Philco Radio & Television Corp.

Model: 48-1290	**Chassis:**	**Year:** Pre 1950
Power:	**Circuit:**	**IF:**
Tubes:		
Bands:		

Resources
Riders 18 (XVIII) PHILCO 18-180
Riders 18 (XVIII) PHILCO 18-181
Riders 18 (XVIII) PHILCO 18-182
Riders 18 (XVIII) PHILCO 18-183
Riders 18 (XVIII) PHILCO 18-184
Riders 18 (XVIII) PHILCO 18-185
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Riders 18 (XVIII) PHILCO 18-187
Riders 18 (XVIII) PHILCO 18-188
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Riders 18 (XVIII) PHILCO 18-192
Riders 18 (XVIII) PHILCO 18-193
Riders 18 (XVIII) PHILCO 18-194
Riders 18 (XVIII) PHILCO 18-195
Riders 18 (XVIII) PHILCO 18-196
Riders 18 (XVIII) PHILCO 18-197
Riders 18 (XVIII) PHILCO 18-198

Circuit Description

Philco Radio-Phonograph Model 48-1290 contains a 13-tube superheterodyne and a Model D-10A Philco Automatic Record Changer.

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

To increase the pickup on all three bands, use the Philco Aerial Coupler, Part No. 76-2353, with the outdoor dipole aerial. Information on aerial and coupler connections is given in the external aerial bulletin PR-1200.

The r-f stage (FM only), converter stage, and first i-f stage are mounted on a separate chassis to insure reliable performance at high frequencies. A 6AU6 high-frequency pentode is used in the r-f stage, and a 7F8 high-frequency double triode is employed as a converter

Three transformer-coupled i-f stages are used. The first, third, and fourth 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 second i-f transformer, having a single primary winding tuned to 9.1 mc., one secondary winding tuned to 9.1 mc., and another secondary winding tuned to 455 kc., provides untuned primary for AM operation, to prevent instability. All transformers provide tuned-primary, tuned-secondary coupling on FM, to supply the additional gain needed at 9.1 mc. Switching of the windings, to attenuate undesired beat frequencies, is necessary only in the first i-f transformer; the large difference between the two intermediate frequencies makes further switching unnecessary. One 7A7 and two 6BA6 high-transconductance pentodes are used in the i-f stages. The wide-band response required for FM reception is obtained by "over-coupled" FM windings in the i-f transformers.

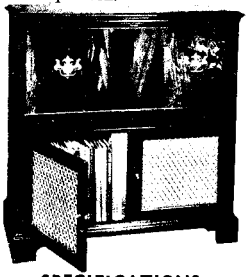
The new Philco advanced FM detector circuit, employing the FM1000 tube of special design, is used for FM reception. This circuit has excellent tuning characteristics, and inherently rejects AM and noise. Very briefly, the circuit functions as follows: The first and second grids (pins 2 and 5) of the FM1000 are used as grid and anode, respectively, of a modified Colpitts oscillator, which normally operates at the intermediate frequency of 9.1 mc. The output of the i-f amplifier stages is fed into the injection grid (pin 6). The reactive coupling between the plate and oscillator circuits causes the oscillator to lock in and follow the frequency variations of the i-f signal. As the oscillator frequency increases, the plate current through R324 decreases, and as the oscillator frequency decreases, the plate current increases. This variation is linear with respect to frequency deviation; the plate current, therefore, produces the same wave shape as the voltage that frequency-modulated the carrier. This audio signal is fed to the audio amplifier through the decoupling network, C331 and R322.

The high-mu-triode section of a 6SQ7GT is used in the first audio stage, and is biased from the bleeder in the negative return of the power supply. The first audio stage is resistance-coupled to one triode section of a 7AF7 twin triode. This section functions as a cathode-and-plate-loaded phase inverter, and is resistance-coupled to the audio output stage, which employs two 6V6GT beam pentodes in push-pull combination. The output tubes are transformer-coupled to a twelve-inch electrodynamic speaker, and are biased from the bleeder circuit connected across the speaker field in the negative return of the power supply. Inverse feedback is obtained by connecting the secondary of the output transformer, through the resistor network, R204 and R203, to the volume control. The second triode section of the 7AF7 tube is used as the phonograph preamplifier stage, and is self-biased by cathode resistor R213.

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

Any push button except the OFF button operates the a-c switch to turn on the power; the OFF button turns off the power.

The treble control, when turned to its maximum clockwise position, actuates switch S200 to place the scratch eliminator in operation; in any other position, the control regulates the treble response in either radio or phono operation.



SPECIFICATIONS

CABINET	Wood, mahogany finish
CIRCUIT	13-tube superheterodyne
FREQUENCY RANGES	
Broadcast	540—1720 kc.
Short wave	9.3—15.5 mc.
FM	88—108 mc.
AUDIO OUTPUT	10 watts
PUSH BUTTONS	Ten: One for OFF, five for broadcast-station selection, three for band selection, and one for phonograph operation
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	Radio: 110 watts Phonograph: 140 watts
AERIALS	Built-in loop and a-c line (FM) aerial; external aerial also may be used
INTERMEDIATE FREQUENCIES	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (13)	6AU6, 7F8, 6BA6(2), 7A7, FM1000, 7AF7, 6SQ7GT, 6V6GT(2), 7F7, 7E7, 5U4G
PHONOGRAPH	Philco Automatic Record Changer, Model D-10A

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.

TROUBLE SHOOTING

Section 1 POWER SUPPLY

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

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.

Set the volume control to minimum, and the bass and treble controls fully counterclockwise. Depress the BC push button.

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	200v		Trouble in this section. Isolate by the following tests.
2	B	250v	No voltage	Defective: 5U4G. Open: L100, T100, W100, S100. Shorted: C101B, C102, C103, C317*, C405*.
			Low voltage	Defective: 5U4G, T100. Open: C103. Leaky: C101B, C102, C103, C317*, C405*.
			High voltage	Defective: 6V6GT*. Open: T200*.
3	D	Negative 9.8v	No voltage	Shorted: C104. Open: R101.
			Low voltage	Changed resistance: R101.
			High voltage	Open: R102.
4	A	200v	No voltage	Open: R100. Shorted: C101A, C415*, C417*, C419*.
			Low voltage	Changed resistance: R100. Leaky: C101A, C415*, C417*, C419*.

Listening test: Abnormal hum may be caused by open C101A, C101B, or C104.

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

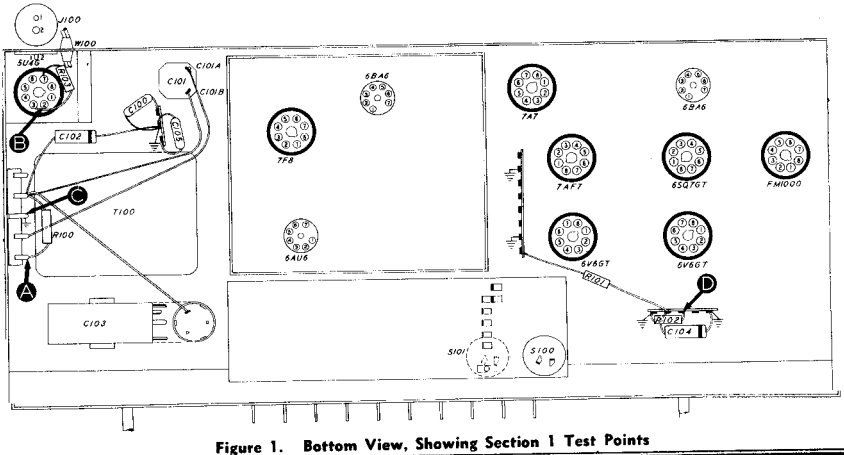


Figure 1. Bottom View, Showing Section 1 Test Points

Section 2 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.

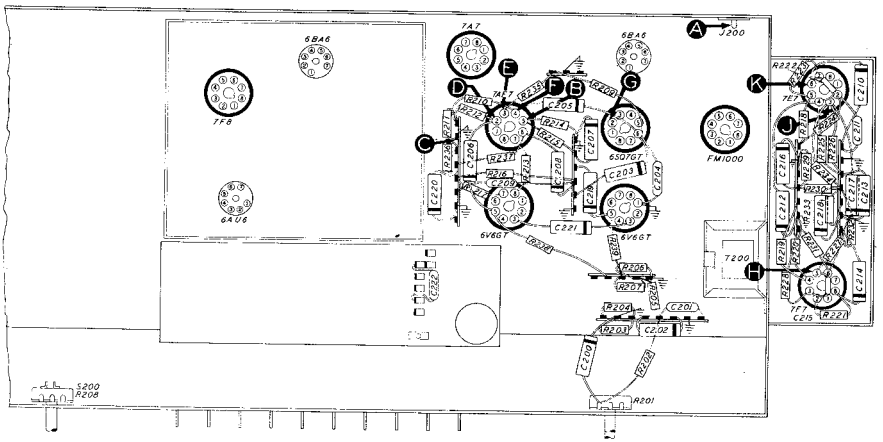
Set the volume control to maximum, and the bass and treble controls fully counterclockwise. Depress the push button indicated in the chart.

