Philco Radio & Television Corp.

	Model: 50-520	**Chassis:**	**Year:** Pre 1951
	Power:	**Circuit:**	**IF:**
	Tubes:		
	Bands:		

Resources
Riders 20 (XX) PHILCO 20-114
Riders 20 (XX) PHILCO 20-115
Riders 20 (XX) PHILCO 20-116
Riders 20 (XX) PHILCO 20-117
Riders 20 (XX) PHILCO 20-118

MODEL 50-520

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 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 35Z5GT), test point C, 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, 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.

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.

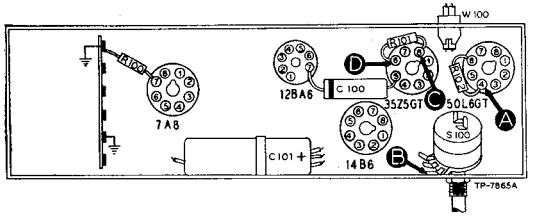


Figure 1. Bottom View, Showing Section 1 Test Points

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	105 volts		Trouble in this section. Isolate by the following tests.
2	C	130 volts	No voltage	Defective: 35Z5GT. Open: W100, S100. Shorted: C100, C101A.
			Low voltage	Defective: 35Z5GT. Open: C101A. Leaky: C101A.
			High voltage	Open: R101.
3	D	118 volts	No voltage	Open: R101. Shorted: C101B.
			Low voltage	Open: C101B. Leaky: C101B. Shorted: C203*.
			High voltage	Open: R102, T200*, R204*.
4	A	105 volts	No voltage	Open: R102. Shorted: C101C.
			Low voltage	Open: C101C. Leaky: C101C.
			High voltage	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 generator. Connect the generator ground lead to B—, test point B; connect the output lead through a .1-μf. condenser to the test points in the chart.

Set the volume control to maximum, and 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.

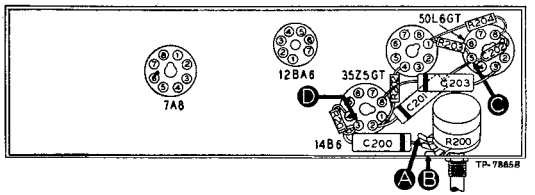


Figure 2. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal input.	Trouble in this section. Isolate by the following tests.
2	C	Clear output with moderate input.	Defective: 50L6GT, LS200. Open: R204, T200. Shorted: C202, C203.
3	D	Same as step 1.	Defective: 14B6 (triode section). Open: C201, R202, R203. Shorted: C201.
4	A	Same as step 1.	Open: R200 (rotate through range), C200, R201. Shorted: C301D*.

* 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-μf. 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.

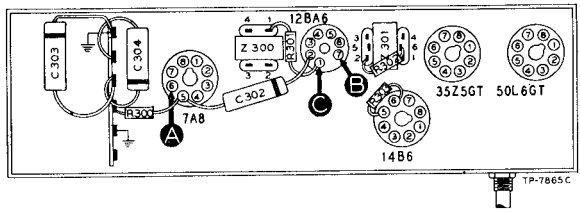


Figure 3. Bottom View, Showing Section 3 Test Points

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 dependant upon the condition of certain parts in the minor 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 signal input.	Trouble in this section. Isolate by the following tests.
2	C	Loud, clear output with moderate input.	Defective: 12BA6, 14B6 (triode section). Misaligned: Z301. Open: C301A, C301B, L301A, L301B, R300, R302, R303. Shorted: C302, C300B, C301A, C301B, C301C.
3	A	Same as step 1.	Defective: 7A8*. Misaligned: Z300. Open: C300A, C300B, L300A, L300B, R301. Shorted: C300A, C400*, C400A*.

* 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-μf. 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.

