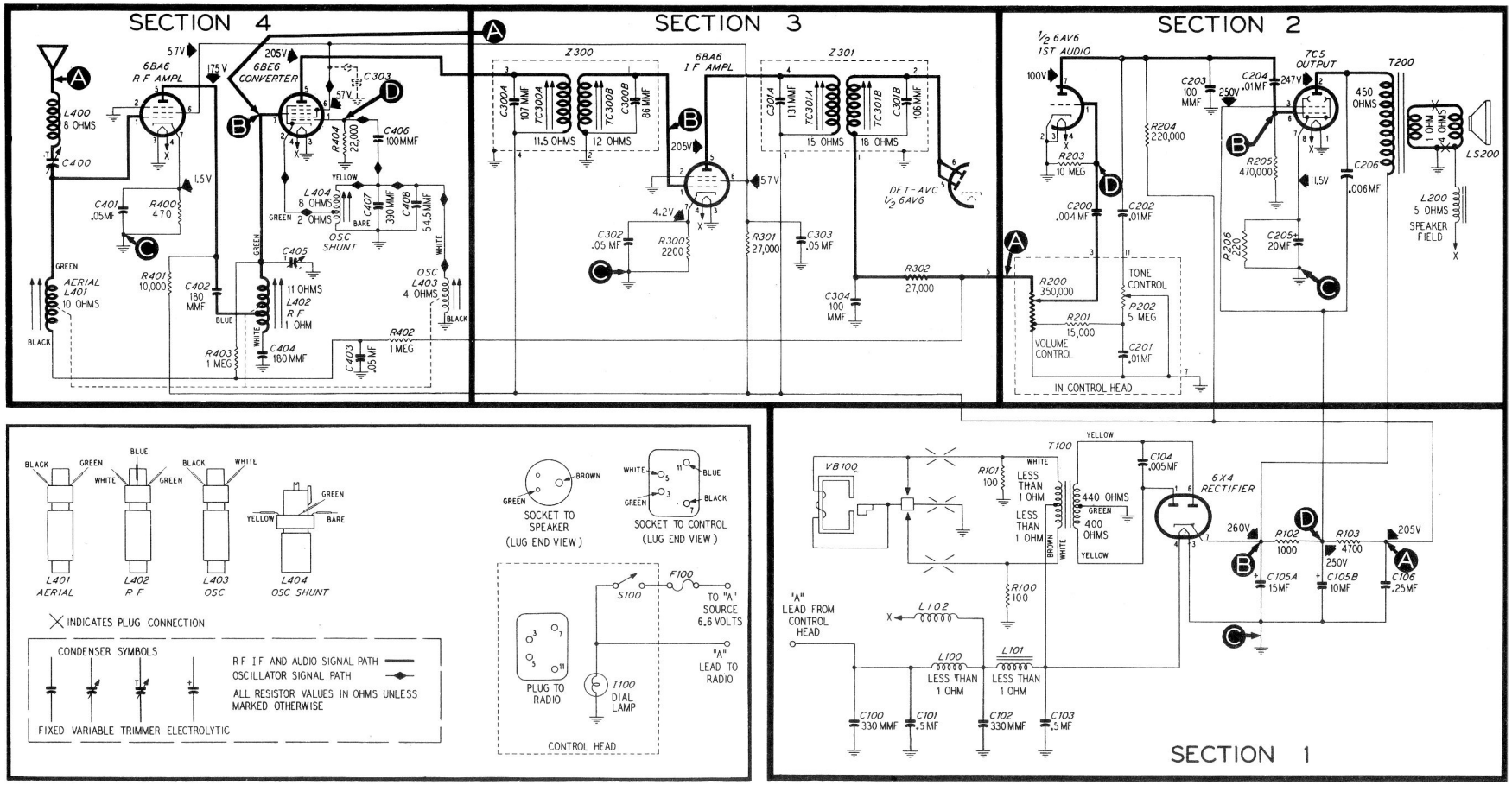

Figure 5. Philco Auto Radio Models CR-4 and CR-6, Sectionalized Schematic Diagram, Showing Test Points

1948-49

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, 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 6X4 rectifier) and the radio chassis, test point C, with the ohmmeter polarity chosen so that the highest resistance reading is obtained. If the reading is lower than 5,000 ohms, check condensers C105A, C105B, and C105C 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.

3. If the fuse is blown, check the vibrator before installing a new fuse.

4. If the vibrator is defective, check C104 before installing a new vibrator.

I.F. = 455KC.

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.