If the "NORMAL INDICATION" is obtained in step 1, (a) and (b), proceed with the scratch eliminator tests; if not, isolate the trouble by following the steps as directed in the chart.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	A	Loud, clear signal with weak signal input (with BC button, PB-3, depressed).	Trouble in audio-amplifier circuits. Isolate by steps 2, 3, 4, 5, and 6.
1(b)	B	Loud, clear signal with weak signal input (with PHONO button, PB-9, depressed).	Trouble in phono-preamplifier circuit. Isolate by step 7.
2	D (Remove 7AF7)	Clear signal with strong signal input (BC button depressed).	Defective: 6V6GT. Open: LS200, T200, R238, C206. Shorted or leaky: C221, C206.
3	E (7AF7 removed)	Clear signal with strong signal input (BC button depressed).	Defective: 6V6GT. Open: C219, R239. Shorted or leaky: C219.
4	F (Replace 7AF7)	Loud, clear signal with moderate signal input (BC button depressed).	Defective: 7AF7. Open: R211, R212, R235, R210. Leaky: C205.
5	G	Loud, clear signal with weak signal input (BC button depressed).	Defective: 6SQ7GT. Open: C205, R209. Shorted or leaky: C222, C204.
6	A	Loud, clear signal with weak signal input (BC button depressed).	Open: R200 (rotate through range), C202, R205, R206.
7	B	Loud, clear signal with weak signal input (PHONO button depressed).	Defective: 7AF7. Open: R236, R237, PB-9, C208, R216, R213. Shorted or leaky: C220.

Listening Test: Distortion may be caused by leaky C202, C205, C206, or C219, open R207.

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



TP-5305B

Figure 2. Bottom View Showing Section 2 Test Points (location of R200 shown in figure 8)

Section 2 (Cont.)

TROUBLE SHOOTING

SCRATCH-ELIMINATOR TESTS

Set the bass control fully clockwise. Turn the treble control clockwise as far as possible without turning on the scratch eliminator, except as noted in chart (the scratch eliminator is on when this control is turned fully clockwise until switch S200 is actuated). Depress the PHONO push button, PB-9. For all steps except 1(b), set the volume control to maximum; for this step, adjust the volume control as indicated in the chart.

Connect an output meter between terminal 3 (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 points indicated in the "METER POINT" column of the chart.

STEP	TEST POINT	SIG. GEN. OUTPUT	METER POINT	SPECIAL INSTRUCTIONS	POSSIBLE CAUSE OF ABNORMAL INDICATION
1(a)	A	Adjust for 3v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 1.2v (approx.).	
1(b)	A	Adjust for 3v output-meter reading, with scratch eliminator off.		Reduce volume control to obtain output meter reading of .5v. Increase generator output to obtain output-meter reading of 3v. Turn scratch eliminator on; output voltage should not drop more than .6v (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: R231, C217, R234, R233. Shorted: C218, C217.
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: R222, R225, R226. Shorted or leaky: C212, C213, C210.
4	A	Same as step 3.	J	With scratch eliminator on, voltage at point J should be approx. 28v, negative.	Defective: 7F7. Open: R228, C215, R227, R221, R220, R219, C209. Shorted or leaky: C209, C215, C214.
5	A	Adjust for 3v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 1.2v (approx.).	Defective: 7E7 (pentode section). Open: R224, R218, R223, C210, C211. Shorted or leaky: C211.

Section 3

TROUBLE SHOOTING

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

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 counterclockwise.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the FM circuits, or the tests for Section 4 (r-f and converter circuits); 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 D 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 AM circuits. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 6BA6, 6SQ7GT (diode section). Open: PB-1, PB-9, R311, R313, R315, R316, R317, R318, C321, L303A, B, D. Shorted: C322, C324, C325, C326, C302C, L303B, D. Misaligned: Z303.
3	D	Loud, clear signal with moderate signal input.	Defective: 7A7. Open: PB-1, R305, R306, R307, R308, R309, L302A, B, C, D. Shorted: C340, C314, C315, C301B, L302B, C. Misaligned: Z302.
4	E	Loud, clear signal with weak signal input.	Defective: 6BA6. Open: R301, R302, R303, R325, L301A, B, C. Shorted: C308, C309, C310, C300B, L301A, B. Misaligned: Z301.
5	A	Loud, clear signal with signal input much weaker than in step 4.	Defective: 7F8*, WS-3(R). Open: R300, R408*, L300B, C, D. Shorted: C338, C305, L300B, D. Misaligned: Z300.

* 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; this makes it possible to use an AM signal for testing the i-f amplifiers and the pentode section of the detector.

In step 1(b), an unmodulated r-f signal is used to check FM detection (with the oscillator section operating); the test is made by observing the d-c voltage drops across the audio load resistor (R324) 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 are used to check the oscillator section of the FM detector.

Set the volume control to maximum, and turn the bass and treble controls fully clockwise. Depress the FM push button, PB-1. 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 for 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 test for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits.

Since the circuit location of test point A for this section is the same as that of test point D for Section 4, the effectiveness of step 1, (a) and (b), 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."

Section 3 (Cont.) 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 detector or i-f 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 J, and negative lead to test point H. 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 voltmeter to chassis; connect prod end of negative lead through 100,000-ohm isolating resistor to test point G. Use 10-volt range.	Negative 1.8 volts (approx.).	Defective: FM1000. Open: L305, C330, R321, L304A, B, C342, C341, C343, R319, R320, R304. Shorted: C330, C342, C341, C343, C331, C333, C334, C332, C304A, L304A.
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: L304A, B. Changed capacitance: C342, C343. Open: C331, R322.
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: R324, R323, PB-1. Shorted or leaky: C329, C333, C334.
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: 6BA6 (3rd i.f.). Shorted or leaky: C303B, C, L303A, C. Open: R314. 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: 7A7 (2nd i.f.). Misaligned: Z302. Shorted: C302A, C302B, L302A, B.
7	E	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with weak signal input.	Defective: 6BA6 (1st i.f.). Misaligned: Z301. Shorted: C301A, C301C, L301C.
8	A	Set generator to 9.1 mc. (mod. on). Leave test point G shorted.	Loud, clear signal with very weak signal input.	Defective: 7F8*. Misaligned: Z300. Open: L300A, WS-3(R), WS-1(F). Shorted: C300A, C300C, L300A, C.

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

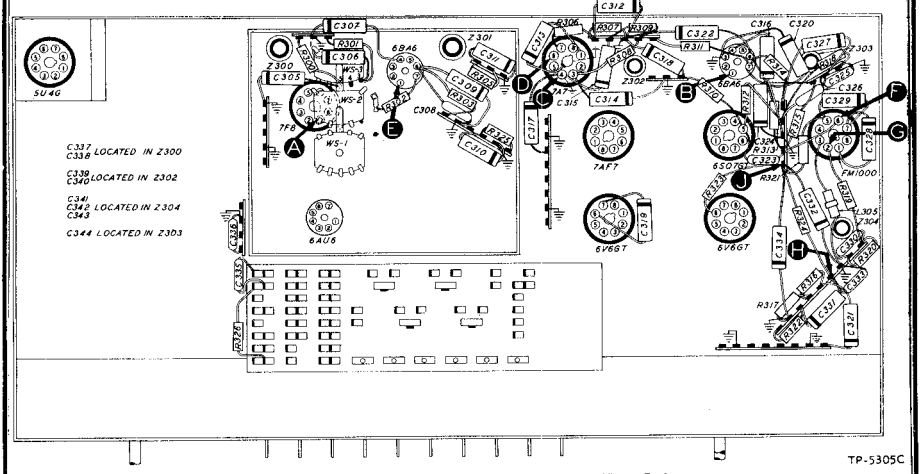


Figure 3. Bottom View, Showing Section 3 Test Points

Section 4

TROUBLE SHOOTING

R-F AND CONVERTER CIRCUITS

For the following tests, 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. Adjust the generator to give a weak input signal.

Set the radio volume control to maximum, and turn the bass and treble controls counterclockwise.

