

Section 1

# TROUBLE SHOOTING

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

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

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

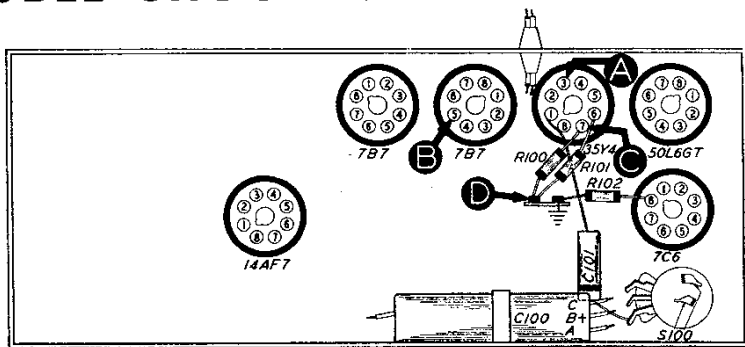


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	98 volts		Trouble within this section. Isolate by the following tests.
2	C	131 volts	No voltage. Low voltage. High voltage.	Defective: 35Y4, W100, S100. Shorted: C100A. Defective: 35Y4. Open: C100A, R100. Leaky: C100A. Open: R100.
3	D	118 volts	No voltage. Low voltage. High voltage.	Shorted: C100B. Leaky: C100B, C100C, C203*. Open: R101, T200*, R204*.
4	A	98 volts	No voltage. Low voltage. High voltage.	Shorted: C100C. Open: R101. Leaky: C100C. Open: R204*.

Listening Test: Abnormal hum may be caused by open C100A, C100B, C100C, or R102.

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

Section 2

# TROUBLE SHOOTING

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

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

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

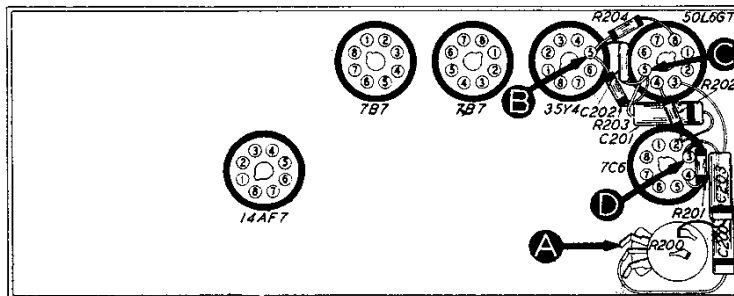


FIGURE 2. BOTTOM VIEW, SHOWING SECTION 2 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Clear signal with strong signal input.	Defective: 50L6GT, T200, LS200. Shorted or leaky: C203, C202. Open: R204, R203.
3	D	Same as step 1.	Defective: 7C6. Shorted or leaky: C201. Open: R201, R202, C201.
4	A	Same as step 1. Note: Rotate R200 through range.	Defective: R200. Shorted or leaky: C200. Open: R201, C200.

Listening Test: Distortion on strong signals may be caused by leaky C200 or open R201.

**Section 3**

**TROUBLE SHOOTING**

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

Set the radio volume control to maximum.

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

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

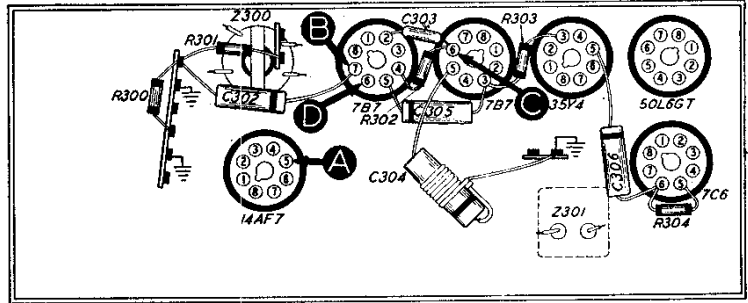


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble within this section. Isolate by the following tests.
2	C	Loud, clear signal with strong signal input.	Defective: 7B7 (2nd i.f.), 7C6 (diode section), Z301. Shorted or leaky: C305. Open: R303. Misaligned: Z301.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7 (1st i.f.). Shorted or leaky: C303, C302. Open: R301, R302, R300, C303, C302.
4	A	Loud, clear signal with weak signal input.	Defective: 14AF7*, Z300. Open: R401*, R403*, C306. Shorted or leaky: C306. Misaligned: Z300.