FURTHER DATA ON SHEETS 177, 182, 183

AUTO RADIO MODELS CR-4 CR-6

DATA SHEET 181

PHILCO

SECTION 1 *Power-Supply* TROUBLE SHOOTING

For the tests in this section, use a d-c voltmeter. Connect the negative lead to the chassis, test point C; connect the positive lead to the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter, with an "A" supply voltage of 6.6 volts, d.c.

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

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

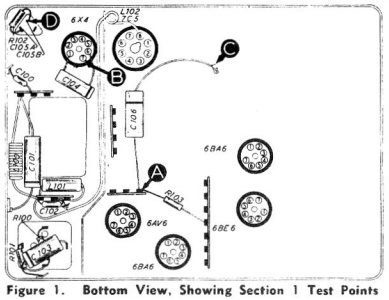

Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	205v		Trouble in this section. Isolate by the following tests.
2	B	260v	No voltage	Defective: 6X4, VB100, T100, L100, L101. Shorted: C100, C101, C102, C103, C104, C105A, S100, F100.
			Low voltage	Defective: 6X4, VB100, T100. Leaky: C104, C105A, C105B, C106.
3	D	250v	No voltage	Defective: R102. Shorted: C105B.
			Low voltage	Defective: R102. Leaky: C105B, C106.
4	A	205v	No voltage	Defective: R103. Shorted: C106.
			Low voltage	Defective: R103. Leaky: C106, C303*.

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

SECTION 2 *Audio* 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.

Turn the radio 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, the i-f, detector, and a-v-c circuits. If not, isolate and correct the trouble in this section.

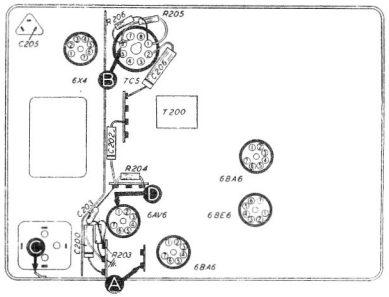

Figure 2. Bottom View, Showing Section 2 Test Points

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	B	Loud, clear signal with strong signal input.	Defective: LS200, T200, 7C5, R205, R206. Shorted or leaky: C206, C205.
3	D	Loud, clear signal with weak signal input.	Defective: 6AV6, R203. Open: R204, C204. Shorted or leaky: C203, C204 (rotate tone control), C202, C201.
4	A	Loud, clear signal with weak signal input.	Defective: R200, R201, R202. Open: C200, C201, C202. Shorted or leaky: C201, C202.
Listening Test:		Distortion on strong signals may be caused by leaky or shorted C200.	

1948-49 I.F. = 455 KC.

FURTHER DATA ON SHEET 177, 181, 183

AUTO RADIO

SECTION 3 *I-F, Det., and A-V-C* 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.

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

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for Section 4, the 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 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."

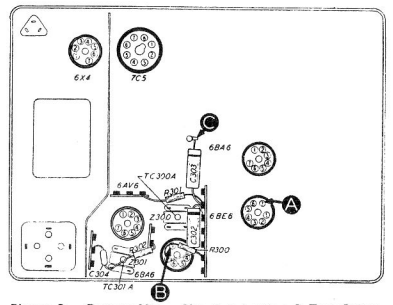

Figure 3. Bottom View, Showing Section 3 Test Points

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, 6AV6. Open: R301, R300, C303, C302. Shorted or leaky: C302, C303, C304. Misaligned: Z301.
3	A	Loud, clear signal with weak signal input.	Defective: 6BE6*, Z300. Misaligned: Z300. Open: L404*. Shorted: C405*.

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

SECTION 4 *R-F and Converter* TROUBLE SHOOTING

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to the chassis, test point C; connect the output lead to the test points indicated in the chart.

DUMMY AERIAL.—For the dummy aerial (steps 1 and 4), use two 30-mmf. condensers. Connect one condenser in series with the generator output lead, and the other between the aerial receptacle and the chassis.

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

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.