OSCILLATOR TESTS (AM and FM CIRCUITS): Connect the positive lead of a high-resistance voltmeter to the oscillator cathode (pin 5) of the 7F8, test point F. Connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 8), test point E. Use a suitable range, such as 0—10 volts. Absence of negative voltage with any station-selector push button (PB-8 through PB-4) depressed, or for any dial position with push button PB-1, PB-2, or PB-3 depressed, indicates that the oscillator is not functioning.

AM CIRCUITS

PUSH BUTTON

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Adjust to frequency of each push button, in turn.	Depress, in turn, PB-8 through PB-4.	Loud, clear signal when each push button is depressed.	Trouble in circuits associated with push-button station selectors. Isolate by tests in steps 2 and 3.
2	E to F (Oscillator test)		Depress, in turn, PB-8 through PB-4.	Negative voltage.	No voltage for any particular push button — Defective: Coil (L409A through L409E) or push button. No voltage for all push buttons—Defective: 7F8, WS-2(F), PB-2, PB-3. Open: R404, R405, R407, R409, C413, C414, C416, L405, WS-2(F), WS-2(R). Shorted: C415, C417, C419.
3	A	Adjust to frequency of each push button, in turn.	Depress, in turn, PB-8 through PB-4.	Loud, clear signal when each push button is depressed.	Defective: L400, C411, C424A through C424E. Open: R412, R413, C413, PB-2, PB-3, WS-1(F), WS-2(F).

BROADCAST MANUAL

4	A	1000 kc.	Depress BC push button, PB-3. Tune to signal.	Loud, clear signal.	Trouble in broadcast manual-tuning circuits. Isolate by tests in steps 5 and 6.
5	A	1000 kc.	Depress BC push button. PB-3. Tune to signal.	Loud, clear signal.	Open: PB-3, PB-2, C421, C411, WS-1(F). Shorted: C400D, L400.
6	E to F (Oscillator test)		Depress BC push button, PB-3. Rotate tuning control through range.	Negative voltage.	Open: PB-3, L404. Shorted: C409E, L404, C400E

SHORT-WAVE MANUAL

7	B	12 mc.	Depress SW push button, PB-2. Tune to signal.	Loud, clear signal.	Trouble in short-wave circuits. Isolate by tests in steps 8 and 9.
8	B	12 mc.	Depress SW push button, PB-2. Tune to signal.	Loud, clear signal.	Defective: J400, L401, L402, C401 C410. Open: L401, PB-2.
9	E to F (Oscillator test)		Depress SW push button, PB-2. Rotate tuning control through range.	Negative voltage.	Open: L403, C408, C407. Shorted: C409A.

Section 4 (Cont.) TROUBLE SHOOTING

FM CIRCUITS

Before proceeding with the tests for the FM circuits, connect test point G in Section 3 to the chassis.

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	G	100 mc.	Depress FM push button, PB-1. Tune to signal.	Loud, clear signal.	Trouble in FM circuits. Isolate by the following tests.
2	E to F (Oscillator test)		Depress FM push button, PB-1. Rotate tuning control through range.	Negative voltage.	Defective: 7F8. Open: L408, R406, PB-1, WS-2(F). Shorted: C400H, C400C, C419, C418.
3	H	100 mc.	Depress FM push button, PB-1. Tune to signal.	Loud, clear signal.	Defective: 6AU6. Open: L410, R401, R400, R402, C406. Shorted: C400B, WS-2(F), C404, C405.
4	G	100 mc.	Same as step 3.	Loud, clear signal.	Open: L406, C402. Shorted: C400A, C400F.

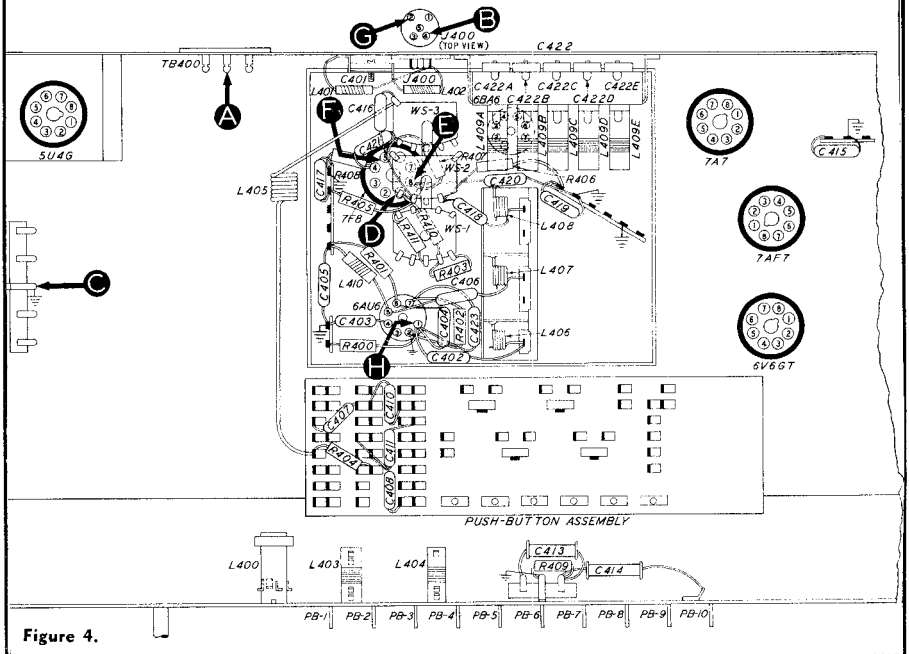


Figure 4.

TP-5305D

Bottom View, Showing Section 4 Test Points (locations of C409 and C412 shown in figure 8)

CABLIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked, with a pencil, on the dial backplate at the end of the pointer.

The method of measuring for these points is illustrated in figure 5. Hold a rule against the dial backplate, with the start of the rule against the inside of the upturned edge of the backplate.

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

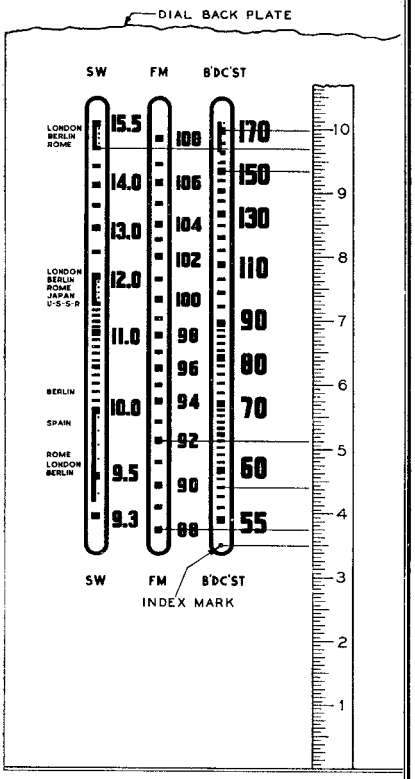
Preliminary Checks

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. Measure the resistance between B+ (pin 2 of the 5U4G) and the radio chassis. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1000 ohms, check condensers C101B, C102, and C103 for leakage or shorts.

This resistance value, which is much lower than normal, does not represent 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.



TP-1C

Figure 5. Calibration Measurements for Dial Backplate

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, .01 mf.	30-1226-1
C101	Condenser, electrolytic, 2-section	30-2570-19
C101A	Condenser, filter, 10 mf., 450 w. v.	Part of C101
C101B	Condenser, filter, 10 mf., 450 w. v.	Part of C101
C102	Condenser, r-f by-pass, .003 mf.	61-0117*
C103	Condenser, filter, 40 mf., 450 w. v.	30-2568-5

SECTION 1 (Continued)
POWER SUPPLY

Reference Symbol	Description	Service Part No.
C104	Condenser, bias filter, .5 mf.	61-0133*
C105	Condenser, line filter, .01 mf.	30-1226-1
I100	Lamp, bin	34-2040
I101	Lamp, dial	34-2040
I102	Lamp, dial	34-2040
I103	Lamp, telltale	34-2040

REPLACEMENT PARTS LIST (Continued)

SECTION 1 (Continued)

POWER SUPPLY

Reference Symbol	Description	Service Part No.
J100	Socket, phono power	27-6200
L100	Field, speaker	Part of LS200
R100	Resistor, B+ filter, 5600 ohms	66-2564340
R101	Resistor, voltage divider, 1 megohm	66-5103340*
R102	Resistor, voltage divider, 220,000 ohms	66-4223340*
R103	Resistor, telltale-lamp dropping, 10 ohms	66-0103340
S100	Switch, master power, on-off	42-1717
S101	Switch, phono power, on-off	42-1714
T100	Transformer, power	32-8282
W100	Line cord	41-3755-18

