Philco Radio & Television Corp.

Model: 48-1270	**Chassis:**	**Year:** Pre 1950
Power:	**Circuit:**	**IF:**
Tubes:		
Bands:		

Resources
Riders 18 (XVIII) PHILCO 18-146
Riders 18 (XVIII) PHILCO 18-147
Riders 18 (XVIII) PHILCO 18-148
Riders 18 (XVIII) PHILCO 18-149
Riders 18 (XVIII) PHILCO 18-150
Riders 18 (XVIII) PHILCO 18-151
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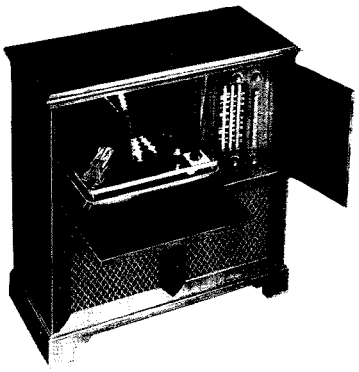
Riders 18 (XVIII) PHILCO 18-163
Riders 18 (XVIII) PHILCO 18-164



PHILCO RADIO-PHONOGRAPH
MODEL 48-1270

Circuit Description

Philco Radio-Phonograph, Model 48-1270, contains a 13-tube superheterodyne, providing reception on the standard-broadcast band, 540 to 1720 kc., the short wave range between 9.3 and 15.5 mc., and the FM band 88 to 108 mc.

A low-impedance loop within the cabinet provides adequate signal pickup for the standard-broadcast and short-wave bands. In most locations, the built-in FM dipole 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.

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 7W7 high-frequency pentode is used in the r-f stage, and a 7F8 high-frequency double triode is employed as a converter. These stages provide high signal-to-noise ratio, high conversion efficiency, and good image rejection. The FM tuning gang is constructed with copper plates to obtain the high Q required for proper selectivity.

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, tuned-secondary coupling on AM, 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 7B7 and two 7H7 high-transconductance pentodes are used in the i-f stages.

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

SPECIFICATIONS

CABINET	Wood, mahogany or walnut 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 cyles, a.c.
POWER CONSUMPTION	Radio: 110 watts Phonograph: 140 watts
AERIALS	Built-in loop and dipole; external aerial also may be used
INTERMEDIATE FREQUENCY	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (13)	7W7, 7F8, 7H7(2), 7B7, FM1000, 7AF7, 6SQ7GT, 6V6GT(2), 7F7, 7E7, 5U4G
RECORD PLAYER	Philco Automatic Record Changer, Model M-4

oscillator, which nominally 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 modulation of the FM 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, R203 and R204, 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 new Philco scratch-eliminator circuit reduces the high-frequency surface noise during the low-volume passages on a phonograph record, and permits maximum treble response during the high-volume passages. The circuit consists of a reactance tube (pentode section of the 7E7), a two-stage amplifier (7F7), and a half-wave rectifier (diode section of the 7E7). The reactance tube (connected to the plate circuit of the phono amplifier) functions as a variable capacitance which shunts a controlled amount of the surface-noise frequencies to ground. A portion of the audio signal is amplified, rectified, and applied as a bias voltage to the grid of the reactance tube. During the low-volume passages, when the surface noise tends to mask the high frequencies, the low bias voltage increases the capacitance of the reactance tube, and the surface noise is reduced. During the high-volume passages, when the surface noise itself is masked by the volume, the high bias voltage decreases the capacitance of the tube, thus permitting all audio frequencies to pass relatively unaffected.

Philco TROUBLE-SHOOTING *Procedure*

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

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

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

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

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 sources of trouble.
2. Measure the resistance between B+ (pin 2 of the 5U4G) and the radio chassis (test point C). 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 C101A, C101B, C101C, C102, and C103 for leakage or shorts.

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

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	W—line cord
I—pilot lamp	PB—push button	TB—terminal board
J—socket	R—resistor	WS—wafer switch
L—choke or coil	S—switch	Z—electrical assembly
LA—loop aerial	T—transformer	

The number of the symbol, except when the number is less than 100, 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 and scratch-eliminator circuits.
300-series components are in Section 3—the i-f amplifier, detector, & 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.

Section 1

TROUBLE SHOOTING

CAUTION: Do not turn on the power with the speaker disconnected, or the radio may be damaged.

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, at a line voltage of 117 volts, a.c.

Depress the BC push button, set the volume control to minimum, and turn both tone controls 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.

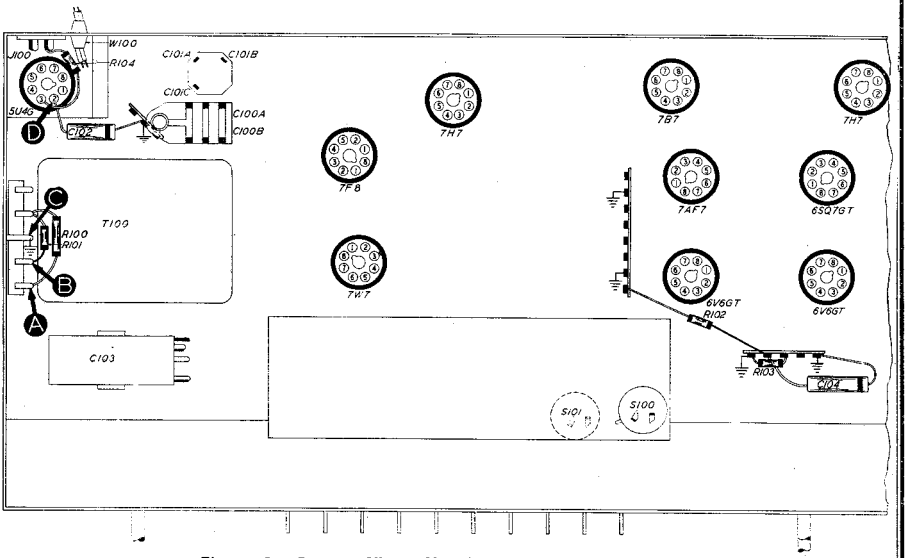


Figure 2. Bottom View, Showing Section 1 Test Points

TP-4023A

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A B	220v 200v		Trouble within this section. Isolate by the following tests.
2	D	250v	No voltage Low voltage High voltage	Defective: 5U4G, T100, W100, S100. Shorted: C101C, C102, C316*, C317*. Open: L100, C316*. Defective: 5U4G, T100. Leaky: C101C, C102, C103, C316*, C317*. Open: R102. Defective: 6V6GT*. Open: R103, T200*.
3	B	200v	No voltage Low voltage High voltage	Open: R101. Shorted: C101B, C417*, C419*, C421*. Defective: R101. Leaky: C101B, C417*, C419*, C421*. Defective: 6V6GT*, T200*.
4	A	220v	No voltage Low voltage	Open: R100. Shorted: C101A. Defective: R100. Leaky: C101A.

Listening Test: Abnormal hum may be caused by open C101A, C101B, C101C, or C103.

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

Section 2

TROUBLE SHOOTING

AUDIO-CIRCUIT TESTS

For the tests in the audio circuit, use an audio signal generator. Connect the ground lead of the generator to the chassis (test point C); connect the output lead through a .1-mf. condenser to the test points indicated.