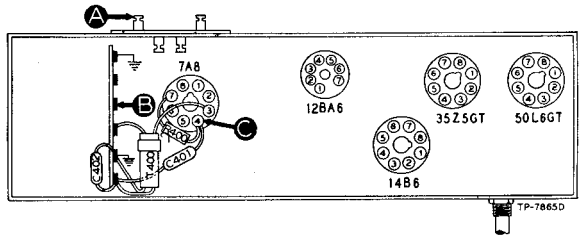
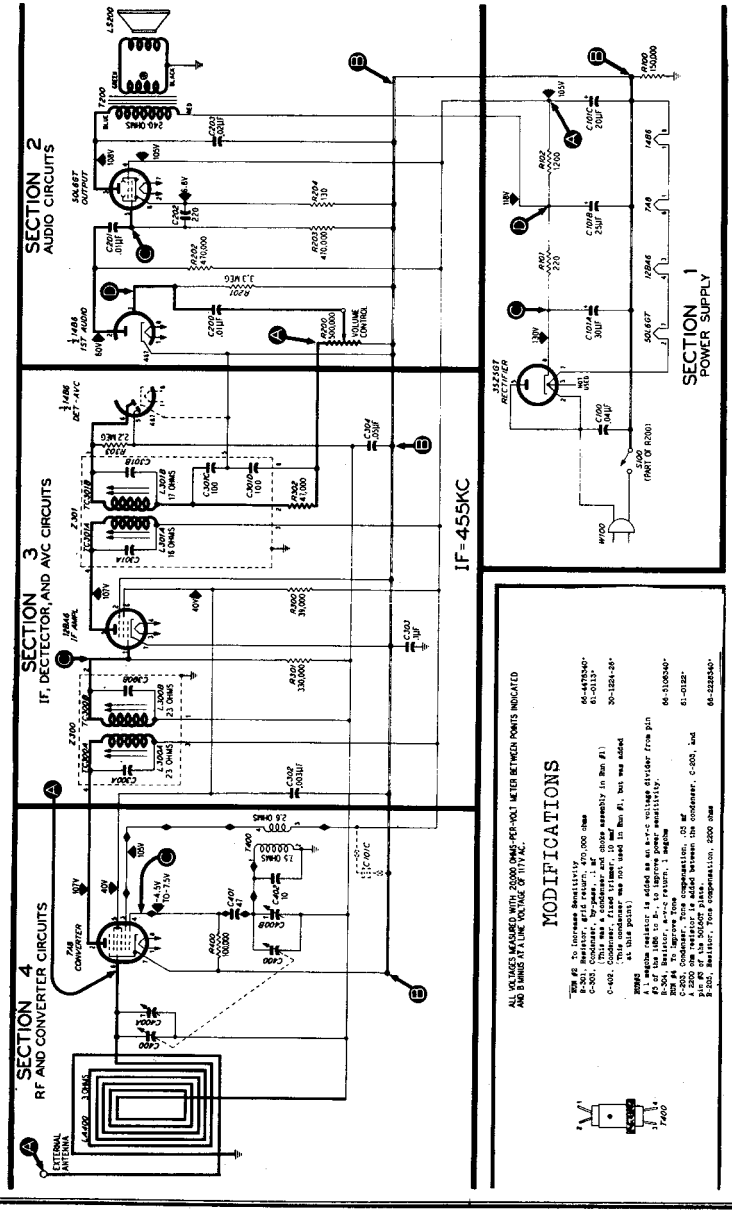


Figure 4. Bottom View, Showing Section 4 Test Points

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 signal input.	Trouble in this section. Isolate by the following tests.
2	C (Osc. test; see note below.)		Tune through range.	Negative 4.5 to 7.5 volts.	Defective: 7A8. Open: C401, T400, R400. Shorted: T400, C401, C400, C400B, C402.
3	A	1000 kc.	1000 kc.	Same as step 1.	Defective: 7A8. Open: LA400. Shorted: LA400, C400, C400A.

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

MODEL 50-520



ALIGNMENT PROCEDURE

CONTROLS: Turn on radio and set volume control to maximum.

DIAL POINTER: Turn tuning condenser to full-mesh position. Set dial pointer to index mark, located to left of "55."

OUTPUT METER: Connect across voice-coil terminals.

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

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

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B—; output lead through .1-μf. condenser to pin 6 of 7A8 converter.	455 kc.	540 kc. (gang fully meshed)	Adjust tuning cores, in order given, for maximum output.	TC301B—2nd i-f sec. TC301A—2nd i-f pri. TC300B—1st i-f sec. TC300A—1st i-f pri.
2	Radiating loop; see note below.	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C400B—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C400A—aerial

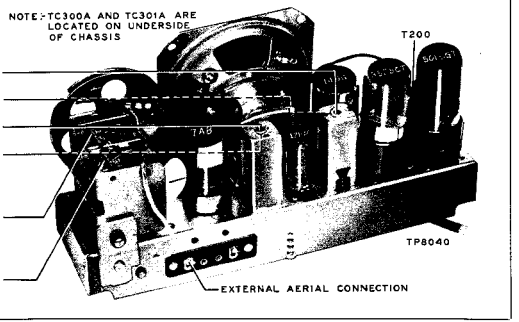


Figure 6. Top View, Showing Trimmer Locations

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.

Circuit Description

Philco Radio Model 50-520 is a five-tube table-model superheterodyne, providing reception on the standard broadcast band. The high-impedance loop aerial normally provides adequate signal pickup. An external aerial may be connected, if desired, by attaching the lead to lug 4 on the rear of the chassis. Do not use a ground.

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

The 7A8 is transformer-coupled to the 12BA6 i-f amplifier, which is also transformer-coupled to the diodes of the 14B6, second detector and first audio amplifier. A-v-c voltage is applied to the control grids of both the i-f and converter tubes.

The triode section of the 14B6 is the first audio stage, and is resistance-coupled to the 50L6GT output tube. The output tube is transformer-coupled to a permanent-magnet 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. The 150,000-ohm resistor, R100, prevents hum which might otherwise occur under conditions of high humidity.