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

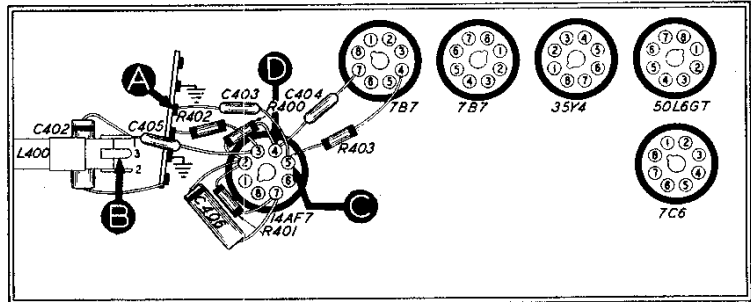
**Section 4**

**TROUBLE SHOOTING**

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

Set the radio volume control to maximum.

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



# REPLACEMENT PARTS LIST

## NOTE

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

### SECTION 1 POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, electrolytic, 3-section	30-2570-14
C100A	Condenser, filter, 30 mf.	Part of C100
C100B	Condenser, filter, 25 mf.	Part of C100
C100C	Condenser, filter, 20 mf.	Part of C100
C101	Condenser, line filter, .04 mf.	30-4119
I100	Panel lamp	34-2068
R100	Resistor, filter, 220 ohms	66-1224340*
R101	Resistor, filter, 1200 ohms	66-2123340*
R102	Resistor, leakage, 150,000 ohms	66-4153340*
S100	Switch, a-c power	Part of R200
W100	Power cord and plug	L2183*

### SECTION 2 AUDIO CIRCUITS

C200	Condenser, coupling, .01 mf.	61-0120*
C201	Condenser, coupling, .01 mf.	61-0120*
C202	Condenser, by-pass, 220 mmf.	62-122001001*
C203	Condenser, plate, .02 mf.	30-4599*
LS200	Loud-speaker	36-1615
R200	Volume control (with a-c power switch), 500,000 ohms	33-5491
R201	Resistor, grid load, 3.3 megohms	66-5333340*
R202	Resistor, plate load, 470,000 ohms	66-4473340*
R203	Resistor, grid leak, 470,000 ohms	66-4473340*
R204	Resistor, bias, 130 ohms	66-1123340*
T200	Transformer, output	Part of LS200

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

C300A	Condenser, trimmer	Part of Z300
C300B	Condenser, trimmer	Part of Z300
C301A	Condenser, trimmer	Part of Z301
C301B	Condenser, trimmer	Part of Z301
C301C	Condenser, i-f by-pass	Part of Z301
C301D	Condenser, i-f by-pass	Part of Z301
C302	Condenser, by-pass, .003 mf.	30-4582*
C303	Condenser, coupling, 220 mmf.	62-122001001*
C304	Condenser-and-choke assembly, .2 mf.	30-4594
C305	Condenser, screen by-pass, .05 mf.	30-4510*
C306	Condenser, a-v-c by-pass, .05 mf.	30-4510*
R300	Resistor, dropping, 2200 ohms	66-2223340*
R301	Resistor, plate load, 15,000 ohms	66-3153340*
R302	Resistor, grid load, 150,000 ohms	66-4153340*
R303	Resistor, screen, 33,000 ohms	66-3333340*
R304	Resistor, a-v-c, 2.2 megohms	66-5223340*
R305	Resistor, diode load, 47,000 ohms (part of Z301)	66-3473340*

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

Reference Symbol	Description	Service Part No.
Z300	Transformer, 1st i-f, including C300A and C300B	32-4151
Z301	Transformer, 2nd i-f, including R305, C301A, C301B, C301C and C301D	32-4152