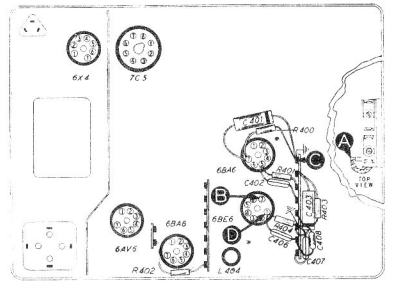

Figure 4. Bottom View, Showing Section 4 Test Points

STEP	TEST POINT	DIAL SETTINGS		NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
		SIG. GEN.	RADIO		
1	A (Through dummy aerial.)	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Trouble in this section. Isolate by the following tests.
2	B (Through .1-mf. condenser.)	1000 kc.	1000 kc.	Loud, clear signal with moderate signal input.	Defective: 6BE6, R403, L404, Osc. circuit. Shorted: C405. Open: R403.
3	D to C (Osc. test; see Note below.)		Rotate tuning control	Negative 1.5—4 volts.	Defective: 6BE6, L403, L404. Shorted or leaky: C406, C407, C408. Open: R404, C406, C407, C408.
4	A (Through dummy aerial.)	1000 kc.	1000 kc.	Loud, clear signal with weak signal input.	Defective: L400 L401, L402. Shorted: C400. Shorted or leaky: C402, C401, C403, C404. Open: R400, R401, R402, C402, C401, C403, C404.

OSCILLATOR TEST

NOTE: Connect positive lead of high-resistance voltmeter to chassis, test point C; connect prod end of negative lead through 100,000-ohm isolating resistor to oscillator grid, test point D. Use suitable meter range, such as 0—10 volts. Proper operation of oscillator is indicated by negative voltage of 1.5 to 4 volts (measured with 20,000-ohms-per-volt meter) throughout range of tuning control.

MODELS CR-4, CR-6

PHILCO DATA SHEET 182

ALIGNMENT PROCEDURE

TURN ON RADIO POWER, SET VOLUME CONTROL TO MAXIMUM, AND TURN TONE CONTROL FULLY COUNTERCLOCKWISE.

DIAL—Set tuning-core gang to full-mesh position; with tuning cable disengaged, 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.

DUMMY AERIAL—For steps 2, 3, and 4, either of two dummy-aerial connections may be used: (1) connect generator output lead through 30-mmf. condenser to shielded aerial lead (Philco Part No. 95-0181) plugged into aerial receptacle; (2) connect output lead through 30-mmf. condenser to aerial receptacle, then connect 30-mmf. condenser from receptacle to chassis.

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 aerial receptacle.	455 kc.	535 kc.	Ground pin 1 of 6BE6. Adjust trimmers (once only) in order given, for maximum output.	TC301B TC301A TC300B TC300A
2	Through dummy aerial to aerial receptacle.	580 kc.	Tune to signal from generator.	Remove ground from pin 1 of 6BE6. Adjust for maximum while rocking tuning control.	L404
3	Same as step 2.	1500 kc.	Same as step 2.	Adjust for maximum output. Re-engage tuning cable for correct dial calibration.	C400 C405
4	Same as step 2.			Repeat steps 2 and 3 until no further improvement is obtained.	
5	After reinstalling radio in car, adjust C400 for maximum output from weak station near 1400 kc. Engage tuning control for correct dial calibration.				

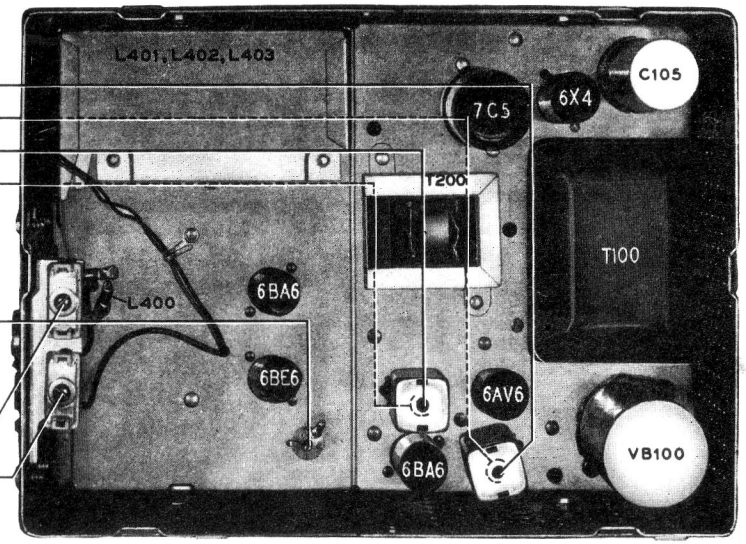

Figure 6. Top View, Showing Trimmer and Tuning-Core Locations (dotted lines indicate tuning screws located at bottom of chassis)

FURTHER DATA ON SHEETS 177, 181, 182. 1948-49

SYMBOLIZATION AND TERMINOLOGY

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.

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	TC—tuning core
		Z—electrical assembly

ALIGNMENT DATA
AUTO RADIO MODELS
CR-4 CR-6

PHILCO DATA SHEET 183