MODEL 50-520

SPECIFICATIONS

CABINET	
Model 50-520	Moulded plastic, mottled mahogany
Model 50-520I	Moulded plastic, ivory
CIRCUIT	Five-tube superheterodyne
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	1.2 watts
OPERATING VOLTAGE	105—125 volts, a.c./d.c.
POWER CONSUMPTION	30 watts
AERIAL	High-impedance loop; provision for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8, 12BA6, 14B6, 50L6GT, 35Z5GT

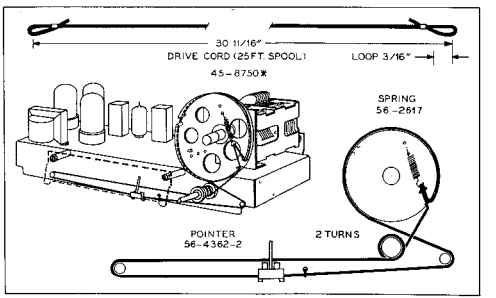


Figure 7. Drive-Cord Installation Details

MODEL 50-520

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.

SECTION 1

POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .04 μf.	45-3500-2*
C101	Condenser, electrolytic, 3-section	30-2573
C101A	Condenser, filter, 30 μf., 150 v.	Part of C101
C101B	Condenser, filter, 25 μf., 150 v.	Part of C101
C101C	Condenser, filter, 20 μf., 150 v.	Part of C101
R100	Resistor, leakage, 150,000 ohms	66-4158340*
R101	Resistor, filter, 220 ohms, 1 watt	66-1224340*
R102	Resistor, filter, 1200 ohms	66-2128340*
S100	Switch, off-on	Part of R200
W100	Line cord	L-2183*

SECTION 2

AUDIO CIRCUITS

C200	Condenser, d-c blocking, .01 μf.	61-0120*
C201	Condenser, d-c blocking, .01 μf.	61-0120*
C202	Condenser, by-pass, 220 μμf.	62-122001001*
C203	Condenser, tone compensation, .02 μf.	61-0108*
LS200	Speaker, p.m.	36-1627-5
R200	Volume control (with off-on switch), 500,000 ohms	33-5566-4
R201	Resistor, grid return, 3.3 megohms	66-5338340*
R202	Resistor, plate load, 470,000 ohms	66-4478340*
R203	Resistor, grid return, 470,000 ohms	66-4478340*
R204	Resistor, cathode bias, 130 ohms, 1 watt	66-1124340*
T200	Transformer, output	32-8384

SECTION 3

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

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, i-f filter	Part of Z301
C301D	Condenser, i-f filter	Part of Z301
C302	Condenser, screen by-pass, .003 μf.	61-0109*
C303	Condenser, by-pass, .1 μf.	61-0113*
C304	Condenser, a-v-c by-pass, .05 μf.	61-0122*
L300A	Coil, primary, 1st i-f.	Part of Z300
L300B	Coil, secondary, 1st i-f.	Part of Z300

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
L301A	Coil, primary, 2nd i-f.	Part of Z301
L301B	Coil, secondary, 2nd i-f.	Part of Z301
R300	Resistor, screen dropping, 39,000 ohms	66-3398340*
R301	Resistor, grid return, 330,000 ohms	66-4338340*
R302	Resistor, i-f filter, 47,000 ohms	66-3478340*
R303	Resistor, diode load, 2.2 megohms	66-5228340*
TC300A	Tuning core	Part of Z300
TC300B	Tuning core	Part of Z300
TC301A	Tuning core	Part of Z301
TC301B	Tuning core	Part of Z301
Z300	Transformer, 1st i-f	32-4160-6A
Z301	Transformer, 2nd i-f	32-4240-A

SECTION 4

R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning gang, 2-section	31-2727-9
C400A	Condenser, trimmer, aerial	Part of C400
C400B	Condenser, trimmer, oscillator	Part of C400
C401	Condenser, d-c blocking, 47 μμf.	60-00515307*
C402	Condenser, fixed trimmer, 10 μμf.	30-1224-26*
LA400	Loop aerial	32-4052-33
R400	Resistor, grid return, 100,000 ohms	66-4108340*
T400	Transformer, oscillator	32-4263

MISCELLANEOUS

Description	Service Part No.
Cabinet, Model 50-520	10750
Cabinet, Model 50-520I	10750-1
Back	54-7777
Fastener (4)	W2235-2FA9
Knob	54-4527-11
Dial-backplate assembly	76-4658
Drive cord (25-ft. spool)	45-8750*
Drive-shaft-and-pulley assembly	76-3671-3
Pointer	56-4362-6
Spring	56-2617
Rubber mount, gang mounting (3)	27-4771-1
Socket, miniature (1)	27-6203
Socket, Loktal (2)	27-6138*
Socket, octal (2)	27-6174*