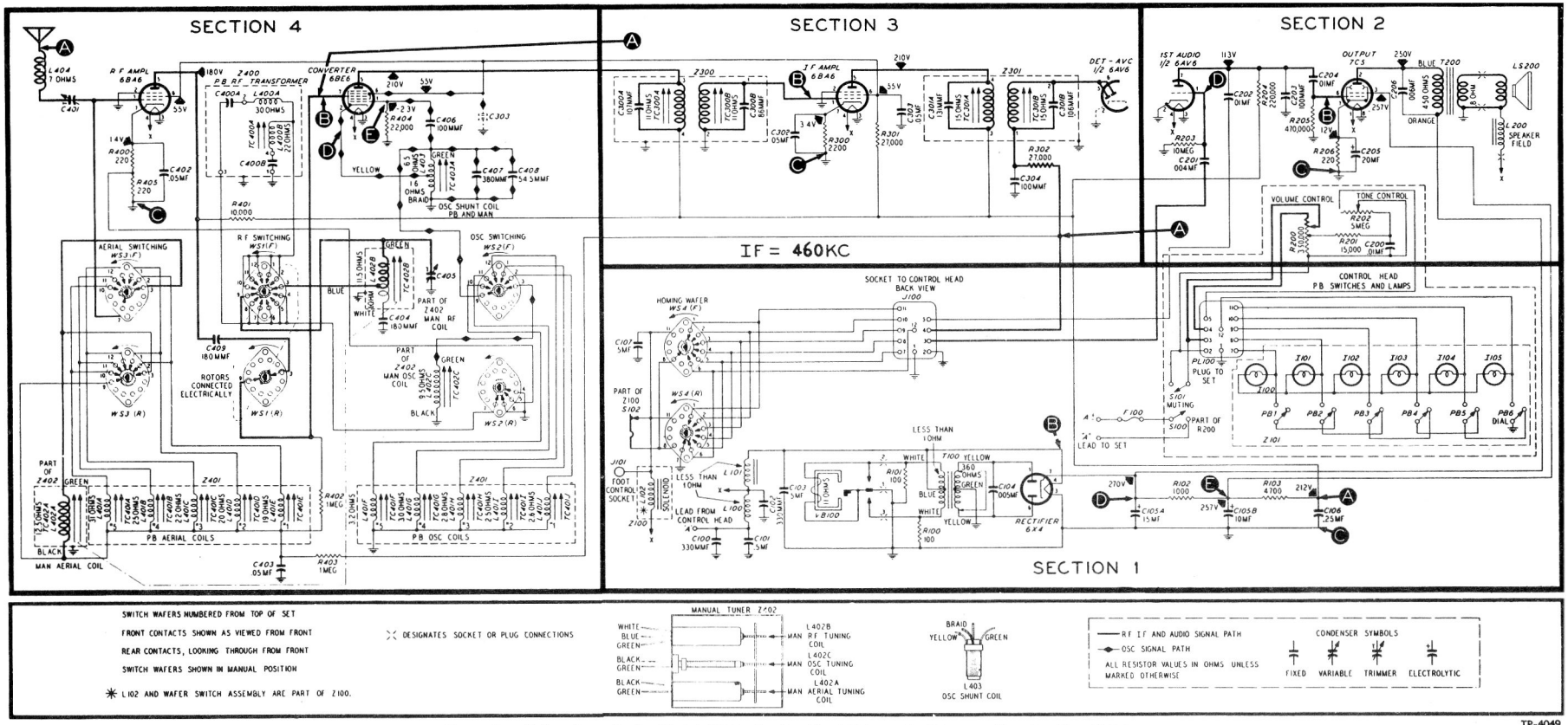

Figure 5. Philco Auto Radio Model CR-8, Sectionalized Schematic Diagram, Showing Test Points

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 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 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.