Set the radio volume control to maximum, turn both tone controls counterclockwise, and depress the phono push button.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the scratch-eliminator-circuit tests. If not, isolate and correct the trouble in the audio circuit.

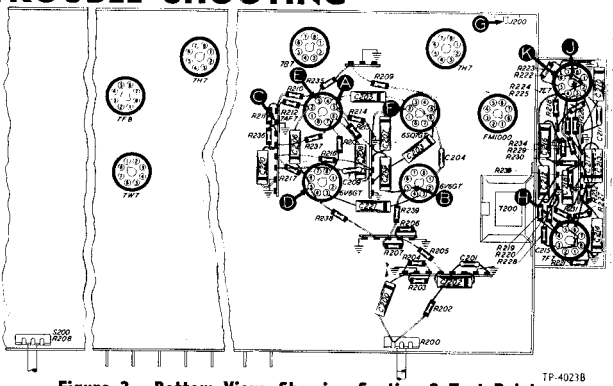


Figure 3. Bottom View, Showing Section 2 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in audio circuit. Isolate by the following tests.
2	B D	Loud, clear signal with strong signal input.	Defective: 6V6GT, T200, LS200, R238, R239. Shorted or lecky: C221. Open: C104.
3	E	Loud, clear signal with moderate signal input.	Defective: 7AF7, R211, R212, R235. Open: C206, C219. Shorted or leaky: C206, C219.
4	F	Loud, clear signal with weak signal input.	Defective: 6SQ7GT. Open: R208 (rotate through entire range), R209, R210. Shorted or leaky: C203, C204, C205.
5	G	Same as step 4.	Defective: R200, R203, R205, R206, R207. Shorted or leaky: C202.
6	A	Same as step 4.	Defective: 7AF7, R236, R237, PB9. Shorted or leaky: C220. Open: C208, R216, R217.

SCRATCH-ELIMINATOR-CIRCUIT TESTS

For the tests in the scratch-eliminator circuit, set the volume control to maximum, turn the bass tone control counterclockwise, and depress the phono push button. Set the scratch-eliminator switch, which is operated by the treble-tone-control knob, as directed in the chart.

Connect the output lead of an audio signal generator through a .1-mf. condenser to the test points indicated in the chart. Set the generator for an output frequency of 5000 cycles.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 3; if not, isolate and correct the trouble in the scratch-eliminator circuit.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A (With scratch eliminator turned off, adjust generator for 2 volts across voice coil)	.8 volt across voice coil, with scratch eliminator turned on.	Trouble in scratch-eliminator circuit. Isolate by the following tests.
2	H (Adjust generator output to approximately .3 volt)	Approximately –6 volts* from J to C, with scratch eliminator turned on.	Defective: 7F7, 7E7 (diode section). Open: R231, R233, R234, C217. Shorted or leaky: C213, C217, C218.
3	A (Reduce generator output to maintain –6 volts* from J to C)	Considerable reduction in generator output required to maintain voltage from J to C at –6 volts.*	Defective: 7F7. Open: R228, C215, R221, R220, R219, C209. Shorted or leaky: C209, C214, C215.
4	A (Generator output reduced as in step 3)	–1.4 volts* from K to C.	Open: R222, R225, R226. Shorted or leaky: C210, C212, C213.
5	A (Generator adjusted as in step 1)	.8 volt across voice coil, with scratch eliminator turned on.	Defective: 7E7 (pentode section). Open: R218, R223, R224, C210, C211. Shorted or leaky: C211.

* Readings taken with 20,000-ohms-per-volt meter on 10-volt range, with 100,000-ohm resistor connected in series with negative lead.

Section 3 TROUBLE SHOOTING

AM CIRCUITS

For the following tests use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the radio 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, set the volume control to maximum, and turn both tone controls counterclockwise.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for the FM 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 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 under "POSSIBLE CAUSE OF ABNORMAL INDICATION".

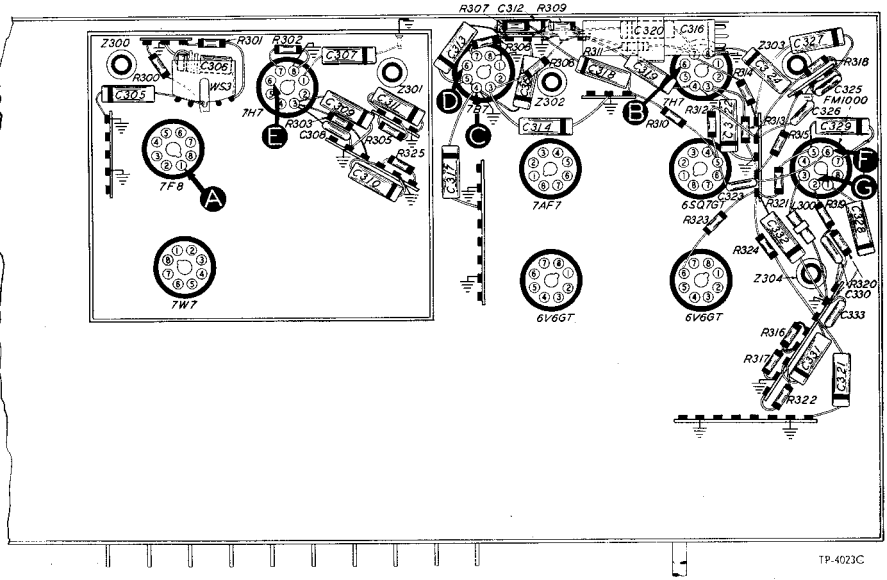


Figure 4. Bottom View, Showing Section 3 Test Points

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in AM circuits. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 7H7, 6SQ7GT (diode section), PB1, PB9. Open: R311, R313, R315, R318, C321. Shorted: C320, C322, C324, C325, C326. Defective or misaligned: Z303.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7, PB1. Open: R305, R306, R307, R308, R309. Shorted: C312, C313, C314, C315, C403*. Defective or misaligned: Z302.
4	E	Loud, clear signal with weak signal input.	Defective: 7H7. Open: R301, R302, R303, R325. Shorted: C306, C307, C308, C309, C310. Defective or misaligned: Z301.
5	A	Loud, clear signal with much weaker signal input.	Defective: 7F8*, WS3(R). Open: R300, R410*. Shorted: C305. Defective or misaligned: Z300.

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

Section 3 (Cont.) TROUBLE SHOOTING

FM CIRCUITS (FM DETECTOR)

The tests in this circuit are made with an audio signal generator, an AM r-f signal generator, and a 20,000-ohms-per-volt meter. Connect a .1-mf. condenser in series with the output lead of each generator.

In step 1, unmodulated r-f signals together with d-c voltage readings are used to check the response of the detector circuit to FM, by observing the voltage drops across the audio-load resistor R324 for different input frequencies within the i-f range of the detector. In step 3, the oscillator section of the detector is made inoperative, thereby converting the circuit to an AM detector and making it possible to check certain components with an AM signal. The tests in this section will not indicate the condition of alignment of the detector unless the circuit is extremely misaligned.

NOTE: In steps 1 and 3, the output of the AM signal generator must be at least .5 volt. If the output is insufficient, the generator lead may be connected to test point B or D in this section, depending upon the maximum output of the generator used. When using these test points, it is assumed that the last two i-f stages are trouble-free. These two i-f stages may be at fault, however, if abnormal indications are obtained in BOTH steps. If doubtful, refer to steps 2 and 3 in the chart for "FM CIRCUITS (I-F Amplifier)" and check the components listed under "POSSIBLE CAUSE OF ABNORMAL INDICATION".

