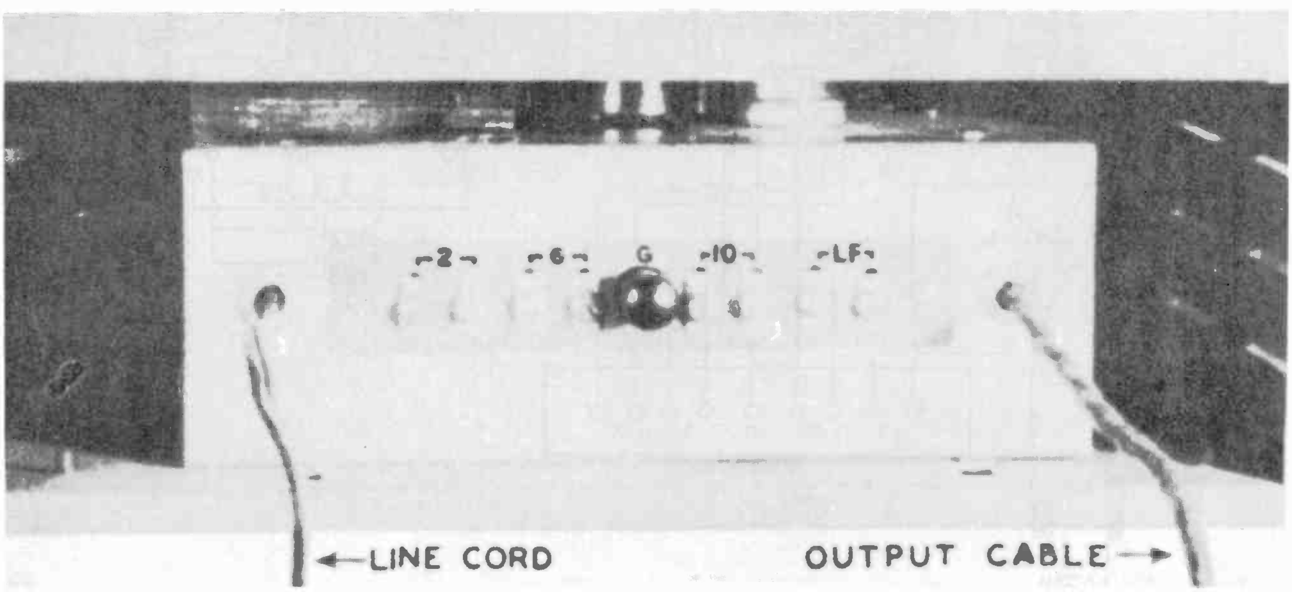
PIN	DC	RESISTANCE IN OHMS
1	1.5V	260
2	88V	1500
3	88V	1500
4		---
5	1.5V	---
6		2,200,000
7	3V	45

1R5

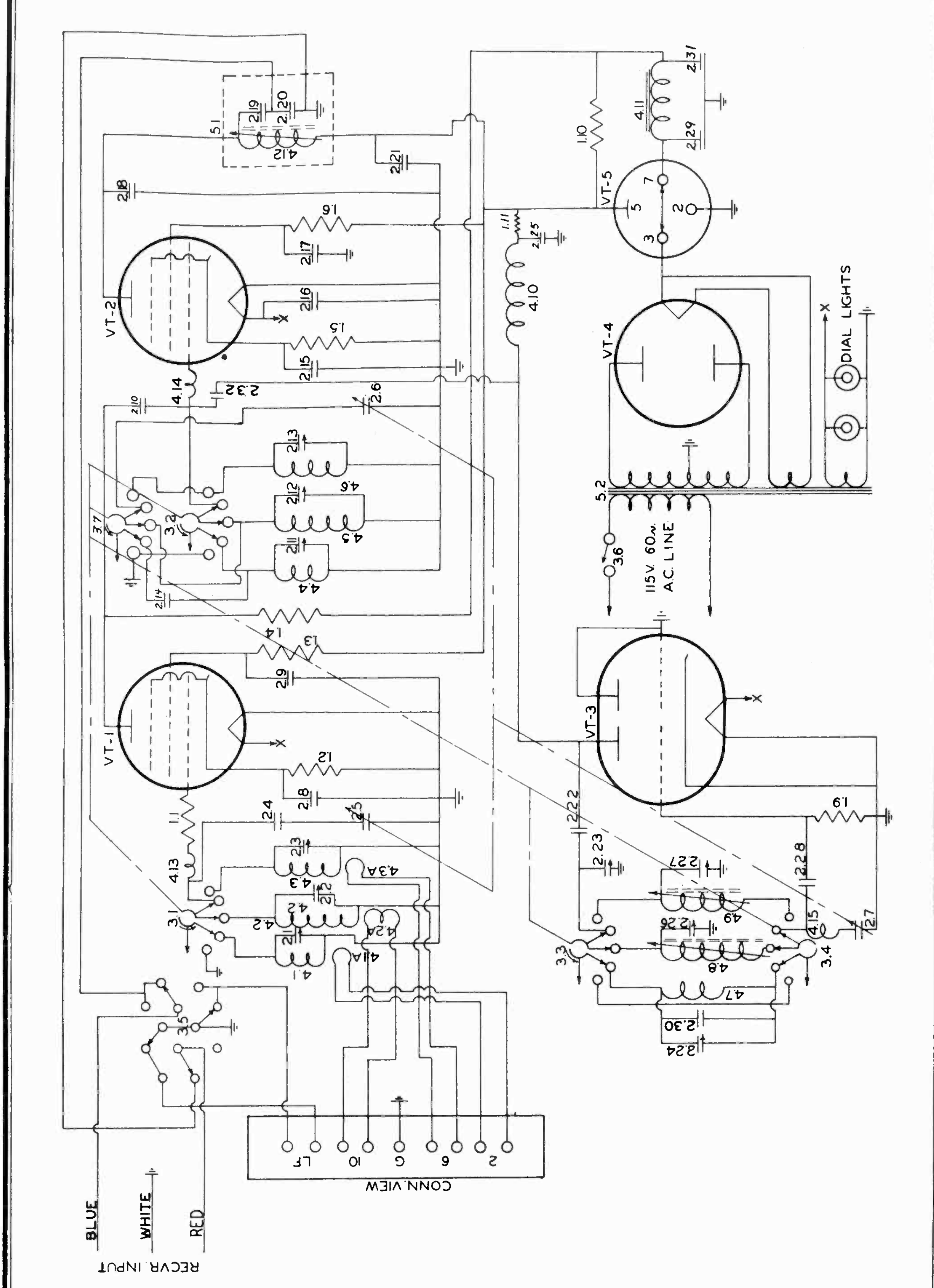
PIN	DC	RESISTANCE IN OHMS
1	3.3V	45
2	88V	1500
3	88V	1500
4	--	85
5	1.6V	45
6	--	--
7	2.3V	50

RADIO MFG. ENGINEERS INC. MODEL VHF-152

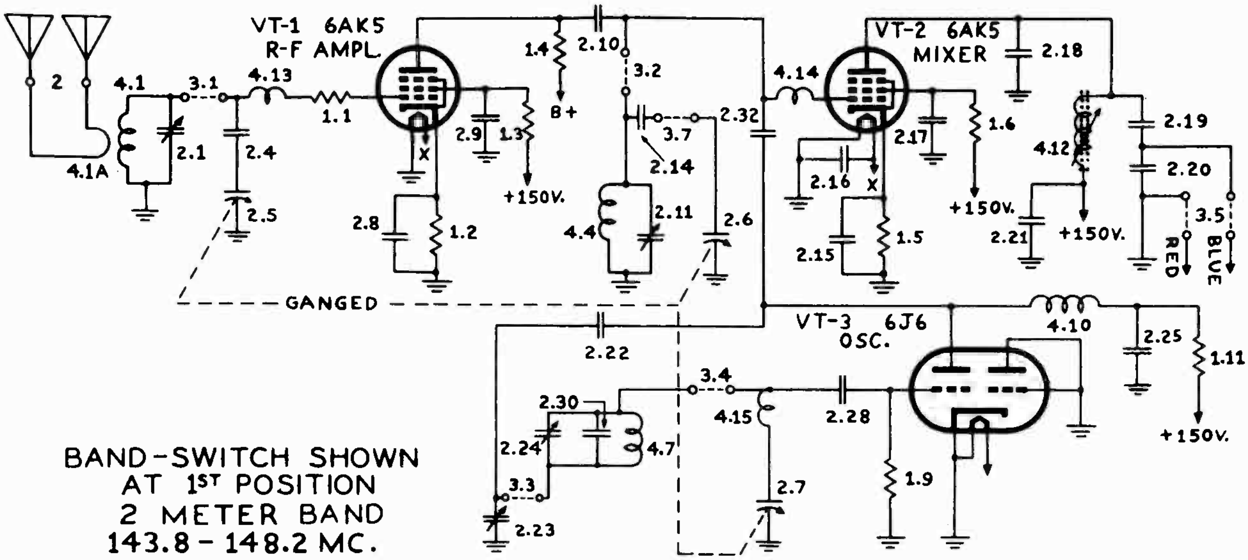




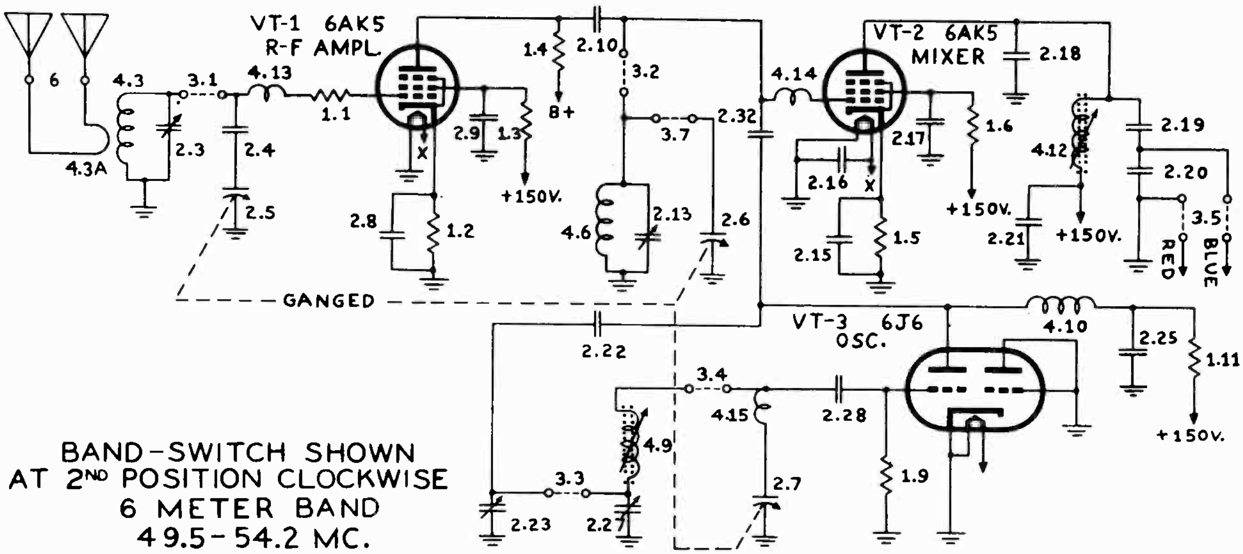
MODEL VHF-152 RADIO MFG. ENGINEERS INC.



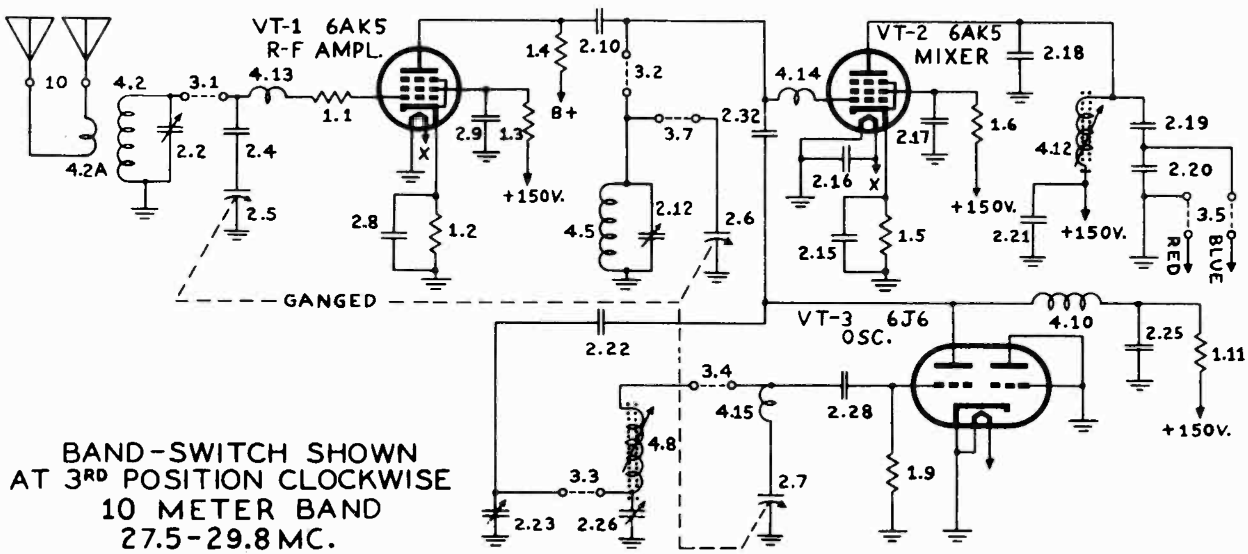
RADIO MFG. ENGINEERS INC. MODEL VHF-152



BAND-SWITCH SHOWN
AT 1ST POSITION
2 METER BAND
143.8 - 148.2 MC.

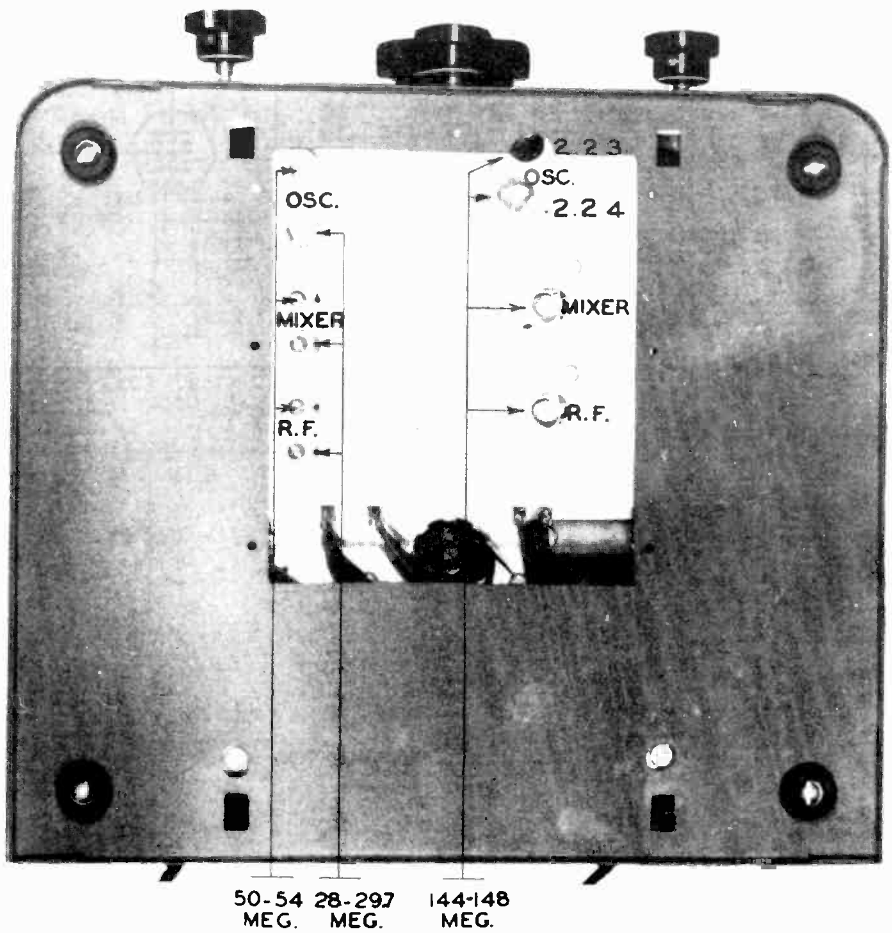


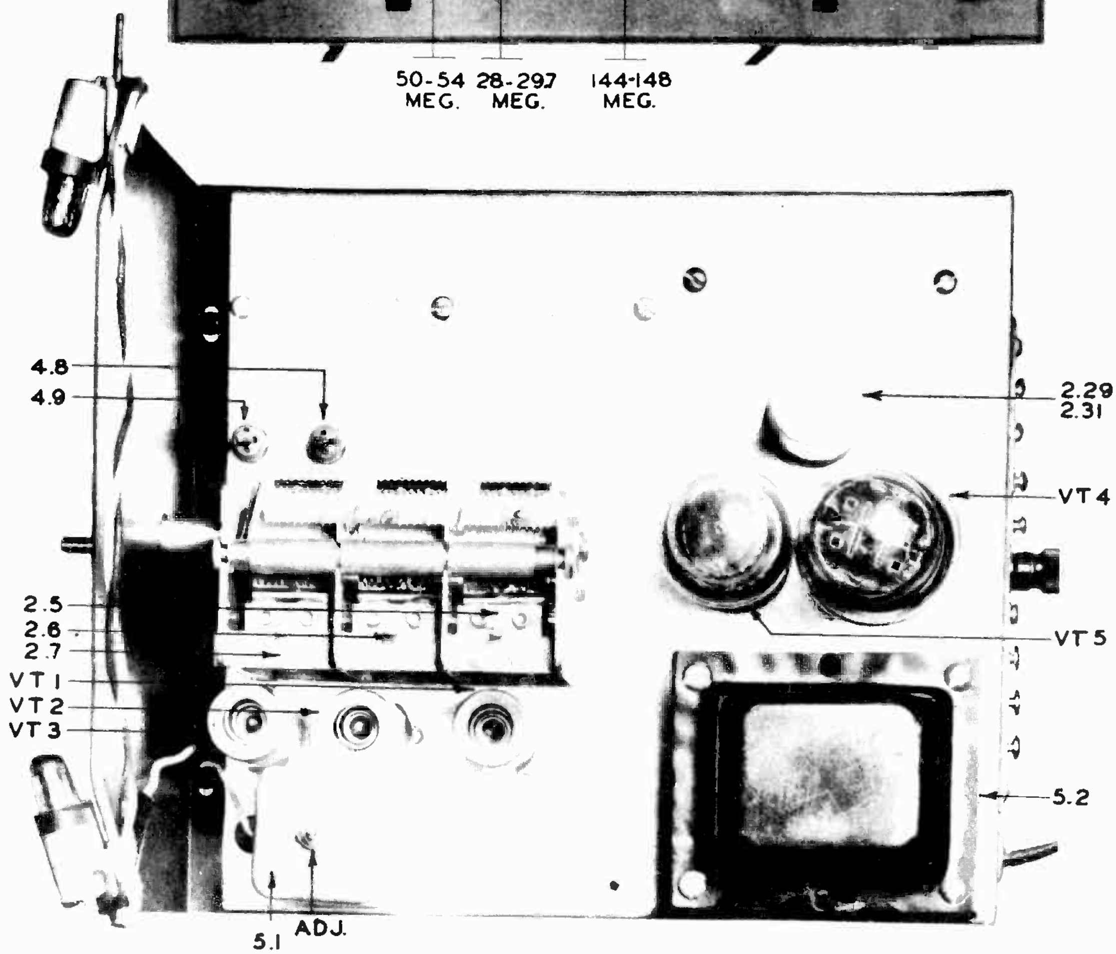
BAND-SWITCH SHOWN
AT 2ND POSITION CLOCKWISE
6 METER BAND
49.5 - 54.2 MC.



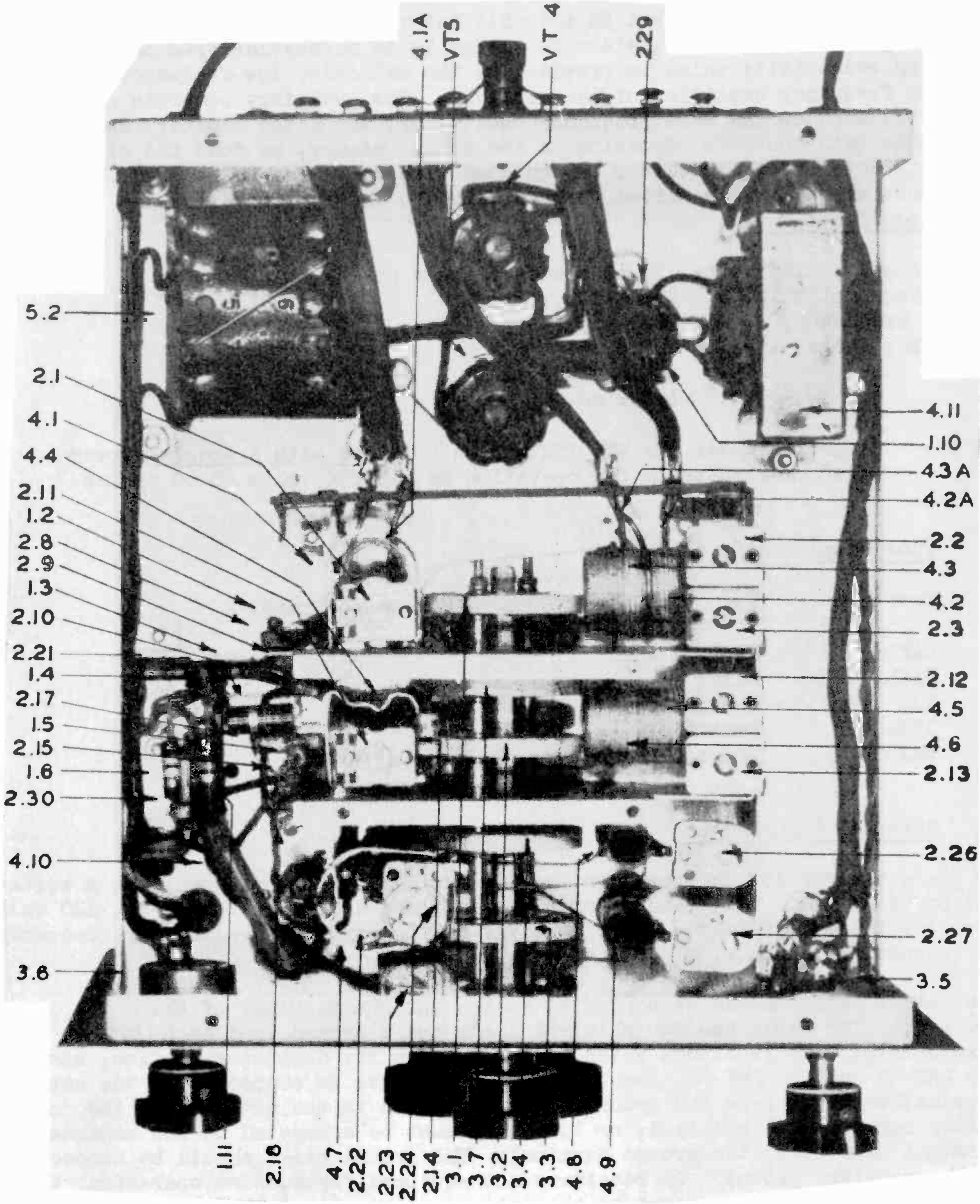
BAND-SWITCH SHOWN
AT 3RD POSITION CLOCKWISE
10 METER BAND
27.5 - 29.8 MC.

MODEL VHF-152 RADIO MFG. ENGINEERS INC.





RADIO MFG. ENGINEERS INC. MODEL VHF-152



MODEL VHF-152 RADIO MFG. ENGINEERS INC.

The VHF-152 Frequency Converter has been designed for use with a conventional communication type receiver to extend its range to cover the 10, 6 and 2 meter amateur bands. The unit consists of an RF amplifier, a mixer, and a high frequency oscillator. The function of the unit is to convert the very high frequencies received by it to a new fixed frequency of 7 megacycles which is fed to the receiver and amplified and detected in the normal manner. This system of receiving may be described as a double heterodyne system. Its advantages are: high image rejection, since the image is 14 megacycles from the signal; and high selectivity which is provided by the selective low frequency intermediate frequency amplifier of the receiver. The auxiliary controls on the receiver, such as the beat frequency oscillator, the noise limiter, and RF and audio gain controls, function in the normal manner, as does the signal strength meter if the receiver is equipped with one. The RME-45 and RME-84 Receivers are admirably suited for use with the VHF-152 Converter.

Specifications

Power Supply: 115 volts, 50-60 cycles, single phase*
Power Consumption: 40 watts @ 115 volts
Output Frequency: 7 mc (7000 kc)
Frequency Range: 27.5 - 29.8 mc
49.5 - 54.2 mc
143.8 -148.2 mc

*NOTE: On special order the VHF-152 may be obtained with a special power transformer suitable for operation on 115-230 volts 25-60 cycles.

Tube Complement

	Type	Use	Schematic Symbol
1.	6AK5	RF Amplifier	V1
2.	6AK5	Mixer	V2
3.	6J6	Oscillator	V3
4.	5Y3G	Rectifier	V4
5.	VR150	Voltage Regulator	V5

External Connections

To place the VHF-152 in operation the line cord should be plugged into a suitable power source. The standard model is designed for operation on 100-120 volt 50-60 cycle AC line only. Use of the VHF-152 on any other voltage or frequency may result in damage.

The output cable should be connected to the antenna terminal of the receiver. The cable has two shielded leads and a ground lead each ending in a terminal lug. On receivers which have provision for doublet operation, such as the RME-45 and the RME-84, the blue coded lead must be connected to the antenna terminal farthest from the ground terminal. This is the hot side of the converter output. The red lead, or low side, must be connected to the antenna terminal nearest to the ground terminal. The ground braid should be connected to the receiver ground. On receivers not equipped for doublet operation, the blue lead should be connected to the antenna terminal and the red and ground (shield) leads should be connected to the receiver ground. This lead is coded white. Unless the above instructions are followed, the changeover switch will not operate properly.

If an RME DB-20 Preselector is used ahead of the receiver, the connections will be made as above except that the converter output cable connects in the same manner to the DB-20 antenna terminals instead of to the receiver.

Precautions

IMPORTANT - Attempted operation of the VHF-152 on any voltage or frequency than that for which it is designed will result in damage to the unit. The operator must be sure that the supply is correct before plugging in the converter.

Antennas

On frequencies of 30 megacycles and above, the use of a resonant antenna is mandatory. For this reason the VHF-152 is provided with separate antenna connection for each frequency band. On the terminal strip on the rear apron are four sets of two terminals each. These terminals are marked "2" for the 144-148 mc band: "6" for the 50-54 mc band, and "10" for the 28-29.7 mc band. The input impedance for each band has been designed to be 300 ohms so that the owner may make use of the 300 ohm twin lead line now available. The remaining set of two terminals marked "LF" are for connecting the low frequency antenna used with the receiver. This pair of terminals is connected through to the receiver when the antenna changeover switch is turned to "OUT".