SECTION 2

AUDIO CIRCUITS

C200	Condenser, bass control, .006 mf.	45-3500-7*
C201	Condenser, tone compensation, 100 mmf.	30-1224-1*
C202	Condenser, tone compensation, .02 mf.	61-0108*
C203	Condenser, treble control, .01 mf.	61-0120*
C204	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C205	Condenser, d-c blocking, .006 mf.	45-3500-7*
C206	Condenser, d-c blocking, .006 mf.	45-3500-7*
C207	Condenser, tone compensating, .001 mf.	45-3500-5*
C208	Condenser, d-c blocking, .02 mf.	61-0108*
C209	Condenser, high-pass, 150 mmf.	60-10155407*
C210	Condenser, d-c blocking, .001 mf.	45-3500-5*
C211	Condenser, reactance feedback, 330 mmf.	60-10335407*
C212	Condenser, bias filter, .01 mf.	61-0120*
C213	Condenser, bias filter, .01 mf.	61-0120*
C214	Condenser, bias filter, .01 mf.	61-0120*
C215	Condenser, d-c blocking, 330 mmf.	60-10335407*
C216	Condenser, bias filter, .03 mf.	45-3500-1*
C217	Condenser, d-c blocking, .002 mf.	61-0062*
C218	Condenser, bias filter, .02 mf.	61-0108*
C219	Condenser, d-c blocking, .006 mf.	45-3500-7*
C220	Condenser, plate by-pass, .1 mf.	61-0113*
C221	Condenser, tone compensating, .003 mf.	61-0117*
C222	Condenser, r-f by-pass, 22 mmf.	60-00205307*
J200	Socket, FM test	27-6180
LS200	Speaker	36-1606
PB-9	Push button, PHONO	Part of 42-1777†
PL200	Phono plug and cable	41-3735
PL201	Phono plug	Part of T201
R200	Volume control, 2 megohms (tapped at 1 megohm)	33-5535-5
R201	Tone control, bass, 1 megohm	33-5539-7
R202	Resistor, tone compensating, 33,000 ohms	66-3333340*
R203	Resistor, inverse feedback, 4.7 ohms	66-9473340*
R204	Resistor, inverse feedback, 68 ohms	66-0683340
R205	Resistor, grid return, 1 megohm	66-5103340*
R206	Resistor, bias divider, 1 megohm	66-5103340*
R207	Resistor, bias divider, 10 megohms	66-6103340*
R208	Tone control (with scratch-eliminator switch), treble, 500,000 ohms	33-5538-22*
R209	Resistor, plate load, 220,000 ohms	66-4223340*
R210	Resistor, grid return, 1 megohm	66-5103340*
R211	Resistor, cathode load, 47,000 ohms	66-3473340*

† 42-1777 Push-button switch assembly.

SECTION 2 (Continued)

AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R212	Resistor, cathode bias, 4700 ohms	66-2473340*
R213	Resistor, cathode bias, 6800 ohms	66-2683340*
R214	Resistor, grid return, 4.7 megohms	66-5473340*
R215	Resistor, tone compensating, 220,000 ohms	66-4223340*
R216	Resistor, voltage divider, 100,000 ohms	66-4103340*
R217	Resistor, voltage divider, 100,000 ohms	66-4103340*
R218	Resistor, voltage divider, 33,000 ohms	66-3334340*
R219	Resistor, tone compensating, 680,000 ohms	66-4683340*
R220	Resistor, grid return, 330,000 ohms	66-4333340*
R221	Resistor, cathode bias, 2200 ohms	66-2224340*
R222	Resistor, grid return, 1 megohm	66-5103340*
R223	Resistor, voltage divider, 33,000 ohms	66-3333340*
R224	Resistor, plate load, 18,000 ohms	66-3183340*
R225	Resistor, bias filter, 220,000 ohms	66-4223340*
R226	Resistor, bias filter, 220,000 ohms	66-4223340*
R227	Resistor, grid return, 560,000 ohms	66-4563340*
R228	Resistor, plate load, 220,000 ohms	66-4223340*
R229	Resistor, bias filter, 3.3 megohms	66-5333340*
R230	Resistor, bias filter, 1.5 megohms	66-5153340*
R231	Resistor, plate load, 100,000 ohms	66-4103340*
R232	Resistor, bias filter, 220,000 ohms	66-4223340*
R233	Resistor, voltage divider, 220,000 ohms	66-4223340*
R234	Resistor, voltage divider, 560,000 ohms	66-4563340*
R235	Resistor, plate load, 56,000 ohms	66-3563340*
R236	Resistor, plate dropping, 470,000 ohms	66-4473340*
R237	Resistor, plate load, 150,000 ohms	66-4153340*
R238	Resistor, grid return, 330,000 ohms	66-4333340*
R239	Resistor, grid return, 330,000 ohms	66-4333340*
S200	Switch, scratch eliminator	Part of R208
T200	Transformer, output	32-8274
T201	Transformer, phono input	32-8256

SECTION 3

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

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, r-f by-pass, .01 mf.	61-0120*
C306	Condenser, i-f by-pass, .01 mf.	61-0120*
C307	Condenser, filament by-pass, .006 mf.	45-3500-7*
C308	Condenser, by-pass, 220 mmf.	60-10205307*
C309	Condenser, screen by-pass, .01 mf.	61-0120*
C310	Condenser, plate by-pass, .01 mf.	61-0120*
C311	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C312	Condenser, cathode by-pass, .01 mf.	61-0120*
C313	Condenser, filament by-pass, .006 mf.	45-3500-7*

REPLACEMENT PARTS LIST (Continued)

SECTION 3 (Continued)

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

Reference Symbol	Description	Service Part No.
C314	Condenser, screen by-pass, .01 mf.	61-0120*
C315	Condenser, plate by-pass, .01 mf.	61-0120*
C316	Condenser, filament by-pass, .006 mf.	45-3500-7*
C317	Condenser, r-f by-pass, .01 mf.	61-0120*
C318	Condenser, a-v-c filter, .05 mf.	61-0122*
C319	Condenser, r-f by-pass, .01 mf.	61-0120*
C320	Condenser, cathode by-pass, .01 mf.	61-0120*
C321	Condenser, d-c blocking, .006 mf.	45-3500-7*
C322	Condenser, screen by-pass, .01 mf.	61-0120*
C323	Condenser, d-c blocking, 100 mmf.	60-10105407*
C324	Condenser, plate by-pass, .01 mf.	61-0120*
C325	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C326	Condenser, r-f by-pass, 100 mmf.	30-1224-1*
C327	Condenser, r-f by-pass, .01 mf.	61-0120*
C328	Condenser, filament by-pass, .006 mf.	45-3500-7*
C329	Condenser, screen by-pass, .01 mf.	61-0120*
C330	Condenser, grid, 33 mmf.	60-00305307*
C331	Condenser, d-c blocking, .03 mf.	45-3500-1
C332	Condenser, r-f by-pass, .01 mf.	61-0120*
C333	Condenser, r-f by-pass, 1500 mmf.	60-20155404*
C334	Condenser, electrolytic, audio by-pass, 10 mf., 450 w. v.	30-2417-6
C335	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C336	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C337	Condenser, fixed trimmer, 3000 mmf., part of Z300	60-20305304
C338	Condenser, coupling, 9 mmf., part of Z300	60-90905417
C339	Condenser, fixed trimmer, 330 mmf., part of Z302	60-10335407
C340	Condenser, coupling, 3.3 mmf., part of Z302	30-1221
C341	Condenser, voltage divider, 68 mmf., part of Z304	60-00683327
C342	Condenser, voltage divider, 33 mmf., part of Z304	60-00333327
C343	Condenser, fixed trimmer, 15 mmf., part of Z304	60-00155327
C344	Condenser, fixed trimmer, 270 mmf., part of Z303	60-10275327
L300A	Primary winding	Part of Z300
L300B	Primary winding	Part of Z300
L300C	Secondary winding	Part of Z300
L300D	Secondary winding	Part of Z300
L301A	Primary winding	Part of Z301
L301B	Secondary winding	Part of Z301
L301C	Secondary winding	Part of Z301
L302A	Primary winding	Part of Z302
L302B	Primary winding	Part of Z302
L302C	Secondary winding	Part of Z302
L302D	Secondary winding	Part of Z302
L303A	Primary winding	Part of Z303
L303B	Primary winding	Part of Z303
L303C	Secondary winding	Part of Z303
L303D	Secondary winding	Part of Z303
L304A	Primary winding	Part of Z304
L304B	Secondary winding	Part of Z304
L305	Coil, FM detector	32-4007-1
PB-1	Push button, FM	Part of 42-1777†
R300	Resistor, plate decoupling, 47,000 ohms	66-3473340

† 42-1777 Push-button switch assembly.