Set the radio volume control to maximum. Turn both tone controls counterclockwise, and depress the FM push button.

If the "NORMAL INDICATION" is obtained in the first step, proceed with the tests for "FM CIRCUITS (I-F Amplifier)." If not, isolate and remedy the trouble in the FM detector.

STEP	PROCEDURE	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	Connect d-c voltmeter across resistor R324 (positive lead to junction of R324 and R323; negative lead to junction of R324 and C331), with meter on 50-volt range. Connect r-f-generator output to test point F. Turn off modulation and adjust generator output to approximately .5 volt. Swing generator frequency from approximately 80 kc. above to 80 kc. below 9.1 mc.	Approximately 15 to 30 volts across R324 for 9.1-mc. signal or no signal; a swing of approximately ± 12 to 20 volts for a deviation of ± 80 kc.	Trouble in FM detector. Isolate by the following tests.
2	Connect audio signal generator to test point F; adjust for high generator output.	Loud, clear signal.	Defective: Z304, FM1000, PB1. Shorted: C332, C333. Open: C316B, C331, R322, R323, R324, L300.
3	Short test point G (pin 2 of FM1000) to chassis. Connect r-f-generator output to test point F. Use modulated signal. Set generator for maximum output at 9.1 mc.	Loud, clear signal	Defective: FM1000. Shorted: C316B, C332. Open: R323, R324, L300.
4	Remove short from test point G. Connect negative lead (prod end) of d-c voltmeter through 50,000-ohm resistor to test point G; connect positive lead to test point C. Set meter to 10-volt range.	Approximately 2.5 volts negative.	Defective: FM1000, Z304, L300, C330. Shorted: C329. Open: R320, R321.

FM CIRCUITS (I-F AMPLIFIER)

Follow the preliminary instructions for the AM circuits with these exceptions: Depress the FM push button, set the signal-generator frequency to 9.1 mc., and short test point G (pin 2 of FM1000) to the chassis (test point C), to permit the use of an AM signal.

The parts which were found to be satisfactory for AM, with the exception of those indicated in the chart, will usually operate satisfactorily for FM.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4. If not, isolate and correct the trouble in the FM i-f amplifier.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear signal with weak signal input.	Trouble in FM i-f amplifier. Isolate by the following tests.
2	B	Loud, clear signal with strong signal input.	Defective: 7H7. Shorted or open: C327. Defective or misaligned: Z303.
3	D	Loud, clear signal with moderate signal input.	Defective: 7B7. Defective or misaligned: Z302.
4	E	Loud, clear signal with weak signal input.	Defective: 7H7. Defective or misaligned: Z301.
5	A	Loud, clear signal with weak signal input.	Defective: 7F8, WS3(R). Defective or misaligned: Z300.

Section 4

TROUBLE SHOOTING

For the following tests, with the exception of the oscillator tests, use an r-f signal generator with modulated output. Connect the 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 both tone controls counterclockwise.

OSCILLATOR TESTS ("AM CIRCUITS" chart, steps 5, 8, and 10; "FM CIRCUITS" chart, step 2): Connect the positive lead of a high-resistance voltmeter to the oscillator cathode (pin 5) of the 7F8, test point E. Connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid (pin 8), test point F. Use a suitable meter range, such as 0—10 volts. Absence of negative voltage with any push button (PB8 through PB4 depressed, or for any dial position (push button PB1, PB2, or PB3 depressed), indicates the oscillator is not functioning.

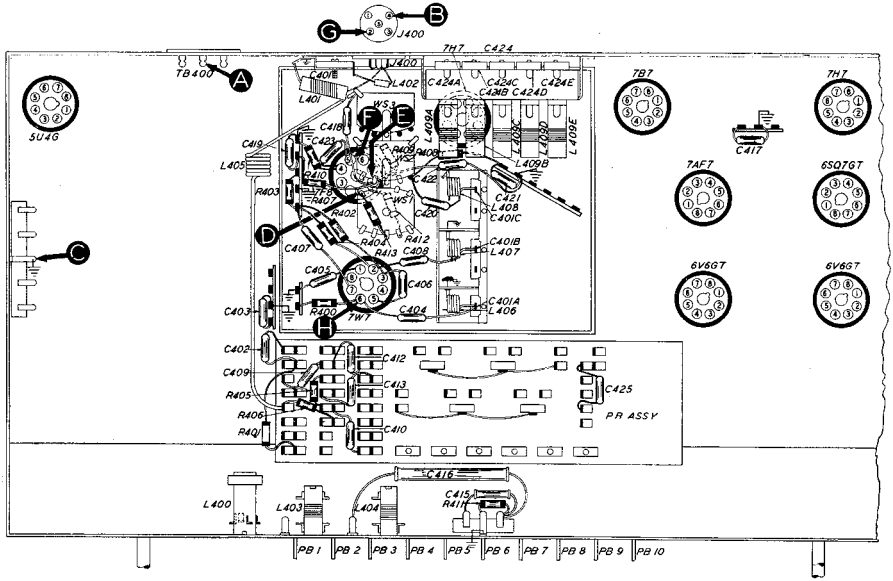


Figure 5. Bottom View, Showing Section 4 Test Points

AM CIRCUITS

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 sequence.	Depress, in sequence, PB8 through PB4.	Loud, clear signal when each push button is depressed.	Trouble in circuits associated with push-button station selectors. Isolate by tests in steps 4, 5, and 6.
2	A	1000 kc.	Depress BC push button (PB3). Tune in signal with tuning control.	Loud, clear signal.	Trouble in circuits associated with dial tuning (BC band). Isolate by tests in steps 7 and 8.
3	B	12 mc.	Depress SW push button (PB2). Tune in signal with tuning control.	Loud, clear signal.	Trouble in circuits associated with dial tuning (SW band). Isolate by tests in steps 9 and 10.

Section 4 (Cont.) TROUBLE SHOOTING

STEP	TEST POINT	SIG. GEN. FREQUENCY	PUSH BUTTON OR TUNING CONTROL	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
4	D	Adjust to frequency of push button	Depress PB6.	Loud, clear signal.	Defective: 7F8, WS1(F). Open: R410, C423.
5	E to F (Oscillator test)		Depress, in sequence, PB8 through PB4.	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, WS2(F), PB2, PB3, C416. Open: R406, R407, R409, R411, C400, C411B, C415, C418, L404, L405, WS2(F), WS2(R).
6	A	Adjust to frequency of each push button in sequence.	Depress, in sequence, PB8 through PB4.	Loud, clear signal when each push button is depressed.	Defective: TB400, L400, C411C, C424A through C424E. Open: R412, R413, C413, PB2, PB3, WS1(F), WS2(F).
7	A	1000 kc.	Depress BC push button (PB3). Tune in signal with tuning control.	Loud, clear signal.	Defective: C400, PB3.
8	E to F (Oscillator test)		Depress BC push button (PB3). Rotate tuning control through range.	Negative voltage.	Defective: L404.
9	B	12 mc.	Depress SW push button (PB2). Tune in signal with tuning control.	Loud, clear signal.	Defective: J400, L401, L402, C401, C412.
10	E to F (Oscillator test)		Depress SW push button (PB2). Rotate tuning control through range.	Negative voltage.	Defective: 7F8, L403, C409, C411A, C410.