Operation and Circuit Details

Introduction

The VHF 152 operates in conjunction with a communication type receiver tuned to approximately 7 mc. The accuracy of setting the receiver will effect the accuracy of calibration of the VHF-152 by the same amount. That is to say if the low frequency receiver is off 100 kilocycles, the calibration of the VHF-152 will also be off by 100 kilocycles. It should be noted that the operator is not bound to use the output frequency of exactly 7.0 mc. If interference is encountered he may move the receiver tuning slightly to a clear channel, realizing that the VHF-152 calibration will change by the same amount the low frequency receiver was moved. If it is necessary to move the receiver frequency so far that the calibration is affected, he may recalibrate by following instructions in Section IV. It is not recommended that the output frequency be moved more than 150 kc higher or lower than 7.0 mc because of tracking troubles that may be encountered. In the factory the I.F. is left aligned at 6950 kc.

In double heterodyne receiving systems spurious signals may be received which are harmonics of the receiver local oscillator. On the VHF-152 two such signals may be received. One signal will be heard at 29.8 mc, which is outside the 28-29.7 mc band. Another may be heard at 52.2 mc. If it is found that this spurious signal falls on a real signal which is desired, the spurious signal may be moved by changing the receiver tuning slightly.

Line Switch

The equipment is turned on by means of the line switch on the right hand side of the control panel.

Changeover Switch

On the left side of the control panel is the changeover switch. When this switch is turned to "IN", the output of the VHF-152 is fed to the receiver input terminals. At the same time the low frequency antenna terminals are grounded to prevent 7 mc signals from feeding through the VHF-152 to the receiver. When the changeover switch is turned to "OUT" the output of the VHF-152 is grounded and the low frequency "LF" antenna terminals are connected through the receiver. Thus by turning the changeover switch to "OUT" the receiver functions normally.

Band Switch

In the center of the control panel is the band change switch. This switch has three positions marked: 144-148, 50-54, and 28-29.7, and is used to switch the VHF-152 to the desired range.

RF Stage Peaking

When the VHF-152 leaves the factory, the stages are peaked to maximum sensitivity. It may be found that some antennas may reflect a reactance into the RF stage that will detune it slightly. With the antenna for a certain band connected the RF padder for that band may be peaked up by listening to a signal. Figure IV shows the location of the RF padders for each band. To get at the padders it is necessary to remove the bottom cover plate.

IF Stage Peaking

The IF transformer on the VHF-152 is peaked at the factory at 6.95 mc. Different receivers connected to the output may change this tuning slightly. The owner should check the peaking of this transformer with the receiver connected. Peaking is accomplished by turning the screw on the top of the can. The screw should be adjusted for maximum gain as indicated by a received signal or maximum background noise if a signal is not available.
The owner may, if he has an accurate signal source available, recalibrate his converter as discussed in succeeding paragraphs. It should be born in mind that the calibration of the converter is affected by the setting of the companion receiver. Therefore, before attempting to recalibrate the converter, the calibration of the receiver should be checked.

The VHF-152 will drift somewhat during the first three minutes after being turned on and to a much less extent during the next ten or twenty minutes. It is recommended that no attempt be made to recalibrate or align the equipment until it has reached a stable temperature.

All calibrating and alignment should be done with the receiver connected and the changeover switch in the "IN" position.

If the receiver has a carrier level meter such as is on the RME-45, this meter is used as a tuning indicator when peaking the circuits. If the receiver is not equipped with a meter, it will be necessary to connect an audio output meter to the receiver for a tuning indicator. When using an audio output meter, it is necessary to remove the AVC from the receiver.

IF Coil Alignment

As pointed out. the VHF-152 is calibrated and aligned for an output frequency of 6.95 mc. The output tuning is controlled by the screw on the top of the aluminum can on the top of the chassis. The tr may be peaked with a 6.95 mc signal fed into the mixer grid or with a signal tuned in on the converter. Connection to the mixer grid is most easily made on the stator of the center section of the tuning condenser. In either case, the transformer is adjusted to maximum sensitivity as indicated by the meter on the receiver.

Calibration

Calibration of the VHF-152 should not be attempted unless it is definitely established that the calibration is off.

Calibration is controlled by the oscillator padders. These padders are made accesible by removal of the cabinet bottom plate. Beneath this plate is a second aluminum plate in which are padder access holes. All calibrating and aligning should be done with this cover on.

High beat is used on all bands. That is to say, the oscillator is always 7 mc (approximately) above the received signal. As in the case of all super heterodyne receivers, if sufficient input is used each signal may be received at two points differing by twice the IF frequency. With a signal being received, the padder setting that gives the highest oscillator frequency is the proper setting.

The two low frequency ranges have iron core oscillator coils. The screws for adjusting the inductance of these coils is accessible on the top of the chassis. Unless the screws have been disturbed, adjustment should never be necessary.

RF Alignment

When the calibration is correct, the RF circuits should be aligned. Each of the R-F padders should be adjusted for maximum sensitivity as indicated by the meter on the receiver.

When using a signal generator in aligning the VHF-152 a 300 ohm resistor should be inserted between the signal generator and the antenna terminals in order that the low impedance of the signal generator will not swamp the RF circuit and cause a misalignment of this circuit. Best results will be obtained when the RF circuit is aligned with the antenna connected.

Voltage Charts

As an aid in trouble shooting on the VHF-152, the following chart of voltages at various points in the circuit is tabulated below. Voltage readings should be made with a voltmeter of at least 2000 ohms per volt resistance. Variation of ± 15% may be expected. All voltages are measured from the point indicated to ground.

Circuit	Volts
RF Plate	190
RF Screen	115
RF Cathode	1.9
Mixer Plate	150
Mixer Screen	121
Mixer Cathode	6.0
Osc. Plate	49
Osc. Grid*	-12.0 (10 meters), - 7.0 (6 Meters), - 3.0 (2 Meters)

* Note: With a 2.5 mh choke in series with the voltmeter lead.

Parts List

No.	Component
1.1	20 ohm 1/2 watt ± 20% carbon
1.2	220 ohm 1/2 watt ± 10% carbon
1.3	15K ohm 1/2 watt ± 10% carbon
1.4	18K ohm 2 watt ± 10% carbon
1.5	2200 ohm 1/2 watt ± 5% carbon
1.6	250K 1/2 watt ± 10% carbon
1.9	4.7K ohm 1/2 watt ± 10% carbon
1.10	3.5K ohm 10 watt Brown Devil
1.11	18K ohm 2 watt ± 10%
2.1	30 Mmfd. - Mica Padder
2.2	20 Mmfd. - Mica Padder
2.3	20 Mmfd. - Mica Padder
2.4	25 Mmfd. - Ceramic ± 10% Neg.Coeff
2.5	Tuning Condenser, Rear Sec. (RF)
2.6	Tuning Condenser, Middle Sec.(Mixer)
2.7	Tuning Condenser, Front Sec. (Osc.)
2.8	1000 Mmfd. ± 20% 500 volt
2.9	1000 Mmfd. ± 20% 500 volt
2.10	100 Mmfd. Ceramic ± 10%
2.11	30 Mmfd. Mica Padder
2.12	20 Mmfd. Mica Padder
2.13	20 Mmfd. Mica Padder
2.14	15 Mmfd. Ceramic ± 5%
2.15	1000 Mmfd. ± 20% 500 volt
2.16	1000 Mmfd. ± 20% 500 volt
2.17	1000 Mmfd. ± 20% 500 volt
2.18	25 Mmfd. Ceramic ± 10% Neg. Coeff
*2.19	100 Mmfd. ± 5% 500 volt
2.20	1000 Mmfd. ± 20% 500 volt
2.21	.01 Mfd. Paper 600 volt
2.22	25 Mmfd. Ceramic ± 10% Neg. Coeff
2.23	3-13 Mmfd. Ceramic Padder, Neg. Coeff
2.24	3-13 Mmfd. Ceramic Padder, Neg. Coeff
2.25	1000 Mmfd. ± 10% 500 volt
2.26	3.13 Mmfd. Ceramic Padder, Neg. Coeff
2.27	3-13 Mmfd. Ceramic Padder, Neg. Coeff
2.28	25 Mmfd. Ceramic ± 10% Neg. Coeff
2.29	10 Mfd. Electrolytic 450 volt
2.30	20 Mmfd. Ceramic ± 5% Neg. Coeff
2.31	10 Mfd. Electrolytic 450 volt
2.32	1.5 Mmfd. ± .25 Mmfd.
3.1	R.F. Switch Section, Ceramic
3.2	Mixer Switch Section, Ceramic
3.3	Osc. Plate Switch Section, Ceramic
3.4	Osc. Grid Switch Section, Ceramic
3.5	Changeover Switch 4 pole, 2 position
3.6	A.C. Line Switch Single Pole Single Throw
3.7	Mixer Switch Section, Ceramic

No.	Component
4.1	2 Meter R.F. Coil
4.2	10 Meter R.F. Coil
4.3	6 Meter R.F. Coil
4.4	2 Meter Mixer Coil
4.5	10 Meter Mixer Coil
4.6	6 Meter Mixer Coil
4.7	2 Meter Osc. Coil
4.8	10 Meter Osc. Coil
4.9	6 Meter Osc. Coil
4.10	Osc. Plate Choke ± 10% 2.5 Microhenry
4.11	Power Supply Filter Choke
*4.12	7 mc I.F. Coil
4.13	R.F. Lead Inductance
4.14	Mixer Leader Inductance
4.15	Osc. Lead Inductance
5.1	7 mc I.F. Transformer
5.2	Power Transformer
VT-1	6AK5
VT-2	6AK5
VT-3	6J6G
VT-4	5Y3GT
VT-5	VR150-30

*In some units the coil 4.12 will be fixed in inductance and capacitor 2.19 will be 100 mmfd. - adjustable.

RADIO & TELEVISION INC.

MODELS D-1000, D-1100, T-9000, T-2200, T-2200X

TUBE COMPLEMENT

Type	Function	Type	Function
6AG5	FM RF Amplifier	6H6	Ratio Detector
6SB7Y	FM Converter	6SK7	AM RF amplifier
6SK7	FM 1st I.F. Amplifier	6SA7	AM Converter
6SK7	FM 2nd I.F. Amplifier / AM 1st I.F. Amplifier	6SQ7	AM Detector and 1st Audio
6SK7	FM 3rd I.F. Amplifier	6SN7	Audio Driver and phase Inverter
6U5	Tuning Indicator	6K6GT	Push Pull Output
		6K6GT	Push Pull Output
		5Y3GT	Rectifier

ELECTRICAL SPECIFICATIONS

117 volt 60 cycle AC. operation. Power consumption 85 watts. Built in AM Loop and folded Dipole FM antenna. FM tuning range 88mc to 108mc. FM dial calibration in channel numbers and Frequency in megacycles. AM tuning range 540 KC to 1620 KC.

Speaker: 12" PM or two 6" x 9" oval PM Voice Coil Impedance 6 ohms. Power output 9 watts undistorted 12 watts maximum.

ON-OFF SWITCH AND VOLUME CONTROL

Rotate the knob on the extreme right clockwise to turn receiver on. Continued rotation to the right increases volume.

BAND SWITCH

The second knob from the left has 4 positions. Each function is marked on the instrument panel. AM extreme left, FM 2nd position from left, PH for Phono 3rd position from left and TV. for Television sound on extreme right.

TONE CONTROL

The knob on the extreme left consists of two independently variable controls. The larger section varies the high frequency response and the smaller controls bass.

TUNING AND TUNING INDICATOR

The second knob from the right tunes the receiver. In selecting stations tune for maximum closing of the tuning indicator on both AM and FM. The tuning indicator does not operate on Phono or TV.

ALIGNMENT

Before proceeding with alignment of set calibration point must be checked. This is the first line beyond 88 MC. Set Dial pointer to this line with tuning condenser fully meshed.

MODELS D-1000, D-1100, T-9000, T-2200, T-2200X

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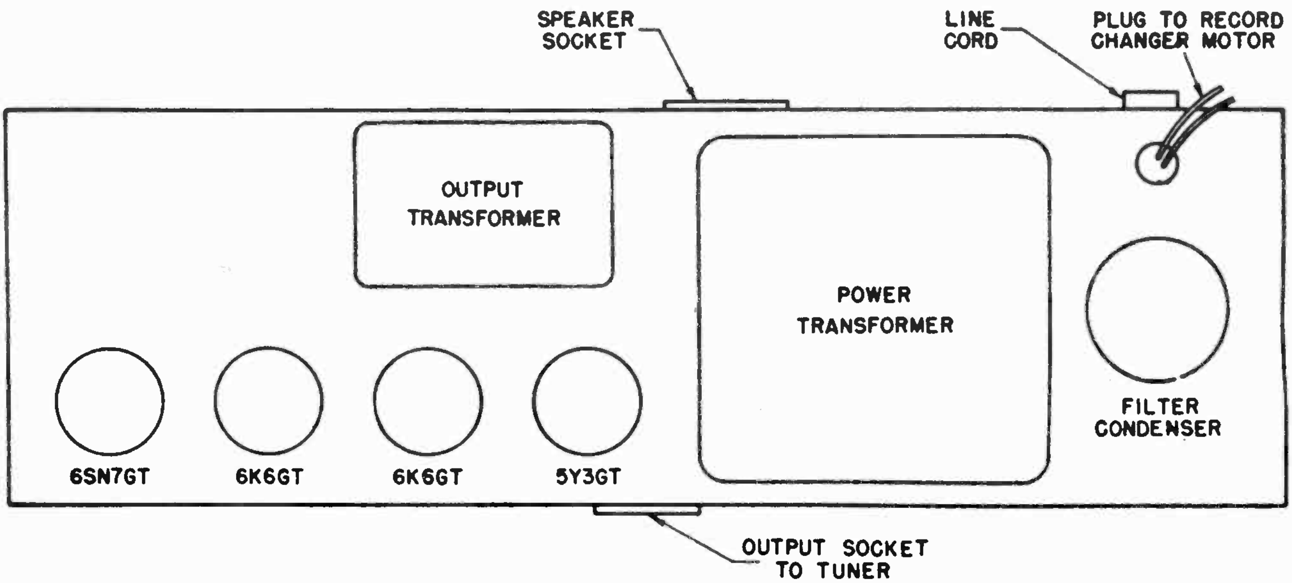
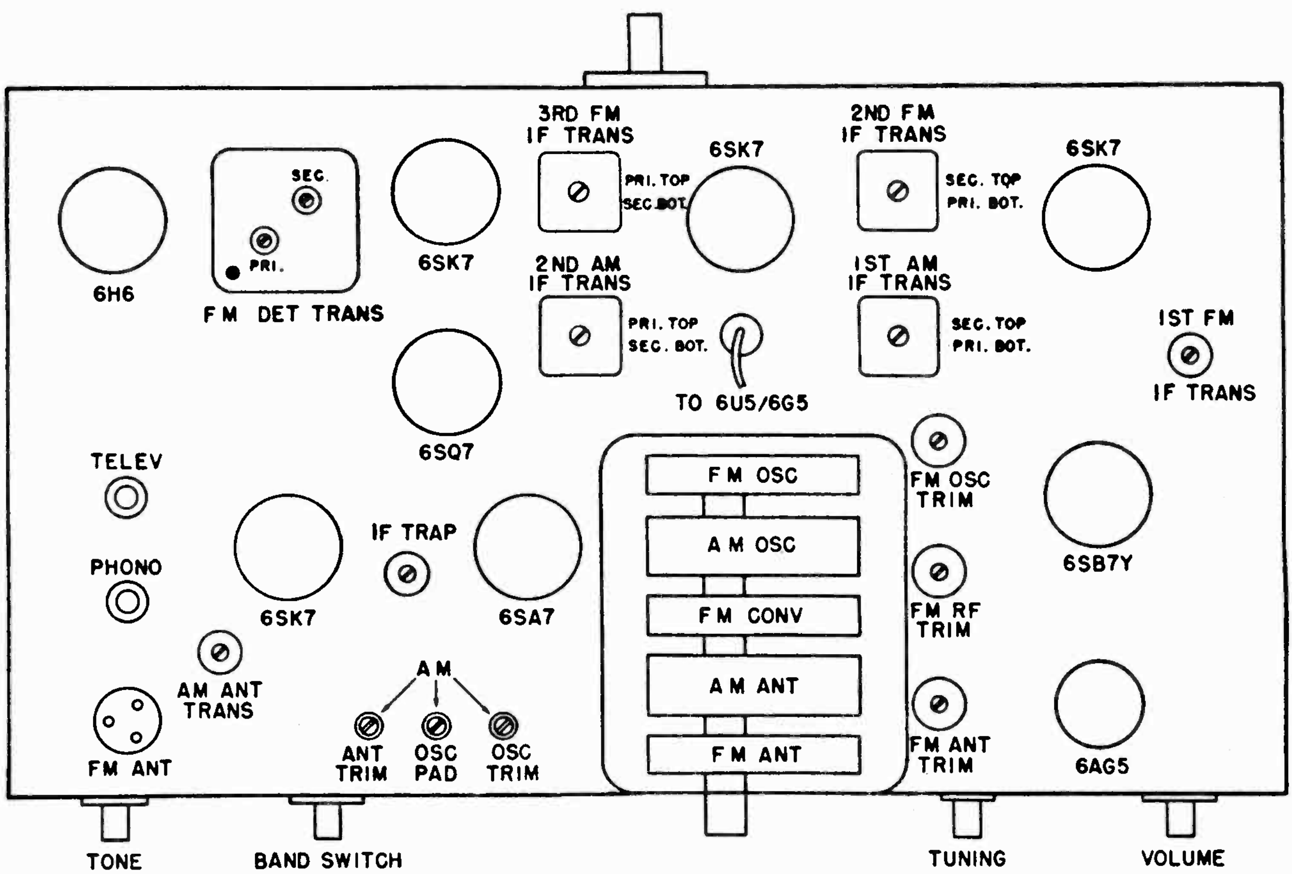




RADIO & TELEVISION INC.

MODELS D-1000, D-1100, T-9000, T-2200, T-2200X

RESISTANCE READINGS (Ohms)

K—1000
M—1,000,000

Symbol	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6AG5	0	70	0	2	400K	400K	70	—
2	6SB7	0	0	400K	400K	20K	0	0	0
3	6SK7	0	0	180	150K	180	400K	0	400K
4	6SK7	0	0	0	650K	0	400K	0	400K
5	6SK7	0	0	180	150K	180	400K	0	400K-FM INF-AM
6	6SK7	0	0	0	2.5M	0	400K	0	400K-AM INF-FM
7	6SA7	0	0	400K-AM INF-FM	400K-AM INF-FM	20K	1.0	0	85K
8	6SQ7	0	10M	0	75K	75K	1M	0	0
9	6H6	0	0	130K	0	24K	—	0	130K
10	6U5	0	1.5M	700K	400K	0	0	—	—
11	6SN7	120K Tone Mx. 200K " Min.	500K	3.3K	42K	500K	3.3K	0	0
12	6K6GT	—	0	500K	400K	500K	—	0	410
13	6K6GT	—	0	500K	400K	540K	42K	0	410
14	5Y3GT	—	400K	—	120	—	120	400K	400K

VOLTAGE READINGS

Symbol	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6AG5	OV.	0.7V DC	OV.	6.3V AC	85V DC	85V DC	0.7V DC	—
2	6SB7Y	OV.	6.3V AC	85V DC	85V DC	-6.0	OV.	OV.	OV.
3	6SK7	OV.	6.3V AC	OV.	OV.	OV.	85V DC	OV.	85V DC
4	6SK7 AM	OV.	OV.	OV.	OV.	OV.	110V DC	6.3V AC	107V DC
	FM	OV.	OV.	OV.	OV.	OV.	85V DC	6.3V AC	85V DC
5	6SK7	OV.	OV.	OV.	OV.	OV.	90V DC	6.3V AC	95V DC
6	6SK7	OV.	OV.	OV.	OV.	OV.	110V DC	6.3V AC	60V DC
7	6SA7	OV.	OV.	120V DC	85V	-12.0(VTVM)	OV.	6.3V AC	OV.
8	6SQ7	OV.	OV.	OV.	OV.	OV.	70V DC	OV.	6.3V AC
9	6H6	OV.	OV.	OV.	OV.	1.9V DC	—	6.3V AC	15V DC
10	6U5	6.3VAC	105V DC	OV.	130V DC	OV.	OV.	—	—
11	6SN7 AM	OV.	94V DC	2.0V DC	OV.	94V DC	2.0V DC	OV.	6.3V AC
	FM	OV.	82V DC	1.8V DC	OV.	82V DC	1.8V DC	OV.	6.3V AC
	PH.	OV.	135V DC	2.6V DC	OV.	133V DC	2.6V DC	OV.	6.3V AC
12-13	6K6GT AM	NC	6.3V AC Bet. 2 & 7	318V DC	245V DC	OV.	NC	6.3V AC Bet. 2 & 7	18.5V DC
	FM	NC	"	305V DC	207V DC	OV.	NC	"	16.0V DC
	PH.	NC	"	340V DC	310V DC	OV.	NC	"	24.5V DC
14	5Y3GT AM	NC	5.0V AC Bet. 2 & 7	NC	320V AC	NC	320V AC	5.0V AC Bet. 2 & 7	320V DC
	FM	NC	"	NC	320V AC	NC	320V AC	"	310V DC
	PH.	NC	"	NC	320V AC	NC	320V AC	"	340V DC

Line at 117 Volts AC. All DC Readings taken with 20,000 Ohms per Volt Meter unless otherwise indicated. AC Readings taken at 1000 Ohms per volt. Allow ± 10%.

MODELS D-1000,
D-1100, T-9000,
T-2200, T-2200X

RADIO & TELEVISION INC.

AM ALIGNMENT INSTRUCTION SHEET

Steps	Connect Generator	Set Generator at	Set Gang at	Adjust	To Obtain
1	Pin No. 4 6SK7 R.F Tube with .05 Mfd. Series Cond.	455 Kc	Quiet point	1st and 2nd I.F. Pri. & Sec.	Max. output
2	"	"	"	Wave trap	Min. output
3	"	1500 Kc	1500 Kc	BC OSC trimmer	Max. output
4	"	600 Kc	600 Kc	OSC. padder	"
5	"	1500 Kc	1500 Kc	BC. OSC. trimmer	"
6	Use Coupling Coil between Generator and Loop	600 Kc	600 Kc	Ant. Loading Coil	"
7	"	1500 Kc	1500 Kc	Ant. Trimmer	"

Set Band switch to AM.
Set Tone control to maximum left.
Set Volume control to maximum right.
Place AM loop in same relative position as in cabinet.

Keep output of signal generator low to prevent AVC Action.
Use output meter across voice coil.

FM ALIGNMENT INSTRUCTION SHEET

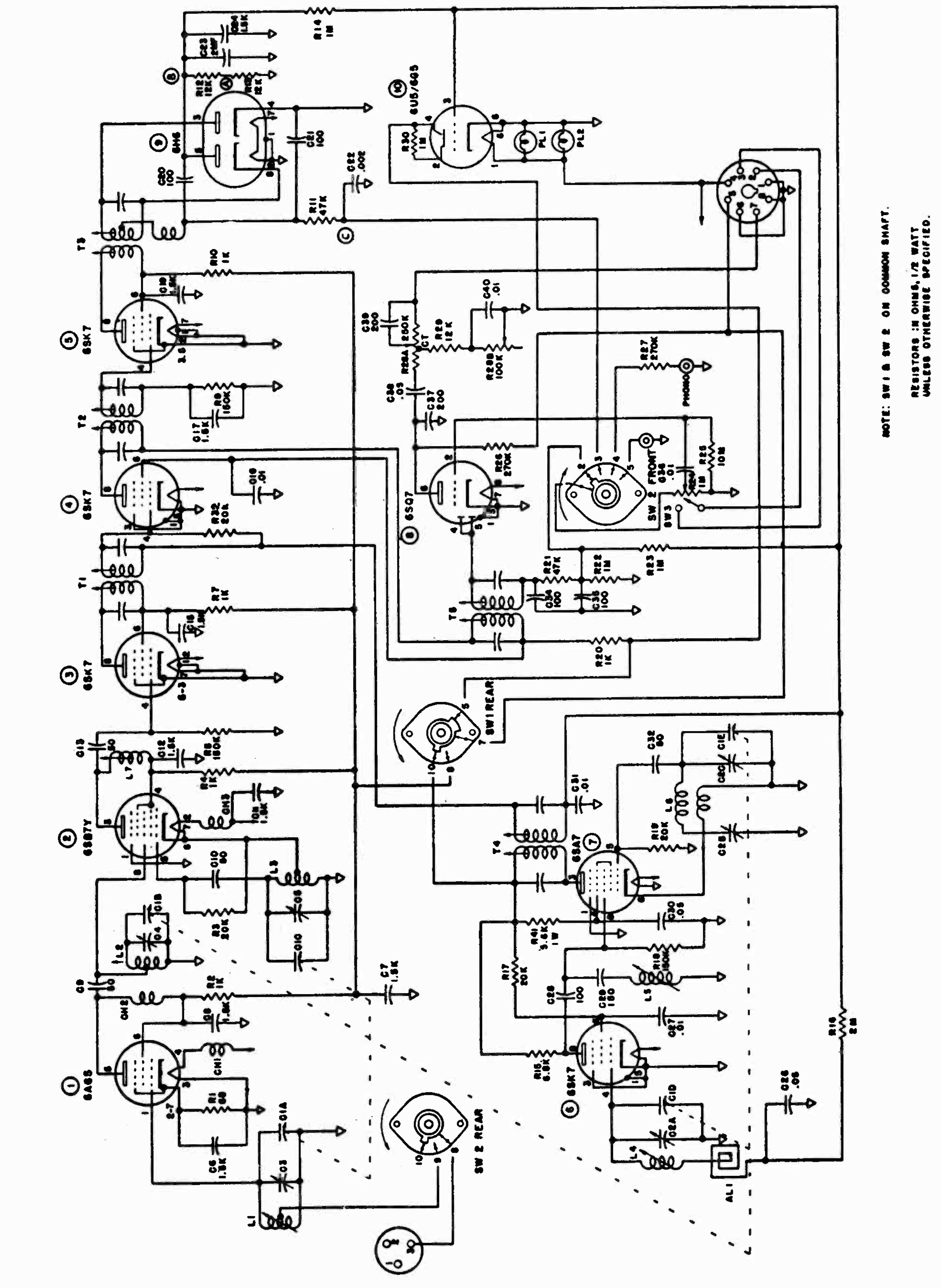
Steps	Connect Generator	Set Generator at	Set Gang at	Adjust	To Obtain
1	Pin No. 8 6SB7Y	10.7 MC	Hi. Freq. Stop	Ratio Det. Primary (Red Dot)	Max. output from point B to Gnd.
2	"	"	"	3rd IF Pri. & Sec.	"
3	"	"	"	2nd IF Pri. & Sec.	"
4	"	"	"	1st IF	"
5	"	"	"	Ratio Det. Sec.	Zero Balance on VTVM from C to A
6	Clip on to FM Dipole	108 MC	108 MC	Osc. Trimmer	Max output from point B to Gnd.
7	"	88 MC	88 MC	Osc Coil*	"
8	"	103 MC	103 MC	RF Trimmer	"
9	"	103 MC	103 MC	Ant. Trimmer	"

Set Band Switch to FM
See Circuit Diagram for VTVM Connections.
For Steps 1 through 5 use .01 Mfd. condenser in Series with High side of generator.

Use V.T.V.M for output Indication
*This adjustment is made by pushing turns together or pulling apart. Use insulated tool.