SECTION 3 (Continued)

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

Reference Symbol	Description	Service Part No.
R301	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R302	Resistor, cathode bias, 68 ohms	66-0683340*
R303	Resistor, screen dropping, 47,000 ohms	66-3473340*
R304	Resistor, shunt, 6800 ohms, part of Z304	66-2683340*
R305	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R306	Resistor, cathode bias, 180 ohms	66-1183340*
R307	Resistor, cathode bias, 1500 ohms	66-2153340
R308	Resistor, screen dropping, 100,000 ohms	66-4103340*
R309	Resistor, plate decoupling, 3300 ohms	66-2333340*
R310	Resistor, a-v-c filter, 330,000 ohms	66-4333340*
R311	Resistor, cathode bias, 180 ohms	66-1183340*
R312	Resistor, diode load, 1 megohm	66-5103340*
R313	Resistor, screen dropping, 47,000 ohms	66-3473340*
R314	Resistor, inverse feedback, 100 ohms	66-1103340*
R315	Resistor, plate decoupling, 3300 ohms	66-2333340*
R316	Resistor, audio decoupling, 100,000 ohms	66-4103340*
R317	Resistor, diode load, 270,000 ohms	66-4273340*
R318	Resistor, r-f filter, 47,000 ohms	66-3473340*
R319	Resistor, oscillator stabilizing, 27 ohms	66-0273340*
R320	Resistor, grid leak, 15,000 ohms	66-3153340*
R321	Resistor, screen dropping, 56,000 ohms	66-3563340*
R322	Resistor, audio decoupling, 100,000 ohms	66-4103340*
R323	Resistor, plate dropping, 15,000 ohms	66-3153340
R324	Resistor, audio plate load, 47,000 ohms	66-3473340*
R325	Resistor, plate dropping, 3300 ohms	66-2333340*
R326	Resistor, voltage divider, 100,000 ohms	66-4103340*
TC300A	Tuning core	Part of Z300
TC302A	Tuning core	Part of Z302
TC304A	Tuning core	Part of Z304
WS-3(R)	Switch-wafer section	Part of 76-2211‡
Z300	Transformer, 1st i-f, including C300A, C300B, C300C, C337, C338, and TC300A	32-4020-1
Z301	Transformer, 2nd i-f, including C301A, C301B, and C301C	32-4001
Z302	Transformer, 3rd i-f, including C302A, C302B, C302C, C339, C340, and TC302A	32-4002
Z303	Transformer, 4th i-f, including C303A, C303B, C303C, and C344	32-4003-2
Z304	Transformer, FM detector, including C304A, C341, C342, C343, R304, and TC304A	32-4004

SECTION 4

R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning	31-2694
C400A	Condenser, trimmer, FM aerial	Part of C400
C400B	Condenser, trimmer, FM r.f.	Part of C400
C400C	Condenser, trimmer, FM osc.	Part of C400
C400D	Condenser section, tuning, AM aerial	Part of C400
C400E	Condenser section, tuning, AM osc.	Part of C400
C400F	Condenser section, tuning, FM aerial	Part of C400
C400G	Condenser section, tuning, FM r.f.	Part of C400
C400H	Condenser section, tuning, FM osc.	Part of C400
C401	Condenser, trimmer, s-w aerial	31-6473-2
C402	Condenser, d-c blocking, 10 mmf.	60-00105407*
C403	Condenser, filament by-pass, 220 mmf.	60-10205307*
C404	Condenser, screen by-pass, 1500 mmf.	60-20155404*

REPLACEMENT PARTS LIST (Continued)

SECTION 4 (Continued)

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C405	Condenser, plate by-pass, 1500 mmf.	60-20155404*
C406	Condenser, d-c blocking, 33 mmf.	60-00335407*
C407	Condenser, neutralizing (s.w.), 10 mmf.	60-00105407*
C408	Condenser, oscillator series, 255 mmf.	30-1220-24
C409	Condenser, trimmer assembly, 3-section	31-6477
C409A	Condenser, trimmer, oscillator shunt (s.w.)	Part of C409
C409B	Condenser, trimmer, oscillator shunt (bc.)	Part of C409
C409C	Condenser, trimmer, aerial shunt (bc.)	Part of C409
C410	Condenser, aerial series (s.w.), 300 mmf.	60-10305307*
C411	Condenser, d-c blocking, 22 mmf.	60-00205307*
C412	Condenser, trimmer, bc. series	31-6473-3
C413	Condenser, r-f voltage divider, 285 mmf.	30-1224-14
C414	Condenser, r-f voltage divider, 485 mmf.	30-1224-15
C415	Condenser, r-f by-pass, 470 mmf.	60-10475307*
C416	Condenser, d-c blocking, 470 mmf.	60-10475307*
C417	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C418	Condenser, d-c blocking, 220 mmf.	60-10205307*
C419	Condenser, r-f by-pass, 220 mmf.	60-10205307*
C420	Condenser, oscillator grid, 100 mmf.	60-10105407*
C421	Condenser, oscillator-to-mixer coupling, 750 mmf.	60-10755301*
C422	Condenser, trimmer assembly, 5-section, aerial tuning (push button)	31-6479
C422A	Condenser, trimmer	Part of C422
C422B	Condenser, trimmer	Part of C422
C422C	Condenser, trimmer	Part of C422
C422D	Condenser, trimmer	Part of C422
C422E	Condenser, trimmer	Part of C422
C423	Condenser, cathode by-pass, 100 mmf.	60-10105407*
J400	Socket, s-w and FM aerial	27-6214-1
L400	Coil, bc. aerial	32-4049-3
L401	Coil, s-w aerial	32-4050
L402	Coil, FM isolation	32-4111
L403	Coil, s-w osc.	32-3996
L404	Coil, bc. osc.	32-4019-4
L405	Choke, osc. isolation	32-4089
L406	Coil, FM aerial	32-3993
L407	Coil, FM r.f.	32-3992
L408	Coil, FM osc.	32-3994
L409A	Coil, push-button osc.	32-4059
L409B	Coil, push-button osc.	32-4059
L409C	Coil, push-button osc.	32-4059-1
L409D	Coil, push-button osc.	32-4059-1
L409E	Coil, push-button osc.	32-4059-1
L410	Choke, FM plate load	32-4061
LA400	Loop, bc.	76-3530
PB-1 to PB-10	Push-button-switch assembly	42-1777
PL400	Plug assembly, FM a-c-line aerial	41-3781
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, screen dropping, 56,000 ohms.	66-3563340*
R402	Resistor, cathode bias, 82 ohms	66-0823340*
R403	Resistor, voltage divider, 4.7 megohms.	66-5473340*
R404	Resistor, parasitic suppressor, 100 ohms.	66-1103340*
R405	Resistor, plate feed, AM, 22,000 ohms	66-3223340*
R406	Resistor, plate feed, FM, 22,000 ohms.	66-3223340*
R407	Resistor, grid return, 22,000 ohms	66-3223340*
R408	Resistor, cathode bias, 2200 ohms	66-2223340*
R409	Resistor, cathode bias, 10,000 ohms	66-3103340*
R410	Resistor, parasitic suppressor, 10 ohms.	66-0103340*
R411	Resistor, grid return, 4.7 megohms	66-5473340*
WS-1	Switch wafer	Part of 76-2211‡
WS-2	Switch wafer	Part of 76-2211‡

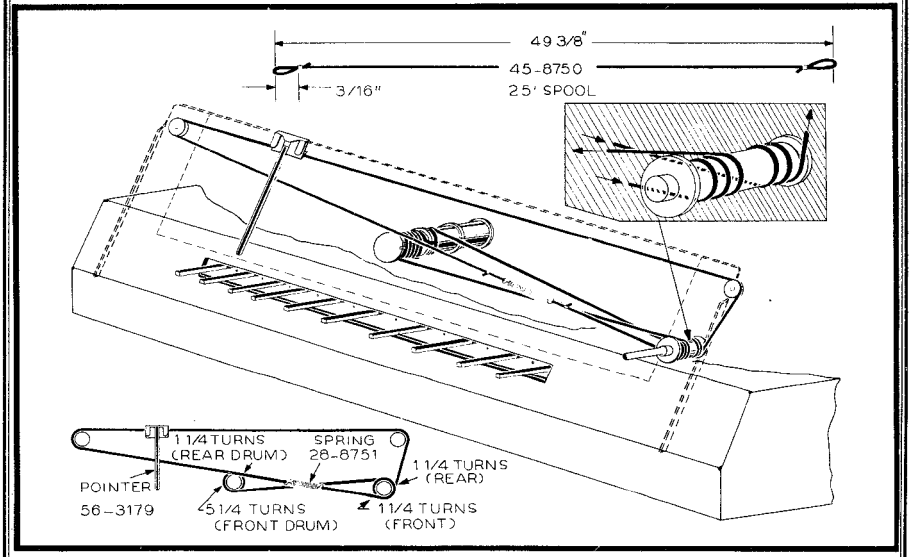
† 42-1777 Push-button switch assembly.
‡ 76-2211 Rotary wafer switch, 3 section.