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 (PB1). Tune in signal with tuning control.	Loud, clear signal.	Trouble in FM circuits. Isolate by the following tests.
2	E to F (Oscillator test)		Depress FM push button. Rotate tuning control through range.	Negative voltage.	Defective: 7F8, L408, C400, C400C, PB1, WS2(F). Open R408. Shorted: C421.
3	H	100 mc.	Depress FM push button (PB1). Tune in signal with tuning control.	Loud, clear signal.	Defective: 7W7. Open: R400, R402, R403, R404, C408. Shorted: C400, C400B, C405, C406, C407, WS2(F).
4	G	100 mc.	Same as step 3.	Loud, clear signal.	Defective: J400, L406, C400A, C404.

CALIBRATING DIAL BACKPLATE

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

The method of measuring for these points is illustrated in figure 1. 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.

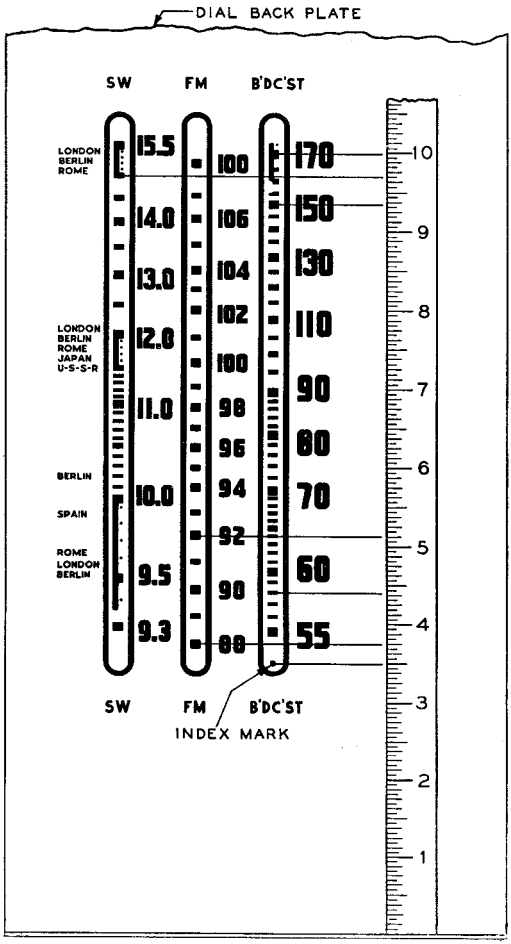
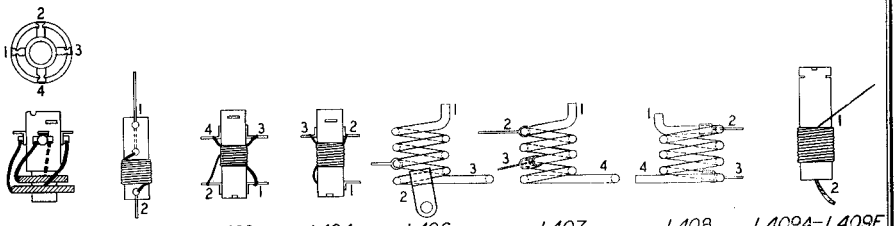
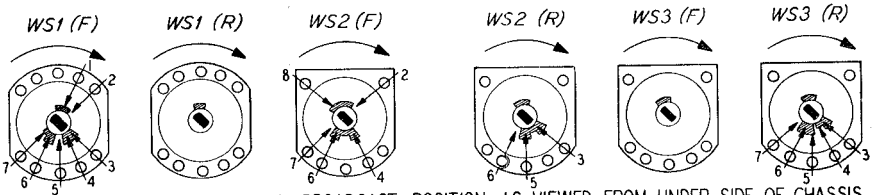


Figure 1. Calibration Measurements for Dial Backplate

PHILCO CORP. MODEL 48-1270

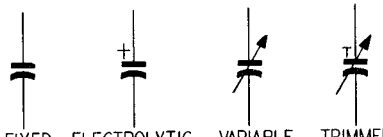


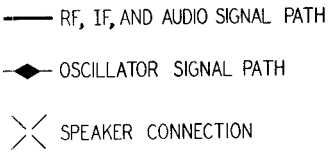
L400 BC AERIAL | L401 SW AERIAL | L403 SW OSC | L404 BC OSC | L406 FM AERIAL | L407 FM RF | L408 FM OSC | L409A-L409E PB OSC



BAND-SWITCH SECTIONS SHOWN IN BROADCAST POSITION AS VIEWED FROM UNDER SIDE OF CHASSIS. (F) INDICATES FRONT CONTACTS, LOOKING FROM FRONT. (R) INDICATES REAR CONTACTS, LOOKING THROUGH WAFER.

CONDENSER SYMBOLS





NOTE:

ALL PUSH BUTTONS EXCEPT PB8 ARE SHOWN IN OUT POSITION. ALL ROTARY SWITCHES ARE LINKED TO FM PUSH BUTTON.

ALL RESISTOR VALUES ARE IN OHMS UNLESS MARKED OTHERWISE.

VOLTAGES IN SECTION 1 AND IN AUDIO CIRCUITS OF SECTION 2 WERE TAKEN WITH BC PUSH BUTTON IN. VOLTAGES IN SCRATCH ELIMINATOR CIRCUITS OF SECTION 2 WERE TAKEN WITH PHONO PUSH BUTTON IN AND TREBLE CONTROL SET TO SCRATCH ELIMINATOR POSITION. VOLTAGES IN SECTIONS 3 AND 4 WERE TAKEN WITH FM PUSH BUTTON IN.

ALIGNMENT PROCEDURE

CAUTION: Do not 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 FM alignment is not required, the AM alignment alone may be made.

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

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

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

CONTROLS—Set the volume control to maximum, the bass tone control fully counterclockwise, the treble tone control fully clockwise, and the signal-generator dial, radio dial, and radio push buttons as indicated in the chart.

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

ALIGNMENT OF FM CIRCUITS

Align the AM circuits first.

OUTPUT METER—Connect the output meter between terminal No. 3 of the aerial terminal panel and the chassis.

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

CONTROLS—Set the treble tone control and the volume control fully clockwise, and the bass tone control fully counterclockwise. Depress the FM push button.

LOCATION OF COILS—For the location of coils L406, L407, and L408 (steps 11 and 15), refer to the base layout of Secton 4, figure 5.

Note 1. When pin 2 of FM1000 is connected to the chassis, the oscillator portion of the FM detector is made inoperative, thereby converting the circuit 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 over-coupled 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 C303D 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 from the generator be kept below the point where 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 alternate procedure employing FM broadcast-station signals in place of a signal generator 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 padders 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 all coil adjustments with a tuning wand. If inserting 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 of the signal generator. Place the two dipoles several feet apart.