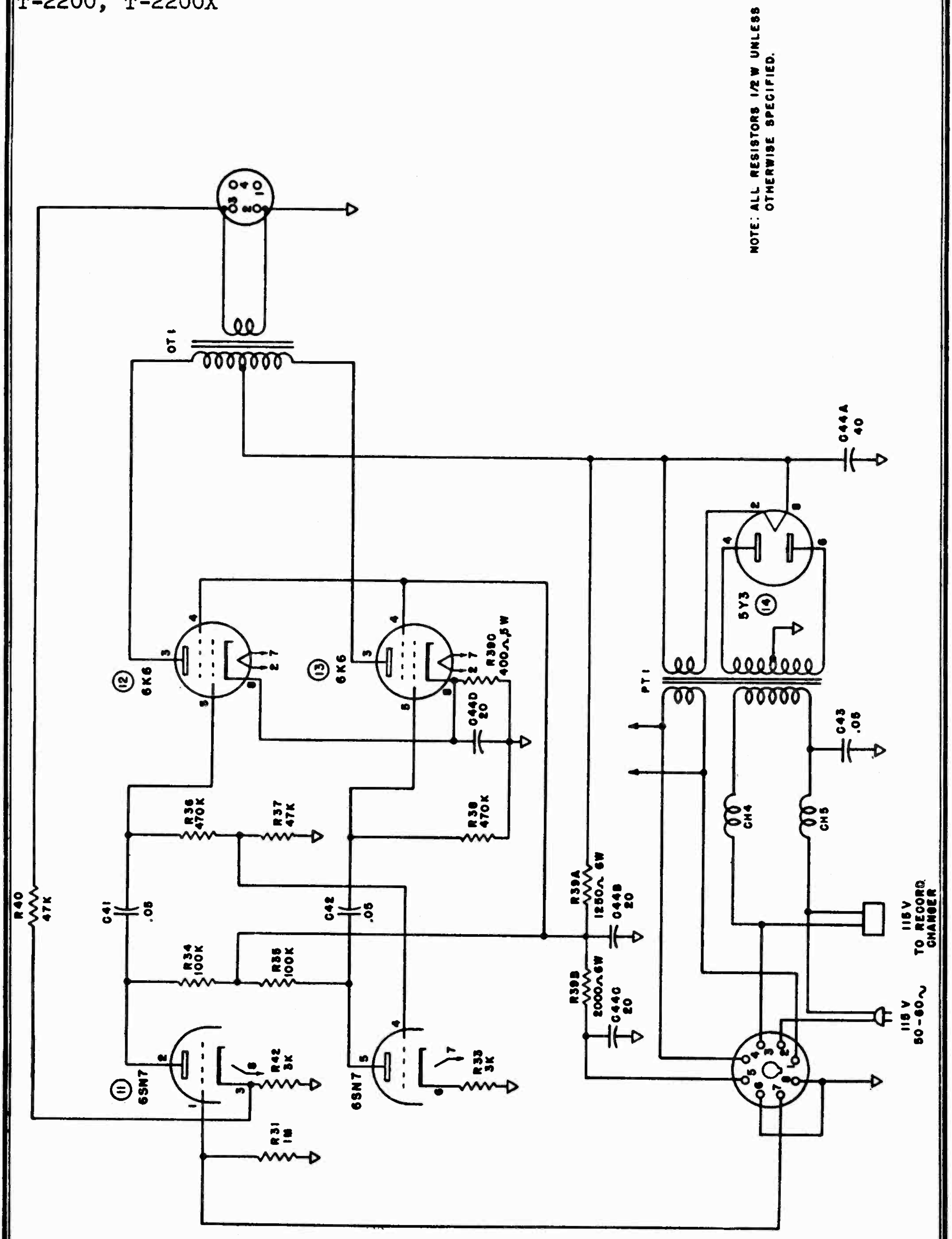
RADIO & TELEVISION INC.

MODELS D-1000, D-1100, T-9000, T-2200, T-2200X



MODELS D-1000, D-1100, T-9000, T-2200, T-2200X

RADIO & TELEVISION INC.



RADIO & TELEVISION INC.

MODELS D-1000, D-1100, T-9000, T-2200, T-2200X

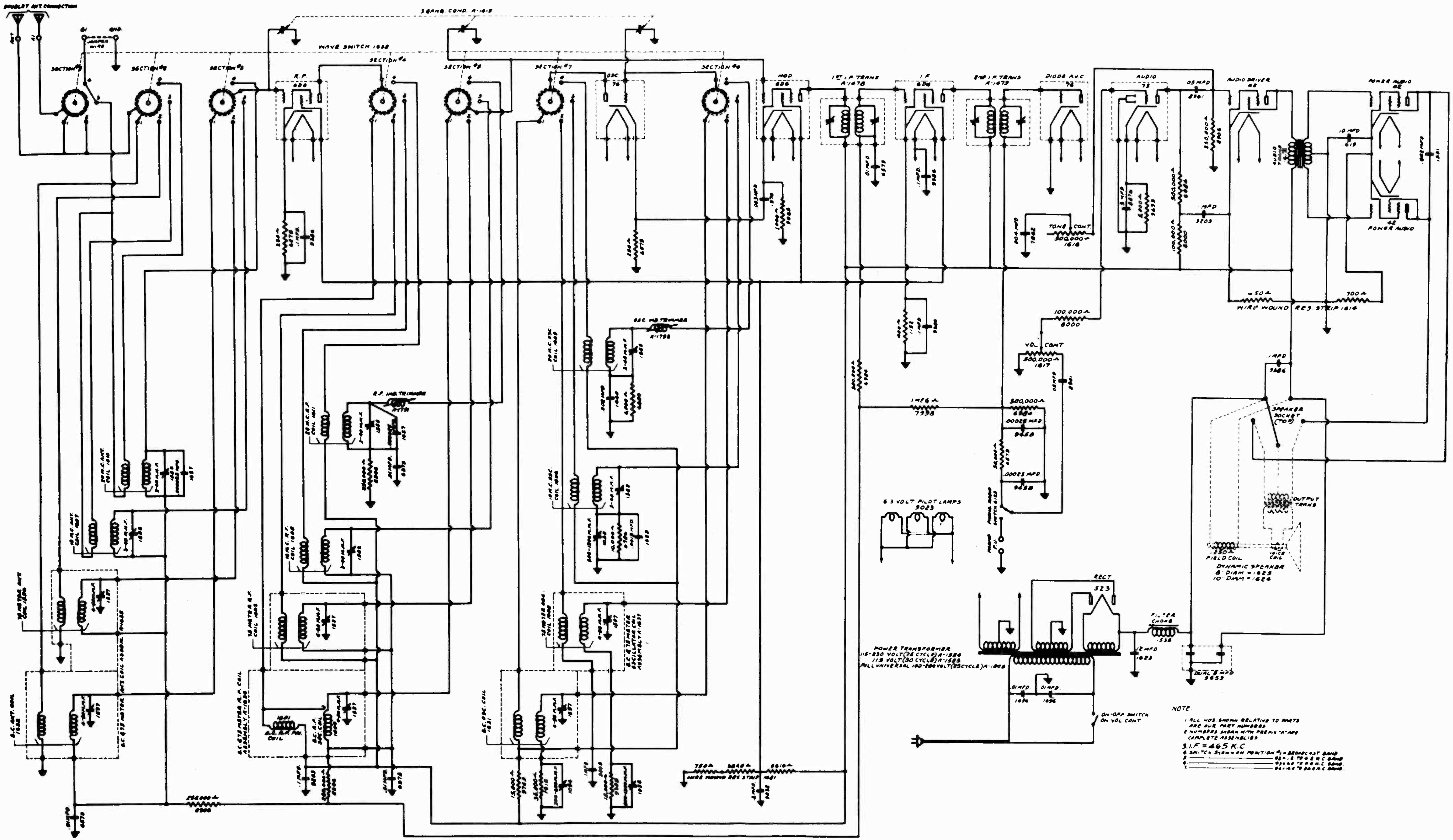
PARTS LIST

Symbol	Part No.	DESCRIPTION
C1A-B-C-D-E	CV106	AM-FM Tuning Condenser
C2A-B-C	CT107	3 Section Trimmer Assembly
C3	CT174	FM RF Trimmer 1-8 Mmfd.
C4	CT174	FM Mixer Trimmer 1-8 Mmfd.
C5	CT175	FM Oscillator Trimmer 1-12 Mmfd.
C6-7-8-11-12-15-17-19-24	CC144	1500 Mmfd. Ceramic ±20%
C9-10-13-32	CC141	51 Mmfd. Ceramic ±20%
C16-27	CP102	.01 Mfd. 400 V.
C20-21-28 34-35	CC142	100 Mmfd. Ceramic ±20%
C22	CC145	200 Mmfd. Ceramic ±20%
C23	CE101	2 Mfd. Electrolytic 25 V
C26-31-43	CP105	.05 Mfd. 200 V.
C29	CC178	150 Mmfd. Ceramic
C30-38 41-42	CP104	.05 Mfd. 400 V.
C36-40	CP103	.01 Mfd. 200 V.
C37-39		200 Mmfd. Ceramic ±20%
C44A-B-C-D	CE100	Electrolytic Cond. 40 20-20 Mfd. 450 V. 20 Mfd. 25 V.
R1	RS68B	68 ½ W. ±10%
R2-4-7-10-20	RS102B	1000 ½ W. ±10%
R3-17-19-32	RS203B	20K ½ W. ±10%
R5-8-18	RS151B	150K ½ W. ±10%

Symbol	Part No.	DESCRIPTION
R11-40-21-37	RS473B	47K ½ W. ±10%
R12-13-29	RS123B	12K ½ W. ±10%
R14-22-23-30-31	RS105B	1 Meg. ½ W. ±10%
R15	RS682B	6.8K ½ W. ±10%
R16	RS225B	2.2 Meg. ½ W. ±10%
R24	VC150	1 Meg. Volume Control and Switch
R25	RS106B	10 Meg. ½ W. ±10%
R26-27	RS274B	270K ½ W. ±10%
R28A-B	VC151	Dual Tone Control
R33-42	RS322B	3000 ½ W. ±10%
R34-35	RS104B	100K ½ W. ±10%
R36-38	RS474B	470K ½ W. ±10%
R39A-B-C	RD123	Voltage Divider and Bias Res.
R41	RS562	5.6K 1 W. ±10%
L1	FM221	FM Antenna Coil
L2	FM221	FM RF Coil
L3	FM222	FM Osc. Coil
L4	AN183	AM Ant. Coil
L5	TR184	AM IF Trap
L6	OS182	AM Osc. Coil
CH1-2-3-4-5	LC181	Choke
AL1	AL236	AM Loop
L7	IF180	FM 1st I.F.T.
T1	KT161	FM 2nd I.F.T.
T2	KT162	FM 3rd I.F.T.
T3	RD168	FM Ratio Detector
T4	KT163	AM 1st I.F.T.
T5	KT164	AM 2nd I.F.T.
SW1-2	SW124	Band Switch
PT1	PT119	Power Transformer
OT1	OT120	Output Transformer
PL1-2	PL147	No. 47 Pilot Light

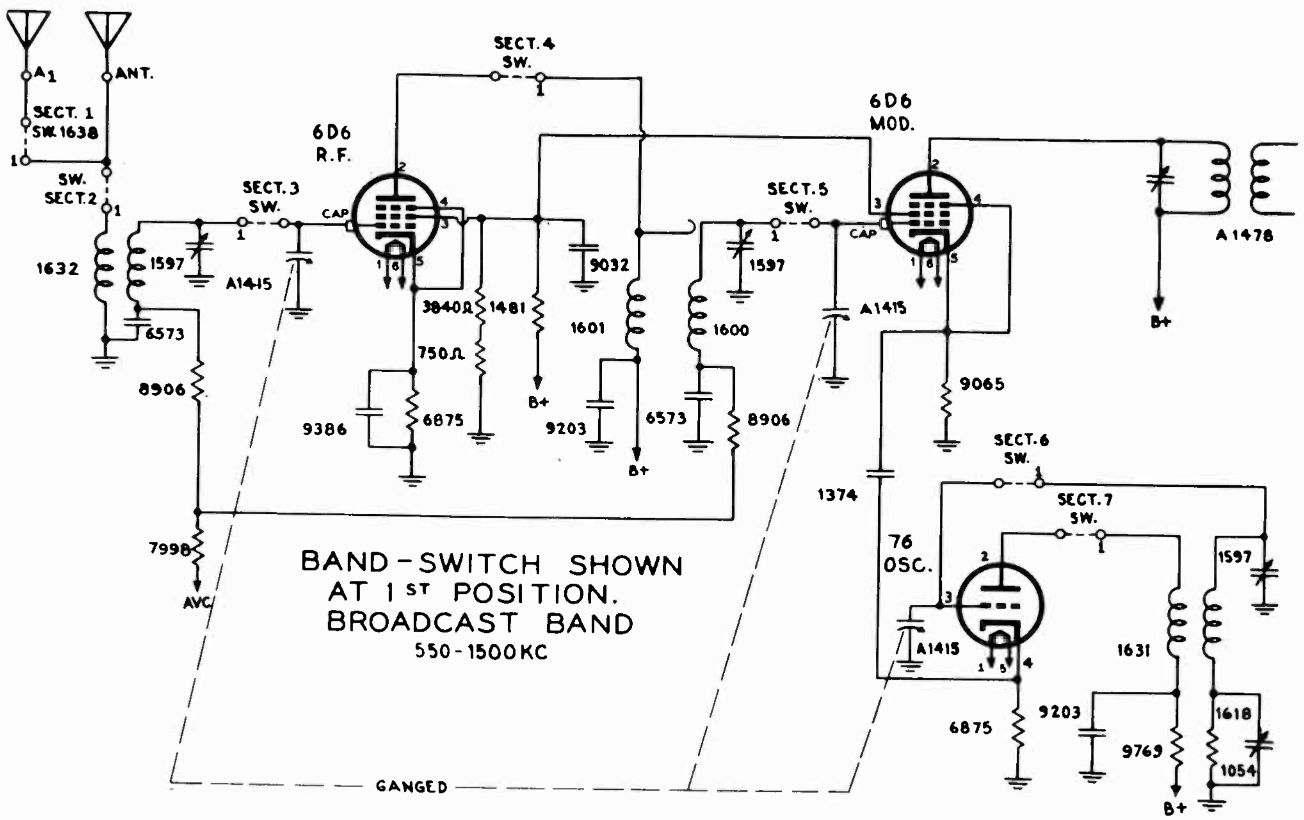
RADIO WIRE TELEVISION

MODEL F-62

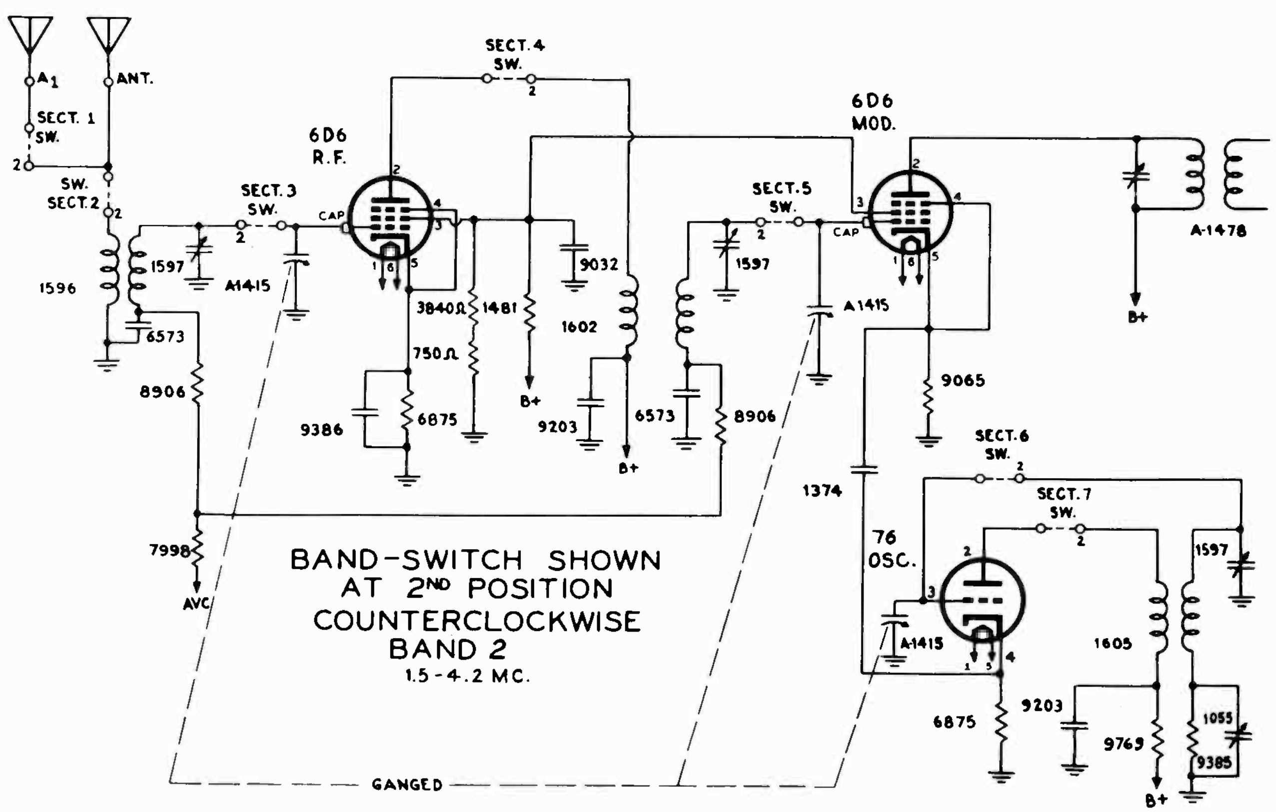


RADIO WIRE TELEVISION

MODEL F-62



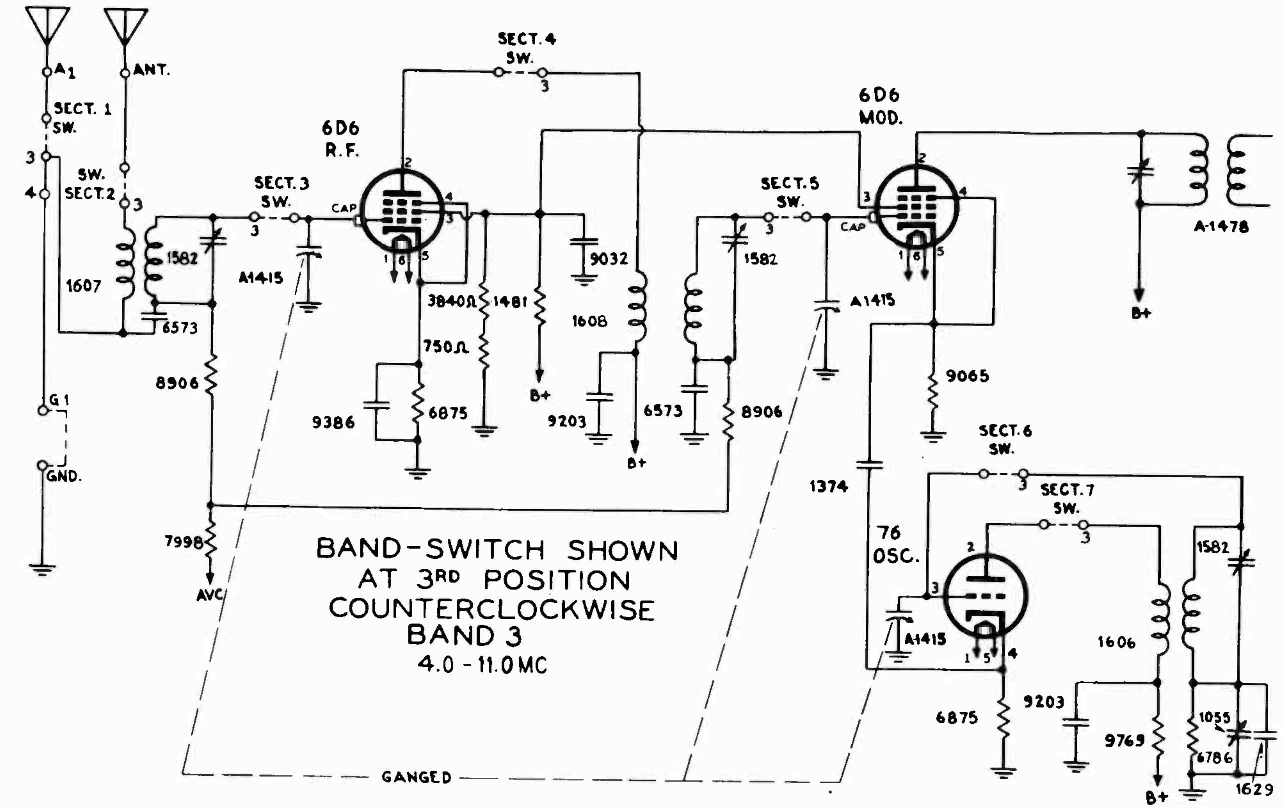
BAND-SWITCH SHOWN AT 1ST POSITION. BROADCAST BAND
550-1500KC



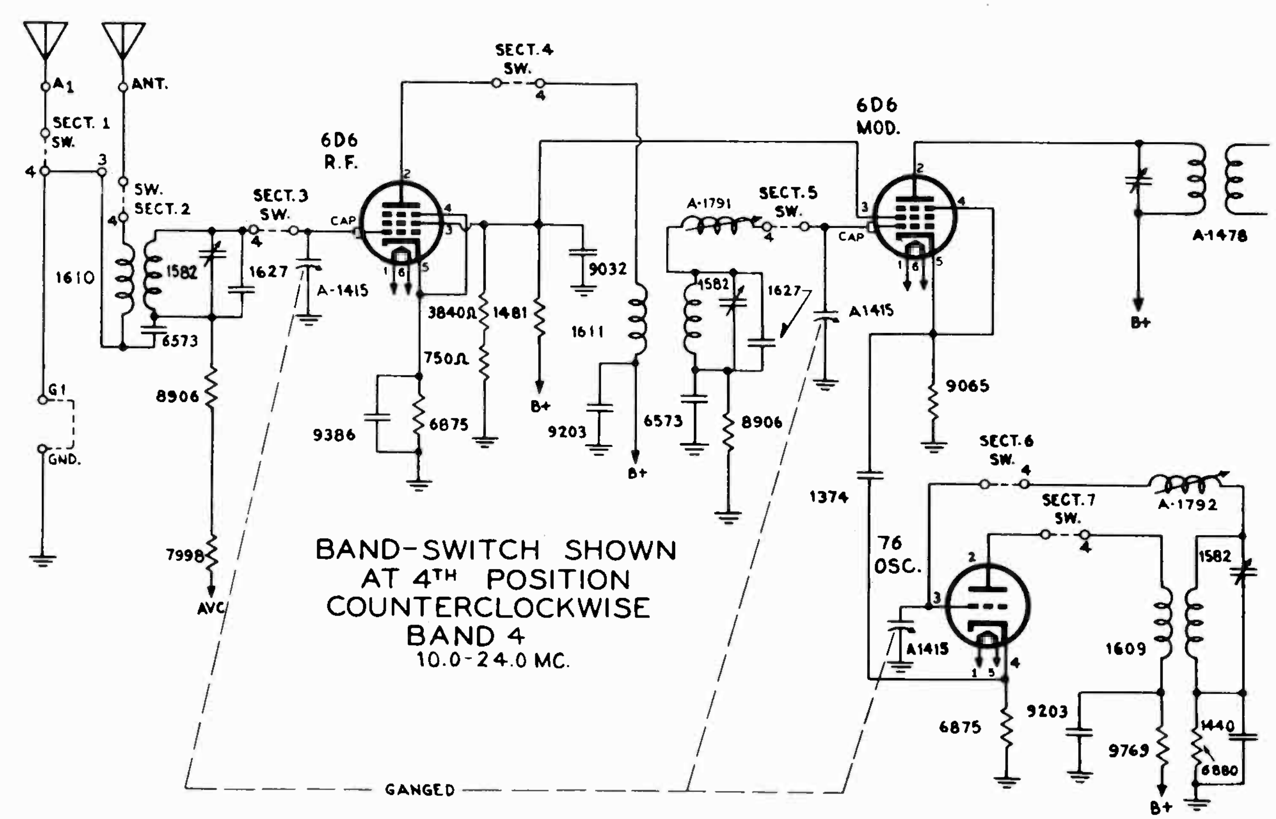
BAND-SWITCH SHOWN AT 2ND POSITION COUNTERCLOCKWISE BAND 2
1.5-4.2 MC.

MODEL F-62

RADIO WIRE TELEVISION



BAND-SWITCH SHOWN AT 3RD POSITION COUNTERCLOCKWISE BAND 3
4.0-11.0 MC



BAND-SWITCH SHOWN AT 4TH POSITION COUNTERCLOCKWISE BAND 4
10.0-24.0 MC.

RADIO WIRE TELEVISION

MODEL F-62

ALIGNMENT PROCEDURE: Realignment of this receiver should never be necessary unless one of the oscillator, antenna, or RF coils has been replaced, and then only the frequency band in which that coil is used will require realignment. Lack of sensitivity, selectivity, and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, inadequate or excessively long antenna, open or grounded bias resistor, bypass condenser, etc. Under no circumstances should realignment be attempted until all other possible sources have been first throughly investigated and have been definitely proven not to be the cause. If an IF tube is replaced it is advisable to realign the IF amplifier, particularly if the replacement tube is one of a different manufacture than the one in the receiver. IT IS IMPERATIVE THAT AN ACCURATELY CALIBRATED OSCILLATOR BE USED WITH SOME TYPE OF OUTPUT MEASURING DEVICE.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the oscillator output to the control grid of the 6D6 modulator tube. Leave the grid cap disconnected and connect a 1 meg ohm resistor from the modulator grid to the chassis base. Connect the ground side of the oscillator to the receiver ground post.

2. Set the test oscillator frequency to 465 kilocycles (this must be accurate).

3. Align the first intermediate transformer by turning one of the trimmer screws accessible through the holes in the top of the coil shield up and down (increasing and decreasing capacity) until maximum reading is obtained on the output meter, after which adjust the other trimmer screw of the same transformer for maximum sensitivity.

4. Adjust the other intermediate transformer in the same manner.

TO ALIGN THE VARIABLE CONDENSER: It is important when aligning the gang condensers, padder condensers, and trimmer condensers to follow the procedure carefully, otherwise the receiver will be insensitive and the dial calibration will be incorrect. The trimmer and padder condensere will be referred to by number as indicated on the diagram which shows their relative locations.

1. Connect the high output side of the test oscillator through a .00025 Mfd. condenser to the set antenna post, and the ground to the set ground.

2. Place the band selector switch for operation on the 10 to 22 megacycle band, tune the receiver dial to EXACTLY 20 MEGACYCLES and set the test oscillator frequency to EXACTLY 20 MEGACYCLES. THEN TUNE IN THE 20 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING TRIMMER NO. 13. Next, rock the gang condenser slightly to the right and left and adjust trimmers No. 15 and 17 for maximum 20 megacycle signal sensitivity. CARE MUST BE TAKEN SO THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ALIGNING THE RECEIVER AT 20 MEGACYCLES. When making trimmer No. 13 adjustment always back off the trimmer to minimum capacity and then screw down the trimmer (add capacity) until the first peak, which is the fundamental and the one you are to use, is tuned in. If the trimmer is screwed down beyond the point where this first peak is received, the incorrect image peak will be tuned in. After completing adjustment of trimmers No. 13, 15, and 17 always check to see if the proper peak has been used. To do this leave the test oscillator frequency at 20 megacycles, increase the output of the test oscillator, and tune the receiver dial to approximately 19 megacycles Vary the receiver dial slightly to the right and left of 19 megacycles and if the fundamental peak was used in aligning at 20 megacycles, the test oscillator signal will be heard at approximately 19 megacycles on the set dial. If it is not possible to receive the signal at approximately 19 megacycles, then the fundamental peak was not used and the 20 megacycle adjustment of trimmers No. 13, 15, and 17 must be gone over and properly adjusted.