### SECTION 4 R-F AND CONVERTER CIRCUITS

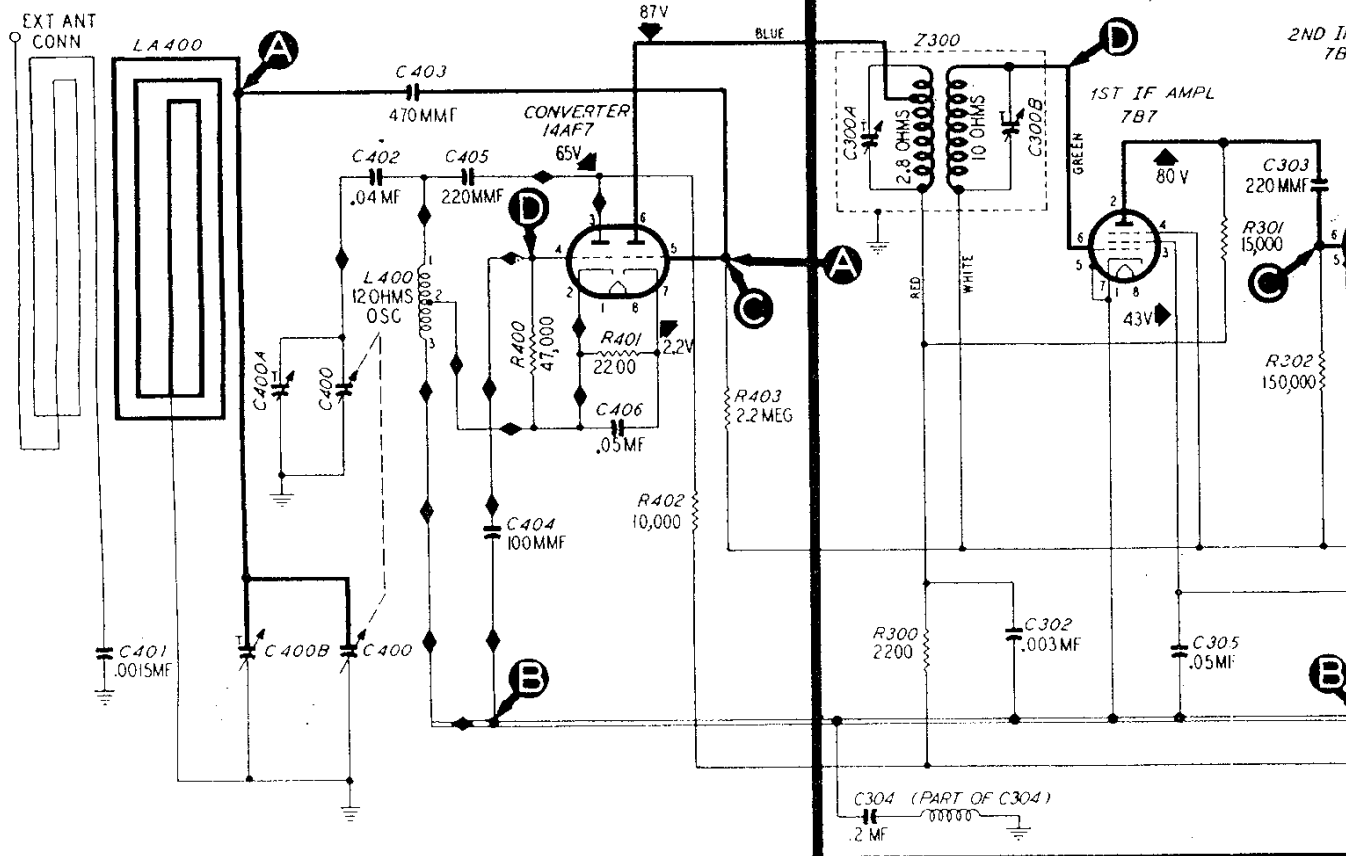
C400	Condenser, tuning, 2-section	31-2727
C400A	Condenser, trimmer	Part of C400
C400B	Condenser, trimmer	Part of C400
C401	Condenser, series blocking, .0015 mf.	30-4621*
C402	Condenser, isolating, .04 mf.	45-3500-2*
C403	Condenser, coupling, 470 mmf.	62-147001001*
C404	Condenser, osc. grid, 100 mmf.	30-1225-2
C405	Condenser, osc. plate, 220 mmf.	62-122001001*
C406	Condenser, by-pass, .05 mf.	30-4510*
L400	Coil, oscillator	32-4153
LA400	Loop aerial	32-4052-14
R400	Resistor, oscillator grid, 47,000 ohms	66-3473340*
R401	Resistor, bias, 2200 ohms	66-2223340*
R402	Resistor, dropping, 10,000 ohms	66-3103340*
R403	Resistor, grid, 2.2 megohms	66-5223340*