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	T—transformer
I—pilot lamp	R—resistor	WS—wafer switch
L—choke or coil	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 amplifier, detector, and a-v-c circuits.
400-series components are in Section 4—the aerial, r-f, and oscillator circuits.

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

FURTHER DATA ON SHEETS 177, 185, 186.

I.F. = 460KC.
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PHILCO DATA SHEET 184

TROUBLE SHOOTING

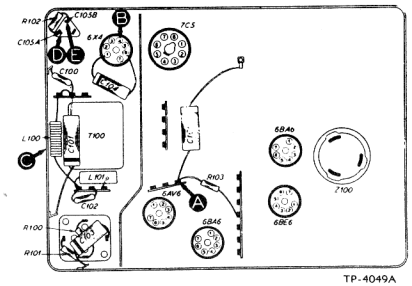
Section 1

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.



TP-4049A

Figure 1. 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.

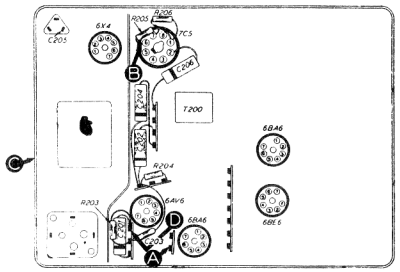
TROUBLE SHOOTING

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

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	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

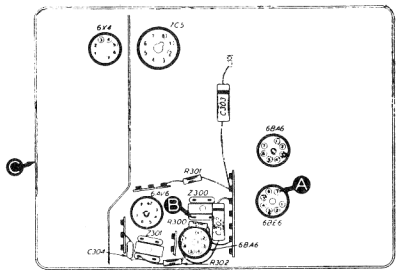
For the tests in this section, use an r-f signal generator, with modulated output, set at 460 kc. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

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.

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."



TP-4049C

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	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.

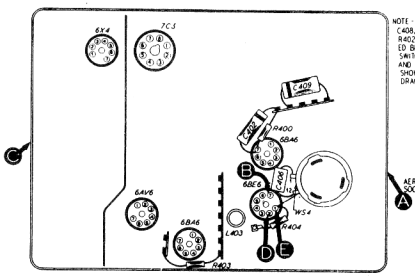
TROUBLE SHOOTING

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).



TP-4049D

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.

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FURTHER DATA
ON SHEET 177,
184, 186.

PHILCO DATA SHEET 185

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.	460 kc.	Manual. 1600 kc	Adjust, in order given, for maximum output.	TC301B TC301A TC300B TC300A
2	Same as step 1.	460 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.				

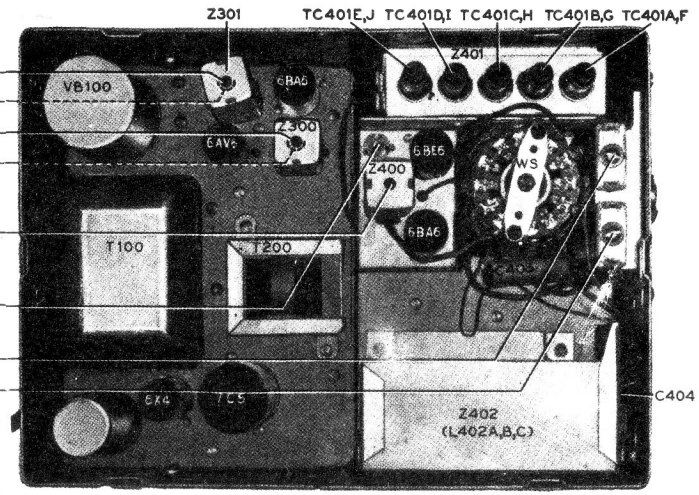

Figure 6. Top View, Showing Trimmer and Tuning-Core Locations (dotted lines indicate tuning screws located at bottom of chassis)

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

1948-49 I.F. = 460 KC.

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.

FURTHER DATA ON SHEETS 177, 184, 185.

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PHILCO DATA SHEET 186