MISCELLANEOUS

Description	Service Part No.
Bin-lamp-socket assembly	26-6233-3
Cabinet (less scale)	10697
Cabinet Parts and Hardware	
Back, cabinet	54-7516
Baffle and cloth, l.h.	40-6785
Baffle and cloth, r.h.	40-6968-1
Baffle, wood	219001
Bin mechanism, l.h.	76-3223
Bin mechanism, r.h.	76-3223-1
Bolt, speaker (4 req.)	W-1587
Bracket, lamp	56-3545-5
Catch, bullet (2 req.)	45-6002
Cradle assembly	76-3222
Dial-scale-and-backplate assembly	76-3187-4
Dome (4 req.)	45-6042
Door, record album	45-6414
Doors (matched pair furnished)	45-1556
Grille, wire (2 req.)	56-3250
Hinge, continuous	56-3627
Hinge, knife	56-4882
Hinge, stop	56-5278-1
Panel, instrument	45-6382
Pull, brass	56-3249
Spring, bin mechanism	56-4978
Strike, bullet catch (2 req.)	45-6003
Telltale jewel	54-4304
Top, cabinet	45-6415
Cable and plug, speaker	41-3734-3
Cord, drive (25-ft. spool)	45-8750
Dial-lamp-socket assembly, 14" lead	76-2109
Dial-lamp-socket assembly, 8" lead	76-2109-2
Dial-Scale Hardware	
Backplate	76-2106
Pointer	56-3179
Scale strap (2 req.)	56-4916
Spring, drive	28-8953
Grommet, r-f-unit mtg. (3 req.)	54-4295
Knob, control (4 req.)	54-4227
Knob, push button (10 req.)	54-4292
Push-Button-Assembly Hardware	
Cap (10 req.)	54-4294
Cap, centering (5 req.)	28-6936
Cover assembly	76-1343
Screw, tuning core (5 req.)	56-2249
Switch assembly, push-button	42-1777
Tab, BC	54-4317-2
Tab, FM	54-4317-4
Tab kit (station call letters)	40-6943
Tab, OFF	54-4317-1
Tab, PHONO	54-4317-5
Tab, SW	54-4317-3
Telltale-lamp-socket assembly	41-3737
Terminal strip, coils (5 req.)	56-2250FA3
Tuning core (5 req.)	56-6100
Shaft, drive (tuning)	76-2107
Socket, aerial (s-w and FM)	27-6214-1
Socket-adapter plate (3 req.)	56-4033-1FA3
Socket, Loktal (3 req.)	27-6138*
Socket, miniature (2 req.)	27-6226
Socket, octal (4 req.)	27-6174
Socket, Loktal, r-f unit (1 req.)	27-6213
Socket, miniature (1 req.)	27-6203-1
Socket, Loktal, scratch eliminator (2 req.)	27-6138*
Wafer-Switch Hardware	
Fulcrum assembly	76-2206
Link, connecting	54-7169

SETTING PUSH BUTTONS

1. Connect the output meter between the No. 3 terminal of the aerial terminal panel and the chassis.
2. Turn the volume control to maximum, and bass and treble controls fully counterclockwise.
3. Couple the signal generator loosely to the loop aerial (see Note under "AM ALIGNMENT CHART").
4. Turn on the power, and allow the radio to warm up for 15 minutes before starting the adjustments.
5. Starting with the lowest frequency desired, set the signal generator to the desired frequency (modulation on), push the station-selector push button, and adjust the associated oscillator tuning core and aerial trimmer condenser (marked on rear of chassis) for maximum indication on the output meter.
6. Reset the signal-generator frequency, and repeat the procedure for each remaining station-selector push button.
7. 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.



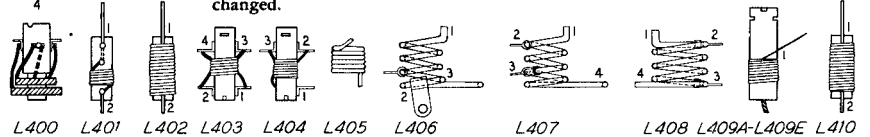
TP-164

Figure 6. Drive-Cord Installation Details

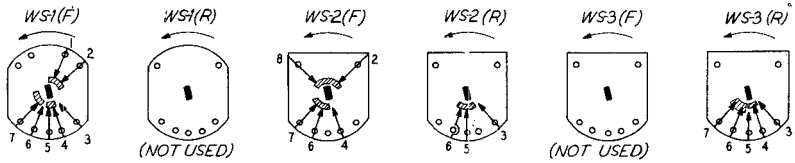
PHILCO CORP. MODEL 48-1290

IMPORTANT!

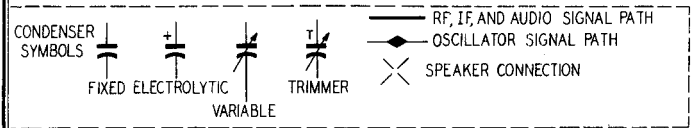
To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical positions as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be changed.

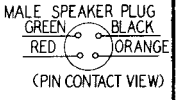


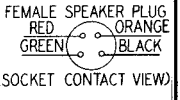
L400 BC AERIAL | L401 SW AERIAL | L402 FM CHOKE | L403 SW OSC | L404 BC OSC | L405 OSC CHOKE | L406 FM AERIAL | L407 FM RF | L408 FM OSC | L409A-L409E PB OSC | L410 FM CHOKE



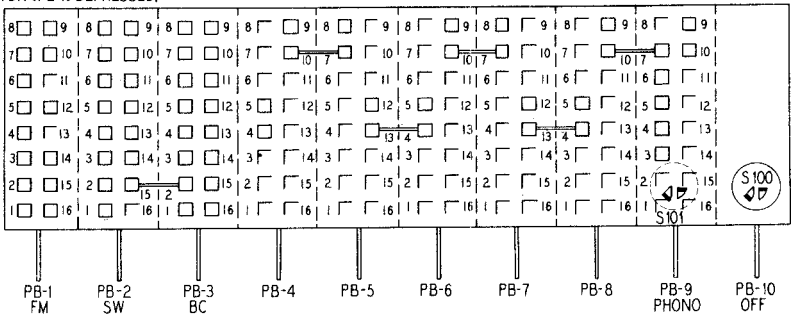
ROTARY WAFER SWITCH SECTIONS ARE SHOWN (AS VIEWED WITH CHASSIS INVERTED) IN THE POSITION FOR BROADCAST, SHORT-WAVE, PUSH-BUTTON, OR PHONO OPERATION. THESE SECTIONS ARE THROWN TO THE FM POSITION WHEN ACTUATED BY THE FM PUSH BUTTON. WAFER SECTIONS ARE SYMBOLIZED WS1, WS2, WS3, FROM FRONT OF CHASSIS TOWARD REAR. (F) INDICATES FRONT CONTACTS, LOOKING FROM FRONT. (R) INDICATES REAR CONTACTS, LOOKING THROUGH FROM FRONT.







NOTE:-
VOLTAGE READINGS GIVEN WERE TAKEN WITH A 20,000-OHMS-PER-VOLT METER, AT A LINE VOLTAGE OF 117 V A.C.
VOLTAGE READINGS IN SCRATCH ELIMINATOR CIRCUITS OF SECTION 2 WERE TAKEN WITH PHONO PUSH BUTTON (PB-9) DEPRESSED, AND TREBLE CONTROL SET TO SCRATCH ELIMINATOR POSITION.
VOLTAGE READINGS ASSOCIATED WITH FM DETECTOR WERE TAKEN WITH FM PUSH BUTTON (PB-1) DEPRESSED.



PUSH-BUTTON SWITCHES AS VIEWED WITH CHASSIS INVERTED.

ALIGNMENT PROCEDURE

CAUTION: Do no turn on power with speaker disconnected, or the radio may be damaged.

ALIGNMENT OF AM CIRCUITS

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

OUTPUT METER—Connect between No. 3 terminal (voice-coil connection) of aerial terminal panel and chassis.

AM SIGNAL GENERATOR—Connect ground lead to chassis, and output lead as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain radio output below 1.5 volts, as read on output meter.