### MISCELLANEOUS

Description	Service Part No.
Cabinet (less scale)	
49-900-E	10629D
49-900-I	10629C
Back, Cabinet	
49-900-E	54-7096
49-900-I	54-7097
Clip, scale mounting	56-3290
Fastener, cabinet back	56-2726FA9
Pointer	54-4253
Pointer bracket and arm assembly	76-1654-2
Spring, pointer bracket	56-3859
Scale, dial	
49-900-E	27-5916-2
49-900-I	27-5916-3
Cord, pointer drive (25-ft. spool)	45-8760*
Cord, tuning-condenser drive (25-ft. spool)	45-8750*
Knob	
49-900-E	54-4218-1
49-900-I	54-4218
Socket assembly, pilot lamp	76-1981
Socket, 1oktal	27-6177*
Socket, octal	27-6174*
Spring, tuning-condenser drive cord	56-2617
Shaft, tuning	56-3031FA11
Bushing	27-9437
Retaining spring	57-1488FA3

SECTION 4-RF AND CONVERTER

SECTION 3-IF, DETECTOR



**Preliminary Checks**

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

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

2. Measure the resistance between B+ (pin 7 of 35Y4 rectifier tube) and B (test point B). When the ohmmeter test leads are connected in proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1500 ohms, check condensers C100A, C100B, and C100C for leakage or shorts.