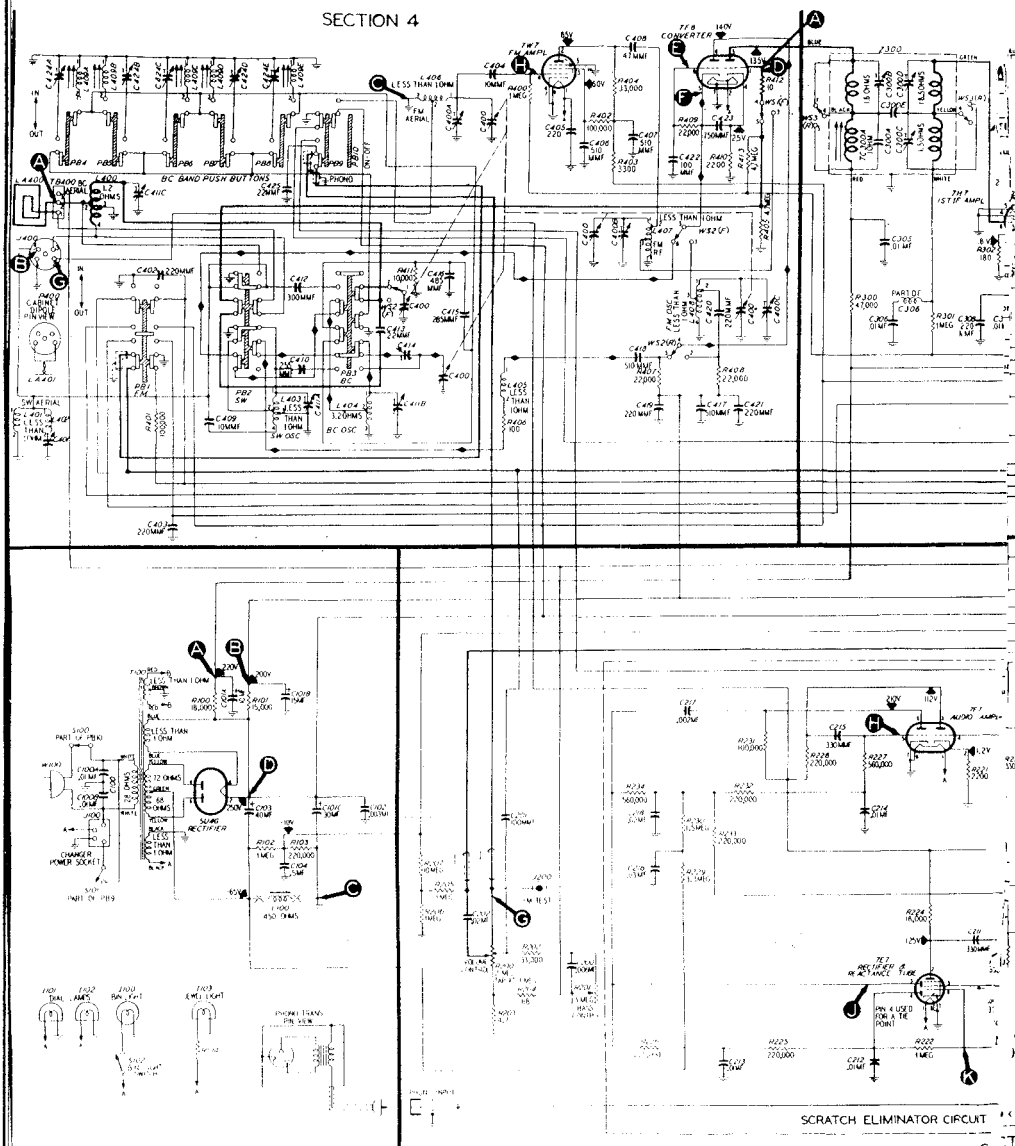
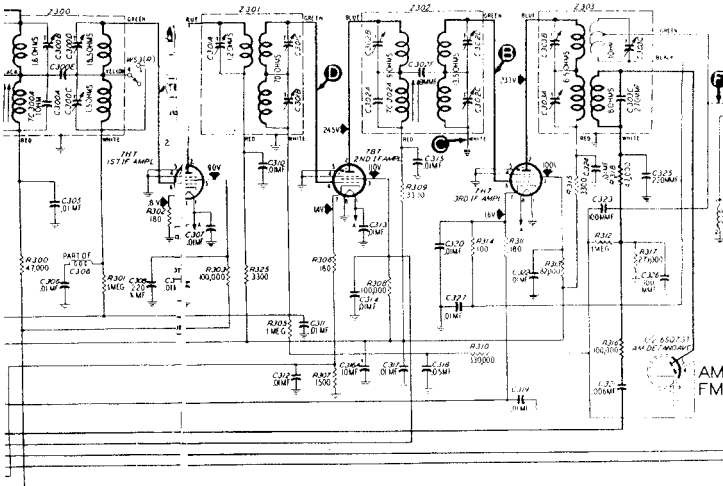
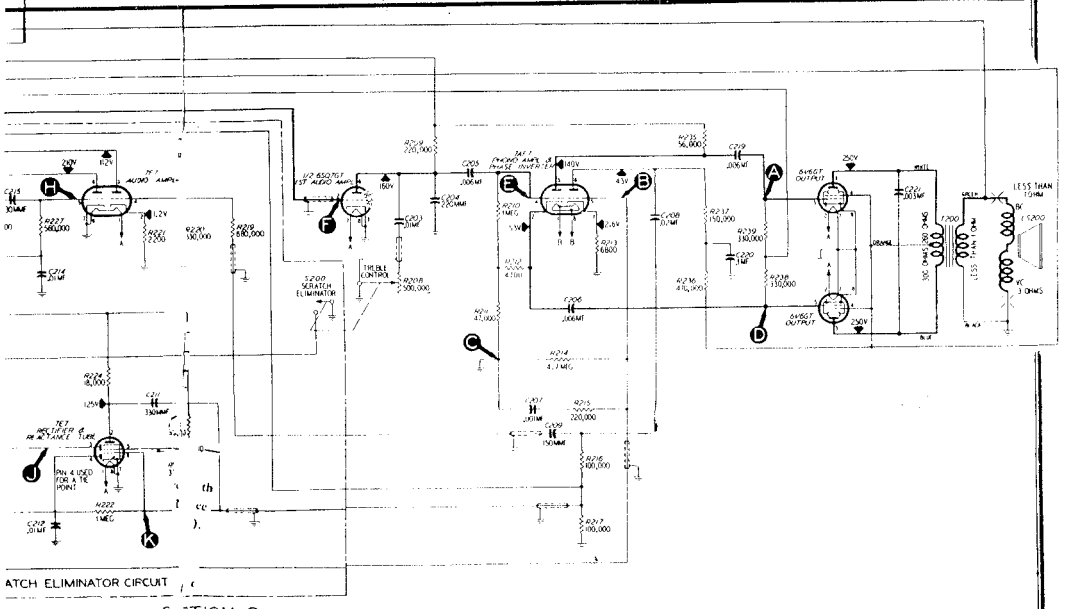