CONTROLS—Set volume control to maximum, bass tone control fully counterclockwise, treble tone control fully clockwise (do not turn on scratch eliminator), and signal-generator dial, radio dial, and radio push buttons as indicated in chart.

DIAL POINTER—With tuning condensers fully meshed, dial pointer must coincide with index mark at low-frequency end of dial. See "CALIBRATING DIAL BACKPLATE" for method of measuring backplate for index and calibration marks.

ALIGNMENT OF FM CIRCUITS

OUTPUT METER—Connect between No. 3 terminal (voice-coil connection) of aerial terminal panel and chassis.

AM SIGNAL GENERATOR—Connect ground lead to chassis; connect output lead through .1-mf. condenser to points specified in chart. Use modulated output unless otherwise specified.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain radio output below 1.5 volts, as read on output meter. All adjustments are made for maximum output, unless otherwise specified in chart.

CONTROLS—Set volume control to maximum, bass tone control fully counterclockwise, and treble tone control fully clockwise. Depress FM push button, PB-1.

LOCATIONS OF COILS—For the locations of coils L406, L407, and L408 (steps 11 and 15), refer to figure 4.

Note 1. When the oscillator grid (pin 2) of the FM1000 is connected to the chassis, the oscillator section of the FM detector is made inoperative; the circuit is thereby converted from an FM to an AM detector.

Note 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. When this network is connected across the primary or secondary winding of an overcoupled i-f transformer, the network loads the circuit so that the transformer is effectively below critical coupling; the unloaded winding may then be correctly peaked at the intermediate frequency.

Note 3. The top of padder C303C 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.

Note 4. It is essential that the output of the generator be kept below the level at which the oscillator of the FM detector locks in; otherwise, an erroneous zero beat will be obtained. When a single very sharp zero-beat point is obtained, the adjustment is correct.

Note 5. The use of a signal generator for steps 10 through 16 is recommended only if the available generator is sufficiently accurate to insure correct frequency settings. Otherwise, an alternative procedure employing FM broadcast-station signals is recommended. For the adjustments at the high-frequency end of the band, use the station nearest 105 mc.; for the adjustments at the low-frequency end of the band, use the station nearest 88 mc. or 92 mc., as indicated. If the radio is 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. The FM detector must be made inoperative, as directed in step 10 of the "FM ALIGNMENT CHART."

Note 6. Check the tracking of oscillator and r-f circuits with a tuning wand. If placing the brass end in or near the coil increases the output-meter reading, spread the turns; if the powdered-iron end increases the output 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.

Note 7. Make two simple dipole aerials to feed signals from the signal-generator to the radio. Each dipole 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 of the radio. Connect the other dipole aerial to the output leads of the signal generator. Place the two dipoles several feet apart.

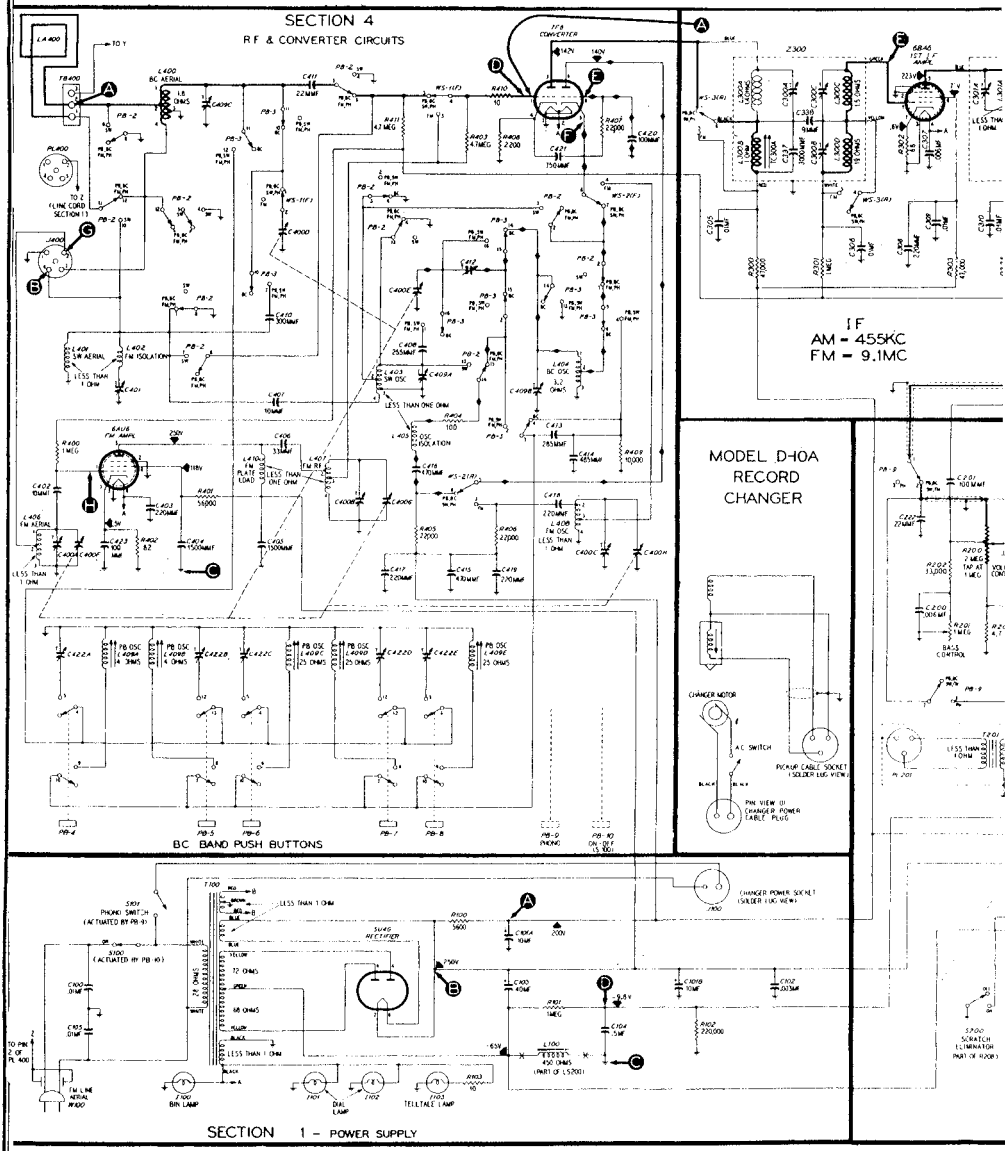
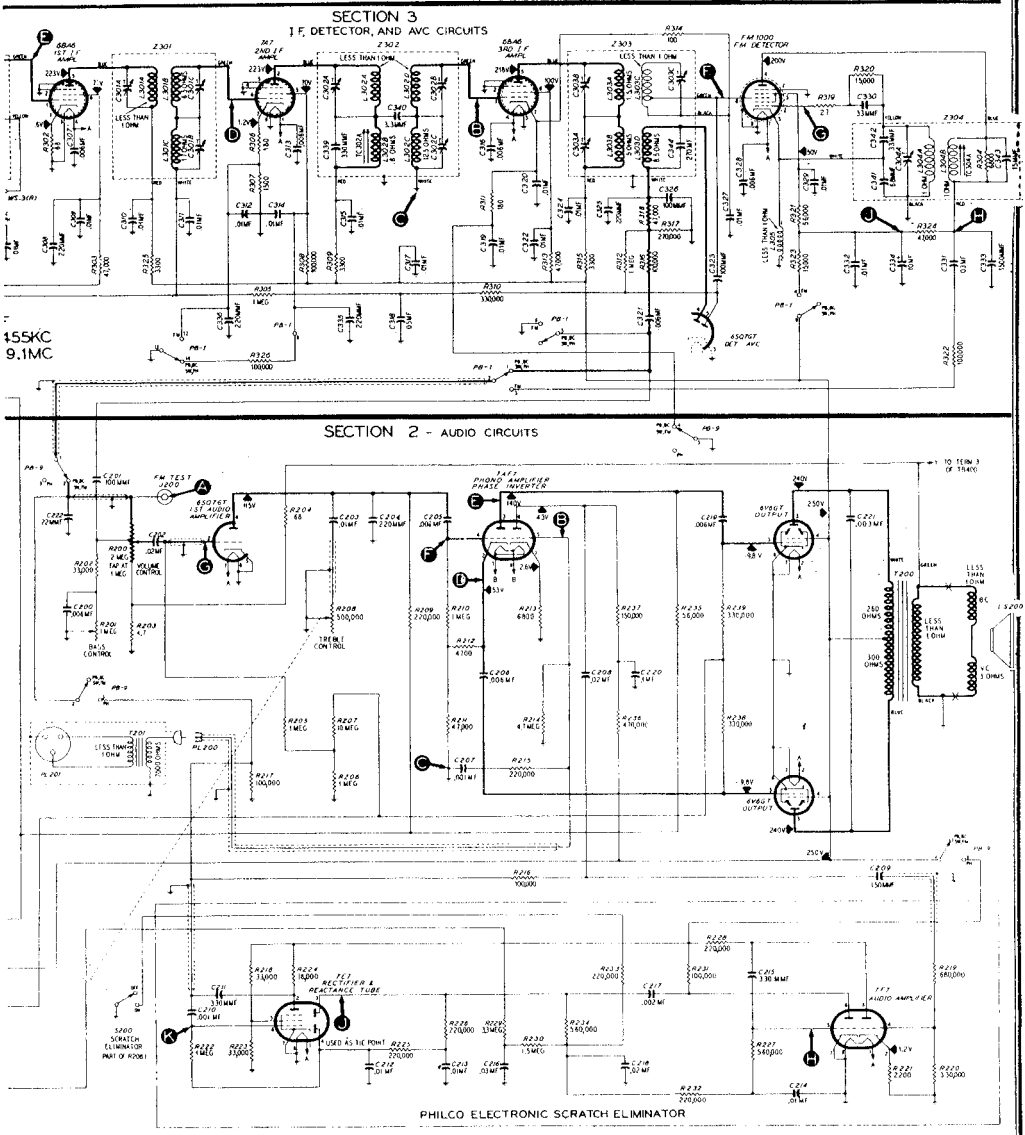