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

VOLTAGES WERE MEASURED BETWEEN THE POINTS INDICATED AND B- USING A 20,000-OHMS-PER-VOLT METER WITH AN INPUT OF 117 V A C

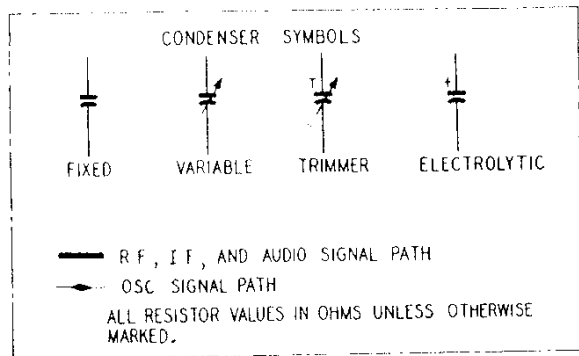
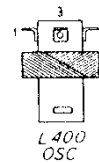
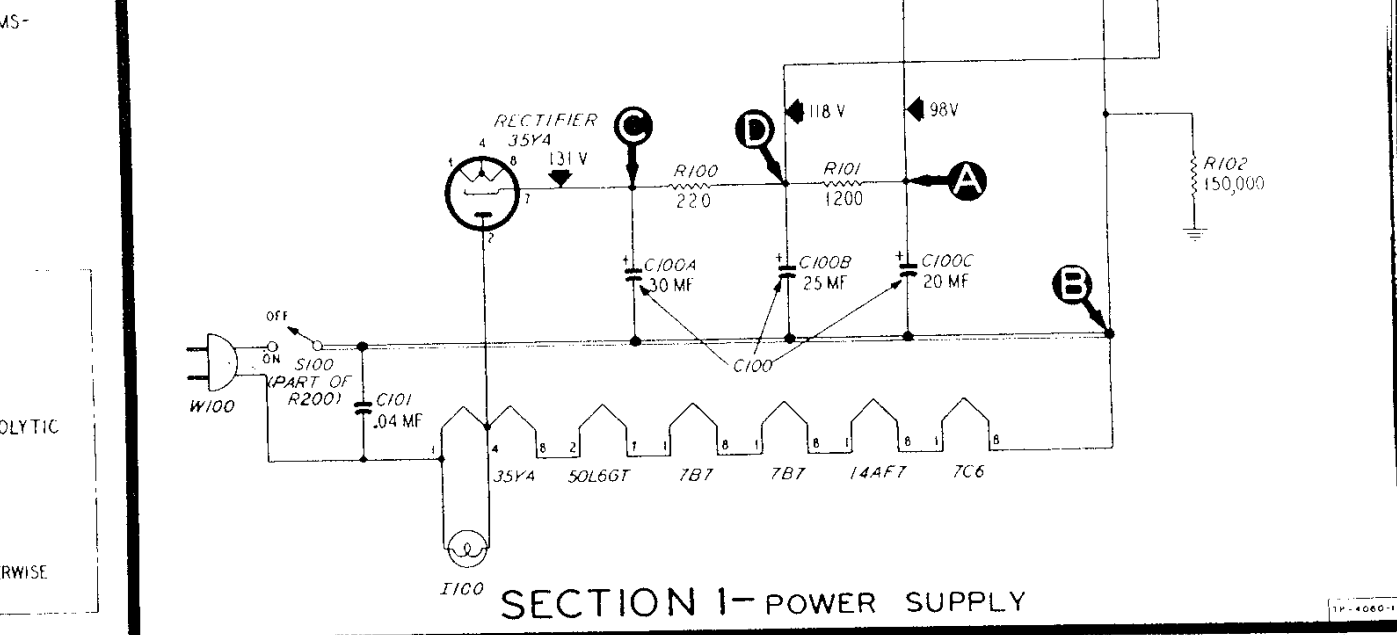
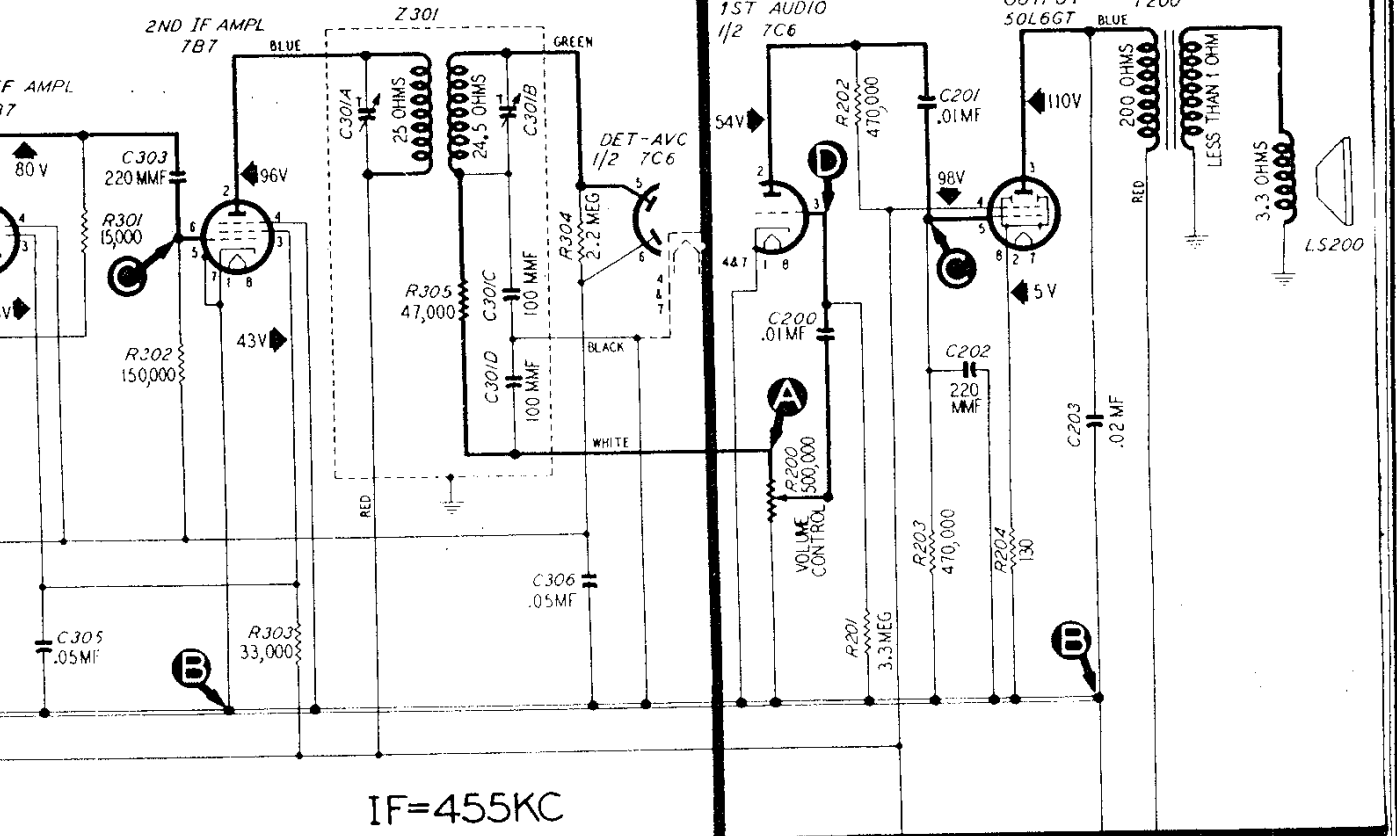