3. Leave the band selector switch for operation on the 10 to 22 megacycle band, tune the receiver to 11 megacycles on the dial, and set the test oscillator frequency to approximately 11 megacycles. Then while rocking the gang condenser slightly to the right and left adjust inductance trimmers No. 14 and 16 for maximum sensitivity.

4. Recheck 20 megacycle adjustment of trimmers No. 13, 15, and 17.

5. Place the band selector switch for operation on the 4 to 10 megacycle band and set the receiver dial and the test oscillator frequency to exactly 9 megacycles. When adjusting trimmer No. 10 two peaks, the fundemental and the image peak, will be noticed. CARE MUST BE TAKEN SO THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ALIGNING THE RECEIVER AT 9 MEGACYCLES. First back off trimmer No. 10 to minimum capacity, next screw down the trimmer (add capacity) until the first peak, which is the fundamental and the one you are to use, is tuned in. When the first peak has been located adjust trimmer No. 10 TO BRING IN THE 9 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT. Next adjust trimmers No. 11 and 12 for maximum 9 megacycle sensitivity After completing adjustment of trimmers No. 10, 11, and 12 always check to see if the proper peak has been used. To do this leave the test oscillator frequency at 9 megacycles and increase the test oscillator output. Vary the receiver dial slightly to the right and left of 8 megacycles, and if the fundamental peak of trimmer No. 10 was used in aligning at 9 megacycles the test oscillator signal will be heard at approximately 8 megacycles on the receiver dial. If it is not possible to receive the signal, then the fundamental peak was not used and the 9 megacycle adjustment of trimmers No. 10, 11, and 12 must be gone over and properly adjusted.

6. Leave the band selector switch for operation on the 4 to 10 megacycle band and tune the receiver and set the test oscillator frequency to approximately 4.2 megacycles. Then while rocking the gang condenser slightly to the right and left, adjust padder No. 7 for maximum sensitivity.

7. Place the band selector switch for operation on the 1.5 to 4 megacycle band and tune the receiver dial and set the test oscillator frequency to EXACTLY 3.8 MEGACYCLES. THEN BRING IN THE 3.8 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING TRIMMER NO. 1, after which adjust trimmers No. 2 and 3 for maximum sensitivity.

8. With the band selector switch in the same position (1.5 to 4 megacycle band) tune the receiver dial and set the test oscillator frequency to approximately 1.6 megacycles. Then while rocking the gang condenser slightly to the right and left adjust padder condenser No. 8 for maximum 1.6 megacycle signal sensitivity.

9. Adjust the band selector switch for operation on the 1500 to 550 kilocycle band and tune the receiver dial and set the test oscillator frequency to EXACTLY 1400 KILOCYCLES. THEN BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING TRIMMER NO. 4, AFTER WHICH ADJUST TRIMMERS NO. 5 and 6 FOR MAXIMUM SENSITIVITY.

10. Leave the band selector switch for operation on the 1500 to 550 kilocycle band and tune the receiver dial and set the test oscillator frequency to approximately 600 kilocycles. Next, while rocking the gang condenser slightly to the right and left adjust padder condenser No. 9 for maximum sensitivity.

MODEL F-62

RADIO WIRE TELEVISION

Alignment of all bands will rarely be necessary. If a coil on any one of the bands should become defective and replacement is necessary, then only the band in which the coil was replaced will require realignment. Wherever complete realignment has been made it is recommended that all of the adjustments be gone over again. Generally it will be found that improved results can be obtained if this is done. Assuming that all tubes and component parts of the set are okeh, then extreme inaccuracies in the dial calibration, low sensitivity, and poor selectivity are indications that the alignment procedure has not been followed. Should these conditions be apparent proceed to realign and carefully follow each step in the order given.

VOLTAGE TABLE

Line Voltage : 115 Volume Control : Full on Wave Band : Broadcast

TUBE		FILAMENT	PLATE	SCREEN	CATHODE
6D6	Radio Frequency	6.2	250	94	2.2
76	Oscillator	6.2	115		2.2
6D6	Modulator	6.2	250	94	4.5
6D6	Intermediate Frequency	6.2	250	94	2.2
76	Second Detector & AVC	6.2			
75	Audio	6.2	55*		1
42	Audio Driver	6.2	225		16
42	Output	6.2	330		28
42	Output	6.2	330		28
5Z3	Rectifier	4.8	118 M. A. Total Drain		

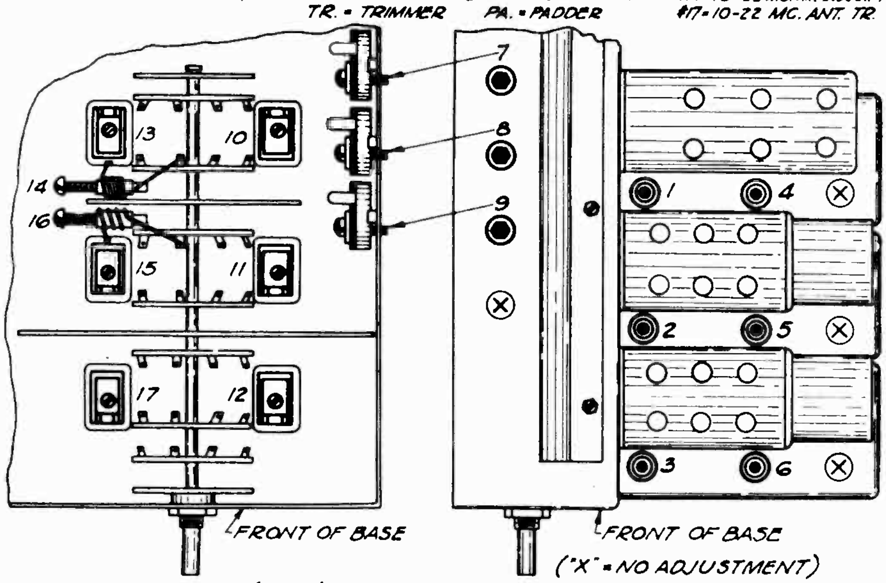
* Triode Plate comparative voltage only.
Read all voltages from socket to chassis with 1000 ohm per volt voltmeter.

PART NUMBER	
1635	BC & 1.5-4.2 M.C. Band Antenna Coil Assembly
1636	BC & 1.5-4.2 M.C. Band RF Coil Assembly
1637	BC & 1.5-4.2 M.C. Band Oscillator Coil Assembly
1607	4-10 M.C. Band Antenna Coil
1608	4-10 M.C. Band RF Coil
1606	4-10 M.C. Band Oscillator Coil
1610	10-24 M.C. Band Antenna Coil
1611	10-24 M.C. Band RF Coil
1609	10-24 M.C. Band Oscillator Coil
1478	First IF Transformer
1479	Second IF Transformer
1638	Wave Switch
1415	Three Gang Condenser
1584	25 Cycle Power Transformer (230-115V)
1585	50-60 Cycle Power Transformer (115V)
1535	Filter Choke
1619	10 Mfd. Electrolytic Condenser
1623	12 Mfd. Wet Electrolytic Condenser
8876	5 Mfd. Electrolytic Condenser
9659	Dry Electrolytic Condenser Dual 8 Mfd.
1615	Audio Transformer
1616	Tone Control with S.P.S.T. Switch
1617	Volume Control
1481	Vitreous Enameled Resistor
1614	Vitreous Enameled Resistor
6576	Phonograph Jacks
6123	Radio-Phonograph Switch
1582	Trimmer Condenser

PART NUMBER	
1054	Padding Condenser
1055	Padding Condenser
1791	Oscillator Inductance Trimmer
1792	RF Inductance Trimmer
1440	.002 Mfd. Mica Condenser
1629	.0015 Mfd. Moulded Condenser
9458	.00025 Mfd. Moulded Condenser
1374	.003 Mfd. Moulded Condenser
6573	.01 Mfd. 200 Volt Condenser
1496	.01 Mfd. 600 Volt Condenser
1551	.002 Mfd. 600 Volt Condenser
8961	.05 Mfd. 400 Volt Condenser
9386	.1 Mfd. 200 Volt Condenser
9203	.1 Mfd. 400 Volt Condenser
7862	.004 Mfd. 400 Volt Condenser
6875	250 Ohm 1/3 Watt Resistor
6879	50,000 Ohm 1/3 Watt Resistor
6786	10,000 Ohm 1/3 Watt Resistor
9065	1,000 Ohm 1/3 Watt Resistor
6984	500 Ohm 1/3 Watt Resistor
1152	400 Ohm 1/3 Watt Resistor
7998	1 Meg Ohm 1/3 Watt Resistor
9693	5,000 Ohm 1/3 Watt Resistor
8000	100,000 Ohm 1/3 Watt Resistor
6918	35,000 Ohm 1/3 Watt Resistor
9385	15,000 Ohm 1/3 Watt Resistor
9769	15,000 Ohm 1/2 Watt Resistor
1420	Antenna and Ground Strip
1565	7/8" Octagon Knob
1566	1 1/8" Octagon Knob

#1 = 1.5-4 MC. OSC. TR.
#2 = 1.5-4 MC. R.F. TR.
#3 = 1.5-4 MC. ANT. TR.
#4 = 550-1500 KC. OSC. TR.
#5 = 550-1500 KC. R.F. TR.
#6 = 550-1500 KC. ANT. TR.
#7 = 4-10 MC. OSC. PA.
#8 = 1.5-4 MC. OSC. PA.
#9 = 550-1500 KC. OSC. PA.
#10 = 4-10 MC. OSC. TR.
#11 = 4-10 MC. R.F. TR.
#12 = 4-10 MC. ANT. TR.
#13 = 10-22 MC. OSC. TR.
#14 = 10-22 MC. OSC. INDUCT. TR.
#15 = 10-22 MC. R.F. TR.
#16 = 10-22 MC. R.F. INDUCT. TR.
#17 = 10-22 MC. ANT. TR.

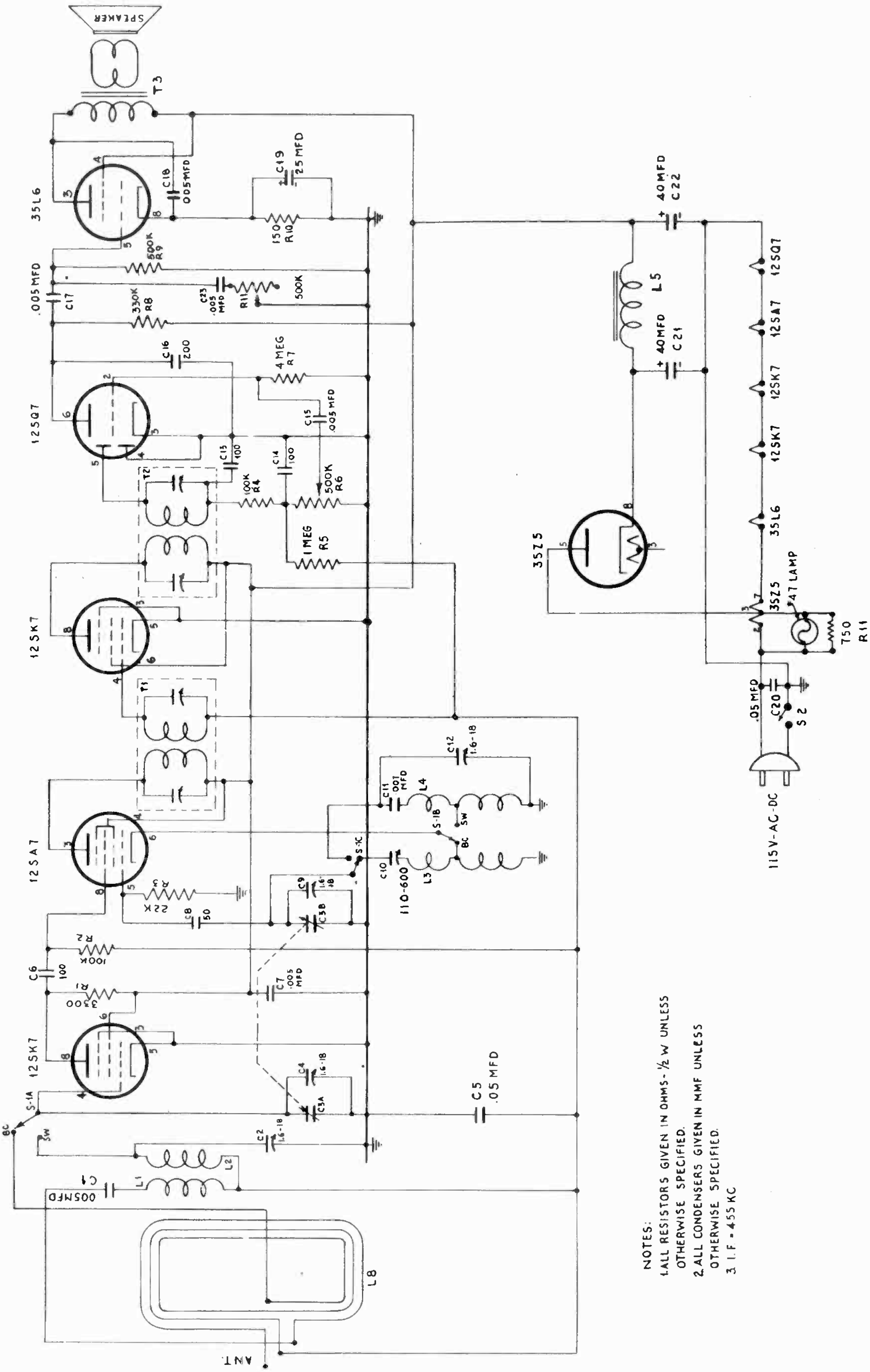
TR. = TRIMMER PA. = PADDER



RIGHT HAND BOTTOM (INSIDE) OF CHASSIS LEFT HAND SIDE OF CHASSIS
VIEWS SHOWING LOCATION OF PADDERS & TRIMMERS

RADIO WIRE TELEVISION

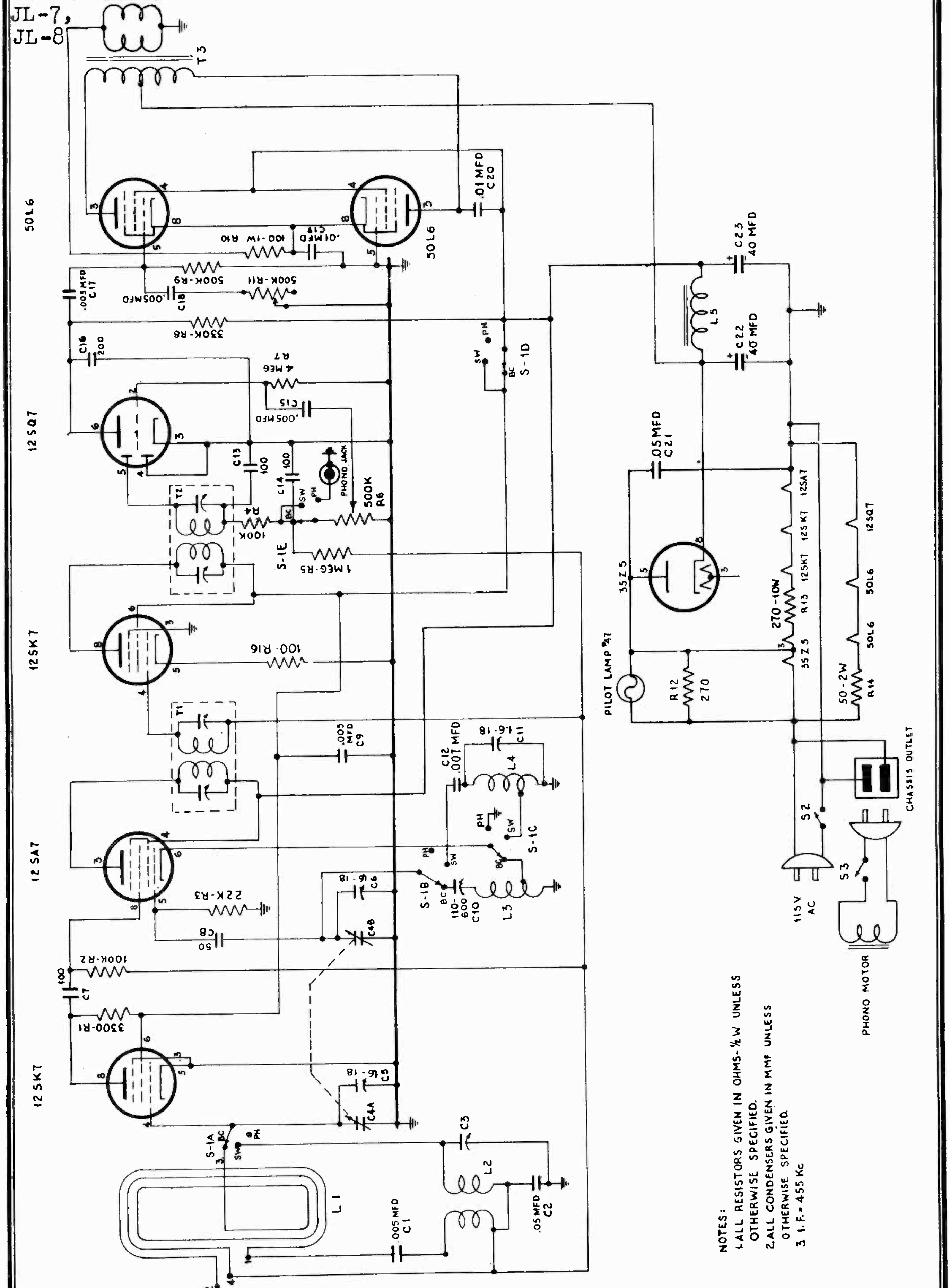
MODEL JL-6



NOTES:
1. ALL RESISTORS GIVEN IN OHMS - ½ W UNLESS OTHERWISE SPECIFIED.
2. ALL CONDENSERS GIVEN IN MMF UNLESS OTHERWISE SPECIFIED.
3. I.F. = 455KC

RADIO WIRE TELEVISION

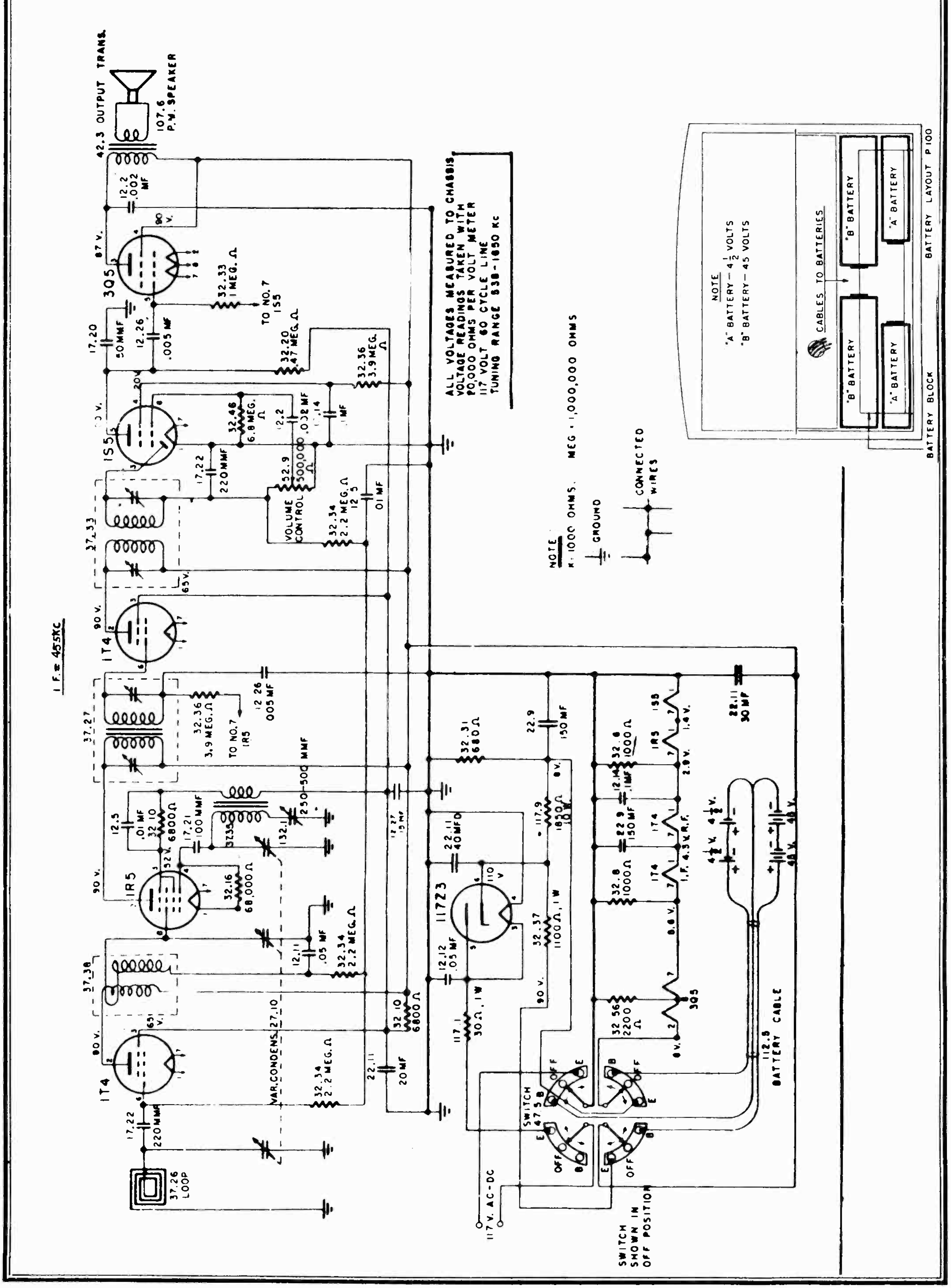
MODELS JL-7, JL-8



NOTES:
1. ALL RESISTORS GIVEN IN OHMS-½W UNLESS OTHERWISE SPECIFIED.
2. ALL CONDENSERS GIVEN IN MMF UNLESS OTHERWISE SPECIFIED.
3. I.F. = 455 Kc

RADIO WIRE TELEVISION

MODEL JS-1



MODEL JS-1 RADIO WIRE TELEVISION

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

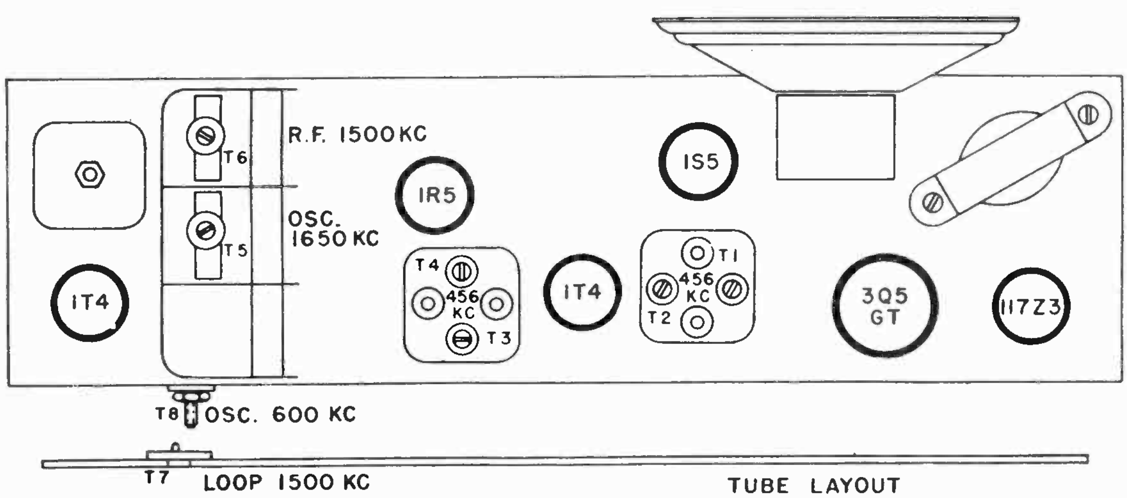
Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain ½ scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

REMOVE CHASSIS BOTTOM PLATE

	RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1	Fully closed	Exactly 456 KC	.1 MF	Common Ground and Control Grid 1R5 top front section var. cond.	Adjust for maximum output T1, T2, T3, and T4.
2	Fully closed	Approx. 538 KC	.1 MF	Control Grid 1T4 top rear section var. condenser	Adjust for maximum output T8
3	Fully open	Exactly 1650 KC	.1 MF	Control Grid 1T4 top rear section var. cond.	Adjust for maximum output T5
	REPEAT OPERATIONS 2 and 3.				
4	Approx. 1500 KC	Approx. 1500 KC	.1 MF	Control Grid 1T4 same as No. 3	Adjust for maximum output T6
	The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed				
5	Approx. 1500 KC	Approx. 1500 KC	.1 MF	Radiating Loop 20" from Receiver	Adjust T7 for maximum output
6	Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from Receiver	Adjust T8 for maximum while rocking variable condenser