Figure 7. Philco Radio-Phonograph Model 48-1290, Sectiona



18-1290, Sectionalized Schematic Diagram, Showing Test Points

RECORD CHANGER: Philco Model D-10A, RCD. CH. 18-1

MODEL 48-1290

PHILCO CORP.

STEP	SIGNAL GENERATOR		RADIO		
	CONNECTIONS TO RADIO	DIAL SETTING	PUSH BUTTON	DIAL SETTING	SPECIAL INSTRUCTIONS
1	Through .1 mf. condenser to stator of aerial section of tuning gang.	455 kc.	Depress BC push button, PB-3.	1700 kc.	Adjust each trimmer, in order, for maximum output. Do not repeat adjustments.
2	Loosely coupled with loop. See note below.	15 mc.	Depress SW push button, PB-2.	15 mc.	Adjust for maximum output. Image should be heard with set tuned to 14.1 mc.
3	Same as step 2.	15 mc.	Depress SW push button, PB-2.	15 mc.	Adjust for maximum output (rock tuning control).
4	Same as step 2.	1700 kc.	Depress BC push button, PB-3.	1700 kc.	Adjust for maximum output.
5	Same as step 2.	1500 kc.	Depress BC push button, PB-3.	1500 kc.	Adjust for maximum output.
6	Same as step 2.	580 kc.	Depress BC push button, PB-3.	580 kc.	Adjust for maximum output (rock tuning control).
7	Repeat steps 4, 5, and 6, in order, until no further increase in output is obtained. Then repeat step 4.				

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

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO	
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS
1	To terminal 2 of L407 (see figure 4).	9.1 mc.	Gang fully closed.	Connect jumper between osc. grid, pin 2 of FM1000, and chassis (see Note 1). Connect loading net work (see Note 2) between top of padder C383C and chassis (see Note 3).
2	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between plate pin 2 (blue lead), of third i-f tube and chassis.
3	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between grid, pin 6 (green lead), of third i-f tube and chassis.
4	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between plate, pin 2 (blue lead), of second i-f tube and chassis.
5	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between grid, pin 6 (green lead), of second i-f tube and chassis.
6	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between plate, pin 2 (blue lead), of first i-f tube and chassis.
7	Same as step 1.	9.1 mc.	Same as step 1.	Leave loading network connected as in step 6.
8	To grid (pin 6) of third i-f tube.	9.1 mc. (modulation off)	Same as step 1.	Remove loading network, and remove jumper from pin 2 of FM1000 and chassis. Connect jumper between plate, pin 4 (blue lead) of FM1000, and junction of R324 and red lead of Z304. Adjust trimmer for zero beat.
9	Same as step 8.	9.1 mc.	Same as step 1.	Remove jumper used in step 8. Adjust tuning core for zero beat (see Note 4).
10	To terminal 2 of J400 (see Note 5).	105 mc.	105 mc.	Connect jumper between pin 2 of FM1000 and chassis. Adjust for maximum output.
11	Same as step 10.	88 mc.	88 mc.	Adjust coil L408 for maximum output (see Note 6).
12	Repeat steps 10 and 11 until no further improvement is noted.			
13	Same as step 10.	105 mc.	105 mc.	Adjust for maximum output (rock tuning control).
14	See Note 7.	105 mc.	105 mc.	Adjust for maximum output.
15	Same as step 14.	92 mc.	92 mc.	Adjust coil L407, then L406, for maximum output (see Note 6).
16	Repeat steps 13, 14, and 15 until no further improvement in sensitivity can be obtained.			

AM ALIGNMENT CHART

ISTRUCTIONS	ADJUST
, in order, for maximum eat adjustments.	C303A—4th i-f pri.
	C302C—3rd i-f sec.
	TC302A—3rd i-f pri.
	C301B—2nd i-f sec.
	C300B—1st i-f sec.
	TC300A—1st i-f pri.
output. Image should tuned to 14.1 mc.	C409A—SW osc.
m output (rock tuning	C401—SW aerial
output.	C409B—BC osc. (shunt)
output.	C409C—BC aerial
m output (rock tuning	C412—BC osc. (series)
near the radio loop.	

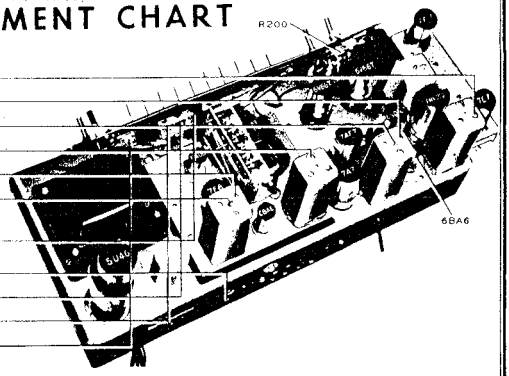


Figure 8. Top View, Showing AM Trimmer Locations

ICTIONS	ADJUST
grid, pin 2 of FM1000, nect loading net work padder C303C and	C303B—4th i-f pri.
tween plate pin 2 and chassis.	C303C—4th i-f sec.
tween grid, pin 6 and chassis.	C302A—3rd i-f pri.
tween plate, pin 2 and chassis.	C302B—3rd i-f sec.
tween grid, pin 6 e and chassis.	C301A—2nd i-f pri.
tween plate, pin 2 d chassis.	C301C—2nd i-f sec.
ted as in step 6.	C300C—1st i-f sec. C300A—1st i-f pri.
remove jumper from Connect jumper be- of FM1000, and junc- 304. Adjust trimmer	C304A—FM det. osc.
l. Adjust tuning core	TC304A—FM det. line- arity.
2 of FM1000 and output.	C400C—FM osc.
output (see Note 6).	FM osc. tracking.
rock tuning control).	C400B—FM r-f.
	C400A—FM aerial.
or maximum output	FM r-f and aerial tracking.

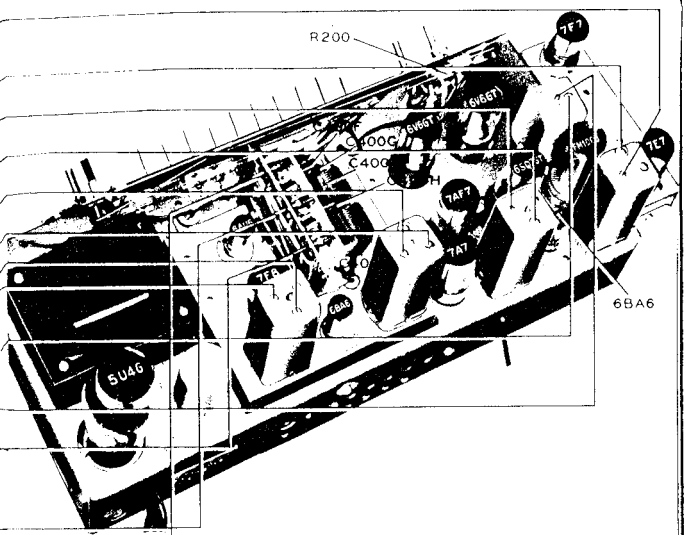


Figure 9. Top View, Showing FM Trimmer Locations

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