FIGURE 5. PHILCO RADIO, MODELS 49-900-E AND 49-900-I, SECTIONAL

IF AMPL, DETECTOR, AND AVC

SECTION 2 - AUDIO



49-900-I, SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

MODELS 49-900E, 49-900I

# ALIGNMENT PROCEDURE

SET RADIO VOLUME CONTROL

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

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

**DIAL POSITION**—Adjust to normal position. dot, locate

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1				Turn C300B down tight.	
2	(Chassis out of cabinet). Ground lead to B; output lead through .1-mf. condenser to test point C. Section 4.	455 kc.	540 kc.	Adjust trimmers, in the order given for maximum output.	C301B C301A C300B C300A
3	(Chassis in cabinet). Radiating loop. (See note below.)	1600 kc.	1600 kc.	Adjust for maximum output.	C400B
4	Same as step 3.	1500 kc.	1500 kc.	Adjust for maximum output.	C400A

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

### Circuit Description

Philco Models 49-900-E and 49-900-I are six-tube table-model superheterodyne radios, providing reception in the standard broadcast band. The two models are identical except for the cabinets.

The high-impedance loop aerial normally provides adequate signal pickup. If greater pickup is required, an external aerial may be connected.

The loop works into a 14AF7 converter. Variable condenser tuning is used. The two i-f stages employ 7B7 pentode tubes. To obtain good stability, resistance coupling is employed between the first and second i-f tubes. One diode (pin 5) of the 7C6 provides detection and a-v-c voltage. The triode section of this tube functions as the first audio amplifier, and is resistance-coupled to the 50L6GT output tube. The speaker is a permanent-magnet dynamic. The power supply employs a 35Y4, working into a resistance-capacitance filter system.

The 150,000-ohm resistor R102, connected between B bus and chassis, prevents the hum which might otherwise occur under conditions of high humidity.

The series-resonant circuit, C304, functions as a bypass of exceptionally low impedance; C304 is resonant at the i.f., 455 kc.

### Philco TROUBLE-SHOOTING Procedure

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

chart and a bottom view of the chassis showing the locations of the test points and components of that section.

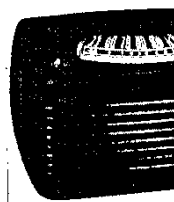
In each chart, the first step is a master check for determining whether trouble exists in that section, without going through the entire test procedure.

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

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

### SPECIFICATIONS

<b>CABINET</b>	
Model 49-900-E	Plastic, ebony
Model 49-900-I	Plastic, ivory
<b>CIRCUIT</b> ..... 5-tube superheterodyne	
<b>FREQUENCY RANGE</b> ..... 540-1620 kc.	
<b>AUDIO OUTPUT</b> ..... 1 watt	
<b>OPERATING VOLTAGE</b> ..... 105-120 volts, a.c. or d.c.	
<b>POWER CONSUMPTION</b> ..... 30 watts	
<b>AERIAL</b> ..... Built-in loop; terminal also provided for external aerial	
<b>INTERMEDIATE FREQUENCY</b> ..... 455 kc.	
<b>PHILCO TUBES (6)</b> ..... 14AF7, 7B7 (2), 7C6, 50L6GT, 35Y4	