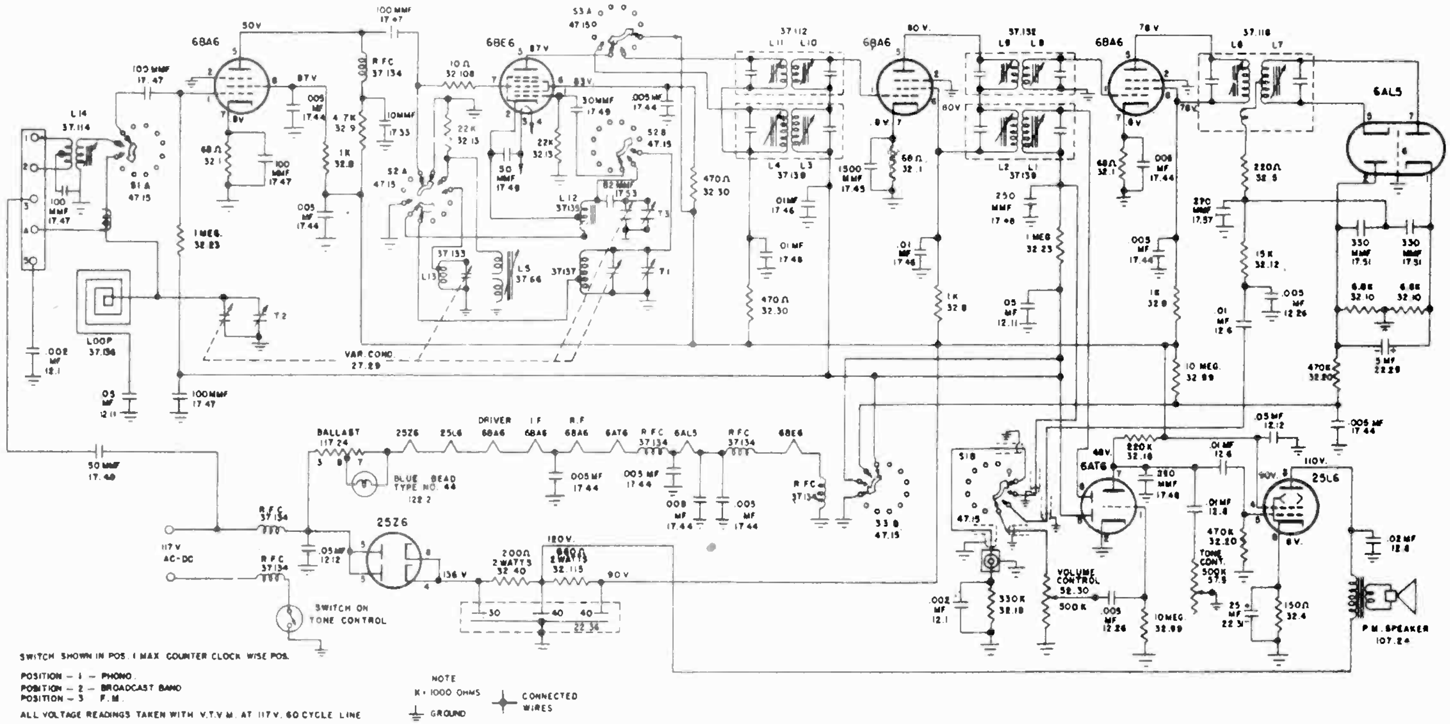


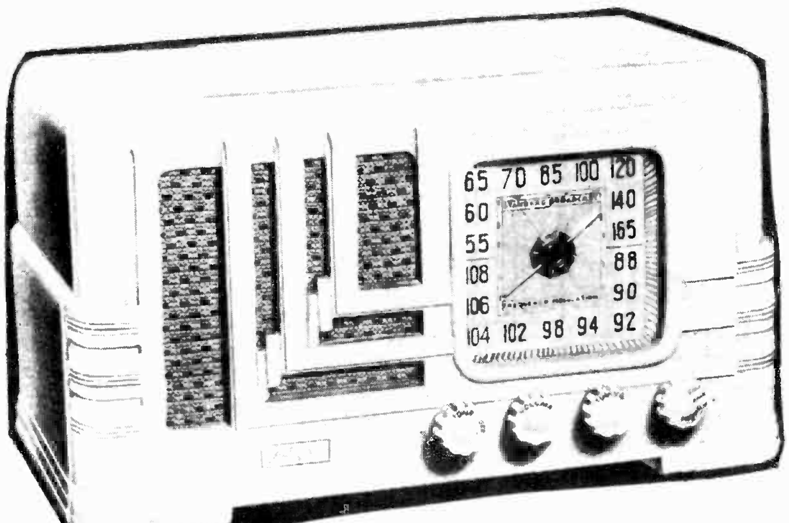
TUBE LAYOUT

TUNING RANGE 538 – 1650 KC

RADIO WIRE TELEVISION

MODEL JS-2



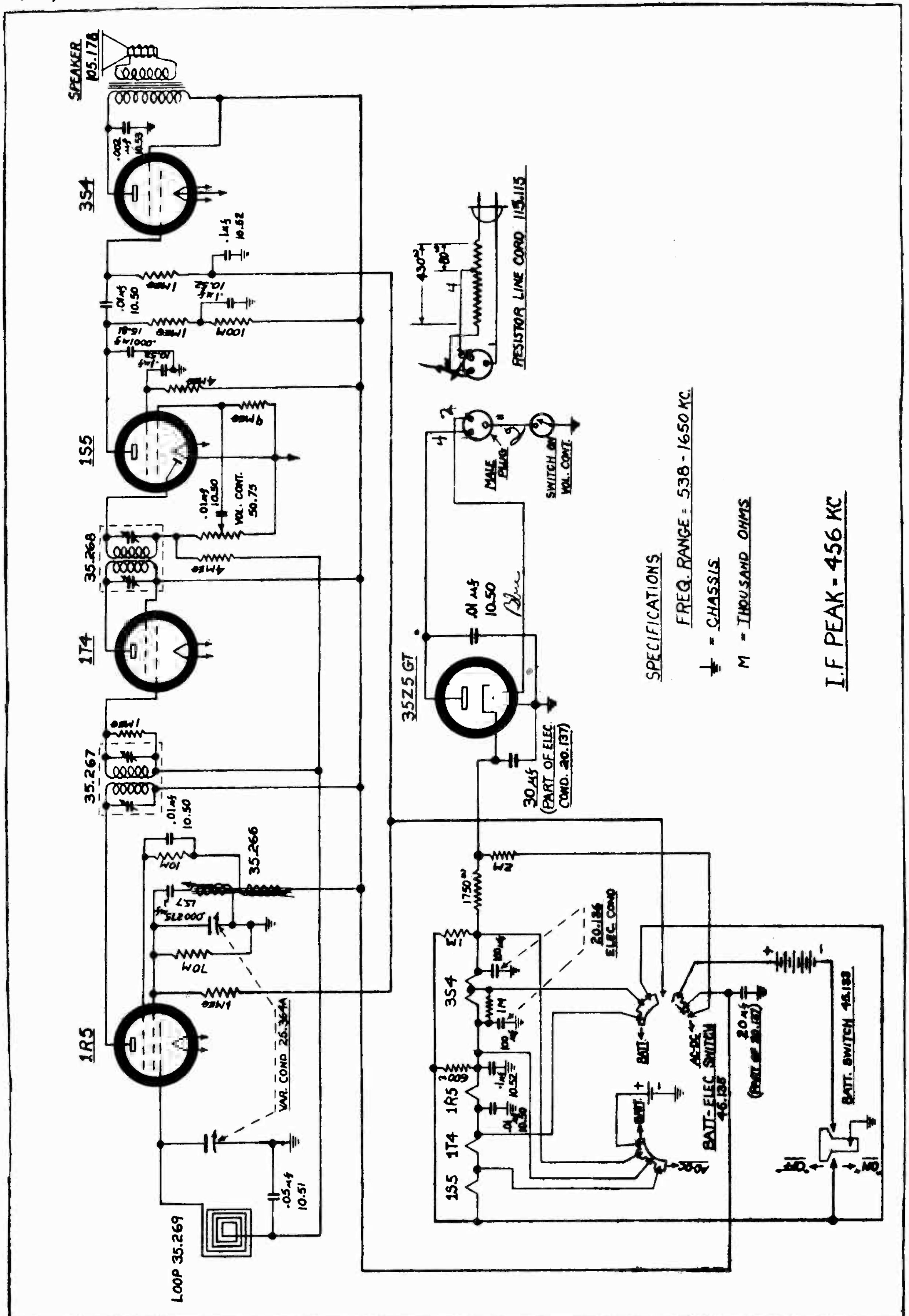


The receiver is designed to operate on 105-125 volts, 40 to 60 cycles, alternating current (AC) or 105-125 volts direct current (DC). The power consumption is 60 watts.

The tuning range on FM is from 87 MC to 109 MC, covering all FM stations from channels 200 to 300. The tuning range for standard broadcast is from 530 to 1680 kilocycles covering the full broadcast range and high fidelity stations with sufficient overlap at both ends of the dial.

MODELS JS-115,
JS-319

RADIO WIRE TELEVISION



RADIO WIRE TELEVISION

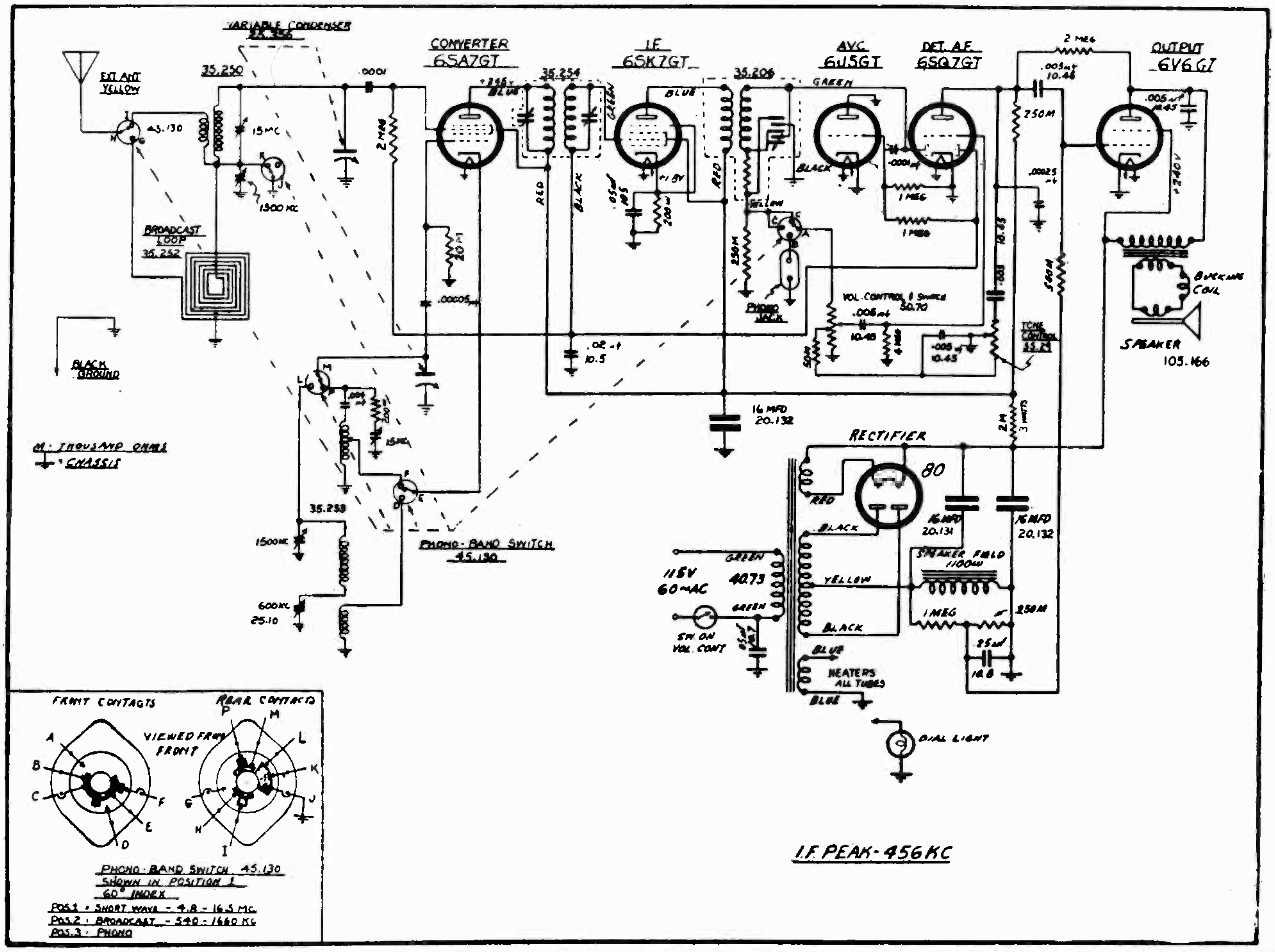
MODEL JS-135

Turn receiver on and wait for tubes to reach operating heat. Adjust Wave Band Switch to desired Wave Band. LEFT for Short Wave; CENTER for Standard Broadcast; and RIGHT connects terminals for phonograph record player in the circuit. The UPPER HALF of the Dial Scale covers the Broadcast Band. The LOWER HALF covers the Short Wave Band. Turn the Vernier Tuning Knob until the desired station (see dial pointer), is heard. Adjust Volume to a satisfactory level after making certain that the station is tuned correctly. Tuning on Short Wave is more critical. Use more care lest worthwhile stations be passed over unnoticed.

A Phonograph Record Player can be attached to the terminals marked "PHONO" in rear of chassis.

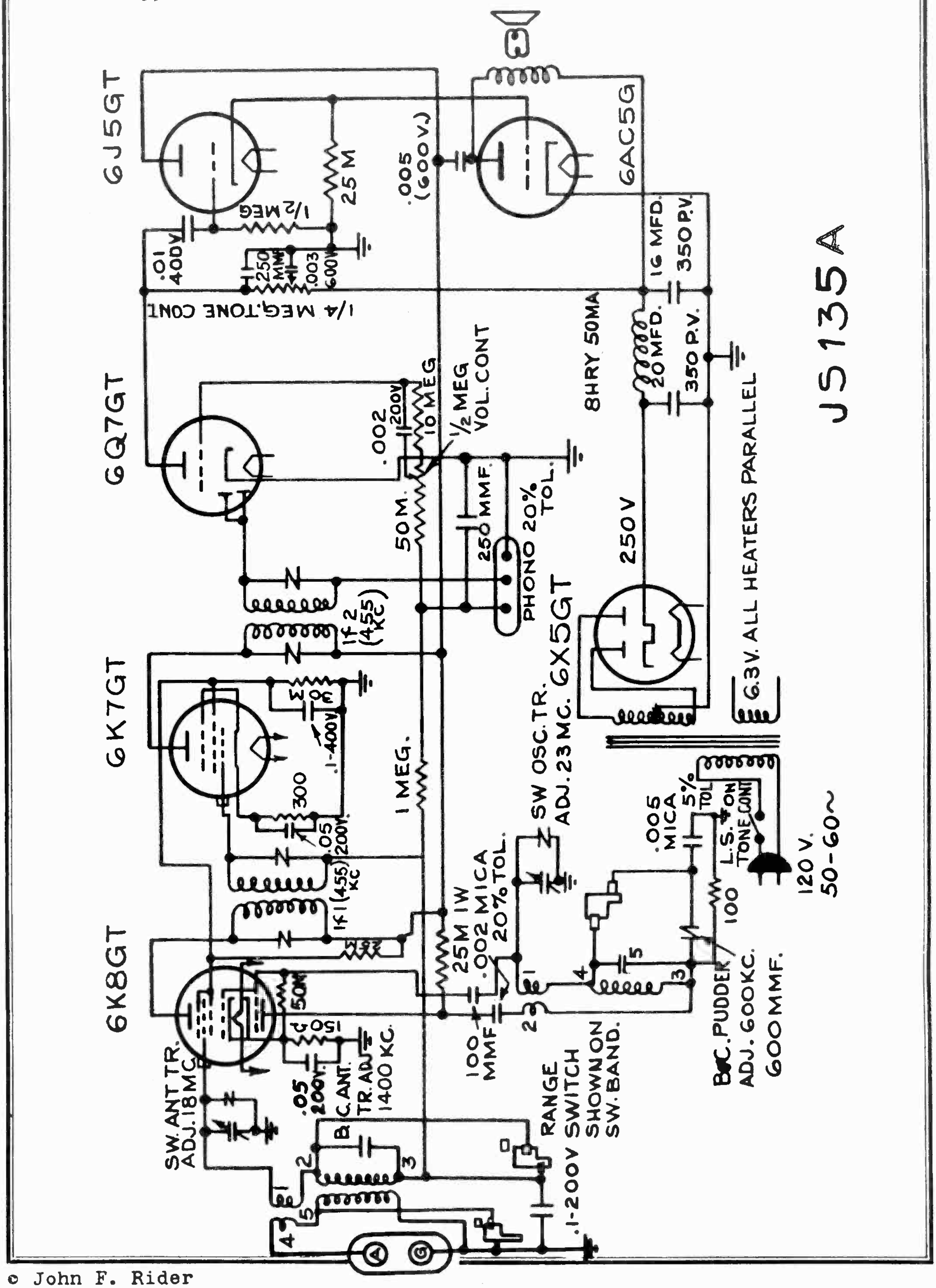
One 6 Volt 250 M. A. lamp is used for dial illumination. Use similar type for replacement.

WARNING: Check power line for voltage nad frequency (cycles) to make certain they are the same as specified on label located at rear of the receiver chassis before inserting the receiver power line in electric outlet.



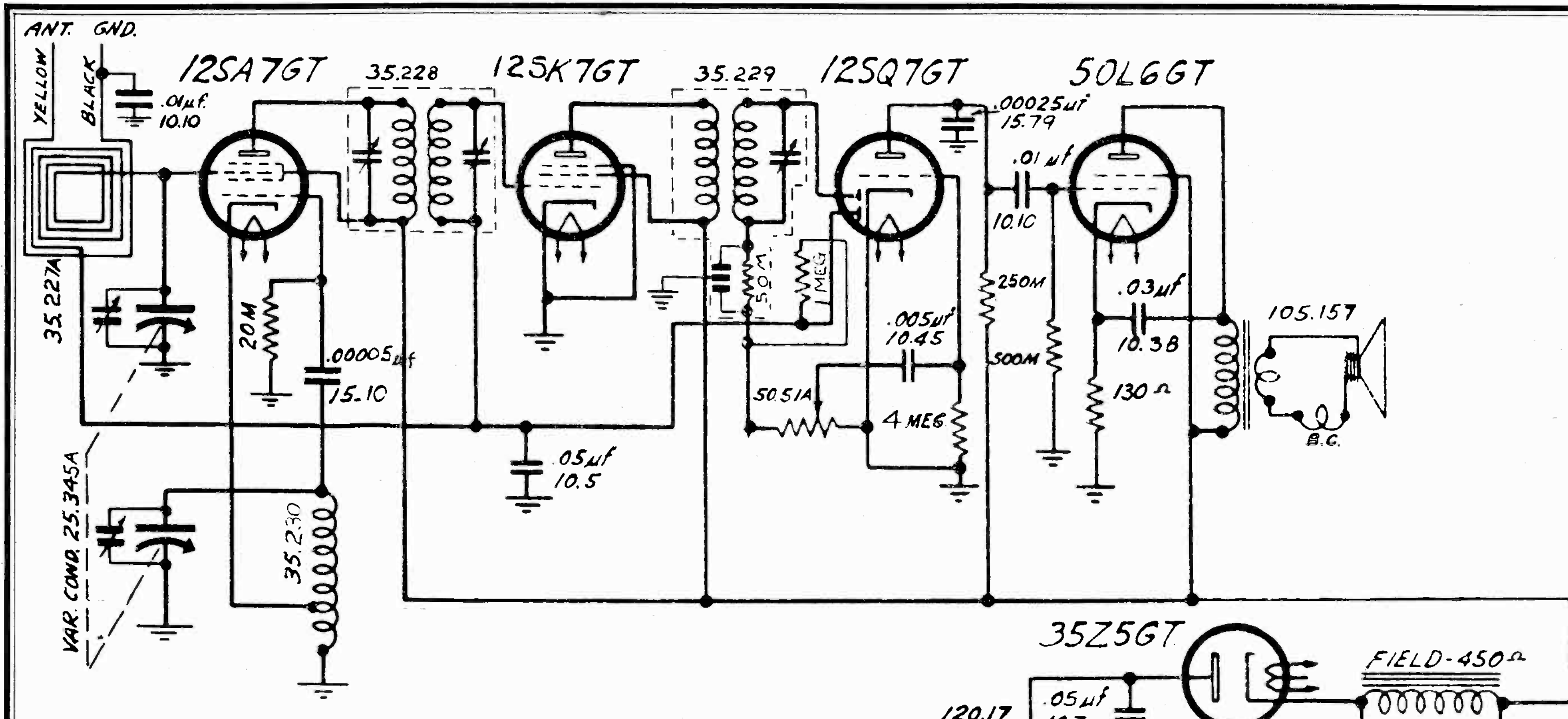
MODEL JS-135A

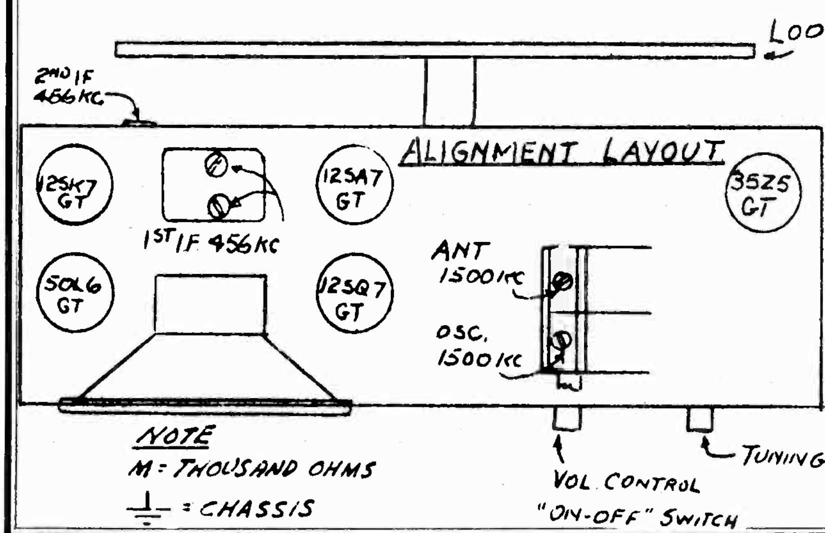
RADIO WIRE TELEVISION



RADIO WIRE TELEVISION

MODELS JS-166, JS-167





NOTE
M = THOUSAND OHMS
⏚ = CHASSIS

ALIGNMENT PROCEDURE

Feed 456 K.C. through .01 condenser to antenna (rear section of variable condenser. Adjust I.F. trimmers for maximum output.

R.F. -

Set variable condenser to 1500 K.C. Feed 1500 K.C. signal through 100 mmf. condenser to antenna lead (rear of loop). Adjust ant. and osc. trimmers for maximum output. Check sensitivity at 600 K.C. Bend rotor plates if necessary to insure proper tracking.

MODELS JS-173,
JS-184, JS-185

RADIO WIRE TELEVISION

WARNING: Check power line for voltage and frequency (cycles) to make certain they are the same as specified on label located at rear of the receiver chassis before inserting the receiver power line in electric outlet.

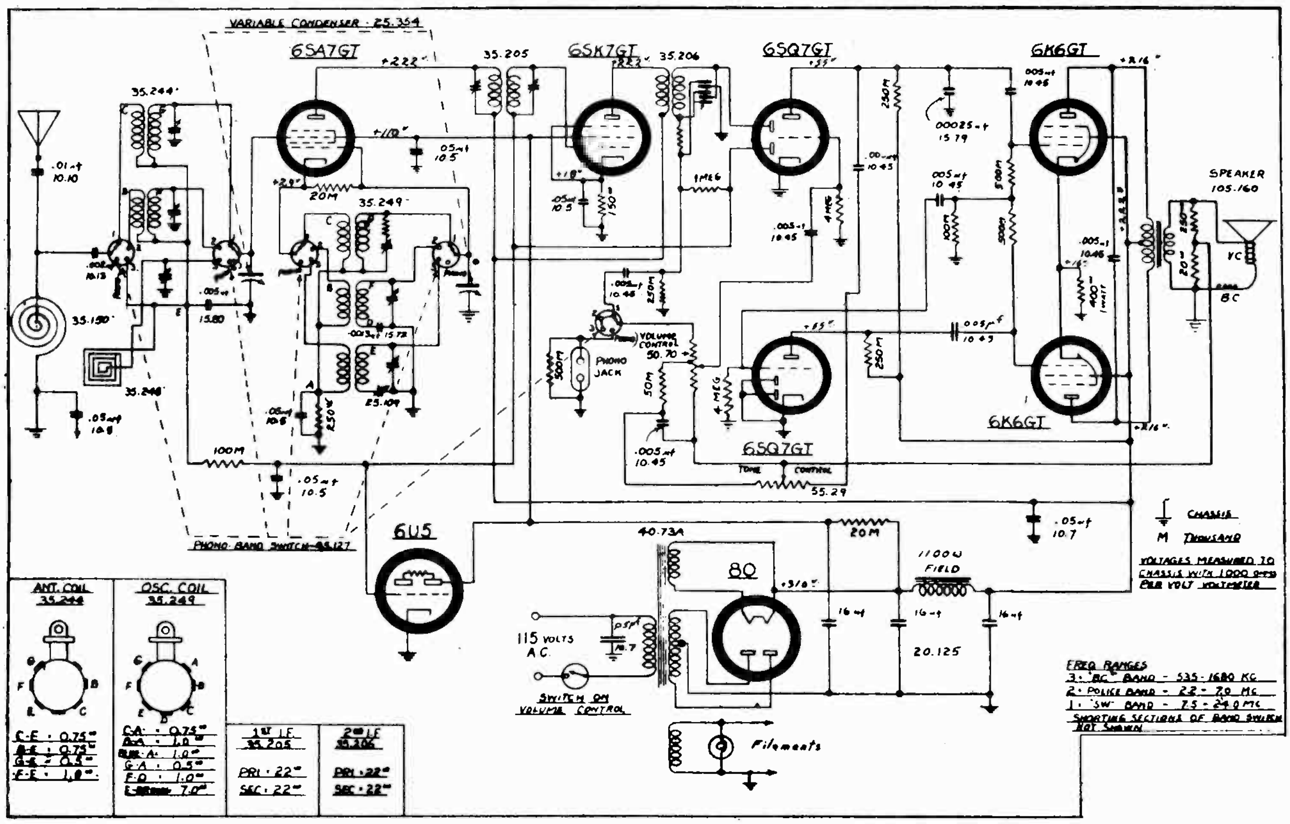
These Receivers must be operated on 60 Cycles, 120 Volt current. Any other type Voltage, if used will result in damage to the receiver.

SHORT WAVE RECEPTION: An external Antenna is absolutely necessary for good reception on either of the Short Wave Bands. This antenna may consist of a short wire strung indoors or preferably a good OUTSIDE ANTENNA.

In installing an antenna to be used with a sensitive short wave receiver every precaution should be observed to keep interfering noises at a minimum. The lead-in and antenna proper should be located as far as possible from any potential source of interference, such as electric signs, elevators, trolley wires, motors, power lines, etc. The antenna should also be as remote as possible from pick up from the ignition systems of passing automobiles. For connection to the antenna, a yellow wire is brought out through the rear of the receiver. Insert the power line plug in the electric outlet and turn the "ON-OFF" switch and Volume Control knob to the right. A few seconds will be required for the tubes to reach operating temperature.