Figure 7. Philco Radio-Phonograph, Model 48-1270, Secti

SECTION 3





ATCH ELIMINATOR CIRCUIT

SECTION 2

odel 48-1270, Sectionalized Schematic Diagram, Showing Test Points

RECORD CHANGER: Philco Model M-4, RCD. CH. 18-14

MODEL 48-1270

AM ALIGNMENT CH RT

STEP	SIGNAL GENERATOR		RADIO		
	CONNECTIONS TO RADIO	DIAL SETTING	PUSH BUTTON	DIAL SETTING	SPECIAL INSTRUC ONS
1	Through .1 mf. condenser to stator of aerial section of tuning gang.	455 kc.	Depress BC push button (PB3)	1700 kc.	Adjust each trimmer, in order, for maxi h output. Do not repeat adjustments.
2	Loosely coupled with loop. See note below.	15 mc.	Depress SW push button (PB2).	15 mc.	Adjust for maximum output. Check for ima by tuning set to 14.1 mc.
3	Same as step 2.	15 mc.	Depress SW push button (PB2).	15 mc.	Adjust for maximum output (rock tuning c trol).
4	Same as step 2.	1700 kc.	Depress BC push button (PB3)	1700 kc.	Adjust for maximum output.
5	Same as step 2.	1500 kc.	Depress BC push button (PB3)	1500 kc.	Adjust for maximum output.
6	Same as step 2.	580 kc.	Depress BC push button (PB3)	580 kc.	Adjust for maximum output (rock tuning c trol).
7	Repeat steps 4, 5, and 6 in order until no further increase in output is noted. 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 CH RT

STEP	SIGNAL GENERATOR		RADIO	
	CONNECTIONS TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS
1	To terminal No. 2 of L407 (see page 15).	9.1 mc.	Gang fully closed	Connect jumper between pin 2 of FM1000 and chassis (see Note 1 Connect loading network (see Note 2) between top of padder C303D and chassis (see N 3).
2	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 2 (blue lead) of third I-F tu and chassis.
3	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 6 (green lead) of third I-F t e and chassis.
4	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 2 (blue lead) of second I tube and chassis.
5	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 6 (green lead) of secc tube and chassis.
6	Same as step 1.	9.1 mc.	Same as step 1.	Connect loading network between pin 2 (blue lead) of first I-F e 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 FM 00 and chassis. Connect jumper between pin 4 (blue lead) of FM1000 and junction of R324 c red lead of Z304. Adjust trimmer for zero beat.
9	Same as step 8.	9.1 mc. (modulation on)	Same as step 1.	Remove jumper used in step 8. Adjust trimmer for zero beat (see ote 4).
10	To terminal No. 2 of J400 (see Note 5).	105 mc.	105 mc.	Connect jumper between pin 2 of FM1000 and chassis. Adjust aximum 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.
16	Repeat steps 13, 14, and 15 until no further improvement in sensitivity can be obtained.			

SETTING PUSH BUTTONS

1. Connect the output meter between terminal No. 3 on the aerial terminal panel and the chassis.

2. Turn the volume control to maximum, and both tone controls fully counterclockwise.

3. Couple the signal generator loosely th ugh a coil of wire to the loop aerial (see Note under "AM ALIGNMENT CHART").

4. Turn on the power, and allow the ra o to warm up for 15 minutes before startin the adjustments.

5. Starting with set the signa quency (mo selector push oscillator tun denser (mark mum indicati alignment, th to hold the volts.

RT

CTIONS	ADJUST TRIMMER
ir h output. Do not repeat	C303A
	C302C
	TC302A
	C301B
	C300C
	TC300A
ad by tuning set to 14.1 mc.	C411A
ontroll.	C401
	C411B
	C411C
ontroll.	C414

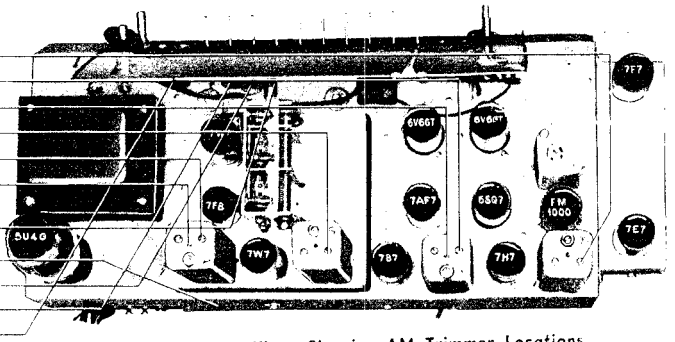


Figure 8. Top View, Showing AM Trimmer Locations

ART

	ADJUST TRIMMER
e t. Connect loading network Note 3).	C303B
tube and chassis.	C303D
f tube and chassis.	C302B
tube and chassis.	C302D
tube and chassis.	C301A
e and chassis.	C301C
	C300D
	C300B
00 and chassis. Connect red lead of Z304. Adjust	C304C
ote 4).	
aximum output.	TC304A
	C400C
	C400B
	C400A

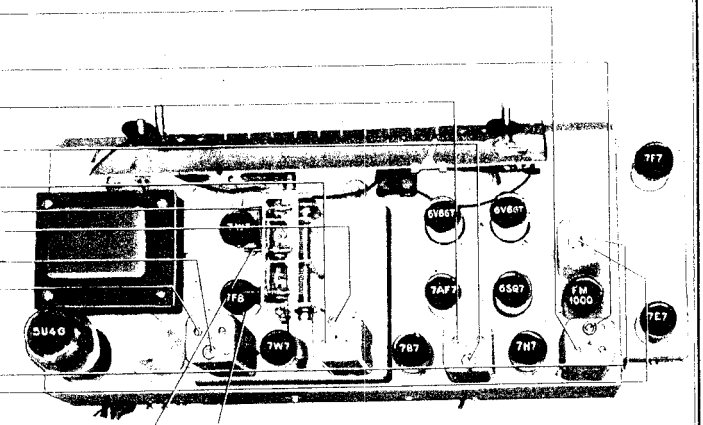


Figure 9. Top View, Showing FM Trimmer Locations

th igh
ce Note
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rat o to
tin the

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. During alignment, the input signal must be attenuated to hold the output-meter reading below 1.5 volts.

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.

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

Reference Symbol	Description	Service Part No.
C100	Condenser, two-section	30-1226-1
C100A	Condenser, line filter, .01 mf	Part of C100
C100B	Condenser, line filter, .01 mf	Part of C100
C101	Condenser, electrolytic, three-section	30-2570-1
C101A	Condenser, filter, 10 mf	Part of C101
C101B	Condenser, filter, 15 mf	Part of C101
C101C	Condenser, filter, 30 mf	Part of C101
C102	Condenser, filter, .003 mf	61-0117*
C103	Condenser, filter, 40 mf	30-2568-5
C104	Condenser, bias filter, .5 mf	61-0133*
I100	Lamp, Bin	34-2040
I101	Lamp, dial	34-2040
I102	Lamp, dial	34-2040
I103	Lamp, jewel	34-2040
J100	Socket, phono power	27-6182
L100	Field, speaker	Part of LS200
R100	Resistor, B+ dropping, 18,000 ohms	66-3184340
R101	Resistor, B+ dropping, 15,000 ohms	66-3154340*
R102	Resistor, bias filter, 1 megohm	66-5103340*
R103	Resistor, bias filter, 220,000 ohms	66-4223340*
R104	Resistor, jewel-lamp dropping, 10 ohms	66-0104340
S100	Switch, master power, on—off	Part of PB10
S101	Switch, phono power, on—off	Part of PB9
T100	Transformer, power	32-8282
W100	Line cord	L3199

SECTION 2

C200	Condenser, tone compensating, .006 mf	45-3500-7*
C201	Condenser, by-pass, 100 mmf	30-1224-1*
C202	Condenser, audio coupling, .02 mf	61-0108*
C203	Condenser, tone compensating, .01 mf	61-0120*
C204	Condenser, 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, d-c blocking, 150 mmf	60-10155407*
C210	Condenser, d-c blocking, .001 mf	45-3500-5*
C211	Condenser, d-c blocking, 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*

SECTION 2 (Cont.)