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# TUNING PROCEDURE

## VOLUME CONTROL TO MAXIMUM

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

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

ADJUST

C301B

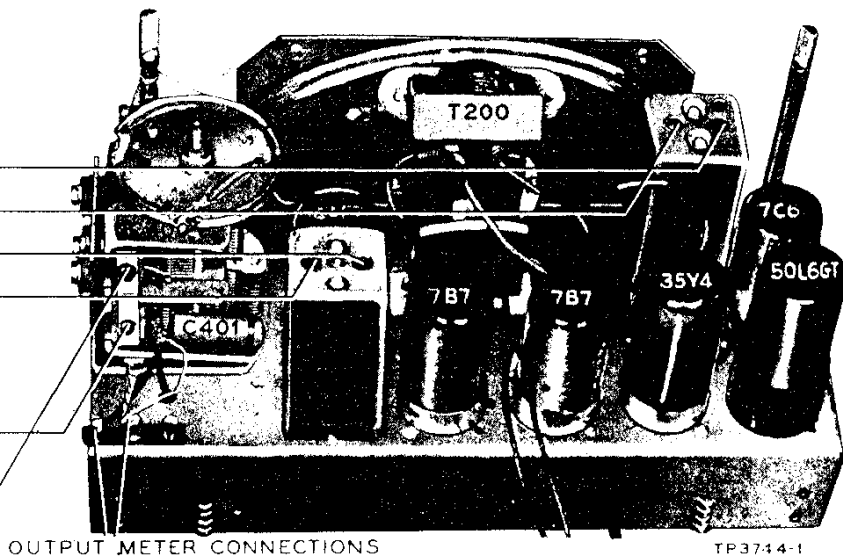
C301A

C300B

C300A

C400B

C400A



OUTPUT METER CONNECTIONS

TP3744-1

FIGURE 6. TOP VIEW, SHOWING TRIMMER LOCATIONS

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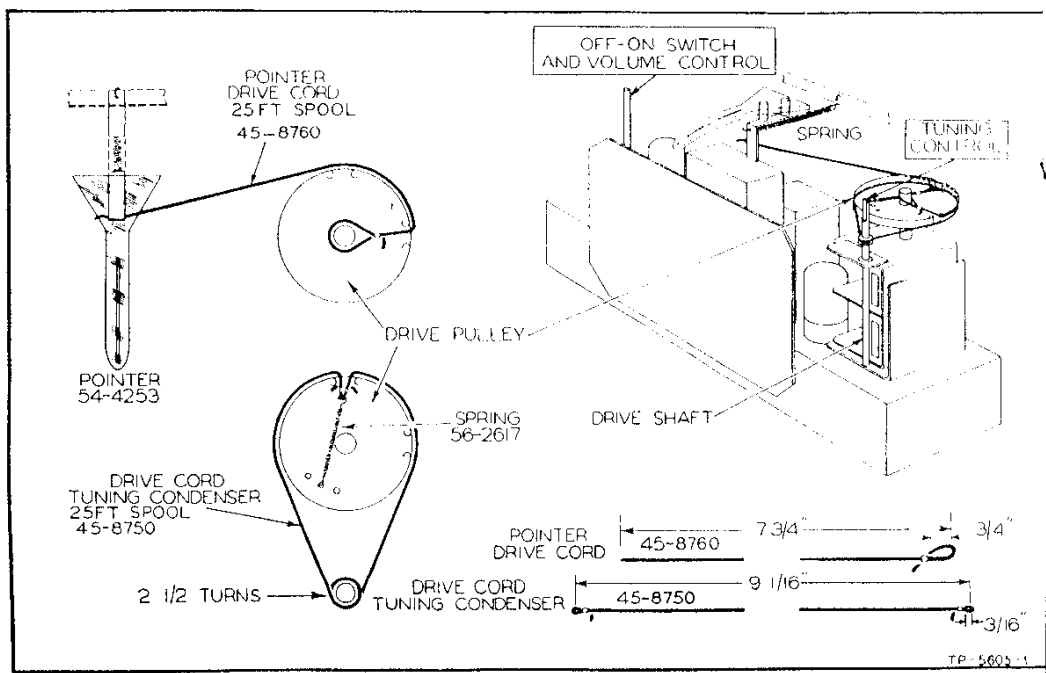
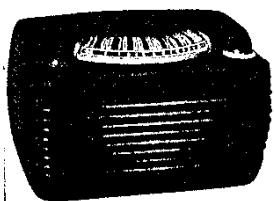


FIGURE 7. DRIVE-CORD INSTALLATION DETAILS