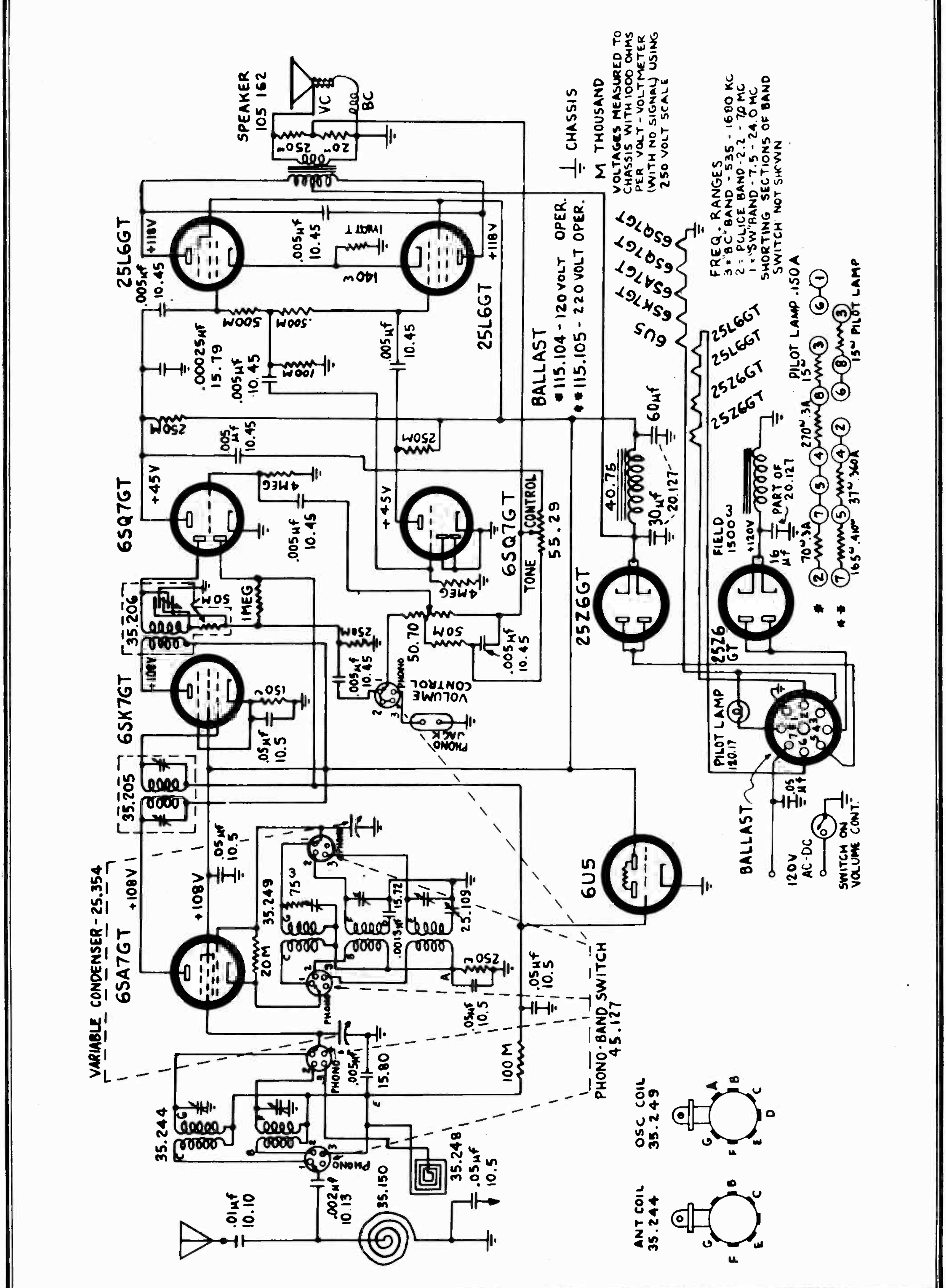
DIAL LAMP: Thse models use one 6-8 Volt, 150 M. A. Lamp. Use similar lamps when replacing or damage will result.

CAUTION: When pilot lamp burns out, replace at once.



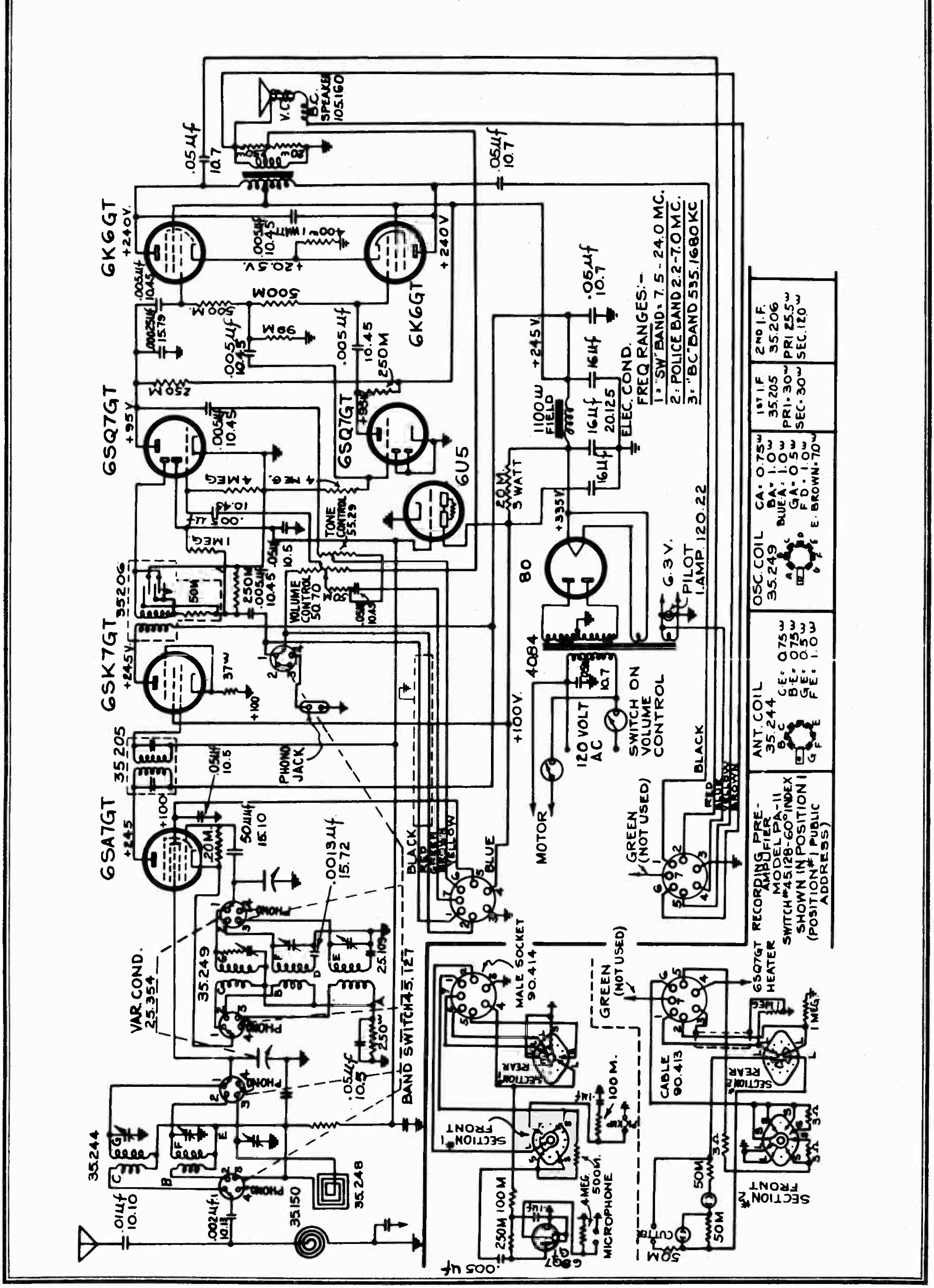
RADIO WIRE TELEVISION

MODEL JS-174



MODEL JS-176

RADIO WIRE TELEVISION



This receiver is equipped for FM (Frequency Modulation); Television and Phonograph Units.

Located on the rear of the chassis is a two pin JACK provided for this purpose. The Band Switch must be in the left position when operating.

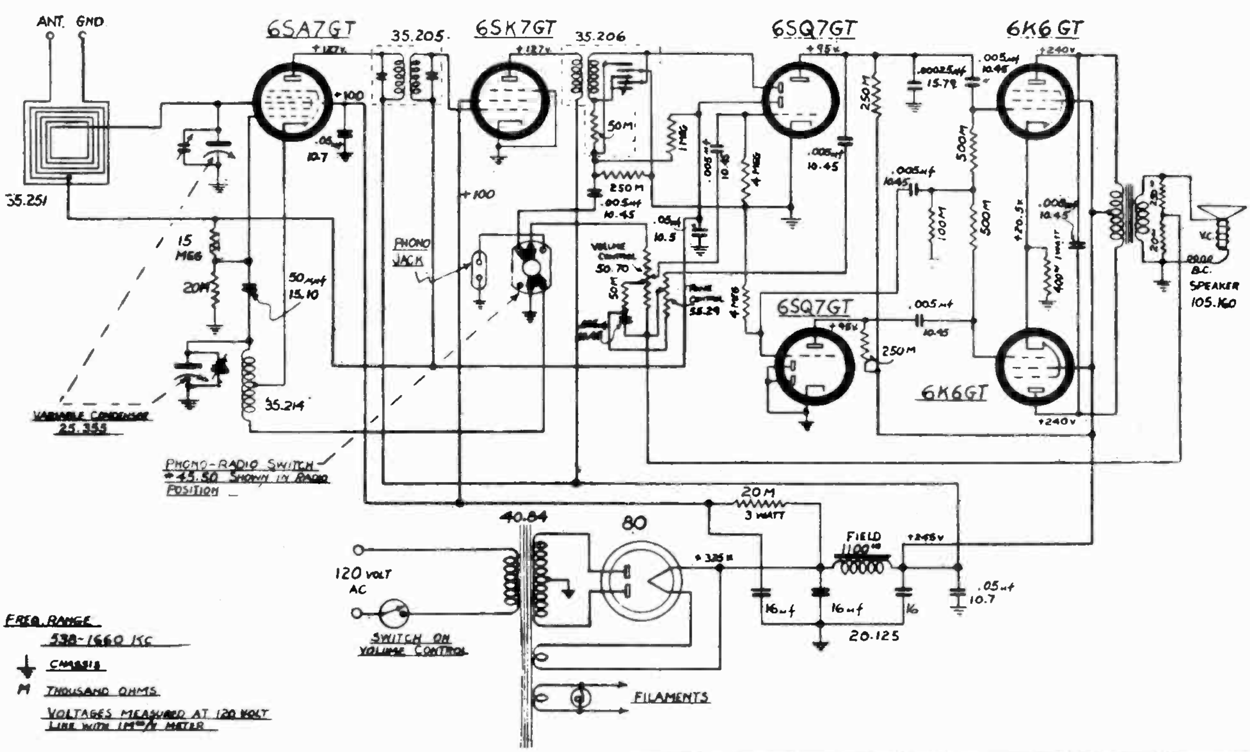
If receiver hums slightly reverse the Power Cord Plug.

TUBE COMPLEMENT: A tube layout chart at the rear of the receiver indicates the type of tubes employed, as well as their location on the receiver chassis. When replacing these tubes replace only with tubes having identical type numbers.

When operating the receiver in a steel re-enforced building or other shielded locations, an outside antenna is recommended. This may be connected to the terminal on the loop marked "AERIAL". A ground may also be connected to the terminal marked "GROUND".

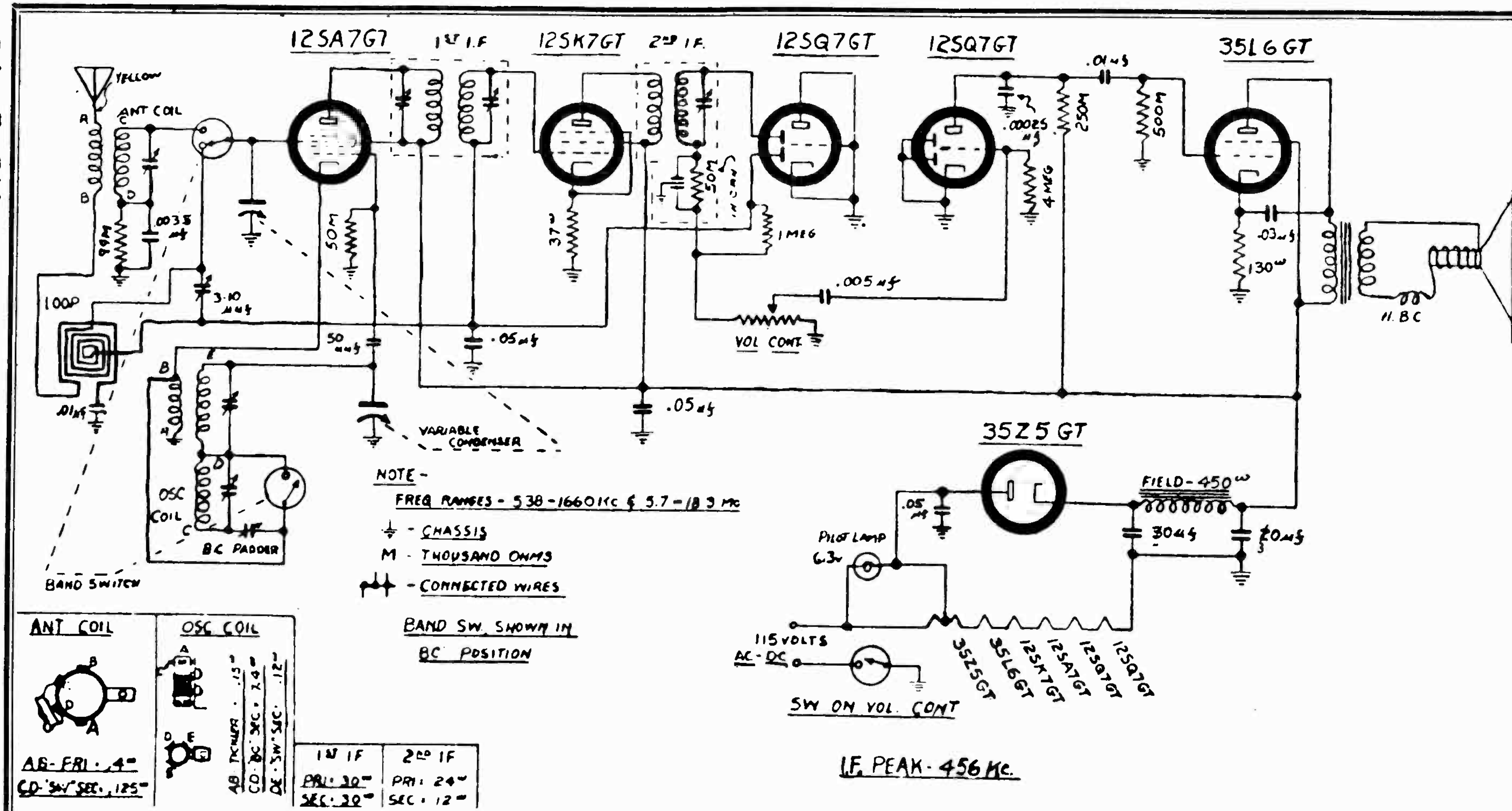
WARNING: Check power line for voltage and frequency (cycles) to make certain they are the same as specified on label located at rear of the receiver chassis, before inserting the power line in electric outlet.

This Receiver is equipped with a ROTATING LOOP ANTENNA. By rotating the Loop Control from left to right or vice versa, reception may be greatly improved. A correct position of the LOOP ANTENNA will result in noise-free reception.



MODELS JS-186, JS-187

RADIO WIRE TELEVISION



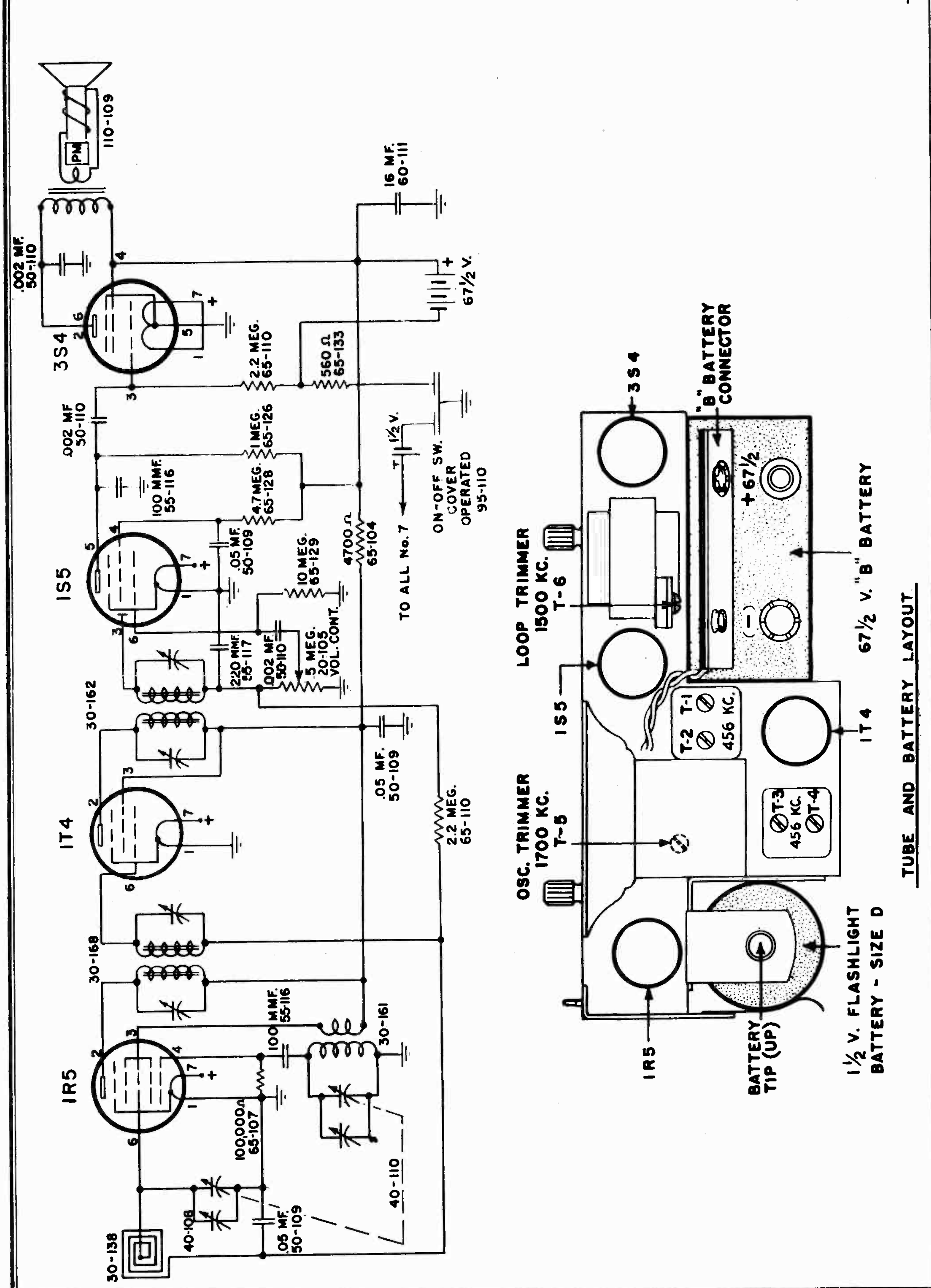
This 6 Tube Superheterodyne is designed to operate on 115 volts, 40 to 60 cycles, alternating current (AC) or 115 volts direct current (DC).

The Tuning Ranges, 533 to 1660 kilocycles (KC) and 5.7 to 18.3 megacycles (MC), cover all the major Domestic and Foreign Short Wave Broadcast, Police, Aircraft and Amateur Bands.

One 6-8 volt 150 M.A. lamp is used to illuminate the dial. Similar lamp should be used for replacement or damage may result.

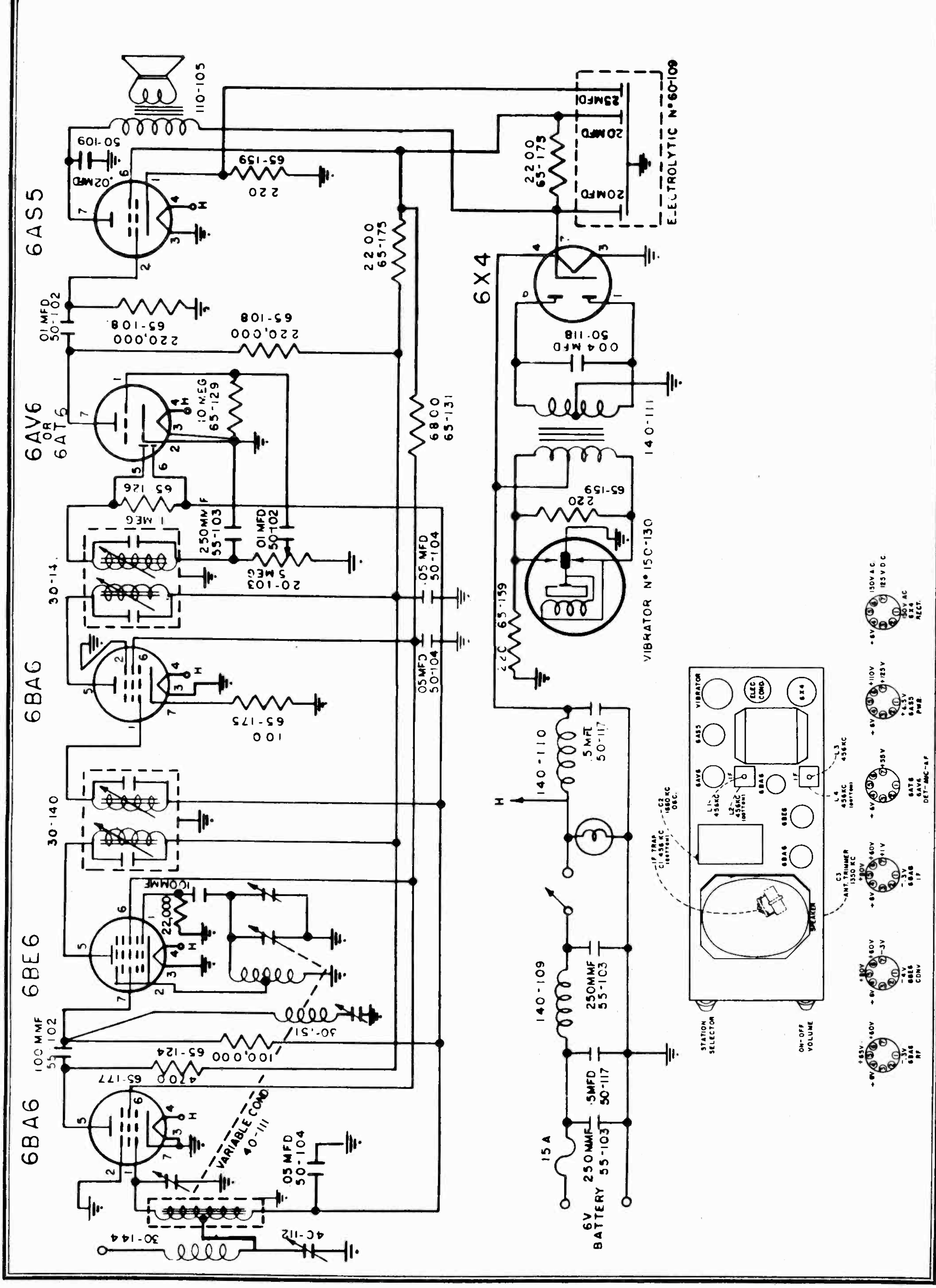
REGAL ELECTRONICS CORP.

MODEL BP-48



MODEL CR-761

REGAL ELECTRONICS CORP.



REGAL ELECTRONICS CORP. MODEL CR-761

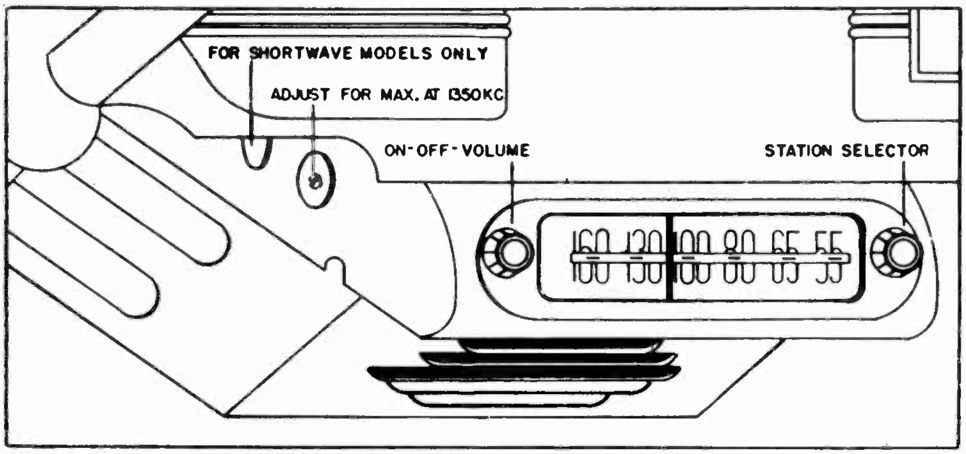


FIGURE 1. RADIO IN POSITION

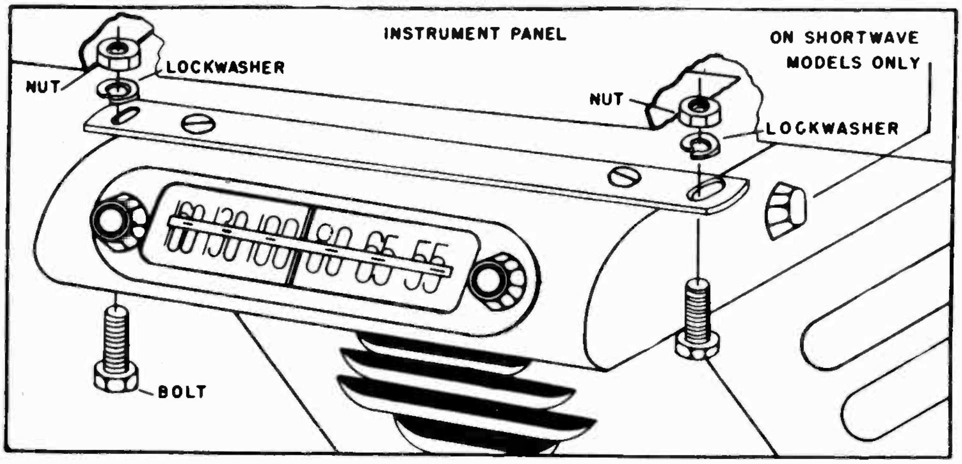


FIGURE 2. FRONT VIEW OF RADIO INSTALLATION

INSTALLATION

This radio is designed to operate at maximum efficiency when used with any good make auto-radio aerial. Install the aerial before proceeding with the installation of the radio. The aerial lead and complete installation instructions are packed with each aerial. The location of the aerial will determine the length of the aerial lead required to reach the radio. The shortest possible aerial lead should be used.

RADIO INSTALLATION: Determine the best possible location for the radio along the lower edge of the instrument panel. Using the front mounting strap as a template, mark and drill two 1/4" holes in the instrument-panel flange.

Fasten the strap to the top of the radio housing with two screws; then attach the fire-wall mounting strap to the stud on the back of the radio. Hold the radio in place, and bend the fire-wall strap to fit the fire wall. Mark and center-punch the location for the mounting-bolt hole on the fire-wall, and drill a 3/8" hole. Before drilling the hole, make certain that there are no obstructions such as ignition coil, battery, etc. on the motor side of the fire wall. Fasten the front mounting strap to the flange of the instrument panel (see figure 2), and bolt the fire-wall mounting strap securely to the fire wall (see figure 3).

CONNECTIONS: Plug the aerial lead into the connector on the radio. Place the fuse in the fuse housing on the "A" lead, and connect the fuse end of the "A" lead to the short lead on the back of the radio. Connect the other end of the "A" lead to the ignition switch or ammeter stud.

ANTENNA COMPENSATOR: An adjustment (see figure 1), reached through a hole on the upper-left side of the radio, near the front, is used to balance the radio to the aerial. With the radio turned on and the aerial fully extended, tune in a weak signal between 1200 kc and 1400 kc on the dial. With the volume control set just high enough to make the program audible, set the trimmer adjustment to obtain maximum signal strength. A small screwdriver is required for this adjustment.
Radio is now ready for operation.