Reference Symbol	Description	Service Part No.
C219	Condenser, d-c blocking, .006 mf	45-3500-7*
C220	Condenser, audio by-pass, .1 mf	61-0113*
C221	Condenser, tone compensating, .003 mf	61-0117*
J200	Socket, FM test	27-6180
LS200	Speaker	36-1606
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, treble, 500,000 ohms	33-5539-8
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*
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	66-3334340*
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, bias filter, 560,000 ohms	66-4563340*
R235	Resistor, plate load, 56,000 ohms	66-3563340*
R236	Resistor, plate decoupling, 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

REPLACEMENT PARTS LIST

SECTION 3

Reference Symbol	Description	Service Part No.
C300A	Condenser, fixed trimmer, primary	Part of Z300
C300B	Condenser, trimmer, primary	Part of Z300
C300C	Condenser, trimmer, secondary	Part of Z300
C300D	Condenser, trimmer, secondary	Part of Z300
C300E	Condenser, coupling	Part of Z300
C301A	Condenser, trimmer, primary	Part of Z301
C301B	Condenser, trimmer, secondary	Part of Z301
C301C	Condenser, trimmer, secondary	Part of Z301
C302A	Condenser, fixed trimmer, primary	Part of Z302
C302B	Condenser, trimmer, primary	Part of Z302
C302C	Condenser, trimmer, secondary	Part of Z302
C302D	Condenser, trimmer, secondary	Part of Z302
C302E	Condenser, coupling	Part of Z302
C303A	Condenser, trimmer, primary	Part of Z303
C303B	Condenser, trimmer, primary	Part of Z303
C303C	Condenser, r-f by-pass, 270 mmf	Part of Z303
C303D	Condenser, trimmer, secondary	Part of Z303
C304A	Condenser, voltage divider, 68 mmf	Part of Z304
C304B	Condenser, voltage divider, 33 mmf	Part of Z304
C304C	Condenser, trimmer	Part of Z304
C304D	Condenser, fixed trimmer	Part of Z304
C305	Condenser, r-f by-pass, .01 mf	61-0120*
C306	Condenser-and-choke assembly, i-f by-pass, .01 mf	38-9851-3
C307	Condenser, filament by-pass, .01 mf	61-0120*
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, .01 mf	61-0120*
C314	Condenser, screen by-pass, .01 mf	61-0120*
C315	Condenser, plate by-pass, .01 mf	61-0120*
C316	Condenser, electrolytic, two-section	30-2552
C316A	Condenser, by-pass, 10 mf	Part of C316
C316B	Condenser, by-pass, 10 mf	Part of C316
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, coupling, 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, a-v-c by-pass, 100 mmf	30-1224-1*
C327	Condenser, r-f by-pass, .01 mf	61-0120*
C328	Condenser, filament by-pass, .01 mf	61-0120*
C329	Condenser, screen by-pass, .01 mf	61-0120*
C330	Condenser, oscillator coupling, 33 mmf	60-00305307*
C331	Condenser, audio coupling, .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*
L300	Coil, FM detector	32-4007-1
R300	Resistor, plate dropping, 47,000 ohms	66-3473340*
R301	Resistor, a-v-c decoupling, 1 megohm	66-5103340*
R302	Resistor, cathode bias, 180 ohms	66-1183340*
R303	Resistor, screen dropping, 100,000 ohms	66-4103340*
R304A	Resistor, shunt, 6800 ohms	Part of Z304

SECTION 3 (Cont.)

Reference Symbol	Description	Service Part No.
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 dropping, 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, 82,000 ohms	66-3823340*
R314	Resistor, inverse feedback, 100 ohms	66-1103340*
R315	Resistor, plate dropping, 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 coupling, 47,000 ohms	66-3473340*
R319	Resistor, parasitic suppressor, 22 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, plate load, 47,000 ohms	66-3473340*
R325	Resistor, plate dropping, 3300 ohms	66-2333340*
TC300A	Tuning core	Part of Z300
TC302A	Tuning core	Part of Z302
TC304A	Tuning core	Part of Z304
WS3 (R)	Switch, wafer	Part of WS
Z300	Transformer, 1st i.f., including C300A, C300B, C300C, C300D, C300E, 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, C302D, C302E, and TC302A	32-4002
Z303	Transformer, 4th i.f., including C303A, C303B, C303C, and C303D	32-4003-2
Z304	Transformer, FM detector, including C304A, C304B, C304C, C304D, R304A, and TC304A	32-4004

SECTION 4

C400	Condenser, tuning	31-2694
C400A	Condenser, trimmer	Part of C400
C400B	Condenser, trimmer	Part of C400
C400C	Condenser, trimmer	Part of C400
C401	Condenser, trimmer	31-6473-2
C402	Condenser, r-f by-pass, 220 mmf	60-10205307*
C403	Condenser, r-f by-pass, 220 mmf	60-10205307*
C404	Condenser, coupling, 10 mf	60-00105407*
C405	Condenser, filament by-pass, 220 mmf	60-10205307*
C406	Condenser, screen by-pass, 510 mmf	60-10515307*
C407	Condenser, plate by-pass, 510 mmf	60-10515307*
C408	Condenser, d-c blocking, 47 mmf	60-00515307*
C409	Condenser, neutralizing (s.w.), 10 mmf	60-00105407*
C410	Condenser, oscillator series, 255 mmf	30-1220-24
C411	Condenser, trimmer assembly, three-section	31-6477
C411A	Condenser, trimmer, oscillator shunt (s.w.)	Part of C411
C411B	Condenser, trimmer, oscillator shunt (bc.)	Part of C411
C411C	Condenser, trimmer, aerial shunt (bc.)	Part of C411

REPLACEMENT PARTS LIST

SECTION 4 (Cont.)