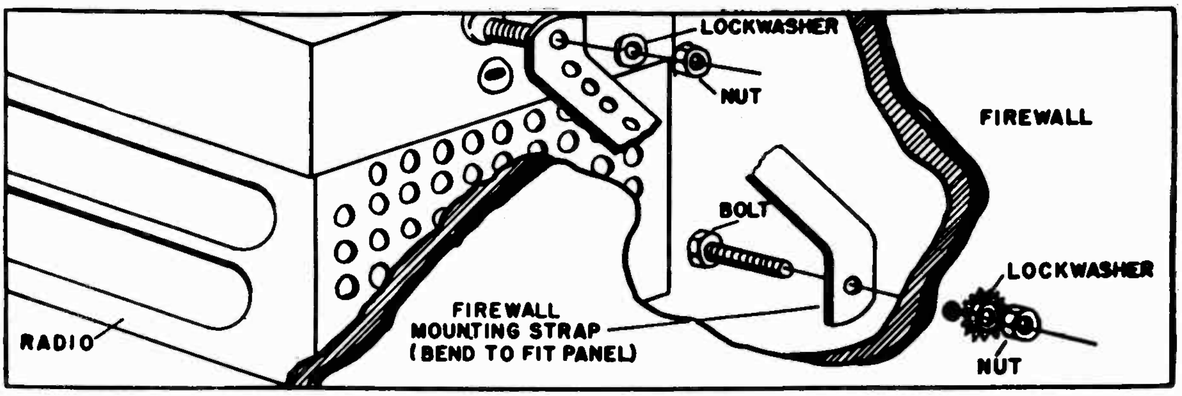


FIGURE 3. REAR VIEW OF RADIO INSTALLATION

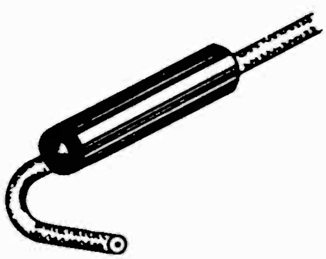
ELIMINATION OF INTERFERENCE FROM CAR ELECTRICAL SYSTEM

Remove the coil-to-distributor high-tension lead from the distributor. Cut the lead two inches from the end, and screw the distributor resistor into the coil lead (see figure 4). Then screw the short length into the resistor, and plug the cable into the distributor cap. Two noise-filter condensers are furnished. One condenser must be connected to the output terminal of the generator (never to the field terminal), and the other to the battery side of the ignition coil. The generator-condenser bracket should be fastened to the generator housing, under the screw that holds the field (see figure 5), while the coil-condenser bracket should be fastened under the coil mounting bolts.

In some particularly stubborn cases of motor interference, one or more of the following procedures may be necessary:

A condenser can often be used to advantage on the electrically operated oil gauge or gas gauge. Connect the condenser lead to the terminal of the gauge, and bolt the condenser case securely to the frame or some other grounded part of the car.

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.



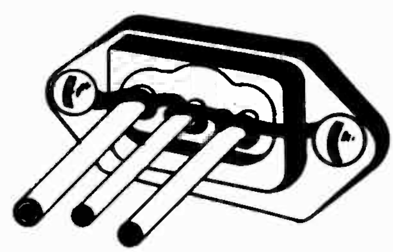


FIGURE 4. DISTRIBUTOR RESISTOR

FIGURE 6. BONDING OF FIRE-WALL TUBES

FIGURE 5. GENERATOR CONDENSER

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw (see figure 6).

In some cases it may be necessary to connect an additional condenser to the ammeter or to the ignition switch.

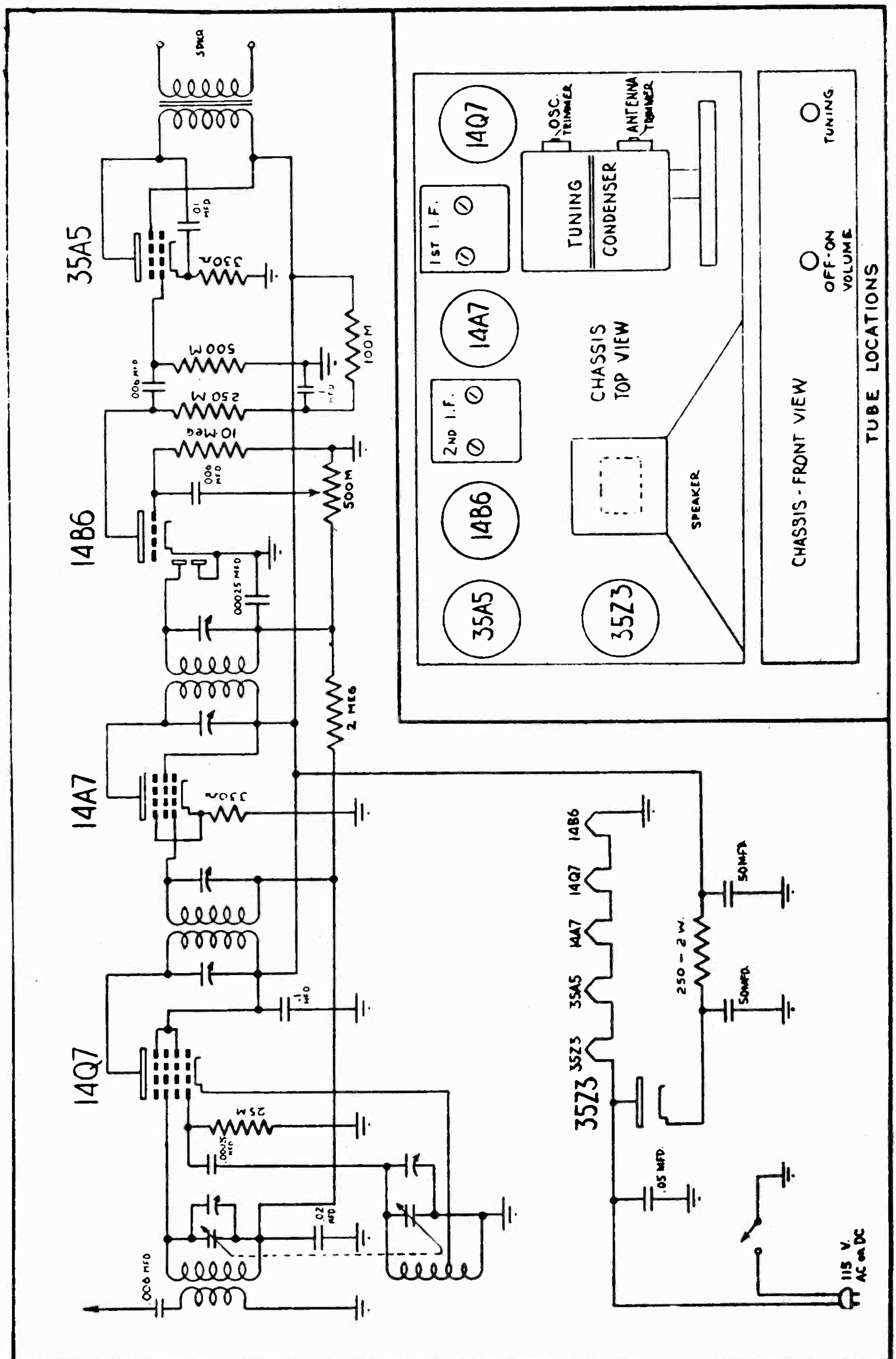
It may be necessary to use a condenser on the voltage regulator. The condenser case should be mounted under one of the voltage-regulator mounting screws, or at some other convenient location, and connected to the battery terminal of the voltage regulator.

Interference from electric clocks can be eliminated by connecting a condenser to the ammeter terminal. The case of the condenser must be securely grounded.

If tire-static interference is noted in a particular installation, static collector springs should be obtained and installed in the front wheels of the car.

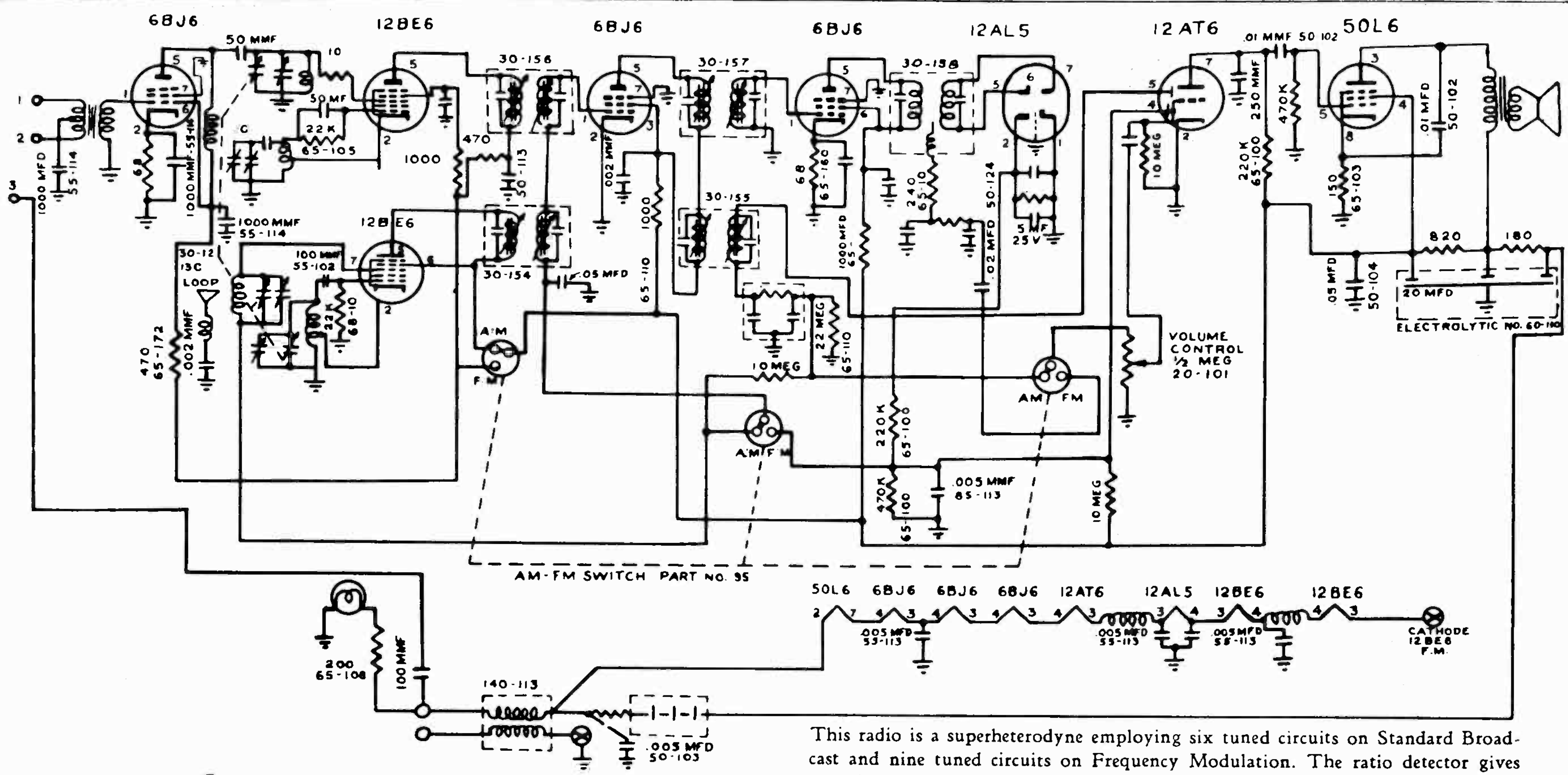
REGAL ELECTRONICS CORP.

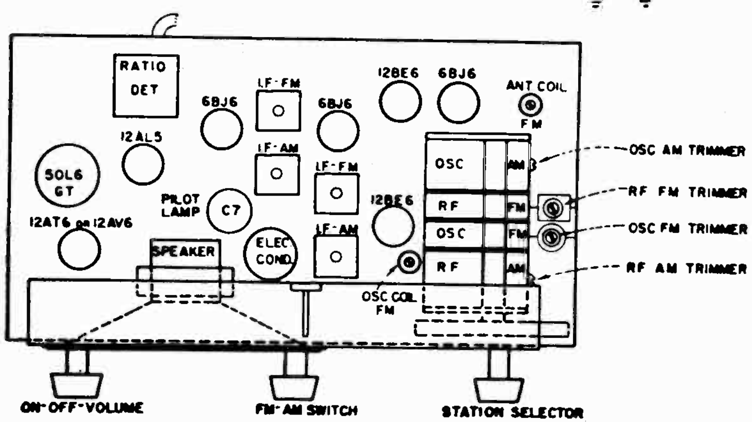
MODEL L-43



MODEL 78

REGAL ELECTRONICS CORP.





This radio is a superheterodyne employing six tuned circuits on Standard Broadcast and nine tuned circuits on Frequency Modulation. The ratio detector gives you the latest design in F.M. reception. Automatic volume control, beam power output, and selinium long life rectifier makes this receiver an outstanding model.

The tube complement consists of (1) 6BJ6 Radio Frequency Amplifier, (1) 12BE6 Converter (FM), (1) 12BE6 Convertor (AM), (1) 6BJ6 I.F. Amplifier, (1) 6BJ6 Driver, (1) 12AL5 Ratio Detector, (1) 12AT6 Detector AVC First Audio Amplifier, (1) 50L6GT Beam Power Amplifier.

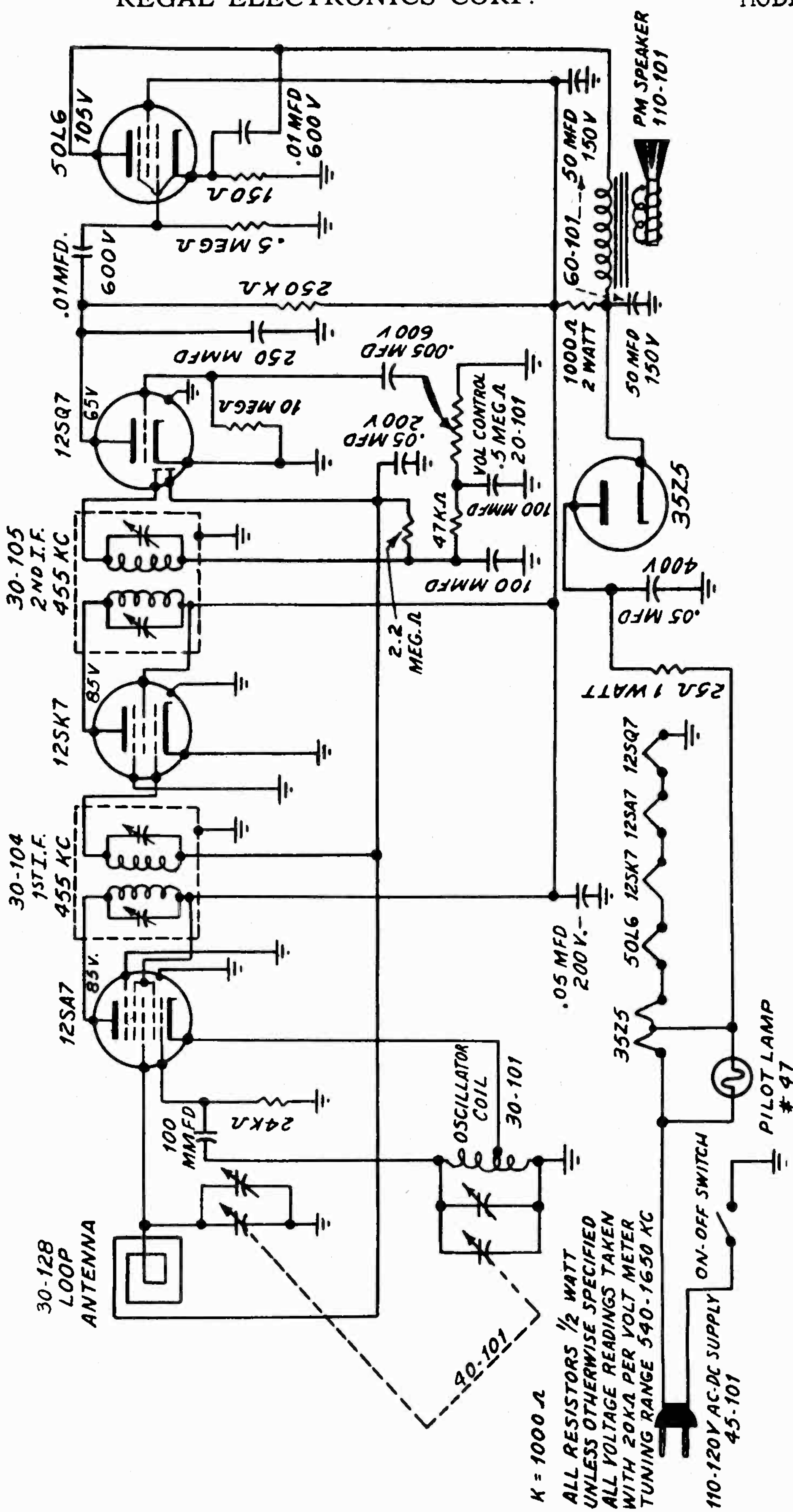
The Pilot light is a type C-7 Mazda.

The tuning range on standard broadcast is 540 to 1650 Kilocycles covering the full broadcast range and 87.6 to 109.4 MC, covering all the FM channels from 200 to 300.

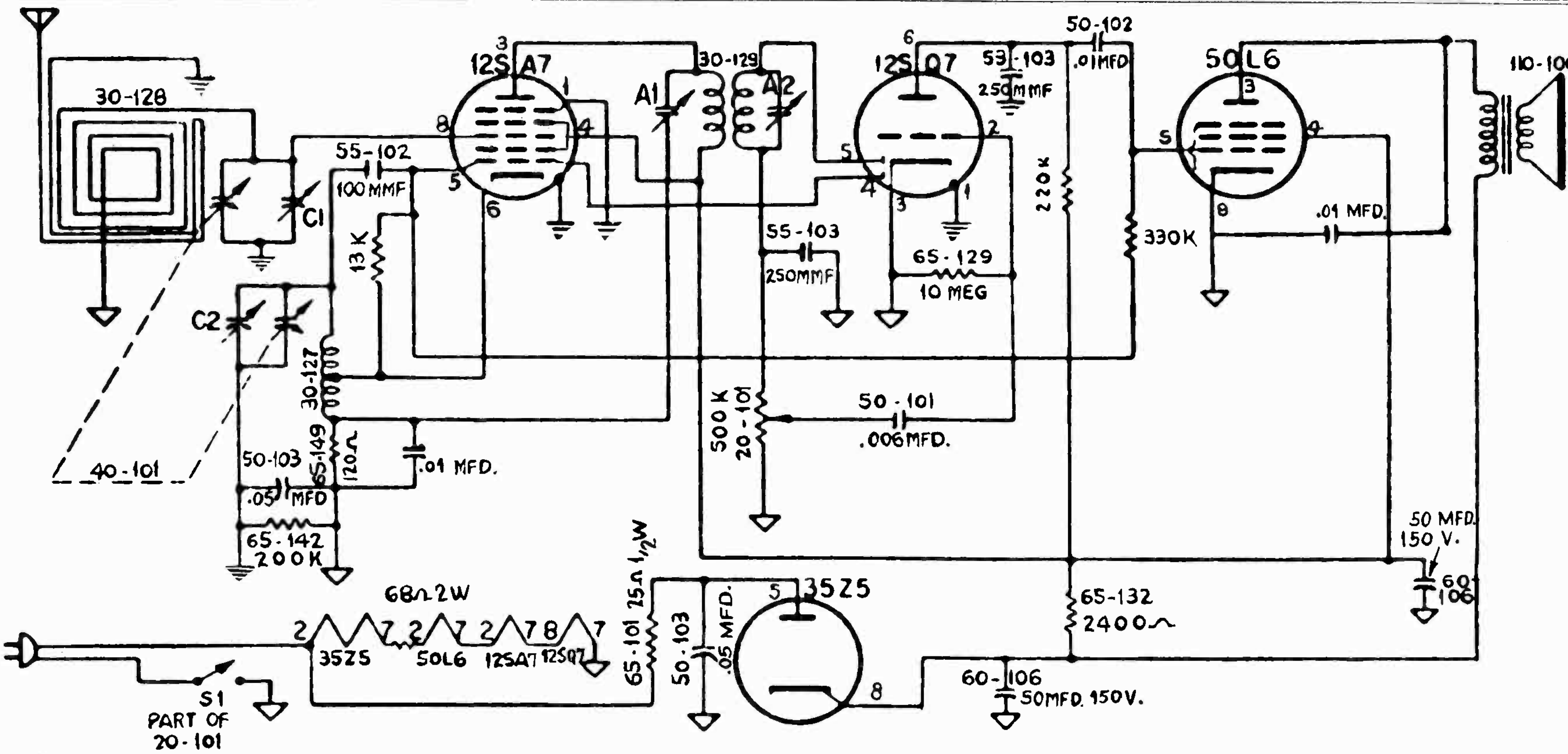
This radio is designed for convenient use in any location within range of a standard outlet receptacle. It will operate on 105 to 125 volts, 50 to 60 cycles alternating current, or on 105 to 125 volts direct current. Power consumption is 37 watts.

REGAL ELECTRONICS CORP.

MODEL 205

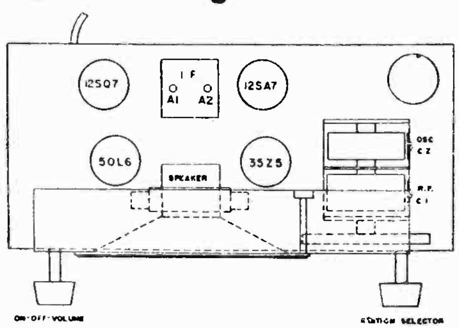


MODEL 1107 REGAL ELECTRONICS CORP.



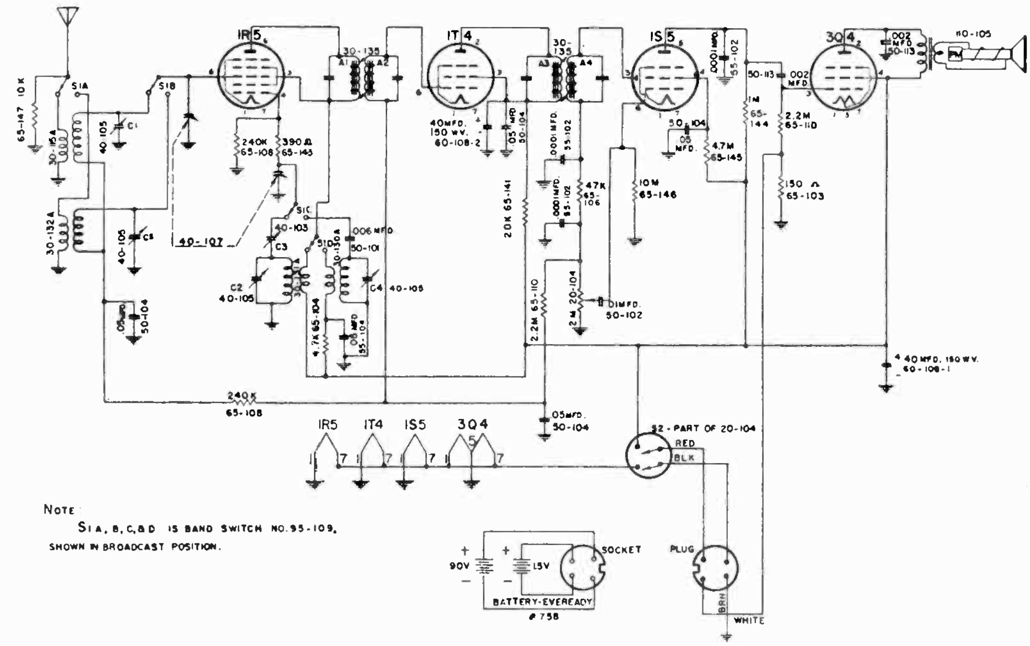
DENOTES CHASSIS GROUND

B



The Model 1107 is a 4 tube, 1 Band super-heterodyne with a built in Regaloop Antenna. The tunning range of the Broadcast frequency is 540 to 1650 kilocycles or 560 to 182 meters. This receiver operates on 105-125 volts, 50-60 cycles alternating current or on 105-125 volts direct current.

REGAL ELECTRONICS CORP. MODEL 1500



DWG. 130-139 MODEL 1500

THE MODEL 1500 is a 4-tube battery-operated superheterodyne farm radio receiver with two tuning ranges for reception of standard broadcast and short-wave stations. 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 in megacycles, or 16 to 49 meters, which include the following 16, 19, 25, 31, 39 and 49 meter bands.

This radio is designed to operate from an Eveready #758 battery pack. This unit has a 90 volt "B" supply and a 1½ volt "A" supply, and is connected to the receiver by means of a 6-foot flexible battery cable and plug.

ELECTRICAL SPECIFICATIONS

THE CIRCUIT OF 1500 is a superheterodyne employing eight tuned circuits for maximum sensitivity and selectivity, with Automatic Volume Control (AVC) and a beam power output system. The tube complement consists of (1) 3Q4 power amplifier, (1) 1S5 Detector, AVC and first audio amplifier, (1) 1T4 IF amplifier, and (1) 1R5 converter.

If your set does not work check your tubes. Make sure each tube is in its socket.

MODEL 1500

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

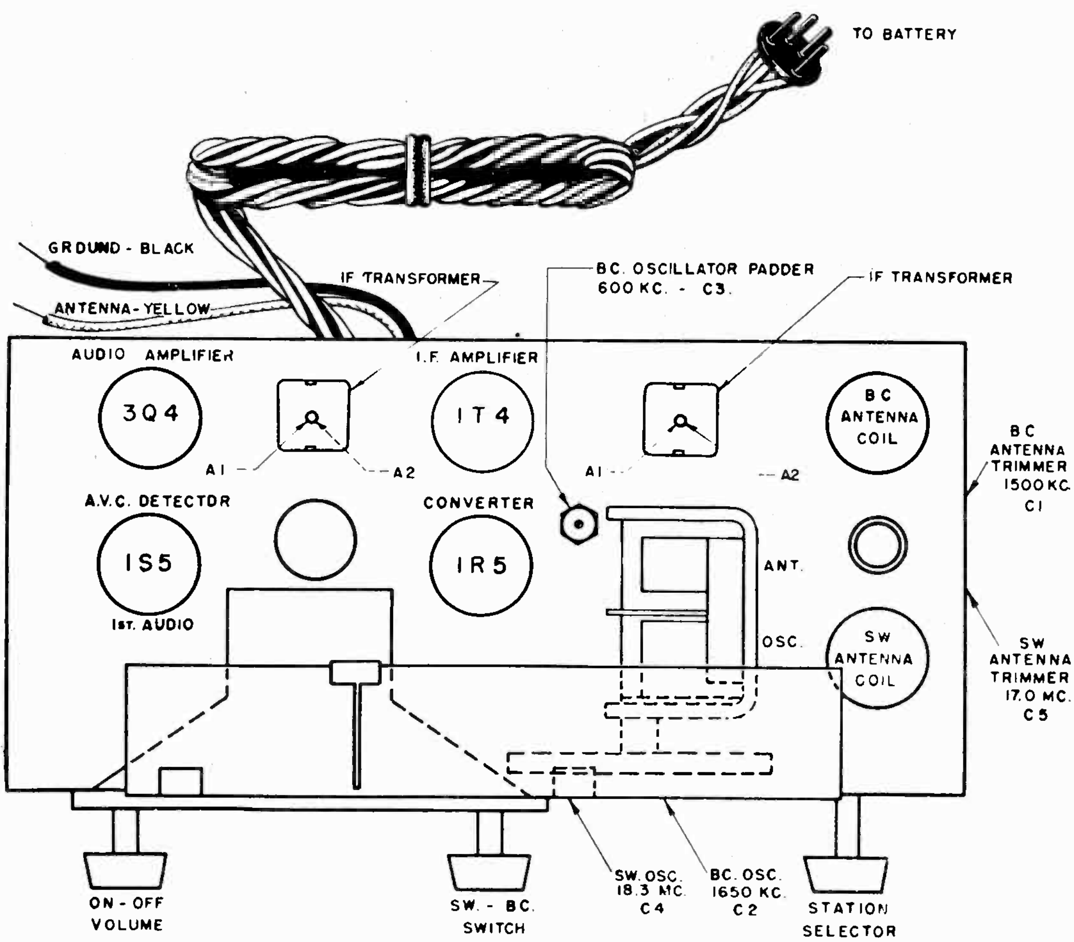
BROADCAST :- 540 - 1650 KC. SHORTWAVE :- 5.8 - 18.3 MC.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	BAND SWITCH POSITION	SIGNAL GEN'R FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD	R.F. SECTION OF VARIABLE CONDENSER	B C	455 KC.	1650 KC.	ACROSS VOICE COIL	A1, A2, A3, A4.	ADJUST FOR MAXIMUM
200 MMFD.	ANTENNA LEAD	B C	1650 KC.	1650 KC.	" "	C 2	" " "
200 MMFD.	" "	B C	1500 KC.	1500 KC	" "	C 1	" " "
200 MMFD.	" "	B C	600 KC.	600 KC.	" "	C 3	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT. RECHECK C1 3 C2 ADJUSTMENTS AS GIVEN
400 Ω	" "	S W	18.3 MC.	18.3 MC.	" "	C 4	ADJUST FOR MAXIMUM.
400 Ω	" "	S W	17 MC.	17 MC.	" "	C 5	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT.

IF TWO PEAKS CAN BE OBTAINED, USE ONE WITH TRIMMER SCREW FURTHER OUT.

DWG. NO. 130-142

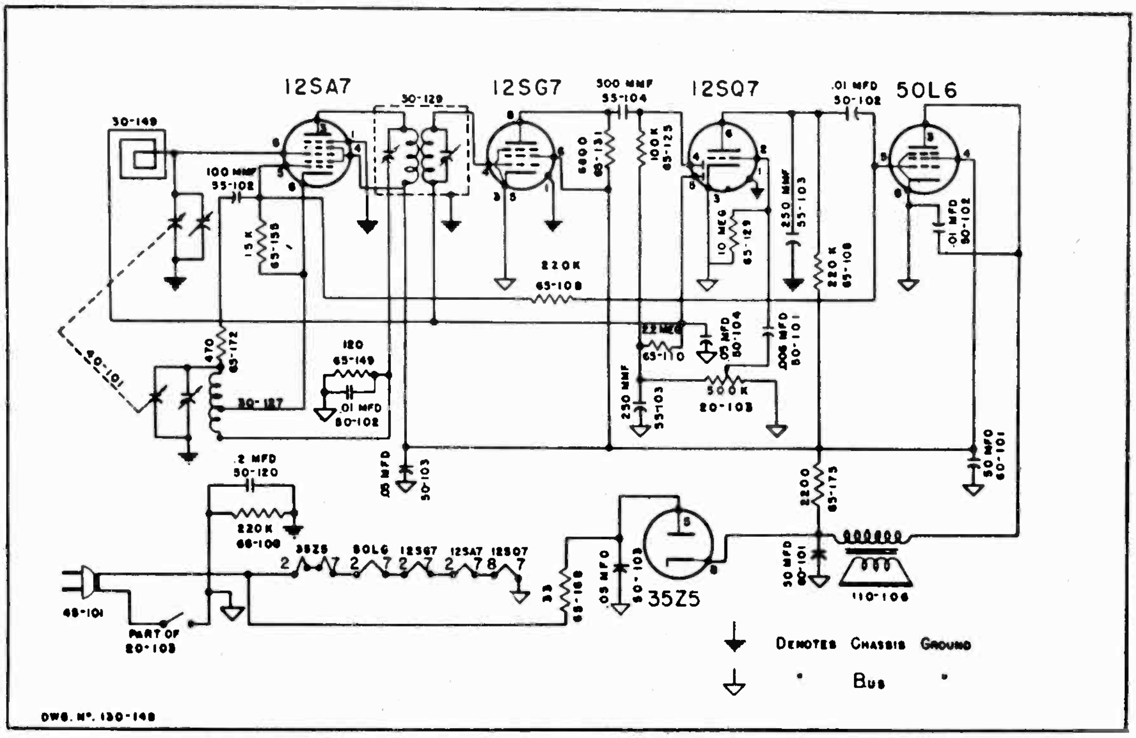
MODEL 1500

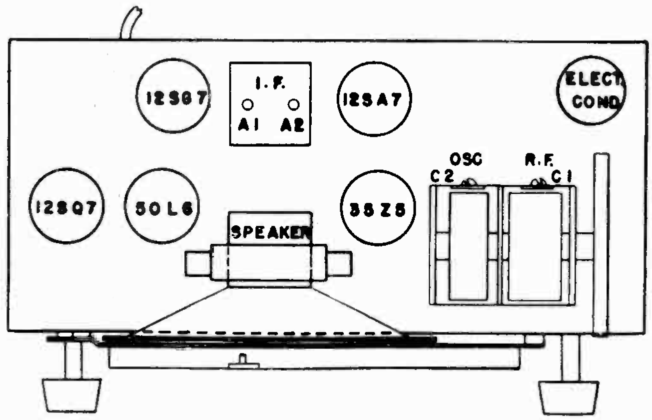


DWG. NO. 130-141

MODEL 1500

REGAL ELECTRONICS CORP. MODEL 7251





ON-OFF-VOLUME

STATION SELECTOR

This Model is a 5 tube, 1 Band super-heterodyne with a built in Regaloop Antenna. The tuning range of the Broadcast Band is 540 to 1650 kilocycles or 560 to 182 meters. This receiver operates on 105-125 volts, 50-60 cycles alternating current or on 105-125 volts direct current.

Antenna

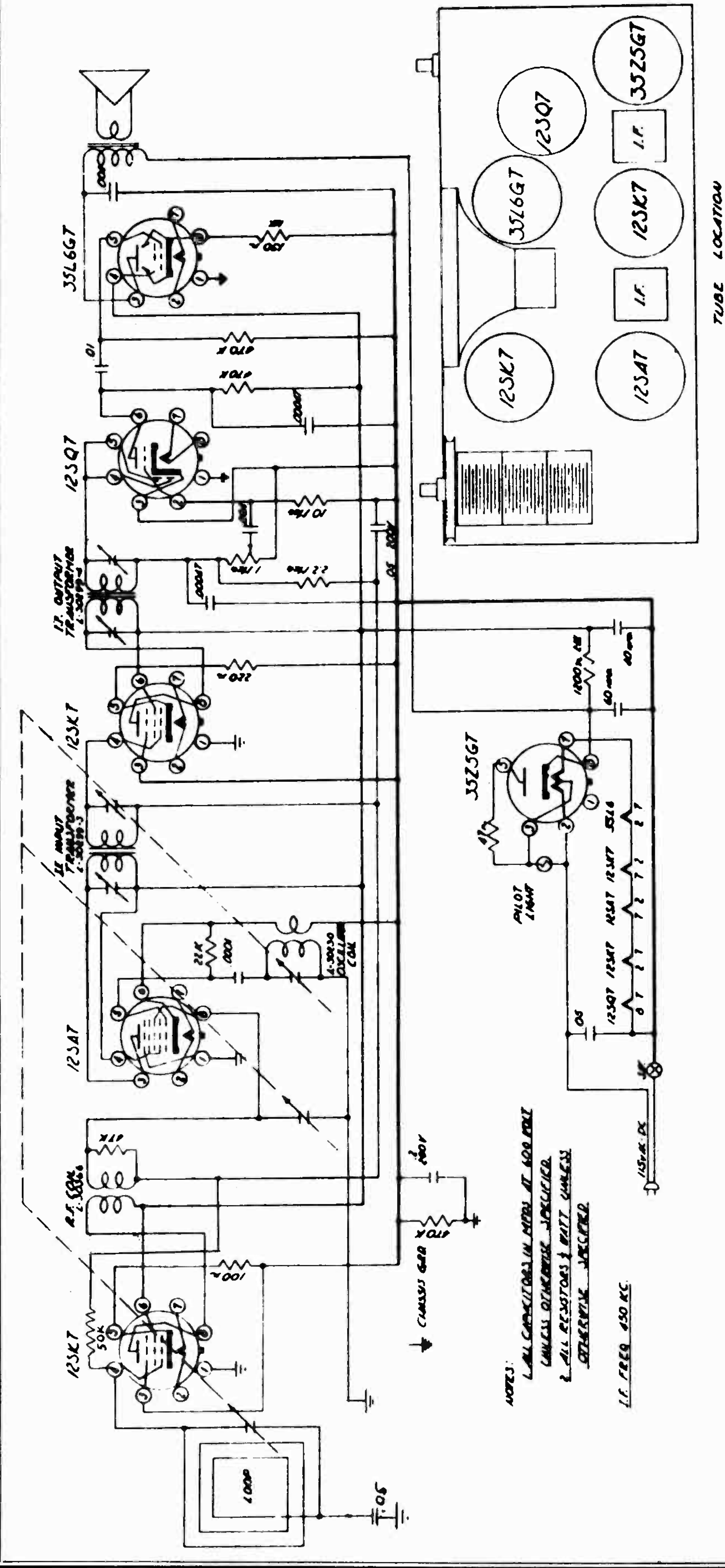
The loop Antenna in this receiver will give good reception under normal conditions. It is directional and the best position may be obtained by slowly rotating the receiver in different directions until the signal volume is at its strongest. For better results on weak signals connect a good outside Antenna. A connection is provided at the rear of the receiver for connecting an outdoor Antenna.

ELECTRICAL SPECIFICATIONS

Super-heterodyne with Beam Power out-put system. TUBES: 1-12SA7, 1-12SG7, 1-12SQ7, 1-50L6, 1-35Z5.

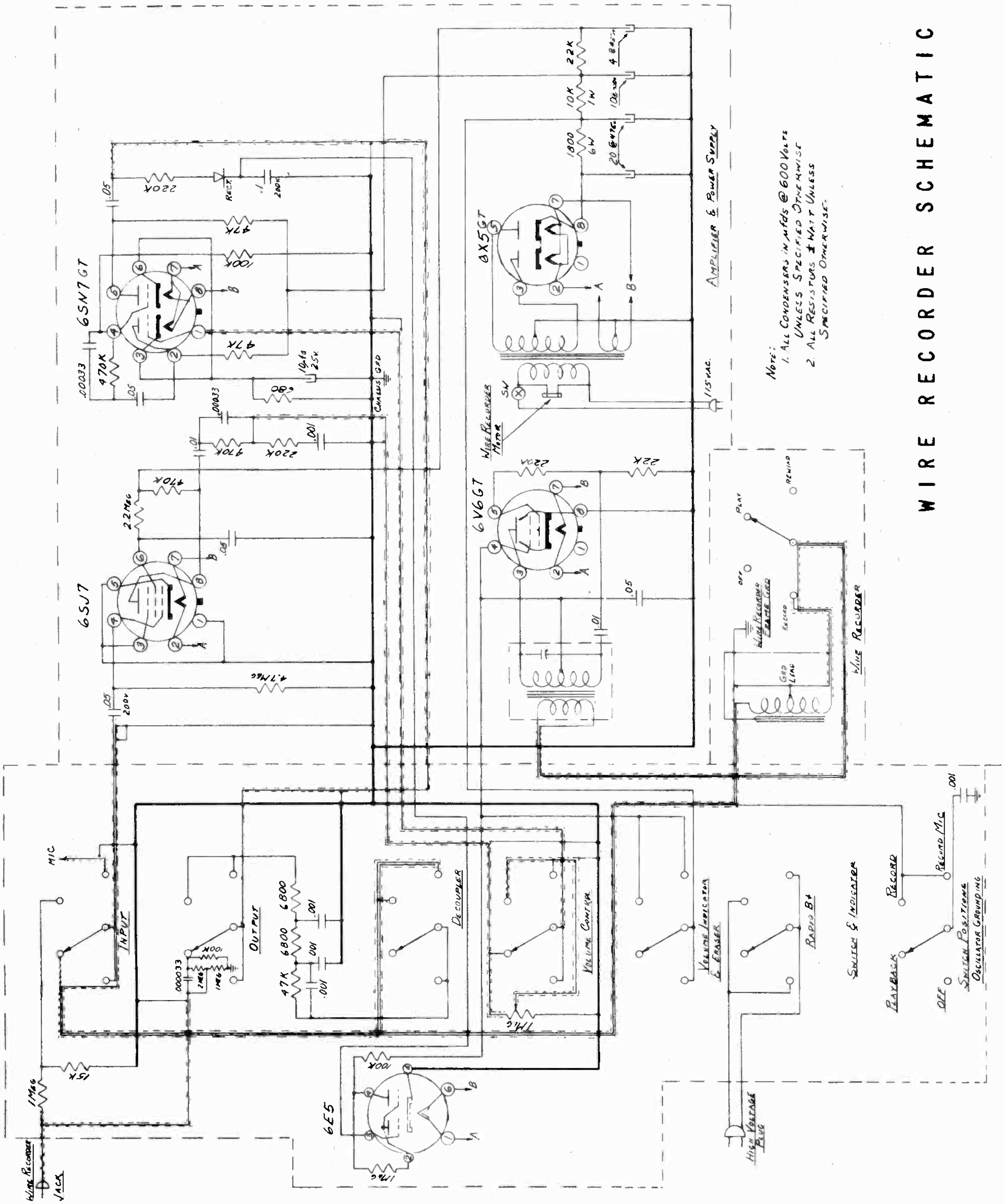
REMLER COMPANY LTD.

MODEL 6000, Scottie



MODELS 7110, 7120

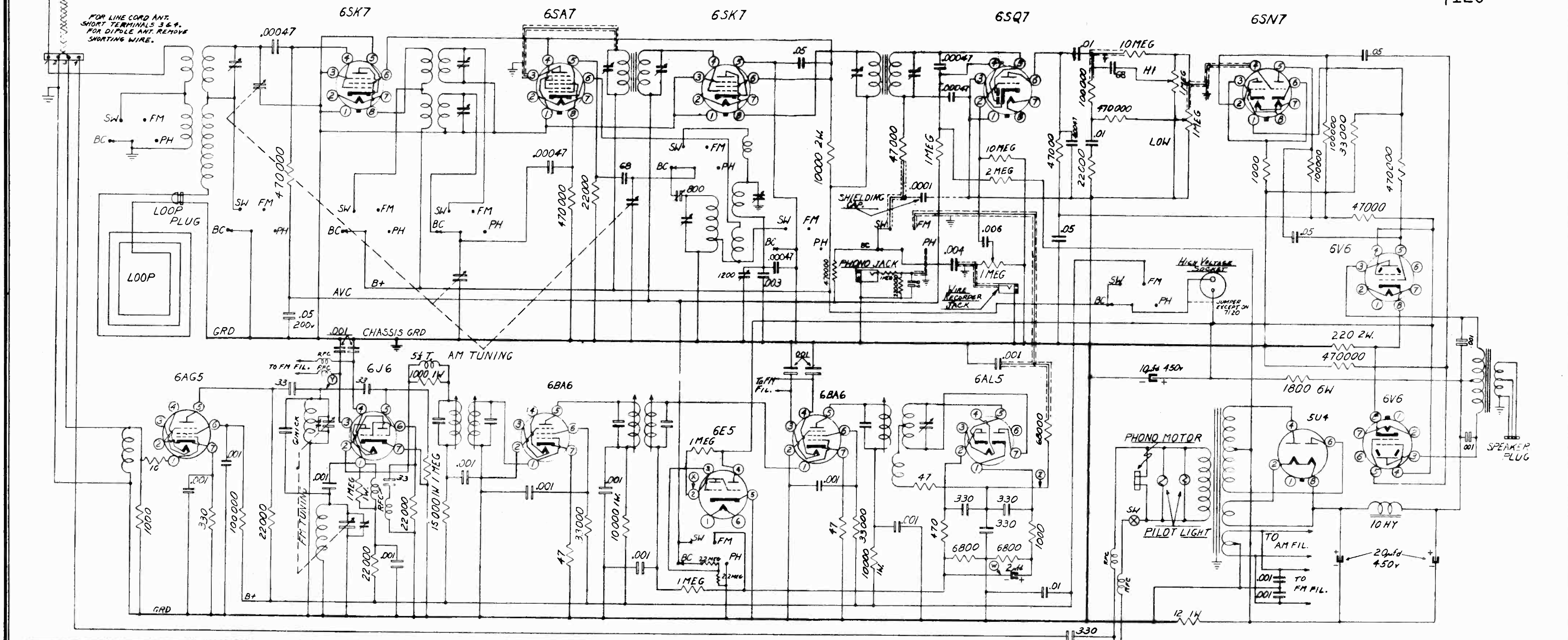
REMLER COMPANY LTD.



WIRE RECORDER SCHEMATIC

REMLER COMPANY LTD.

MODELS 7110, 7120



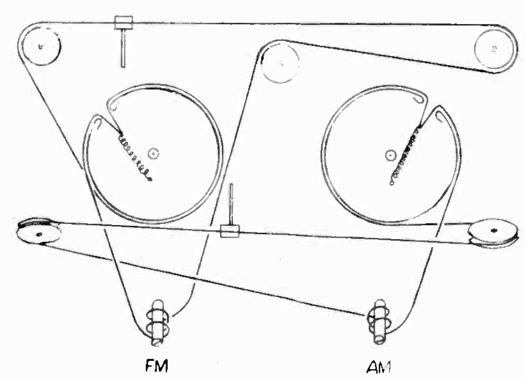
NOTES:
1. Resistors ½ Watt Unless Specified Otherwise.
2. Condensers 600v. Unless Specified Otherwise.
3. Condensers Having Values Of 33, 68 & 330 Are In µµFD. All Others Are In µFD.

MODEL 7110 - 7120 ALIGNMENT INSTRUCTIONS

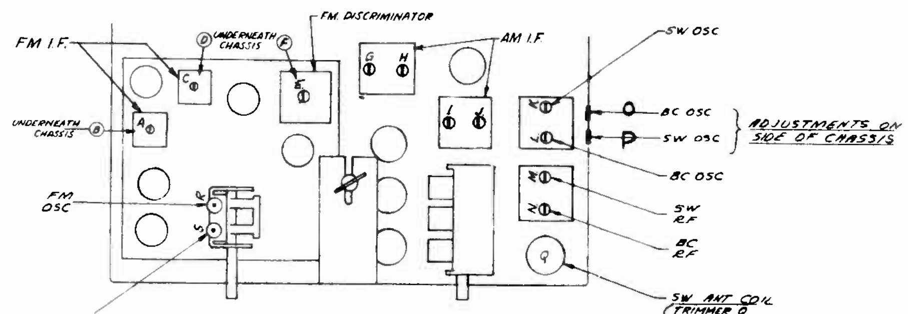
Tuning range, Broadcast 540kc-1700kc, Shortwave 5.8mc-18mc, FM 88mc to 108mc.

Keep volume control at comfortable listening level, and output from signal generator no higher than necessary to obtain output reading. It is absolutely necessary that an insulated alignment tool be used for all adjustments. The broadcast band antenna loop should remain connected. Connecting link should be open between antenna terminals 3 and 4 on rear of chassis when aligning, but closed when tuning FM stations. Use dial scale provided with these instructions, centered on receiver dial plate. Receiver and signal generator must be turned on at least 10 minutes prior to commencing alignment.

DUMMY ANT.	SIG. GEN. COUPLING	SIG. GEN. FREQ.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
BROADCAST BAND (Bandswitch on BC)						
.1 mfd	To pin #8 on 6SA7 and ground	450kc	Between stations on high freq. end of band	DC VTVM neg. on point "X" (Lead from grid of 6E5)	G, H, I, J	Aligns I.F. for both broadcast or shortwave bands.
.1 mfd	To Ant. term. strip, screw No. 1	1500kc	1500kc	Same as Above	Turn L until Sig. is heard, then peak N on VTVM.	
.1 mfd	Same as Above	800kc	800kc	Same as Above	Turn O until Sig. is heard.	Repeat preceding step and this step, until neither L nor O requires further adjustments for peak on VTVM.
SHORTWAVE BAND (Bandswitch on SW)						
.1 mfd	To Ant. term. strip, screw No. 1. Link open	16mc	16mc	DC VTVM neg. on point "X" (Lead from grid of 6E5)	Turn K until Sig. is heard, then peak M and Q on VTVM	
.1 mfd	Same as Above	6mc	6mc	Same as Above	Turn P until Sig. is heard.	Repeat preceding step and this step, until neither K nor P requires further adjustments for peak on VTVM.
FM Band (Bandswitch on FM)						
.1 mfd	To pin 1 on 2nd 6BA6 and ground	10.7mc. Less than 30 % AM	Between stations at approx. 100mc	DC VTVM neg. on AVC bus (Point "W")	Adjust E for Max. Neg. Volt.	NOTE: All I.F. alignment must be done without moving the signal generator setting from the 10.7mc point. If it becomes necessary to move the signal generator setting during the process of I.F. alignment, ALL I.F.'s must be realigned when the generator is reset to 10.7mc.
.1 mfd	To pin 1 on 1st 6BA6 and ground	Same as Above	Same as Above	Same as Above	Adjust D and C for Max. Neg. Voltage.	
.1 mfd	Same as Above	Same as Above	Same as Above	DC VTVM neg on Pt. "Z". Pos on ground	Adjust F until VTVM reads zero	Signal generator output must be low enough so that AVC value will be less than 1v. when setting F for zero.
.1 mfd	Point Y	Same as Above	Same as Above	DC VTVM neg. on AVC bus (Point "W")	Adjust B and A for Max. Neg. Voltage.	Repeat preceding 3 steps and this step; after 1st adjustments at this step.
.1 mfd	Ant. term. strip, term. #3 link open	100mc Less than 30 % AM	100mc	Same as Above	Peak R and S	After completing following step, return to this step and check for accuracy of dial calibration by using input from station of known frequency instead of the 100mc from signal generator.
Remove dummy ant. and connect link betw. ant. term. Pts. 3 and 4	None	None	Tune in any FM station near center of dial, if possible	See Remarks Column	See Remarks Column	Station must be tuned in for maximum AVC neg. voltage by using VTVM on Point "W". After station is tuned in, move VTVM connection to point "Z" and readjust "F" until meter needle excursions are symmetrical about the zero point.



DIAL CORD DRIVE



TOP FRONT VIEW CHASSIS

REMLER COMPANY LTD.

MODELS 7110, 7120

OPERATION OF WIRE RECORDER

MODEL 7120

TO INSTALL WIRE:

1. Remove rubber band from spool and press spool onto spindle so that the wire will reel off from the front side of the spool.

2. Hold top of spool with fingertips to prevent unwinding and draw out the celluloid leader past recording head and into channel of turntable.

3. While holding the leader against inner edge of the channel, rotate the turntable by hand until two complete turns of wire are in the channel. See that the wire threads into the recording head. The full length of the leader must be pressed against the inner surface of the channel or speed variations will result.

4. The Model 7120 comes equipped with a quarter hour spool of recording wire. Standard spools of wire are available in quarter hour, half hour and one hour lengths, any of which will fit the wire recorder.

TO SPLICE BROKEN WIRE:

1. Use several inches of the two ends of the wire and tie a common square knot. Draw knot tight and trim ends close.

TO RECORD RADIO PROGRAMS OR PHONOGRAPH RECORDS ON WIRE:

1. Turn radio selector switch to desired position.

2. Turn wire recorder selector switch at left of tuning eye to RECORD.

3. The Magic Eye indicates the volume of the sound being recorded. It will normally flicker as the sound varies in intensity. Turn the recorder VOLUME control until the eye just barely closes but never overlaps. Too much overlapping of the indicator eye may cause distortion or recording at a high level that can not be erased. If the eye is not brought to the closing point, the recorded level may be so low as to allow wire noise to be heard on the playback.

4. Turn motor switch at right hand back corner to RECORD. The small button next to the switch must be depressed when switching to RECORD position.

5. Whatever sound is heard from the loudspeaker is now being recorded. The radio volume and tone controls may be set in any position while recording as they do not affect the program being recorded.

TO RECORD FROM MICROPHONE:

1. Turn recorder selector to MIC.

2. Adjust VOLUME control as in para. 3 above, while speaking into microphone.

3. Turn motor switch to RECORD.

4. Speak in a normal tone of voice, holding the microphone about four inches from the lips.

5. None of the radio controls have any effect while recording from the microphone, except that the power switch must be turned ON.

MODELS 7110, 7120

REMLER COMPANY LTD.

REWINDING AND PLAYBACK:

Before the recording can be played back, the wire must first be rewound to the start of the program. This rewinding is accomplished at a speed of about five times the recording and playback speed.

1. Turn the recorder selector switch to PLAYBACK.

2. Turn the radio volume control to the extreme counter clock-wise position.

3. Turn the motor switch to REWIND.

4. The radio volume control can now be adjusted until the chattering sound is at the desired volume. This sound is the program that has just been recorded running in the reverse direction. After some experience, this sound may be used to judge when the recorded program has been rewound.

5. When the wire has been rewound to the desired point, turn the motor switch to PLAY.

6. The program that has been recorded will now be heard on the radio speaker. The volume and tone may be adjusted with the radio tone and volume controls. The recorder volume control has no effect during the playback.

7. To stop playback at any time, turn motor switch to OFF.

8. If wire is completely wound off of either the spool or turntable, the motor will automatically shut off. In this case, turn the motor switch to OFF, rethread the wire and press reset button to reconnect motor.

9. If a spool of wire is to be stored, REWIND entire length of wire as above and remove spool. Place a rubber band around spool to retain wire.

10. When not using the wire recorder, turn motor switch and recorder selector switch to OFF. Never turn radio power switch or recorder selector switch to OFF until motor switch is turned to OFF and turntable has stopped revolving. If this procedure of first turning the motor switch to OFF position is not followed, the wire is likely to unwind from one spool and not wind onto the other spool, thus causing it to become tangled.

ERASING RECORDED MATERIAL:

The recording may be played and replayed as often as desired without affecting the performance of the record. If it is desired to use the same spool of wire over again, simply REWIND and RECORD right over the old program. The wire will automatically be cleared of previously recorded material at the same time the new recording is being made. If it is desired to erase the program on the wire without recording a new one, the following procedure should be used.

1. Rewind wire to the point at which erasing is to start.

2. Turn recorder selector switch to RECORD.

3. Turn recorder volume control to extreme counter clock-wise position.

4. Turn motor switch to RECORD.

5. Turn motor switch to OFF after desired amount of wire has been erased.

The Models 7110 and 7120 are designed for operation on 115 volt, 60 cycle house current only.