Reference Symbol	Description	Service Part No.
C412	Condenser, aerial series (s.w.), 300 mmf	60-10305307*
C413	Condenser, d-c blocking, 22 mmf	60-00205307*
C414	Condenser, trimmer, b-c series	31-6473-3
C415	Condenser, r-f voltage divider, 285 mmf	30-1224-14
C416	Condenser, r-f voltage divider, 485 mmf	30-1224-15
C417	Condenser, r-f by-pass, 510 mmf	60-10515307*
C418	Condenser, d-c blocking, 510 mmf	60-10515307*
C419	Condenser, r-f by-pass, 220 mmf	60-10205307*
C420	Condenser, d-c blocking, 220 mmf	60-10205307*
C421	Condenser, r-f by-pass, 220 mmf	60-10205307*
C422	Condenser, oscillator coupling, 100 mmf	60-10105407*
C423	Condenser, oscillator-to-mixer coupling, 750 mmf	60-10755301*
C424	Condenser, trimmer assembly, five-section	31-6479
C424A	Condenser, trimmer	Part of C424
C424B	Condenser, trimmer	Part of C424
C424C	Condenser, trimmer	Part of C424
C424D	Condenser, trimmer	Part of C424
C424E	Condenser, trimmer	Part of C424
C425	Condenser, r-f by-pass, 22 mmf	60-00205307*
J400	Socket, s-w and FM aerial	27-6214-1
L400	Coil, bc. aerial	32-4049-1
L401	Coil, s-w aerial	32-4050-2
L402	Coil, FM isolation	32-4111
L403	Coil, s-w oscillator	32-3996
L404	Coil, bc. oscillator	32-4019-4
L405	Choke, oscillator isolation	32-4089
L406	Coil, FM aerial	32-3993
L407	Coil, FM r-f	32-3992
L408	Coil, FM oscillator	32-3994
L409A	Coil, push button	32-4059
L409B	Coil, push button	32-4059
L409C	Coil, push button	32-4059-1
L409D	Coil, push button	32-4059-1
L409E	Coil, push button	32-4059-1
LA400	Loop, bc.	76-2262
LA401	Dipole, FM	76-2381-2
PB1—PB10	Push-button switch assembly	42-1777
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, voltage divider, 100,000 ohms	66-4103340*
R402	Resistor, screen dropping, 100,000 ohms	66-4103340*
R403	Resistor, plate dropping, 3300 ohms	66-2333340*
R404	Resistor, plate load, 33,000 ohms	66-3333340*
R405	Resistor, voltage divider, 4.7 megohms	66-5473340*
R406	Resistor, parasitic suppressor, 100 ohms	66-1103340*
R407	Resistor, plate load, 22,000 ohms	66-3223340*
R408	Resistor, plate load, 22,000 ohms	66-3223340*
R409	Resistor, grid return, 22,000 ohms	66-3223340*
R410	Resistor, cathode bias, 2200 ohms	66-2223340*
R411	Resistor, cathode bias, 10,000 ohms	66-3103340*
R412	Resistor, parasitic suppressor, 10 ohms	66-0103340*
R413	Resistor, grid return, 4.7 megohms	66-5473340*
WS	Wafer switch, three-section	76-2211
WS1	Switch, wafer	Part of WS
WS2	Switch, wafer	Part of WS

MISCELLANEOUS

Description	Service Part No.
Bin-light-socket assembly	27-6233-3
Cabinet (L)	10656-L
(M)	10656-M
(W)	10656-W
Cabinet parts and hardware	
Baffle and cloth, R.H. (L)	40-6795
(M and W)	40-6785
Baffle and cloth, L.H. (L)	40-6796
(M and W)	40-6784
Baffle, wood (L, M, and W)	219047
Bin mechanism, L.H.	76-2368
Bin mechanism, R.H.	76-2174-1
Bolt, speaker (4 required)	W-1587
Bracket, lamp	56-2332
Bracket and cradle	76-2200
Brass pull (L) (2 required)	56-3408
(M and W) (2 required)	56-3249
Bullet catch	45-6002
Bullet strike	45-6003
Continuous hinge	56-3647
Dial-scale-and-backplate assembly (M)	76-2226-4
(L and W)	76-2226-5
Dome (4 required)	45-6042
Doors, cabinet, matched pair (L)	45-1557
(M)	45-1556
(W)	45-1555
Knife hinge	56-4066
Panel, instrument (L)	45-6381
(M)	45-6382
(W)	45-6383
Screw, scale mtg. (4 required)	1W24894FE11
Tell-tale jewel	54-4304
Wire grille (2 required)	56-3250
Cable and plug, phono	41-3735
Cable and plug, speaker	41-3734-3
Cable assembly, 10 5/8 in. (2 required)	41-3754-1
Cable assembly, 5 3/4 in.	41-3754-2
Cable assembly, 8 1/4 in.	41-3754-3
Cable assembly, 18 in.	41-3754-4
Cable assembly	41-3754-16
Chassis mtg. hardware	
Bracket support	56-3616FA3
Grommet, foot mtg.	54-4122
Lock washer	1W24260FA1
Nut	1W19994FA3
Rubber mount	54-4122
Screw (4 required)	1W17326FA3
Screw (4 required)	1W18204FA3
Screw, back (12 required)	1W25345FA9
"T" nut, foot mtg.	W-2502
Washer (2 required)	1W52540FA3
Washer, foot mtg.	W-2271
Clip, bc. aerial coil	28-5002FA1
Cord, drive (25-ft. spool)	45-8750
Dial scale hardware	
Backplate assembly	76-2108
Pointer	56-3179
Screw (5 required)	1W19670FA3
Spring	28-8953
Gasket, speaker	54-7351

REPLACEMENT PARTS LIST

MISCELLANEOUS (Cont.)

Description	Service Part No.
Knob, control (L) (4 required)	54-4227-1
(M and W) (4 required)	54-4227
Knob, push button (10 required)	54-4292
Loop mtg. hardware	
Spacer (2 required)	1W29184FA3
Washer (6 required)	1W52540FA3
Washer, spring	28-4186
Palnut, volume-control mtg. (3 required)	1W29091FA3
Plug, FM dipole	54-4346
Push-button-assembly hardware	
Cap (10 required)	54-4294
Cover assembly	76-1343
Cap centering (5 required)	28-6936
Rubber mount (2 required)	27-4596
Screw (2 required)	1W19674FA3
Screw, tuning core (5 required)	56-2249
Tab, BC	54-4318
Tab, FM	54-4317-4
Tab kit	40-6943
Tab, OFF	54-4317-1
Tab, PHONO	54 4317-5
Tab, SW	54-4317-3

MISCELLANEOUS (Cont.)

Description	Service Part No.
Terminal strip, coils (5 required)	56-2250FA3
Tuning core (5 required)	56-6100
Record-changer mtg. hardware	
Cover frame	76-2341
Input transformer	32-8256
Rubber mount	54-4313
R-f-unit mtg. hardware	
Grommet (3 required)	54-4295
Screw (3 required)	1W19674FA3
Spacer (3 required)	1W29158FA3
Washer (3 required)	1W52224FA3
Socket, Loktal, r-f unit (2 required)	27-6213
Socket, Loktal, main chassis and r-f unit (7 required)	27-6138*
Socket, octal (4 required)	27-6174
Socket assembly, dial light	76-2109
Socket assembly, dial light, 7-inch lead	76-2109-2
Socket assembly, pilot	41-3737
Tube shield, FM1000	56-2731
Wafer-switch hardware	
Fulcrum assembly	76-2206
Link	54-7169
Tri-mount fasteners	28-4279FA1

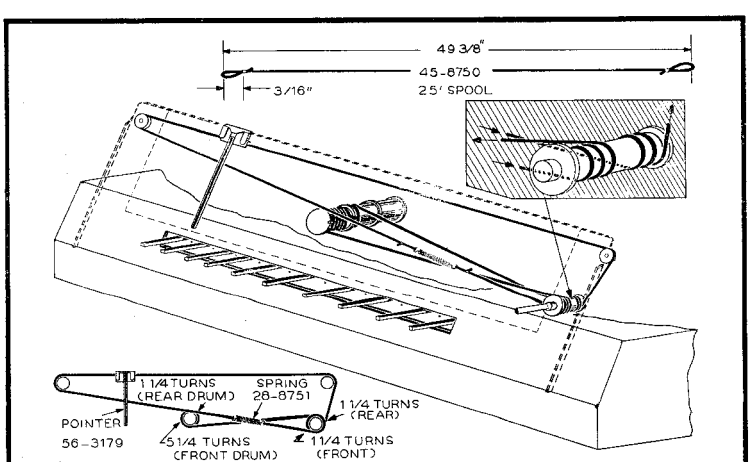

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Figure 6. Drive-Cord Installation Details